



Greenland Systems

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Glossary

Booster	A supplementary heat source i.e. Electricity, Gas, Wood stove.
Differential Controller	An electrical device that reads the difference between the Collector temperature and the stored water temperature and controls the solar input.
Element	The electric boost element is used to heat the stored water.
Continuous Water Heater	A gas booster that only heats the water as it flows through it.
Non Return Valve	Also known as a check valve, allows fluid to flow in only one direction.
Off Peak	Electrical power supplied at a prearranged time.
Temperature Control Valve	Ensures the system will not overheat.
Pumped Solar System	Utilises a pump to circulate the fluid from solar collectors to the storage tank.
Pressure Limiting Valve	A valve connected to the cold water inlet to the water tank to control the water pressure.
Pressure / Temp_Relief Valve	A valve installed in the water tank to relieve excessive pressure and temperature.
Potable Water	Drinking water
Selective Surface	The special treatment given to the surface of the absorber plate.
Storage Tank	A lined water tank for storing the heated water.
Solar Collector	Evacuated Tube collector where the fluid passes through copper tubes or Flows over heat pipes and is heated.
Tempering Valve	A valve used to control the delivery temperature of the stored water.
Thermostat	Automatically controls the temperature in the storage tank.

Use of this Manual

This manual contains easy to follow procedures for the correct installation & operation of Greenland Systems, 260 & 320 Litre, Open Loop Pumped Solar systems.

Please take your time to read and understand the operating guidelines provided to ensure successful and trouble-free operation of your Greenland systems water heater. If you have any questions, contact your local Greenland systems customer service representative.

Consumer Information

General information & Operating guidelines for Greenland Systems Water Heaters

The general performance and energy savings that you can expect to obtain from your Greenland Systems water heater will depend upon a number of factors, such as water usage patterns, daily temperatures, available Solar Energy and the cost & type of purchased energy being utilized.

Your Greenland Systems water heater is designed to utilize a combination of solar energy and purchased energy, operating simultaneously, to maintain a minimum operating temperature of 60°C. **To ensure that you always have an adequate supply of hot water, we recommend that the auxiliary booster is left switched ON at all times.**

Reliance on solar energy only or minimizing auxiliary booster usage manually to unrealistic times, can and will result in inadequate water temperatures, particularly during times of cool and inclement weather. Overnight temperature stabilization is a reduction in water temperature, as the hot water at the top of the storage cylinder transfers some of its heat to the cooler water in the lower part of the cylinder. This effect is often perceived as 'heat loss' by consumers who control their boosting to minimal times, but is actually the redistribution of stored heat more evenly over the entire contents of the tank. Utilizing the auxiliary booster as recommended will ensure that the effects of overnight temperature stabilization have no effect on the water temperature in the home.

To ensure adequate hot water is available at all times, it is important to follow our simple operating guidelines.

Standards & Regulatory Requirements

All Greenland Systems Solar Hot water systems must be installed by an authorized Plumber. All installation work will need to meet local authority standards, Australian Standard (AS 3500.4) and the National Plumbing Code along with local Electrical regulations. Where required, the relevant electrical & plumbing work will need to be certified to the satisfaction of local regulatory authorities.

Solar Hot Water Storage Tank

To obtain maximum performance the solar tank/system should be positioned as close as possible to the most used outlets. The solar pumped storage tank can be installed internally (dependant upon local regulations) on an approved spill tray with drain or externally on a level concrete plinth.

Boosting

Average annual solar savings are calculated with the 'Auxiliary booster' left in the 'ON' position at all times. It is important to understand that the system is not always consuming purchased energy when the 'booster' is on, as the system regulates purchased energy use via an inbuilt automatic thermostat. It is not necessary for consumers to manually turn the 'booster' switch on / off.

If your system is operating on a Solar / Electricity combination, Greenland Systems recommend that the electrical booster is connected to standard 'Day Rate' electricity to ensure an adequate supply of hot water at all times. To maximize the amount of solar savings available, a time clock can be fitted to operate the booster at selected times.

Systems that use electrical boosting can be connected where available to "Off Peak" power, however to ensure that adequate hot water is available at all times a "Day Rate" facility will need to be provided.

If your system is operating on a Solar / Gas combination, utilizing a continuous flow gas water heater as the auxiliary booster, the gas water heater will need to be left with the power and gas switched 'ON' at all times. For operating and maintenance information, please refer to the separate Gas manual provided.

When using gas boosting through a continuous hot water system, the gas system should be as close as possible to the most used outlets.

Solar systems can also be used for preheating to an existing hot water heater provided that

- The existing water heater is thermostatically controlled not flow controlled.
- The operating pressure of the two systems is compatible.
- The existing water heater is able to provide adequate hot water supplies during times of cooler or inclement weather.
- Warranty or lifespan of the existing water heater is not affected by the installation of solar water heater as a pre heater.
- The electric element is removed from the solar water heater.
-

Hot Water can be DANGEROUS

WARNING - HOT WATER BURNS. As a safety precaution, young children should always be supervised around hot water fixtures.

Hot water systems can store water at temperatures that can cause scalding. Water temperatures over 50°C can scald and care needs to be taken to ensure that injuries do not occur through incorrect use of your water heater.

As solar water heaters can generate water temperatures in excess of 85°C, we strongly recommend (and it may also be a local regulatory requirement) that a tempering valve, or approved 'mixing valve' be fitted to the heater to prevent water temperatures 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 by an authorized plumber at the time of installation or in retrofitting to existing systems.

Care should be taken to avoid coming into contact with any pipe work or fixtures associated with the water heater collector 'flow & return lines.

Water from the solar collectors can be hot enough to create pressurized steam which can cause severe scalding - Under NO circumstances should any 'home handy man' type modifications be attempted.

How hot will the stored water be?

As a general rule of thumb, a correctly selected solar water heater can attain an average of twice the ambient day time temperature from Solar Energy alone. In simple terms, on a clear cloudless day of 25°C, Solar Energy will raise the stored water to roughly 50°C. The auxiliary booster will then boost the water to 60°C

During the warmer months, where daytime temperatures can exceed 40°C, temperatures can exceed 85°C.

Greenland Systems range of split pumped systems, utilize a solar controller designed to automatically cease circulating water through the solar collector array once the stored water has reached a maximum of 85°C. It is important to ensure that the power supply to the control unit is NEVER switched off during normal 'day to day' operation.

Frost Protection

Greenland 'Open Loop' split pumped systems are not suitable for installation above 800 meters altitude — systems installed at these altitudes suffering frost damage, will not be covered under Greenland Systems' warranty program. **Greenland Systems recommend the use of a suitable frost protection system in areas of known frost.**

If a Greenland Systems Solar Hot Water Heater is to be installed in an area subject to freeze conditions, an approved 'freeze protection valve' **MUST** be fitted to protect against frost damage. Freezing conditions occur below 6°C. Systems not fitted with an approved freeze protection valve suffering frost damage will not be covered under Greenland Systems warranty program.

Greenland Systems range of solar hot water heaters are fitted with an inbuilt frost protection mechanism in the solar control unit designed to automatically circulate a small amount of water through the solar collector array when freeze conditions occur. It is important to ensure that the power supply to the control unit is **NEVER** switched off during normal 'day to day' operation.

Going away on 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 or dish washers operating nearby. If hydrogen is discharged through the tap, it will make a sound like air escaping.

Installation Information

Water quality

Town water supplies are generally a controlled water source and should not cause any difficulty with the system. Some water may have elevated mineral content and require more frequent system maintenance. Greenland Systems Solar hot water Heaters are suitable for use with water supplies with a total dissolved solid content less than 1000 ppm and which the total hardness does not exceed 200 ppm CaCO₃. If the local water supplies have calcium hardness (CaCO₃) exceeding 200 ppm contact Greenland Systems Customer Services for Advice and technical assistance

Water Pressure

The storage tank has a pressure/temperature relief valve set at 850 kPa. The cold water inlet pressure should not exceed 700 kPa (approximately 20% below the pressure relief valve setting). A pressure reduction valve must be installed if this is not the case. The relief valve will discharge a small amount of water when the system is heating and should be checked every six months.

Please note: If a **Tempering valve** has been fitted, it is important to remember that when a pressure limiting valve (PLV) is also fitted, that the cold water line to the tempering valve is run 'after' the PLV to ensure that there is equal pressure from both the hot & cold water lines going to the Tempering valve.

Selecting System Location

The collectors should be installed facing the equator. South in the Northern Hemisphere, North in the Southern Hemisphere (systems should face North in Australia). A deviation of 45° to east or west has little effect on annual solar gain. The solar collector should be no more than 15 metres away from the storage tank (Pumped). The collector/s must be at a minimum pitch of 10°, with flat roof frames available if less than 10° roof pitch is available. 30° pitch and over requires extra fixings and frames. The solar system must be free from shade all year round and clear from obstructions.

Roof Support Requirements

No extra roof supports are needed when installing a Greenland Systems Collector in most cases, as a collector when full weighs between 32 kg and 51 kg and covers an area of between 1.7 and 2.8 square meters depending on the model. The collectors sit flat on the roof.

When installed in Cyclonic areas, the use of an approved Cyclone frame will be required. If you have any queries regarding the requirements of your location please contact your local Greenland Systems Customer Services representative. For installation instructions, please refer to the instructional leaflet provided with the frame.

Electric connections

Local codes must be adhered to for all electrical work and be undertaken by a qualified electrician. All Greenland Systems Solar Hot Water Heaters will need the element connected for auxiliary boosting. (see data plate for power rating on hot water tank). All 'pumped' solar hot water systems require a general power outlet to run the pump. When using the gas booster an additional general power outlet will be needed.

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.

Installation of Pumped Solar Systems

Installing the Collectors

One and most important thing is that you must assemble the Greenland Solar Collector part by part on the roof.

WARNING — Solar collectors can generate temperatures that can scald. Exercise extreme care when handling systems, paying special attention to the inlet & outlet fittings. Greenland systems advise covering the All vacuum tubes that make up the solar collector during installation or alternatively installing the tubes after the rest of the installation has been finalized

The reason is under the sunshine the tube condenser head will turn to very hot (200 °C) without the working load

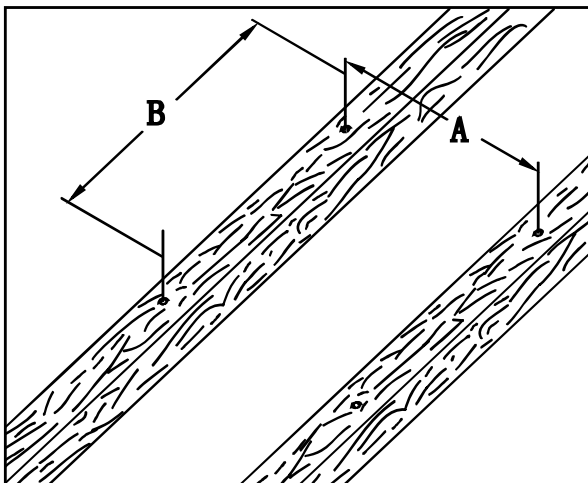
WARNING - If Solar collectors are not connected to the solar storage tank for extended periods (eg; on new home installations) it is important to ensure that collector 'flow & return' lines are emptied of water after pressure testing has been completed. Failure to drain flow & return lines can lead to dangerous, scalding water temperatures being released during tank 'fit off; or damage to collectors due to over pressurization.

After selecting the position of the tank and collectors (making sure they are generally no more than 15 metres apart), check the roof for broken or loose tiles and rusted or loose steel sheets and make good.

Position the collector rail on the front edge of a tile or over a batten and with the straps supplied, fix them to/ through the roof. Tilt the collector rail slightly on the hot outlet side to allow any air to be bled from the highest point.

Before lifting the collector/s onto the roof, we recommend you install all brass fittings to the collectors. Due to the high temperatures generated, the use of standard Teflon is unsuitable. Only use a jointing system that is rated for high temperatures .i.e. Hemp and TOT thread sealant, High Density Teflon used with Loctite 569 (Hydraulic Sealant), or Loctite 55 pipe sealing cord.

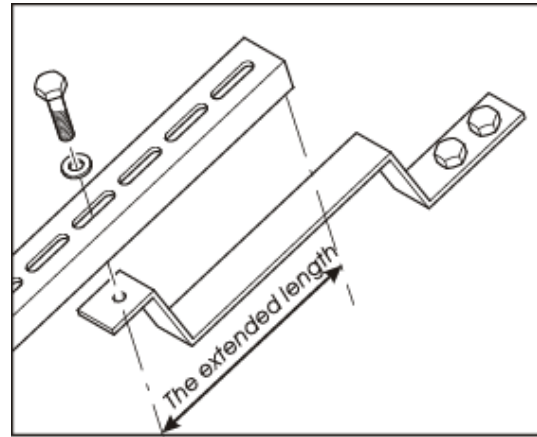
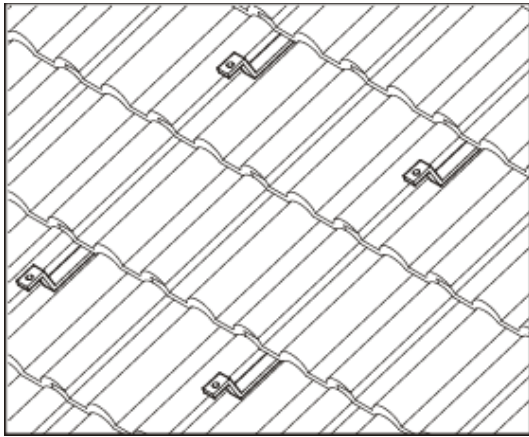
Collector Assembly



I. Measure the installation area

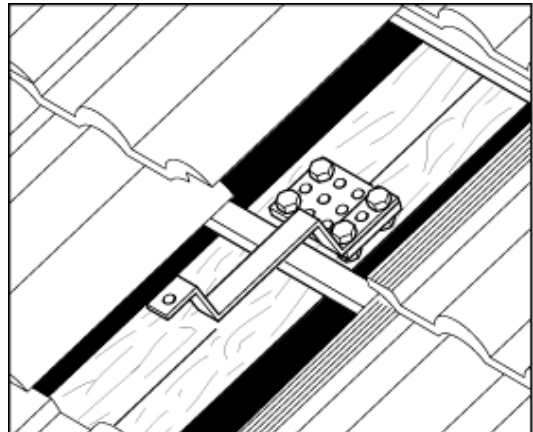
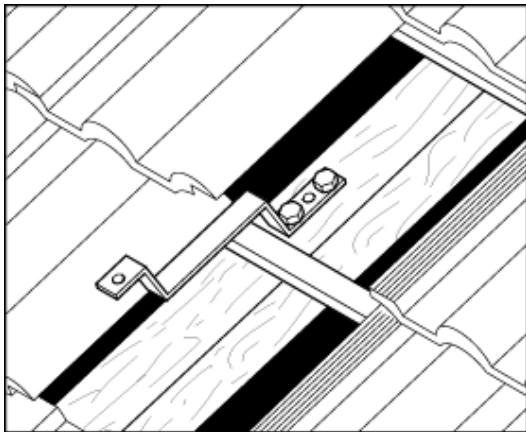
Observe the roof and select the available roof position without shade from trees or other buildings, then mark the corner positions of the collector field. Provisionally, determinate the roof hook positions (4 per collector module) according to the following ranges:

GL1-8AS: A 500 - 770 mm
 B 1600 - 2000 mm
GL1-16AS: A 970 - 1690 mm
 B 1600 - 2000 mm



As the Picture shows, put tiles on the roof hooks, and it must be made water-proofed.

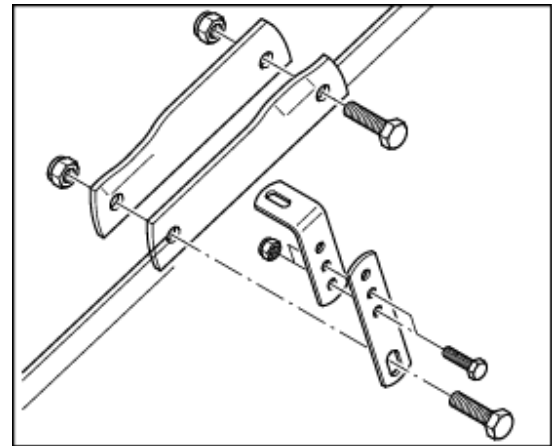
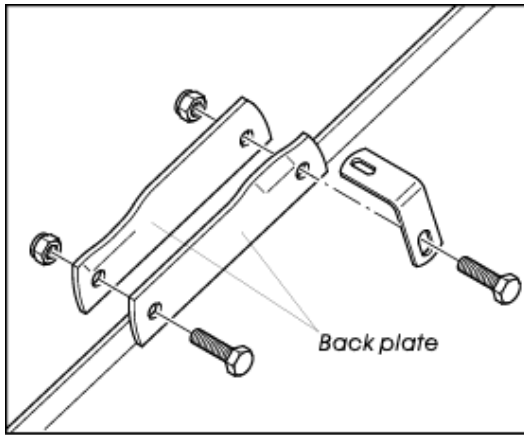
Install verticals support on the roof hooks as picture shows. Keeping the same extended length on top and bottom of the supports and install the bolts on the long hole according to drawing to avoid vertical supports slip, then only fix screws slightly. (Continue to item 3)



II. Mounting of roof hooks

- a) Install roof hook on tile roof
First install roof hook on the eaves then on the ridge, and tighten it on rafter with bolt and screw

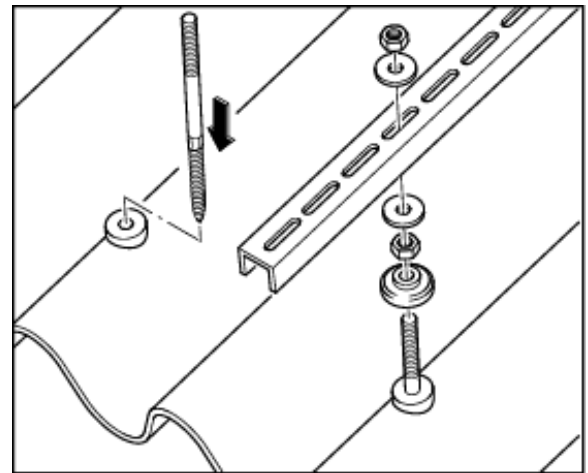
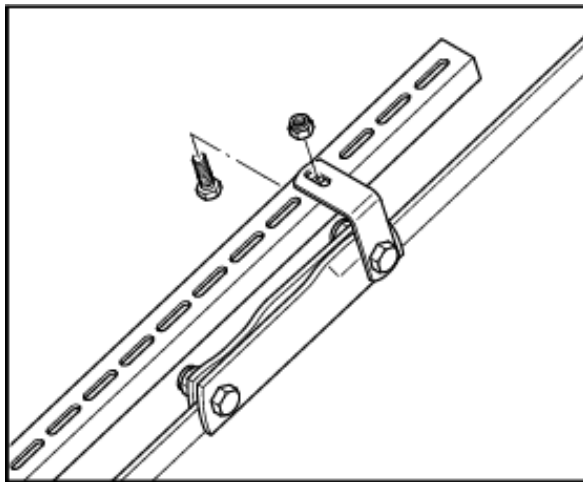
If necessary use the attached perforated plates to achieve the above measure (see data in item 1). The roof hooks must be mounted vertically and horizontally in alignment.



b) Install the roof hook on steel plate roof

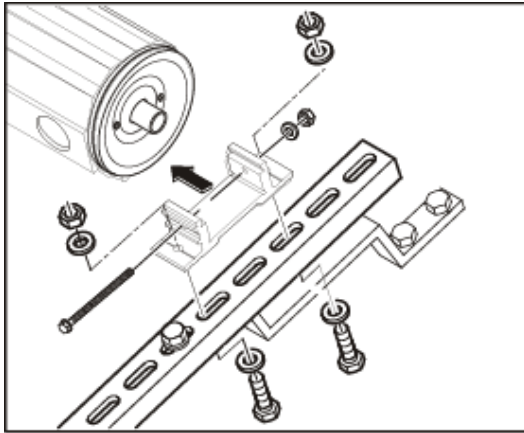
Firstly install the fixing components on the bite seam, then with screw let the Back plates clamp the bite seam, but don't need to bore

Use spacer plate if necessary.



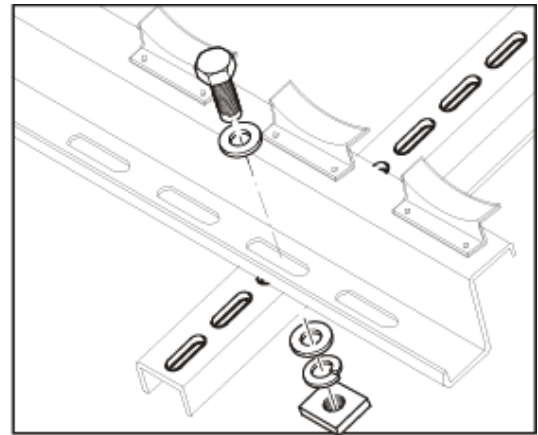
Installing vertical supports on the roof hooks as picture shows, to keep the same stretched length between up and down and then fasten the bolts on the long hole according to the drawing to avoid vertical supports slip. Then only fix screw slightly. (Continue to item 3)

c) Install the roof hook on eternit corrugated roof
Install the thread pole on the rafter, and then install vertical support with spacer keeping the same stretched length between up and down. Fasten the bolts on the long hole according to drawing to avoid vertical supports slip. Then only fix screw slightly.

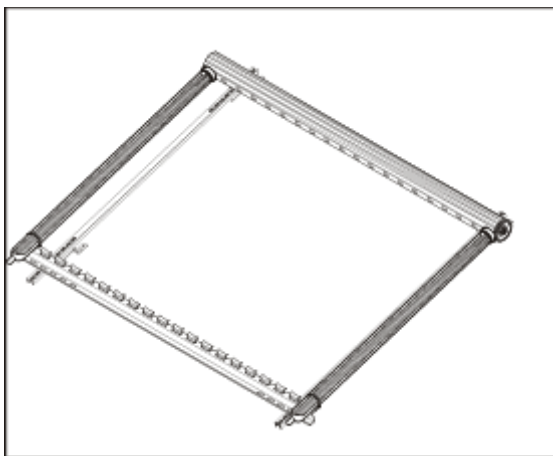


III. Assembling collector

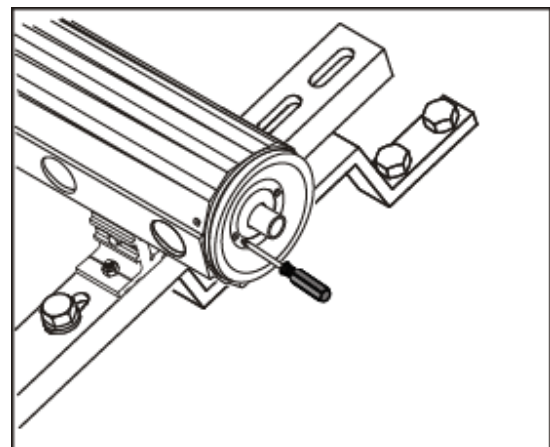
Slide the support of the header box in to bottom of the head box. And fixing the support in the third and fifth long holes of the vertical support as picture shows.



Install the bottom support on the third hole of the vertical support; fasten screw to avoid the bottom support slipping.



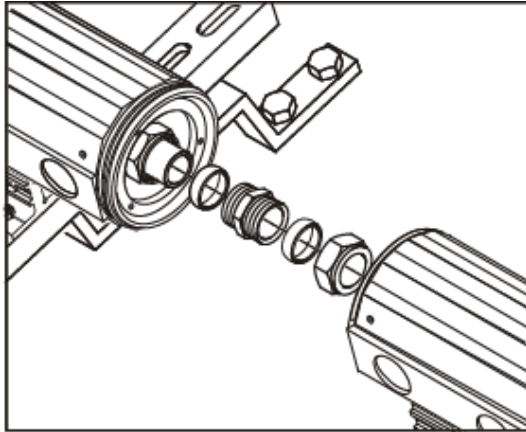
From right to left install the vacuum tubes, keep whole collector in parallel and note that the header box is not exact horizontal, but there is a small slope downwards to inlet. Then measure the slope and tighten all screws.



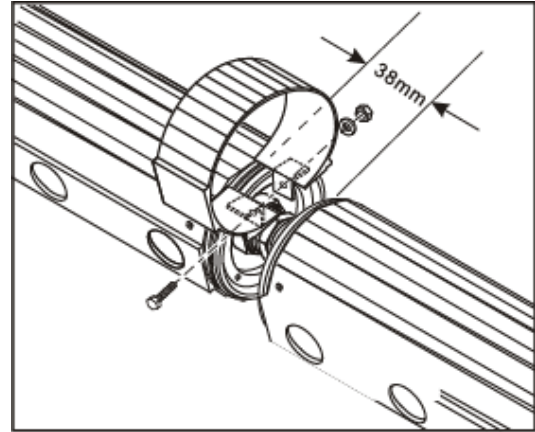
IV. Mounting of more collectors

If there are more than one collector connected together, refer to the following advice.

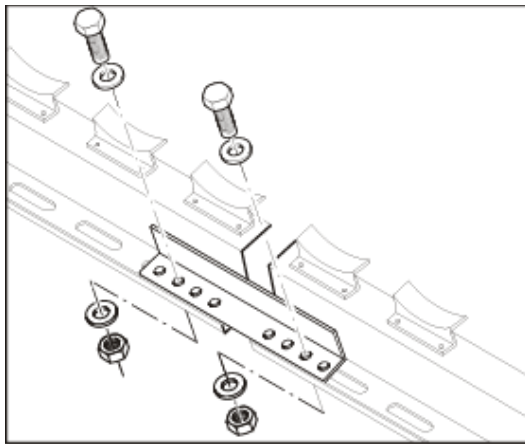
Disassemble the end cover with screwdriver.



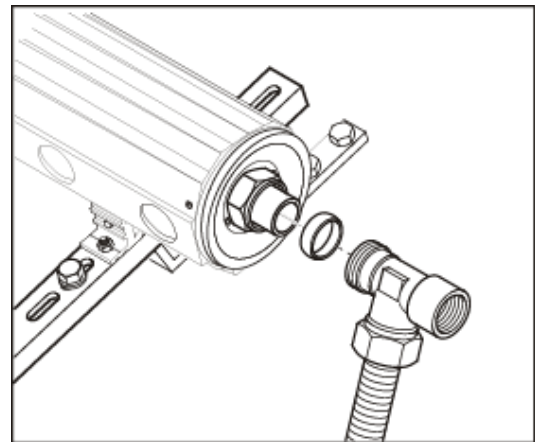
Connecting two header boxes with two-end fitting in series or according to the advanced designs. To keep



Insert insulation material in the space, and on which cover the connection cuff.



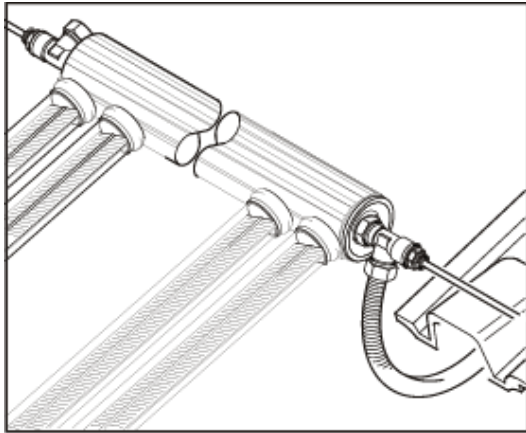
Connecting two header boxes with two-end fitting in series or according to the advanced design. To keep granularity of 38mm between the two header boxes.



V. Connect piping

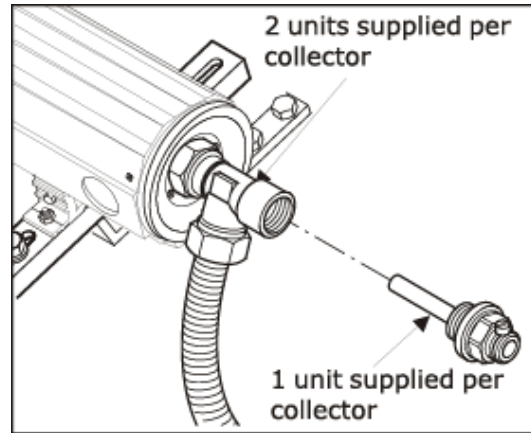
Lay the header box on the highest place if possible, otherwise use air-vent at the highest place above the collector.

Notice: put some thing to cover the tubes, otherwise the temperature of condenser will be up to 200°C or even higher, when tubes are exposed under the sun.

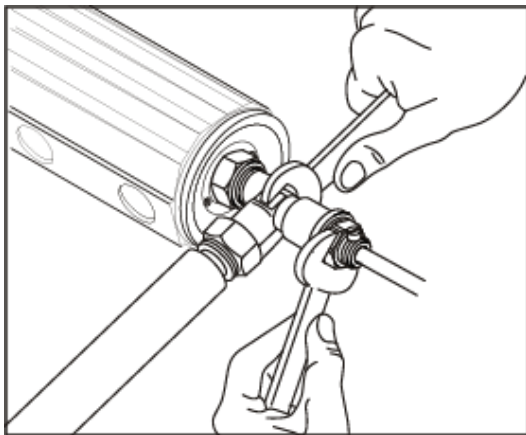


Use air ventilation tiles, which have been modified to allow for space of pipes.

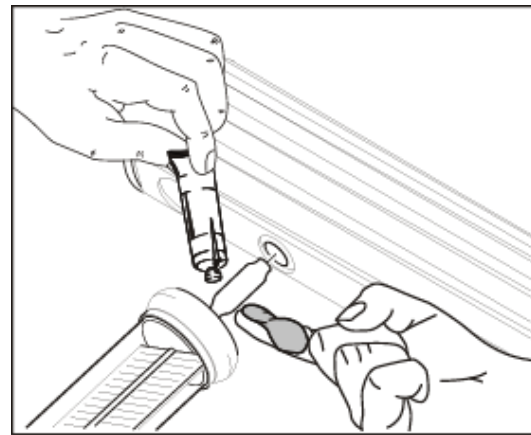
Notice: Use UV-resistant insulation



Install thermo well, which is for sensor, on the outlet pipe. Smear some heat transmission paste on sensor and insert the sensor into the thermo well.

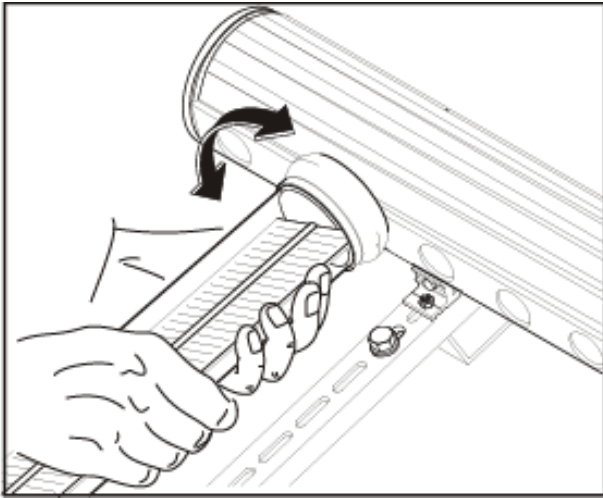


As picture shows, tighten the thermo well. Check and adjust the sensor in order to make it work well.

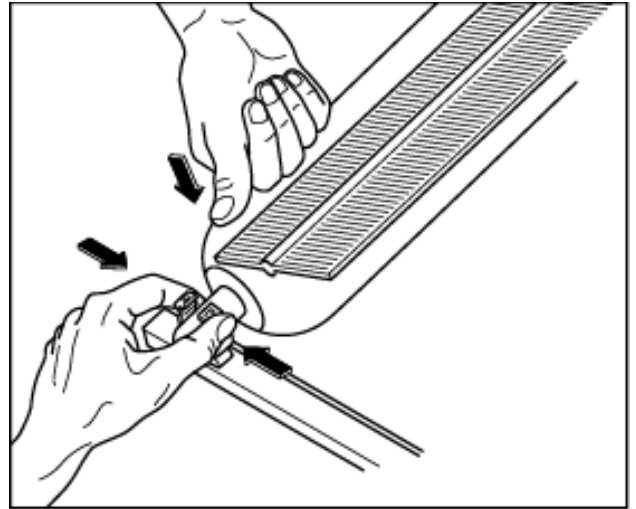


VI. Install the vacuum tubes

Grease condenser with heat transmission paste when it isn't hot. Then slide condenser into cartridge while turning tube gently back and forth. Meanwhile adjust the position of the bottom support, and let clips upward. Upper rubber gasket must rest on header box with slight pressure.



Adjust vacuum tube and keep the elective coating side (blue side) to face upward. In case the roof is not oriented exactly to the north but deviates by as angle "a", the vacuum tube should be turned with angle of "b" into the direction of the zenith of the sun:



Put the end cap of tube into the clip, if necessary; adjust the location of the bottom support. The end of the tube shall rest on the rubber strip of the bottom support. Close clip.

Watch out: Clip is sharp; wear gloves!

Leakage checking

Pump air into system till 6 bar and check whether there are leakages of connections in the whole system.

System cleaning Pump warm transfer medium into system with electrical pump or hand pump, clean system and outgas the air from system. Adding working medium After system cleaning, pump working medium into system till pressure to 3 bar.

Adjust the controller according to the requirement of manufacturer; fix the flow rate that relies on the absorber area and adjust it in controller. And not the unit of measuring.

Solar Flow and Return lines

Run the solar flow and return lines from collector/s to tank using insulated copper with a gradual fall to the storage tank. Approved flashing must be used when penetrating the roof.

WARNING - Under no circumstances should plastic piping be used.

Sensor wire

The solar sensor wire will need to be run with the 'flow and return' lines from collectors to tank. Make sure the sensor wire is inserted into the sensor fitting and sealed. 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 the collector or tank 'flow and return line', as very high temperatures can interfere with the sensor wire and cause the solar controller to malfunction.

Care should be taken to ensure that the sensor wire is protected from damage by external fixtures. **The use of protective conduit is advised for all external areas.**

Solar Tank Connections see system diagrams page.

Position

The solar tank will need to be positioned on an approved base i.e. a concrete plinth and as close as possible to the most used outlet or the gas booster if used.

Solar Tank connection Flow / Return.

Please refer to the system diagrams on page 16 for the correct installation.

Solar Differential controller installation

- The controller must be fixed to the storage tank or the wall close to the tank using the fixing lugs.
- Fit the tank sensor fitting on the tank
- Connect the collector sensor wire to the fitting provided on the bottom of the controller.
- Plug the pump into the power outlet under the controller
- Plug the controller into the GPO
- Once tank is full of water, turn GPO on.

Hot and Cold Water Connections

All plumbing connections must be done by a licensed Plumber and in accordance with local Authority regulations.

Cold Water connection

The cold water inlet connection to the solar storage tank is $\frac{3}{4}$ inch ϕ . The cold water inlet requires an approved isolating/non return valve. In some locations regulations require a pressure relief valve be fitted to the cold water supply.

Hot water connection

The hot water outlet from the solar tank is $\frac{3}{4}$ inch ϕ . All hot water pipes need to be insulated.

Installations on flat roof stands

Flat roof stands are available for systems where the pitch of the roof is below 10°. Please refer to the separate roof stand information sheet.

Filling and commissioning the solar system

WARNING — Do not turn power on to the electrical element until the following procedure is undertaken.

Caution:

Ensure that storage tank is completely full of water by bleeding the hot water lines via an internal hot water tap before switching power on to the electrical element or plugging in and operating the continuous flow gas water heater. Failure to properly bleed the storage tank can in some cases cause damage not covered by Greenland Systems warranty policy.

Open Loop commissioning procedure

Turn on the mains cold water to the storage tank making sure there is a hot tap turned on in the home to bleed all the air from the tank. When water begins to flow from the open tap, turn off.

When tank full, manually turn solar pump on to remove any air in solar collectors. Re-open internal hot water tap to ensure all air is purged from the storage tank, then turn tap off. Once system is fully bled, plug in and turn on the solar controller.

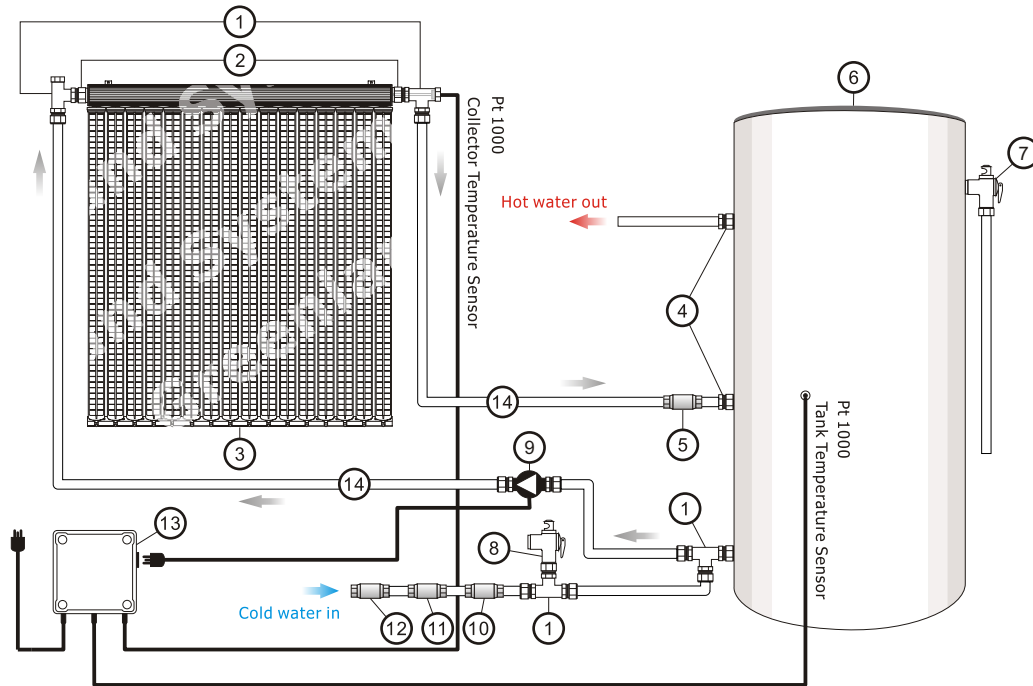
Filling and commissioning Open Loop








WARNING — Do not turn power on to the electrical element until the following procedure is undertaken.

Turn on the mains cold water to the system making sure the pressure / temperature valve is open. When water flows from the pressure / temperature valve, close valve. Turn on a hot tap in the home to bleed all remaining air from the tank and the hot water lines.

Check system for leakage by pressure testing all fittings to a minimum of 800 kpa. Once any leaks are rectified, the system is ready for use.

Installation Diagram of Greenland Systems Solar Hot Water Heater



No.	Componet Name	Qty.	Comment
1	T-fitting	4	AS / NZS Approved
 2	Greenland Systems Compression Fitting	2	C22 x 1/2", DZR
 3	Greenland Systems Single Glass Full Vacuum Solar Collector	1	GL70-20, GL100-16, GL100-16PT AS/NZS Approved
4	3/4" Male Connecting Fitting	2	AS / NZS Approved
 5	High Temperature Non-return Valve	1	170°C Rated
 6	Stainless Steel Water Storage Tank	1	AS/NZS Approved
 7	PTR Valve, 850 kPa (Supplied with water tank)	1	AS / NZS Approved
8	Expansion Control Valve	1	AS / NZS Approved (Mandatory in some states)
 9	Circulation Pump	1	Grundfos UP15, 240V/25W DZR,PWA
10	Pressure Limiting Valve, 500 kPa max	1	AS / NZS Approved
11	Strainer	1	AS / NZS Approved
12	Non-return Valve	1	AS / NZS Approved
 13	Electronic Controller	1	Solar Knight 01.PCB by Pintar Electronics PTY LTD
14	1/2" or 3/4" Copper Tube	A/R	AS / NZS Approved

 These items are included with GLS solar systems

All copper tubes between the collector and the tank to be lagged with suitable UV resistant High Temperature rated insulation with wall thicness of 19mm min.

MAINTENANCE & SERVICE CALLS

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

1. Check to ensure that shading from trees is not excessive and is not covering the collectors for all or part of the day.
2. Have you used more hot water than normal?
3. Can you detect water leaking from within the plumbing system?
4. Is the booster or time-clock switched 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?
7. Is the system installed on a NEW home? - if so, there may be a problem external to the water heater. Check with your builder first.

If the system is still not operating correctly, call your local Greenland Systems Customer Service for further advice. Under no circumstances should unqualified people attempt to undertake service work.

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.

Major Service (Usually Every Seven Years)

This service should be performed every Seven years, or more often in poor water quality areas.

1. Replace the pressure/temperature relief valve.
2. Undertake a visual check of the unit for any potential problems, eg. broken glass, shading, booster & pump operation etc.
3. Carefully inspect all connections.

Collector Tubes

It is recommended that your household insurance policy cover the collector Tubes 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.

Greenland Systems Electrical Water Heater Information

The Greenland Systems range of electric mains water pressure storage water heaters are made up of high quality enamel lined steel storage cylinders housed in weatherproof cabinets and insulated with high efficiency foam insulation.

At the time of writing all models are of the single element type controlled by an adjustable thermostat which is factory set at 70 degrees Celsius. The thermostat has a double-pole energy cut-out (ECO) which isolates the element from the power supply to prevent boiling.

Thermostat adjustments must only be carried out by an appropriately qualified tradesman.

There are no user adjustments provided on these appliances.

Electrical loadings must not be exceeded.

The electrical cover is at the top/end of the unit.

Specifications can change without notice.



General DATA

Dimension:

GL100 8 tubes

2200 x 958 x 187 mm

GL 100-16 16 tubes

2150 x 1920 x 187 mm

Tube: 8/16

Gross collector area: 2.11 m² / 4.13 m²

Net absorber area: 1.38 m² / 2.75 m²

Inclination angle: 15°

Aluminium nitride Absorber

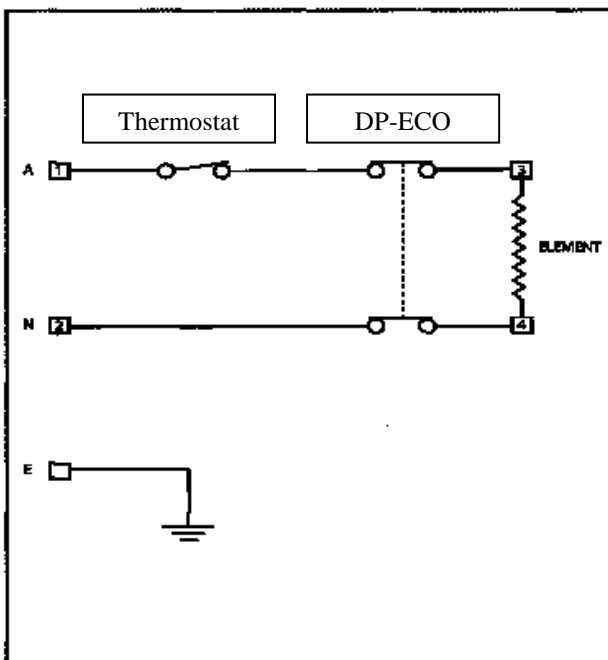
Vacuum grade: 10⁻⁵ mbar

Gross weight: 50kg / 100 kg

Connection: Dn22 mm fitting

Stagnation temperature: 190°C

Wiring Schematic (240 VAC Phase 1)



Recycling

We are responsible to use environment friendly materials in our products and to gather these materials for recycling.

Greenland Systems Solar Controller

Installation

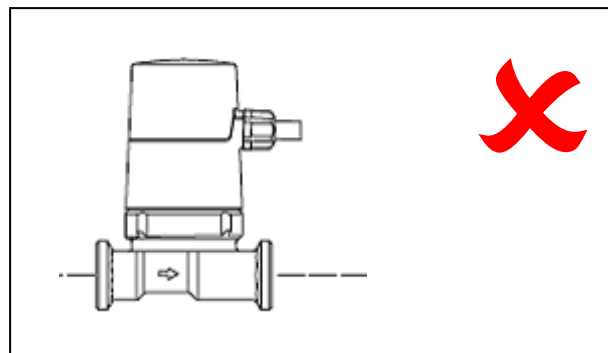
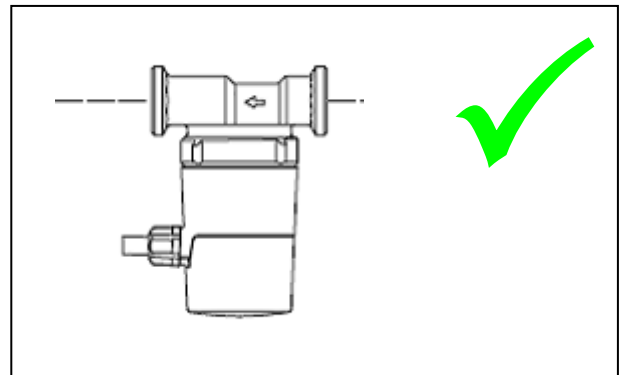
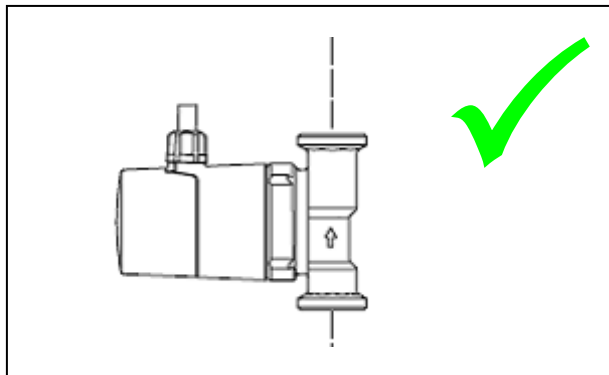
- The controller must be fixed to the storage tank in an easily accessible position
- The controller must be fixed to the storage tank or wall close to the tank using the fixing lugs
- Fit the tank sensor point on the tank.
- Connect the collector sensor wire to the connection point from controller. (no right or wrong way)
- Plug the solar pump into the controller.
- Plug the controller in to the main power and turn it on.
- Replace the front cover.

The Power supply to circulating pumps and controllers should always be from circuits that are not subject of switching by the local electricity supplier for the purposes of load management

Most errors are caused by damage to the sensor leads. If you need to extend or repair the roof lead you must solder and shrink seal the join or use a waterproof connector.

Greenland Systems Circulator Pump

Recommended installation orientations for Circulator Pump





Greenland Systems

WARRANTY

10 Year Warranty

This warranty applies to water heaters installed in a single family dwelling only. A separate warranty policy applies for water heaters installed in commercial, industrial or multi - family dwellings.

Greenland Systems Pty Ltd warrants to and for the sole benefit of the original purchaser of water heaters sold by Greenland Systems, will remain free from defects in material and workmanship under normal usage in accordance with the guidelines set in Greenland Systems solar water heater literature. This warranty shall remain in effect for ten (10) years after first installation of the system with respect to:

- Storage Tanks
- Solar Collectors
- Solar Vacuum Tubes Carry An Extended Warranty of Twelve (12) Years

The Greenland Systems warranty will remain in effect to all other parts (including valves, elements and thermostats) supplied by Greenland Systems for a period of three (3) years after such installation.

Greenland Systems shall provide both the labour and the parts required to repair, or at Greenland Systems' option, Greenland Systems shall replace any part of the system which upon examination by Greenland Systems is determined by Greenland Systems 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 Greenland Systems' 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.

Except as otherwise provided by law, the warranty set forth herein is the complete and entire warranty made by Greenland Systems and there are no other warranties, expressed or implied, whether of merchantability, fitness or particular purpose, or otherwise made by Greenland Systems. 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 certain 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.

Greenland Systems

Conditions - All models

The above is subject to an area within a 30 kilometre radius of the Greenland Systems Distributor or Branch from where the unit was purchased. Customers outside this area will be subject to any freight costs and any traveling charges incurred by the Greenland Systems representative carrying out rectification work.

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

Exclusions

1. Collector glass is not covered by this warranty.
2. Where pressure limiting Valve is not fitted in areas where main's pressure is ever to exceed 500 kPa.
3. Where a cold water expansion valve, check valve and strainer are not fitted where required by local regulations or either due to poor water quality.
4. The manufacturer shall be under no obligation under this warranty in the case of accident, Acts of God, installation/repairs carried out by persons outside Greenland Systems installation and maintenance instructions.
5. No responsibility is accepted for any consequential loss or damage caused by a defect.
6. Frost damage to Greenland Systems Open Loop solar heaters when installed in a frost prone area without approved frost protection device.
7. Components utilized in the installation of Greenland Systems water heaters not supplied by Greenland Systems. eg: tempering valves, cold water valve, tubes, assemblies, etc, etc.
8. Extended or implied warranties not formally provided by Greenland Systems.
9. Extra costs incurred for hiring of labour and/or equipment required to effect repairs. Eg: Cranes / Lifting devices, etc.
10. Costs incurred for rectifying faults (or perceived faults) not directly attributed to the Greenland Systems water heater.

Non Warrantable items.

It is important to understand that Greenland Systems warranty policy only applies to items that are covered under Greenland Systems warranty program. The exclusions outlined previously need to be understood, as Greenland Systems shall not accept charges for repairs or component replacement that are not directly attributable to the Greenland Systems water heater. The following examples are some complaints that Greenland Systems will not accept as warranty claims-

Insufficient hot water caused by reluctance from the consumer to utilize the auxiliary booster.

Insufficient hot water caused by an incorrectly set or faulty tempering or mixing valve.

Insufficient hot water caused by faulty or incomplete installation.

Damage to components caused by incorrect commissioning of water heater.

Damage to Gas water heater caused by incorrect commissioning of water heater.

Insufficient hot water caused by 'undersized' systems.

Excessive leakage from valves not supplied with the Greenland Systems water heater.

Excessive leakage from the Pressure Temperature relief valve in instances where water pressure or temperature exceeds specified limits.

Insufficient or fluctuating water temperature caused by insufficient water flow that may occur with 'water saving' tap-ware or appliances. (Gas water heaters)

Insufficient hot water caused by undersized gas lines. (Gas water heaters)

Insufficient hot water caused by Blown fuses/tripped electrical switches, or inadequate household electrical wiring.

Insufficient hot water caused by incorrect selection of Gas type (Gas water heaters)

Insufficient water flow caused by debris accumulating in water strainer (Gas water heater)

Water hammer



Greenland Systems

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