

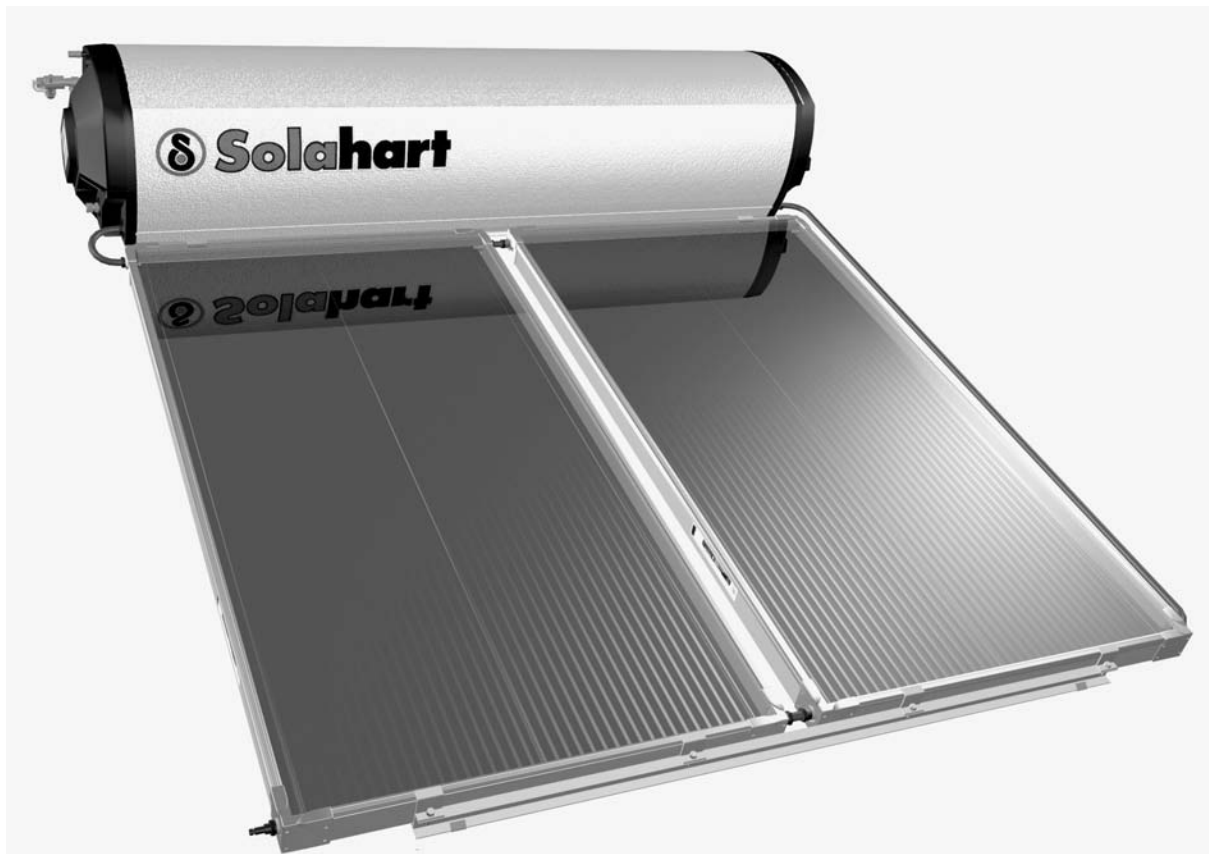


OWNER'S MANUAL

Includes Installation Instructions

SOLAR WATER HEATERS

Solahart Industries Pty Ltd
ABN 45 064 945 848



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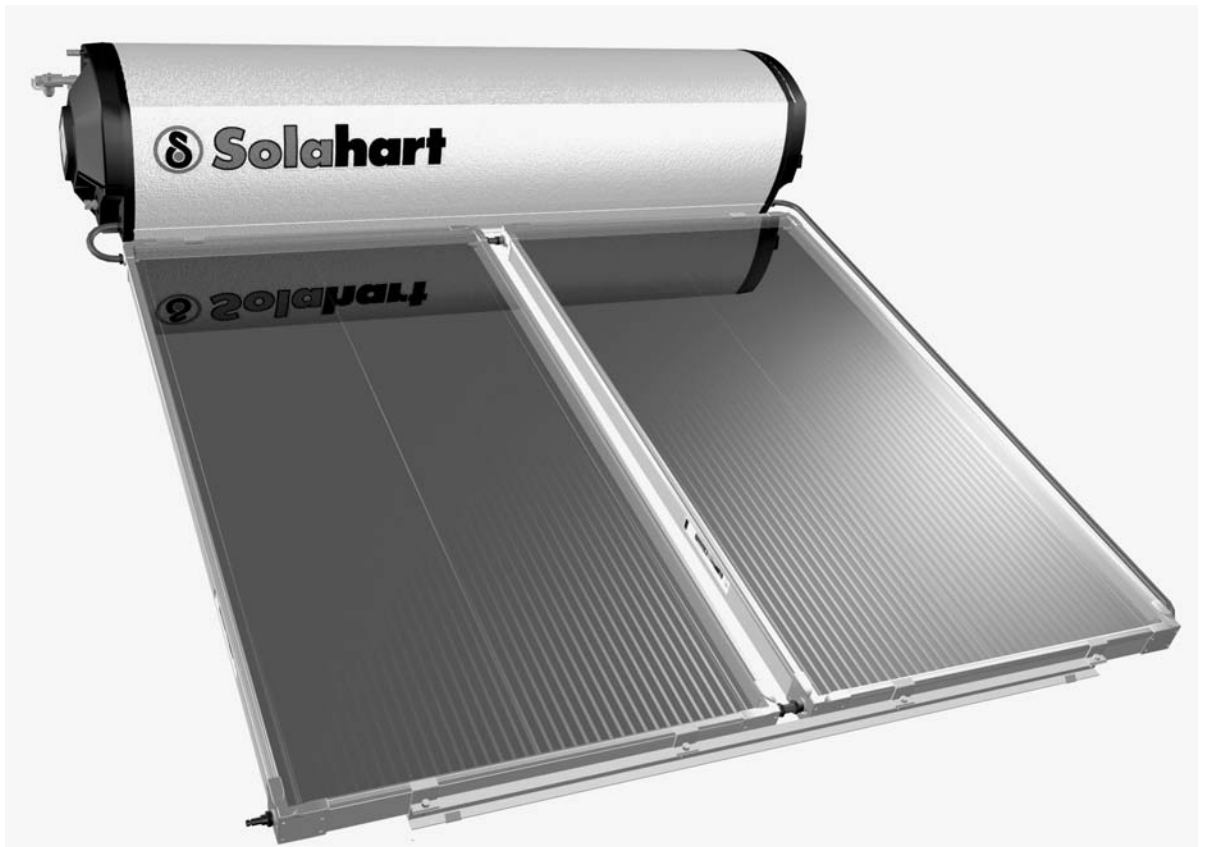
WORLD'S LEADING TECHNOLOGY

Your Solahart is equipped with the latest technology in solar water heaters. The Closed Circuit Series feature collectors that contain a special heat transfer fluid called 'Hartgard' which acts to enhance the performance of your Solahart water heater. 'Hartgard' is a special food grade solution and is the only solution permitted to be used in the closed circuit systems. Hartgard has been approved by the National Health and Medical Research Council of Australia. Unlike water, 'Hartgard' fluid resists freezing, allowing Solahart to guarantee the Closed Circuit Series against frost damage. Solahart water heaters are so effective that they can save you money anywhere in the world. How much you save depends on local conditions and your hot water usage patterns.

The 'L' and 'L Free Heat' Series uses a direct heating collector, incorporating state-of-the-art manufacturing technology to ensure the same quality and finish as the Closed Circuit Series.

It is important that you select the correct water heater for your local conditions and your family's needs.

WARNING: Your Solahart Closed Circuit Systems are protected by our exclusive 'Hartgard' fluid. The fluid is contained in the solar panels and the heat exchanger jacket around the main cylinder. Although the fluid is of food grade quality, it is important that it is not ingested. As with all water heaters, we recommend that you do not drink or cook with the hot water from your Solahart heater.



HERE'S HOW IT WORKS

The Solahart Closed Circuit Series uses a heat exchanger that operates under the Natural Thermosyphon Principle. The 'L' Series uses a direct heating method that relies upon the same Thermosyphon Principle, but circulates potable water through the collectors.

The Solahart collectors absorb solar energy. The low-iron content solar glass allows more radiation to pass through and be retained than other traditional float glass systems.

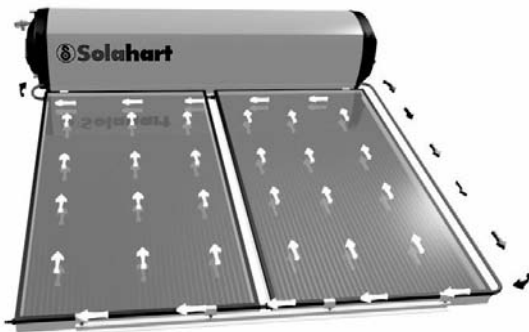
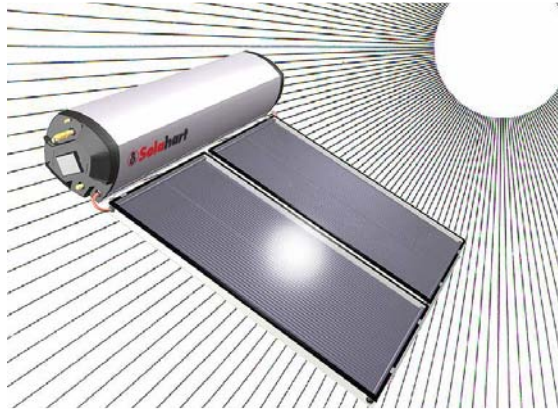
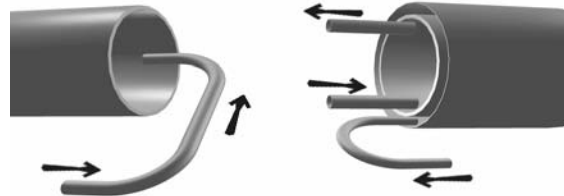


Diagram of Closed Circuit Series

In the Closed Circuit Series, heat is absorbed by the collector and passed to the 'Hartgard' heat transfer liquid inside the collector. As the temperature of the 'Hartgard' increases, the hot fluid rises up through the collector by the Natural Thermosyphon Principle, into the heat exchanger jacket around the potable water storage tank. Here, the heat is transferred to the potable water, cooling the 'Hartgard' fluid.

The cooler fluid is then forced back down into the collectors through the displacement action of the hot fluid rising up into the heat exchanger jacket.

The cooler fluid is again heated in the collectors and rises back up to pass the heat to the potable water in the storage tank. This process repeats until all water in the storage tank is heated.



'L' Series

Closed Circuit Series

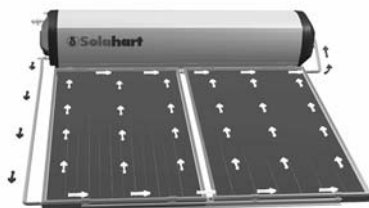


Diagram of L Series

For the 'L' Series, heat is collected directly by the potable water circulating through the collector. As the potable water heats up, it rises by the Natural Thermosyphon Principle, directly to the storage tank. As the heated potable water travels through to the storage tank, the cooler potable water returns to the collectors. This process repeats until all water in the storage tank is heated.

OPERATING HINTS

The overall performance and power cost savings that you will obtain from your Solahart water heater will depend on your hot water usage pattern and the usage of your electric or gas booster.

With a two panel, 300 litre Solahart hot water heater, on a clear winter day, the collectors can raise the tank temperature to approximately twice the daily maximum temperature. For example on a clear 15°C day the tank temperature can reach approximately 30°C. The supplementary booster should then be used to raise the water temperature to at least 60°C before the water is used.

A booster switch, or alternatively a time clock, may be fitted to the system to turn the booster on when required. This method can increase energy savings.

The following hints are provided to assist you in selecting the best pattern of hot water usage for your solar water heater.

- 1) Solar energy input is greater on sunny days between 10am, and 3pm. If possible, schedule your heavy washing or laundry for as close as possible to the middle of the day.
- 2) Keep trees in the sun's path at a level where the collectors are not shaded at any time during periods of effective solar radiation.

Off Peak Power

If your Solahart water heater is connected to an 'Off Peak' (night rate) electrical supply, it is important to remember that the booster may only operate late at night. On cloudy days the tank may only gain a small amount of energy during the day. Careful planning will be required to avoid running out of hot water if large quantities are drawn 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 at the end of the day.

Over-Night Temperature Stabilisation

Over-night temperature stabilisation is the 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 section of the cylinder. This effect is often perceived as heat loss, but is actually the redistribution of stored heat more evenly over the entire contents of the storage tank. This may make it necessary to use the booster to raise the water in the top section of the cylinder back to an acceptable temperature.

Over-night temperature stabilisation is most evident in the morning if the booster switch or time clock is left OFF over-night.

Using Your Solahart Heater as a Pre-Heater

Your Solahart can be used as a pre-heater to an existing heater provided that:

- 1) The power supply to the Solahart is not connected.
- 2) The existing water heater is thermostatically controlled, **not flow controlled**, except when used in conjunction with an electronic instantaneous water heater. (Note: For flow controlled water heaters, the heater can act as a supplementary heat source only, not as a pre-heater, and the heater can be connected in a **parallel circuit only**, via a changeover valve(s)).
- 3) The operating pressures of the two heaters are compatible or reduced to the lower of the two heaters.
- 4) The existing heater has sufficient thermal capacity in its own right to supply normal water requirements and is complete with its own controls and valves and these are not interfered with.

FACTS YOU SHOULD KNOW ABOUT YOUR SOLAHART WATER HEATER

Hot Hot Water!

Your Solahart water heater will generate hot water quickly and efficiently. Under normal family use, it will operate between 60°C and 70°C. However, the temperature can exceed this and under certain circumstances may be as high as 95°C. This can occur during prolonged periods of direct sunlight and particularly in summer or long periods of reduced water usage. Extreme care should be taken in these circumstances.

Check the water temperature before use, such as when entering a shower or filling a bath or basin, to ensure it is suitable for the application and will not cause scald injury.

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

WARNING

This water heater is not intended to be operated, adjusted or tampered with by young children or infirm persons. Young children should be supervised to ensure they do not interfere with the water heater.

The removal of the front cover will expose 240 V wiring. It must only be removed by an authorised or service person.

Care should be taken not to touch the pipe work connecting the solar storage tank and the solar collectors. Very high temperature hot water can be generated by the solar collectors under certain conditions, and will flow through the pipe work from the solar collectors to the solar storage tank.

Period of Reduced Usage or 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 hot tap be turned on for several minutes. Do not use a dishwasher, clothes washer or other appliance for this purpose. During this procedure there must be no smoking, open flames or any electrical appliance operating nearby. If hydrogen is discharged through the tap it will make an unusual sound like air escaping.

'Hartgard' Solution

'Hartgard' is a blue, non-toxic, propylene glycol fluid and when mixed with water, provides the Heat Transfer Fluid in Closed Circuit systems. 'Hartgard' is used to lower the freezing temperature of the Heat Transfer Fluid and so provides protection against freezing (for the correct % of Hartgard in the Heat Transfer Fluid, refer to the section on Frost / Freeze Protection).

Should the water from your Closed Circuit Series Heater appear blue, then this may indicate a leak of 'Hartgard' from the jacket into the potable water. While **'Hartgard' is a food-grade solution and not hazardous to health**, the blue colour in the water indicates a fault and your Solahart serviceman should be contacted to inspect the system.

Over-temperature Protection System

The Closed Circuit Series high performance systems have a means of controlling the maximum temperature of the water in the storage tank. These systems contain an in-line 'Hartstat' valve, located between the hot outlet of the collectors and the inlet to the tank heat exchanger. This valve closes when the tank has reached a sufficiently high temperature, thereby preventing further heat transfer to the tank, and thus limiting its temperature to more acceptable levels.

Corrosion Protection

Corrosion protection of the potable water tank is obtained by using two coats of vitreous enamel and the use of a sacrificial anode.

MAINTENANCE

Service Calls

Should your Solahart not provide hot water please check the following before requesting a service call:

- 1) Shading from trees is not excessive and is not covering the collectors for all or part of the day.
- 2) Hot water usage is not excessive.
- 3) Hot water is not leaking from within the plumbing system.
- 4) Booster switch and/or time switch is turned ON.
- 5) Booster circuit fuse or circuit breaker is sound.
- 6) Electric or gas meter speeds up when the booster switch is turned ON after being OFF.

Contact your local Solahart dealer if all of the above have been checked and there is still no hot water.

Six Monthly Service

TEMPERATURE PRESSURE RELIEF VALVE

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

Continuous leakage of water from the valve and its drain line may indicate a problem with the water heater

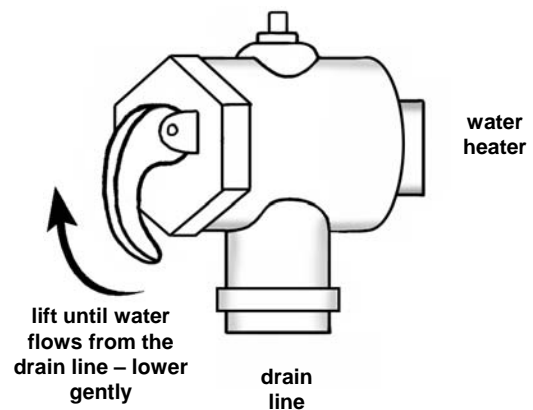
WARNING: Never block the outlet of this valve or its drain line for any reason.

Operate the easing lever on the temperature pressure relief valve once every six months. **It is very important that the lever is raised and lowered gently.**

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

If water does not flow freely from the drain line when the lever is lifted, then the water heater should be checked by your nearest Solahart Dealer.

The temperature pressure relief valve should be checked for performance or replaced at intervals not exceeding 5 years, or more frequently in areas where there is a high incidence of water deposits.



EXPANSION CONTROL VALVE

In many areas, including South Australia, Western Australia and scaling water areas, an expansion control valve is fitted to the cold water line to the water heater. Water will flow from its drain line during the heating period.

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

COLLECTOR GLASS

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

Major Service (Usually Every Five Years)

This service should be performed every five years, or more often in poor water quality areas (refer to Table below).

THE MAJOR SERVICE CAN ONLY BE CARRIED OUT BY YOUR LOCAL SOLAHART DEALER OR AUTHORISED SERVICE REPRESENTATIVE.

Note: The major service and any replacement of components which have not failed are not included in the Solahart warranty.

- 1) Check the closed circuit fluid level (Closed Circuit Series only).
- 2) Replace the pressure/temperature operated relief valve. (Part No. 45-1104).
- 3) Flush the cold water relief valve. (Part No. 45-1103).
- 4) Where fitted, check the electric element for excessive calcium build up or corrosion. Replace if necessary.
- 5) Visually check the unit for any potential problems, eg. broken glass, excessive dust build-up, shading etc.
- 6) Carefully inspect all connections.
- 7) Drain and flush out tank sediment build-up (if any) (Refer to instructions for emptying the water heater on Page 7).
- 8) Drain and flush out collectors ('L' Series only) (Refer to instructions for emptying the water heater on Page 7).
- 9) Replace the anode.
- 10) For units fitted with a Gas Booster check the following:
 - i) Condition of the spark electrode.
 - ii) Condition of the flue terminal gasket.
 - iii) Build up of dust on the fan.

Water Quality - Is it Suitable for the Solahart Water Heater?

Your Solahart heater is suitable for use with water with a total dissolved solid content less than 1,000 ppm and for which the total hardness does not exceed 200 ppm CaCO₃. Water supplies having calcium hardness (CaCO₃), and an alkalinity in excess of 150 ppm should be treated by a softening process prior to use with this heater to prevent scaling and damage to the electric booster element.

A water analysis can be obtained from your water supply authority.

Anode Replacement Period

The tank is lined with two coats of high quality vitreous enamel. The sacrificial anode is a low-cost item that is simple to replace. All metals corrode in hot water. Copper and stainless steel tanks generally are not fitted with anodes and therefore rely on the inherent properties of the metal to limit the corrosion rate. Replacing the anode regularly is less expensive than replacing the complete tank.

Water quality details should be obtained from the water authority where special water supplies are used. The following table is a guide to anode replacement intervals, and to system Major Service intervals.

Total Dissolved Solids (ppm)	Recommended Anode Replacement/Major Service Interval
0 - 600	5 years
600 - 1,000	3 years – an aluminium anode is required
Over 1,000	Less than 2 years – an aluminium anode is required

Generally, where the water is supplied from a bore or well, the quality of the water will be such that a three-year anode change (or less) will be required. A water analysis is recommended for these locations.

To replace the anode the Solahart serviceman will do the following;

- 1) Turn off the electricity or gas supply (which ever is applicable).
- 2) Turn off the water supply.
- 3) Release the water pressure at the pressure/temperature relief valve by holding the relief arm open.
- 4) Remove the terminal cover plate or flue cowl (for units fitted with gas booster).
- 5) Unscrew the anode nut located to the left of the electric element (or burner tube) and withdraw the old anode.
- 6) Insert the new anode assembly into the cylinder through the anode socket.
- 7) Tighten the new anode nut, turn on the water supply, and check that the seal on the nut is watertight.
- 8) Re-fit the cover (or flue terminal). Open a hot water tap to dispel air from the tank, or operate the pressure/temperature relief valve.
- 9) Turn on the electricity or gas supply (which ever is applicable).

DO NOT TURN POWER ON UNTIL THE HEATER IS FILLED WITH WATER OR DAMAGE TO THE HEATING ELEMENT WILL RESULT

To Empty the Water Heater

Note that the potable water supply to the system should not be switched off unless the Collectors are covered by a secured opaque material.

- 1) For Closed Circuit Series, securely cover the collectors from sunlight with cardboard or other opaque material *BEFORE* emptying the water heater.
- 2) Turn off the electricity or gas supply (whichever is applicable).
- 3) Flush cold water through the tank in order to cool both the tank and the closed circuit fluid.
- 4) Do not drain the tank, as it is recommended the potable water tank remain pressurised until the closed circuit pressure is relieved.
- 5) Turn off the water supply.
- 6) For Closed Circuit Series, relieve the pressure in the jacket by removing the PR6 jacket relief valve. Extreme care should be taken when removing the valve as the jacket fluid could be at high temperature and under pressure.
- 7) Release the water pressure at the pressure/temperature relief valve by holding the relief arm open.
- 8) Disconnect the cold water inlet and allow the water to drain out via a hose fitted to the cold water inlet connection.
- 9) Avoid contact with the hot water and ensure that the hose safely discharges the hot water away from the roof area.
- 10) Hold open the tank relief lever to allow air into the storage tank.
- 11) For 'L' Series only, unscrew and remove the bung plug on the bottom right-hand corner of the right-hand collector.

PR6 / PR200 Jacket Pressure Relief Valve

The heat exchange jacket has a relief valve located in the vent pipe of the jacket. This relief valve is to prevent over-pressurisation of the closed circuit either due to incorrect filling or abnormal operating conditions. During the heater's first summer season, fluid will discharge from the relief valve until the ideal closed circuit fluid volume is established. Discharges from the valve after this time could indicate the heater is not operating efficiently. Under these circumstances you must contact your nearest Solahart service centre immediately. Do not attempt to service the heater yourself.

When operating in daylight the heat exchange circuit will be pressurised, and will contain a mixture of superheated water and steam. Do not remove the PR6 / PR200 valve during operation, as there may be a very high SCALDING risk present.

Collector Glass

To prevent rapid deterioration of the collector, broken glass should be replaced immediately.

WARNING: Collector glass MUST NOT be replaced whilst the solar collector is on the roof.

In extremely dusty areas such as mining towns and locations adjacent to dust forming plants, it is recommended that the glass cover of the collector be washed clean at least every three months, should adequate rain not have fallen in this period.

Insurance

Warranty does not cover breakage of collector glass. It is recommended that the household insurance policy cover the collector glass and/or damage to the water heater, especially in cyclonic areas and in locations where hail is likely to occur.

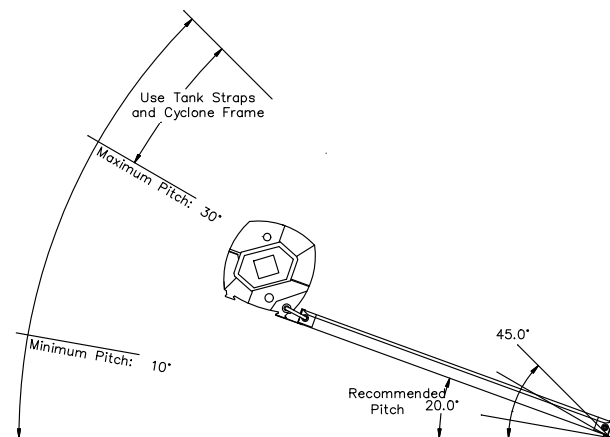
INSTALLATION INSTRUCTIONS - ALL MODELS

INSTALLATION MUST COMPLY WITH LOCAL ELECTRICAL AND PLUMBING CODES

LOCATION

For optimum performance, the heater should be installed facing the equator (South in the Northern Hemisphere, North in the Southern Hemisphere). ALWAYS USE A COMPASS TO CHECK ORIENTATION. Deviation from the equator of up to 45° East or West has little effect on total annual solar contribution (approximately 5 per cent). If it is not possible to face the equator, the decision of either an EASTERLY or WESTERLY bias must be made. If the majority of hot water usage is before 2 p.m. favour an EASTERLY bias. If the majority of hot water usage is after 2 p.m. favour a WESTERLY bias.

Ideally, the heater should be installed on a pitch equal to the geographic latitude of the place of installation. However, variation in the pitch to within $\pm 20^\circ$ of the latitude will have little effect on the total annual solar contribution (nominally around a 5 per cent reduction). The minimum allowable angle of pitch of the heater is 10° , to ensure sufficient pitch for thermo syphoning and glass cleaning. At pitches greater than 30° , the system must be installed using special tank straps and mounted on a cyclone frame. These items are available from your local Solahart supplier.



If it is necessary to face the solar hot water heater 45° to either the East or the West, a lower pitch installation will give better performance. In such cases, the addition of a third panel to the system may be more aesthetically, economically and thermally beneficial than mounting the heater on roof brackets to face the equator.

THE HEATER MUST BE INSTALLED ON AN ADEQUATELY SUPPORTED AREA OF ROOF, as close as possible to the most frequently used hot water outlet, or existing water heater system in retrofit installations. The heater must be installed in an area that is free of shade all year round. Ensure that trees do not shade the heater, particularly in winter.

NOTE: The element/anode end of the Tank should be placed no nearer than $\frac{3}{4}$ length of the Tank, to any wall or obstruction, so that the anode can be replaced during a service.

ELECTRICAL CODES

Local codes in Australia require all electrical work to be performed by a qualified electrician. ALL INSTALLATIONS ARE TO BE IN ACCORDANCE WITH LOCAL ELECTRICAL CODES APPLICABLE IN YOUR AREA. The power rating and current requirement of your Solahart heater will be specified on the heater's data plate, located on the cover to the electrical cavity.

All electric wiring should be enclosed in suitable weatherproof conduit with watertight fittings. An ON/OFF switch may be installed in the home at a convenient location, eg: in the kitchen or laundry. An isolation switch MUST be installed in the meter box for service work on the unit.

DO NOT TURN ON THE ELECTRICAL POWER TO THE HEATER'S ELEMENT UNTIL THE STORAGE TANK IS FILLED WITH WATER.

Failure to do so will cause the electric booster element to burn out. If water and/or power are not available on completion of installation, tape the booster control switch in the OFF position and place a warning label "DO NOT TURN ON ELECTRICITY UNTIL FILLED WITH WATER" on the electrical booster control switch.

CONTROL THERMOSTAT/SAFETY CUT-OUT COMBINATION SWITCH

A combination thermostat/safety cut-out is installed to control the electrical heating element to the factory pre-set temperature of 60°C . Individual situations may require this setting to be altered. Only qualified electricians or Solahart service contractors are permitted to adjust the thermostat. The safety cut-out will de-energise the element should the temperature within the tank reach 87°C when the element is activated.

PLUMBING NOTES

All installations are to be in accordance with the building and plumbing codes applicable in your area. Australian codes require all plumbing work to be performed by a qualified plumber.

Note that any pipes that are required to enter to the house either through a wall, ceiling cavity or roof need to be fully sealed and waterproofed and should comply with local building codes and practices.

PLASTIC PIPING SHOULD NOT BE USED IN ANY HOT WATER PIPING RUNS, DUE TO THE HIGH OPERATING TEMPERATURE AND PRESSURE OF SOLAR WATER HEATERS.

TEMPERATURE & PRESSURE RELIEF VALVE

A combined temperature and pressure relief (TPR) valve (Part No. 45-1104) is fitted to the connection end of the tank to limit both the tank water pressure to 1000 kPa and the tank water temperature to 99°C. It is MANDATORY that this TPR valve be fitted in all cases, except where the storage tank is vented to atmosphere through an open pipe. When applying Teflon sealing tape to the thread of the TPR valve, ensure that the tape is at least 3 mm back from the end of the thread to prevent tape fouling the valve seat.

The TPR valve should be operated once every six months to remove lime deposits and to verify that it is not blocked. To operate the TPR valve hold the relief arm lever open. **It is important that the lever is raised and lowered gently.**

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

The TPR valve is shipped in the pipe kit and must be fitted before the water heater is operated. Before fitting the TPR valve, make sure the probe has not been bent. Seal the TPR valve thread with Teflon tape - never hemp, ensure that the tape is at least 3 mm back from the end of the thread to prevent tape fouling the valve seat. Screw the valve into the correct opening leaving the valve outlet pointing downwards. Do not use a wrench on the TPR valve body - use the spanner flats provided.

Continuous leakage of water from the TPR valve and its drain line may indicate a problem with the water heater

WARNING: Never block the outlet of the TPR valve or its drain line for any reason.

TPR VALVE DRAIN

A copper drain line must be fitted to the TPR valve to carry the discharge clear of the water heater. Connect the drain line to the TPR valve using a disconnection union. The pipe work from the TPR valve to the drain should be as short as possible and fall all the way from the water heater with no restrictions. It should have no more than three right angle bends in it. Use DN15 pipe. The outlet of the drain line must be in such a position that flow out of the pipe can be easily seen (refer to AS/NZS 3500.4) - but arranged so hot water discharge will not cause injury, damage or nuisance. The drain line must discharge at an outlet or air break not more than 9 metres from the TPR valve.

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

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

EXPANSION CONTROL VALVE

Local regulations may make it mandatory to install an expansion control valve (ECV) in the cold water line to the water heater. In other areas, an ECV is not required unless the water saturation index is greater than +0.4. However, an ECV may be needed in a corrosive water area where there are sufficient quantities of silica dissolved in the water. For this Solahart Water Heater an RMC H50 Cold Relief Valve (part no 45-1103) is used as the ECV.

The ECV must always be installed after the TRIO valve (part no 33-1675), and must be the last valve installed prior to the water heater (see a typical cold water configuration page 10). A copper drain line must be run separately from the drain of the TPR valve. The TRIO valve in the cold water inlet line also enables the water to be turned OFF for servicing purposes.

DRAIN LINES - GENERAL

The TPR valve and ECV should both have drain pipes connected to their outlets. These pipes should run to ground level where hot water discharge is safe, and clear of any paved areas. Do not seal or block the ends of these drain pipes or the valve outlets. Do not allow water from the valve outlets or drain pipes to drip or discharge onto roofing materials or roof gutters.

VALVE LOCATION

All the valves in the inlet line must be located at least 1 metre away from the heater and within easy reach, no more than 1.8 metres above ground level. The valves should not be located on the house roof and NOT IN THE CEILING SPACE.

WATER PRESSURE

Where the supply water pressure frequently exceeds 850 kPa, an additional pressure-limiting valve will be necessary to limit the incoming mains pressure to 600 kPa. In cases where a pressure-limiting valve is not fitted, the occurrence of any pressure in excess of 600 kPa under any circumstances will automatically invalidate the Warranty given by Solahart.

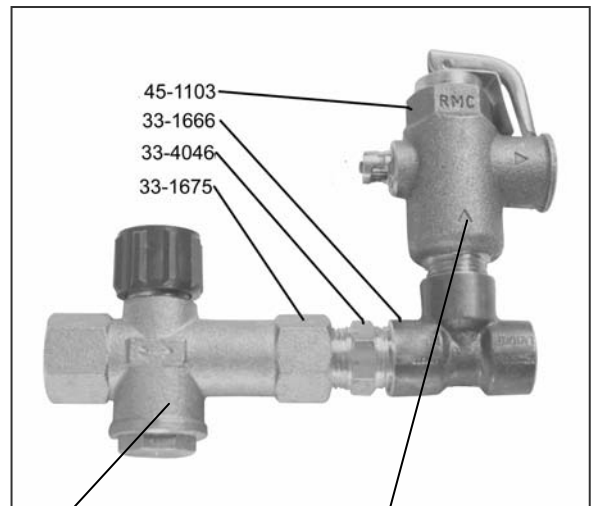
SUPPLEMENTARY ENERGY SUPPLIES

The standard TPR valve that is fitted to the tank is rated at 10 kW. Supplementary energy supplies giving a combined total heat input in excess of 10 kW including the electric booster should not be fitted to the heater unless the TPR valve is replaced with another of a larger capacity.

TPR VALVE (45-1104)



Typical Cold Water Inlet Configuration



TRIO Valve (33-1675)
Non Return & Isolating
Valve with Strainer

H50 Cold Relief
Valve (45-1103)

FROST / FREEZE PROTECTION

Open Circuit Thermosyphon (L) systems are not suitable for locations that are prone to freeze conditions or where the air temperature can fall below 5°C (41°F). In areas that are prone to frost / freezing, it is recommended that a Closed Circuit Thermosyphon (J or Kf) system be used.

The concentration of the Propylene Glycol solution (Heat Transfer Fluid) in the closed circuit should be determined by the minimum temperature that the system will be exposed to.

Freezing Point of Propylene Glycol (Hartgard) Solution

20% Propylene Glycol by volume	-7°C	18°F
30% Propylene Glycol by volume	-13°C	7°F
40% Propylene Glycol by volume	-22°C	-8°F
50% Propylene Glycol by volume	-34°C	-29°F

Solahart recommends using a 1 complete bottle of Hartgard in each system or a minimum concentration of 20% as this will cover most applications. If the system is to be installed in an area where the temperature falls below -34°C (-29°F), please contact your dealer for advice.

EXTERNAL PIPE INSULATION

Where potable water piping is in an external location or attic space where the temperature can be as low as -7°C (18°F), it must be insulated with a minimum $\frac{3}{4}$ " Armaflex (or similar) flexible elastomeric closed cell thermal insulation. Where the temperature can fall to -11°C (12°F), the insulation thickness must be increased to $1\frac{1}{2}$ ".

Insulation in external locations can deteriorate through UV radiation. To prevent this, a layer of outdoor UV stable paint or other similar protective coating must be applied to the insulation.

STOVE COIL BOOSTERS

Manually fed boosters such as stove coils, back boilers or coils in open fired grates are not permitted to be connected to Solahart heaters unless the storage cylinder is open vented. Such auxiliary energy sources must not be connected into the closed circuit. Installation details for these devices are available from Solahart on application. In Australia, refer to AS3500.1 for additional information. Refer also to your local water authority requirements for details of vent design, header tank and reduction valves.

ELECTRICAL ELEMENT BOOSTING

Some systems are supplied with an auxiliary electrical booster element which can be used as a boosting heater or as an emergency heater. If the element is present as an emergency heater it should only be used as an emergency heater.

IN-SERIES GAS BOOSTING

Refer to the installation manual provided with the kit.

INSTALLATIONS IN CYCLONE OR HURRICANE AREAS

In areas susceptible to cyclones, hurricanes or very high winds, a separate set of instructions and a modified mounting kit is available from Solahart. This kit is suitable for 'with-pitch' installations only.

PACKING, STORAGE & TRANSPORTATION

All Thermosyphon products are to be kept in the original packaging materials and should be stored or transported in the vertical position - note there is an arrow to indicate the 'UP' direction for Tanks.

SYSTEM DECOMMISSIONING

At the end of the product lifetime, decommissioning of the system should be undertaken by an installer or suitable qualified plumber and / or electrician (if required). All materials used in this product can be passed to your local material recycling centre for disposal - refer to local council regulations for details.

INSTALLERS CHECKLIST

- Ensure that the system is installed as directed in this manual
- Check that all mechanical fixings are secured
- Check that all pipe connections are correctly tightened
- Ensure potable water is connected and switched on
- Check that the potable water tank is filled
- For Closed Circuit systems ensure the closed circuit has been commissioned correctly and is filled with the correct concentration of Heat Transfer Fluid solution
- Ensure that electrical power is switched on (if required)
- Ensure the Collector covers are removed
- Ensure that any pipe connections through the roof have been sealed correctly
- Ensure the system is installed with the correct TILT (hot pipe side higher)
- In case of a remote installation make sure that a minimum of $\frac{3}{4}$ " or 22mm pipe is used and that the piping has a continuous upwards slope towards the tank.

NOTICE TO VICTORIAN CUSTOMERS

The Victorian Plumbing Industry Commission advises that this appliance must be installed by a licensed person as required by the Victorian Building Act 1993.

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

INSTALLATION INSTRUCTIONS - CLOSED CIRCUIT SERIES

THE TANKS AND COLLECTORS ARE HEAVY. IMPROPER LIFTING TECHNIQUES COULD RESULT IN PERSONAL INJURY DURING INSTALLATION. IT IS THE INSTALLER'S RESPONSIBILITY TO USE ONLY APPROVED LIFTING AND SAFETY DEVICES AND TECHNIQUES WHEN LIFTING COLLECTORS AND TANKS ON ROOFS.

Select the location of the storage tank. The front mounting foot of the tank should be positioned directly over a tile batten. Remove several tiles to expose the rafters and this batten.

Measure 2050 mm down (1270 mm for 301 & 221 Closed Circuit System) from the centre of the batten to determine the location of the collector rail. (refer to drawings, Page 35) Mark this location. Remove several roofing tiles from this location to expose the rafters. Hook the two stainless steel straps (Part No. 33-0847, three for the 303 Closed Circuit System) to the rail and line up the straps with the rafters. Ensure that they are no more than 1.6 m apart and not closer than 1 m.

After positioning the rail level, raise the left hand side 12 mm for each collector fitted (ie 12 mm for a single collector system, 24 mm for a two collector system, 36 mm for a three collectors etc) and fix the straps to the rafters. Replace the tiles (refer to drawings, Page 35).

Move back up to where the storage tank is to be positioned. Place the aluminium flashing over this row of tiles and tuck the top of the flashing under the row above.

Now using a lifting device, lift the collectors onto the roof and place them carefully into the collector rail. Remove the red transit plugs from the collector sockets.

Join the collectors together using the collector connector assemblies (Part No. 33-7121). On systems that use conetite fittings, ensure the fittings are fully inserted into the sockets before tightening the nuts. Only medium spanner pressure will be required.

The conetite fittings should be used only once. If for any reason, assemblies with conetite fittings need to be removed, replace them completely with new assemblies.

Fit the fill assembly (Part No. 33-7134) and the collector bung assembly (Part No. 33-7135) into the bottom left and top right hand corners (respectively) of the left and right hand collectors (respectively) using medium spanner pressure. Centralise the collectors on the rail, and lock the collectors to the rail with the 4 collector clamps and tighten, using the nuts and bolts provided.

For roof installations, slide the tank-to-collector spacers (Part No. 33-7144) over the top of the collectors. These should be located 200 mm from the outer edge of the collectors, and on a high spot of the tiles (or profile for metal roofs).

Now using a lifting device, lift the tank onto the roof. Place the tank onto an aluminium flashing, **and locate the tank central to the collectors** before sliding it down onto the spacers.

Secure the tank to the roof rafters in a similar manner to that for the collectors, using the tank straps (Part No. 33-0845) and the aluminium clamps (Part No. 33-0847). Loosely attach the tank clamps to the rear foot of the tank base, and clip in and bolt the tank straps as per drawings, Page 35. Ensure the bolt heads fit into the valley of the tile.

Remove the yellow instruction label from the cold pipe. Fit the cold pipe first at the right hand side of the tank and insert the other end of the pipe to the lower collector socket and tighten.

Remove the yellow instruction label from the hot pipe. Fit the hot pipe first at the left hand side of the tank. Tighten collector-side nut, before tightening tank-side nut. The floating conetite should always be on the tank-side.

Note that neither the hot nor the cold pipes (collector return and flow lines) require insulation on these systems. It is recommended however insulation be fitted to these should the system be installed on a metal or trafficable roof.

When in position, secure the tank straps to the roof rafters as for the collector strap. Ensure the straps are tight. Replace the roof tiles. Fit the Pressure/Temperature Operated Relief Valve (Part No. 45-1104) into the tank as per water connection diagrams, Page 34.

If the installation involves the Hartstat System this should now be fitted. Refer to the installation instructions provided with the Hartstat Kit for details.

FIBRO CEMENT OR METAL SHEET ROOFING

Select a location for the storage tank, close to a purlin. Avoid locating tank at mid-span of sheeting. Fixing and assembly procedures are similar to that detailed for tiled roofs, with the exception that the tank straps and the collector straps are fixed with coach screws to the purlins below (refer to drawings, Page 35).

METAL TILED ROOF

Select a location for the storage tank. The front mounting foot of the tank should be positioned directly over a tile batten. Fixing and assembly procedures are similar to that detailed for tiled roofs, except that the tank and collector straps are fixed with spring head galvanised nails directly through the metal tiles into the rafters below. Seal under the straps with a weatherproof mastic sealer.

INSTALLATIONS USING STANDS

Refer to installation sheet in the stand kit.

SPECIAL CONSIDERATIONS FOR COLD CLIMATES

In areas where air temperatures fall below -15°C at any time or where snow will remain on the ground for more than 24 hours continuously, refer to Solahart for specific recommendations on suitability of location.

In areas subject to heavy snowfalls, care should be taken that snow cannot build up behind the tank and that the brackets installed are capable of withstanding the expected snow loading. In these cases install the tank as close as possible to the roof ridge.

In areas where temperatures may fall below 0°C special care must be taken to ensure that exposed lengths of the hot and cold pipes and the inlet and outlet pipes of the solar hot water heater are insulated and moisture proofed. Ensure that pipes and valves are located away from freeze locations wherever possible. Note that freezing of the valves can permanently damage the valves. Take particular care at roof penetrations.

Install the TRIO Valve and Cold Relief Valve indoors (eg. in the laundry) or in other locations not subject to freezing, but NOT in the ceiling space. If these valves are located external to the building they must be insulated with at least 19 mm of fibreglass or foam insulation, and sealed to prevent entry of moisture. A satisfactory location in frost areas is on an external wall high under the eaves.

In locations frequently subject to atmospheric temperature below -10°C, hot and cold pipes and valves may freeze even when insulated. It is recommended that in these locations, the cold pipes and valves to the Solahart storage tank and the hot pipe from the tank should have electric heater tape under the insulation. The electric heater tape should have a heat output of between 10 and 20 W/m. The tape should be a self-limiting tape such as "Raychem" and should be controlled by a thermostat set at 0°C. Connect the heater tape to a normally ON power supply.

FILLING AND COMMISSIONING OF THE STORAGE TANK

Do not turn on the electric power or gas until the tank has been filled with water. Turn on at least one hot water outlet tap - preferably over a bath or laundry basin. Open the mains water supply tap on the line to the water heater and allow the water to fill the storage cylinder displacing air out of the top of the cylinder through the open tap. As soon as water flows freely (without air bursts) from the tap, close the tap and allow the cylinder to pressurise. Check all joints for water tightness.

Turn on the electric power or gas to the booster element ensuring that the power or gas is correctly connected i.e. 'Active' line to 'Active' terminal etc.

Operate both pressure relief valves easing gear to ensure that the valves are functional. The storage tank is now filled and ready to operate as an electric or gas water heater. To operate as a solar water heater, the closed circuit must be commissioned by an authorised Solahart installer or service contractor.

FILLING AND COMMISSIONING THE CLOSED CIRCUIT

The solar collectors and tank heat exchanger jacket are connected together to create a sealed, closed circuit that is entirely separate from the potable water in the storage cylinder. The circuit is filled with 'Hartgard' fluid. Under no circumstances can any fluids other than 'Hartgard' be used as the heat transfer fluid.

Only Solahart trained and authorised installers are permitted to fill the closed fluid circuit. Refer to your Solahart dealer for more information. For authorised installers, a special set of instructions and installation tools are provided.

Only potable water can be used in conjunction with 'Hartgard'. Refer to the section on water quality on Page 6 of this manual.

THE STORAGE TANK MUST BE FILLED WITH WATER BEFORE FILLING THE CLOSED CIRCUIT.

Instructions detailing the closed circuit commissioning process are provided on the following two pages.

PRECAUTIONS WITH HARTGARD – RAINWATER TANKS

While Hartgard is non toxic to humans, it does have an adverse effect on water stored in rainwater tanks. Hartgard will kill microscopic algae that is typically present in rainwater tanks. This may then render the rainwater foul and unfit for human consumption. Solahart recommends that installers ensure that rainwater tanks cannot be contaminated with Hartgard solution. Before installing a closed circuit system, the installer should determine whether the run-off from the roof on which the system will be mounted, is collected in a rainwater tank.

If this is the case, then the section of gutter immediately beneath the proposed location of the new Solahart system should be isolated from the rainwater collection system. This can be done by blocking that section of gutter from the remaining gutter, and fitting a separate down pipe to take any run-off water from that section of roof away to waste. If this is not practical for a specific installation, then the installer should discuss the possible options with the home owner.

This should be done prior to installing the new system, so that any leak or spillage during installation does not make its way into the rainwater tank.

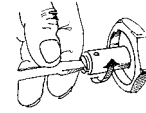
If a rainwater tank does become contaminated, then the following actions are necessary to return the water supply to a consumable state.

- a. Correct the leak or spillage.
- b. Wash down the roof area where the spill or leak has occurred.
- c. Flush out the gutters and down pipes.
- d. Empty the rainwater tank, and clean out all algae from the inside of the tank.
- e. Refill the rainwater tank with fresh water.

CLOSED CIRCUIT COMMISSIONING PROCEDURE – GENERAL

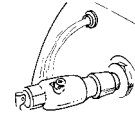
Remove the Fill Plug from the Collector Fill Assembly.
Remove PR6/PR200 Valve from the Tank.
Connect a ½” hose to the Collector Fill Assembly
and fill the Closed Circuit with water.
(Hose to be supplied by Installer).

1



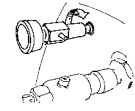
Continue filling until water overflows from the
Jacket Relief Valve Port and there are no air bubbles
in the overflowing water.

2



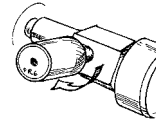
Fit the Test Block into the Jacket Relief Valve Port.

3



Fit the PR6/PR200 Valve to the Test Block.

4



Remove the hose from the Collector Fill Assembly
and replace the Fill Plug as quickly as possible
to minimise fluid spillage.

5



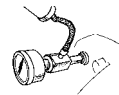
CAUTION: *If more than 0.5 litres of fluid is spilled, repeat steps 1-5*

When charging the system using a PR200 Valve, pressurise the system until the PR200 Valve opens or until a pressure of 170kPa is read on the pressure gauge, whichever happens first.

When charging the system using a PR6 Valve, pressurise the system until the PR6 Valve opens or until a pressure of 80kPa is read on the pressure gauge, whichever happens first.

Connect a bicycle pump/portable compressor
to the Test Block and pressurise the Closed Circuit
to 80kPa/170kPa, as appropriate.
Remove bicycle pump/portable compressor from Test Block.

6

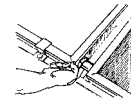


WARNING:

Do not allow the Closed Circuit pressure to rise above 200kPa or permanent system damage may occur.

If the PR6/PR200 Valve opens during the pressure test, wait
until the Valve re-seals before checking all connections for
evidence of leakage.
If the Valve does not open during the pressure test then
check all connections for any evidence of leakage.

7



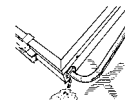
Ensure that the Closed Circuit pressure
remains stable for at least 10 minutes.

8



If any leakage is observed at any of the connections,
rectify the problem and repeat steps 1 to 8.

9



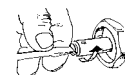
Release the pressure from the Closed Circuit
by removing the PR6/PR200 Valve from the Test Block.
Once the pressure is relieved, replace PR6/PR200 Valve.

10



Remove the Fill Plug from the Fill Assembly
and connect the ½” hose as quickly as possible
to minimise fluid spillage.

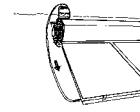
11



CAUTION: If more than 0.5 litres of fluid is spilled, repeat steps 1-5

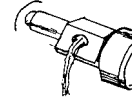
Remove the PR6/PR200 Valve and siphon the entire contents of the Hartgard container into the Closed Circuit using the ½" hose.

12



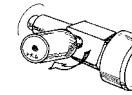
Water will flow from the PR6/PR200 Valve Port during this operation (4.5 litres for each container of Hartgard).

13



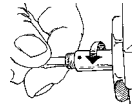
When the Hartgard container is empty, flush approx 1 litre of clean water through the hose into the Collector (to ensure all of the Hartgard has been siphoned into the system), and refit the PR6/PR200 Valve to the Test Block.

14



Remove the hose from the Fill Assembly and screw in the Fill Plug as quickly as possible to minimise fluid spillage.

15



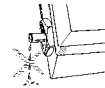
CAUTION: If more than 0.5 litres of fluid is spilled, repeat steps 1-5

When charging the system using a PR200 Valve, pressurise the system until the PR200 Valve opens or until a pressure of 170kPa is read on the pressure gauge, whichever happens first.

When charging the system using a PR6 Valve, pressurise the system until the PR6 Valve opens or until a pressure of 80kPa is read on the pressure gauge, whichever happens first.

Pressurise the Closed Circuit to 80kPa/170kPa, as appropriate, using the bicycle pump/portable compressor and ensure there is no leak at the Fill Assembly. Remove bicycle pump/portable compressor from Test Block.

16



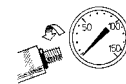
Ensure that the pressure remains stable for at least 10 minutes.

17



Release the pressure from the Closed Circuit by removing the PR6/PR200 Valve from the Test Block.

18



Remove the Test Block from the Tank.

19



Fit the PR6/PR200 Valve to the Jacket Relief Valve Port when ready or as soon as water starts to be expelled (440 systems).

20



The closed circuit system is now ready for operation.

INSTALLATION INSTRUCTIONS – OPEN CIRCUIT SERIES

THE TANKS AND COLLECTORS ARE HEAVY. IMPROPER LIFTING TECHNIQUES COULD RESULT IN PERSONAL INJURY DURING INSTALLATION. IT IS THE INSTALLER'S RESPONSIBILITY TO USE ONLY APPROVED LIFTING AND SAFETY DEVICES AND TECHNIQUES WHEN LIFTING COLLECTORS AND TANKS ON ROOFS.

Select the location of the storage tank. The front mounting foot of the tank should be positioned directly over a tile batten. Remove several tiles to expose the rafters and this batten. Measure 2050 mm down (1170 mm for 30IL & 221L) from the centre of the batten to determine the location of the collector rail. (refer to drawings, Page 35) Mark this location. Remove several roofing tiles from this location to expose the rafters. Hook the two stainless steel straps (Part No. 33-0847, three for 303L) to the rail and line up the straps with the rafters. Ensure that they are no more than 1.6m apart and no closer 1m.

After positioning the rail level, raise the right hand side 12 mm for each collector fitted (i.e. 12 mm for a single collector system, 24 mm for a two collector system, 36 mm for a three collector system etc) and fix the straps to the rafters. Replace the tiles (refer to drawings, Page 35).

Move back up to where the storage tank is to be positioned. Place the aluminium flashing over this row of tiles and tuck the top of the flashing under the row above. Now using a lifting device lift collectors onto the roof. Place the collectors carefully into collector rail. Remove the red transit plugs from the collector with a screwdriver. Silicon O-rings are supplied in the Parts Box and must be fitted at each pipe connection.

Join the collectors using the collector unions provided (Part No. 33-0695). Apply only medium pressure with a spanner to tighten. Centralise the collectors on the rail. Lock the collectors to the rail with the 4 collector clamps. Tighten using the nuts and bolts provided. Fit the copper blanking discs (Part No. 33-0606) and collector nuts (Part No. 33-0600) into the top left hand corner of the left hand collector and into the bottom right hand corner of the right hand collector.

Now use a lifting device to lift the tank onto the roof. Place the tank onto the aluminium flashing, central to the collectors. Fit the collector hot pipe into the top right hand corner of the right hand collector. Fit the collector cold pipe into the lower left hand corner of the left hand collector. After lining up the connecting pipes with the tank, fit the hot pipe. Fit the cold pipe to the tank cold inlet socket.

Note that neither the hot nor the cold pipes (collector return and flow lines) require insulation on these systems. It is recommended however insulation be fitted to these should the system be installed on a metal or trafficable roof.

Secure the tank to the roof rafters in a similar manner to the collector using the tank straps (Part No. 33-0845) and the aluminium clamps (Part No. 33-0847). Loosely attach the tank clamps to the rear foot of the tank base, and clip in and bolt the tank straps as per drawings, Page 35. Ensure that the bolt heads fit into the valley of the tile. Ensure straps are tight. Replace roof tiles.

Fit the temperature and pressure relief valve (Part No. 45-1104) into the tank as per the connection diagram on Page 34.

FIBRO CEMENT OR METAL SHEET ROOFING

Select a location for the storage tank close to a purlin. Avoid locating tank at mid-span of sheeting. Fixing and assembly procedures are similar to that detailed for tiled roofs, with the exception that the tank straps and the collector straps are fixed with coach screws to the purlins below (refer to drawings, Page 35).

METAL TILED ROOF

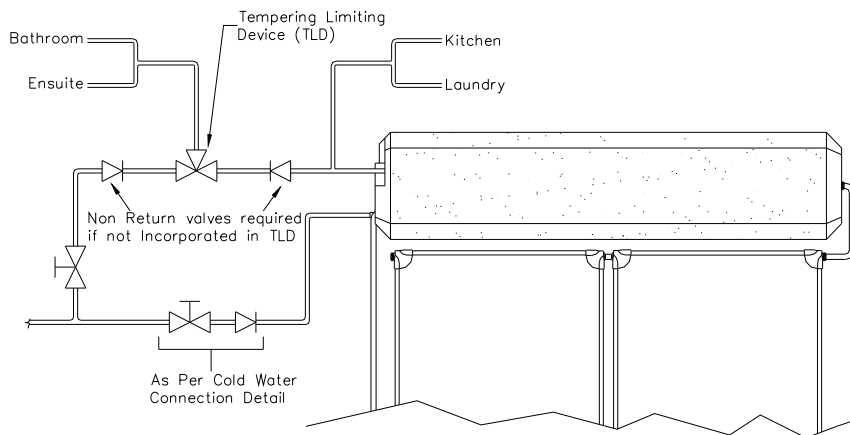
Select a location for the storage tank. The front mounting foot of the tank should be positioned directly over a tile batten. Fixing and assembly procedures are similar to that detailed for tiled roofs, except that the tank and collector straps are fixed with spring head galvanised nails directly through the metal tiles into the rafters below. Seal under the straps with a weatherproof mastic sealer.

STANDS

Refer to installation sheet in the stand kit.

INSTALLATIONS USING CONNECTION OF TEMPERATURE LIMITING DEVICES

In the event of the collectors stagnating and generating steam, it is possible that high temperature water may by-pass the temperature limiting device. To prevent this from occurring please follow the connection details shown below.



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

WARNING: A non return valve **MUST BE** installed on the cold water line to the solar storage tank **AFTER** the cold water branch to a temperature limiting device prior to an open circuit direct system.

If a combination isolation valve and non return valve (duo or trio valve) is installed on the cold water line to the solar water heater and the cold water line to the temperature limiting device branches off after this valve prior to an open circuit direct system, then a second non return valve must be installed between the cold water branch and the solar storage tank.

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

In systems where a temperature limiting valve used, ensure the limiting temperature complies with local building / plumbing codes and is not higher than 60°C.

FILLING AND COMMISSIONING THE STORAGE TANK AND COLLECTORS

DO NOT TURN ON ELECTRIC POWER OR GAS UNTIL AFTER THE VESSEL HAS BEEN FILLED WITH WATER.

Turn on a least one hot water outlet tap, preferably over a bath or laundry basin. Open the mains water supply valve on the line to the water heater to allow water to fill the storage cylinder and collectors, dispelling air out of the top of the cylinder through the open tap. As soon as water flows freely (without air bursts) from the tap, close the tap and allow the cylinder to pressurise. Check all joints for water tightness.

Turn ON the electric power or gas to the booster element ensuring that the power or gas is correctly connected i.e. 'Active' line to 'Active' terminal etc.

Operate the easing lever on both pressure relief valves to ensure that the valves are functional. The system tank is now filled and ready to operate.

TECHNICAL SPECIFICATIONS

Systems	151L & 151L FREE HEAT	151J	151KF	181L & 181L FREE HEAT	181J & 181J FREE HEAT	181KF & 181KF FREE HEAT	182L & 182L FREE HEAT	182J & 182J FREE HEAT	182KF & 182KF FREE HEAT
Delivery litres	130	130	130	160	160	160	160	160	160
(solar) US gal.	34	34	34	42	42	42	42	42	42
Delivery litres	128	128	128	153	153	153	153	153	153
(aux. boost) US gal.	34	34	34	40.6	40.6	40.6	40.6	40.6	40.6
Weight kg	239	256	256	275	292	292	311	337	338
(full) lbs	527	564	564	606	644	644	685	743	745
Weight kg	86	102	102	92	108	108	125	153	154
(empty) lbs	190	225	225	203	238	238	276	337	339
Length m	2.475	2.475	2.475	2.475	2.475	2.475	2.475	2.475	2.475
in	97.5	97.5	97.5	97.5	97.5	97.5	97.5	97.5	97.5
Height m	0.51	0.51	0.51	0.51	0.51	0.51	0.51	0.51	0.51
in	20.1	20.1	20.1	20.1	20.1	20.1	20.1	20.1	20.1
Width m	1.29	1.29	1.29	1.485	1.485	1.485	2.31	2.31	2.31
in	50.1	50.1	50.1	58.5	58.5	58.5	90.9	90.9	90.9
Working kPa	1000	1000	1000	1000	1000	1000	1000	1000	1000
Pressure psi	145	145	145	145	145	145	145	145	145
Test kPa	2100	2100	2100	2100	2100	2100	2100	2100	2100
Pressure psi	305	305	305	305	305	305	305	305	305
Tank type	150L or 150LF	150J	150J	180L or 180LF	180J or 180F	180J or 180F	180L or 180LF	180J or 180F	180J or 180F
Type of Collector	L	J	KF	L	J	KF	L	J	KF
Number of Collectors	1	1	1	1	1	1	2	2	2

Systems	221L & 221L FREE HEAT	221J & 221J FREE HEAT	221KF & 221 KF FREE HEAT	301L & 301L FREE HEAT	301J & 301J FREE HEAT	301KF & 301KF FREE HEAT	302L & 302L FREE HEAT	302J & 302J FREE HEAT	302KF & 302KF FREE HEAT
Delivery litres	200	200	200	260	260	260	260	260	260
(solar) US gal.	52	52	52	68	68	68	68	68	68
Delivery litres	184	184	184	246	246	246	246	246	246
(aux. boost) US gal.	48.6	48.6	48.6	65	65	65	65	65	65
Weight kg	324	347	347	421	448	448	457	495	495
(full) lbs	714	765	765	928	987	987	1007	1091	1091
Weight kg	101	123	123	118	144	144	151	186	186
(empty) lbs	223	271	271	260	317	317	333	410	410
Length m	2.475	2.475	2.475	2.475	2.475	2.475	2.475	2.475	2.475
in	97.5	97.5	97.5	97.5	97.5	97.5	97.5	97.5	97.5
Height m	0.51	0.51	0.51	0.51	0.51	0.51	0.51	0.51	0.51
in	20.1	20.1	20.1	20.1	20.1	20.1	20.1	20.1	20.1
Width m	1.76	1.76	1.76	2.31	2.31	2.31	2.31	2.31	2.31
in	69.3	69.3	69.3	90.9	90.9	90.9	90.9	90.9	90.9
Working kPa	1000	1000	1000	1000	1000	1000	1000	1000	1000
Pressure psi	145	145	145	145	145	145	145	145	145
Test kPa	2100	2100	2100	2100	2100	2100	2100	2100	2100
Pressure psi	305	305	305	305	305	305	305	305	305
Tank type	220L or 220LF	220J or 220F	220J or 220F	300L or 300LF	300J or 300F	300J or 300F	300L or 300LF	300J or 300F	300J or 300F
Type of Collector	L	J	KF	L	J	KF	L	J	KF
Number of Collectors	1	1	1	1	1	1	2	2	2

Systems	303L & 303L FREE HEAT	303J & 303J FREE HEAT	303KF & 303KF FREE HEAT	443L & 443L FREE HEAT	443J & 443J FREE HEAT	443KF & 443KF FREE HEAT	444L & 444L FREE HEAT	444J & 444J FREE HEAT	444KF & 444KF FREE HEAT
Delivery litres	260	260	260	400	400	400	400	400	400
(solar) US gal.	68	68	68	105	105	105	105	105	105
Delivery litres	246	246	246	359	320	320	320	320	320
(aux. boost) US gal.	65	65	65	94.9	84.5	84.5	84.5	84.5	84.5
Weight kg	493	540	552	676	730	730	712	775	788
(full) lbs	1087	1190	1217	1490	1609	1609	1569	1708	1737
Weight kg	184	228	229	250	289	289	260	319	332
(empty) lbs	406	503	505	551	637	637	573	703	732
Length m	2.475	2.475	2.475	2.475	2.475	2.475	2.475	2.475	2.475
in	97.5	97.5	97.5	97.5	97.5	97.5	97.5	97.5	97.5
Height m	0.51	0.51	0.51	0.51	0.51	0.51	0.51	0.51	0.51
in	20.1	20.1	20.1	20.1	20.1	20.1	20.1	20.1	20.1
Width m	3.16	3.16	3.16	3.34	3.34	3.34	4.36	4.36	4.36
in	124.4	124.4	124.4	131.5	131.5	131.5	171.8	171.8	171.8
Working kPa	1000	1000	1000	1000	1000	1000	1000	1000	1000
Pressure psi	145	145	145	145	145	145	145	145	145
Test kPa	2100	2100	2100	2100	2100	2100	2100	2100	2100
Pressure psi	305	305	305	305	305	305	305	305	305
Tank type	300L or 300LF	300J or 300F	300J or 300F	440L or 440LF	440J or 440F	440J or 440F	440L or 440LF	440J or 440F	440J or 440F
Type of Collector	L	J	KF	L	J	KF	L	J	KF
Number of Collectors	3	3	3	3	3	3	4	4	4

Notes: Solar Delivery: typical draw from field tests, methodology analogous to AS1056.1
 Aux. Boost Delivery measured as prescribed by AS1056.1 Appendix C.

TECHNICAL SPECIFICATIONS (cont)

Tanks		150L & 150LF	150J	180L & 180LF	180J	180F	220L & 220LF	220J	220F	300L & 300LF	300J	300F
Capacity	litres	150	150	180	180	180	220	220	220	300	300	300
	US gal.	40	40	48	48	48	58	58	58	80	80	80
Weight (full)	kg	199	206	235	245	246	284	297	298	381	398	399
	lbs	439	454	518	540	542	626	655	657	840	877	879
Weight (empty)	kg	49	56	55	65	66	64	77	78	81	98	99
	lbs	108	123	121	143	145	141	170	172	179	216	218
Length	m	1.28	1.28	1.494	1.494	1.494	1.76	1.76	1.76	2.31	2.31	2.31
	in	50.4	50.4	58.8	58.8	58.8	69.3	69.3	69.3	91	91	91
Height & width	m	0.51	0.51	0.51	0.51	0.51	0.51	0.51	0.51	0.51	0.51	0.51
	in	20.1	20.1	20.1	20.1	20.1	20.1	20.1	20.1	20.1	20.1	20.1

Tanks		440L & 440LF	440J	440F
Capacity	litres	440	440	440
	US gal.	116	116	116
Weight (full)	kg	564	587	588
	lbs	1243	1294	1294
Weight (empty)	kg	124	147	148
	lbs	273	324	324
Length	m	3.285	3.285	3.285
	in	129.3	129.3	129.3
Height & width	m	0.51	0.51	0.51
	in	20.1	20.1	20.1

Cylinder material Steel, low carbon, 2.5 mm (0.1")
 Cylinder lining Primaglaze: ceramic vitreous enamel, 2 coats
 Insulation Polyurethane: pressure injected foam, zero CFC
 Case Aluminium: marine grade, 0.4 mm (0.2")
 End caps Polypropylene: carbon black, UV stabilised
 Anode Magnesium, sacrificial, with steel core

Auxiliary Electric Booster	Natural Wonder Gas Booster
Type: Copper sheath, immersion	Type: Fan forced
Rating (kW): 1.8, 2.4, 3.0, 3.6, 4.8	Rating: 13MJ/h
Supply Voltage: 220V - 250V	Supply Voltage: 220V - 250V

Collectors	L	J	KF	
Aperture	m ²	1.87	1.87	1.87
	ft ²	20	20	20
Capacity	litres	3	3.5	3.5
	US gal.	0.8	0.9	0.9
Weight (full)	kg	36	46	46
	lbs	79	101	101
Weight (empty)	kg	33	42	42
	lbs	73	93	93
Length	m	1.937	1.937	1.937
	in	76.6	76.6	76.6
Depth	m	0.077	0.077	0.077
	in	3	3	3
Width	m	1.022	1.022	1.022
	in	40.24	40.24	40.24
Working pressure	kPa	850	80	80
	psi	85	12	12
Test pressure	kPa	150	450	450
	psi	22	64	64
No of risers		6	35	35
Riser material	Copper	Steel	Steel	
Absorber material	Aluminium	Steel	Steel	
Absorber surface	P*	P*	C*	

Tray: Aluminium: 0.6 mm
 Insulation: Polyester: 55mm - L and J
 Glasswool: 55mm - KF
 Glass: Tempered Low Iron, 3.2mm thick

P* = Polyester powder coat
 C* = Chromonyx selective surface

ANNUAL PERFORMANCE CALCULATIONS FOR EUROPE

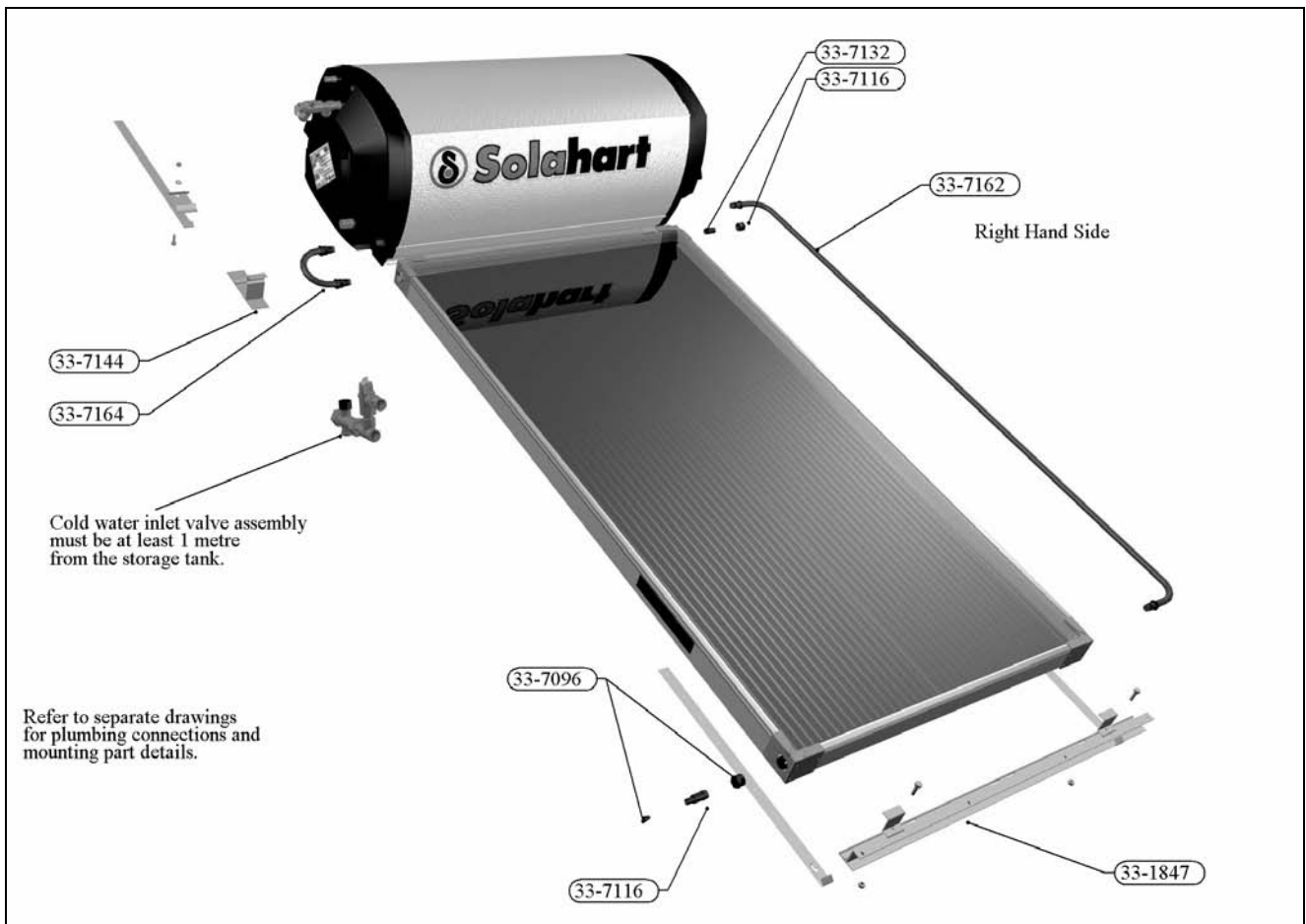
Annual performance calculation of Solahart thermosyphon systems according EN12976 SolarKeyMark Systems, ITW Test Report No 04SYS30 for the 302Kf system and INETI Test Report No 10/101.104/2005 for the 302J system.

Qd = energy demand
 QL = solar energy (load)
 f-sol = solar fraction

Demand	Location	Latitude	200 litres/day				250 litres/day				300 litres/day						
			Qd	302Kf		302J		Qd	302Kf		302J		Qd	302Kf		302J	
				QL	f-sol	QL	f-sol		QL	f-sol	QL	f-sol		QL	f-sol	QL	f-sol
MJ	MJ	%	MJ	%	MJ	MJ	%	MJ	%	MJ	MJ	%	MJ	%	MJ	%	
Stockholm	69.6 N	11164	5582	50	3671.9	32.9	1393	9	6307	45.3	4453	32	16746	6812	40.7	4934.8	29.5
Wurzburg	49.5 N	10628	5929	55.8	3162	29.6	1327	7	6843	51.5	3865.4	28.9	15926	7506	47.1	4281.5	26.7
Davos	46.8 N	12110	8767	72.4	5507.9	45.5	1513	7	9871	65.2	6723.3	44.5	18165	10565	58.2	7460.6	41.4
Athens	38.0 N	8326	6118	73.5	4427.5	53.3	1040	7	7159	68.8	5442.2	52.4	12488	7979	63.9	6175.8	49.5

INSTALLATION DIAGRAM

MODELS 151J & 151KF



For general (for ALL models) Installation Instructions, refer to Page 8.

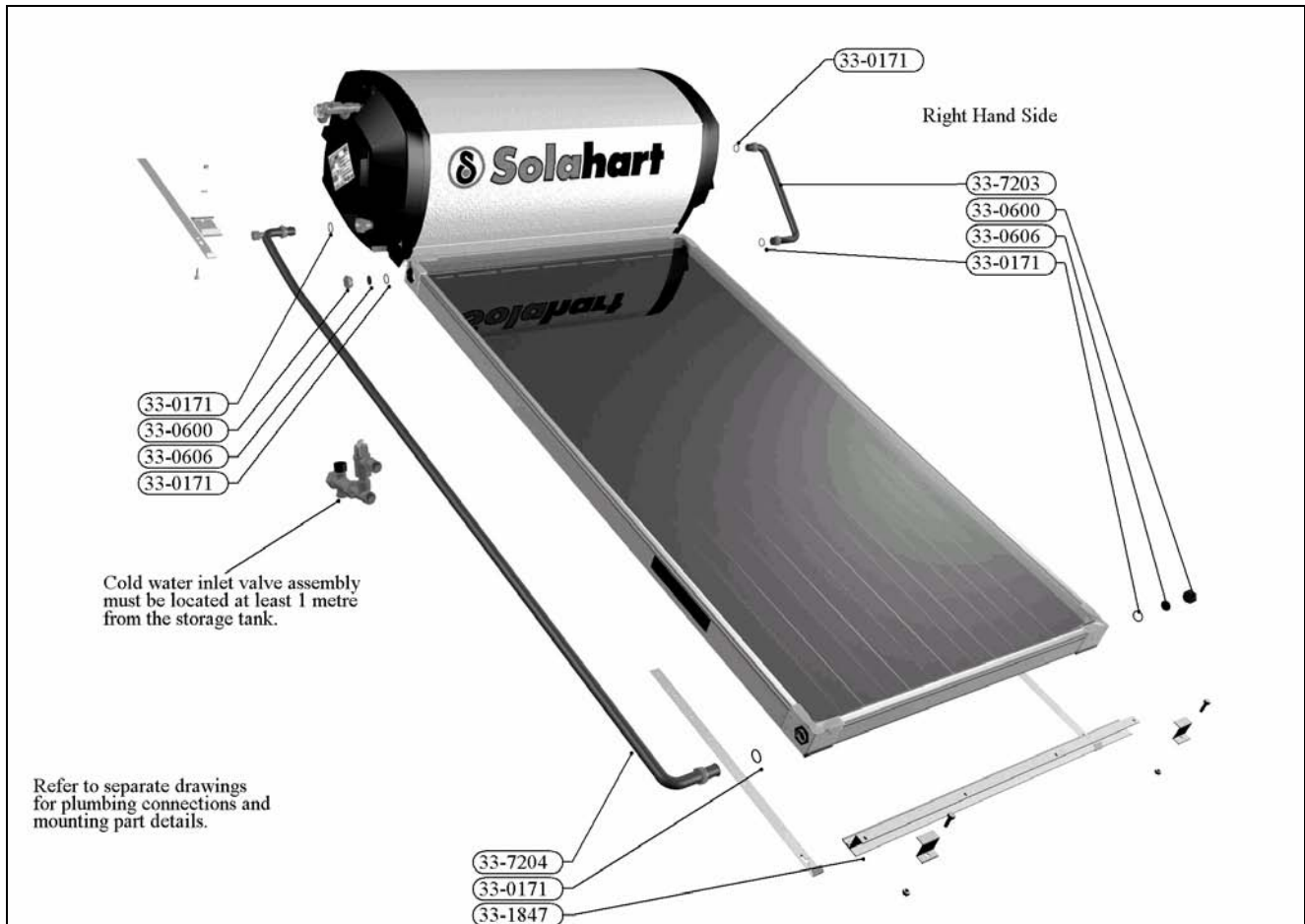
For Installation Instructions on Closed Circuit models, refer to Page 12.

For Water Connection details, refer to Page 34.

For Tank and Collector fixing details, refer to Page 35.

INSTALLATION DIAGRAM

MODELS 151L & 151L FREE HEAT



For general (for ALL models) Installation Instructions, refer to Page 8.

For Installation Instructions on Open Circuit models, refer to Page 16.

For Water Connection details, refer to Page 34.

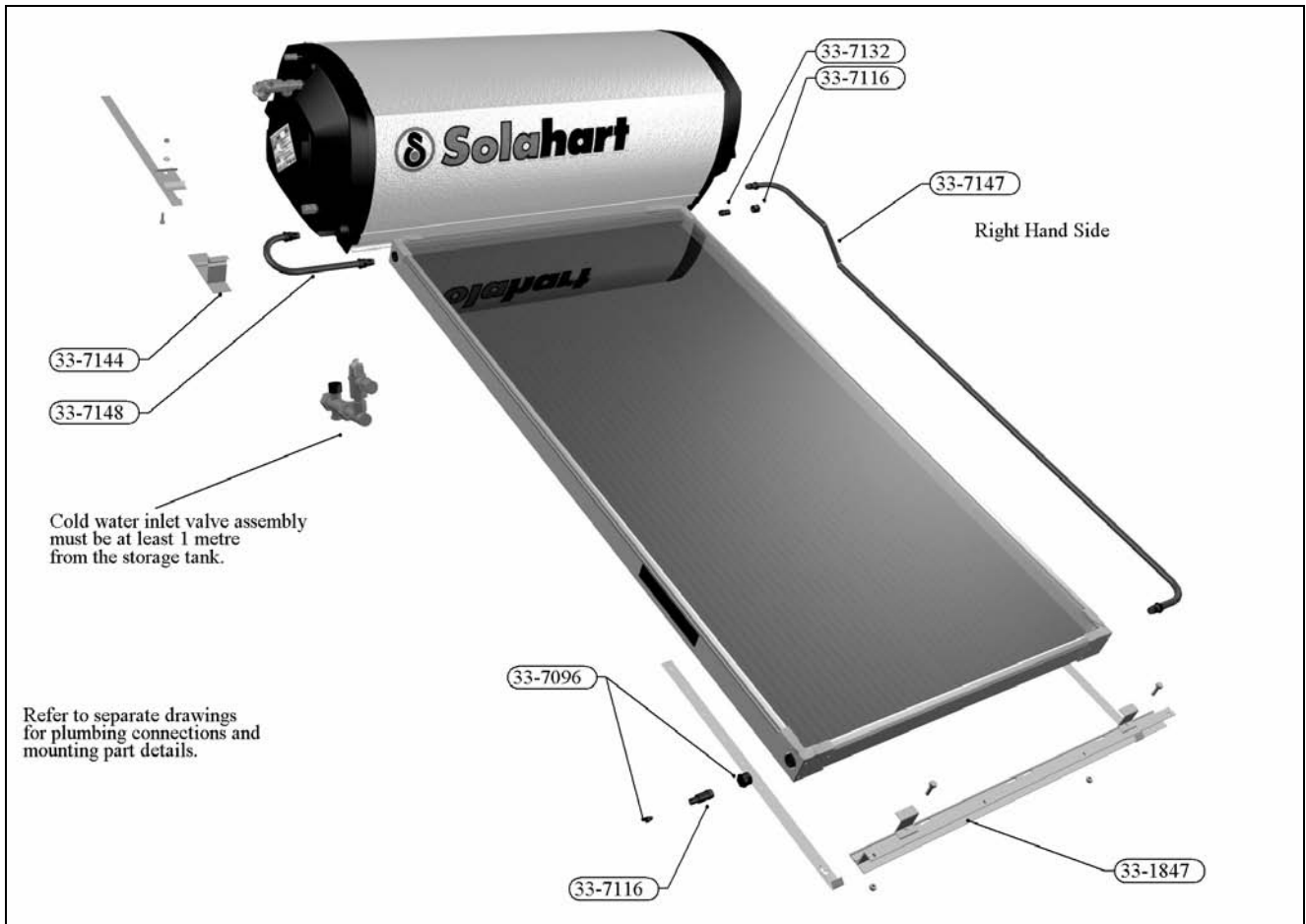
For Tank and Collector fixing details, refer to Page 35.

PLEASE NOTE

Solahart Open Circuit systems (L & L Free Heat) are not intended under any circumstances for use in a known frost area. An L or L Free Heat system installed in a known frost area does not carry any warranty. Solahart Closed Circuit Series heaters are specially designed for frost prone and bad water areas and should always be installed in these conditions.

INSTALLATION DIAGRAM

MODELS 181J, 181KF, 181J FREE HEAT & 181KF FREE HEAT



For general (for ALL models) Installation Instructions, refer to Page 8.

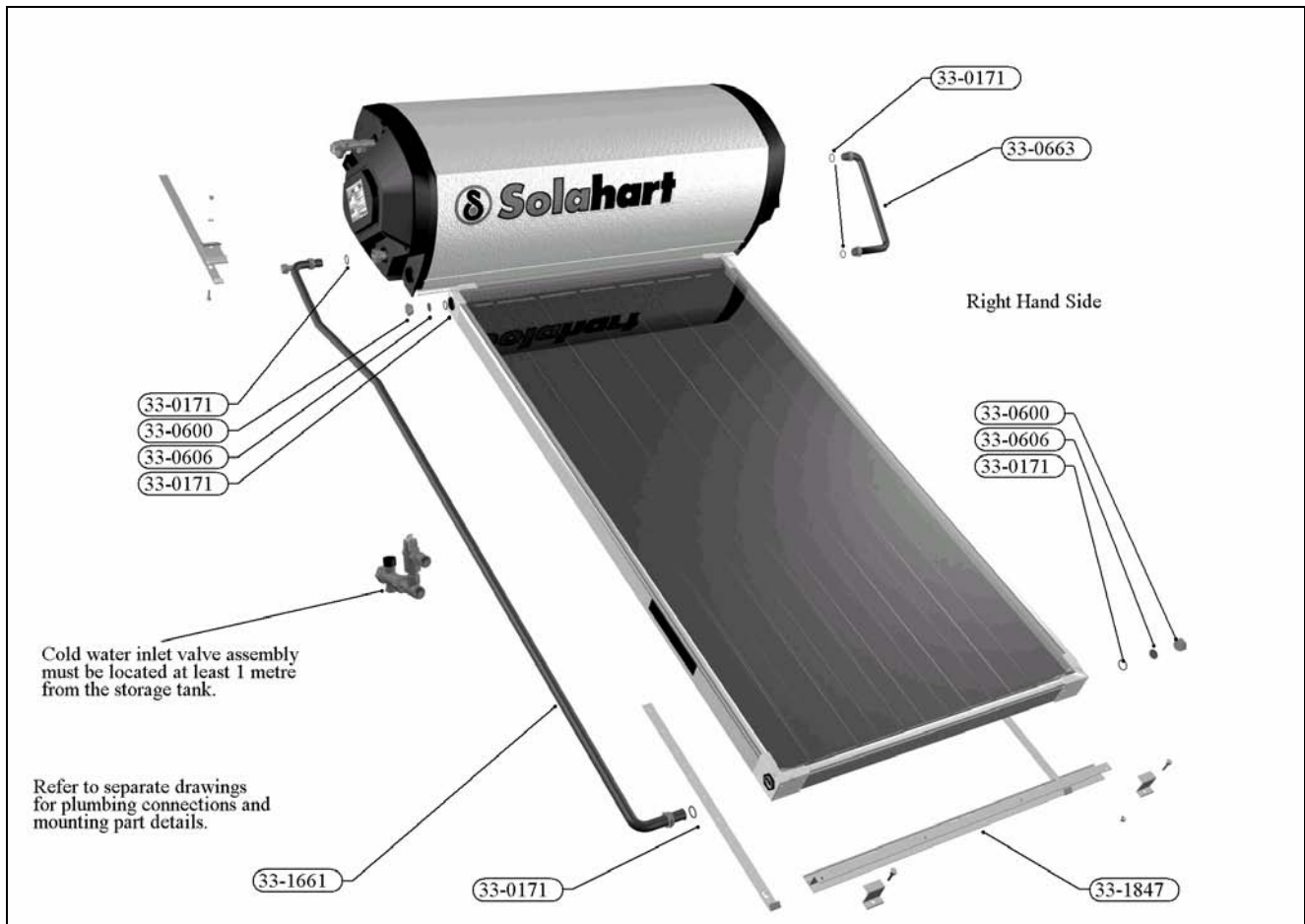
For Installation Instructions on Closed Circuit models, refer to Page 12.

For Water Connection details, refer to Page 34.

For Tank and Collector fixing details, refer to Page 35.

INSTALLATION DIAGRAM

MODELS 181L & 181L FREE HEAT



For general (for ALL models) Installation Instructions, refer to Page 8.

For Installation Instructions on Open Circuit models, refer to Page 16.

For Water Connection details, refer to Page 34.

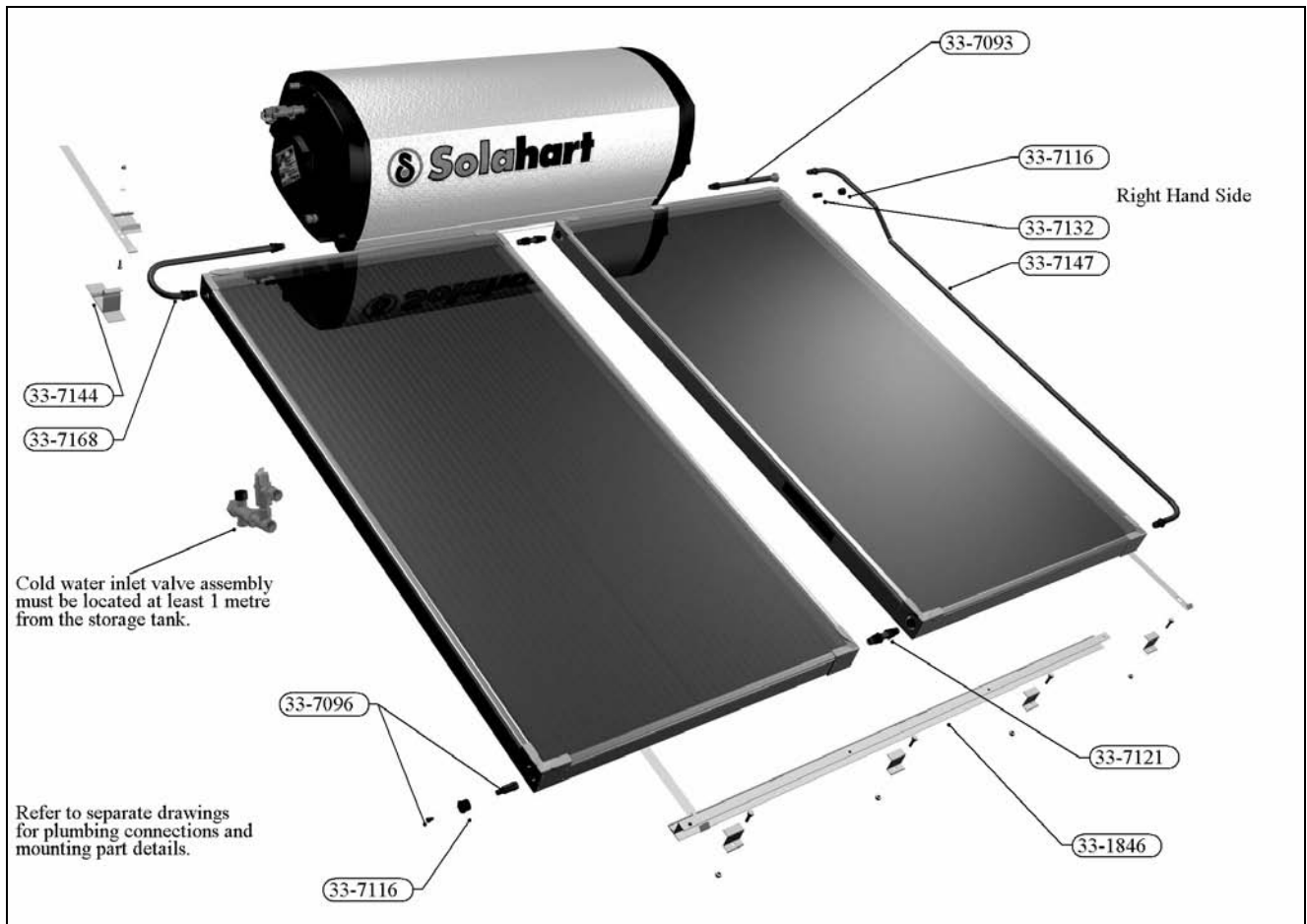
For Tank and Collector fixing details, refer to Page 35.

PLEASE NOTE

Solahart Open Circuit systems (L & L Free Heat) are not intended under any circumstances for use in a known frost area. An L or L Free Heat system installed in a known frost area does not carry any warranty. Solahart Closed Circuit Series heaters are specially designed for frost prone and bad water areas and should always be installed in these conditions.

INSTALLATION DIAGRAM

MODELS 182J, 182KF, 182J FREE HEAT & 182KF FREE HEAT



For general (for ALL models) Installation Instructions, refer to Page 8.

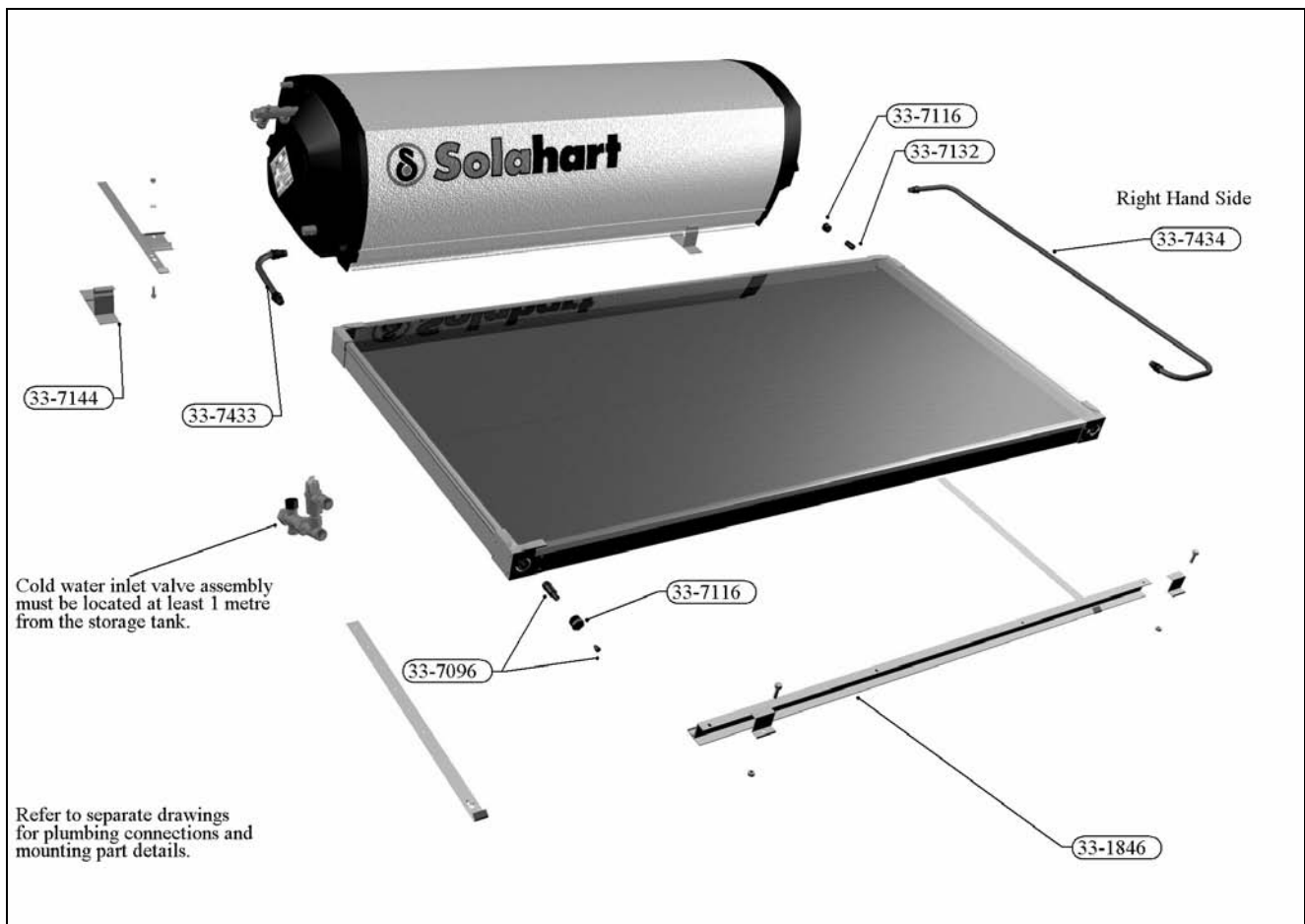
For Installation Instructions on Closed Circuit models, refer to Page 12.

For Water Connection details, refer to Page 34.

For Tank and Collector fixing details, refer to Page 35.

INSTALLATION DIAGRAM

MODELS 221J & 221KF



For general (for ALL models) Installation Instructions, refer to Page 8.

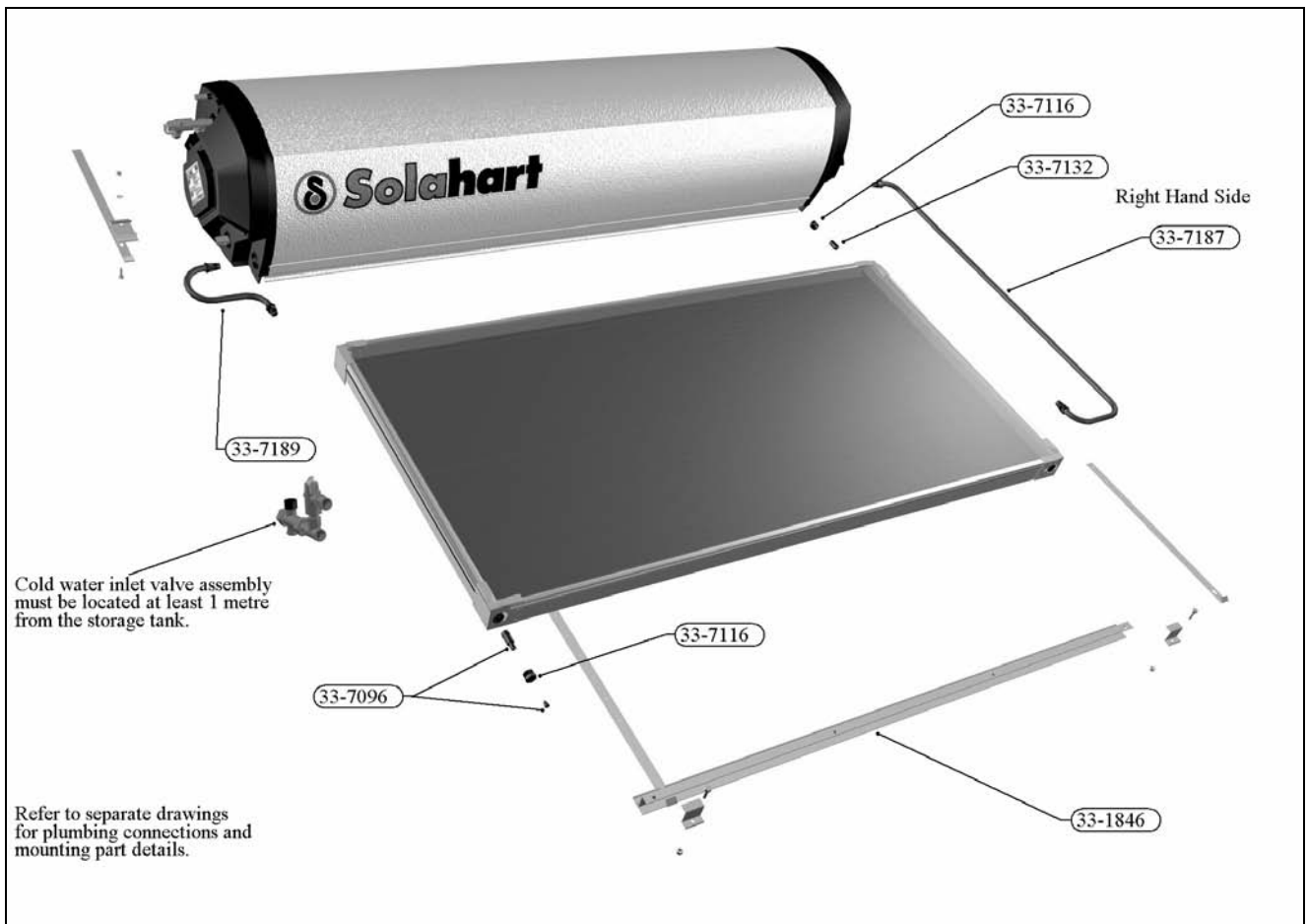
For Installation Instructions on Closed Circuit models, refer to Page 12.

For Water Connection details, refer to Page 34.

For Tank and Collector fixing details, refer to Page 35.

INSTALLATION DIAGRAM

MODELS 301J & 301KF



For general (for ALL models) Installation Instructions, refer to Page 8.

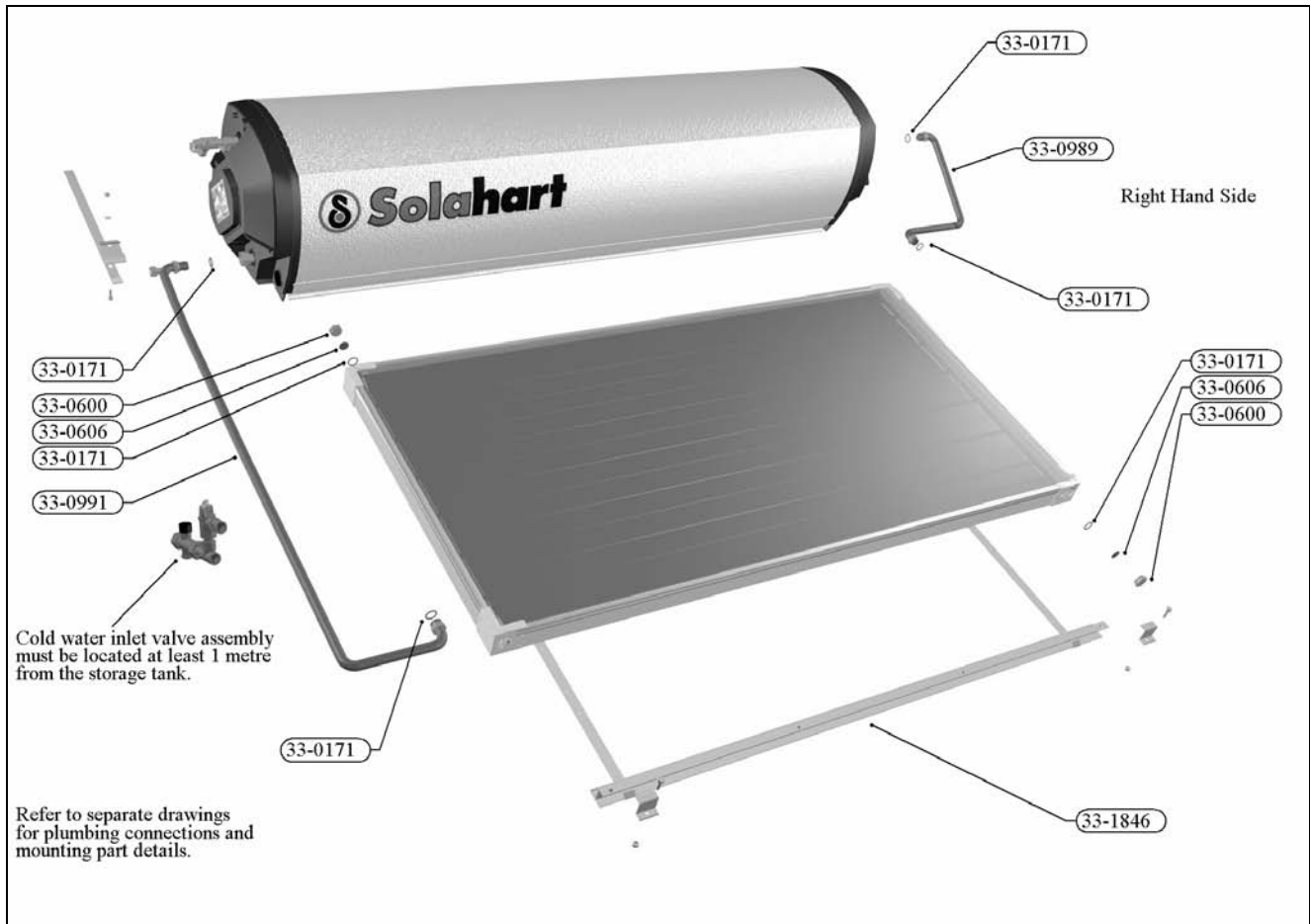
For Installation Instructions on Closed Circuit models, refer to Page 12.

For Water Connection details, refer to Page 34.

For Tank and Collector fixing details, refer to Page 35.

INSTALLATION DIAGRAM

MODELS 301L & 301L FREE HEAT



For general (for ALL models) Installation Instructions, refer to Page 8.

For Installation Instructions on Open Circuit models, refer to Page 16.

For Water Connection details, refer to Page 34.

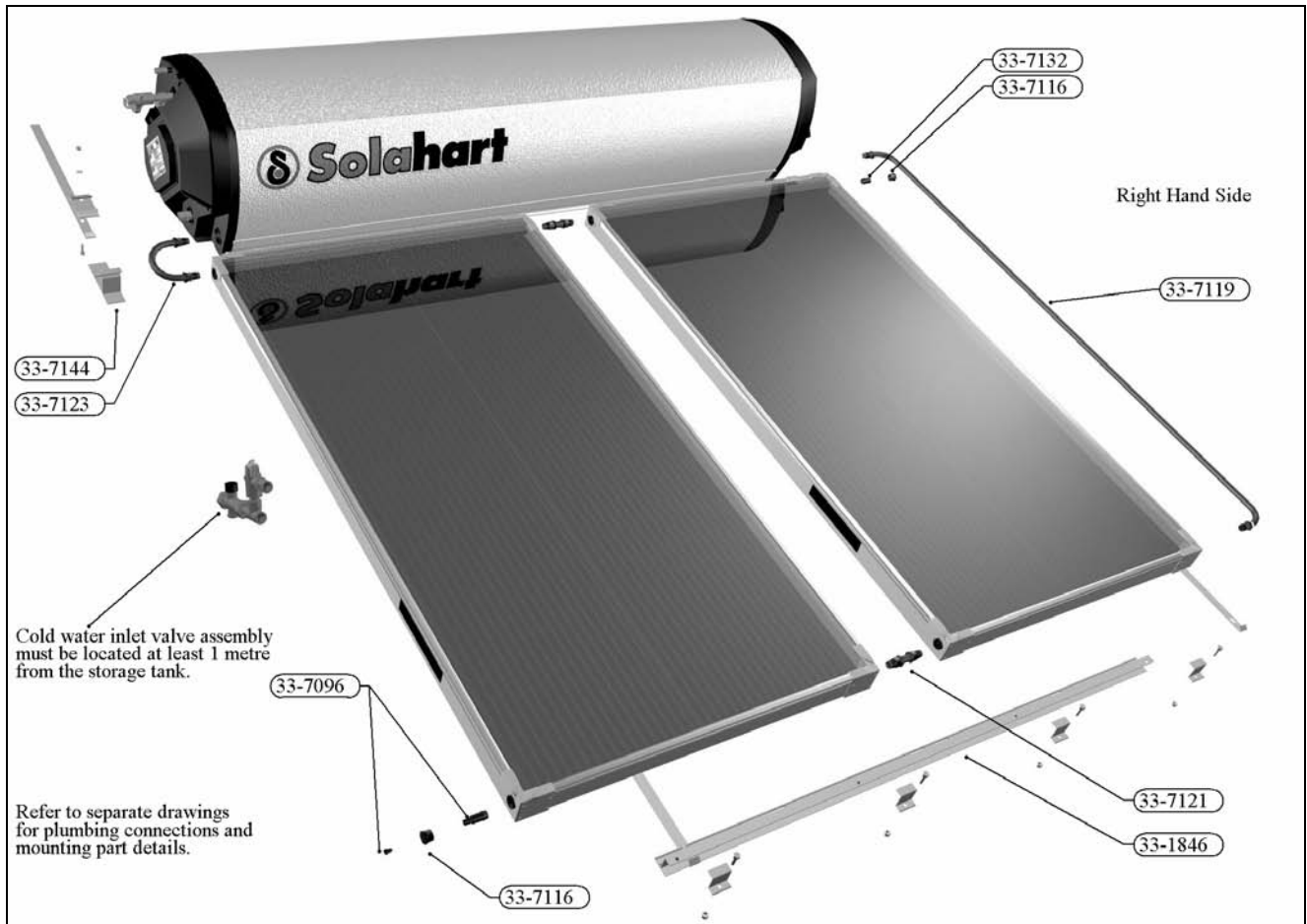
For Tank and Collector fixing details, refer to Page 35.

PLEASE NOTE

Solahart Open Circuit systems (L & L Free Heat) are not intended under any circumstances for use in a known frost area. An L or L Free Heat system installed in a known frost area does not carry any warranty. Solahart Closed Circuit Series heaters are specially designed for frost prone and bad water areas and should always be installed in these conditions.

INSTALLATION DIAGRAM

MODELS 302J, 302KF, 302J FREE HEAT & 302KF FREE HEAT



For general (for ALL models) Installation Instructions, refer to Page 8.

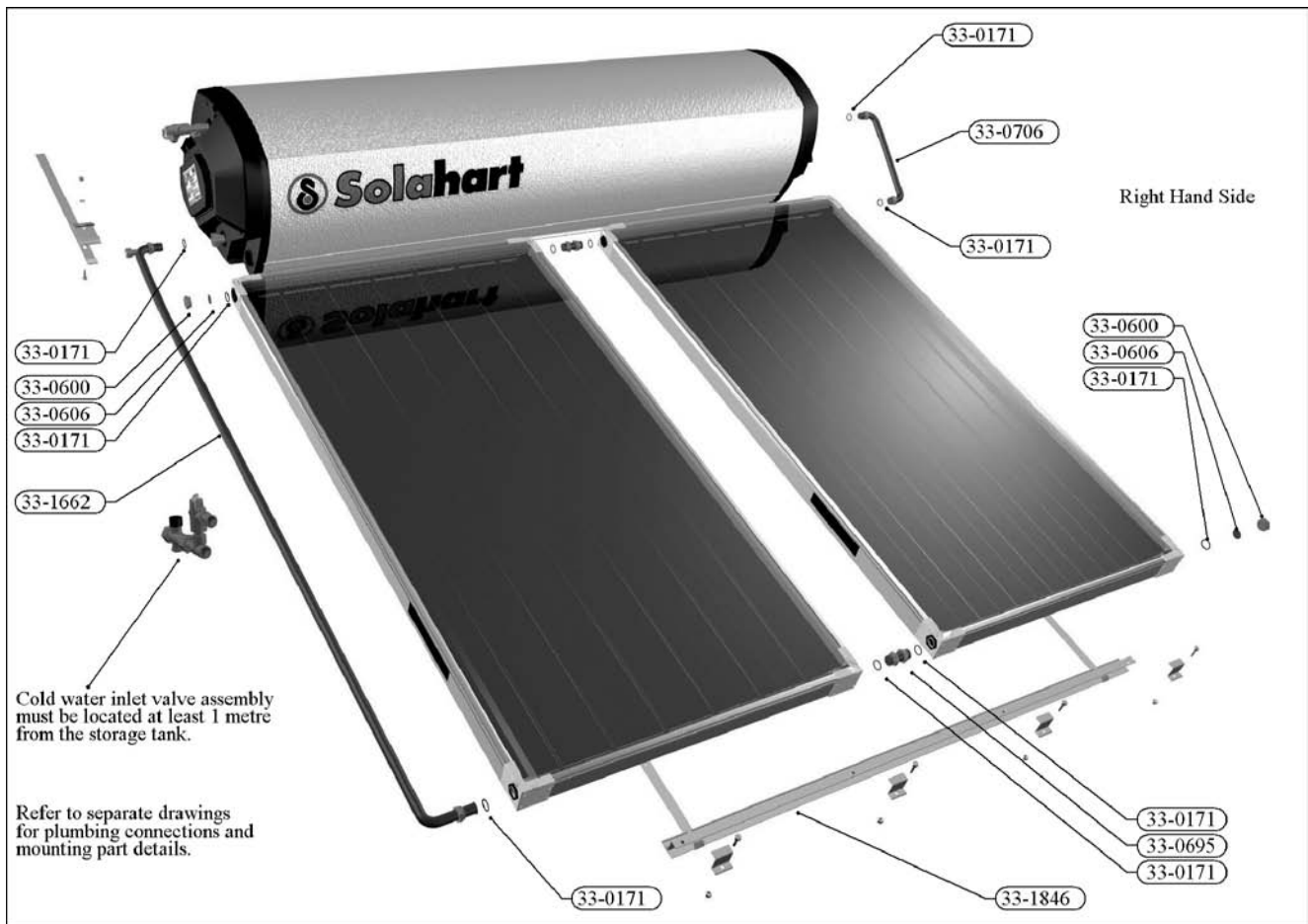
For Installation Instructions on Closed Circuit models, refer to Page 12.

For Water Connection details, refer to Page 34.

For Tank and Collector fixing details, refer to Page 35.

INSTALLATION DIAGRAM

MODELS 302L & 302L FREE HEAT



For general (for ALL models) Installation Instructions, refer to Page 8.

For Installation Instructions on Open Circuit models, refer to Page 16.

For Water Connection details, refer to Page 34.

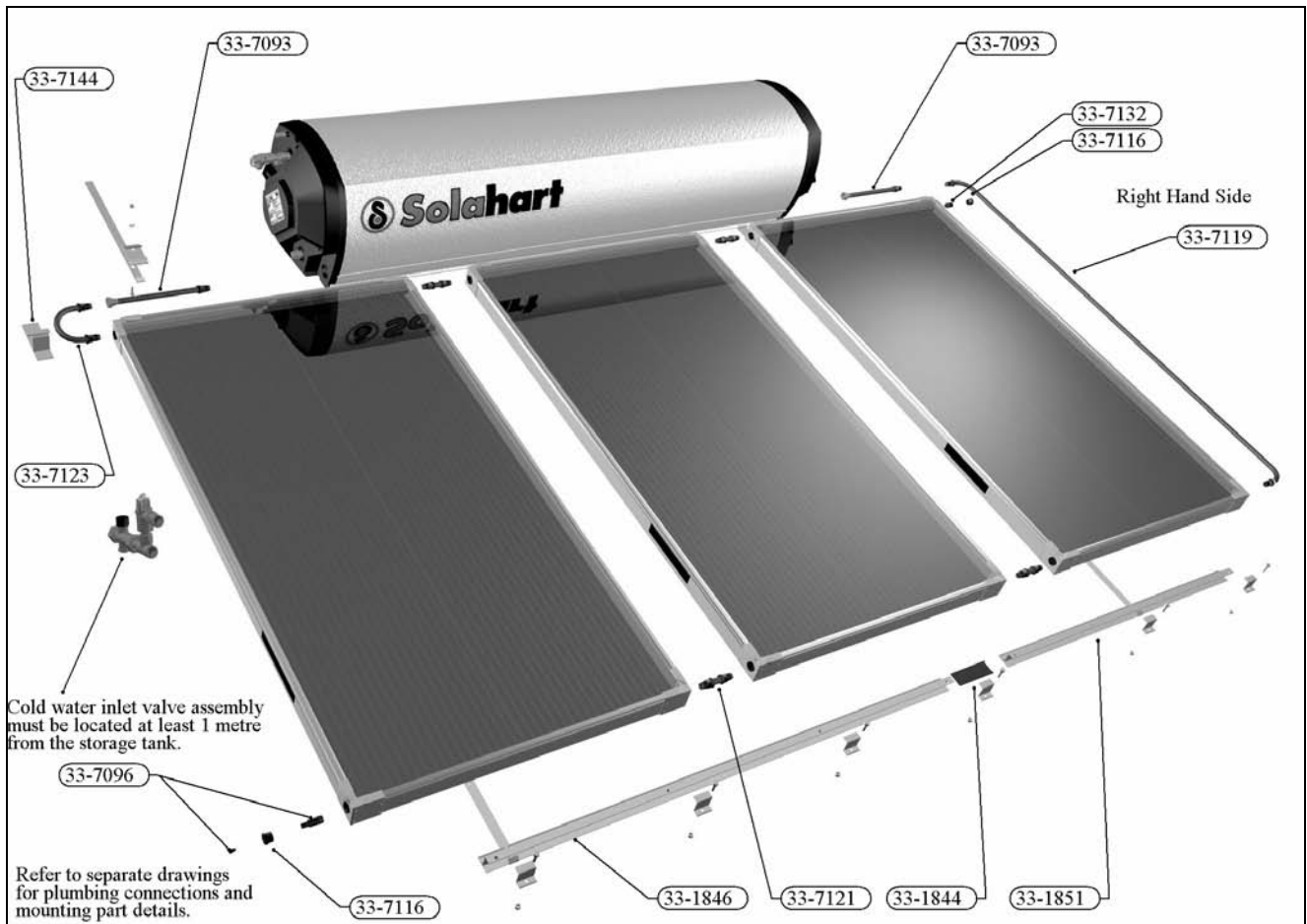
For Tank and Collector fixing details, refer to Page 35.

PLEASE NOTE

Solahart Open Circuit systems (L & L Free Heat) are not intended under any circumstances for use in a known frost area. An L or L Free Heat system installed in a known frost area does not carry any warranty. Solahart Closed Circuit Series heaters are specially designed for frost prone and bad water areas and should always be installed in these conditions.

INSTALLATION DIAGRAM

MODELS 303J, 303KF, 303J FREE HEAT & 303KF FREE HEAT



For general (for ALL models) Installation Instructions, refer to Page 8.

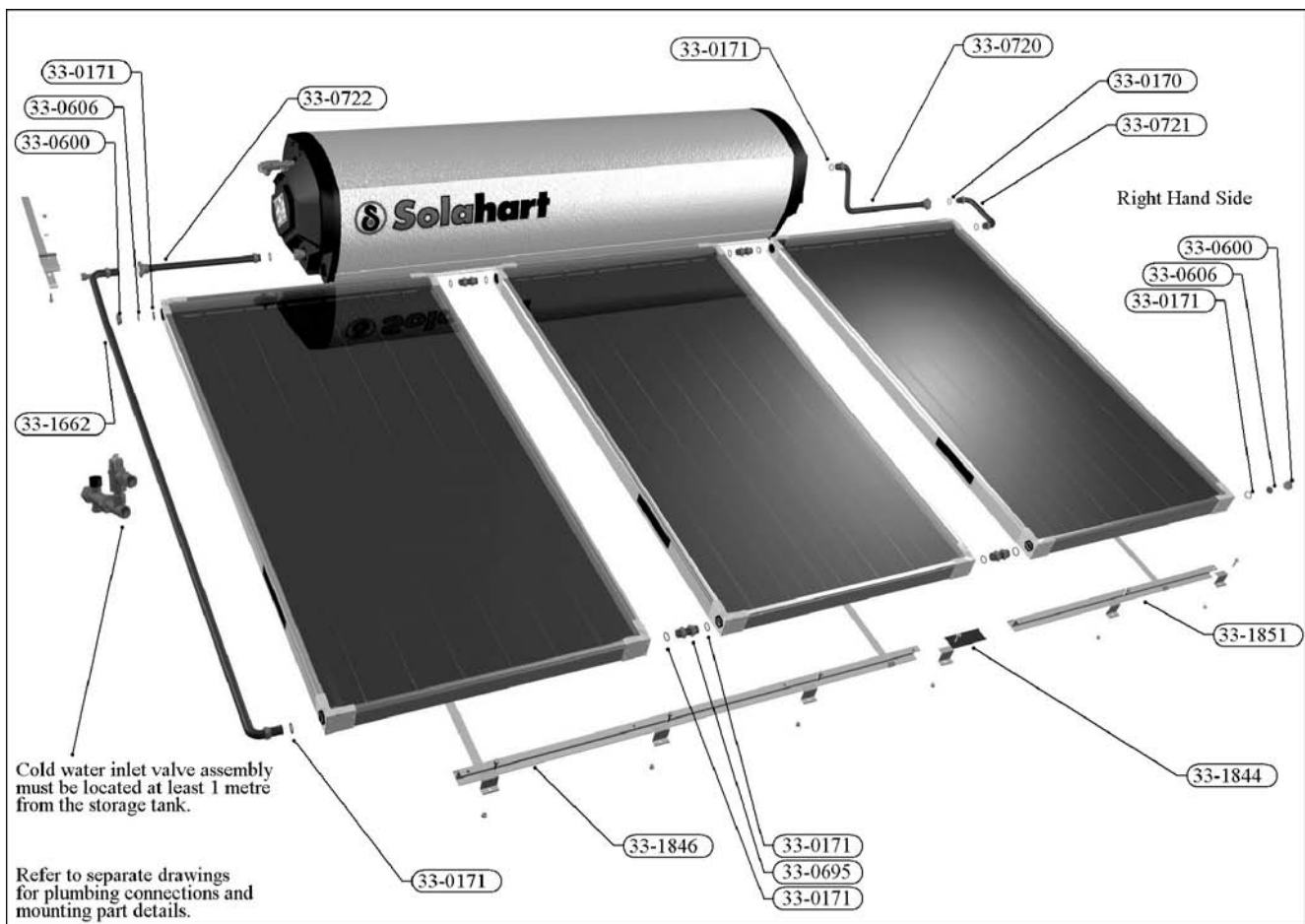
For Installation Instructions on Closed Circuit models, refer to Page 12.

For Water Connection details, refer to Page 34.

For Tank and Collector fixing details, refer to Page 35.

INSTALLATION DIAGRAM

MODELS 303L & 303L FREE HEAT



For general (for ALL models) Installation Instructions, refer to Page 8.

For Installation Instructions on Open Circuit models, refer to Page 16.

For Water Connection details, refer to Page 34.

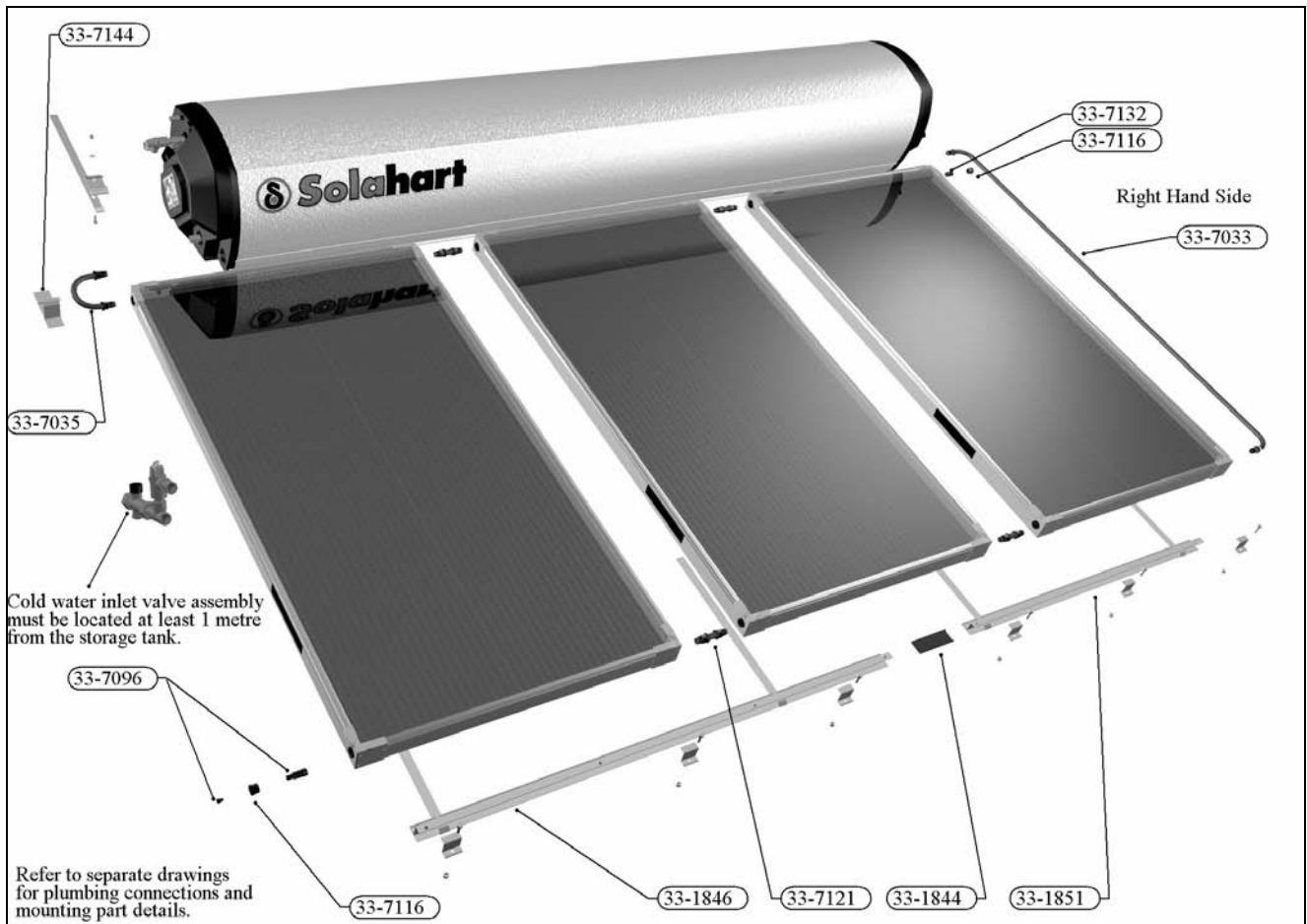
For Tank and Collector fixing details, refer to Page 35.

PLEASE NOTE

Solahart Open Circuit systems (L & L Free Heat) are not intended under any circumstances for use in a known frost area. An L or L Free Heat system installed in a known frost area does not carry any warranty. Solahart Closed Circuit Series heaters are specially designed for frost prone and bad water areas and should always be installed in these conditions.

INSTALLATION DIAGRAM

MODELS 443J, 443KF, 443J FREE HEAT & 443KF FREE HEAT



For general (for ALL models) Installation Instructions, refer to Page 8.

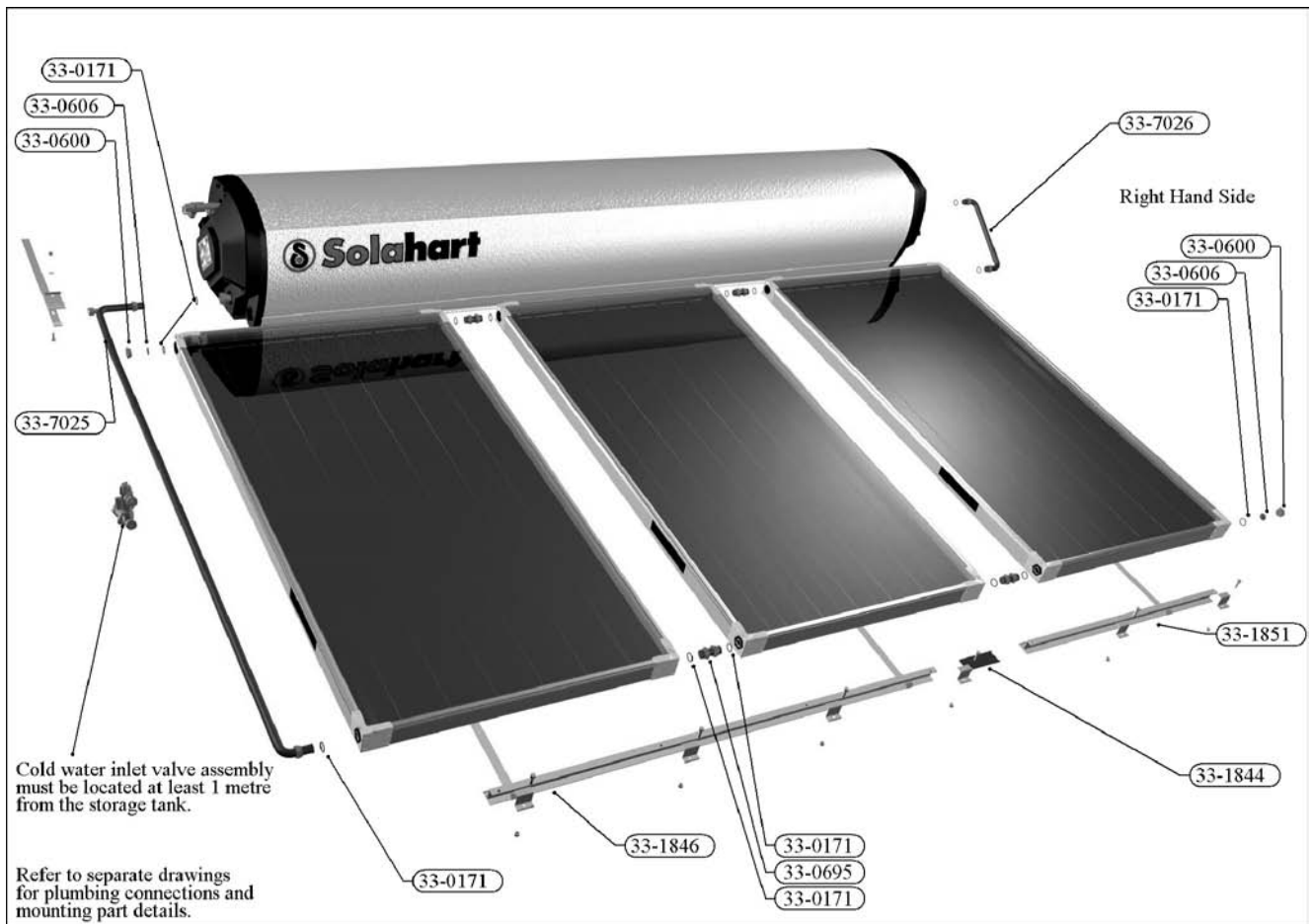
For Installation Instructions on Closed Circuit models, refer to Page 12.

For Water Connection details, refer to Page 34.

For Tank and Collector fixing details, refer to Page 35.

INSTALLATION DIAGRAM

MODELS 443L & 443L FREE HEAT



For general (for ALL models) Installation Instructions, refer to Page 8.

For Installation Instructions on Open Circuit models, refer to Page 16.

For Water Connection details, refer to Page 34.

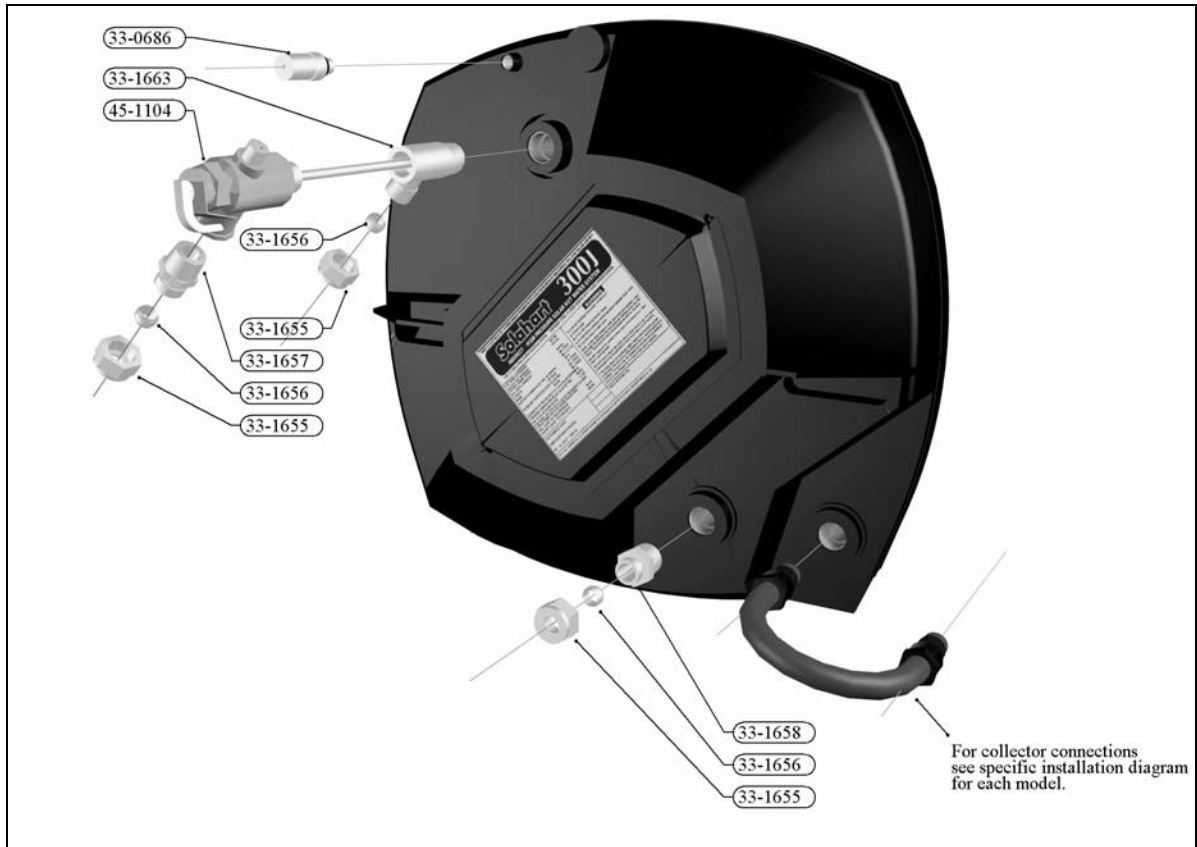
For Tank and Collector fixing details, refer to Page 35.

PLEASE NOTE

Solahart Open Circuit systems (L & L Free Heat) are not intended under any circumstances for use in a known frost area. An L or L Free Heat system installed in a known frost area does not carry any warranty. Solahart Closed Circuit Series heaters are specially designed for frost prone and bad water areas and should always be installed in these conditions.

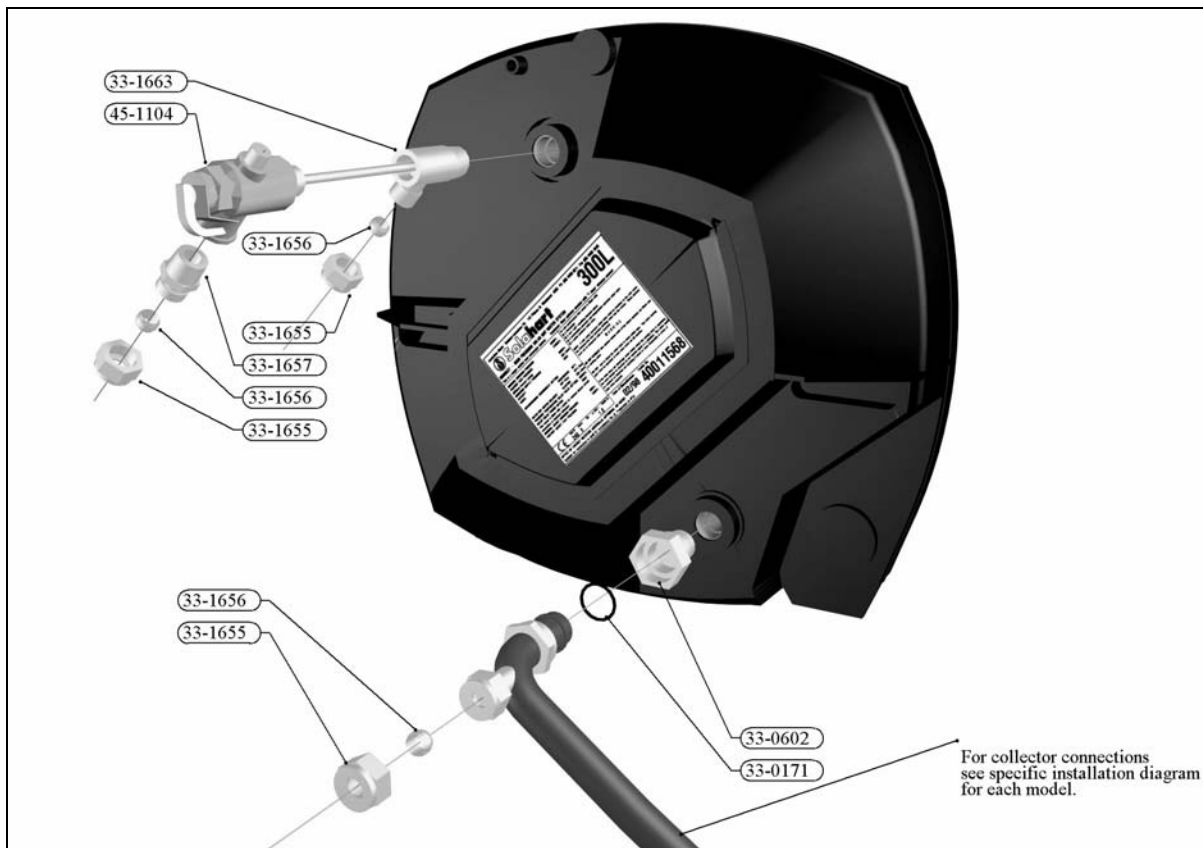
Closed Circuit Systems Water Connections

(All Potable water & drain lines are 1/2" BSP)

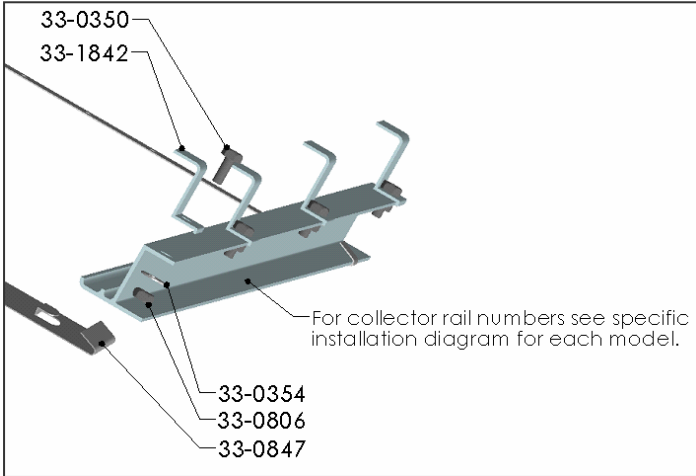


Open Circuit Systems Water Connections

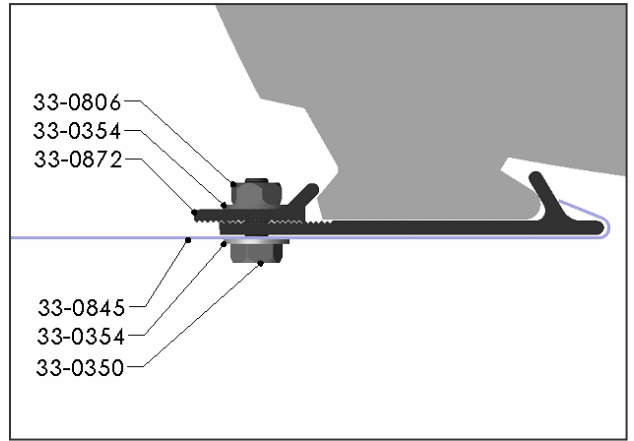
(All Potable water & drain lines are 1/2" BSP)



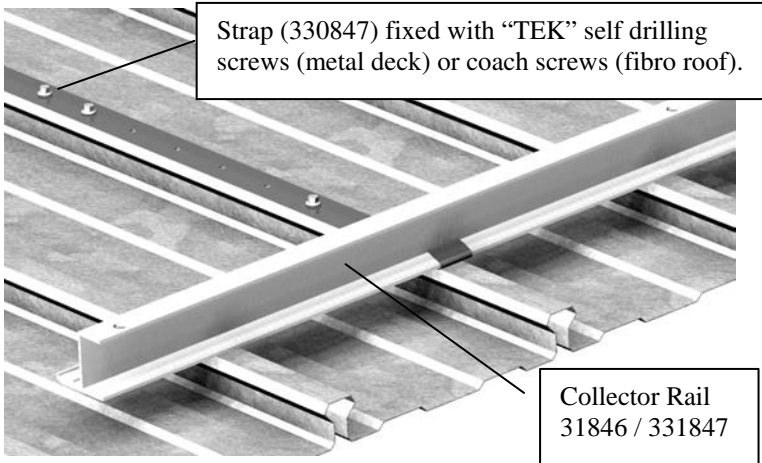
Assembly Drawings



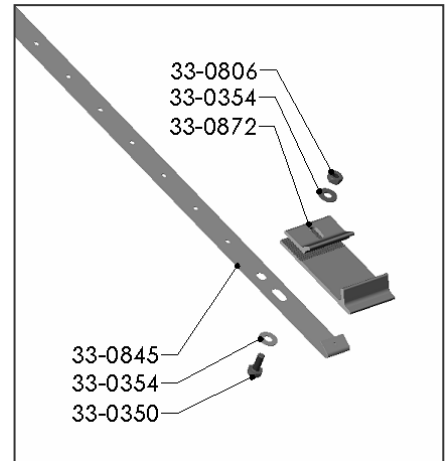
Collector Rail Fixing



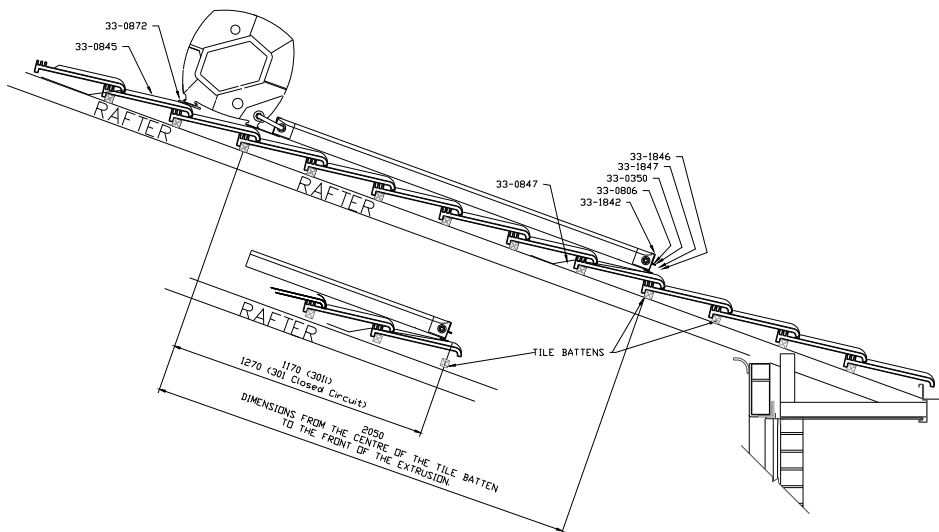
Tank Clamp Assembly



With Pitch Steel Roof Mounting



Tank Rail Fixing



With Pitch Tiled Roof Mounting

WARRANTY POLICY – THERMOSYPHON MODELS

Dear Customer,

Thank you for purchasing a new Solahart solar water heater system. Solahart manufactures various models of solar water heaters for use throughout the world. These have warranties and service requirements to ensure their application is fit for their purpose no matter where you live.

WARRANTY POLICY

Using the information contained in the Installation Report you have returned to Solahart Industries Pty Ltd, Solahart will record on the customer database the serial number and location of your Solahart water heater.

The protection offered by the warranty detailed below is in addition to all other non excludable rights and remedies that the consumer has under the Trade Practices Act (in Australia) and similar state or territorial laws that may apply.

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.

The manufacturer (Solahart Industries Pty Ltd) warrants the Solahart water heater against manufacturing defects, faulty material and/or workmanship and leakage from corrosion upon the following terms.

1) **MODELS 'L', 'J', AND 'KF'**

COMPLETE WATER HEATER 'L', 'J', AND 'KF'

Five year, 100% comprehensive warranty covering all parts and labour.

2) **MODEL 'FREE HEAT'**

Ten year, warranty, on Storage Cylinder and Collectors.

Plus

Five years warranty, covering all parts and labour on the Tank and collectors.

3) **INDIVIDUAL TANKS 'L', 'LF', 'J', AND 'F', AND COLLECTORS 'L', 'J', AND 'KF'**

Tanks and collectors purchased as other than as a complete water heater are covered by the following warranty.

Twelve month Comprehensive Warranty covering:

- (i) Parts
- (ii) Labour
- (iii) Freight

A further 4 years tank inner cylinder and collectors guarantee (supply only), applicable after the expiration of the 12 month comprehensive warranty. Customer to pay removal and re-installation costs.

CONDITIONS ALL MODELS

The above is subject to an area within a 30 kilometre radius of the Solahart dealer from whom the unit was purchased. Customers outside this area will be subject to freight and travelling charges incurred by the Solahart dealer carrying out the work.

Items replaced under warranty are only covered for the remaining term of the warranty period applicable to the original unit purchased.

A call out fee applies to warranty calls made outside normal Solahart business hours.

EXCLUSIONS

1. Collector glass is not covered by this warranty.
2. Where corrosion has occurred when the anode has not been changed in accordance with the owner's manual.
3. Where the cold water expansion valve, check valve and strainer is not fitted in areas where main's pressure is likely to exceed 550 kPa (80 psi).
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 Solahart installation and maintenance instructions.
6. No responsibility is accepted for any consequential loss or damage caused by a defect.
7. *Where the closed circuit is not filled with the Solahart approved heat transfer or antifreeze fluid in accordance with instructions.
8. *In the case of collapse of the inner cylinder due to an incorrect filling procedure.
9. *Where the closed circuit has had water addition not in accordance with the water quality specifications.
10. Frost damage to 'L' and 'L Free Heat' Series heaters when installed in a frost prone area.

*Applicable only to Closed Circuit Series.

RECOMMENDATION

Statutory Authorities and Codes recommend that the pressure/temperature operated relief valve fitted to the storage tank be replaced at intervals not exceeding five years.

Solahart also recommends that the anode be replaced at intervals as indicated in the Owner's Manual.

INSTALLATION & WARRANTY REPORT

Dear Customer – To register your warranty please ensure the following information is correct then sign and return to our Solahart Industries Pty Ltd freepost address:

Solahart Industries Pty Ltd.
Reply Paid Perth 95,
Welshpool, Western Australia 6106

WARRANTY: Details and conditions of warranty are in the Warranty Policy section of this manual.

Please complete all details below

Owner's Name			
Installation Address			
Suburb		State	
Country		Postcode	
Telephone	(H)		(W)
Solahart Dealership		Consultant	

Installer's Name			Installation Date		
Type of Installation (please circle)	New	Solar to Solar	Tank Replacement	Other	
Work Delivery Details					

System Model No				System Type		
Tank Model No				Tank Serial No		
Collector Model No				No of Collectors		
Collector Serial No's	1)	2)	3)	4)		
Booster Type (please circle)	Electric continuous	Off Peak 1 (night)	Off Peak 2 (night & day)	In-Tank Gas Booster	In-Line Booster	Solar Preheat only
Booster Control (please circle)	None	Timer	Manual Switch	One Shot Control		
In-Line Booster (if installed)	Model No		Serial No			
Service's Due	1)	2)	3)	4)		

If replacing a water heater, please give details

Brand		Model No		Electric	Gas
If a Solahart unit	Tank Serial No		Date of manufacture		
Collector Serial No's	1)	2)	3)	4)	

Comments					

Installer Certification – I certify this installation has been installed and tested in accordance with Solahart Industries Pty Ltd specifications					
Signature:	Installer		Customer		
Date					

White Copy: Head Office

Yellow Copy: Dealer

Blue Copy: Sales Office

Green Copy: Manual

Corporate Headquarters

112 Pilbara Street,
Welshpool.
Western Australia 6106

PO Box 95
State Mail Centre
Welshpool
Western Australia 6986

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Fax Int 61 8 9351 4640
Email solahart@solahart.com.au
Web site <http://www.solahart.com.au>

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Fax 07 3255 5189

Northern Territory (Darwin)

Phone 08 8947 0274
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Victoria / Tasmania

Phone 03 9212 8950
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South Australia

Phone 08 8262 7825
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Western Australia

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International Offices

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Phone Int 31 492 579 696
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USA

Phone Int 1 334 260 1586
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