

This system shall be installed in accordance with:

- Manufacturer's Installation Instructions
- Current AS/NZS 3500
- All applicable local rules and regulations including local OH&S requirements

This system must be installed, commissioned and serviced by an Authorised Person.

The solar hot and solar cold pipes between the solar storage tank and the solar collectors must be suited to the high water temperatures and pressures that may occur. As such, plastic pipe must not be used. Components used to join pipes must use metallic materials to achieve sealing.

NOT SUITABLE AS A POOL OR SPA HEATER



The Australian
Gas Association
All Rinnai gas products
are AGA certified.

Certified
Product



WaterMark
AS3498 Lic W169
SAI Global



N10378

Certified
Product



WaterMark
AS3498 Lic W208
SAI Global



Australian
Standard
AS/NZS2712
Lic No. 1849
SAI Global

Issue
12

SCOPE OF MANUAL

This manual covers the installation of the split solar hot water system, excluding the roof installation of the flat plate or evacuated tube collector(s). Full information on the collector installation can be found in the manual provided with the collector installation kit, or on the Rinnai website. www.rinnai.com.au.

All information and warnings in the relevant collector installation manual are applicable to this installation.

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WARNINGS AND IMPORTANT INFORMATION

SAFETY AND REGULATORY INFORMATION

DO NOT operate this system before reading the manufacturers instructions.

This appliance must be installed, commissioned and serviced by an authorised person in accordance with all applicable local rules and regulations.

Access covers of water heating system components will expose 240V wiring and MUST be removed by an authorised person.

This appliance is not intended for use by persons (including children) with reduced physical, sensory or mental capabilities, or lack of experience and knowledge, unless they have been given supervision or instruction concerning use of the appliance by a person responsible for their safety.

For continued safety of this appliance it must be installed, operated and maintained in accordance with the manufacturer's instructions.

Children should be supervised to ensure they DO NOT play with the appliance.

Any power leads from the water heater system components MUST BE plugged into an external weatherproof electrical outlet. If the power supply cord of any water heating components is damaged, it MUST BE replaced by an authorised person in order to avoid a hazard, using genuine replacement parts available from Rinnai. Take care not to touch the power plugs with wet hands.

Care should be taken not to touch the pipe work as it may be HOT! The pipes between the solar collectors and storage cylinder MUST BE copper or alternative material pipes that may be supplied by Rinnai. Plastic pipe is NOT suited to the water temperatures and pressures that may occur in the system.

DO NOT place articles on or against this appliance.

DO NOT store chemicals or flammable materials near this appliance.

DO NOT operate with collectors or covers removed from this appliance.

DO NOT activate pump unless cylinder is full of water.

NEVER use a flammable spray such as hair spray, lacquer, paint, etc near this unit as this may cause a fire.

NOTICE TO VICTORIAN CONSUMERS

This appliance must be installed by a person licensed with the Victorian Building Authority.

Only a licensed person will have insurance protecting their workmanship.

So make sure you use a licensed person to install this appliance and ask for your Compliance Certificate.

For further information contact the Victorian Building Authority on 1300 815 127

SCALD HAZARDS



HOT WATER CAN CAUSE SCALDS.

CHILDREN, DISABLED, ELDERLY AND THE INFIRM ARE AT THE HIGHEST RISK OF BEING SCALDED.

FEEL WATER TEMPERATURE BEFORE BATHING OR SHOWERING.

SCALDS FROM HOT WATER TAPS CAN RESULT IN SEVERE INJURIES TO YOUNG CHILDREN.

SCALDS OCCUR WHEN CHILDREN ARE EXPOSED DIRECTLY TO HOT WATER WHEN THEY ARE PLACED INTO A BATH WHICH IS TOO HOT.

ALWAYS.....

Test the temperature of the water with your elbow before placing your child in the bath, also carefully feel water before bathing or showering yourself.

Supervise children whenever they are in the bathroom.

Make sure that the hot water tap is turned off tightly.

CONSIDER.....

Installing child proof tap covers or child resistant taps (both approaches will prevent a small hand being able to turn on the tap).

Installing tempering valves or thermostatic mixing valves which reduce the hot water temperature delivered to the taps. Your local plumbing authority may already require that these be fitted. Contact your installer or local plumbing authority if in doubt.

NEVER....

Leave a toddler in the care of another child. They may not understand the need to have the water temperature set at a safe level.

OPERATION PRINCIPLE

Split solar hot water systems are designed to have the solar collectors (either flat plate or evacuated tubes) on the roof and the storage cylinder installed at ground or floor level.

The system comprises a hot water storage cylinder, solar collectors, pump, controller and temperature sensors, and either gas or electric boosting.

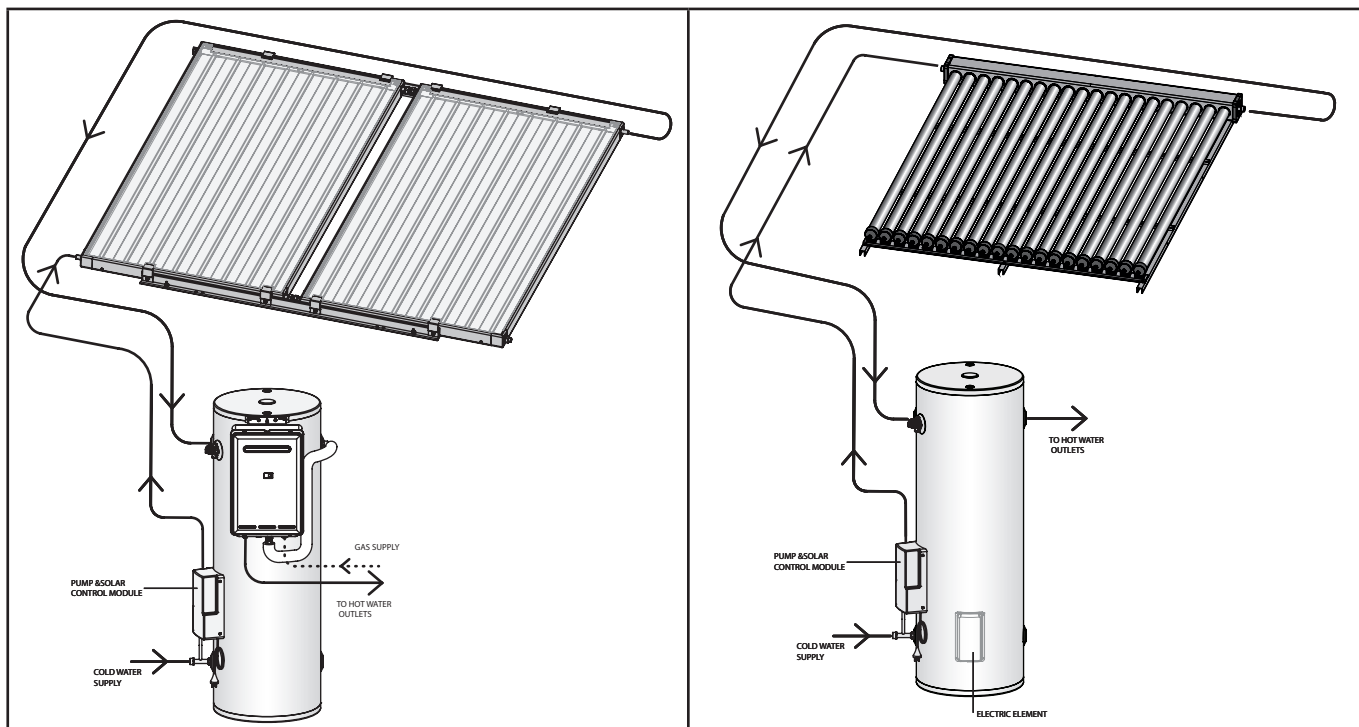
Water is pumped from the storage tank to the solar collectors when there is enough heat available from the sun. The solar controller utilises information from the temperature sensors to manage this process.

Supplementary heating is utilised if insufficient heat is available from the sun (such as during cloudy or rainy weather or during winter months) either via an electric heating element(s) located inside the storage cylinder or via an in-line Gas booster located external to the storage cylinder.

The following diagrams illustrate the operation of the system as with both electric and gas boosting.



These diagrams are intended to give an overview of the operation principle of a split solar hot water system. They are not intended as an installation guide. Connections on the tank may vary from those shown. The installation diagrams shown later in this manual must be followed.



SYSTEM LOCATION

The location of all system components must comply with both local regulatory and Rinnai requirements. In particular solar collectors need to be positioned on roofs in accordance with the instructions in the solar collector installation manual, that is provided with the collector installation kit.

SAFETY DEVICES

The water heating system is supplied with various safety devices including temperature sensors, overheat sensors and switches and a Pressure & Temperature Relief (PTR) valve. These devices must not be tampered with or removed. The water heating system must not be operated unless each of these devices is fitted and is in working order.



DO NOT tamper with or remove safety devices.

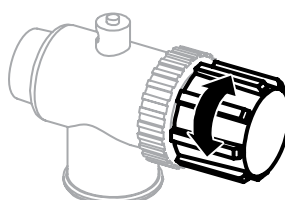
DO NOT operate the water heater unless all safety devices are fitted and in working order.

DO NOT block or seal the PTR Valve and drain pipe.

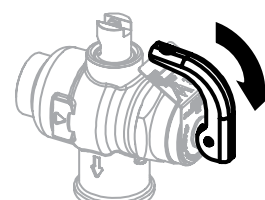
Pressure & Temperature Relief (PTR) Valve

This valve is located near the top of the water heater and is essential for safe operation. It is normal for the valve to release a small quantity of water through the drain line during heating.

However, continuous leakage of water from the valve and its drain line may indicate a problem with the water heater.



Twist cap until water flows from drain line



Lift lever until water flows from drain line (Lower lever gently!)



Never block the outlet of the PTR valve or its drain line for any reason. The easing gear must be operated at least every 6 months to remove lime deposits and verify that it is not blocked. Failure to do this may result in the water heater failing.

If the valve does not discharge water when the easing gear lever is opened, or does not seal again when the easing gear is closed, attendance by an authorised person must be arranged without delay. The PTR valve is not serviceable.

EXCESSIVE DISCHARGE FROM SAFETY DEVICES

Pressure & Temperature Relief (PTR) Valve

It is normal and desirable that this valve allows a small quantity of water to be discharged during the heating cycle. If it discharges more than a bucket of water during a 24 hour period or discharges continuously there may be another problem.

If the valve dribbles continuously, try easing the valve gear for a few seconds as described above. This may dislodge any foreign matter and alleviate the problem.

If the valve discharges at high flows, especially at night, it may be as a result of the water pressure exceeding the design pressure of the water heater. Ask your installer to fit a Pressure Limiting Valve (PLV).



NEVER replace the PTR valve with one which has a higher pressure rating than is specified for your water heater.

Expansion Control Valve (ECV) - if required

It is normal that this valve allows a small quantity of water to be discharged during the heating cycle. If it discharges more than a bucket of water during a 24 hour period or discharges continuously there may be another problem.

If the valve leaks continuously, try easing the valve gear for a few seconds. This may dislodge any foreign matter and alleviate the problem. If this does not alleviate the problem contact Rinnai.

Operate the easing gear regularly to remove any lime deposits and to verify that it is not blocked.

GAS BOOSTERS

Do not touch the flue outlet or do not insert any objects into the flue outlet.

- Keep flammable materials, spray cans, fuel containers, trees, shrubs and pool chemicals etc, well clear of the flue outlet.
- Do not use the gas types other than those designated on the data plate. For example, do not use Propane/ Butane gas mixtures on appliances marked Propane Gas.
- Do not use Propane Gas on appliances marked as Natural Gas and vice versa.

HYDROGEN GAS

In the case of systems using a vitreous enamel lined cylinder, if the hot water unit is not used for two weeks or more, a quantity of hydrogen gas, which is highly flammable, may accumulate in the water heater. To dissipate this safely, it is recommended that a non electrically operated hot tap be turned on for two minutes at a sink, basin, or bath, but not a dishwasher or other appliance. During this procedure there must be no smoking, open flame or any electrical appliance operating nearby. If hydrogen is discharged through the tap, it will probably make a sound like air escaping.

WATER TEMPERATURE

The solar control unit and pump ensure water circulates between the solar collectors and storage cylinder until the water at the base of the cylinder reaches approximately 65°C. Under these conditions water at the hot outlet may exceed 85°C. During periods of low solar gain supplementary heating occurs to a minimum of 60°C for electric boosted systems and 70°C for gas boosted systems.



To meet Australian regulatory requirements, supplementary heating must be operational.

TURNING OFF THE WATER HEATING SYSTEM

If you plan to be away for only a few nights, we suggest you leave the water heating system switched on. If it is necessary to switch off the water heater, do so as outlined below:

Electric Boosted Systems

- Switch off the electrical supply to the supplementary heating element. The switch is usually marked and located in the electricity meter box of the dwelling.
- Switch off the electric supply to the solar controller and pump.

Gas Boosted systems

- Switch off the electric supply to the gas booster.
- Switch off the electric supply to the solar controller and pump.

TURNING ON THE WATER HEATING SYSTEM

Electric Boosted system

- Switch on the electric supply to the supplementary heating element(s). The switch is usually marked and located in the electricity meter box of the dwelling.
- Switch on the electrical supply to the solar controller pump.
- Electric and solar water heating will now occur as required. It may take a number of hours before hot water is available.

Gas Boosted systems

- Switch on the electrical supply to the gas booster.
- Switch on the electrical supply to the solar controller and pump. Solar water heating will now occur.
- Hot water is available immediately from the gas booster when hot water tap is opened, irrespective of solar heat gain.

WATER QUALITY

The water quality of most public supplies is suitable for the water heating system. The water quality from bore wells is generally unsuitable for the water heating system. Refer to separate 'Warranty Terms and Conditions' document for water quality parameters and how they affect the warranty conditions. If in doubt about the water quality, have it checked against the parameters listed in the warranty conditions. The system is not suitable as a pool or spa heater.

DRAINING AND FILLING THE WATER HEATING SYSTEM

Draining or filling normally occur only during installation or servicing and must be carried out by an authorised person.

MAINTENANCE AND REGULAR CARE

Operate the easing gear of the PTR as described in the section 'Safety Devices' on page 7.

The overflow tray (supplied by installer) and drain underneath the storage cylinder (if fitted) should be periodically checked to ensure there are no blockages.

SERVICING AND REPAIR

Our Servicing network personnel are fully trained and equipped to give the best service on your appliance. If your appliance needs service, ring the service contact numbers on the back of this booklet.

It is recommended that the system be serviced at least every 3 years.

The pressure and temperature relief valve and expansion control valve must be checked for performance or replaced by an authorised person at intervals not exceeding 5 years or more frequently in areas where the water is classified as scaling water (refer to the supplied warranty booklet).

It is recommended that the sacrificial anode fitted to vitreous enamel lined cylinders be inspected every 5 years or more frequently in areas where there is a high incidence of water deposits. This does not apply to stainless steel cylinders. Anodes suited to hard and soft water, are available from Rinnai.

If the electric conduit, power supply cord or plug to the water heater is damaged, they must be replaced by an authorised person in order to avoid a hazard. The power supply cord and plug (if fitted) must be replaced by a genuine replacement part available from Rinnai.

SAVE A SERVICE CALL

Before contacting Rinnai for service, please follow the fault finding guide. If the problem persists or this information doesn't answer your questions, contact Rinnai on the phone number on the back of this manual

Service call outs attending to any condition or fault that is not related to Rinnai product or components may be chargeable.

INSUFFICIENT OR NO HOT WATER	
Excessive hot water consumption	Electric Boosted Systems: <p>Often people are surprised at the amount of hot water used, especially when showering. If the amount of hot water used during the day exceeds the storage capacity of the cylinder, it is likely that there will be insufficient hot water.</p>
	Gas Boosted Systems: <p>Insufficient flow may occur if multiple outlets are in use at the same time and exceed the rated flow capacity of the gas booster. If so, reduce the number of outlets in use.</p> <p>Consider discussing with your installer, fitting water saving fixtures and/or flow control or pressure limiting valves to reduce consumption.</p>
Incorrect solar system size	The system may not have been adequately sized to suit the household.
Temperature and pressure relief valve / expansion control valve discharging water continuously	PTR Valves & ECV Valves (if fitted) <p>It is normal and desirable that this valve allows a small quantity of water to be discharged during the heating cycle. If it discharges more than a standard bucket of water during a 24 hour period or discharges continuously there may be another problem.</p> <p>If water continuously dribbles from the valve, try easing the valve gear for a few seconds as described in the section 'Maintenance and Regular Care' on page 9. This may dislodge any foreign matter and alleviate the problem.</p> <p>If the valve discharges at high flows, contact your installer or Rinnai to discuss.</p>
Booster heating not operating or insufficient gas supply for gas boosted heating system	Electric Boosted Systems: <p>Check to ensure the electric isolating switch(es) at the switchboard (usually marked "Hot water" or "water heater") is switched 'ON'.</p> <p>Check to ensure that the electric fuses for hot water at the switchboard are intact.</p> <p>If running on Off-Peak, discuss boosting times with electricity supplier.</p>
	Gas Boosted Systems: <p>Check to ensure the power cord of the gas booster is plugged in and switched 'on'.</p> <p>Check gas is available and the isolation valve is opened.</p> <p>Close the hot tap and wait for 10 seconds and open it again. The hot tap must be opened enough to ensure that the flow rate is sufficient to light the gas booster.</p> <p>Check if there is gas supply to other appliances in the rest of the house.</p>

Booster thermostat settings	<p>Electric Boosted Systems:</p> <p>Check the temperature of hot water delivered with a thermometer placed under the closest outlet (usually the kitchen sink) on a non-tempered hot water line.</p> <p>This test should be done early in the morning after overnight electrical boosting before any hot water is used. The temperature of the water delivered should be at least 55°C (allowing for heat losses in pipe work).</p> <p>If this is not the case, the temperature may need to be increased. Contact your installer or Rinnai to discuss adjusting the thermostat.</p>
HIGH ELECTRICITY OR GAS BILL	
Hot water usage patterns	<p>Electric Boosted Systems:</p> <p>If using an off peak (overnight) boosted electrical system, the time of use of the water may affect whether heating is done by electric element or solar energy. This is because both solar heated water and electrically heated water are stored in the same cylinder. (This is not a problem with gas boosted systems, and is less of an issue with mid element storage cylinders as the electric element only heat the top half of the tank, leaving half the tank for solar energy).</p> <p>If the bulk of hot water is used in the morning, there will be cold water in the cylinder for the sun to heat during the day leading to lower electricity usage.</p> <p>If the bulk of the hot water is used in the evening, the electric element will reheat the water overnight. In the morning there will be no cold water in the storage cylinder for the sun to heat.</p> <p>Consider changing your usage pattern to optimise solar energy usage.</p>
High electricity cost	<p>Electric Boosted Systems:</p> <p>The electricity tariff will determine the running costs of the system. Contact the electricity supplier to confirm what these tariffs are.</p>
Solar control unit switched off	<p>If the solar control unit is switched off there will be no solar pre-heating of water, resulting in the water being heated entirely by electricity or gas boosting.</p> <p>Check the power outlet for the solar control unit is switched on</p>
Temperature and pressure relief valve / expansion control valve discharging water continuously	See entry under 'Insufficient or No Hot Water'
Lack of solar gain	<p>Reduced sunlight due to overcast weather in summer or low solar contribution in winter will result in an increased dependence on electricity or gas boosting. Higher electricity or gas bills under these conditions, especially in winter, are normal.</p> <p>If the solar collectors are shaded by trees or other objects, or the glass is dirty, the effectiveness of the collectors is greatly reduced. Arrange for trimming of trees or relocation of the solar collectors if the obstruction is permanent. Arrange for cleaning of the collector glass</p> <p>Solar collectors incorrectly positioned will also severely affect the solar gain. Check that positioning and alignment of solar collectors is in accordance with the section 'System Orientation and Inclination' in the solar collector installation manual.</p>

NO WATER FROM THE HOT TAP	
Restriction in the hot tap or failure of the cold water supply to the heater	Check for water flow at the other hot taps and that the cold water isolation valve is fully open.
BROKEN OR DAMAGED EVACUATED TUBE COLLECTORS	
Broken or Damaged Flat Plate Collectors	<p>If any of the evacuated tubes have a clear or white bottom this may indicate that the vacuum in the glass tube has gone, and the tube will not be performing properly. The tubes are normally a silver colour.</p> <p>If the vacuum in the tubes is gone or the tube is obviously broken, the system can still be used. The remaining tubes will be fully operational. However the system performance will be reduced.</p> <p>If a tube is broken or damaged it should be replaced. Contact Rinnai to discuss.</p>
CONDENSATION IN COLLECTORS	
Condensation in flat plate solar collectors	There is a small amount of ventilation between atmosphere and the internals of the solar collector to ensure efficient operation. Under certain weather conditions, water vapour naturally present in the air may condense on the inside surface of the collector glass. This does not affect the performance of the system. If you are concerned contact Rinnai to discuss.
NOISY SOLAR COLLECTORS	
Noise from solar collectors	Occasionally on days of high solar gain, the water temperature in the collector may become very high. The noise may be similar to a boiling kettle, or an expanding contracting metallic sound. The collector is designed to withstand these conditions, and no action is needed, unless it is extreme. Contact Rinnai to discuss if you have any concerns.
SOLAR PUMP CONTINUOUSLY OPERATING	
Temperature sensor leads not in place	The system will not operate correctly if the temperature sensor leads are not correctly positioned (dry well on storage cylinder and on the solar collector outlet). Contact your installer or Rinnai to discuss.
WATER HAMMER	
Hot and cold water plumbing in the premises	Contact your installer or a plumber to discuss checking the clipping of hot and cold water pipe work and install a pressure limiting valve or water hammer arrestor as required
WATER COMING FROM COLLECTORS ON ROOF	
Frost valve(s) operating (flat plate collectors)	In conditions where the water in the solar collector could freeze and damage the collector, the frost valve(s) will release a small quantity of water to prevent the build up of pressure.

SYSTEM

Specifications for the various components are shown below.

System Type	Glass Lined Cylinders 175, 215, 160, 200	Glass Lined Cylinders 270, 320, 250, 315	Stainless Steel Cylinders 160,250,315
Solar flow and return connection:	Rp ½	Rp ½	Rp ½
PTR valve connection:	Rp ½	Rp ½	Rp ¾
Cold inlet connection:	Rp ¾	Rp ¾	Rp ¾
Hot outlet connection:	Rp ¾	Rp ¾	Rp ¾
PTR valve setting	1000 kPa	850 kPa	850 kPa
Rating of PTR Valve supplied	10 kW	10 kW	10 kW
Expansion Control Valve (ECV) setting	850 kPa	700 kPa	700 kPa
Max supply pressure with ECV	680 kPa	550 kPa	550 kPa
Max supply pressure without ECV	800 kPa	680 kPa	700 kPa
Pressure limiting valve rating (supplied by installer if required)	500 kPa	500 kPa	500 kPa

Flow Control

A variable speed pump controls the water flow rate through the collectors and storage cylinder to optimise the performance of the system.

Differential Temperature Controller

The primary task of the differential temperature controller is to control the operation of the pump to optimize solar energy collection. This task is performed by measuring the temperature differential between the hot sensor and the cold sensor. When the differential is high enough the pump is activated and water passes through the collectors collecting solar energy. When the differential falls the pump turns off.

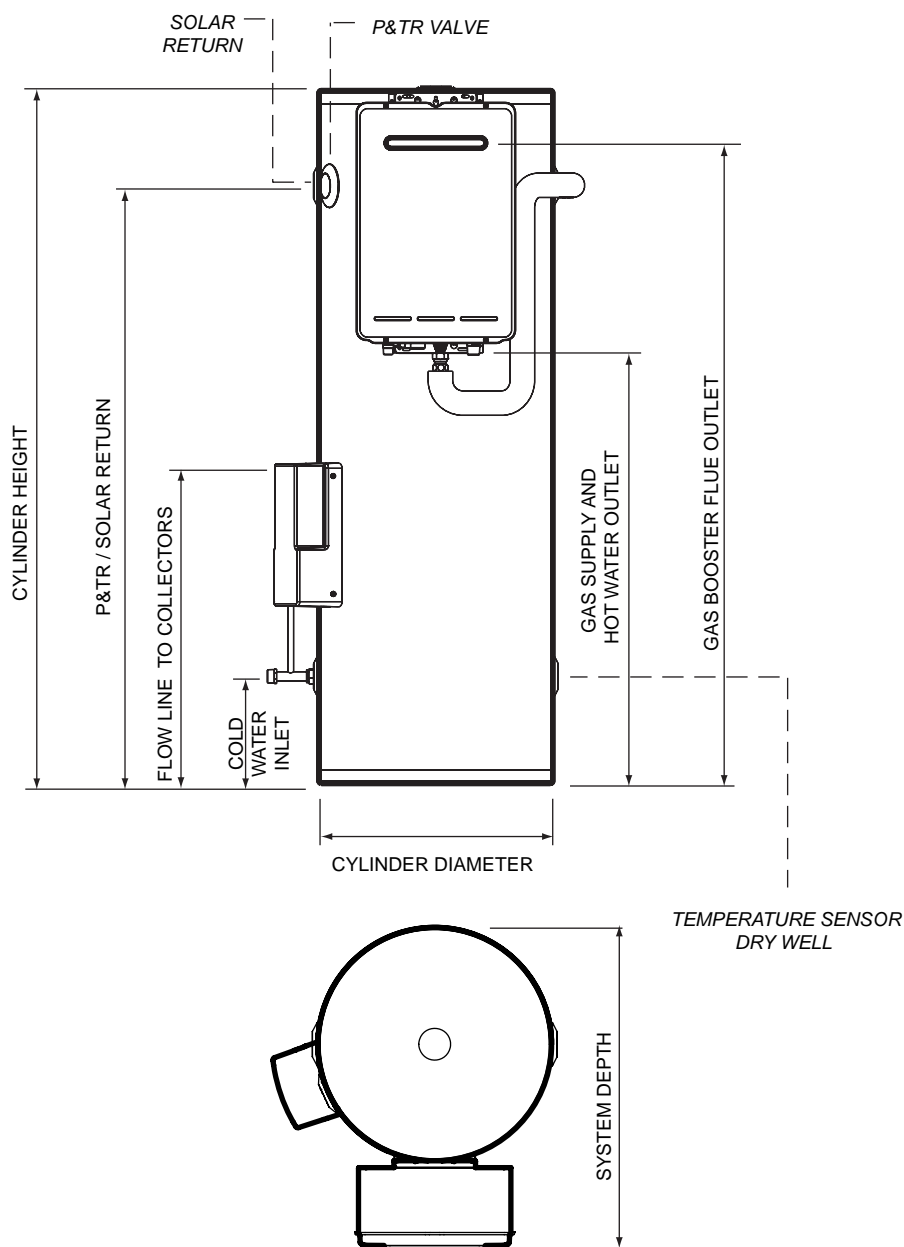
A secondary task of the controller is to stop energy collection when the cylinder is full of hot water. This is referred to as no load protection and the pump is shut down if the temperature of the water going to the collectors exceeds 65°C. With such a temperature in the base of the cylinder, the temperature of water in the top of the cylinder is expected to be about 85°C.

When the controller is in low temperature mode it will also circulate water through the collector when the roof temperature becomes cold. This is to prevent damage to the system due to freezing. See page 22 for more details.

STORAGE CYLINDERS

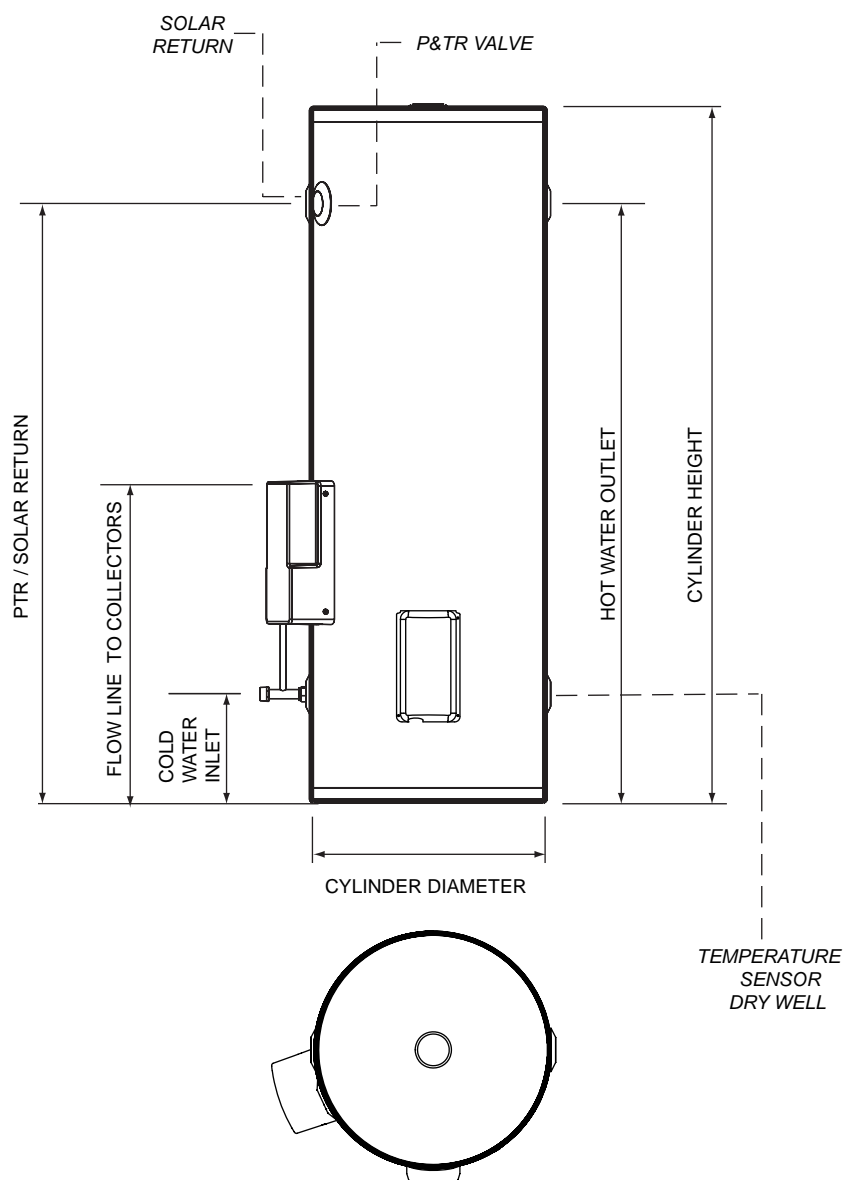
Glass Lined Gas Boosted Cylinders

	SG175	SG215	SG270SL	SG320SL
Cylinder height	1530	1825	1475	1695
PTR / solar return	1310	1605	1215	1430
Flow line to collectors	665	665	540	540
Cold water inlet	225	225	90	90
Gas supply and hot water out	940	1235	885	1105
Gas booster flue outlet	1400	1695	1345	1565
Cylinder diameter	515	515	625	625
Weight empty	66 kg	88 kg	91 kg	107 kg
System Depth	710	710	820	820



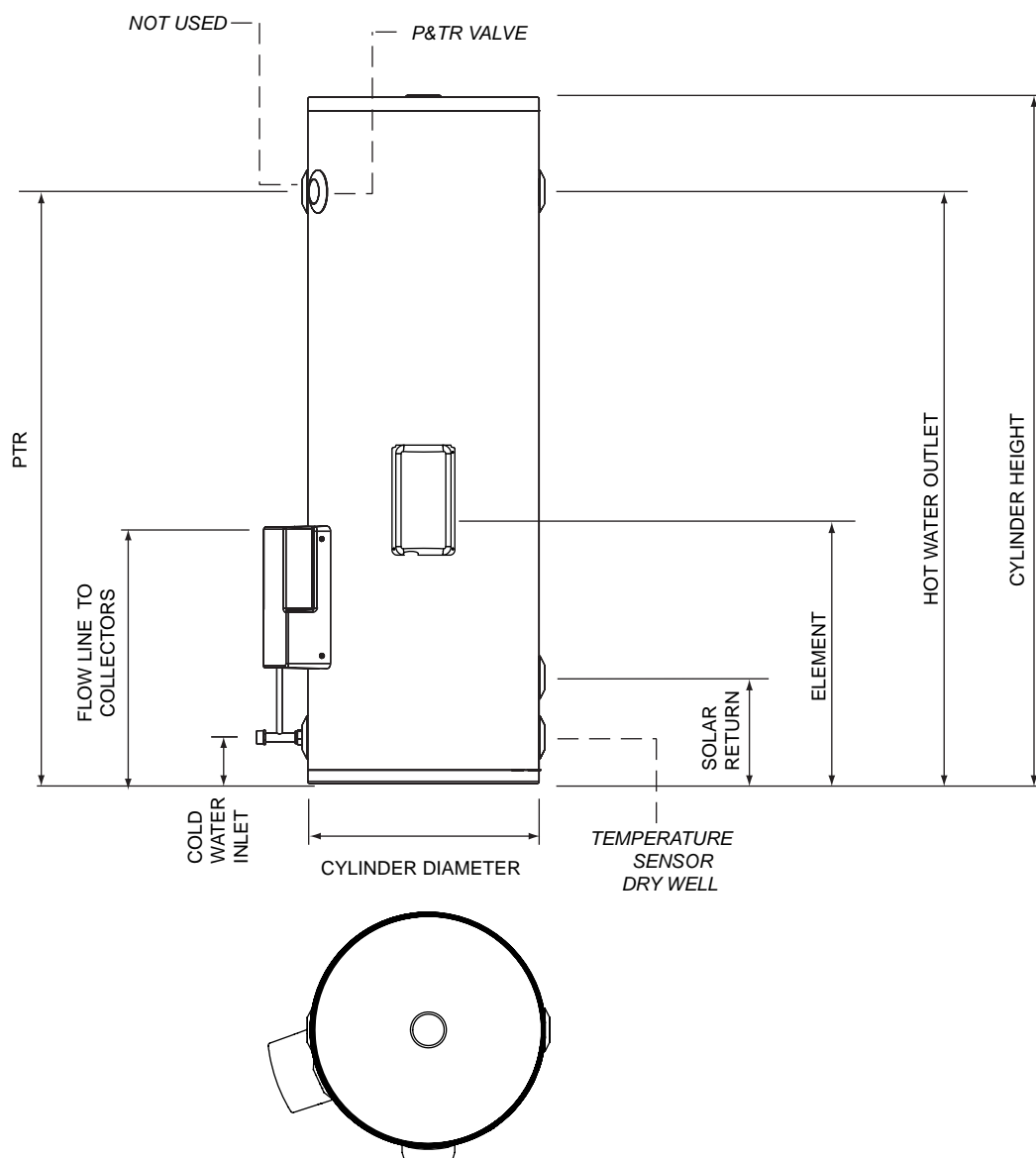
Glass Lined Bottom Element Electric Boosted Cylinders

	SE200	SE250SL	SE315SL
Cylinder height	1825	1475	1695
PTR / solar return / hot water outlet	1605	1215	1430
Flow line to collectors	665	540	540
Cold water inlet	225	90	90
Cylinder diameter	515	625	625
Weight empty (kg)	90	93	109



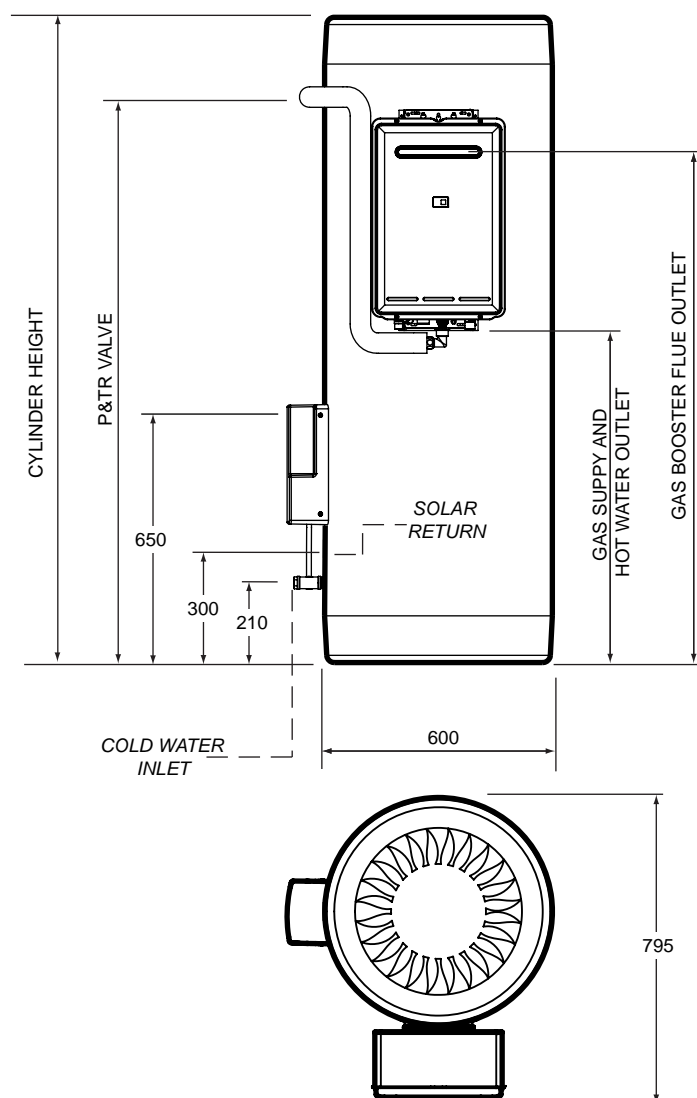
Glass Lined Mid Element Electric Boosted Cylinders

	SM250SL	SM315SL
Cylinder height	1475	1695
PTR / hot water outlet	1215	1430
Solar return	300	300
Flow line to collectors	540	540
Element	525	525
Cold water inlet	90	90
Cylinder diameter	625	625
Weight empty (kg)	93	109



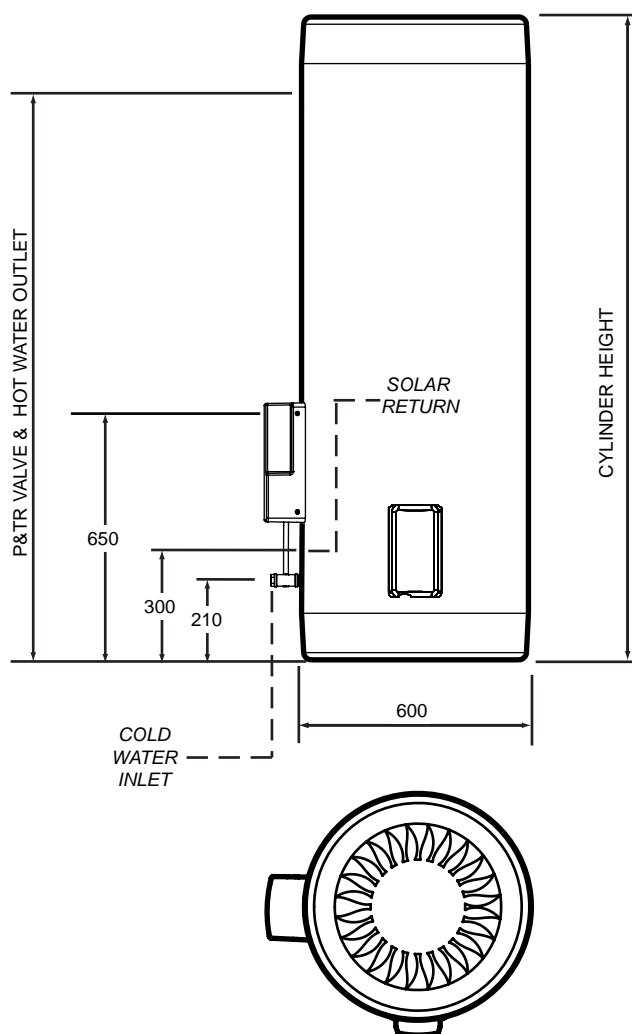
Stainless Steel Gas Boosted Cylinders

	250	315
Cylinder height	1700	2090
PTR / solar return / hot water outlet	1490	1880
Gas supply and hot water outlet	880	1270
Gas booster flue outlet	1345	1735
Weight empty (kg)	56	68



Stainless Steel Electric Boosted Cylinders

	160	250	315
Cylinder height	1205	1700	2090
PTR / solar return / hot water outlet	995	1490	1880
Weight empty (kg)	46	56	68



SOLAR COLLECTORS

Full specifications for the solar collectors can be found in the installation manual provided in the collector installation kit.

The following information is provided to assist in completing the installation

	ENDURO & EXCELSIOR	ENDURO XL	Evacuated Tubes
Potential Solar Output at PTR relief conditions	1.25 kW	1.40 kW	20 tubes - 1.30 kW 25 tubes - 1.63 kW 30 tubes - 1.96 kW
Frost Protection	FOR MORE INFORMATION ON FROST PROTECTION REFER TO WARRANTY BOOKLET		Power must be on at the pump and the solar controller must be in low temperature mode. See the section 'Frost Protection Mode' on page 22. FOR MORE INFORMATION ON FROST PROTECTION REFER TO WARRANTY BOOKLET

GAS BOOSTERS

Model Name	S20	S26	S26i *	S32 *
Boost capacity at 20°C rise (l/min)	20	26	32	37
Boost capacity at 25°C rise (l/min)	16	24	26	32
Maximum rated flow (l/min)	20	26	32	37
Minimum water supply pressure for maximum rated flow (kPa) ¹	120	200	140	180
Frost protection	Yes			
Gas consumption maximum (MJ/h)	125	188	195	250
Gas consumption minimum (MJ/h)	18	23	16	21
Hot water delivery temperature (°C) ²	70			
Dimensions - height x width x depth (mm)	530 x 350 x 194			600 x 470 x 244
Weight (kg)	15	21	21	29
<p>1 Units will operate at lower pressures but the rated flow will not be achieved.</p> <p>2 Gas boosters for Solar hot water applications must be set by Rinnai to deliver a minimum temperature of 70°C. Solar Gas boosters will be marked as Solar. Units not marked 'Solar' MUST NOT be used.</p> <p>* These models are made to order.</p> <p>Due to ongoing product improvement the specifications of the gas booster may vary. Refer to the documentation supplied with the gas booster for up to date specifications.</p>				

INSTALLATION - ALL SYSTEMS

REGULATIONS AND OCCUPATION HEALTH AND SAFETY (OH&S)



Installation and commissioning must be performed by authorised persons.

Solar systems must be installed in accordance with these instructions and all regulatory requirements which exist in your area including those in relation to manual lifting, working at heights and on roofs. Applicable publications and regulations may include:

- AS/NZS 5601 Gas Installations
- AS/NZS 3500 National Plumbing and Drainage
- AS/NZS 3000 Wiring rules
- Building Codes of Australia (BCA)
- Local Occupational Health and Safety (OH&S) regulations

This appliance is not suitable for use as a domestic spa pool or swimming pool heater.

Solar collectors are heavy and bulky items and are usually positioned on the roofs of buildings. Australian State and Territories have a principal Occupational Health and Safety (OH&S) Act which contains requirements relating to the handling of large, bulky or awkward items and the prevention of falls from elevated surfaces. Persons installing solar collectors must be aware of their responsibilities and be adequately trained and qualified, in accordance with local OH&S requirements.

LOCATION - GENERAL INFORMATION

All system components must be in an accessible location. The storage cylinder must be accessible without the use of a ladder or scaffold. Sufficient clearances shall allow access to, and removal of, all serviceable parts. Ensure the PTR valve, pump kit, drain lines and thermostat and elements for electric systems have sufficient clearances and are accessible for service and removal. The information on any data plates must also be readable. In the case of vitreous enamel lined cylinders, leave a clearance of the height of one storage cylinder above the cylinder being installed so the sacrificial anode can be inspected and replaced. This does not apply to stainless steel cylinders.

Select suitable areas of roof on which to install the solar collectors as close as practicable to the cylinder. Ensure that the area is even and without cracked or damaged tiles. Collectors should be positioned for optimum solar benefit, and to minimise wind loading. Refer to the installation manual supplied with the collector installation kit for more information.

The solar pump kit and gas booster heater require an AC 240V power supply. A weatherproof 240V, 10A earthed power point must therefore be provided adjacent to these.

All electrically boosted solar hot water heating elements must be connected to an independent, fused, AC 240V 50 Hz power supply with an isolating switch installed at the switch board.

STORAGE CYLINDER LOCATION

The storage cylinder should be placed as close as practicable to the most frequently used hot water outlet point or points to minimise the delay time for hot water delivery. This will usually be the kitchen tap.

The solar storage cylinders have an ingress protection rating of IPX4 making them suitable for internal or external installation.

Storage cylinders must be installed in freestanding mode on a level and stable base. For external installations, storage cylinders should be mounted on a concrete base at least 50mm thick or on well seasoned, evenly spread hardwood slats with a thickness of at least 25mm. Where property damage can occur, storage cylinders should be installed with an approved safe tray (overflow tray).

Ensure the cylinder does not stand on wet surfaces.

GAS BOOSTER LOCATION

Unless specifically designated as a internal model, the gas booster is designed for outdoor installation only. As such, it must be located in an above ground open air situation with natural ventilation, without stagnant areas, where gas leakage and products of combustion are rapidly dispersed by wind and natural convection.

WATER PIPES, FITTINGS AND INSULATION



The solar hot and solar cold pipes between the solar storage tank and the solar collectors must be suited to the high water temperatures and pressures that may occur. As such, plastic pipe must not be used. Components used to join pipes must use metallic materials to achieve sealing. The collector flow and return pipes should be at least 15 mm copper tube.

Insulation

All hot water pipework should be insulated with sealed polyethylene foamed or equivalent insulation to optimise performance and energy efficiency, and to protect against frost damage. Such insulation may also be mandatory under local regulations.

Rinnai recommend insulation to achieve at least the R value shown in the following table.

Location of Installation	Pipes on Roof Flat Plate Collectors	Pipes on Roof Evacuated Tube Collectors	Pipe between tank and gas booster
<ul style="list-style-type: none"> CER Zone 4 Areas defined as “B or “C” in the latest version of the Rinnai Solar Hot Water Warranty Booklet. Any other area prone to frost conditions. 	R = 1.0K.m ² /W	R = 1.0K.m ² /W	R = 0.6 K.m ² /W
<ul style="list-style-type: none"> All other areas 	R = 0.6 K.m ² /W	R = 1.0K.m ² /W	R = 0.6 K.m ² /W

All supplied insulation materials must be fitted as shown to minimise heat losses. In frost prone areas this insulation will also protect against frost damage.

Pipe Sizing

With the exception of solar collector flow and return pipes, water pipe sizing should be performed in accordance with AS/NZS 3500. All external pipework MUST be insulated to prevent frost damage.

Depending on the pump kit used for the installation, the maximum combined lengths of the solar flow and return pipes are as follows:

Pump Kit	Pipe Size	1 Flat Plate Collector EVT20A or EVT25A	2 Flat Plate Collectors EVT30A or 2 x EVT20A	3 Collectors
SGPKIT2B	DN 15	40 metres	40 metres	30 metres
SGPKIT3B	DN 20	60 metres	60 metres	40 metres
USKIT1B				

WATER SUPPLY

The maximum water pressures for the various systems are listed on page 13. Approved pressure limiting valves may be required if the maximum rated water supply pressures are exceeded. For gas boosted systems to achieve the rated flow through the outlet of the continuous flow water heater, the minimum water supply pressures must be supplied. The systems will operate at lower pressures but the rated flow will not be achieved.

Water chemistry and impurity limits are detailed in the separate warranty document. Most metropolitan water supplies fall within these requirements. If you are unsure about water quality, contact your water authority. If sludge or foreign matter is present in the water supply, a suitable filter should be incorporated in the water supply to the storage cylinder.

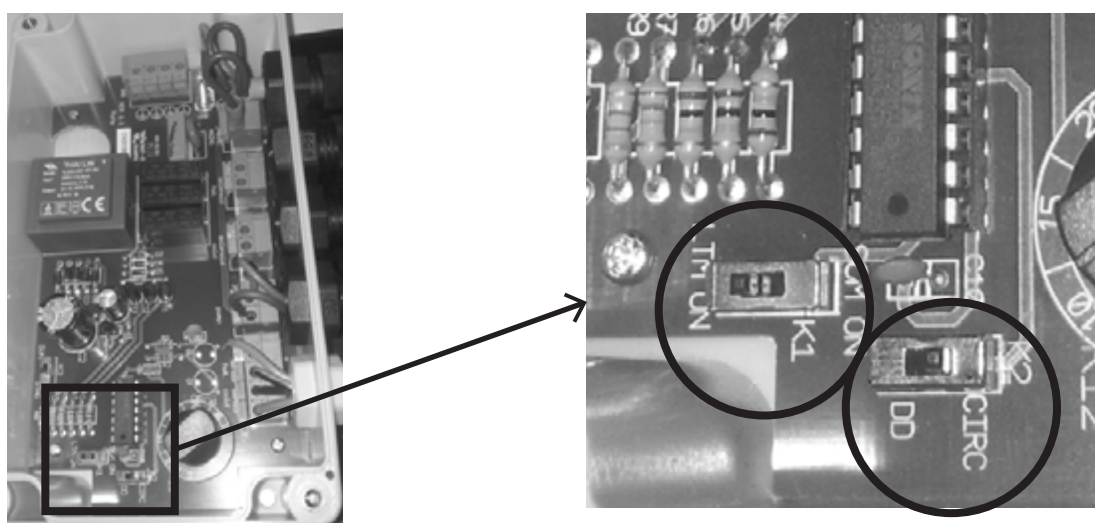
HOT WATER DELIVERY TEMPERATURE

Local regulations and/or the requirements of AS/NZS 3500.4 must be considered regarding the temperature limitations of hot water supplied to areas used primarily for personal hygiene. The temperature of water to these areas is limited to 45°C for early childhood centres, primary and secondary schools and nursing homes or similar facilities for young, aged, sick or people with disabilities and 50°C for all other buildings. To comply with these requirements, a temperature limiting device, such as a thermostatic mixing or tempering valve, will be required on all solar hot water systems as detailed below.

FROST PROTECTION MODE

The Solar Controller has two different temperature modes. Low temperature mode and standard operating mode. When the controller is in low temperature mode, the pump will circulate water to the collectors when the temperature on the roof drops low enough, to prevent freezing of the collectors.

Standard operating mode can be used for systems using flat plate collectors. Low temperature mode **MUST** be used for systems with evacuated tube collectors. Refer to the warranty booklet for more details.



Frost protection dipswitches on solar controller

Mode	Dip Switch K1	Dip Switch K2
Standard operating mode	SOM 'ON	CIR
Low temperature mode	LTM	CIR



Power **MUST** be turned OFF to the controller before opening the controller box.

Power **MUST** be OFF when adjusting dip switches

VALVES AND FITTINGS

The following valves and fittings are supplied with your solar hot water system:

- A combined pressure and temperature (PTR) relief valve, capacity 10 kW. Relief valve pressure settings vary with models. This valve is fitted at the top of the storage cylinder. The PTR valve is a safety device and it is mandatory that it is fitted by the installer in all installations.
- A non return valve fitted on the solar pump outlet to prevent backflow through the pump from the solar collectors. This valve is factory connected.
- Fittings as shown on pages 28 to 33 or 40 to 45.

The following valves & fittings are to be supplied by the installer:

- A cold water expansion control valve (ECV). An ECV must be fitted in Western Australia and South Australia to the cold water supply to the storage cylinder to comply with local regulations. An ECV is recommended in all other geographical areas where the water supply has a tendency to cause scaling. This will reduce hot water discharge from the pressure and temperature relief (PTR) valve which minimises wear on this valve.
- A stop cock, non return valve and line strainer. Combination valves incorporating two or more of these functions (such as 'Trio' valves) are suitable. These are fitted to the cold water supply to the storage cylinder by the installer.
- Cold water supply and hot water discharge pipework to and from the storage cylinder.
- Solar collector flow and return pipes and storage cylinder connections.
- An isolating valve and connection union for the gas supply to the gas booster.
- An approved pressure limiting valve (supplied with some systems) is required if the maximum rated water supply pressure on page 13 is exceeded.
- Tempering valve(s) or thermostatic mixing valve

INSTALLATION - GAS BOOSTED SYSTEMS

OVERVIEW OF SYSTEM COMPONENTS

The range of gas boosted solar hot water systems include all the components shown on pages 28 to 33 (refer to the appropriate diagram depending on cylinder type/size).

The pump kit and associated plumbing connections are factory pre-assembled. All other components and fittings will require connection on site. The gas booster and pump/controller kit may be mounted to the front of the storage cylinder casing or in an alternative external location. In all cases the heated outlet of the cylinder is connected to the cold water inlet of the gas booster.

GAS BOOSTER LOCATION

Unless specifically designated as a internal model, the gas booster is designed for outdoor installation only. As such, it must be located in an above ground open air situation with natural ventilation, without stagnant areas, where gas leakage and products of combustion are rapidly dispersed by wind and natural convection. The location must comply with the clearances specified in AS/NZS 5601. See page 26.

The gas booster must be mounted on a vertical structure with the water and gas connections on the underside pointing downwards. In most installations the gas booster is mounted directly on the storage cylinder using two custom made mounting brackets (supplied). In all cases the heated outlet of the cylinder is connected to cold water inlet of the gas booster.

GAS SUPPLY

The maximum gas consumption of the gas booster and the required gas pressure are shown on the appliance data plate. If the gas pipe sizing is insufficient the customer will not get the full performance benefit. Gas pipe sizing must consider the gas input to the gas booster as well as all the other gas appliances on the premises. The gas meter and regulator must be specified for this gas rate. An approved sizing chart such as the one in AS/NZS 5601 should be used. An approved full flow isolation valve and disconnection union must be fitted to the gas supply inlet of the gas booster. Isolation valves must not be fitted directly to the booster.

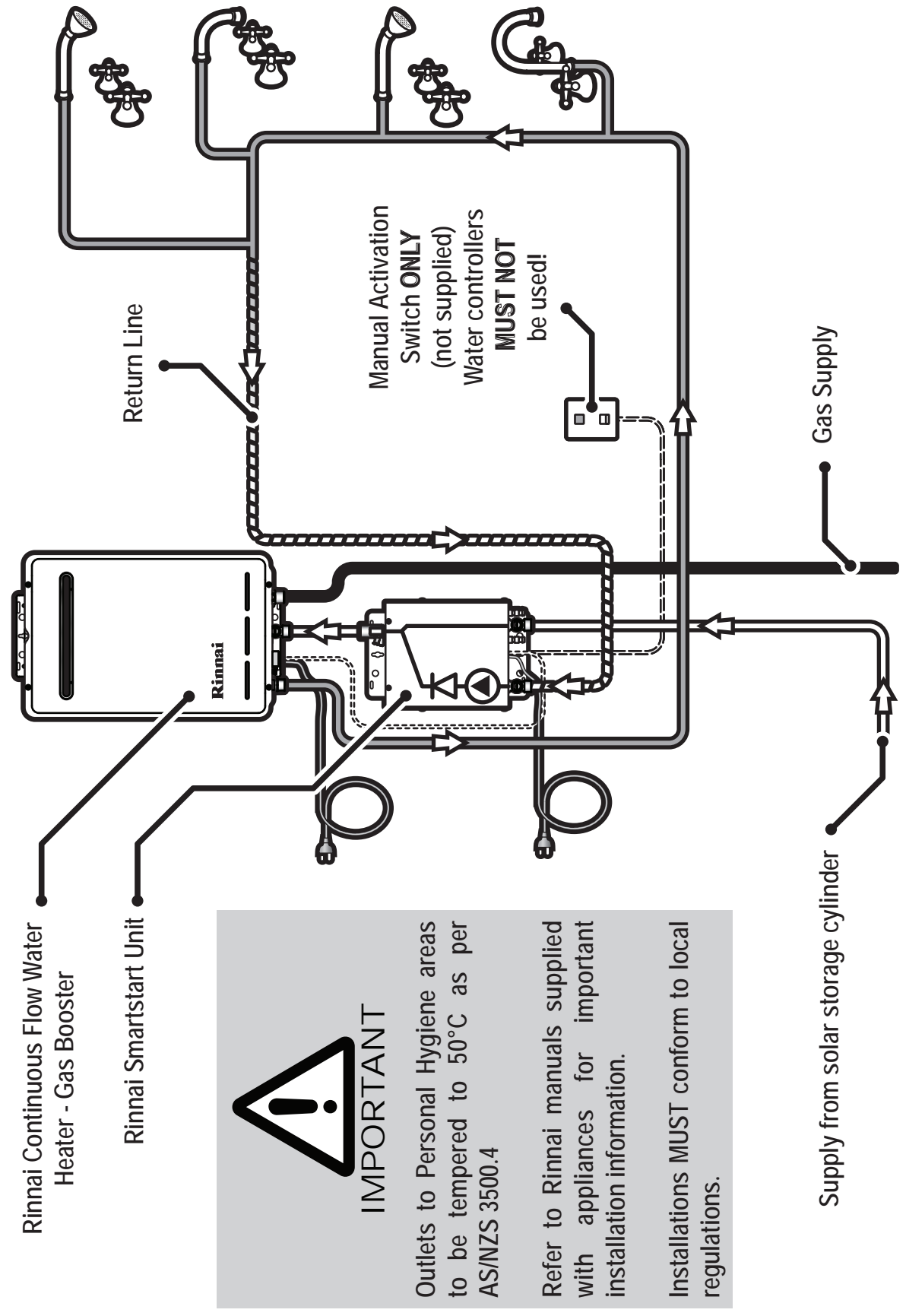
HOT WATER DELIVERY TEMPERATURE

Gas boosters for use in solar hot water systems are preset to deliver a fixed temperature of 70°C in accordance with plumbing regulations. In addition, they contain the warning stating "Rinnai Water Controllers are NOT compatible with solar hot water installations and MUST NOT BE USED in the vicinity of the temperature controller connections inside the appliance."



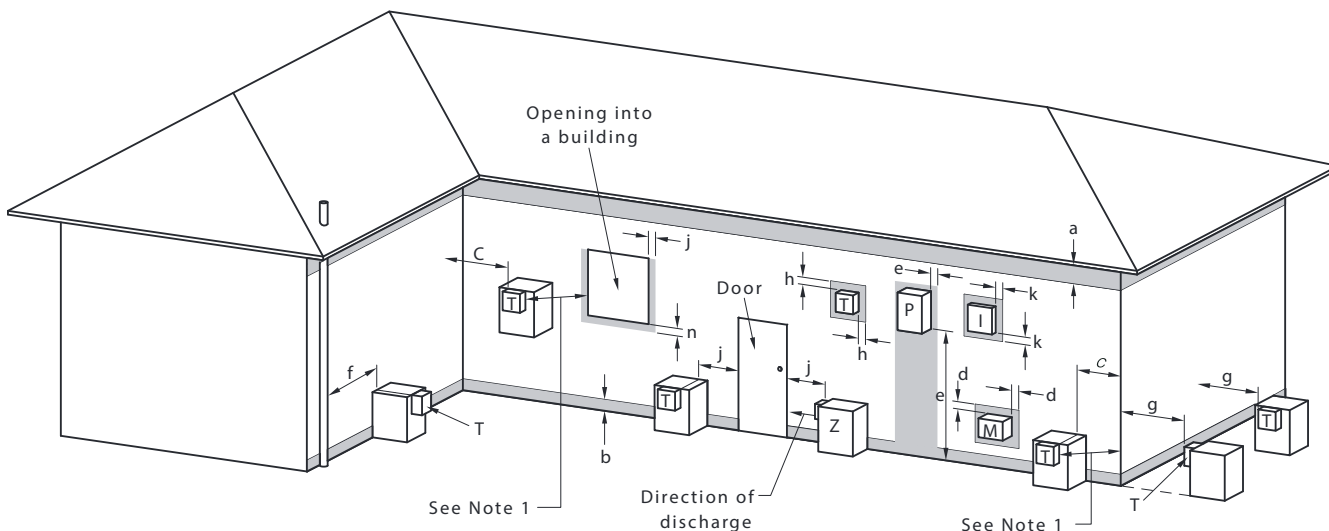
Gas Boosters other than models designated "S20", "S26", "S26i", "S32" or "Solar" must not be used. Gas Boosters marked with the text: "THIS APPLIANCE DELIVERS WATER NOT EXCEEDING 50°C IN ACCORDANCE WITH AS 3498" are incompatible with solar hot water systems and must not be used.

RINNAI SMARTSTART



GAS BOOSTER CLEARANCES

Figure 6.2 from AS/NZS5601 is reproduced below. It was current at the time of printing, but may have been superseded. It is the installer's responsibility to ensure that current requirements are met.



I = Mechanical air inlet M = Gas meter P = Electricity meter or fuse box T = Flue terminal Z = Fan-assisted appliance only

Shading indicates prohibited area for flue terminals

Ref.	Item	Min. clearances (mm)
		Fan assisted
	Below eaves, balconies and other projections:	
a	• <i>Appliances</i> up to 50 MJ/h input	200
	• <i>Appliances</i> over 50 MJ/h input	300
b	From the ground, above a balcony or other surface *	300
c	From a return wall or external corner *	300
d	From a gas <i>meter</i> (M) (see Note 5) (see Clauses 5.11.5.9 for vent terminal location of regulator) (See Table 6.7 for New Zealand requirements)	1000
e	From an electricity <i>meter</i> or fuse box (P) † (see Note 5)	500
f	From a drain pipe or soil pipe	75
g	Horizontally from any building structure* or obstruction facing a terminal	500
h	From any other <i>flue terminal</i> , cowl, or combustion air intake *	300
j	Horizontally from an openable window, door, non-mechanical air inlet, or any other opening into a building with the exception of sub-floor ventilation:	
	• <i>Appliances</i> up to 150 MJ/h input *	300
	• <i>Appliances</i> over 150 MJ/h input up to 200 MJ/h input *	300
	• <i>Appliances</i> over 200 MJ/h input up to 250 MJ/h input *	500
	• <i>Appliances</i> over 250 MJ/h input *	1500
	• All fan-assisted <i>flue appliances</i> , in the direction of discharge	1500
k	From a mechanical air inlet, including a spa blower	1000
n	Vertically below an openable window, non-mechanical air inlet, or any other opening into a building with the exception of sub-floor ventilation:	
	• Space heaters up to 50 MJ/h input	150
	• Other <i>appliances</i> up to 50 MJ/h input	500
	• <i>Appliances</i> over 50 MJ/h input and up to 150 MJ/h input	1000
	• <i>Appliances</i> over 150 MJ/h input	1500

* - unless appliance is certified for closer installation.

† - Prohibited area below electricity meter or fuse box extends to ground level.

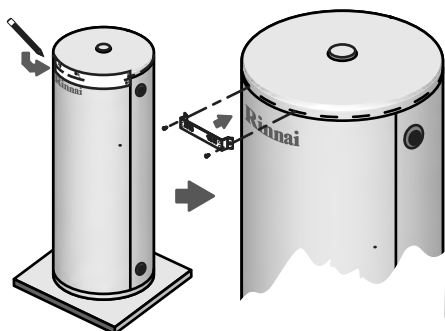
NOTES:

- Where dimensions c, j or k cannot be achieved an equivalent horizontal distance measured diagonally from the nearest discharge point of the terminal to the opening may be deemed by the *Technical Regulator* to comply.
- See Clause 6.9.4 for restrictions on a flue terminal under a covered area.
- See Figure J3 for clearances required from a flue terminal to an LP Gas cylinder. A flue terminal is considered to be a source of ignition.
- For appliances not addressed above acceptance should be obtained from the Technical Regulator.
- Minimum clearances d and e also apply to any combustion air intake openings of appliances.

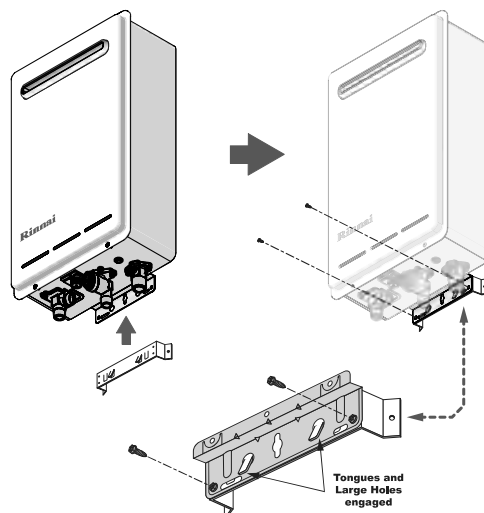
FIGURE 6.2 (in-part) LOCATION OF FLUE TERMINALS OF BALANCED FLUE, ROOM SEALED, FAN-ASSISTED OR OUTDOOR APPLIANCES

GAS BOOSTER MOUNTING

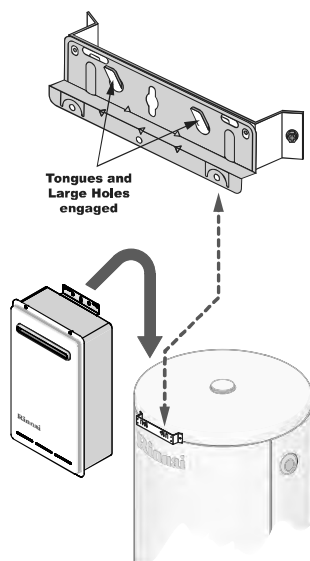
Step 1. Mount upper mounting bracket using template provided.
(SG175 & SG215 are factory mounted).



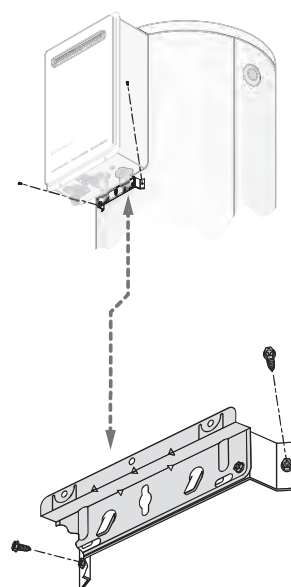
Step 2. Fix lower mounting bracket to Booster using screws provided.



Step 3. Hang booster on bracket and secure with screws provided.



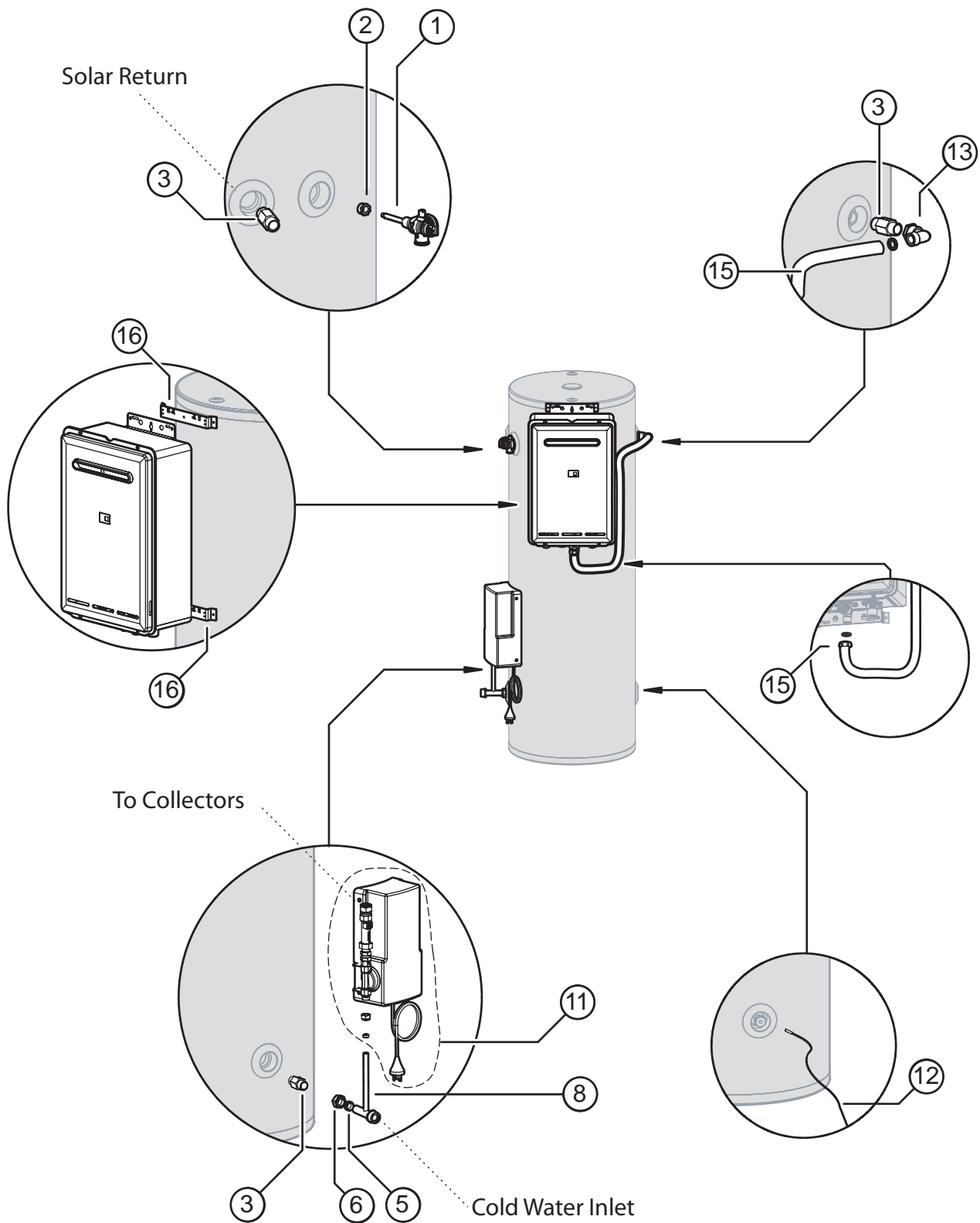
Step 4. Secure lower mounting bracket to cylinder using screws provided.



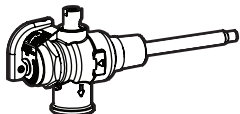
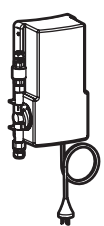







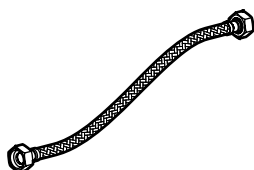


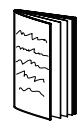
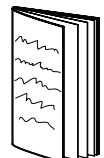
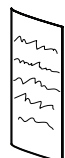
If the gas booster is not mounted on the storage cylinder, ensure that the wall or structure on which it is to be mounted is capable of supporting the weight of the appliance and associated pipe work. Refer to the table on page 19 for individual gas booster weights. For gas boosters installed on elevated structures or under floors specific requirements apply, refer to AS/NZS 5601 for details. Location of gas booster flue terminal must be in accordance with AS/NZS 5601. Refer page 26.

COMPONENTS AND INSTALLATION DIAGRAMS

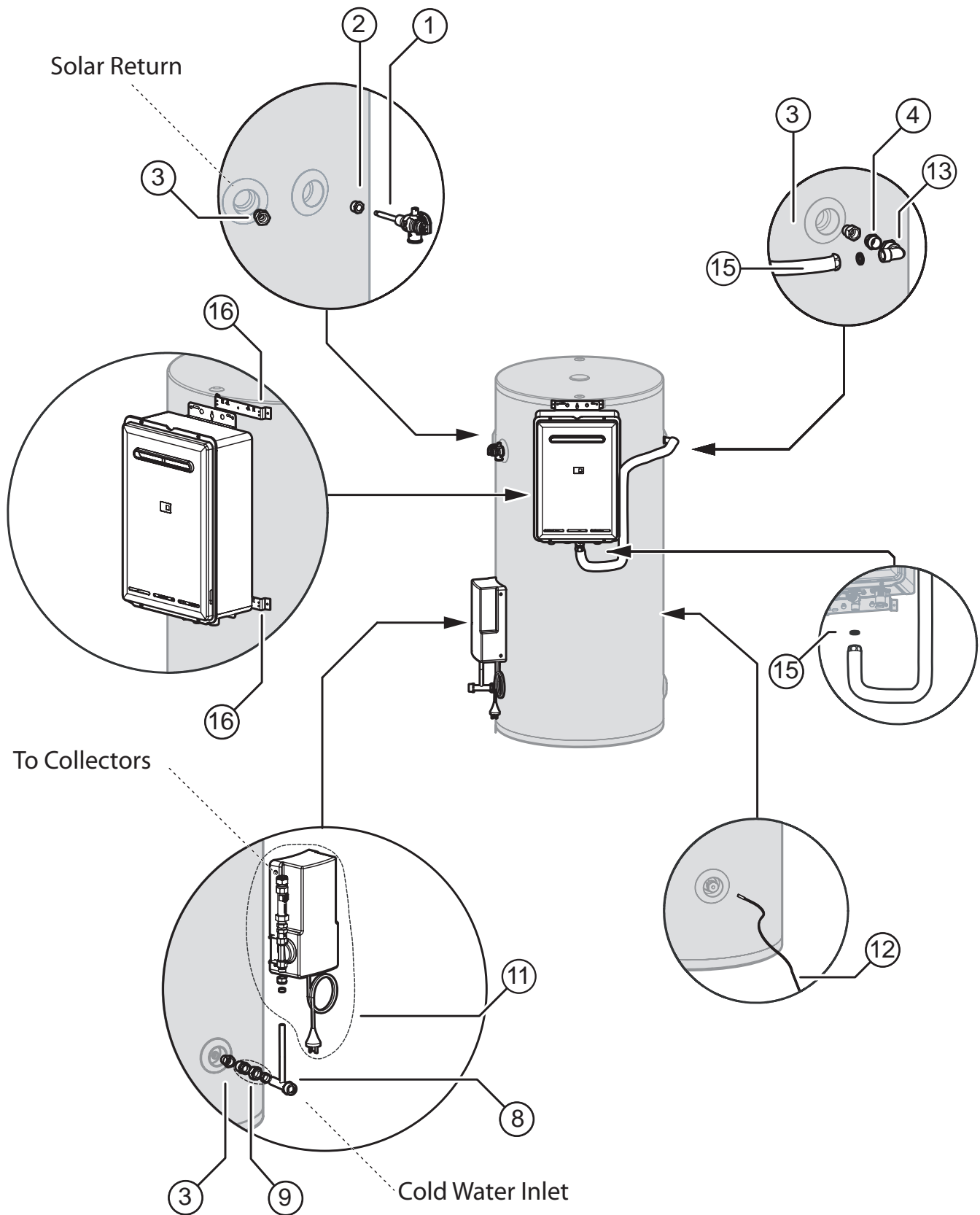
Glass Lined SG175 or SG215 with SGPKIT2A or SGPKIT2B



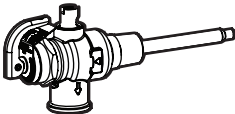




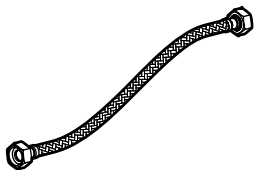



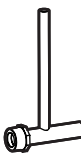
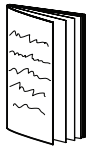

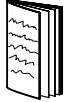
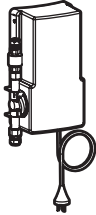
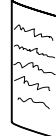

Glass Lined SG175 or SG215 with SGPKIT2B

Items Supplied with Cylinder			Items Supplied with SGPKIT2B (cont)		
1	1	 PTR Valve 92501190	11	1	 Pump & Controller Assembly 39001747 Includes: • Non return valve 27801713 • Temperature sensor lead 31002710 • Pump 30001755 • Control Box 31002703
2	1	 Adaptor R 3/4 x Rp 1/2			
3	3	 Nipple R 3/4			
16	2	 Gas Booster Mounting Brackets 1 x tabs bent (A) 26601098 1 x tabs unbent (B) 26601096	12	1	 Temperature Sensor with 2 m lead Part of Pump and Controller Assembly, but shown separately for clarity in diagrams 31002710
Items Supplied with SGPKIT2B					
5	1	 3/4 Kinco Olive 33001011	13	1	 Elbow 3/4 Rp x 3/4 R 21201074
6	1	 3/4 Kinco Nut 16801018	15	1	 Braided Flexi Pipe (inc washers) 20001020
8	1	 Cold Inlet Copper T 11603921			
-	10	 Screws 22601048	-	1	 Warranty booklet 15401041
-	1	 Operation and Installation Manual 15401021	-	1	 STC form 15401023

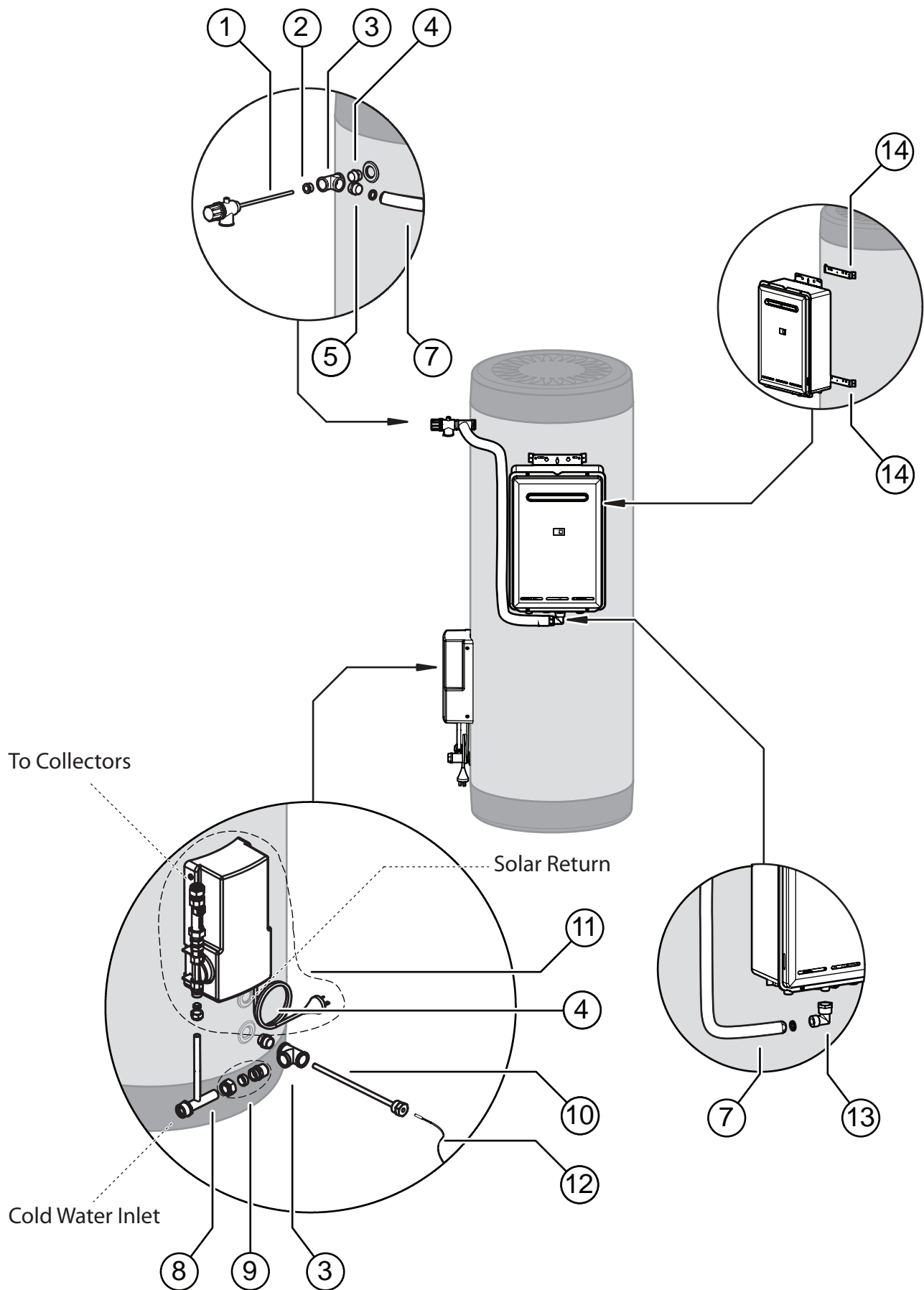
Glass Lined SG270SL or SG320SL with SGPKIT3B



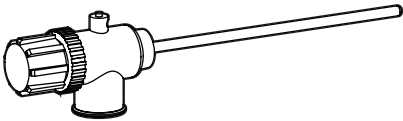


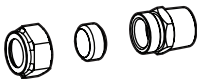

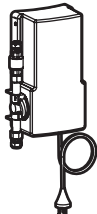




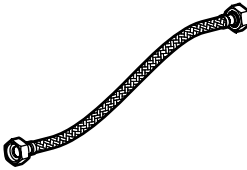
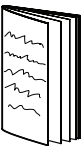



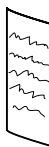



Glass Lined SG270SL or SG320SLwith SGPKIT3B

Items Supplied with Cylinder			Items Supplied with SGPKIT3B (cont)		
1	1	 PTR Valve 92501190	12	1	 Temperature Sensor with 2 m lead Part of Pump and Controller Assembly, but shown separately for clarity in diagrams 31002710
2	1	 Adaptor R 3/4 x Rp 1/2	13	1	 Elbow 3/4 Rp x 3/4 R 21201074
3	3	 Adaptor R 3/4 x Rp 3/4	15	1	 Braided Flexi Pipe (inc washers) 20001020
Items Supplied with SGPKIT3B			16	2	 Gas Booster Mounting Brackets 1 x tabs bent (A) 26601098 1 x tabs unbent (B) 26601096
4	1	 R 3/4 Nipple 17201005	-	14	 Screws 22601048
8	1	 Cold Inlet Copper T 11603921	-	1	 Operation and Installation Manual 15401021
9	1	 G3/4 (Comp) x R 3/4 union 32201713	-	1	 Warranty booklet 15401041
11	1	 Pump & Controller Assembly 39001747 Includes: • Non return valve 27801713 • Temperature sensor lead 31002710 • Pump 30001755 • Control Box 31002703	-	1	 STC form 15401023
			-	1	 Gas Booster Mounting Template 15401034

Stainless Steel Gas Boost with USKIT1B



Stainless Steel Gas Boosted with USKIT1B

Items Supplied with Cylinder			Items Supplied in USKIT1B		
1	1	 PTR Valve 11004784	8	1	 Cold Inlet Copper T 11603921
2	1	 Adaptor R 3/4 x Rp 1/2 19801004	9	1	 G3/4 (Comp) x R 3/4 union 32201713
3	2	 T 3/4 Rp 19001011	11	1	 Pump & Controller Assembly 39001747 Includes: • Non return valve 27801713 • Temperature sensor lead 31002710 • Pump 30001755 • Control Box 31002703
4	2	 R 3/4 Nipple 17201005	12	1	 Temperature Sensor with 2 m lead Part of Pump and Controller Assembly, but shown separately for clarity in diagrams 31002710
5	1	 Adaptor R 3/4 to G 3/4 (flexi) 17201006	-	6	 Screws 22601048
7	1	 Braided Flexi Pipe (inc washers) 20001020	-	1	 Operation and Installation Manual 15401021
10	1	 Temperature Sensor Sheath 250 mm 10204721	-	1	 Warranty booklet 15401041
13	1	 Elbow 3/4 Rp x 3/4 R 21201074	-	1	 STC form 15401023
14	2	 Gas Booster Mounting Brackets 1 x tabs bent (A) 26601098 1 x tabs unbent (B) 26601096			
-	8	 Screws 22601048			
-	1	 Gas Booster Mounting Template 15401040			

INSTALLATION PROCEDURE

1. Install Solar Collectors

Position and install the solar collectors in accordance with the installation manual supplied with the solar collectors.

2. Position Storage Cylinder

Position the hot water storage cylinder on a level base in accordance with the section 'Storage Cylinder Location' on page 20.

3. Connect PTR Valve

Connect the PTR Valve in the location shown in the relevant diagram on pages 28 to 33. Leave the valve outlet pointing down. Tighten the valve using the spanner flats - never use the valve body.

The PTR Valve must be adequate for the thermal loading applied to the storage cylinder. In the case of gas boosted systems, the thermal load is applied only by the solar collectors. The continuous flow hot water heater does not apply thermal load to the storage cylinder. The potential solar output for the solar collectors at PTR Valve relief conditions is listed in the table on page 19.

The PTR Valve pressure ratings vary according to the cylinder specifications. The maximum heat input rating is 10.0 kW. The PTR valve rating **MUST EXCEED** the total input from the solar collectors. If it does not, the PTR valve **MUST** be exchanged for a model of higher capacity.

For example, for a gas boosted solar system with 3 x Enduro collectors, the thermal load is $3 \times 1.25 = 3.75$ kW. This is less than 10.0 kW, hence the supplied PTR valve is of sufficient capacity.

4. Mount Gas Booster

Mount the gas booster in accordance with the section 'Gas Booster Mounting' on page 27.

5. Connect Fittings and Mount Pump Assembly

Connect fittings and pipe work as shown in the relevant diagram on pages 28 to 33. Remove cover of pump box and attach pump box to cylinder using screws provided. **DO NOT** connect the power lead to power supply at this stage.

6. Set Frost Protection Mode

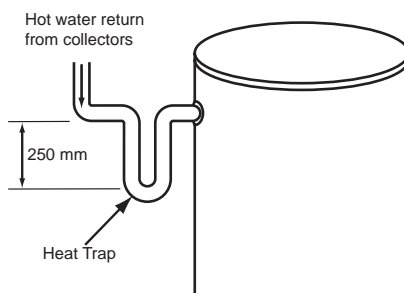
Adjust Dip Switches on Solar Controller to give the required frost protection. (Refer page 22).



7. Install and Connect Flow and Return Pipe Work

Connect flow and return pipe work between storage cylinder and solar collector. Ensure that suitable pipe and insulation is used as described in the section 'Water Pipes, Fittings and Insulation' on page 21.

A heat trap is required on the return line from the cylinder if the pipework is to rise vertically to prevent heat losses due to the thermosyphoning of hot water from the tank.



8. Connect Temperature Sensor Leads

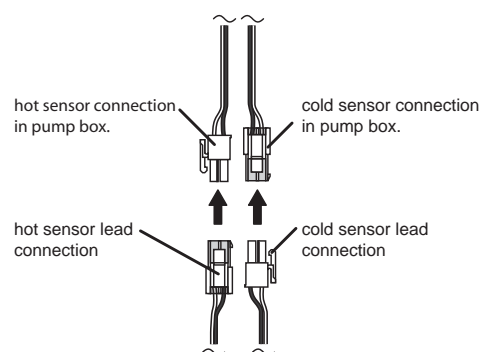
The hot (longer) temperature sensor lead should be fitted at the collector hot outlet as shown in the installation manual supplied with the solar collectors. It must be sealed in place with thermoplastic putty or silicone.

Run the lead down the solar return pipe and connect it to the connection within the pump and controller assembly as shown in the diagram. Ensure the lead is protected from light.

The cold (shorter) temperature sensor lead should be fitted as shown in the relevant diagram on pages 28 to 33.

Ensure the lead is protected from light. It must be sealed in place with thermoplastic putty or silicone. The plug is then connected to the pump and controller assembly as shown in the diagram.

Replace pump assembly cover.



NOTE IT IS IMPORTANT THAT THESE PROBES ARE INSTALLED AS SPECIFIED. FAILURE TO DO SO WILL LEAD TO MALFUNCTION OR LACK OF HOT WATER

9. Cold Water Supply

Connect cold water supply to the inlet 'T'. Ensure that the relevant valves are fitted as described in the section 'Valves and Fittings' on page 23.

Purge the cold water supply lines to remove air and swarf before final connection.

10. Relief Drain Lines

Independent 15 mm copper pipes must be fitted to the drain outlets of the PTR and ECV. Each pipe must be open to atmosphere and run with a continual downward grade in a frost free environment to a visible discharge point. Drain lines must not exceed 9 metres in length.

Valves or other restrictions must not be placed in the relief valve drain outlet line.



NOTE Some water will drip from the drain lines during heating of the water in the storage cylinder. It is recommended to discharge directly above a drain.

11. Hot Water Discharge

Connect the hot water outlet of the gas booster to the pipe work supplying hot water to the premises.



WARNING A temperature limiting device may be required as detailed in the section " on page 21.

12. Connect Gas to Booster

Connect a suitable gas supply and isolating valve to the gas booster. Follow instructions supplied with gas booster. Keep gas booster isolated at this stage.

FILLING THE SYSTEM



Ensure building occupants are warned to stay clear of the solar system components, building perimeter and roof since hot water or steam may be discharged from pipes or components.

1. Ensure the electric power supplies to the water heater and pump kit are switched 'OFF'.
2. Ensure the gas supply to the continuous flow water heater is isolated.
3. Turn on the hot water tap at the sink. Open the stop cock in the cold water mains supply line.
4. The entire system will now be filled with cold water. Most air will be dispelled through the tap. Some air should be bled by temporarily loosening a fitting at the collector outlet, or from the air bleed valve on the collectors.
5. Turn off the hot tap at the sink when water flows freely without air bubbles or air bursts. Check all connections for leakage and tighten if necessary. This applies especially to fittings in positions not easily accessed such as near the solar collectors. Operate the easing gear of both the PTR and ECV valves at the storage cylinder to ensure these valves are functional.



If leaks are detected the system must be drained and leaks repaired before the system is refilled. If this is necessary, cover the solar collectors with packaging cardboard or a tarp to prevent them from heating which could result in steam or hot water being discharged from fittings..

CHECKING SOLAR PUMP OPERATION

1. Ensure hot and cold sensors are connected as shown on page 35.
2. Activate power supply.
3. Pumps will operate when solar energy is available to be collected.

ADJUSTING FLOW RATE



If the solar pump does not activate the system can still be commissioned as detailed in these instructions, but solar preheating will not be available until the pump and controller operate.

The purpose of controlling the water flow rate between the collectors and storage cylinder is to optimise the performance of the system. The optimum flow rate for the system depends on the number and type of collectors.

Combined Flow and Return Pipe Length	1 flat plate collector or 20 Evacuated Tubes	25 or 30 Evacuated Tubes	40 or 50 Evacuated Tubes	2 flat plate collectors	3 flat plate collectors
< 30 metres of (DN15)					
30-40 metres (DN15)					

PRE SOLAR HEATING CHECKS

Before commencing solar heating of the water in the system ensure the following actions have been completed:

Solar Collectors

1. Are the solar collectors installed with the correct slope and orientation to the sun?
2. Is the installation finished neatly with the roof made good, all tiles and flashings in place?
3. Are the bolts tight on the roof framework?
4. Are all solar collector straps fitted and correctly anchored to the roof structure?
5. If leak testing completed and successful, have any covers been removed from the solar collectors?
6. Has operation of the solar pump been checked?
7. Have the hot and cold sensors and leads been positioned and connected correctly?

Gas Booster

1. Ensure the gas supply is isolated. Remove the test point screw located on the gas inlet connection and attach a pressure gauge.
2. Turn on the electrical power to the gas booster only (not the solar pump kit) and turn on the gas supply.
3. Ensure the cold water inlet ('trio') valve on the storage cylinder inlet is open. Open all available hot water taps.
4. Operate ALL other gas appliances at their maximum gas rate, in accordance with manufacturers instructions.



Ensure building occupants do not have access to hot water outlets during this procedure.

With all gas appliances in operation at the maximum gas rate, the pressure should read between 1.13 - 3.0 kPa on Natural Gas. On LPG the pressure should be 2.75 - 3.0 kPa. If the pressure is lower, the gas supply is inadequate and the appliance will not operate to specification. It is the installers responsibility to check the gas meter, service regulator and pipe work for correct operation/ sizing & rectify as required. Note that the gas regulator on the appliance is electronically controlled and factory pre-set. Under normal circumstances it DOES NOT need adjustment during installation. Make adjustments only if the gas booster is not operating correctly and all other possible causes for incorrect operation have been eliminated. Instructions for gas pressure setting are located in the pocket behind the front cover of the gas booster.

5. Close the hot water taps including the shower.
6. Close the cold water inlet ('trio') valve on the storage cylinder inlet and inspect and clean the strainer. Repeat for the strainer connected at the inlet of the gas booster. This procedure may need to be repeated to ensure the strainers remains clear, especially on new installations.
7. Confirm the hot water delivery temperature from the gas booster. This is done by checking the hot water delivery temperature at an untempered outlet close to the water heater. This is usually the hot water outlet in the kitchen. The untempered hot water delivery should be between 65°C & 70°C.

Temperature Limiting Devices

1. Commission any temperature limiting devices in accordance with the instructions supplied by the manufacturer.
2. Confirm the hot water delivery temperature at a tempered water outlet. Tempered water outlets should be those supplying areas primarily used for the purposes of personal hygiene such as bathrooms. The hot water delivery temperature should not exceed 50°C or 45°C as detailed in the section " on page 21.

SOLAR HEATING

1. Remove any cardboard or tarp covers that may have been placed over the solar collectors to prevent them from heating water during installation and commissioning.
2. Activate electrical power to both the gas booster and solar pump and controller. Solar heating of the water in the cylinder will now commence when sufficient solar radiation is available.

FINISHING THE INSTALLATION

1. After testing is completed explain to the householder the functions and operation of solar water heater components and the importance of carrying out maintenance.
2. Complete the installation record at the back of the manual.
3. Leave this manual and the warranty booklet with the householder.

DRAINING INSTRUCTIONS

1. The power supply to the gas booster and pump controller must be switched off and fuse(s) removed.
2. Close the cold water mains supply stop cock.
3. Open a hot tap to relieve pressure.
4. Disconnect the hot outlet near the top of the storage cylinder.
5. Disconnect the cold inlet near the bottom of the storage cylinder.
6. Disconnect the connection between the solar 'flow pipe' and solar pump.
7. Disconnect the connection between the solar 'return pipe' and the cylinder.
8. The cylinder and solar collectors will now drain completely

INSTALLATION - ELECTRIC BOOSTED SYSTEMS

OVERVIEW OF SYSTEM COMPONENTS

The range of electric boosted solar hot water systems include all the components shown on pages 40 to 45. (refer to the appropriate diagram depending on cylinder type/size and kit).

The pump kit and associated plumbing connections are factory pre-assembled. All other components and fittings will require connection on site.

ELECTRIC SUPPLY



Electrical connection must be carried out by a qualified person and in accordance with AS/NZS 3000 'Wiring Rules' and local authority requirements.

All electrically boosted solar hot water heating elements must be connected to an independent, fused, AC 240V 50 Hz power supply with an isolating switch installed at the switch board. Ensure the household wiring to the system is capable of withstanding the system electrical load (refer to specifications for electrical load details). Twin element models are factory wired for 'non' simultaneous' operation.

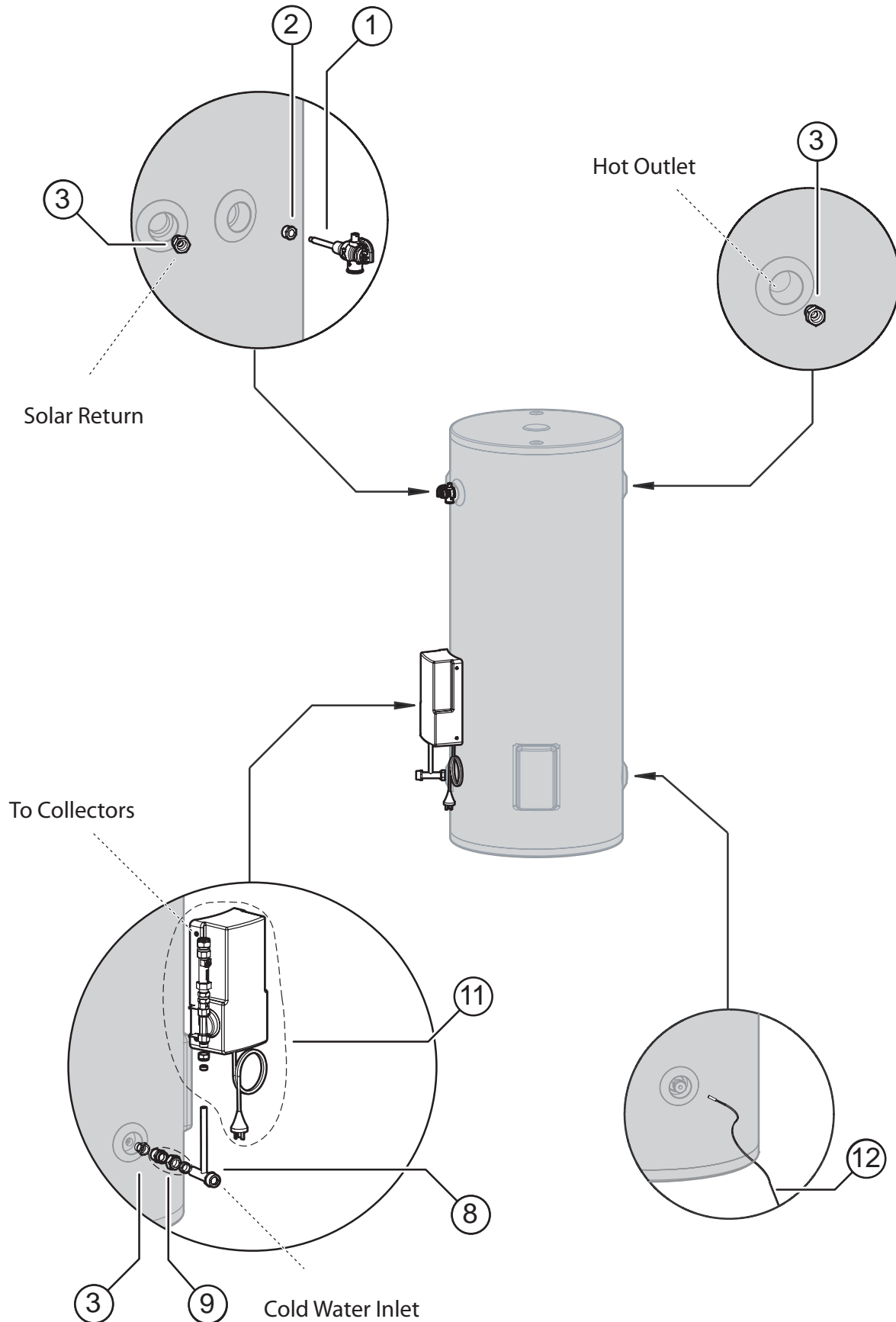
The solar pump kit requires an AC 240V power supply from a 10A earthed power point adjacent to the storage cylinder. For outdoor installations this power point must be weatherproof. This power supply must be independent from the power supply to any heating elements.

HOT WATER STORAGE AND DELIVERY TEMPERATURE

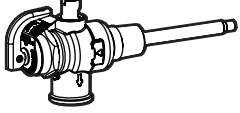




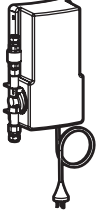


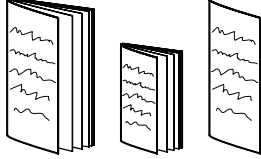
Australian Standards require a minimum storage cylinder thermostat set point of 60°C.

COMPONENTS AND INSTALLATION DIAGRAMS

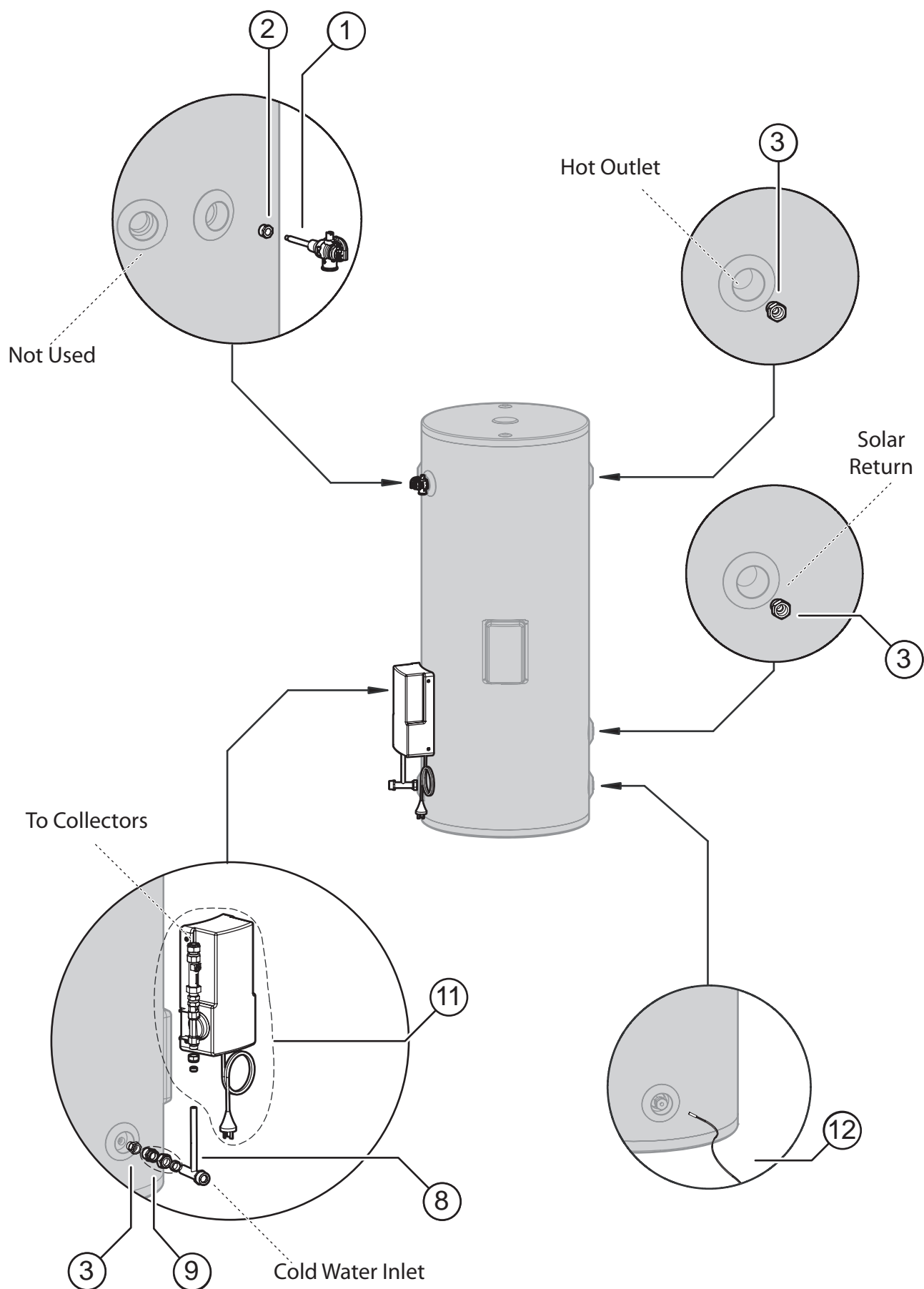
Glass Lined Lower Element Electric Boosted Systems with USKIT1B



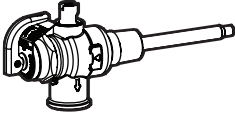




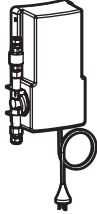


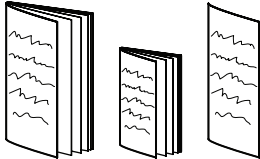
Glass Lined Lower Element Electric Boosted Systems with USKIT1B

Items Supplied with Cylinder			Items Supplied in USKIT1B		
1	1	 <p>PTR Valve 92501190</p>	8	1	 <p>Cold Inlet Copper T 11603921</p>
2	1	 <p>Adaptor R $\frac{3}{4}$ x Rp $\frac{1}{2}$</p>	9	1	 <p>G3/4 (Comp) x R $\frac{3}{4}$ union 32201713</p>
3	3	 <p>Adaptor R $\frac{3}{4}$ x Rp $\frac{3}{4}$</p>	11	1	 <p>Pump & Controller Assembly 39001747 Includes: <ul style="list-style-type: none"> Non return valve 27801713 Temperature sensor lead 31002710 Pump 30001755 Control Box 31002703 </p>
			12	1	 <p>Temperature Sensor with 2 m lead Part of Pump and Controller Assembly, but shown separately for clarity in diagrams 31002710</p>
				6	 <p>Screws 22601048</p>
			-	1	 <p>Operation and Installation Manual 15401021 Warranty booklet 15401041 STC form 15401023</p>

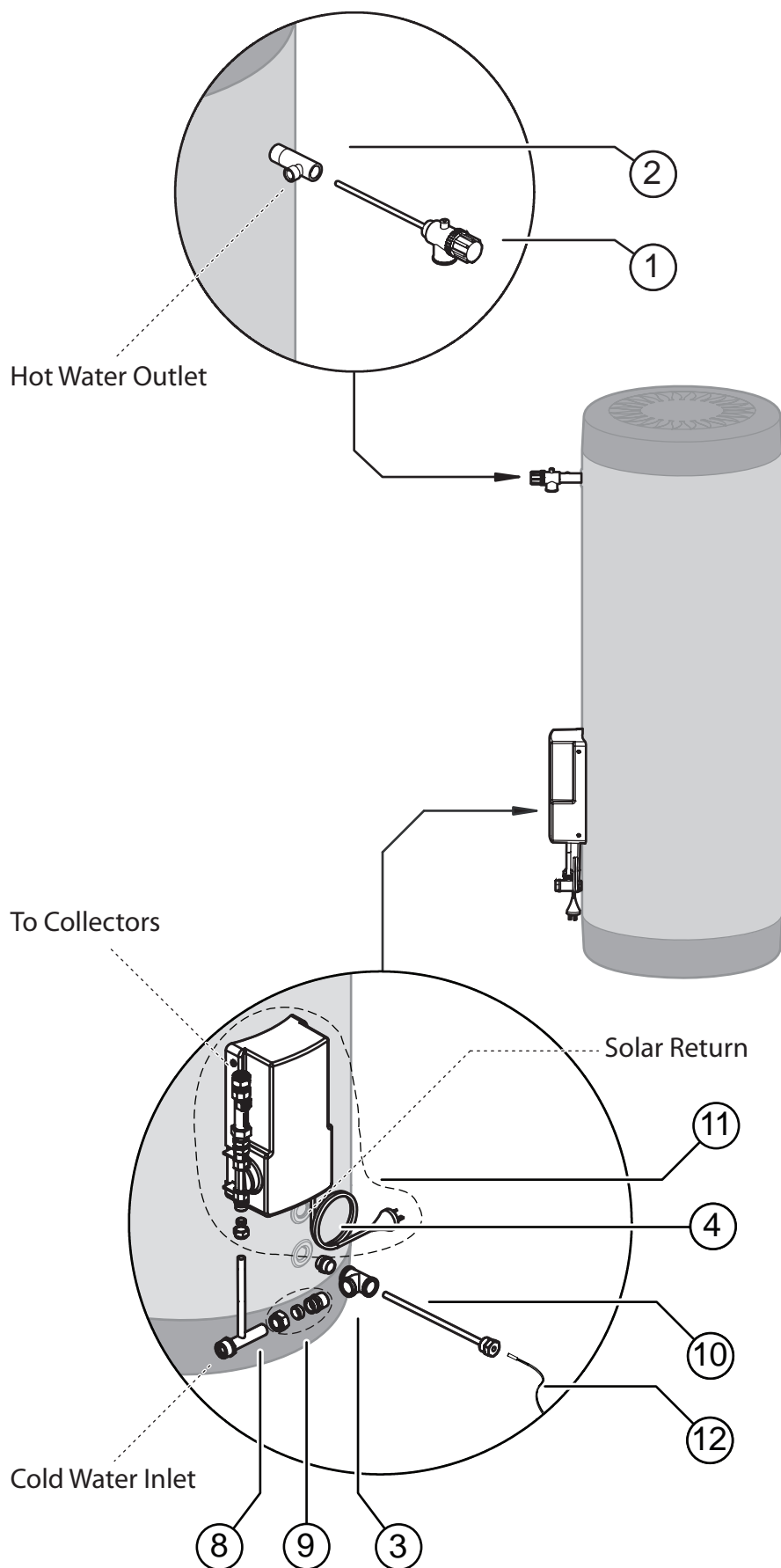
Glass Lined Optimised Element Electric Boosted Systems with USKIT1B



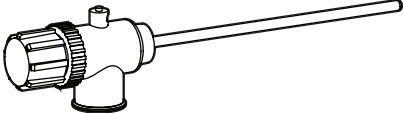
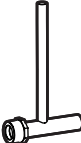
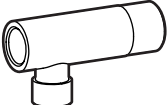


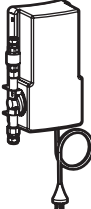




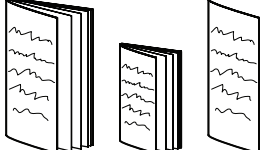
Glass Lined Optimised Element Electric Boosted Systems with USKIT1B

Items Supplied with Cylinder			Items Supplied in USKIT1B		
1	1	 PTR Valve 92501190	8	1	 Cold Inlet Copper T 11603921
2	1	 Adaptor R $\frac{3}{4}$ x Rp $\frac{1}{2}$	9	1	 G3/4 (Comp) x R $\frac{3}{4}$ union 32201713
3	3	 Adaptor R $\frac{3}{4}$ x Rp $\frac{3}{4}$	11	1	 Pump & Controller Assembly 39001747 Includes: • Non return valve 27801713 • Temperature sensor lead 31002710 • Pump 30001755 • Control Box 31002703
			12	1	 Temperature Sensor with 2 m lead Part of Pump and Controller Assembly, but shown separately for clarity in diagrams 31002710
				6	 Screws 22601048
			-	1	 Operation and Installation Manual 15401021 Warranty booklet 15401041 STC form 15401023

Stainless Steel Electric Boosted with USKIT1B



Stainless Steel Elec Boosted with USKIT1B

Items Supplied with Cylinder			Items Supplied in USKIT1B		
1	1	 PTR Valve 11004784	8	1	 Cold Inlet Copper T 11603921
2	1	 Hot Outlet T 19001018	9	1	 G3/4 (Comp) x R 3/4 union 32201713
3	1	 T 3/4 Rp 19001011	11	1	 Pump & Controller Assembly 39001747 Includes: • Non return valve 27801713 • Temperature sensor lead 31002710 • Pump 30001755 • Control Box 31002703
4	1	 R 3/4 Nipple 17201005	12	1	 Temperature Sensor with 2 m lead Part of Pump and Controller Assembly, but shown separately for clarity in diagrams 31002710
10	1	 Temperature Sensor Sheath 250 mm 10204721		6	 Screws 22601048
				1	 Operation and Installation Manual 15401021 Warranty booklet 15401041 STC form 15401023

INSTALLATION PROCEDURE

1. Install Solar Collectors

Position and install the solar collectors in accordance with the installation manual supplied with the solar collectors.

2. Position Storage Cylinder

Position the hot water storage cylinder on a level base in accordance with the section 'Storage Cylinder Location' on page 20.

3. Connect PTR Valve

Connect the PTR Valve in the location shown in the relevant diagram on pages 40 to 45.

Leave the valve outlet pointing down. Tighten the valve using the spanner flats - never use the valve body.

The PTR Valve must be adequate for the thermal loading applied to the storage cylinder. In the case of electric boosted systems, the thermal load is applied by the solar collectors and the element(s). The potential solar output for the solar collectors at PTR Valve relief conditions is listed in the table on page 19.

The PTR Valve pressure ratings vary according the cylinder specifications. The maximum heat input rating is 10.0 kW. The PTR valve rating **MUST EXCEED** the total input from the solar collectors and element(s). If it does not, the PTR valve **MUST** be exchanged for a model of higher capacity.

For example, A twin element 3.6 kW cylinder with 3 x Enduro panels will have a maximum energy input of $3 \times 1.25 + 2 \times 3.6 = 10.95$ kW, therefore a higher kW capacity P&TR valve will be required.

4. Connect Fittings and Mount Pump Assembly

Connect fittings and pipe work as shown in the relevant diagram from page 40 to 45. Remove cover of pump box and attach pump box to cylinder using screws provided. **DO NOT** connect the power lead to power supply at this stage.

5. Set Frost Protection Mode

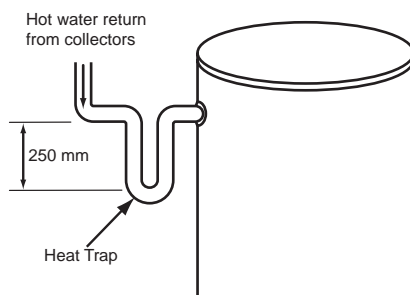
Adjust Dip Switches on Solar Controller to give the required frost protection. (Refer to the section 'Frost Protection Mode' on page 22.).



6. Install and Connect Flow and Return Pipe Work

Connect flow and return pipe work between storage cylinder and solar collector. Ensure that suitable pipe and insulation is used as described in the section 'Water Pipes, Fittings and Insulation' on page 21.

A heat trap is required on the return line from the cylinder if the pipework is to rise vertically to prevent heat losses due to the thermosyphoning of hot water from the tank.



7. Connect Temperature Sensor Leads

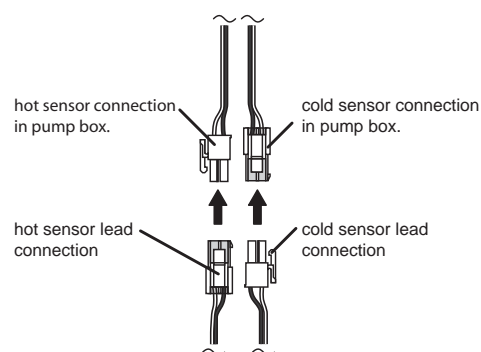
The hot (longer) temperature sensor lead should be fitted at the collector hot outlet as shown in the installation manual supplied with the solar collectors. It must be sealed in place with thermoplastic putty or silicone.

Run the lead down the solar return pipe and connect it to the connection within the pump and controller assembly as shown in the diagram. Ensure the lead is protected from light.

The cold (shorter) temperature sensor lead should be fitted as shown in the relevant diagram on pages 40 to 45.

Ensure the lead is protected from light. It must be sealed in place with thermoplastic putty or silicone. The plug is then connected to the pump and controller assembly as shown in the diagram.

Replace Pump Assembly Cover.



IT IS IMPORTANT THAT THESE PROBES ARE INSTALLED AS SPECIFIED. FAILURE TO DO SO WILL LEAD TO MALFUNCTION OR LACK OF HOT WATER

8. Cold Water Supply

Connect cold water supply to the inlet 'T'. Ensure that the relevant valves as described in the section 'Valves and Fittings' on page 23. are fitted.

Purge the cold water supply lines to remove air and swarf before final connection.

9. Relief Drain Lines

Independent 15 mm copper pipes must be fitted to the drain outlets of the PTR and ECV. Each pipe must be open to atmosphere and run with a continual downward grade in a frost free environment to a visible discharge point. Drain lines must not exceed 9 metres in length.

Valves or other restrictions must not be placed in the relief valve drain outlet line.



Some water will drip from the drain lines during heating of the water in the storage cylinder. It is recommended to discharge directly above a drain.

10. Hot Water Discharge

Connect the hot water outlet of the storage cylinder to the pipe work supplying hot water to the premises.



A temperature limiting device may be required as detailed in the section " on page 21.

11. Connect to Electrical Supply



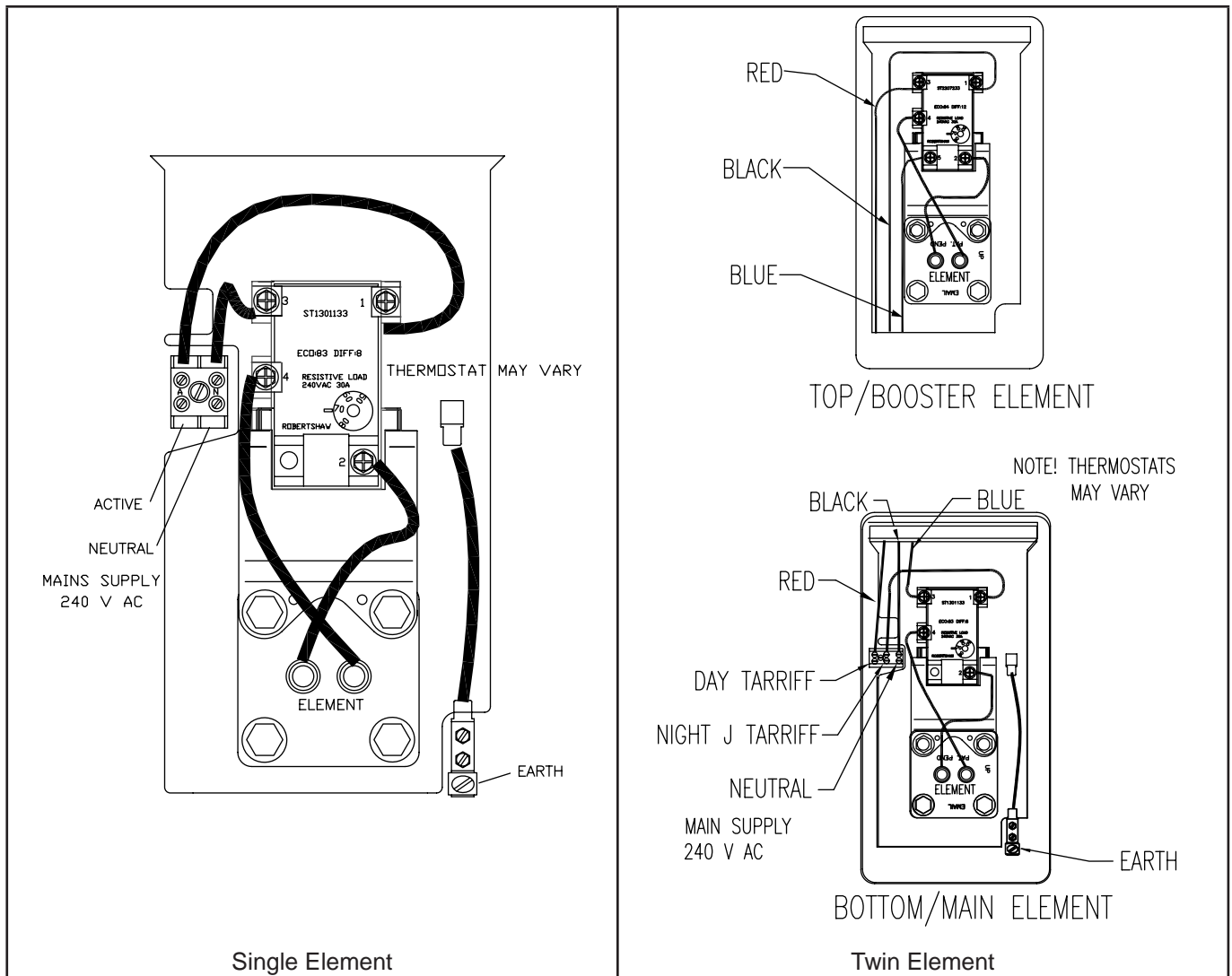
Twin element storage cylinders are wired for non simultaneous operation. The electric supply should be 'Off-Peak' (overnight) to the bottom heating unit and continuous to the top heating unit.

The power supply to a single lower element model should be Off-Peak (overnight).

The power supply to the element of mid element solar storage cylinder can be Off-Peak (overnight), extended Off-Peak (overnight and day) or continuous or other tariffs available from the local electricity supply authority.

Rinnai strongly recommends the use of an Off-Peak tariff to ensure that solar heating takes priority over electrical heating. If this isn't available, then a timer can be used to limit electrical heating to non solar hours.

Wiring Diagrams



A flexible 20 mm conduit is required for the electrical cable to the storage cylinder. The conduit is to be connected to the unit with a 20mm terminator. Connect the power supply wires directly to the terminal block and earth tab connections ensuring there are no excess wire loops inside the front cover. Connections for twin element heaters

Twin element heaters are wired for non simultaneous operation. A flexible 20 mm conduit is required for the electrical cable to the storage cylinder. All wiring passes through the lower entry. The conduit is to be connected to the unit with a 20 mm terminator. A common neutral is used. Connect the power supply wires directly to the terminal block and earth tab connections ensuring there are no excess wire loops inside the front cover.

Heating Element Thermostat Temperature Settings

Australian Standards require a minimum thermostat set point of 60°C to inhibit the growth of Legionella Pneumophila bacteria. These standards also require that the thermostat set point of water heaters fitted with an upper (or booster) element is at least 10°C below the thermostat set point of the lower element.

In the interests of durability, the thermostat set point for storage cylinders should not exceed 70°C. Hence, in systems with a single heating element only the thermostat set point should be at least 60°C and no greater than 70°C. In systems with both a lower and upper (or booster) element, the thermostat set point of the lower element should be between 60°C and 70°C and the upper element 50°C - 60°C.

FILLING THE SYSTEM



Ensure building occupants are warned to stay clear of the solar system components, building perimeter and roof since hot water or steam may be discharged from pipes or components.

1. Ensure the electric power supplies to the water heater and pump kit are switched 'OFF'.
2. Turn 'ON' the hot water tap at the sink. Open the stop cock in the cold water mains supply line.
3. The entire system will now be filled with cold water. Most air will be dispelled through the tap. Some air should be bled by temporarily loosening a fitting at the collector outlet, or from the air bleed valve on the collectors.
4. Turn 'OFF' the hot tap at the sink when water flows freely without air bubbles or air bursts. Check all connections for leakage and tighten if necessary. This applies especially to fittings in positions not easily accessed such as near the solar collectors. Operate the easing gear of both the PTR and ECV valves at the storage cylinder to ensure these valves are functional.



If leaks are detected the system must be drained and leaks repaired before the system is refilled. If this is necessary, cover the solar collectors with packaging cardboard or a tarp to prevent them from heating which could result in steam or hot water being discharged from fittings..

CHECKING SOLAR PUMP OPERATION

1. Ensure hot and cold sensors are connected as shown on page the section 'Connect Temperature Sensor Leads' on page 47.
2. Activate power supply.
3. Pumps will operate when solar energy is available to be collected.

ADJUSTING FLOW RATE



If the solar pump does not activate the system can still be commissioned as detailed in these instructions, but solar preheating will not be available until the pump and controller operate.

The purpose of controlling the water flow rate between the collectors and storage cylinder is to optimise the performance of the system.

The pump setting for optimum performance depends on the combined flow and return pipe length and the number and type of collectors.

Combined Flow and Return Pipe Length	1 flat plate collector or 20 Evacuated Tubes	25 or 30 Evacuated Tubes	40 or 50 Evacuated Tubes	2 flat plate collectors	3 flat plate collectors
< 30 metres of (DN15)					
30-40 metres (DN15)					

PRE SOLAR HEATING CHECKS

Before commencing solar heating of the water in the system ensure the following actions have been completed:

Solar Collectors

1. Are the solar collectors installed with the correct slope and orientation to the sun?
2. Is the installation finished neatly with the roof made good, all tiles and flashings in place?
3. Are the bolts tight on the roof framework?
4. Are all solar collector straps fitted and correctly anchored to the roof structure?
5. If leak testing completed and successful, have any covers been removed from the solar collectors?
6. Has operation of the solar pump been checked?
7. Have the hot and cold sensors and leads been positioned and connected correctly?

Electric Heating Elements

1. In systems with a single heating element only has the thermostat set point been set to at least 60°C and no greater than 70°C.
2. In systems with both a lower and upper (or booster) element, has the thermostat set point of the lower element been set to at least 60° and no greater than 70°. Has the upper element been set to 10° less than the lower element?.

Temperature Limiting Devices

1. Commission any temperature limiting devices in accordance with the instructions supplied by the manufacturer.
2. Confirm the hot water delivery temperature at a tempered water outlet. Tempered water outlets should be those supplying areas primarily used for the purposes of personal hygiene such as bathrooms. The hot water delivery temperature should not exceed 50°C or 45°C as detailed in the section " on page 21.

Solar Heating

1. Remove any cardboard or tarp covers that may have been placed over the solar collectors to prevent them from heating water during installation and commissioning.
2. Activate electrical power to the solar pump and controller. Solar heating of the water in the cylinder will now commence when sufficient solar radiation is available.

AUXILIARY ENERGY SUPPLY

1. Connect the electrical element to the power supply (off peak if available).
2. When the system is full of water turn on electrical supply to element.

FINISHING THE INSTALLATION

1. After testing is completed explain to the householder the functions and operation of solar water heater components and the importance of carrying out Maintenance as per separate warranty document.
2. Complete the installation record at the back of the manual.
3. Leave this manual and the warranty booklet with the householder.

DRAINING INSTRUCTIONS

1. The power supply to the element and pump controller must be switched off and fuse(s) removed.
2. Close the cold water mains supply stop cock.
3. Open a hot tap to relieve pressure.
4. Disconnect the hot outlet near the top of the storage cylinder.
5. Disconnect the cold inlet near the bottom of the storage cylinder.
6. Disconnect the connection between the solar 'flow pipe' and solar pump.
7. Disconnect the connection between the solar 'return pipe' and the cylinder.
8. The cylinder and solar collectors will now drain completely.

Rinnai

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Rinnai has a Service and Spare Parts network with personnel who are fully trained and equipped to give the best service on your Rinnai appliance. If your appliance requires service, please call our National Help Line. Rinnai recommends that this appliance be serviced every 3 years.

Internet: www.rinnai.com.au E-mail: enquiry@rinnai.com.au

National Help Line

Tel: 1300 555 545* Fax: 1300 555 655*

**Cost of a local call higher from mobile or public phones.*

Hot Water Service Line

Tel: 1800 000 340

