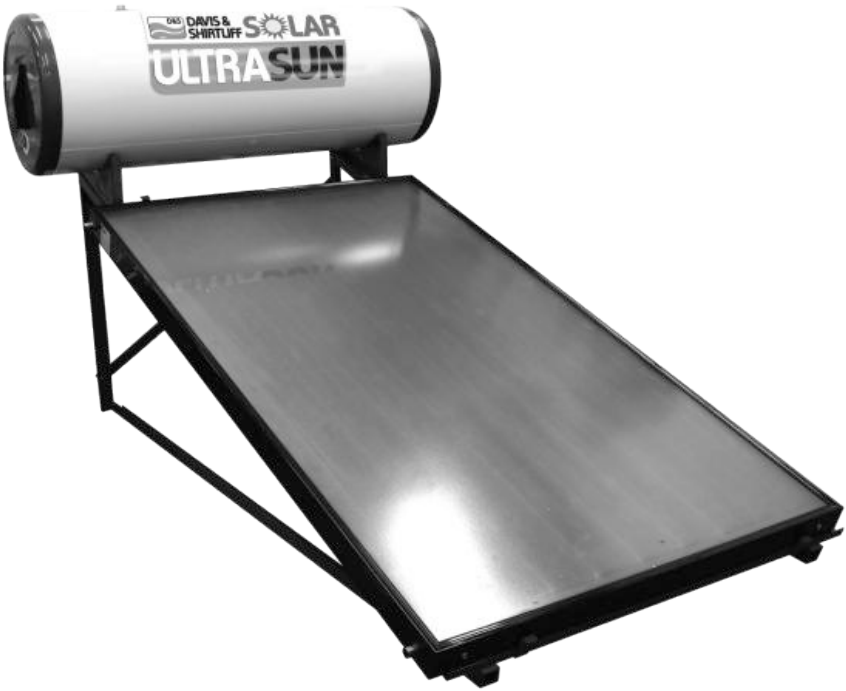
DAYLIFF

ULTRASUN UFS

Flatplate Solar Systems



Installation & Operating Manual

INDEX

Congratulations on selecting a Ultrasun UFS Flatplate Solar Hot Water System. They are manufactured to the highest standards and if installed and operated correctly will give many years of efficient and trouble free service. Careful reading of this Installation Manual is therefore important, though should there be any queries they should be referred to the equipment supplier.

1. SPECIFICATIONS

Ultrasun UFS Flatplate Solar hot water systems are economical effective heaters that provide excellent performance, good value and guaranteed long life. They are of Open Loop thermosyphon design with water flow circulating through the collector and being stored in the tank ready for use.Features include;

- Heavy duty storage tank comprising SUS304 stainless steel inner cylinder encased in a plastic painted insulated galvanized steel casing complete with 2.4kW electric heater, thermostat and a sacrificial anode to protect against corrosion
- Ultra high efficiency solar collectors incorporating capillary copper pipes ultrasonically welded on a black chrome backplate covered by high transmittance glass
- Insulated copper pipe complete with necessary compression fittings, pressure release valve and a drain cock
- Galvanised mounting frame

Ultrasun UFS Flatplate Systems are available in three sizes to suit domestic and small scale institutional applications. They are effective and robust products designed for many years of trouble free operation with a 5 year guarantee to demonstrate product quality.

OPERATING CONDITIONS

Water quality: Water outside the following limits should be appropriately pre-treated. Clarity: Clear, TDS:<600mg/l, Hardness:<200mg/l,$CaCo_3$

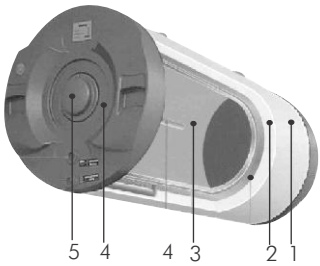
Saturation Index: >0.8

Max. Operating Temperature: 150^{0}C

Max. Operating Pressure: 6bar

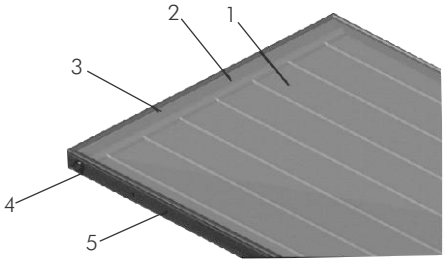
DESIGN FEATURES

Direct Tank



1. Steel outside casing coated by electrostatic powder coating baked at 220°C to protect the tank from outdoor conditions and UV rays
2. Direct-injected, CFC-free polyurethane foam Insulation in 40mm thickness
3. Stainless steel hot water tank
4. UV resistant plastic cap
5. 2.4kW electric heater

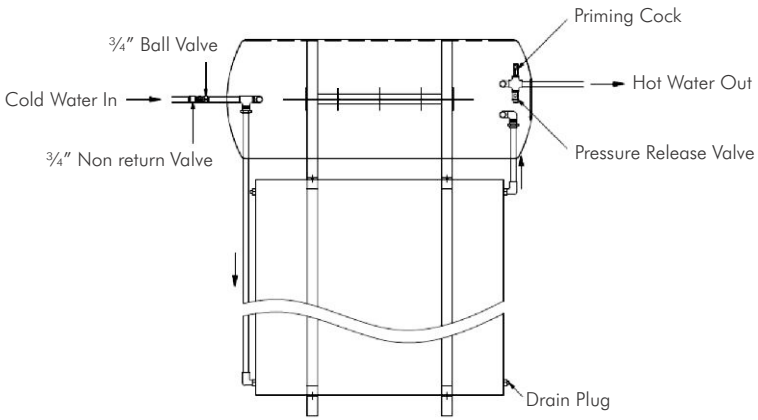
Solar Collector



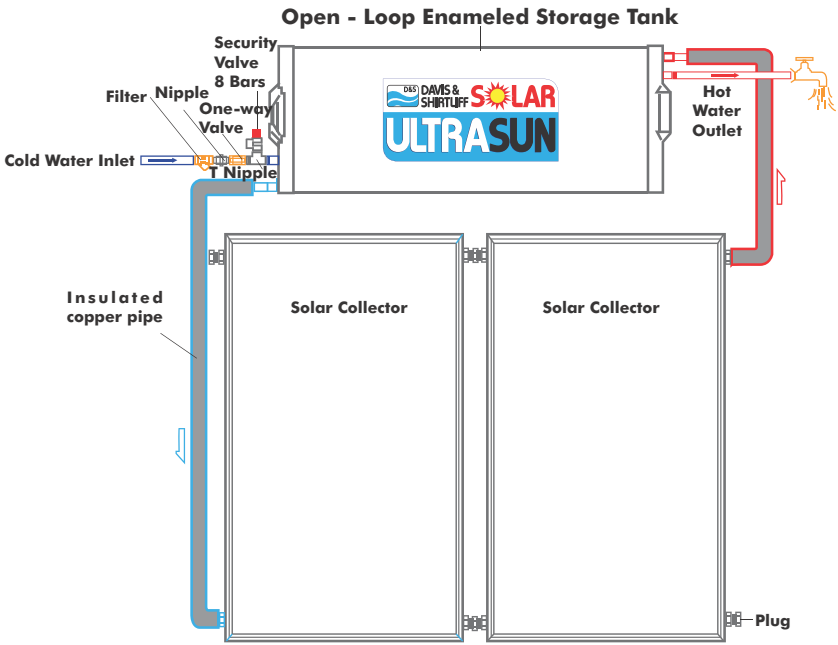
1. Copper Aluminum fin absorbing plate
2. High Transmittance Glass
3. Polyester Fibre Insulation
4. EPDM Sealing Gasket
5. 6063 Aluminium Alloy Frame

2. EQUIPMENT SPECIFICATIONS

The equipment supplied comprises of two principal components, the tank and the collectors which are mounted together on a frame. The units work on the thermosyphon principal whereby the temperature differential between the top and bottom of the system creates water circulation thus facilitating the heating process. A schematic layout of the circulation arrangement is shown below:-

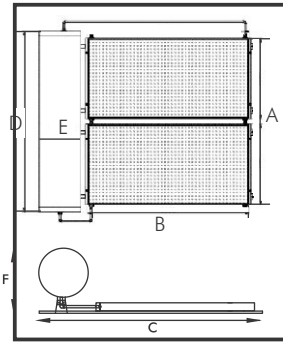


Open-Loop (Direct) Systems



SPECIFICATIONS

Model		UFS 150D	UFS 200D	UFS 300D
System Tank Size (Litres)		150	200	300
Typical Household (People)		5	7	10
Flat Plate Collectors		1xFCP2.0	1xFCP2.4	2xFCP2.0
Collector (m^2)		2	2.4	4
Collector Weight (kgs)		32	38	64
Collector Fluid Capacity (litres)		12	15	24
Max Heat Output/Day (kWhrs)		11	14.3	22.3
Min Heat Output/Day (kWhrs)		7.4	9.6	14.9
Dimensions(mm)	A	1000	1400	2100
	B	2000		
	C	2600		
	D	1170	1480	2300
	E	520		
	F	620		
Empty Weight (kgs)		65	75	105
Full Weight (kgs)		215	275	405



NOTE

Maximum heating output is based on average irradiation levels of 6000W/m^2/day prevailing in September- March and minimum Heating output is based on average irradiation levels of 4000W/m^2/day prevailing in June/July and are for indicative purposes only.

3. WARNING AND SYMBOLS

WARNING

The installation of the solar system must be in accordance with the relevant requirements of the local authority building regulations as well as regulations for the prevention of accidents when carrying out works such as solar installation. It is necessary to do so in a safe and professional manner, taking due care of any aspects of the works that could result in injuries to the person, buildings as well as general public.

WARNING

Work should be preceded by a risk assessment covering all aspects of health and safety risks, or training requirements that are reasonably foreseen.

WARNING

These instructions describe mounting and installation of thermosiphon solar water heaters. All installations must be done by qualified people.

WARNING

Installers must adhere to the valid work protection regulations, in particular when working on the roof. Anti-fall protection must be employed whenever there is a risk of falling.

WARNING

To avoid the risk of being burned or scalded by hot components, Installation and replacement of collectors or parts should be done on cloudy days. Installation work on sunny days should be carried out only in the morning or evening or with the collector covered.

WARNING

To avoid the risk of being burned or scalded by hot solar fluid or components, fill and flush the solar system when the collectors are cold. The collectors should be covered while doing so.

Steam can escape from the expansion relief valve of the solar pump unit if the system is shut down. To avoid injuries an expansion relief valve must be connected to a collecting container with a hose line

In order to ensure a seamless operation of the product, the safety valve should be cleaned periodically and checked for proper functions. In areas with very calcareous water the calk residuals on the valve should frequently be cleaned off.

Immersion heater is intended as standby device for water heating and should not be used simultaneously.

In areas with hard water hot water temperature should not exceed 45°C to avoid calcification.

The product shall be installed in an area where children cannot access.

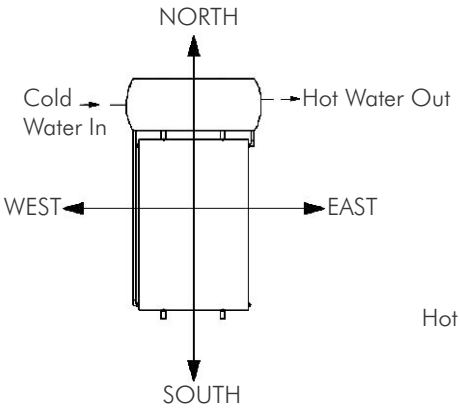
This product is designed for water heating purposes using solar energy and it may not be changed or modified in any way. It should be installed by a qualified person, who should observe the applicable local regulations and the building code.

4. SITING

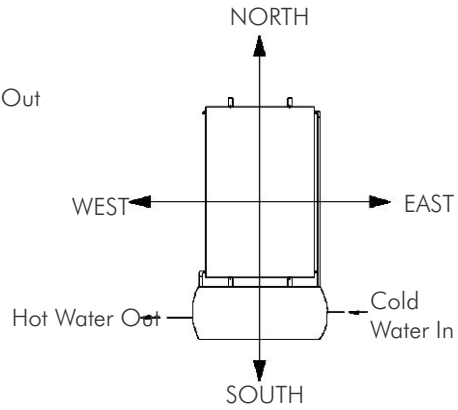
Correct siting is critical for the effective operating of a solar water heater, the following being important guidelines:-

- Orientate the principal axis of the units in a North/South direction, with the collector facing the equator. This orientation is important to maximise sun exposure on the collector as it tracks on its East /West axis throughout the day.
- Tilt at approx 15°. In order to optimise irradiation and also assist in the thermosyphon process. Heater units should never be laid flat.
- Avoid any shade, especially between 10am and 4pm. Shade reduces system efficiency.

Preferably, solar panels should be installed on roofs where solar irradiation is highest and they are also less exposed to damage. If this is not possible, a protected ground sitting is acceptable.



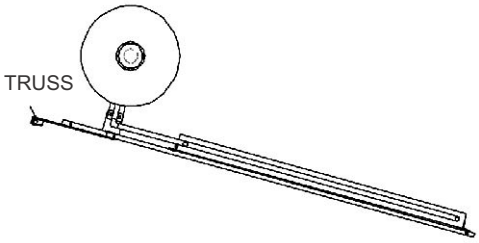
ORIENTATION OF SYSTEM NORTH OF THE EQUATOR



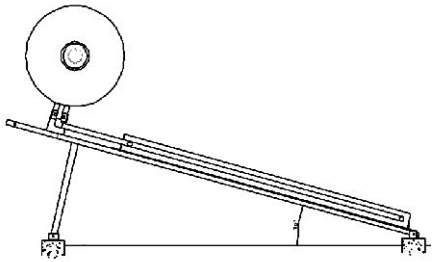
ORIENTATION OF SYSTEM SOUTH OF THE EQUATOR

5. INSTALLATION

Ultrasun UFS solar heaters are provided with drilled frames incorporating a support cross bar. On roofs the preferable mounting arrangement is by means of hooks affixed to the cross bar and secured to an appropriate mounting point on the roof beams. Suspension from the hooks is generally sufficient and fixed location is not necessary.
For ground installation rear support legs are available which should be mounted on small concrete feet as shown below:-



ROOF INSTALLATION

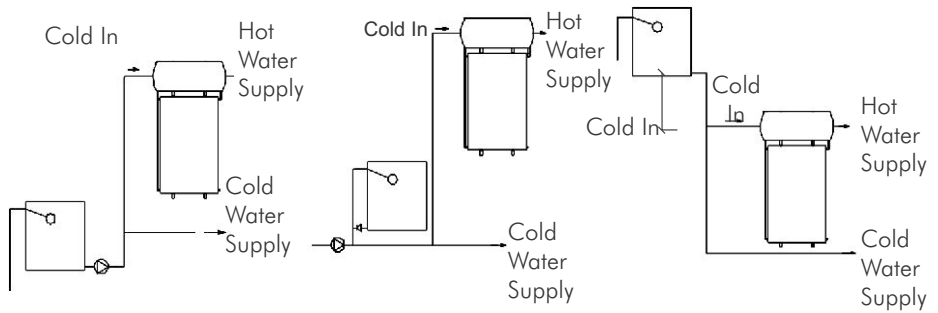


GROUND INSTALLATION

Two types of installations are available: A pitched roof installation and a flat roof installation. The pitch roof bracket is provided for all installations while a flat roof conversion kit is available to convert the pitched roof bracket into a stand.

Approximate weights for systems should be taken into account to ensure that roof structure is able to bear the weight before the installation commences. The longitudinal beams should coincide with the rafters of the roof where the structure is most rigid.

The units can be installed using a gravity system or pressurised supply. Pressurised systems are preferable as they give higher line pressures up to a maximum of 3 Bar. Note that in the case of pressurised supply hot and cold lines must be pressurised at the same pressure to ensure even temperature control. The systems are easy to plumb being provided with two piping connections only, the inlet and outlet. It is important to fit a non-return valve and isolating valve on the inlet line. Suggested installation layout arrangements are shown below:-



PUMPED SUPPLY FROM TANK

DIRECT PUMPED SUPPLY WITH COLD WATER STANDBY HEADER TANK

GRAVITY SUPPLY

All units are fitted with 3kW electric booster heaters which should be connected to the mains supply via 20A fuse or MCB by a qualified electrician. Manual control is suggested with the switch mounted in a convenient place.

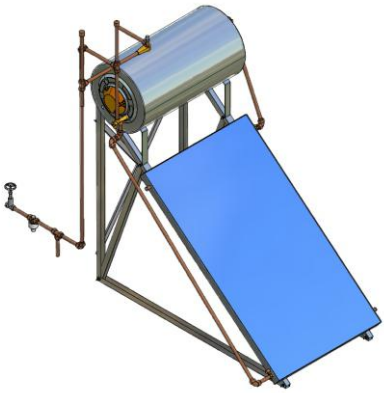
3Bar solar pressure relief valve must be installed on the primary circuit (between heat exchanger of the tank and collector) to avoid challenges with over pressure and over temperature.

Oxidation may be seen on the galvanised parts of mounting sets if installation is very close to the sea or humid areas.

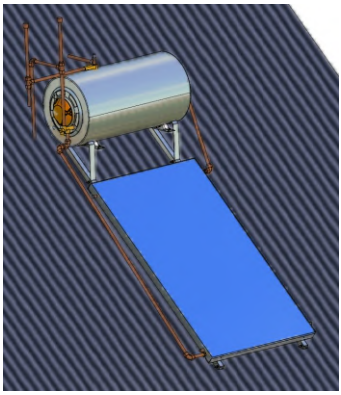
- Open the 3 Bar relief valve on the tank.
- Unplug the endcap on the side of solar collector.
- Connect the filling hose to the bottom right of the collector.
- Raise hose above the tank and fill tank with fluid
- Close the top left collector plug when thermal fluid starts to leak out.
- Continue filling the thermal fluid until it leaks out of the 3 Bar relief valve which is an indication it is full
- Unplug the filling hose and close the bottom right of collector.

The various installations are shown below:

Flat roof Installation

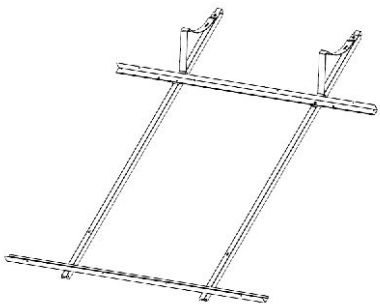


Pitch Installation



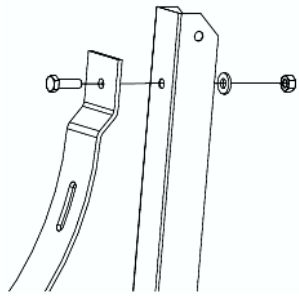
Single Panel Installation

Pitch Roof Bracket Assembly



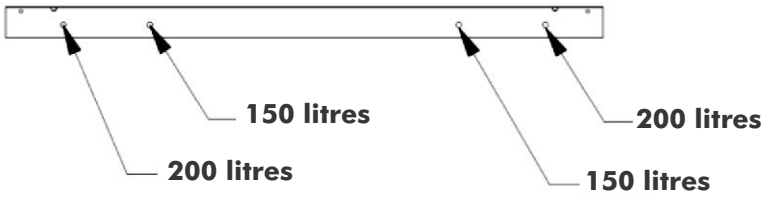
Step 1

Fit the top part of the solar tank bracket to channel 3 using M8 x 25 screws as shown.



Step 2
Select the holes in the angled section that are required for the specific installation. It is suggested that the holes be marked according to the specific type of installation required.

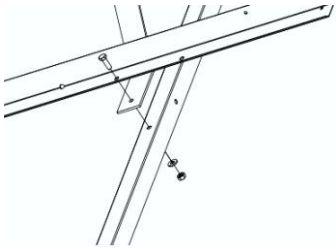
Two types of angled sections are provided, a set for a single panel installation and a set for a double panel installation. The holes required for each type of installation are shown below:



Single Panel Angled Section

Double Panel Angled Section

Step 3
After selecting which angled section to use and which holes to mount it with, in order to fit the required system, the top angled section can be fitted to both solar tank brackets using M8 x 25 screws as shown below:

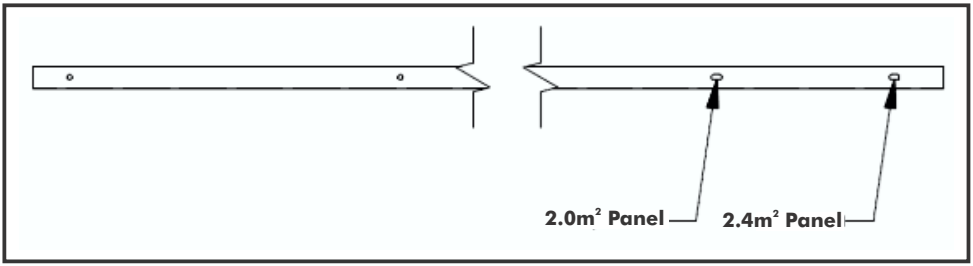


Step 4

Select which slotted holes the bottom angled section should be bolted onto. The selection should be based on the size of the solar collectors supplied. Two sizes are available:

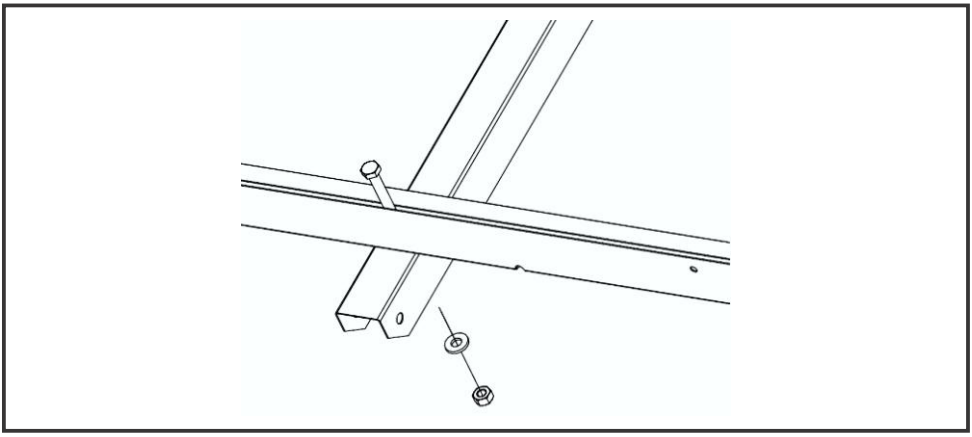
- $2.0m^2$ - Approximately 2000 mm in length
- $2.4m^2$ - Approximately 2000 mm in length

The correct slotted holes on longitudinal channel are indicated below:

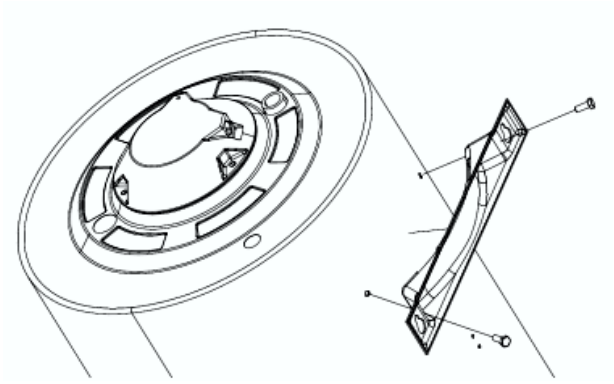


Step 5

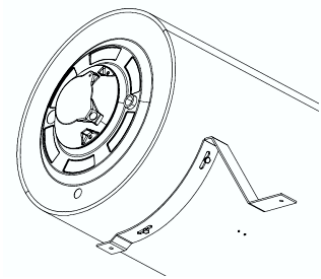
Fit the second appropriate angled section to the bottom of the channel on both sides as shown below:



Step 6
Remove the tank feet supplied as shown below:

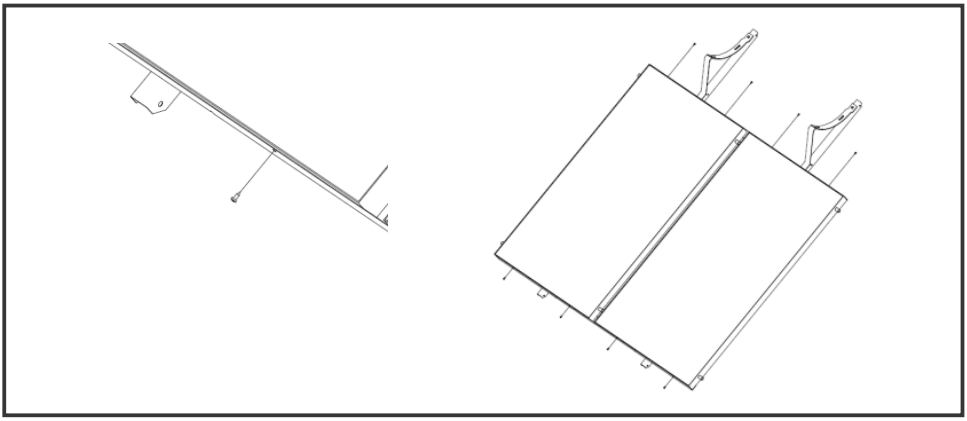


Step 7
Fit the tank to the completed bracket frame as shown below on both sides. This step is to confirm that the two longitudinal channel beams are appropriately spaced to accommodate the tank.



Step 8

Fit the collectors to the bracket by placing them between the angled sections as shown below. Adjust the bottom angled section position by means of the slotted holes in order to fit the panel/s closely. Fasten the panels through the 6mm holes by means of the M5 x 16 self drilling screws.



Step 9

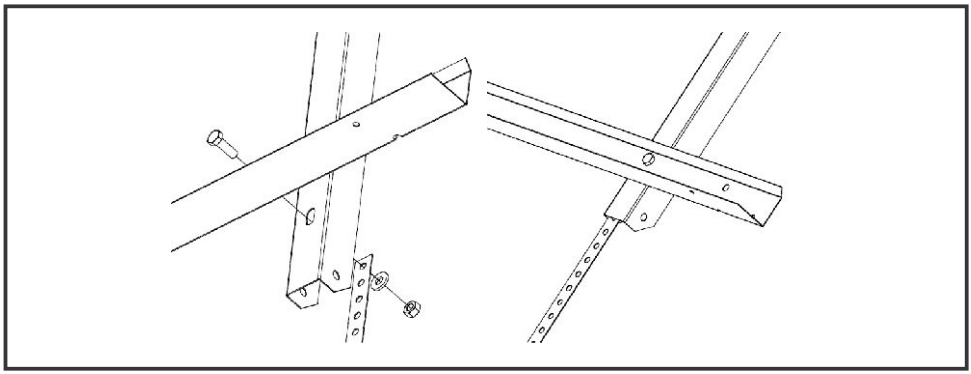
Remove the collectors for installation to the roof. The completed frame should be fastened to the roof as appropriate.

Tin Roofs

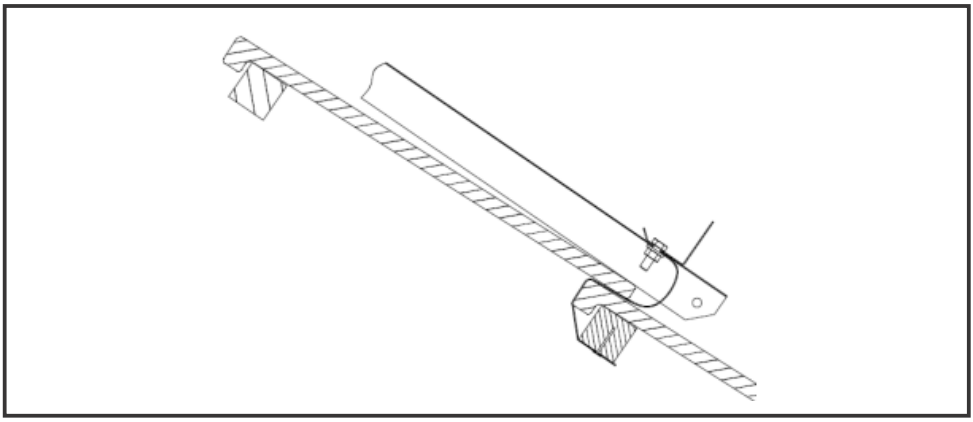
It is suggested to fasten the assembly through the longitudinal channel by means of an appropriate fastener by earthing the roof and sealing the entry point.

Tiled Roofs

Six metals strips are supplied and can be fastened by all M8 x 25 screws as shown below:



The strips can be used to fit the system to the battens of the roof to provide additional support. Please note that longitudinal channel should coincide with or be as closely located to the rafters of the roof structure as possible. The strip fastening method is depicted below in section view. Use all six fastening points to support the structure.



After the bracket system is securely fastened to the roof, the tank can be re-fitted. Use the straight compression couplers to connect collectors in parallel for double panel systems and re-fit the collectors between the angled sections and fasten with screws.

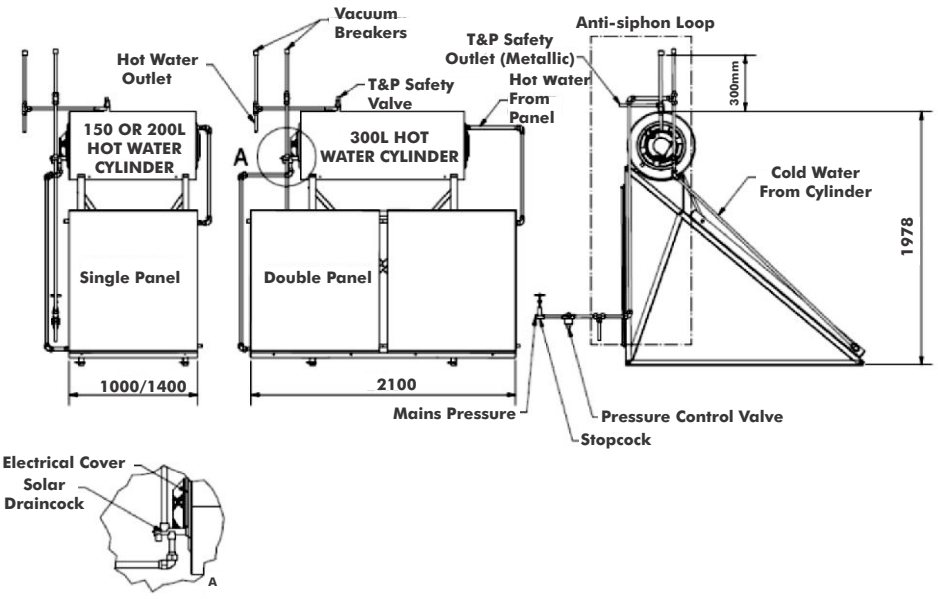
Step 10

Connect piping as shown on **Fig 1**. Use appropriate roof seals supplied to seal off any pipe entry points into the roof.

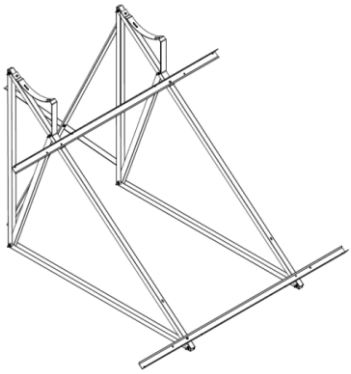
Step 11

Apply pipe insulation to all exposed pipes.

Fig 1



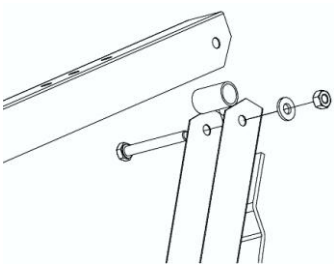
Flat Roof Conversion



Assemble the structure as described for pitched roof installations up to step 5. Do not tighten all screws initially in order to attain proper alignment of the entire structure before final tightening.

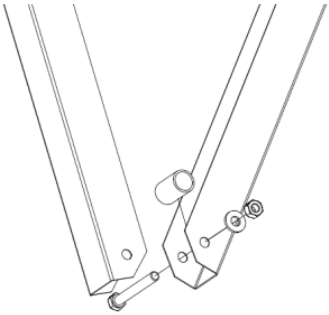
Step 12

Turn the structure upside down and fasten channel 2 to the top part of channel 3 using M8 x 65 screws and long spacer tubes as shown below on both sides:



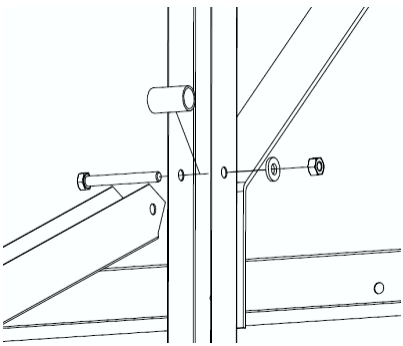
Step 13

Fit the two longitudinal channels using M8 x 65 screws and long spacer tubes on both sides as shown below:



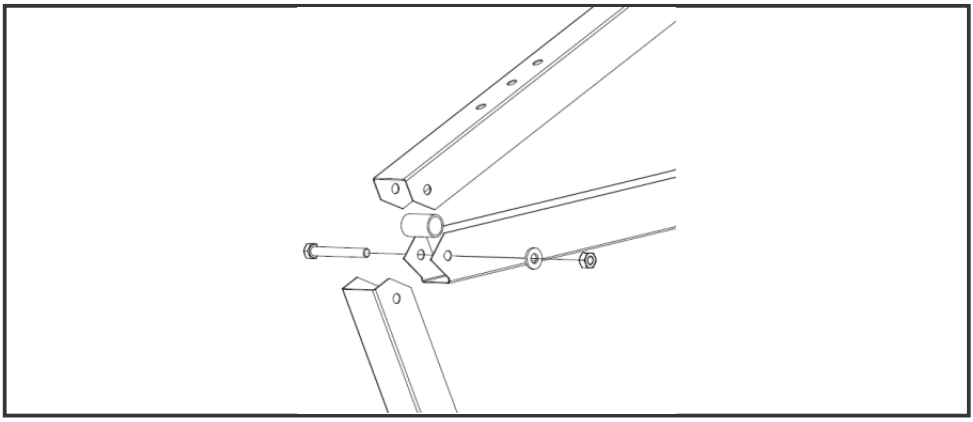
Step 14

Fit channel 4 to channel 3 using M8 x 65 screws and long spacer tubes on both sides as shown below:



Step 15

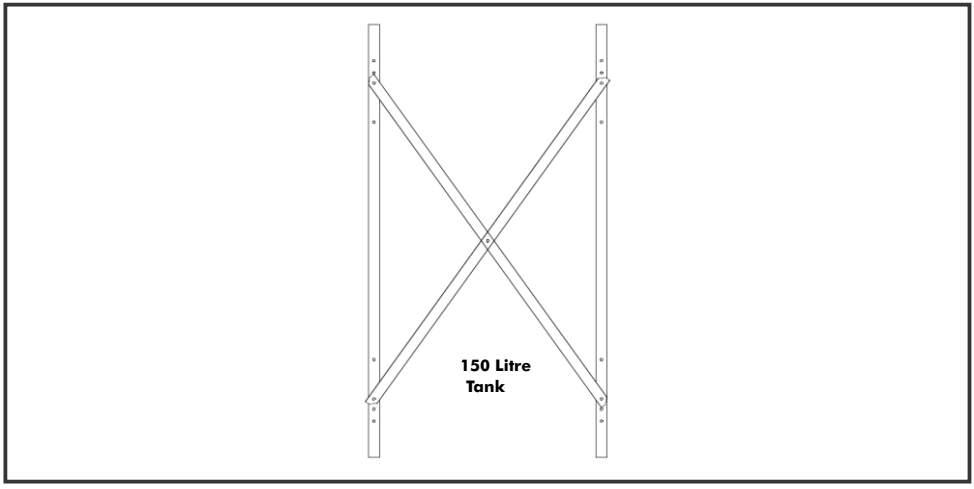
Mount channels 1, 2 and 4 together using M8 x 65 screws and long spacer tube on both sides as shown below:

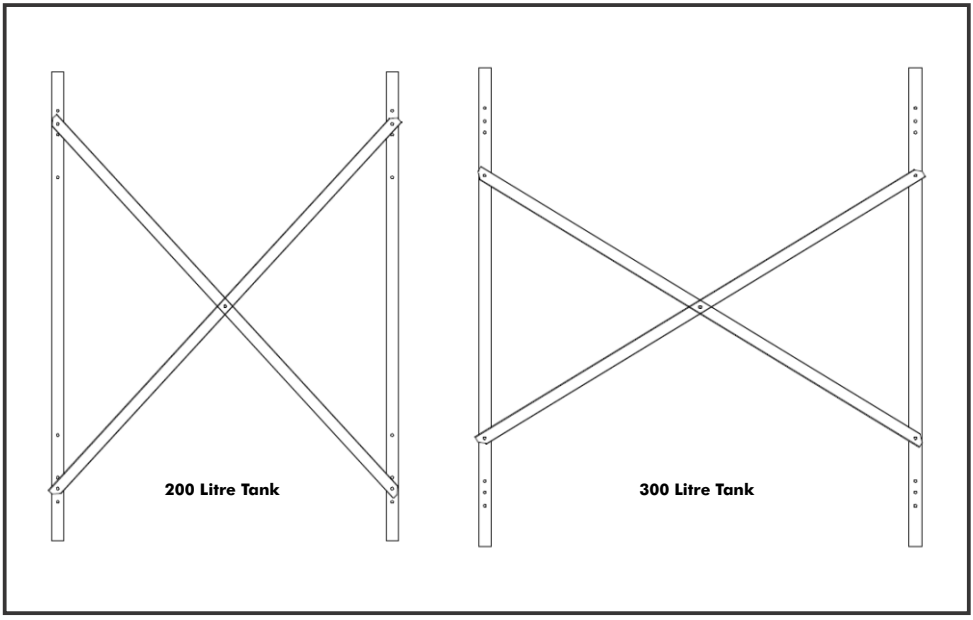


Step 16

Two types of braces are included in the kit. Short braces are used for 150 and 200 litre installations and long braces for 300 litre installations. It should be decided at this stage of the assembly which braces and which mounting holes should be used. This dictates the distance between the two trusses and which hot water system will fit. It is suggested that the braces and fitment holes be marked for the specific installation required.

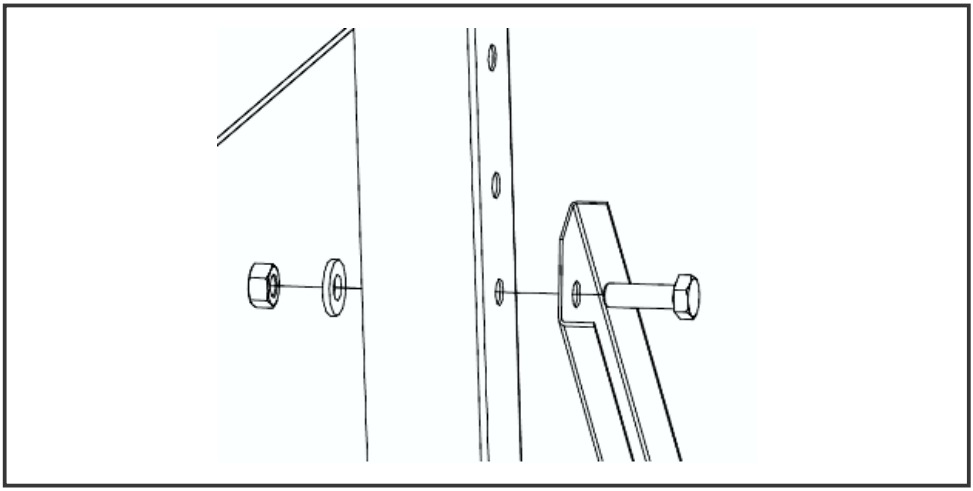
The various layouts for the different braces are shown below:





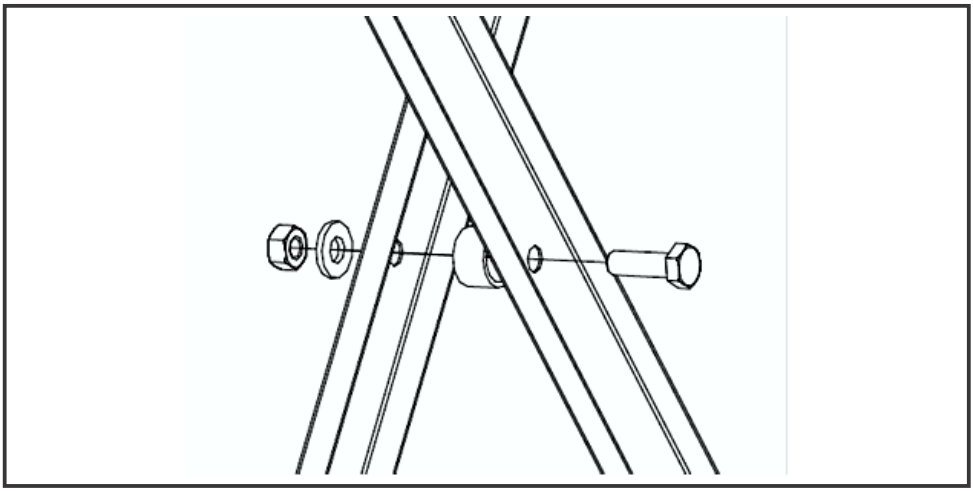
Step 17

Fit the brace ends using M8 x 25 screws on both sides as shown below:

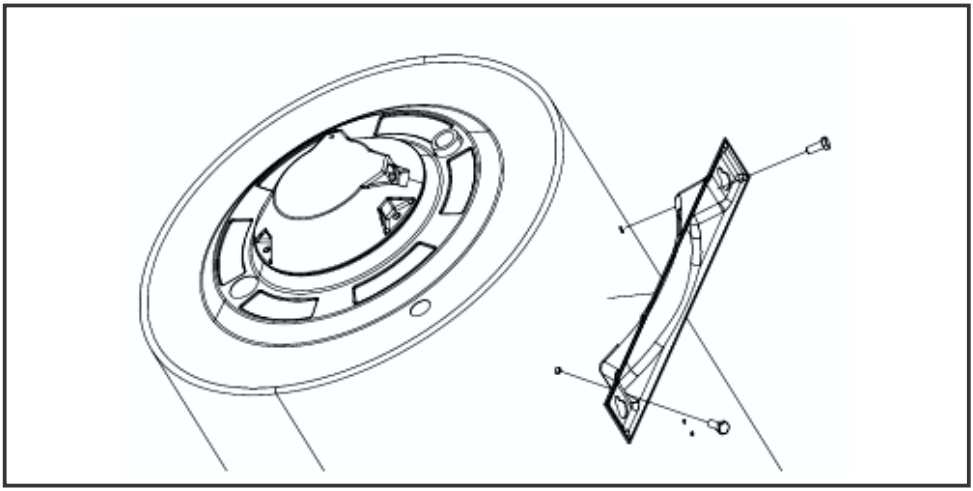


Step 18

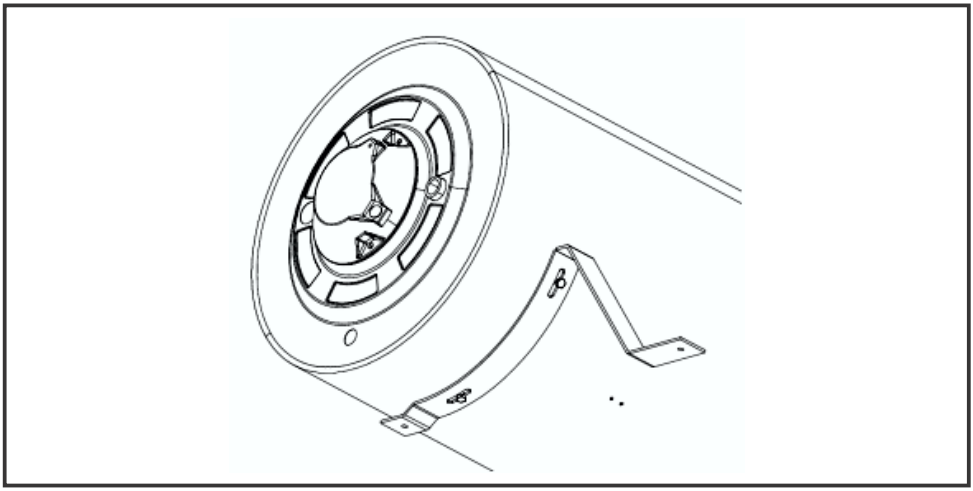
Fasten the braces' centre holes using M8 x 25 screws and short spacer tube as shown below:



Step 19
Remove the tank feet supplied as shown below:

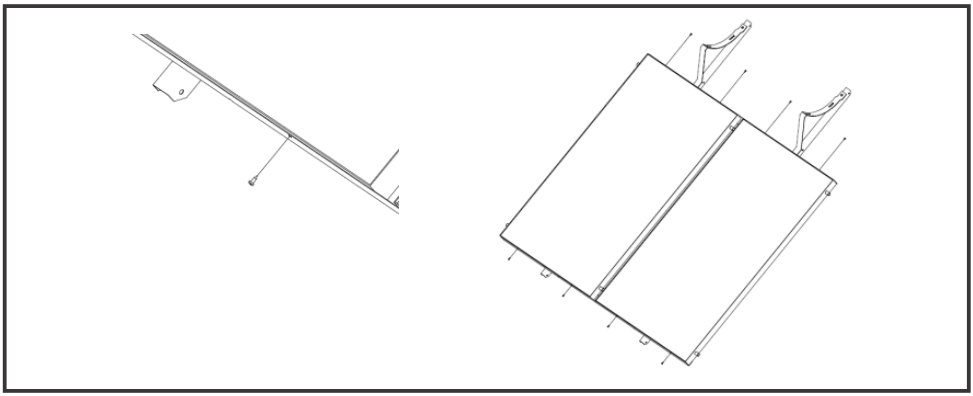


Step 20
Fit the tank to the completed bracket frame as shown below on both sides. This step is to confirm that the two channel 3 beams are appropriately spaced to accommodate the tank.



Step 21

Fit the panel/s to the assembled frame by placing them between the angled sections as shown below. Adjust the bottom angled section position by means of the slotted holes in order to fit the panel/s closely. Fasten the panels through the 6mm holes by means of the M5 x 16 self drilling screws.



Step 22

Remove the panels for installation on the roof. The completed frame should be fastened to the roof as appropriate.

NOTE

If un-slit tubular pipe insulation is supplied with the kit then the insulation tubes can be applied during the piping installation. This can be achieved by sliding the tubes over pipe sections before the connectors are tightened.

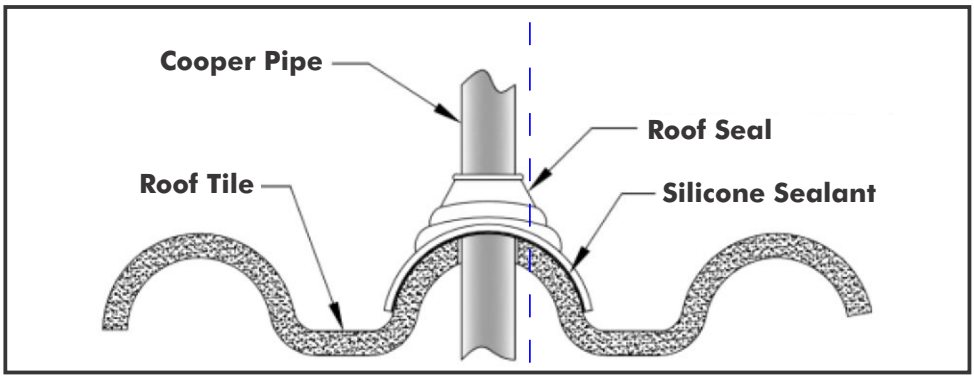
NOTE

If slit pipe insulation is supplied then pipe insulation can be applied to all exposed pipes. Use cable ties to secure.

ROOF SEAL

This is a bonded seal to the roof surface which normally has a metal surround that can be easily manipulated to fit the profile of roof clading. Before applying the seal, a 25mm hole has to be drilled in the roof cladding. For metal roofs a hole saw for metal can be used while a core drill of 25mm suitable for concrete can be used on tiled roofs. Care should be taken when drilling through concrete or ceramic tile to adequately support the tile by placing it on a bed of sand during drilling - otherwise the tile might break. The hammer action should NOT be used when drilling through concrete tile or when using a core drill.

The roof seal can accommodate any thickness pipe up to 35mm. The rubber cone section should be cut off at an appropriate ridge for the specific thickness of pipe to be used. The pipe is simply pushed through the cut cone to create a watertight seal against the pipe surface as shown below.

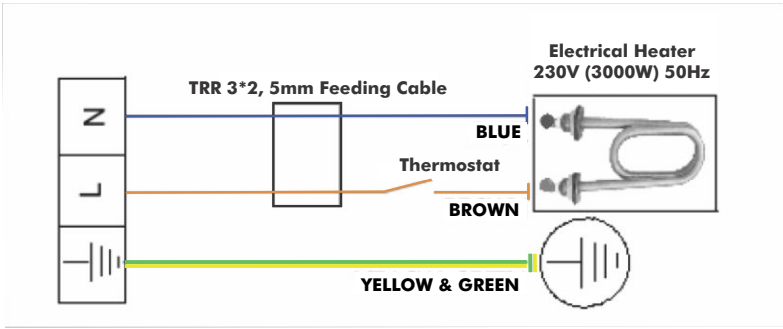


Electrical Installation

Inside the water tank an electrical heater and integrated thermostat with safety cut-out function are installed as a support. Electrical heater has a power of 3 kW (3000 Watt) for all tank models and requires 220-250 volt single phase, AC power supply.

It is important to ensure the disconnection of the electrical heater from the main power supply by using a bipolar switch which complies with all current applicable CEI-EN and local regulations. The power supply must be protected by an individual fuse or circuit breaker rated to suit the electrical heater. Electrical connection at the tank must be applied by an electrical disconnection device and connected at the tank as follows: The earth wire is connected to the earth stud marked with an earth symbol, the active wire connected to the thermostat terminal marked (L) and neutral wire is connected to the thermostat terminal marked (N).

Do not turn on the power supply until the solar heater tank has been filled with water and pressurized. There is a risk of damage to the system if the installation sequence is not followed.



6. SYSTEM COMMISSIONING

a) **Direct Systems**

On installation or after service it is important that the system is primed. This is carried out by first opening the incoming feed followed by the bleed cock and then observing when all air is expended from the bleed outlet. Proper priming is important or else the unit will not operate at full efficiency.

7. USAGE

It is important that the hot water availability is properly managed as solar energy heating only occurs between the hours of 9:00am - 4:00pm. This effectively means that hot water is available in the evening as any draw off will result in temperature reduction from the replacement cold water. If hot water is required in the morning there should either be no night time draw off or the booster heater should be used. Users should plan hot water usage accordingly.

8. MAINTENANCE

It is recommended that the system is serviced bi annually by an accredited D&S service provider.

The solar panels must be annually flushed by applying a high pressure reverse cleaning water flow to loosen and remove deposits and sedimentation.

Check pipe insulation at least once a year, for any wear and tears and replace if necessary.

Make sure that the system is securely fastened to the roof structure at least once a year and rectify if necessary.

9. TROUBLE SHOOTING

DIRECT SYSTEMS

PROBLEM	POSSIBLE CAUSE	SOLUTION
Insufficient hot water	High hot water usage at night	Rotation use or replace with a larger system
	Prevailing weather conditions	Incorporate complimentary electric heater to be used when irradiation is low
	Non-operation of electric booster	Replace the electric heater
	Air locks in the collectors	Ensure tank connections are higher than collectors connection
	Slow leaks by system or pipe work	Pressure test the pipes
		Visually inspect for leaks. Raise top right hand corner on the system
	Blockage in the connection pipes	Unblock then pipes
		Replace the blocked pipes
	Collectors blocked with sediments	Flush collectors with clean water to clear the sediments
		Incorporate a filter in the pipework

INDIRECT SYSTEMS

PROBLEM	POSSIBLE CAUSE	SOLUTION
Heated water loss	Leaking water pipes	Check regularly for leaks and repair
Inoperative electric heater	Power supply or booster switch off	Switch on power or booster switch
	Blown fuse	Replace fuse
	Tripped circuit breaker	Switch on the breaker
	Thermostat failure	Replace the thermostat
	Low thermostat setting	Adjust the thermostat
	Faulty electric element	Check element circuit continuity and replace the element if faulty

PROBLEM	POSSIBLE CAUSE	SOLUTION
Water discharge from pressure release valve	Pressure above 3 bar	Lift valve hand lever and reset valve
	High mains pressure	Use a pressure tank to regulate and reduce pressure levels
	Pressure is below specification settings	Replace the valve if discharge continues
	Pressure feedback from another device	Check that there is no feedback pressure from another device connected to hot reticulation circuit
Insufficient pressure	Inlet water strainer blocked	Unblock the strainer
	Unit supply pipework blocked or undersized	Unblock the pipe work
		Replace with correct pipework
	Mains supply pressure below 1 bar	Consult water supply authority for modifications to the system
	Pressure control valve flow insufficient for user's requirements	Install a large valve but should not exceed rated tank pressure of 3.5 bar

10. TERMS OF WARRANTY

i) General Liability

- In lieu of any warranty, condition or liability implied by law, the liability of Dayliff (hereafter called the Distributor) in respect of any defect or failure of equipment supplied **is limited to making good by replacement or repair** (at the Distributor's discretion) defects which under proper use appear therein and arise solely from faulty design, materials or workmanship within a specified period. This period commences **immediately after the equipment has been delivered to the customer** and at its termination all liability ceases. Also the warranty period will be assessed **on the basis of the date that the Distributor is informed of the failure.**

- This warranty applies solely to equipment supplied and **no claim for consequential damages,** however arising, will be entertained. Also the warranty specifically excludes defects caused by fair wear and tear, the effects of careless handling, lack of maintenance, faulty installation, incompetence on the part of the equipment user, Acts of God or any other cause beyond the Distributors's reasonable control. Also, any repair or attempt at repair carried out by any other party **invalidates all warranties.**

ii) Standard Warranty

General Terms

If equipment failure occurs in the normal course of service having been competently installed and when operating within its specified duty limits warranty will be provided as follows:-

- **Up to three years - The item will be replaced or repaired at no charge.**
- **Over three years, less than five years - The item will be replaced or repaired at a cost to the customer of 50% of the Davis & Shirtliff market price.**

The warranty on equipment supplied or installed by others is conditional upon the defective unit **being promptly returned free to a Davis & Shirtliff office** and collected thereafter when repaired. No element of site repair is included in the warranty and any site attendance costs will be payable in full at standard chargeout rates.

DAYLIFF is a brand of **Davis & Shirtliff**

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for details of the nearest branch or stockist

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