DAYLIFF

ULTRASUN UFX

Flatplate Solar Systems

Installation & Operating Manual

INDEX

Congratulations on selecting a Ultrasun UFX 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 UFX Flatplate solar hot water systems are high specification thermosyphon type hot water heaters designed for long life operation in extreme conditions. Options are available for Open Loop and Closed Loop systems, Open Loop heating the water directly through the collector and Closed Loop separating the collector flow water from the through flow water, heat being transferred through the tank jacket. This is suitable for mineralised and brackish water that may corrode or scale the collector's capillaries. Features include:-

- Heavy duty tank which includes a steel powder coated outside casing, steel storage tank internally coated with glazed enamel and fitted with a magnesium sacrificial anode for exceptional corrosion protection, UV resistant plastic end caps and a 3kW heating element with thermostat.
- Flatplate solar collectors that incorporate full area selective copper plates laser welded to copper circulation tubes, high specification insulation and tempered security glass to provide energy absorption of up to 95%.
- Low thermal conductivity high specification flexible stainless steel circulation piping with silver foil coated polystyrene insulation jackets.
- Connection piping that includes an incoming non-return valve, pressure release valve rated at 8bar and drain cock. An added 3bar pressure release valve is provided for Closed Loop tanks.
- Galvanised mounting frame for both flat or inclined roof installations that ensures high durability in all weather conditions

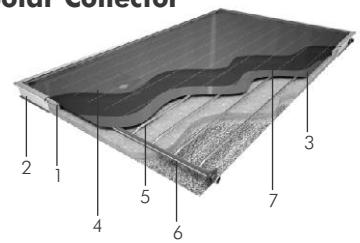
Ultrasun UFX Flatplate solar systems are available in various tank sizes and collector configurations to suit domestic and small-scale installation applications. They are efficient and robust products guaranteed for five years to demonstrate the high material specification. Designed for many years of trouble free operations, they are the ideal solution for all solar water heating applications.

SPECIFICATIONS

Water Quality: Water outside the following limits should be appropriately pre-treated,
Direct*: *Clarity*:** clear, ***TDS<600mg/l, ***Hardness***<200mg/l $CaCO_3$, ***Saturation Index***: >0.8<1.0
Indirect: Clarity: clear, ***TDS:*** <1500mg/l, ***Hardness:*** <400mg/l $CaCo_3$, ***Saturation Index***: >0.8<1.0
Max. Operating Pressure: 6 Bar for Open Loop, 3 Bar for Closed Loop
Max Flow Rate: $2m^3$/hr
Test Pressure: *Tank:* 8 Bar, ***Collector:*** 10 Bar

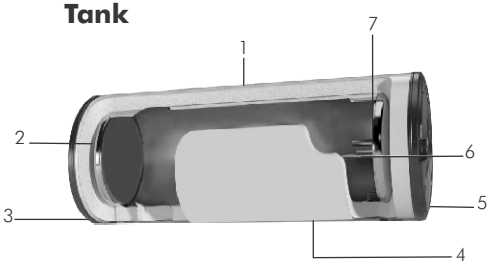
DESIGN FEATURES

Solar Collector



1. UV resistant 100% EPDM sealing and gaskets
2. Extruded pure aluminium frame with electrostatic powder coating finish
3. Aluminium foil faced,direct-injected monoblock polyurethane insulation
4. Tempered solar glass with high solar transmittance
5. Cooper riser tubes
6. Cooper manifold tubes
7. Full plate selective coated copper absorber

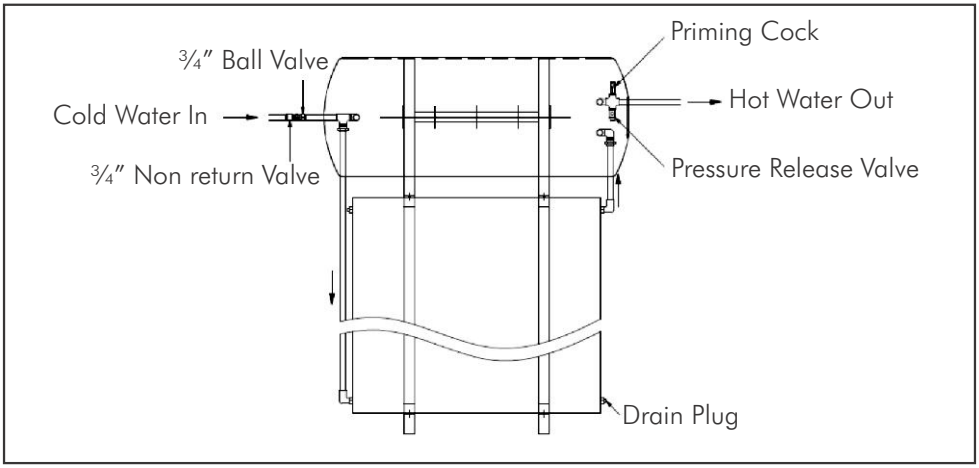
Tank



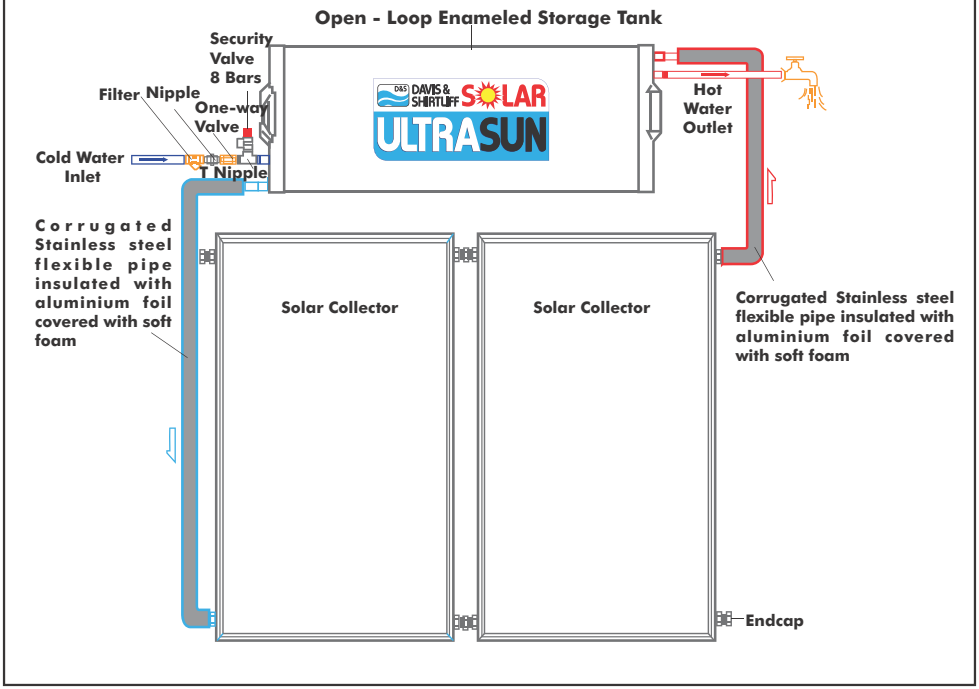
1. Direct-injected, CFC free polyurethane foam Insulation in 50mm thickness
2. Heat exchanger jacket
3. Enamel low-carbon steel hot water tank
4. Steel outside casing coated by electrostatic powder coating baked at 220°C to protect the tank from outdoor conditions and UV rays
5. UV resistant plastic cap
6. 3kW electric heater
7. Magnesium anode

2. EQUIPMENT SPECIFICATIONS

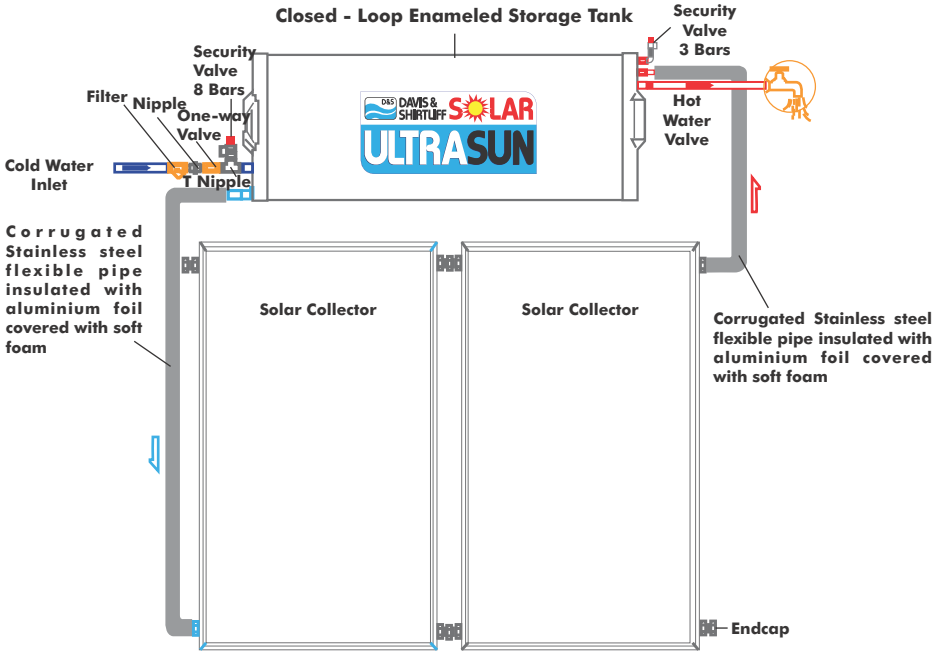
The equipment supplied comprises of two principal components, the tank and the collectors which are mounted together on a frame. The units work on the thermosyphon principal whereby the temperature differential between the top and bottom of the system creates water circulation thus facilitating the heating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



Open-Loop (Direct) Systems

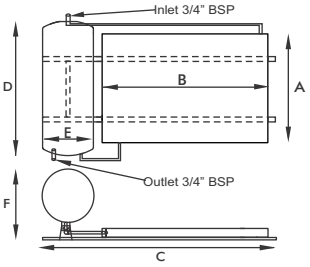


Closed-Loop (Indirect) Systems



SPECIFICATIONS

Model		UFX 160D/I	UFX 200D/I	UFX 300D/I	
System Tank Size (Litres)		160	200	300	
Typical Household (People)		4	5	8	
Collector Model		1x ST230	2 x ST180	2 x ST230	
Collector Area (m^2)		2.3	3.6	4.6	
Collector Weight (kg)		36	52	72	
Collector Fluid Capacity (litres)		1.5	2.4	3.1	
Max Heat Output/Day (kWhrs)		13	20	28	
Min Heat Output/Day (kWhrs)		9	14	18	
Dimensions(mm)	A	1240	1900	2560	
	B	1960			
	C	2700			
	D	1070	1270	1870	
	E	610			
	F	700			
Empty Weight (kg)		60/70	70/80	90	120
Full Weight (kg)		220/230	270/280	390	420



NOTE

1. Standard output systems (S Models) should be used in hot locations and high output systems (L Models) in more temperate ones. However hot water availability will vary throughout the year depending on prevailing irradiation levels and electric boosters may be necessary on cooler days.
2. 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

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. 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 the general public.

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

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

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.

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.

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^{0}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.

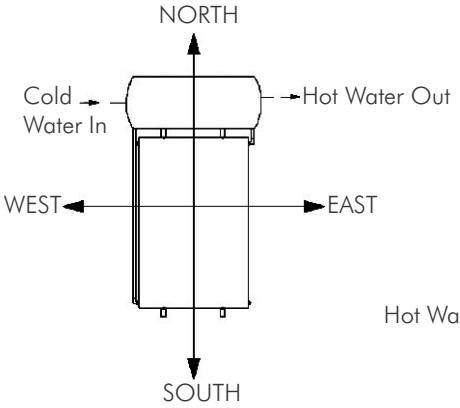
After the expiry of the guarantee period, if the magnesium anode rod is worn out, the anode rod shall be replaced by a new one in accordance with the instructions in the users' manual.

4. SITING

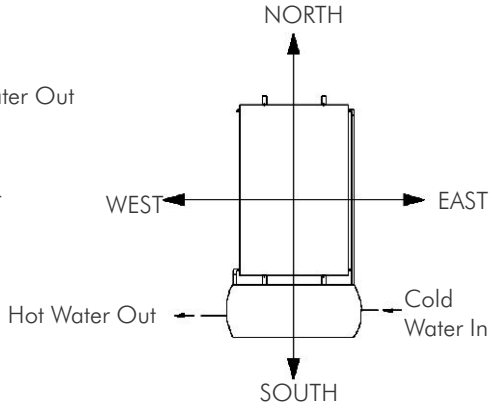
Correct siting is critical for the effective operating of a solar water heater, the following being important guidelines:-

- 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^{0}. In order to optimises irradiation and also assists 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.



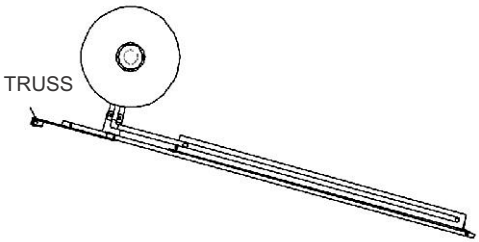
ORIENTATION OF SYSTEM NORTH OF THE EQUATOR



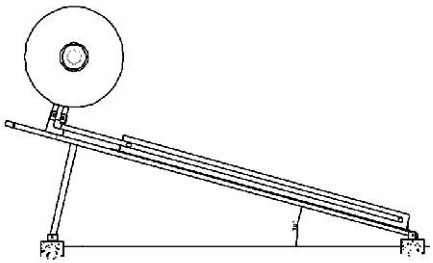
ORIENTATION OF SYSTEM SOUTH OF THE EQUATOR

5. INSTALLATION

Ultrasun UFX 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:-

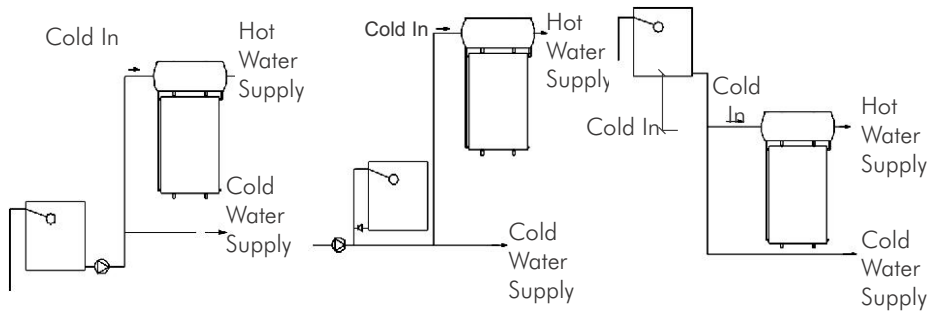


ROOF INSTALLATION



GROUND INSTALLATION

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.
8 Bar pressure relief valve must be installed before the cold water inlet of the tank and after non-return valve to protect tank against over pressure.

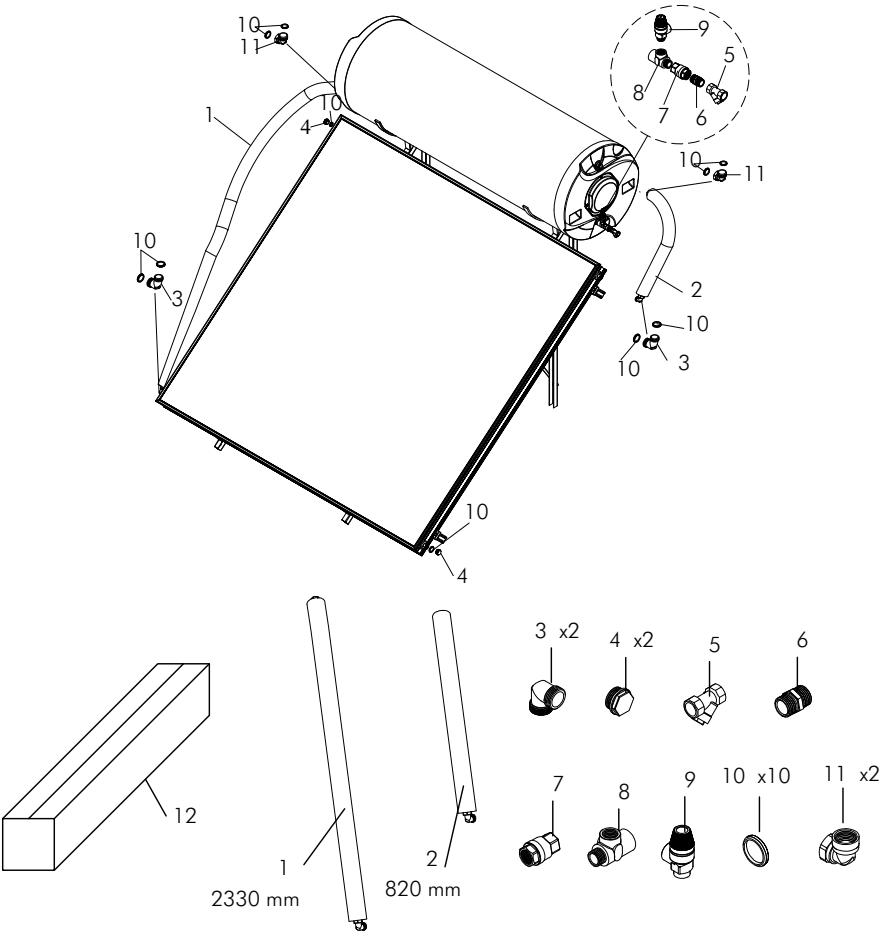
Tanks must be handled with care as damages can break glass enamel coating inside leading to corrosion problems.

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

Filling Indirect system with thermal fluid;

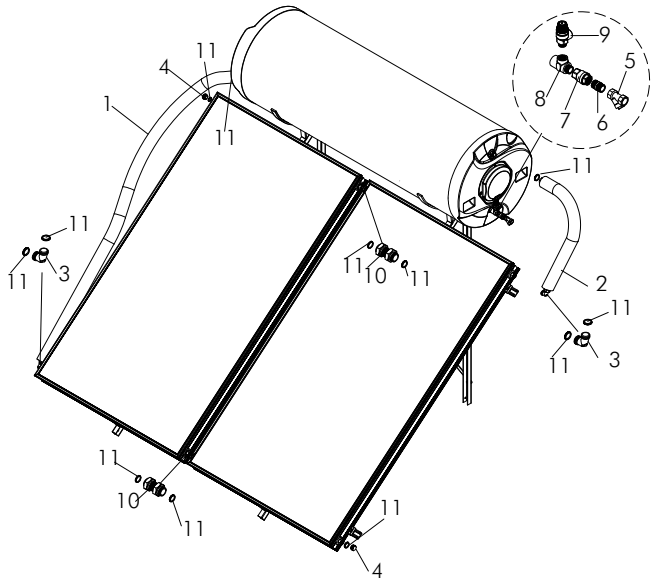
- Open the 3 Bar relief valve on the tank.
- Unplug the endcap on the side of solar collector.
- Connect the filling hose to the bottom right of the collector.
- Raise hose above the tank and fill tank with fluid
- Close the top left collector plug when thermal fluid starts to leak out.
- Continue filling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

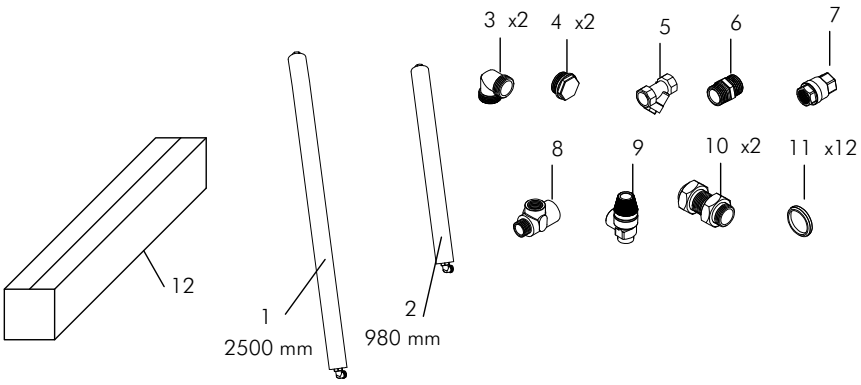
One panel installation kit



No.	Description	Quantities
1	Corrugated inox pipe with insulation - 2330 mm	1
2	Corrugated inox pipe with insulation - 820 mm	1
3.	Elbow 3/4″	2
4	Cap, brass 3/4"M	2
5	Filter, brass 1/2"FF	1
6	Nipple, brass 1/2"MM	1
7	One-way valve, brass 1/2"FF	1
8	Te adapter, 1/2"M-1/2"M-3/4"F	1
9	Pressure relief valve 6 bar 1/2"M	1
10	Fibre gasket	6
11	Flexible connector 3/4″ mm^2	2
12	Cardboard box	1

Two panel installation kit





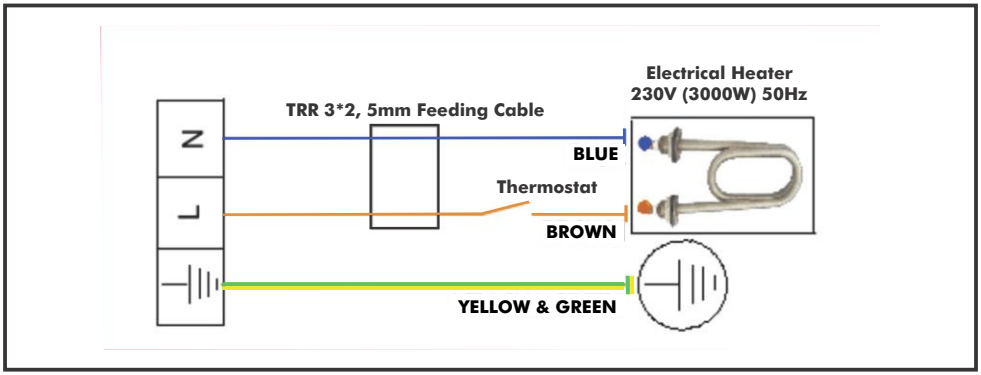
No.	Description	Quantities
1	Corrugated inox pipe with insulation - 2500 mm	1
2	Corrugated inox pipe with insulation - 980mm	1
3.	Elbow 3/4″	2
4	Cap, brass 3/4"M	2
5	Filter, brass 1/2"FF	1
6	Nipple, brass 1/2"MM	1
7	One-way valve, brass 1/2"FF	1
8	Te adapter, 1/2"M-1/2"M-3/4"F	1
9	Pressure relief valve 6 bar 1/2"M	1
10.	Fibre gasket	10
11	Flexible Connector 3/4″mm^2	2
12	Cardboard box	1

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 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 ensuring that the earth wire is connected to the earth stud marked with an earth symbol, the Live 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.



Earthing and lightning Protection

An equipotential connection must be provided between the metal pipes in the solar system and the common earthing system (equipment for earthing is not included in the package). The system may be earthed using a stake, with the earth electrode positioned outside the wall of the building. The earth electrode should be connected to the common earthing system using equipotential conductor of the same cross-section.

If there is a lightning protection system, the solar water heater system should be integrated with it. If there is no lightning protection a new one should be installed to avoid risks of lightning damages.

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.

b) **Indirect Systems**

As well as priming the service water as indicated above, it is important to fill the heating system with pure water. Ordinary lowly mineralised tap or drinking water is suitable and care must be taken to completely fill the collector and tank jacket. This is done using the priming plug on top of the tank and carefully filling the unit until all air is expended. It is also important to open the top collector bleed plug to ensure air pockets are eliminated in the collection capillaries. Once primed, it is vital to ensure that the system is properly sealed as fluid loss will render the system ineffective. The system must therefore be thoroughly checked for leaks when operating and they must be sealed accordingly.

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

a) Direct Systems

Direct hot water system have no moving parts and are essentially maintenance free, though periodically the collector glass cover should be cleaned as a dust layer will reduce efficiency.

b) Indirect Systems

Indirect systems rely on the small volume of circulated heating water in the sealed system and full efficiency is obtained only when it is fully charged with water. The units must therefore be regularly checked, recommended on a monthly basis and any leaked water replaced.

Hot water tank needs an annual maintenance. In case of using at high temperature and if the quality of the water in use is poor, the maintenance intervals should be shortened.

- Cut out the mains connection of the tank before starting the maintenance works.
- The hot water circuit should be run for checking the circulation in the circuit and hot water production.
- The tank and the connection points should be checked for any water leakage.
- Check valve and pressure reducer are vital for the safety of the system. They should be checked for proper functioning during the maintenance works and replaced if faulty.
- The temperature indicator, pump and the thermostat should be checked regularly.
- The magnesium anode, for preventing corrosion, should be checked once a year. If necessary, it should be replaced with a new one. The anode lid on the top of the tank should be taken out, checked visually and replaced if necessary. Otherwise, the life of the tank is shortened.
- In order to achieve the maximum possible performance from the water heater lime, stones, dirt and sediments that build up in the tank due to hardness of the mains water should be cleaned off periodically.

The sacrificial anode should be replaced as follows:

Total Dissolved Solids	**Replacement**
0-400 ppm	Every 5 years
400-800 ppm	Every 3 years
Over 800 ppm	Every 2 years
Borehole or Well Water	Every 2 years

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	Connect electric heater to be used when irradiation is low
	Non-operation of electric booster	Replace the electric heater
	Air locks in the collectors	Prime System
	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 pipes
		Replace 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 Davis & Shirtliff (hereafter called the Company) in respect of any defect or failure of equipment supplied **is limited to making good by replacement or repair** (at the Company'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 Company 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 Company'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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