

Manual of Pressurized Solar Water Heater



This manual applies to Models ThermoPower-VTS15-HP-G, ThermoPower-VTS30-HP-G, ThermoPower-VTS15-HP-E, and ThermoPower-VTS30-HP-E.

"The solar energy system described by this manual, when properly installed and maintained, meets the minimum standards established by the SRCC. This certification does not imply endorsement or warranty of this product by SRCC."

The supplier's name: SunMaxx Solar LLC Address: 2917 State Highway 7, Bainbridge, NY 13733



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IMPORTANT INFORMATION AND WARNINGS

Safety & Regulatory information DO NOT operate this system before reading the manufacturer's instructions.

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

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 safety, this appliance 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.

In order to prevent from burn injury, touching the heat pipes in the glass tubes is strictly prohibited. The evacuated tubes should not be exposed to direct sunlight before installation.

Care should be taken not to touch the pipe work as it may be HOT! Plastic pipe is NOT suited to the water temperature and pressure that may occur in the system. DO NOT store chemicals or flammable materials near the appliance.

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

This domestic solar water heating system will reduce your energy bill and protect our Earth by cutting carbon footprints. The SRCC has published system performance at different locations within the United States. You can refer to the report or certificate for details on energy savings.



SOLAR WATER HEATER PACKAGING & TRANSPORT

All ThermoPower-VTS15-HP and ThermoPower-VTS30-GP appliances (storage tank, evacuated tubes, support base and connection accessories), are delivered well packed to the customer.



The storage tank is placed between two round Styrofoam covers of 7 cm each, which are tightened on the storage tank with stretch film. Then it is placed in a hard carton pack, on which the indications of each model are displayed on the outside. The frame and reflector are fixed beside the tank in the same box.



The evacuated tube with heat pipe and aluminum fin is packed with 4 plastic protective elbows, attached on 4 different positions oon the tube. One box can store 10 or 15 tubes, and are then packed in a wooden box.





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1. Features of pressurized solar water heater

• High food-grade stainless steel 304 2B. State-of-the-art welding and potable water status.

• Through the 365° inner tube absorber and reflectors behind the tubes, the heat up time is very fast from the time the sun rises on the east side of the tube until it sets on the west side – unlike a flat plate collector, which has a high output during the sun's highest radiation level (around midday).

• Year-round utilization, even in cold, windy climates where freezing does not occur below -2 degrees Celsius for short periods of time.

• Can operate with incoming water pressures of 0.4 MPa – no circulating pump or controller necessary.

• The system will still function even if some vacuum tubes lose their vacuum or are accidentally damaged.

• All-day tracking capabilities due to 360° absorber on inner tube.

• The diffuser reflector plate behind the glass tubes adds to the heat gain during blue sunlight days.

• When installing more than one unit, system can be installed using parallel and/or series connections, increasing the hot water capacity/supply.



2. Structure of solar water heater



Component description:

HEAT PIPES: An evacuated-tube collector contains several individual glass tubes, each containing an aluminum fin and a heat pipe. The heat pipe transfers heat efficiently to the water in the tank.

WATER TANK: The storage tank is made of three layers: inner shell, intermediate foam insulation and outer cladding. The shell is built to hold maximum water pressure of 150 psi. Shell material is corrosion-proof, food-grade stainless steel. Foam insulation thickness is designed to self-sustainingly maintain the tank water temperature during continuous overcast days in the coldest wintertime. Outer cladding is normally galvanized sheet metal, providing a fine surface finish and a long-lasting life.

EVACUATED TUBES: Top-quality double-walled tubes are used. There is an aluminum or copper-coated mirror on the inside surface of the inner glass wall. The mirror well traps thermal energy inside the tube. On the metal mirror layer, there is selective absorption coating, which converts over 99% of the energy from visible and invisible lights.



The outer glass wall acts as glazing, creating a vacuum and protecting the coating against the elements. On the inner surface of tube ends, a silver-colored getter material is applied, which absorbs the remaining gases inside the tube's hollow space. Deducting the absorption and surface reflection of the outer wall of the tube, the overall efficiency of the tube is over 92%.

REFLECTOR: Reflector is silver-coated reflecting panel. The reflectors can improve solar system thermal efficiency and reinforce the frame structure.

FRAMES: Frame is made of rustproof material. A frame may have full-length rear legs, suitable for flat surface installation, or shortened rear legs, suitable for sloped surface installation. Length of rear legs could be cut to fit at site.

3. Working principle

3.1. Principle of vacuum tube



The vacuum tube is composed of inner tube, outer tube, selective absorption layer, vacuum space, inspiratory layer. The outer wall of the inner tube is the selective absorption layer. The space between outer tube and inner tube is the vacuum space. At the bottom of the outer tube, there is an inspiratory layer which can be used to absorb the remnant air.

3.2. Working principle of solar water heater

The vacuum tubes absorb solar energy, and the aluminum fin passes the heat energy to the heat pipe. The liquid medium in the heat pipe is heated by the heat



energy, then turns into a gas medium. The gas medium flows up to the top of the heat pipe and transfers the energy to the cold water in the tank, subsequently reverting back to a liquid medium and flowing down. As the process continues, the water in the tank will become the hot water.



Fig 3.1 Solar water heater working sketch map



4. Technical data and product description

4.1 Technical data

Model	ThermoPower-VTS15-HP	ThermoPower-VTS30-HP	
Number of Tubes	15	30	
Gross area	24.5 ft ²	47.9 ft ²	
Tank Volumetric Capacity	40 gallons	79 gallons	
Weight Empty	143.3 lbs	198.4 lbs	
Fill weight	474.0 lbs	925.9 lbs	
Length of Tubes	70.9 in	70.9 in	
Outer tube diameter	2.3 in	2.3 in	
Tube thickness	.06 in	.06 in	
Tube Thermal Expansion	3.3×10⁻⁰℃	3.3×10-6°C	
Absorptive coating	Graded Al-N/Al	Graded Al-N/Al	
Absorbency	>92%(AM1.5)	>92%(AM1.5)	
Emittance	7%(100°C)	7%(100°C)	
Vacuum	P<0.005Pa	P<0.005Pa	
Heat Loss	$<0.8W/m^{2}$	<0.8W/m ²	
Insulation	Polyurethane,55mm	Polyurethane,55mm	
Stagnation Temperature	<220°C	<220°C	
Maximum working temperature	90°C	90°C	
Maximum Working	0.6MPa	0.6MPa	
Pressure of all circuits			
Working pressure	0.4MPa	0.4MPa	
Maximum wind and snow	0.40 h N/m ²	0.401 N/m ²	
load	0.49810/11-	0.49KIN/III ²	
Tilt Angle	45°	45°	
Inlet and Outlet	¹ /2 in	¹ / ₂ in	
T&P Valve Port	¹ /2 in	1/2 in	
Frame	Aluminum Alloy	Aluminum Alloy	

4.2 System Tolerance Information

Freeze tolerance limits are based upon an assumed set of environmental conditions. Extended periods of cold weather, including ambient air temperatures above the specified limit, may cause freezing in exposed parts of the system. It is the owner's responsibility to protect the system in accordance with the Supplier's instructions if the air temperature is anticipated to approach the specified freeze tolerance limit.



4.3 System start-up procedures

After the system installation, check there is no leakage in the system and follow the following steps to start up the system.

Step 1: Connect Garden Pipe to Drain Valve V4, and keep V4 Open.

Step 2: Open the following valves: V0, V2, V4 and shut off the following valves: V1, V3, V5

Step 3: Keep the water running for 5 minutes to flush out the solder or stains after the water from V4 is observed.

Step 4: Shut off V4 and Open V3, and the system is in normal operating status.

4.4 System pipe anti-freezing protections

This is a direct DHW system. The plumbing copper pipe needs anti-freezing protection when the lowest temperature is below 23 Fahrenheit or -5 Celsius in the coldest climate. The anti-freezing protection detail is described below.

The tables SRCC uses to evaluate the freeze protection provided by pipe insulation indicate that 1.5 inches of insulation on a 0.75 inch type L copper pipe will protect the pipe down to ~14°F. It would be okay for the whole system if all the pipe was insulated well under this temperature condition.

It would be better to drain down the whole system if the temperature is lower than 14°F to avoid freezing in the connecting pipe.

In case of black out or power loss during cold weather when the temperature is lower than 14° F or -10° Celsius, a system drain out procedure must be followed as follows, and the existing auxiliary water heater must have adequate capacity, listed and labeled by an accredited listing organization to continue providing adequate hot water.

Step 1: Shut off V2 and V3 Solar Isolation valves to isolate solar system.

Step 2: Open V1 to using auxiliary hot water heater system, and bypass the solar water system. Ensure the V0 is open.

Step 3: Connect Garden Pipe to both Drain Valve V4 and V5.

Step 4: Put both Garden Pipes in the house drain dock or sinks.

Step 5: Open both V4 and V5 drain valves until no more water comes out of either pipes.

Step 6: Shut off both V4 and V5 drain valves.

When the electricity is back to normal, follow the system start-up procedures to set up the system to normal operation.

4.5 Specific notices

4.5.1 Auxiliary Hot Water Heater

The system is not a replacement of the existing auxiliary hot water heater. It is installed upstream of the existing conventional hot water heater. The auxiliary hot water heater must be maintained as usual. The auxiliary hot water heater must have



adequate capacity, listed and labeled by an accredited listing organization. It should have built-in insulation per the accredited organization. If the auxiliary hot water heater doesn't come with insulation, it should be covered with minimum R2.2 insulation with thickness of 1/4". (GUIDE: 6.1.1.4)

4.5.1 Different metallic materials

To prevent galvanic corrosion, a dielectric union or coupling should be installed in between the copper pipe and steel tank.(GUIDE: 6.1.1.10)

4.5.2 System Tank (GUIDE: 6.1.3.2)

The direct system comes with a 63-gallon tank, no heat exchanger, hence no extra tank is needed.

4.5.3 Heat Transfer Fluid (HTF) inside the heat pipe (GUIDE: 6.1.3.6 and 6.3.7)

The HTF inside the heat pipe is a small amount of pure water at a very low pressure. The heat pipe and HTF are built as one unit, no refill is needed, and the water inside will not be reduced.

No other fluid shall be used that would change the original classification of this system. Unauthorized alterations to this system could result in hazardous health conditions.

4.5.4 Temperature Sensor Wiring and System Monitoring (GUIDE: 6.1.5.5 and 6.4.1) Connect either temperature sensor to the cold water pipe and hot water pipe, respectively. Put one-foot R4.4 insulation on both sensors. The sensor and pipe intersection point should be in the middle of the one foot insulation.

To determine whether the solar system is working, observe the thermometer when hot water is being used in the house. The water returning from the collector on a sunny day should be at least 10°F warmer than the water going up to the collector. The temperature of the cold water and hot water is displayed on the monitor.

4.5.5 The insulation of the final 5 feet to the auxiliary water heater (GUIDE: 6.1.6.3)

The insulation of the final 5 feet to the auxiliary water heater shall be insulated with R-0.46 K m^2/W or greater insulation.

4.5.6 Public Traffic Statement (GUIDE: 6.3.17)

Components exposed to public traffic should be maintained below 140°F or insulated/isolated to prevent any hazards to public traffic.

4.5.7 Components accessibility (GUIDE: 6.4.6)

All components should be accessible for maintenance and servicing.

4.5.8 Installation and Maintenance Practices (GUIDE: 6.5.5 and 6.5.10)

Do not impair enclosure function. Do not allow vermin intrusion. Ensure applicable codes and National Roofing Contractors Association practices are followed. The entire system should be checked by the installer once every two years.

Follow applicable codes and practices when penetrating the structure to install solar system.

4.5.9 Safe practices (GUIDE: 6.5.11)

Building materials adjacent to solar components shall not be exposed to elevated temperatures.

4.5.10 System mounting (GUIDE: 6.5.12, 6.5.13, 6.5.14 and 6.5.19)



Allocate a place that is not shaded between 10:00AM and 3:00PM, and keep the solar panel facing south with 45° of adjustment tolerance. The pitched degree of the panel should be close to the latitude of the location.

All the piping should be properly supported according to plumbing code. These supports must not compress the insulation.

Any structural element or fire rated assembly should not be reduced after penetration during the installation. It will be up to local code to dictate exactly how this is done. The outdoor pipes should be insulated with R6.6 insulation with thickness at or greater than 1 inch. The indoor pipes should be insulated with R2.6 with thickness at least 1/4".

4.5.11 Projected components need to be replaced

The glass vacuum tubes might need to be replaced if broken by unexpected hazards, such as collision with a hard material. Please contact the installer to order replacement parts. The battery of the temperature monitor needs to be replaced when the battery is out. The battery can be purchased at store.

5. Installation of solar water heater

5.1. Frame installation drawing









(Solar Water Heater for Sloping Roof) 1.back box 2.adjusted end cap 3.front pole 4.front support 5.tank bracket 6.horizontal support

5.2 Installation of frame:







5.3 Installation of the tank

Fig 1	Fig 2	Fig 3



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Step 1. Screw off the nuts	Step	2.	Inst	all	the	Step	3.	Install	the	T.P
from the connection bolts	acces	sories	s and	turn	the	valve				
of the water tank. Take the	small	red	cap c	of the	air					
water tank out. Put it on	vent	on	the	top	to					
the installed frames slowly	ventil	ate.								
and lightly.										
Take care to insert the										
bolts of the water tank										
into the corresponding										
connecting holes of the										
tank brackets.										

5.4 Installation of the heat pipe and vacuum tubes

Open the pack of vacuum tubes and take out one vacuum tube at a time.

a. Install the anti-dust seal on top of vacuum tube.

b. Insert the vacuum tubes into the water tank slowly, while turning the tube.



5.5 Solar water heater installation and attention

Thisstep requires you to locate your hot water heater. The collector should face approximately south (plus or minus 20°). Use a declination value from a map or declination table to determine the direction of true South from the compass reading.

The collector should be tilted at the latitude angle plus 15° for best winter operation and latitude minus 15° for best summer performance. Tilt at latitude for best year-round performance.



A good GPS will also provide accurate compass headings and your exact latitude. If you do not have a compass or GPS, wait until solar noon and the shadow of a vertical stick or surface will point due North. True South is 180° from true North. HINT: MANY SOLAR SYSTEMS ARE PLACED AT THE ROOF SLOPE WHICH IS LESS THAN LATITUDE MINUS 150, BUT IS MORE AESTHETICALLY PLEASING, WITH ONLY A SMALL 10% PENALTY IN ANNUAL PERFORMANCE.

The latitude of your location can be found on the Internet or in your local paper. The latitudes of some selected U.S. cities are presented in Table 5-1 for reference. (HINT: Look at other solar collectors in your area, see how they are oriented to South and elevated for latitude). The report includes a solar sitting template to show the effects of shadowing from trees or nearby buildings, declination map and other useful information about system sitting.

City (arranged by increasing latitude)	Latitude (all North)
Anchorage, AK	62°
Juneau, AK	58°
Seattle, WA	47.5°
Portland, OR; Minneapolis, MN; Bangor ME	45°
Buffalo, NY	43°
Chicago, IL; Boston, MA; Detroit, MI	42°
Denver, CO; Indianapolis, IN; Philadelphia, PA	40°
Kansas City, MO; St. Louis, MO; Washington, DC; Cincinnati, OH	39°
Reno, NV	39.5°
San Francisco, CA; Sacramento, CA	38°
Nashville, TN	36°
Albuquerque, NM; Memphis, TN	35°
Los Angeles, CA	34°

Table 5-1 Approximate Latitudes of Selected U.S. Cities





Phoenix, AZ; Charleston, SC	33°
San Diego, CA; Savannah, GA	32°
Houston, TX; New Orleans, LA; Jacksonville, FL	30°
Tampa, FL	28°
Brownsville, TX; Miami, FL	26°
Honolulu, HI	21°
Hilo, HI	20°

Three reference poses are given below. However, in deciding the specific location and pose of a unit, the installer should consider:

1) Choose a strong foundation and safe place

2) Location should have optimized sunshine exposure

3) Minimize plumbing length to decrease heat loss

4) Ensure good aesthetic view with the surrounding environment

5) Perform safe operations to prevent from injury during



The solar water heater must be installed in locations with wind and snow load lower than 0.49kN/m². If the wind and snow load in the location is more than this value, please strengthen the installation of system.

The best time to install the heat pipes and vacuum tubes is in the morning or in the evening, or a time when the sunlight is weak. If there is strong sunlight, the heat pipes will be heated quickly and the temperature will reach above 100°. That will scald the installation workers easily. Or wrap the vacuum tubes in a piece of cloth so that they are not exposed to direct sunlight.



After installing and adjusting solar water heater, connect cousins with building plate by the inflated bolt. Fix it more than 4 steel ropes to avoid damage from strong wind. .Be sure there is no leakage in pipeline, joints, valves, etc.

The pipeline outside must be have heat protection and anti-freezing. In some very cold areas, an emptier or restrained temperature anti-freezing cable should be added.

If the solar water heater is not in the protected scope of a lightning conductor fixed on the building, the user should add the lightning conductor. The local power department must connect the roof conductive part to the grounding wire with at least 16 mm grounding cables. For building height (installation height) less than 20 meters, there is no need to adopt special measures to protect from lightning strikes

. When penetrations are required in structural elements to accompany passage of solar components, those modified structural elements shall comply with local building codes.

. Building materials adjacent to solar equipment shall not be exposed to elevated temperatures, which could accelerate their deterioration. Many non-metal roofing materials will soften in high temperature ranges and begin to degrade.

. The design and installation of systems shall not impair emergency movement of the building occupants.

.The installation shall:

. NOT IMPAIR ENCLOSURE FUNCTION

. NOT ALLOW VERMIN INTRUSION

.MEET APPLICABLE CODES AND NATIONAL ROOFING CONTRACTORS ASSOCIATION PRACTICES

6. Pipeline installation6.1 Plumbing system schematic map

ThemoPower-VTS15-FP and ThermoPower-VTS30-HP products are solar hot water heater systems which pre-heat inlet water with solar energy prior to feeding into the conventional hot water heater. It can be integrated with the existing gas, electric, propane, or oil hot water heater by installing upstream of the existing hot water heater. Food grade materials should be used for all water contact areas.

A mixing valve must be installed if the homeowner does not have one currently. Set



the output water temperature at a point of 48.9°C (120°F).

The tank upper temperature limit is 300°F and 130 psig. As the thermosiphon system has no way to stop the operation of the solar collector, there should always be a T&P relief valve installed to release some high temperature water out of the tank; then mains water will charge the tank to keep the tank in normal working condition. The T&P valve releases some water out of the tank when the temperature is more than 194°F, or the water pressure is above 58 psi to ensure the safety of the system. The specification of the T&P R is,

Inlet: 1/2 in tapered male thread

Outlet:1/2 in parallel female thread

Maximum opening temperature:90°C/99°C

Rated working pressure: 0.4MPa/0.6MPa

Maximum working pressure: 1.5MPa

If you are away from your home for a long time and the system will not be used during that period, we recommend you drain down the system and close the inlet valve to avoid overheating. In order to prolong the system's life, cover the collector using a canvas cloth or mat.

When the tank gets too hot, please drain down some hot water and then charge the mains water to cool down the system slowly.

All exposed areas need to be well insulated to resist freezing. The insulated tank keeps the hot water in the tank from losing too much energy throughout the night. The system can absorb energy at most weather conditions, even on full cloudy days in winter. The collector tubes still get energy from infrared heat passing through the clouds on fully cloudy day.

All labeled valves (V1 to V5) must be installed within an adult's reach. Draining valves (V4 & V5) must come with hose bibs that can connect a garden hose for draining purpose.

Piping should be sloped toward drain ports with a drainage slope of no less than 2 cm vertical drop for each meter of horizontal length (1/4 inch per foot).



The illustration below is the installation pipe line of pressurized solar water heater. The directions of each valve and the corresponding positions should match the illustration. There should be no leakage in the tie-in. The pipe line must have heat preservation and anti-freezing.

Underground piping subject to vehicular traffic shall be installed to withstand the additional load applied by this traffic. The trenches and backfill shall be free of sharp objects in contact with the pipe.

As the system is a solar-only system, there will be some days during which it cannot meet the user's heat demand if the solar irradiance is not optimal. It requires auxiliary hot water heating equipment to ensure that user demand can always be met.

Our system can plumb with electrical, gas, or oil water heater; for connecting detail, please reference the below diagram. Please note that, when you choose the backup water heater,

"THE AUXILIARY WATER HEATER MUST HAVE ADEQUATE CAPACITY, LISTED AND LABELED BY AN ACCREDITED LISTING ORGANIZATION."

The backup water heater thermostat set point can be 51.7 °C (125°F) to meet the final delivery water temperature.

Regarding the electrical back up water heater, you can choose to connect both of the heat elements to speed up heat rate, or you can connect only one on the top of this water heater. It is best to get advice from the field-wiring installer to ensure all the wire can meet the heat element's maximum power.





The above is a reference plumbing connection diagram. The formal plumbing architecture design and blueprint drawing shall always be done by a licensed architect and signed by licensed plumbers. Acquire the proper working permits from the local city building department before the installation. Install the system using a licensed contractor with solar install certificate. Request and perform the inspection and sign-off after installation.

Important Notice and Warnings

To prevent burn injury, touching the heat pipe in the glass tubes is strictly prohibited. The

evacuated tubes should not be exposed to direct sunlight before installation.

The inlet and outlet port size is $\frac{1}{2}$ " tube; you can choose $\frac{1}{2}$ " or $\frac{3}{4}$ " pipe size between the water supply and water tank connections. The safety valve size is also $\frac{1}{2}$ ". Make sure all the safety valves are in normal condition before flushing the system.

The temperature monitor and sensor shall be installed properly to ensure the system works normally. There are two recommended methods to install temperature sensor in the inlet and outlet pipe.

Method 1: use a three-way valve and sensor pocket to install the temperature sensor at the inlet and outlet port of the water tank.



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		Dige
Fig1. sensor pocket	Fig2. the top end of the	Fig3. sensor pocket
	sensor pocket	valve

It is better to install the sensor at the inlet and outlet port of the tank to measure the temperature accurately.

Method 2: if the sensor pocket is not available when installing the system, you can choose this easier method to install the temperature sensor.

step1. Put the temperature	Fig2. Use duct tape to fix	Fig3. Then insulate the
sensor close to the inlet and	the sensor.	whole pipe with PU
outlet copper pipe. Keep		foam.
them tightly in contact.		

The sensor shall be install as close as possible to the inlet and outlet port of the tank and insulated well.

After installing the temperature sensor, the sensor wiring shall go through the pipe to enter the house, and then connected with the temperature monitor. The monitor shall be installed in a place where it can be constantly monitored expediently and kept dry. The recommended temperature monitor TR-71Ui can be easily installed; simply fix the monitor onto the wall and insert the thermal sensor connector into the sensor jack

of the monitor. Please reference the monitor diagram below.





To determine whether the solar system is working, observe the thermometer when hot water is being used in the house. The water returning from the collector on a sunny day should be at least 10°F warmer than the water going up to the collector. The temperature of the cold water and hot water is displayed on the monitor.

The monitor main unit shall work normally with ambient temperature between -10° C and 60° C and humidity under 90% RH. The thermal sensor shall meet the working temperature between -40° C - 110° C. The recommended measure accuracy is 0.1° C.

If the solar water heater is installed either on a metal roof or in a trafficable area, such as on an accessible roof, then the solar hot and solar cold pipes must be insulated. The solar hot and solar cold pipes may be required to be insulated to comply with local regulations.



6.2 Plumbing connections



Components list and Valve labels ID Name Normal Model/technical Photo Quantity operation specification position V0 City water ON 3/4" ball valve 1 shut off valve 3/4" ball valve 1 V1 Solar OFF **B**ypass valve V2 ON 3/4" ball valve Solar 1 isolation valve 3/4" ball valve 1 V3 Solar ON isolation valve V4 Solar Drain OFF 3/4" Drains hose outlet 1 valve connection with NPT threaded inlets V5 Solar Drain OFF 3/4" Drains hose outlet 1 valve connection with NPT threaded inlets 1/2" WATTS series 70A V6 Mixing Set temperature 1 Tempering Valve 48.9°C valve (120°F-160°F) temperature range: 120°F to 160°F. Maximum Pressure: 150psi (10 bar). Size Range: 1/2 to 3/4 in. (15 to 20mm)



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V7	T&P R valve	Normal operation condition	WYA-15 1/2" Meet ANSI Z21.22 Inlet:1/2 in tapered male thread Outlet:1/2 in parallel fe male thread Maximum opening temp erature:90°C/99°C Rated working pressure: 0.4MPa/0.6MPa Maximum working pres sure: 1.5MPa		1
V8	Air vent valve	OPEN	R99Y		1
V9	No-return valve/check valve	OPEN	Maximum operating pressure 400psi		1



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Connections list					
ID	Name	Material	Model	Photo	Requirements
Connection 1	Fluid loop Tube	Cooper	3/4"		Materials shall meet the standards of the national sanitation foundation
Connection 2	3/4" CxCxC Tee and Couplings	Cooper	3/4"		Materials shall meet the standards of the National Sanitation Foundation
Connection 3	3/4" Copper x Female Adapter	Cooper	3/4"		Materials shall meet the standards of the National Sanitation Foundation
Connection 4	3/4" x 1/2" Copper x male Adapter	Cooper	3/4" x 1/2"		Materials shall meet the standards of the National Sanitation Foundation

ID	Front label	Back Label
VO	City water shut off valve. Shut this valve will shut the water supply for the solar and Hot Water System. Normal operation position: OPEN	City water shut off valve OPEN V0









All the system labels will be made of weather proof material and packaged with the product in shipment. Some of them must be attached to the valves with plastic or wire tie after installation. If the label is lost or damaged for some reason, type a new one on heavy paper stock and seal in clear plastic to make it waterproof.

The freeze protection label must be attached to the water tank drain valve. Hot warning label must be attached to the position where the mix-valve is installed. The system label will be attached on the front side of the tank. Valves V0-V5 labels must be attached or hung on the valves installed according to the diagram in this manual.

6.3 Insulate the pipe

For the installation of the pipeline system and power cord (including indoor and outdoor parts) of the flat solar system, the pipeline shall go through the airway of the house, and should not be installed in the flue; the indoor part shall be open line and shall not bury the pipeline of the solar system and power cord in cement without any protection, as the connections of pipeline and the power cord may need maintenance or repair. Upon installation, the user shall guarantee that the connections of pipelines and the power cord are easy to maintain or repair. If the user installs the pipeline of the system as concealed pipe, any economic losses caused by the leakage of concealed pipe and other related causes shall not be borne by SunMaxx Solar.

If insulation is required, the full length of the solar hot and solar cold pipes MUST BE insulated.

There are many different kinds of water pipe insulation and many can be used on any type of pipe. When doing research to see what kind of insulation you will need, you should consider the type of pipes you have, your home's age, and the climate in which you live. You will use this information to pick an insulation that has the correct R-value for your needs. The R-value of a material is its ability to keep heat in or out of the water pipes. This value is based on several factors including the type of



material plus its density and thickness. The higher the R-value, the better an insulator the material has been found to be. There are five major types of water pipe insulation that can be used on any type of pipe, each with its one unique advantages and disadvantages.

First, there is spiral wrap fiberglass insulation, which is the cheapest of all the options but also has the lowest R-value of the group, as well as the most labor intensive to install. Second is self-sealing foam tubing. This kind of foam pipe insulation has been found to be extremely easy and quick to install since there is no tape needed. Once it is cut to the correct length and wrapped around the pipe, you simply remove the plastic strips to uncover the glue that seals the two sides together. There are various types, and the higher the cost, the higher the R-value. Third, there is foam tubing that is not self-adhesive. The major advantage of non-self sticking foam tubing is that you can find it in higher R-values, even though it does take some extra work to be installed.

The fourth kind of water pipe insulation is pipe covers that are a fiberglass shell. This type of pipe cover differs from the other types because it is a hard fiberglass shell with a paper cover on the outside and a reflective foil lining inside. Like the foam tubing, they have a slit on one side that lets you wrap the water pipe and is self-sealing. They are especially good on higher pipes that reach greater temperatures, such as steam pipes, where the additional heat levels can damage foam tubing. While they are an option for cold water pipes, it would be better to use them only on pipes with extremely hot temperatures and use a less expensive option on the cold water pipes. The fifth option is cut-to-size standard fiberglass insulation (typical of an attic) that is taped around pipes. It is the best option for the insulation of your hot water tank as well. In the end, to give your home the best possible water pipe insulation, you are going to need to use a variety of insulation materials depending on what the pipe is used for and where it is located.

No matter which kind of insulation you choose, it should meet the below requirements:

The insulation must:

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1 Be of a closed-cell type or equivalent, suitable for a solar water heating application and capable of withstanding the temperature of the water generated by the solar collectors under stagnation conditions.

2 The specification of the chosen insulation material should be checked with the insulation manufacturer prior to installation, as different materials may vary in temperature tolerance.

3 The outdoor pipes should be insulated with R6.6 insulation, with thickness greater than or equal to 1 inch. The indoor pipes should be insulated with R2.6 with thickness at least 1/4".

4 All pipe insulation exposed to sunlight must be protected from UV degradation. Use of pipe insulation jackets, a coating of exterior-grade latex paint, or metal tape is recommended. Do not use duct tape because it will quickly deteriorate when exposed to outdoor conditions. The drain plugs on the bottom of the collector should also be completely surrounded and covered by R-12 rubber insulation for freeze protection and better results.

The pipe shall be insulated after there is no leakage. Prepare the foam tube and aluminum tape first. Then insulate the copper tube step by step.









5 Be fitted up to and cover the connections on both the solar storage tank and the solar collectors.

Plumbing pipes should be well insulated with R2.6 material, and with minimum outside exposure length. It should be lined up through the attic and interior walls. However, in case it is hard to wire through interior walls, the pipes can run along an external wall and enter at the basement level.

All plumbing work must be carried out by a qualified person, and the material of the collector loop shall conform to local authority requirements.

7. Commissioning the system

After the system installation, check there is no leakage in the system and follow these steps to start up the system.

To fill and turn on the water heater:

Step 1: Connect Garden Pipe to Drain Valve V4, and keep V4 open.

Step 2: Open the following valves: V0, V2, V4 and shut off the following valves: V1, V3, V5

Step 3: Keep the water running for 5 minutes to flush out the solder or stains after the water from V4 is observed.

Step 4: Shut off V4 and open V3, and the system is in normal operating status.

NOTE:



1. Please check all the valves are working well and the system is filled with water completely before putting the system in operation.

2. Please install the thermostatic mixing valve to make sure the outlet temperature is lower than 50°C.

3. Please use the pipe connecting the T&P valve hole in order to allow steam caused by high temperature and pressure of the system to escape in such a way that no damage is done to the system or any other materials in the building by the drained hot water. For information on regular operation of safety valves, please see the user guideline in the packing of safety valves.

4. The system must be maintenance by a specialist.

8. Troubleshooting

If you are having a problem with your unit, try the suggestions below. If the problem persists, please contact the manufacturer.

Problem	Possible solutions
	Stop the system. Cut off V0 to stop the mains water into
Solar system leaking	the system. Use V5 drain valve to drain all the water in
	the tank and then call for service immediately
	a) Less solar insolation in your geography area: take use
	of other assistant energy sources, such as electric heating
	system or gas heating.
	b) Vacuum tube broken: replace a new fine vacuum tube
	c) Heat pipe not installed correctly: pull out the heat pipe
Solar system has low working performance	and dab some silicon grease on the heat pipe's condenser,
	then reinsert it into the manifold
	d) Pipe line not sealed and insulated very well, leading to
	more energy loss: check and seal the pipe line and keep
	the pipeline insulated very well.
	e) A faulty heat pipe: replace new fine heat pipe and
	contact authorized service provider
	This is a normal working condition. Once some hot water
Water releasing from T&P valve	or air is released from the T&P valve, the valve will be



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	automatically closed shortly thereafter.	
No hot water but air from tap when system	There is air in the solar tank. Please keep air flowing out	
is refilled	from tap until air disappears	

If there are some emergency things happened, or you will leave the solar system unattended and unused for long periods of time, please turn off V2 and V3, and open V1.

If after using this trouble-shooting guide, you still can't solve the problem, please contact your authorized service provider.

9. Maintenance requirements

9.1. Cleaning

Regular rain should keep the evacuated tubes clean, but if particularly dirty they may be washed with a soft cloth and warm, soapy water or glass cleaning solution. If the tubes are not easily and safely accessible, high pressure water spray is also effective.

9.2. Leaves

During autumn days, leaves may accumulate between or beneath the tubes. Please remove these leaves regularly to ensure optimal performance and to prevent a fire hazard.

9.3. Broken tube

If a tube is broken, it should be replaced as soon as possible to maintain maximum collector performance. The system will still operate normally even with a tube broken. Any broken glass should be cleared away to prevent injury.

To replace a tube:

Remove the tube clip, slide broken tube out, and carefully pick up any glass pieces. Please wear protective gloves when handling the broken glass. When removing the tubes, the rubber ring in the manifold casing may pop out. Just return the ring into place before inserting the new tube.

Avoid touching the glass wool insulation with bare hands, as it can cause mild skin irritation.



The new tubes should already have heat transfer fins inserted, so slide the new tube into place, taking care to guide the heat pipe into the slot between the fin and the glass wall. Normally the heat pipe does not need to be removed from the manifold.

10. Special conditional operation

1. If tank is not full, you can add water anytime. Please add water after using hot water. If tank is exposed without water longer than 15 minutes, do not feed water. Please make sure to add water in evening or next day morning, so it will protect the vacuum tubes from breaking due to substantial difference in temperature.

2. In order to avoid scalding, please turn on the cold water valve first, then turn on the hot water valve, then adjust the cold water valve and hot water until reaching the suitable hot water temperature if the mixing valve is not available.

3. In area where water pressure is high, please turn down the filling water valve so cold water can enter into the water tank slowly.

4. Getter should be mirrorlike in appearance, or else tube is not in a vacuum condition.If it appears misty, please change the tube.

5. Air vent in the tank mustn't be jammed, in order to avoid swelling or broken tank.

6. Keep the tank full while winding.

7. In winter, keep the pipeline insulated to protect it from freezing in cold areas and start the electrical cable installed on the inlet and outlet pipe.

8. Fix the frame carefully against strong winds to prevent accidents.

9. Please do not change the structure of the solar water heater at random.

10. The water temperature can be very high in the summer months and steam can be observed coming out of the vent pipe. If the solar water heater is not in use in the summer or for a long period of time, it is advisable to cover the glass tubes with a canvas cloth or a mat.

11. Other important information

1. Gaskets, sealants, and hoses are silicon rubber, not affected by fluids or environment.



- Components exposed to public traffic are maintained below 140°F. All other exposed areas over 140°F are labeled with appropriate warning.
- 3. The solar system is installed on the roof. It will not impair building enclosure function.
- 4. It is better not to allow vermin intrusion during the system service period.
- Installation provisions must meet applicable codes and National Roofing Contractors Association practices.
- 6. All components shall be accessible for maintenance and servicing after installing.

12. Warranty Card

Upon installation of the solar geysers, the dealer responsible for the sale will fill out the warranty card and the customer will complete a record of it and retain it for future servicing.

This limited warranty covers the glass tubes, hot water tank, and tank support frame for tube breakage, leakage or any other malfunction caused by defects in the materials and/or workmanship. It extends to the first buyer and to any subsequent owner as long as the water heater has been installed by trained and qualified authorized technicians approved by SunMaxx Solar.

On glass tubes, the limited warranty is for a period of 5 years from the date of purchase. This warranty excludes loss of vacuum in a tube or tubes due to breakage during transport, handling, or after installation. A gradual reduction in vacuum levels over time is normal and accordingly is not a defect under the terms of this warranty. The limited warranty on the hot water tank and support frame is for a total period of 3 years from the date of purchase.

This warranty also does not cover:

Leakage or breakage of tubes or other malfunctions caused by defective installation, misuse, operation, and/or maintenance contrary to the written instructions in this manual.

Odiferous, discolored, or rusty water coming from the system. Damage to surrounding area or property caused by leakage or malfunction of the



system.

Costs associated with the replacement and repair of the unit, including freight, shipping or delivery charges, removal, installation or re-installation charges, any materials and permits required for installation, re-installation, or repair. All legal disputes to be settled in New York State. To facilitate warranty service, you should: Follow all instructions enclosed with the product. Retain all bills of sale or receipts for proof of installation, etc. Contact your installer or dealer as soon as any problem or defect is noticed. When necessary, allow our chosen representative to inspect the unit.

For your record:

Write the model and serial number here: Model:

Serial:

(You can find them on the label staked on the water tank)

Install Company Name:

Contact Phone No.:

Install Date:

ANNEX 1. Components List

Information Of Components List To Be Delivered



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No.	Part No.	Item	Quantity	
1	1	Evacuated tube with	30	
2	2	Sealing gasket	30	
3	3	Tank	1	
4	4	T&P relief valve	1	
5	5	Automatic air vent	1	
6	6	Horizontal support	4	
7	7	front support	4	
8	8	Adjusted end cap	30	
9	9	End bracket	1	
10	10	Bolt nut	25	
11	11	Tank support	3	
12	12	Front leg	3	
The part No. in this table shall be refer to the No. in the below drawing.				



ThermoPower-VTS30-HP SOLAR WATER HEATER SYSTEM DRAWING

Component For Plumbing System - Installer Must Buy From Home Depot Or



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Plumbing Stores separately.				
No.	Part No.	Item	Quantity	
13	\	Ball valve 3/4"	3	
14	/	Non-return valve	1	
15	/	Drain valve 3/4"	2	
16	/	Conner Ding 2/4"	The length determined	
10		Copper Pipe 3/4	by the actual layout	
17	\	Temperature monitor	1	
10	\	TEE Coupling 2/4"	Per the actual install	
10		TEE Coupling 5/4	conditions	
19	\	Pipe insulation 2"	Per the actual install	
			conditions	
20	\	Pipe insulation 3/4"	Per the actual install	
			conditions	
21	\	PVC pipe 4"	Per the actual install	
			conditions	
22	\	Mixing valve	1	
23	\	Back up water heater*	1	

* Backup water heater shall have adequate capacity, listed and labeled by an accredited listing organization.

The recommended option is AO Smith GVR-50 gas water heater or AO Smith ECS-50 electric water heater. Consumer are free to choose any other 50 gallon gas or electric water heaters with R-value equal to or greater than 16, and with volume within 10% of 50 gallons.

ANNEX 2 Notice Label

Hot warning label





Freeze protection label

Freeze Protection Information

The freeze protection method of this system is thermal mass and manual draining. Drain the system as instructed in the owner's manual when temperatures of 14°F or below are expected.



System Label

OG-300 Certified	This product certified by: Solar Rating & Certification Corporation™ www.Solar-Rating.org	SunMaxx Solar LLC 5042-5160 New York 206 Bainbridge, NY 13733 USA	
Solar Energy Factor (SEF _D)	SRCC Cert. No.	Model No.	
0.7	30004234	VTS30-HP-G	
1.2	30004235	VTS15-HP-G	
0.9	30004236	VTS15-HP-E	
1.4	30004237	VTS30-HP-E	
The installed system is ma	arked above		