1st SUNFLOWER RENEWABLE ENERGY

Version 11.03

For our present, For their future.

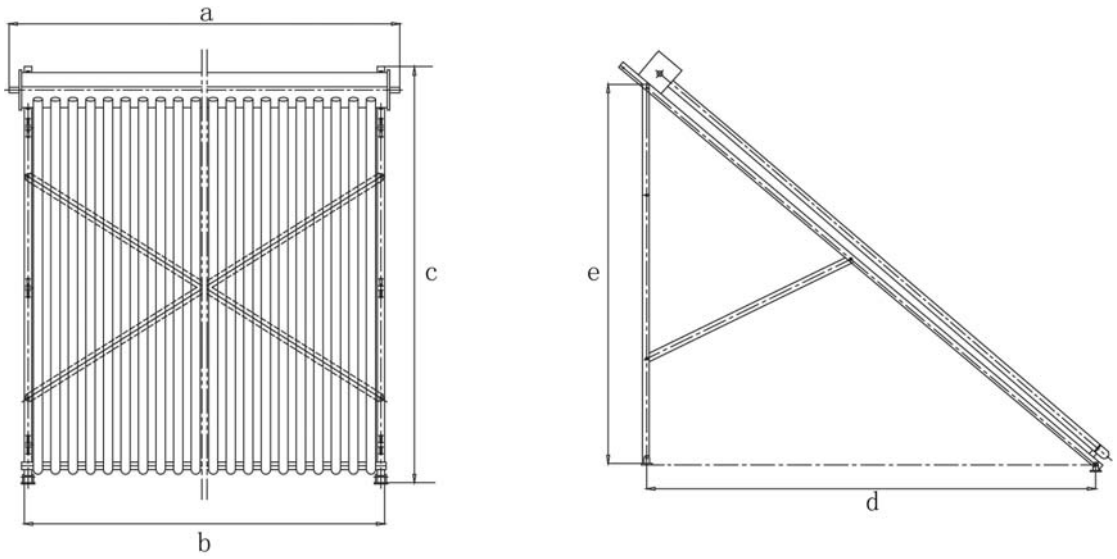
SFB-AL (SF-B) series Installation Manual

All-glass Evacuated Tubular Solar Collector with Heat Pipe

Contents

Please read the whole manuals carefully before assembly!

1. Solar collector size and weight



Item No.	Specification			Weight	size(mm)				
	Qty. of solar tubes	Diameter of solar tube	Length of solar tube		a	b	c	d	e
SFB104715-AL	10pcs	Ø 47mm	1.5M	25 kg	825	655	1650	1263	973
SFB204715-AL	20pcs	Ø 47mm	1.5M	49 kg	1475	1305	1650	1263	973
SFB304715-AL	30pcs	Ø 47mm	1.5M	68 kg	2125	1955	1650	1263	973
SFB105818-AL	10pcs	Ø 58mm	1.8M	36 kg	915	745	1960	1501	1172
SFB155818-AL	15pcs	Ø 58mm	1.8M	55 kg	1290	1120	1960	1501	1172
SFB205818-AL	20pcs	Ø 58mm	1.8M	72 kg	1665	1495	1960	1501	1172
SFB305818-AL	30pcs	Ø 58mm	1.8M	108 kg	2415	2245	1960	1501	1172

2. How to transport and carry it

Please carry the tank horizontally. It's forbidden to carry it vertically.
Please carry the glass tubes carefully and horizontally. It's forbidden to carry them vertically.

3. Installation

3.1 Unpacking and inspection

No.	Name	Total quantity							
		SFB*4715-AL				SFB*5818-AL			
		10	15	20	30	10	15	20	30
1	Manifold box	1	1	1	1	1	1	1	1
2	Thermal silicon grease	1	1	1	1	1	1	1	1
3	Decoration cover	10+1	15+1	20+1	30+1	10+1	15+1	20+1	30+1
4	Vertical bar	2	2	2	3	2	2	2	3
5	Aluminum horizontal bar	1	1	1	1	1	1	1	1
6	Black nylon screw cup	10+1	15+1	20+1	30+1	10+1	15+1	20+1	30+1
7	Screw	1 PKG	1 PKG	1 PKG	1 PKG	1 PKG	1 PKG	1 PKG	1 PKG
8	Heat Pipe	10	15	20	30	10	15	20	30

Note: In above form, the number after "+" means the quantity of extra free compensation parts.

Standing frame (optional accessory)

No.	Name	Total quantity							
		SFB*4715-AL				SFB*5818-AL			
		10	15	20	30	10	15	20	30
1	Rear foot	2	2	2	3	2	2	2	2
2	Diagonal bracing	2	2	2	3	2	2	2	2
3	Cross bar	2	2	2	4	2	2	2	4
4	Foot pad	4	4	4	6	4	4	4	6
5	Screws	1 PKG	1 PKG	1 PKG	1 PKG	1 PKG	1 PKG	1 PKG	1 PKG

3.2 Assemble the Frames and Manifold Box

3.2.1 Side Rails

Place the 2 side rails on a flat surface such as floor, as shown below:

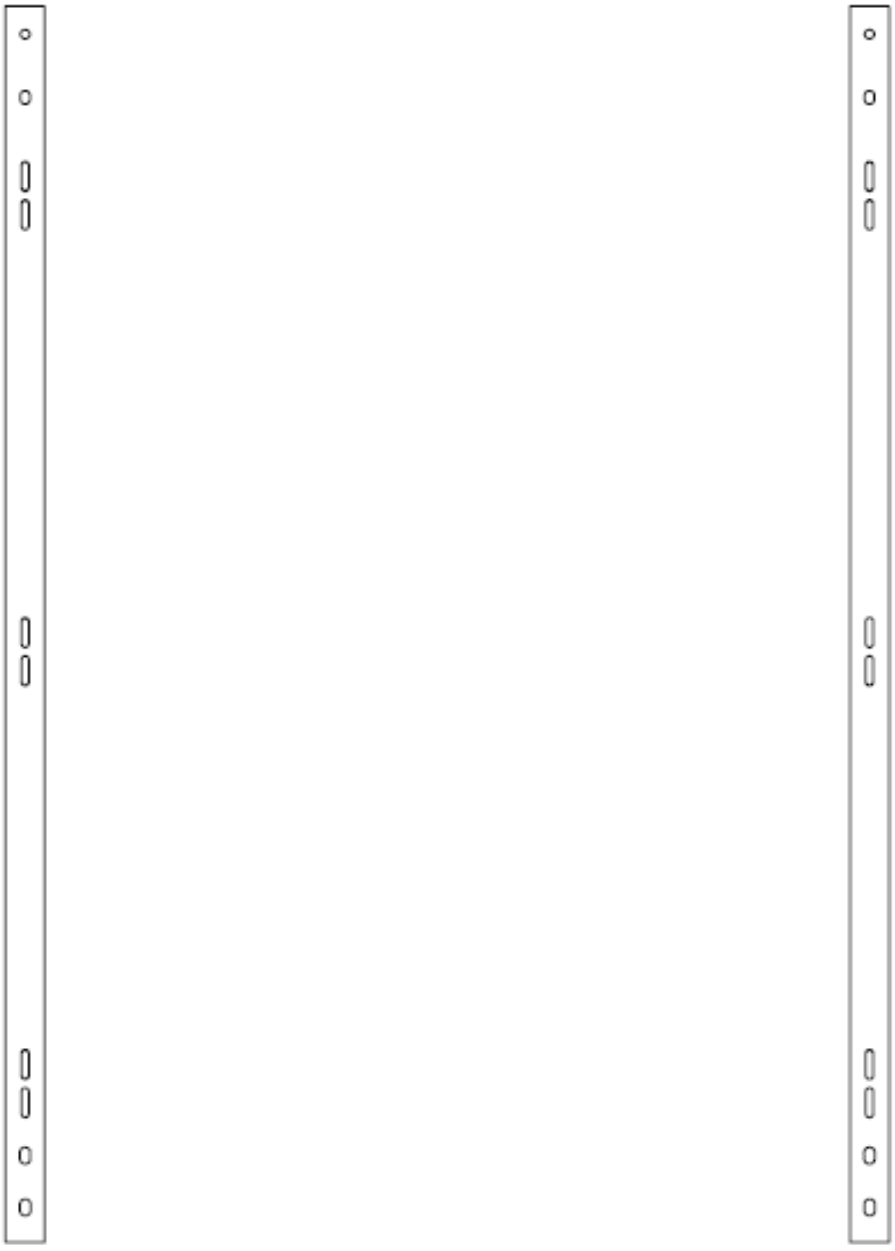


Fig 3.1

Please pay attention to distinguish the end and top of the vertical bar. The end-connect to bottom rail has an angle as shown in the following picture:

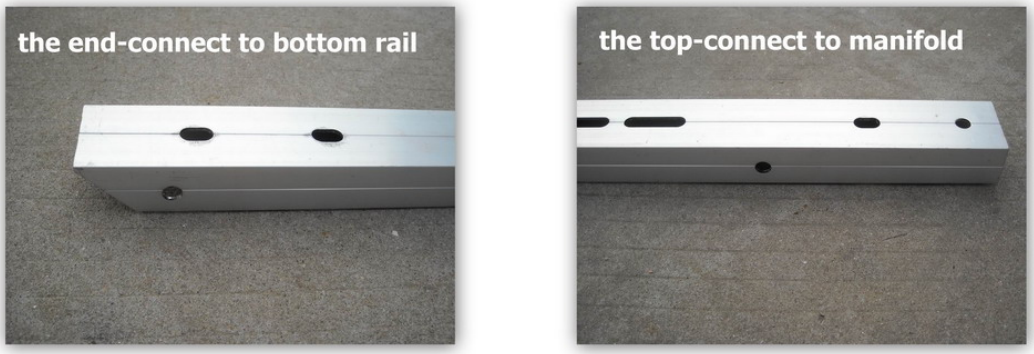


Fig 3.2

3.2.2 Assemble the Manifold

a) Put the manifold on the two vertical bars, and find the holes for screws.

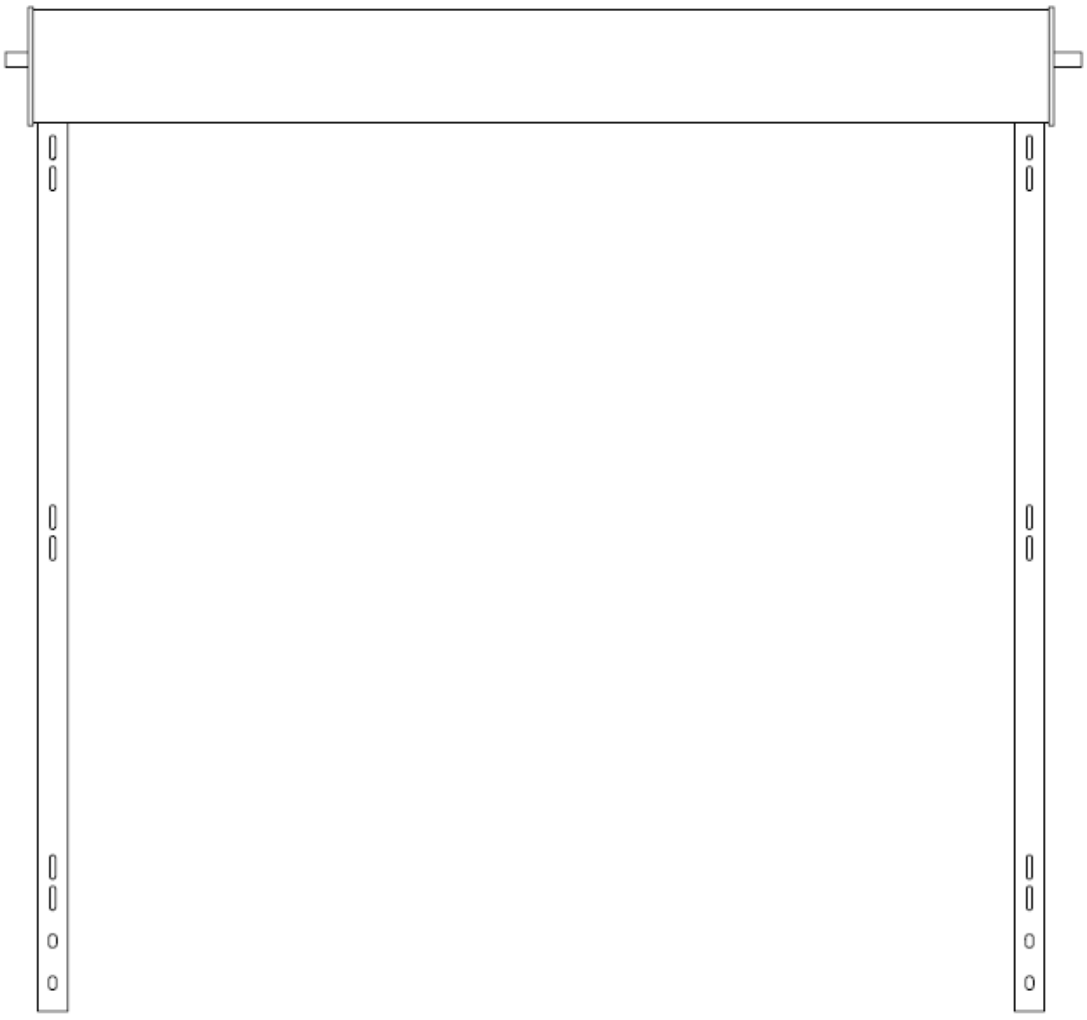


Fig 3.3

b) Assemble the manifold to the holes on the vertical bars using the screws provided. See the following pictures.

Fig 3.4

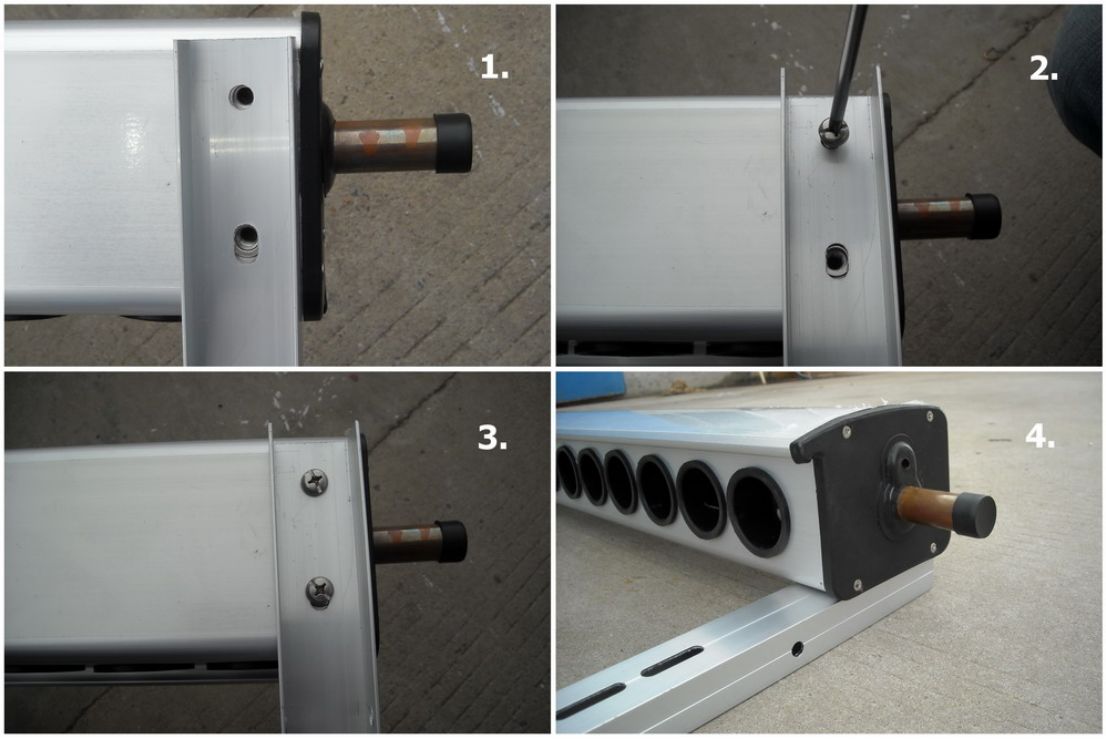


Fig 3.5

3.3 Assemble the horizontal bar

a) You will find three holes at each end of the horizontal bar. Put the screw and nuts through the middle hole and place a black cover on the screw. It prevents the tube's cups from sliding off the horizontal bar.

Fig 3.6

b) Assemble the horizontal bar on the vertical bar using the screws provided, as shown in Fig 3.7

Fig 3.7

3.4 Assemble the solar collector on your sloping roof

3.4.1 Sloping roof

If your roof is sloping, mounting straps will be a useful accessory. You can buy them from us or you could also make them by yourself in a similar shape or function. Please make sure they are strong enough. Our mounting straps are made of SUS304 stainless steel with a 1mm thickness.

Fig 3.8

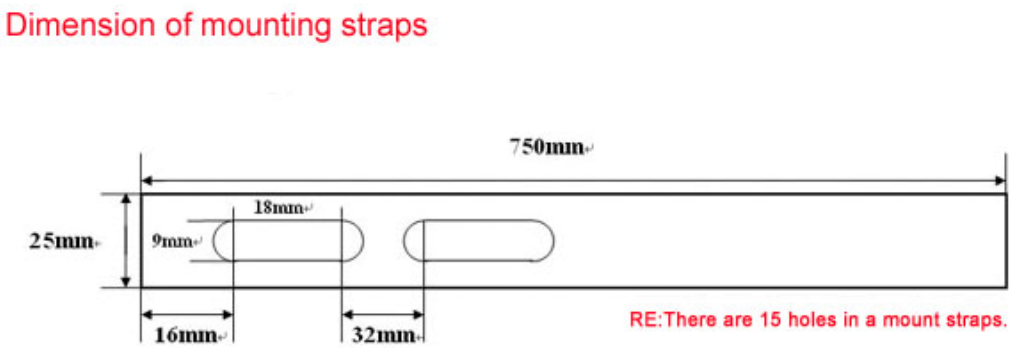


Fig 3.9

Installation steps:

a) Select a suitable location on the roof for the collector. In the northern hemisphere, the collector should face due south, at an angle to the ground equal to the latitude. For example, latitude of 49 degrees would use a collector angle of about 49 degrees, plus 10 degrees to give best heating in winter.

b) Put the solar collector on the roof to choose some points to anchor the screws. These screws are used to fix the mounting straps on the roof. Remove roof tiles at the corners of an area large enough to fit the collector.

c) Bend the mounting straps according to the height of the tiles and the location of the long-round hole on the vertical straps. Bend the mounting straps through the gap of two tiles, and secure it to the roof supports using the screws. Secure all remaining all mounting straps in this way. After that, put solar collector on the roof and adjust the location so that you can fix vertical bar to the bent mounting straps using screws. Bolt the solar collector vertical bar frame to the mounting straps. (See Fig 3.10~3.13).

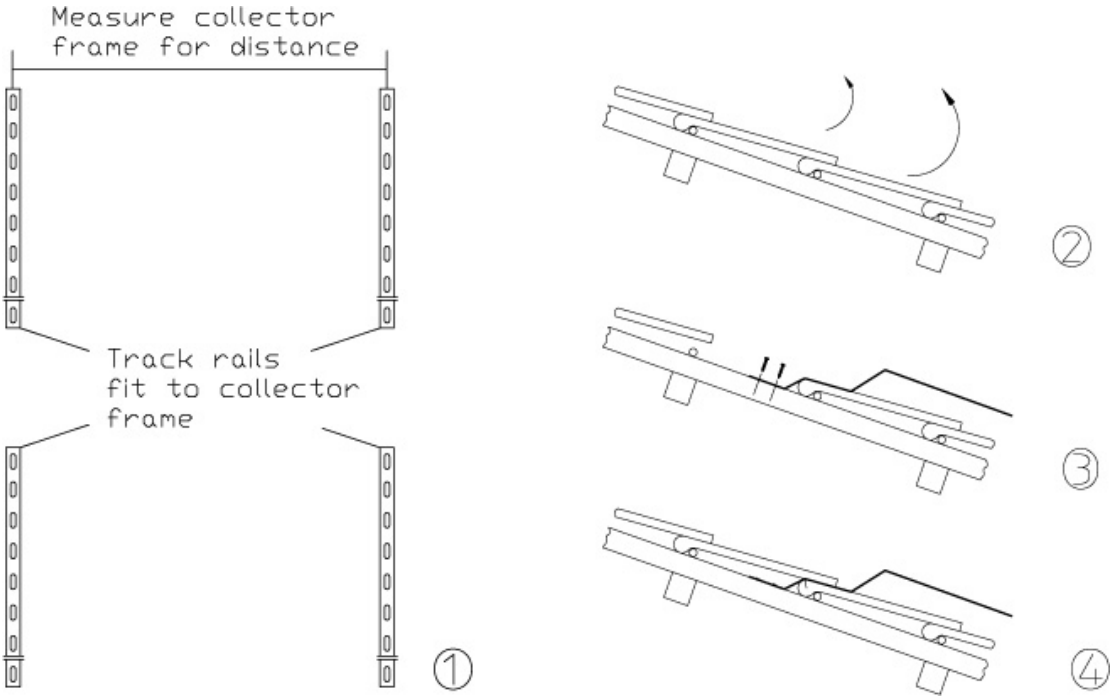


Fig 3.10

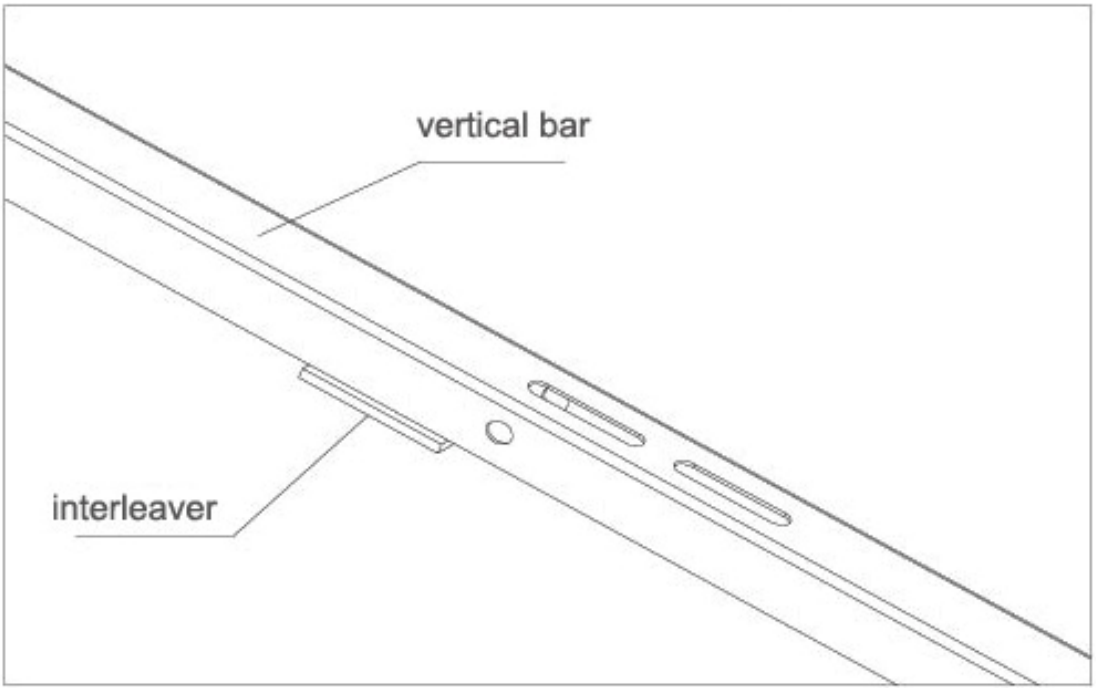


Fig 3.11

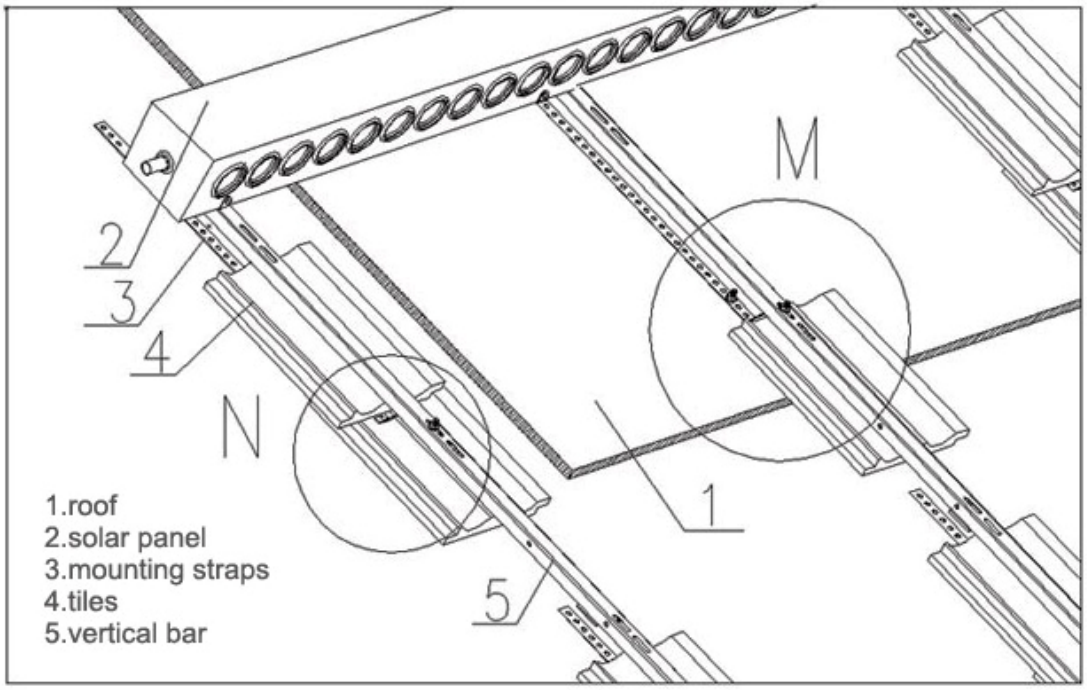


Fig 3.12

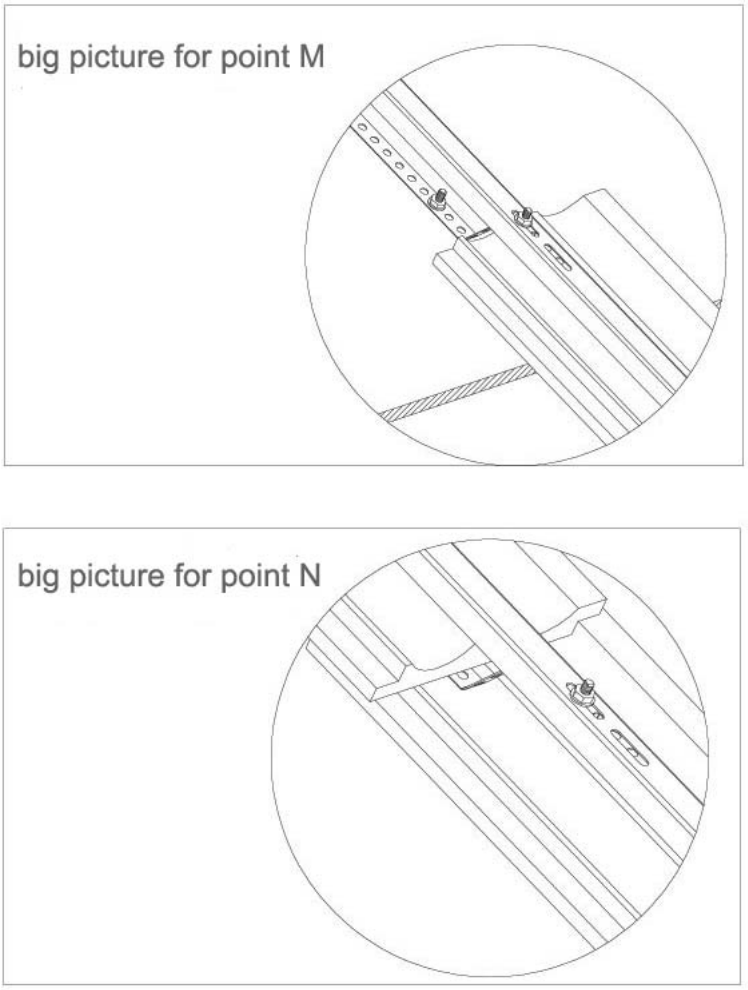


Fig 3.13

3.4.2 Flat roof

If your roof is flat, you will need a standing frame. After installing the cross bar and connecting the standing bar to the vertical bar, the collector with a standing frame is finished. (See Fig. 3.14, Steps 1-8)

Fig 3.14

3.5 Install the tubes (Please wear gloves before installing the tubes)

a) Unscrew the black cups from the bottom rings and clip the rings on the bottom rail, spacing them out evenly

Fig 3.15

b) Place the silver end of the evacuated tube through the bottom ring, then slide the copper pipe (covered in the thermal paste) into the slot in the manifold. These can sometimes be a little stiff. Repeat until all your solar tubes are in place.

Fig 3.16

c) Screw the black cup you removed back into the bottom rings, covering the silver ends of the solar tubes, secure tightly. This will hold all the tubes in place. See Fig. 3.17 below for greater detail.

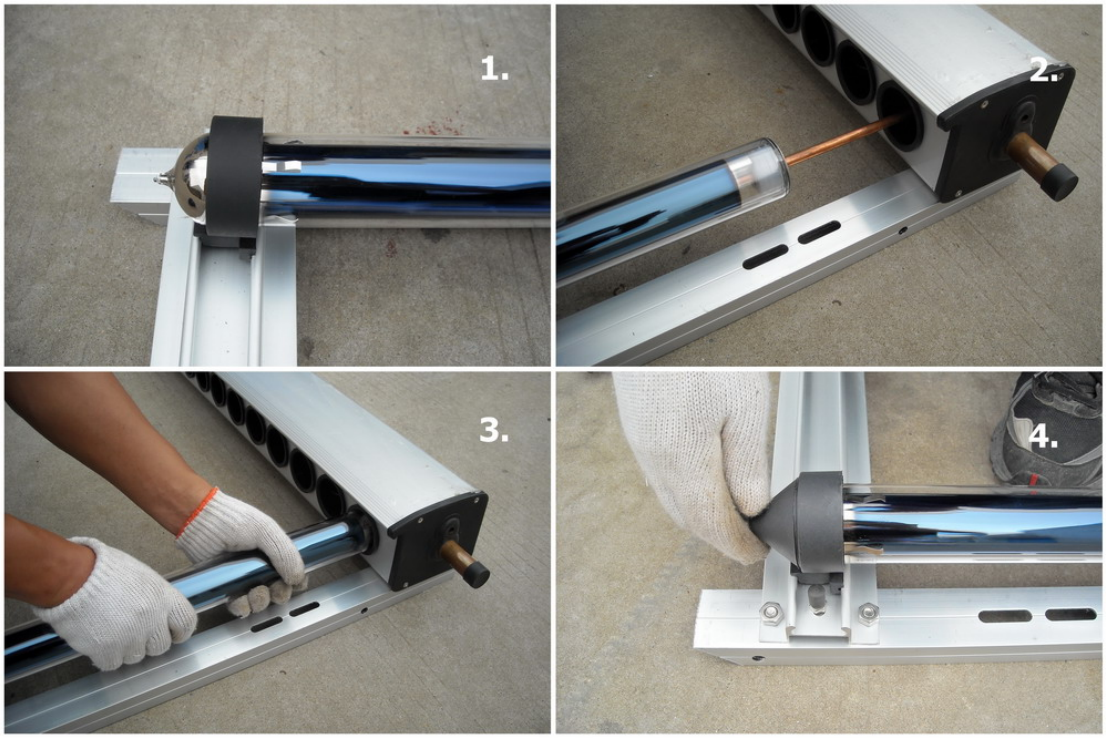


Fig 3.17

d) Repeat the above process to insert all the tubs. Check all screws and nuts. Make sure all of them are secured well. Adjust the distance between the tubes so that they are all parallel and perpendicular to the manifold. After you have finished, the collector will look like this:

Fig 3.18

Warning: DO NOT ASSEMBLE IN STRONG SUNLIGHT!

If you assemble solar collectors under strong sunshine, or the ambient temperature is high, it's forbidden to touch the two copper pipes' ends by hand directly. Once tubes are exposed to sunlight, they immediately begin to work. The heat will be transferred to the top of the heat pipes in seconds. Therefore, the two ends of the copper pipes will become very hot after you finish the assembly. Touching either pipe directly will scald your skin! You also can cover the tubes with a blanket to avoid this hazard.

Fig 3.19

Suggestions:

1. The assembly process is best finished in the shade.
2. If the process has to be finished under sunshine, you can cover the inserted tubes by a black cloth, etc.

4. Lightning protection

The solar water heater should have lightning protection to avoid lightening damage. A lightning rod is necessary which should be 1.5m higher and 3 m farther away from the solar water heater. For any problems that involve plumbing or electrical connections the services of a qualified professional must be employed.

5. How to connect a couple of collectors?

We suggest you use the corrugated connection pipe to connect two or more solar collectors. It is very convenient and allows for easy alignment between two solar collectors. Please see the following picture.

Fig 5.1

6. Connection of the collector field to the heat transfer circuit

There are many kinds of heat transfer circulation requirements in actual installations.The following drawing shows some basic possibilities.

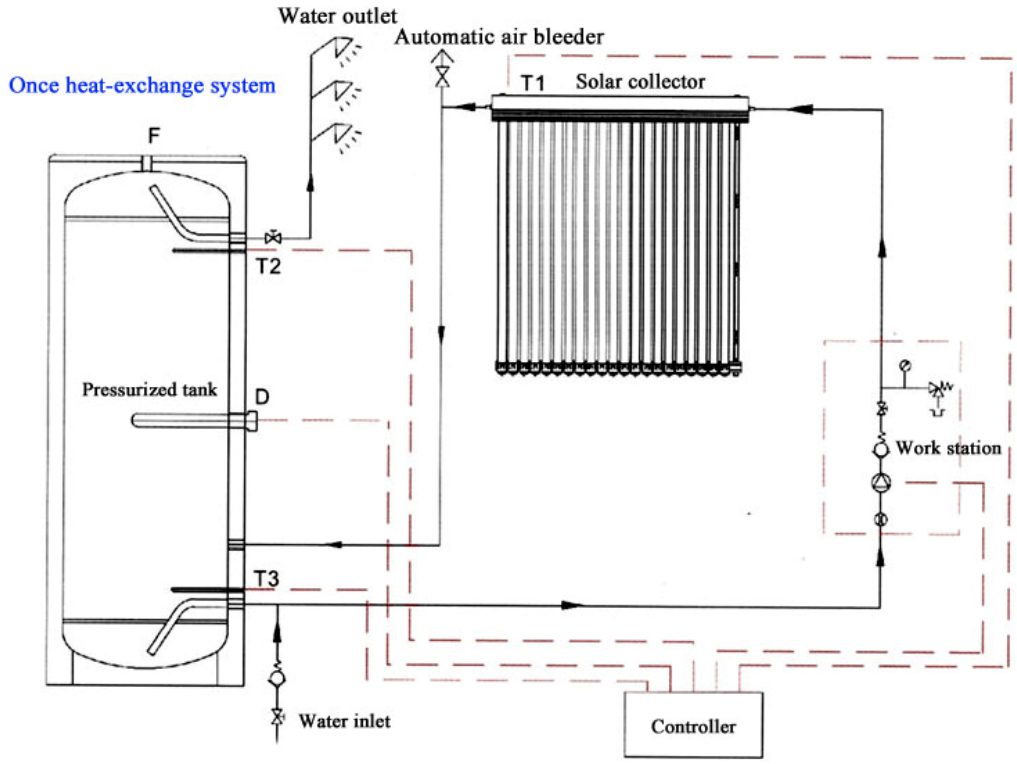


Fig 6.1

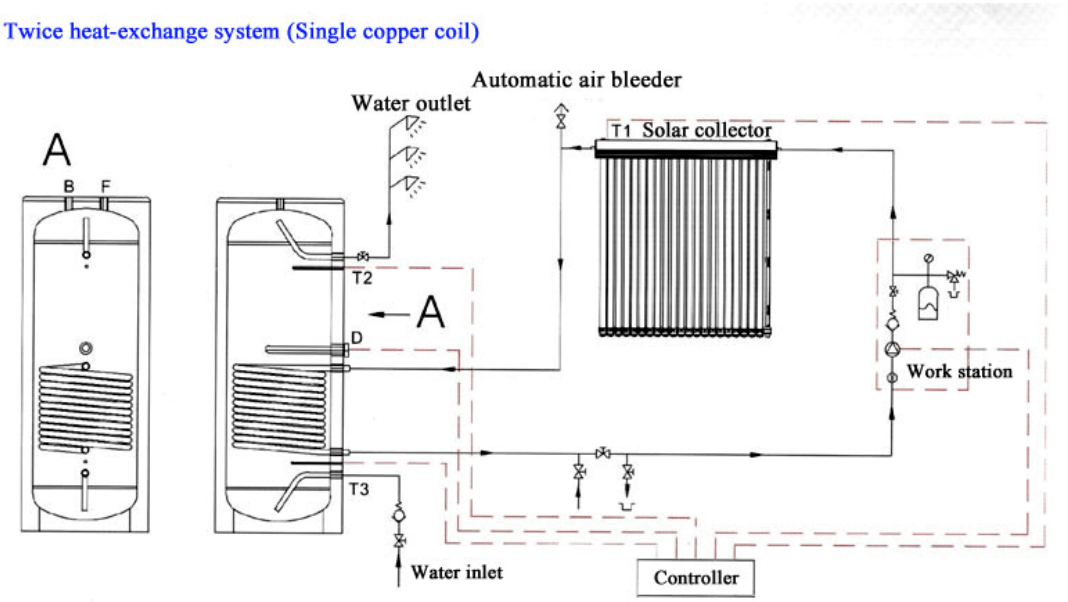


Fig 6.2

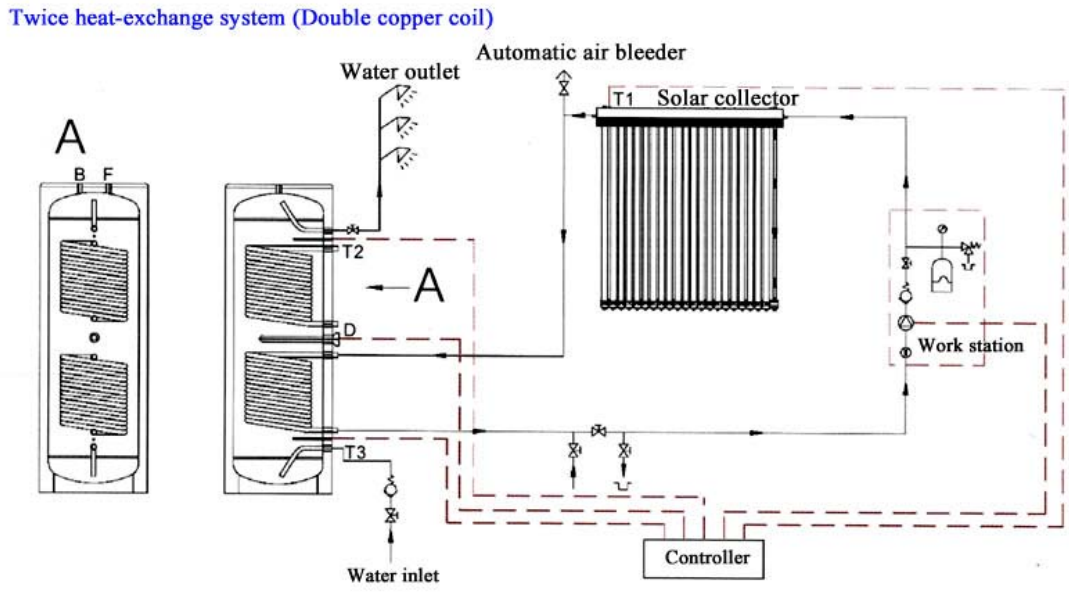


Fig 6.3

7. Dimensions of pipe connections

- For solar collector arrays up to 20m^2, the following dimensions are recommended for the flow and return pipe work:
  Main pipe lines:2 inch or $1^1/_2$ inch

Branch pipe lines: 1 inch or 3/4 inch

- For a solar installation with pipe work of total length 30 to 50 meters, the following dimensions are recommended for the flow and return pipe work:
  Less than 36 tubes 12 mm or ½ inch-possible, but recommend ¾ inch.
  Up to 90 tubes 22 mm or ¾ inch
  Up to 120 tubes 128 mm or 1 inch
  More than 120 tubes – use parallel branches of 1 inch each.
  Pipe work should be insulated with ¾ inch minimum high temperature pipe insulation, more insulation in more extreme cold environments.

8. Heat Transfer Media

Any kind of liquid may be heated by the heat exchanger. In areas where chloride ion concentration is greater than 40 ppm a heat exchanger must be used in the hot water storage tank. The solar system should be filled with distilled or de-chlorinated water, or another clean fluid such as glycol.

9. Precautions

Note: In order to avoid jamming the digital flow meter and in result to display no flow on solar station, the filter(A) must be installed on the return and flow pipeline of the solar station.

All devices connected to the controller must conform to the technical specification of the controller. Assembly, installation and maintenance work may only be performed by properly qualified and authorized personnel with a generally recognized qualification.

The solar station must be installed indoors. Prior to installation, remove the sealing caps from the solar station.

The maximum distance between the solar station and the water tank is 300 mm (about 12 inches).

Pre-setting, installing and adjusting the expansion tank as per the installation and operation instruction for “expansion tank ", the corrugated connection pipe for the expansion tank does not need thermal insulation.

Safety valve: There is a risk of scalding from hot steam with discharge from the safety valve due to heating and excess pressure in the hydraulic pipes. Drain off the discharge from the safety valve using a copper pipe correctly and in an eco-friendly way, according to valid technical regulations and building codes and local regulations, do not allow solar fluid to leak into the environment.

Be careful of scalding from hot fluid. Maximum temperature of collectors during filling/leak check or installation/maintenance work should be below 70°C. Allow collectors to cool down if necessary.

10. Max. working pressure

Regardless of the installation configuration, pressure release values, expansion vessels and/or other

pressure control devices must be installed. T he solar loop should be designed to operate at no more than 800kPa (PRV may be 850kPa). (800kPa =8bar=116psi) For installation where main pressure water is used, the system should ideally be designed to operate at a pressure of <500kPa, achieved by use of a pressure limiting/reduction value.

11. Pressure Drop

△p=0.2Kpa

12. Installation Angle

It is common for solar water heaters to be installed at an angle that is similar to the latitude of your location. Installing it with a tilt angle (as measured from horizontal) less than 20° is not recommended as the heat pipes perform best in the range of 20-70 degrees. While adhering to this guideline, an angle of your latitude +/-10° is acceptable, and will not greatly reduce the solar heater output.

Angles out of this range can also be used, but a decrease of heat output will result. When the angle is lower than the latitude, it will increase summer output, while a higher angle will enhance winter output.

13. Wind and snow accumulation

When installing the solar water heater, please consider the issue of wind resistance and the resultant stress on the attachment points. The standard frame is designed to withstand wind speeds of up to 100km/h (62 mph) and 30cm (about 11.8 inches) of snow accumulation without damage. For areas with the possibility for high winds, additional reinforcement of attachment points (e.g. into roof rafters, or ground anchors) may be required and can easily be supplied by your local installers.

14. Maintenance Requirements

14.1 Cleaning

Regularly raining could keep the heat pipe vacuum tubes clean, but if it is particularly dirty then it may need to be cleaned with a soft cloth and warm, soapy water or other glass cleaning solutions. If the tubes are not easily and safely accessible, a water spray from a garden hose may also be used.

14.2 Leaves

During autumn, leaves may accumulate between or under the tubes. Please remove these leaves regularly to ensure optimal performance and to prevent any fire hazard. (The solar water heater will not cause the ignition of

flammable materials).

14.3 Broken Tube

If one heat pipe vacuum tube is broken, please don't worry, the system will still work. You just need to replace the broken tube. It is very easy. Follow the instructions in step **3.5.**