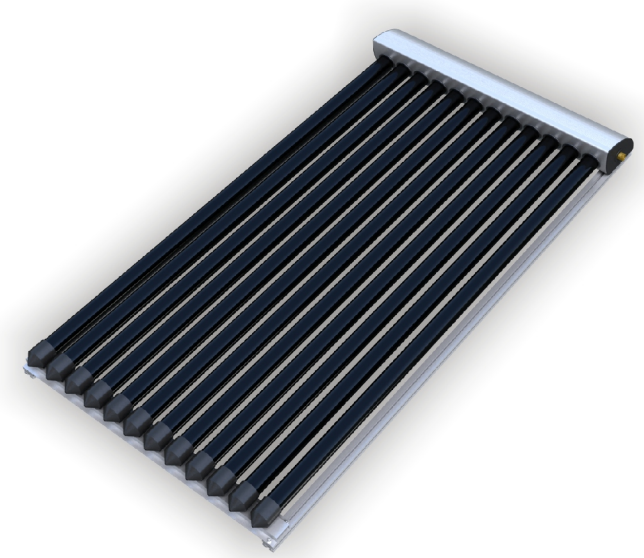
Himin

HEAT PIPE COLLECTOR
USER MANUAL



Read this manual carefully to get the best performance from this system.

Thank you for buying this product and trusting Himin Solar!
This manual has been prepared to acquaint you with the characteristics, installation, operation and maintenance of your solar water heater and should be kept for future reference.

Local Standards

Installation must be completed in accordance with the requirements of AS/NZS 3500.4 ("National Plumbing and Drainage Code Hot Water Supply Systems Acceptable Solutions"), as well as any relevant local standards and regulations.

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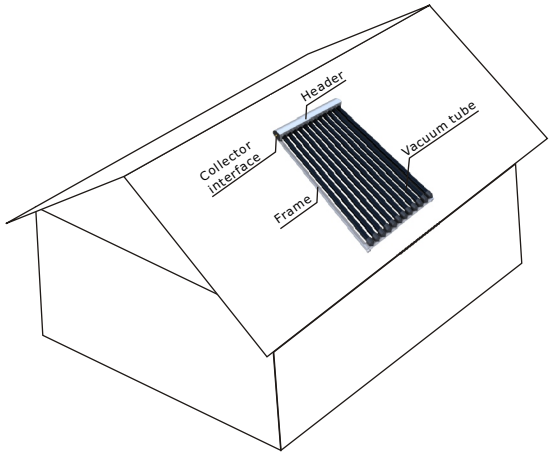
Product introduction

The Himin heat pipe collector includes a header, vacuum tubes, heat pipes, mounting frames and a tube bottom rack. It is typically used to collect heat for space heating or domestic hot water. The roof-mounted collectors can be installed solely or connected together.



Features

★ High purity (99.97%) copper heat pipes feature excellent corrosion resistance and can stand high temperature up to 250℃. The degradation of heat transfer property is less than 5% within 5000 hours.

★ Lots of Pressurized Hot Water

The water in the tank is at full supply pressure, and an internal or external gas or electric booster provides hot water at all times.

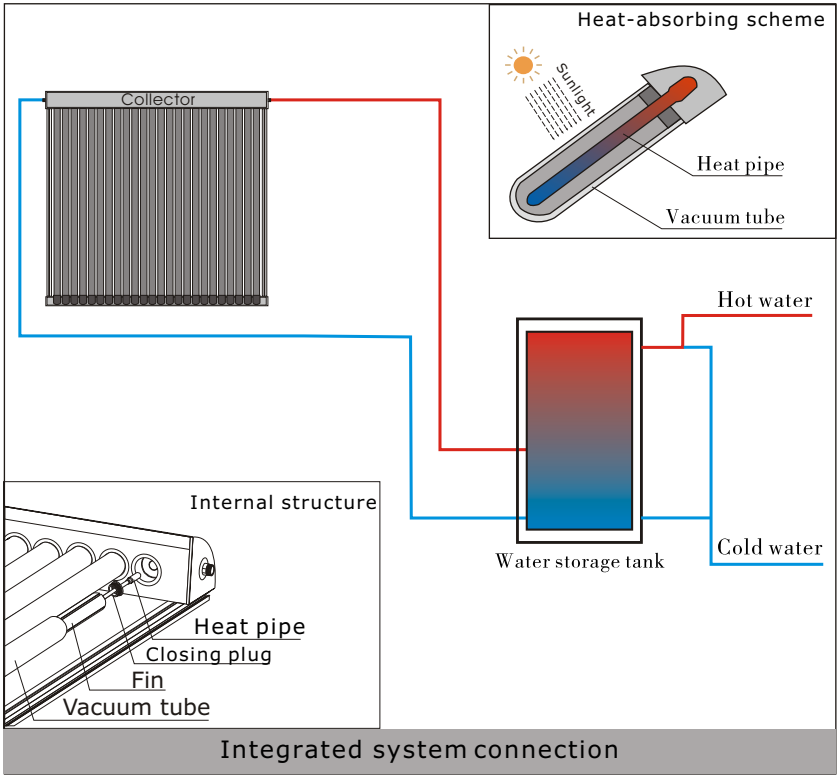
★ Stable and reliable system

There is no water in the evacuated tubes, so there is no fouling, no breaking due to freezing, and the collector can safely work at very low temperatures.

★ Melds beautifully with buildings

The optimal design of the collector makes it visually less obtrusive and compatible with existing architectural designs.

Structure and working principle



Working principle

Sunlight is captured by the coated vacuum tubes which absorb the radiation as heat and conduct it through aluminum fins to the heat pipes. The liquid inside the heat pipes vaporizes as it is heated and the vapor rapidly rises to the condenser (top), releasing the latent heat, and condenses to form a liquid and returns to the pipe bottom where it evaporates once more and repeats the cycle. A manifold on the top of the solar collector allows a working fluid (typically anti-freeze) to absorb the heat from the top of each heat pipe. The working fluid is pumped through the manifold and then through an external heat exchanger which transfers the heat to water in a pressurized storage tank.

Technical data

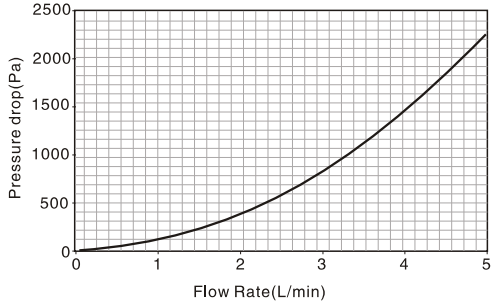
Collector parameters

Spacing between vacuum tubes	72mm
Vacuum tube dimension	Φ58 × 1800mm
Heat pipe dimension	1800 × Φ14/Φ8mm
Heat pipe working temperature	-30℃ ~ 200℃
Insulation material	PU
Heat loss	<3（W/m²k）
Test pressure	0.9 MPa
Maximum working pressure	0.6 MPa
Instantaneous efficiency	>0.7
Maximum angle	90°
Minimum angle	30°

Collector specifications

Specifications	Drawing model	Aperture area (m^2)	Dimension (mm)	Vacuum tube number	Weight（empty）(kg)
Z-RG/0.6-WF-1.2/12-58/41	HRJ-12/1.8	1.2	1977×1030×151	12	48
Z-RG/0.6-WF-1.6/16-58/41	HRJ-16/1.8	1.6	1977×1318×151	16	62
Z-RG/0.6-WF-2.0/20-58/41	HRJ-20/1.8	2.0	1977×1606×151	20	76
Z-RG/0.6-WF-2.4/24-58/41	HRJ-24/1.8	2.4	1977×1894×151	24	90
Z-RG/0.6-WF-2.8/28-58/41	HRJ-28/1.8	2.8	1977×2182×151	28	104
Z-RG/0.6-WF-3.2/32-58/41	HRJ-32/1.8	3.2	1977×2470×151	32	118
Z-RG/0.6-WF-3.6/36-58/41	HRJ-36/1.8	3.6	1977×2758×151	36	132

HRJ-36/1.8 Collector Pressure Drop



General information

1. The collector should be installed by professionals. Before installing and operating the collector, please read carefully the installation instructions provided and illustrated in this manual.

2. Please observe that the mounting is adapted to the characteristics of the building and conform to the local regulations and best practices.

3. The highest efficiency with the collector is obtained if it faces toward the sun and slopes at an angle to the horizon equal to the latitude plus about 10 degrees.

4. Check the roof conditions including its waterproof structure and load-bearing capacity.

5. The position you select for the installation of the collector should not be shaded by any obstacles (trees, buildings…) all year round.

6. Snow load

a) In areas prone to heavy snow falls, the solar collectors should ideally be installed at an angle of>50° to help promote snow sliding off the tubes.

b) Each tube is strong enough to withstand >40kg loading,but roof attachment points may need to be reinforced.Please refer to local regulations regarding snow loading precautions.

7.Wind loading

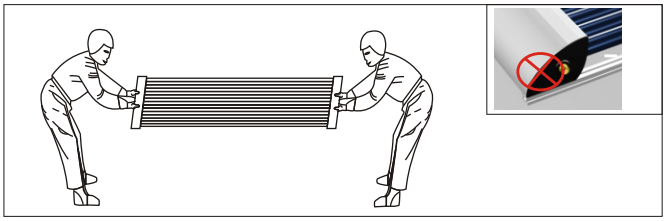
a) when installing the collector, please consider the issue of wind resistance, and the resultant stress on attachment point. Please adhere to relevant building codes/regulations regarding installation of such objects.

b) The standard frame, and frames kits all designed to withstand wind speeds of up to 120km/h without damage. For areas with wind speeds that may exceed this level an additional front track and rear legs should be installed.

c) It is the responsibility of the installation officer to ensure that the frame mounting is of suitable strength. Where applicable inspection by builder department officer or equivalent should be completed to ensure the installation is in accordance with relevant regulations.

8. Do not touch the vacuum tubes when the collector is exposed to strong sunlight.

9. When carrying the collector, do not lift using the collector inlet, outlet and fins to avoid their possible deformation.



10. Before installing the collector, a lightning rod or a lightening conductor should be mounted on top of the building and electrically connected to the ground through a wire.

Warning: Collectors assembly ends, in not to install the system in use or not running but system before please ensure that collectors do not exposed to the sun, suggest using pall will cover prevent collector empty sun collectors.

11.Freeze protection

The solar collector is not suitable for frost-prone areas unless protected by a frost protection system or device.

1) For areas with temperatures below 5℃, a closed loop filled with a glycol-water mix should be used to provide freeze protection. Please refer to glycol manufacturer's specifications about the temperature ranges the liquid can withstand. Only food grade polypropylene-glycol should be used.

2) Evacuated tubes are not susceptible to damage in cold weather, and heat pipes are protected against damage that could result from the freezing of the water inside.

3) Himin does not warrant the solar collector against freeze related damage.

12.Roof Structural Integrity

1) Collector weight is minimal and will not cause excessive weight stress on the roof structure. No reinforcement of the roof structure is needing for flush mounted collectors.

2) If installing at a raised angle in a high wind region, high winds will cause vertical and horizontal loads on the frame. Please ensure that the frame structure is able to withstand such pull forces.Contact your local building department if in doubt.

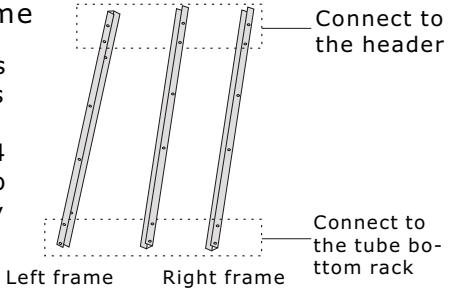
Solar collector installation

Collector assembly

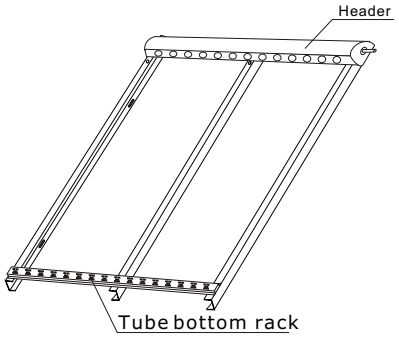
1. Assemble the frame

Assemble the galvanized frame

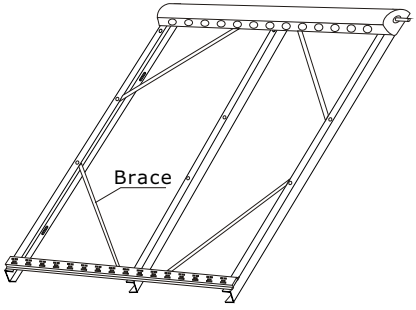
① Lay the left and right frames opposite on the ground as shown in the right figure.
Note: The collectors with 24 vacuum tubes or more have two right frames, while others only have one right frame.



② Bolt the frames to the header and the tube bottom rack. (Each set of fittings includes one bolt, one nut, one washer and one spring washer.)



③ Bolt two braces to the frames and the header and another two braces to the frames and the tube bottom rack. Tighten all the fittings.

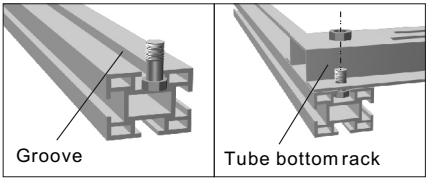


Assemble the aluminum alloy frame

① Lay the frames down on the ground and bolt the frames to the header.

Note：The collectors with 24 vacuum tubes or more have three frames, while others have two frames.

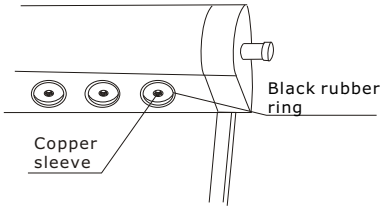
② Bolt the other end of the frame to the tube bottom rack. Put the bolt into the chute of the frame and then connect it to the tube bottom rack.



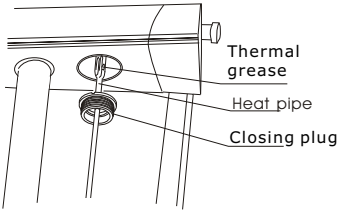
Ⅱ. Assemble the heat pipes and vacuum tubes

Leave the heat pipe and vacuum tube before the completion of pipe, pump and controller. The heat pipe and vacuum tube can be assembled well if there is anti-stagnation guards or the cover of vacuum tubes.

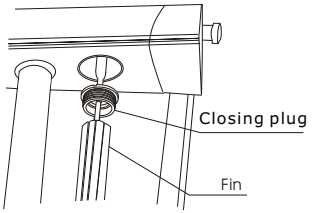
①Place the black rubber rings into the holes in the header with even parts on the upper side and uneven parts on the lower side;



② The heat pipe should be inserted into a closing plug which is about 2cm away from the condensing section (the upper part of the pipe). Then apply the thermal silicon grease to the upper part and insert the heat pipe into the copper sleeve in the inner tank;

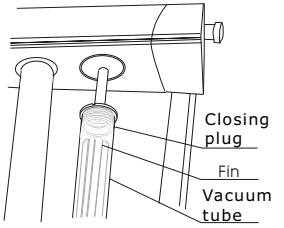


③Assemble the fins around the thin part of the pipes;



④Moisturize the vacuum tube opening or the black rubber ring with water; then one person clenches the fins together and the other person inserts a vacuum tube from the lower part of fins, keeping the vacuum tube and heat pipe concentric. Move the vacuum tube forward and insert the closing plug to the vacuum tube until the uncoated part of the vacuum tube is fully inserted into the black rubber ring;

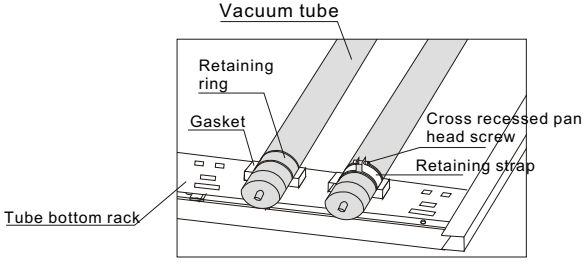
You may lubricate the tube with graphite or other lubricants.

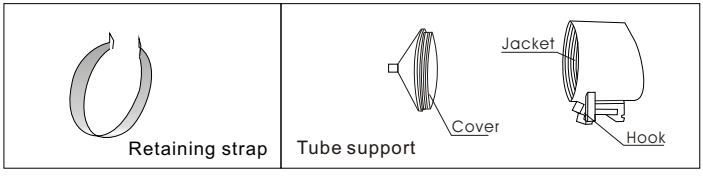


⑤Assemble the tube bottom rack.

For the collector with galvanized frames

① Wear a retaining ring around the bottom of each vacuum tube;
② Lay a gasket on the tube bottom rack;
③ Insert the retaining strap into the holes of the gasket and tube bottom rack on one side and wind it around the end of the vacuum tubes. Make sure the two holes in the strap are over the vacuum tubes and parallel with the bottom rack;
④ Push the jacket to the end of the vacuum tube and fix it to the tube bottom rack, and then install the cover;
⑤ Screw up the retaining strap with a cross recessed pan head screw. Make sure the gap between the two holes is less than 15mm.





For the collector with aluminum alloy frames

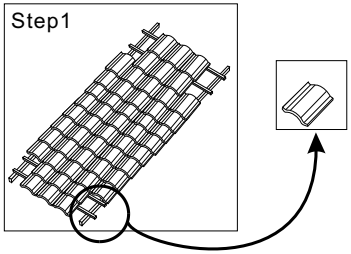
Push the jacket to the end of the vacuum tube and fix it to the tube bottom rack, and then install the cover.
It is not necessary to fix the vacuum tubes with retaining straps.

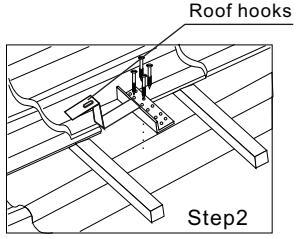
Collector mounting

I Install the collector on the pitched roof

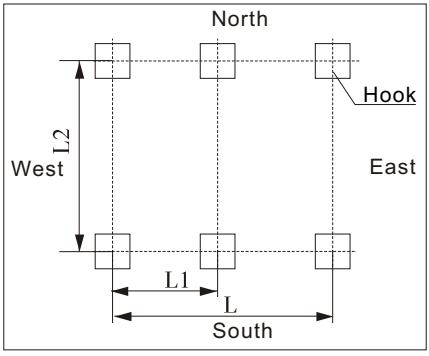
Fix the frame to the roof and then assemble the heat pipes and vacuum tubes according to the instructions below:

① Mark the roof according to the size of the collector and remove the tiles to expose the boards.





Dimensions of the collector



Unit: mm

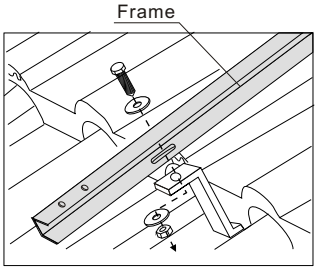
Model	East-West		South-North
	L	L1	L2
HRJ-12/1.8	836	None	1561
HRJ-16/1.8	1124		
HRJ-20/1.8	1412		
HRJ-24/1.8	1700	850	
HRJ-28/1.8	1988	994	
HRJ-32/1.8	2276	1138	
HRJ-36/1.8	2564	1282	

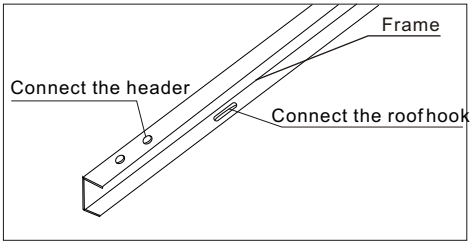
②Fix the roof hook to the boards with wood screws.

③ Screw the collector frames and the roof hooks together.

Note: When mounting the collectors with 24 tubes or more, it is not necessary to fix the middle frame to the roof hooks.

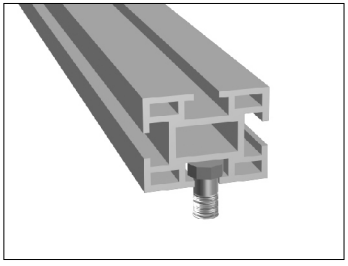
Galvanized frames

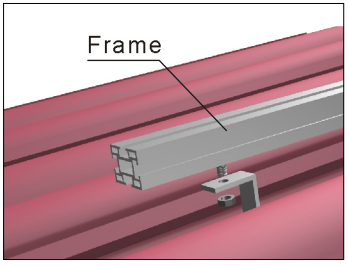




Aluminum alloy frames

Insert the bolt into the frame groove and connect it with the roof hook.

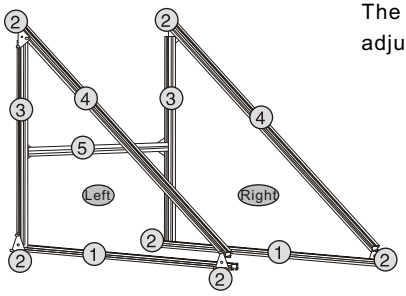




④ Assemble the manifold header, tube bottom rack, heat pipes and vacuum tubes.

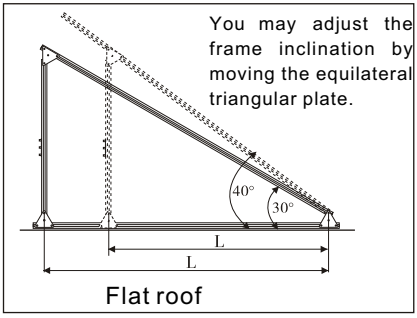
Ⅱ Install the collector on the flat roof

1.Aluminum alloy support



The support is silver gray and its angle is adjustable.

① Bottom frame
② Equilateral triangular plate
③ Back frame
④ Front frame
⑤ Horizontal bracket

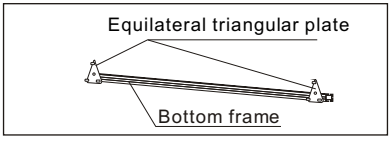


Support dimensions (mm) :

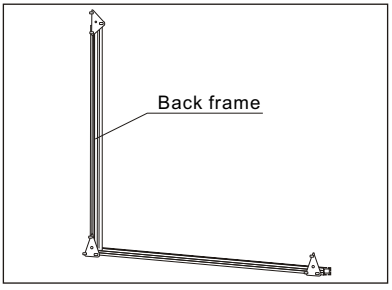
Angle \ Length	L
30°	1733
35°	1447
40°	1225
45°	1046
50°	897

Note : Assemble the supports from left to right.

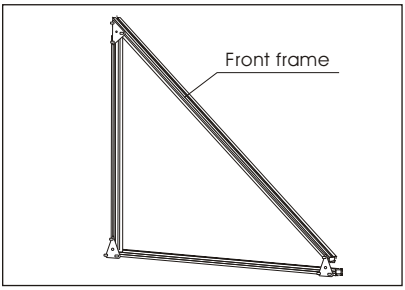
① Connect the triangular plate with the bottom frame with bolts (M8×16).



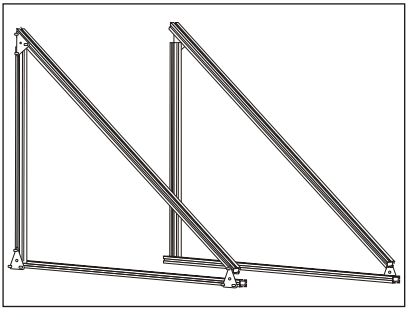
② Connect the triangular plate with the back frame with bolts (M8×16).



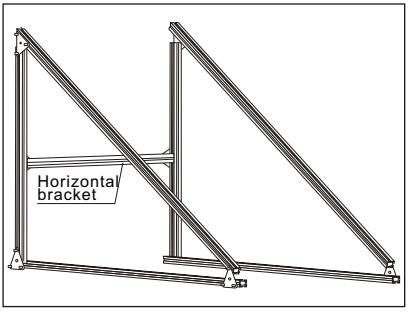
③ Connect the front frame with the back frame and bottom frame with bolts (M8×20).



④ Assemble the bottom frame, back frame, front frame and the triangle frame in the same way.



⑤ Connect the horizontal bracket with the back frames with the triangular plates and bolts (M8×20).



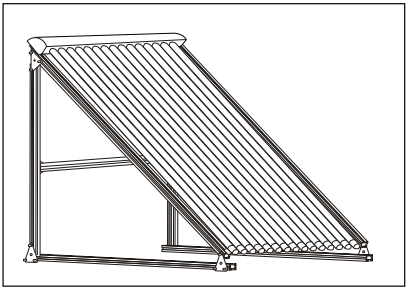
⑥Fix the collector

For the collector with galvanized frames:

Connect the collector frames and the front frames with bolts (M8×20).

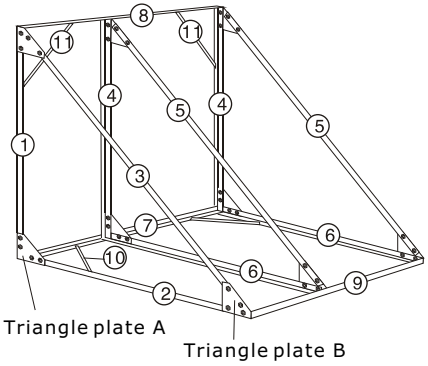
For the collector with aluminum alloy frames:

Fix the header and tube bottom rack to the frames and then assemble the vacuum tubes and heat pipes.



2.Galvanized sheet support

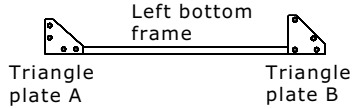
The support is dark gray and its angle is nonadjustable.



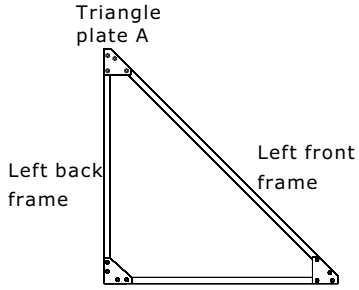
① Left back frame
② Left bottom frame
③ Left front frame
④ Right back frame
⑤ Right front frame
⑥ Right bottom frame
⑦ Lower back horizontal brace
⑧ Upper horizontal brace
⑨ Front horizontal brace
⑩ Brace Ⅰ
⑪ Brace Ⅱ

Note: Collectors with 20 tubes or less do not have the middle frame.

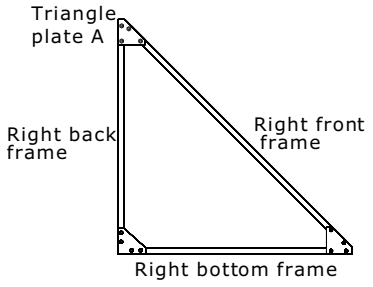
Step 1: Bolt the triangle plate A, plate B and ② together.



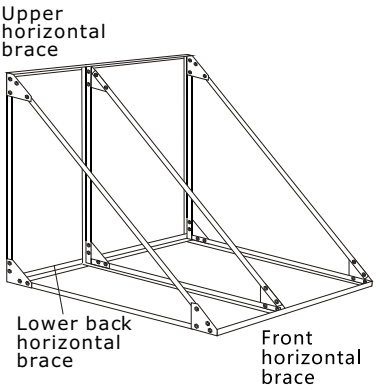
Step 2: Bolt another plate A to ① and ③.



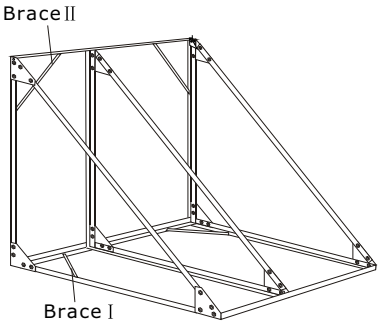
Step 3: Bolt plate A and plate B to ④ and ⑤.



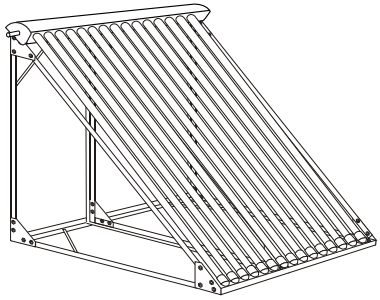
Step 4: Connect the left frames and right frames with ⑦, ⑧, and ⑨.



Step 5: Bolt ⑩ and ⑪ to the frames.



Step 6: Connect the collector frames and the front frames with bolts (M8×16).

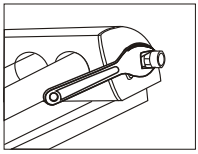


Connection of collectors

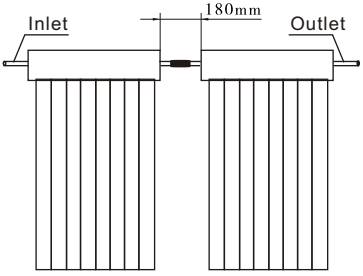
Both the inlet and outlet of the header are externally threaded (3/4" ID).

Note: 1.Connect the collectors with metal pipes (e.g. metal bellows) rather than plastic pipes, given their high temperature and pressure resistance.

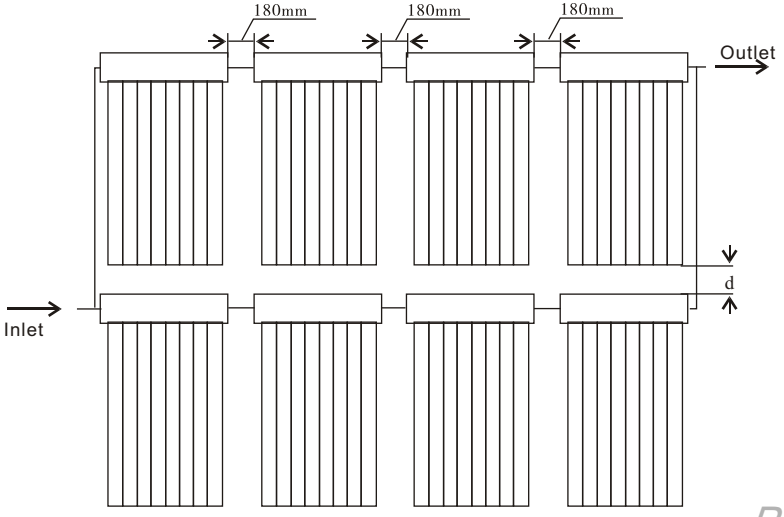
2. Hold the header inlet/outlet with a wrench before connecting the connectors.



Single-rowed collectors



Double-rowed collectors



Note: ①When collectors are mounted,collectors in a row should not be more than that in the table below.The flow to each row should be the same.Therefore,widths of the rows are the same.Diameter of the pipeline will be not less than 13mm when collestors installed in a row are not be more than 4,and not less than 20mm when the total aperture area is larger than 20m^2(appro.10 pieces)

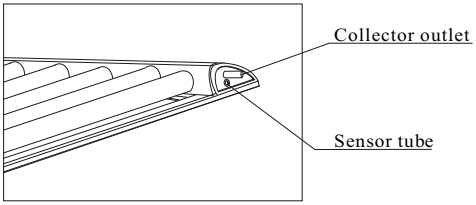
② For collectors mounted on a flat roof, the minimum distance between collector rows is 1600mm to guarantee that all the collectors can get sufficient sunlight.

③ When mounting multi-rowed collectors, make sure that the number of collectors in a row does not exceed what underlined in the figure below; carefully plan the positions of the water inlet and outlet in order to maintain equal flow volume of each row.

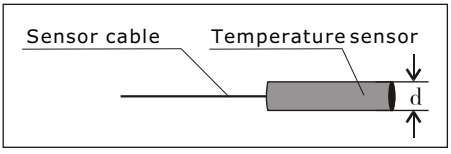
Tube number	12	16	20	24	28	32	36
Number of collectors in a row	16	13	10	8	7	6	5

Temperature sensor installation

Insert the temperature sensor into the sensor tube close to the header outlet until it can not go in further.



Note: ① The diameter of the temperature sensor is less than or equal to 6mm.

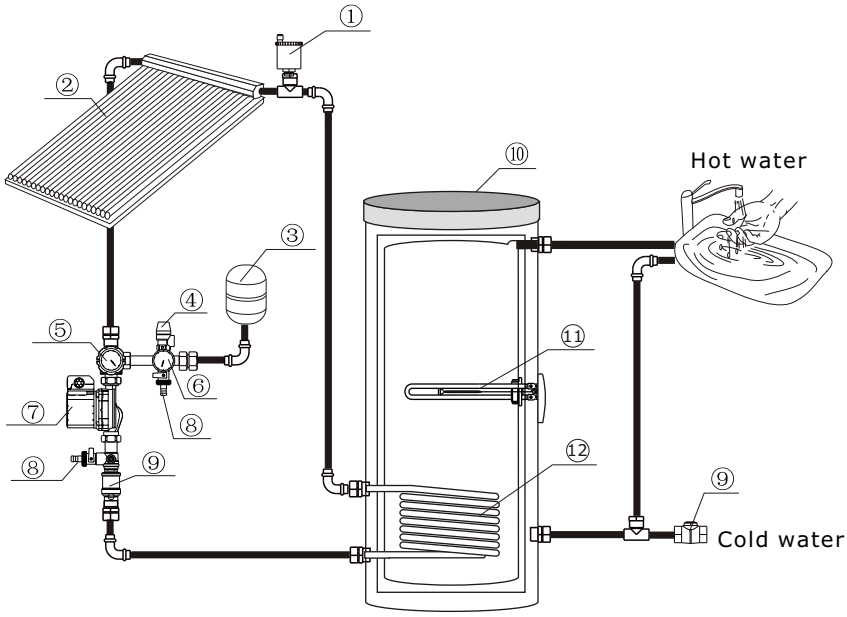


② The sensor cable should be fixed to the outer layer of the pipe insulation. Direct contact with the pipe at high temperature may cause cable aging and senor damage.

Solar water heating system

Solar water heating systems include solar collectors, storage tanks and pipes, etc. There are two types of solar water heating systems: single circulation system and double circulation system.

(1)Single circulation system



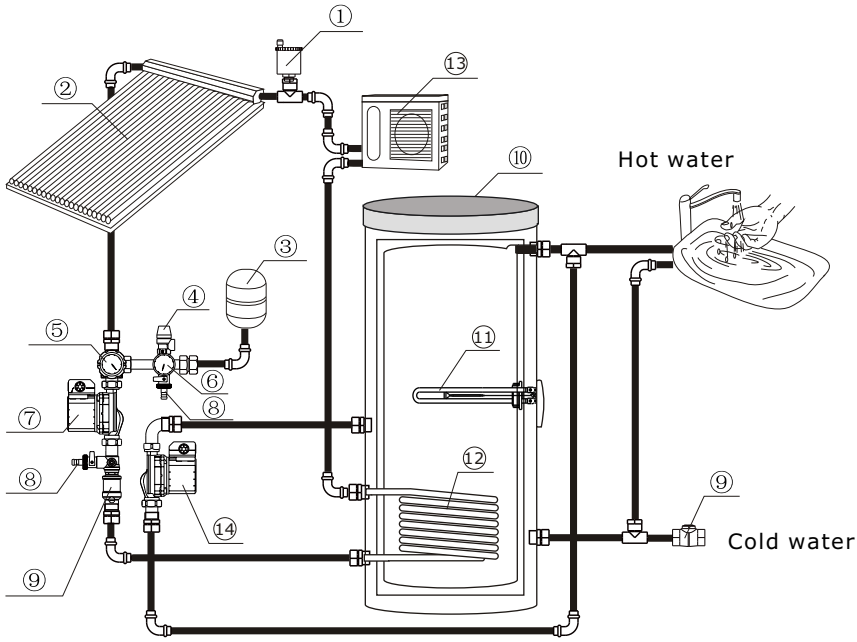
① Air vent valve　② Solar collector　③ Expansion tank

④ Safety valve　⑤ Temperature gauge　⑥ Pressure gauge

⑦ Circulation pump　⑧ Injection valve　⑨ Check valve

⑩ Storage tank　⑪ Electric booster　⑫ Heat exchanger

(2)Double circulation system



① Air vent valve
② Solar collector
③ Expansion tank
④ Safety valve
⑤ Temperature gauge
⑥ Pressure gauge
⑦ Circulation pump 1
⑧ Injection valve
⑨ Check valve
⑩ Storage tank
⑪ Electric booster
⑫ Heat exchanger
⑬ Radiator
⑭ Circulation pump 2

Troubleshooting

Problem	Possible cause	Solution
Temperature reading implausible(e.g. below 40℃) or no temperature reading on the controls	Temperature sensor is defective or installed incorrectly	Replace or install correctly
Bad performance of the collector	Heavy snow covers the collector in winters.	Sweep away the snow in time
	In sunny days, if the fluid in the collector keeps stationary for a long time (more than two days), the fluid may go bad and block the pipe.	Drain off the fluid when the collector is left unused for extended periods
Vacuum tubes breakage	Heavy impacts, e.g. Hails	Contact professionals to replace the damaged tubes.
Other causes		Contact the professionals.

Pipe insulation

The water piping should be well insulated after watertightness test according to the following regulations:

1 .The pipes from the collector to the storage tank must be insulated by high temperature (≥100℃)resistant rubber hose while insulation of the indoor pipes from the storage tank to the hot water outlet and the cold water outlet is optional.

2 . For the pipes from the collector to the storage tank outdoors, in the attic or basement, the insulation thickness should be 20mm at least, and 10 mm at least indoors.

3 .The outdoor pipe is required to be wrapped with stainless steel or galvanized sheet.

The heat transfer fluid

Propylene glycol is recommended as the heat transfer fluid of the collector. Its freezing point should not below the lowest ambient temperature in winter and it doesn't corrode the copper and braze filler metals. Flush the pipe to remove impurities before filling the working fluid. The service life of heat transfer fluid can be 5 years generally, but it is recommended that its performance should be checked once a year. Its freezing point can be detected with a refractometer and its PH value can be checked with a pH indicator paper. If the fluid color becomes darker, the freezing point higher, or the PH paper indicates acid, the heat transfer fluid must be replaced.

Maintenance requirements

The following basic maintenance may be completed by the HOME OWNER.

1. Cleaning

a) 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 but ONLY if the solar collector is located in a position which does NOT require climbing onto the roof, use of stepladder or otherwise potentially dangerous location. If the tubes are not easily and safely accessible, high-pressure water spray is also effective.

b) If cleaning is required and the above outlined methods are not suitable, the company that supplied and installed the solar collector should be contacted to complete such cleaning.

The following maintenance may ONLY be completed by Authorised PERSONS.

2. Broken Tube

a) If a tube is broken it should be replaced as soon as possible to maintain maximum collector performance.

b) The system will still operate normally and safely even with a tube broken.

c) Any broken glass should be cleared away to prevent injury.
ALWAYS WEAR SAFETY GLOVES AND GLASSES.
d) To replace a tube:
——Remove the tube clip(s), slide broken tube out and carefully pick up any glass pieces. Protective gloves must be worn when handling broken glass.
——Avoid touching the glass wool insulation inside the manifold with bare hands, as it can cause mild skin irritation.
——If the heat pipe is not easily removed, it can be left in place and a new evacuated tube inserted, guiding the heat pipe down the groove between the evacuated tube inner wall and heat transfer fin.
——If the heat pipe is easily removed, the easiest option is to replace the heat pipe and evacuated completely.

3. Replace and top up the Propylene Glycol

Drain the Propylene Glycol before maintaining the solar system. For the closed looped solar system with Propylene Glycol as heat exchanger fluid, there is pump station with charge/discharge valves of glycol. Replace and top up the glycol according to the solar system instructions and the manufacturer's guide.

4. Freezing

1) In the frost area where the temperature is below 0℃, the Propylene Glycol must be used as the heat exchanger fluid. Its freezing point must be lower than the local lowest temperature.
2) Check the color, PH and freezing point of the heat exchanger fluid each year. Ensure its freezing point comply with the anti-freezing requirement.

5.After the installation of the collector, the collector should be covered to prevent too much exposure to the direct sunshine if there is no water inside the collector. Uncover it when you conduct a preliminary test of it.

Parts list

1.Collectors with the galvanized frames

Item	Quantity	
Vacuum tube	n	
Fin	2n	
Tube support	n+1	
Heat pipe	n	
Header	1	
Left frame	1	
Rubber seal around the header outlet and sensor tube	2	
Closing plug	n+1	
Rubber ring	n+1	
Left cover	1	
Right cover	1	
Brace	4	
Cross recessed pan head screw M4×30	n+1	
Washer 4	n+1	
Spring washer 4	n+1	
Nut M4	n+1	
Retaining ring	n+1	
Retaining strap	n+1	
Gasket	n+1	
Tube bottom rack	1	
Thermal grease	2	
Horizontal bracket	1	0
Right frame	2	1
Bolt M6×16	15+1	10+1
Washer 6	15+1	10+1
Spring washer 6	15+1	10+1
Nut M6	15+1	10+1
Note	Number of tubes>20	Number of tubes≤20

1. “+1” means “+1” spare part.
2. This parts list does not include the specially ordered parts.

2.Collector with the aluminum alloy frames

Item	Quantity	
Vacuum tube	n	
Fin	2n	
Tube support	n+1	
Heat pipe	n	
Header	1	
Rubber seal around the header outlet and sensor tube	2	
Closing plug	n+1	
Rubber ring	n+1	
Left cover	1	
Right cover	1	
Brace	4	
Cross recessed pan head screw M4×30	n+1	
Washer 4	n+1	
Spring washer 4	n+1	
Nut M4	n+1	
Retaining ring	n+1	
Retaining strap	n+1	
Gasket	n+1	
Tube bottom rack	1	
Hex socket bolt M6×50	6+1	
Nut M6	6+1	
Frame	3	2
Bolt M8×20	6+1	4+1
Washer 8	6+1	4+1
Spring washer 8	6+1	4+1
Nut M8	6+1	4+1
Thermal grease	3	2
Note	Number of tubes>20	Number of tubes≤20

1. "+1" means "+1" spare part.
2. This parts list does not include the specially ordered parts.

3.Adjustable aluminum alloy support

Item	Quantity
Bottom frame	2
Back frame	2
Front frame	2
Equilateral triangular plate	8
Horizontal bracket	1
Bolt M8×16	26+1
Washer 8	26+1
Nut M8	26+1

4.Nonadjustable galvanized frame

Item	Quantity	
Left back frame	1	1
Left bottom frame	1	1
Left front frame	1	1
Right back frame	1	2
Right front frame	1	2
Right bottom frame	1	2
Lower back horizontal brace	1	1
Upper horizontal brace	1	1
Front horizontal brace	1	1
Brace Ⅰ	2	2
Brace Ⅱ	2	2
Triangle plate A	2	3
Triangle plate B	4	6
Bolt M10×20	30+1	45+1
Bolt M8×20	12+1	14+1
Note	Number of tubes≤20	Number of tubes>20

5.Pitched roof fasteners

Item	Quantity	
Roof hook	6	4
Bolt M8×20	6+1	4+1
Nut M8	6+1	4+1
Washer M8	6+1	4+1
Spring washer	6+1	4+1
Wood screw ST 4.8×45	24+1	16+1
Note	Number of tubes>20	Number of tubes≤20

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