Manual

of

Flat plate solar collector

Subject to technical modifications.
Due to continuous further development, the drawings, installation steps and technical data indicated here may differ.

Part 1 Flat plate solar collector specifications

	2m2 certified by Solar Keymark	3m2 certified by Solar Keymark
Dimension	2000*1000*95mm	2000*1500*95mm
Gross area	2.00 ㎡	3.00 ㎡
Absorber material/welding/pipe type	aluminum plate, laser-welding, harp type copper pipe	
Manifold pipe diameter/quantity	φ22/2	
Riser pipe diameter/quantity	φ10/9	φ10/14
Absorber coating	blue titanium	
Side frame	aluminum profile	
Glazing glass/thickness	Anti-reflective, low-rion super-white textured reinforced glass /3.2	
Bottom insulation	50mm, glass wool	
Conversion factor η0 (optical efficiency)	0.805	0.783
Annual collector yield under Solar Keymark, based on ISO 9806:2013 (at mean fluid temperature of 50°C, location Würzburg) kWh	1002	1503
Peak power per module (at G = 1000 W / m², η0) W	1489.05	2217.97
Maximum working pressure, Mpa	0.7	

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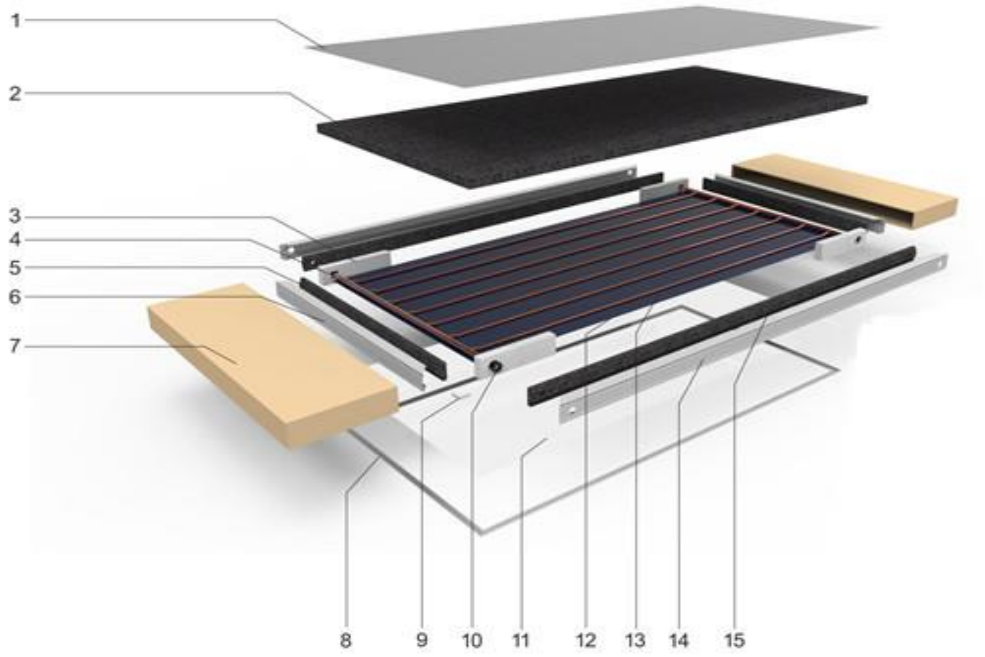
Page 2/2

Annex to Solar Keymark Certificate	Licence Number	011-7S2812 F
Supplementary Information	Issued	2017-11-14

Annual collector output in kWh/collector at mean fluid temperature ϑ_m, based on ISO 9806:2013 test results

Standard Locations		Athens			Davos			Stockholm			Würzburg		
Collector name	ϑ_m	25°C	50°C	75°C	25°C	50°C	75°C	25°C	50°C	75°C	25°C	50°C	75°C
P-G/0.8-T/L/LT-1.82		2 493	1 790	1 200	1 898	1 331	866	1 392	926	579	1 520	1 002	616
P-G/0.8-T/L/LT-2.80		3 740	2 685	1 800	2 846	1 996	1 299	2 088	1 389	868	2 280	1 503	924

Part 2 Structure and technical parameters of flat plate collector



1. Bottom back sheet
2. Bottom insulation layer
3. Protection foam
4. Header

5/15. Insulation layer at side frame

6/14. Frame

7. Package carton
8. Upper sealing
9. Angle connection
10. Rubber sealing ring
11. Low iron tempered textured glass
12. Absorber sheet
13. Riser

Part 3 Selection of flat plate collector

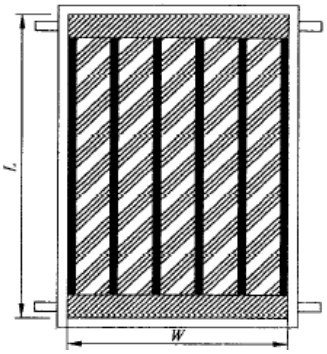
3.1 System selection

solar hot water system composes flat plate collector, water storage tank, and controller, which is used to supply hot water for family and corporation.

Please choose the appropriate solar hot water system according to the different structures of buildings. Flat plate collector can be customized according to the installation space on the buildings, to realize the perfect integration of solar collectors with building.

3.2 Selection points

3.2.1 Ac＝L×W



3.2.2 Selection

Regular Type	Outline size (mm)	Aperture area (m^2)	Tank configuration (L) Depending on local solar irradiation
2m2 flat plate collector	2000*1000*95	1.850	80/100/120
3m2 flat plate collector	2000*1500*95	2.831	120/150/180

Note: the size of flat heat collector can be customized according to the reserved space of the building.

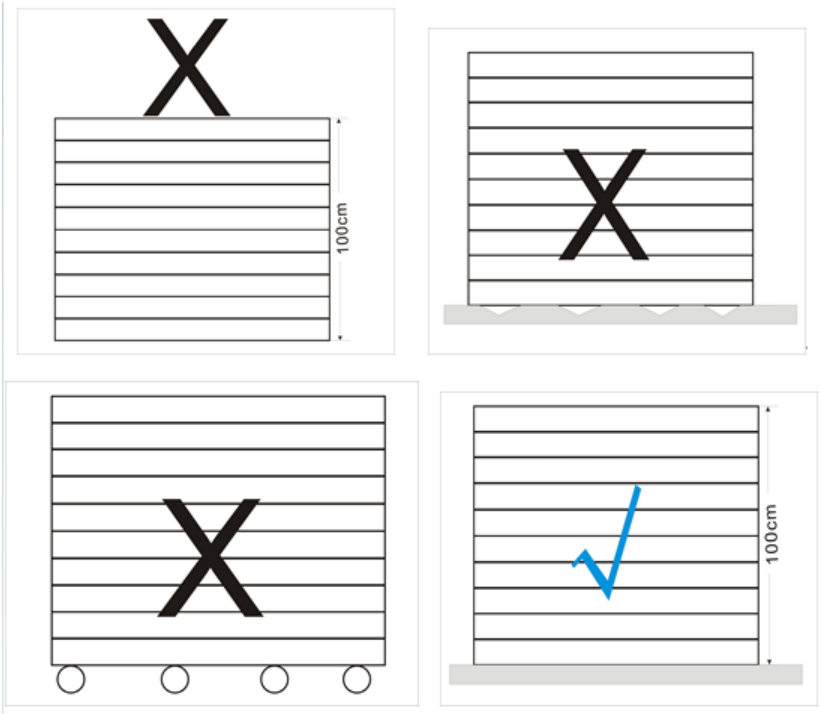
Part4 Installation instructions

4.1 Transportation

- The safety of the collector must be ensured during transportation: collectors have to be packed reliably during transportation, the important parts shall be packed carefully and reliably, and fastened by package straps. Please try to avoid the strike and vibration as much as possible during the transportation. Collectors shall be loaded tightly and tidily, to avoid crashing caused by the intermediate spare space.
- **Warning**: Lifting or raising the flat plate collector by the header pipes is strictly prohibited, no matter in transportation or in the installation, to avoid the distortion of inlet/outlet of flat plate collectors. Please lift or raise the flat plate collector by holding the aluminum frames.

4.2 Storage

The collector shall be kept with following instructions: Collectors shall be placed in dry and ventilated place, away from corrosive, flammable and oily products. The collector can be placed vertically or horizontally in stack. Stacking height shall be no higher than 1000 mm, the collectors can be placed on a flat surface with large contact area,



4.3 General installation requirements

- The collector is installed on the roofs or the walls of building, shall not affect the building function of the installation site, and should be integrated with building in both function and appearance.
- The collector shall be installed to the direction of the south, southwest or southeast with deviation less than 15 degrees (or facing to the north direction in the southern hemisphere). Deviation over 15 degree or the vertical installation will affect the heat collection effect, which shall be compensated with more aperture area, and the compensation area shall not exceed twice of the standard aperture area.
- Ensure protection measures to the installers and system during installation process.
- There shall be no trees or any building to block the sunshine in front of the installation site.

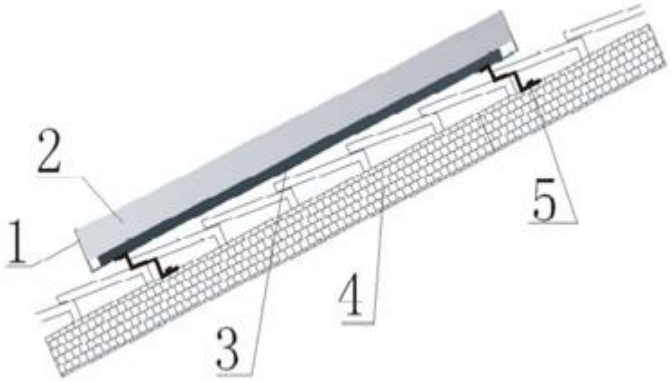
4.4 Installation of heat collector

4.4.1 Key points for installation

a) The installation kit shall be fixed tightly to the building, and harmless to the water proof level.
b) The collector installation kit shall be installed on the major structure of the building, accurate location and reliable fixing.
c) Temperature resistance of the insulation material shall be higher than 120 ˚C.
d) The flat plate collector can withstand the working pressure of 0.8MPa; overpressure could damage the solar collector, such as leakage of the heat transfer medium.
e) The strength of the collector plate should be able to withstand the dry sand quality 100kg per square meter, no damage.
f) The drying performance parameters: flat plate collector daylighting area received daily solar irradiation H = 17MJ/ (M2 -D), ambient temperature Ta = 8 DEG C, the heat collector is filled with medium and heated by the sun to the highest temperature on the same day, no damage.
g) The wall or the roof shall be able to afford the weight twice of solar collectors.
h) Please follow and obey other instruction or regulation for collector installation.
i) The sun protection sheet or film is recommended to cover up the collector until the collector has been flushed and filled, however it must not be exposed to the weather for longer than 4 weeks. For longer periods, a suitable sun protection tarpaulin is suggested to be applied, as the stagnation temperature could reach up to 216.9 ℃ when there is no water or limited water within the solar collector.

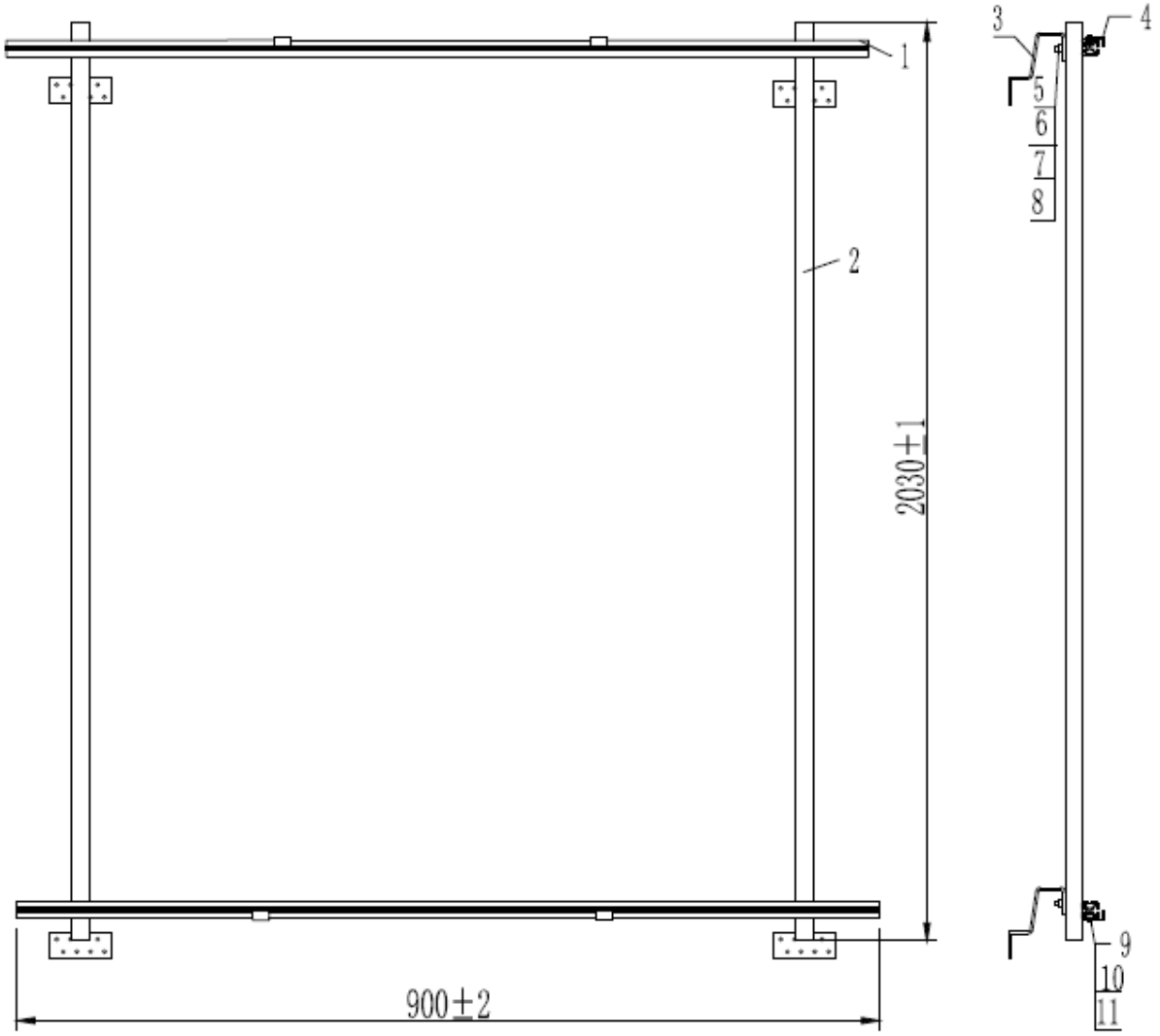
4.4.2 Installation of flat plate solar collectors

4.4.2.1 Installation onto pitched roof

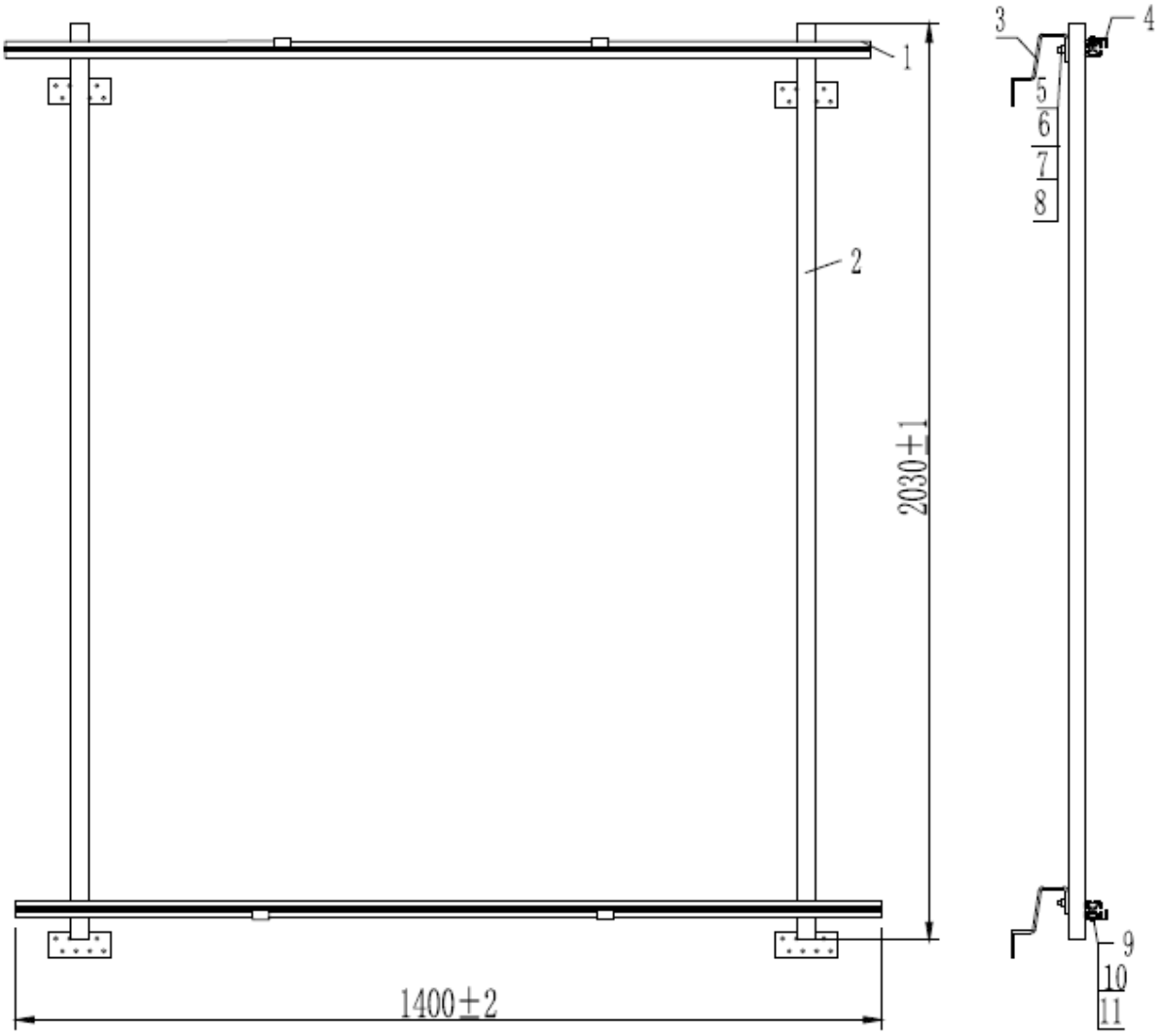


1. Collector hook
2. Flat plate collector
3. Pitched roof installation frame
4. pitched roof, or beam
5. Roof hook

Meanwhile, the whole set of pitched roof installation kit for 2m2 and 3m2 flat plate solar collector are designed with the same structure and same quantity of components, just with different dimensions, composed of,

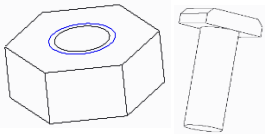


Pitched roof installation kit for 2m2 flat plate solar collector

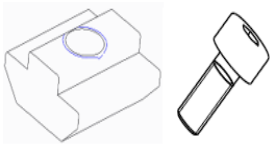


Pitched roof installation kit for 3m2 flat plate solar collector

1. - Horizontal frame /quantity:2
2. - Vertical frame /quantity:2
3. – Roof hook /quantity:4
4. – Collector hook/quantity:4
5. - T shape bolt, M10*30 /quantity:4
6. - Outer hexagon nut, A2-70, M10 /quantity:4
7. – Flat washer, A2-200HV, M10 / /quantity:4
8. - Spring washer, A2, M10 /quantity:4
9. – Slide nut,40M8 /quantity:8
10. – Bolt, A2-70, inner hexagon, cylinder head, full thread, M8*20 /quantity:8
11. - Flat washer, A2-200HV, M8 /quantity:8



One whole set of nut/bolt is composed of item 5,6,7,8 with quantity of 4 sets, for fixing the 4 roof hooks onto the vertical frames.



Another whole set of nut/bolt is composed of item 9,10,11 with quantity of 8 sets, including 4 sets for fixing the 4 collector hooks onto the horizontal frames, and 4 sets for connecting the horizontal frames and vertical frames together at the 4 corners.

4.4.2.2 Installation onto flat roof

Flat roof stands can be customized and assembled at site, or pe-designed and welded at site.

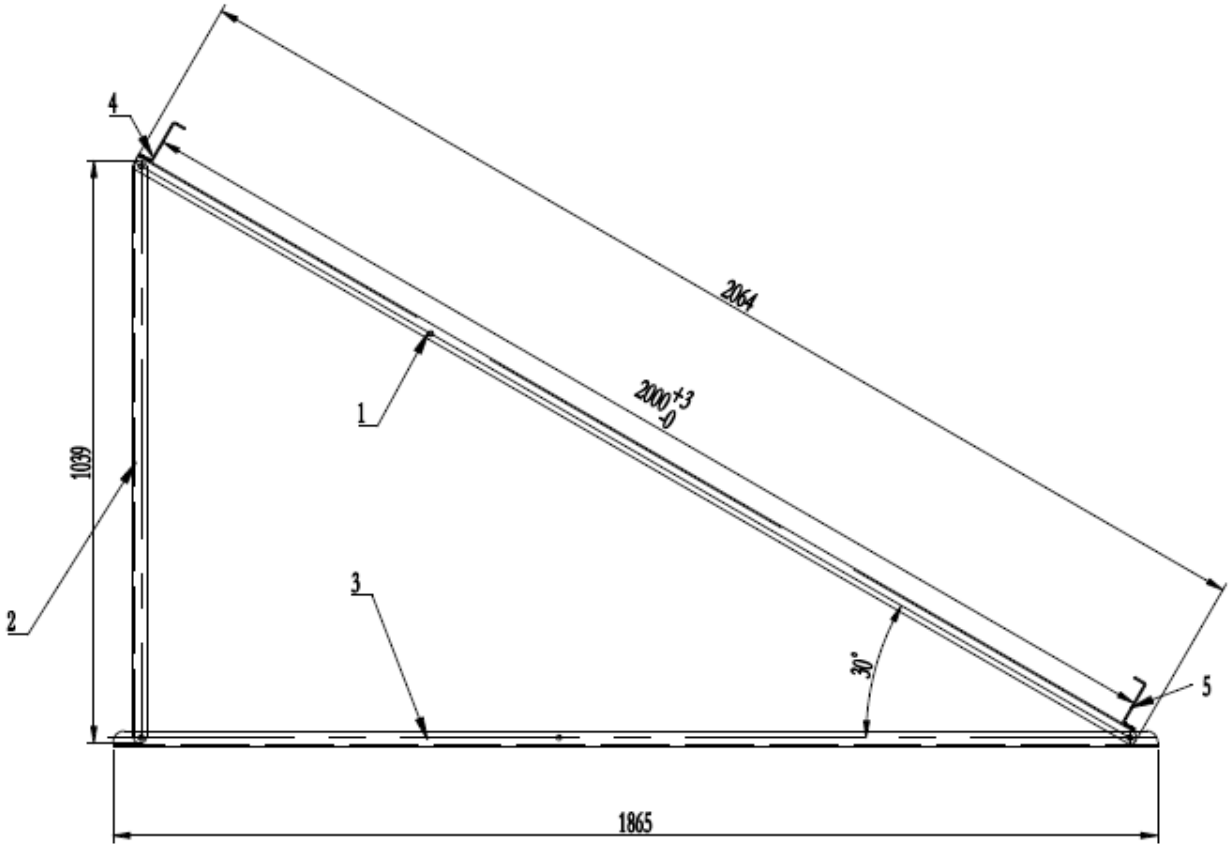
Fix the stands on the foundation of roofs with expansion bolts, and assemble the stands tightly to avoid strong wind. Steel wire is necessary if wind is strong in the installation area. Water proof treatment has to be done to the installation site to avoid rain or snow leakage. Welded stands shall be painted to anti-corrosion.

The whole flat roof installation kit is suitable for both the 2m2 and 3m2 flat plate solar collector, as the collectors are with the same length of 2m2, just the two triangular brackets are to be set at the vertical edges of the collectors.

The tilt angle is normally 10-15 degree higher than the local latitude at the installation site, for the balance of solar absorption in the winter and summer time.

The maximum tilt angle could be 90 degree, when the solar collectors are vertically installed, realizing the integration between the solar collector and the building, just the solar absorption rate could be affected, with reduced energy yield, depending on the installation site's conditions.

Meanwhile, the whole set of pitched roof installation kit is composed of,



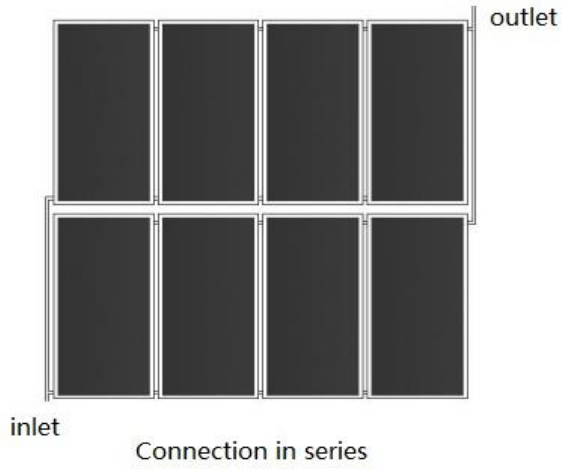
1. Main connection plate, quantity:2
2. Connection plate, quantity:2
3. Main fixing plate, quantity:2
4. Upper Collector hook, quantity: 2
5. Bottom Collector hook, quantity: 2

*Accompanied with 6 pieces of SUS 304 stainless steel bolt of M8*60 + 6 pieces of M8 nut for connection of the plates, as well as 4 pieces of SUS 304 stainless steel bolt of M8*20 + 4 pieces of M8 nut for connection between the plates and collector hooks.

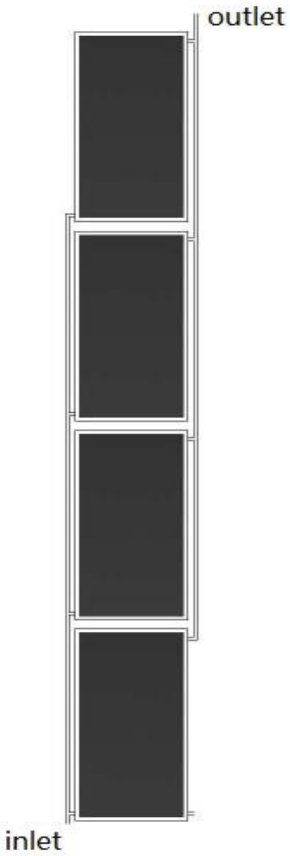
4.4.2.3 Connection of flat plate collectors

Overheating will occur if collectors have not been used for long time, so metal pipes are recommended for collector connection. It is suggested to use two spanners to connect the pipes with collector, to avoid distortion or breakage of the copper pipes inside of flat plate collector. Collectors can be connected in series, in parallel, or in series-parallel connection. It is suggested that the connection area in series shall be no more than 20 square meters, DN 20 water pipe could be adopted under such conditions. If the total area is more than 20 square meters, they can be connected in series-parallel, and install automatic relief valve at the outlet of collectors. Below connection diagrams for your kind reference.

Connection in series

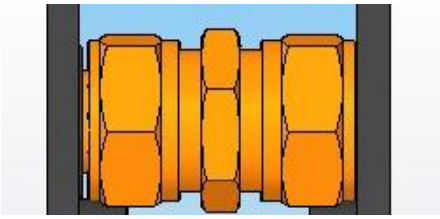


Connection in series



Connection in parallel

For the series connections of the flat plate solar collector, the ϕ22 fitting connectors are needed,



1.5 Overheating. If the collectors are not used for long time, please cover the collectors with lighttight sheet, to avoid overheating.

1.6 Wind & snow load. It is not only necessary to consider the load of collector, fluids and piping, but also need to consider the possible wind and snow load, when calculate the building load. The solar collector and installation frame subjected to wind speed simulation experiment can withstand strong gusts 10; and solar collector and installation frame can withstand heavy rain and snow level, with snow limit to 0.54KPa. Guarantee the safe and stable operation of the collector in the rain and snow environment.

1.7 Maintenance of flat plate collectors. Periodical cleaning shall be done to clean the dust and dirt on collector surface, in order to ensure the heat performance of the collectors. And check the system completely at least every two years, and change the parts in time. When conditions allow, you can regularly wipe the dust from the collector pipe, too much dust will affect the system's output water temperature. Product design life is 10 years, if beyond the design life or pipe ages after long-term use, or serious decline in thermal performance, cannot meet the water needs, please contact the professional for related replacement.

1.8 Equipotential bonding / lightning protection. Lightning protection is recommended with the solar thermal system. The connection of the collector system to an existing or new lightning protection system, as well as the installation of a local equipotential bond, may only be carried out by authorized service personnel after taking all local conditions into consideration.

1.9 Heat transfer medium. The water and glycol could be used as heat transfer medium. The glycol is more used for the areas in the cold areas, mainly for anti-freezing purpose. The glycol is with the possibility of carbonization, when the solar thermal system works under high temperature for overlong time, which may block the pipe. The water with high chlorine content or improper heat transfer medium may lead to the corrosion of the copper pipe of the collector, resulting in leakage of the solar collector.

1.10 Scald hazard. During the application of the solar thermal system, please be very cautious that the hot water coming from the system could be with very high temperature, scalding the skin. Meanwhile the flow and return connections could also be the burn/scald hazard due to (among other things) escaping steam.