

## JinYi Heat Pipe Solar Collector Installation & Maintenance Manual

(Version 1.1 - August 2012)

## Thank You

Thank you for purchasing a JinYi solar water heating system.

We sincerely hope that you enjoy your solar powered showers, sound in the knowledge that you are a part of the SOLUTION to climate change.

## Customer Service is Important to JinYi

It is important that this collector be installed properly.

You should expect the installation officer to:

- Be on time
- Be polite
- Answer any questions you may have about the system
- Explain the basic operation of the system to you
- Clean up after the installation

If you have any comments about the service provided by the installation officer please contact us:

**Jiaxing JinYi Solar Energy Technology Co.,Ltd.**

**Tel: 0086-573-8284 8871 / 8284 8872**

**Fax: 0086-573-8284 8893**

**E-mail: [info@jinyi-solar.com](mailto:info@jinyi-solar.com)**

















For more information about JinYi products please visit

[www.jinyi-solar.com](http://www.jinyi-solar.com)

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## 1. Safety information

	<p>Safety precautions: before commencing mounting work on roofs, it must be ensured in all cases that the non-personal fall protection and fall-arrest systems required by (roof covering and roof sealing works) and (scaffolding works) are in place see also Builders Protection Ordinance, must be observed!</p>		<p>Safety harnesses should be fixed above the users whenever possible. Safety harnesses should only be fastened to sufficiently load-bearing structures or fixing points!</p>
	<p>If non-personal fall protection or fall-arrest systems cannot be installed for technical reasons, all personnel must be secured by means of suitable safety harnesses!</p>		<p>Never use damaged ladders (e.g., wooden ladders with split runners or rungs, or bent or buckled metal ladders). Never try to repair broken runners, rungs or steps on wooden ladders!</p>
	<p>Only use safety harnesses (safety belts, lanyards and straps, shock absorbers, fall arresters) that were tested and certified by authorized testing bodies.</p>		<p>Ensure that ladders are put up safely. Observe the correct leaning angle (68° - 75°). Prevent ladders from sliding, falling over or sinking into the ground (e.g. using wider feet, feet suited to the ground or hooking devices).</p>
	<p>If non-personal fall protection or fall-arrest systems are not provided, working without the use of suitable safety harnesses may lead to falls from heights and therefore cause serious or lethal injuries!</p>		<p>Only lean ladders against secure points. Secure ladders in traffic areas by suitable cordoning.</p>
	<p>Ladders not properly secured against sinking in, sliding or falling over may lead to dangerous falls!</p>		<p>Contact with live electric overhead cables can be lethal.</p>
	<p>Whenever you are near live overhead electric cables where contact is possible, only work if:</p> <ul style="list-style-type: none"> <li>- it is ensured that they are voltage-free and this is secured for the duration of work.</li> <li>- the live parts are secured by covering them or cordoning them off.</li> <li>- the prescribed safety distances are maintained</li> </ul> <p>Voltage radius:            1m with.....voltages up to 1000V            3m with....voltages from 1000V to 11000V            4m with..voltages from 11000V to 22000V            5m with..voltages from 22000V to 38000V            &gt; 5m in case of unknown voltages</p>		<p>Wear protective goggles when drilling and handling evacuated tube collectors (danger of implosion)!</p>
			<p>Wear safety shoes when carrying out installation work!</p>
			<p>Wear cut-proof safety gloves when mounting collectors and handling evacuated tube collectors (danger of implosion)!</p>
	<p>The manufacturer hereby guarantees to take back products identified with an eco-label and to recycle the materials used.</p> <p>Only the heat transfer medium specified may be used!</p>		<p>Wear a helmet when carrying out installation work!</p>



## Warning!

For your safety, please read through this manual carefully before installation to minimize the risk of fire, property damage, and personal injury!

## 2. SAFETY PRECAUTIONS

### 2.1 METALLIC COMPONENTS

Always wear leather protective gloves when handling solar heater components. All efforts have been made to make the metal components safe to handle, but there may still be some sharp edges.

### 2.2 VACUUM TUBES

- a) Be careful when handling the vacuum tubes, as they will break if knocked heavily or dropped.
- b) If exposed to sunlight and therefore hot (have internal pressure built up), the tubes may explode rather than implode if knocked and broken. This is a rare occurrence, but nevertheless safety precautions should be taken.
- c) If the vacuum tubes are struck by a hard object with sufficient force (ie. branch falling on roof), they may break. During installation consideration should be taken as to the possible path any broken glass may take. Where possible protection should be implemented to prevent broken glass from reaching ground level where somebody could walk on it (ie. Guttering on roof).
- d) The home owner should be made aware by the Installer the location of the solar system and the possible vicinity of broken glass in the event of an extreme storm or object falling on the collector.

### 2.3 HEALTH & SAFETY

- a) Always wear safety glasses when handling vacuum tubes
- b) Adhere to safety regulations regarding working on roofs (or at a height)
- c) Always obtain engineer approval for installations in high wind regions.

### 2.4 TRANSPORTATION

**Safety is critical during lifting. Appropriate equipment must be used. Full safety and arrest training is essential.** For hand lifting, assemblies and parts are lifted piece by piece to the elevated mounting location. The frame assembly is normally lifted first. Firmly anchor the frame. Then the tank is lifted and placed on the shoulder rests, and bolted down.

### 2.5 SNOW AND ICE LOAD

In region, where is rich of snow in winter, man should note the regulation of local construction bureau about the collector installation angle of inclination roof. Considering stacking of snow, moving of snow by wind and freezing of snow, the load of snow will increase, so it is necessary to take measure to avoid this situation happening.

### 2.6 LIGHTNING PROTECTION

In installation location is prone to lightning strikes, it is advisable to earth/ground the copper circulation loop of the collector to avoid lightning related damage, or electrical safety issues. Refer also to local building codes regarding lightning safety and grounding.

## Before you start

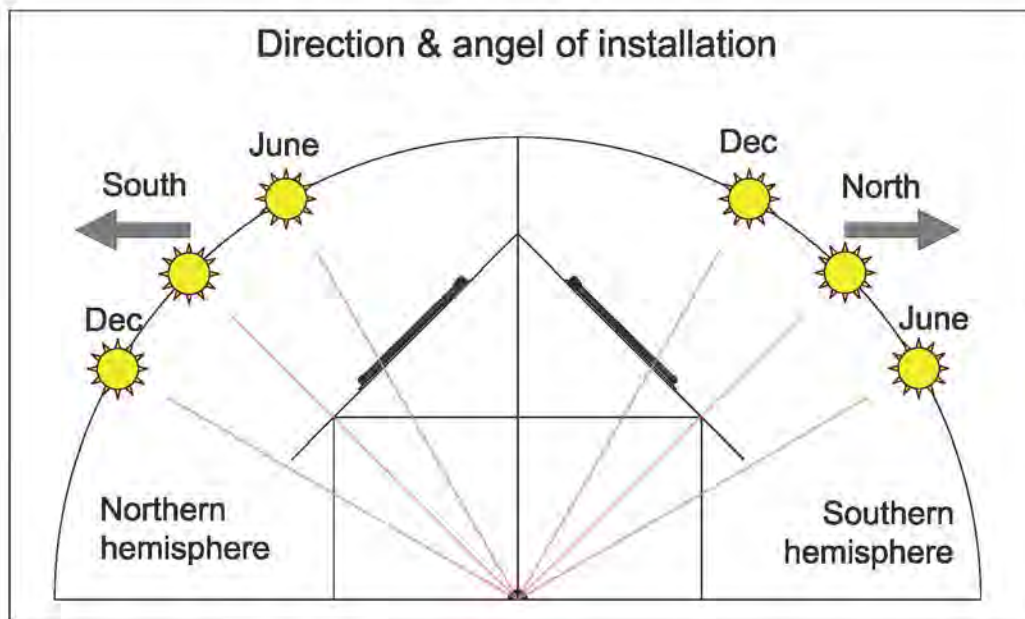
- The assembly of the solar collector requires two able persons with the ability to lift 20Kg each.
- Best to install on cloudy day.
- Store vacuum tubes in dark or shaded place until insertion into the manifold.

- Do not remove and/or expose the tubes to sunlight until ready to install, otherwise the heat pipe tip will become very hot, sufficient to cause serious skin burns. The outer glass surface will not become hot. NEVER TOUCH THE INSIDE OF THE VACUUM TUBE OR HEAT PIPE CONDENSER AFTER EXPOSURE TO SUNLIGHT. WEAR THICK LEATHER GLOVES IF HANDLING THE HEAT PIPE.

### 3. Solar collector direction

The first rule of deciding the angle and direction of your solar collector is:

- In the northern hemisphere: Your collector should face south
- In the southern hemisphere: Your collector should face north



The general rule of thumb is to install your solar collectors at your Latitude plus 10 degrees.

Please note – if your roof is within +/- 10 degrees of the recommended angle for your collector, then you are fine with mounting the solar collectors flush to the roof. The added cost and work of installing the collectors on a tilt mount in this case is not warranted as the increase in efficiency would not be significant enough.

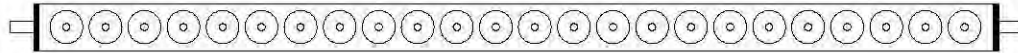


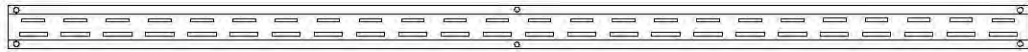
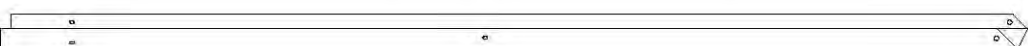



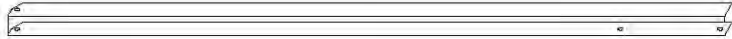
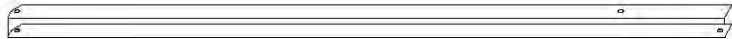







Seasonal Changes in Heat Output – Prevent Excessive Summer Heat

Try mounting your solar panels 20 degrees higher than the latitude of your location calls for (ie, 50 degrees instead of 30 degrees). In the winter, you will get additional performance because the more vertical solar collector is more in line with the sun that is closer to the horizon – this increases your winter output dramatically. In the summer, you will get lower than standard performance because the more vertical solar collector is angled more away from the sun as it is higher in the sky – this allows you to get enough heat output for your needs without the need to worry about excessive heat and damage to your system or home.



The minimum collector mounting angle can not be lower than 10 degrees

#### 4. Parts list of solar collector

No.	Parts List
A	
B-1	
B-2	
C	
D-1	
D-2	
E	
F	
G-1	
G-2	
H	
I-1	 <span style="margin-left: 20px;">M8*20MM</span>
I-2	 <span style="margin-left: 20px;">M8*25MM</span>
I-3	 <span style="margin-left: 20px;">M8*50MM</span>
J	
K	
L	

## 5. Installation

### 5.1 Unpack and inspection

Model: JHC-5818-10								
No.	Name	QTY. packaging	Spare part (Pitched roof)			Spare part(Flat roof)		
			No.	Qty.	Len.(mm)	No.	Qty.	Len.(mm)
1	Solar collector(Manifold & Frame)	1	A	1	895	A	1	890
			B	1	765	B	1	765
			C	1	765	C	1	765
			D	2	1960	D	2	1960
			E	0		E	2	810
			F	0		F	2	1261
			G	0		G	2	1260
			H	0		H	4	
			I	6		I	23	
			J	10		J	10	
			L	1		L	1	
2	Heat pipe vacuum tube	1	K	10		K	10	

Model: JHC-5818-15								
No.	Name	QTY. packaging	Spare part (Pitched roof)			Spare part(Flat roof)		
			No.	Qty.	Len.(mm)	No.	Qty.	Len.(mm)
1	Solar collector(Manifold & Frame)	1	A	1	1270	A	1	1265
			B	1	1140	B	1	1140
			C	1	1140	C	1	1140
			D	2	1960	D	2	1960
			E	0		E	2	810
			F	0		F	2	1514
			G	0		G	2	1260
			H	0		H	4	
			I	6		I	23	
			J	15		J	15	
			L	1		L	1	
2	Heat pipe vacuum tube	1	K	15		K	15	

Model: JHC-5818-18								
No.	Name	QTY. packaging	Spare part (Pitched roof)			Spare part(Flat roof)		
			No.	Qty.	Len.(mm)	No.	Qty.	Len.(mm)
1	Solar collector(Manifold & Frame)	1	A	1	1495	A	1	1490
			B	1	1365	B	1	1365
			C	1	1365	C	1	1365
			D	2	1960	D	2	1960
			E	0		E	2	810
			F	0		F	2	1688
			G	0		G	2	1260
			H	0		H	4	
			I	6		I	23	
			J	18		J	18	
			L	1		L	1	
2	Heat pipe vacuum tube	2	K	18		K	18	

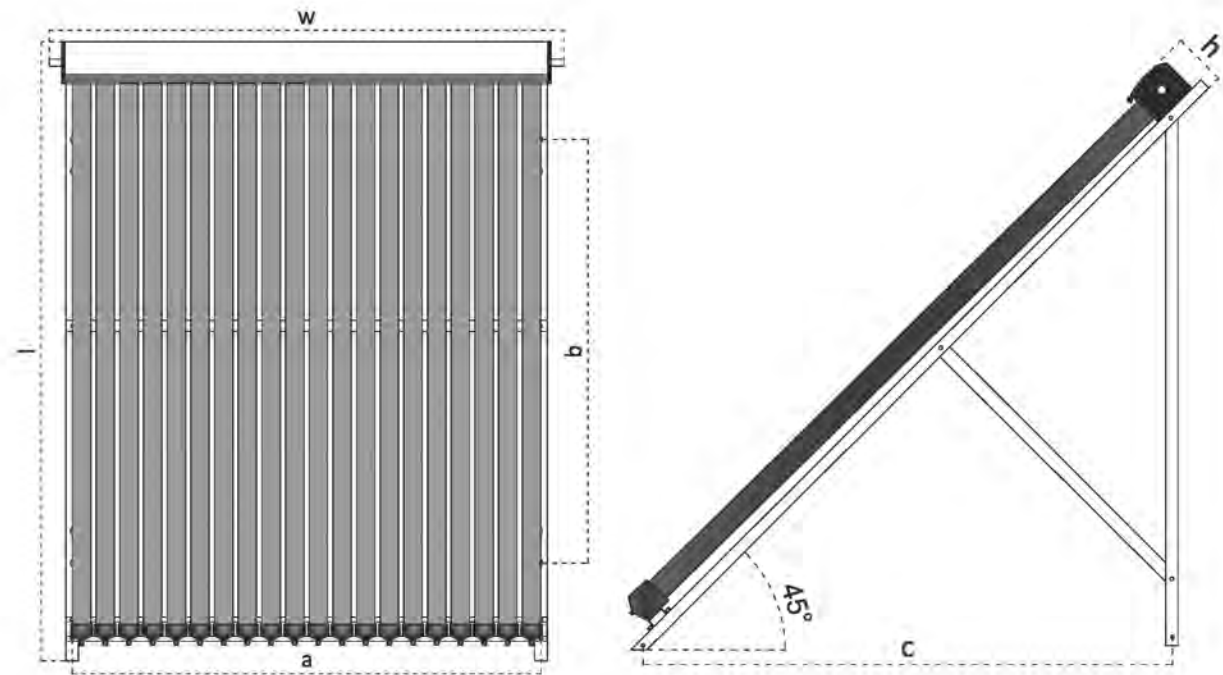


Model: JHC-5818-20								
No.	Name	QTY. packaging	Spare part (Pitched roof)			Spare part(Flat roof)		
			No.	Qty.	Len.(mm)	No.	Qty.	Len.(mm)
1	Solar collector(Manifold & Frame)	1	A	1	1645	A	1	1640
			B	1	1515	B	1	1515
			C	1	1515	C	1	1515
			D	2	1960	D	2	1960
			E	0		E	2	810
			F	0		F	2	1810
			G	0		G	2	1260
			H	0		H	4	
			I	6		I	23	
			J	20		J	20	
			L	1		L	1	
2	Heat pipe vacuum tube	2	K	20		K	20	

Model: JHC-5818-24								
No.	Name	QTY. packaging	Spare part (Pitched roof)			Spare part(Flat roof)		
			No.	Qty.	Len.(mm)	No.	Qty.	Len.(mm)
1	Solar collector(Manifold & Frame)	1	A	1	1945	A	1	1940
			B	1	1815	B	1	1815
			C	1	1815	C	1	1815
			D	3	1960	D	3	1960
			E	0		E	3	810
			F	0		F	4	1360
			G	0		G	3	1260
			H	0		H	6	
			I	9		I	33	
			J	24		J	24	
			L	1		L	1	
2	Heat pipe vacuum tube	2	K	24		K	24	

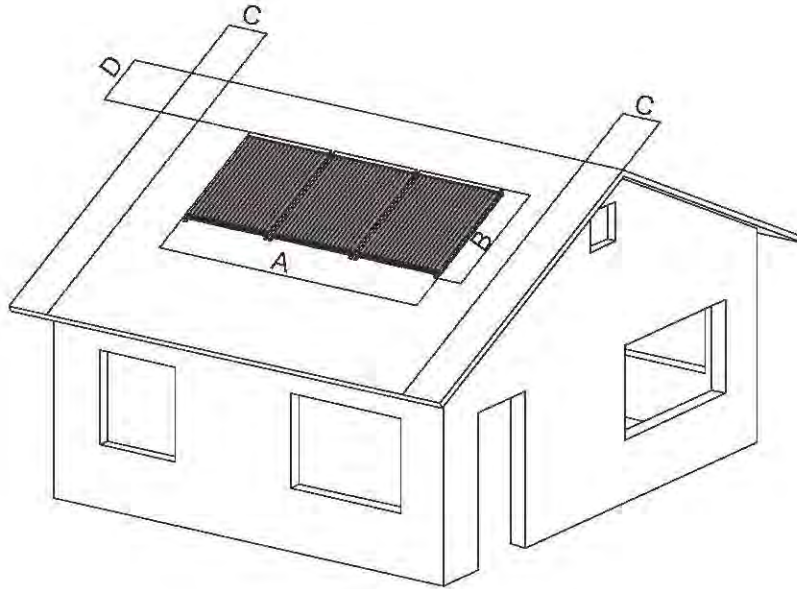
Model: JHC-5818-30								
No.	Name	QTY. packaging	Spare part (Pitched roof)			Spare part(Flat roof)		
			No.	Qty.	Len.(mm)	No.	Qty.	Len.(mm)
1	Solar collector(Manifold & Frame)	1	A	1	2395	A	1	2390
			B	1	2265	B	1	2265
			C	1	2265	C	1	2265
			D	3	1960	D	3	1960
			E	0		E	3	810
			F	0		F	4	1520
			G	0		G	3	1260
			H	0		H	6	
			I	9		I	33	
			J	30		J	30	
			L	1		L	1	
2	Heat pipe vacuum tube	2	K	30		K	30	

### 5.2. Solar collector size:



NO.	Model	Heat Pipe Vacuum Tube			Figure Size	Installation Size	Installation Size
		Qty.(PCS)	Dia.(mm)	Len.(mm)	(l × w × h)(mm)	(a × b) (mm)	(a × c) (mm)
1	JHC-5818-10	10	58	1800	1960 × 890 × 130	735 × 1340	735 × 1274
2	JHC-5818-15	15	58	1800	1960 × 1265 × 130	1100 × 1340	1100 × 1274
3	JHC-5818-18	18	58	1800	1960 × 1490 × 130	1335 × 1340	1335 × 1274
4	JHC-5818-20	20	58	1800	1960 × 1640 × 130	1485 × 1340	1485 × 1274
5	JHC-5818-24	24	58	1800	1960 × 1940 × 130	1785 × 1340	1785 × 1274
6	JHC-5818-30	30	58	1800	1960 × 2390 × 130	2235 × 1340	2235 × 1274

### 5.3 Space requirement for pitched roofs



#### Dimension A

Collector No.	JHC-5818-10	JHC-5818-15	JHC-5818-18	JHC-5818-20	JHC-5818-24	JHC-5818-30
	(m)	(m)	(m)	(m)	(m)	(m)
1	0.89	1.27	1.49	1.64	1.94	2.39
2	1.88	2.64	3.08	3.38	3.98	4.88
3	2.87	4.01	4.67	5.12	6.02	7.37
4	3.86	5.38	6.26	6.86	8.06	9.86
5	4.85	6.75	7.85	8.6	10.1	
6	5.84	8.12	9.44	10.34		

#### Dimension B

Collector No.	JHC-5818
	(m)
1	1.96
2	4.07
3	6.18

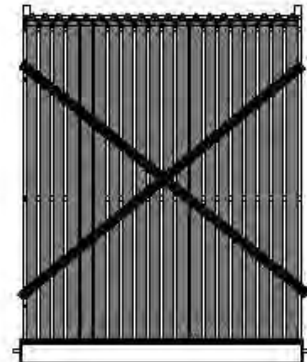
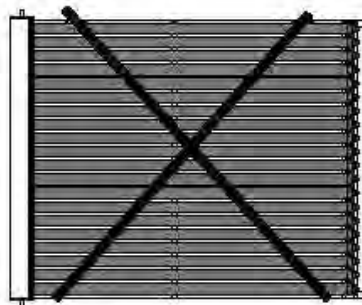
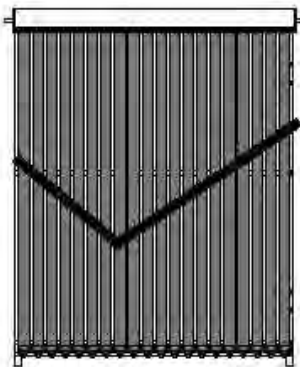
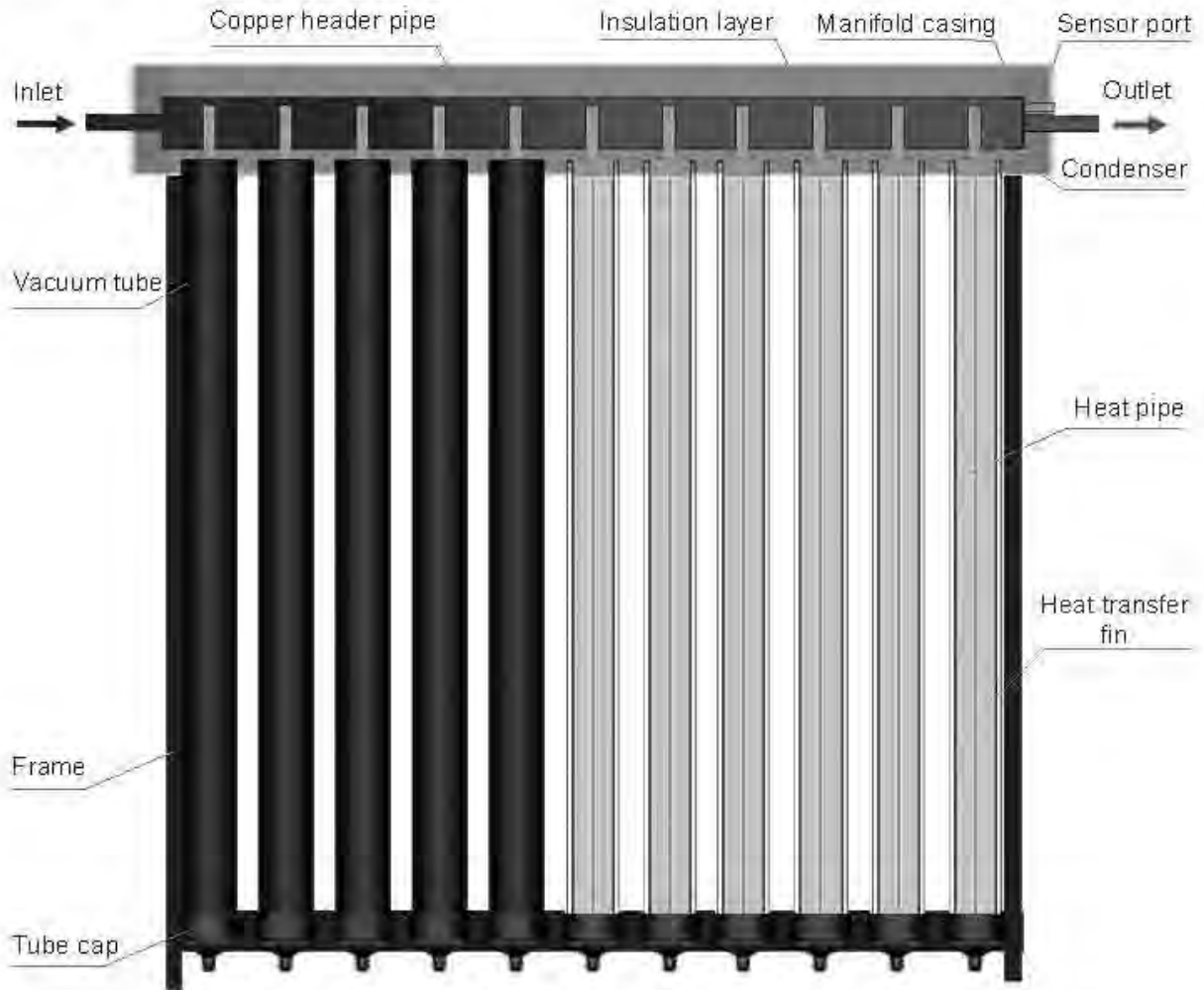
#### Dimension C

Corresponds to the roof overhang including the thickness of the end wall. The adjoining 0.30 m distance from the collector is required for hydraulic connection below the roof.

#### Dimension D

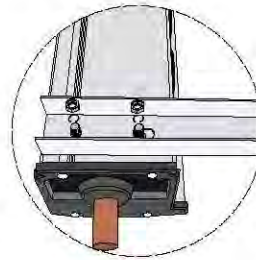
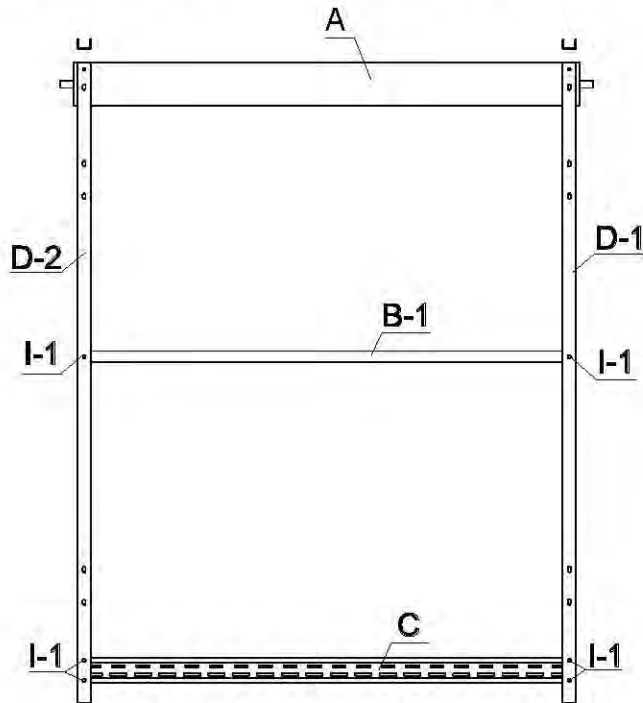
Represents a minimum of 3 pan tile rows to the ridge. If this is not observed, there arises a risk of damage to the roof cladding at the ridge, especially on wet-laid pan tiles.

### 5.4 Solar collector schematic diagram:

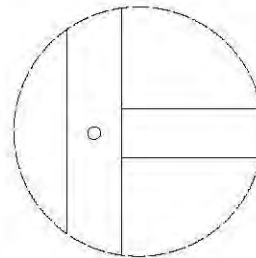


## 5.5 Install pitched roof collector :

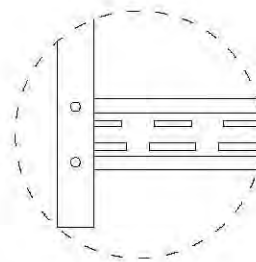
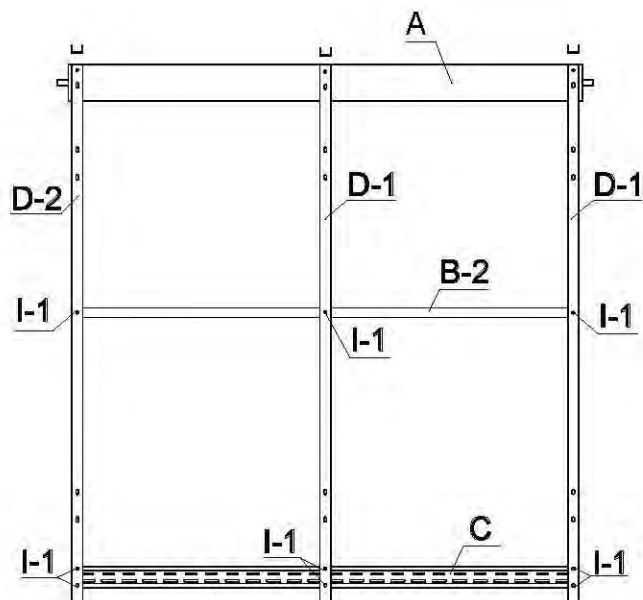
### 5.5.1 Fix the Frames and Manifold Box :



1. Put the manifold back up, install the front legs on the back of manifold, tighten nuts.

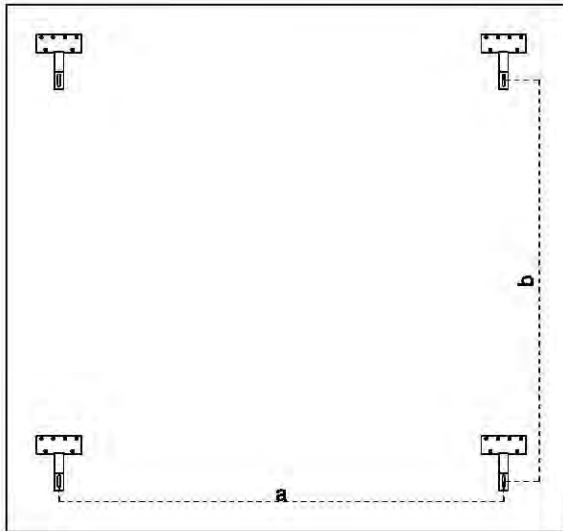


2. Install the horizontal bar, tighten the nuts between front legs and horizontal bar.

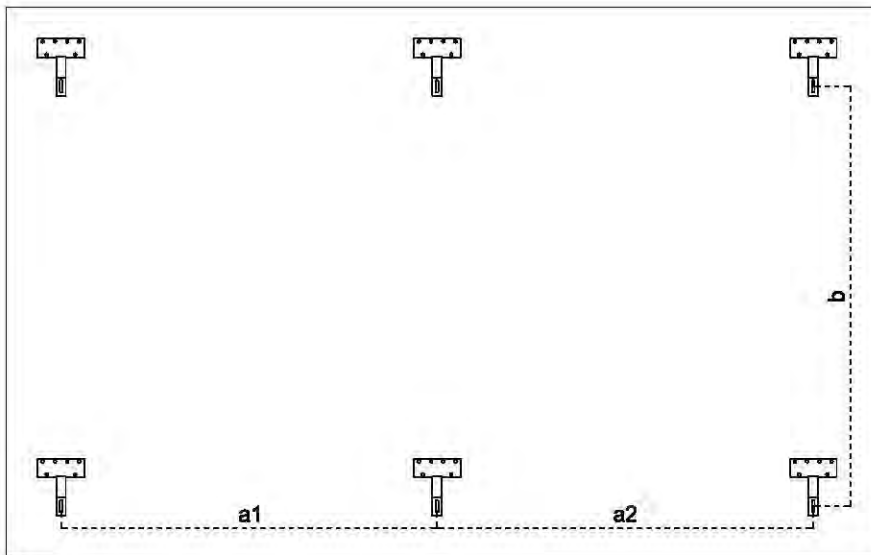


3. Turn the tail stock back up, install the tail stock on the front legs, Tighten nuts.

### 5.5.2 Positioning the retaining roof hook:

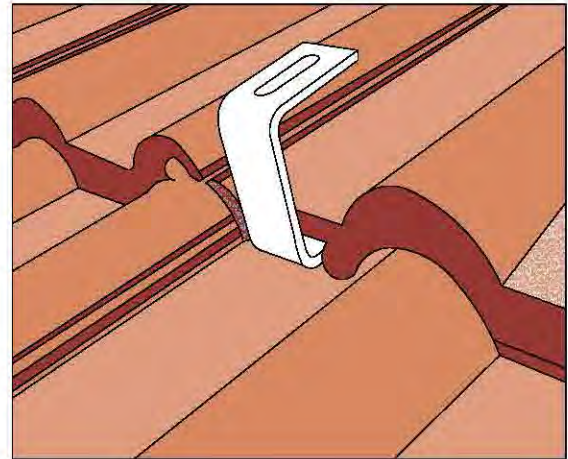
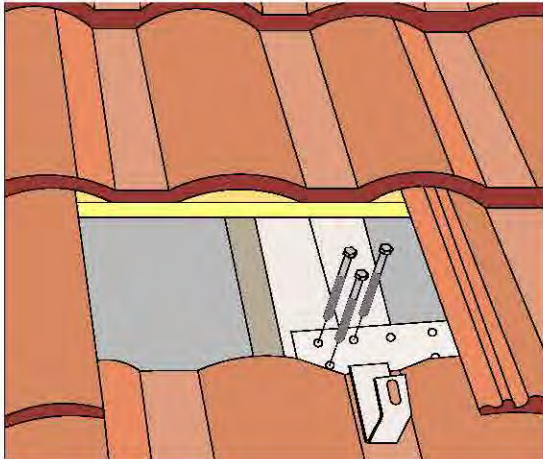
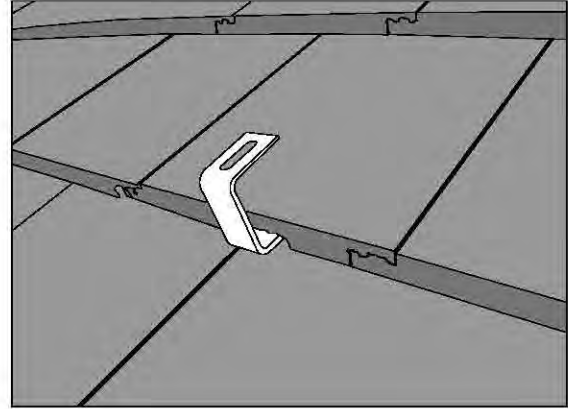
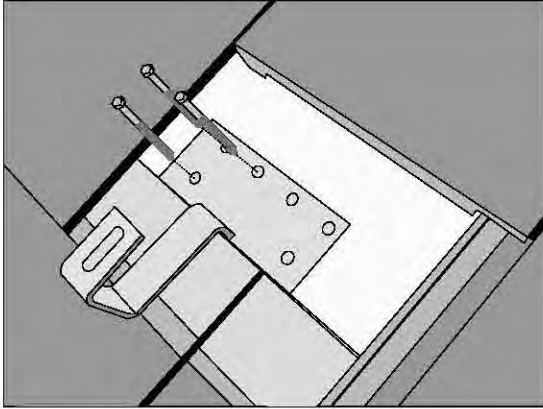


Model	JHC-5818-10	JHC-5818-15	JHC-5818-18	JHC-5818-20
a	735mm	1100mm	1335mm	1485mm
b	1340mm, 1240mm, 1140mm (All are available)			

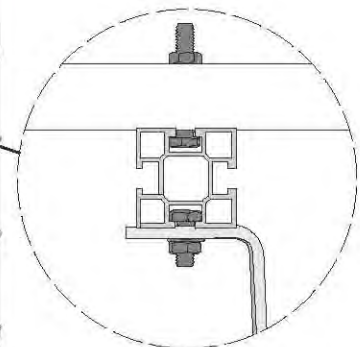
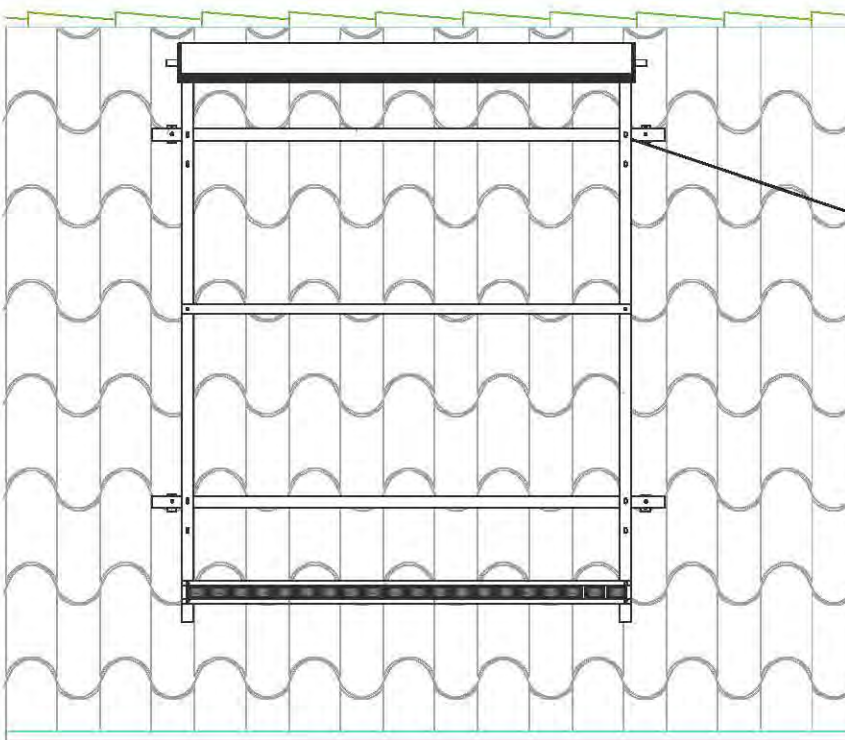
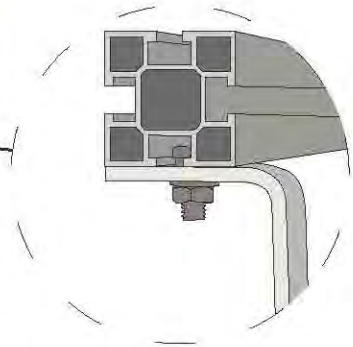


Model	JHC-5818-24	JHC-5818-30
a1	892.5mm	1117.5mm
a2		
b	1340mm, 1240mm, 1140mm (All are available)	

### 5.5.3 Roof hook installation :

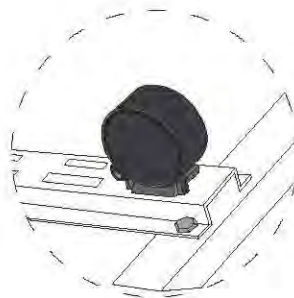
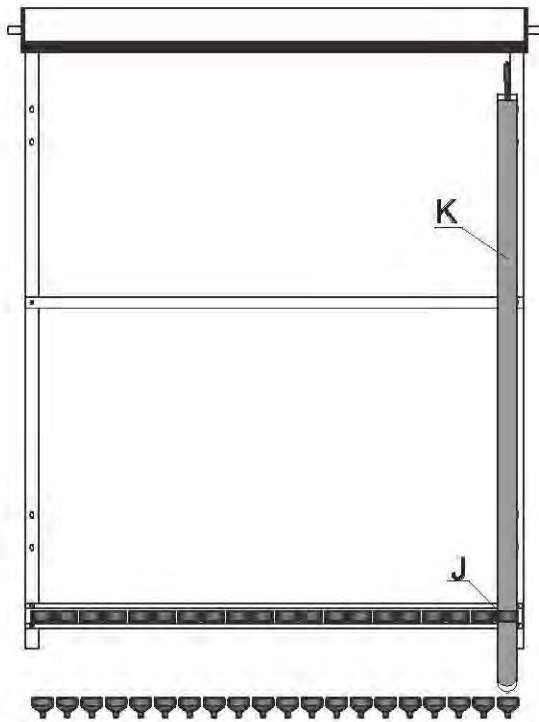


#### 5.5.4 Installing the bearing rails and frames:

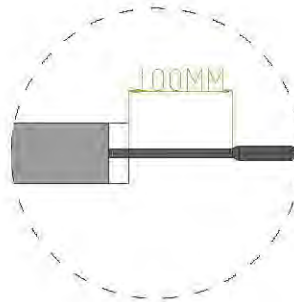




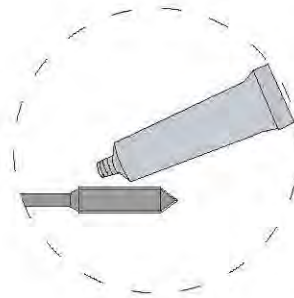
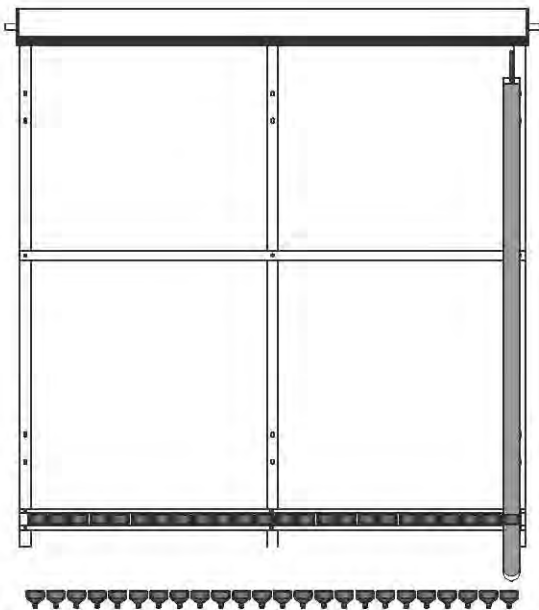
### 5.5.5 Installing the heat pipe vacuum tube :



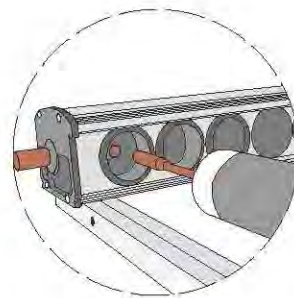
1. Install the tube cap.



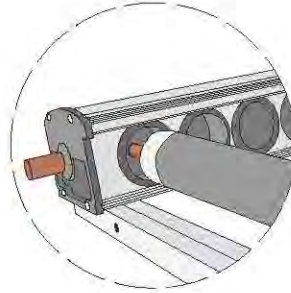
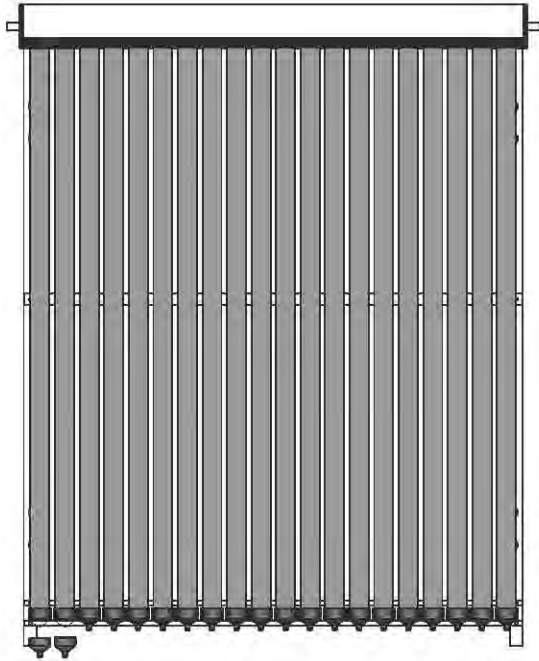
2. Pull the heat pipe out a little.



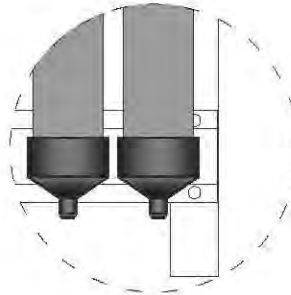
3. Smear silicone grease on the surface of heat pipe condenser.  
(Used to increase energy transfer efficiency)



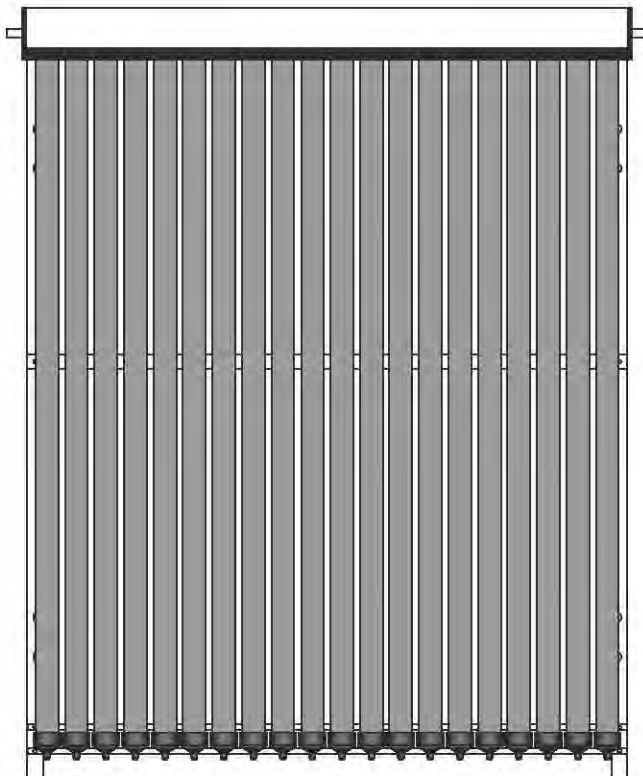
4. Push the heat pipe condenser to the manifold hole, make sure into the condenser touch the heat pipe manifold port tightly.



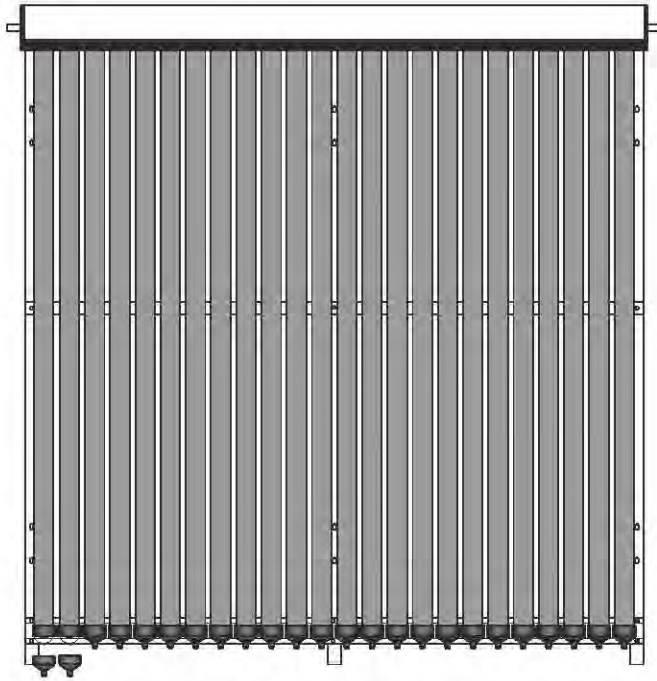
5. Push the vacuum tube to the manifold hole, make sure vacuum tube fix with the anti dust circles tightly.



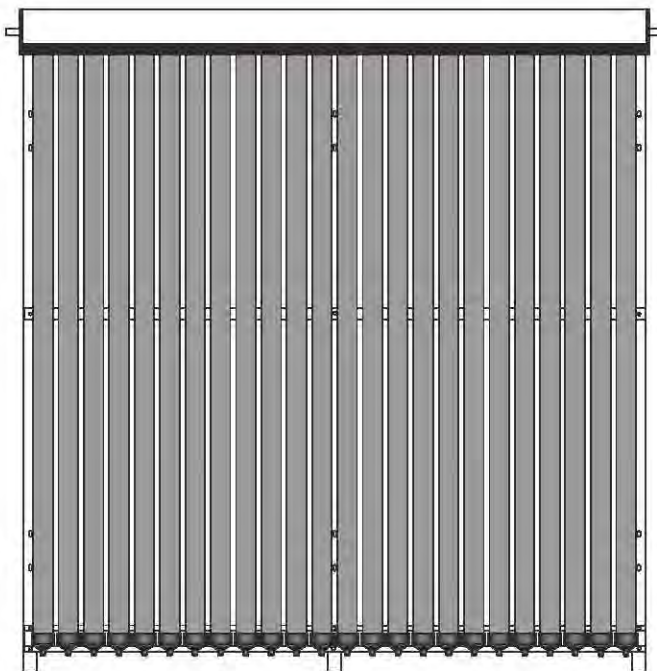
6. Circumgyrate and install the cap of tailstock tightly.



7. Check everything and finish the solar collector installation



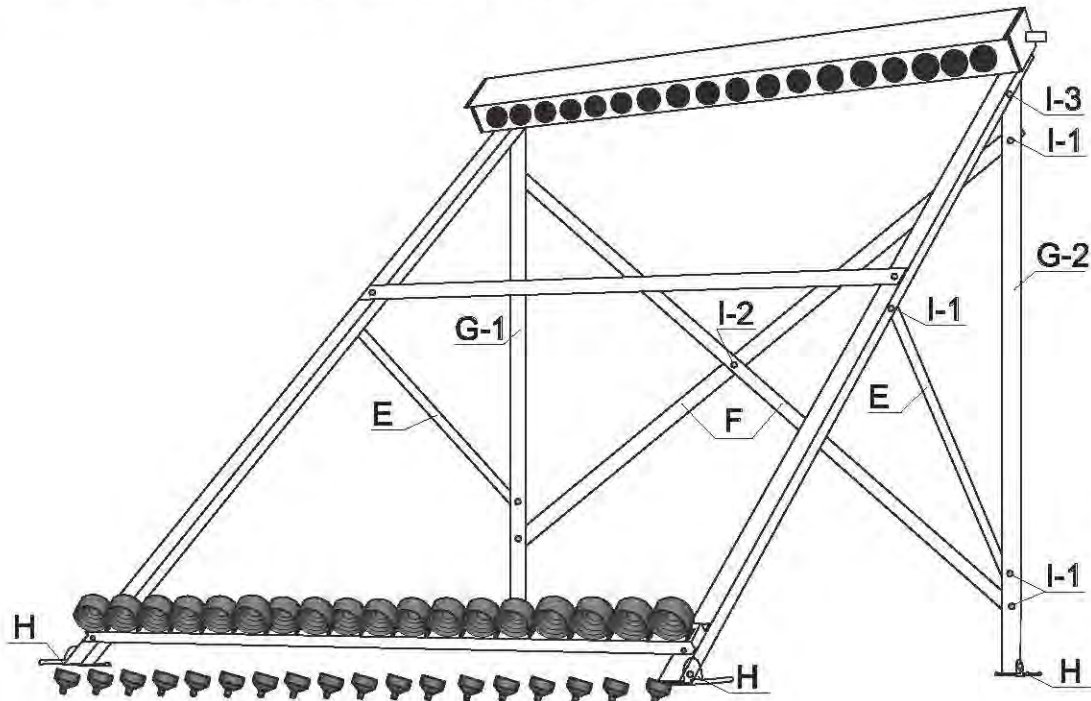
Circumgyrate and install the cap of tailstock tightly.



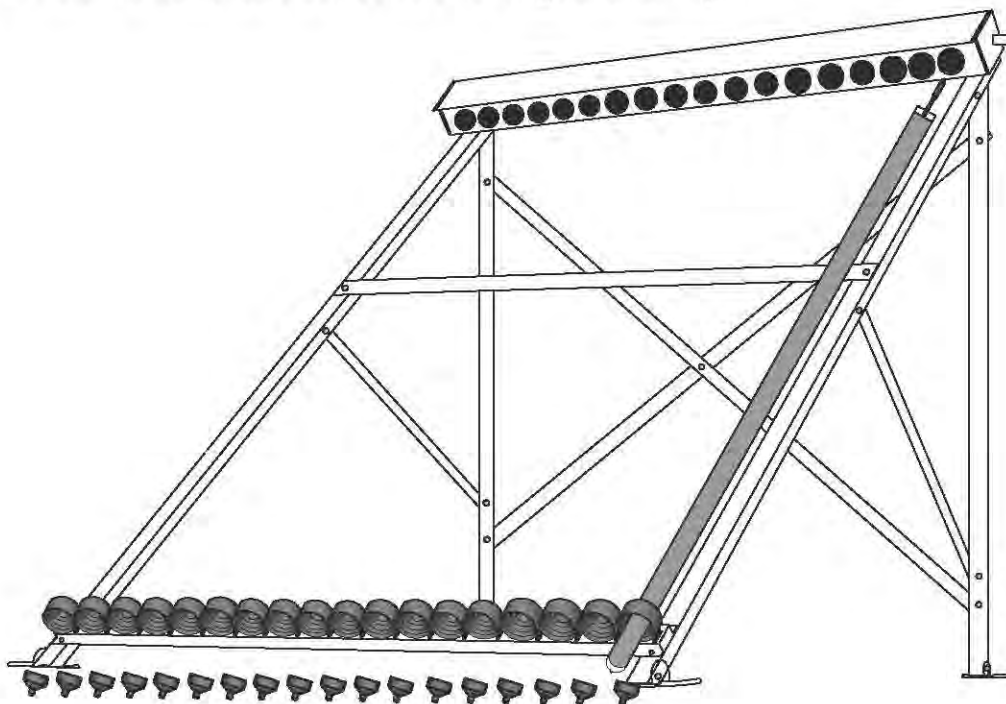
Check everything and finish the solar collector installation

## 5.6 Install flat roof collector

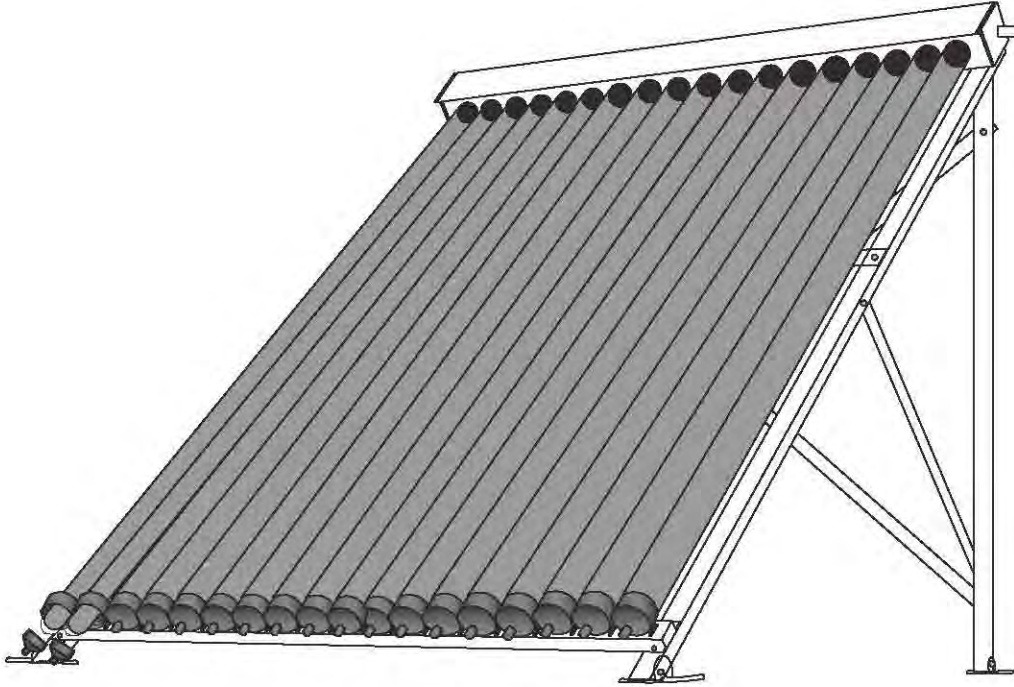
Applicable model: JHC-5818-10, JHC-5818-15, JHC-5818-18, JHC-5818-20



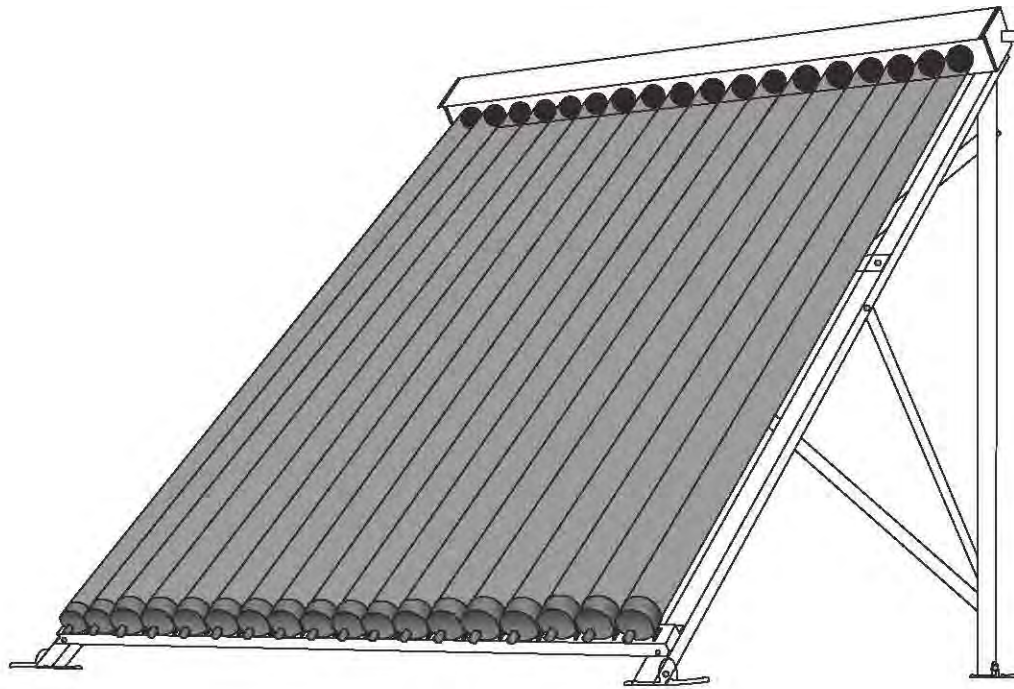
1. Install frame and manifold box please refer to page 13.
2. Install rear legs.
3. Install cross bars between the rear legs to create an "X"
4. Install horizontal bars between the front legs and rear legs



Install the heat pipe vacuum tube please refer to page 17

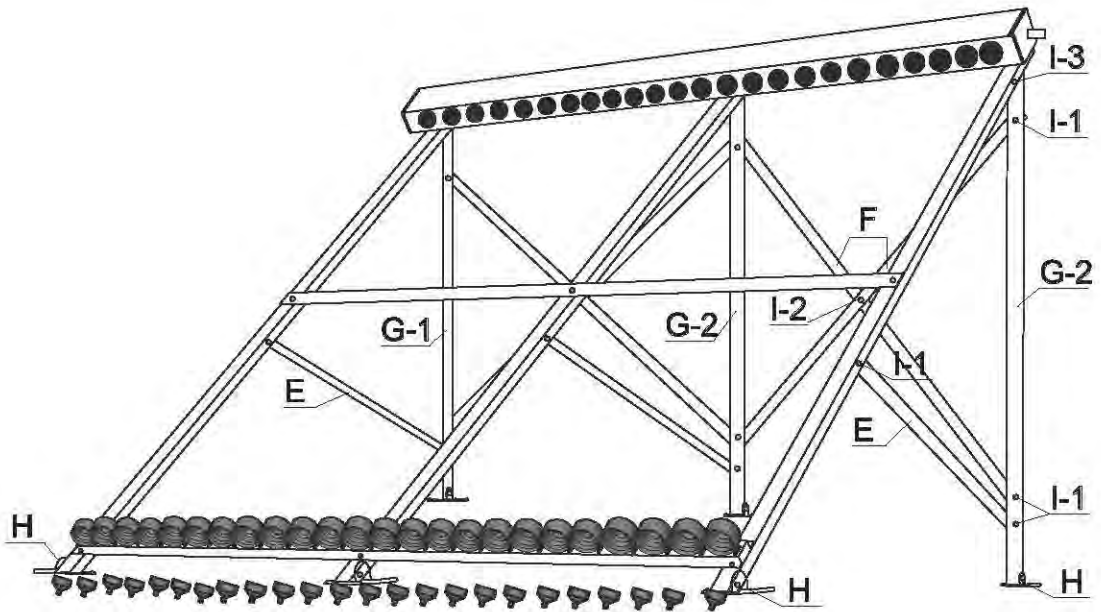


Circumgyrate and install the cap of tailstock tightly.

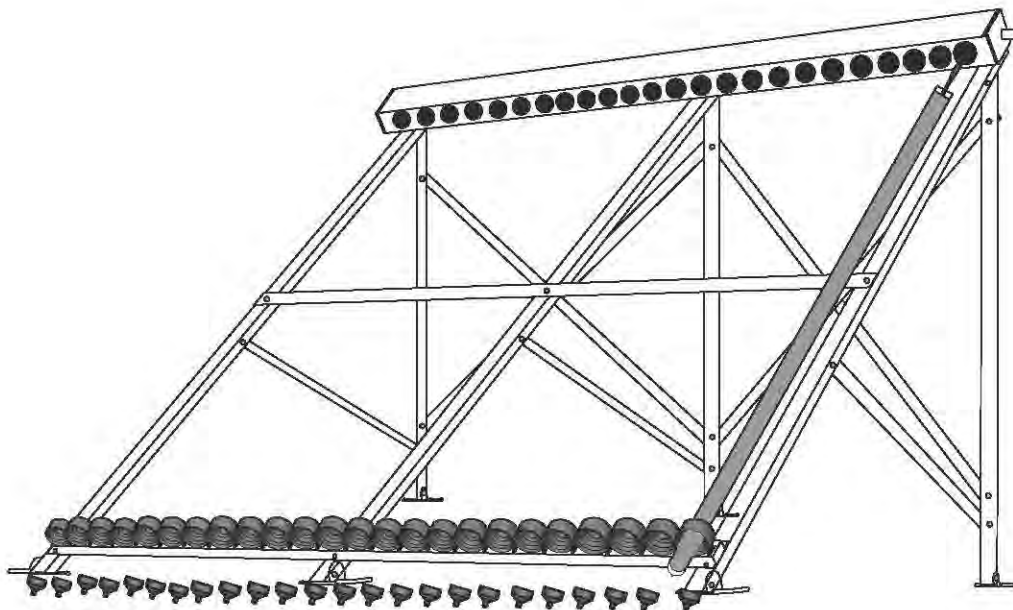


Check everything and finish the solar collector installation

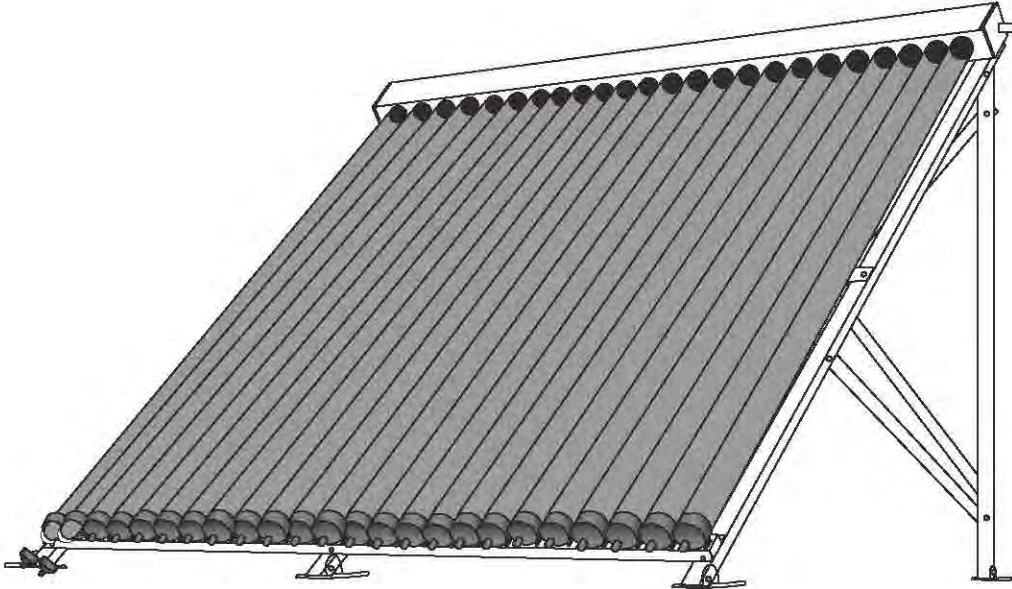
Applicable model: JHC-5818-24, JHC-5818-30



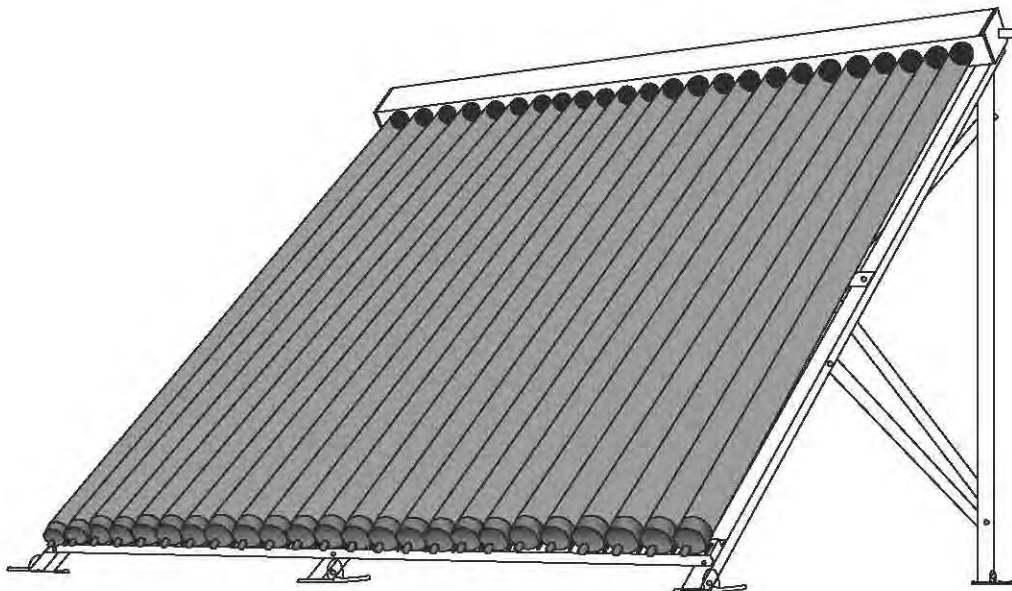
1. Install frame and manifold box please refer to page 13.
2. Install rear legs.
3. Install cross bars between the rear legs to create an "X"
4. Install horizontal bars between the front legs and rear legs



Install the heat pipe vacuum tube please refer to page 17



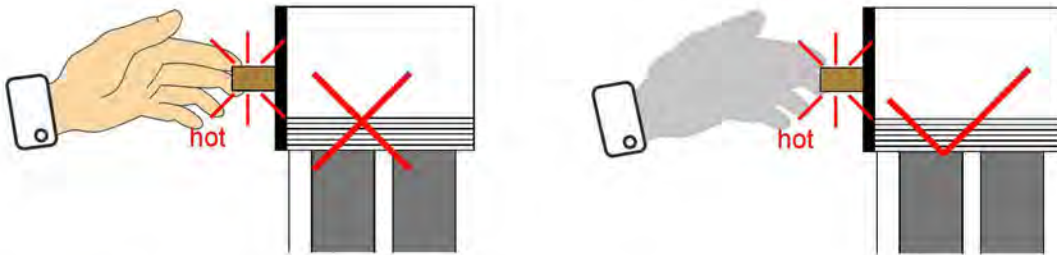
Circumgyrate and install the cap of tailstock tightly.



Check everything and finish the solar collector installation

## Warning!

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. Because once tubes are exposed under sunshine, they begin to work. The heat will be transferred to the top of heat pipes in seconds. Therefore, the two ends of copper pipes are very hot after you finished the assembly. Touch it directly will scald skin! You also can cover a blanket to tubes to avoid it.



## Suggestions:

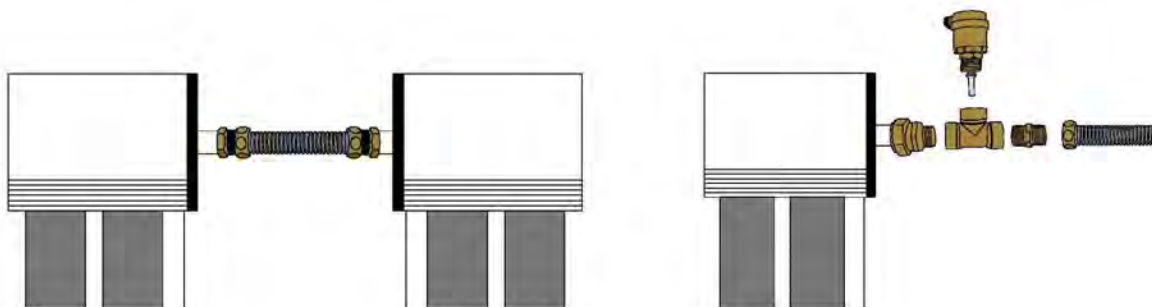
1. The assembly process is best to be finished at in the shade.
2. If the process has to be finished under sunshine, you can cover the inserted tubes by black cloth, etc.

## 6. Lightning protection

The collectors should be done lightning protecting to avoid the lightning attacking. The lightning rod is necessary which should be 1.5m higher and 3 m far away from the solar collectors. For any problems that involve plumbing or electrical connections the services of a qualified professional must be employed.

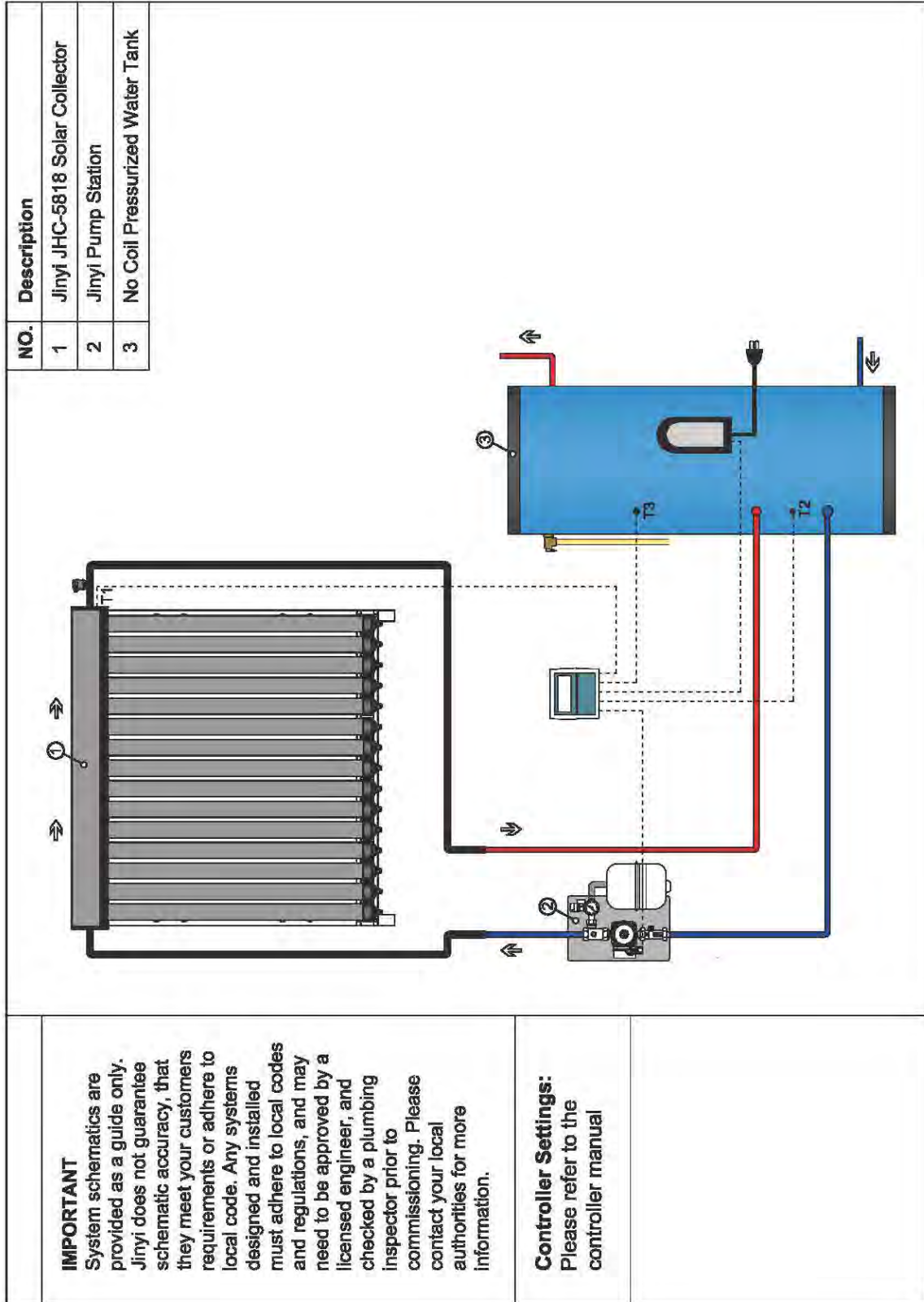
## 7. How to connect couple of collectors

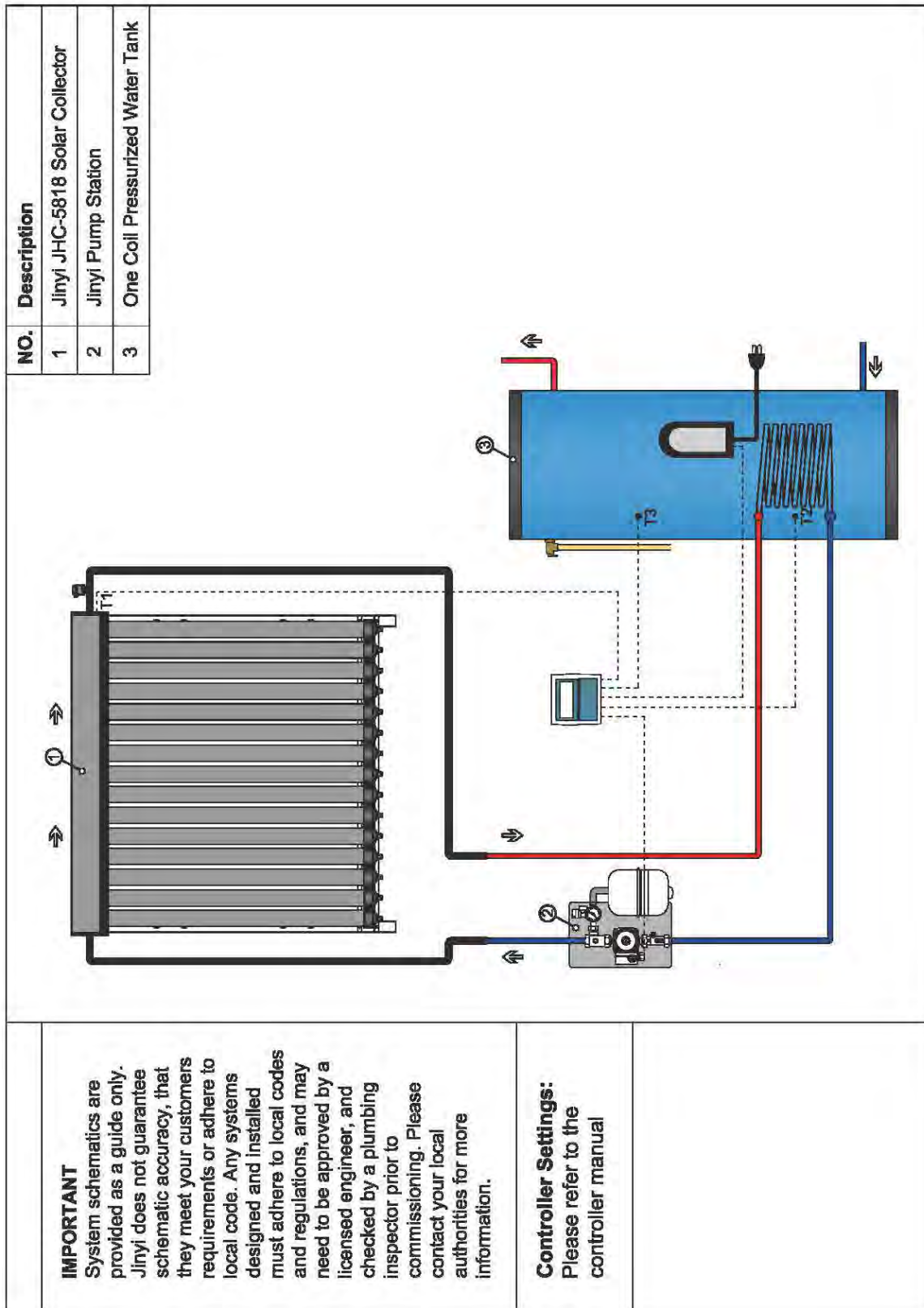
We suggest you use the corrugated connection pipe to connect every two solar collectors, which is very convenient and completely fit two solar collectors. Please see the following picture.

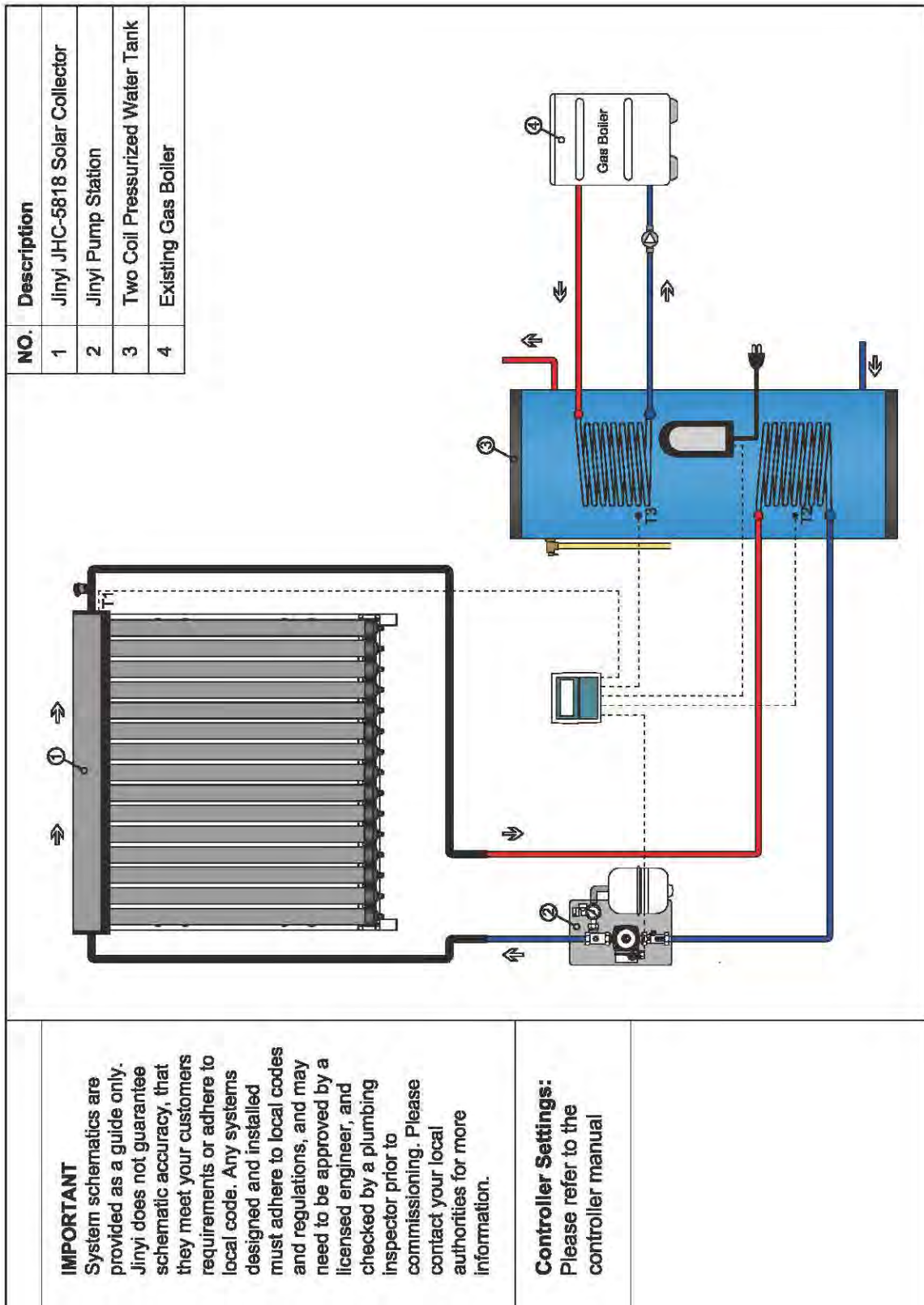




### 8. System connection schematic







## 9. Dimensions of pipe connections

Qty. Tube(x)	Series and parallel	Main pipeline	Branch pipeline
$x \leq 36$	Series	$\frac{1}{2}$ or $\frac{3}{4}$ inch	$\frac{1}{2}$ or $\frac{3}{4}$ inch
$36 > x \leq 90$	Series	$\frac{3}{4}$ inch	$\frac{3}{4}$ inch
$90 > x \leq 120$	Series	$\frac{3}{4}$ inch	$\frac{3}{4}$ inch
$120 > x \leq 240$	Series and 2 parallel	1 inch	$\frac{3}{4}$ inch
$240 > x \leq 360$	Series and 3 parallel	$1\frac{1}{4}$ inch	$\frac{3}{4}$ inch
$360 > x \leq 480$	Series and 4 parallel	$1\frac{1}{2}$ inch	$\frac{3}{4}$ inch
$480 > x \leq 600$	Series and 5 parallel	2 inch	$\frac{3}{4}$ inch

In a standard heating system, we recommend that you use standard flexible stainless steel tube and stainless steel fittings when installing the collectors (or standard copper piping and copper fittings). The connection points of the pipes should be brazed or connected using olive connections due to the high stagnation temperatures. No galvanised pipes, galvanised fittings or graphite seals may be used. Hemp may only be used in conjunction with pressure and temperature resistant sealant. The components used must be resistant to the heat transfer medium. The thermal insulation of pipes outdoors must be temperature and UV radiation-resistant and resistant to bird damage. Under no circumstances can plastic pipe work or fittings be installed within the solar system.

## 10. Water quality

a) Water in direct flow through the manifold header must firstly meet potable water requirements, and in addition the following:

Total dissolved solids	< 600 p.p.m.	Total hardness	< 200 p.p.m.
Chloride	< 250 p.p.m.	Free Chlorine	< 5 ppm
Magnesium	< 10 p.p.m.		

b) In areas with "hard" water (>200ppm), lime scale may form inside the header pipe. In such regions, it is advisable to install a water softening device to ensure the long term efficient operation of the collector, or use a closed loop for the solar circulation loop.

c) If using a glycol/water mix, the water must meet the above requirements, and the glycol content of the liquid must not exceed 50%, unless the manufacture specifies that a different ratio is recommended for use with solar water heaters. Glycol may need to be changed periodically (every 3-5 years) to prevent the glycol from becoming acidic.

d) In order to meet health and safety regulations, only food grade polypropylene glycol or other heat transfer fluids should be used.

e) For areas with sustained winter temperatures below  $-5^{\circ}\text{C}$ , a closed loop filled with an anti-freeze heat transfer fluid should be used to provide freeze protection. Only food grade heat transfer fluids should be used.

## 11. Installation precautions

Note: In order to avoid jamming the digital flow meter and in result to display no flow on solar station, the filter must be installed on the return and flow pipeline of 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 sealing caps from solar station. The maximum distance between solar station and water tank is 300mm, keep top edges of solar station and top edges of storage tank.

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

Be careful of scald 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.

## 12. Max. working pressure

Regardless of the installation configuration, pressure release valves, expansion vessels and/or other pressure control devices must be installed. The solar loop should be designed to operate at no more than 0.6MPa. (0.6MPa=6bar=87psi) For installation where mains pressure water is used, the system should ideally be designed to operate at a pressure of <0.4MPa, achieved by use of a pressure limiting/reduction valve.

## 13. Pressure drop at rated flow rate

Pressure drop through an Jinyi 15 tube header at 2.7L/min and 20 °C is around 0.2kPa.  
Pressure drops at higher temperatures will be slightly lower.

## 14. Wind and snow load

When installing the collector 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 120km/h and 30cm snow accumulation without damage. For the areas with possibility for high winds, additional reinforcement of attachment points may be required and can easily be supplied by your local installers.

## 15. Maintenance requirements

### 15.1 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.

### 15.2 Leaves

During autumn, leaves may accumulate between or beneath the tubes. Please remove these leaves regularly to ensure optimal performance and to prevent a fire hazard. (The solar collector will not cause the ignition of flammable materials)

### 15.3 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.



Jiaxing Jinyi Solar Energy Technology Co.,Ltd.

Add: Caozhuang Industrial Park, Yuxin Town, Jiaxing City, Zhejiang Province, China

Tel: 0086-573-8284 8871 / 8284 8872 / 8322 6565

Fax: 0086-573-8284 8893

Web: [www.jinyi-solar.com](http://www.jinyi-solar.com)

E-mail: [info@jinyi-solar.com](mailto:info@jinyi-solar.com)

