



INSTRUCTIONS BOOKLET  
FOR INSTALLATION, USE AND MAINTENANCE

**Flat Plate Solar Collector**



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**Flat Plate Solar Collector**

**- FP2.0Cu/Al, FP2.5Cu/Al, FP3.0Cu/Al**



**Dec 2023    Version 1.1**



Dear Customer,

Thank you for choosing a Flat Plate Solar Collector by VERSOL GROUP.

In your interest and to maintain the highest level of performance and life of your appliance, we recommend that you follow the instructions contained in this booklet and have regular maintenance performed by qualified personnel.

We would like to remind you that failure to follow the instructions contained in this booklet may invalidate the guarantee



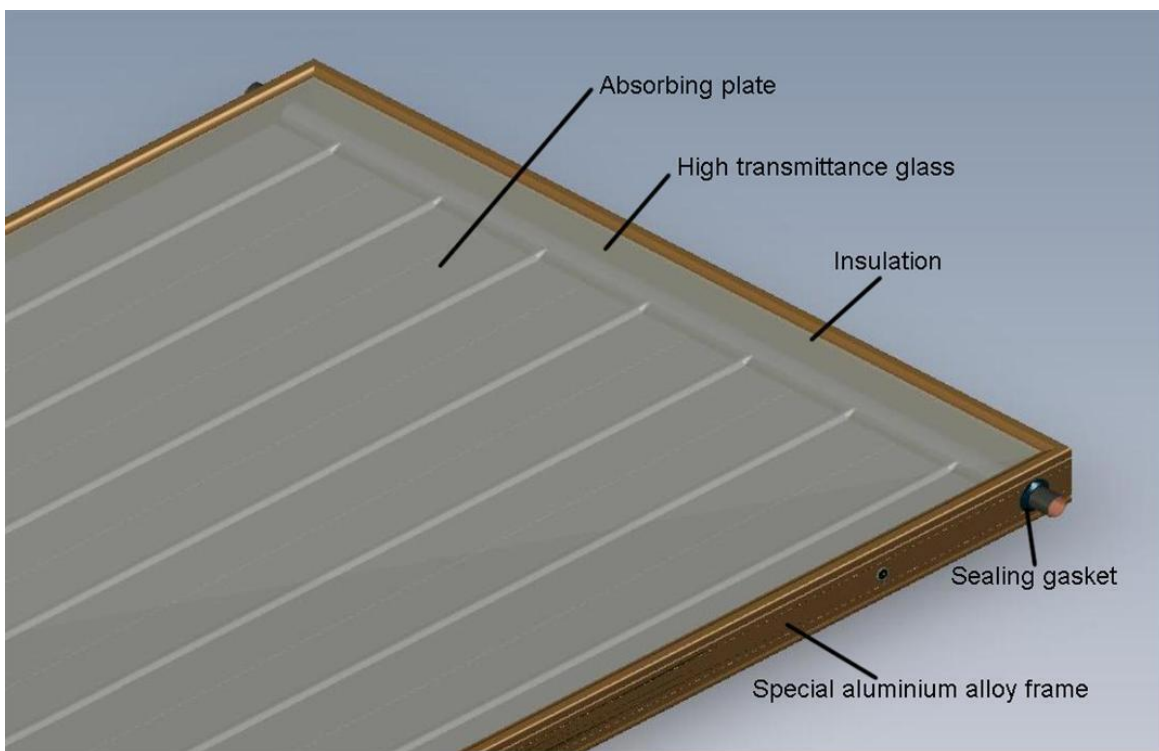


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## 1.Introduction

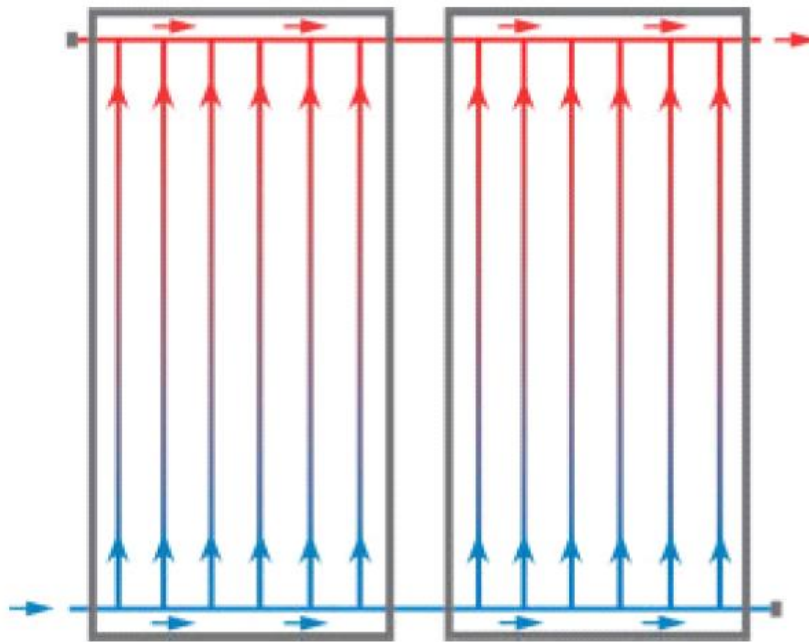
A glazed flat-plate solar collector consists of a shallow rectangular box with a flat black plate behind a tempered glass cover. The plate is attached to a series of parallel tubes or one serpentine tube through which water or another liquid (such as an antifreeze solution) passes. Sunlight passes through the glazing and strikes the absorber plate, which heats up, changing solar energy into heat energy. The heat is transferred to liquid passing through pipes attached to the absorber plate. Microe absorber plates are commonly painted with "selective coatings"(Figure 1).



**Figure 1**

As the liquid circulates through the system, it absorbs the heat from sunlight falling on the collectors. The heated liquid then enters a heat exchanger or is added directly to the conventional system. In commercial applications, the solar-heated water flows to a storage tank that is connected to the conventional water heating system. Although flat-plate solar collectors could mainly be used under the

circumstance of the temperature above zero centigrade as they are less efficient in cold weather than in warm, micoe system is best suited to applications that require medium to high temperatures .



**Figure 2**

## 2.Data sheet

Model	FP2.0Cu/Al	FP2.5Cu/Al	FP3.0Cu/Al
Gross area	2.0m <sup>2</sup>	2.5m <sup>2</sup>	3.0m <sup>2</sup>
Aperture area	1.85m <sup>2</sup>	2.34m <sup>2</sup>	2.83m <sup>2</sup>
Absorber area	1.85m <sup>2</sup>	2.34m <sup>2</sup>	2.83m <sup>2</sup>
L×W×H(mm)	2000×1000×80	2000×1250×80	2000×1500×80
Weight(Kg)	32	38	46
Absorber capacity	1.66L	2.1L	2.47L
Housing	Aluminium alloy		
Surface	Aluminium alloy		
Back plate	Steel plate/ Aluminium zinc plate/ Aluminum foil		
Absorber sheet	Titanium alloy		
Absorption	$\alpha \geq 0.93$		
Emission	E=0.15		
Manifold	22mm		
Risers	10*0.5mm		
Connection size	22mm or 3/4"		
Glass	Textured tempered glass		
Transmittance of glass	$\geq 91\%$		
Insulation	Polyester cotton		
Max. stagnation temperature	160.5°C		
Max. operation pressure	1.2MPa		
Rated working pressure	0.6MPa		
Maximum wind and snow load	0.49kN/m <sup>2</sup>		
Heat transfer medium	Water or Antifreeze		
Approved installation angle	15°~75°		

## 3. Installation & Transportation

### 3.1 Transportation

Solar Collectors must be secured during transportation. It is imperative that each collector be secured from falling out of the packaging, and that they be secured from scratching each other, as this may damage the collectors and lessen their performance. You should always follow these simple precautions:

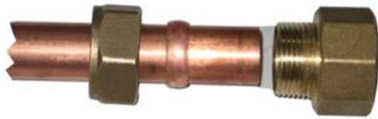
- Use of a carryin strap is recommended
- Do not lift the collector by the connection ports or header tube
- Avoid impacts and vibration on the collector as much as possible
- Please lift the collector by the lifting lugs (if included)

### 3.2 Installation

#### 3.2.1. Installation of the collector

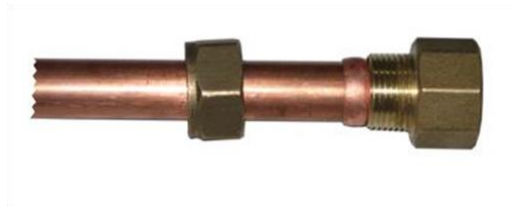
Both the inlet and outlet of the collector are with no screw thread.

1). Unscrew the cutting ferrule then install it to the inlet/outlet as the figure3.

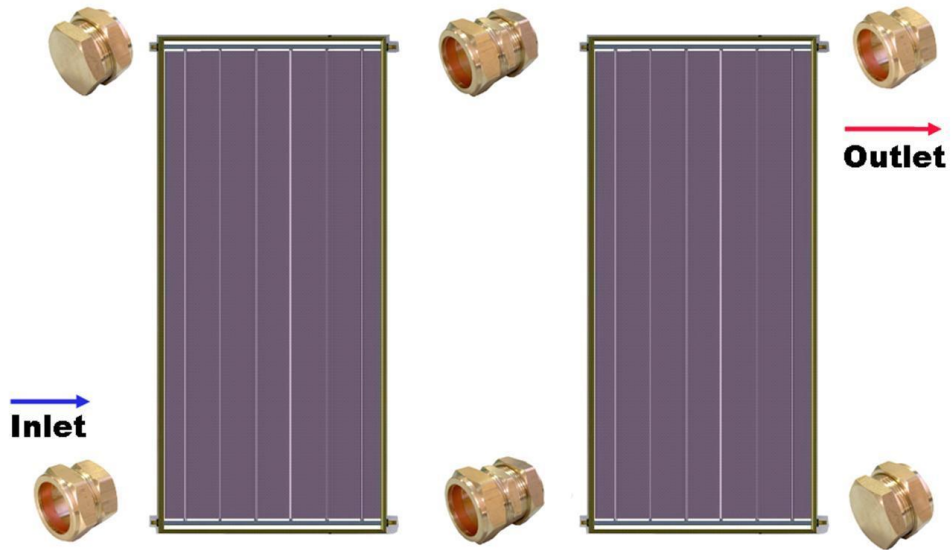


**Figure 3**

2). Insert the inlet/outlet into the cutting ferrule as figure4, then tightening the nut with two spanners.







**Figure 4**

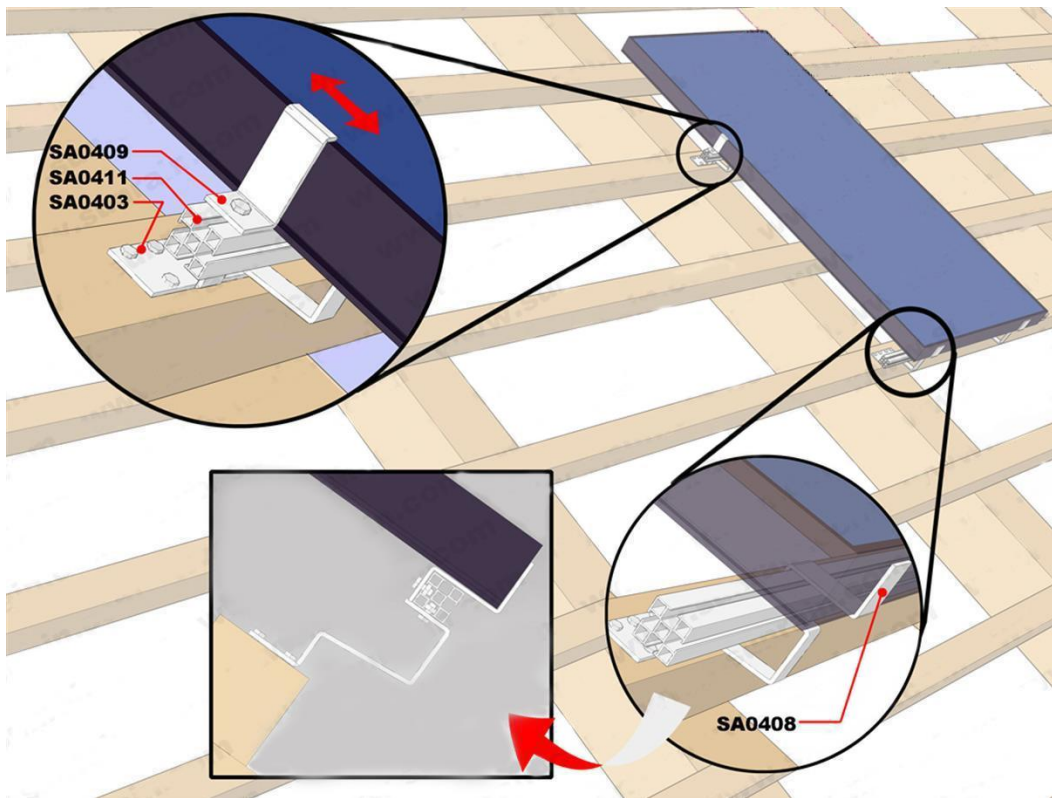


**Figure 5**

**Configuration Tabel (Figure 5)**

Name	Type	Specification	drawing
Collector	FP2.0Cu/Al FP2.5Cu/Al FP3.0Cu/Al	2000×1000×80mm 2000×1250×80mm 2000×1500×80mm	
Compression end cap		22mm	
Female compression nipple		22mm×3/4in	
Compression coupling		22mm×22mm	



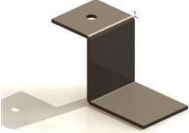

### 3.2.2. Array mounting on tile roofs



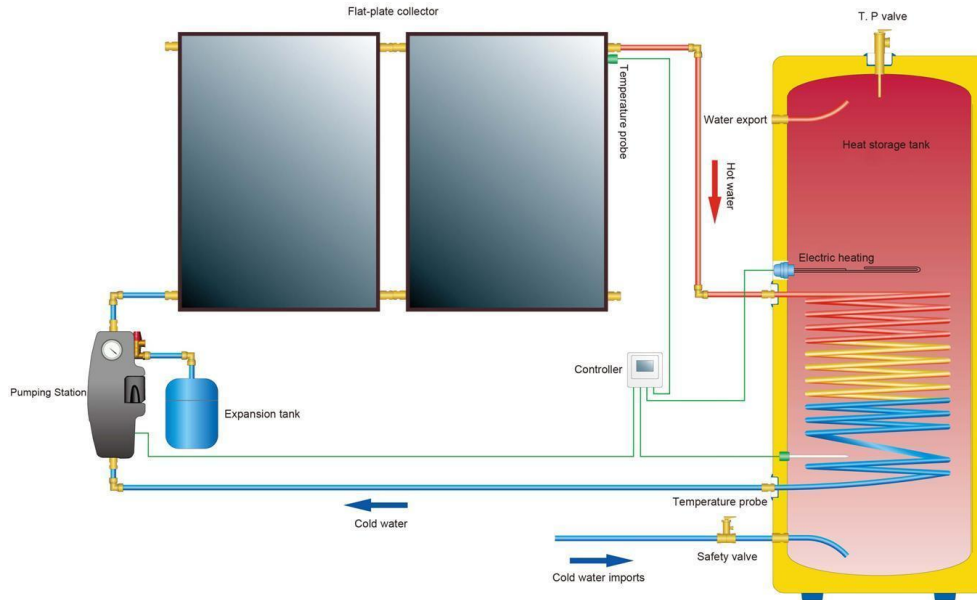
**Figure 6**

#### Configuration Table (Figure 6)

Name	Type	Qty	Specification	drawing
Collector	FP2.0Cu/Al FP2.5Cu/Al FP3.0Cu/Al	1	2000×1000×80mm 2000×1250×80mm 2000×1500×80mm	
Compression end cap		2	22mm	
Female compression nipple		2	S22mm×3/4in	





<p><b>Mounting bracket</b></p>	<p><b>SA0411</b></p>	<p><b>2</b></p>	<p><b>40×40mm</b></p>	
<p><b>Collector mounting bracket</b></p>	<p><b>SA0403</b></p>	<p><b>4</b></p>	<p><b>Thickness:5mm</b></p>	
<p><b>Collector connect sheet</b></p>	<p><b>SA0408</b></p>	<p><b>2</b></p>	<p><b>Thickness:4mm</b></p>	
<p><b>Collector connect sheet</b></p>	<p><b>SA0409</b></p>	<p><b>2</b></p>	<p><b>Thickness:4mm</b></p>	





### 3.2.3. Installation of the system



**Figure 7**

### Configuration Table (Figure 7)

Name	Type	Specification	drawing
Split Pressure Water Tank	SZ-XXL series	100L-500L	
Collector	FP2.0Cu/Al FP2.5Cu/Al FP3.0Cu/Al	2000×1000×80mm 2000×1250×80mm 2000×1500×80mm	
Compression end cap		22mm	
Female compression nipple		22mm×3/4in	

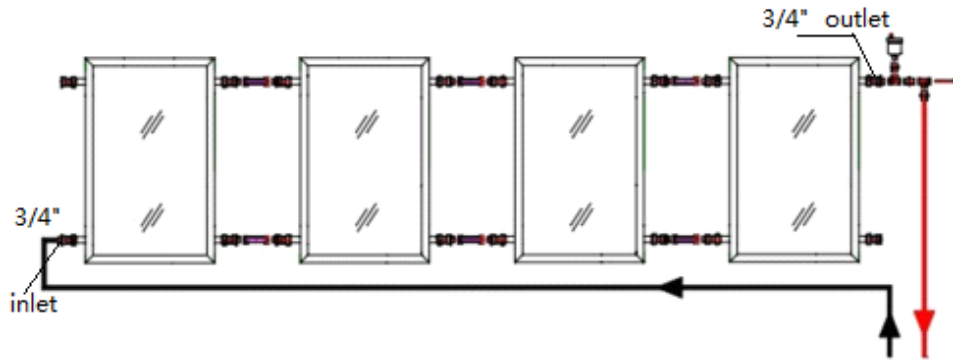
<b>Compression coupling</b>		<b>22mm×22mm</b>	
<b>Pump station</b>	<b>WCFD1-III / WCFD2-III</b>	<b>Full power of recycle pump:AC110V/220V,9 3W; Temperature and pressure gauge:120°C,1.0MPa; Pressure relief valve:0.8MPa Flowmeter:2-8L/min Connector:1/2in</b>	
<b>Controller</b>	<b>SM-SS-F</b>	<b>Power supply:AC100~240V</b>	
<b>Expansion tank</b>		<b>Capacity:18L/24L; Max.Working pressure:1.0MPa</b>	

Note:If the solar water collector is not in the protecting scope of lighting conductor fixed in the buildings,the installer or user should design the lighting protection based on the local requirement.

### 3.2.4 Installation for collector arrays up to 20 m<sup>2</sup>

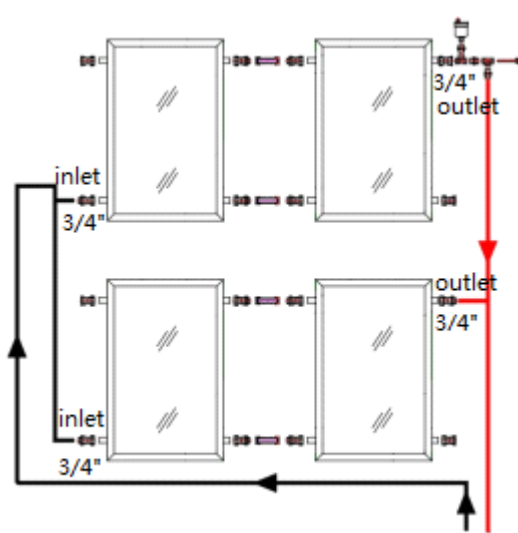
Connect the collectors with metal pipes(e.g.metal bellows) rather than plastic pipes, given there high temperature and pressure resistance.

1).Single-rowed collectors

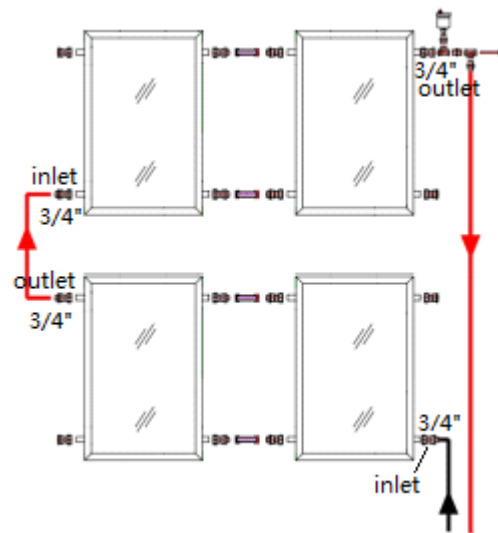


**Figure 8**

2). Double-rowed collectors



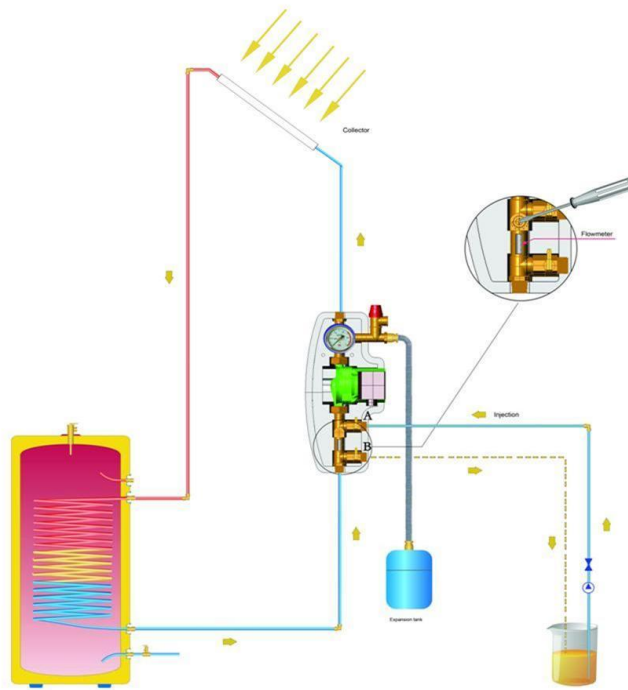
**Figure 9**



**Figure 10**

- Note:(1) Every row install 7 collectors at most, if the system need more than 7 collectors, please install them in series and in parallel meanwhile.  
 (2) The copper pipe may expand with the high temperature, so suggest to use metal bellows among three collectors to avoid the pipe being out of shape.  
 (3) econdary circulation can prevent freeze effectively.

### 3.3 Working principle of Pump station



**Figure 11**

#### a. Circulator Fluid

The fluid that circulates through your solar collectors is known as the HTF or Heat Transfer Fluid. Your HTF can be either water (potable water in an open loop system) or a water-glycol solution. A water glycol solution can protect flat plates from freezing in temperatures far below zero if need be. Use the chart below to determine the amount of glycol that should be used in your solar collector loop to provide adequate freeze and burst Protection.

#### Percent (volume) Glycol Concentration Required

Temperature (F)	Freeze Protection	Burst Protection
20	18%	12%
10	29%	20%
0	36%	24%
-10	42%	28%
-20	46%	30%
-30	50%	33%
-40	54%	35%
-50	57%	35%
-60	60%	35%

The water-glycol solution our company provides has a special formulation so that it not only can prevent freeze but also prevent boiling, corrosion and scaling. If customer will prepare the fluid himself ,please choose the good quality product or mix some corrosion inhibitor in the water-glycol solution.

## b. The steps for liquid filling

Note: Ensure the solar collector is covered and completely cool before starting the liquid fill.

① Initial Settings. Set the flow control valve in the fully open position using a flat blade screwdriver, (Slot aligns with F), and set the two valves for the liquid fill port (upper port) and air vent (lower port) in the fully open position as shown in the picture.



② Keeping the flow control valve open, connect the liquid filling pipe to the liquid filling port and connect a pipe to the air vent port to direct overflow fluid to a container.



③ Close the flow control valve using a flat blade screwdriver (Slot horizontal- see picture)



④ Start filling the liquid, watching the exit of the pipe connected to the air vent. Initially this pipe should discharge air, but when liquid flows continuously out of the air vent pipe, without flow variation or air bubbles, close the air vent valve (lower valve- see picture)



⑤ Continue the liquid fill, watching the pressure increase on the pressure gauge in the Pump Station. When the pressure in the pipeline, as measured by the pressure meter, reaches 4 BAR, close the liquid fill port valve (upper valve -see picture).



⑥ Watch the pressure gauge of the pump station for 3 minutes (user can line up the red pointer with the initial pressure reading to help detect pressure changes). If the pressure remains stable, the liquid filling pipe and fill equipment can be disconnected. The liquid filling is now COMPLETE. If the pressure is observed to decrease, we need to do leak detection and maintenance for the circulation pipeline before filling again.

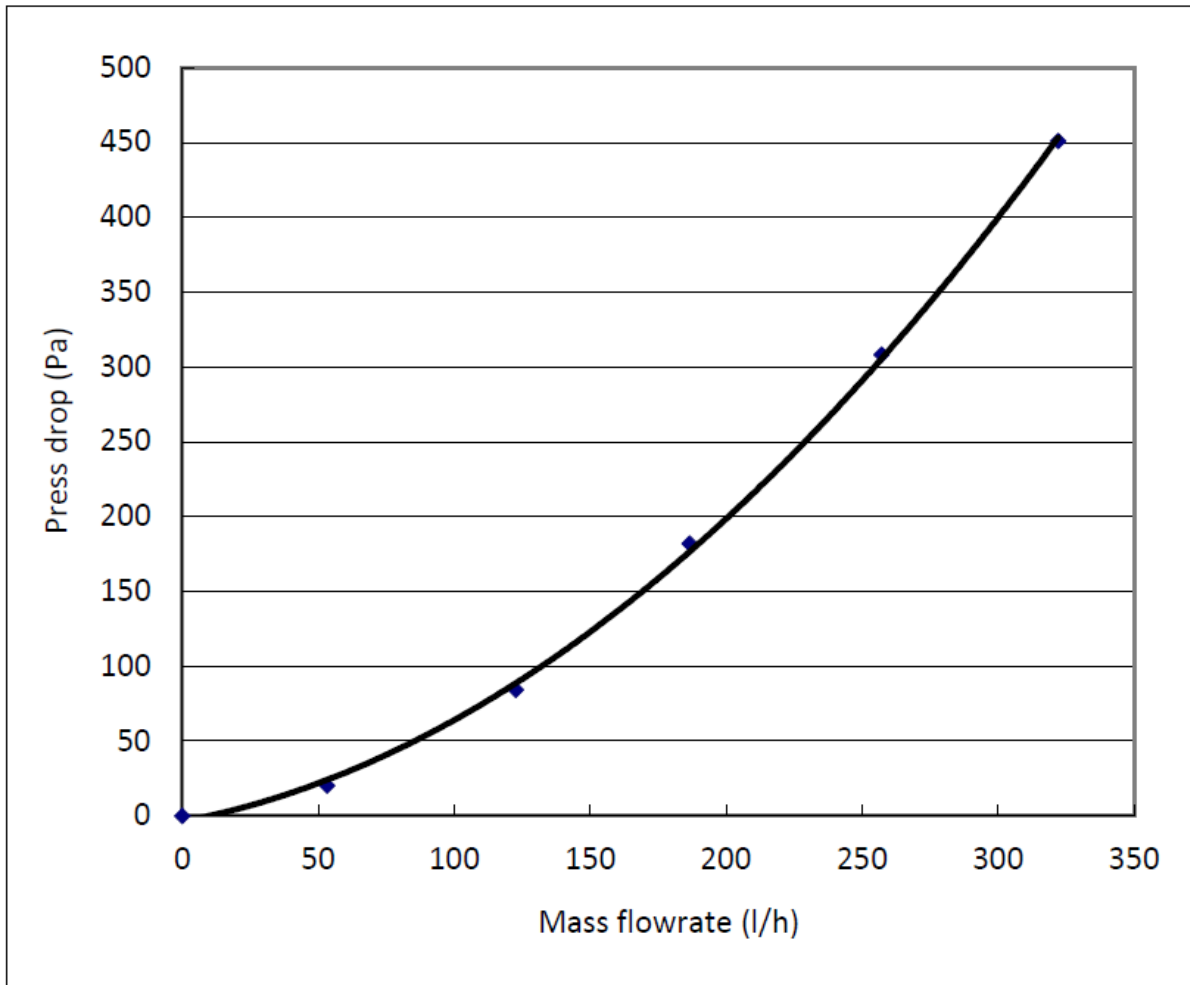


### 3.4 Recommendation about lightning protection

It's advisable to earth/ground the copper circulation loop of the collector to avoid lightning related damage.

### 3.5 Pressure drop

- a) For open loop systems, the normal operating pressure should be less than 500kpa/72.5psi via use of a pressure limiting (pressure reduction) valve on the mains cold supply line.
- b) For closed loop systems, the solar loop must operate at less than 500kpa/72.5psi, and have an expansion vessel installed to control water expansion.
- c) Any system design must provide means for allowing pressure release at no more than 800kpa/113psi.



Pressure drop curve (for 20°C water)

### 3.6 Acceptable wind and snow load

- a) The standard frame, and frame kits all designed to withstand wind speed of up to 80mph/128km/h without damage. For areas with wind speeds that may exceed this level an additional front track and rear legs should be installed.
- b) The maximum snow load is 3000Pa.

## 4. Trouble shooting

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

Problem	Cause	Remedy
Flat panel solar collector low working performance	a) Less solar insolation in your geography area	a) Add other assistant energy sources, such as gas heating system or electric heating system.
	b) Solar collector is covered by shade so can't receive enough sunlight	b) Relocated in unshaded area
	c) Solar collector installed by a wrong angle	c) Adjust the solar collector and make sure the installation angle is from 15 to 75 degree
	d) Pipe line don't seal and insulated very well, so there is more energy loss	d) Check and seal the pipe line and keep the pipeline insulated very well.

## Maintenance of Collector

The maintenance of collector is simple, just several points as below:

- 1、 Clean dust on glass surface: It is depending on the situation, that is to say, as the case (can be semi-annual), to clean collector glass surface with a cloth or dust mop for increase light transmission and ensure that the collector absorber efficiency.
- 2、 Clean tube and tank: For the collector system use water as medium, sewage regularly to prevent pipe blockage; and cleaning the water tank to ensure water is clean. The clean method is to open sewage valve as normal conditions, drain until the water is clean.
- 3、 inspection working status of system: To check connecting pipe, exhaust valves and other devices of collector regularly, repair it in time if there is any leakage and other problems.
- 4、 Maintenance of frame: check collector frame regularly, paint it if rust, so as to avoid frame corrosion and collapse.

5、 Other parts: For parts such as pumps, solenoid valves, auxiliary heating parts and electrical control cabinet, The maintenance should be implemented according to the manufacturer's guidelines.

## 5.1 Information of company

Name of company:	Versol Ltd Sp Zoo
Address:	Elektoralna, 13 lok, 00-137, Warszawa, Poland
Tel:	+48 22 247 8210
E-mail:	info@versolgroup.com



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