



XL1921 SOLAR COLLECTOR

MOUNTING SYSTEM FOR FLAT ROOF

Subject to technical modifications.

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

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1. General Information

1.1 Structure and function of XL1921 collector



XL 1921 evacuated tube collector consists of 3 main components, which are completely pre-assembled in a collector module:

- Evacuated tubes
- CPC reflector
- Manifold with heat transfer units

The incident solar radiation is reflected by the CPC reflector onto the absorber surface of the evacuated tubes where it is converted into heat.

The high vacuum in the tubes combined with the highly selective coating on the absorber prevents the heat from escaping into the environment.

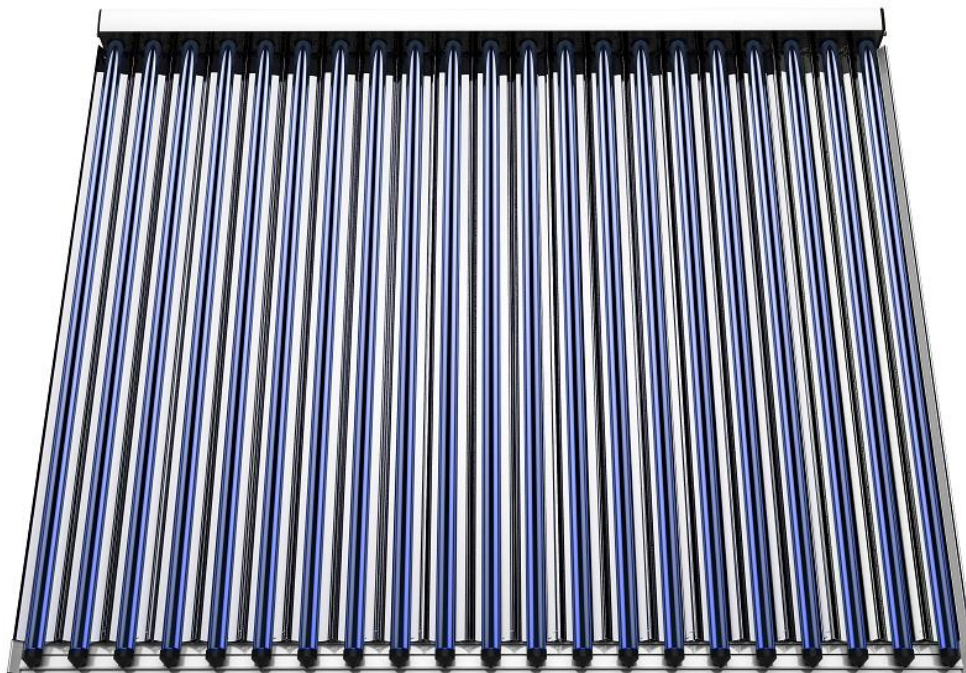
The heat is transported away from the collector using a suitable heat transfer medium and by means of so-called heat exchangers inside the vacuum tubes and the tube register connected to them.

1.2 Applications and design of XL1921

The XL1921 collector may be used for water heating, room heating, solar cooling, etc.

The CPC XL/OEM XL collector should only be used in conjunction with suitable solar controllers and only in intrinsically safe and sealed solar heating systems that are fitted with a suitable and sufficiently sized expansion tank.

1.3 Technical data of XL1921



Annual energy yield under Solar Keymark



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Annex to Solar Keymark Certificate		Licence Number		011-7S1950 R									
Supplementary Information		Issued		2019-05-15									
Annual collector output in kWh/collector at mean fluid temperature ϑ_m													
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
CPC XL 1514		2 669	2 483	2 223	2 346	2 120	1 844	1 699	1 515	1 300	1 828	1 637	1 407
CPC XL 1521		3 994	3 715	3 327	3 510	3 172	2 760	2 542	2 266	1 944	2 735	2 449	2 105
CPC XL 1914		3 351	3 118	2 792	2 946	2 662	2 316	2 133	1 902	1 632	2 295	2 055	1 766
CPC XL 1918		4 295	3 995	3 578	3 775	3 411	2 968	2 733	2 437	2 091	2 941	2 634	2 263
CPC XL 1921		5 007	4 658	4 171	4 401	3 977	3 460	3 187	2 841	2 438	3 429	3 071	2 639

Main specifications



	CPC1512	CPC1518	XL1921
Dimension	1392*1640*103mm	2082*1640*103mm	2427*2057*103mm
Gross area	2.28 m ²	3.41 m ²	4.99 m ²
Aperture area	2 m ²	3 m ²	4.47 m ²
Number of evacuated tube	12	18	21
Outer diameter / length of evacuated tube	φ47/1500mm	φ47/1500mm	φ47/1900mm
Insulation	Rock wool	Rock wool	Rock wool
Efficiency based on gross area, Solar Keymark ISO 9806:2013	56.1%	56.1%	56%
Annual collector yield under Solar Keymark, based on ISO 9806:2013 (at mean fluid temperature of 50°C, location Würzburg) kWh	1403	2099	3071
Maximum operation pressure, Mpa	0.8	0.8	0.8
Stagnation temperature	345°C	345°C	345°C
Collector Contents, L	1.6	2.4	3.2
Connection diameter, mm	15	15	15
Allowed heat transfer medium	Water	Water	Water

3.1 Hydraulic interconnection of collectors

An average throughput of 30 – 40 l/h per m² of aperture area (approx. 0.5 – 0.7 l/min per m²) can be assumed when selecting the piping dimensions. We recommend low-flow operation for large-scale solar energy systems, as the specific flow rate can be reduced to 12 – 18 l/h m² (approx. 0.2 – 0.3 l/min per m²).

In order to keep piping work to a minimum, we recommend that you connect max. 9.0 m² (high-flow) and 15 m² (low-flow) of collector aperture area in series. In order to minimize the pressure loss due to the solar energy system piping, the flow speed in the copper piping should not exceed 1 m/s. We recommend flow speeds of between 0.3 and 0.5 m/s.

The cross sections should be dimensioned in accordance with throughput and speed as in a standard heating system. We recommend that you use standard copper piping and fittings when installing the collectors.

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.

Guidelines for selecting pipe diameter dimensions

For series connection of XL1921

- high-flow

Aperture area [↵]	m ²	2 [↵]	3 [↵]	4 [↵]	5 [↵]	6 [↵]	7 [↵]	8 [↵]	9 [↵]
Flow rate [↵]	liters/min [↵]	1.5 [↵]	2.5 [↵]	3 [↵]	3.5 [↵]	3.5 [↵]	4 [↵]	4 [↵]	4.5 [↵]
Copper pipe [↵]	dimensions [↵]	12 x 1 [↵]	12 x 1 [↵]	12 x 1 [↵]	15 x 1 [↵]	15 x 1 [↵]	15 x 1 [↵]	15 x 1 [↵]	18 x 1 [↵]
Aperture area [↵]	m ²	5 [↵]	6 [↵]	7 [↵]	8 [↵]	9 [↵]	10 [↵]	11 [↵]	12 [↵]
Flow rate [↵]	liters/min [↵]	1.5 [↵]	1.5 [↵]	1.5 [↵]	2 [↵]	2 [↵]	2.5 [↵]	2.5 [↵]	2.5 [↵]
Copper pipe [↵]	dimensions [↵]	12 x 1 [↵]	12 x 1 [↵]	12 x 1 [↵]	12 x 1 [↵]	12 x 1 [↵]	12 x 1 [↵]	12 x 1 [↵]	12 x 1 [↵]
Aperture area [↵]	m ²	13 [↵]	14 [↵]	15 [↵]	16 [↵]	17 [↵]	18 [↵]	19 [↵]	20 [↵]
Flow rate [↵]	liters/min [↵]	3 [↵]	3 [↵]	3.5 [↵]	3.5 [↵]	4 [↵]	4 [↵]	4.5 [↵]	4.5 [↵]
Copper pipe [↵]	dimensions [↵]	12 x 1 [↵]	12 x 1 [↵]	15 x 1	15 x 1 [↵]	18 x 1 [↵]	18 x 1 [↵]	18 x 1 [↵]	18 x 1

The values are reference values which must be determined precisely on a case-by-case basis.

3.2 Connection options

- > Corrugated hose return (cold)
- ↖-----> Corrugated hose flow (hot) with collector sensor

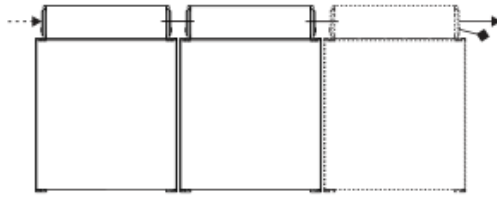
3.2.1 Connection options for 1 collector

Caution: Sensor position on the flow side (hot).



3.2.2 Connection options for 2 or more adjacent collectors

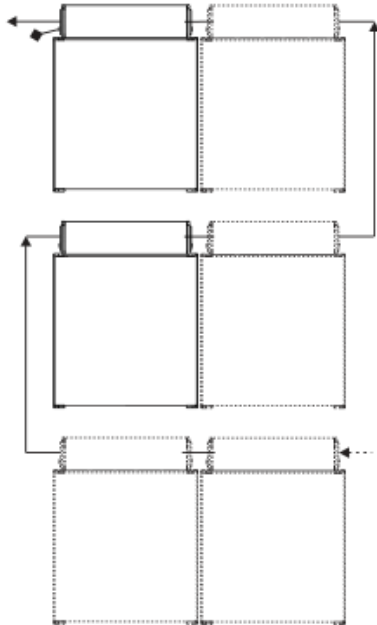
Caution: Sensor position on the flow side (hot).



Reverse connection of the flow direction is possible.

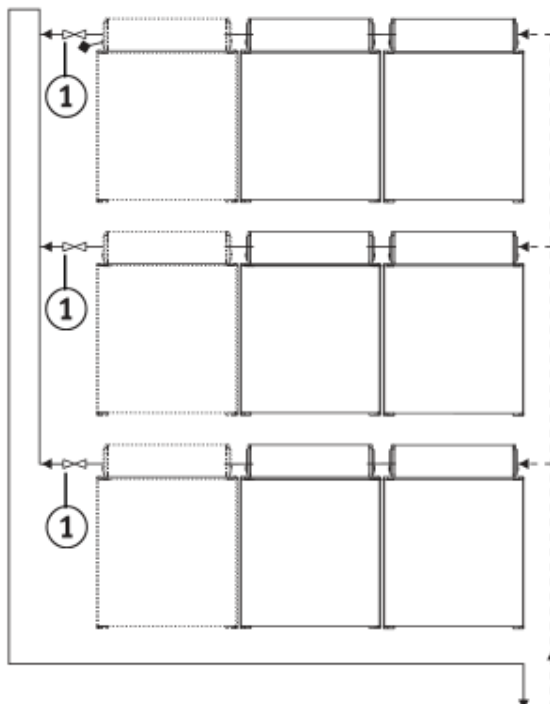
3.2.3 Connection options for 2 or more stacked collectors

Caution: Sensor position on the flow side (hot).



3.2.4 Connection options for 1 or 2 adjacent collectors and 2 or 3 stacked collectors

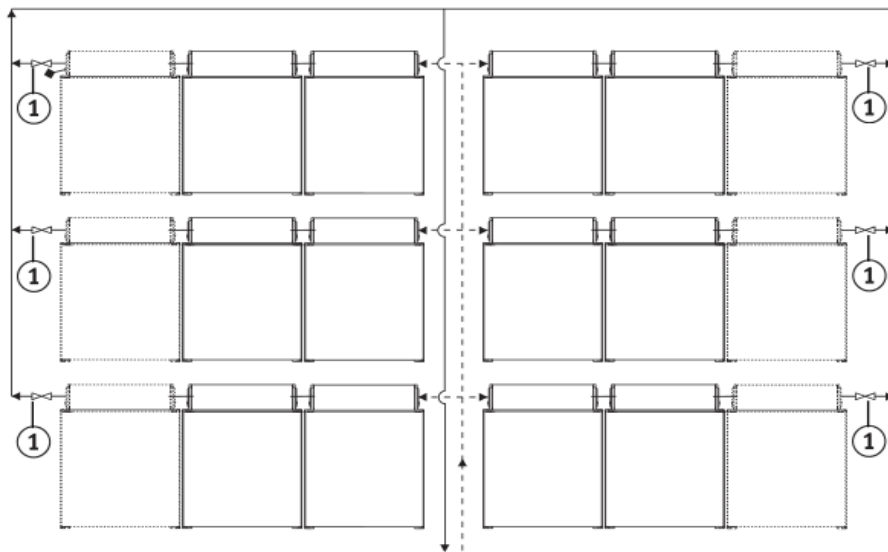
Caution: Sensor position on the flow side (hot).



Note!
For better bleeding and for equalisation of the collector arrays install a shut-off ball valve in the flow of each exit. (Pos.1)

3.2.5 Connection options f for 1 or 2 series connections beside each other and several series connections above each other

Caution: Sensor position on the flow side (hot).



4. Installing the XL1921 solar collector



Danger!

Please carefully observe the following notes on installation and safety, in order to avoid risk of injury or death and damage to property and equipment.

4.1 General notes on installation

- The accident prevention regulations of accident prevention and insurance associations are to be observed.
- Danger of falling persons, falling objects, breakthrough of surfaces due to insufficient load-bearing capacity, etc., are to be prevented by means of appropriate measures such as the use of scaffolding, protective walls, safety harnesses, leaning ladders, intercepting scaffolds, roof scaffolds, roof ladders, etc.
- When installing the XL1921 solar collector, gloves and safety glasses are to be worn.
- When overhead power lines are nearby, appropriate safety measures (voltage disconnection, covering, safety distances) are to be observed upon consultation with the line operator.
- The collector is to be fastened carefully, so that the stresses which arise in the event of gales, storms, and snow, can be safely accommodated by the fasteners.
- For installations in gardens, safety precautions are to be taken, in order to prevent playing children from becoming injured, or from causing damage.
- The alignment of the collector is to be as southerly as possible. A deviation of $\pm 30^\circ$ is possible. Shading during the main usage period is to be avoided.
- The manifold of the collector is always to be installed uppermost.
- The predefined minimum pitch of the collector is 15° (self-cleaning), the maximum pitch is 90° .
- The sun protection sheet must be left on 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 must be applied.

- Plastic piping and press-fitting connections are not permissible in the collector circuit.
- All hydraulic connections are to be realized using olive connections (recommended) or brazed joints.
- When brazing, comprehensive fire protection and sufficient ventilation are to be ensured.
- The insulation of the connecting pipework must be resistant to temperatures of up to 150°C, and UV-resistant.

4.2 Transporting the collector onto the roof

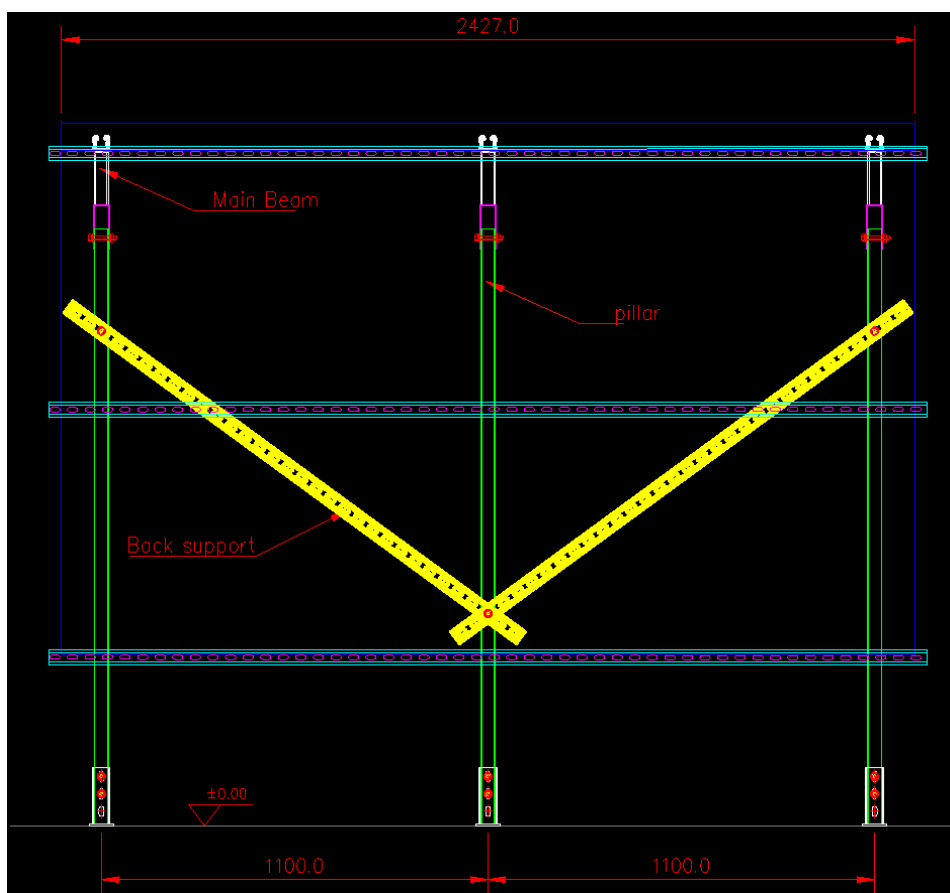
The collector is transported onto the roof inside the packaging. This prevents damage to the reverse side of the collector. Attention is to be paid to the strength of the wind.

On the reverse side of the collector, strap loops are found above and below, left and right. Hooks or straps can be inserted here. In so doing, it must be ensured that fastenings (knots) are secure.

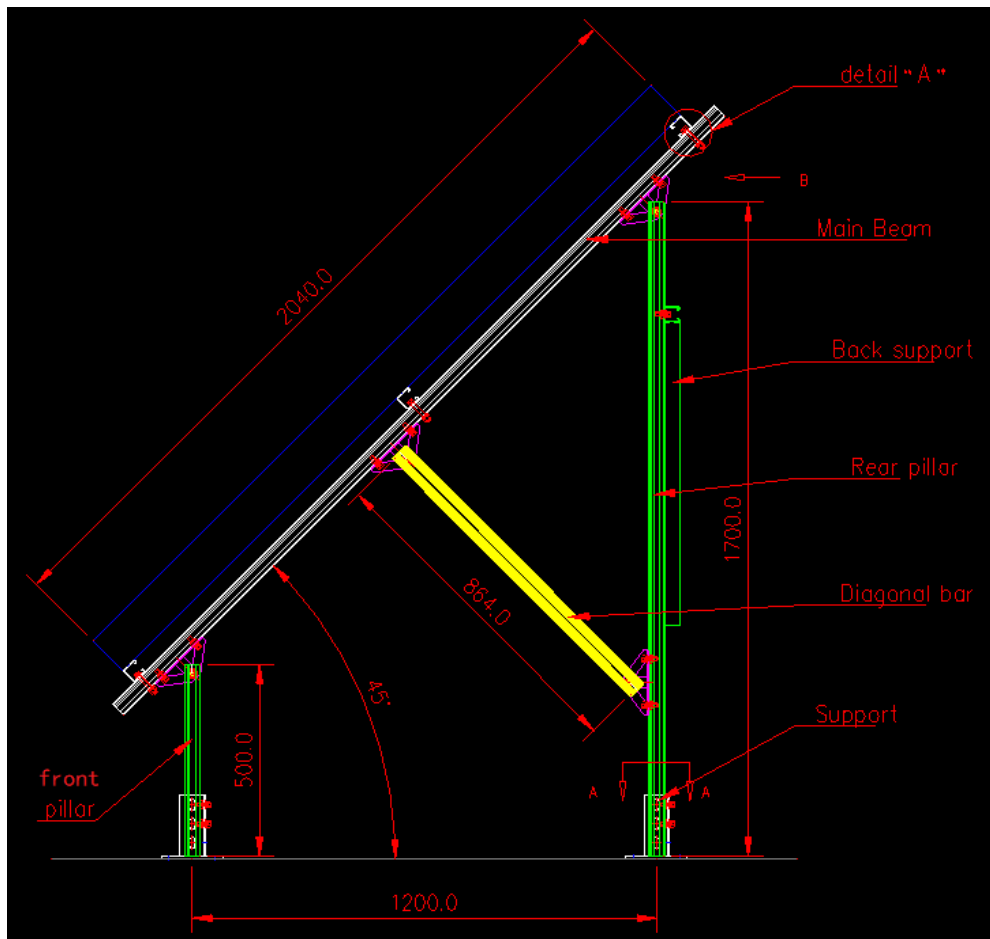
Transport onto the roof is made easier with a construction crane or mobile crane. If such a device is not available, an inclined hoist can be used. In either case, the collector must, in addition, be guided by ropes, which prevent swinging or lateral tilting. In the absence of motor-powered aids, the collector is hoisted onto the roof with the help of leaning ladders or planks, which serve as slide ramps.

4.3 Installing the collector onto the flat roof

4.3.1 Overview of the flat roof installation frame



Front view

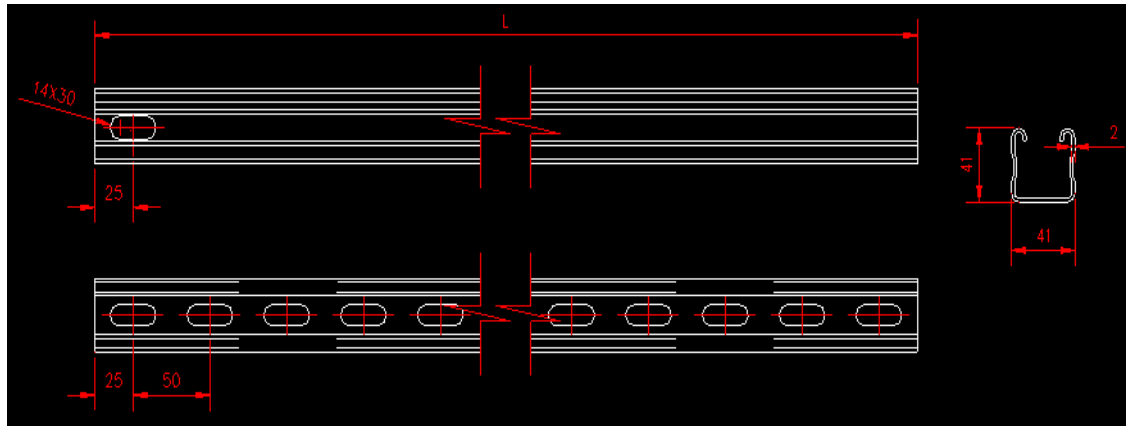


Side view

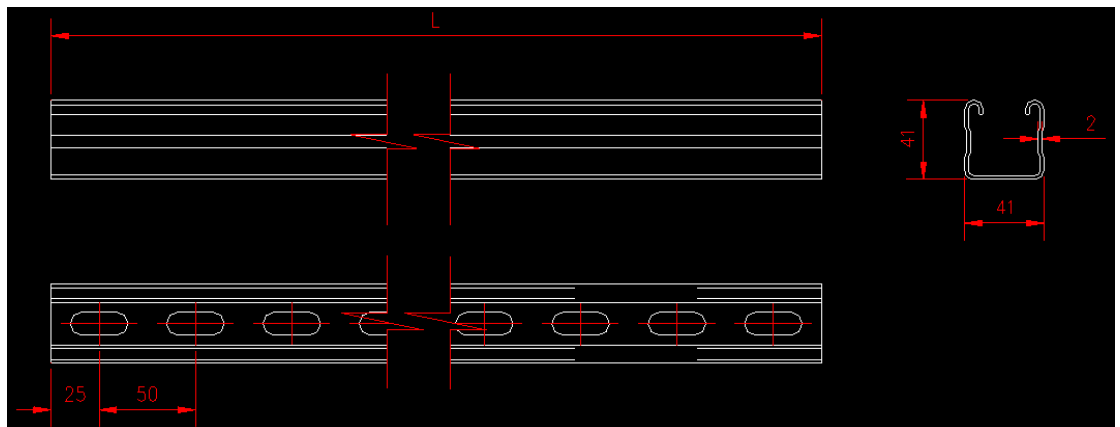
4.3.2 Components of the flat roof mounting system

4.3.2.1 Main components of the flat roof mounting system

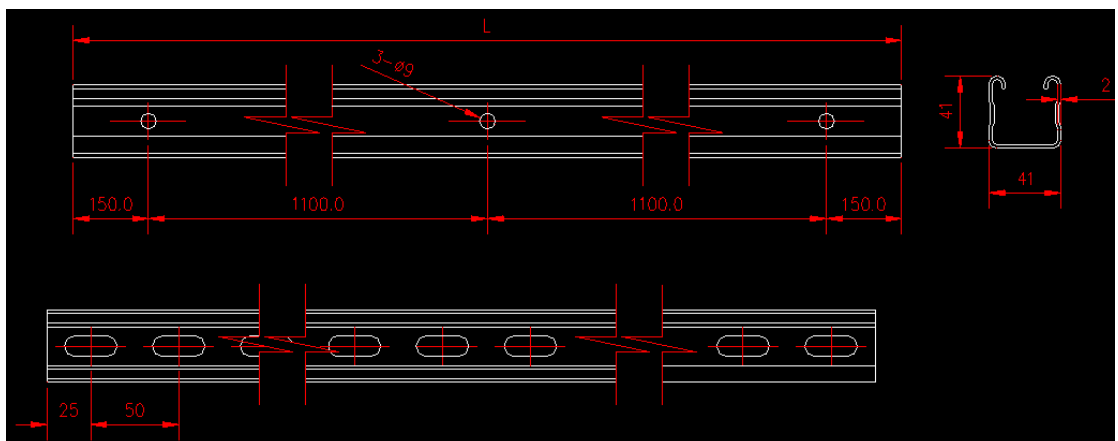
No.	Component	Dimension	Length,mm	Remarks	Qty.
1	Front pillar	U41X41X2	500	One end is drilled with 14X30 hole, 25mm from the edge	3
2	Rear pillar	U41X41X2	1700	One end is drilled with 14X30 hole, 25mm from the edge	3
3	Main beam	U41X41X2	2200		3
4	Horizontal beam	U41X41X2	2500		3
5	Diagonal bar	U41X41X2	865	each end is drilled with 14X30 hole, 25mm from the edge	3
6	Back support	U41X41X2	1600		2
7	43 opening hinge	160x65x48			12
8	Support	160x70x166			6



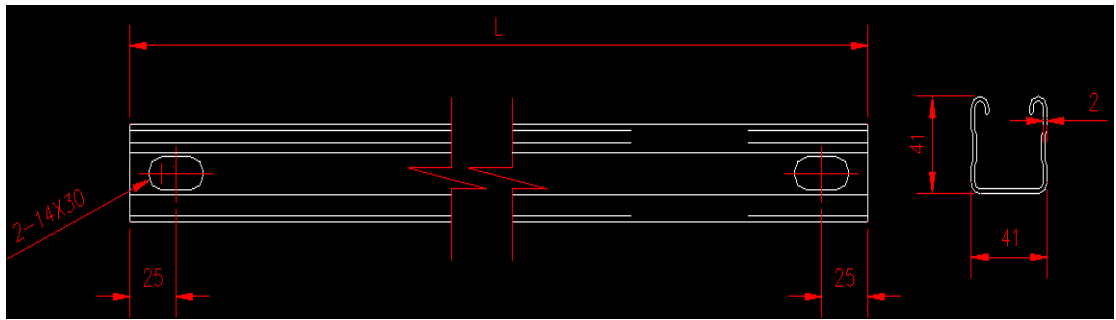
- Front pillar, length of 500mm, 3 pieces
- Rear pillar, length of 1700mm, 3 pieces



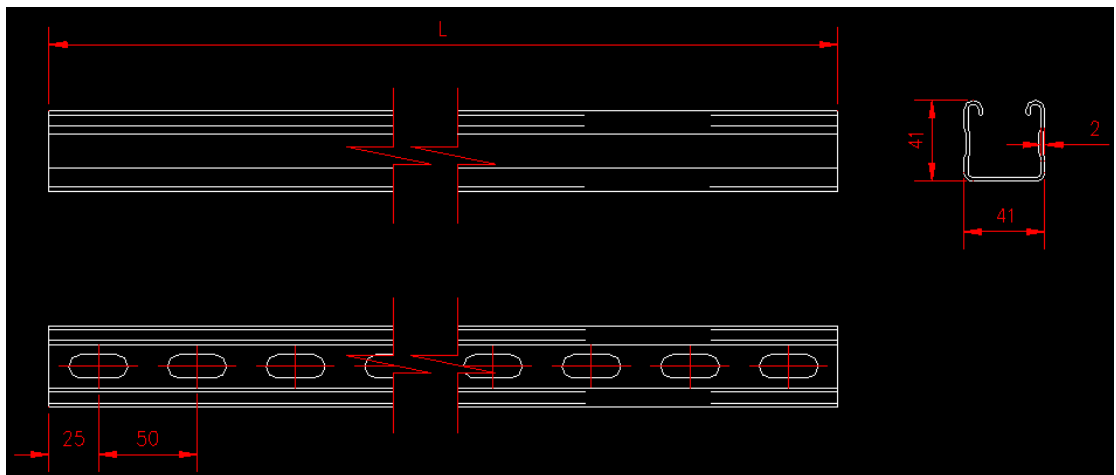
- Main beam, length of 2200mm, 3 pieces



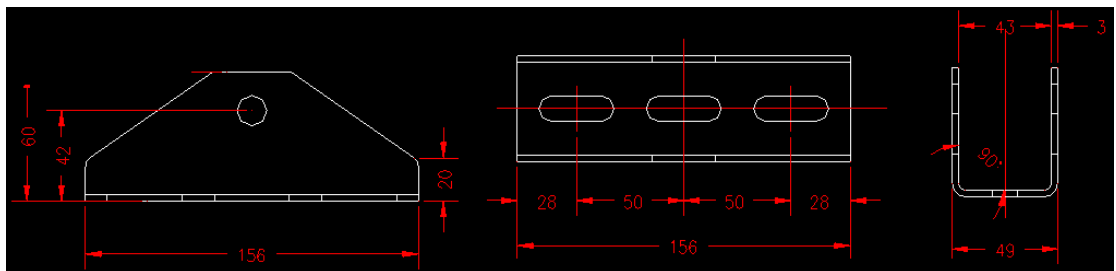
- Horizontal beam, length of 2500mm, 3 pieces



- Diagonal bar, length of 865mm, 3 pieces



- Back support, length of 1600mm, 2 pieces



- 43 opening hinge, 12 pieces

4.3.2.2 Connection screws sets

	Screw Sets		Using Position	Components				Qty	Spare Qty.	Total Qty.
				Flat Wafer	Spring Washer	Hex Nut	Square Nut			
1	Inner hexagon screw sets	M10X30	Connection between support and pillar	28	14	14	/	12	2	14
2	Outer hexagon screw sets	M12X80	connection between pillar and hinge	28	14	14	/	12	2	14
3	Inner hexagon screw sets	M10X30	connection between hinge and rear pillar	8	8	/	8	6	2	8
3	Inner hexagon screw sets	M10X30	connection between hinge and main beam	40	20	20	/	18	2	20
4	Inner hexagon screw sets	M10X70	connection between main beam and horizontal beam	22	11	11	/	9	2	11
5	Inner hexagon screw sets	M10X30	for back support	6	6	/	6	4	2	6
6	Inner hexagon screw sets	M8X30	For fixing the collector's clip onto the frame	8	8	/	8	6	2	8

4.3.3 Fix the collector onto the flat roof mounting system

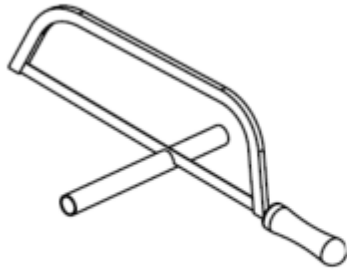
Rest the collector in its packaging on the bearing rails, open the package and let the collector slide into the lower retainers. Each lower retainer must completely encompass the lower frame of the collector.

Check that all screw fittings are securely fastened.

The same fits for all the 6 bearing clips for the upper and lower retaining and fixing of the XL1921 solar collector onto the mounting system.

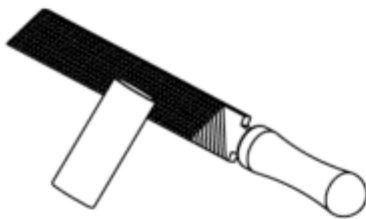
5. Hydraulic connection

5.1 Connections with olive rings



①

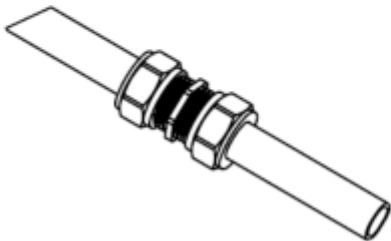
It is preferable to use olive connections in the collector circuit, due to their ease of installation, and their temperature resistance. When tightening or loosening the fittings, always grip the body of the fitting with a spanner to counter the force.



②

1. Cut the pipe to the required length (pos.1). Olive connections size 12 mm has an insertion depth of 18.5 mm.

2. Remove burrs (pos.2) and check the pipe ends for scratches, soiling and deformations.



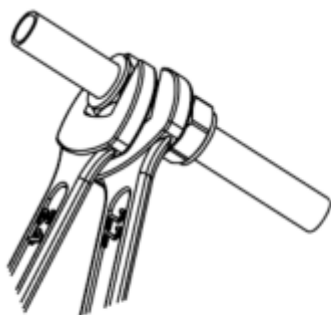
③

3. Check that the olive ring is correctly positioned at the fitting.

Through the olive ring, push the pipe into the fitting, up to the stop (pos.3).

4. Tighten the union nut by hand.

Then, upon first installation, screw tight with one revolution (360°). Use an open-ended spanner to counter the force (pos.4).

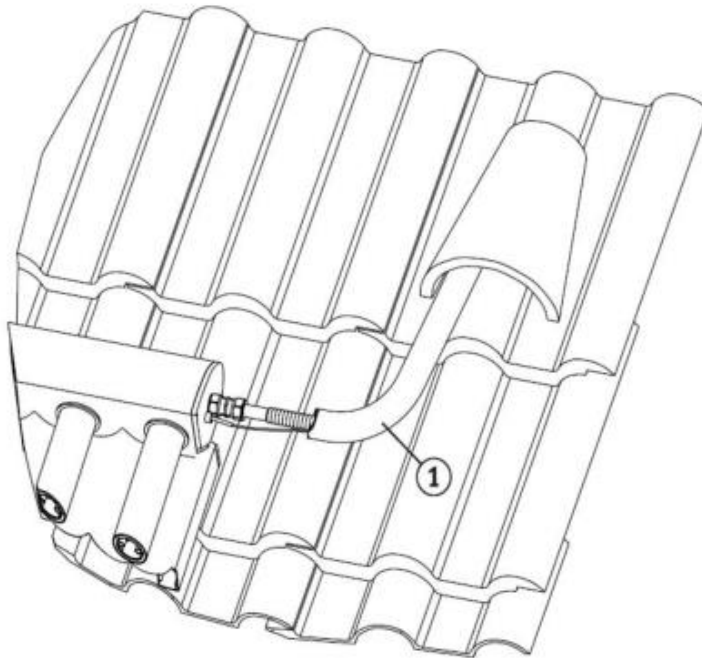


④

5. Check that the connection is leak-tight. If the connection is not leak-tight, loosen it and check the pipe for damage.

6. Each time the fitting has been loosened, it must be hand-tightened during reassembly, then further tightened using an open-ended spanner, turning only 1/8 to 1/4 of a rotation (45° to 90°).

5.2 Connecting the flow and return lines to the collector



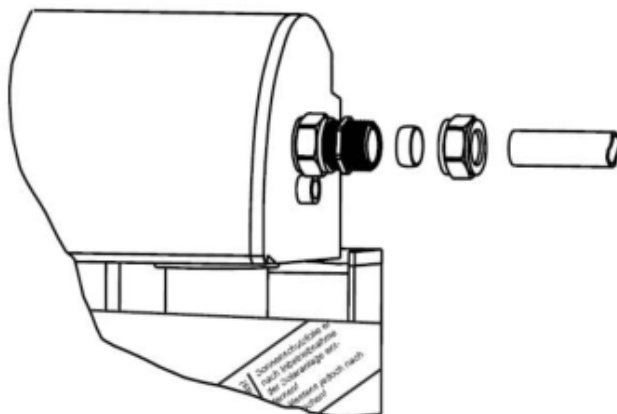
3. Check that the connection is leak-tight.



Note!

If, during commissioning, a motor-driven flushing pump is used for flushing, bleeding and filling the solar energy system (for the prerequisites please refer to the service instructions, section “Commissioning”), bleeding at the highest point of the system is unnecessary.

4. For flexible connection of the collector to the pipes, flexible metal connection hoses are available as an accessory kit (pos.1).



Note!

The flow or return pipe can be connected to the collector on the left or on the right, as selected.

1. Attach the connecting pipes with an olive connection as shown in the figure to the left.

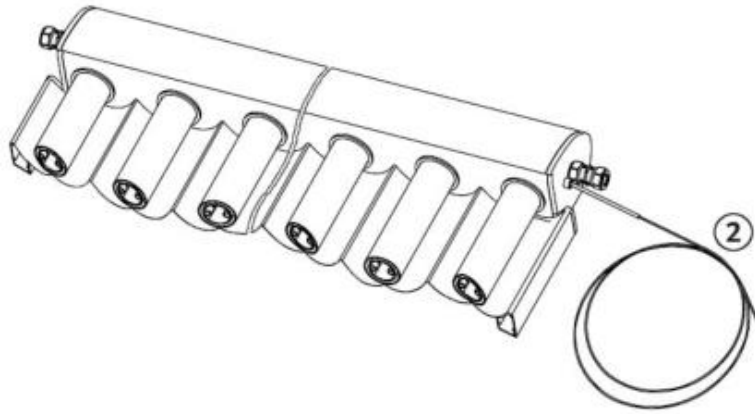


Note!

When tightening or loosening the fittings, always grip the body of the fitting to counter the force.

2. For reductions to 12 mm connecting pipes reduced support sleeves are available in the accessories connection kits.

5.3 Sensor connection



Caution!
Always

install the sensor (pos.2) on the hot flow side.

1. Both on the left and on the right side there is an immersion sleeve integrated in the collector side piece.
2. Push the sensor all the way into the immersion sleeve.

6. Periodic inspection and maintenance

The solar collector should be periodic inspection by the licensed plumbers at least one time a year. The vacuum tube, the plumbing connections, vacuum quality of the evacuated tubes, tube supporters, mounting kits should be inspected. All the aspects above should be the same as when it was installed.