INSTALLATION GUIDE FOR
ON ROOF FLAT PLATE SOLAR COLLECTOR MOUNTING

63 9810.0337- Rev.05 05/04/2011

1.0 GENERAL

1.1 Safety Information

In order to reduce the number of deaths and major accidents attributable to work at height, the Health and Safety Executive has introduced comprehensive regulations and guidance that should be followed by all businesses working at height.

We consider in the following paragraphs some of the main features of the regulations and guidance.This is,however, only a limited summary and it is recommended that all businesses planning on undertaking solar water heating installations obtain a copy of the regulations and guidance issued by the Health and Safety Executive and carefully consider the contents.

The regulations and guidance state that you are required to carry out a risk assessment for all work conducted at height and to put in place arrangements for:

- Eliminating or minimising risks from work at height.
- Safe systems of work for organising and performing work at height.
- Safe systems for selecting suitable work equipment.
- Safe systems for protecting people from the consequences of work at height.

The regulations and guidance highlight a hierarchy for safe work at height:

- **Avoid** the risk by not working at height if practicable.
- **Prevent** falls, where it is not reasonably practicable to avoid work at height; you are required to take suitable and sufficient steps to prevent the risk of a fall including selecting the most suitable work equipment (in accordance with the regulations)
- **Mitigate** the consequences of a fall; where the risk of a person or object falling still remains, take suitable and sufficient measures to minimise the distance and consequences of any fall.

Collective protection measures, such as guard rails on scaffold, should be given priority over personal protection measures, such as safety harnesses.

Within the regulations' framework, you are required to:

1) Assess the risk to help you decide how to work safely.

2) Follow the hierarchy for safe work at height (i.e. avoid, prevent and mitigate).

3) Plan and organise your work properly, taking account of weather conditions and the possibility of emergencies.

4) Make sure those working at height are competent.

5) Make use of appropriate work equipment.

6) Manage the risks from working on or around fragile surfaces and from falling objects.

7) Inspect and maintain the work equipment to be used and inspect the place where the work will be carried out (including access and egress).

When preparing to install a solar water heating system, it is required that you perform a risk assessment in relation to work at height and plan how you will organise your work, taking into account the site, the weather conditions and the experience and competence of colleagues or contractors who may be working at height with you.

Risk Assessments

The HSE has published a number of very useful free publications that advise how to undertake risk assessments.

Two of these that you should obtain are:

Five Steps to Risk Assessment.

A Guide to Risk Assessment Requirements.

The five steps outlined in the HSE leaflet are:

Step 1: Look for the hazards

This will mean looking at the site and identifying significant hazards.These could be features such as a steep roof, a fragile surface where the collectors may be mounted, uneven ground or obstructions where access to the roof might be required.

Step 2: Decide who may be harmed and how

This might mean considering the particular risks that young workers or trainees might face and thinking about the residents of the household or visitors who could be hurt by your activities.

Step 3: Evaluate the risks and decide which precautions should be made.You should consider how likely it is that each hazard will cause harm, decide which precautions you might take and then assess, after you have taken those precautions, whether the remaining risk will be high, medium or low.Where you identify remaining risks, you should consider which further action you could take to control the risks so that harm is unlikely.

Step 4: Record your findings

If you have fewer than five employees you do not need to write anything down, though it is useful to keep a written record of what you have done. If you employ five or more people you must record the significant findings of your assessment.You must also tell your employees about your findings.You need to be able to show that a proper check was made, that you considered who might be affected, that you dealth with all the obvious significant hazards, that the precautions you propose are reasonable and that the remaining risk is low.

Step 5: Review your assessment if necessary

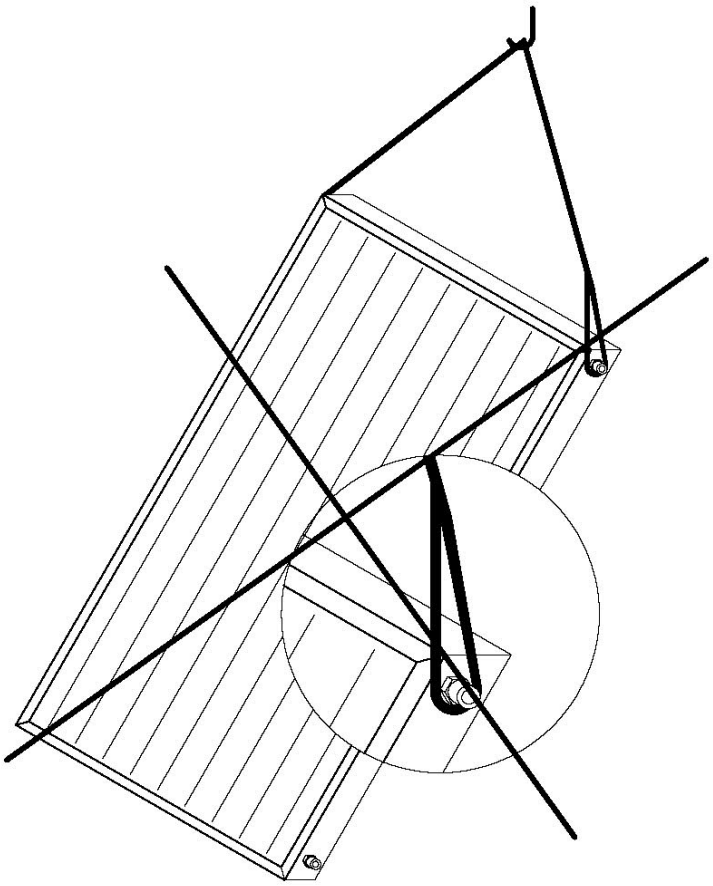
Each solar water heating installation may bring its own challenges and present its own particular hazards.You should therefore be careful not to rely on a "standard" risk assessment for installing a solar water heating system in a house, but review the particular hazards for each new situation.The issue of work equipment must be considered, but at the preparation stage you should consider where scaffold or other access equipment might be positioned and look out for any obvious obstacles to this, such as a conservatory or porch.

In addition to the risks associated with work at height, you should also consider the risks associated with lifting and carrying solar collectors, using electric drills and using blow lamps or blow torches for soldering.This is not an exclusive list and you should consider all aspects of the proposed installation to assess whether there are additional risks that need to be taken into account.

2.0 Installation of on roof flat panel solar collector.

2.1 Lifting the panel

Do not lift the collectors by the connections.
Refer to page 28, Solar Collector specifications for details of the dimension and weight of each panel. Carrying/lifting straps must be securely fastened to the main framework of the panel. Point impact and loading of the glass panel must be avoided.The collector must not be installed if the glass panel is damaged in any way.



2.2 General Assembly Notes

These instructions relate to the installation of the on roof BAYMAK flat plate solar collector panels. Parts are provided for fixing to profiled, clay roof tile or shingle roofs, not all parts will be required for each roof type. Refer to the parts list for each roof type to establish the correct components that need to be used in each case. All other equipment must be installed as per detailed in the Prozeda (Sor S, Sor M Plus) and Oventrop Regusol 130 User Guides.

Use only BAYMAK mounting systems. Use of other brackets/mounting systems will invalidate the warranty and may result in an insecure and dangerous panel installation.

The mounting brackets or bench screws must be fixed to the roof structural members.They must never be fixed to roofing laths. If suitably positioned structural members are not available or, if they are of a section that may be weakened by the inserting of the fixing screws, additional noggins should be inserted between the structural members.These must be at least the same cross section as the structural member.

Use only the corrosion resistant fastenings supplied. Holes through any roof waterproofing materials should be sealed with an appropriate UV and weather resistant sealant.

Attention!

Don't touch the connection during transportation,filling, operation and service. They can getting high temperatures, if the collectors wait under the sun.

Structure

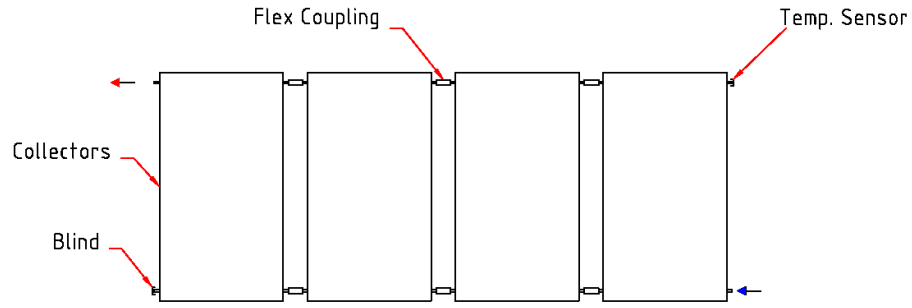
The collectors may only be mounted on sufficiently load-bearing roof surfaces and substructures. It is essential that the structural load-bearing capacity of the roof and the substructure must be assessed before mounting the collectors. Particular attention should be paid to the quality of the (timber) substructure in terms of the stability of the screw joints necessary for installing the collector mounting brackets. Anchor screws must be bolted into support with a minimum depth of 150mm. Where roof structure is not strong enough noggins must be inserted to accept anchor screws.The roof structure must be able to take the wind and snow loads that can occur. (Note: 100 kg/m2 snow load). The assessment should also take into account any special features of the particular site that could lead to increased loads (air jets or eddy formations, etc).There must be at least 1m distance from roof ridging or edges.

Lightning protection / Equipotential bonding of the building

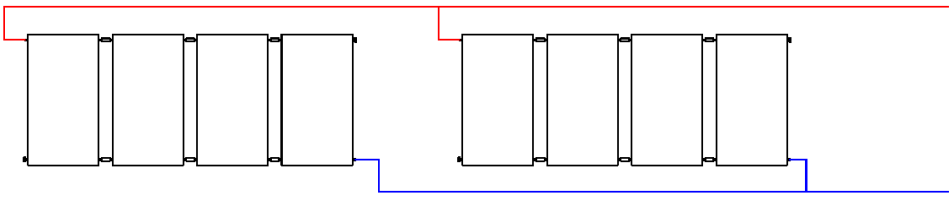
It is not necessary to connect collector arrays to the lightning protection of the building. For installations on metal substructures at the installation site, authorised lightning protection specialists must be consulted.The metal pipes of the solar circuit must be earth bonded to the main earthing circuit by means of a conductor (green/yellow) with a cross-section of at least 16mm^2.

Installation of Solar Collector

Collector panels must be connected in series. Collector connections (Ø18 pipe) are connected each other by stainless steel hoses have compression joints. N.B. ensure the sealing washer provided is inserted between the connections.All connecting pipe work and fittings must be of a suitable metal; either copper, brass or stainless steel. Pipe work can not be either plastic and galvanised. Soft soldered joints must not be used.Any seals or sealing compounds must be resistant to temperatures of up to 150°C and be resistant up to a 50% glycol/water mix.



Coupling of the collectors to one another for collector arrays up to 20 m²



Connection of the collector field to the heat transfer circuit for collector arrays up to 20 m²

Notes:

- Maximum 4 collectors should be connected next to next.
- Closed type expansion tank in convenient volume must installed to the system.
- The storage tank should be choosed according to the calculation method (1 m^2 selecive surface needs 60 lt water) .

  For example : For 20 sqm aparture area the suitable storage tank capacity is 1200 L.

Collector inclination

For the use of whole year the collector inclination should be same with the city's latitude. It is recommended not to install the collector at angles less than 30° inclination.

Solar fluid

The BAYMAK collector panels **MUST** be protected with a water/glycol or Solar Thermal heat transfer fluid. Use only the fluid which is supplied pre-mixed to a concentration of 55-58% glycol . The use of chemical resistant gloves nd suitable eye protection is required when handling. The solar fluid must be Non –toxic, odoulress, bio-degradable.The heat transfer fluid should be only fullfilled to the system in the morning or evening when the collector is cold. The glycol concentration must not be allowed to fall below 30% or inadequate frost protection will be given. Systems found to have lower glycol concentrations will not be covered by the warranty.

BAYMAK advices following Solar Thermal fluids.

-Fernox Solar S1

-Tyfocor LS

-Tyfocor L

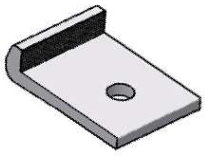
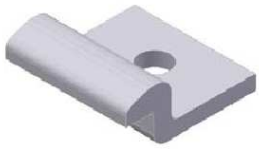
Attention!

The described products consists of the assembled materials are recycled materias and can be used again as mentioned in the manual book .

Attention!

Don't touch the connection during transportation filling, operation and service. They can getting high temperatures, if the collectors wait under the sun.

2.3 Mounting kits parts list

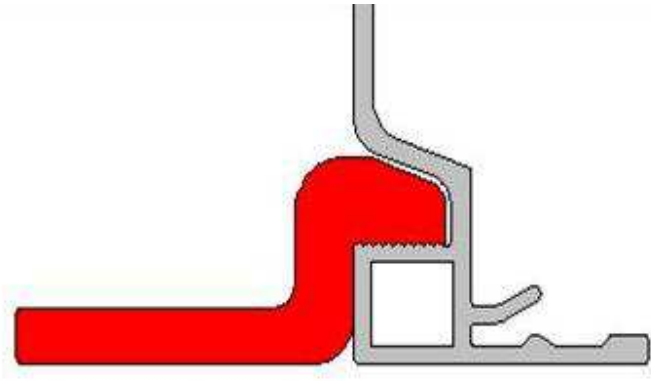
		
1	2	3
		
4	5	6
		
7	8	9
		
10	11	12
		
13	14	15
		
16	17	

No	Part Name	Quantities for roof type			
		Clay Tile Roof		Shingle Roof	
		1 K	2K	1 K	2K
1	Roof Connection Foundation	4	4	4	4
2	L Roof Bracket	4	4	-	-
3	Z Roof Bracket	-	-	4	4
4	Main Rail (Sigma Profile) (*)	2	2	2	2
5	L Collector Support	4	8	4	8
6	Z Collector Support	4	8	4	8
7	Connection bracket (In angular roof brackets only)	6	6	6	6
8	20º Connection Profile (*) (In angular roof brackets only)	2	2	2	2
9	45º Connection Profile (*) (In angular roof brackets only)	2	2	2	2
10	45º Support Profile (*) (In angular roof brackets only)	-	-	1	1
11	Screw M8x70	8	8	8	8
12	Screw M8x30	16	16	16	16
13	Bolt (Sigma Profile) 3/8' withworth	12	20	12	20
14	Nut 3/8' withworth	12	20	12	20
15	Nut M8	12	12	12	12
16	Bolt M8x25	12	12	12	12
17	Lock Washer	24	32	24	32

(*) Lenghts change according to the collector type (X or XL)

2.4 Suggestion for Attachment Points.

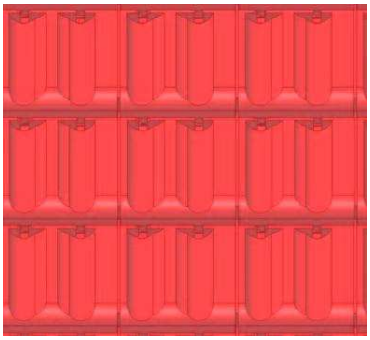
BAYMAK Solar collectors have slot attachmend point. They can attached on all sides with Baymak Mounting Set.



2.5 Roof Mounting Kits Installation

Clay roof tile

1: Remove required numbers of brick from the roof.



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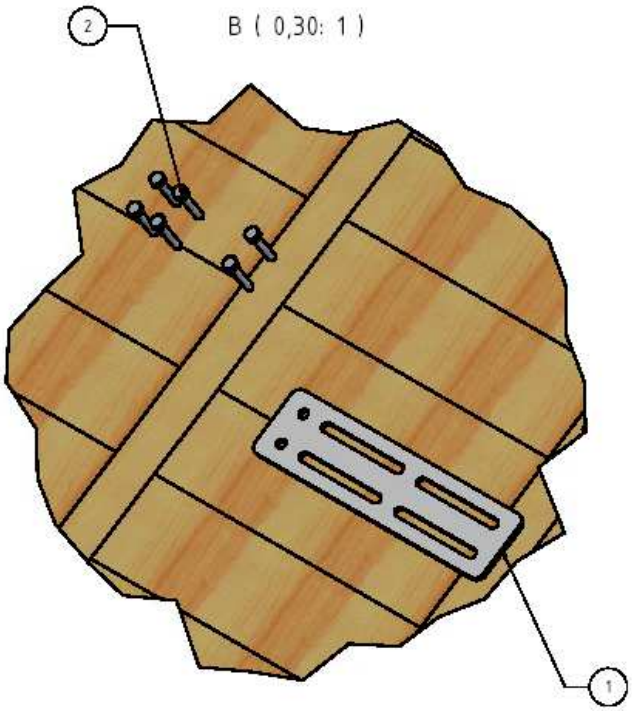
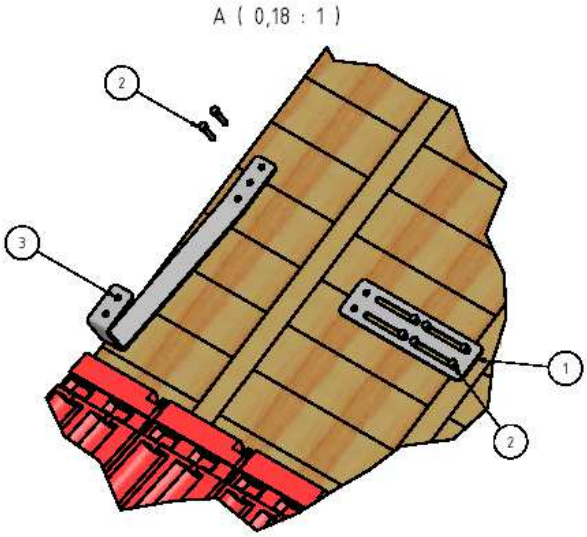
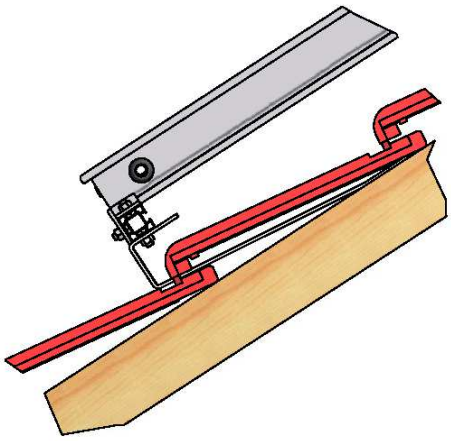
2: Nail the roof connection foundation to the roof.

Before installing the collector onto the aluminium rail check the distance according to the Table 1 (see pg 20). All profiles have slot connections therefore these are recommended dimensions. They can be changed according to the installation position of the roof.

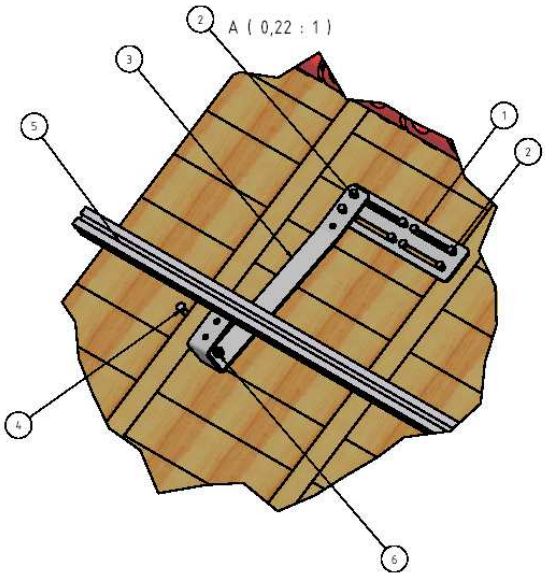


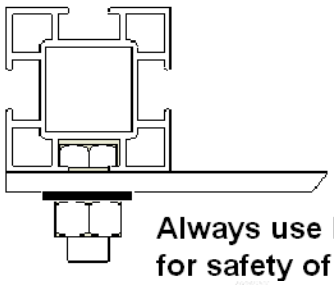
3: Bolt roof brackets onto the roof connection foundation as shown on the figures below.



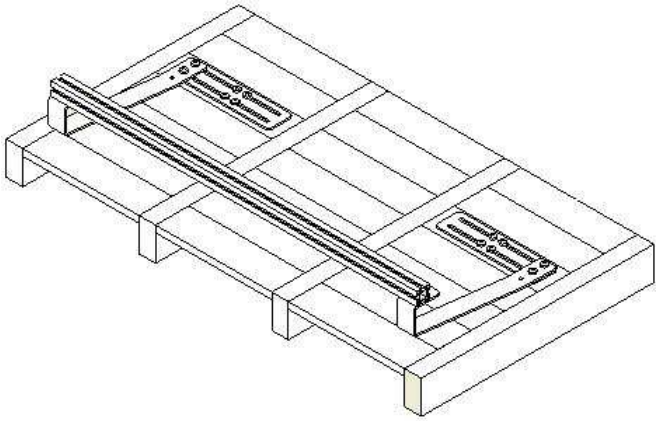


4: Place main rails (sigma) on the roof brackets and bolt.

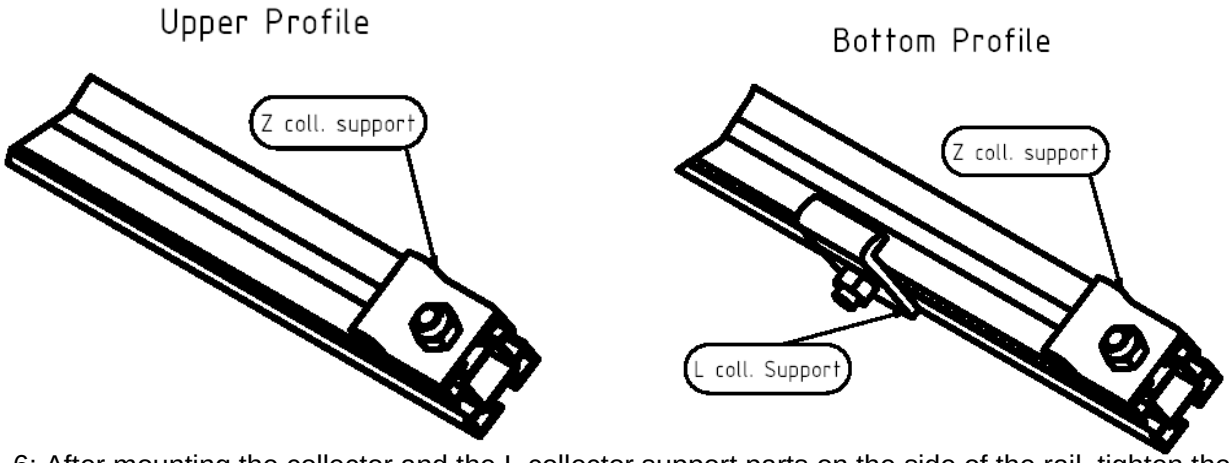




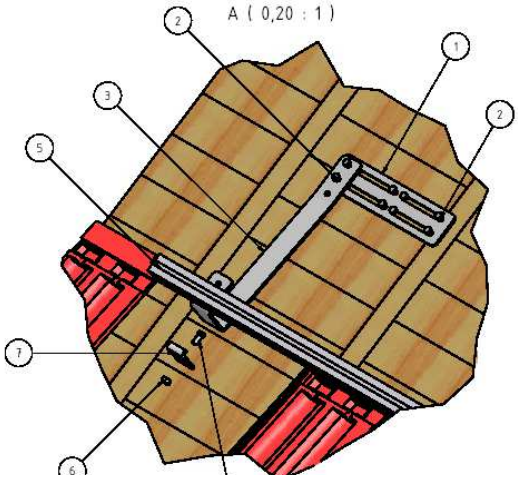
Always use Lock Washers with the nuts for safety of the connections.!

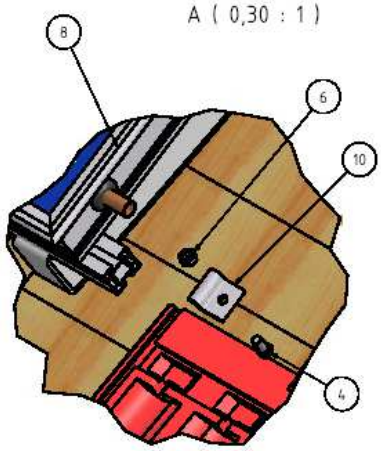


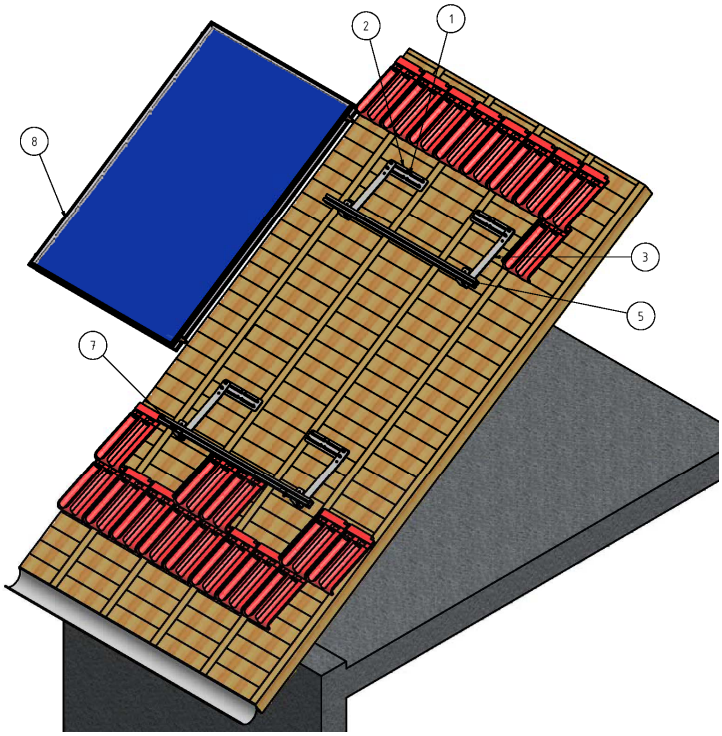
5: Place the bolts in aluminum rails to mount L and Z collector support parts. On each rails 2 (two) Z collector supports should be mounted. Then place the solar collector onto aluminum rails. After placing collector, mount the L supports as seen on below pictures.



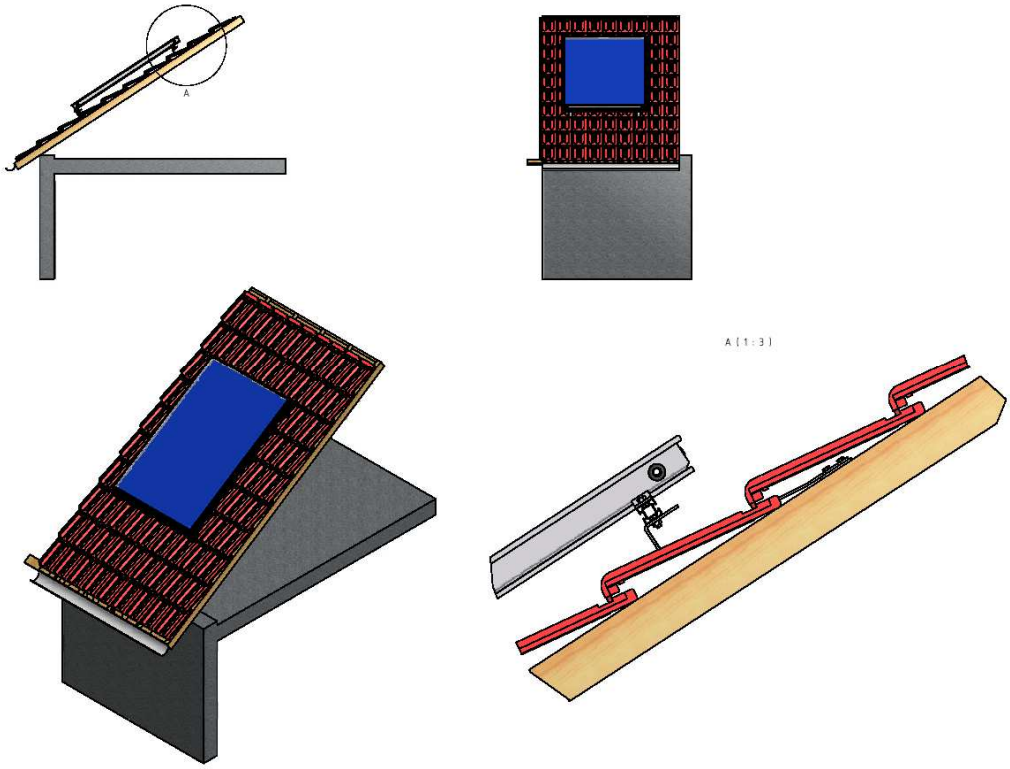
6: After mounting the collector and the L collector support parts on the side of the rail, tighten the bolts and nuts to aluminum parts and 3/8" bolts to the solar collector. Use always Lock Washers with the nuts for safety connections.



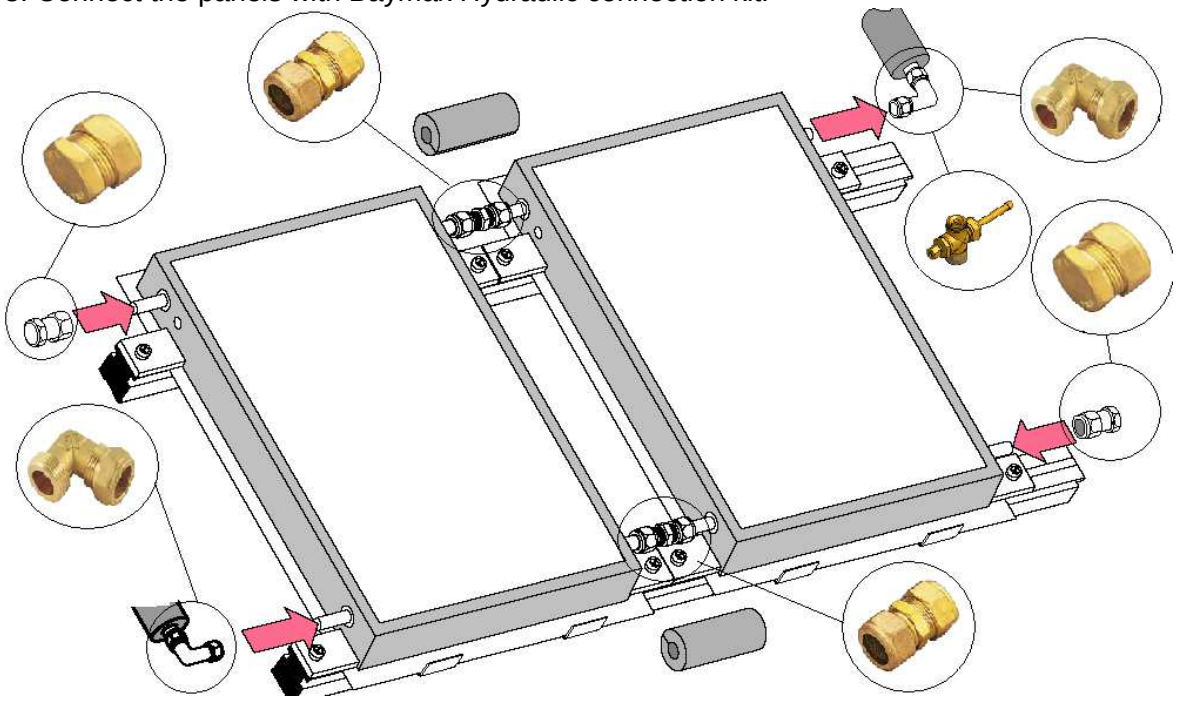




7: Repeat previous step for the second collector. (For 2 panels)



8: Connect the panels with Baymak Hydraulic connection kit.

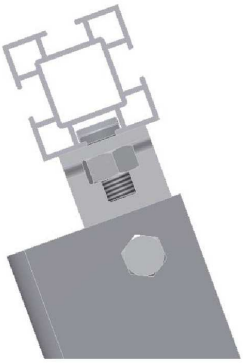


In angular roof mounting installation, the different points are as follows:

In angular system installation, for the front side of the system, bolt two connection brackets to each main brackets. Then bolt long or short rails to those connection brackets.

For the rear side of the system, first bolt one connection bracket to each main brackets. Then bolt angular connection brackets (20º or 45º) to those brackets.

Bolt one connection brackets to each angular connection brackets, then bolt long or short rails to those connection brackets.

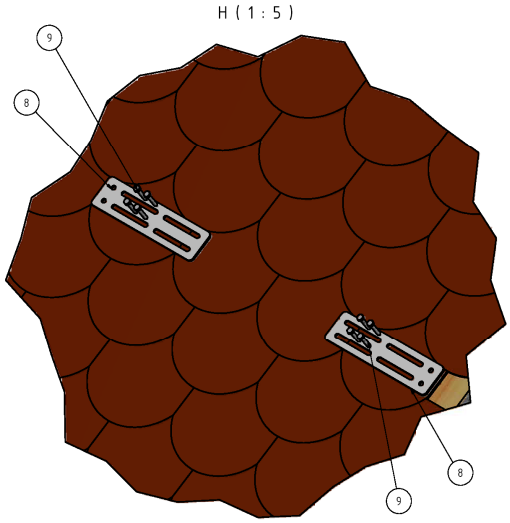


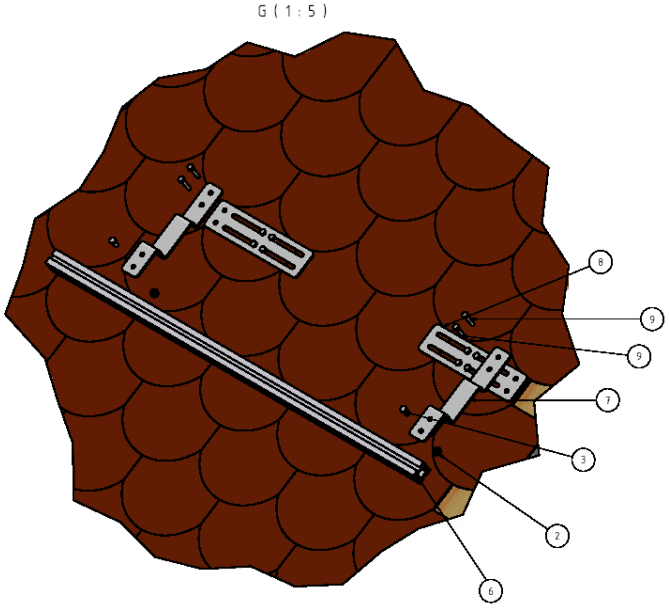
In 45° angular mounting for XL series, bolt addinational support profile on rear side of the system as shown on picture.

Shingle roof

1: Nail the roof connection foundation to the roof.

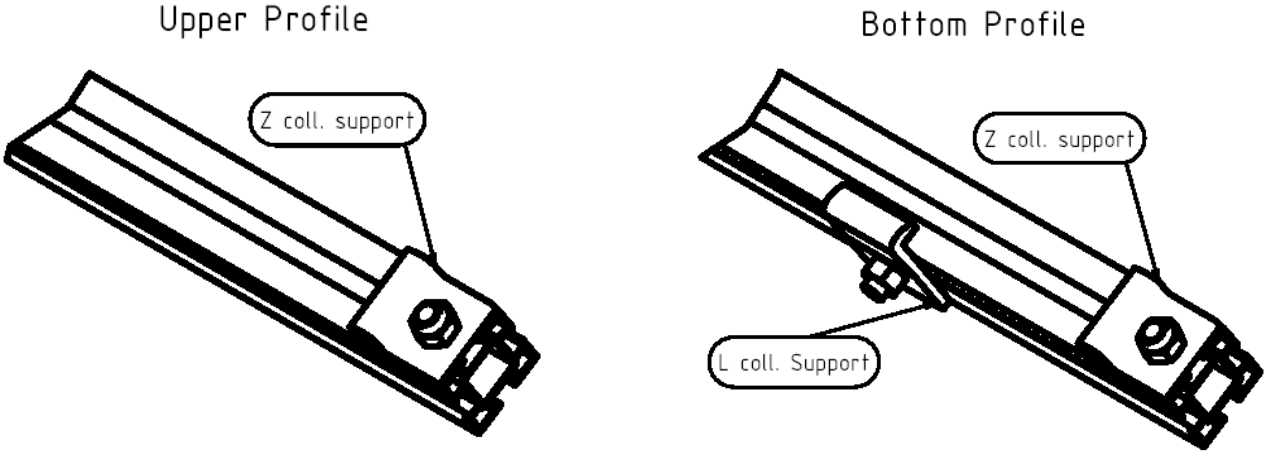
Before installing the collector onto the aluminium rail check the distance according to the Table 1 (see pg 20). All profiles have slot connections therefore these are recommended dimensions. They can be changed according to the installation position of the roof.



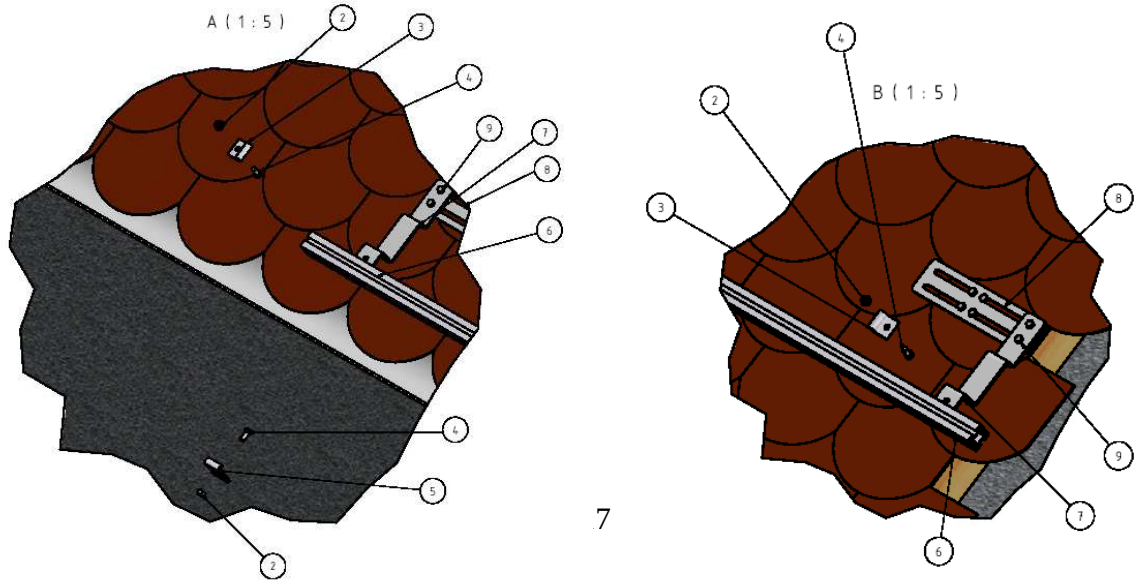


2: Bolt connection brackets onto the roof connection brackets as shown on the figures side.

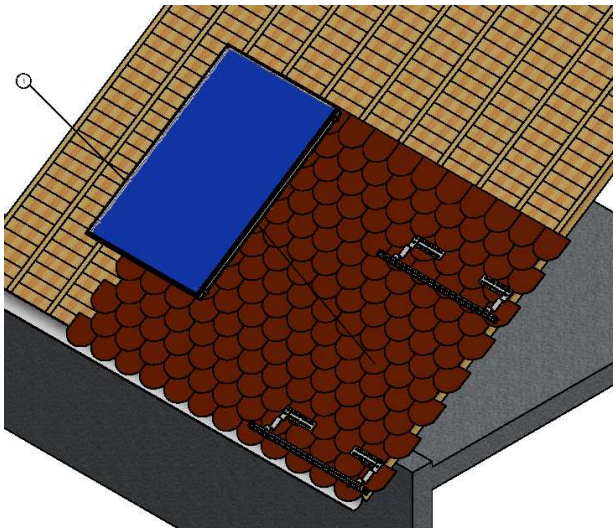
3: Place the bolts in aluminum rails to mount L and Z collector support parts. On each rails 2 (two) Z collector supports should be mounted. Then place the solar collector onto aluminum rails. After placing collector, mount the L supports as seen on below pictures.



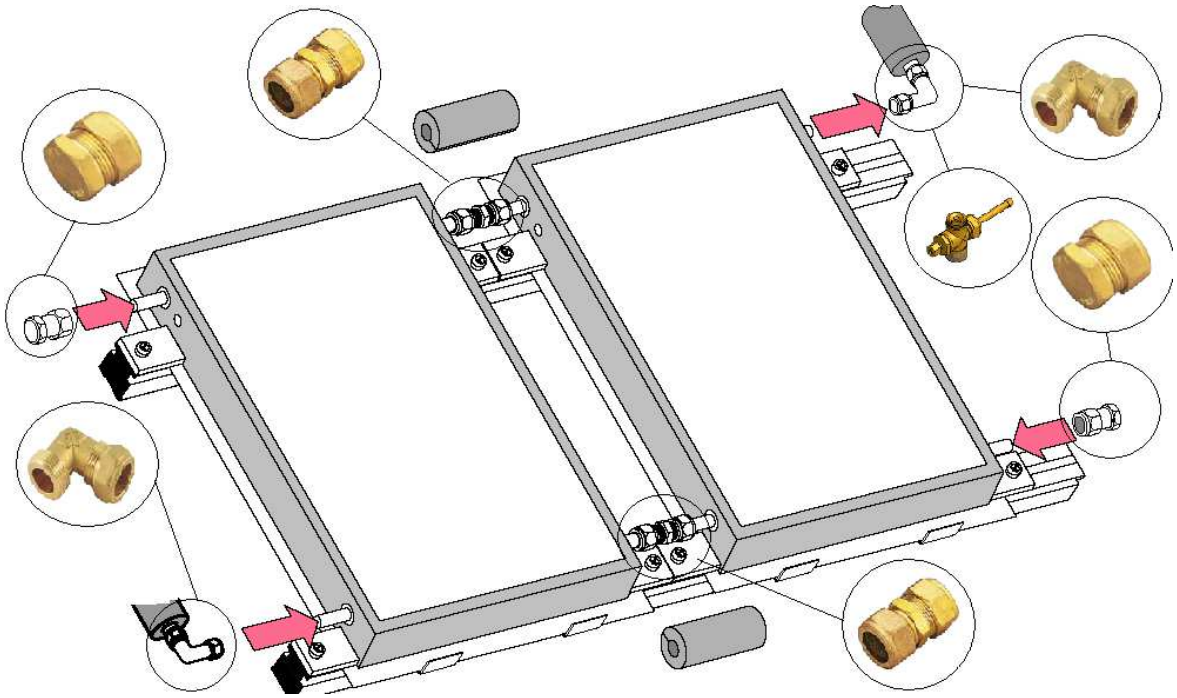
4: After mounting the collector and the L collector support parts on the side of the rail, tighten the bolts and nuts to aluminum parts and 3/8” bolts to the solar collector. Use always Lock Washers with the nuts for safety connections.

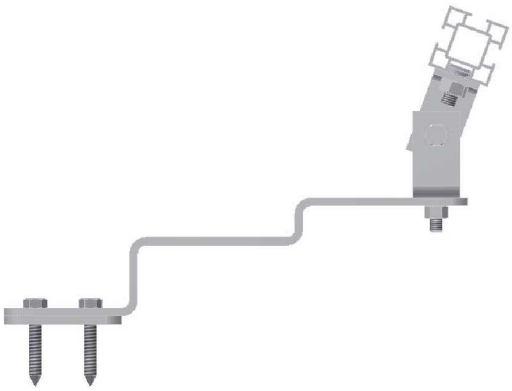


5: Place the collector on the rails, then bolt the collector to the rail. Repeat previous step for the second collector. (For 2 panels)



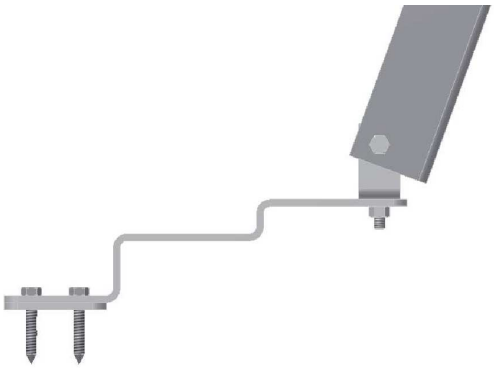
6: Connect the panels with Baymak Hydraulic connection kit.





In angular roof bracket installation, the different points are as follows:

In angular system installation, front roof bracket takes angular position, do not tighten roof bracket before the installation of panel.



Also use same roof bracket to each back roof connection brackets.

Bolt angular connection brackets (20º or 45º) to those roof brackets.

Then bolt long or short rails to those roof brackets. On the installation, do not tighten bolt till placing the panels.

After this step, every steps are the same as Clay tile mounting.

TABLE -1-

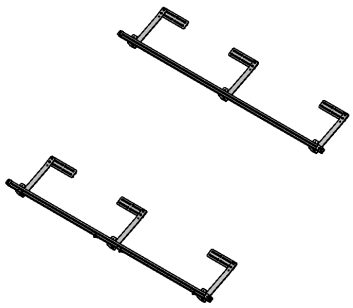
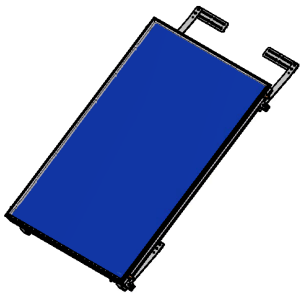
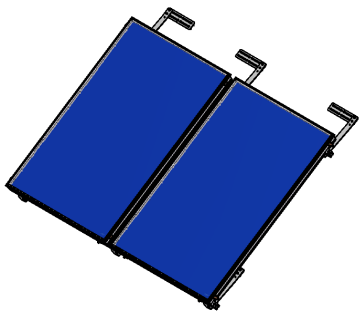
	A	
	Clay Tile	**Shingle**
1K X Parallel	1580 (*)	1580 (*)
1K X 20° Angular	1720	1720
1K X 45°	1550	1550
2K X Parallel	1580 (*)	1580 (*)
2K X 20°	1720	1720
2K X 45°	1550	1550
1K XL Parallel	2010(*)	2010(*)
1K XL 20°	2175	2175
1K XL 45°	1965	1965
2K XL Parallel	2010(*)	2010(*)
2K XL 20°	2175	2175
2K XL 45°	1965	1965

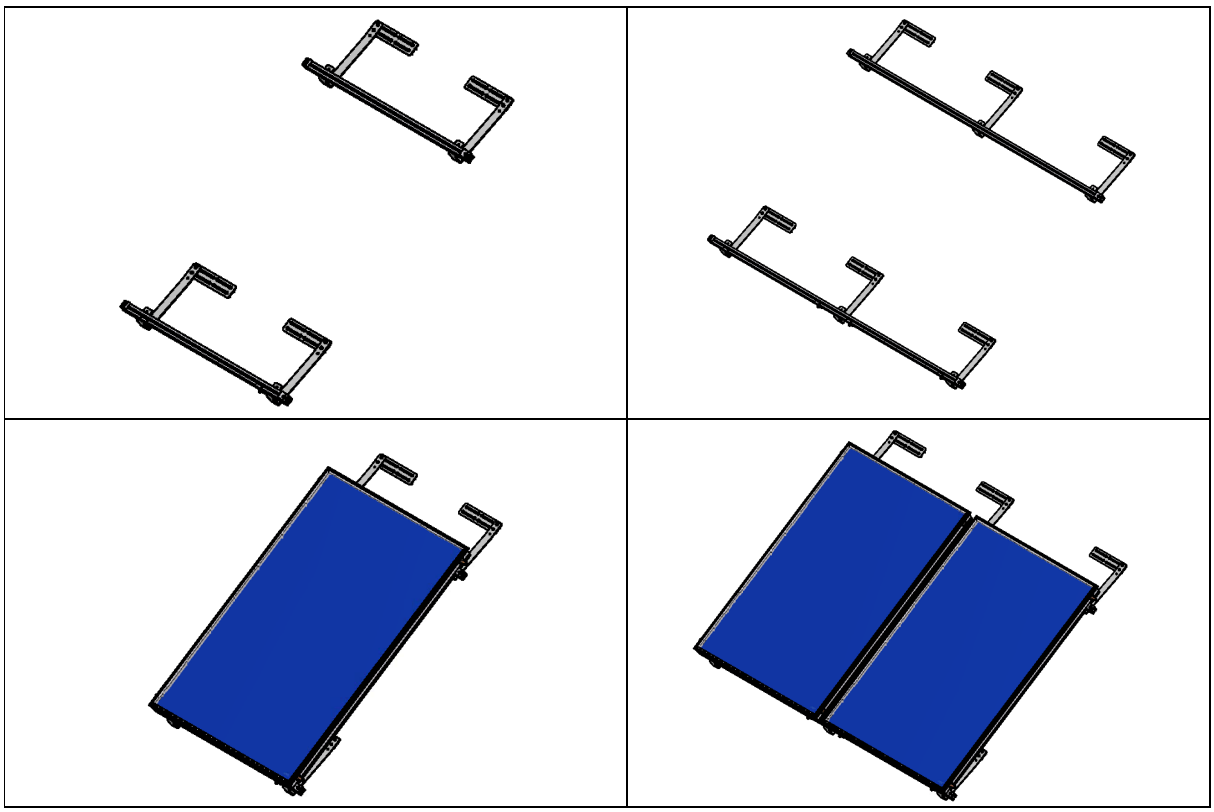
(*) These measurements are max. values therefore slot connections, they can be lower according to the suitable area of the roof.
(**) The B measure can be choosen between 600mm to 900mm for all mounting kit.

2.6 Roof Mounting Kits Types

Clay Roof Tile

Parallel Roof Mounting Kits

1K X Series	2K X Series
	
	
1K XL Series	2K XL Series



20º Angular Roof Mounting Kits

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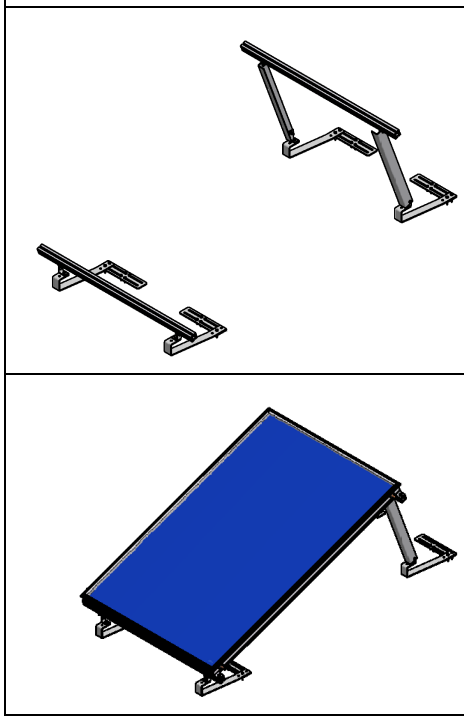	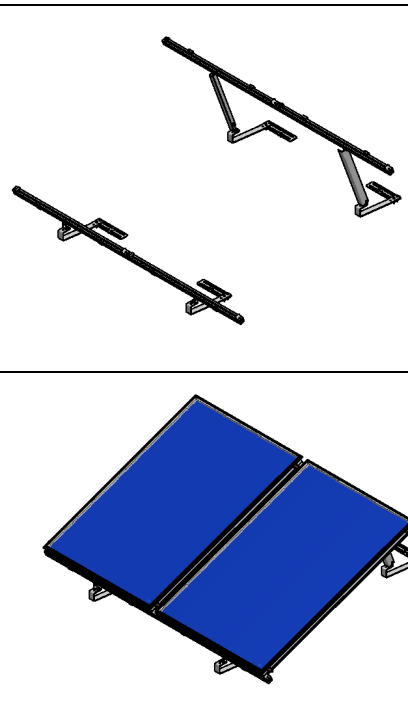

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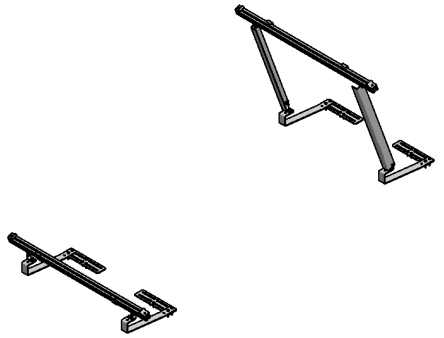	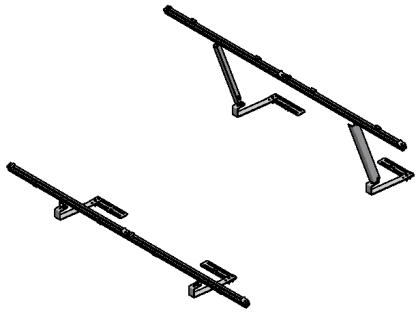
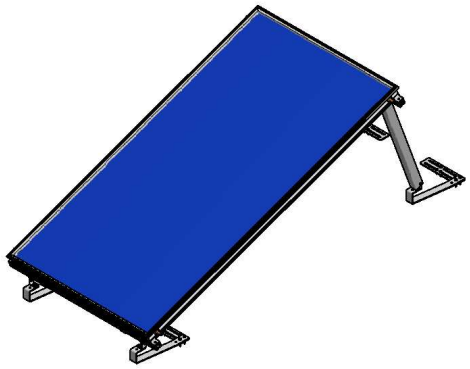	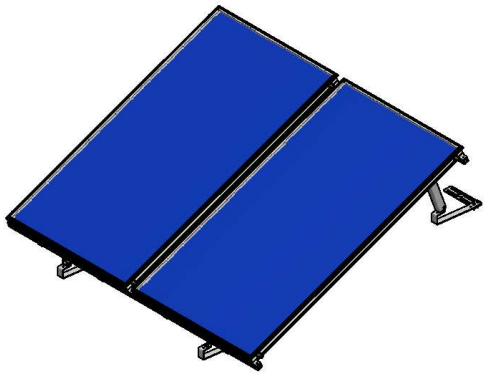

45º Angular Roof Mounting Kits

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	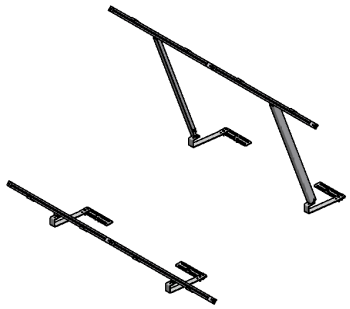

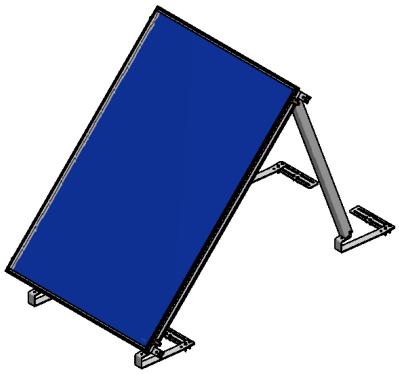	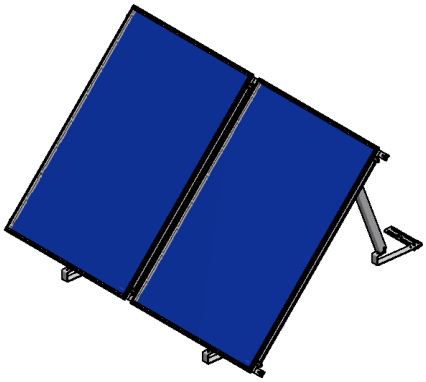
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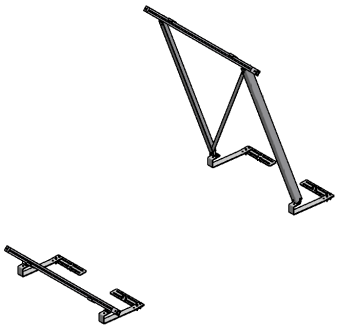
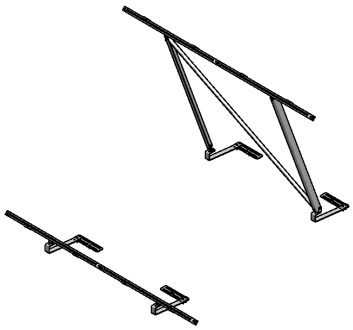
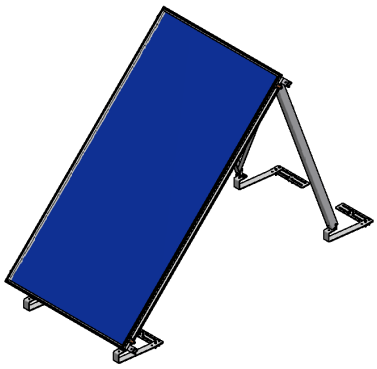
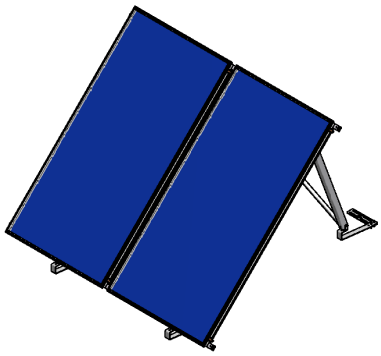
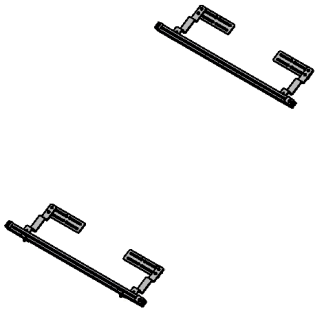
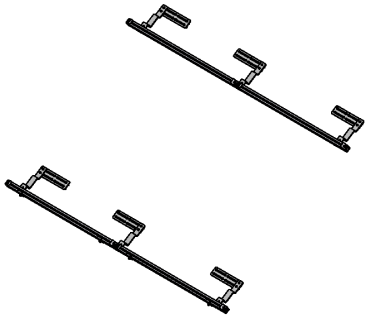
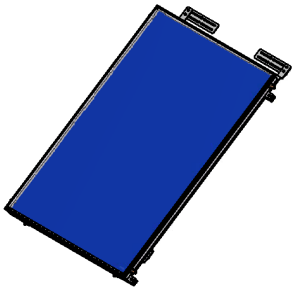
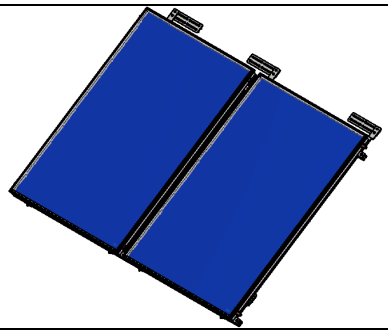
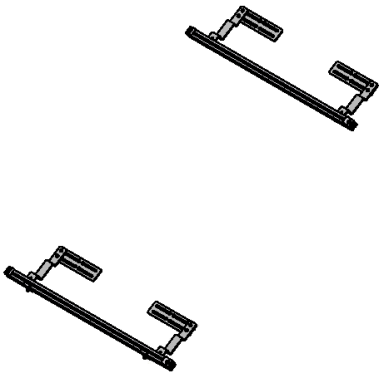
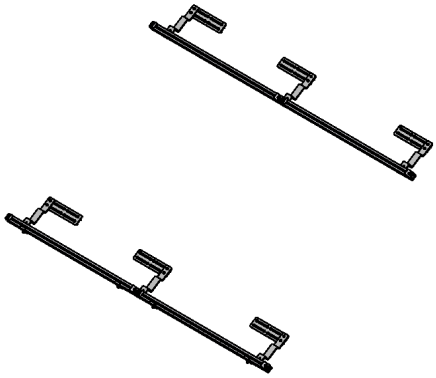
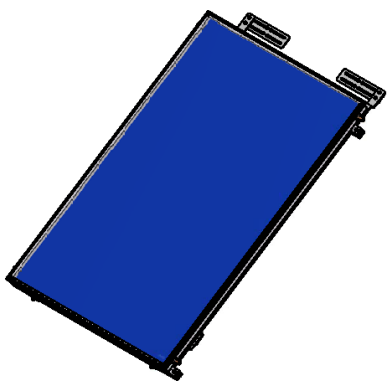
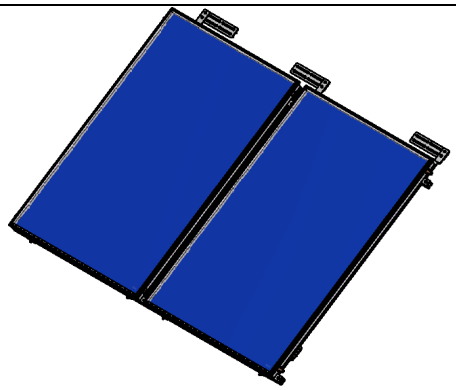
	
	

Shingle Roof

Parallel Roof Mounting Kits

1K X Series	2K X Series
	
	
1K XL Series	**2K XL Series**
	
	

3.0 Installation of the collector sensor

The Collector panel temperature sensor should be installed in the sensor pocket nearest to the collector array flow. It should be secured in the pocket by inserting through the rubber gland provided. All materials used for installing temperature sensors (sensor element, conducting compound, cables, sealing and insulating materials) must be suitably temperature resistant (up to 250°C).

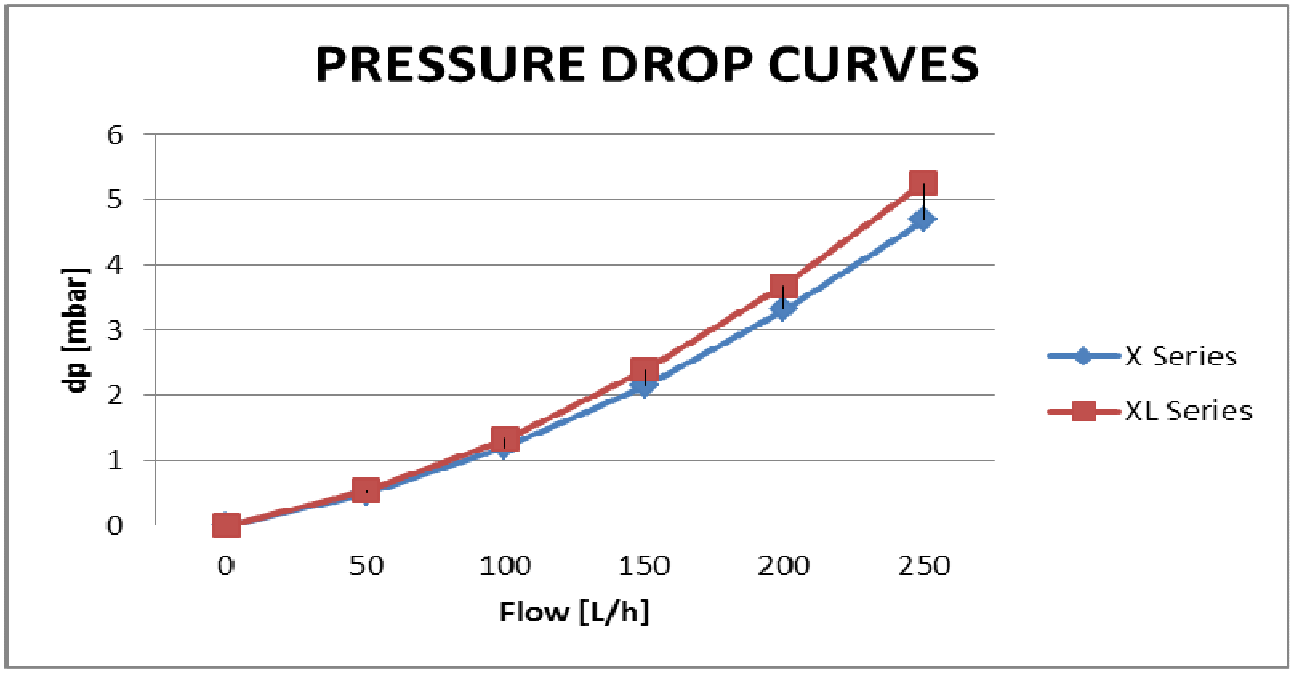
4.0 Spare Parts

A number of Spare Parts are available should any part of the BAYMAK system require replacement. Use only genuine parts obtained from BAYMAK, use of other non BAYMAK parts may cause system malfunctions and will invalidate the warranty. Fitting of any spare parts must be carried out by a competent installer or authorised service engineer or agent.

5.0 Solar Collector Specifications

5.1 Technical data of Baymak collector

MODEL	ADVANCED XL	ADVANCED X	APOLLO XL	APOLLO X	ESSENTIAL XL	ESSENTIAL X
Overall Area	2.51 sqm	2.00 sqm	2.51 sqm	2.00 sqm	2.51 sqm	2.00 sqm
Aperture Area	2.34 sqm	1.87 sqm	2.34 sqm	1.87 sqm	2.34 sqm	1.87 sqm
Absorber Area	2.34 sqm	1.87 sqm	2.34 sqm	1.87 sqm	2.34 sqm	1.87 sqm
Absorber Type	Copper	Copper	Aluminium	Aluminium	Aluminium	Aluminium
Absorber Coating	Sellective-Cu	Sellective-Cu	Sellective-Al	Sellective-Al	Sellective-Al	Sellective-Al
Absorption	% 95	% 95	% 95	% 95	% 95	% 95
Emission	% 5	% 5	% 5	% 5	% 5	% 5
Frame	Black Anodised Al	Black Anodised Al	Anodised Al	Anodised Al	Pure Al	Pure Al
Glass Type	Low iron tempered sandy solar glass	Low iron tempered sandy solar glass	Low iron tempered sandy solar glass	Low iron tempered sandy solar glass	Low iron tempered sandy solar glass	Low iron tempered sandy solar glass
Glass Thickness	4 mm	4 mm	4 mm	4 mm	4 mm	4 mm
Light Transmittance Td65	91.6 %	91.6 %	91.6 %	91.6 %	91.6 %	91.6 %
Solar Energy Transmittance Tsol	90.5 %	90.5 %	90.5 %	90.5 %	90.5 %	90.5 %
Sealing	Vulcanized EPDM	Vulcanized EPDM	Vulcanized EPDM	Vulcanized EPDM	Vulcanized EPDM	Vulcanized EPDM
Isolation	Rock Wool (40 mm)	Rock Wool (40 mm)	Rock Wool (40 mm)	Rock Wool (40 mm)	Rock Wool (40 mm)	Rock Wool (40 mm)
Back Plate	0.8 mm Aluminium	0.8 mm Aluminium	0.8 mm Galvanized Steel	0.8 mm Galvanized Steel	0.8 mm Aluminium	0.8 mm Aluminium
Number of Risers	12	12	10	10	12	12
Ø Risers	10 mm (t:0,5)	10 mm (t:0,5)	10 mm (t:0,5)	10 mm (t:0,5)	10 mm (t:0,5)	10 mm (t:0,5)
Ø Manifold	18 mm (t:0,8)	18 mm (t:0,8)	18 mm (t:0,8)	18 mm (t:0,8)	18 mm (t:0,8)	18 mm (t:0,8)
Connections	Compression Joint	Compression Joint	Compression Joint	Compression Joint	Compression Joint	Compression Joint
Water Volume	2.2 liters	1.8 liters	1.8 liters	1.5 liters	2.2 liters	1.8 liters
Working Pressure	10 bar	10 bar	10 bar	10 bar	10 bar	10 bar
Testing Pressure	15 bar	15 bar	15 bar	15 bar	15 bar	15 bar
Max.Temperature	200 °C	200 °C	200 °C	200 °C	200 °C	200 °C
StagnationTemperature	180 °C	180 °C	180 °C	180 °C	163 °C	163 °C
Length	2180 mm	1750 mm	2180 mm	1750 mm	2180 mm	1750 mm
Width	1150 mm	1150 mm	1150 mm	1150 mm	1150 mm	1150 mm
Thickness	80 mm	80 mm	80 mm	80 mm	80 mm	80 mm
Weight	53 kg	42 kg	50 kg	40 kg	52 kg	42 kg



	L/h	0	50	100	150	200	250
X Series	mbar	0	0.49	1.2	2.14	3.31	4.69
XL Series	mbar	0	0.54	1.33	2.39	3.69	5.26

(*) Pressure loss collector at a thermal conducting temperature of 20°C.

5.2 Dimensions of the pipe diameters

In order to benefit from the collector efficiently the flow rate between 30 - 40 l/m²h should be choosen for 25 m² solar collector.

Dimensions table for the flow rate 30 - 40 l/m²h

Collector brut area (m2)	~7.5	~10	~12.5	~25
Diameter for Copper (mm)	18	18/22	22	22
Diameter for Stainless Steel (mm)	DIN 16	DIN 16 /DIN20	DIN 20	DIN 20

6.0 Maintenance and Commissioning

Maintenance - General

The level of antifreeze in system's liquid must be checked with antifreeze tester in autumn and enough antifreeze must be added to protect the stuff against freezing in winter. Warranty does not contain the damage due to freezing. Do not let the antifreeze concentration 30%. Do Not mix the fluid with other types.

Check pH value with a pH indicator rod (target value approx. pH 7.5). If the limit pH value is less than pH 7, replace the heat transfer fluid.
Addition and subtraction of water must be done when there is no direct radiation from the sun. Make sure system temperature is low by reading system temperature. If the radiation occurs, shade and cover the glasses.
Eventhough solar heater transfer fluid is not corrosive, wear gloves and goggles and if that fluid contacts with skin, wash with soap and water. If it contacts to eyes, wash with large quantities of water.
Keep the glass surface clean. Otherwise, decrease of efficiency may occur on the system.
The collector or the collector array must be inspected visually, once a year, for any damage, leaks and contamination.

Commissioning - General

The system should be thoroughly flushed to remove any contaminants in the solar primary circuit prior to filling with the heat transfer fluid.
The system must be checked with pressure test with 0.5 bar below the max. system pressure then must be checked for any leakage.
System pressure should be set 0.5 bar above the static pressure due construct height. During commissioning, it should be between 1,5-2 bar.
Determine the system pressure when the system is cold.

Adjust the solar controller according to Prozeda SorS, SorM Plus Users Guides.

The flow rate should be adjusted to give the optimum flow rate depending on the number and type of collector panels connected. Adjust the flow rate when the system is cold.

All descriptions and illustrations provided in this leaflet have been carefully prepared but we reserve the right to make changes and improvements in our products which may affect the accuracy of the information contained in this leaflet. All goods are sold subject to our standard Conditions of Sale which are available on request.

BAYMAK is a member of BDR Therma

Website www.baymak.com.tr