



**SFB-AL Series ~ Evacuated Tube Collector
Installation Manual**

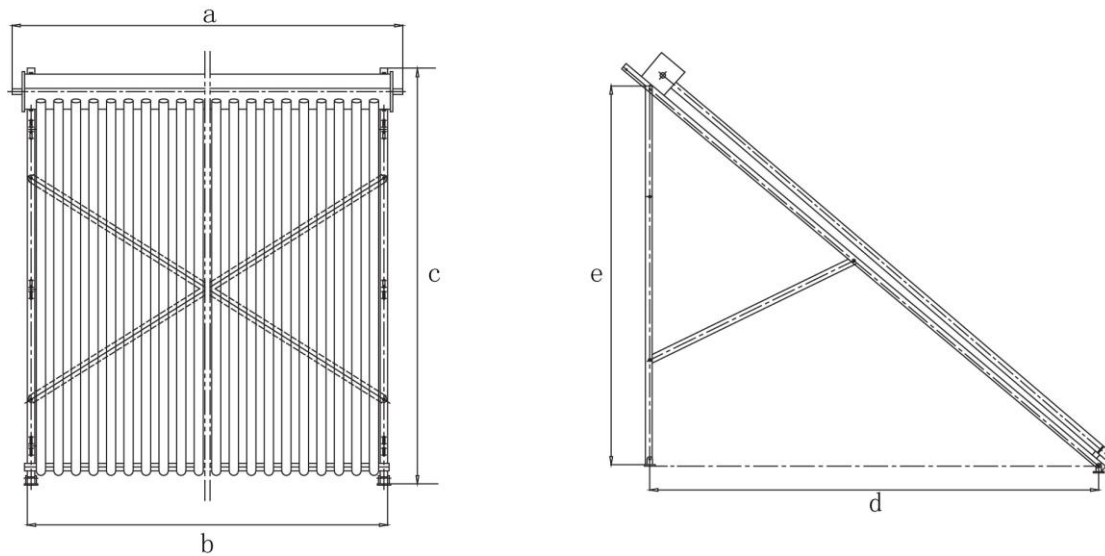


SFB-AL Series Installation Manual

All-glass Evacuated Tubular Solar Collector with Heat Pipe

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1. Solar collector - Weights and Dimensions:



Item No.	Specification			Weight Kg	size(mm)				
	Qty. of solar tubes	Diameter of solar tube	Length of solar tube		a	b	c	d	e
SFB104715-AL	10pcs	Ø 47mm	1.5M	25	825	655	1650	1263	973
SFB154715-AL	15pcs	Ø 47mm	1.5M	37	1200	1030	1650	1263	973
SFB204715-AL	20pcs	Ø 47mm	1.5M	49	1475	1305	1650	1263	973
SFB304715-AL	30pcs	Ø 47mm	1.5M	68	2125	1955	1650	1263	973
SFB105818-AL	10pcs	Ø 58mm	1.8M	36	915	745	1960	1501	1172
SFB155818-AL	15pcs	Ø 58mm	1.8M	55	1290	1120	1960	1501	1172
SFB205818-AL	20pcs	Ø 58mm	1.8M	72	1665	1495	1960	1501	1172
SFB305818-AL	30pcs	Ø 58mm	1.8M	108	2415	2245	1960	1501	1172

2. Transportation and storage

The Navitron Solar Collector is packaged in boxes designed to minimise the risk of damage during transit. Depending on the number of tubes, the collector may be packaged in three or four boxes, one containing the header, frame and various small components, and the others containing the evacuated glass tubes. The boxes should be regarded as fragile and handled accordingly.

Avoid impacts. Do not handle the boxes roughly. Avoid dropping the boxes and avoid dropping objects onto or against the boxes.

3. Installation

3.1 Packing List

Please check that all listed parts for the relevant collector are included before commencing installation.

SFB104715-AL

No.	Items	Qty.(pcs)	Qty. of spare part	Total
1	Manifold box	1		1
2	SFVB (All-glass Evacuated Tubular Solar Collector with Heat Pipe,Φ47mm*1500mm)	10	According to the practical situation	10
3	Thermal silicon grease (80g)	1		1
4	Vertical bar	2		2
5	Aluminum horizontal bar	1		1
6	Black nylon screw cup	10	1	11
7	M8x20hex head	4		4
8	Manifold and bottom bar fixing clips and nut retainer	4		4
9	Rubber tile pad	4		4

SFB154715-AL

No.	Items	Qty.(pcs)	Qty. of spare part	Total
1	Manifold box	1		1
2	SFVB (All-glass Evacuated Tubular Solar Collector with Heat Pipe,Φ47mm*1500mm)	15	According to the practical situation	15
3	Thermal silicon grease (80g)	1		1
4	Vertical bar	2		2
5	Aluminum horizontal bar	1		1
6	Black nylon screw cup	15	1	16
7	M8x20hex head	4		4
8	Manifold and bottom bar fixing clips and nut retainer	4		4
9	Rubber tile pad	4		4

SFB204715-AL

No.	Items	Qty.(pcs)	Qty. of spare part	Total
1	Manifold box	1		1
2	SFVB (All-glass Evacuated Tubular Solar Collector with Heat Pipe,Φ47mm*1500mm)	20	According to the practical situation	20
3	Thermal silicon grease (80g)	1		1
4	Vertical bar	2		2
5	Aluminum horizontal bar	1		1
6	Black nylon screw cup	20	1	21
7	M8x20hex head	4		4
8	Manifold and bottom bar fixing clips and nut retainer	4		4
9	Rubber tile pad	4		4

SFB304715-AL

No.	Items	Qty.(pcs)	Qty. of spare part	Total
1	Manifold box	1		1
2	SFVB (All-glass Evacuated Tubular Solar Collector with Heat Pipe,Φ47mm*1500mm)	30	According to the practical situation	30
3	Thermal silicon grease (80g)	1		1
4	Vertical bar	3		3
5	Aluminum horizontal bar	1		1
6	Black nylon screw cup	30	1	31
7	M8x20hex head	6		6
8	Manifold and bottom bar fixing clips and nut retainer	6		6
9	Rubber tile pad	6		6

SFB105818-AL:

No.	Items	Qty.(pcs)	Qty. of spare part	Total
1	Manifold box	1		1
2	SFVB (All-glass Evacuated Tubular Solar Collector with Heat Pipe,Φ58mm*1800mm)	10	According to the practical situation	10
3	Thermal silicon grease (80g)	1		1
4	Vertical bar	2		2
5	Aluminum horizontal bar	1		1
6	Black nylon screw cup	10	1	11
7	M8×20hex head	4		4
8	Manifold and bottom bar fixing clips and nut retainer	4		4
9	Rubber tile pad	4		4

SFB155818-AL:

No.	Items	Qty.(pcs)	Qty. of spare part	Total
1	Manifold box	1		1
2	SFVB (All-glass Evacuated Tubular Solar Collector with Heat Pipe,Φ58mm*1800mm)	15	According to the practical situation	15
3	Thermal silicon grease (80g)	1		1
4	Vertical bar	2		2
5	Aluminum horizontal bar	1		1
6	Black nylon screw cup	16	1	16
7	M8×20hex head	4		4
8	Manifold and bottom bar fixing clips and nut retainer	4		4
9	Rubber tile pad	4		4

SFB205818-AL:

No.	Items	Qty.(pcs)	Qty. of spare part	Total
1	Manifold box	1		1
2	SFVB (All-glass Evacuated Tubular Solar Collector with Heat Pipe,Φ58mm*1800mm)	20	According to the practical situation	20
3	Thermal silicon grease (80g)	1		1
4	Vertical bar	2		2
5	Aluminum horizontal bar	1		1
6	Black nylon screw cup	20	1	21
7	M8x20hex head	4		4
8	Manifold and bottom bar fixing clips and nut retainer	4		4
9	Rubber tile pad	4		4

SFB305818-AL:

No.	Items	Qty.(pcs)	Qty. of spare part	Total
1	Manifold box	1		1
2	SFVB (All-glass Evacuated Tubular Solar Collector with Heat Pipe,Φ58mm*1800mm)	30	According to the practical situation	30
3	Thermal silicon grease (80g)	1		1
4	Vertical bar	3		3
5	Aluminum horizontal bar	1		1
6	Black nylon screw cup	30	1	31
7	M8x20hex head	6		6
8	Manifold and bottom bar fixing clips and nut retainer	6		6
9	Rubber tile pad	6		6

3.2 Assembly of the Frames and Manifold Box:

3.2.1 Side Rail assembly:

Place the 2 side rails vertically, as shown below:

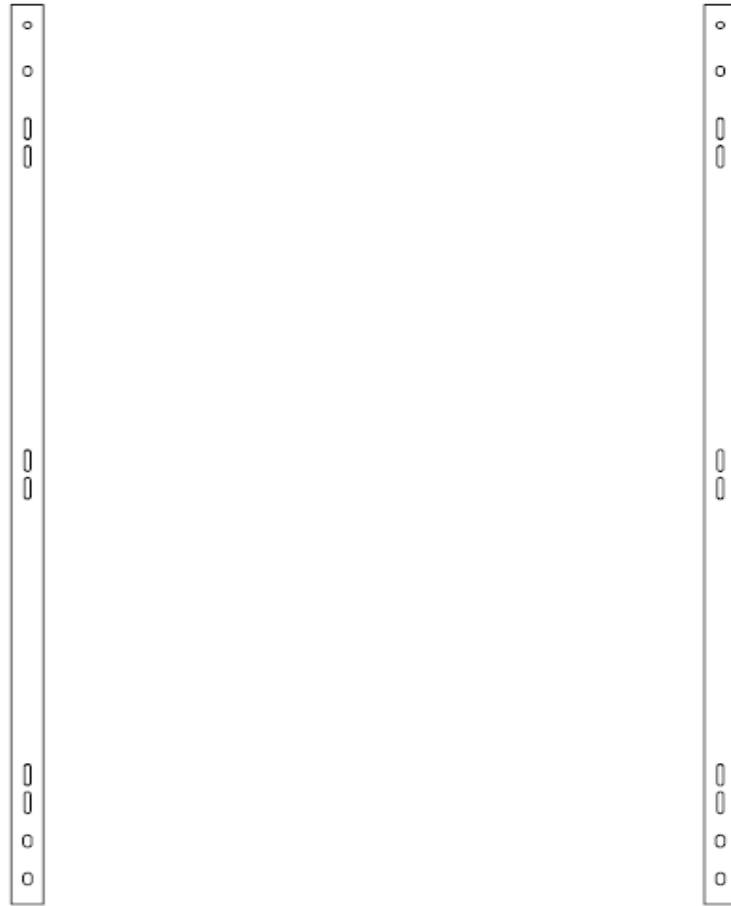


Fig 3.1

Identify the top and bottom the end of the vertical rails. See figure 3.2 below:

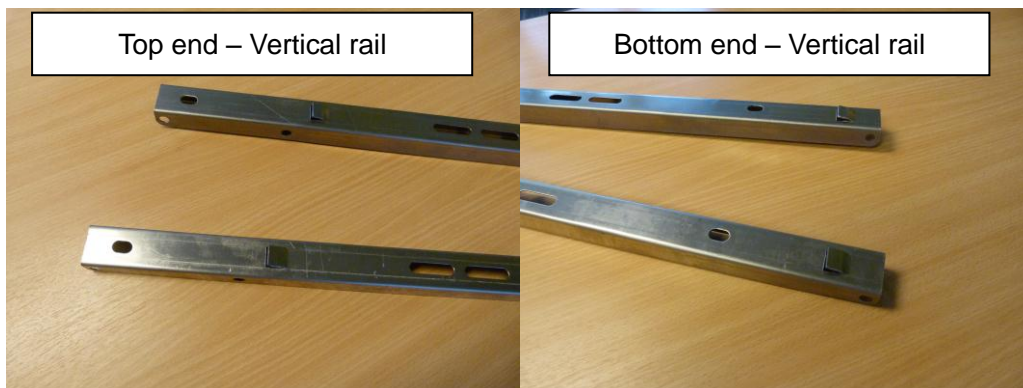


Fig 3.2

3.2.2 Fixing the Manifold:

- a) Place the manifold on the two vertical bars, and insert the lip on the front edge of the

manifold under the raised locating lug (See figure 3.5 – plate 1).

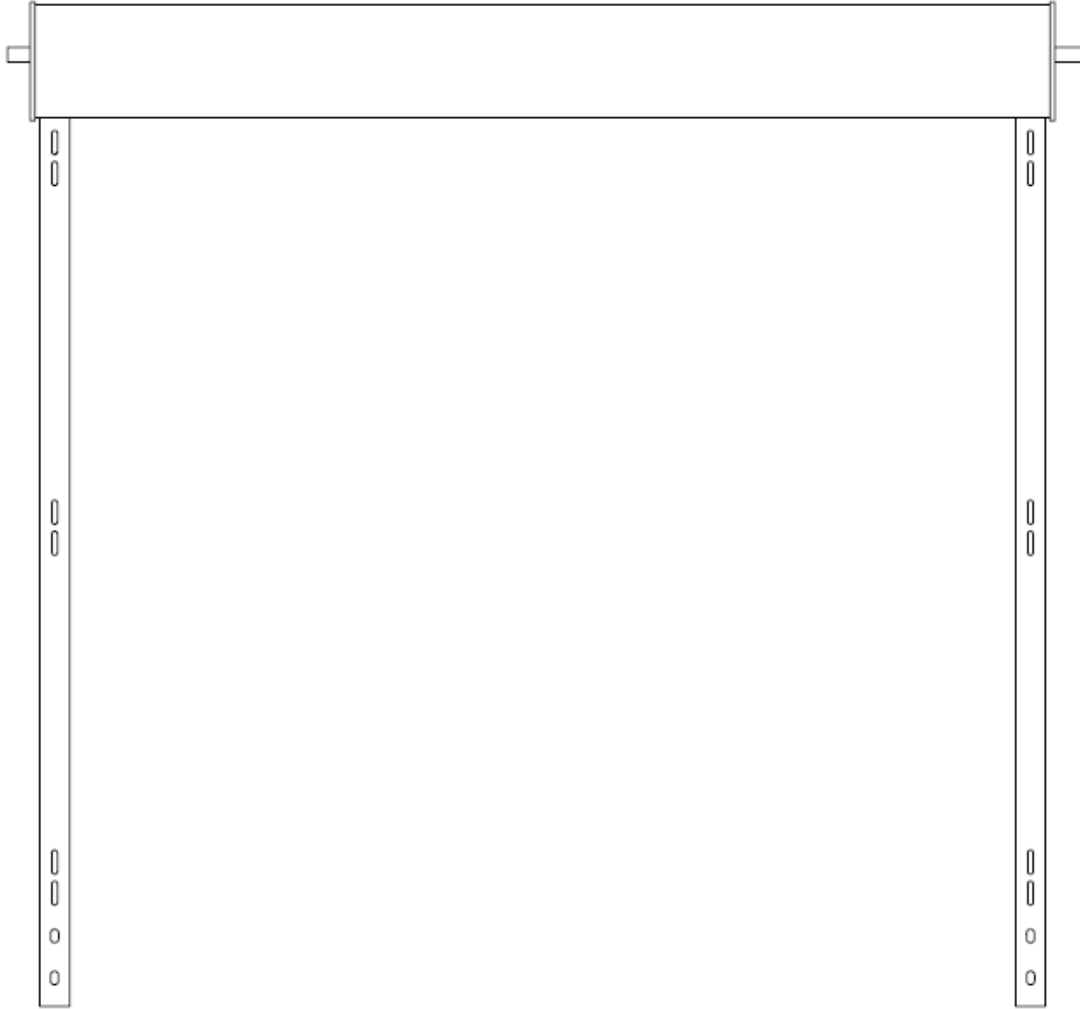


Fig 3.3

- b) Fix the manifold to the holes on the vertical bars using screws, fixing clips and nut retainers provided. (See figures 3.4 and 3.5)

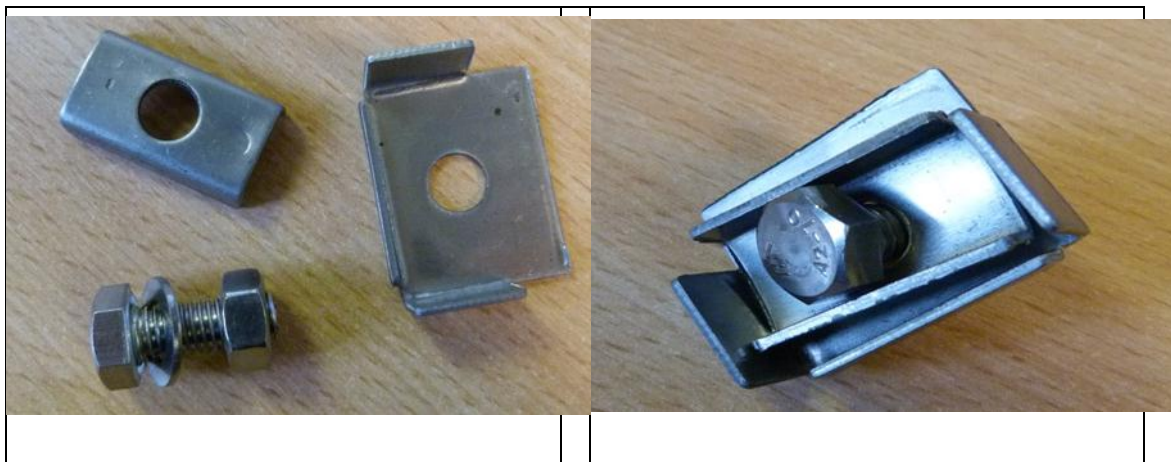


Fig 3.4



Fig 3.5

3.3 Fix the bottom rail:

- a) The bottom rail fits similarly to the manifold. Insert the lower edge under the retaining lug and secure the upper edge using screws, fixing clips and nut retainers provided.

N.B. The wider slots should be at the bottom as shown.

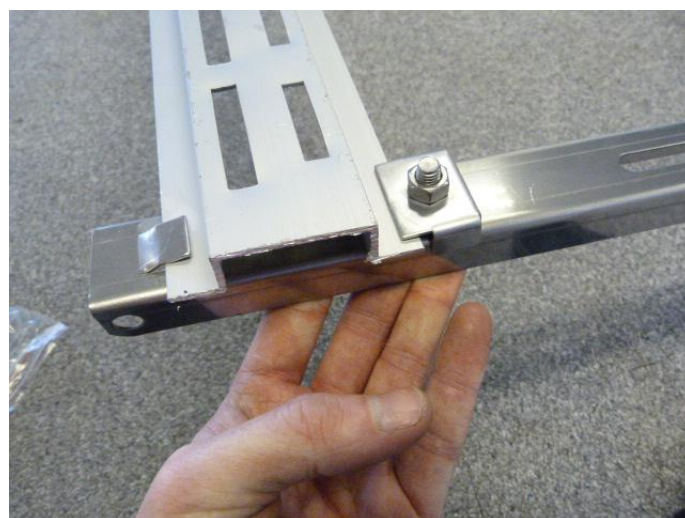


Fig 3.6

3.4 Mounting the solar collector

3.4.1 Pitched roof

Mounting straps may be used to secure the collector to a pitched slate or tile roof. The mounting straps are available as a separate item – ROOFKIT10/20 (for 10, 15 or 20 tube collectors) or ROOFKIT30 (for 30 tube collectors). The mounting straps are made of SUS304 grade stainless steel of 1mm thickness, which allows the straps to easily bear the weight of the collector, but at the same time being thin enough to pass behind slates or tiles without causing them to lift. (See figure 3.8).



Fig
3.8

Dimension of mounting straps

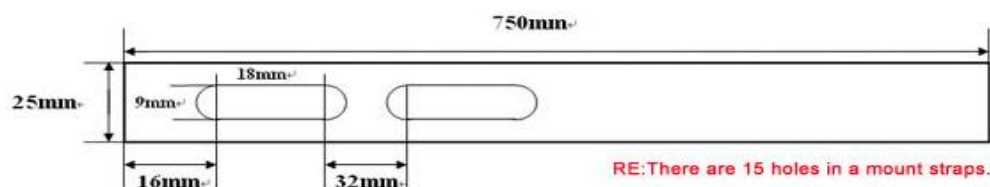


Fig 3.8

Installation steps:

There are a number of alternative methods of fixing Navitron solar collectors to the roof, depending on personal preference and roof structure. Please contact Navitron for further information or installation training.

- Select a suitable location on the roof hemisphere, the collector should ideally be located at a latitude equal to the ground equal to the latitude. For example, collectors located at a latitude of 50° would be mounted at an angle of 50° from the horizontal. N.B. There are 15 holes in each mounting strap
- Using the solar collector frame as a template, and locating the straps inside the 'U' channel of the side collectors, choose the roof fixing points for the straps. Remove enough roof tiles to locate the straps and screw securely to the roof timbers.
- Bend mounting straps according to the height of tiles and the location of oval fixing holes in the side rails of the collector frame. Replace the roof tiles. Fix solar collector on mounting straps. (Fig 3.9~3.12).

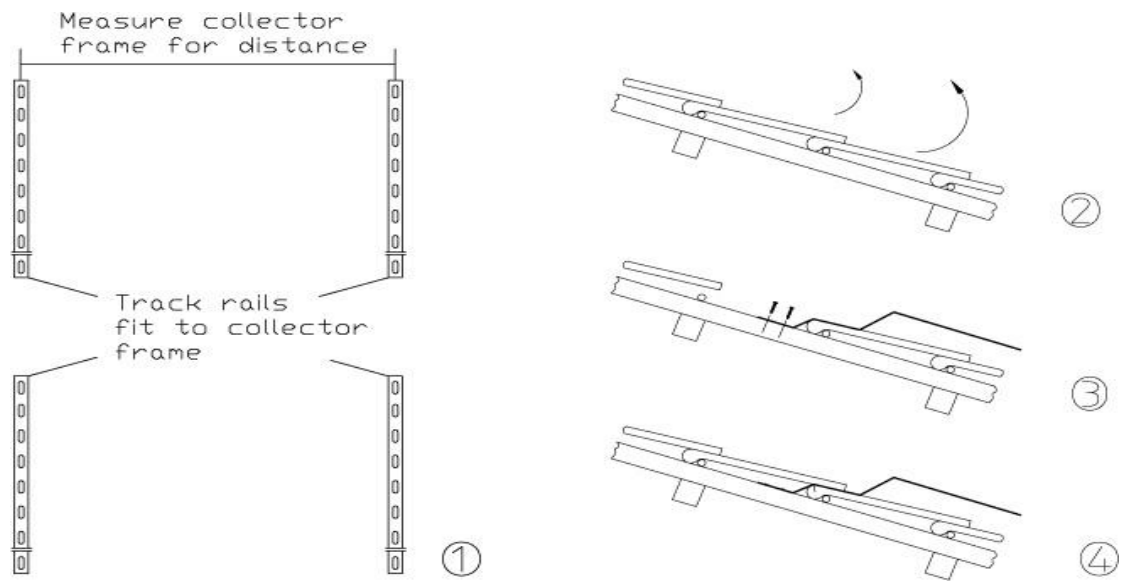


Fig 3.9

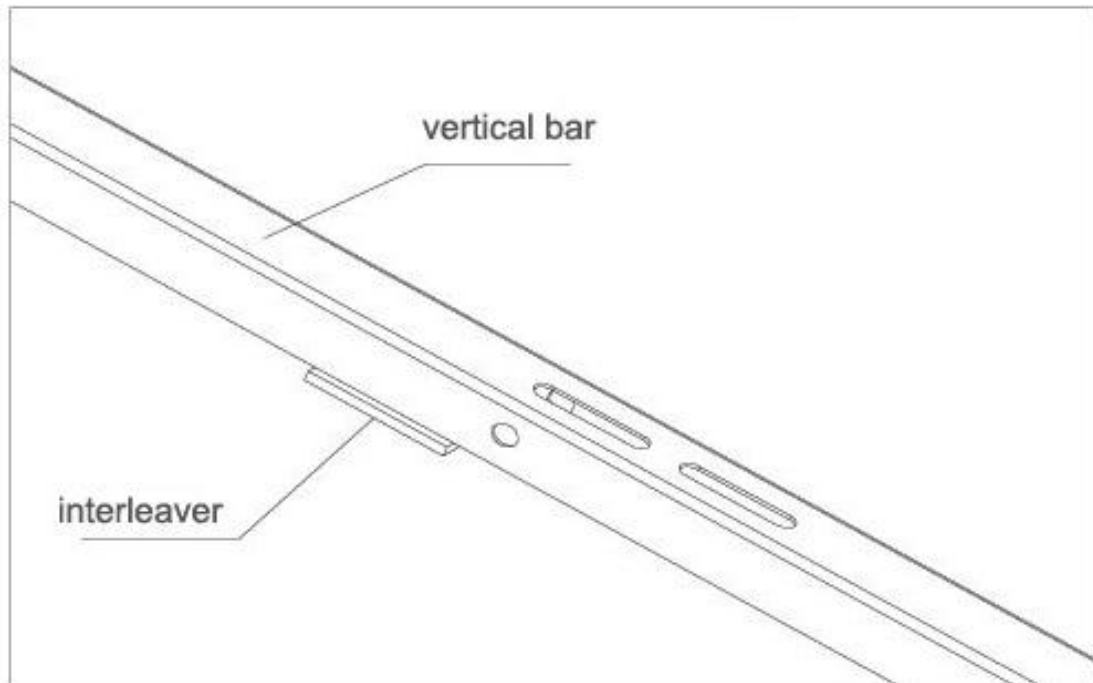


Fig 3.10

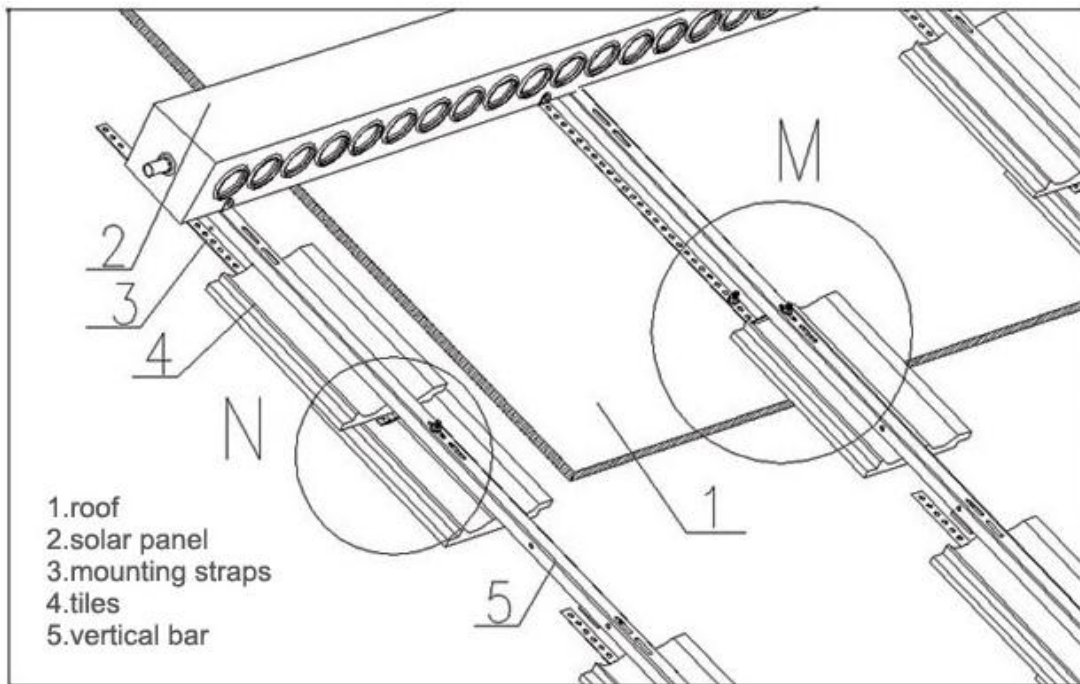


Fig 3.11

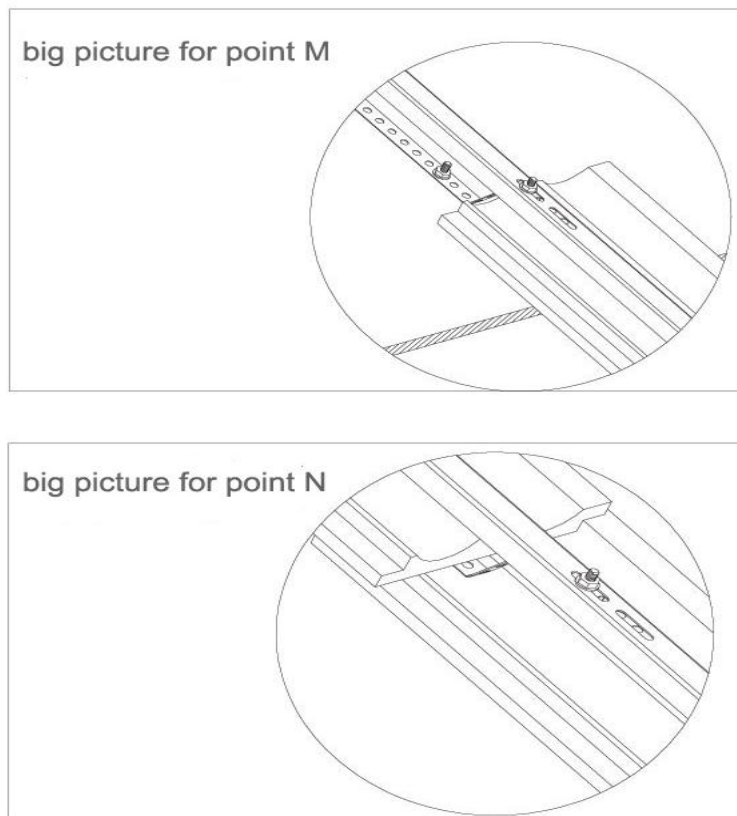


Fig 3.12

3.4.2 Flat roof installation

To mount solar collectors on a flat roof, use the optional 'A-Frame' kit, which is available through your supplier. Please ensure that you have the correct frame for the collector. The A-frame is designed for a mounting angle of 40°, although other angles can be easily accommodated through minor modification. (See figure 3.13 – Plates 1 to 8).

Once the A frame is assembled, the evacuated tubes should then be installed (Refer to section 3.5). On completion the feet of the A Frame should then be bolted to the roof.



Fig 3.13

3.5 Installation of tubes

- a) Insert the black cups into the slots in the bottom rail. The slots will need to line up with the holes in the manifold that the tube will fit into. You can slacken the rail fixings to adjust the positioning if required.
- b) Unscrew the cup from the ring holder.

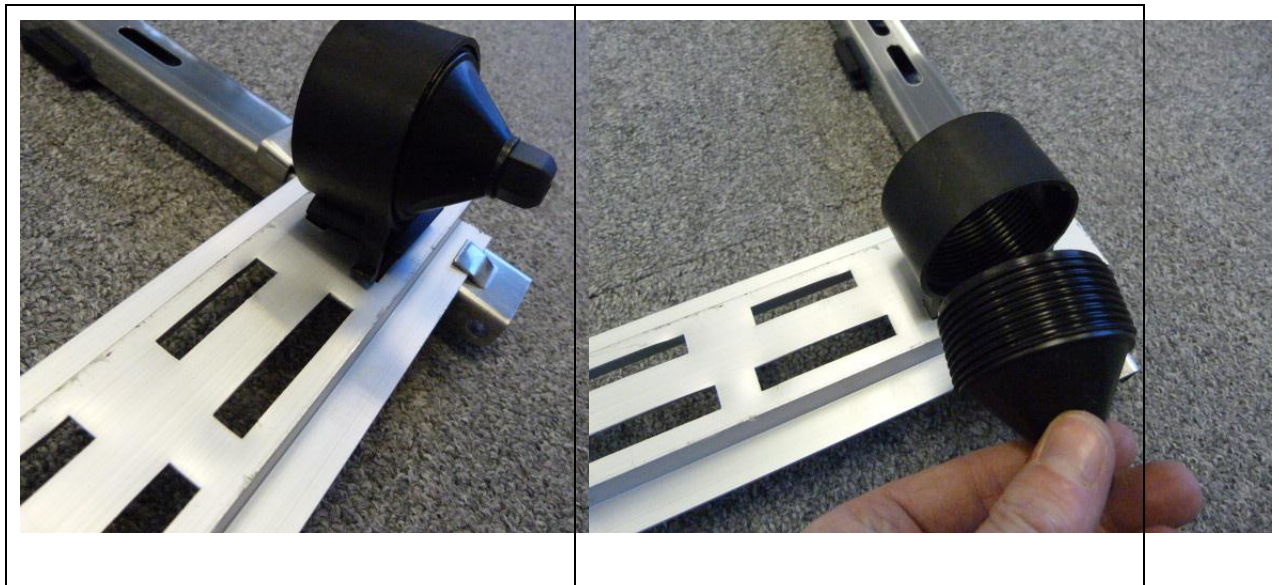


Fig 3.14

- c) Apply the thermal paste provided liberally to the tip of the copper heatpipes protruding from each evacuated tube. (See figure 3.15)



Fig 3.15

- c) Lower the silver end of the evacuated tube into bottom ring from above sufficiently far to clear the manifold, and then slide the tube upwards to locate the tip of the copper heatpipe into the corresponding port of the manifold. If the heatpipe is difficult to locate, check that it has not been slightly bent. If so, using thumb and forefinger straighten the tip

and try again. Repeat until all your solar tubes are in place. (See figure 3.15)



Fig 3.15

d) Screw the black cup you removed back into its bottom rings, over the silver ends of the solar tubes until hand-tight. (See figure 3.16).



Fig 3.16

e) See figure 3.17 for detail of the completed collector.

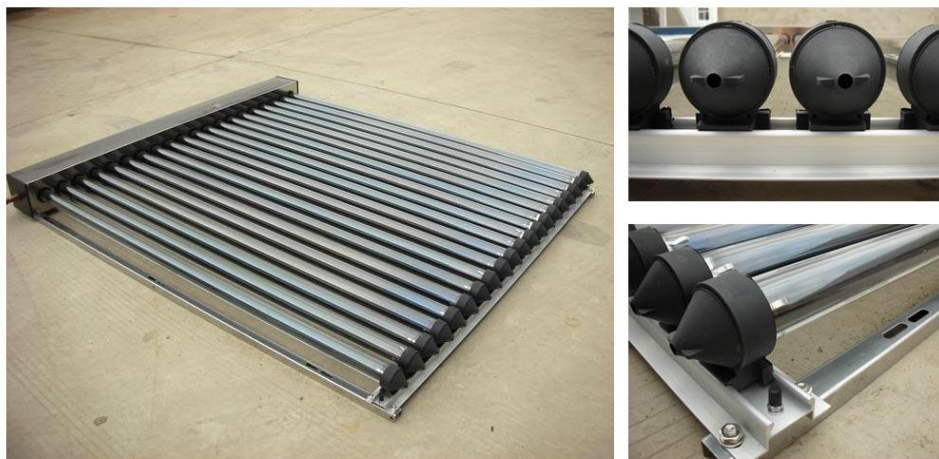


Fig 3.17

Warning:

f) Avoid assembling the solar collectors in strong sunshine, even if the ambient air is cool. DO NOT touch the copper connections at either end of the manifold, which can get very hot, even when exposed to weak sunshine. Keep evacuated tubes shaded until installation for the same reason. Direct contact between skin and hot copper heatpipes or manifold connections will cause burns! It is recommended that the evacuated tubes are not installed until after plumbing and electrical works have been completed, but if this is not possible, the tubes may be covered by a tarpaulin or other opaque cover to prevent operation until work is completed. (See figure 3.18)



Fig 3.18

4. Lightning protection

Nearby lightning strikes can cause high voltages to be induced in the solar collector and its framework. This high voltage can cause damage to sensitive electronics such as the solar controller. Suitable Navitron lightning protection equipment can be obtained from your supplier. It is very unusual to require protection against direct lightning strikes, however, if the collector is installed on a roof prone to lightning strikes, a lightning conductor should be installed, which should be 1.5m higher and 3m away from the solar collectors.

5. Interconnection of Multiple Collectors

Two collectors may be interconnected using straight 22mm compression couplings. For multiple panel installations, the use of flexible stainless steel connectors is recommended, as shown in the following picture.



Fig 5.1

6. Plumbing Layout / Variations

The Solar collectors can be plumbed in many different ways – dependant on specific customer requirements, please refer to figure 6.1 basic variant. If you are unsure or need any further advice – please contact the Navitron technical staff at the address and telephone number listed on the cover page.

Fig 6.1

Solar Hot Water System Schematic – Standard Layout

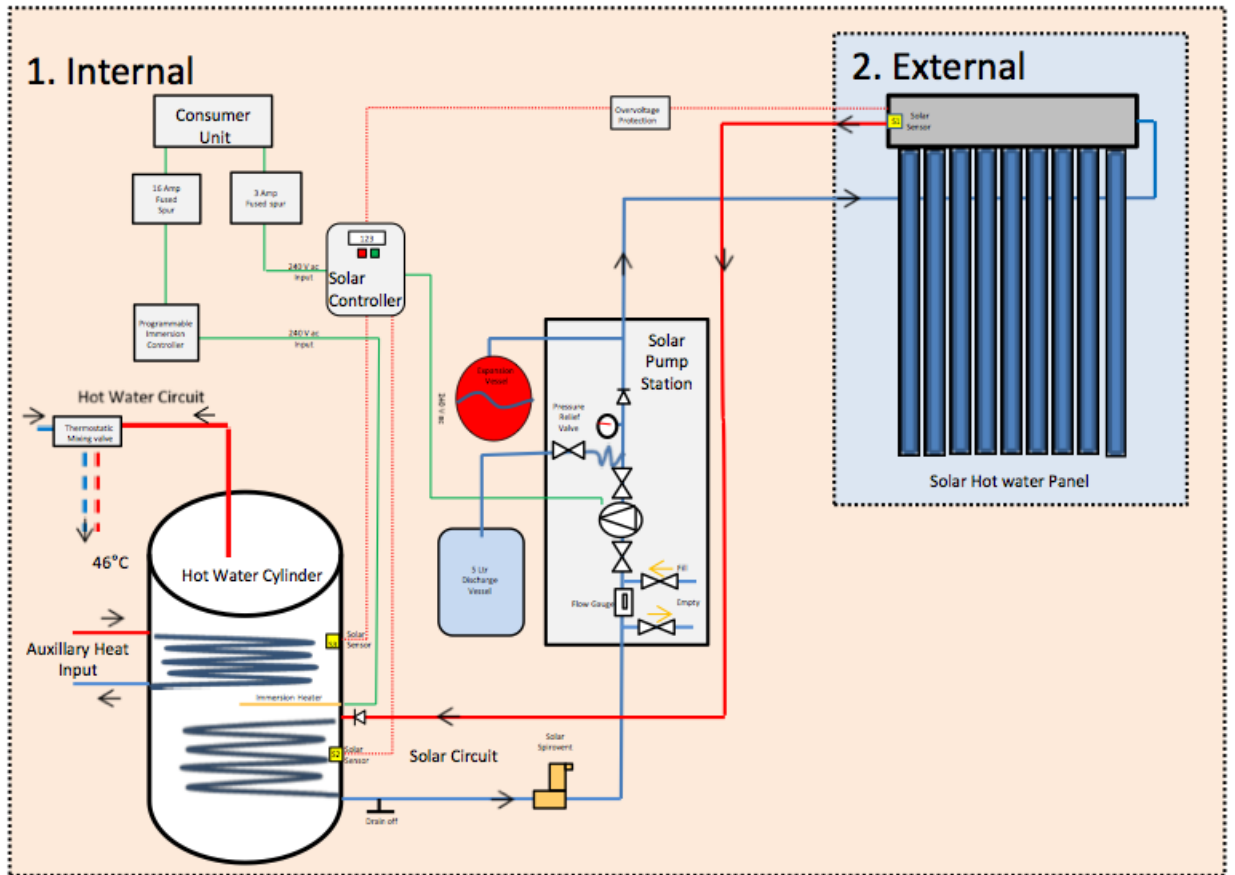


Fig 6.2

7. Dimensions of pipe connections

- For solar collector arrays up to 5m² (gross collector area), pipework of 10mm or 12mm is recommended, with total pipe length not exceeding 40m. Pipework of 15mm may be used, but total pipe length should not exceed 20m
- For solar collector arrays between 5m² and 10m² (gross collector area), pipework of 15mm or 22mm may be used.
- Pipe length should be kept to a minimum.
- All pipework, with the exception of pipework connecting the expansion vessel to the system, should be insulated with high temperature insulation (suitable for temperatures up to 150°C) with a minimum wall thickness of 19mm.

8. Heat Transfer Medium

In areas where ambient temperature may drop below freezing, antifreeze must be used. This antifreeze must be non-toxic i.e. propylene glycol. For most countries a 40% dilution of glycol should provide sufficient protection against freezing. Antifreeze is more viscous than water, so do not exceed this concentration without first checking compatibility with the circulation pump. Water used in the closed circuit of the solar water heating system should be dechlorinated, unless the chlorine concentration is below 40ppm, in order to protect the metal parts of the system.

9. Precautions

Only temperature sensors (and other electrical accessories) supplied by the controller manufacturer should be connected to the controller.

Assembly, installation and maintenance work may only be performed by properly qualified and authorised personnel.

The pump station must be installed indoors.

Set the pre-charge pressure of the expansion tank as per guidelines provided by the manufacturer. Do not insulate the connection pipe joining the expansion tank to the rest of the solar water heating system, and maintain a minimum length of 50cm.

Beware of scalding risk from hot water/steam discharging from pressure relief valve of pump station during fault conditions. The overflow should be piped in copper pipe, observing suitable pipe diameters for the length of pipe involved. Discharge should be directed into a metal container.

Do not attempt to fill system if the collector temperature exceeds 70°C. Allow collectors to cool down if necessary.

10. 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 800kPa (PRV may be 850kPa). (800kPa =8bar=116psi) For installation where mains pressure water is used, the system should ideally be designed to operate at a pressure of <500kPa, achieved by use of a pressure limiting/reduction valve.

11. Collector Pressure Drop

$\Delta p=0.2\text{Kpa}$

12. Installation Angle

It is common for collectors to be installed at an angle that corresponds to the latitude of the location. Installing at an angle less than 20° is not recommended as the heat pipes perform best in the range of 20-70°. While adhering to this guideline, an angle of latitude +/-10° is acceptable, and will not greatly reduce solar output. Angles beyond this range may be used, but a decrease in heat output will result. An angle lower than the latitude will enhance summer output, while a greater angle will enhance winter output.

13. 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 potentially exposed to higher wind speeds, additional reinforcement of attachment points may be required and can easily be supplied by your local installers.

14. Maintenance Requirements

14.1 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.

14.2 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. (However, please note that the solar collector cannot reach temperatures sufficient to cause ignition of flammable materials)

14.3 Broken Tube

Evacuated tubes are very resilient, and inert in the environment. Broken tubes are only ever the result of physical damage. Broken tubes can be identified at or before time of installation by looking at the end of the evacuated tube. If the tip appears silver, then the vacuum is intact, but if the vacuum has failed, it will appear white. If a broken tube is not replaced, it will eventually turn white along its entire length. Broken tubes should be replaced as soon as possible to maintain maximum collector performance, although the system will still operate normally even with a tube broken, and no harm will be done. Broken tubes may be replaced without having to drain down the system. Any broken glass should be cleared away to prevent injury, and damaged tubes should be handled carefully, and with

appropriate protection.