

Split Solar Hot Water Systems
Evacuated Tube Collectors
Installation Manual

Rinnai

TABLE OF CONTENTS

Specifications	3
Evacuated Tube Solar Collector	3
Installation information	5
Regulations and Occupation Health and Safety (OH&S)	5
System Orientation and Inclination	5
Water Quality	5
Water Pipes, Fittings and Insulation	6
Roof Mounting Options	6
Mounting Location Suitability	7
Installation - Evacuated Tubes	9
Components	9
Assemble Base Frame	13
Installation on a Pitched Tile Roof	14
Installation on a Pitched Metal Roof	15
Installation on a Flat Roof Frame	16
Fitting the Evacuated Tubes	18
Joining Two Collectors	19
Plumbing Connections and Temperature Sensor	19

This manual covers the installation of Rinnai evacuated tube solar collectors as part of a complete solar hot water systems.

Full instructions can be found in the “Operation / Installation Manual - Rinnai Split Solar Hot Water Systems”. This manual is provided in the pump kit or from www.rinnai.com.au.

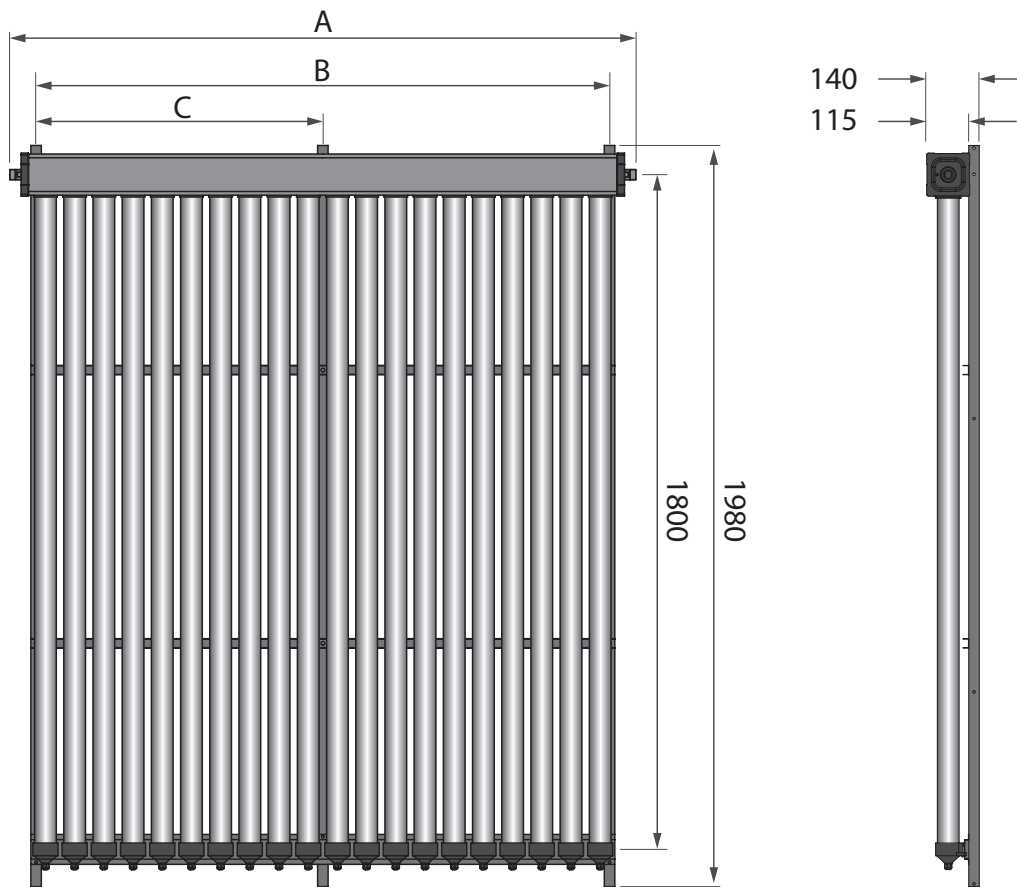
All information and warnings in the “Operation / Installation Manual - Rinnai Split Solar Hot Water Systems” are applicable to this installation.

SPECIFICATIONS

EVACUATED TUBE SOLAR COLLECTOR

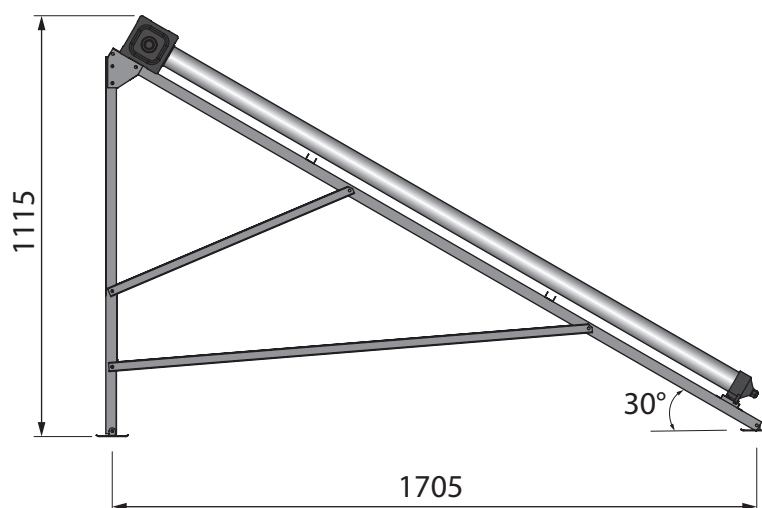
	EVT20A	EVT25A	EVT30A
Number of tubes	20	25	30
Waterways	Copper	Copper	Copper
Threaded Connections	R ³ / ₄	R ³ / ₄	R ³ / ₄
Maximum operating pressure	1000 kPa	1000 kPa	1000 kPa
Frame material	Aluminium	Aluminium	Aluminium
Weight empty	70 kg	81 kg	94 kg
Potential solar output at PTR relief conditions	1.30 kW	1.63 kW	1.96 kW
Frost Protection	<p>The Rinnai solar hot water warranty booklet specifies the locations that are suitable for installation of evacuated tube solar hot water systems.</p> <p>Power must be on at the pump, and the solar controller must be in frost protection mode. See the "Operation / Installation Manual - Rinnai Split Solar Hot Water Systems" for more details.</p> <p>For more information on frost protection, refer to the warranty booklet.</p>		

Dimensions - Base Frame



	A	B	C
EVT20A	1670	1530	765
EVT25A	2060	1920	960
EVT30A	2450	2310	1155

Dimensions - Flat Roof Frame



INSTALLATION INFORMATION

REGULATIONS AND OCCUPATION HEALTH AND SAFETY (OH&S)

Installation and commissioning must be performed by authorised persons. Rinnai solar systems must be installed in accordance with these instructions and all regulatory requirements which exist in your area including those in relation to manual lifting, working at heights and on roofs. Applicable publications and regulations may include:

- AS/NZS 3500 National Plumbing and Drainage
- Building Codes of Australia
- Local Occupational Health and Safety (OH&S) regulations



Solar collectors are heavy and bulky items and are usually positioned on the roofs of buildings. Each Australian State and Territory has a principal Occupational Health and Safety (OH&S) Act which contains requirements relating to the handling of large, bulky or awkward items and the prevention of falls from elevated surfaces. Persons installing solar collectors must be aware of their responsibilities and be adequately trained and qualified, in accordance with local OH&S requirements.

SYSTEM ORIENTATION AND INCLINATION

The performance of any solar hot water system is determined by the way the system is installed.

For Australian installations, solar collectors should face the equator (True North) for optimum performance. Installing solar collectors facing up to 45 degrees away from North (between North-East and North-West) will reduce efficiency by approximately 5%.

For Australian installations the inclination of solar collectors should be the same as the latitude of the site for optimum performance. Inclinations within 20 degrees of the latitude of the site will reduce efficiency by approximately 5%. Most roofs in Australia have a slope of between 20° and 25° and provide an appropriately angled mounting surface.

Installers must ensure they comply with relevant local regulations regarding solar collector inclination and orientation.

City	Latitude	City	Latitude	City	Latitude
Adelaide	35°S	Canberra	35°S	Melbourne	38°S
Albany	35°S	Darwin	12°S	Perth	32°S
Alice Springs	24°S	Dubbo	32°S	Port Hedland	20°S
Brisbane	27°S	Geraldton	28°S	Rockhampton	24°S
Broken Hill	31°S	Hobart	42°S	Sydney	34°S
Cairns	17°S	Mildura	34°S	Townsville	19°S

Latitudes of Australian Cities

WATER QUALITY

The water quality of most public supplies is suitable for the water heating system. The water quality from bore wells is generally unsuitable for the water heating system. Refer to the separate Rinnai solar warranty booklet for water quality parameters and how they affect the warranty conditions. If in doubt about the water quality, have it checked against the parameters listed in the warranty conditions. The system is not suitable as a pool or spa heater.

WATER PIPES, FITTINGS AND INSULATION



The solar hot and solar cold pipes between the solar storage tank and the solar collectors must be suited to the high water temperatures and pressures that may occur. As such, plastic pipe must not be used. Components used to join pipes must use metallic materials to achieve sealing. The collector flow and return pipes should be 15 mm copper tube and should be suitably insulated along their full length



To meet the separation distance requirements of AS/NZS 3500.4, the 5V DC sensor leads shall maintain a separation distance of not less than 25mm from any above ground water piping.

Flow and return pipes must not contact other services including cold water pipes. 100mm minimum clearance must be provided, or otherwise as required in AS/NZS 3500.

All hot water pipework should be insulated with sealed polyethylene foamed or equivalent insulation to optimise performance and energy efficiency, and to protect against frost damage. Such insulation may also be mandatory under local regulations.

Rinnai recommend insulation to achieve an R value of 1.0 K.m²/W.

With the exception of solar collector flow and return pipes, water pipe sizing should be performed in accordance with AS/NZS 3500. All external pipework **MUST** be insulated to prevent frost damage.

The suggested maximum combined lengths of the solar flow and return pipes is 40 metres. Please refer to the system installation manual supplied with the pump kit for the maximum pipe length for the specific pump kit.

All supplied insulation materials must be fitted as shown to minimise heat losses. In frost prone areas this insulation will also protect against frost damage.

ROOF MOUNTING OPTIONS



Rinnai Evacuated tube systems are **NOT** certified for installation in cyclone areas.

Rinnai evacuated tube solar collectors may be installed on the following roof types:

- Pitched metal roof
- Pitched tile roof
- Flat roof

For roofs with a slope of 10° or less a flat roof frame must be used.

Roof construction must be checked to ensure that the roof timbers are capable of supporting the additional load. (Refer to AS 3500.4 Appendix H).

The roof mounting option must be appropriate for the wind loading that is likely in the installed location. See the section 'Mounting Location Suitability' on page 7.

For buildings higher than 10 metres the specifications for securing solar collectors to the building structure need to be determined on a case by case basis for each building by a person qualified to do so in accordance with the Building Code of Australia (BCA). Such specifications relate to the type of fastenings, the number of fastenings and their embedment into the building structure. They are determined from factors including the geographical location and topography, the prevailing wind conditions, building dimensions, rooftop form and structural materials, and the intended location of the solar panels relative to building internal, edge and corner zones. The BCA references AS1170.2 "Structural Design Actions Part 2: Wind Actions", AS3600 "Concrete Structures" and AS4100 "Steel Structures" in relation to these specifications.

MOUNTING LOCATION SUITABILITY

The following table indicates which installation locations are suitable for different roof mounting options for Rinnai split solar hot water systems.

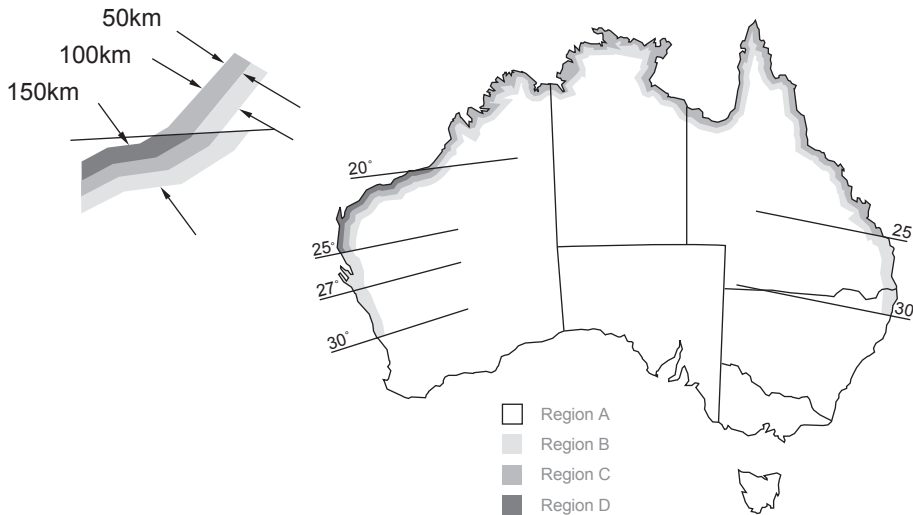
Wind Region	Region A			Region B			Region C		Region D
Roof Area (see page 8 for explanation)	Area 1	Area 2	Area 3	Area 1	Area 2	Area 3	Area 1	Areas 2 & 3	Areas 1,2 & 3
Pitched Roof	✓	✓	✓	✓	✓	✗	✗	✗	✗
Flat Roof Frame	✓	✓	✗	✓	✗	✗	✗	✗	✗

✓ Suitable

✗ Not Suitable

Wind Region

Australia has been categorised into 4 wind regions. Each region has varying wind load parameters such as wind speed and wind direction multipliers. The diagram below illustrates the region locations. For more information on how to classify site specific wind loading parameters see AS/NZS 1170.2 - Wind Actions, or consult a certified structural engineer.

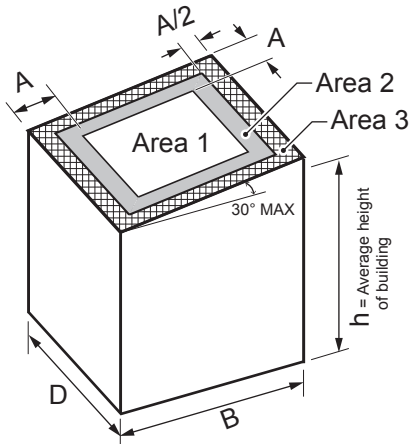


Region A	Region B		Region C		Region D
Callytharra Springs	Adelaide River	Ivanhoe	Borroloola	Mackay	Carnarvon
Gascoyne Junction	Atherton	Kyogle	Broome	Mareeba	Exmouth
Green Head	Biloela	Marble Bar	Bundaberg	Millstream	Karratha
Kununurra	Brisbane	Mullewa	Burketown	Moreton	Onslow
Lord Howe Island	Christmas Island	Norfolk Island	Cairns	Nhulunbuy	Port Hedland
Morawa	Collinsville	Torres Strait Islands	Cocos Islands	Normanton	
Toowoomba	Corindi	Wyndham	Darwin	Rockhampton	
Wittanoom	Geraldton		Derby	Townsville	
Bourke			Karumba		

Indicative selection of towns in Regions A,B,C &D

Roof Area

As per AS/NZS 1170.2, domestic pitched and flat roof areas are classified into working areas. The diagram below illustrate these areas.



A = minimum of 0.2 x B, 0.2 x D and 1 x h

Area 1 - Internal of roof.

Area 2 - Intermediate area, wind pressures increased by 1.5 times.

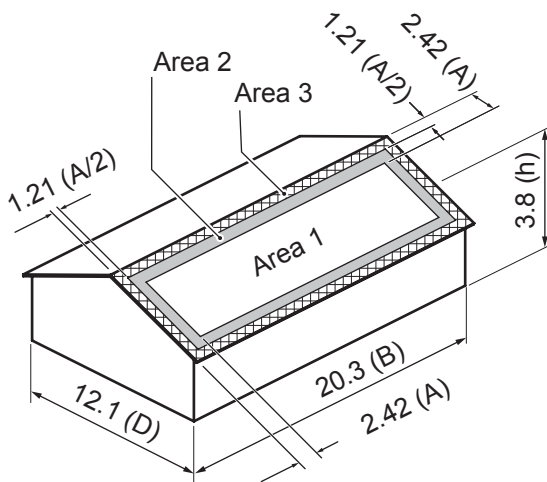
Area 3 - Roof edge including corners, wind pressures increased by 3 times. For installations in roof area 3, a minimum of 0.5m from the edge of the roof is recommended.

Height limit for all installations is 10 metres.

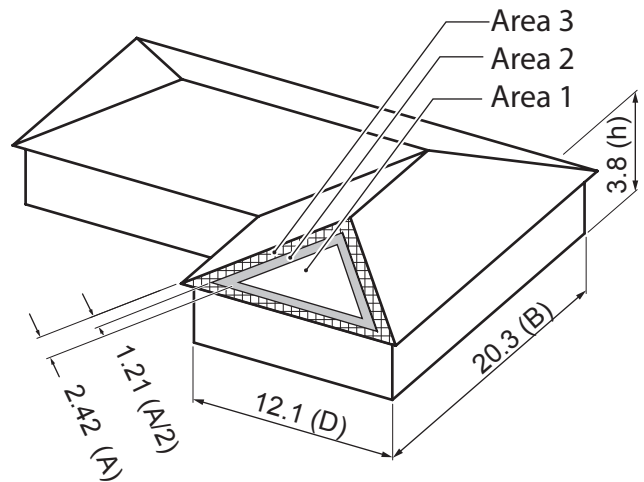
For more information on how to classify specific roof area installations, or for building heights exceeding 10 metres see AS/NZS1170.2 or consult a certified structural engineer.

Some examples are shown below.

Example 1



Example 2



In both examples :

A = min of $0.2 \times 20.3 = 4.06$
 $0.2 \times 12.1 = 2.42$
 $1 \times 3.8 = 3.8$

→ A = 2.42

A/2 = 1.21 m

INSTALLATION - EVACUATED TUBES







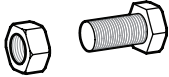
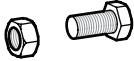
COMPONENTS

Evacuated Tube Collector Components

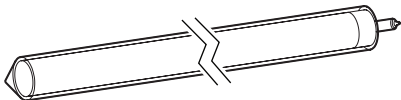
Each evacuated tube collector installation requires several components packaged within different boxes. Please ensure you have all the relevant boxes before starting installation

		METAL PITCH ROOF				TILED PITCH ROOF				FLAT ROOF			
		20	25	30	40	20	25	30	40	20	25	30	40
Solar Collector	KEVT20A contains: EVTMAN20R5A EVTFRM20R5A EVTUBE10R5A												
		1			2	1			2	1			2
		1			2	1			2	1			2
		2			4	2			4	2			4
Solar Collector	KEVT25A contains: EVTMAN25R5A EVTUBE10R5A EVTUBE15R5A												
			1				1				1		
			1				1				1		
			1				1				1		
Solar Collector	KEVT30A contains: EVTMAN30R5A EVTUBE15R5A												
				1				1				1	
				2				2				2	
Tiled Pitch Roof Mounting Kit	EVTPI20R5A					1			2				
	EVTPI25R5A						1						
	EVTPI30R5A							1					
	EVTRFBRKT					1	1	1	2				
Flat Roof Frames	EVTFRF20R5A									1			2
	EVTFRF25R5A										1		
	EVTFRF30R5A											1	
Additional Installation Components	IKEVTR5A	1	1	1	1	1	1	1	1	1	1	1	1
	DDEVTCPLKIT				1				1				1


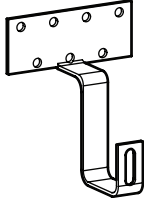
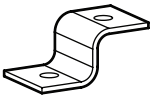
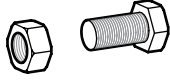

Manifold, Base Frame and Bottom Support Assembly Kit Components

EVTMAN20R5A	EVTMAN25R5A	EVTMAN30R5A	EVTFRM20R5A	Item	EVTMAN20R5A	EVTMAN25R5A	EVTMAN30R5A	EVTFRM20R5A	
1	1	1	-	 <p>Manifold Header (to suit required number of tubes)</p>	1	1	1	-	 <p>Bottom Support Assembly (Single Tube Cap 40011224)</p>
-	3	3	3	<p>1980 mm long</p>  <p>Base Frame Rail A-</p>	-	2	2	2	<p>EVT20A 1560 mm EVT25A 1950 mm EVT30A 2340 mm</p>  <p>Base Frame Rail B</p>
20	25	30	-	 <p>Dust Caps 40011220</p>	1	1	1	-	 <p>Heat Transfer Paste 40011222</p>
6	6	6	-	 <p>M8-16 Nut and Bolt</p>	9	9	9	-	 <p>M6-12 Nut and Bolt</p>

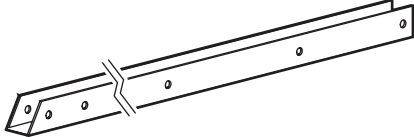
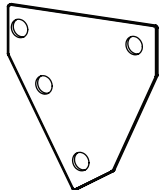
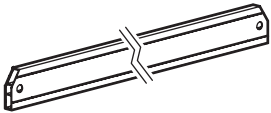

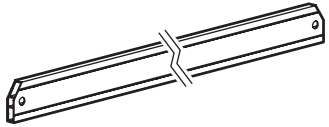
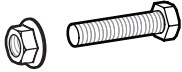
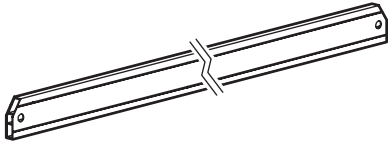
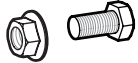
Evacuated Tubes

EVTUBE10R5A	EVTUBE15R5A	Item
10	15	 <p>Evacuated Tube (including heat pipe)</p>

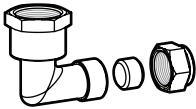
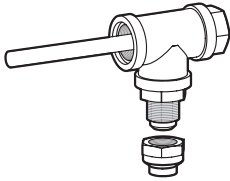
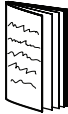

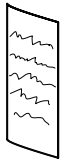
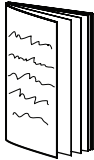
Pitch Roof Mounting Kits

EVTPIT20R5A	EVTPIT25R5A	EVTPIT30R5A	EVTRFBRKT	Item	EVTPIT20R5A	EVTPIT25R5A	EVTPIT30R5A	EVTRFBRKT	Item
2	2	2	-	 Pitch Roof Rail	-	-	-	4	 Tiled Roof Mounting Hook
-	-	-	4	 Tiled Roof Mounting Clips	-	-	-	8	 M8-16 Nut and Bolt
-	-	-	20	 M6 Screws	-	-	-	8	

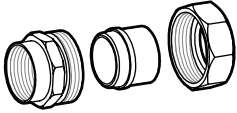
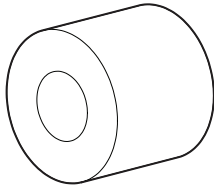
Flat Roof Frame Kits

EVTFRF20R5A	EVTFRF25R5A	EVTFRF30R5A	Item	EVTFRF20R5A	EVTFRF25R5A	EVTFRF30R5A	Item
3	3	3	 FRF Back Leg	3	3	3	 FRF Bracket
3	3	3	 FRF Side Brace Short	6	6	6	 FRF Foot 40011226
3	3	3	 FRF Side Brace Long	4	4	4	 M6-25 Bolt and Flange Nut
4	4	4	 FRF Back Brace	34	34	34	 M6-12 Nut and Bolt

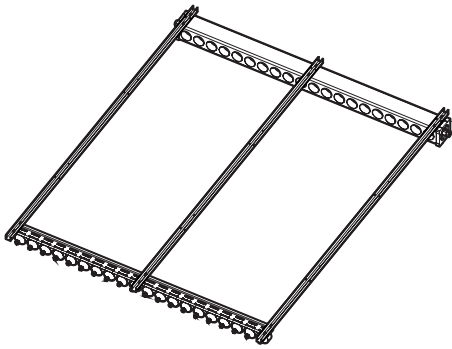
Installation Kits

IKEVTR5A	Item	IKEVTR5A	Item
1	 <p>Elbow 21201071</p>	1	 <p>Hot Sensor Assembly 10204715</p>
1	 <p>Warranty Booklet 15401041</p>	1	 <p>Hot Sensor Lead 31002715</p>
1	 <p>STC form 15401023</p>	1	 <p>Instruction Manual 15401100</p>

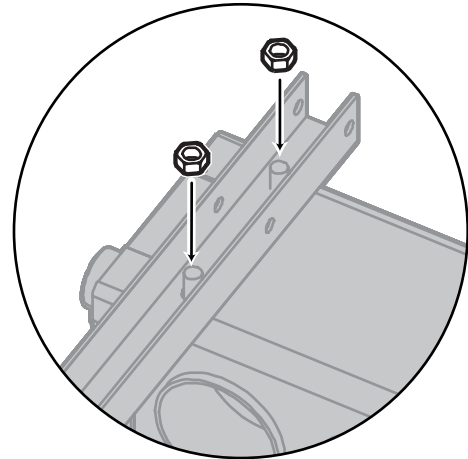
Collector Joining Kits

DDEVTCPLKIT	Item	DDEVTCPLKIT	Item
1	 <p>3/4 Rp Barrel Union 32201105</p>	1	 <p>Insulation for Barrel Union 14601214</p>

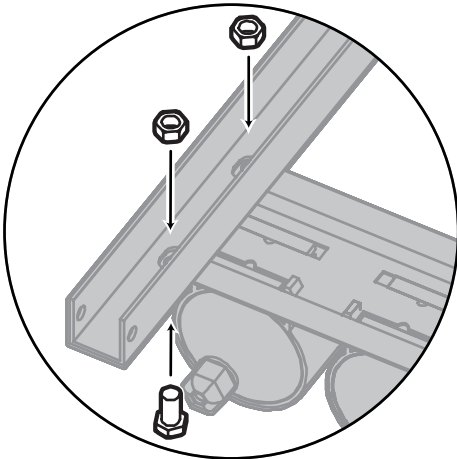
ASSEMBLE BASE FRAME



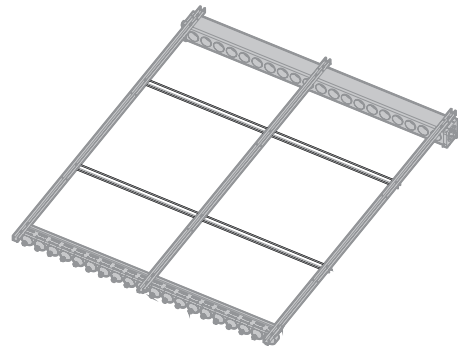
Step 1. Place the manifold header and the bottom support assembly upside down. Place the three Base Frame Rail A as shown in the diagram.



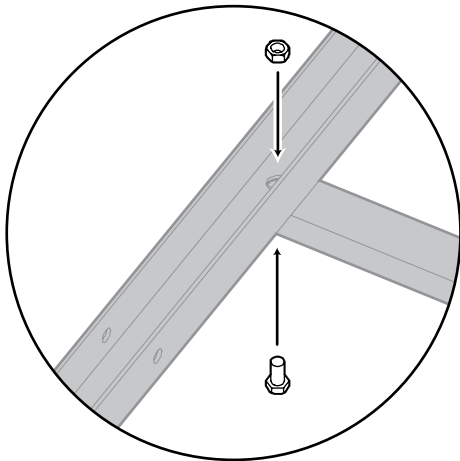
Step 2. Fasten the rails to the header using the nuts supplied with the header.



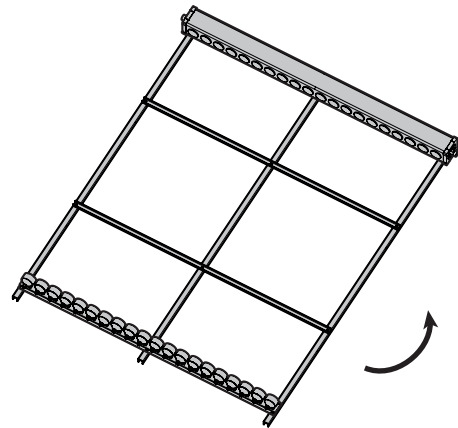
Step 3. Fasten the rails to the bottom support assembly using the M8 nuts and bolts supplied.



Step 4. Position the two Base Frame B rails under the existing components

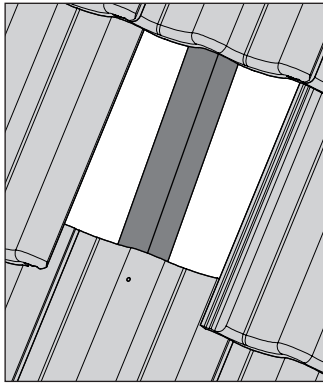


Step 5. Fasten using the M6 nuts and bolts supplied.

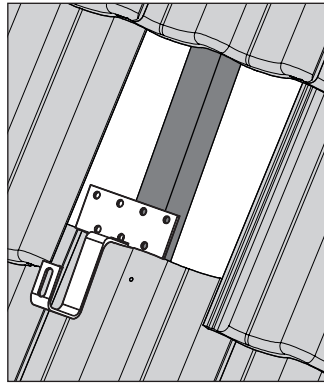


Step 6. Turn assembly up correct way

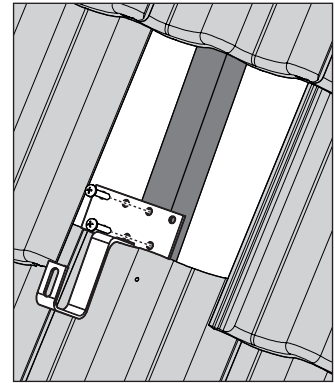
INSTALLATION ON A PITCHED TILE ROOF



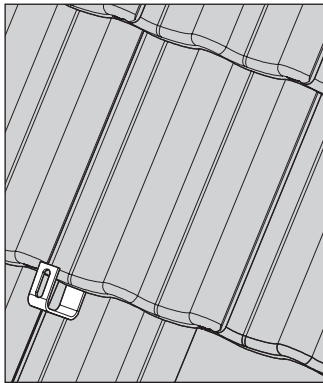
Step 1. Carefully remove a roof tile.



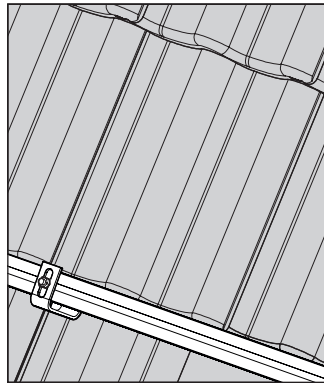
Step 2. Position the mounting bracket as shown.



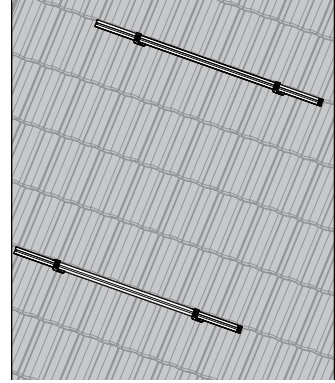
Step 3. Fasten the bracket to roof structure using suitable screws.



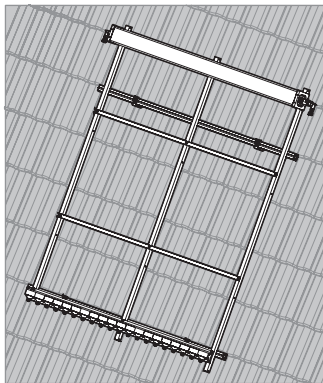
Step 4. Replace the roof tile.



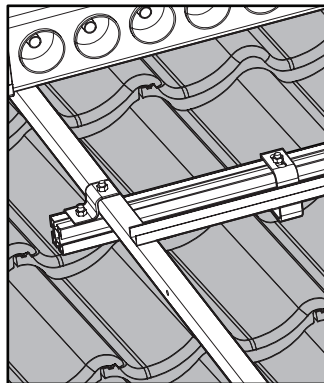
Step 5. Fit the mounting rail in bracket and fasten



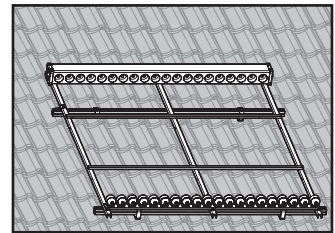
Step 6. Repeat steps 1 to 6 for the remaining brackets and rail.



Step 7. Position the base frame on the rails.

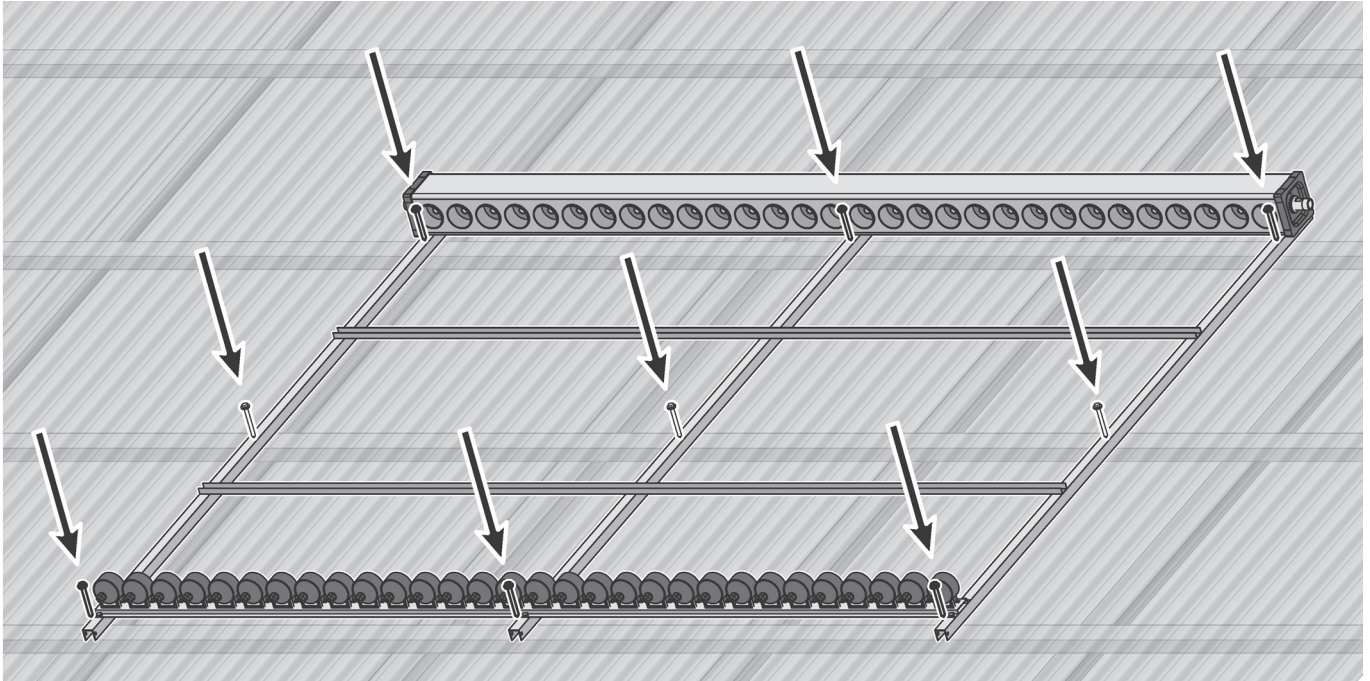


Step 8. Fasten the assembly using the mounting clips



INSTALLATION ON A PITCHED METAL ROOF

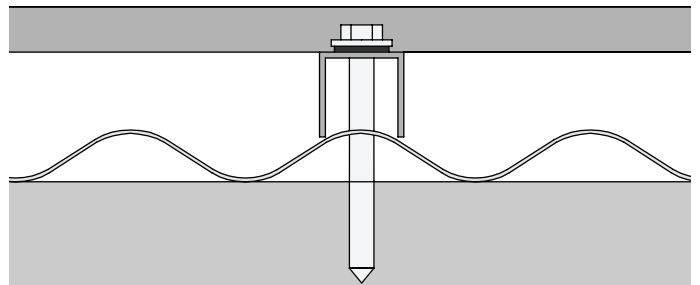
Fasten the base frame to the roof battens/purlins as shown in the diagram below. The base rails should sit on the peak of the roofing material to minimise the chance of water leaks. The frame must be fastened to the battens in at least 9 locations. Fasteners should be as close as possible to the header and the bottom support assemblies. It will be necessary to drill through the aluminium base frame.



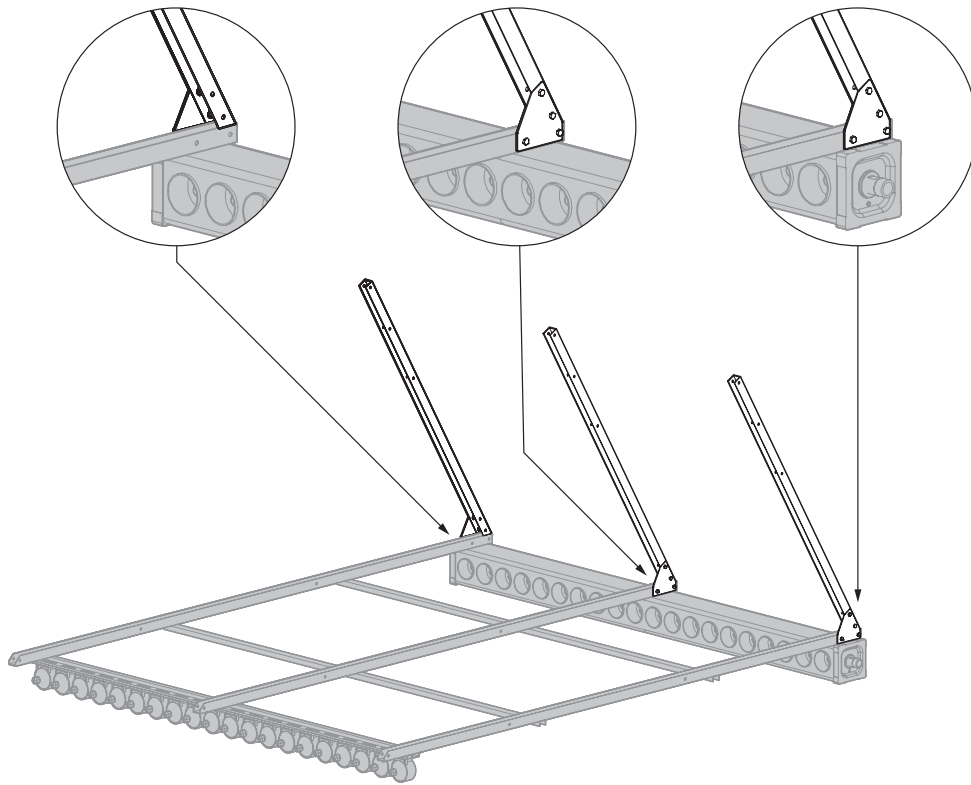
For timber battens/purlins use 14G, Ø6.3 timber screws (or equivalent) with a minimum embedment of 35 mm into the batten.

For a metal batten/purlin use 14G, Ø6.3 tek screws (or equivalent). Minimum steel thickness 0.75 mm, grade 550.

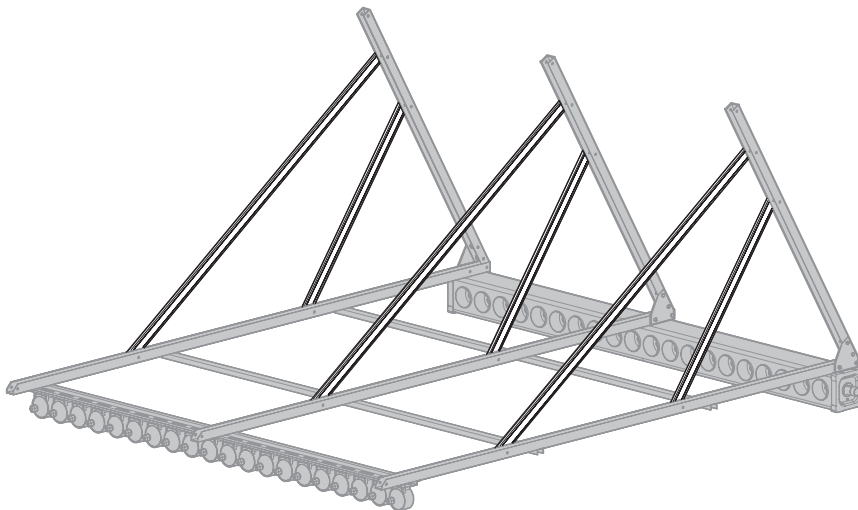
All penetrations into the roof material are to be sealed by the installer. It is the responsibility of the installer to ensure the installation is watertight.



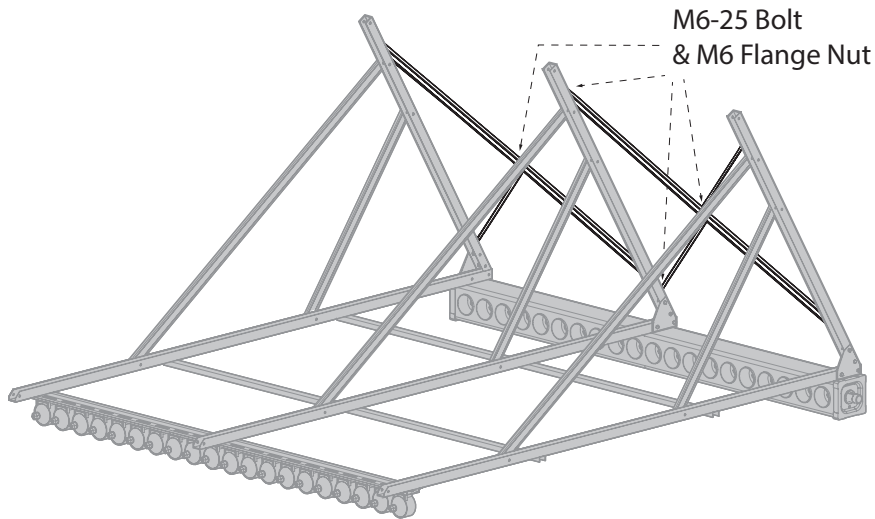
INSTALLATION ON A FLAT ROOF FRAME



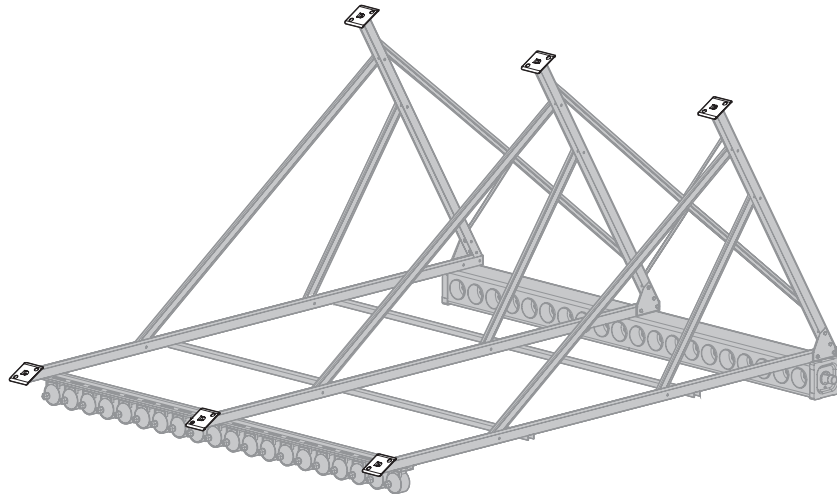
Step 1. Turn the complete base frame upside down and connect the rear legs and brackets using the M6-12 bolts and M6 flange nuts as shown.



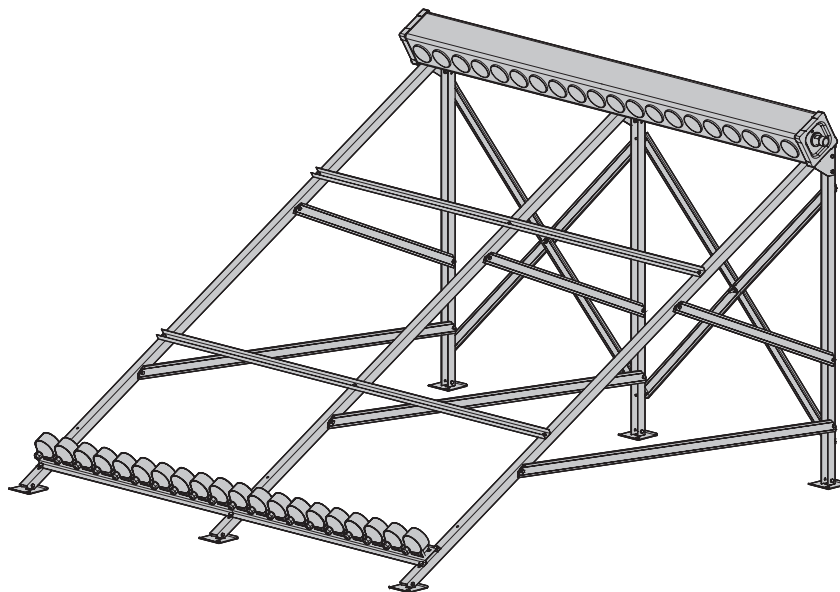
Step 2. Connect the side braces as shown. Attach with M6-12 bolts and M6 flange nuts.



Step 3. Connect the back braces as shown. Attach with M6-12 bolts and M6 flange nuts except where shown otherwise in image.



Step 4. Connect the feet as shown. Attach with M6-12 bolts and M6 flange nuts.

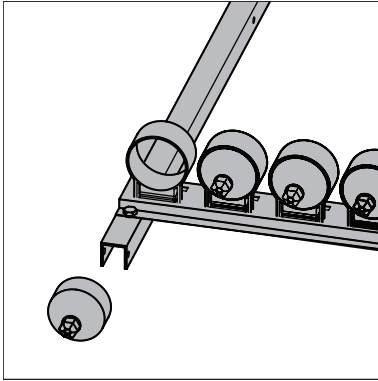


Step 5. Turn frame over. Fasten to roof using suitable fasteners (not supplied).

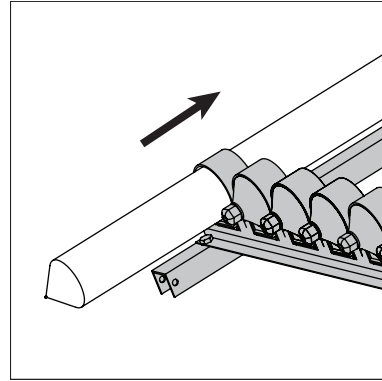
FITTING THE EVACUATED TUBES



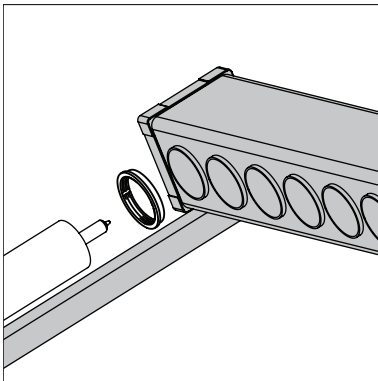
The fin and bulb on the evacuated tube will become hot when exposed to sunshine. Take care when handling to prevent burns.



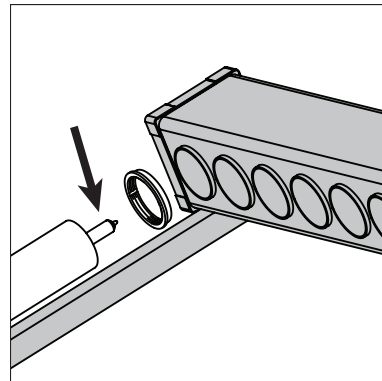
Step 1. Unscrew the tube cap as shown.



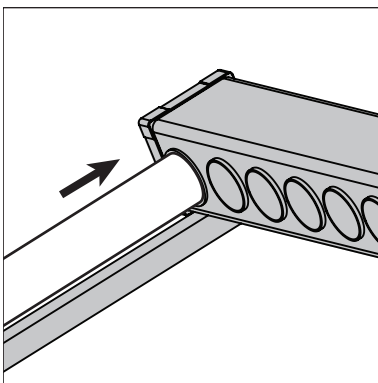
Step 2. Slide the evacuated tube through the tube cap.



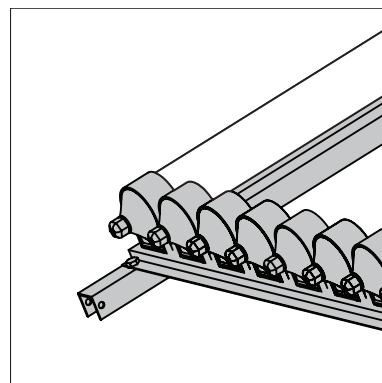
Step 3. Position the dust cap into the header



Step 4. Apply heat transfer paste to heat pipe bulb.



Step 5. Slide the tube into the header. Soapy water around the outside of the glass will make this easier

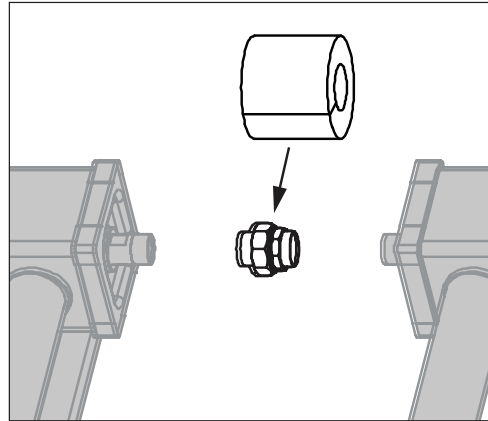


Step 6. Replace the tube cap.

Step 7. Repeat steps 1 to 6 for the remaining tubes.

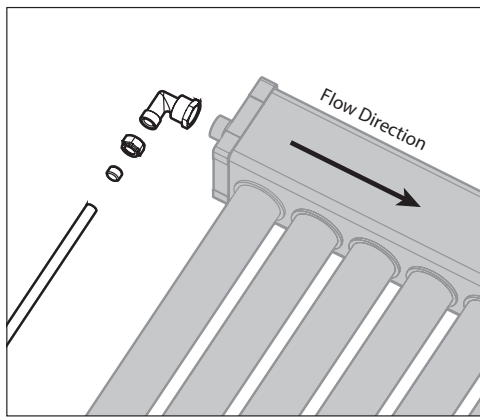
JOINING TWO COLLECTORS

Two EVT20A collectors can be joined together for a 40 tube system, using kit DDEVTCPLKIT. Ensure insulation covers all exposed fittings.

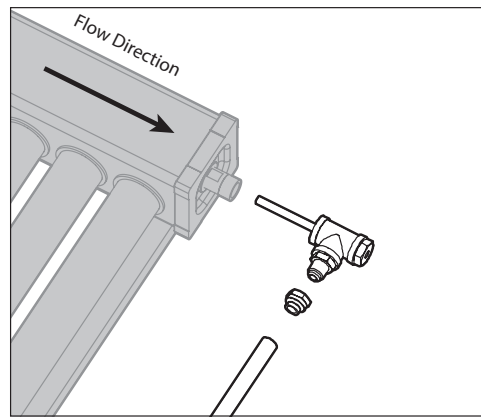


PLUMBING CONNECTIONS AND TEMPERATURE SENSOR

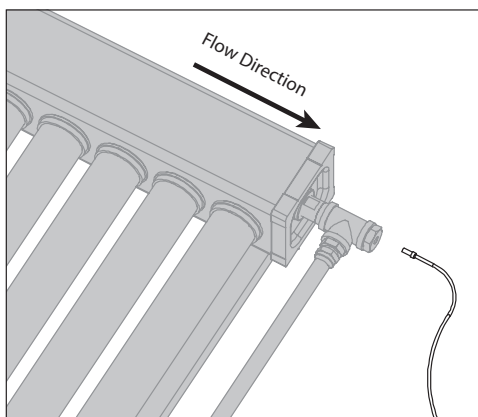
The flow direction can be reversed from how it is shown in the diagrams below. Always ensure that the hot sensor lead and the air bleed valve are positioned at the outlet end of the header.



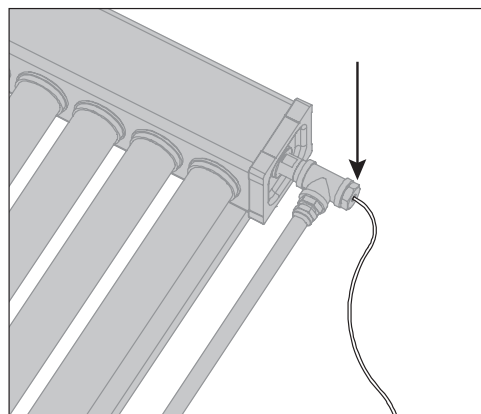
Step 1. Connect fittings to cold water side of header. Copper flow pipework is supplied by installer.



Step 2. Connect hot sensor assembly to hot water side of header. Copper return pipework is supplied by installer.



Step 3. Connect temperature sensor lead into hot sensor assembly. Ensure that the lead is pushed all the way into the pocket.



Step 4. Secure the lead to the header using silicone to ensure it will not come loose. Connect the plug end to the solar controller as described in the Operation / Installation Manual - Rinnai Split Solar Hot Water Systems.

Step 5. Insulate all exposed fittings and pipework as described in the section 'Water Pipes, Fittings and Insulation' on page 6..

Rinnai Australia Pty Ltd

ABN 74 005 138 769 | AU45204

100 Atlantic Drive, Keysborough, Victoria 3173
P.O. Box 460, Braeside, Victoria 3195
Tel: (03) 9271 6625
Fax: (03) 9271 6622

National Help Line

Tel: 1300 555 545* Fax: 1300 555 655
Monday to Friday, 8.00 am to 5.00 pm EST.

After Hours Hot Water Service Line

Tel: 1800 000 340*

**Cost of a local call higher from mobile or public phones.*

For further information visit www.rinnai.com.au
or email enquiry@rinnai.com.au

Rinnai has a Service and Spare Parts network with personnel who are fully trained and equipped to give the best service on your Rinnai appliance. If your appliance requires service, please call our National Help Line. Rinnai recommends that this appliance be serviced every 3 years.

With our policy of continuous improvement, we reserve the right to change, or discontinue at any time, specifications or designs without notice.