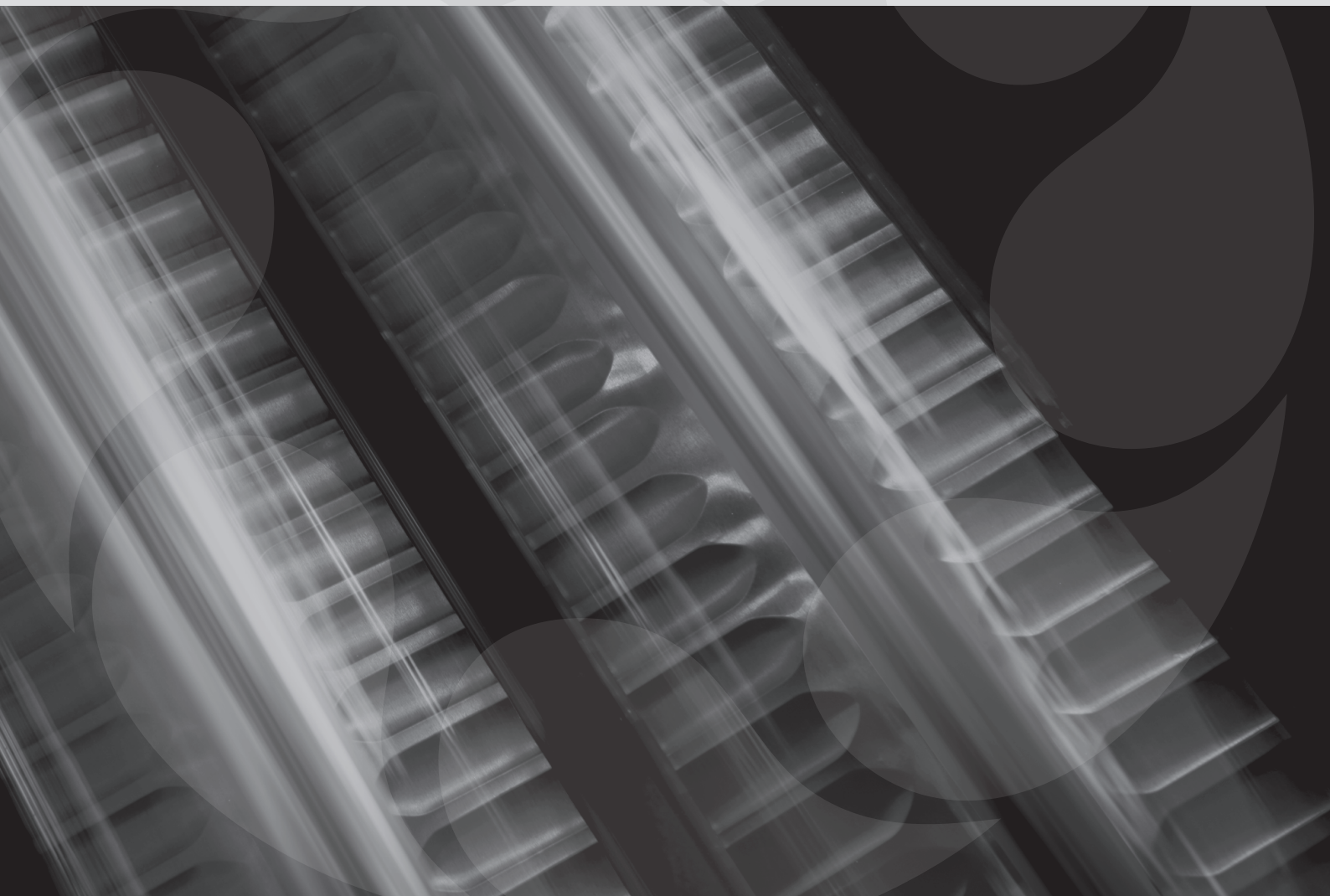


THERMO MAX

Installation Manual



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Introduction

Solar hot water systems should be designed and sized correctly before commencing the installation. Proper design will ensure that a system is correctly sized to provide many years of optimised performance and most or all of the required hot water when the most solar radiation is available. However a supplementary heating system such as oil or gas boiler, heat pump or wood boiler is required for months which have less solar radiation.

For large systems Kingspan provide a system design service to its Accredited Installer Network and technical design consultants. Please visit www.kingspansolar.com to locate an Accredited Installer or distributor in your area.

Details on how to size a solar system correctly can be found in our “Technical Design Guide” available for download from our website www.kingspansolar.com. For information on sizing solar cooling systems please contact our technical design team at Kingspan Renewables.

This guide will illustrate and explain how a system should be installed to conform with the Kingspan Renewables manufacturer guidelines for the Thermomax product models, namely DF100, HP100 & HP200.

Using this guide

Stages of a solar installation are described in the following pages, with illustrations where necessary to explain how to install the relevant components, and contains general recommendations and important safety information.

Note: Prior to installation, the ‘Technical Design Guide’ should be consulted to correctly specify the system components.

Handling Guidance

- Tube and manifold boxes should be transported horizontally.
- Heavy goods should not be loaded on top of the kit boxes.
- Care should be taken when opening boxes to prevent scratches or sudden shocks to the glass.
- Do not use sharp objects to open the tube boxes.

Installation Guidance

- Unpack and install tubes only after the manifold and pipe work has been installed.
- With the HP200 and HP250 only, tubes may be installed after the system has been filled, pressure tested and is ready for operation.
- Do not leave the solar collector exposed to solar radiation when the solar loop and manifold have been drained. Collectors left exposed in a dry state must be covered to prevent possible long term damage.
- HP tubes must have a minimum elevation of 20° and a maximum of 70°

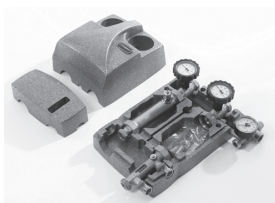
For further technical support please contact the following numbers, Ireland - 1800 812 718 or UK – 0845 812 0007.

Health and Safety Precautions

A solar panel installation must be performed in accordance with all Health & Safety legislation and local building/planning regulations for the relevant jurisdiction.

Furthermore, the necessary electrical work required to install control equipment should be undertaken by a qualified electrical contractor.

Standard Kit Components



Dual Stream Pump Station



SC100 Controller



Sloping Roof Kit with Brackets



Connection Kit



Flexi Connections



Expansion Vessel



Manifold & Tube Holders

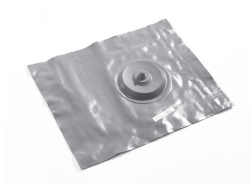


Cooling Vessel



Tyfocor® LS

Additional Components



Solar Roof Flashing



Interconnection Kit



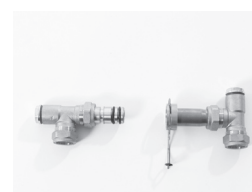
22mm Thermostatic Mixing Valve
Note - 28mm also available



Insulated Hose Mounting Set



22mm 3 Port Diverter Valve
Note - 15 & 28mm also available



Insulated Hose Assembly,
available in 5, 10 & 15m lengths

Important Pre Installation Information

Sizing of safety equipment

Component sizes are relative to the volume of liquid in the system. Therefore it is important that the Thermomax 'Technical Design Guide' is consulted for each system.

Pipe Sizing (minimum of 15mm diameter pipework must be used)

Collector Area (m ²)	Flow Rate Ltr/hr	Pipe Diameter Copper External (mm)	DF100 (mbar)	Collector Pressure Drop HP100 (mbar)	HP200 (mbar)
2	120	15 x 1	8.54	1.18	4.11
3	180	15 x 1	12.57	2.87	10.47
4	240	15 x 1	17.08	2.36	8.22
5	300	22 x 1	21.11	4.05	14.58
6	360	22 x 1	25.14	5.74	20.94
8	240	22 x 1	33.68	6.92	25.05

Expansion Vessel Sizing

Model	Collector Area (m ²)	System Volume (Ltrs)	Static Height	Vessel Size
HP100	2	17	5	18
	3	17	5	18
	4	18	5	18
	5	19	5	18
HP200	2	17	5	18
	3	17	5	18
	4	18	5	18
	5	19	5	18
DF100	2	19	5	18
	3	20	5	25
	4	22	5	25
	5	24	5	35

Cooling Vessel Sizing (only required with DF100 systems)

It is strongly recommended that a cooling vessel is used with the DF100 collector to protect the expansion vessel from stagnation temperatures.

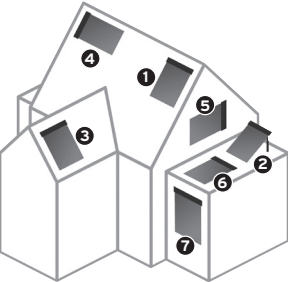
Cooling Vessel Sizing

Model	Collector Area (m ²)	System Volume (Ltrs)	Static Height	Vessel Size	Cooling Vessel Size
DF100	2	19	5	18	5
	3	20	5	25	8
	4	22	5	25	8
	5	24	5	35	12

Roof Kits

The Thermomax product range is available with a choice of roof fixing options to suit many roof types, see diagram below for the most common fixings. The most common fixings are illustrated and explained in the following section and may be easily secured to slate, tile or masonry finishes.

Roof kits and their relevant manufacturer codes:



Option	Code	Description	Suitable for HP	Suitable for DF
1	C0590	Sloping roof kit V	Y	Y
2	C0599	Flat roof 'A' frame kit (35°– 55°)	Y	Y
3	C0591	Sloping roof 20o elevation V	Y	Y
4	C0593	Sloping roof kit H	N	Y
5	C0597	Façade kit H	N	Y
6	C0595	Façade kit V	N	Y
7	C0595	Façade kit V	N	Y

Metal Roof Fixings

Kingspan also supply roof fixing kits for metal and other commercial roofs. Two options available utilise appropriate clamps so the fabric of the metal roof is not penetrated:

The following metal roof clamps are for use with the 'joint plate kit' KSK0016:

KSK0025 – Bulb standing seam

KSK0026 – Double folded standing seam

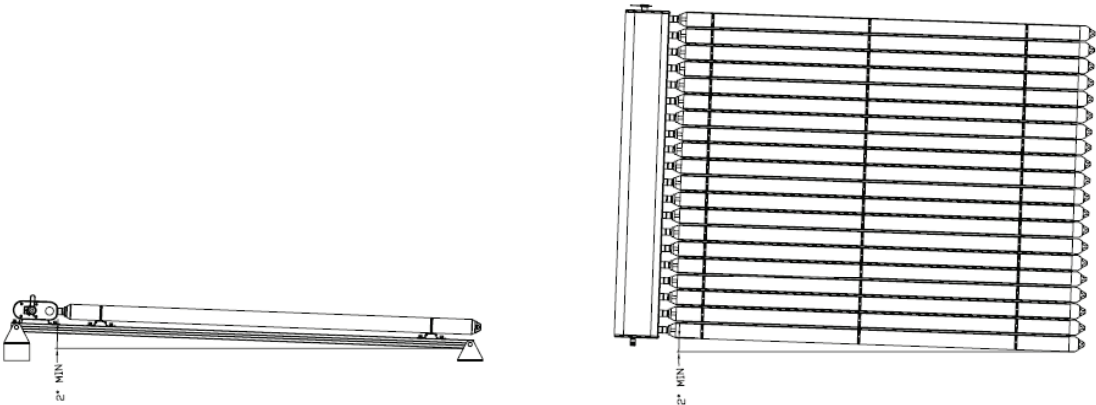
Note the minimum and maximum distances on each fixing kit.

The distance between the vertical rails on each fixing kit should be between 600mm-1100mm on 20 tube systems and 800-1400mm on 30 tube systems. This is illustrated on each roof kit diagram.

Note that the fixing clamps on the side rails are preset for ease of on-site installation.

With any DF100 installation where the collector is installed horizontally on a wall façade or roof surface; the airvent on the collector manifold must be the highest point of the collector, otherwise air in the system will remain in the pipes within the collector tubes and be difficult to flush out. Airlocks in the pipes will stop circulation through the system.

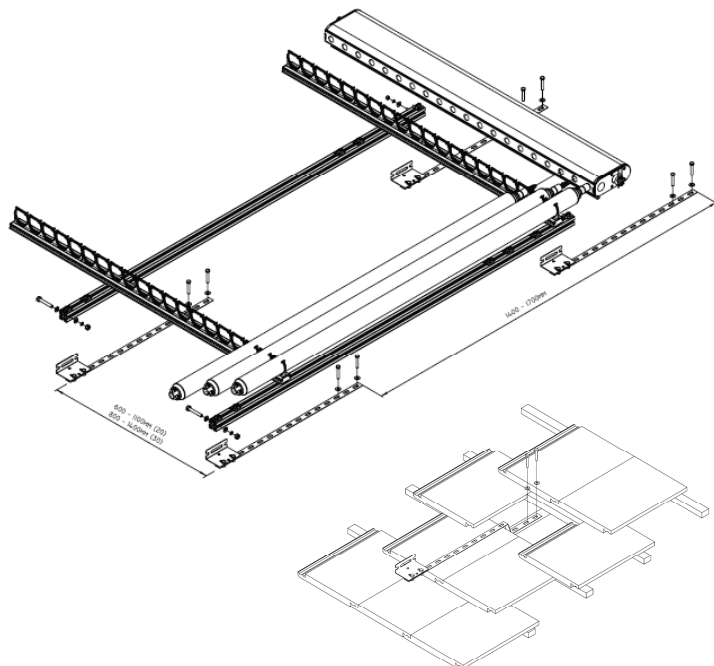
When the collector is orientated correctly, i.e. with the manifold slightly higher than the base of the collector, air will be forced back into the system. In this instance the air separator will prevent air from circulating.



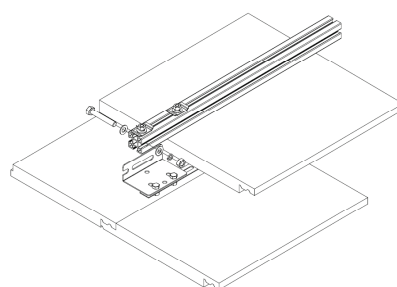
C0590 – Sloping Roof Kit

In high wind load areas e.g. at excessive heights or very exposed areas when the force acting upon the solar panel is greater than 2.5kN/m^2 , an additional vertical support rail (C0594) may be obtained. Please refer to the wind loading table – page.

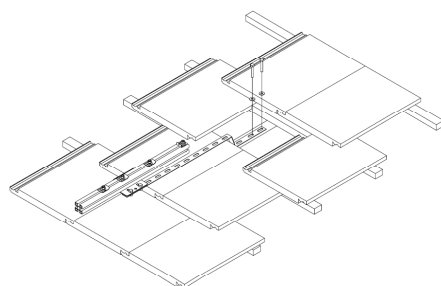
On the sloping roof kit, a distance of 1400mm (minimum) and 1700mm (maximum) should be observed between the top of the lower brackets and the top of the upper brackets.



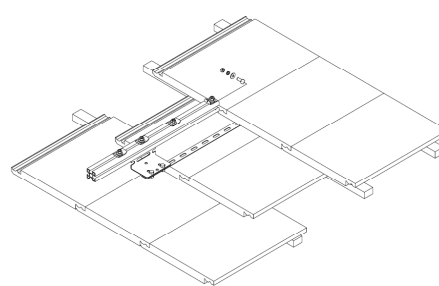
1. Slide back tile and attach lower brackets to roof rafter



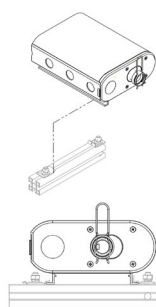
2. Secure side rails to lower bracket with the pre-drilled holes to the bottom



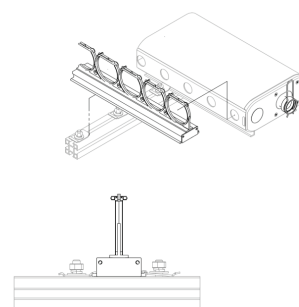
3. Attach upper brackets to roof rafters



4. Secure side rails to upper brackets with sliding bolt fixing

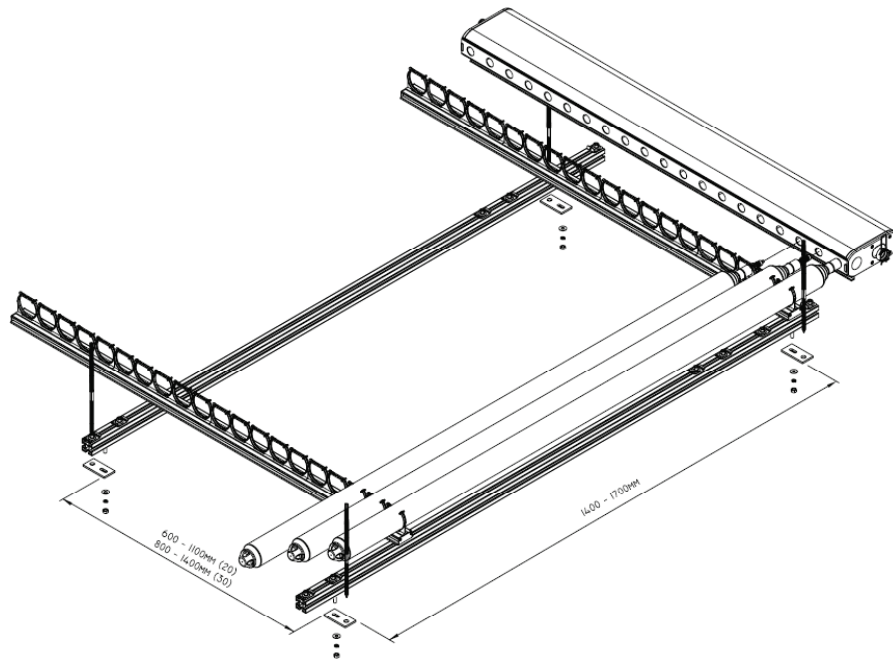


5. Locate manifold on side rails and secure with upper clamp bolts



6. Locate horizontal support rails on the side rails

KSK0012 – Bolt down Roof Kit



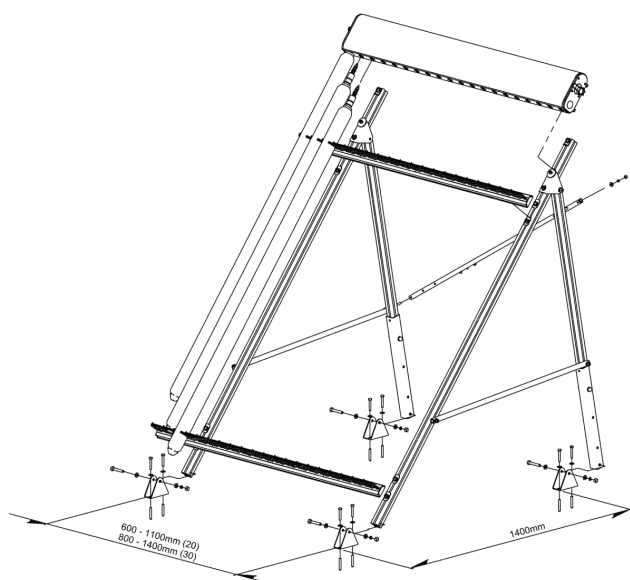
This roof kit may be used to secure directly through tile or slate surfaces.

1. Locate the rafters beneath the roof material and drill to a depth of 120mm with a 12mm drill bit.
2. Insert the rawl plug provided if necessary and fix the bolt with a spanner.
3. Locate the nut above the rubber roof seal and tighten to ensure a good seal is made on the fixing surface.
4. Stabilise the flat fixing plate by tightening the attached nuts above and below the plate.
5. Attach the roof rails to the four fixing plates using the bolts provided.

C0599 – Surface mount 35° to 55°

In high wind load areas e.g. at excessive heights or very exposed areas when the force acting upon the solar panel is greater than 2.5kN/m², an additional vertical support rail (C0596) may be obtained. Please refer to the wind loading table – page.

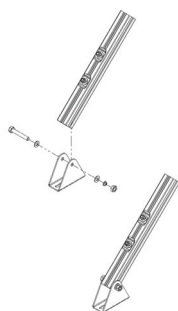
07



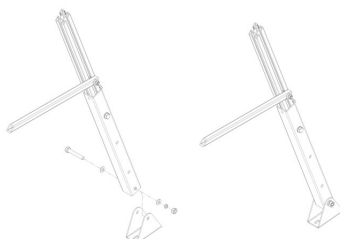
1. Attach front brackets to surface at distance shown



2. Attach rear brackets to surface at distance shown



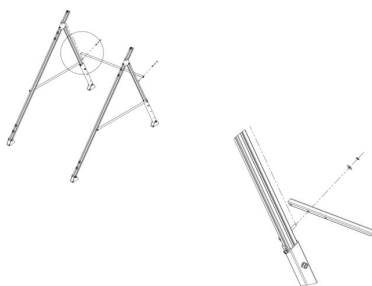
3. Secure side rail to front bracket



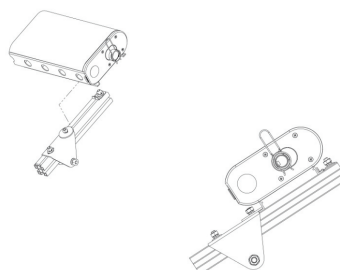
4. Adjust and secure rear brace



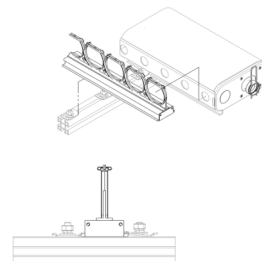
5. Locate manifold on side rails



6. Adjust and secure rear brace

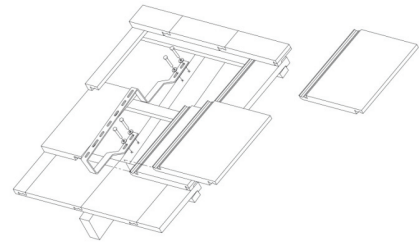
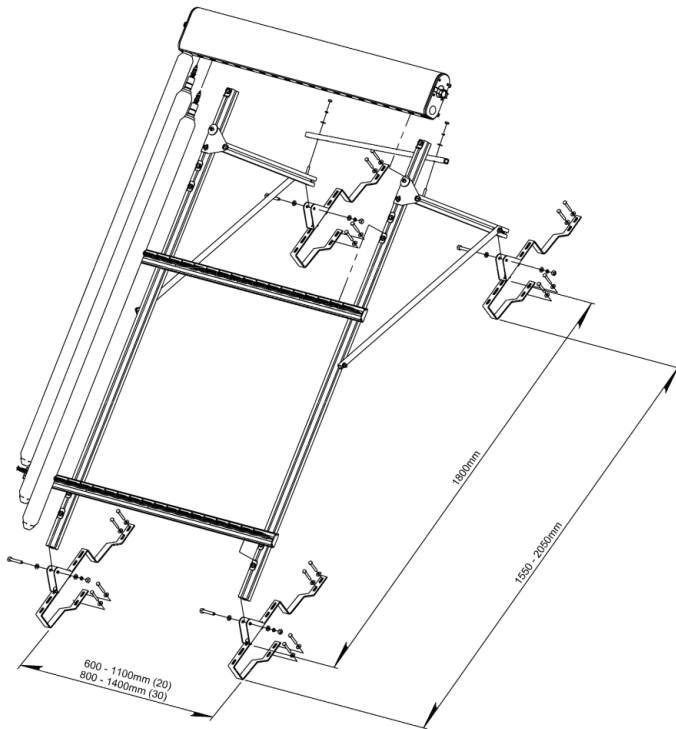


7. Locate manifold on side rails

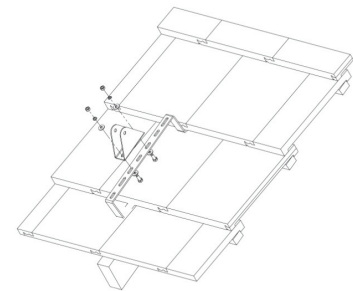


8. Locate support rails on side rails

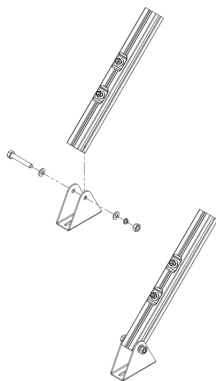
C0591 – Sloping Roof Kit 20° Elevated



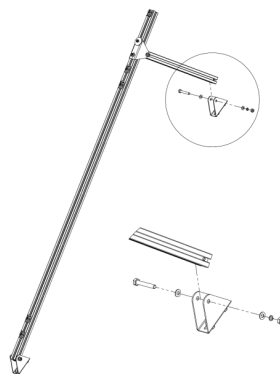
1. Attach brackets to roof at distance shown over



2. Assemble hinge brackets to roof brackets at distance shown over



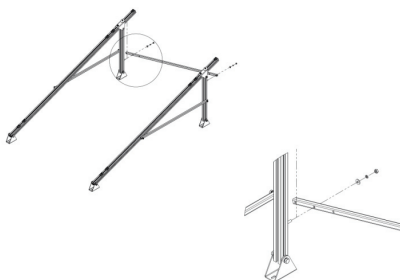
3. Secure side rail to lower bracket



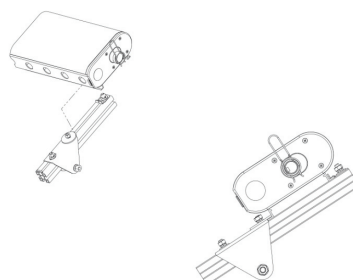
4. Secure rear strut to upper bracket



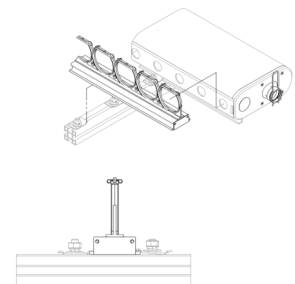
5. Adjust and secure side brace



6. Attach and secure rear brace



7. Locate manifold on side rails



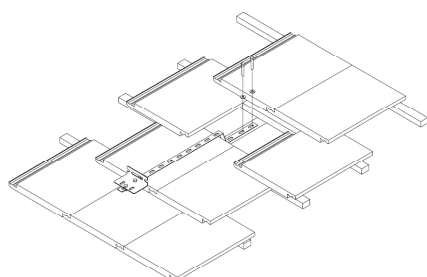
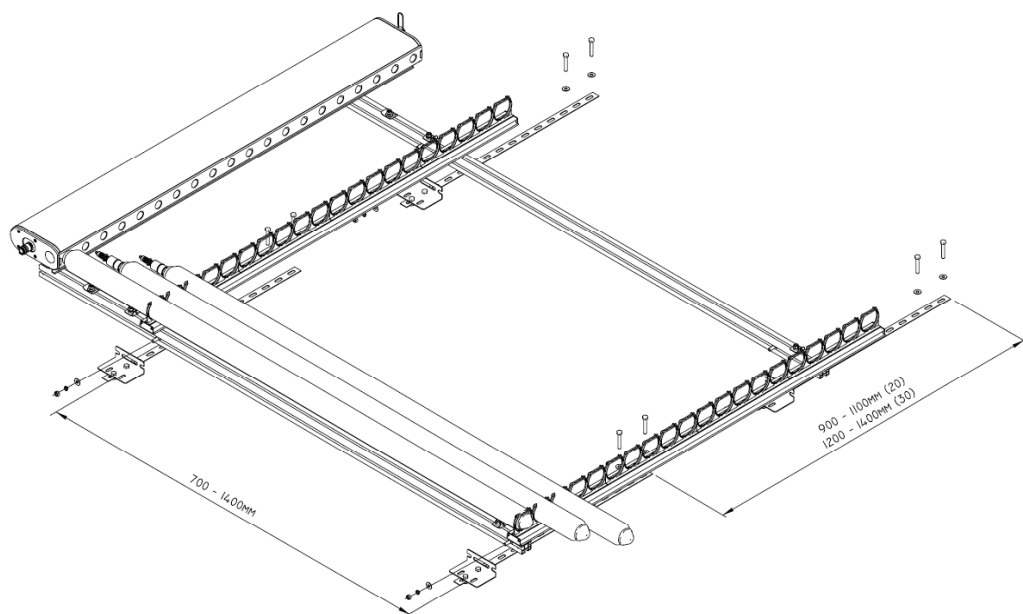
8. Locate support rails on side rails

C0593 – Sloping Roof Kit Horizontal

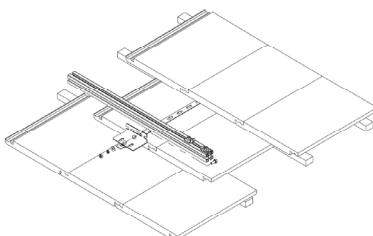
Note – Only the DF100 can be mounted in this horizontal position.

Drill required

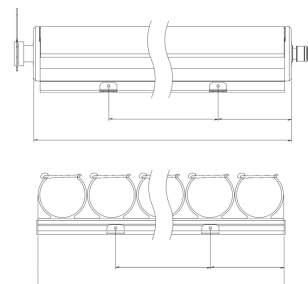
(This is new 2-6 image)



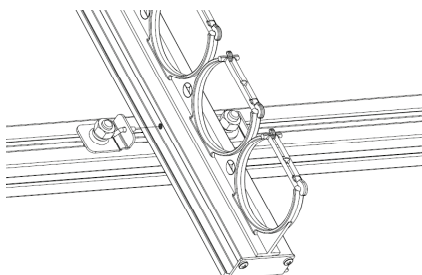
1. Attach brackets to roof at distance shown



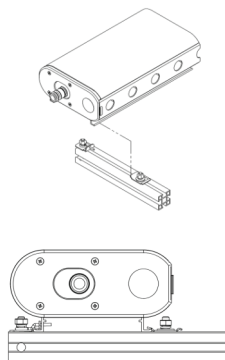
2. Secure side rails to brackets



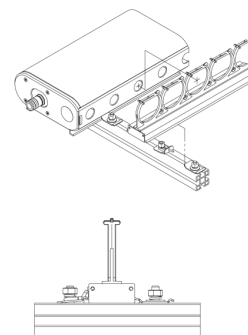
3. Locate locking pin positions and drill holes



4. Secure locking pins to prevent slippage



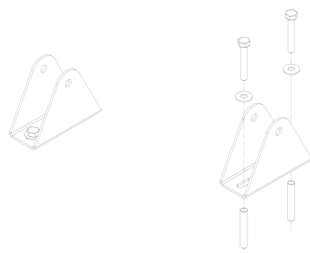
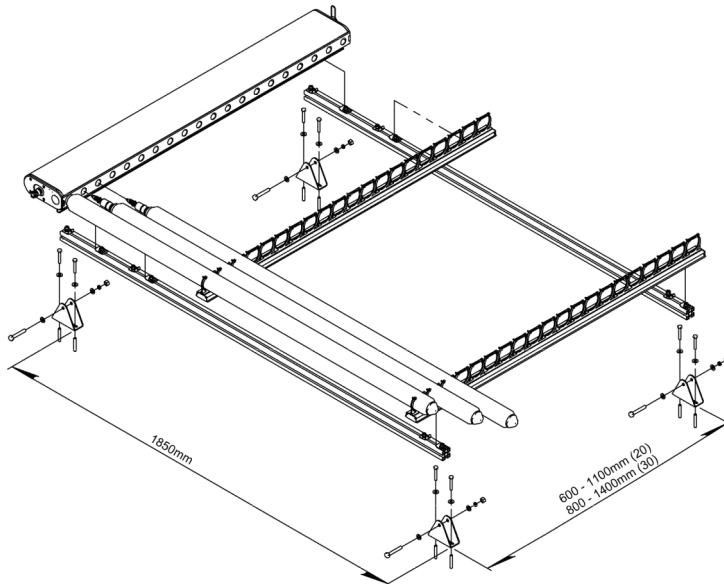
5. Locate manifold on side rails



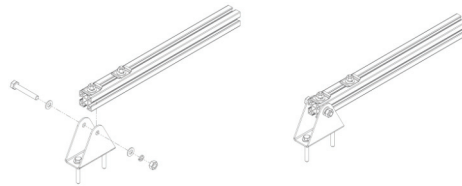
6. Locate support rails on side rails

C0597 – Surface Mount 90° Horizontal

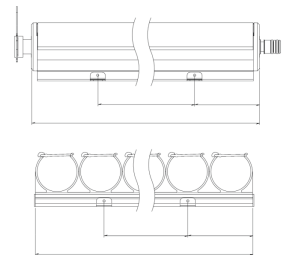
Note – Only the DF100 can be mounted in this horizontal position.



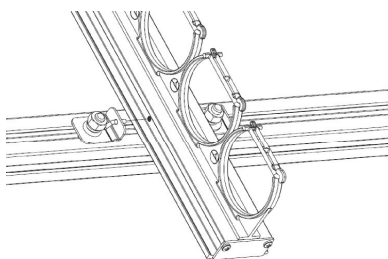
1. Attach brackets to surface at distance shown above



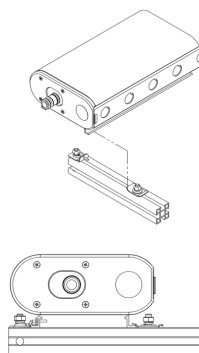
2. Attach side rails to brackets using bolts provided



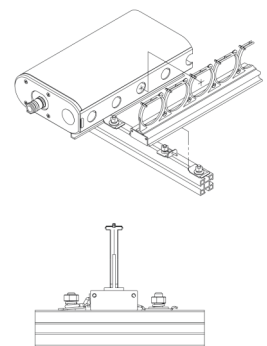
3. Locate locking pin position on manifold and support rails and drill holes



4. Locate support rails on side rails



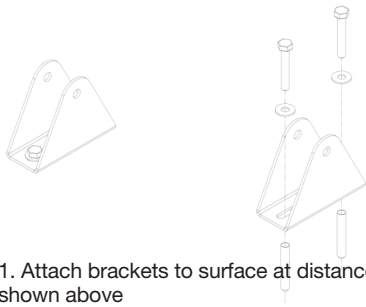
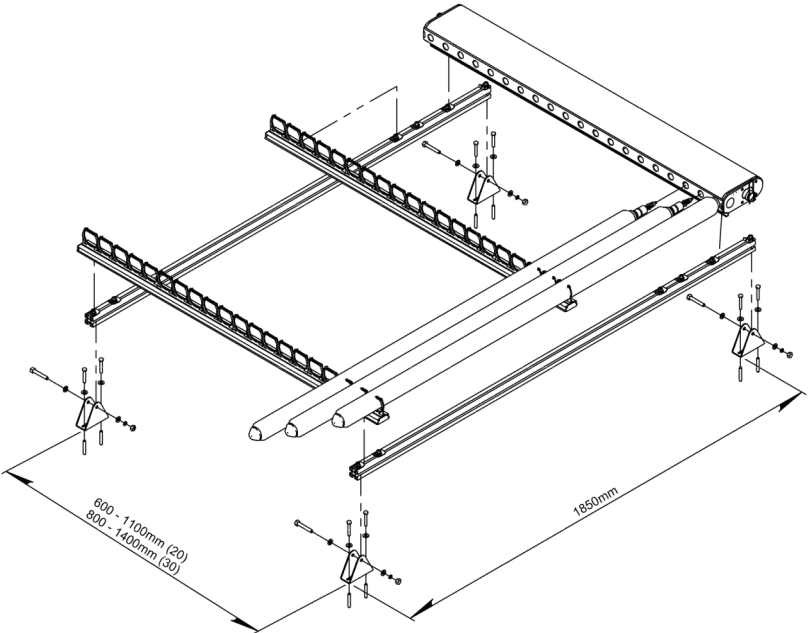
5. Locate manifold on side rails



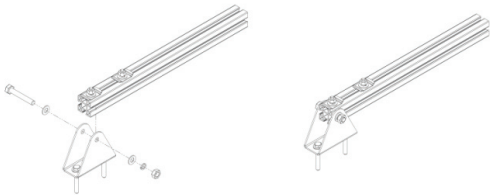
6. Secure clamps

C0595 – Surface Mount 0° & 90° Vertical

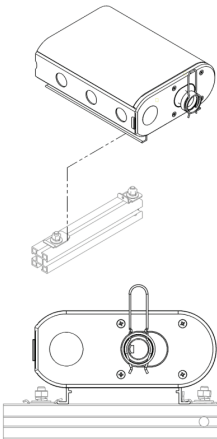
Note – Only the DF100 can be mounted in a horizontal or vertical position.



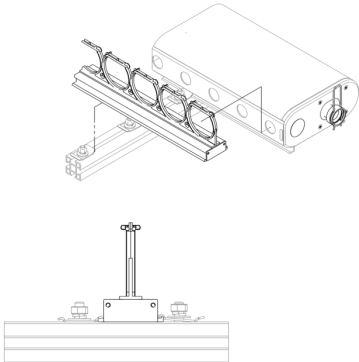
1. Attach brackets to surface at distance shown above



2. Attach side rails to brackets using bolts provided



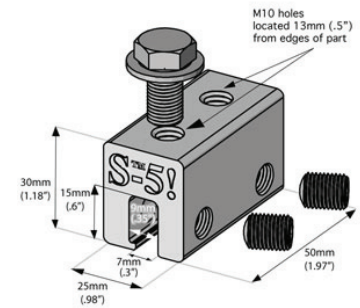
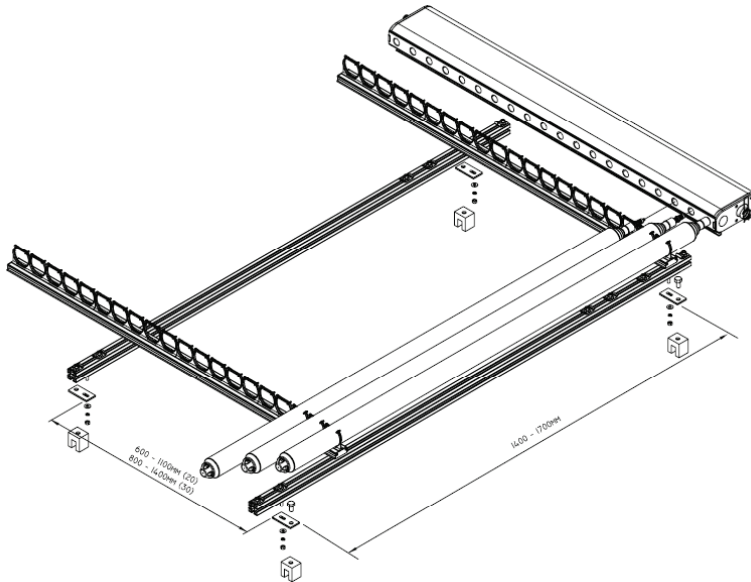
3. Locate manifold on side rails



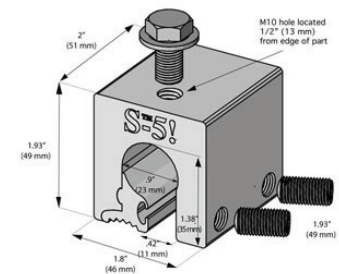
4. Secure all clamps

Standing Seam Metal Roof Kit

A metal roof kit requires a joint plate kit (KSK0016) comprising two vertical side rails and adjustable plate connections. The roof type will determine the clamp required.



KSK0025 – Bulb Standing Seam Clamps



KSK0026 – Double Folded Standing Seam Clamps

This roof kit may be used to secure directly onto standing seam roof types.

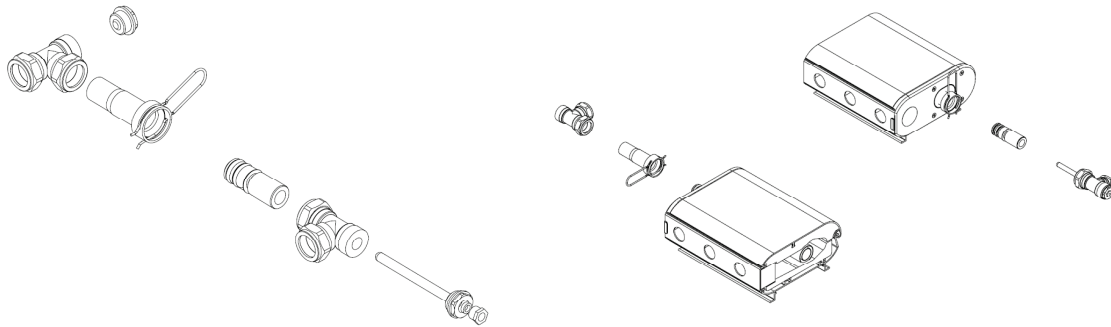
1. Locate the standing seams at the appropriate distances indicated on the diagram
2. Situate the clamps in the four positions and secure using an appropriate tool
3. Position the flat fixing plate and secure with the bolt provided.
4. Attach the roof rails to the four fixing plates using the bolts provided.

Connection Information

In any solar panel system, the 'return' refers to the intake in the collector where liquid is returning to be reheated. The 'flow' refers to the collector side where the liquid is flowing to the heat exchanger.

Note: It is essential that the collector temperature sensor is located in the flow of the collector.

The following illustration shows the connections to the manifold.



- 1 Tighten compression fitting to connection fitting (flow and return)
- 2 Tighten compression fitting to pipe work (flow and return)
- 3 Attach assembled fittings to manifold
- 4 Push clip all the way down until connection is fully retained
- 5 Pull gently on assembly to ensure proper engagement and retention

Flexible Pipe Connections

Flexible pipe connections are recommended to connect the manifold through the building fabric and allow flexibility in connecting to the internal pipe work.

Flexible stainless steel pipes are available in both a 15mm and 22mm diameter. If connecting one diameter pipe to another, a suitable reducer compression fitting is recommended to make the connection.

Types of Connections

The only pipe which should be used with a solar installation is copper pipe, continuous flexible stainless steel or mild steel.

When using copper pipe, only compression or brazed joints can be used. Solder and galvanised fittings will not withstand high temperature or expansion and are therefore not suitable for solar pipe work.

**PEX / PLASTIC / PEX-ALU-PEX or GALVANISED TUBING OR FITTINGS
SHOULD **NOT** BE USED UNDER ANY CIRCUMSTANCES**

Insulation

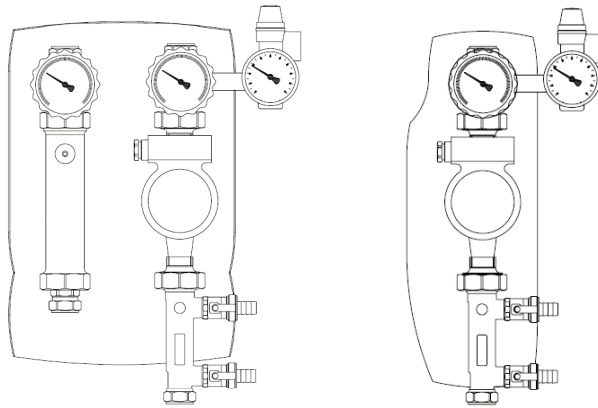
All pipe work on the solar loop should be insulated with high temperature insulation (such as HT/Armaflex from Armacell GmbH). High temperature insulation is essential as regular pipe insulation will melt at temperatures experienced by solar pipes.

The wall thickness of the insulation should be equal to the diameter of the pipe. The only pipes which should not be insulated are the pipes to the safety vessels as they should allow heat to dissipate when the system is experiencing excessive heat and pressure.

Pump Station

The Kingspan Renewables' Thermomax product range offers both a single stream and a dual stream pump station. Each pump station is available in two flow rates, 2-12 litres and 8-28 litres.

The flow rate required on a system is typically 1 litre per minute, per square metre installed. Therefore a 2-12 litre pump station will be sufficient for systems up to 12m².



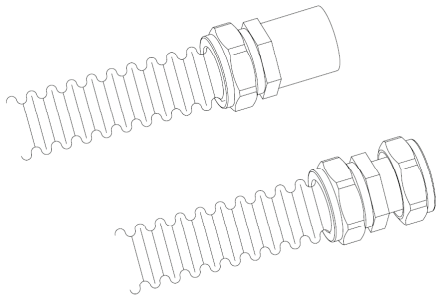
Key

- Flush and fill connections
- Flow meter available
- Motorised pump on return
- Isolating valves
- 6 bar pressure relief valve
- Expansion vessel connection
- 22mm connections (x 4)
- Insulated fascia
- Air separator

Connections of flow and return pipe work to the pump station are made with the straight compression fittings provided for direct copper connection.

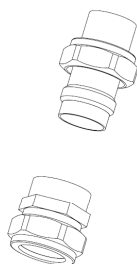
C0784 – Insulated Hose Stub Fitting

When flexible stainless steel pipe is being used to connect to the pump station, the insulated hose stub fitting is required to make the connection. The split ring within the fitting should be removed and placed over the second rib of the flexible pipe. When the compression fitting is tightened, the split ring will click twice as it positions itself and locks inside the fitting. See below:



C0785 – Insulated Hose Clamp Ring

When the short flexible connection is being joined to stainless steel pipe work, the insulated hose clamp ring is required to make the connection. The split ring within the fitting should be removed and placed over the second rib of the flexible pipe. When the compression fitting is tightened, the split ring will click twice as it positions itself and locks inside the fitting. See below:



Safety Vessel Connections

Pressure Relief Valve (PRV)

Rated at 6 bar, the PRV may discharge heat transfer fluid (Tyfocor® LS) which must be channelled into a container capable of withstanding high temperature discharge and containing the total collector volume. The container should be secured so it cannot be removed or spilled.

The PRV should not be channelled into a drain or any pipe work which will allow it to enter the normal water course.

Fitting the expansion vessel:

It is recommended that the expansion vessel is located below the level of the connection from the pump station to prolong its life.

The expansion vessel supplied by Kingspan Renewables includes an appropriate corrugated hose and threaded connection to join the vessel to the pump station.

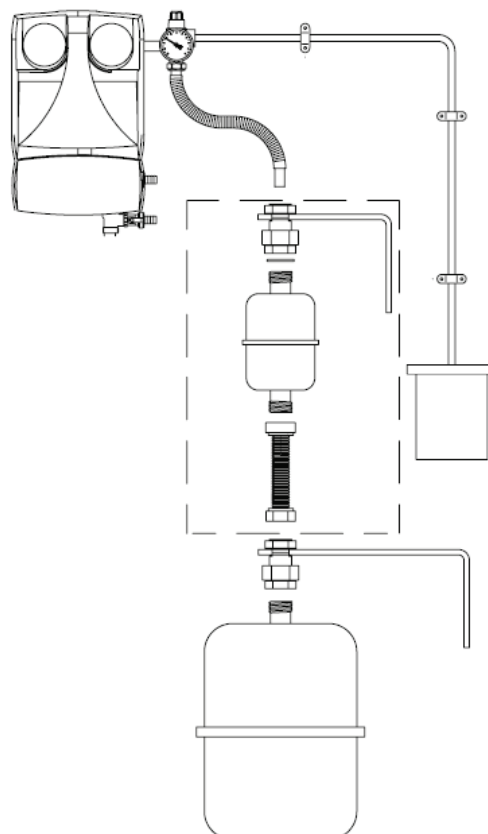
Temperature Reducing Vessel (TRV)

Also known as a 'cooling vessel' or 'stratification vessel', the TRV is highly recommended with the Thermomax DF100, CLS flat plate collectors. Due to high temperatures which can be experienced within the solar loop, the TRV allows for additional expansion and reduces the temperature of the heat transfer fluid before it enters the expansion vessel.

Fitting the TRV:

With the direct flow vessel kit, which includes the TRV, a corrugated hose assembly is included to join the expansion vessel to the TRV from the pump station.

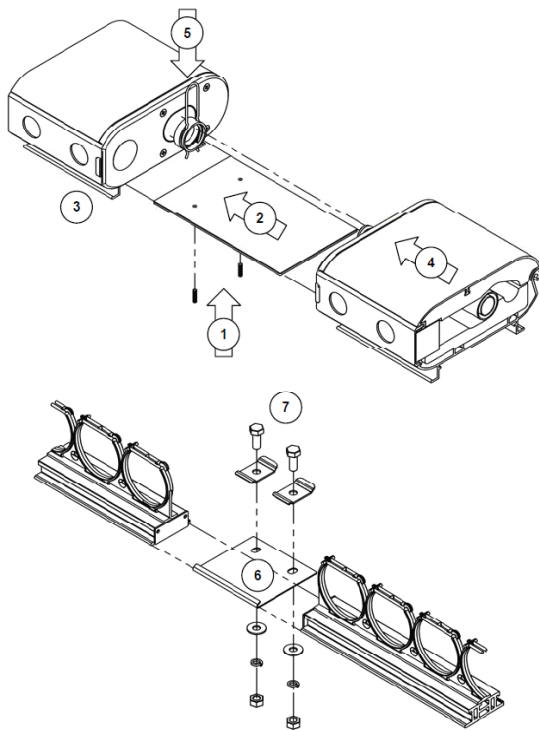
The following diagrams illustrate the hydraulic connections of the above vessels to the pump station.



Interconnection Kit (Product Code C0674)

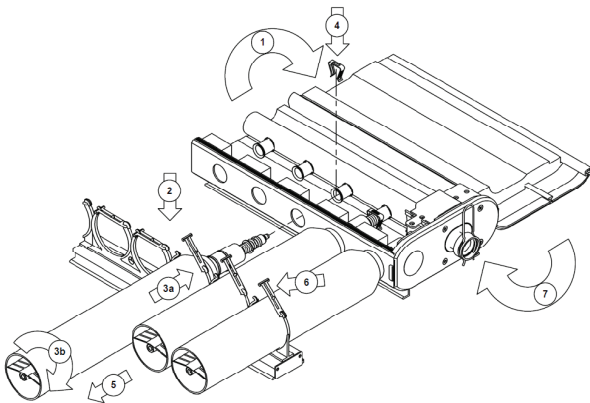
When joining more than one manifold together, it is necessary to use the interconnection kit which will support and align multiple collectors. All manifolds comprise a male and female connection, enabling manifolds to be connected without the need for additional pipework. The maximum number of manifolds which may be connected in series before connecting in parallel is shown in the table below:

Model	Max. Number of collectors
DF100 x 30 tubes	5
HP100 x 30 tubes	6
HP200 x 30 tubes	4



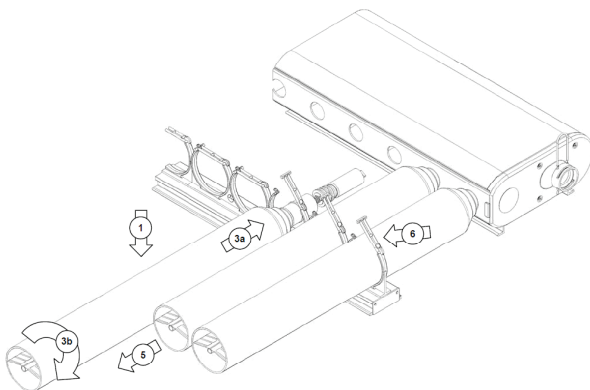
1. Insert screws into plate ensuring screws do not protrude to upper side
2. Slide plate approximately half way into channel at bottom of manifold that is fixed to side rails
3. Tighten up screws to force plate against bottom of manifold (do not overtighten)
4. Slide channel of next manifold on plate
5. Push clip all the way down until connection is fully retained
6. Assemble support rail connection plate to fixed support rails
7. Assemble retaining plates and fittings

Inserting DF100 Tubes



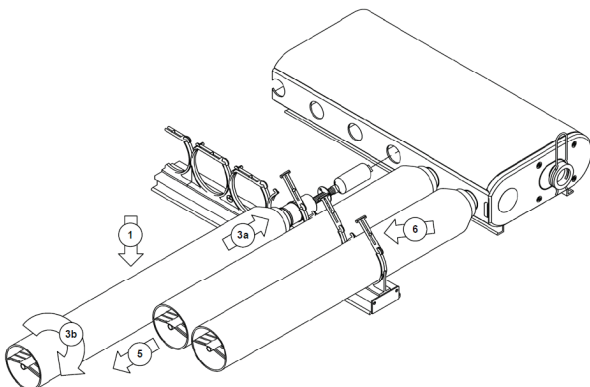
1. Open manifold lid by removing front seal strip as shown on manifold end cap
2. Place tube in tube clips on both support rails
3. Slide tube into manifold connection while slightly rotating tube until washer on bellow sits flush against manifold fitting. Do not apply force, if any problems are experienced, check alignment of support rails to manifold.
4. Insert tube retaining clip to secure tube to manifold and rotate clip 360° to ensure a good connection.
5. Gently pull on tube to ensure secure assembly.
6. Close tube retaining rubber on both support rails. Repeat steps 2 to 6 for all tubes.
7. Close manifold lid ensuring proper engagement of front seal strip over whole length and on end caps.

Inserting HP100 or HP150 Tubes



1. Open manifold lid by removing front seal strip as shown on manifold end cap
2. Place tube in tube clips on both support rails
3. Slide tube into manifold connection while slightly rotating tube until a clicking noise is heard. Do not apply force. If tube does not engage properly, support the tube at the bellow section while pushing into the manifold connection until it clicks into position.
4. Gently pull on tube to ensure secure assembly.
5. Close tube retaining rubber on both support rails. Repeat steps 2 to 5 for all tubes.
6. Close manifold lid ensuring proper engagement of front seal strip over whole length and on end caps.

Inserting HP200 or HP250 Tubes



1. Open manifold lid by removing front seal strip as shown on manifold end cap
2. Place tube in tube clips on both support rails
3. Slide tube into manifold connection while slightly rotating tube until TWO clicking noises are heard. Do not apply force. If tube does not engage properly, support tube at bellow section while pushing into the manifold connection.
4. Gently pull on tube to ensure secure assembly.
5. Close tube retaining rubber on both support rails. Repeat steps 2 to 5 for all tubes.
6. Close manifold lid ensuring proper engagement of front seal strip over whole length and on end caps.

Wiring the Solar Control Panel

All electrical aspects of the installation should be undertaken by a qualified electrician. Note that for safety, the pump and sensor connections should always be wired prior to connecting power to the solar control panel.

Important: The solar control panel must have a permanent electrical power supply which must not be interrupted either manually or with a time switch. If the permanent electrical supply to the building is to be switched off for any period of time, the solar collector(s) should either be covered, or the system drained and the tubes removed.

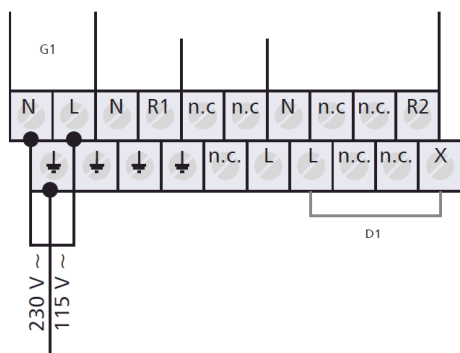
In order to protect the normal operation of the control panel, it should be located at least 100 mm from insulated pipes which may become hot during operation.

Control panels use PT1000 sensors containing twin core copper cable with a 0.75mm cross section and 1.5 metre in length.

Sensor cables can be extended with twin core copper cable of 0.75mm diameter up to 50 metres and 1.50mm diameter between 50-100m. Screened cable should be used on the sensor cables to prevent RFI from electrical cables. All connections to extend the cables should be housed in a junction box for protection.

The following diagrams show the connection of the solar pump and other relays on the SC range of controllers. This should be read in conjunction with the Installation and Operation Manual supplied with each SC control panel.

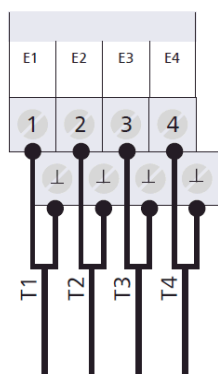
Power Supply Connection:



Sensor Connection

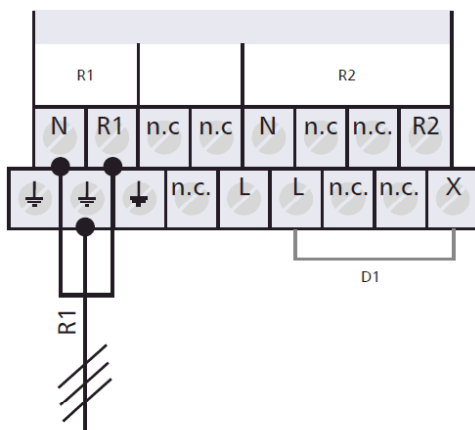
The connection of PT1000 sensors is as shown below. The polarity of the sensor cables is not relevant on each sensor. The SC100 has four inputs as illustrated below. However the SC200 and SC300 can receive five and six sensors respectively (for larger system design) and are connected in the same way.

Input connection for 1-4 sensors:



(Note that the SC200 and SC300 possess two of these relays as well as an electromechanical relay. The SC200 and SC300 are therefore suitable for controlling two pumps i.e. for an east/west panel array or a stagnation configuration requiring a second pump.)

Avoiding damage and malfunctions – When connecting an external relay or contactor, or when connecting a pump which has its own electronic RPM control, the controller output's RPM control must be deactivated (see chapter 7.3.3 “Setting the RPM control parameters”).



Commissioning the System

Inserting the tube

The evacuated tubes should be inserted at a time when there is very low light such as late afternoon when the sun is low and not particularly strong. Alternatively the tubes should be covered. This is important as tube connections can heat up considerably in a short space of time and have potential to cause injury while the glass temperature will remain low.

Please refer to page 17 for information on tube connection into the manifold.

Expansion Vessel

Prior to filling the system, the expansion vessel pressure must be set 0.3 Bar below the system pressure.

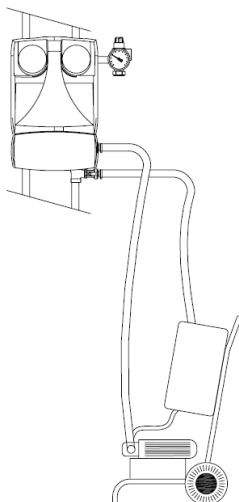
The pressure is checked at the base of the vessel and the bleed valve may be bled or topped up with a pump. Omitting to perform this check will result in irregular pressure readings during the commissioning of the system.

Filling the Loop

It is important that a motorised flush and fill centre is used to fill and pressurise the system with Tyfocor® LS as follows:

1. Open the fill and drain valves to allow the liquid to circulate around the solar loop
2. Turn the hot and cold temperature gauges 45o clockwise.
3. Close the isolating valve above to the flow meter to ensure all air and liquid passes through the fill centre to filter any air and contaminants.
4. Run the fill centre pump to circulate the Tyfocor® LS for approximately 20 minutes.
5. Open and close the isolating valve intermittently to circulate air bubbles which may accumulate in the sight glass.
6. Return isolating valve to closed position.
7. When the solar loop has been purged of air, close the bottom/drain connection – the fill centre will begin to pressurise the solar loop
8. Reopen the isolating valve above the flow meter fully.
9. Fill the loop until the pressure gauge just exceeds the required pressure and stop the pump. Check pipe joints on the solar loop for leaks and check that pressure is not lost over a 30 minute period.
10. If all the plumbing is sound, set the system pressure by opening the return connection until the required pressure is met.
11. Return the temperature gauges to the original position.
12. The fill centre may now be disconnected.

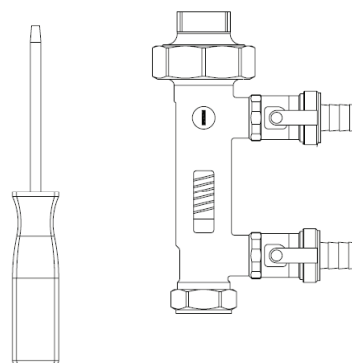
The flow and return pipes from the flush and fill centre should be connected as shown in the diagram below:



Setting the flow rate

The pump may only be run when the system has been filled as dry operation will damage the pump. The desired flow rate is 1 litre per minute per m² (10 tubes=1m²).

1. Set the pump to the first speed and run it manually from the controller (see following paragraph).
2. If the desired flow rate is exceeded, set the flow meter to the desired rate by adjusting the flow meter valve (see below) with the pump running. Otherwise repeat this step at the next pump speed and continue until the desired flow rate is achieved
3. Stop the pump.



21

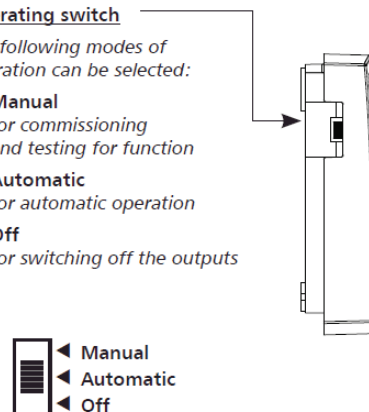
Operating the pump in 'Manual' mode (for SC range controllers)

In order to run the pump in 'Manual' mode, slide the operating switch on the left side of the solar control panel to the upper of the three positions. On the screen, select the appropriate relay with the up/down arrows and press the 'Set' button to run the relay and to switch it off again.

Operating switch

The following modes of operation can be selected:

- **Manual**
for commissioning and testing for function
- **Automatic**
for automatic operation
- **Off**
for switching off the outputs



Other Relays

If any additional relays are set up on the system, these should be tested in 'Manual' mode as above, to ensure the connections have been wired correctly.

Decommissioning the System

Due to temperatures potentially exceeding 170°C and pressures greater than 6 bar, a solar installation should only be decommissioned by a trained individual. The system should be decommissioned in low light, ideally in the morning when the solar loop should be coolest.

Electrical

- Isolate controller from mains
- Remove cables to consumer units i.e. controller and pump
- Remove sensors and associated cables
- Remove earthing cables

Collector Loop

- Beware of hot transfer fluid
- Drain collector loop at drain valve. Contain the heat transfer fluid for appropriate disposal.
- Disconnect pipes from the manifold

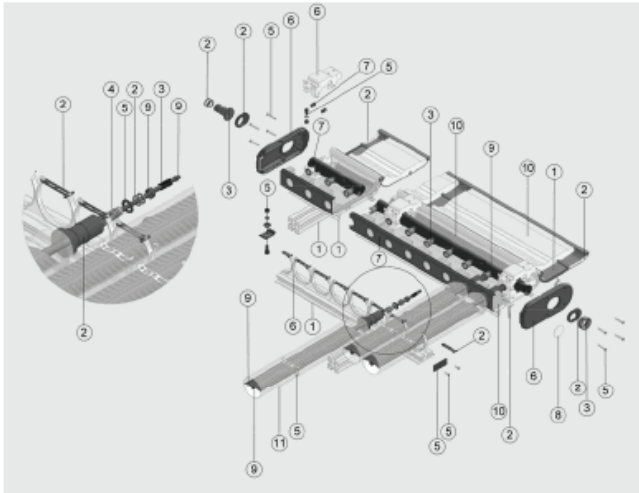
Collector (Beware of high temperatures)

- Remove rubber retainer to release manifold lid
- Unclip tube
- Remove the rubber support retainers from around glass tube
- Remove tube manifold clip
- Remove tubes from manifold
- Remove lid and separate materials
- Remove Manifold and support rails and separate materials
- Remove roof kit and separate materials
- Reinstate roof

Disposal

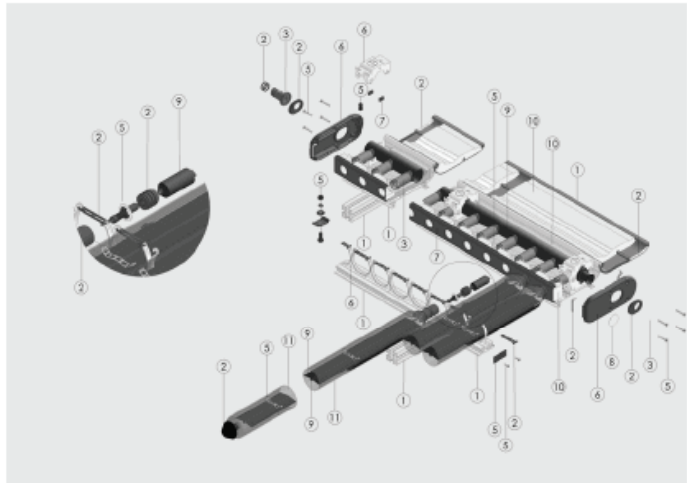
Dispose of separate materials in accordance with local regulations. Please see the following pages for details of materials used in the construction of Thermomax collectors.

Construction Materials DF100



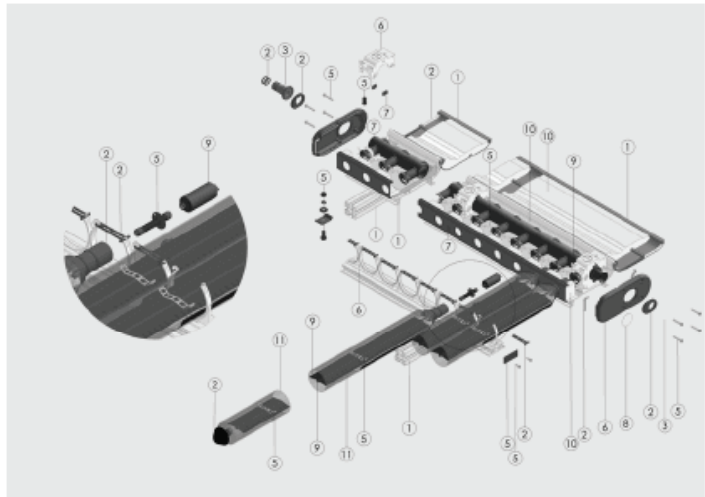
	GB	D
1	Aluminium	Aluminium
2	EPDM	EPDM
3	Brass	Messing
4	Bronze	Bronze
5	Stainless Steel	Edelstahl
6	PA66 30% GF	PA66 30% GF
7	Silicon	Silicon
8	Vinyl	Vinyl
9	Copper	Kupfer
10	Melamine	Melaminschaum
11	Glass	Glas

Construction Materials HP100



	GB	D
1	Aluminium	Aluminium
2	EPDM	EPDM
3	Brass	Messing
4	Bronze	Bronze
5	Stainless Steel	Edelstahl
6	PA66 30% GF	PA66 30% GF
7	Silicon	Silicon
8	Vinyl	Vinyl
9	Copper	Kupfer
10	Melamine	Melaminschaum
11	Glass	Glas

Construction Materials HP200



	GB	D
1	Aluminium	Aluminium
2	EPDM	EPDM
3	Brass	Messing
4	Bronze	Bronze
5	Stainless Steel	Edelstahl
6	PA66 30% GF	PA66 30% GF
7	Silicon	Silicon
8	Vinyl	Vinyl
9	Copper	Kupfer
10	Melamine	Melaminschaum
11	Glass	Glas

Servicing and Maintenance

Users should regularly check the temperatures which the solar control panel is recording. With the SC range of controllers, simply pressing the 'SET' button on the fascia once will display the upper and lower collector temperatures since the control panel was last reset. If the collector temperatures have been excessively high i.e. over 170°C, it is recommended that the antifreeze level be checked using a refractometer by a qualified engineer.

A sample of the Tyfocor® LS antifreeze fluid can be extracted from the pump station at the pump itself. The large centre of the pump hub can be opened with a large flathead screwdriver. This should be opened slowly until a few drops of the antifreeze fluid are released. A sample of the fluid placed on the glass of the refractometer will display the level of antifreeze in the system. If the antifreeze has lost its antifreeze properties the system should be refilled with fresh Tyfocor® LS.

It is recommended that the solar system is serviced annually by a qualified engineer and immediately if the system shows evidence of having lost pressure or has discharged liquid at the pressure relief valve. The Tyfocor® LS antifreeze fluid should always be replaced after 7 years.

Maintenance schedule

A qualified person should service the system at the recommended intervals, using the maintenance schedule below. In addition the user should check the system pressure at regular intervals. A visual inspection of the pressure gauge is required to check that the system pressure is maintained at the level noted below.

The service engineer should complete the following; the shaded boxes should be completed if the system requires refilling:

	Upon commissioning	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7
Date of inspection								
Expansion vessel setting before filling								
System pressure								
Expansion vessel setting after filling								
Flow rate								
Antifreeze level								
pH reading								
Inspection of barium getter on tubes								
Engineer details								
Print name								
Sign								
Telephone No.								

Technical Information

Wind Loading

Stress and maximum load on the substance on flat roofs to DIN 1055

25°	Prevention of Collector Slippage						Prevention of Collector Lifting					
	Weight Per Foot (kg)						Weight Per Foot (kg)					
	10 Tube Collector		20 Tube Collector		30 Tube Collector		10 Tube Collector		20 Tube Collector		30 Tube Collector	
Height Above Ground (m)	A	B	A	B	A	B	A	B	A	B	A	B
8	76	102	76	102	116	155	26	65	26	65	41	100
8 to 20	129	178	129	178	195	269	57	125	51	125	80	191

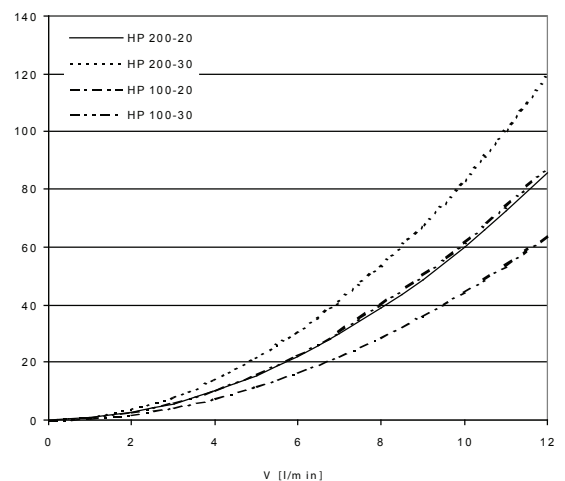
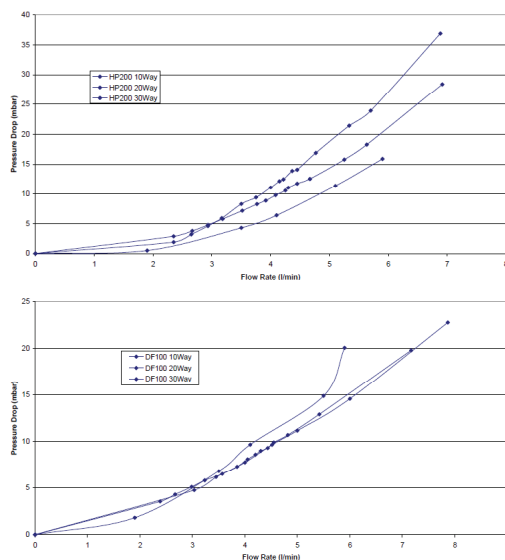
Stress and maximum load on the substance on flat roofs to DIN 1055

45°	Prevention of Collector Slippage						Prevention of Collector Lifting					
	Weight Per Foot (kg)						Weight Per Foot (kg)					
	10 Tube Collector		20 Tube Collector		30 Tube Collector		10 Tube Collector		20 Tube Collector		30 Tube Collector	
Height Above Ground (m)	A	B	A	B	A	B	A	B	A	B	A	B
8	102	171	102	171	156	256	73	73	73	73	111	111
8 to 20	177	287	177	287	266	430	137	137	137	137	206	206

Technical Specification

	DF100			HP100		HP200		
	10	20	30	20	30	10	20	30
Dimensions (Length x Width x Height) [mm]	1996 x	1996 x	1996 x	2045 x	2045 x	2005 x	2005 x	2005 x
	709 x	1418 x	2127 x	1418 x	2127 x	709 x	1418 x	2127 x
	97	97	97	97	97	97	97	97
Weight [kg]	36.9	54.8	81.4	47.2	70.5	33.2	50.3	75.1
Volume [l]	2.6	3.8	5.6	1.2	1.7	0.83	1.2	1.7
Max. Field Size [m²]	10	12	15	16	18	8	10	12
Cu Pipe Diameter 2-3m² [mm] per panel area 4-9m² 10-15m² 16-20m²	15mm x 1 22mm x 1 28mm x 1.2 35mm x 1.5							
Max. Operating Pressure [bar]	8							
Min. Slope [°]	0			20				
Max. Slope [°]	90			70				
Max. Load [kN/m²] (DIN 1055-5)	2.5							
Heat Transfer Medium	Propylene Glycol suitable for evacuated tube collectors							

Pressure Drop Curves



Technical Specification

25

	DF100		HP100		HP200	
	2m ²	3m ²	2m ²	3m ²	2m ²	3m ²
Dimensions						
Absorber Area	2.004m ²	3.020m ²	2.006m ²	3.009m ²	2.01m ²	3.021m ²
Overall Dimensions (mm)	1996 x 1418 x 97	1996 x 2127 x 97	1996 x 2127 x 97	1996 x 2127 x 97	2005 x 1418 x 97	2005 x 1418 x 97
Width of Manifold	1418mm	2127mm	1418mm	2127mm	1418mm	2127mm
Length (Tube and Manifold)	1996mm	1996mm	2005mm	2005mm	2005mm	2005mm
Depth	97mm	97mm	97mm	97mm	97mm	97mm
Aperture Area			2.157m ²	3.229m ²		
Fluid Volume (In Manifold)	3.6 Ltr	5.6 Ltr	1.2 Ltr	1.7 Ltr	1.1 Ltr	1.7 Ltr
Inlet and Outlet Dimensions	22mm	22mm	22mm	22mm	22mm	22mm
Weight (Empty)	54.8kg	81.4kg	47.2kg	70.5kg	50.3kg	75.1kg
Mounting						
Recommended Inclination	0-90°	0-90°	20-70°	20-70°	20-70°	20-70°
Operating Data						
Efficiency	Based on Absorber	Based on Absorber	Based on Absorber	Based on Absorber	Based on Absorber	Based on Absorber
eta 0	0.83	0.832	0.815	0.795	0.792	0.778
k1	1.53 W/m ² K	1.14 W/m ² K	1.1 W/m ² K	1.07 W/m ² K	1.25 W/m ² K	1.91 W/m ² K
k2	0.0063 W/m ² K ²	0.0144 W/m ² K ²	0.0106 W/m ² K ²	0.008 W/m ² K ²	0.0088 W/m ² K ²	0.01 W/m ² K ²
Test Report						
Performance Test Report	BLG 10606	BLG 10706	BLG 10906	BLG 10110 - 06	BLG 10906	BLG 11006
Quality Test Report				BLG 10111 - 06		
Flow Rate						
Rated	160 Ltr / h	240 Ltr / h	160 Ltr / h	240 Ltr / h	160 Ltr / h	240 Ltr / h
Minimum	120 Ltr / h	180 Ltr / h	120 Ltr / h	180 Ltr / h	120 Ltr / h	180 Ltr / h
Maximum	300 Ltr / h	480 Ltr / h	300 Ltr / h	480 Ltr / h	300 Ltr / h	480 Ltr / h
Maximum Operating Pressure	8 Bar	8Bar	8 Bar	8Bar	8 Bar	8Bar
Stagnation Temperature	286°C	286°C	183.6°C	183.6°C	183.6°C	183.6°C
Heat Transfer Fluid	Water/Glycol	Water/Glycol	Water/Glycol	Water/Glycol	Water/Glycol	Water/Glycol
Materials						
Absorber	Copper	Copper	Copper	Copper	Copper	Copper
Coating	Selective Coating	Selective Coating	Selective Coating	Selective Coating	Selective Coating	Selective Coating
Absorbance	95%	95%	95%	95%	95%	95%
Emissivity	5%	5%	5%	5%	5%	5%
Mounting Frame and Clips	Stainless Steel, Aluminium EPDM	Stainless Steel, Aluminium EPDM	Stainless Steel, Aluminium EPDM	Stainless Steel, Aluminium EPDM	Stainless Steel, Aluminium EPDM	Stainless Steel, Aluminium EPDM
Glass	Low Iron - Transm. 0.92	Low Iron - Transm. 0.92	Low Iron - Transm. 0.92	Low Iron - Transm. 0.92	Low Iron - Transm. 0.92	Low Iron - Transm. 0.92
Vacuum	Higher than 10 ⁸ Bar	Higher than 10 ⁸ Bar	Higher than 10 ⁸ Bar	Higher than 10 ⁸ Bar	Higher than 10 ⁸ Bar	Higher than 10 ⁸ Bar
Temperature limitation (Memotron)			95/130°C	95/130°C	95/130°C	95/130°C
Quality Certification / Solar Keymark	Yes	Yes	Yes	Yes	Yes	Yes

Warranty Statement

Kingspan Renewables Ltd Warranty Statement for Solar and Electronic Goods

Subject to the following provisions, Kingspan Renewables Ltd warrants that the Goods will be free from defects in material and workmanship for a period of 5 years in relation to THERMOMAX SOLAR PRODUCTS and a period of 27 months in relation to THERMOMAX ELECTRONIC PRODUCTS from the date of manufacture.

The warranty is given by Kingspan Renewables Ltd subject to the following conditions:

- A. Kingspan Renewables Ltd shall be under no liability in respect of any defect in the Goods arising from any information drawing design or specification supplied by the Buyer
 - B. Kingspan Renewables Ltd shall be under no liability in respect of any defect arising from fair wear and tear, wilful or accidental damage, negligence, abnormal working conditions, failure to follow the Kingspan Renewables Ltd instructions, misuse or alteration or repair of the Goods without approval
 - C. The above warranty does not extend to parts materials equipment not manufactured by Kingspan Renewables Ltd in respect of which the Buyer shall only be entitled to the benefit of any such warranty or guarantee as is given by the manufacturer to the Company.
 - D. The defect has been reported by the Buyer to Kingspan Renewables Ltd within the warranty period
 - E. The installation of the Goods having been carried out by fully trained and competent person(s)
 - F. The Goods having been subjected to neither "prolonged stagnation conditions" nor exhibiting signs of "extreme temperature exposure"
-
1. The Buyer shall not make any statement or representation or give any warranty to any third party in respect of any Goods other than in the terms made or given by Kingspan Renewables Ltd to the Buyer nor shall the Buyer have any authority to commit Kingspan Renewables Ltd to provide any service in relation to the Goods.
 2. The Company's liability to the Buyer for death or injury resulting from its own or that of its employees' agents' or subcontractors' negligence and damage suffered by the Buyer as a result of any breach of the obligations implied by Section 12 of The Sale of Goods Act 1979 shall not be limited.
 3. If Kingspan Renewables fails to deliver the Goods for any reason other than any cause beyond the Company's reasonable control or the Buyer's fault then Kingspan Renewables Ltd shall only be liable to the Buyer for and the Company's liability shall be limited to the excess (if any) of the cost to the Buyer (in the cheapest available market) of similar goods to replace those not delivered over the Price of the Goods.
 4. The Buyer shall examine all delivered Goods forthwith. Any claim based on any defect in the quality or condition of the Goods or their failure to correspond with specification shall be notified to Kingspan Renewable Ltd within 7 days from the delivery date or where the defect was not apparent on reasonable inspection within a reasonable time after discovery of the failure. If delivery is not refused and the Buyer does not notify Kingspan Renewable Ltd the Buyer shall not be entitled to reject the Goods.
 5. Kingspan Renewables Ltd shall be entitled to examine any Goods, which are the subject of any claim by the Buyer, and to remove such Goods or any part thereof for testing. No tests carried out by the Buyer will be recognised by Kingspan Renewables Ltd unless carried out strictly in accordance with a method previously agreed by Kingspan Renewables Ltd as being suitable for the purpose.
 6. Any valid claim in respect of the Goods which is based on any defect in the quality or condition of the Goods or their failure to meet specification is notified to Kingspan Renewables Ltd in accordance with these Conditions Kingspan Renewables Ltd shall be entitled to repair or replace the Goods (or the part in question) free of charge or at the Company's sole discretion refund to the Buyer the Price (or a proportionate part of the Price) but Kingspan Renewables Ltd shall have no further liability to the Buyer.
 7. Kingspan Renewables Ltd shall not be liable to the Buyer by reason of any representation (unless fraudulent) or any implied warranty condition or other term or any duty at common law (including but without limitation the negligence of Kingspan Renewables Ltd its employees agents or otherwise) or under the express terms of the Contract for any loss of production loss of profits or anticipated profits loss of contracts operation time or anticipated savings loss of business or of expected further business loss of or corruption to data damage to the Buyer's reputation or goodwill damages costs or expenses payable by the Buyer to any third party or any other indirect special or consequential loss or damage or claim (whether caused by the negligence of Kingspan Renewables Ltd its employees agents or otherwise) which arise out of or in connection with the supply of the Goods or their use or resale by the Buyer.
 8. Without prejudice to the provisions of clauses 3, 4, 5, 6 and 7 the entire liability of the Buyer under or in connection with the Contract shall not exceed the Price of the Goods.
 9. Kingspan Renewables Ltd shall not be liable to the Buyer or be deemed to be in breach of the contract by reason of any delay in performing or any failure to perform any of the Company's obligations in relation to the Goods if the delay or failure was due to any cause beyond the Company's reasonable control. Without limiting the foregoing, due to causes beyond the Company's reasonable control.
 10. For comprehensive details regarding "Warranties and Liability" please refer to the "CONDITIONS OF SALES" section 7.



Kingspan Renewables Limited

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