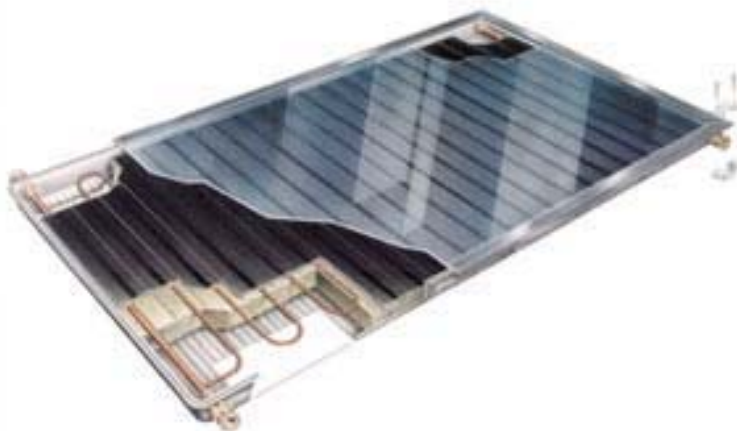




eco hometec

World Class Solar Hot Water Heating Systems



INSTALLATION MANUAL



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eco hometec has a policy of continuous improvement and reserves the right to change any specification without notice. Your statutory rights are not affected.

eco hometec is committed to design, develop and produce environmentally friendly appliances for both domestic and commercial applications

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DN6 8DD

These instructions should be left with the householder or occupier of premises or premises manager after completion of the installation.

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Why choose eco hometec?

Benefits at a glance



Compact space-saving design



High quality manufacture



Supplied as a complete kit of parts for quick and simple installation



Virtually maintenance-free



Unobtrusive roof-integrated solar collector



Simple and safe feature against overheating and freezing



High performance



Low cost



Tried and tested in thousands of installations



Domestic water heating



Industrial water heating



Hot water for hotels, schools, offices, shops, canteens etc.



Swimming pools



Caravans, boats, holiday parks



Greenhouses



Fish farms



Car washes



Heat exchangers



Agricultural and industrial processing

HEALTH & SAFETY

INFORMATION FOR THE INSTALLER, SERVICE ENGINEER & END USER

Under the current issue of the Consumer Protection Act and the Health and Safety at Work Act it is a requirement to provide information on substances hazardous to health (COSHH Regulations).

eco hometec takes every reasonable care to ensure that these products are designed and constructed to meet these general safety requirements, when properly used and installed. To fulfil this requirement each panel is comprehensively tested before despatch.

When working on the final system it is the Users/Installers responsibility to ensure that any necessary personal protective clothing or equipment is worn appropriate to parts that could be considered as being hazardous to Health and Safety.

This panels may contain some of the items below.

INSULATION AND SEALS

Glass Rope, Mineral Wool, Insulation Pads, Ceramic Fibre, Glass Insulation.

may be harmful if inhaled may be irritating to the skin, eyes, nose or throat. When handling avoid inhalation and contact with eyes.

Use (disposable) gloves, face masks and eye protection.

After handling, wash hands and other exposed parts.

When disposing, reduce dust with water spray, ensure parts are securely wrapped.

GLUES, SEALANTS & PAINT

Glues, Sealant and Paints used in the product present no known hazards when used in the manner for which they are intended.

Installation should be undertaken by suitable qualified and trained personnel.

When working on a roof it is essential to use approved scaffolding, towers and all proper safety equipment.

Personnel fitting solar collectors should:-

- Wear safety helmets
- Wear safety goggles
- Wear protective clothing
- Wear proper safety boots
- Wear safety gloves

Take extra care when working from heights and on sloping surfaces.

1. Unpacking panels

Unpack panels carefully so that they are not damaged. The packaging is designed to be recyclable. Dispose of all packaging in an environmentally friendly way by taking it to recycling centres.

Take care when carrying the collectors to the roof. Carrying and manipulating heavy weights and large frames on the roof is difficult and can cause you to slip. Make sure that you have all necessary supports and help for the job.

Before fitting the panels or collectors do not allow the absorber surface to be exposed to light because the whole collector will become very hot and the heat will be conducted to the externally piping which may become too hot to touch and when touched may cause severe burns and the shock may dislodge the installer from his or her foothold. The collectors are specifically designed to collect light and convert it into powerful heat.

Take care when the collectors are exposed to the sun. The absorber plate and heat transfer pipes reach ultra high temperatures in excess of 200 degrees Celsius and should not be touched whether the system is in operation or not otherwise severe burns will be suffered. If necessary in very hot conditions shield the collector from direct sunlight until the installation is complete.

2. Introduction

Solar is Latin meaning "of the sun" and that is where the energy comes from that our collectors provide. The sun radiates energy in the form of light, which travels through space of 93 million miles until it reaches our planet. The light travels at various wave lengths, some short and some long wave lengths. Some of the light is converted into heat by the atmosphere of our planet and some of it radiates onto the surface of the earth; some light bounces back into space.

The light can strike our collectors in the form of direct radiation - direct sunshine - or

diffusion radiation - the kind of light that you get on a cloudy day. The light is collector on the absorber plate of the collector, which is selectively coated with a substance to ensure the maximum absorption of light.

The absorber plate when it collects light causes an electro-magnetic stimulation of particles in the absorber plate. This causes light energy to be transferred into heat energy. The heats is transferred to the copper tubes behind the absorber plate by conduction and then, by the same process into the heat transfer fluid comprising a closed circuit inside the copper tubes. From there the heat will be drawn as required into a hot water cylinder, and or a heat exchanger for a swimming pool and or a heat sink for a central heating system.

The system is controlled by a highly sophisticated digital electronic controller, which can be programmed by the installer for maximum efficiency for each particular installation.

3. BS Standards

There are important principles that every installer of solar water heating must be familiar with that are set out in BS 5918:1980. In addition installers should be aware of BS 6785 (in relation to solar heated swimming pools) all relevant water supply regulations. British standards applicable to components of the installation are set out in the table below. Where ever possible components should be used that comply with British Standards or any higher applicable standard to ensure the best performance for the collectors

Table 1 BS. Applicable standards

Feed & Expansion Cisterns Expansion Vessels	BS 417 BS 4213 BS 4814
Pumps	BS1394 parts 1 & 2
Valves	BS 5154
Copper Tubes	BS 2871
ABS Tube	BS 5391
PP Tube	BS4991
Unplasticized PVC	BS 3505
HDPE	BS 3284
Stainless Steel Tube	BS 4127 part 1
Copper & Copper alloy fittings	BS 864 Part 2
Malleable cast iron & cast copper alloy	BS 143 & BS 1256
Unplasticized PVC	BS 4346 part 1
ABS	BS 5393
All softwoods used	BS 4072 treatment

4. Heat Transfer Fluid

Because the system is designed to use a glycol solution as a heat transfer fluid, which is pressurised, to between 4 and 4.5 bar great care must be taken in the plumbing.

Glycol has a very low surface tension and is very pervasive and will locate and leak through hairline cracks and holes that would not leak if a water solution was used. Accordingly it is imperative that joints are perfectly and carefully made.

Also the installer should refer to the advice in the pre-commissioning steps set out in this manual.

4.1 Pipe and Tubing

All pipe and tubing to be to the appropriate BS or higher standard only use best quality 15mm or 22mm copper pipe or stainless steel flexible pipe. Pipe work should take the shortest practicable route.

4.2 Connections

Only use hard solder for joints or press fittings with solar compatible O rings, or compression fittings.. The use of any other connections is not recommended.

Compression fittings must be used strictly in accordance with the manufacturer's instructions.

4.3 Positioning of the Collectors

Positioning the collectors is important for optimum performance. Collectors should ideally be mounted at an angle of between 30 degrees and 60 degrees on a south facing that is not shaded by overhanging trees buildings or structures.

Good results can be obtained by splitting the collector array on East/West elevations but this should only be used when it is not possible to have a mainly southerly position for the collectors.

4.4 Insulation

Good insulation is very important to the installation. Poorly insulated installations lose tremendous amounts of energy, especially in winter when energy gains will be low.

eco hometec recommend that all pipe work containing the heat transfer fluid is insulated with at least 27mm thickness; if this is not possible then minimum insulation of 13mm is required.

Insulation for external pipe should be resistant to ultra violet light.

Insulation must be capable of withstanding temperatures of up to 175 degrees Celsius. The insulation should be CFC free and PVC free and should not affect copper or stainless steel. Insulation rate should be Lambda 0.040. It should be flexible at low temperatures that are experienced in the location where it is to be installed. All insulation joints must be suitably sealed preferably by use of the manufacturer's recommended tape. Insulation joints must be weatherproof.

Where collectors are built into roof spaces it may be necessary to provide insulation behind the collector and to ensure that the roofing materials have sufficient insulation properties to comply with the building regulations.

4.5 Pressure Vessel

The pressure vessel should be pre pressurised to 3 bar.

The pressure vessel should be located in a position where it can be easily accessed. It

should be fitted with isolating valve for ease of replacement. The isolating valve should not be accessible without a tool so that an unqualified person cannot shut it off. It should be fitted on the return run of the system.

A free fluid path from the collectors to the pressure vessel must be provided. This path must **not** contain a non-return valve.

The membrane in the pressure vessel should be fully glycol resistant.

4.6 Pump

A standard circulating pump, fitted with isolating valves, should be incorporated within the pipe work. The flow regulator should be set to 1.0 litre per minute per panel. A three-panel installation is set to a flow rate of three litres per minute.

4.7 De-aeration Valve

These are integrally built in to the eco hometec panels' installation sets and upon installation must be located highest place of the collector circuit. They must be manually bled with a key. eco hometec do not recommend use of automatic de-aeration valves because if they malfunction they may have a tendency to suck air into the collector heat transfer fluid system.

4.8 Cylinders

Choice of cylinder is one of the most important judgments that a solar engineer must make. For households with four or more occupants eco hometec recommend a 200 - 300 litre cylinder containing a heat transfer coil for solar and other heat transfer coils (for use with a gas boiler and/or an electric element). Where there are two coils the bottom or lower coil should be used for solar heat transfer.

Where a pre-heat cylinder is used it should be of sufficient size to exceed about 80% of the average daily hot water usage. In order to calculate average hot water usage (at around 55 degrees Celsius) you assume between 30 litres per person for a household with four or more people rising to 40 litres per person for a household with less than four people.

4.9 Legionnaire's Disease

The bacteria that cause legionnaires disease can survive normal drinking water disinfection by the water company and can enter the mains water supply. Once in a system, they may multiply particularly if the water temperature is favourable or if the system contains excessive sediment.

Although this not usually a problem associated with domestic water supplies (because the turnover of water does not usually allow the water to stagnate), it is possible to occur and precaution should be taken in the design stage of an installation.

Hot water should be stored at 60°C. (Cold water should be stored at 25°C or less). Water fittings and washers should not be made of material which encourages the growth of the organisms, and systems should be designed to avoid dead-ends which cause water stagnation and allow multiplication of the organism.

Every cylinder that is larger than 400 litres should be heated once a day to at least 60 degrees.

5. Pre Commissioning Steps

When the system is installed but before it is commissioned the following steps should be taken

The whole system must be inspected including the roof and existing water and heating systems. Any faults or damage that exists should be noted and reported to the householder or premises manager before work starts.

The collectors should be fixed to the roof as set out in this manual

The system should be installed in accordance with the chosen schematic and in accordance with the recommendations and instructions in this manual.

First check the weather. If there is high level of sunshine, cover the collectors to ensure that they are not receiving light.

The system should first be filled with water, flushed and then checked for leaks.

The system should then be filled with the glycol mixture and then pressure tested for leaks, weeps and failings. The whole system should be re-inspected very carefully.

The glycol manufacturers Instructions should be followed and the correct dilution mixed to provide adequate frost protection.

The mixture can be introduced through the filling loop double check valve under pressure using a garden spray unit available from hardware stores or similar pumped applicator, fitted with suitable connectors.

The system should then be re-inspected carefully.

Wire in controller and sensors in accordance with the controller instructions. Connect the controller. Set the pump speed to its highest.

If the weather outside is fine, the controller should start the system operating at 100% pump speed.

If the weather conditions are not fine set the controller to its manual operation and set the pump speed to 100% in accordance with the controller manual.

If you have set the controller to manual operation, reset it to automatic operation, Adjust the parameters in the controller for optimum performance for the system.

Ensure that the pressure gauge is working. Explain to the householder or premises manager that the pressure gauge should be maintained at around 4 to five bar and that if the gauge permanently falls below three bar they should either call for service or if competent add glycol solution to the system. Explain that some changes in pressure occur normally between low and high temperatures and are not a cause for concern or alarm.

6. In roof installation

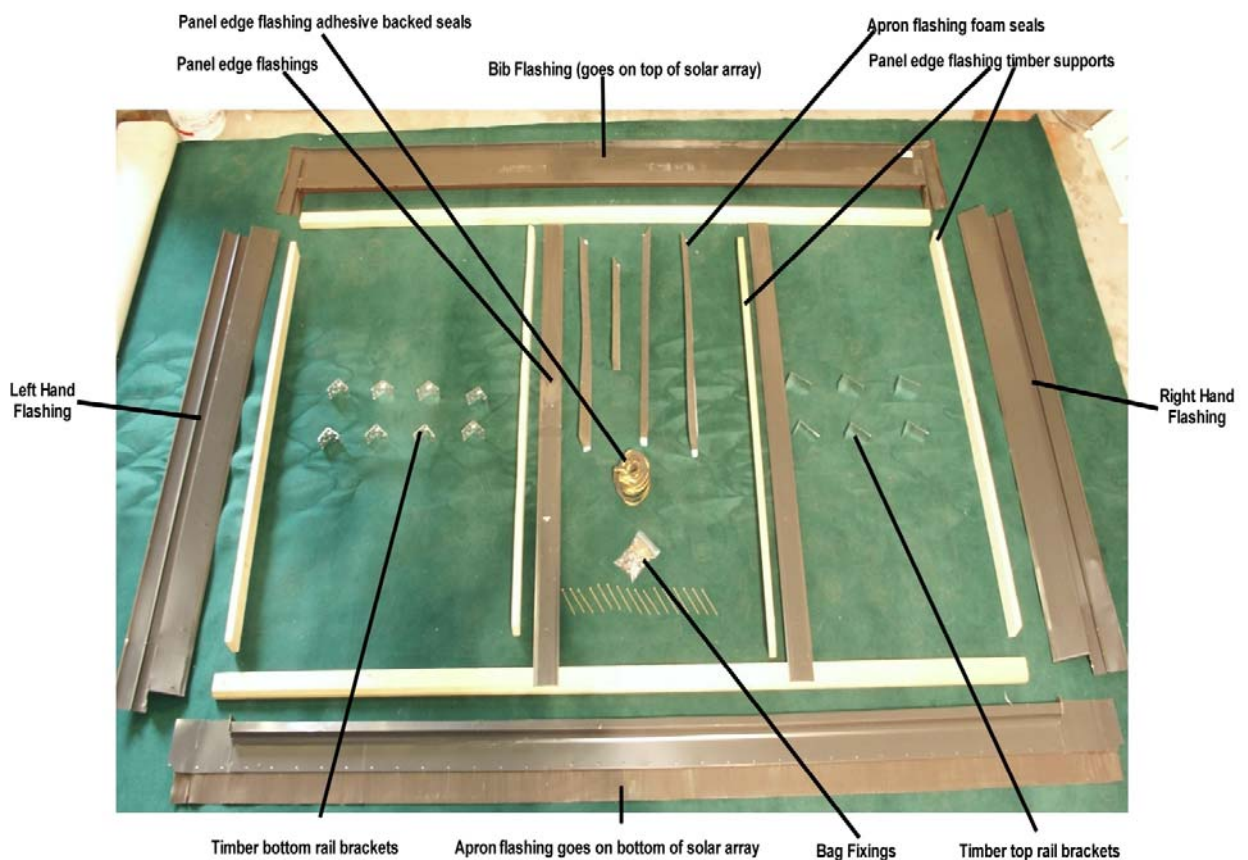
The standard in roof mounting kit is designed to accommodate 2 or 3 panel configurations and is suitable for most types of roof tiles.

Included in the in roof mounting kit are the following parts:

Parts shown are for three panel in roof kit.

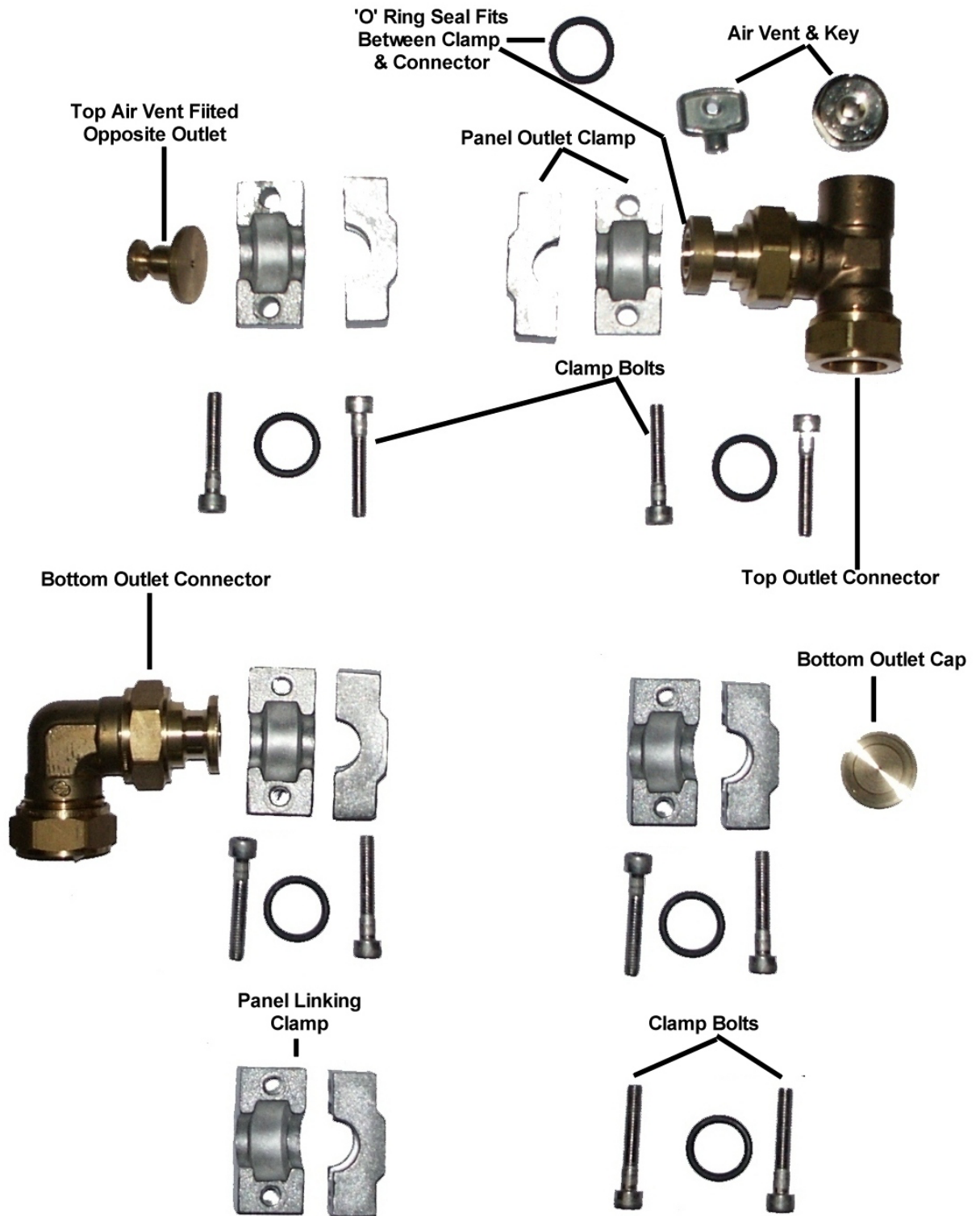
1. Top bib flashing (goes on top of panels)
2. Bottom apron flashing (goes at bottom of panels)
3. Left hand flashing (goes down left side of panel array)
4. Right hand flashing (goes down right side of panel array)
5. Panel edge flashings (goes between panels)
6. Timber left, middle and right hand rails (goes between panels used to support and fix too panel edge flashing)
7. Top bib flashing timber rail (fixed to rafters to support top of panel array)
8. Bottom apron flashing timber rail (fixed to rafters to support bottom of panel array)
9. Triangular adhesive backed foam strips (sticks to top of panels under bib flashing)
10. Square adhesive backed foam strips (sticks to top of bottom timber rail and panels sit on top)
11. Coil rubber adhesive backed seal (goes down side of panels under flashing strips)

Figure 1 In roof fixing kit components



Please take the time to layout and identify all parts prior to installation.

Figure 2 Panel Couplings and fittings



Above is the various parts supplied to connect panels and pipe work.
Please take the time to layout and identify all parts prior to installation.

7. Installation safety considerations.

Please note the panels are large and heavy and will require at least two persons to carry. Please ensure all access equipment used is safe and capable of supporting the personnel and equipment and materials placed upon it.

The first thing to do is to determine where in the roof the panels are to be fixed.

8. Positioning of the collectors

Positioning the collectors is important for optimum performance. Collectors should ideally be mounted at an angle of between 30 degrees and 60 degrees on a south facing that is not shaded by overhanging trees buildings or structures.

Good results can be obtained by splitting the collector array on East/West elevations but this should only be used when it is not possible to have a mainly southerly position for the collectors.

Figure 3 Checking roof tile alignment



The overall roof space required is as follows

Table 2 Panel dimensions

	Width	Height
2 panel	2600	2600
3 panel	3700	2600

Choose a suitable location for panels and check location is large enough to accommodate the removal of tiles (if fitting in existing roof) and provides adequate space for fixing of flashings.

When positioning the solar array consider carefully how the cut tiles will fit. Often cutting can be minimised or made easier by moving the array left, right, up or down.

It is a good idea to assemble flashing on the floor first to check how the tiles will sit into and onto the flashing.

8.1 Remove the roof tiles from required area.



In this example we have removed a tiled area (2600 x 2600) required for a 2 panel installation. For every additional panel remove a further 1100 of tiles.

Fix the bottom timber panel support rail across the roof trusses in the desired location with the chamfered edge uppermost see figure 7. The rail supports the bottom edge of the panels and as such determines the finished position of the solar array and its flashing. Pay particular attention at this stage to determine how the

roof tiles will sit and how they will fit under and onto the flashings. Care and attention to detail at this stage will make the overall installation easier and the finished job look neater.

If necessary fix another timber of the required thickness (not shown and not supplied) underneath the bottom rail to raise the finished array to the required height. Fix to the roof trusses with the bracket and screws provide as per figure 4 below.

Figure 4 Fixing Bottom Rail



Figure 5 Apron timber rail bracket



Figure 6 Fix Apron flashing rail 50mm back

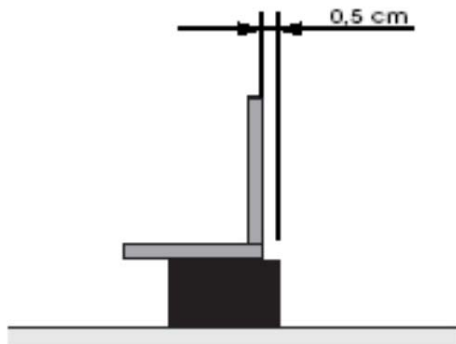
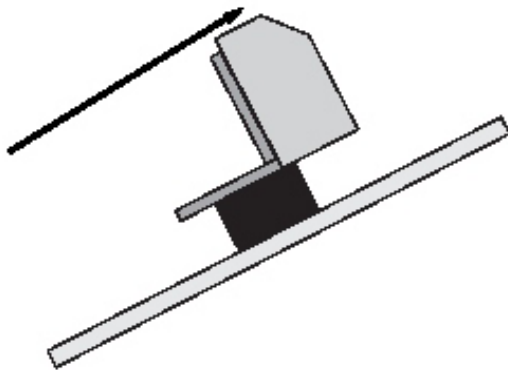


Figure 7 Chamfered edge uppermost



When you have fixed the bottom rail across the roof trusses replace the tiles up to the underside of the rail and fix the apron flashing using the screws provided.

Figure 8 Fixing apron flashing



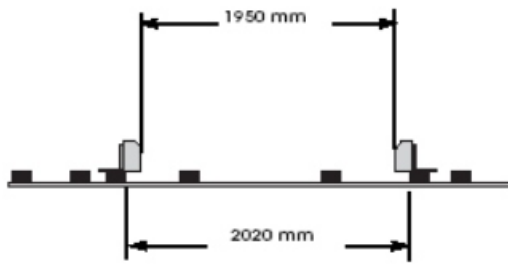
Fix the adhesive backed expanded foam strip across the top edge of the apron flashing.

Figure 9 Adhesive backed strip



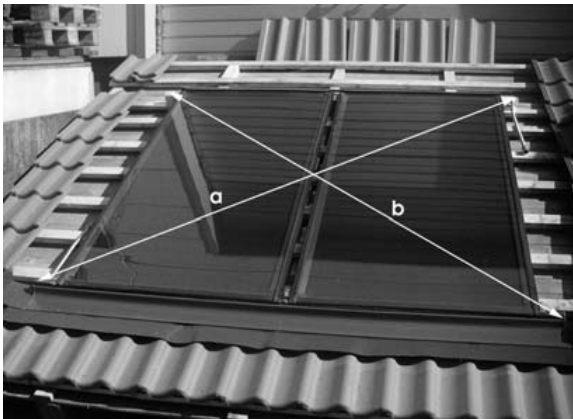
Fix the top timber support rail across the roof trusses with the chamfered edge facing down. The distance between the upper and the lower timber rail should be 1950 mm (as per figure 10) and the height above the trusses the same as the bottom. If you have raised or lowered the bottom rail, to suit the roof tiles, then fix the top rail the same.

Figure 10 Top & Bottom rail spacing



Check the diagonals to make sure the top and bottom rails are square.

Figure 11 Checking diagonals



Place the left panel onto the top and bottom rails as shown below.

Fix the remainder of the foam to the bib flashing and position the next panel.

Figure 12 Positioning panel



Figure 13 Fixing foam strip



The next thing to do is to couple the array together. Fix an 'O' ring into the recess on the panel coupling as per figure 14 below.

Smear some silicone grease into the coupling threads, position the panels together and join using the two part aluminium clamp and bolts.

Figure 14 Fitting 'O' ring



Butt up and align panel socket and spigot as per figure 15.

Figure 15 Panel socket and spigot



On the return connection (always diagonally opposite the flow connection) connect the right-angled brass elbow supplied using alloy clamp and “O” ring as before.

The brass end cap with screw air vent supplied should be fitted to the top connection opposite the flow connection using alloy clamp and “O” ring as before.

The brass blank end cap supplied should be fitted to the remaining bottom connection using alloy clamp and “O” ring as before.

Figure 18 End cap

Figure 16 Jointing clamp



On the flow connection (top left or right hands side) attach the brass tee piece with air vent supplied using alloy clamp and “O” ring as before.

Figure 17 Clamp detail



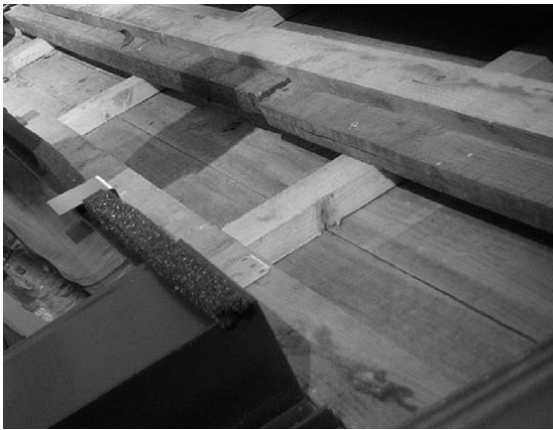
When you have clamped the panels together, fixed the flow and return connections and extend the flow and return pipe work through and into the roof space.

Next fix the square adhesive backed expanded foam strip across the top edge of the panels and secure the large right hand brackets (figure 19) to the top side of the bib flashing timber rail using the 4x40 screws supplied as per figure 20.

Figure 19 Panel clamp bracket



Figure 20 Securing top of panel array



When you have joined the panels top and bottom fix the edge flashing timber rails between and on the outside edges of the panels.

You may need to fix noggins between the roof trusses and then using the long screws supplied screw the rails to the noggins.

The gap between panels and rail should be no more than 3mm as per figure 21 below.

Figure 21 Side rail gap

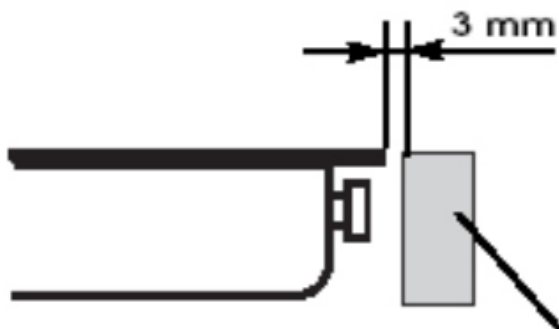


Figure 22 Fixing edge timber flashing rails



Fit the adhesive backed black strip to the inside panel edges as per figure 23.

Figure 23 Centre adhesive strip



Fix centre flashing strips to the timber rail using the coloured screws as shown figure 24.

Figure 24 Capped flashing screws



Figure 25 Fixing flashing rails



Next fix the left and right hand edge flashings using the capped coloured screws as shown figure 24.

Figure 26 Fixing side flashings

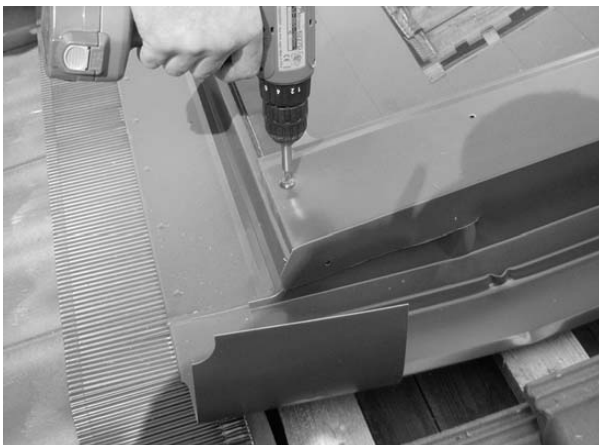


Figure 27 Fix edge flashing

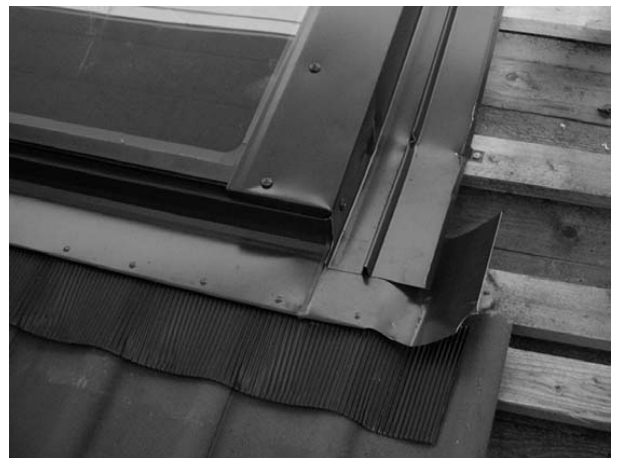


Using the nails and clips shown in figure 28 below, secure the side flashings to the tile lathes by hooking the clips over the outside edge of the flashings and nailing into the lathe as shown in figure 29.

Figure 28 Side flashing clips

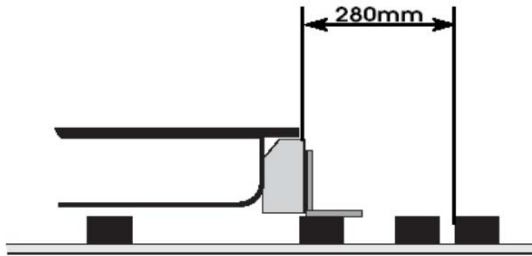


Figure 29 Fixing side flashing



Fix another timber rail (not supplied) across the top of the array, 280mm above the bib flashing support rail fixed earlier. See figure below.

Figure 30 Top Flashing support rail



Finally position the bib flashing on the top of the array and drill and fix through each end using 4x40 screws supplied. See figure below 31

Using the nails and clips as shown in figure 28 and secure the bib flashings to the previously fixed top timber rail.

Figure 31 Fixing apron flashing



Figure 32



Fit the adhesive backed triangular foam fillet strip along the sides and top of the bib flashing as shown in figure 32.

When you have firmly fixed all flashing the roof tiles can be replaced.

Figure 33 Replace tiles



9. On roof installation

The standard on roof mounting kit is designed to accommodate 3 panels. However it can be shortened as required for installation using different multiples of panels.

9.1 Un packing the on roof mounting kit

Included in the roof mounting kit are the following parts:

From left to right as in figure 1 below

- 2 x Galvanised 3 metre tubes
- 2 x 3 metre aluminium horizontal top and bottom panel supports
- 3 x aluminium vertical frame braces
- 4 x aluminium frame/roof support brackets
- 6 x black right angle panel clamps
- 2 x packs of fixings, nuts bolts and screws
- 2 x screwed studs

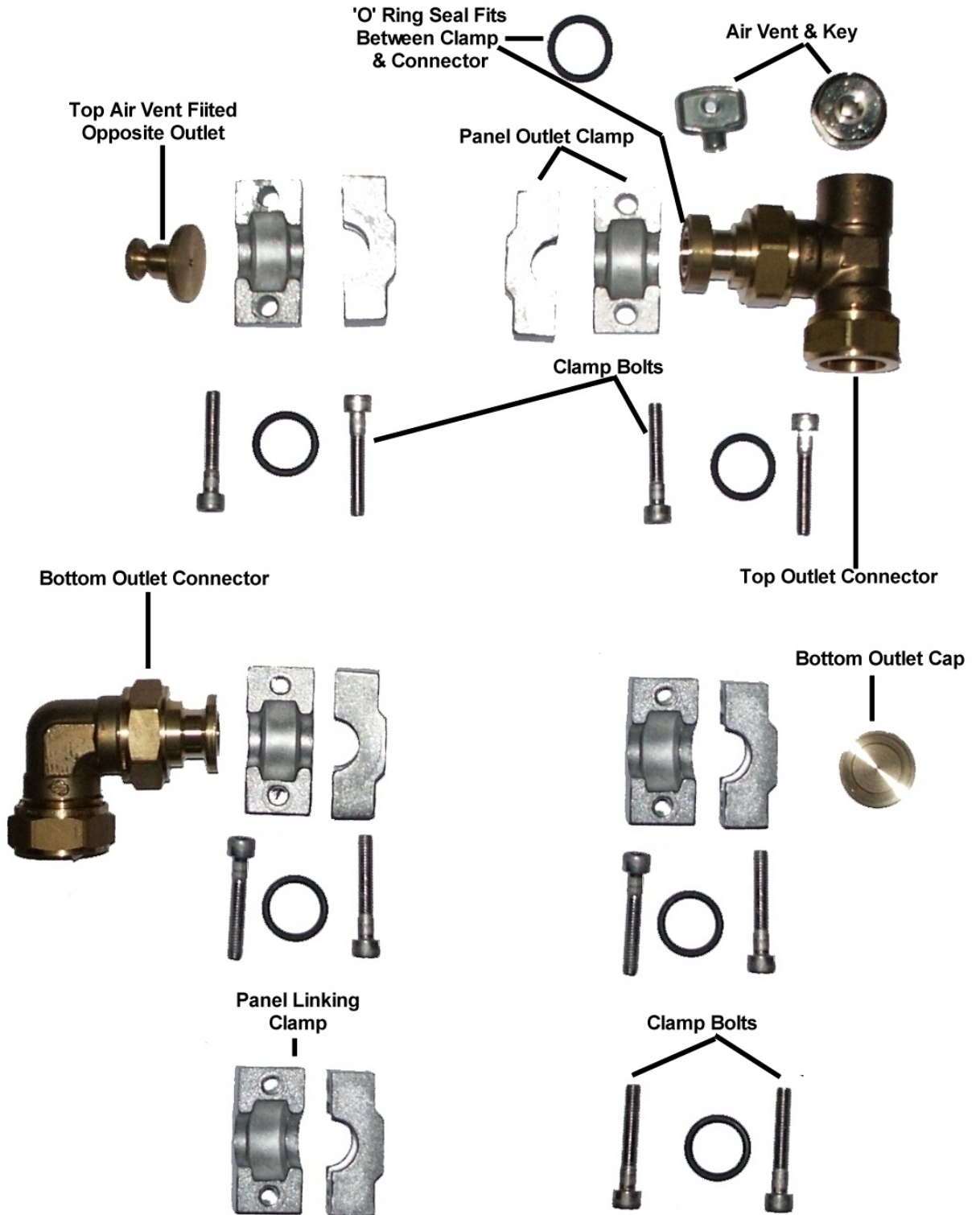
Figure 34 On roof fixing kit



Unpack and identify the parts as listed and shown above

The panels are supplied complete with jointing and connection kits as pictured in figure 36 below.

Figure 35



10. Positioning of the Collectors

Positioning the collectors is important for optimum performance. Collectors should ideally be mounted at an angle of between 30 degrees and 60 degrees on a south facing that is not shaded by overhanging trees buildings or structures.

Good results can be obtained by splitting the collector array on East/West elevations but this should only be used when it is not possible to have a mainly southerly position for the collectors.

The frame when assembled will sit on the roof similar to example as per figure 37 below.

Figure 36 Assembled frame



The overall roof space required is as follows

Table 3 Frame dimensions

	Width	Height
1 panel	1040	2010
2 panel	2080	2010
3 panel	3120	2010

Choose a suitable location for frame and panels and check location is large enough to accommodate the completed frame.

11. Installation of frame

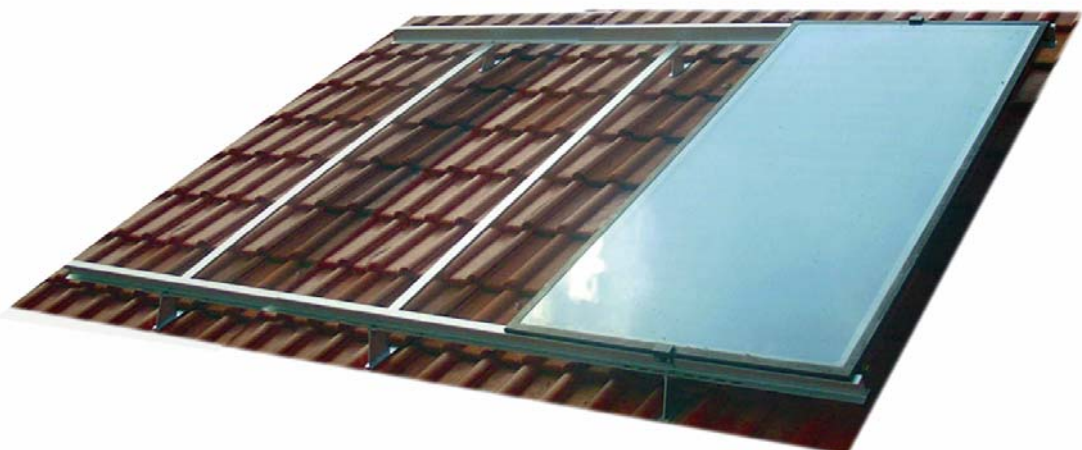
The frame supports attach to the roof timbers and pass under the tiles and are then bolted directly to the panel support bars. See figure 40.

Figure 37 Frame support detail



To determine the best position for the frame supports it is a good idea to loosely assemble the frame on the ground. The bars connecting the top and bottom rails should be positioned to sit underneath the centre line of each panel as per figure 39.

Figure 38 Frame details



Having determined where on the roof the frame supports will be located remove the row of roof tiles immediately below the top and bottom frame supports. See figures 6 below

Figure 39 Roof tile removal



11.1 Fixing the frame

Position the frame supports in the required location make sure the frame is square and fasten the galvanised bar across the roof trusses using the brackets and screws supplied. Repeat the process for the top frame supports.

Figure 40 Checking frame dimensions



The assembly when completed should look similar to the installation in figure 42 below.

Figure 41 Frame fixed to roof



When you have checked the frame is square make sure all fixings, nuts and bolts are tight and replace roof tiles.

On the installation below 200mm uprights were placed between the top frame and frame supports to increase the pitch of the panels.

The ideal pitch of the solar panels is between 30 and 60 degrees. On roofs with shallow pitch aluminium bars should cut to required length, drilled, and bolted to the frame and feet to provide the required pitch as per figure 43 below,

Figure 42 Frame supports



11.2 Positioning the panels

Carefully lift the panels and position on frame leaving a 100mm gap between panels.

Figure 43 Positioning panels



Apply a smear of silicone supplied to socket end of connector and insert "O" ring supplied as per figures 45 and 46.

Figure 44 Silicone in connector socket



Figure 45 Insert "O" ring



Butt up and align panel socket and spigot as per figure 47 below.

Figure 46 Panel socket and spigot



Using clamp and bolts supplied apply a smear of silicone to bolt thread and fasten with allen key the alloy connection clamp over the panel socket and spigot as shown in figure 48 below.

On the flow connection (top left or right hands side which ever is the most convenient) attach the brass tee piece with air vent supplied using alloy clamp and "O" ring as before.

Figure 47 Clamp detail



On the return connection (always diagonally opposite the flow connection) connect the right-angled brass elbow supplied using alloy clamp and "O" ring as before.

The brass end cap with screw air vent supplied should be fitted to the top connection opposite the flow connection using alloy clamp and "O" ring as before.

The brass blank end cap supplied should be fitted to the remaining bottom connection using alloy clamp and "O" ring as before.

Figure 48 End cap



Finally the panels should be secured to the frame using clamps and fixings supplied. Position clamps at the centre of each panel top and bottom.

Figure 49 Panel clamp



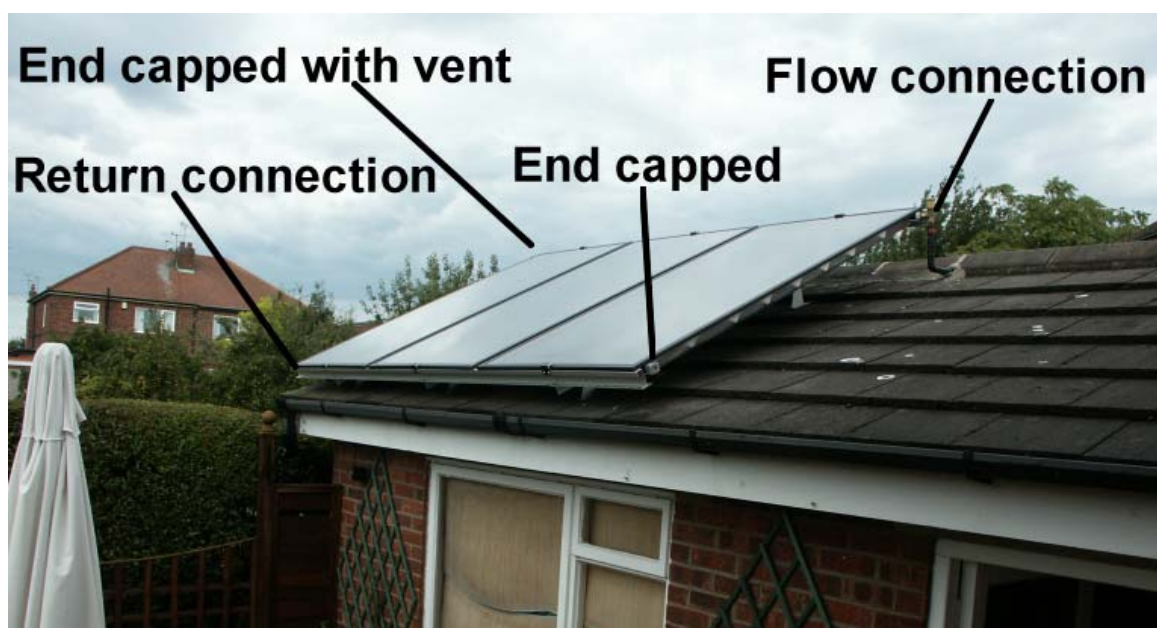
The panels when clamped should look like figure 51 below

Figure 50 Panels clamped to frame.



Finally the installation when complete should look like figure 18 below with hydraulic connections ready to be connected. If required the flow and return connections can be reversed however the flow must always be at the top with the return diagonally opposed.

Figure 51 Completed installation



12. Hydraulics & Filling the system

The hydraulic pipe work should be fabricated in 15mm copper or stainless steel tube. The flow pipe leaves the top of the array returning to the opposite bottom corner.

Incorporated in the circuit should be a circulating pump fitted with isolating valves, a 6 bar pressure relief valve (discharging to a safe low level outlet), a 12 litre expansion vessel, filling loop with non return valve and 6 bar pressure gauge.

These items can be supplied by eco hometec.

When the pipe work is complete the system should be filled, vented, checked for leaks, flushed and re-filled with water/glycol mix.

The glycol manufacturers Instructions should be followed and the correct dilution mixed to provide adequate frost protection.

The mixture can be introduced through the filling loop double check valve under pressure using a garden spray unit available from hardware stores or similar pumped applicator, fitted with suitable connectors.

The system should then be re-inspected carefully.

Wire in controller and sensors in accordance with the controller instructions. Connect the controller. Set the pump speed to its highest.

If the weather outside is fine, the controller should start the system operating at 100% pump speed.

If the weather conditions are not fine set the controller to its manual operation and set the pump speed to 100% in accordance with the controller manual.

If you have set the controller to manual operation, reset it to automatic operation, Adjust the parameters in the controller for optimum performance for the system.

Ensure that the pressure gauge is working. Explain to the householder or premises manager that the pressure gauge should be maintained at around 4 to five bar and that if the gauge permanently falls below three bar they should either call for service or if competent add glycol solution to the system. Explain that some changes in pressure occur normally between low and high temperatures and are not a cause for concern or alarm.

The mixture can be introduced through the filling loop double check valve under pressure using a garden spray unit available from hardware stores or similar pumped applicator. All pipe work should be insulated with Armacell or similar insulation.

Please note due to the high temperatures a solar system can experience any insulation must be capable of withstanding temperatures of +150°C and if installed outside must be UV resistant.

eco hometec recommend the use of Armacell insulation.

Table 4 Technical data

TOTAL AREA	2,03 M ²
Absorbing surface	1,76 m ²
Linkage dimension	1040x2040 mm
Cover glass	4mm solar safety
Hydraulic Connections	12mm clamp and O ring (supplied)
Panel Casing	Pressed non-corrosive Aluminium – Magnesium sheet
Sensor Phial	4mm or 6mm sensors
Thermal insulation	Mineral wool
System fluid capacity	1.2 litres
Total weight	43kG
Conversion layer	Highly selective based on colloidal nickel pigmented alumina
Solar absorptive	Min. 0.94
Thermal emissivity	Max.0.16
Optical efficiency	80%
Operating temperature	<100 ^o C
Max. Permissible operating pressure	10 bar
No load temperature at radiation 1000w/m ² @ ambient 25 ^o C	178 ^o C
Max.working over pressure of system fluid	600kPa
Recommended minimum flow rate for system fluid	60 litres per hour
Part number	S1465GB
Connection length	It is possible to connection of up to 4 collectors in series

Figure 52 Dimensions

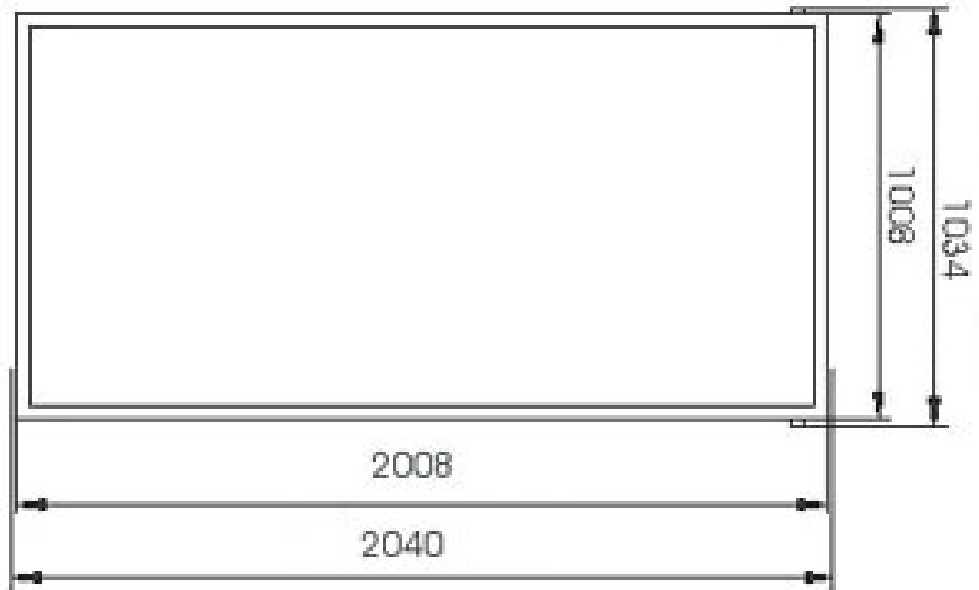


Figure 53 Dimensions

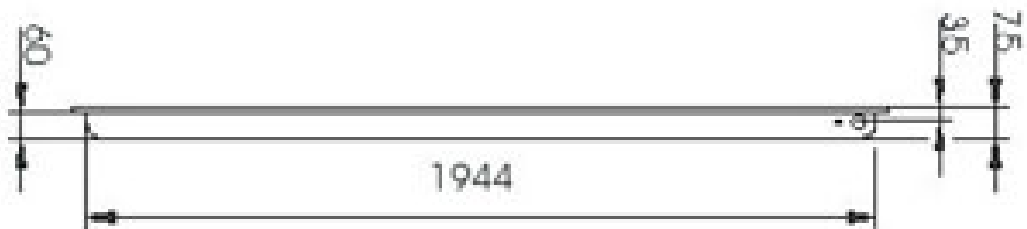


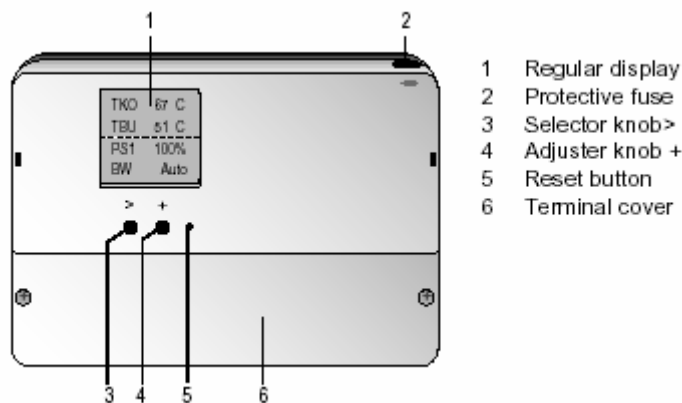
Figure 54 In roof 3 panel flashing and mounting frame



Figure 55 Flat roof mounting frame



13. Solar storage heater controller PS 5510 M



13.1 Intended use

Provides simple control of solar circulating pump based on adjustable (0-40K) temperature differential on and (0-40K) temperature differential off measured with sensors fitted to solar collector and hot water cylinder.

The controller is an electronic device for use in conjunction with a hydraulic circuit in accordance with the manufacturer's specifications. The device is not to be used for any other purpose.

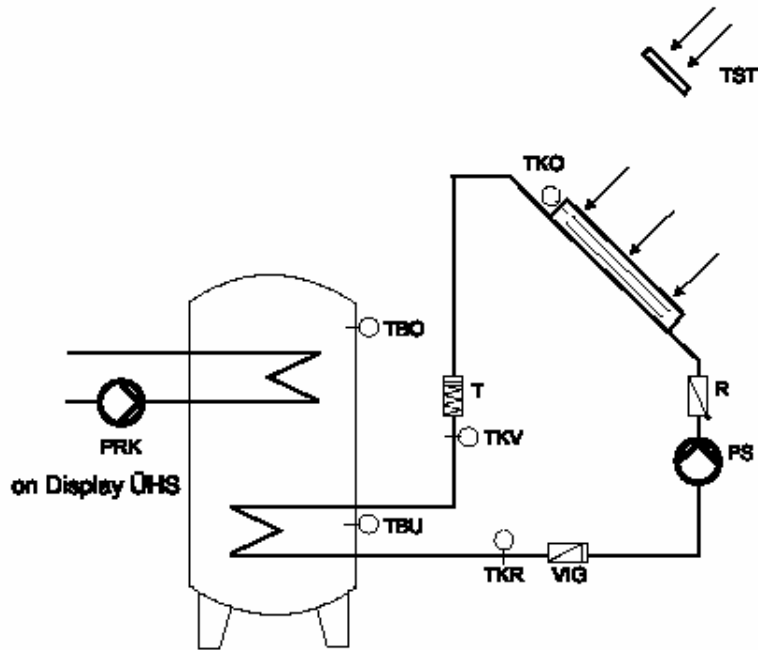
The controller complies with the following EU guidelines:

- 72/23/EWG "Low Voltage Guidelines"
- 89/336/EWG "EMC Guidelines", including amendment guideline 92/31/EWG

Danger

The controller is electrically operated. Improper installation or attempted repair can cause a life-threatening electric shock hazard. Only adequately qualified specialist personnel must perform installation and commissioning. It is forbidden to open the device or ancillary components. Repairs are to be carried out only by the manufacturer.

Figure 56 Hydraulic/sensor configuration



13.2 Explanation of terms and abbreviations

1. PS Solar pump
2. TBU Domestic hot water (DHW) temperature/bottom sensor
3. TKO Collector temperature/sensor
4. BW Operating mode selector
Auto = automatic
On = pumps on at 100%
OFF = controller off, display only
5. TMA Maximum hot water storage temperature (85°C)
6. DT15K Solar difference pump on 0-40K
7. DT5K Solar difference pump off 0-40K
8. PH Live connection
9. N Neutral Connection
10. PE Earth Connection

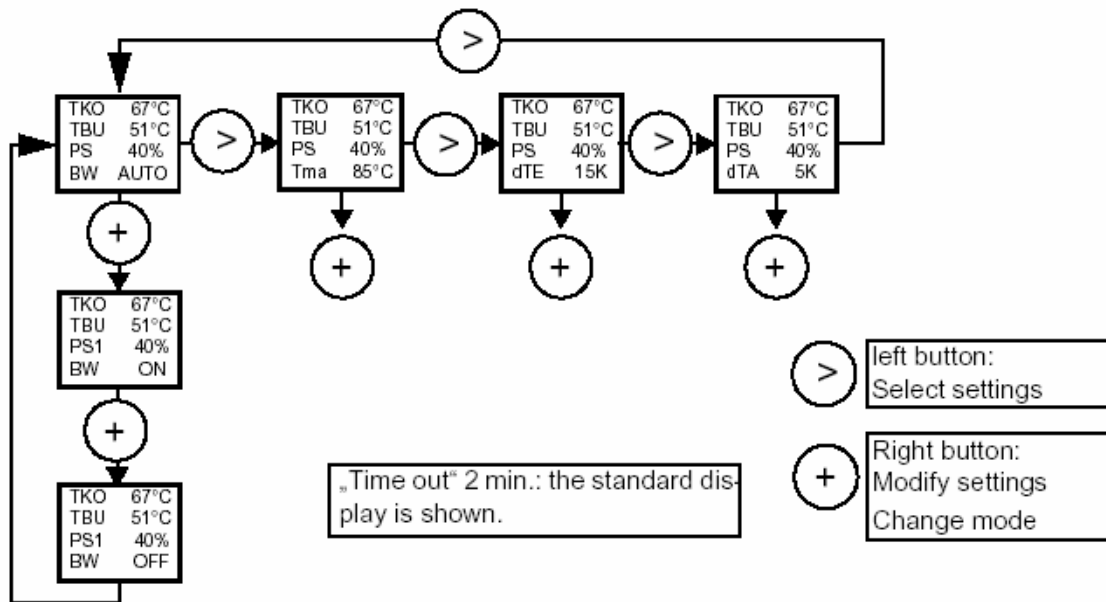
Figure 57 PS5510 240v Input/output connector strip

5	4	3	2	1	L	N	N	N	N	N	N	⏏	⏏	⏏	⏏	⏏
				PS	Ph	N					PE					

Figure 58 PS5510 Sensor connector strip

18	17	16	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1
													TBU	TKO			

13.3 Menu Structure



13.4 Functions

The solar pump is switched on when the difference in temperature at the collector sensor **TKO** and the hot water sensor **TBU** is larger than the given set point **dTE**. The solar pump is switched off when the difference in temperature at the collector sensor **TKO** and the hot water sensor **TBU** is smaller than the given set point **dTA**. Using speed regulation of the pump, it is attempted to maintain a transfer temperature at the collector sensor **TKO**. The set point **xs** is given by the following formula:

$$xs \text{ TKO-DHS-Tank} = TBU + 1/2 \times (dTE + dTA)$$

If the temperature rises above the set "maximum storage temperature" **Tma**, the solar pump switches off. If a temperature of above 130°C is reached at the collector sensor, the solar pump is switched off.

13.5 Installation

Electrical installation and safety regulations must comply with local regulations. The solar controller must be powered continuously in order to ensure operation at all times.

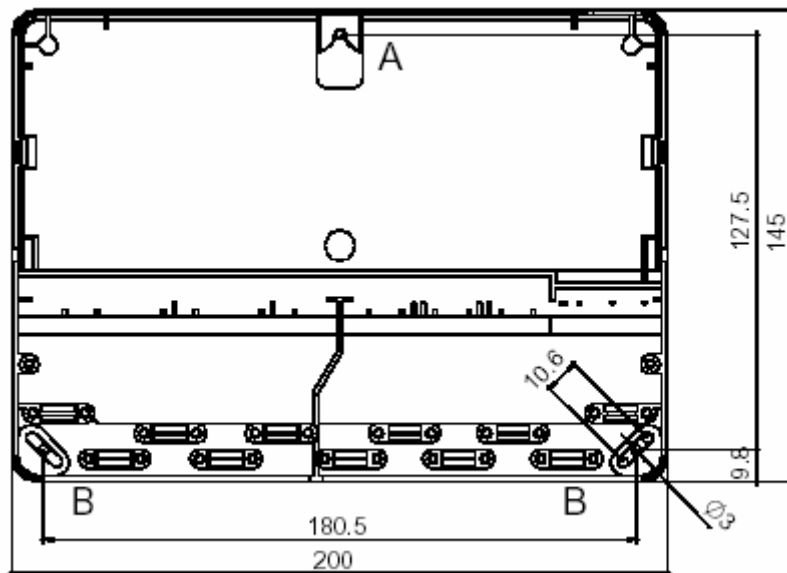
Before putting the controller into operation the electrical connections to all system components must be checked. It may be necessary to electrically suppress strongly inductive loads in the vicinity of the controller (contactors, solenoid-operated valves, etc.).

This can be done by connecting RC-links directly to the coil terminals of the offending components. Recommended RC-links: 0.047µF, 100W, rated at 250 VAC (e.g. Bosch, RIFA, etc.).

13.6 Mounting instructions

1. After drilling the three mounting holes, screw in the top screw so that the controller can be hung from it.
2. Remove the connector strip cover by loosening the securing screws.
3. Screw the two lower mounting screws 'B'.
4. The controller can now be wired up.

Figure 59 Control Dimensions



Technical specifications

Supply voltage 230 VAC $\pm 10\%$, 50-60 Hz

Power consumption 7 VA

Sensor circuit voltage 12 V, insulation strength 4 KV

Ambient temperature 0 °C50 °C

Sensor cable length, cross-section max. 100 m; 0,75 mm²

Output switching capability 250 VAC, 1 A, 50 Hz

Certification -compliant

Protection category II EN 60730

Protection level IP40 EN 60529

EMV EN 50082-1

EMV-emission EN 50081-1

Protective fuse 6,3 A medium reaction 5x20 mm filled with extinguishing agent.

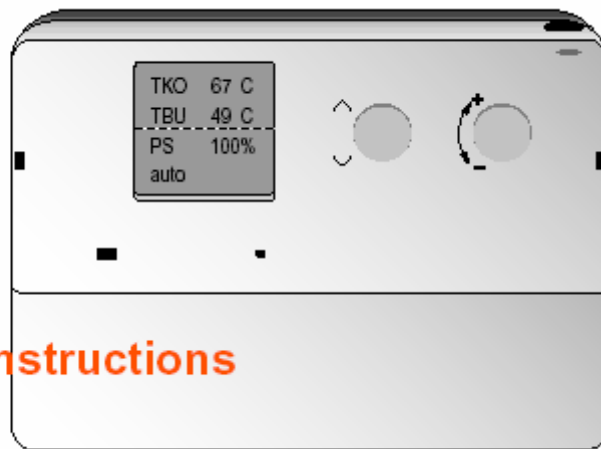
Table 5 Table of temperature sensors and resistances

Sensor NTC 5000 Ω at 25 °C

Temperature °C	Resistance Ω	Temperature °C	Resistance Ω	Temperature °C	Resistance Ω	Temperature °C	Resistance Ω
-20	48'536	2	14'479	24	5'225	75	740
-18	43'247	4	13'342	26	4'787	80	628
-16	38'592	6	12'085	30	4'029	85	535
-14	34'489	8	10'959	35	3'266	90	458
-12	30'866	10	9'950	40	2'663	95	393
-10	27'663	12	9'045	45	2'184	100	339
-8	24'827	14	8'231	50	1'801	105	294
-6	22'313	16	7'499	55	1'493	110	255
-4	20'079	18	6'840	60	1'244	120	195
-2	18'094	20	6'246	65	1'042	130	150
0	16'352	22	5'710	70	876	140	118

14. Solar storage heater controller PS 5511 M

Figure 60 Controller PS 5511 M



Operating instructions

These are available in separate document, please contact eco hometec to order your copy if required.

Provides advanced control of solar circulating pump and mixing or zone valves based on adjustable (0-40K) temperature differentials measured with sensors fitted to various parts of the installation. solar collector and hot water cylinder

The PS5510 M controller assures optimum performance of the solar system and can be supplied to fit any combination of panel and solar hot water tank installation.

15. Additional Equipment

Glycol mix volumes and protection levels by percentages.

Tools required to fill system and operating procedures.

Details of pipe insulation

Pump sets

Flow meters

Glycol resistant expansion vessels

Extra Solar items available from eco hometec include the following:

temperature & energy recorders

double thickness pipe-insulation

double thickness solar-storage insulation

high recover twin coil hot water copper cylinders

solar compatible condensing boilers & controls.

Systems available for flat roofs, vertical walls, swimming pools, space heating & industrial processes.

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