Read fully before proceeding

Installation Instructions for SAM

(Solar Air Modules)

Suggested sequence for installing a SAM System

1. Measure and calculate where you will position the module system on the roof
2. Install roof mounting brackets
3. Install the front rail
4. Install the back telescopic legs
5. Lay back rail on top of legs just below the back brackets
6. Install roof penetration.
7. Mount collectors onto racking system
8. Install Solar PV Panel on racking system
9. Lift entire frame and attach telescopic back legs
10. Select the best located module in line with roof penetration and Install outletflange too module
11. Install ducting and flexible tubing from the module to the roof penetration.
12. Drop wiring from solar panel into the roof space.
13. Cut hole in ceiling or wall for outlet
14. Position ducting from back of roof penetration to back of outlet.
15. Install inline fan as close as practicable to ceiling outlet or duct splitter
16. Install outlet grill into ceiling /wall.
17. Wire in the controller/ thermostat
18. Test the system

Roof Preperation

1. Ensure you have all the parts required for the installation before you start. You will find a list in the box with the brackets.

2. Measure carefully the total length of the unit and select the appropriate position on your roof. Taking note also that your roof penetration for the inlet duct is clear of any roof rafters or battens. This should be a north or west face. If on a flat metal roof you may wish to take full advantage of the suns arc and face the brackets in a NNW position. This is difficult to do on a tiled roof so stick to the face closest to the suns early afternoon position.

Fig 1

For tiled roof see below.For metal roof go to point 14.

3. You will need 2, 3, or 4 rafters to fix too. Choose your bottom row or front hook position and slide a tile up to see where the closest rafter is. Now select as close as possible even spaces for the required length and slide the tiles up at the other positions along that line of tiles. Do the same for the back hooks leaving 2 tiles and sliding the third row tiles up for the rear hooks. The end hooks should be roughly 300mm from the end of the rail. (I.e. if the rail is 3405mm long the distance between the end hooks should be about 2.8 meters).

Fig 2

4. Place the first front bracket on the top of the rafter directly behind the edge of the tile. You will notice that you have enough length either side of the hook to slide the bracket either way so that the flat portion of the hook sits flush on top of the tile valley. (fig 2)

5. Secure the bracket to the top of the rafter with the screws provided. Or use two 12 gauge x 65mm long self-drilling wood screws. (fig 2) DO NOT SPLIT THE TIMBER. You may find that it is easier to pre-drill if the wood is old hardwood or the holes are too close to the edge of the rafter.
6. Repeat this operation for the other brackets frontand rear.

7. Remove the tile slid up above the bracket. On the underside of the tile you will see there is a protrusion that is used to lock the tiles together.

8. Using a small cold chisel and a hammer gently knock the protrusion off that lines up with the bracket(Fig 4).This is doneso that the tile can be slid back intoposition and lies flat with the rest of the tiles.

Fig 4

9. The bottom edge of the replaced tile will not beflush with the bottom edge of that line of tiles, this is OK weather wise (fig 5). However, if you don't like the look of this you may mark the position of the bracket, slide the tile back up and cut a slot the correct distance for the tile to line up with the bottom edge of the row.

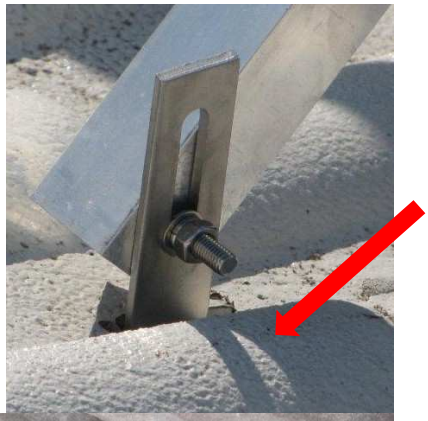

Fig 5

10. Remove the tile where the roof penetration is to go. Slide the two tiles above up out of the way. Cut apiece of batten wood 38mm x 42mm x gap approx and secure this to the existing batten(fig 6).Remove the two side battens and secure a piece of flat steel between the top batten and the bottom one. This will support the sides of the roof mat. (Fig 7)

Fig 6

Squirt silicone over the wood and the steel and along the bottom lip of the tiles below.Place the rubber mat over the hole and secure this to the top piece of wood.(fig 6)Put the tiles on the two sides back. You may want to squeeze more silicone under the lip of these two as an added seal. (fig 8)

Fig 7

The finished penetration should be under the top and side tiles and over the bottom ones.

Fig 8

11. Once all the Hooks aresecured and the tiles replaced you can install the frontrail. You may have to join sections of rail together for the correct length. If so - two rail splice kits are in your pack. Lay the splicedrail on the downside of the hooks,grooved surface up, with track on the narrow surface forward. Make sure that the rail is central to the end hooks.

Fig 9

12. Attach the front leg L connecting pieces with the nut (1)to the top side of the rail.Place roughly in line with the hooks. The connecting legs should be with the single hole vertical towards the hook (fig 7) leaving the slot horizontal for the nut (1).Make sure that the grooves in the nut (1) are facing towards the slot. By tilting the leg you can fit the nut (1) into the track. Ensure the grooves are sitting on top of the lip on the inside of the rail track (fig 11) and loosely tighten the bolt so that you are able to slide the leg up to the hooks when fixing the rail.

Fig 10

13. Attach the connecting legs loosely to the hooks moving eachnut (1) slightly along the track so the connecting leg is parallel to the hook.Now tighten the nut (1) to the track. Lift the rail up so the narrow track points to the sky appx 90° to the ground. Tighten the connecting legs securely. Go to point21.

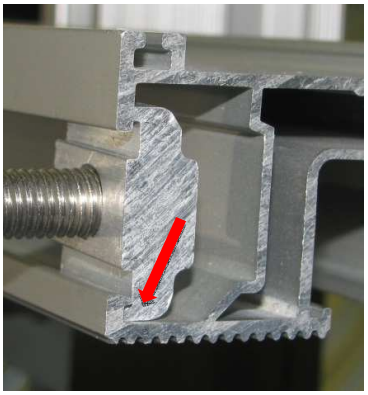

Fig 11

14. See points 1 and 2 above

15. It will be easier to place the screw if you pre dent the metal with a metal punch. The screws will need to be Fastened to a batten. Do not tighten the screw down all the way on corrugated metal sheets, it will flatten the corrugation.
The frontfeet are L shaped whilst the backfeet have two uprights. You will need two battens to secure the feet to. These should be about 900mm apart. Space the feet evenly with the end feet roughly 300mm from the end of the rail.
(See instruction point 3 for example)

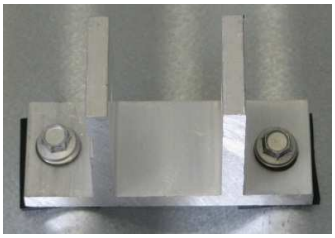

Fig12

16. You will find rubber pads in your kit. These go between the feet and the metal.

17. DO NOT FORGET TO PUT THE RUBBER BETWEEN THE TWO METALS

18. Fix the feet to the ridges of corrugated metal sheets (fig 9) and to the flat valley on klip lock metal sheets. (fig 13)

19. A squirt of silicone under the rubber can be used for extra protection against the weather - if needed.

Fig 13

20. It is now time to make the roof penetration. The ducting is 150mm so cut a round hole about 200mm in diameter. Square will do also. Use a grinder with a metal cutting disk or use tin snips.

21. **If using a grinder be aware of the risk of fire from the sparks inside the roof**

Squirt silicone on the metal where the flange mat is to go and settle the mat onto this bead. Screw metal drill screws or use rivets with a small washer or shoulder to secure mat to metal roof. Silicone again on top of heads and around the flashing.

Fig 14

22. See points 10, 11 and 12 for instructions on how to fit the rails to the feet.

Fitting the modules to the rails

23. In order to keep the collectors stationary, parallel and in position whilst you tighten the end/mid clamps you will need to secure offset arms (see picture) with clamps to the bottom rail.

Offset arms are ***not*** provided with the kit. You may use tile hooks for the same purpose.

24. Use 2 arms for each collector. As multiples of 2 or more collectors need to be compressed together with ratchet straps so no air leaks occur between the joints, you will need the appropriate number of offset arms. (Hint) These arms make the job of fixing the collectors to the rails easy and hassle free. Even with 2 people and no offset armsthe modules are difficult to line up.

Fig 15

25. With one or more collectors only one duct flange is required for the duct work to be connected to the collector/s. **Choose the outlet from the SAM, which will give you the shortest ducting distance to the outlet.** Remove the 250mm square plate from the back of the collector with a Philips head screw driver and replace it with the outlet flange in your kit. The screws you take out with the plate are too small for the flange so use size 8 pan head self-tappers about 15 or 20mm long.

Fig 16

For one single module

26. You are provided with 4 end clamps to secure the collector to the rails. These should be positioned in the track by first screwing the nut (1) onto the bolt about 4 turns. By tilting the clamp end you can fit the nut into the track and let it hang there.

27. Lifting the collector, rest it centrally on the rails and against the offset arms. This will put the collector in the right horizontal position for clamping it to the rails (Fig 17)

28. Slide the end clamps up to the side of the collector and pull upwards on the clamp so that the nut (1) grooves are centrally over the track runners. (See 13 fig 11) You can now tighten the bolt so that the top of the clamp fits over the edge of the collector side rail and on top of the rubber insert.

Fig 17

For 2 or more modules

29. You will notice that some boxesare marked: “Mid” or “Mid Module”. Make sure these collectors are not placedat the ends of the array as the intermediate rubber inserts have been fitted into the side rails to allow for flow of air between the panels. If this has not been done at the factory the inserts provided need to be fitted into the intermediate panels. (Contact supplier for instructions).

30. Attach the required number of offset arms in positions along the bottom rail so that 2 rest under the presumed place of each collector. (see fig 15)

31. Place 2 end clamps, one in each of the rails about 50mm from the endwhere you are placing the first collector. Place the first collector against the offset arms and as in instruction point 27; secure the clamps to the collector and rails.

32. Before putting the next module into position, fit 2 intermediate clamps to the track and side rail of the first collector panel (Fig. 18).Do not tighten yet, just leave them loosely on top of the side rail above the rubber insert as the next panel needs to be slid into position and compressed against the first panel before this is done.

33. Lift and rest the next panel against the offset arms.

34. Assuming you have just 2 modules you now need to wrap a ratchet strap around the two panels leaving the ratchet in a position on top of the modules so that you can tighten the strapping.Compress the intermediate rubber inserts enough so that the intermediate clamps fit over the inside edge of both of the side rails on the two collectors. You will need to have a strap near the top and the bottom of the panels. The strap must be sitting on the ”inside” of the clamps as they need tightening and the other pair of end clamps fitted before you loosen the straps.(Two straps is preferable, but one strap will do. In this case - you do one side first followed by the other).

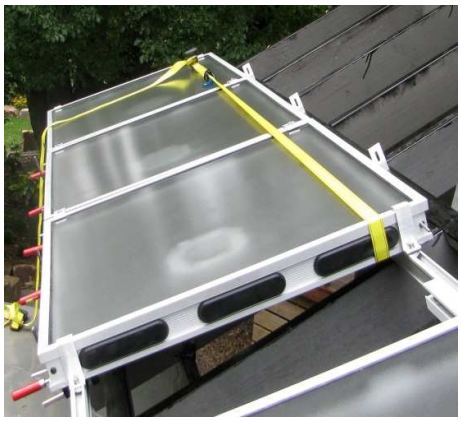

Fig 19

35. Tighten the straps. Liftthe bolts on the clamps so that the nut (1) fits neatly into the lip on the rail (See instruction 13 fig 11) andthe clamp is sitting on the rubber insert and over the side rail and tighten firmly. (Fig 20)

36. Fit the other pair of end clamps and tighten. If there are more panels in the system then intermediate clamps are required for each panel until the last is in place. Follow the same procedure as in 35. Up to 5 panels can be fitted with one pair of 5mtr ratchet straps.

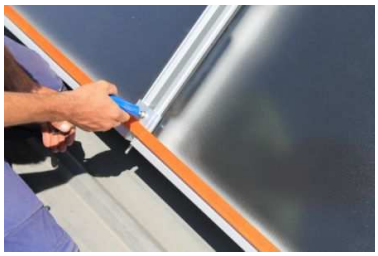

Fig 20

37. You are now ready for mounting the PV Panel.This is a relatively easy operation. Normally you would place the PV panel on the end of the array, which will give you the shortest distance to the thermostat or the possibility of running the cable through the duct. The PV panel may be installed on the racking used for the collectors – or alternatively elsewhere on the roof. For this purpose the PV panel is available with a custom made mounting frame – making the installation very easy. For mounting the PV panel on the rack, fix the L-profile rails loosely to the rack using the predrilled holes and the nuts and bolts supplied. Position the PV panel between the rails, apply silicone to glue the panel in the best position (normally high). Then tighten the L-Profile rails to secure the PV panel’s position, whilst the silicone is drying.

Fig 21

Roof Duct work

38. Estimate the length of semi-rigid aluminium duct you will need to get from the flange at the back of the SAM to the roof penetration flange. Remember that the duct is stretchable and will stretch 2 to 3 times its closed length. After cutting attach PVC tape to the cut ends to stop it

Fig 22

39. Slide one end onto the flange protruding from the outlet plate on the SAM.

Fig 23

40. Cut a length of the grey UV stabilized PVC insulating and protectiveduct sleeve and slide this over the semi-rigid aluminium ducting before you connect the other end of the aluminium sleeve to the roof flange. Connect the sleeves to the roof flange. Use a cable tie over the two sleeves at both ends to secure the sleeves to the flanges.

Fig 24

41. The SAM collectors, PV panel and roof penetration is now complete.

Duct work in roof space

The warm dry air from the SAM system may either be supplied into the building via outlets mounted in the ceiling or down low (e.g. in the wall of a cupboard) to maximise the direct heat impact.

We recommend 150 mm high quality insulated flexibleducting (Fig 25).

Always keep duct work as straight and short as possible for maximum performance.

Fig 25

Go up in the roof space and pick the spot where the outlet(DownJet) is to be located. Keep at least 70mm away from all wood and metal rafters and battens. Push a nail through the plaster to see the centre of the hole from the room below. From below mark the circle to be cut out. (A template is part of the box the Down Jet is packed in). Cut out the plaster and insert the down jet.

Fig 26

42. Attach the two duct flanges to each side of the fan with the screws provided.

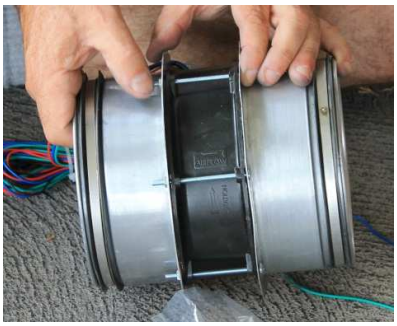

Fig 27

43. Go back into the roof/ceiling space with your fan, butterfly valve, duct sleeves and PVC duct tape.

44. The fan is designed to suck not push so for maximum airflow it is important to place the fan as close as possible to the outlet. The fan is marked with the direction of flow. Arrow towards the outlet. Use the flanges mounted on the fan to attach thefan to outlet with approx. 400 mmacoustic flexible duct for good performance with minimal fan and airflow noise. You may tape the duct to the fan – and also use the tape to ensure no air escapes from the joints.

Fig 27

45. The Butterfly valve is used to prevent warm air from escaping the room when the fan is not in use. The butterfly valve may be inserted in the duct where the duct is in a horizontal position - either before or after the fan. Valve opens towards the air outlet.

Fig 28

46. You should be able to secure the flexible duct to the flange on the underside of the roof penetration. If you can't you will need to flair another piece of aluminium duct and attach this to the roof penetration flange first. Connect thereafter the duct work together.

47. The fan wiring and the wires from the PV panel need to be positioned in the wall, where the thermostat is to be operated. Make sure the thermostat is not located directly above or below the warm air outlet. Secure the backing plate of the thermostat to the wall using a secure fastening method such as butterfly clamps.

48. Wiring of the thermostatic controller and fan

Wiring up the SAM system is simple.

Analogue Thermostat

- Connect the positive(Red) wire from the PV panel to terminal #2
- Connect thepositive Red) wire from the heating fan to terminal #3
- Connect the positive (red) wire from the cooling fan (if applicable) to terminal #4)
- All negative wires (Black) are joined (but not to a terminal)

The blue and green wires are not used for the analogue thermostat.

Please notice: There is an On/Off switch on the side of the thermostat.

Digital Thermostat

First – connect the red wire from the PV panel to the positive terminal and the black to the negative terminal.

The wires from the fan are connected as follows:

- Red into the terminal marked: High
- Green into the terminal marked: Med
- Blue into the terminal marked: Low
- Black into negative terminal together with the black from PV panel

If another fan is connected for cooling/heat extraction purposes

Only the red and black wires are used (one speed)

Red into the terminal marked: Cool

Black into negative terminal together with the black from PV panel (and main fan).

If the sun is shining and provides enough power to operate the fan(about 10 volt with load) and the temperature inside the house is lower than the set temperature- the SAM System should now be operating - and besupplying warm dry air into the building.

Congratulations! You have now completed the SAM installation.