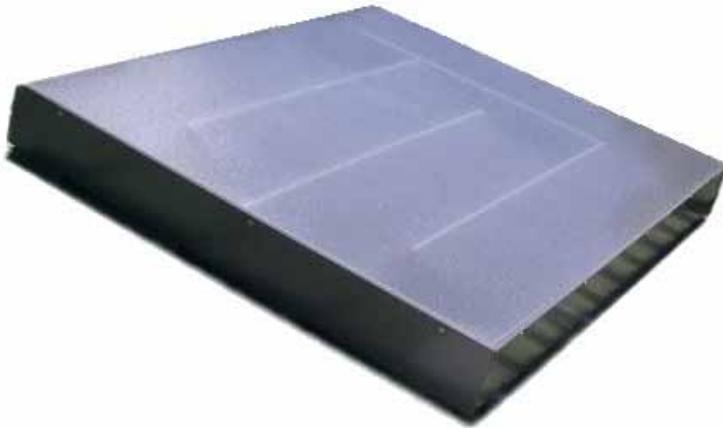


Installation Guide



Version 1.1

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Caution

No Liability is assumed for any damage caused by improper installation.

Notice

The information in this manual is subject to change without notification. Additional pages may be inserted in future editions. The user is asked to excuse any technical inaccuracies or typographical errors in the present edition.

No responsibility is assumed if accidents occur while the user is following the instructions in this manual.

This manual, any copyrightable subject matter sold or provided with or in connection with the sale of the Sun Lizard products are protected by copyright. All rights are reserved. Copying or other reproduction of all or part of this manual, any copyrightable subject matter without the prior written consent of Alternative Fuels & Energy Pty Ltd is prohibited. Any copies made of all or part of this manual, any copyrightable subject must contain the same copyright notice as the material from which the copying is done.

1. Introduction *Congratulations on your purchase of a Sun Lizard Solar Heat Collector and reducing your contribution to Australia's greenhouse gas emission.*

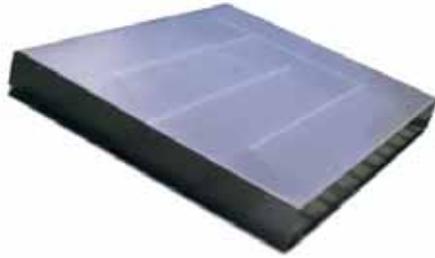
The Sun Lizard has been designed to install quickly and easily to most buildings. Prior to commencing the installation of the Sun Lizard, please read the following installation guide carefully and if in doubt, contact your local distributor or installer.

2. Handling & Unpacking Carefully remove the items from the boxes. Please take note of these general precautions.

- Each collector weighs approximately 60kg. It is important that at least two strong persons are available to lift and handle the systems on site.
- When handling the collector, take extreme care, as the glass is fragile.
- Avoid placing the panels on any uneven surfaces
- Do not twist or bend the collector; always lay the collector on a flat surface.
- When moving the collector, ensure that it is lifted by its side and not by the corners.
- Do not place tools or other heavy objects on the glass even with the protective cover in place. Glass breakage during installation or through negligence will not be covered under warranty.
- **Throughout the installation of the Sun Lizard, the installer should ensure that the Product Specifications are not compromised.**

3. Inventory Checklist

Check that nothing is missing against the list of shipped components below:



Typical Installation of Sun Lizard Dual Collector System

- 2 x Solar Heat Collectors
- 4 x Square Tube (located under the each collector)
- 2 x L Section Roof Mounting Brackets

Additional components supplied with Sun Lizard if required and ordered for the following roof types:

South Facing Pitched Roof with Ceiling Cavity

- 2 x NS Roof Frames

East and West Facing Pitched Roof with Ceiling Cavity

- 2 x NS Roof frames

East or West Facing Pitched Roof with Ceiling Cavity

- 2 x EW Roof Frames
- 2 x NS Roof Frames

Flat or South Facing Roof with no Ceiling cavity

- 2 x NS Roof frames

North Facing Pitched Roof with no Ceiling Cavity

- 2 x NS Roof frames

East or West Facing Pitched roof with no Ceiling Cavity

- 2 x EW Roof frames
- 2 x NS Roof frames

East and West Facing Pitched Roof with no Ceiling Cavity

- 2 x EW Roof frames

If there are any missing parts, please contact AFE on (03) 9722 9596.

Where possible, please recycle all packaging. If you have received a number of Sun Lizards, your local distributor may collect packaging for reuse. Unfortunately, the cost to ship empty packaging back exceeds the cost of new packaging unless it is done in bulk. We have tried to use recycled materials, offcuts and recyclable components to reduce waste.

4. Important Notes Before Installing a Sun Lizard

It is recommended that a qualified tradesman be used to install the Sun Lizard Heat Collector to:

- Ensure that the roof structure is capable of withstanding the additional weight of the Sun Lizard.
- Complete the installation and ensure that the Sun Lizard is correctly mounted to withstand any extreme local conditions.
- Complete all roof penetrations to meet any regulations.

While it is possible for a home handyman to do the installation, local regulatory requirements may necessitate the use of a qualified tradesman. While no warranty will be void if a qualified tradesman is not used, no responsibility for roof leaks or other possible damage through incorrect installation will be entertained.

To avoid damaging any of the components, it is recommended to assemble the Sun Lizard on the roof as part of the installation procedure. Once the solar collector is mounted and fixed, the remaining components can be easily assembled. If assembly is impossible on the roof of the building, then assembly should occur prior to installation.

We recommend laying out all the components in a dummy assembly to ensure you are familiar with how they will all fit together. Do this on the ground first and then on and in the roof. This is also useful to ensure you keep ducting to a minimum and have all the components required prior to commencing installation.

Note that the Colorbond finish of the Sun Lizard may have a plastic film to prevent scratches during manufacture. In some cases there may still be a film attached to the outer panels. Once the Sun Lizard is securely in place, this film can be removed.

5. Selecting a Location for the Solar Heat Collectors

The Sun Lizard should be installed on the roof of your building as close as possible to the following conditions:

1. The most effective direction to install the Sun Lizard is between 5 degrees East and 10 West of due North. Installation outside of this orientation will degrade performance to some degree. Local conditions may require minor changes to this ideal.
2. If no roof surface faces North, then an Elevation Frame may need to be used to achieve the optimum performance. If you have not purchased additional frames for your specific roof type, please contact your local distributor or contact us direct to aid you in the selection of the appropriate accessories.
3. The Sun Lizard requires the sun to work. If trees shade your roof during the day, the Sun Lizard will not be as effective, or in extreme cases, it may not work at all. Ensure that minimal shading occurs on the roof (where the proposed location of the Sun Lizard is to be) during the day. The elevation of the sun and therefore any shading will vary throughout the year and is different in various parts of Australia. If you are unsure, please talk to your local distributor or contact us direct.
4. The Solar Heat Collectors will need to be mounted at an angle that is suited for your location to ensure the Solar Heat Collectors obtain the maximum solar gain. Please refer to the map and tables below to determine the optimum tilt angle (elevation from horizontal). If unsure, please talk to your local distributor or contact us direct.



Latitudinal Range	Solar Heat Collector		PV Panel		Examples of Major Centers
	Optimum Elevation	Elevation Range	Optimum Elevation	Elevation Range	
15°-20°	5°S-0°	15°S-10°N	15°N - 20°N	5°N-30°N	Cairns
20°-25°	0°- 5°N	10°S-15°N	20°N - 25°N	10°N-35°N	Mackay Rockhampton
25°-30°	5°N - 10°N	5°S-20°N	25°N-30°N	15°N-40°N	Brisbane, Gold Coast, Geraldton
30°-35°	10°N-15°N	0°-25°N	30°N-35°N	20°N-45°N	Port Macquarie, Newcastle, Gosford, Sydney, Adelaide, Perth
35°-40°	15°N-20°N	5°N-30°N	35°N-40°N	25°N-50°N	ACT, Melbourne, Ballarat, Bendigo, Geelong
40°-45 °	20°N-25°N	10°N-35°N	40°N-45 °N	30°N-55°N	Devonport, Launceston, Hobart

6. Installing the Frame

EW Frame

Notes: the longest section of tube sits flat on the roof with the shortest section being the vertical/upright. On the Elevation Frame NS (the smaller frame kit), the longest section sits on top of the Elevation Frame EW.

Pic of EW Frame assembled

For a tiled roof

- (a) Position the Elevation Frame EW into the correction position.
- (b) Check that the orientation is correct, by adjusting the pitch of the frame to produce a level surface. To get the correct angle before cutting the tube, place the assembled frame on the roof overhanging the side and then using a spirit level, get the top of the frame horizontal, then mark the vertical tube where it needs to be cut. Cut the tube and bolt together using the hinge and bolts supplied.
- (c) Using the four frame-mounting brackets or other appropriate fixing components, fix the frame to the roof. Ensure that the structure is secure. The frame comes with two spacers to ensure that the two sides of the frame are correctly positioned in relation to each other. Use the spacers at the base of the frame first and once the frame is secured, screw the spacers to the top of the frame to brace and space the frame prior to locating the Elevation Frame NS on top. You can use the spacers to temporarily hold the frame together while you position it on the roof. Remove tiles and confirm that the brackets can be screwed/bolted to roof joists, mark the bracket position on the frame, and then drill bolt holes. Fix the brackets to the roof joists and then bolt the frame to the brackets.
- (d) Once secure, the frame should be checked again to ensure a level surface at the top of the frame. Check with a spirit level.
- (e) Now mount the Elevation Frame NS onto the level top surface of the Elevation Frame EW. The longest

Depending on the orientation and pitch of your roof, your Sun Lizard may come with an Elevation Frame. In the previous section, "selecting your location", you would have chosen your installation location and also acquired the appropriate accessories to complete the installation.

Refer to the following notes to complete the preparation for the installation of the solar collector, if your installation requires the use of an elevation frame. If not, proceed to step 13.

Prior to fixing the Solar heat Collector or any frames, keep in mind that the ducting or pipe will bolt onto the rear of the Solar Heat Collector. If there is a ceiling cavity, this ducting will go into the ceiling cavity using duct flashing. You need to make sure when locating an appropriate position that the roof penetration and ducting will not be obstructed by roof battens or other structural beams. If you require a frame, do the frame first.

section sits on top of the EW frame. The mounting holes at the end of each frame section should match and both frames should be secured to each other at each corner.

- (f) Adjust the Elevation Frame NS so that it creates a pitch appropriate to your location (see chart 1) and faces North (see selecting a location). Typically this angle will be between 15 and 20 degrees. The predrilled holes in the Elevation Frame NS vertical/upright section are at 5 degree intervals starting at 10 degrees. Select the correct hole and cut off just above the hole on both upright sections.
- (g) The installation is now ready for the mounting of the Solar heat Collector.

Pic of NS Frame on EW Frame

For a metal roof.

- a) Position the Elevation Frame EW into the correction position.
- b) Check that the orientation is correct, by adjusting the pitch of the frame to produce a level surface. To get the correct angle before cutting the tube, place the assembled frame on the roof overhanging the side and then using a spirit level, get the top of the frame horizontal, then mark the vertical tube where it needs to be cut. Cut the tube and bolt together using the hinge and bolts supplied.
- c) Fix the frame to the roof with the appropriate bolts and/or brackets, in at least six locations. Ensure that the structure is secure. The frame comes with two spacers to ensure that the two sides of the frame are correctly positioned. Use the spacers at the base of the frame first and once the frame is secured, screw the spacers to the top of the frame to brace and space the frame prior to locating the Elevation Frame NS on top.
- d) Once secure, the frame should be checked to ensure a level surface at the top of the frame. Check with a

- spirit level.
- e) Now mount the Elevation Frame NS onto the level top surface of the Elevation Frame EW. The longest section sits on top of the EW frame. The mounting holes at the end of each frame section should match and both frames should be secured to each other at each corner.
 - f) Adjust the Elevation Frame NS so that it creates a pitch appropriate to your location (see chart 1) and faces due North (see selecting a location). Typically this will be between 15 and 20 degrees. The predrilled holes in the Elevation Frame NS vertical/upright section are at 5 degree intervals starting at 10 degrees. Select the correct hole and cut off just above the hole on both upright sections.
 - g) The installation is now ready for the mounting of the Solar heat Collector.

Using an Elevation Frame NS

Note: The Elevation Frame NS can be used to increase or decrease the angle of the solar heat collector. To increase the angle the vertical/upright section is placed to the south, to decrease the angle (a very steep northern roof) the vertical/upright is placed to the north.



For a tiled roof.

- a) Position the Elevation Frame NS into the correct position facing North (see selecting a location).
- b) Using the four frame-mounting brackets or other mounting brackets, fix the frame to the roof. Ensure that the structure is secure.
- c) Once secure, adjust the Elevation Frame NS so that it creates a pitch appropriate to your location (see [chart 1](#)) and faces due North (see selecting a location). Typically this will be between 15 and 20 degrees. The predrilled holes in the Elevation Frame NS vertical/upright section are at 5 degree intervals starting at 10 degrees. Select the correct hole and cut off just above the hole on both upright sections.
- d) The installation is now ready for the mounting of the Solar Heat Collector.

For a metal roof.

- a) Position the Elevation Frame NS into the correct position facing North (see selecting a location).
- b) Fix the frame to the roof with the appropriate bolts, in at least six locations. Ensure that the structure is secure.
- c) Once secure, adjust the Elevation Frame NS so that it creates a pitch appropriate to your location (see [chart 1](#)) and faces North (see selecting a location). Typically this will be between 15 and 20 degrees. The predrilled holes in the Elevation Frame NS vertical/upright section are at 5 degree intervals starting at 10 degrees. Select the correct hole and cut off just above the hole on both upright sections.
- d) The installation is now ready for the mounting of the Solar Heat Collector.

7. Installing the Solar Heat Collectors

Connecting to a frame

- a) Undo the bolts at each end of the Top Hat section underneath the solar heat collector. Inside is square tube which is predrilled. Slide all four pieces of tube out to the second hole and refit bolts.
- b) Making sure the collector is facing the correct direction (the inlet/outlet cover plates with 6 nuts are on the south side) slide the collector and the square tube into the frame hinges on the northern side and fit bolts.
- c) Standing at the rear of the solar heat collector, lift the collector until the rear is high enough to bring up the vertical/uprights of the frame and then connect the hinge to the square tube.
- d) Tighten and check all bolts
- e) Remove 6 nuts at rear of solar heat collector and take off cover plates.
- f) Fit inlet/outlet adapter and replace nuts and washer.
- g)



Use extreme care to lift the 60Kg Solar Collectors onto the roof. Use an elevator or lift if available or at least 4 men and enough ropes and ladders to ensure safety at all times. Mount the Solar Collector to the roof of your building (or if using an elevation frame, to the frame itself - see below).

With a tile roof, use the mounting brackets (if supplied) or metal strapping tape to slide under the roof tile, and fit to a roof batten.

With a metal roof, mount the Solar Heat Collector directly to the roof, ensuring that the mounting bolts are also bolted to the roof battens or strapping tape is secured to the roof and collector.

Once the Solar Collector is mounted, ensure that it is secure enough to withstand any extreme local weather conditions. It is the responsibility of the installer to ensure that the Sun Lizard is correctly installed and secured to the roof of the building so that it will withstand all weather conditions.

Once attached to the roof, the inlet and outlet vents are connected to the existing inlet pipe for the heater (see diagram 3). If using external air, the heat collectors will have adapters to filter any insects or stop birds from getting into the heating system. If using return air, then the connections are made in a series of parallel connections (see diagram 4) Insulated ducting should be used and for external pipe it should be insulated and weatherproofed.

8. Finishing the Job

Once all the components are connected and tested, the ducting and roof penetrations need to be sealed and checked. If any external pipe or ducting is used it needs to be insulated and/covers with another layer to prevent heat loss.

9. Important notes on Installation

- The 150mm round flexible duct has an area of 17663 mm square ($\text{Pi} \times \text{Radius} \times \text{Radius} = 3.14 \times 75 \times 75$)
- But a circular duct has a smaller surface area than any rectangular duct, so allowance needs to be made for this as there is more resistance in rectangular duct.
- If you want to fit in a 90mm stud wall, then you need to allow for variation in timber thickness.
- So a duct with a thickness of 85mm would be fine.
- To calculate the width then is $\text{area}/\text{depth} = 17663/80 = 220$.
- 220 is therefore the minimum width of the duct, but you need to compensate for resistance, so at least a minimum width of 300mm.
- The other factor to consider is the vent registers.
- Most of these are 300mm wide where they connect to the duct and 330mm wide on the face, so in order to fit these to a duct you need to make the duct at least 330mm wide.
- It is possible to get square vent registers that measure 150x150mm which are obviously large enough.
- This then means the duct can be 250 wide and 85mm deep.
- Finally, if you are going from circular duct to rectangular duct, then the adapter needs to also not restrict the airflow.
- If the duct is outside the wall (not in the cavity), then make the depth at least 100mm to allow some depth for the register to fit.

You can pump the air into the room via a ceiling vent (not located near the inlet air vent) - this should be done as a last resort, as it is not as effective as heating at floor level, especially if the ceilings are over 2.4 metres (8').

10. Handy Tips

- Flexible ducting if used, should be stretched tight. If left loose this creates more resistance and reduces air flow.
- The ducting should not be compressed to fit through gaps or taped to anything which may cause the ducting to be compressed.
- Try to avoid 90 degree or sharper bends - ideally have 2 x 45 degree bends.
- If possible, use metal or polypropylene pipe made to measure. Although more expensive, it won't deteriorate and will allow optimum airflow. Use short lengths of flexible ducting to connect longer metal pipe or where it is too difficult to get metal fittings installed.
- We recommend using at least R1.0 (preferably R1.5) insulation around the outlet ducting to prevent any heat loss.
- If the ductwork is installed within a cavity wall, the installer must ensure the same volume of air as the 150mm diameter ducting is provided and that the cavity **MUST BE** airtight. (See box ducting information on previous page), but 90mm x 250mm approximates the same volume of air and airflow and should be the minimum size.

11. Warranty

Solar Collector - 20 years

Accidental or deliberate damage is not covered.
Incorrect installation may void the warranty.

12. Technical Help

The Sun Lizard is designed to give years of maintenance free service. If there are any problems please check the web site for technical help. The latest troubleshooting information is available or you can contact a technical expert to give advice.

13. User Guide

The Sun Lizard is designed to provide a solar solution to heating and cooling your home.

To optimise your benefits from the Sun Lizard please note the following will help you get the most from your investment.

Make your home energy efficient

- Insulation ceiling, walls and floor
- Seal doors and windows
- Use curtains and pelmets on windows
- Allow passive solar gain if possible
- Provide external shading in summer

Zone your home when practical

- Close doors to rooms not being used when you are home
- During the day when the Sun Lizard is working leave doors open to spaces you want heated to allow warm air to penetrate effectively, but close doors in the evening to retain heat in the living spaces

Work with the natural environment

- Wear appropriate clothing for the weather conditions
- Check the weather forecast so you set the Sun Lizard to the correct setting for the time of year or type of day
- Use external shading or allow passive solar gain at the relevant times of year
- Allow cross ventilation in summer when cool breezes replace the hot air

Image	Description	Document and page no	Page	Quality
Sun Lizard Logo	Sun Lizard Logo	Collector Installation Guide	1	High
HC Picture	Picture of HC	Collector Installation Guide	1	High
HC Inventory Pic	Picture of all components laid out	Collector Installation Guide	5	High
Australia Map	Map showing latitude	Collector Installation Guide	7	High
EW Frame	EW Frame	Collector Installation Guide	9	High
NS Frame on EW Frame	Show how they fit together	Collector Installation Guide	10	High
NS Frame	Assembled	Collector Installation Guide	11	High
Pics of connection	Step by step pics	Collector Installation Guide	13	High
Diagram of duct connections	Example of one type of connection	Collector Installation Guide	13	High
Diagram of other connection	Another example	Collector Installation Guide	13	High