



Sterling Power Products

THERM : Air Conditioner Range

Handbook

THERM2200



www.sterling-power.com
www.sterling-power-usa.com
Warranty (2 years return to factory)



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Sterling use of language You'll note throughout the reading of this manual that a lot of the text may be considered cordial and more friendly than perhaps is the norm for technical manuals. We have attempted to balance accessible writing with technical accuracy. We believe this will allow it to be most easily read and understood- as some overly technical manuals can be opaque, unreadable and painfully boring to installers- who may then just end up ignoring them entirely.

Manual preface Please take your time to read and fully understand the contents of this Handbook. These guidelines are developed with your safety and the products performance in mind and failure to follow or understand these guidelines may lead to voiding the product warranty or even leading to damage or injury for you or your setup.

If you are unsure of any step or guideline then please consider reaching out to Sterling via our web contact form or our phone service and we shall offer our support.

THERM Air Conditioning Summary This item is an air conditioning/thermal control unit designed to be roof-fitted. It is designed to fit comfortably into a small skylight install, or to be easily installed into custom-cut holes. It is also designed to operate on either 12V or 24V batteries - and this is dictated by model. Do not use a 12V unit on a 24V battery bank and vice-versa. Double check your model now before continuing.

How to use this manual This manual must be read throughout before installing this electronic device. Do not lose these instructions - keep them safe. The most up to date instructions can be found on sterling-power.com. Please refer to the latest instruction manual before contacting Sterling. At Sterling, we endeavour to include all of the product information that we can think of into the manual.

To easily browse the manual, you'll find 'chapters' or rough page summaries at the top of each page and at the bottom right of each page. Then, down the left hand side of each page you will find individual sections of each page- followed by the actual paragraph writing to the right of each section. If you are looking for explicit information and don't know where to find it, flick through until the bottom right 'section' lines up with what you want to find, scan the left hand summary to find the relevant area- then read to the right.

Being safe Installation of the electronic device must be carried out by qualified and trained personnel only. The personnel must be familiar with the locally accepted guidelines and safety measures. Your safety is Sterling's top priority. Please follow all precautions to keep yourself safe. If you believe your unit requires repair then please contact Sterling or your distributor. Do not attempt to service the unit yourself.



SAFETY AND LEGAL LEGAL GUIDELINES

Warranty and Terms

Your 100 % satisfaction is our goal. We realise that every customer and circumstance is unique. If you have a problem, question, or comment please do not hesitate to contact us. We welcome you to contact us even after the warranty and return time has passed.

Each product manufactured by Sterling Power comes with at least a 2 year limited factory warranty. Certain Products have a warranty period of time greater than 2 years. Each product is guaranteed against defects in material or workmanship from the date of purchase. At our discretion, we will repair or replace free of charge any defects in material or workmanship that fall within the warranty period of the Sterling Power product. The following conditions do apply:

- The original receipt or proof of purchase must be submitted to claim warranty. If proof cannot be located a warranty is calculated from the date of manufacture.
- Our warranty covers manufacture and material defects. Damages caused by abuse, neglect, accident, alterations and improper use are not covered under our warranty.
- Warranty is null and void if damage occurs due to negligent repairs.
- Customer is responsible for inbound shipping costs of the product to Sterling Power either in the USA or England.
- Sterling Power will ship the repaired or warranty replacement product back to the purchaser at their cost.

If your order was damaged in transit or arrives with an error, please contact us ASAP so we may take care of the matter promptly and at no expense to you. This only applies for shipping which was undertaken by our company and does not apply for shipping organised by yourself. Please do not throw out any shipping or packaging materials. All returns for any reason will require a proof of purchase with the purchase date. The proof of purchase must be sent with the returned shipment. If you have no proof of purchase call the vendor who supplied you and acquire the appropriate documentation.

To make a claim under warranty, call our customer care check telephone numbers on www.sterling-power.com or www.sterling-power-usa.com. We will make the best effort to repair or replace the product, if found to be defective within the terms of the warranty. Sterling Power will ship the repaired or warranty replacement product back to the purchaser, if purchased from us.

Please review the documentation included with your purchase. Our warranty only covers orders purchased from Sterling Power. We cannot accept warranty claims from any other Sterling Power distributor. Purchase or other acceptance of the product shall be on the condition and agreement that Sterling Power USA LLC and Sterling Power LTD shall not be liable for incidental or consequential damages of any kind. Some states may not allow the exclusion or limitation of consequential damages, so, the above limitations may not apply to you. Additionally, Sterling Power USA and Sterling Power LTD neither assumes nor authorizes any person for any obligation or liability in connection with the sale of this product. This warranty is made in lieu of all other obligations or liabilities. This warranty provides you specific legal rights and you may also have other rights, which vary from state to state. This warranty is in lieu of all other, expressed or implied.

Copyright and Plagiarism

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Liability

Sterling Power can not accept liability for:

- consequential damage due to use of this device
- possible errors in the manuals and the results thereof

Device Modification

Please do not modify the device unless you have been instructed to do so by Sterling Power directly. Product modification shall be done at Sterling when needed. Warranty shall be voided if personal attempts are made to modify the device without Sterling's approval.

Installation Laws

The installer and the user are liable for ensuring the item is properly and legally installed and suitable for use in whatever territories and conditions it is expected to operate in. Improper use of the item, improper understanding of the item, improper installation of the item etcetera do not reflect on Sterling or make Sterling liable.



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SAFETY AND LEGAL SAFETY GUIDELINES

Product Guidelines

Your Sterling Power product should only be utilised for its designated purpose. If you do not feel capable to install an AC item correctly - DO NOT. If there are any doubts about the install - get it professionally installed.

Ensure that the mains supply and battery leads are disconnected before transporting or moving the unit. No liability can be accepted for damage in transit once equipment has been unpackaged. Store the product in a dry environment, between -20°C to 60°C .

Transport and Storage

Refer to the battery manufacturer's manual for information on transportation, stowage, charge rates, recharging and battery disposal for your batteries. Sterling cannot be considered an authority on your batteries.

General Maintenance

The device must be switched off during maintenance and all cables removed from the direct feed to or from the unit. It must also be protected against unexpected switching off. Remove battery connections and ensure unit is off. If repair is required, only use original parts. Unauthorised attempts to repair Sterling units will lead to the warranty being voided. Only someone with adequate understanding of electronics and the unit itself should attempt a repair. Ensure your connections are good and clean and aim to protect your unit from humidity and water ingress. All contacts should be checked intermittently. Damage that occurs from improperly maintained contacts are at fault of the user.

Safety Precautions

Electrical appliances can be heavy. Please do not lift heavy units unassisted. Ensure that your product is correct for your system, voltage thresholds are crucial. Orientation is not critical to unit function, however may affect water ingress rating. Install device in a well ventilated space for cooling purposes. Do not expose the unit to snow, rain, water, spray, condensation, pollution etc, unless it is a waterproof unit. If it is a waterproof unit, only expose it to situations it is correctly rated for. Do not cover or obstruct the ventilation. Device connects to common negative. Common negatives must be earthed. In case of fire, use fire extinguisher equipment suitable for electrical fires. Avoid all possibilities of reverse polarity or short circuiting. Check cabling and connections frequently and ensure the connections are sufficient. Always protect DC cabling with the appropriate fusing. Ensure the unit is adequately and safely mounted to prevent displacement and damage. Always use a professional to install electrical products. Ensure the product is correctly set up for your battery. Keep out of reach of children

WARNING : Do NOT remove the panelling to inspect the internals unless expressly told to by Sterling. This is not a product designed to be user-serviced.

WARNING : Do NOT use the device in situations where there is danger of gas / dust / vapour explosions, or around potentially flammable produce.

The THERM is a heavy unit. Do not install alone, and do not install if you do not feel comfortable with the full install process. Do not lift unassisted.

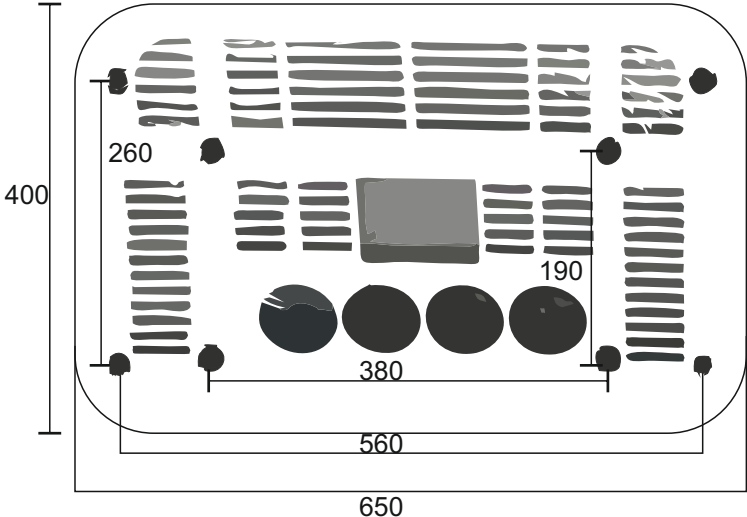
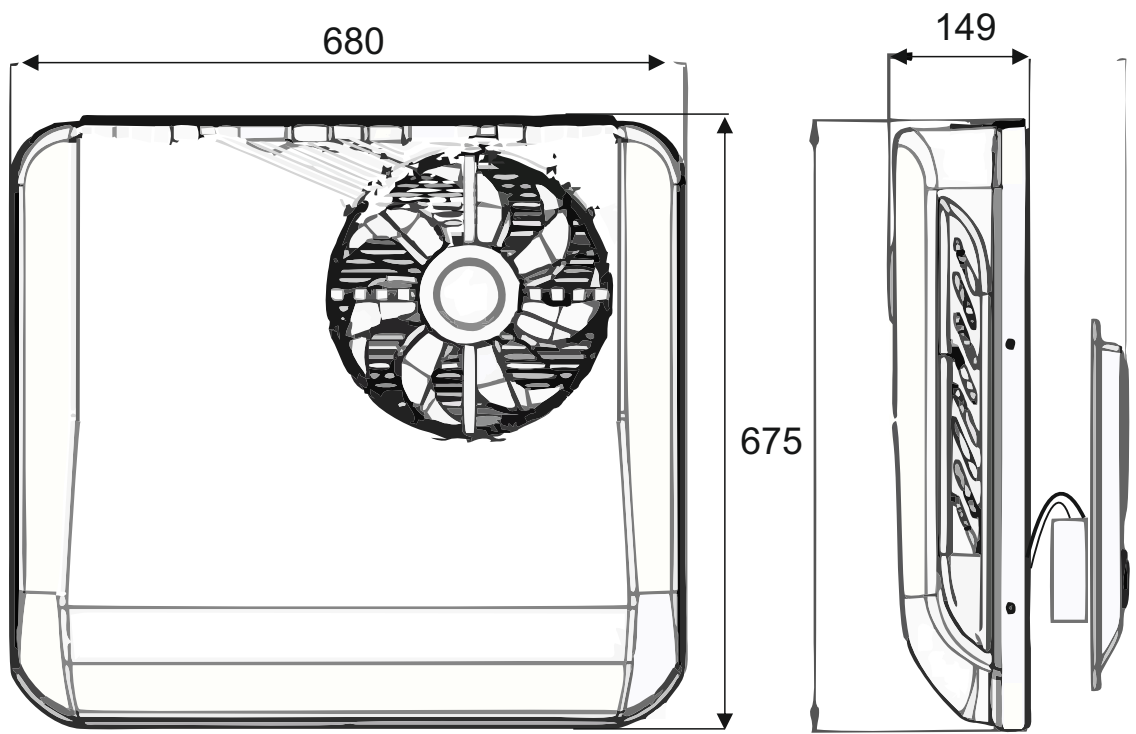


SPECIFICATIONS SPECIFICATIONS DATA SHEET

Specifications and technical data

Rated Cooling Capacity (Not draw- but the actual cooling effect)	600W minimum cooling capacity, 2200W peak cooling capacity	
Operating Voltage	DC - 12V	DC - 24V
Current draw	30A-60A	15A-30A
Power	300W-700W	
Volume of air moved	450m3/h over four outlets	
Operating modes	Fan mode / Eco mode / Hi-Power mode	
Refrigerant	R134A/500g +/- 20g	
Dimensions	680 * 675 *149	
Weight	19.8kg	
Intended use	General use, designed to fit as a roof mounted air conditioning system on boats and recreational vehicles, designed to fit into smaller 400*200mm skylights easily. Minimum sunroof size is 400*200mm. Maximum is ~550*350mm.	
Minimum skylight hole	400*200mm	
Maximum skylight hole	550*350mm	
Integrated protections	Low voltage and high voltage protection for the DC circuit, detects leaks automatically.	
Intended battery banks	Minimum ~100Ah. Recommended to not run off of your starter battery, to insulate you against accidentally discharging the battery and not being able to get back in motion.	
General advice	LiFePO4 leisure batteries are recommended due to their high cycle life and full depth of discharge capabilities. Ensure your charge system is suitable for Lithium batteries. Ensure that if you make modifications to the cable that the contacts are sound throughout.	

SPECIFICATIONS FOOTPRINT AND SPEC SHEET



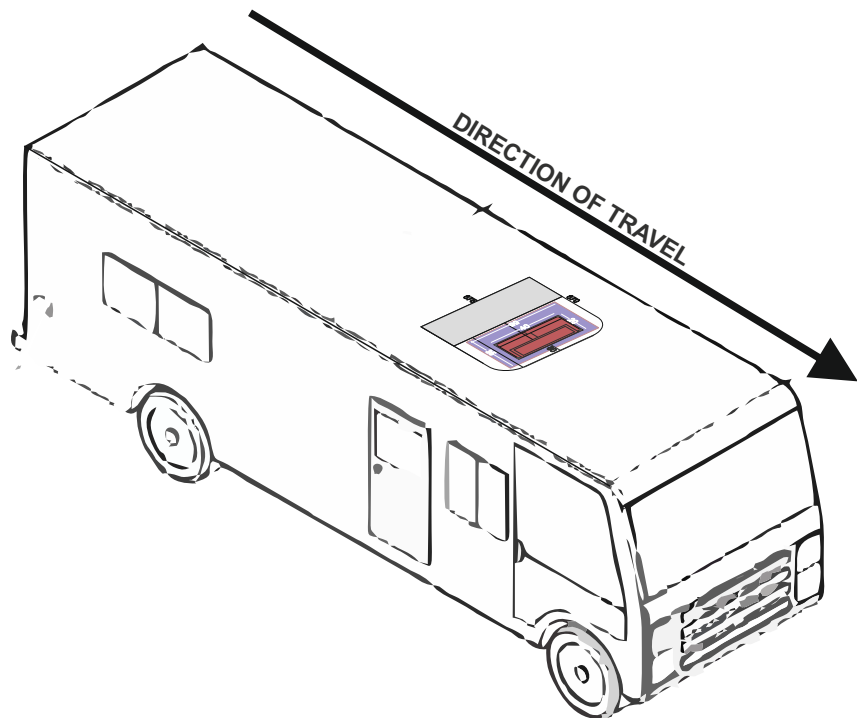
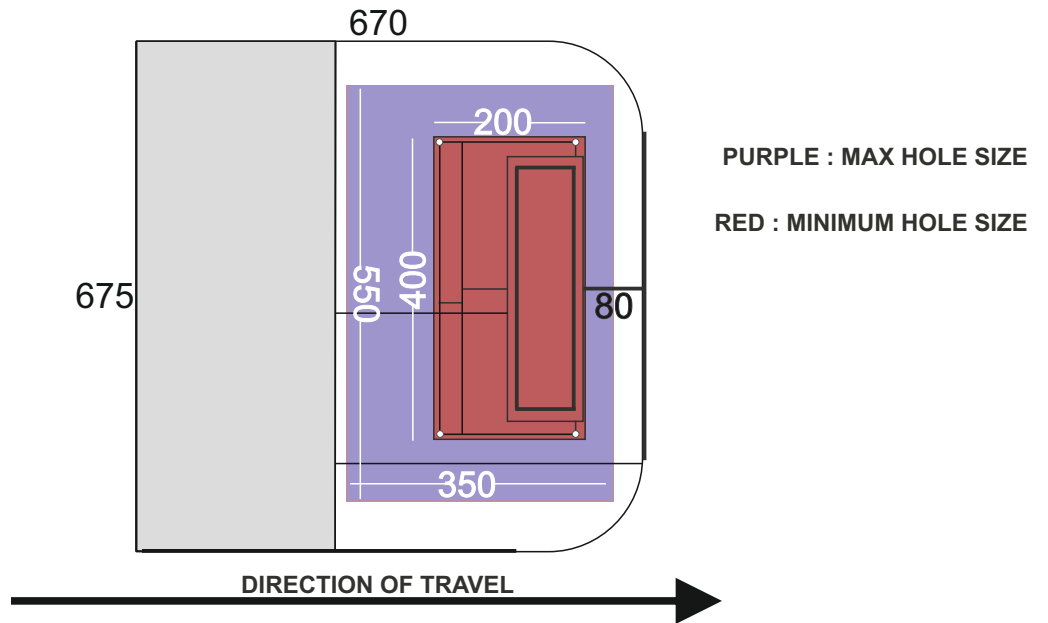
SPECIFICATIONS ROOF/SKYLIGHT VENTILATION

Skylight measurements

The intended skylight measurements/ventilation duct for the THERM2200 is a range between
 MIN : 400 * 200
 MAX : 550 * 350

The long axis is down the 'side' of your vehicle, rather than the side that if extended would bisect it. The following diagrams should make this clearer.

If your skylight hole does not fit within that range, the skylight will need a frame constructed to limit it to the above range, or additional space will need to be cut in order to make it fit.



FIRST OPENING ITEM INVENTORY

Contents of the 2200:

When you open up the Therm 2200 for the first time, you'll be welcomed with almost everything (apart from tools) that you'll need to undertake the install, as photographed on our steel worktable. I'll list everything (apart from the fairly obvious massive air conditioning unit, and its associated panel) for easy confirmation. There's also one other part which is important that you do not throw away. We'll get to that in a moment.

1) Technically I'm cheating here, because this set of 4.5m DC cable is part of the THERM2200.

2) Digital screen for configuration and understanding

3) Malleable foam air-seal with self-adhesive layer.

4) 2x Stabilising legs for the Therm2200 (to minimise vibration noise)

5) A collection of 8 nuts that we will use for installation shortly.

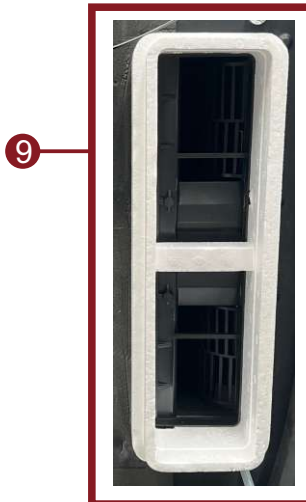
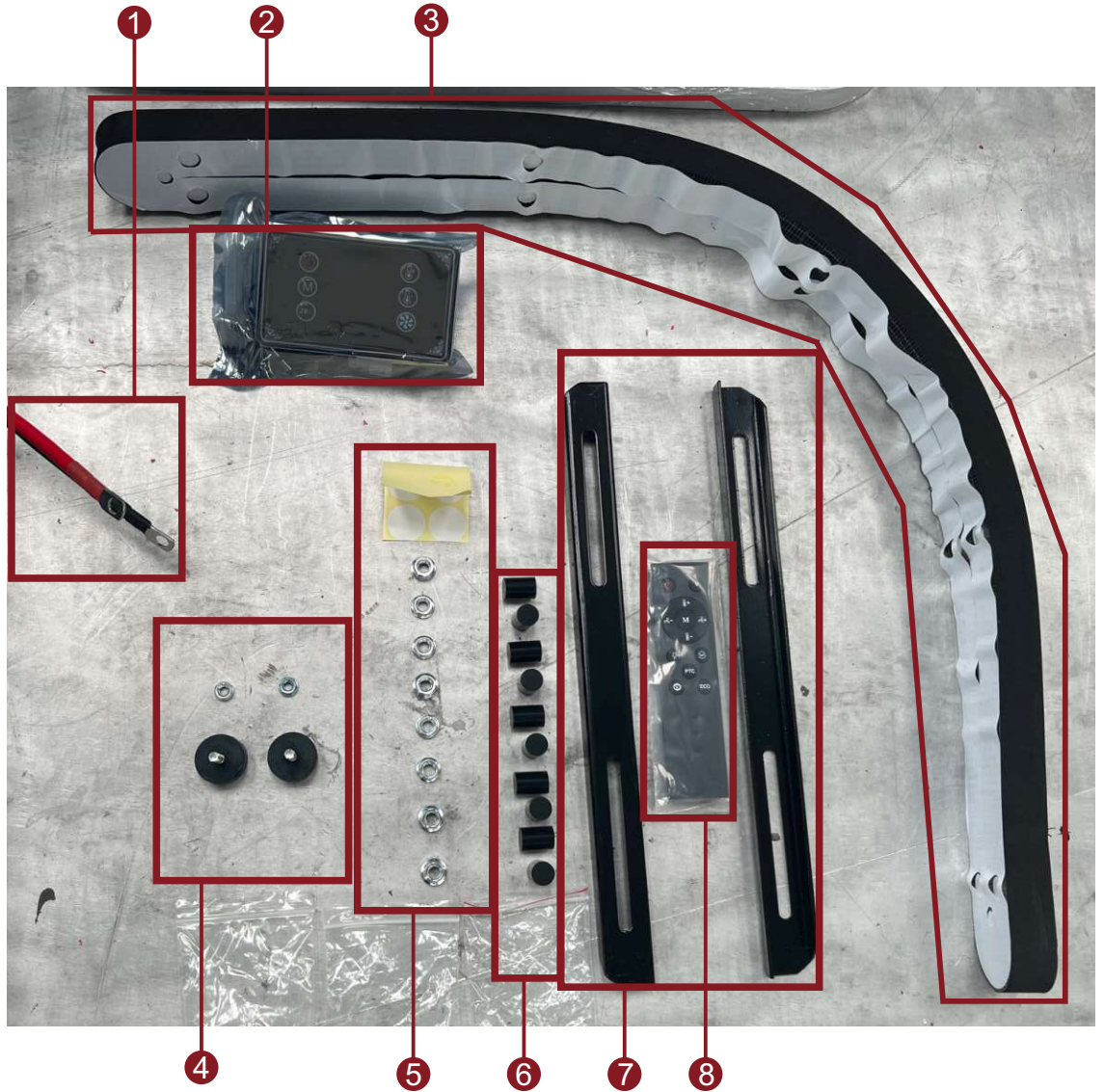
6) 10x decorative/reinforcement cylinders

7) 2x mounting brackets

8) THERM2200 IR remote control

9) This is the item I make mention of 'not throwing away'.

This polystyrene 'brick' is integral as a vent to allow the air-con to seal and effectively distribute air into your install.



FIRST OPENING CONTROL BREAKDOWN

Interior control/filter panel

1) Bolt 'receivers', here is where you'll tighten the nuts to ensure the panel stays in place

2) Screen housing

3) Ventilation ducts

Control panel and remote controls

1) Power ON/OFF

2) Voltage display
(if pressed on remote, the screen on the panel will display the battery voltage)

3) Raise the target temperature

4) Lower the target temperature

5) Slow fan speed DOWN

6) Accelerate fan speed

7) Toggle operating modes
(remote) Or select them directly
(Auto, Cool, Eco, Fan).

8) Force cool mode

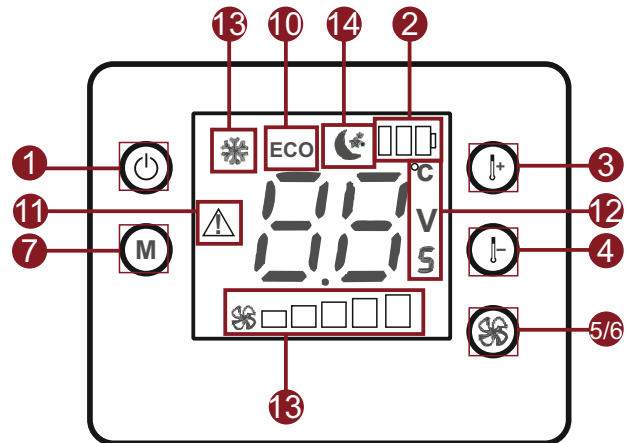
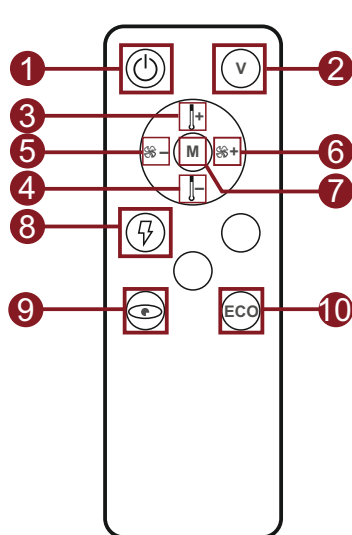
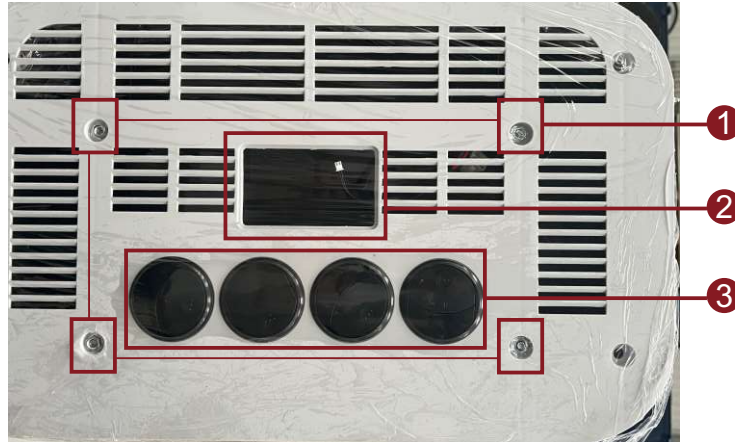
9) Run air-con on a limited time setting (0.5Hrs to 10Hrs configurable with the T- and T+ buttons)

10) Force ECO mode, or signalling that ECO mode is currently on.

11) Signals that the on-screen numbers are indicating an error

12) Alternatively, indicates if the current numbers are regarding voltage, celsius, fahrenheit.

13) Indicating the control panel is currently in 'cooling' mode



Installing screen

Item 2 on the control panel is the housing for the screen. This can be stiff to install as it's important it stays in place. The easiest method of clicking the screen into place is doing so before the panel is installed. Align the panel and the screen in the orientation that you want, and then turn the panel upside down.

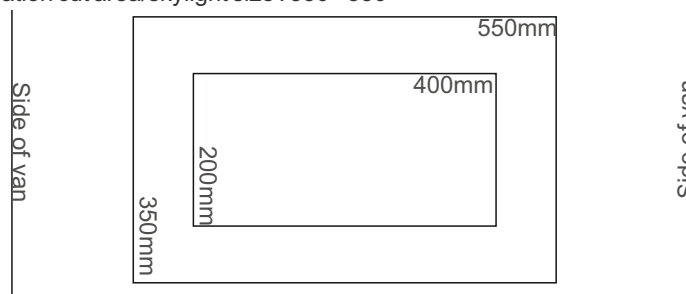
Using a table (presuming one is available) push down on the panel around the screen and it should click over into position with a bit of a push.

INSTALL BEGINNING THE INSTALLATION

Installation Intro

The THERM2200 was designed with flexibility in mind regarding the install. Where the THERM2800 was designed specifically with 360*360 and 400*400 skylights in mind, the THERM2200 is smaller- requiring a smaller footprint and will be easier to install on smaller skylight inserts.

Minimum installation cut area/skylight size : 400*200
 Maximum installation cut area/skylight size : 550 * 350



Check your skylight dimensions (if you have one!)

With that in mind- take those measurements and go measure your skylight. It may be worth drawing up a brief diagram of how everything is going to fit, as it is going to be frustrating for you if you embark on the install and realise that you need additional materials and have to cancel the install.

If we already fit your existing skylight without any modification, then this is going to be a simple and quick install.

If your existing skylight is not big enough, or doesn't exist at all, a cut within the dimensions outlined above will need to be made.

If your existing skylight is too large for these measurements, we would advise either looking at the THERM2800 (with its 360*360 default shape), or to consider filling in space in the skylight until the area above is all that remains.

it is worth noting this is only designed for installs on the roof. This is not designed for installs in any other orientation.

Installation begin

1) Clean the installation area

Clean the surroundings on both the inside and outside of the install cut area. This is vital for a number of reasons- Ensuring adhesion, ensuring there are no breaks to the seal, ensuring nothing is going to deteriorate the install over time are all things we need to be sure of. There's no reason to install something twice.

2) Apply sealing/mount foam

Once we're certain the install area is sound, we need to apply the sealing foam around the hole. The purpose of this is to give the air conditioning unit a stable and supportive base- but, more importantly, to ensure that each environment (the inside and the outside) are kept entirely separate. Even partial 'leaks' can affect the ability for us to control and dictate the temperature inside.

2) NOTE 1

You can install the foam either around the hole directly, or onto the body of the THERM2200 itself. We have included notches in the THERM2200 body that may allow this to be made easier. Make sure that the sealing foam is secure to the THERM2200 body and that there is no space for wrinkling or any air gaps. An example is below. We do not want any chance of water leakage or for inefficiency.

Wait until foam secure in place

Once it is in position- wait until it is secured in place. Adhesive, if added, may take time to set. Now's a great time to get that well earned cup of tea. You'll need the strength for the next step.

3) Example foam fit around an install



NOTE : Notice that I've included item 9 of the packing list already... It's just sensible to keep it all together and may as well be fitted in now.

INSTALL SECURING THE INSTALL

3.5) Consider adding legs-

4) Arrange THERM2200 placement

Not strictly needed, but probably recommended to minimise vibration... Towards the back of the THERM2200 you will find two larger circular areas. These are for items 4 from the inventory.

Apply the nut (from the same bag as the larger rubber legs) to the back of the rubber leg, all the way down, and add the rubber legs to the corners of the THERM2200.

Apply a bit of glue to the still free side of the sealing foam (to ensure both sides are going to be adhesive!) and look to drop the THERM2200 into position before the glue dries. This is to ensure that you have a full seal.

The slanted part of the THERM2200 should face the FRONT of the vehicle, IE in the direction of travel. This is to minimise the resistance on the item when you move.

You may need to rearrange the cables to make sure that everything appears in line and that all the cables are accessible (DC power cables). The placement- you probably will need to use the bolts coming down from the THERM2200 polystyrene 'vent' you already have.

to make sure that everything appears in line and that all the cables are accessible (DC power cables). The placement- you probably will need to use the bolts coming down from the THERM2200 polystyrene 'vent' you already have.



There may be some variations in what works specifically for your install

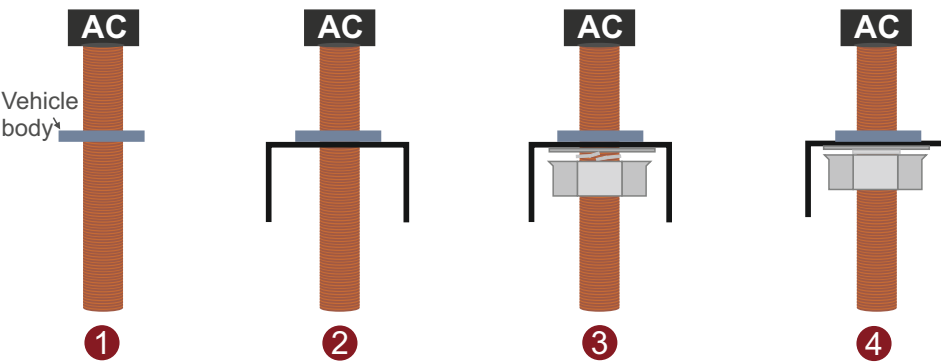
1) Ensure and verify that the bolt is secure into the AC housing, and cannot be further tightened (within reason)

2) Apply the mounting brackets, with the flat side pressing against the vehicle body.

3) Apply a one of the silver nuts until 'snug' by hand

4) Tighten the nut with a 13mm spanner until it can no longer be (reasonably) hand tightened.

With everything lined up neatly, you can now begin securing both the air-con, and soon, the control panel into place. Notice the exposed steel bolts- those are our next steps. To secure the air-conditioner into place and to bond it neatly to your vehicle, we've simplified it all into a sequential diagram.



Installing the control panel

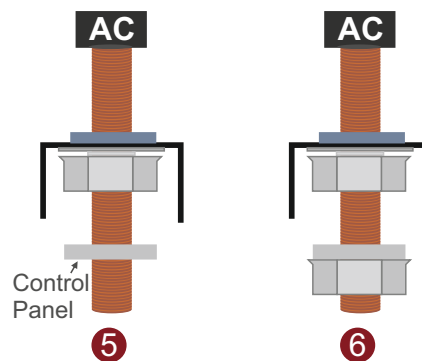
We're most of the way there. Route the DC power cables down roughly the path you want them to take (that decision is entirely yours...) and go get the control panel. You'll see that the control panel has two free contacts, as does the air conditioning unit on the roof. These will need bonding together before you mount the panel fully.

5) Line up the bolts with the four central bolt-holes on the control panel, ensuring that the vents will line up with the polystyrene vent

The control panel's four vents will need to line up with the styrofoam venting we added previously.

6) Secure the control panel in place now with the remaining four nuts

7) Optionally, you can now cover these bolts with the included stickers, and you can also move towards using the remaining screws to secure the panel's remaining absent holes in place to the vehicle.



INSTALL FINISHING INSTALL AND OPERATIONS

DC Cable Routing	The DC cable will now need to start being routed, however is feasible, towards your battery bank. You have 4.5m of cable length before you're going to start running out, and you have direct ring terminals on the ends of the cables.
DC advice	We advise you to not put this onto your starter battery in most installs. This puts your starter battery needlessly at risk if you accidentally leave the AC running. You will benefit from having a dedicated leisure battery circuit, ideally using LiFePO4 batteries (for longest life and for the additional safety when using a capable BMS).
DC cable extension	If you cannot reach your battery bank- you may need to either extend these cable lines or to tap the cable lines onto your DC distribution circuit.. All installs end up being a little bit different as necessities dictate.
24V and 12V reminders	If you're using the 24V variant (or if you're using the 12V item and you have 6V batteries) be sure to recall that your positive and negative connection needs to go across the whole bank, rather than just one battery.
Letting the refrigerant settle	Once you know what the routing will be- don't quite connect it yet. Leave the AC alone for 1-4 hours for the refrigerant to settle... Then connect it into your system. You now (hopefully) have power. You can power the AC on and off using the respective buttons on both the remote and the panel, and adjust the temperature to your comfort.
Operating the unit	The THERM2200 is a relatively simple unit to use and understand. The control panel screen will give you an update on all currently relevant settings.
Adjusting fan speed	Fan speed can be adjusted up and down by using the relevant buttons, either on the control panel or on the remote.
Adjusting temperature	Temperature, too, can be adjusted up and down via the remote or on the control panel itself. (T+, T-)
Modes	There are various operating modes, toggled by repeatedly pressing the M button (which simultaneously stands for Mode and for Menu).
COOL	COOL is the high power cooling mode, symbolised by a snowflake.
ECO	ECO is a low-powered cooling mode, symbolised by the 'ECO' symbol on the screen being lit.
SLEEP	SLEEP runs peacefully- ensuring the noise of the fan doesn't keep you awake
FAN	FAN ONLY, symbolised by the fan, is neither cooling or heating- just air-flow.
DC Voltage	You can check your DC battery voltage by pressing either M on the control panel or V on the remote.
Adjusting settings	To adjust the alarm settings- Hold M for five seconds. You'll be able to press M repeatedly to toggle through the settings in order of(Low voltage disconnect, High voltage disconnect, Temperature targets). These settings can be adjusted using the T+ and T- buttons on the remote.
Toggling from F to C	To toggle from Fahrenheit to Celsius (and back again), hold the control panel fan button for five seconds.
Engaging timers	Pressing timer on the remote will allow you to set a 0.5Hr to 10Hr operating cycle, which will turn off when finished.
Factory reset	With the air conditioning unit turned off, press and hold the power button for six seconds to restore all settings back to default. The default settings are as follows- UNDER VOLTAGE ERROR - 10.5V / 21.5V UNDER VOLTAGE RECOVER - 12.0V / 25V COOLING MODE FAN SPEED THREE TARGET TEMP : 24'C

ERRORS ERROR CODES AND DESCRIPTIONS

Error codes	<p>Sometimes errors happen- the below list of error codes should help you identify what the error is - and might give you an idea of how to resolve them.</p> <p>If an unknown error pops up, or you're unsure how to resolve it, please be in touch.</p>
E1	Unit over-temperature issue, likely blocked cooling
E2	Compressor torque failure
E3	Overcurrent failure
E5	Under-voltage (Low DC voltage)
E6	Condenser fan fault (blockage likely)
E7	Compressor over-worked, exceeding power limit
E9	Compressor over-temperature protection
EA	Communication error (between control panel and AC main body)
EC	Controller self check failure (internal issue or EMF)
F0	Phase issue (U)
F1	Phase issue (V)
F3	Phase issue (W)
F4	Pressure fault (Likely leak or sealant failure)
F5	Ambient temperature sensor fault
F6	Evaporator core sensor fault



NOTES **NOTES**



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Warranty (2 years return to factory)