



MODEL NUMBER: _____

SERIAL NUMBER: _____

DATE PURCHASED: _____

OWNERS MANUAL CARAVAN AIR-CONDITIONER

BELAIR

MODEL

A3501

T3500


A3800



For your safety, please read this manual
carefully before using the product.

Safety Notices

Dear user, thank you for choosing a HOUGHTON caravan air-conditioner. For your ease of use and safe maintenance we have included the following symbols in this manual:

 All the contents with this "Warning" logo are about the safety of the user and the air-conditioner. The user shall operate in strict compliance with the instructions.


 All the contents with this "Prohibition" logo are about the actions that shall be prohibited, or else the air-conditioner may be damaged or the user's personal safety may be endangered.

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Safety Notes

- ❗ Make sure the external electric supply socket of the caravan air-conditioner is effectively grounded in accordance with your local regulations.
- ❗ Failure to ground the unit correctly may cause electric shock or fire.
- ❗ The caravan air-conditioner shall be switched on for electric leakage detection after installation.
- ❗ If you are not to use the air-conditioner for a long time, please isolate the power supply.
- ❗ Clean the filter of the air-conditioner regularly. A dirty filter will decrease air flow and lead to poor heating and cooling performance.
- ❗ Use the remote control to operate the air-conditioner.
- ❗ Install the air-conditioner in compliance with the instructions of this manual.
- ❗ Incorrect installation methods or alteration of the product may cause damage to the product or personal injuries to the user.
- ❗ Be careful when installing the unit on the roof of the caravan, crawl boards may be required.
- ❗ There may be wires between the roof and the ceiling. When cutting into the roof, make sure the power is isolated prevent risk of electric shock.
- ❗ Installation and maintenance of the air-conditioner must only be performed by personnel with appropriate trade qualifications and holding current licenses for such work.
- ❗ Do not over-tighten the power connection terminals.
- ❗ Ensure that your electrical supply and wiring is correctly sized for the power demand of the air-conditioner. Refer to the product specifications.
- ❗ This appliance is not to be used by persons (including children) with reduced physical, sensory or mental capabilities, or lack of experience and knowledge. Children are not to play with this appliance and should be supervised at all times.
- ❗ It may not be operated in vehicles while driving.

- ⊘ Keep the air inlet and outlet of the inside and outside units of the air-conditioner clear.
- ⊘ Do not spray any paint or insecticide on the surface of the air-conditioner.
- ⊘ Immediately turn off the air-conditioner and isolate power supply if there is any unusual odour, smoke or fire detected. Contact after-sales service personnel in case of unit fault and fire.

Product Introduction

A. Purpose

HOUGHTON BELAIRE is designed to provide a comfortable environment inside a recreational vehicle or caravan.

B. Achieving effective heating & cooling

Many factors will affect the total heat load within the caravan and many factors can also affect the working efficiency of the air-conditioner. Before purchasing HOUGHTON BELAIRE air-conditioners, the user shall consult with the caravan manufacturer to understand the total heat load of the caravan and to choose the correct air-conditioner for the application.

The following measures are very useful to reduce the heat load within a caravan or RV and improve the performance of the air-conditioner.

- Close all the doors, skylights and windows, draw the curtains and open the sunshade or awning.
- Adjust the caravan's position to make sure the sunshade is on the southern side in the northern hemisphere or on the northern side in the southern hemisphere. This will reduce the exposure to direct sunshine.
- Turn off unnecessary electrical appliances within the caravan to reduce the heat load.
- Cook outside of the caravan when possible.
- Park the caravan in shade if possible.
- In case of exceptionally high temperatures, turn on the air-conditioner in advance during the morning.
- Adjust the set temperature of the remote control to prevent frequent starting or stopping of the unit.

C. Condensation

When warm, moist air within the caravan meets with a cold surface, condensation water may be formed. This is also known as "sweating". In this case, make sure the following measures are taken:

- Close and seal all the doors, skylights, windows to reduce the entrance of warm moist air.
- Operate the inside fan on high fan speed, avoid low and auto fan speeds.

During the operation of the air-conditioner, condensate water will be produced and allowed to drain onto the roof. This is normal. The amount of condensate water is a function of air humidity. High humidity inside the caravan will result in more condensate being generated. Close doors, windows and hatches to reduce this to a minimum.

Please note that losses or damage caused by the condensate water are not within warranty scope.

D. Choosing and using a generator

- HOUGHTON BELAIRE requires a mains quality AC power source for correct operation. If you decide to supply power using a generator then you are strongly recommended to consult with the generator supplier to confirm suitability and sizing of the generator for your application.

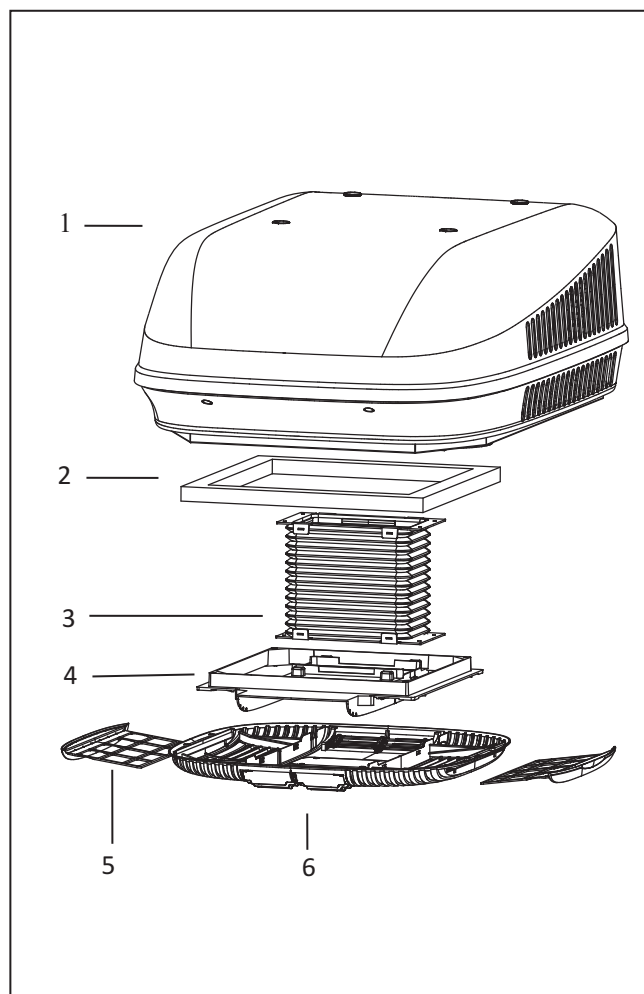
Please note that losses caused to the product by the using of the generator are not within warranty scope.

Packing List

Installation parts list

Main parts:

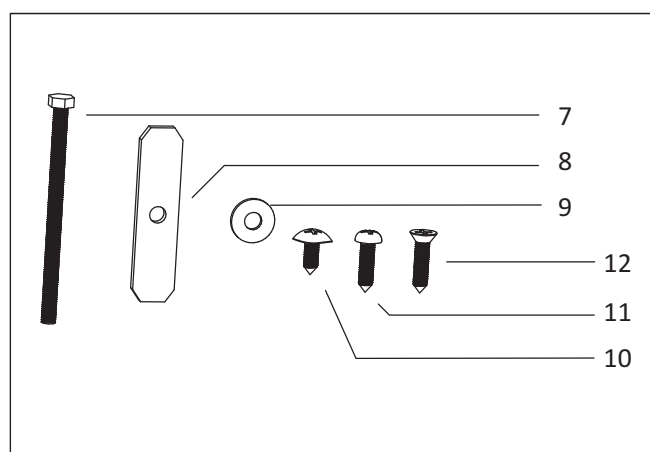
1. BELAIRE air-conditioner outdoor unit ×1
2. Outlet gasket ×1
3. Outlet air duct ×1
4. Plenum mounting bracket ×1
5. Return air filters ×2
6. Plenum assembly ×1
7. M8 x 120mm hex head bolts ×4
8. Metal clamping bars ×4
9. Large M8 washers ×4
10. Truss head tapping screws ST4×10 ×8
11. Plenum screw - ST4.2×19 pan head screws ×4
12. Countersunk head self tapping screws ST4.2×16 ×6



Not shown:

- Manual ×1
- Remote control & bracket ×1

If you note that any items are missing or damaged then please contact Houghton or the local distributor.



Installation Guidance

Installation instructions

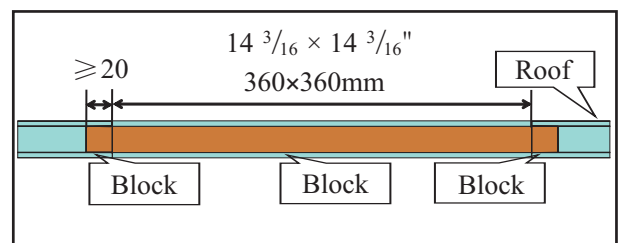
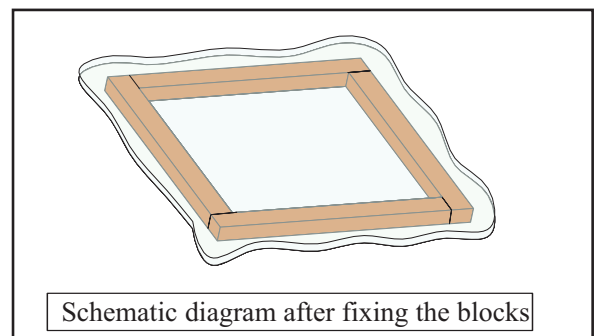
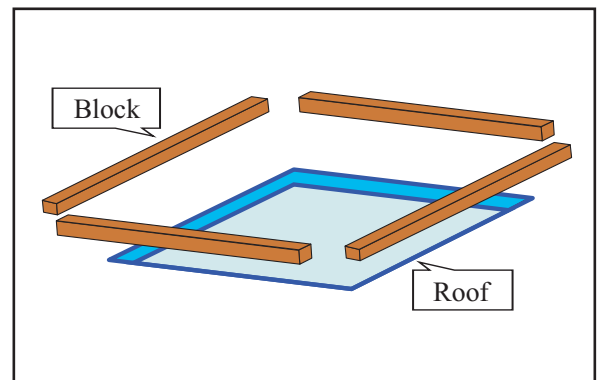
- Thoroughly read and understand this manual before installation.
- Abide by the national wiring rules in your country.
- Do not add any other parts or modify the product in the installation.
- The installers shall be equipped with refrigeration technician qualification certificates and/or suitable electrical trade qualifications.
- Consult with HOUGHTON or the local distributor in the case of unusual applications or installation conditions that are not specifically covered by this manual.

Installation requirements

- The RV or caravan roof shall be able to support the air-conditioner's weight (45kg /99 lbs).
- Minimum thickness of roof is 25mm/ 1"; maximum thickness of roof is 85mm/3 ³/₈".
- If the roof's thickness is greater than 85mm/3 ³/₈", you can purchase a "Thick roof kit" to suit your unit from HOUGHTON or the local distributor.

Load bearing of roof

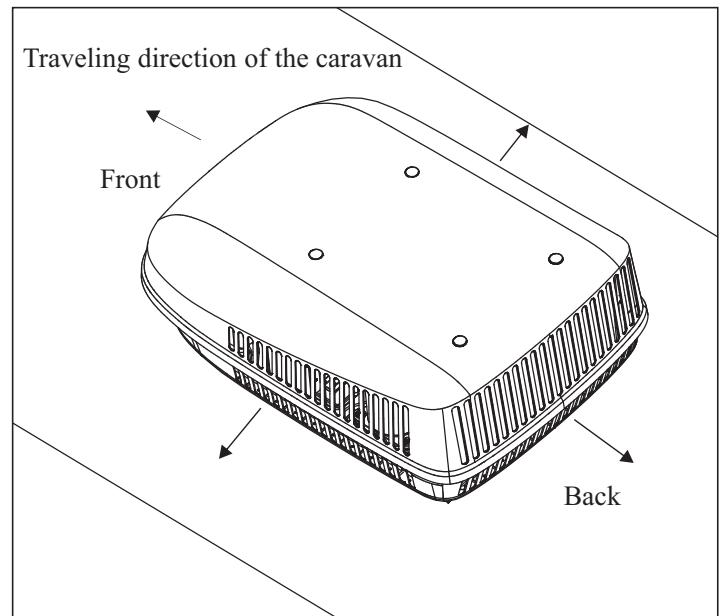
- The roof shall be able to bear the weight of the air-conditioner and shall be level without accumulating water. It is suggested that the caravan manufacturer confirms the suitability of the roof for load bearing.
- If the installation hole is not preexisting then consult your caravan manufacturer for the most suitable way to cut the installation hole.
- The 360×360mm / 14 ³/₁₆ × 14 ³/₁₆" hole shall be boarded up with wood sections that are at least 20mm / ³/₄" thick. This boarding is to ensure that the roof will not crush from the installation bolts and that conditioned air does not enter the ceiling space.



Installation position

Before the installation, consider the installation position:

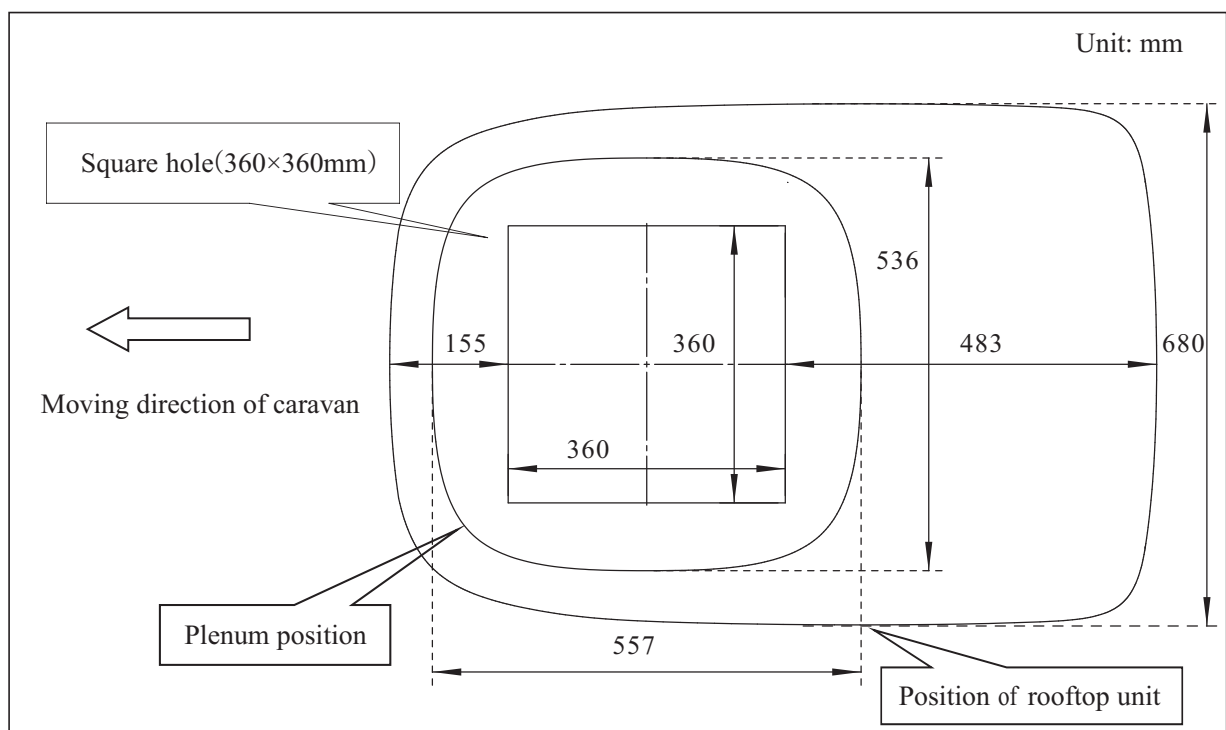
- At least 150mm is needed on the left and right side.
- At least 200mm is needed at the front and back area.
- At least 50mm is needed for the height.
- Rooftop unit is to be put in the center of the roof to ensure the balance of air flow.
- The direction of the rooftop unit should be the same with moving direction of a caravan, otherwise, it will cause damage of outdoor fan.
- It's suggested to install 2 or more units on a caravan which is more than 7 meters long to achieve desired cooling effect.
- Please confirm position of rooftop unit as per below drawing, and check the position of plenum in the inside of caravan.
- Position of rooftop unit should avoid partitions, cupboards or lights to make air flow go smoothly.

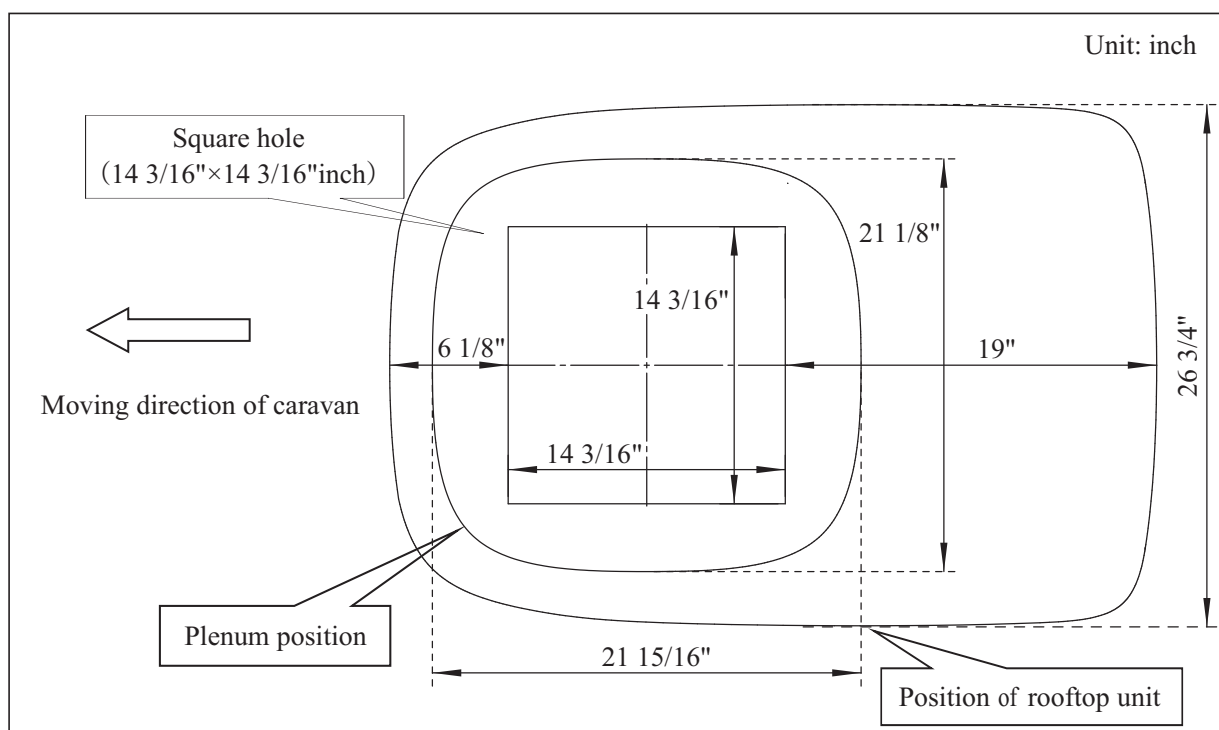


Note

Angle of inclination of the air-conditioner shall not be greater than 5° and the rear of the air-conditioner shall not be higher than the front.

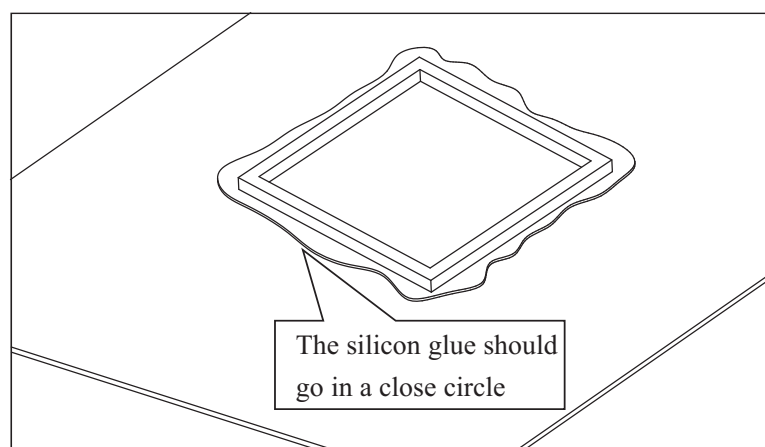
For advice on installations outside of these limits please contact HOUGHTON or the local distributor.





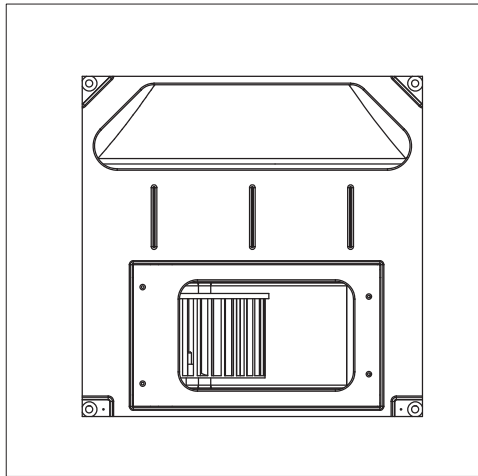
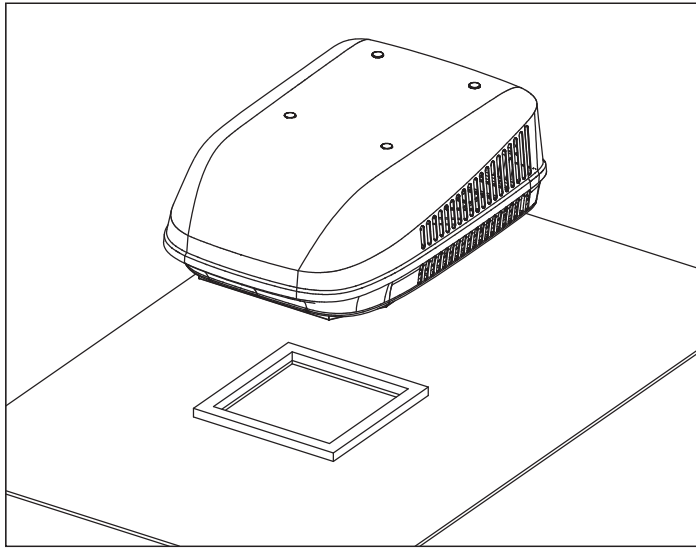
Install outlet gasket

- Make sure the roof is dry, clean and without oil before installation.
- Take off the paper from the back of the outlet gasket, and stick the outlet gasket onto the roof over the square hole.
- Press the outlet gasket to make sure the outlet gasket is closely adhered to the roof.
- Fill the silicon glue around the outlet gasket to make sure no leakage happens. Please note the silicon glue can't touch the rooftop unit.



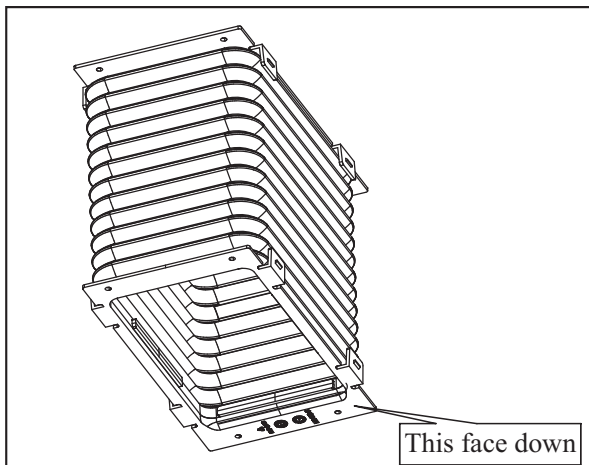
Install outdoor unit

- Place the outdoor unit over the outlet gasket and adjust position to make sure the 4 bolts under the outdoor unit are aligned with the 4 corners of the square hole(360×360mm). When position of outdoor unit is being adjusted, a person needs to go to the inside of caravan to ensure the alignment.
- Do not push or pull the outdoor unit directly, otherwise, it will cause damage to the outlet gasket and lead leakage of air and water.
- The 4 holes which receive M8 bolts on the base of the outdoor unit should align with the 4 corners of the square hole(360×360mm) on the roof.



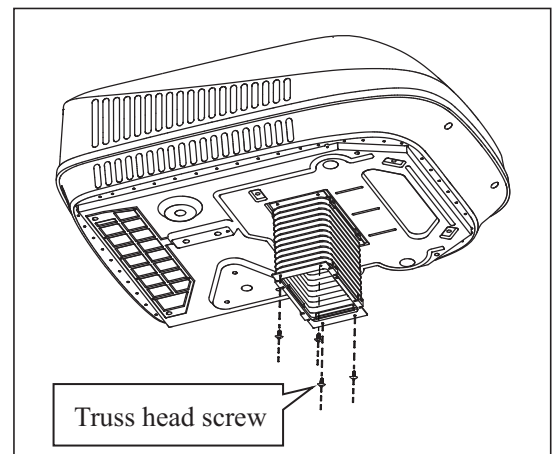
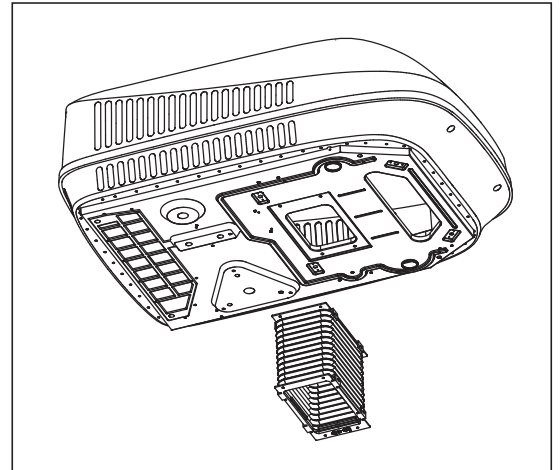
Install outlet air duct

- Cut the 4 cable ties and fix the outlet air duct to the outdoor unit from inside of caravan using 4 truss head screws.(This step can be done before installing outdoor unit, but please note do not damage the outlet air duct).



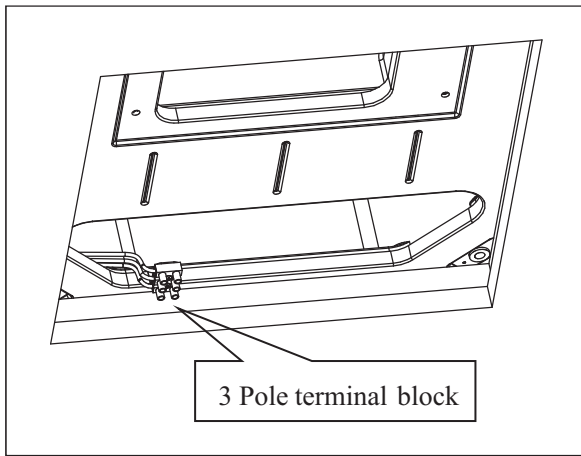
Note

The outlet air duct has the up and down , left and right direction ,only one way to be connected correctly , please align and connect.



Connect the power

- Pay attention to the local wiring regulations that need to be followed when connecting to main supply.
- Look upward from inside the caravan, and locate the terminal block as shown in the figure.
- Connect the external power lines to the 3-pole terminal block and note the positions of the active, neutral and ground.

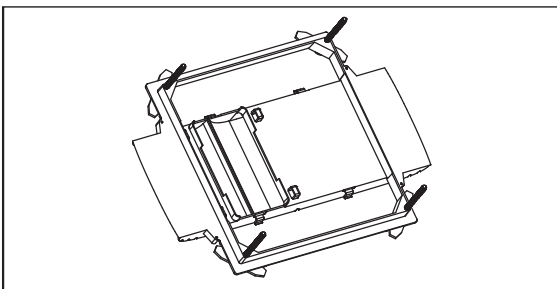


Note

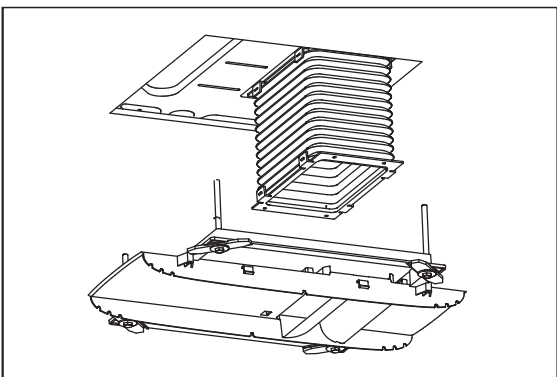
Match the corresponding active, neutral and the ground wire and firmly tighten up the screws to make sure the power line is not loose or improperly connected, otherwise a short circuit or fire could be caused.

Install plenum mounting bracket

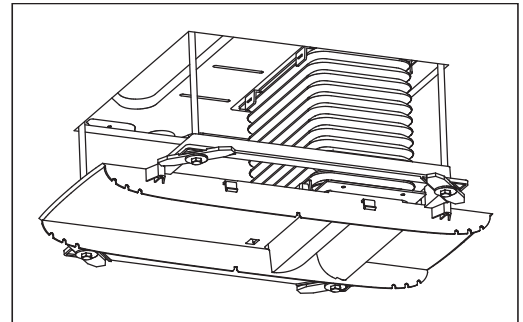
- Overlap M8 bolt with washer and fixing metal plates, and get bolts through the 4 holes on corners of the plenum mounting bracket.
- Make sure fixing metal plates is 10mm distance from the plenum mounting bracket in order to adjust angle during installation.



- Push the plenum mounting bracket upward to snap into the square hole.



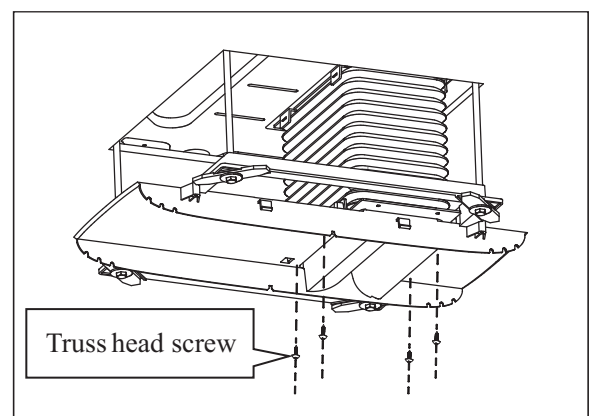
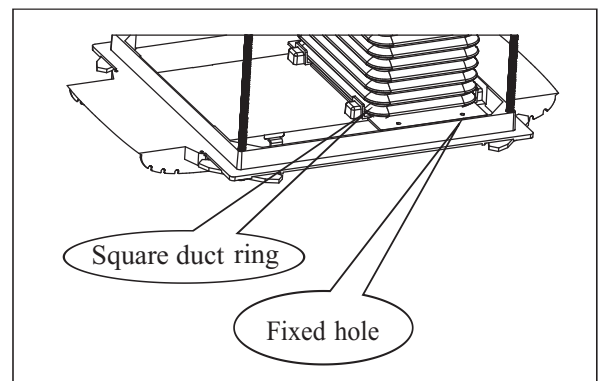
- Tighten M8 bolt to make sure the plenum mounting bracket is connected with outdoor unit tightly.
- It's suggested that when screwing the bolt, torque should be 7N.M which could make the connection between outdoor unit and outlet gasket perfect.



- Check if the plenum mounting bracket is completely embedded into the square hole.

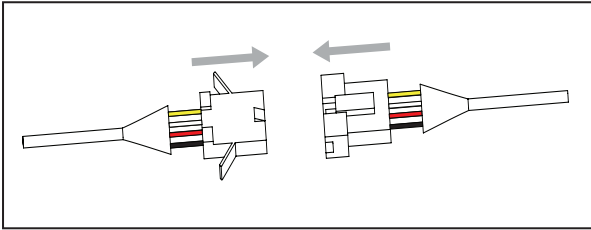
Connect outlet air duct

- Snap the outlet air duct into the square hole on the plenum mounting bracket, Four fixed hole position is naturally aligned.
- Screw the outlet air duct with the plenum mounting bracket with 4 flat head screws from underneath the plenum mounting bracket, support the square duct ring by hand when screwing.

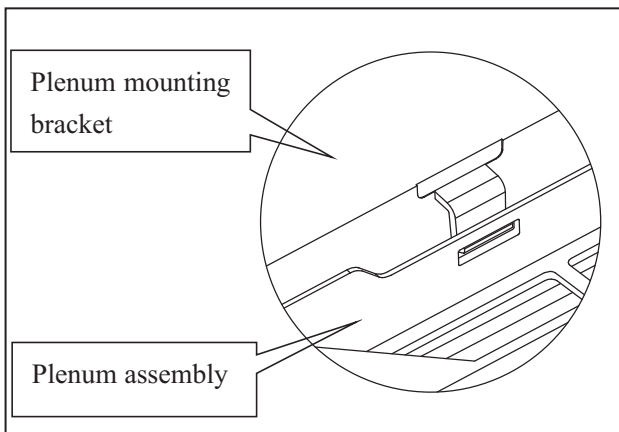


Install plenum assembly

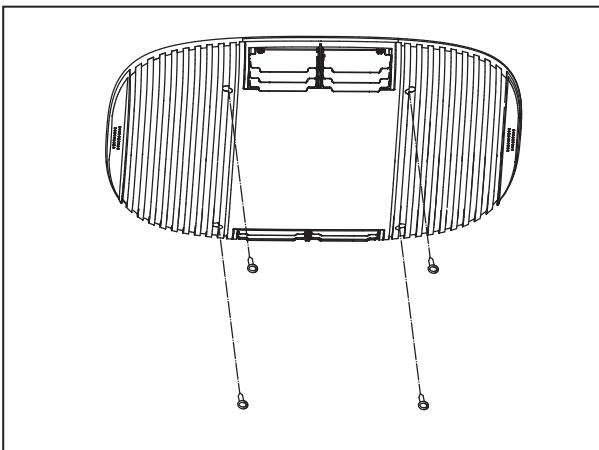
- Connect the socket and plug of the display panel wires and the controller wires; please notice that colors of the wires should be matching.



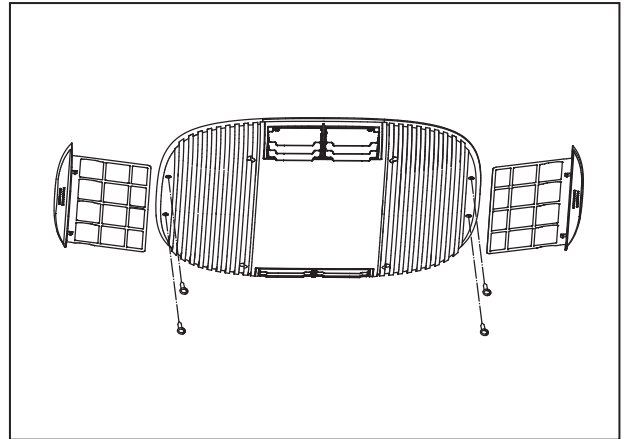
- Attach the plenum assembly to the plenum mounting bracket by engaging the two parts. You will hear four clicks to as the parts connect together.



- Fix the plenum assembly on the plenum mounting bracket with 4 provided pan head tapping screws.



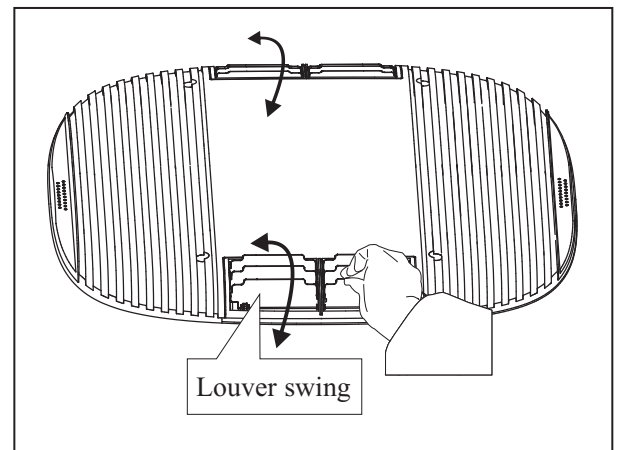
- Take out the return air filter and fix the plenum to the ceiling with 4 provided countersunk head tapping screws.




- Finally, fit both return air filter into the plenum properly and **the installation is all completed.**

Adjust the louver

- Adjust direction and angle of louver by moving blade around its axis. The 2 blades move together. Louvers on opposite sides are symmetrical.



Quick Start Guide

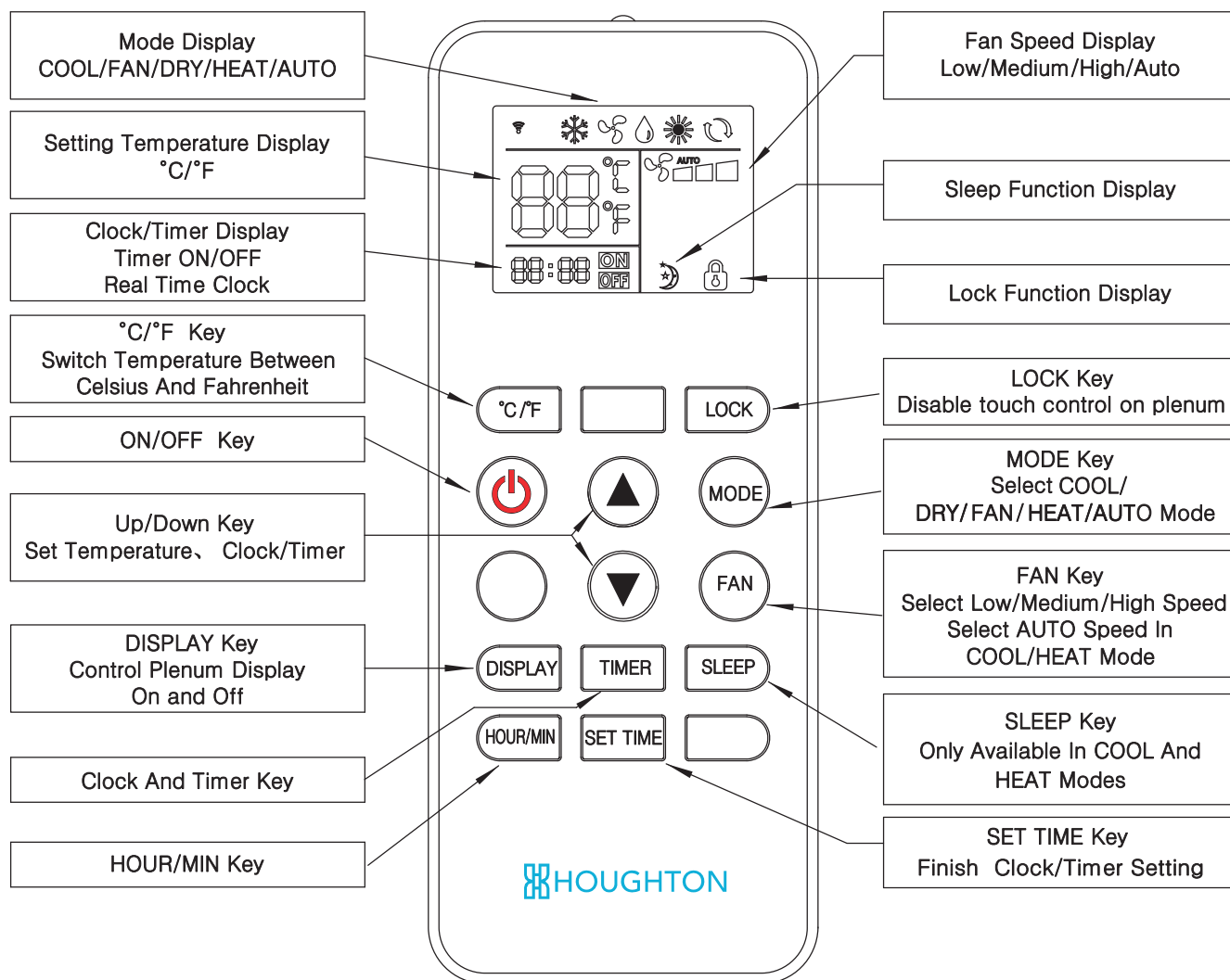
- Switch on the power to the air-conditioner at the isolation breaker.
- Using the remote control, start the air-conditioner by pressing "  " button and then select fan function by pressing the "MODE" button.
- Operate in low FAN, medium FAN and high FAN in turn to check normal operation.
- Select COOL mode, adjust the set point temperature to three degrees lower than the room temperature, the unit will start to blow cool air after the compressor starts.
- Select HEAT mode, adjust the setting temperature to three degrees higher than the room temperature, the unit will start to blow warm air after the compressor starts.

Note

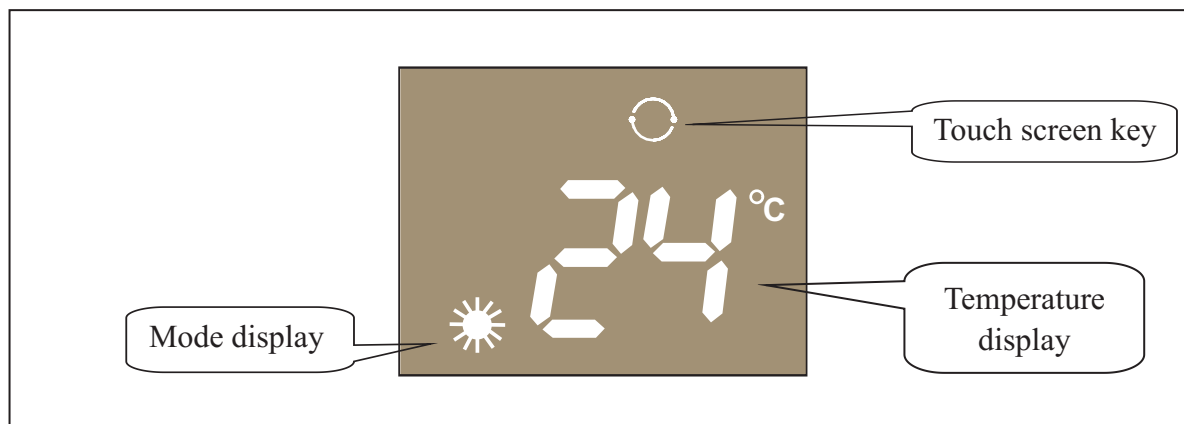
After selecting the COOL or HEAT mode, the compressor may delay starting for 3 minutes. This is a feature to protect the compressor.

Remote control operation

Standard remote control



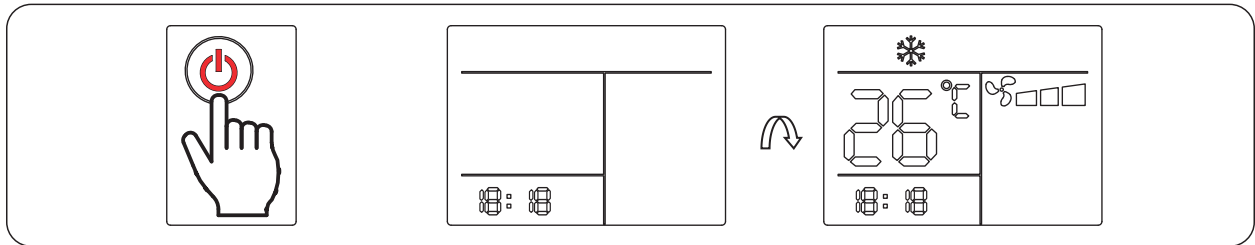
Plenum display



1. Operation of the remote control

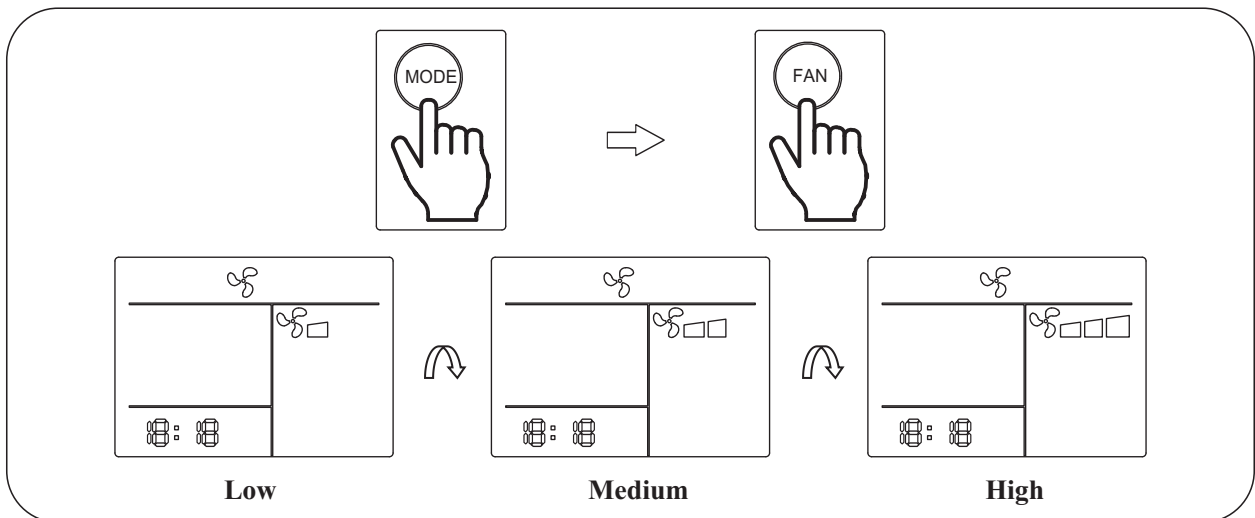
Turn on

- Press the on/off "🔌" key, the unit turns on, the plenum buzzer beeps once and the running mode and temperature will be displayed.



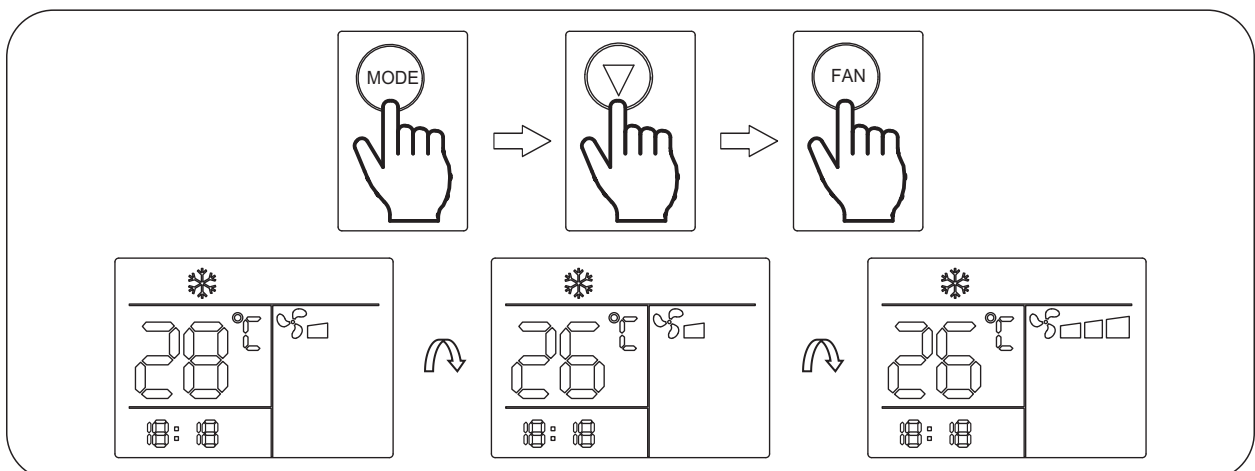
FAN mode

- Press the "MODE" key, select the "🌀" mode, Press the "FAN" key to select Low/Medium/High fan speeds. The plenum will display "🌀" and the indoor environment temperature.



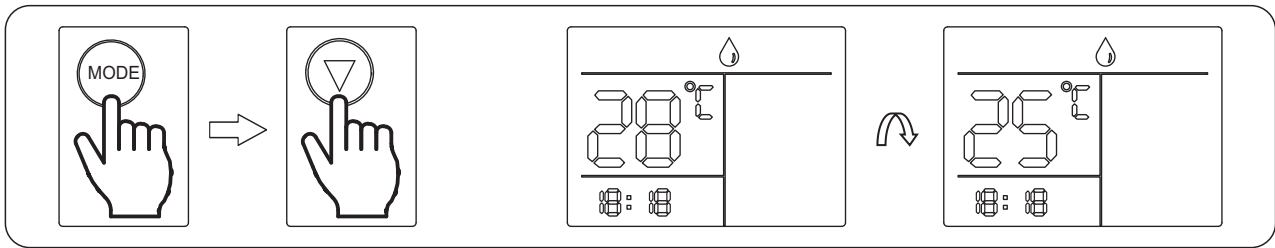
COOL mode

- Press the "MODE" key, select the "❄️" mode. Press the down "▼" key to decrease the room temperature. Press the "FAN" key to select a different speed. The plenum will display "❄️" and the setting temperature.



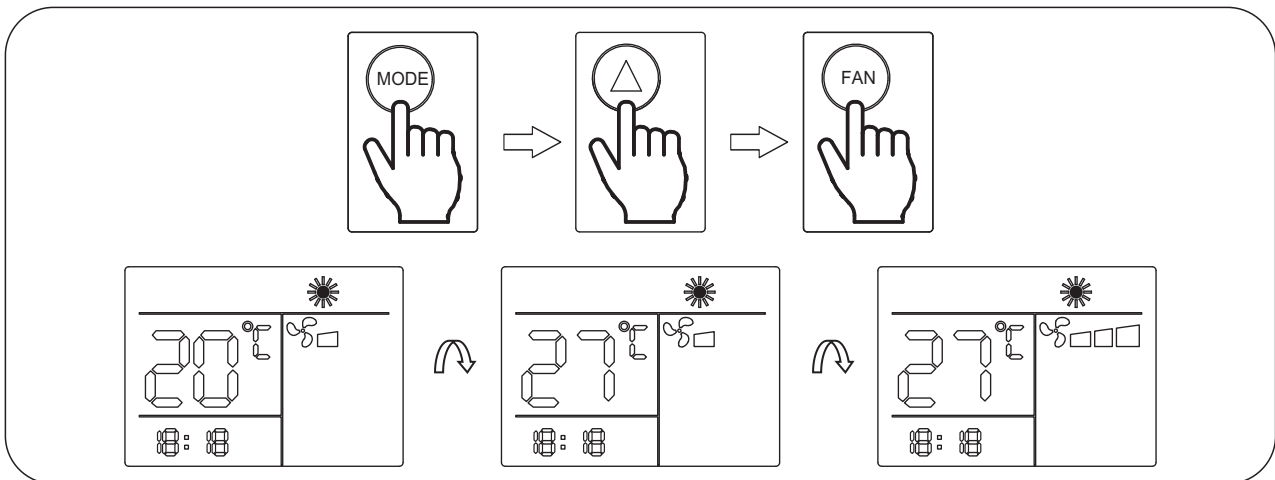
DRY mode

- Press the "MODE" key, select the "💧" mode, Press the down "▼" key to set the temperature 1°C lower than the room temperature, and the plenum will display "❄" and the setting temperature.



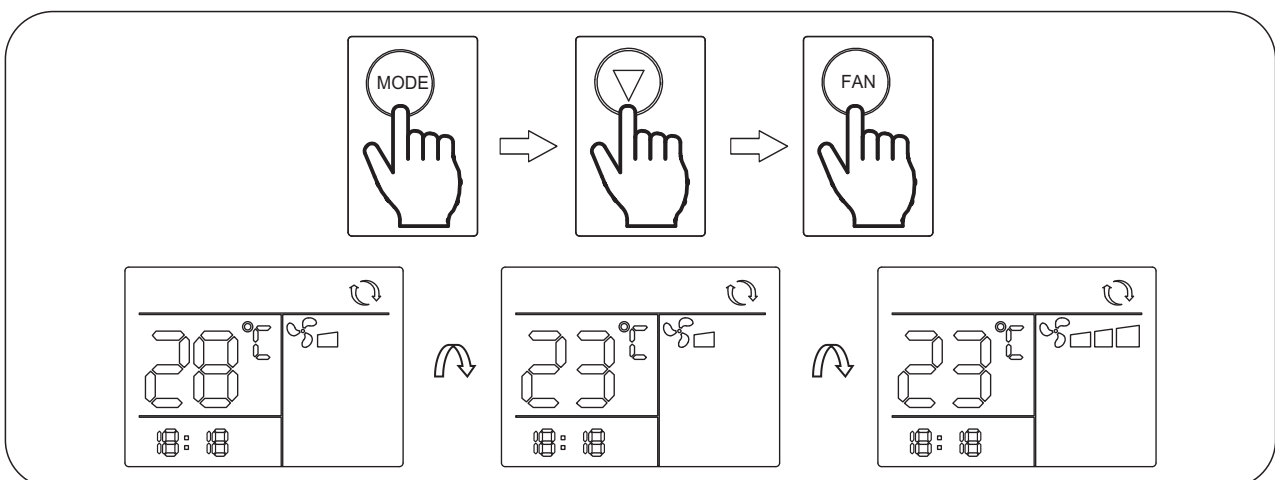
HEAT mode

- Press the "MODE" key, select the "❄" mode. Press the up "▲" key to increase the room temperature. Press the "FAN" key to select different speed. and the plenum will display "❄" and the setting temperature.



AUTO mode

- Press the "MODE" key, select the "↻" mode. Press the up "▲" or down "▼" key to adjust the set point temperature. Press the "FAN" key to select different fan speed. The plenum will display "↻" and "❄" or "↻" and "❄" and the setting temperature.

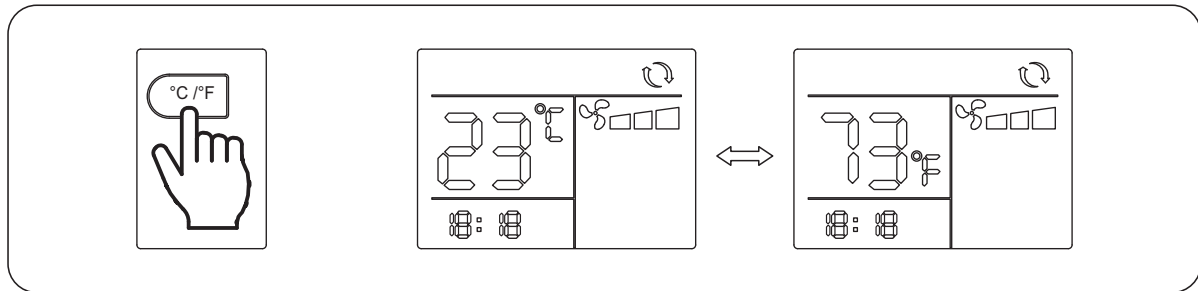


Note

When in the AUTO mode, according to the difference between the setting temperature and the environmental temperature, the plenum will display "☉" and "❄" (automatic heating), or "☉" and "❄" (automatic cooling) in the same time.

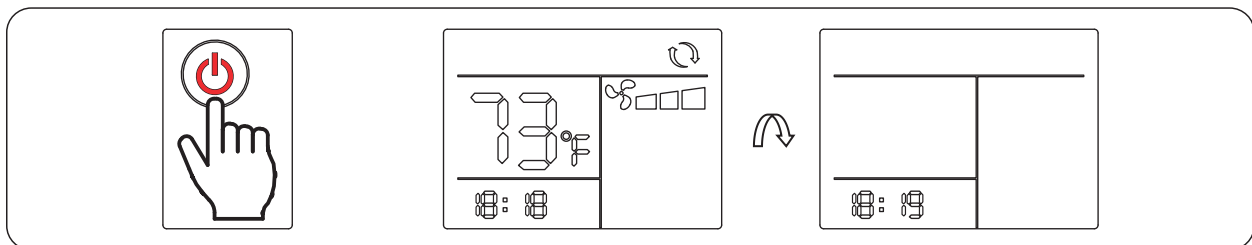
Celsius and Fahrenheit degree change

- In any mode, Press the "°C/°F" key to select temperature units of Celsius or Fahrenheit.



Turn off

- Press the on/off "⏻" key again, unit turns off and the plenum and remote control will be blank.



Timing function

- Set clock and timer.
 - Press the "SET TIME" key, the Hour digit will flash. Press "▲" or "▼" key to set hour. Press the "HOUR/MIN" key, the Minute digit will flash. Press "▲" or "▼" key to set minute. Clock setup is done.
 - Press the "SET TIME" key, until "ON" shows on the upper right side of the clock and hour digit flashes. Then press the "HOUR/MIN" key, and "▲" or "▼" key, to set the desired time to turn the unit on.
 - Press the "SET TIME" key, until "OFF" shows on the lower right side of the clock and hour digit flashes. Then press the "HOUR/MIN" key, and "▲" or "▼" key, to set the desired time to turn the unit off.
 - Clock and timer is now set. Keep on pressing the "SET TIME" key to check again clock and programmed time to turn unit on and off. When all setup is done, after 10 flashes, it will return to clock display.
- Timing to turn on : Press the "TIMER" key until "ON" flashes and shows the time to turn on. When "ON" is displayed after its 10 flashes, and only current clock is displayed, then the setup of timing to turn the unit on is done.
- Timing to turn off : Press the "TIMER" key until "OFF" flashes and shows the time to turn off. When "OFF" is displayed after its 10 flashes, and only current clock is displayed, then the setup of timing to turn the unit off is done.
- Timing to turn on and off : Press the "TIMER" key until "ON" and "OFF" flashes simultaneously and shows the time to

turn off. When "On" and "OFF" are displayed after their simultaneous 10 flashes, and only current clock is displayed, then the setup of timing to turn the unit on and off is done.

- Turn off timing function: Press the "TIMER" key, when it only shows the clock, the timer function is turned off.
- Simple method to reset the timer function: remove battery from the remote control, and then replace, The remote control will be restored to the factory settings, and the timer function is turned off.

2. Plenum operation

Basic air-condition features can be accessed via the plenum control. This is useful if the remote control has been lost or is not functioning.

- Press the touch screen "☉" key on the plenum. The selected mode will cycle through "OFF ->COOL->FAN ->HEAT" modes with each touch. The set point temperature is 24°C with high fan speed.



- The plenum display will show symbols for each function:
COOL "❄", DRY "❄", FAN "🌀", HEAT "☀", AUTO "☉".

Note

Operation of the air-conditioner using the plenum control can be prevented by pressing "LOCK" on the remote control. Press the "LOCK" key on the remote control again to unlock.

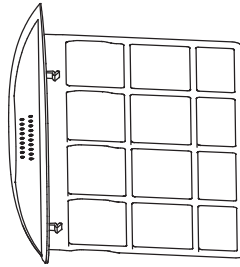
Tips

- The remote control should be operated by directing it towards the plenum, which will beep once when a signal is received.
- When the unit is on, press the "DISPLAY" key on the remote control, the plenum control LED display can be turned on and off.
- When the unit is on, press the "LOCK" key on the remote control to prevent operation of the plenum touch key. Press "LOCK" again to unlock this function.
- When run on heating mode in low ambient temperatures the unit will periodically defrost the outside coil. The plenum will display "dF" during defrost operation and then return to heating once the defrost is completed.
- When the ambient temperature is lower than 0°C / 32°F, the heating capacity is reduced.
- If the device is left unused for long time, please remove the batteries from the remote control.
- The air-conditioner features power cut memory and automatic starting-up after power is restored.

Product Maintenance

Filter

- The return air filter is the only component that needs periodic maintenance.
- Check and clean the filter each week when in use to prevent the filter from being blocked by dirt.
- The filter should be washed frequently to ensure effective cooling and heating.
- Pull out the filter from the plenum before washing in warm water with a touch of detergent.
- Dry before replacing.



Replacement filter can be ordered separately.

Bolt check

- It is recommended that the four bolts holding the unit to the roof are checked for tightness 3 months after the first installation of the product.
- These bolts should be regularly inspected every 12 months through-out the air-conditioner's life.

Maintenance

- It is recommended that the air-conditioner is operated regularly to ensure good performance.
- In the case of a caravan that will not be used regularly then the unit should be operated for 20-30 minutes every 6 months.

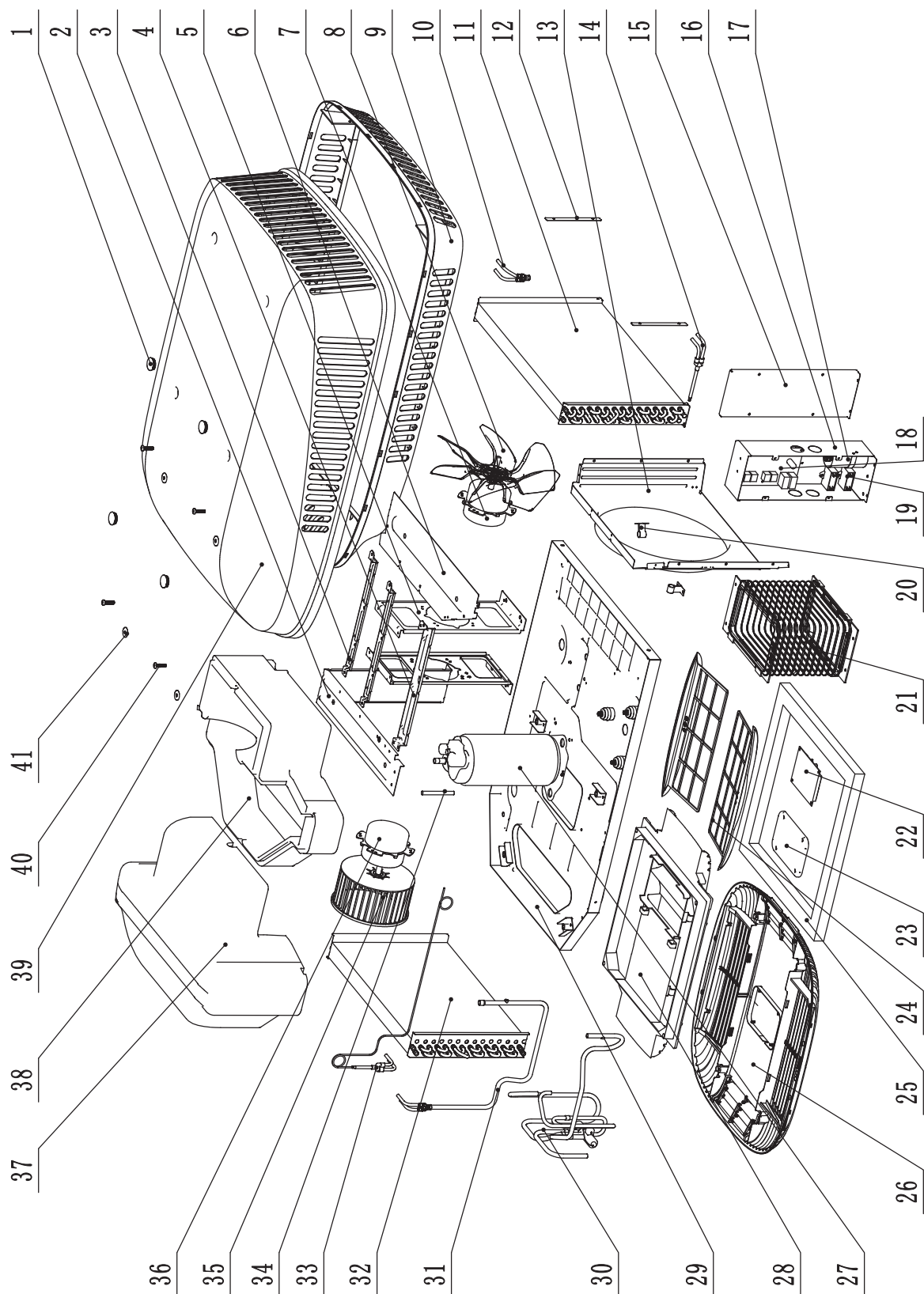
Specifications

Model	A3501	A3800	T3500
Power supply	115V/60Hz	115V/60Hz	220–240V/50Hz
Refrigerant charged	R410A/470g	R410A/650g	R410A/590g
Rated cooling capacity	13500BTU/H	15000BTU/H	3500W
Rated heating capacity	-----	15000BTU/H	3500W
Input power for cooling (W)	1300	1500	1300
Input power for heating (W)	-----	1300	1200
Rated current for cooling (A)	12	14	5.6
Rated current for heating (A)	-----	12	5.2
Maximum input power(W)	1550	1750	1500
Maximum current (A)	14	16	6.5
Maximum design pressure	550PSIG	550PSIG	4500kpa
Minimum design pressure	236PSIG	236PSIG	3000kpa
Maximum air flow	351CFM	351CFM	150l/s
Installed weight	73.7+ 6.2(lbs)	80.3+ 6.2(lbs)	35.5+ 2.8 (kg)
Outdoor unit dimension Height 340mm/13 ¹¹ / ₁₆ " Width 680mm /26 ³ / ₄ " Length 998mm /39 ⁵ / ₁₆ " Plenum unit dimension Height 43mm /1 ¹¹ / ₁₆ " Width 536mm /21 ¹ / ₈ " Length 557mm/21 ¹⁵ / ₁₆ "			

Notes

1. All parameters listed are subject to change without notice and the specifications shown on unit data plates shall prevail;
2. E&OE. All values are approximate & subject to change.
3. Rated cooling test condition: indoor 27℃/19℃ outdoor 35℃/24℃;
 Rated heating test condition: indoor 20℃/12℃ outdoor 7℃/6℃.

Exploded Diagram and Parts List



No.	Figure No.	Name	Qty
1	7330-1000-21	Screw cap	4
2	7330-1000-02	Spiral case	1
3	7330-1000-10	Motor mounting plate	2
4	7330-1000-09	Compressor mounting plate	1
5	7330-1020-01	Motor bracket	2
6	7330-1000-07	Condensation cover	1
7	7270-1020-02	Outdoor motor	240V
	7280-1020-02	Outdoor motor	115V
8	7270-1000-06	Axial flow fan	1
9	7330-1080-02	Base	1
10	7330-1522-00	Condenser in tube assembly	1
11	7330-1521-00	Condenser assembly	1
12	7330-1080-09	lining board	2
13	7330-1070-01	Fan ring	1
14	7330-1523-00	Condenser out tube assembly	1
15	7330-1000-11	Control box cover	1
16	7330-1700-01	Control box	1
17	TDQ-04205	Compressor Capacitor	240V
	7280-1700-03ZH2	Compressor Capacitor	115V
18	7330-1700-08	Main board	240V
	7370-1700-08	Main board	115V
19	TDQ-04106	Fan capacitor	240V
	7280-1700-04	Fan capacitor	115V
20	7270-1000-17	Pipe clamp	2
21	7339-1000-02	Air duct interface	1
	7339-1000-03	Block	8
	7339-1000-05	Air duct	1
	7339-1000-09	Square duct ring	1

No.	Figure No.	Name	Qty
22	7339-1700-01	Display receiving board	1
23	7339-1010-07	Display mounting cover	1
24	7339-1010-06	Filter	2
25	7270-0000-08	Outlet gasket	1
26	7339-1010-01	Plenum assembly	1
27	7270-1000-01ZH1	Compressor	T3500
	7300-1000-01ZH2	Compressor	A3800
	7280-1000-01ZH2	Compressor	A3501
28	7339-1000-01	Plenum mounting bracket	1
29	7330-1010-00	Chassis base	1
30	7330-1500-00	Four way valve assembly	240V
	7370-1500-00	Four way valve assembly	115V
31	7330-1512-00	Evaporator out tube assembly	1
32	7330-1511-00	Evaporator assembly	1
33	7330-1513-00	Evaporator in tube assembly	1
34	7280-1000-08ZH1	Compressor locating rod	1
35	7330-1000-05	Centrifugal fan	1
36	7330-1030-02	Indoor motor	240V
	7340-1030-02	Indoor motor	115V
37	7330-1050-02	Upper foam	1
38	7330-1060-03	Lower foam	1
39	7330-1080-01	Canopy	1
40	18-10-60	Pan bolt	4
41	18-33-18	Large washer	4

Trouble Shooting Guide

No plenum display when unit turned ON

- Check whether the power is supplied to RV and circuit breakers are on?
- Check that the remote battery is OK?
- Check whether the remote control is off?

Cooling not available

- Check that the cooling mode is selected and the plenum display shows "❄".
- Use the remote control to set required temperature below the current room temperature.
- The compressor will delay a re-start for three minutes.

Heating not available

- Check that the heating mode is selected and the plenum display shows "🔥".
- Use the remote control to set required temperature above the current room temperature.
- More time would be needed for starting heating under extremely cold condition.
- When the unit is in heating mode and the outside temperature is very low the unit may automatically enter defrost mode. The heating will temporarily stop as the unit warms the outside coil to remove any frost & ice. Heating will resume once the outside coil has been cleared. During defrost the unit will display "dF".

Poor cooling capacity

- To make sure the filter is clean.
- Turn on the fan to high FAN to obtain the maximum capacity.

- To make sure all the doors and windows, as well as the sunroof are closed.
- Curtains and awnings can be used to decrease the heating load.

Fault codes displayed on the panel

Communication fault	E0
Room temperature sensor fault	E1
Indoor coil temperature sensor fault	E2
Outdoor coil temperature sensor fault	E3
No cooling effect	E4
Outdoor coil temperature too high	E5

- In case there is "0" or a jumbled display while on generator supply this may indicate unstable voltage and current.

Before contacting Houghton for technical support please collect the following information.

- Are any error codes displayed?
- Is the display panel in normal operation or not? Does it display a temperature from 16 to 30°C?
- Can you adjust the setting temperature when in cool or heat mode?
- Is there a "0" shown in the display?
- Is the display showing a jumbled display?
- When in fan mode is there any air flow from the plenum outlets?
- Can you hear the compressor starting or stopping in heating or cooling mode?

Your help in collecting this information will greatly assist the Houghton service team in correcting any problems – Thank you.

Circuit Diagram

