



MODEL NUMBER: _____

SERIAL NUMBER: _____

DATE PURCHASED: _____

OWNERS MANUAL

OF CARAVAN AIR - CONDITIONER

BELAIR
MODEL

T150

T3500

T135C



For your safety using, 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 product and the user, 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 machine 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 controller 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.
-  Do not put hand into discharge duct during installation as this may damage the foam coil tray.
-  Ensure that your electrical supply and wiring is correctly sized for the power demand of the air-conditioner. Refer to the specification requirements of the product.
-  This appliance is not to be used by persons(including children) with reduced physical,sensory or mental capabilities,or lack of experience and knowledge,unless they have been given supervision or instruction.Children being supervised not to play with the appliance.

-  Keep the inlet and outlet of the inside and outside units of the caravan air conditioner smooth.
-  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 odor,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. How to provide an efficient operation

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, 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.
- 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 the unnecessary electrical appliances within the caravan to reduce the heat-load.
- Please cook outside of the caravan.
- Park the caravan at a shade place.
- In case of exceptional high temperature, turn on the air-conditioner in advance during the morning.
- Adjust the set temperature of the remote control to prevent from frequent start or stop of the unit.

C. Condensation

For the areas where the air humidity is comparatively low, when the warm moist air within the caravan meets with the cold wind from the outlet, condensate water may be caused, which is also called as "sweating". In this case, make sure the following measures are taken:

- Close all the doors, skylights, windows and draw the curtains to reduce the warm moist air incoming.
- In the operation of the air-conditioner, a large number of condensate water will be produced on the roof as the warm moist air is exhausted by the operation of the air-conditioner. The size of the condensate water is decided by the air humidity. In this case, do not adjust the FAN to low or auto mode but adjust it to high FAN mode to increase the circulation of the air and reduce the condensation degree.

Please be noted that losses caused by the condensate water are not within warranty scope.

D. Choosing and using of generator

HOUGHTON BELAIRE requires an AC power source and may require for generator driving in some remote areas. Requirements for generator include: efficient power source, stable currency, output power $\geq 2800\text{W}$, output waveform: sine wave, that shall meet the driving requirements of the compressor. The user shall consult with the generator supply and fully refer to their suggestions.

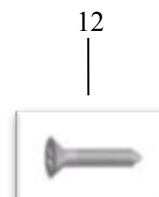
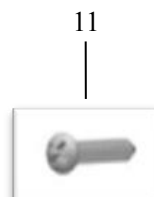
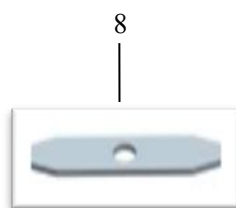
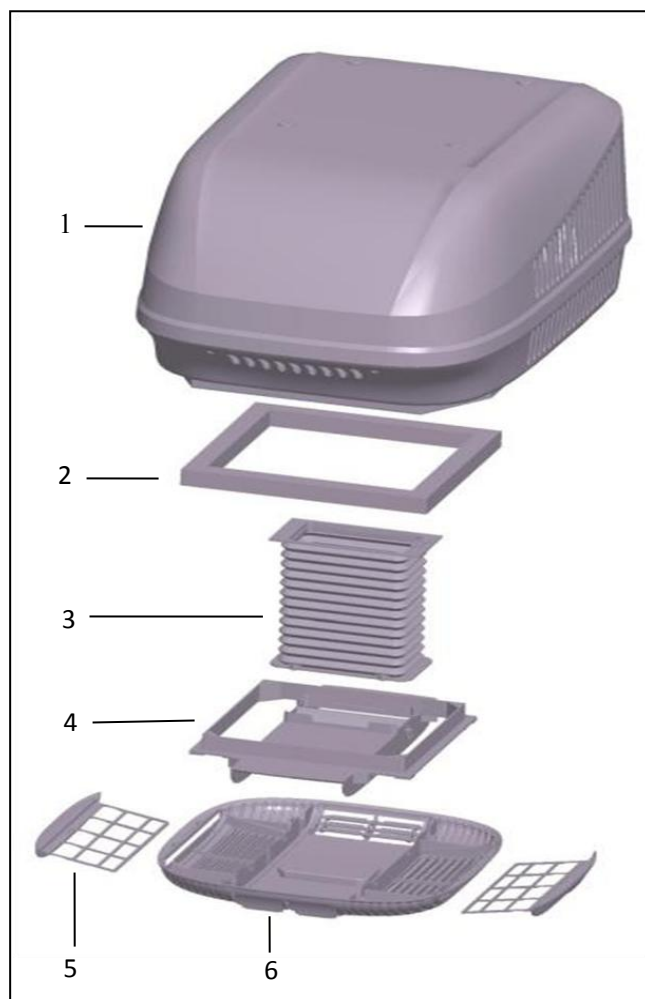
Please be noted that losses caused to the product by the using of the generator are not within warranty scope.

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 filter ×2
6. Plenum assembly ×1
7. M8x120mm bolts ×4
8. Fixing metal plate ×4
9. Large washer ×4
10. Flat head screw ×8
11. Pan head tapping screw ×4
12. Countersunk head tapping screw ×6



Installation Guidance

Installation instructions

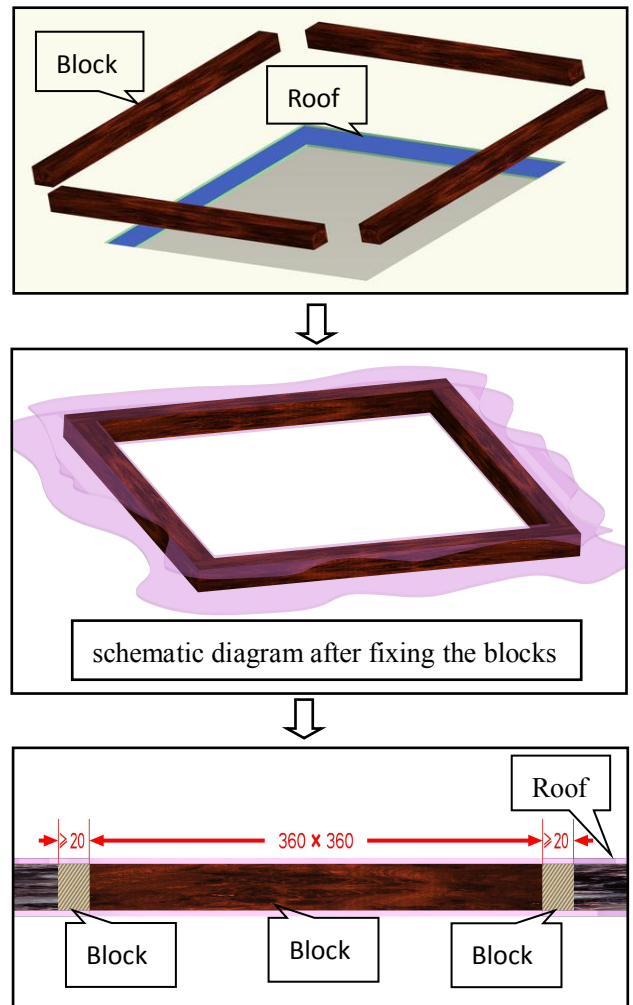
- Read this Manual thoroughly before installation and understand the guidance.
- Abide by the national circuit operation rules in the installation.
- Do not add other parts or restructure the product in the installation.
- The installers shall be equipped with refrigeration technician qualification certificates.
- 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 (40kg).
- The opening part of the roof shall be able to support the air-conditioner's weight and allow for the corresponding operations.
- Minimum thickness of roof: $\geq 25\text{mm}$; maximum thickness of roof: $\leq 85\text{mm}$.
- If the roof's thickness is beyond the above requirements, you can purchase the enhanced length of the outlet air duct and M8 installation bolts from HOUGHTON or the local distributor.

Load bearing of roof

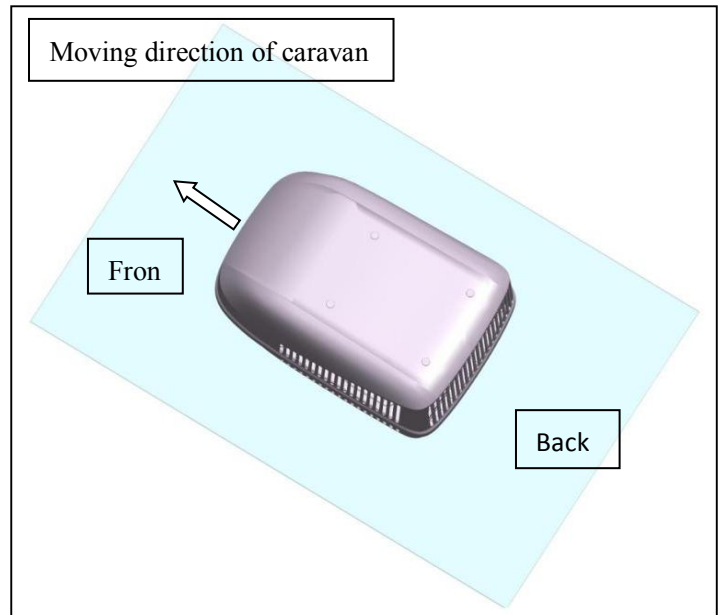
- The roof shall be able to bear the weight of the air-conditioner and shall be level without accumulating water. It is suggested that the caravan manufacturer confirms the suitability of the roof for load bearing.
- If the roof is not preserved with holes, they shall be punched from the top of the roof to the inside and use them as leading to punch through the ceiling. It is suggested to consult with the caravan manufacturer to get the best punching method.
- The square holes (360 x 360mm) on the roof require for woods of 20mm minimum thickness to padding and fixing to bear the pressure once the bolts are fixed and keep air away from entering the cavity of the roof. Please be careful for the preserved wire holes.



Installation position

Before the installation, consider the installation position:

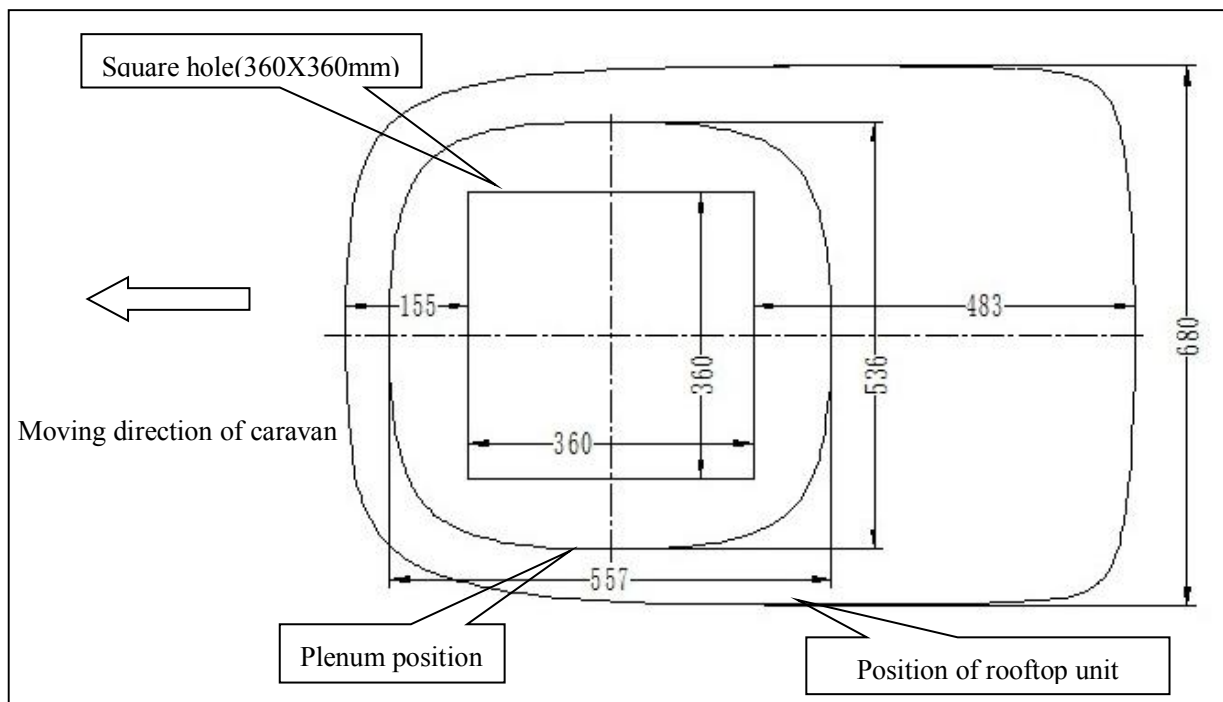
- At least 150mm is needed on the left and right side.
- At least 200mm is needed at the front and back area.
- At least 50mm is needed for the height.
- Rooftop unit is to be put in the center of the roof to ensure the balance of air flow.
- The direction of the rooftop unit should be the same with 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

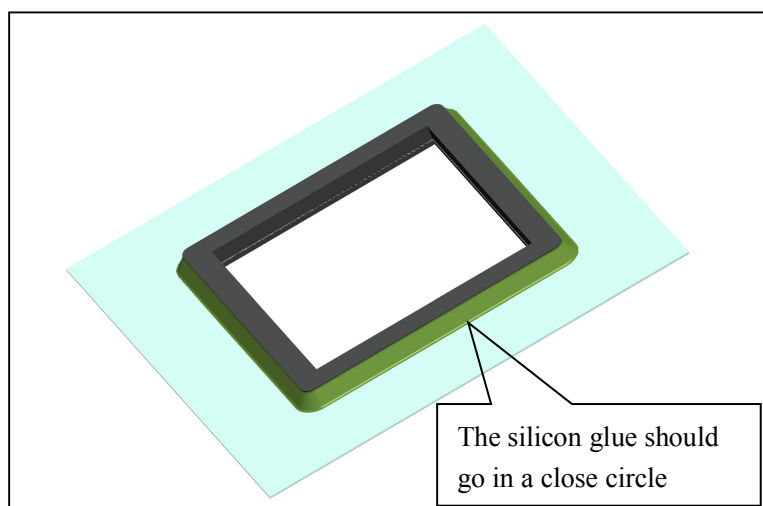
Angle of inclination of the air-conditioner shall not be larger than 5° and the back part of the air-conditioner shall not be higher than the front part.

If advice on installations outside of these limits, please contact with the local distributor.



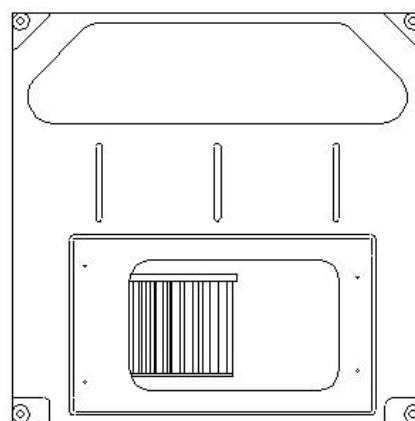
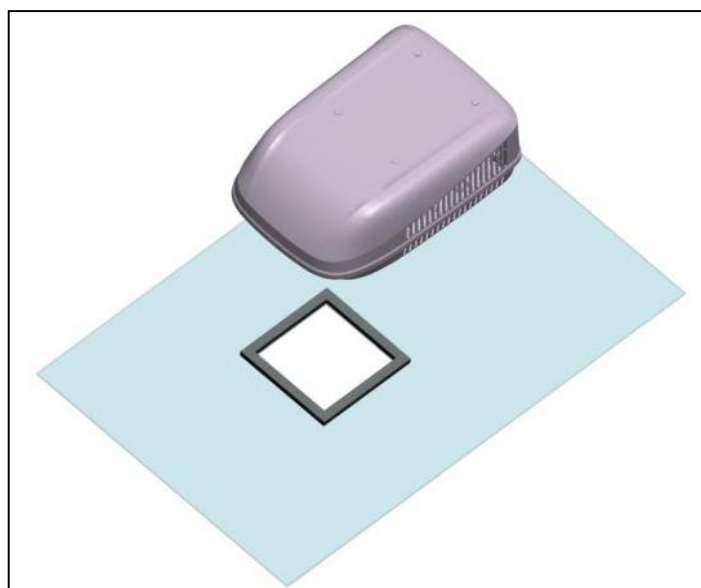
Install outlet gasket

- 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.



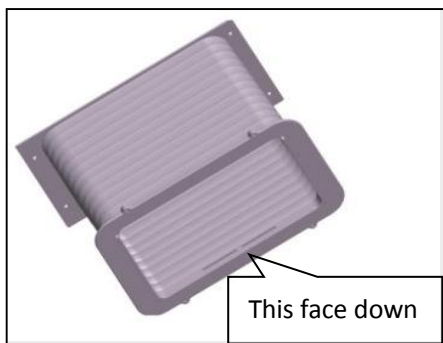
Install outdoor unit

- 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(360x360mm). 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(360x360mm) on the roof.



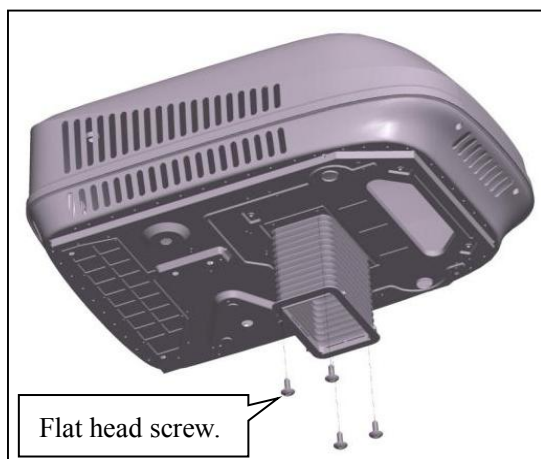
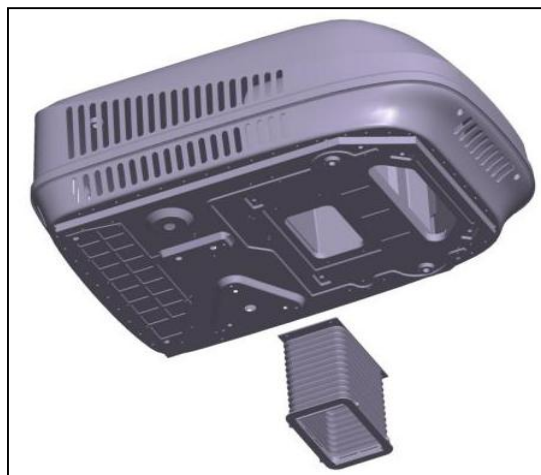
Install outlet air duct

- Cut the 4 cable ties and fix the outlet air duct to the outdoor unit from inside of caravan using 4 flat 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.

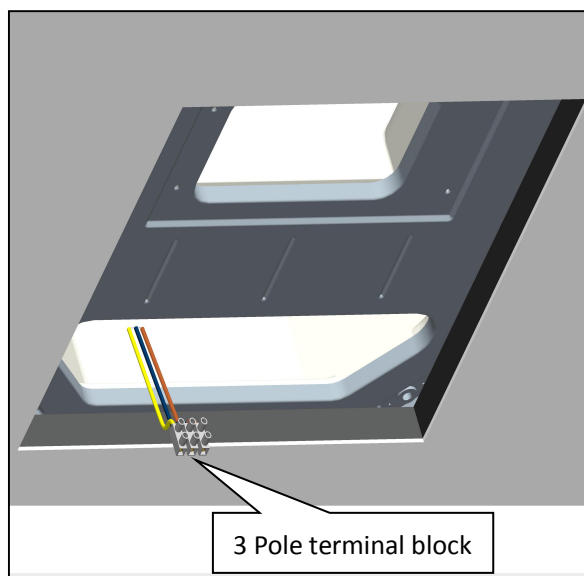


Connect the power

- 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.

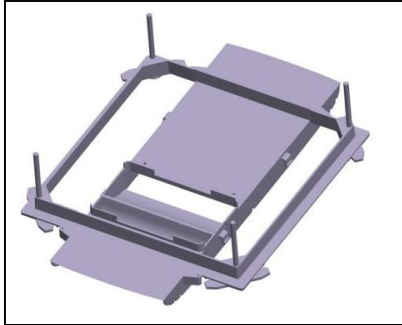
Note

Match the corresponding active (brown), neutral (blue) and the ground wire (yellow green) 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.

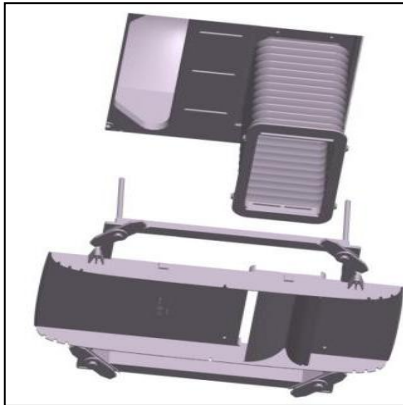


Install plenum mounting bracket

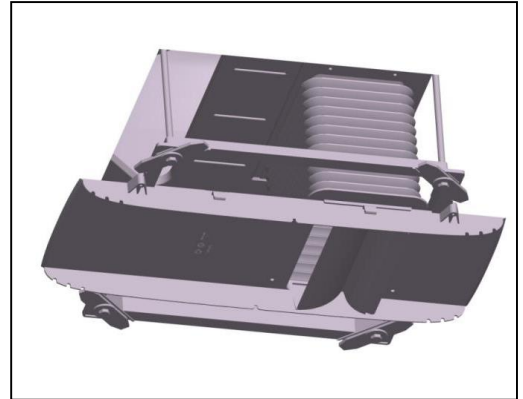
- Overlap M8 bolt with washer and fixing metal plates, and get bolts through the 4 holes on corners of the plenum mounting bracket.
- Make sure fixing metal plates is 10mm distance from the plenum mounting bracket in order to adjust angle during installation.



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



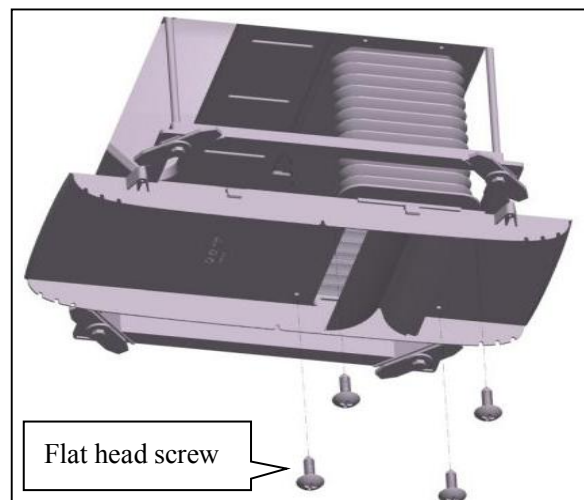
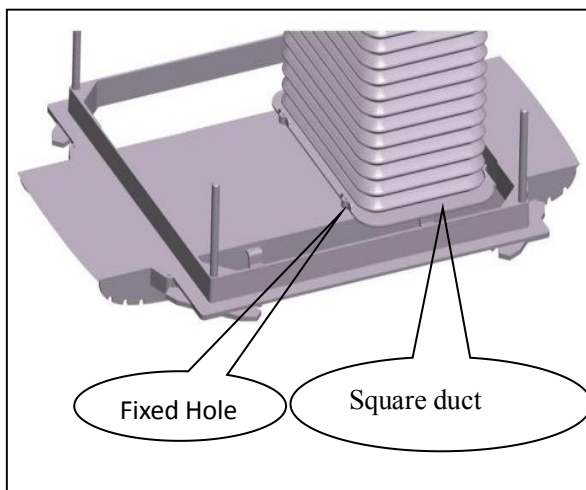
- Tighten M8 bolt to make sure the plenum mounting bracket is connected with outdoor unit tightly.
- It's suggested that when screwing the bolt, torque should be 7N.M which could make the connection between outdoor unit and outlet gasket perfect.



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

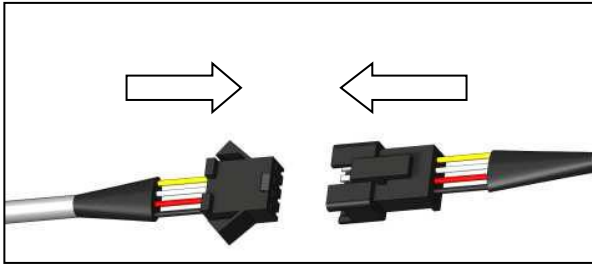
Connect outlet air duct

- 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.

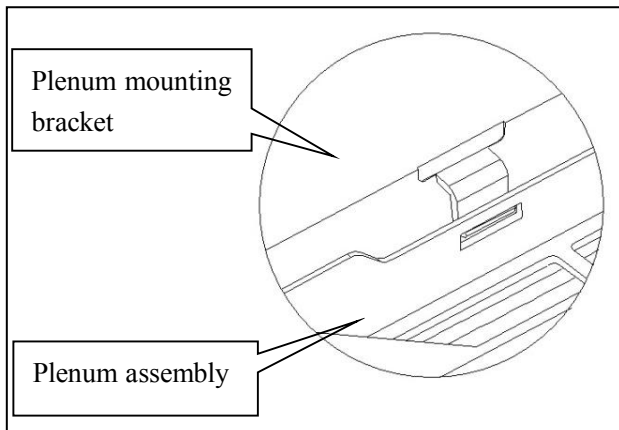


Install plenum assembly

- Connect the socket and plug of the display panel wires and the controller wires; please notice that colors of the wires should be matching (**yellow to yellow, red to red, etc**);



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

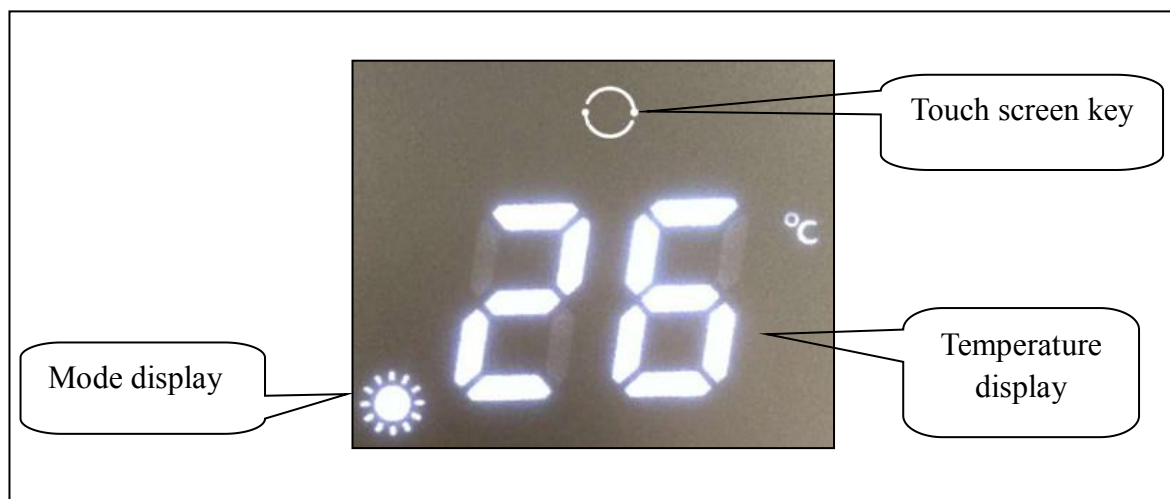
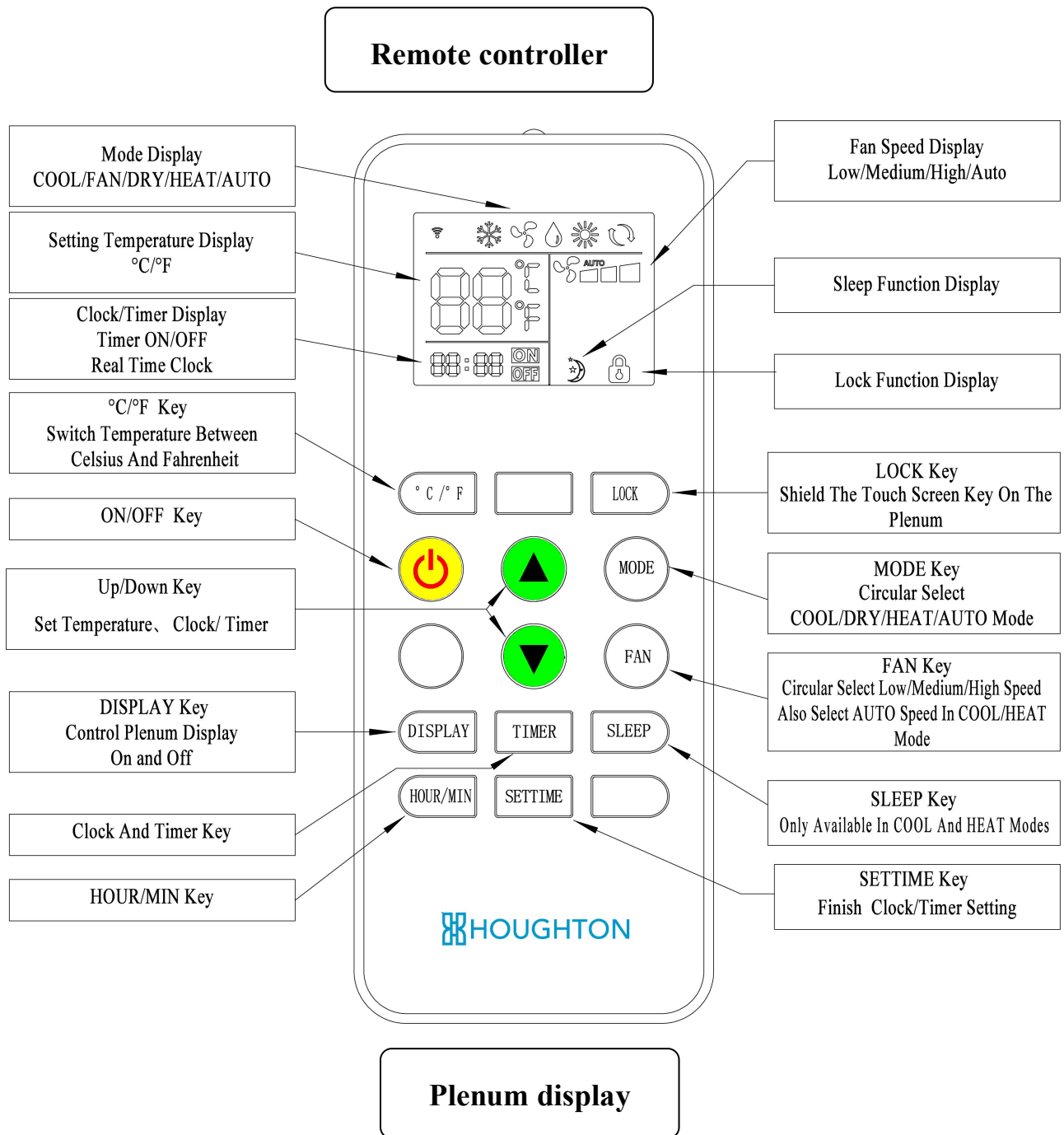
Instructions for Use

- Switch on the power to the air-conditioner at the isolation breaker.
- Start the air-conditioner by switching to FAN mode to select the fan FAN.
- Operate in low FAN, medium FAN and high FAN in turn to check normal operation.
- To select the COOL mode, adjust the set point temperature to three degrees lower than the room temperature, the unit will start to blow cold air after the compressor starts.
- To select the HEAT mode, adjust the set point temperature to three degrees higher than the room temperature, the unit will start to blow hot air after the compressor starts.

Note


After selecting the COOL/HEAT mode, the compressor will have a delay start for three minutes.

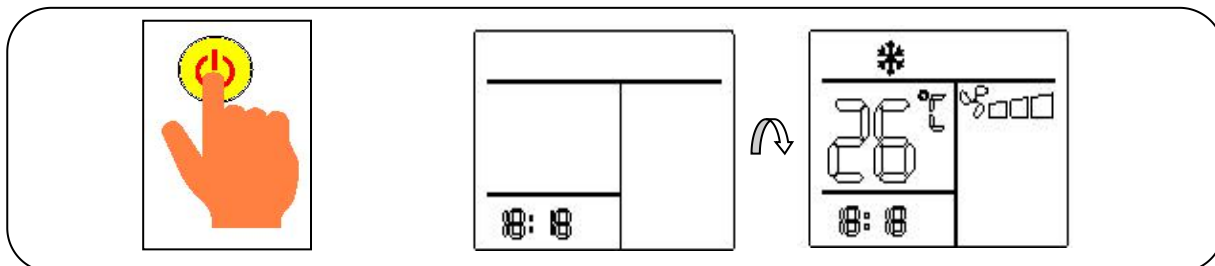
Operation Instruction





1. Operation of the remote controller

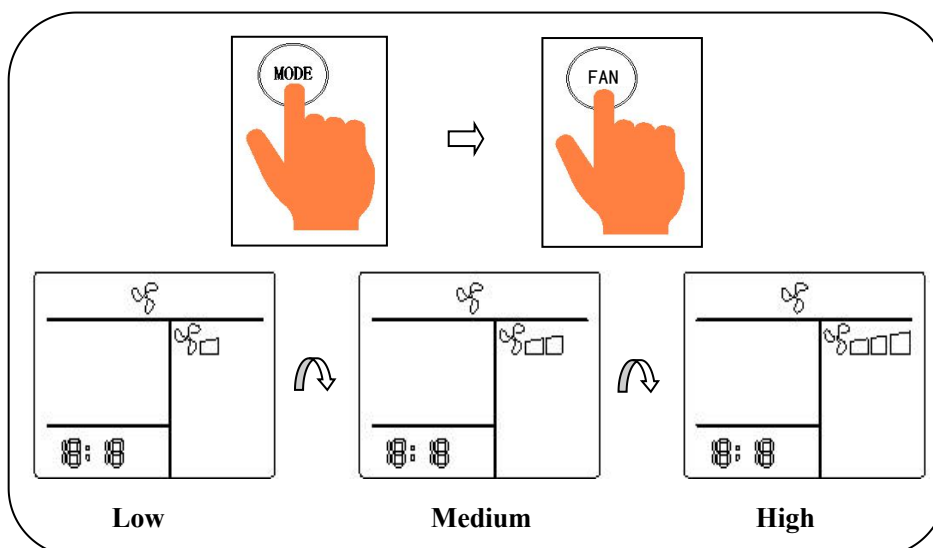
Turn on

- Press the on/off “” key, the machine turns on, the buzzer of the plenum beeps one time and the running mode and temperature will be displayed.






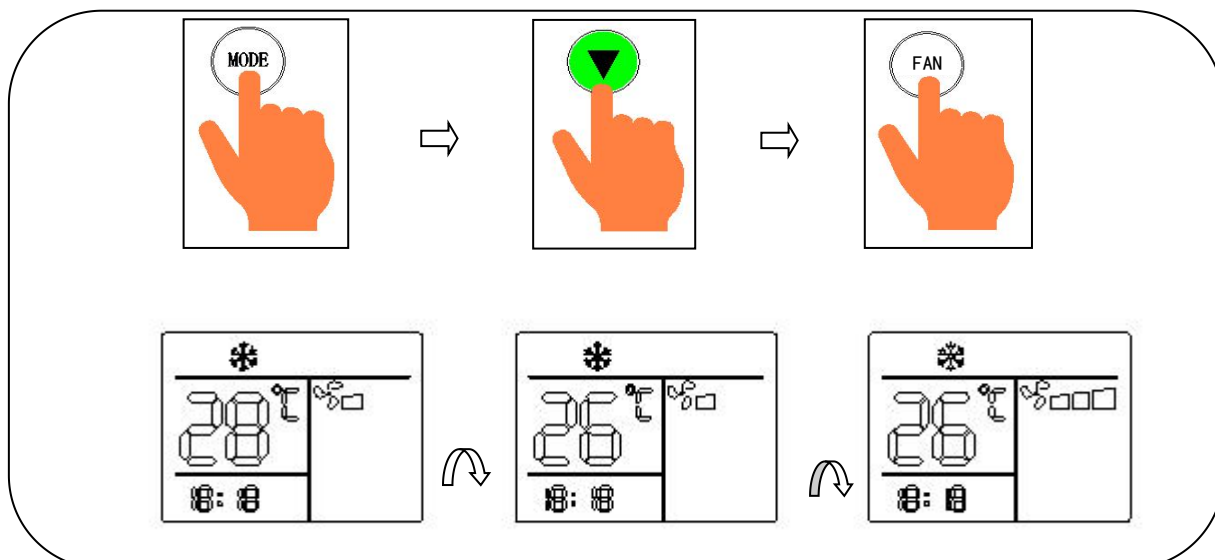
FAN mode

- Press the “MODE” key, select the “” mode, Press the “FAN” key, Select Low/Medium/High FAN circularly and the plenum will display “” and the indoor environment temperature.





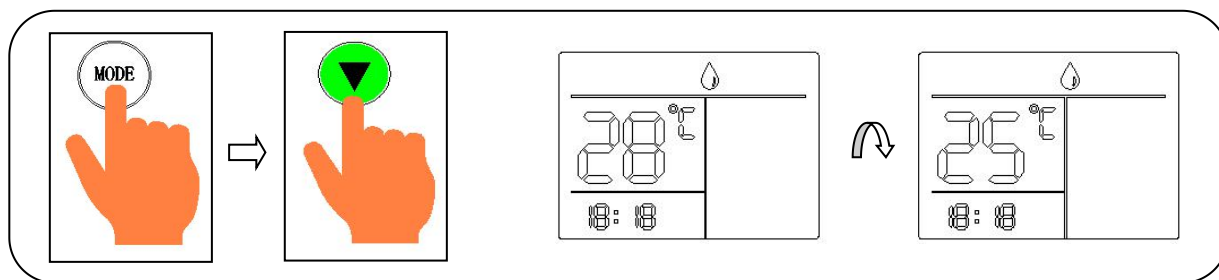
COOL mode

- Press the “MODE” key, select the “” mode, Press the down “” key to set the temperature lower than the room temperature, Press the “FAN” key to select different speed. and the plenum will display “” and the setting temperature.





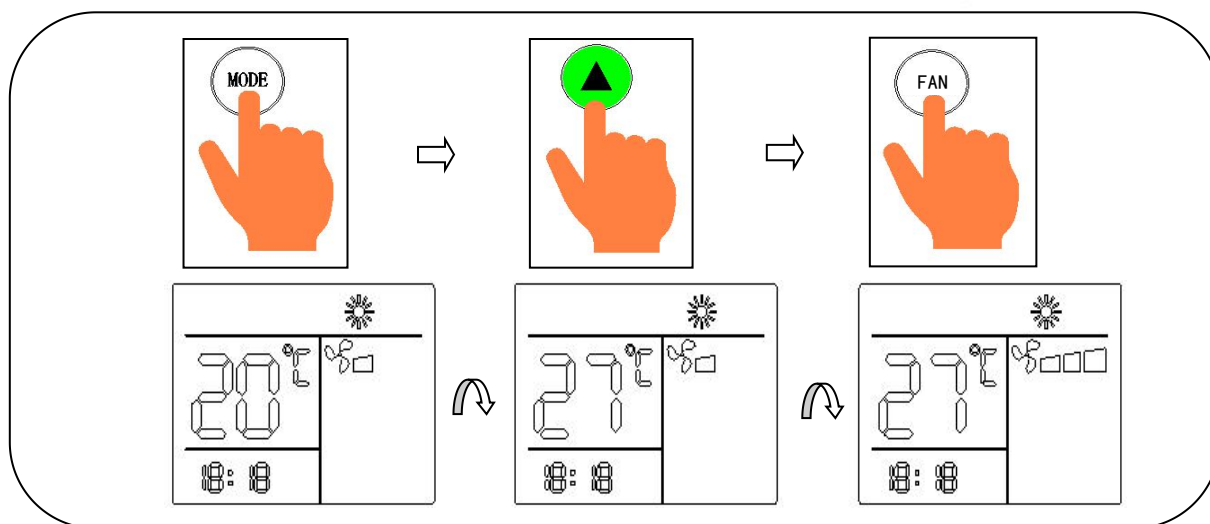
DRY mode

Press the “MODE” key, select the “” mode, Press the down “▼” key to set the temperature 1℃ lower than the room temperature, and the plenum will display “” and the setting temperature.








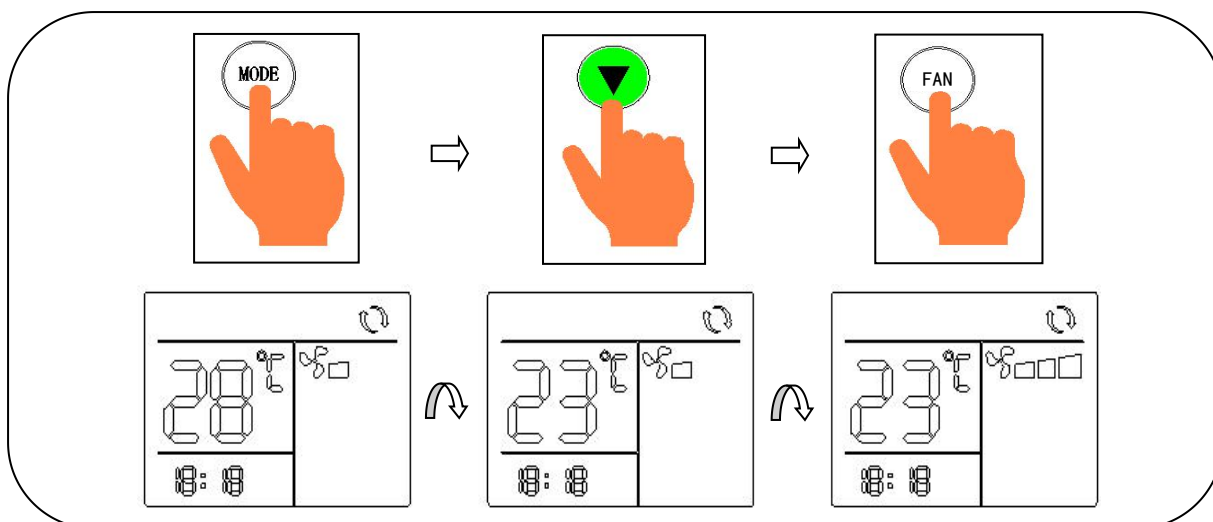
HEAT mode

- Press the “MODE” key, select the “” mode, Press the up “▲” key to set the temperature higher than 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 set different temperature, Press the “FAN” key to select different fan speed. and the plenum will display “” and “”, or “” and “”, and the setting temperature.

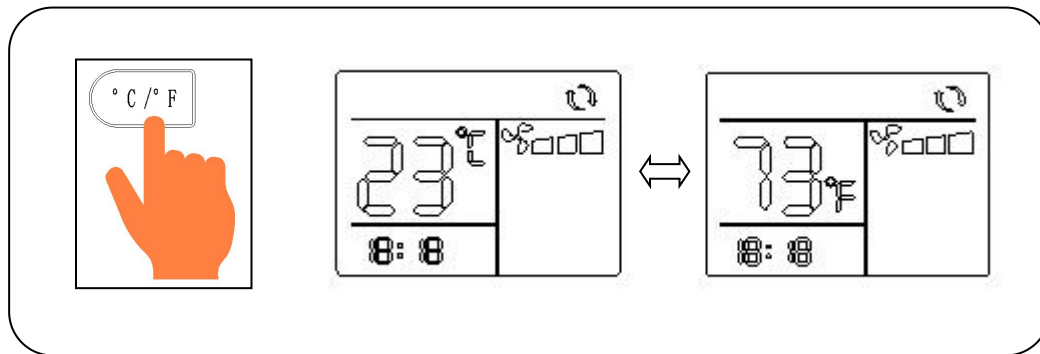


Note


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.

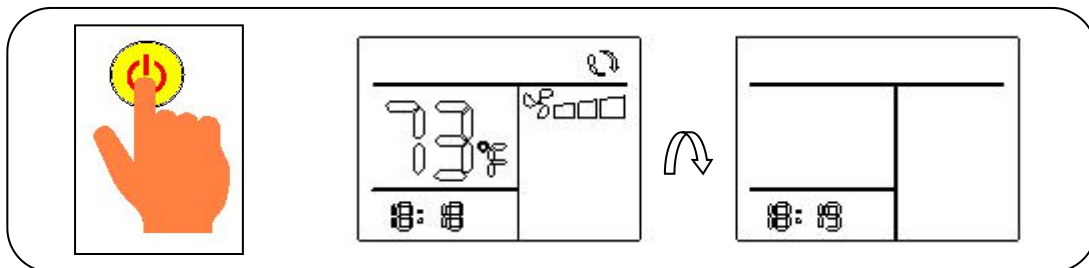
Celsius and Fahrenheit degree change

- In any mode, Press the “°C/°F” key, you can select temperature between Celsius and Fahrenheit.




Turn off





- Press the on/off “” key again, unit turns off and the plenum will display nothing.



2. Plenum operation

- Press the touch screen “” key on the plenum, the setting will be circularly from “OFF ->COOL ->FAN ->HEAT” modes for every pushing. The setting temperature is 24°C in high fan FAN.







- Mode display of the plenum are as: COOL “”, DRY, FAN “”, HEAT “”, AUTO “”.

Note

In case the plenum touch screen key is locked by the remote controller, operations of the key would be not available. Press the lock key on the remote controller again to unlock!

Tips

- When in the automatic mode, according to the difference between the setting temperature and the environmental temperature, the panel will display “” and “” (automatic heating), or “” and “” (automatic cooling) in the same time.
- The remote controller should be operated by directing at the plenum, which will beep once when received signal, otherwise operate after adjusting the distance and angle.
- The unit will blow cold air in COOL mode and hot air in HEAT mode.
- When the unit is on, press the “DISPLAY” key on the remote controller, the control plenum LED display will be on and off.
- When the unit is on, press the “LOCK” key on the remote controller to shield and invalidate the touch screen key on the plenum.
- The air-conditioner features power cut memory and automatic starting-up after power back functions.
- Low temperature heating will cause frosting, during when it is normal to show “DF” on the plenum.
- When the environmental temperature is lower than 0°C, the heating effect is reduced, suggest to adopt other ways for heating in the same time.
- If the device is left unused for long time, please remove the batteries from the remote controller.

Product Maintenance

Filter

- The return air filters are the only components that need to be maintained periodically.
- Check and clean the filter screen 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 panel before washing in warm water with a touch of detergent.



Replacement filters can be ordered separately.

Bolt check

- It is recommended that the 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-conditioners life.

Maintenance

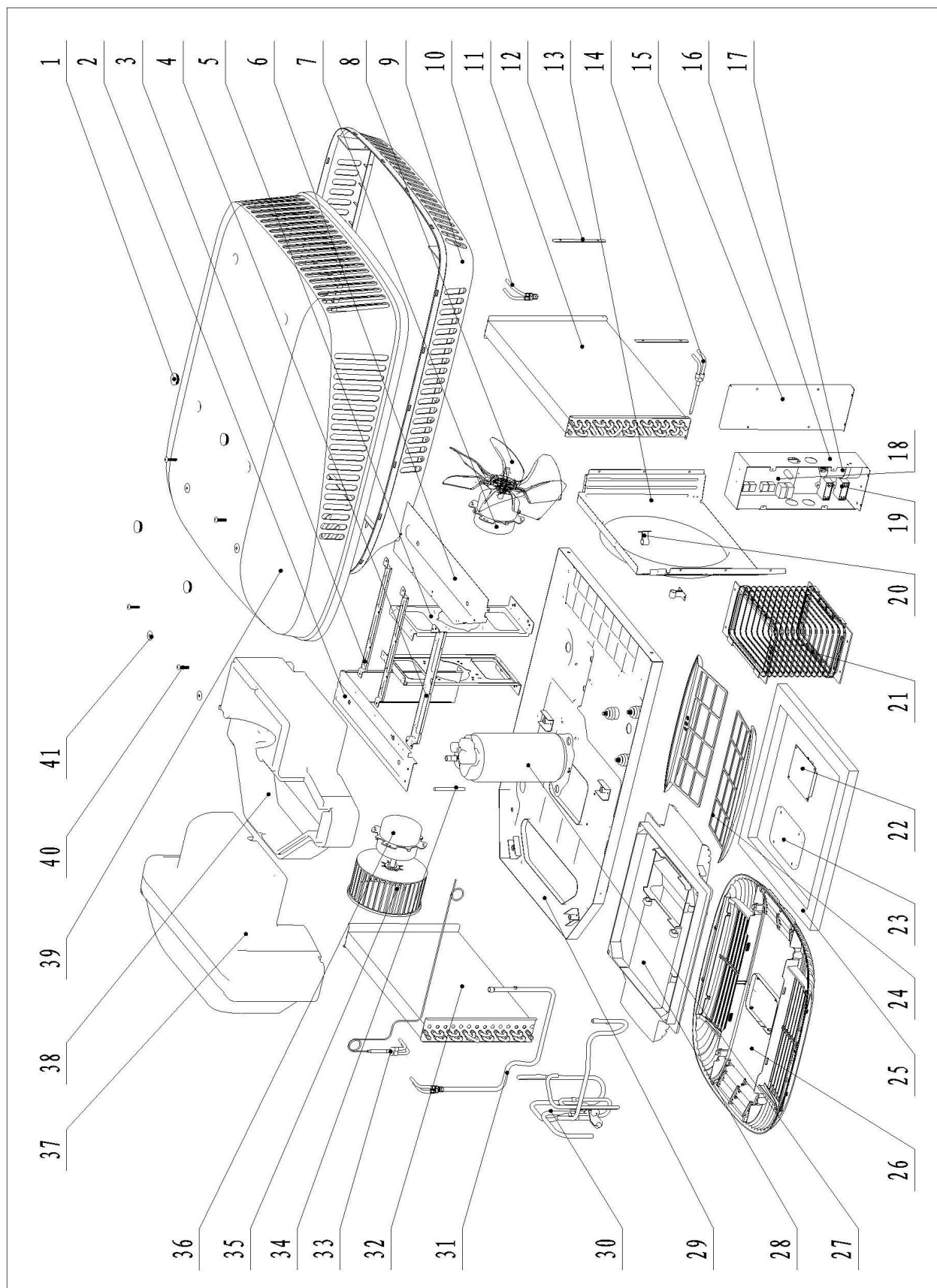
- It is recommended that the air-conditioner is operated regularly to ensure good performance.
- In the case of a caravan that will not be used regularly then the unit should be operated for 20-30 minutes every 6 months.
- In case the caravan is parked outdoors for long time, suggest to use protective jacket to protect the outdoor unit of the air-conditioner from wind and sun.

Specification Parameters

Model	T135C	T150	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(kPa)	4500	4500	4500
Minimum design pressure (kPa)	3000	3000	3000
Maximum air flow (l/s)	165	165	150
Installed weight (kg)	33.5+2.8	36.5+2.8	35.5+2.8
Outdoor unit dimension	Height 340mm	Width 680mm	Length 998mm
Plenum unit dimension	Height 43mm	Width 536mm	Length 557mm

- Notes:** 1. All parameters listed are subject to change without notice and the nameplates on the machine shall prevail;
2. E&OE All values are approximate & subject to change.

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	T150
	7280-1000-01ZH2	Compressor	T135C
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 display of the plenum when press the On/Off

- Check whether the access to the power of the RV OK?
- Check whether the remote battery is OK?
- Check whether the remote control is off .
- Poor connecting of the control line between the outdoor unit and the plenum, maybe fallen off .

Cooling not available

- To make sure the mode is chosen as Cooling, and the light of cooling mode “❄” is on.
- The temperature setting value on the remote controller should be lower than the indoor temperature.
- The compressor has a delay start for three minutes.

Heating not available

- To make sure the mode is chosen as Heating, and the light of heating mode “☀” is on.
- The temperature setting value on the remote controller should be higher than the indoor temperature; the compressor has a delay start for three minutes.
- More time would be needed for starting heating under extremely cold condition.

Poor cooling capacity

- Ensure the filter is clean.
- Turn on the fan to high FAN to obtain the maximum capacity.
- 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
Inadequate coolants	E4
Temperature anomaly	E5

E1: Room temperature sensor

Fault in connection to temperature sensor or other damage.

E2:Indoor coil temperature sensor

Fault in connection to temperature sensor or other damage.

E3:Outdoor coil temperature sensor

Fault in connection to temperature sensor or other damage.

E4: Insufficient refrigerant-capillary tube fracture leads to coolants leakage, compressor fault or sensor failure.

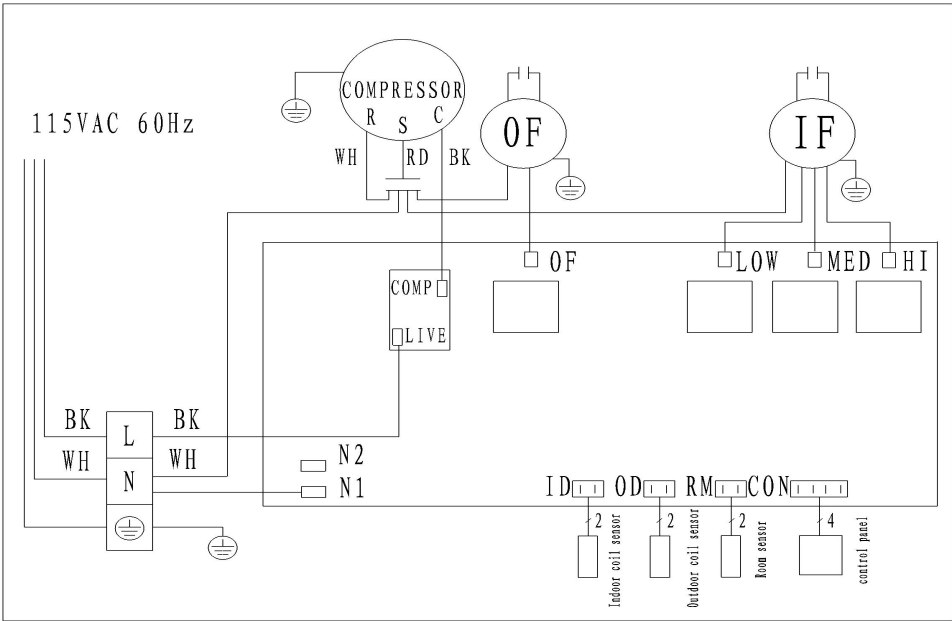
E5: Outdoor coil temperature too high when cooling or Indoor coil temperature too high when heating.(E5 during cooling may be caused by high ambient temperature,or not smooth air flow at the condenser or poor performance of outside motor.When heating, the outside motor could stop when the ambient temperature is too high, but this is not failure, it's the self protection the system takes to prevent unit from overheating.)

- In case there is “0” or any messy code when the generator supplies power, this may indicate unstable voltage .

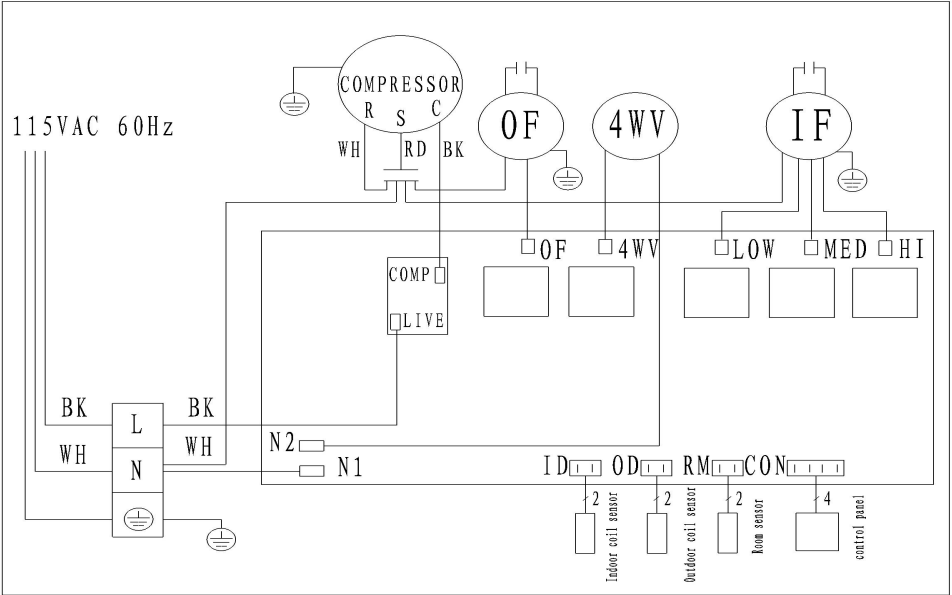
Answer the following questions as far as possible when contacting for fault diagnosis:

- If any error code is displayed?
- Whether the display panel is in normal operation or not? Whether the temperature displays from 16 to 30℃?
- Whether the temperature can be freely adjusted from 16 to 30℃ when in cool or heat mode?
- Whether there is “0” shown in the display?
- Whether any messy code on the display?
- Whether the switching of low, medium and high FAN wind is available after FAN setting? Whether any air out?
- Whether the compressor is working or not?

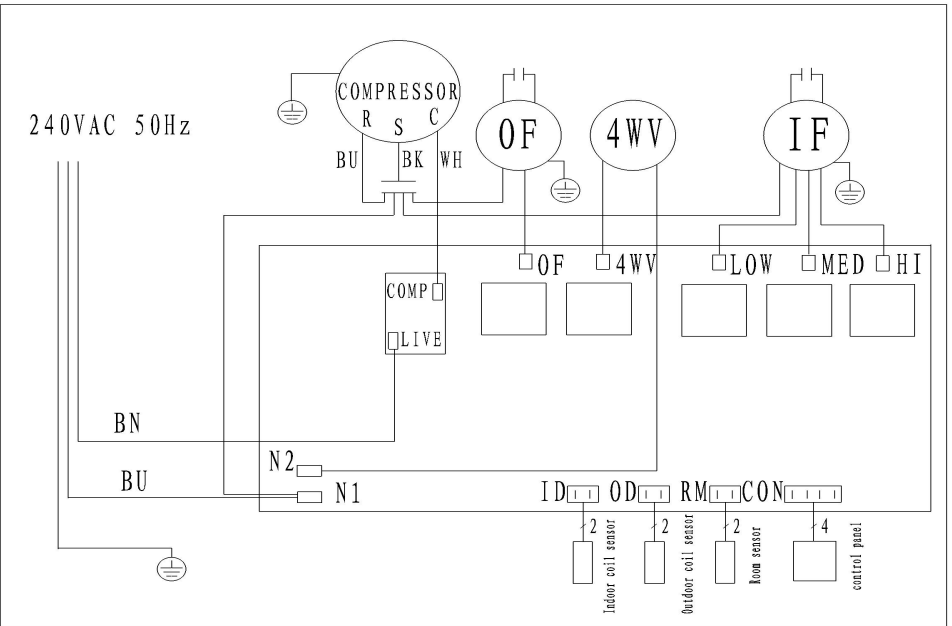
Circuit Diagram



T135C



T150



T3500



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