



R410a Installation and fault finding training

Contents:

- General introduction
- Disassembly and reassembly
- Installation guide
- Trouble shooting



General introduction:

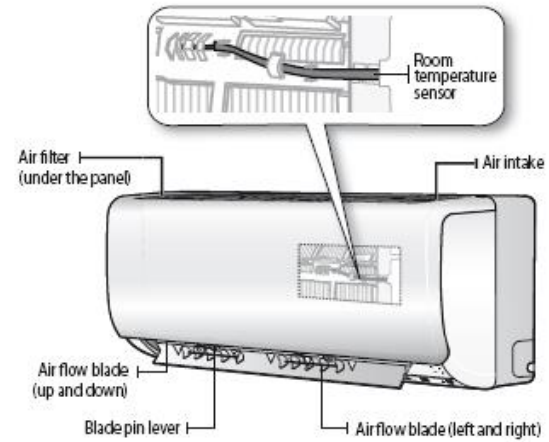


1. Product Introduction

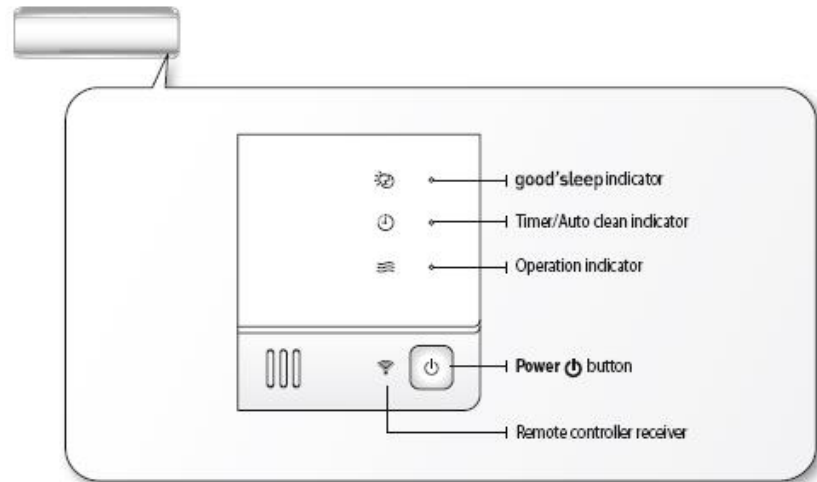
Development Specification



Main parts

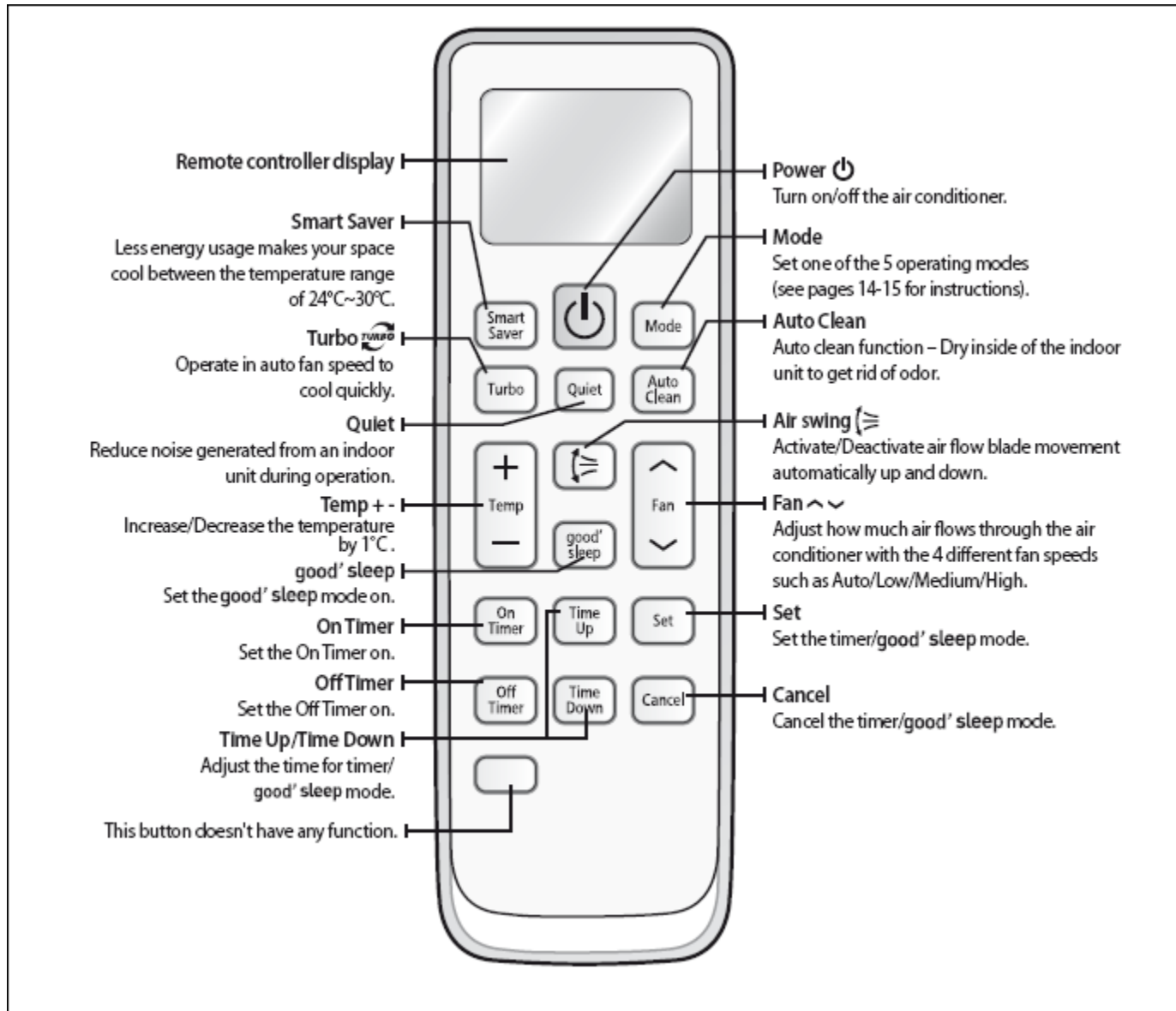


Display



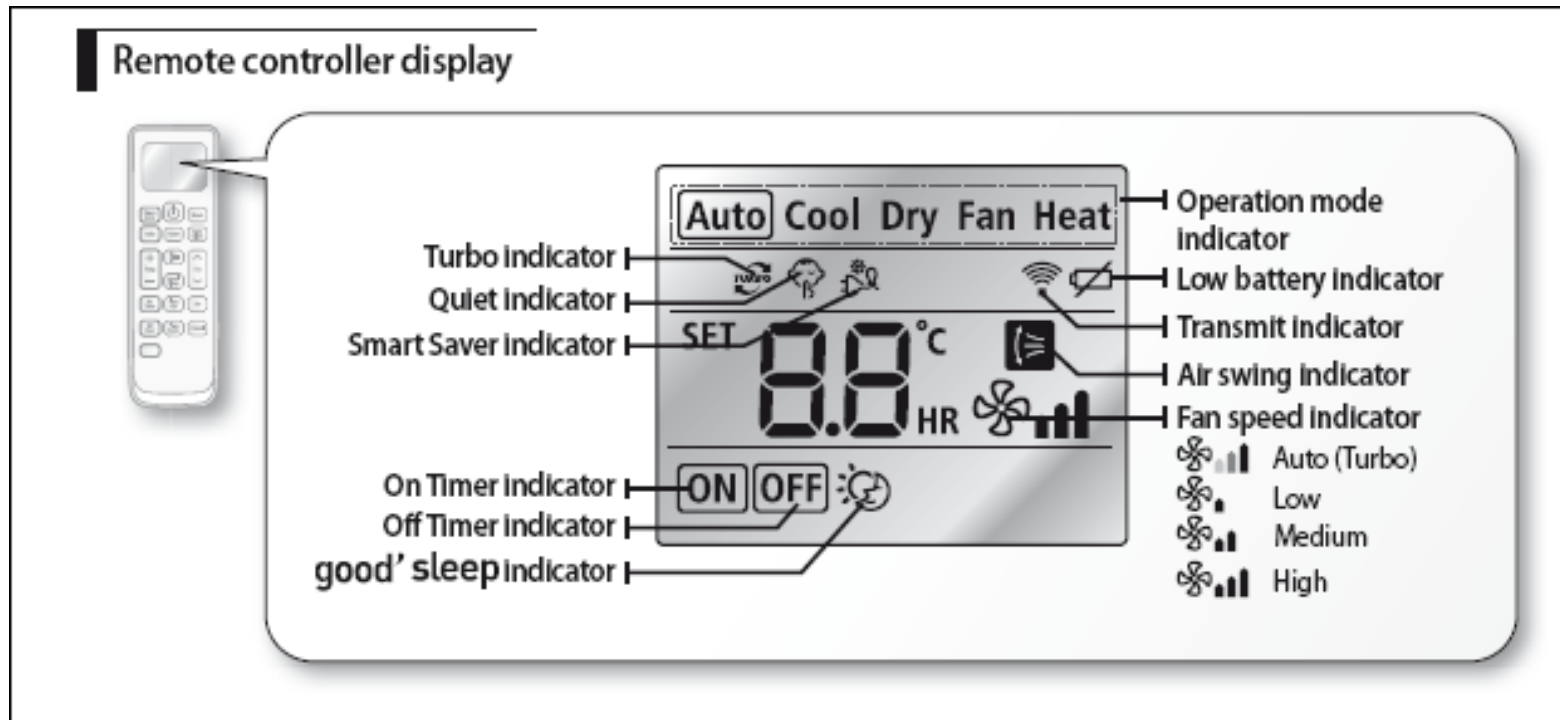
Instruction of Function :

Remote controller buttons



Instruction of Function :

Remote controller display



Instruction of Function :

Basic Function


Auto	In Auto mode, the air conditioner will automatically set the temperature and fan speed depending on the room temperature detected by the room temperature.
Cool	In Cool mode, the air conditioner will cool your room. You can adjust the temperature and the fan speed to feel cooler in hot season.
Dry	The air conditioner in Dry mode acts like a dehumidifier by removing moisture from the indoor air. Dry mode makes the air feel refreshing in a humid climate.
Fan	Fan mode can be selected to ventilate your room. Fan mode will be helpful to refresh the stale air in your room.
Heat	The air conditioner heats as well as cools. Warm your room with this versatile appliance in the code of winter.














Instruction of Function :


Remote Controller

Press the  button to turn on the air conditioner.

Press the  button to set the operating mode.

Press the  button to set the desired fan speed.

Auto	 (Auto)
Cool	 (Auto),  (Low),  (Med),  (High)
Dry	 (Auto)
Fan	 (Low),  (Med),  (High)
Heat	 (Auto),  (Low),  (Med),  (High)

Press the  button to adjust the temperature.

Auto	You can adjust the desired temperature by 1°C within the range of 16°C~30°C.
Cool	You can adjust the desired temperature by 1°C within the range of 16°C~30°C.
Dry	Temperature adjustment is not possible.
Fan	Temperature adjustment is not possible.
Heat	You can adjust the desired temperature by 1°C within the range of 16°C~30°C.

Instruction of Function :

Remote Controller


Adjusting the air flow direction

Vertical air flow

Air flow blades move up and down.



Press the **Air swing**  button on the remote controller.

- ▶ Air swing indicator will be on and air flow blades move up and down continuously to circulate the air.
- ▶ Press the **Air swing**  button on the remote controller again, to keep the air flow direction in a constant position.

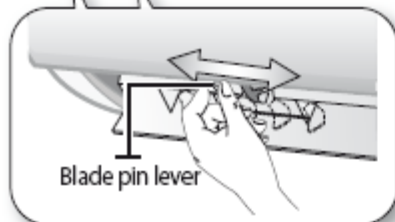


Horizontal air flow

Make sure one of the blade pin lever that stick out of the air flow blades are not broken.



Move the blade pin lever left or right to keep the air flow direction in a constant position you prefer.



- Be extremely careful with your fingers while adjusting the Horizontal air flow direction. There is a potential risk of personal injury when the unit is mishandled.

Instruction of Function :

Remote Controller

Using the Turbo function

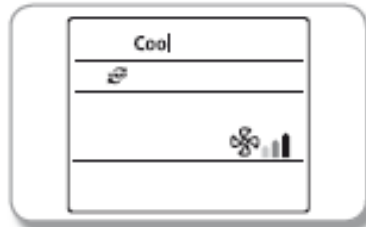
Turbo function will be helpful to cool your room quickly and effectively.



Press the **Turbo** button on the remote controller during Cool mode.

- ▶ Turbo indicator appears on the remote controller display and the air conditioner operates in Turbo function for 30 minutes.

Cancel Press the **Turbo** button once again.



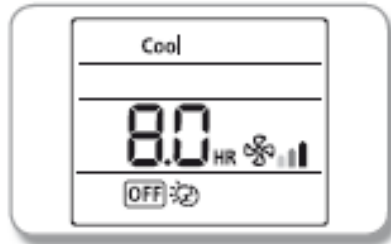
- Turbo function is only available in Cool mode.
- If you press the **Mode** button while the Turbo function is on, it will cancel the function.
- Temperature/Fan speed cannot be adjusted while using this function.

Instruction of Function :

Remote Controller

Good sleep mode

For a comfortable sleep, the air conditioner will operate it Fall asleep ▷ Sound sleep ▷ Wake up from **good' sleep** mode.



When the air conditioner is on and in cool/heat mode

1. Press the **good' sleep** button on the remote controller.
 - ▶ **good' sleep** indicator appears and Off timer indicator starts blinking on the remote controller display.
2. Press the **Time Up** or **Time Down** button to set the time.
 - ▶ You can set the time in half hourly unit from 30 minutes ~ 3 hours and hour unit from 3 hours ~ 12 hours.
 - ▶ Operating hour can be set from minimum 30 minutes to maximum 12 hours.
 - ▶ Default operation hour is set to 8 hours.
3. Press the **Set** button to active it on.
 - ▶ Off timer indicator stops blinking and reserved time will be displayed for 3 seconds. Then the air conditioner operates in good'sleep mode.
 - ▶ If you don't press **Set** button within 10 seconds after pressing the **good' sleep** or **Time Up** or **Time Down** button, the air conditioner will return to previous status. Check Off timer indicator and **good' sleep** indicator on the indoor unit.

Instruction of Function :

Remote Controller

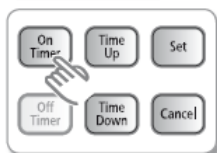
Setting the On/Off timer


Setting On timer while the air conditioner is off / Off timer while the air conditioner is on.

You can set the air conditioner to turn on/off automatically at desired time.

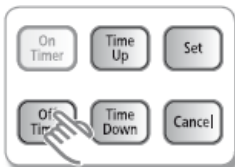
Setting On timer while the air conditioner is off / Off timer while the air conditioner is on

Setting On timer



1. Press the **On Timer/Off Timer** button.
 - ▶ On/Off timer indicator will blink on the remote controller display.
2. Press the **Time Up** or **Time Down** button to set the time.
 - ▶ You can set the time in half hourly unit from 30 minutes ~ 3 hours and hour unit from 3 hours ~ 24 hours.
 - ▶ Operating hour can be set from minimum 30 minutes to maximum 24 hours.
3. Press the **Set** button to active it on.
 - ▶ On timer indicator stops blinking and reserved time will be displayed for 3 seconds.
 - ▶ If you don't press **Set** button within 10 seconds after selecting the time the air conditioner will return to previous status. Check On timer or Off timer indicator and  Indicator on the indoor unit.

Setting Off timer



Cancel Press the **Cancel** button.

Additional options available in On timer mode

Mode You can select from Auto/Cool/Dry/Fan/Heat.

+ Temp - You can adjust the temperature in Auto/Cool/Dry/Heat mode.



- Only the latest setting timer will be applied between the On Timer/Off Timer and good' sleep Off timer functions.
- After setting the timer, the set time will be displayed for 3 seconds before it disappears.

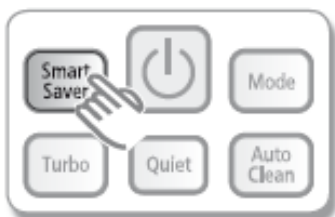
Instruction of Function :

Remote Controller

Using the Smart Saver function

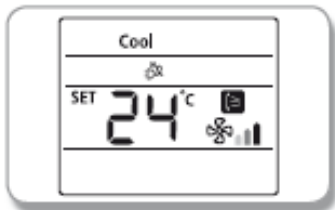
This function will set the temperature range limit to help you save energy while the air conditioner is operating in Cool mode.

This function will set the temperature range limit to help you save energy while the air conditioner is operating in Cool mode.



Press the **Smart Saver** button on the remote controller while the air conditioner is operating in Cool mode.

- ▶ Smart Saver indicator and air swing indicator appears automatically on the remote controller display.
The air flow blades move up and down.
- ▶ If the current set temperature is lower than 24°C, it will automatically raise to 24°C.



Cancel Press the **Smart Saver** button once again.



NOTE

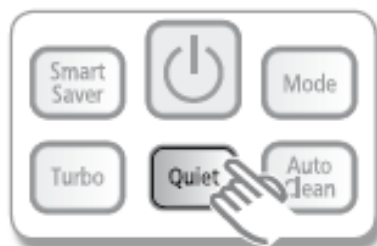
- Smart Saver function is only available in Cool mode.
- When Smart Saver function is activated, temperature range will be limited to 24°C~30°C.
- If the desired temperature is lower than 24°C, turn off the Smart Saver function by pressing the **Smart Saver** button again.
- Temperature/Fan speed can also be adjusted (see page 15 for instructions).
- Air flow can be adjusted manually (see page 16 for instructions).
- If you press the **Mode** button while the Smart Saver function is on, it will cancel the function.

Instruction of Function :

Remote Controller

Using the quiet function

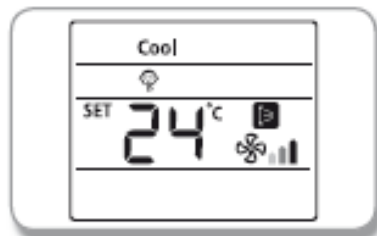
You can reduce the noise generated from an indoor unit.



Press the **Quiet** button on the remote controller while the air conditioner is operating in Cool/Heat mode.

- ▶ Quiet indicator appears on the remote controller display.
- ▶ The indoor unit will operate more quietly.

Cancel Press the **Quiet** button once again.



- If using a multi system, this function will work only when the Quiet function is set on all operated indoor units.

Instruction of Function :

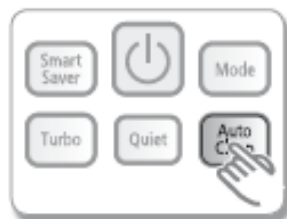
Remote Controller

Using the Auto Clean function (Certain models)

Auto clean function will prevent from growing mold by eliminating the moisture inside of the indoor unit. Your indoor unit evaporates the moisture inside of the unit. Activate this function to provide you with more clean and healthier air.

Using the Auto Clean function

Auto clean function will prevent from growing mold by eliminating the moisture inside of the indoor unit. Your indoor unit evaporates the moisture inside of the unit. Activate this function to provide you with more clean and healthier air.



Press the **Auto Clean** button.

When the air conditioner is turned off,

- ▶ The Auto clean indicator on the indoor unit display appears and the Auto clean function runs.

When the air conditioner is turned on,

- ▶ After stopping the air conditioner operation, the Auto clean indicator on the indoor unit display appears and the Auto clean function runs.

※ Auto Clean time can vary, depending on the previously used mode.

Auto(cool), Cool, Dry mode : approximately 30 minutes.

Auto(heat), Heat, Fan mode : approximately 15 minutes.





Cancel Press the **Auto Clean** button once again.


















- When the air conditioner is turned on, the Auto clean function runs after stopping the air conditioner operation.




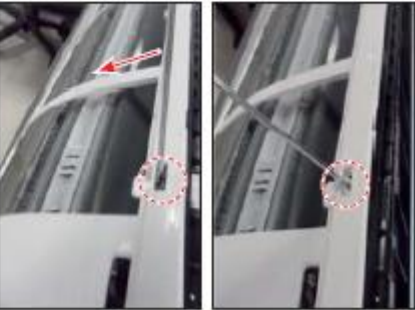
Disassembly and re-assembly:





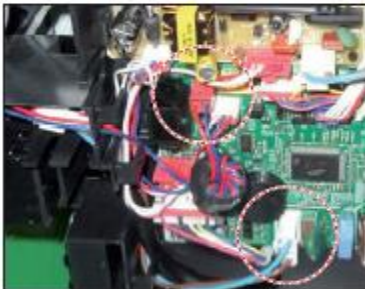

No	Parts	Procedure	Remark
1	PANEL-FRONT	<p>1) Stop the driving of air conditioner and shut off main power supply.</p> <p>2) Detach FILTER PRE from the PANEL FRONT.</p> <p>3) Cover Panel is assembled on bottom of indoor unit as shown in the figure. Remove the Cap Screw as shown on the right side and then remove the screw and separate the Cover Panel.</p>	   


No	Parts	Procedure	Remark						
		<p>4) Cover Panel is fixed to body by Hook in center area and side area.</p> <p>5) Separate the hook after pushing both end of Cover Panel as shown in the figure. (Watch out for the damage of the hook)</p> <p>6) Raise front part upward obliquely as shown in the figure and then remove the hooks.</p>	 <table border="1"> <thead> <tr> <th colspan="2">HOOK</th> </tr> </thead> <tbody> <tr> <td>9/12K</td> <td></td> </tr> <tr> <td>18/24/30K</td> <td></td> </tr> </tbody> </table>   	HOOK		9/12K		18/24/30K	
HOOK									
9/12K									
18/24/30K									





No	Parts	Procedure	Remark
		<p>⚠ Caution: Assembly of Cover Panel after service end.</p> <ul style="list-style-type: none"> - Reassembly is in the reverse order of the removal. - Piping and drain hose must be careful not to damage and Progress must be done with both hands. 	  <p style="text-align: right;">Hook (Side)</p>  <p style="text-align: right;">Hook (Center)</p>  <p style="text-align: right;">Screw</p>  <p style="text-align: right;">Cap Screw</p>

No	Parts	Procedure	Remark
		<p>7) To detach the PANEL-FRONT from the main frame, unfasten 2 screws at the bottom. (use + Screw Driver)</p>	 
		<p>8) To detach the COVER-PANEL from the main frame, loosen 4 HOOK Structures. When separate the hook : Use the (-) screw Driver. (-)Screw Driver Insert the hook and then pull the hook as shown on the right side. (Watch out for the damage of the hook)</p>	 

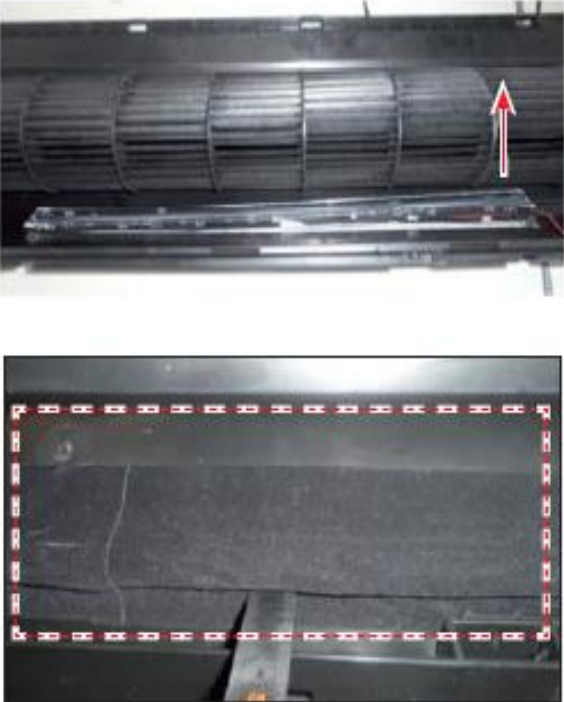
No	Parts	Procedure	Remark
		<p>9) Remove the Panel Frame from the Main Frame as shown on the right side.</p> <p>10) Remove the WiFi KIT connector. WiFi KIT connector is located of Panel Front. (For model with WiFi KIT)</p>	   

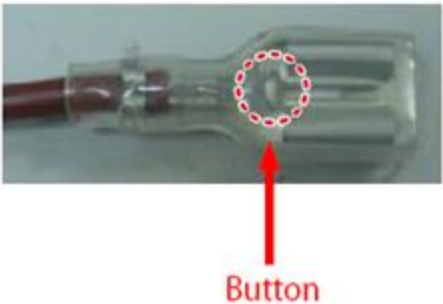

No	Parts	Procedure	Remark
2	CONTORL IN	<p>5) Loosen Stepping MOTOR Wire / BLADE Wire.</p> <p>6) Loosen MOTOR Wire. ⚠ Caution: When you separate the connector, pull pressing the locking button.</p> <p>7) Loosen the terminal block wires. ⚠ Caution: When you separate the connector, pull pressing the locking button.</p> <p>8) Loosen the Thermistor wire connector, Display wire connector. ⚠ Caution: When you separate the connector, pull pressing the locking button.</p>	   

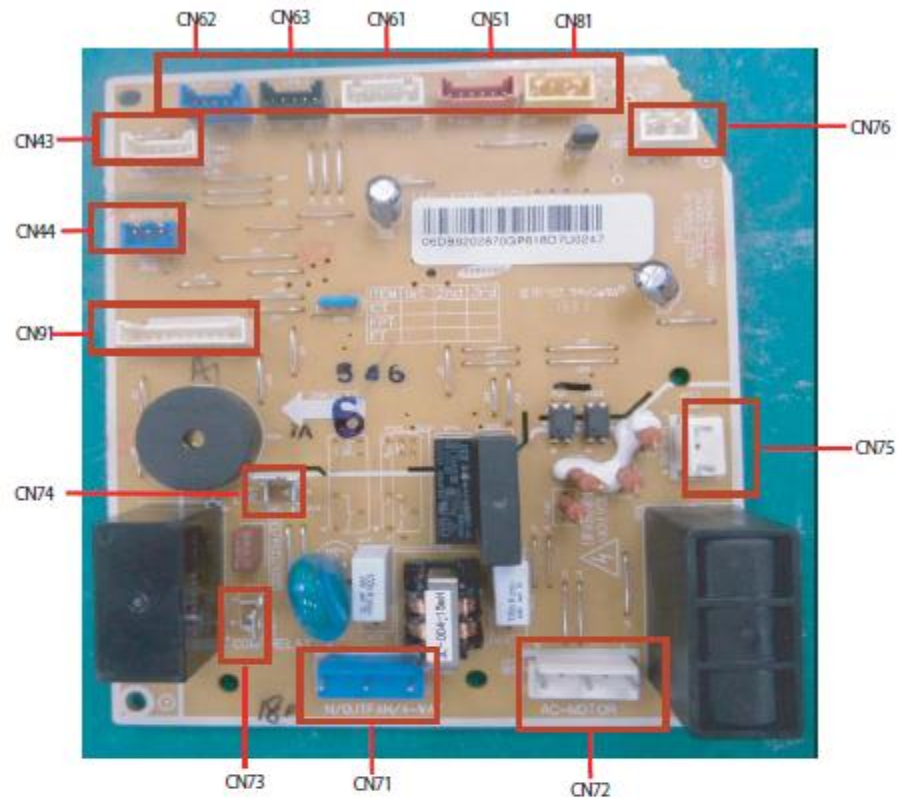
No	Parts	Procedure	Remark
5	EVAPORATOR	<p>9) Take off the CASE-CONTROL from the main frame after loosen the remaining connector.</p> <p>⚠ Caution: When you separate the connector, pull pressing the locking button.</p>	
3	TRAY DRAIN	<p>1) To detach TRAY-DRAIN from the main frame, pull the bottom of the TRAY-DRAIN towards you.</p>	

No	Parts	Procedure	Remark
4	Evaporator	<p>1) Detach the HOLDER PIPE.</p> <p>2) Unfasten the screw at the left side. (use + Screw Driver)</p> <p>3) Unfasten the screw at the right side. (use + Screw Driver)</p> <p>4) To detach Evaporator from the main frame, pull the bottom of the Evaporator towards you.</p>	   

No	Parts	Procedure	Remark
5	FAN MOTOR & CROSS FAN	<p>1) Unfasten the screw. (use + Screw Driver)</p> <p>2) Detach the FAN Motor case.</p> <p>3) Unfasten the screw a little. (use + Screw Driver)</p> <p>4) Pull the CROSS-FAN to the left side.</p>	   

No	Parts	Procedure	Remark
6	Assy SPI Lamp	<p>1) Remove the Assy SPI Lamp from the Back Body as shown on the right side.</p> <p>⚠ Caution.</p> <ul style="list-style-type: none"> - Confirm Seal of backside necessarily after replace of Assy SPI Lamp. - Seal should be close adhesion to SPI Lamp. - Measure as shown on the right side since replace. <p>(If the seal is not close adhesion perfectly : Defectiveness can happen)</p> <p style="text-align: center;">Super Plasma Ion</p>	

NO	Parts	Description	Figure
4	PBA	<p>3) Loosen the terminal block wires. (Total 4EA: #N(1)-EA, #-1EA, #3-1EA)</p> <p>Caution: The terminal is the locking type. So, when you separate terminals, pull pressing the button.</p>  <p>Button</p>	



<p>CN61/CN62/CN63 - STEP MOTOR</p> <p>#1: DC 12V #2-#5: STEP MOTOR SIGNAL</p>	<p>CN71 --N/OUTFAN/4-WAY</p> <p>#1: POWER-N #3: OUTFAN RELAY signal #5: 4-WAY RELAY signal</p>	<p>CN81 - SPI</p> <p>#1: SPI SIGNAL #3: DC 12V</p>	<p>CN51 - WI-FI MODULE</p> <p>#1: WIFI UART SIGNAL1 #2: WIFI UART SIGNAL2 #3: WIFI RESET SIGNAL #4: GND #5: DC 12V #6: NC</p>
<p>CN91 - DISPLAY</p> <p>#1-#4 :DIO;CLK;STB;IRQ #5: GND #6-#7 : DC 5V;DC 12V #8: PWM_LED #9-#10: TEST_RX; TEST_TX #11: MODE0</p>	<p>CN43 - TEMPERATURE SENSOR</p> <p>#1,#2: ROOM SENSOR #3,#4: EVA MID SENSOR #5,#6: EVA IN SENSOR</p>	<p>CN72 - AC-MOTOR</p> <p>#1: Motor start Capacitor connect. #3: AC phase control singal #5: Power</p>	<p>CN44 - MOTOR_F/B</p> <p>#1: DC 5V #3: GND #5: Feedback signal input</p>
<p>CN73 - COMP RELAY</p> <p>#1: COMP RELAY</p>	<p>CN74 - POWER_L</p> <p>#1: POWER_L</p>	<p>CN76 - SMPS DC OUT (12V/GND/5V)</p> <p>#1: DC 12V #2: GND #3: DC 5V</p>	<p>CN75 - SMPS-IN</p> <p>#1: POWER_N #2: NC #3: POWER_L</p>

Installation guide:



12-5-1 Before Installation

Keep the air conditioner outlet and inlet free from its surroundings.

In case of installation, keep the symmetry and fix it to prevent vibration.

The pipe length shall meet the standard as far as possible.

Minimum 2.5m piping!!!

12-5-2 Installation Procedure

■ Location

Install the product in an area to guarantee the best cooling effect, convenience of piping and electric work, and inexistence of vibration or wind.

■ Wall Drilling

Drill the wall downward in a diameter of 60 to 65mm.

■ Fixing Indoor Unit & Outdoor Unit

Fix the air conditioner indoor unit securely to the wall. Secure the outdoor unit in a suitable position.

■ Pipe Spooling & Connecting

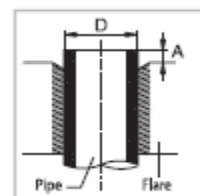
You shall cut the pipe with a pipe cutter and grind all the burrs of the cut surface.

pipe expansion may continue until the pipe surface becomes uneven or torn apart.

Be sure to use a torque wrench to tighten pipes or flare nuts.

<Torque & Depth>

Outer Diameter (D)	Torque(kgf-cm)	Depth(A)
ø6.35 mm(1/4")	140~170	1.3 mm
ø9.52 mm(3/8")	250~280	1.8 mm
ø12.70 mm(1/2")	380~420	2.0 mm
ø15.88 mm(5/8")	440~480	2.2 mm
ø19.05 mm(4/4")	9900~1,210	2.2 mm



■ Leak Test

Put an inert gas like nitrogen in the outdoor unit pipe and put soap bubbles or other test liquids on the pipe surface for the leak test.

■ Drain Hose Connecting

Install the drain hose downward to drain water naturally. Be sure to pour water into the hose to check if it drains well.

■ Electric & Earth Work

Electric and earth work shall meet the "Electric Facility Technology Standard" and the "Internal Wire Regulation" of the Electric Business Laws.

■ Inspection & Trial Run

Upon completion of the tests, you shall make a trial run while you explain the main functions of the air conditioner to finish the installation.

12-6-1 Air-Purge Procedure

- 1) Connect each assembly pipe to the appropriate valve on the outdoor unit and tighten the flare nut.



- 2) Connect the charging hose of low pressure side of manifold gauge to the packed valve having a service port (3/8" Packed valve) as shown at the figure.



- 3) Open the valve of the low pressure side of manifold gauge counter-clockwise.



- 4) Purge the air from the system using vacuum pump for about 30 minutes.
 - After that, please recheck that pressure is stabilized.
 - Close the valve of the low pressure side of manifold gauge clockwise.
 - Remove the hose of the low pressure side of manifold gauge.



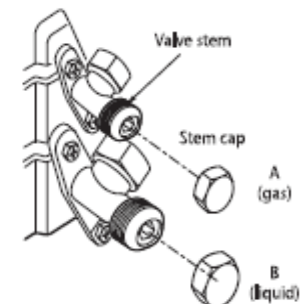
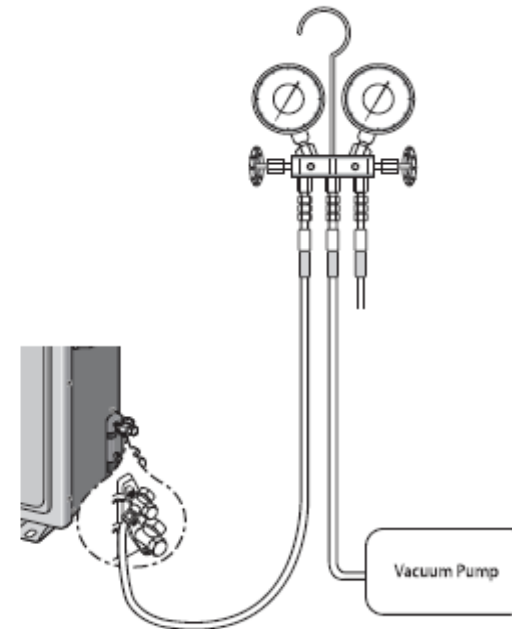
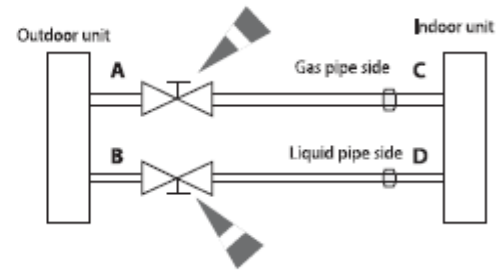
- 5) Set valve cork of both liquid side and gas side of packed valve to the open position.



- 6) Mount the valve stem nuts to the 2 way and 3 way valve. And mount the service port cap to 3 way valve.



- 7) Check for gas leakage.
 - At this time, especially check for gas leakage from the 3 way valve's stem nuts, and from the service port cap.



Installation tips:

There are differences between R410a units and R22 units, therefore different considerations need to be made when installing them. The running pressure of an R410a unit is higher than that of an R22 unit. This needs to be kept at the forefront of the installers mind when choosing where to fit the indoor and outdoor units.

R410a units need a longer pipe run to absorb the pressure generated by the compressor. Ensuring that you have a minimum pipe length of 2.5m between the indoor and outdoor will minimise noise and vibration. As with installing an R22 unit, vacuuming the system is critical! Not vacuuming or insufficient vacuuming will cause efficiency problems and will ultimately lead to the unit being unreliable.

Inverter units have both indoor and outdoor PC boards. This in turn means that there is a signal cable that needs to be installed between the indoor and outdoor unit as well as a power supply cable between the indoor and outdoor unit. The power and signal cable need to be two separate cables, otherwise you run the risk of electromagnetic interference from the power cable interfering with the signals being sent along the signal cable. In other words, rather use one 2 core + earth cable for power and a separate 2 core cable for signal NOT one 5 core cable.



Upon completing the installation, test the incoming power supply to ensure there is a clean 220v (or 380v – 415v in the case of a three phase unit) supply. Due to the much larger number of components on inverter PC boards, they may be more susceptible to damage from unclean power.

Upon completing the installation, the following steps need to be taken:

1. Pressure test the system with nitrogen before opening the service valves.
2. Vacuum the system to 1Torr/1000 microns before opening the valves to ensure there is no air or moisture in the system.
3. Check the power supply to the unit is correct and stable before one starts the machine, it should be 220v-240v on a single phase unit and 380v-415v on a three phase unit.

The integrity of the refrigerant piping is much more critical on R410a units, because if a leak occurs, the system would need to be emptied and re-gassed completely once the leak is fixed. One CANNOT just top up an R410a unit.

Troubleshooting:



Tools required:

The air conditioning technician requires a number of specialized tools to carry out his job effectively. Among these are the basic hand tools and ladders and so forth. There are also a number of items that are critical in the diagnosing of faults on modern air conditioners. These are tools that you MUST carry if you hope to diagnose faults:

- A good set of accurate gauges
- A quality vacuum pump in good working order
- A multi-meter including a clamp amp meter.
- A capacitor tester if this function is not available on the multi-meter.
- An accurate digital thermometer.
- An accurate digital scale that can weigh in refrigerant to two decimal points

1st check on site:

When you arrive on site for the first time, there are a number of checks you need to carry out before you begin to try to diagnose a problem. These may seem obvious, but it is easy to overlook something simple, and waste a lot of time looking for a more complex fault than what actually exists. A few minutes spent checking the simple things can save hours and plenty of money on something misdiagnosed.

- Is the power supply to the unit on and correct (230VAC + or – 10% in the case of a single phase unit and 380 – 415 VAC in the case of a 3 phase system)?
- Are the filters and indoor coil clean and free of obstruction?
- Is the indoor unit barrel fan clean? This is very important as a dirty barrel fan causes a multitude of problems.
- Are there any lights flashing or error codes displayed on the indoor unit or remote control?
- Is the outdoor unit coil clean and free of obstructions? A bush or tree that has grown against the coil will severely restrict airflow, cause high head pressure problems.
- Does the outdoor fan look in good condition and unobstructed?
- Do the interconnecting cables or pipes look damaged?
- Are there obvious oily marks on the pipes/flare nuts/ coil/ unit casing? These could indicate a leak.

Unit not cooling:

There are a number of issues that can cause a unit to stop cooling. A lack of refrigerant, a blockage or a lack of air flow are the most common causes.

- Are the filters clean?
- Are the indoor and outdoor coils clean?
- Is the gas pressure correct? An overcharge or undercharge can prevent effective cooling.
- Is the airflow unhindered?
- Is the indoor barrel fan clean?
- Is there a section of indoor coil that is not the same temperature as the rest? If so, this could indicate a blockage.
- Are there any kinked pipes?
- Is the compressor and outdoor fan running?
- Are the amps within range? High amps can indicate overcharge or a blockage, low amps can indicate bypassing on the reverse valve or a shortage of refrigerant.

Unit not heating:

The issues that affect the heating performance of the unit are similar to those that affect the cooling. We are again checking refrigerant charge, air flow and for signs of a blockage. Remember that the indoor unit will only start once the indoor coil has reached temperature, so we are expecting the compressor to start before the indoor unit.

- Are the filters clean?
- Are the indoor and outdoor coils clean?
- Is the gas pressure correct? An overcharge or undercharge can prevent effective heating.
- Is the airflow unhindered?
- Is the indoor barrel fan clean?
- Is there a section of indoor coil that is not the same temperature as the rest? If so, this could indicate a blockage.
- Are there any kinked pipes?
- Is the compressor running?
- Are the amps within range? High amps can indicate overcharge or a blockage, low amps can indicate bypassing on the reverse valve or a shortage of refrigerant.

If you feel that all of the pipes going into the 4way / reverse valve are the same temperature (hot) this normally indicates that the reverse valve is faulty.

Check that the electrical terminal that supplies a power to the solenoid that controls the 4way / reverse valve. An absence of power could indicate a damaged communication cable or faulty PC board.

Check that the solenoid valve is securely attached to the 4way / reverse valve.

To check if the solenoid is working, apply power to it and touch it with a steel screw driver, it should be magnetised.

Water leak:

Water leaking from the indoor unit can be caused by several factors, including the unit freezing up, a blocked drain or broken pipes/drain pans and the level of the drain or indoor unit.

- Is the indoor unit level? If the unit is at an angle, the condensate water will leak from the unit before it can reach the drain.
- Is the drain running at a downwards angle? Any up-turn in the drain pipe can cause water to flood back to the indoor unit.
- Is the drain pipe blocked?
- Check the drip tray and indoor unit back body for cracks. Water marks can indicate a crack too small to see with the naked eye.
- Is there sufficient air flow through the unit?
- Is the barrel fan clean?
- Is the gas pressure correct?
- Is the unit sized correctly? An undersized unit can run until it eventually freezes up and then leaks.
- Is the unit being run constantly for extended periods of time?

Vacuumping and charging the system:

When installing a unit or working on a unit with the internal or external pipe work open to the atmosphere, it is critical that you vacuum the system once you are done. It is important that you use a good vacuum pump and that you replace your vacuum pump's oil regularly. Changing the oil in your vacuum pump is explained in the user manual, follow these directions carefully. Checking your vacuum on your gauges is not enough, you need a vacuum gauge to check that the vacuum you have pulled is sufficient to remove all the atmospheric moisture out of your system. There are vacuum gauges of all shapes and sizes in a variety of price ranges. Choose an accurate one within your price range. When pulling your vacuum, make sure you vacuum to at least 1000micron and make it holds this vacuum for at least an hour. If the vacuum rises slowly, but stops before it reaches 3000micron, there is still moisture in the system. If it keeps rising above 3000micron, there is a leak on the system. Do not rely solely on your vacuum pump for checking for leaks. You also need to carry out proper positive pressure testing to ensure your system is leak free.

Once you are happy that your system is leak free and well vacuumed, you can re-charge the system. The label on the side of the outdoor unit will tell you exactly how much refrigerant you need to add. You can weigh in the correct gas charge to the system to ensure that your system is perfectly charged. Remember that units must always be charged while they are in the cooling mode. R22 units must be charged as vapour (the bottle upright) and R410a units must be charged as liquid (the bottle upside down). It is critical to weigh in the correct amount. If an R410a system loses more than 15% of its total charge, it needs to be recharged completely with virgin refrigerant. This is because R410a is a blend and the ratio of the blend needs to be maintained.



Fault finding:

Inverter units have advanced self-diagnostics built into them. Generally the unit will show a code to let the technician know where to look for the problem. The technician needs to take note of the error code displayed on the indoor unit AND the outdoor unit. The outdoor units have LEDs that will display an error code. If the technician suspects that there may be a PC board fault, the PC boards should be visually inspected for damage, burnt components/tracks or fuses that are open circuit. After isolating the power supply to an inverter, allow 15 minutes for the capacitors to discharge before handling the PC board or you may receive an electrical shock.

If an outdoor PC board needs to be replaced, it is critical that new thermal grease is applied thoroughly to any part of the PC board that is in contact with a heat sync. Thermal grease can be purchased at most major electronic stores (Communica and Matrix Warehouse are often the most convenient places to purchase it from). It is also crucial that the screws holding the PC board to the heat sync are all tight and in place. Failing to do this can cause a new PC board to overheat and fail.

To check the pressure of an inverter unit, set the unit to cooling on the lowest set temperature. Listen to the outdoor unit as it starts up. You should hear the compressor ramping up. When it seems that the compressor is running at its fastest speed, the pressure should be around 8.2bar / 820kPa / 130psi. This is a rough guide, as there is no way of knowing the exact frequency of the compressor when you are checking the pressure. If the pressure is significantly below this with the compressor running at what sounds like its highest speed, there is a good chance the unit is short of refrigerant. In this case the following steps should be taken:

Recover the remainder of the refrigerant in system if any.

Pressure tests the unit with Nitrogen to establish where the leak is.

Repair the leak.

Vacuum the system.

Recharge the system with the correct amount of refrigerant as stated on the side of the Condenser unit.

Remember that because R410a is a blend, these systems have to be charged with liquid refrigerant. Turn the disposable R410a cylinder upside down when charging and be sure to use an accurate scale to weigh in the correct amount of refrigerant.

Safety:

We are dealing with refrigerants with a low boiling point in liquid form. One should always use the correct personal protective equipment (P.P.E) when dealing with refrigerants; remember safety is your responsibility.

The recommended P.P.E is:

- Safety goggles.
- Non-absorbent gloves.
- Overalls that cover torso, arms and legs.

As the refrigerant comes into contact with the skin, evaporation rapidly occurs. The refrigerant requires heat energy to evaporate, and in this instance it obtains the heat energy for the most part from the skin. A rapid, below freezing, temperature drop causes mild to severe frost bite. Should the liquid refrigerant enter the eyes, eye damage could result.

Should an accident occur the following represents the recommended treatment:

Inhalation:

- Remove patient to fresh air, keep warm and at rest.
- Apply artificial respiration if breathing has ceased.
- In event of cardiac arrest apply cardiac massage.
- Obtain immediate medical assistance.

Liquid refrigerant on skin:

- Remove contaminated clothing.
- Immediately run cold water over effected areas for at least fifteen minutes.
- If irritation or blistering occurs obtain medical attention.

Liquid refrigerant in the eyes:

- Immediately irrigate with cold water, holding the eyelids open for at least ten minutes.
- Obtain immediate medical attention.

Useful information:

Samsung additional refrigerant table

Product type	Size (kW)	Max Length	Max Height	No additional charge (m)	Additional charge (g/m)
1 Way Cassette	2.6	20	15	20	0
	3.5	20	15	20	0
Mini 4 Way Cassette	2.6	20	15	20	0
	3.5	20	15	20	0
	5.2	30	20	5	10
	6	50	30	5	25
4 Way Cassette	7.1	50	30	5	25
	9	50	30	5	25
	10	50/75*	30	30	See table
	12.5	75	30	30	See table
	14	75	30	30	See table
Slim Duct	3.5	20	15	20	0
	5.2	50	30	5	30
	7.1	50	30	5	25
MSP Duct	5.2	50	30	5	30
	7.1	50	30	5	25
	9	50	30	30	See table
	10	50	30	30	See table
	12.5	75	30	30	See table
	14	75	30	30	See table
Consol	2.6	20	15	20	0
	3.5	20	15	20	0
	5.2	50	30	5	30
Mid Wall	2.6	20	15	20	0
	3.5	20	15	20	0
	5.2	50	30	5	30
	7.1	50	30	5	25

Additional Refrigerant Table

Below 30m	30-40m	40-50m	50-60m	60-70m	70-75m
0	+500g	+1000g	+1500g	+2000g	+2250g

* This is model dependant, please refer to the brochure

Alliance additional refrigerant table

If the connecting pipe is longer than 7 metres, add refrigerant as needed. Heat pump type added amount $A = (L - 7) \times 50$ g/m. (A: amount of added refrigerant, L: the length of connecting pipe)

The length of connecting pipe (m)	7	8	9	10
Heat pump type added amount (g)	0	50	100	150

Samsung RAC inverter error display

1. Indoor unit

No.	LED Display			Explanation
	Oper	Timer	Smart Saver	
1	×	○	○	COMMUNICATION ERROR(INDOOR -> OUTDOOR)
2	×	○	×	INDOOR ROOM TEMP SENSOR ERROR
3	○	○	×	EVAP IN TEMP SENSOR ERROR
4	×	×	○	FAN ERROR (INDOOR)
5	○	×	○	OUTDOOR ERROR DISPLAY
6	○	○	○	EEPROM ERROR OR OPTION ERROR

- : LED ON
- : LED BLINK
- ×

2. Outdoor unit

No.	LED Display			Explanation
	Yellow	Green	Red	
1	○	○	○	Power off/ VDD NG
2	○	○	○	IPM Over Current(OC)
3	○	○	●	Abnormal Serial communication
	○	●	●	
4	○	○	●	Normal Operation
5	○	○	○	Compressor Starting error
6	○	●	○	DC-Link voltage under/over error
7	○	○	○	Outdoor temperature sensor error
8	○	○	●	Discharge over temperature
9	○	○	○	Discharge temperature sensor error
10	○	○	●	Current sensor error
11	○	●	○	Compressor limit error
12	○	●	○	Coil temperature sensor error
13	○	●	●	1min. Time out Communication
14	●	○	○	Fan error
15	●	○	○	OTP error
16	●	○	●	Compressor rotation error
17	●	○	○	Operation condition secession (Dual only)
18	●	○	○	DC-Link voltage sensor error
19	●	○	●	I_Trip error / PFC Over current
20	●	●	○	GAS Leak error
21	●	●	○	AC Line Zero Cross Signal out
22	●	●	●	Power ON reset(1sec)
23	○	○	○	Capacity miss match

● : LED ON, ○ : LED OFF, ○ : LED BLINK

Samsung CAC inverter error display

Error mode	Contents	Measure	Product operation in error condition	Error type
			Outdoor unit/ Compressor/Indoor unit	
101	Indoor unit communication error	Check the communication cable of indoor unit. Check the DC output voltage at the communication terminal	Operation Off	Communication error
102	Indoor unit/outdoor unit communication time-out error: error in more than 6 packets	Check the outdoor communication cable connection. Check DC output voltage and the communication terminal	Operation Off	Communication error
121	Indoor temperature sensor (open/short error)	Check indoor unit room temperature sensor. Check indoor unit PCB connector CN1 (White)	Operation Off	Indoor sensor error
122	Indoor unit Fvs In sensor (Open/Short)	Check indoor unit pipe sensor. Check indoor PCB connector CN1 (White)	Operation Off	Indoor sensor error
128	Indoor unit Fvs In sensor disconnection	Check the disconnection of indoor unit pipe sensor	Operation Off	Indoor sensor error
153	Indoor floating switch secondary detection	Check indoor unit float sensor. Check indoor PCB connector CN5 (Black)	Operation Off	Self diagnostic error
202	Indoor/outdoor communication error (1 min)	Check the communication connection between indoor and outdoor units. Check the power line and communication cable connection status	Operation Off	Communication error
203	Communication error between indoor/outdoor INI „MANN MICOM (1 min)	Check MAIN MICOM Check INVERTER MICOM	-	Communication error
221	Outdoor temperature sensor error	Check sensor connection status Check sensor location Check sensor resistance	Operation Off	Outdoor sensor error
237	COND/temperature sensor error	Check sensor connection status Check sensor location Check sensor resistance	Operation Off	Outdoor sensor error
251	[Inverter] Emission temperature sensor error	Check sensor connection status Check sensor location Check sensor resistance	Operation Off	Outdoor sensor error
416	Emission temperature excessively high	No error (DISCHARGE temperature control)	-	Outdoor unit protection control error
440	Heating operation blocked	Check the operation setting state Check temperature sensor	Operation Off	Self diagnostic error
441	Cooling operation blocked	Check the operation setting state Check temperature sensor	Operation Off	Self diagnostic error
458	Outdoor fan 1 error	Check input power connection status Check the connection status between the motor and outdoor unit PCB Check indoor/outdoor fuse	Operation Off	Self diagnostic error
461	[Inverter] Compressor startup error	Check the compressor connection status Check the resistance between difference phases of the compressor	Operation Off	Outdoor unit protection control error
462	[Inverter] Total current error/ PFC over current error	Check the input power Check the coolant charging status Check the normal operation of outdoor fan	Operation Off	Outdoor unit protection control error

Error mode	Contents	Measure	Product operation in error condition	Error type
			Outdoor unit/ Compressor/Indoor unit	
464	Inverter) RM over current error	Check coolant charging Check the compressor connection status and normal operation Check the obstacles around the indoor and outdoor units Check whether the outdoor unit service valve is open Check whether the indoor/outdoor installation pipe/wiring are correct	Operation Off	Outdoor unit protection control error
465	Compressor V limit error	Check the compressor connection status Check the resistance between difference phases of the compressor	Operation Off	Outdoor unit protection control error
466	DC LINK over/low voltage error	Check input power Check AC power connection	Restart in 3 minutes	Outdoor unit protection control error
467	Inverter) Compressor rotation error	Check the compressor connection status Check the resistance between difference phases of the compressor	Operation Off	Outdoor unit protection control error
468	Inverter) Current sensor error	Check EEPROM DATA Check the normal operation of PCB	Operation Off	Outdoor unit protection control error
469	Inverter) DC LINK voltage sensor error	Check the input power connection Check the status of RY21 and R200 in the INVERTER PCB	Operation Off	Outdoor unit protection control error
471	Inverter) OIP error	Check EEPROM DATA Check the normal operation of PCB	Operation Off	Outdoor unit protection control error
472	AC ZERO-CROSSING SIGNAL OUT error	Check the input power status	Operation Off	Outdoor unit protection control error
473	Compressor LOCK error	Check the compressor connection status Check the resistance between difference phases of the compressor	Operation Off	Outdoor unit protection control error
475	Outdoor fan 2 error	Check the input power connection status Check the connection status of the motor and the outdoor unit PCB Check the indoor/outdoor unit fuse	Operation Off	Self diagnostic error
554	Gas leak error	Check the coolant charging status Check the indoor iPA sensor Check if the outdoor unit service valve is open Check that the indoor/outdoor installation pipe/wiring are correct	Operation Off	Self diagnostic error
556	Capacities not matched	Check the option code of the indoor unit	Operation Off	Outdoor unit protection control error
601	Communication error between the indoor unit and wired remote controller	Check the connection wire between the indoor unit and the wired remote controller	Normal operation	Wired remote controller error
602	Communication error between the Master and Slave wired remote controllers	Check the option switch for defining the Master and Slave (only one Master and one Slave can exist)	Normal operation	Wired remote controller error
606	COM1/COM2 cross installation error	Check that wired remote controller is connected to the COM2 terminal of the indoor unit	Normal operation	Wired remote controller error
6ER	Wired remote controller COM2 option setting error	Check that Com1, Com2 setting DIP switch is set to Com2	Normal operation	Wired remote controller error