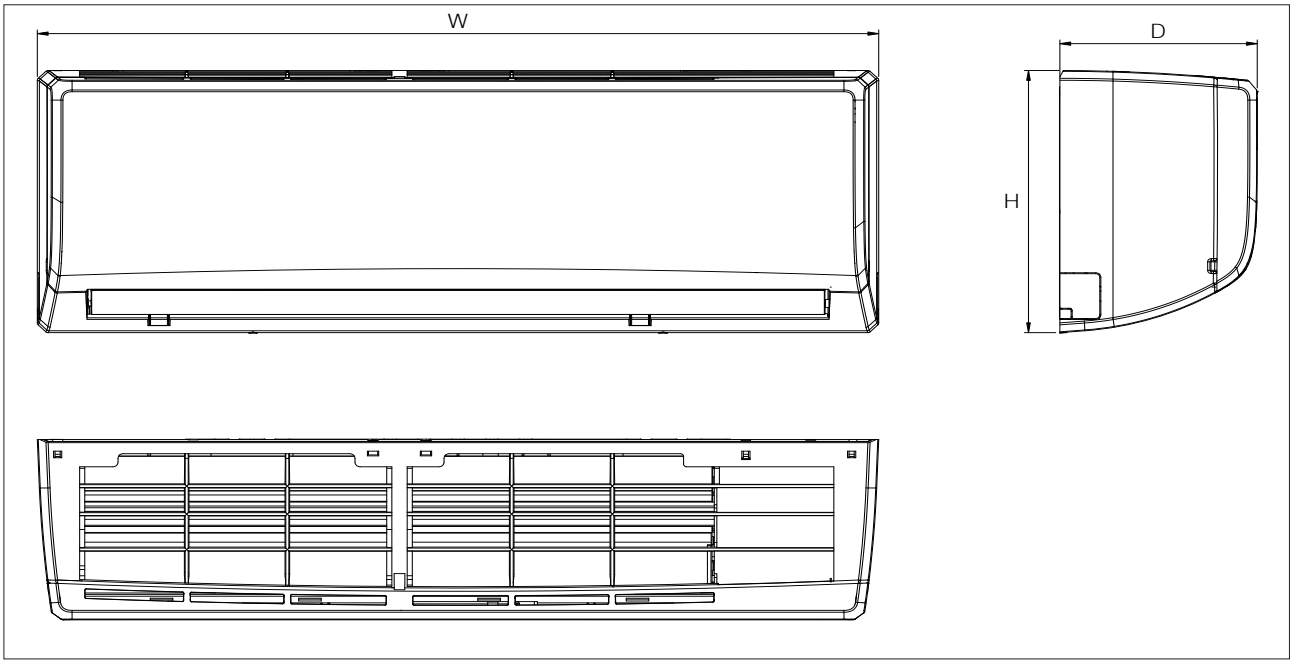
EN

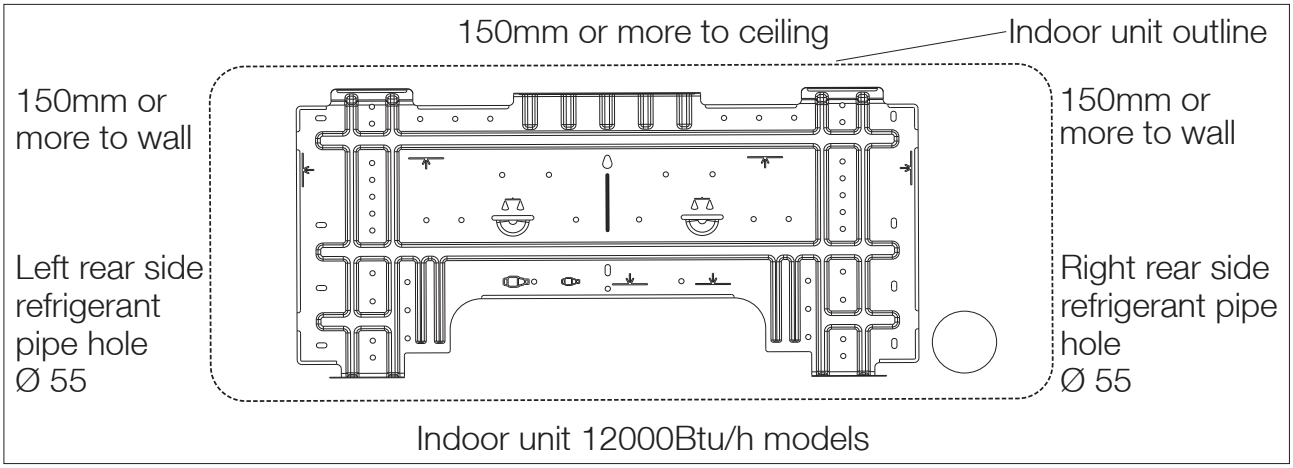
# Service Manual
# Split Type Air Conditioner

## CONTENTS

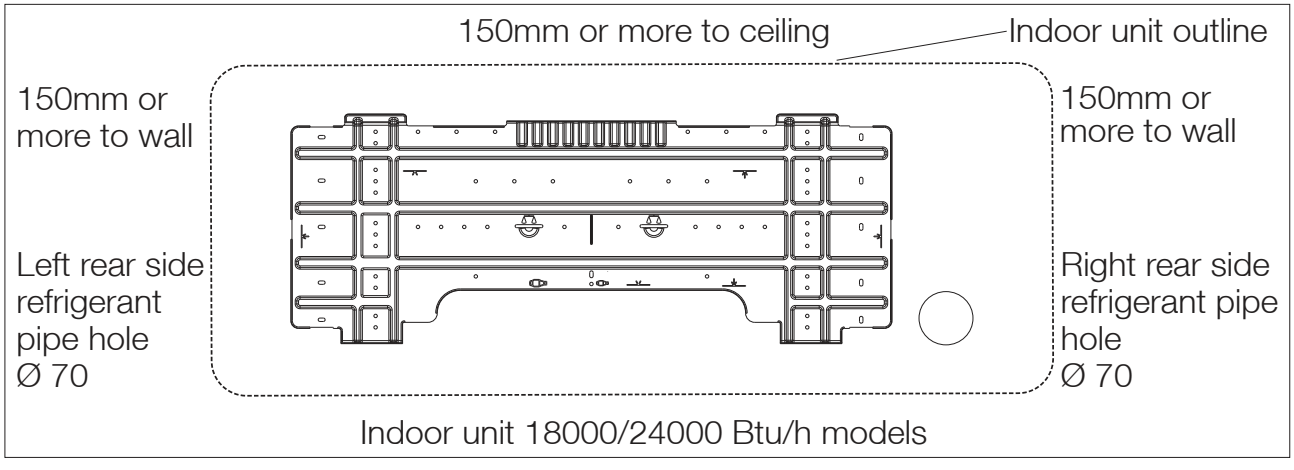
**1.** CONSTRUCTION VIEWS
**1.1** Indoor View

| INDOOR UNIT | W | H | D |
|---|---|---|---|
| | 822 | 280 | 196 |
| | 1053 | 323 | 226 |
| | 822 | 280 | 196 |
| | 1053 | 323 | 226 |
| | 822 | 280 | 196 |
| | 1053 | 323 | 226 |



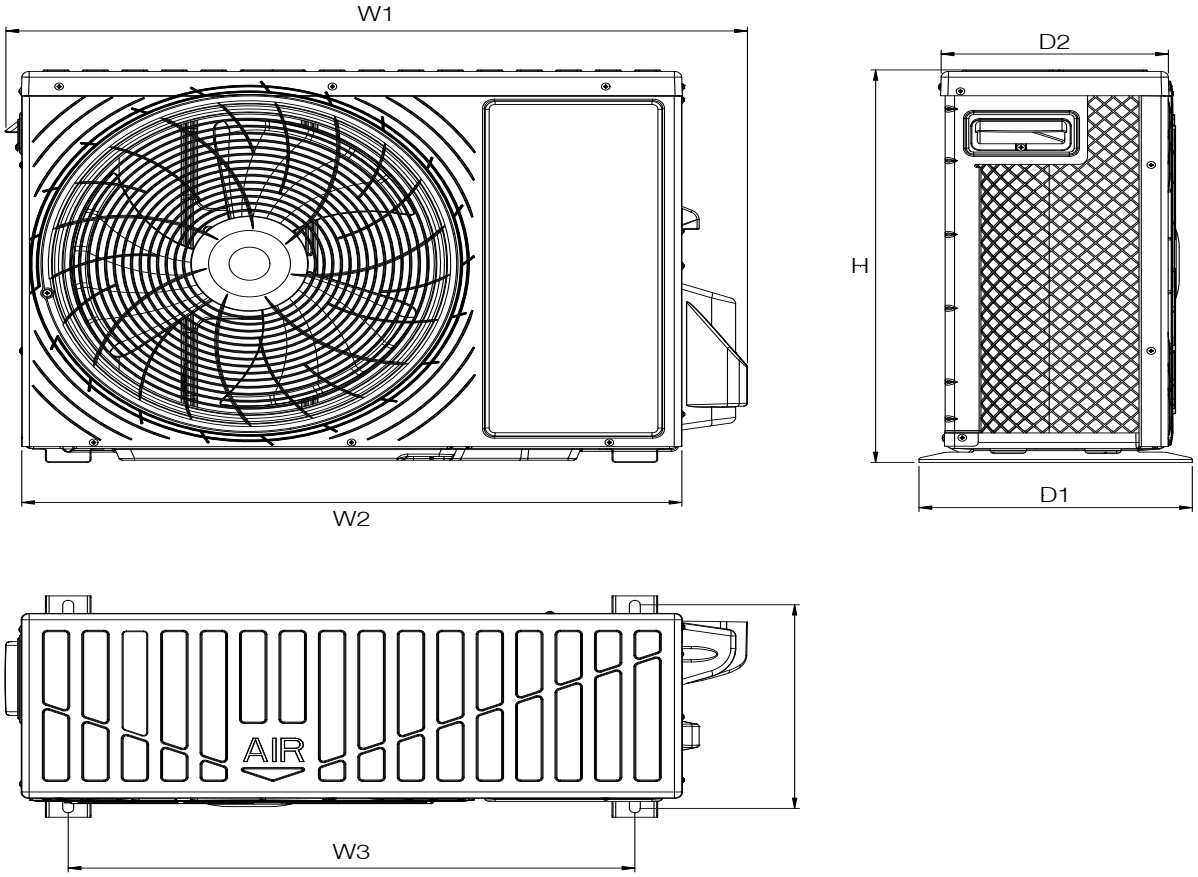

Indoor unit 12000Btu/h models




Indoor unit 18000/24000 Btu/h models

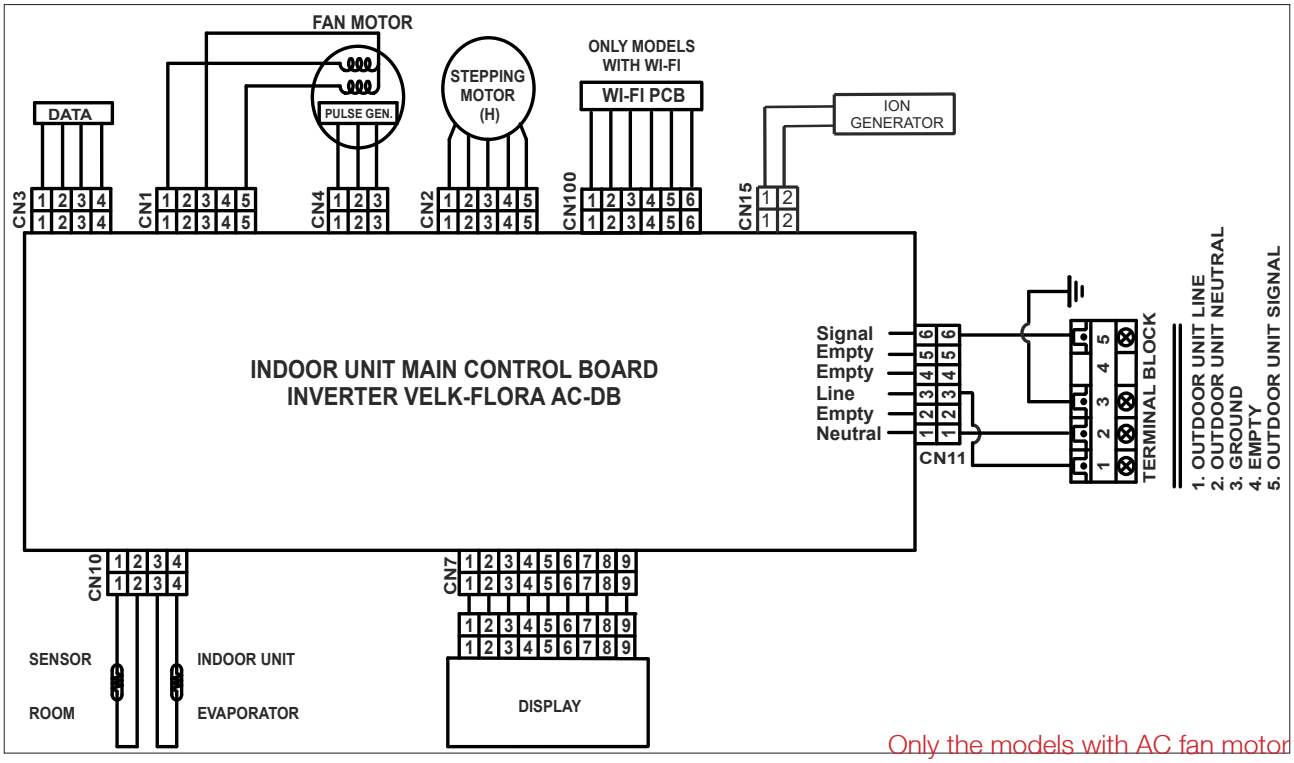
## **1.2** Outdoor View

| W1 | W2 | W3 | D1 | D2 | H |
|---|---|---|---|---|---|
| 815 | 725 | 622 | 300 | 261 | 532 |
| 909 | 816 | 567 | 364 | 336 | 642 |
| 1009 | 916 | 668 | 364 | 334 | 638 |



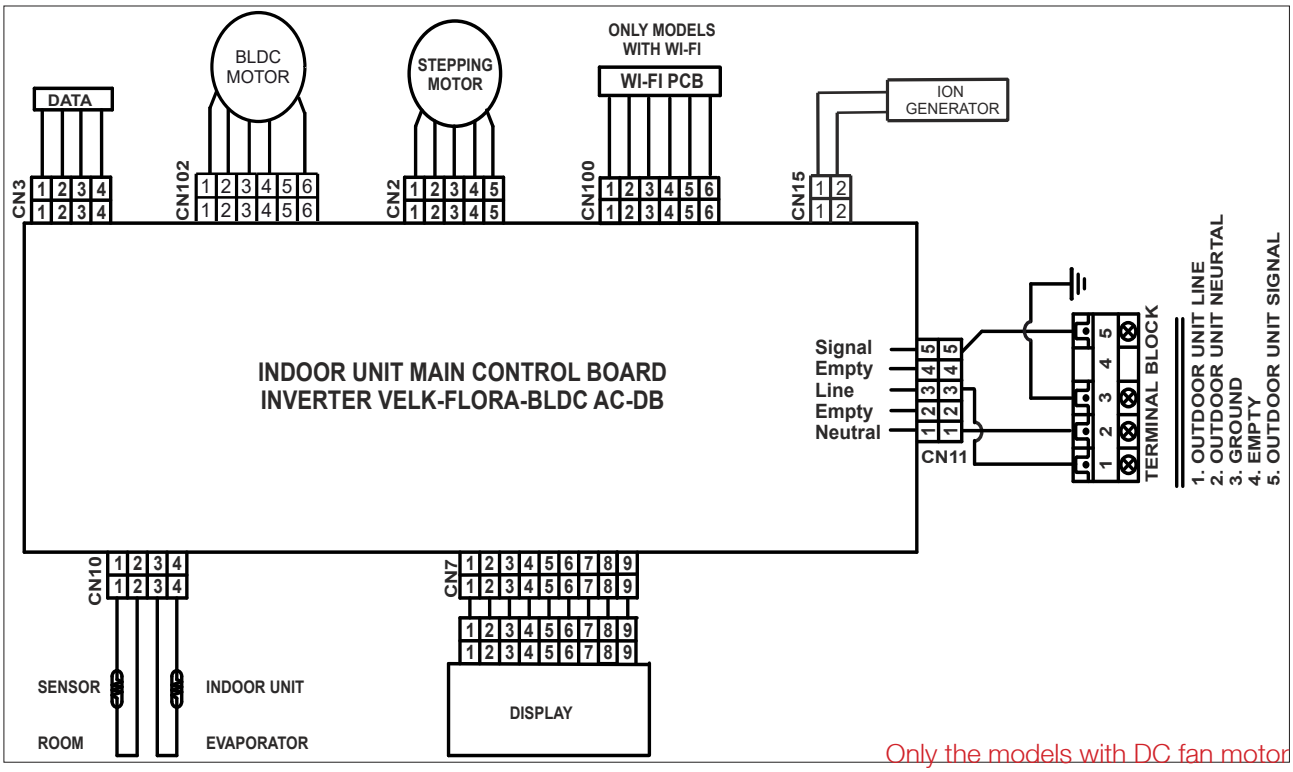

## **2.** SCHEMATIC DIAGRAMS

### **2.1** Indoor Units 12K

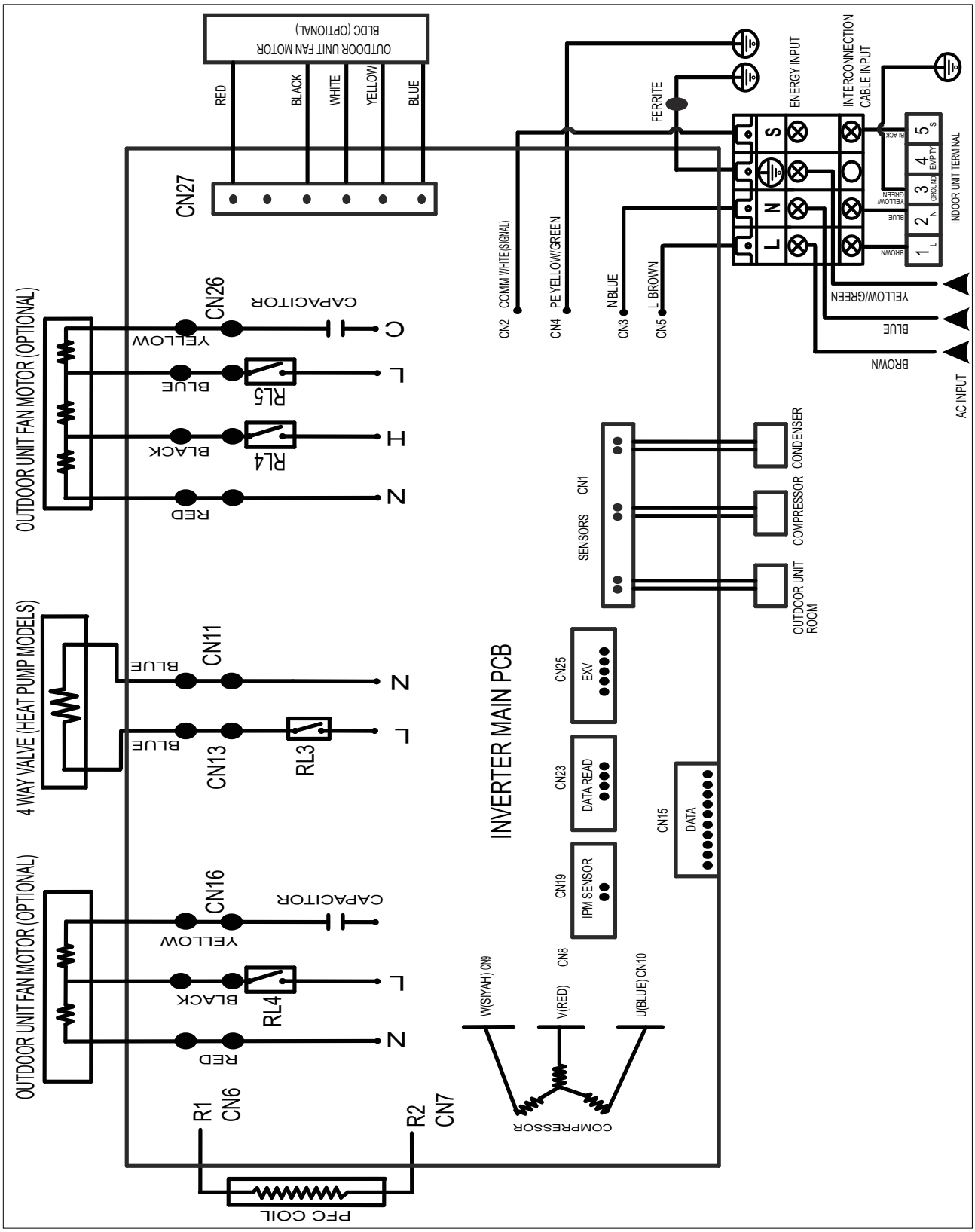



Only the models with AC fan motor

## **2.2** Indoor Units 12K & 18K & 24K

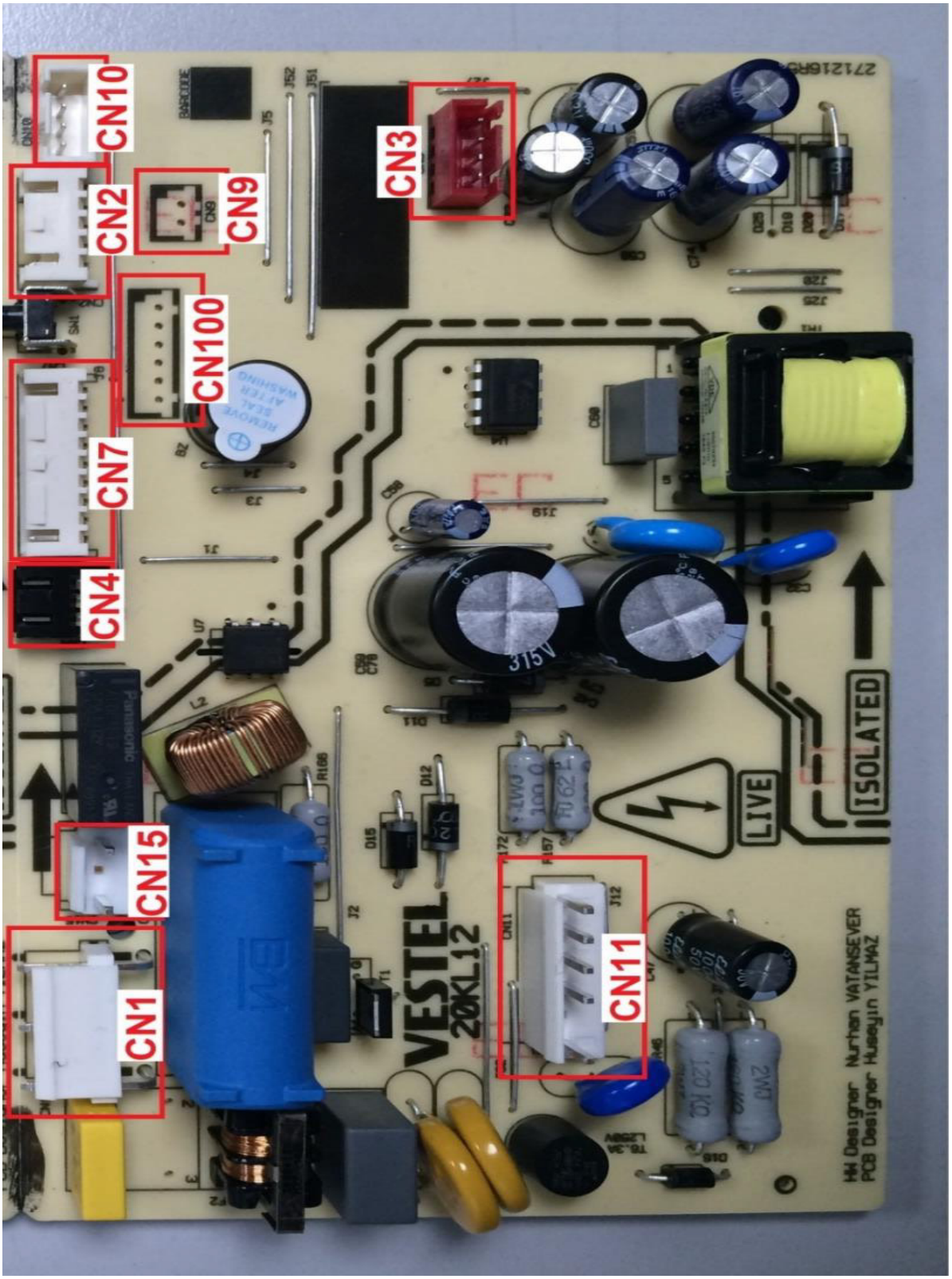


**2.3** Outdoor Units



**2.4** PRINTED CIRCUIT BOARD

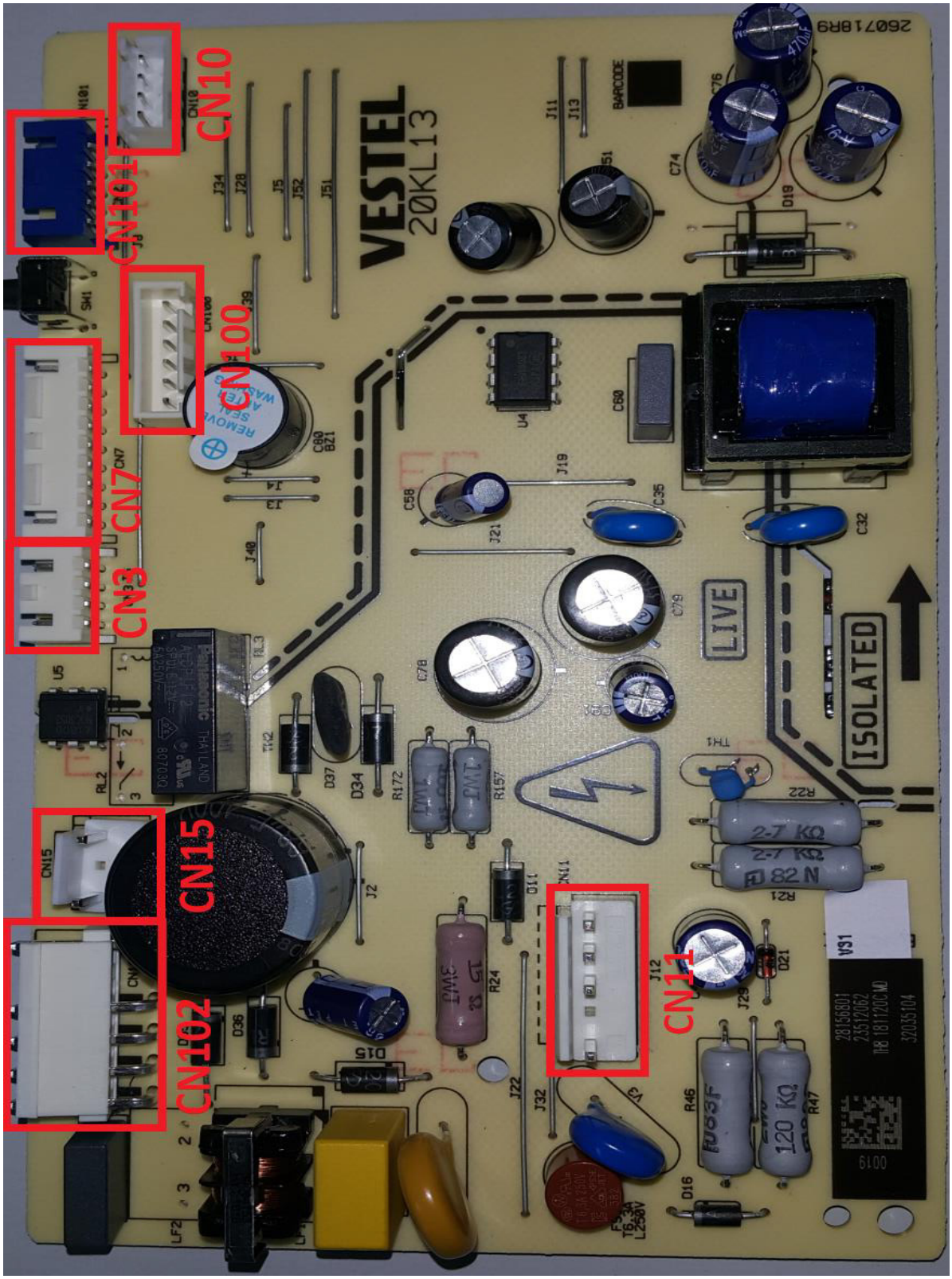
**2.5** Indoor Units 12K (ZS12V70CCHI - ZS12V80CCHI - ZS12V71CCHI - ZS12V81CCHI - ZS12V91CCHI




| SOCKET | DESCRIPTION |
|---|---|
| CN1 | Indoor unit fan cable |
| CN11 | Phase neutral communication cable |
| CN15 | Ioniser cable |
| CN4 | Indoor unit fan-taco cable |
| CN9 | Plasma ioniser cable |

| SOCKET | DESCRIPTION |
|---|---|
| CN10 | NTC sensor cable |
| CN7 | Display cable |
| CN3 | Software installation cable |
| CN2 | Horizontal blade step motor cable |
| CN100 | Wifi module card cable |

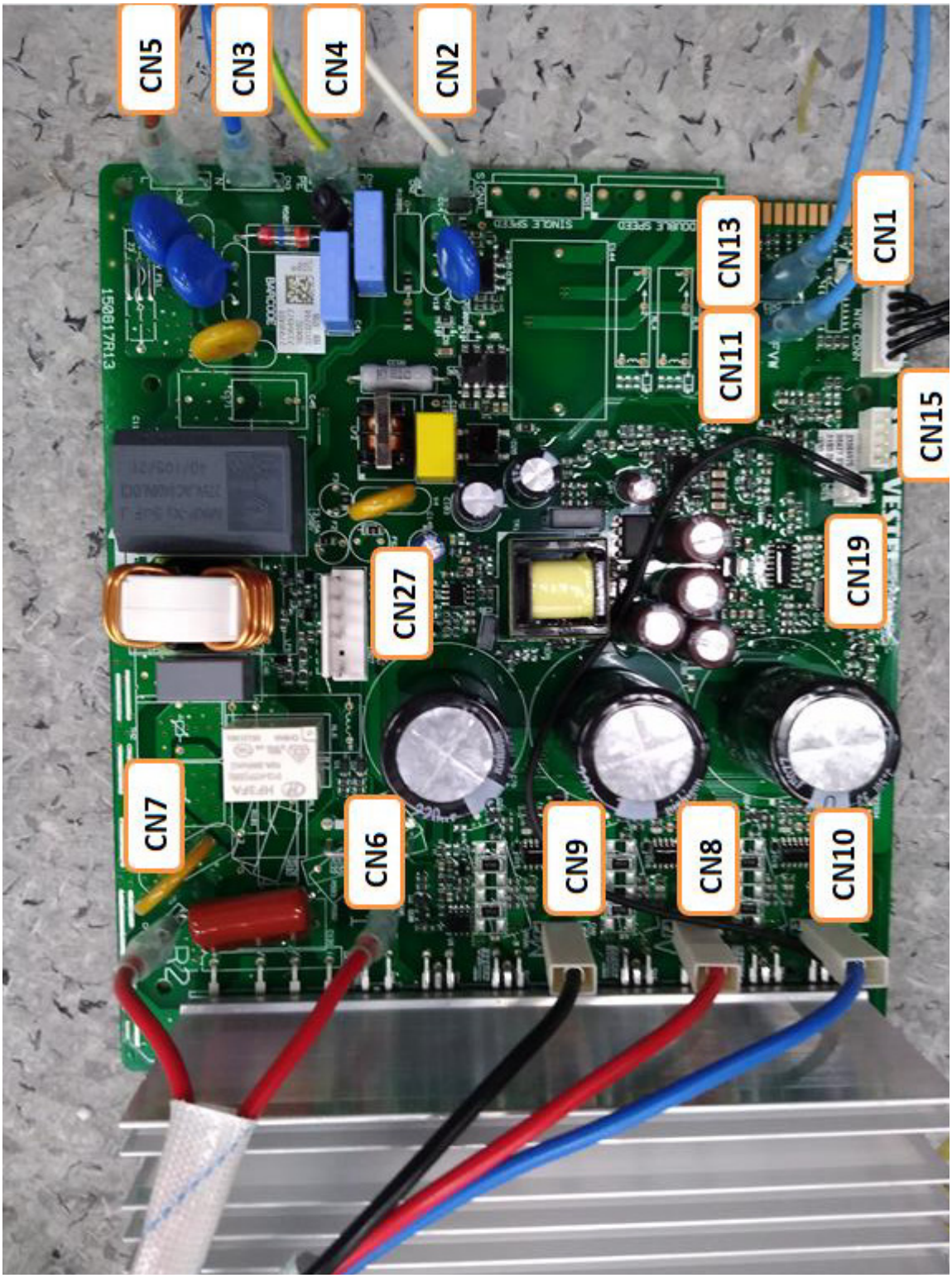
## **2.6** Indoor Units 18K & 24K




| SOCKET | DESCRIPTION |
|---|---|
| CN102 | Indoor unit fan cable |
| CN15 | Ioniser cable |
| CN3 | Software installation cable |
| CN7 | Display cable |

| SOCKET | DESCRIPTION |
|---|---|
| CN101 | Horizontal blade step motor cable |
| CN10 | NTC sensor cable |
| CN100 | Wifi module card cable |
| CN11 | Line-Neutral information cable |

## **2.7** Outdoor Units

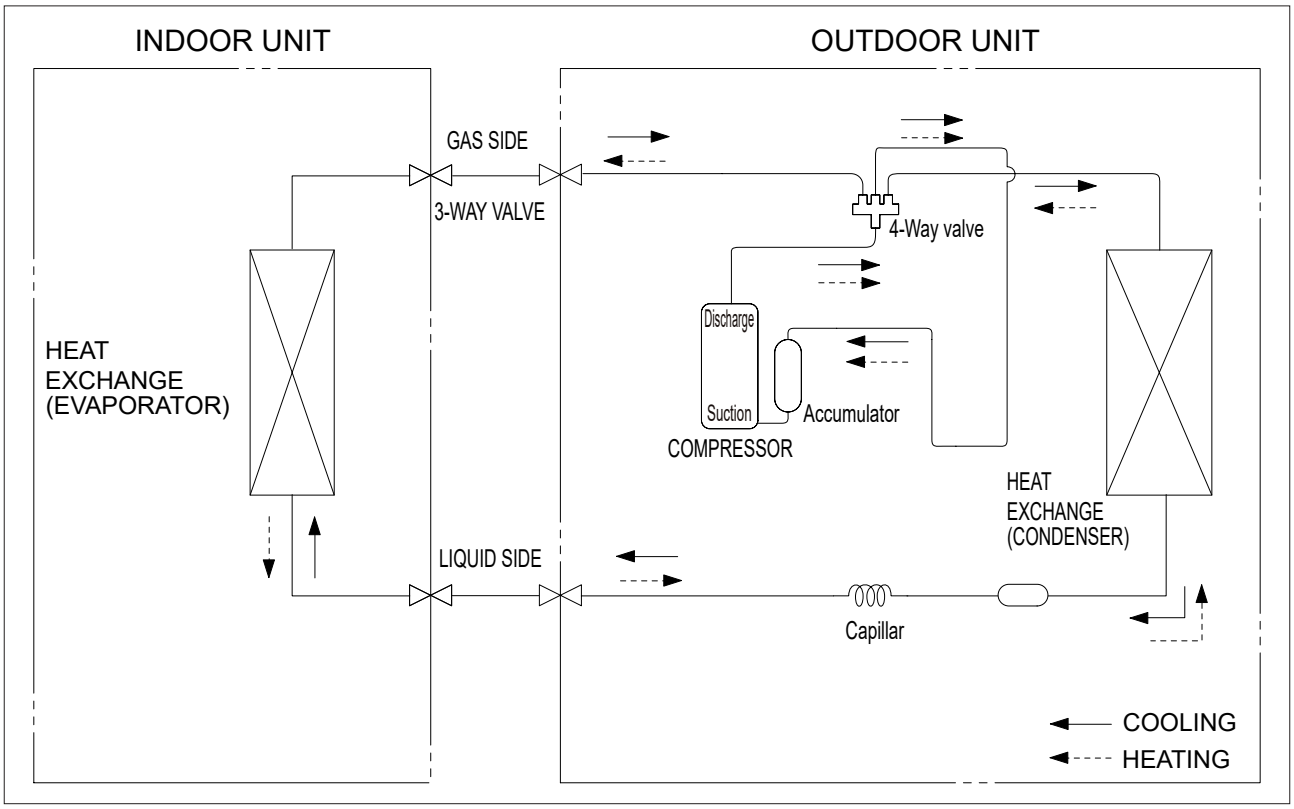



| SOCKET | DESCRIPTION |
|---|---|
| CN10 | Compressor cable (blue) |
| CN8 | Compressor cable (red) |
| CN9 | Compressor cable (black) |
| CN6 | Reactor cable |
| CN7 | Reactor cable |
| CN27 | BLDC fan cable |
| CN5 | Line cable (brown) |
| CN3 | Neutral cable (blue) |

| SOCKET | DESCRIPTION |
|---|---|
| CN4 | Earth cable (yellow+green) |
| CN2 | Information cable (white) |
| CN11 | 4 way valve cable 1 (blue) |
| CN13 | 4 way valve cable 2 (blue) |
| CN1 | NTC temperature sensor cable |
| CN19 | Card cooler sensor cable |
| CN15 | Software installation socket |

## **3.** REFRIGERANT SYSTEM DIAGRAM

### **3.1** Cooling And Heating Models




**Refrigerant pipe diameters for all models;**

| | | **12K** | **18K** | **24K** |
|---|---|---|---|---|
| Liquid | Inch | 1/4 | 1/4 | 1/4 |
| Gas | | 3/8 | 1/2 | 5/8 |

# **4.** PRECAUTIONS

The installation and maintenance must be accordant with the installation manual and instructions. Incorrect operation due to ignoring instruction will cause harm or damage.

Wiring should be done by an expert electric technician according to national regulations on electrical wiring.

All installation and maintenance shall be performed by qualified person.

## **4.1** Electrical Safety Precautions

⚠ **12K models power supplied by indoor unit**

- The air conditioner must be grounded.
- Insufficient grounding may cause electric shocks. Do not connect the grounding wire to gas pipes, water pipes, lightning conductors or telephone grounding wire. After mounting, the appliance should be powered up in order to determine grounding leak check. If you neglect, it may cause electric shocks and damages in the product.
- In order to prevent overloading of the electrical circuit, do not operate any other high-power appliance on the same circuit. Do not connect with extension cables or multi plugs. If you neglect, it may cause electric shocks or damages in the air conditioner.
- Use a dedicated mains circuit for the AC.
- Do not use a damaged or low value circuit breaker.
- Make sure that the live wire, the neutral wire and the ground wire in the mains socket are properly connected.
- Inadequate or incorrect electrical connections can cause electric shock or fire.
- Do not change the power cord or extend it with improper addition.
- The unit is a type I electrical appliance. Make sure that the unit is properly grounded. The yellow-green wire is the ground wire that cannot be used for other purposes. Improper grounding can cause electric shock.
- The unit must be reliably earthed and connected to the special earth device by the qualified electrician.
- The ground resistance must comply with local regulations.
- The mains supply must have reliable ground terminal. Do not connect the ground wire to water pipes, gas pipes, contamination pipes or other possible unsafe places.
- Fuses must comply with the prescribed model and rating printed on the fuse cover or circuit board.
- If the length of the power cord is not enough, please contact your supplier for new power cord. Lengthen the power cord by yourself is not allowed.
- Do not connect two power cables together to supply power to the air conditioner.
- Do not extend the power cable conductor by cutting.

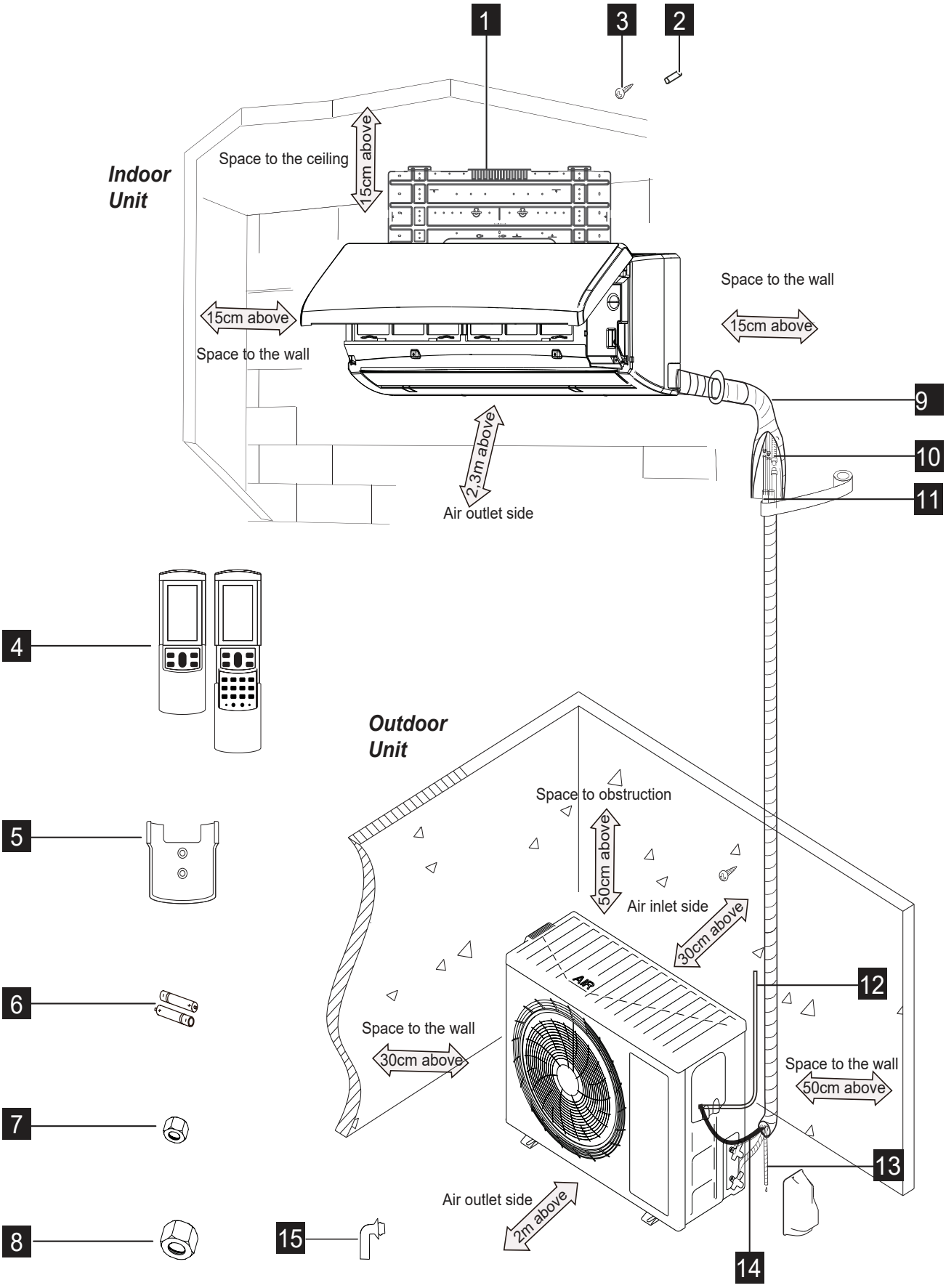
## **4.2** Installation Safety Precautions

- After the mounting, electrical switch/fuse should be easily accessible.
- Do not install the unit in areas with strong heat sources, vapours or flammable gasses, contamination with oil particles, high frequency electromagnetic equipment (e.g. welding equipment or medical devices), high salinity (e.g. close to coastal areas), sulphuric gas (e.g hot water springs), poor air quality.
- Install the indoor and outdoor unit out of reach of children.
- The wall must be strong enough to support the weight and vibration of the unit.
- Leave at least 1 m distance between the unit and other electrical appliances.
- Wear safety belt if the height of working is above 2m.
- Do not touch the product with wet hands.
- Do not allow water to run into electric parts.

## **4.3** Transportation Safety Precautions

- During handling and transportation of your air conditioner, watch out the ARROW sign while handling the indoor unit.
- Do not step on and do not put heavy objects on the indoor and outdoor unit boxes.
- Carry the outdoor unit vertically and keep it vertically at the place it is stored.
- Do not carry the outdoor unit only one person.

## **4.4** Product Description




**NOTE**
**All the pictures in this manual are for explanation purposes only. The actual shape of the indoor unit you purchased may be slight different on front panel and display window. The actual shape shall prevail.**

| Number | Name of Accessories | Quantity |
|---|---|---|
| 1 | Indoor unit mounting plate | 1 |
| 2 | Clip anchor | 6 |
| 3 | Self-tapping screw | 6 |
| 4 | Remote control | 1 |
| 5 | Remote control holder | 1 |
| 6 | Battery (AAA 1.5V) | 2 |
| 7 | Flare nut (for liquid pipe) | 1 |
| 8 | Flare nut (for gas pipe) | 1 |
| 9 | Decorative tape | 1 |
| 10 | Connection piping assembly | 1 |
| 11 | Insulation hose for refrigerant piping | 1 |
| 12 | External power cable | 1 |
| 13 | Drain hose | 1 |
| 14 | Interconnection cable | 1 |
| 15 | Drain apparatus | 1 |

Note: Other necessary parts for the installation, besides the above mentioned, must be provided by the customer/installer.

## **5.** BEFORE INSTALLATION

### **5.1** Tools needs for installation

**1.** Level gauge
**2.** Electric drill
**3.** Hole core drill (ø55mm / ø70mm)
**4.** Flaring tool set
**5.** Specified torque wrenches
**6.** Spanner (half union)
**7.** A glass of water
**8.** Hexagonal wrench (5mm)
**9.** Gas-leak detector
**10.** Vacuum pump
**11.** Gauge manifold
**12.** Users manual
**13.** Thermometer
**14.** Multimeter
**15.** Pipe cutter
**16.** Measuring tape
**17.** Screw driver ( Phillips and slotted )
**18.** Pliers and flash cutter
**19.** Socket wrench set & allen wrench set
**20.** Allen tools
**21.** Rubber wedge hummer
**22.** Adjustable spanner
**23.** R410A Gas tank
**24.** Extension cable
**25.** Vinyl tape
**26.** Gas charge hose & scales
**27.** Plaster & spatula
**28.** Pipe bending kit

### **5.2** Accessories

| **Number** | **Name of Accessories** | **Quantity** |
|---|---|---|
| 1 | Indoor unit mounting plate | 1 |
| 2 | Clip anchor | 6 |
| 3 | Self-tapping screw | 6 |
| 4 | Remote control | 1 |
| 5 | Remote control holder | 1 |
| 6 | Battery (AAA 1.5V) | 2 |
| 7 | Flare nut (for liquid pipe) | 1 |
| 8 | Flare nut (for gas pipe) | 1 |
| 9 | Decorative tape | 1 |
| 10 | Connection piping assembly | 1 |
| 11 | Insulation hose for refrigerant piping | 1 |
| 12 | External power cable | 1 |
| 13 | Drain hose | 1 |
| 14 | Interconnection cable | 1 |
| 15 | Drain apparatus | 1 |

Note: Other necessary parts for the installation, besides the above mentioned, must be provided by the customer/installer.

### **5.3** Installation details

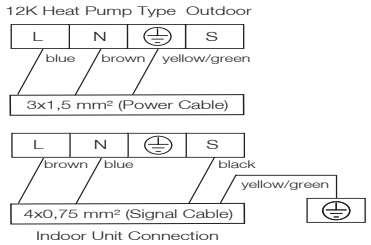
### **5.3.1** Wrench torque sheet for installation

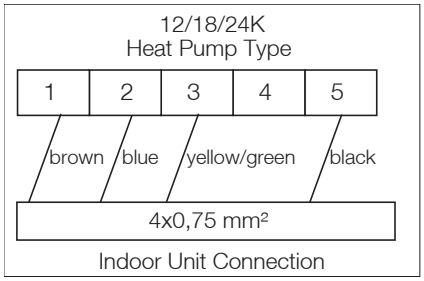
| Outer Diameter (mm) | Torque (N.m) | Additional Torque (N.m) |
|---|---|---|
| Ø 6,35 (1/4") | 15(1.53kg.m) | 17(1.73kg.m) |
| Ø 9,52 (3/8") | 34(3.47kg.m) | 37(3.77kg.m) |
| Ø 12,70 (1/2") | 50(5.1kg.m) | 54(5.5kg.m) |
| Ø 15,88 (5/8") | 68(6.95kg.m) | 72(7.34kg.m) |

## **5.3.2** Connecting the cables

| Capacity Watts / Btu/h | System Voltage/ Frequency | Power Cord Cable Gauge (mm²) | Connecting Cable Gauge (mm²) | Fuse Type (A) | Circuit Breaker (A) |
|---|---|---|---|---|---|
| 3517/12000 | 220-240V/50Hz. | 1,5 | 0,75 | 6,3 | 16 |
| 5280/18000 | 220-240V/50Hz | 2,5 | 0,75 | 6,3 | 16 |
| 7034/24000 | 220-240V/50Hz | 2,5 | 0,75 | 6,3 | 20 |

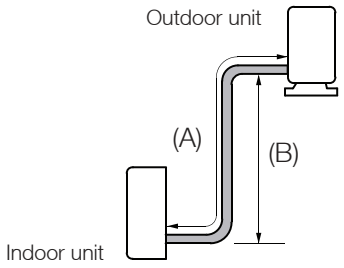
## **5.3.3** Electrical wires



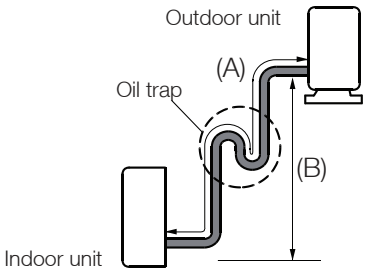




## **5.3.4** Piping length and the elevation

| Capacity Watts / Btu/h | Suction/Discharge Pipe Diameter (mm) | Standard Length (m) | Maximum Length (m) | Maximum Height (m) (A) | Additional Refrigerant (g/m |
|---|---|---|---|---|---|
| 3517/12000 | Ø9,52(3/8")-6,35(1/4") | 4 | 15 | 5 | 15 |
| 5280/18000 | Ø12.7(1/2")-6,35(1/4") | 4 | 15 | 5 | 25 |
| 7034/24000 | Ø15,88(5/8")-6,35(1/4") | 4 | 15 | 5 | 30 |



Piping length under 5m



Piping length 5m or more

## **5.3.5** Important Installation Informations

- In order to avoid extraordinary noise and vibration, the authorized service personnel must apply a proper fixation of the air conditioner.
- Do not block the air inlet or the air outlet.
- Do not use the unit in places with extremely high humidity.
- The wall must be strong enough to support the weight and vibration of the unit.
- Install the indoor unit at least 230 cm above the floor surface.
- The air filter should remain accessible.
- Install the indoor unit in a place where the condensate water can be easily drained.

- Considering the wall structure, the outdoor unit should be installed on a flat surface to avoid raspy noise, echo and vibration.
- Choose a place that will not take direct sunlight. If the selected place is exposed to direct sunlight, the outdoor unit should be shaded.
- Install the unit at the site where it is exposed to as little wind as possible, especially in areas where it is frequently windy.
- If the installation site is exposed to heavy winds, such as in coastal areas, place the unit along the widest part of the wall or use protective plates.
- Select a dust-free location where the air flow is good, which will not obstruct the air inlet and outlet of the appliance.
- Choose a place that can be easily assembled. It should be ensured that the selected location is a place where the possible service intervention can be made easily.

⚠ **It is strictly forbidden to place the outdoor units on the ground. If it needs to be placed on the ground, mounting must be done on the console of the outdoor unit by installing the console to the nearest distance of the ground. If this situation is not possible, mounting must be done above the rubber wedges with screw.**

## 5.4 Installation Summary

You can see the summary of installation below. For other details and installation visuals, please refer to the supplied installation manual.

### 5.4.1 Indoor Unit Installation

**Installation the Wall Mounting Bracket**

- The mounting plate of the indoor unit is removed from the product
- The location of the installation is determined. The distance of the product from the ceiling should be adjusted to a minimum of 15 cm. Install the wall mounting bracket horizontally over the structural parts on the wall using the spaces indicated on the bracket. Balancing must be done with water level gauge during the process.

**Drilling the Hole**

- While the holes required for mounting the mounting plate is marked, the indoor unit wall plate is used as a template.
- The location of the holes which the connection pipes and the drain hose will located is determined.

**Connective Pipes**

- Cut out the marked area from the right side or left side of the rear body with a saw, etc. Smooth the cut edges.
- The indoor unit connection pipe should be moved slowly and manually supported from the corner in order to avoid damage to the pipe when opening and bending. Pipe bending is very critical, especially when the pipe outlet is from the right side.
- Improper bending operation of the pipes may cause cracking, rupture, constriction or excessive noise of refrigerant flow.

**Drainage**

- If the product have double drainage pipes outlet ( for 18K BTU/h products), give the mounting plate some inclination (1 - 2 degrees) in which direction the water discharge hose will come out.
- The outlet direction and the slope of the drain hose must be taken into account while opening a hole through which the pipes will pass.
- If there is only one drainage pipes outlet direction in the drain pan, there is no need to tilt this outlet. Because there is the required slope inside the pan.

**Fastening the Indoor Unit**

- Pass the piping through the hole in the wall.
- Put the upper claw at the back of the indoor unit on the upper hook of the wall mounting bracket, move the indoor unit from side to side to see that it is securely hooked.
- Push the lower part of the indoor unit up on the wall, then move the indoor unit from side to side, up and down to check if it is hooked securely.

**Piping and Wrapping**

- Bundle the tubing, connecting cable, and drain hose with tape securely and evenly as shown in the side ward figure.
- Because the condensed water from rear of the indoor unit is gathered in ponding box and is piped out of room, do not put anything else in the box.

## 5.5 Outdoor Unit Installation

- During heating operation, the condensate and defrosting water should be drained out reliably through the drain hose.
- In case of a drain hose, the unit must be installed on a base more than 5 cm height.

### **5.5.1** Flaring Work

Main cause for refrigerant leakage is due to defect in the flaring work. Carry out correct flaring work using the following procedure:

- Cut the pipes and the cable.
- Use the piping kit accessory or pipes purchased locally.
- Measure the distance between the indoor and the outdoor unit.
- Cut the pipes a little longer than the measured distance.
- Cut the cable 1m longer than the pipe length.

### **5.5.2** Burr Removal

- Burrs not removed may result in leakage of gas.
- Remove burrs at the tip of the pipe cut.
- Put the end of the copper tube/pipe in a downward direction as you remove burrs in order to avoid dropping burrs into the tubing.

### **5.5.3** Put Nut on

Remove flare nuts attached to indoor and outdoor unit, then put them on pipe/tube having completed burr removal. (It is not possible to put them on after flaring work.)

## **5.6** Piping Connection Summary

### **5.6.1** Indoor Unit

- Connecting the indoor unit tubing to the connection piping:
  - Align pipes to be connected. Sufficiently tighten the flare nut with fingers, and then tighten it by using wrenches.
  - Then tighten the flare nut with spanner and torque wrench.
- Wrap the insulation material around the connecting portion:
  - Cover the indoor unit pipe and the connection pipe with the heat insulation material. Bind them together with vinyl tape so that there is no gap.
  - Ensure to isolate separately the suction pipe from the liquid pipe.
  - Wrap the insulated pipes with vinyl tape in the rear section for pipe housing. Fasten the power cable to the pipes with vinyl tape.
  - Wrap the piping, drain hose and power cable tightly with vinyl tape so that they can fit into the rear piping housing section.
- Connecting the indoor unit tubing to the connection piping:
  - Remove the spacer.
  - Hook the indoor unit onto the upper portion of the mounting plate (Engage the hooks of the mounting plate into the openings at the rear top of the indoor unit).
  - Ensure that the hooks are properly seated on the mounting plate by moving the indoor unit in all directions.
  - Press the lower left and right sides of the unit against the mounting plate until the hooks engage into their slots (clicking sound).

### **5.6.2** Outdoor Unit

- Align pipes to be connected. Sufficiently tighten the flare nut with fingers, and then tighten it by using wrenches as shown.
- Then, tighten the flare nut with torque wrench until the wrench clicks.
- Make sure to follow the above torque table value.

### **5.6.3** Piping Formation

- Form the piping by wrapping the connecting portion of the indoor unit with insulation material and secure it with narrow vinyl tape and wide vinyl tape.
  - If you want to connect an additional drain hose, the end of the drain hose outlet should be routed above the ground. Secure the drain hose appropriately.
- In cases where the outdoor unit is installed below the indoor unit level:
  - Wrap the piping, drain hose and connecting cable from the down to up.
  - Secure the wrapped piping along the exterior wall using saddle or equivalent.
- In cases where the outdoor unit is installed above the indoor unit level:
  - Wrap the piping and connecting cable from the down to up.
  - Form a trap to prevent water from entering the room.
  - Secure the wrapped piping along the exterior wall using saddle or equivalent.

### **5.6.4** Checking the Drainage

- Open and lift the indoor unit front panel.
- Check the drainage
  - Carefully pour a glass of water on the evaporator.
  - Ensure the water flows through the drain hose of the indoor unit without any leakage and goes out the drain exit.
- Drain piping
  - The drain hose should point downward for easy drain flow.

## **5.7** Installation of Electrical Wires Summary

### **5.7.1** Installation of Indoor Electric Wires

- Open the front panel and remove the wiring cover by loosening the screw.
- Route the power connection cable and signal control wire (for heap pump model only) from back of the indoor unit and pull it toward the front through the wiring hole for connection.

Connect and screw the wires onto the terminal block as identified by their colours.

- Wrap wires that are not connected with insulating tape so that they do not touch any electrical or metal parts
- Secure the wires firmly with the cable clamp.
- Put the wiring cover back and screw it.
- Reinstall the front panel.
  - Do not extend the power cable conductor by cutting.

### **5.7.2** Installation of Outdoor Electric Wires

- Remove the terminal cover on the right side plate of outdoor unit by loosening the screw.
- Take off wire cable clamp. Connect and screw the power connection cable and signal control wire (for heap pump model only) onto the terminal block following corresponding identification numbers and colours on the terminal blocks of indoor and outdoor units.
- To prevent water from entering, make a trap (“U”) in the connection wires
- Wrap wires that are not connected with insulating tape so that they do not touch any electrical or metal parts.
- Fix the power connection wires with wire clamps.
- Reinstall the handle.

**NOTE:** After confirming the above conditions, prepare the wiring as follows:

- The screws which fasten the wiring to the terminal block may come loose from vibrations during transportation.
- Check and make sure all screws are well fixed. Otherwise, it could burn-out of the wires.
- Be sure the circuit capacity is sufficient.
- Ensure the starting voltage is maintained at over 90% of the rated voltage marked on the nameplate.
- Confirm that the cable thickness is as specified in the power source specification.
- The following may be caused by voltage drop: Vibration of a contactor, which will damage the contact point, fuse blowing, disturbance of the normal function of the overload.
- The means for disconnection from a power supply shall be incorporated in the fixed wiring and have an air gap contact separation of at least 3mm in each active (phase) conductor.

# **6.** NEW REFRIGERANT ( R410A)

**Formula : 50% R32 (CH2F2) + 50% R125 (CHF2CF3)**

The most notable difference between R-410A and R-22 is the higher operating pressures (approximately 50% higher on both the discharge side and the suction side).

For example, a high-efficiency air conditioners R-22 typically operates with a suction pressure of about 5 bars and a discharge pressure of about 17 bars at an outdoor temperature of 35°C. With R-410A, the same unit will operate under the same conditions with a suction pressure of 8 bars and a discharge pressure of 27 bars. (Note that in most cases, equipment designed for R-22 cannot use R-410A because of this difference in operating pressures, so retrofitting an existing R-22 system is normally not an option.)

Today R-410A is most popular refrigerant in HVAC field both because it is an HFC (hydro fluorocarbon), and because its greater efficiency allows for the design and use of smaller air conditioning equipment.

R-410A is an azeotropic mixture of HFC-32 and HFC-125. It has been developed as a long-term replacement for R-22 in a variety of new air conditioning and cooling equipment. R-22 is an HCFC, or hydro chlorofluorocarbon, which means that it contains chlorine, an element that is depleting to the ozone layer. Because R-410A contains no chlorine at all, its ozone depletion potential (ODP) is zero. R-410A comes in rose-coloured cylinders. The “rose” colour is PMS (Pantone Matching System) 507.

As with any refrigerant, there are certain safety precautions that the technician needs to understand and observe. This article describes typical applications, recycling/recovery procedures and equipment, and precautions applicable to this new refrigerant product.

## **6.1** Typical Applications

Major applications for R-410A include unitary air conditioning equipment, chillers, and commercial refrigeration systems. In unitary residential and light commercial systems, R-410A has demonstrated a 5 to 6% higher energy efficiency rating (EER) than R-22. Its higher cooling capacity permits smaller, more compact units to be used.

Because of the significantly higher pressures associated with R-410A, a typical compressor designed for R-22 cannot be used with R-410A. As noted previously, this fact—along with other components in the system that would need to be changed—renders the refrigerant inappropriate for retrofit of existing R-22 systems.

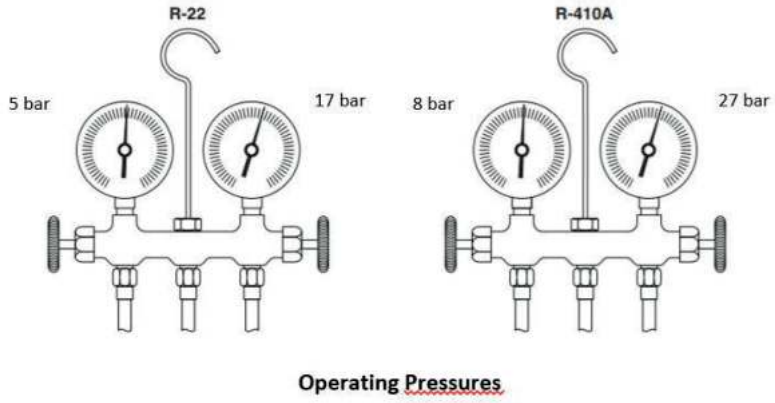
Another important issue is the compatibility of the compressor lubricant with the azeotropic R-410A mixture. To ensure satisfactory operation and durability, a polyester based lubricant that is miscible with the refrigerant is recommended.

Compressor manufacturers are continuing to test and recommend specific lubricants for use with R-410A. It is therefore important to contact the compressor and/or equipment manufacturer to review system lubricant requirements.

It is also important to review materials with which the refrigerant will come in contact, including motor windings in hermetic and semi-hermetic compressors, gaskets, etc., for compatibility.

R-410A and R-22 are chemically compatible—which means that they will not react or form other compounds if accidentally mixed—but they will form a mixture that can be difficult to separate.

At this time, separation cannot be accomplished by any known on-site recovery device or in the facilities of most offsite reclaimers. Disposal of the mixture by incineration is recommended.




**Operating Pressures**

In order to prevent the damage to equipment that can be caused by charging with contaminated refrigerant, cross contamination (the mixing of R-410A with other refrigerants) should be avoided during recovery and recycling. Recovery equipment includes not only the recovery/recycling machine itself, but also all equipment that comes into contact with the refrigerant during recovery and reclamation. This may include hoses, storage cylinders, vacuum pumps, manifold gauges, and scales.

To eliminate the possibility of cross contamination, the technician should use recovery/recycling devices with self-purging or evacuation features. Such equipment contains special valves that work with internal compressors to remove refrigerant by creating a partial vacuum in the tanks and hoses, thus allowing for the complete removal and diversion of materials into the recovery cylinder. Hoses, cylinders, and manifold gauges should either be dedicated to R-410A or evacuated after each recovery job. All equipment should be clearly marked to indicate the formulation for which it can be used, and all new cylinders should be evacuated prior to the first use.

Proper maintenance of vacuum pumps, used to remove non condensable gases and moisture from a system, is equally important. New (clean) oil specifically formulated for vacuum pumps should be used at the start of each procedure. The oil should be changed at intervals as recommended by the manufacturer, or more frequently if it takes on a milky or cloudy appearance. An isolation valve is an absolute necessity for checking system integrity. In addition, worn O-rings and hoses should be replaced to ensure minimal manifold leakage during evacuation. Vacuum pumps should be capable of pulling a vacuum of 300 to 500 microns. Scales are sometimes used during recovery to prevent tank overfilling. If the scale is equipped with an automatic solenoid shut off, it must be purged prior to each use.

## **6.2** Safety Precautions

Because it is heavier than air, R-410A vapours can accumulate at ground level. If a large release of vapour occurs, the vapour may displace the oxygen available for breathing, resulting in suffocation. Although smaller leaks pose no acute health hazards, exposure to levels of more than 1,000 parts per million (the same limit as R-22) can be harmful. Symptoms of exposure to dangerous levels of R-410A include dizziness, headache, confusion, cardiac irregularities, and loss of consciousness in extreme cases. If a leak is present or suspected, a suitable leak detector should be used to determine the need for ventilation or respiratory protection.

R-410A expands significantly when heated. Exposure of a container to direct sunlight or other heat source can cause it to burst, resulting in serious injury. Allied Signal recommends that its cylinders not be allowed to exceed 52°C. Care also should be taken to avoid damage to containers that could cause them to leak or rupture. Storage near corrosive chemicals or fumes or on damp floors should be avoided.

Although R-410A is not flammable, it may become combustible at elevated pressures in the presence of large quantities of air. Containers and recovery/recycling equipment should not be exposed to welding, brazing, open flames, or high temperatures until thoroughly purged of all traces of liquid and vapour. Recovery and recycling systems with self-purging capabilities are invaluable for this purpose.

**Other common sense precautions for storing and handling R-410A include:**

- using personal protective equipment (e.g., side shield glasses and safety shoes) when handling containers
- avoiding skin contact, which may cause frostbite
- protecting containers from damage, and hoses from cuts or abrasions
- storing containers under a roof to protect them from weather extremes
- never attempting to repair or alter containers or valves.

As stated previously, the energy efficiency of R-410A is allowing the design of smaller, more efficient air conditioning equipment. By following the procedures and noting the precautions provided in this article, the technician can readily service systems using this increasingly popular refrigerant.

**The following is a quick review of some of the most important points to remember when you are working with R-410A:**

- Never vent R-410A (or any other refrigerant) to the atmosphere.
- Use good piping practices when installing units with R-410A. (Piping practices are similar to those recommended for R-22 systems.)
- R-410A operates at pressures 50 to 70% higher than those of R-22. Be certain that servicing equipment and replacement components are designed to operate with this refrigerant.
- R-410A cylinders are rose coloured (PMS 507).
- Recovery cylinders must be rated at 27 bar or higher
- Charge systems with liquid refrigerant to avoid fractionation.
- Manifold sets should be at 52 bar (high side) and 14 bar (low side), with a 35 bar low-side retard.
- Use hoses with a 52 bar service pressure rating.
- R-410A is compatible with POE oils. POE oils absorb moisture rapidly. Do not expose the oil to the atmosphere. Keep all components sealed until the time of installation/brazing.

## **6.3** R410a Charging Instruction

- R410a should be charged only at liquid phase into the air conditioner.
- Never to charge 410a with vapour state during the charging process.
- The refrigerant tank should be placed upside down every time.
- The original charging hose should be used for R410a. Because the hose type is different than R22.
- R22 hoses can not fix the service valve on the unit.
-

There are two options which we can charge the R410a into the system;:

**1.** No Refrigerant Leakage on the System

This option can be required when the compressor, condenser, 4 way valve, etc. are changed in the system.

The authorized technician can apply this process only.

The vacuum operation should be applied to the unit first at least 1 hour after the replacing any parts which it is specified above.

The charging process can be start if there is no any leakage on the system. The authorized technician should be checked the vacuum quality on the manifold gauge.

The gauge should be displayed -760 mmHG or -1 Bar Gauge if there is no any leakage after the vacuum pump is stopped. Otherwise the pressure will increase if there is any leakage on the system after the vacuum pump is stopped.

The leakage point should be found and repaired if there is any leakage.

The charging process should be proceed only with a calibrated electronic scale.

The refrigerant tank should be placed on the scale after the manifold and refrigerant hose fixed to the unit's service valve. The tank should be placed always upside down.

⚠ **Always a little bit refrigerant should be set free to the ambient to prevent the air inside the hole in to the unit.**

It is best and certain way to charge the R410a by using the required amount according to the unit's name plate. Please check the unit's name plate always to see the correct amount.

⚠ **The additional amount should be added if the piping length is longer than 4 meters according to unit's specs. Please check the required additional refrigerant amount for every unit on its spec sheet.**

The required amount should be charged according to amount by using electronic scale. Only the liquid phase of refrigerant should be charged.

⚠ **The compressor shouldn't be run during the charging process.**

The charging process should be finished after the required amount is charged in to the system and remove the manifold and refrigerant hose.

**2.** Refrigerant Leakage on the System

First of all the leakage point should be repaired on the system.

For example that there is a leakage on the service valve at piping connection.

The piping connection point should be repaired and all the process above should be repeated for charging the refrigerant.

- Vacuum first.
- Vacuum quality and reliability check.
- Refrigerant charge.

The photos above left to right;

The refrigerant tank should be placed upside down on the electronic scale.

The quality manifold and hoses should be used.

The vacuum process always should be applied.

The R410a compressors uses POE oil inside and POE oil is high sensitive about humidity.

Vacuum process is most important stage before the charging process.

## **6.4** R410A Pressure Temperature Chart

| **R410A** | **Liquid** | | | **Vapour** | | |
|---|---|---|---|---|---|---|
| **Temperature (°C)** | **Pressure (barA)** | **Pressure (barg)** | **Pressure (psig)** | **Pressure (barA)** | **Pressure (barg)** | **Pressure (psig)** |
| 70 | 0,36 | -0,66 | -9,52 | 0,35 | -0,66 | -9,55 |
| -68 | 0,40 | -0,61 | -8,85 | 0,40 | -0,61 | -8,87 |
| -66 | 0,45 | -0,56 | -8,10 | 0,45 | -0,56 | -8,13 |
| -64 | 0,51 | -0,50 | -7,27 | 0,51 | -0,50 | -7,31 |
| -62 | 0,57 | -0,44 | -6,37 | 0,57 | -0,44 | -6,40 |
| -60 | 0,64 | -0,37 | -5,37 | 0,64 | -0,37 | -5,41 |
| -58 | 0,72 | -0,30 | -4,29 | 0,71 | -0,30 | -4,33 |
| -56 | 0,80 | -0,21 | -3,10 | 0,80 | -0,22 | -3,15 |
| -54 | 0,89 | -0,12 | -1,81 | 0,88 | -0,13 | -1,86 |
| -52 | 0,98 | -0,03 | -0,41 | 0,98 | -0,03 | -0,47 |
| -50 | 1,09 | 0,08 | 1,11 | 1,09 | 0,07 | 1,05 |
| -48 | 1,20 | 0,19 | 2,76 | 1,20 | 0,19 | 2,69 |
| -46 | 1,33 | 0,31 | 4,54 | 1,32 | 0,31 | 4,47 |
| -44 | 1,46 | 0,45 | 6,46 | 1,45 | 0,44 | 6,38 |
| -42 | 1,60 | 0,59 | 8,53 | 1,60 | 0,58 | 8,45 |
| -40 | 1,76 | 0,74 | 10,76 | 1,75 | 0,74 | 10,66 |
| -38 | 1,92 | 0,91 | 13,15 | 1,91 | 0,90 | 13,05 |
| -36 | 2,10 | 1,08 | 15,71 | 2,09 | 1,08 | 15,60 |
| -34 | 2,29 | 1,27 | 18,45 | 2,28 | 1,26 | 18,33 |

| | | | | | | |
|---|---|---|---|---|---|---|
| -32 | 2,49 | 1,47 | 21,38 | 2,48 | 1,47 | 21,25 |
| -30 | 2,70 | 1,69 | 24,51 | 2,69 | 1,68 | 24,37 |
| -28 | 2,93 | 1,92 | 27,84 | 2,92 | 1,91 | 27,69 |
| -26 | 3,18 | 2,16 | 31,38 | 3,17 | 2,15 | 31,22 |
| -24 | 3,44 | 2,42 | 35,16 | 3,43 | 2,41 | 34,98 |
| -22 | 3,71 | 2,70 | 39,16 | 3,70 | 2,69 | 38,98 |
| -20 | 4,01 | 2,99 | 43,41 | 3,99 | 2,98 | 43,21 |
| -18 | 4,32 | 3,30 | 47,91 | 4,30 | 3,29 | 47,69 |
| -16 | 4,65 | 3,63 | 52,67 | 4,63 | 3,62 | 52,44 |
| -14 | 4,99 | 3,98 | 57,70 | 4,98 | 3,96 | 57,46 |
| -12 | 5,36 | 4,35 | 63,02 | 5,34 | 4,33 | 62,76 |
| -10 | 5,75 | 4,73 | 68,63 | 5,73 | 4,71 | 68,35 |
| -8 | 6,15 | 5,14 | 74,54 | 6,13 | 5,12 | 74,24 |
| -6 | 6,58 | 5,57 | 80,76 | 6,56 | 5,55 | 80,44 |
| -4 | 7,03 | 6,02 | 87,31 | 7,01 | 6,00 | 86,97 |
| -2 | 7,51 | 6,50 | 94,19 | 7,48 | 6,47 | 93,83 |
| 0 | 8,01 | 6,99 | 101,41 | 7,98 | 6,97 | 101,03 |
| 2 | 8,53 | 7,52 | 109,00 | 8,50 | 7,49 | 108,59 |
| 4 | 9,08 | 8,07 | 116,95 | 9,05 | 8,04 | 116,51 |
| 6 | 9,65 | 8,64 | 125,28 | 9,62 | 8,61 | 124,82 |
| 8 | 10,25 | 9,24 | 133,99 | 10,22 | 9,21 | 133,52 |
| 10 | 10,88 | 9,87 | 143,13 | 10,85 | 9,84 | 142,61 |
| 12 | 11,54 | 10,53 | 152,66 | 11,50 | 10,49 | 152,12 |
| 14 | 12,23 | 11,22 | 162,63 | 12,19 | 11,18 | 162,05 |
| 16 | 12,95 | 11,93 | 173,03 | 12,91 | 11,89 | 172,43 |
| 18 | 13,70 | 12,68 | 183,89 | 13,65 | 12,64 | 183,25 |
| 20 | 14,48 | 13,46 | 195,21 | 14,43 | 13,42 | 194,55 |
| 22 | 15,29 | 14,28 | 207,02 | 15,24 | 14,23 | 206,31 |
| 24 | 16,14 | 15,13 | 219,31 | 16,09 | 15,07 | 218,57 |
| 26 | 17,02 | 16,01 | 232,10 | 16,97 | 15,95 | 231,33 |
| 28 | 17,94 | 16,93 | 245,41 | 17,88 | 16,87 | 244,62 |
| 30 | 18,89 | 17,88 | 259,26 | 18,84 | 17,82 | 258,42 |
| 32 | 19,89 | 18,87 | 273,66 | 19,83 | 18,81 | 272,79 |
| 34 | 20,92 | 19,91 | 288,62 | 20,86 | 19,84 | 287,71 |
| 36 | 21,99 | 20,98 | 304,15 | 21,92 | 20,91 | 303,21 |
| 38 | 23,10 | 22,09 | 320,29 | 23,04 | 22,02 | 319,32 |
| 40 | 24,26 | 23,24 | 337,02 | 24,19 | 23,17 | 336,02 |
| 42 | 25,45 | 24,44 | 354,39 | 25,38 | 24,37 | 353,37 |
| 44 | 26,70 | 25,68 | 372,42 | 26,62 | 25,61 | 371,36 |
| 46 | 27,99 | 26,97 | 391,09 | 27,91 | 26,90 | 390,02 |
| 48 | 29,32 | 28,31 | 410,47 | 29,25 | 28,23 | 409,36 |
| 50 | 30,71 | 29,69 | 430,55 | 30,63 | 29,62 | 429,42 |
| 52 | 32,14 | 31,13 | 451,34 | 32,06 | 31,05 | 450,21 |
| 54 | 33,63 | 32,61 | 472,90 | 33,55 | 32,54 | 471,77 |
| 56 | 35,17 | 34,16 | 495,25 | 35,09 | 34,08 | 494,12 |
| 58 | 36,76 | 35,75 | 518,39 | 36,69 | 35,67 | 517,27 |
| 60 | 38,42 | 37,41 | 542,37 | 38,34 | 37,33 | 541,30 |
| 62 | 40,13 | 39,12 | 567,24 | 40,06 | 39,05 | 566,20 |
| 64 | 41,91 | 40,90 | 593,02 | 41,84 | 40,83 | 592,04 |
| 66 | 43,75 | 42,74 | 619,74 | 43,69 | 42,68 | 618,86 |
| 68 | 45,67 | 44,66 | 647,50 | 45,62 | 44,60 | 646,74 |
| 70 | 47,65 | 46,64 | 676,28 | 47,62 | 46,60 | 675,76 |

## **6.5** Vacuuming and Refrigerant Charging & Discharging Process

Vacuuming of the system is very important in terms of performance in cooling systems. During the installation process or if the system is switched on, it must be vacuumed. Air and moisture in the refrigeration system have undesirable effects as indicated below:

- Pressure in the system rises.
- Operating current rises.
- Cooling or heating (only for models with heating function) efficiency drops.
- Moisture in the refrigerant circuit may freeze and block capillary tubing.
- Water may lead to corrosion of parts in the refrigeration system.

Therefore, pipe installation between the indoor and outdoor unit must apply leakage test and be evacuated to remove any non condensables and moisture from the system.

### Vacuum operation should be done with a high quality vacuum pump.

Check that each tube (both liquid and gas side tubes) between the indoor and outdoor units have been properly connected and all wiring for the test run has been completed. Remove the service valve caps from both the gas and the liquid side on the outdoor unit.

Note that both the liquid and the gas side service valves on the outdoor unit are kept closed at this stage.

**1.** When relocating the unit to another place, perform evacuation using vacuum pump.

**2.** Make sure the refrigerant added into the air conditioner is in liquid form in any case.

**3.** Oil trap should be installed every 5m (no oil trap needed when outdoor unit installed at a lower place than indoor unit).

### Vacuuming Application

**1.** For cooling (summer), the low pressure line (blue hose) is connected to the 3-way (turn) valve of the outdoor unit. Tighten the flare nut.

**2.** For heating (winter) the high pressure line (red hose) is connected to the 3-way (turn) valve of the outdoor unit. Tighten the flare nut.

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

**4.** The vacuum pump is switched on. System start vacuuming by opening manifold low pressure line valve and system valve.

**5.** Vacuuming continue for 10 minutes until the precise vacuum clock falling to zero (0).

**6.** Close the valve of the low pressure side of manifold gauge clock side. Then vacuum pump is switched off.

**7.** Remove the hose of the low pressure side of manifold gauge.

**8.** After the vacuum process is completed, a precise vacuum manometer is observed for 5 minutes.

**9.** Make sure the pressure display in the pressure indicator is a little higher than the atmospheric pressure. This procedure verifies if the refrigerant goes through the tubes correctly.

**10.** The rise of the pointer on the vacuum clock indicates leakage in the system. In this case, it is necessary to check the system for leakage.

**11.** Check for gas leakage.

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

**13.** If there is no leakage, the valve on the 2-way (pressure) valve on the unit is opened with the allen wrench and the refrigerant in the outdoor unit is supplied to the system.

**14.** The return valve is opened and the system is made ready for operation.

### Pump Down

When relocating or disposing of the air conditioner, pump down the system following the procedure below so that no refrigerant is released into the atmosphere.

- Connect the hose of manifold valve to the charge port of stop valve on the gas pipe side of the outdoor unit.
- Close the stop valve on the gas pipe side almost completely.
- Fully close the stop valve on the liquid pipe side.
- Turn on the unit in COOL mode.
- Fully close the stop valve on the gas pipe side when the pressure gauge shows 1 - 0.5 kgf/cm2 (100 ~ 50 kPa)
- Stop the test run operation by turn the unit off and all the refrigerant gas have been collected in the outdoor unit.

### Refrigerant Refill

⚠ **For the R410A refrigerant, can not be added into the system before it is completely discharged from system.**

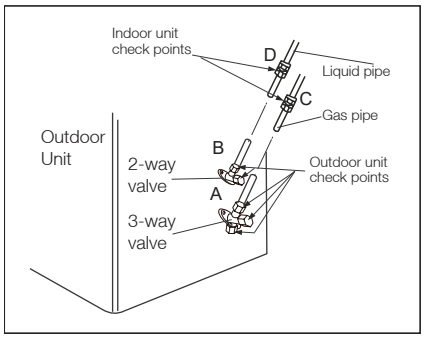
- Purge air. (for new installation only)
- Turn the 3-way valve clockwise to close, connect the pressure gauge (low pressure side) to the service valve, and open the 3-way valve again.
- Connect the tank to refill with Refrigerant.
- Set the unit to cool operation mode.

- Check the pressure indicated by the pressure gauge. (low pressure side)
- Standard pressure should be 7.5-10.5 kg/cm2 in a regular, high operation mode.
- Open the refrigerant tank and fill with refrigerant until the rated pressure is reached.
- It is recommended not to pour the refrigerant in too quickly, but gradually while operating a pressure valve
- Stop operating of the air conditioner
- Close the 3-way valve, disconnect the pressure gauge, and open the 3-way valve again.
- Close the cap of each valve.

### Gas Leakage Check

**1.** Soap water method

Apply a soap water or a liquid neutral detergent on the indoor unit connection or outdoor unit connections (A: Low side valve, B: High side valve valve C and D are ends of indoor unit connection) by a soft brush to check for leakage of the connecting points of the piping. If bubbles come out, the pipes have leakage point.




**2.** Leak detector

Use the leak detector to check for leakage.

## **7.** CLEANING AND MAINTENANCE

### **7.1** Before Maintenance

Turn the system off before cleaning. To clean, wipe with a soft, dry cloth. Do not use bleach or abrasives.

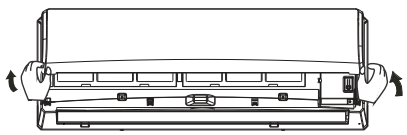
- Power supply must be disconnected before cleaning the indoor unit.
- A cloth dampened with cold water may be used on the indoor unit if it is very dirty. Then wipe it with a dry cloth.
- Do not use a chemically treated cloth or duster to clean the unit.
- Do not use benzine, thinner, polishing powder, or similar solvents for cleaning. These may cause the plastic surface to crack or deform.
- Never use water hotter than 40ºC to clean the front panel, it could cause deformation and discolouration.

### **7.2** Cleaning the Unit

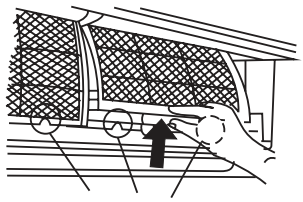
Wipe the unit with a soft dry cloth only. If the unit is very dirty, wipe it with a cloth soaked in warm water.

### **7.3** Cleaning the Filters

A clogged air filter reduces the cooling efficiency of this unit. Please clean the filter once every month.

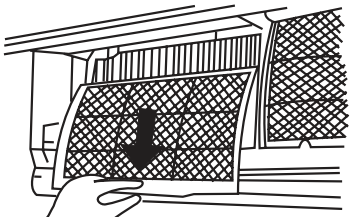


**1.** Lift the indoor unit front panel up to an angle until it stops with a full support from the bracket.

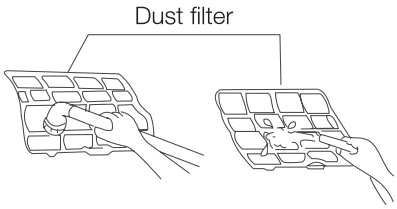


Dust filter handle

**2.** Hold the dust filter handle and lift it up slightly to take it out from the filter holder.



**3.** hen pull the dust filter downwards out of the indoor unit. Vacuum the dust filters with a vacuum cleaner. If the filters are too dirty, wash them with warm water and mild detergent. Make sure to dry the filters before re-install them. Do not dry with fire or under direct sunlight.




**4.** Insert the upper portion of air filter back into the unit, taking care that the left and right edges line up correctly and place filter into position.

## **7.4** Cleaning the air outlet and the panel

**1.** Use a dry and soft cloth to wipe it.

**2.** Pure water or mild detergent may be used if it is very dirty.

- Do not use benzine, thinner, polishing powder, or similar solvents for cleaning. These may cause the surface to crack or deform.
- To avoid the risk of electrical shock or fire, do not let water fall into the indoor unit.
- Never wipe the air flow louver violently.
- Do operate your air conditioner without filter. If your filters are unusable, buy new ones from the authorised service.

## **7.5** Preparation for extended non operation

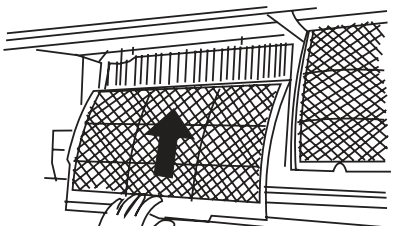
If you plan to idle the unit for a long time, perform the following:

**1.** Clean the indoor unit and filters.

**2.** Operate the fan for about 15 minutes to dry the inside of the unit.

**3.** Stop the air conditioner and disconnect power.

**4.** Remove the batteries from the remote controller. The outdoor unit requires periodic maintenance and cleaning. Do not attempt to do this yourself. Contact your dealer or service provider.



## **8.** TROUBLESHOOTING

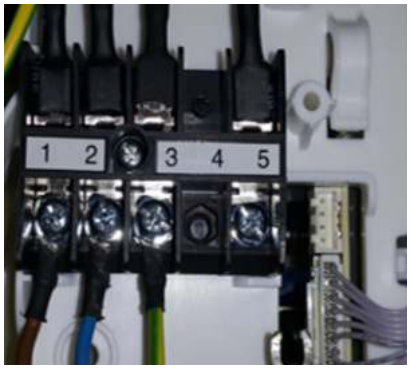
**Important Notes For Zanussi Inverter Products**

**TEST FUNCTIONS (All products with a VEL board)**
There is only one test function on Vestel electronic boards. With this control unit, robustness of the components on the indoor unit can be checked. The process is as follows:

**1.** Disconnect signal cable no.5 going from the indoor unit terminal to the outdoor unit.
**2.** Bridge to the clips no. 2 and 5 (neutral and signal) in the terminal with an appropriate cable.
**3.** Press the force start button to energize the product.

After these procedures have been completed, the indoor unit will carry out the following steps in order;

**1.** Horizontal fin will be completely opened.
**2.** Ionizer will be switched on.
**3.** Indoor unit fan will reach maximum speed.
**4.** Display will count down from "88" to "00," decreasing "11" each time.
**5.** All LEDs will become on at the same time and go out one by one. (Products with LED display)
**6.** Error will be shown, if any. "E6, E4 etc." (If there is an error, interventions will be performed on the indoor unit according to the error code.)
**7.** Display will be darkened 50 seconds after the seven segment becomes "00" or as soon as the on/off button is pressed.
**8.** If there is no error in the air conditioner at the end of the test, 00 will be displayed.



Disconnect the signal cable on the indoor unit terminal.

Bridge the cables 2 and 5 together with an appropriate cable.


Energize the air conditioner by pressing the on/off button on the indoor unit board.

Device will switch to self-testing. It will continue to count from 88 to 00.

Display lights will become on and go out one by one.


NOTE: If there is no error at the end of self-testing on 2020 products, display will shows"00."

NOTE: Any procedure carried out by only pressing the start button without bridging as a result of the procedure above is a faulty procedure and will result in an ER-06 communication error. Please disconnect the signal cable in the terminal, bridge the neutral and signal cables with an appropriate cable and perform self testing.

## **8.1** Important Information On Malfunction Procedures

- Boards should not be replaced due to ER-05, ER-07, ER-03, ER-15, ER-16, AE error codes.
- Please make sure that you do not replace the sensor without seeing an error code. Sensors on inverter products rarely break down.
- Protection codes shown with LED on the outdoor unit do not indicate a malfunction; these are codes showing that the product has entered the protection mode due to environmental conditions and external factors. When the conditions go back to normal, the protection status of the product will also go away.
- The compressor does not operate by continuously increasing or decreasing its frequency. (For example, it rotates at a constant frequency when the room temperature is equal to the set temperature.) Such situations should not be regarded as errors
- In the event of an ER-06 malfunction, first, apply the checking steps specified in the troubleshooting flow chart. If you cannot solve the problem, finally perform the self-testing procedure.
- ,Each malfunction record entered can be seen by the technical personnel performing field track. In order to diagnose problems more easily and faster and take action, to transfer more accurate information to the service providers, and to process invoices properly, please make sure that the malfunction descriptions are understandable, informative and appropriate. If necessary, take photographs and videos and include them in the records.
- Descriptions such as “Gas charge performed, problem solved.” are not enough. Leakage check must be performed, and the information regarding the place of the repair must be written, and photographs must be included when necessary. The part repaired, such as “compressor, 4-way valve, condenser, etc.” must be entered correctly.
- Remember to specify the error code received in case of electronic board replacement.

## **8.2** Error Codes

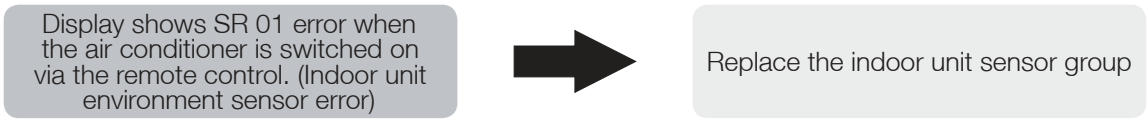
| **ERROR** | **Indoor Unit Display** | **Outdoor Unit LED** |
|---|---|---|
| Compressor cable disconnected / Sw compressor incompatibility | ER 02 | Blinking 25 times - stopping for 3 sec. |
| Indoor unit pipe sensor is on or short circuited | ER 03 | No display |
| Indoor unit fan motor error | ER 04 | No display |
| Indoor unit setting not performed/deleted | ER 05 | No display |
| Indoor and outdoor unit communication error | ER 06 | Blinking 9 times - stopping for 3 sec. |
| Gas leak error | ER 07 | Blinking 7 times - stopping for 3 sec. |
| Current protection/sudden disconnection in supply | No display | Blinking 8 times - stopping for 3 sec. |
| Model incompatibility between units | ER 09 | Blinking 22 times - stopping for 3 sec. |
| Board cooling sensor is on or short circuited | ER 10 | Blinking 15 times - stopping for 3 sec. |
| Compressor start protection | ER 11 | Blinking 11 times - stopping for 3 sec. |
| Compressor over current protection (if it occurs during operation) | ER 13 | Blinking 13 times - stopping for 3 sec. |
| Compressor over current protection (if it occurs during first start) | ER 14 | Blinking 8/13 times - stopping for 3 sec. |
| Outdoor environmental sensor is on or short circuited | ER 15 | Blinking 16 times - stopping for 3 sec. |
| Compressor pressing sensor is on or short circuited | ER 16 | Blinking 17 times - stopping for 3 sec. |
| Outdoor unit setting not performed/deleted | ER 18 | No display |
| High voltage error during startup (card or reactor sourced) | ER 17 | No display |
| Low/high voltage protection | HL | Blinking 18 times - stopping for 3 sec. |
| Compressor discharge temperature is too high product stopped (protection) | No display | Blinking 19 times - stopping for 3 sec. |
| AC high voltage information | No display | Blinking 20 times - stopping for 3 sec. |
| Board cooler temperature is too high, product stopped (protection) | No display | Blinking 21 times - stopping for 3 sec. |
| Arc protection (loose connections) | AE | Blinking 24 times - stopping for 3 sec. |
| Outdoor unit BLDC fan motor error | ER26 | Blinking 26 times - stopping for 3 sec. |

## **8.3** Protection Codes

| CODE | Indoor Unit Display | Outdoor Unit LED |
|---|---|---|
| Compressor speed limited due to outdoor temperature | No display | Blinking 1 time - stopping for 3 sec. |
| Compressor speed limited due to outdoor pipe (condenser) temperature | No display | Blinking 2 times - stopping for 3 sec. |
| Compressor speed limited due to compressor pressing temperature | No display | Blinking 3 times - stopping for 3 sec. |
| Compressor speed limited due to board cooler temperature | No display | Blinking 4 times - stopping for 3 sec. |
| Compressor speed limited due to indoor unit exchanger temperature | No display | Blinking 5 times - stopping for 3 sec. |
| Defrost occurred | DF | Blinking 6 times - stopping for 3 sec. |
| Compressor speed limited due to current | No display | Blinking 10 times - stopping for 3 sec. |
| Supply frequency error | No display | Blinking 23 times - stopping for 3 sec. |
| Indoor unit environment sensor is on or short circuited | SR 01 | No display |
| Outdoor unit pipe sensor is on or short circuited | SR 08 | Blinking 14 times - stopping for 3 sec. |
| PFC circuit protection | No display | Blinking 12 times - stopping for 3 sec. |
| Wi-fi module communication error | ER 19 | No display |
| PFC high voltage switch-off protection | No display | Blinking 28 times - stopping for 3 sec. |
| Sudden voltage drop/compressor protection | No display | Blinking 29 times - stopping for 3 sec. |
| DC supply voltage error | No display | Blinking 30 times - stopping for 3 sec |
| Excessive power error | No display | Blinking 31 times - stopping for 3 sec. |

## **8.4** Troubleshooting Flow Charts

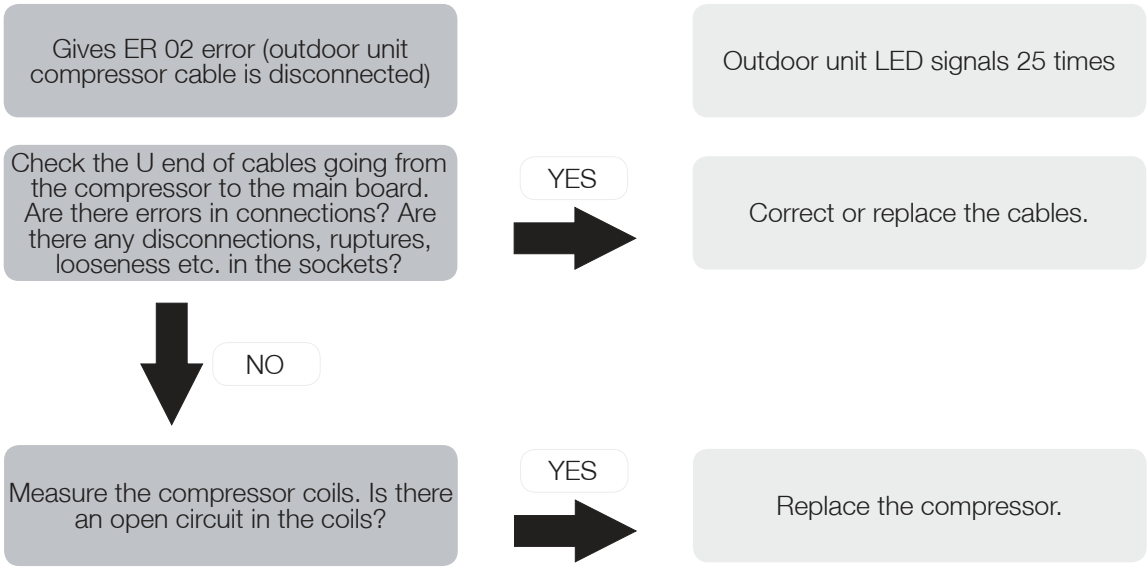
| Error Code | (7 Segment) | Outdoor unit led |
|---|---|---|
| Indoor unit environment sensor error | SR 01 | No display |

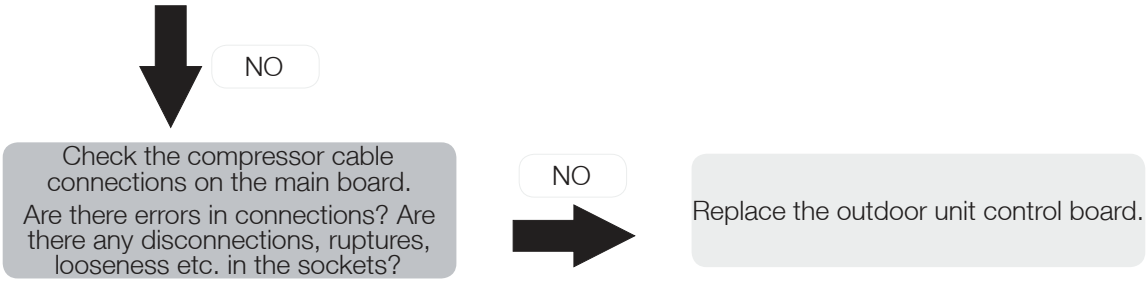



**NOTE 1:** Sensor errors given above contain precision. NTS resistances within the sensors are either short-circuited or open-circuited. Sensor groups should be replaced when these errors are seen.

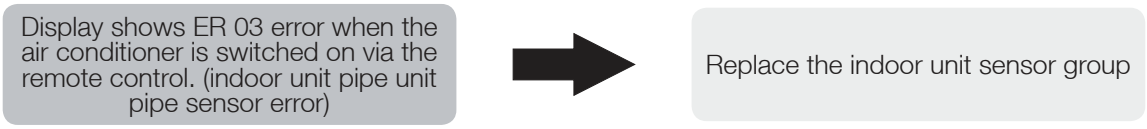
**NOTE 2:** The former name of this error is ER 01. The error description was changed to SR 01 on all products that started to be used as of 2015. This error does not cause the product to stop; the product continues the cooling or heating process according to 24°C without regard to the environment sensor. However, it sends a malfunction signal to the customer by giving a signal on the indoor unit display.

| Error Code | (7 Segment) | Outdoor unit led |
|---|---|---|
| Compressor cable disconnected | ER 02 | Blinking 25 times - stopping for 3 sec. |



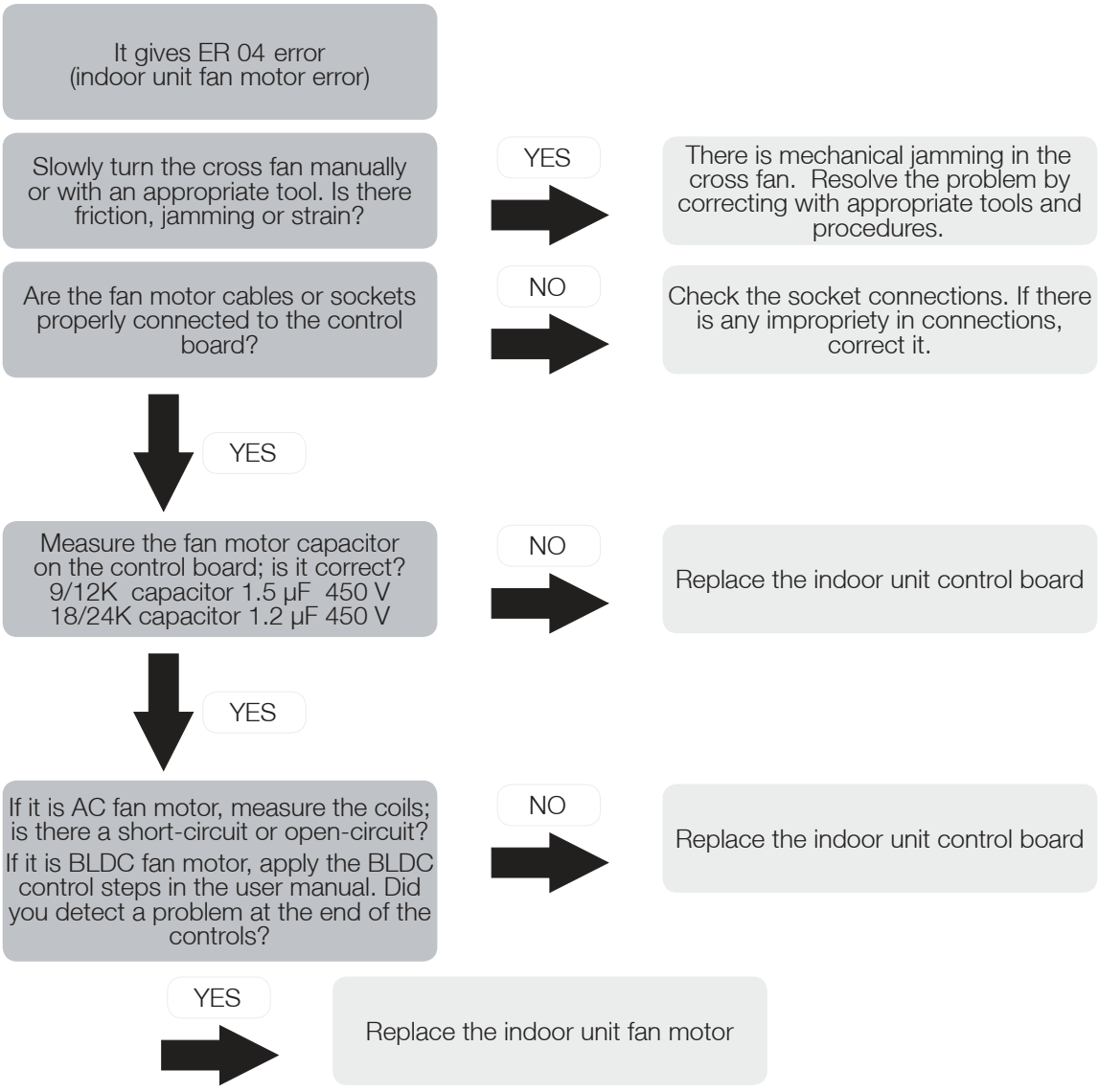



| Error Code | (7 Segment) | Outdoor unit led |
|---|---|---|
| Indoor unit pipe sensor error | ER 03 | |




**NOTE: Indoor unit pipe sensor ensures anti-frost in the indoor unit and the operational order of the indoor unit fan motor.** Sensor errors given above contain precision. NTS resistances within the sensors are either short circuited or open circuited. While these situations are rarely observed in inverter products, the indoor unit sensor group should be replaced if these errors are seen.

| Error Code | (7 Segment) | Outdoor unit led |
|---|---|---|
| Indoor unit fan motor error | ER 04 | |



| Error Code | (7 Segment) | Outdoor unit led |
|---|---|---|
| Indoor unit setting not performed/deleted | ER 05 | |

Air conditioner gives ER 05 error. Type code of the air conditioner is deleted.

→ (*) Manually do setting via the remote control after getting support from the product support unit about the setting code. Board must never be replaced.

(*) Refer to 12.4 setting with remote control page 56

| Error Code | (7 Segment) | Outdoor unit led |
|---|---|---|
| Communication error | ER 06 | Blinking 9 times - stopping for 3 sec. |

Indoor unit gives ER 06 error (Indoor and outdoor unit)

→ Outdoor unit LED gives 9 signals (Outdoor unit signal error)

Are there cross connections in interconnection cables?

→ YES → Check the connections again, correct if there is any connection error.

↓ NO

Check the product codes. Is there a pairing problem?

→ YES → Replace indoor unit or outdoor unit according to indoor unit and outdoor unit pairing codes.

↓ NO

Check the terminal connections and the suitability of electrical installation. Are there any loose connections, loose contacts, etc?

→ YES → Resolve the impropriety.

↓ NO

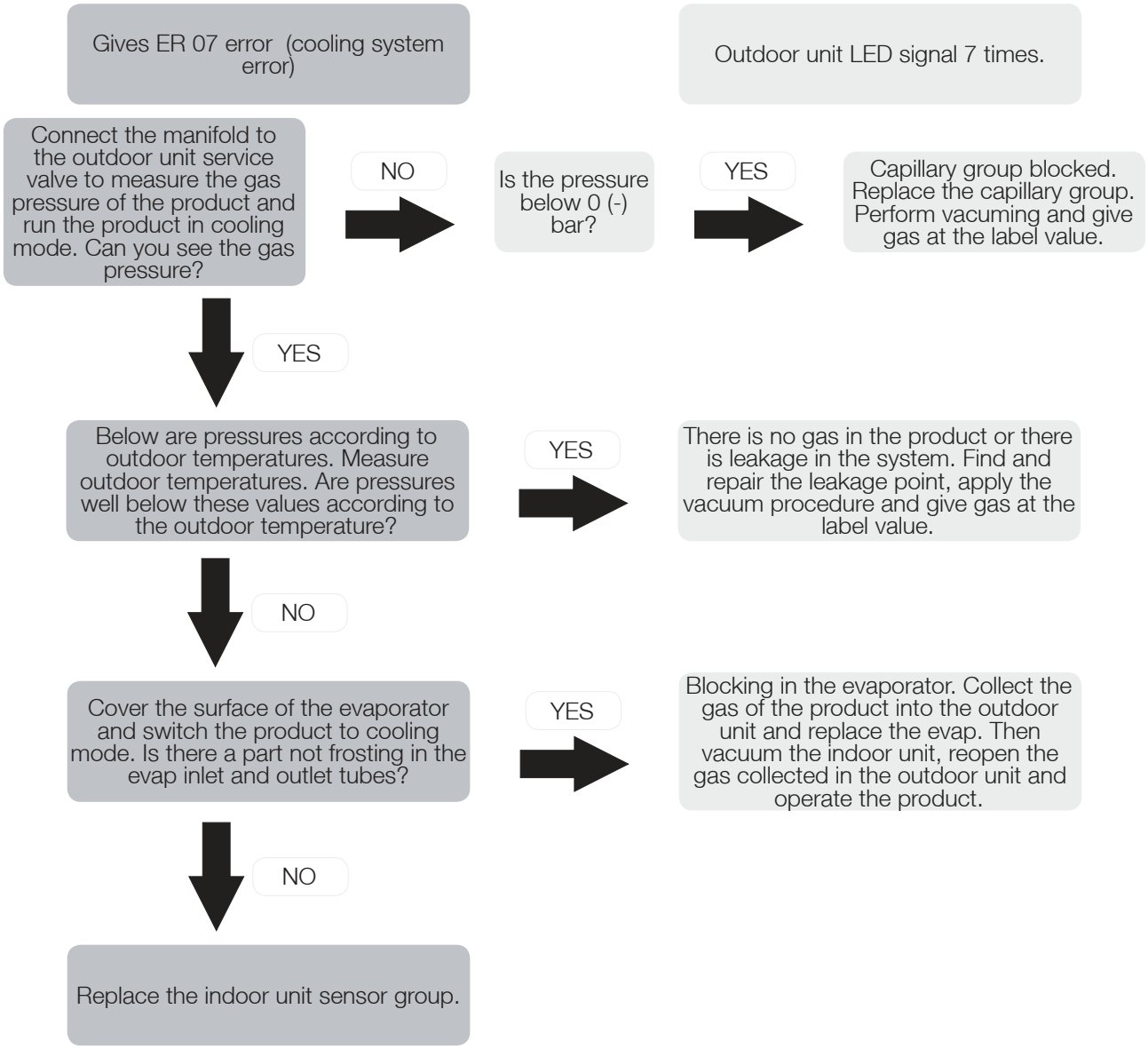
Disconnect all connection cables going from the indoor unit terminal to the outdoor unit and short-circuit the clips no. 2 and 5 with an appropriate cable. Press the force start button to give energy. At the end of the test, if the board is malfunctioned, it will give an error code; if it is okay, it will give 00.

→ YES → Replace the indoor unit control board.

↓ NO

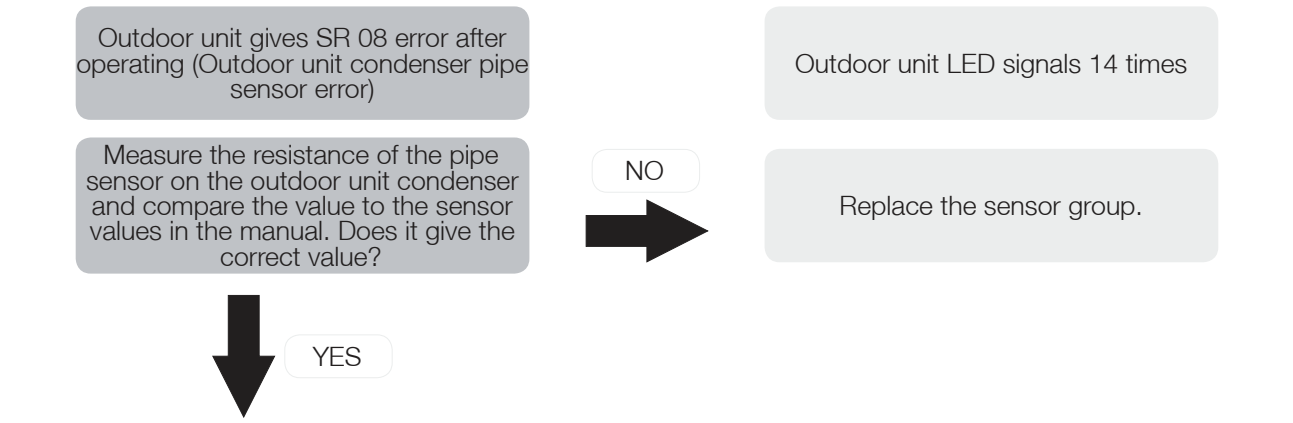
Replace the outdoor unit control board.

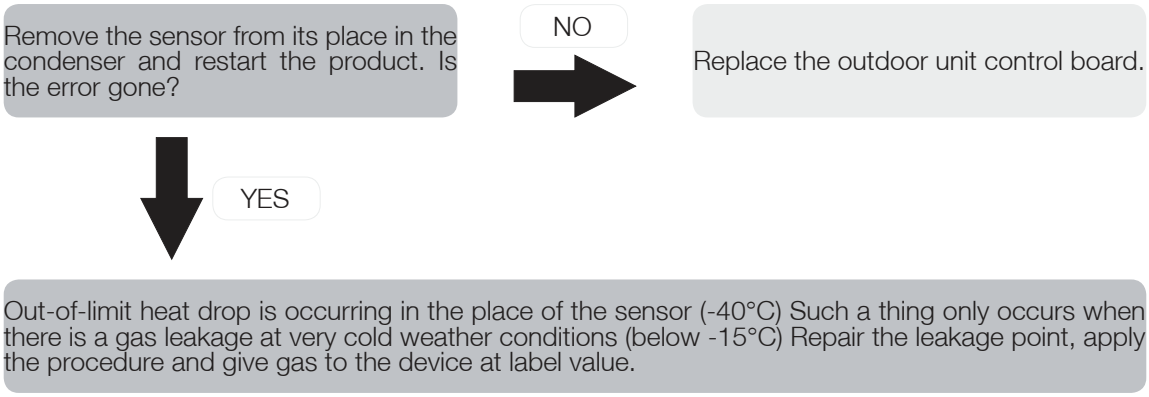
| Error Code | (7 Segment) | Outdoor unit led |
|---|---|---|
| Cooling system error | ER 07 | Blinking 7 times - stopping for 3 sec. |




**NOTE:** ER 07 error occurs when the compressor is working 1 hour after the product has been switched on. It usually occurs a result of a gas leakage or impropriety. (Blocking or leakage in the capillary group, exchangers or interconnection pipes.) It has nothing to do with the electronic board. Never replace the board due to this error.

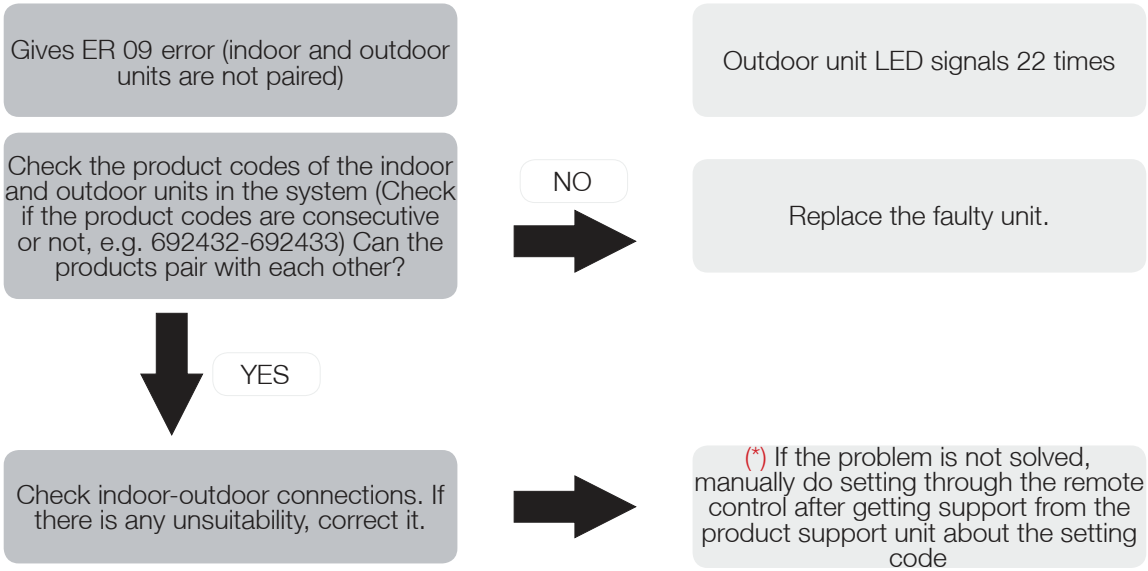
| Error Code | (7 Segment) | Outdoor unit led |
|---|---|---|
| Outdoor unit pipe sensor is on or short circuited | SR 08 | Blinking 14 times - stopping for 3 sec.. |





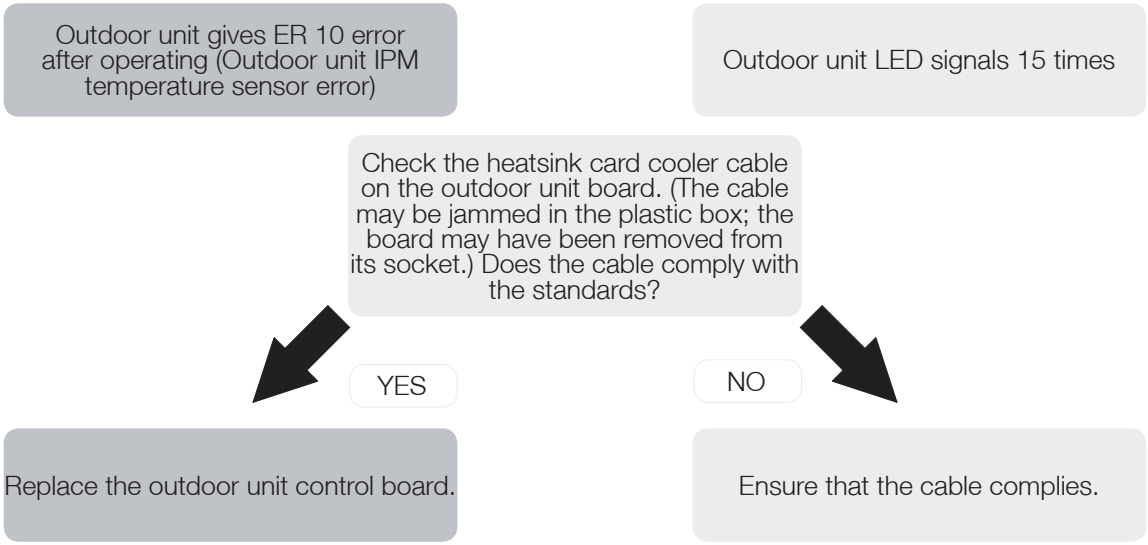

**NOTE:** Condenser pipe sensor measures the temperature of the gas at the condenser outlet. Its functions are to prevent icing of the condenser and ensure that the gas temperature is below the critical level in cooling mode. Above given sensor errors contain precision. NTS resistances within the sensors are either short-circuit or open-circuit. While these situations are rarely observed in inverter products, the sensor group should be replaced if these errors are seen.

| Error Code | (7 Segment) | Outdoor unit led |
|---|---|---|
| Model incompatibility between units | ER 09 | Blinking 22 times - stopping for 3 sec. |

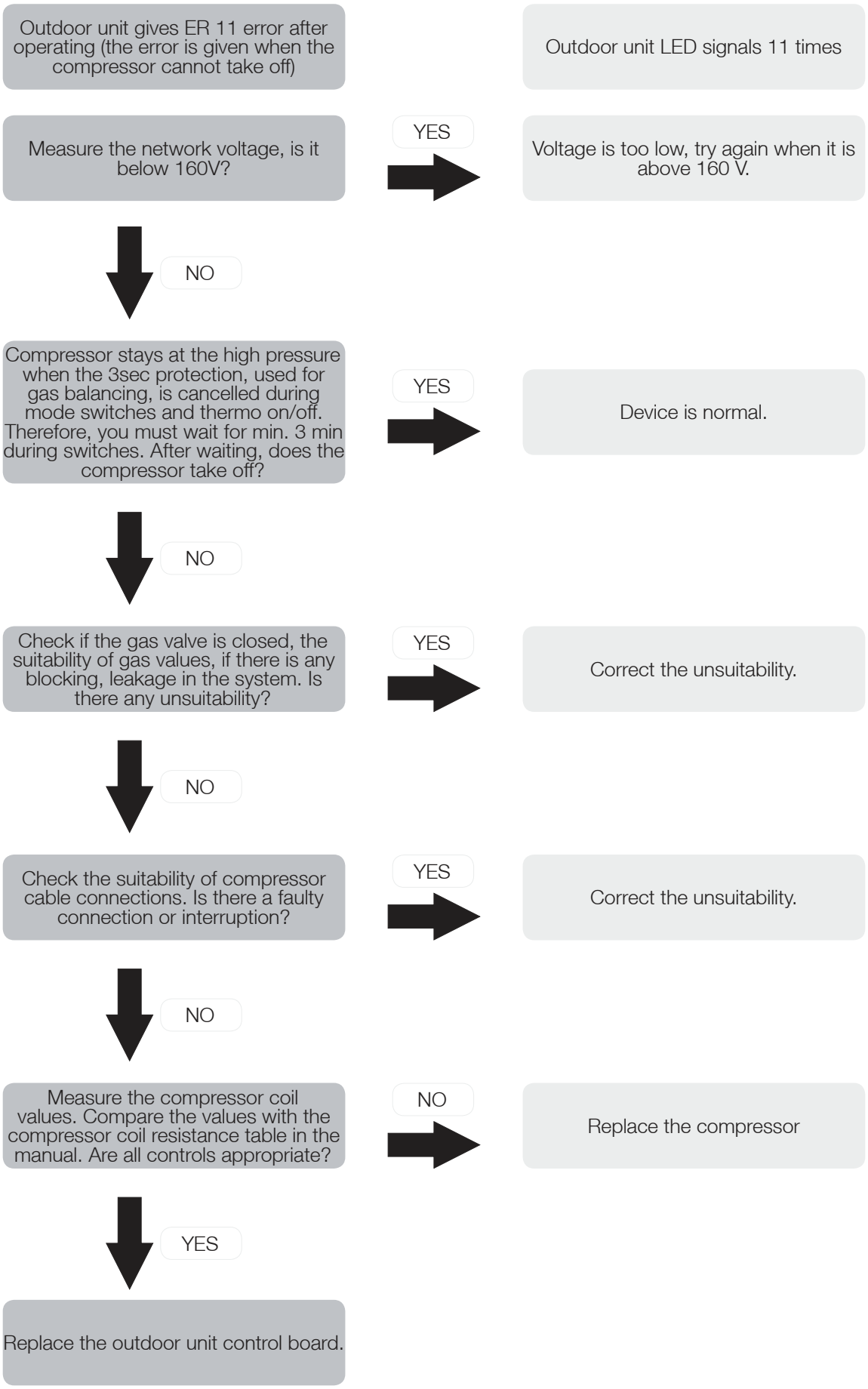



(*) Refer to 12.4 setting with remote control page 56

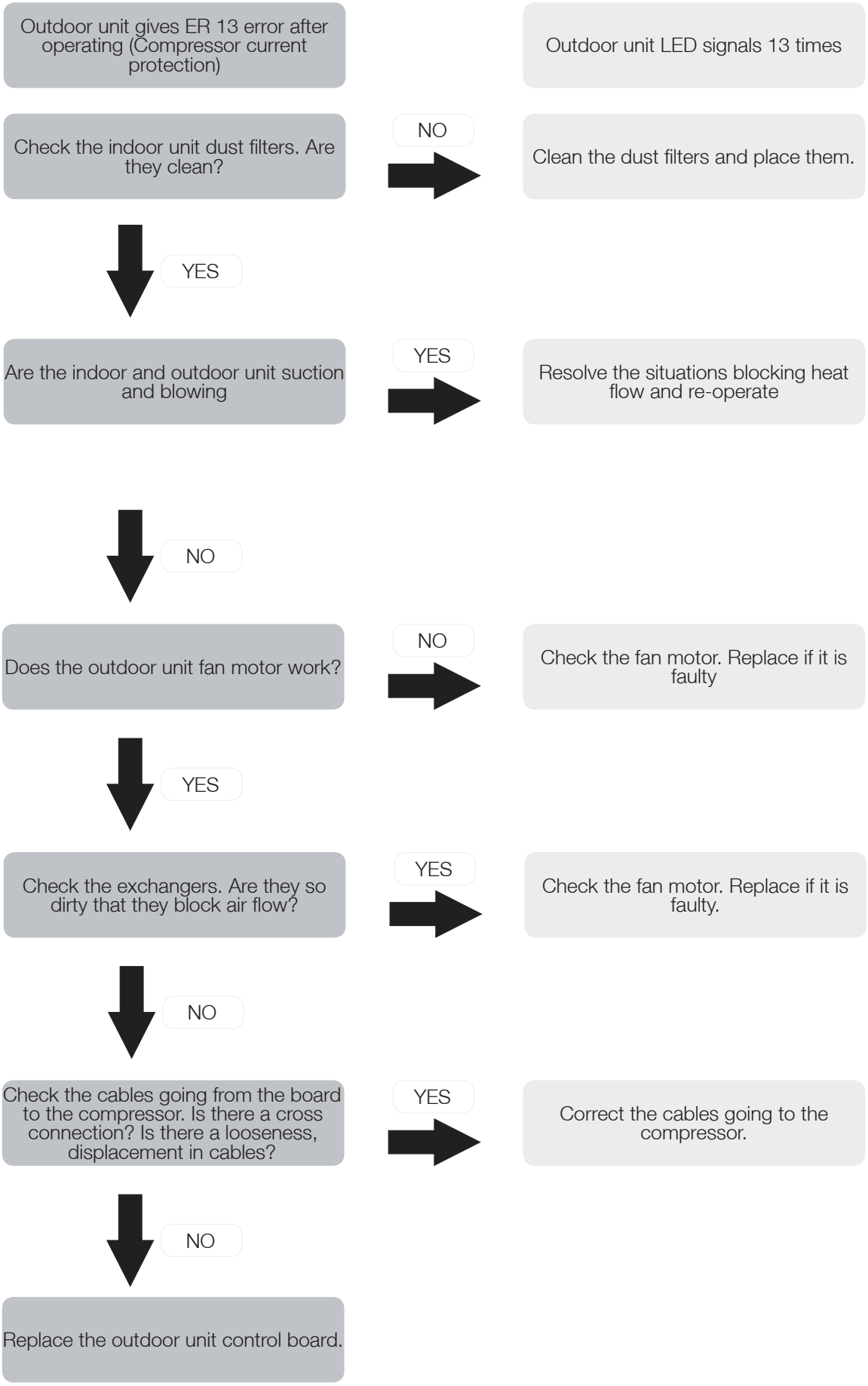
| Error Code | (7 Segment) | Outdoor unit led |
|---|---|---|
| Board cooling sensor is on or short circuited | ER 10 | Blinking 15 times - stopping for 3 sec. |



| Error Code | (7 Segment) | Outdoor unit led |
|---|---|---|
| Compressor could not take off error | ER 11 | Blinking 11 times - stopping for 3 sec. |



| Error Code | (7 Segment) | Outdoor unit led |
|---|---|---|
| Compressor excessive current protection (if t occurs during operation) | ER 13 | Blinking 13 times - stopping for 3 sec. |



| Error Code | (7- Segment) | Outdoor unit led |
|---|---|---|
| Compressor excessive current protection (if it occurs during first start) | ER 14 | Blinking 8/13 times - stopping for 3 sec. |

The product gives ER 14 error when it is first given energy (Compressor current protection)

Outdoor unit LED signals first 8 times, then 13 times

Do the controls specified for ER 11.

| Error Code | (7 Segment) | Outdoor unit led |
|---|---|---|
| Outdoor environment sensor is open or short-circuit | ER 15 | Blinking 16 times - stopping for 3 sec. |

Outdoor unit gives ER 15 error after operating (Outdoor unit environment → Replace the outdoor unit sensor group.

| Error Code | (7- Segment) | Outdoor unit led |
|---|---|---|
| Compressor discharge sensor is open or short-circuit | ER 16 | Blinking 17 times - stopping for 3 sec. |

Outdoor unit gives ER 16 error after operating (compressor discharge temperature sensor error) → Replace the outdoor unit sensor group.

| Error Code | (7 Segment) | Outdoor unit led |
|---|---|---|
| Outdoor unit setting not performed/ deleted | ER 18 | |

Air conditioner gives ER 18 error. Outdoor unit board's type code is deleted. → Replace the outdoor unit control board.

| Error Code | (7 Segment) | Outdoor unit led |
|---|---|---|
| Low/high voltage protection | ER HL | Blinking 18 times - stopping for 3 sec. |

Air conditioner gives ER HL error. It is an error for low/high voltage.

Outdoor unit LED signals 18 times.

Check the network voltage values. Does the voltage continuously fluctuate or is it above/below the limits?

YES → Product is normal. Product will start to operate after voltage values return to normal.

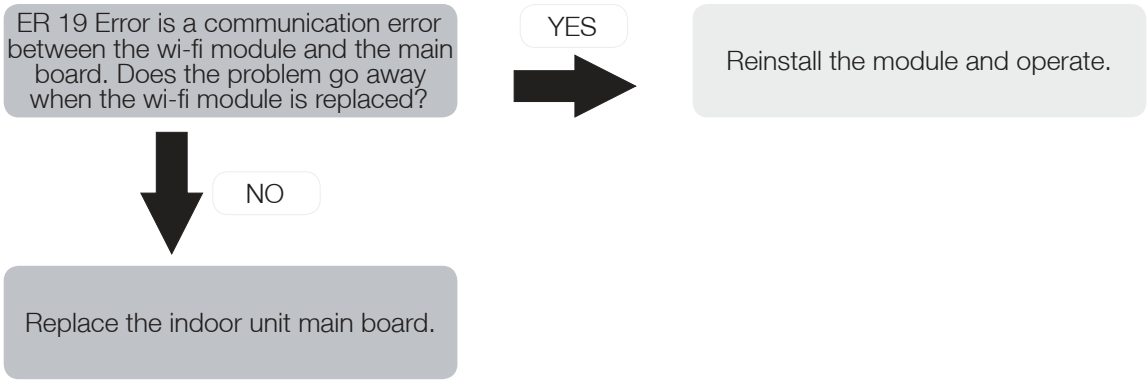
NO

Check the reactor cables. Is there a disconnection or looseness in the cables?

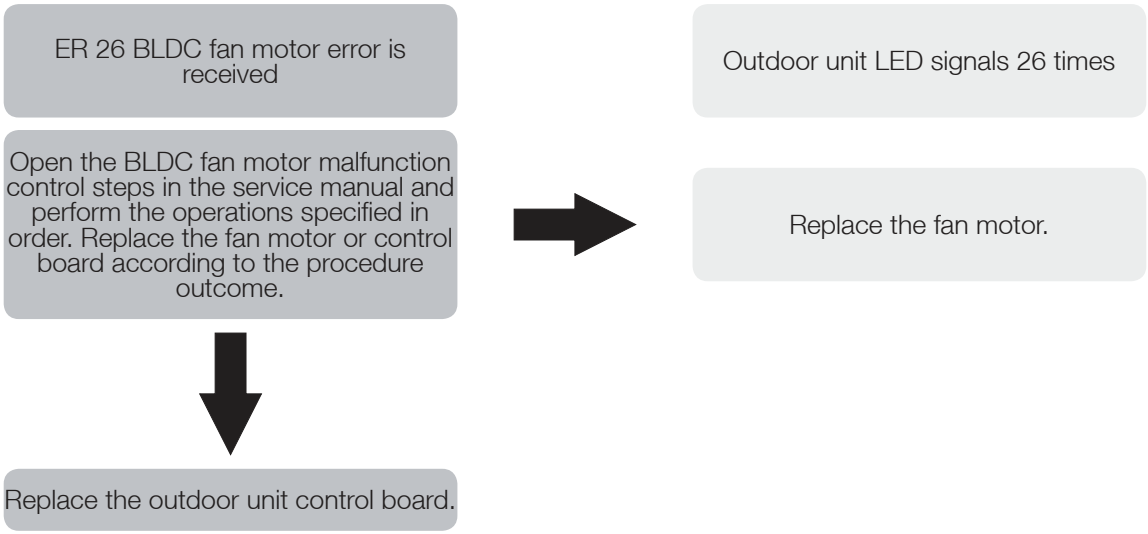
YES → Check the cables.

NO → Replace the outdoor unit control board.

| Error Code | (7 Segment) | Outdoor unit led |
|---|---|---|
| Wi-fi module communication error | ER 19 | |




| Error Code | (7 Segment) | Outdoor unit led |
|---|---|---|
| Outdoor unit BLDC fan motor error | ER 26 | Blinking 26 times -stopping for 3 sec. |




## 8.5 Protection codes

| Protection Code | (7 Segment) | Outdoor unit led | Description |
|---|---|---|---|
| Compressor start protection | ER 11 | Blinking 11 times - stopping for 3 sec. | Described above in error codes. |
| Compressor excessive current protection | ER 13 | Blinking 13 times - stopping for 3 sec. | Described above in error codes. |
| Arc protection (loose connections) | AE | Blinking 24 times - stopping for 3 sec. | There is a connection loose enough to generate an arc in the device or the network; connections should be checked again |
| Defrost occurred | DF | Blinking 6 times - stopping for 3 sec. | This is normal. Occurs in order to melt the ice in the outdoor unit. |
| Compressor discharge temperature is too high product stopped (protection) | No display | Blinking 19 times - stopping for 3 sec. | Occurs when the compressor temperature reaches above the critical level. Exchanger cleanliness and gas level should be checked. |
| Board cooler temperature is too high, product stopped (protection) | No display | Blinking 21 times - stopping for 3 sec. | May occur when the outdoors are too hot or in out-of-limit situations. Exchanger cleanliness should also be checked. |
| Supply frequency error | No display | Blinking 23 times - stopping for 3 sec. | May occur when the supply frequency goes beyond the limits. Supply voltage line should be controlled. |
| PFC circuit protection | No display | Blinking 12 times - stopping for 3 sec. | Protection occurs in the event of sudden voltage and frequency drops. Air conditioner should be turned off and on again when the supply voltage returns to normal. |
| Current protection/sudden disconnection in supply | No display | Blinking 8 times - stopping for 3 sec. | Occurs in the event of sudden drops of supply voltage. When the problem is solved, the product continues working. |

## **8.6** Warning Codes

| Warning Code | (7 Segment) | Outdoor unit led | Warning Description |
|---|---|---|---|
| Compressor speed limited due to outdoor pipe (condenser) temperature | No display | Blinking 2 times - stopping for 3 sec. | Limits or decreases the compressor frequency when the temperature on the condenser goes out of limits due to outside factors and customer usage. |
| Compressor speed limited due to compressor pressing temperature | No display | Blinking 3 times - stopping for 3 sec. | Occurs when the compressor temperature reaches above the critical level. Limits or decreases the compressor frequency when limits are exceeded. Exchanger cleanliness and gas level should be checked. |
| Compressor speed limited due to board cooler temperature | No display | Blinking 4 times - stopping for 3 sec. | May occur when the outdoors are too hot or in out-of-limit situations. Limits or decreases compressor frequency. |
| Compressor speed limited due to indoor unit exchanger temperature | No display | Blinking 5 times - stopping for 3 sec. | Compressor frequencies are limited or its speed decreased for high temperature in heating and ice melting in cooling in the indoor unit. |
| Compressor speed limited due to current | No display | Blinking 10 times - stopping for 3 sec. | Generally, the current increases due to the burden generated by the high outdoor temperature. Therefore, the compressor's operating speed is limited. |
| PFC high voltage switch-off protection | No display | Blinking 28 times - stopping for 3 sec. | Protection occurs in order for the board to not get damaged when the device remains at high voltage |
| Sudden voltage drop/ compressor protection | No display | Blinking 29 times - stopping for 3 sec. | Speed is decreased to prevent damage to the compressor in sudden voltage drops. |
| AC high voltage information | No display | Blinking 20 times - stopping for 3 sec. | Indicates that supply voltage is high. |

## **8.7** Protection Functions

Not all errors occurring in inverter air conditioners are defined as malfunction. Some error may be temporary due to external factors or different reasons. These temporary errors are named protection. A**ir conditioner resumes working after the causes of the protection go away**. The warning code display with the help of the LED on the outdoor unit board are as follows.

### **8.7.1** Protection According To The Outdoor Temperature

| **Cooling mode outdoor temperature limits** | **Outdoor Temperatures** | **Description** |
|---|---|---|
| Outdoor temperature limit | 43-47-50-54 °C | If the outdoor temperature is in this range, compressor tends to first fix the frequency and then decrease it. |
| **Heating mode outdoor temperature limits** | **Outdoor Temperatures** | **Description** |
| Outdoor temperature limit | 15-19-23 °C | If the outdoor temperature is in this range, compressor tends to first fix the frequency and then decrease it. |

### **8.7.2** Compressor Discharge Temperature Protection

Compressors used in air conditioners work between certain heat values determined by the companies. The predetermined temperature limits in inverter air conditioners are as follows.

| **Compressor Discharge Temperature protections** | **Protection Limits** | **Description** |
|---|---|---|
| Comp. Discharge temperature limit 3 | 113 °C | If the discharge temperature is above this value, compressor and outdoor unit fan motor stops. |
| Comp. Discharge temperature limit 2 | 106 °C | If the discharge temperature is above this value, frequency is decreased. |
| Comp. Discharge temperature limit 1 | 103 °C | If the discharge temperature is above this value, frequency is not increased. |
| Comp. Discharge temperature limit reset | 96 °C | If the discharge temperature is below this value, protection deactivates. |

### 8.7.3 Protection according to indoor unit evaporator temperature

This protection is a function that can occur in cooling and heating modes.

| Cooling mode indoor unit icing temperature limits | Evap Temperature | Description |
|---|---|---|
| Indoor unit pipe sensor temperature limit 3 | 1 °C | If the indoor unit pipe sensor temperature is below this value in cooling mode, compressor and outdoor unit fan motor stops. |
| Indoor unit pipe sensor temperature limit 2 | 4 °C | If the indoor unit pipe sensor temperature is below this value in cooling mode, frequency is decreased. |
| Indoor unit pipe sensor temperature limit 1 | 6 °C | If the indoor unit pipe sensor temperature is below this value in cooling mode, frequency is not increased. |

| Heating mode indoor unit excessive heating limits | Evap Temperature | Description |
|---|---|---|
| Indoor unit pipe sensor temperature limit 3 | 67 °C | If the indoor unit pipe sensor temperature is above this value in heating mode, frequency is decreased. |
| Indoor unit pipe sensor temperature limit 2 | 60 °C | If the indoor unit pipe sensor temperature is above this value in heating mode, frequency is not increased. |
| Indoor unit pipe sensor temperature limit 1 | 56 °C | If the indoor unit pipe sensor temperature is above this value in heating mode, it goes into limiting. |

**In this protection, protection system is run according to the current value.**

| Model | Current (A) |
|---|---|
| 9/12K | 10 |
| 18/24 | 13 |

If the compressor's current reaches the above values, it starts to decrease the frequency. If the current value does not go below the specified value, compressor frequency is decreased to the min. level; compressor is never shut down.

### 8.7.4 Low/High Voltage Protection

| Outdoor unit AC voltage protection | Voltage limits | Description |
|---|---|---|
| Low AC voltage | 145 | If the network voltage is at or below 145 V, compressor and outdoor unit fan motor stops. It works again when the voltage increases |
| High AC voltage | 270 | If the network voltage is at or above 270 V, compressor and outdoor unit fan motor stops. It runs again when the voltage decreases. |

**NOTE:** There are no intermediate values for voltage protection in Vestel electronic boards. Low and high limits were determined and when these limits are exceeded, HL icon in the indoor unit and the LED in the outdoor unit blinks 18 times and the outdoor unit stops. When the values go back to normal, protection codes go away and outdoor unit starts to work again.

### 8.7.5 Protection According To The Outdoor Unit Condenser Temperature

**1.** During this protection, frequency is not increased when the outdoor unit exchanger temperature reaches the critical level of 65°C.
**2.** Frequency is decreased when the outdoor unit exchanger temperature reaches the critical level of 70°C.
**3.** When the outdoor unit exchanger temperature goes below the critical level of 60°C, protection is reset and frequency is released.

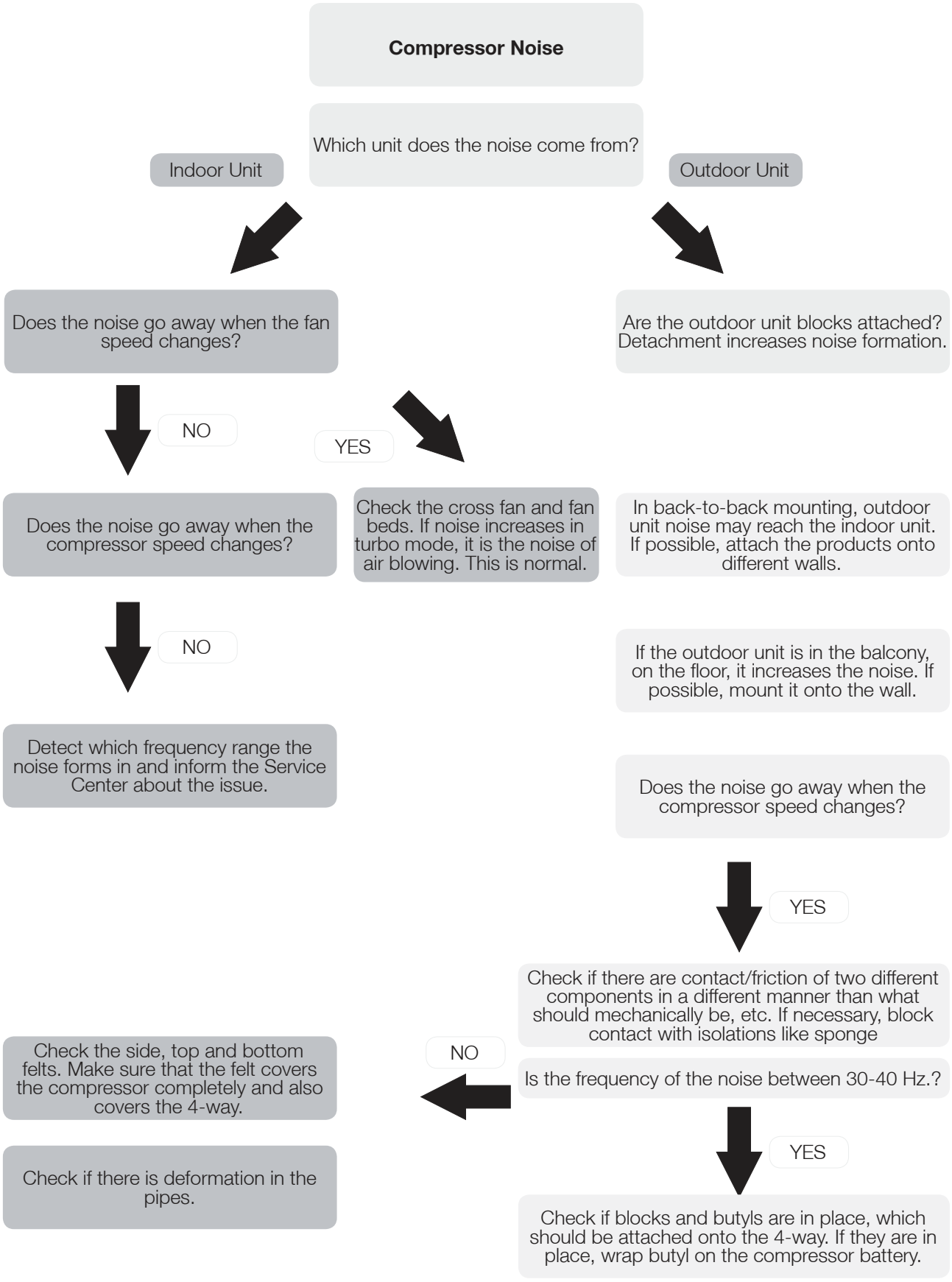
**Cooling System Error**

**1.** Gas leakage protection works as long as the air conditioner is active in cooling and heating modes.
**2.** Temperature for cooling (If the difference between IU Environment sensor - Pipe sensor temperature is less than 3C)
**3.** Temperature for heating (If the difference between IU Pipe sensor - Environment sensor temperature is less than 3C)
**4.** Control time for cooling and heating is 60 minutes. When the temperature difference goes above 3C, control is reset.

**The coding and protection values of this error are the same on all boards. It is displayed with the error code ER-07.**

## **8.8** Noisy Operation Solution Flow Chart

- Noisy operation may vary, independently from the product, depending on the environmental conditions, mounting conditions or the noise perception of the consumer. Therefore, the first and most important thing to do in noisy operation complaints is to exactly identify the noise or complaint. Try to identify the noise formation following the flow chart below.
- If you cannot identify, appropriately film a video and inform the Service Center. (Video should be filmed at least 1 meter away from the product, and there should not be any other noise other than the cause of the complaint.)



**Compressor Noise**

| Indoor Unit | Pipes | Outdoor Unit |
|---|---|---|
| Check if there is section narrowing in the evap inlet-outlet. | Check if there are problems such as section narrowing, blocking, etc. in interconnection pipes. | Check if there is blocking or section narrowing in the capillaries. |

## **8.9** Gas Pressure Measurement In Inverter Products Table

To measure the gas pressure values and compare them to the gas pressure table in cooling in inverter air conditioners manufactured in 2020, the steps below should be followed, and a performance test application that will fix the compressor frequency of the product at 55 Hz should be started.

**1.** Set the indoor unit fan cycle to high speed via remote control.
**2.** Set the setting temperature to 18°C via remote control.
**3.** When the product is turned on, press repeatedly on the sleep mode on the remote control for 6 times after applying the operations in items 1 and 2. (At the end of each pressing, buzzer voice should be heard from the indoor unit; the 6th buzzer voice should last longer.)
**4.** With the operation in item 3, performance control application of
**5.** the product working in cooling mode will start, the compressor frequency will be fixed at 55 Hz and the indoor unit fan motor's cycle will reach the highest cycle in the fan profile of the product.
**6.** ,In order to disable the performance test algorithm, the air conditioner should be turned off and on again with the remote control. (Unless this operation is carried out, the product will continue to stay in performance test mode.

To measure the gas pressure values and compare them to the gas pressure table in heating, the steps below should be followed, and a performance test application that will fix the compressor frequency of the product at 55 Hz should be started.

**1.** Set the indoor unit fan cycle to high speed via remote control.
**2.** Set the setting temperature to 30°C via remote control.
**3.** When the product is turned on, press repeatedly on the sleep mode on the remote control for 6 times after applying the operations in items 1 and 2. (At the end of each pressing, buzzer voice should be heard from the indoor unit; the 6th buzzer voice should last longer.)
**4.** With the operation in item 3, performance control application of the product working in cooling mode will start, the compressor frequency will be fixed at 60 Hz and the indoor unit fan motor's cycle will reach the highest cycle in the fan profile of the product.
**5.** In order to disable the performance test algorithm, the air conditioner should be turned off and on again with the remote control. (Unless this operation is carried out, the product will continue to stay in performance test mode.)

| **Factory Gas Pressure Measurement Values Of 12K Products (1)** | | | | | | |
|---|---|---|---|---|---|---|
| Indoor temperature (°C) | Outdoor temperature (°C) | Compressor frequency (Hz) | Id sensor (°C) | Current (A) | Suction line pressure (Bar) | Discharge line pressure (Bar) |
| 27 | 30 | 55 | 11.48 | 3.65 | 5.92 | 24.56 |
| 27 | 32 | 55 | 11.89 | 3.76 | 5.99 | 25.7 |
| 27 | 34 | 55 | 12.23 | 3.88 | 6.04 | 26.8 |
| 27 | 36 | 55 | 12.59 | 4 | 6.27 | 28 |
| 32 | 42 | 55 | 16.17 | 4.54 | 7.22 | 31.79 |
| 32 | 44 | 55 | 16.62 | 4.69 | 8.14 | 33.09 |
| 32 | 46 | 55 | 17.07 | 4.85 | 7.94 | 34.47 |
| 32 | 48 | 55 | 17.55 | 5.01 | 8.16 | 35.82 |
| 20 | 0 | 60 | 38.75 | 3.75 | 3.8 | 23.6 |
| 20 | 2 | 60 | 40.08 | 3.87 | 4.18 | 24.43 |
| 20 | 5 | 60 | 41.47 | 3.99 | 4.6 | 25.36 |
| 20 | 7 | 60 | 42.99 | 4.12 | 4.99 | 26.44 |
| 20 | 10 | 60 | 44.89 | 4.2 | 6.4 | 27.83 |
| 20 | 15 | 60 | 50.24 | 4.69 | 7.82 | 31.63 |

(1) cooling mode values
(1) heating mode values

| Factory Gas Pressure Measurement Values Of 18K Products (1) | | | | | | |
|---|---|---|---|---|---|---|
| Indoor temperature (°C) | Outdoor temperature (°C) | Compressor frequency (Hz) | Id sensor (°C) | Current (A) | Suction line pressure (Bar) | Discharge line pressure (Bar) |
| 27 | 30 | 55 | 10.08 | 5.79 | 7.81 | 24.46 |
| 27 | 32 | 55 | 10.22 | 5.93 | 7.91 | 25.58 |
| 27 | 34 | 55 | 10.62 | 6.11 | 8 | 26.82 |
| 27 | 36 | 55 | 10.83 | 6.24 | 8.05 | 27.52 |
| 32 | 42 | 55 | 14.7 | 6.88 | 9.18 | 31.71 |
| 32 | 44 | 55 | 15.2 | 7.03 | 9.3 | 32.97 |
| 32 | 46 | 55 > 50 | 16.91 | 6.54 | 9.96 | 33.44 |
| 32 | 48 | 55 > 43 | 19.08 | 6.05 | 10.95 | 34.06 |
| 20 | 0 | 60 | 34.92 | 5.86 | 4.24 | 22.25 |
| 20 | 2 | 60 | 35.46 | 5.9 | 4.62 | 22.65 |
| 20 | 5 | 60 | 36.67 | 6.04 | 5.09 | 23.54 |
| 20 | 7 | 60 | 39.95 | 6.14 | 6.35 | 24.12 |
| 20 | 10 | 60 | 41.63 | 6.3 | 6.91 | 25.22 |
| 20 | 15 | 60 | 41.44 | 6.46 | 6.75 | 27.06 |

(1) cooling mode values

(1) heating mode values

| Factory Gas Pressure Measurement Values Of 24K Products (1) | | | | | | |
|---|---|---|---|---|---|---|
| Indoor temperature (°C) | Outdoor temperature (°C) | Compressor frequency (Hz) | Id sensor (°C) | Current (A) | Suction line pressure (Bar) | Discharge line pressure (Bar) |
| 27 | 30 | 55 | 9.02 | 5.67 | 7.72 | 21.9 |
| 27 | 32 | 55 | 9.43 | 5.81 | 7.77 | 23.03 |
| 27 | 34 | 55 | 9.59 | 5.96 | 7.86 | 24.1 |
| 27 | 36 | 55 | 9.87 | 6.09 | 7.98 | 25.14 |
| 32 | 42 | 55 | 14.22 | 6.69 | 9.27 | 29.52 |
| 32 | 44 | 55 | 14.84 | 6.88 | 9.45 | 30.47 |
| 32 | 46 | 55 | 15.39 | 7.07 | 9.61 | 31.78 |
| 32 | 48 | 55 | 16.07 | 7.27 | 9.8 | 33.12 |
| 20 | 0 | 60 | 36 | 5.02 | 5.4 | 21.58 |
| 20 | 2 | 60 | 37 | 6.11 | 5.77 | 22.32 |
| 20 | 5 | 60 | 35.45 | 6.23 | 6.41 | 23.11 |
| 20 | 7 | 60 | 36.07 | 6.3 | 6.8 | 23.69 |
| 20 | 10 | 60 | 37.38 | 6.47 | 7.42 | 24.85 |
| 20 | 15 | 60 | 40.17 | 6.69 | 8.24 | 27.13 |

(1) cooling mode values

(1) heating mode values

# **9.** COMPONENTS

## **9.1** Compressors




| Compressor Type | Model | Winding Resistance (25 °C) |
|---|---|---|
| LG | GS089MAA | 1.99 +/- 7% Ω |
| | GSG102MKA | 1.99 +/- 7% Ω |
| | GAT156MBA | 1.45 +/- 7% Ω |

**IMPORTANT NOTE: Attention must be paid to environment and material temperature in compressor measurements.**
Resistance values between coils should be equal or very close to each other.

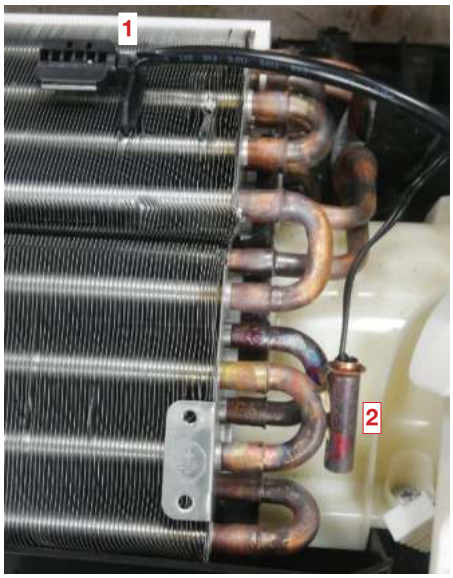
| | UW (Ω) | VW (Ω) | VU (Ω) | Faulty/robust |
|---|---|---|---|---|
| Measurement 1 | 1.90 | 1.89 | 1.90 | Robust |
| Measurement 2 | 1.12 | 1.89 | 1.90 | Faulty |
| Measurement 3 | 1.90 | No value | 1.90 | Faulty |
| Measurement 4 | 2.10 | 2.11 | 2.05 | Robust |

elements whose resistance decreases if the heat increases. Indoor environment sensor and evap sensor are NTC elements.

Such sensors do not have a standard resistance value. They only have a usage resistance range. NTC will show different resistance values depending on the temperature of the environment it is in.

## **9.2.1** Indoor unit sensors (indoor environment sensor, evaporator pipe sensor)


1. Evaporator defrost sensor
2. Indoor unit sensor.




**Functions They Help**

**Environment sensor:** Regulating the operating functions of the air conditioner (auto, cooling, heating, dehumidification and sleep modes).

**Evaporator sensor:** Regulates the operation of the protection modes of the air conditioner (e.g. anti-frost in indoor unit, remaining hot in heating, operating order of the indoor unit fan motor etc.)

## **9.2.2** Outdoor unit sensors (ntc)

**1.** Compressor Discharge Line Sensor (3,341 kΩ / 100 C)
**2.** Condenser Pipe Sensor (10.00 kΩ / 25 C)
**3.** Outdoor Unit Temperature Sensor (10.00 kΩ / 25 C)

**Condenser discharge sensor**

**Condenser temperature Sensor**

**Outdoor unit environment tepmperature sensor**

**Compressor discharge line sensor:** measures the temperature value of the gas which the compressor discharges. Its duty in the system is to help decrease the cycle of the compressor when the compressor discharge gas temperature goes above the critical level.

**Condenser pipe sensor:** Measures the temperature of the gas at the condenser outlet. Its duty in the system is to prevent icing of the condenser in heating and ensuring that the gas temperature is below the critical level in cooling.

**Outdoor temperature sensor:** Air conditioners' operating environment temperatures are predetermined. When these temperatures are exceeded, it helps prevent damage to the air conditioner by decreasing the cycle of the compressor.

**How to do a sensor measurement**

- Sensor should be disconnected from the device.
- The temperature in the environment to be measured should be measured with an appropriate thermometer.
- The sensor from which a resistance value will be obtained should be kept in the environment for 5 min. (until the temperature of the sensor equals to the environment temperature)
- Resistance values should be taken with an appropriate measuring tool. (The measurement method is shown in the below figure.)

The table attached is compared. If the values obtained match, sensor is robust.



### **9.2.3** Solenoid coil measurement

Robustness of the coil: Measurement tool probes are connected to its two cables as shown in the below image and resistance values are taken. The value on the display (1,307 kΩ 25°C) shows that the coil is robust. The next measurement is to detect a problem in the insulation of the coil. To understand this, one probe is connected to one of the ends, and the other probe is touched to the metal body of the coil. If a value is shown on the display, the coil is faulty.


## **9.3** Fan Motors

### **9.3.1** Indoor unit fan motors (AC - BLDC)

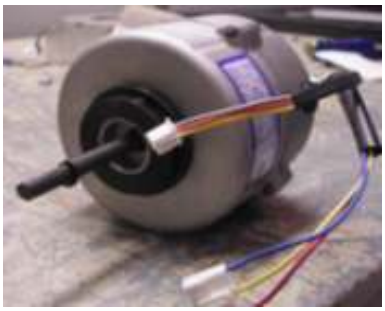
As indoor unit fan motors, asynchronous motors and BLDC motors whose cycle can be controlled are used. The control of the cycle in AC motors is performed through the relay or triac on the electronic board. It ensures that the cold air obtained in the evaporator is given to the outdoor environment and, at the same time, the hot air in the indoor environment is passed through the evap.

Indoor unit fan motors used in 2020 are given in the table below.

| Code | Definition | A/c unit | Voltage | Type | Product |
|---|---|---|---|---|---|
| 32027553 | Fan engine 9/12K | Indoor unit | 220-240 V | AC/ceramic | Flora 9/12K |
| 32032130 | Fan engine 18/24K | Indoor unit | 310 V DC | BLDC | Flora 18/24K |
| 32032732 | Fan engine 9/12K | Indoor unit | 310 V DC | BLDC | Floe 9/12K |

**Ceramic**

**Aluminium**



**Motor inner structure**

**Aluminium body vs AC Ceramic Body**

**Measurement Control**

Ac voltage of the yellow and grey cable sockets of the tacho socket on the indoor unit board should be measured (Voltage should be 7-10V)

Resistances between the blue-red, blue-yellow and yellow-red cables in the supply socket should be separately measured. If a value is seen in all measurements, it means robust; if there is no value even in one of the measurements between the cables, it means faulty.

## **9.3.2** Outdoor unit fan motors

**BLDC Fan Motors**

It is used in 9-12K Nature Plus A+ / Plasma Inverter A++ / HTS / Regal / Finlux / Seg products, Nature Buzz A++ 12-18-24 K products and Plasma inverter 9K A+++ products manufactured in 2016 and it is fed with DC voltage by the outdoor unit control board. Its speed is determined according to compressor and condenser temperatures.

Control temperatures:

| Cooling/Dehumidification | 12K Outdoor Unit | | | | |
|---|---|---|---|---|---|
| Compressor suction temperature (°C) | ≤ 50 | > 50 ~ ≤ 65 | > 65 ~ ≤ 75 | > 65 ~ ≤ 93 | > 93 |
| Outdoor unit fan motor cycle (rpm) | 400 | 600 | 800 | 980 | 1100 |

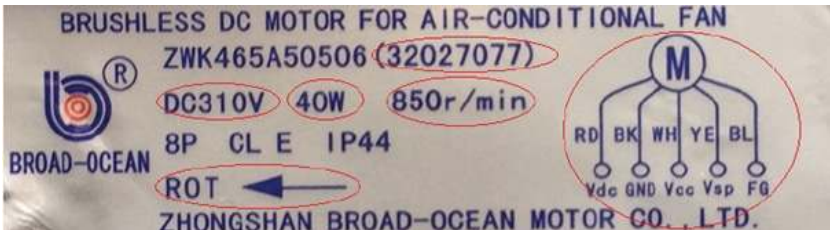
| Heating | 12K Outdoor Unit | | | | |
|---|---|---|---|---|---|
| Condenser input temperature (°C) | ≤ 3 | > 3 ~ ≤ 5 | > 5 ~ ≤ 8 | > 8 ~ ≤ 12 | > 12 |
| Outdoor unit fan motor cycle (rpm) | 1100 | 980 | 800 | 600 | 400 |

**BLDC Outdoor Unit Fan Motor Control**

- Fan motors of DC type used in Vestel outdoor units are internally driven today.
- Separate control of motor coils is not possible in internally driven type motors. Therefore, there is no other possible control besides some simple measurements to decide whether the motor is faulty or not.
- The malfunction code for outdoor units using BLDC outdoor unit fan motor is given as ER26.
- In the event of this error code being received, outdoor unit will stop completely. In such case, the following control and measurements should be conducted and a decision should be made about whether the malfunction is in the motor or in the outdoor unit main board.

Prior to the checks, the following technical information about the motor label is useful to know.

**Identifying the engine label:**




On the label given as an example above:

We can see the order code of the 32027077 motor at Vestel, its supply voltage with DC310V (may be >310 Vdc), the power it will spend with 40W, its designed cycle number with 850r/min (may rotate higher) and its rotation direction with the ROT symbol.

Finally, RD (red) (Vdc), BK (Black) (GND), WH (White) (Vcc), YE (Yellow) (Vsp), BL (Blue) (FG) definitions that can be seen on the far right indicate the colors of the ends in the motor and their functions.

Briefly, RD/BK should be known as motor supply ends, BK/WH as motor driver supply ends, BK/YE as motor cycle control ends and BL as the motor signal feedback ends.

In the event of an ER26 error occurring, the points to control will be some of these ends.

**Control steps for ER26 (BLDC engine malfunction):**

**1.** Cut the energy supply of the unit completely, rotate the fan propeller and make sure that the motor shaft is rotating easily. If the motor shaft is jammed, it is possible to see an ER26 error.

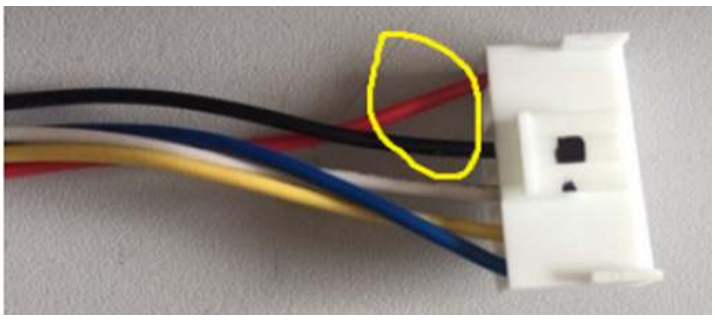
**2.** Remove the motor socket from where it is connected on the board and perform the measurements below:

**Note:** The control steps described below are listed according to priority.

Check the impedance of the supply ends of the motor with your measuring tool.

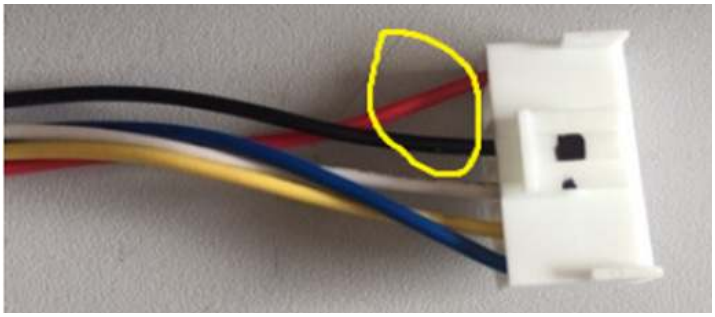
Supply ends of the motor are red and black.

When the measurement tool's (+) probe is connected to red and (-) probe to black, 1.38 MΩ will be read and the contrary will result in a value of approximately 1.22 MΩ. This value may vary depending on the environment temperature. The important thing is that a value is seen in measurements. If there is no value seen after measuring, the motor is faulty.

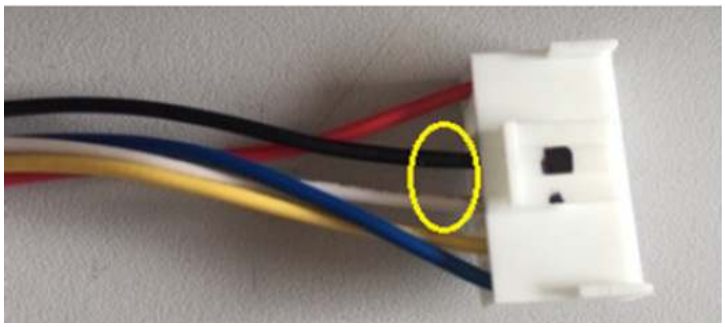


**3.** If a value is read at the motor supply ends, whether the motor circuit of the main board is robust should be controlled.

– Attach the motor socket to its place, give energy to the air conditioner and turn it on. In this case, a voltage between 210 Vdc and 340 Vdc at the red and black ends of the motor should be measured. When making this measurement, it is necessary to take the measuring tool to Vdc (correct current measuring) state and make measurements as red probe/red motor cable and black probe/black motor cable. If there is voltage in the range specified above according to the measurement result, the motor board circuit is robust but the motor is faulty.

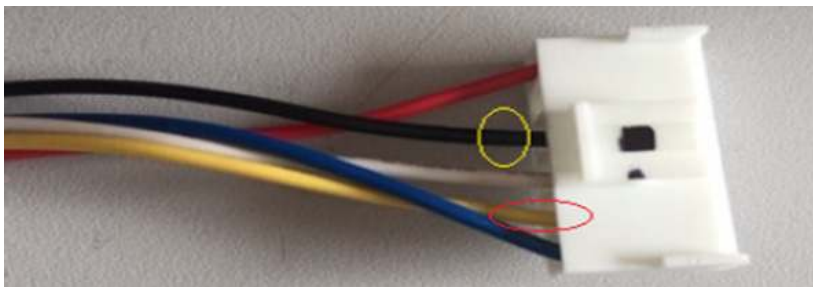


– Measurement should be done between the black and white ends of the motor while the air conditioner is operating and 15 Vdc voltage should be seen. Red probe of the measuring tool should be at the white end of the motor and its black probe at the black end of the motor. Measurement should always be performed at the correct current grade. If measurement result is 15 Vdc, the board is robust but the motor is faulty. If voltage measurement cannot be performed, the motor is faulty.



– Measurement should be done between the black and yellow ends of the motor while the air conditioner is operating and a voltage between 0 and 6.5 Vdc should be measured. Red measurement probe will be at the yellow end and the black measurement probe will be at the black end. If a voltage in the range specified above can be measured, the board is robust but the motor is faulty. If voltage measurement cannot be performed, the motor is faulty.

**Important Note: DC type fan motor cannot be controlled with external standard network voltage. Therefore, testing is not appropriate.**



## **9.4** Setting with remote control

**OPTION SET MODE**

You must follow the steps below to put your remote in setting mode;

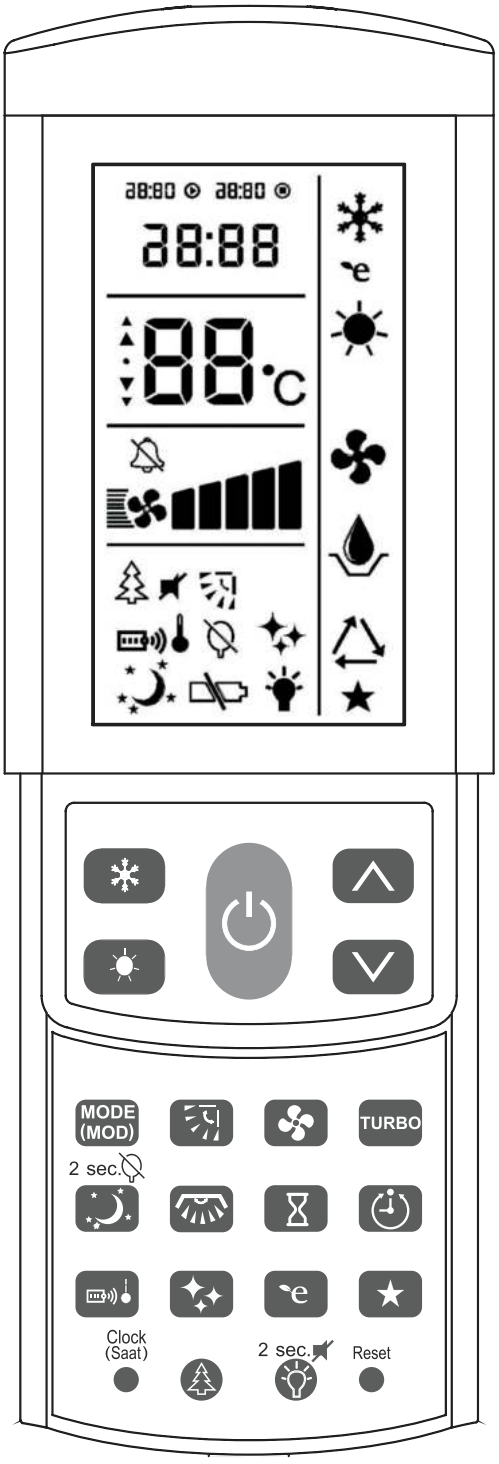
**1.** The batteries should be removed.

**2.** You must press simultaneously set (+) and set (-) buttons when re-inserting the batteries.

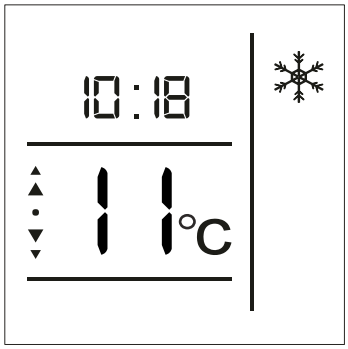
**3.** When you reinsert the batteries, the remote controller will switch to set mode. ( When the RC switch in this mode, you can not control the RC standard use mode. )

**4.** You will see 6 zero icon on the screen.

**5.** Start entering the setting codes by pressing the buttons shown in the tables.







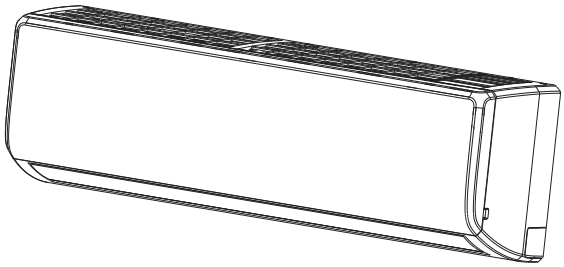
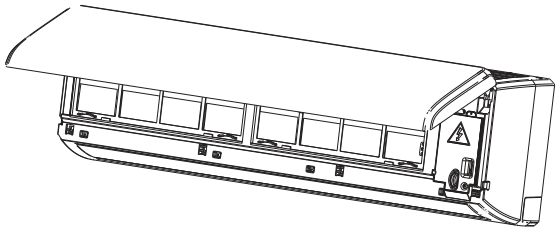
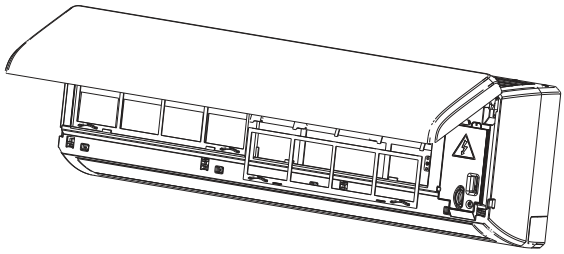
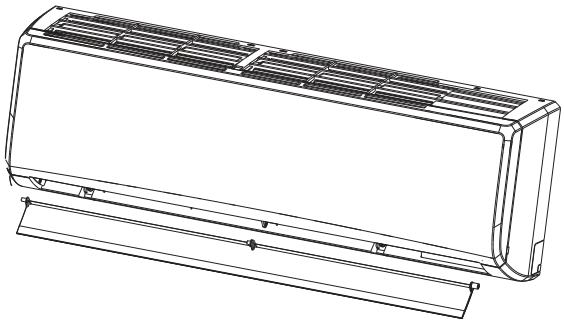
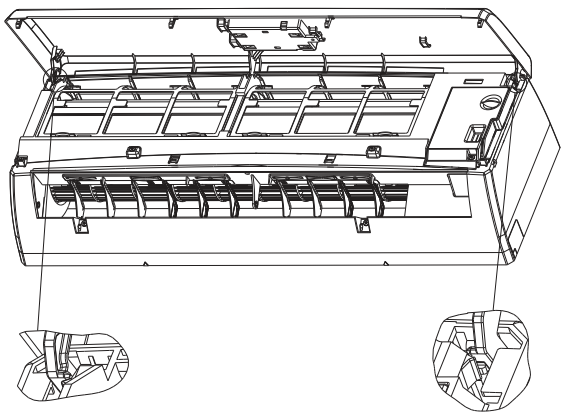

| Indoor Unit | Set Code |
|---|---|
| ZS12V70CCHI | 053843*112450 |
| ZS12V71CCHI | 053843*112450 |
| ZS12V80CCHI | 053843*112450 |
| ZS12V81CCHI | 053843*112450 |
| ZS12V91CCHI | 053843*112450 |
| ZS18V70CCHI | 051A33*113350 |
| ZS18V80CCHI | 051A33*113350 |
| ZS18V81CCHI | 051A33*113350 |
| ZS24V70CCHI | 053333*112350 |
| ZS24V71CCHI | 053333*112350 |
| ZS24V80CCHI | 053333*112350 |
| ZS24V81CCHI | 053333*112350 |
| ZS24V91CCHI | 053333*112350 |

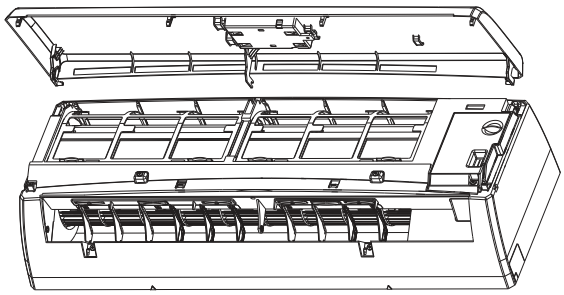
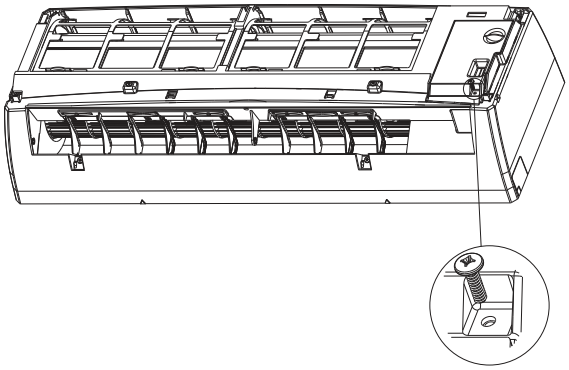
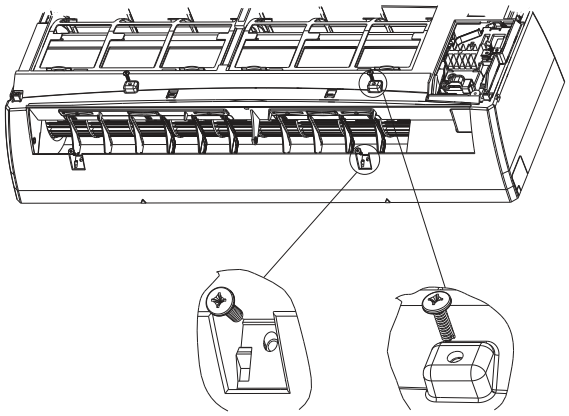
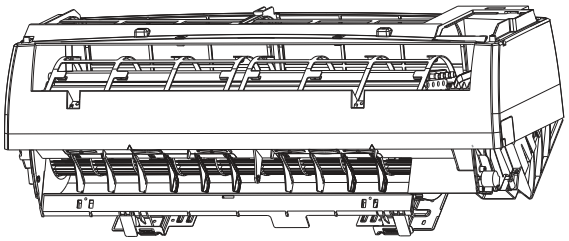
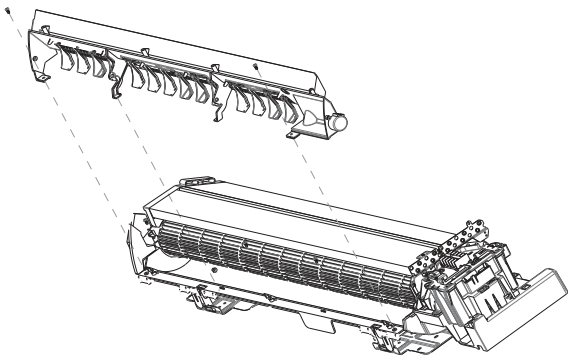
For the indoor control unit you supply as spare parts, you must make the setting adjustments in this table according to each model. If the product is operated before setting operation, AC does not work and an error code appears on indoor unit display

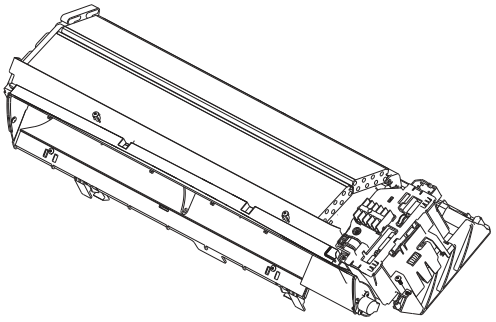
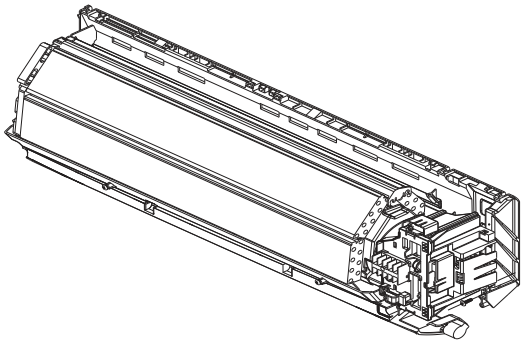
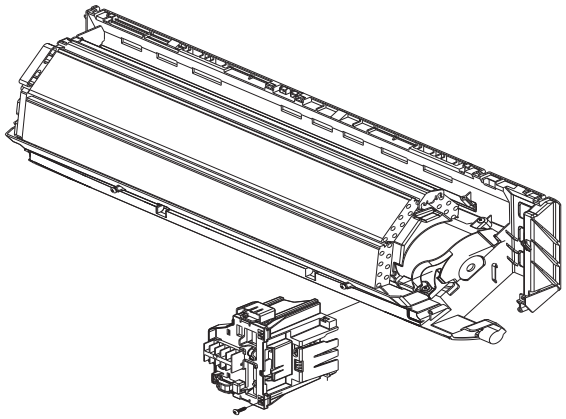
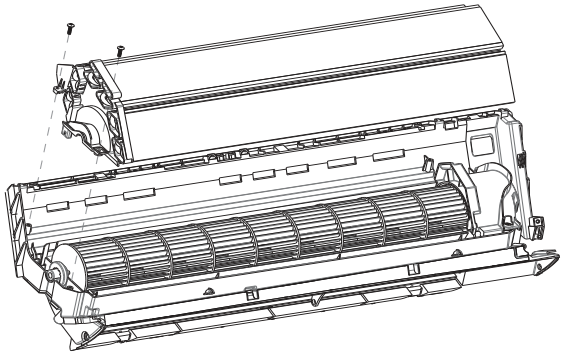
**NOTE:** The leading zero number does not change

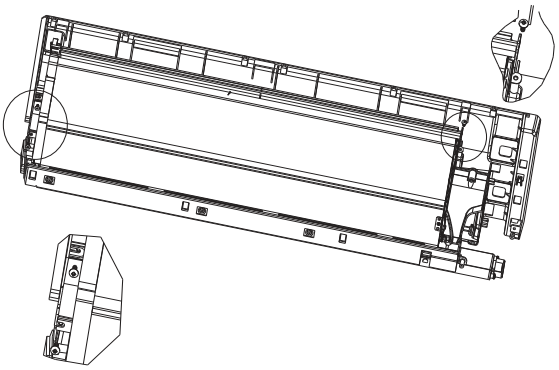
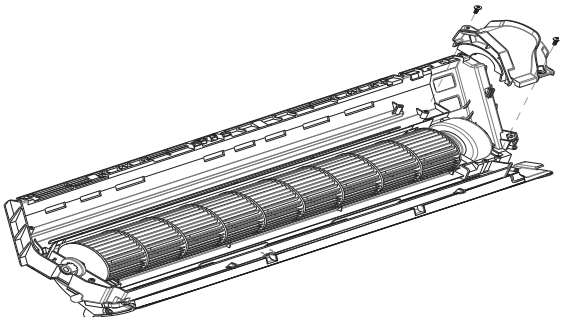
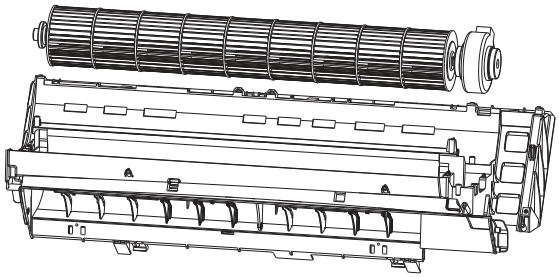
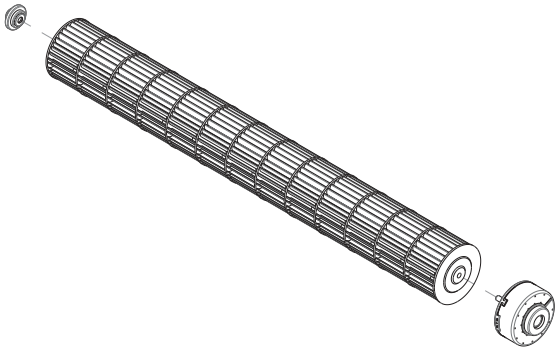
## **10.** DISASSEMBLY AND REASSEMBLY INSTRUCTIONS

### **10.1** Indoor Unit

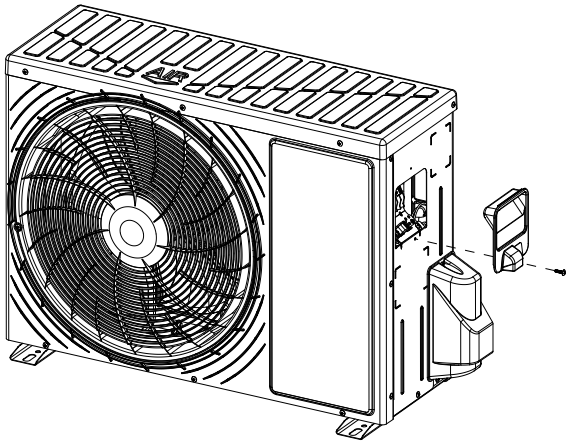
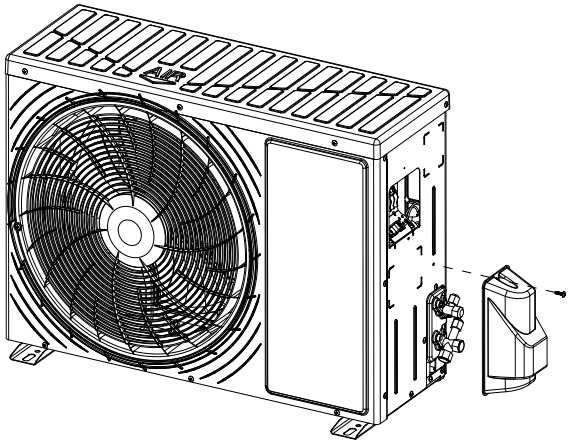
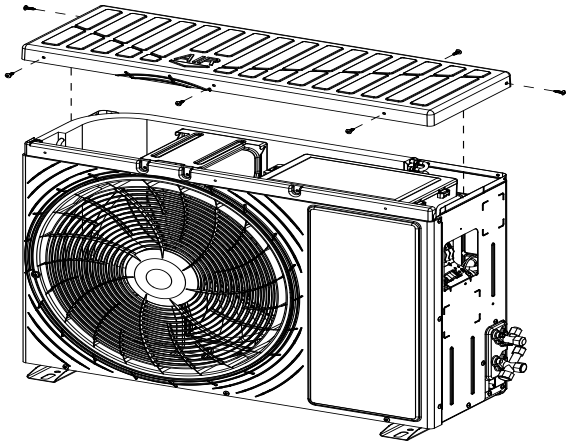
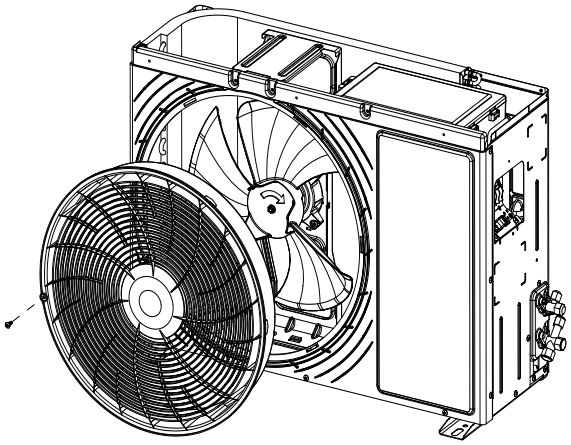
| **Steps** | **Procedure** |
|---|---|
| **Visual before disassembly** |  |
| **Removal of filter and horizontal louver**<br><br>Open the front panel. |  |
| Push the filter inward and then draw it upward to remove it. |  |
| Remove the center pin of horizontal louver from its slot.<br>Remove the horizontal louver pin that connected with step motor shaft by pulling the left side.<br><br>Finally, remove the horizontal louver from on the far left. |  |
| **Removal of front panel and front case**<br><br>Push up on the front cover by holding the taps on both sides of indoor unit. |  |

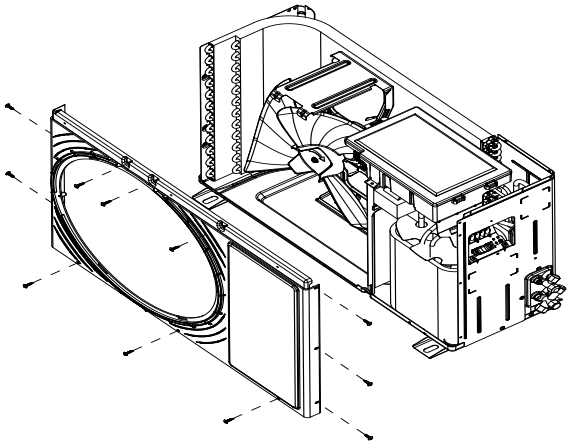
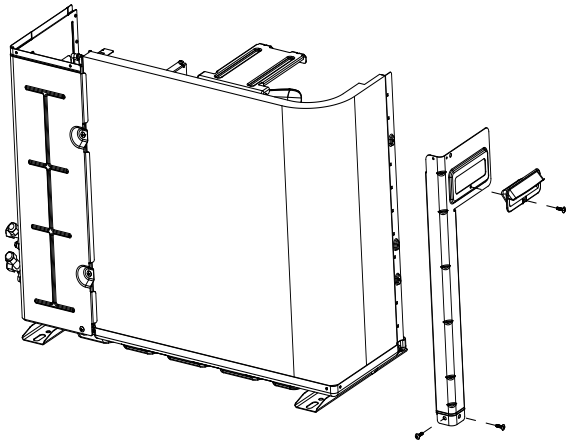
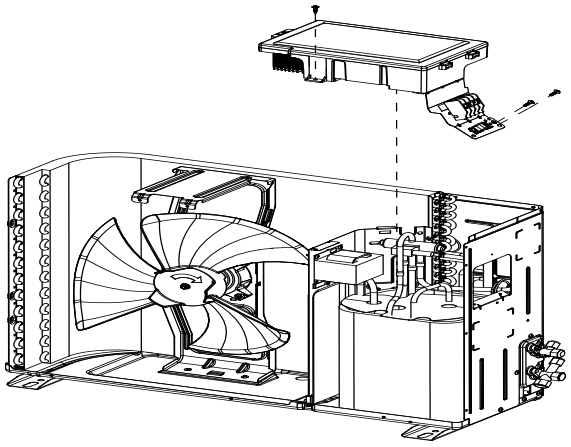
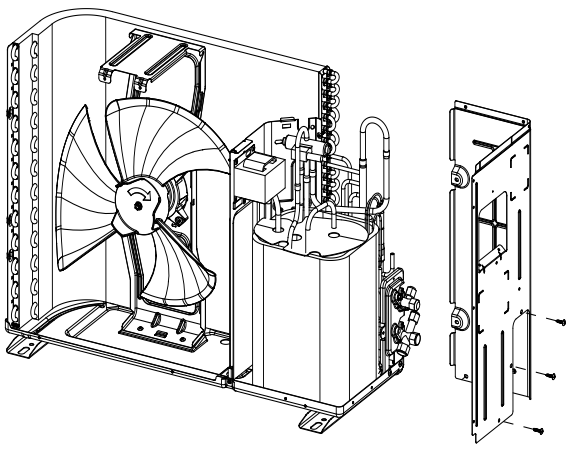
| Steps | Procedure |
|---|---|
| If you want to disjoint the front panel, remove the panel by waggling toward left and right the two tabs located on the backside from their slots. |  |
| Screw off the electric box cover located under the front pane<br>Remove the display cable socket located on the indoor unit electronic card. |  |
| Screw off all the crews on the front panel<br><br>4 screws for 12K front panels<br>7 screws for 18/24K front panels |  |
| After screw off all the screws, remove the front case starting with the right side by holding and pulling it up. |  |
| **Removal of drain tray (*)**<br><br>Remove the ionizer cable from the ionizer housing. Then remove the step motor cable socket on the controller properly.<br><br>Screw off the 3 screws that the connect the near body and drain tray<br><br>*** Only 18/24K indoor units** |  |

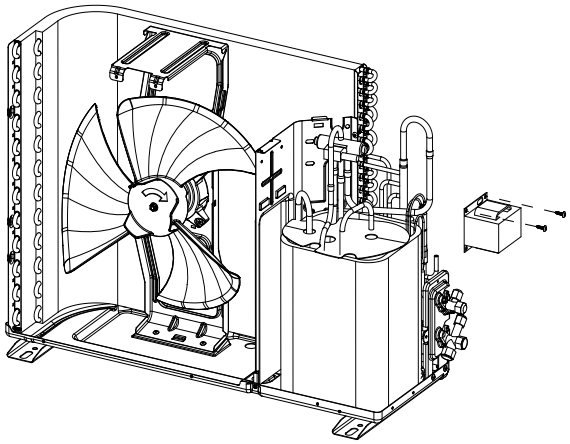
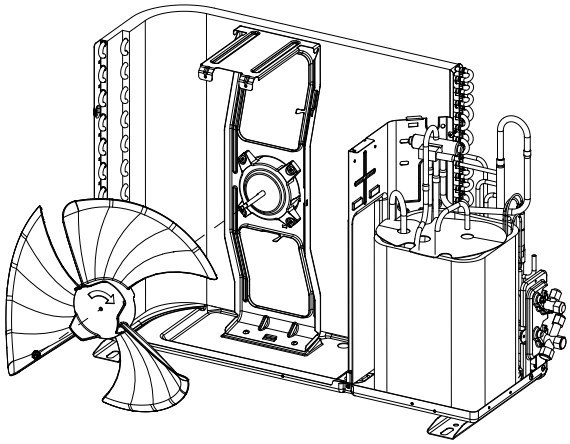
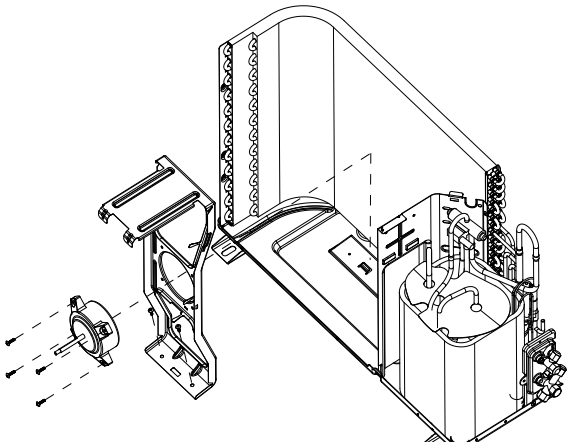
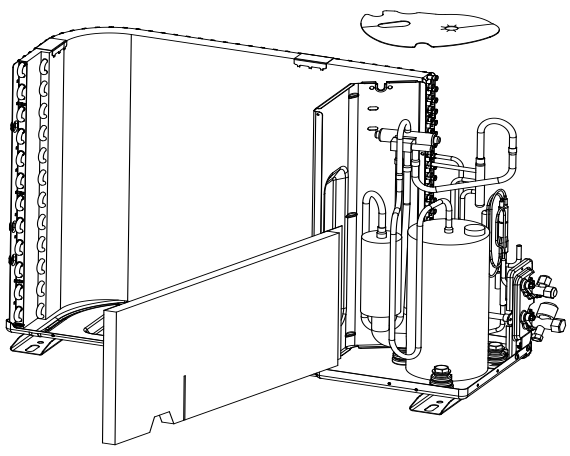
| Steps | Procedure |
|---|---|
| **Removal of electric box assy**<br>Firstly, remove the front case properly. Then screw off the electric box cover. |  |
| Remove the pipe sensor and ambient sensor located on evaporator from their housing and screw off the earthing cable. |  |
| Control panel ( electric ) box is fixed to the indoor unit with screws. Remove this screws with a proper tool. Push towards the rear and let the box get rid of the rear body connecting tab.<br><br>2 screws for 12K front panels<br>4 screws for 18/24K front panels |  |
| **Removal of evaporator**<br><br>**12K**<br>Firstly, remove the screw located in the rear body.<br>Remove the screw connecting the evaporator with the electric box.<br>Remove the tabs on evaporator plastic on left side the product.<br>Move the evaporator forward and remove it from the rear body. Then, you can remove the evaporator by raising. |  |

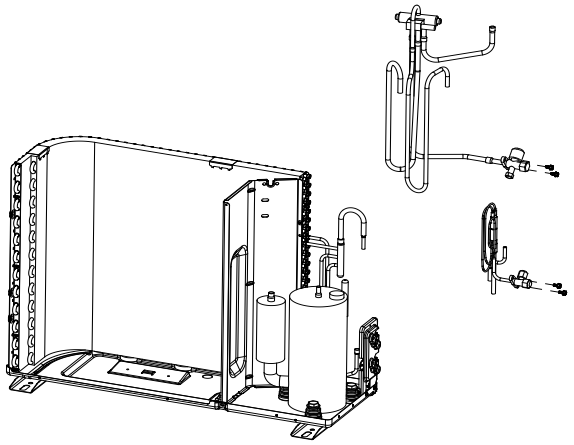
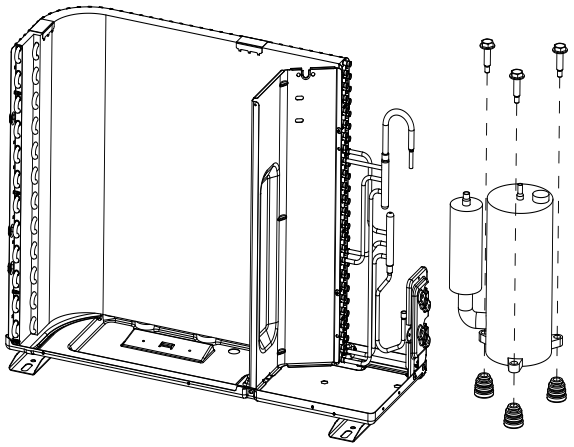
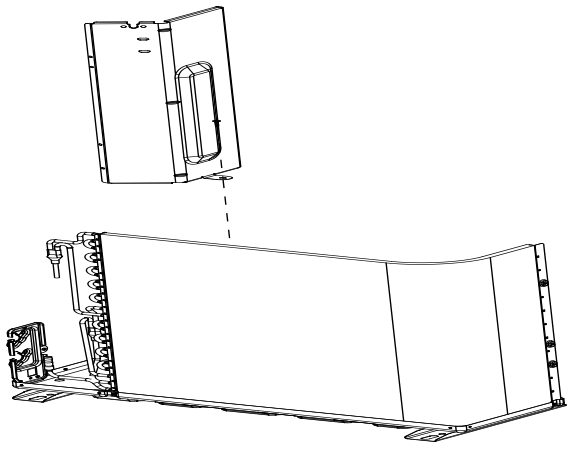
| Steps | Procedure |
|---|---|
| **18/24K**<br>Evaporator is fixed to the body with 3 screws and 2 pawls. Remove the 2 screws located on evaporator plastic on the left side the product and other screw located on right rear side.<br><br>Remove the 2 pawls located on left rear side and right front side. Move the evaporator pipes towards the right side. Then you can remove the evaporator by raising. |  |
| **Removal of fan motor and cross fan**<br><br>Remove the step motor cable and fan motor cable from the fan motor cover.<br>Fan motor cover is fixed to the rear body with two screws. Screw off these screws with proper tool and remove the cover by raising. |  |
| Remove cross flow fan by screwing off the connection screw that connecting with motor shaft and cross flow fan. |  |
| Remove the ring of bearing of sub assy on the cross flow fan. |  |

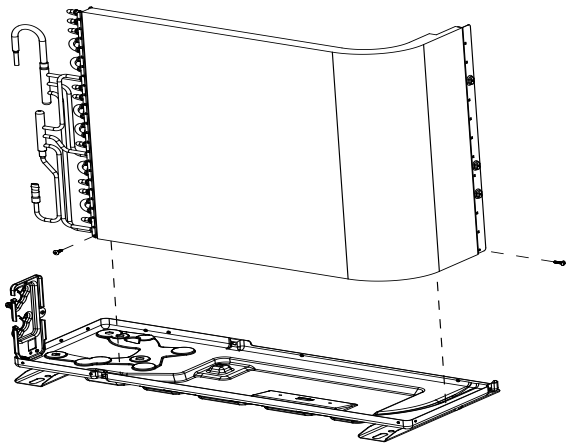
## **10.2** Outdoor Unit

| Steps | Procedure |
|---|---|
| **Big Holder**<br><br>Screw off the one screw located in big holder. |  |
| **Valve Cover**<br><br>In order to reach the valves, you should screw off the one screw located on valve cover and remove the cover. |  |
| **Top Panel**<br><br>You should screw off the all screws located on the top panel in order to remove the top panel. |  |
| **Front Grille**<br><br>You can reach the fan propeller, outdoor fan motor and motor support by removing the grill without removing the front panel completely. |  |

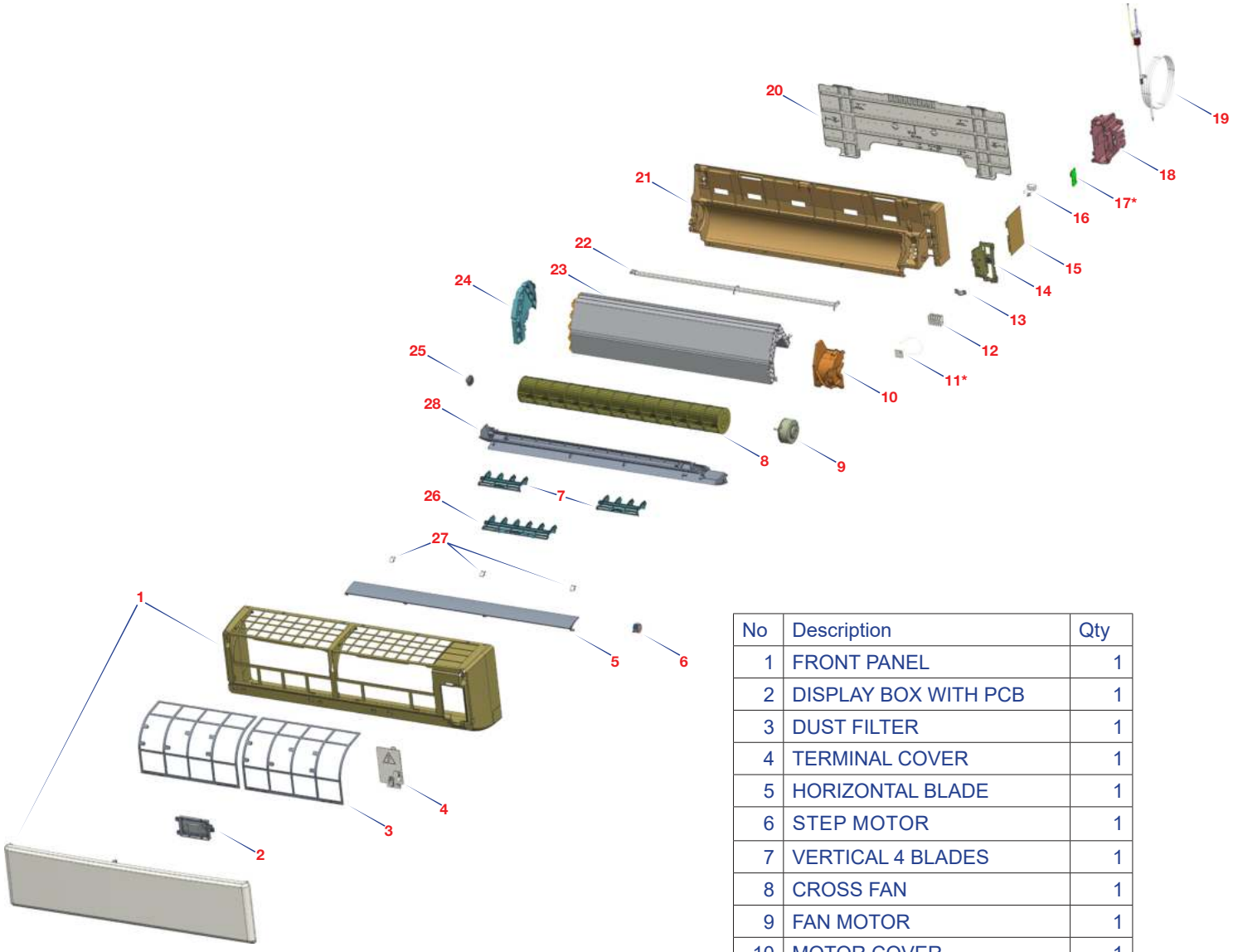
| Steps | Procedure |
|---|---|
| **Front Panel**<br><br>You should screw off the 3 screws located on the upper, 3 screws located on the bottom, 2 screws in left side and 2 screws in the right side on the front panel in order to remove the front panel and reach the compressor and 4 way valve. |  |
| Remove 4 screws connecting the right side plate with the chassis, the valve support and the electric box. Remove the right side plate. |  |
| **Control Box**<br><br>Take the control unit by removing all screws on the control unit and terminal block. |  |
| Remove 4 screws connecting the right side plate with the chassis, the valve support and the electric box. Remove the right side plate. |  |

| Steps | Procedure |
|---|---|
| **Reactor**<br><br>Remove the reactor by loosen the 2 screws on the interconnection plate. |  |
| **Axial Fan**<br><br>Loosen the screw fixing the blade. Remove the axial flow blade. |  |
| **Motor Bracket and Fan Motor**<br><br>Loosen the one tapping screw fixing the motor support. Raise the support to remove it.<br><br>Loosen the 4 tapping screws fixing the motor. Disconnect the leading wire of motor. Remove the motor. |  |
| **Sponges**<br><br>Remove the upper and enwrapped soundproof sponge by taking out on the touch and close fastener. |  |

| Steps | Procedure |
|---|---|
| **Refrigerant components (4 way valve, capillary, etc.)**<br><br>Remove the 3 screws fixing the isolation sheet and then remove the isolation sheet.<br>Recover the refrigerant at first. Loosen fixing screw on condenser connection. Disassemble the pipes in both inlet and outlet with welding torch. Detach the condenser. After remove all condenser connection screws, pull the condenser upwards to remove it.<br><br>Before handling the cooling system components ( compressor, condenser, 4way valve, capillary ) you have to recover the refrigerant first.<br><br>Unsolder the capillary, valves and the outlet pipe of condenser. Do not block the capillary with welding slag during unsoldering<br><br>Remove the 2 screws fixing the gas valve. Unsolder the gas valve and the air-return pipe.<br><br>**NOTE:** Discharge the refrigerant completely before unsoldering; when unsoldering, wrap the gas valve with wet cloth to avoid damage to the valve caused by high temperature.<br><br>**NOTE:** Discharge the refrigerant completely before unsoldering; when unsoldering, wrap the gas valve with wet cloth to avoid damage to the valve caused by high temperature.<br><br>Solder of the pipe connecting the compressor, condenser and valve support. (Do not block the capillary during soldering.) |  |
| **Compressor**<br><br>To remove the compressor, you must first detach the brazed part of the suction and the discharge pipe connected with compressor and remove the 4-way and capillary.<br>Loosen the 3 nuts of compressor leg and remove the compressor. |  |
| **XXXXX**<br><br>Remove the 3 screws fixing the isolation sheet and then remove the isolation sheet. |  |

| Steps | Procedure |
| --- | --- |
| **Condenser**<br><br>Recover the refrigerant at first. Loosen fixing screw on condenser connection. Disassemble the pipes in both inlet and outlet with welding torch. Detach the condenser. After remove all condenser connection screws, pull the condenser upwards to remove it. |  |

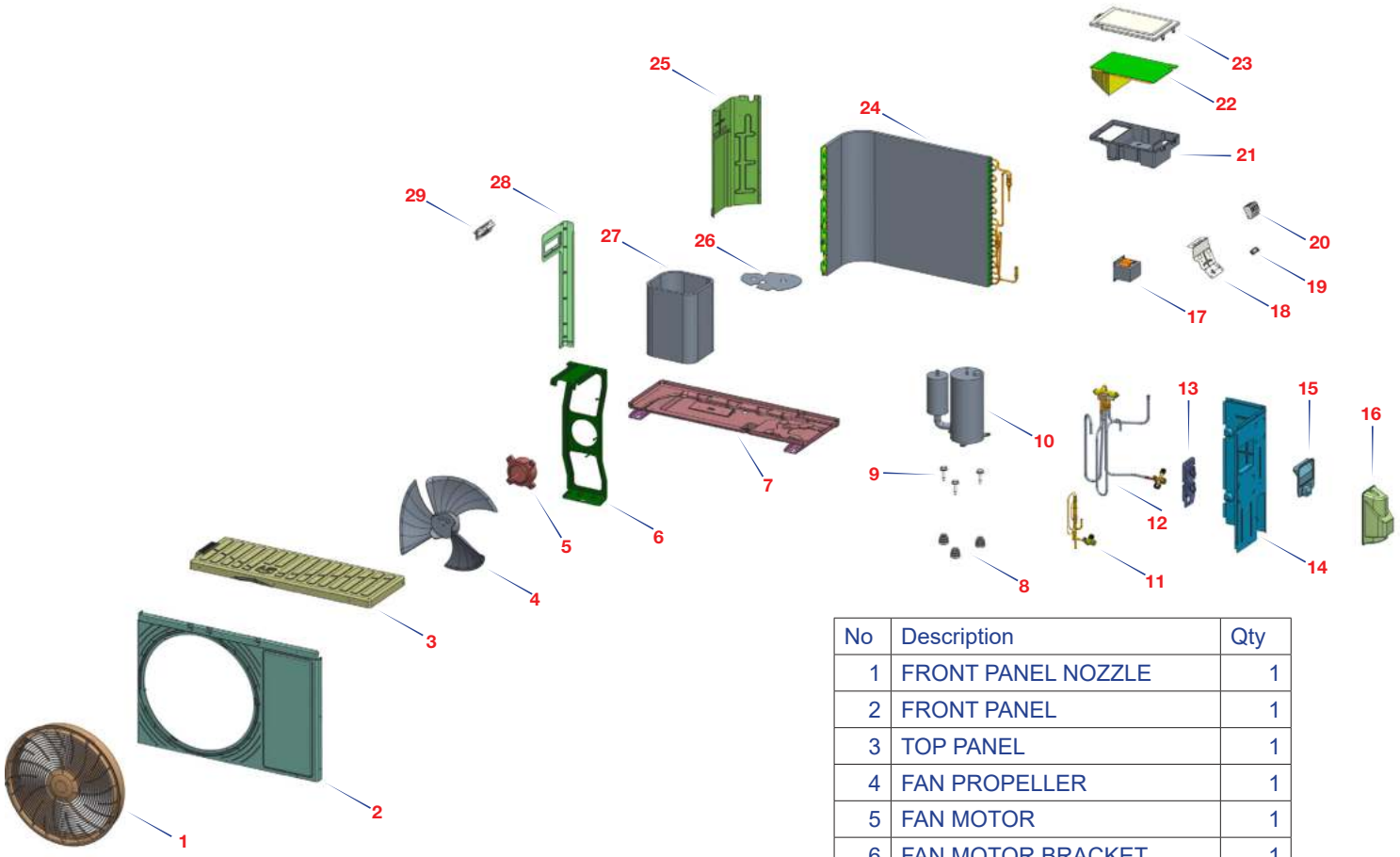
## **11.** EXPLODED VIEW INDOOR UNIT




| No | Description | Qty |
|---|---|---|
| 1 | FRONT PANEL | 1 |
| 2 | DISPLAY BOX WITH PCB | 1 |
| 3 | DUST FILTER | 1 |
| 4 | TERMINAL COVER | 1 |
| 5 | HORIZONTAL BLADE | 1 |
| 6 | STEP MOTOR | 1 |
| 7 | VERTICAL 4 BLADES | 1 |
| 8 | CROSS FAN | 1 |
| 9 | FAN MOTOR | 1 |
| 10 | MOTOR COVER | 1 |
| 11 | WIFI ANTENNA * | 1 |
| 12 | TERMINAL BLOCK | 1 |
| 13 | CABLE HOLDER | 1 |
| 14 | CONTROL BOX COVER | 1 |
| 15 | CONTROL PCB | 1 |
| 16 | IONIZER | 1 |
| 17 | WIFI PCB * | 1 |
| 18 | CONTROL BOX | 1 |
| 19 | POWER CABLE | 1 |
| 20 | MOUNT PLATE | 1 |
| 21 | BACK BODY | 1 |
| 22 | EVAPORATOR PROFILE | 1 |
| 23 | EVAPORATOR | 1 |
| 24 | EVAPORATOR PLASTIC | 1 |
| 25 | CROSS FAN RUBBER | 1 |
| 26 | VERTICAL 6 BLADES | 1 |
| 27 | SCREW COVER | 3 |
| 28 | TRAY DRAIN ** | 1 |

(*) Only with WIFI models
(**) Only with 18/24 indoor units

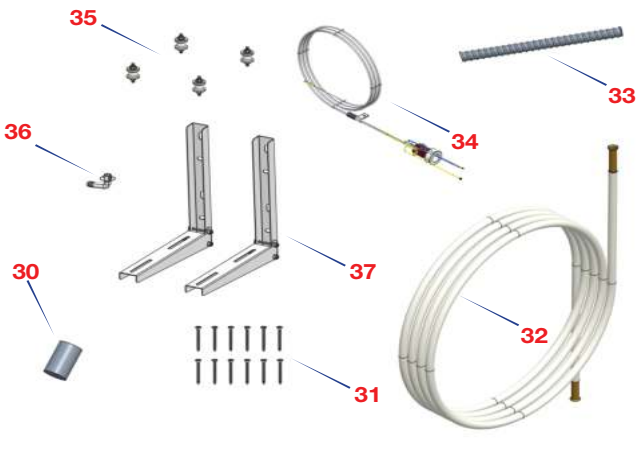
## 12. EXPLODED VIEW OUTDOOR UNIT




| No | Description | Qty |
|---|---|---|
| 1 | FRONT PANEL NOZZLE | 1 |
| 2 | FRONT PANEL | 1 |
| 3 | TOP PANEL | 1 |
| 4 | FAN PROPELLER | 1 |
| 5 | FAN MOTOR | 1 |
| 6 | FAN MOTOR BRACKET | 1 |
| 7 | BASE PLATE | 2 |
| 8 | COMPRESSOR RUBBER | 3 |
| 9 | COMPRESSOR BOLT | 3 |
| 10 | COMPRESSOR | 1 |
| 11 | CHECK VALVE GROUP | 1 |
| 12 | 4 WAY VALVE GROUP | 1 |
| 13 | VALVE BRACKET | 1 |
| 14 | SERVICE PLATE | 1 |
| 15 | CONTROL PANEL COVER | 1 |
| 16 | VALVE COVER | 1 |
| 17 | REACTOR | 1 |
| 18 | INTER-CONNECTION PLATE | 1 |
| 19 | CABLE HOLDER | 1 |
| 20 | TERMINAL BLOCK | 1 |
| 21 | CONTROL BOX | 1 |
| 22 | CONTROL PCB GROUP | 1 |
| 23 | CONTROL BOX COVER | 1 |
| 24 | CONDENSER | 1 |
| 25 | PARTITION PLATE | 1 |
| 26 | COMP. TOP ISOLATION | 1 |
| 27 | COMP. SIDE ISOLATION | 1 |
| 28 | CORNER BRACKET | 1 |
| 29 | HOLDER | 1 |

## Accessories (Optional)

| No | Description | Qty |
|---|---|---|
| 30 | DECORATIVE TAPE | 1 |
| 31 | SCREW GROUP | 1 |
| 32 | INTER-CONNECTION PIPES | 1 |
| 33 | DRAIN HOSE | 1 |
| 34 | CABLES | 1 |
| 35 | ANTIVIBRATION GROMMET | 4 |
| 36 | DRAIN APPARATUS | 1 |
| 37 | WALL MOUNT BRACKET | 2 |



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