



SERVICE MANUAL

CMA15 SERIES

Horizontal/Side Discharge Condensing Units

Model

CMA1512SA-1	CMA1530SA-1
CMA1518SA-1	CMA1536SA-1
CMA1524SA-1	CMA1548SA-1





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Safety Precautions

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1. Precautions

To prevent personal injury, or property or unit damage, adhere to all precautionary measures and instructions outlined in this manual. Before servicing a unit, refer to this service manual and its relevant sections.

Failure to adhere to all precautionary measures listed in this section may result in personal injury, damage to the unit or to property, or in extreme cases, death.



WARNING indicates a potentially hazardous situation which if not avoided could result in serious personal injury, or death.



CAUTION indicates a potentially hazardous situation which if not avoided could result in minor or moderate personal injury, or unit damage.

1.1 In case of Accidents or Emergency

WARNING

- If a gas leak is suspected, immediately turn off the gas and ventilate the area if a gas leak is suspected before turning the unit on.
- If strange sounds or smoke is detected from the unit, turn the breaker off and disconnect the power supply
- If the unit comes into contact with liquid, contact an authorized service center.
- If liquid from the batteries makes contact with skin or clothing, immediately rinse or wash the area well with clean water.
- Do not insert hands or other objects into the air inlet or outlet while the unit is plugged in.
- Do not operate the unit with wet hands.
- Do not use a remote controller that has previously been exposed to battery damage or battery leakage.

A CAUTION

- Clean and ventilate the unit at regular intervals when operating it near a stove or near similar devices.
- Do not use the unit during severe weather conditions. If possible, remove the product from the window before such occurrences.

1.2 Pre-Installation and Installation

WARNING

- Use this unit only on a dedicated circuit.
- Damage to the installation area could cause the unit to fall, potentially resulting in personal injury, property damage, or product failure.
- Only qualified personnel should disassemble, install, remove, or repair the unit.
- Only a qualified electrician should perform electrical work. For more information, contact your dealer, seller, or an authorized service center.

CAUTION

While unpacking be careful of sharp edges around the unit as well as the edges of the fins on the condenser and evaporator.

1.3 **Operation and Maintenance**

WARNING

- Do not use defective or under-rated circuit breakers.
- Ensure the unit is properly grounded and that a dedicated circuit and breaker are installed.
- Do not modify or extend the power cable. Ensure the power cable is secure and not damaged during operation.
- Do not unplug the power supply plug during operation.
- Do not store or use flammable materials near the
- Do not open the inlet grill of the unit during operation.
- Do not touch the electrostatic filter if the unit is equipped with one.
- Do not block the inlet or outlet of air flow to the unit.
- Do not use harsh detergents, solvents, or similar items to clean the unit. Use a soft cloth for cleaning.
- Do not touch the metal parts of the unit when removing the air filter as they are very sharp.
- Do not step on or place anything on the unit or outdoor units.
- Do not drink water drained from the unit
- Avoid direct skin contact with water drained from the
- Use a firm stool or step ladder according to manufacturer procedures when cleaning or maintaining the unit.

CAUTION

- Do not install or operate the unit for an extended period of time in areas of high humidity or in an environment directly exposing it to sea wind or salt
- Do not install the unit on a defective or damaged installation stand, or in an unsecure location.
- Ensure the unit is installed at a level position
- Do not install the unit where noise or air discharge created by the outdoor unit will negatively impact the environment or nearby residences.
- Do not expose skin directly to the air discharged by the unit for prolonged periods of time.
- Ensure the unit do not operate in areas water or other liquids.
- Ensure the drain hose is installed correctly to ensure proper water drainage.
- When lifting or transporting the unit, it is recommended that two or more people are used for this task.
- When the unit is not to be used for an extended time, disconnect the power supply or turn off the breaker.



2. Information servicing(For flammable materials)

2.1 Checks to the area

 Prior to beginning work on systems containing flammable refrigerants, safety checks are necessary to ensure that the risk of ignition is minimized. For repair to the refrigerating system, the following precautions shall be complied with prior to conducting work on the system.

2.2 Work procedure

 Works shall be undertaken under a controlled procedure so as to minimise the risk of a flammable gas or vapour being present while the work is being performed. Technical personnel in charge of operation, supervision, maintenance of air-conditioning systems shall be adequately instructed and competent with respect to their tasks. Works shall be undertaken with appropriate tools only (In case of uncertainty, please consult the manufacturer of the tools for use with flammable refrigerants)

2.3 General work area

 All maintenance staff and others working in the local area shall be instructed on the nature of work being carried out. work in confined sapces shall be avoided. The area around the work space shall be sectioned off. Ensure that the conditions within the area have been made safe by control of flammable material.

2.4 Checking for presence of refrigerant

 The area shall be checked with an appropriate refrigerant detector prior to and during work, to ensure the technician is aware of potentially flammable atmospheres. Ensure that the leak detection equipment being used is suitable for use with flammable refrigerants, i.e. no sparking, adequately sealed or intrinsically safe.

2.5 Presence of fire extinguisher

 If any hot work is to be conducted on the refrigeration equipment or any associated parts, appropriate fire extinguishing equipment shall be available to hand. Have a dry powder or CO2 fire extinguisher adjacent to the charging area.

2.6 No ignition sources

 No person carrying out work in relation to a refrigeration system which involves exposing any pipe work that contains or has contained flammable refrigerant shall use any sources of ignition in such a manner that it may lead to the risk of fire or explosion. All possible ignition sources, including cigarette smoking, should be kept sufficiently far away from the site of installation, repairing, removing and disposal, during which flammable refrigerant can possibly be released to the surrounding space. Prior to work taking place, the area around the equipment is to be surveyed to make sure that there are no flammable hazards or ignition risks. NO SMOKING signs shall be displayed.

2.7 Ventilated area

 Ensure that the area is in the open or that it is adequately ventilated before breaking into the system or conducting any hot work. A degree of ventilation shall continue during the period that the work is carried out. The ventilation should safely disperse any released refrigerant and preferably expel it externally into the atmosphere.

2.8 Checks to the refrigeration equipment

- Where electrical components are being changed, they shall be fit for the purpose and to the correct specification. At all times the manufacturer's maintenance and service guidelines shall be followed. If in doubt consult the manufacturer's technical department for assistance. The following checks shall be applied to installations using flammable refrigerants:
 - the charge size is in accordance with the room size within which the refrigerant containing parts are installed;
 - the ventilation machinery and outlets are operating adequately and are not obstructed;
 - if an indirect refrigerating circuit is being used, the secondary circuit shall be checked for the presence of refrigerant; marking to the equipment continues to be visible and legible.
 - markings and signs that are illegible shall be corrected;
 - refrigeration pipe or components are installed in a position where they are unlikely to be exposed to any substance which may corrode refrigerant containing components, unless the components are constructed of materials which are inherently resistant to being corroded or are suitably protected against being so corroded.

2.9 Checks to electrical devices

 Repair and maintenance to electrical components shall include initial safety checks and component inspection procedures. If a fault exists that could compromise safety, then no electrical supply shall be connected to the circuit until it is satisfactorily dealt with. If the fault cannot be corrected immediately but it is necessary to continue operation, and adequate temporary solution shall be used. This shall be reported to the owner of the equipment so all parties are advised.

Initial safety checks shall include:



- that capacitors are discharged: this shall be done in a safe manner to avoid possibility of sparking
- that there no live electrical components and wiring are exposed while charging, recovering or purging the system;
- that there is continuity of earth bonding.

2.10 Repairs to sealed components

- During repairs to sealed components, all electrical supplies shall be disconnected from the equipment being worked upon prior to any removal of sealed covers, etc. If it is absolutely necessary to have an electrical supply to equipment during servicing, then a permanently operating form of leak detection shall be located at the most critical point to warn of a potentially hazardous situation.
- Particular attention shall be paid to the following to ensure that by working on electrical components, the casing is not altered in such a way that the level of protection is affected. This shall include damage to cables, excessive number of connections, terminals not made to original specification, damage to seals, incorrect fitting of glands, etc.
 - Ensure that apparatus is mounted securely.
 - Ensure that seals or sealing materials have not degraded such that they no longer serve the purpose of preventing the ingress of flammable atmospheres. Replacement parts shall be in accordance with the manufacturer's specifications.

NOTE: The use of silicon sealant may inhibit the effectiveness of some types of leak detection equipment. Intrinsically safe components do not have to be isolated prior to working on them.

2.11 Repair to intrinsically safe components

- Do not apply any permanent inductive or capacitance loads to the circuit without ensuring that this will not exceed the permissible voltage and current permitted for the equipment in use. Intrinsically safe components are the only types that can be worked on while live in the presence of a flammable atmosphere. The test apparatus shall be at the correct rating.
- Replace components only with parts specified by the manufacturer. Other parts may result in the ignition of refrigerant in the atmosphere from a leak.

2.12 Cabling

• Check that cabling will not be subject to wear, corrosion, excessive pressure, vibration, sharp edges or any other adverse environmental effects. The check

shall also take into account the effects of aging or continual vibration from sources such as compressors or fans.

2.13 Detection of flammable refrigerants

 Under no circumstances shall potential sources of ignition be used in the searching for or detection of refrigerant leaks. A halide torch (or any other detector using a naked flame) shall not be used.

2.14 Leak detection methods

- The following leak detection methods are deemed acceptable for systems containing flammable refrigerants. Electronic leak detectors shall be used to detect flammable refrigerants, but the sensitivity may not be adequate, or may need re-calibration. (Detection equipment shall be calibrated in a refrigerant-free area.) Ensure that the detector is not a potential source of ignition and is suitable for the refrigerant used. Leak detection equipment shall be set at a percentage of the LFL of the refrigerant and shall be calibrated to the refrigerant employed and the appropriate percentage of gas (25 % maximum) is confirmed. Leak detection fluids are suitable for use with most refrigerants but the use of detergents containing chlorine shall be avoided as the chlorine may react with the refrigerant and corrode the copper pipe-work.
 - If a leak is suspected, all naked flames shall be removed or extinguished.
 - If a leakage of refrigerant is found which requires brazing, all of the refrigerant shall be recovered from the system, or isolated (by means of shut off valves) in a part of the systemremote from the leak. Oxygen free nitrogen (OFN) shall then be purged through the system both before and during the brazing process.

2.15 Removal and evacuation

- When breaking into the refrigerant circuit to make repairs or for any other purpose, conventional procedures shall be used. However, it is important that best practice is followed since flammability is a consideration.
- The following procedure shall be adhered to:
 - remove refrigerant;
 - purge the circuit with inert gas;
 - evacuate;
 - purge again with inert gas;
 - open the circuit by cutting or brazing.



- The refrigerant charge shall be recovered into the correct recovery cylinders. The system shall be flushed with OFN to render the unit safe. This process may need to be repeated several times. Compressed air or oxygen shall not be used for this task. Flushing shall be achieved by breaking the vacuum in the system with OFN and continuing to fill until the working pressure is achieved, then venting to atmosphere, and finally pulling down to a vacuum. This process shall be repeated until no refrigerant is within the system. When the final OFN charge is used, the system shall be vented down to atmospheric pressure to enable work to take place. This operation is absolutely vital if brazing operations on the pipe-work are to take place.
- Ensure that the outlet for the vacuum pump is not close to any ignition sources and there is ventilation available.

2.16 Charging procedures

- In addition to conventional charging procedures, the following requirements shall be followed:
 - Ensure that contamination of different refrigerants does not occur when using charging equipment.
 Hoses or lines shall be as short as possible to minimize the amount of refrigerant contained in them.
 - Cylinders shall be kept upright.
 - Ensure that the refrigeration system is earthed prior to charging the system with refrigerant.
 - Label the system when charging is complete (if not already).
 - Extreme care shall be taken not to overfill the refrigeration system.
 - Prior to recharging the system it shall be pressure tested with OFN. The system shall be leak tested on completion of charging but prior to commissioning. A follow up leak test shall be carried out prior to leaving the site.

2.17 Decommissioning

Before carrying out this procedure, it is essential that the technician is completely familiar with the equipment and all its detail. It is recommended good practice that all refrigerants are recovered safely. Prior to the task being carried out, an oil and refrigerant sample shall be taken.

In case analysis is required prior to re-use of reclaimed refrigerant. It is essential that electrical power is available before the task is commenced.

- Become familiar with the equipment and its operation.
- Isolate system electrically.

- Before attempting the procedure ensure that:
 - mechanical handling equipment is available, if required, for handling refrigerant cylinders;
 - all personal protective equipment is available and being used correctly;
 - the recovery process is supervised at all times by a competent person;
 - recovery equipment and cylinders conform to the appropriate standards.
- Pump down refrigerant system, if possible.
- If a vacuum is not possible, make a manifold so that refrigerant can be removed from various parts of the system.
- Make sure that cylinder is situated on the scales before recovery takes place.
- Start the recovery machine and operate in accordance with manufacturer's instructions.
- Do not overfill cylinders. (No more than 80 % volume liquid charge).
- Do not exceed the maximum working pressure of the cylinder, even temporarily.
- When the cylinders have been filled correctly and the process completed, make sure that the cylinders and the equipment are removed from site promptly and all isolation valves on the equipment are closed off.
- Recovered refrigerant shall not be charged into another refrigeration system unless it has been cleaned and checked.

2.18 Labelling

• Equipment shall be labelled stating that it has been de-commissioned and emptied of refrigerant. The label shall be dated and signed. Ensure that there are labels on the equipment stating the equipment contains flammable refrigerant.

2.19 Recovery

- When removing refrigerant from a system, either for servicing or decommissioning, it is recommended good practice that all refrigerants are removed safely.
- When transferring refrigerant into cylinders, ensure that only appropriate refrigerant recovery cylinders are employed. Ensure that the correct numbers of cylinders for holding the total system charge are available. All cylinders to be used are designated for the recovered refrigerant and labelled for that refrigerant (i.e. special cylinders for the recovery of refrigerant). Cylinders shall be complete with pressure relief valve and associated shut-off valves in good working order.



- Empty recovery cylinders are evacuated and, if possible, cooled before recovery occurs.
- The recovery equipment shall be in good working order with a set of instructions concerning the equipment that is at hand and shall be suitable for the recovery of flammable refrigerants. In addition, a set of calibrated weighing scales shall be available and in good working order.
- Hoses shall be complete with leak-free disconnect couplings and in good condition. Before using the recovery machine, check that it is in satisfactory working order, has been properly maintained and that any associated electrical components are sealed to prevent ignition in the event of a refrigerant release. Consult manufacturer if in doubt.
- The recovered refrigerant shall be returned to the refrigerant supplier in the correct recovery cylinder, and the relevant Waste Transfer Note arranged. Do not mix refrigerants in recovery units and especially not in cylinders.
- If compressors or compressor oils are to be removed, ensure that they have been evacuated to an acceptable level to make certain that flammable refrigerant does not remain within the lubricant. The evacuation process shall be carried out prior to returning the compressor to the suppliers. Only electric heating to the compressor body shall be employed to accelerate this process. When oil is drained from a system, it shall be carried out safely.

2.20 Venting of HC Refrigerant (R290)

Venting may be carried out as an alternative to recovering the refrigerant. Because HC refrigerants have no ODP and negligible GWP, under certain circumstances it may be considered acceptable to vent the refrigerant. However, if this is to be considered, it should be done in accordance with the relevant national rules or regulations, if they permit.

In particular, before venting a system, it would be necessary to:

- Ensure that legislation relating to waste material has been considered
- Ensure that environmental legislation has been considered
- Ensure that legislation addressing safety of hazardous substances is satisfied
- Venting is only carried out with systems that contain a small quantity of refrigerant, typically less than 500 g.
- Venting to inside a building is not permissible under any circumstances
- Venting must not be to a public area, or where people

- are unaware of the procedure taking place
- The hose must be of sufficient length and diameter such that it will extend to at least 3 m beyond the outside of the building
- The venting should only take place on the certainty that the refrigerant will not get blown back into any adjacent buildings, and that it will not migrate to a location below ground level
- The hose is made of material that is compatible for use with HC refrigerants and oil
- A device is used to raise the hose discharge at least
 1 m above ground level and so that the discharge is pointed in an upwards direction (to assist with dilution)
- The end of the hose can now discharge and disperse the flammable fumes into the ambient air.
- There should not be any restriction or sharp bends within the vent-line which will hinder the ease of flow.
- There must be no sources of ignition near the hose discharge
- The hose should be regularly checked to ensure that there are no holes or kinks in it, that could lead to leakage or blocking of the passage of flow

When carrying out the venting, the flow of refrigerant should be metered using manifold gauges to a low flow rate, so as to ensure the refrigerant is well diluted. Once the refrigerant has ceased flowing, if possible, the system should be flushed out with OFN; if not, then the system should be pressurised with OFN and the venting procedure carried out two or more times, to ensure that there is minimal HC refrigerant remaining inside the system.



Model Reference

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1. Model Reference

Refer to the following table to determine the specific indoor and outdoor unit model number of your purchased equipment.

	Indoor Unit Model	Outdoor Unit Model	Capacity (Btu/h)	Power Supply
		CMA1512SA-1	12k	
	MCD18/24B1A	CMA1518SA-1	15k	
		CMA1524SA-1	24k	
	MCD30/36C1A	CMA1530SA-1	30k	1Ph,
A-COIL		CMA1536SA-1	36k	208/230V~, 60Hz
	MCD48C1A	CMA1548SA-1	48k	
	MCD60D1A	ONIA 10400A-1	48k	



2. External Appearance

2.1 Indoor Unit



2.2 Outdoor Unit



Double Fan Outdoor Unit





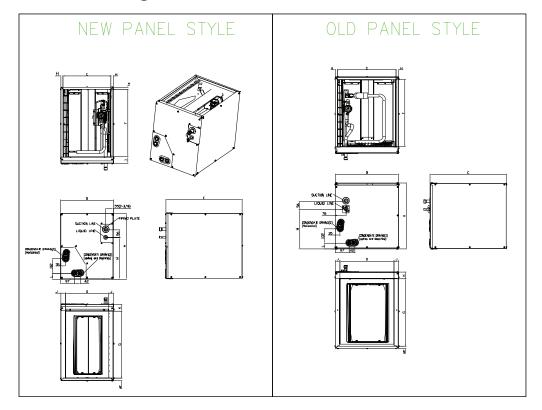
Indoor Unit-A-COIL

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1. Dimensional Drawings



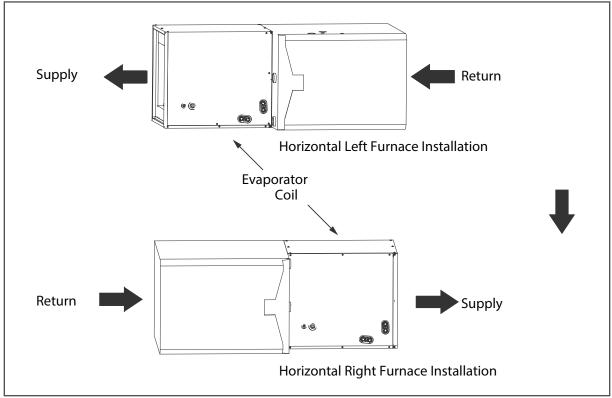
Diversit		18k/24k		30k	30k/36		48k		60k	
Dimensic Model	ons	Old panel style		Old panel style		Old panel style		New panel style		
Wiodei		inch	mm	inch	mm	inch	mm	inch	mm	
А	Model Height	18	457	24	609	28	711	28	711	
В	Model Width	17-1/2	445	21	533	24-1/2	622	21	533	
С	Supply Air Opening Width	16-3/16	411	19-3/4	502	23-1/4	591	19-3/4	502	
D	Return Air Opening Width	15-1/8	384	19-1/2	496	23	585	19-1/2	496	
Е	Model Depth	21	533	21	533	21	533	21	533	
F	Supply Air Opening Depth	18-5/8	473	18-5/8	473	18-5/8	473	18-5/8	473	
G	Return Air Opening Depth	18	458	18-1/2	470	18-1/2	470	18-1/2	470	
Н	Supply Air Opening Side Clearance	5/8	16	5/8	16	5/8	16	5/8	16	
I	Supply Air Opening Front Clearance	1-3/4	45	1-3/4	45	1-3/4	45	1-3/4	45	
J	Return Air Opening Side Clearance	1-3/16	30	3/4	19	3/4	19	3/4	19	
K	Return Air Opening Front Clearance	1-13/16	46	1-13/16	46	1-13/16	46	1-13/16	46	
L	Condensate Drains Height	1-7/16	37	2-1/8	54	2-1/8	54	2-1/8	54	
М	Liquid Line Height	10-7/8	276	16-5/16	414	20-1/4	514	21	533	
N	Return Air Opening Side Clearance	1-3/16	30	3/4	19	3/4	19	3/4	19	

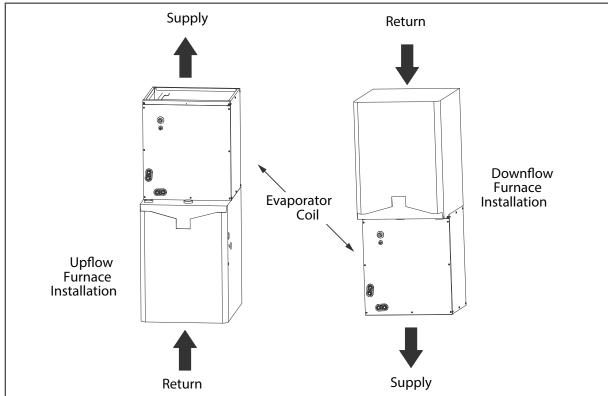
2. Introduction

Use this instruction manual to install indoor coil on multi-position furnaces.

The coil is enclosed in a casing.

For 18k~48k

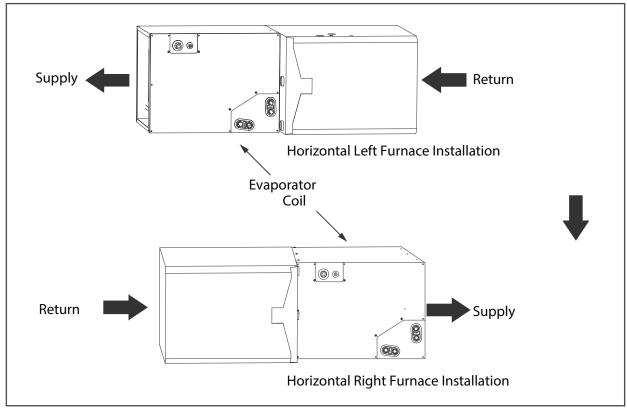


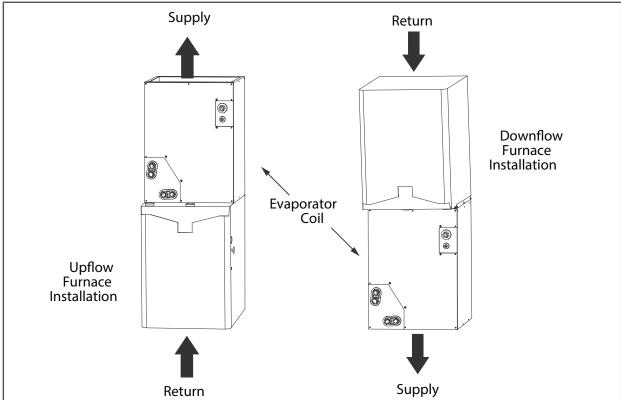


Typical Coil Installation on Furnace



For 60k,





Typical Coil Installation on Furnace



Outdoor Unit

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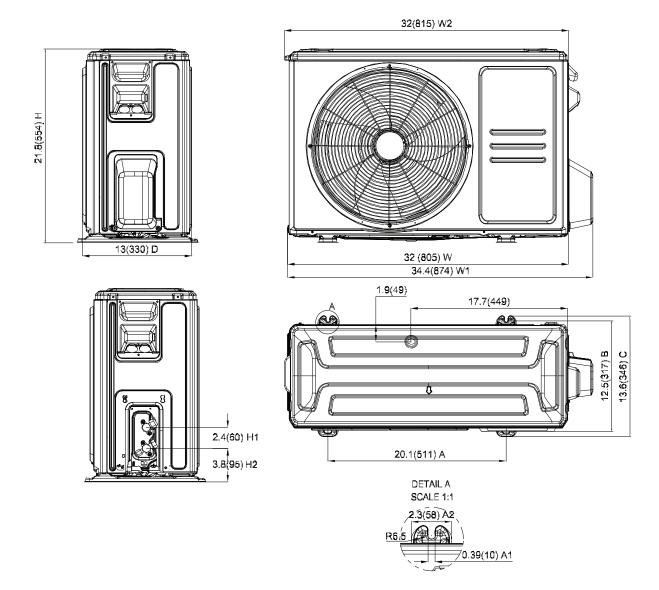
1. Dimensional Drawings

Please check the corresponding dimensional drawing according to the panel plate.

Outdoor Unit Model	Panel Plate
CMA1512SA-1	X330
CMA1518SA-1	\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\
CMA1524SA-1	E30
CMA1530SA-1	D30
CMA1536SA-1	E30
CMA1548SA-1	E30

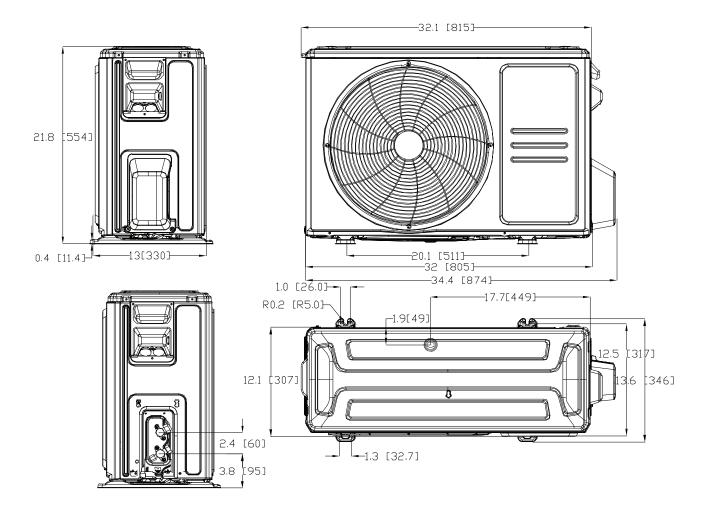


Panel Plate X330(Rounded grille 1)



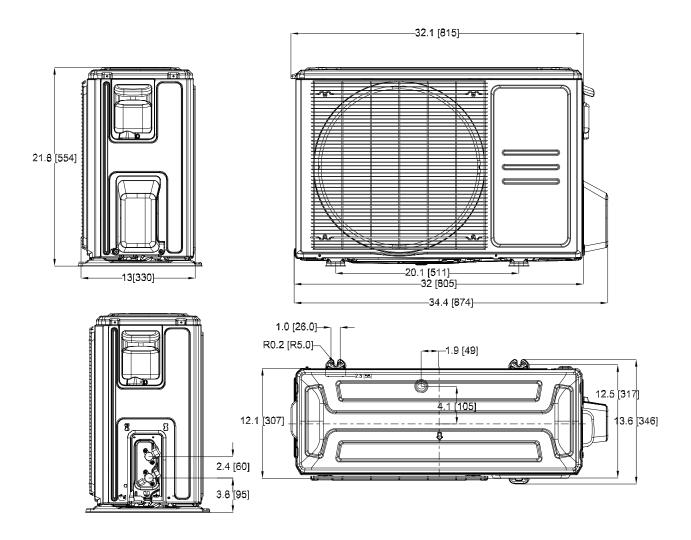


Panel Plate X330(Rounded grille 2)



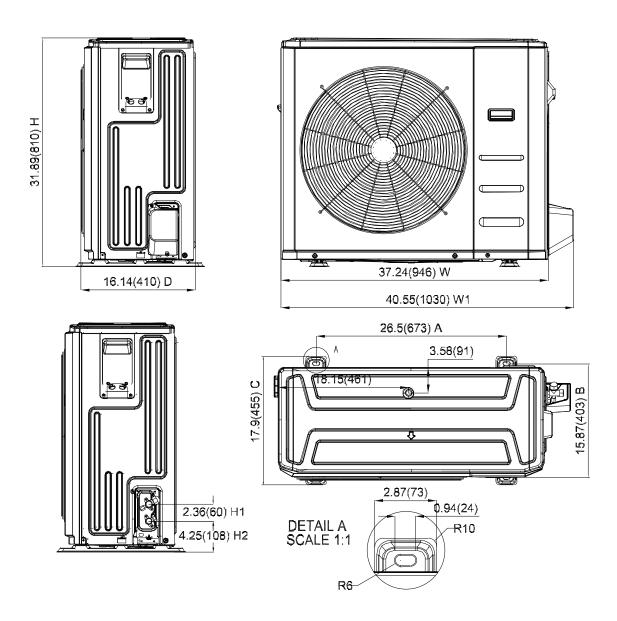


Panel Plate X330(Square grille)



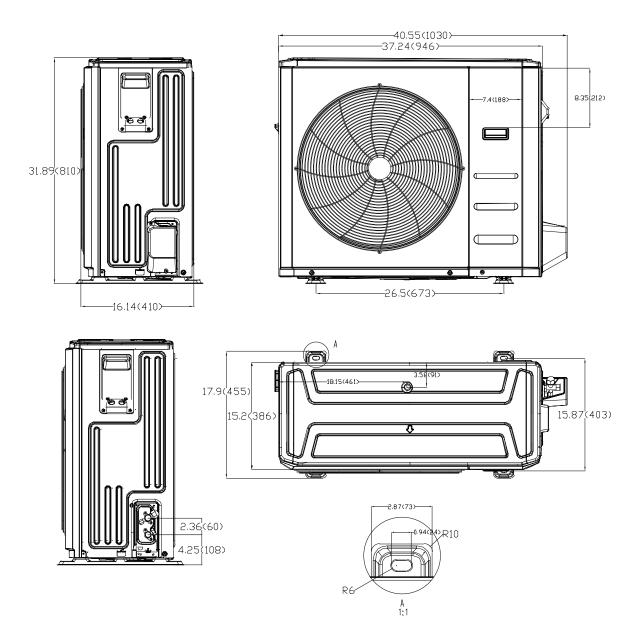


Panel Plate D30(Rounded grille 1)



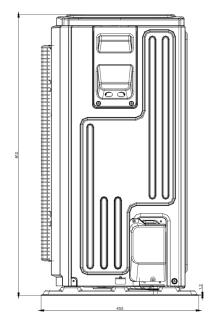


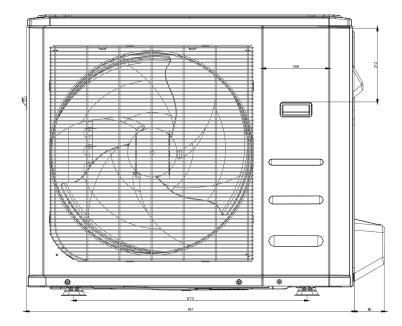
Panel Plate D30(Rounded grille 2)

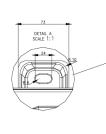


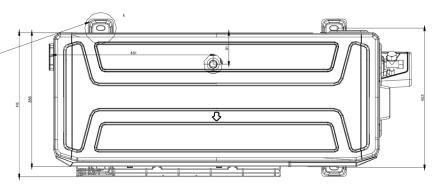


Panel Plate D30(Square grille)



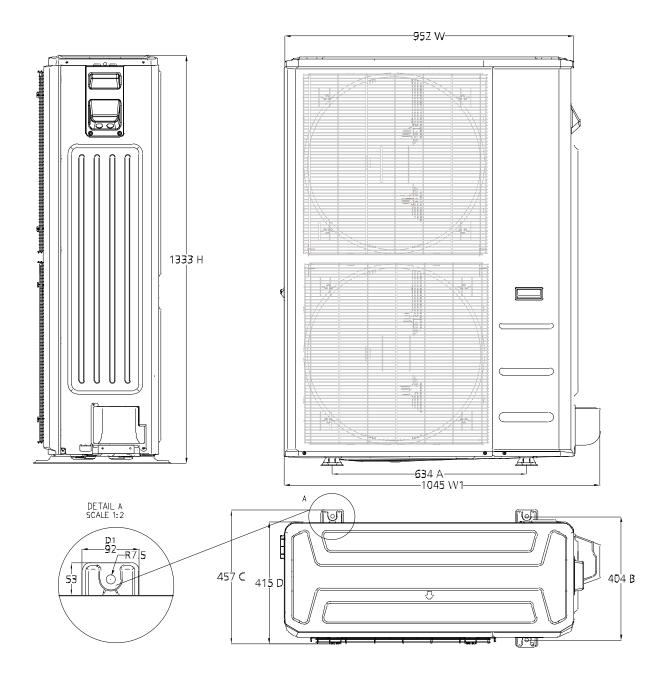






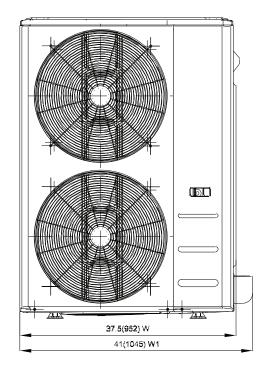


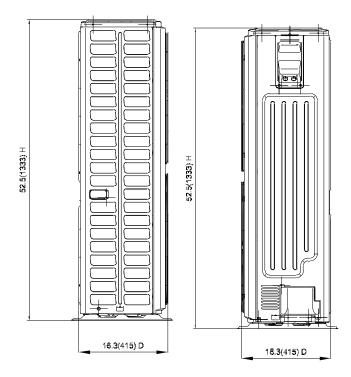
Panel Plate E30(Square grille)

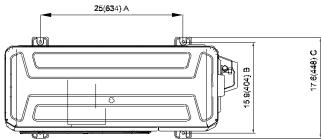




Panel Plate E30(Rounded grille 1)

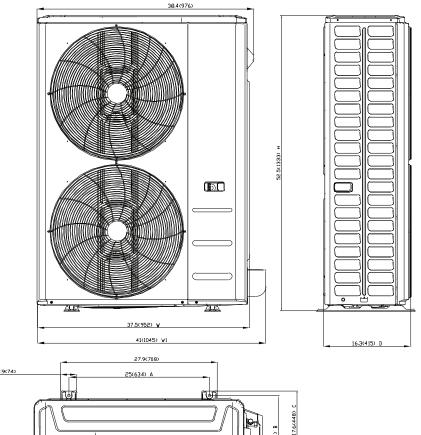


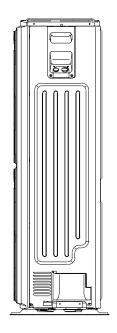


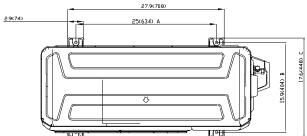




Panel Plate E30(Rounded grille 2)

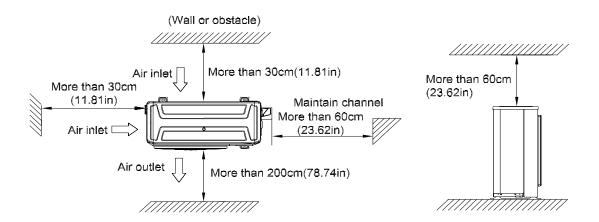








2. Service Place





3. Capacity Correction Factor for Height Difference

Capacity(Btu/h)	6k~9k		Pipe Length (m/ft)			
Cooling			7.5/24.6	10/32.8	20/65.6	25/82
	Indoor Upper	10/32.8		0.969	0.936	0.920
	than Outdoor	5/16.4	0.995	0.979	0.946	0.929
Height difference H (m)		0	1.000	0.984	0.951	0.934
11 (111)	Outdoor Upper	-5/-16.4	1.000	0.984	0.951	0.934
	than Indoor	-10/-32.8		0.984	0.951	0.934

Capacity(Btu/h)	12k		Pipe Length (m/ft)				
Cooling			7.5/24.6	10/32.8	20/65.6	25/82	
	Indoor Upper	10/32.8		0.974	0.953	0.942	
11 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	than Outdoor	5/16.4	0.995	0.984	0.962	0.951	
Height difference H (m)		0	1.000	0.989	0.967	0.956	
11 (11)	Outdoor Upper	-5/-16.4	1.000	0.989	0.967	0.956	
	than Indoor	-10/-32.8		0.989	0.967	0.956	

Capacity(Btu/h)	18k		Pipe Length (m/ft)				
	Cooling	,	7.5/24.6	10/32.8	20/65.6	30/98.4	
		20/65.6			0.941	0.919	
	Indoor Upper than Outdoor	10/32.8		0.974	0.951	0.928	
11 . 1 . 1.0		5/16.4	0.995	0.983	0.960	0.937	
Height difference H (m)		0	1.000	0.988	0.965	0.942	
11 (111)	Outdoor Upper than Indoor	-5/-16.4	1.000	0.988	0.965	0.942	
		-10/-32.8		0.988	0.965	0.942	
		-20/-65.6			0.965	0.942	
		-20/-65.6			0.963	0.955	

Capacity (Btu/h)	24k		Pipe Length (m/ft)					
	Cooling		7.5/24.6	10/32.8	20/65.6	30/98.4	40/131.2	50/164
		25/82				0.917	0.898	0.879
	Indoor Upper	20/65.6			0.946	0.926	0.907	0.887
	than Outdoor	10/32.8		0.975	0.955	0.936	0.916	0.896
		5/16.4	0.995	0.985	0.965	0.945	0.925	0.905
Height difference		0	1.000	0.990	0.970	0.950	0.930	0.910
H (m)	Outdoor Upper	-5/-16.4	1.000	0.990	0.970	0.950	0.930	0.910
		-10/- 32.8		0.990	0.970	0.950	0.930	0.910
	than Indoor	-20/- 65.6			0.970	0.950	0.930	0.910
		-25/-82				0.950	0.930	0.910



Capacity (Btu/h)	30k		Pipe Length (m/ft)					
Cooling			7.5/24.6	10/32.8	20/65.6	30/98.4	40/131.2	50/164
	Indoor Upper than Outdoor	25/82				0.891	0.862	0.832
		20/65.6			0.930	0.900	0.871	0.841
		10/32.8		0.970	0.940	0.910	0.879	0.849
Height		5/16.4	0.995	0.980	0.949	0.919	0.888	0.858
difference		0	1.000	0.985	0.954	0.923	0.893	0.862
H (m)	Outdoor Upper than Indoor	-5/-16.4	1.000	0.985	0.954	0.923	0.893	0.862
		-10/-32.8		0.985	0.954	0.923	0.893	0.862
		-20/-65.6			0.954	0.923	0.893	0.862
		-25/-82				0.923	0.893	0.862

Capacity (Btu/h)	36k		Pipe Length (m/ft)						
Cooling			7.5/24.6	15/49.2	25/82	35/114.8	50/164	65/213.3	
	Indoor Upper than Outdoor	30/98.4				0.889	0.850	0.812	
		20/65.6			0.924	0.898	0.859	0.820	
		10/32.8		0.959	0.933	0.907	0.868	0.828	
Height		5/16.4	0.995	0.969	0.942	0.916	0.876	0.837	
difference		0	1.000	0.974	0.947	0.921	0.881	0.841	
H (m)	Outdoor Upper than Indoor	-5/-16.4	1.000	0.974	0.947	0.921	0.881	0.841	
		-10/-32.8		0.974	0.947	0.921	0.881	0.841	
		-20/-65.6			0.947	0.921	0.881	0.841	
		-30/-98.4				0.921	0.881	0.841	

Capacity (Btu/h)	48k			Pipe Length (m/ft)						
Cooling			7.5/24.6	15/49.2	25/82	35/114.8	50/164	65/213.3		
	Indoor Upper than Outdoor	30/98.4				0.884	0.843	0.802		
		20/65.6			0.920	0.893	0.852	0.810		
		10/32.8		0.957	0.930	0.902	0.860	0.819		
Height		5/16.4	0.995	0.967	0.939	0.911	0.869	0.827		
difference		0	1.000	0.972	0.944	0.916	0.873	0.831		
H (m)	Outdoor Upper than Indoor	-5/-16.4	1.000	0.972	0.944	0.916	0.873	0.831		
		-10/-32.8		0.972	0.944	0.916	0.873	0.831		
		-20/-65.6			0.944	0.916	0.873	0.831		
		-30/-98.4				0.916	0.873	0.831		

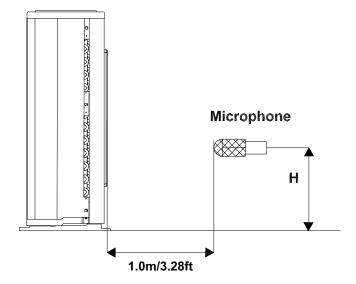


Capacity (Btu/h)	60k			Pipe Length (m/ft)						
Cooling			7.5/24.6	15/49.2	25/82	35/114.8	50/164	65/213.3		
	Indoor Upper than Outdoor	30/98.4				0.870	0.823	0.775		
		20/65.6			0.911	0.879	0.831	0.783		
		10/32.8		0.953	0.920	0.888	0.840	0.791		
Height		5/16.4	0.995	0.962	0.930	0.897	0.848	0.799		
difference		0	1.000	0.967	0.934	0.902	0.852	0.803		
H (m)	Outdoor Upper than Indoor	-5/-16.4	1.000	0.967	0.934	0.902	0.852	0.803		
		-10/-32.8		0.967	0.934	0.902	0.852	0.803		
		-20/-65.6			0.934	0.902	0.852	0.803		
		-30/-98.4				0.902	0.852	0.803		



4. Noise Criterion Curves

Outdoor Unit

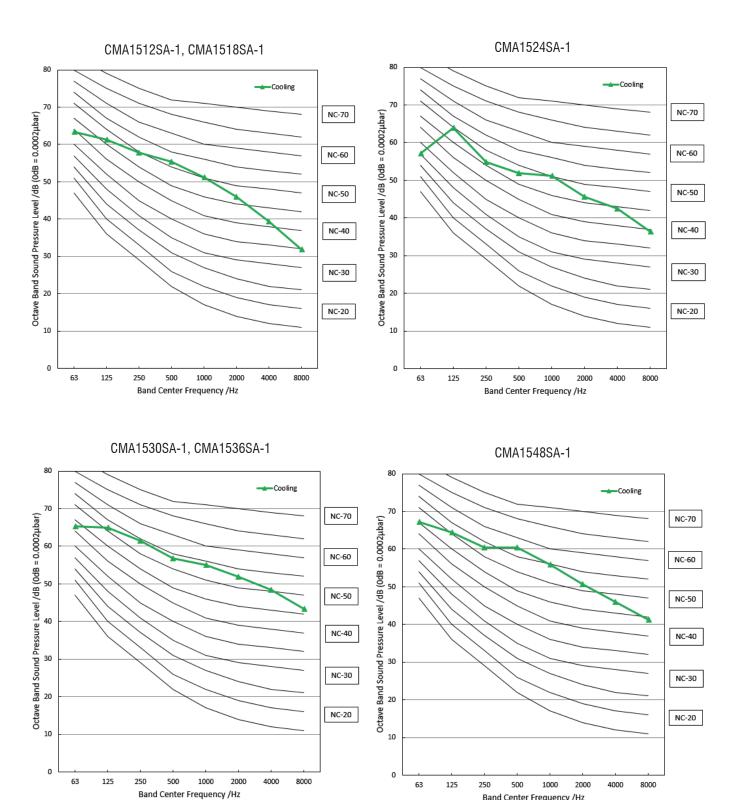


Note: $H= 0.5 \times height of outdoor unit$

Notes:

- -Sound measured at 1.0m/3.25ft away from the center of the unit.
- -Data is valid at free field condition
- -Data is valid at nominal operation condition
- -Reference acoustic pressure OdB=20µPa
- -Sound level will vary depending on arrange off actors such as the construction (acoustic absorption coefficient) of particular room in which the equipment is installed.
- -The operating conditions are assumed to be standard.

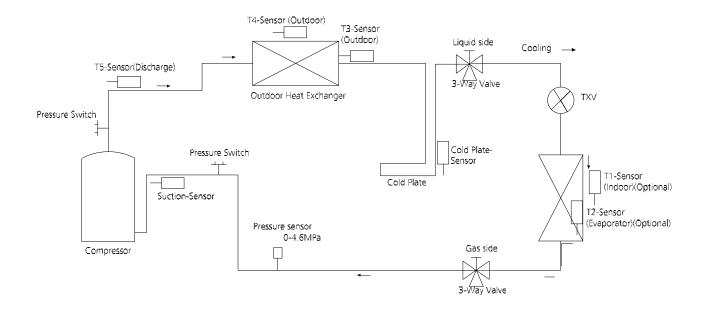




Band Center Frequency /Hz



5. Refrigerant Cycle Diagrams



Model	Pipe Size (Diameter:ø) mm(inch)		Piping length (m/ft)		Elevation (m/ft)		- Additional Refrigerant	
Woder	Gas	Liquid	Rated	Max.	Rated	Max.	Additional Nemgerant	
CMA1512SA-1 CMA1518SA-1	19(3/4)	9.52(3/8)	7.5/24.6	30/98.4	0	20/65.6		
CMA1524SA-1	19(3/4)	9.52(3/8)	7.5/24.6	50/164	0	25/82		
CMA1530SA-1	19(3/4)	9.52(3/8)	7.5/24.6	50/164	0	25/82	65g/m (0.69oz/ft)	
CMA1536SA-1	19(3/4)	9.52(3/8)	7.5/24.6	65/213	0	30/98.4		
CMA1548SA-1	22(7/8)	9.52(3/8)	7.5/24.6	65/213	0	30/98.4		



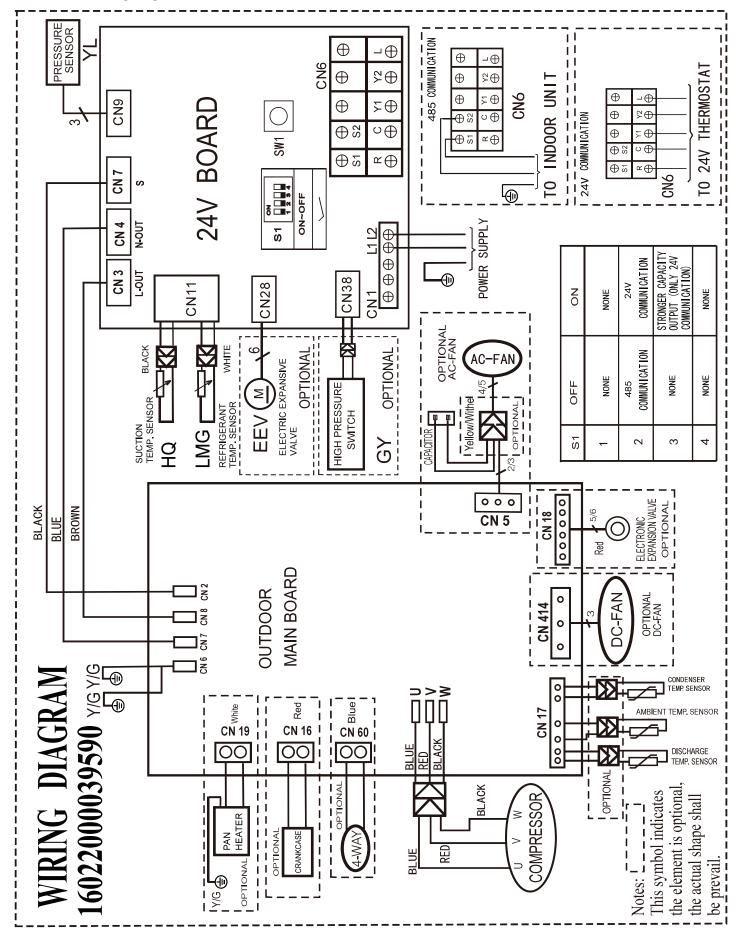
6. Electrical Wiring Diagrams

ODU Model	ODU Wiring Diagram		
CMA1512SA-1 CMA1518SA-1	16022000039590		
CMA1524SA-1	16022000039430		
CMA1530SA-1	16022000039410		
CMA1536SA-1			
CMA1548SA-1	16022000039411		

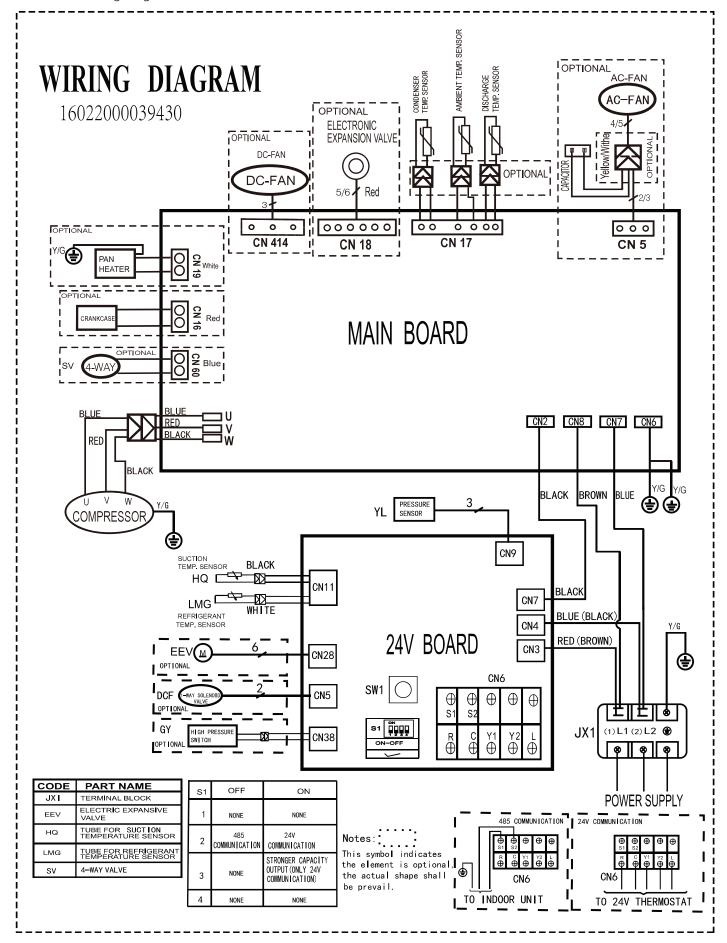
ODU Model	ODU Main Printed Circuit Board	Inverter Module Printed Board	24V Printed Board
CMA1512SA-1	17122000048066	I	
CMA1518SA-1	1712200048000	/	
CMA1524SA-1	17122000048064	/	
CMA1530SA-1	17122000047742	/	17122000054047
CMA1536SA-1	17122000047742	/	
CMA1548SA-1	17122000037804	17122000042012	



Outdoor unit wiring diagram: 16022000039590

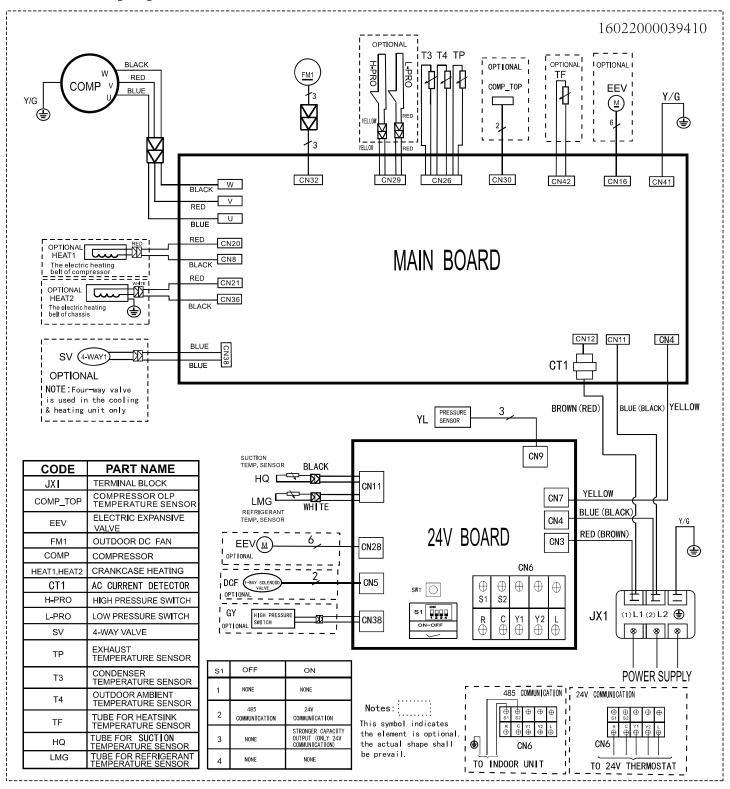


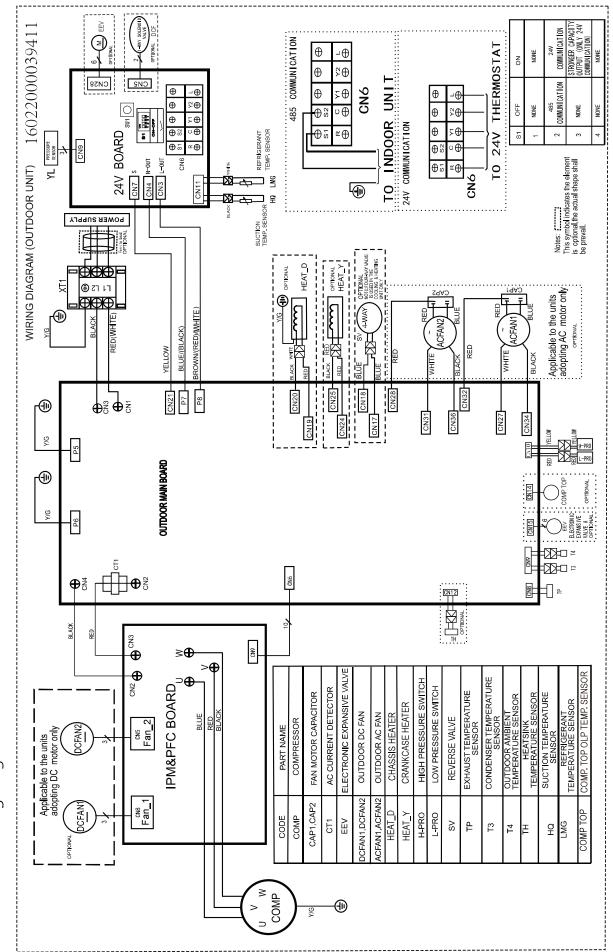
Outdoor unit wiring diagram: 16022000039430





Outdoor unit wiring diagram: 16022000039410

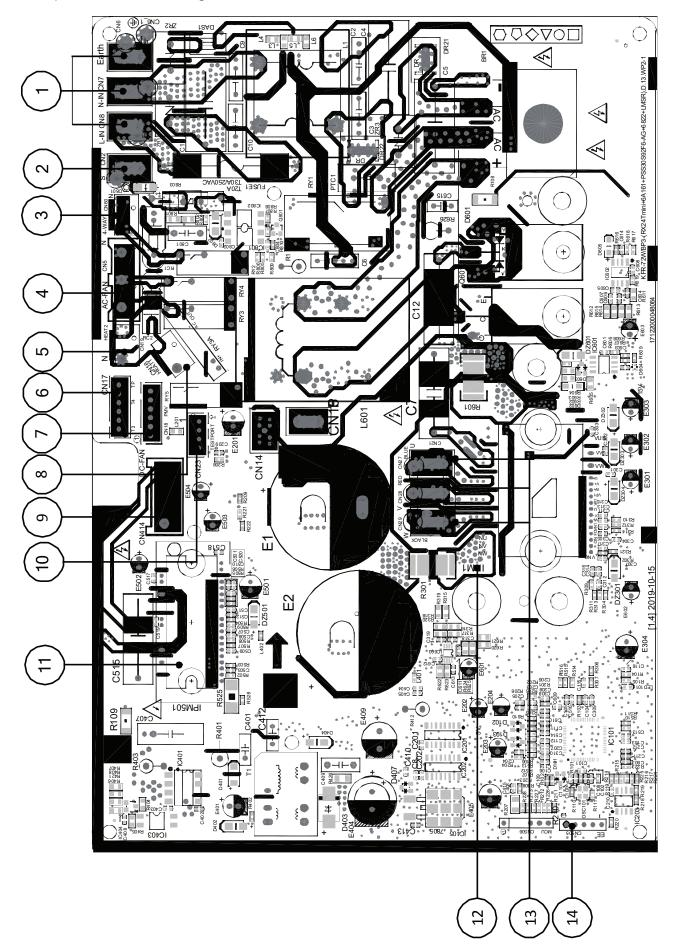




Outdoor unit wiring diagram:16022000039411

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Outdoor unit printed circuit board diagram: 17122000048064& 17122000048066



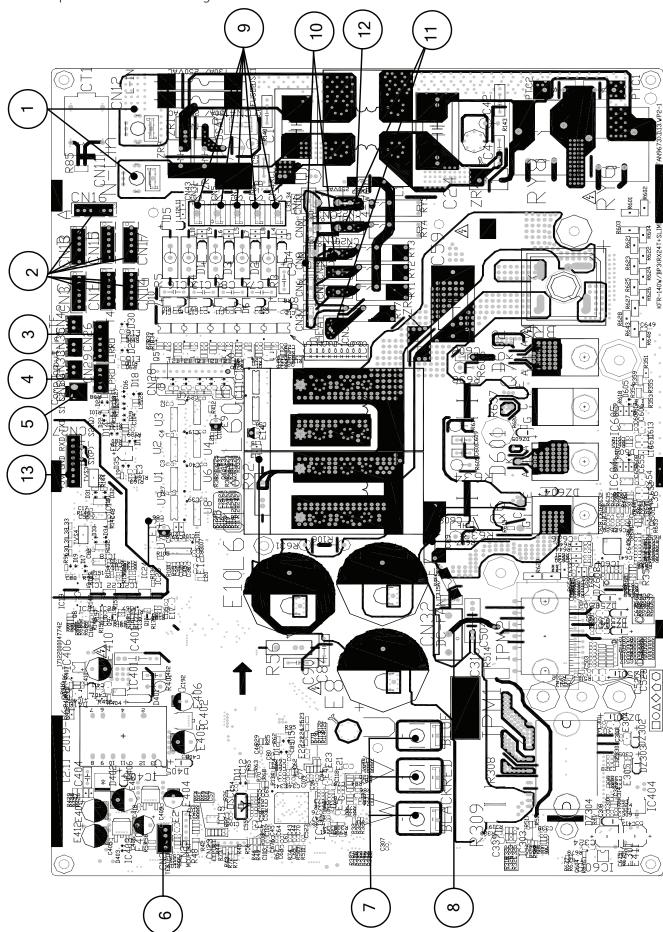


No.	Name	CN#	Meaning
		CN6	Earth: connect to Ground
1	Power Supply	CN7	N_in: connect to N-line (208-230V AC input)
		CN8	L_in: connect to L-line (208-230V AC input)
2	S	CN2	S: connect to indoor unit communication
3	4-WAY	CN60	connect to 4 way valve, 208-230V AC when is ON.
4	AC-FAN	CN5	connect to AC fan
5	HEAT2	CN19	connect to chassis heater, 208-230V AC when is ON
6	TP T4 T3	CN17	connect to pipe temp. sensor T3, ambient temp. sensor T4, exhaust temp. sensor TP
7	PMV	CN18	connect to Electric Expansion Valve
8	HEAT1	CN16	connect to compressor heater, 208-230V AC when is ON
9	DC-FAN	CN414	connect to DC fan
10	TESTPORT	CN23	used for testing
11	FAN_IPM	IPM501	IPM for DC fan
12	COMP_IPM	IPM1	IPM for compressor
	U	CN27	connect to compressor
13	V	CN28	0V AC (standby)
	W	CN29	200-300V AC (running)
14	EE_PORT	CN505	EEPROM programer port

Note: This section is for reference only. Please take practicality as standard.



Outdoor unit printed circuit board diagram: 17122000047742





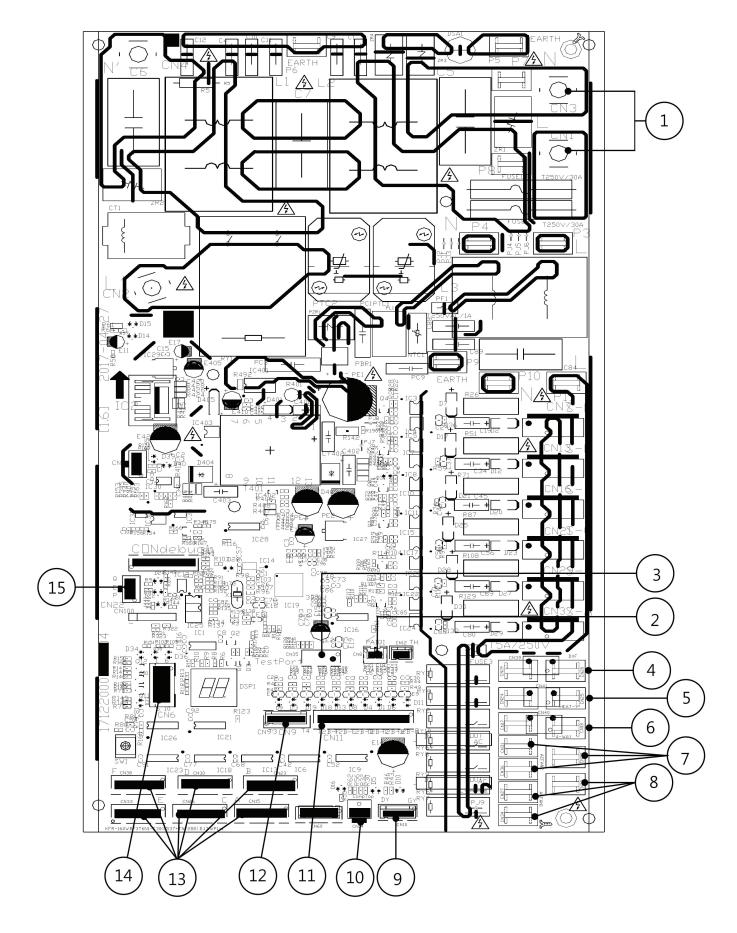
No.	Name	CN#	Meaning	
1	Dower Cupply	CN11	N_in: connect to N-line (208-230V AC input)	
'	Power Supply	CN12	L_in: connect to L-line (208-230V AC input)	
	EEV-A	CN16		
	EEV-B	CN13		
	EEV-C	CN3		
2	EEV-D	CN15	connect to electric expansion valve	
	EEV-E	CN1		
	EEV-F	CN17		
	EEV-G	CN14		
3	T3 T4 TP	CN26	connect to pipe temp. sensor T3, ambient temp. sensor T4, exhaust temp. sensor TP	
4	H-PRO,L-RPO	CN29	connect to high and low pressure swtich(pin1-pin2&pin3-pin4:5VDC pulse wave)	
5	OLP TEMP. SENSOR	CN30	connect to compressor top temp. sensor (5VDC Pulse wave)	
6	TESTPORT	CN24	used for testing	
		U	connect to compressor	
7	COMPRESSOR	V	0V AC (standby)	
		W	10-200V AC (running)	
8	DC-FAN	CN32	connect to DC fan	
	S-E	CN31		
S-D CN5				
9	S-C(mono)	CN34	S: connect to indoor unit communication(pin1-pin2: 24VDC Pulse wave; pin2-pin3: 208-230V AC input)	
	S-B CN2			
	S-A	CN4		



No.	Name	CN#	Meaning				
10	CN8 HEAT_D						
10	HEAT_D	CN20	connect to the heater 200 220V AC when is ON				
11	LIFAT V	LIFAT	LIFAT	LIFAT	LIFAT	CN21	connect to the heater, 208-230V AC when is ON
	HEAT_Y CN36						
12	4-WAY	CN38	connect to 4 way valve, 208-230V AC when is ON.				
13	/	CN27	connect to key board CN1				

Note: This section is for reference only. Please take practicality as standard.

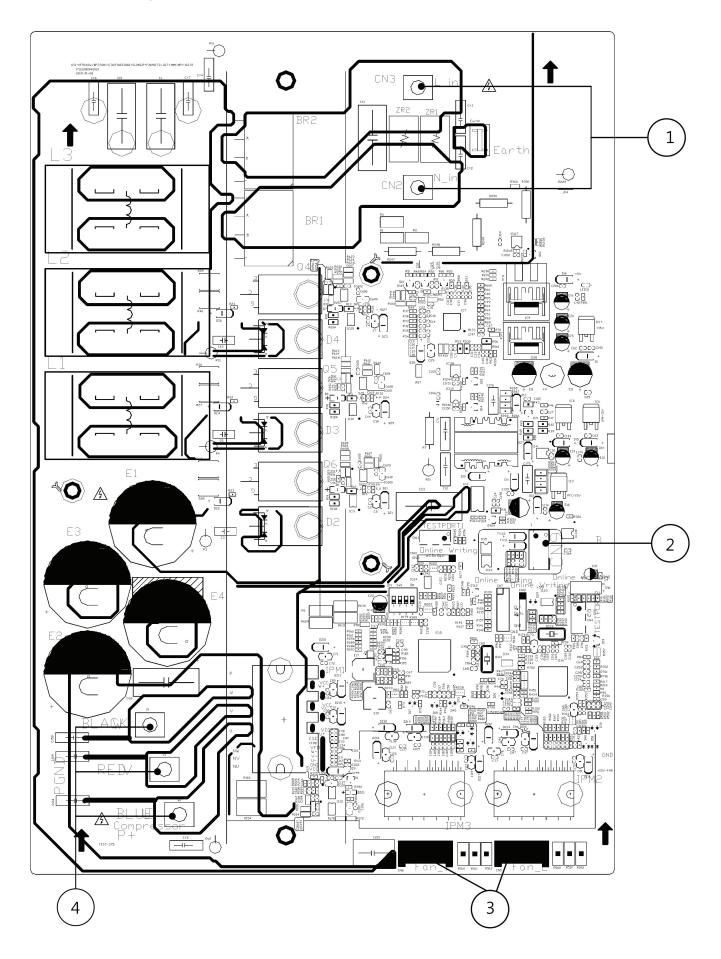
Outdoor unit printed circuit board diagram: 17122000037804





No.	Name	CN#	Meaning
1	Daywar Cymaly	CN1	L1_in: connect to L1-line (230V AC input)
1	Power Supply	CN3	L2_in: connect to L2-line (230V AC input)
2	TP	CN8	Exhaust temp. sensor TP
3	TESTPORT	CN35	used for testing
4	HEAT1	CN19/CN20	connect to chassis heater, 208-230V AC when is ON
5	HEAT2	CN24/CN25	connect to compressor heater, 208-230V AC when is ON
6	4-WAY	CN17/CN18	connect to 4 way valve, 208-230V AC when is ON.
7	AC-FAN2	CN31/CN36/CN28	connect to AC fan2
8	AC-FAN1	CN27/CN34/CN32	connect to AC fan1
9	H-PRO/L-PRO	CN10	connect to low&high pressure switch
10	Compressor Top	CN14	connect to compressor top temperature sensor
11	T2B	CN11	connect to pipe temp. sensor T2B
12	T4 T3	CN9	connect to pipe temp. sensor T3, ambient temp. sensor T4
13	PMV	CN15/CN23/CN26/ CN30/CN33/CN38	connect to Electric Expansion Valve(A~F)
14	/	CN6	connect to IPM&PFC board CN9
15	PQE	CN22	Communication to indoor unit

Outdoor unit IPM board diagram: 17122000042012





No.	Name	CN#	Meaning
1	Dayyor Cumply	CN3	connect to main board L-Out
'	Power Supply	CN2	connect to main board N-Out
2	/	CN9	connect to main board CN6
3	FAN_DC	FAN_1/FAN_2 connect to outdoor DC fan 1& DC fan 2	
		U1	
4	CN_COMP	V1	connect to compressor
		W1	

Note: This section is for reference only. Please take practicality as standard.



Outdoor unit printed circuit board diagram: 17122000054047 2 5 3.10 17122000054047 •••••••••• US1-KFR53W/BP3N1-X330-W,ZY001,JD,TY,MSJ,DP1 \mathbb{B}



No.	Name	CN#	Meaning
1	/	CN5	connect to one-way solenoid valve
2	/	CN9	connect to pressure sensor (5VDC)
3	/	CN28	connect to electric expansion valve (12VDC)
4	TESTPORT	CN45	used for testing (5VDC)
5	/	CN11	connect to suction temp. sensor, cold plate temp. sensor (5VDC)
6	H-PRO	CN38	connect to high pressure switch (5VDC)
		CN3	connect to main board L-Out
7	Power Supply	CN4	connect to main board N-Out

Note: This section is for reference only. Please take practicality as standard.



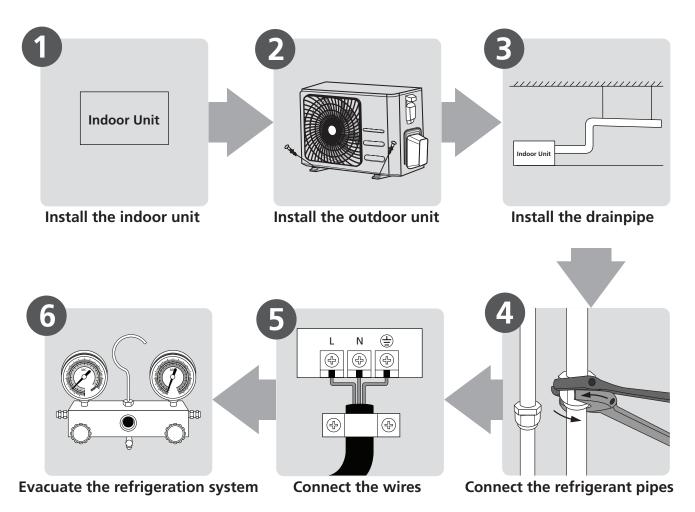
Installation

Contents

- 1. Installation Overview
- 2. Location Selection
- 3. Indoor Unit Installation
- 4. Outdoor Unit Installation
- 5. Drainage Pipe Installation
- 6. Refrigerant Pipe Installation
- 7. Vacuum Drying and Leakage Checking
- 8. Additional Refrigerant Charge
- 9. Engineering of Insulation
- 10. Engineering of Electrical Wiring
- 11 Test Operation



1. Installation Overview





Perform a test run



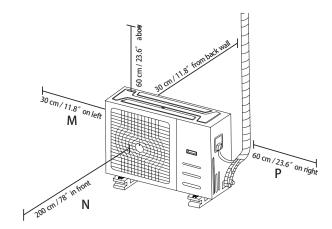
2. Location selection

2.1 Unit location selection can refer to installation manual.

2.2 DO NOT install the unit in the following locations:

- Where oil drilling or fracking is taking place.
- Coastal areas with high salt content in the air.
- Areas with caustic gases in the air, such as near hot springs.
- Areas with power fluctuations, such as factories.
- Enclosed spaces, such as cabinets.
- Areas with strong electromagnetic waves.
- Areas that store flammable materials or gas.
- Rooms with high humidity, such as bathrooms or laundry rooms.
- If possible, DO NOT install the unit where it is exposed to direct sunlight.

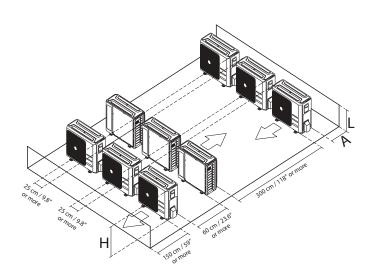
2.3 The minimum distance between the outdoor unit and walls described in the installation guide does not apply to airtight rooms. Be sure to keep the unit unobstructed in at least two of the three directions (M, N, P)



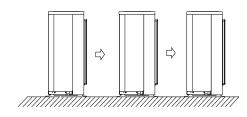
2.4 Rows of series installation

The relations between H, A and L are as follows.

	L	А
I < H	L ≤ 1/2H	25 cm / 9.8" or more
LSH	1/2H < L ≤ H	30 cm / 11.8" or more
L > H	Can not be installed	

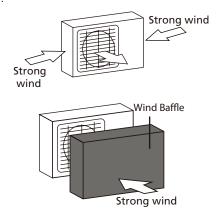


DO NOT install the rows of series like following figure.



2.5 If the unit is exposed to heavy wind:

 Install unit so that air outlet fan is at a 90° angle to the direction of the wind. If needed, build a barrier in front of the unit to protect it from extremely heavy winds.



2.6 If the unit is frequently exposed to heavy rain or snow:

Build a shelter above the unit to protect it from the rain or snow. Be careful not to obstruct air flow around the unit.

2.7 If the unit is frequently exposed to salty air (seaside):

Use outdoor unit that is specially designed to resist corrosion.



3. Indoor Unit Installation(A-COIL)

3.1 Install evaporator coils

Upflow coil installation

The cased coil is designed to ft furnaces of the same width.

- 1. Set coil in place on upfow furnace discharge air opening.
- 2. Ensure coil is level for proper condensate drainage. Do not tip coil toward condensate drain. Coil casing need not be fastened or screwed to furnace.
- 3. When installing wider coil on narrow furnace, create feld fabricated adapter.
- 4. Set cased coil on supply duct opening.
- 5. Place field fabricated 4-in. minimum adapter on coil casing. Adapter should be tapered to fit coil/furnace combination when one of them is larger than the other.
- 6. Set furnace on adapter.

NOTE: On upflow installations where the indoor coil is placed in an unconditioned space, a 6" wide piece of insulation should be applied and wrapped around the outside of coil casing and supply duct contact point.

NOTE: Consult the furnace installation instructions for any special requirements when installing the coil to the furnace.

Downflow Coil Installation

IMPORTANT: Installing "A" coils rotated 90 degrees from the front of the furnace in downfow applications can cause water blow of or coil freeze up. This is due to the concentration of air on one coil slab or lack of air on the opposite coil slab. If the airfow is high due to ductwork or other causes, and there is a chance for water blow of, it is recommended that a 4-in. minimum feld-supplied adapter be placed between the coil and the furnace to allow the air to distribute evenly to both coil slabs.

NOTE: In downflow installation with a 4-way multipose furnace, break off perforated duct flanges on furnace. See furnace installation instructions.

Horizontal Coil Installation

The unit can be installed on a work platform, secured to roof truss in attic, suspended from hangers on foor joists in crawl space, or installed on blocks. It is designed to allow airfow in either direction, to mate with horizontal-left or horizontal-right furnace installations. Ensure coil cabinet is level side to side and front to back. It is allowable to add up to 1/2-in. additional slope over length and depth of coil cabinet in the direction of drain pan connection.

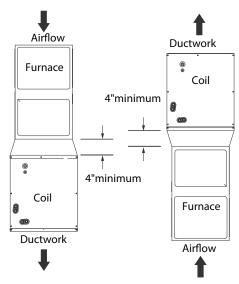
Horizontal Right Installation

- 1. Use field fabricated attachment plates to secure coil to furnace.
- 2. Use self-tapping screws to mount attachment plates to coil casing.
- 3. Connect furnace snugly against coil casing.
- 4. Use self-tapping screws to attach furnace.
- 5. Seal joint between coil casing and furnace to create an air tight seal using locally approved materials.
- 6. If coil is wider than furnace, use 4-in minimum transition and self tapping screws to attach furnace.

Horizontal Left Installation

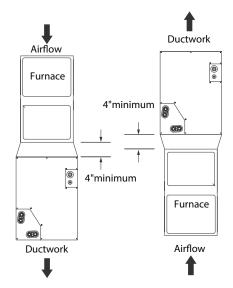
- 1. Unbend the 4 tabs at the right side of the casing.
- 2. Connect furnace snugly against coil casing.
- 3. Use self-tapping screws to attach furnace.
- 4. Seal joint between coil casing and furnace to create air tight seal using locally approved materials.
- 5. If coil is wider than furnace, use 4-in. Minimum transition and self tapping screws to attach furnace.

Old style



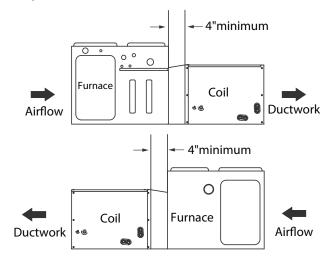
Vertical Upfow & Downfolw Installation

New style



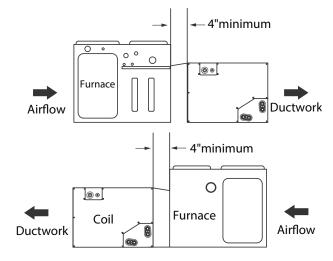
Vertical Upfow & Downfolw Installation

Old style

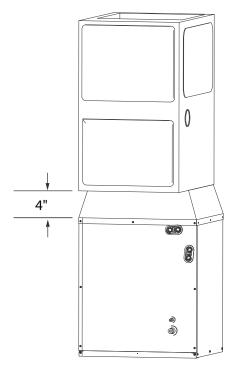


Horizontal Right & Left Installation

New style

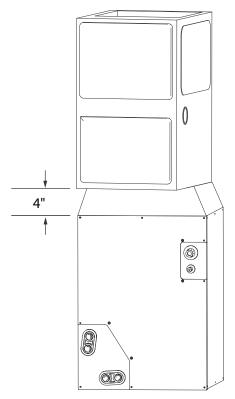


Old style



Downflow Installation with Coil Rotated 90°

New style



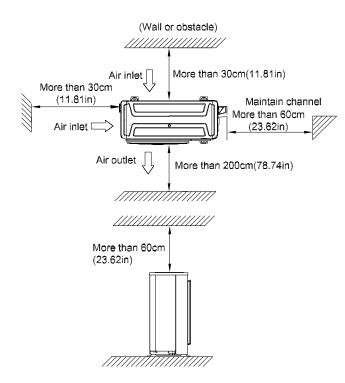
Downflow Installation with Coil Rotated 90°

Horizontal Right & Left Installation



4. Outdoor unit installation

4.1 Service space for outdoor unit



4.2 Install drain joint(Heat pump unit only)

Before bolting the outdoor unit in place, you must install the drain joint at the bottom of the unit.

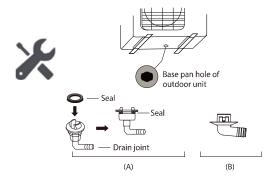
Note that there are two different types of drain joints depending on the type of outdoor unit.

If the drain joint comes with a rubber seal(see Fig. A), do the following:

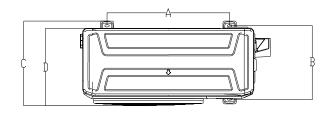
- 1. Fit the rubber seal on the end of the drain joint that will connect to the outdoor unit.
- 2. Insert the drain joint into the hole in the base pan of the unit.
- 3. Rotate the drain joint 90° until it clicks in place facing the front of the unit. **For some panel plates, you need to use tool.**
- 4. Connect a drain hose extension (not included) to the drain joint to redirect water from the unit during heating mode.

If the drain joint doesn't come with a rubber seal (see Fig. B), do the following:

1. Insert the drain joint into the hole in the base pan of the unit. The drain joint will click in place. 2. Connect a drain hose extension (not included) to the drain joint to redirect water from the unit during heating mode.



4.3 Bolt pitch

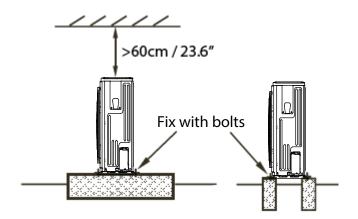


Panel Plate	Unit	D	А	В	С
X2	mm	303	452	286	314
^2	inch	11.93	17.80	11.26	12.36
Va	mm	330	511	317	346
X3	inch	12.99	20.12	12.48	13.62
X4	mm	342	663	354	394
	inch	13.46	26.1	13.94	15.5
X6	mm	375	615	397	440
Λb	inch	14.76	24.2	15.6	17.3
D20	mm	410	673	403	455
D30	inch	16.14	26.50	15.87	17.9
F20	mm	415	634	404	457
E30	inch	16.34	24.96	15.9	17.99
F00	mm	350	590	378	400
590	inch	13.78	23.23	14.88	15.75



4.4 Install Outdoor Unit

Fix the outdoor unit with anchor bolts(M10)



Caution

Since the gravity center of the unit is not at its physical center, so please be careful when lifting it with a sling.

Never hold the inlet of the outdoor unit to prevent it from deforming.

Do not touch the fan with hands or other objects.

Do not lean it more than 45, and do not lay it sidelong.

Make concrete foundation according to the specifications of the outdoor units.

Fasten the feet of this unit with bolts firmly to prevent it from collapsing in case of earthquake or strong wind.



5. Condensate Drain Line Connection

CAUTION:

Failure to follow this caution may result in property damage.

When installing over a finished ceiling and/or living area, install a field-fabricated secondary condensate pan under the entire unit.

The coil is designed to dispose of accumulated water through built-in condensate drain fittings.

It is recommended that PVC fittings be used on the condensate pan. Do not over-tighten. Finger tighten plus 1-1/2 turns. Be sure to install plastic plug in unused condensate drain fitting. Two 3/4 inch female threaded pipe connections are provided in each coil condensate pan.

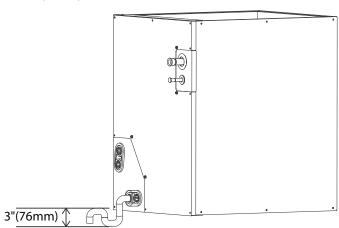
A trap is not necessary on the condensate line if on the supply air side of furnace. Consult local codes for additional restrictions or precautions.

If local codes require a trap then the following guidelines are suggested to assure proper drainage. Install a trap in condensate line of coil as close to the coil as possible. Make trap at least 3 inches (76 mm) deep and no higher than the bottom of unit condensate drain opening . Pitch condensate line 1 inch (25.4 mm) for every 10 ft. of length to an open drain or sump. Make sure that the outlet of each trap is below its connection to condensate pan to prevent condensate from overflowing the drain pan. Prime all traps, test for leaks, and insulate traps and lines if located above a living area.

WARNING

Failure to follow this warning could result in personal injury or death.

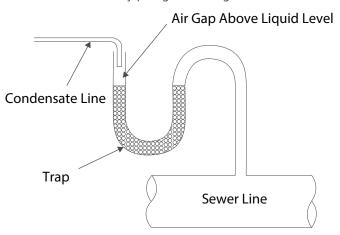
Provide trap with air gap in drain line when connecting to waste (sewer) line.



NOTE: If unit is located in or above a living space, where damage may result from condensate overflow, a field-

supplied, external condensate pan should be installed underneath the entire unit, and a secondary condensate line (with appropriate trap) should be run from the unit

into the pan. Any condensate in this external condensate pan should be drained to a noticeable place. As an alternative to using an external condensate pan, some localities may allow the running of a separate 3/4 inch (19 mm) condensate line (with appropriate trap) per local code to a place where the condensate will be noticeable. The owner of the structure must be informed that when condensate flows from secondary drain or external condensate pan, the unit requires servicing or water damage will occur. To further protect against water damage. install a float switch to shut the unit off if the water in the secondary pan gets too high.



Waste line connection

If the condensate line is to be connected to a waste (sewer) line, an open trap must be in stalled ahead of the waste line to prevent escape of sewer gases.

6. Refrigerant Pipe Installation

6.1 Maximum length and drop height

Ensure that the length of the refrigerant pipe, the number of bends, and the drop height between the indoor and outdoor units meets the requirements shown in the following table.

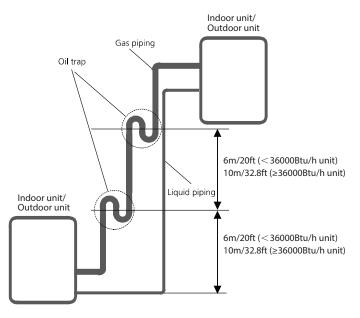
Capacity(kBtu/h)	Max. Length	Max. Elevation
Capacity(KDtu/11)	(m/ft)	(m/ft)
<15	25/82	10/32.8
15-23	30/98.4	20/65.6
24~35	50/164	25/82
36~60	65/213.3	30/98.4

Caution:

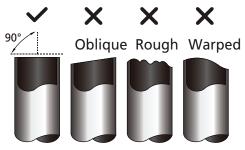
1. The capacity test is based on the standard length and the maximum permissive length is based on the system reliability.

2. Oil traps

- -If oil flows back into the outdoor unit's compressor, this might cause liquid compression or deterioration of oil return. Oil traps in the rising gas piping can prevent this.
- -An oil trap should be installed every 6m(20ft) of vertical suction line riser (<36000Btu/h unit).
- -An oil trap should be installed every 10m(32.8ft) of vertical suction line riser (≥36000Btu/h unit).



- 2. Confirm the cross way of the pipes.
- 3. Measure the necessary pipe length.
- 4. Cut the selected pipe with pipe cutter
 - Make the section flat and smooth.



- 5. Insulate the copper pipe
 - Before test operation, the joint parts should not be heat insulated.
- 6. Flare the pipe
 - Insert a flare nut into the pipe before flaring the pipe
 - According to the following table to flare the pipe.

Pipe diameter	Elaro dimonsio	Flare dimension A (mm/inch)		
Tipe diameter	riale ullilelisic	I A (IIIII/IIICII)	Flare shape	
(inch(mm))	Min	Max		
1/4" (6.35)	8.4/0.33	8.7/0.34		
3/8" (9.52)	13.2/0.52	13.5/0.53	90 [°] ±4	
1/2" (12.7)	16.2/0.64	16.5/0.65	A 45 3	
5/8" (15.9)	19.2/0.76	19.7/0.78	R0.4~0.8	
3/4" (19)	23.2/0.91	23.7/0.93		
7/8" (22)	26.4/1.04	26.9/1.06		

- After flared the pipe, the opening part must be seal by end cover or adhesive tape to avoid duct or exogenous impurity come into the pipe.
- 7. Drill holes if the pipes need to pass the wall.
- 8. According to the field condition to bend the pipes so that it can pass the wall smoothly.
- 9. Bind and wrap the wire together with the insulated pipe if necessary.

6.2 The procedure of connecting pipes

1. Choose the pipe size according to the specification table.



- 10. Set the wall conduit
- 11. Set the supporter for the pipe.
- 12. Locate the pipe and fix it by supporter
 - For horizontal refrigerant pipe, the distance between supporters should not be exceed 1m.
 - For vertical refrigerant pipe, the distance between supporters should not be exceed 1.5m.
- 13. Connect the pipe to indoor unit and outdoor unit by using two spanners.
 - Be sure to use two spanners and proper torque to fasten the nut, too large torque will damage the bell mouthing, and too small torque may cause leakage. Refer the following table for different pipe connection.

Pipe Diameter	Torque	Cleately man	
Pipe Diameter	N.m(lb.ft)	Sketch map	
1/4" (6.35)	18~20		
	(13.3~14.8)	_	
2/0" /0 E2\	32~39	· all	
3/8" (9.52)	(23.6~28.8)		
1/2" (12.7)	49~59		
1/2 (12.7)	(36.1~43.5)		
F (O (1 F O)	57~71		
5/8" (15.9)	(42~52.4)		
2/4" /10\	67~101		
3/4" (19)	(49.4~74.5)		
7/0" /22\	85-110		
7/8" (22)	(62.7-81.1)		

7. Vacuum Drying and Leakage Checking

7.1 Purpose of vacuum drying

- Eliminating moisture in system to prevent the phenomena of ice-blockage and copper oxidation.
 Ice-blockage shall cause abnormal operation of system, while copper oxide shall damage compressor.
- Eliminating the non-condensable gas (air) in system to prevent the components oxidizing, pressure fluctuation and bad heat exchange during the operation of system.

7.2 Selection of vacuum pump

- The ultimate vacuum degree of vacuum pump shall be -756mmHg or above.
- Precision of vacuum pump shall reach 0.02mmHg or above.

7.3 Operation procedure for vacuum drying

Due to different construction environment, two kinds of vacuum drying ways could be chosen, namely ordinary vacuum drying and special vacuum drying.

7.3.1 Ordinary vacuum drying

- 1. When conduct first vacuum drying, connect pressure gauge to the infusing mouth of gas pipe and liquid pipe, and keep vacuum pump running for 1hour (vacuum degree of vacuum pump shall be reached -755mmHg).
- 2. If the vacuum degree of vacuum pump could not reach -755mmHg after 1 hour of drying, it indicates that there is moisture or leakage in pipeline system and need to go on with drying for half an hour.
- 3. If the vacuum degree of vacuum pump still could not reach -755mmHg after 1.5 hours of drying, check whether there is leakage source.
- 4 . Leakage test: After the vacuum degree reaches -755mmHg, stop vacuum drying and keep the pressure for 1 hour. If the indicator of vacuum gauge does not go up, it is qualified. If going up, it indicates that there is moisture or leak source.

7.3.2 Special vacuum drying

The special vacuum drying method shall be adopted when:

- 1. Finding moisture during flushing refrigerant pipe.
- 2. Conducting construction on rainy day, because rain water might penetrated into pipeline.
- 3. Construction period is long, and rain water might penetrated into pipeline.



4. Rain water might penetrate into pipeline during construction.

Procedures of special vacuum drying are as follows:

- 1. Vacuum drying for 1 hour.
- 2. Vacuum damage, filling nitrogen to reach 0.5Kgf/cm².

Because nitrogen is dry gas, vacuum damage could achieve the effect of vacuum drying, but this method could not achieve drying thoroughly when there is too much moisture. Therefore, special attention shall be drawn to prevent the entering of water and the formation of condensate water.

3. Vacuum drying again for half an hour.

If the pressure reached -755mmHg, start to pressure leakage test. If it cannot reached the value, repeat vacuum damage and vacuum drying again for 1 hour.

4. Leakage test: After the vacuum degree reaches -755mmHg, stop vacuum drying and keep the pressure for 1 hour. If the indicator of vacuum gauge does not go up, it is qualified. If going up, it indicates that there is moisture or leak source.

8. Additional Refrigerant Charge

- After the vacuum drying process is carried out, the additional refrigerant charge process need to be performed.
- The outdoor unit is factory charged with refrigerant. The additional refrigerant charge volume is decided by the diameter and length of the liquid pipe between indoor and outdoor unit. Refer the following formula to calculate the charge volume.

	Diameter of liquid pipe (mm(inch))	Formula		
R410A(Throttling part in the indoor unit)	6.35(1/4)	V=30(0.32)g/m(oz/ft)×(L- standard pipe length)		
	9.52(3/8)	V=65(0.69)g/m(oz/ft)×(L- standard pipe length)		
	12.7(1/2)	V=115(1.23)g/m(oz/ft)×(L- standard pipe length)		

V: Additional refrigerant charge volume.

L: The length of the liquid pipe.

Note:

- Refrigerant may only be charged after performed the vacuum drying process.
- Always use gloves and glasses to protect your hands and eyes during the charge work.
- Use electronic scale or fluid infusion apparatus to weight refrigerant to be recharged. Be sure to avoid extra refrigerant charged, it may cause liquid hammer of the compressor or protections.
- Use supplementing flexible pipe to connect refrigerant cylinder, pressure gauge and outdoor unit. And
 The refrigerant should be charged in liquid state.
 Before recharging, The air in the flexible pipe and
 manifold gauge should be exhausted.
- After finished refrigerant recharge process, check whether there is refrigerant leakage at the connection joint part. (Using gas leakage detector or soap water to detect).



9 . Engineering of Insulation

9.1 Insulation of refrigerant pipe

1. Operational procedure of refrigerant pipe insulation

Cut the suitable pipe \rightarrow insulation (except joint section) \rightarrow flare the pipe \rightarrow piping layout and connection \rightarrow vacuum drying \rightarrow insulate the joint parts

2. Purpose of refrigerant pipe insulation

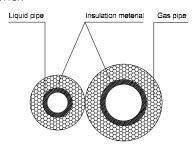
- During operation, temperature of gas pipe and liquid pipe shall be over-heating or over-cooling extremely. Therefore, it is necessary to carry out insulation; otherwise it shall debase the performance of unit and burn compressor.
- Gas pipe temperature is very low during cooling. If insulation is not enough, it shall form dew and cause leakage.
- Temperature of gas pipe is very high (generally 50-100°C) during heating. Insulation work must be carried out to prevent hurt by carelessness touching.

3. Insulation material selection for refrigerant pipe

- The burning performance should over 120 °C
- According to the local law to choose insulation materials
- The thickness of insulation layer shall be above 10mm. If in hot or wet environment place, the layer of insulation should be thicker accordingly.

4. Installation highlights of insulation construction

 Gas pipe and liquid pipe shall be insulated separately, if the gas pipe and liquid pipe were insulated together; it will decrease the performance of air conditioner.



- The insulation material at the joint pipe shall be 5~10cm longer than the gap of the insulation material.
- The insulation material at the joint pipe shall be inserted into the gap of the insulation material.
- The insulation material at the joint pipe shall be banded to the gap pipe and liquid pipe tightly.
- The linking part should be use glue to paste together
- Be sure not bind the insulation material over-tight, it may extrude out the air in the material to cause bad

insulation and cause easy aging of the material.

9.2 Insulation of drainage pipe

1. Operational procedure of refrigerant pipe insulation

Select the suitable pipe → insulation (except joint section) → piping layout and connection → drainage test → insulate the joint parts

2. Purpose of drainage pipe insulation

The temperature of condensate drainage water is very low. If insulation is not enough, it shall form dew and cause leakage to damage the house decoration.

3. Insulation material selection for drainage pipe

- The insulation material should be flame retardant material, the flame retardancy of the material should be selected according to the local law.
- Thickness of insulation layer is usually above 10mm.
- Use specific glue to paste the seam of insulation material, and then bind with adhesive tape. The width of tape shall not be less than 5cm. Make sure it is firm and avoid dew.

4. Installation and highlights of insulation construction

- The single pipe should be insulated before connecting to another pipe, the joint part should be insulated after the drainage test.
- There should be no insulation gap between the insulation material.



10. Engineering of Electrical Wring

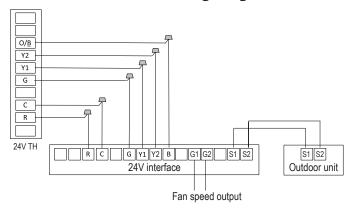
1. Highlights of electrical wiring installation

- All field wiring construction should be finished by qualified electrician.
- Air conditioning equipment should be grounded according to the local electrical regulations.
- Current leakage protection switch should be installed.
- Do not connect the power wire to the terminal of signal wire.
- When power wire is parallel with signal wire, put wires to their own wire tube and remain at least 300mm gap.
- According to table in indoor part named "the specification of the power" to choose the wiring, make sure the selected wiring not small than the date showing in the table.
- Select different colors for different wire according to relevant regulations.
- Do not use metal wire tube at the place with acid or alkali corrosion, adopt plastic wire tube to replace it.
- There must be not wire connect joint in the wire tube If joint is a must, set a connection box at the place.
- The wiring with different voltage should not be in one wire tube.
- Ensure that the color of the wires of outdoor and the terminal No. are same as those of indoor unit respectively.

Table: Minimum Cross-Sectional Area able of Power and Signal Cables

Rated Current of Appliance (A)	AWG
≤ 6	18
6 - 10	16
10 - 16	14
16 - 25	12
25 - 32	10

2. 24V coil interface wiring diagram



NOTE: The room temperature sensor should be installed near to the thermostat.

According to the difference between the space temperature and space setpoint temperature.

The coil can adjust the compressor speed and the indoor fan speed to obtain better performance with using 24V interface module.



11. Test Operation

1. The test operation must be carried out after the entire installation has been completed.

2. Please confirm the following points before the test operation.

- The indoor unit and outdoor unit are installed properly.
- Piping and wiring are properly connected.
- Ensure that there are no obstacles near the inlet and outlet of the unit that might cause poor performance or product malfunction.
- The refrigeration system does not leak.
- The drainage system is unimpeded and draining to a safe location.
- The heating insulation is properly installed.
- The grounding wires are properly connected
- The length of the piping and the added refrigerant stow capacity have been recorded.
- The power voltage is the correct voltage for the air conditioner.

CAUTION: Failure to perform the test run may result in unit damage, property damage or personal injury.

3. Test Run Instructions

- 1. Open both the liquid and gas stop valves.
- 2. Turn on the main power switch and allow the unit to warm up.
- 3. Set the air conditioner to COOL mode, and check the following points.

Indoor unit

- Double check to see if the room temperature is being registered correctly.
- Ensure the manual buttons on the indoor unit works properly.
- Check to see that the drainage system is unimpeded and draining smoothly.
- Ensure there is no vibration or abnormal noise during operation.

Outdoor unit

- Check to see if the refrigeration system is leaking.
- Make sure there is no vibration or abnormal noise during operation.
- Ensure the wind, noise, and water generated by the unit do not disturb your neighbors or pose a safety hazard.

4. Drainage Test

a. Ensure the drainpipe flows smoothly. New buildings should perform this test before finishing the ceiling.

- b. Turn on the main power switch and run the air conditioner in COOL mode.
- c. Check to see that the water is discharged. It may take up to one minute before the unit begins to drain depending on the drainpipe.
- d. Make sure that there are no leaks in any of the piping.
- e. Stop the air conditioner. Turn off the main power switch and reinstall the test cover.



Maintenance

Contents

1.	First	Time Installation Check	2
2	Refri	gerant Recharge	4
3	Re-Installation		5
		Indoor Unit	
		Outdoor Unit	



1. First Time Installation Check

Air and moisture trapped in the refrigerant system affects the performance of the air conditioner by:

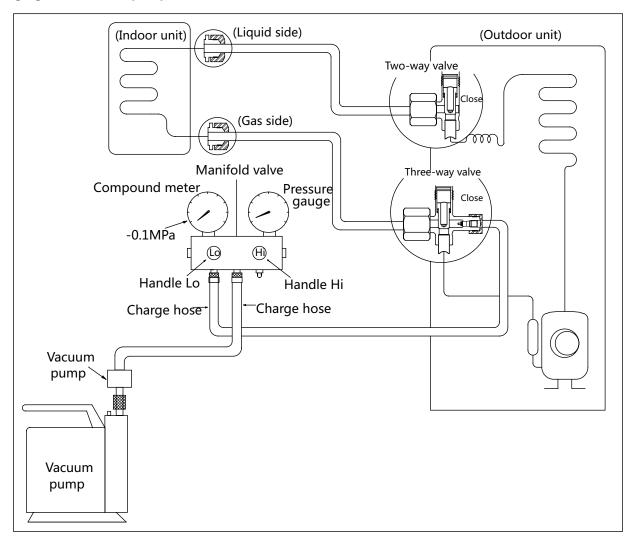
- Increasing pressure in the system.
- Increasing the operating current.
- Decreasing the cooling or heating efficiency.
- Congesting the capillary tubing due to ice build-up in the refrigerant circuit.
- Corroding the refrigerant system.

To prevent air and moisture from affecting the air conditioner's performance, the indoor unit, as well as the pipes between the indoor and outdoor unit, must be be leak tested and evacuated.

Leak test (soap water method)

Use a soft brush to apply soapy water or a neutral liquid detergent onto the indoor unit connections and outdoor unit connections. If there is gas leakage, bubbles will form on the connection.

Air purging with vacuum pump



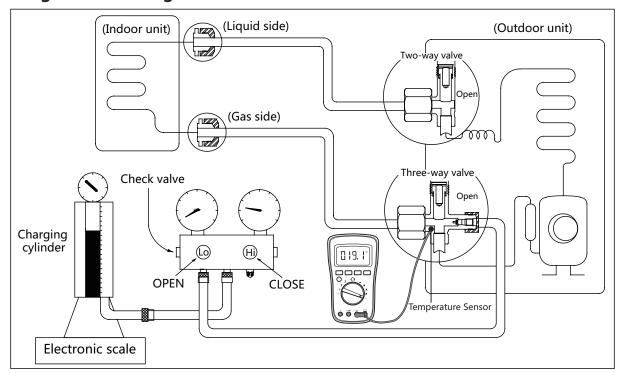


- 1. Tighten the flare nuts of the indoor and outdoor units, and confirm that both the 2- and 3-way valves are closed.
- **2.** Connect the charge hose with the push pin of Handle Lo to the gas service port of the 3-way valve.
- **3.** Connect another charge hose to the vacuum pump.
- **4.** Fully open the Handle Lo manifold valve.
- **5.** Using the vacuum pump, evacuate the system for 30 minutes.
 - **a.** Check whether the compound meter indicates -0.1 MPa (14.5 Psi).
 - If the meter does not indicate -0.1 MPa (14.5 Psi) after 30 minutes, continue evacuating for an additional 20 minutes.
 - If the pressure does not achieve -0.1 MPa (14.5 Psi) after 50 minutes, check for leakage.

- If the pressure successfully reaches -0.1 MPa (14.5 Psi), fully close the Handle Lo valve, then cease vacuum pump operations.
- **b.** Wait for 5 minutes then check whether the gauge needle moves after turning off the vacuum pump. If the gauge needle moves backward, check wether there is gas leakage.
- Loosen the flare nut of the 3-way valve for 6 or 7 seconds and then tighten the flare nut again.
 - **a.** Confirm the pressure display in the pressure indicator is slightly higher than the atmospheric pressure.
 - **b.** Remove the charge hose from the 3-way valve.
- **7.** Fully open the 2- and 3-way valves and tighten the cap of the 2- and 3-way valves.



2. Refrigerant Recharge



Procedure:

- 1. Close both 2- and 3-way valves.
- 2. Slightly connect the Handle Lo charge hose to the 3-way service port.
- **3.** Connect the charge hose to the valve at the bottom of the cylinder.
- **4.** If the refrigerant is R410A/R32, invert the cylinder to ensure a complete liquid charge.
- **5.** Open the valve at the bottom of the cylinder for 5 seconds to purge the air in the charge hose, then fully tighten the charge hose with push pin Handle Lo to the service port of 3-way valve..
- **6.** Place the charging cylinder onto an electronic scale and record the starting weight.
- 7. Fully open the Handle Lo manifold valve, 2- and

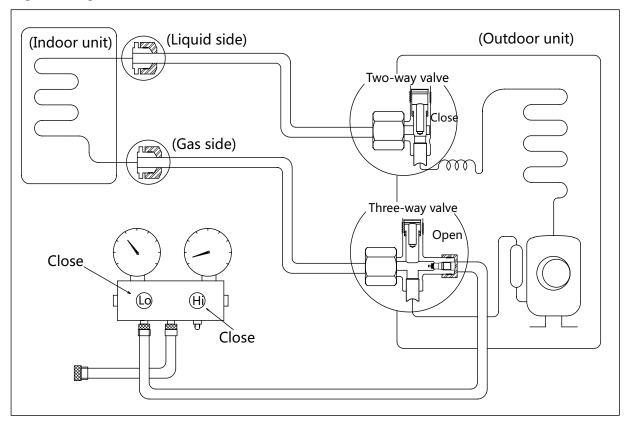
3-way valves.

- **8.** Operate the air conditioner in cooling mode to charge the system with liquid refrigerant.
- **9.** When the electronic scale displays the correct weight (refer to the gauge and the pressure of the low side to confirm, the value of pressure refers to chapter Appendix), turn off the air conditioner, then disconnect the charge hose from the 3-way service port immediately.
- **10.** Mount the caps of service port and 2- and 3-way valves
- **11.** Use a torque wrench to tighten the caps to a torque of 18 N.m.
- **12.** Check for gas leakage.

3. Re-Installation

3.1 Indoor Unit

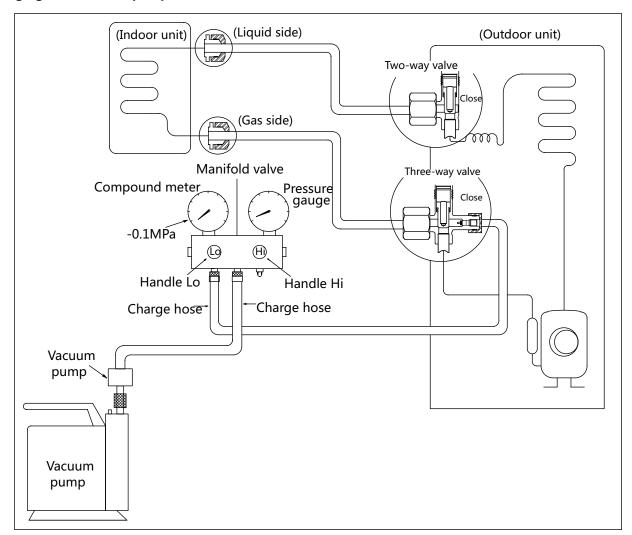
Collecting the refrigerant into the outdoor unit



- 1. Confirm that the 2- and 3-way valves are opened.
- 2. Connect the charge hose with the push pin of Handle Lo to the 3-way valve's gas service port.
- **3.** Open the Handle Lo manifold valve to purge air from the charge hose for 5 seconds and then close it quickly.
- **4.** Close the 2-way valve.
- **5.** Operate the air conditioner in cooling mode. Cease operations when the gauge reaches 0.1 MPa (14.5 Psi).
- **6.** Close the 3-way valve so that the gauge rests between 0.3 MPa (43.5 Psi) and 0.5 MPa (72.5 Psi).
- **7.** Disconnect the charge set and mount the caps of service port and 2- and 3-way valves.
- **8.** Use a torque wrench to tighten the caps to a torque of 18 N.m.
- **9.** Check for gas leakage.



Air purging with vacuum pump

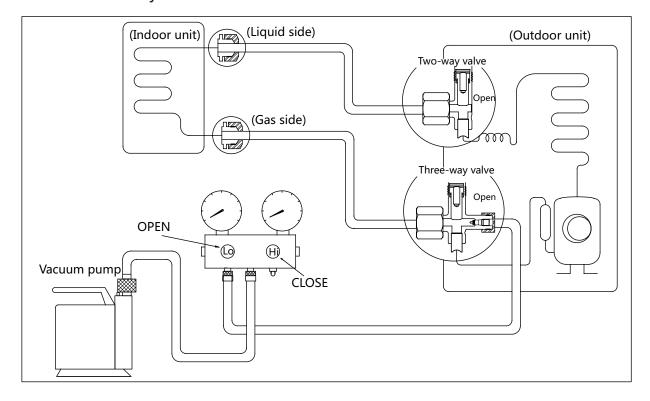


- 1. Tighten the flare nuts of the indoor and outdoor units, and confirm that both the 2- and 3-way valves are closed.
- 2. Connect the charge hose with the push pin of Handle Lo to the gas service port of the 3-way valve.
- **3.** Connect another charge hose to the vacuum pump.
- **4.** Fully open the Handle Lo manifold valve.
- 5. Using the vacuum pump, evacuate the system for 30 minutes.
 - **a.** Check whether the compound meter indicates -0.1 MPa (14.5 Psi).
 - If the meter does not indicate -0.1 MPa (14.5 Psi) after 30 minutes, continue evacuating for an additional 20 minutes.
 - If the pressure does not achieve -0.1 MPa (14.5 Psi) after 50 minutes, check for leakage.

- If the pressure successfully reaches -0.1 MPa (14.5 Psi), fully close the Handle Lo valve, then cease vacuum pump operations.
- **b.** Wait for 5 minutes then check whether the gauge needle moves after turning off the vacuum pump. If the gauge needle moves backward, check wether there is gas leakage.
- **6.** Loosen the flare nut of the 3-way valve for 6 or 7 seconds and then tighten the flare nut again.
 - a. Confirm the pressure display in the pressure indicator is slightly higher than the atmospheric pressure.
 - **b.** Remove the charge hose from the 3-way valve.
- 7. Fully open the 2- and 3-way valves and tighten the cap of the 2- and 3-way valves.

3.2 Outdoor Unit

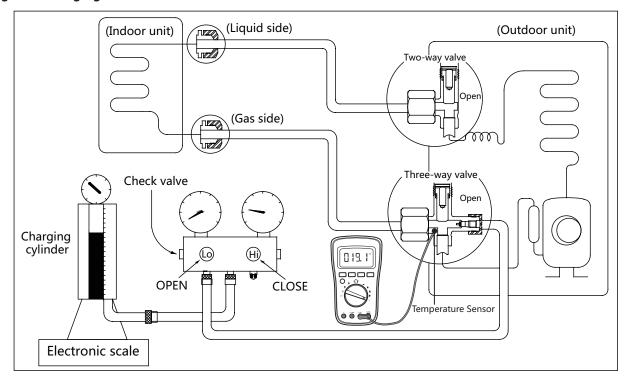
Evacuation for the whole system



- 1. Confirm that the 2- and 3-way valves are opened.
- **2.** Connect the vacuum pump to the 3-way valve's service port.
- **3.** Evacuate the system for approximately one hour. Confirm that the compound meter indicates -0.1 MPa (14.5Psi).
- **4.** Close the valve (Low side) on the charge set and turn off the vacuum pump.
- **5.** Wait for 5 minutes then check whether the gauge needle moves after turning off the vacuum pump. If the gauge needle moves backward, check whether there is gas leakage.
- **6.** Disconnect the charge hose from the vacuum pump.
- **7.** Mount the caps of service port and 2- and 3-way valves.
- **8.** Use a torque wrench to tighten the caps to a torque of 18 N.m.



Refrigerant charging



Procedure:

- 1. Close both 2- and 3-way valves.
- **2.** Slightly connect the Handle Lo charge hose to the 3-way service port.
- **3.** Connect the charge hose to the valve at the bottom of the cylinder.
- **4.** If the refrigerant is R410A/R32, invert the cylinder to ensure a complete liquid charge.
- **5.** Open the valve at the bottom of the cylinder for 5 seconds to purge the air in the charge hose, then fully tighten the charge hose with push pin Handle Lo to the service port of 3-way valve..
- **6.** Place the charging cylinder onto an electronic scale and record the starting weight.

- **7.** Fully open the Handle Lo manifold valve, 2- and 3-way valves.
- **8.** Operate the air conditioner in cooling mode to charge the system with liquid refrigerant.
- **9.** When the electronic scale displays the correct weight (refer to the gauge and the pressure of the low side to confirm, the value of pressure refers to chapter Appendix), turn off the air conditioner, then disconnect the charge hose from the 3-way service port immediately..
- **10.** Mount the caps of service port and 2- and 3-way valves.
- **11.** Use a torque wrench to tighten the caps to a torque of 18 N.m.
- **12.** Check for gas leakage.

Note: 1. Mechanical connectors used indoors shall comply with local regulations.

2. When mechanical connectors are reused indoors, sealing parts shall be renewed. When flared joints are reused indoors, the flare part shall be re-fabricated.



Product Features

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1. Display Function

Mode	Priority	G	Y1	Y/Y2	В	W	W1	W2	E/AUX	DH/DS/BK	Display
Shut down	/	0	0	0	0	0	0	0	0	*	00
Fan	7	1	0	0	*	0	0	0	0	*	01
Cooling 1		*	1	0	0	0	0	0	0	1	02
Cooling 2	6	*	*	1	0	0	0	0	0	1	03
Drying 1	0	*	1	0	0	0	0	0	0	0	04
Drying 2		*	*	1	0	0	0	0	0	0	05
Heating 1		*	1	0	1	0	0	0	0	1	12
Heating 2	5	*	*	1	1	0	0	0	0	1	12
Heating 2		*	*	*	*	1	0	0	0	1	12
Emergency heating		*	0	0	*	0	1	0	0	*	12
Emergency heating	3	*	0	0	*	0	0	1	0	*	12
Emergency heating		*	0	0	*	0	1	1	0	*	12
Emergency heating		*	1	0	1	0	1	0	0	1	
Emergency heating		*	1	0	1	0	0	1	0	1	
Emergency heating		*	*	1	1	0	1	0	0	1	12
Emergency heating		*	*	*	*	1	1	0	0	1	12
Emergency heating	4	*	*	1	1	0	0	1	0	1	
Emergency heating		*	*	*	*	1	0	1	0	1	
Emergency heating		*	1	0	1	0	1	1	0	1	
Emergency heating		*	*	1	1	0	1	1	0	1	12
Emergency heating		*	*	*	*	1	1	1	0	1	
Emergency heating	1	*	*	*	*	*	*	*	1	*	12
Heating zone control		*	1	0	1	0	*	*	0	0	
Heating zone control	2	*	*	1	1	0	*	*	0	0	12
Heating zone control		*	*	*	*	1	*	*	0	0	

NOTICE:

1 : signal

0 : no signal

*: 1 or 0

If the input does not meet the above, press shutdown for processing.



2. Safety Features

Compressor three-minute delay at restart

Compressor functions are delayed for up to ten seconds upon the first startup of the unit, and are delayed for up to three minutes upon subsequent unit restarts.

Automatic shutoff based on discharge temperature

If the compressor discharge temperature exceeds a certain level for nine seconds, the compressor ceases operation.

Inverter module protection

The inverter module has an automatic shutoff mechanism based on the unit's current, voltage, and temperature. If automatic shutoff is initiated, the corresponding error code is displayed on the indoor unit and the unit ceases operation.

Compressor preheating

Preheating is automatically activated when T4 sensor is lower than setting temperature.

Sensor redundancy and automatic shutoff

- If one temperature sensor malfunctions, the air conditioner continues operation and displays the corresponding error code, allowing for emergency use.
- When more than one temperature sensor is malfunctioning, the air conditioner ceases operation.

3. Basic Functions

3.1 Abbreviation

Unit element abbreviations

Abbreviation	Element
T1	Indoor room temperature
T2	Coil temperature of evaporator
T3	Coil temperature of condenser
T4	Outdoor ambient temperature
TP	Compressor discharge temperature
TS	Setting temperature
Tsc	Adjusted setting temperature

In this manual, such as CDIFTEMP, HDIFTEMP2, TEH2, TCE1, TCE2...etc., they are well-setting parameter of EEPROM.

3.2 Fan Mode

When fan mode is activated:

- Temperature control is disabled and no temperature setting is displayed.
- The indoor fan speed can be set to low, medium, high,

- turbo and auto.
- Auto fan: In fan-only mode, AC operates the same as auto fan in cooling mode with the temperature set at 24°C(75°F).
- Under 24V control, when only G signal is available, when switching from heating mode or emergency heating mode to fan mode, T4<10°C(50°F), the heating mode is sent to the outdoor; when T4>12°C(53.6 °F), the normal outdoor control is resumed, the fan mode is sent to the outdoor.

3.3 Cooling Mode

3.3.1 Compressor Control

- If the following conditions are satisfied, the compressor ceases operation.
 - When the frequency value calculated by the GA algorithm is negative compensation.
 - Protection time for temperature shutdown is more than ten minutes.
 - T1 is lower than or equal to (Tsc-CDIFTEMP).
- If one of the following conditions is satisfied, not judge protective time.
 - Compressor running frequency is more than test frequency.
 - When compressor running frequency is equal to test frequency, T4 is more than 15°C(59 °F) or T4 fault.
 - Change setting temperature.
 - Turning on/off Turbo or Silent function.
 - Various frequency limit shutdown occurs.

3.3.2 Indoor Fan Control

- 1) In cooling mode, the indoor fan operates continuously. The fan speed can be set to low, medium, high, turbo and auto.
- 2) Auto fan action in cooling mode:
 - Descent curve
 - When T1-Tsc is lower than 3.5°C/6.3°F, fan speed reduces to high;
 - When T1-Tsc is lower than 1°C/1.8°F, fan speed reduces to medium;
 - When T1-Tsc is lower than 0.5°C/0.9°F, fan speed reduces to low;
 - Rise curve
 - When T1-Tsc is higher than or equal to 1°C/1.8°F, fan speed increases to medium;
 - When T1-Tsc is higher than or equal to 1.5°C/2.7°F, fan speed increases to high;
 - When T1-Tsc is higher than or equal to 4°C/7.2°F,

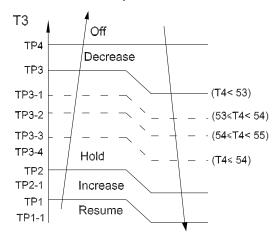


fan speed increases to turbo.

3.3.3 Outdoor Fan Control

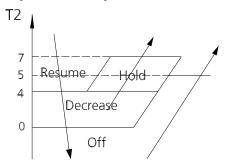
- The outdoor unit will be run at different fan speed according to T4 and compressor frequency.
- For different outdoor units, the fan speeds are different.

3.3.4 Condenser Temperature Protection



- Off: Compressor stops.
- Decrease: Decrease the running frequency to the lower level at 0.04Hz/s.
- Hold: Keep the current frequency.
- Increase: Increase the running frequency to the higher level at 1Hz/s
- Resume: No limitation for frequency.

3.3.5 Evaporator Temperature Protection



- Off: Compressor stops.
- Decrease: Decrease the running frequency to the lower level per 1 minute.
- Hold: Keep the current frequency.
- Resume: No limitation for frequency.

3.4 Auto Mode

- This mode can be selected with the remote controller and the temperature setting can be adjusted between 16°C~30°C.
- In auto mode, the machine selects cooling, heating, or fan-only mode on the basis of ΔT (ΔT =T1-TS).

ΔΤ	Running mode
ΔT>2°C(3.6°F)	Cooling
-3 °C (-5.4°F)<ΔT≤2°C(3.6°F)	Fan-only
ΔT≤-3°C(-5.4°F)	Heating*

Heating*: In auto mode, cooling only models run the emergency heating.

- Indoor fan will run at auto fan speed.
- If the machine switches mode between heating and cooling, the compressor will keep stopping for certain time and then choose mode according to ΔT.

3.5 Drying Mode

- In drying mode, AC operates the same as auto fan in cooling mode.
- All protections are activated and operate the same as they do that in cooling mode.
- Low Room Temperature Protection

If the room temperature is lower than 10°C/50°F, the compressor ceases operations and does not resume until room temperature exceeds 12°C/53.6°F.

3.6 Forced Operation Function

Press the AUTO/COOL button, the AC will run as below sequence:



• Forced cooling mode:

The compressor and outdoor fan continue to run and the indoor fan runs at breeze speed. After running for 30 minutes, the AC will switch to auto mode with a preset temperature of 24°C(76°F).

• Forced auto mode:

Forced auto mode operates the same as normal auto mode with a preset temperature of 24°C(76°F).

- The unit exits forced operation when it receives the following signals:
 - Switch off
 - Changes in:
 - mode
 - fan speed
 - sleep mode
 - Follow me



3.7 Timer Function

- The timing range is 24 hours.
- Timer On. The machine turns on automatically at the preset time.
- Timer Off. The machine turns off automatically at the preset time.
- Timer On/Off. The machine turns on automatically at the preset On Time, and then turns off automatically at the preset Off Time.
- Timer Off/On. The machine turns off automatically at the preset Off Time and then turns on automatically at the preset On Time.
- The timer does not change the unit operation mode. If the unit is off now, it does not start up immediately after the "timer off" function is set. When the setting time is reached, the timer LED switches off and the unit running mode remains unchanged.
- The timer uses relative time, not clock time

3.8 Sleep Function

- The sleep function is available in cooling, heating, or auto mode.
- The operational process for sleep mode is as follows:
 - When cooling, the temperature rises 1°C/1.8°F (to not higher than 30°C/86°F) every hour. After 2 hours, the temperature stops rising and the indoor fan is fixed at low speed.
 - When heating, the temperature decreases 1°C/1.8°F(to not lower than 16°C/60.8°F) every hour. After 2 hours, the temperature stops decreasing and the indoor fan is fixed at low speed. Anti-cold wind function takes priority.
- The operating time for sleep mode is 8 hours, after which, the unit exits this mode.
- The timer setting is available in this mode.



Troubleshooting

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Troubleshooting

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1. Safety Caution

WARNING

Be sure to turn off all power supplies or disconnect all wires to avoid electric shock. While checking indoor/outdoor PCB, please equip oneself with antistatic gloves or wrist strap to avoid damage to the board.

WARNING

Electricity remains in capacitors even when the power supply is off. Ensure the capacitors are fully discharged before troubleshooting.



2. General Troubleshooting

2.1 Error Display (Indoor Unit)

When the indoor unit encounters a recognized error, the operation lamp will flash in a corresponding series, the timer lamp may turn on or begin flashing, and an error code will be displayed. These error codes are described in the following table:

Display	Error Information	Solution
EH 00	Indoor EEPROM parameter error	TS23
EL OI	Indoor / outdoor unit communication error	TS24
EL 16	Communication malfunction between adapter board and outdoor main board	TS49
EH 03	The indoor fan speed is operating outside of the normal range(for some models)	TS25
EH 60	Indoor room temperature sensor T1 is in open circuit or short circuit	TS27
EH 61	Evaporator coil temperature sensor T2 is in open circuit or short circuit	TS27
EP OC	System lack refrigerant	TS28
ЕН ОЪ	Communication error between indoor PCB and display PCB	TS48
EH OE	Water-level alarm malfunction	TS29
EC 53	Outdoor room temperature sensor T4 is in open circuit or short circuit	TS27
EC 52	Condenser coil temperature sensor T3 is in open circuit or short circuit	TS27
EC 54	Compressor discharge temperature sensor TP is in open circuit or short circuit	TS27
EC 56	Evaporator coil outlet temperature sensor T2B is in open circuit or short circuit(Multi-zone)	TS27
EC SI	Outdoor EEPROM parameter error	TS23
EC 01	The outdoor fan speed is operating outside of the normal range(for some models)	TS25
PC 00	IPM malfunction or IGBT over-strong current protection	TS30
PC 01	Over voltage or over low voltage protection	TS31
PC 02	Top temperature protection of compressor or High temperature protection of IPM module	TS33
PC 04	Inverter compressor drive error	TS32
PC 03	High pressure protection or low pressure protection (for some models)	TS35
EC 0 d	Outdoor unit malfunction	TS35



PC OL	Low ambient temperature protection	TS42
FL 09	Mismatch between the new and old platforms	TS49

For other errors:

The display board may show a garbled code or a code undefined by the service manual. Ensure that this code is not a temperature reading.

Troubleshooting:

Test the unit using the remote control. If the unit does not respond to the remote, the indoor PCB requires replacement. If the unit responds, the display board requires replacement.

LED flash frequency:



Error Display on Two Way Communication Wired Controller

Display	Malfunction or Protection	Solution
ЕН ЬЗ	Communication error between wire controller and indoor unit	TS50

The other error codes displayed on the wire controller are same from those on the unit.



2.3 Error Display (For Outdoor Unit)

Display	Malfunction or Protection	Solution
EC SI	Outdoor EEPROM malfunction	TS23
EL 01	Indoor / outdoor units communication error	TS24
EL 16	Communication malfunction between adapter board and outdoor main board	
PC 00	IPM module protection	TS30
PC 02	Top temperature protection of compressor or High temperature protection of IPM module	TS34
PC 06	Temperature protection of compressor discharge	TS47
PC 08	Outdoor overcurrent protection	TS37
PC OR	High temperature protection of condenser	TS46
PC OF	PFC module protection	TS39
PC 10	Outdoor unit low AC voltage protection	TS31
PC#	Outdoor unit main control board DC bus high voltage protection	TS31
PC I2	Outdoor unit main control board DC bus high voltage protection /341 MCE error	TS31
PC 30	High pressure protection	TS44
PC 31	Low pressure protection	TS33
PC 40	Communication malfunction between IPM board and outdoor main board	TS36
P(4)		
PC 43		
P(44	Outdoor unit zero speed protection	TS37
PC 45		
PC 46	Compressor speed has been out of control	TS37
PC 49	Compressor overcurrent failure	TS37
EC 52	Condenser coil temperature sensor T3 is in open circuit or short circuit	TS27
EC 53	Outdoor room temperature sensor T4 is in open circuit or short circuit	TS27
EC 54	Compressor discharge temperature sensor TP is in open circuit or short circuit	TS27
ECST	Refrigerant pipe temperature sensor error	TS27
EC SC	High pressure sensor is in open circuit or short circuit	TS27
EC 71	Over current failure of outdoor DC fan motor	TS27
EC 73	Lack phase failure of outdoor DC fan motor	TS40
EC 73	Zero-speed failure of outdoor DC fan motor	TS25
EC 01	Outdoor fan speed has been out of control	TS25
PC OL	Low ambient temperature protection	TS42
FC 08	High temperature protection of IPM module	TS34
EC SS	Outdoor IPM module temperature sensor fault	TS43
PH 90	High temperature protection of evaporator	
PH 91	Low temperature protection of evaporator	



3. Outdoor Unit Point Check Function

- A check switch is included on the outdoor PCB.
- Push SW1 to check the unit's status while running. The digital display shows the following codes each time the SW1 is pushed.

Number of Presses	Display	Remark
		Displays running frequency, running state, or malfunction code
00	Normal display	Defrosting mode: "dF" or alternative displays between running frequency and "dF" (ach appears for 0.5s.)
		Forced cooling mode: the LED displays "FC" or alternative displays between running frequency and "FC" (each appears for 0.5s).
01	Indoor unit capacity demand code	Actual data*HP*10 If capacity demand code is higher than 99, light the decimal point of the high digit tube. (For example, the digital display tube show "5.0", so 5.0 multipled by 10 to become 50, then added to 100 to become 150, so actual capacity demand=150/10=15. the digital display tube show "60", so
		actual capacity demand=60/10=6.0) GA algorithm models display ""
02	The frequency after the capacity requirement adapter	If the value is higher than 99, light the decimal point of the high digit tube.
03	Room temperature (T1)	If the temp. is lower than 0°C, the digital display tube will show "0". If the temp. is higher than 70°C, the digital display tube will show "70".
04	Indoor unit evaporator temperature (T2)	If the temp. is lower than -9°C, the digital display tube will show "-9". If the temp. is higher than 70°C, the digital display
05	Condenser pipe temp.(T3)	tube will show "70". If the indoor unit is not connected, the
06	Outdoor ambient temp.(T4)	digital display tube will show: ""
07	Compressor discharge temp. (TP)	The display value is between 0~199°C. If the temp. is lower than 0°C, the digital display tube will show "0". If the temp. is higher than 99°C, light the decimal point of the high digit tube. (For example, the digital display tube show "0.5", so 0.5 multipled by 10 to become 5, then added to 100 to become 105°C.)
08	AD value of current	The display value is a hex number.
09	AD value of voltage	For example, the digital display tube shows "Cd", so C*16 ¹ +d*16 ⁰ =12*16+13=205, it means AD value is 205.
10	Indoor unit running mode code	Standby O Cooling 1 Heating 2 Fan only 2 Daying 4 Forced
11	Outdoor unit running mode code	Standby:0,Cooling:1, Heating:2, Fan only 3, Drying:4, Forced cooling:6, Defrost:7
12	EXV open angle	Actual data/4. If the value is higher than 99, light the decimal point of the high digit tube. For example, the digital display tube show "2.0",so 2.0 multipled by 10 to become 20, then added to 100 to become 120,it means the EXV open angle is 120×4=480p.)



		Bit7	Frequency limit caused by	The display value is a hex number. For			
			IGBT radiator				
		Bit6	Reserved	example, the digital			
		Bit5	Reserved	display show 2A, the			
		Bit4	Frequency limit caused by low	corresponding binary			
		Dic i	temperature of T2.(LH00)	is 101010, so Bit5=1,			
13	Frequency limit symbol	Bit3	Frequency limit caused by	Bit3=1, and Bit1=1.			
			T3.(LC01)	This means that a			
		Bit2	Frequency limit caused by	frequency limit may be			
			TP.(LC02) Frequency limit caused by	caused by T3 or the			
		Bit1	current(LC03)	current.			
			Frequency limit caused by	†			
		Bit0	voltage (LC05)				
	Outdoor unit fan speed	If it is l	higher than 99, light the decimal	point of the high digit			
		tube. (For example, the digital display tube show "2.0", so 2.0					
14		multipled by 10 to become 20, then added to 100 to become					
		120. This value is multiplied by 8, and it is the current fan					
		speed:	120*8=960				
	The average value of the	The di	nlus 60 (that is when				
	temperature values detected	The displayed value is the actual value plus 60 (that is, when the displayed value is 10, the actual value is -50). When the					
15	by the high and low pressure	displayed value is higher than 99, light the decimal point of					
	sensors in the last 10 seconds	the high digit tube. (if it displays 2.0, so 2.0 multipled by 10					
	of the compressor frequency calculation period		to become 20, then added to 100 to become 120, the actual				
	The temperature value	value i	,				
16	detected by the high and low	\	there is no mucrous consent it is a	المالية المالي			
	pressure sensor	When there is no pressure sensor, it is displayed as					
		The dis	splay value is a hex number.				
	AD value detected by the high						
17	and low pressure sensor	For example, the digital display tube shows "Cd", so					
	and fore pressure serisor	C*16 ¹ +d*16 ⁰ =12*16+13=205, it means AD value is 205. When there is no pressure sensor, it is displayed as					
	The currently running	vvnen	there is no pressure sensor, it is o	iispidyeu as			
18	communication protocol	00-99					
	version	00 33					
	1 * 0.1.51.01.1	1					



4. Engineering Mode

4.1 Information Inquiry

In order to enter to the engineering mode, and check the data of the system (data checking mode), Please make the following steps:

- Make sure that the AC is on the standby status, or working normally in a non-locked conditions.
- Press "Power" + "Fan" buttons together for 7s until the remote controller screen shows "0", and also "Auto, Cool, Dry, Heat, Battery " icons will be displayed at the same time.
- Press "Up" or "Down" button to choose different channel number that you want to check (from 0-30) on the remote controller, and then the display will show the parameter value

Channel	Code	Meaning	Remark
0		Error code	Refer to next list of error code Empty means no error
1	T1	Room temperature	Actual data, °C
2	T2	Indoor coil temperature	Actual data,°C
3	T3	Outdoor coil temperature	Actual data, °C
4	T4	Ambient temperature	Actual data, °C
5	TP	Discharge temperature	Actual data,°C
6	FT	Targeted frequency	Actual data
7	Fr	Actual frequency	Actual data
8	dL	Running current	3.2A=3
9	Ac	AC voltage	
10	Sn	Reserved	
11		Reserved	
12	Pr	Outdoor fan speed	Actual data/8
13	Lr	EXV opening steps	Actual data/8
14	lr	Indoor fan speed	Actual data/8
15	Hu	Humidity (if a sensor there)	Actual data, %
16	TT	Set temperature including compensation	Actual data, °C
17	nA	Reserved	
18	nA	Reserved	
19	Uo	Outdoor DC bus voltage	
20	оТ	Target Frequency calculated by indoor	Without limitation
21	nA		
22	nA		
23	nA		
24	nA		
25	nA	- Reserve	
26	nA	-	
27	nA		
28	nA		
29	nA	4	
30	nA		



Please note that:

- 1-The Channel number indicates a certain parameter value (Check the below table).
- 2-The indoor unit display will show the code for 2s, and then the parameter value.
- 3-In the engineering mode, the other keys or operations are invalid except for the following buttons "Power", "Up", "Down", and "Ok".
- 4-In order to exit from the engineering mode, press "Power" + "Fan" buttons together for 2s to quit Checking and back to the home screen.
- 5-The engineering mode will be exited if there is no valid input data for 60s.

Error code of engineer mode

Display	Error Information
EH 00	Indoor EEPROM malfunction
EH OR	Indoor EEPROM parameter error
Et 01	Indoor / outdoor unit communication error
EH BR	Communication error between indoor unit and external fan module
EH 30	Parameters error of indoor external fan
EH 35	Phase failure of indoor external fan
EH 36	Indoor external fan current sampling bias fault
EH 37	Indoor external fan zero speed failure
EH 38	Indoor external fan stall failure
EH 39	Out of step failure of indoor external fan
EH 3R	Low voltage protection of indoor external fan DC bus
EH 3 b	Indoor external fan DC bus voltage is too high fault
EH 3E	Indoor external fan overcurrent fault
EH 3F	Indoor external fan module protection/hardware overcurrent protection
EH 03	The indoor fan speed is operating outside of the normal range
EC SI	Outdoor unit EEPROM parameter error
EC S2	Condenser coil temperature sensor T3 is in open circuit or short circuit
EC 53	Outdoor room temperature sensor T4 is in open circuit or short circuit
EC S4	Compressor discharge temperature sensor TP is in open circuit or short circuit
EC SS	IGBT temperature sensor TH is in open circuit or short circuit
EC 0 d	Outdoor unit malfunction
EH 60	Indoor room temperature sensor T1 is in open circuit or short circuit
EH 61	Evaporator coil temperature sensor T2 is in open circuit or short circuit
EC 71	Outdoor external fan overcurrent fault
EC 75	Outdoor external fan module protection/hardware overcurrent protection
EC 13	Outdoor external fan phase failure
EC 74	Outdoor external fan current sampling bias fault
EC 73	Zero speed failure of outdoor unit DC fan
EC 07	The outdoor fan speed is operating outside of the normal range(
ЕНОЬ	Communication error between indoor PCB and display PCB
EHBS	Intelligent eye communication failure
EL OC	System lack refrigerant



EH OE	Water-level alarm malfunction
EH OF	Intelligent eye malfunction
PH 07	Communication malfunction between indoor unit and auto-lifting panel
PC 00	IPM malfunction or IGBT over-strong current protection
PC10	Over low voltage protection
PC#	Over voltage protection
PC12	DC voltage protection
PC 02	Top temperature protection of compressor or High temperature protection of IPM module
PC 40	Communication error between outdoor main chip and compressor driven chip
P(4)	Current Input detection protection
PC 42	Compressor start error
PC 43	Lack of phase (3 phase) protection
P(44	Outdoor unit zero speed protection
PC 45	341PWM error
PC 46	Compressor speed malfunction
P(49	Compressor over current protection
PC 06	Compressor discharge temperature protection
PC 08	Outdoor current protection
PH 09	Anti-cold air in heating mode
PC OF	PFC module malfunction
PC 30	System overpressure protection
PC 31	System pressure is too low protection
PC 03	Pressure protection
PC OL	Outdoor low ambient temperature protection
PH 90	Evaporator coil temperature over high protection
PH 91	Evaporator coil temperature over low Protection
PC OR	Condenser high temperature protection
PHOC	Indoor unit humidity sensor failure
마 00	Frequency limit caused by T2
PH 30	Indoor external fan current limit
PH 3!	Indoor external fan voltage limit
PC 01	Frequency limit caused by T3
PC 05	Frequency limit caused by TP
LC 05	Frequency limit caused by voltage
LC 03	Frequency limit caused by current
LC 06	Frequency limit caused by PFC
LC 30	Frequency limit caused by high pressure
PC 31	Frequency limit caused by low pressure
רסאנו	Frequency limit caused by remote controller
	Indoor units mode conflict(match with multi outdoor unit)
ΩR	No malfunction and protection



4.2 Advanced Function Setting

In order to enter to the engineering mode, and check the advanced function settings, Please make the following steps: If you want to check the current functions set value (Presetting Page):

- 1- Firstly, you need to disconnect the power supply from the unit, and wait for 1 minute.
- 2- Then connect the power supply again to the unit (the unit should be under the standby state).
- 3- Press "Power" + "Fan" buttons together for 7s until the remote controller screen shows "0", and also "Auto, Cool, Dry, Heat, Battery " icons will be displayed at the same time.
- 4- Press "Up" or "Down" button to choose different channel number that you want to check (from 0-30) on the remote controller.
- 5- Then Press "Power" button for 2s until the remote controller screen shows "Ch" .
- 6- Press "OK" button to query the current function set value while the remote controller shows "CH", and the function set value will be shown on the indoor unit display.

If you want to change the current functions set value:

- 1- Firstly, you need to disconnect the power supply from the unit, and wait for 1 minute.
- 2- Then connect the power supply again to the unit (the unit should be under the standby state).
- 3- Press "Power" + "Fan" buttons together for 7s until the remote controller screen shows "0", and also "Auto, Cool, Dry, Heat, Battery " icons will be displayed at the same time.
- 4- Press "Up" or "Down" button to choose different channel number that you want to change (from 0-30) on the remote controller.
- 5- Then Press "Power" button for 2s until the remote controller screen shows "Ch".
- 6- Press "Up" or "Down" button to choose the desired set value from the screen of the remote control.
- 7- Then Press "OK" to send the new set value to the indoor unit, and the indoor unit will display "CS", which means that the new set value is uploaded successfully.
- 8- Finally, disconnect the power supply again from the unit, and wait for 10 minutes, then connect it again.

Please note that:

- 1- The Channel number indicates a certain function, and each number will be showed on the indoor unit screen indicates the current function set value (Check the below table).
- 2- In the engineering mode, the other keys or operations are invalid except for the following buttons "Power", "Up", "Down", and "Ok".
- 3- In order to set a new set value successfully, you need to finish the steps (from 2 to 7) within 1 minute only.
- 4- The engineering mode will be exited if there is no valid input data for 60s.
- 5- In order to exit from the engineering mode, Pleas follow the following steps:
 - Press "Power" button for 2s press until the remote controller screen shows "0".
 - Then Press "Power" + "Fan" buttons together for 2s to quit the engineering mode and back to the home screen.



Channel	Function	Parameter Value Meaning	Remark
0	/	Nothing to set	
1	Auto-restart function	0 – Inactive 1 – Active	
2	Fan control when Ts reached	1- Fan stop 2 - Fan runs at lowest RPM 3 - Fan runs at setting RPM 4 - Fan stops for 4 mins and runs for 1mins 5 - Fan stops for 8 mins and runs for 1mins 6 - Fan stops for 16 mins and runs for 1mins 7 - Fan stops for 24 mins and runs for 1mins 8 - Fan stops for 48 mins and runs for 1mins 9 - Fan stops for 15 mins and runs for 2.5mins 10 - Fan stops for 30 mins and runs for 2.5mins 11 - Fan stops for 60 mins and runs for 2.5mins 12- Fan runs at setting RPM, but stop if choose auto speed 13- Fan runs at the lowest speed, but stop if choose auto speed	
3	Mode lock	CH–Cooling and heating (all modes) CC–Cooling only (Cooling + Drying + Fan only)	Remote controller will change as well.
4	Lowest setting temperature	16-24	Remote controller will change as well.
5	Highest setting temperature	25-30	Remote controller will change as well.
6	Reserved	Nothing to set	
7	/	Nothing to set	
8	/	Nothing to set	
9	/	Nothing to set	
10	/	Nothing to set	
11	Min. frequency limitation in cooling mode	10, 11, 12,, 49, 50, (Cancel)	
12	Min. frequency limitation in heating mode	10, 11, 12,, 49, 50, (Cancel)	
13	/	Nothing to set	
14	/	Nothing to set	
15	Frequency selection of outdoor forced- operation	10, 11, 12,, 249, 250, (Cancel)	
16	One button reset	rS – Reset	
17	nA	Nothing to set	
18	/	Nothing to set	
19	Max. frequency selection in cooling mode	40, 41, 42,, 83, 84, (Cancel)	



20	/	Nothing to set	Without limitation
21	Cooling temperature compensation	-3.0, -2.5, -2.0,, 3.0, 3.5, (Cancel)	
22	Heating temperature compensation	-6.5, -6.0, -5.5,, 0.5, 1.0, 1.5,, 7.0, 7.5, (Cancel)	
23	Reserved	Nothing to set	
24	Reserved	Nothing to set	
25	Reserved	Nothing to set	
26	Reserved	Nothing to set	
27	Defrosting	A0 – Common defrosting A1 – Harsh defrosting	
28	Reserved	Nothing to set	
29	Reserved	Nothing to set	
30	Reserved	Nothing to set	



5. Error Diagnosis and Troubleshooting Without Error Code



Be sure to turn off unit before any maintenance to prevent damage or injury.

5.1 Remote maintenance

SUGGESTION: When troubles occur, please check the following points with customers before field maintenance.

No.	Problem	Solution
1	Unit will not start	TS17 - TS18
2	The power switch is on but fans will not start	TS17 - TS18
3	The temperature on the display board cannot be set	TS17 - TS18
4	Unit is on but the wind is not cold(hot)	TS17 - TS18
5	Unit runs, but shortly stops	TS17 - TS18
6	The unit starts up and stops frequently	TS17 - TS18
7	Unit runs continuously but insufficient cooling(heating)	TS17 - TS18
8	Cool can not change to heat	TS17 - TS18
9	Unit is noisy	TS17 - TS18



5.2 Field maintenance

	Problem	Solution
1	Unit will not start	TS19 - TS20
2	Compressor will not start but fans run	TS19 - TS20
3	Compressor and condenser (outdoor) fan will not start	TS19 - TS20
4	Evaporator (indoor) fan will not start	TS19 - TS20
5	Condenser (Outdoor) fan will not start	TS19 - TS20
6	Unit runs, but shortly stops	TS19 - TS20
7	Compressor short-cycles due to overload	TS19 - TS20
8	High discharge pressure	TS19 - TS20
9	Low discharge pressure	TS19 - TS20
10	High suction pressure	TS19 - TS20
11	Low suction pressure	TS19 - TS20
12	Unit runs continuously but insufficient cooling	TS19 - TS20
13	Too cool	TS19 - TS20
14	Compressor is noisy	TS19 - TS20



1.Remote Maintenance	Electrical Circuit Refrigerant Circui										t			
Possible causes of trouble	ower failure	The main power tripped	oose connections	aulty transformer	The voltage too high or too low	rhe remote control is powered off	3roken the remote control	Dirty air filter	Dirty condenser fins	The setting temperature is higher/lower than the oom's(cooling/heating)	The ambient temperature is too high/low when the mode is cooling/heating	an mode	SILENCE function is activated(Optional function)	rosting and defrosting frequently
Unit will not start	☆	☆	☆	☆					0		i - 0		9	
The power switch is on but fans will not start			$\dot{\alpha}$	☆	☆									
The tempreture on the playboard cannot be setted						☆	\Rightarrow							
Unit is on but the wind is not cold(hot)										☆	☆	☆		
Unit runs, but shortly stops					A					立	☆			
The unit startup and stop frequently					\Rightarrow						☆			☆
Unit runs continuously but insufficient cooling(heating)								☆	☆	☆	☆		☆	
Cool can not change to heat														
Unit is noisy														
Test method / remedy	Test voltage	Close the power switch	Inspect connections - tighten	Change the transformer	Test voltage	Replace the battery of the remote control	Replace the remote control	Clean or replace	Clean	Adjust the setting temperature	Turn on the AC later	Adjust to cool mode	Turn off the SILENCE funciton	Turn on the AC later



1.Remote Maintenance			Ot	her	'S	
Possible causes of trouble	Heavy load condition	Loosen hold down bolts and / or screws	3ad airproof	he air inlet or outlet of either unit is blocked	nterference from cell phone towers and remote boosters	Shipping plates remain attached
Unit will not start	Ĭ	2	Ğ	È	<u>=</u>	S
The power switch is on but fans will not start					☆	
The temperature on the display board cannot be set						
Unit is on but the wind is not cold(hot)						
Unit runs, but shortly stops				٨		
The unit starts up and stops frequently Unit runs continuously but insufficient cooling(heating)	☆		☆	☆		
Cool can not change to heat	A		N	A		
Unit is noisy		☆				☆
Test method / remedy	Check heat load	Tighten bolts or screws	Close all the windows and doors	Remove the obstacles	Reconnect the power or press ON/OFF button on remote control to restart operation	Remove them



2.Field Maintenance		Refrigerant Circuit									Others												
Possible causes of trouble	Compressor stuck	Shortage of refrigerant	Restricted liquid line	Dirty air filter	Dirty evaporator coil	nsufficient air through evaporator coil	Overcharge of refrigerant	Dirty or partially blocked condenser	Air or incompressible gas in refrigerant cycle	short cycling of condensing air	High temperature condensing medium	nsufficient condensing medium	Broken compressor internal parts	nefficient compressor	Expansion valve obstructed	expansion valve or capillary tube closed completely	eaking power element on expansion valve	Poor installation of feeler bulb	Heavy load condition	oosen hold down bolts and / or screws	shipping plates remain attached	Poor choices of capacity	Contact of piping with other piping or external plate
Unit will not start	J	0,					J			0,	_	Ī		Ī							0,		
Compressor will not start but fans run Compressor and condenser (outdoor) fan will not start	☆																						
Evaporator (indoor) fan will not start																							
Condenser (Outdoor) fan will not start																							
Unit runs, but shortly stops		☆	☆				☆	☆								☆	☆						
Compressor short-cycles due to overload		☆					☆	☆															
High discharge pressure							☆	☆	☆	☆	☆	☆											
Low discharge pressure		\Leftrightarrow												☆									
High suction pressure							☆							☆				☆	☆				
Low suction pressure		☆	☆	☆	☆	☆									☆	☆	$\stackrel{\wedge}{\sim}$						
Unit runs continuously but insufficient cooling		$\stackrel{\wedge}{\simeq}$	☆	☆	☆	☆		☆	$\stackrel{\wedge}{\simeq}$	☆				$\stackrel{\wedge}{\simeq}$					☆			$\stackrel{\wedge}{\simeq}$	
Too cool																							
Compressor is noisy							$\stackrel{\wedge}{\simeq}$						☆							☆	$\stackrel{\wedge}{\sim}$		$\stackrel{\wedge}{\simeq}$
Test method / remedy	Replace the compressor	Leak test	Replace restricted part	Clean or replace	Clean coil	Check fan	Change charged refrigerant volume	Clean condenser or remove obstacle	Purge, evacuate and recharge	Remove obstruction to air flow	Remove obstruction in air or water flow	Remove obstruction in air or water flow	Replace compressor	Test compressor efficiency	Replace valve	Replace valve	Replace valve	Fix feeler bulb	Check heat load	Tighten bolts or screws	Remove them	Choose AC of lager capacity or add the number of AC	Rectify piping so as not to contact each other or with external plate



2.Field Maintenance					E	le	ctri	cal	Cir	cui	t				
Possible causes of trouble	Power failure	Blown fuse or varistor	Loose connections	Shorted or broken wires	Safety device opens	Faulty thermostat / room temperature sensor	Wrong setting place of temperature sensor	Faulty transformer	Shorted or open capacitor	Faulty magnetic contactor for compressor	Faulty magnetic contactor for fan	Low voltage	Faulty stepping motor	Shorted or grounded compressor	Shorted or grounded fan motor
Unit will not start	☆	☆	☆	☆	☆			☆							
Compressor will not start but fans run				☆		☆			☆	☆				☆	
Compressor and condenser (outdoor) fan will not start				☆		☆				☆					
Evaporator (indoor) fan will not start				☆					☆		☆				☆
Condenser (Outdoor) fan will not start				☆		☆			☆		☆				☆
Unit runs, but shortly stops										☆		☆			
Compressor short-cycles due to overload										☆		☆			
High discharge pressure															
Low discharge pressure															
High suction pressure															
Low suction pressure															
Unit runs continuously but insufficient cooling															
Too cool						☆	$\stackrel{\wedge}{\simeq}$								
Compressor is noisy															
Test method / remedy	Test voltage	Inspect fuse type & size	Inspect connections - tighten	Test circuits with tester	Test continuity of safety device	Test continuity of thermostat / sensor & wiring	Place the temperature sensor at the central of the air inlet arille	Check control circuit with tester	Check capacitor with tester	Test continuity of coil & contacts	Test continuity of coil & contacts	Test voltage	Replace the stepping motor	Check resistance with multimeter	Check resistance with multimeter



6. Quick Maintenance by Error Code

If you do not have the time to test which specific parts are faulty, you can directly change the required parts according the error code.

You can find the parts to replace by error code in the following table.

Part requiring	Error Code														
replacement	EH 00	EL 01	EH 03	EH 60	EH 61	EL OC	EH OE	EC 53							
Indoor PCB	√	√	√	√	√	√	√	х							
Outdoor PCB	х	√	х	х	х	х	х	√							
Indoor fan motor	х	х	√	х	х	х	х	х							
T1 sensor	х	х	х	√	х	х	х	х							
T2 Sensor	х	х	х	х	✓	х	х	х							
T2B Sensor	х	х	х	х	х	х	х	х							
T2A Sensor	х	х	х	х	х	х	х	х							
T3 Sensor	х	х	х	х	х	х	х	х							
T4 Sensor	х	х	х	х	х	х	х	√							
Reactor	х	√	х	х	х	х	х	х							
Compressor	х	х	х	х	х	х	х	х							
Additional refrigerant	х	х	х	х	х	√	х	х							
Water-level switch	х	х	х	х	х	х	√	х							
Water pump	х	х	х	х	х	х	√	х							

Part requiring replacement	EC S4	EC SI	EC SC	EC S2	EC 07/71 /72/73	PC 00	PC OI	PC 02	PC 04	PC 03
Indoor PCB	х	х	х	x	х	х	х	х	х	х
Outdoor PCB	√	✓	✓	✓	✓	✓	√	✓	√	✓
Outdoor fan motor	х	х	х	х	√	√	х	√	√	х
T3 Sensor	х	х	х	√	х	х	х	х	х	х
TP Sensor	√	х	х	х	х	х	х	х	х	х
Pressure sensor	х	х	√	х	х	х	х	х	х	х
Reactor	х	х	х	х	х	х	√	х	х	х
Compressor	х	х	х	х	х	√	х	х	√	х
IPM module board	х	х	х	х	х	√	√	√	√	х
Low pressure protector	х	х	х	х	х	х	х	х	х	√
Additional refrigerant	х	х	х	х	х	х	х	х	х	√



Part requiring replacement	EL 16	EH Ob	PC 06	PC 08/44/49	PCOR	PCOF
Indoor PCB	х	✓	х	х	х	х
Outdoor PCB	✓	х	✓	✓	✓	√
Outdoor fan motor	х	х	х	✓	√	х
T3 Sensor	х	х	х	х	✓	х
TP Sensor	х	х	✓	х	х	х
Pressure sensor	х	х	х	х	х	х
Reactor	х	х	х	✓	х	✓
Compressor	х	х	х	х	х	х
IPM module board	х	х	х	✓	х	х
Data adapter board	√	✓	х	х	х	х
High pressure valve assy	х	х	√	х	х	х
High pressure protector	х	х	х	х	х	х
Low pressure protector	х	х	х	х	х	х
Additional refrigerant	х	х	√	х	√	х

Part requiring replacement	PC 4I	PC 43	PC 10/11/12	PC 30	PC 31	PC 40
Indoor PCB	х	x	х	х	х	х
Outdoor PCB	✓	✓	√	✓	√	✓
Outdoor fan motor	х	х	х	√	х	х
T3 Sensor	х	х	х	х	х	х
TP Sensor	х	х	х	х	х	х
Pressure sensor	х	х	х	х	х	х
Reactor	х	х	√	х	х	х
Compressor	х	✓	х	х	х	х
IPM module board	х	х	√	х	х	✓
Data adapter board	х	х	х	х	х	х
High pressure valve assy	х	х	х	х	х	х
High pressure protector	х	х	х	✓	х	х
Low pressure protector	х	х	х	х	✓	х
Additional refrigerant	х	х	х	х	√	х
Electric control box	х	х	х	х	х	✓



7. Troubleshooting by Error Code

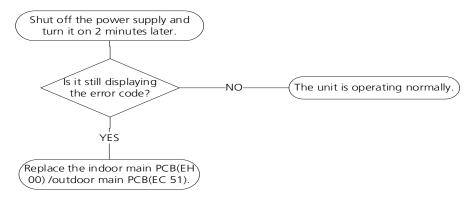
7.1 EH 00 / EC 51 (EEPROM Parameter Error Diagnosis and Solution)

Description: Indoor or outdoor PCB main chip does not receive feedback from EEPROM chip.

Recommended parts to prepare:

- Indoor PCB
- Outdoor PCB

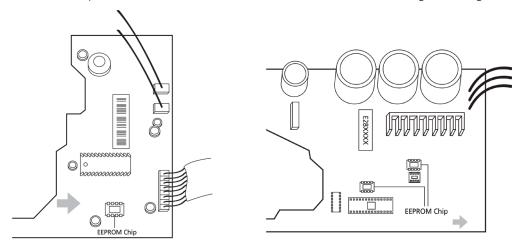
Troubleshooting and repair:



Remarks:

EEPROM: A read-only memory whose contents can be erased and reprogrammed using a pulsed voltage.

The location of the EEPROM chip on the indoor and outdoor PCB is shown in the following two images:



This pictures are only for reference, actual appearance may vary.

Troubleshooting and repair of compressor driven chip EEPROM parameter error and communication error between outdoor main chip and compressor driven chip are same as EC 51.

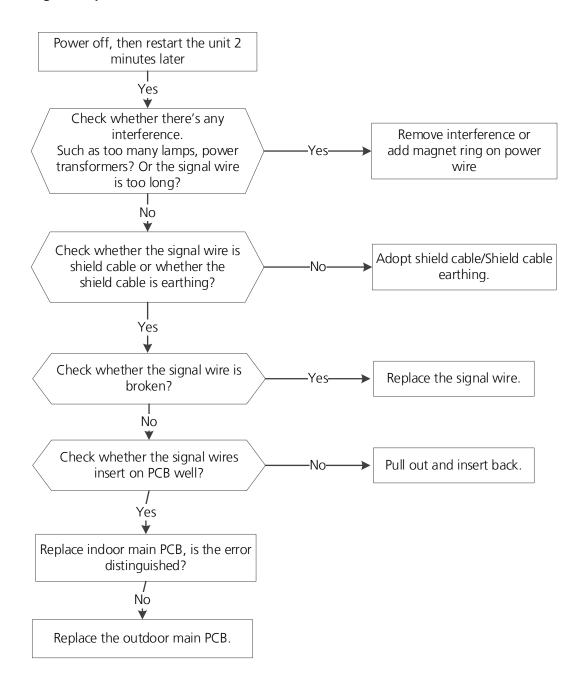
7.2 EL 01 (Indoor and Outdoor Unit Communication Error Diagnosis and Solution)

Description: Indoor unit can not communicate with outdoor unit

Recommended parts to prepare:

- Signal wires
- Magnet ring
- Indoor PCB
- Outdoor PCB

Troubleshooting and repair:





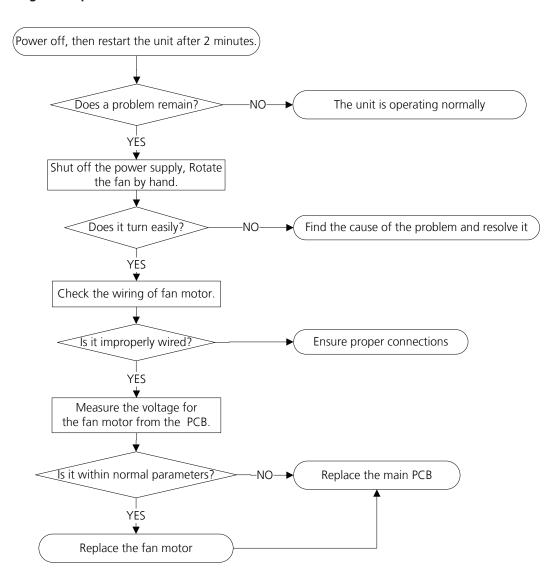
7.3 EH 03 / EC 07 (Fan Speed Is Operating Outside of Normal Range)/EC 71(Over Current Failure of Outdoor DC Fan Motor)/ EC73(Zero-speed failure of outdoor DC fan motor) Diagnosis and Solution

Description: When indoor / outdoor fan speed keeps too low or too high for a certain time, the unit ceases operation and the LED displays the failure.

Recommended parts to prepare:

- Connection wires
- Fan assembly
- Fan motor
- PCB

Troubleshooting and repair:

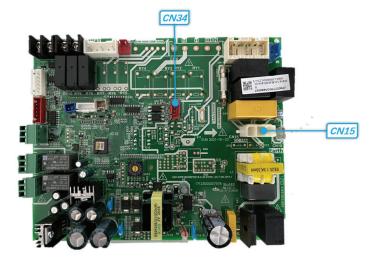




Index:

1. Indoor DC Fan Motor(control chip is in fan motor)

Power on and when the unit is in standby, measure the voltage of pin1&pin2 of CN15, pin3 of CN34 in fan motor connector. If the value of the voltage is not in the range showing in below table, the PCB must has problems and need to be replaced.



CN34

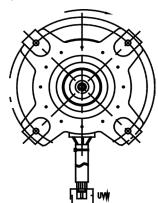
NO.	Color	Signal	Voltage
1	/	/	
2	Black	GND	
3	Orange	PWM	5-12VDC
4	Blue	FG	0-12VDC

CN15

NO.	Color	Signal	Voltage
1	Yellow		208/230VAC
2	Black		208/230VAC
3	Yellow-Green	GND	

2. Outdoor DC Fan Motor (control chip is in outdoor PCB)

Release the UVW connector. Measure the resistance of U-V, U-W, V-W. If the resistance is not equal to each other, the fan motor must has problems and need to be replaced. otherwise the PCB must has problems and need to be replaced.





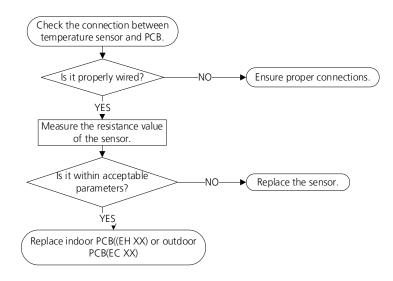
7.4 EH 60/EH 61/ EC 53/EC 52/EC 54/EC 56/EC 57/EC 50/EC 5C (Open Circuit or Short Circuit of Temperature Sensor Diagnosis and Solution)

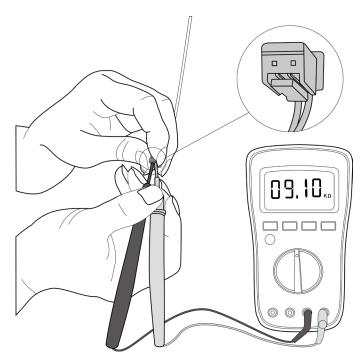
Description: If the sampling voltage is lower than 0.06V or higher than 4.94V, the LED displays the failure.

Recommended parts to prepare:

- Connection wires
- Sensors
- PCB

Troubleshooting and repair:





This picture and the value are only for reference, actual appearance and value may vary



7.5 EL 0C (System lack refrigerant Diagnosis and Solution)

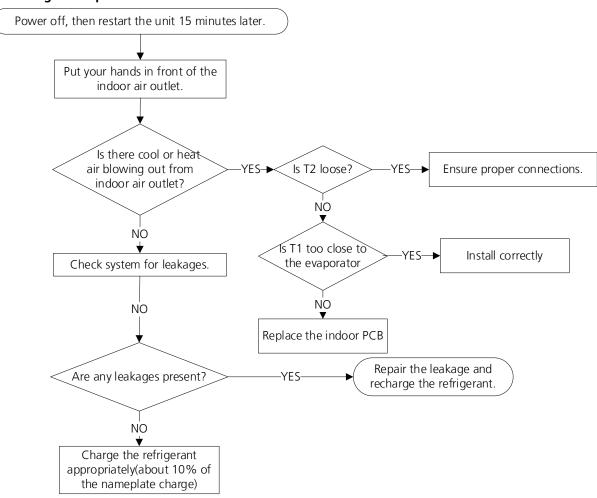
Description:

Judging the abnormality of the refrigeration system according to the number of compressor stops and the changes in operating parameters caused by excessive exhaust temperature.

Recommended parts to prepare:

- Indoor PCB
- Additional refrigerant

Troubleshooting and repair:



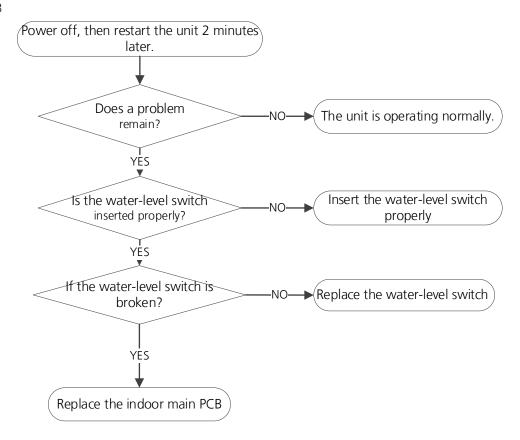


7.6 EH 0E(Water-Level Alarm Malfunction Diagnosis and Solution)

Description: If the sampling voltage is not 5V, the LED displays the failure code.

Recommended parts to prepare:

- Connection wires
- Water-level switch
- Indoor PCB





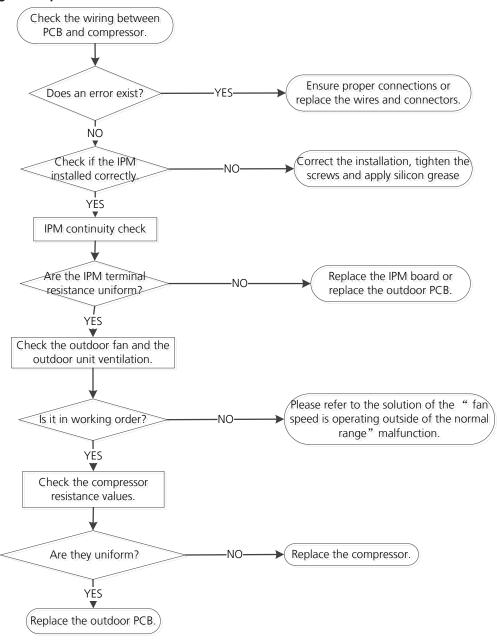
7.7 PC 00(IPM malfunction or IGBT over-strong current protection Diagnosis and Solution)

Description: When the voltage signal the IPM sends to the compressor drive chip is abnormal, the display LED shows "PC 00" and the AC turn off.

Recommended parts to prepare:

- Connection wires
- IPM module board
- Outdoor fan assembly
- Compressor
- Outdoor PCB

Troubleshooting and repair:





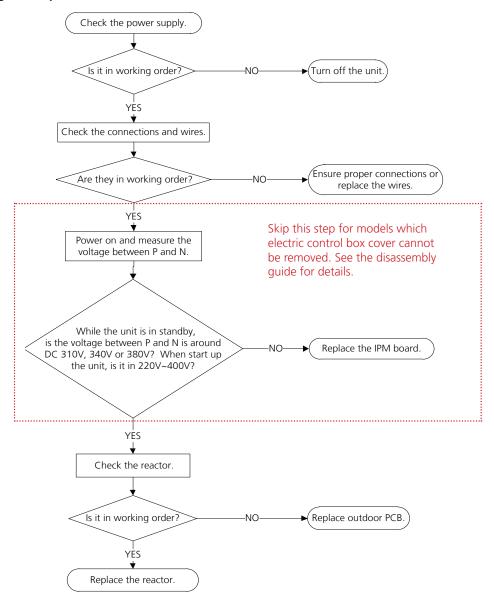
7.8 PC 01(Over voltage or too low voltage protection)/PC 10(Outdoor unit low AC voltage protection)/PC 11(Outdoor unit main control board DC bus high voltage protection)/PC 12(Outdoor unit main control board DC bus high voltage protection /341 MCE error) Diagnosis and Solution

Description: Abnormal increases or decreases in voltage are detected by checking the specified voltage detection circuit.

Recommended parts to prepare:

- Power supply wires
- IPM module board
- PCB
- Reactor

Troubleshooting and repair:



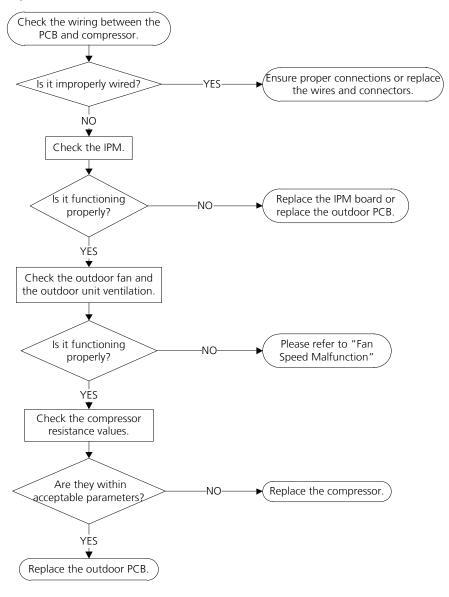


7.9 PC 04(Inverter compressor drive error Diagnosis and Solution)

Description: An abnormal inverter compressor drive is detected by a special detection circuit, including communication signal detection, voltage detection, compressor rotation speed signal detection and so on.

Recommended parts to prepare:

- Connection wires
- IPM module board
- Outdoor fan assembly
- Compressor
- Outdoor PCB



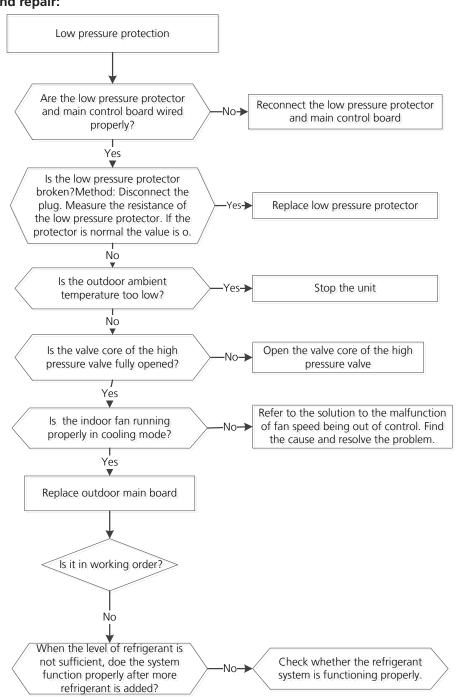


7.10 PC 03/PC 31(Low Pressure Protection Diagnosis and Solution)

Description: If the sampling voltage is not 5V, the LED displays a failure code.

Recommended parts to prepare:

- Connection wires
- Low pressure protector
- Indoor fan assembly
- Outdoor PCB



7.11 PC 02/LC 06(Top temperature protection of compressor or High temperature protection of IPM module diagnosis and solution)

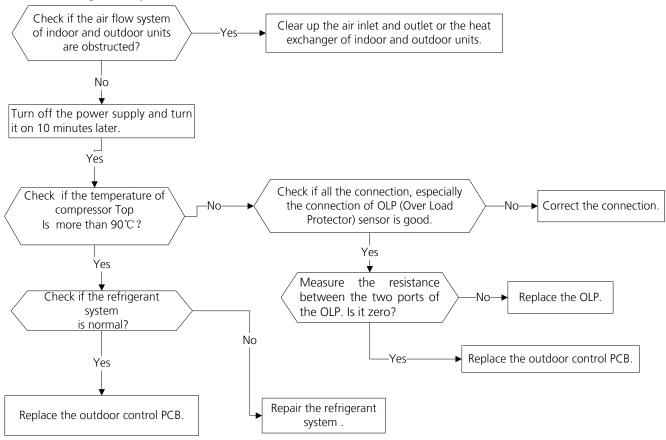
Description: For some models with overload protector, If the sampling voltage is not 5V, the LED will display the failure.

If the temperature of IPM module is higher than a certain value, the LED displays the failure code.

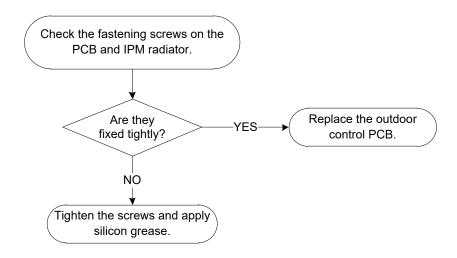
Models without overload protector should be diagnosed according to the second flowchart.

Recommended parts to prepare:

- Connection wires
- Outdoor PCB
- IPM module board
- High pressure protector
- System blockages





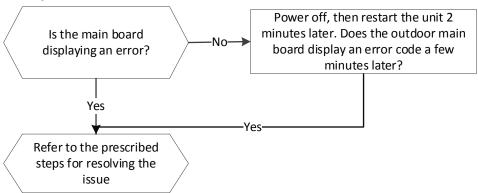


7.12 EC 0d(Outdoor unit malfunction Diagnosis and Solution)

Description: The indoor unit detect the outdoor unit is error.

Recommended parts to prepare:

• Outdoor unit



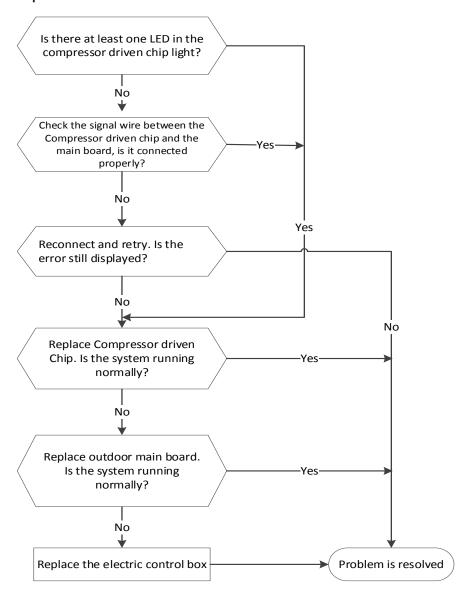


7.13 PC 40(Communication error between outdoor main PCB and IPM board diagnosis and solution)

Description: The main PCB cannot detect the IPM board.

Recommended parts to prepare:

- Connection wires
- IPM board
- Outdoor main PCB
- Electric control box





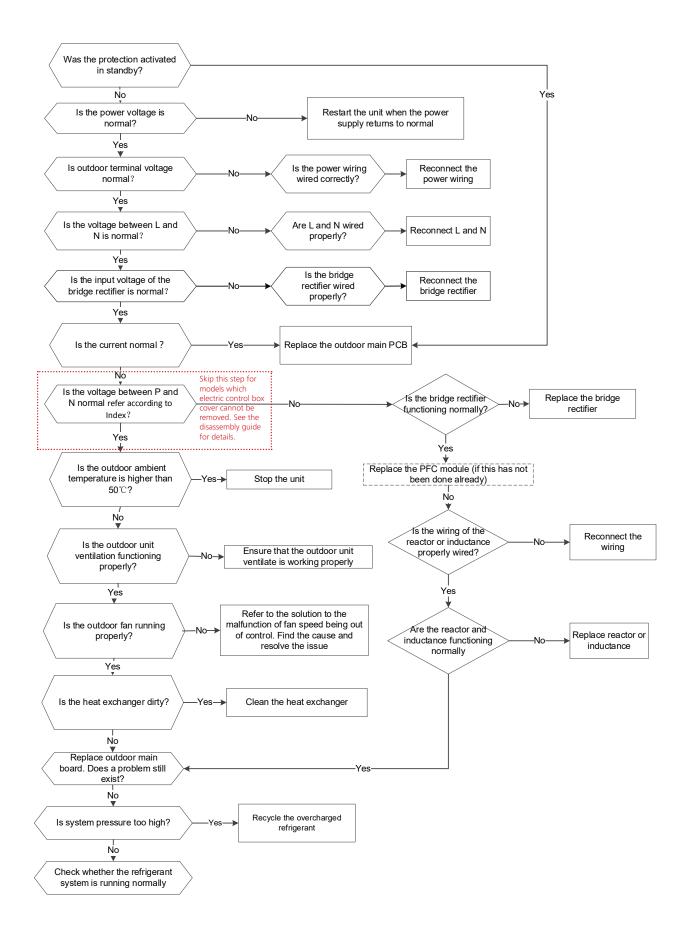
7.14 PC 08(Current overload protection)/PC 44(Outdoor unit zero speed protection)/ PC 46(Compressor speed has been out of control)/PC 49(Compressor overcurrent failure) diagnosis and solution

Description: An abnormal current rise is detected by checking the specified current detection circuit.

Recommended parts to prepare:

- Connection wires
- Rectifier
- PFC circuit or reactor
- Blocked refrigeration piping system
- Pressure switch
- Outdoor fan
- IPM module board
- Outdoor PCB







7.15 PC 0F(PFC module protection diagnosis and solution)

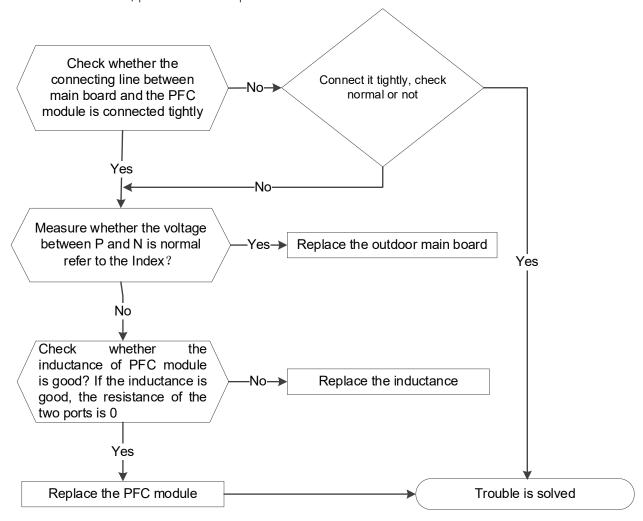
Description: When the voltage signal that IPM send to compressor drive chip is abnormal, the LED displays the failure code and the AC turns off.

Recommended parts to prepare:

- Connection wires
- Inductance
- Outdoor main PCB
- PFC module

Troubleshooting and repair:

At first test the resistance between every two ports of U, V, W of IPM and P, N. If any result of them is 0 or close to 0, the IPM is defective. Otherwise, please follow the procedure below:



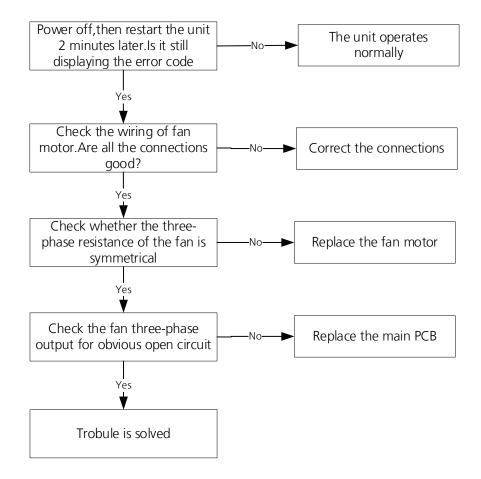


7.16 EC 72 (Lack phase failure of outdoor DC fan motor diagnosis and solution)

Description: When the three-phase sampling current of the DC motor is abnormal, especially when the current of one or more phases is always small and almost 0, the LED displays the failure code.

Recommended parts to prepare:

- Connection wire
- Fan motor
- Outdoor PCB



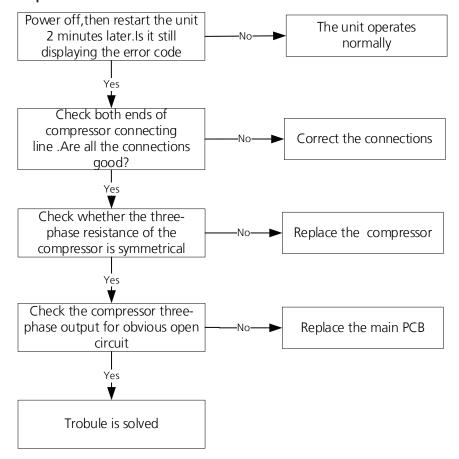


7.17 PC 43 (Outdoor compressor lack phase protection diagnosis and solution)

Description: When the three-phase sampling current of the compressor is abnormal, especially when the current of one or more phases is always small and almost 0, the LED displays the failure code

Recommended parts to prepare:

- Connection wire
- Compressor
- Outdoor PCB





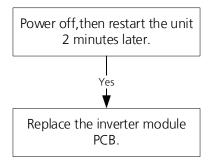
7.18 PC 45 (Outdoor unit IR chip drive failure) diagnosis and solution

Description: When the IR chip detects its own parameter error, the LED displays the failure code when power on.

Recommended parts to prepare:

• Inverter module PCB.

Troubleshooting and repair:



7.19 PC 0L (Low ambient temperature protection)

Description: It is a protection function. When compressor is off, outdoor ambient temperature(T4) is lower than -35°C. for 10s, the AC will stop and display the failure code.

When compressor is on, outdoor ambient temperature(T4) is lower than -40°C.for 10s, the AC will stop and display the failure code.

When outdoor ambient temperature(T4) is no lower than -32°C.for 10s, the unit will exit protection.



7.20 EC55 (Outdoor IPM module temperature sensor fault) diagnosis and solution

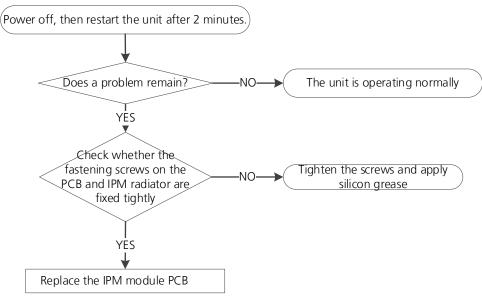
Description: If the sampling voltage is 0V or 5V, the LED displays the failure code.

Recommended parts to prepare:

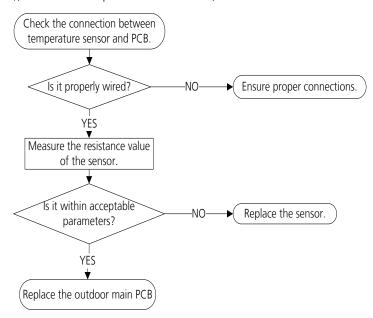
- IPM module PCB
- Connection wires
- Sensors
- Outdoor main PCB

Troubleshooting and repair:

If the radiator has no sensor, follow the steps below to resolve,



If the radiator has a sensor(TH), follow the steps below to resolve,





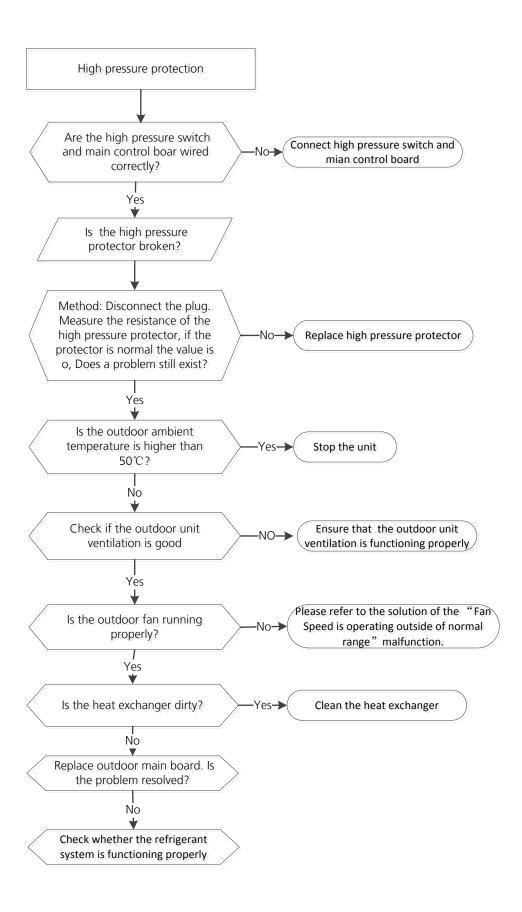
7.21 PC 03/PC 30 (High pressure protection diagnosis and solution)

Description: Outdoor pressure switch cut off the system because high pressure is higher than 4.4 MPa

Recommended parts to prepare:

- Connection wires
- Pressure switch
- Outdoor fan
- Outdoor main PCB



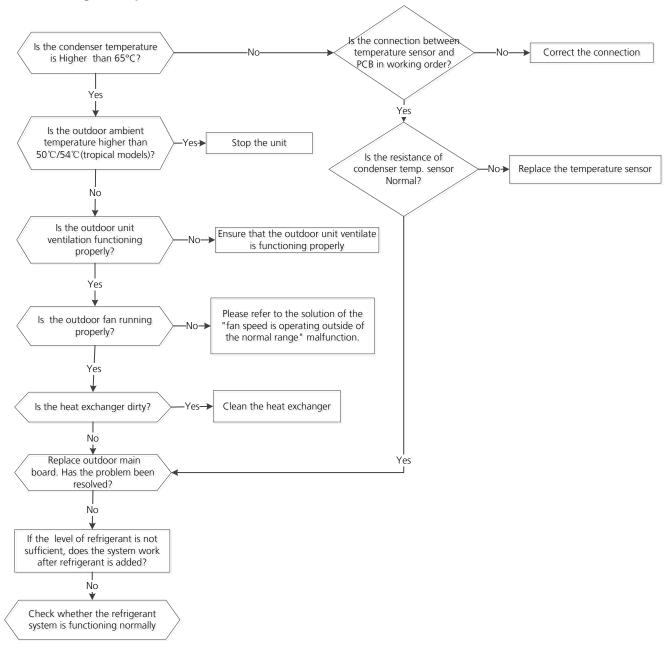


7.22 PC 0A (High temperature protection of condenser diagnosis and solution)

Description: When the outdoor pipe temperature is more than 65°C, the unit stops. It starts again only when the outdoor pipe temperature is less than 52°C.

Recommended parts to prepare:

- Connection wires
- Condenser temperature sensor
- Outdoor fan
- Outdoor main PCB
- Refrigerant





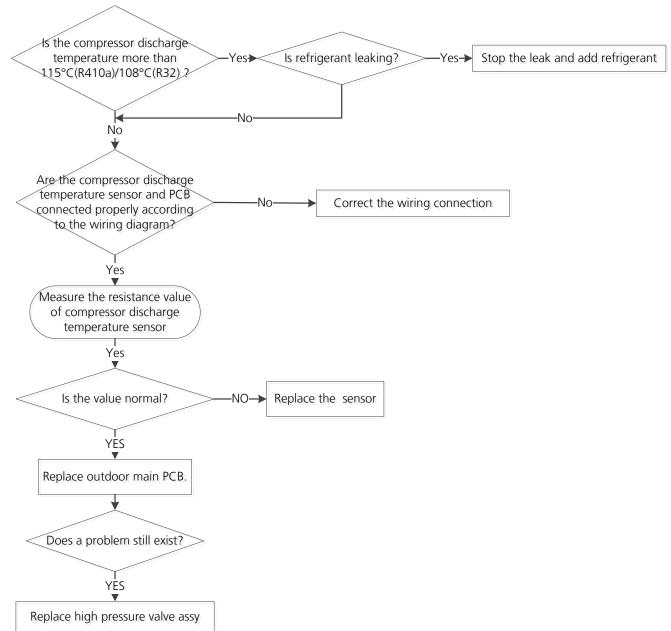
7.23 PC 06 (Discharge temperature protection of compressor diagnosis and solution)

Description: If the compressor discharge temperature exceeds a certain level for nine seconds, the compressor ceases operation, the LED displays the failure code

Recommended parts to prepare:

- Connection wires
- Discharge temperature sensor
- Additional refrigerant
- Outdoor main PCB

Troubleshooting and repair:



Note: For certain models, outdoor unit uses combination sensor, T3,T4 and TP are the same of sensor. This picture and the value are only for reference, actual appearance and value may vary.

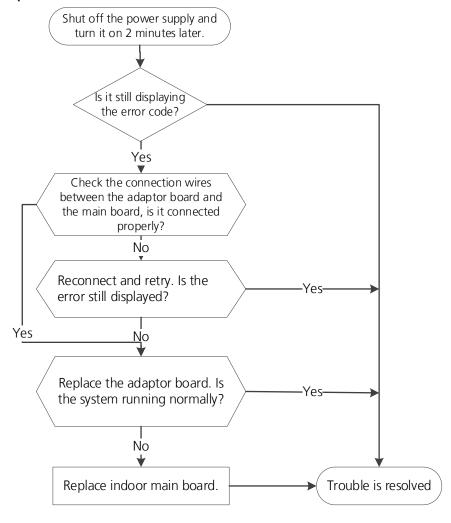


7.24 EH 0b(Communication error between indoor two chips diagnosis and solution)

Description: Indoor PCB main chip does not receive feedback from another chip.

Recommended parts to prepare:

- Indoor main board
- Adapter board





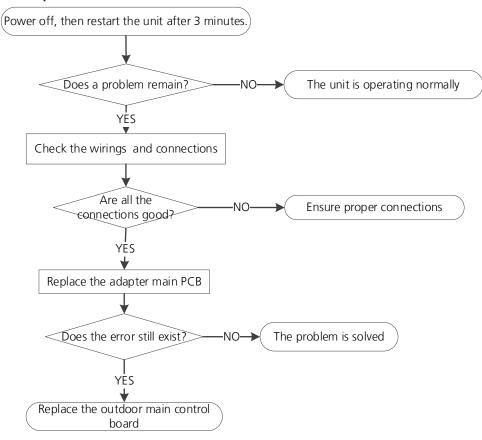
7.25 EL 16(Communication malfunction between adapter board and outdoor main board diagnosis and solution)

Description: The adapter PCB cannot detect the main control board.

Recommended parts to prepare:

- Connection wires
- Adapter board
- Outdoor main PCB

Troubleshooting and repair:



7.26 FL 09 (Indoor and outdoor mismatch malfunction diagnosis and solution)

Description: Indoor and outdoor units are mismatched, the LED displays this code. Please replace the matching indoor or outdoor unit.



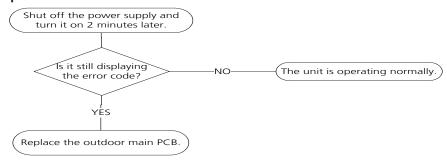
7.27 PC 41(Outdoor compressor current sampling circuit failure diagnosis and solution)

Description: Three-phase sampling offset voltage error, the static bias voltage is normally 2.5V

Recommended parts to prepare:

Outdoor main PCB

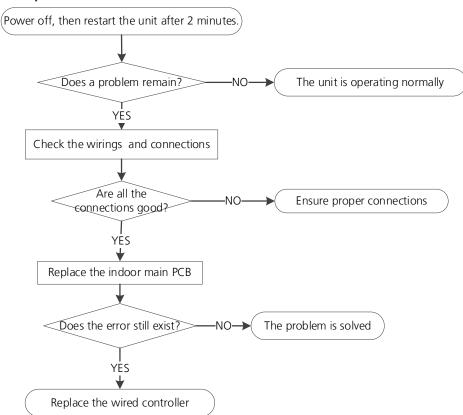
Troubleshooting and repair:



7.28 EH b3 (Communication error between wired controller and indoor unit Diagnosis and Solution

Description: If Indoor PCB does not receive feedback from wired controller, the error displays on the wired controller **Recommended parts to prepare**:

- Connection wires
- Indoor PCB
- Wired controller





8. Check Procedures

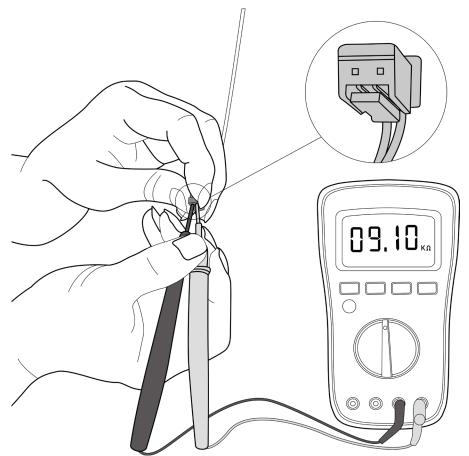
8.1 Temperature Sensor Check



WARNING

Be sure to turn off all power supplies or disconnect all wires to avoid electric shock. Operate after compressor and coil have returned to normal temperature in case of injury.

- 1. Disconnect temperature sensor from PCB (Refer to Chapter 5. Indoor Disassembly and Chapter 6. Outdoor Disassembly).
- 2. Measure the resistance value of the sensor using a multi-meter.
- 3. Check corresponding temperature sensor resistance value table (Refer to Chapter 8. Appendix).

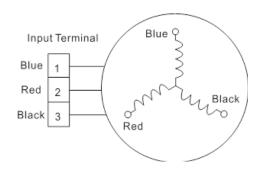


Note: The picture and the value are only for reference, actual condition and specific value may vary.

8.2 Compressor Check

- 1. Disconnect the compressor power cord from outdoor PCB (Refer to Chapter 6. Outdoor Unit Disassembly)).
- 2. Measure the resistance value of each winding using a multi-meter.
- 3. Check the resistance value of each winding in the following table.





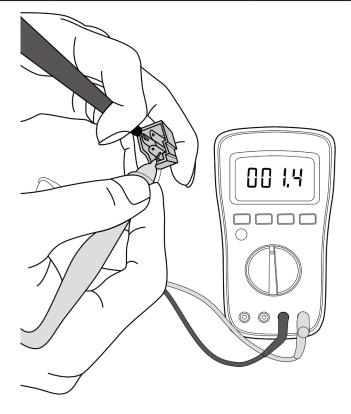
Resistance Value	ASM135D23UFZ	ATM115D43UFZ2	ASN98D22UFZ	ATQ360D1UMU
Blue-Red				
Blue-Black	1.75Ω	1.87Ω	1.57Ω	0.37Ω
Red-Black				

Resistance Value	ATF235D22UMT ATF250D22UMT KTF250D22UMT	ATF310D43UMT	KSK103D33UEZ3	ASM98D32UFZ	
Blue-Red					
Blue-Black	0.75Ω	0.65Ω	2.13Ω	2.2Ω	
Red-Black					

Resistance Value	Resistance Value ASN140D21UFZ KSN140D21UFZ		KTM240D57UMT	KSN140D58UFZ		
Blue-Red						
Blue-Black	1.28Ω	1.99Ω	0.62Ω	1.86Ω		
Red-Black						



Resistance Value	KTF310D43UMT	ATN150D30UFZA KTM240D43UKT	KTM240D46UKT2	KTQ420D1UMU ATQ420D1SN5A1 EAPQ420D1UMUA EAPQ440D1UMUA		
Blue-Red						
Blue-Black	0.65Ω	1.03Ω	1.04Ω	0.37Ω		
Red-Black						



Note: The picture and the value are only for reference, actual condition and specific value may vary.

8.3 IPM Continuity Check



WARNING

Electricity remains in capacitors even when the power supply is off. Ensure the capacitors are fully discharged before troubleshooting.

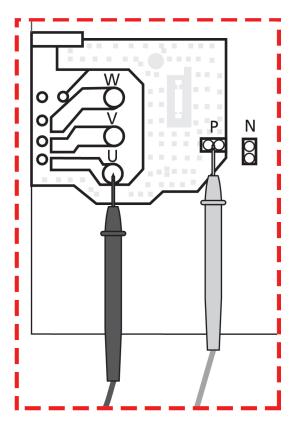
- 1. Turn off outdoor unit and disconnect power supply.
- 2. Discharge electrolytic capacitors and ensure all energy-storage unit has been discharged.
- 3. Disassemble outdoor PCB or disassemble IPM board.
- 4. Measure the resistance value between P and U(V, W, N); U(V, W) and N.



Digital	tester	Resistance value	Digita	l tester	Resistance value
(+)Red	(-)Black		(+)Red	(-)Black	
	N	∞	U		∞
P	U		V	N	
r	V	(Several M Ω)	W] IN	(Several M Ω)
	W		-		

Or test the conductivity of IPM with diode mode.

Needle-ty	pe Tester	Normal Value	Needle-ty	pe Tester	Normal Value	
Red	Black	Normal Value	Red	Black	Normal value	
	U			U		
P	V	Open-circuit	N	V	0.3-0.5V	
	W			W		
Needle-ty	pe Tester	Normal Value	Needle-ty	Normal Value		
Black	Red	Normal value	Black	Red	Normal value	
	U			U		
P	V	0.3-0.5V	N	V	Open-circuit	
	W			W		



Note: The picture and the value are only for reference, actual condition and specific value may vary.



8.4 Normal voltage of P and N

	208-240V(1-phase)	
In standby		
	around 310VDC	
In operation		
	>310VDC	

8.5 4-way Valve Check

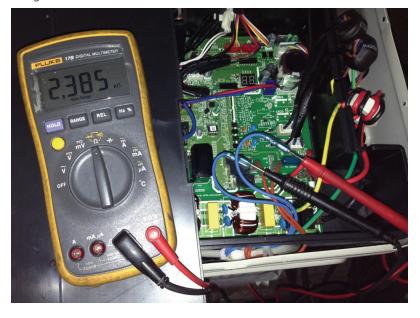
1. Power on, use a digital tester to measure the voltage, when the unit operates in cooling, it is 0V. When the unit operates in heating, it is about 230VAC.

If the value of the voltage is not in the range, the PCB must have problems and need to be replaced.





2 Turn off the power, use a digital tester to measure the resistance. The value should be $1.8\sim2.5~\text{K}\Omega$.





8.6 EEV Check



Electricity remains in capacitors even when the power supply is off. Ensure the capacitors are fully discharged before troubleshooting.

- 1. Disconnect the connector from outdoor PCB.
- 2. Measure the resistance value of each winding using a multi-meter.
- 3. Check the resistance value of each winding in the following table.



Color of lead winding	Normal Value
Red- Blue	
Red - Yellow	About 50Ω
Brown-Orange	About 5052
Brown-White	



Appendix

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i)	Temperature Sensor Resistance Value Table for T1, T2, T3, and T4 (°C – K)	.2



i) Temperature Sensor Resistance Value Table for T1,T2,T3 and T4 (°C – K)

°C	°F	K Ohm	°C	°F	K Ohm	°C	°F	K Ohm	°C	°F	K Ohm
-20	-4	115.266	20	68	12.6431	60	140	2.35774	100	212	0.62973
-19	-2	108.146	21	70	12.0561	61	142	2.27249	101	214	0.61148
-18	0	101.517	22	72	11.5	62	144	2.19073	.19073 102 216		0.59386
-17	1	96.3423	23	73	10.9731	63	145	2.11241	103	217	0.57683
-16	3	89.5865	24	75	10.4736	64	147	2.03732	104	219	0.56038
-15	5	84.219	25	77	10	65	149	1.96532	105	221	0.54448
-14	7	79.311	26	79	9.55074	66	151	1.89627	106	223	0.52912
-13	9	74.536	27	81	9.12445	67	153	1.83003	107	225	0.51426
-12	10	70.1698	28	82	8.71983	68	154	1.76647	108	226	0.49989
-11	12	66.0898	29	84	8.33566	69	156	1.70547	109	228	0.486
-10	14	62.2756	30	86	7.97078	70	158	1.64691	110	230	0.47256
-9	16	58.7079	31	88	7.62411	71	160	1.59068	111	232	0.45957
-8	18	56.3694	32	90	7.29464	72	162	1.53668	112	234	0.44699
-7	19	52.2438	33	91	6.98142	73	163	1.48481	113	235	0.43482
-6	21	49.3161	34	93	6.68355	74	165	1.43498	114	237	0.42304
-5	23	46.5725	35	95	6.40021	75	167	1.38703	115	239	0.41164
-4	25	44	36	97	6.13059	76	169	1.34105	116	241	0.4006
-3	27	41.5878	37	99	5.87359	77	171	1.29078	117	243	0.38991
-2	28	39.8239	38	100	5.62961	78	172	1.25423	118	244	0.37956
-1	30	37.1988	39	102	5.39689	79	174	1.2133	119	246	0.36954
0	32	35.2024	40	104	5.17519	80	176	1.17393	120	248	0.35982
1	34	33.3269	41	106	4.96392	81	178	1.13604	121	250	0.35042
2	36	31.5635	42	108	4.76253	82	180	1.09958	122	252	0.3413
3	37	29.9058	43	109	4.5705	83	181	1.06448	123	253	0.33246
4	39	28.3459	44	111	4.38736	84	183	1.03069	124	255	0.3239
5	41	26.8778	45	113	4.21263	85	185	0.99815	125	257	0.31559
6	43	25.4954	46	115	4.04589	86	187	0.96681	126	259	0.30754
7	45	24.1932	47	117	3.88673	87	189	0.93662	127	261	0.29974
8	46	22.5662	48	118	3.73476	88	190	0.90753	128	262	0.29216
9	48	21.8094	49	120	3.58962	89	192	0.8795	129	264	0.28482
10	50	20.7184	50	122	3.45097	90	194	0.85248	130	266	0.2777
11	52	19.6891	51	124	3.31847	91	196	0.82643	131	268	0.27078
12	54	18.7177	52	126	3.19183	92	198	0.80132	132	270	0.26408
13	55	17.8005	53	127	3.07075	93	199	0.77709	133	271	0.25757
14	57	16.9341	54	129	2.95896	94	201	0.75373	134	273	0.25125
15	59	16.1156	55	131	2.84421	95	203	0.73119	135	275	0.24512
16	61	15.3418	56	133	2.73823	96	205	0.70944	136	277	0.23916
17	63	14.6181	57	135	2.63682	97	207	0.68844	137	279	0.23338
18	64	13.918	58	136	2.53973	98	208	0.66818	138	280	0.22776
19	66	13.2631	59	138	2.44677	99	210	0.64862	139	282	0.22231



ii) Temperature Sensor Resistance Value Table for TP(for some units) (°C --K)

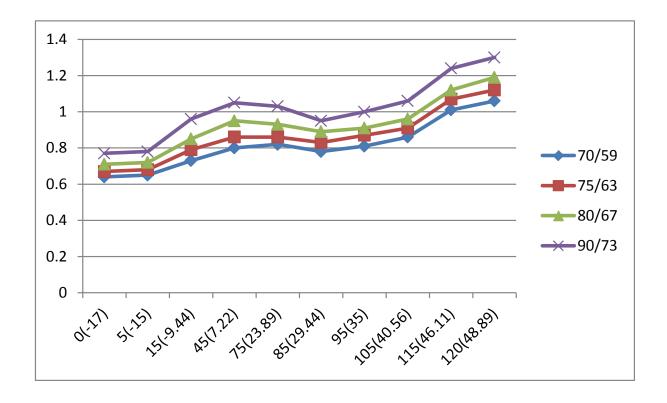
°C	°F	K Ohm	°C	°F	K Ohm	°C	°F	K Ohm	°C	°F	K Ohm
°C	°F	K Ohm	°C	°F	K Ohm	°C	°F	K Ohm	°C	°F	K Ohm
-20	-4	542.7	20	68	68.66	60	140	13.59	100	212	3.702
-19	-2	511.9	21	70	65.62	61	142	13.11	101	214	3.595
-18	0	483	22	72	62.73	62	144	12.65	102	216	3.492
-17	1	455.9	23	73	59.98	63	145	12.21	103	217	3.392
-16	3	430.5	24	75	57.37	64	147	11.79	104	219	3.296
-15	5	406.7	25	77	54.89	65	149	11.38	105	221	3.203
-14	7	384.3	26	79	52.53	66	151	10.99	106	223	3.113
-13	9	363.3	27	81	50.28	67	153	10.61	107	225	3.025
-12	10	343.6	28	82	48.14	68	154	10.25	108	226	2.941
-11	12	325.1	29	84	46.11	69	156	9.902	109	228	2.86
-10	14	307.7	30	86	44.17	70	158	9.569	110	230	2.781
-9	16	291.3	31	88	42.33	71	160	9.248	111	232	2.704
-8	18	275.9	32	90	40.57	72	162	8.94	112	234	2.63
-7	19	261.4	33	91	38.89	73	163	8.643	113	235	2.559
-6	21	247.8	34	93	37.3	74	165	8.358	114	237	2.489
-5	23	234.9	35	95	35.78	75	167	8.084	115	239	2.422
-4	25	222.8	36	97	34.32	76	169	7.82	116	241	2.357
-3	27	211.4	37	99	32.94	77	171	7.566	117	243	2.294
-2	28	200.7	38	100	31.62	78	172	7.321	118	244	2.233
-1	30	190.5	39	102	30.36	79	174	7.086	119	246	2.174
0	32	180.9	40	104	29.15	80	176	6.859	120	248	2.117
1	34	171.9	41	106	28	81	178	6.641	121	250	2.061
2	36	163.3	42	108	26.9	82	180	6.43	122	252	2.007
3	37	155.2	43	109	25.86	83	181	6.228	123	253	1.955
4	39	147.6	44	111	24.85	84	183	6.033	124	255	1.905
5	41	140.4	45	113	23.89	85	185	5.844	125	257	1.856
6	43	133.5	46	115	22.89	86	187	5.663	126	259	1.808
7	45	127.1	47	117	22.1	87	189	5.488	127	261	1.762
8	46	121	48	118	21.26	88	190	5.32	128	262	1.717
9	48	115.2	49	120	20.46	89	192	5.157	129	264	1.674
10	50	109.8	50	122	19.69	90	194	5	130	266	1.632
11	52	104.6	51	124	18.96	91	196	4.849			
12	54	99.69	52	126	18.26	92	198	4.703			
13	55	95.05	53	127	17.58	93	199	4.562			
14	57	90.66	54	129	16.94	94	201	4.426			
15	59	86.49	55	131	16.32	95	203	4.294			
16	61	82.54	56	133	15.73	96	205	4.167			
17	63	78.79	57	135	15.16	97	207	4.045			
18	64	75.24	58	136	14.62	98	208	3.927			
19	66	71.86	59	138	14.09	99	210	3.812			



iii) Pressure On Service Port

Cooling chart(R410A):

°F(°C)	ODU(DB)	0(-17)	5(-15)	15 (-9.44)	45 (7.22)	75 (23.89)	85 (29.44)	95 (35)	105 (40.56)	115 (46.11)	120 (48.89)
	70/59 (21.11/15)	6.4	6.5	7.3	8.0	8.2	7.8	8.1	8.6	10.1	10.6
BAR	75/63 (23.89/17.22)	6.7	6.8	7.9	8.6	8.6	8.3	8.7	9.1	10.7	11.2
BAR	80/67 (26.67/19.44)	7.1	7.2	8.5	9.5	9.3	8.9	9.1	9.6	11.2	11.9
	90/73 (32.22/22.78)	7.7	7.8	9.6	10.5	10.3	9.5	10.0	10.6	12.4	13.0
	70/59 (21.11/15)	93	94	106	116	119	113	117	125	147	154
PSI	75/63 (23.89/17.22)	97	99	115	125	124	120	126	132	155	162
FSI	80/67 (26.67/19.44)	103	104	123	138	135	129	132	140	162	173
	90/73 (32.22/22.78)	112	113	139	152	149	138	145	154	180	189
	70/59 (21.11/15)	0.64	0.65	0.73	0.8	0.82	0.78	0.81	0.86	1.01	1.06
I MDa	75/63 (23.89/17.22)	0.67	0.68	0.79	0.86	0.86	0.83	0.87	0.91	1.07	1.12
MPa	80/67 (26.67/19.44)	0.71	0.72	0.85	0.95	0.93	0.89	0.91	0.96	1.12	1.19
	90/73 (32.22/22.78)	0.77	0.78	0.96	1.05	1.03	0.95	1	1.06	1.24	1.3





System Pressure Table-R410A

Pressure			Temperature		Pressure			Temperature	
Кра	bar	PSI	°C	°F	Кра	bar	PSI	°C	°F
100	1	14.5	-51.623	-60.921	2350	23.5	340.75	38.817	101.87
150	1.5	21.75	-43.327	-45.989	2400	24	348	39.68	103.42
200	2	29	-36.992	-34.586	2450	24.5	355.25	40.531	104.95
250	2.5	36.25	-31.795	-25.231	2500	25	362.5	41.368	106.46
300	3	43.5	-27.351	-17.232	2550	25.5	369.75	42.192	107.94
350	3.5	50.75	-23.448	-10.206	2600	26	377	43.004	109.40
400	4	58	-19.953	-3.915	2650	26.5	384.25	43.804	110.84
450	4.5	65.25	-16.779	1.798	2700	27	391.5	44.592	112.26
500	5	72.5	-13.863	7.047	2750	27.5	398.75	45.37	113.66
550	5.5	79.75	-11.162	11.908	2800	28	406	46.136	115.04
600	6	87	-8.643	16.444	2850	28.5	413.25	46.892	116.40
650	6.5	94.25	-6.277	20.701	2900	29	420.5	47.638	117.74
700	7	101.5	-4.046	24.716	2950	29.5	427.75	48.374	119.07
750	7.5	108.75	-1.933	28.521	3000	30	435	49.101	120.38
800	8	116	0.076	32.137	3050	30.5	442.25	49.818	121.67
850	8.5	123.25	1.993	35.587	3100	31	449.5	50.525	122.94
900	9	130.5	3.826	38.888	3150	31.5	456.75	51.224	124.20
950	9.5	137.75	5.584	42.052	3200	32	464	51.914	125.44
1000	10	145	7.274	45.093	3250	32.5	471.25	52.596	126.6
1050	10.5	152.25	8.901	48.022	3300	33	478.5	53.27	127.8
1100	11	159.5	10.471	50.848	3350	33.5	485.75	53.935	129.0
1150	11.5	166.75	11.988	53.578	3400	34	493	54.593	130.20
1200	12	174	13.457	56.223	3450	34.5	500.25	55.243	131.43
1250	12.5	181.25	14.879	58.782	3500	35	507.5	55.885	132.59
1300	13	188.5	16.26	61.268	3550	35.5	514.75	56.52	133.7
1350	13.5	195.75	17.602	63.684	3600	36	522	57.148	134.80
1400	14	203	18.906	66.031	3650	36.5	529.25	57.769	135.98
1450	14.5	210.25	20.176	68.317	3700	37	536.5	58.383	137.0
1500	15	217.5	21.414	70.545	3750	37.5	543.75	58.99	138.1
1550	15.5	224.75	22.621	72.718	3800	38	551	59.591	139.26
1600	16	232	23.799	74.838	3850	38.5	558.25	60.185	140.33
1650	16.5	239.25	24.949	76.908	3900	39	565.5	60.773	141.39
1700	17	246.5	26.074	78.933	3950	39.5	572.75	61.355	142.43
1750	17.5	253.75	27.174	80.913	4000	40	580	61.93	143.4
1800	18	261	28.251	82.852	4050	40.5	587.25	62.499	144.49
1850	18.5	268.25	29.305	84.749	4100	41	594.5	63.063	145.5
1900	19	275.5	30.338	86.608	4150	41.5	601.75	63.62	146.5
1950	19.5	282.75	31.351	88.432	4200	42	609	64.172	147.5
2000	20	290	32.344	90.219	4250	42.5	616.25	64.719	148.49
2050	20.5	297.25	33.319	91.974	4300	43	623.5	65.259	149.40
2100	21	304.5	34.276	93.697	4350	43.5	630.75	65.795	150.4
2150	21.5	311.75	35.215	95.387	4400	44	638	66.324	151.3
2200	22	319	36.139	97.050	4450	44.5	645.25	66.849	152.32
2250	22.5	326.25	37.047	98.685	4500	45	652.5	67.368	153.26
2300	23	333.5	37.939	100.290		Ì		İ	

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Due to ongoing product improvements, specifications and dimensions are subject to change and correction without notice or incurring obligations. Determining the application and suitability for use of any product is the responsibility of the installer. Additionally, the installer is responsible for verifying dimensional data on the actual product prior to beginning any installation preparations.

Incentive and rebate programs have precise requirements as to product performance and certification. All products meet applicable regulations in effect on date of manufacture; however, certifications are not necessarily granted for the life of a product.

Therefore, it is the responsibility of the applicant to determine whether a specific model qualifies for these incentive/rebate programs.



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