SPLIT AIR CONDITIONERS

Service Manual

ComfortStar®

CDP7 SERIES

CDP7-24-15	30S
CDP7-30-15	
CDP7-36-15	30T
CDP7-42-15	
CDP7-48-15	30U
CDP7-60-15	30V
CDP7-60-15-3	/

IMPORTANT NOTE:

Read this manual carefully before operating your new air conditioning unit. Make sue to save this manual for future reference.

Please check the applicable models, technical data, F-GAS(if any) and manufacturer information from the "Owner's Manual - Product Fiche " in the packaging of the outdoor unit. (European Union products only)

Safety Signs

This is the general warning sign. It is used to alert the user to potential hazards. All safety messages that follow this sign shall be obeyed to avoid possible harm.

DANGER

Indicates a hazard with a high level of risk which, if not avoided, will result in death or serious injury.

WARNING

Indicates a hazard with a medium level of risk which, if not avoided, could result in death or serious injury.

CAUTION

Indicates a hazard with a low level of risk which, if not avoided, could result in minor or moderate injury.

NOTE

A situation that may cause damage to the equipment or loss of property.

WARNING

Work on the refrigerant circuit with flammable refrigerant in safety group A2L may only be carried out by authorized contractors. These heating contractors must be trained in accordance with UL 60335-2-40, Section HH. The certificate of competence from an industry accredited body is required.
Work on electrical equipment may only be carried out by a qualified electrician.
Before initial commissioning, all safety – related points must be checked by the particular certified heating contractors. The system must be commissioned by the system installer or a qualified person authorized by the installer.
For installation of the indoor unit, refer to the corresponding installation and operation manual. If an indoor unit is installed in an unventilated area, the area shall be so constructed that should any refrigerant leak, it will not stagnate so as to create a fire or explosion hazard.
The appliance shall be stored so as to prevent mechanical damage from occurring.
Do not stack combustible materials on the surface of the indoor unit.

Do not use means to accelerate the defrosting process or to clean, other than those recommended by the manufacturer.
The appliance shall be stored in a room that does not have continuously operating ignition sources (for example: open flames, an operating gas appliance or an operating electric heater).
Do not pierce or burn the unit.
Be aware that refrigerants may not contain an odour.
If refrigerant gas leaks during installation, ventilate the area immediately.
Comply with national gas regulations.

Safety Precautions

WARNING

This appliance is not intended for use by persons (including children) with reduced physical, sensory or mental capabilities, or persons who lack experience and knowledge, unless they are supervised or have been given instructions concerning the use of the appliance by a person responsible for their safety. Children should be supervised to ensure that they do not play with the appliance.

Any person who is involved with working on or opening a refrigerant circuit should hold a current valid certificate from an industry-accredited assessment authority, which authorizes their competence to handle refrigerants safely in accordance with an industry recognized assessment credential.

Servicing shall only be performed as recommended by the equipment manufacturer.

Maintenance and repair requiring the assistance of other skilled personnel shall be carried out under the supervision of a person competent in the use of flammable refrigerants.

Prior to beginning work on systems containing flammable refrigerants, safety checks are necessary to minimize the risk of ignition.

When repairing the refrigerating system, comply with the following precautions prior to conducting work on the system:

– shall be undertaken according to controlled procedures so as to minimize the risk of the presence of flammable gases or vapors while the work is being performed.

– All maintenance staff and others working in the local area shall be instructed on the nature of work being carried out. Work in confined spaces shall be avoided.

– The area shall be checked with an appropriate refrigerant detector prior to and during work, to ensure the technician is aware of potentially toxic or flammable environment. Ensure that the leak detection equipment being used is suitable for use with all applicable refrigerants, i.e. non-sparking, adequately sealed or intrinsically safe.

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

– When carrying out work in relation to a refrigerating system that involves exposing any pipe work, no sources of ignition shall be used 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, repair, or removal and disposal of the unit, during which refrigerant can possibly be released into the surrounding space. Prior to beginning work, 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 clearly displayed.

Ensure that the area is in the open or that it is adequately ventilated before opening 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 surroundings.

Where electrical components are being changed, they shall be fit according to their 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 actual refrigerant charge 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.

– Equipment marking must remain visible and legible. Markings and signs that are illegible shall be corrected.

Refrigerating pipe or components are installed in a position where they are unlikely to be exposed to any substances which may corrode refrigerant containing components, unless the components are constructed of materials that are inherently resistant to corrosion or are suitably protected against corrosion.

Repair and maintenance of 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 the fault has been dealt with satisfactorily.

Safety Precautions

⚠ WARNING

If the fault cannot be corrected immediately but it is necessary to continue operation, an adequate temporary solution shall be used. This shall be reported to the owner of the equipment so that all parties are advised. Initial safety checks shall include:
– That capacitors are discharged: this shall be done in a safe manner to avoid the possibility of sparking;
– That no live electrical components and wiring are exposed while charging, recovering or purging the system;
– That there is continuity of earthing.
Sealed electrical components shall be replaced. Intrinsically safe components must be replaced.
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.
Under no circumstances shall potential sources of ignition be used while searching for or detection of refrigerant leaks. A halide torch (or any other detector using a naked flame) shall not be used.
Electronic leak detectors may be used to detect refrigerant leaks but, in the case of flammable refrigerants, 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 for the refrigerant employed, and the appropriate percentage of gas (25 % maximum) is confirmed.
If a leak is suspected, all naked flames shall be removed/extinguished. If a leakage of refrigerant which requires brazing is found, all of the refrigerant shall be recovered from the system, or isolated(by means of shut off valves) in a part of the system remote from the leak.
Leak detection fluids are also 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.
NOTE： Examples of leak detection fluids are
-bubble method,
-fluorescent method agents.
When breaking into the refrigerant circuit to make repairs - or for any other purpose-conventional procedures shall be used. However, for flammable refrigerants it is important that best practice be followed, since flammability is a consideration. The following procedure shall be adhered to:
- safely remove refrigerant following local and national regulations.
- evacuate.
-purge the circuit with inert gas .
- evacuate.
- continuously flush or purge with inert gas when using flame to open circuit, and.
- open the circuit.
The refrigerant charge shall be recovered into the correct recovery cylinders if venting is not allowed by local and national codes. For appliances containing flammable refrigerants, the system shall be purged with oxygen-free nitrogen to render the appliance safe for flammable refrigerants. This process might need to be repeated several times. Compressed air or oxygen shall not be used for purging refrigerant systems.
For appliances containing flammable refrigerants, refrigerants purging shall be achieved by breaking the vacuum in the system with oxygen-free nitrogen 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 oxygen-free nitrogen charge is used, the system shall be vented down to atmospheric pressure to enable work to take place.
The outlet for the vacuum pump shall not be close to any potential ignition sources, and ventilation shall be available.
Ensure that contamination of different refrigerants does not occur when using charging equipment. Hoses or lines shall be as short as possible to minimise the amount of refrigerant they contain.
Cylinders shall be kept upright. Ensure that the refrigeration system is grounded prior to charging the system with refrigerant.
Label the system when charging is complete (if it is not already labeled).
Take extreme care not to overfill the refrigeration system.

Safety Precautions

⚠WARNING

Prior to recharging the system, it shall be pressure-tested with the appropriate purging gas. 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.

Before carrying out this procedure, it is essential that the technician is completely familiar with the equipment and all its detail. It is recommended 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.

a) Become familiar with the equipment and its operation.

b) Isolate system electrically.

c) 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.

d) Pump down refrigerant system, if possible.

e) If a vacuum is not possible, make a manifold so that refrigerant can be removed from various parts of the system.

f) Make sure that the cylinder is situated on the scales before recovery takes place.

g) Start the recovery machine and operate it in accordance with the manufacturer's instructions.

h) Do not overfill cylinders. (No more than 80% volume liquid charge).

i) Do not exceed the maximum working pressure of the cylinder, even temporarily.

j) When the cylinders have been filled correctly and the process has been completed, make sure that the cylinders and the equipment are removed from site promptly and all isolation valves on the equipment are closed off.

k) Recovered refrigerant shall not be charged into another refrigeration system unless it has been cleaned and checked.

Equipment shall be labeled 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.

When removing refrigerant from a system, either for servicing or decommissioning, it is recommended that all refrigerants are removed safely.

When transferring refrigerant into cylinders, ensure that only appropriate refrigerant recovery cylinders are employed. Ensure that the correct number of cylinders for holding the total system charge is 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 the flammable refrigerant. If in doubt, the manufacturer should be consulted. 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.

The recovered refrigerant shall be processed according to local legislation 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 compressor body shall not be heated by an open flame or other ignition sources to accelerate this process. When oil is drained from a system, it shall be carried out safely.

Do not use the air conditioner for other purposes. In order to avoid any quality deterioration, do not use the unit for the cooling of precision instruments, food, plants, animals or works of art. Before cleaning, be sure to stop the operation, turn the breaker off or unplug the supply cord. Otherwise, electric shock and injury may occur. In order to avoid electric shock or fire, make sure that an earth leak detector is installed.

Never touch the air outlet or the horizontal blades while the swing flap is in operation. Your fingers may be come caught or the unit may break down.

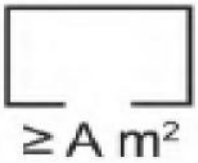
Safety Precautions

WARNING

Never put any objects into the air inlet or outlet.
Objects touching the fan at high speed can be dangerous.
Never inspect or service the unit by yourself.
Ask a qualified service person to perform this task.
Do not dispose of this product as unsorted municipal waste. This waste should be collected separately for special treatment. Do not dispose of electrical appliances as unsorted municipal waste. Use separate collection facilities. Contact your local government for information regarding the connection systems available.
If electrical appliances are disposed of in landfills or dumps, hazardous substances can leak into the groundwater and get into the food chain, harming your health and well-being.
To prevent refrigerant leak, contact your dealer. When the system is installed and operates in a small room, it is required to maintain the concentration of the refrigerant below the limit, in case a leak occurs. Otherwise, oxygen in the room may be affected, resulting in a serious accident.
The refrigerant in the air conditioner is safe and normally does not leak.
If the refrigerant leaks into the room and comes into contact with the fire of a burner, a heater or a cooker, a harmful gas could be released.
Turn off any combustible heating devices, ventilate the room, and contact the dealer where you purchased the unit.
Do not use the air conditioner until a service person confirms that the refrigerant leak is repaired.
Keep ventilation openings clear of obstruction.
Be sure the air conditioner is earthed.
In order to avoid electric shock, make sure that the unit is earthed and that the earth wire is not connected to a gas or water pipe, lightning conductor or telephone earth wire.
Do not operate the air conditioner with a wet hands. An electric shock may happen.
Do not touch the heat exchanger fins. These fins are sharp and could cut you.
To avoid oxygen deficiency, ventilate the room sufficiently if equipment with a burner is used together with the air conditioner.
Arrange the drain hose to ensure smooth drainage. Incomplete drainage may cause wetting of the building, furniture, etc.
Never touch the internal parts of the controller.
Do not remove the blower access panel. Some parts inside are dangerous to touch, and machine troubles may occur.
Attention is drawn to the fact that additional transportation regulations may exist with respect to equipment containing flammable gas. The maximum number of pieces of equipment or the configuration of the equipment permitted to be transported together will be determined by the applicable transport regulations.
Signs for similar appliances used in a work area are generally addressed by local regulations and give the minimum requirements for the provision of safety and/or health signs for a work location.
All required signs are to be maintained and employers should ensure that employees receive suitable and sufficient instruction and training on the meaning of appropriate safety signs and the actions that need to be taken in connection with these signs. The effectiveness of signs should not be diminished by too many signs being placed together. Any pictograms used should be as simple as possible and contain only essential details.
The storage of the appliance should be in accordance with the applicable regulations or instructions, whichever is more stringent.
Storage package protection should be constructed such a way that mechanical damage to the equipment inside the package will not cause a leak of the REFRIGERANT CHARGE.
The maximum number of pieces of equipment permitted to be stored together will be determined by local regulations.
Do not operate the air conditioner when using a room fumigation - type insecticide. Failure to observe this precaution could cause the chemicals to become deposited in the unit, which could endanger the health of those who are hypersensitive to chemicals. It may also cause the refrigerant sensor to alarm.
Do not place appliances which produce open flame in places exposed to the air flow from the unit or under the indoor unit. It may cause incomplete combustion or deformation of the unit due to the heat.
Do not install the air conditioner in a location where flammable gas may leak out. If the gas leaks out and stays around the air conditioner, a fire may break out.

Safety Precautions

⚠ WARNING



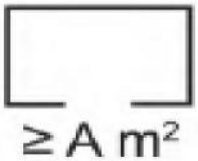
The appliance shall be installed, operated and stored in a room with a floor area not less than the minimum room area. Refer to the installation instructions for the minimum room area required to install the appliance.

⚠ WARNING

The suction pipe and liquid pipe of the indoor unit need to be protected and cannot be grabbed when moving the indoor unit.
The pipe-work including piping material, pipe routing, and installation shall include protection from physical damage in operation and service, and be in compliance with national and local codes and standards, such as ASHRAE 15, ASHRAE 15.2, IAPMO Uniform Mechanical Code, ICC International Mechanical Code. inspection prior to being covered or enclosed; or CSA B52. All field joints shall be accessible for inspection prior to being covered or enclosed.
All joints made in the installation between parts of the refrigerating system, with at least one part charged, shall be made in accordance with the following:
— A brazed, welded, or mechanical connection shall be made before opening the valves to permit refrigerant to flow between the refrigerating system parts. A vacuum valve shall be provided to evacuate the interconnecting pipe or any uncharged refrigerating system part.
— Mechanical connectors used indoors shall comply with ISO 14903. When mechanical connectors are reused indoors, sealing parts shall be renewed. When flared joints are reused indoors, the flare part shall be refabricated.
— Refrigerant tubing shall be protected or enclosed to avoid damage.
— Flexible refrigerant connectors (such as connecting lines between the indoor and outdoor unit) that may be displaced during normal operation shall be protected against mechanical damage.
Compliance is checked according to the installation instructions and a trial installation, if necessary.
Field-made refrigerant joints indoors shall be tightness tested. The test method shall have a sensitivity of 5 grams per year of refrigerant or better under a pressure of at least 0,25 times the maximum allowable pressure. No leak shall be detected.
After completion of field piping for split systems, the field pipework shall be pressure tested with an inert gas and then vacuum tested prior to refrigerant charging, according to the following requirements.
The minimum test pressure for the low side of the system shall be the low side design pressure and the minimum test pressure for the high side of the system shall be the high side design pressure, unless the high side of the system, cannot be isolated from the low side of the system in which case the entire system shall be pressure tested to the low side design pressure.
Field-made refrigerant joints indoors shall be tightness tested. The test method shall have a sensitivity of 5 grams per year of refrigerant or better under a pressure of at least 0,25 times the maximum allowable pressure. No leak shall be detected.
— mechanical joints in compliance with ISO 14903 or UL 207 (U.S. only).
— welded or brazed joints.
— joints in enclosures that vent to the unit or to the outside. Compliance is checked by inspection and tests.
Components and accessories from the units are not part of ordinary domestic waste.
Complete units , compressors, motors etc. are only to be disposed of via qualified disposal specialists.
This unit uses flammable refrigerant R454B. Please contact the dealer when you want to dispose of this unit.
Law requires that the collection, transportation and disposal of refrigerants must conform with the regulations governing the collection and destruction of hydrofluorocarbons.

Safety Precautions

WARNING



The appliance shall be installed, operated and stored in a room with a floor area not less than the minimum room area. Refer to the installation instructions for the minimum room area required to install the appliance.

WARNING

The refrigerant leakage sensor can only use the factory model or the specified model indicated in the corresponding manual.
The R454B refrigerant leakage sensor must be used to activate the refrigerant shut-off device, the alarm device, incorporated circulation airflow or other emergency controls, which shall give an electrical signal at a predetermined alarm set point in response to leaked refrigerant.
The location of leakage sensors shall be chosen in relation to the different installation scenarios. Please refer to the indoor unit installation manual for specific requirements.
The installation of the refrigerant leakage sensor shall allow access for checking, repair or replacement by an authorized person.
The refrigerant leakage sensor shall be installed so its function can be verified easily.
The refrigerant leakage sensor shall be protected to prevent tampering or unauthorized resetting of the pre-set value.
To be effective, the refrigerant leakage sensor must be electrically powered at all times after installation, other than when servicing.
If the refrigerant leakage sensor detects a refrigerant leak, the fan will be turned on to the maximum， the compressor will stop running. you should immediately leave the leak area and notify a professional for handling.
The service life of the refrigerant sensor is 15 years, and it should be replaced after the service life.
LEAK DETECTION SYSTEM installed on indoor unit. Unit must be powered except for service.

WARNING

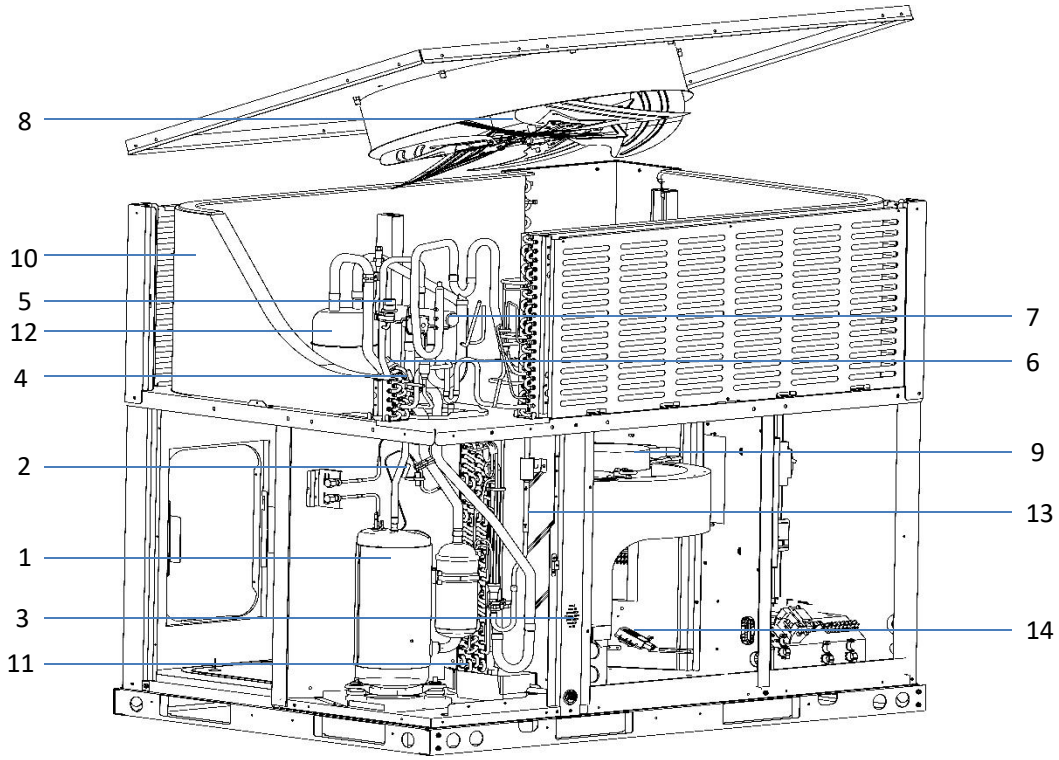
For appliances connected via an air duct system to one or more rooms, auxiliary devices which may be a potential ignition source shall not be installed in the duct work. Examples of such potential ignition sources are hot surfaces with a temperature exceeding 700° C and electric switching devices.
For appliances connected via an air duct system to one or more rooms, only auxiliary devices approved by the appliance manufacturer or declared suitable with the refrigerant shall be installed in connecting ductwork.

Service Manual

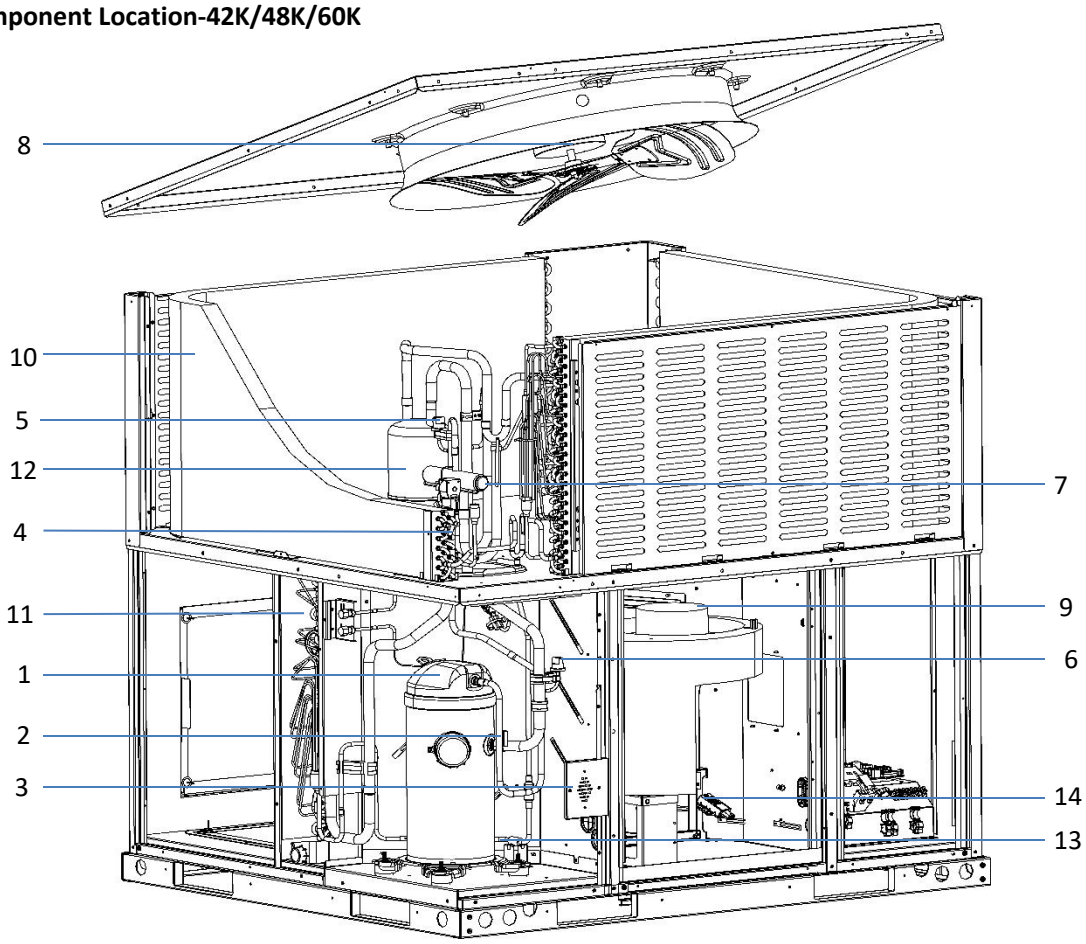
PART 1 Product instruction

2.1 Functional Part

Component Location-24K/30K/36K



Component Location-42K/48K/60K



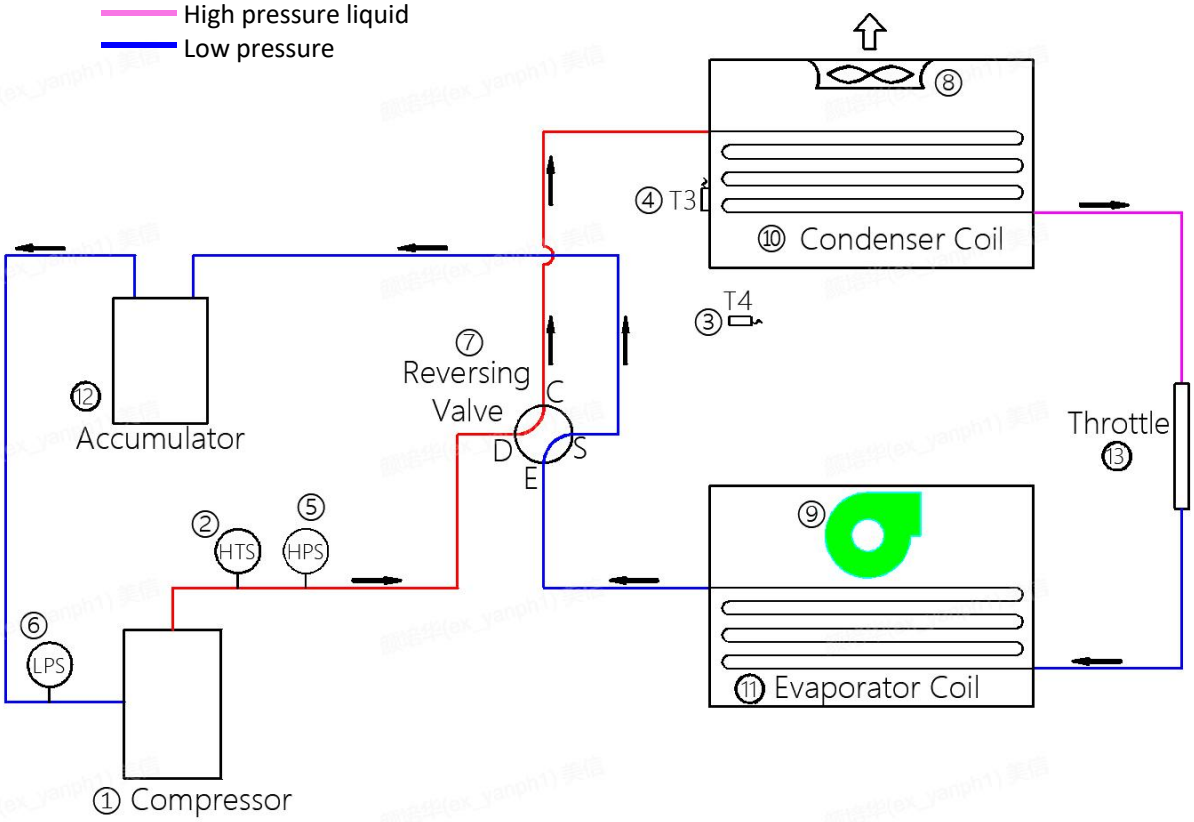
2.1 Functional Part

No.	Symbol	Part Name	Major function
1	Comp.	Compressor	Provides power for refrigerant circulation.
2	DTS	Compressor discharge temperature Switch	Used to compressor discharge temperature protection.
3	T4	Ambient temperature sensor	Used to ambient protection and defrost control.
4	T3	Outdoor coil temperature sensor	Used to discharge temperature protection and Fan control in cooling mode, and defrost control.
5	HPS	High pressure switch	Used to high pressure protection when up to 580psig and recovery when below to 435psig.
6	LPS	Low pressure switch	Used to low pressure protection when below to 14.5psig and recovery when up to 31.9psig.
7	RV	Reversing Valve	Used to switch mode between cooing and heating.
8	OD Fan	Outdoor unit fan motor	Used to help heat exchange.
9	ID Fan	Indoor unit fan motor	Used to help heat exchange.
10	/	Outdoor unit Coil	Heat exchange with outdoor air.
11	/	Indoor unit Coil	Heat exchange with indoor air.
12	/	Accumulator	Prevent liquid refrigerant from entering the compressor.
13	/	Throttle（orifice）	Used for refrigerant throttling and pressure reduction
14	/	R454B Refrigerant Sensor	Used to detect refrigerant leakage

2.2 Refrigerant Flow Chart

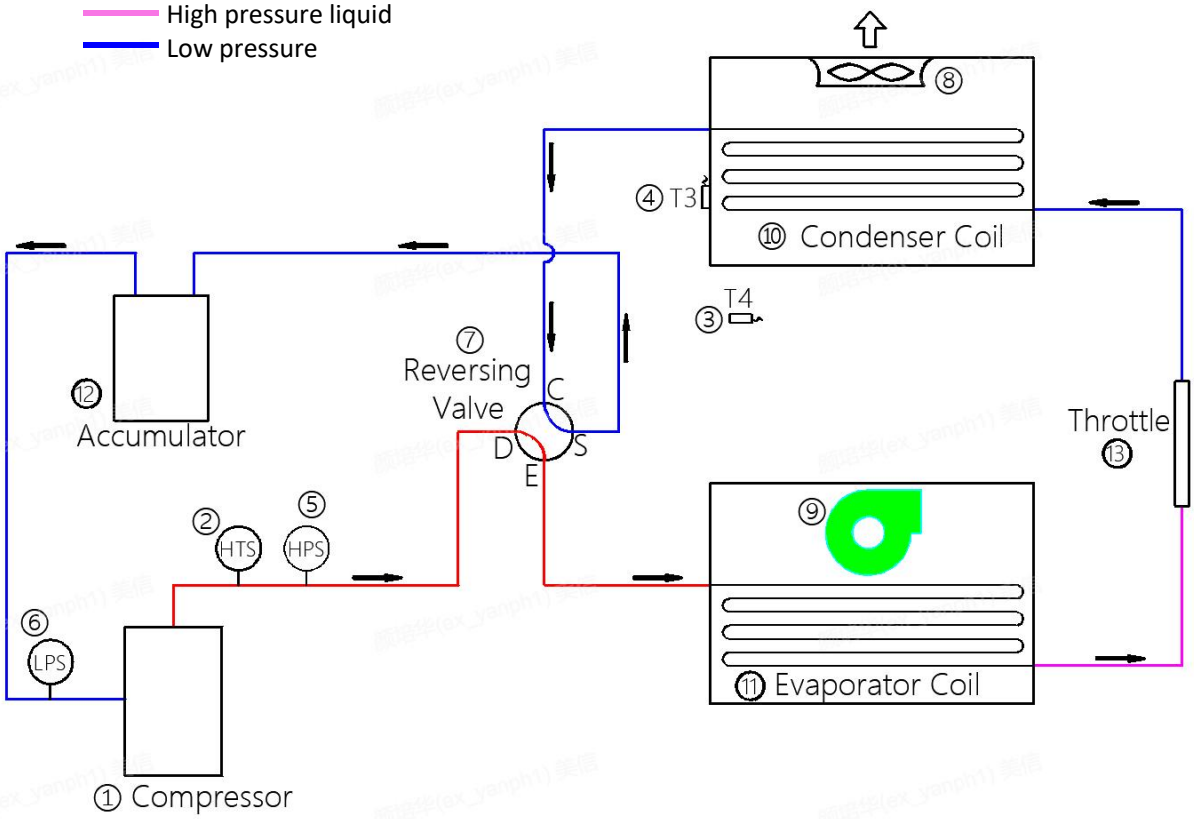
Cooling Operation/Defrost Operation

High pressure gas
High pressure liquid
Low pressure

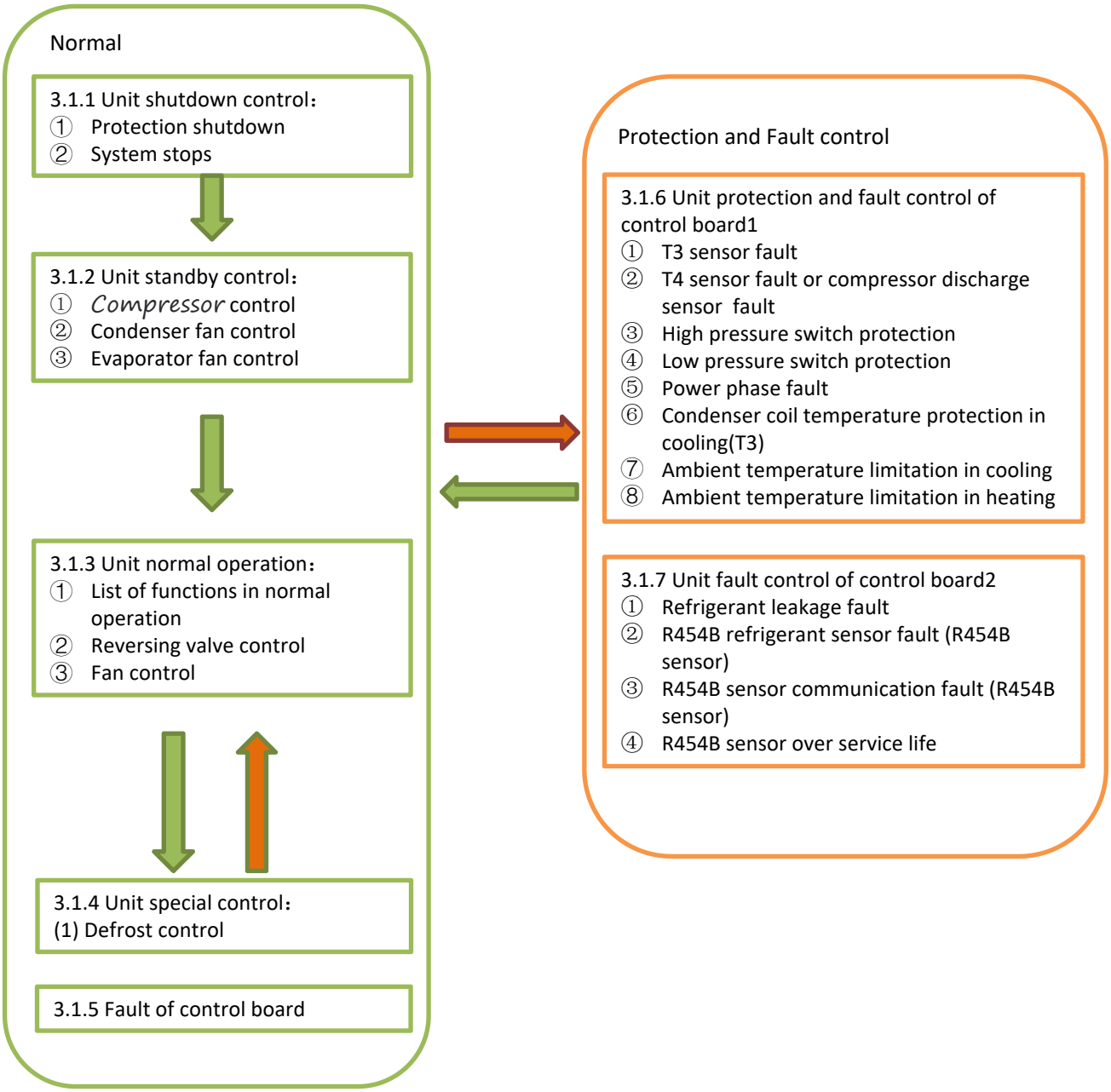


Heating Operation

High pressure gas
High pressure liquid
Low pressure



3.1 Function General



3.1.1 Unit shutdown control

⑴ Unit protection shutdown

To protect the outdoor unit, our system will shut down when there is something abnormal. Also the LED1 would flash when fault present.

⑵ Thermostat satisfied shutdown

Anytime system is in standby, the LED of control board 1 and control board 2 will steady on.

3.1.2 Unit standby control

⑴ Compressor control will steady

When there is no "Y" signal, the compressor will stop , If the standby time is more than 3 minutes, the compressor will start after receiving "Y" signal.

⑵ Outdoor unit fan control

When there is no "Y" signal, the outdoor unit fan will stop, When there is "Y" signal, the outdoor fan will start.

⑶ Evaporator fan control

When there is no operation signal, the indoor fan will stop after a delay of 90 seconds, and when there is a operation signal, the indoor fan would start immediately.

3.1.3 Unit normal operation

⑴ List of functions in normal

[Cooling]

Symbol	Part Name	Control status
Comp.	Compressor	ON
RV	The Reversing Valve	OFF
OD Fan	Outdoor unit fan motor	ON
ID Fan	Indoor unit fan motor	ON

[Heating]

Symbol	Part Name	Control status
Comp.	Compressor	ON
RV	The Reversing Valve	ON
OD Fan	Outdoor unit fan motor	ON
ID Fan	Indoor unit fan motor	ON

[Defrost]

Symbol	Part Name	Control status
Comp.	Compressor	ON
RV	The Reversing Valve	OFF
OD Fan	Outdoor unit fan motor	OFF
ID Fan	Indoor unit fan motor	ON

⑵ Reversing valve control

The heat pump need "B" signal of 24V wires.

- Cooling:

  The reversing valve is off during cooling.

- Heating:

  The reversing valve is on during heating and heating standby.

3.1.4 Unit special control

(1) Defrost control

● The Demand Defrost Control (DDC) monitors the outdoor unit coil temperature using thermistor (T3). A second thermistor (T4) monitors outdoor ambient temperature. Based on these parameters, as well as accumulative running time and Standby time, the DDC calculates proper initiation of defrost.

● Manual defrost mode

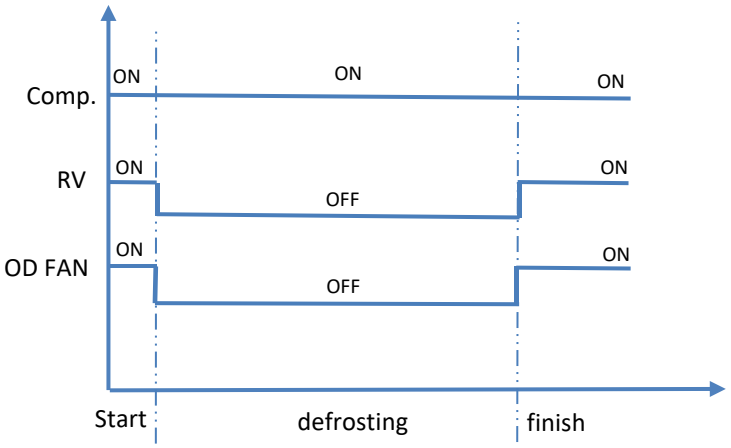
To manually cycle the defrost mode, set switch SW3-1 to the "ON" position. The system will engage a defrost cycle, and automatically exit defrost mode once the Shut-down conditions of defrost mode described below are met.

Caution :Once the manual defrost mode is finished, please set switch SW3-1 back to "OFF".

● Defrost mode for single-phase unit and three-phase unit

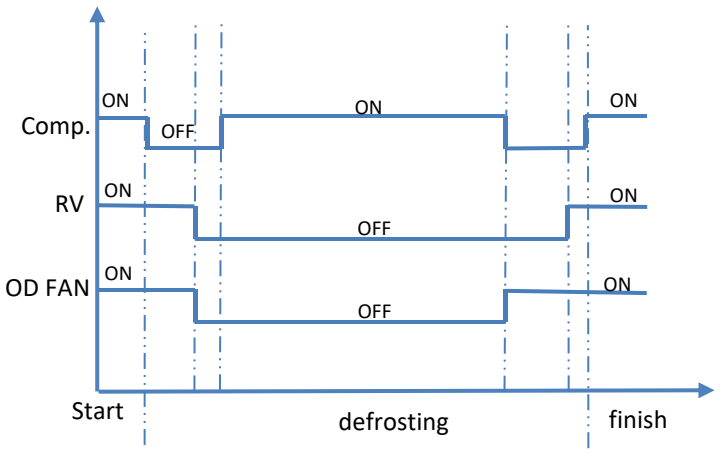
1. SW3-2 switch is set to "ON", the system will perform a regular defrost mode for single-phase unit.
2. SW3-2 switch is set to "OFF", the system will perform a special defrost mode for three-phase unit. The compressor will stop for a short time at the beginning and end of defrost mode.

For single-phase unit



The defrosting process does not stop the compressor, Suitable for 24K30K/36K/42K/48K/60K single-phase models.

For and three-phase unit



The defrosting process will stop the compressor twice, Suitable for 60K three-phase model.

3.1.4 Unit special control

● Start-up conditions of defrost mode

When SW3-3 switch is set to “ON”, the system will perform a defrost cycle in any of the following conditions:

1. If the compressor is operating and T3 is < 30.2℉ , the system will perform a defrost cycle every 30 minutes of operation.
2. When T3 is < 28.4℉ and the compressor is operating for the first time after being connected power.
3. When T3 is < 28.4℉ and The system has been in standby for two hours .

When SW3-3 switch is set to “OFF”, the system will perform a defrost cycle in any of the following conditions:

1. If the compressor is operating and T3 is < 30.2℉ , the system will perform a defrost cycle every 60 minutes of operation.
2. When T3 is < 28.4 ℉ and the compressor is operating for the first time after being connected power.
3. When T3 is < 28.4 ℉ and the system has been in standby for two hours.

● Shut-down conditions of defrost mode:

The mode will shut down in any of the following conditions:

1. The defrosted time lasting for 10 minutes;
2. T3 is ≥ 77 ° F when T4 ≥ 28.4℉ ;
3. Compressor stop operating; 4. T3 is ≥ 77 ℉ last for 60s when T4 < 28.4 ℉ .

SW3 Switch Location in the Control Board1 (For reference only)

SW3 	SW3-1	ON	MANUAL DEFROST
		OFF	AUTOMATIC DEFROST
	SW3-2	ON	SINGLE-PHASE UNIT
		OFF	THREE-PHASE UNIT
	SW3-3	ON	DEFROSTING CYCLE: 60MIN
		OFF	DEFROSTING CYCLE: 30MIN

3.1.5 Fault of Control board：

The unit has two control boards for the unit. The LED will flash when the unit is abnormal. Security consideration, the unit shutdown until the abnormal condition is corrected.

UNIT FAULT OF CONTROL BOARD 1			
No.	LED Status	Protection/Fault control description	Possible Reason
1	1Flash/Cycle	T3 sensor fault	T3 sensor is shorted circuit or open circuit
2	2Flash/Cycle	T4 sensor fault	T4 sensor is shorted circuit or open circuit/Poor heat exchange on condensing side/refrigerant over charge/ throttle blocked
3	3Flash/Cycle	Low pressure cut-out protection	Poor heat exchange on evaporation side/Charging leakage (low refrigerant)/throttle blocked
4	4Flash/Cycle	Power phase fault	The phase sequence of the power cable is incorrect /wiring error
5	5Flash/Cycle	Condenser coil temperature protection in cooling(T3)	High temperature and overload/poor heat exchange on condensing side/T3 failure
6	6Flash/Cycle	Ambient temperature limited(T4)	Ambient temperature is out of the range/There are other heat sources around T4

UNIT FAULT OF CONTROL BOARD 2			
No.	LED Status	FAULT control description	Possible Reason
1	3Flash/Cycle	R454B refrigerant sensor fault	R454B refrigerant sensor failure
2	4Flash/Cycle	R454B refrigerant sensor communication fault	Wiring error/ R454B refrigerant sensor failure
3	8Flash/Cycle	R454B refrigerant sensor over service life	R454B refrigerant sensor over service life/R454B refrigerant sensor failure
4	Keep Flashing	R454B refrigerant leakage protection	Fan is failure/Control board2 is failure

Caution:

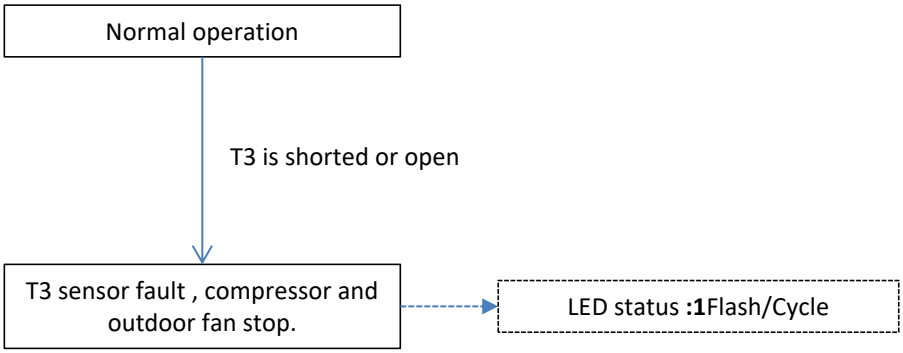
1. The control board1 flash interval is 3 seconds. For example, 3 Flash / Cycle is flash three times every 3 seconds .The control board2 flash interval is 2 seconds. For example, 3 Flash / Cycle is flash three times every 2 seconds.
2. If the refrigerant sensor over service life, should be replaced by an authorized person. If a leak is detected, follow safety procedures： Immediately evacuate all persons from the room or space, and contact the qualified licensed service personnel to advise them that the refrigerant R454B (A2L class flammable refrigerant) leak has occurred.
3. When the outdoor temperature is between 50℉ and 67℉ , the compressor can only run for cooling within a short time, otherwise it may cause damage to compressor.

Warning:

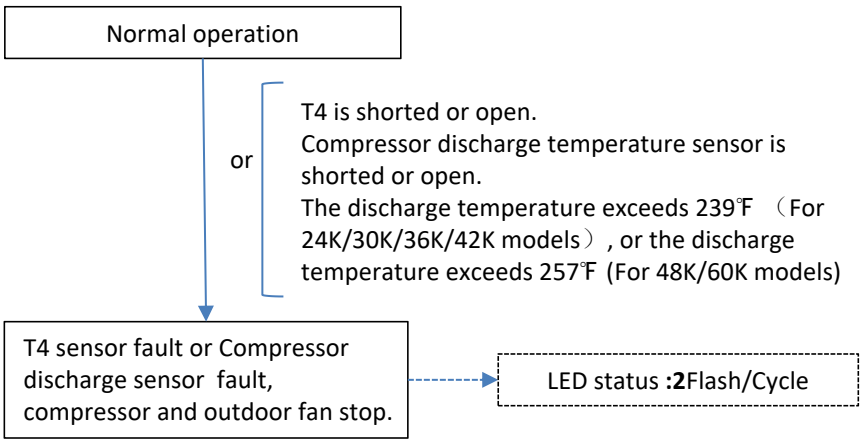
1. Component trouble shooting requires opening control box with power on. Use extreme care while working on this condition. Check nameplate and this instruction when making wire connections.

3.1.6 Unit protection and fault control of Control Board 1

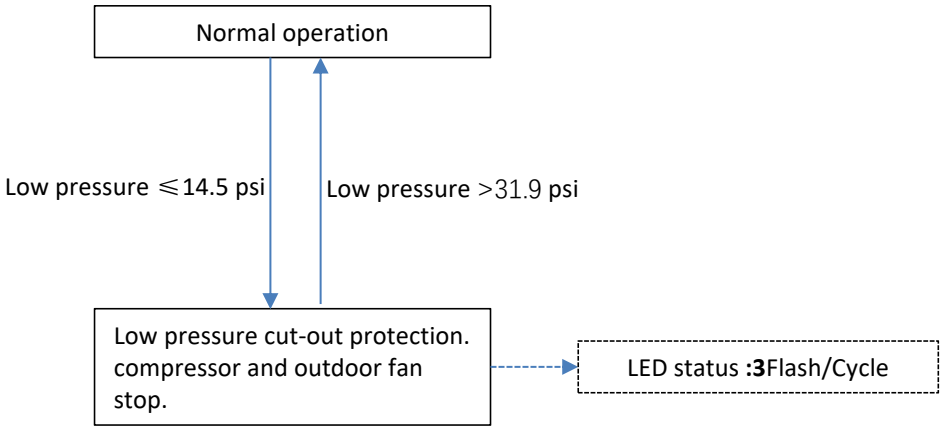
(1) T3 sensor fault



(2) T4 sensor fault or Compressor discharge sensor fault

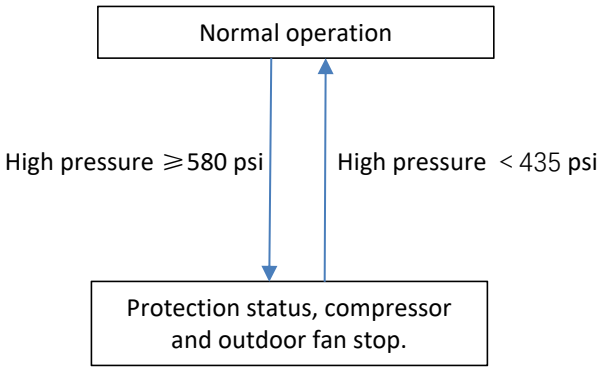


(3) Low Pressure Switch Protection



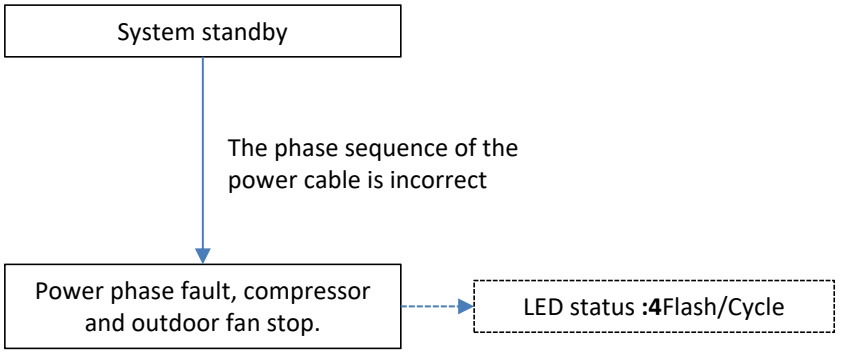
3.1.6 Unit protection and fault control of Control Board 1

(4) High Pressure Switch protection

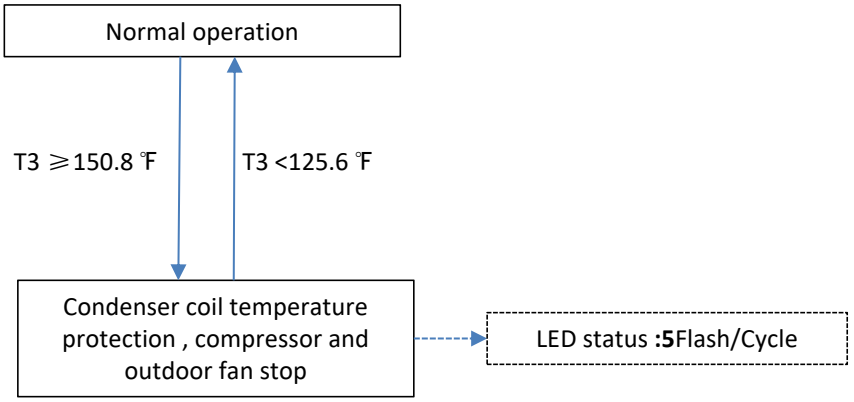


Note : When the High Pressure Switch is open , the "Y" signal will be cut off and the system will shutdown for security . But the led of control board1 does not flash.

(5) Power phase fault

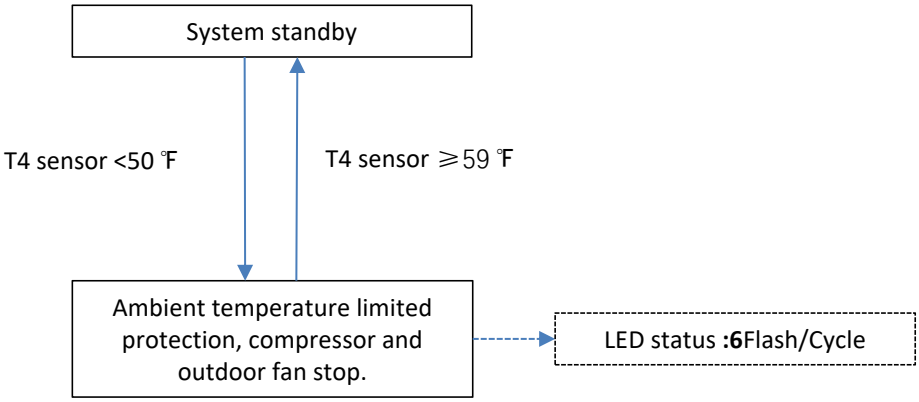


(6) Condenser coil temperature protection in cooling(T3)

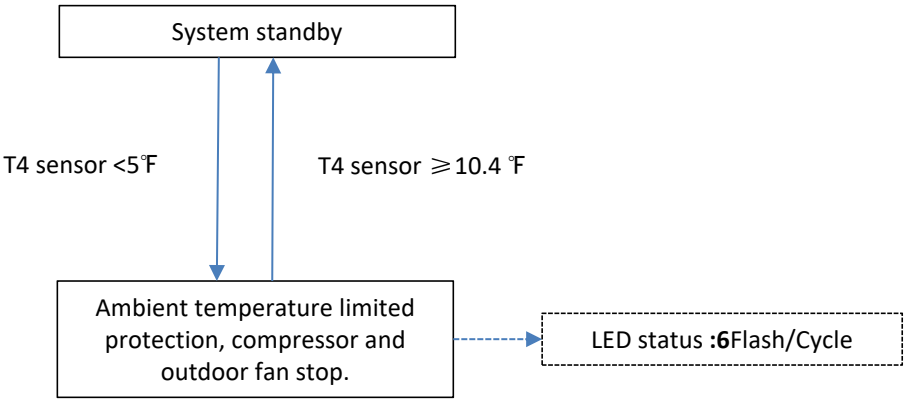


3.1.6 Unit protection and fault control of Control Board 1

(7) Ambient temperature limitation in cooling



(8) Ambient temperature limitation in heating

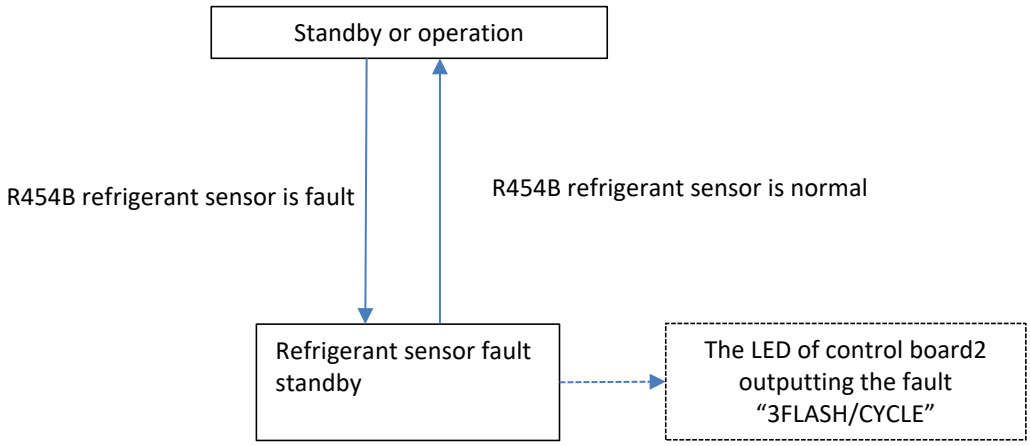


3.1.7 Unit fault of control Control Board 2

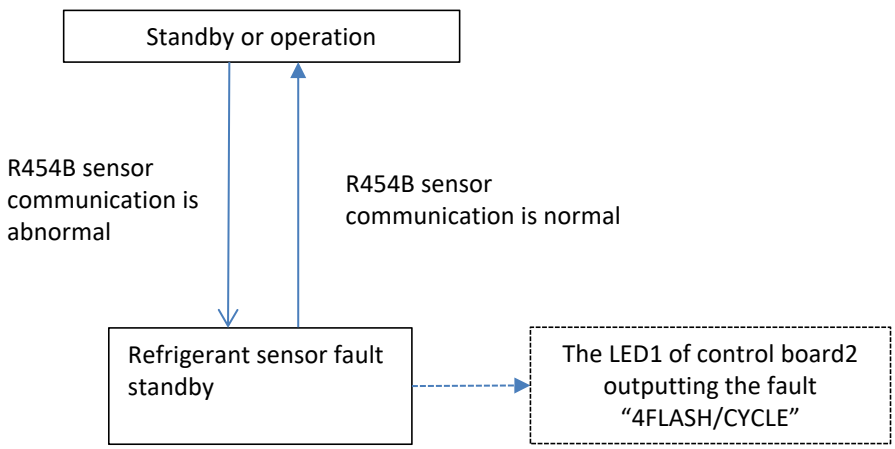
NOTICE

When there is a R454B refrigerant sensor-related fault, the indoor unit fan runs in maximum wind gear, outdoor fan and compress stop.

(1) R454B refrigerant sensor fault

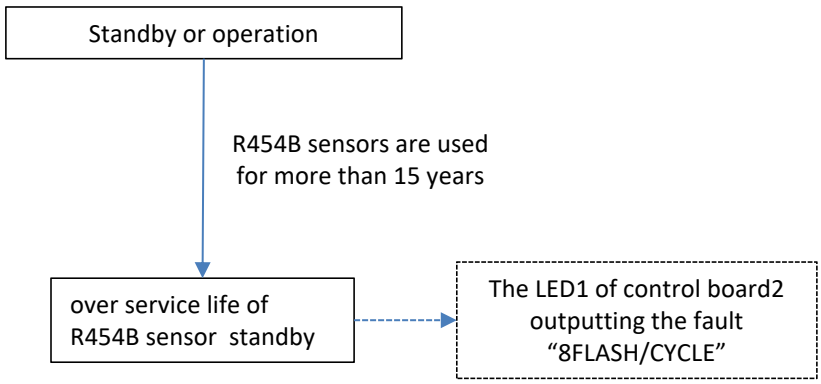


(2) R454B sensor communication fault



3.1.7 Unit fault of control Control Board2

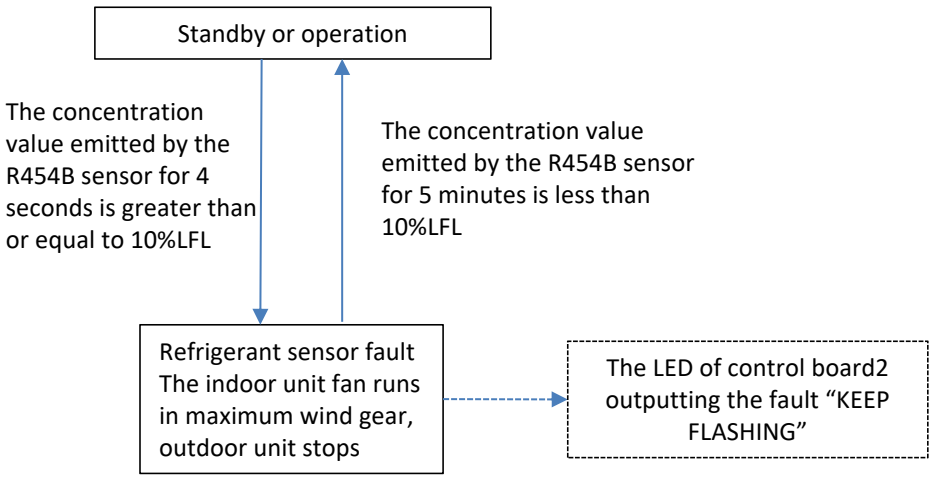
(3) R454B sensor over service life



WARNING

The installation of the refrigerant leakage sensor shall allow access for checking, repair or replacement by an authorized person.

(4) Refrigerant leakage fault



WARNING

If a leak is detected, follow safety procedures：Immediately evacuate all persons from the room or space, and contact the qualified licensed service personnel to advise them that the refrigerant R454B (A2L class flammable refrigerant) leak has occurred.

4.1 Pre-operation

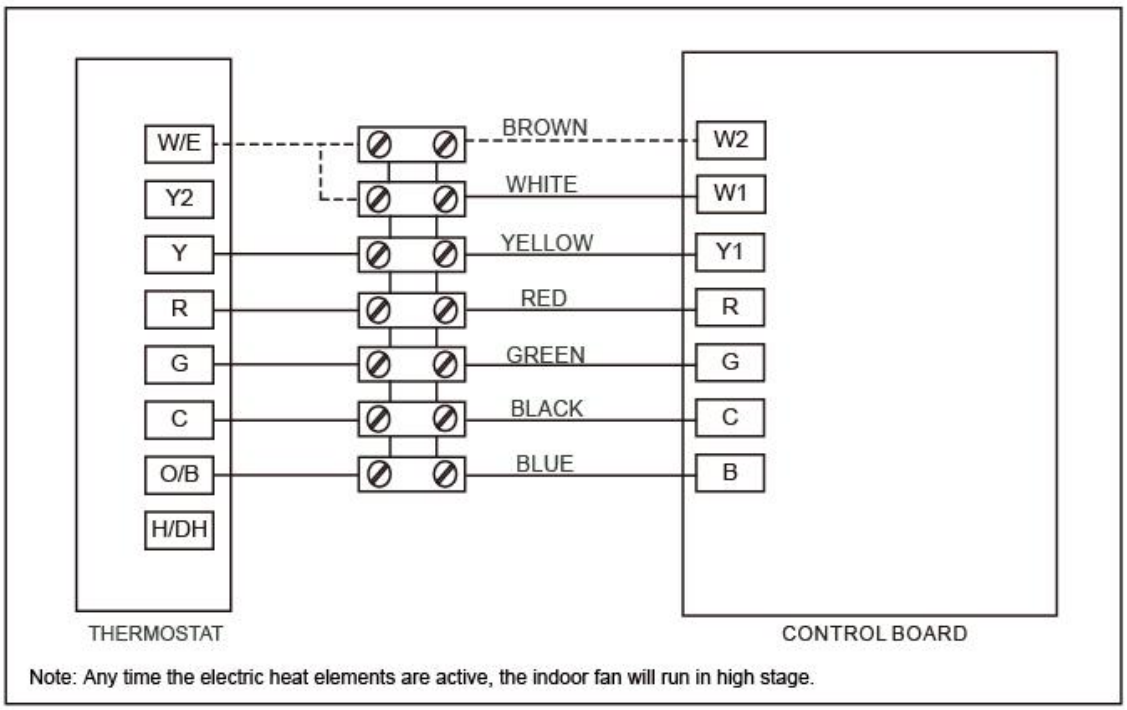
4.1.1 Checks before test operation

No.	Checkpoints	Cautions or warnings
1	Are all units securely installed?	Dangerous for turning over during storm Possible damage to pipe connections
2	Is the earth wire installed according to the applicable local standard?	Dangerous if electric leakage occurs
3	Are the condenser unit installed according to location restrictions requirement?	Poor capacity abnormal operation
4	Are all air inlets and outlets of the unit unobstructed?	Poor cooling Poor heating
5	Does the drain flow out smoothly?	Pipeline water leak
6	Have the connections been checked for air tight test and vacuum drying?	Poor capacity abnormal operation
7	Is a proper quantity of refrigerant charged?	Poor capacity abnormal operation
8	Do the supply power wirings connected Normally? Including the earth wiring.	Dangerous if electric leakage occurs
9	Does the earth leakage circuit breaker connected normally?	Dangerous if electric leakage occurs
10	Do the wirings of 24V signal connected according to wiring diagram? Including the thermostat wiring and setting.	abnormal operation
11	Is the supply voltage conform to the specifications on the name plate?	abnormal operation Damage unit
12	Are the cable sizes as specified and according to local regulations?	Damage of cables

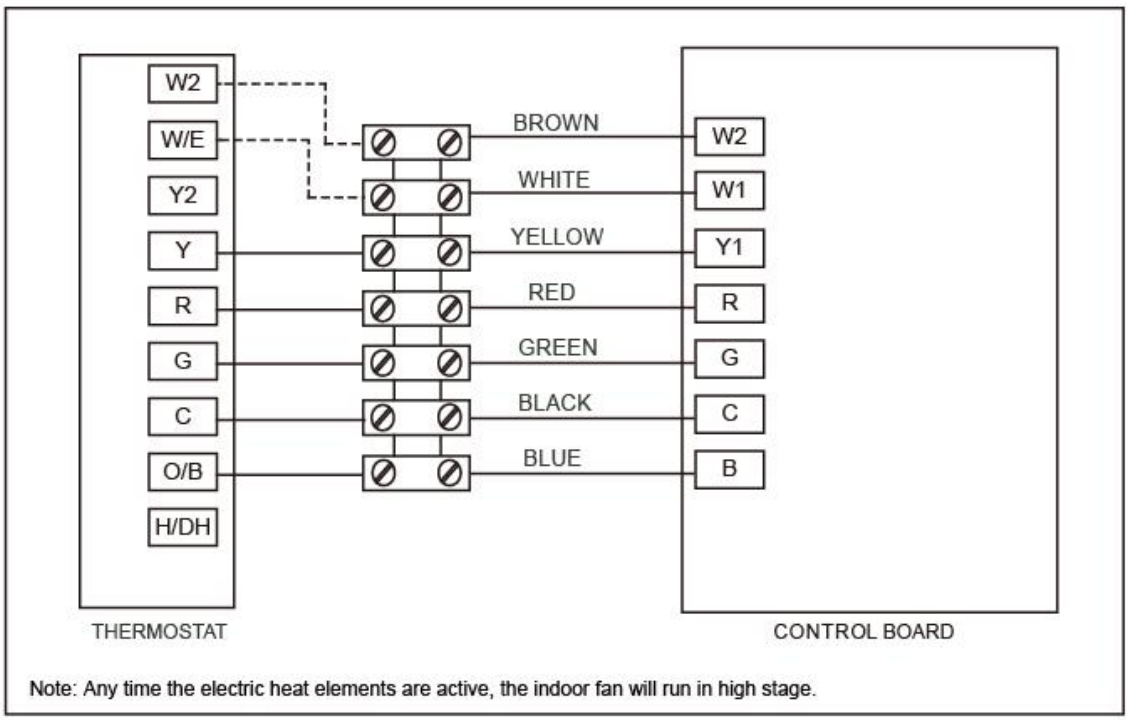
4.1 Pre-operation

4.1.2 Control wiring

Note: B signal need thermostat programming settings.



2H and 1C Thermostat Non-communicating Control Mode Setup

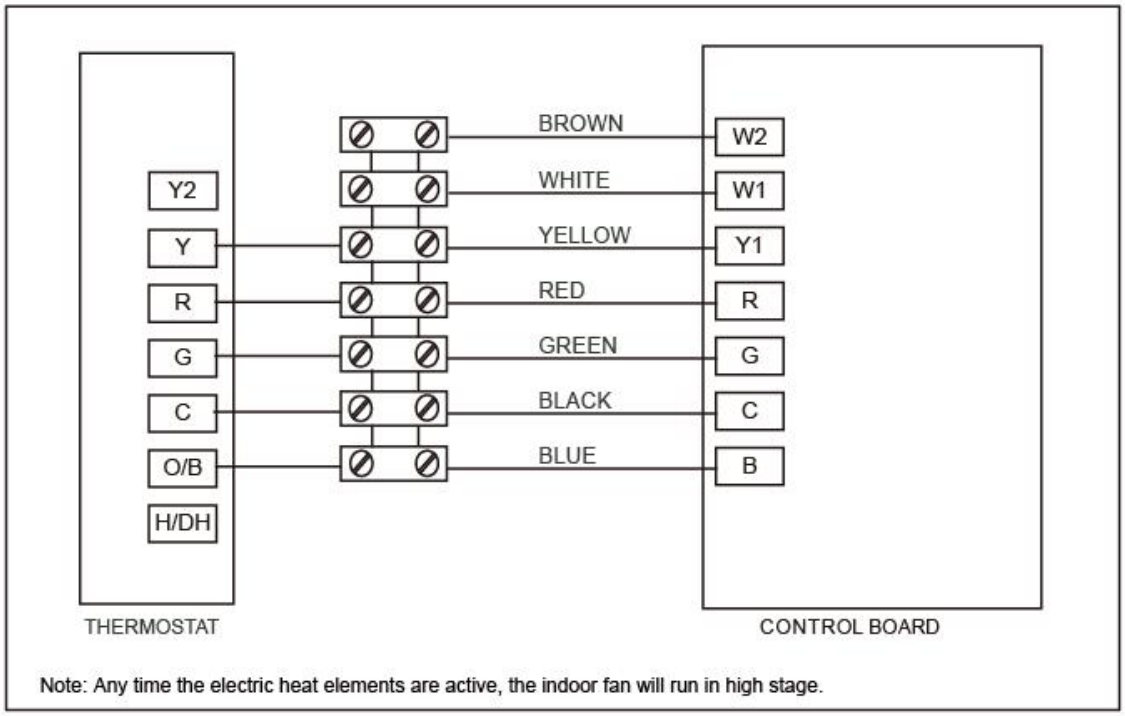


3H and 1C Thermostat Non-communicating Control Mode Setup

4.1 Pre-operation

4.1.2 Control wiring

Note: B signal need thermostat programming settings.



1H and 1C Thermostat Non-communicating Control Mode Setup

Notes:
- *Be sure power supply agrees with equipment nameplate.*
- *Power wiring and grounding of equipment must comply with local code.*
- *Low voltage wiring to be No.18 AWG minimum conductor.*
- *" ....."Field installed electric auxiliary heat connection.*
- *Single-stage auxiliary heating (Supported by 2H thermostat).*

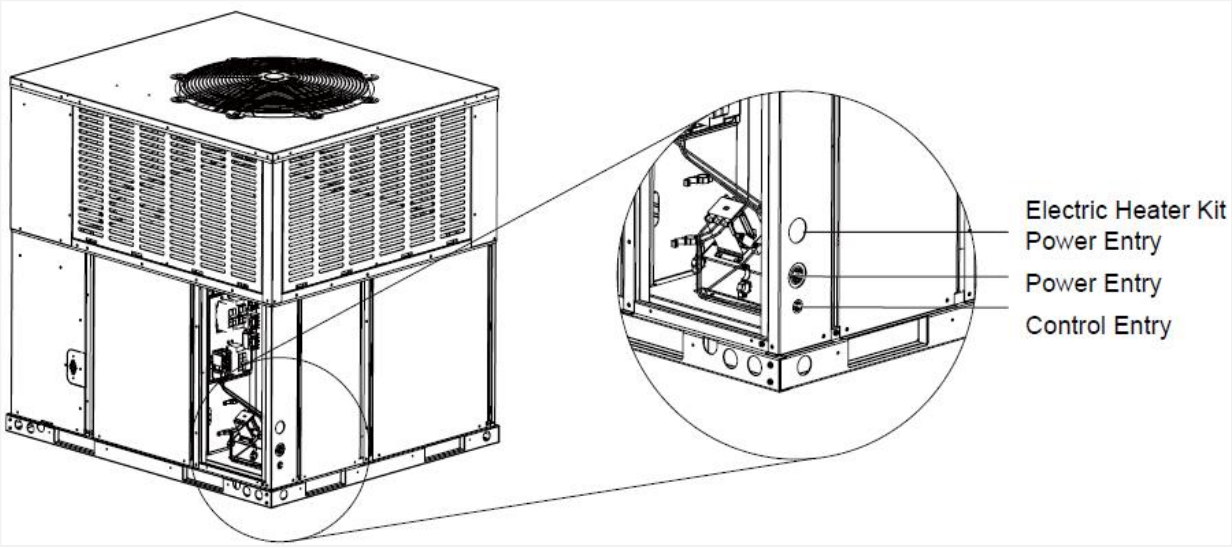
- *Twin-stage auxiliary heating(Supportedby3Hthermostat)*
- *W:Electric auxiliary heat signal.*
- *W1:The first stage Field installed electric auxiliary heat signal.*
- *W2:The second stage Field installed electric auxiliary heat signal.*
- *The W signal is connected to the Electric auxiliary heat or the first stage Electric auxiliary heat.*

4.1 Pre-operation

4.1.3 Power Wiring

1. The high voltage power supply must match the equipment nameplate：
Single phase power supply(208/230 V~, 1 PH, 60 Hz)
Three phase power supply(208-230 V~, 3 PH, 60 Hz).

2. Confirm that the hole position of the sheet metal opening corresponds to the wiring function harness.

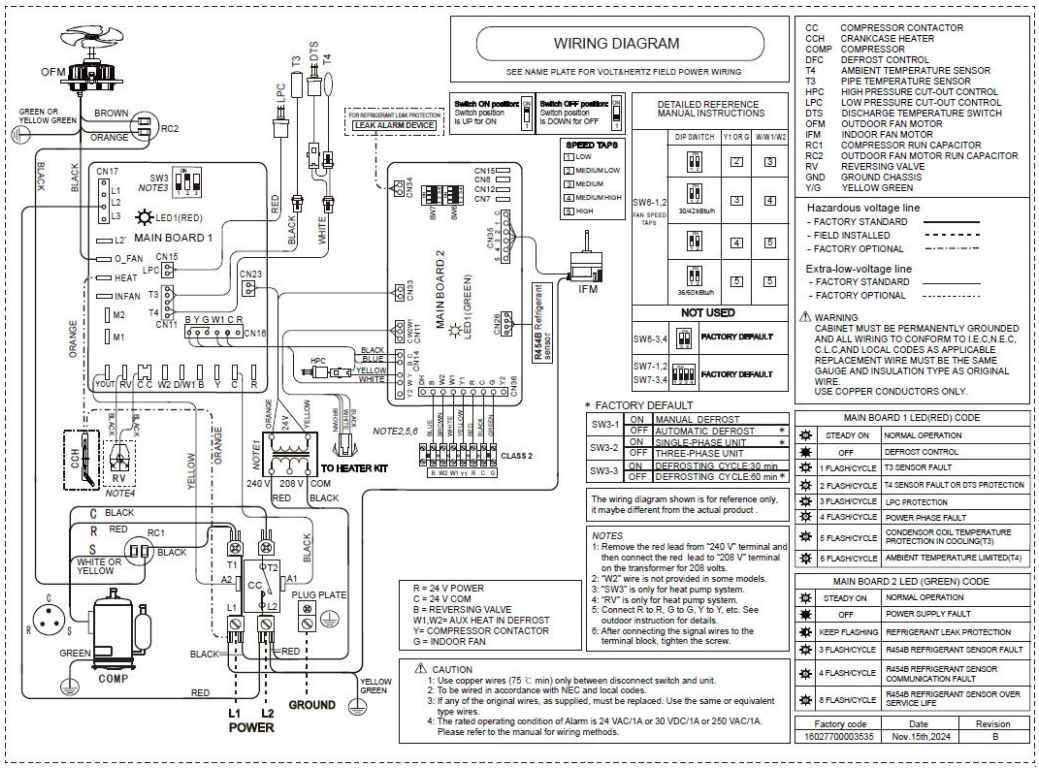


3. Connect the power cord to the L1 L2 or L1 L2 L3 of the appliance. If the sequence of power cable connections is incorrect, the appliance will occur fault.

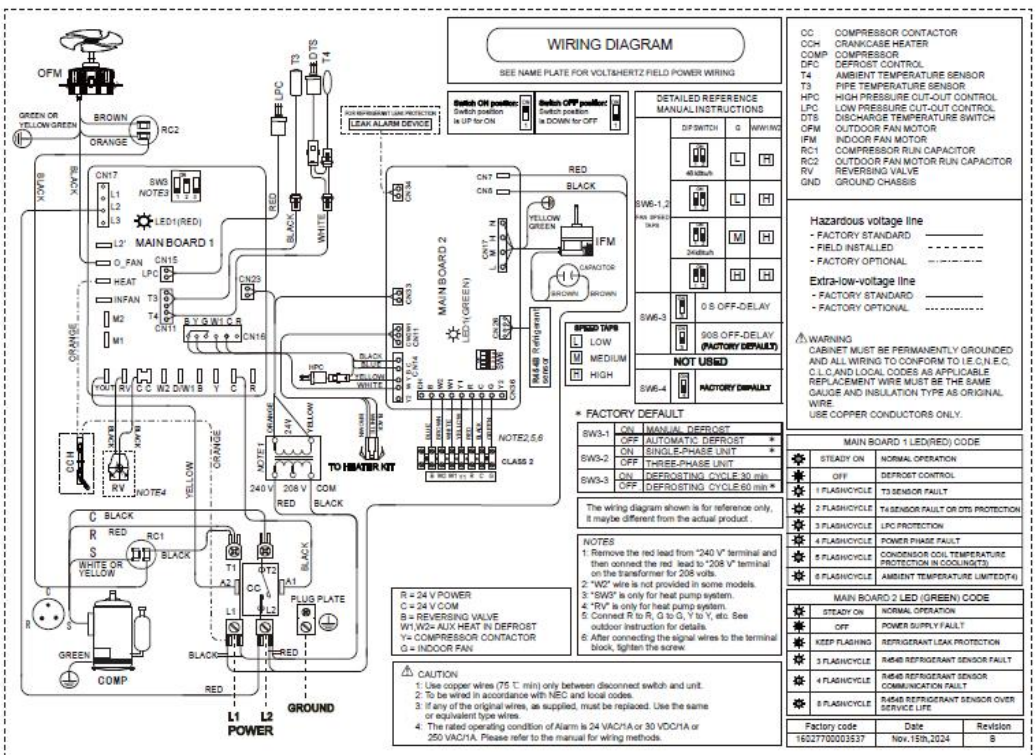
4.1 Pre-operation

4.1.4 Dip setting—wiring nameplate

For 30K/36K/42K/60K single phase models



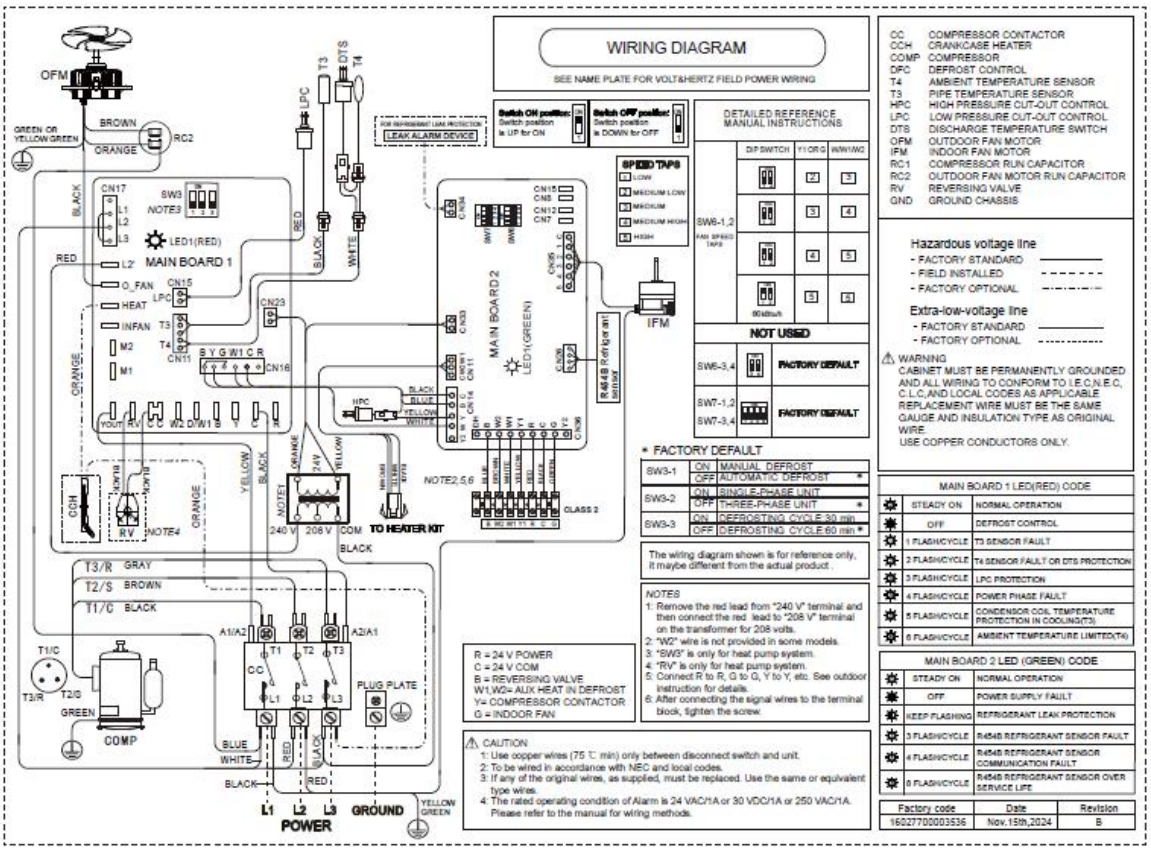
For 24K/48K models



4.1 Pre-operation

4.1.4 Dip setting—wiring nameplate

For 60K three phase model



4.1 Pre-operation

4.1.5 DIP setting—Control board appearance

There are two kinds of control board 1 used in different models.

Control board 1
For 24K/30K/36K/42K/48K/60K single phase models

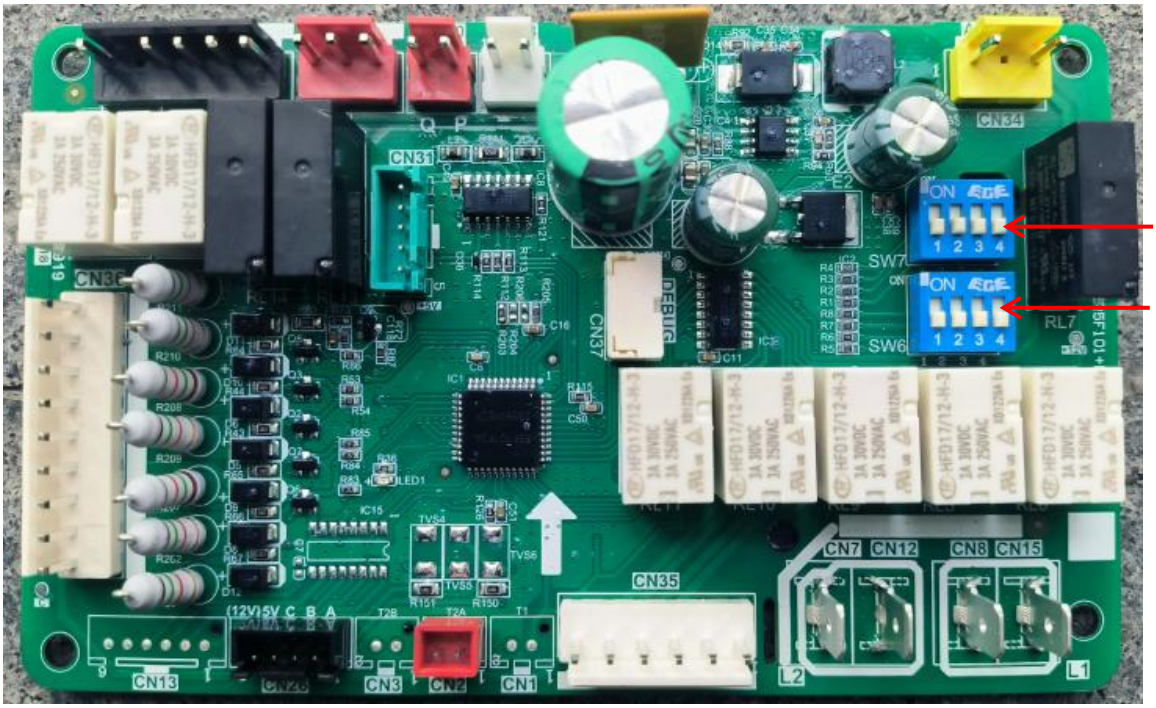
Control board 1
For 60K three phase models

4.1 Pre-operation

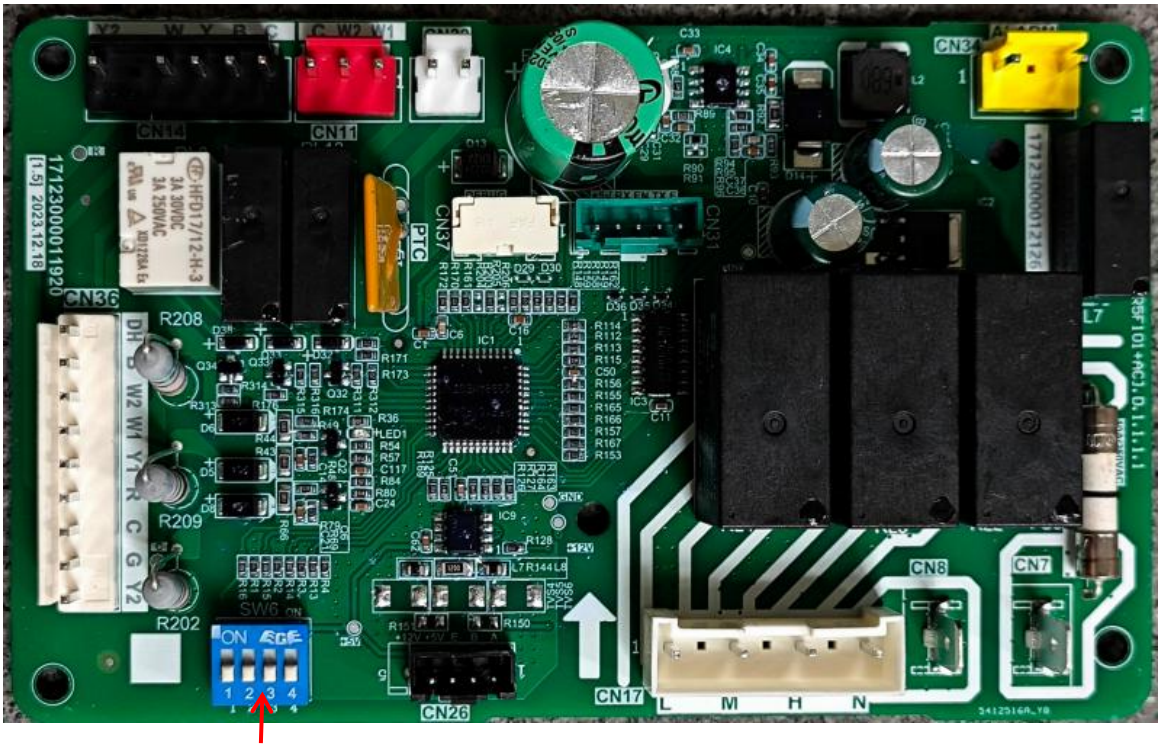
4.1.5 DIP setting—Control board appearance

There are two kinds of control board 2 used in different models.

Control board 2 for DC motor
For 30K/36K/42K/60K single phase/60K three phase models



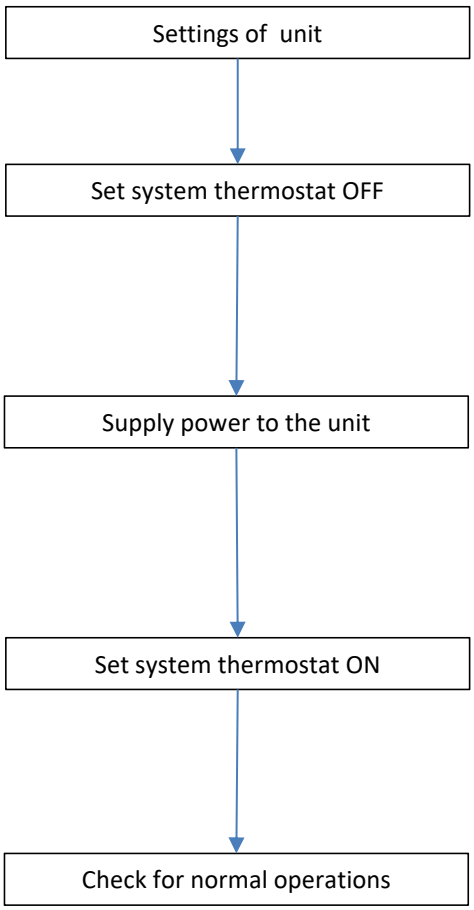
Control board 2 for AC motor
For 24K/48K models



SW6

4.1 Pre-operation

4.1.6 Turn power on



Note:
Make field setting if needed.
(For the setting procedure, refer to information in "4.1.4 and 4.1.5 **DIP setting**")

Note:
In a normal condition, the LED steady on.

Note:
Be sure to turn the power on 1 hour before starting operation when the ambient temperature is below **70**℉

Note:
Check operations
Check for the 24V signal from thermostat
Check for operation mode
Check for the digital display shows the compressor frequency

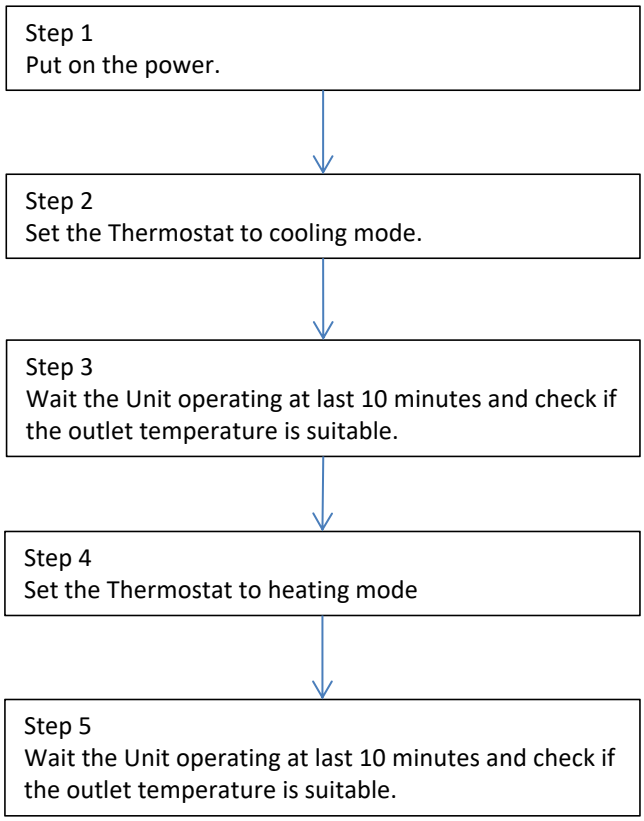
4.1.3 Charging Refrigerant

(1) Weigh-in charging method

The amount of refrigerant charge must be according to the nameplate.

4.2 Trial Operation

4.2.1 Trial Operation



Note:
Only for HP Unit.

4.2.2 Refrigerant Quantity Check

The appliance has been filled with refrigerant, and the system does not need to re-add refrigerant except for maintenance.

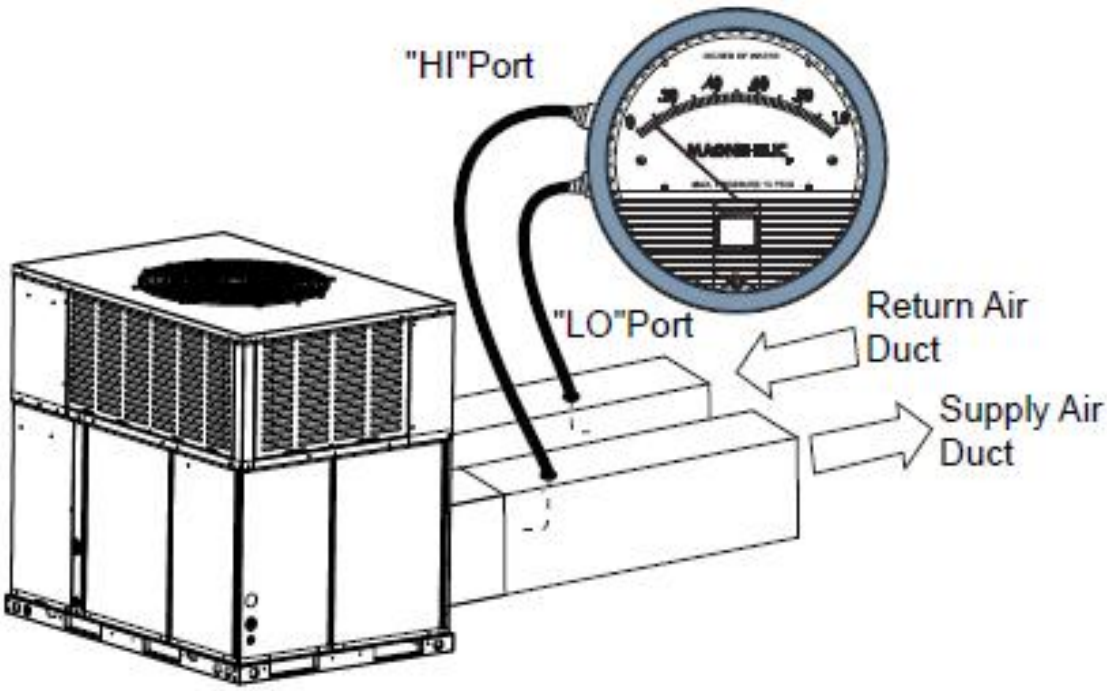
If need to add refrigerant to appliance, refrigerant can be charged according to the prototype nameplate or the following table.

Model	24K	30K	36K	42K	48K	60K 1PH	60K 3PH
Refrigerant Type	R454B	R454B	R454B	R454B	R454B	R454B	R454B
Refrigerant Factory Charged	2550g	2350g	3100g	3600g	3700g	4300g	4300g
	5lb-10oz	5lb-3oz	6lb-13oz	7lb-15oz	8lb-3oz	9lb-8oz	9lb-8oz

4.2.3 External Static Pressure Setup

To measure external static pressure:

1. Measure the supply air static pressure and record this positive number.
2. Measure the return air static pressure and record this negative number.
3. The sum of the absolute values of two parameters is equal to the total static pressure.



Airflow performance data at different static pressures and wind ranges:

Model Number	Motor Speed		External Static Pressure-Inches W.C.[kPa]									
			0[0]	0.1[.02]	0.2[.05]	0.3[.07]	0.4[.10]	0.5[.12]	0.58	0.6[.15]	0.7[.17]	0.8[.20]
24	Low	CFM	972.2	890.7	829	765.6	700.7	597.1	533.2	527.1	472.3	411.7
		Current2/A	1.02	0.99	0.97	0.95	0.93	0.9	0.89	0.88	0.85	0.83
		Power2/W	235	229	224	219	214	207	204	202	194	188
	Middle-Factory	CFM	1192.8	1121.8	1058.6	992.5	920.5	849.5	788.8	773.2	638.3	565
		Current2/A	1.38	1.35	1.32	1.29	1.26	1.23	1.21	1.2	1.16	1.12
		Power2/W	316	309	303	295	286	278	271	269	258	245
	High	CFM	1331.3	1259.4	1185.9	1113.4	1035.4	961.3	900.1	884.2	796	640.8
		Current2/A	1.63	1.6	1.57	1.54	1.5	1.47	1.44	1.44	1.4	1.35
		Power2/W	367	358	350	341	331	321	314	312	301	290
30	Low (Tap2)	CFM	1145.1	1088	1001.4	952.5	897.7	840.7	779.9	761.3	686.4	619
		Current/A	1.86	1.9	1.95	1.98	2.02	2.05	2.1	2.1	2.14	2.19
		Power/W	190	200	200	210	211	220	229	230	232	240
	Middle(Tap3) - Factory	CFM	1279.3	1233.8	1142	1095.8	1054.2	1006.1	969.8	959.6	887.5	821
		Current/A	2.28	2.33	2.39	2.43	2.46	2.51	2.54	2.55	2.62	2.67
		Power/W	258	260	270	280	281	290	298	300	310	317
	High(Tap4)	CFM	1458.9	1420.2	1376.1	1287.4	1250.4	1212.5	1179.1	1171.5	1132.4	1090.5
		Current/A	3.03	3.1	3.15	3.23	3.28	3.33	3.37	3.37	3.43	3.48
		Power/W	370	380	390	400	410	415	420	420	430	440
36	Low(Tap3)	CFM	1279.3	1233.8	1142	1095.8	1054.2	1006.1	969.8	959.6	887.5	821
		Current/A	2.28	2.33	2.39	2.43	2.46	2.51	2.54	2.55	2.62	2.67
		Power/W	258	260	270	280	281	290	298	300	310	317
	Middle(Tap4)	CFM	1458.9	1420.2	1376.1	1287.4	1250.4	1212.5	1179.1	1171.5	1132.4	1090.5
		Current/A	3.03	3.1	3.15	3.23	3.28	3.33	3.37	3.37	3.43	3.48
		Power/W	370	380	390	400	410	415	420	420	430	440
	High(Tap5) - Factory	CFM	1516.3	1477.6	1436.4	1344.6	1308	1270.3	1239	1230.7	1194.1	1154.8
		Current/A	3.3	3.37	3.43	3.52	3.56	3.61	3.65	3.66	3.71	3.76
		Power/W	410	420	430	445	450	460	462	464	470	480

4.2.3 External Static Pressure Setup

Airflow performance data at different static pressures and wind ranges:

Model Number	Motor Speed		External Static Pressure-Inches W.C.[kPa]									
			0[0]	0.1[.02]	0.2[.05]	0.3[.07]	0.4[.10]	0.5[.12]	0.58	0.6[.15]	0.7[.17]	0.8[.20]
42	Low (Tap2)	CFM	1425.7	1365.3	1297.9	1230.9	1161.2	1097.1	1043	1027	952.8	876.1
		Current/A	1.99	2.05	2.11	2.17	2.23	2.3	2.37	2.38	2.46	2.53
		Power/W	210	220	230	240	250	260	270	270	280	290
	Middle(Tap3) - Factory	CFM	1604.2	1550.3	1493.9	1431.4	1371.7	1311.9	1252.6	1253.4	1189.8	1126.2
		Current/A	2.52	2.58	2.66	2.73	2.8	2.87	2.93	2.95	3.03	3.11
		Power/W	290	300	310	320	330	341	350	355	370	380
	High(Tap4)	CFM	1934.1	1992.4	1884.3	1797	1742.7	1690.4	1653.4	1643.3	1590.5	1540.7
		Current/A	3.38	3.93	4.01	4.09	4.18	4.27	4.33	4.34	4.43	4.52
		Power/W	490	500	511	529	540	551	560	562	580	590
48	Low- Factory	CFM	2058.5	2017.5	1975.1	1923.7	1856.0	1778.7	1705.2	1688.2	1585.0	1467.7
		Current/A	3.47	3.39	3.31	3.23	3.12	3.04	1.32	2.88	2.75	2.62
		Power/W	804	784	766	746	720	691	665	659	623	588
	Middle	CFM	2192.0	2145.0	2092.0	2033.7	1962.6	1873.8	1798.0	1778.4	1659.7	1537.7
		Current/A	3.81	3.72	3.63	3.53	3.43	3.31	3.21	3.18	3.04	2.9
		Power/W	881	860	838	813	786	755	728	721	682	643
	High	CFM	2320.9	2262.0	2200.0	2133.0	2051.4	1950.8	1872.0	1848.7	1730.0	1603.7
		Current/A	4.18	4.08	3.98	3.88	3.77	3.64	3.54	3.52	3.37	3.24
		Power/W	963	937	912	885	857	823	796	788	749	710
60 (208/230 V~ 60 Hz)	Low(Tap3)	CFM	1604.2	1550.3	1493.9	1431.4	1371.7	1311.9	1252.6	1253.4	1189.8	1126.2
		Current/A	2.52	2.58	2.66	2.73	2.8	2.87	2.93	2.95	3.03	3.11
		Power/W	290	300	310	320	330	341	350	355	370	380
	Middle(Tap4)	CFM	1934.1	1992.4	1884.3	1797	1742.7	1690.4	1653.4	1643.3	1590.5	1540.7
		Current/A	3.38	3.93	4.01	4.09	4.18	4.27	4.33	4.34	4.43	4.52
		Power/W	490	500	511	529	540	551	560	562	580	590
	High(Tap5) - Factory	CFM	2033.1	1984.5	1939	1891.9	1837.6	1788	1748.9	1739.8	1687.2	1640.2
		Current/A	4.35	4.42	4.48	4.56	4.65	4.73	4.8	4.81	4.9	4.99
		Power/W	567	575	586	599	610	620	630	634	650	660
60 (208/230 V 3~ 60 Hz)	Low(Tap3)	CFM	1604.2	1550.3	1493.9	1431.4	1371.7	1311.9	1252.6	1253.4	1189.8	1126.2
		Current/A	2.52	2.58	2.66	2.73	2.8	2.87	2.93	2.95	3.03	3.11
		Power/W	290	300	310	320	330	341	350	355	370	380
	Middle(Tap4)	CFM	1934.1	1992.4	1884.3	1797	1742.7	1690.4	1653.4	1643.3	1590.5	1540.7
		Current/A	3.38	3.93	4.01	4.09	4.18	4.27	4.33	4.34	4.43	4.52
		Power/W	490	500	511	529	540	551	560	562	580	590
	High(Tap5) - Factory	CFM	2033.1	1984.5	1939	1891.9	1837.6	1788	1748.9	1739.8	1687.2	1640.2
		Current/A	4.35	4.42	4.48	4.56	4.65	4.73	4.8	4.81	4.9	4.99
		Power/W	567	575	586	599	610	620	630	634	650	660

5. Intelligent Troubleshooting

5.1 Unit Protection/Fault List：

The unit has two control boards for the unit. The LED will flash when the unit is abnormal. Security consideration, the unit shutdown until the abnormal condition is corrected.

UNIT FAULT OF CONTROL BOARD 1			
No.	LED Status	Protection/Fault control description	Possible Reason
1	1Flash/Cycle	T3 sensor fault	T3 sensor is shorted circuit or open circuit
2	2Flash/Cycle	T4 sensor fault	T4 sensor is shorted circuit or open circuit/Poor heat exchange on condensing side/refrigerant over charge/ throttle blocked
3	3Flash/Cycle	Low pressure cut-out protection	Poor heat exchange on evaporation side/Charging leakage (low refrigerant)/throttle blocked
4	4Flash/Cycle	Power phase fault	The phase sequence of the power cable is incorrect /wiring error
5	5Flash/Cycle	Condenser coil temperature protection in cooling(T3)	High temperature and overload/poor heat exchange on condensing side/T3 failure
6	6Flash/Cycle	Ambient temperature limited(T4)	Ambient temperature is out of the range/There are other heat sources around T4

UNIT FAULT OF CONTROL BOARD 2			
No.	LED Status	Fault control description	Possible Reason
1	3Flash/Cycle	R454B refrigerant sensor fault	R454B refrigerant sensor failure
2	4Flash/Cycle	R454B refrigerant sensor communication fault	Wiring error/ R454B refrigerant sensor failure
3	8Flash/Cycle	R454B refrigerant sensor over service life	R454B refrigerant sensor over service life/R454B refrigerant sensor failure
4	Keep Flashing	R454B refrigerant leakage protection	Fan is failure/Control board2 is failure

Caution:

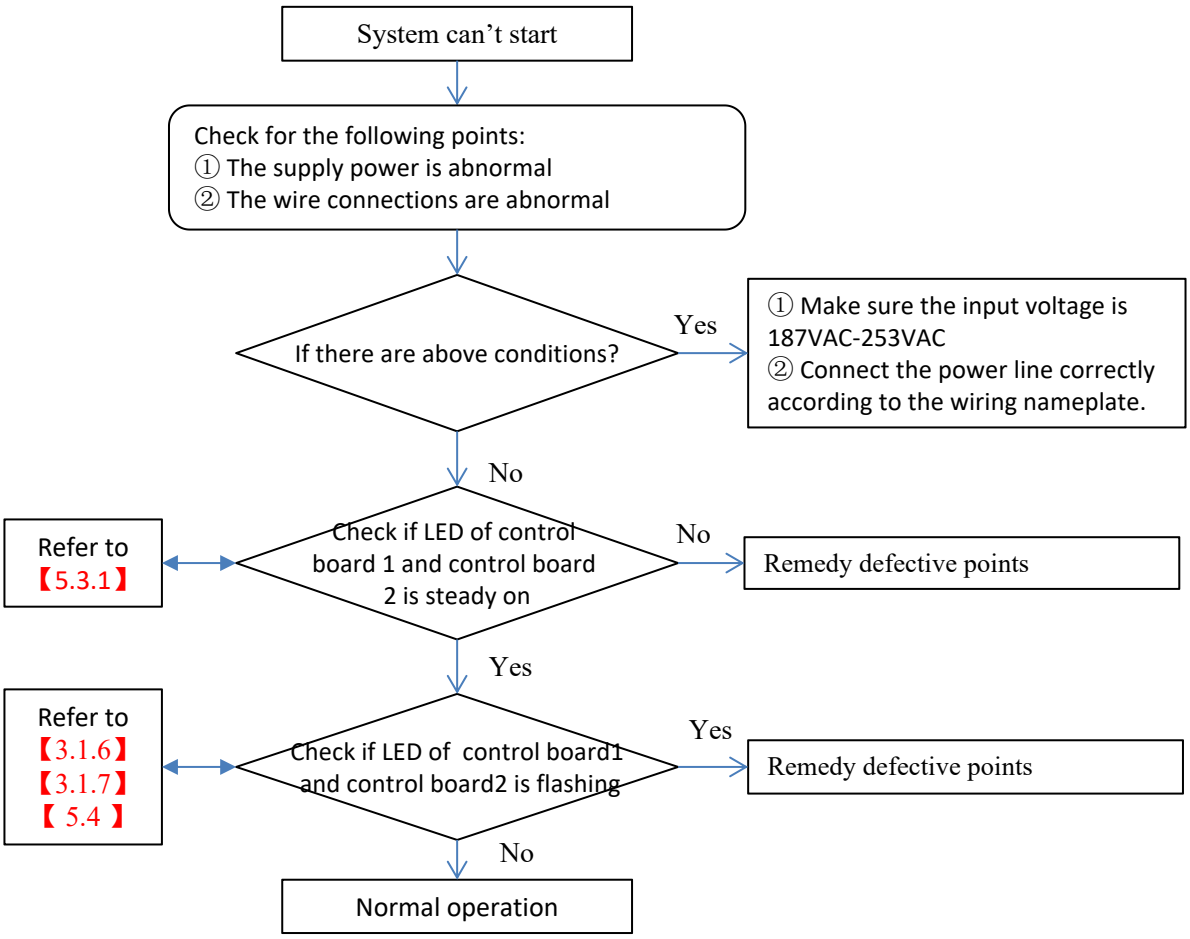
1. The control board1 flash interval is 3 seconds. For example, 3 Flash / Cycle is flash three times every 3 seconds .The control board2 flash interval is 2 seconds. For example, 3 Flash / Cycle is flash three times every 2 seconds.
2. If the refrigerant sensor over service life, should be replaced by an authorized person. If a leak is detected, follow safety procedures： Immediately evacuate all persons from the room or space, and contact the qualified licensed service personnel to advise them that the refrigerant R454B (A2L class flammable refrigerant) leak has occurred.
3. When the outdoor temperature is between 50℉ and 67℉ , the compressor can only run for cooling within a short time, otherwise it may cause damage to compressor.

Warning:

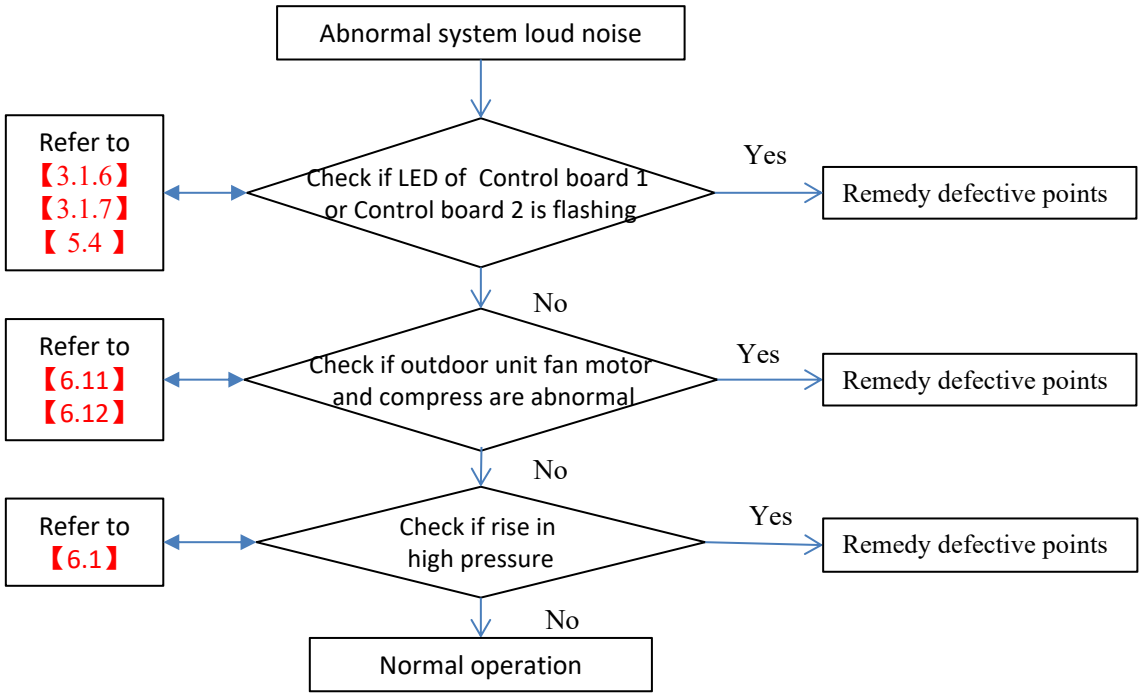
1. Component trouble shooting requires opening control box with power on. Use extreme care while working on this condition. Check nameplate and this instruction when making wire connections.

5.2 Abnormal system status checking guide

5.2.1 System can't start



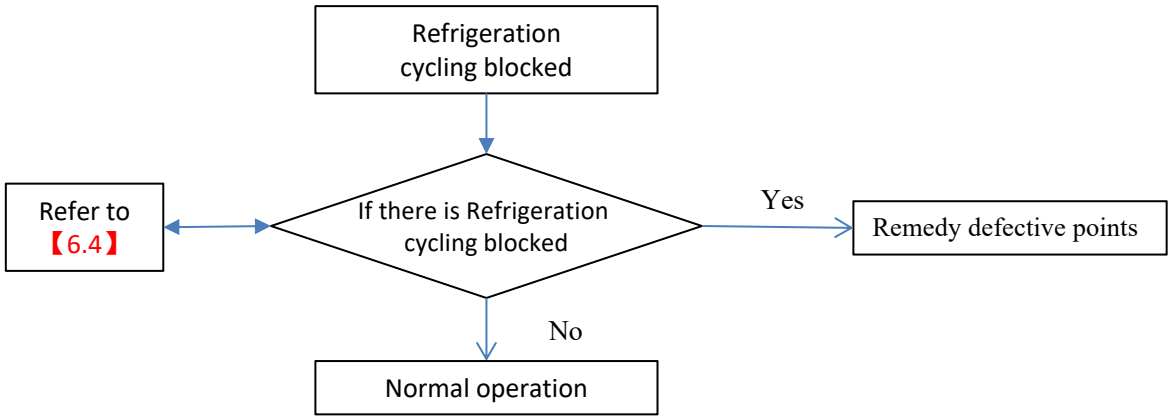
5.2.2 Abnormal system loud noise



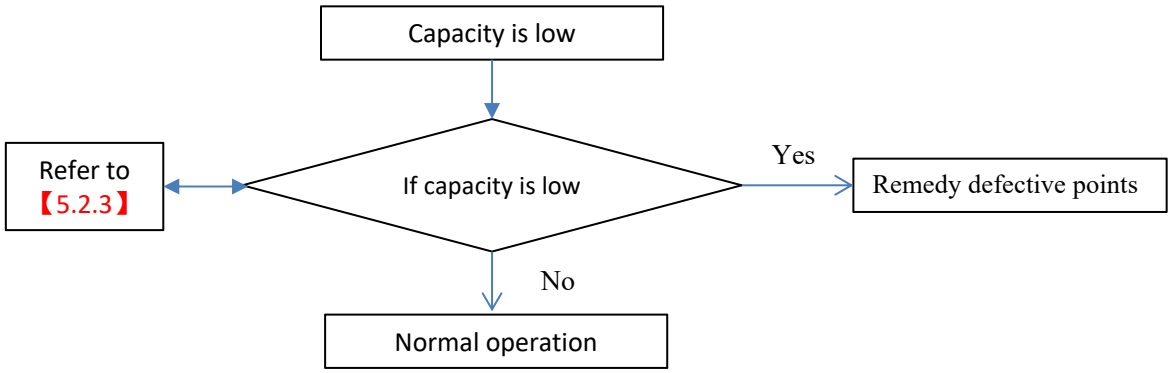
5.2 Abnormal system status checking guide

5.2.3 Other common issues

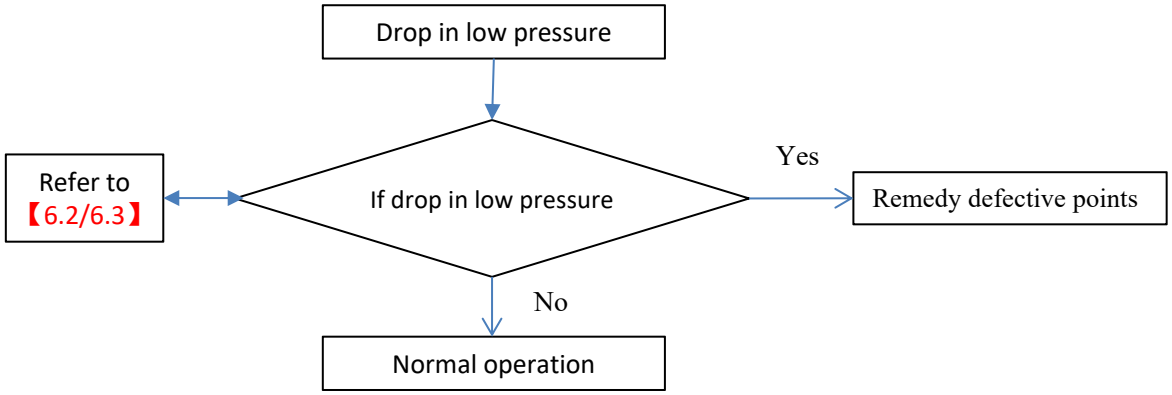
①Refrigeration cycling blocked：



②Capacity is low：



③Drop in low pressure：

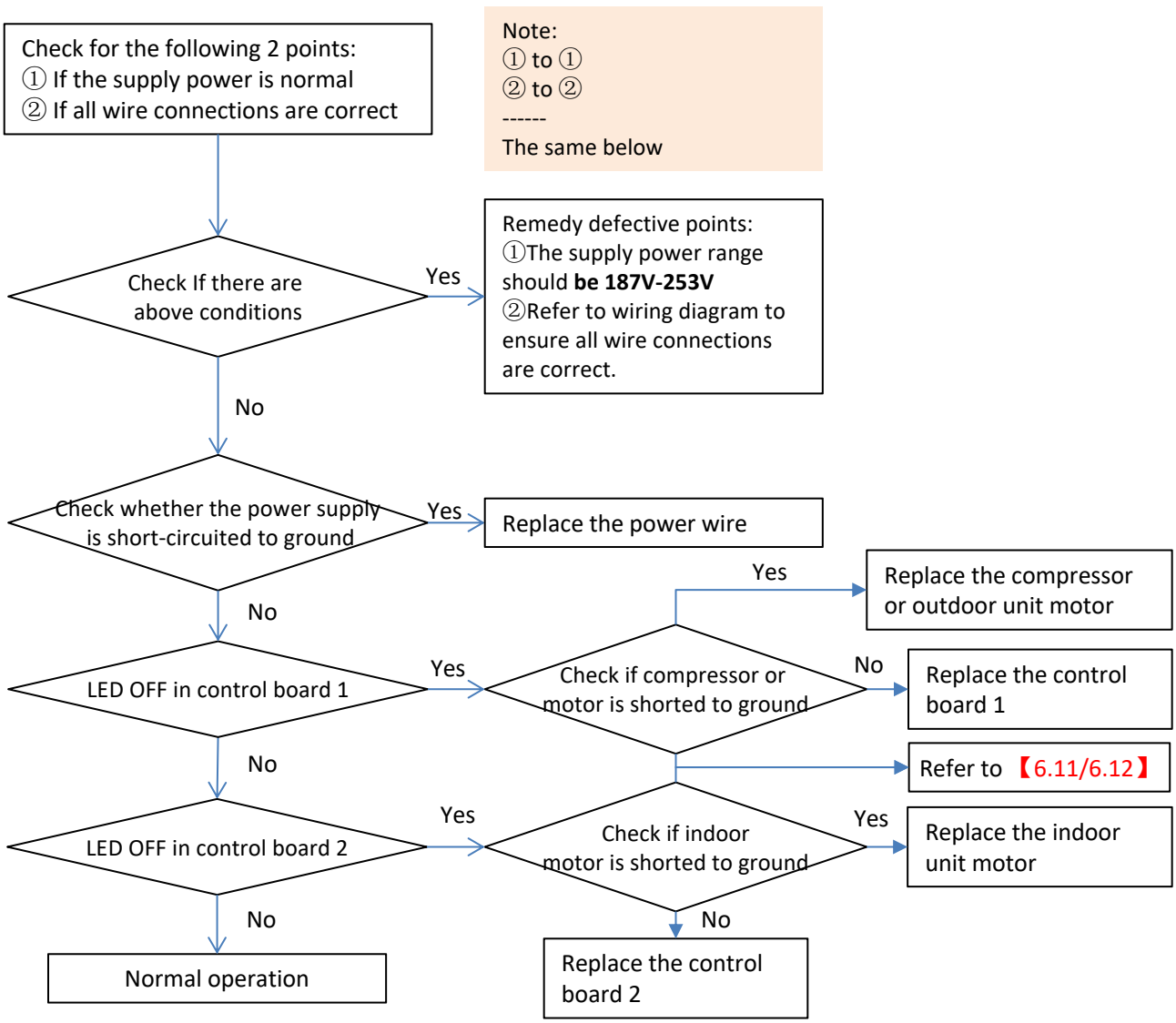


5.3 Symptom-based Troubleshooting

5.3.1 LED OFF

Issue	LED OFF (control board 1 or control board 2)
Model	All
Fault name	/
Possible cause	• Abnormal power input • Abnormal wire connections • Abnormal power wire

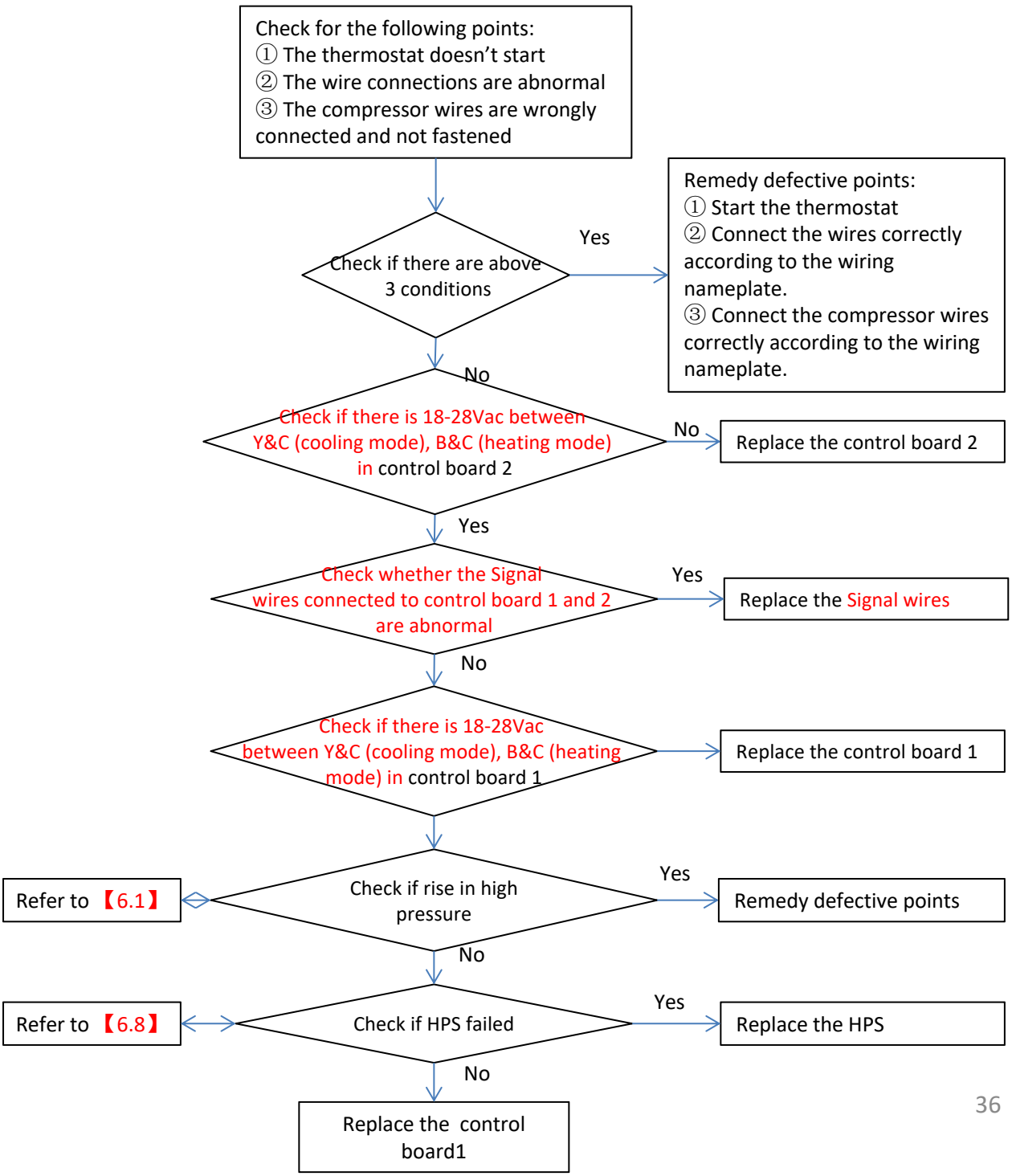
Troubleshooting



5.3 Symptom-based Troubleshooting

5.3.2 System does not start operation

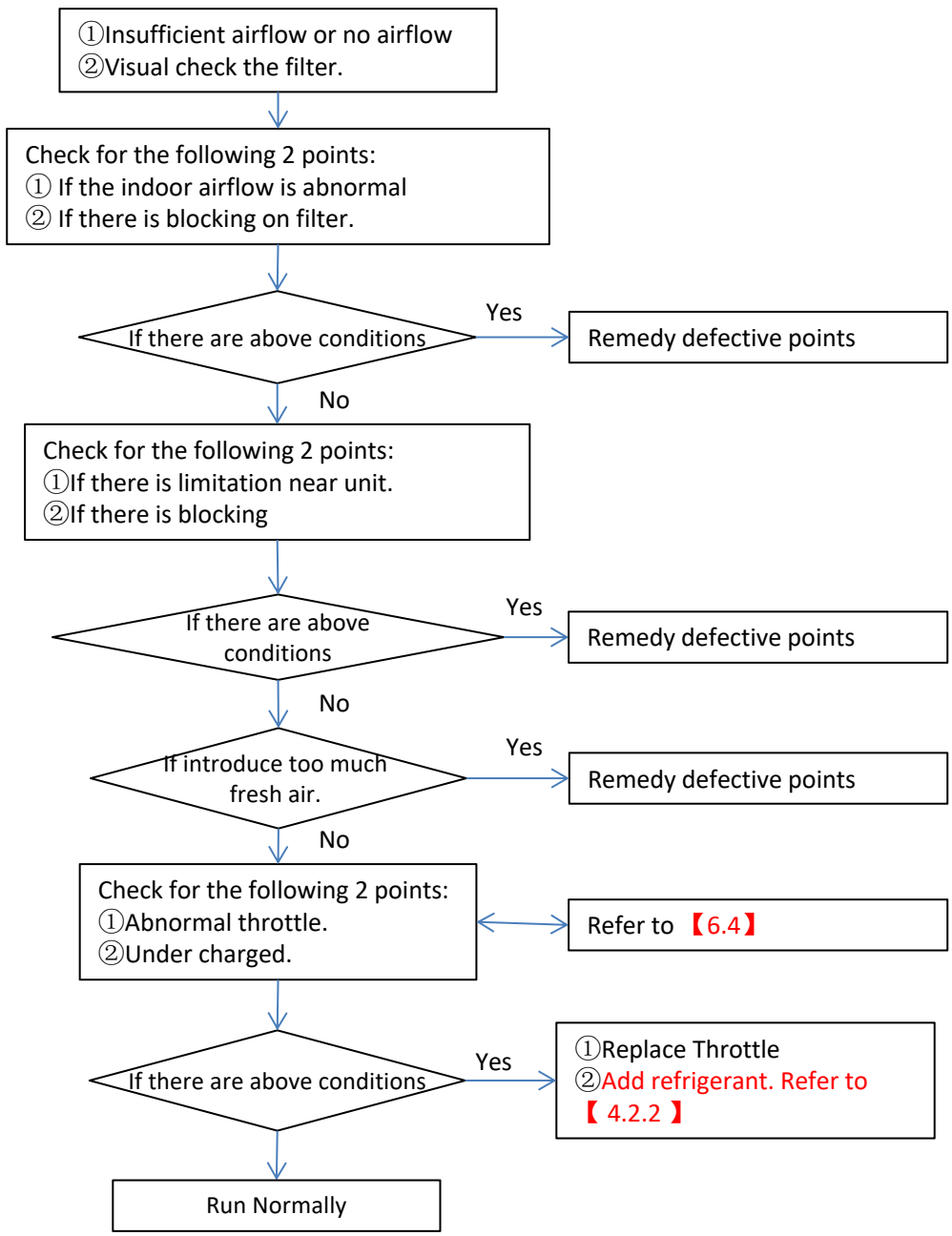
Issue	System does not start operation
Model	All
Fault name	/
Possible cause	• The thermostat doesn't start • Wrong wire connections between thermostat and unit • Damaged thermostat • Disconnect the compressor wire（could be caused after service） • Main control board 1 or main control board 2 is damaged



5.3 Symptom-based Troubleshooting

5.3.3 Capacity is low

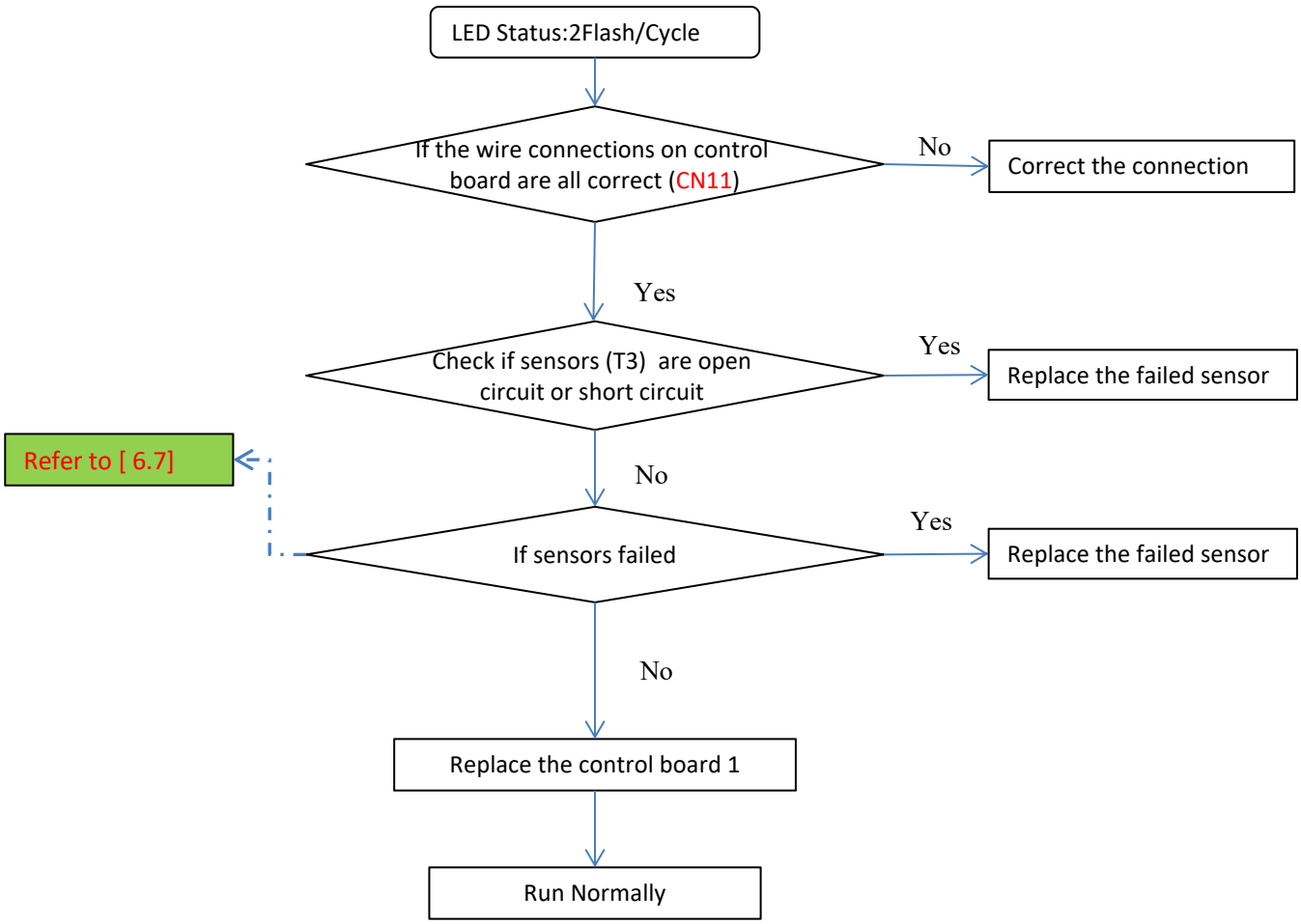
Issue	Capacity is low
Model	All
Name	/
Possible cause	• Poor heat dissipation in indoor unit • Poor heat dissipation in outdoor unit • Under charged • First start



5.4 Troubleshooting by Control board1 LED Status

5.4.1 1Flash/Cycle

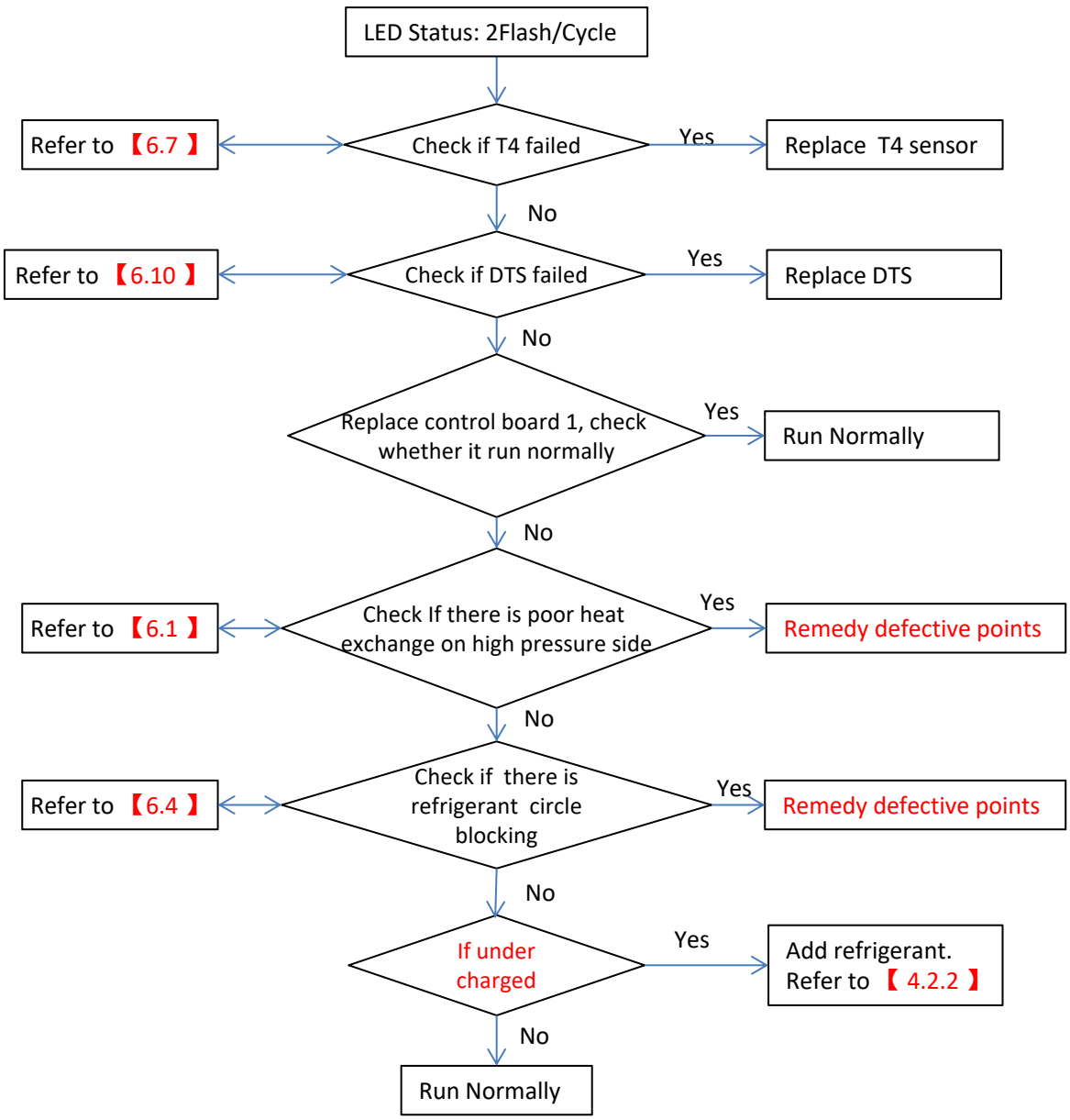
LED Status	1Flash/Cycle
Model	All
Name	T3 sensor fault
Possible cause	• T3 sensors failed • Wrong wire connections of sensor • Control board failure



5.4 Troubleshooting by Control board1 LED Status

5.4.2 2Flash/Cycle

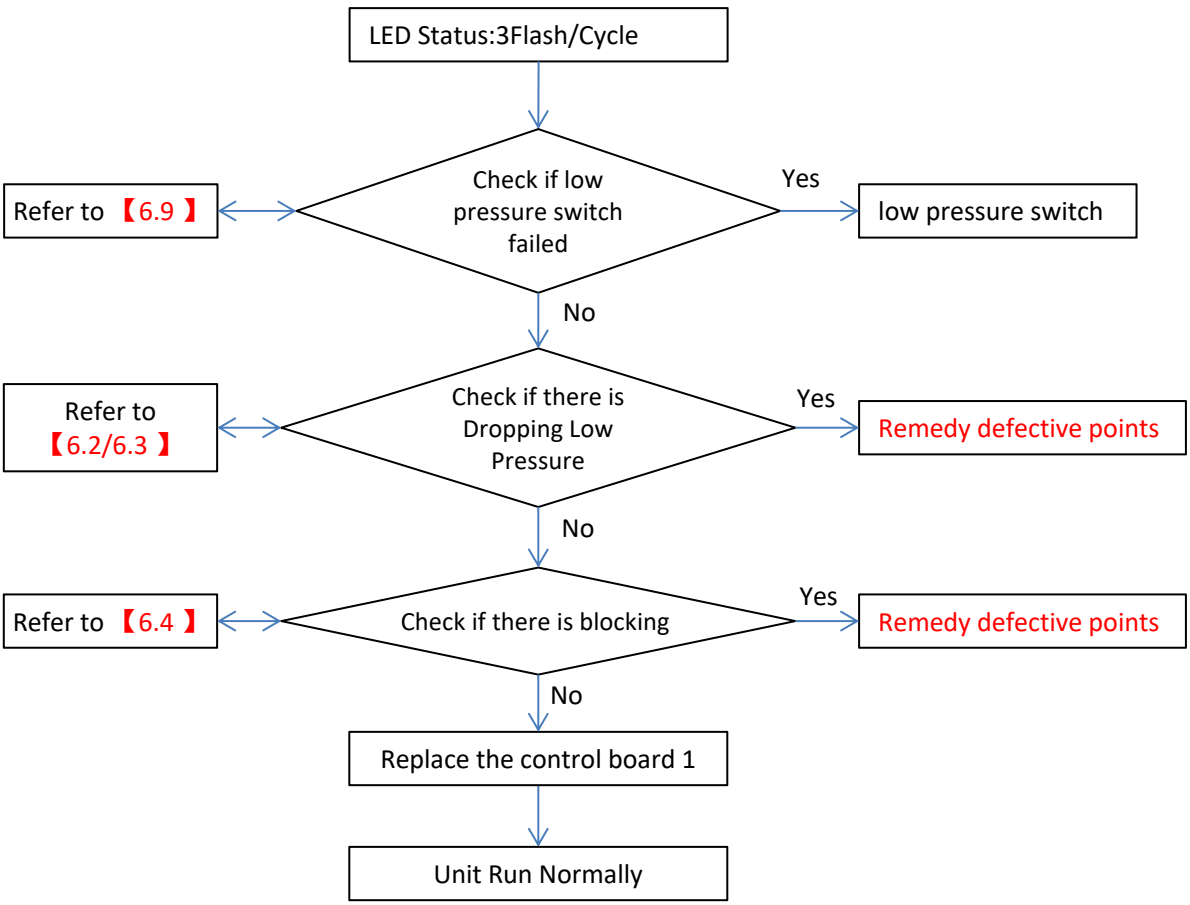
LED Status	2Flash/Cycle
Model	All
Name	T4 sensor fault or compressor discharge sensor fault
Possible cause	• T4 sensor failed • Under charged • Indoor unit motor stopped abnormally • poor heat exchange on indoor unit (heating mode) • Poor heat exchange on outdoor unit(cooling mode)



5.4 Troubleshooting by Control board1 LED Status

5.4.3 3Flash/Cycle

LED Status	3Flash/Cycle
Mode	All
Name	Low pressure cut-out protection
Possible cause	• Indoor unit motor stopped abnormally • Indoor unit coil poor heat exchange • Throttle/coil blocked • Under charged

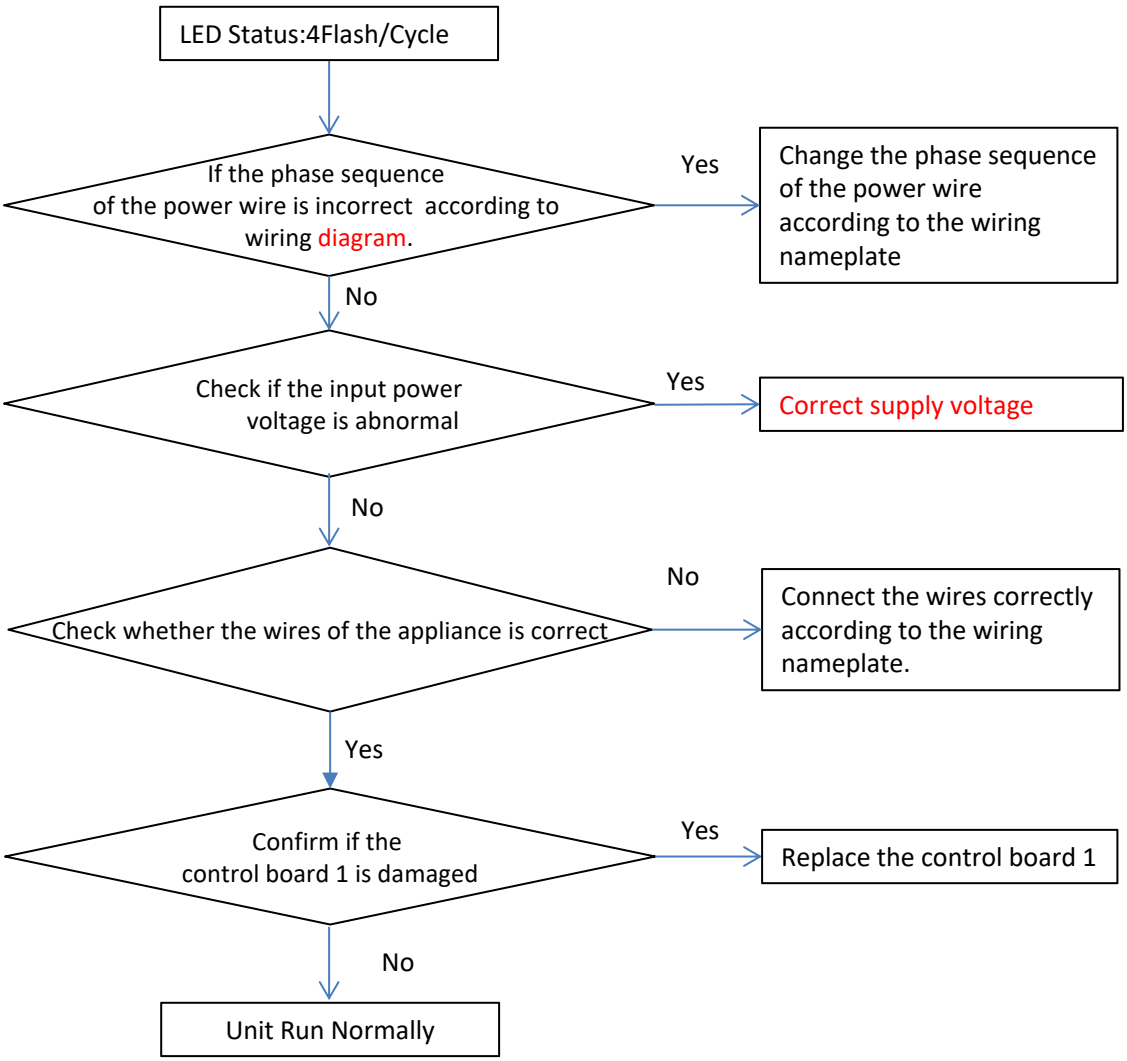


5.4 Troubleshooting by Control board1 LED Status

5.4.4 4Flash/Cycle

LED Status	4Flash/Cycle
Mode	All
Name	Power phase fault
Possible cause	• The phase sequence of the power cable is incorrect • Control board 1 malfunction

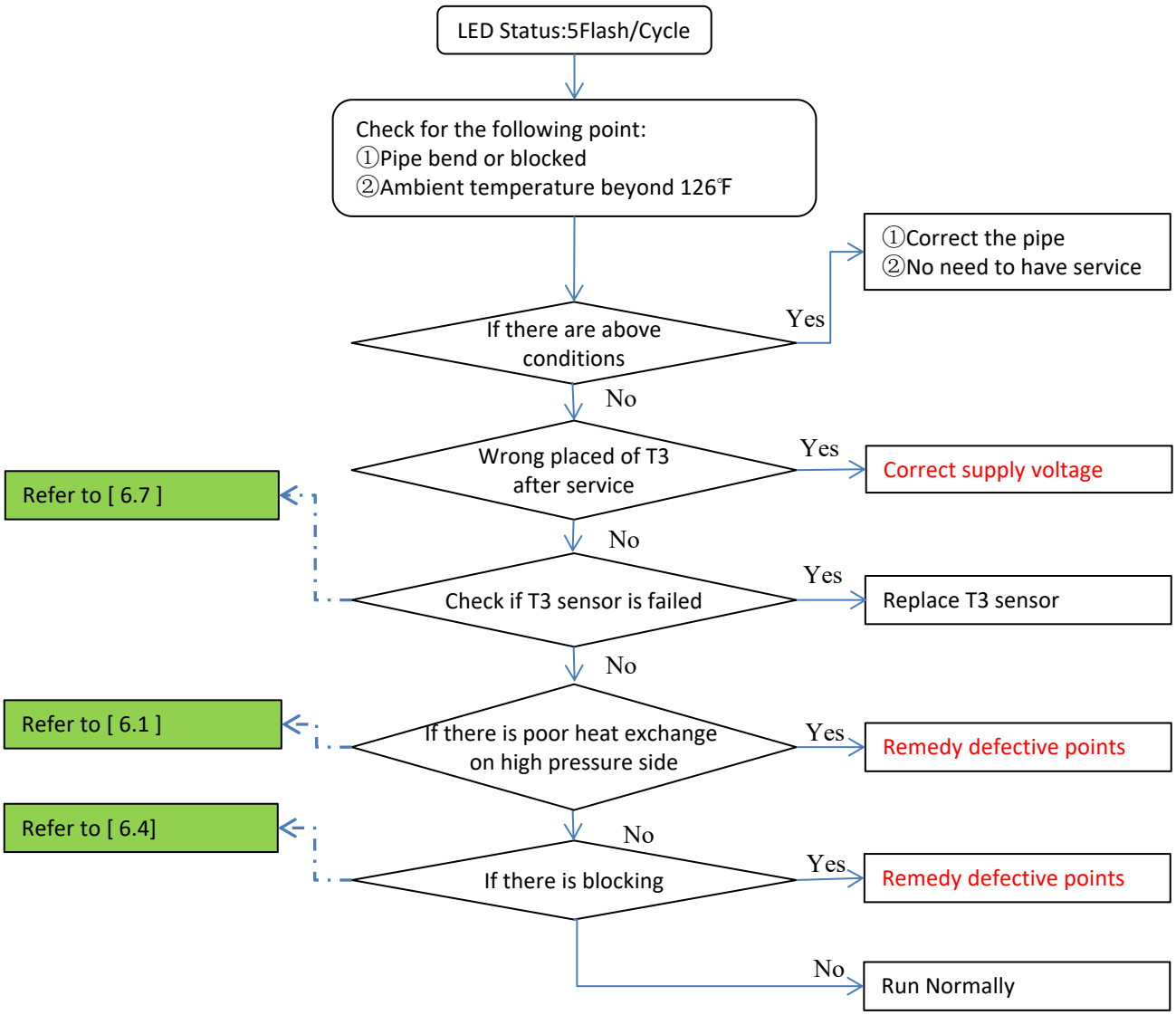
Note: this fault occurs only on 60K three-phase model



5.4 Troubleshooting by Control board1 LED Status

5.4.5 5Flash/Cycle

Faulty code	5Flash/Cycle
Model	Cooling
Name	Condenser coil temperature protection in cooling(T3)
Possible cause	• Poor heat exchange on outdoor unit（cooling mode） • Pipe blocked • location of T3 sensor error • Refrigerant over charged • T3 sensor failed • High ambition temperature

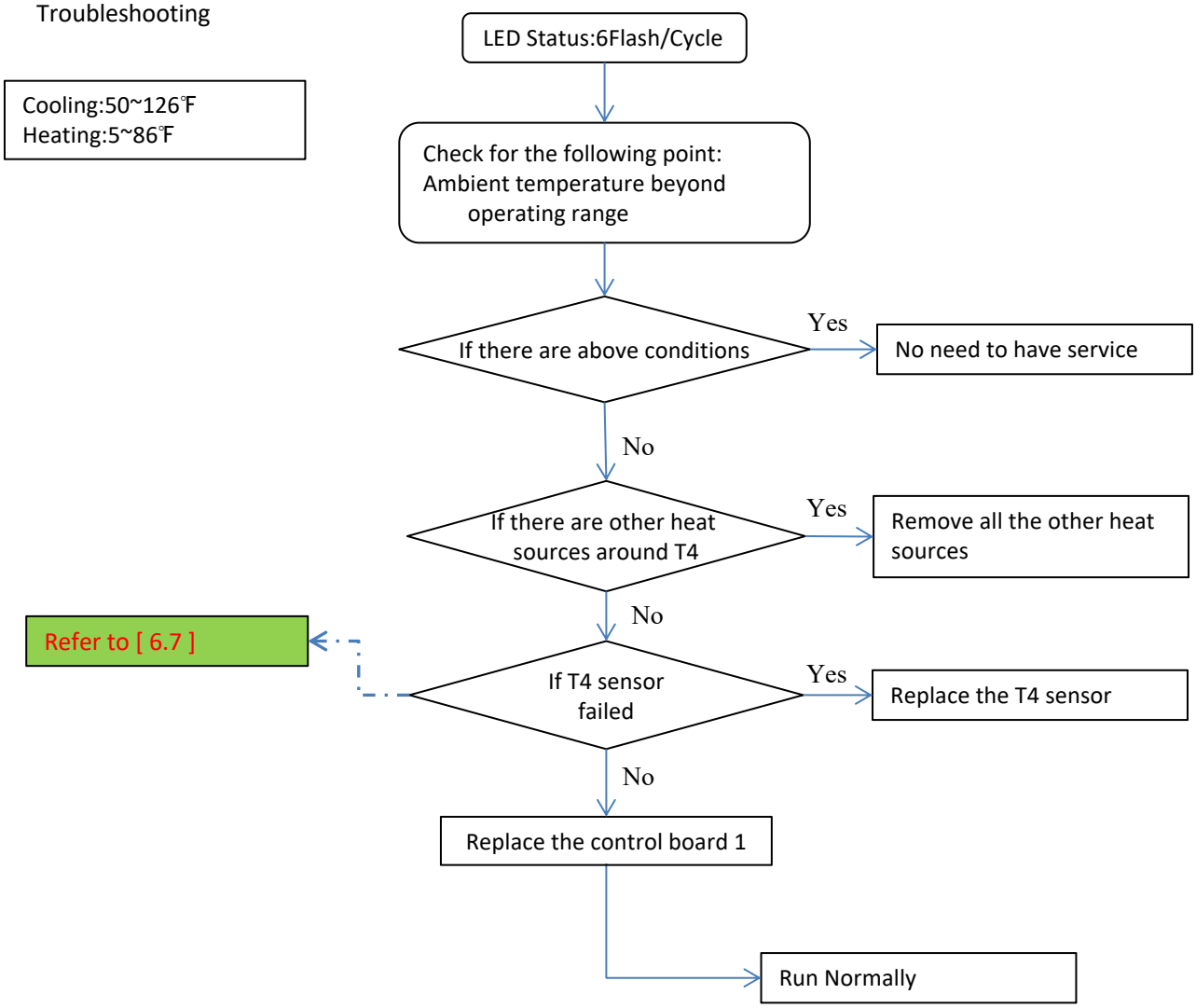


5.4 Troubleshooting by Control board1 LED Status

5.4.6 6Flash/Cycle

LED Status	6Flash/Cycle
Model	All
Name	Ambient temperature limited(T4)
Possible cause	• Ambient temperature beyond operating range • The O/B mode on thermostat set secure • There are other heat sources around T4 • T4 sensor fault

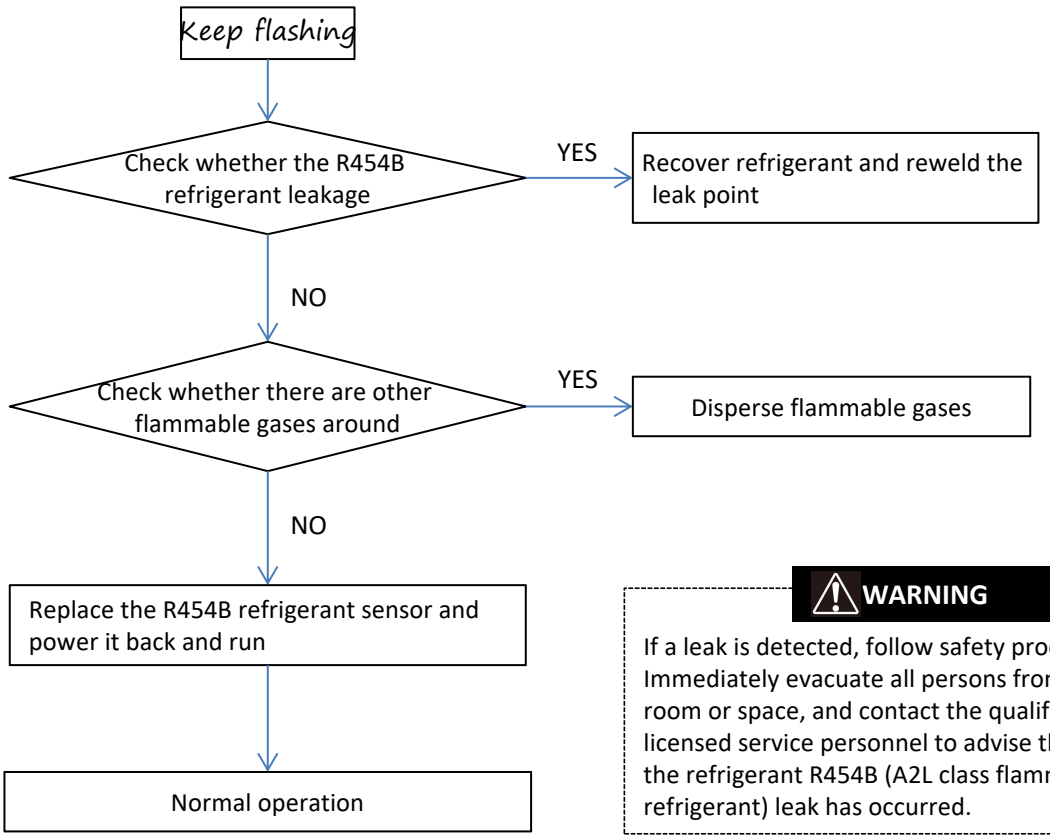
Troubleshooting



5.5 Troubleshooting by Control board2 LED Status

5.5.1 Keep flashing

Faulty code	Keep flashing
Model	All
Name	Refrigerant leakage fault
Possible cause	• R454B refrigerant leakage • Other flammable gases around • R454B refrigerant sensor failed



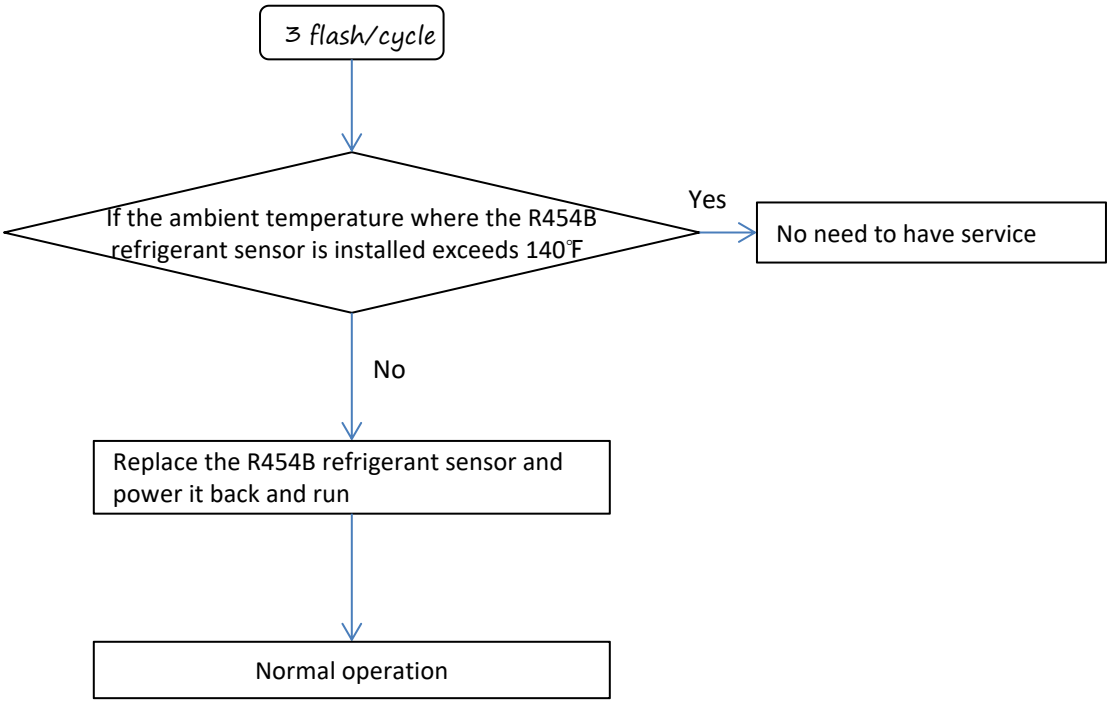
WARNING

If a leak is detected, follow safety procedures: Immediately evacuate all persons from the room or space, and contact the qualified licensed service personnel to advise them that the refrigerant R454B (A2L class flammable refrigerant) leak has occurred.

5.5 Troubleshooting by Control board2 LED Status

5.5.2 3 flash/cycle

Faulty code	3 flash/cycle
Model	All
Name	R454B refrigerant sensor fault
Possible cause	• Sensors failed • Beyond the normal operating temperature range

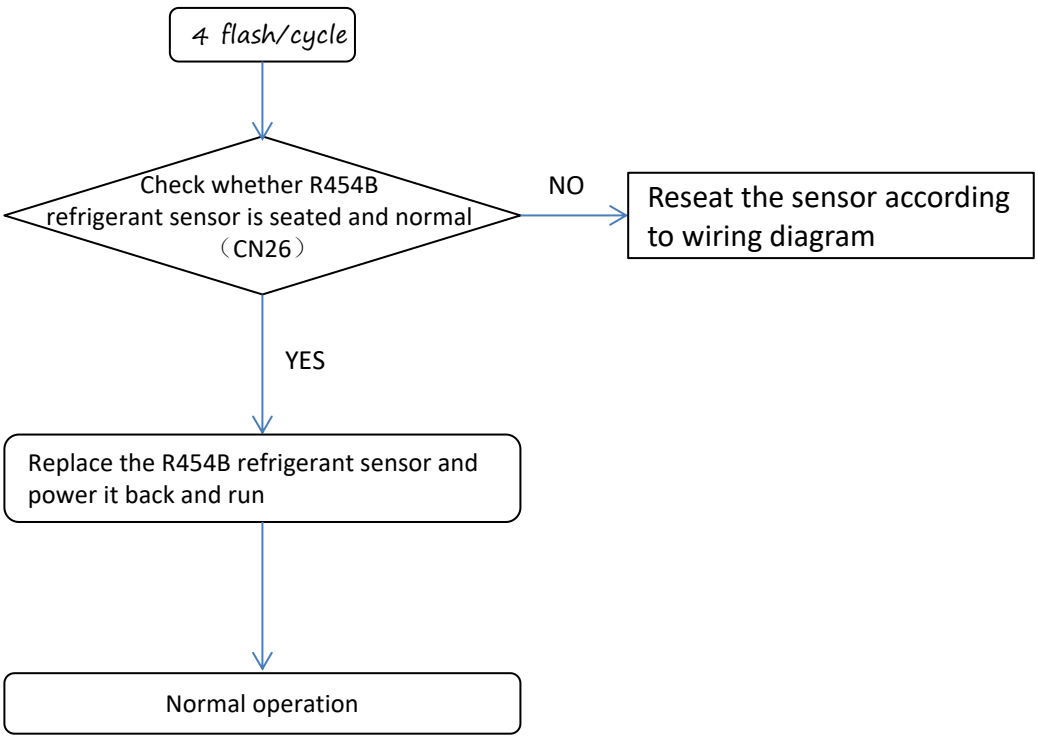


5.5 Troubleshooting by Control board2 LED Status

5.5.3 4 flash/cycle

Faulty code	4 flash/cycle
Model	All
Name	R454B refrigerant sensor communication fault
Classify	Electric issue
Possible cause	• R454B refrigerant sensor line connection in indoor unit abnormal: refrigerant sensor signal line in indoor unit is not properly plugged (CN26) • R454B refrigerant sensor in indoor unit abnormal: damaged
Notes:	

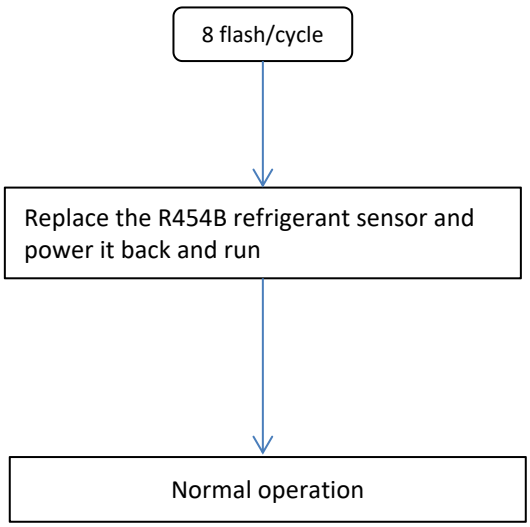
Troubleshooting



5.5 Troubleshooting by Control board2 LED Status

5.5.4 8 flash/cycle

Faulty code	8 flash/cycle
Model	All
Name	R454B refrigerant sensor over service life
Possible cause	• R454B refrigerant sensor over service life

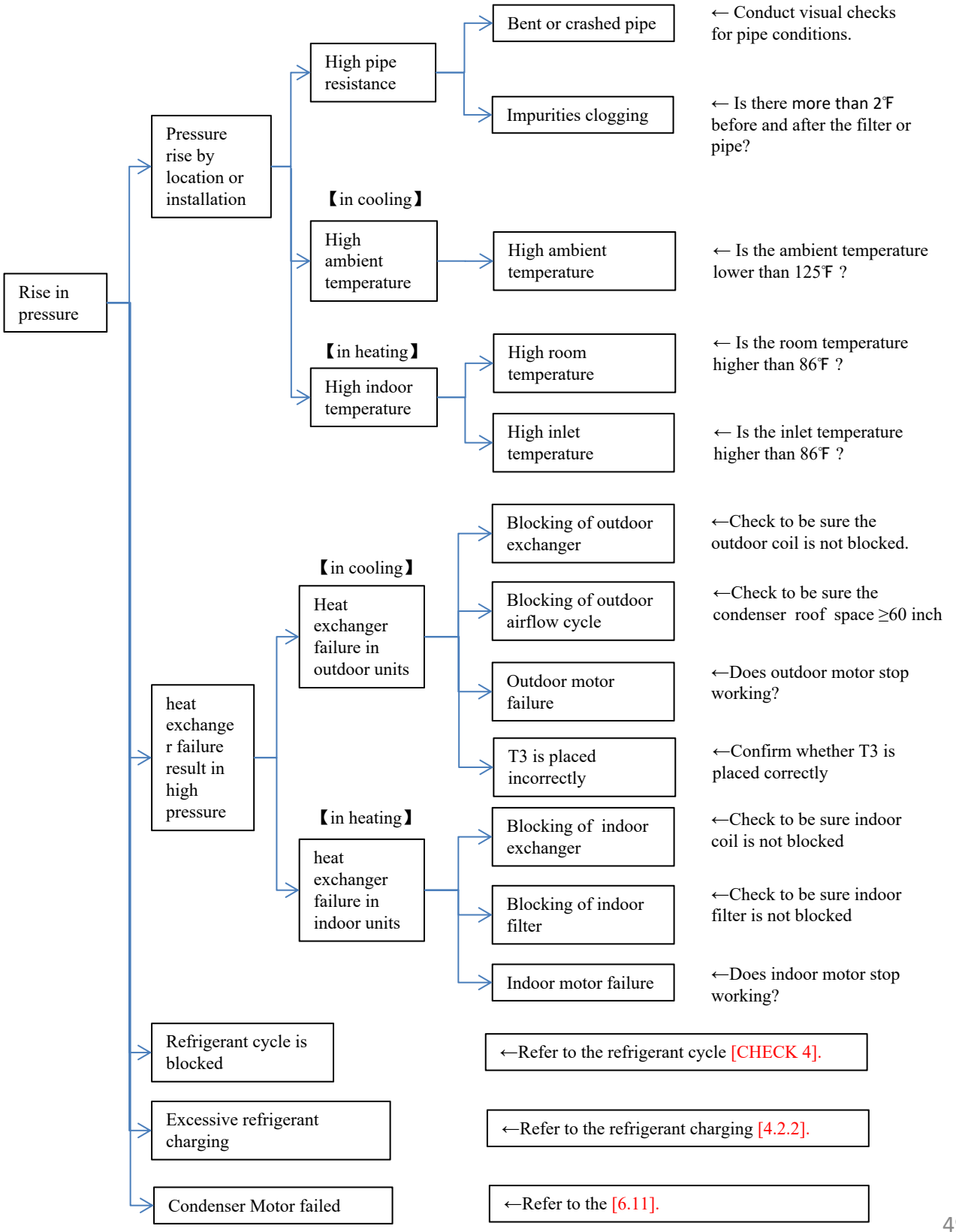


⚠ WARNING

The installation of the R454B refrigerant leakage sensor shall allow access for checking, repair or replacement by an authorized person.

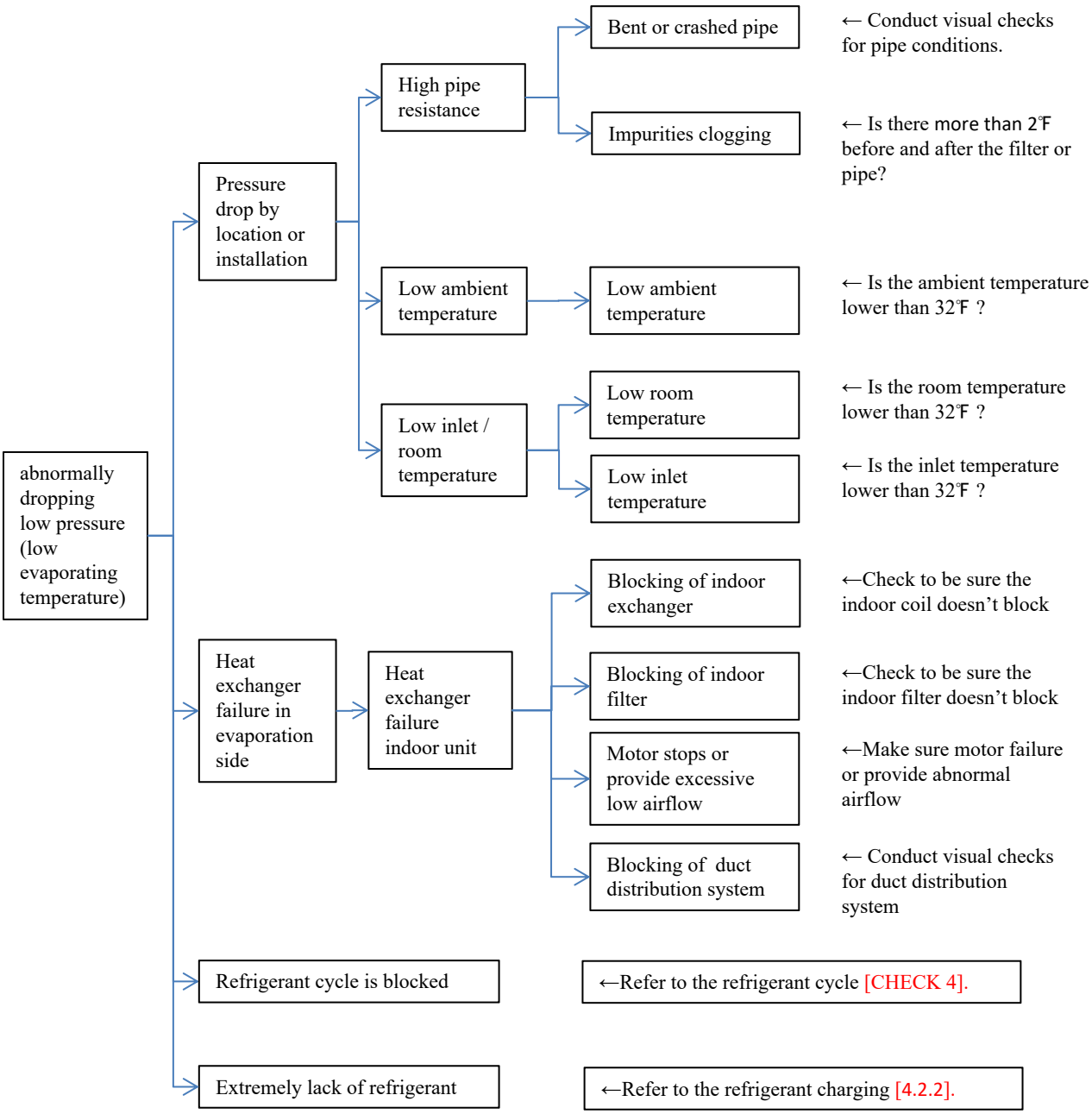
CHECK 1 6.1 Check for Causes of Rise in High Pressure

Note: 310-380PSIG head pressure is normal for heating in normal conditions operation. The pressure may be as high as 440PSIG at 40°F outdoor temperature or higher.

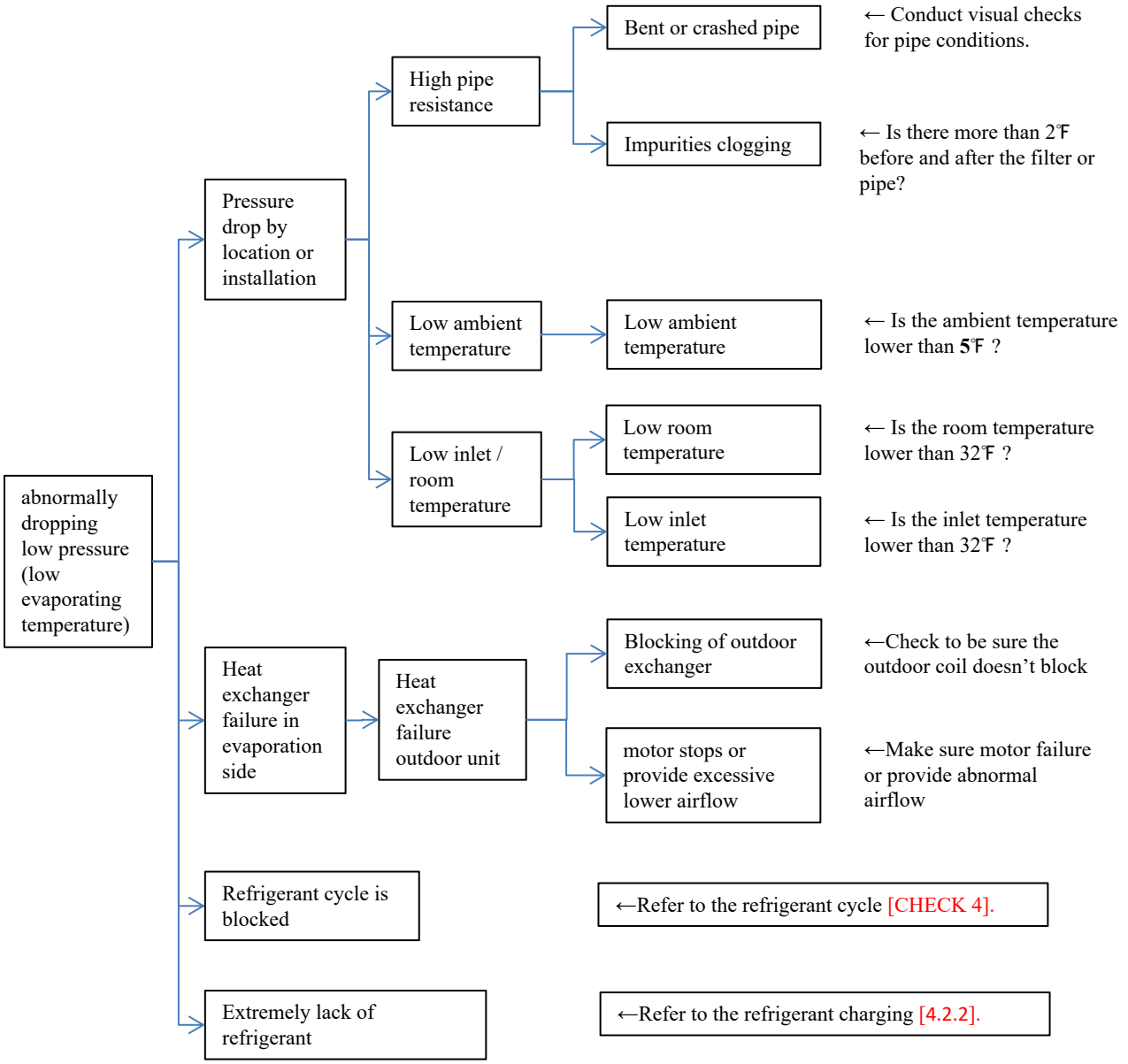


CHECK 2 6.2 Check for Causes of Dropping Low Pressure in cooling

Note: 110-140PSIG head pressure is normal in cooling conditions. The value may be lower/higher at maximum/minimum/limited frequency of compressor operation .

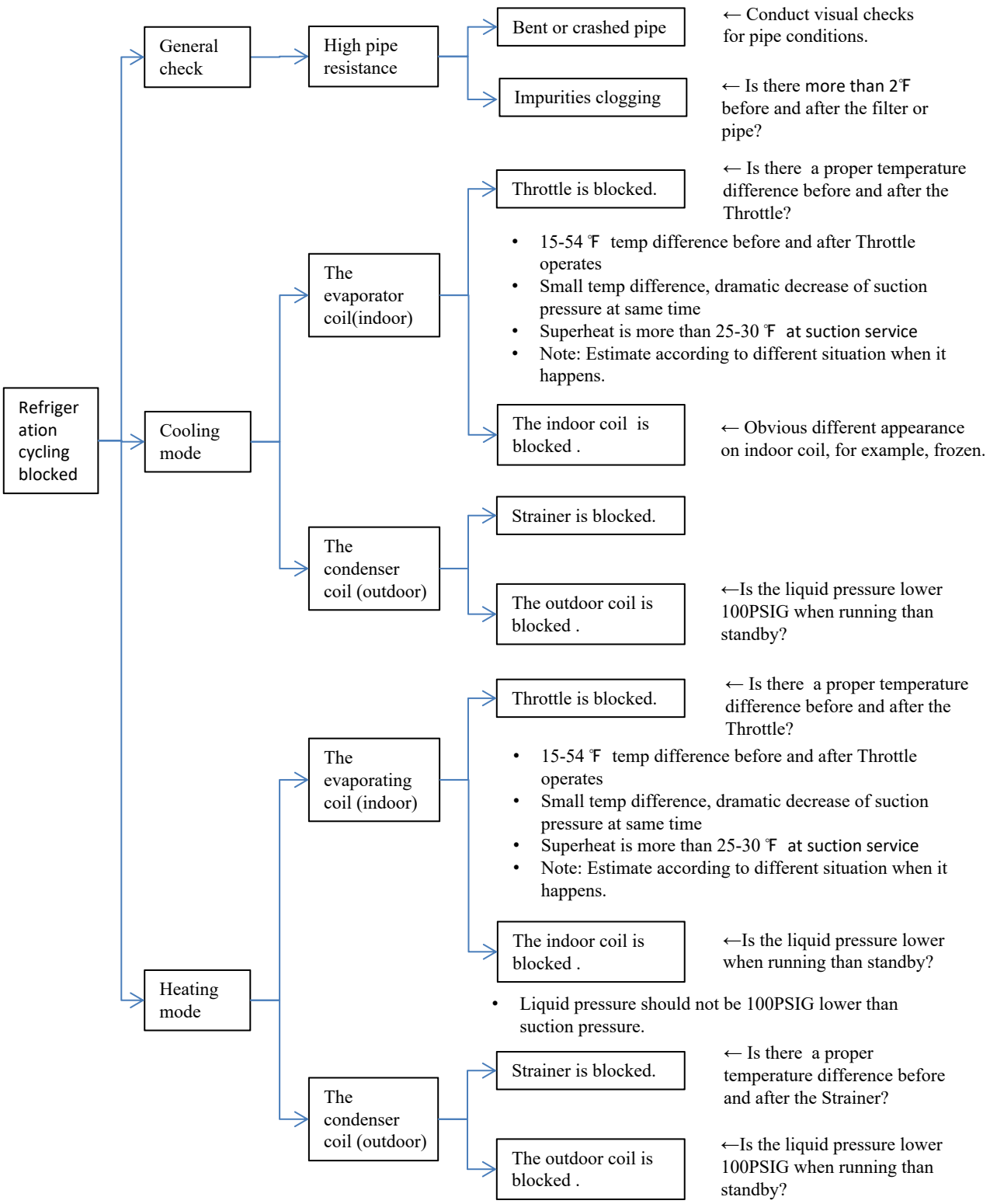


CHECK 3 6.3 Check for Causes of Dropping Low Pressure in heating



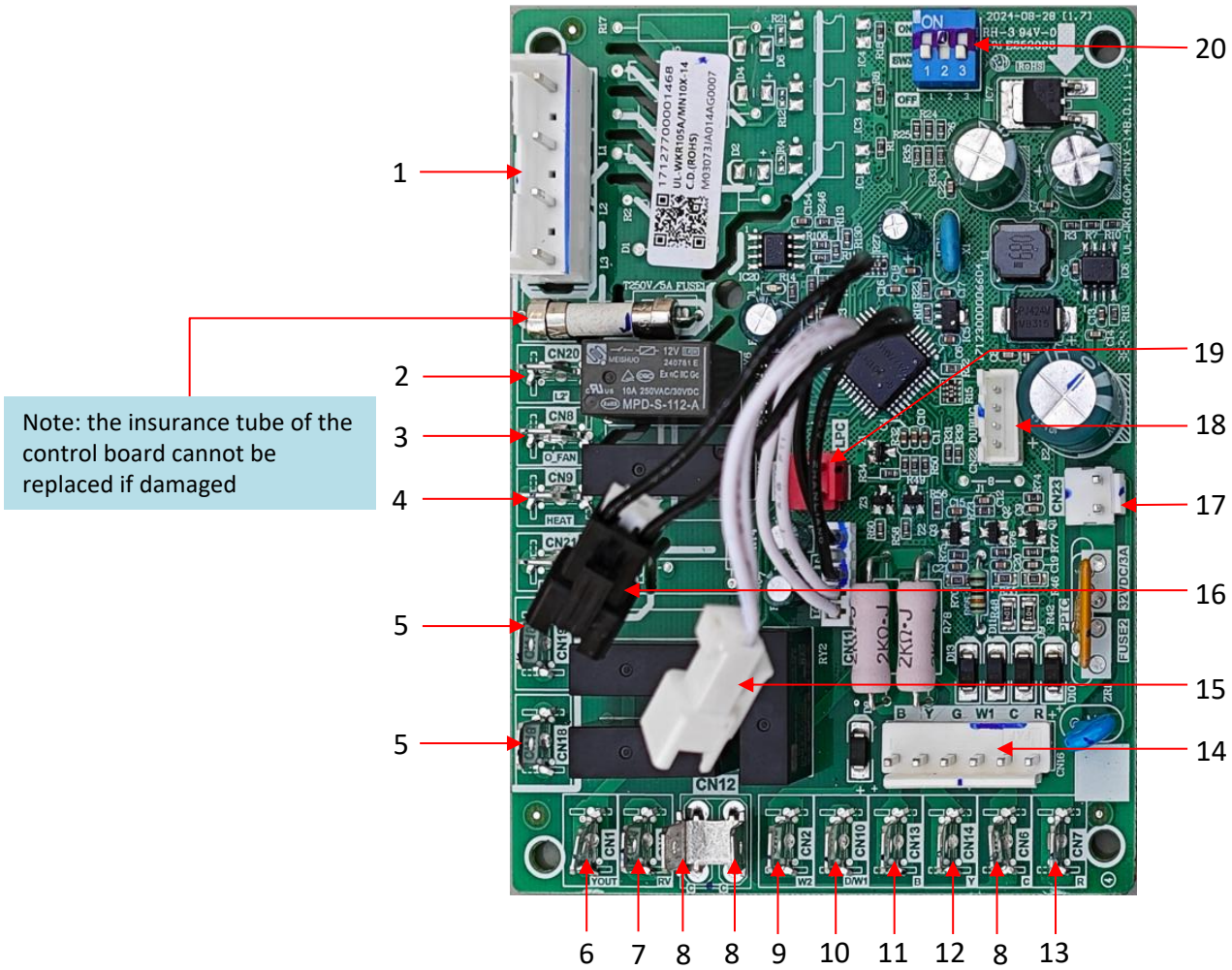
CHECK 4 6.4 Check for Causes of Refrigeration cycling blocked

Note: Check at normal cooling and heating mode operation, some problems will be more obvious.



CHECK 5 **6.5 Check for Control Board1**

Note: Using the control board 1 of a single-phase model as an example



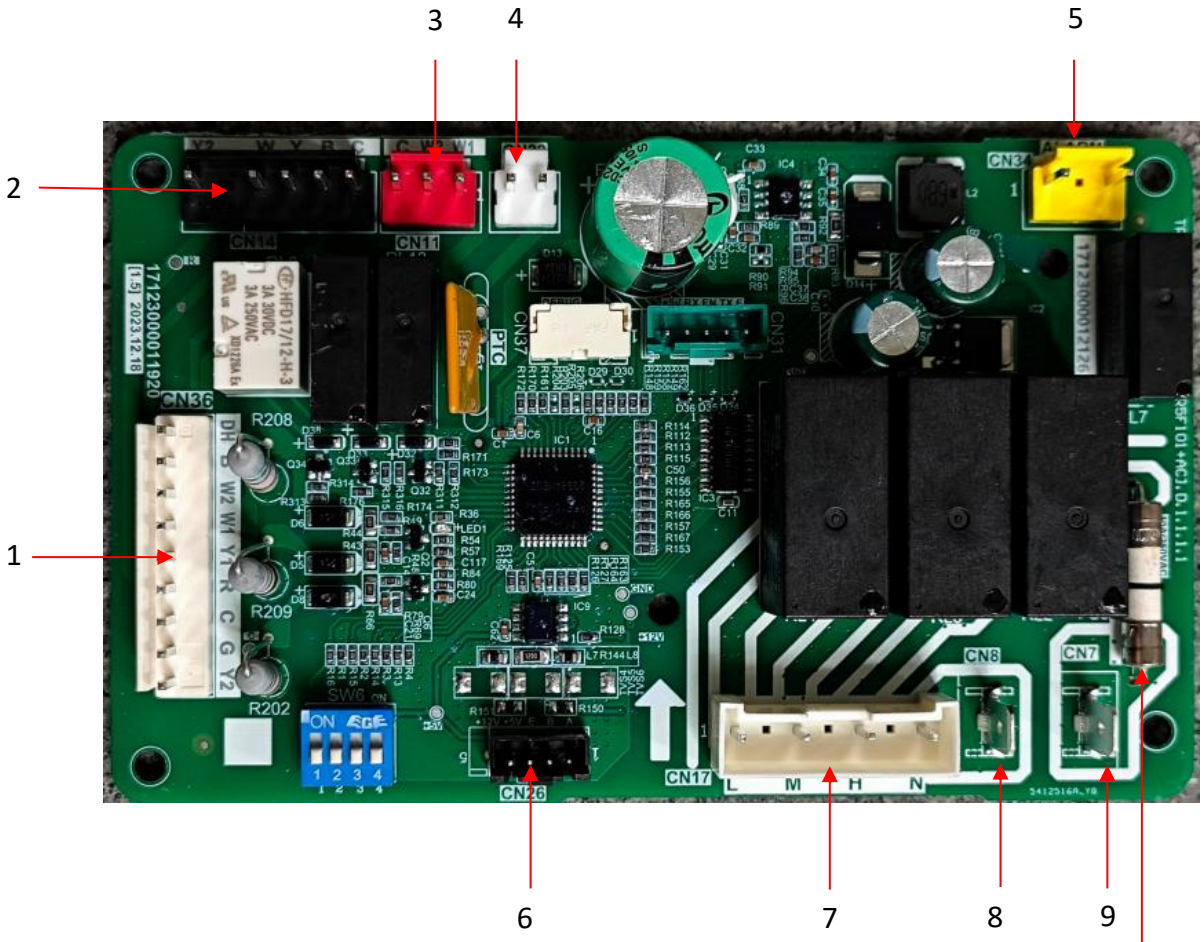
1 Power port
2 L2 Power port
3 Outdoor fan output port
4 Heat control port
5 Reserved port
6 Compressor contactor control port
7 Reversing port (heat pump only)
8 Thermostat wire connections
9 W2 signal port
10 D/W1 signal port
11 B signal port
12 Y signal port
13 24 VAC output port
14 Conventional 24VAC non-communicating thermostat control wires port
15 T4 sensor port
16 T3 sensor port
17 24 VAC input port
18 Main control board debug port
19 Low Pressure switch port (heat pump only)
20 SW1-3 dip switch : defrost logic setting

CHECK 5 **6.5 Check for Control Board1**

Label	Port	Code	Content	Voltage
1	CN17	L1/L2/L3	Power port	0 or 230VAC
2	CN20	L2’	L2’ power port	0 or 230VAC
3	CN8	O_FAN	Outdoor fan output port	0 or 230VAC
4	CN9	HEAT	Heat control port	0 or 230VAC
5	CN18	M1	Reserved	—
	CN19	M2	Reserved	—
6	CN1	YOUT	Compressor contactor control port	0 or 24VAC
7	CN3	RV 24V	Reversing valve port	0 or 24VAC
8	CN16	C B Y W	Thermostat wire connections	0 or 24VAC
9	CN2	W2	W2 signal port	0 or 24VAC
10	CN10	D/W1	D/W1 signal port	0 or 24VAC
11	CN13	B	B signal port	0 or 24VAC
12	CN14	Y	Y signal port	0 or 24VAC
13	CN7	R	24 VAC output port	0 or 24VAC
14	CN16	--	Conventional 24VAC non-communicating thermostat control wires port	0 or 24VAC
15	CN11	T4	T4 sensor port	0-5VDC(varying)
16	CN11	T3	T3 sensor port	0-5VDC(varying)
17	CN23	--	24 VAC input port	0 or 24VAC
18	CN22	DUBUG	Main control board debug port	0-5VDC(varying)
19	CN15	LPC	Low Pressure switch port (heat pump only)	0-5VDC(varying)
20	SW3	SW3	SW1-3 dip switch : defrost logic setting	0-5VDC(varying)

CHECK 6 **6.6 Check for Control Board2**

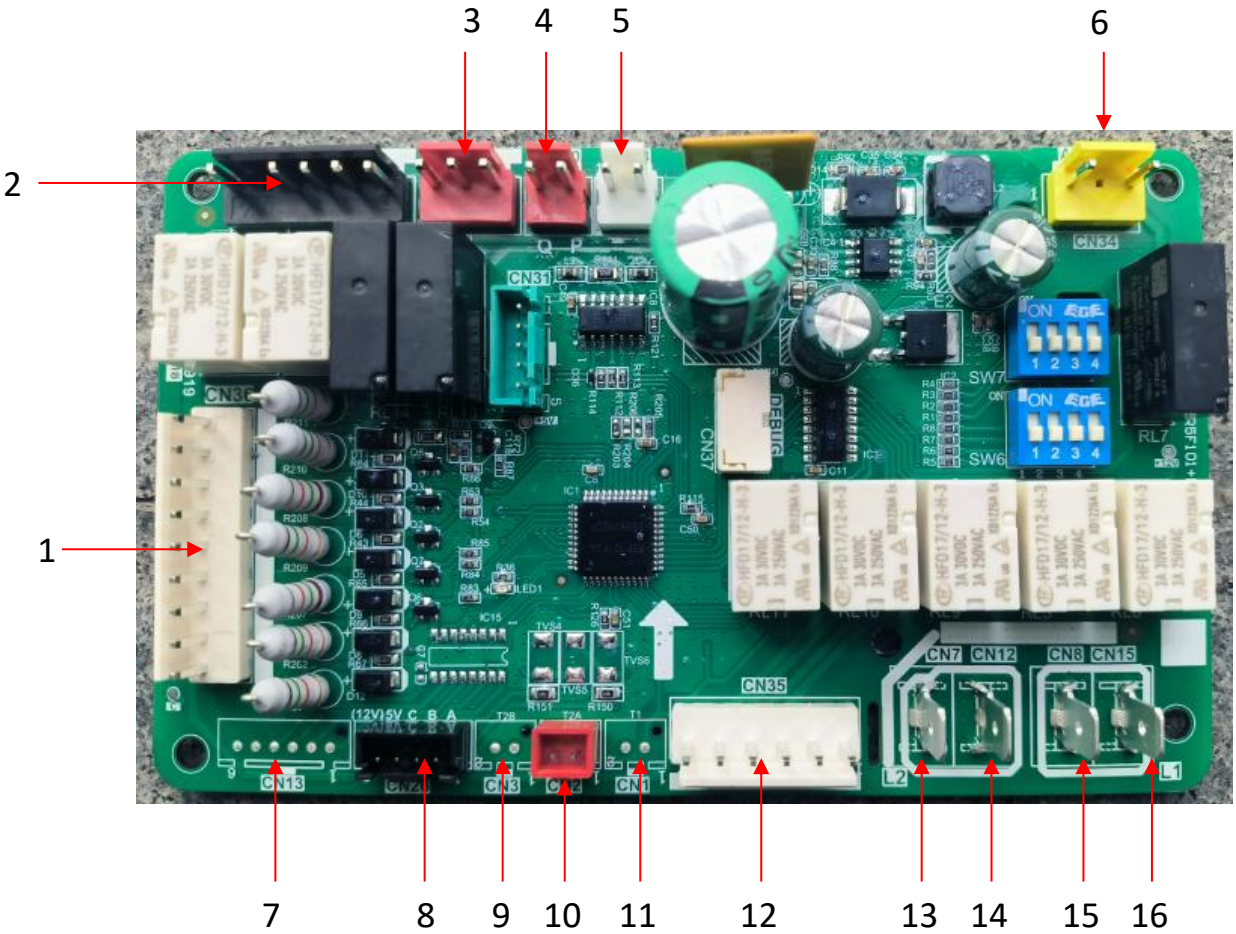
6.6.1 Control board2 for AC motor



Label	Port Code	Content	Port Voltage
1	CN36	Thermostat wire connections	0-24V AC
2	CN14	Outdoor unit control port	0-24V AC
3	CN11	Heating kit control port	0-24V AC
4	CN33	Transformer output	0-24V AC
5	CN34	Alarm connection (Reserve)	0-12V AC
6	CN26	R454B refrigerant sensor port	0-5V AC
7	CN17	Indoor fan motor control port	208-230V AC
8	CN8	Power in (L2)	208-230V AC
9	CN7	Power in (L1)	208-230V AC

CHECK 6 **6.6 Check for Control Board2**

6.6.2 Control board2 for DC motor



Label	Port Code	Content	Port Voltage
1	CN36	Thermostat wire connections	0-24V AC
2	CN14	Outdoor unit control port	0-24V AC
3	CN11	Heating kit control port	0-24V AC
4	CN30	Outdoor unit communication port	0-5V AC
5	CN33	Transformer output	0-24V AC
6	CN34	Alarm connection (Reserve)	0-12V AC
7	CN13	EEV port	0-12V AC
8	CN26	R454B refrigerant sensor port	0-5V AC
9	CN3	T2B sensor port	0-5V AC
10	CN2	T2 sensor port	0-5V AC
11	CN1	T1 sensor port	0-5V AC
12	CN35	Indoor fan motor control port	0-24V AC
13	CN7	Power in (L2)	208-230V AC
14	CN12	Power in (L2)	208-230V AC
15	CN8	Power in (L1)	208-230V AC
16	CN15	Power in (L1)	208-230V AC

CHECK 7 6.7 Check for Temperature Sensor（T3/T4）

Check temp transducer（T3/T4）：
Compare the temperature checked (T3/T4), it's normal if the temperature difference was within 15℉ when standby.

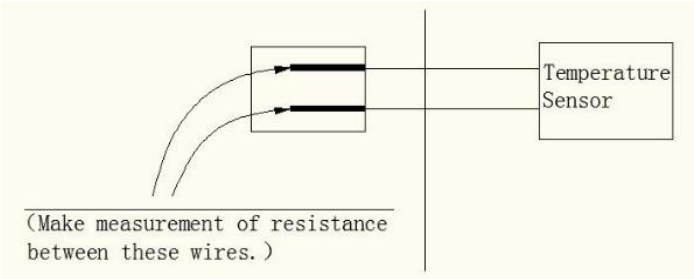
T3/T4: 77℉ --10KΩ

Normal — Yes → Work well

No → Ambient temp below 5℉ ? — Yes → Out of operating range. Do nothing

No

When power off and sensor unplugged



Resistance in thermistor beyond the chart — Yes → Replace sensor

Refer to 【7.6】

No → Replace the control board

Note：low probability, caution in handling

CHECK 8 6.8 Check for High Pressure Switch（HPS）

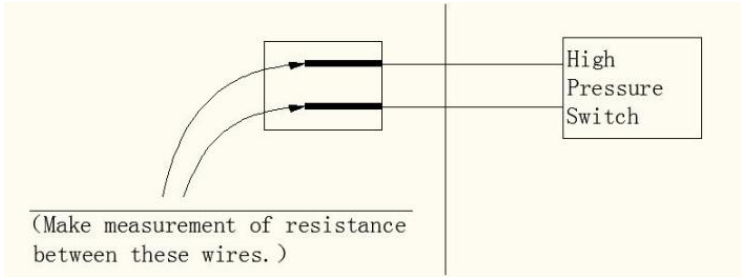
High Pressure Switch：
Whether the switch can start normally when start the machine

Start normally

Yes → Work well

No

When power off and pull up



Note:
Normal high pressure switch opens above 580PSIG, resets below 435PSIG.

High pressure switch secure, wiring damaged

Yes → *Reconnect/repair damaged wiring*

No

R ＞ 1Ω

Yes → abnormal pressure switch, replace it

No

Still in high pressure protection?

Yes → Replace control board 1

Note: low probability, caution in handling

No

Work well

CHECK 9 6.9 Check for Low Pressure Switch（LPS）

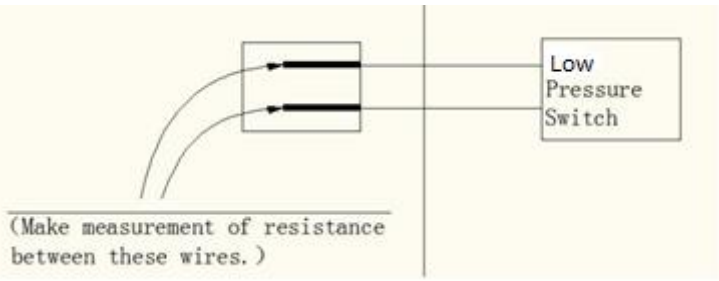
Low Pressure Switch：
Whether the switch can start normally when start the machine

Start normally

Yes → Work well

No

When power off and pull up



Note:
Normal high pressure switch opens below 14.5PSIG, resets above 32PSIG.

Low pressure switch secure, wiring damaged?

Yes → Reconnect/repair the damaged wiring

No

R ＞ 1Ω

Yes → abnormal pressure switch, replace it

No

Still in low pressure protection?

Yes → Replace control board 1

Note: low probability, caution in handling

No

Work well

CHECK 10 6.10 Check for Discharge Temperature Switch（DTS）

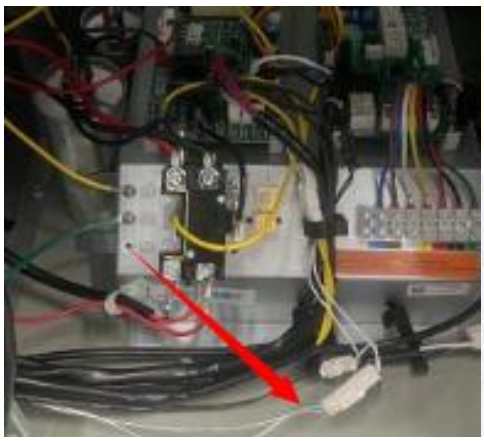
Discharge Temperature Switch：
Whether the switch can start normally when start the machine

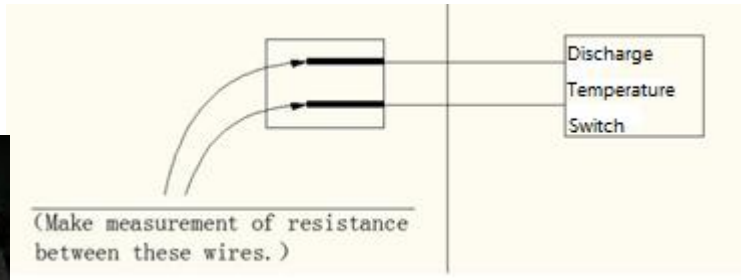
Start normally

Yes → Work well

No

When power off and pull up





Discharge Temperature Switch secure, wiring damaged?

Yes → Reconnect/repair the damaged wiring

No

R ＞ 1Ω

Yes → abnormal pressure switch, replace it

No

Still in Discharge Temperature Switch protection?

Yes → Replace control board 1

Note: low probability, caution in handling

No

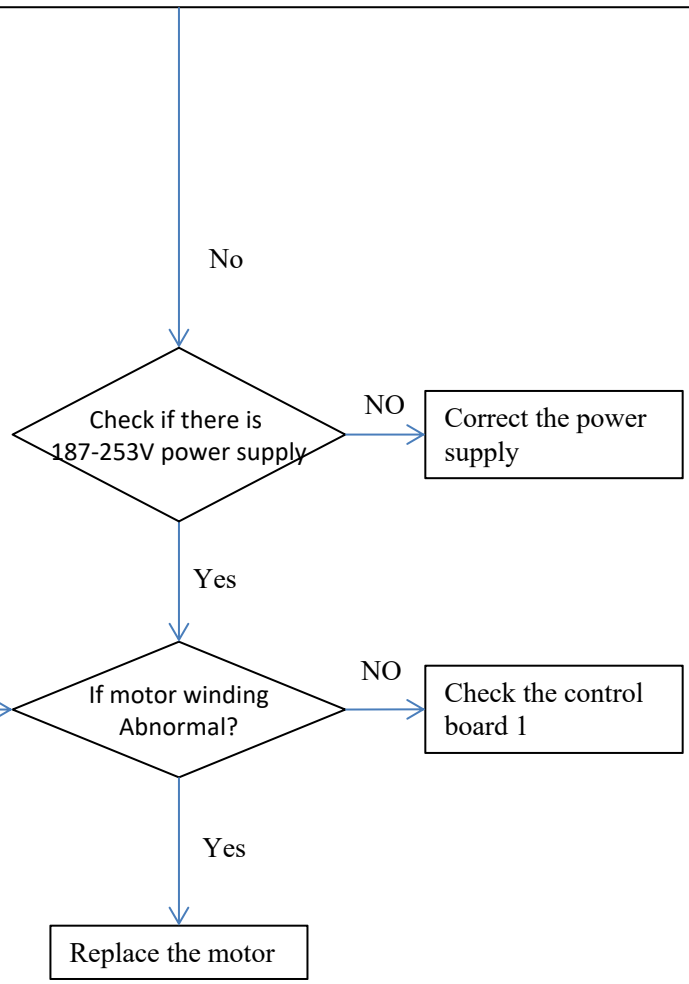
Work well

Note:
For 24K/30K/36K/42K:
Normal discharge temperature switch opens above 239℉ , resets below 167℉
For 48K/60K 1PH/60K 3PH:
Normal discharge temperature switch opens above 257℉ , resets below 203℉

CHECK 11 6.11 Check for outdoor unit fan motor

Outdoor unit fan motor：
Whether fan can start normally

Fan	measuring position	Resistance（Ω）
60W	Between black and orange	<170；＞100
	Between black and brown	<50；＞30
110 W	Between black and orange	<55；＞35
	Between black and brown	<70；＞45
290 W	Between black and orange	<25；＞16
	Between black and brown	<13；＞8



CHECK 12 6.12 Check for Compressor

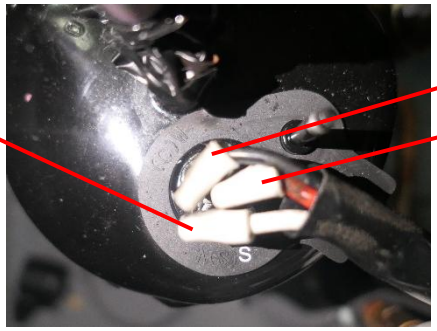
6.12.1 Check for Compressor for single-phase models

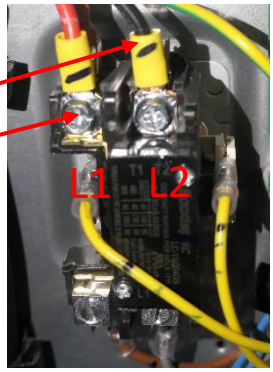
Compressor:
Whether compressor can start normally

Note: for 24K/30K/36K/42K/48K/60K single phase models.

Normal? — Yes → Work well

No → When power off, after 3minutes and unplugged





Note: For Scroll compressor, supply wring is unitary, you can check it with colour (Red for L1, Black for L2, White for S)

Resistance （Ω）	Rotary	Scroll
Between R and C （L1 and L2）	<2	<2
Between C and S (L1 and S)	<2	<1
Between R and S (L2 and S)	<4	<1
Between U/V/W and ground	>10M	>10M

Normal compressor winding? — No → Replace compressor

Yes → If the ground resistance is normal? — No → Replace compressor

Yes → If the compressor current is normal — No → Replace compressor

If the current is pulsating violently or abnormally beyond the “B” value

Yes → Check according to the condition of whole unit

Model	1.5Ton	2Ton	2.5Ton	3Ton	3.5Ton	4Ton	5Ton 1PH	5Ton 3PH
B(A)	10	12	13	17	20	23	30	20

CHECK 12 6.12 Check for Compressor

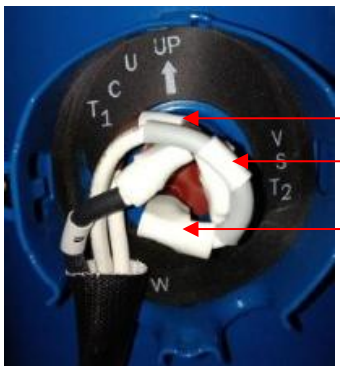
6.12.2 Check for Compressor for three-phase models

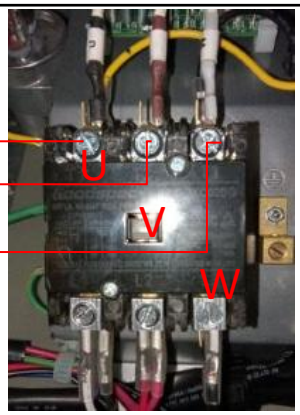
Compressor：
Whether compressor can start normally

Note: for 24K/30K/36K/42K/48K/60K single phase models.

Normal? — Yes → Work well

No → When power off，after 3minutes and unplugged





Note:)

Resistance （Ω）	Scroll
Between R and C （U and V）	<1
Between C and S (U and W)	<1
Between R and S (V and W)	<1
Between U/V/W and ground	>10M

Normal compressor winding? — No → Replace compressor

Yes → If the ground resistance is normal? — No → Replace compressor

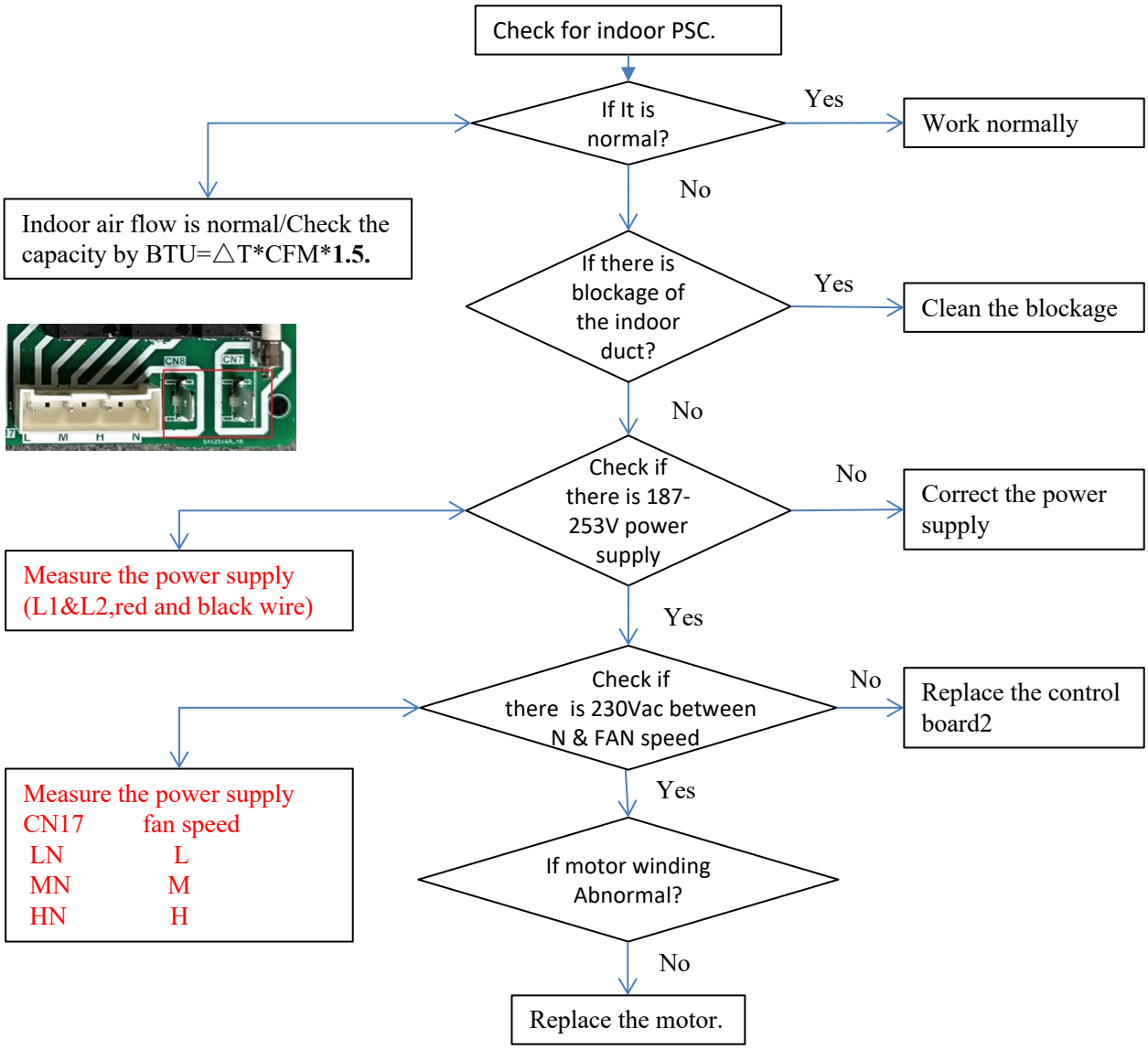
Yes → If the compressor current is normal — No → Replace compressor

If the current is pulsating violently or abnormally beyond the “B” value

Yes → Check according to the condition of whole unit

Model	1.5Ton	2Ton	2.5Ton	3Ton	3.5Ton	4Ton	5Ton 1PH	5Ton 3PH
B(A)	10	12	13	17	20	23	30	20

CHECK 13 6.13 Check for indoor unit PSC status

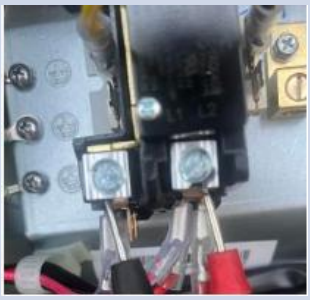


CHECK 14 6.14 Check for indoor unit ECM status

Indoor air flow：
Indoor air flow is normal? Check the capacity by BTU=△T*CFM***1.5** in force mode。

Normal? — Yes → Work well

No

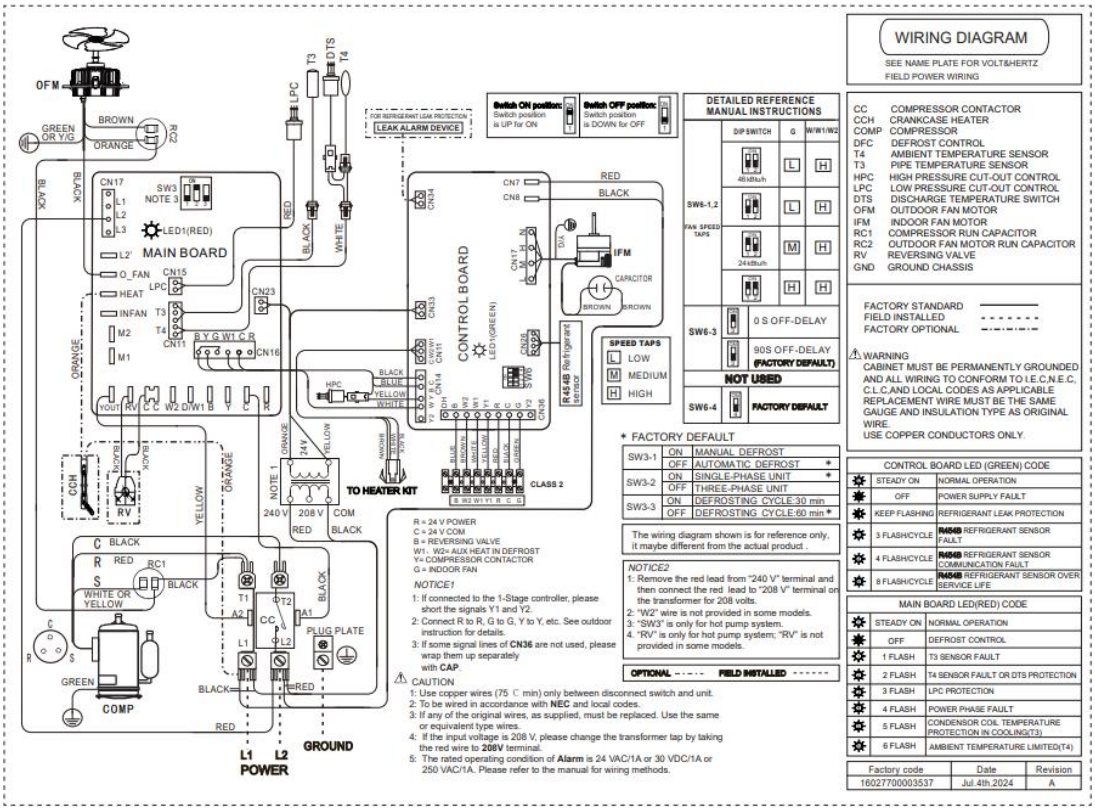
2.5/3/3.5/5Ton	Voltage (V)	Guide
Between L1 and L2	254>V>187	Black and red wire 
Between C and ,3,or,5(CN35)	27>V>18	

If the motor winding voltage are normal? — No → Check control board2

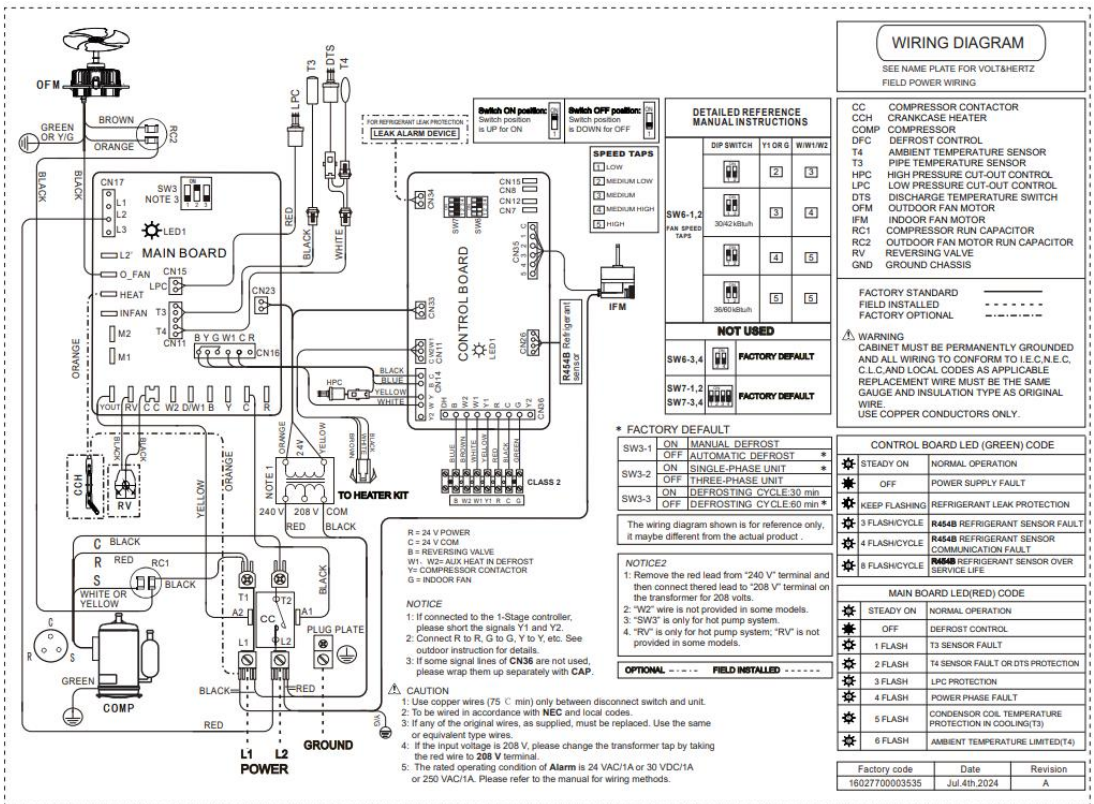
Yes → Replace motor

Appendix 1 7.1 Wiring diagrams

Single phase power supply electrical control wiring nameplate paired with AC motor

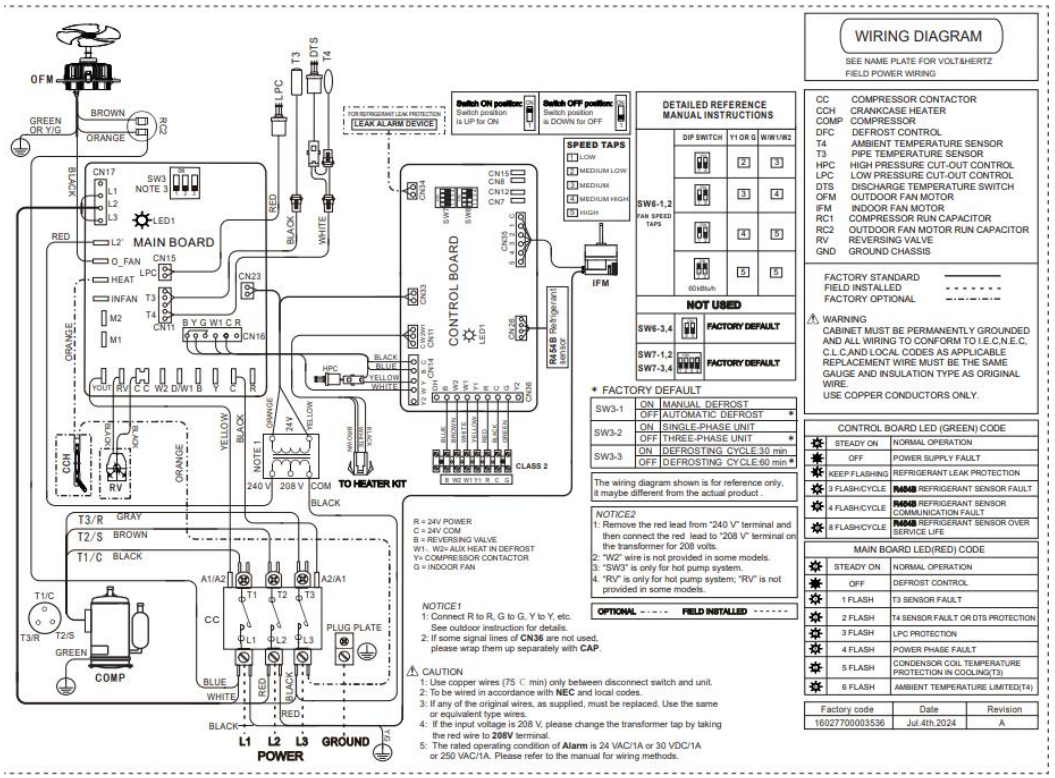


Single phase power supply electrical control wiring nameplate paired with DC motor



Appendix 1 7.1 Wiring diagrams

Three phase power supply electrical control wiring nameplate paired with DC motor



Appendix 2 7.2 Control board replacement procedure

WARNING:

- Improper servicing could result in dangerous operation, injury or property damage. The operations described below must be performed by qualified personnel.

NOTICE:

- Do not directly touch the components on the control board to avoid static electricity damage.

Board Replacement Procedure

1. Turn off power to the unit and wait AT LEAST 3 minutes before removing the unit's control board access panel.

NOTICE:

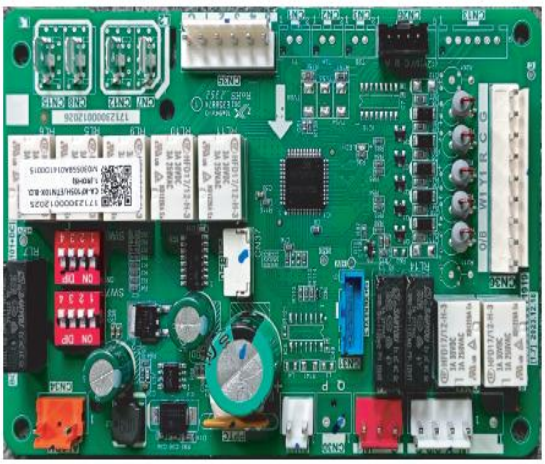
- Take a photo before removing any screws or wiring to use as reference when installing the new board.
- Use a screwdriver instead of an electric screwdriver/drill, otherwise the board may be damaged.
- There is no need to disconnect the field supplied thermostat wires; directly remove the thermostat wire plug on the board.

2. Remove all wires and plugs from the main board.
3. Remove the 6 screws on the control board and separate the board from the unit (Refer to Figure 1: items circled in yellow.)

NOTICE:

- Hold the control board before removing the last screw, otherwise the control board may be damaged because of falling.

THE CONTROL BOARD 1



THE CONTROL BOARD 2

*The photo shown is for reference only, the actual product may vary.

Figure 1

Appendix 2 7.2 Control board replacement procedure

4. Carefully remove the main board 1 and main board 2 from the support (note to use both hands when disassembling)

SEPARATION PILLAR

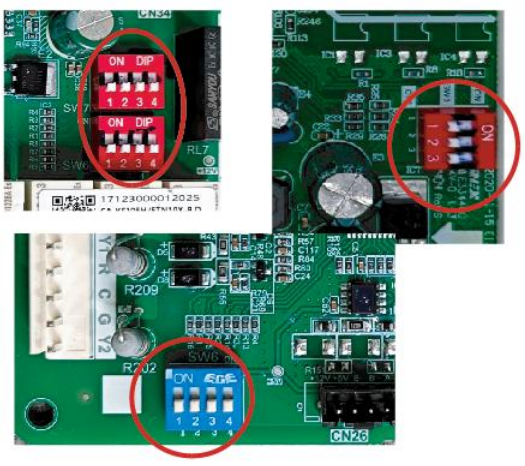
*The photo shown is for reference only, the actual product may vary.

Figure 2

5. Install the new board on the unit removed from the old board (Refer to Figure 1 for screw location.)

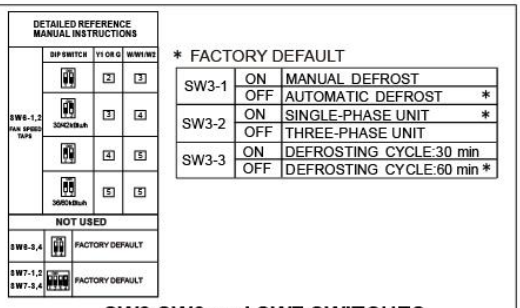
6. Reconnect the wires according to the wiring diagram (Or refer to the photo before disassembly.)

7. Set and check SW3,SW6 and SW7 switches code. Refer to Table 1 or the wiring diagram for information (Refer to Figure 3: SW3,SW6 and SW7 circled in red or blue.)



SW3,SW6 and SW7 SWITCH

Figure 3



SW3,SW6 and SW7 SWITCHES

Table 1

8. SW3 switch is set for the defrost control mode.

* FACTORY DEFAULT

SW3-1	ON	MANUAL DEFROST
	OFF	AUTOMATIC DEFROST *
SW3-2	ON	SINGLE-PHASE UNIT *
	OFF	THREE-PHASE UNIT
SW3-3	ON	DEFROSTING CYCLE:30 min
	OFF	DEFROSTING CYCLE:60 min *

9. Double check all wire connections and screw positions before powering on.

Appendix 3 7.3 Refrigerant Sensor Repair and Replacement Guidelines

1. Loosen the 10 screws on the outer sheet metal plates A and B, and remove the sheet metal.

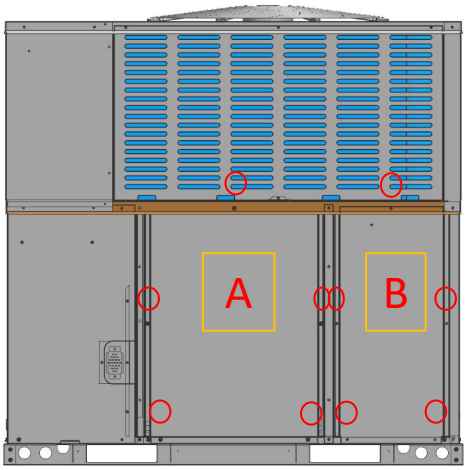


Figure a-1

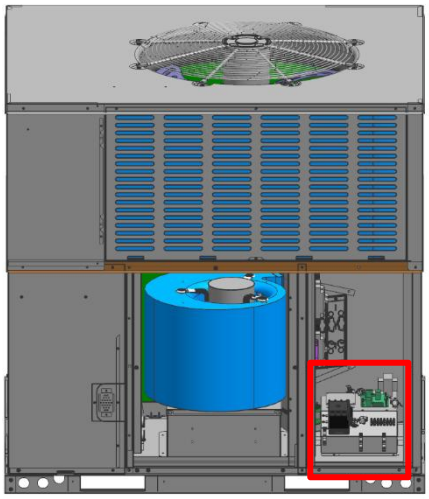


Figure a-2

2. Remove the evaporator fan motor cable and the refrigerant sensor cable from the control board2. The connection port of the evaporator fan motor is CN35, and the connection port of the refrigerant sensor is CN26.

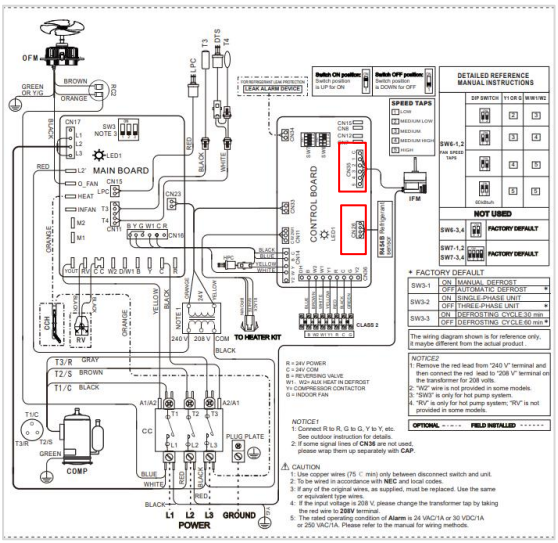


Figure b-1

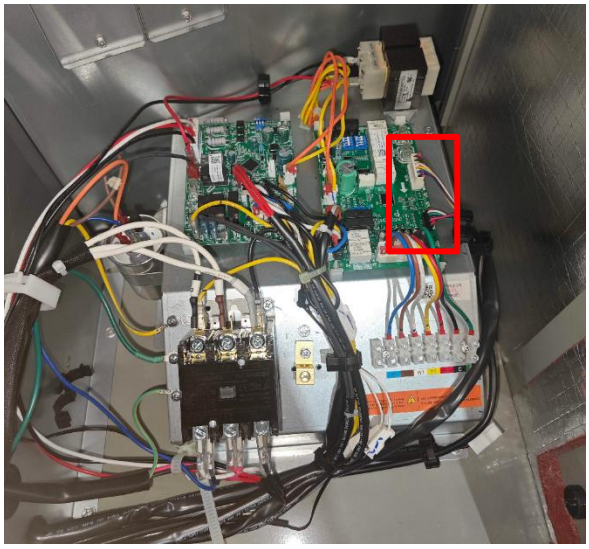


Figure b-2

Appendix 3 7.3 Refrigerant Sensor Repair and Replacement Guidelines

3. Loosen the two screws on the support of the inner motor, and then remove the evaporator wind wheel to see the position of the refrigerant sensor as shown in Figure c-2.

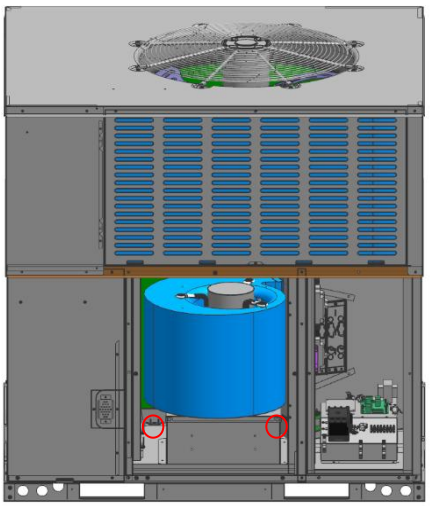


Figure c-1

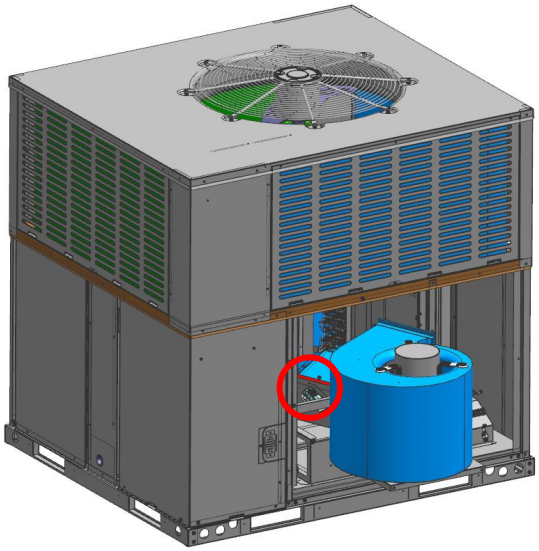


Figure c-2

4. Remove the screws that fix the Refrigerant sensor and replace the Refrigerant sensor. Reuse screw to secure the Refrigerant sensor as shown in Figure d-1.

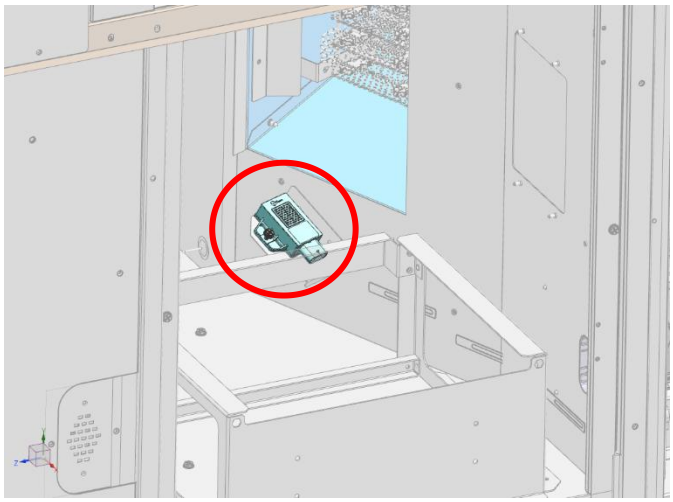


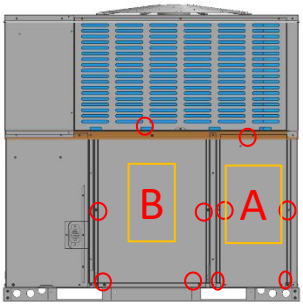
Figure d-1

5. Install the evaporator wind wheel, restore the wiring according to the wiring nameplate, and install sheet metal A and B.

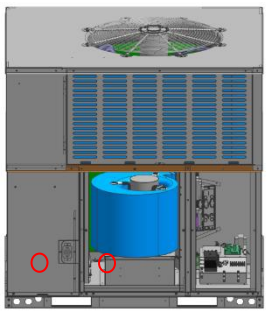
Appendix 4 7.4 Blower Volute or Motor Maintenance and Replacement

Blower volute maintenance and replacement

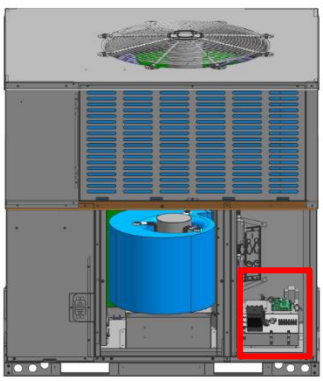
1. Remove the ten screws from the panel A and panel B, and remove the sheet metal.



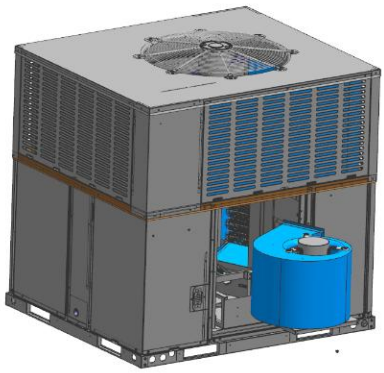
2. Remove the two screws under the Blower Volute



3. Remove the fan motor cable from the control board. The connection port of the evaporator fan motor is CN35.

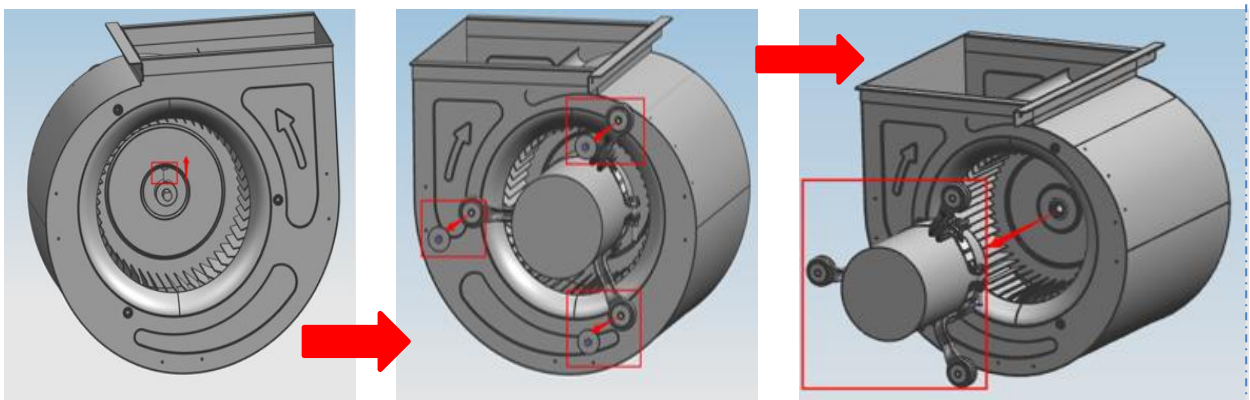


4. Take out the Blower Volute from the machine.



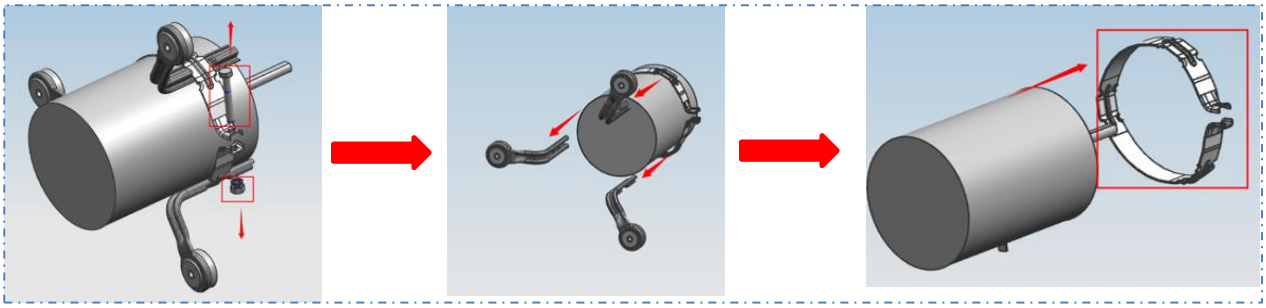
Motor maintenance replacement

1. Pull down the bolt that secure the motor spindle, three bolts and dislodge the fan volute.

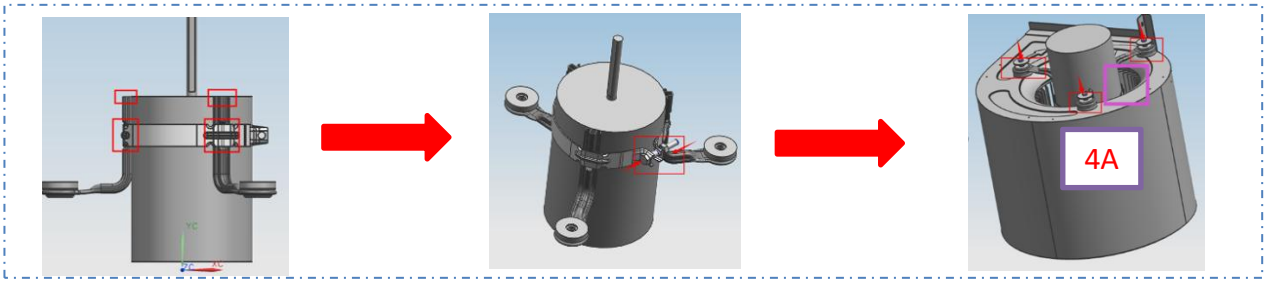


Appendix 4 7.4 Blower Volute or Motor Maintenance and Replacement

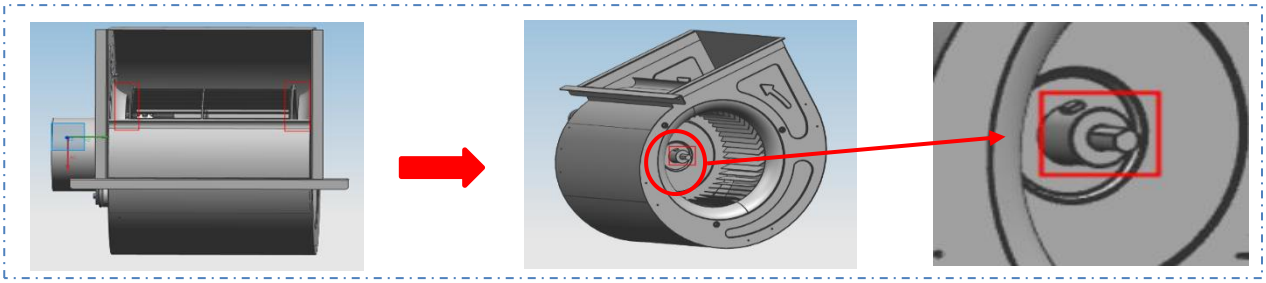
2. Pull down the bolt and nut that secure three Motor brackets and one clamp.
Then dislodge three Motor brackets and one clamp.



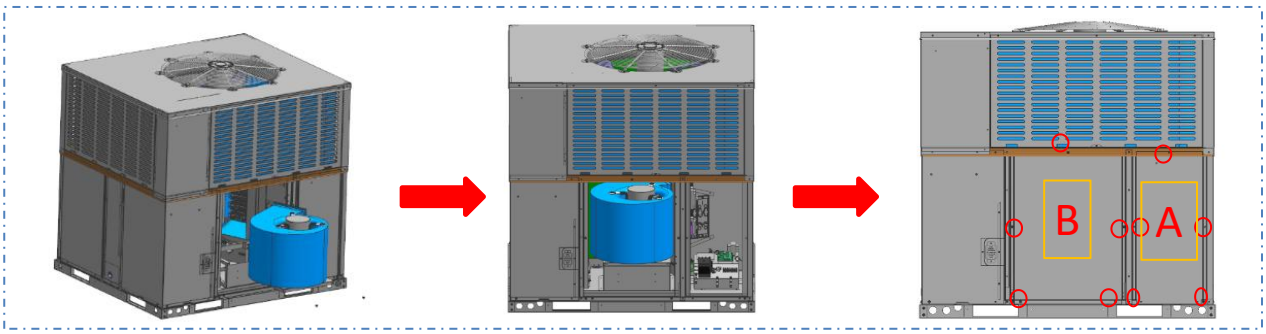
3. Fix the three motor brackets in specific positions on the motor using the clamp, and then lock the clamps with the bolt and nut. Finally ,use three bolts to fix the motor onto the fan volute. The orientation of the motor wire body terminals is shown in the figure 4A.



4. Adjust the gap between the centrifugal fan blades and the fan volute on both sides, and finally use the locking bolt to fix the centrifugal fan blade on the flat position of the motor spindle.



5. Install the Blower Volute, restore the wiring according to the wiring nameplate, and install sheet metal A and B.



Appendix 5 7.5 Troubleshooting Guide

SYSTEM FAULTS			LOW VOLTAGE/POWER SUPPLY OR HIGH VOLTAGE/WHAT TO CHECK MODE	INDOOR UNIT THERMOSTAT DEF.	INEFFICIENT COMP. FUSE	RES. OUTDOOR UNIT DU AIRFLOW	RES. DU AIRFLOW	INEFFICIENT ODU FAN	INEFFICIENT DU FAN	RES. ODU RADIATOR	REF. UNDERCHARGE	REF. OVERCHARGE	REF. C.R. RESTRICTIONS	ORIFICE IS BLOCKED	COIL DEF.	INDOOR COIL LEAKING	REV. LEAKING	T3 SENSOR DEF.	T4 SENSOR DEF.	R454B REFRIGERANT SENSOR DEF.	A2L SENSOR OVER SERVICE LIFE	DTS DEF.	LPS DEF.	HPS DEF.		
SYSTEM	Display shows nothing	C	P	S			S																			
		H	P	S			S																			
	System won't start SS	C	P	P	S		S																			
		H	P	P	S		S																			
	Capacity is insuffciency	C						P	P	P			P			S	S	S				S			
		H						P	P	P			P			S	S	S				S			
	Display is not normal when running	C					P																			
		H					P																			
	Cool when heating requirement	C					P																			
		H		P																						
CONTROL BOARD 1	1Flash/Cycle	C																		P						
		H																		P						
	2Flash/Cycle	C																			P					
		H																			P					
	3Flash/Cycle	C			P								P			S										
		H			P								P			S										
	4Flash/Cycle	C																								
		H																								
	5Flash/Cycle	C							P	P				S	S					S						
		H													S											
	6Flash/Cycle	C											P				S				S	S				
		H											P			P					S	S				
CONTROL BOARD 2	Keep Flashing	C																	P				S			
		H																	P				S			
	3Flash/Cycle	C																					P			
		H																					P			
	4Flash/Cycle	C		P			S																P			
		H		P			S																P			
	8Flash/Cycle	C																						P		
		H																						P		

C-Cooling
H-Heating
P-Primary Causes
S-Secondary Causes
Comp.-compressor
RES.-Restrictions
REF.-Refrigeration
DEF.-Defective
CIR.-Circuit
REV.-Reversing Valve

T3-Outdoor coil temp. sensor
T4-Ambient temp. sensor
DTS-Compressor discharge temperature Switch
HPS-High pressure switch
LPS-Low pressure switch
RES IDU AIRFLOW -Perhaps failue of fan motor or fan capacitor or filter
RES ODU AIRFLOW -Perhaps failue of fan motor or fan capacitor or recirculation or blocking coil
RES ODU RADIATOR-Perhaps failue of blocking radiator

Appendix 6 7.6 Temperature and Resistance Relationship Tables(T3/T4)

Temperature °F	Resistance kΩ	Temperature °F	Resistance kΩ	Temperature °F	Resistance kΩ	Temperature °F	Resistance kΩ
-4	106.73	37	29.87	78	10	119	3.69
-3	103.25	38	29.22	79	9.5	120	3.61
-2	99.89	39	28.19	80	9.26	121	3.53
-1	96.65	40	27.39	81	9.03	122	3.45
0	93.53	41	26.61	82	8.81	123	3.38
1	90.53	42	25.85	83	8.59	124	3.3
2	87.62	43	25.12	84	8.38	125	3.23
3	84.83	44	24.42	85	8.17	126	3.16
4	82.13	45	23.73	86	7.97	127	3.1
5	79.52	46	23.07	87	7.78	128	3.03
6	77.01	47	22.42	88	7.59	129	2.96
7	74.58	48	21.8	89	7.4	130	2.9
8	72.24	49	21.2	90	7.22	131	2.84
9	69.98	50	20.61	91	7.05	132	2.78
10	67.8	51	20.04	92	6.88	133	2.72
11	65.69	52	19.49	93	6.72	134	2.67
12	63.65	53	18.96	94	6.56	135	2.61
13	61.68	54	18.44	95	6.4	136	2.56
14	59.78	55	17.94	96	6.25	137	2.5
15	57.95	56	17.45	97	6.1	138	2.45
16	56.17	57	16.98	98	5.96	139	2.4
17	54.46	58	16.52	99	5.82	140	2.35
18	52.8	59	16.08	100	5.68	141	2.3
19	51.2	60	15.65	101	5.55	142	2.25
20	49.65	61	15.23	102	5.42	143	2.21
21	48.16	62	14.83	103	5.3	144	2.16
22	46.71	63	14.43	104	5.18	145	2.12
23	45.31	64	14.05	105	5.06	146	2.08
24	43.95	65	13.68	106	4.94	147	2.03
25	42.64	66	13.32	107	4.83	148	1.99
26	41.38	67	12.97	108	4.72	149	1.95
27	40.15	68	12.64	109	4.61	150	1.91
28	38.97	69	12.31	110	4.51	151	1.88
29	37.82	70	11.99	111	4.41	152	1.84
30	36.71	71	11.68	112	4.31	153	1.8
31	35.64	72	11.38	113	4.21	154	1.77
32	34.6	73	11.09	114	4.12	155	1.73
33	33.59	74	10.8	115	4.03	156	1.7
34	32.61	75	10.53	116	3.94	157	1.66
35	31.67	76	10	117	3.85	158	1.63
36	30.76	77	10	118	3.77	159	1.6