YMGI, Engineered Comfort Products for A Sustainable and Efficient Green World!

SERVICE MANUAL

DC INVERTER SPLIT TYPE HEAT PUMP (Down to -22°F Ambient) OUTDOOR CONDENSING UNIT

Model Numbers:

VRUO-2436HP-U2B(54)
VRUO-4860HP-U2B(54)

Thermostat-Controlled

Universal Outdoor Condenser Works With:

1. Any Brand of American Style Indoor Units, and
2. YMGI Indoor Unit Universal VRUI

Thank you for choosing this YMGI product. Please read the owner's manual carefully before installation and operation, and retain for your records and future reference. If you need a replacement copy, please contact your local agent or visit www.ymgigroup.com to download a current electronic version.

NOTICE

This product is designed and manufactured to be free from any defects in material and workmanship during normal use and maintenance. Installation, operation, maintenance and repair must follow all standards and professional practices for regular cooling and heating equipment, such as NEC, State, or Local Codes and all related documents/manuals provided by YMGI. Failure to follow and adhere to all codes and documentation can cause damage to equipment, property even personal injury.

Installer: Currently licensed/certified HVAC technicians only. Must Read the manual and all provided documents prior to installation. Complete and fill out all required information on the warranty registration card.

User: Retain this manual and all supplied documents for your records and future reference.

Servicer: Use this manual for information concerning servicing and maintenance of this product.

SAFETY WARNING

Only qualified technicians should install and service this equipment. The installation, startup, operation and servicing of this equipment can be hazardous and requires a HVAC professional who has been trained, licensed and certified. Installations, adjustments or any equipment alterations done by an unqualified person could result in serious injury and even death. When working on the equipment, observe all precautions in the provided documents, on the tags, stickers, and labels that are attached to or placed on the equipment.

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Introduction

Read this manual carefully, making sure you understand all the instructions, practices and procedures contained in this manual. Be sure you are familiar with all the safety advisories that appear throughout this manual. Your personal safety depends upon your observance of all precautions contained in this manual.

Safety advisories appear throughout this manual and your personal safety and the proper operation of this appliance depend upon the strict observance of these precautions.

The 3 types of advisories are defined in the following table:

⚠WARNING	Indicates a potentially hazardous situation which if not avoided could result in serious injury or even death.
⚠ CAUTION	Indicates a potentially hazardous situation which, if not avoided, could result in minor or moderate injury. It could also be used to alert against unsafe practices.
NOTICE	Indicates a situation that could result in equipment or property-damage only. It can also be used to call attention to important details within this manual.

Important Environmental Concerns

Studies have shown that certain man-made chemicals can affect the earth's stratospheric ozone layer when released into the atmosphere. Refrigerants that contain Chlorine, Fluorine and Carbon (CFCs) and those containing Hydrogen, Chlorine, Fluorine and Carbon (HCFCs), may affect the ozone layer. Not all refrigerants have the same potential impact on the environment. YMGI Group advocates for the responsible handling of all refrigerants including industry replacements for CFCs such as HCFCs and HFCs.

Responsible Refrigerant Practices

YMGI Group believes that responsible refrigerant practices are important to our customers, the HVAC/R industry and the environment. All HVAC/R technicians who handle refrigerants must be certified. The Federal Clean Air Act (Section 608) sets forth the requirements for handling, reclaiming, recovering and recycling of certain refrigerants, the equipment and tools necessary to perform these service procedures. In addition, some states or municipalities may have additional requirements that must also be adhered to for responsible management of refrigerants. HVAC/R technicians must know the applicable laws and follow them.

Disposal Notice

Do not dispose this product or its components as unsorted municipal waste, as they contain items that may require special treatment. Contact your local waste management company for details.

⚠WARNING

Proper Field Wiring and Grounding Required!

Failure to follow established electrical codes can result in death, serious personal injury and property damage. All field wiring MUST be performed by qualified personnel. Improperly installed and grounded field wiring poses **FIRE** and **ELECTROCUTION** hazards. To avoid these hazards, you MUST follow the requirements for field wiring installation and grounding as described in this manual and by NEC and your state and local electrical codes.

⚠WARNING

Personal Protective Equipment (PPE) Required!

Failure to wear proper PPE for the job being undertaken could result in serious injury or even death. Technicians must take the necessary precautions to protect themselves from potential electrical, mechanical, and chemical hazards and MUST follow all precautions in this manual and on the tags, stickers, and labels, as well as the instructions below:

- Before installing or servicing this unit, technicians MUST put on all PPE recommended for the work being undertaken. ALWAYS refer to appropriate Material Safety Data Sheets (MSDS) and Occupational Safety and Health Administration (OSHA) guidelines for proper PPE.
- When working with or around hazardous chemicals, ALWAYS refer to the appropriate MSDS sheets and OSHA guidelines for information on allowable personal exposure levels, proper respiratory protection, and handling recommendations.

If there is a risk of arc or flash, technicians MUST put on all PPE in accordance with NFPA 70E or other country-specific requirements for arc flash protection, PRIOR to servicing the unit.

Copyright

⚠WARNING

- Instructions for installation and use of this product are provided by the manufacturer.
- Installation must be performed by authorized and licensed personnel only and in accordance with all the requirements of this manual, the NEC, CEC and any state and local codes.
- For safe operation of this unit, please read and follow all instructions carefully.
- The total operation capacity of the indoor units should not exceed 120% of the total capacity of the outdoor units if all indoor units must operate at their peak capacities all the time. Otherwise, the heating and cooling operation will be diminished and less efficient which could damage the units.
- Any person responsible for system operation or system maintenance should retain this manual for reference.
- If the unit fails to operate normally, please contact your authorized system installer or HVAC professional as soon as possible and provide the following information:
  - Data on the unit (model number, serial number and owner's name).
  - A detailed description of the unit's problem before and after the problem occurred.
- To avoid personal injury or property damage, do not disassemble the unit yourself. If disassembly is required to check the unit, contact your authorized system installer or HVAC professional as they have the experience and training necessary to perform this task.

Note: Each unit has been thoroughly tested to ensure it operates correctly before leaving the factory.

Basic Cautions and Warnings

⚠ CAUTION

All units shall be installed by an experienced HVAC licensed contractor or technician. Read all manuals before installation, startup and operation.

⚠ CAUTION

All NEC, state, local codes and installation instructions must be followed for all units, otherwise, the unit warranty will be void and could result in serious damage to people or property.

⚠WARNING

YMGI Group is not responsible for any damage or loss due to Do-It-Yourself (DIY), self-installation or any improper installation, improper operation, improper service or natural disasters of any kind.

⚠WARNING

Do not connect power to the unit until all wiring, tubing and all unit inspections and testing have been completed. Ground the unit according to the instructions and adhering to NEC, state and local codes.

⚠WARNING

All wiring connections must be correct and secure. Loose wire(s) or improper contacts may cause arcs or overheating which can result in a fire hazard.

Note From YMGI – Must Read

Dear Customers, Purchasers, Installers, and Contractors

Thank you for choosing an YMGI product.

All YMGI's products are fully tested and have passed rigorous safety, performance and manufacturing standards before being packed and shipped. YMGI only uses suppliers that meet our strict standards for high quality and performance for all parts. YMGI also recognizes a quality installation is equally important therefore your system must be installed by a licensed HVAC professional. A quality installation ensures your unit will operate at its highest efficiency and peak performance for many years of worry free comfort; while a poor installation can result in unit failure and cause the unit to operate inefficiently, either immediately or over time, resulting in costly repairs.

Because a quality installation is so critical, YMGI provides detailed information in our manuals which will aid the installing technician and the owner of the unit(s).

At YMGI our goal is to ensure that your YMGI units are installed properly and correctly from the beginning.

The YMGI equipment you purchased is either a split-type or a self-contained cooling/heating system. These types of systems require a certified and licensed HVAC professional technician for proper installation. Only a certified and licensed HVAC professional technician will have the knowledge, experience, and attention for all required details to perform a complete and successful installation. This equipment is different from a window or portable type air conditioners you can purchase from local retail stores such as Home Depot, Lowe's, Sears, etc. which the manufacturer may not require certified and licensed personnel to install.

Reading and following YMGI Group recommendations and requirements contained in the following pages and other documents, is the first step to help ensure a smooth installation and proper operation of your unit for many years.

⚠WARNING
YMGI doesn't recommend nor allow any do-it-yourself (DIY) installation (partially or fully). Due to the complexity of the installation of this product most DIY installations usually have problems, either immediate or near future. These problems can cost more to fix than any upfront savings. **YMGI warranty doesn't cover any DIY units.**

If you have any questions about your unit or if the unit has a problem, you should first check the manual. If you can't find a solution, then contact your local installer or service technician to schedule a service appointment. The technician can physically inspect the unit. If at the time of inspection, the installer or service technician has any questions about the unit, they can contact YMGI technical support division directly at:

Toll Free Number: (866)833-3138 or Email: techsp@ymgigroup.com

IMPORTANT: YMGI Group is the MEDIA AUTHORITY:

YMGI Group, located in O'Fallon, MO 63366 is the author of all media produced for its products and is the only party able to give any additional explanation for any data, definitions and or descriptions found within any of its media, including but not limited to YMGI product brochures, manuals, pamphlets, catalogs, and videos. YMGI's distributors, installers, dealers, agents, customers or any other third parties will not supersede YMGI in anyway concerning YMGI-published materials and their meaning. Any concerns or questions arising from YMGI distributors, installers, dealers, agents, customers or any other third parties, should be presented directly to YMGI. YMGI will respond to any concerns or questions, if necessary, about any of its media in writing.

NOTICE

- Be sure to only hire a certified and currently licensed HVAC Company to complete 100% of the installation so that all details of the installation are performed correctly and completely.
- Be sure to have ONLY the licensed HVAC professional perform all aspects of the installation. Factory Warranty will be void if any portion of the installation is not performed by a licensed HVAC contractor/technician. DIY or partial DIY will also void ALL factory warranties.
- When hiring an HVAC technician that is offering their services as a "side job" and not hiring a licensed HVAC company may pose possible risk. This may result in an incomplete or unsatisfactory installation, no guarantee for workmanship and lack of maintenance and further service to your unit.
- Have the installation technician read in full the installation manual and all supplied documents for the product model you purchased. Details within the documentation contributes greatly to the success and quality of the installation. Experience with other manufacturers may not be applied fully to another manufacturer, although there will be similarities there will also be differences. Ignoring the provided installation procedures is an act of negligence and may cause unit failure or damage which could be irrevocable and permanent.
- It is possible for a licensed contractor/technician to make a mistake during the installation. YMGI doesn't supervise nor is able to control the contractor/technician's installation. It is critical that the installer take each variable into account during the initial installation. This will ensure a complete and professional installation and that all units work properly.

⚠WARNING

The following will damage the unit and its key components resulting in loss of factory warranty:

1. Any foreign substances introduced into the system because of failure to seal the ends of the refrigeration piping before pulling the piping through any structures at time of installation.
2. Not installing an oil P-trap in the copper suction line where the indoor unit is located 18 feet or more below the outdoor unit.
3. Cross piping and/or cross wiring of any units including more than one single zone or a multi zone system.
4. Not conducting a positive leak check prior to the negative leak check.
5. Not conducting a positive leak check by charging the system with dry-nitrogen 350 PSI to hold for 3+ hours, and performing soap bubble testing.
6. Not conducting a negative leak check by evacuating the copper lines for 30 minutes for each zone. Vacuum must be held at 500 microns or better for at least 60 minutes, starting 60-minute timer after the vacuum pump is turned off.
7. Not selecting the correct size of wire or circuit breaker.
8. Not answering ALL questions in the technician's checklist located inside the warranty registration form.

⚠WARNING

The following may be overlooked, ignored, or considered unimportant during your installer's installation, but will cause your unit to underperform and may cause unit failure.

1. Any kinks in or improper bending of the copper piping.
2. Any poorly formed flares or not centering the flare with the flare nut, or not tightening all connections.
3. Not trial testing each indoor unit individually.
4. Not reading technical data (temp/time/pressure/current) after the system is stabilized (normally the compressor needs to run at least 10 minutes before reading the data). If the data is read too early may lead to inaccurate assessments about the unit.

In an effort to help protect our customers from possible faulty installations that can lead to premature unit failure, YMGI provides the above information for you and the technician. You can observe while your system is being installed, even though your observation is not a guarantee your system is being or has been installed properly and professionally. With the information provided above, you will know some things to look for and questions you can ask. If at any time you feel there may be an issue with the installation, please have your technician contact YMGI at (866)833-3138 x 703 with any questions, issues or concerns you may have.

INSTALLING TECHNICIAN/CONTRACTOR'S RESPONSIBILITIES

1. Discuss with the customer detailed information about the structure to be conditioned, local weather (typical design, extreme temperature/humidity conditions, cooling and heating hours), previous and existing HVAC equipment (if any), usage and dependence on new HVAC equipment or YMGI products.
2. Performing a cooling/heating load calculation by using commercially available professional programs/methods such as Right-J (Manual J) for residential HVAC applications and Right-CommLoad (ASHRAE RTS/CLTD) for light commercial and commercial HVAC applications.
3. Contact your YMGI distributor/sales department or contact the manufacturer directly to obtain additional information to fully understand your YMGI products, including but not limited to product features, cooling/heating performance at standard ratings/conditions and extreme conditions, allowed indoor and outdoor temperature and humidity ranges, installation, operation, maintenance, service, warranty, parts and any other issues pertaining to YMGI products.
4. Select the correct (most suitable) YMGI product unit models and accessories necessary for your HVAC applications and list them in the proposal/quote, in writing, on company's quotation form or letter head, based upon the information you collected from 1), 2) and 3).
5. List your currently valid HVAC license number and EPA number in your proposal/quote.
6. Make sure you are the only party to perform the entire installation and you will not sub-contract any part of the installation to any non-licensed parties or persons. You will be solely responsible for the entire installation that you have been contracted.
7. Make sure you have all the materials you need to properly, completely and correctly finish the installation. The YMGI units and accessories may be just a portion of what you will need for the project. When support issues arise, remember YMGI employees and YMGI distributors/sales, dealers and agents are not installers and may only provide suggestions. You are the only decision maker to determine what other materials you need to complete the installation.
8. When connecting electrical wires, follow all NEC, state and local codes and ensure the installation of all YMGI units and accessories meet these requirements.
9. Connect the unit to a correctly sized electrical power source. If the unit is installed in an area where lightning or storms occur frequently, a correctly sized and type of power surge protector must be installed between the outdoor unit and the power source.
10. Select the correct types and sizes of HVAC circuit breakers, disconnect switch boxes, wires and conduit from circuit breaker to disconnect box and then from disconnect box to outdoor unit.
11. Select the proper location for installing indoor units and outdoor units with all factory requirements being followed (cooling/heating air inlets and outlets are not blocked or restricted, mounting structure is secure, installation for convenience is considered, allow adequate clearance for maintenance/service and all applicable codes are met).
12. Cap/tape the two ends of every copper line before running them through any structure to keep any foreign substances from entering the pipe causing contamination. Label them A-A, B-B, C-C, D-D, or any other identifying marks on each pair of copper lines and wiring cable sets to keep from cross-piping or cross-wiring in multiple zone installations or where pipes for different single zone systems are close to one another.
13. Secure the wiring cables that connect between the indoor unit and outdoor unit, following all applicable NEC, state and local codes for your installation. If there is no special NEC, state or local codes to govern how these wires are to be installed, you can tape/cable tie them along with insulated copper line.
14. Tighten all pipe and wire connections ensuring there is no leakage or false connections.
15. Conduct a positive pressure leakage test, checking each of the inter-connecting copper lines between each indoor unit and outdoor unit by charging with dry-nitrogen at the outdoor unit’s service port (note: do not back-seat stopping valve). A liquid soap solution shall be applied at all pipe connections to check for leakage. A 1/4” - 5/16” hose/valve adaptor may be needed if you have a 1/4” traditional manifold hose connection.
16. If there is no positive leaking, then conduct a negative pressure leakage test, checking all inter-connecting copper lines between each indoor unit and outdoor unit by pulling vacuum at the outdoor unit’s service port (note: do not back-seat stopping valve) and checking that the vacuum level of 500 Microns can be held for at least 60 minutes.
17. If there is no leakage found at any of the refrigeration pipe connections, flip up the indoor unit’s face panel and remove filter, carefully pour some clear water onto the up-right aluminum coil surface to test if the water can drain out of each the indoor unit’s freely without finding any leakage.
18. If there is water leakage found, locate the source of the leak and correct it. Only after everything is clear, engage the correct electrical power to the system.
19. Then back-seat stopping valves of the outdoor unit to release refrigerant from the outdoor unit into the inter-connecting pipes and indoor unit.
20. Make sure both the indoor unit and outdoor unit are powered on correctly, operating the indoor unit in fan mode first. Then move on to test cooling, dehumidifying/drying, heating and other modes.
21. Read refrigerant pressures and pipe/valve temperatures only after the system is stabilized (normally 10 minutes after cooling/heating mode is started successfully). Record this data into the technician checklist in the lower half section of the Limited Product Warranty Registration Card/Form.
22. Adjust refrigerant charging level (remove refrigerant if pipe is shorter, the temperature is colder; add refrigerant if pipe is longer the temperature is warmer), following the manufacturer's instructions. If the average pipe length is shorter or longer than 25' and pressure/temperature readings at the outdoor unit service valves are not falling into normal ranges.
23. Explain to the user/owner about proper unit operation and maintenance. Leave your contact information to allow them to reach you. If the customer finds the unit doesn't work properly and cannot resolve the issue themselves, check the customer's units/parts/accessories and correct the issue if there is one. Communicate with YMGI-technical support line at (866)833-3138 x 703, if further help necessary.

    Following these requirements will aid in ensuring that the units to be installed meet general HVAC practicing standards and necessary factory requirements. Finding any possible problems early, preventing any further damage to the unit will help to ensure a properly working unit for many years.

LIMITED PRODUCT WARRANTY

Once the installation and successful testing of the system has been completely performed by a qualified licensed/certified HVAC technician/contractor, the registration card/form is filled out completely and correctly, and filed along with a valid installation invoice from the contractor within 7 days of the original installation, the following standard **Limited Product Warranty** is qualified: **7-years** on the **compressor** and **2-year** on **PARTS ONLY**. There is **no labor coverage**.

YMGI products are designed and manufactured free from defects in workmanship, and materials for normal use. However, if for any reason, including occasionally transporting between YMGI factories/warehouses and your delivery location, you discover the unit has issues, YMGI Group will help field a solution by following YMGI's established warranty procedures:

Compressor: YMGI will warrant the compressor of an YMGI-validated and approved warranty filing, for a period of 7 years from the date of successful installation at its original installation location.

Parts: YMGI will warrant parts of an YMGI-validated and approved warranty filing, for two years from the date of successful installation at original installation location.

All warranty compressors and parts replaced will become the sole property of YMGI Group and must be returned to YMGI Group upon request. Warranty parts may be new or refurbished. All parts are tested and approved before shipping.
At no time does YMGI Group warrant labor cost of any type. Warranty will start from the date of successful installation at original installation location, or 90 days as of original shipping date from YMGI Group, whichever comes first.

This is a standard limited liability warranty and DOES NOT cover the following:

- Any damage or repairs to properties, or persons as an incident of or consequence of improper faulty transportation, installation, operation, maintenance or service.
- Any damage caused by frozen or broken water hoses or refrigeration pipes in the event of equipment failure.
- Any damage due to floods, fire, wind, lightening, accidents, corrosive atmosphere or any other conditions beyond the control of YMGI Group.
- Any damage due to interruption or inadequate electrical service to equipment.
- Any products that are installed outside the US or Canada.
- Any unit that has been moved from its original installation address.
- Any labor costs associated with the installation or service of the unit.
- Poor unit performance due to improper unit selection (SEER, Unit size).

To validate the above warranties, ALL of the following conditions must all be fulfilled:

1. The unit was fully (100%) and successfully installed by a licensed or certified HVAC technician.
2. The unit was installed following all NEC, state and local codes.
3. The unit was installed following all the information within the Instructions and User Manuals provided by YMGI Group.
4. ALL fields, especially the technician-checklist, of the **Limited Warranty Registration Card/Form** were filled completely by the installing technician and signed by both the installing company technician and the unit owner.
5. The **Limited Warranty Registration Card/Form** and a copy of the original installing company's invoice have been received by YMGI Group-Warranty Dept., POB 1559, O'Fallon, MO 63366, within 7 days of successful installation.

No warranty filing will be validated or approved, if any one of the above conditions are not met.
Product registration doesn't guarantee the validity of this limited warranty statement.

Steps to follow for warranty part replacement:

1. The installing or service technician must contact YMGI tech support at 1-866-833-3138 ext. 703 from the installation location to check and confirm with YMGI Technical support the exact part(s) needed to fix the problem(s).

2. YMGI will check the customer's warranty filing. There will be no charge for Parts with a validated and approved warranty. Any Parts that have not been validated and approved or have an invalid warranty filing resulting in an unapproved warranty request, will be charged accordingly.

3. ***YMGI will ground ship out the parts ASAP. Expedited shipping is available at the customer's expense.***

4. Replacement parts that have an approved warranty registration are to be warranted for the remainder of the 2-year on parts and a 7-year compressor warranty. Purchasing of replacement parts without a valid warranty filing or unapproved warranty request, will be sold as is and are not covered by any warranty.

   YMGI is continually improving products with various engineering changes and these changes are made without prior notice. Such improvements or changes include but are not limited to product specification, appearance, functionality, size, packaging, etc. These improvements or changes will not void the limited warranty stated herein. YMGI is the final authority concerning this warranty policy.

LIMITED PRODUCT WARRANTY REGISTRATION FORM

Top Portion and Keep Copy A is for YMGI Internal records. Copy B is for Installer to Fill out and Mail back to YMGI. Bottom Copy C for Customer records.

For YMGI Use Only								
	Date:		Shipping Packing List Number:		Registration Card Serial No.			
	Did the Company Pay YMGI:		Unit(s) Work Successfully:	Yes/No	Date Completed Registration Card Received:			
	Installation Invoice Attached to the Registration Card		Hired YMGI Recommended HVAC Contractor/Technician?		Warranty Approved		Warranty Denied	

Outdoor Unit Serial Number :	Indoor Unit Serial Numbers:				
	Unit 1		Unit 6		
	Unit 2		Unit 7		
	Unit 3		Unit 8		
	Unit 4		Unit 9		
	Unit 5		Unit 10		

Contact at Installation Location:

Name:		Phone:		Fax:	
Address:		Email:			
City:		State (Province):		Country:	

Contact of the Installing HVAC Contractor/Technician:

Technician Full Name (Print):		Phone:		Fax:	
HVAC Technician's Company:		Email:			
Company Address:		City:		State (Province):	
Currently Licensed/Certified HVAC Technician License or Certification Number:		License Approved/ Certified by:			
Official Phone # to Check the License Validity:					

Checklist for Installing HVAC Technician to Verify Installation Quality, and for Warranty Processing Purpose (If not filled out completely by technician, warranty will be voided)

1) Did you install the whole system? If not, please note below. Yes / No / % of installation done by you (HVAC technician).	15) Where is the outdoor unit located? Ground / wall / balcony / roof / other location or pad Is the outdoor unit anchored to ground or secured onto wall bracket? Yes / No
2) What had been done, prior to your arrival?	16) Have you checked to make sure there is no cross-piping and/or cross-wiring between any two indoor units (zones)? What was your procedure?
3) Did you read the User Manual and Installation Instructions before starting the installation? Yes / No	17) Were the refrigerant pipe ends capped or sealed, prior to running them through structures to keep debris from entering the copper lines?
4) Who unpacked the unit and accessory boxes to check for damage?	18) Have you checked both cooling and heating on all indoor units individually to ensure proper function? Yes / No
5) Supply electrical power V/Ph/Hz measured at wiring terminal block of Indoor unit: / Outdoor unit:	19) Did you charge the inter-connecting copper pipes and indoor unit with nitrogen to check for positive leakage (pressures 150-200PSI), before conducting a vacuum leak check? Yes / No
6) Incoming electrical power V/Ph/Hz measured at terminal blocks of Indoor unit: / Outdoor unit:	20) Did you vacuum correctly to check the connecting pipes and indoor unit for leakage? What was the micron gauge reading, for how many minutes?
7) Wire gauge, length and terminal colors between circuit breaker/disconnect switch to outdoor unit:	21) Did you check the compressor's start and stop sequences to determine proper functionality? Yes / No
8) Wire gauge, length and terminal colors between each indoor and outdoor unit: Unit A / Unit B / Unit C / Unit D	22) If copper length were not made to the supplied or recommended refrigerant pipe length, how much refrigerant added or deducted?
9) The size of HVAC circuit breaker/fuse or disconnect switch to the outdoor unit:	23) Measured refrigerant pressures at outdoor service suction valve, when unit was stabilized. Heat pump (PSI): / Cooling (PSI): / Outdoor Ambient Temp. (°F):
10) Are the inter-connecting wires and copper lines between indoor and outdoor units installed/covered/protected by line set covers, or anything else?	24) What were the measured temperatures (probe not touching any metal): At cooling: indoor return air °F / Discharge air °F / and outdoor °F At heating: indoor return air °F / Discharge air °F / and outdoor °F
11) What is the refrigerant pipe length between each indoor unit and the outdoor unit? Unit A / Unit B / Unit C / Unit D	25) Have you checked all unit functions with customer present, and all functions are working correctly? Yes / No
12) Where is/are the indoor unit(s) located? (Bedroom, kitchen, etc.) Unit A / Unit B / Unit C / Unit D	26) Did you show the user how to operate the unit? Did he/she understand you? Yes / No / Yes / No
13) What is the elevation difference between each indoor unit and the outdoor unit? Unit A / Unit B / Unit C / Unit D	27) Do you provide regular one-year free technical service for this installation? Yes / No
14) Did you check the indoor unit for condensate leakage and refrigerant leakage, before and after connecting them? Yes / No	28) Do you list the working details in the invoice and leave a copy to the customer? Yes / No

Installation Finished and Unit Works Successfully. Print Name of Installation HVAC Technician: Signature: Date and time:	Installation Finished and Unit Works Successfully. Print Name of Owner: Signature: Date and time:

By signing above, I acknowledge the liability and responsibility for any false statement or omission of facts, and I authorize YMGI to verify the details provided above, and make its decision on warranty. I understand our filing or filling out of the warranty card/form DOES NOT imply automatic warranty approval, because warranty is approved only to qualified and successful installations by a qualified HVAC technician. I understand that the warranty (if approved) is a standard 5 year compressor and 1 year parts only, and does not include any labor coverage. I agree to and will follow all the contents contained in the Limited Product Warranty Policy of YMGI, and no other entity, stated in public, including but not limited to manuals, web site, email, etc.

Important Note: A copy of the installing HVAC company's invoice to show all their work details, your payment proof, center copy B of this registration card filled out after a successful installation, all three (3) MUST be mailed together to Warranty Dept., YMGI Group, POB 1559, O'Fallon, MO 63366, for warranty processing. Customer keeps bottom copy C. YMGI will check against copy A that was kept at YMGI.

WHY DOES YMGI GROUP REQUIRE INSTALLATION AND SERVICE TO BE PERFORMED 100% BY CURRENTLY LICENSED OR CERTIFIED HVAC TECHNICIANS/CONTRACTORS?

1. **Expertise and Safety:**
   They have the training and experience to accurately and safely install and service your equipment. The equipment runs with high-pressure refrigerant, oil and electrical current. The copper lines must be installed properly to prevent leakage and foreign substances from contaminating the refrigerant system.
2. **You will save money in the long run:**
   If any problem occurs with the unit that has been fully installed by a currently licensed or certified technician/contractor, contact the original licensed or certified HVAC technician to evaluate the unit as they have the training and experience to correct the problem quickly and efficiently. A technician may be unwilling to repair an issue on a unit that they did not install. If you do find a technician willing to perform this service, there is an increased possibility of higher service fees, increased service visits, or delayed service from that technician.
3. **It's the law!**
   The federal, state and/or local government and authorities have various governing laws or regulations, guidelines, ordinances, etc. These laws may require only licensed or certified professionals can install and service this type of high pressure HVAC equipment.

SUGGESTIONS TO AID YOU IN HIRING AN HVAC CONTRACTOR:

1. Hire a currently practicing, licensed/certified HVAC professional technician/contractor. Technicians, who are no longer practicing (retired, etc.) in this field, may not have current technical knowledge or may lack experience on the equipment you have purchased.
2. Hiring a licensed technician to install your unit as a "side job" and not hiring a licensed HVAC company may pose possible risk. This may result in an incomplete or unsatisfactory installation, no guarantee for workmanship and lack of maintenance and further service to your unit.
3. Hire a technician/contractor who services customers in your local area and one you are familiar with. Local contractors have a faster response time and it will be easier for you to determine if they are reputable.
4. Use only a reputable licensed/certified HVAC installation professional to prevent any unexpected charges because of unethical business practices.
5. Check their references, verify they provide professional service for their customers. N.A.T.E or A.C.C.A certified technicians are strongly recommended.
6. Some contractors/technicians may not feel comfortable about installing equipment that has been purchased by someone other than themselves. They prefer to purchase and install the equipment themselves. You can contact YMGI directly to check and see if there are contractors in your area who have installed our products or any similar products.
7. Ask for a detailed quote for the complete installation project. A flat rate quote is the safest contract for both you and the contractor.
8. Local HVAC technicians may charge you on a project basis or on an hourly basis. It has been our general experience; **a full single head installation normally can cost $800 to $1500**. These costs are estimates, and your actual costs may differ due to your specific job requirements and installation location.
9. Number of hours can vary depending upon each individual situation, some factors are, but not limited to:
   - Difficulty or complexity of securely installing the indoor unit.
   - Difficulty or length of the inter-connecting pipes and wires to be installed.
10. A successful installation is dependent on all these suggestions and all the necessary steps are followed.
11. If the contractor(s)/technician(s) are experienced with the systems/brands you purchased. **You might save on the installation cost, but remember to always ask for and verify references.**
12. The contracts should list and detail all work to be performed and the standards they will follow. Some contractors are willing to include a 1-year installation/service warranty at no extra charge. Check to see if this is an available option. If available, make sure it is included in the contract.
13. Verify and confirm the installation is completed and all the unit functions have been tested and working properly. All items on the checklist should be checked and clearly marked in the warranty registration card/form, prior to paying the contractor in full.

The cost of not having your unit professionally installed can be more expensive than the additional cost of hiring a certified contractor. Protect your investment and warranty eligibility by doing it right the first time.

⚠WARNING

Safety Precautions

1. Follow these instructions to complete the necessary installation process. Carefully read this manual before installation and unit startup or servicing.
2. Wire size of power cord should be properly sized to meet the required electrical loads. Should the power cord get damaged, the power cord should be replaced with a manufacturer approved cable.
3. After connecting the power cord, attach the electric box cover and secure properly.
4. Always meet the nitrogen charge requirements when welding pipes.
5. Never short-circuit or cancel the pressure switch as this will result in damage to the unit.
6. Connect the wired controller before energizing, otherwise the wired controller cannot be used.
7. Before using the unit, verify the piping and wiring are correct. This will avoid water leakage, refrigerant leakage, electric shock, or fire etc.
8. Do not insert fingers or objects into the air outlet or inlet grille.
9. Open a door or window for ventilation for allowing fresh air to enter the room to avoid depleting the oxygen while gas/oil supplied heating equipment is used during the installation.
10. Never start up or shut off the unit by means of directly plugging into or unplugging the power cord from the power outlet.
11. Turn off the unit after it runs at least five minutes, otherwise it will influence the oil return of the compressor.
12. Do not allow children to operate this unit.
13. Do not operate this unit with wet hands.
14. Turn off the unit or disconnect the power supply before cleaning the unit. This will avoid possible electric shock or personnel injury.
15. Never spray or splash water towards the unit. This can cause a malfunction in the unit or can result in electric shock.
16. Do not expose the unit to moist or corrosive environments.
17. While operating in cooling mode, do not set the indoor unit's room temperature too low. Keeping the temperature difference between indoor and outdoor unit within 41°F.
18. YMGI Group recommends that only properly trained and authorized personnel be allowed to repair or service the unit. Improper repairs or servicing can result in electric shock or fire hazards. Please contact YMGI Group if you need help locating a qualified repair or service technician.
19. Before installation, check the power supply to ensure it is sufficient to meet and is in accordance with the requirements specified on the nameplate of the unit. Ensure the power overload is functioning correctly and make sure it is properly maintained.
20. Installation must be performed only by an authorized installer or HVAC professional in accordance with the requirements set by the NEC and CEC. Do not attempt to install the unit yourself. Improper handling may result in water leakage, electric shock, fire, and voiding of the warranty.
21. Be sure to use only approved accessories and parts to prevent water leakage, electric shock and fire.
22. Make sure the unit is grounded properly prior to connecting to power source, to avoid electric shock. Do not connect the ground wire to a gas pipe, water pipe, lightning rod or telephone line.
23. Energize the unit for 8 hours before operation. Turn off or disconnect the power within 24 hours to prevent short-cycling (to protect the compressor).
24. If refrigerant leakage happens in a confined space during installation, ventilate immediately. Poisonous gases can occur if the refrigerant gas is exposed to fire.
25. Volatile liquids, such as paint thinners or solvents if exposed to the unit's surface will cause damage to the surface finish. Only use a soft cloth along with a mild non-abrasive detergent to clean the outer casing of the unit.
26. If the unit does not operate normally or if you notice any type of burning odor, power off the unit and turn off the main power supply, then immediately contact your YMGI authorized repair service center or HVAC professional.

NOTICE

YMGI Group will not be responsible for any personal injury or any property damage caused by improper or incorrect installation, improper service or maintenance or by not following the instructions listed in this manual.

DO NOT pull on the power supply cords or refrigeration lines that are connected to the indoor and outdoor units. Install the power supply cords and secure them into position. PVC line set cover is recommended for the outdoor unit to protect against rain, sunlight and accidental damage.

DO NOT allow cold air to blow directly onto people for a prolonged period, as this could make people cold and uncomfortable.

DO NOT undersize any of the power supply wires.

DO NOT connect several units to a single breaker. Don't undersize or oversize the circuit breaker. A poorly sized circuit breaker can cause unit failure and even fire.

DO NOT wire or open a unit while the unit is running. Make sure to disconnect the power supply and switch off all circuits prior to inspecting or servicing the unit. Inspecting and servicing the unit while the power supply is connected, and the circuits are switched on could cause an electrical shock or fire.

DO NOT install the indoor unit near any cooking surfaces, in direct sunlight or any ventilation systems. Poor placement could decrease efficiency and waste energy.

DO NOT install the unit in places where there is exposure to flammable materials or gas.

DO NOT apply chemical solvents, flammable insecticides, or abrasive materials directly on the unit. Clean the unit only with a soft dry cloth.

DO NOT install the unit in a damp laundry room or near flammable gas. All units must be protected by a certified electrical circuit breaker in accordance with all safety and electrical codes.

DO NOT use the system for anything other than what it was designed.

DO NOT store or install the units near food, paint, or other chemicals.

DO NOT use the unit in cool or dry mode for prolonged periods where humidity is higher than 90%.

DO NOT operate the unit for prolonged periods without refreshing ambient air. Open a door or window periodically to allow in fresh air.

PRODUCT INTRODUCTION TO UNITARY -22° F HEAT PUMP SYSTEM

List of Outdoor Units

Model	Power Supply V/Ph/Hz	Appearance
VRUO-2436HP-U2B(54)	208/230V-1Ph-60Hz	
VRUO-4860HP-U2B(54)	208/230V-1Ph-60Hz	

List of Indoor Units

Model		Cooling/Heating Capacity (Btu/h)	Power Supply V/Ph/Hz	Appearance
Airhandler	VRUI-24UC-M2B(54)	24000/24000	208/230V-1Ph-60Hz	
Airhandler	VRUI-36UC-M2B(54)	36000/36000	208/230V-1Ph-60Hz	
Airhandler	VRUI-48UC-M2B(54)	48000/48000	208/230V-1Ph-60Hz	
Airhandler	VRUI-60UC-M2B(54)	54000/54000	208/230V-1Ph-60Hz	

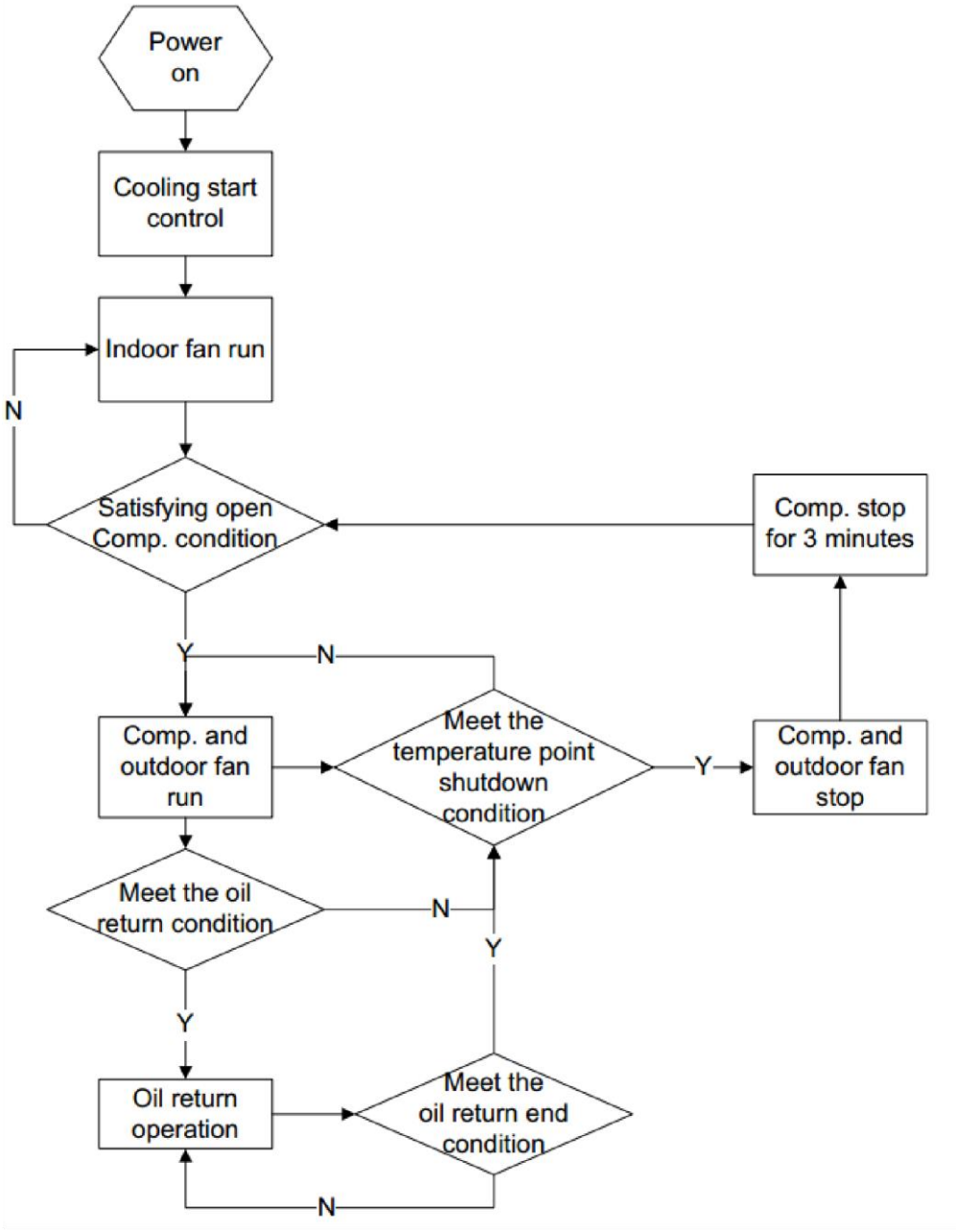
Electrical Parameters

Model	Power Supply	Circuit breaker capacity
	V/Ph/Hz	A
VRUO-2436HP-U2B(54)	208/230V-1Ph-60Hz	35
VRUO-4860HP-U2B(54)	208/230V-1Ph-60Hz	45

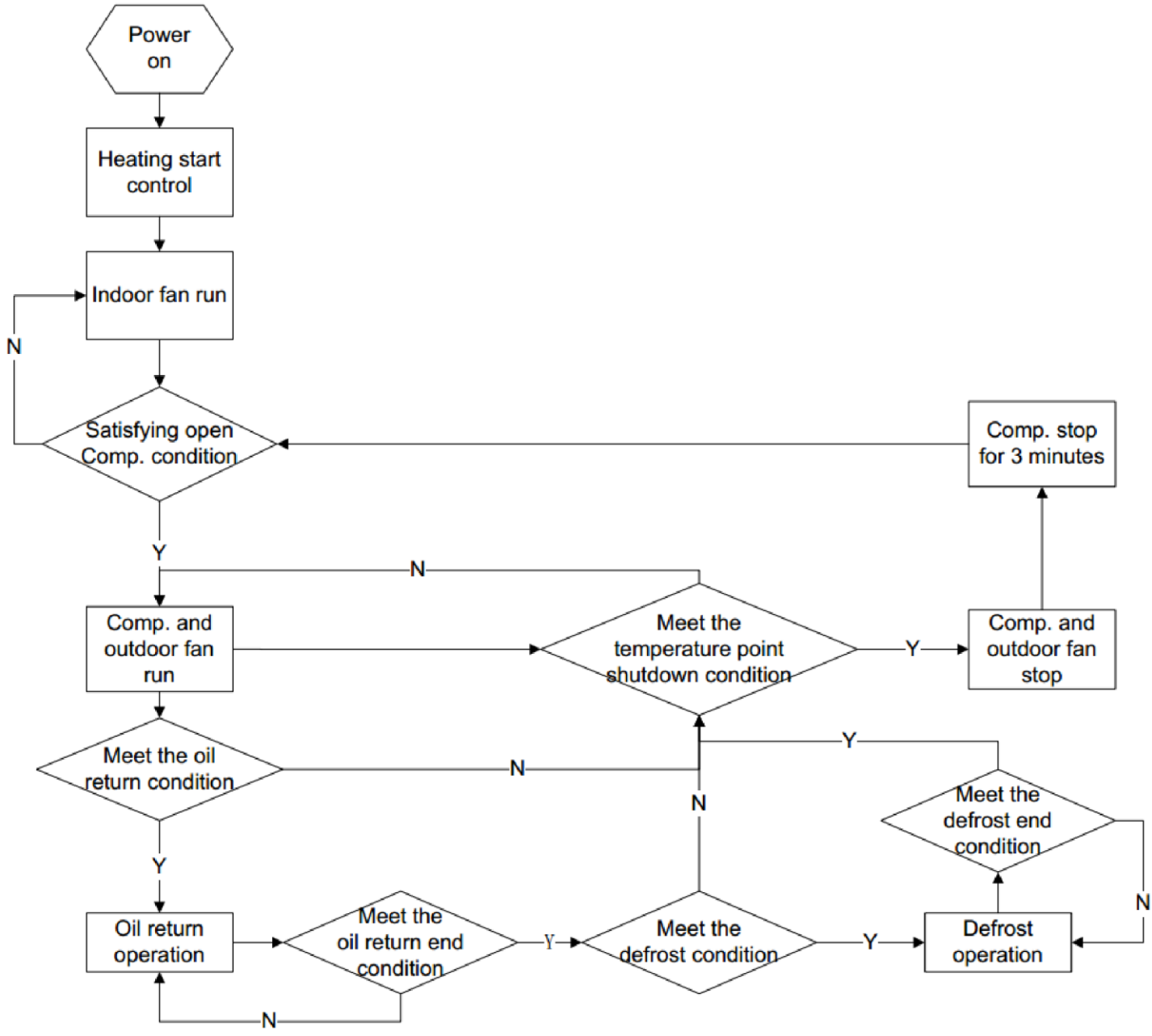
Model	Power Supply	Fuse Capacity	Circuit breaker capacity
	V/Ph/Hz	A	A
VRUI-24UC-M2B(54)	208/230V-1Ph-60Hz	3.15	15
VRUI-36UC-M2B(54)	208/230V-1Ph-60Hz	3.15	15
VRUI-48UC-M2B(54)	208/230V-1Ph-60Hz	3.15	15
VRUI-60UC-M2B(54)	208/230V-1Ph-60Hz	3.15	15

Operation Mode

Cooling Mode



Heating Mode



Control Mode

Based Control

Compressor Control
When cooling or heating mode is turned on, indoor fan will run for a while before the compressor starts. Under different modes, the compressor can only be stopped after running for some time (special cases excluded). This is to protect the compressor from frequent starting or stopping. Once the compressor is stopped, it must not be restarted right away. Please wait for a few minutes.

EXV Control
When the unit is first started, the electronic expansion valve will reset control. During this process, the expansion valve will produce a rattling sound. When cooling or heating mode is turned on, the valve will be opened at a certain step before the compressor starts.

Outdoor Fan Control
This series of air conditioner has two types of outdoor units: one with a single fan and the other with dual fans. The outdoor fan can run at the highest level 10 and the lowest level 1. By controlling the speed of outdoor fan, the unit can achieve cooling at low temperature and heating at high temperature. When the indoor unit is in fan mode, outdoor fan will not operate.

4-way Valve Control
After heating mode is turned on for a while, 4-way valve will be energized to change the direction of refrigerant flow so that the system can run in heating mode and the indoor unit will not blow cold air. Under other modes, the valve will not be energized.

To avoid the 4-way valve from incorrectly changing directions, when the unit stops in heating mode, due to a temperature point or other protection reasons, the 4-way valve will continue to function temporarily and lose power after a while. There must be adequate differential pressure for the 4-way valve to change directions.

Special Control

Defrosting Control
ODU defrosting control in heating: Defrosting will start when the temperature sensed by outdoor tube temperature sensor reaches a preset value. During defrosting, the 4-way valve will switch to the cooling condition, and outdoor and indoor fan will both stop. When the temperature sensed by outdoor tube temperature sensor reaches the preset value for the defrosting to stop, the system will quit defrosting. The 4-way valve will switch back to the heating condition, compressor and outdoor unit fan restart.

Oil Return Control
If the unit is running at low frequency for a long period of time, the system will enable oil return control. This is to lead oil in the pipeline back to the compressor so that the compressor will not be properly lubricated. Generally, the oil return takes about 5min. The compressor running frequency will be raised to the preset oil return frequency.

Protection Control

High Pressure Protection Control
System will enable high pressure protection control if the high pressure switch is detected open for continuously a short time. Under high pressure protection, system will be shut down and display error code E1.

When high pressure protection occurs for the first time, system will restore operation if the high pressure switch is detected to reclose continuously a short time. When high pressure protection occurs for the second time within short period of time, the system will not restore operation. You need to manually turn off the unit and clear the error before restarting the unit. (If high pressure protection occurs frequently, please contact an HVAC professional personnel to inspect and repair.)

Low Pressure Protection Control
System will enable low pressure protection control if the low-pressure switch is detected open continuously for a short time. Under low pressure protection, the system will shut down and display error code E3.When low pressure protection occurs, system will restore operation if the low pressure switch is detected to be reclosed within a few minutes after shutdown. If low pressure protection occurs several times in a short period of time, the system will not restore operation automatically. You will need to manually turn off the unit before restarting.

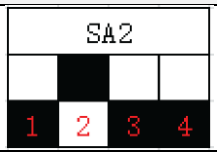
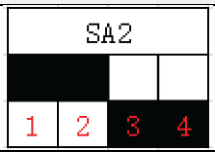
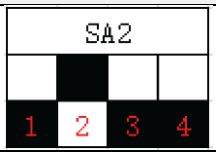
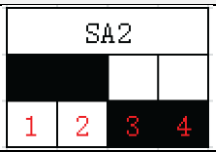
High Temperature Prevention Control
Under heating mode, the system will enable high temperature prevention control if the temperature sensed by indoor tube temperature sensor reaches a certain value. When high temperature prevention control is enabled, outdoor fan will slow down.

Discharge High Temperature Protection Control
System will enable discharge temperature protection control if the discharge high temperature sensor is detected open continuously a short time. Under discharge high temperature protection, system will be shut down and display error code E4. When discharge high temperature protection occurs, the system will restore operation if the discharge high temperature sensor is detected to be reclosed within a few minutes after shutdown. If discharge high temperature protection occurs several times in a short period of time, system will not restore operation automatically. You need to manually turn off the unit before restarting it.

Functions

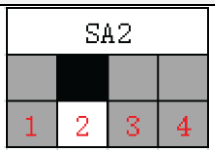
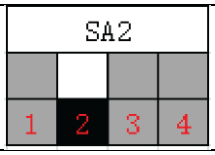
Set Capacity Dip Switch

Set the capacity of the outdoor unit through the four dip switches of the outdoor unit main control board.
Specific dip switch definition, the first dip switch distinguishes the capacity.

Capacity	24K	36K	48K	60K
Dip Switches				

Set Defrost Mode

The second dip switch is selecting the defrost mode.
The second dip switch is used to change the defrost setting, factory default setting is standard defrost. Under extremely low environment temperature, if the standard defrost does not have the condenser defrosted completely, please set the second dip switch to Strong Defrost. Under strong defrost, the defrosting time will run longer, and enable the condenser to be defrosted completely.

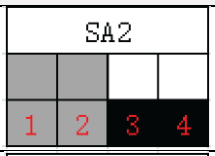
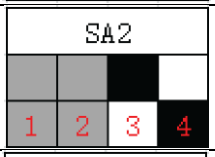
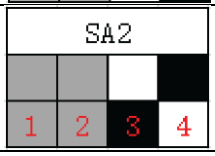
Defrost mode	Outdoor unit dip switches
Standard Defrost (Default)	
Strong Defrost	

Set Operating Mode

The third dip switch and the fourth dip switch select the operating mode.

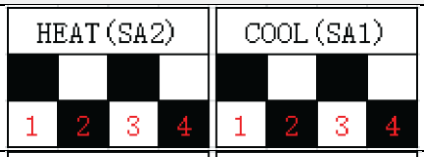
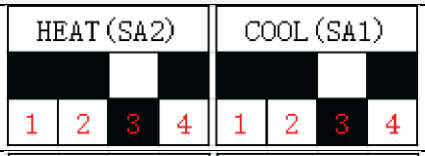
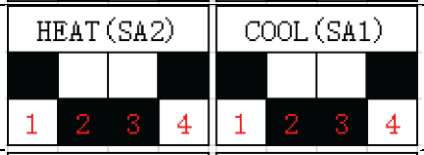
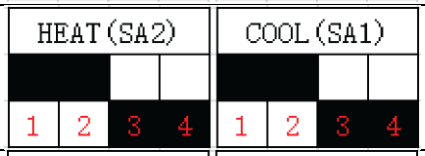
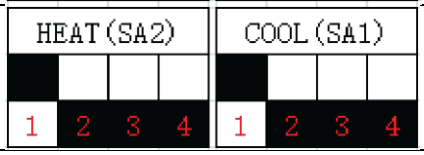
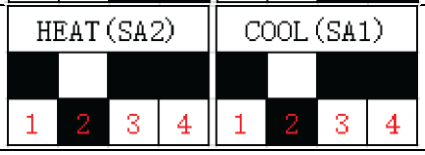
Standard mode is the conventional mode.
By setting the strong mode dip switches of the condensing unit, the air conditioner can quickly increase the capacity output and ensure reliable operation in a short time, so as to meet the user's demand for the indoor temperature to quickly reach the set temperature.

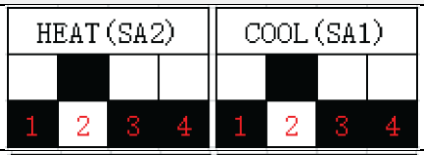
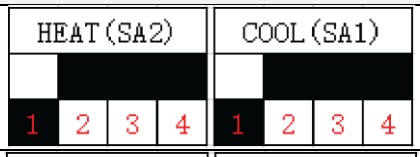
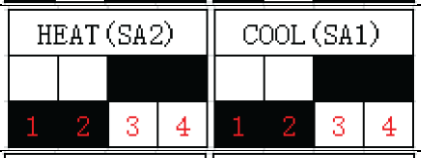
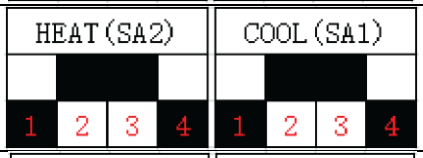
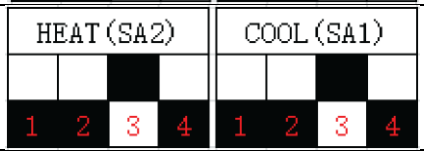
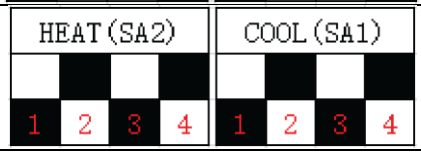
Energy saving mode is achieved by setting the condensing unit operating mode to operate the air conditioner within a small load range.

Operating mode	Outdoor unit dip switches
Standard mode (Default)	
Strong mode	
Energy saving mode	

Set Indoor Fan Speed

Set the indoor fan speed through the eight dip switches of the indoor main control board. The higher the level, the higher speed of the indoor unit fan.

Capacity	24K indoor unit dip switches	36K indoor unit dip switches
Level 1 (Default)		
Level 2		
Level 3		

Capacity	48K indoor unit dip switches	60K indoor unit dip switches
Level 1 (Default)		
Level 2		
Level 3		

Forced Defrost Control

Press and hold "SW1" for 5s to enter the first level menu of the debugging mode, the outdoor unit mainboard LED displayer flashes. Under the first level menu, short press "SW1" to switch various functions. After switching to "06", short press "SW2" or "SW3" to enter the forced defrosting mod. "ON" means open, "OF" means closed, and then short press "SW1" to save. During debugging, if no operation is performed within 10s, the debugging mode interface is automatically exited.

Refrigerant Recovery Control

Press and hold "SW1" for 5s to enter the first level menu of the debugging mode, the outdoor unit mainboard LED displayer flashes. Under the first level menu, short press "SW1" to switch various functions. After switching to "08", short press "SW2" or "SW3" to enter the refrigerant recovery control mode, "ON" means open, "OF" means closed. Then short press "SW1" to save. During debugging, if no operation is performed within 10s, the debugging mode interface is automatically exited.

Forced Operation Control

Press and hold "SW1" for 5s to enter the first level menu of the debugging mode, the outdoor unit mainboard LED displayer flashes. Under the first level menu, short press "SW1" to switch various functions. After switching to "09", short press "SW2" or "SW3" to enter the forced operation control mode, "01"denotes that turn on the forced operation cooling mode; "02"denotes that turn on the forced operation cooling mode; "OF" indicates that shut down the forced cooling / heating mode. Then short press "SW1" to save. During debugging, if no operation is performed within 10s, the debugging mode interface is automatically exited.

Thermostat Functions

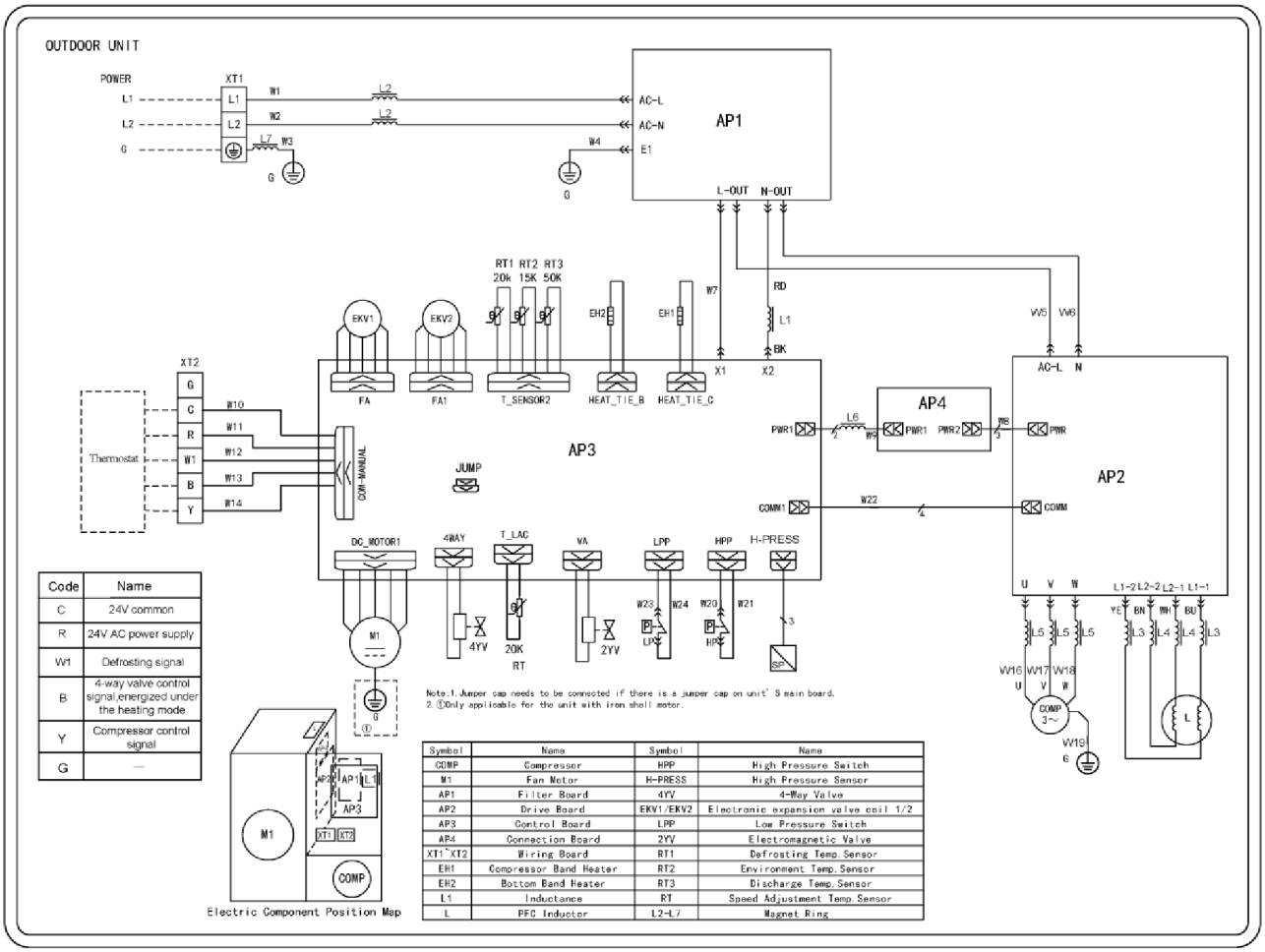
Thermostat model: XE70-00/E1, please refer to the thermostat instruction manual for all functions.

TroubleShooting
Wiring Diagram

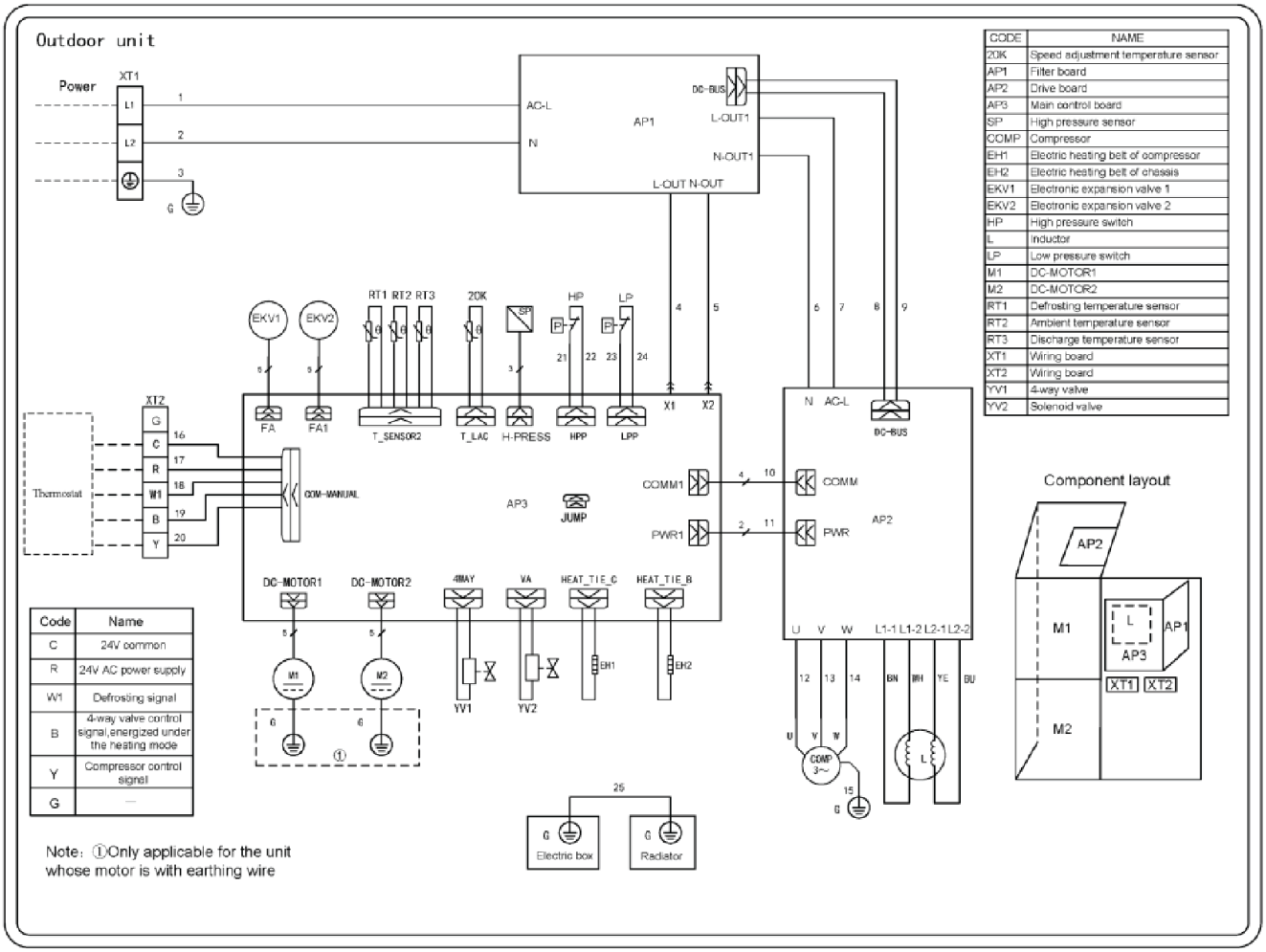
The following electric wiring diagram is for reference only. Please refer to the version stickered inside your unit as the latest version.

ODU Wiring Diagrams

VRUO-2436HP-U2B(54)



VRUO-4860HP-U2B(54)



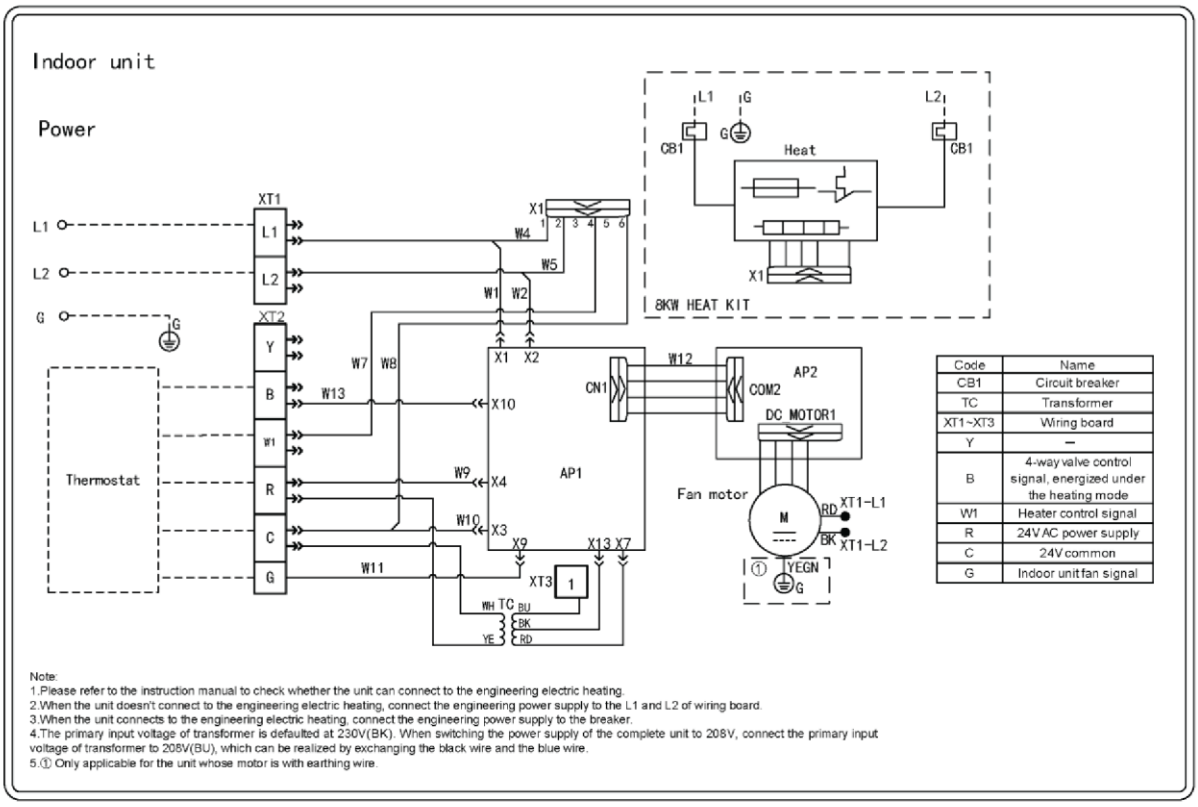
CODE	NAME
20K	Speed adjustment temperature sensor
AP1	Filter board
AP2	Drive board
AP3	Main control board
SP	High pressure sensor
COMP	Compressor
EH1	Electric heating belt of compressor
EH2	Electric heating belt of chassis
EKV1	Electronic expansion valve 1
EKV2	Electronic expansion valve 2
HP	High pressure switch
L	Inductor
LP	Low pressure switch
M1	DC-MOTOR1
M2	DC-MOTOR2
RT1	Defrosting temperature sensor
RT2	Ambient temperature sensor
RT3	Discharge temperature sensor
XT1	Wiring board
XT2	Wiring board
YV1	4-way valve
YV2	Solenoid valve

Code	Name
C	24V common
R	24V AC power supply
W1	Defrosting signal
B	4-way valve control signal, energized under the heating mode
Y	Compressor control signal
G	—

Note: ①Only applicable for the unit whose motor is with earthing wire

Wiring Diagrams of IDUs

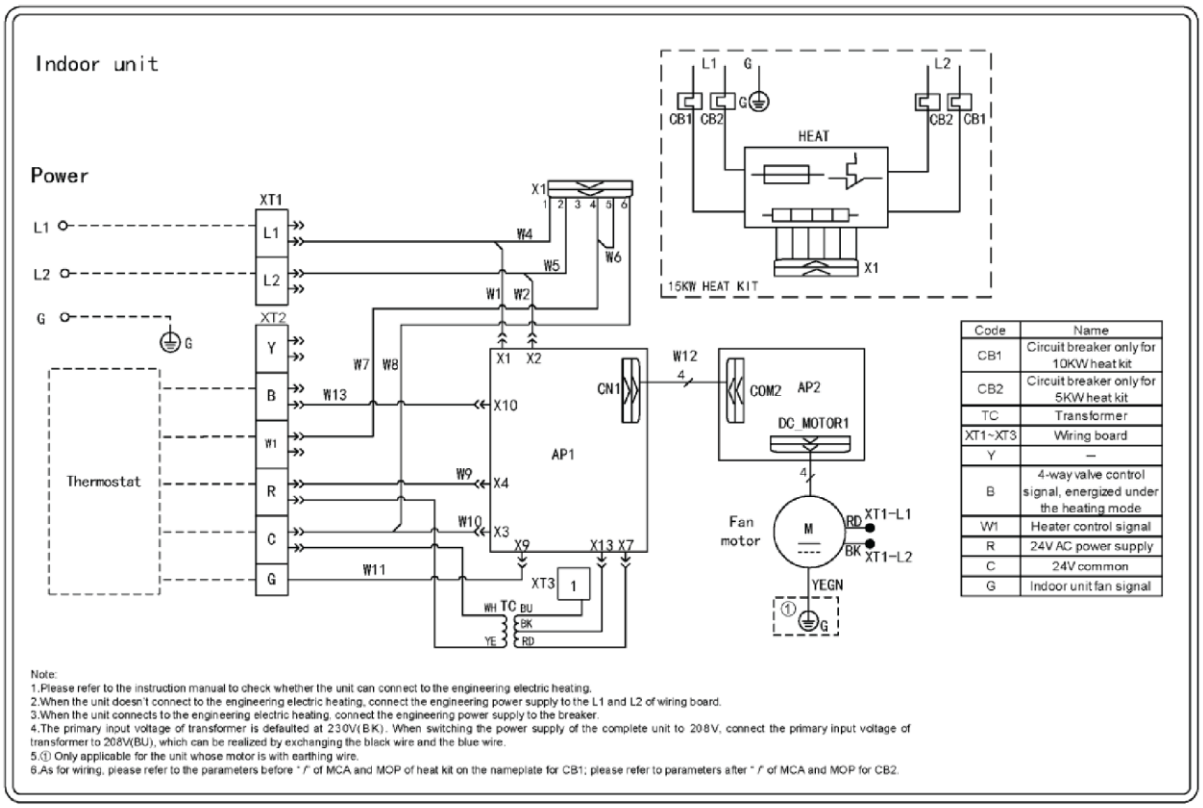
VRUI-24UC-M2B(54) & VRUI-36UC-M2B(54)



Code	Name
CB1	Circuit breaker
TC	Transformer
XT1~XT3	Wiring board
Y	–
B	4-way valve control signal, energized under the heating mode
W1	Heater control signal
R	24V AC power supply
C	24V common
G	Indoor unit fan signal

Note:
1.Please refer to the instruction manual to check whether the unit can connect to the engineering electric heating.
2.When the unit doesn't connect to the engineering electric heating, connect the engineering power supply to the L1 and L2 of wiring board.
3.When the unit connects to the engineering electric heating, connect the engineering power supply to the breaker.
4.The primary input voltage of transformer is defaulted at 230V(BK). When switching the power supply of the complete unit to 208V, connect the primary input voltage of transformer to 208V(BU), which can be realized by exchanging the black wire and the blue wire.
5.① Only applicable for the unit whose motor is with earthing wire.

VRUI-48UC-M2B(54) & VRUI-60UC-M2B(54)

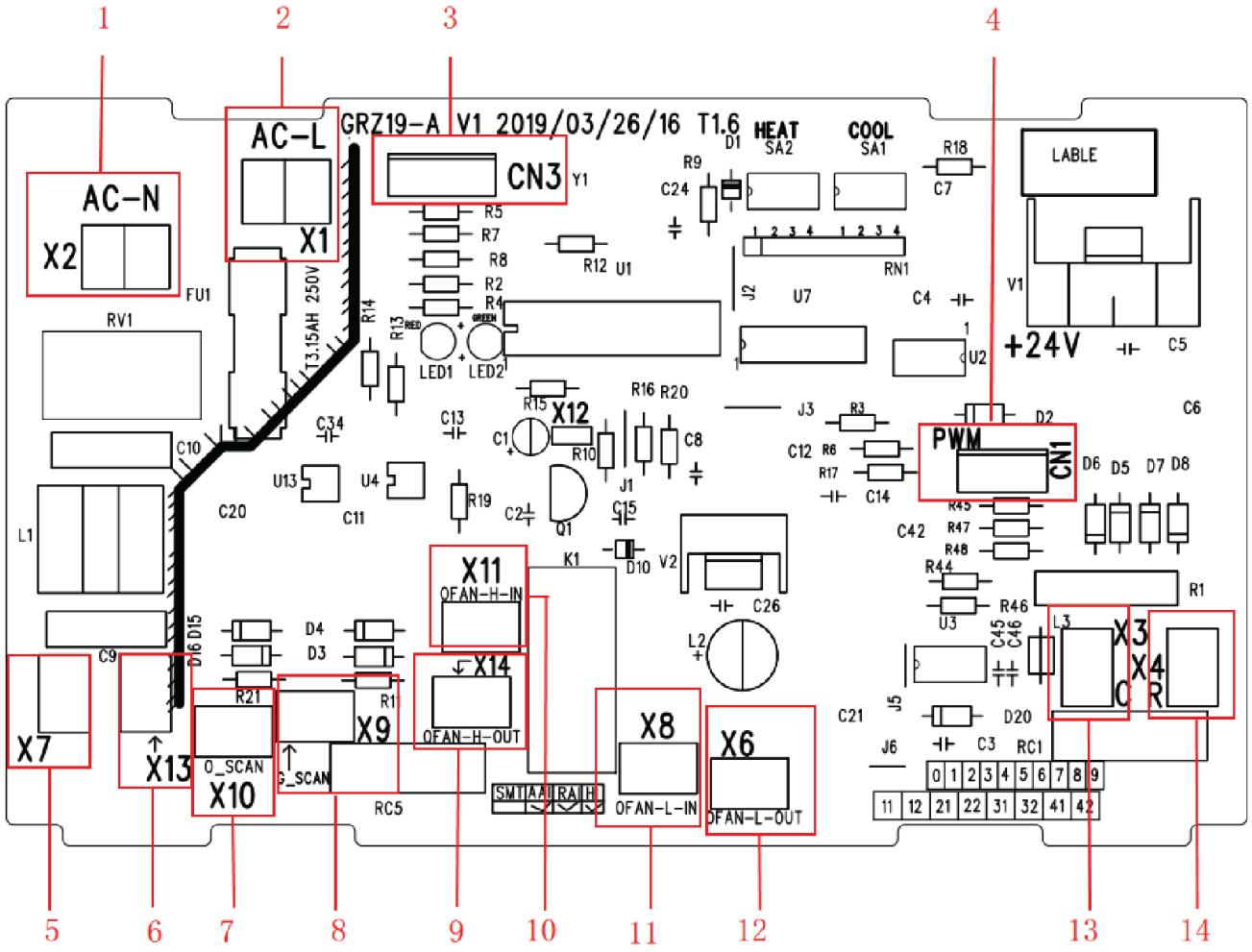


Code	Name
CB1	Circuit breaker only for 10KW heat kit
CB2	Circuit breaker only for 5KW heat kit
TC	Transformer
XT1~XT3	Wiring board
Y	–
B	4-way valve control signal, energized under the heating mode
W1	Heater control signal
R	24V AC power supply
C	24V common
G	Indoor unit fan signal

Note:
1.Please refer to the instruction manual to check whether the unit can connect to the engineering electric heating.
2.When the unit doesn't connect to the engineering electric heating, connect the engineering power supply to the L1 and L2 of wiring board.
3.When the unit connects to the engineering electric heating, connect the engineering power supply to the breaker.
4.The primary input voltage of transformer is defaulted at 230V(BK). When switching the power supply of the complete unit to 208V, connect the primary input voltage of transformer to 208V(BU), which can be realized by exchanging the black wire and the blue wire.
5.① Only applicable for the unit whose motor is with earthing wire.
6.As for wiring, please refer to the parameters before " / " of MCA and MOP of heat kit on the nameplate for CB1; please refer to parameters after " / " of MCA and MOP for CB2.

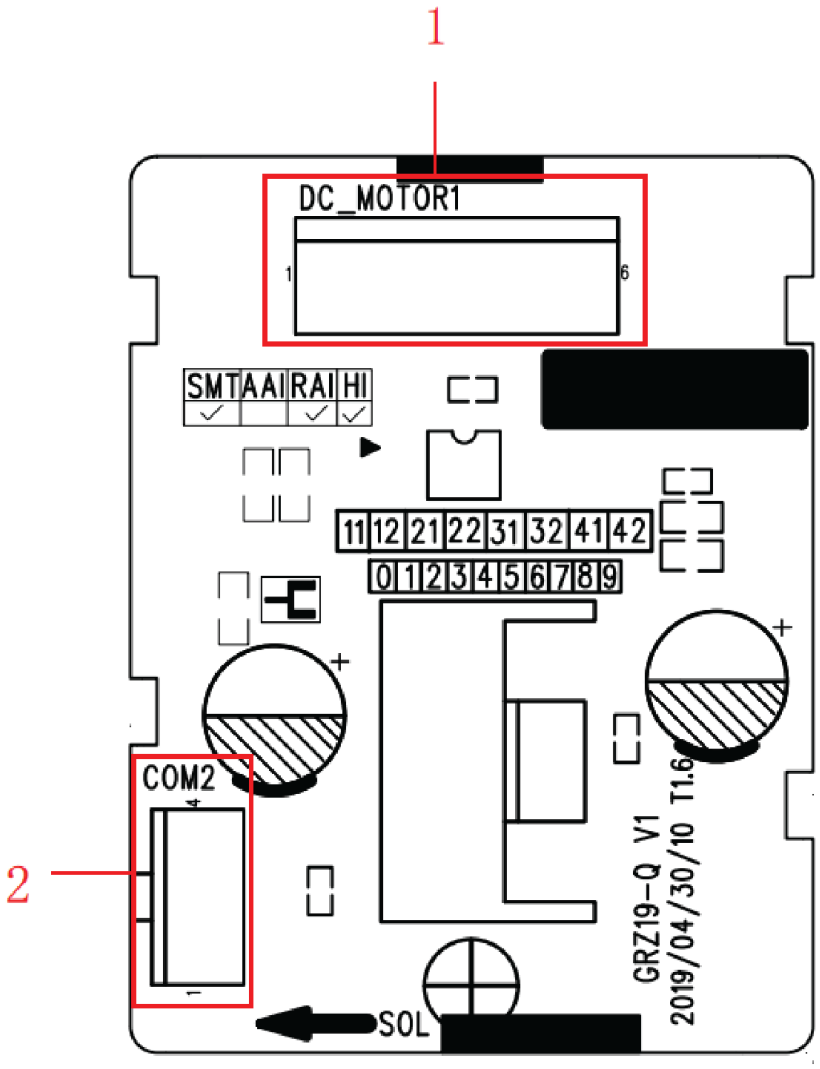
PCB Layout

Interface



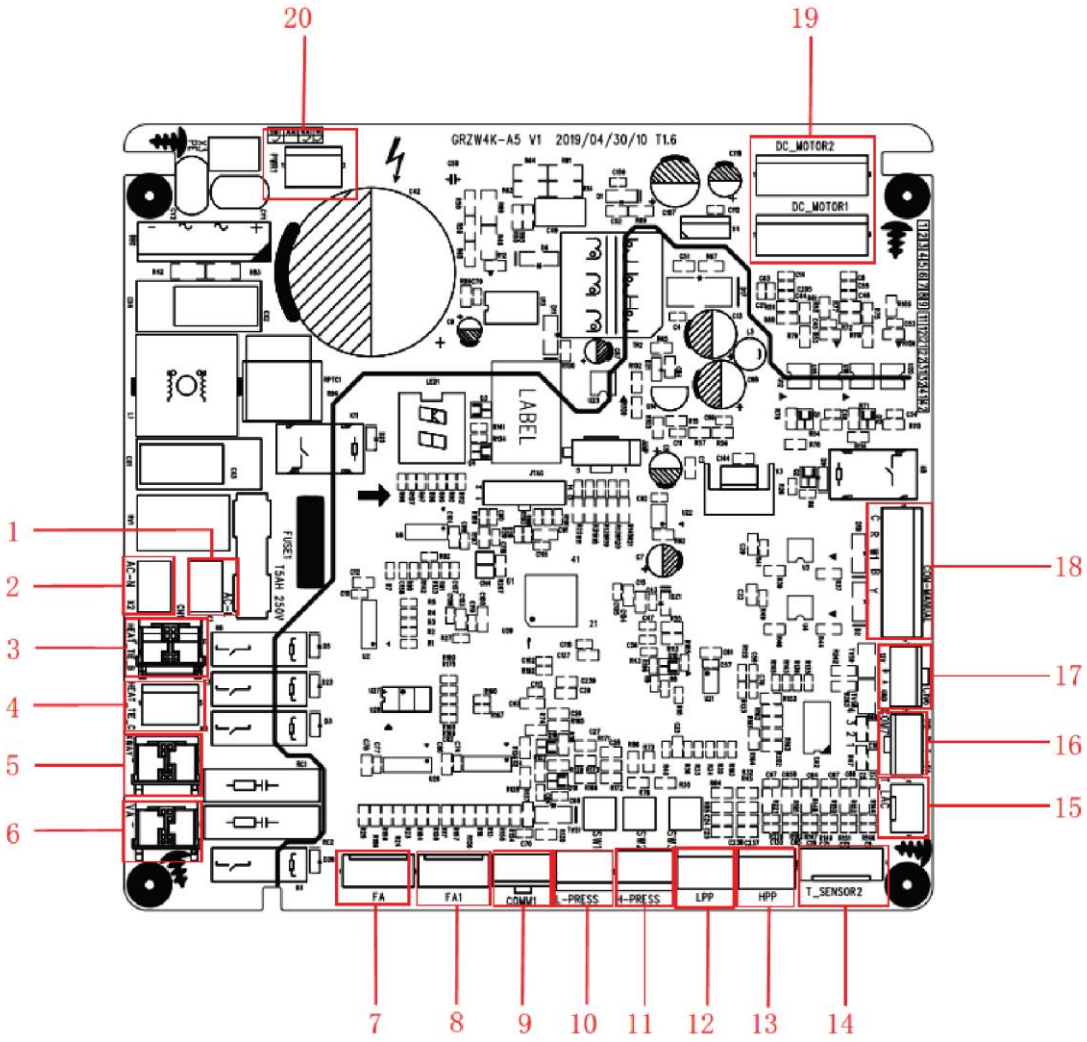
No.	Printing	Interface	No.	Printing	Interface
1	AC-N（X2）	Neutral wire input	8	X9(G_SCAN)	Indoor motor check
2	AC-L （X1）	Live wire input	9	X14(OFAN-H-OUT)	AC motor high speed output
3	CN3	Wired control communication interface	10	X11(OFAN-H-IN)	AC motor high speed input
4	CN1	DC motor output	11	X8(OFAN-L-IN)	AC motor low speed input
5	X7	Transformer Neutral wire input	12	X6(OFAN-L-OUT)	AC motor low speed output
6	X13	Transformer Live wire input	13	X3(C)	Transformer Neutral wire output
7	X10(O_SCAN)	4-Way check	14	X4(R)	Transformer Live wire output

Pinboard



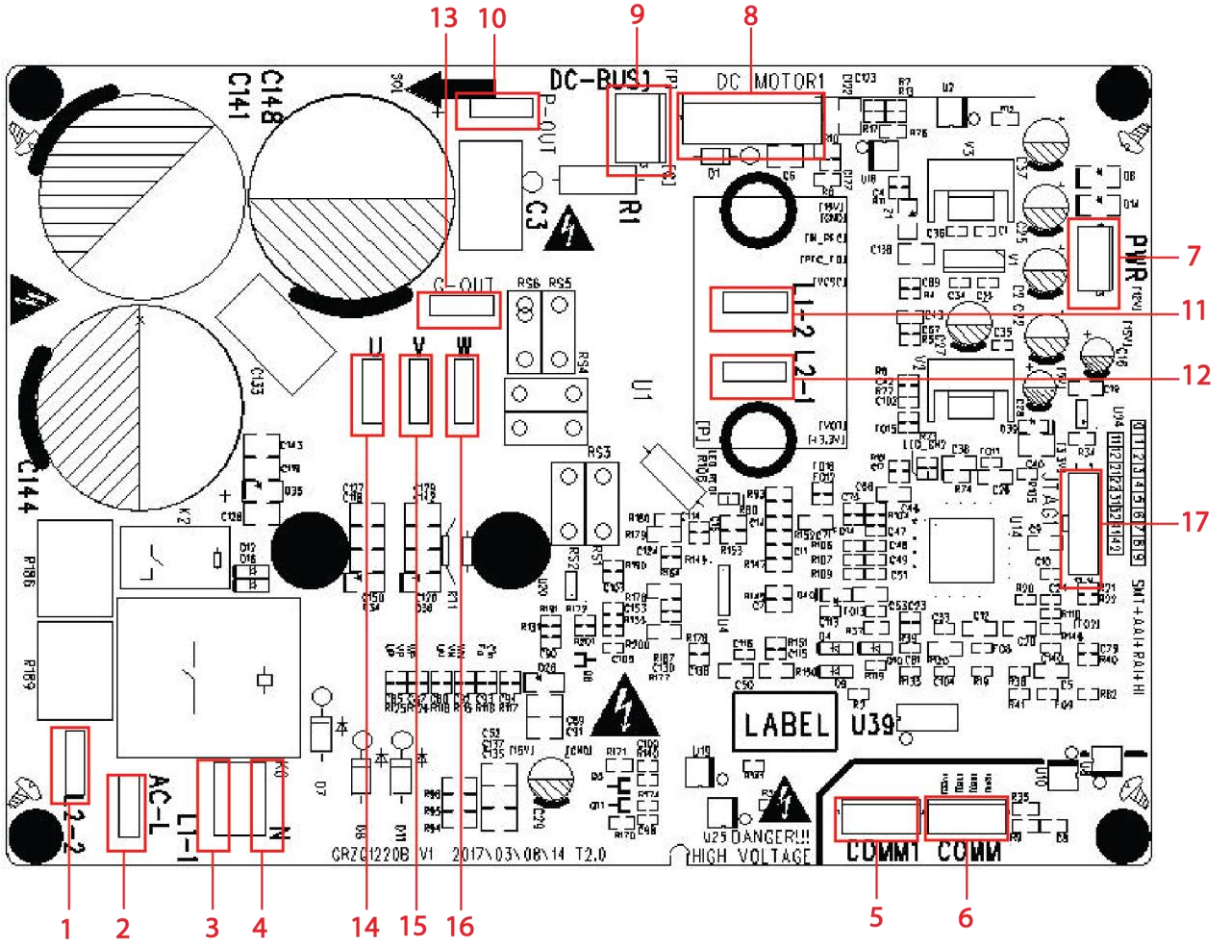
No.	Printing	Interface	No.	Printing	Interface
1	DC-MOTOR1	DC motor output	2	COM2	DC motor control signal input

Outdoor Unit Mainboard



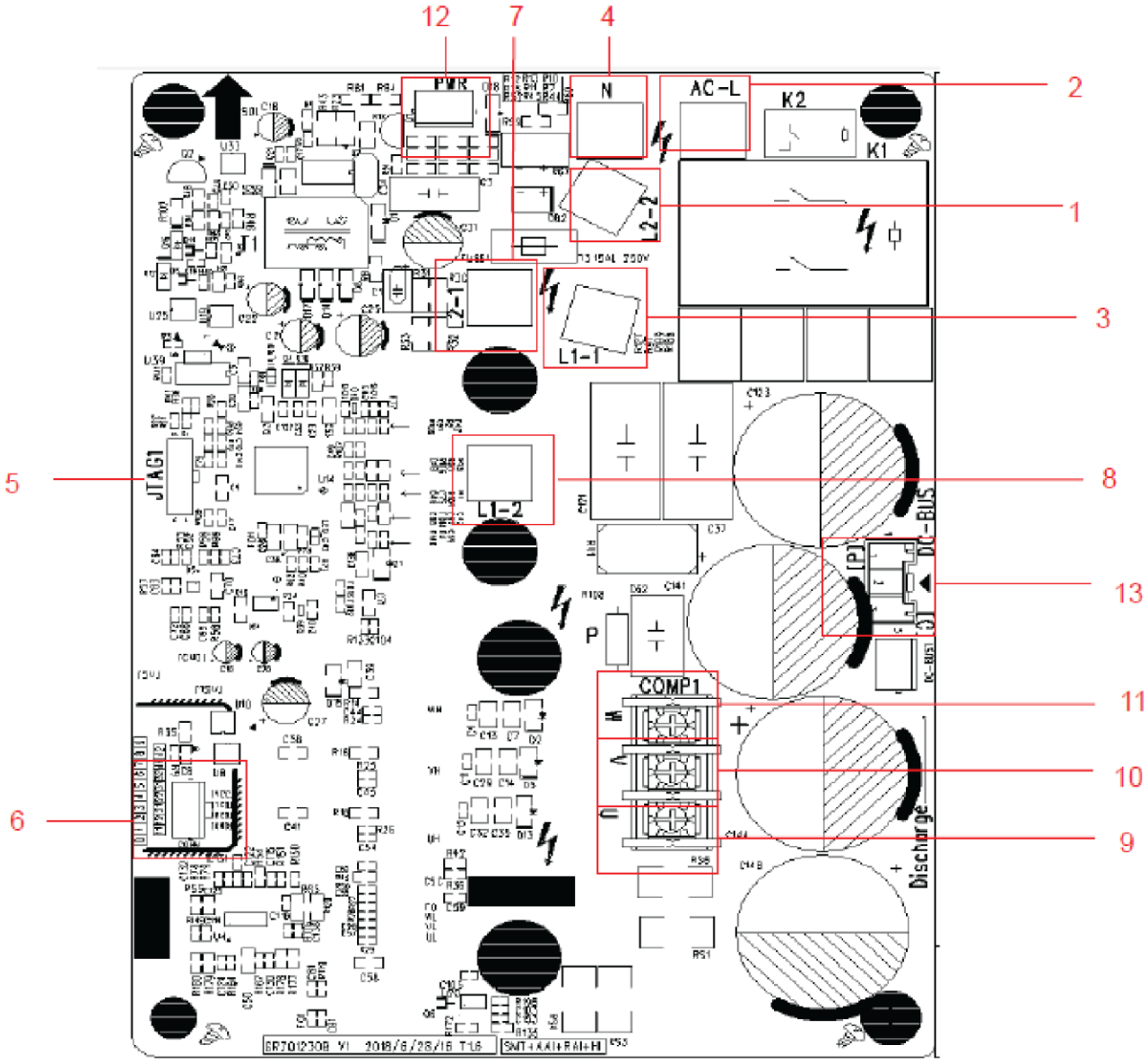
No.	Printing	Interface	No.	Printing	Interface
1	AC-L	Live wire input	11	H-PRESS	High pressure sensor interface
2	AC-N	Neutral wire input	12	LPP	System low pressure protection interface
3	HEAT_TIE_B	Chassis electric heating belt	13	HPP	System high pressure protection interface
4	HEAT_TIE_C	Compressor electric heating belt	14	T_SENSOR2	2. Outdoor tube temperature sensor interface 4. Outdoor ambient temperature sensor interface 6. Discharge temperature sensor interface
5	4WAY	4-way valve	15	T_LAC	Low temperature cooling temperature sensing
6	VA	Electromagnetic valve interface	16	COM7	Unit communication interface
7	FA	Electronic expansion valve interface	17	CN6	GPRS communication interface
8	FA1	Electronic expansion valve 1 interface Refrigerant heat dissipation	18	COM-MANUAL	Thermostat interface
9	COMM1	Drive communication interface	19	DC_MOTOR1 DC_MOTOR2	DC motor output
10	L-PRESS	Low pressure sensor interface	20	PWR1	310V DC power supply interface

Drive Board
VRUO-2436HP-U2B(54)



No.	Printing	Interface	No.	Printing	Interface
1	L2-2	PFC induction wire (blue)	10	P-OUT	Reserved
2	AC-L	Live wire	11	L1-2	PFC induction wire (white)
3	L1-1	PFC induction wire (brown)	12	L2-1	PFC induction wire (yellow)
4	N	Neutral wire	13	G-OUT	Reserved
5	COMM1	Communication terminal, same with COMM	14	U	Compressor U phase terminal
6	COMM	Communication terminal, same with COMM1	15	V	Compressor V phase terminal
7	PWR	Drive power supply terminal	16	W	Compressor W phase terminal
8	DC-MOTOR1	DC fan terminal	17	JTAG1	Programming interface (for testing)
9	DC-BUS1	Power discharge terminal (for testing)	-	-	-

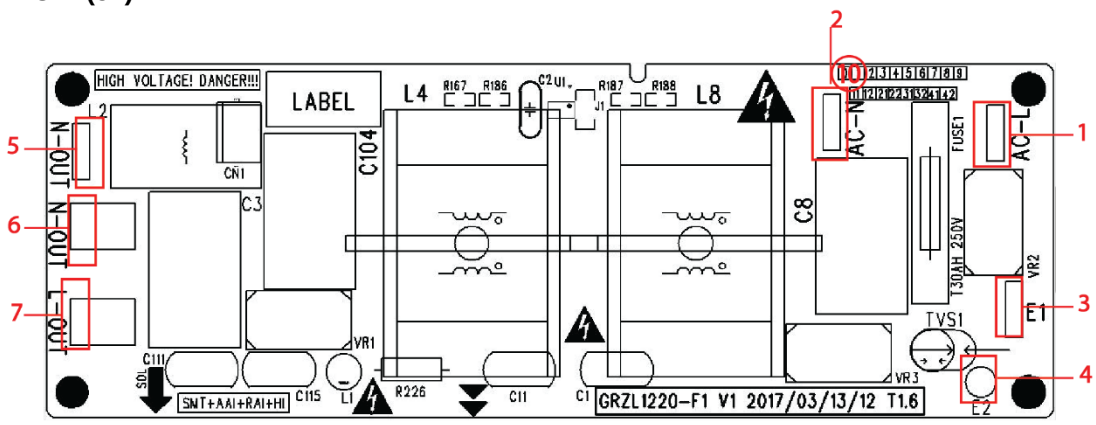
Drive Board
VRUO-4860HP-U2B(54)



No.	Printing	Interface	No.	Printing	Interface
1	L2-2	PFC induction wire (blue)	8	L1-2	PFC induction wire (white)
2	AC-L	Live wire	9	U	Compressor U phase terminal
3	L1-1	PFC induction wire (brown)	10	V	Compressor V phase terminal
4	N	Neutral wire	11	W	Compressor W phase terminal
5	JTAG1	Programminginterface (for testing)	12	PWR	Drive power supply terminal
6	COMM	Communication terminal, same with COMM	13	DC-BUS	Power discharge terminal (for testing)
7	L2-1	PFC induction wire (yellow)	-	-	-

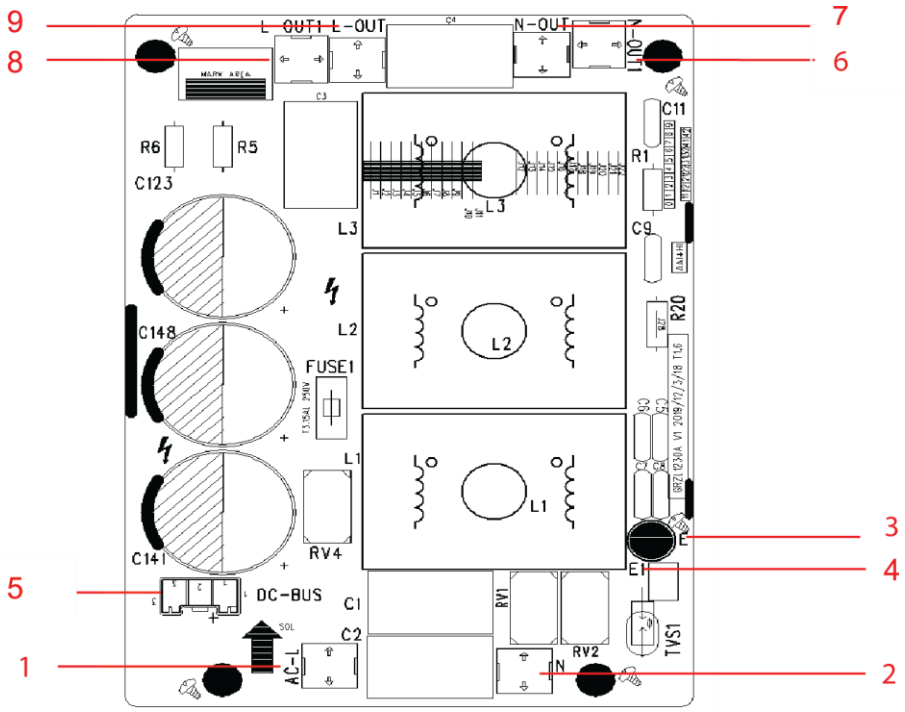
Filtering Board

VRUO-2436HP-U2B(54)



No.	Printing	Interface	No.	Printing	Interface
1	AC-L	Power input live wire terminal	5	N-OUT	Power output neutral wire terminal (reserved)
2	AC-N	Power input neutral wire terminal	6	N-OUT	Power output neutral wire terminal
3	E1	Filtering board ground wire terminal	7	L-OUT	Power output live wire terminal
4	E2	Filtering board grounding hole (reserved)	-	-	-

VRUO-4860HP-U2B(54)



No.	Printing	Interface	No.	Printing	Interface
1	AC-L	Power input live wire terminal	6	N-OUT1	Power output neutral wire terminal (reserved)
2	N	Power input neutral wire terminal	7	N-OUT	Power output neutral wire terminal
3	E	Filtering board ground wire terminal	8	L-OUT1	Power output live wire terminal
4	E1	Filtering board grounding hole (reserved)	9	L-OUT	Power output live wire terminal
5	DC-BUS	Power discharge terminal (for testing)	-	-	-

IPM, PFC Testing Method

Method of Testing IPM Module

1. Preparation before test: prepare a universal meter and turn to its diode option, and then remove the wires U, V, W of the compressor after it is powered off for one minute.
2. Testing Steps:

   Step 1: put the black probe on the place P and the red one on the wiring terminal U, V, W respectively as shown in the following figure to measure the voltage between UP, VP and WP.

   Step2: put the red probe on the place N and the black one on the wiring terminal U, V, W respectively as shown in the following figure to measure the voltage between NU, NV and NW.

3. If the measured voltages between UP, VP, WP, NU, NV, NV are all among 0.3V-0.7V, then it indicates the IPM module is normal; If any measured valve is 0, it indicates the IPM is damaged.

Method of Testing PFC Module Short Circuit

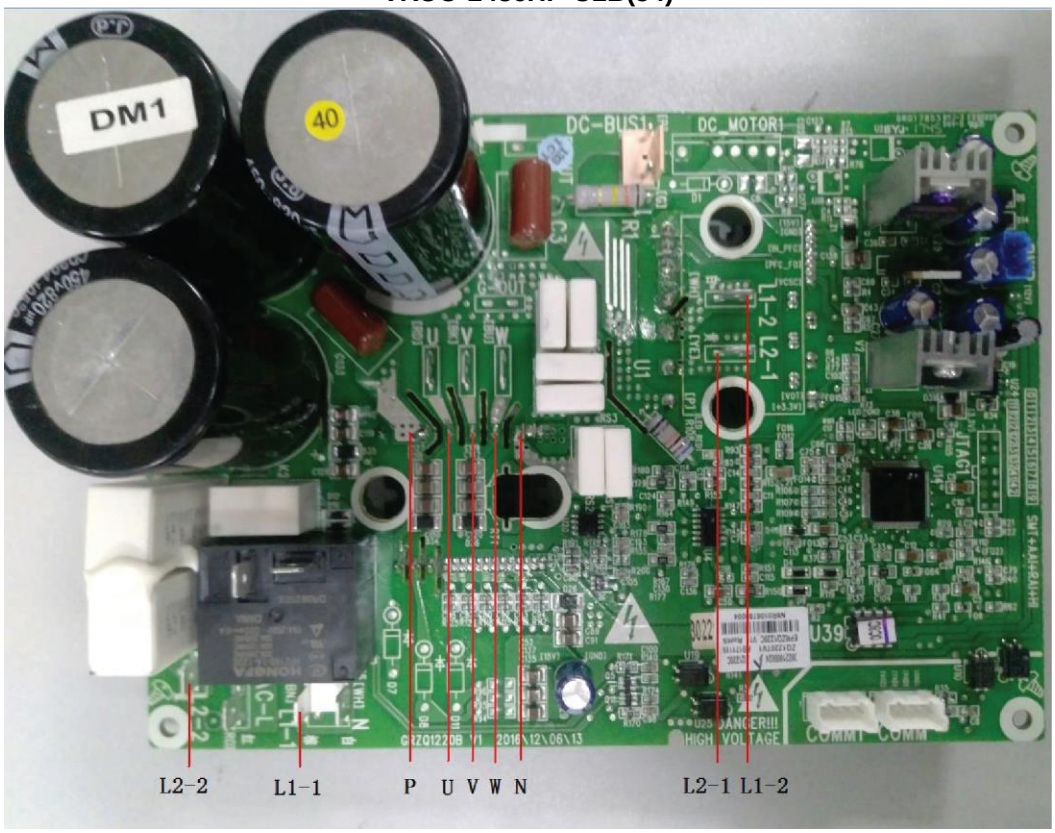
1. Preparation before test: prepare a universal meter and turn to its diode option, and then remove the wires L1-2, L2-1 after it is powered off for one minute.
2. Testing Steps:

   Step 1: Put the black probe on the place P and the red one on the wiring terminal L1-2, L2-1respectively as shown in the following figure to measure the voltage between L1-2and P; L2-1andP.

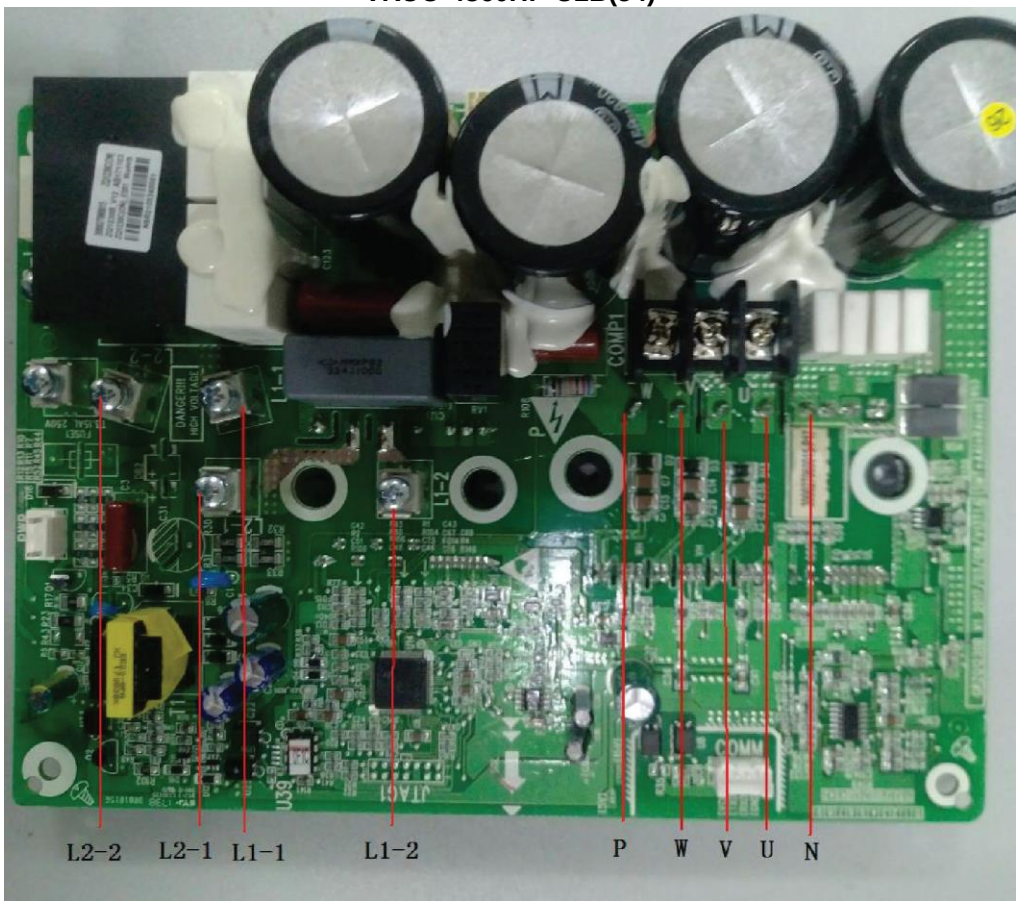
   Step 2: Put the red probe on the place N and the black one on the wiring terminal L1-2, L2-1respectively as shown in the following figure to measure the voltage between N and L1-2; N and L2-1.

3. If the measured voltages between L1-2andP; L2-1andP;Nand L1-2;NandL2-1 are all among 0.3V-0.7V, then it indicates the PFC module is normal; If any measured valve is 0, it indicates the PFC is damaged.

VRUO-2436HP-U2B(54)



VRUO-4860HP-U2B(54)



Error Codes

No.	Error code	Error
1	E1	Compressor high pressure protection
2	E3	Compressor low pressure protection
3	E4	Compressor air discharge high-temperature protection
4	F2	Condenser temperature sensor error
5	F3	Outdoor ambient temperature sensor error
6	F4	Discharge temperature sensor error
7	F6	ODU tube temperature sensor error
8	EE	ODU memory chip error
9	H4	Overload
10	H5	IPM protection
11	H6	DC fan error
12	H7	Driver out-of-step protection
13	HC	Pfc protection
14	Lc	Startup failure
15	P0	Driver reset protection
16	P5	Over-current protection
17	P6	Master control and driver communication error
18	P7	Driver module sensor error
19	P8	Driver module high temperature protection
20	PA	AC current protection
21	Pc	Driver current error
22	PL	Bus low-voltage protection
23	PH	Bus high-voltage protection
24	PU	Charge loop error
25	ee	Drive memory chip error
26	e1	High pressure sensor error
27	C4	ODU jumper cap error

If malfunction occurs during operation, LCD temperature display zone will show the failure information. If several malfunctions occur at the same time, their corresponding error codes will be shown in turn. When malfunction occurs, please shut off the unit and send for professional personnel to repair. For example, E1 (as shown below) indicates high pressure protection.

Troubleshooting

"E1" Compressor High Pressure Protection

Error display: ODU mainboard LED displayer

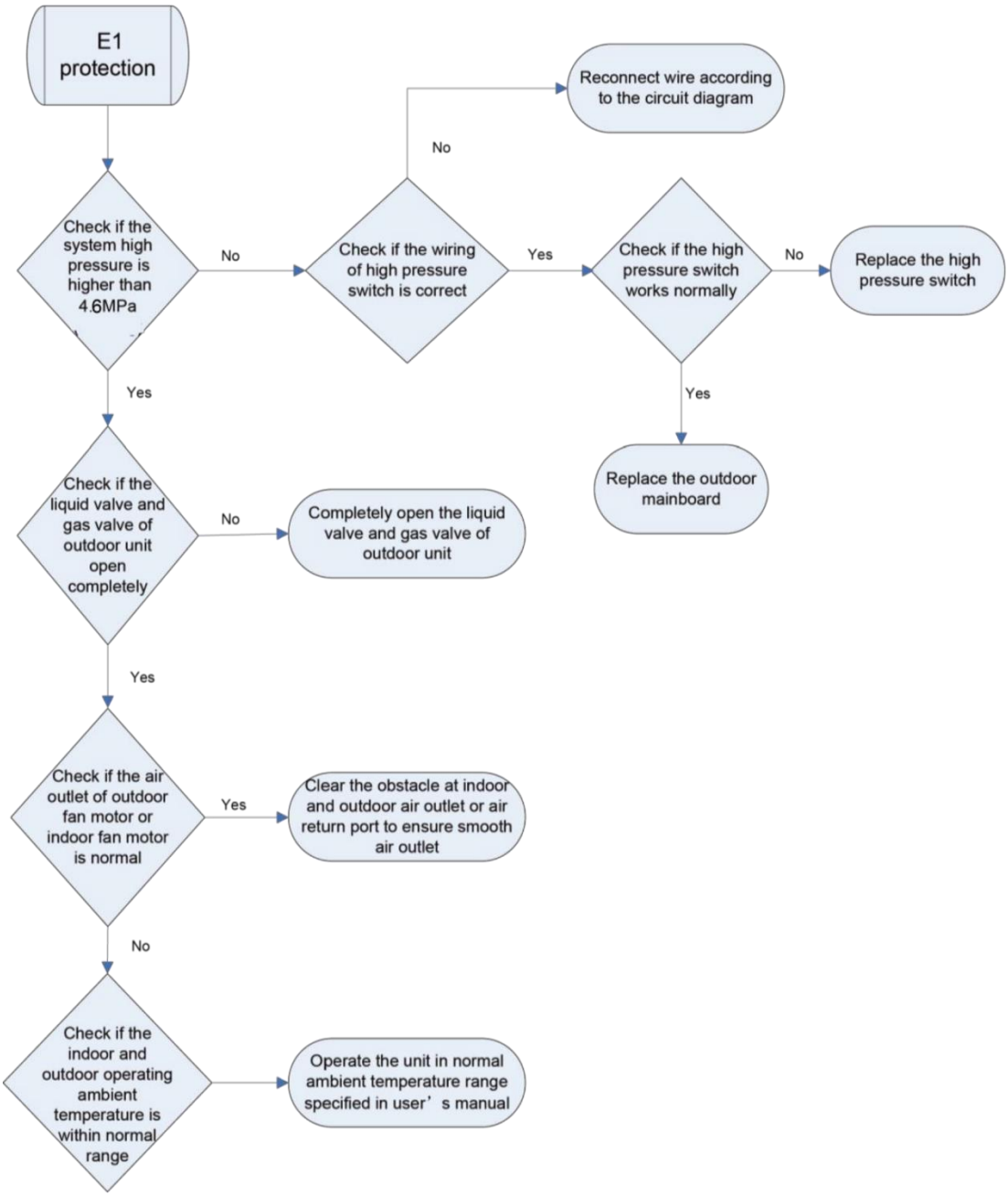
Error judgment condition and method:

It is judged through the action of high pressure switch. If the high pressure switch is cut off, it is judged that high pressure is too high and the system stops operation for protection.

Possible reason:

- Cut-off valve of ODU is not fully opened
- High pressure switch is abnormal
- Outdoor or indoor fan is not working properly
- IDU filter or air duct is blocked (heating mode)
- Ambient temperature is too high;
- Refrigerant charging amount is too much
- System pipeline is blocked

Troubleshooting:



“E3” Compressor Low-pressure Protection, Refrigerant Shortage Protection, Refrigerant Recovery Mode

Error display: ODU mainboard LED displayer

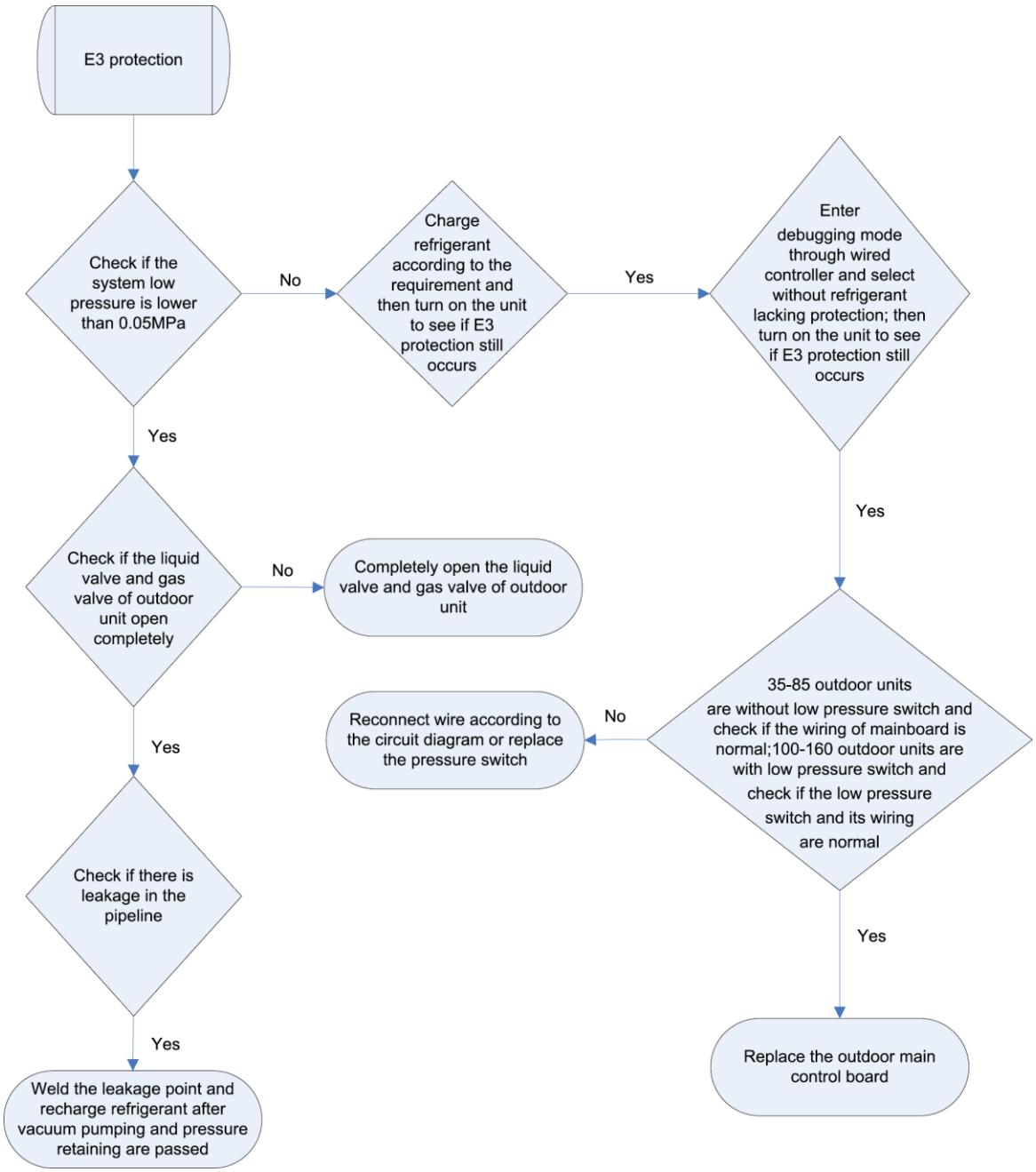
Error judgment condition and method:

It is judged through the action of low pressure switch. If the low pressure switch is cut off, it is judged that low pressure is too low and the system stops operation for protection.

Possible reason：

- Cut-off valve of ODU is not fully opened
- Low pressure sensor is abnormal
- Outdoor or indoor fan is not working properly
- IDU filter or air duct is blocked (cooling mode)
- Ambient temperature is too low
- Refrigerant charging amount is insufficient
- System pipeline is blocked

Troubleshooting:



“E4” Compressor Air Discharge High-temperature Protection

Error display: ODU mainboard LED displayer

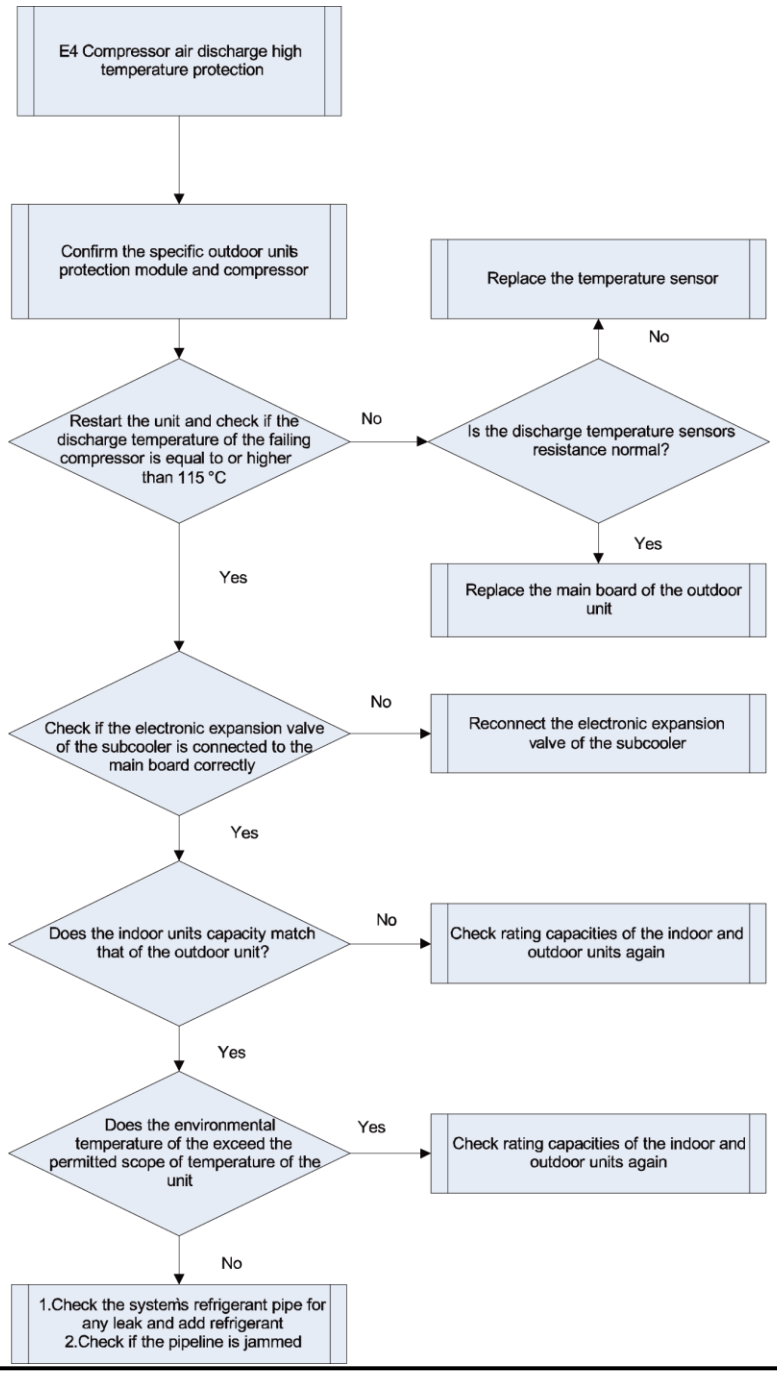
Error judgment condition and method:

Test the compressor discharge temperature through compressor discharge pipe and shell top temperature sensor. If the tested temperature value is higher than 115℃, the unit will stop for protection

Possible reason：

- Cut-off valve of ODU is not fully opened
- Electronic expansion valve is abnormal
- Outdoor or indoor fan is not working properly
- IDU filter or air duct is blocked (cooling mode)
- Ambient temperature exceeds allowable operation range
- Refrigerant charging amount is insufficient
- System pipeline is blocked

Troubleshooting:



"F2" Condenser Temperature Sensor Error

Error display: ODU mainboard LED displayer

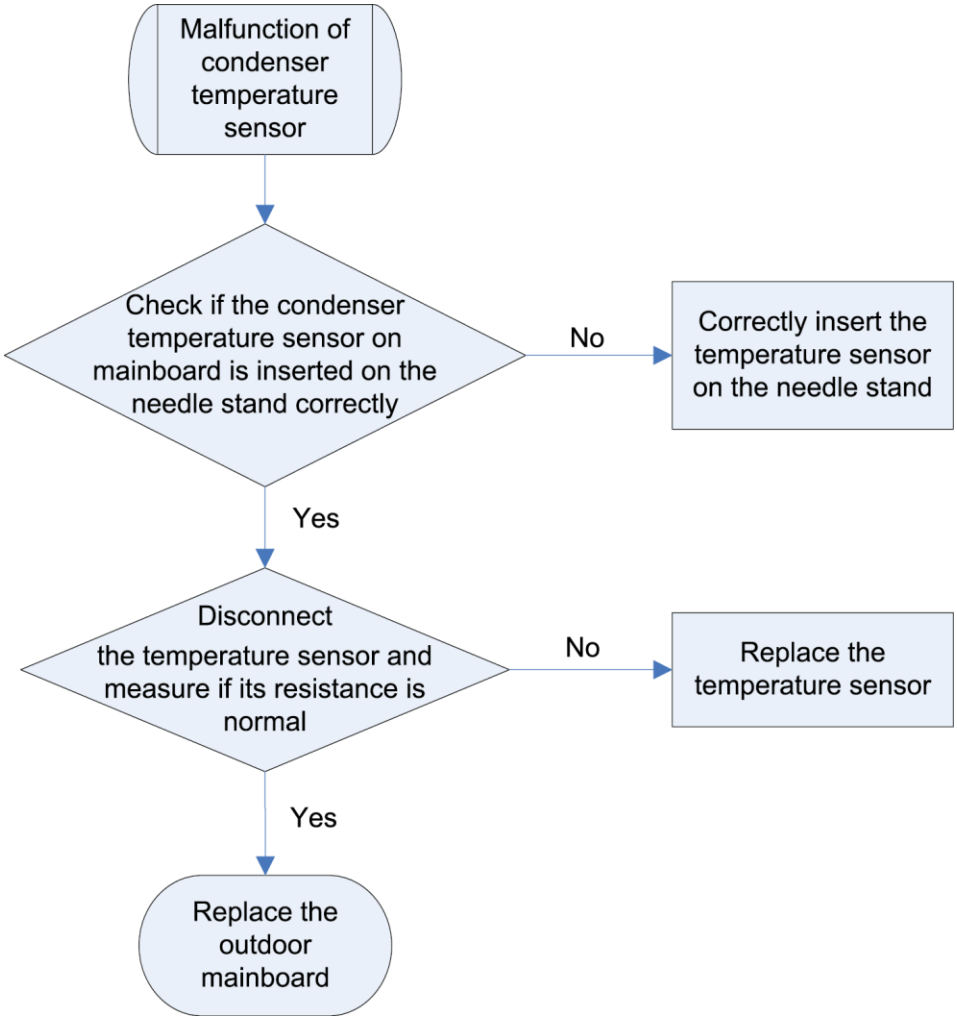
Error judgment condition and method:

Sample the AD value of temperature sensor through temperature sensor detecting circuit and judge the range of AD value. If the sampling AD value exceeds upper limit and lower limit in 5 seconds continuously, report the error.

Possible reason:

- Poor contact between temperature sensor and terminal in mainboard interface
- Temperature sensor is abnormal
- Detecting circuit is abnormal

Troubleshooting：



NOTE:

Please refer to Appendix 1 for the relation between temperature and resistance of temperature sensor.

"F3" Outdoor Ambient Temperature Sensor Error

Error display: ODU mainboard LED displayer

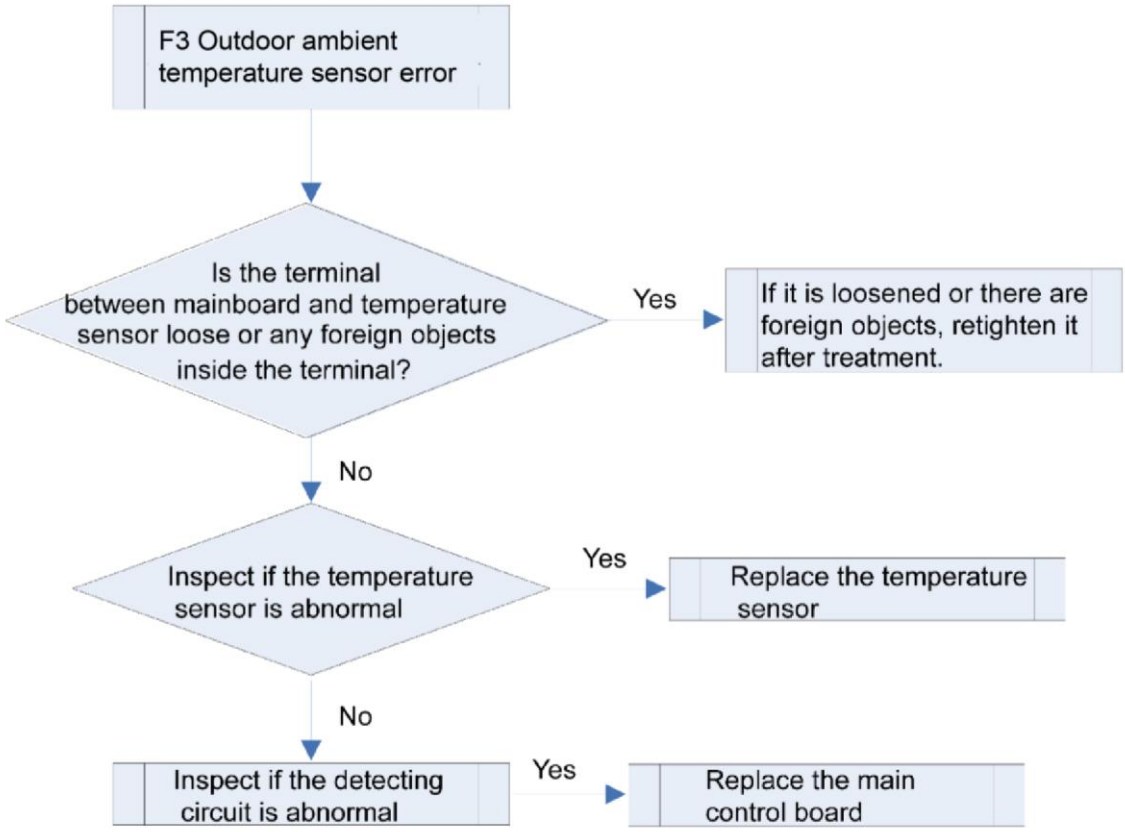
Error judgment condition and method:

Sample the AD value of temperature sensor through temperature sensor detecting circuit and judge the range of AD value. If the sampling AD value exceeds upper limit and lower limit in 5 seconds continuously, report the error.

Possible reason:

- Poor contact between ambient temperature sensor and terminal in mainboard interface
- Ambient temperature sensor is abnormal
- Detecting circuit is abnormal

Troubleshooting：



NOTE:

Please refer to Appendix 1 for the relation between temperature and resistance of temperature sensor.

"F4" Discharge Temperature Sensor Error

Error display: ODU mainboard LED displayer

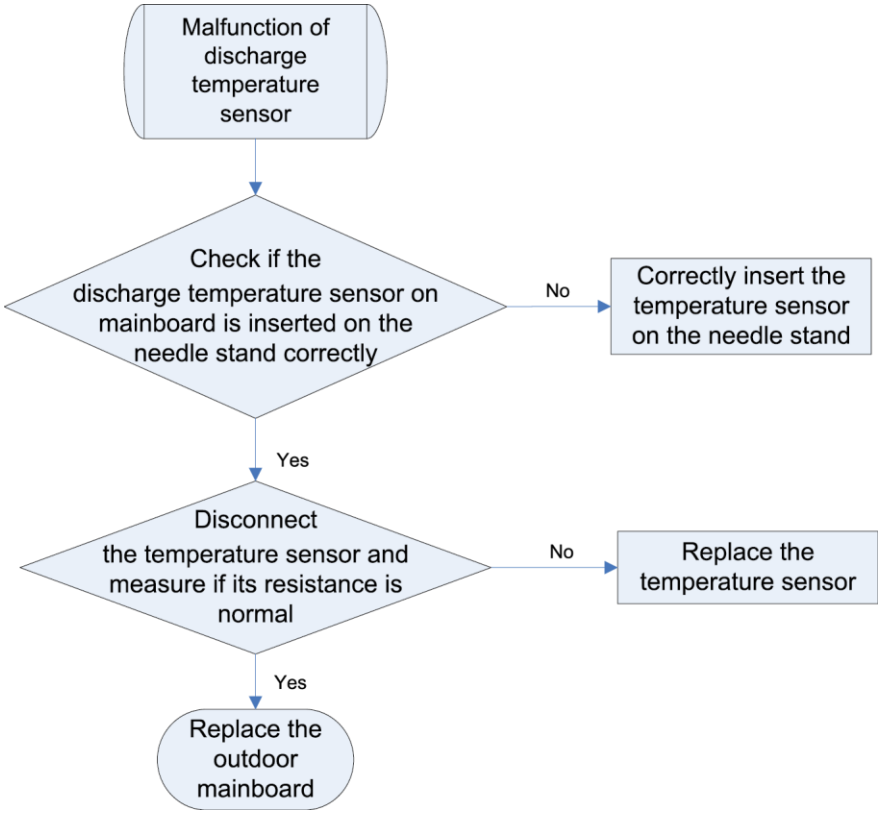
Error judgment condition and method:

Sample the AD value of temperature sensor through temperature sensor detecting circuit and judge the range of AD value. If the sampling AD value exceeds upper limit and lower limit in 5 seconds continuously, report the error.

Possible reason:

- Poor contact between temperature sensor and terminal in mainboard interface
- Temperature sensor is abnormal
- Detecting circuit is abnormal

Troubleshooting：



NOTE:

Please refer to Appendix 1 for the relation between temperature and resistance of temperature sensor.

"F6" ODU Tube Temperature Sensor Error

Error display: ODU mainboard LED displayer

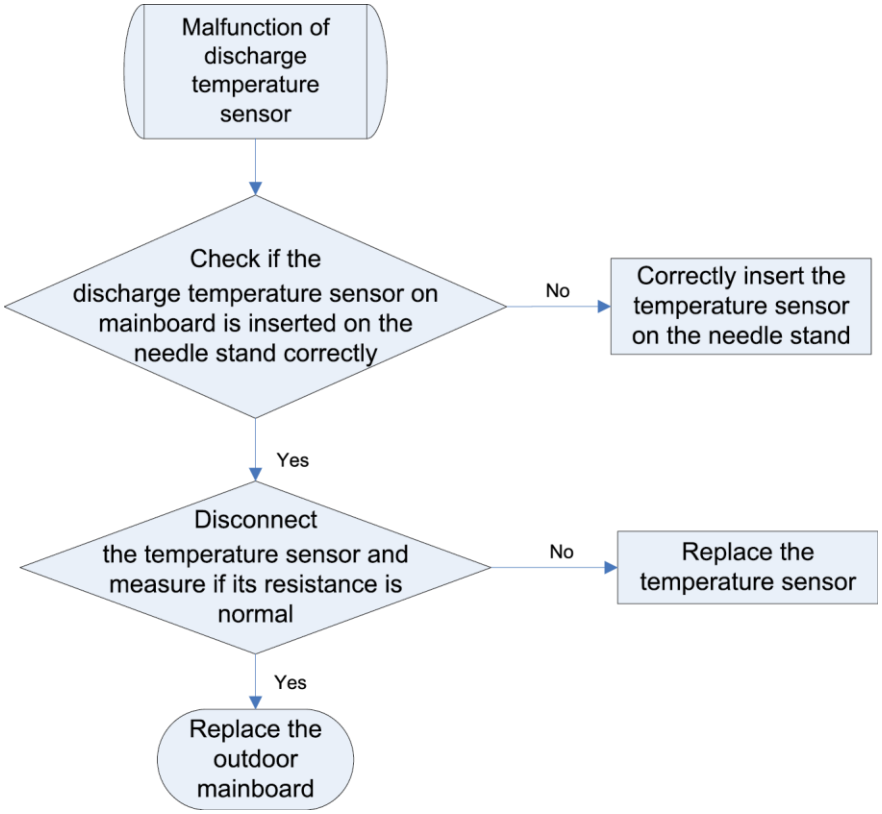
Error judgment condition and method:

Sample the AD value of temperature sensor through temperature sensor detecting circuit and judge the range of AD value. If the sampling AD value exceeds upper limit and lower limit in 5 seconds continuously, report the error.

Possible reason:

- Poor contact between temperature sensor and terminal in mainboard interface
- Temperature sensor is abnormal
- Detecting circuit is abnormal

Troubleshooting:



NOTE:

Please refer to Appendix 1 for the relation between temperature and resistance of temperature sensor.

“EE” ODU Memory Chip Error

Error display: ODU mainboard LED displayer

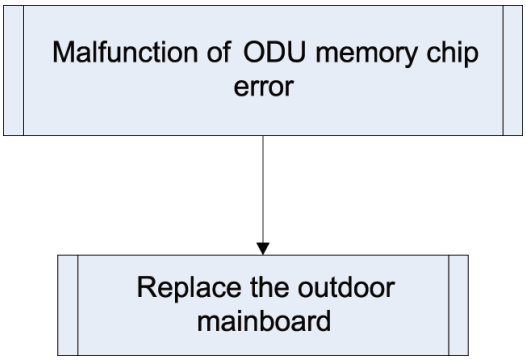
Error judgment condition and method:

If ODU mainboard cannot read the memory chip, this error will be reported.

Possible reason:

- Memory chip on the ODU mainboard is damaged.
- Memory chip is weakly welded.
- Memory chip lead is short-circuited.

Troubleshooting:



“H4” Overload

Error display: ODU mainboard LED displayer

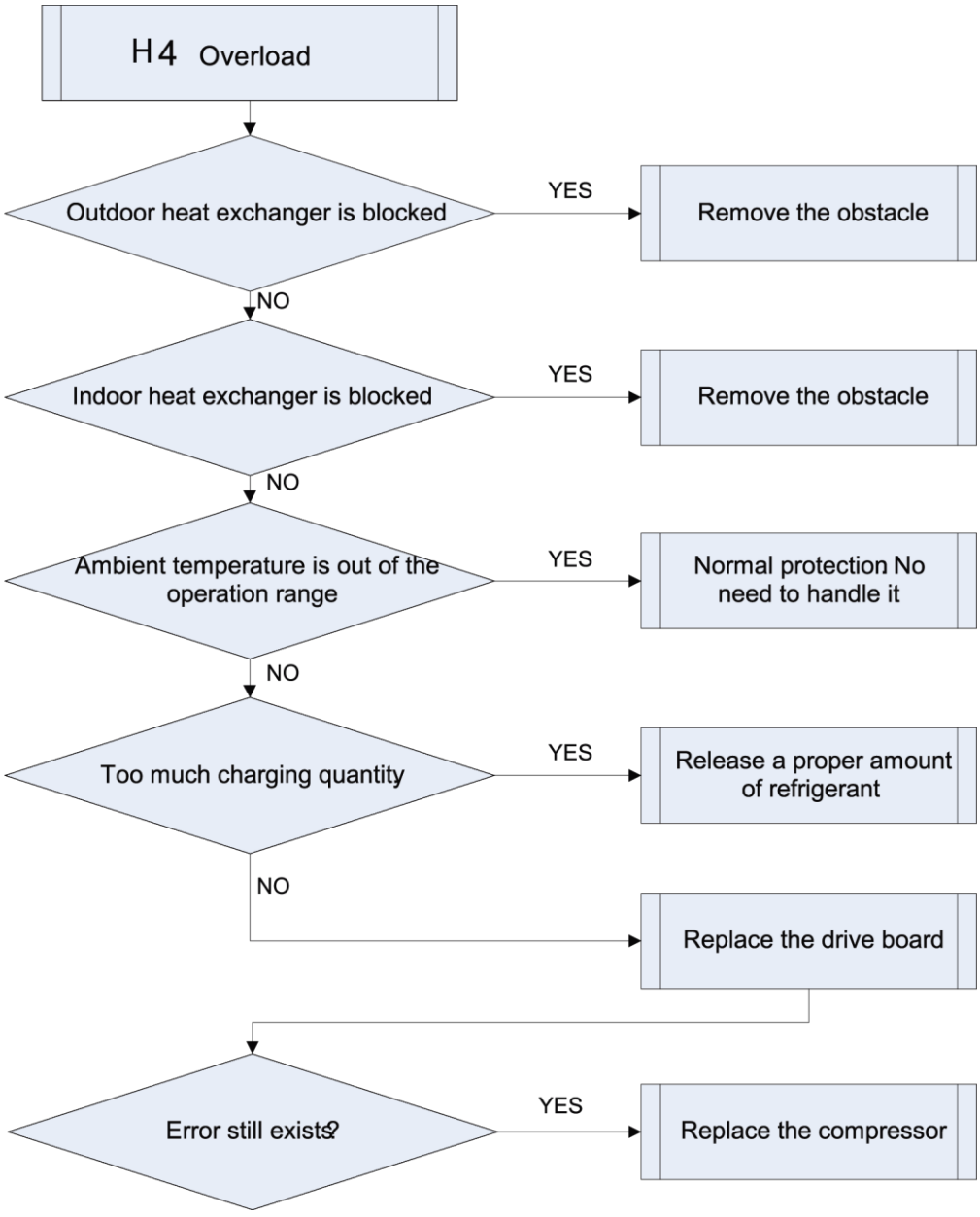
Error judgment condition and method:

When condensing pressure is higher than the protection value, system will report overload protection.

Possible reason:

- Cooling ODU heat exchanger is blocked or heat exchange is bad.
- Heating IDU heat exchanger is blocked or heat exchange is bad.
- Operating temperature is too high.
- System charging quantity is too much.

Troubleshooting：



“H5” IPM Protection

Error display: ODU mainboard LED displayer

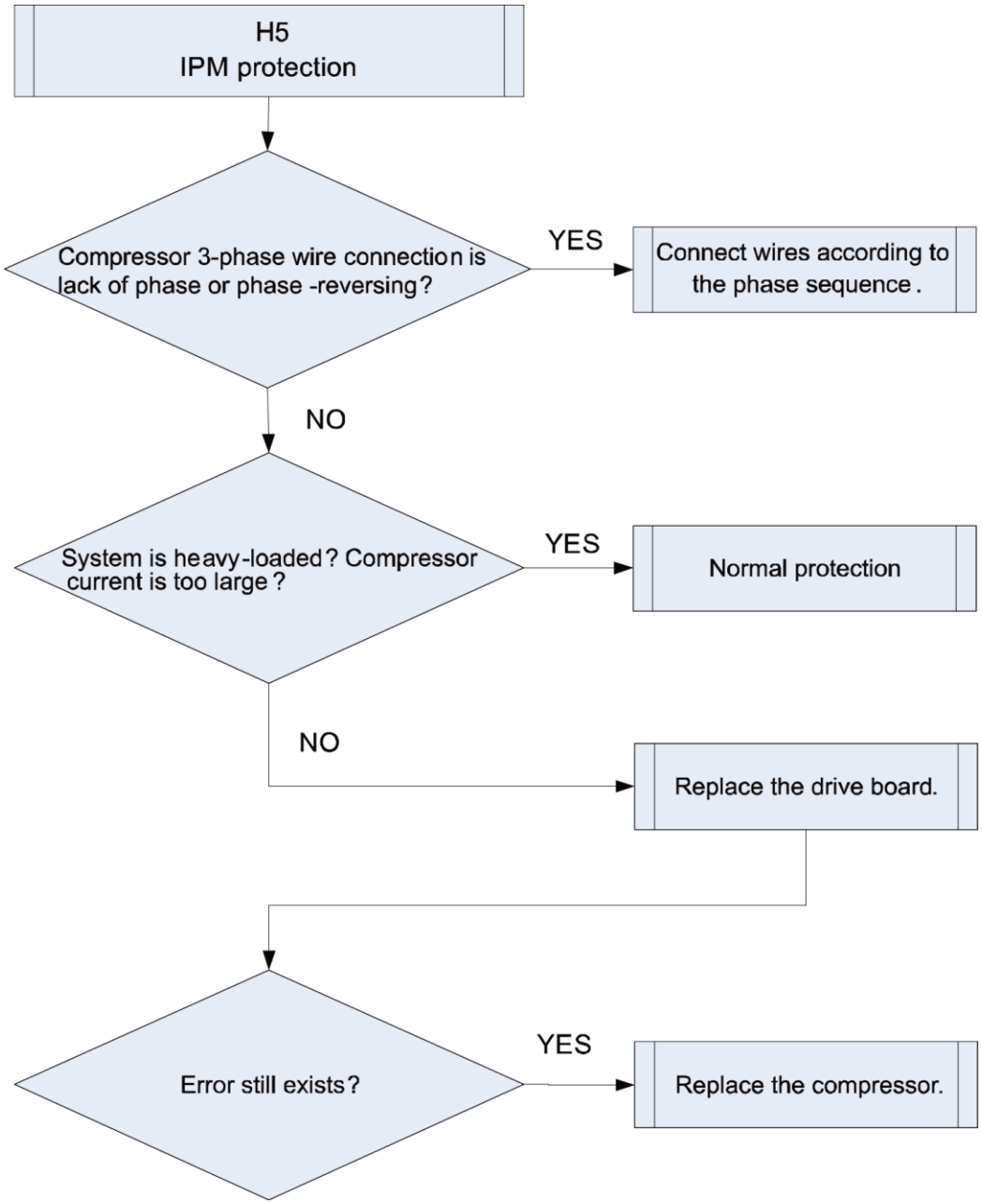
Error judgment condition and method:

When power is connected and drive chip received IPM lead F0 that is of low level, than it is IPM module malfunction. System will shut down for protection.

Possible reason:

- Compressor 3-phase wire connection is lack of phase or phase-reversed.
- System is overloaded and compressor current is too large.
- Drive board IPM module is damaged.
- Drive board IPM module’s 15V power supply is lower than 13.5V.
- Drive board 6-line PWM signal and the corresponding element are abnormal.
- Drive board compressor current sampling circuit element is damaged or drive chip current sampling AD terminal is abnormal.
- Compressor is damaged.

Troubleshooting：

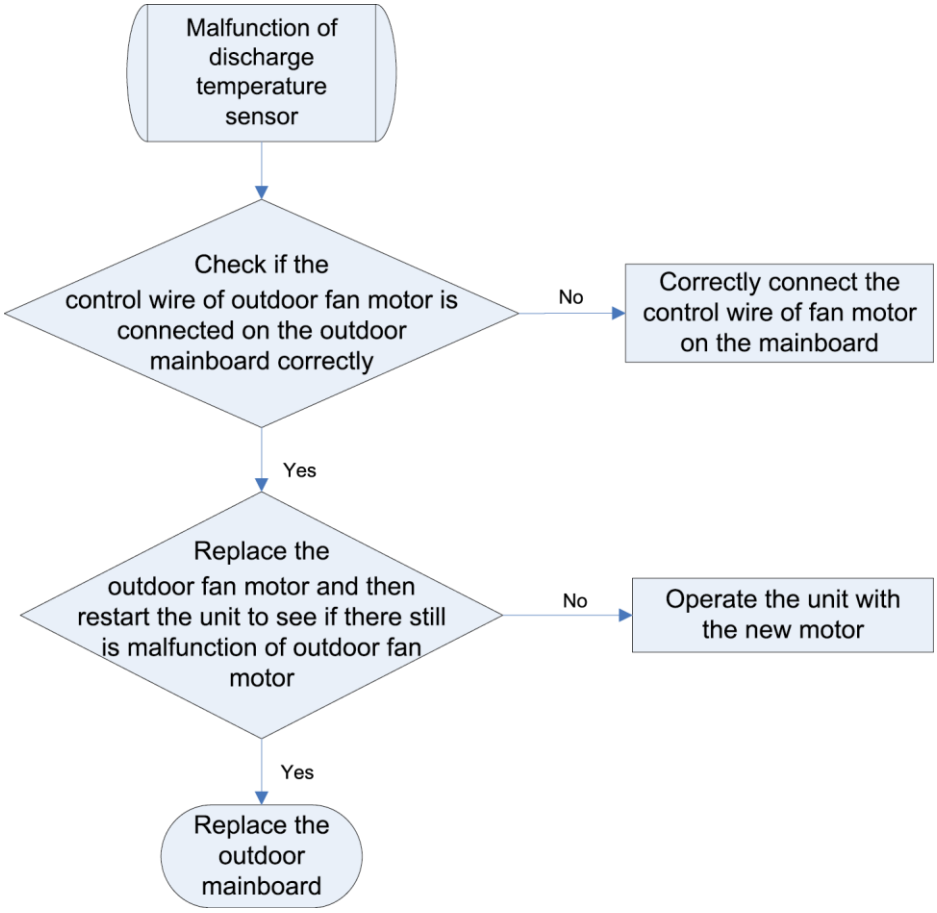


“H6” DC Fan Error

Error display: ODU mainboard LED displayer
Error judgment condition and method:
Mainboard doesn’t receive the signal of outdoor fan within 30s after the outdoor fan starts up.

- Outdoor fan wiring terminal is not correctly connected to the mainboard.
- Outdoor fan is damaged.
- If it is a new unit or a new motor has been replaced in the unit and the wire connection is correct, then probably it is the program that goes wrong.

Troubleshooting：



“H7” Driver Out-of-Step Protection

Error display: ODU mainboard LED displayer

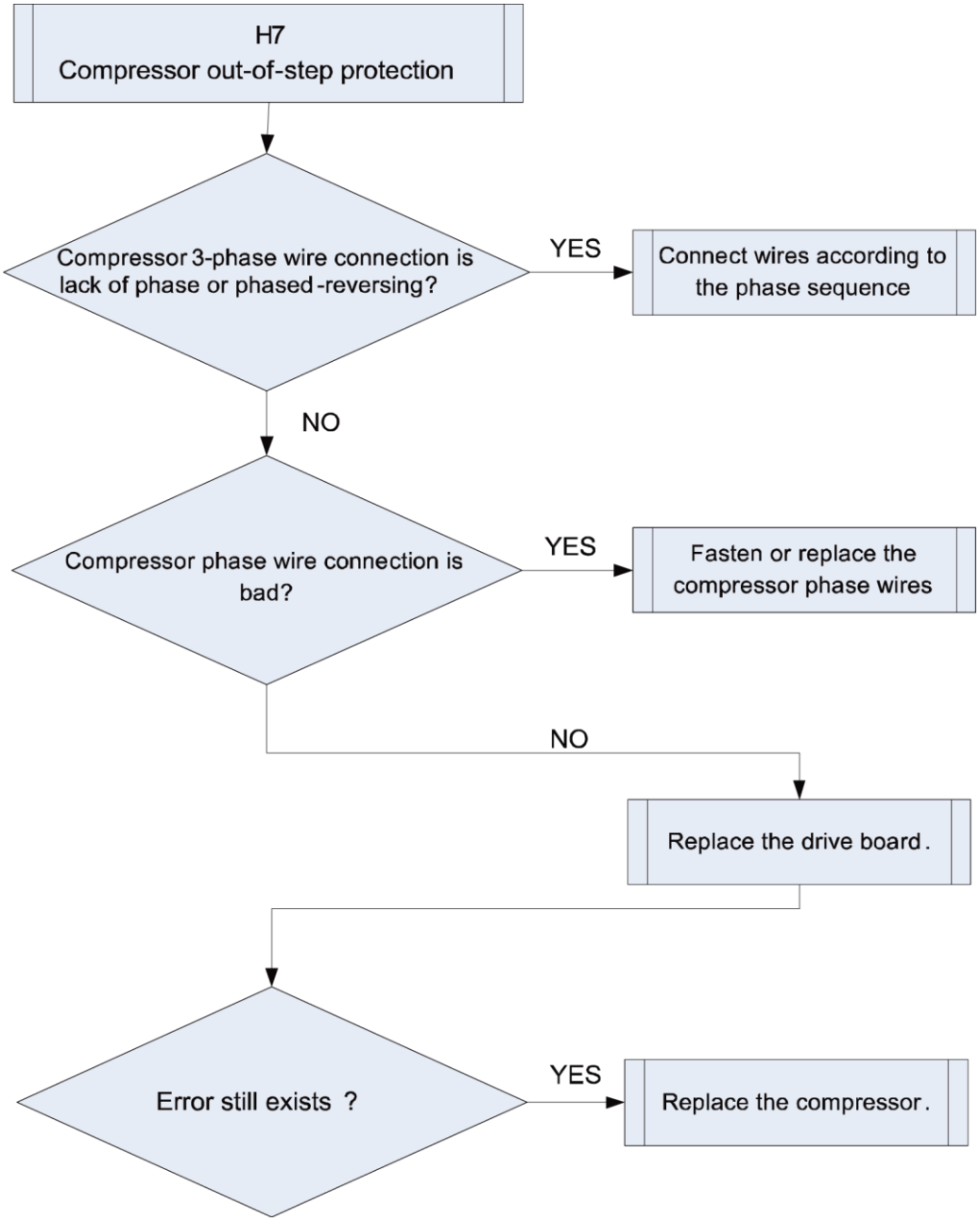
Error judgment condition and method:

During operation, it can’t detect the rotor position and stops output, or the actual running speed differs too much from the set running speed. In each case, compressor runs out of step and system stops for protection.

Possible reason:

- Compressor 3-phase wire connection is lack of phase or phased-reversed.
- Compressor phase wire connection is bad.
- System is blocked, short of refrigerant or compressor oil.
- Drive board IPM module is damaged.
- Drive board compressor current sampling circuit element is damaged or drive chip current sampling AD terminal is abnormal.
- Compressor is damaged.

Troubleshooting：



“HC” PFC Protection

Error display: ODU mainboard LED displayer

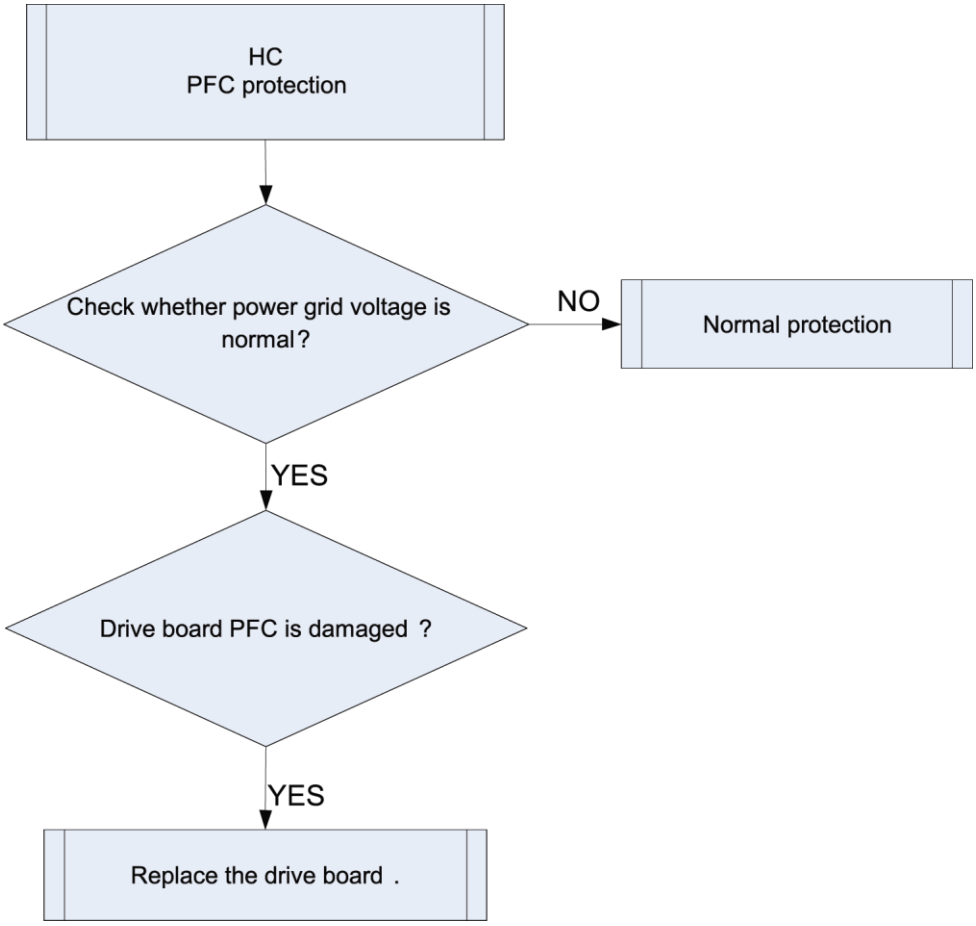
Error judgment condition and method:

After power is connected, and drive chip received IPM lead F0 that is of low level, than it is IPM module malfunction. System will shut down for protection.

Possible reason:

- Power grid voltage is abnormal
- Drive board PFC module is damaged
- Drive board PFC module’s 15v power supply is lower than 13.5v
- Drive board PWM signal for PFC and corresponding element is abnormal
- Drive board PFC current sampling circuit element is damaged or drive chip current sampling AD terminal is abnormal.

Troubleshooting：



“Lc” Startup Failure

Error display: ODU mainboard LED displayer

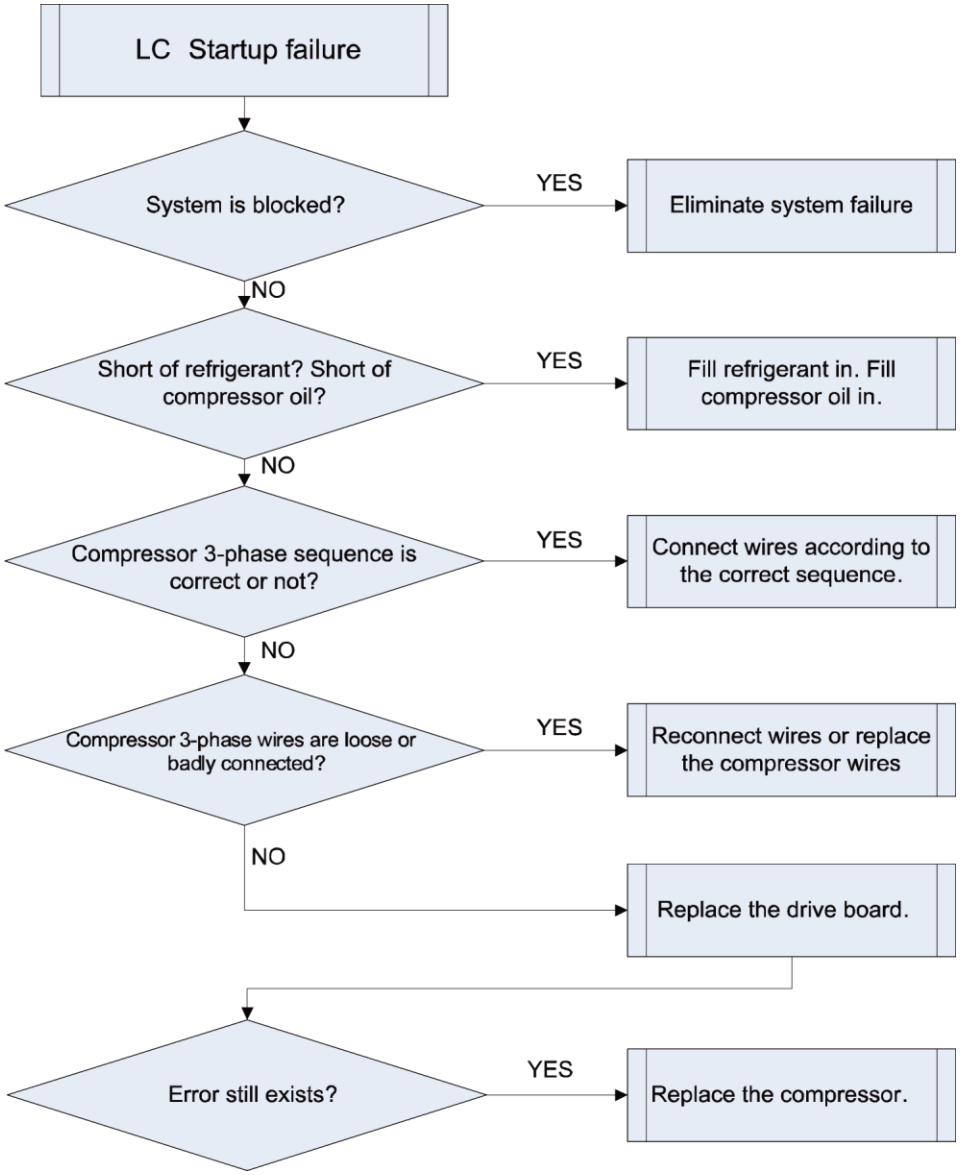
Error judgment condition and method:

Check the error code on nixie tube of ODU main control board. If PJ is displayed, it indicatesinverter compressor startup failure

Possible reason:

- Poor contact of compressor UVW wire
- Compressor is broken
- Compressor drive board is broken

Troubleshooting：



“P0” Driver Reset Protection

Error display: ODU mainboard LED displayer

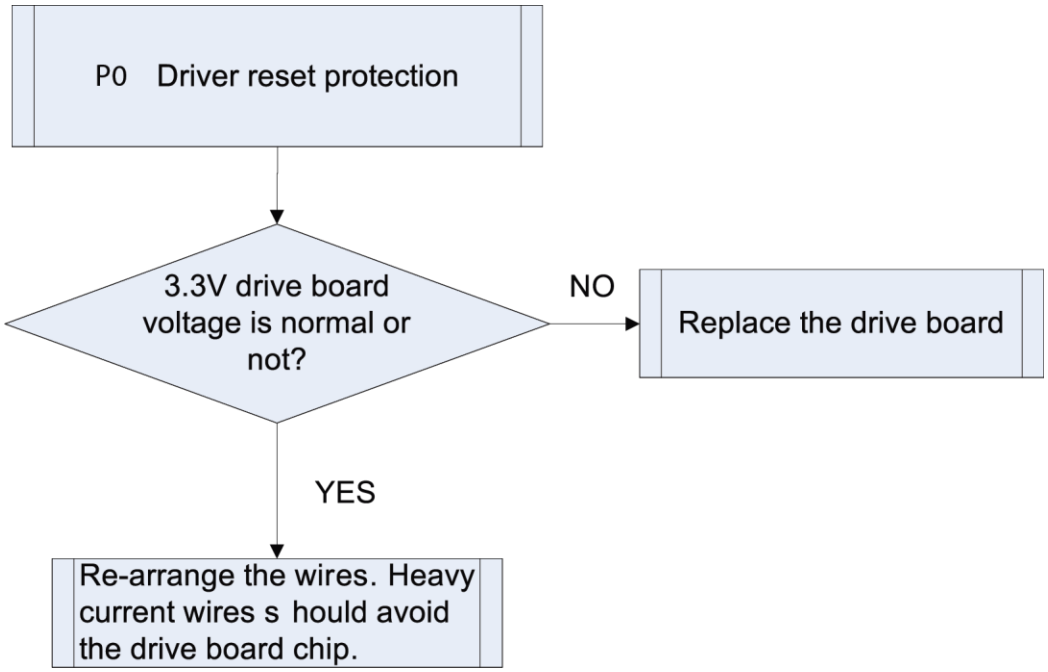
Error judgment condition and method:

Drive board chip resets and starts initialization. After the drive board is energized for 5s, it detects that the chip resets again. In this case, it can be judged as drive chip reset protection.

Possible reason:

- 3.3V drive chip supply voltage drop.
- TRST lead of JTAG programming is interrupted.

Troubleshooting



“P5” Over-Current Protection

Error display: ODU mainboard LED displayer

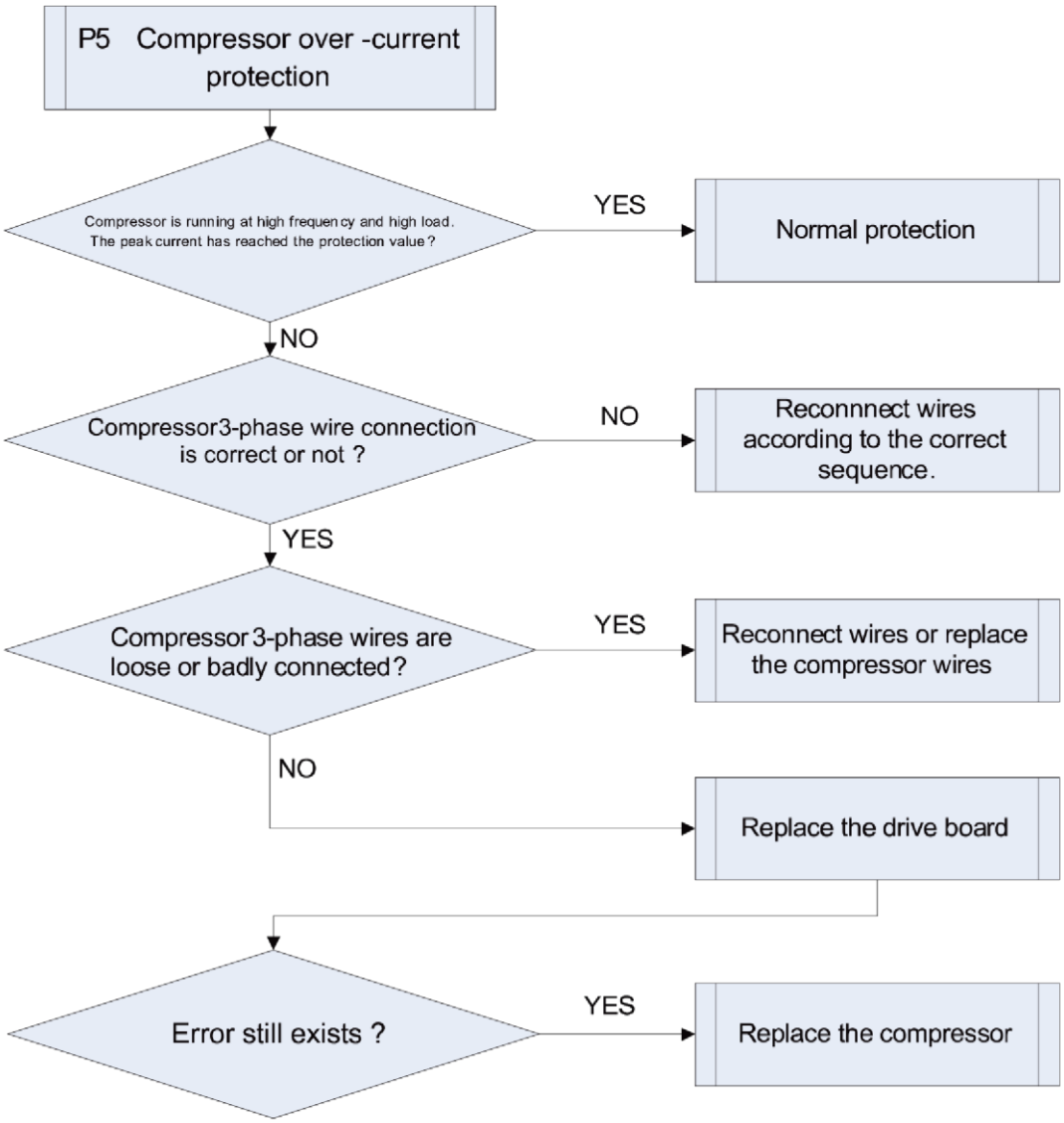
Error judgment condition and method:

If compressor’s instant current value is higher than the set current protection value, then it can be judged that compressor over-current occurs and system will shut down for protection.

Possible reason:

- System load is too much and compressor current is too large.
- Compressor 3-phase wire connection is lack of phase or phase-reversed.
- Compressor phase wire is loose or has bad contact.
- Drive board current sampling circuit element is damaged or drive chip current sampling AD terminal is abnormal.
- Compressor is damaged.

Troubleshooting：



“P6” Master Control and Driver Communication Error

Error display: ODU mainboard LED displayer

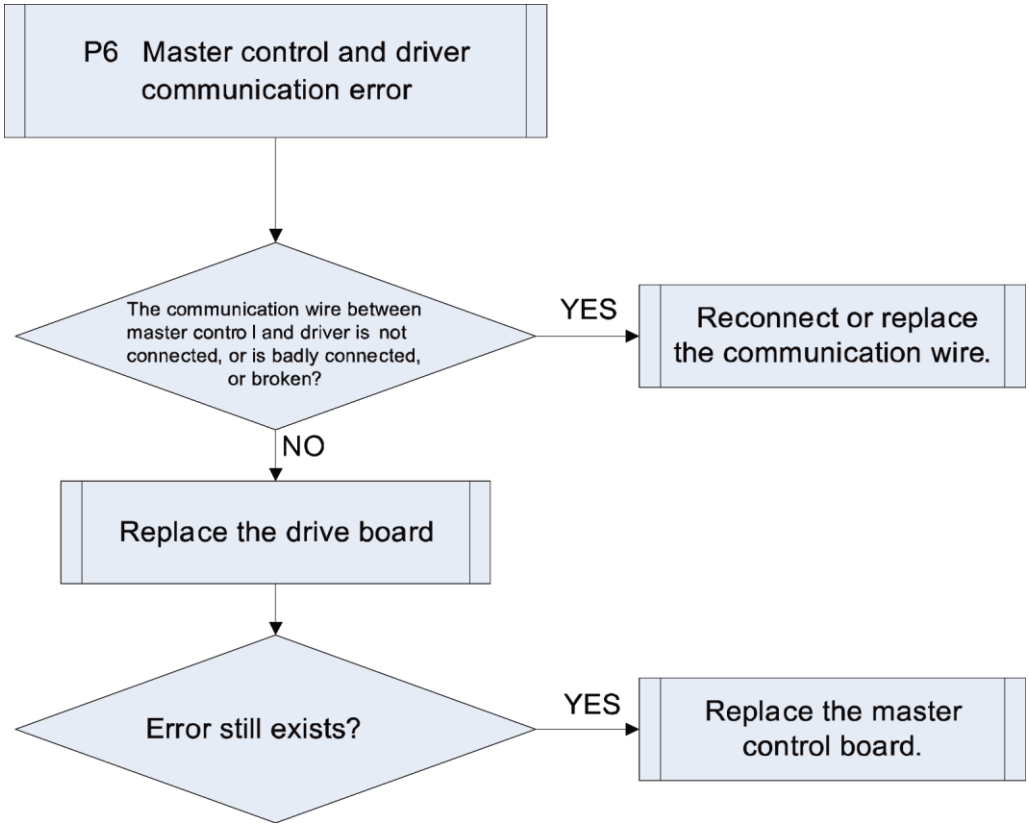
Error judgment condition and method:

If there is no other malfunction and the communication between master control and driver is cut off for 30s, then itcan be judged that the communication between master control and driver is faulted. System will shut down for protection.

Possible reason:

- Communication wire between master control and driver is not well connected, or has bad contact, or is broken.
- The switch power of drive board is abnormal, therefore, the 3.3V power voltage is abnormal.
- Communication circuit of the drive board or the master control board is abnormal.

Troubleshooting：



“P7” Driver Module Sensor Error

Error display: ODU mainboard LED displayer

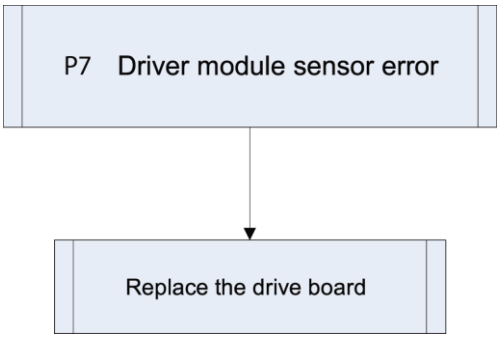
Error judgment condition and method:

If IPM or PFC module temperature is lower than the set protection value, then it can be judged that driver module sensor error occurs and system will shut down for protection.

Possible reason:

- Module temperature sensor is short-circuited or broken-circuited.
- Drive board current sampling circuit element is damaged or drive chip current sampling AD terminal is abnormal.

Troubleshooting：



3.4.19“P8” Driver Module High Temperature Protection

Error display: ODU mainboard LED displayer

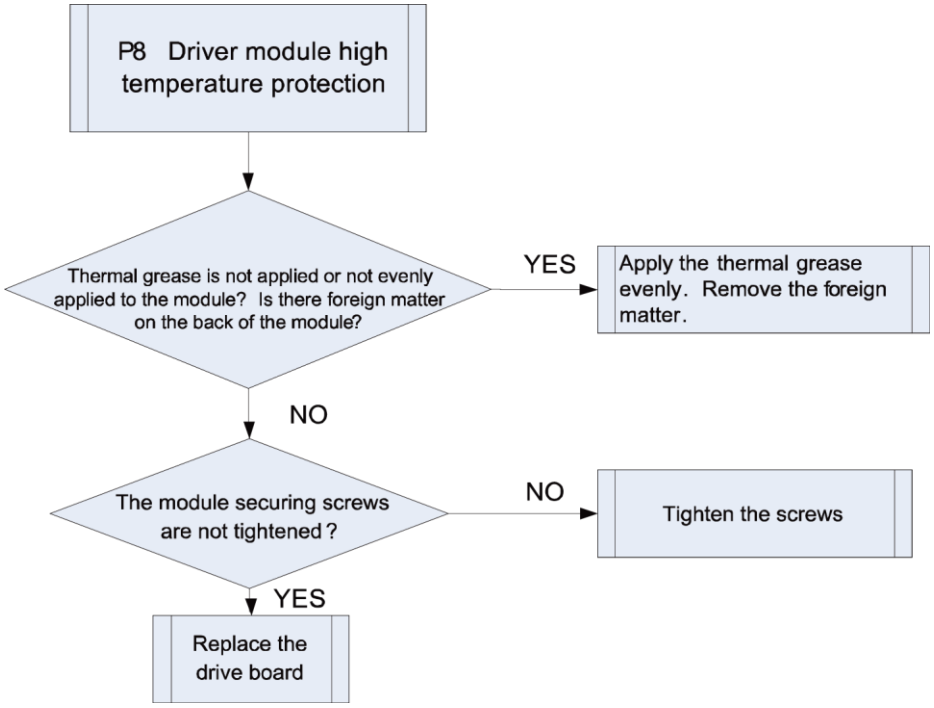
Error judgment condition and method:

If IPM module temperature or PFC module temperature exceeds the set protection value, then it can be judged that driver module temperature is too high and system will shut down for protection.

Possible reason:

- Thermal grease is not applied or not evenly applied to the module, or there is other substance on the back of the module.
- The module securing screws are not tightened up.
- Drive board temperature sampling circuit element is damaged or drive chip temperature sampling AD terminal is abnormal.

Troubleshooting：



3.4.20“PA” AC Current Protection

Error display: ODU mainboard LED displayer

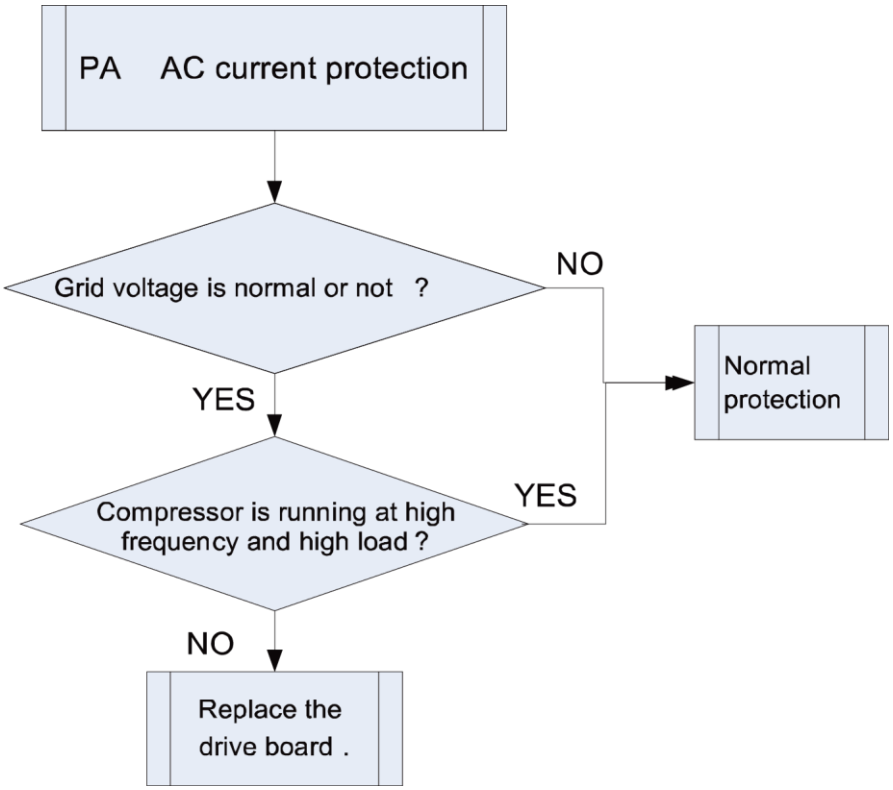
Error judgment condition and method:

If input current value exceeds the set protection value, then it can be judged that AC current protection occurs and system will shut down for protection.

Possible reason:

- System is heavy-loaded and compressor current is too large.
- Grid voltage is abnormal.
- PFC module is damaged.
- Drive board PFC current sampling circuit element is damaged or drive chip PFC current sampling AD terminal is abnormal.

Troubleshooting：



“Pc” Driver Current Error

Error display: ODU mainboard LED displayer

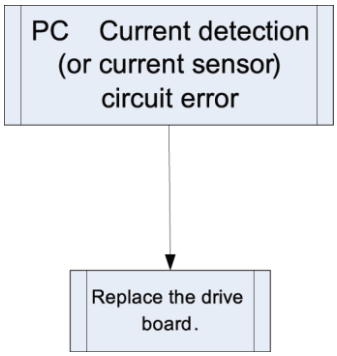
Error judgment condition and method:

After power charging, if offset voltage average is detected to exceed 12.5% of 1.65V in 1s, then it can be judged that current detection (or current sensor) circuit is faulted. System will shut down for protection.

Possible reason:

- Current detection (or current sensor) sampling circuit element is abnormal.
- Drive chip compressor current sampling AD terminal is badly welded or short-circuited.

Troubleshooting：



“PL” Bus Low-Voltage Protection

Error display: ODU mainboard LED displayer

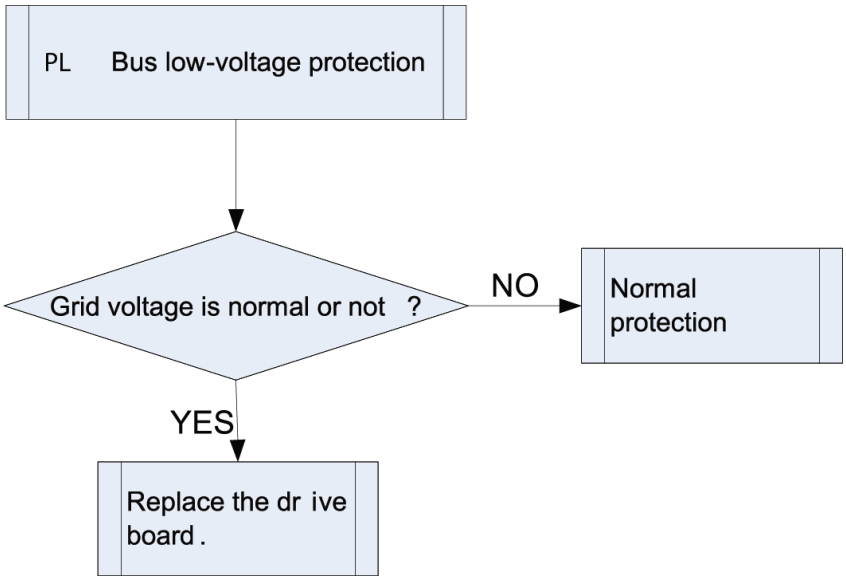
Error judgment condition and method:

When compressor is running and there is no other malfunction, if busbar voltage is lower than the set value for low voltage protection, then it can be judged that bus low-voltage protection occurs. System will shut down for protection.

Possible reason:

- Voltage of power grid is abnormal.
- Drive board busbar voltage sampling circuit element is damaged or driveboard busbar voltage sampling AD terminal is abnormal.

Troubleshooting：



“PH” Bus High-Voltage Protection

Error display: ODU mainboard LED displayer

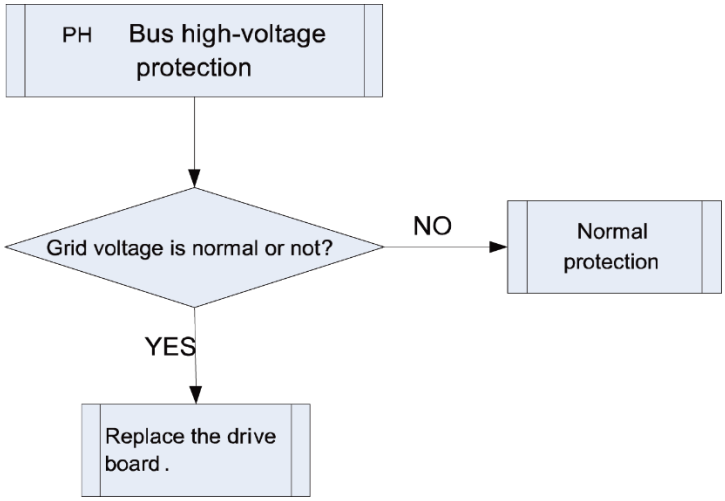
Error judgment condition and method:

If there is no other malfunction and the busbar voltage is higher than the set value for high voltage protection, then it can be judged that bus high-voltage protection occurs. System will shut down for protection.

Possible reason:

- Voltage of power grid is abnormal.
- Drive board busbar voltage sampling circuit element is damaged or driveboard busbar voltage sampling AD terminal is abnormal.

Troubleshooting：



“PU” Charge Loop Error

Error display: ODU mainboard LED displayer

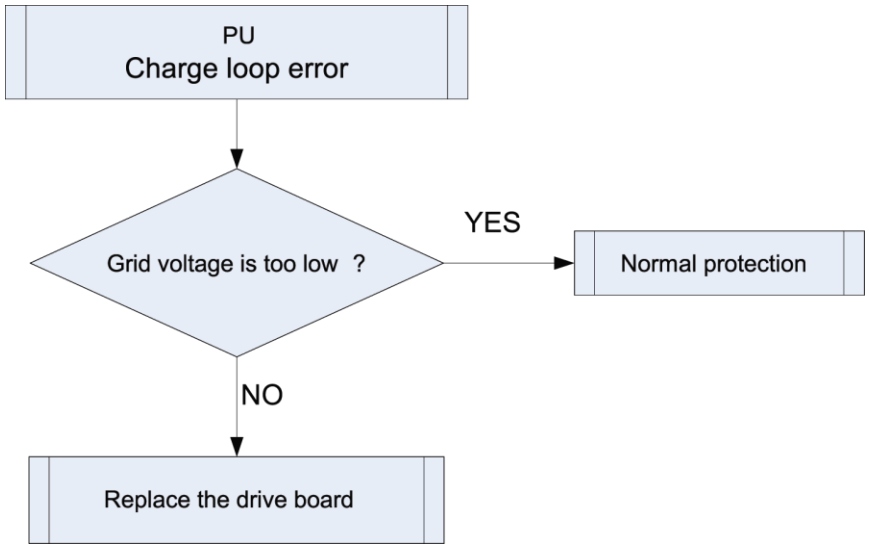
Error judgment condition and method:

When the charge loop starts to get charged and the busbar voltage cannot reach the set value in a certain period of time, then it can be judged that charge loop error exists. System will shut down for protection.

Possible reason:

- Voltage of power grid is abnormal. Voltage is too low.
- Drive board charge loop element is abnormal.
- Drive board busbar voltage sampling circuit element is damaged or drivechip busbar voltage sampling AD terminal is abnormal.

Troubleshooting：



“ee” Drive Memory Chip Error

Error display: ODU mainboard LED displayer

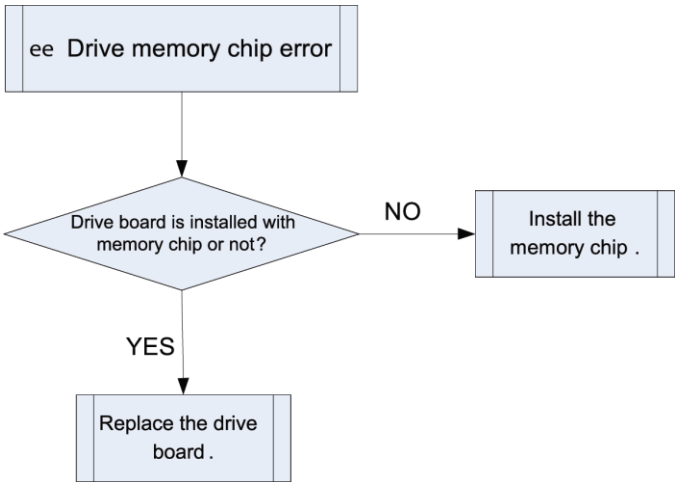
Error judgment condition and method:

If power is connected but the drive board with memory chip cannot detect the memory chip or read the memory chip data correctly, then it can be judged that drive memory chip error exists.

Possible reason:

- The drive board that needs memory chip is not installed with the memory chip.
- The lead or connector of memory chip is badly welded or short-circuited.

Troubleshooting：



“e1” High Pressure Sensor Error

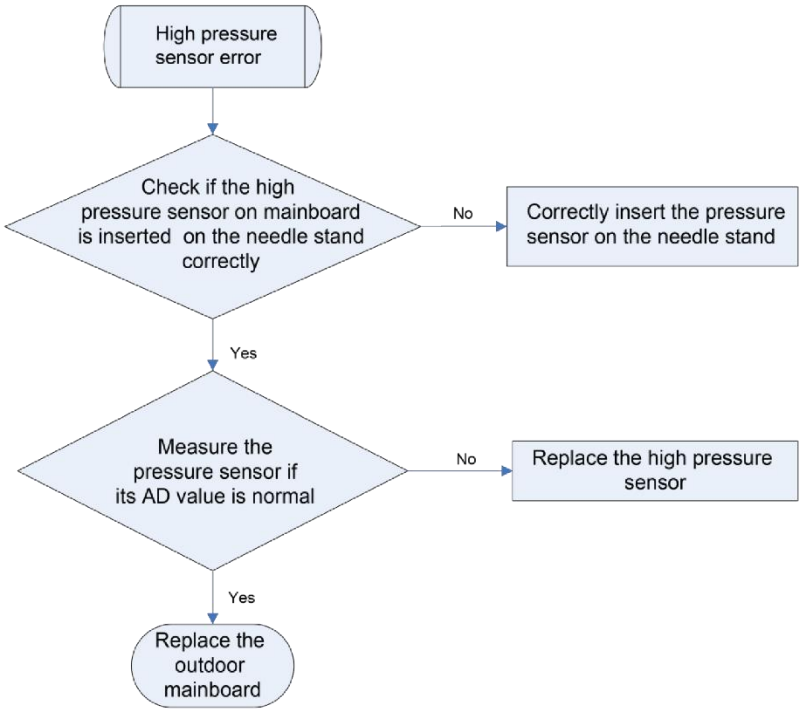
Error display: ODU mainboard LED displayer

Sample the AD value of pressure sensor through pressure sensor detecting circuit and judge the range of AD value, If the sampling AD value exceeds upper limit and lower limit in 30seconds continuously, report the error.

Possible reason:

- Poor contact between pressure sensor and terminal in mainboard interface
- Pressure sensor is abnormal
- Detecting circuit is abnormal

Troubleshooting：



“C4” ODU Jumper Cap Error

Error display: ODU mainboard LED displayer

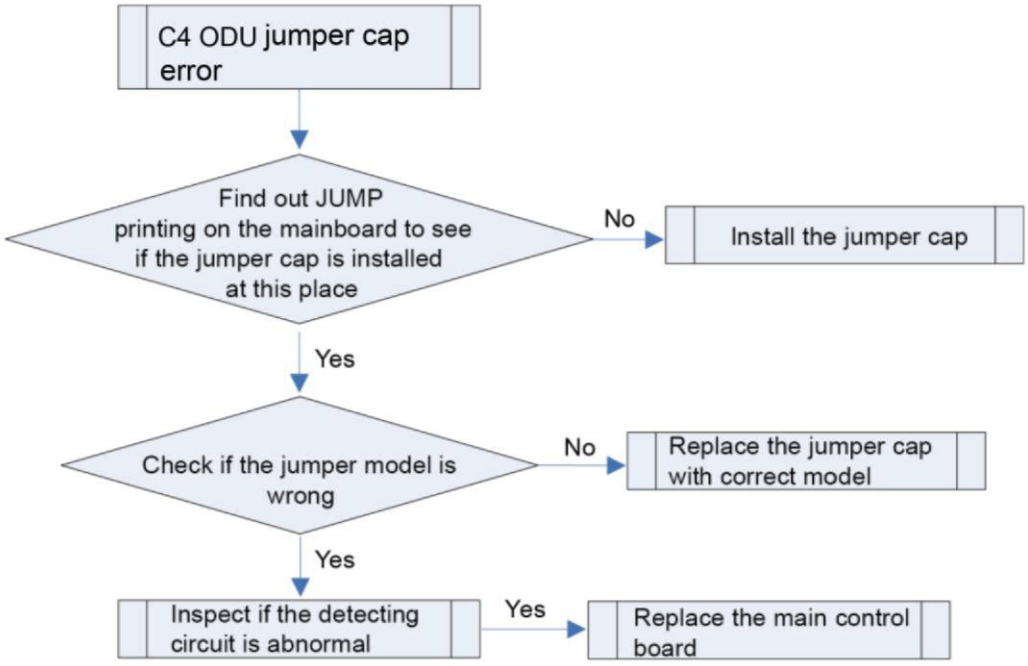
Error judgment condition and method:

If jumper cap model doesn‘t match with mainboard, report the error

Possible reason:

- Jumper cap is not installed
- Jumper cap model is wrong
- Detecting circuit is abnormal

Troubleshooting：



Failures Not Caused by Errors

If your air conditioner fails to function normally, please first check the following items before maintenance:

Problem	Cause	Corrective measure
The air conditioner can't run.	If you turn off the unit and then immediately turn it on, in order to protect the compressor and avoid system overload, compressor will delay running for 3min.	Please wait for a while.
	Wire connection is wrong.	Connect wires according to the wiring diagram.
	Fuse or circuit breaker is broken.	Replace the fuse or switch on the circuit breaker.
	Power failure.	Restart after power is resumed.
	Power plug is loose.	Re-insert the power plug.
	Thermostat has low battery.	Replace the batteries.
Bad cooling or heating effect.	Air inlet and outlet of the units have been blocked.	Clear the obstacles and keep the room for the units well ventilated.
	Improper temperature setting	Reset a proper temperature.
	Fan speed is too low.	Reset a proper fan speed.
	Air flow direction is not right.	Change the direction of air louvers.
	Doors or windows are open.	Close them.
	Exposed under direct sunshine.	Put on curtains or louvers in front of the windows.
	Too many heat sources in the room.	Remove unnecessary heat sources.
	Filter is blocked or dirty.	Send for a professional to clean the filter.
	Air inlets or outlets of the units are blocked.	Clear away obstacles that are blocking the air inlets and outlets of the units.

The following situations are not operation failures.

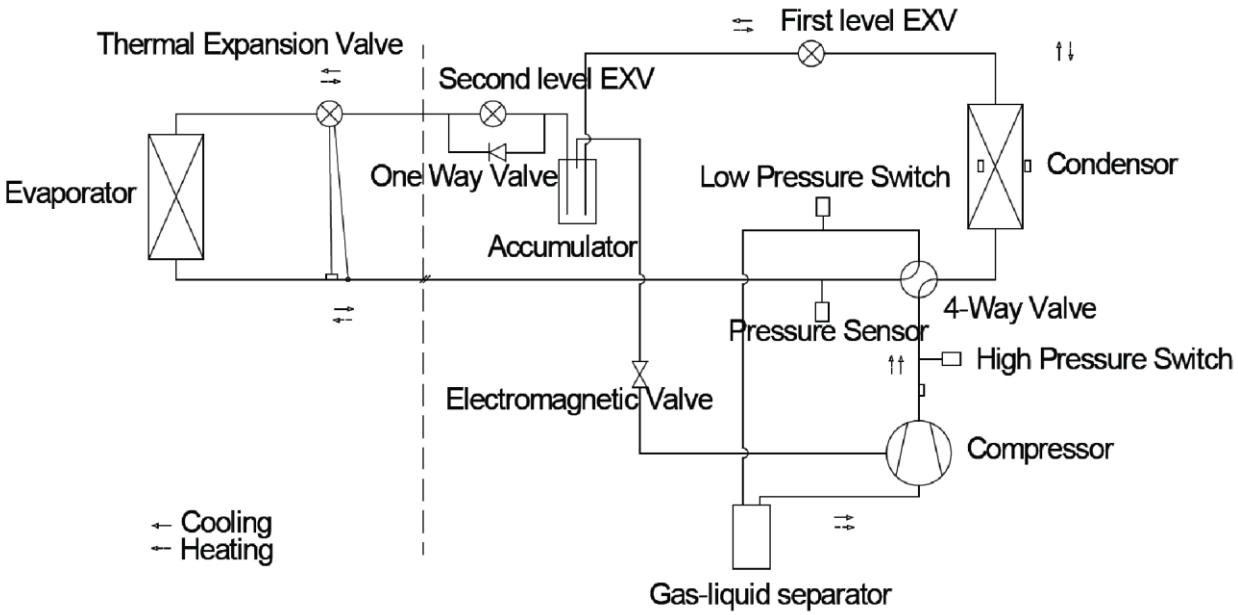
Problem	Time of occurrence	Cause
Mist comes from the air conditioner.	During operation.	If the unit is running under high humidity, the wet air in the room will be quickly cooled down.
The air conditioner generates some noise.	System switches to heating mode after defrosting	Defrosting process will generate some water, which will turn to water vapor.
	The air conditioner is buzzing at the beginning of operation.	Thermostat will be buzzing when it starts working. The noise will become weak 1min later.
Dust comes from the air conditioner.	When the unit is turned on, it purrs.	When the system is just started, the refrigerant is not stable. About 30s later, the purr of the unit becomes low.
	About 20s after the unit first enables the heating mode or there is refrigerant brushing sound when defrosting under heating.	It's the sound of 4-way valve switching direction. The sound will disappear after the valve changes its direction.
	There is hissing sound when the unit is started or stopped and a slight hissing sound during and after operation.	It's the sound of gaseous refrigerant that stops flowing and the sound of drainage system.
	There is a sound of crunching during and after operation.	Because of temperature change, front panel and other components may be swelled up and cause abrasion sound.
	There is a hissing sound when the unit is turned on or suddenly stopped during operation or after defrosting.	Because refrigerant suddenly stops flowing or changes the flow direction.
	The unit starts operation after being unused for a long time.	Dust inside the units come out together with the air.
The air conditioner generates an odor.	During operation.	The room smell or the smell of cigarette comes out through the units.

NOTICE

Check the above items and use the corresponding corrective measures. If the air conditioner continues to function poorly, please stop the air conditioner immediately and contact YMGI's authorized local service center. Ask a professional HVAC Technician to check and repair the unit.

Maintenance

System Diagram



Connection Pipe Vacuum Pumping

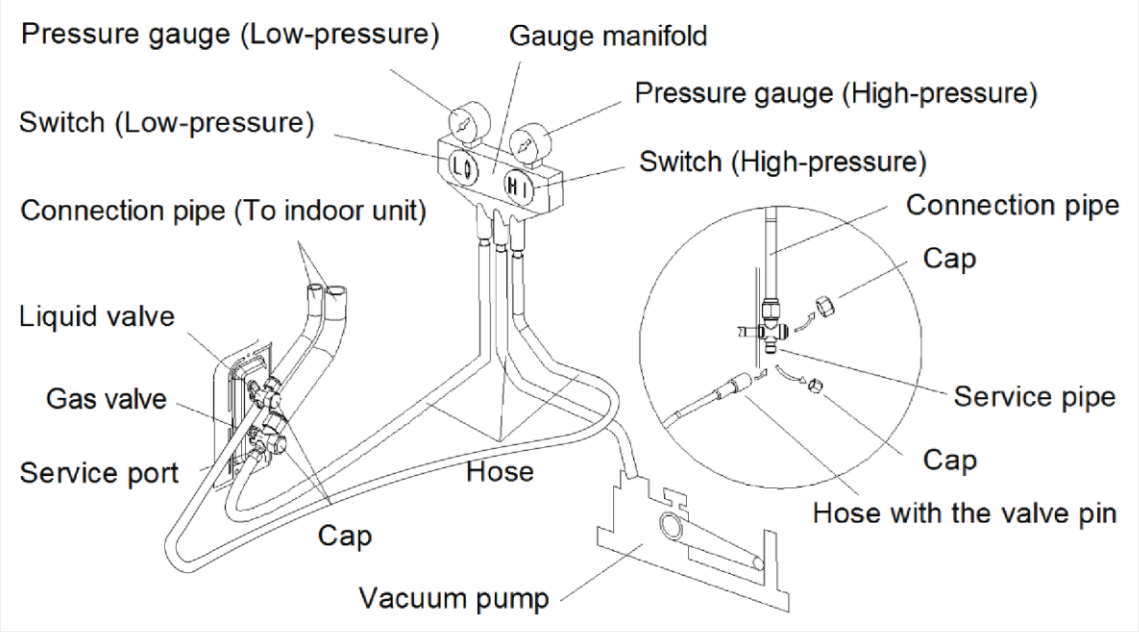
NOTICE
1) Make sure the outlet of vacuum pump is away from fire source and is well-ventilated.
2) Before vacuum pumping, make sure the unit cut-off valves are closed.
3) When vacuum pumping, both the liquid pipe and the gas pipe must be pumped.

1. Remove the caps of the liquid valve, gas valve and also the service port.
2. Meanwhile the gas and liquid valves should be kept closed in case of refrigerant leak.
3. Connect the hose used for evacuation to the vacuum pump.
4. Open the switch at the lower pressure side of the manifold valve assembly and start the vacuum pump. Meanwhile, the switch at the high pressure side of the manifold valve assembly should be kept closed, otherwise evacuation would fail.
5. The evacuation duration depends on the unit's capacity, generally.

Model	Time(min)
VRUO-2436HP-U2B(54)	35
VRUO-4860HP-U2B(54)	40

And verify if the pressure gauge at the low pressure side of the manifold valve assembly reads -0.1Mpa (-750mmHg), if not, it indicates there is leak somewhere. Then, close the switch fully and then stop the vacuum pump.

6. Wait for 10min to see if the system pressure can remain unchanged. If the pressure increase, there may be leakage.
7. Slightly open the liquid valve and let some refrigerant go to the connection pipe to balance the pressure inside and outside of the connection pipe, so that air will not come into the connection pipe when removing the hose. Notice that the gas and liquid valve can be opened fully only after the manifold valve assembly is removed.
8. Place back the caps of the liquid valve, gas valve and also the service port.



NOTICE

For large-size units, there are maintenance ports for liquid valve and gas valve. During evacuation, you may connect the two hoses of the branch valve assembly to the maintenance ports to speed up the evacuation.

Refrigerant should be reclaimed into the appropriate storage tank. System should use oxygen-free nitrogen purging to ensure safety. This process may need to repeat several times. Do not use compressed air or oxygen in this process.

Refrigerant Charging

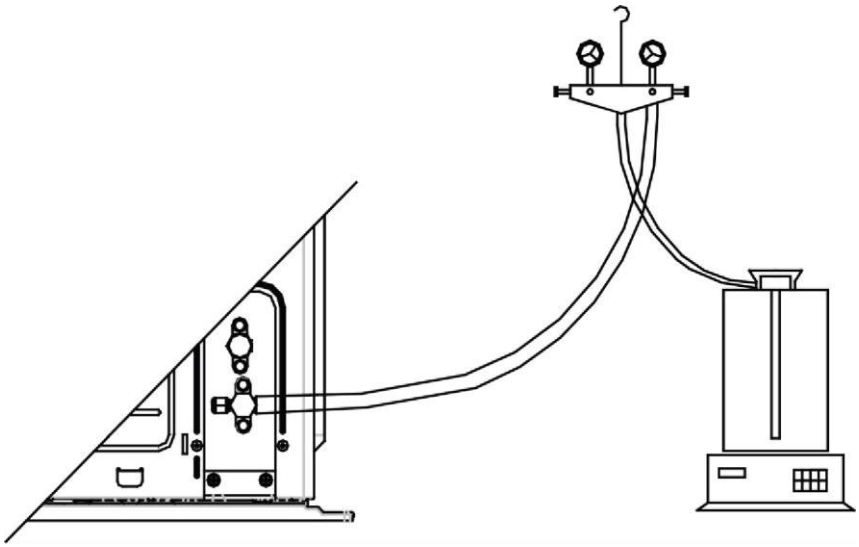
Pre-charging

Step 1: Connect the high pressure gauge line to the valve of liquid pipe and connect the low pressure gauge line to the valve of gas pipe. Connect the middle gauge line to the vacuum pump. Power on the vacuum pump and perform vacuum drying.

Step 2: After vacuum drying, close the high and low pressure gauge valves. Then remove the middle gauge line from the connector of vacuum pump. Then connect to the refrigerant tank.

Step 3: Loosen the middle gauge line from the connector of pressure gauge to a proper extent and slightly open the valve of refrigerant tank. Evacuate the middle gauge line. Then tighten up the connector again and completely open the valve of refrigerant tank at the same time.

Step 4: Keep the refrigerant tank erect and put it on an electronic scale. Record the current weight as m1.



Step 5: Open the high pressure gauge valve (Keep the low pressure gauge valve closed). Then charge refrigerant into the system. Meanwhile, record the weight of refrigerant tank as m2.

Step 6: m1-m2=m. If m equals to the required charging quantity M, close the valve of refrigerant tank at once. Then move to step 8.

Step 7: If you can't continue to charge refrigerant into the system and the quantity of charged refrigerant is less than the required charging quantity, then record the current quantity of charged refrigerant:

m=m1-m2
m`=M-m

The remaining charging quantity is: m`=M-m

Step 8: After charging, remove the pressure gauge.

Refrigerant charging when unit is turned on:

Step 1: Close the valve of refrigerant tank. First remove the pressure gauge lines and connect the outdoor unit to the indoor unit. Then reconnect the pressure gauge lines. Connect the low pressure gauge line to the other joint of gas valve and connect the high pressure gauge line to the liquid valve. Connect the middle gauge line to the vacuum pump. Power on the vacuum pump and perform vacuum test.

Step 2: After vacuum test, close the high and low pressure gauge valves. Then remove the middle gauge line from the connector of vacuum pump. Then connect to the refrigerant tank.

Step 3: Loosen the middle gauge line from the connector of pressure gauge to a proper extent and slightly open the valve of refrigerant tank. Evacuate the middle gauge line. Then tighten up the connector again and completely open the valve of refrigerant tank at the same time.

Step 4: Turn on the air conditioner and let it run for a while.

Step 5: Open the low pressure gauge valve (Keep the high pressure gauge valve closed). Then charge in the remaining charging quantity m`.

Step 6: After all required refrigerant is charged in, close the valve of refrigerant tank.

Step 7: Remove the pressure gauge to finish the refrigerant charging work.

Procedure of refrigerant charging

Following is the supplementary requirement for refrigerant charging on the basis of normal procedure:

1) Make sure that when charging refrigerant into the system, no other types of refrigerant will be mixed. The pipeline for refrigerant charging should be as short as possible to reduce the amount of refrigerant left in it.
2) The refrigerant tank should stand erect.
3) Make sure the refrigerating system is already grounded before refrigerant charging.
4) When charging is completed (or not yet completed), stick a label on the system.
5) Before re-charging refrigerant into the system, use oxygen-free nitrogen to perform pressure test. When charging is completed, perform leak test before trial running. Before leaving the workplace, perform a leak test again.

Maintenance of Major Components

Replacement of thermostat

Please refer to the instruction manual of thermostatXE70-00/E1.

How to replace the compressor

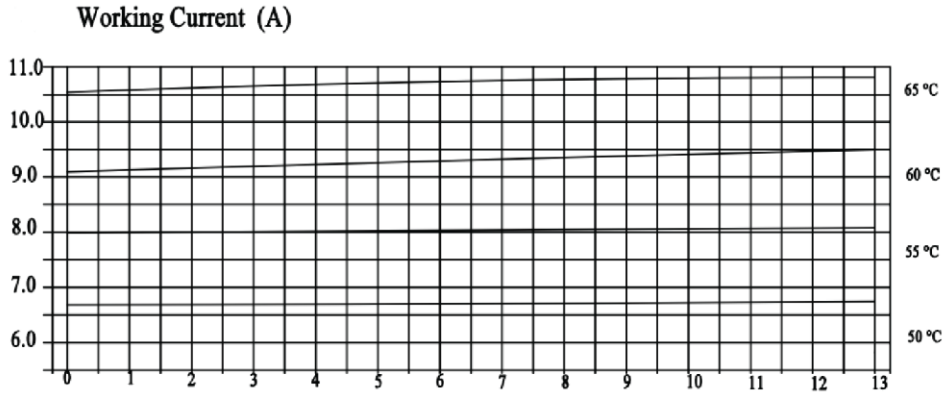
Diagnosis of compressor failure

A. On condition that the unit can be started up

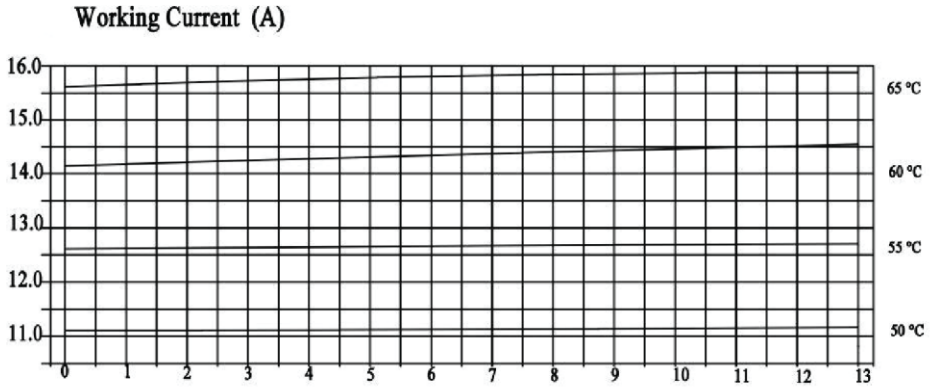
Step 1:

If the unit can be started up, then start it up to check the current of the faulted compressor. Use a pressure gauge to measure the pressure of the big and small valves. Connect with a computer to monitor the data. Refer to the following table based on the recommended working current. The electric current of an inverter compressor will be different under different rotation speed or different working conditions. If the compressor is working at 60Hz, the working current corresponding to different condensing temperature and evaporating temperature is shown below:

Inverter compressor QXFT-F310zN450



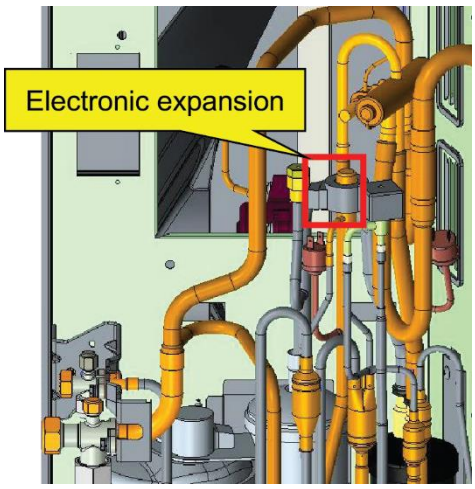
Inverter compressor QXAU-F516zX440A



Step 2:
Judge whether the operating noise of the compressor is normal, and whether there is a sharp noise or obvious scraping. If there is a normal compressor working nearby, compare their operating noise.

Step 3:
Examine whether the electronic expansion valve of the outdoor unit is active and whether the 4-way valve works or not. How to examine:

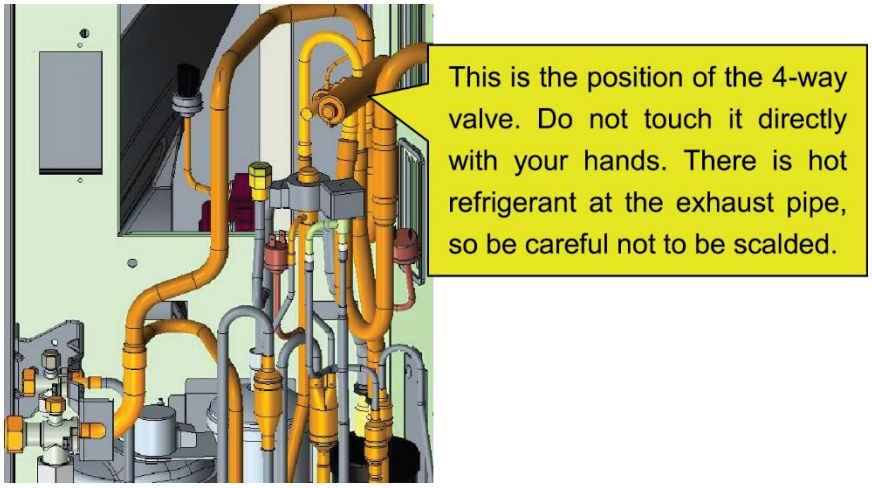
1) Electronic expansion valve:
The electronic expansion valve will be reset every time when the unit is powered on or off. Touch the valve and you can feel the movement of the valve spool. In the last stage of the reset process, you will hear the click of the valve and feel its vibration.

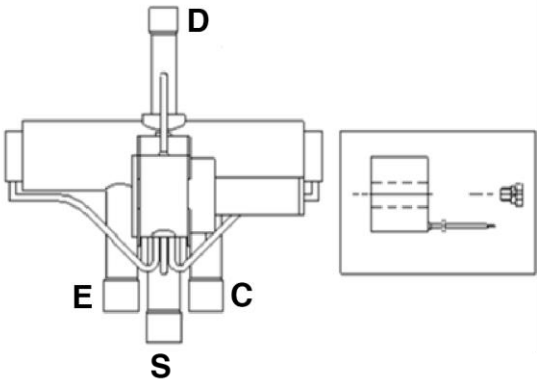


Touch the electronic expansion valve:

a. Touch the top of the electronic expansion valve and you can feel its move as it is reset upon startup.
b. Make sure the coil is fixed firmly.

2) 4-way valve:
During normal operation, the 4 copper tubes that connect to the valve will have different temperature. When the 4-way valve is working, it will generate some noise and vibration.





D-Connects to the exhaust side
CAUTION! HIGH TEMPERATURE

Labels on the 4-way valve:
D-connects to the exhaust side
E-connects to the evaporator of indoor unit
S-connects to the inhalation side of the liquid separator
C-connects to the condenser

When the system is in cooling mode: C pipeline is under high pressure and high temperature; E, S pipeline is under low pressure and low temperature

When the system is in heating mode: E pipeline is under high pressure and high temperature; C, S pipeline is under low pressure and low temperature

Because D is connected to the exhaust side, it is under high pressure and high temperature regardless of the operating mode. When the unit is powered on, in defrosting or oil return mode, the 4-way valve will produce some noise. Do not touch the pipes directly with your hands and be cautious of hot temperatures.

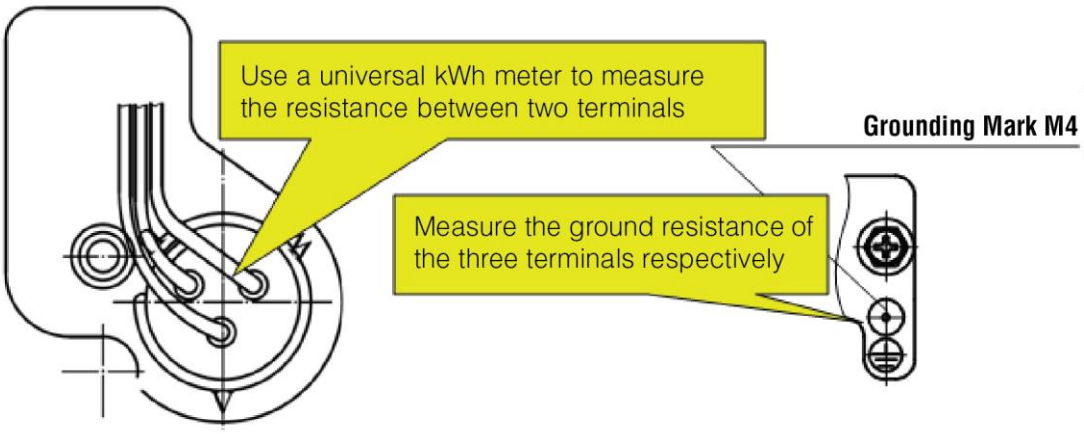
Step 4:
Check the drive board of compressor, i.e. the IPM module.
Please refer to the IPM checking method in the section of troubleshooting.
Check the drive board of compressor, i.e. the IPM module.

Please refer to the IPM checking method in the section of troubleshooting.

B. On condition that the unit cannot be started up

Step 1:
Cut off the power supply and detach the cover of the wiring box of the compressor. Check the wiring of the compressor.

Step 2:
Check the resistance between the wiring terminals (U, V, W) of compressor.



Refer to the following table for the resistance between any two terminals:

Compressor model	UV Winding resistance	VW Winding resistance	WU Winding resistance
QXFT-F310zN450	0.79±7%Ω	0.79±7%Ω	0.79±7%Ω

Measure the ground resistance of each wiring terminal. The resistance should be above 10 megohm. If not, we can determine that the compressor is faulted inside.

Step 3:
On condition that the unit cannot be started up, we also need to check the solenoid valve assembly of the system, including the electronic expansion valve. The checking method is the same as instructed above.

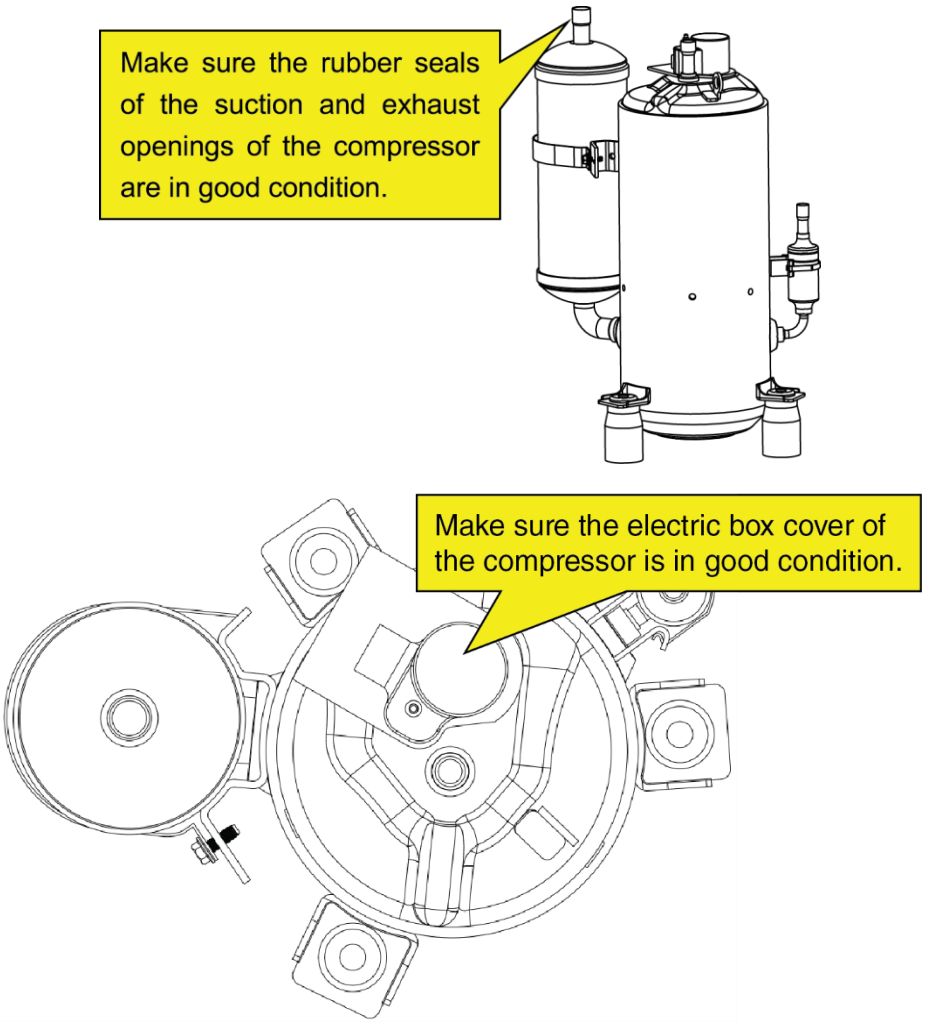
Step 4:
Check whether the IPM module is normal. Please refer to the IPM checking method in the section of troubleshooting.

Replacement of compressor

Step 1: Preparation

1) Prepare the components for replacement

When carrying the old and new compressors, do not place the compressors horizontally or upside down. The angle of inclination should be within ±30°. Make sure the lubricant inside the compressors will not flow from the oil balance mouth. The suction and exhaust openings of the compressors must be sealed. If a rubber seal is missing, use adhesive tape to seal the opening. This is to prevent the compressor oil from contacting the air.



NOTICE

Before replacement, make sure the nameplates and models of the compressors are identical.

NOTICE

Make sure the lubricant is sealed inside the compressors.

2) Prepare relevant tools
   1) Prepare nitrogen. Strictly follow the nitrogen welding standards during the welding process. Make sure there is sufficient nitrogen. The nitrogen pressure should be above 2.0MPa.
   2) Prepare welding rods. Prepare some welding rods of common specifications and some special welding rods that contain more than 5% silver. They are used to weld the compressor. The suction and exhaust openings of the compressor are all connected to copper-plated steel pipes, so we need to use special welding rods and solder.
   3) Prepare applicable welding tools. Please evaluate how much oxygen and acetylene should be used according to the current welding condition. Try to avoid repeated welding.
   4) Prepare a complete set of tools, including an internal hexagonal wrench, diagonal pliers, pincer pliers, nipper pliers, a universal meter, a pressure gauge, a Phillips head screwdriver, a straight screwdriver, two or more wrenches, insulating tape and wire cables.

Step 2: Disconnect power
If the compressor needs to be replaced after determining as above, then switch off the outdoor unit and disconnect the power cable of the outdoor unit. Use insulating tape to wrap the power cable and put a notice board on the power switch to remind people to be cautious of electric shock.

Step 3: Organize the electric components
When you detach the compressor wires, temperature sensors and electric heaters, mark them correspondingly for the convenience of reconnecting them.

Step 4: Discharge refrigerant
Discharge refrigerant from the system. Discharge simultaneously from the high pressure side and low pressure side. Do not discharge too fast (It should take more than 12h to completely discharge the refrigerant); otherwise, large quantity of lubricant will escape from the system together with the refrigerant.

Step 5: Detach the compressor
Check the condition of the damaged compressor, including its position and model.
If the information of the compressor is confirmed, check the oil quality.

(a) If the oil is clear and impurities-free, we consider that the oil of the system is not polluted. Meanwhile, if we confirm that the valves and pipes are also normal, then we can replace the compressor only. For the removal of compressor, please refer to the section: Removal of Major Components.

How to check oil quality:

1) After the compressor is detached, put it on a solid ground and shake it at an angle of 30~45°to ensure that the contaminant at the bottom of the compressor can be poured out.
2) Place the compressor at a position above the ground level and then pour out the oil from the air outlet of the compressor. Collect the oil in a transparent container. The amount of oil should be over 150ml.

NOTE:

a. The axial direction of the compressor should not slant at an angle greater than 20° to the horizontal direction.

b. Prevent the compressor from falling.

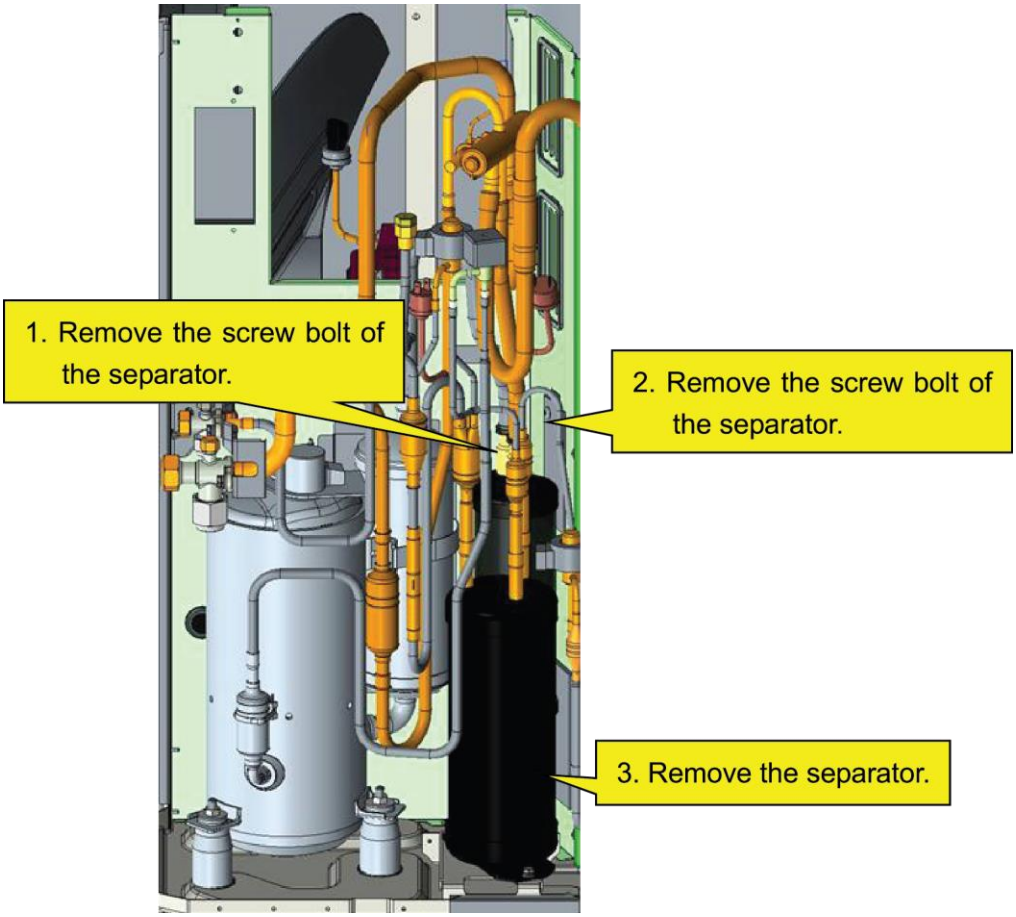
c. Put a transparent container (over 150ml in volume) under the exhaust pipe to collect the compressor oil, so you can examine the oil quality.

3. Put the container of compressor lubricant in a bright location and see if there is impurity and discoloration. Sniff the compressor lubricant. Normally, there is no pungent smell.

   If the oil is contaminated, replace the compressor and the gas-liquid separator.

NOTE: Confirm whether the compressor needs to be replaced. The pipe mouths of the faulted compressor must be sealed by adhesive tape as soon as the compressor is detached. Make sure the compressor is well preserved for the ease of future analysis.

Step 6: Check the components
If the oil is contaminated, check the components of the unit, including the gas-liquid separator.
Check the gas-liquid separator



When the separator is detached, check whether there are impurities inside. Below is the testing method:

NOTE:
When pouring the liquid from the separator, make sure the discharge pipe is at the lower position.Slant at an angle not larger than 20°
Use a transparent container to collect the content inside the separator. Check its color, seal it well and return it to the factory for inspection.

NOTE:
If the compressor is damaged and needs to be replaced, the gas-liquid separator should also be replaced, whether or not there are impurities in the separator or other abnormal conditions.

Confirm which parts of the system should be replaced. Make sure the pipe mouths of the damaged parts or components are sealed by adhesive tape as soon as they are detached. Keep them in the original condition for future analysis.

Step 7: Clear the pipeline
After confirming which parts of the system should be replaced, check the pipeline of the system. Blow through the main pipeline with nitrogen. After clearing the pipeline, if the components are not replaced immediately, seal the pipeline with adhesive tape to prevent the system from being contaminated by water and/or impurities in the air.

Step 8: Replace the compressor
For the removal of compressor, please refer to the section: Removal of Major Components.

Step 9: Check/Replace the gas-liquid separator

NOTE:
If a compressor is damaged and needs to be replaced, its gas-liquid separator should also be replaced. This is to avoid the abnormal condition of the separator from affecting the safe and reliable operation of the system.
For the removal of gas-liquid separator, please refer to the section: Removal of Major Components.

Step 10: Check the system for leaks

1. First, check each welding point. Check whether the welding points are smooth and whether there is any obvious welding hole or other abnormal conditions.
2. Next, fill high-pressure nitrogen into the system for leak detection. If it is only the outdoor unit that needs to be repaired and the indoor unit is confirmed normal, then it's OK to charge high-pressure nitrogen into the outdoor unit only. Fill in the nitrogen simultaneously from the high pressure side and low pressure side. We recommend charging the nitrogen from the big and small valves at the same time. The pressure of nitrogen should be above 20kgf. Then use soapy water to check for leaks. Check the welding points particularly.
3. Finally, retain the pressure of the system. Fill high-pressure nitrogen into the system and maintain the pressure above 25kgf. Close the big and small valves and keep the pressure of indoor and outdoor units for more than 12h. If the pressure remains unchanged, then start vacuum pumping; otherwise, check the system for leaks again.

Temperature should be considered when judging the pressure change. If temperature changes by 1℃, pressure will change by roughly 0.01MPa.

For example, if temperature is 30℃ when nitrogen of 2.5MPa is charged, and temperature changes to 25℃ after 12h, we consider that the system is qualified if the pressure is found at 2.43MPa or above.

Step 11: Evacuate the system and charge refrigerant
Please refer to the section of maintenance: vacuum pumping and refrigerant charging.

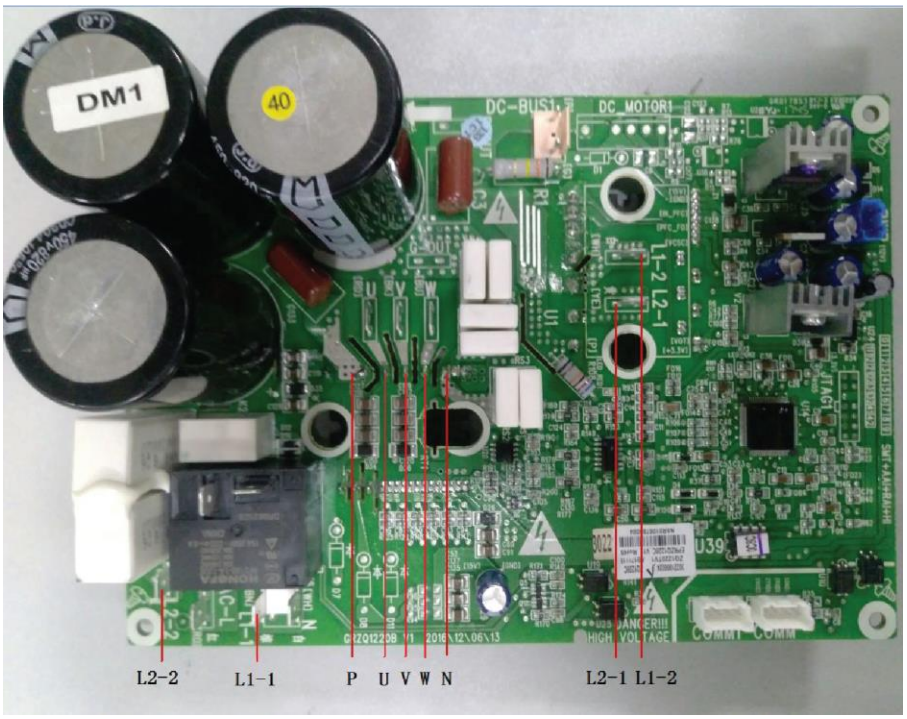
Step 12: Connect electric components
Connect cables, compressor wires and the electric heating belt according to the signs marked before and the wiring diagram on the cover of the electric box.

How to replace the drive module of compressor

Step 1: First, make sure that power is cut off. Set the universal meter at the AC voltage and measure the voltage between L1, L2, L3, and N. If each time the voltage is 0V (Errors may occur to the universal meter, sometimes the voltage may not be 0V), proceed with the next step and put a sign on the power switch that reads “Under maintenance, don’t switch on”.

Step 2: Measure the voltage between DC bus P and N on the drive board of the compressor. Set the universal meter at the DC voltage and measure the voltage between P and N as shown below. If the voltage is below 36V, proceed with the next step. In case that a universal meter is not available, disconnect power for 20min and then continue with the next step.

Step 3: Remove all the wires on the drive board of the compressor.



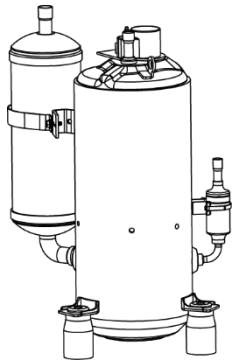
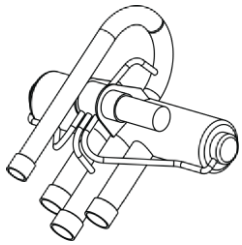
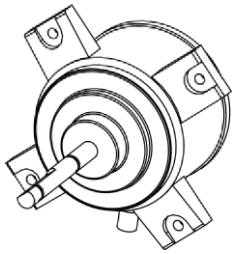
Step 4: Remove the screws on the drive board of the compressor. The screws are located in the white circles as shown above in the picture.

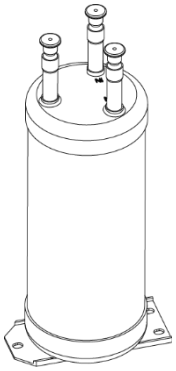
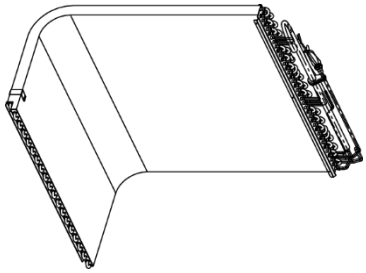
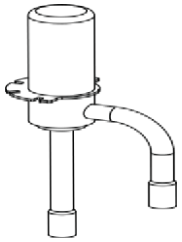
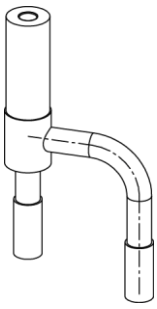
Step 5: Replace with a new compressor drive board. Before replacement, apply some silica gel on the IPM module.

Step 6: Install the new compressor drive board. Fix the screws and connect the wires correctly.

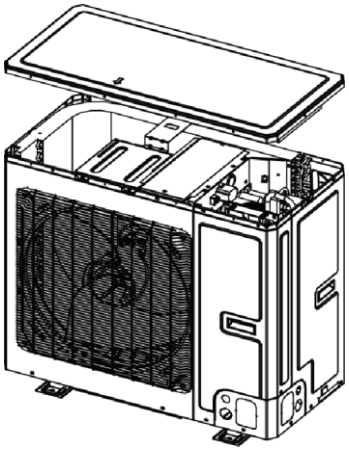
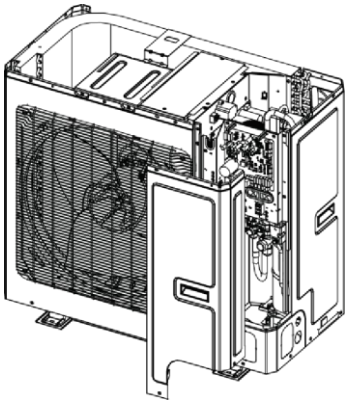
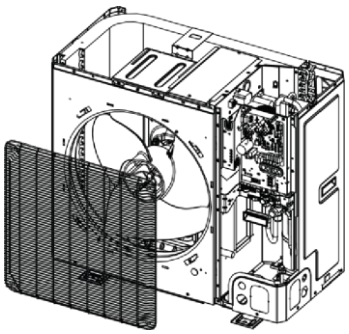
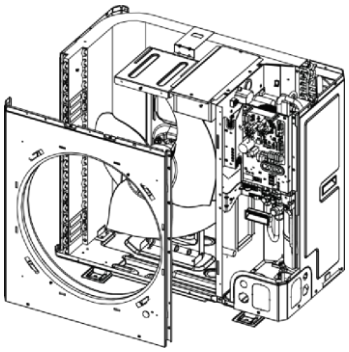
Removal of Major Components

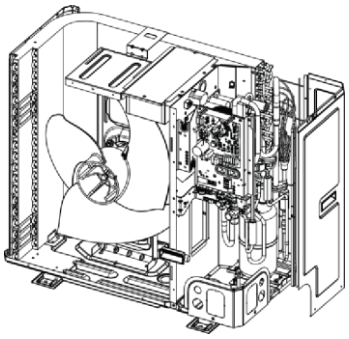
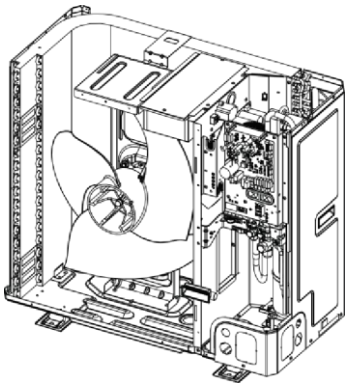
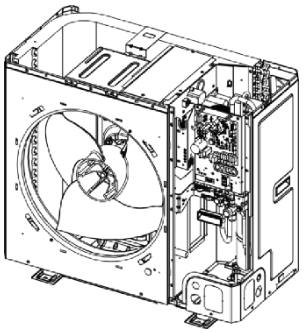
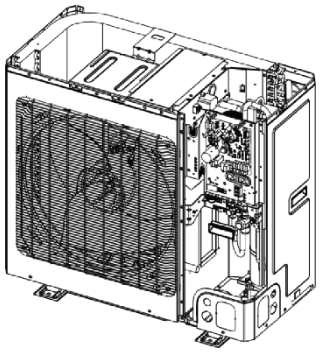
Removal of ODU Major Components

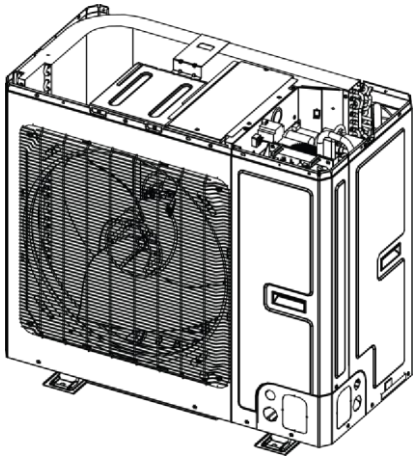
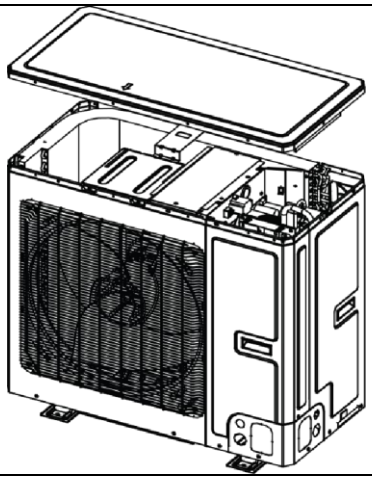
Picture	Name	Function
	Compressor	Through compression, the low pressure refrigerant occupies a less space. As its pressure and temperature both rise, it becomes high pressure and high temperature refrigerant. It is the power drive of the system.
	4-way valve	It is used to change directions, the flow of refrigerant in cooling/heating.
	Motor	The power drive of the fan. It enables the fan to run so as to provide smooth currents of air for forced convection and heat exchange of condenser and evaporator.
	Fan	It is used to provide smooth currents of air for forced convection and heat exchange of condenser and evaporator.
	Gas liquid separator	Installed at the suction side of compressor, it can separate the liquefied refrigerant from the gaseous refrigerant to make sure that only gaseous refrigerant will be sucked into the compressor. If liquefied refrigerant gets inside the compressor, ineffective compressor or slugging phenomenon will occur.

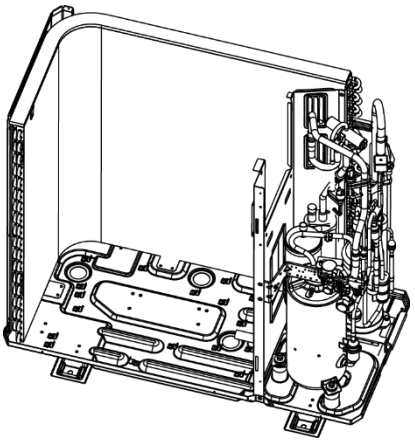
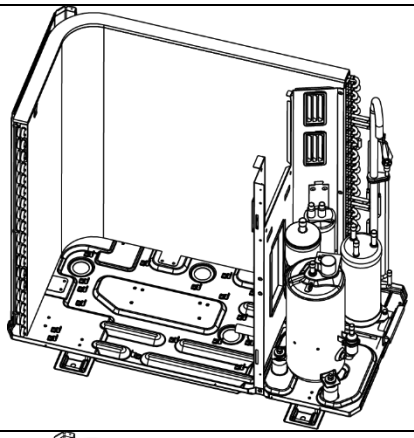
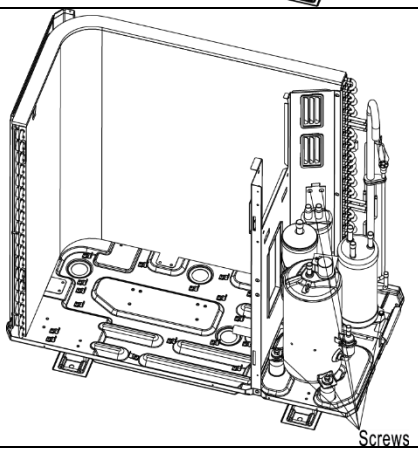
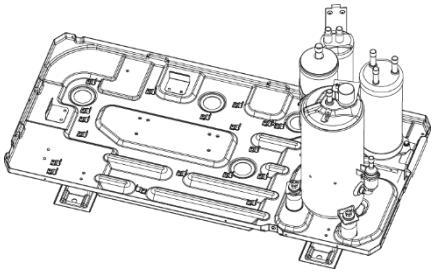
Picture	Name	Function
	Accumulator	Flash refrigerant from liquid to gas
	Condenser	It is used to transfer partial heat of the hot flow to the cold flow so that the flow temperature can reach the specified index. It is an energy exchanging device.
	Electronic expansion valve	It is used to lower the pressure and temperature of liquefied refrigerant and adjust the flow of refrigerant entering the evaporator.
	Electromagnetic Valve	Electromagnetic valve controls increased enthalpy switch.

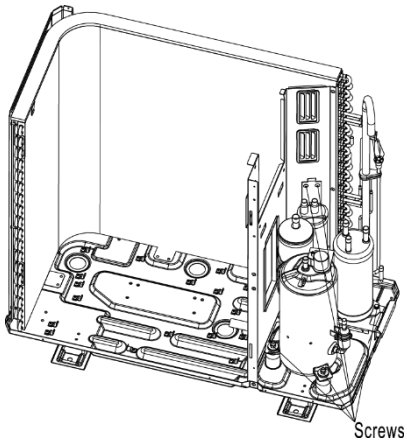
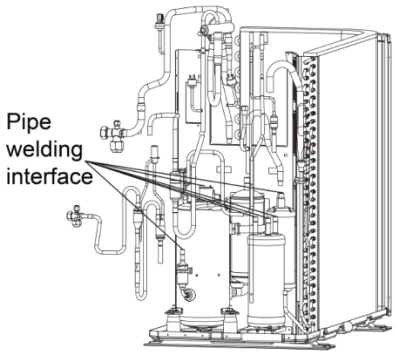
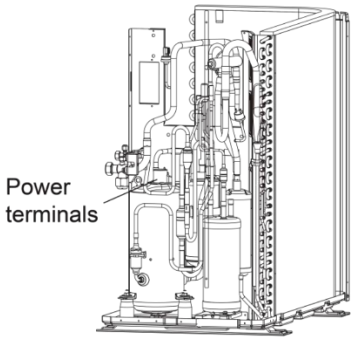
VRUO-2436HP-U2B(54)

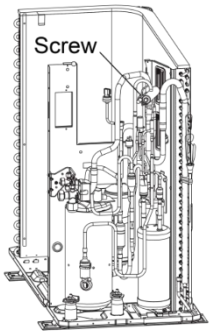
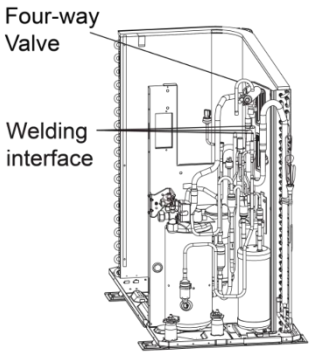
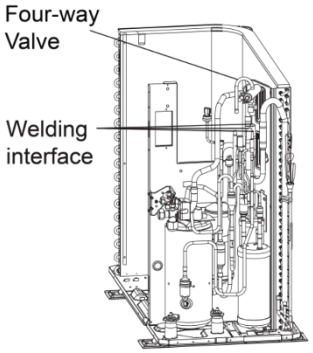
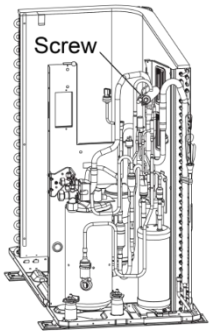
Removal of front panel		
NOTE: Before removing the front panel, make sure power is cut off.		
Step	Picture	Work instruction
1. Remove the upper cover plate.		• Unscrew the screws of the upper cover plate with a screwdriver.
2. Remove the front side plate.		• Unscrew the screws of the upper and front side plate with a screwdriver.
3. Remove the front grill.		• Unscrew the screws of the front grill with a screwdriver.
4. Remove the front panel.		• Unscrew the screws that connect the front panel to the middle insulating board and screws around the front

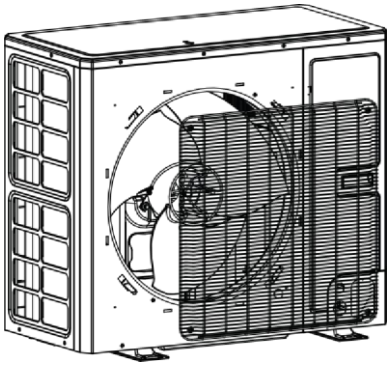
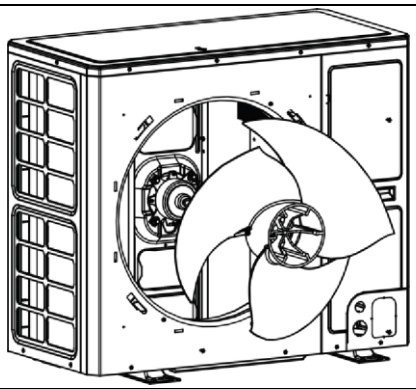
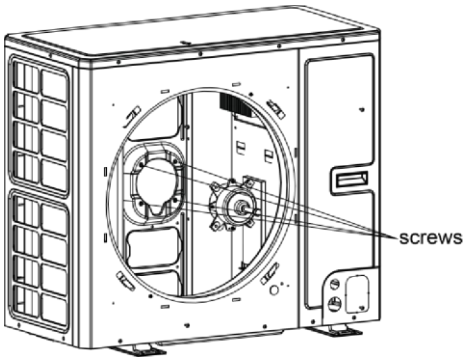
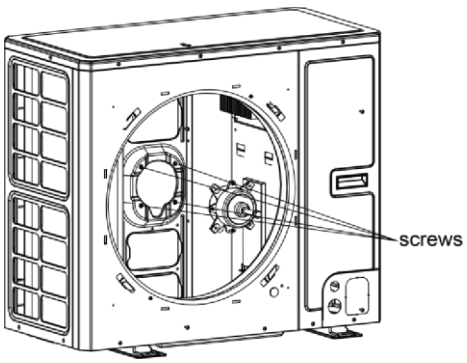
Removal of front panel		
NOTE: Before removing the front panel, make sure power is cut off.		
Step	Picture	Work instruction
5. Remove the right side plate.		• Unscrew the screws that connect the right side plate to the electric box and the screws around the right side plate.
6. Install the right side plate		• Screw up the screws around the right side plate. Be careful to handle well the clasps at the bottom of the right side plate.
7. Install the front panel.		• Install the front panel by mounting on 6 clasps on its both sides. Please note that there is one screw on the lower right side.
8. Install the grill.		• Attach the grill back in place and tighten up the screws.

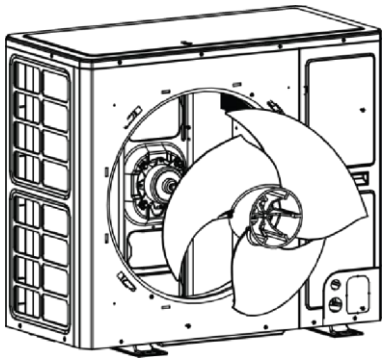
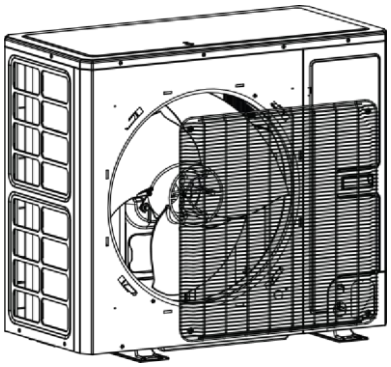
Removal of front panel		
NOTE: Before removing the front panel, make sure power is cut off.		
Step	Picture	Work instruction
9. Install the front side plate.		• Fix the clasps on both sides of the plate and tighten up the screws.
10. Install the upper cover plate.		• Tighten up the screws around the upper cover plate.

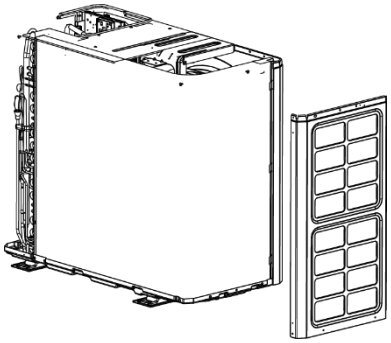
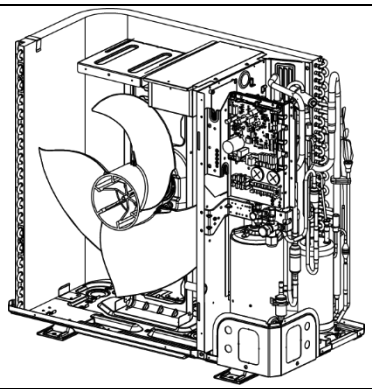
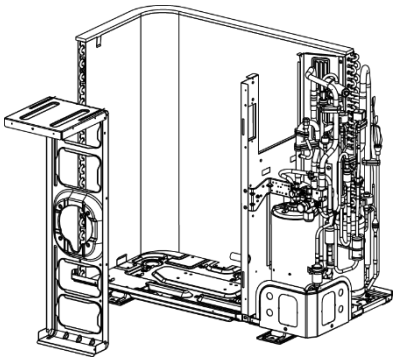
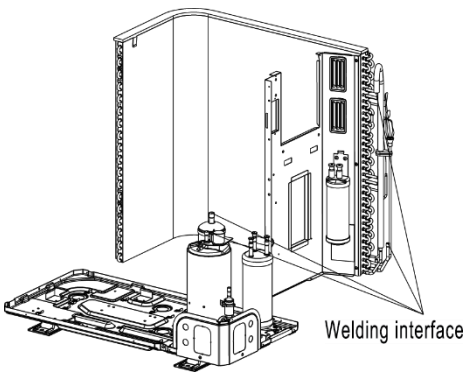
Removal of compressor/gas liquid separator		
NOTE: Before removing the compressor/gas liquid separator, make sure there is no refrigerant in the pipeline and power is cut off.		
Step	Picture	Work instruction
1. Remove wires.		• Loosen the securing screws of the wires with a screwdriver. • Remove the wires. **NOTE:** When removing the wires, mark the wire terminals corresponding to their color so as to avoid misconnection.
2. Break off the pipes that connecting to the compressor/gas liquid separator.		• Weld the pipes that are connected to the compressor/gas liquid separator. • Then remove the pipes. **NOTE:** When welding the pipes, do not let the flame burn the other components.
3. Loosen the compressor's base connectors / gas liquid separator's base nuts.		• Use a wrench to twist off the compressor/gas liquid separator's base nuts.
4. Remove the compressor/gas liquid separator from the chassis.		• Take away the compressor/gas liquid separator and replace with a new one. **NOTE:** When replacing the compressor/gas liquid separator, avoid touching the nearby pipeline and components.

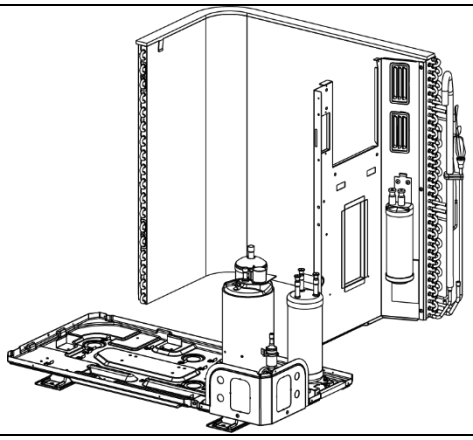
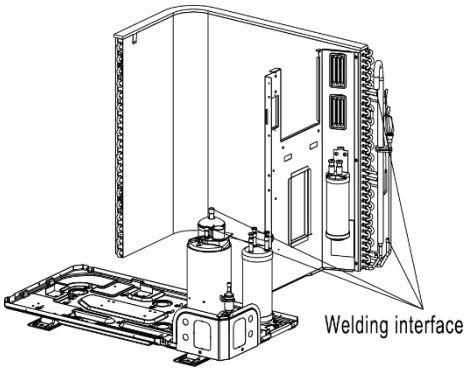
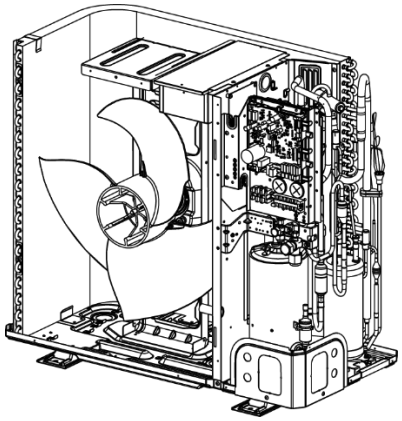
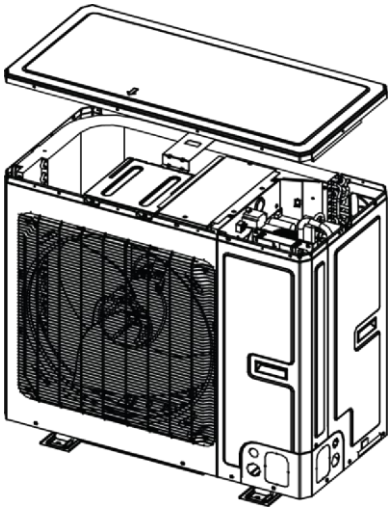
Removal of compressor/gas liquid separator		
NOTE: Before removing the compressor/gas liquid separator, make sure there is no refrigerant in the pipeline and power is cut off.		
Step	Picture	Work instruction
5. Install the new compressor/gas liquid separator onto the chassis.		• After replacing the compressor/gas liquid separator, tighten up the base screw nuts.
6. Connect the welding interfaces of compressor/gas liquid separator to the pipeline.		• Weld the connection pipes of compressor so as to connect them to the compressor. **NOTE**: When replacing the compressor, avoid touching the nearby pipeline and components.
7. Connect the compressor wires.		• Connect the compressor wires to the wire terminals on the top of compressor. **NOTE**: When connecting the wires, be sure to match the colors with the corresponding wire terminals.

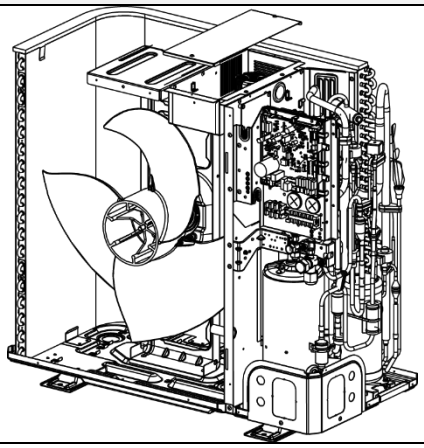
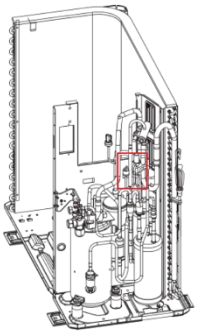
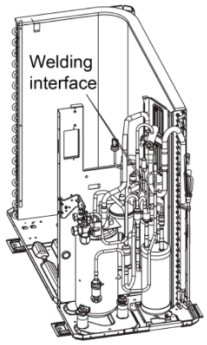
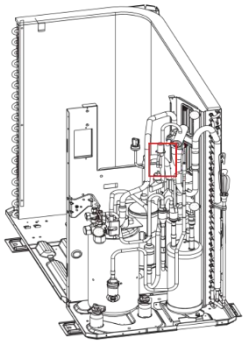
Removal of 4-way valve		
NOTE: Before removing the 4-way valve, make sure refrigerant is fully discharged from the unit and power is cut off.		
Step	Picture	Work instruction
1. Take off the coil of the 4-way valve.		• Carefully unscrew the screws of electromagnetic coil with a screwdriver.
2. Break off the connection pipes from the 4-way valve.		• Use a soldering gun to loosen the 4 joints on the 4-way valve and then remove the connection pipes. **NOTE**: When welding the pipes, the 4-way valve should be wrapped with wet cloth for cooling. Do not let the flame burn the other components.
3. Replace the 4-way valve and connect it to the connection pipes.		• Replace the 4-way valve and then use a soldering gun to weld the 4 joints of the 4-way valve. **NOTE**: When welding the pipes, the 4-way valve should be wrapped with wet cloth for cooling. Do not let the flame burn the other components.
4. Install the coil of 4-way valve.		• Tighten the screws of the coil of 4-way valve with a screwdriver.

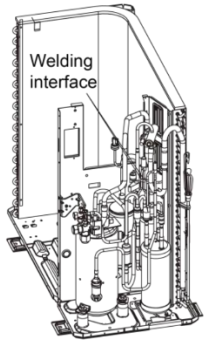
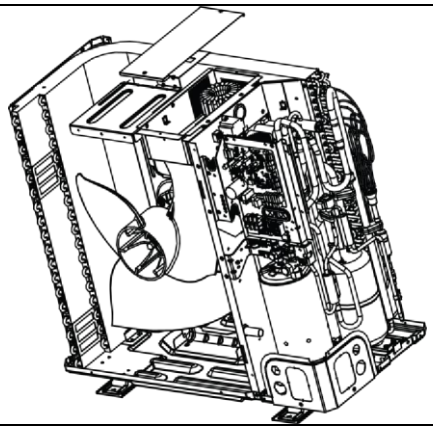
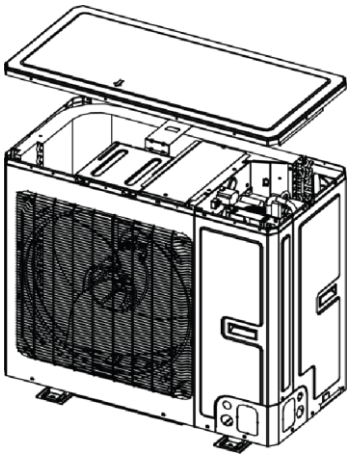
Removal of fan and motor		
Note: Before removing the fan, make sure power is cut off.		
Step	Picture	Work instruction
1. Remove the grill.		• Use a screwdriver to unscrew the two screws on the upper left and lower right corners.
2. Remove the fan.		• Use a wrench to remove the specialized nut and gasket of the fan. **NOTE**: Please keep the nut and gasket safe after removing them from the fan.
3. Remove motor.		• Use a screwdriver to unscrew the bolt of motor. **NOTE**: Motor wire should be first removed from the electric box.
4. Install the motor.		• Replace with a new motor. Then tighten up the screw bolt.

5. Install the fan.		• Install the fan in place. Put on the gasket and use a wrench to secure the screw nut. **NOTE**: After installing the fan, turn the fan by hand to see if it can run normally. If not, please check for the reason.
6. Install the grill.		• After replacing the motor, use a screwdriver to tighten up the screw bolt that secures the motor. Arrange the wires according to the wiring diagram.

Removal of condenser		
NOTE: Before removing the condenser, make sure there is no refrigerant in the pipeline and power is cut off.		
Step	Picture	Work instruction
1. Remove the panels.		• Remove the upper, lower and front panels.
2. Remove the electric box.		• Loosen the wire clamp at the bottom of the electric box. • Unscrew the screws of electric box. • The connection wires inside and outside the electric box should be removed.
3. Remove motor support.		• When removing the motor support, be careful to protect the components.
4. Remove the condenser.		• Heat up the welding points of connection pipes through gas welding until the pipes break off. **NOTE**: When welding the pipes, do not let the flame burn the other components. The welding points of condenser are steel and copper welding points. Be sure to maintain the welding quality.

5. Take out the condenser.		• Loosen the securing screws of condenser support. Take off the plate type heat exchanger and the support as a whole.
6. Install the new condenser.		• Secure the screws of condenser and support. Then fix them together on the chassis. • Install the condenser by referring to the positions of entering and leaving pipes. Weld the connection pipes. • Nitrogen welding: the pressure of nitrogen is 0.5±0.1kgf/ cm² (relative pressure). **NOTE**: When welding the pipes, do not let the flame burn the other components.
7. Secure the electric box and arrange the wires according to the requirement.		• Put the electric box in place and tighten up the screws of electric box. • Arrange and secure the wires as original.
8. Check and open the upper and side panels.		• Check whether each component and connection wire is well connected. • If everything is OK, place back the upper, left and right side panels.

Removal of electronic expansion valve		
NOTE: Before removing the condenser, make sure there is no refrigerant in the pipeline and power is cut off.		
Step	Picture	Work instruction
1. Remove the electric box.		• Remove the upper, lower and front panels. • Loosen the wire clamp at the bottom of the electric box • Unscrew the screws of electric box. • The connection wires inside and outside the electric box should be removed. • When removing the electric box, be careful to protect the components.
2. Remove the fixed block.		• Remove the fixed block between the electronic expansion valve and the pipe.
3. Remove the electronic expansion valve.		• Take off the coil of electronic expansion valve. • Loosen the connection pipe of electronic expansion valve by welding. Then remove the connection pipe. **NOTE**: When welding the pipe, do not let the flame bunt the other components.
4. Take out the electronic expansion valve.		• Take out the electronic expansion valve.

5. Install the new electronic expansion valve.		• Weld the connection pipe of electronic expansion valve. • When welding the electronic expansion valve, the valve should be wrapped with wet cloth. • Nitrogen welding: the pressure of nitrogen is 0.5±0.1kgf/ cm² (relative pressure). **NOTE:** When welding the pipes, do not let the flame burn the other components. • Install the coil of electronic expansion valve.
6. Secure the electric box and arrange the wires as required.		• Put the electric box back in place and tighten up the screws. • Arrange the wires as original.
7. Check and open the upper and front panels.		• Check whether each component and connection wire is well connected. • If everything is OK, install the upper, left and right panels. Tighten up the screws.

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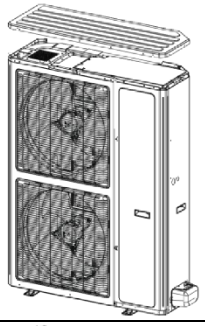
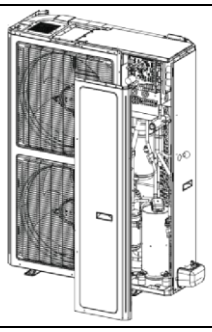
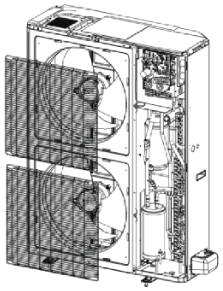
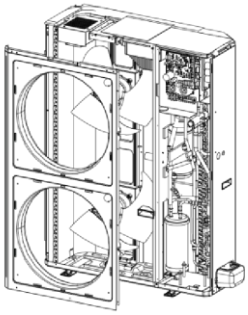
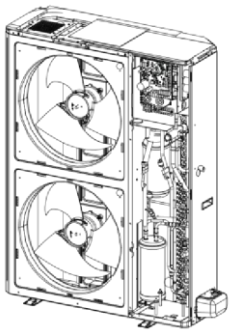
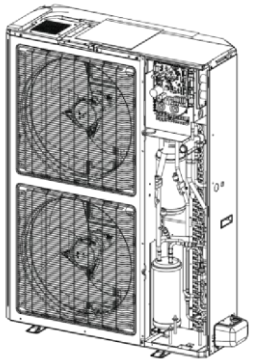
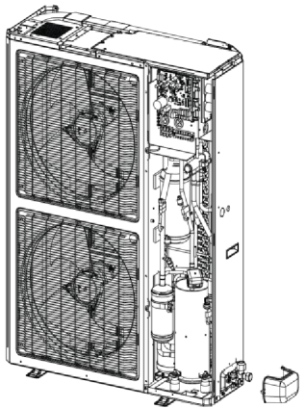
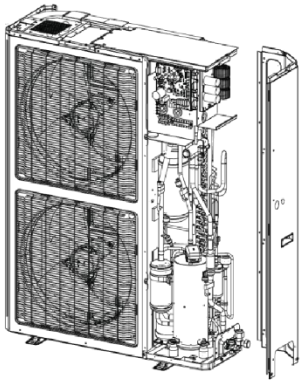
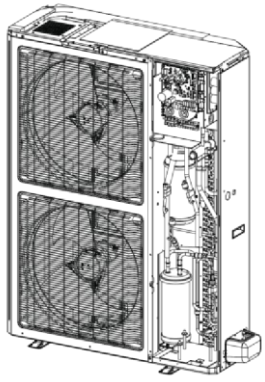
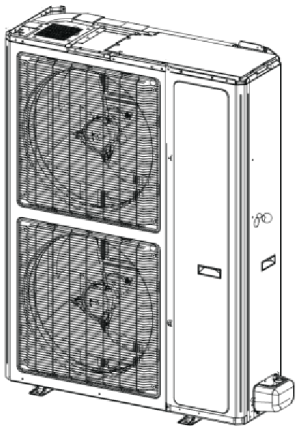
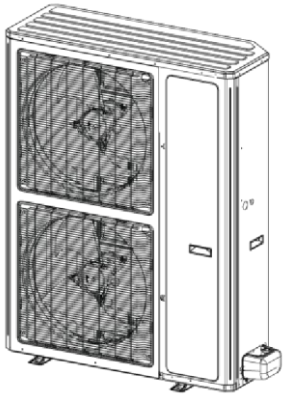
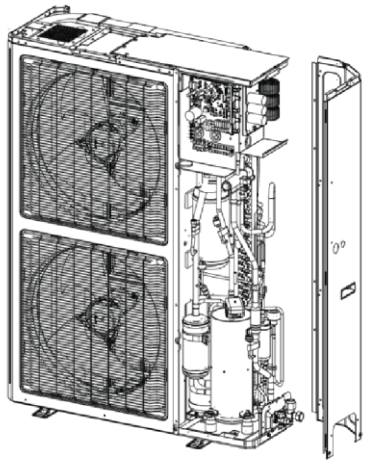
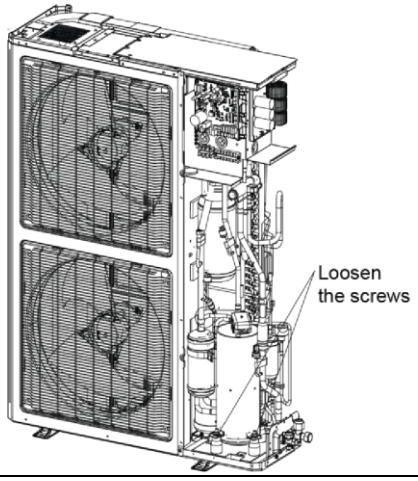
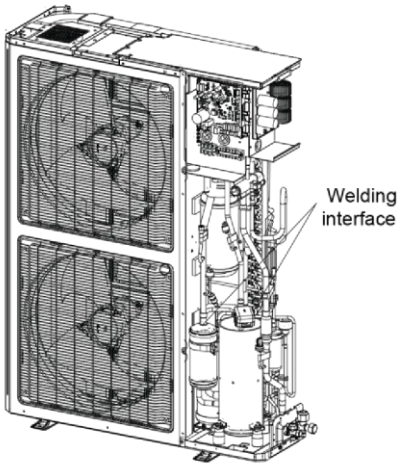
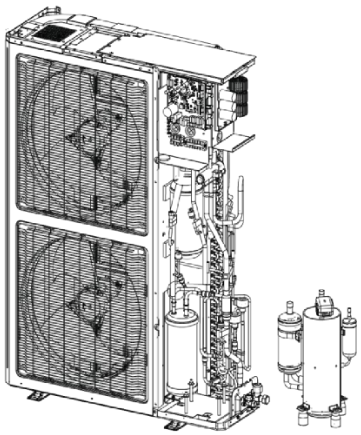
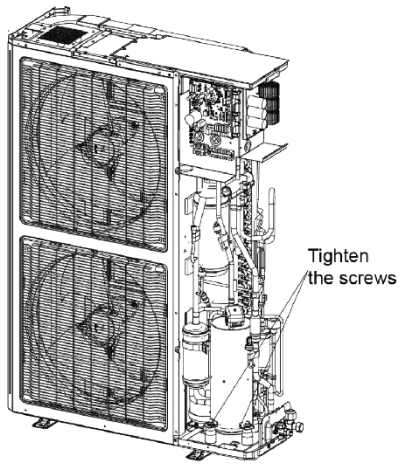
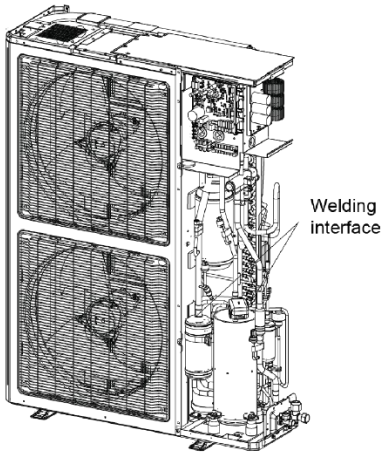
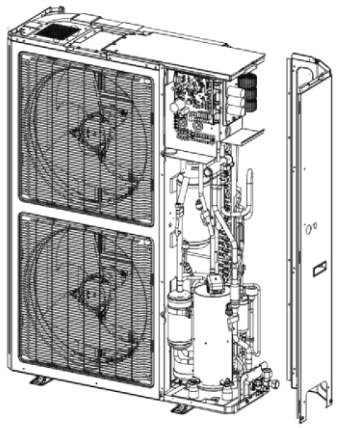
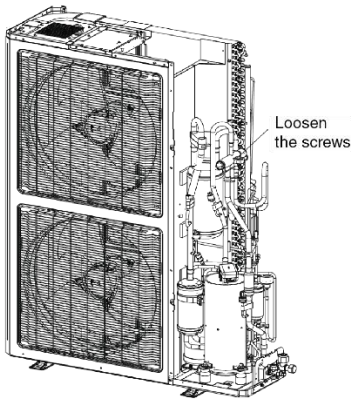
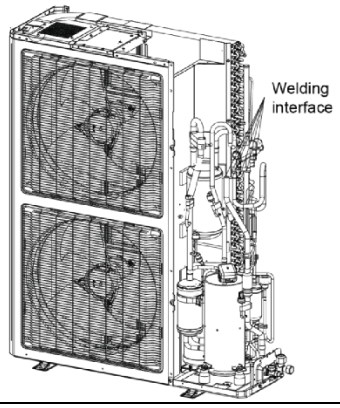
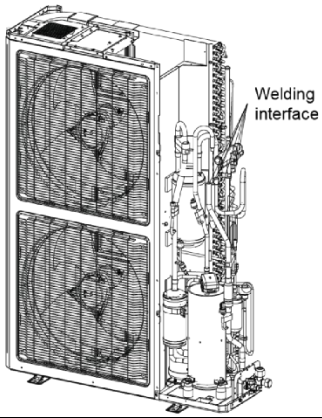
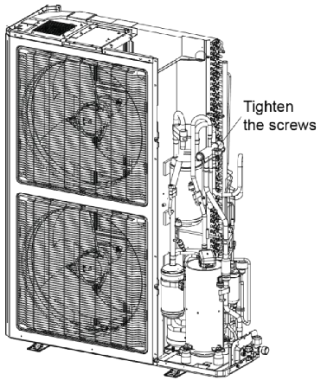
Removal of front panel		
NOTE: Before removing the front panel, make sure power is cut off.		
Step	Picture	Work instruction
1. Remove the upper cover plate.		• Unscrew the screws of the upper cover plate with a screwdriver.
2. Remove the front plate.		• Unscrew the screws of the front plate with a screwdriver.
3. Remove the front grill.		• Unscrew the screws of the front grill with a screwdriver.
4. Remove the front panel.		• Unscrew the screws that connect the front panel to the middle insulating board and screws around the front panel.
5. Install the front panel.		• Install the front panel by mounting on 6 clasps on its both sides. Please note that there is one screw on the lower right side.

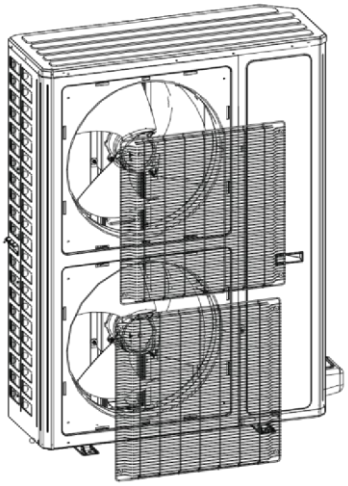
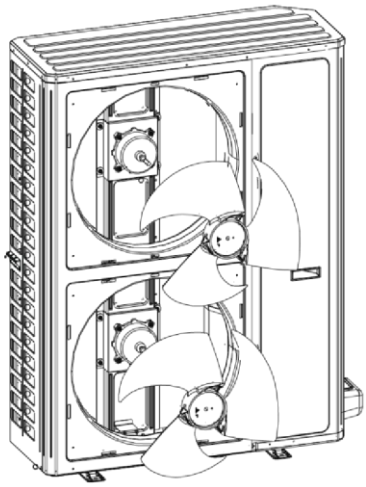
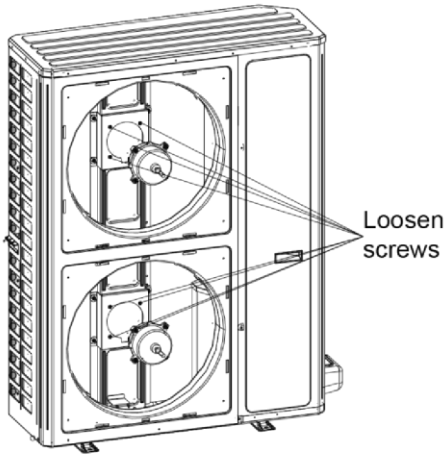
Removal of front panel		
NOTE: Before removing the front panel, make sure power is cut off.		
Step	Picture	Work instruction
6. Install the grill.		• Attach the grill back in place and tighten up the screws.
7. Remove the valve cover		• Unscrew the screws of the valve cover with a screwdriver.
8. Remove the right side plate.		• Unscrew the screws that connect the right side plate to the electric box and the screws around the right side plate.
9. Install the right side plate.		• Screw up the screws around the right side plate. Be careful to handle well the clasps at the bottom of the right side plate.

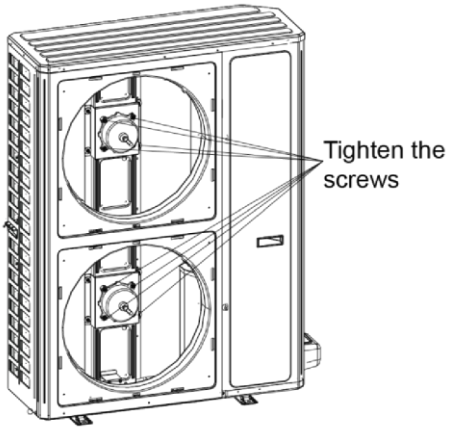
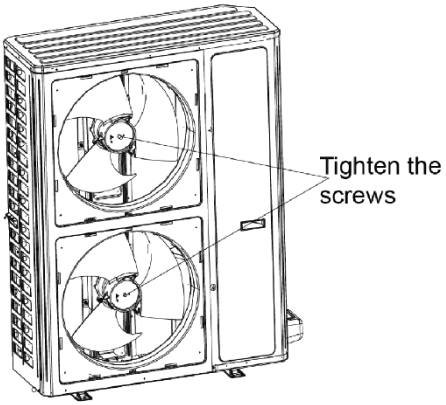
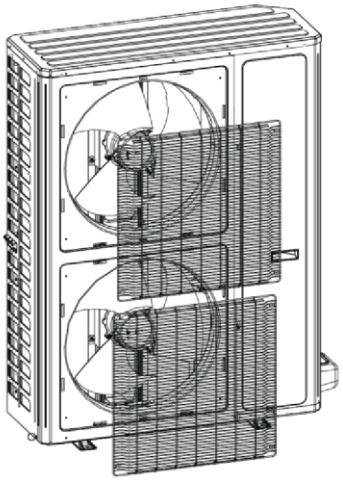
10. Install the grill.		• Attach the grill back in place and tighten up the screws.
11. Install the upper cover plate.		• Tighten up the screws around the upper cover plate.

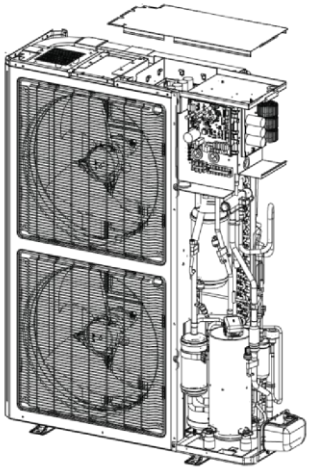
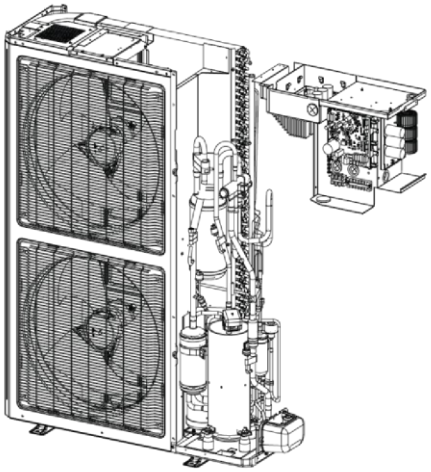
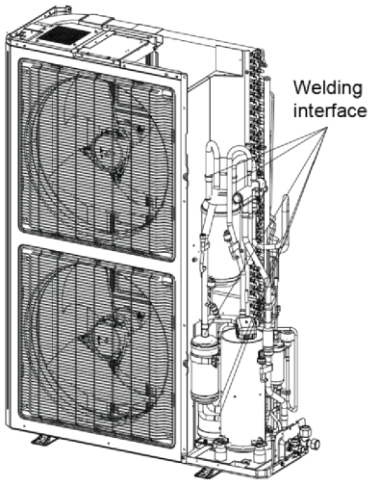
Disassembly of compressor		
NOTE: Before removing the compressor, make sure there is no refrigerant in the pipeline and power is cut off.		
Step	Picture	Work instruction
1. Remove wires.		• Loosen the securing screws of the wires with a screwdriver. • Remove the wires. **NOTE**: When removing the wires, mark the wire terminals corresponding to their color so as to avoid misconnection.
2. Loosen the securing screws at the foot of compressor.		• Use a wrench to twist off the screw nuts at the foot of compressor.
3. Break off the pipes that connecting to the compressor.		• Weld the pipes that are connected to the compressor. • Then remove the pipes. **NOTE**: When welding the pipes, do not let the flame burn the other components.

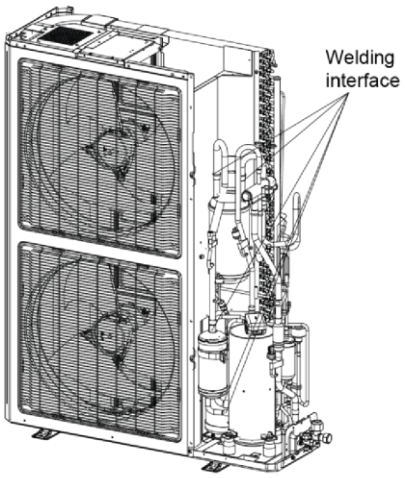
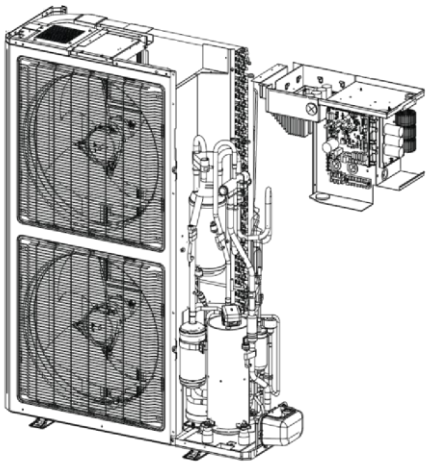
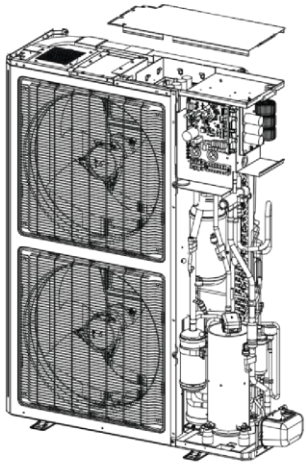
4. Remove the compressor from the chassis.		• Take out the compressor and replace it. **NOTE**: When replacing the compressor, avoid touching the nearby pipeline and components.
5. Fix the new compressor back onto the chassis.		• After replacing the compressor, tighten up the screws at the foot of compressor.
6. Connect the compressor suction port and exhaust port with the pipes.		• Weld the compressor connection pipes and connect them to the compressor. **NOTE**: When replacing the compressor, avoid touching the nearby pipeline and components.
7. Connect the compressor wires.		• Connect the compressor wires to the wire terminals on the top of compressor. **NOTE**: When connecting the wires, be sure to match the colors with the corresponding wire terminals.

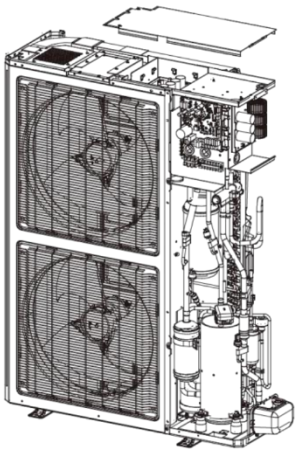
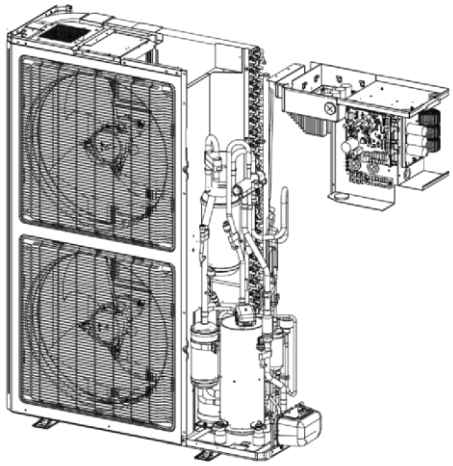
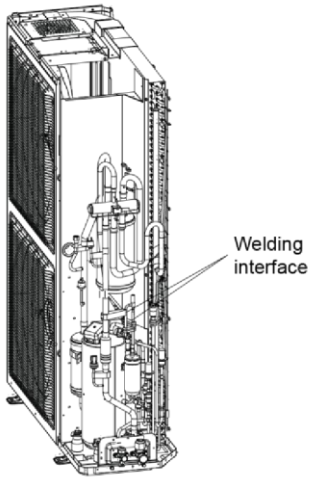
Removal of 4-way valve		
NOTE: Before removing the 4-way valve, make sure refrigerant is fully discharged from the unit and power is cut off.		
Step	Picture	Work instruction
1. Take off the coil of the 4-way valve.		• Carefully unscrew the screws of electromagnetic coil with a screwdriver.
2. Break off the connection pipes from the 4-way valve.		• Use a soldering gun to loosen the 4 joints on the 4-way valve and then remove the connection pipes. **NOTE**: When welding the pipes, the 4-way valve should be wrapped with wet cloth for cooling. Do not let the flame burn the other components.
3. Replace the 4-way valve and connect it to the connection pipes.		• Replace the 4-way valve and then use a soldering gun to weld the 4 joints of the 4-way valve. **Note:** When welding the pipes, the 4-way valve should be wrapped with wet cloth for cooling. Do not let the flame burn the other components.
4. Install the coil of 4-way valve.		• Tighten the screws of the coil of 4-way valve with a screwdriver.

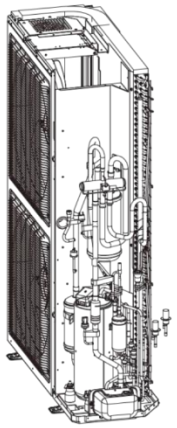
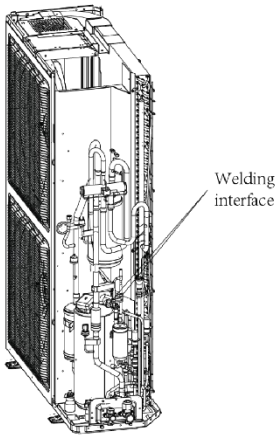
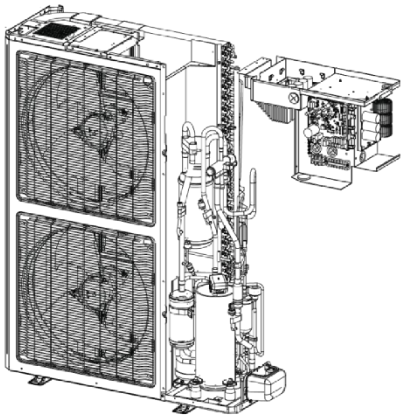
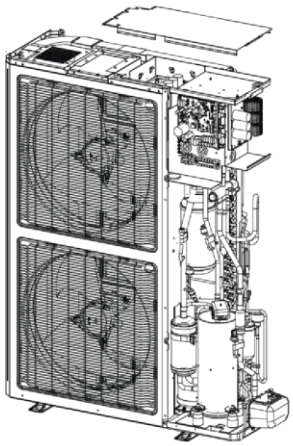
Removal of fan and motor		
NOTE: Before removing the fan, make sure power is cut off.		
Step	Picture	Work instruction
1. Remove the grill.		• Use a screwdriver to unscrew the two screws on the upper left and lower right corners.
2. Remove the fan.		• Use a wrench to remove the specialized nut and gasket of the fan. **NOTE**: Please keep the nut and gasket safe after removing them from the fan.
3. Remove motor.		• Use a screwdriver to unscrew the bolt of motor. • **NOTE**: Motor wire should be first removed from the electric box.

4. Install the motor.		• Replace with a new motor. Then tighten up the screw bolt.
5. Install the fan.		• Install the fan in place. Put on the gasket and use a wrench to secure the screw nut. • **NOTE**:After installing the fan, turn the fan by hand to see if it can run normally. If not, please check for the reason.
6. Install the grill.		• After replacing the motor, use a screwdriver to tighten up the screw bolt that secures the motor.

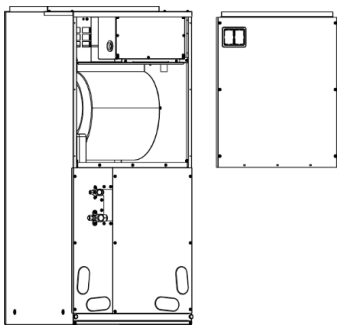
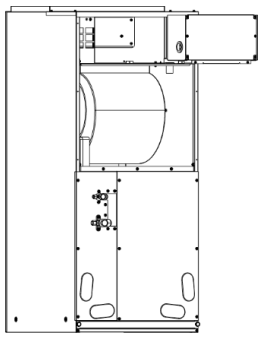
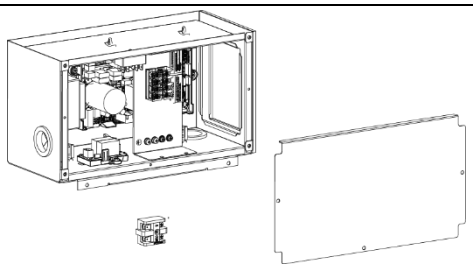
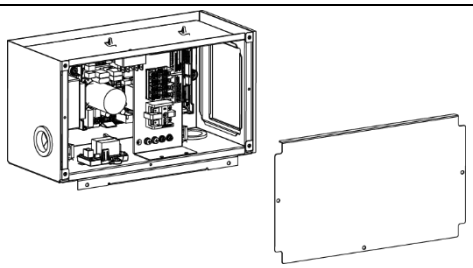
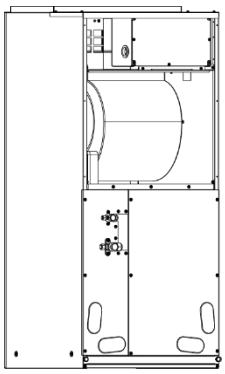
Removal of gas liquid separator		
NOTE: Before removing the gas liquid separator, make sure there is no refrigerant in the pipeline and power is cut off.		
Step	Picture	Work instruction
1. Loosen the wire clamp at the bottom of the electric box and the screws of electric box.		• Remove the upper, lower and front panels. • Loosen the wire clamp at the bottom of the electric box. • Unscrew the screws of electric box.
2. Remove the electric box.		• The connection wires inside and outside the electric box should be removed. • When removing the electric box, be careful to protect the components.
3. Remove the compressor/gas liquid separator from the		• Take away the compressor/gas liquid separator and replace with a new one. **NOTE:** When replacing the compressor/gas liquid separator, avoid touching the nearby pipeline and components.

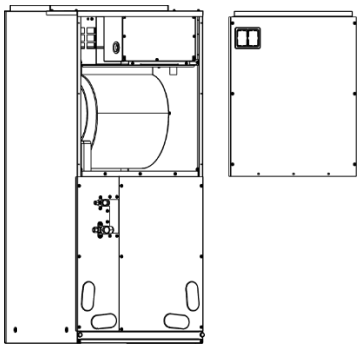
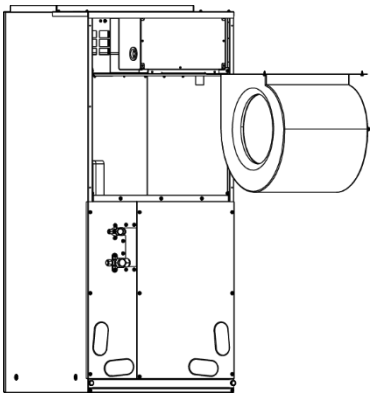
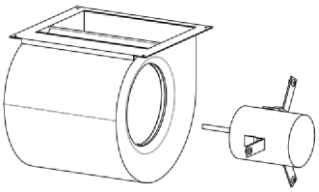
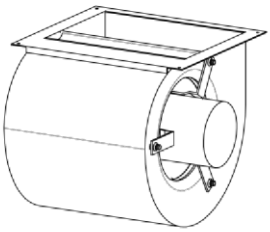
4. Install the new gas liquid separator		• Install the gas liquid separator by referring to the positions of entering and leaving pipes. Weld the 2 welding interfaces. • Nitrogen welding: the pressure of nitrogen is 0.5±0.1kgf/ cm^2 (relative pressure). **NOTE**: When welding the pipes, do not let the flame burn the other components. • Tighten the screws of gas liquid separator.
5. Secure the electric box and arrange the wires as required.		• Put the electric box back in place and tighten up the screws. • Arrange the wires as original.
6. Check and open the upper and side panels.		• Check whether each component and connection wire is well connected. • If everything is OK, install the upper, left and right panels. Tighten up the screws.

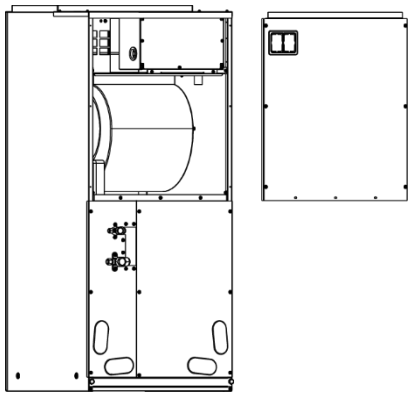
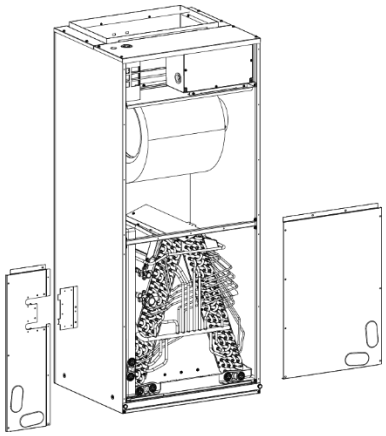
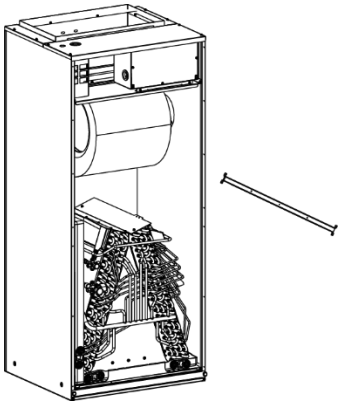
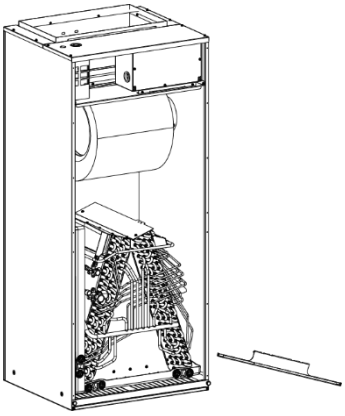
Removal of electronic expansion valve		
NOTE: Before removing the electronic expansion valve, make sure there is no refrigerant in the pipeline and power is cut off.		
Step	Picture	Work instruction
1. Loosen the wire clamp at the bottom of the electric box and the screws of electric box.		• Remove the upper, lower and front panels. • Loosen the wire clamp at the bottom of the electric box. • Unscrew the screws of electric box.
2. Remove the electric box.		• The connection wires inside and outside the electric box should be removed. • When removing the electric box, be careful to protect the components.
3. Remove the electronic expansion valve.		• Take off the coil of electronic expansion valve. • Loosen the connection pipe of electronic expansion valve by welding. Then remove the connection pipe. **NOTE**: When welding the pipe, do not let the flame bunt the other components.

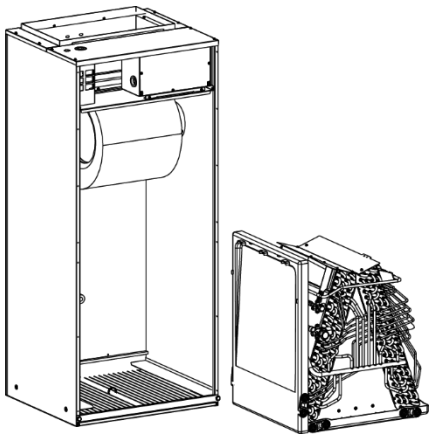
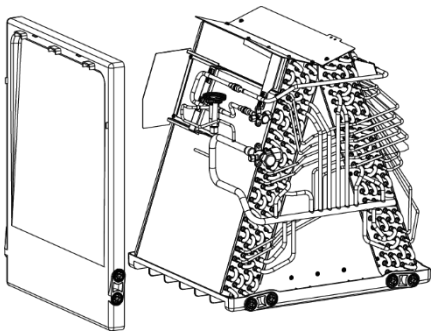
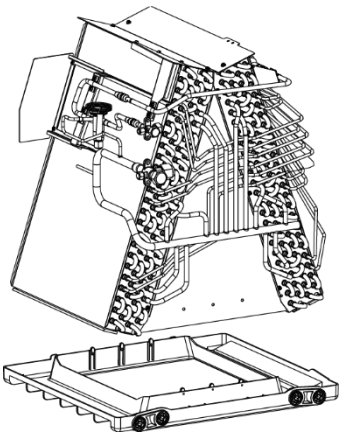
4. Take out the electronic expansion valve.		• Take out the electronic expansion valve.
5. Take out the electronic expansion valve.		• Weld the connection pipe of electronic expansion valve. • When welding the electronic expansion valve, the valve should be wrapped with wet cloth. • Nitrogen welding: the pressure of nitrogen is 0.5±0.1kgf/ cm, (relative pressure). **NOTE**: When welding the pipes, do not let the flame burn the other components. • Install the coil of electronic expansion valve.
6. Secure the electric box and arrange the wires as required.		• Put the electric box back in place and tighten up the screws. • Arrange the wires as original.
7. Check and open the upper and side panels.		• Check whether each component and connection wire is well connected. • If everything is OK, install the upper, left and right panels. Tighten up the screws.

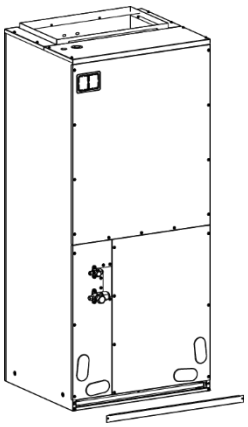
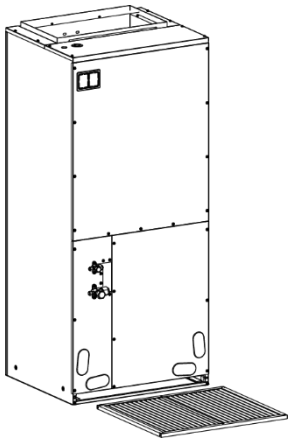
Air Handler Unit

Disassembly and Assembly of the Electric Box		
Step	Picture	Work instruction
1. Remove the upper panel		• Loosen screws around the upper panel with a screwdriver. • Remove the upper panel away from the unit.
2. Remove the electric box.		• Disconnect the power cord and control line from the wiring terminals, and then draw them out. • Loosen screws around the electric box with a screwdriver. • Remove the electric box from the unit.
3. Remove the electric element.		• Disconnect the electric element from the wiring terminal. • Loosen screws around the electric element with a screwdriver. • Remove the electric element from the electric box.
4. Mount the new electric element.		• Place the electric element at the proper position. • Tighten the screws around the electric element with a screwdriver. • Wire the electric element to the wiring terminal.
5. Reinstall the electric box.		• Loosen screws round the upper panel with a screwdriver. • Remove the upper panel from unit.

Disassembly and Assembly of the Fan Motor		
Step	Picture	Work instruction
1. Remove the upper panel.		• Loosen screws round the upper panel with a screwdriver. • Remove the upper panel from unit.
2. Remove the fan.		• Disconnect the wires of the fan from the wiring terminal and draw them out. • Loosen screws located at the front of the fan with a screwdriver. • Remove the fan from the unit.
3. Remove the motor.		• Loosen screws fixing the motor and fan blades. • Loosen screw bolts fixing the bracket. • Remove the motor rightward from the fan.
4. Reinstall the fan.		• Place the motor at the proper position. • Tighten screws fixing the motor and fan blades. • Tighten screw bolts fixing the motor bracket. • After the installation, reassemble the unit as before.

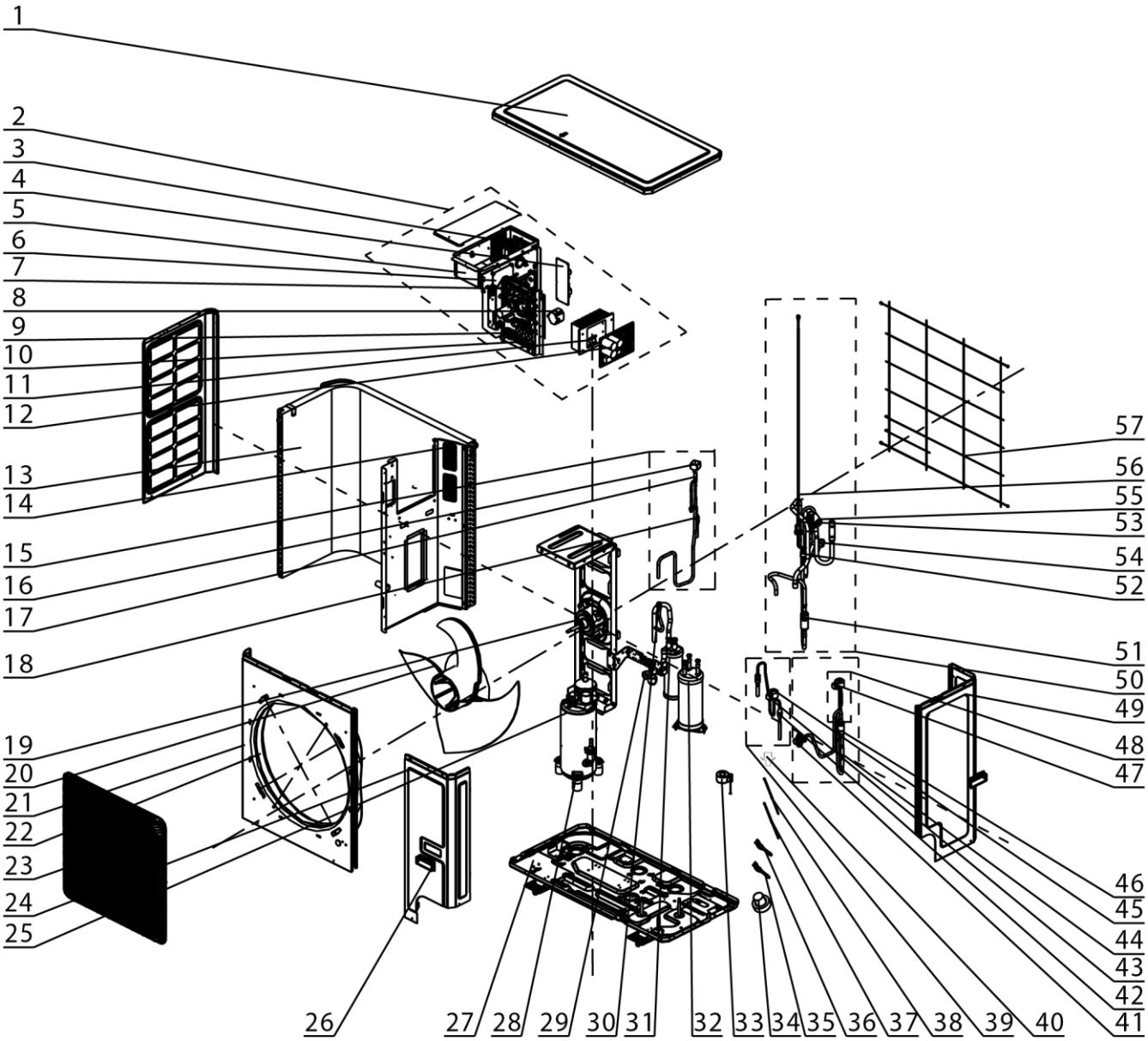
Disassembly and Assembly of the Evaporator and Drain Pan		
Step	Picture	Work instruction
1. Remove the upper panel.		• Loosen screws round the upper panel with a screwdriver. • Remove the upper panel from unit.
2. Remove the lower panel (1) and panel (2).		• Loosen screws round the lower panel with a screwdriver. • Remove the lower panel from unit.
3. Remove the enhanced frame if applicable.		• Remove the screws from enhanced frame. • Disassemble the enhanced frame from the unit.
4. Remove the mounting plate of the drain pan.		• Loosen screws at both side of the mounting plate with a screwdriver. • Remove the mounting plate from the unit.

5. Remove the primary drain pan.		• Remove the primary drain pan from the unit.
6. Remove the secondary drain pan.		• Remove the secondary drain pan from the unit.
7. Remove the evaporator.		• Remove the evaporator away from the primary drain pan. • Reassemble the unit as before.

Disassembly and Assembly of the Filter		
Step	Picture	Work instruction
1. Remove the mounting plate.		• Loosen screws fixing the mounting plate with a screwdriver. • Remove the mounting plate away from the unit.
2. Remove the filter screen.		• Remove the filter screen away from the unit. • After replacing the filter screen, reassemble the unit as before.

ODU Explosive View and Lists of Parts

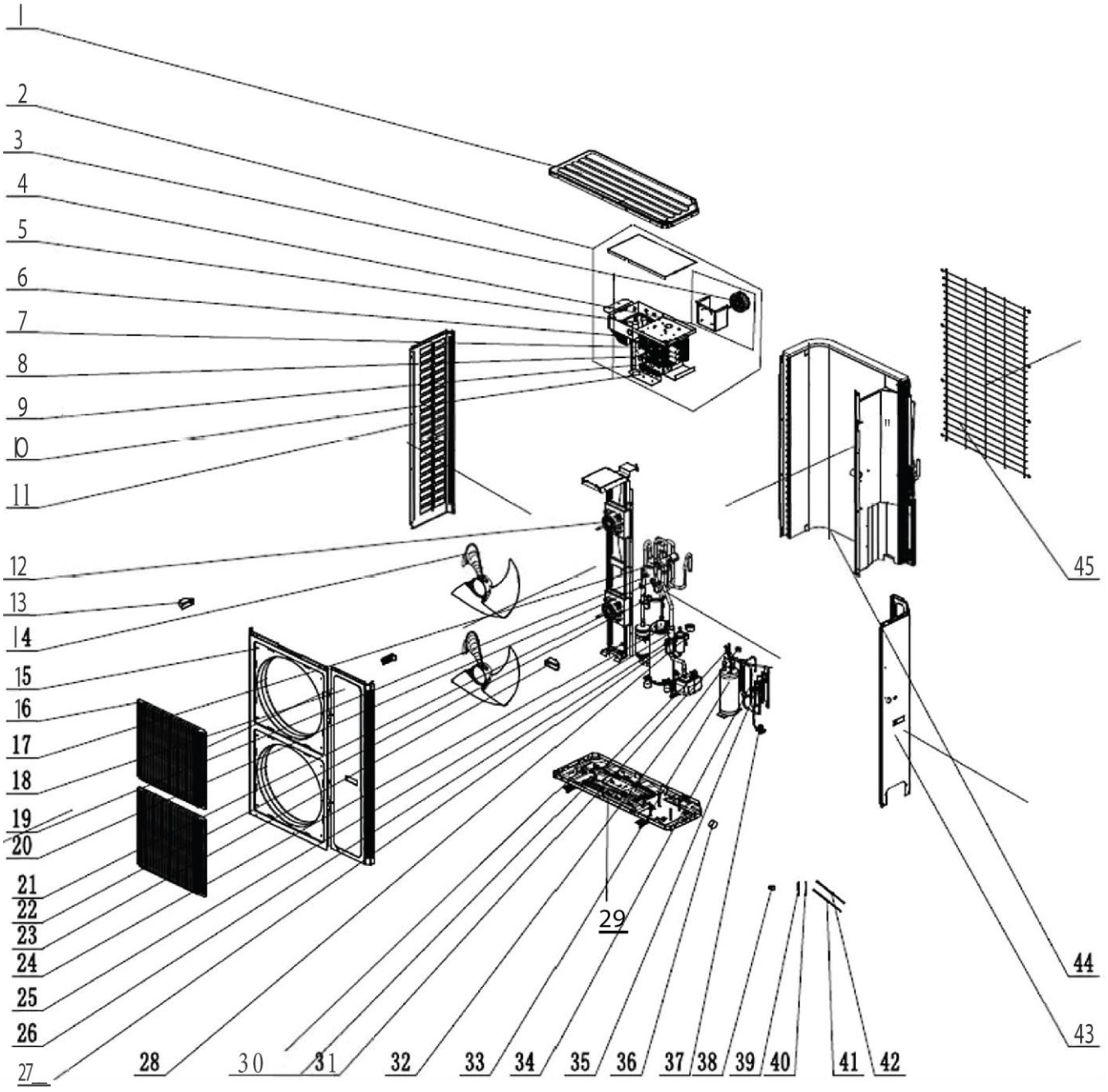
VRUO-2436HP-U2B(54)



No.	Material name
1	Coping
2	Electric Box Assy
3	PFC Inductance
4	Filter Board
5	Reactor Sub-Assy
6	Power Switch
7	Main Board
8	Inductance
9	Terminal Board
10	Terminal Board
11	Radiator

12	Main Board
13	Condenser Assy
14	Filter Sub-Assy
15	Electromagnetic Valve Sub-Assy
16	Magnet Coil (Electromagnetic Valve)
17	Electromagnetic Valve
18	Strainer
19	Brushless DC Motor
20	Axial Flow Fan
21	Cabinet
22	Diversion Circle
23	Front Grill
24	Front Side Plate
25	Compressor And Fittings
26	Handle
27	Chassis Assy
28	Foot
29	Cut Off Valve
30	Fusible Plug
31	Gas-liquid Separator
32	Accumulator
33	4 Way Valve Coil
34	Drainage Hole Cap
35	Temperature Sensor
36	Temperature Sensor
37	Electrical Heater(Compressor)
38	Electrical Heater (Chassis)
39	Electric Expansion Valve Sub-Assy
40	Drainage Joint
41	Cut-Off Valve 3/8(N)
42	Strainer
43	Electric Expand Valve Fitting
44	One Way Valve
45	Electronic Expansion Valve
46	Strainer
47	Electric Expand Valve Fitting
48	Electric Expansion Valve Sub-Assy
49	Rear Side Plate
50	4-Way Valve Assy
51	Silencer
52	Pressure Protect Switch
53	Filter
54	Pressure Protect Switch
55	4-Way Valve
56	Pressure Sensor
57	Rear Grill

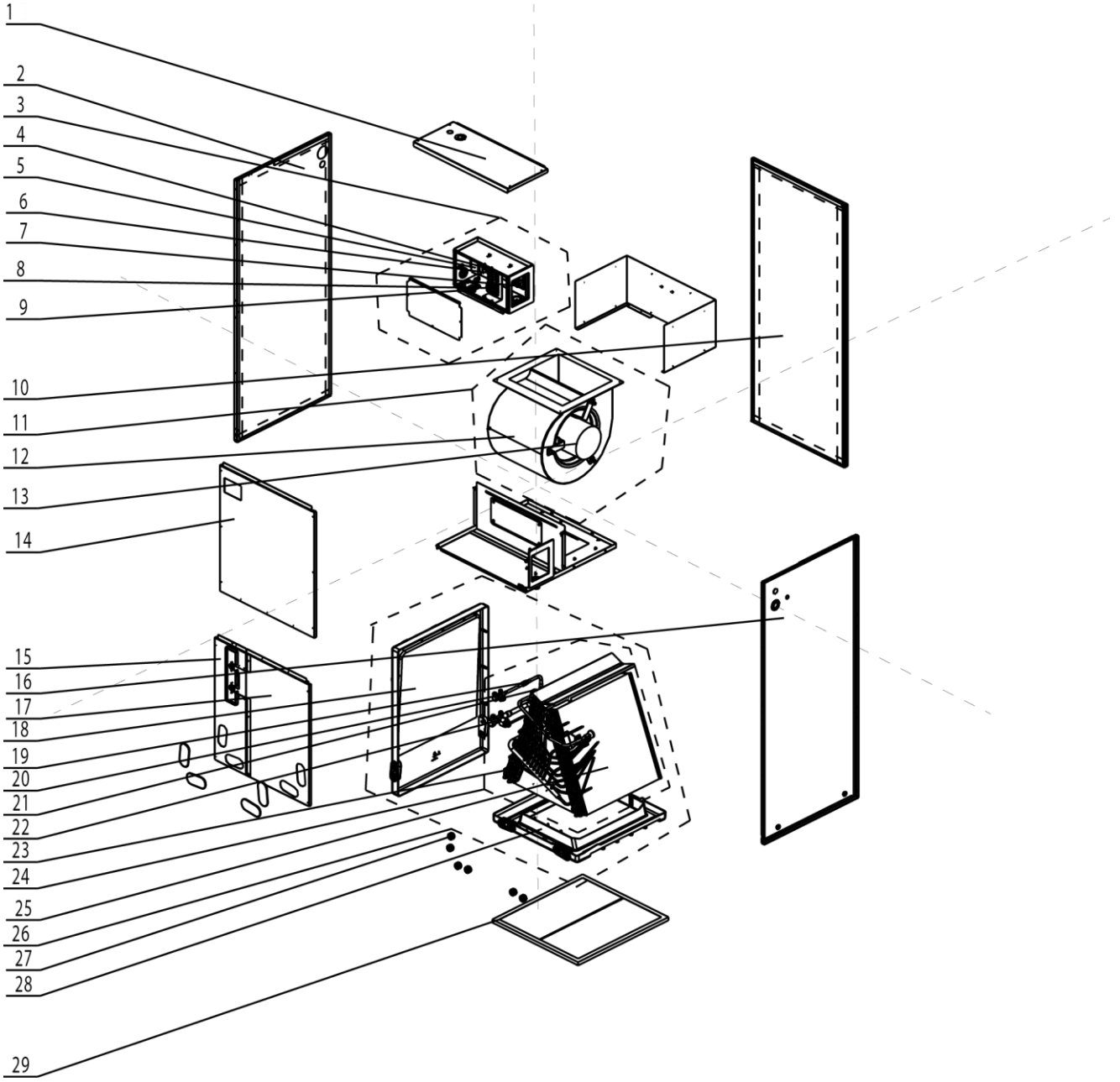
VRUO-4860HP-U2B(54)



No.	Description	Part Number
1	Top Cover	01265356P03
2	Electric Box Assy	100002067316
3	Inductance	43120122
4	Inductance Box Sub-assy	017024060021
5	Drive Board	300078060066
6	Radiator	430034000032
7	Main Board	300027060636
8	Filter board	300020060032

9	Terminal Board	422000000015
10	Terminal Board	4201025502
11	Left Side Plate	01315366P02
12	Fan Motor	1570280000403
13	Handle	2623305301
14	Axial Flow Fan	10335008
15	Cabinet	01515204P02
16	Front Grill	01600400000601
17	4-Way Valve Assy	030152060548
18	Front Side Plate	01315364P02
19	Gas-liquid Separator Sub-Assy	0722501801
20	Pressure Protect Switch	4602000603
21	Brushless DC Motor	1570280000410
22	Pressure Protect Switch	46020007
23	Handle	2623525309
24	Compressor and Fittings	009001000266
25	Filter	07216221
26	Pressure Sensor	43004400001503
27	Electric Expand Valve Fitting	4300034501
28	Electric Expand Valve Fitting	4300034502
29	Chassis Sub-assy	000191060080
30	Cut-off Valve	07130212
31	Electromagnetic Valve	43003091
32	Magnet Coil (electromagnetic valve)	4304000488
33	Accumulator	07424100031
34	One Way Valve	07133618
35	Electronic Expansion Valve	072009060004
36	Drainage hole Cap	06813401
37	Cut off Valve	07130209
38	4 Way Valve Coil	4300040094
39	Temperature Sensor	3900028025G
40	Temperature Sensor	3900007201
41	electrical heater	7651521216
42	Electrical Heater	7651000417
43	Rear Side Plate Sub-Assy	017051060121P
44	Condenser Assy	000100060341
45	Rear Grill	0157520501
Not Shown	Drainage Joint	Need Part #

VRUI-24HP-U2B(54)
VRUI-36HP-U2B(54)
VRUI-48HP-U2B(54)
VRUI-60HP-U2B(54)



No.	Material name
1	Coping
2	Left Side Plate
3	Electric Box Assy
4	Terminal Board
5	Transformer
6	Terminal Board
7	Main Board
8	Terminal Board

9	Pinboard
10	Rear Side Plate
11	Centrifugal Fan Assy
12	Motor For Centrifugal Fan
13	Brushless DC Motor
14	Top Cover Board Sub-Assy
15	Bottom Cover Plate Assy
16	Right Side Plate
17	Bottom Cover Plate Assy
18	Water Tray
19	Strainer
20	Cut-Off Valve 3/8(N)
21	Thermal Expansion Valve
22	Cut Off Valve
23	Evaporator Assy
24	Evaporator Assy
25	Evaporator Assy
26	Water Tray Assy
27	Choke Plug
28	Water Tray
29	Filter Sub-Assy

Resistance/Temperature Lists of Temperature Sensors

Voltage List of 15 KΩ Temperature Sensors (including ODU temperature sensors)

Temperature (°C)	Temperature (°F)	Resistance (kΩ)	Voltage (V)	Temperature (°C)	Temperature (°F)	Resistance (kΩ)	Voltage (V)
-20.00	-4.00	144	0.311	71.00	159.80	2.523	2.825
-19.00	-2.20	138.1	0.323	72.00	161.60	2.439	2.838
-18.00	-0.40	128.6	0.345	73.00	163.40	2.358	2.852
-17.00	1.40	121.6	0.362	74.00	165.20	2.28	2.865
-16.00	3.20	115	0.381	75.00	167.00	2.205	2.877
-15.00	5.00	108.7	0.4	76.00	168.80	2.133	2.889
-14.00	6.80	102.9	0.42	77.00	170.60	2.064	2.901
-13.00	8.60	97.4	0.44	78.00	172.40	1.997	2.912
-12.00	10.40	92.22	0.462	79.00	174.20	1.933	2.923
-11.00	12.20	87.35	0.484	80.00	176.00	1.871	2.934
-10.00	14.00	82.75	0.506	81.00	177.80	1.811	2.945
-9.00	15.80	78.43	0.53	82.00	179.60	1.754	2.955
-8.00	17.60	74.35	0.554	83.00	181.40	1.699	2.964
-7.00	19.40	70.5	0.579	84.00	183.20	1.645	2.974
-6.00	21.20	66.88	0.605	85.00	185.00	1.594	2.983
-5.00	23.00	63.46	0.631	86.00	186.80	1.544	2.992
-4.00	24.80	60.23	0.658	87.00	188.60	1.497	3.001
-3.00	26.60	57.18	0.686	88.00	190.40	1.451	3.009
-2.00	28.40	54.31	0.714	89.00	192.20	1.408	3.017
-1.00	30.20	51.59	0.743	90.00	194.00	1.363	3.025
0.00	32.00	49.02	0.773	91.00	195.80	1.322	3.033
1.00	33.80	46.8	0.801	92.00	197.60	1.282	3.04
2.00	35.60	44.31	0.835	93.00	199.40	1.244	3.047
3.00	37.40	42.14	0.866	94.00	201.20	1.207	3.054
4.00	39.20	40.09	0.899	95.00	203.00	1.171	3.061
5.00	41.00	38.15	0.931	96.00	204.80	1.136	3.068
6.00	42.80	36.32	0.965	97.00	206.60	1.103	3.074
7.00	44.60	34.58	0.998	98.00	208.40	1.071	3.08
8.00	46.40	32.94	1.033	99.00	210.20	1.039	3.086
9.00	48.20	31.38	1.067	100.00	212.00	1.009	3.092
10.00	50.00	29.9	1.102	101.00	213.80	0.98	3.098
11.00	51.80	28.51	1.138	102.00	215.60	0.952	3.103
12.00	53.60	27.18	1.174	103.00	217.40	0.925	3.108
13.00	55.40	25.92	1.21	104.00	219.20	0.898	3.114
14.00	57.20	24.73	1.246	105.00	221.00	0.873	3.119
15.00	59.00	23.6	1.282	106.00	222.80	0.848	3.123
16.00	60.80	22.53	1.319	107.00	224.60	0.825	3.128
17.00	62.60	21.51	1.356	108.00	226.40	0.802	3.133
18.00	64.40	20.54	1.393	109.00	228.20	0.779	3.137
19.00	66.20	19.63	1.429	110.00	230.00	0.758	3.141
20.00	68.00	18.75	1.467	111.00	231.80	0.737	3.145
21.00	69.80	17.93	1.503	112.00	233.60	0.717	3.15
22.00	71.60	17.14	1.54	113.00	235.40	0.697	3.153
23.00	73.40	16.39	1.577	114.00	237.20	0.678	3.157
24.00	75.20	15.68	1.613	115.00	239.00	0.66	3.161
25.00	77.00	15	1.65	116.00	240.80	0.642	3.165
26.00	78.80	14.36	1.686	117.00	242.60	0.625	3.168
27.00	80.60	13.74	1.722	118.00	244.40	0.608	3.171

28.00	82.40	13.16	1.758	119.00	246.20	0.592	3.175
29.00	84.20	12.6	1.793	120.00	248.00	0.577	3.178
30.00	86.00	12.07	1.829	121.00	249.80	0.561	3.181
31.00	87.80	11.57	1.863	122.00	251.60	0.547	3.184
32.00	89.60	11.09	1.897	123.00	253.40	0.532	3.187
33.00	91.40	10.63	1.931	124.00	255.20	0.519	3.19
34.00	93.20	10.2	1.964	125.00	257.00	0.505	3.192
35.00	95.00	9.779	1.998	126.00	258.80	0.492	3.195
36.00	96.80	9.382	2.03	127.00	260.60	0.48	3.198
37.00	98.60	9.003	2.062	128.00	262.40	0.467	3.2
38.00	100.40	8.642	2.094	129.00	264.20	0.456	3.203
39.00	102.20	5.997	2.125	130.00	266.00	0.444	3.205
40.00	104.00			131.00	267.80	0.433	3.207
41.00	105.80	7.653	2.185	132.00	269.60	0.422	3.21
42.00	107.60	7.352	2.215	133.00	271.40	0.412	3.212
43.00	109.40	7.065	2.243	134.00	273.20	0.401	3.214
44.00	111.20	6.791	2.272	135.00	275.00	0.391	3.216
45.00	113.00	6.529	2.299	136.00	276.80	0.382	3.218
46.00	114.80	6.278	2.326	137.00	278.60	0.372	3.22
47.00	116.60	6.038	2.353	138.00	280.40	0.363	3.222
48.00	118.40	5.809	2.379	139.00	282.20	0.355	3.224
49.00	120.20	5.589	2.404	140.00	284.00	0.346	3.226
50.00	122.00	5.379	2.429	141.00	285.80	0.338	3.227
51.00	123.80	5.179	2.453	142.00	287.60	0.33	3.229
52.00	125.60	4.986	2.477	143.00	289.40	0.322	3.231
53.00	127.40	4.802	2.5	144.00	291.20	0.314	3.232
54.00	129.20	4.625	2.522	145.00	293.00	0.307	3.234
55.00	131.00	4.456	2.544	146.00	294.80	0.299	3.235
56.00	132.80	4.294	2.566	147.00	296.60	0.292	3.237
57.00	134.60	4.139	2.586	148.00	298.40	0.286	3.238
58.00	136.40	3.99	2.607	149.00	300.20	0.279	3.24
59.00	138.20	3.848	2.626	150.00	302.00	0.273	3.241
60.00	140.00	3.711	2.646	151.00	303.80	0.266	3.242
61.00	141.80	3.579	2.664	152.00	305.60	0.261	3.244
62.00	143.60	3.454	2.682	153.00	307.40	0.254	3.245
63.00	145.40	3.333	2.7	154.00	309.20	0.248	3.246
64.00	147.20	3.217	2.717	155.00	311.00	0.243	3.247
65.00	149.00	3.105	2.734	156.00	312.80	0.237	3.249
66.00	150.80	2.998	2.75	157.00	314.60	0.232	3.25
67.00	152.60	2.898	2.766	158.00	316.40	0.227	3.251
68.00	154.40	2.797	2.781	159.00	318.20	0.222	3.252
69.00	156.20	2.702	2.796	160.00	320.00	0.217	3.253
70.00	158.00	2.611	2.811				

Voltage List of 20 KΩ Pipeline Temperature Sensors
(including temperature sensors for defroster, IDU and ODU pipes)

Temperature (°C)	Temperature (°F)	Resistance (kΩ)	Voltage (V)	Temperature (°C)	Temperature (°F)	Resistance (kΩ)	Voltage (V)
-30.00	-22.00	361.8	0.173	66.00	150.80	3.998	2.75
-29.00	-20.20	339.8	0.183	67.00	152.60	3.861	2.766
-28.00	-18.40	319.2	0.195	68.00	154.40	3.729	2.781
-27.00	-16.60	300	0.206	69.00	156.20	3.603	2.796
-26.00	-14.80	282.2	0.218	70.00	158.00	3.481	2.811
-25.00	-13.00	265.5	0.231	71.00	159.80	3.364	2.825
-24.00	-11.20	249.9	0.245	72.00	161.60	3.252	2.838
-23.00	-9.40	235.3	0.259	73.00	163.40	3.144	2.852
-22.00	-7.60	221.6	0.273	74.00	165.20	3.04	2.865
-21.00	-5.80	208.9	0.288	75.00	167.00	2.94	2.877
-20.00	-4.00	196.9	0.304	76.00	168.80	2.844	2.889
-19.00	-2.20	181.4	0.328	77.00	170.60	2.752	2.901
-18.00	-0.40	171.4	0.345	78.00	172.40	2.663	2.912
-17.00	1.40	162.1	0.362	79.00	174.20	2.577	2.923
-16.00	3.20	153.3	0.381	80.00	176.00	2.495	2.934
-15.00	5.00	145	0.4	81.00	177.80	2.415	2.944
-14.00	6.80	137.2	0.42	82.00	179.60	2.339	2.954
-13.00	8.60	129.9	0.44	83.00	181.40	2.265	2.964
-12.00	10.40	123	0.462	84.00	183.20	2.194	2.974
-11.00	12.20	116.5	0.484	85.00	185.00	2.125	2.983
-10.00	14.00	110.3	0.507	86.00	186.80	2.059	2.992
-9.00	15.80	104.6	0.53	87.00	188.60	1.996	3.001
-8.00	17.60	99.13	0.554	88.00	190.40	1.934	3.009
-7.00	19.40	94	0.579	89.00	192.20	1.875	3.017
-6.00	21.20	89.17	0.605	90.00	194.00	1.818	3.025
-5.00	23.00	84.61	0.631	91.00	195.80	1.763	3.033
-4.00	24.80	80.31	0.658	92.00	197.60	1.71	3.04
-3.00	26.60	76.24	0.686	93.00	199.40	1.658	3.047
-2.00	28.40	72.41	0.714	94.00	201.20	1.609	3.054
-1.00	30.20	68.79	0.743	95.00	203.00	1.561	3.061
0.00	32.00	65.37	0.773	96.00	204.80	1.515	3.068
1.00	33.80	62.13	0.804	97.00	206.60	1.47	3.074
2.00	35.60	59.08	0.835	98.00	208.40	1.427	3.08
3.00	37.40	56.19	0.866	99.00	210.20	1.386	3.086
4.00	39.20	53.46	0.898	100.00	212.00	1.346	3.092
5.00	41.00	50.87	0.931	101.00	213.80	1.307	3.098
6.00	42.80	48.42	0.965	102.00	215.60	1.269	3.103
7.00	44.60	46.11	0.998	103.00	217.40	1.233	3.108
8.00	46.40	43.92	1.033	104.00	219.20	1.198	3.114
9.00	48.20	41.84	1.067	105.00	221.00	1.164	3.119
10.00	50.00	39.87	1.102	106.00	222.80	1.131	3.123
11.00	51.80	38.01	1.138	107.00	224.60	1.099	3.128
12.00	53.60	36.24	1.174	108.00	226.40	1.069	3.133
13.00	55.40	34.57	1.209	109.00	228.20	1.039	3.137
14.00	57.20	32.98	1.246	110.00	230.00	1.01	3.141
15.00	59.00	31.47	1.282	111.00	231.80	0.9825	3.145

16.00	60.80	30.04	1.319	112.00	233.60	0.9556	3.15
17.00	62.60	28.68	1.356	113.00	235.40	0.9295	3.153
18.00	64.40	27.39	1.393	114.00	237.20	0.9043	3.157
19.00	66.20	26.17	1.429	115.00	239.00	0.8799	3.161
20.00	68.00	25.01	1.466	116.00	240.80	0.8562	3.165
21.00	69.80	23.9	1.503	117.00	242.60	0.8333	3.168
22.00	71.60	22.85	1.54	118.00	244.40	0.8111	3.171
23.00	73.40	21.85	1.577	119.00	246.20	0.7895	3.175
24.00	75.20	20.9	1.614	120.00	248.00	0.7687	3.178
25.00	77.00	20	1.65	121.00	249.80	0.7485	3.181
26.00	78.80	19.14	1.686	122.00	251.60	0.7289	3.184
27.00	80.60	18.32	1.722	123.00	253.40	0.7099	3.187
28.00	82.40	17.55	1.758	124.00	255.20	0.6915	3.19
29.00	84.20	16.8	1.793	125.00	257.00	0.6736	3.192
30.00	86.00	16.1	1.828	126.00	258.80	0.6563	3.195
31.00	87.80	15.43	1.863	127.00	260.60	0.6395	3.198
32.00	89.60	14.79	1.897	128.00	262.40	0.6232	3.2
33.00	91.40	14.18	1.931	129.00	264.20	0.6074	3.203
34.00	93.20	13.59	1.965	130.00	266.00	0.5921	3.205
35.00	95.00	13.04	1.998	131.00	267.80	0.5772	3.207
36.00	96.80	12.51	2.03	132.00	269.60	0.5627	3.21
37.00	98.60	12	2.063	133.00	271.40	0.5487	3.212
38.00	100.40	11.52	2.094	134.00	273.20	0.5351	3.214
39.00	102.20	11.06	2.125	135.00	275.00	0.5219	3.216
40.00	104.00	10.62	2.155	136.00	276.80	0.509	3.218
41.00	105.80	10.2	2.185	137.00	278.60	0.4966	3.22
42.00	107.60	9.803	2.215	138.00	280.40	0.4845	3.222
43.00	109.40	9.42	2.243	139.00	282.20	0.4727	3.224
44.00	111.20	9.054	2.272	140.00	284.00	0.4613	3.226
45.00	113.00	8.705	2.299	141.00	285.80	0.4502	3.227
46.00	114.80	8.37	2.326	142.00	287.60	0.4394	3.229
47.00	116.60	8.051	2.353	143.00	289.40	0.4289	3.231
48.00	118.40	7.745	2.379	144.00	291.20	0.4187	3.232
49.00	120.20	7.453	2.404	145.00	293.00	0.4088	3.234
50.00	122.00	7.173	2.429	146.00	294.80	0.3992	3.235
51.00	123.80	6.905	2.453	147.00	296.60	0.3899	3.237
52.00	125.60	6.648	2.477	148.00	298.40	0.3808	3.238
53.00	127.40	6.403	2.5	149.00	300.20	0.3719	3.24
54.00	129.20	6.167	2.522	150.00	302.00	0.3633	3.241
55.00	131.00	5.942	2.544	151.00	303.80	0.3549	3.242
56.00	132.80	5.726	2.565	152.00	305.60	0.3468	3.244
57.00	134.60	5.519	2.586	153.00	307.40	0.3389	3.245
58.00	136.40	5.32	2.607	154.00	309.20	0.3312	3.246
59.00	138.20	5.13	2.626	155.00	311.00	0.3237	3.247
60.00	140.00	4.948	2.646	156.00	312.80	0.3164	3.249
61.00	141.80	4.773	2.664	157.00	314.60	0.3093	3.25
62.00	143.60	4.605	2.682	158.00	316.40	0.3024	3.251
63.00	145.40	4.443	2.7	159.00	318.20	0.2956	3.252
64.00	147.20	4.289	2.717	160.00	320.00	0.2891	3.253
65.00	149.00	4.14	2.734				

Voltage List of 50 KΩ Discharge Temperature Sensors
(including discharge air temperature sensor)

Temperature (°C)	Temperature (°F)	Resistance (kΩ)	Voltage (V)	Temperature (°C)	Temperature (°F)	Resistance (kΩ)	Voltage (V)
-30.00	-22.00	911.56	0.036	61.00	141.80	11.736	1.518
-29.00	-20.20	853.66	0.038	62.00	143.60	11.322	1.548
-28.00	-18.40	799.98	0.041	63.00	145.40	10.925	1.577
-27.00	-16.60	750.18	0.043	64.00	147.20	10.544	1.606
-26.00	-14.80	703.92	0.046	65.00	149.00	10.178	1.635
-25.00	-13.00	660.93	0.049	66.00	150.80	9.8269	1.664
-24.00	-11.20	620.94	0.052	67.00	152.60	9.4896	1.693
-23.00	-9.40	583.72	0.056	68.00	154.40	9.1655	1.722
-22.00	-7.60	549.04	0.059	69.00	156.20	8.9542	1.741
-21.00	-5.80	516.71	0.063	70.00	158.00	8.5551	1.778
-20.00	-4.00	486.55	0.066	71.00	159.80	5.9676	1.806
-19.00	-2.20	458.4	0.07	72.00	161.60	7.9913	1.834
-18.00	-0.40	432.1	0.075	73.00	163.40	7.7257	1.862
-17.00	1.40	407.51	0.079	74.00	165.20	7.4702	1.889
-16.00	3.20	384.51	0.084	75.00	167.00	7.2245	1.916
-15.00	5.00	362.99	0.088	76.00	168.80	6.9882	1.943
-14.00	6.80	342.83	0.094	77.00	170.60	6.7608	1.969
-13.00	8.60	323.94	0.099	78.00	172.40	6.542	1.995
-12.00	10.40	306.23	0.104	79.00	174.20	6.3315	2.021
-11.00	12.20	289.61	0.11	80.00	176.00	6.1288	2.046
-10.00	14.00	274.02	0.116	81.00	177.80	5.9336	2.071
-9.00	15.80	259.37	0.123	82.00	179.60	5.7457	2.096
-8.00	17.60	245.61	0.129	83.00	181.40	5.5647	2.12
-7.00	19.40	232.67	0.136	84.00	183.20	5.3903	2.144
-6.00	21.20	220.5	0.143	85.00	185.00	5.2223	2.168
-5.00	23.00	209.05	0.151	86.00	186.80	5.0605	2.191
-4.00	24.80	195.97	0.158	87.00	188.60	4.9044	2.214
-3.00	26.60	188.12	0.167	88.00	190.40	4.7541	2.237
-2.00	28.40	178.65	0.175	89.00	192.20	4.6091	2.259
-1.00	30.20	169.68	0.184	90.00	194.00	4.4693	2.281
0.00	32.00	161.02	0.193	91.00	195.80	4.3345	2.302
1.00	33.80	153	0.202	92.00	197.60	4.2044	2.323
2.00	35.60	145.42	0.212	93.00	199.40	4.0789	2.344
3.00	37.40	135.96	0.223	94.00	201.20	3.9579	2.364
4.00	39.20	131.5	0.233	95.00	203.00	3.841	2.384
5.00	41.00	126.17	0.242	96.00	204.80	3.7283	2.404
6.00	42.80	119.08	0.256	97.00	206.60	3.6194	2.423
7.00	44.60	113.37	0.267	98.00	208.40	3.5143	2.442
8.00	46.40	107.96	0.28	99.00	210.20	3.4128	2.46
9.00	48.20	102.85	0.292	100.00	212.00	3.3147	2.478
10.00	50.00	98.006	0.306	101.00	213.80	3.22	2.496
11.00	51.80	93.42	0.319	102.00	215.60	3.1285	2.514
12.00	53.60	89.075	0.333	103.00	217.40	3.0401	2.531

13.00	55.40	84.956	0.348	104.00	219.20	2.9547	2.547
14.00	57.20	81.052	0.362	105.00	221.00	2.8721	2.564
15.00	59.00	77.349	0.378	106.00	222.80	2.7922	2.58
16.00	60.80	73.896	0.393	107.00	224.60	2.715	2.595
17.00	62.60	70.503	0.41	108.00	226.40	2.6404	2.611
18.00	64.40	67.338	0.427	109.00	228.20	2.5682	2.626
19.00	66.20	64.333	0.444	110.00	230.00	2.4983	2.64
20.00	68.00	61.478	0.462	111.00	231.80	2.4308	2.655
21.00	69.80	58.766	0.48	112.00	233.60	2.3654	2.669
22.00	71.60	56.189	0.499	113.00	235.40	2.3021	2.682
23.00	73.40	53.738	0.518	114.00	237.20	2.2409	2.696
24.00	75.20	51.408	0.537	115.00	239.00	2.1816	2.709
25.00	77.00	49.191	0.558	116.00	240.80	2.1242	2.722
26.00	78.80	47.082	0.578	117.00	242.60	2.0686	2.734
27.00	80.60	45.074	0.599	118.00	244.40	2.0148	2.747
28.00	82.40	43.163	0.621	119.00	246.20	1.9626	2.759
29.00	84.20	41.313	0.643	120.00	248.00	1.9123	2.77
30.00	86.00	39.61	0.665	121.00	249.80	1.8652	2.781
31.00	87.80	37.958	0.688	122.00	251.60	1.8158	2.793
32.00	89.60	36.384	0.711	123.00	253.40	1.7698	2.804
33.00	91.40	34.883	0.735	124.00	255.20	1.7253	2.814
34.00	93.20	33.453	0.759	125.00	257.00	1.6821	2.825
35.00	95.00	32.088	0.784	126.00	258.80	1.6402	2.835
36.00	96.80	30.787	0.809	127.00	260.60	1.5996	2.845
37.00	98.60	29.544	0.835	128.00	262.40	1.5602	2.855
38.00	100.40	28.359	0.86	129.00	264.20	1.522	2.864
39.00	102.20	27.227	0.886	130.00	266.00	1.485	2.873
40.00	104.00	26.147	0.913	131.00	267.80	1.449	2.882
41.00	105.80	25.114	0.94	132.00	269.60	1.4141	2.891
42.00	107.60	24.128	0.967	133.00	271.40	1.3803	2.9
43.00	109.40	23.186	0.994	134.00	273.20	1.3474	2.908
44.00	111.20	22.286	1.022	135.00	275.00	1.3155	2.916
45.00	113.00	21.425	1.05	136.00	276.80	1.2846	2.924
46.00	114.80	20.601	1.078	137.00	278.60	1.2545	2.932
47.00	116.60	19.814	1.107	138.00	280.40	1.2233	2.94
48.00	118.40	19.061	1.136	139.00	282.20	1.1969	2.947
49.00	120.20	18.34	1.164	140.00	284.00	1.1694	2.955
50.00	122.00	17.651	1.193	141.00	285.80	1.1476	2.96
51.00	123.80	16.99	1.223	142.00	287.60	1.1166	2.969
52.00	125.60	16.358	1.252	143.00	289.40	1.0913	2.975
53.00	127.40	15.753	1.281	144.00	291.20	1.0667	2.982
54.00	129.20	15.173	1.311	145.00	293.00	1.0429	2.988
55.00	131.00	14.618	1.34	146.00	294.80	1.0197	2.995
56.00	132.80	14.085	1.37	147.00	296.60	0.9971	3.001
57.00	134.60	13.575	1.4	148.00	298.40	0.9752	3.007
58.00	136.40	13.086	1.429	149.00	300.20	0.9538	3.013
59.00	138.20	12.617	1.459	150.00	302.00	0.9331	3.018
60.00	140.00	12.368	1.475	-		-	-

2 Temperature/Pressure List of Refrigerant

Temperature	Pressure		Temperature	Pressure		Temperature	Pressure
(°F)	kPa		(°F)	kPa		(°F)	kPa
-22.00	275		32.00	803		86.00	1880
-20.20	286		33.80	823		87.80	1910
-18.40	298		35.60	851		89.60	1960
-16.60	311		37.40	879		91.40	2030
-14.80	324		39.20	903		93.20	2080
-13.00	334		41.00	937		95.00	2130
-11.20	348		42.80	962		96.80	2180
-9.40	363		44.60	994		98.60	2240
-7.60	375		46.40	1020		100.40	2290
-5.80	391		48.20	1050		102.20	2350
-4.00	404		50.00	1090		104.00	2410
-2.20	424		51.80	1110		105.80	2460
-0.40	435		53.60	1150		107.60	2510
1.40	453		55.40	1180		109.40	2580
3.20	468		57.20	1220		111.20	2650
5.00	483		59.00	1250		113.00	2710
6.80	504		60.80	1280		114.80	2770
8.60	520		62.60	1320		116.60	2840
10.40	538		64.40	1350		118.40	2910
12.20	556		66.20	1400		120.20	2980
14.00	579		68.00	1440		122.00	3050
15.80	598		69.80	1470		123.80	3100
17.60	618		71.60	1520		125.60	3180
19.40	639		73.40	1560		127.40	3250
21.20	660		75.20	1600		129.20	3320
23.00	682		77.00	1640		131.00	3400
24.80	705		78.80	1680		132.80	3480
26.60	728		80.60	1730		134.60	3540
28.40	752		82.40	1780		136.40	3630
30.20	777		84.20	1820		138.20	3720

Operation Tools

The following tools will be used:

1. Liquid-level gauge
2. Screwdriver
3. Electric driven rotary hammer
4. Drill
5. Pipe expander
6. Torque wrench
7. Open-end wrench
8. Pipe cutter
9. Leak detector
10. Vacuum pump
11. Pressure gauge;
12. Universal meter;
13. Hexagon wrench
14. Tapeline.

USER NOTES AND INSTALLATION/SERVICE/MAINTENANCE NOTES

Installation Company: _____

Technician Name: _____

Phone: _____

Email: _____

INSTALLATION NOTES

Please record any questions or problems you have experienced as a unit history:

No.	Date	Notes	Asked Your Technician for Help?	Asked YMGI Tech. contacted for help?

USER NOTES

Please record any questions or problems you have experienced as a unit history:

No.	Date	Company Name, Technician Name, Phone & HVAC License #	Job Not Performed by Technician	Technician Checklist Completed Fully?

SERVICE / MAINTENANCE NOTES

No.	Date	Type of Service / Maintenance	Company Name, Technician Name, Phone & HVAC License #



YMGI is dedicated to designing, manufacturing and distributing the highest quality, energy saving and environmentally friendly air conditioner and heat pump products, while providing the best service and support to all of our customers. Our mission is to help build a sustainable, efficient and green world.

YMGI Symphony-Ductless & Ducted Heat Pump & Heat Recovery:

- **Symphony SOLAR DC Inverter**
  (56) Single PV, (79) Single PH 12-18K Btu/h
  (86) Single Zone All DC 09-24K Btu/h
  (55) Multi Zone Solar VRF 3, 4, 8, 16, and 24 Ton.
- **Symphony SOLO DC Inverter**
  (57)2,3 Single Zone 16 SEER, 09-36K Btu/h
  (58)4, (78)1-Single Zone 18-23 SEER, 09-36K Btu/h
- **Symphony CHOIR DC Inverter**
  (46)2 DC Inverter Multiple Zone 15 SEER, 2x09K and 2x12K Btu/h
  (59)2S-DC Inverter Multiple Zone 16 SEER 6x09K to 9x09K Btu/h
  (59)4-DC Inverter Multiple Zone 21 SEER 2x09K to 5x12K Btu/h
- **Symphony VRF - DC Inverter HP, Heat Recovery, and Solar. Up to 64 zones.**
- **Symphony HARMONY-Packaged Self-Contained**
  42”x16” PTAC/PTHP Electric Heater or Hot Water Coil, and VPAK
- **Symphony CONDUCTOR-Split Type Condensing Units**
  Side Discharge VRUI & VRUO

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