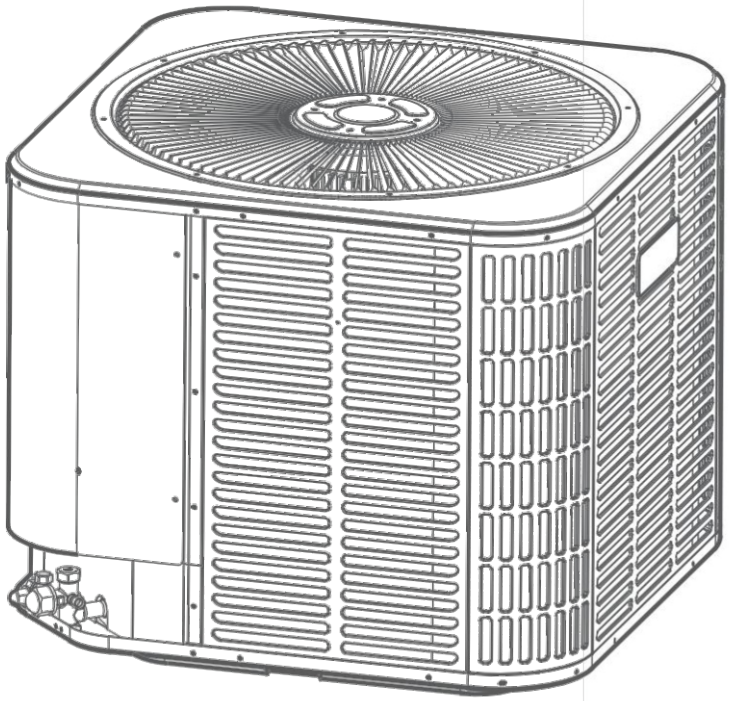
KOIT SERIES

Variable Speed Top Discharge Heat Pump Condensing Unit (R454B)

Installation & User's Manual

2 Ton (24,000 BTU/h) - 5 Ton (60,000 BTU/h)



Models Covered:

KOIT24H2-41G
KOIT36H2-41G
KOIT48H2-41G
KOIT60H2-41G

KLIMAIRE®
Mark of Superior Quality

IMPORTANT NOTE:
Read this manual carefully before installing or operating your new air conditioning unit.
Be sure to keep this manual for future reference.
For more information, please visit www.klimaire.com

SCAN ME!

Scan the QR code to visit our Help Center for installation guides, manuals, videos and more.

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I1IT2511

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What´s Included

The KOIT outdoor condensing unit is supplied with the following installation items.
Use all included parts during installation to ensure proper system performance and to prevent leaks or damage.

1x	Liquid-line copper adapter (brazed-to-flare)
1x	Suction-line copper adapter (brazed-to-flare)
1x	Bidirectional liquid-line filter drier
1x	Installation & User’s Manual
1x	Warranty card

1. Safety Precautions

Read and Understand All Safety Precautions Prior to Installation. Improper installation, adjustment, or servicing due to negligence of these instructions may result in **death, serious injury, or property damage.** The level of potential risk is classified and indicated by the following symbols.

⊘ DANGER

This symbol indicates an action that must never be attempted may result in death or serious injury.

⚠ WARNING

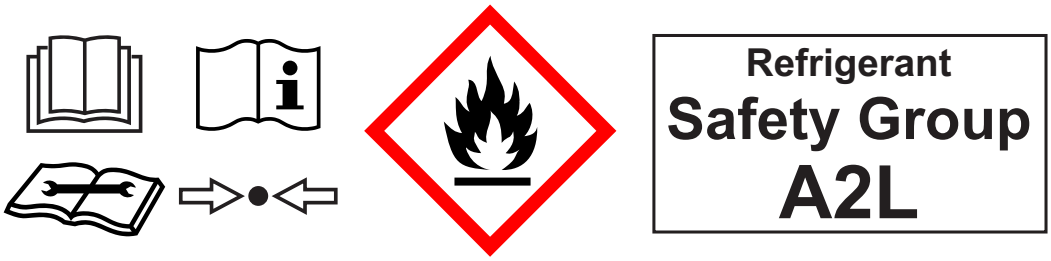
This symbol indicates that ignoring the related instructions **may cause death or serious injury.**

❗ CAUTION

This symbol indicates that ignoring the related instructions **may cause minor or moderate injury** or result in **damage to the appliance or property.**

ⓘ NOTICE

This symbol indicates that the instruction provides **important information** to ensure correct installation, operation, and maintenance of the unit.



⚠ CAUTION

Risk of fire
This unit a mildy flamable (A2L) refrigerant. See A2L refrigerant safety considerations to ensure safe installetion, operation, and servicing of unit.

* The design and specifications are subject to change without prior notice for product improvement. Consult with the sales agency or manufacturer for details.
* The shape and position of buttons and indicators may vary according to the model, but their function are the same.

1. Safety Precautions

⚠ WARNING

SAFETY AND INSTALLATION REQUIREMENTS

1. Only qualified and certified personnel licensed to handle refrigerant fluids are permitted to install this unit. All installations must comply with applicable local, state, and national regulations.
2. Installation, servicing, maintenance, and repairs must be performed exclusively by a certified HVAC technician.
3. Service procedures should be carried out only as recommended by the manufacturer.
4. Product uninstallation and recycling must also be performed by certified personnel in accordance with environmental regulations.
5. This appliance is designed for outdoor operation. If indoor installation or storage is required, it must be placed in a room free from continuously operating open flames (e.g., gas appliances) and free from ignition sources (e.g., electric heaters).
6. Children aged 8 and above, and individuals with limited physical, sensory, or mental capabilities, must only operate the appliance under supervision or after proper instruction.
7. Children must not play with or near the appliance, and they or untrained persons must not clean or perform maintenance unless supervised.
8. Install the appliance in strict accordance with national wiring and electrical safety regulations.
9. Disconnect all power circuits before accessing electrical terminals or components.
10. This information is intended for individuals with adequate electrical, mechanical, and HVAC training. Attempting to repair central air-conditioning equipment without proper qualifications may result in serious personal injury and/or property damage.

⚠ WARNING

REFRIGERANT & OIL SAFETY

Servicing central air-conditioning equipment may cause **property damage, serious injury, or death.**
This system uses **R-454B refrigerant**, which operates at pressures **50–70% higher than R-22**.
Use **only service tools and equipment approved for R-454B.**

- R-454B cylinders are painted **rose** and may include a **dip tube** for liquid charging.
- The system contains **POE oil (VG74, VG75, or equivalent)**, which is **highly hygroscopic** and quickly absorbs moisture.
- Keep the system **sealed** at all times.
- If exposed to air for more than **4 hours, replace the compressor oil**.
- **Do not break a vacuum with air.**
- **Always replace the filter drier** when the system is opened or components are replaced.

1. Safety Precautions

⚠ WARNING

DANGEROUS VOLTAGE

- Failure to follow this warning may result in property damage, serious personal injury, or death.
- High voltage can cause severe injury or death. Disconnect all remote electrical power supplies before servicing the equipment.
- Always follow approved lockout/tagout (LOTO) procedures to ensure that power cannot be energized accidentally during installation, maintenance, or repair.

HOT SURFACE

- Contact with hot components may cause mild to severe burns.
- Failure to observe this warning may result in property damage or personal injury.
- Do not touch the top of the compressor or adjacent high-temperature components.

SERVICE VALVE SAFETY

Failure to observe this warning may result in the release of high system pressure, causing personal injury or property damage.

- Use extreme caution when opening the liquid line service valve.
- Turn the valve stem counterclockwise only until it contacts the internal stop (bead).
- Do not force the valve beyond its designed limit.

BRAZING REQUIRED

Failure to verify wiring connections or use the proper maintenance tools may result in equipment damage or personal injury.

- When using existing refrigerant lines, ensure all joints are brazed using approved methods.
- Do not solder refrigerant lines. Soldered joints cannot withstand system pressures and may fail.

HIGH CURRENT LEAKAGE

Failure to follow this warning may result in property damage, serious personal injury, or death.

- Before connecting the power supply, proper grounding is mandatory.
- Verify that all grounding conductors, straps, and bonding points are secure and compliant with electrical codes.

CHEMICAL EXPOSURE (CALIFORNIA PROPOSITION 65)

- This product may expose individuals to lead and lead compounds, chemicals known to the State of California to cause cancer, birth defects, or other reproductive harm.
- For more information, visit: www.P65Warnings.ca.gov

WARNING — GENERAL SAFETY PRECAUTIONS

- Do not use any alternative methods to accelerate defrosting or cleaning other than those specifically recommended by the manufacturer.
- This appliance is designed for outdoor operation. If indoor installation or storage is required, place the unit in a room free from continuously operating open flames (such as gas appliances) and free from ignition sources (such as electric heaters).
- Do not pierce or burn any component of the appliance.
- Be aware that refrigerants may be odorless; leaks may not be detectable without proper instruments.

1. Safety Precautions

CAUTION

Contains Refrigerant

- Failure to follow proper procedures may result in personal illness, injury, or serious equipment damage.
- This system contains high-pressure refrigerant and oil.
- Before opening or servicing the system, ensure the refrigerant is fully recovered to relieve internal pressure.

NOTICE

1. This air conditioner contains fluorinated greenhouse gases. Refer to the nameplate for type and quantity.
2. Only qualified and trained technicians may install, service, or maintain this unit.
3. When inspecting for refrigerant leaks, document and record results accurately.
4. Installation must follow all manufacturer guidelines.
5. Use only specified accessories to avoid malfunction
6. End-of-life removal must be performed by certified technicians using authorized recycling facilities.
7. Do not use any alternative methods to accelerate defrosting or cleaning other than those specifically recommended by the manufacturer.
8. This appliance is intended for outdoor operation. If indoor installation or storage is required, place the unit in a room without continuously operating open flames (such as gas appliances) and without ignition sources (such as electric heaters).
9. Do not pierce or burn any refrigerant-containing components.
10. Be aware that refrigerants may be odorless, meaning leaks may not be detectable without proper equipment.

INDOOR UNIT REQUIRED

If a different-brand indoor unit is used, it must still be fully compatible with the KOIT outdoor unit's capacity, refrigerant type (R454B), and TXV requirements. Improper matching may result in reduced performance, higher energy consumption, or system malfunction.

- The indoor unit must be properly matched with the correct thermal expansion valve (TXV).
- The TXV model must be selected according to the system's capacity to ensure proper operation and performance.

KLIMAIRE MATCHED SYSTEMS RECOMMENDED

- The manufacturer recommends installing only approved, properly matched Klimaire indoor and outdoor units.
- All manufacturer split systems are AHRI-rated only when paired with TXV-equipped indoor units.
- Using approved matched systems ensures **maximum efficiency, optimal performance, and superior overall system reliability.**
- For best results, always install matched indoor and outdoor components as specified by the manufacturer.

GROUNDING REQUIRED

Failure to use the correct maintenance tools or follow proper procedures may result in equipment damage or personal injury.

- Ensure all grounding devices are reconnected after servicing.
- Verify that every component capable of conducting electrical current is properly grounded.
- If any grounding wire, screw, strap, clip, nut, or washer is removed during maintenance, it must be reinstalled and securely fastened to restore the grounding path.

2. Installation Safety Guidelines (R454B / A2L)

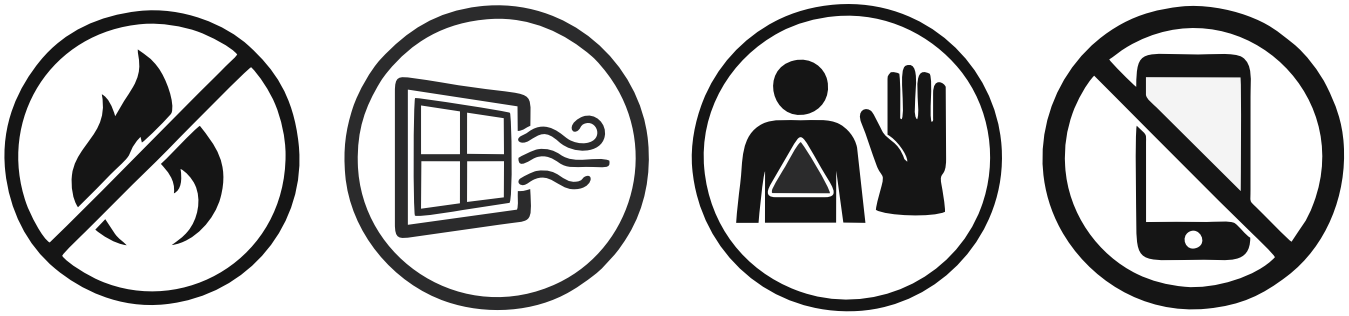
Installation Safety Principles

1. Site Safety

- Open flames are prohibited in the installation area.
- Maintain ventilation at all times during installation and service.
- Keep the work area free of oil and debris that could ignite.

2. Operation Safety

- Wear protective clothing and anti-static gloves.
- Do not use mobile phones or other electronic devices near refrigerant piping.



Open Flames Prohibited | **Ventilation Necessary** | **Wear Protective Clothing / Anti-Static Gloves** | **Do Not Use Mobile Phone**

3. Installation Safety

- Use a **Refrigerant Leak Detector** designed for A2L (R32) refrigerants.
- Select an **appropriate installation location** meeting all safety distances.

Please note:

1. **The installation site must be well-ventilated** to ensure adequate air circulation and safe operation of the equipment.
2. Installation or maintenance shall be performed in areas free from open flames, welding operations, smoking, drying ovens, or any heat sources exceeding **1018°F (550°C)** that could ignite a fire.
3. When installing an air conditioner using refrigerant R454B, **anti-static precautions** must be taken, such as wearing anti-static clothing and gloves.
4. Choose an installation site where the **air inlets and outlets of both the indoor and outdoor unit's are unobstructed**, away from combustible materials and easily accessible for maintenance.
5. If a refrigerant leak occurs during installation, immediately close the outdoor unit's service valve. Allow the refrigerant to fully disperse before re-entering. Any damaged product must be returned to the authorized service center. **Welding of refrigerant pipes or other repair attempts on the user's site are strictly prohibited.**
6. Avoid installing the indoor unit directly above electrical devices, power outlets, kitchen cabinets, beds, sofas, or other valuable items, or where piping runs along either side of such areas.

2. Installation Safety Guidelines (R454B / A2L)

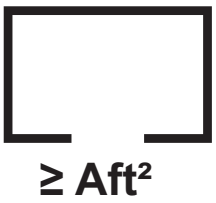
Suggested Tools

Tool	Picture	Tool	Picture	Tool	Picture
Standard Wrench		Pipe Cutter		Vacuum Pump	
Adjustable/ Crescent Wrench		Screw drivers (Phillips & Flat blade)		Safety Glasses	
Torque Wrench		Manifold and Gauges		Anti-static Gloves	
Hex Keys or Allen Wrenches		Level		Refrigerant Scale	
Drill & Drill Bits		Flaring tool		Micron Gauge	
Hole Saw		Clamp on Amp Meter		Welding Gun	

All tools must be clean, dry, and approved for R454B (A2L) use.

3. Safety Guidelines for A2L Refrigerants (R454B)

A2L



Safety Information for A2L Refrigerants

Because this unit contains **R454B (A2L)** refrigerant, it must be installed, operated, and serviced with extreme care. R454B is a **mildly flammable refrigerant** — any improper handling, open flame, or lack of ventilation can create serious fire or explosion hazards. Always follow this manual and comply with **all federal, national, and local codes** regarding flammable refrigerants.

⚠ WARNING

- This appliance contains R454B (A2L), a mildly flammable refrigerant. Improper handling can cause fire, explosion, serious injury, or death.
- The appliance must be installed, operated, and stored in a room **free from open flames or continuous ignition sources** (e.g., gas stoves, heaters, or electric heaters).
- **Never use open flames or halide torches to detect leaks.**
- **Disconnect all power** before opening service panels or performing electrical or refrigerant work.
- Always keep a **dry-powder or CO_2 fire extinguisher** accessible near the work area.
- **Do not pierce, weld, burn, or heat** sealed components or piping.
- **Do not accelerate the defrosting process** or apply external heat sources except as approved by the manufacturer.
- Do not vent refrigerant to the atmosphere; follow all EPA and local regulations.
- Be aware that **R454B may be odorless** — leaks may not be easily detectable.
- Only **qualified technicians** trained to handle A2L refrigerants may install, service, or decommission this appliance.
- Clearly **label all equipment and cylinders** to indicate A2L refrigerant content.
- R454B is **heavier than air** and can accumulate in low areas, creating ignition or suffocation hazards.
- If a leak is suspected, **turn off power, extinguish flames, evacuate personnel, and ventilate the area immediately.**

3. Safety Guidelines for A2L Refrigerants (R454B)

CAUTION

- Use only A2L-rated tools, leak detectors, hoses, and service equipment when working on the refrigerant circuit.
- Confirm earth-bond continuity before re-energizing the system.
- Discharge all capacitors before touching electrical or control circuits.
- Replace — never repair — sealed or safety-critical electrical components.
- Maintain correct breaker configuration and voltage polarity before restoring power.
- Ensure adequate ventilation around the outdoor unit during servicing to prevent the accumulation of flammable vapors.
- Keep all wiring secured away from sharp edges, moving components, and hot surfaces.
- Do not use compressed air or oxygen for leak testing or pressurizing the system — use Oxygen-Free Nitrogen (OFN)only.
- Use only tools and instruments that are intrinsically safe and non-sparking.
- Maintain clear airflow around the condenser and service area throughout the work process.
- Ensure all service valves and access ports are properly tightened and leak-tested after servicing.
- Verify that all panels, covers, and protective guards are reinstalled before system startup.

Information for Servicing (R454B)

1. **Check the information in this manual**
   - Determine the required installation space for the device, including the minimum clearances from adjacent structures.
2. **Protect pipework from damage**
   - Pipework must be protected from physical damage and must not be installed in an unventilated space smaller than 13 ft^3 (4 m^3).
3. **Compliance with regulations**
   - Compliance with national gas regulations must be observed.
4. **Accessibility for maintenance**
   - Mechanical connections must be accessible for maintenance purposes.
5. **Follow the instructions in this manual**
   - All instructions for handling, installing, cleaning, maintaining, and disposing of the refrigerant must be followed.
6. **Ventilation openings**
   - Ensure that all ventilation openings are kept clear of obstructions.
7. **Servicing must follow manufacturer guidelines**
   - Servicing must be performed only as recommended by the manufacturer.
8. **No open flames or ignition sources**
   - The appliance must be stored in a room without continuously operating open flames (e.g., operating gas appliances) or ignition sources (e.g., operating electric heaters).
9. **Certification for refrigerant work**
   - Anyone working on a refrigerant circuit must hold a valid and up-to-date certificate issued by an industry-accredited authority confirming competence in handling refrigerants.
   - Service operations must follow manufacturer recommendations.
   - Repairs requiring additional personnel must be supervised by someone competent in the use of flammable refrigerants.

3. Safety Guidelines for A2L Refrigerants (R454B)

Information for Servicing (R454B)

10. Competent personnel only

Any working procedure that affects safety devices or safety-related components must be carried out only by competent personnel.

11. Checks to the Area

A) Prior to beginning work on systems containing flammable refrigerants

- Safety checks are necessary to ensure that the risk of ignition is minimized.
- For repair to the refrigerating system, the following precautions shall be complied with prior to conducting work on the system.

B) Work procedure

- Work shall be undertaken under a controlled procedure to minimize the risk of a flammable gas or vapor being present while the work is being performed.

C) General work area

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

D) Checking for the Presence of Refrigerant

- The area must be checked with an appropriate refrigerant detector before and during work to ensure the technician is aware of any potentially flammable atmosphere.
- Ensure that the leak detection equipment used is suitable for flammable refrigerants — it must be non-sparking, adequately sealed, or intrinsically safe.

E) Presence of Fire Extinguisher

- If any hot work is to be performed on the refrigeration equipment or associated components, suitable fire extinguishing equipment must be readily available.
- Keep a dry powder or CO_2 fire extinguisher adjacent to the charging area.

F) No Ignition Sources

- No person carrying out work on a refrigeration system that involves exposing any pipework shall use sources of ignition in a manner that could lead to a risk of fire or explosion.
- All potential ignition sources, including smoking, must be kept well away from the area where installation, repair, removal, or disposal work is being performed — particularly when refrigerant may be released into the surrounding space.
- Before beginning any work, survey the area around the equipment to ensure that no flammable hazards or ignition risks are present.
- **No Smoking**" signs must be clearly displayed.

G) Ventilated Area

- Ensure that the work area is either outdoors or adequately ventilated before breaking into the system or performing any task that may generate heat.
- Ventilation must be maintained throughout the duration of the work.
  The ventilation system should safely disperse any released refrigerant and, if possible, discharge it to the outside atmosphere.

3. Safety Guidelines for A2L Refrigerants (R454B)

H) Checks to the Refrigeration Equipment

The refrigerant charge size complies with the room size in which the refrigerant-containing parts are installed.

- The ventilation equipment and outlets are functioning properly and are not obstructed.
- If an indirect refrigerating circuit is used, the secondary circuit must be checked for the presence of refrigerant.
- Equipment markings remain visible and legible; any damaged or illegible markings or signs must be replaced or corrected.
- Refrigeration pipes and components are installed in locations where they are not likely to be exposed to substances that could cause corrosion, unless the components are made of corrosion-resistant materials or are suitably protected against corrosion.

I) Checks to Electrical Devices

- When replacing electrical components, ensure that they meet the correct specifications and are suitable for their intended purpose.
- Repair and maintenance of electrical components must include initial safety checks and component inspection procedures.
- If a fault exists that could compromise safety, the electrical supply must not be connected to the circuit until the issue has been satisfactorily resolved.
- If the fault cannot be corrected immediately but continued operation is necessary, an adequate emporary solution may be implemented.
- This must be reported to the equipment owner to ensure that all parties are informed.

Initial safety checks must include:

Ensuring that capacitors are fully discharged in a safe manner to avoid the risk of sparking.
Confirming that no live electrical components or wiring are exposed while charging, recovering, or purging the system.
Verifying the continuity of earth bonding.

12 Repairs to Sealed Components

- Before carrying out repairs to sealed components, all electrical supplies must be disconnected from the equipment being serviced prior to removing any sealed covers or enclosures. If it is necessary to keep the electrical supply connected during servicing, a continuously operating leak detection system must be installed at the most critical location to provide an early warning of any potentially hazardous situation.

- Particular attention must be given to ensuring that any work on electrical components does not compromise the integrity or protection level of the equipment casing. This includes avoiding:
  - Damage to cables
  - Excessive numbers of connections
  - Terminals not made to the original specification
  - Damage to seals
  - Incorrect fitting of cable glands, etc.
  - Ensure that all apparatus is securely mounted

- Check that seals or sealing materials have not deteriorated to the point that they no longer prevent the ingress of flammable atmospheres.
- All replacement parts must conform to the manufacturer’s specifications.

3. Safety Guidelines for A2L Refrigerants (R454B)

NOTE:

The use of silicone sealant may reduce the effectiveness of certain types of leak detection equipment. Ensure that replacement parts are suitable for use with flammable refrigerants.

13. Repair to Intrinsically Safe Components

- Do not apply any permanent inductive or capacitive loads to the circuit without first ensuring that this will not exceed the permissible voltage and current limits for the equipment in use.
- Only intrinsically safe components may be worked on while live in the presence of a flammable atmosphere.
- Any test apparatus used must be correctly rated for the application.
- Replace components only with parts specified by the manufacturer — the use of non-approved parts may cause ignition of refrigerant vapors in the event of a leak.

14. Cabling

Check that all cabling is protected against wear, corrosion, excessive pressure, vibration, sharp edges, and any other adverse environmental conditions.
The inspection must also consider the effects of aging and continuous vibration from sources such as compressors or fans.

15. Detection of Flammable Refrigerants

- Under no circumstances should potentially sources of ignition be used to locate or detect refrigerant leaks.
- A halide torch or any other detector that uses an open flame must not be used.

16. Leak Detection Methods

The following leak detection methods are acceptable for systems containing flammable refrigerants:

- Electronic leak detectors must be used to detect flammable refrigerants; however, their sensitivity may vary and may require periodic re-calibration.
- Detection equipment must be calibrated in a refrigerant-free area.
  Ensure that the detector is not a potential source of ignition and is suitable for use with the specific refrigerant employed.
- Detection equipment must be set to detect a percentage of the refrigerant's Lower Flammable Limit (LFL) and calibrated accordingly.
  The detection threshold must not exceed 25% of the LFL.
- Leak detection fluids are generally suitable for use with most refrigerants. However, avoid detergents that contain chlorine, as chlorine may react with the refrigerant and cause corrosion of copper pipework.

If a leak is suspected, all open flames must be extinguished or removed from the area.
If a refrigerant leak requiring brazing is identified, all refrigerant must first be recovered from the system or isolated using shut-off valves in a section remote from the leak.
Oxygen-free nitrogen (OFN) must then be purged through the system both before and during the brazing process.

3. Safety Guidelines for A2L Refrigerants (R454B)

17. Removal and Evacuation

When breaking into the refrigerant circuit for repairs — or for any other purpose — standard service procedures must be followed. However, when working with flammable refrigerants, it is essential that best practices be strictly observed due to the associated fire and explosion risks.

The following procedure must be followed:

1 Safely remove the refrigerant in accordance with local and national regulations.
2 Evacuate the system.
3 Purge the circuit with inert gas (optional for A2L refrigerants).
4 Evacuate again (optional for A2L refrigerants).
5 Continuously flush or purge with inert gas when using a flame to open the circuit.
6 Open the circuit.

Additional requirements:

- Compressed air or oxygen must never be used for purging refrigerant systems.
- For appliances containing flammable refrigerants, purging should be performed by breaking the vacuum in the system with OFN, filling until working pressure is reached, venting to the atmosphere, and then pulling down to a vacuum (optional for A2L refrigerants).
  This process must be repeated until the system is confirmed free of refrigerant (optional for A2L refrigerants).
- When the final OFN charge is complete, vent the system to atmospheric pressure before commencing any work.
- The outlet of the vacuum pump must not be located near any potential ignition sources, and adequate ventilation must be provided.

18. Decommissioning

Before beginning this procedure, the technician must be fully familiar with the equipment and its details. It is considered best practice to ensure that all refrigerants are recovered safely.
Prior to starting the task, take both an oil sample and a refrigerant sample for possible analysis before any reclaimed refrigerant is reused.
It is essential that electrical power is available before commencing the procedure.

Procedure:

1. Become familiar with the equipment and its operation.
2. Electrically isolate the system.
3. Before proceeding, ensure that:
  - Mechanical handling equipment is available, if required, for moving refrigerant cylinders.
  - All personal protective equipment (PPE) is available and being used correctly.
  - The recovery process is always supervised by a competent person.
  - Recovery equipment and cylinders comply with the relevant standards.

4. Pump down the refrigerant system, if possible.
5. If a vacuum cannot be achieved, install a manifold so that refrigerant can be removed from different parts of the system.
6. Ensure that the recovery cylinder is placed on scales before the recovery process begins.
7. Start the recovery machine and operate it in accordance with the manufacturer's instructions.
8. Do not overfill recovery cylinders — the fill level must not exceed 80% of the liquid volume.
9. Do not exceed the cylinder's maximum working pressure, even temporarily.

3. Safety Guidelines for A2L Refrigerants (R454B)

10. When the cylinders have been filled correctly and the process is complete, ensure that the cylinders and associated equipment are promptly removed from the site and that all isolation valves on the system are closed.

11. Recovered refrigerant must not be charged into another refrigeration system unless it has been properly cleaned and tested.

19. Refrigerant Removal and Recovery Procedures

When removing refrigerant from a system — either for servicing or decommissioning — it is considered best practice to ensure that all refrigerants are removed safely.

When transferring refrigerant into cylinders:

- Use only approved refrigerant recovery cylinders designed for that specific refrigerant type.
- Ensure that enough cylinders are available to contain the total system charge.
- All cylinders must be clearly labeled for the recovered refrigerant and equipped with a pressure relief valve and shut-off valves in good working order.
- Empty recovery cylinders should be evacuated and, if possible, cooled before recovery begins.

20. Safety Instructions for Transportation and Storage

1. No Fire or Smoking:

- During transportation and storage, ensure that there are no open flames, ignition sources, or smoking in the vicinity of the equipment or refrigerant containers.

2. Compliance with Regulations:

- All transportation and storage activities shall be carried out in accordance with applicable local laws and regulations, including those governing the handling of flammable refrigerants.

4. Unit Location Considerations

4.1 Inspect Units

Before installation, inspect the unit and its packaging for any signs of damage:

- Check the outer carton for dents, tears, punctures, or impact marks.
- Carefully remove the packaging and inspect the unit for any visible or concealed damage.
- Verify through the service port that the refrigerant charge has been maintained during shipment.

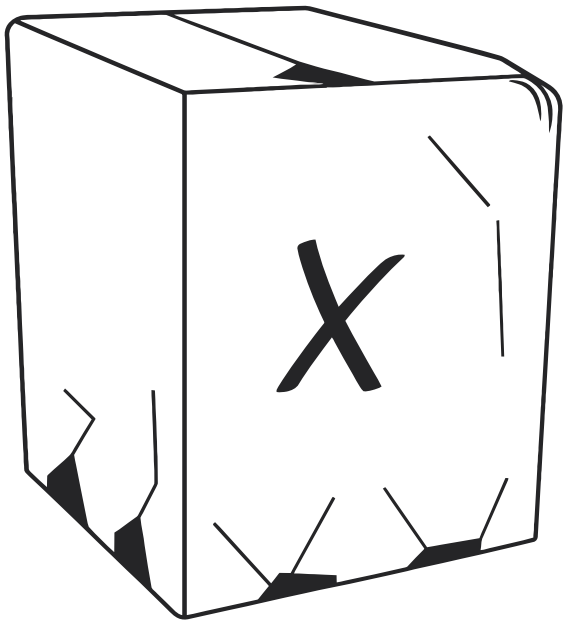


Figure 4.1 - Shipping Damage Example

Table 4.2 Unit Dimensions

The following table lists the outdoor unit dimensions for each KOIT model:

Model	H (in.)	W (in.)	D (in.)	Weight (Net/Gross) (lbs)
KOIT24H2-41G	24-15/16	29-1/8	29-1/8	137 / 159
KOIT30H2-41G	24-15/16	29-1/8	29-1/8	146 / 176
KOIT36H2-41G	33-3/16	29-1/8	29-1/8	190 / 220
KOIT48H2-41G	33-3/16	29-1/8	29-1/8	190 / 220

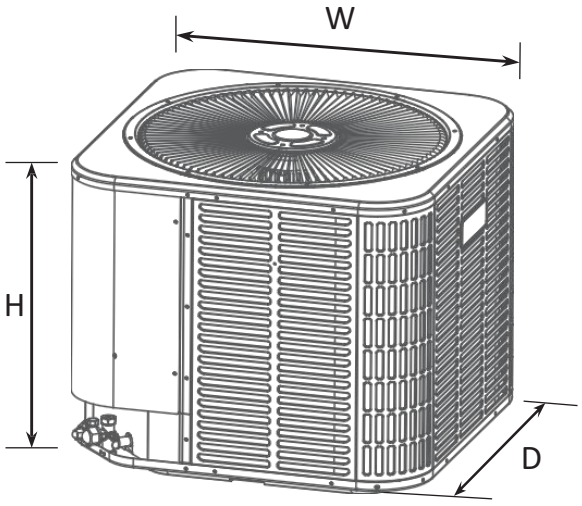


Figure 4.2 - External Unit Dimensions

NOTICE

- Ensure the roof or mounting structure can support the full weight of the outdoor unit specified on nameplate.
- Use isolation mounts for rooftop installations to reduce vibration transmission.

4. Unit Location Considerations

4.3 Location Restrictions

Proper placement of the outdoor condensing unit is essential for safe, reliable, and efficient system operation. The following guidelines combine KOIT requirements with industry best practices.

Installation Clearance Requirements

Ensure the area above and around the unit remains clear to allow unrestricted airflow and service access.

Minimum clearances:

- Above unit: 60 in. (1,524 mm) — unrestricted discharge
- Access panel side: 24 in. (610 mm)
- Opposite side: 12 in. (305 mm) to shrubs or obstruction
- Between adjacent units: 24 in. (610 mm)

Additional Guidelines:

- Leave enough space for smooth **airflow, wiring, refrigerant line routing**, and **maintenance access.**
- Do not install the unit near a bedroom window—normal operating noise may cause disturbance.

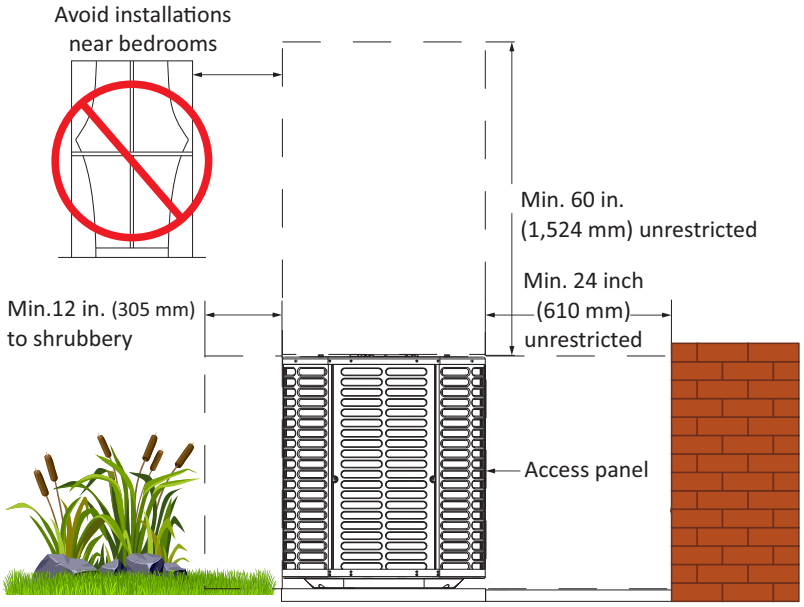


Figure 4.3A - Clearance Requirements

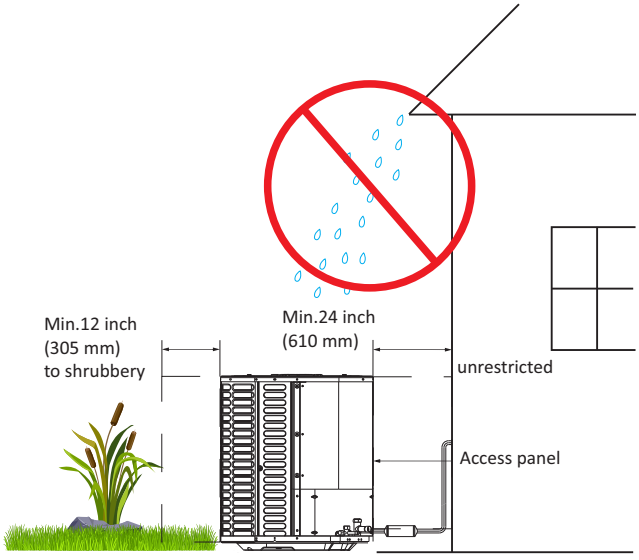


Figure 4.3B - Overhang & Water Hazard Diagram

Avoid Water, Snow, or Overhead Hazards

- Do not install the unit where water, snow, or ice from a roof or overhang can fall directly onto it.
- Avoid areas where strong winds blow directly into the air outlet or suction side.
- Maintain drainage pathways so water and melted frost can exit freely.

Corrosive or Harsh Environments

- Exposure to corrosive elements may shorten the service life of the unit, corrode metal components, and negatively affect performance. Corrosive elements include, but are not limited to: sodium, chloride, sodium hydroxide, sodium sulfate, seawater compounds, sulfur, chlorine, fluorine, fertilizers, and various industrial/manufacturing chemical pollutants.

Recommendations:

- Ensure lawn sprinklers, hoses, or wastewater do not spray directly onto the unit.
- In coastal areas, install the unit on the side of the building farthest from the waterfront.
- Fences or shrubs may be used to provide shielding—maintain minimum equipment clearances.
- Clean the outdoor coil and exposed surfaces every 3 months in corrosive environments.

4. Unit Location Considerations

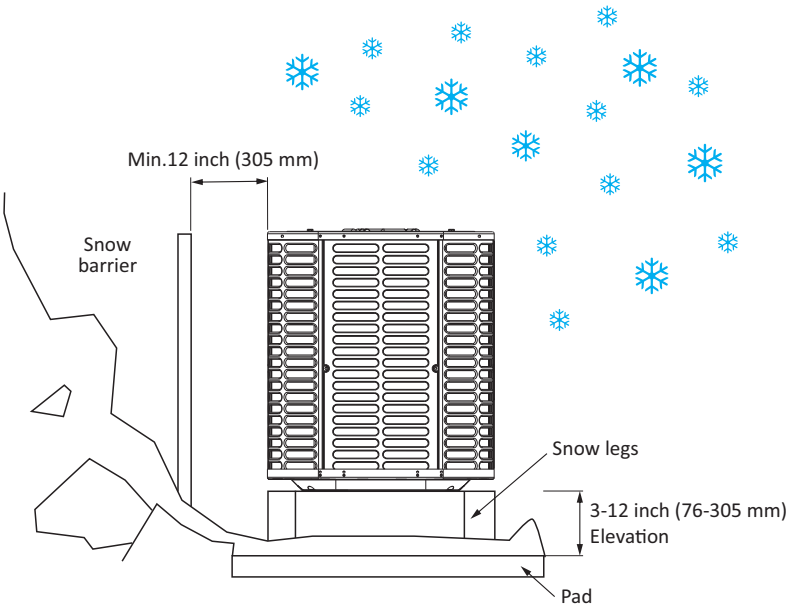


Figure 4.3C - Barrier + Elevated Unit

Cold Climate Considerations

Precautions must be taken for units installed in areas with snow or long-term temperatures below freezing.

- Raise the unit **3–12 inches (76–305 mm)** using risers or a raised pad.
  This ensures melted frost drains before refreezing.
- Ensure the drain hole on the chassis is never blocked.
- Install a **snow drift barrier** when necessary to reduce snow accumulation around the unit.
- Avoid locations that are prone to snow drifts; if unavoidable, provide side protection.

4.4 Unit Placement

Proper placement of the outdoor condensing unit ensures stable operation, long equipment life, and compliance with installation standards. Follow the guidelines below when installing the unit on a pad or rooftop structure.

Pad Installation Requirements

When installing the KOIT outdoor unit on a support pad (concrete slab or approved composite pad), follow these requirements:

- The pad must be **level, stable,** and positioned high enough above ground level to allow proper drainage around the unit.
- The pad must extend **1–2 inches (25–51 mm)** beyond the unit's footprint on all sides to provide stability and help reduce vibration transfer.
- Maintain separation between the pad and the building structure to minimize noise transmission.
- Ensure that the installation location complies with all national, state, and local mechanical and building codes.

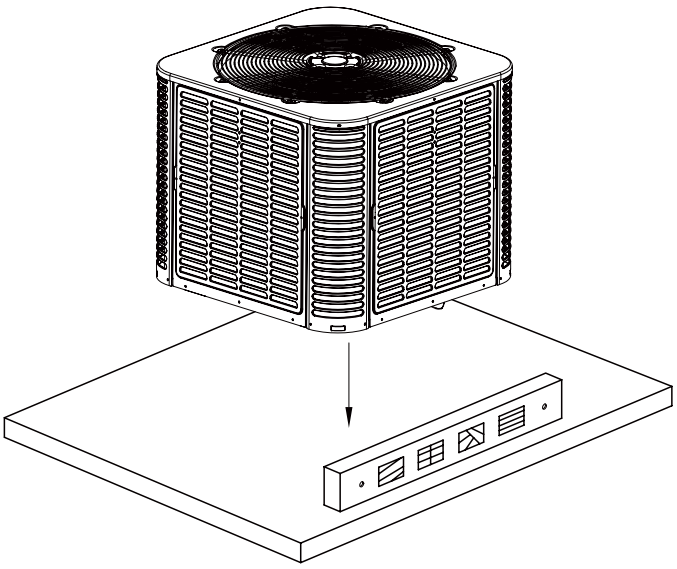


Figure 4.4 - Outdoor Unit Placement on Cement Slab

4. Unit Location Considerations

Rooftop Installation Requirements

When installing the outdoor unit on a rooftop:

- Confirm that the roof structure is rated to support the full weight of the unit (unit weight listed on the nameplate/carton).
- Use structurally appropriate mounting hardware or roof curbs as required by building code.
- Maintain drainage clearance around the unit to prevent water accumulation.
- Follow all national, state, and local building and mechanical installation regulations.

NOTICE

- The KOIT outdoor unit requires a mounting surface large enough to fully support its footprint. **Unit footprint: 29-1/8" × 29-1/8"**
- Ensure that the pad or mounting surface meets the minimum or recommended pad size listed above.

5. Refrigerant Pipeline Considerations

Table 5-1. Refrigerant Line Sizes & Maximum Limits

Use **only the line sizes specified** in the table below and determine the required line length accordingly. If the suction line exceeds 50 ft (15 m), **do not increase the pipe size** beyond the recommended specification.

Capacity Model	Liquid Line	Suction Line	Total Equivalent Length (ft) 100
	Dimensions in inches Std.		Maximum Elevation Difference (ft)
KOIT24H2-41G	3/8	3/4	50
KOIT36H2-41G	3/8	3/4	50
KOIT48H2-41G	3/8	7/8	50
KOIT60H2-41G	3/8	7/8	50

Std: Standard line size.

NOTICE

Refrigerant Line Length Requirements

To ensure proper system performance and oil return, follow these standard line-length rules:

- **Standard maximum equivalent line length:** 100 ft (30.5 m) as listed in Table 5-1.
- **Maximum vertical lift:** 50 ft (15 m)
- **Use only the pipe diameters shown in Table 5-1.** (Do not increase pipe diameter beyond recommended sizes.)
- **If suction line exceeds 65 ft (20 m), do NOT increase suction line size.** *(This ensures proper oil return and prevents compressor damage.)*

Required Refrigerant Line Length

Determine the required refrigerant line length between the outdoor unit and indoor unit (see Figure 5-1).

5. Refrigerant Pipeline Considerations

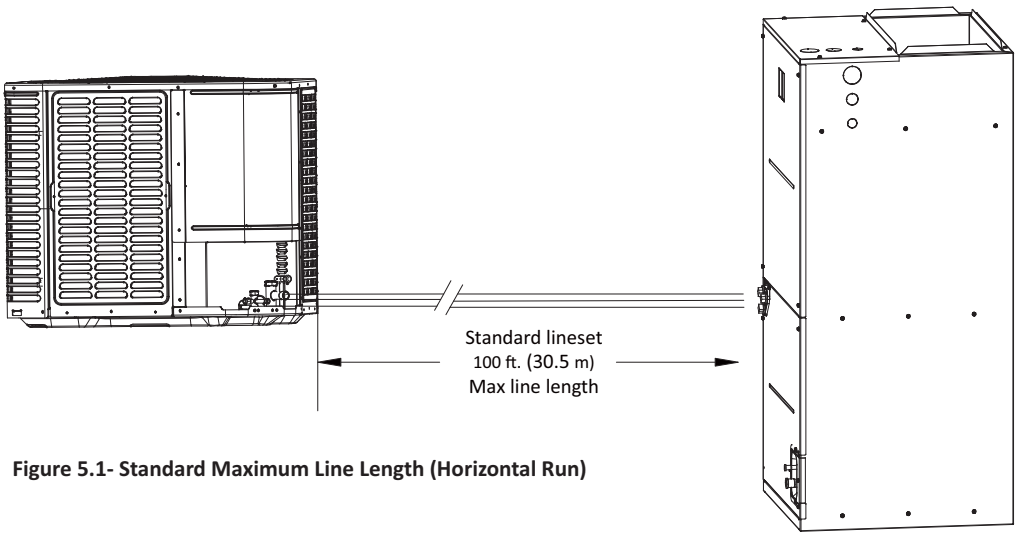


Figure 5.1- Standard Maximum Line Length (Horizontal Run)

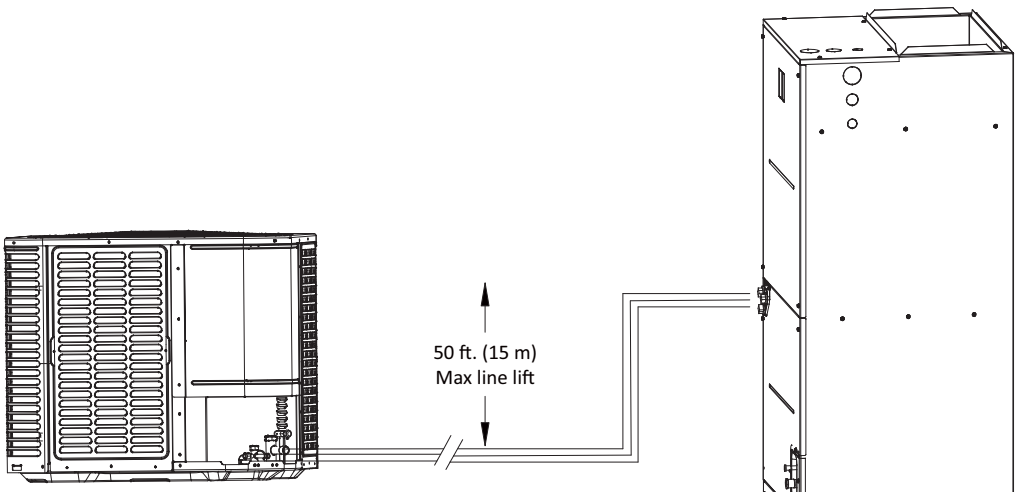
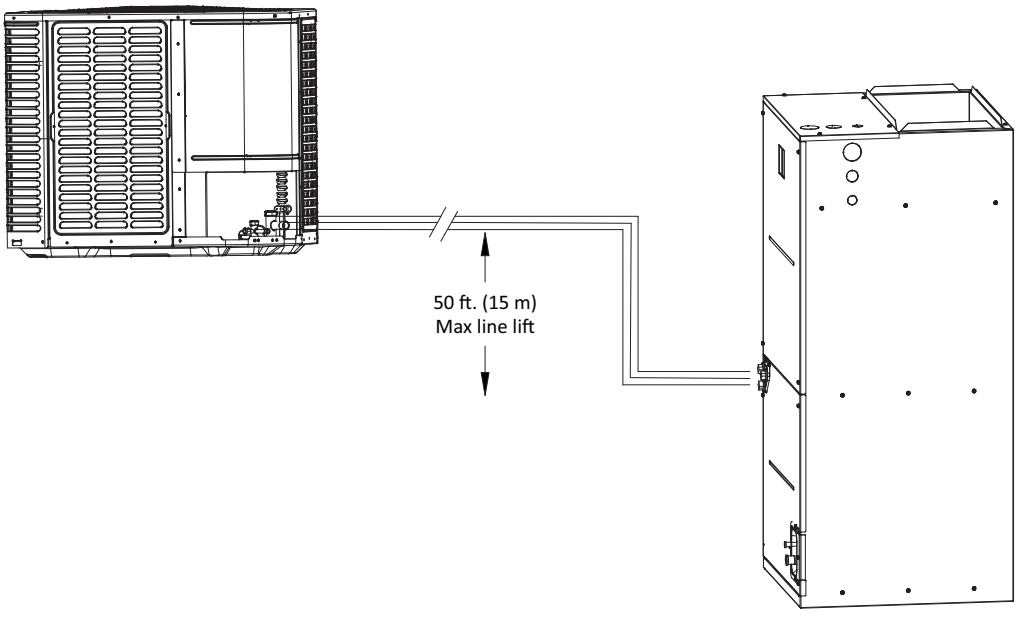


Figure 5.2 - Maximum Vertical Line Lift

(A) Upward line lift



(B) Downward line lift

5. Refrigerant Pipeline Considerations

5.2 Long Line Installation Precautions

Long refrigerant line runs require special installation procedures to ensure proper oil return and reliable system performance.

General Requirements

- The total refrigerant line length between the outdoor and indoor unit must not exceed 100 ft (30.5 m).
- If all line routing is horizontal, no additional precautions are required.
- If the line set includes a vertical rise or drop, oil return traps are required based on the height difference.

Oil Trap Requirements for Vertical Line Sets

Vertical Height Difference (h)	Required Oil Trap Placement
0 < h ≤ 16.5 ft (0–5 m)	No oil trap required.
16.5 ft < h ≤ 33 ft (5–10 m)	Install **one oil return trap** at the midpoint of the height difference.
33 ft < h ≤ 50 ft (10–15 m)	Install **two oil return traps**, spaced evenly along the vertical rise.

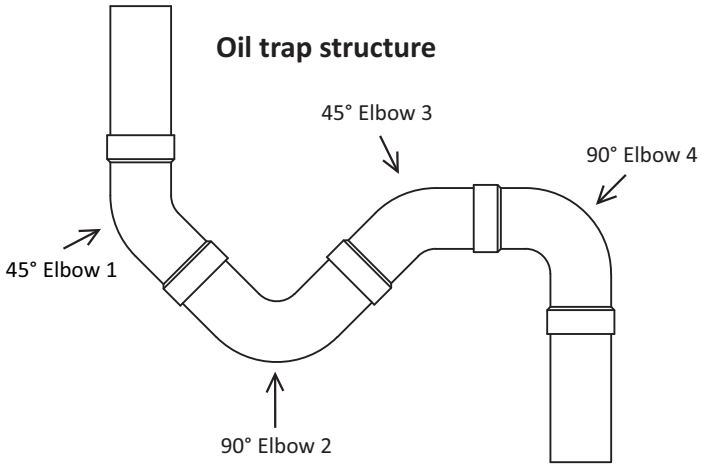


Figure 5.2 - Oil Return Trap Structure

NOTICE

For systems with vertical height differences, proper oil trap installation is required to maintain correct oil return and protect the compressor:

- Install oil traps according to the vertical height difference..
- Do not exceed a vertical lift/drop of 50 ft (15 m). Refer to Table 5.1
- Ensure all traps and elbows follow standard mechanical piping practices.
- Use only the line sizes specified in Table 5-1.

5. Refrigerant Pipeline Considerations

5.3 Refrigerant Pipe Insulation

To ensure proper system performance and prevent refrigeration loss, both the liquid and suction lines must be properly insulated.

- Insulate **each line individually**—do **not** allow copper-to-copper contact.
- Ensure insulation is continuous and sealed to prevent condensation.
- Use insulation material that meets local code requirements and is rated for refrigeration use.

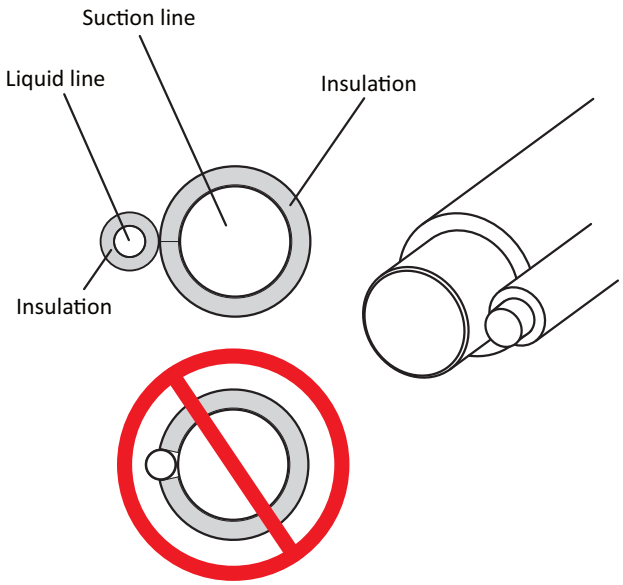


Figure 5.3 - Insulated Liquid and Suction Lines

NOTICE

Refrigerant Pipe Insulation

To maintain system efficiency and prevent condensation issues:

- Always insulate the liquid and suction lines separately.
- Do not allow the pipes to come into direct contact (metal-to-metal).
- Ensure all insulation seams are sealed and protected from moisture.
- Use only approved insulation materials suitable for HVAC refrigeration applications.

5.4 Reusing Existing Refrigerant Lines

Existing refrigerant lines may be reused if they meet size, condition, and cleanliness requirements.

- Line sets must match the **pipe sizes listed in Table 5-1.**
- Lines must be **clean**, **dry**, and **free of acid, oil contamination**, **or leakage.**
- All joints must be **brazed, not soldered**, to ensure proper sealing.

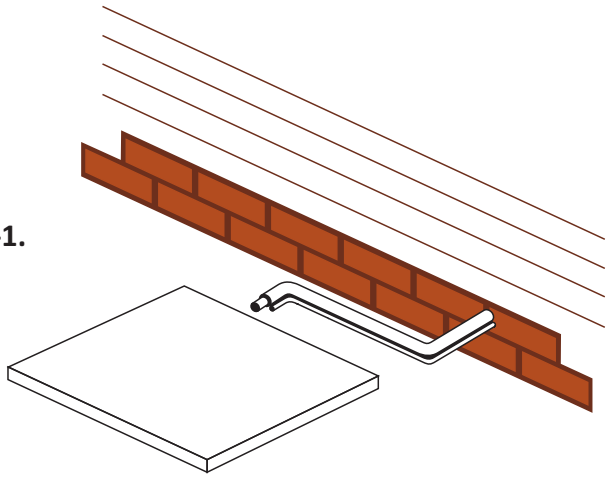


Figure 5.4 — Existing Refrigerant Lines Layout

NOTICE

When reusing existing line sets:

- Flush or clean the lines as needed to meet system requirements.
- Only reuse lines that are fully compatible with the refrigerant and pressure rating of the system

6. Refrigerant Pipeline Routing

Preventive Measures

Take preventive measures to reduce noise caused by vibration transmission through the refrigerant lines within the building structure. Follow these best practices:

- When securing refrigerant lines to floor joists or structural framing, use isolated hangers to minimize vibration transfer.
- When routing refrigerant lines through column spaces or above closed ceilings, use isolation hangers.
- When refrigerant lines pass through walls or window sills, ensure they are properly insulated and isolated.
- Keep refrigerant lines separated from all ductwork to prevent vibration transfer.
- Minimize the number of 90° bends in the routing whenever possible.

NOTICE

- Comply with all applicable **national, state, and local codes** when routing and isolating refrigerant piping near joists, rafters, walls, or other structural elements

Isolation from Joist/Rafter

- Secure the suction line from joists using isolators every 8 ft (2.4 m).
- Secure the liquid line directly to the insulated suction line using tape, wire, or another suitable method at 8 ft (2.4 m) intervals.

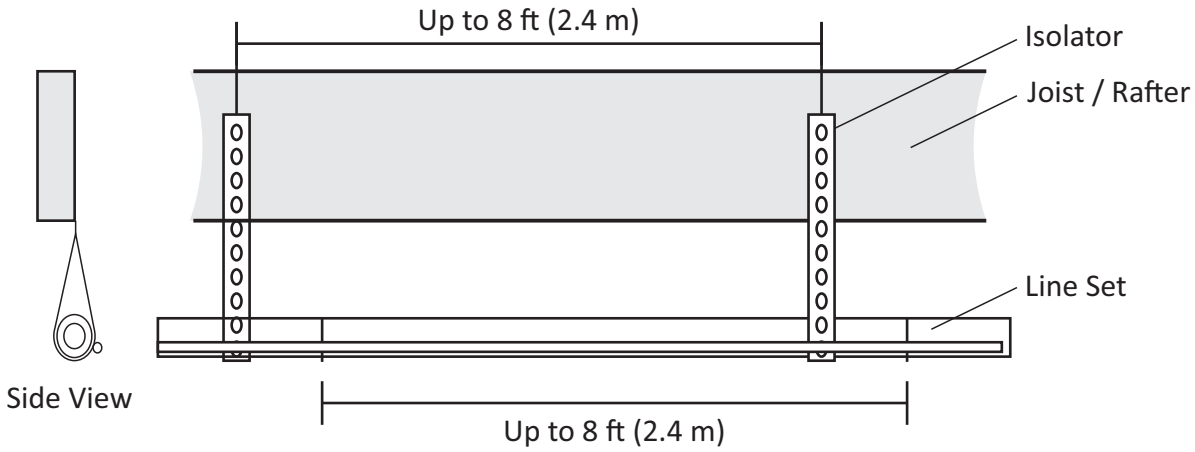


Figure 6.1A- Isolation from Joist/Rafter

6. Refrigerant Pipeline Routing

Isolation on the Wall

- Secure the suction line to wall-mounted isolators every 8 ft (2.4 m).
- Attach the liquid line directly to the insulated suction line using tape, wire, or another suitable method at 8 ft (2.4 m) intervals.

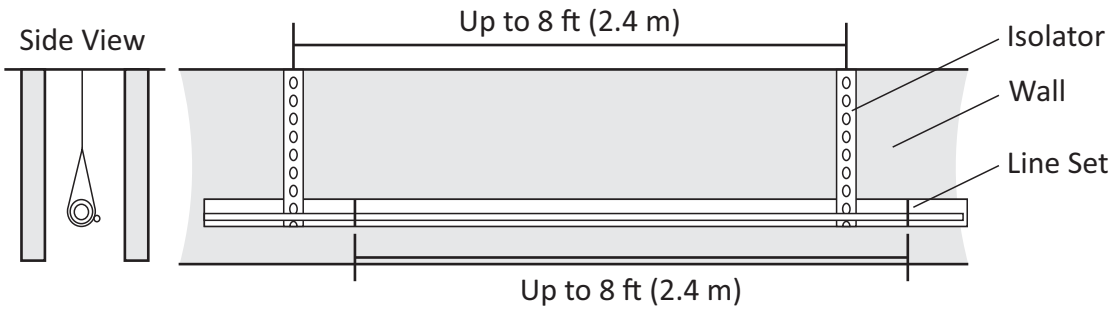


Figure 6.1B - Isolation on the Wall

Isolation Through Wall

- Secure the suction line when passing through the wall using an approved wall sleeve or conduit .
- The suction line must be fully insulated, and the opening around the sleeve should be sealed to prevent air leakage and vibration transfer.
- Attach the liquid line directly to the insulated suction line using tape, wire, or another suitable method at intervals of 8 ft (2.4 m).

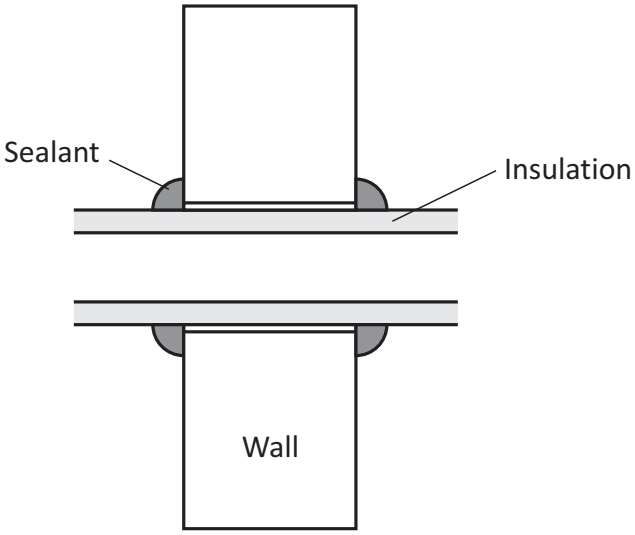


Figure 6.1C - Isolation Through Wall

Incorrect Installation
Do NOT Support Line Set From Ductwork

- SImproper support of the refrigerant line set can cause vibration transfer, noise issues, and potential damage to the piping.
- Do not attach, rest, or hang the line set on any part of the ductwork.
- Always route and support the piping using approved isolation methods as shown in previous sections.

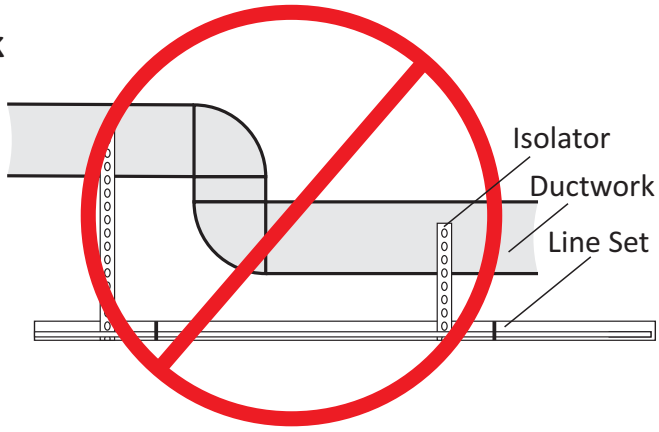


Figure 6.1D - Incorrect Installation Example

6. Refrigerant Pipeline Routing

Routing Through PVC Conduit

When routing the refrigerant lines through PVC conduit, ensure proper protection and sealing of the suction and liquid lines.

- Run the insulated suction line and liquid line together inside the PVC conduit.
- Seal conduit openings to prevent moisture or debris from entering.
- Keep the conduit path smooth and avoid sharp bends.
- Cap the outdoor end of the conduit to prevent water intrusion.

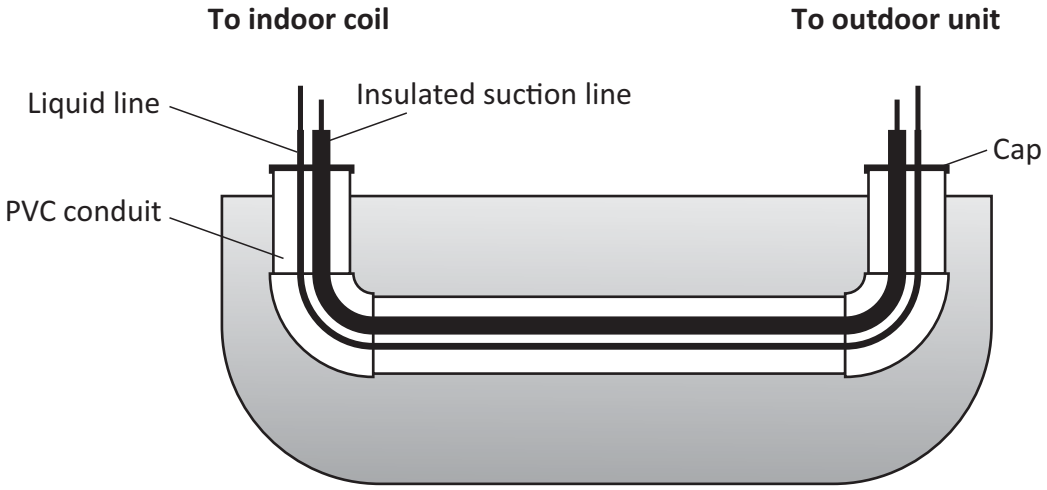


Figure 6.1E - Routing Through PVC Conduit

7. Refrigerant Line Brazing

CAUTION

- Do not install the connecting piping until both the indoor and outdoor units have been properly installed.
- Insulate both the gas and liquid lines to prevent condensation (water leakage).
- Be extremely careful not to damage, dent, or deform the tubing while cutting, flaring, or handling. Any deformation will significantly reduce the unit's heating and cooling efficiency.

7.1 Cutting The Refrigerant lines

When preparing refrigerant pipes,take extra care to cut and flare them properly.This will ensure efficient operation and minimize the need for future maintenance.

1. Use the piping kit accessory or the pipes purchased locally.
2. Measure the distance between the indoor and the outdoor unit.
3. Cut the pipes a little longer than measured distance.

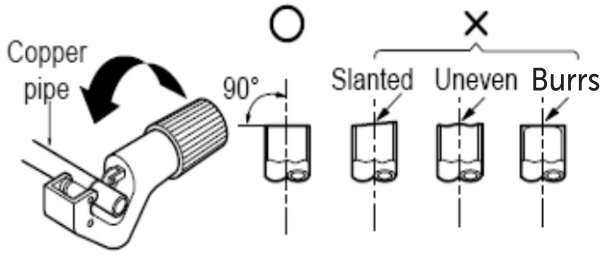


Figure 7.1 - Proper Cutting of Refrigerant Pipes

7.2 Remove Burrs

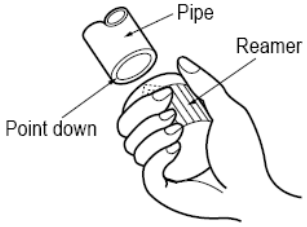


Figure 7.2 - Removing Burrs From the Refrigerant Pipe

Burrs can affect the air-tight seal of refrigerant piping connection. They must be completely removed.

1. Completely remove all burrs from the cut cross-section of the pipe/tube.
2. Hold the end of the copper tube/pipe pointing downward while removing burrs to prevent debris from falling into the tubing.

7.3 Pipe Connection

Step 1 — Prepare the Refrigerant Lines Ends

- Clean the inner and outer surfaces of each pipe end with an emery cloth to remove debris and ensure a proper brazed connection

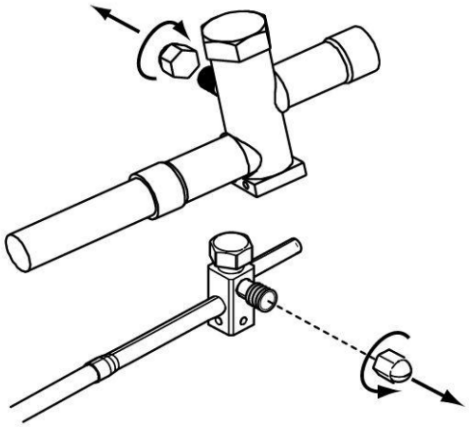


Figure 7.3A – Removing Pressure Tap Caps

Step 2 — Purge the Refrigerant Lines

- Prepare to purge the refrigerant lines and indoor coil with a low flow of dry nitrogen to prevent oxidation and scale formation during brazing.
- Maintain a continuous nitrogen flow throughout the entire brazing process.

7. Refrigerant Line Brazing

Step 3 — Remove Pressure Tap Caps

- Remove the pressure tap caps from the service valves prior to brazing.
- Store the caps safely for reinstallation after the valves have cooled.

Step 4 — Brazing the Line Set with the Adapter and Filter Drier

- Insert the indoor-unit liquid refrigerant piping into the brazing side of the liquid line adapter.
- Insert the indoor-unit suction (larger) refrigerant piping into the brazing side of the suction line adapter.
- It is recommended to maintain a continuous low flow of nitrogen while brazing to prevent oxidation.
- Braise both the refrigerant lines to the adapters.

Figure 7.3B - Bidirectional Filter Drier

Filter Drier Installation (Liquid Line Only) packed with outdoor unit

- Insert the tubing carefully into the drier without forcing it past the internal stop.
- Install and braze the liquid-line bi-directional filter drier onto the liquid line between the adapter and the copper pipe.

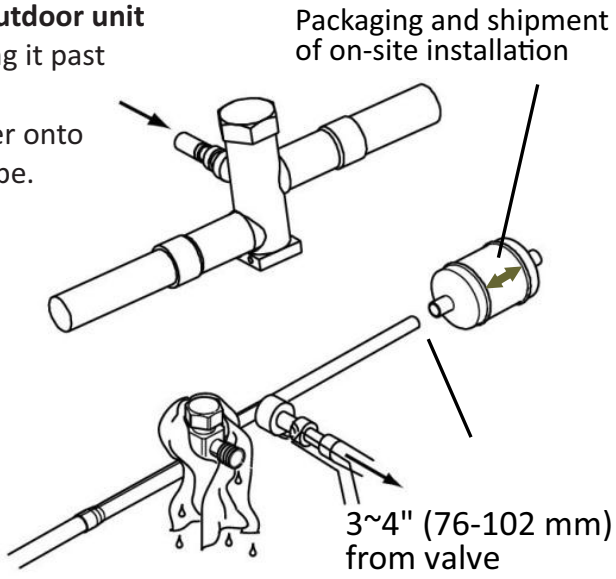


Figure 7.3C – Filter Drier Installation

Step 5 — Reinstall Pressure Tap Caps

After all brazed joints have cooled completely:

- Reinstall the pressure tap caps on the service valves.
- Tighten each cap securely to ensure a proper seal before beginning leak testing.
- Inspect the caps to confirm the sealing surfaces are clean and undamaged.
- Do **not** proceed to charging or evacuation procedures until **all caps are installed and tightened.**

NOTICE

- A bidirectional filter dryer is recommended for all units; install it on the liquid line as shown.
- Maintain the nitrogen purge for the entire brazing process to prevent internal oxidation.

Step 6– Pipe insulation

- Ensure insulation is wrapped completely around all piping.
- Direct contact with bare piping may result in burns during heating or frostbite during cooling.

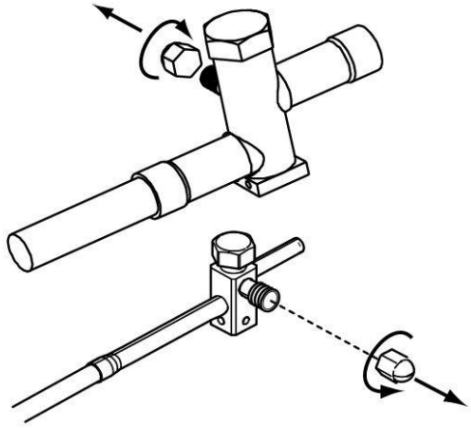


Figure 7.3D – Reinstalling Pressure Tap Caps

7. Refrigerant Line Brazing

7.4 Adapter Installation

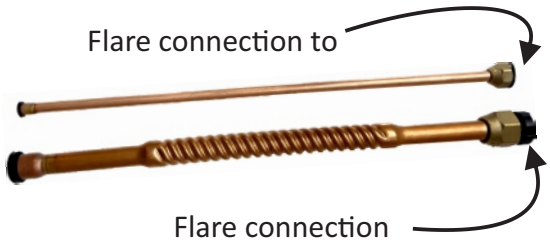


Figure 7.4A – 18-Inch Suction and Liquid Line Adapters - Brazed to Flare Connections (packed in the outdoor unit.)

Figure 7.4 B – Factory-Installed Flare Service Valves for Easy Hook-Up

STEP 1 - Attach the Adapter Pipes to the Outdoor Unit's Service Valves (Hand-Tighten)

Connect the suction-line adapter and liquid-line adapter to their corresponding flare service valves
- on the outdoor unit.

Tighten each flare nut by hand only to ensure proper alignment and to prevent cross-threading.
- Do not use tools at this stage. Hand-tightening ensures the adapters seat correctly before final
- torque is applied later.

STEP 2 — Fully Tighten the Adapters to the Outdoor Unit's Service Valves (Using a Wrench)

Using a standard torque wrench, fully tighten both flare nuts that connect the adapter pipes to the outdoor-unit service valves. Refer to Torque Values listed on Table 7.3.

NOTE: Use **two wrenches** to prevent the copper pipe from twisting or cracking while tightening.

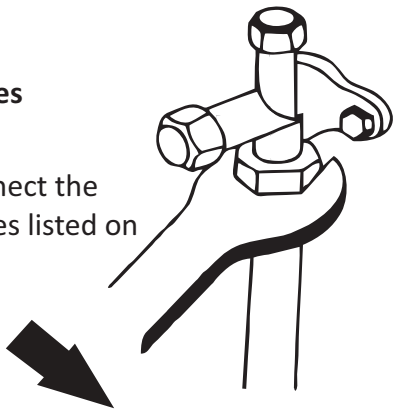


Figure 7.4C - Wrench-Tightening Procedure

Table 7.4 Standard HVAC Flare Nut Torque Values

Connecting Copper Size (OD)	Typical Use	Torque (N·m)	Torque (kgf·cm)	Torque (ft-lb)
3/8"	Liquid line	**33–42 N·m**	340–430 kgf·cm	27–31 ft-lb
3/4"	Suction line	**98–120 N·m**	1,000–1,225 kgf·cm	52–56 ft-lb
7/8"	Suction line	**118–142 N·m**	1,200–1,450 kgf·cm	58–62 ft-lb

CAUTION

- Ensure the pipe is fully seated and properly aligned before tightening.
- Over-tightening the flare nut can damage the flare surface (bell mouth) and may result in refrigerant leakage.
- Under-tightening the flare nut can also cause leaks. Always tighten according to the specified torque values in Table 7.4.

8. System Leak Check

Check for Leaks

Step 1 - Pressurize the System (Nitrogen Test)

- After completing the field piping, pressurize the refrigerant lines using dry nitrogen only.
- Increase pressure to 150 PSIG (1.03 MPa) or to the minimum low-side design pressure listed on the unit nameplate.

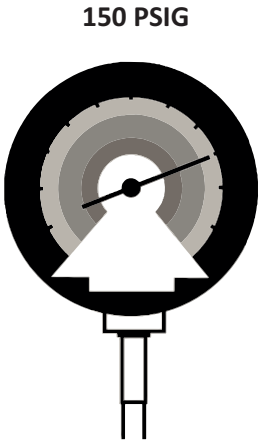


Figure 8.1- Pressurizing the Line Set with Dry Nitrogen

Step 2 - Inspect All Brazed Joints

While the system remains under pressure, apply a soapy water solution or approved bubble detection fluid to every braze, flare, and service port.

- Bubbling indicates a leak.
- If a leak is detected, **release nitrogen only from that test**, repair the joint, and repeat Step 1 until no leaks remain.

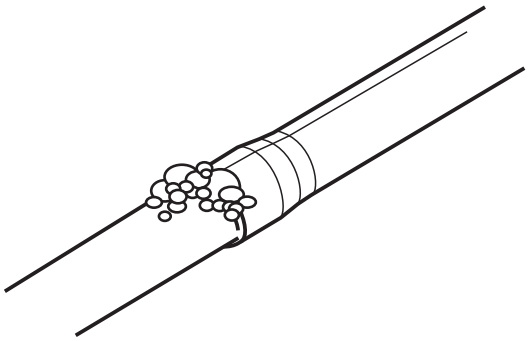


Figure 8.2 - Leak Inspection with Bubble Solution

Step 3 - Pressure Stabilization Check

After confirming that all joints are leak-free, **keep the system pressurized** and verify there is no pressure drop over time. A stable reading indicates successful leak testing.

NOTICE

- A Use only dry nitrogen — never oxygen or compressed air.
- The system must pass both the nitrogen pressure test and vacuum test before refrigerant charging.
- The leak test pressure must be at least the low-side design pressure listed on the nameplate.

9. Evacuation

NOTICE

Drain Refrigerant Lines & Indoor Coils

- Do not open the service valves until both the leakage inspection and the evacuation of refrigerant lines and indoor coils are fully completed.

Step 1 - Evacuate the System

- Evacuate the refrigerant piping and indoor coil using a vacuum pump until the micron gauge reads **350 microns or lower.**
- Once the target vacuum is reached, **close the valve** connected to the vacuum pump.

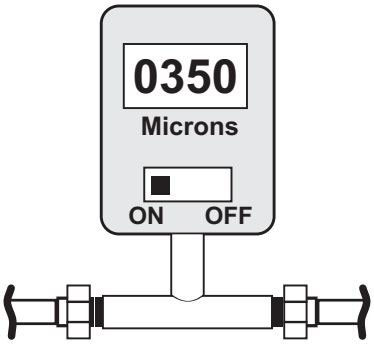


Figure 9.1 - Evacuation of Refrigerant System

Step 2 - Verify Vacuum Stability

- Observe the micron gauge with the vacuum pump isolated. Evacuation is considered complete when:
  - The micron reading **does not rise above 500 microns** within **1 minute.**

After confirming stability:

- Turn **OFF** the vacuum pump and micron gauge.
- Close the valve on the manifold instrument cluster.

Figure 9.2 - 1-Minute Standing Vacuum Test

10. Service Valves

⚠ WARNING

- Use extreme caution when opening the service valves.
- Turn the valve counterclockwise **ONLY until the valve stem just touches the rolled edge. No torque is required.**
- Failure to follow this instruction may cause a sudden release of system pressure, resulting in serious injury or property damage.
- Use an Allen/hex wrench that meets or exceeds Rc-Rockwell hardness specifications.

NOTICE

Drain Refrigerant Lines & Indoor Coils

- Leakage inspection and evacuation **must be completed before opening any service valve.**
- Always **open the suction service valve first**, before opening the liquid service valve.
- For copper-welded piping, complete leak testing and vacuum pumping **prior to opening any service port** to avoid refrigerant loss.

CAUTION

Check to make sure there is no refrigerant leak after completing the installation work. If there is a refrigerant leak, ventilate the area immediately and evacuate the system (refer to the Air Evacuation section of this manual).

Opening the Service Valves

Step 1 - Remove the Valve Cover

- Remove the protective cap from the service valve. (Refer to Figure 10-1.)

Step 2 - Open the Valve

- Insert the correct hex wrench fully into the valve stem, then rotate **counterclockwise** until the stem **just touches the rolled edge**. This is typically **about 5 turns.**
- No further torque is required.

Step 3 - Replace the Stem Cap

- Reinstall and hand-tighten the valve stem cap to prevent leakage.
- After hand-tightening, add an additional 1/6 turn for proper sealing.

Step 4 - Repeat for the Liquid Service Valve

- Repeat Steps 1–3 using the appropriate hex wrench size.

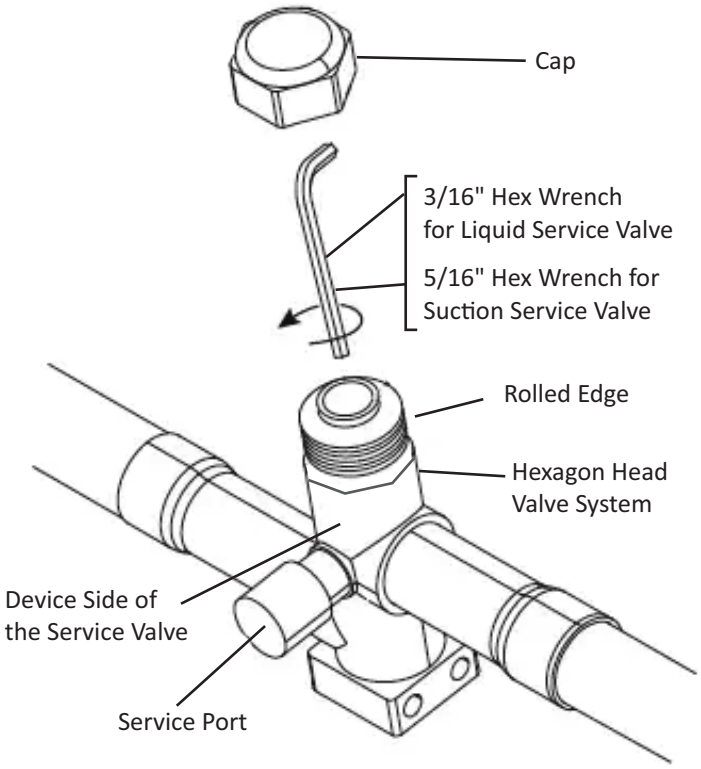
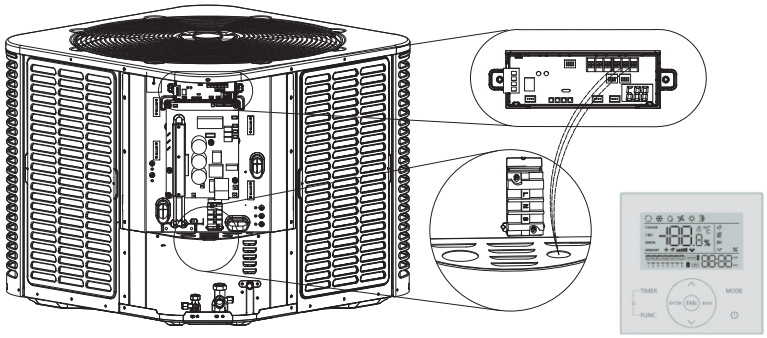


Figure 10.1 - Opening the Service Valves

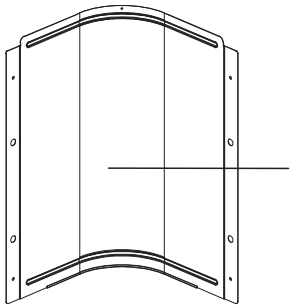
11. Electrical - Low Voltage

There are two types of low-voltage connections available for Klimaire Ducted systems, depending on the thermostat selected.

RS-485 Communication Low-Voltage Connection



Control board access panel



24V Low-Voltage standard Thermostat control option

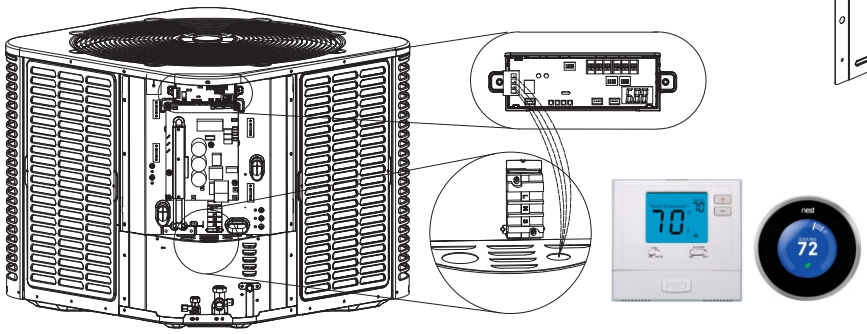


Figure 11.1 - Connection of Low Voltage Devices

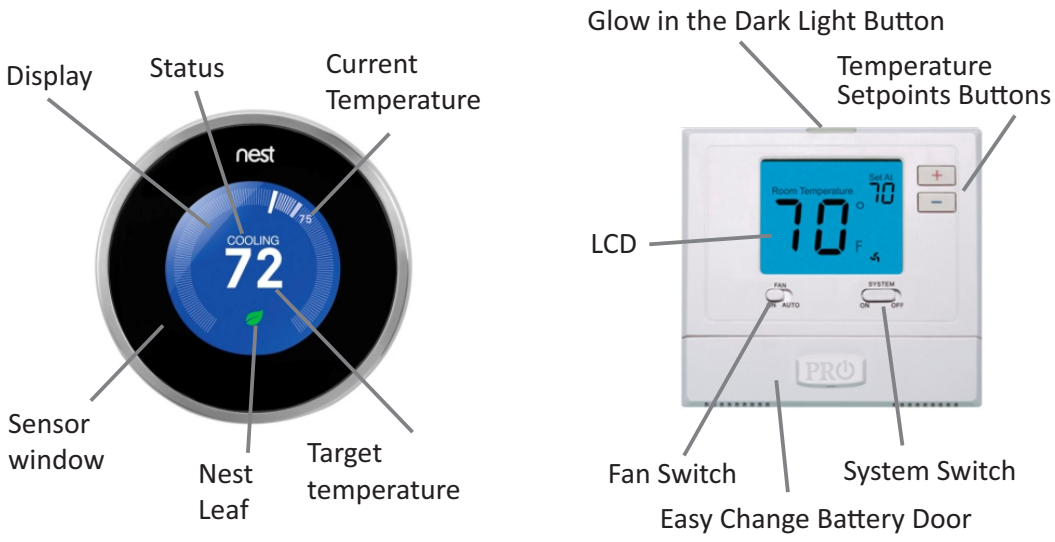


Figure 11.2 - 24-Volt Typical Communicative Thermostats

11. Electrical - Low Voltage

- This mode is compatible with many standard thermostats, including smart thermostats such as Nest, Honeywell, and other conventional 24V systems.
- Ensure the power supply is consistent with the nameplate rating of the unit
- All wiring, grounding, and power connections must comply with local electrical codes.
- Low-voltage wiring must be color-coded and use No. 18 AWG conductor.
- Single-stage electric auxiliary heating requires a 2H thermostat.
- Two-stage electric auxiliary heating requires a 3H thermostat.
- W1: First stage of electric emergency heat (indoor unit).
- W2: Second stage of electric emergency heat (indoor unit).

11.3 Wiring Notes 24V Mode Thermostat

NOTICE

- Refer to the thermostat manufacturer's manual for specific thermostat wiring instructions.

Reversing Valve Operation

- Factory Default, the reversing valve is energized in heating mode and de-energized in Cooling Mode.
- Wire O = Reversing valve energized in COOL mode.
- Wire B = Reversing valve energized in HEAT mode.

Indoor Unit

Code	Name
R	24V AC power supply
C	Common
G	Fan
Y1	Low stage
Y2	High stage
O	Cooling four-way value
W1	W1 Electric heating 1
W2	2 W2 Electric heating
D	D Defrost
Yo	Yo Low stage (to outdoor)

Outdoor Unit

Code	Name
R	24V AC power supply
C	Common
Yo	Low stage
Y2	High stage
O	Four-way value
D	Defrost
L	Fault signal
DHM	Dehumidification
T	Timer

Table 11.4A - 24V Indoor and Outdoor Control Cable Coding

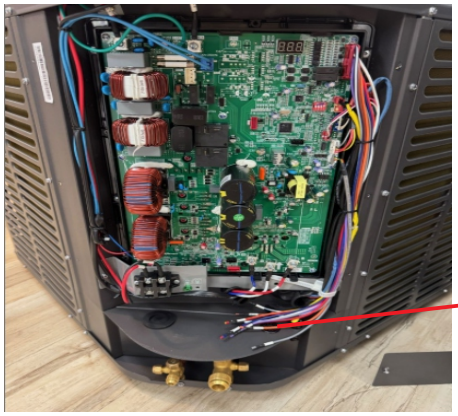
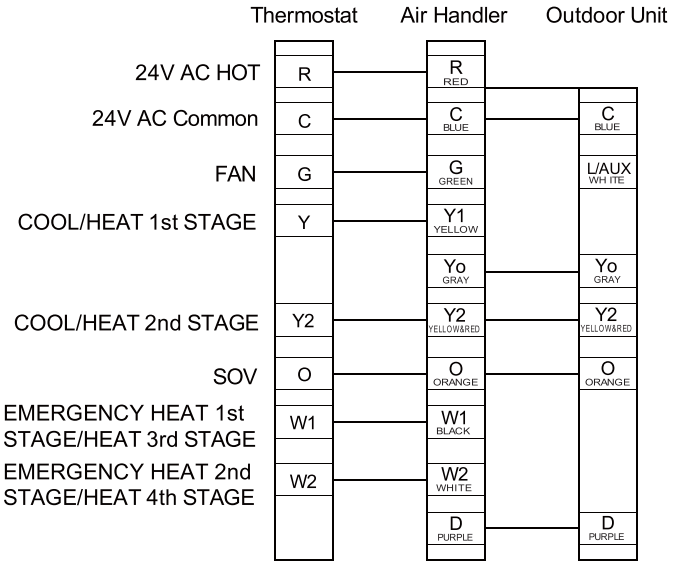


Figure 11.4B- 24V Control Terminal Connections

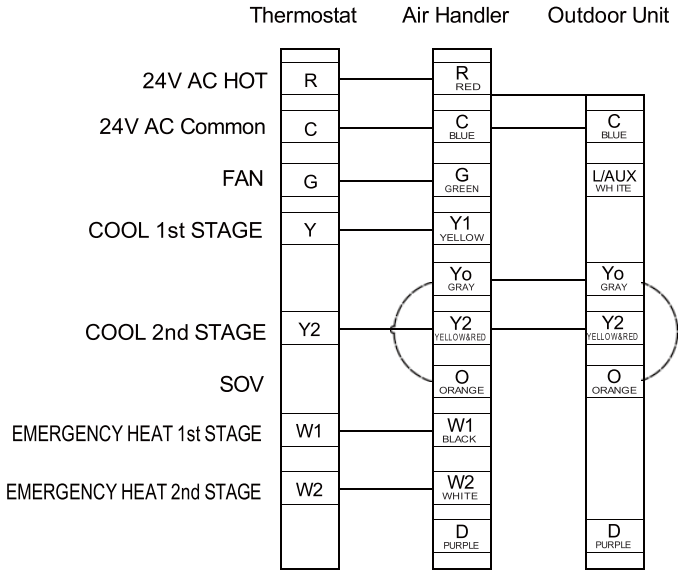
11. Electrical - Low Voltage

Control Wiring For Heat Pump Systems

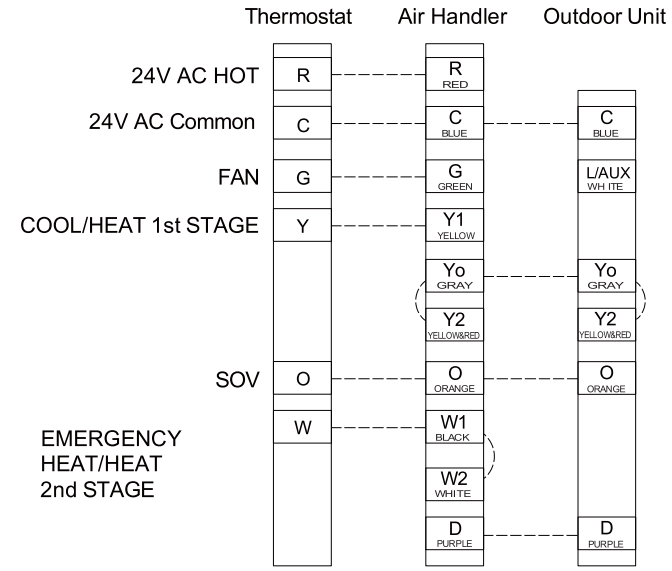
2 Stage, 2 Step, Heating Pump



2 Stage, 2 Step, Cooling Only



Single Stage, Heating Pump



Single Stage, Cooling Only

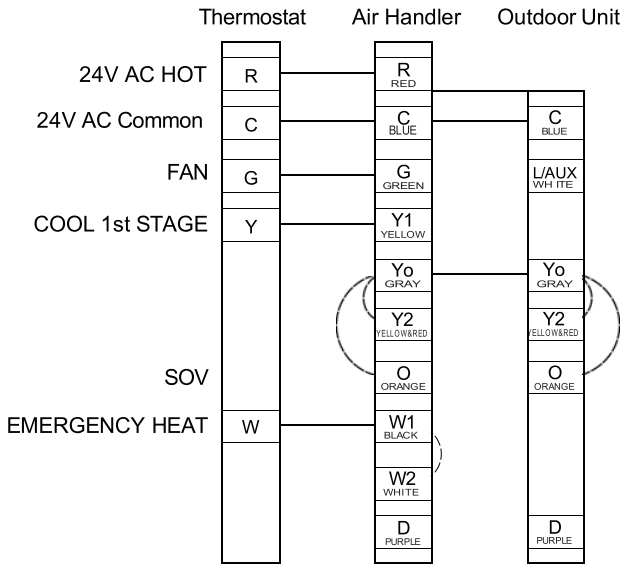


Figure 11.4C - Schematic Diagrams for Low-Voltage Control Wiring Connections

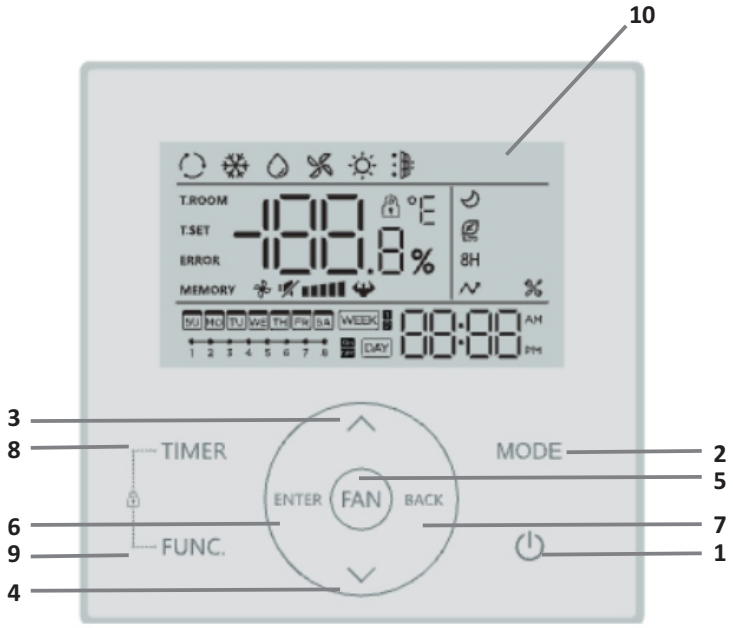
Note : When auxiliary or electric heat is engaged, the indoor fan automatically operates in high stage.

11. Electrical - Low Voltage

RS-485 Communication Mode (Digital Control)

Wiring Notes RS - 485 Thermostat Wired Remote Controller

- Built in Wifi communication.
- RS-485 communication cable: 30ft or 50ft options to connect indoor to outdoor units with quick plug connections are available.
- Extension cable:30 ft or 50 ft thermostat extension cable options with quick plug connections are available.



1	[ON/OFF] button	6	[ENTER] button
2	[MODE] button	7	[BACK] button
3	[UP] button	8	[TIMER] button
4	[DOWN] button	9	[FUNC.] button
5	[FAN SPEEDS button	10	LCD

Required Components

- **Outdoor - Indoor RS-485 Communication Cable**

- **Thermostat Cable with Plugs**

Figure 11.5 - Wired Remote Control with WiFi - Button Definitions

System Compatibility

The Klimaire Wired Remote Controller option requires that the indoor and outdoor units are matching Klimaire systems.

Easy Connections

1. RS-485 Cable (Black Plugs)
   - Connect the RS-485 cable black female plug into the indoor unit's black male plug.
   - Connect the RS-485 cable black female plug into the outdoor unit's black male plug.
2. Thermostat Cable with Plugs (Red Plugs)
   - Connect the red female plug of the thermostat cable into the thermostat's red male plug.
   - Connect the opposite red male plug into the indoor unit's red female plug.

11. Electrical - Low Voltage

Typical Installation Diagram for the Klimaire Wired Remote Controller

Connect the wire from the master control board of the indoor unit to a connecting cable. Then connect the other side of the connecting cable to the wired control.

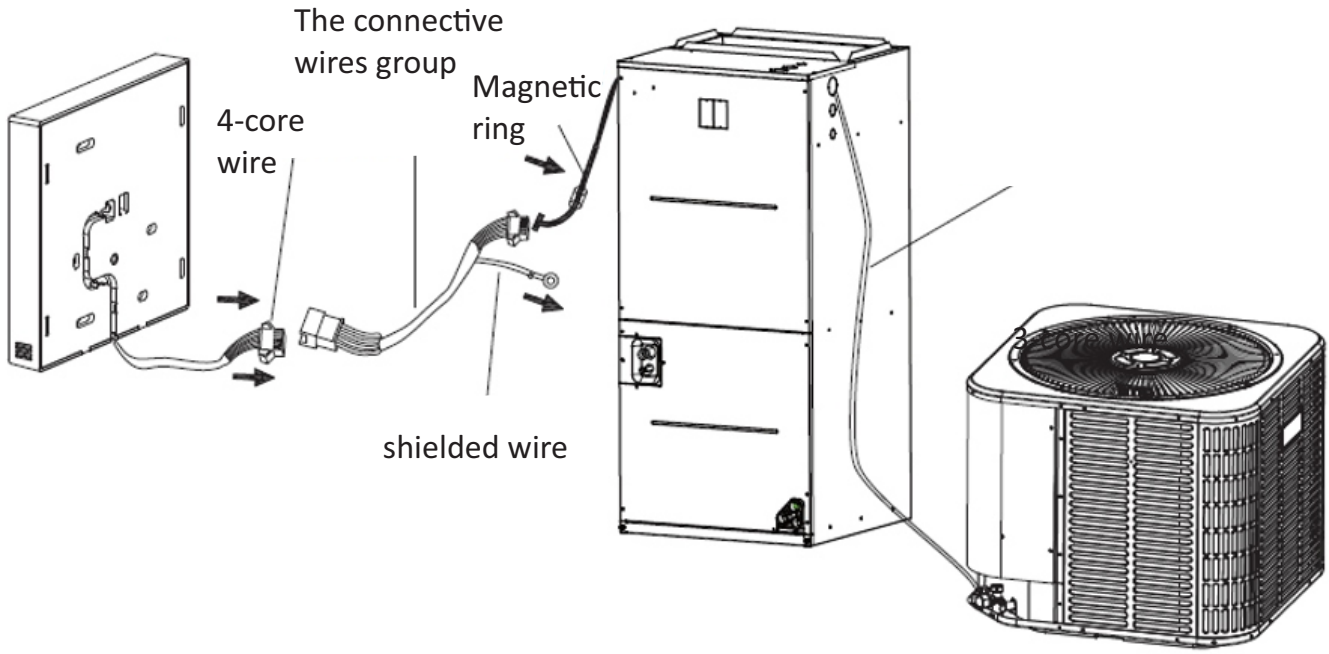


Figure 11.6 - Typical Installation Diagram for the Klimaire Wired Remote Controller

NOTICE

- For more details, refer to the **Wired Remote Controller Owner's Manual.**

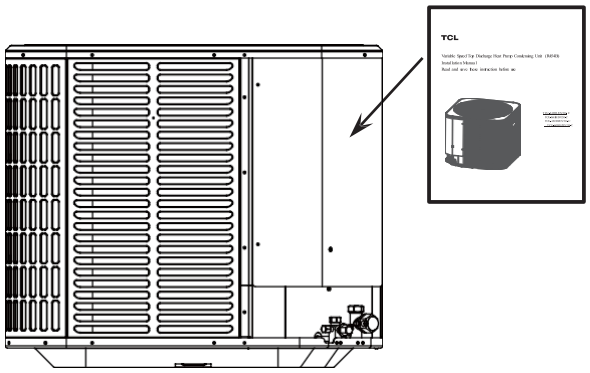
12. Electrical - High Voltage

⚠ WARNING

LIVE ELECTRICAL PARTS

- During installation, testing, servicing, and troubleshooting of this product, it may be necessary to work with live electrical components.
- Failure to follow all electrical safety precautions when exposed to live electrical components could result in death or serious injury.
- Power supply wiring must comply with national, state, and local regulations.

12.1 High Voltage Power Supply



The high voltage power supply must be in agreement with the equipment nameplate. Power wiring should comply with National, State and Local codes (208/230V, 1 ph, 60Hz).

Figure 12.1A - High Voltage Power Supply Requirements

High Voltage Power Supply Specifications

The following table lists the required voltage, minimum circuit ampacity (MCA), and recommended breaker size for each KOIT model.

High Voltage Power Supply Specifications

The following table lists the required voltage, minimum circuit ampacity (MCA), and recommended breaker size for each KOIT model.

Table 12.1 — Power Supply Specifications

Power Supply			
Model	**Voltage**	**MCA**	**Breaker**
KOIT24H -41G	208/230V-1Ph-60Hz	16A	25A
KOIT36H2 -41G		22A	35A
KOIT48H2 -41G		35A	60A
KOIT60H2 -41G		35A	60A

Follow instructions on unit wiring diagram located on the inside of the control box cover.

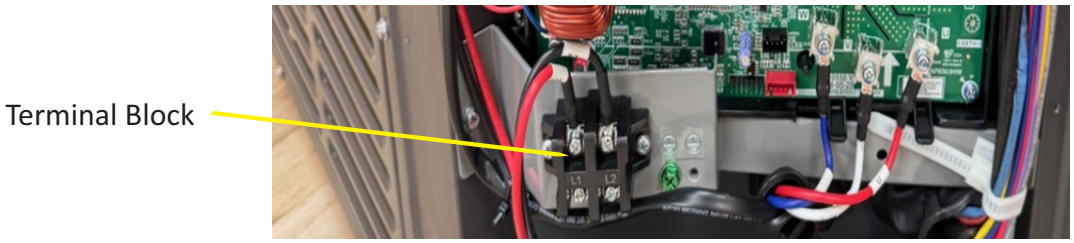


Figure 12.1B - High Voltage Terminal Block

12. Electrical - High Voltage

12.2 High Voltage Disconnect Switch

- Install a separate electrical disconnect switch at the outdoor (condensing) unit. Refer to Table 12.
- Field-provided flexible electrical conduit must be used for all high-voltage wiring.
- To maintain full compressor warranty coverage, a surge protector must be installed to prevent damage caused by abnormal electrical spikes.

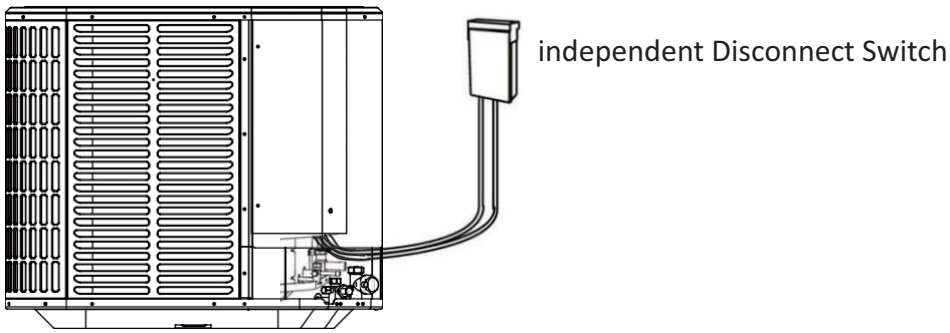


Figure 12.2 - High-Voltage Disconnect Switch Installation

12.3 Grounding

Ground the outdoor unit according to National, State, and Local code requirements.

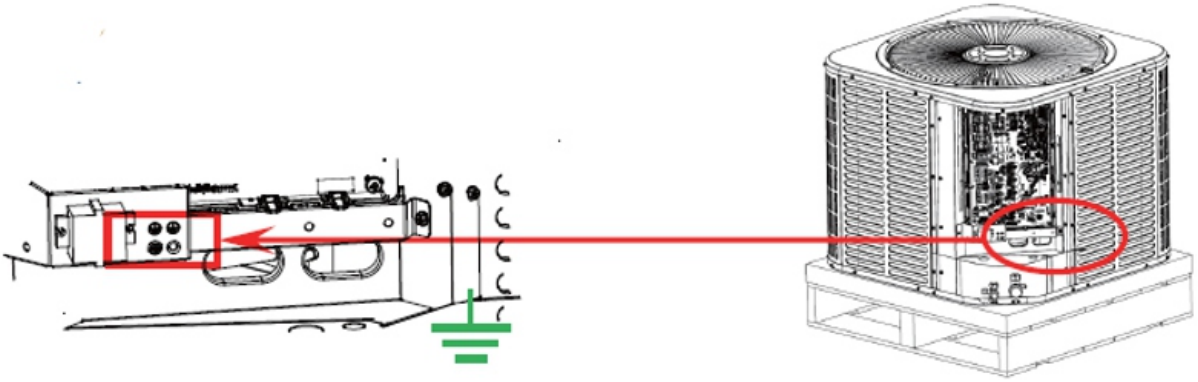


Figure 12.3 — Outdoor Unit Grounding Location

Table 12.3 — Outdoor Unit Grounding and Power Wiring Specifications

Type (Btu/ hour)			24K	36K	48K	60K
Power		Stage	Single			
		Voltage/Frequency	208/230VAC, 60 Hz			
Wire Gauge	Indoor Unit Power Cord	Conductor Quantity	3	3	3	3
		Wire Diameter (AWG)	16	16	16	16
	Outdoor Unit Power Cord	Conductor Quantity	3	3	3	3
		Wire Diameter (AWG)	14	12	10	10

13. Start - Up

System Startup Procedure

1. Turn OFF the system thermostat.

Figure 13.1 — Thermostat (OFF Position)

2. Turn ON the disconnect switch

Apply power to both the indoor and outdoor units.

Figure 13.2 — Disconnect Switch.

3. Cold-Weather Initial Start Recommendation

If the outdoor ambient temperature is **below 59°F (15°C)** during the first startup:

- Allow the system to remain powered for 1 hour before operating.
- This ensures the crankcase heater properly warms the compressor oil.

If starting in **Heating Mode** for the first time and the outdoor temperature is **below 23°F (-5°C)**:

- The system will **automatically initiate a 60-minute preheat cycle** before operation begins.
- **"PRH"** will appear on the thermostat or display panel during this period.

Figure 13.3 — 60-Minute Preheat Indicator

4. Turn ON the system thermostat.

After preheat (if applicable), turn the thermostat to ON and select the desired mode.

Figure 13.4 — Thermostat (ON Position)

13. Start - Up

Operating Temperature Guidelines

Attempting to operate the system outside the allowable temperature ranges may trigger built-in protection, preventing operation.

Table 13.1 Room Temperature Operating Range

Mode	Temperature Range
Heating	32°F–86°F (0°C–30°C)
Cooling	63°F–90°F (17°C–32°C)
Dry Mode	63°F–90°F (17°C–32°C)

Table 13.2 Outdoor Temperature Operating Range

Mode	Temperature Range
Heating	-5°F–80°F (-20°C–27°C)
Cooling	5°F–125°F (-15°C–52°C)

If the system is switched to another mode or restarted after shutdown, the compressor will automatically resume operation **after a 3-minute protection delay.**

Characteristics of Heating Operation (Heat Pump Models)

Preheating

When heating is selected, the indoor unit may require **2–5 minutes** to preheat before delivering warm air. This is normal.

Defrosting

During heating, if the outdoor coil accumulates frost:

- The system will enter **automatic defrost mode** to improve heating effect.
- During defrosting period the Indoor and outdoor fans temporarily stops.
- After defrost cycle is completed, heating resumes **automatically.**

14. System Refrigerant Charging Method

14.1 Weigh-In Charging Method (Primary Method)

The weigh-in method must be used during initial system installation or whenever the refrigerant charge is replaced. It is also required when subcooling verification cannot be performed due to outdoor temperature or when the system cannot run in Cooling mode.

Factory Charge Information

- KOIT Klimaire outdoor units include a factory charge sufficient for 25 ft (7.6 m) of standard-sized interconnecting liquid line.
- For line lengths greater than 25 ft (7.6 m), add 0.54 oz/ft (15 g/ft) of R-454B refrigerant.

New Installation — Additional Charge for Line Sets Over 25 ft (7.62 m)

If the total refrigerant line length exceeds 25 ft (7.62 m), additional refrigerant must be added.

Calculation Form

1. Total line length (m/ft) = _____ (a)
2. Standard line allowance = 7.62 m (25 ft) (b)
3. Excess length (a – b) = _____ (c)
4. Refrigerant multiplier = 50 g/m (0.54 oz/ft) (d)
5. Additional refrigerant required (c × d) = _____ (e)*

** If total line length is less than or equal to 7.62 m (25 ft), e = 0.*

Sealed-System Repairs — Total System Charge Calculation

When replacing refrigerant after repairs, both factory charge and additional line-length charge must be included.

Calculation Form

1. Total line length (ft) = _____ (a)
2. Standard line allowance = 25 ft (7.62 m) (b)
3. Excess length (a – b) = _____ (c)
4. Refrigerant multiplier = 0.54 oz/ft (50 g/m) (d)
5. Additional refrigerant (c × d) = _____ (e)*
6. Factory precharge (nameplate) = _____ (f)
7. Total system charge (e + f) = _____

** If the line length is less than or equal to 25 ft (7.62 m), e = 0.*

The required refrigerant amount can be determined using the formulas above, or you may reference the piping-length guidelines below for quick selection of the appropriate additional charge.

14. System Refrigerant Charging Method

Charging Guidelines by Piping Length

Table 14.1 Charging Guidelines by Piping Length

Model	KOIT24H -41G	KOIT36H2 -41G	KOIT48H2 -41G	KOIT60H2 -41G
Length of Pipe with Standard Charge (ft)	25	25	25	25
Refrigerant Capacity Of Standard Charge (lbs)	4.74	6.28	8.82	8.82
The longest pipe Length (ft)	100	100	100	100
Aditional Refrigerant Charge (oz/ft)	0.54	0.54	0.54	0.54
Max. diff.in level between indoor and outdoor ubit (ft)	50	50	50	50

For example, for a 36K model, when the pipe is 100ft, the additional refrigerant charging is (100ft -25ft) =75 ft x 0.54
Total refrigerant capacity of the system is 6.28 + 2.51 = 8.79lbs.

Table 14.2 Total Refrigerant Capacity (lb)

Model	Category	LFL(lb/ft^3)	h0(ft)	Pipe Length (ft)				
				25	49	66	98	164
KOIT24H -41G	R454B	0.0185	7.2	4.74	5.57	6.12	7.22	/
KOIT36H2 -41G				6.28	7.11	7.66	8.76	/
KOIT48H2 -41G				8.82	9.65	10.2	11.3	13.5
KOIT60H2 -41G				8.82	9.65	10.2	11.3	13.5

NOTES: LFL = Lower Flammability Limit / H0 = Minimum Required Installation Height

① Refrigerant charge of the precharged part of the appliance.

② Refrigerant charge added during installation.

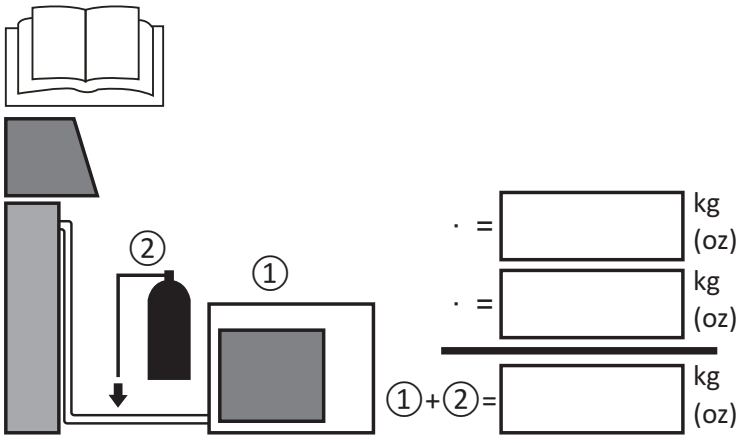


Figure 14.1 — Total System Charge Summary(Factory Charge + Added Charge)

Charging Temperature Requirements

- System charging verification may only be performed in Forced Cooling Mode. Outdoor ambient temperature must be between 68–113°F (20–45°C). Indoor temperature must be between 68–89°F (20–32°C). If either temperature is outside this range, use the weigh-in method only.

14. System Refrigerant Charging Method

14.2 Subcooling Charging & Adjustment (Cooling Mode Only)

Subcooling charging is the **recommended operational charging method** when outdoor temperatures are high enough to allow stable system cooling performance.

Before Charging

1. Verify outdoor temperature is **above 68°F (20°C).**
2. If outdoor temperature is **below 68°F (20°C) → use the weigh-in method**, not subcooling.
3. Confirm indoor and outdoor temperatures meet the required operating range:
   - **Outdoor:** 68–113°F (20–45°C)
   - **Indoor:** 68–89°F (20–32°C)

When the outdoor ambient temperature is higher than 68°F (20°C), be sure to return in spring or summer in order to accurately charge the system in Cooling mode.

Forced Cooling Mode Activation

To enter Forced Cooling Mode:

1. Set the system to **Cooling Mode.**
2. Press and hold down **KEY4** for 3 second sand then release it on the control board until “7” appears.
3. The system will operate at a fixed compressor frequency for charging.
4. Forced Cooling automatically stops after **60 minutes**, or press **KEY4** again to exit manually.

Subcooling Charging Procedure — Cooling Mode Only

1. **Allow the system to run in Forced Cooling Mode for 20 minutes** to allow the refrigerant cycle to stabilize. During this mode, the compressor will operate at a fixed frequency.
2. **Measure both of the following:**
   • **Liquid line temperature**
   • **Liquid line pressure** from the liquid service port
3. **Determine the actual subcooling value** using the measured temperature and pressure relative to the values listed in **Table 14-2.**
4. **Identify the required design subcooling value** for the system model and outdoor temperature using **Table 14-3.**
5. **Compare the measured subcooling to the required design subcooling:**
   • If the actual subcooling is lower than the design value → **Add refrigerant.**
   • If the actual subcooling is higher than the design value → **Recover refrigerant.**
6. After each adjustment, **allow 5 minutes of system stabilization**, then recheck:
   • Liquid line pressure
   • Liquid line temperature
   • Calculated subcooling
7. **Repeat the adjustment cycle** until the measured subcooling matches the design subcooling value specified in Table 14-3.
8. Once charging is complete:
   • Remove service tools.
   • Press and hold the **KEY4** button to exit Forced Cooling Mode.
   • The **“7”** indicator will turn off when the system returns to normal operation.

14. System Refrigerant Charging Method

Table 14.2 — Liquid Line Temperature vs. Subcooling & Required Liquid Gauge Pressure

Liquid Line Temp (°F/°C)	Subcooling Value(°F/°C)							
	6	7	8	9	10	11	12	13
	Liquid Gauge Pressure(PSI)							
55/13	164	167	170	172	175	178	181	184
60/15.5	178	181	184	187	191	194	197	200
65/18	194	197	200	203	206	210	213	217
70/21	210	213	217	220	223	227	230	234
75/24	227	230	234	238	241	245	249	252
80/27	245	249	252	256	260	264	268	272
85/29	264	268	272	276	280	284	288	292
90/32	284	288	292	297	301	305	309	314
95/35	305	309	314	318	323	327	332	336
100/38	327	332	336	341	346	351	355	360
105/40.5	351	355	360	365	370	375	380	385
110/43	375	380	385	390	396	401	406	412
115/46	401	406	412	417	422	428	433	439
120/49	428	433	439	445	450	456	462	468
125/52	456	462	468	474	480	486	492	498

Table 14.3 — Target Subcooling Values by Model and Ambient Temperature

Subcooling (°F/°C)		Ambient Temperature (°F/°C)				
		68~77/20~25	77~86/25~30	86~95/30~35	95~104/35~40	104~113/40~45
Model	24K	10±2	8±2	8±2	6±2	6±2
	36K	10±2	8±2	8±2	6±2	6±2
	48K	8±2	8±2	8±2	6±2	6±2
	60K	8±2	8±2	8±2	6±2	6±2

15. System Operation

15.1 Default Display

LED indicators on the main control board display the operating status of the KOIT outdoor unit (ODU).

- **DSP1-1 / DSP1-2:** Normally blank. They display codes only when a sensor error or command response error occurs.
- **DSP1-3:** Displays the outdoor unit's current operating mode.

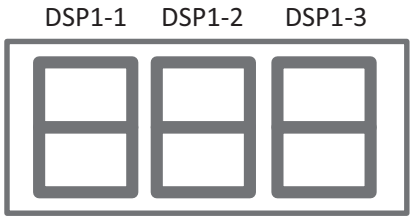


Figure 15.1 - DSP1-1 / DSP1-2 / DSP1-3 Display Layout

Table 15.1B Outdoor Operation Mode Display (DSP1-3)

DISP1-3 Code	Description
0	Standby
1	Ready
2	Cooling
3	Heating
4	Oil return operation
5	Defrosting operation
6	Forced defrosting
7	Forced cooling operation
8	Forced heating operation
A	Fault
H	Dehumidification mode operation

15.2 Field Setting (DIP Switches)

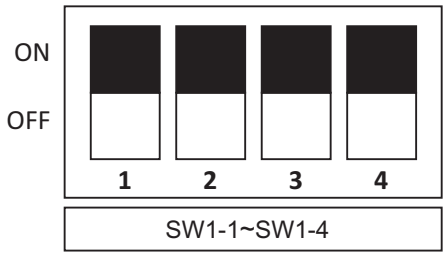


Figure 15.2A - SW1-1 to SW1-4 DIP Switch Layout

Settings are made using the DIP switches on the main control board.
Note: The DIP switch is read only once at power-on. After power is applied, changes will not be detected again until the system is completely powered OFF and restarted.

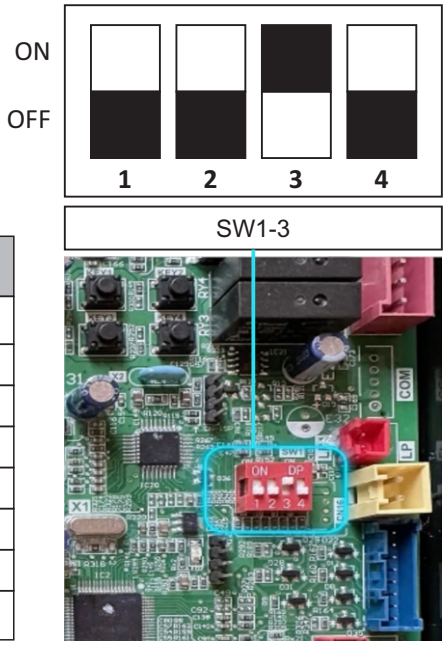


Figure 15.2B DIP Switch

Table 15.2 SW1 DIP Switch Settings

SW1 Dip Switch		Description	
NO.	Setting item	Status	Content
SW1-1	Single cooling/heat pump	ON	AC outdoor unit
		digit (OFF)	HP outdoor unit
SW1-2	Operating capacity	ON	Lower capacity
		digit (OFF)	Normal capacity
SW1-3	Control mode	ON	485 communication
		digit (OFF)	24V ON/OFF control
SW1-4	Keep the factory defaults		

15. System Operation

15.3 Operation Modes

Cooling Mode

1. When the indoor unit receives a cooling start signal from the thermostat or wired controller, it starts the indoor blower and runs at the commanded fan speed (Y1/Y2 signal).
   Once a cooling stop signal is received, the indoor fan will stop after a short delay.

2. When the outdoor unit receives a cooling start signal, the outdoor fan and compressor start.
   The outdoor fan and compressor speeds adjust automatically based on:

   - Y1/Y2 signal
   - The set temperature difference
   - Load conditions
     When a cooling stop signal is received, the unit stops after a short delay.

Heating Mode

1. When the indoor unit receives a heating start signal, it starts the blower and runs the commanded fan speed.
   When a heating stop signal is received, the fan will stop after a short delay.

2. When the outdoor unit receives a heating start signal, the compressor and blower start and adjust speed according to:

   - Y1/Y2 signal
   - Set temperature difference
   - Outdoor temperature/load conditions

3. During heating, the outdoor unit may enter defrost mode, during which:

   - Both indoor & outdoor blowers may stop
   - The four-way valve shifts to cooling mode
   - The compressor enters defrost control

Emergency Heat Mode

When the indoor unit has electric auxiliary heat installed:

- If an emergency heat signal (W1/W2) is received, the indoor blower runs and the electric heater turns ON.
- In emergency mode:
  - Indoor blower runs high speed
  - Outdoor unit does not run
- When the emergency heat stop signal is received, the heater shuts off and the blower stops after a short delay.

15.4 Control Mode

Base Control

Compressor Control

- The compressor can only be restarted after running for a minimum time.
  This prevents frequent starts/stops which could damage the compressor.

15. System Operation

Electronic Expansion Valve (EEV) Control

- On startup, the EXV resets (may make a rattling sound).
- Cooling mode: valve opens to maximum preset steps before compressor starts.
- Heating mode: valve opens to a smaller preset value before compressor starts.

Indoor Fan Control

- Indoor fan has 7 speeds (or 2 speeds if using a 24V thermostat).
- In heating mode, the indoor blower may stop during defrost.

Outdoor Fan Control

- Outdoor fan has 5 speeds, controlled by outdoor temperature.
- In fan-only mode, the outdoor fan does not run.

Four-Way Valve Control

- De-energized in cooling mode.
- Energized when entering heating mode (except during defrost).
- During defrost the valve switches temporarily to cooling circuit to melt frost.

Special Control

Oil Return Control

If the unit runs at low frequency for a long time, the compressor RPM is automatically increased to return oil. After 5 minutes, normal operation resumes.

Defrost Control

- Activated when coil temperature is below the set value due to frost.
- Outdoor fan stops, reversing valve shifts to cooling, compressor runs defrost mode.
- When coil temperature rises back to threshold, the unit exits defrost.

Warm-Up Control

- To protect the compressor in very cold temperatures, the controller warms the compressor
- winding at low current for up to 2 hours before startup.

Forced Start

Used when normal start is not possible.

- Hold KEY4 for 3 seconds → Forced Cooling (display “7”)
- Hold KEY4 for 6 seconds → Forced Heating (display “8”)

15.5 Protection Control

High Pressure Protection

- If the high-pressure switch opens continuously, the system shuts down.
- If opened twice in a short period, the unit must be manually reset.

Low Pressure Protection

- If the low-pressure switch opens continuously, the system shuts down.
- If it happens repeatedly, manual reset is required.

Refrigerant Leakage Protection

If refrigerant leakage is detected:

- Indoor fan goes to maximum speed
- Outdoor fan stops
- Alarm condition is created

A technician must verify and clear the issue before restart.

15. System Operation

15.6 Unit Functions

(When RS485 wire controller is required – refer to the instruction manual for the wire controller)

- **Mode:** Auto / Cool / Dry / Fan / Heat / Emergency Heat
- **Fan Speed:** Mute / Low / Med-low / Med / Med-high / High speed / Turbo / Auto
- **Timer ON/OFF**
- **Temp Setting**
- **Weekly Timer**
- **24-Hour System**
- **12-Hour System**
- **Auto-Restart (on some models)**
- **Child Lock**
- **LCD Display**
- **Clock**
- **Panel function (on some models)**

16. Troubleshooting

The KOIT outdoor unit (ODU) displays all system faults using the DSP1-1 and DSP1-2 LED windows located on the main control board. These displays show error codes whenever a sensor issue, communication failure, protection trip, or configuration problem is detected.
For display locations and normal operating indications, refer to Section 15.1 — Default Display.

NOTICE

- Certain error codes relate to configuration settings rather than hardware failure.
- If the error involves model mismatch, control mode, or communication setup, verify DIP switch settings listed in Section 15.2 — Field Settings before beginning component diagnostics.

16.1 Error & Protection Codes

Refer to the table below to determine the cause of the displayed error code and the recommended steps to resolve the issue. Each code helps identify whether the problem is related to sensors, communication, protection trips, or configuration settings.

16. Troubleshooting

Table 16.1 — Error & Protection Codes

Code	Reason	Remark
E0	IDU & ODU Communication failure	The IDU & ODU wiring connection correct?
E1	IDU Room temperature sensor failure. (IDU RT failure)	IDU room sensor and PCB.
E2	IDU Tube temperature sensor failure. (IDU IPT failure)	IDU coil sensor and PCB.
E3	ODU Pipe temperature sensor failure. (OPT)	ODU pipe sensor and ODU PCB
E6	IDU PG Fan motor / DC fan motor works abnormal (IDU failure)	Fan motor, fan blade and PCB.
E7	ODU Environment temperature sensor failure	ODU environment sensor and ODU PCB.
E8	ODU Exhaust temperature sensor failure.	ODU exhaust sensor and ODU PCB.
E9	IPM / Compressor driving control abnormal.	ODU PCB, compressor, etc.
EA	ODU Current test circuit failure	ODU PCB broken?
Eb	The main PCB and display board communication abnormal	Display board and ODU PCB.
EC	The ODU PCB MCU and Fan motor / Compressor driving IC communication abnormal	ODU main PCB
EE	ODU EEPROM failure.	ODU PCB broken? Try to re-power on AC unit.
EF	ODU DC fan motor failure.	Fan motor, ODU PCB.
EU	ODU Voltage test circuit abnormal.	ODU PCB.
Ey	ODU Condenser outlet temperature sensor failure	ODU Condenser outlet sensor and ODU PCB.
P0	IPM module protection.	ODU PCB
P1	Over / under voltage protection.	ODU PCB broken? Power supply abnormal?
P2	Over current protection.	ODU PCB broken? Power supply abnormal?
P4	ODU Discharge pipe over temperature protection.	Please check the troubleshooting for detail.
P5	Sub-cooling protection on cooling mode.	Please check the troubleshooting for detail.
P6	Overheating protection on cooling mode.	Please check the troubleshooting for detail.
P7	Overheating protection on heating mode.	Please check the troubleshooting for detail.
P8	Outdoor Over temperature/Under temperature protection.	Please check the troubleshooting for detail.
P9	Compressor driving protection (Load abnormal).	Please check the troubleshooting for detail.
F0	Infrared Customer feeling test sensor failure. (IDU failure)	Querying by press remote controller

16. Troubleshooting

F1	Electric power test module failure. (IDU failure)	Querying by press remote controller
F2	Discharge temperature sensor failure PROTECTION.	1. The discharge temperature sensor damage 2. The discharge temperature sensor connection is loose 3. ODU main PCB damage
F3	ODU coil temperature failure PROTECTION.	1. The coil temperature sensor damage 2. The coil temperature sensor connection is loose 3. ODU main PCB damage
F4	Cooling system gas flow abnormal PROTECTION.	Please check the troubleshooting for detail.
F5	PFC PROTECTION	Please check the troubleshooting for detail.
F6	The Compressor lack of phase / Anti-phase PROTECTION.	Please check the troubleshooting for detail.
F7	IPM Module temperature PROTECTION	Please check the troubleshooting for detail.
F8	4-Way Value reversing abnormal.	Please check the troubleshooting for detail.
F9	The module temperature test circuit failure.	ODU PCB
FA	The compressor phase-current test circuit failure.	ODU PCB
Fb	Limiting/Reducing frequency for over load protection on Cooling/Heating mode.	Querying by press remote controller
FC	Limiting/Reducing frequency for high power consumption protection.	Querying by press remote controller
Fd	The communication of refrigerant detection sensor and indoor PCB abnormal	The refrigerant sensor disengaged or faulty.
FE	Limiting/Reducing frequency for module current protection (phase current of compressor).	Querying by press remote controller
FF	Limiting/Reducing frequency for module temperature protection.	Querying by press remote controller
FH	Limiting/Reducing frequency for compressor driving protection.	Querying by press remote controller
FP	Limiting/Reducing frequency for anti-condensation protection.	Querying by press remote controller
FU	Limiting/Reducing frequency for anti-frost protection.	Querying by press remote controller
Fj	Limiting/Reducing frequency for discharge over temperature protection.	Querying by press remote controller
Fn	Limiting/Reducing frequency for ODU AC current protection.	Querying by press remote controller
Fy	Gas leakage protection	Please check the troubleshooting for detail.
H1	High pressure switch failure (HP)	1. High pressure switch damage 2. High pressure switch loose connection

16. Troubleshooting

		3. ODU main PCB damage
H2	Low pressure switch failure (LP)	1. Low pressure switch damage 2. Low pressure switch loose connection 3. ODU main PCB damage
H3	High pressure sensor failure (SHP)	1. high pressure sensor damage 2. high pressure sensor loose connection 3. ODU main PCB damage
H4	Low pressure sensor failure (SHP)	1. Low pressure sensor damage 2. Low pressure sensor loose connection 3. ODU main PCB damage
Hd	Excessive refrigerant concentration / refrigerant leakage	1. Is there R454B gas leakage? 2. Are there polluting gases around the environment? 3. Refrigerant test sensor fault? 4. Indoor PCB defective?
C5	Communication fault of the Wired Controller and indoor unit main PCB.	1. Check the connection of the wired controller and PCB; 2. Indoor PCB defective？ 3. The wired controller failed？
dA	The indoor supply air temperature sensor failure	Check the sensor and PCB

NOTICE

Remote Controller Failure Code Querying Function

- Some error codes (such as Fb–Fj or Fn) require using the remote controller for inspection.
- While the unit is operating, press the ECO button 8 times within 8 seconds.
- The buzzer will sound BIBI twice, and the unit will enter the special failure code inspection mode, allowing the display of additional diagnostic codes (e.g., Fb, FC, Fd, FE, FF, FH, FP, FU, Fj, Fn, etc.).

16. Troubleshooting

16. 2 Troubleshooting Error Codes Flowcharts

E0 ---IDU & ODU Communication Failure

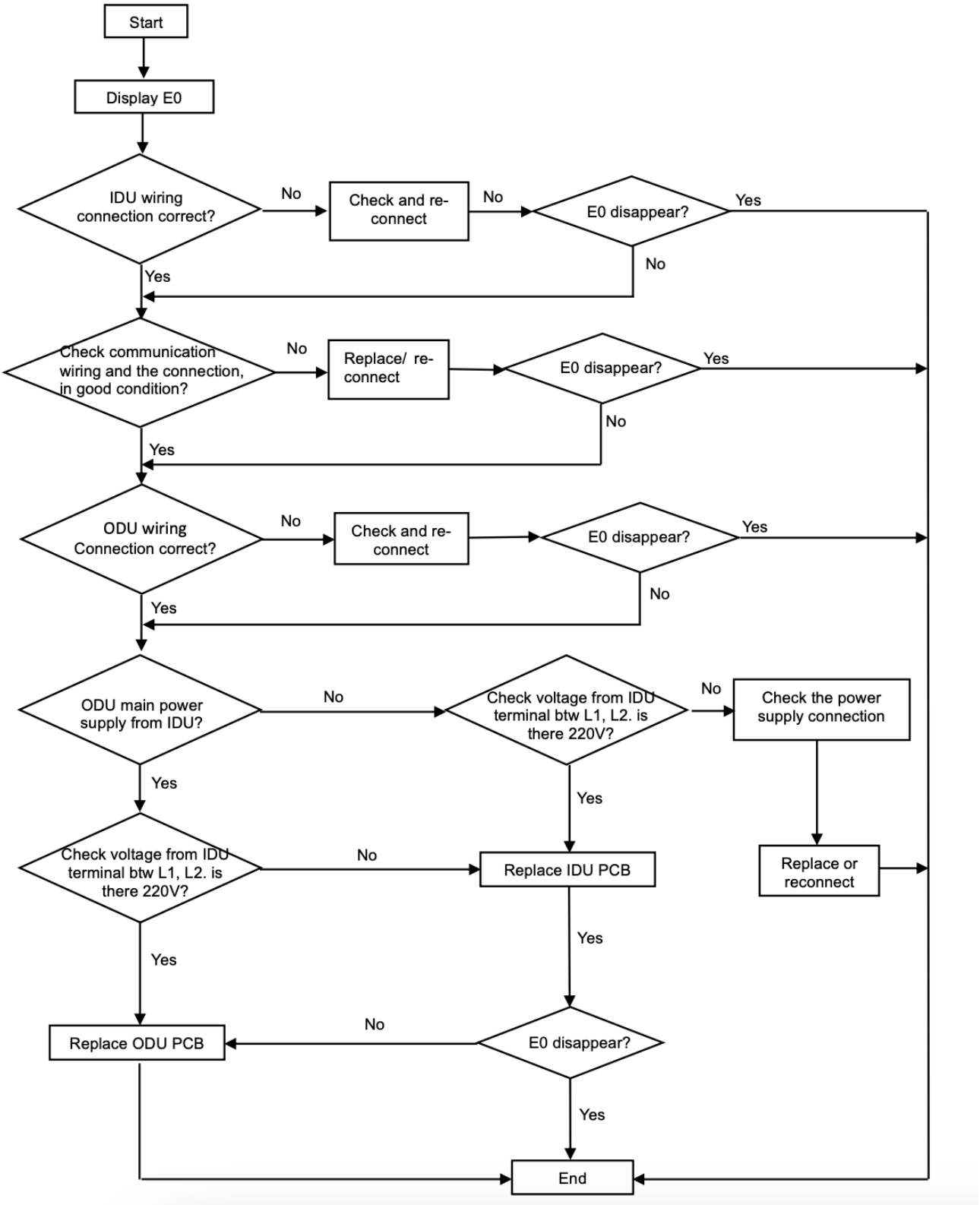


Figure 16.2A

16. Troubleshooting

E3 / E7 / E8 / Ey — ODU Coil Temperature Sensor / Ambient Temperature Sensor /
Discharge Temperature Sensor / Condenser Outlet Temperature Sensor Failure

When any outdoor temperature sensor becomes open-circuit or short-circuit, the unit will display fault code E3, E7, E8, or Ey. In this condition, both the indoor unit (IDU) and outdoor unit (ODU) will shut down. Once the sensor resistance returns to normal, the system will return to standby and can be restarted.

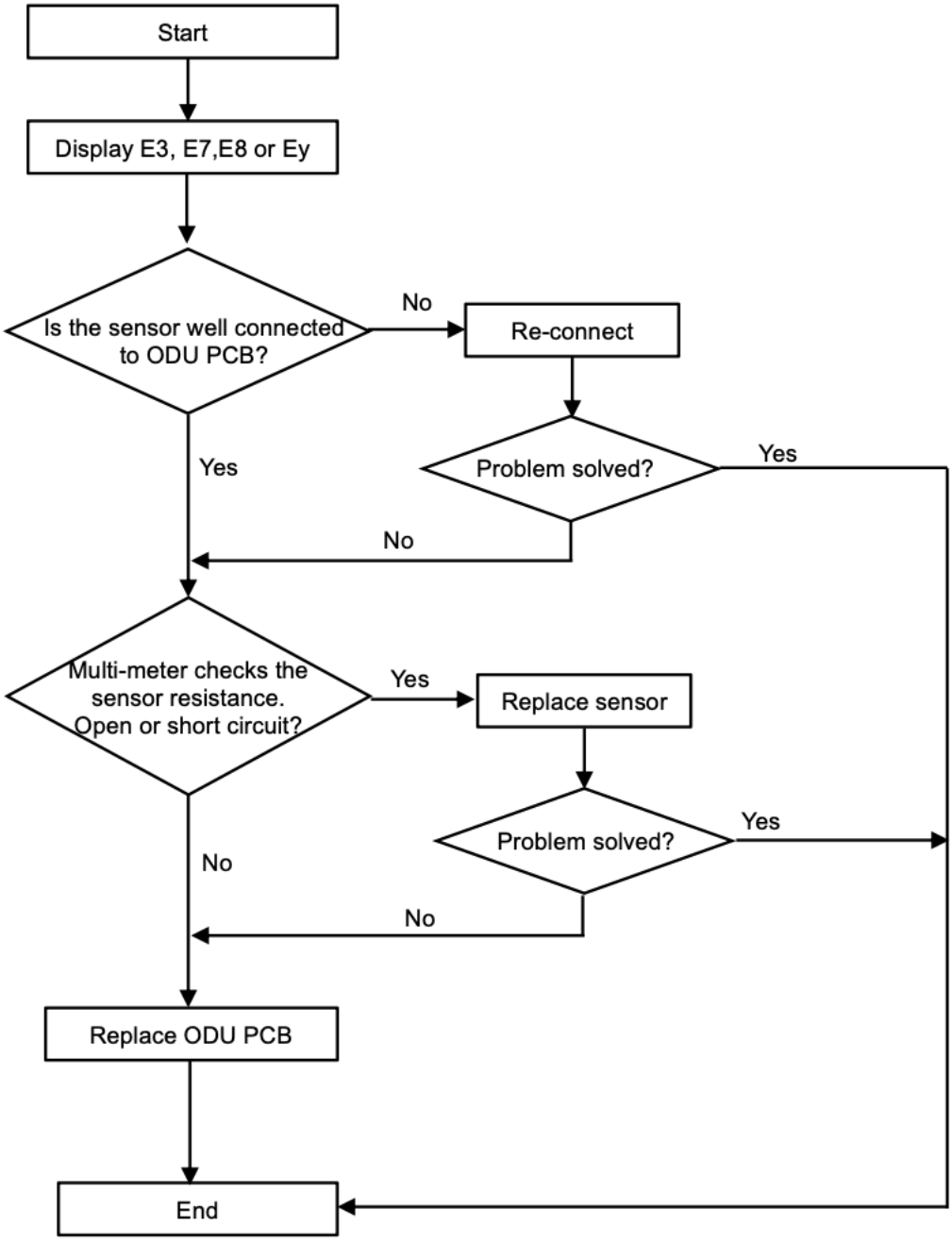


Figure 16.2B

16. Troubleshooting

E9---ODU IPM /Compressor Driving Fault

If unit have 6 times stopping works for IPM protection continuously, it will display E9 error, and unit can't be recovered to operation, except press ON/OFF button.

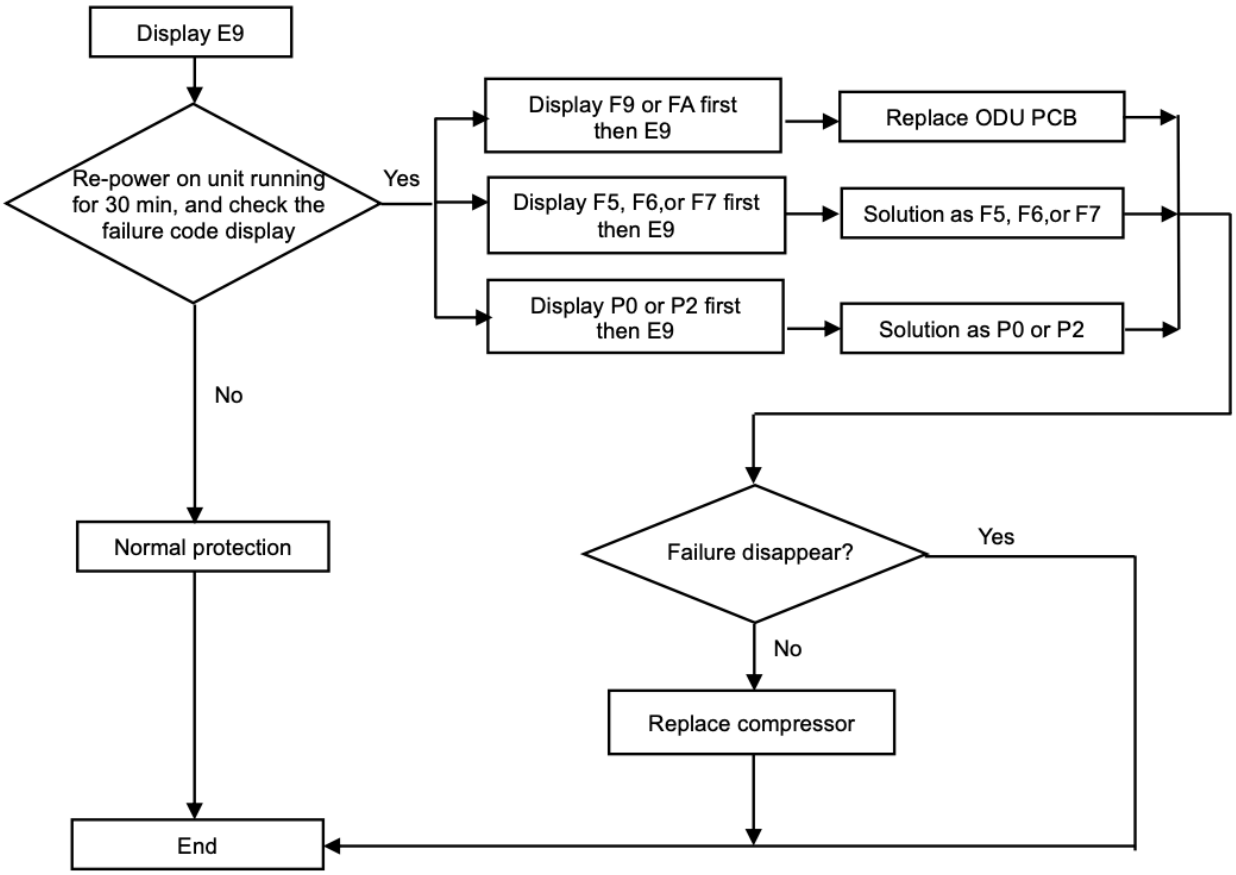


Figure 16.2C

EA — ODU Current Sampling Failure

Cause: Outdoor current sampling circuit failure or incorrect driver parameters.

Solution: Replace the ODU PCB.

Eb — ODU Communication Failure Between Main Board and Display Board

Causes:

1. Communication wire damaged
2. Outdoor main board damaged
3. Display board damaged

Solutions:

1. Replace the communication wire
2. Replace the outdoor main board
3. Replace the display board

EC — Communication Error Between ODU PCB MCU and Fan Motor / Compressor Driving IC

Cause: ODU mainboard damage

Solution: Replace the ODU PCB

EE — ODU EEPROM Failure

Cause: ODU mainboard damaged

Solution: Replace the ODU PCB

16. Troubleshooting

EF — ODU DC Fan Motor Failure

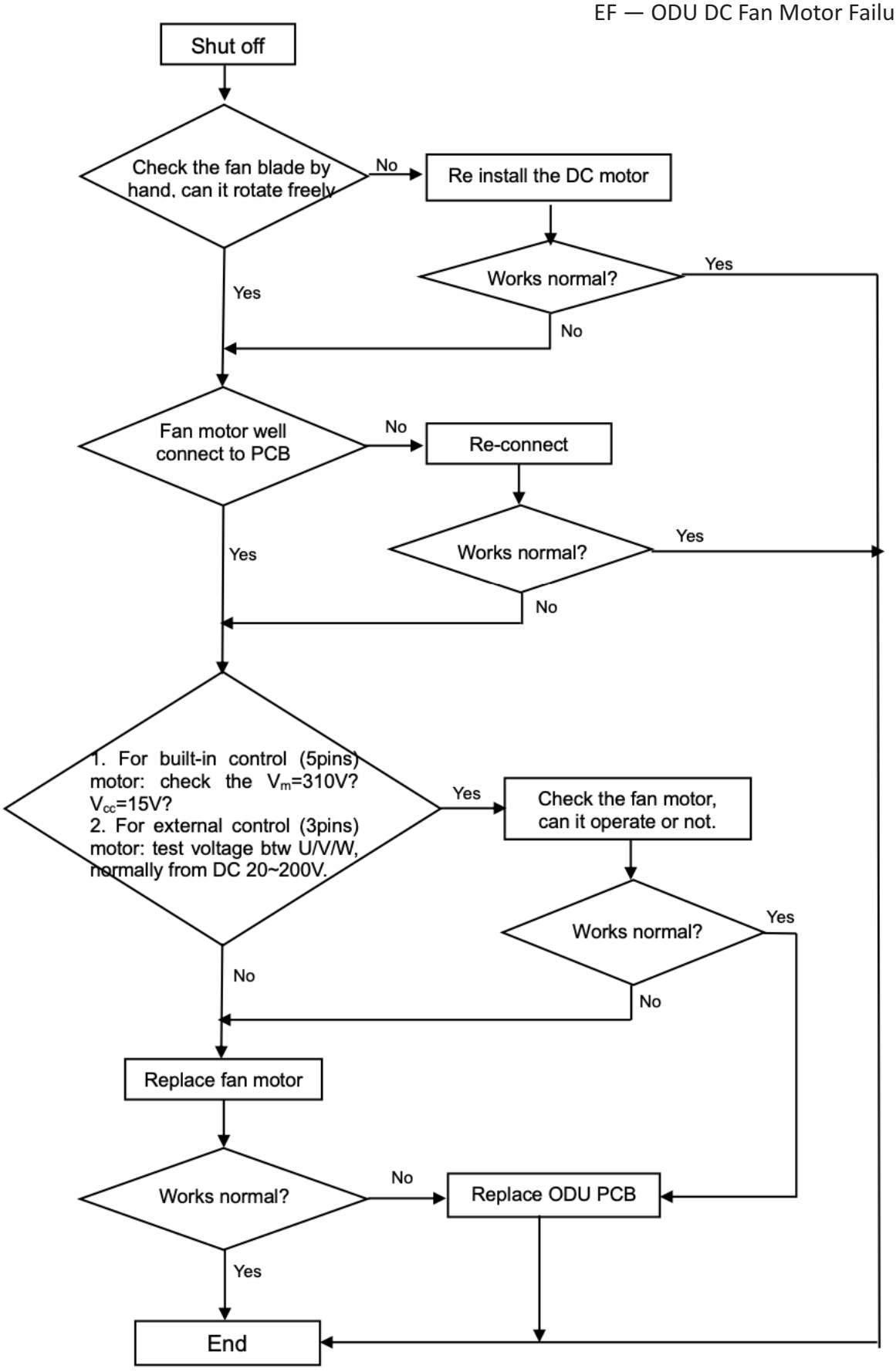


Figure 16.2D

16. Troubleshooting

EU — ODU Voltage Test Sensor Failure

After power relay works, while tested voltage effective value less than 50V for 3s continuously, unit will display EU.

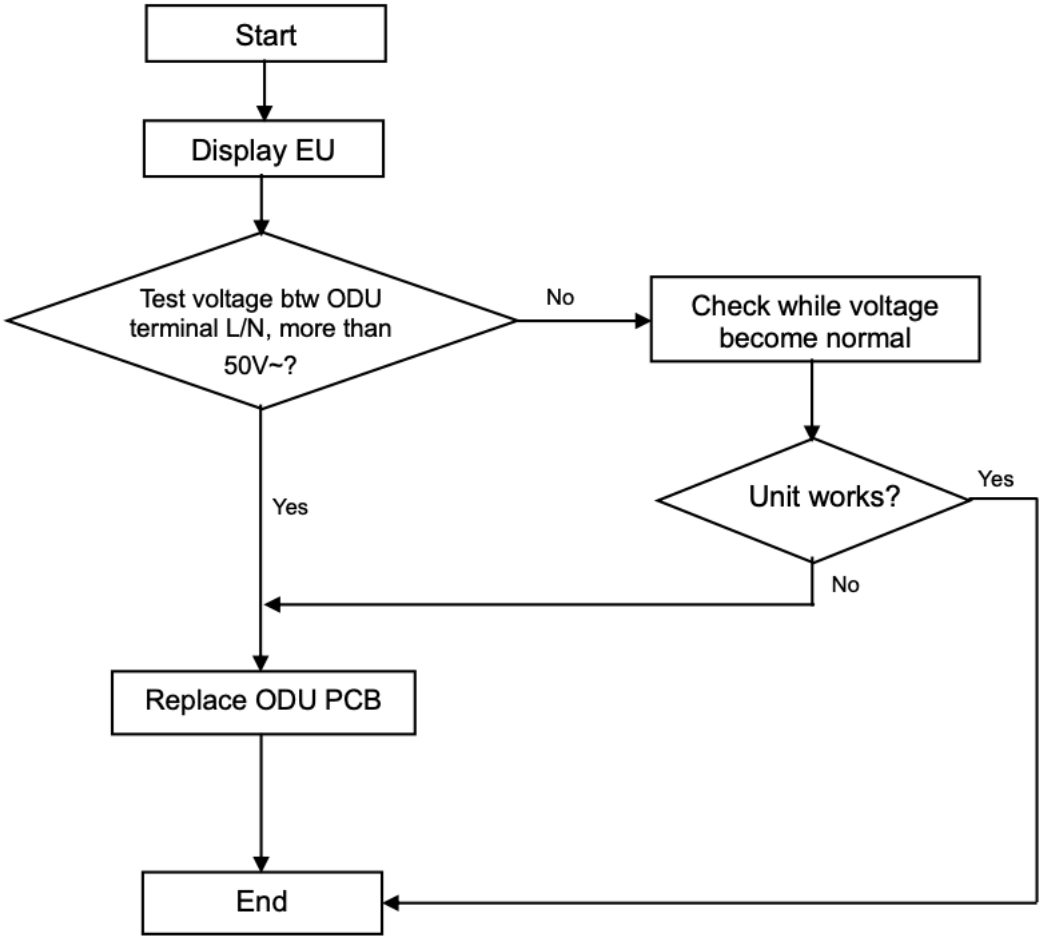


Figure 16.2E

16. Troubleshooting

When overheat or overcurrent for IPM, AC unit will display P0 protection.

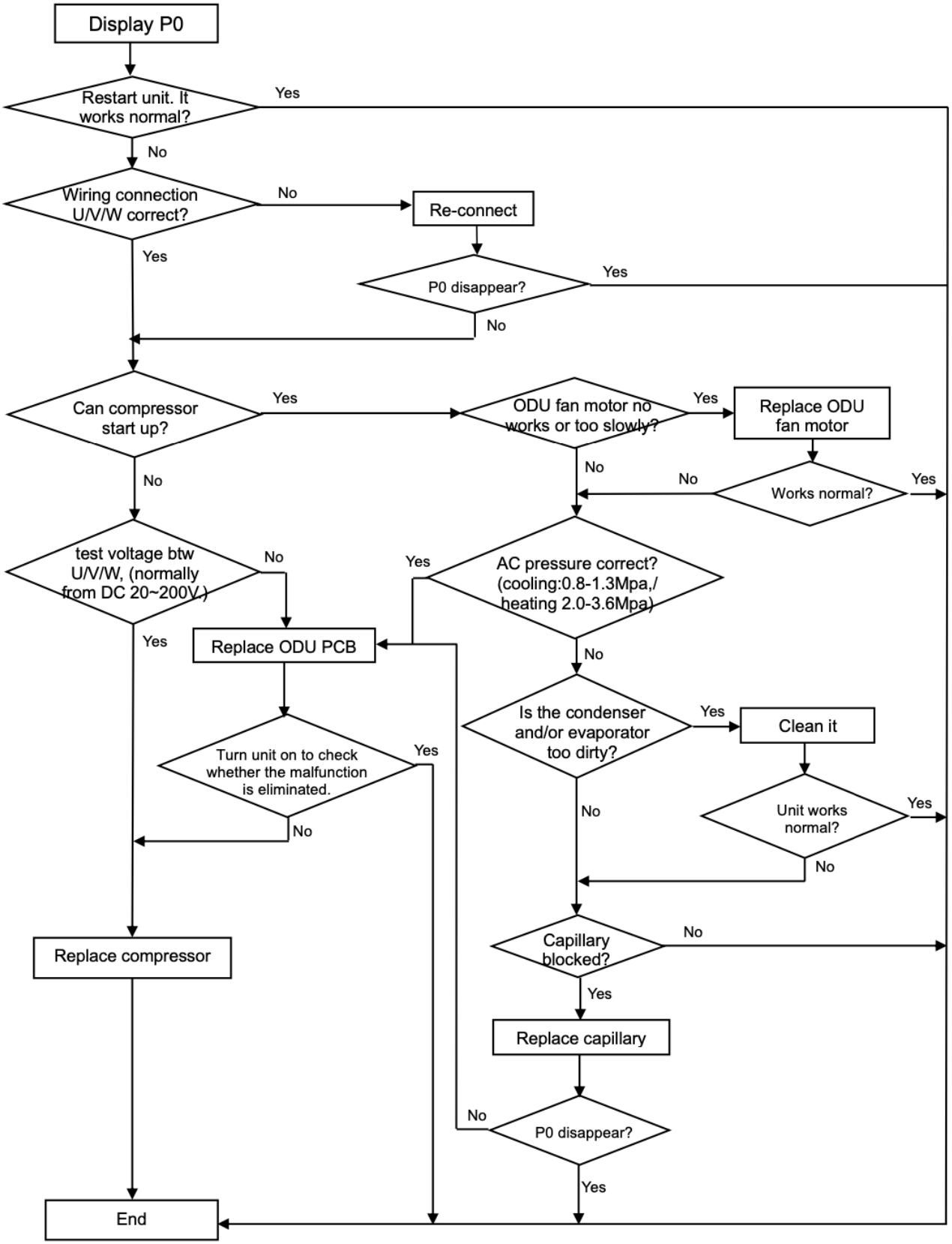


Figure 16.2F

16. Troubleshooting

P1--- Over / Under Voltage Protection

1. Test voltage between L1 & L2, When the power supply V > AC 260V or V < AC 150V, AC will display P1 protection, unit willrecover back to previous status while V > AC 155V.
2. Test voltage on the big size electrolytic capacitor of ODU PCB, When DC busbar voltage V > DC 420V or V < DC 150V, IDU display P1 protection. unit will recover back to previous status while DC190V < V < DC 410V

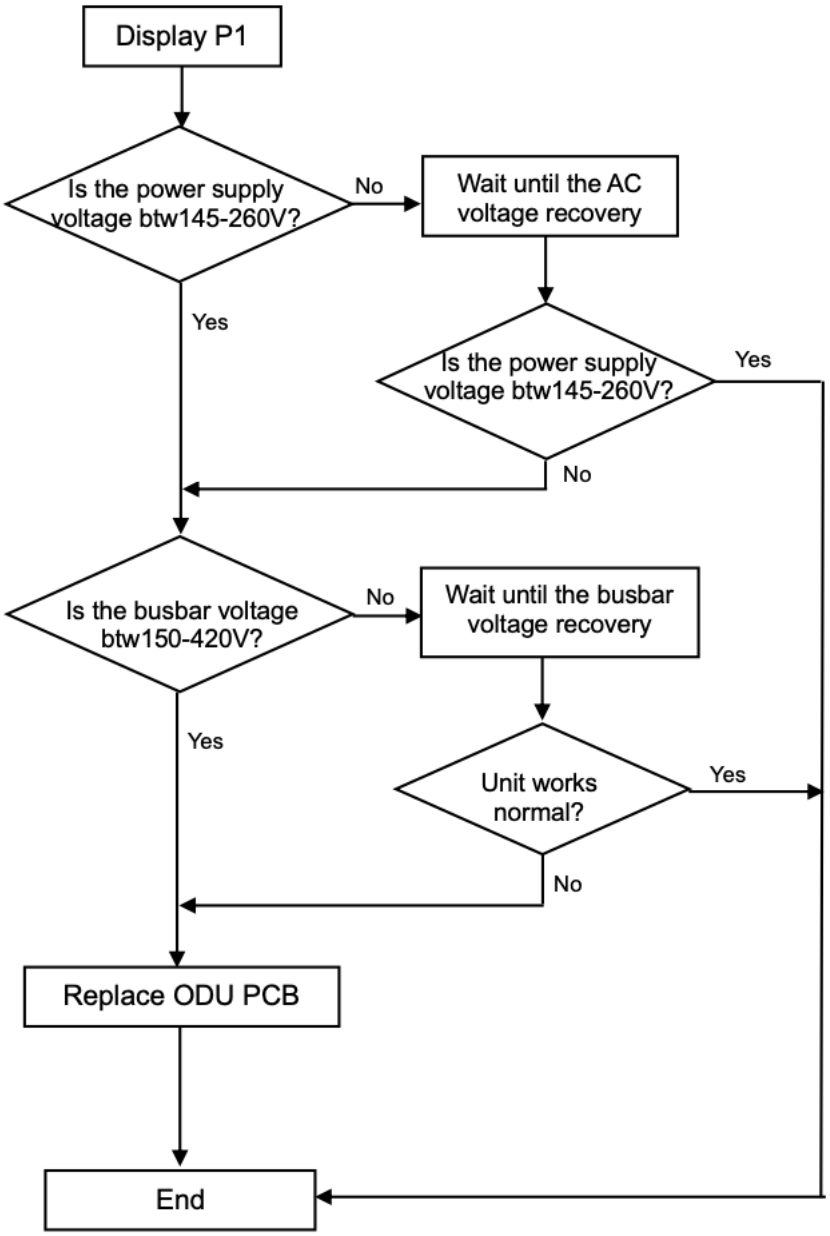


Figure 16.2G

16. Troubleshooting

P2---Over Current Protection

When the AC unit running current more than I max , it will stop and display P2 protection.
Note: for different AC model, I_{max} has a difference valve.

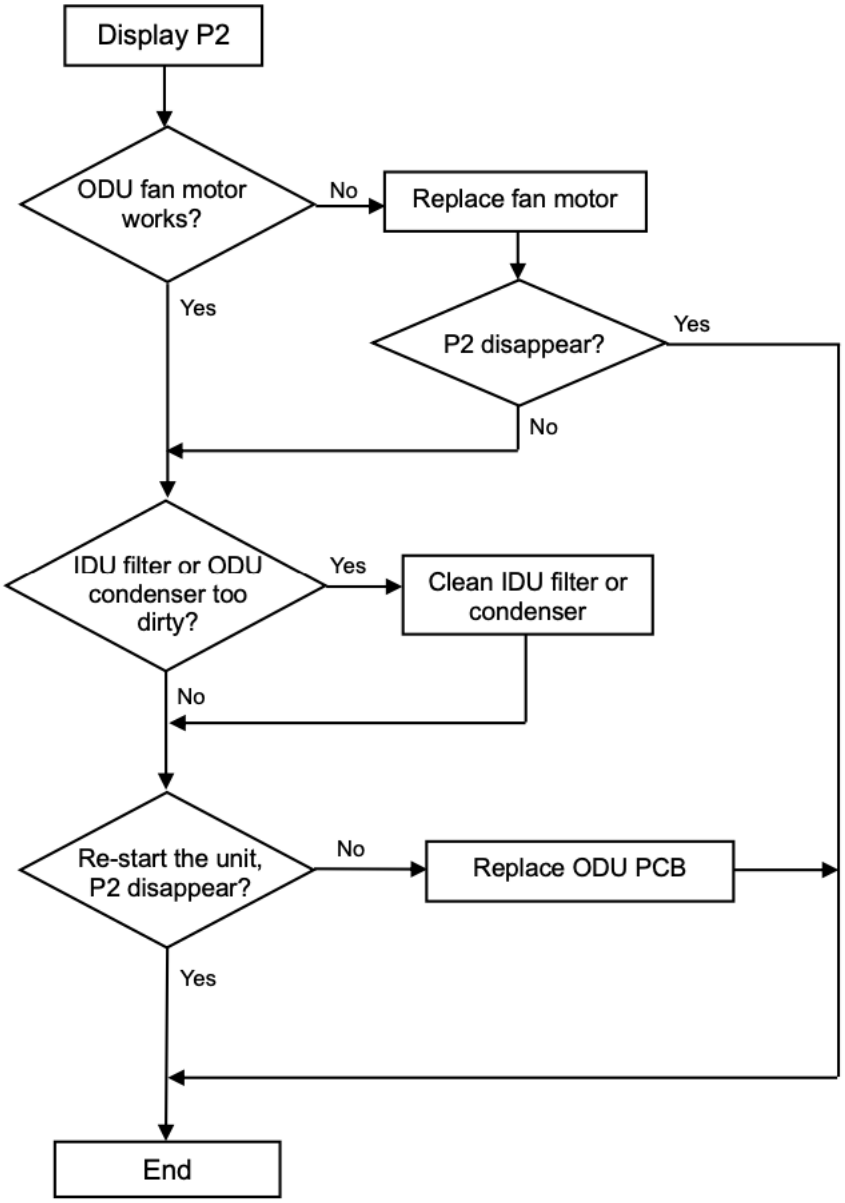


Figure 16.2H

16. Troubleshooting

P4 ---ODU Discharge Temperature Overheating Protection

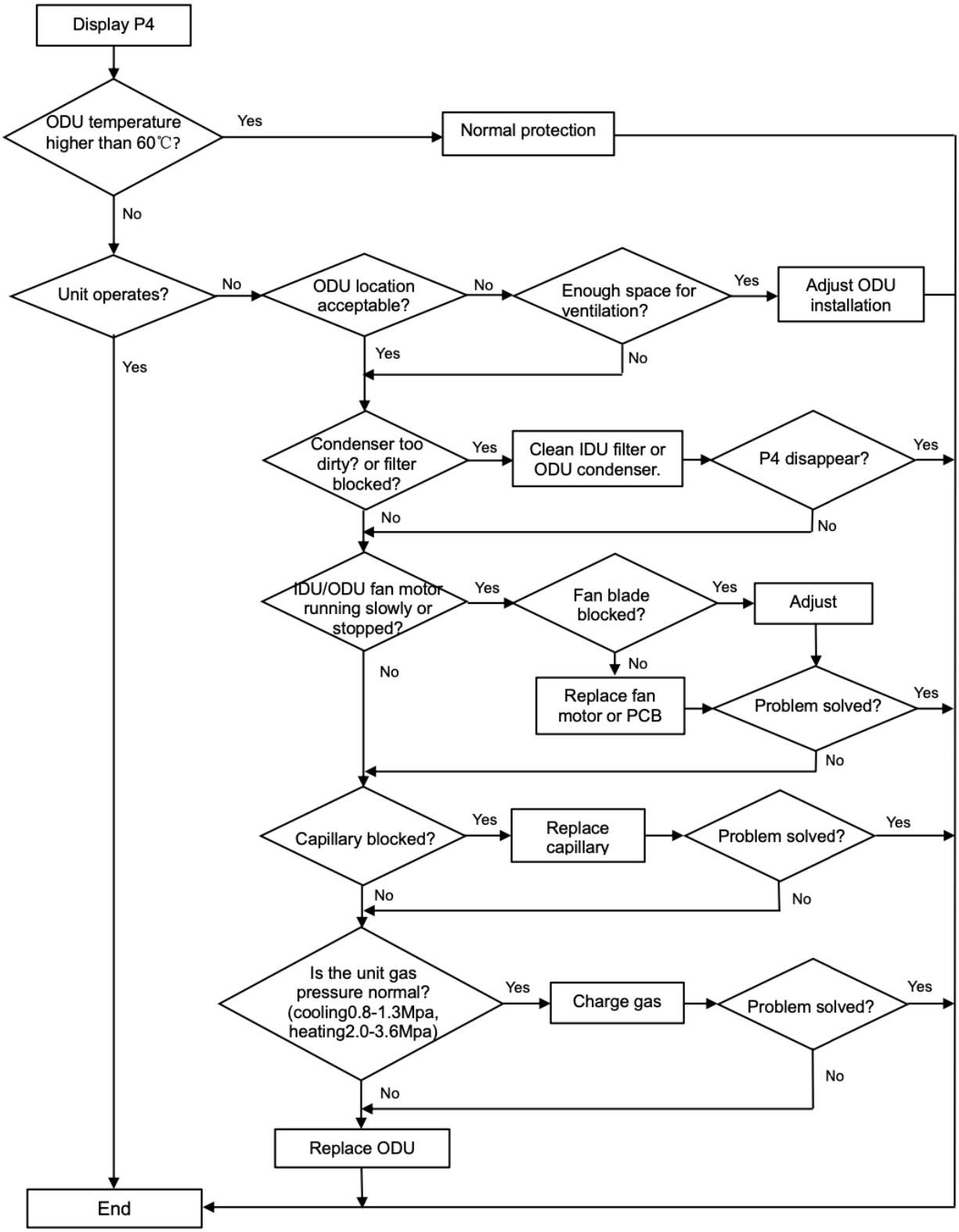


Figure 16.2I

16. Troubleshooting

P5---Sub-Cooling Protection on Cooling/Dry Mode

On Cooling or Dry mode, when IDU evaporator coil temperature IPT<1°C continuously for 3 min after compressor start up for 6 min, CPU will switch off outdoor unit and show P5 failure code.

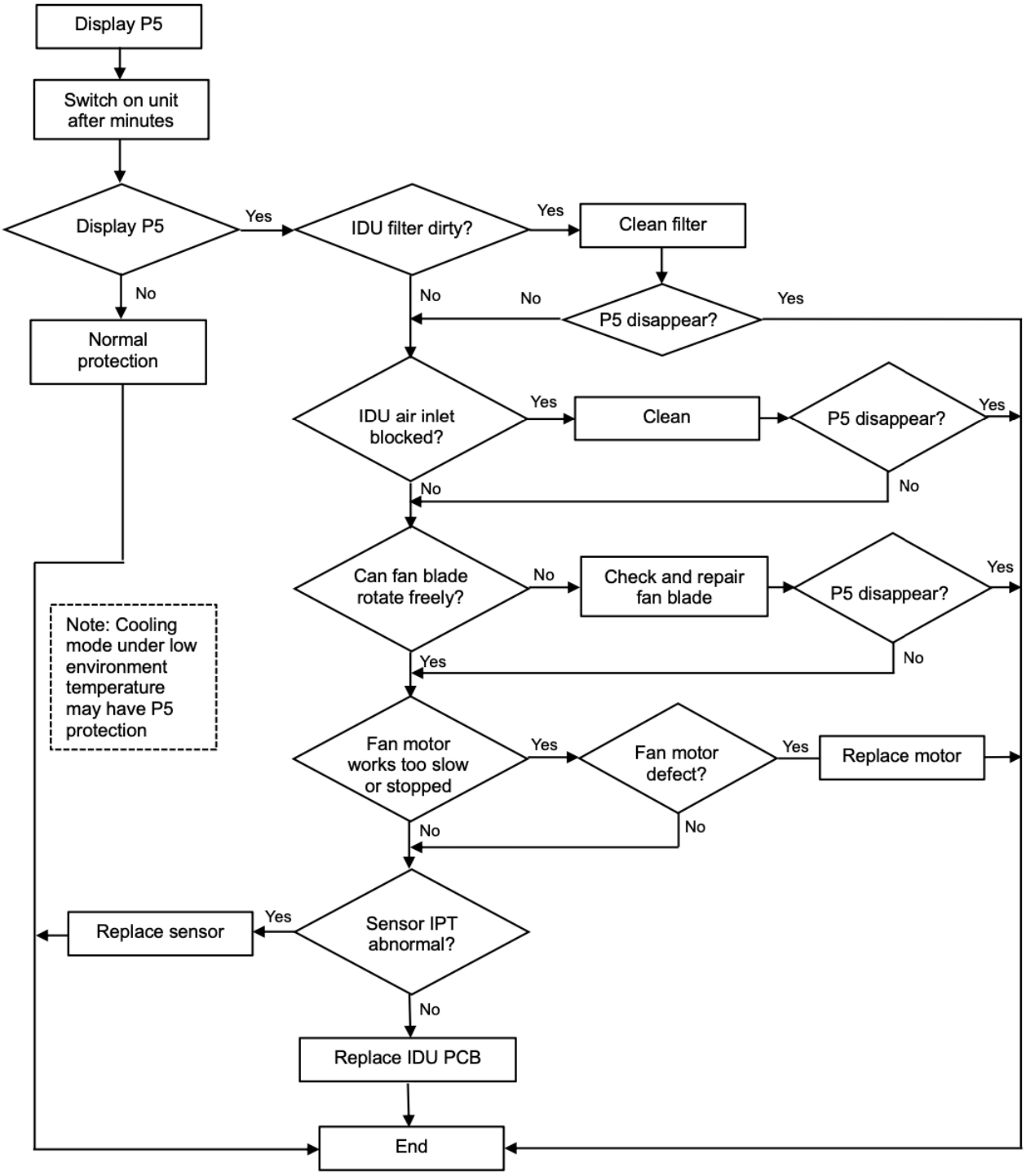


Figure 16.2J

16. Troubleshooting

P6---Overheating Protection on Cooling mode

On Cooling or Dry mode, when ODU condenser coil temperature OPT≥62 ˚C, MCU will switch off outdoor unit and show P6 failure code.

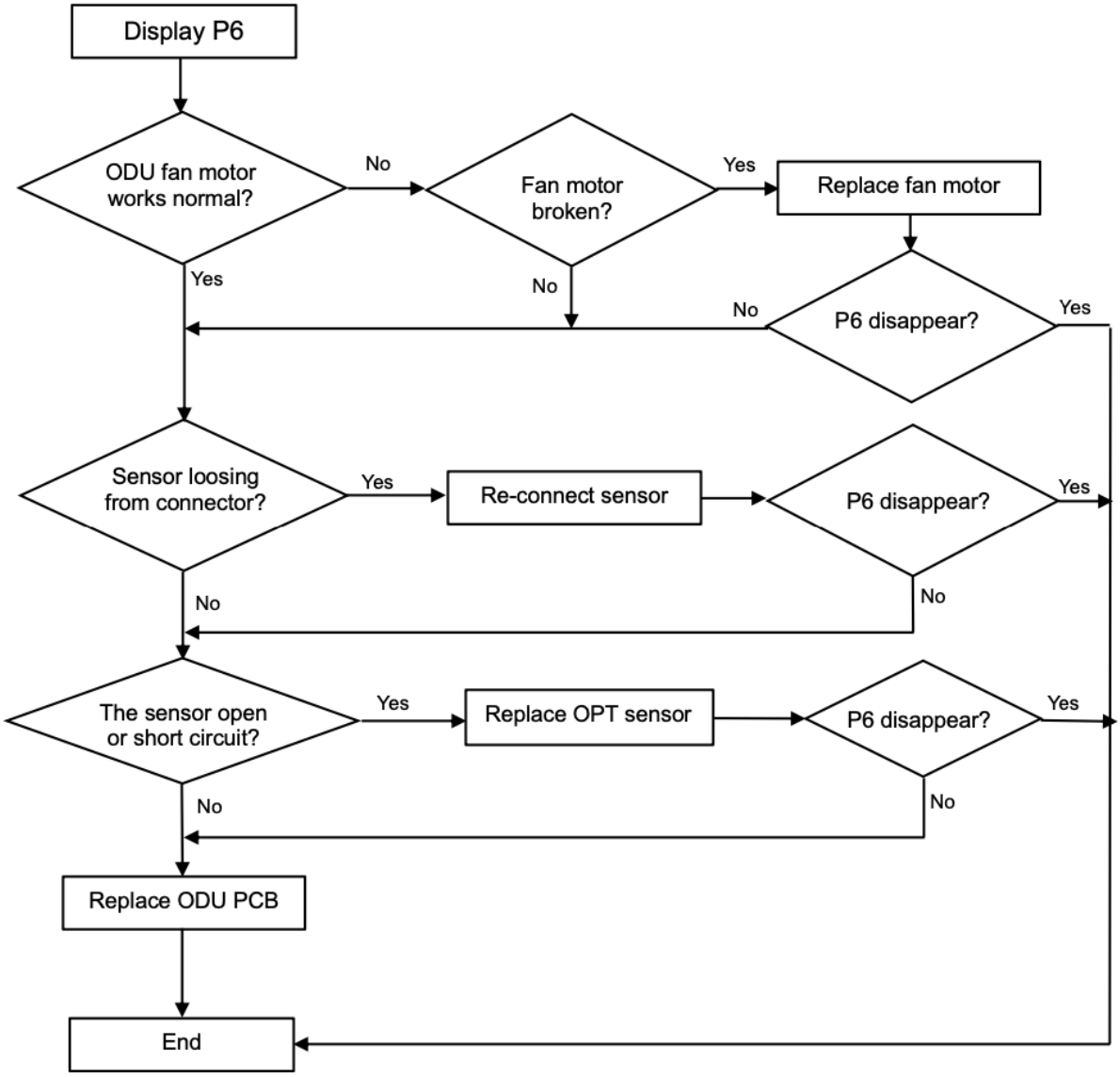


Figure 16.2K

16. Troubleshooting

P7---Overheating Protection on Heating Mode

On heating mode, when IDU evaporator coil temperature IPT≥62℃, IDU PCB will switch off outdoor unit and show P7 failure code.

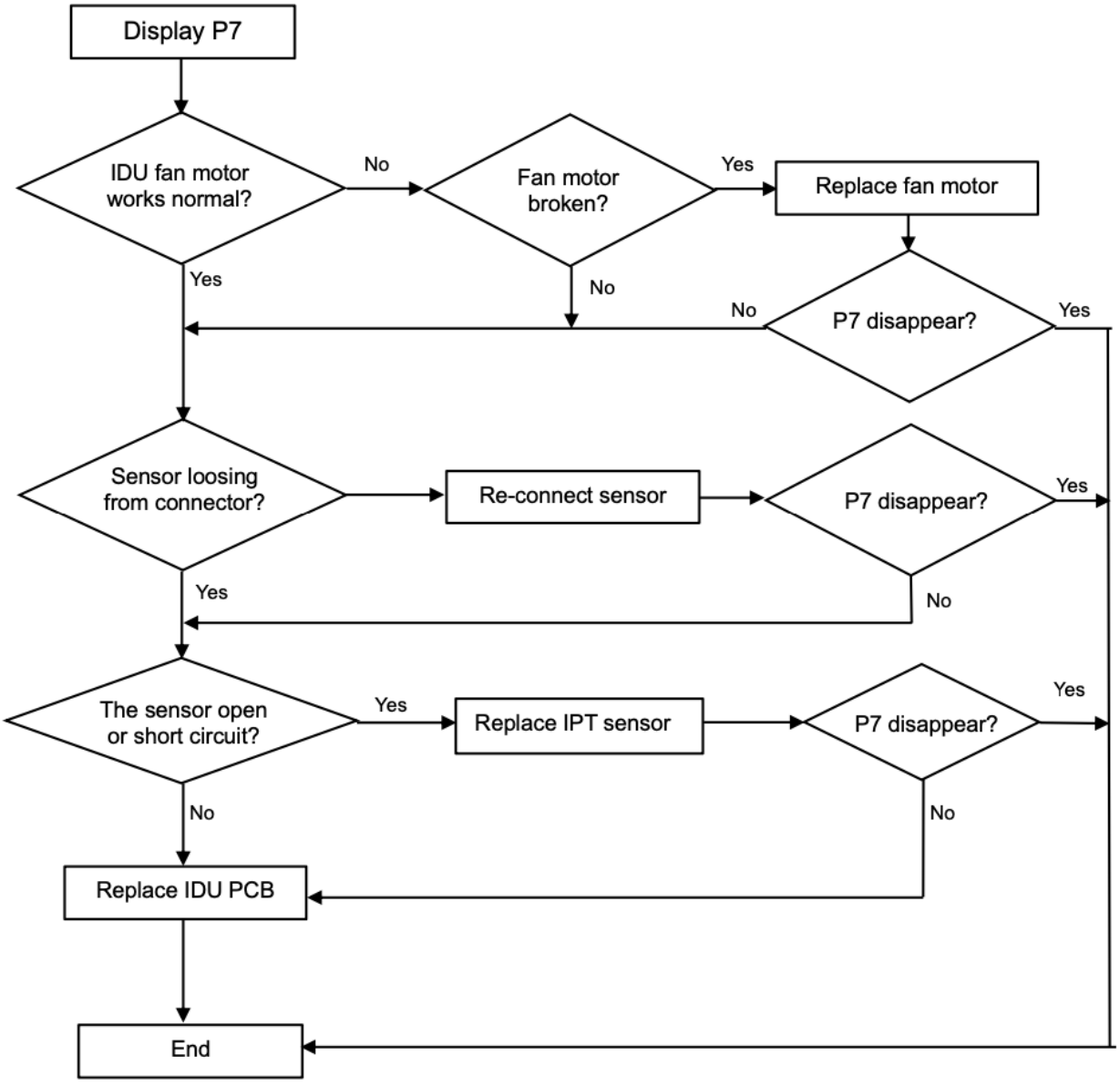


Figure 16.2L

16. Troubleshooting

P8---Outdoor Over Temperature/Under-Temperature Protection

When environment temperature as below condition, the compressor will stop working, after 200s delay, the IDU will show P8 failure code.

(1). **On Cooling or Dry mode** ODU ambient temperature: OAT＜-20℃ or OAT＞63℃;

(2). **On Heating mode**

a. OAT≥40℃ or

b. 30℃＜OAT≤40℃ and RT＞35℃

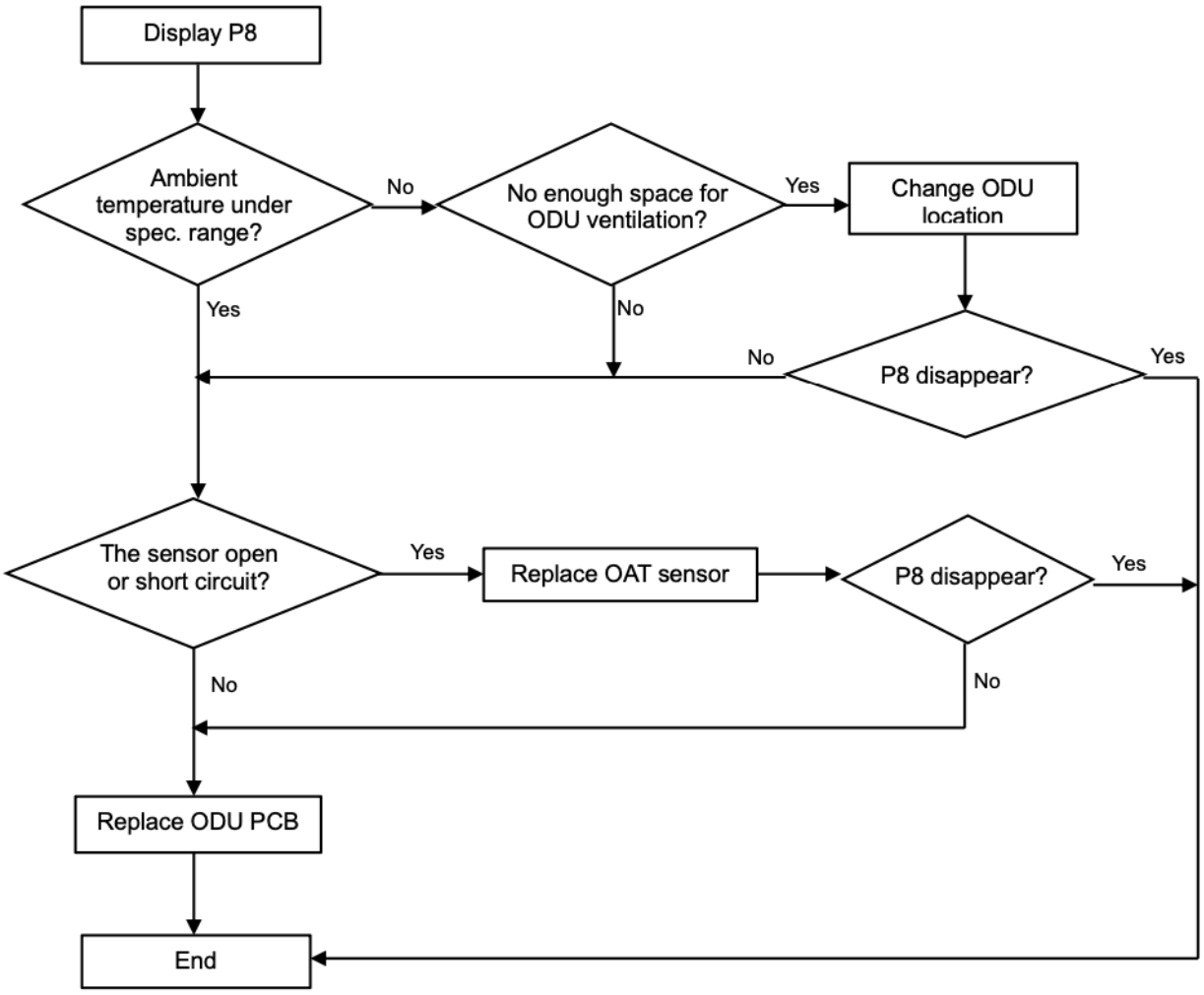


Figure 16.2M

16. Troubleshooting

P9---The compressor driving protection (the compressor load abnormal)

When compressor start up or in the process of operation, if:

(1). MCU can't test the feedback signal from compressor, or

(2). Tested an abnormal signal from compressor, or

(3). The compressor startup abnormal.

The outdoor unit will shut off, and show P9 protection.

(The unit will re-startup 6 times continuously, if it still can't work normal, then show P9 code)

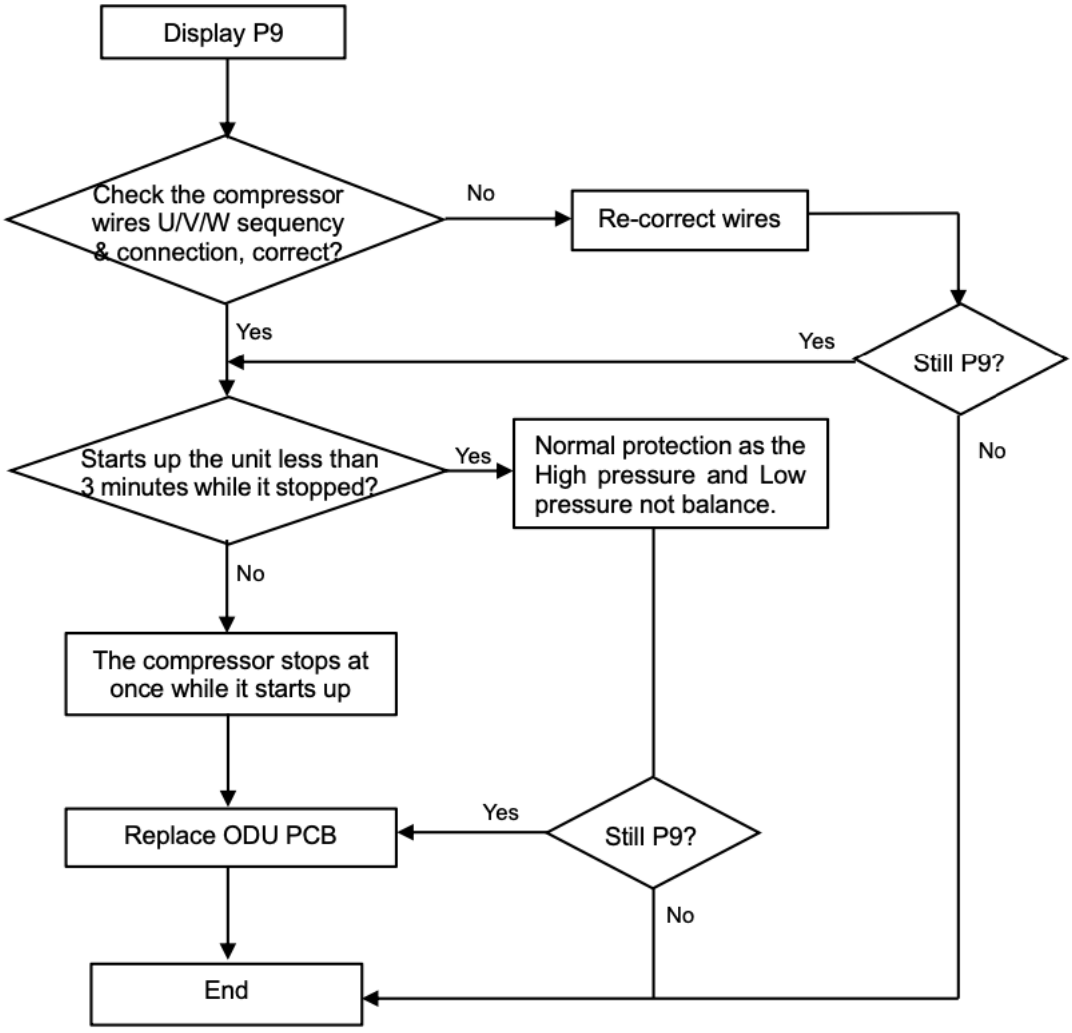


Figure 16.2N

16. Troubleshooting

F4---Cooling System Gas Flow Abnormal Protection

When compressor startup, unit will check the variation of IDU coil temperature. If there is mistake installer forgetting to open the 2 way or 3 way valve on ODU, the gas can't flow in the cooling system, it will show F4 protection.

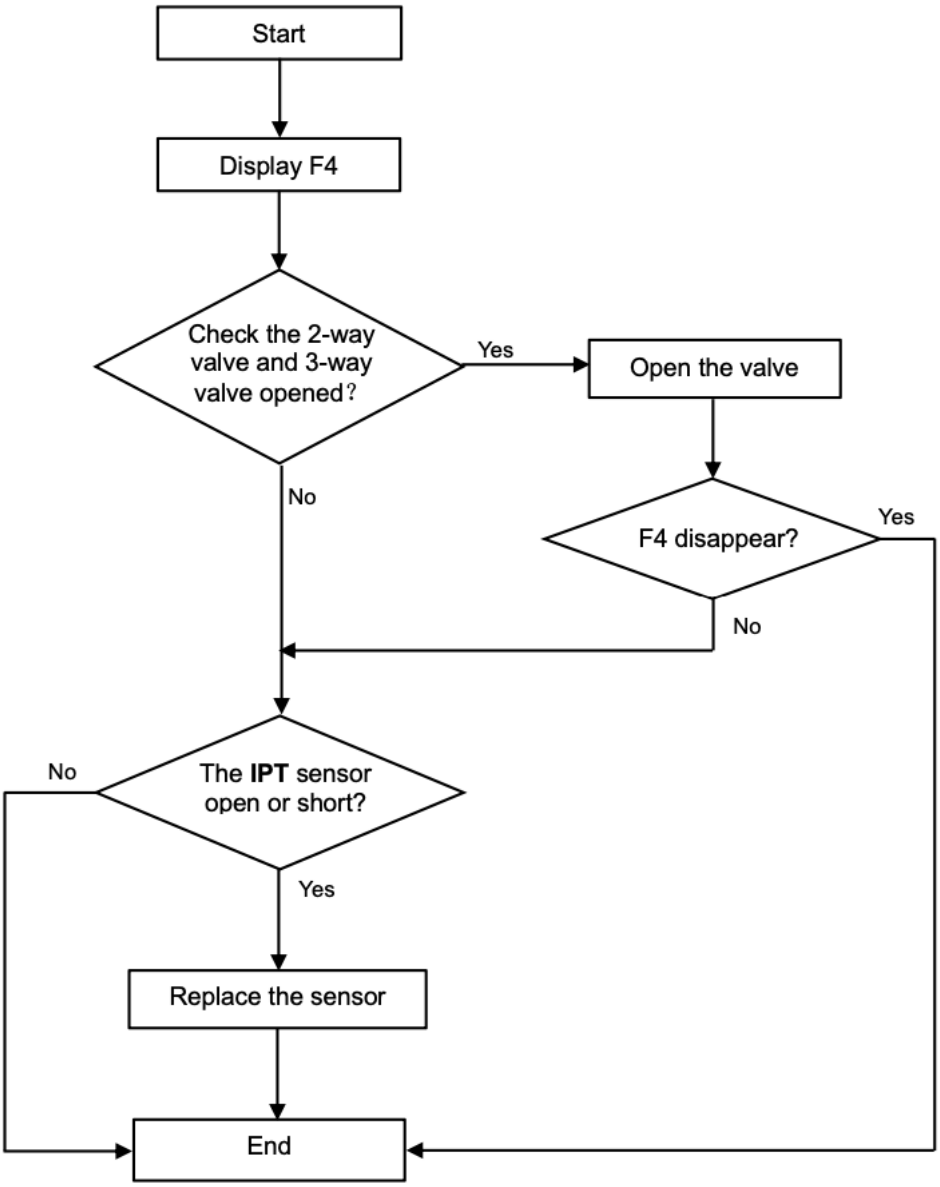


Figure 16.2O

16. Troubleshooting

F5---PFC Protection

PFC Overcurrent protection

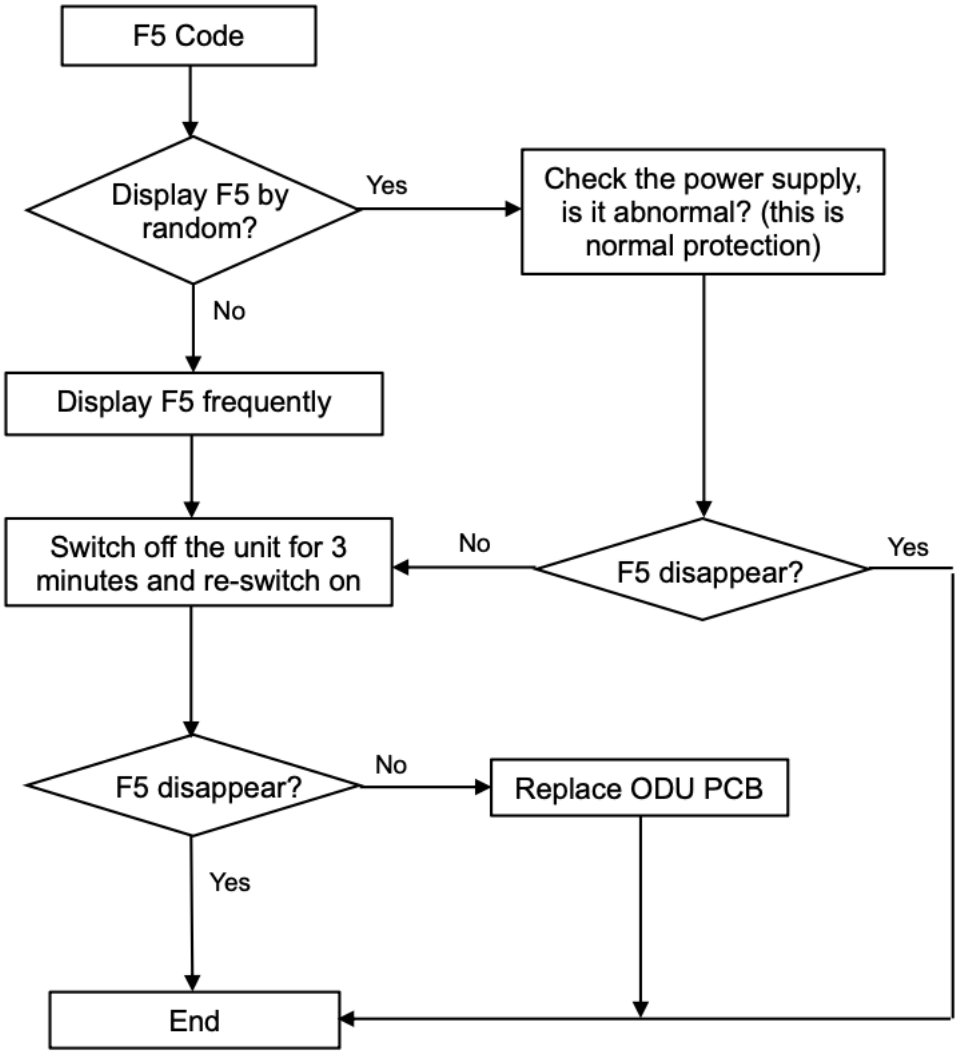


Figure 16.2P

16. Troubleshooting

F6---The Compressor Lack of Phase / Anti-Phase Protection.

If ODU PCB can't test one, two or even three phases of compressor current, it will show F6 protection.

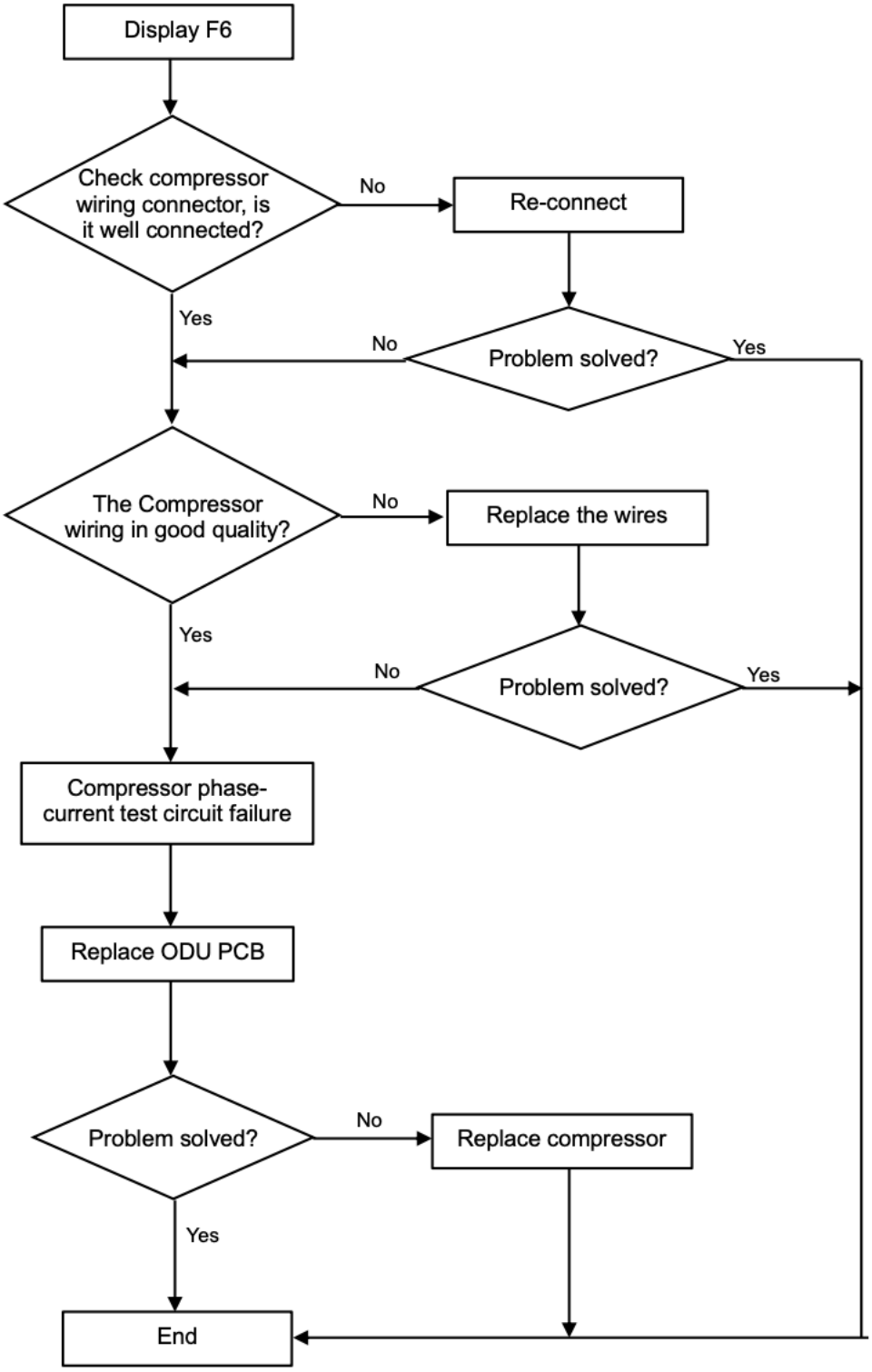


Figure 16.2Q

16. Troubleshooting

F7---Module Temperature Protection.

IPM overtemperature protection, when IPM temperature more than 95°C, it will show F7.

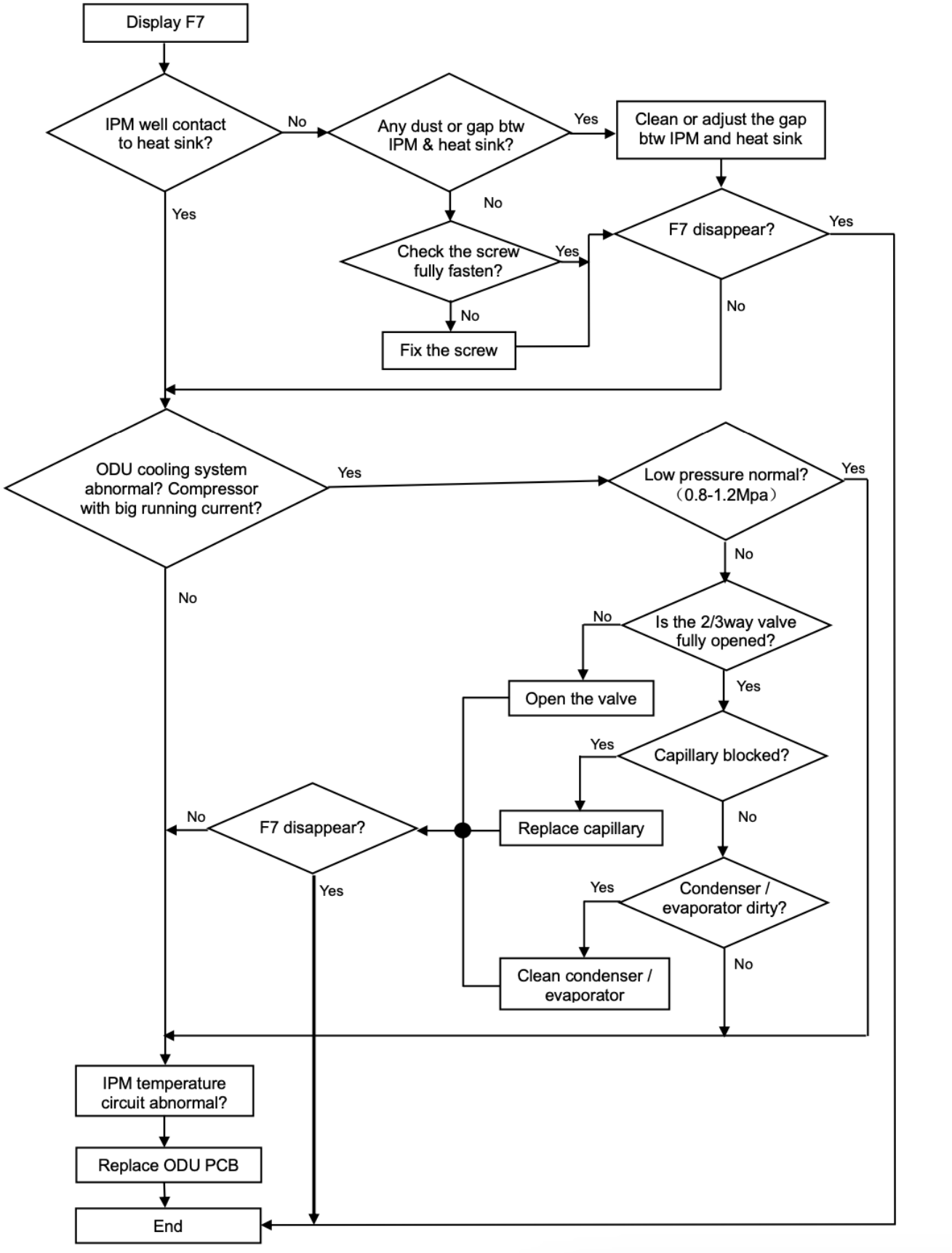


Figure 16.2R

16. Troubleshooting

F8---4-Way Value Reversing abnormal

On heating mode, if IDU Coil temperature tested lower than Room temperature 5℃ or even more after compressor works for 8min, unit will show F8 code.

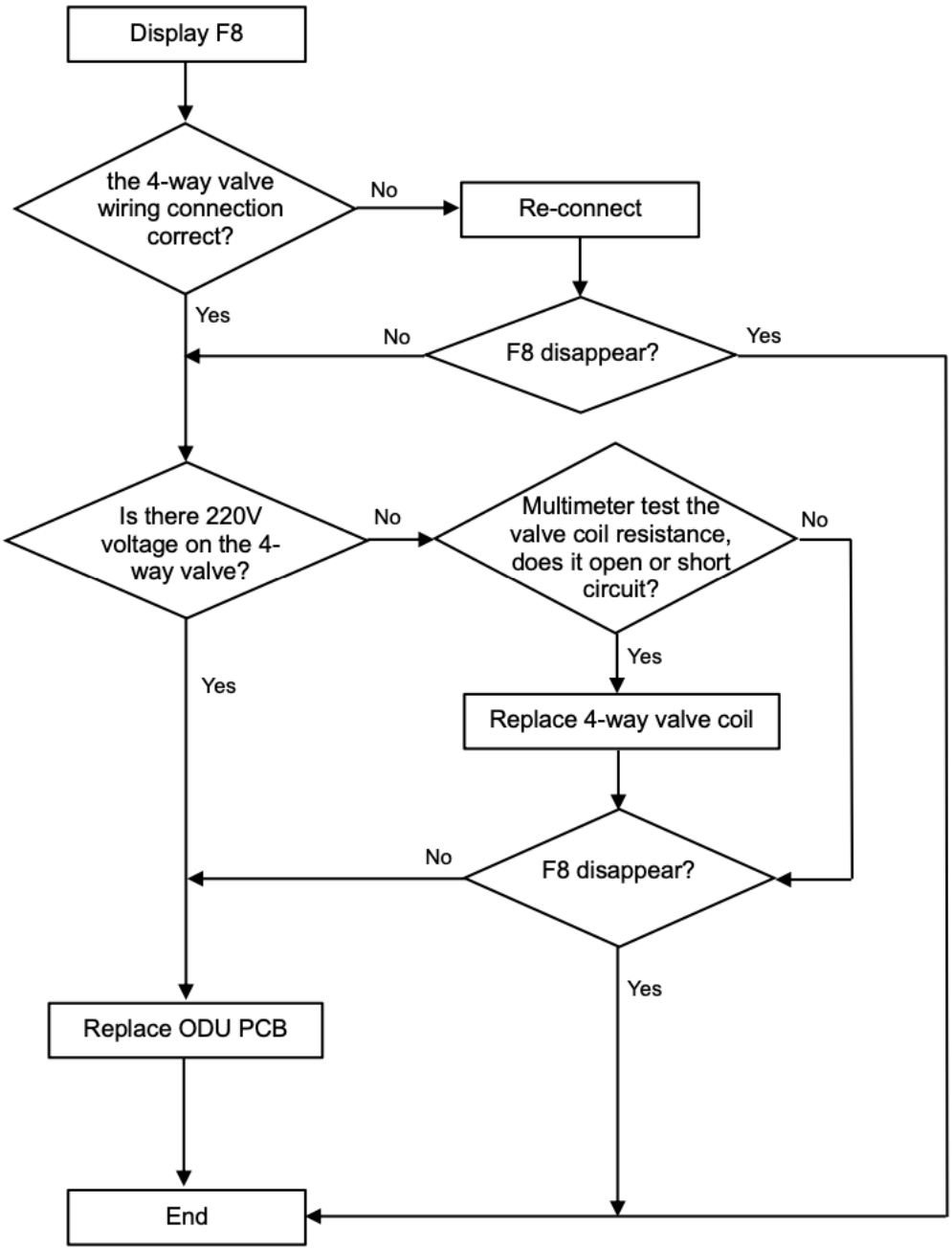


Figure 16.2S

F9—The Module Temperature Test Circuit Failure

Reason: The IPM module temperature test circuit failure. Solution: Replace the ODU PCB.

FA—The Compressor Phase-Current Test Circuit Failure

Reason: The IPM module temperature test circuit failure. Solution: Replace the ODU PCB.

16. Troubleshooting

Fy--- Gas Leakage Protection

After compressor works in high frequency for 9 min, if the temperature on IDU evaporator & ODU condenser has only a little variation comparing previous, but, the compressor discharge temperature on high level, then the unit will show Fy failure code.

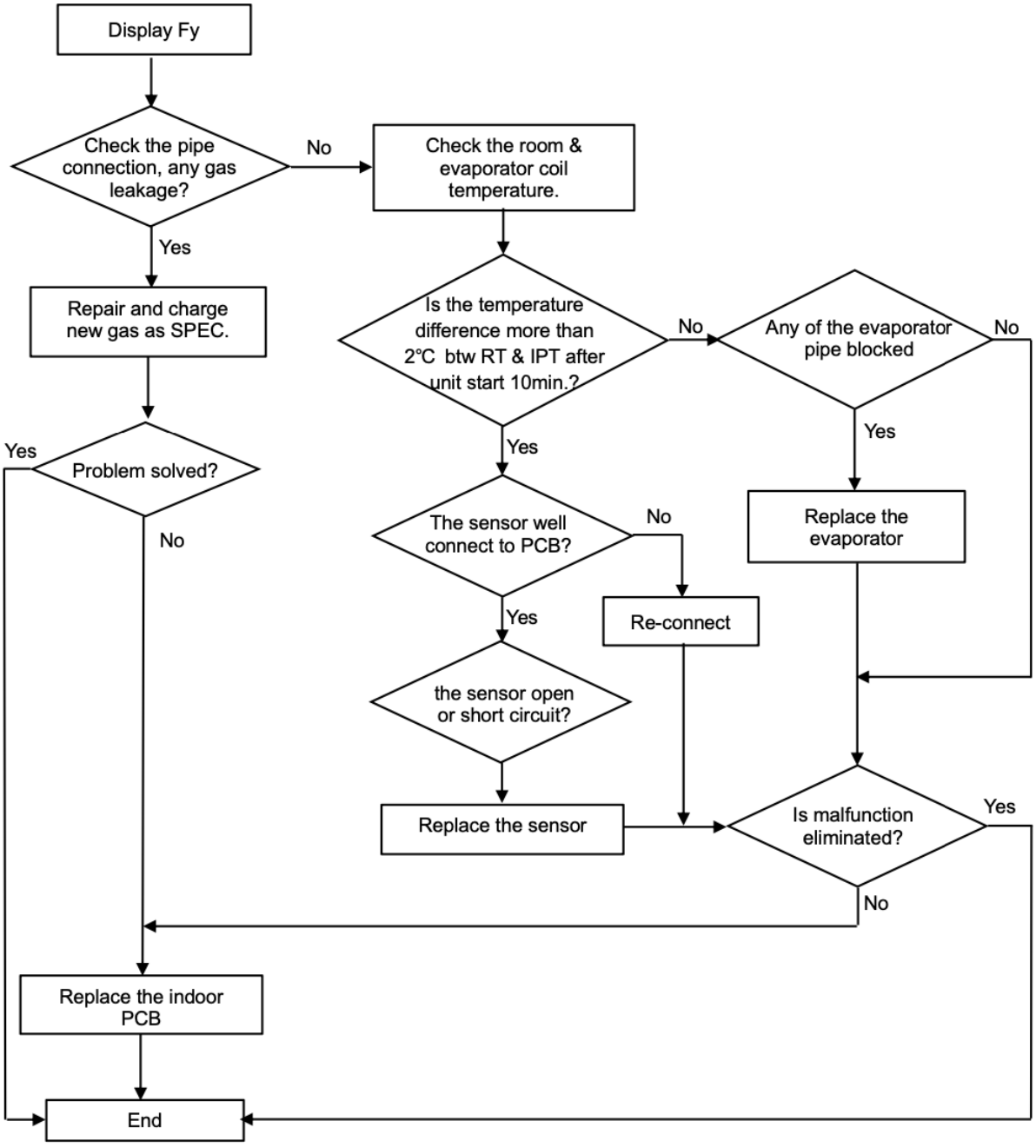


Figure 16.2T

16. Troubleshooting

H1,H2,H3 & H4 — High Pressure/Low Pressure Switch, Pressure Sensor Test Abnormal.

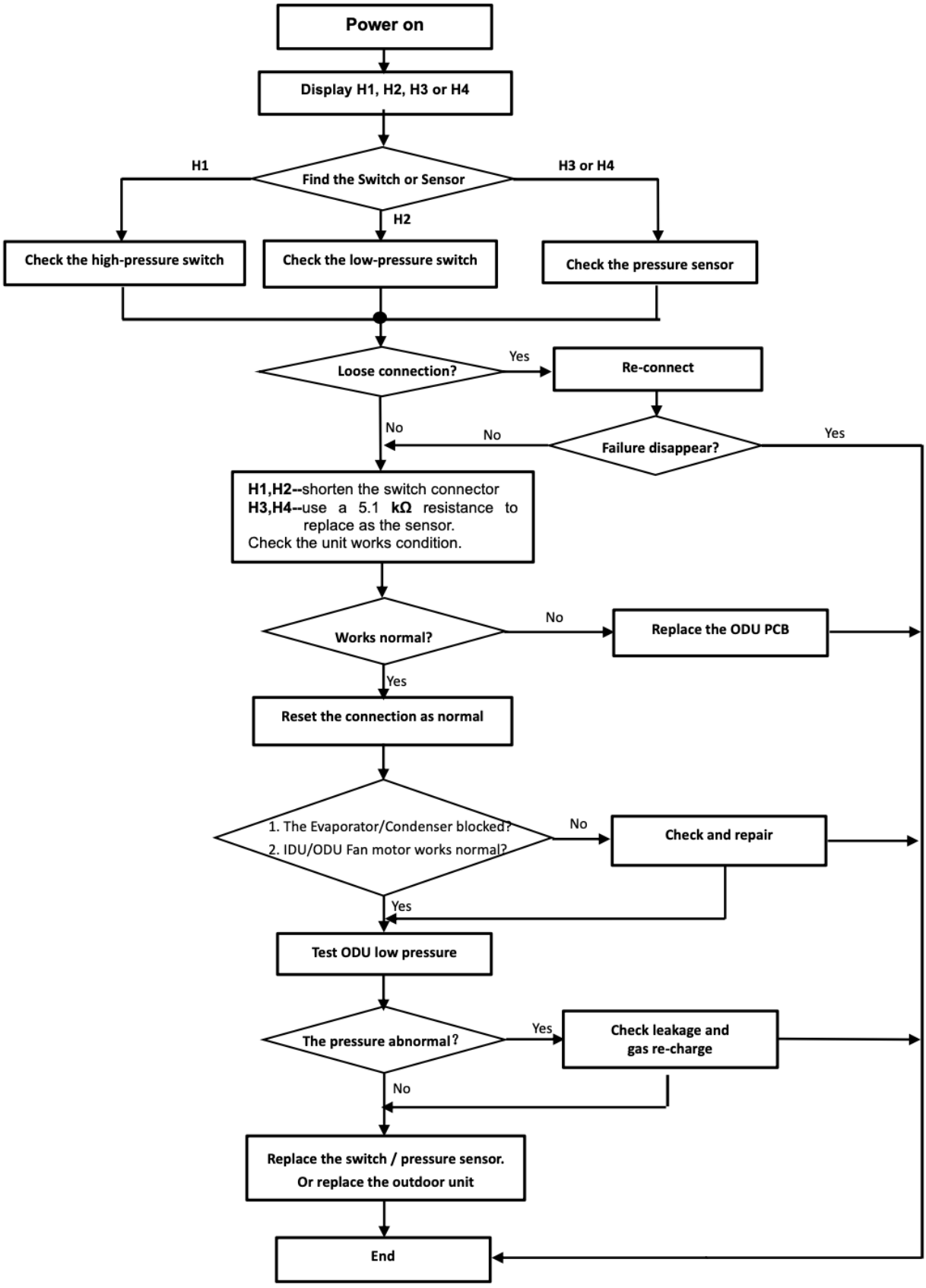


Figure 16.2U

16. Troubleshooting

Fd — The Communication of Refrigerant Detection Sensor and Indoor PCB Abnormal

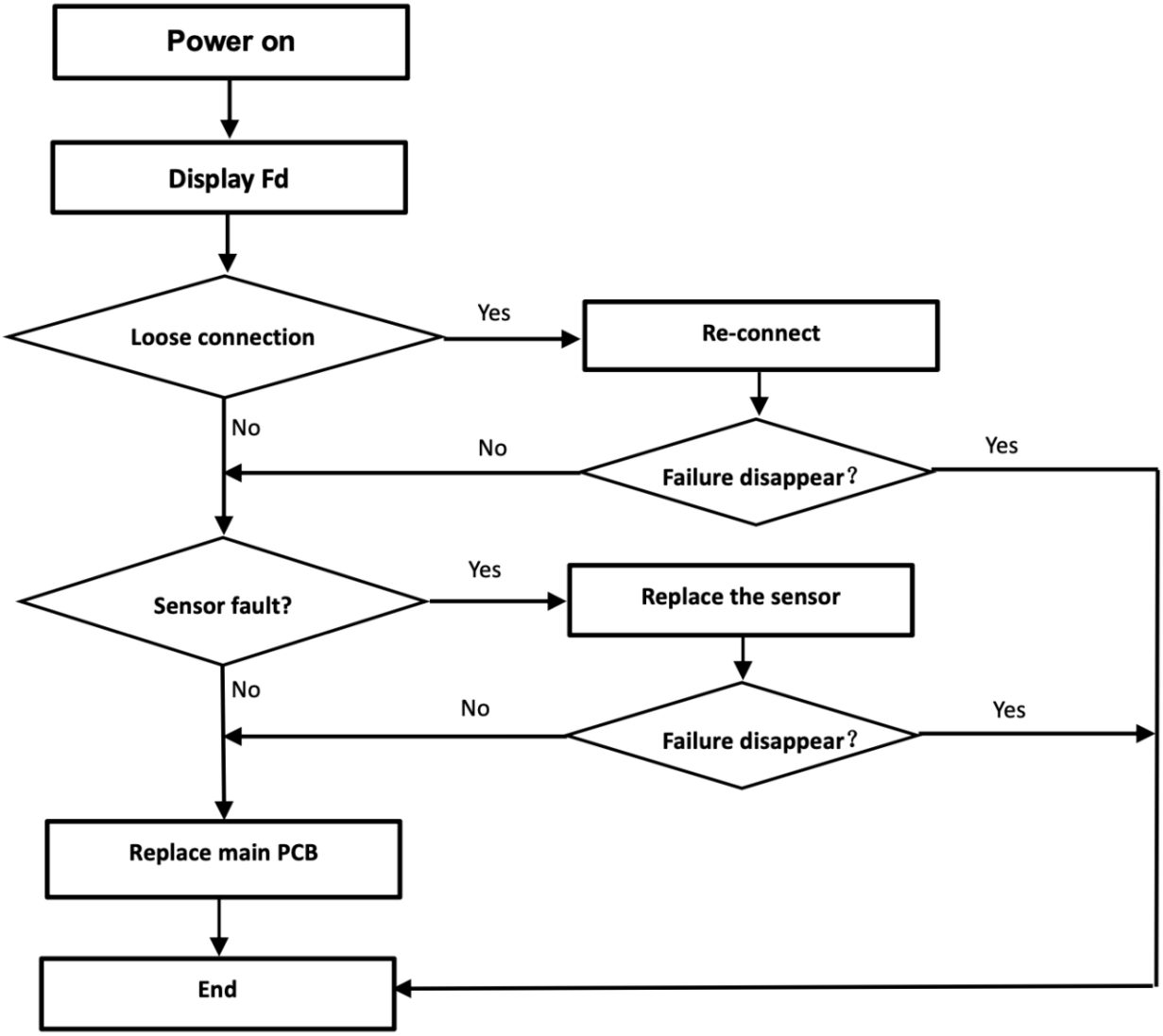


Figure 16.2V

16. Troubleshooting

16.4 Failures Not Caused by Errors

The following conditions may appear unusual but do not indicate a malfunction and do not require repairing.

Problem	Possible Cause
Abnormal noises of outdoor unit	The unit will make different sounds based on its current operating mode.
Both the indoor and outdoor units make noises	The air conditioner may hum during operation. This is a normal phenomenon, which is caused by refrigerant gas flowing through the indoor and outdoor units.
	When the air conditioner is turned on, and just stopped or defrosted, a hiss may be heard. This noise is normal and is caused by refrigerant gas stopping or turning.
Unit does not turn on when pressing ON/ OFF button	The unit has a 3-minute protection feature that prevents the unit from overloading. The unit cannot be restarted within three minutes of being turned off.
	Cooling and Heating Models: If the Operation light and PRE-DEF (Pre-heating/ Defrost) indicators are lit up, the outdoor temperature is too cold and the unit's anti-cold wind is activated in order to defrost the unit.
The unit changes from COOL mode to FAN mode	The unit changes its setting to prevent frost from forming on the unit. Once the temperature increases, the unit will start operating again.
	The set temperature has been reached, at which point the unit turns off the compressor. The unit will resume operating when the temperature fluctuates again.
Both the indoor and outdoor units emit white mist	When the unit restarts in HEAT mode after defrosting, white mist may be emitted due to moisture generated from the defrosting process.
Dust is emitted from either the indoor or outdoor unit	The unit may accumulate dust during extended periods of nonuse, which will be emitted when the unit is turned on. This can be mitigated by covering the unit during long periods of inactivity.
The unit emits a bad odor	The unit may absorb odors from the environment (such as furniture, cooking, cigarettes, etc.) which will be emitted during operations.
	The unit filters have become moldy and should be cleaned.
The fan of the outdoor unit does not operate	During operation, the fan speed is controlled to optimize product operation.

17. Wiring Diagram

17.1 Wiring Diagram of Outdoor Unit

Important Electrical Requirements

It is important that proper electrical power is available for connection to the KOIT outdoor unit being installed. Refer to the unit nameplate, wiring diagram, and electrical data in the installation instructions.

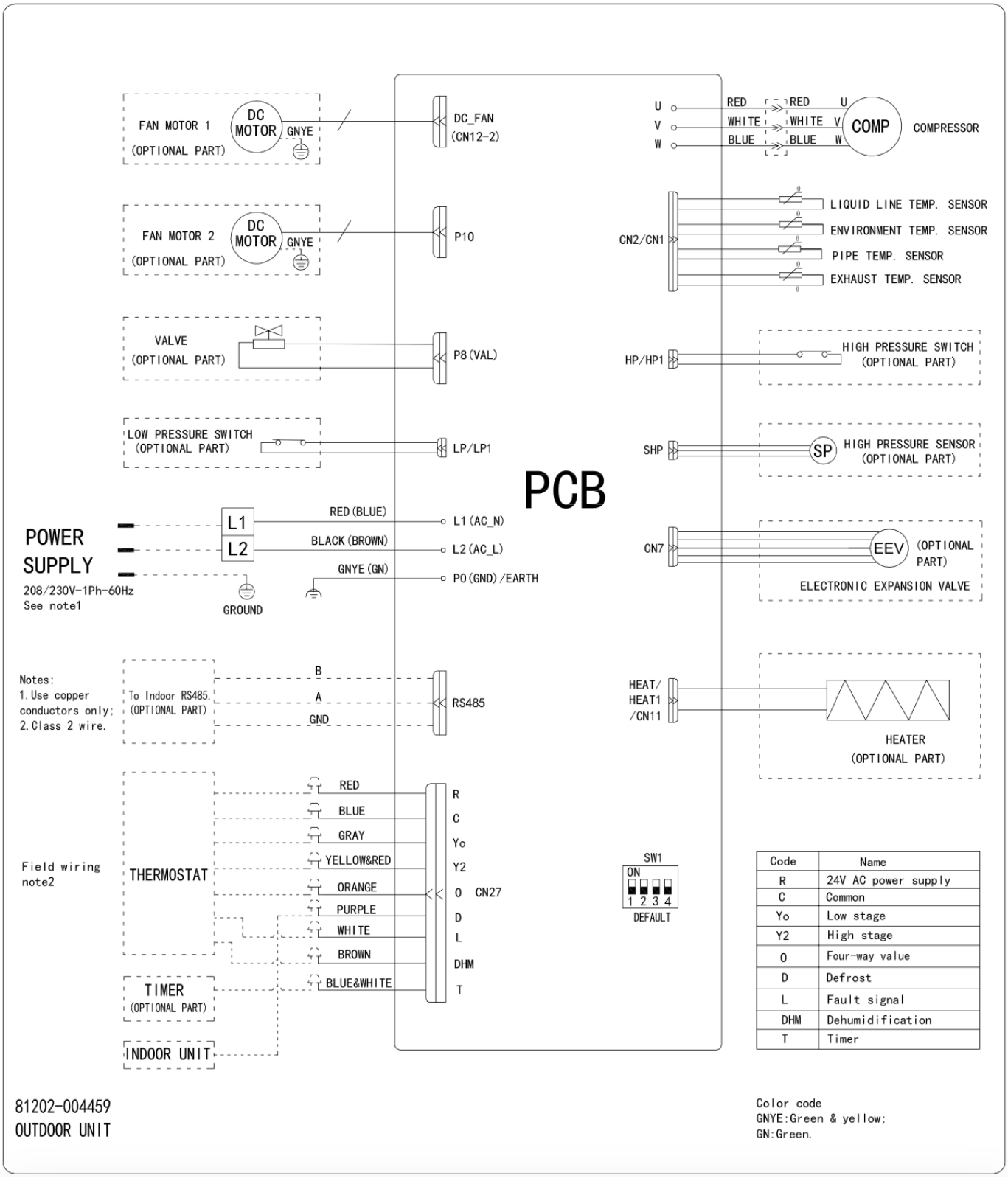
- If required, install a branch-circuit disconnect of adequate size, located within sight of and readily accessible to the unit.
- When electric heat is installed, units may be equipped with one or two 30–60 A circuit breakers. These breakers protect internal wiring in the event of a short circuit and also act as a disconnect.
- Circuit breakers installed inside the unit do not provide overcurrent protection for the supply wiring; therefore, the supply wiring must be sized larger than the branch-circuit protection.
- Supply circuit power wiring must be 167°F (75°C) minimum copper conductors only.
- Refer to the electrical data in this section for required ampacity, wire size, and circuit protection ratings.
- Supply-circuit protective devices may be either fuses or HACR-type circuit breakers, as required by local electrical codes.

17. Wiring Diagram

Outdoor Unit Wiring Diagram

The following diagram shows all electrical connections between major outdoor-unit components, including the compressor, DC fan motor, sensors, EEV, reversing valve, thermostat interface, and 24V control wiring.

Figure 17.1 — Outdoor Unit Wiring Diagram



17. Wiring Diagram

NOTICE

- Ensure all field wiring is tightened securely to prevent loose connections.
- Verify that communication-wiring polarity between the indoor and outdoor units matches the diagram.
- Do not route low-voltage signal wiring in the same conduit as high-voltage power wiring.
- When optional components (low-pressure switch, high-pressure switch, second fan motor, valve, heater) are installed, follow the corresponding terminals shown in the diagram.
- Improper wiring may cause malfunction, communication failure, or damage to the PCB.

17.2 American Wire Gauge (AWG) and Ampacity Reference Chart

Field wiring must comply with the National Electric Code (or C.E.C. in Canada) and all applicable local regulations.

Wiring material ampacities	AWG
4	22
7	20
10	18
13	16
18	14
25	12
30	10
40	8
55	6
70	4

The ampacities shown apply to appliance wiring materials whit insulation rated not less than 194°F (90°C). Supply circuit power wiring must be 167°F minimum copper conductors only.

18. Maintenance

18. 1 Major Component Functions

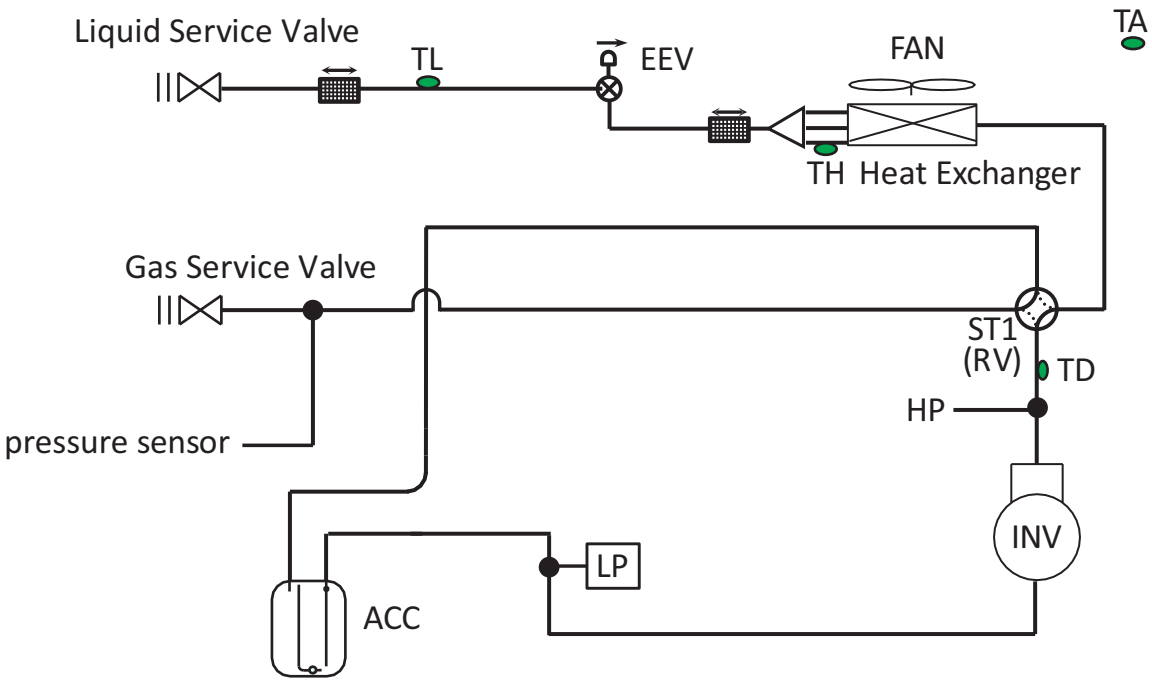


Figure 18.1 — Major Components and Refrigerant Circuit Diagram

Name	Symbol	Function
Inverter Compressor	INV	Adjusts refrigerant flow rate by changing the speed (RPS) based on operating pressure.
DC Motor	FAN	Outputs heat-exchange capacity by adjusting motor rotational speed based on operating pressure.
Electronic Expansion Valve	EEV	1) Fully open in cooling mode and during defrost operation. 2) Controls compressor discharge superheat in heating mode.
Reversing Valve	ST1 (RV)	Switches between heating and cooling operating modes (including defrost operation).
Temperature Sensor	TH	Detects outdoor coil temperature during heating.
	TA	Detects outdoor air temperature and controls fan speed.
	TL	Detects liquid line temperature and is used to calculate sub-cooling (SC).
	TD	Detects compressor discharge temperature and calculates discharge superheat (DSH).
	TF	Detects heatsink temperature of inverter module.
High-Pressure Switch	HP	Detects high-pressure protection.
Low-Pressure Switch	LP	Detects low-pressure protection.
Accumulator	ACC	Prevents the compressor from ingesting liquid refrigerant.

Table 18.1 - Major Components Function Description

18. Maintenance

18.2 Cleaning Precautions

Regular maintenance ensures safe operation, optimal performance, and long service life of the system. All maintenance should be performed by qualified personnel.

⚠ WARNING

Qualified Personnel Required

- Only trained and qualified maintenance personnel may perform cleaning or service on the outdoor unit.

❗ CAUTION

Electric Shock

- Before performing any cleaning or maintenance, turn OFF the unit and disconnect the main power supply.

Sharp Edges

- When removing or handling filters or panels, avoid contact with metal edges.
- Sharp parts may cause cuts or injuries.

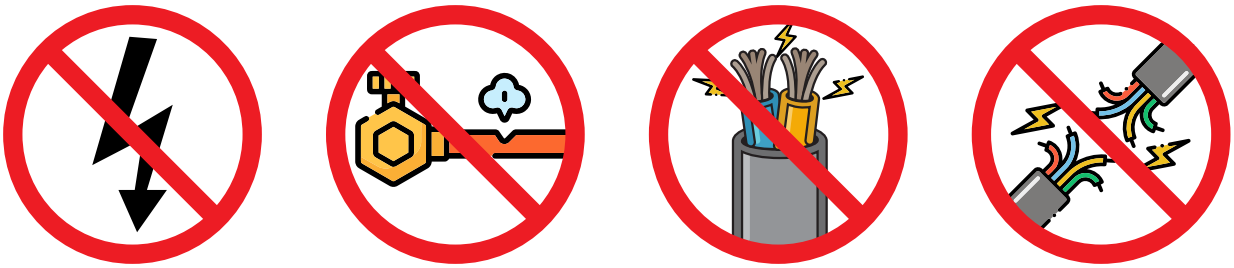
ℹ NOTICE

Cleaning Materials

- Do not use chemicals, benzene, paint thinner, polishing powder, or chemically treated cloths to clean the unit.
- These substances may damage the surfaces or components.

18.2 Cleaning Precautions

Perform the following before the start of each heating or cooling season to maintain system reliability:



Pre-Season Checklist

- Turn off the unit and disconnect power to ensure safe inspection.
- Check all wiring connections for damage, looseness, or corrosion.
- Inspect for refrigerant leaks around service valves, coils, and fittings.
- Ensure all air inlets and outlets are unobstructed and free from debris.
- Clean the outdoor coil using low-pressure water. Do not bend fins.

18. Maintenance

18.4 Routine Maintenance Tasks

These tasks should be performed regularly (every 3–6 months depending on installation environment):

Outdoor Unit:

- Clean heat-exchanger fins
  Remove dust, leaves, and debris to maintain proper airflow and efficiency.
- Verify fan motor operation
  Ensure the fan rotates freely without obstructions or abnormal noise.
- Check for vibration or noise
  Tighten any loose screws or mounting brackets.
- Inspect the refrigerant circuit
  Look for oil staining, which may indicate a leak.
- Check service valves
  Confirm valve caps are tight and not leaking.

18.5 Annual Professional Maintenance

A licensed HVAC technician should perform the following once per year:

- Measure system operating pressures.
- Check compressor current draw and inverter module condition.
- Verify EXV (electronic expansion valve) operation.
- Confirm proper operation of high-pressure and low-pressure safety switches.
- Inspect sensor readings (TL, TH, TD, TF) and replace faulty sensors.
- Perform a full refrigerant leak test.
- Clean and tighten all electrical connections.

18.6 After Maintenance

After completing service:

- Restore power to the unit.
- Perform a full system test in cooling and heating (if applicable).
- Verify no error codes appear on DSP1-1 or DSP1-2.
- Confirm stable operation and normal fan/compressor behavior.

19. Disposal Guidelines

Disposal Guidelines

This appliance contains refrigerant, oil, and other potentially hazardous materials. When disposing the appliance, local and federal regulations require special handling, collection, and treatment. Do NOT dispose of this product as household waste or unsorted municipal waste.

⚠ WARNING

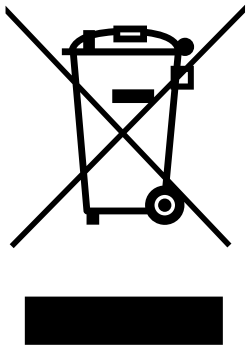
⚠ **Remove all refrigerant and oil prior to disposal as required by EPA and local regulations.**

- This must be performed by licensed HVAC personnel.

Proper Disposal Methods

When disposing the appliance, follow one of the approved options:

- Dispose of the appliance at a designated municipal electronic waste collection facility.
- When purchasing a new appliance, the retailer may take back the old unit free of charge (varies by region).
- The manufacturer or distributor may accept the old unit for proper disposal.
- Sell or transfer the appliance to a certified scrap-metal or recycling center authorized to handle refrigerant-bearing equipment.



NOTICE

Improper disposal of this appliance—such as abandoning it outdoors, dumping it in forests, or placing it in general waste bins—poses serious environmental and health risks.

Hazardous refrigerants and oils may:

- Dcontaminate groundwater,
- enter the food chain,
- or release harmful gases into the atmosphere.

Always follow proper disposal protocols.

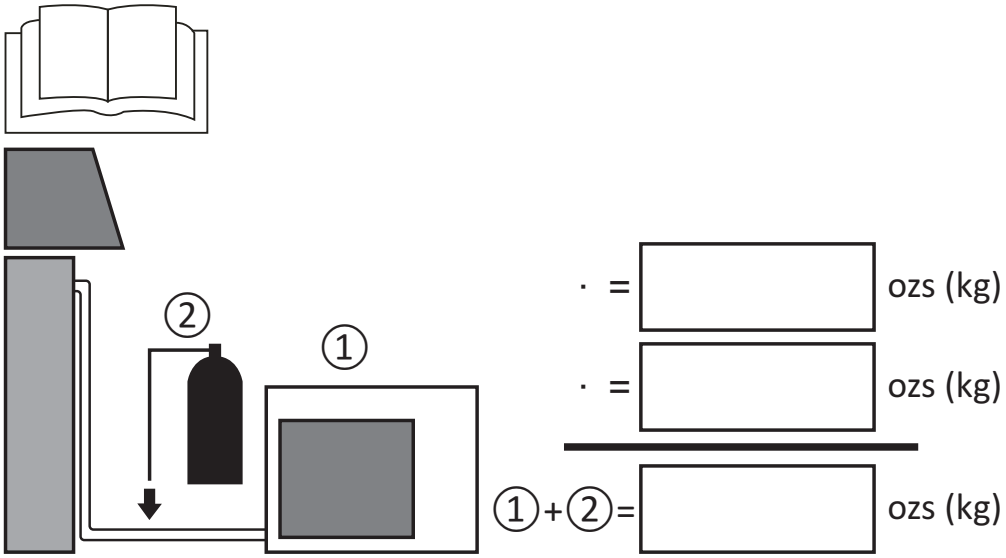
20. Installer Reference

System Notes (For Installer or Technical Use)

(To be completed by the Installer)

Record the following information for future service and maintenance:

1. Factory Refrigerant Charge
   (Listed on the KOIT Outdoor Unit Nameplate)
2. Additional Refrigerant Added
   (Charged during installation)
3. Total Refrigerant Charge
   (1 + 2)



① Refrigerant charge of the precharged part of the appliance.

② Refrigerant charge added during installation.

System Notes (For Installer or Technical Use)

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