MITSUBISHI ELECTRIC

CITY MULTI

Air Conditioners

PVFY-L08, 12, 18, 24, 30, 36, 48, 54NAMU-A*

SERVICE MANUAL

Table of Contents

1. Safety Precautions

Always observe for safety!
Before obtaining access to terminal, all supply circuits must be disconnected.

1.1. Symbols used in the text

WARNING
Describes precautions that should be observed to prevent danger of injury or death to the user.

CAUTION
Describes precautions that should be observed to prevent damage to the unit.

FLAMMABLE REFRIGERANT WARNING
This unit uses a flammable refrigerant. If refrigerant leaks and comes in contact with fire or heating part, it will create harmful gas and there is risk of fire.

: Indicates a part which must be grounded.

Meaning of symbols displayed on unit			
	Refrigerant Safety Group **A2L**	**Warning!** (Risk of fire)	**<u>This unit uses a flammable refrigerant.</u>** If refrigerant leaks and comes in contact with fire or heating part, it will create harmful gas and there is risk of fire.
	Read the OPERATING INSTRUCTIONS carefully before operation.		
	Service personnel are required to carefully read the OPERATING INSTRUCTIONS and INSTALLATION MANUAL before operation.		
	Further information is available in the OPERATING INSTRUCTIONS, INSTALLATION MANUAL, and the like.		

1.2. Cautions for service

CAUTION

1. Perform service after recovering the refrigerant left in unit completely.
2. Do not release refrigerant in the air.
3. After completing service, charge the cycle with specified amount of refrigerant.

1.3. Warning for service

WARNING

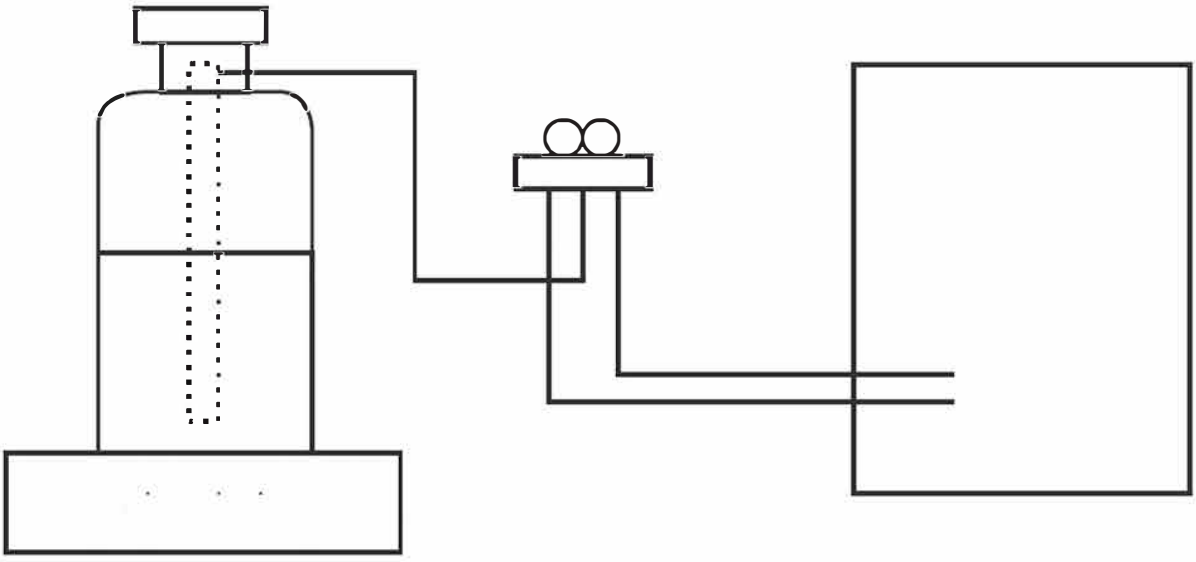
1. Do not alter the unit.
2. For installation and relocation work, follow the instructions in the Installation Manual and use tools and pipe components specifically made for use with refrigerant specified in the outdoor unit installation manual.
3. Ask a dealer or an authorized technician to install, relocate and repair the unit.
4. This unit should be installed in rooms which exceed the floor space specified in outdoor unit installation manual. Refer to outdoor unit installation manual.
5. Refrigerant pipes connection shall be accessible for maintenance purposes.
6. If the air conditioner is installed in a small room or closed room, measures must be taken to prevent the refrigerant concentration in the room from exceeding the safety limit in the event of refrigerant leakage. Should the refrigerant leak and cause the concentration limit to be exceeded, hazards due to lack of oxygen in the room may result.
7. Keep gas-burning appliances, electric heaters, and other fire sources (ignition sources) away from the location where installation, repair, and other air conditioner work will be performed. If refrigerant comes into contact with a flame, poisonous gases will be released.
8. When installing or relocating, or servicing the air conditioner, use only the specified refrigerant written on outdoor unit to charge the refrigerant lines. Do not mix it with any other refrigerant and do not allow air to remain in the lines. If air is mixed with the refrigerant, then it can be the cause of abnormal high pressure in the refrigerant line, and may result in an explosion and other hazards.
9. After installation has been completed, check for refrigerant leaks. If refrigerant leaks into the room and comes into contact with the flame of a heater or portable cooking range, poisonous gases will be released.
10. Do not use low temperature solder alloy in case of brazing the refrigerant pipes.
11. When performing brazing work, be sure to ventilate the room sufficiently. Make sure that there are no hazardous or flammable materials nearby. When performing the work in a closed room, small room, or similar location, make sure that there are no refrigerant leaks before performing the work. If refrigerant leaks and accumulates, it may ignite or poisonous gases may be released.
12. Do not install the unit in places where refrigerant may build-up or places with poor ventilation such as a semi-basement or a sunken place in outdoor: Refrigerant is heavier than air, and inclined to fall away from the leak source.
13. Do not use means to accelerate the defrosting process or to clean, other than those recommended by the manufacturer.
14. The appliance shall be stored in a room without continuously operating ignition sources (for example: open flames, an operating gas appliance or an operating electric heater).
15. Do not pierce or burn.
16. Be aware that refrigerants may not contain an odor.
17. Pipe-work shall be protected from physical damage.
18. The installation of pipe-work shall be kept to a minimum.
19. Compliance with national gas regulations shall be observed.

20. Keep any required ventilation openings clear of obstruction.
21. Servicing shall be performed only as recommended by the manufacturer.
22. The appliance shall be stored in a well-ventilated area where the room size corresponds to the room area as specified for operation.
23. Maintenance, service, and repair operations shall be performed by authorized technician with required.

1.4. Additional refrigerant charge

(When charging directly from cylinder.)

1. Check that cylinder for R454B available on the market is a siphon type.
2. Charging should be performed with the cylinder of siphon stood vertically. (Refrigerant is charged from liquid phase.)



Electronic weighing scale Unit

1.5. Service tools

Use the below service tools as exclusive tools for R454B refrigerant.

No.	Tool name	Specifications
①	Gauge manifold	Specifications • Only for R454B • Use the existing fitting specifications. (UNF1/2) • Use high-tension side pressure of 768.7 PSIG [5.3 MPa.G] or over.
②	Charge hose	• Only for R454B • Use pressure performance of 738.2 PSIG [5.09 MPa.G] or over.
③	Electronic weighing scale	-
④	Gas leak detector	• Use the detector for R454B.
⑤	Adapter for reverse flow check	• Attach on vacuum pump.
⑥	Refrigerant charge base	-
⑦	Refrigerant cylinder	• Only for R454B • Cylinder with siphon
⑧	Refrigerant recovery equipment	-

2. Refrigerant R454B

FLAMMABLE REFRIGERANT WARNING

- Refrigerant is FLAMMABLE and may cause INJURY, DEATH, or significant DAMAGE to equipment if improperly handled.
  - Carefully read all labels affixed to the unit.
  - Carefully read and follow all safety precautions for the unit.
  - Verify any person performing work near where flammable refrigerant is used is properly informed prior to work commencing of the risks and safety precautions associated with flammable refrigerant and the nature of the work being done.

2.1. Cautions related to new refrigerant

Cautions for units utilizing refrigerant R454B

CAUTION

Do not use the existing refrigerant piping.
Contamination inside refrigerant piping can cause deterioration of refrigerant oil etc.

Make sure that the inside and outside of refrigerant piping is clean and it has no contamination such as sulfur hazardous for use, oxides, dirt, shaving particles, etc., which are hazard to refrigerant cycle. In addition, use pipes with specified thickness.
Contamination inside refrigerant piping can cause deterioration of refrigerant oil etc.

Store the piping to be used indoors during installation and both ends of the piping sealed until just before brazing. (Leave elbow joints, etc. in their packaging.)
If dirt, dust or moisture enters into refrigerant cycle, that can cause deterioration of refrigerant oil or malfunction of compressor.

The refrigerant oil applied to flare and flange connections must be ester oil, ether oil or alkylbenzene oil in a small amount.
If large amount of mineral oil enters, that can cause deterioration of refrigerant oil, etc.

Charge refrigerant from liquid phase of gas cylinder.
If the refrigerant is charged from gas phase, composition change may occur in refrigerant and the efficiency will be lowered.

Use a vacuum pump with a reverse flow check valve.
Vacuum pump oil may flow back into refrigerant cycle and that can cause deterioration of refrigerant oil etc.

Use the following tools specifically designed for use with R454B refrigerant.

The following tools are necessary to use R454B refrigerant.

Tools for R454B	
Gauge manifold	Flare tool
Charge hose	Size adjustment gauge
Gas leak detector	Vacuum pump adapter
Torque wrench	Electronic refrigerant charging scale

Do not use a charging cylinder.
If the refrigerant is charged from gas phase, composition change may occur in refrigerant and the efficiency will be lowered.

Handle tools with care.
If dirt, dust or moisture enters into refrigerant cycle, that can cause deterioration of refrigerant oil or malfunction of compressor.

Do not use charging cylinder.
If a charging cylinder is used, the composition of refrigerant will change and the efficiency will be lowered.

Ventilate the room if refrigerant leaks during operation.
If refrigerant comes into contact with flame, poisonous gases will be released.

Use the specified refrigerant only.

IMPORTANT

Never use any refrigerant other than that specified.

- Doing so may cause a burst, an explosion, or fire when the unit is being used, serviced, or disposed of.
- Correct refrigerant is specified on name plate of outdoor unit.
- If other refrigerant (R22, etc.) is used, chlorine in refrigerant can cause deterioration of refrigerant oil, etc.
- We will not be held responsible for mechanical failure, system malfunction, unit breakdown or accidents caused by failure to follow the instructions.

2.2. Cautions for units using R454B refrigerant

Basic work procedures are the same as those for conventional units using refrigerant R410A. However, pay careful attention to the following points.

WARNING

1. 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.
   b. For repair to the REFRIGERATING SYSTEM, the following checks (i - viii) shall be performed shall be completed prior to conducting work on the system.
      i. Work Procedure
         - Work shall be undertaken under a controlled procedure so as to minimize the risk of a flammable gas or vapor being present while the work is being performed.
      ii. 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.
      iii. Checking for presence of refrigerant
         - The area shall be checked with an appropriate refrigerant detector prior to and during work, to ensure the technician is aware of potentially toxic or flammable atmospheres.
         - Ensure that the leak detection equipment being used is suitable for use with all applicable refrigerants, i.e. non-sparking, adequately sealed or intrinsically safe.
      iv. Presence of fire extinguisher
         - If any hot work is to be conducted on the refrigerating equipment or any associated parts, appropriate fire extinguishing equipment shall be available to hand.
         - Have a dry powder or CO2 fire extinguisher adjacent to the charging area.
      v. No ignition sources
         - No person carrying out work in relation to a REFRIGERATING SYSTEM which involves exposing any pipe work shall use any sources of ignition in such a manner that it may lead to the risk of fire or explosion.
         - All possible ignition sources, including cigarette smoking, should be kept sufficiently far away from the site of installation, repairing, removing and disposal, during which refrigerant can possibly be released to the surrounding space.
         - Prior to work taking place, the area around the equipment is to be surveyed to make sure that there are no flammable hazards or ignition risks. "No Smoking" signs shall be displayed.
      vi. Ventilated area
         - Ensure that the area is in the open or that it is adequately ventilated before breaking into the system or conducting any hot work.
         - A degree of ventilation shall continue during the period that the work is carried out.
         - The ventilation should safely disperse any released refrigerant and preferably expel it externally into the atmosphere.
      vii. Checks to the refrigerating equipment
         - Where electrical components are being changed, they shall be fit for the purpose and to the correct specification.

- At all times the manufacturer's maintenance and service guidelines shall be followed. If in doubt, consult the manufacturer's technical department for assistance.
- The following checks shall be applied to installations using FLAMMABLE REFRIGERANTS:
  A. The actual REFRIGERANT CHARGE is in accordance with the room size within which the refrigerant containing parts are installed.
  B. The ventilation machinery and outlets are operating adequately and are not obstructed.
  C. Marking to the equipment continues to be visible and legible. Markings and signs that are illegible shall be corrected.
  D. Refrigerating pipe or components are installed in a position where they are unlikely to be exposed to any substance which may corrode refrigerant containing components, unless the components are constructed of materials which are inherently resistant to being corroded or are suitably protected against being so corroded.

viii. Checks to electrical devices
- Repair and maintenance to electrical components shall include initial safety checks and component inspection procedures.
- If a fault exists that could compromise safety, then no electrical supply shall be connected to the circuit until it is satisfactorily dealt with.
- If the fault cannot be corrected immediately but it is necessary to continue operation, an adequate temporary solution shall be used.
  A. This shall be reported to the owner of the equipment so all parties are advised.
- Initial safety checks shall include:
  A. That capacitors are discharged: this shall be done in a safe manner to avoid possibility of sparking.
  B. That no live electrical components and wiring are exposed while charging, recovering or purging the system.
  C. That there is continuity of earth bonding.

2. Repairs to sealed components
   a. Sealed electrical components shall be replace.
3. Repair to intrinsically safe components
   a. Intrinsically safe components must be replaced.
4. Cabling
   a. Check that cabling will not be subject to wear, corrosion, excessive pressure, vibration, sharp edges or any other adverse environmental effects.
   b. The check shall also take into account the effects of aging or continual vibration from sources such as compressors or fans.
5. Detection of flammable refrigerants
   a. Under no circumstances shall potential sources of ignition be used in the searching for or detection of refrigerant leaks. A halide torch (or any other detector using a naked flame) shall not be used.
   b. The following leak detection methods are deemed acceptable for all refrigerant systems.
      i. Electronic leak detectors may be used to detect refrigerant leaks but, in the case of FLAMMABLE REFRIGERANTS, the sensitivity may not be adequate, or may need re-calibration. (Detection equipment shall be calibrated in a refrigerant-free area.)

ii. Ensure that the detector is not a potential source of ignition and is suitable for the refrigerant used.
iii. Leak detection equipment shall be set at a percentage of the LFL of the refrigerant and shall be calibrated to the refrigerant employed, and the appropriate percentage of gas (25 % maximum) is confirmed.
iv. Leak detection fluids are also suitable for use with most refrigerants but the use of detergents containing chlorine shall be avoided as the chlorine may react with the refrigerant and corrode the copper pipe-work.
v. If a leak is suspected, all naked flames shall be removed / extinguished.
vi. If a leakage of refrigerant is found which requires brazing, all of the refrigerant shall be recovered from the system, or isolated (by means of shut off valves) in a part of the system remote from the leak.
vii. **Removal of refrigerant shall be according to 2-4.6.**

6. Removal and evacuation
   a. When breaking into the refrigerant circuit to make repairs (for any other purpose) conventional procedures shall be used.

IMPORTANT
For flammable refrigerants it is important that best practice be followed, since flammability is a consideration.

- The following procedure shall be adhered to:
  i. Safely remove refrigerant following local and national regulations
  ii. Evacuate
  iii. Purge the circuit with inert gas
  iv. Evacuate
  v. Continuously flush or purge with inert gas when using flame to open circuit
  vi. Open the circuit

IMPORTANT
The refrigerant charge shall be recovered into the correct recovery cylinders if venting is not allowed by local and national codes.

   b. For appliances containing flammable refrigerants, the system shall be purged with oxygen-free nitrogen to render the appliance safe for flammable refrigerants. This process might need to be repeated several times.

IMPORTANT
Compressed air or oxygen shall not be used for purging refrigerant systems.

- For appliances containing flammable refrigerants, refrigerants purging shall be achieved through the following process:
  i. Break the vacuum in the system with oxygen-free nitrogen and continue to fill until the working pressure is achieved.

ii. Then, vent to atmosphere.
iii. Finally, pull down to a vacuum.
iv. This process shall be repeated until no refrigerant is within the system.
v. When the final oxygen-free nitrogen charge is used, the system shall be vented down to atmospheric pressure to enable work to take place.

IMPORTANT
The outlet for the vacuum pump shall not be close to any potential ignition sources, and ventilation shall be available.

7. Charging procedures
   a. In addition to conventional charging procedures, the following requirements shall be followed:
      i. Ensure that contamination of different refrigerants does not occur when using charging equipment. Hoses or lines shall be as short as possible to minimize the amount of REFRIGERANT contained in them.
      ii. Cylinders shall be kept in an appropriate position according to the instructions.
      iii. Ensure that the REFRIGERATING SYSTEM is earthed prior to charging the system with refrigerant.
      iv. Label the system when charging is complete (if not already).
      v. Extreme care shall be taken not to overfill the REFRIGERATING SYSTEM.
      vi. Prior to recharging the system, it shall be pressure-tested with the appropriate purging gas.
      vii. The system shall be leak-tested on completion of charging but prior to commissioning.
      viii. A follow up leak test shall be carried out prior to leaving the site.
8. Decommissioning
   a. Before carrying out this procedure, it is essential that the technician is completely familiar with the equipment and all its detail.

IMPORTANT
It is recommended good practice that all refrigerants are recovered safely.

   b. Prior to the task being carried out, an oil and refrigerant sample shall be taken in case analysis is required prior to re-use of recovered refrigerant.
   c. It is essential that electrical power is available before the task is commenced.
   d. Become familiar with the equipment and its operation.
   e. Isolate system electrically.
   f. Before attempting the procedure, ensure that:
      i. Mechanical handling equipment is available, if required, for handling refrigerant cylinders.
      ii. All personal protective equipment is available and being used correctly.
      iii. The recovery process is supervised at all times by a competent person
      iv. Recovery equipment and cylinders conform to the appropriate standards.

g. Pump down refrigerant system, if possible.
   i. If a vacuum is not possible, make a manifold so that refrigerant can be removed from various parts of the system.
h. Make sure that cylinder is situated on the scales before recovery takes place.
i. Start the recovery machine and operate in accordance with instructions.
j. Do not overfill cylinders. (no more than 80 % volume liquid charge)
k. Do not exceed the maximum working pressure of the cylinder, even temporarily.
l. When the cylinders have been filled correctly and the process completed, make sure that the cylinders and the equipment are removed from site promptly and all isolation valves on the equipment are closed off.
m. Recovered refrigerant shall not be charged into another REFRIGERATING SYSTEM unless it has been cleaned and checked.

9. Labeling
   a. Equipment shall be labeled stating that it has been decommissioned and emptied of refrigerant.
      • The label shall be dated and signed.
   b. For appliances containing FLAMMABLE REFRIGERANTS, ensure that there are labels on the equipment stating the equipment contains FLAMMABLE REFRIGERANT.
10. Recovery

IMPORTANT

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

   a. When transferring refrigerant into cylinders, ensure that only appropriate refrigerant recovery cylinders are employed.
      i. Ensure that the correct number of cylinders for holding the total system charge is available.
      ii. All cylinders to be used are designated for the recovered refrigerant and labeled for that refrigerant (i.e. special cylinders for the recovery of refrigerant).
      iii. Cylinders shall be complete with pressure-relief valve and associated shutoff valves in good working order.
      iv. Empty recovery cylinders are evacuated and, if possible, cooled before recovery occurs.
   b. The recovery equipment shall be in good working order with a set of instructions concerning the equipment that is at hand and shall be suitable for the recovery of the flammable refrigerant.
      • If in doubt, the manufacturer should be consulted.
      • In addition, a set of calibrated weighing scales shall be available and in good working order.
      • Hoses shall be complete with leak-free disconnect couplings and in good condition.
   c. The recovered refrigerant shall be processed according to local legislation in the correct recovery cylinder, and the relevant waste transfer note arranged.
   d. Do not mix refrigerants in recovery units and especially not in cylinders.

e. If compressors or compressor oils are to be removed, ensure that they have been evacuated to an acceptable level to make certain that flammable refrigerant does not remain within the lubricant.
f. The compressor body shall not be heated by an open flame or other ignition sources to accelerate this process.

IMPORTANT
When oil is drained from a system, it shall be carried out safely.

2.3. Precautions for devices that use R454B

FLAMMABLE REFRIGERANT WARNING

- IGNITION SOURCES: Verify the following safety precautions are followed to prevent refrigerant ignition and ensure proper operation without equipment damage, injury, or death.
  - Verify equipment is installed in a room that does not contain continuously operating ignition sources (for example: open flames, an operating gas appliance, or an operating electric heater).
  - Verify equipment is installed in a room large enough to properly accommodate the release of the full system charge.
    - Ensure actual system refrigerant charge is in accordance with the room sizes Amin and TAmin, found in ***Appendix A*** of this manual.
      - Improper room sizes can lead to dangerously high concentrations of refrigerant vapor.
    - Ensure appropriate fire extinguishing equipment (dry powder or CO2 fire extinguisher) is available and adjacent to worksite whenever any hot work is required on the refrigerating equipment or any associated parts.
  - DO NOT use ignition methods, such as a halide torch, to detect refrigeration leaks. Electronic leak detectors may be used as long as they pose no risk as potential ignition source.
    - Verify the electronic refrigerant leak sensor is calibrated to the refrigerant used and appropriate percent of gas is confirmed.
  - When installing field pipe joint connections, avoid locations with possible ignition sources such as UV lights, electric heaters, gas appliances, pilot flames, brushed motors and similar devices.
  - Ensure the worksite is free from faulty equipment and appliances that could be a potential ignition source.
    - Failure to do so may result in ignition risk due to outdated and unsafe equipment.
  - Place “No Smoking" signs in the worksite.
  - Markings and labels on the equipment must remain legible. Correct all labels or service markings that are illegible. Labels and service markings contain information that is critical to the next service technician

FLAMMABLE REFRIGERANT WARNING

- VENTILATION: Be aware that refrigerants may not contain an odor. If the refrigerant gas comes into contact with a flame, poisonous gases will be released.
  - Limit or avoid work in confined spaces. Prior to installation, verify service connections and field joints are placed in ventilated and easily accessible areas.
  - Do not perform any hot work without proper ventilation in the work space.
  - Confirm that all ventilation outlets and machinery are not obstructed, and are operating adequately.
    - Failure to provide constant ventilation allows for the concentration of refrigerant vapor in the work area.
  - If refrigerant gas leaks during installation work, ventilate the room.
    - If the refrigerant gas comes into contact with a flame, poisonous gases will be released.

FLAMMABLE REFRIGERANT WARNING

- LEAK DETECTION: Check the work area for any potential toxic or flammable gases using an appropriate refrigerant detector prior to, during, and after work is complete.
  - If a leak is suspected, immediately remove/extinguish all naked flames.
  - Ensure all refrigerant is recovered and system is isolated prior to making repairs. For PAA connections, use flare connection as the equipment as designed for. Mitsubish Electric US, Inc. is not responsible for improper brazing connections done by the installer.
    - Instructions for the removal of refrigerant can be found in *Handling and service of R454B* chapter of this manual.
  - Hazardous vapors may exist in mechanical rooms. Use appropriate leak detection equipment (non-sparking) that is adequately sealed and intrinsically safe.
    - Ensure leak detection equipment set at a percentage of the LFL (lower flammability limit) of the refrigerant employed, and the appropriate percentage of gas (25% maximum) is confirmed.
  - Recover refrigerant via the outdoor unit service ports only. Do not vent refrigerant. Always follow the decommissioning procedure.
  - Do not pierce or burn.

CAUTION

- Do not use means to accelerate the defrosting process or to clean, other than those recommended by the manufacturer.
  - Some chemicals and cleaning products may be incompatible with the coil materials, and may corrode the coil.
- Verify leak detection fluids do not contain chlorine.
  - Leak detection fluids that contain chlorine may react with refrigerant and corrode pipework.
- Confirm that refrigerant piping and other components are installed in a position/location that is unlikely to be exposed to corrosive materials.
  - Corrosion can reduce the longevity of the product, and possibly lead to a hazardous refrigerant leak.
- When it is necessary to replace electrical components, the new components must be fit for the purpose and to the correct specification. Always follow guidelines in the installation and service manuals, and if in doubt, consult with the manufacturer's technical department for assistance.
  - Improperly sourced parts may lead to reduced functionality and product life.

2.4. Installation of R454B system

FLAMMABLE REFRIGERANT WARNING

- Ensure proper protection from physical damage during installation, operation, and service when performing pipework or handling piping material.
- Verify pipe work performed in compliance with national and local regulations and standards.
- Ensure all field joints in pipe work are inspected prior to covering and enclosing.
  - Verify all field pipe joints are properly pressure tested with inert gas.
  - Verify all field pipe joints are vacuum tested prior to refrigerant charging.
    - Verify all indoor field-made joints are tightness tested with 0.25 times the MAXIMUM ALLOWABLE PRESSURE, with NO LEAK DETECTED.

FLAMMABLE REFRIGERANT WARNING

Auxiliary devices which may be a POTENTIAL IGNITION SOURCE shall not be installed in the duct work. Examples of such POTENTIAL IGNITION SOURCES are hot surfaces with a temperature exceeding 1292 °F (700 °C) and electric switching devices.

IMPORTANT

Approved electric heater kits manufactured for Mitsubishi Electric US, Inc. includes electric heat kits manufactured for Mitsubishi Electric US, Inc. that are allowed for use with the listed air handlers. These tables are found in the chapter *Indoor unit accessories* found in the Installation manual.

FLAMMABLE REFRIGERANT WARNING

LEAK DETECTION SYSTEM INSTALLED. This air handler is equipped with a refrigerant leak detection system.

See service manual for service and replacement instructions.

- Unit must remain ON, except for service, installation, or inspection.
- Loss of power to the refrigerant leak sensor mounted in the indoor unit will result in an inability to detect a refrigerant leak. This may cause a fire. Refrigerant leak sensor lifetime is 15 years.
- Only replace refrigerant leak sensor devices with sensors approved for use by Mitsubishi Electric US, Inc.
- Do not install equipment in a configuration where false ceilings or drop ceilings are used as a return air plenum.

2.4.1. Safety checks for systems using R454B

1. **Complete prior to installation**
   - Verify the REFRIGERANT CHARGE is in accordance with the room size, found in the charts below in *Minimum floor and minimum conditioned space area*, where refrigerant containing parts are installed.
   - Verify ventilation openings are not obstructed and the required ventilation is present.

IMPORTANT

Alarm-triggered mechanical ventilation is not supported at this time.

- Verify markings and signs for the equipment are visible and legible. Correct all illegible markings and signs.

- Verify refrigeration pipe and components are installed in a position where they are unlikely to be exposed to any substance which may corrode refrigerant containing components, unless the components are constructed of materials which are inherently resistant to being corroded or are suitably protected against being so corroded.
- Verify common household chemicals and appliances are properly stored away from the return vents and air handler
  - Vapors and gases from chemical such as propane, butane, methane, insecticides, aerosol or cleaning sprays, and paint or small smoke producing appliances may falsely trigger the leak detection system and impede the proper function of the unit.

2. **Checks to electrical devices**

   Repair and maintenance of electrical components include initial safety checks and component inspection procedures.
   - Verify capacitors are discharged in a safe manner to avoid possibility of sparking.
   - Verify there are no live electrical components.
   - Ensure wiring is not exposed while charging, recovering, or purging the system.
   - Verify continuity of earth bonding.
   - If a fault exists that could compromise safety, do not connect electrical supply to the circuit until fault is repaired.
   - If the fault cannot be corrected immediately but it is necessary to continue operation, an adequate temporary solution shall be used. Report any malfunction or faulty equipment/ operation to the owner of the equipment so all parties are aware.
3. **During repairs to sealed components**
   - Verify all electrical power supplies are disconnected from the equipment being worked upon prior to any removal of sealed covers, etc. If it is absolutely necessary to have an electrical supply to equipment during service, then permanently operating leak detection must be installed at the most critical point to warn of a potentially hazardous situation.
   - Verify the casing is not altered in any manner that affects protection.
     - Verify no visible physical damage to cables exists.
     - Verify connections are not excessive.
     - Verify terminals are installed according to specification.
     - Verify there is no damage to seals.
     - Verify gland fitting are installed properly and according to specifications.
   - Ensure equipment properly secured.
   - Ensure seals or sealing materials are not degraded and operating properly.
   - Verify all replacement parts in accordance with the manufacturer specifications.
4. **Intrinsically safe components can only be replaced but never repaired**
   - Do not apply any permanent inductive or capacitance loads to the circuit without ensuring it will not exceed the permissible voltage and current permitted for the equipment in use. Intrinsically safe components are the only type of components that may be worked on while live in the presence of a flammable atmosphere.
   - Ensure test apparatus meets correct rating specification.
   - Replace components only with parts specified by the manufacturer. Other parts may result in the ignition of refrigerant in the atmosphere from a leak.

NOTE

The use of silicon sealant can inhibit the effectiveness of some types of leak detection equipment.

Intrinsically safe components do not have to be isolated prior to working on them.

5. **Cabling**
   - Verify cabling is installed in a location that avoids wear, corrosion, excessive pressure, vibration, sharp edges, or any other adverse environmental effects.
   - Check the cables for effects of aging or continual vibration from sources such as compressors or fans.

2.4.2. Minimum floor and conditioned space area requirements

For safe and acceptable installation, there are a number of requirements that must be met to ensure that in the event of a refrigerant leak, refrigerant vapors do not have the opportunity to collect and create a hazardous concentration levels of refrigerant vapors.

These requirements are in relation to the following categories:

- Area of the conditioned space (**TAmin**)
- Area of the indoor unit installation space (**Amin**)
- Installation height of the indoor unit, measured from the floor to the bottom of the air handler (h_0)
- Opening conditions for connected rooms and natural ventilation (**Anv**).
- Ducting and damper configurations

For all installations, the following guidelines must be followed:

- Residential installations and ductwork should be designed to comply with ACCA's Manual D (ANSI / ACCA 1 Manual D 2016, Residential Duct Systems).
  - Failure to comply with industry best practices can result in poor performance, including unbalanced heating / cooling / airflow.
- When zone dampers are used, they must be configured such that they will open fully during a refrigerant leak error.
  - Pre-existing zone dampers that do not meet this requirement must be permanently opened fully and disabled.
- Manual dampers must not be completely closed during or after installation. Balancing is acceptable.
  - Closing dampers can reduce the conditioned space area beyond intended acceptable limits.
- Vent registers, grilles, and covers must not completely obstruct air flow from any vent.
  - A blocked vent can reduce the conditioned space area beyond intended acceptable limits.
- At least one room (not including the indoor unit installation room) must have a dedicated return duct.
  - Spaces without return ducts have a risk of refrigerant accumulation during a leak event.
- The height of the ceiling in the indoor unit installation room must be at least 2.2 m (7 ft - 2.7 in).
  - Area calculations have been calculated using this assumption.
- The area of the indoor unit installation room must be at least 20% of the total area of **Amin**.
- Rooms adjacent to the indoor unit installation room can be considered part of the **Amin** area for the purpose of contributing to **Amin** area when the following conditions are met:
  - The rooms are on the same floor.
  - The rooms are connected by a permanent opening that cannot be closed, with an area greater than **Anv** that is below 300 mm (11.8 in) from the floor, at least 50% of which is below 200 mm (7.8 in) from the floor.
  - The rooms are connected by a second permanent opening that cannot be closed, with an area greater than 50% of **Anv** that is above 1.5 m (4 ft - 11.1 in).
- Natural ventilation requirements can be satisfied by use of ventilation ducting, passive through-wall ducts, drop ceilings, louvered doors, door undercuts, space between wall and floor, etc.
  - For openings which extend to the floor, the minimum height is 20 mm (0.8 in) above the top of the floor covering (i.e. tiles and carpet pile).
- Enhanced tightness refrigeration systems (ETRS) are approved for fixed **Anv** requirements.
  - Almost every combination of Mitsubishi Electric US, Inc. indoor unit / outdoor unit are considered an enhanced tightness refrigeration system (ETRS).

–

IMPORTANT

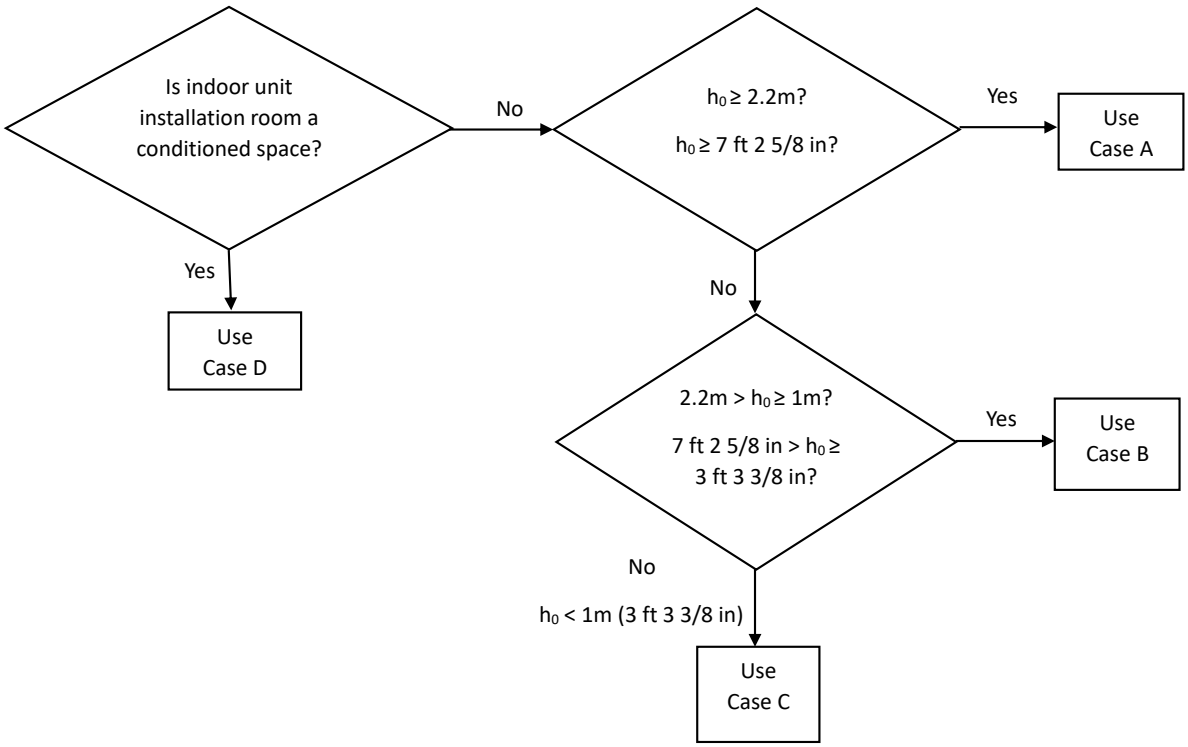
SVZ-AP12NL indoor unit (IDU) with **SUZ-AA12NL** outdoor unit (ODU) is **the only non-ETRS combination**.

For ETRS-compliant systems, the value for: $A_{nvETRS} \geqslant 114cm^2 \ or \ 22in^2$.

– For Non-ETRS-compliant systems, the minimum opening size can be determined from the following equation: $A_{nv} = 0.0317 \times \left(m_c - 0.337 \times \left(\sqrt{A}\right)\right) \times \sqrt{0.563 \times \sqrt{A}}$

– Where **A** is the area of the installation room in square meters, and m_c is the planned total system charge in kilograms.

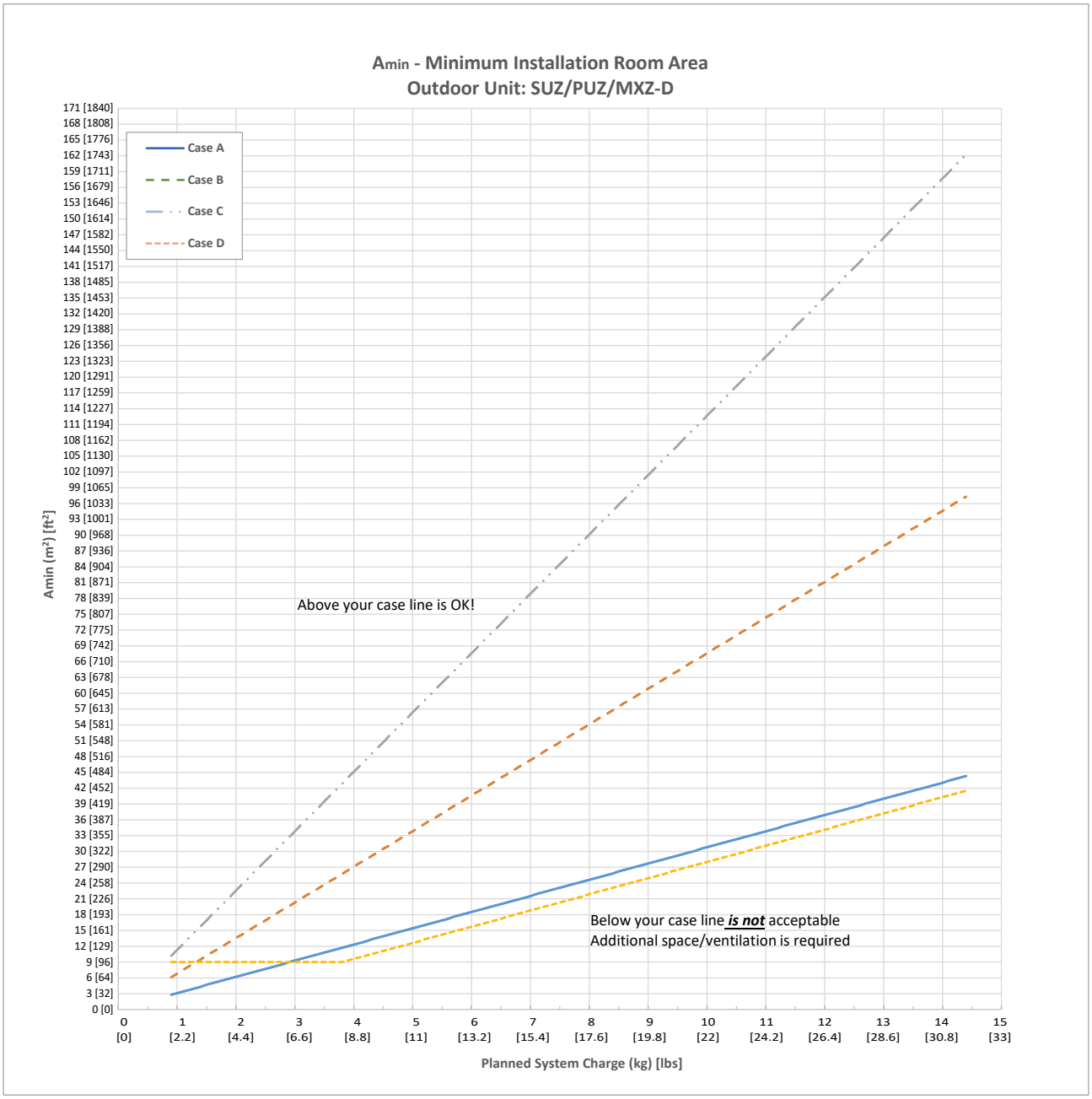
- Use the tables on the following pages to determine **Amin** and **TAmin** requirements.
  1. Match the chart title to the outdoor unit being paired with the air handler.
  2. Use the following flow chart to determine which case line is correct for your application.
  3. Confirm the planned system charge, m_c, and trace up to the correct case line.
  4. Trace left from the intersection with the correct case line to determine **Amin** and **TAmin**.
  5. This information is available in ***Appendix A*** at the end of this manual.

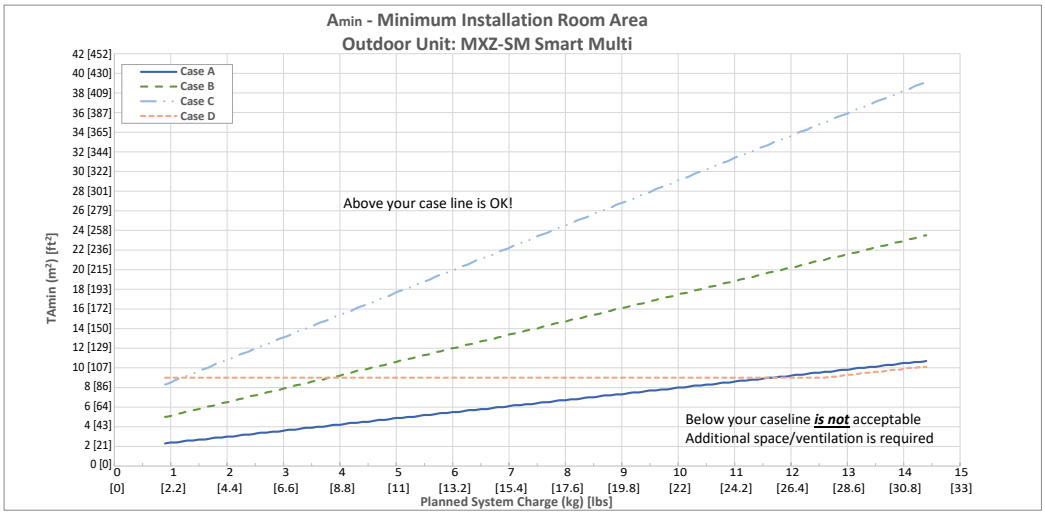


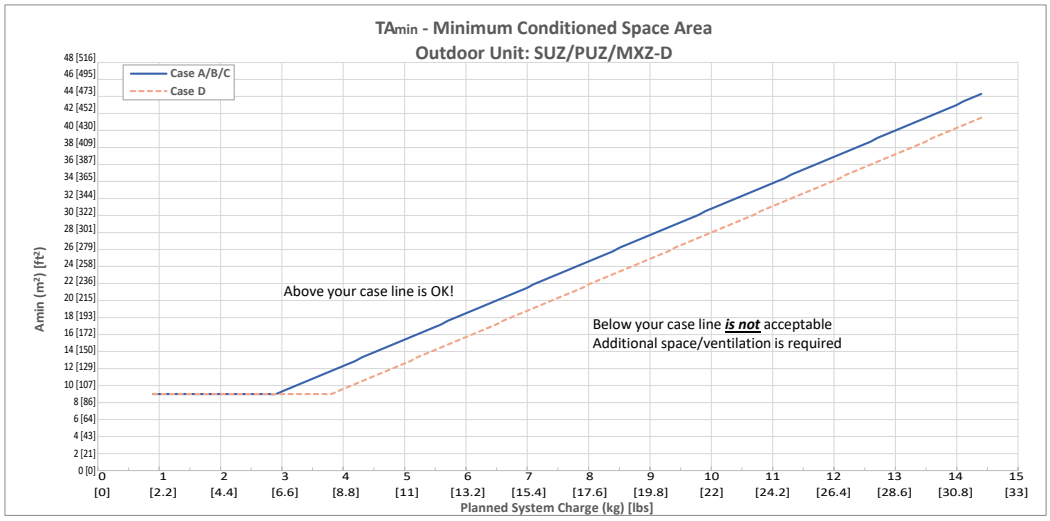
NOTE

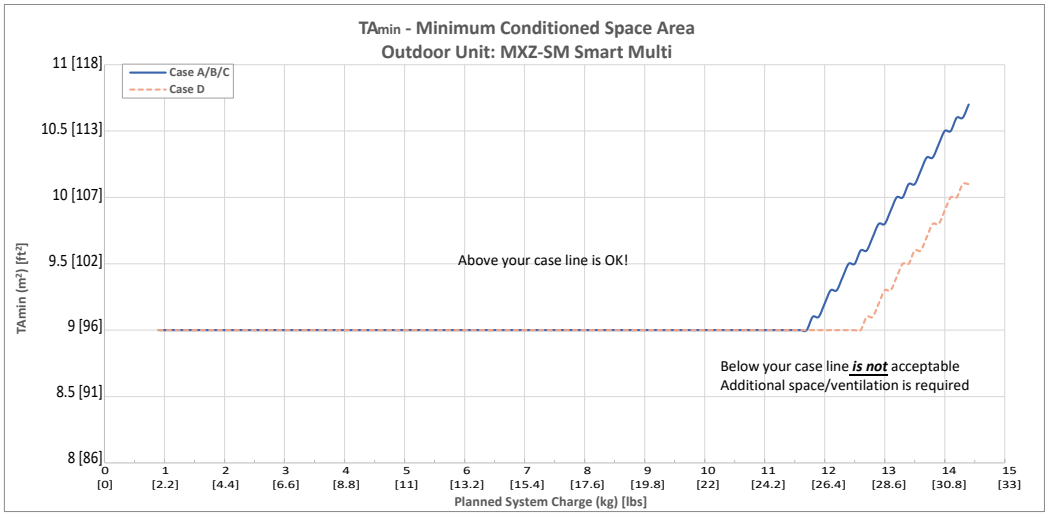
For systems certified as ETRS the following ventilation requirement can be substituted:

$$A_{nvETRS} \geqslant 114cm^2 \ or \ 22in^2$$









2.5. Handling and service of R454B system

FLAMMABLE REFRIGERANT WARNING

- Follow all national and local regulations and policies regarding refrigerant removal, evacuation, and recovery processes.
- Follow all safety precautions and procedures found in the installation and service manuals.
- Flammable refrigerant systems may only be purged with oxygen-free nitrogen.
  – Never use compressed air or oxygen for purging flammable refrigerant systems.
- Do not place vacuum pump air outlet near potential ignition sources.
- Verify proper ventilation available.

2.5.1. Removal and evacuation of refrigerant R454B

FLAMMABLE REFRIGERANT WARNING

- Verify vacuum pump outlet is secured away from potential ignition sources.
- Verify proper ventilation is available.

1. Safely remove refrigerant following local and national regulations.
2. Evacuate
3. Purge the circuit with inert gas.
4. Evacuate
5. Continuously flush or purge with inert gas when using a flame to solder or de-solder.
6. Open the circuit
7. Recover the refrigerant charge into the correct recovery cylinders if venting is not allowed by local and national codes.

2.5.2. Purging the system with R454B

NOTE
This process might need to be repeated several times.

1. Break the system vacuum with oxygen-free nitrogen.
2. Continue to fill until the working pressure is achieved.
3. Vent to atmosphere.
4. Evacuate the system.
5. Repeat steps until no refrigerant remains in the system, then fill a final time with oxygen-free nitrogen.
6. When purge is complete, vent the system down to atmospheric pressure to enable work to take place.

2.5.3. Charging R454B system

In addition to conventional charging procedures and safety precautions described in the installation and service manuals, read and follow the following precautions:

FLAMMABLE REFRIGERANT WARNING

- Do not allow contamination of different refrigerants to occur when using charging equipment.
- Keep hoses or lines as short as possible to minimize the amount of refrigerant contained in them.
- Keep all cylinders in an appropriate position according to the instructions.
- Ensure that the refrigerating system is properly grounded prior to charging the system with refrigerant.
- Label the system when charging is complete (if not already).
- DO NOT OVERFILL the refrigerant system.
- Pressure test the system prior to re-charging with appropriate purging gas.
- Leak test the system at completion of charge, prior to commissioning, and before leaving the worksite.

2.5.4. Recovery of R454B

FLAMMABLE REFRIGERANT WARNING

- Do not mix refrigerants in recovery units and especially not in cylinders.
- Never heat the compressor body with an open flame or any other ignition sources to accelerate the process.

Verify the following prior to recovering refrigerant from the system:

- Verify that only the proper cylinders required for flammable refrigerant recovery are used and that they are properly labeled.
  - If in doubt, contact manufacturer for consultation.
- Verify the correct number of cylinders needed for total system charge are available.
- Verify cylinders are in good working order with necessary pressure relief and shut-off valves.
- Verify recovery cylinders are empty, properly evacuated, and cooled before recovery.
- Verify calibrated weighing scales are available and in good working order.
- Verify hoses are complete with leak-free disconnect coupling and in good condition.
- Ensure all recovered refrigerant is processed in accordance with local legislation, in proper recovery cylinder, and with appropriate transfer note arranged.
- If compressors or compressor oils are to be removed, verify they are evacuated to an acceptable level to make certain that flammable refrigerant does not remain within the lubricant.
- Verify oil drained from the system is carried out safely.

2.6. Description and testing of leak mitigation functions

NOTE

The refrigerant leak detection system can be tested to verify that leak mitigation actions are functional. These actions serve to slow the leak rate and to disperse any concentrated refrigerant in the ducting.

For systems paired with an MXZ-SM Smart Multi outdoor unit, the unit has a safety-shutoff-valve installed that will close upon a leak detection and the compressor will run for several minutes to collect the refrigerant in the accumulator, then shut off.

The indoor unit fan motor activates to provide circulation airflow.

This process puts stress on system components, so testing should occur only when required, such as during system commissioning, or when advised by Mitsubishi Electric US, Inc. service personnel, or when required by local codes and regulations.

For systems paired with any other outdoor unit (SUZ/PUZ/MXZ *not Smart Multi), leak mitigation actions include automatic cutoff of the outdoor unit compressor and activating the fan motor of the indoor unit for circulation airflow.

2.6.1. Testing procedure

1. Confirm that the system is powered on and in normal operation.
2. Unplug the refrigerant leak sensor cable from the indoor unit control board at the plug connector labeled CNSA.
3. The mitigation actions will be triggered and will continue until the unit is powered off.
4. Power off the system.
5. Reconnect the refrigerant leak sensor cable.
6. Restore power and return the system to normal operation.

FLAMMABLE REFRIGERANT WARNING

The fan will automatically start when refrigerant leak is detected by refrigerant leak sensor. Keep a safe distance from the fan to avoid injury.

2.7. Decommissioning of R454B system

NOTE

LABELING: All equipment that is decommissioned and emptied of refrigerant must have a label stating FLAMMABLE REFRIGERANT with the date and signature affixed to the equipment.

Prior to decommissioning, verify the following safety checks:

- Follow all safety precautions and procedures.
- Take oil and refrigerant samples in case analysis is required prior to re-use of recovered refrigerant.
- Verify proper power is available necessary to fully execute procedure.
- Ensure the recovery process is supervised at all times by a trained professional.
- Verify mechanical handling equipment is available, if required, for handling refrigerant cylinders.
- Ensure all personal protective equipment is available and being used correctly.
- Verify recovery equipment and cylinders conform to the appropriate standards.

Follow the steps listed in this procedure to properly decommission the system:

1. Isolate system electrically.
2. Pump down refrigerant system, if possible.
3. If a vacuum is not possible, make a manifold so that refrigerant can be removed from various parts of the system.
4. Verify cylinder is situated on the scales before recovery takes place.
5. Start the recovery machine and operate in accordance with instructions.
   - Do not overfill cylinders (no more than 80 % volume liquid charge).

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

6. Once cylinders are properly filled and the process complete:
   - Promptly remove the cylinders and the equipment from site.
   - Verify all isolation valves on the equipment are closed.

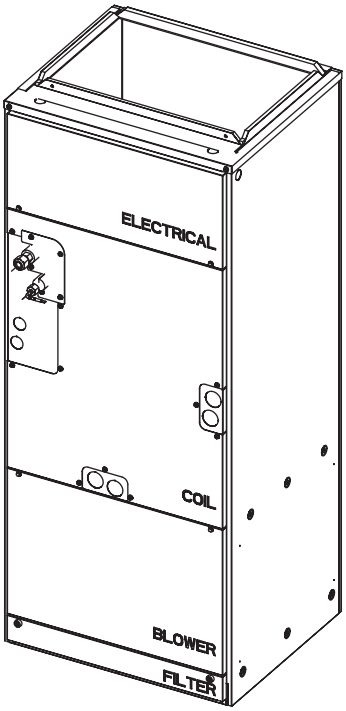
NOTE
Do not re-use recovered refrigerant in another refrigerant system unless it has been cleaned in accordance with procedure and regulation.

2.8. Disposal of R454B

Recover the refrigerant and recycle it.

If recycling is not possible then it should be incinerated by a licensed facility.

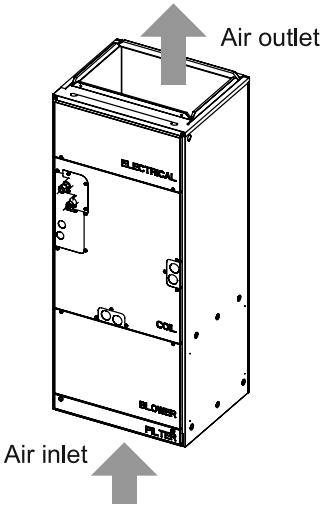
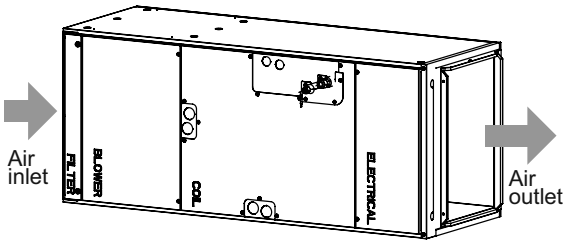
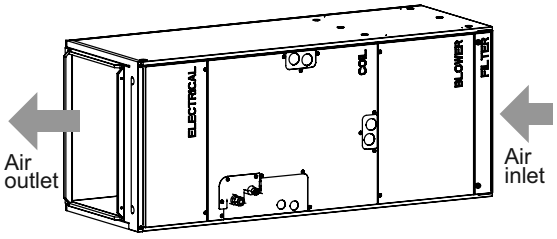
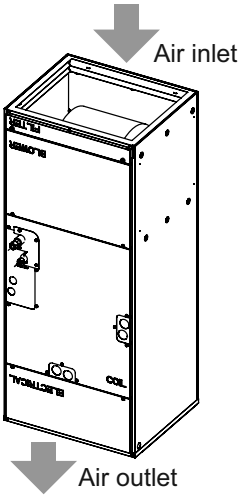
3. Features



Model code	Cooling Capacity / Heating capacity	
	Btu/h	kW
08	8000/9000	2.3/2.6
12	12000/13500	3.5/4.0
18	18000/20000	5.3/5.9
24	24000/27000	7.0/7.9
30	30000/34000	8.8/10.0
36	36000/40000	10.6/11.7
48	48000/54000	14.1/15.8
54	54000/60000	15.8/17.6

4. Part Names

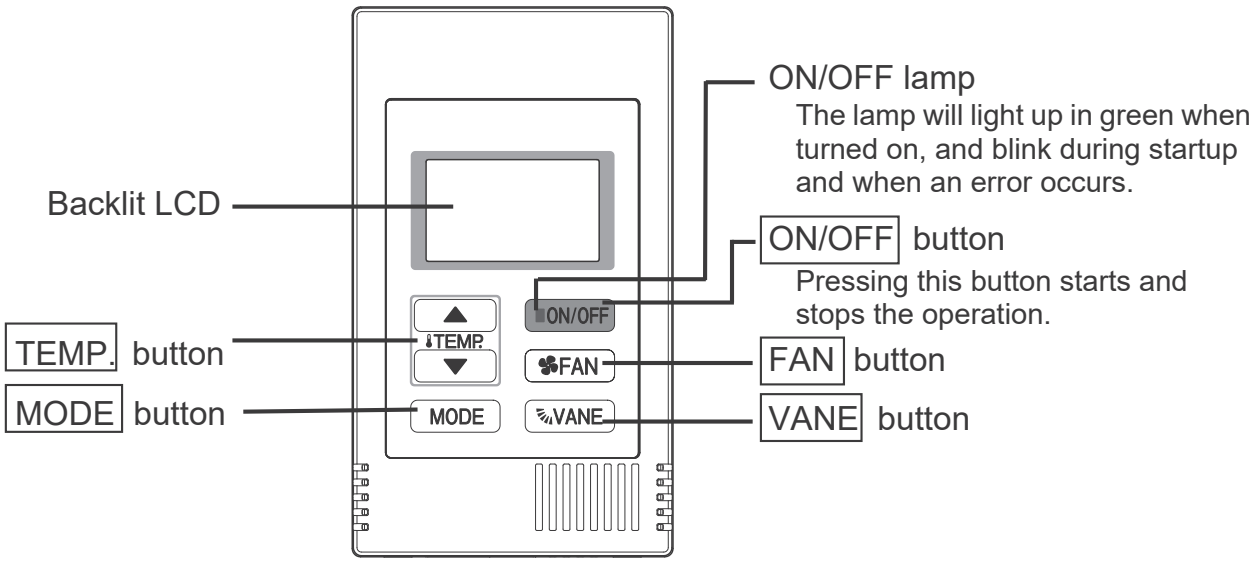
Indoor unit

(1) Vertical	(2) Horizontal right
	
(3) Horizontal left	**(4) Downflow**
	

4.1. Part Names

NOTE
If you use other remote controllers, refer to either the Installation manual or the Initial Setting Manual that comes with the controller to be used.

Simple MA remote controller
Controller interface:



IMPORTANT
To set the functions that are not available on this controller (PAC-YT53CRAU), use MA remote controller or the centralized controller.

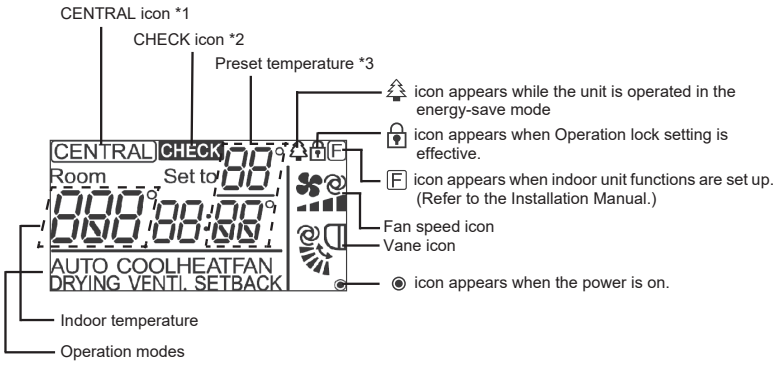
CAUTION

- Never expose the remote controller to direct sunlight. Doing so can result in the erroneous measurement of room temperature.
- Never place any obstacle around the lower right-hand section of the remote controller. Doing so can result in the erroneous measurement of room temperature.

Display:

IMPORTANT

* All icons are displayed for explanation.

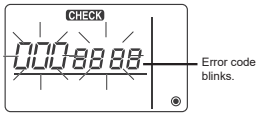


*1 CENTRAL icon

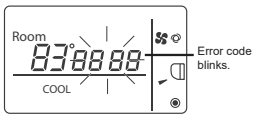
Appears when one of the following local operations is prohibited: ON/OFF; operation mode; preset temperature; fan speed; vane.

*2 CHECK icon

When an error occurs, power indicator will blink, and unit address (three digits) and error code (four digits) will blink.
Check the error status, stop the operation, and consult your dealer.



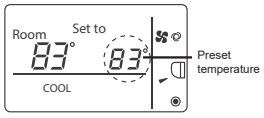
When only error code blinks, air conditioning units stay in operation, but an error may have occurred.
Check the error code, and consult your dealer.



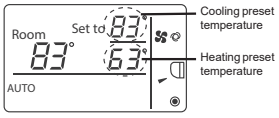
*3 Preset temperature

* Centigrade or Fahrenheit is selectable. Refer to the Installation Manual for details.

In COOL, DRYING, HEAT, or AUTO (single set point) modes



In AUTO (dual set point) or SETBACK modes

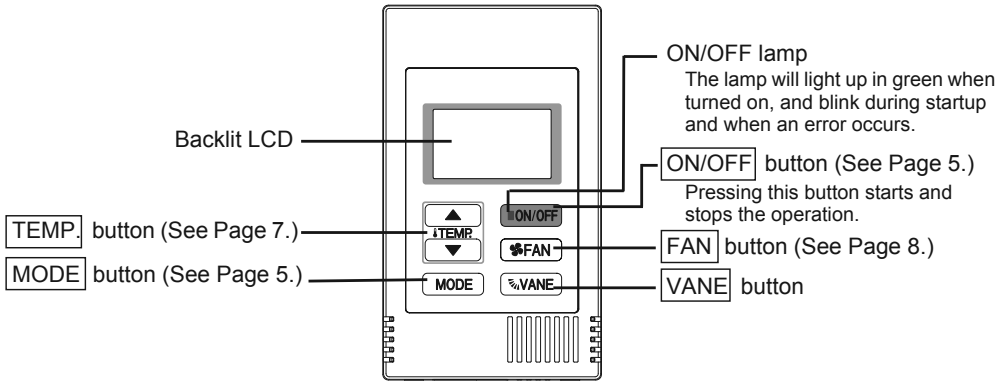


4.1.1. Remote controller

Remote Controller

[PAC-YT53CRAU] Once the operation mode is selected, the unit will remain in the selected mode until changed.

(1) Remote Controller Buttons



CAUTION

Never expose the remote controller to direct sunlight. Doing so can result in the erroneous measurement of room temperature.

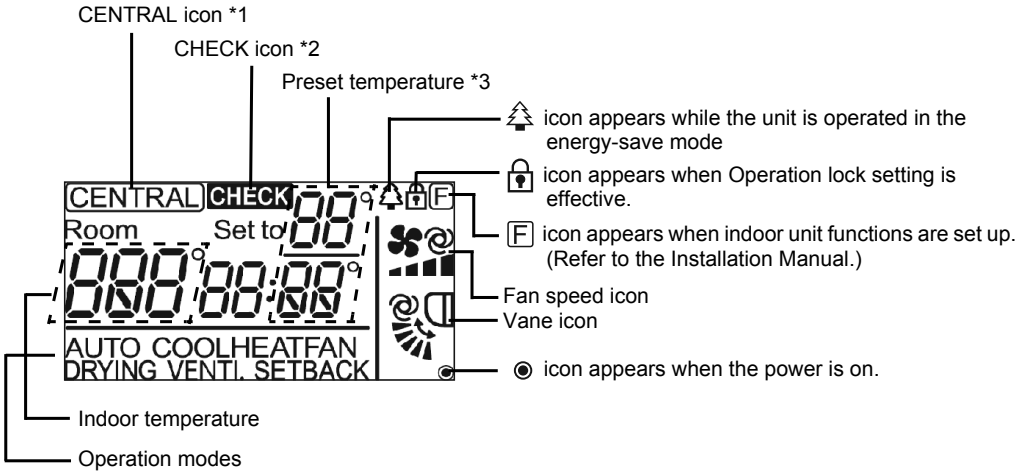
Never place any obstacle around the lower right-hand section of the remote controller. Doing so can result in the erroneous measurement of room temperature.

The thermistor at the lower right-hand section of the remote controller must be free from obstructions to ensure accurate measurement of room temperature.

Remote controller display

IMPORTANT

* All icons are displayed for explanation.

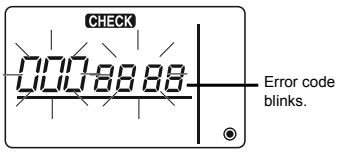


*1 CENTRAL icon

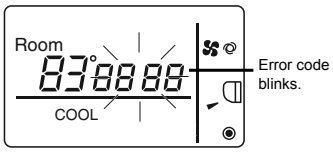
Appears when one of the following local operations is prohibited: ON/OFF; operation mode; preset temperature; fan speed; vane.

*2 **CHECK** icon

When an error occurs, power indicator will blink, and unit address (three digits) and error code (four digits) will blink.
Check the error status, stop the operation, and consult your dealer.



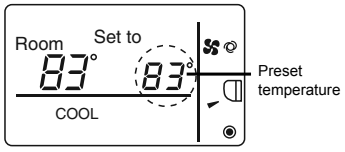
When only error code blinks, air conditioning units stay in operation, but an error may have occurred.
Check the error code, and consult your dealer.



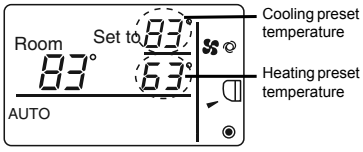
*3 Preset temperature

* Centigrade or Fahrenheit is selectable. Refer to the Installation Manual for details.

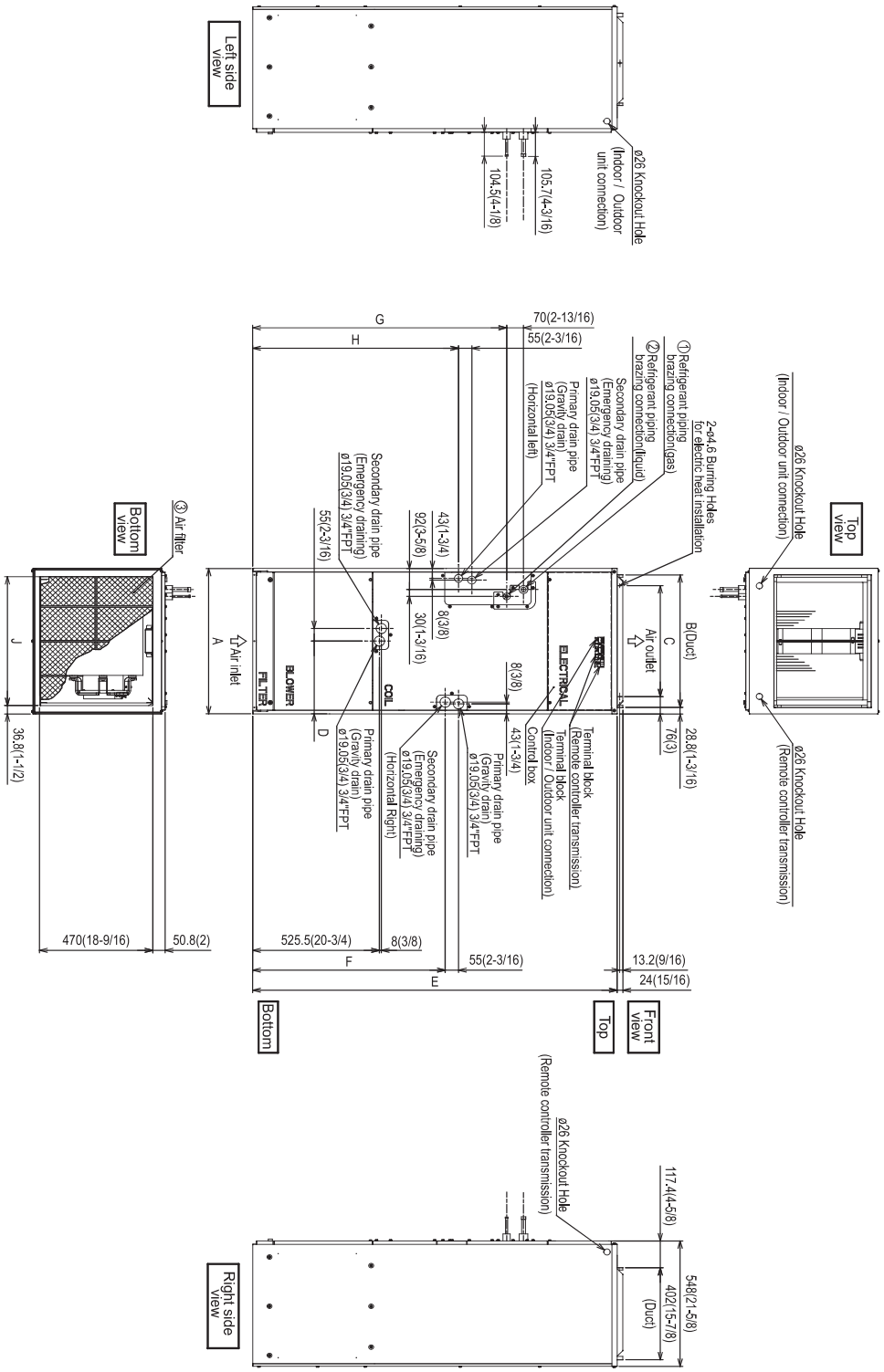
In COOL, DRYING, HEAT, or AUTO (single set point) modes



In AUTO (dual set point) or SETBACK modes



5. Dimensions



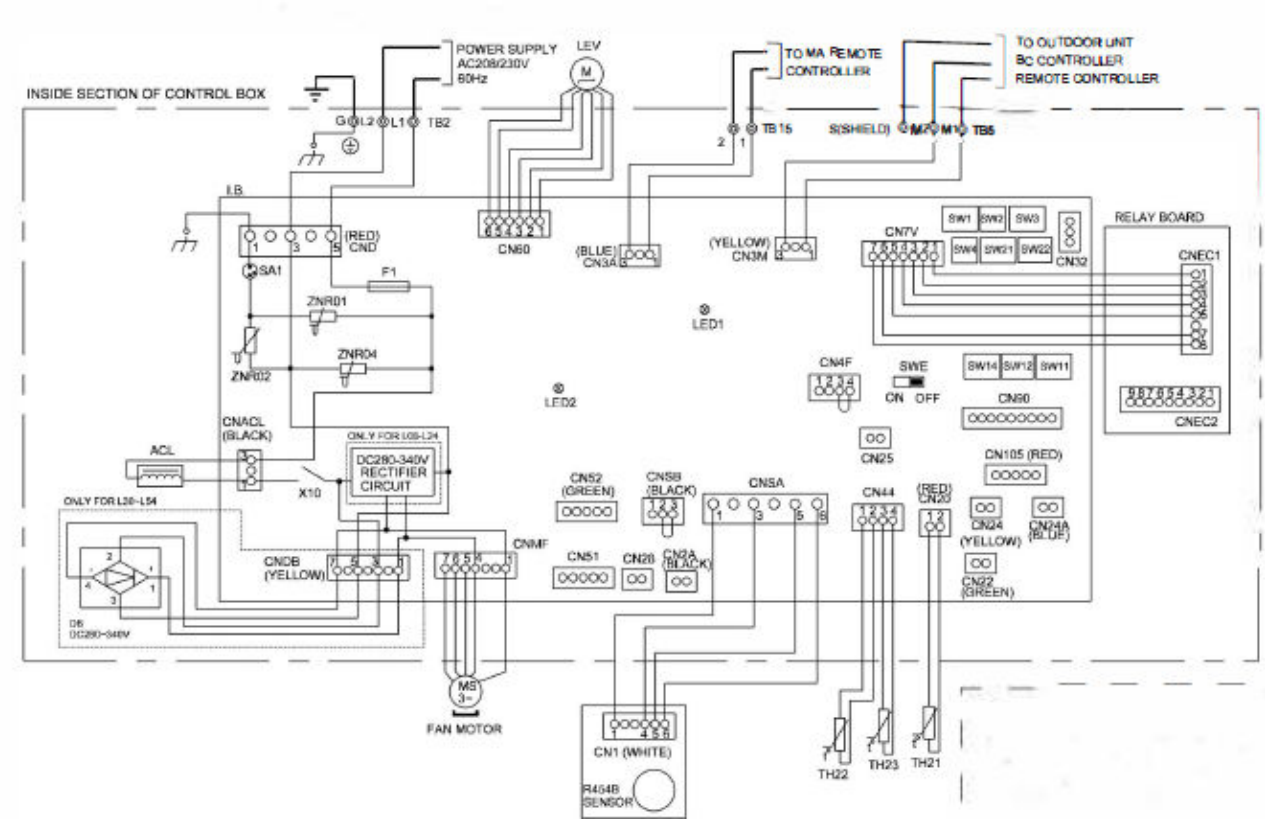
Units: mm (in.)

Model code	③Nominal filter size	Duct connection	①Gas pipe	②Liquid pipe
08 12	508 x 406.4 x 25.4 (20 x 16 x 1)	376 x 402 (14 -13/16 x 15-7/8)	Ø 12.7 (1/2)	Ø 6.35 (1/4)
18				
24			Ø 15.88 (5/8)	Ø 9.52 (3/8)
30 36	508 x 508 x 25.4 (20 x 20 x 1)	477 x 402 (18-13/16 x 15-7/8)		
48 54	508 x 609.6 x 25.4 (20 x 24 x 1)	579 x 402 (22-13/16 x 15-7/8)		

Model code	A	B	C	D
08 12	432 (17)	376 (14 - 13/16)	281 (11 - 1/8)	224 (8 - 7/8)
18				
24				
30 36	534 (21)	477 (18 - 13/16)	382.6 (15 - 1/8)	266.5 (10 - 1/2)
48 54	635 (25)	579 (22 - 13/16)	484.6 (19 - 1/8)	317.5 (12 - 1/2)

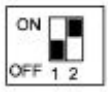
Model code	E	F	G	H	J
08 12	1275 (50 - 1/4)	680 (26 - 13/16)	823 (32 - 7/16)	735.5 (29)	360 (14 - 3/16)
18					
24					
30 36	1,378 (54 - 1/4)	737 (29 - 1/16)	935.5 (37 - 9/16)	792 (31 - 3/16)	461 (18 - 3/16)
48 54	1511 (59 - 1/2)	798.5 (31 - 7/16)	1053 (41 - 1/2)	853.5 (33 - 5/8)	563 (22 - 3/16)

6. Wiring diagram



SYMBOL EXPLANATION

SYMBOL	NAME	SYMBOL	NAME	SYMBOL	NAME
I.B.	INDOOR CONTROLLER BOARD	I.B.	INDOOR CONTROLLER BOARD	TB2	POWER SOURCE TERMINAL BLOCK
SW1	SWITCH (FOR MODE SELECTION)	CN24	CONNECTOR (HEATER CONTROL 1ST)	TB5	TRANSMISSION TERMINAL BLOCK
SW2	SWITCH (FOR CAPACITY CODE)	CN24A	CONNECTOR (HEATER CONTROL 2ND)	TB15	TRANSMISSION TERMINAL BLOCK
SW3	SWITCH (FOR MODE SELECTION)	CN25	CONNECTOR (HUMIDITY OUTPUT)	TH21	INTAKE AIR TEMP. THERMISTOR
SW4	SWITCH (FOR MODEL SELECTION)	CN32	CONNECTOR (REMOTE SWITCH)	TH22	PIPE TEMP. THERMISTOR/LIQUID
SW11	SWITCH (1st DIGIT ADDRESS SET)	CN51	CONNECTOR (CENTRALLY CONTROL)	TH23	PIPE TEMP. THERMISTOR/GAS
SW12	SWITCH (10the DIGIT ADDRESS SET)	CN52	CONNECTOR (REMOTE INDICATION)	ACL	AC REACTOR (POWER FACTOR IMPROVEMENT)
SW14	SWITCH (CONNECTION No. SET)	CN90	CONNECTOR (WIRELESS)	DB	DIODE BRIDGE
SW21	SWITCH (FOR STATIC PRESSURE SELECTION)	CN105	CONNECTOR (IT TERMINAL)	LEV	LINEAR EXPANSION VALVE
SW22	SWITCH (WIRELESS PAIR NO.)	CN2A	CONNECTOR (0-10V ANALOG INPUT)		
SWE	SWITCH (EMERGENCY OPERATION)	LED1	LED (POWER SUPPLY)		
F1	FUSE AC250V 6.3A	LED2	LED (REMOTE CONTROLLER SUPPLY)		
ZNR01,02,04	VARISTOR	R.B	RELAY BOARD		
SA1	ARRESTOR	CNEC2	CONNECTOR FAN INDICATION		
X10	AUX. RELAY				



DIPSWITCH DEFINTION
S1: OFF
S2: ON

Symbols used in wiring diagram above:

1. Connector:

2. Terminal:

3. (**HEAVY DOTTED LINE**): Field wiring

NOTE
Use copper supply wires.

1. **Setting of address switch:**
   a. For address setting, use the rotary switches (SW11, 12).
      - For setting the branch number for the connected BC controller, use the rotary switch (SW14).
      - These switches are located at the section with an arrow mark.
      - The switches are set to "0" at factory. The unit will not operate without setting the address in the field

   b. Determining the address of indoor units differs depending on the system employed in the field.
      - For more detail, refer to the installation manual of the outdoor unit to conduct address setting.

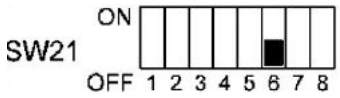
   c. The address setting is a combination of the figure at a number of the 1st digit and the 10ths digit.
      Example:

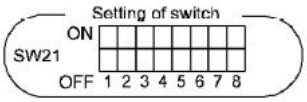
      - For address '3', set 3 to the number of the 1st digit and leave '0' for the number of the 10ths digit.
      - For address '25', set '5' to the number of the 1st digit, and '2' as the 10ths digit number.

   d. The branch number represents that of the BC controller for which the indoor unit is being connected.
      - Set it to '1-F' (hexadecimal rotation display) with SW14.
        – Note: Setting og SW14 is only required for CITY MULTI (W) R2 System.

2. **Selecting the external static pressure and voltage:**
   - The factory setting for use under external static pressure of 125 Pa < 0.5 in WG > 230 V, no switch operation is needed when using under the standard condition.

Voltage	Switch operation
208 V	

Voltage	Switch operation
230 V	

External static pressure	Switch operation
75 Pa < 0.3 in WG >	
125 Pa < 0.5 in WG >	
200 Pa < 0.8 in WG >	
After setting the switch, use below image to place corresponding switch position below. 	

3. **Performing a test run for the Fan:**
   - To perform a test run for the fan, turn on the SWE on the control board while the indoor unit is being powered.

> **IMPORTANT**
> Be sure to turn off the SWE after completing the test run.
>
> – The SWE must not be kept on longer than 10 hours.

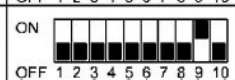
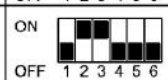
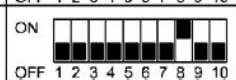
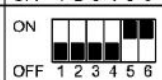
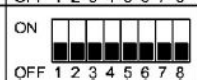
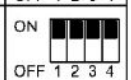
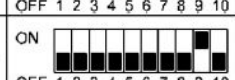
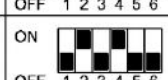
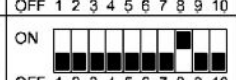
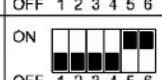
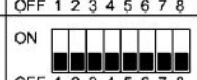
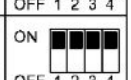
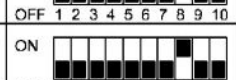
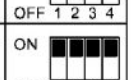
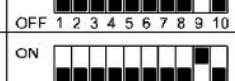
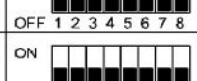
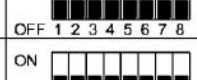
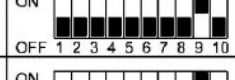
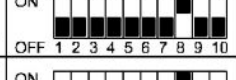
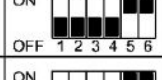
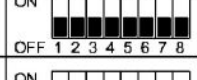
4. **Operation of LED for indoor circuit board service:**

Symbol	LED operation under normal state
LED 1	Main power source applied -> LIGHTING
LED 2	MA transmission power source received -> LIGHTING

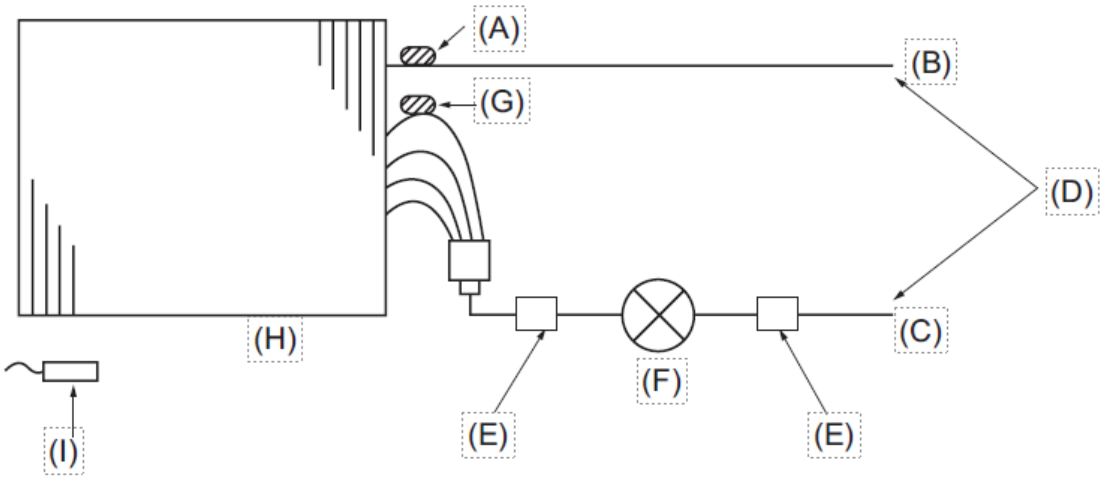
5. **Changing the initial setting:**

> **WARNING**
> Be sure to turn the initial power source off for handling.

   - Set No. 8 of SW3 to ON when using the optional room thermostat.
   - Set No. 1 of SW1 and No. 8 of SW3 to ON when using the room temperature sensor with the remote controller built in.

MODEL	SW1	SW2	SW3	SW4	SW21	SW22
PVFY-L08NAMU-A						
PVFY-L12NAMU-A						
PVFY-L18NAMU-A						
PVFY-L24NAMU-A						
PVFY-L30NAMU-A						
PVFY-L36NAMU-A						
PVFY-L48NAMU-A						
PVFY-L54NAMU-A						

7. Refrigerant System Diagram

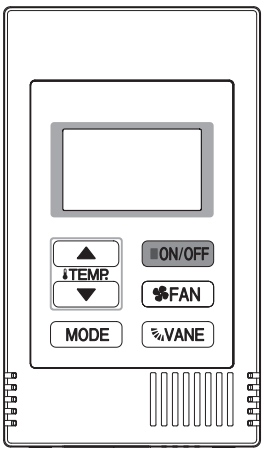


(A)	Gas pipe thermistor TH23
(B)	Gas pipe
(C)	Liquid pipe
(D)	Brazed connections
(E)	Strainer (#100 mesh)
(F)	Linear expansion valve
(G)	Liquid pipe thermistor TH22
(H)	Heat exchanger
(I)	Room temperature thermistor TH21

Capacity	Model codes 08, 12, 18	Model codes 24, 30, 36, 48, 54
Gas pipe	ø12.7 [1/2]	ø15.88 [5/8]
Liquid pipe	ø6.35 [1/4]	ø9.52 [3/8]

8. Microprocessor control

8.1. Cool Operation



How to operate

1. Press POWER ON/OFF button.
2. Press the operation MODE button to display COOL.
3. Press the TEMP. button to set the desired temperature.

NOTE

The set temperature changes 1 °F (1.8 °C) when the TEMP. button is pressed one time. Cooling 67 to 87 °F.

Thermo-regulating function (Function to prevent restarting for 3 minutes)

When indoor units are connected to the PUHY/PURY/PQHY/PQRY series of outdoor units:

- Room temperature ≥ desired temperature + 0.9 °F, Thermo ON
- Room temperature < desired temperature - 0.9 °F, Thermo OFF

When indoor units are connected to the PUMY / MXZ-SM series of outdoor units:

- Room temperature ≥ desired temperature + 0.9 °F, Thermo ON
- Room temperature < desired temperature - 0.9 °F, Thermo OFF

Anti-freezing control

- Detected condition: When the liquid pipe temp. (TH22) is 32 °F or less in 16 minutes from compressors start up, anti-freezing control starts and the thermo OFF.
- Released condition: The timer which prevents reactivating is set for 3 minutes, and anti-freezing control is cancelled when any one of the following conditions is satisfied.

1. Liquid pipe temp. (TH22) turns 50 °F or above.
2. The condition of the thermo OFF has become complete by thermo-regulating, etc.
3. The operation modes became mode other than COOL.
4. The operation stopped.

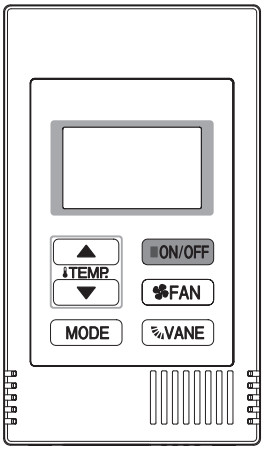
Fan

By the remote controller setting (switch of 3 speeds+Auto).

Type	Fan speed notch
3 speeds + Auto type	[Low], [Med], [High], [Auto]

When [Auto] is set, fan speed is changed depending on the value of: Room temperature - Desired temperature.

8.2. Dry Operation



How to operate

1. Press POWER ON/OFF button.
2. Press the operation MODE button to display DRY.
3. Press the TEMP. button to set the desired temperature.

NOTE

The set temperature changes 1 °F (1.8 °C) when the TEMP. button is pressed one time. Cooling 67 to 87 °F.

Thermo-regulating function (Function to prevent restarting for 3 minutes)

Setting the Dry thermo by the thermo regulating signal and the room temperature (TH21).

- Room temperature ≥ desired temperature + 2 °F, Dry Thermo ON
- Room temperature < desired temperature - 0.9 °F, Thermo OFF

When indoor units are connected to the PUMY / MXZ-SM series of outdoor units:

- Room temperature ≥ desired temperature + 0.9 °F, Thermo ON
- Room temperature < desired temperature, Dry Thermo OFF

Room temperature	3 min. passed since starting operation		Dry thermo ON time (min)	Dry thermo OFF time (min)
	Thermo regulating signal	Room temperature (T1)		
Over 64 °F	ON	T1 ≥ 83 °F	9	3
		83 °F > T1 ≥ 79 °F	7	3
		79 °F > T1 ≥ 75 °F	5	3
		75 °F > T1	3	3

Room temperature	3 min. passed since starting operation		Dry thermo ON time (min)	Dry thermo OFF time (min)
	Thermo regulating signal	Room temperature (T1)		
	OFF	Unconditional	3	10
Less than 64 °F	DRY thermo OFF			

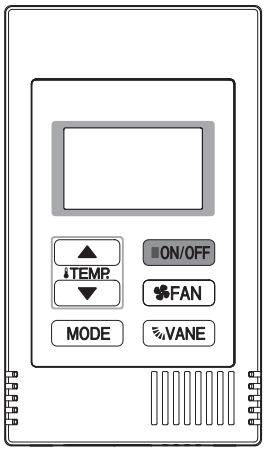
Frozen prevention control: No control function.

Fan

Indoor fan operation controlled depends on the compressor conditions.

Dry thermo	Fan speed notch	
ON	[LOW]	
OFF	Room temp. ≥ 64 °F	Stop
	Room temp.< 64 °F	[LOW]

8.3. Fan Operation



How to operate

1. Press POWER ON/OFF button.
2. Press the operation MODE button to display FAN.

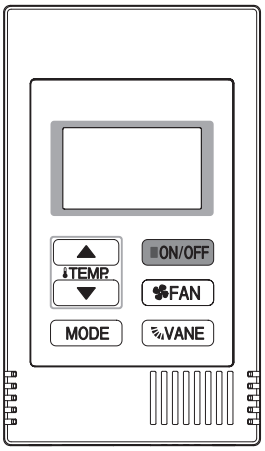
Fan

Set by remote controller.

Type	Fan speed notch
3 speeds + Auto type	[Low], [Med], [High], [Auto]

When [Auto] is set, fan speed becomes [Low].

8.4. Heat Operation



How to operate

1. Press POWER ON/OFF button.
2. Press the operation MODE button to display HEAT.
3. Press the TEMP. button to set the desired temperature.

NOTE

The set temperature changes 1 °F when the TEMP. button is pressed one time. Cooling 63 to 83 °F.

Thermo-regulating function (Function to prevent restarting for 3 minutes)

When indoor units are connected to the PUHY/PURY/PQHY/PQRY series of outdoor units:

- Room temperature ≥ desired temperature + 0.9° F, Thermo OFF
- Room temperature < desired temperature - 0.9° F, Thermo ON

When indoor units are connected to the PUMY / MXZ-SM series of outdoor units:

- Room temperature ≥ desired temperature + 0.9° F, Thermo OFF
- Room temperature < desired temperature - 0.9° F, Thermo ON

Fan

By the remote controller setting (switch of 3 speeds+Auto).

Type	Fan speed notch
3 speeds + Auto type	[Low], [Med], [High], [Auto]

When [Auto] is set, fan speed is changed depending on the value of: Desired temperature - Room temperature.

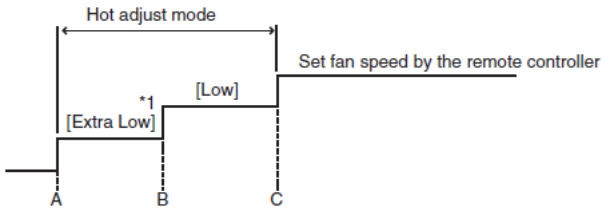
List of Control modes:

1. Hot adjust mode
2. Preheating exclusion mode
3. Thermo OFF mode (When the compressor off by the thermo-regulating)
4. Cool air prevention mode (Defrosting mode)
5. Capacity increasing mode

Hot Adjust mode

The fan speed ramps during normal heating operation for the following conditions:

1. When starting the HEAT operation
2. When the thermo-regulating function changes from OFF to ON
3. When release the HEAT defrosting operation



A: Hot adjust mode starts.

B: 5 minutes have passed since the condition A or the indoor liquid pipe temperature turned 95 °F or more.

C: 2 minutes have passed since the condition A. (Terminating the hot adjust mode)

*1 The fan may stop, depending on the operation status of the indoor units or on the unit settings.

Preheating exclusion mode

When the condition changes the auxiliary heater ON to OFF (thermo-regulating or operation stop, etc.), the indoor fan operates in [Low] mode for 1 minute.

NOTE
This control is same for the model without auxiliary heater.

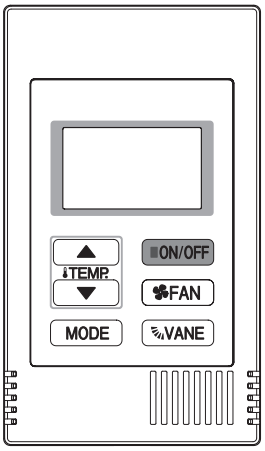
Thermo OFF mode

When the thermo-regulating function changes to OFF, the indoor fan operates in [Extra low].

Heat defrosting mode

The indoor fan stops.

8.5. Auto operation [Automatic cool / heat change over operation]



How to operate

1. Press POWER ON/OFF button.
2. Press the operation MODE button to display AUTO.
3. Press the TEMP. button to set the desired temperature.

NOTE

The set temperature changes 1 °F when the TEMP. button is pressed one time. Cooling 63 to 83 °F.

1. Initial value of operation mode
   - HEAT mode for room temperature < Desired temperature
   - COOL mode for room temperature ≥ Desired temperature
2. Mode change
   - HEAT mode to COOL mode: Room temperature is +3 °F above the target temperature for more than 3 minutes.
   - COOL mode to HEAT mode: Room temperature is -3 °F below the target temperature for more than 3 minutes.
3. COOL mode
   Same control as cool operation
4. HEAT mode
   Same control as heat operation

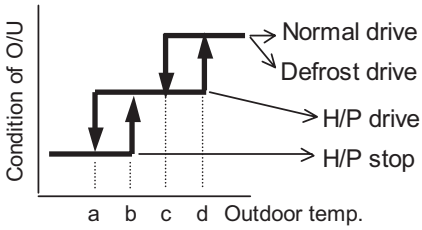
NOTE

The value "3 °F" is modifiable from 1.8 °F to 9 °F by maintenance tool.

8.6. Microprocessor control

8.6.1. Control specifications and DIP Switch setting

Table 1 shows the function settings for an auxiliary heater. Select the desired pattern in the table below, and set the DIP SW on the outdoor and indoor units as shown in Table 1.

<table>
<tr><th rowspan="3">Outdoor unit setting</th><th rowspan="3">Condition of outdoor unit</th><th rowspan="3"></th><th colspan="5">PVFY-NAMU-E1</th></tr>
<tr><th colspan="2">DIP S/W (Indoor unit)*1</th><th colspan="3">Heater control</th></tr>
<tr><th>SW3-2</th><th>SW3-4</th><th>Pattern</th><th>Defrost</th><th>Error</th></tr>
<tr><td rowspan="3">MXZ-TL, MXZ-NL(HZ)
PUMY-NKMU,
PUMY-NBMU
SW4:1,2,3,4,5,6,7,8,9,10
OFF</td><td rowspan="3">N / A</td><td></td><td>OFF</td><td>-</td><td colspan="3">Heater not Available</td></tr>
<tr><td></td><td>ON</td><td>OFF</td><td>Heater Available</td><td>OFF</td><td>OFF</td></tr>
<tr><td></td><td>ON</td><td>ON</td><td>Heater Available</td><td>ON</td><td>ON*2</td></tr>
<tr><td rowspan="6">MXZ-TL, MXZ-NL(HZ)
PUMY-NKMU,
PUMY-NBMU
SW4:1,2,3,4 ON /
5,6,7,8,9,10 OFF</td><td rowspan="6"> 

Parameters a/b/c/d are set by maintenance tool.</td><td rowspan="3">Normal drive</td><td>OFF</td><td>-</td><td colspan="3">Heater not Available</td></tr>
<tr><td>ON</td><td>OFF</td><td>Heater Available</td><td>OFF</td><td>OFF</td></tr>
<tr><td>ON</td><td>ON</td><td>Heater Available</td><td>ON</td><td>ON*2</td></tr>
<tr><td rowspan="3">Defrost drive
H/P drive
H/P stop</td><td>OFF</td><td>-</td><td colspan="3">Heater not Available</td></tr>
<tr><td>ON</td><td>OFF</td><td>Heater Available</td><td>OFF</td><td>OFF</td></tr>
<tr><td>ON</td><td>ON</td><td>Heater Available</td><td>ON</td><td>ON*2</td></tr>
</table>

* 1 Default settings: SW3-2 OFF, SW3-4 OFF

* 2 Heater will not operate during all error modes. Heater will not work during error if the fan is set to stop in thermo off.

Table 2 shows how the field-installed heater is controlled.

Table. 2 [Heater Control Table

Mode Change	Condition								
	(T_0 - T_{RA}) > 2.7 ° F [1.5° C]	AND	T_{RA} has not increased by 0.9° F [0.5° C] in X minutes	EH1 ON for > 5 minutes	AND	(T_0 - T_{RA}) > 2.7 ° F [1.5° C]	AND	T_{RA} has not increased by 0.9° F [0.5° C] in 5 minutes	(T_0 - T_{RA}) < 0.9 ° F [0.5° C]
EH1 ON	o	AND	o						
EH2 ON				o	AND	o	AND	o	
EH1 OFF									o
EH2 OFF									o

Key
- EH1: Electric Heater
- EH2: Electric Heater
- T_0: Set point temperature
- T_{RA} : Return air temperature
- X : Time delay (Default is 20 minutes; selectable to 10, 15, or 25 minutes)

Table 3 shows how the time delay is selected

Table. 3 [Time Delay Selection Table]

Function Setting [1]	Action [2]
108-1	Set Time Delay to 10 minutes
108-2	Set Time Delay to 15 minutes
108-3	Set Time Delay to 20 minutes *2[3]
108-4	Set Time Delay to 25 minutes

[1]Time delay can only be selected with MA controller. If use of a non-MA controller is desired, the time delay must first be selected with the MA controller. Then the non-MA controller can be attached and used.

[2]Time delays are approximate.

[3]The default time delay setting is 20 minutes.

When [Auto] is set, fan speed is changed depending on the value of: Room temperature - Desired temperature.

Chart 1 and Table 4 show an example of heater operation.

Chart 1 [Heater Operation Example]

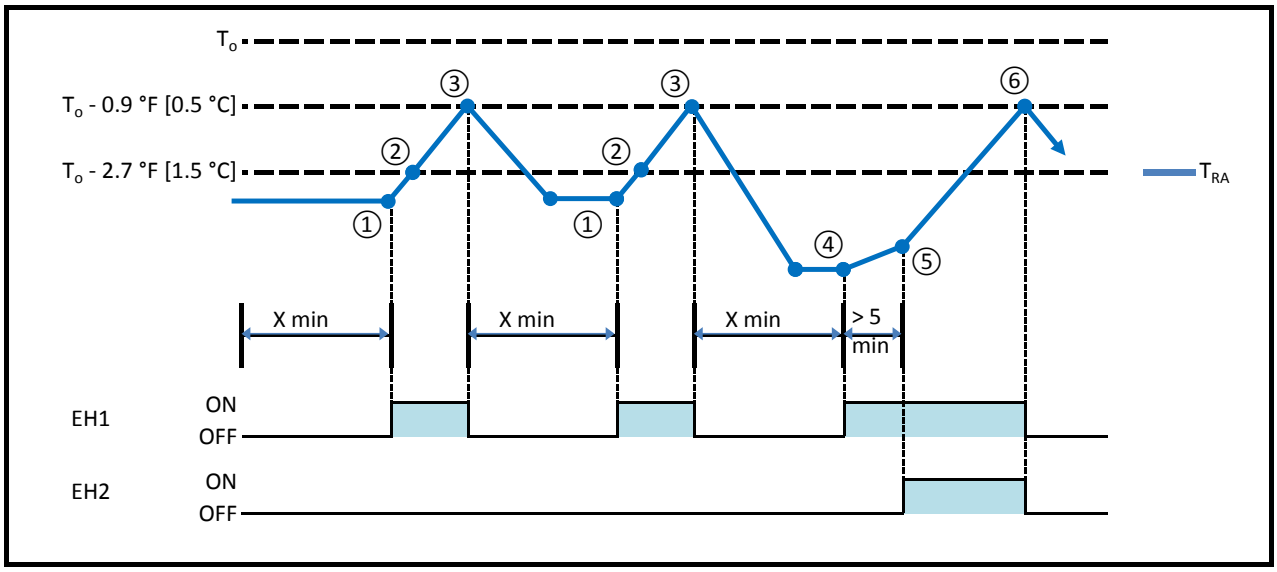


Table. 4 [Heater Operation Example]

Step	Condition			Result
①	(To -T_{RA}) > 2.7 °F [1.5 °C]	AND	T_{RA} has not increased by 0.9 °F [0.5°C] in X min	EH1 ON
②	(To -T_{RA}) < 2.7 °F [1.5 °C]	AND	T_{RA} increasing faster than 0.9 °F [0.5°C] in 5 min	EH2 not ON
③	(To -T_{RA}) < 0.9 °F [0.5°C]			EH1 OFF
④	(To -T_{RA}) > 2.7 °F [1.5 °C]	AND	T_{RA} has not increased by 0.9 °F [0.5°C] in X min	EH1 ON
⑤	(To -T_{RA}) > 2.7 °F [1.5 °C]	AND	T_{RA} not increasing faster than 0.9 °F [0.5°C] in 5 min	EH2 ON
⑥	(To -T_{RA}) < 0.9 °F [0.5°C]			EH1 OFF EH2 OFF

NOTE

Turning on the heater with the fan setting set to OFF requires that the DIP S/W and connectors on the indoor units are set on site.

Back-up heating will not be performed when the heater turns on while demand control is performed (not a request item).

This is applicable only to the R454B series. Make the settings for the following dip switches on the outdoor unit control board before switching on the power.

Fan Control

<table>
<tr><th rowspan="2">Pattern</th><th colspan="6">PVFY-L-NAMU-A</th></tr>
<tr><th>CN22 for FAN control (CN24RELAY-KIT-CM3)</th><th>DIP S/W3-2 (Indoor unit)</th><th>DIP S/W3-4 (Indoor unit)</th><th>Fan in error *1</th><th>Fan in defrost</th><th>Fan (All modes other than defrost and error)</th></tr>
<tr><td>1</td><td rowspan="2">Disabled</td><td rowspan="4">ON</td><td>OFF</td><td colspan="2">Stop (Heater OFF)</td><td rowspan="2">Set (Heater ON)
High *2 (Heater ON)</td></tr>
<tr><td>2</td><td>ON</td><td colspan="2">Stop (Heater OFF)
High (Heater ON)</td></tr>
<tr><td>3</td><td rowspan="2">Enabled</td><td>OFF</td><td>Low (Heater OFF)</td><td>Stop (Heater OFF)</td><td rowspan="2">Stop (Heater OFF)
Stop (Heater ON)</td></tr>
<tr><td>4</td><td>ON</td><td>Low (Heater OFF)
Low (Heater ON)</td><td>Stop (Heater OFF)
Stop (Heater ON)</td></tr>
</table>

* 1 Heater will not operate during all error modes. Heater will not work during error if the fan is set to stop in thermo off.

* 2 While the heater is on, the fan will operate at high speed regardless of the fan setting on the remote controller.

CAUTION

If a heater is installed in the duct, do not use CN22. By doing so, the fan will turn off when the heater is on, which may result in fire.

8.6.2. CN24RELAY-KIT-CM3 (Optional Parts) installation

The following section describes installation of the External Heater Adapter that connects to MXZ-SM/PUMY air conditioner R454B series indoor unit. This accessory includes the necessary wiring harnesses to control the activation of an electric heater with the air conditioner.

(1) Parts list

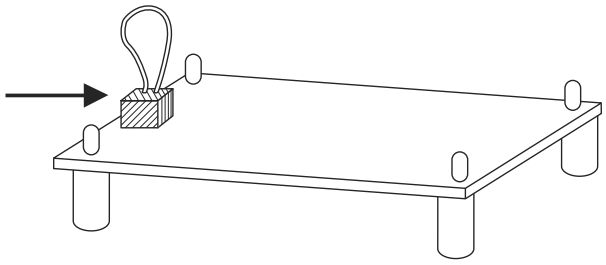
Check that the following parts are included in the package.

1. External output cable..... 2 in total
   Two types of cables with different connectors are included.
2. Panel heater connector..... 3 in total
   White: 3

(2) Connection to the indoor unit

Use the cables that fit the connectors on the indoor unit control board.

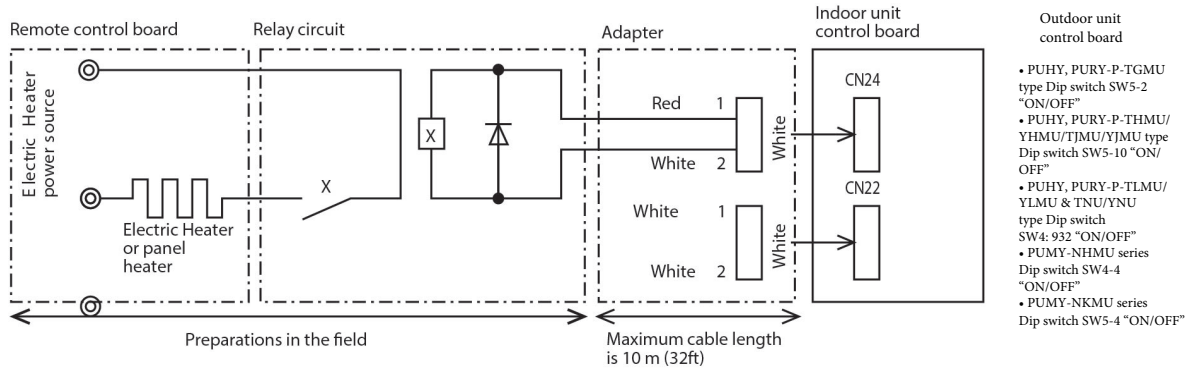
1. External output cable
   This cable is used to connect a relay circuit for an interlocked operation with either an electric or a panel heater.
   Select the heater output pattern (1st = CN24 or 2nd = CN24A) to use, and connect the cable to the connector on the indoor unit control board that corresponds to the selection.
2. Panel heater connector
   This connector is used to perform an interlocked operation with a panel heater. Depending on the indoor unit control board specification, connect the cable to CN22 as appropriate.



NOTE
This connector will stop the fan during auxiliary heater operation and should not be used if the fan is required.

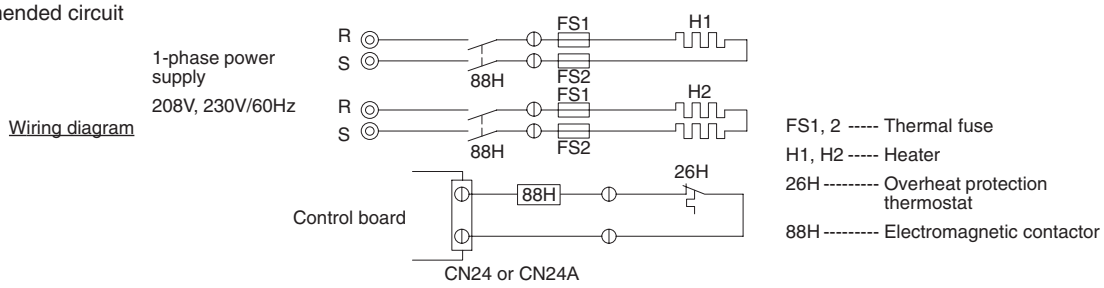
3) Wiring

- A basic connection method is shown below.



- The length of the electrical wiring for the CN24RELAY-KIT-CM3 is 2 meters (6-1/2 ft.)
- To extend this length, use sheathed 2-core cable.
  Control cable type: CVV, CVS, CPEV or equivalent.Cable size: 0.5 mm^2 ~ 1.25 mm^2 (16 to 22 AWG)
  Don't extend the cable more than 10 meters (32ft)

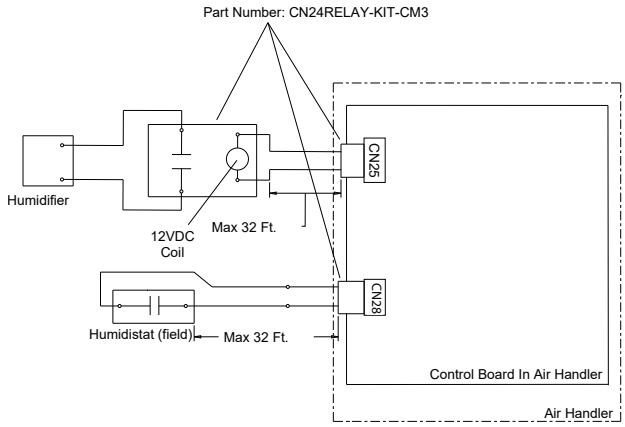
Recommended circuit



(4) Wiring restrictions

- Keep the length of the cable connecting to the circuit board of the indoor unit shorter than 10 meters (32 ft).
- Longer than 10 meters (32 ft) could cause improper operation.
- Use a transit relay when extending wiring such as remote wiring.

8.7. Humidifier



Humidifier Control (CN25 Output is ON)
Sequence of operation:

1. The humidistat closes CN28
2. The fan starts on high
3. CN25 provides 12VDC to turn on the Humidifier (do not exceed 1 Watt draw per relay)
4. When the Humidistat opens, the fan continues to run for 30 seconds to clear the ductwork of moist air
5. If defrost starts during humidifier operation, CN25 de-energizes

Humidistat:

- Non-Voltage a-contact input
- Contact rating voltage > = 15 VDC
- Contact Rating Current > = 0.1 A
- Minimum Applicable Load < = 1mA at DC

Mode (function) No.		Humidistat Output	Condition	CN25 Output	Fan Speed
13	**16**	**CN28 Input**	**(No Defrost/No Error)**		
2	1[a.]	OFF	Heat operation & Thermo OFF	OFF	RC[b.] Setting
			Heat operation & Thermo ON		
		ON	Heat operation & Thermo OFF	OFF	RC Setting
			Heat operation & Thermo ON	ON	High
	2	OFF	Heat operation & Thermo OFF	OFF	RC Setting
			Heat operation & Thermo ON		
		ON	Heat operation & Thermo OFF	ON	High
			Heat operation & Thermo ON		
1[a.]	-	-	No humidifier operation	OFF	RC Setting
The fan continues to run for 30 seconds after the humidifier stops.					

CAUTION
If a heater is installed in a duct, do no use Panel Heater Connector. By doing so, the fan will turn off when the heater is on, which may result in fire.

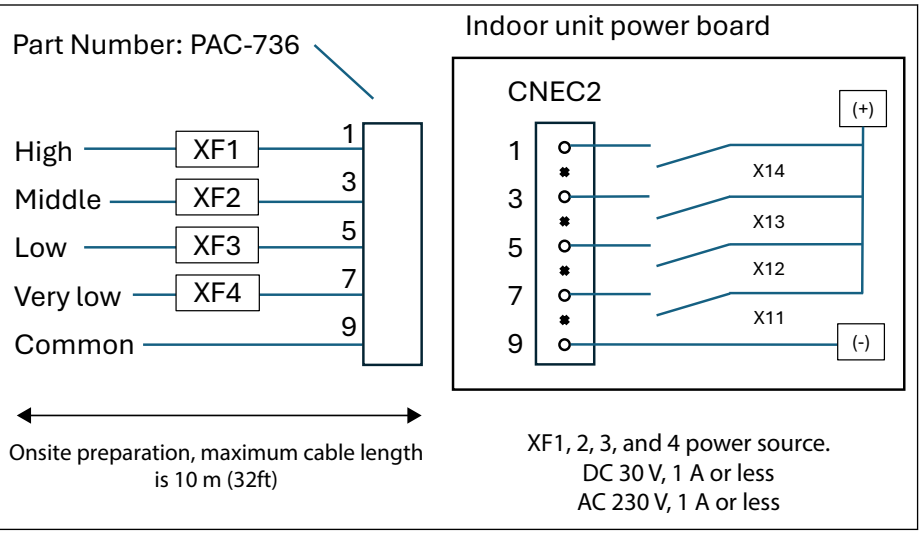
NOTE
Take special care when restarting power to the system to ensure that both the indoor unit and outdoor unit are powered up at the same time to avoid triggering a communication error.

[a.] Factory setting

[b.] Remote controller

8.8. Fan indication

Condition Fan speed	Relay on the board	CNEC2 pin out
Very low	X11	7
Low	X12	5
Middle	X13	3
High	X14	1



9. Troubleshooting

9.1. Check methods

Components and check points

1. Thermistor
   - Room temperature thermistor (TH21)
   - Liquid pipe thermistor (TH22)
   - Gas pipe thermistor (TH23

$$Rt = 15 \exp\{3480(\frac{1}{273+t} - \frac{1}{273})\}$$

Disconnect the connector and measure the resistance between terminals with a tester.(Ambient temperature 10°C - 30°C[50°F-86°F]).

Normal	Abnormal
4.3kΩ - 9.6kΩ	Open or short

Thermistor characteristic graph

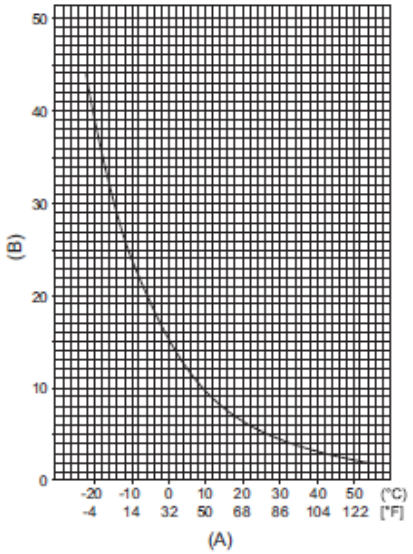
Low-temperature thermistor

- Room temperature thermistor (TH21)
- Liquid pipe thermistor (TH22)
- Gas pipe thermistor (TH23)
- Drain sensor (DS)

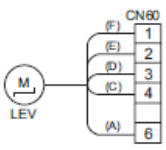
- Thermistor R_0 = 15 kΩ±3%
- Multiplier of B = 3480 kΩ±2%

0°C	32°F	15kΩ
10°C	50°F	9.6kΩ
20°C	68°F	6.3kΩ
25°C	77°F	5.2kΩ
30°C	86°F	4.3kΩ
40°C	104°F	3.0kΩ

(A)Temperature (°C)[°F]
(B)Resistance (kΩ)



2. Fan motor (CNMF)
   Refer to the page on "DC fan motor (fan motor/indoor control board)."
3. Linear expansion valve (LEV)
   Disconnect the connector, and measure the resistance between terminals with a tester.

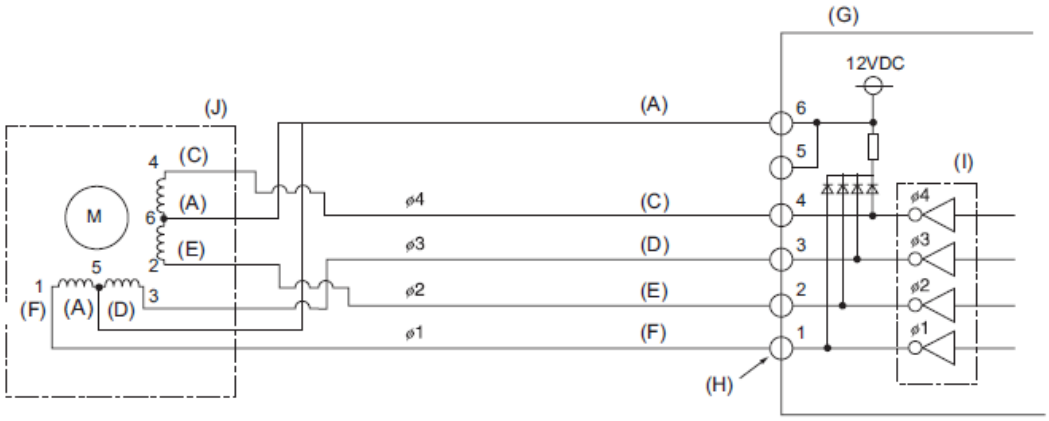


Normal			Abnormal	
1-6	2-6	3-6	4-6	Open or short
White-Red	Yellow-Red	Orange-Red	Blue-Red	
(150) 10%				

(A) Red
(C) Blue
(D) Orange
(E) Yellow
(F) White

1. Summary of LEV operation
   - The LEV is operated by a stepping motor, which operates by receiving a pulse signal from the indoor control board.
   - The LEV position changes in response to the pulse signal.

Indoor control board and LEV connection



(A)Red
(C)Blue
(D)Orange
(E)Yellow
(F)White

(G) Control board
(H) Connection (CN60)
(I) Drive circuit
(J) Linear expansion valve

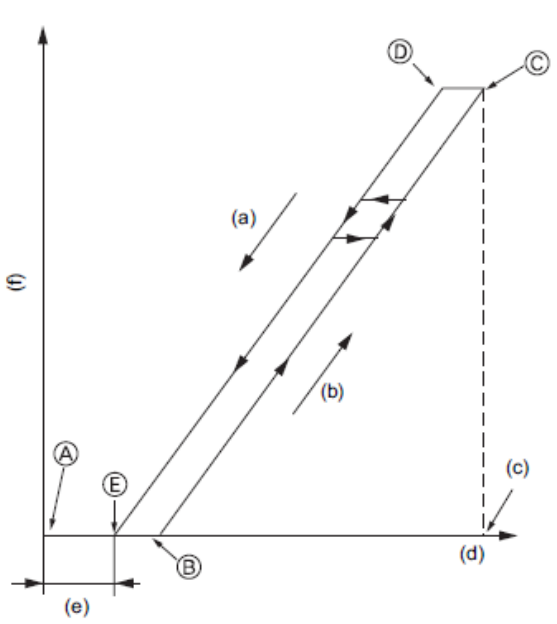
Pulse signal output and valve operation

Phase number	Output pulse			
	1	2	3	4
ø1	ON	OFF	OFF	ON
ø2	ON	ON	OFF	OFF
ø3	OFF	ON	ON	OFF
ø4	OFF	OFF	ON	ON

The output pulse changes in the following order:
When the valve closes 1 -> 2 -> 3 -> 4 -> 1
When the valve opens 4 -> 3 -> 2 -> 1 -> 4

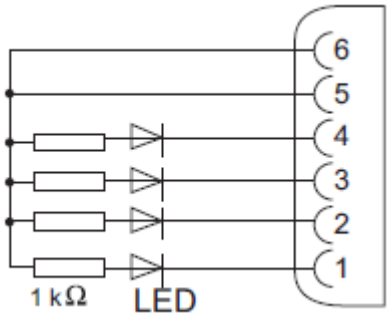
- When the valve position remains the same, all output signals will be OFF.
- If any output signal is missing or if the signal remains ON, the motor vibrates and makes clicking noise.

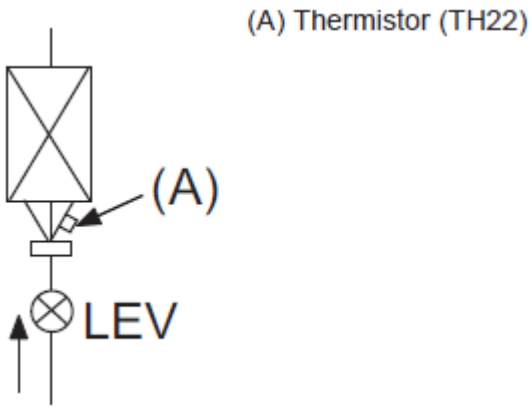
2. LEV operation



- When the power is turned on, a pulse signal of fully closed + 10% is output (valve closure signal), to bring the valve to position A.
- When the valve is operating normally, it is free of vibration noise. If the valve locks or when it goes from point E to A in the figure, it makes louder noise than would be heard when there is an open phase.
- Check for abnormal sound/vibration by placing the metal tip of a screwdriver against the valve and the handle side against your ear.

3. Troubleshooting

Symptom	Checking criteria	Remedy
Circuit failure on the microcomputer	Disconnect the connectors on the control board, and connect LEDs to test the circuit as shown below.  Pulse signals are output for 10 seconds when the main power is turned on. If there are LEDs that do not light up at all or remain lit after the pulses are turned off, there is a problem with the driving circuit.	Replace the indoor control board if driving circuit failure is detected.

Symptom	Checking criteria	Remedy
Locked LEV	The motor will idle and make small clicking noise if it is run while the LEV is locked. If this clicking noise is heard both when the valve is fully closed and while it is being opened, it indicates a problem.	Replace the LEV
Disconnected or shorted LEV motor coils	Measure the resistance between the coils with a tester (red-white, red-orange, Red-yellow, Red-blue). The normal range of resistance is 150kΩ±10%.	Replace the LEV
Valve closure failure (leaky valve)	To check the LEV on the indoor unit, check the indoor unit liquid pipe temperature that appears on the operation monitor on the outdoor unit's multi control board while operating the indoor unit in question in the FAN mode and the other indoor units in the cooling mode.  Normally, the LEV is fully closed while the unit is in the FAN mode. If the valve is leaky, liquid pipe thermistor reading will be lower than normal. If it is significantly lower than the inlet temperature on the remote controller, valve closure failure is suspected. If the amount of leakage is insignificant, replacement of LEV is unnecessary unless it is causing a problem.	Replace the LEV if the amount of leakage is great.
Misconnections of connectors or contact failure	Perform a visual check for disconnected connectors. Perform a visual check of lead wire color.	Disconnect the connectors on the control board and perform a continuity test.

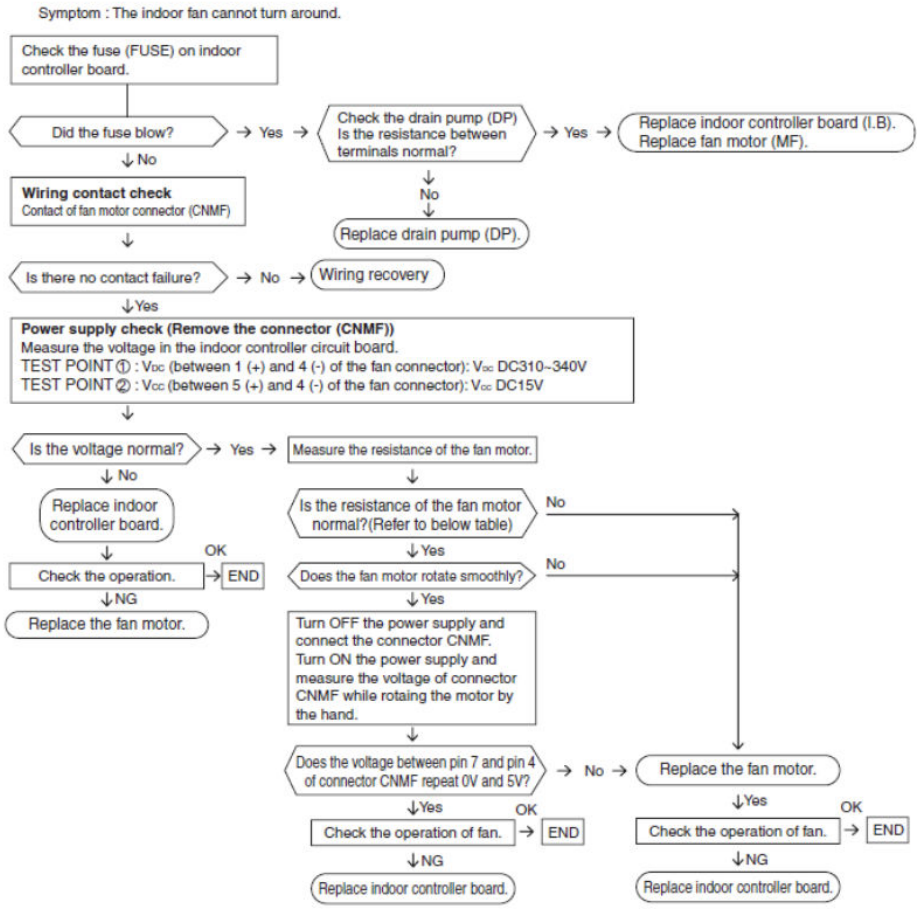
9.2. DC Fan motor (fan motor / indoor controller board)

CAUTION

A high voltage is applied to the connector for connection to the fan motor (CNMF).

Do not unplug the connector CNMF with the unit energized to avoid damage to the indoor control board and fan motor.

Troubleshooting



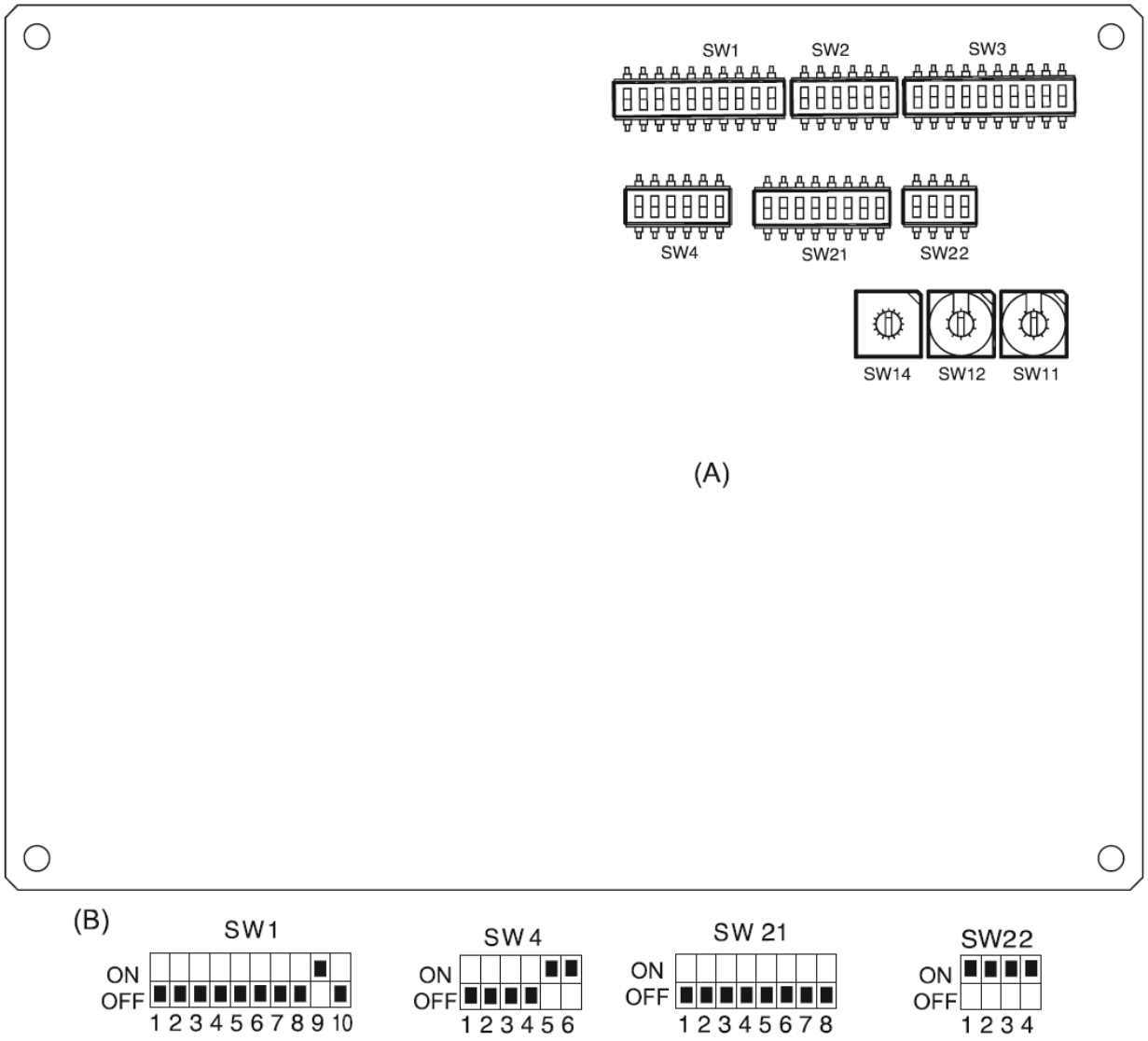
Model code	08, 12, 18, 24, 30, 36	48, 54
Measuring points	Resistance	
pin 1 - pin 4	O.L.	1MΩ
pin 5 - pin 4	50Ω	47kΩ
pin 6 - pin 4	150Ω	143kΩ
pin 7 - pin 4	O.L.	O.L.

NOTE

* To measure the resistance, connect the negative (-) end of the tester to pin 4.

9.3. Address switch setting

Make sure that power to the unit is turned off.

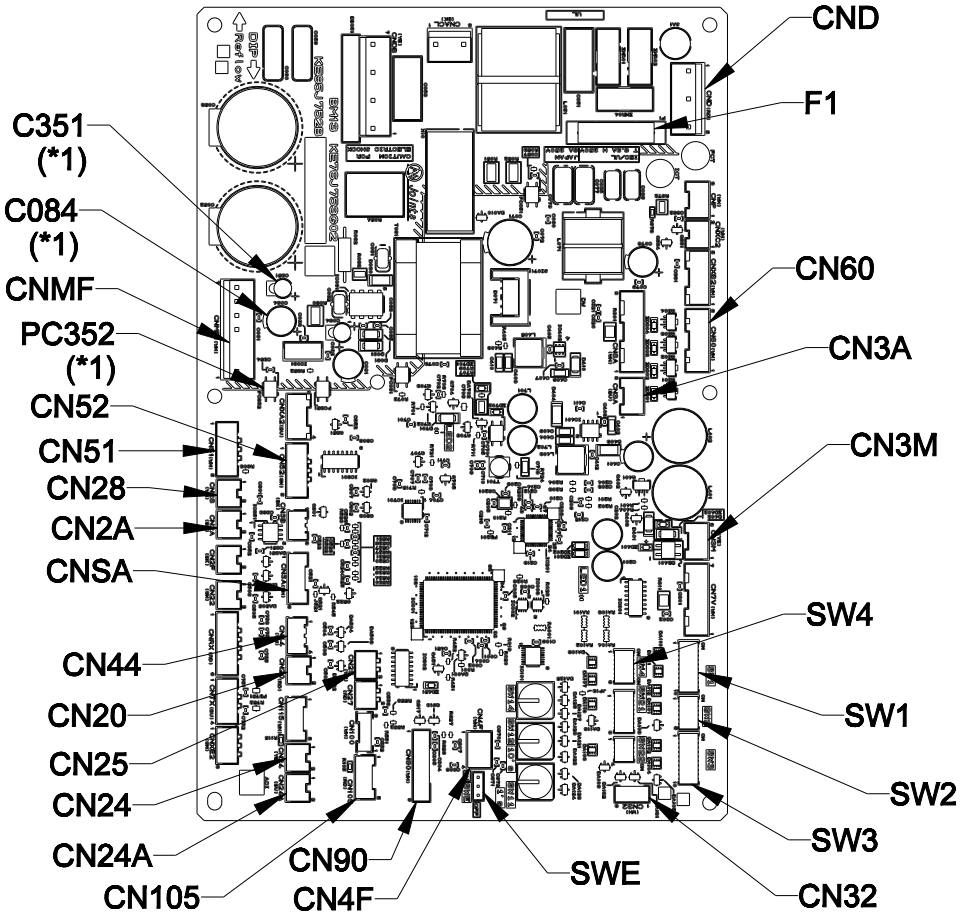


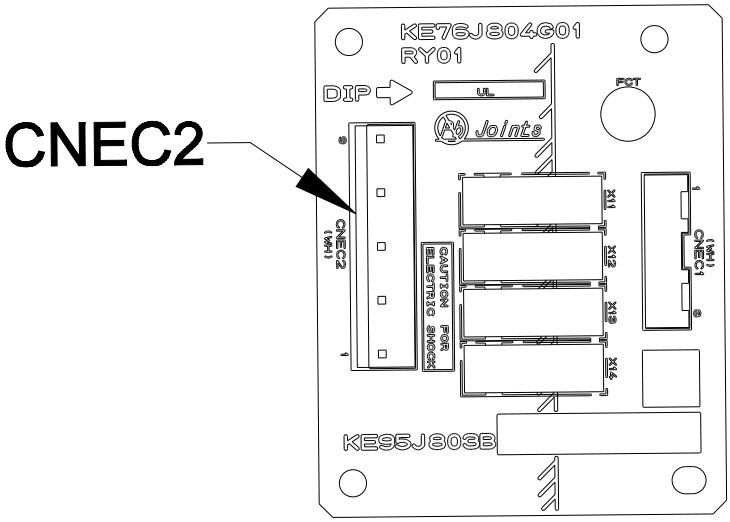
(A) Indoor unit control board

(B) Factory setting (all modes)

1. Address settings vary in different systems. Refer to the section on address setting in the outdoor unit installation manual.
2. Address is set with a combination of SW12 (10's digit) and SW11 (1's digit). To set the address to "25," set SW 12 to "2" and SW 11 to "5."
   - To set the address to "3," set SW12 to "0" and SW11 to "3".
   - To set the address to "25," set SW 12 to "2" and SW 11 to "5."

9.4. Voltage test points on the control board





F1 Fuse (AC 250V 6.3A)

CND Power supply voltage (208 - 230VAC)

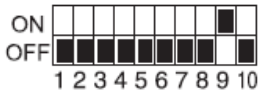
CN3M	For M-NET transmission cable connection (24 - 30VDC)
SWE	Emergency operation
CN32	Remote start/stop adapter
CN3A	For MA remote controller cable connection (10 - 13 VDC (Between 1 and 3.))
CN52	Remote display
CN44	Thermistor (liquid/gas temperature)
CN25	Humidifier output
CN4F	Float sensor
CN24	For 1st heater control
CN24A	For 2nd heater control
CN20	Thermistor (Inlet temperature)
CNMF	Fan motor output: -1 - 4: 294 - 325 VDC -5 - 4: 15 VDC -6 - 4: 0 - 6.5 VDC -7 - 4: Stop 0 or 15 VDC Run 7.5 VDC (0 - 15 pulse)
CN2A	0 -10 VDC Analog input
CN28	Humidifier input
CNEC2	Fan indication output
CN51	Centrally control
CN60	LEV pulso output
CN90	For wireless receiver
CN105	IT communication
CNSA	Refrigerant leak sensor input
VFG	Voltage on the (-) side of PC352 and C084 (Same with the voltage between 7 (+) and 4 (-) of CNMF)
VCC	Voltage between the C084 pins 15 VDC (Same with the voltage between 5 (+)and 4 (-) of CNMF)
Vsp	Voltage between the C351 pins 0 VDC (with the fan stopped) 1 - 6.5VDC (with the fan in operation) (Same with the voltage between 6 (+) and 4 (-) of CNMF)

9.5. Dipswitch setting (factory setting)

1. Function setting
   a. SW1

Switch position	Function	Switch setting	
		ON	OFF
1	Active Thermistor (Intake air thermistor)	Built-in thermistor on the remote controller	Indoor unit
2	Filter clogging detection	Available	Unavailable
3	Filter life	2500 hr	100 hr
4	Outdoor air intake	Enabled	Disabled
5	Remote display	Thermo-ON signal	Fan output
6	Humidifier operation	During heating mode	During heating operation
7	Fan speed	Low	Very low
8	Fan speed at heating Thermo-OFF	Preset fan speed	Follows the setting of SW1-7
9	Auto restart after power failure	Enabled	Disabled
10	Power start/stop	Enabled	Disabled

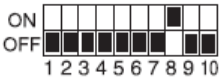
1) Adress board
Factory setting



   b. SW3

Switch position	Function	Switch setting	
		ON	OFF
1	Unit type	Cooling only	Heat pump
2	Heater available	Heater available	Heater not available
3	-	-	-
4	Heater control	Heater ON during defrost and error	Heater OFF during defrost and error
5	-		
6	-	-	-
7	-	-	-
8	Heating 4-deg up	Disabled	Enabled
9	-	-	-
10	-	-	-

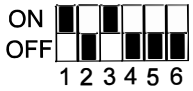
Indoor control board
Dipswitch settings must be made while the unit is stopped.
Factory setting



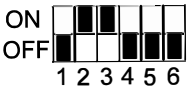
For P08 only

2. Capacity code setting
   SW2: Indoor control board

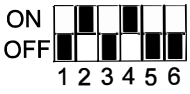
Model code 08



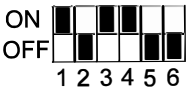
Model code 12



Model code 18



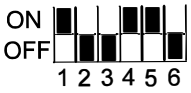
Model code 24



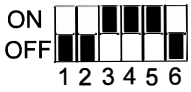
Model code 30

Model code 36

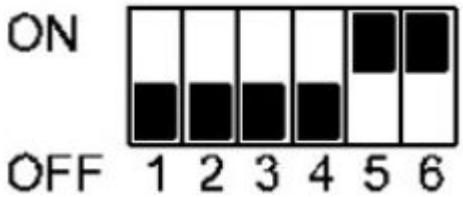
Model code 48



Model code 54



3. Model setting
   SW4: Indoor control board
   Dipswitch setting must be made while the unit is stopped.
   Factory setting:



4. Power voltage setting
   SW5: Indoor contol board
   To chang the power voltage setting:
   - Confirm that the mains power is turned OFF.
   - Set the dipswitch SW21-6 according to the wiring diagram.
   - Label for the appropriate line voltage.
   - Set SW5 to 240V side when the power supply is 230 volts.
   - When the power supply is 208 volts, set SW5 to 220V side.
5. External static pressure

The air handler is equipped with an adjustable static pressure setting. The available settings are shown in the table below.
The blower static pressure setting can be changed by changing the dip switches SW21-1 and SW21-2.
For vertical or horizontal right & left installations, SW21-5 should be in the default 'OFF' position. For downflow installations change SW21-5 to the 'ON' position.

Model code	Available ESP (in. WG)		
08, 12, 18, 24, 30, 36, 48, 54	0.30	0.50[1]	0.80[2]

[1]The air handler will be set to 0.50 ESP from the factory.
[2]Model code 36 in Downflow ESP: 0.60
Model code 54 in Downflow ESP: 0.70

Table 1. Vertical, Horizontal Left, Horizontal Right External Static Pressure Setting

External static pressure	Switch operation
75 Pa<0.3in.WG>	SW21 ON / OFF 1 2 3 4 5 6 7 8
125 Pa<0.5in.WG>	SW21 ON / OFF 1 2 3 4 5 6 7 8
200 Pa<0.8in.WG>	SW21 ON / OFF 1 2 3 4 5 6 7 8

	SW21
Vertical, Horizontal Right, Horizontal Left **(Factory Setting)**	ON / OFF 1 2 3 4 5 6 7 8 9 10
Downflow	ON / OFF 1 2 3 4 5 6 7 8 9 10

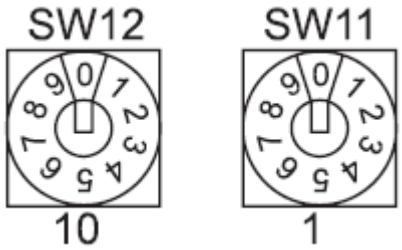
[1]The air handler will be set to 0.50 ESP from the factory.
[2]Model code 36 in Downflow ESP: 0.60
Model code 54 in Downflow ESP: 0.70

6. 1s and 10ths digits
SW11, SW12 (Rotary switch): Indoor control board

IMPORTANT
The use of a ME remote controller requires address setting.

Address settings must be made while the unit is stopped.

Factory setting

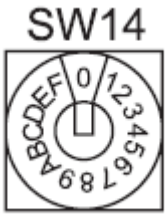


7. Connection number setting
SW14 (Rotary switch): Indoor control board
This switch is used when the unit is connected to an R2 series of outdoor unit.

IMPORTANT

Do not connect to CITI MULTI outdoor unit. **SW14 must remain in the default position.**

Factory setting



NOTE

Changes to the dipswitches SW11, SW12, and SW14 must be made while the unit is powered off and the remote controller is OFF.

10. Disassembly Procedure

10.1. Control box

CAUTION
Exercise caution when removing heavy parts.

1. Remove the Electric panel (2 screws).

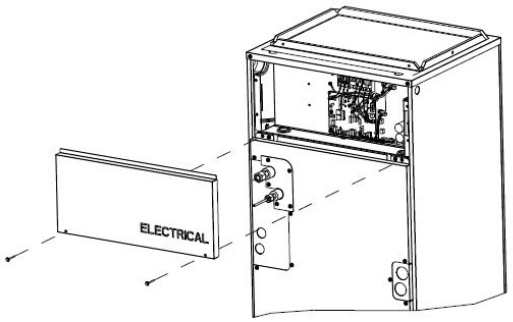


Fig. 1

10.2. Thermistor (Return Air)

CAUTION
Exercise caution when removing heavy parts.

1. Remove the Filter panel (2 thumbscrews).
2. Remove the blower panel (2 screws).

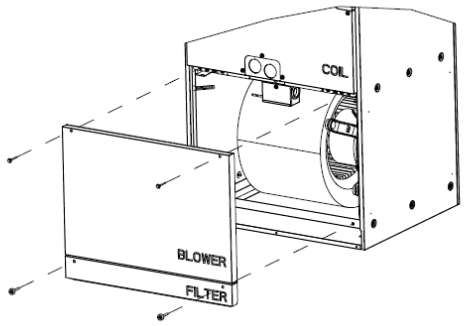


Fig. 2

3. Remove the cover over the Return Air thermistor box and unplug the thermistor.
4. Pull out the thermistor holder and thermistor inside the box.

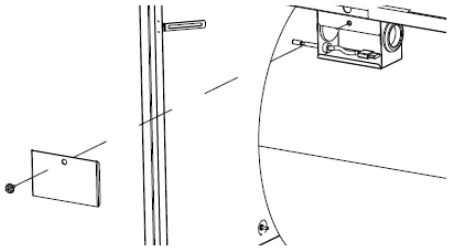


Fig. 3

10.3. Coil Assembly (thermistor, drain pan, heat exchanger)

CAUTION
Exercise caution when removing heavy parts.

1. Remove the electrical, blower, and filter panel indicated in sections 1 and 2.
2. Remove the Coil panel by removing all of the screws securing it to the (3) smaller panels for refrigerant and drain lines.

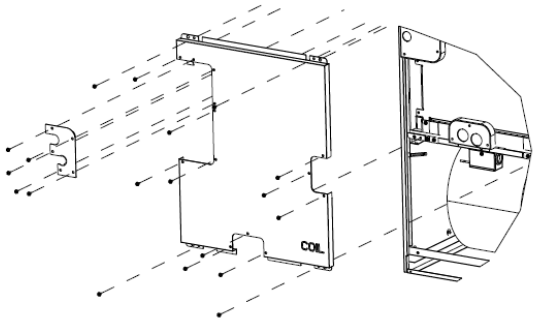


Fig. 4

3. Slide the smaller panels in the directions indicated and remove.

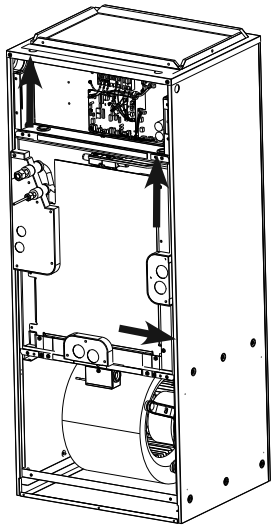


Fig. 5

4. Remove the (1 or 2) brackets that secure the coil, unplug the thermistors and LEV from the control board and route the wires out of the control box area and into coil section. Next, slide the coil from the frame

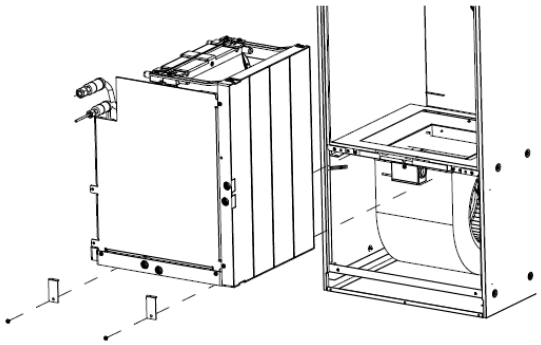


Fig. 6

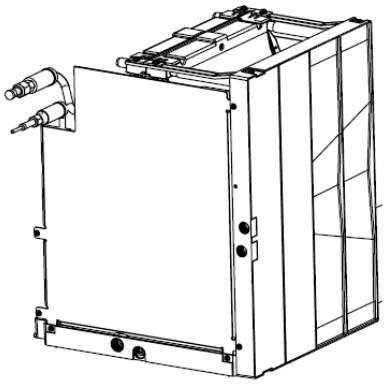


Fig. 7

5. Remove the plate covering the coil assembly to access the thermistors.

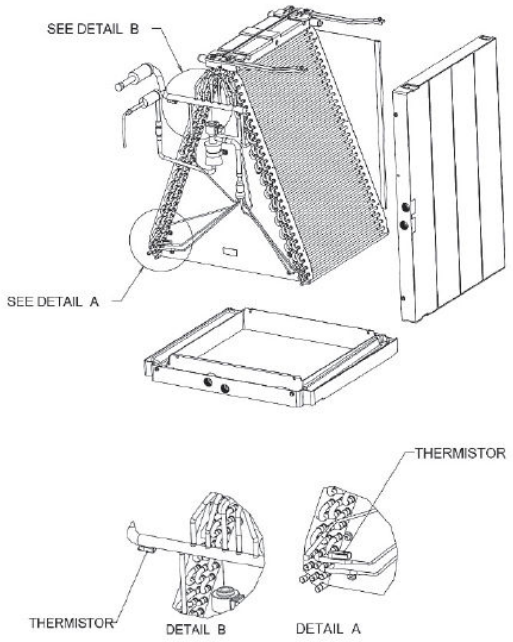


Fig. 8

6. Remove lower and side drain pan.

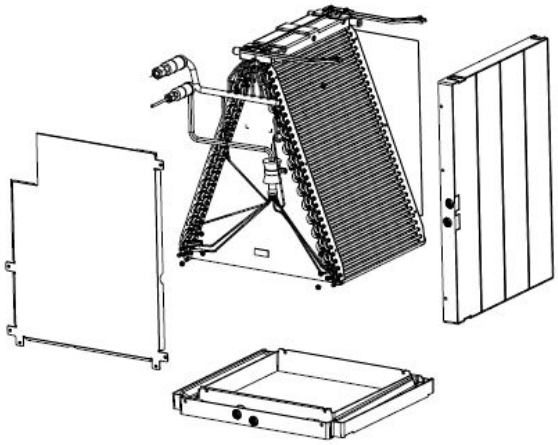


Fig. 9

10.4. Blower/Fan Assembly

CAUTION
Exercise caution when removing heavy parts.

1. Remove the Blower and Filter panel (along with filter if installed) indicated in section 2.
2. Remove the (1 or 2) brackets that secure the coil assembly.

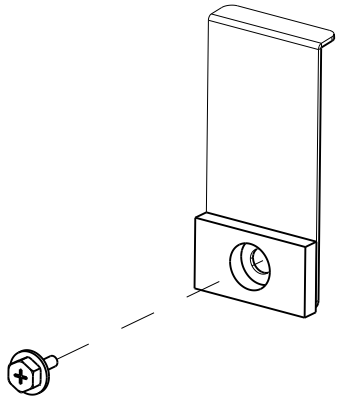


Fig. 10

3. Remove the door that covers the small enclosure attached to the fan assembly. Unplug the motor and route the wire harness out of the enclosure.
4. Remove the (2) screws that secure the fan assembly and slide out.

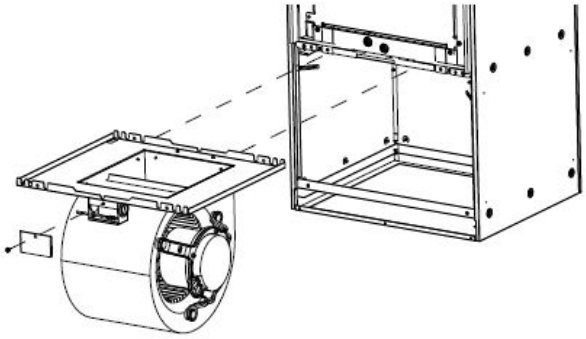


Fig. 11

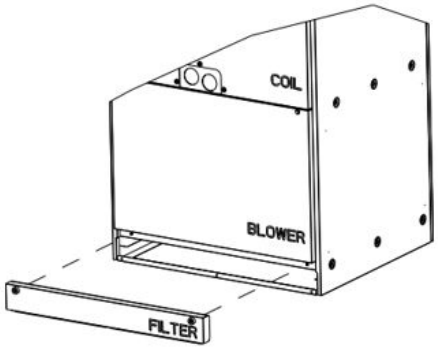
10.5. Refrigerant leak sensor

Table 2. Refrigerant leak sensor instructions

NOTE

The steps and figures on the preceding pages can be used to locate, service, and replace the refrigerant leak sensor.
For vertical installations, follow Step. 1 - 5.
For horizontal installations, follow Step. 1 - 4 and 6.

Step. 1 Remove the panel marked “FILTER”.



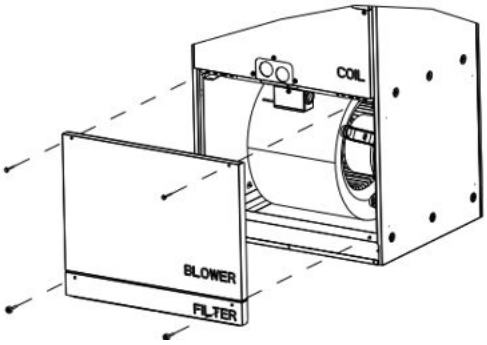
NOTE

The steps and figures on the preceding pages can be used to locate, service, and replace the refrigerant leak sensor.

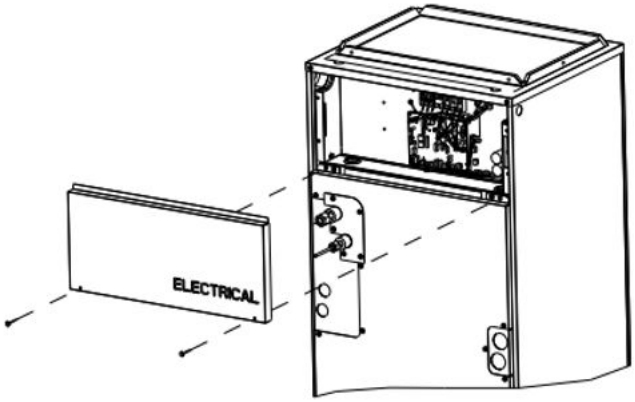
For vertical installations, follow Step. 1 - 5.

For horizontal installations, follow Step. 1 - 4 and 6.

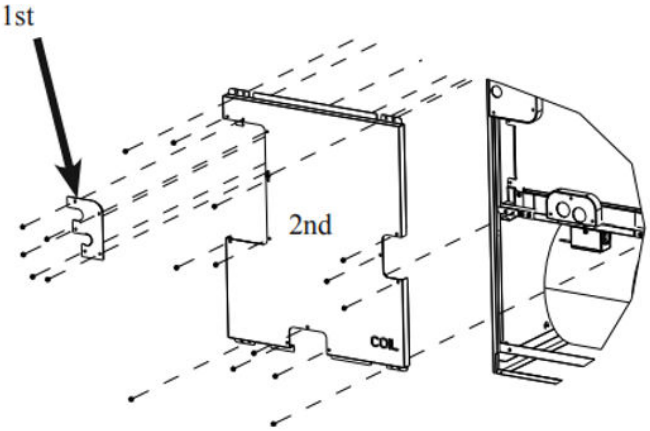
Step. 2 Remove the panel marked “BLOWER”.



Step. 3 Remove the panel marked “ELECTRICAL”.



Step. 4a Remove the screws securing the (3) panels to the COIL panel shown in the image above. Remove the “1st” panel and “2nd” panel marked “COIL”.

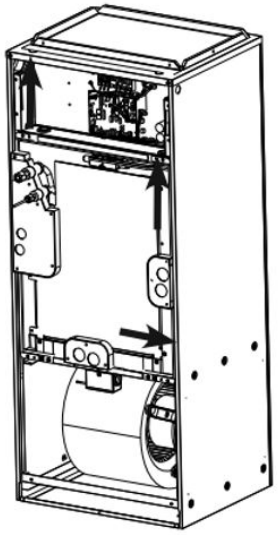


NOTE

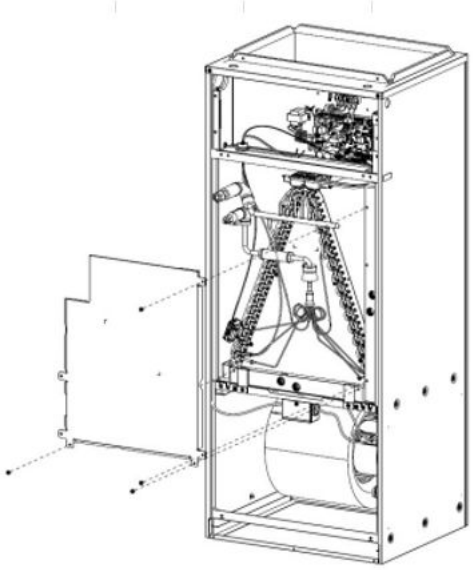
The steps and figures on the preceding pages can be used to locate, service, and replace the refrigerant leak sensor.

For vertical installations, follow Step. 1 - 5.

For horizontal installations, follow Step. 1 - 4 and 6.



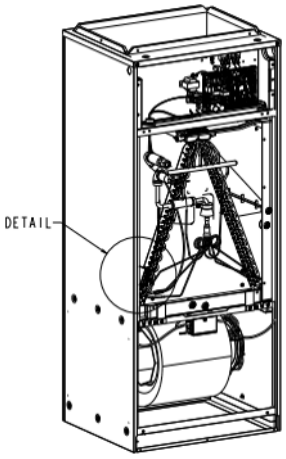
Step. 4b Next, remove the smaller panels covering the drain holes and refrigerant lines by first sliding in the directions indicated here.

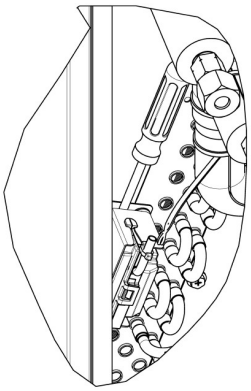


Step. 4C Remove the screws (4) and front plate from the coil assembly.

VERTICAL INSTALLATION ONLY DETAILS

Step. 5 Locate the refrigerant leak sensor attached to the coil as shown. Separate the sensor housing from the vertical flow sensor bracket. Once the refrigerant leak sensor housing assembly is removed from the bracket, open the housing and unplug the cable from the sensor PCB.The refrigerant leak sensor PCB is then replaced, and the cable is reused. The same steps can be followed in reverse to reassemble the indoor unit after service is completed.





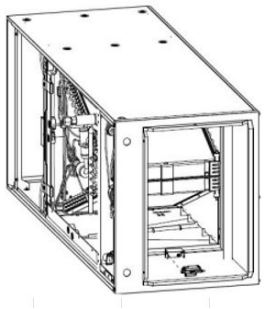
DETAIL ↑

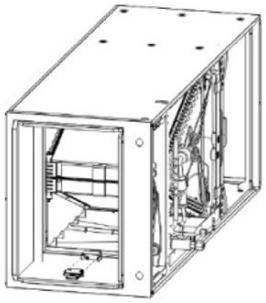
TIP

- If there is difficulty removing the refrigerant leak sensor / housing assembly from the vertical flow bracket, insert a screwdriver between the sensor housing assembly and the bracket as shown in the detailed area above.
- Gently apply pressure against the back of the sensor housing assembly to release it from the bracket.
- Once it has released, remove the bracket by hand.

HORIZONTAL INSTALLATION ONLY DETAILS

Step. 6 Reaching through the front of the cabinet locate the refrigerant leak sensor attached to the bracket on the lower cabinet shelf as shown. Separate the sensor housing from the side flow sensor bracket. Once the refrigerant leak sensor housing assembly is removed from the bracket, open the housing and unplug the cable from the sensor PCB. The refrigerant leak sensor PCB is then replaced, and the cable is reused. The same steps can be followed in reverse to reassemble the indoor unit





11. Appendix A: Quick reference worksheet (minimum room area requirement)

IMPORTANT

This quick reference worksheet must be used in conjunction with Installation manual instructions regarding minimum room area calculation. All safety precautions and instructions must be followed as stated in the Installation manual.

1. What is the factory refrigerant pre-charge of the outdoor unit (ODU)?

TIP

The factory refrigerant pre-charge of the ODU can be found on it's nameplate.

- **Factory pre-charge = _____lb or kg** (circle one)

2. Will there be an additional refrigerant line set beyond the limit of the factory refrigerant pre-charge?
   - **Additional charge = _____lb or kg** (circle one)
3. Take the values from **Step. 1** and **Step. 2**and use the following equation to find the Total planned system charge.
   - **Total planned system charge (m_c) = Factory (Step. 1) + Additional (Step. 2) = _____lb or kg** (circle one)
4. Is the installation space a conditioned space as defined in the installation manual? **YES** or **NO** (circle one)
   - If **Yes** – **Use Case D**. This is the easiest and least restrictive case.
   - Then, **Skip to step 6**. In this case only: **$TA_{min} = A_{min}$**
   - If **No** – Continue to the next step.
5. What is the planned installation height of the indoor unit (IDU), measure from floor to lowest downward facing surface of the IDU?
   - **Installation height (h_0) = _____ ft or m** (circle one)

h_0 - (ft, in.)	h_0 - (m)	Use Case:	Mark correct Case with an 'X'
Lower than 3 ft. 3 3/8 in.	Lower than 1 m	C	
3 ft. 3 3/8 in. to 7 ft 2 5/8 in.	1 m to 2.2 m	B	
Higher than 7ft. 2 5/8 in.	Higher than 2.2 m	A	

6. Use the **Minimum area requirement table,** on the following pages, to determine the correct values for A_{min} and TA_{min}.
   a. In the left most column, find the correct or nearest value for m_c (calculated Step. 2), mark this row with an *.
   b. In the top row, find the column that describes the correct Case (chosen in Step. 4) and the ODU installed, mark this column with an *.

c. Find the intersection of the marked row and column. Circle the correct values for A_{min} and TA_{min}.
d. Write the required minimum room area below:
   - Minimum room area for installation room
     A_{min} = _____ft^2 or m^2 (circle one)
   - Minimum conditioned space area
     TA_{min} = _____ft^2 or m^2 (circle one)

7. Now, find the total areas of each Zone (as defined in the installation manual) and add the room areas together to find the total **TA_{min}** for each zone.

Zone 1		Zone 2		Zone 3		Zone 4	
Room	Area	Room	Area	Room	Area	Room	Area
Zone 1 TA_{min} total		**Zone 2 TA_{min} total**		**Zone 3 TA_{min} total**		**Zone 4 TA_{min} total**	

8. Answer questions **a. - d.** below to verify that room requirements are met.
   a. Does the combined area of each Zone meet or exceed **TA_{min}** as defined in Step. 6d?
      - **Yes** or **No** (circle one)
   b. Does the combined area of the installation room and adjacent connected rooms meet or exceed **A_{min}**?
      - **Yes** or **No** (circle one)
   c. If **A and B** are **YES**, then proceed with installation.
   d. If **A and/or B** are **NO**, then additional area, ventilation, or installation height required.

Table 3. Minimum room area requirement

Total planned system charge	Case A				Case B			
	Outdoor unit (ODU)				Outdoor unit (ODU)			
	SUZ/PUZ/MXZ-D		MXZ-SM		SUZ/PUZ/MXZ-D		MXZ-SM	
m_c kg (lbs)	Amin m2 [ft2]	TAmin m2 [ft2]	Amin m2 [ft2]	TAmin m2 [ft2]	Amin m2 [ft2]	TAmin m2 [ft2]	Amin m2 [ft2]	TAmin m2 [ft2]
0.9 [1.9]	2.8 [30.2]	9 [96.9]	x	x	6.1 [65.7]	9 [96.9]	x	x
1 [2.2]	3.1 [33.4]	9 [96.9]	x	x	6.8 [73.2]	9 [96.9]	x	x
1.5 [3.3]	4.7 [50.6]	9 [96.9]	x	x	10.2 [109.8]	9 [96.9]	x	x
2 [4.4]	6.2 [66.8]	9 [96.9]	x	x	13.6 [146.4]	9 [96.9]	x	x
2.5 [5.5]	7.7 [82.9]	9 [96.9]	x	x	16.9 [182]	9 [96.9]	x	x
3 [6.6]	9.3 [100.2]	9.3 [100.2]	x	x	20.3 [218.6]	9.3 [100.2]	x	x
3.5 [7.7]	10.8 [116.3]	10.8 [116.3]	x	x	23.7 [255.2]	10.8 [116.3]	x	x
4 [8.8]	12.3 [132.4]	12.3 [132.4]	4.2 [45.3]	9 [96.9]	27.1 [291.8]	12.3 [132.4]	9.2 [99.1]	9 [96.9]
4.5 [9.9]	13.9 [149.7]	13.9 [149.7]	4.5 [48.5]	9 [96.9]	30.5 [328.3]	13.9 [149.7]	9.9 [106.6]	9 [96.9]
5 [11]	15.4 [165.8]	15.4 [165.8]	4.9 [52.8]	9 [96.9]	33.8 [363.9]	15.4 [165.8]	10.6 [114.1]	9 [96.9]
5.5 [12.1]	16.9 [182]	16.9 [182]	5.2 [56]	9 [96.9]	37.2 [400.5]	16.9 [182]	11.3 [121.7]	9 [96.9]
6 [13.4]	18.5 [199.2]	18.5 [199.2]	5.5 [59.3]	9 [96.9]	40.6 [437.1]	18.5 [199.2]	12 [129.2]	9 [96.9]
6.5 [14.5]	20 [215.3]	20 [215.3]	5.8 [62.5]	9 [96.9]	44 [473.7]	20 [215.3]	12.7 [136.8]	9 [96.9]
7 [15.6]	21.5 [231.5]	21.5 [231.5]	6.1 [65.7]	9 [96.9]	47.3 [509.2]	21.5 [231.5]	13.4 [144.3]	9 [96.9]
7.5 [16.7]	23.1 [248.7]	23.1 [248.7]	6.4 [68.9]	9 [96.9]	50.7 [545.8]	23.1 [248.7]	14 [150.7]	9 [96.9]
8 [17.8]	24.6 [264.8]	24.6 [264.8]	6.7 [72.2]	9 [96.9]	54.1 [582.4]	24.6 [264.8]	14.7 [158.3]	9 [96.9]
8.5 [18.9]	26.2 [282.1]	26.2 [282.1]	7 [75.4]	9 [96.9]	57.5 [619]	26.2 [282.1]	15.4 [165.8]	9 [96.9]
9 [20]	27.7 [298.2]	27.7 [298.2]	7.3 [78.6]	9 [96.9]	60.9 [655.6]	27.7 [298.2]	16.1 [173.3]	9 [96.9]
9.5 [21.1]	29.2 [314.4]	29.2 [314.4]	7.7 [82.9]	9 [96.9]	64.2 [691.1]	29.2 [314.4]	16.8 [180.9]	9 [96.9]
10 [22.1]	30.8 [331.6]	30.8 [331.6]	8 [86.2]	9 [96.9]	67.6 [727.7]	30.8 [331.6]	17.5 [188.4]	9 [96.9]
10.5 [23.1]	32.3 [347.7]	32.3 [347.7]	8.3 [89.4]	9 [96.9]	71 [764.3]	32.3 [347.7]	18.2 [196]	9 [96.9]
11 [24.2]	33.8 [363.9]	33.8 [363.9]	8.6 [92.6]	9 [96.9]	74.4 [800.9]	33.8 [363.9]	18.8 [202.4]	9 [96.9]
11.5 [25.3]	35.4 [381.1]	35.4 [381.1]	8.9 [95.8]	9 [96.9]	77.8 [837.5]	35.4 [381.1]	19.5 [209.9]	9 [96.9]
12 [26.4]	36.9 [397.2]	36.9 [397.2]	9.2 [99.1]	9.2 [99.1]	81.1 [873]	36.9 [397.2]	20.2 [217.5]	9.2 [99.1]
12.5 [27.5]	38.4 [413.4]	38.4 [413.4]	9.5 [102.3]	9.5 [102.3]	84.5 [909.6]	38.4 [413.4]	20.9 [225]	9.5 [102.3]
13 [28.6]	40 [430.6]	40 [430.6]	9.8 [105.5]	9.8 [105.5]	87.9 [946.2]	40 [430.6]	21.6 [232.6]	9.8 [105.5]
13.5 [29.7]	41.5 [446.8]	41.5 [446.8]	10.1 [108.8]	10.1 [108.8]	91.3 [982.8]	41.5 [446.8]	22.3 [240.1]	10.1 [108.8]
14 [30.8]	43 [462.9]	43 [462.9]	10.5 [113.1]	10.5 [113.1]	94.6 [1018.3]	43 [462.9]	22.9 [246.5]	10.5 [113.1]
14.4 [31.7]	44.3 [476.9]	44.3 [476.9]	10.7 [115.2]	10.7 [115.2]	97.3 [1047.4]	44.3 [476.9]	23.5 [253]	10.7 [115.2]

Total planned system charge	Case C				Case D			
	Outdoor unit (ODU)				Outdoor unit (ODU)			
m_c kg (lbs)	SUZ/PUZ/MXZ-D		MXZ-SM		SUZ/PUZ/MXZ-D		MXZ-SM	
	Amin m2 [ft2]	TAmin m2 [ft2]	Amin m2 [ft2]	TAmin m2 [ft2]	Amin m2 [ft2]	TAmin m2 [ft2]	Amin m2 [ft2]	TAmin m2 [ft2]
0.9 [1.9]	10.2 [109.8]	9 [96.9]	x	x	9 [96.9]	9 [96.9]	x	x
1 [2.2]	11.3 [121.7]	9 [96.9]	x	x	9 [96.9]	9 [96.9]	x	x
1.5 [3.3]	16.9 [182]	9 [96.9]	x	x	9 [96.9]	9 [96.9]	x	x
2 [4.4]	22.6 [243.3]	9 [96.9]	x	x	9 [96.9]	9 [96.9]	x	x
2.5 [5.5]	28.2 [303.6]	9 [96.9]	x	x	9 [96.9]	9 [96.9]	x	x
3 [6.6]	33.8 [363.9]	9.3 [100.2]	x	x	9.3 [100.2]	9.3 [100.2]	x	x
3.5 [7.7]	39.5 [425.2]	10.8 [116.3]	x	x	10.8 [116.3]	10.8 [116.3]	x	x
4 [8.8]	45.1 [485.5]	12.3 [132.4]	15.4 [165.8]	9 [96.9]	12.3 [132.4]	12.3 [132.4]	9 [96.9]	9 [96.9]
4.5 [9.9]	50.7 [545.8]	13.9 [149.7]	16.5 [177.7]	9 [96.9]	13.9 [149.7]	13.9 [149.7]	9 [96.9]	9 [96.9]
5 [11]	56.4 [607.1]	15.4 [165.8]	17.7 [190.6]	9 [96.9]	15.4 [165.8]	15.4 [165.8]	9 [96.9]	9 [96.9]
5.5 [12.1]	62 [667.4]	16.9 [182]	18.8 [202.4]	9 [96.9]	16.9 [182]	16.9 [182]	9 [96.9]	9 [96.9]
6 [13.4]	67.6 [727.7]	18.5 [199.2]	19.9 [214.3]	9 [96.9]	18.5 [199.2]	18.5 [199.2]	9 [96.9]	9 [96.9]
6.5 [14.5]	73.2 [788]	20 [215.3]	21.1 [227.2]	9 [96.9]	20 [215.3]	20 [215.3]	9 [96.9]	9 [96.9]
7 [15.6]	78.9 [849.3]	21.5 [231.5]	22.2 [239]	9 [96.9]	21.5 [231.5]	21.5 [231.5]	9 [96.9]	9 [96.9]
7.5 [16.7]	84.5 [909.6]	23.1 [248.7]	23.4 [251.9]	9 [96.9]	23.1 [248.7]	23.1 [248.7]	9 [96.9]	9 [96.9]
8 [17.8]	90.1 [969.9]	24.6 [264.8]	24.5 [263.8]	9 [96.9]	24.6 [264.8]	24.6 [264.8]	9 [96.9]	9 [96.9]
8.5 [18.9]	95.8 [1031.2]	26.2 [282.1]	25.7 [276.7]	9 [96.9]	26.2 [282.1]	26.2 [282.1]	9 [96.9]	9 [96.9]
9 [20]	101.4 [1091.5]	27.7 [298.2]	26.8 [288.5]	9 [96.9]	27.7 [298.2]	27.7 [298.2]	9 [96.9]	9 [96.9]
9.5 [21.1]	107 [1151.8]	29.2 [314.4]	27.9 [300.4]	9 [96.9]	29.2 [314.4]	29.2 [314.4]	9 [96.9]	9 [96.9]
10 [22.1]	112.7 [1213.1]	30.8 [331.6]	29.1 [313.3]	9 [96.9]	30.8 [331.6]	30.8 [331.6]	9 [96.9]	9 [96.9]
10.5 [23.1]	118.3 [1273.4]	32.3 [347.7]	30.2 [325.1]	9 [96.9]	32.3 [347.7]	32.3 [347.7]	9 [96.9]	9 [96.9]
11 [24.2]	123.9 [1333.7]	33.8 [363.9]	31.4 [338]	9 [96.9]	33.8 [363.9]	33.8 [363.9]	9 [96.9]	9 [96.9]
11.5 [25.3]	129.6 [1395.1]	35.4 [381.1]	32.5 [349.9]	9 [96.9]	35.4 [381.1]	35.4 [381.1]	9 [96.9]	9 [96.9]
12 [26.4]	135.2 [1455.3]	36.9 [397.2]	33.6 [361.7]	9.2 [99.1]	36.9 [397.2]	36.9 [397.2]	9.2 [99.1]	9.2 [99.1]
12.5 [27.5]	140.8 [1515.6]	38.4 [413.4]	34.8 [374.6]	9.5 [102.3]	38.4 [413.4]	38.4 [413.4]	9.5 [102.3]	9.5 [102.3]
13 [28.6]	146.4 [1575.9]	40 [430.6]	35.9 [386.5]	9.8 [105.5]	40 [430.6]	40 [430.6]	9.8 [105.5]	9.8 [105.5]
13.5 [29.7]	152.1 [1637.2]	41.5 [446.8]	37.1 [399.4]	10.1 [108.8]	41.5 [446.8]	41.5 [446.8]	10.1 [108.8]	10.1 [108.8]
14 [30.8]	157.7 [1697.5]	43 [462.9]	38.2 [411.2]	10.5 [113.1]	43 [462.9]	43 [462.9]	10.5 [113.1]	10.5 [113.1]
14.4 [31.7]	162.2 [1746]	44.3 [476.9]	39.1 [420.9]	10.7 [115.2]	44.3 [476.9]	44.3 [476.9]	10.7 [115.2]	10.7 [115.2]

Table 4. *Mrel* for MXZ/PUMY Outdoor Units

System Charge (kg)	M_{rel} (kg)
7.1	2
7.4	2.1
7.9	2.2
8.4	2.3
8.9	2.4
9.4	2.5
9.9	2.6
10.4	2.7
10.9	2.8
11.4	2.9
11.9	3
12.4	3.1
12.9	3.2
13.4	3.3
13.9	3.4
14.4	3.5

IMPORTANT

For systems paired with **MXZ/PUMY outdoor units**, minimum room area calculations are based on **Mrel**, a smaller refrigerant amount that will not be recovered during leak mitigation.

12. Appendix B - High altitude applications - capacity reduction factors

Capacity reduction

When air conditioners and heat pumps are installed in areas above sea level, operating capacity is reduced due to decreased air density. Because of this, equipment size may need to be increased to meet the load requirements. The following correction factors apply to M & P Series air conditioners and heat pumps for both heating and cooling operation. The indoor and outdoor units need to be sized based on the capacity reduction due to the increased air density.

Altitude ft (m)	Indoor unit correction factor	Outdoor unit correction factor
0	1.00	1.00
1,000 (305)	0.96	0.99
2,000 (610)	0.93	0.98
3,000 (914)	0.90	0.98
4,000 (1219)	0.86	0.97
5,000 (1524)	0.83	0.96
6,000 (1829)	0.80	0.95
7,000 (2134)	0.77	0.94
8,000 (2442)	0.74	0.94
9,000 (2743)	0.71	0.93
10,000 (3048)	0.69	0.92

This product is designed and intended for use in the residential, commercial and light-industrial environment.

MITSUBISHI ELECTRIC US, INC.

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Specifications are subject to change without notice.