



OWNER'S & INSTALLATION MANUAL AIR CONDITIONER

Please read this installation manual completely before installing the product.
Please retain this installation manual for future reference after reading it thoroughly.

Wall Mounted

This manual is the simplified version of original manual.
You can obtain the original manual from website.

EN English FR Français ES Español



MFL71421922
Rev.00_091324

www.lghvac.com
www.lg.com

Copyright © 2024 LG Electronics Inc. All Rights Reserved.

Multi V™ Multi F, and Single Zone Wall Mounted Indoor Units Install Tips

Multi V™, Multi F, and Single Zone Wall Mounted Indoor Units Install Tips. The following pages present an overview of LG’s Multi V, Multi F, and Single Zone Wall Mounted indoor units, and is intended to supplement the technical and installation information provided with each product and through www.lghvac.com. The review of basic operation and maintenance skills must reinforce industry established practices and provide helpful tips to make equipment operation successful.

NOTE

⊘ The installation guide is NOT intended to be a replacement for LG installation manuals, nor is it intended to cover ALL the logistics of operating and maintenance of VRF systems. For detailed information on the procedures mentioned here, refer to the installation manual specific to your product. Always comply with applicable local, state, and federal codes.

The following safety guidelines are intended to prevent unforeseen risks or damage from unsafe or incorrect operation of the appliance. The guidelines are separated into ‘WARNING’ and ‘CAUTION’ as described below.

⚠ This symbol is displayed to indicate matters and operations that can cause risk. Read the part with this symbol carefully and follow the instructions in order to avoid risk.

⚠ WARNING

This indicates that the failure to follow the instructions can cause serious injury or death.

⚠ CAUTION

This indicates that the failure to follow the instructions can cause the minor injury or damage to the product.

| | |
|---|--|
|  | <p>Read the precautions in this manual carefully before operating the unit.</p> |
|  | <p>This symbol indicates that the Operation Manual should be read carefully.</p> |
|  | <p>This appliance is filled with flammable refrigerant.</p> |
|  | <p>This symbol indicates that a service personnel should be handling this equipment with reference to the Installation Manual.</p> |

Safety Instructions - Installation

⚠ CAUTION

- Be very careful when transporting the product. There is a risk of the product falling and causing physical injury.
 - Use appropriate moving equipment to transport each frame ensure the equipment is capable of supporting the weight of the equipment.
- The Limited Warranty is void and of no effect, and LG will have no liability hereunder to any Customer or third party, to the extent any of the following occur: acts, omissions, and conduct of any and all third parties including, but not limited to, the installing contractor and any repairs, service or maintenance by unauthorized or unqualified persons.
- Do not install the unit in potentially explosive atmospheres.
- The installation of pipe-work shall be kept to a minimum.
- Any person who is involved with working on or breaking into a refrigerant circuit should hold a current valid certificate from an industry-accredited assessment authority, which authorises their competence to handle refrigerants safely in accordance with an industry recognised assessment specification.
- When mechanical connectors are reused indoors, sealing parts shall be renewed.
- When flared joints are reused indoors, the flare part shall be re-fabricated.

⚠ WARNING

- An authorized, trained technician licensed locally and at the state level must install the unit.
 - Improper installation by the user may result in fire, explosion, electric shock, physical injury or death.
- Wear protective gloves when handling equipment. Sharp edges may cause personal injury.
- Always check for system refrigerant leaks after the unit has been installed or serviced.
 - Exposure to high concentration levels of refrigerant gas may lead to illness or death.
- Dispose the packing materials safely.
 - Packing materials, such as nails and other metal or wooden parts, may cause puncture wounds or other injuries. Tear apart and throw away plastic packaging bags so that children may not play with them and risk suffocation and death.
- Install the unit considering the potential for strong winds or earthquakes.
 - Improper installation may cause the unit to fall over, resulting in physical injury or death.

- Install the unit in a safe location where nobody can step on or fall onto it. Ⓞ Do not install the unit on a defective stand.
 - It may result in an accident that causes physical injury or death.
- Properly insulate all cold surfaces to prevent "sweating."
 - Cold surfaces such as uninsulated piping can generate condensate that could drip, causing a slippery surface that creates a risk of slipping, falling, and personal injury.
- Do not use means to accelerate the defrosting process or to clean, other than those recommended by the manufacturer.
- The appliance shall be stored in a room without continuously operating ignition sources (for example: open flames, an operating gas appliance or an operating electric heater.)
- Do not pierce or burn.
- Be aware that refrigerants may not contain an odour.
- The manufacturer may provide other suitable examples or may provide additional information about the refrigerant odour.
- Pipe-work including piping material, pipe routing, and installation shall include protection from physical damage in operation and service, and be in compliance with national and local codes and standards, such as ASHRAE 15, ASHRAE 15.2, IAPMO Uniform Mechanical Code, ICC International Mechanical Code, or CSA B52.
- An unventilated area where the appliance using flammable refrigerants is installed shall be so constructed that should any refrigerant leak, it will not stagnate so as to create a fire or explosion hazard.
- Field-made refrigerant joints indoors shall be tightness tested according to the following requirements: The test method shall have a sensitivity of 5 grams per year of refrigerant or better under a pressure of at least 0,25 times the maximum allowable pressure. No leak shall be detected;

- After completion of field piping for split systems, the field pipework shall be pressure tested with an inert gas and then vacuum tested prior to refrigerant charging, according to the following requirements:
 - The minimum test pressure for the low side of the system shall be the low side design pressure and the minimum test pressure for the high side of the system shall be the high side design pressure, unless the high side of the system, cannot be isolated from the low side of the system in which case the entire system shall be pressure tested to the low side design pressure.
 - The test pressure after removal of pressure source shall be maintained for at least 1 h with no decrease of pressure indicated by the test gauge, with test gauge resolution not exceeding 5% of the test pressure.
 - During the evacuation test, after achieving a vacuum level specified in the manual or less, the refrigeration system shall be isolated from the vacuum pump and the pressure shall not rise above 1 500 microns within 10 min. The vacuum pressure level shall be specified in the manual, and shall be the lesser of 500 microns or the value required for compliance with national and local codes and standards, which may vary between residential, commercial, and industrial buildings.
- Mechanical connections (mechanical connectors or flared joints) shall be accessible for maintenance purposes.
- Flexible pipe elements shall be protected against mechanical damage, excessive stress by torsion, or other forces. They should be checked for mechanical damage annually.
- Protection devices, piping and fittings shall be protected as far as possible against adverse environmental effects, for example, the danger of water collecting and freezing in relief pipes or the accumulation of dirt and debris.
- Precautions shall be taken to avoid excessive vibration or pulsation to refrigerating piping.
- Piping in refrigerating systems shall be so designed and installed to minimize the likelihood hydraulic shock damaging the system.
- Provision shall be made for expansion and contraction of long runs of piping.
- Steel pipes and components shall be protected against corrosion with a rustproof coating before applying any insulation.
- Non-duct connected appliances containing A2L refrigerants with the supply and return air openings in the conditioned space may have the body of the appliance may be installed in open areas such as false ceilings not being used as return air plenums, as long as the conditioned air does not directly communicate with the air of the false ceiling.

Qualification of workers

The manual shall contain specific information about the required qualification of the working personnel for maintenance, service and repair operations. Every working procedure that affects safety means shall only be carried out by qualified person by manufacturer.

Examples for such working procedures are:

- Breaking into the refrigerating circuit;
- Opening of sealed components;
- Opening of ventilated enclosures.
- Refrigerant tubing shall be protected or enclosed to avoid damage.
- Flexible refrigerant connectors (such as connecting lines between the indoor and outdoor unit) that may be displaced during normal operations shall be protected against mechanical damage.
- A brazed, welded, or mechanical connection shall be made before opening the valves to permit refrigerant to flow between the refrigerating system parts.
- Keep any required ventilation openings clear of obstruction.

NOTE

- Properly insulate all cold surfaces to prevent "sweating".
 - Cold surfaces such as uninsulated piping can generate condensate that may drip and cause a slippery surface condition and / or water damage to interior surfaces.
- Always check for system refrigerant leaks after the unit has been installed.
 - Low refrigerant levels may cause product failure.
- **⊘** Do not make refrigerant substitutions. Use R32 only.
 - If a different refrigerant is used, or air mixes with original refrigerant, the unit will malfunction and be damaged.
- Keep the unit upright during installation to avoid vibration or water leakage.

- When connecting refrigerant tubing, remember to allow for pipe expansion.
 - Improper piping may cause refrigerant leaks and system malfunction.
- ☹ Do not install the outdoor unit in a noise-sensitive area. Periodically check that the outdoor frame is not damaged.
 - There is a risk of equipment damage.
- Install the unit in a safe location where nobody can step on or fall onto it. ☹ Do not install the unit on a defective stand.
 - There is a risk of unit and property damage.
- Install the drain hose to ensure adequate drainage.
 - There is a risk of water leakage and property damage.
- ☹ Do not store or use flammable gas / combustibles near the unit.
 - There is a risk of product failure.
- Do not use this equipment in mission critical or special-purpose applications such as preserving foods, works of art, wine coolers or refrigeration.
- This equipment is designed to provide comfort cooling and heating.
- Do not place IDUs in an environment where the IDUs may be exposed to harmful volatile organic compounds (VOCs), or in environments where there is improper air make up or supply or inadequate ventilation. If there are concerns about VOCs in the environment where the IDUs are installed, proper air make up or supply and/or adequate ventilation should be provided.
- Additionally, in buildings where IDUs will be exposed to VOCs, consider a third party factory-applied epoxy coating to the fan coils for each IDU where the entire coil is dipped, not sprayed.

Safety Instructions - Wiring

⚠ WARNING

- High voltage electricity is required to operate this system. Adhere to applicable building codes: National Electrical Code (NEC) for U.S. and Mexico, Canada Electrical Code (CE) for Canada and these instructions when wiring.
 - Improper connections and inadequate grounding can cause accidental injury or death.
- Always ground the unit following local, state, and national Codes.
 - There is risk of fire, electric shock, and physical injury or death.
- Properly size all circuit breakers or fuses.
 - There is risk of fire, electric shock, explosion, physical injury or death. The indoor unit got power from outdoor unit. Details of fuses or circuit breakers are indicated in installation manual of outdoor unit.
- The information contained in this manual is intended for use by an industry-qualified, experienced, certified electrician familiar with NEC for U.S. and Mexico, or CE for Canada who is equipped with the proper tools and test instruments.
 - Failure to carefully read and follow all instructions in this manual can result in equipment malfunction, property damage, personal injury or death.
- Refer to local, state, and federal codes, and use power wires of sufficient current capacity and rating.
 - Wires that are too small may generate heat and cause a fire.
- All electric work must be performed by a licensed electrician and conform to local building codes or, in the absence of local codes, with NEC for U.S. and Mexico, or CE for Canada, and the instructions given in this manual.
 - If the power source capacity is inadequate or the electric work is not performed properly, it may result in fire, electric shock, physical injury or death.
- Secure all field wiring connections with appropriate wire strain relief.
 - Improperly securing wires will create undue stress on equipment power lugs. Inadequate connections may generate heat, cause a fire and physical injury or death.
- Properly tighten all power lugs.
 - Loose wiring may overheat at connection points, causing a fire, physical injury or death.
- **⊘** Do not change the settings of the protection devices.
 - If the pressure switch, thermal switch, or other protection devices are bypassed or forced to work improperly, or parts other than those specified by LG are used, there is risk of fire, electric shock, explosion, and physical injury or death.
- The appliance shall be installed in accordance with national wiring regulations.
- Means for disconnection must be incorporated in the fixed wiring in accordance with the wiring rules.
- If the supply cord is damaged, it must be replaced by the manufacturer, its service agent or similarly qualified persons in order to avoid a hazard.

ⓘ NOTE

- **⊘** Do not supply power to the unit until all electrical wiring, controls wiring, piping, installation, and refrigerant system evacuation are completed.

Safety Instructions - Operation

⚠ CAUTION

- This appliance is not intended for the purposes of cooling INFORMATION TECHNOLOGY EQUIPMENT
- Servicing shall only be performed as recommended by the equipment manufacturer. Maintenance and repair requiring the assistance of other skilled personnel shall be carried out under the supervision of the person competent in the use of flammable refrigerants.

⚠ WARNING

- The appliance shall be stored so as to prevent mechanical damage from occurring.

- This appliance is not intended for use by persons (including children) with reduced physical, sensory or mental capabilities or lack of experience and knowledge, unless they have been given supervision or instruction concerning use of the appliance by a person responsible for their safety. Children should be supervised to ensure that they do not play with the appliance.
- LEAK DETECTION SYSTEM installed. Unit must be powered except for service. This unit is equipped with a refrigerant leak detector for safety. To be effective, the unit must be electrically powered at all times after installation, other than when servicing.

Safety Instructions - Service & Installation

⚠ CAUTION

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

⚠ WARNING

Checks to the area

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

Work procedure

Work shall be undertaken under a controlled procedure so as to minimise the risk of a flammable gas or vapour being present while the work is being performed.

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.

Checking for presence of refrigerant

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

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.

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.

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.

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:

- The actual refrigerant charge is in accordance with the room size within which the refrigerant containing parts are installed
- The ventilation machinery and outlets are operating adequately and are not obstructed
- If an indirect refrigerating circuit is being used, the secondary circuit shall be checked for the presence of refrigerant
- Marking to the equipment continues to be visible and legible. Markings and signs that are illegible shall be corrected
- Refrigerating pipe or components are installed in a position where they are unlikely to be exposed to any 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.

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. This shall be reported to the owner of the equipment so all parties are advised.

Initial safety checks shall include:

- Capacitors are discharged: this shall be done in a safe manner to avoid possibility of sparking.
- No live electrical components and wiring are exposed while charging, recovering or purging the system.
- Continuity of earth bonding

Repairs to sealed components

Sealed electrical components shall be replaced.

Repair to intrinsically safe components

Intrinsically safe components must be replaced.

Cabling

Check that cabling will not be subject to wear, corrosion, excessive pressure, vibration, sharp edges or any other adverse environmental effects. The check shall also take into account the effects of aging or continual vibration from sources such as compressors or fans.

Detection of flammable refrigerants

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

Leak detection methods

The following leak detection methods are deemed acceptable for all refrigerant systems.

Electronic leak detectors may be used to detect refrigerant leaks but, in the case of FLAMMABLE REFRIGERANTS, the sensitivity may not be adequate, or may need re-calibration. (Detection equipment shall be calibrated in a refrigerant-free area.) Ensure that the detector is not a potential source of ignition and is suitable for the refrigerant used. Leak detection equipment shall be set at a percentage of the LFL of the refrigerant and shall be calibrated to the refrigerant employed, and the appropriate percentage of gas (25 % maximum) is confirmed.

Leak detection fluids are also suitable for use with most refrigerants but the use of detergents containing chlorine shall be avoided as the chlorine may react with the refrigerant and corrode the copper pipe-work.

NOTE

Examples of leak detection fluids are.

- Bubble method.
- Fluorescent method agents.

If a leak is suspected, all naked flames shall be removed / extinguished.

If a leakage of refrigerant is found which requires brazing, all of the refrigerant shall be recovered from the system, or isolated (by means of shut off valves) in a part of the system remote from the leak. Removal of refrigerant shall be according to removal and evacuation procedure.

Removal and evacuation

When breaking into the refrigerant circuit to make repairs – or for any other purpose – conventional procedures shall be used. However, for flammable refrigerants it is important that best practice be followed, since flammability is a consideration.

The following procedure shall be adhered to:

- Safely remove refrigerant following local and national regulations;
- Evacuate;
- Purge the circuit with inert gas (optional for A2L);
- Evacuate (optional for A2L);
- Continuously flush or purge with inert gas when using flame to open circuit; and
- Open the circuit.

The refrigerant charge shall be recovered into the correct recovery cylinders if venting is not allowed by local and national codes. For appliances containing flammable refrigerants, the system shall be purged with oxygen-free nitrogen to render the appliance safe for flammable refrigerants. This process might need to be repeated several times.

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

For appliances containing flammable refrigerants, refrigerants purging shall be achieved by breaking the vacuum in the system with oxygen-free nitrogen and continuing to fill until the working pressure is achieved, then venting to atmosphere, and finally pulling down to a vacuum (optional for A2L). This process shall be repeated until no refrigerant is within the system (optional for A2L). When the final oxygen-free nitrogen charge is used, the system shall be vented down to atmospheric pressure to enable work to take place.

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

Charging procedures

In addition to conventional charging procedures, the following requirements shall be followed.

- Ensure that contamination of different refrigerants does not occur when using charging equipment. Hoses or lines shall be as short as possible to minimise the amount of refrigerant contained in them.
- Cylinders shall be kept in an appropriate position according to the instruction.
- Ensure that the refrigerating system is earthed prior to charging the system with refrigerant.
- Label the system when charging is complete (if not already).
- Extreme care shall be taken not to overfill the refrigerating system.

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

The system shall be leak-tested on completion of charging but prior to commissioning. A follow up leak test shall be carried out prior to leaving the site.

Decommissioning

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

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

Prior to the task being carried out, an oil and refrigerant sample shall be taken in case analysis is required prior to re-use of recovered refrigerant.

It is essential that electrical power is available before the task is commenced.

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

Labelling

Equipment shall be labelled stating that it has been de-commissioned and emptied of refrigerant.

The label shall be dated and signed.

Ensure that there are labels on the equipment stating the equipment contains flammable refrigerant.

Recovery

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

When transferring refrigerant into cylinders, ensure that only appropriate refrigerant recovery cylinders are employed.

Ensure that the correct number of cylinders for holding the total system charge is available.

All cylinders to be used are designated for the recovered refrigerant and labelled for that refrigerant (i.e. special cylinders for the recovery of refrigerant).

Cylinders shall be complete with pressure-relief valve and associated shut-off valves in good working order.

Empty recovery cylinders are evacuated and, if possible, cooled before recovery occurs.

The recovery equipment shall be in good working order with a set of instructions concerning the equipment that is at hand and shall be suitable for the recovery of the flammable refrigerant.

If in doubt, the manufacturer should be consulted. In addition, a set of calibrated weighing scales shall be available and in good working order.

Hoses shall be complete with leak-free disconnect couplings and in good condition.

The recovered refrigerant shall be processed according to local legislation in the correct recovery cylinder, and the relevant waste transfer note arranged.

Do not mix refrigerants in recovery units and especially not in cylinders .

If compressors or compressor oils are to be removed, ensure that they have been evacuated to an acceptable level to make certain that flammable refrigerant does not remain within the lubricant.

The compressor body shall not be heated by an open flame or other ignition sources to accelerate this process.

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

Wall Mounted Indoor Unit General Information

Wall Mounted Indoor Unit Installation Tips

This document contains general installation tips for installing LG Cassete indoor units (IDU). Follow all applicable local and national codes during installation. For more detailed information, refer to the individual unit's installation manual on www.lghvac.com.

The typical unit installation includes:

- Selecting the installation location
- Installing the unit
- Connecting refrigerant pipes
- Connecting drain pipe
- Connecting communication and power wiring
- Installing the remote controller (if applicable)

Always follow your system diagrams, including the LATS diagram (if applicable).

Minimum Floor Area

Minimum floor area (UL 60335-2-40:2019 Edition 3)

- The appliance shall be installed, operated and stored in a room with a floor area larger than the minimum area.
- Use the table to determine the minimum area.
- m : Total refrigerant amount in the system
- Total refrigerant amount : factory refrigerant charge + additional refrigerant mount
- If m is not in table, use the next larger value.
- A_{min} : minimum area for installation

NOTE

- Multi F and Multi V Indoor units shall not be used in a sealed room without ventilation to the outside of the room.
- Multi F and Multi V indoor units shall not be installed on the lowest underground floor of the building.

| m | | Minimum floor area (Installed Height) | | | | | |
|---------|---------|---------------------------------------|-----------------|-------------------------|-----------------|-------------------------|-----------------|
| | | Amin (≥ 1.8 m, 5.91 ft) | | Amin (≥ 2.0 m, 6.56 ft) | | Amin (≥ 2.2 m, 7.22 ft) | |
| | | m ² | ft ² | m ² | ft ² | m ² | ft ² |
| ≤ 1.842 | ≤ 64.97 | - | - | - | - | - | - |
| 1.843 | 65.01 | 13.34 | 143.6 | 12.01 | 129.24 | 10.92 | 117.49 |
| 2.00 | 70.55 | 14.48 | 155.83 | 13.03 | 140.25 | 11.84 | 127.50 |
| 2.20 | 77.60 | 15.92 | 171.41 | 14.33 | 154.27 | 13.03 | 140.25 |
| 2.40 | 84.66 | 17.37 | 187.00 | 15.64 | 168.30 | 14.21 | 150.20 |
| 2.60 | 91.71 | 18.82 | 202.58 | 16.94 | 182.32 | 15.40 | 165.75 |
| 2.80 | 98.77 | 20.27 | 218.16 | 18.24 | 196.34 | 16.58 | 178.50 |
| 3.00 | 105.82 | 21.72 | 233.74 | 19.54 | 210.37 | 17.77 | 191.25 |
| 3.20 | 112.88 | 23.16 | 249.33 | 20.85 | 224.39 | 18.95 | 203.99 |
| 3.40 | 119.93 | 24.61 | 264.91 | 22.15 | 238.42 | 20.14 | 216.74 |
| 3.60 | 126.99 | 26.06 | 280.49 | 23.45 | 252.44 | 21.32 | 229.49 |
| 3.80 | 134.04 | 27.51 | 296.08 | 24.76 | 266.47 | 22.51 | 242.24 |
| 4.00 | 141.10 | 28.95 | 311.66 | 26.06 | 280.49 | 23.69 | 254.99 |
| 4.20 | 148.15 | 30.40 | 327.24 | 27.36 | 294.52 | 24.87 | 267.74 |
| 4.40 | 155.21 | 31.85 | 342.82 | 28.66 | 308.54 | 26.06 | 280.49 |
| 4.60 | 162.26 | 33.30 | 358.41 | 29.97 | 322.57 | 27.24 | 293.24 |
| 4.80 | 169.32 | 34.74 | 373.99 | 31.27 | 336.59 | 28.43 | 305.99 |
| 5.00 | 176.37 | 36.19 | 389.57 | 32.57 | 350.62 | 29.61 | 318.74 |
| 5.20 | 183.42 | 37.64 | 405.16 | 33.88 | 364.64 | 30.80 | 331.49 |
| 5.40 | 190.48 | 39.09 | 420.74 | 35.18 | 378.67 | 31.98 | 344.24 |
| 5.60 | 197.53 | 40.54 | 436.33 | 36.48 | 392.69 | 33.17 | 356.99 |
| 5.80 | 204.59 | 41.98 | 451.91 | 37.79 | 406.71 | 34.35 | 369.74 |
| 6.00 | 211.64 | 43.43 | 467.49 | 39.09 | 420.74 | 35.53 | 382.49 |
| 6.20 | 218.70 | 44.88 | 483.07 | 40.39 | 434.76 | 36.72 | 395.24 |
| 6.40 | 225.75 | 46.33 | 498.65 | 41.69 | 448.79 | 37.90 | 407.99 |
| 6.60 | 232.81 | 47.77 | 514.24 | 43.00 | 462.81 | 39.09 | 420.74 |
| 6.80 | 239.86 | 49.22 | 529.82 | 44.30 | 476.84 | 40.27 | 433.49 |
| 7.00 | 246.92 | 50.67 | 545.40 | 45.60 | 490.86 | 41.46 | 446.24 |
| 7.20 | 253.97 | 52.12 | 560.99 | 46.91 | 504.89 | 42.64 | 458.99 |
| 7.40 | 261.03 | 53.56 | 576.57 | 48.21 | 518.91 | 43.83 | 471.74 |
| 7.60 | 268.08 | 55.01 | 592.15 | 49.51 | 532.94 | 45.01 | 484.49 |
| 7.80 | 275.14 | 57.53 | 619.28 | 50.81 | 546.96 | 46.19 | 497.24 |
| 8.00 | 282.19 | 60.52 | 651.45 | 52.12 | 560.99 | 47.38 | 509.99 |
| 8.20 | 289.25 | 63.59 | 684.43 | 53.42 | 575.01 | 48.56 | 522.74 |
| 8.40 | 296.30 | 66.72 | 718.22 | 54.72 | 589.03 | 49.75 | 535.49 |
| 8.60 | 303.36 | 69.94 | 752.83 | 56.05 | 603.05 | 50.93 | 548.24 |
| 8.80 | 310.41 | 73.23 | 788.25 | 57.32 | 617.07 | 52.12 | 560.99 |
| 9.00 | 317.47 | 76.60 | 824.49 | 62.04 | 667.83 | 53.30 | 573.74 |
| 9.20 | 324.52 | 80.04 | 861.54 | 64.83 | 697.85 | 54.49 | 586.49 |
| 9.40 | 331.58 | 83.56 | 899.40 | 67.68 | 728.52 | 55.94 | 602.08 |
| 9.60 | 338.63 | 87.15 | 938.08 | 70.59 | 759.85 | 58.34 | 627.97 |
| 9.80 | 345.68 | 90.82 | 977.58 | 73.56 | 791.84 | 60.80 | 654.41 |
| 10.00 | 352.74 | 94.56 | 1017.89 | 76.60 | 824.49 | 63.30 | 681.39 |
| 10.20 | 359.79 | 98.39 | 1059.01 | 79.69 | 857.80 | 65.86 | 708.92 |
| 10.40 | 366.85 | 102.28 | 1100.95 | 82.85 | 891.77 | 68.47 | 737.00 |
| 10.60 | 373.90 | 106.25 | 1143.70 | 86.06 | 926.39 | 71.13 | 765.62 |
| 10.80 | 380.96 | 110.30 | 1187.26 | 89.34 | 961.68 | 73.84 | 794.78 |
| 11.00 | 388.01 | 114.42 | 1231.64 | 92.68 | 997.63 | 76.60 | 824.49 |
| 11.20 | 395.07 | 118.62 | 1276.84 | 96.08 | 1034.24 | 79.41 | 854.74 |
| 11.40 | 402.12 | 122.90 | 1322.84 | 99.55 | 1071.50 | 82.27 | 885.54 |
| 11.60 | 409.18 | 127.25 | 1369.67 | 103.07 | 1109.43 | 85.18 | 916.88 |
| 11.80 | 416.23 | 131.67 | 1417.30 | 106.65 | 1148.02 | 88.14 | 948.77 |
| 12.00 | 423.29 | 136.17 | 1465.76 | 110.30 | 1187.26 | 91.16 | 981.21 |
| 12.20 | 430.34 | 140.75 | 1515.02 | 114.01 | 1227.17 | 94.22 | 1014.19 |
| 12.40 | 437.40 | 145.40 | 1565.10 | 117.78 | 1267.73 | 97.34 | 1047.71 |
| 12.60 | 444.45 | 150.13 | 1616.00 | 121.61 | 1308.96 | 100.50 | 1081.78 |
| 12.80 | 451.51 | 154.93 | 1667.70 | 125.50 | 1350.84 | 103.72 | 1116.40 |
| 13.00 | 458.56 | 159.81 | 1720.23 | 129.45 | 1393.38 | 106.98 | 1151.56 |
| 13.20 | 465.62 | 164.77 | 1773.56 | 133.46 | 1436.59 | 110.30 | 1187.26 |
| 13.40 | 472.67 | 169.80 | 1827.72 | 137.54 | 1480.45 | 113.67 | 1223.51 |
| 13.60 | 479.73 | 174.91 | 1882.68 | 141.67 | 1524.97 | 117.09 | 1260.31 |
| 13.80 | 486.78 | 180.09 | 1938.46 | 145.87 | 1570.15 | 120.56 | 1297.65 |
| 14.00 | 493.84 | 185.35 | 1995.06 | 150.13 | 1616.00 | 124.08 | 1335.53 |
| 14.20 | 500.89 | 190.68 | 2052.47 | 154.45 | 1662.50 | 127.65 | 1373.96 |
| 14.40 | 507.95 | 196.09 | 2110.69 | 158.83 | 1709.66 | 131.27 | 1412.94 |
| 14.60 | 515.00 | 201.57 | 2169.73 | 163.28 | 1757.48 | 134.94 | 1452.46 |
| 14.80 | 522.05 | 207.13 | 2229.58 | 167.78 | 1805.96 | 138.66 | 1492.53 |
| 15.00 | 529.11 | 212.77 | 2290.24 | 172.34 | 1855.10 | 142.43 | 1533.14 |
| 15.20 | 536.16 | 218.48 | 2351.72 | 176.97 | 1904.90 | 146.26 | 1574.29 |
| 15.40 | 543.22 | 224.27 | 2414.02 | 181.66 | 1955.35 | 150.13 | 1616.00 |
| 15.60 | 550.27 | 230.13 | 2477.13 | 186.41 | 2006.47 | 154.06 | 1658.24 |
| 15.80 | 557.33 | 236.07 | 2541.05 | 191.22 | 2058.25 | 158.03 | 1701.03 |
| 15.96 | 563.11 | 241.00 | 2594.08 | 195.21 | 2101.20 | 161.33 | 1736.53 |

Minimum Floor Area

Minimum floor area (UL 60335-2-40:2022 Edition 4)

- The appliance shall be installed, operated and stored in a room with a floor area larger than the minimum area.
- Use the table to determine the minimum area.
- m : Total refrigerant amount in the system
- Total refrigerant amount : factory refrigerant charge + additional refrigerant amount
- If m is not in table, use the next larger value.
- A_{\min} : minimum area for installation

| m | | Minimum floor area (Installed Height) | | | | | |
|---------|---------|---------------------------------------|-----------------|-------------------------------------|-----------------|-------------------------------------|-----------------|
| | | A _{min} (≥ 1.8 m, 5.91 ft) | | A _{min} (≥ 2.0 m, 6.56 ft) | | A _{min} (≥ 2.2 m, 7.22 ft) | |
| kg | oz | m ² | ft ² | m ² | ft ² | m ² | ft ² |
| ≤ 1.836 | ≤ 64.76 | - | - | - | - | - | - |
| 1.837 | 64.80 | 6.67 | 71.80 | 6.00 | 64.62 | 5.46 | 58.74 |
| 2.00 | 70.55 | 7.26 | 78.17 | 6.54 | 70.35 | 5.94 | 63.96 |
| 2.20 | 77.60 | 7.99 | 85.99 | 7.19 | 77.39 | 6.54 | 70.35 |
| 2.40 | 84.66 | 8.71 | 93.80 | 7.84 | 84.42 | 7.13 | 76.75 |
| 2.60 | 91.71 | 9.44 | 101.62 | 8.50 | 91.46 | 7.72 | 83.14 |
| 2.80 | 98.77 | 10.17 | 109.44 | 9.15 | 98.49 | 8.32 | 89.54 |
| 3.00 | 105.82 | 10.89 | 117.25 | 9.80 | 105.53 | 8.91 | 95.94 |
| 3.20 | 112.88 | 11.62 | 125.07 | 10.46 | 112.56 | 9.51 | 102.33 |
| 3.40 | 119.93 | 12.35 | 132.89 | 11.11 | 119.60 | 10.10 | 108.73 |
| 3.60 | 126.99 | 13.07 | 140.70 | 11.76 | 126.63 | 10.70 | 115.12 |
| 3.80 | 134.04 | 13.80 | 148.52 | 12.42 | 133.67 | 11.29 | 121.52 |
| 4.00 | 141.10 | 15.25 | 164.20 | 13.07 | 140.70 | 11.88 | 127.91 |
| 4.20 | 148.15 | 16.82 | 181.03 | 13.73 | 147.74 | 12.48 | 134.31 |
| 4.40 | 155.21 | 18.46 | 198.68 | 14.95 | 160.93 | 13.07 | 140.70 |
| 4.60 | 162.26 | 20.17 | 217.15 | 16.34 | 175.89 | 13.67 | 147.10 |
| 4.80 | 169.32 | 21.97 | 236.44 | 17.79 | 191.52 | 14.70 | 158.28 |
| 5.00 | 176.37 | 23.83 | 256.56 | 19.31 | 207.81 | 15.96 | 171.74 |
| 5.20 | 183.42 | 25.78 | 277.49 | 20.88 | 224.77 | 17.26 | 185.76 |
| 5.40 | 190.48 | 27.80 | 299.25 | 22.52 | 242.39 | 18.61 | 200.32 |
| 5.60 | 197.53 | 29.90 | 321.82 | 24.22 | 260.68 | 20.01 | 215.44 |
| 5.80 | 204.59 | 32.07 | 345.22 | 25.98 | 279.63 | 21.47 | 231.10 |
| 6.00 | 211.64 | 34.32 | 369.44 | 27.80 | 299.25 | 22.98 | 247.31 |
| 6.20 | 218.70 | 36.65 | 394.48 | 29.69 | 319.53 | 24.53 | 264.07 |
| 6.40 | 225.75 | 39.05 | 420.34 | 31.63 | 340.48 | 26.14 | 281.39 |
| 6.60 | 232.81 | 41.53 | 447.02 | 33.64 | 362.09 | 27.80 | 299.25 |
| 6.80 | 239.86 | 44.08 | 474.53 | 35.71 | 384.37 | 29.51 | 317.66 |
| 7.00 | 246.92 | 46.72 | 502.85 | 37.84 | 407.31 | 31.27 | 336.62 |
| 7.20 | 253.97 | 49.42 | 531.99 | 40.03 | 430.91 | 33.09 | 356.13 |
| 7.40 | 261.03 | 52.21 | 561.96 | 42.29 | 455.19 | 34.95 | 376.19 |
| 7.60 | 268.08 | 55.07 | 592.75 | 44.61 | 480.12 | 36.86 | 396.80 |
| 7.80 | 275.14 | 58.00 | 624.35 | 46.98 | 505.73 | 38.83 | 417.96 |
| 8.00 | 282.19 | 61.02 | 656.78 | 49.42 | 531.99 | 40.85 | 439.66 |
| 8.20 | 289.25 | 64.11 | 690.03 | 51.93 | 558.93 | 42.91 | 461.92 |
| 8.40 | 296.30 | 67.27 | 724.10 | 54.49 | 586.52 | 45.03 | 484.73 |
| 8.60 | 303.36 | 70.51 | 758.99 | 57.12 | 614.79 | 47.20 | 508.09 |
| 8.80 | 310.41 | 73.83 | 794.71 | 59.80 | 643.71 | 49.42 | 531.99 |
| 9.00 | 317.47 | 77.22 | 831.24 | 62.55 | 673.30 | 51.70 | 556.45 |
| 9.20 | 324.52 | 80.70 | 868.59 | 65.36 | 703.56 | 54.02 | 581.46 |
| 9.40 | 331.58 | 84.24 | 906.77 | 68.24 | 734.48 | 56.39 | 607.01 |
| 9.60 | 338.63 | 87.86 | 945.77 | 71.17 | 766.07 | 58.82 | 633.12 |
| 9.80 | 345.68 | 91.56 | 985.58 | 74.17 | 798.32 | 61.29 | 659.77 |
| 10.00 | 352.74 | 95.34 | 1026.22 | 77.22 | 831.24 | 63.82 | 686.98 |
| 10.20 | 359.79 | 99.19 | 1067.68 | 80.34 | 864.82 | 66.40 | 714.73 |
| 10.40 | 366.85 | 103.12 | 1109.96 | 83.53 | 899.07 | 69.03 | 743.03 |
| 10.60 | 373.90 | 107.12 | 1153.06 | 86.77 | 933.98 | 71.71 | 771.89 |
| 10.80 | 380.96 | 111.20 | 1196.99 | 90.07 | 969.56 | 74.44 | 801.29 |
| 11.00 | 388.01 | 115.36 | 1241.73 | 93.44 | 1005.80 | 77.22 | 831.24 |
| 11.20 | 395.07 | 119.59 | 1287.29 | 96.87 | 1042.71 | 80.06 | 861.74 |
| 11.40 | 402.12 | 123.90 | 1333.68 | 100.36 | 1080.28 | 82.94 | 892.79 |
| 11.60 | 409.18 | 128.29 | 1380.88 | 103.91 | 1118.52 | 85.88 | 924.39 |
| 11.80 | 416.23 | 132.75 | 1428.91 | 107.53 | 1157.42 | 88.87 | 956.54 |
| 12.00 | 423.29 | 137.29 | 1477.76 | 111.20 | 1196.99 | 91.90 | 989.24 |
| 12.20 | 430.34 | 141.90 | 1527.43 | 114.94 | 1237.22 | 94.99 | 1022.49 |
| 12.40 | 437.40 | 146.59 | 1577.92 | 118.74 | 1278.11 | 98.13 | 1056.29 |
| 12.60 | 444.45 | 151.36 | 1629.23 | 122.60 | 1319.68 | 101.32 | 1090.64 |
| 12.80 | 451.51 | 156.20 | 1681.36 | 126.53 | 1361.90 | 104.57 | 1125.54 |
| 13.00 | 458.56 | 161.12 | 1734.32 | 130.51 | 1404.80 | 107.86 | 1160.99 |
| 13.20 | 465.62 | 166.12 | 1788.09 | 134.56 | 1448.35 | 111.20 | 1196.99 |
| 13.40 | 472.67 | 171.19 | 1842.68 | 138.66 | 1492.57 | 114.60 | 1233.53 |
| 13.60 | 479.73 | 176.34 | 1898.10 | 142.83 | 1537.46 | 118.05 | 1270.63 |
| 13.80 | 486.78 | 181.56 | 1954.34 | 147.07 | 1583.01 | 121.54 | 1308.28 |
| 14.00 | 493.84 | 186.86 | 2011.40 | 151.36 | 1629.23 | 125.09 | 1346.47 |
| 14.20 | 500.89 | 192.24 | 2069.27 | 155.72 | 1676.11 | 128.69 | 1385.22 |
| 14.40 | 507.95 | 197.70 | 2127.97 | 160.13 | 1723.66 | 132.34 | 1424.51 |
| 14.60 | 515.00 | 203.22 | 2187.50 | 164.61 | 1771.87 | 136.04 | 1464.36 |
| 14.80 | 522.05 | 208.83 | 2247.84 | 169.15 | 1820.75 | 139.80 | 1504.75 |
| 15.00 | 529.11 | 214.51 | 2309.00 | 173.76 | 1870.29 | 143.60 | 1545.69 |
| 15.20 | 536.16 | 220.27 | 2370.98 | 178.42 | 1920.50 | 147.45 | 1587.19 |
| 15.40 | 543.22 | 226.11 | 2433.79 | 183.15 | 1971.37 | 151.36 | 1629.23 |
| 15.60 | 550.27 | 232.02 | 2497.41 | 187.93 | 2022.91 | 155.32 | 1671.82 |
| 15.80 | 557.33 | 238.00 | 2561.86 | 192.78 | 2075.11 | 159.33 | 1714.97 |
| 15.91 | 561.28 | 241.39 | 2598.31 | 195.53 | 2104.63 | 161.59 | 1739.36 |

Minimum Floor Area

Minimum floor area for ETRS unit (UL 60335-2-40:2022 Edition 4)

The following instructions apply to appliance marked "ETRS" on the nameplate (enhanced tightness refrigerating systems).

- The appliance shall be installed, operated and stored in a room with a floor area larger than the minimum area.
- m : Total refrigerant amount in the system
- Total refrigerant amount : factory refrigerant charge + additional refrigerant amount
- If m is not in table, use the next larger value.
- A_{\min} : minimum area for installation
- H_r : Room height (standard) in meters but not more than 2.2 m

Minimum Floor Area

Minimum floor area for ETRS unit with Safety Shut Off Valve (UL 60335-2-40:2022 Edition 4)

The following instructions apply to ETRS Unit that Safety Shut Off Valve and REFRIGERANT LEAK DETECTION SYSTEM installed.

- Minimum room area or minimum room area of conditioned space is based on releasable charge and is not related to total system refrigerant charge.
- Use the table to determine the minimum area.
- m_{rel} : maximum releasable charge .
- If m_{rel} is not in table, use the next larger value.
- A_{min} : minimum area for installation.
- H_r : Room height (standard) in meters but not more than 2.2 m.

Calculate Maximum Releasable charge by work sheet.

| Line# | Description | Releasable charge per length | x | Length* | = | Total |
|--|---|------------------------------|---|---------|---|---------------------|
| 1 | Liquid Pipe Ø 25.4 mm(1.0 inch) | 0.376 kg/m(0.252 lbs/ft) | x | | = | |
| 2 | Liquid Pipe Ø 22.2 mm(7/8 inch) | 0.286 kg/m(0.192 lbs/ft) | x | | = | |
| 3 | Liquid Pipe Ø 19.05 mm(3/4 inch) | 0.207 kg/m(0.139 lbs/ft) | x | | = | |
| 4 | Liquid Pipe Ø 15.88 mm(5/8 inch) | 0.144 kg/m(0.097 lbs/ft) | x | | = | |
| 5 | Liquid Pipe Ø 12.7 mm(1/2 inch) | 0.090 kg/m(0.060 lbs/ft) | x | | = | |
| 6 | Liquid Pipe Ø 9.52 mm(3/8 inch) | 0.046 kg/m(0.031 lbs/ft) | x | | = | |
| 7 | Liquid Pipe Ø 6.35 mm(1/4 inch) | 0.017 kg/m(0.011 lbs/ft) | x | | = | |
| 8 | Gas Pipe Ø 25.4 mm(1.0 inch) | 0.029 kg/m(0.019 lbs/ft) | x | | = | |
| 9 | Gas Pipe Ø 22.2 mm(7/8 inch) | 0.022 kg/m(0.015 lbs/ft) | x | | = | |
| 10 | Gas Pipe Ø 19.05 mm(3/4 inch) | 0.016 kg/m(0.011 lbs/ft) | x | | = | |
| 11 | Gas Pipe Ø 15.88 mm(5/8 inch) | 0.011 kg/m(0.007 lbs/ft) | x | | = | |
| 12 | Gas Pipe Ø 12.7 mm(1/2 inch) | 0.007 kg/m(0.005 lbs/ft) | x | | = | |
| 13 | Gas Pipe Ø 9.52 mm(3/8 inch) | 0.004 kg/m(0.002 lbs/ft) | x | | = | |
| 14 | Gas Pipe Ø 6.35 mm(1/4 inch) | 0.001 kg/m(0.001 lbs/ft) | x | | = | |
| 15 | Sum of releasable charge correction factor** of Indoor Units* | | | | = | |
| 16 | Releasable charge before leakage detection system activate. | | | | = | 0.204 kg(0.445 lbs) |
| Maximum Releasable Charge(Sum of lines 1~16) | | | | | | |

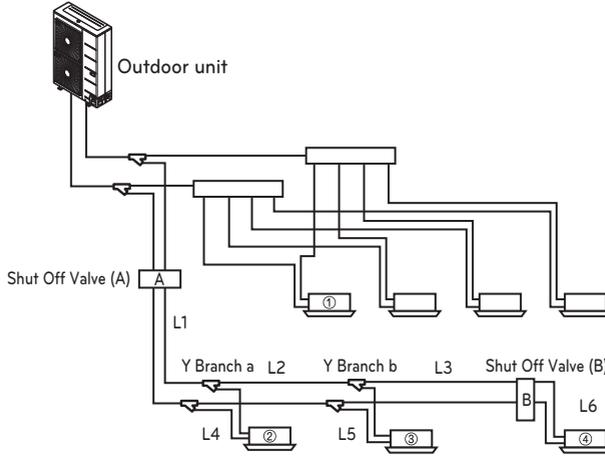
* All pipe and indoor units between shut off valve and next shut off valve or end of the system.

** Releasable charge correction factor of Indoor Units are provided as a card or online Installation manual.

NOTE

- Safety shut off valves installation shall avoid hydraulic shock.
- Safety shut off valves shall not block in liquid refrigerant unless adequate relief is provided to the refrigerant system low pressure side.
- Safety shut off valves shall be located in a space with a room volume large enough to comply with the following formula. When calculating the minimum room area, the releasable charge (m_{rel}) value replaces m .
- Safety shut off valve shall be positioned to enable access for maintenance by an authorized person
- Refer to the Safety shut off valve accessory manual for wiring and installation.

Example of Calculating m_{rel}



| Pipe Name | Description | Length(m) | Liquid Pipe | Gas Pipe |
|-----------|--|-----------|-------------|----------|
| L1 | Between Shut Off Valve (A) and Y Branch (a) | 30 | Ø 9.52 | Ø 15.88 |
| L2 | Between Y Branch (a) and Y Branch (b) | 25 | Ø 9.52 | Ø 15.88 |
| L3 | Between Y Branch (b) and Y Shut Off Valve (B) | 20 | Ø 9.52 | Ø 15.88 |
| L4 | Between Y Branch (a) and Indoor Unit (2) | 15 | Ø 6.35 | Ø 12.7 |
| L5 | Between Y Branch (b) and Indoor Unit (3) | 10 | Ø 6.35 | Ø 12.7 |
| L6 | Between Shut Off Valve (A) and Indoor Unit (4) | 10 | Ø 6.35 | Ø 12.7 |

Case 1 : Indoor units with out shut off valve. (Indoor Unit ①)

Without shut off valve, Use m to determine A_{min}

Example of Calculating m_rel

Case 2 : Indoor units between shut off valve and next shut off valve.(Indoor Unit ②,③)

| Line# | Description | Releasable charge per length | x | Length* | = | Total |
|--|---|------------------------------|---|--------------|---|----------------------|
| 1 | Liquid Pipe Ø 25.4 mm(1.0 inch) | 0.376 kg/m(0.252 lbs/ft) | x | | = | |
| 2 | Liquid Pipe Ø 22.2 mm(7/8 inch) | 0.286 kg/m(0.192 lbs/ft) | x | | = | |
| 3 | Liquid Pipe Ø 19.05 mm(3/4 inch) | 0.207 kg/m(0.139 lbs/ft) | x | | = | |
| 4 | Liquid Pipe Ø 15.88 mm(5/8 inch) | 0.144 kg/m(0.097 lbs/ft) | x | | = | |
| 5 | Liquid Pipe Ø 12.7 mm(1/2 inch) | 0.090 kg/m(0.060 lbs/ft) | x | | = | |
| 6 | Liquid Pipe Ø 9.52 mm(3/8 inch) | 0.046 kg/m(0.031 lbs/ft) | x | 75 m(246 ft) | = | 3.45 kg(7.626 lbs) |
| 7 | Liquid Pipe Ø 6.35 mm(1/4 inch) | 0.017 kg/m(0.011 lbs/ft) | x | 25 m(82 ft) | = | 0.425 kg(0.902 lbs) |
| 8 | Gas Pipe Ø 25.4 mm(1.0 inch) | 0.029 kg/m(0.019 lbs/ft) | x | | = | |
| 9 | Gas Pipe Ø 22.2 mm(7/8 inch) | 0.022 kg/m(0.015 lbs/ft) | x | | = | |
| 10 | Gas Pipe Ø 19.05 mm(3/4 inch) | 0.016 kg/m(0.011 lbs/ft) | x | | = | |
| 11 | Gas Pipe Ø 15.88 mm(5/8 inch) | 0.011 kg/m(0.007 lbs/ft) | x | 75 m(246 ft) | = | 0.825 kg(1.722 lbs) |
| 12 | Gas Pipe Ø 12.7 mm(1/2 inch) | 0.007 kg/m(0.005 lbs/ft) | x | 25 m(82 ft) | = | 0.175 kg(0.41 lbs) |
| 13 | Gas Pipe Ø 9.52 mm(3/8 inch) | 0.004 kg/m(0.002 lbs/ft) | x | | = | |
| 14 | Gas Pipe Ø 6.35 mm(1/4 inch) | 0.001 kg/m(0.001 lbs/ft) | x | | = | |
| 15 | Sum of releasable charge correction factor** of Indoor Units* | | | | = | 1.34 kg(2.95 lbs) |
| 16 | Releasable charge before leakage detection system activate. | | | | = | 0.204 kg(0.445 lbs) |
| Maximum Releasable Charge(Sum of lines 1~16) | | | | | | 6.419 kg(14.055 lbs) |

*Sum of all pipe(L1, L2, L3, L4, L5) length between shut off valve (A) and shut off valve (B)

**TM-A CST 2EA(②, ③) : 0.67 kg/EA * 2 EA = 1.34 kg

Case 3 : Indoor units between shut off valve and end of system.(Indoor Unit ④)

| Line# | Description | Releasable charge per length | x | Length | = | Total |
|--|---|------------------------------|---|---------------|---|---------------------|
| 1 | Liquid Pipe Ø 25.4 mm(1.0 inch) | 0.376 kg/m(0.252 lbs/ft) | x | | = | |
| 2 | Liquid Pipe Ø 22.2 mm(7/8 inch) | 0.286 kg/m(0.192 lbs/ft) | x | | = | |
| 3 | Liquid Pipe Ø 19.05 mm(3/4 inch) | 0.207 kg/m(0.139 lbs/ft) | x | | = | |
| 4 | Liquid Pipe Ø 15.88 mm(5/8 inch) | 0.144 kg/m(0.097 lbs/ft) | x | | = | |
| 5 | Liquid Pipe Ø 12.7 mm(1/2 inch) | 0.090 kg/m(0.060 lbs/ft) | x | | = | |
| 6 | Liquid Pipe Ø 9.52 mm(3/8 inch) | 0.046 kg/m(0.031 lbs/ft) | x | | = | |
| 7 | Liquid Pipe Ø 6.35 mm(1/4 inch) | 0.017 kg/m(0.011 lbs/ft) | x | 10 m(32.8 ft) | = | 0.17 kg(0.361 lbs) |
| 8 | Gas Pipe Ø 25.4 mm(1.0 inch) | 0.029 kg/m(0.019 lbs/ft) | x | | = | |
| 9 | Gas Pipe Ø 22.2 mm(7/8 inch) | 0.022 kg/m(0.015 lbs/ft) | x | | = | |
| 10 | Gas Pipe Ø 19.05 mm(3/4 inch) | 0.016 kg/m(0.011 lbs/ft) | x | | = | |
| 11 | Gas Pipe Ø 15.88 mm(5/8 inch) | 0.011 kg/m(0.007 lbs/ft) | x | | = | |
| 12 | Gas Pipe Ø 12.7 mm(1/2 inch) | 0.007 kg/m(0.005 lbs/ft) | x | 10 m(32.8 ft) | = | 0.07 kg(0.164 lbs) |
| 13 | Gas Pipe Ø 9.52 mm(3/8 inch) | 0.004 kg/m(0.002 lbs/ft) | x | | = | |
| 14 | Gas Pipe Ø 6.35 mm(1/4 inch) | 0.001 kg/m(0.001 lbs/ft) | x | | = | |
| 15 | Sum of releasable charge correction factor** of Indoor Units* | | | | = | 0.67 kg(1.48 lbs) |
| 16 | Releasable charge before leakage detection system activate. | | | | = | 0.204 kg(0.445 lbs) |
| Maximum Releasable Charge(Sum of lines 1~16) | | | | | | 1.114 kg(2.45 lbs) |

*Sum of all pipe(L6) length between shut off valve (B) and end of system.

**TM-A CST 1 EA(④) : 0.67 kg/EA * 1 EA = 0.67 kg

| Minimum floor area | | | | Minimum floor area | | | | Minimum floor area | | | |
|--------------------|---------|------------------|-----------------|--------------------|---------|------------------|-----------------|--------------------|---------|------------------|-----------------|
| m or m_rel | | A _{min} | | m or m_rel | | A _{min} | | m or m_rel | | A _{min} | |
| kg | oz | m ² | ft ² | kg | oz | m ² | ft ² | kg | oz | m ² | ft ² |
| ≤ 1.836 | ≤ 64.76 | - | - | 15.40 | 543.22 | 45.75 | 492.47 | 29.20 | 1030.00 | 86.75 | 933.77 |
| 1.84 | 64.80 | 5.46 | 58.74 | 15.60 | 550.27 | 46.35 | 498.86 | 29.40 | 1037.06 | 87.34 | 940.16 |
| 2.00 | 70.55 | 5.94 | 63.96 | 15.80 | 557.33 | 46.94 | 505.26 | 29.60 | 1044.11 | 87.94 | 946.56 |
| 2.20 | 77.60 | 6.54 | 70.35 | 16.00 | 564.38 | 47.53 | 511.65 | 29.80 | 1051.17 | 88.53 | 952.95 |
| 2.40 | 84.66 | 7.13 | 76.75 | 16.20 | 571.44 | 48.13 | 518.05 | 30.00 | 1058.22 | 89.13 | 959.35 |
| 2.60 | 91.71 | 7.72 | 83.14 | 16.40 | 578.49 | 48.72 | 524.44 | 30.20 | 1065.27 | 89.72 | 965.75 |
| 2.80 | 98.77 | 8.32 | 89.54 | 16.60 | 585.55 | 49.32 | 530.84 | 30.40 | 1072.33 | 90.31 | 972.14 |
| 3.00 | 105.82 | 8.91 | 95.93 | 16.80 | 592.60 | 49.91 | 537.24 | 30.60 | 1079.38 | 90.91 | 978.54 |
| 3.20 | 112.88 | 9.51 | 102.33 | 17.00 | 599.66 | 50.51 | 543.63 | 30.80 | 1086.44 | 91.50 | 984.93 |
| 3.40 | 119.93 | 10.10 | 108.73 | 17.20 | 606.71 | 51.10 | 550.03 | 31.00 | 1093.49 | 92.10 | 991.33 |
| 3.60 | 126.99 | 10.70 | 115.12 | 17.40 | 613.77 | 51.69 | 556.42 | 31.20 | 1100.55 | 92.69 | 997.72 |
| 3.80 | 134.04 | 11.29 | 121.52 | 17.60 | 620.82 | 52.29 | 562.82 | 31.40 | 1107.60 | 93.29 | 1004.12 |
| 4.00 | 141.10 | 11.88 | 127.91 | 17.80 | 627.88 | 52.88 | 569.21 | 31.60 | 1114.66 | 93.88 | 1010.51 |
| 4.20 | 148.15 | 12.48 | 134.31 | 18.00 | 634.93 | 53.48 | 575.61 | 31.80 | 1121.71 | 94.47 | 1016.91 |
| 4.40 | 155.21 | 13.07 | 140.70 | 18.20 | 641.99 | 54.07 | 582.01 | 32.00 | 1128.77 | 95.07 | 1023.31 |
| 4.60 | 162.26 | 13.67 | 147.10 | 18.40 | 649.04 | 54.66 | 588.40 | 32.20 | 1135.82 | 95.66 | 1029.70 |
| 4.80 | 169.32 | 14.26 | 153.50 | 18.60 | 656.10 | 55.26 | 594.80 | 32.40 | 1142.88 | 96.26 | 1036.10 |
| 5.00 | 176.37 | 14.85 | 159.89 | 18.80 | 663.15 | 55.85 | 601.19 | 32.60 | 1149.93 | 96.85 | 1042.49 |
| 5.20 | 183.42 | 15.45 | 166.29 | 19.00 | 670.21 | 56.45 | 607.59 | 32.80 | 1156.99 | 97.45 | 1048.89 |
| 5.40 | 190.48 | 16.04 | 172.68 | 19.20 | 677.26 | 57.04 | 613.98 | 33.00 | 1164.04 | 98.04 | 1055.28 |
| 5.60 | 197.53 | 16.64 | 179.08 | 19.40 | 684.32 | 57.64 | 620.38 | 33.20 | 1171.10 | 98.63 | 1061.68 |
| 5.80 | 204.59 | 17.23 | 185.47 | 19.60 | 691.37 | 58.23 | 626.77 | 33.40 | 1178.15 | 99.23 | 1068.08 |
| 6.00 | 211.64 | 17.83 | 191.87 | 19.80 | 698.43 | 58.82 | 633.17 | 33.60 | 1185.21 | 99.82 | 1074.47 |
| 6.20 | 218.70 | 18.42 | 198.27 | 20.00 | 705.48 | 59.42 | 639.57 | 33.80 | 1192.26 | 100.42 | 1080.87 |
| 6.40 | 225.75 | 19.01 | 204.66 | 20.20 | 712.53 | 60.01 | 645.96 | 34.00 | 1199.32 | 101.01 | 1087.26 |
| 6.60 | 232.81 | 19.61 | 211.06 | 20.40 | 719.59 | 60.61 | 652.36 | 34.20 | 1206.37 | 101.60 | 1093.66 |
| 6.80 | 239.86 | 20.20 | 217.45 | 20.60 | 726.64 | 61.20 | 658.75 | 34.40 | 1213.43 | 102.20 | 1100.05 |
| 7.00 | 246.92 | 20.80 | 223.85 | 20.80 | 733.70 | 61.79 | 665.15 | 34.60 | 1220.48 | 102.79 | 1106.45 |
| 7.20 | 253.97 | 21.39 | 230.24 | 21.00 | 740.75 | 62.39 | 671.54 | 34.80 | 1227.54 | 103.39 | 1112.85 |
| 7.40 | 261.03 | 21.98 | 236.64 | 21.20 | 747.81 | 62.98 | 677.94 | 35.00 | 1234.59 | 103.98 | 1119.24 |
| 7.60 | 268.08 | 22.58 | 243.04 | 21.40 | 754.86 | 63.58 | 684.34 | 35.20 | 1241.64 | 104.58 | 1125.64 |
| 7.80 | 275.14 | 23.17 | 249.43 | 21.60 | 761.92 | 64.17 | 690.73 | 35.40 | 1248.70 | 105.17 | 1132.03 |
| 8.00 | 282.19 | 23.77 | 255.83 | 21.80 | 768.97 | 64.77 | 697.13 | 35.60 | 1255.75 | 105.76 | 1138.43 |
| 8.20 | 289.25 | 24.36 | 262.22 | 22.00 | 776.03 | 65.36 | 703.52 | 35.80 | 1262.81 | 106.36 | 1144.82 |
| 8.40 | 296.30 | 24.96 | 268.62 | 22.20 | 783.08 | 65.95 | 709.92 | 36.00 | 1269.86 | 106.95 | 1151.22 |
| 8.60 | 303.36 | 25.55 | 275.01 | 22.40 | 790.14 | 66.55 | 716.31 | 36.20 | 1276.92 | 107.55 | 1157.61 |
| 8.80 | 310.41 | 26.14 | 281.41 | 22.60 | 797.19 | 67.14 | 722.71 | 36.40 | 1283.97 | 108.14 | 1164.01 |
| 9.00 | 317.47 | 26.74 | 287.80 | 22.80 | 804.25 | 67.74 | 729.11 | 36.60 | 1291.03 | 108.73 | 1170.41 |
| 9.20 | 324.52 | 27.33 | 294.20 | 23.00 | 811.30 | 68.33 | 735.50 | 36.80 | 1298.09 | 109.33 | 1176.80 |
| 9.40 | 331.58 | 27.93 | 300.60 | 23.20 | 818.36 | 68.92 | 741.90 | 37.00 | 1305.14 | 109.92 | 1183.20 |
| 9.60 | 338.63 | 28.52 | 306.99 | 23.40 | 825.41 | 69.52 | 748.29 | 37.20 | 1312.19 | 110.52 | 1189.59 |
| 9.80 | 345.69 | 29.11 | 313.39 | 23.60 | 832.47 | 70.11 | 754.69 | 37.40 | 1319.25 | 111.11 | 1195.99 |
| 10.00 | 352.74 | 29.71 | 319.78 | 23.80 | 839.52 | 70.71 | 761.08 | 37.60 | 1326.30 | 111.71 | 1202.38 |
| 10.20 | 359.79 | 30.30 | 326.18 | 24.00 | 846.58 | 71.30 | 767.48 | 37.80 | 1333.36 | 112.30 | 1208.78 |
| 10.40 | 366.85 | 30.90 | 332.57 | 24.20 | 853.63 | 71.90 | 773.88 | 38.00 | 1340.41 | 112.89 | 1215.18 |
| 10.60 | 373.90 | 31.49 | 338.97 | 24.40 | 860.69 | 72.49 | 780.27 | 38.20 | 1347.47 | 113.49 | 1221.57 |
| 10.80 | 380.96 | 32.09 | 345.37 | 24.60 | 867.74 | 73.08 | 786.67 | 38.40 | 1354.52 | 114.08 | 1227.97 |
| 11.00 | 388.01 | 32.68 | 351.76 | 24.80 | 874.80 | 73.68 | 793.06 | 38.60 | 1361.58 | 114.68 | 1234.36 |
| 11.20 | 395.07 | 33.27 | 358.16 | 25.00 | 881.85 | 74.27 | 799.46 | 38.80 | 1368.63 | 115.27 | 1240.76 |
| 11.40 | 402.12 | 33.87 | 364.55 | 25.20 | 888.90 | 74.87 | 805.85 | 39.00 | 1375.69 | 115.86 | 1247.15 |
| 11.60 | 409.18 | 34.46 | 370.95 | 25.40 | 895.95 | 75.46 | 812.25 | 39.20 | 1382.74 | 116.46 | 1253.55 |
| 11.80 | 416.23 | 35.06 | 377.34 | 25.60 | 903.01 | 76.05 | 818.64 | 39.40 | 1389.80 | 117.05 | 1259.95 |
| 12.00 | 423.29 | 35.65 | 383.74 | 25.80 | 910.07 | 76.65 | 825.04 | 39.60 | 1396.85 | 117.65 | 1266.34 |
| 12.20 | 430.34 | 36.24 | 390.14 | 26.00 | 917.12 | 77.24 | 831.44 | 39.80 | 1403.91 | 118.24 | 1272.74 |
| 12.40 | 437.40 | 36.84 | 396.53 | 26.20 | 924.18 | 77.84 | 837.83 | 40.00 | 1410.96 | 118.84 | 1279.13 |
| 12.60 | 444.45 | 37.43 | 402.93 | 26.40 | 931.23 | 78.43 | 844.23 | 40.20 | 1418.01 | 119.43 | 1285.53 |
| 12.80 | 451.51 | 38.03 | 409.32 | 26.60 | 938.29 | 79.03 | 850.62 | 40.40 | 1425.07 | 120.02 | 1291.92 |
| 13.00 | 458.56 | 38.62 | 415.72 | 26.80 | 945.34 | 79.62 | 857.02 | 40.60 | 1432.12 | 120.62 | 1298.32 |
| 13.20 | 465.62 | 39.22 | 422.11 | 27.00 | 952.40 | 80.21 | 863.41 | 40.80 | 1439.18 | 121.21 | 1304.72 |
| 13.40 | 472.67 | 39.81 | 428.51 | 27.20 | 959.45 | 80.81 | 869.81 | 41.00 | 1446.23 | 121.81 | 1311.11 |
| 13.60 | 479.73 | 40.40 | 434.91 | 27.40 | 966.51 | 81.40 | 876.21 | 41.20 | 1453.29 | 122.40 | 1317.51 |
| 13.80 | 486.78 | 41.00 | 441.30 | 27.60 | 973.56 | 82.00 | 882.60 | 41.40 | 1460.34 | 122.99 | 1323.90 |
| 14.00 | 493.84 | 41.59 | 447.70 | 27.80 | 980.62 | 82.59 | 889.00 | 41.60 | 1467.40 | 123.59 | 1330.30 |
| 14.20 | 500.89 | 42.19 | 454.09 | 28.00 | 987.67 | 83.18 | 895.39 | 41.80 | 1474.45 | 124.18 | 1336.69 |
| 14.40 | 507.95 | 42.78 | 460.49 | 28.20 | 994.73 | 83.78 | 901.79 | 42.00 | 1481.51 | 124.78 | 1343.09 |
| 14.60 | 515.00 | 43.37 | 466.88 | 28.40 | 1001.78 | 84.37 | 908.18 | 42.20 | 1488.56 | 125.37 | 1349.48 |
| 14.80 | 522.06 | 43.97 | 473.28 | 28.60 | 1008.84 | 84.97 | 914.58 | 42.40 | 1495.62 | 125.97 | 1355.88 |
| 15.00 | 529.11 | 44.56 | 479.67 | 28.80 | 1015.89 | 85.56 | 920.98 | 42.60 | 1502.67 | 126.56 | 1362.28 |
| 15.20 | 536.16 | 45.16 | 486.07 | 29.00 | 1022.95 | 86.16 | 927.37 | 42.80 | 1509.73 | 127.15 | 1368.67 |

| Minimum floor area | | | | Minimum floor area | | | | Minimum floor area | | | |
|--------------------|---------|------------------|-----------------|--------------------|---------|------------------|-----------------|--------------------|---------|------------------|-----------------|
| m or m_rel | | A _{min} | | m or m_rel | | A _{min} | | m or m_rel | | A _{min} | |
| kg | oz | m ² | ft ² | kg | oz | m ² | ft ² | kg | oz | m ² | ft ² |
| 43.00 | 1516.78 | 127.75 | 1375.07 | 55.40 | 1954.18 | 164.59 | 1771.60 | 67.80 | 2391.58 | 201.43 | 2168.13 |
| 43.20 | 1523.84 | 128.34 | 1381.46 | 55.60 | 1961.23 | 165.18 | 1777.99 | 68.00 | 2398.63 | 202.02 | 2174.53 |
| 43.40 | 1530.89 | 128.94 | 1387.86 | 55.80 | 1968.29 | 165.78 | 1784.39 | 68.20 | 2405.69 | 202.61 | 2180.92 |
| 43.60 | 1537.95 | 129.53 | 1394.25 | 56.00 | 1975.34 | 166.37 | 1790.79 | 68.40 | 2412.74 | 203.21 | 2187.32 |
| 43.80 | 1545.00 | 130.12 | 1400.65 | 56.20 | 1982.40 | 166.96 | 1797.18 | 68.60 | 2419.80 | 203.80 | 2193.71 |
| 44.00 | 1552.06 | 130.72 | 1407.05 | 56.40 | 1989.45 | 167.56 | 1803.58 | 68.80 | 2426.85 | 204.40 | 2200.11 |
| 44.20 | 1559.11 | 131.31 | 1413.44 | 56.60 | 1996.51 | 168.15 | 1809.97 | 69.00 | 2433.91 | 204.99 | 2206.50 |
| 44.40 | 1566.17 | 131.91 | 1419.84 | 56.80 | 2003.56 | 168.75 | 1816.37 | 69.20 | 2440.96 | 205.59 | 2212.90 |
| 44.60 | 1573.22 | 132.50 | 1426.23 | 57.00 | 2010.62 | 169.34 | 1822.76 | 69.40 | 2448.02 | 206.18 | 2219.29 |
| 44.80 | 1580.28 | 133.10 | 1432.63 | 57.20 | 2017.67 | 169.93 | 1829.16 | 69.60 | 2455.07 | 206.77 | 2225.69 |
| 45.00 | 1587.33 | 133.69 | 1439.02 | 57.40 | 2024.73 | 170.53 | 1835.56 | 69.80 | 2462.13 | 207.37 | 2232.09 |
| 45.20 | 1594.38 | 134.28 | 1445.42 | 57.60 | 2031.78 | 171.12 | 1841.95 | 70.00 | 2469.18 | 207.96 | 2238.48 |
| 45.40 | 1601.44 | 134.88 | 1451.82 | 57.80 | 2038.84 | 171.72 | 1848.35 | 70.20 | 2476.23 | 208.56 | 2244.88 |
| 45.60 | 1608.49 | 135.47 | 1458.21 | 58.00 | 2045.89 | 172.31 | 1854.74 | 70.40 | 2483.29 | 209.15 | 2251.27 |
| 45.80 | 1615.55 | 136.07 | 1464.61 | 58.20 | 2052.95 | 172.91 | 1861.14 | 70.60 | 2490.34 | 209.74 | 2257.67 |
| 46.00 | 1622.60 | 136.66 | 1471.00 | 58.40 | 2060.00 | 173.50 | 1867.53 | 70.80 | 2497.40 | 210.34 | 2264.06 |
| 46.20 | 1629.66 | 137.25 | 1477.40 | 58.60 | 2067.06 | 174.09 | 1873.93 | 71.00 | 2504.45 | 210.93 | 2270.46 |
| 46.40 | 1636.71 | 137.85 | 1483.79 | 58.80 | 2074.11 | 174.69 | 1880.32 | 71.20 | 2511.51 | 211.53 | 2276.86 |
| 46.60 | 1643.77 | 138.44 | 1490.19 | 59.00 | 2081.17 | 175.28 | 1886.72 | 71.40 | 2518.56 | 212.12 | 2283.25 |
| 46.80 | 1650.82 | 139.04 | 1496.59 | 59.20 | 2088.22 | 175.88 | 1893.12 | 71.60 | 2525.62 | 212.72 | 2289.65 |
| 47.00 | 1657.88 | 139.63 | 1502.98 | 59.40 | 2095.28 | 176.47 | 1899.51 | 71.80 | 2532.67 | 213.31 | 2296.04 |
| 47.20 | 1664.93 | 140.23 | 1509.38 | 59.60 | 2102.33 | 177.06 | 1905.91 | 72.00 | 2539.73 | 213.90 | 2302.44 |
| 47.40 | 1671.99 | 140.82 | 1515.77 | 59.80 | 2109.39 | 177.66 | 1912.30 | 72.20 | 2546.78 | 214.50 | 2308.83 |
| 47.60 | 1679.04 | 141.41 | 1522.17 | 60.00 | 2116.44 | 178.25 | 1918.70 | 72.40 | 2553.84 | 215.09 | 2315.23 |
| 47.80 | 1686.10 | 142.01 | 1528.56 | 60.20 | 2123.49 | 178.85 | 1925.09 | 72.60 | 2560.89 | 215.69 | 2321.63 |
| 48.00 | 1693.15 | 142.60 | 1534.96 | 60.40 | 2130.55 | 179.44 | 1931.49 | 72.80 | 2567.95 | 216.28 | 2328.02 |
| 48.20 | 1700.21 | 143.20 | 1541.35 | 60.60 | 2137.60 | 180.04 | 1937.89 | 73.00 | 2575.00 | 216.87 | 2334.42 |
| 48.40 | 1707.26 | 143.79 | 1547.75 | 60.80 | 2144.66 | 180.63 | 1944.28 | 73.20 | 2582.06 | 217.47 | 2340.81 |
| 48.60 | 1714.32 | 144.39 | 1554.15 | 61.00 | 2151.71 | 181.22 | 1950.68 | 73.40 | 2589.11 | 218.06 | 2347.21 |
| 48.80 | 1721.37 | 144.98 | 1560.54 | 61.20 | 2158.77 | 181.82 | 1957.07 | 73.60 | 2596.17 | 218.66 | 2353.60 |
| 49.00 | 1728.43 | 145.57 | 1566.94 | 61.40 | 2165.82 | 182.41 | 1963.47 | 73.80 | 2603.22 | 219.25 | 2360.00 |
| 49.20 | 1735.48 | 146.17 | 1573.33 | 61.60 | 2172.88 | 183.01 | 1969.86 | 74.00 | 2610.28 | 219.85 | 2366.40 |
| 49.40 | 1742.54 | 146.76 | 1579.73 | 61.80 | 2179.93 | 183.60 | 1976.26 | 74.20 | 2617.33 | 220.44 | 2372.79 |
| 49.60 | 1749.59 | 147.36 | 1586.12 | 62.00 | 2186.99 | 184.19 | 1982.66 | 74.40 | 2624.39 | 221.03 | 2379.19 |
| 49.80 | 1756.65 | 147.95 | 1592.52 | 62.20 | 2194.04 | 184.79 | 1989.05 | 74.60 | 2631.44 | 221.63 | 2385.58 |
| 50.00 | 1763.70 | 148.54 | 1598.92 | 62.40 | 2201.10 | 185.38 | 1995.45 | 74.80 | 2638.50 | 222.22 | 2391.98 |
| 50.20 | 1770.75 | 149.14 | 1605.31 | 62.60 | 2208.15 | 185.98 | 2001.84 | 75.00 | 2645.55 | 222.82 | 2398.37 |
| 50.40 | 1777.81 | 149.73 | 1611.71 | 62.80 | 2215.21 | 186.57 | 2008.24 | 75.20 | 2652.60 | 223.41 | 2404.77 |
| 50.60 | 1784.86 | 150.33 | 1618.10 | 63.00 | 2222.26 | 187.17 | 2014.63 | 75.40 | 2659.66 | 224.00 | 2411.16 |
| 50.80 | 1791.92 | 150.92 | 1624.50 | 63.20 | 2229.32 | 187.76 | 2021.03 | 75.60 | 2666.71 | 224.60 | 2417.56 |
| 51.00 | 1798.97 | 151.52 | 1630.89 | 63.40 | 2236.37 | 188.35 | 2027.43 | 75.80 | 2673.77 | 225.19 | 2423.95 |
| 51.20 | 1806.03 | 152.11 | 1637.29 | 63.60 | 2243.43 | 188.95 | 2033.82 | 76.00 | 2680.82 | 225.79 | 2430.35 |
| 51.40 | 1813.08 | 152.70 | 1643.69 | 63.80 | 2250.48 | 189.54 | 2040.22 | 76.20 | 2687.88 | 226.38 | 2436.75 |
| 51.60 | 1820.14 | 153.30 | 1650.08 | 64.00 | 2257.54 | 190.14 | 2046.61 | 76.40 | 2694.93 | 226.98 | 2443.14 |
| 51.80 | 1827.19 | 153.89 | 1656.48 | 64.20 | 2264.59 | 190.73 | 2053.01 | 76.60 | 2701.99 | 227.57 | 2449.54 |
| 52.00 | 1834.25 | 154.49 | 1662.87 | 64.40 | 2271.65 | 191.33 | 2059.40 | 76.80 | 2709.04 | 228.16 | 2455.93 |
| 52.20 | 1841.30 | 155.08 | 1669.27 | 64.60 | 2278.70 | 191.92 | 2065.80 | 77.00 | 2716.10 | 228.76 | 2462.33 |
| 52.40 | 1848.36 | 155.67 | 1675.66 | 64.80 | 2285.76 | 192.51 | 2072.19 | 77.20 | 2723.15 | 229.35 | 2468.73 |
| 52.60 | 1855.41 | 156.27 | 1682.06 | 65.00 | 2292.81 | 193.11 | 2078.59 | 77.40 | 2730.21 | 229.95 | 2475.12 |
| 52.80 | 1862.47 | 156.86 | 1688.45 | 65.20 | 2299.86 | 193.70 | 2084.99 | 77.60 | 2737.26 | 230.54 | 2481.52 |
| 53.00 | 1869.52 | 157.46 | 1694.85 | 65.40 | 2306.92 | 194.30 | 2091.38 | 77.80 | 2744.32 | 231.13 | 2487.91 |
| 53.20 | 1876.58 | 158.05 | 1701.25 | 65.60 | 2313.97 | 194.89 | 2097.78 | 78.00 | 2751.37 | 231.73 | 2494.31 |
| 53.40 | 1883.63 | 158.65 | 1707.64 | 65.80 | 2321.03 | 195.48 | 2104.17 | 78.20 | 2758.43 | 232.32 | 2500.70 |
| 53.60 | 1890.69 | 159.24 | 1714.04 | 66.00 | 2328.08 | 196.08 | 2110.57 | 78.40 | 2765.48 | 232.92 | 2507.10 |
| 53.80 | 1897.74 | 159.83 | 1720.43 | 66.20 | 2335.14 | 196.67 | 2116.96 | 78.60 | 2772.54 | 233.51 | 2513.50 |
| 54.00 | 1904.80 | 160.43 | 1726.83 | 66.40 | 2342.19 | 197.27 | 2123.36 | 78.80 | 2779.59 | 234.11 | 2519.89 |
| 54.20 | 1911.85 | 161.02 | 1733.22 | 66.60 | 2349.25 | 197.86 | 2129.76 | 79.00 | 2786.65 | 234.70 | 2526.29 |
| 54.40 | 1918.91 | 161.62 | 1739.62 | 66.80 | 2356.30 | 198.46 | 2136.15 | 79.20 | 2793.70 | 235.29 | 2532.68 |
| 54.60 | 1925.96 | 162.21 | 1746.02 | 67.00 | 2363.36 | 199.05 | 2142.55 | 79.40 | 2800.76 | 235.89 | 2539.08 |
| 54.80 | 1933.02 | 162.80 | 1752.41 | 67.20 | 2370.41 | 199.64 | 2148.94 | 79.60 | 2807.81 | 236.48 | 2545.48 |
| 55.00 | 1940.07 | 163.40 | 1758.81 | 67.40 | 2377.47 | 200.24 | 2155.34 | 79.80 | 2814.87 | 237.07 | 2551.87 |
| 55.20 | 1947.12 | 163.99 | 1765.20 | 67.60 | 2384.52 | 200.83 | 2161.73 | 80.00 | 2821.92 | 237.67 | 2558.27 |

m : Total refrigerant amount in the system.

m_rel : Maximum Releasable charge when the shut-off valve is installed.

* Make sure to install the Shut Off Valve to apply m_rel.

Altitude adjustment

- The minimum room area of A_min or TA_min shall be corrected by multiplying by the altitude adjustment factor(AF) in the below table based on for building site ground level altitude (Halt) in meters(feet).

Unit : m (ft)

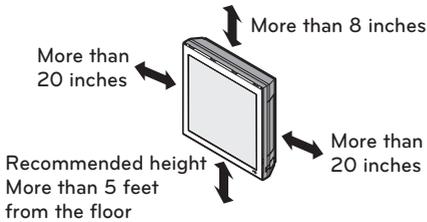
| | | | | | | |
|------|---------------|---------------|---------------|---------------|---------------|---------------|
| Halt | 0 | 200 (656.2) | 400 (1312.3) | 600 (1968.5) | 800 (2624.7) | 1000 (3280.8) |
| AF | 1 | 1 | 1 | 1 | 1.02 | 1.05 |
| Halt | 1200 (3937.0) | 1400 (4593.2) | 1600 (5249.3) | 1800 (5905.5) | 2000 (6561.7) | |
| AF | 1.07 | 1.1 | 1.12 | 1.15 | 1.18 | |

Selecting the Installation Location

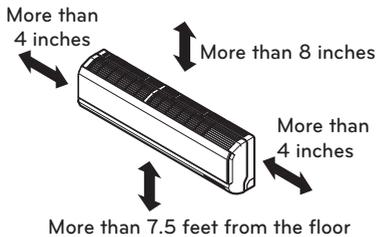
⚠ DANGER

- ⓧ To avoid the possibility of fire, do not install the unit in an area where combustible gas may generate, flow, stagnate, or leak. Failure to do so will cause serious bodily injury or death.

Typical Art Cool Gallery IDU minimum clearances.



Typical Wall Mounted IDU minimum clearances.



ⓘ NOTE

Select a location for installing the Wall Mounted IDU that meets the following conditions:

- Where there is enough structural strength to bear the weight of the unit.
- Operating sound from the unit will not disturb occupants.
- Include enough space for service access.
- Include space for drainage to ensure condensate flows properly out of the unit when it is in cooling mode.
- Use a level indicator to ensure the unit is installed on a level plane.
- Include space for drainage to ensure condensate flows properly out of the unit when it is in cooling mode.

ⓘ NOTE

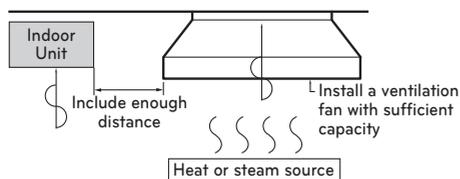
The unit may be damaged, may malfunction, and / or will not operate as designed if installed in any of the conditions listed.

- ⓧ Do not install the unit near a heat or steam source, or where considerable amounts of oil, iron powder, or flour are used. These materials may generate condensate, cause a reduction in heat exchanger efficiency, or malfunction of the condensate drain. If this is a potential problem, install a ventilation fan large enough to vent out these materials.
- ⓧ Do not install the unit where it will be subjected to direct thermal radiation from other heat sources.
- ⓧ Do not install the unit in an area where combustible gas may generate, flow, stagnate, or leak. There is the possibility of fire.
- ⓧ Do not install the unit in a location where acidic solution and spray (sulfur) are often used.
- ⓧ Do not use the unit in environments where oil, steam, or sulfuric acid are present.
- ⓧ Do not install additional ventilation products on the chassis of the unit.
- ⓧ Do not install the unit near high-frequency generator sources.
- ⓧ Do not install the unit near a doorway.

⊘ Indoor units (IDUs) must not be placed in an environment where the IDUs may be exposed to harmful volatile organic compounds (VOCs) or in environments where there is improper air make up or supply or inadequate ventilation. If there are concerns about VOCs in the environment where the IDUs are installed, proper air make up or supply and/or adequate ventilation must be provided. Additionally, in buildings where IDUs will be exposed to VOCs, consider a third party factory applied epoxy coating to the fan coils for each IDU where the entire coil is dipped, not sprayed.

- If the unit is installed near a body of water, the installation parts are at risk of corroding. Appropriate anti-corrosion methods must be taken for the unit and all installation parts.

Installing IDU near a heat or steam source.



Installing in an Area Exposed to Unconditioned Air

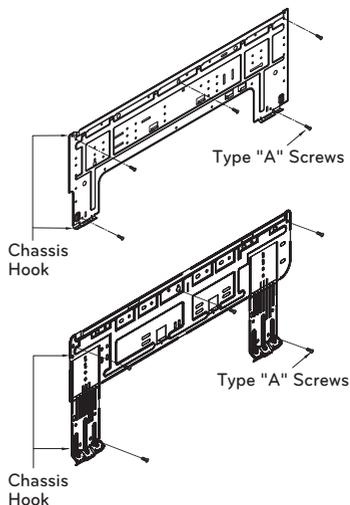
In some installation applications, areas (floors, walls) in some rooms may be exposed to unconditioned air (room may be above or next to an unheated garage or storeroom).

To countermeasure:

- Verify that carpet is or will be installed (carpet may increase the temperature by three [3] degrees).
- Add insulation between the floor joists.
- Install radiant heat or another type of heating system to the floor.

Installing the Indoor Unit

Typical Wall Mounted IDU Installation Plate.



* The feature can be changed according to type of model.

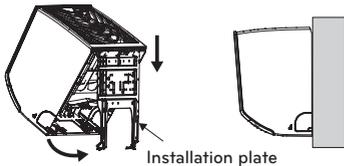
⚠ WARNING

- When choosing a location for the indoor unit, be sure to take into consideration routing of wiring for power outlets within the wall. Contacting wiring can cause serious bodily injury or death.
- Use caution when drilling holes through the walls for the purposes of piping connections. Power wiring can cause serious bodily injury or death.
- Mounting hardware must be securely installed to prevent the unit falling from its installation location. There is risk of injury or property damage from falling equipment.
- Installation work must be performed by trained personnel and in accordance with all local or other applicable codes. There is risk of injury to personnel from incorrect installation.

General Guidelines for Wall Mounted Indoor Units

- 1 Mount the installation plate horizontally by aligning the center line using a leveling tool. Use the type "A" screws that are factory-supplied with the plate.
- If mounting the unit on concrete, consider using anchor bolts. Use a level to ensure the plate is level.
- 2 Observe all rear piping clearances when drilling into the wall.
- 3 To mount the indoor unit to the installation plate, attach the three hooks on the top of the indoor unit to the top edge of the installation plate.
- 4 Verify the hooks are properly attached to the installation plate by gently shaking the indoor unit from side to side.
- 5 To fully anchor the indoor unit to the wall, push the bottom of the indoor unit against the installation plate until the bottom hooks snap into their slots (a click will be heard).

Locking the Wall Mounted IDU onto the Installation Plate.

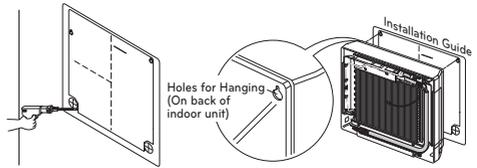


General Guidelines for Art Cool Gallery Indoor Units

- 1 Choose an appropriate location for the indoor unit. To hang the installation guide, verify that it is level and plumb, and then tape it to the wall.
- 2 Drill holes for the mounting screws. Drill hole for the field-installed refrigerant and drain piping.
- 3 To hang the Gallery indoor unit, remove the installation guide and hang the indoor unit on the top two screws. Verify the indoor unit is hanging securely on the screws.
- 4 Align the holes at the bottom of the indoor unit to the mounting holes. Tighten first the top screws, then tighten the bottom screws.
- 5 Verify that the Gallery indoor unit is completely secured to the wall by gently shaking it up and down.

For detailed installation information, refer to the individual unit's installation manual on www.lghvac.com/resources.

Typical Art Cool Gallery IDU Installation.

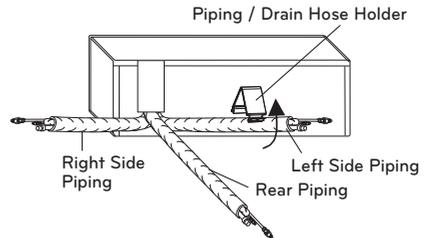


Piping and Wiring

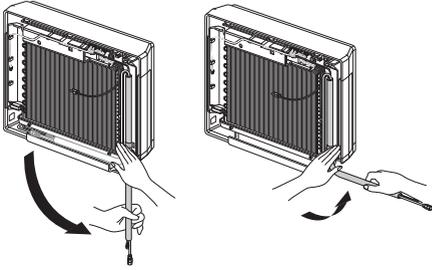
Wall-mounted indoor units have several options on how the piping and wiring can be routed.

- Whichever way the piping and wiring are routed out of the indoor units, the mounting wall on which the indoor unit is installed should be strong and solid enough to protect it from vibration.

Typical Wall Mounted Indoor Unit Piping / Wiring Routes.



Typical Art Cool Gallery Indoor Unit Right Side Piping Access.



NOTE

- Bending in a violent right-to-left motion could damage the piping.
- Bending the piping directly left or right, without bending it downward first, may cause damage.
- Do not twist the piping.
- Do not bend the piping towards the front of the unit because this may damage the indoor unit.

Connecting Refrigerant Pipes

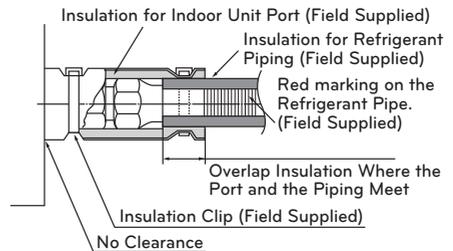
Refrigerant Pipe Connections

Indoor units come with flare type connections. It is the installer's option to use the flare fittings provided or braze the indoor unit to the refrigerant piping system.

Flare Fittings

- All unit flare fittings are 45° and are rated for high-pressure R32 refrigerant.
- Properly form all flare fittings using best practices.
- Place a drop of PVE oil on the outside of flare fitting before tightening.

Typical Refrigerant Line Flare Fitting Insulation Detail



Checking the safe handling

Mark refrigerant pipes with red Pantone® Matching System (PMS) #185 or RAL 3020 after flare fittings or brazing. This marking must extend a minimum of 1 inch (25mm) in both directions and shall be replaced if removed. Return all labels, especially red marking, to their original condition to ensure the next consumer or servicer is aware of the presence of a flammable refrigerant.

Ensure that the red marking for flammable refrigerant identification in the process tube area is visible following servicing.

NOTE

- Do not use any other type of oil (including traditional POE refrigeration oil) as a lubricant. Failure to follow this procedure may lead to restrictions in the refrigeration components.
- Do not over-tighten flare nuts. Excessive tightening will cause fittings to crack.

Brazing

- Use a dry nitrogen purge operating at a minimum pressure of three (3) psig (20.7 kPa) and maintain a steady flow.
- Use a 15% silver phosphorous copper brazing alloy to avoid overheating and produce good flow.
- Protect isolation valves, electronic expansion valves, and other heat-sensitive components from excessive heat with a wet rag or heat barrier spray.

NOTE

Multi V refrigeration system components contain very small capillary tubes, small orifices, electronic expansion valves, oil separators, and heat exchangers that can easily become blocked.

Insulate Refrigerant Pipes

Sufficiently insulate all cold surfaces to prevent moisture forming. All pipes must be insulated and each pipe must be separately wrapped. Use field-provided one-half (1/2) inch (12.7mm) thick (or thicker) closed-cell insulation. The thickness may need to be increased based on ambient conditions and local codes.

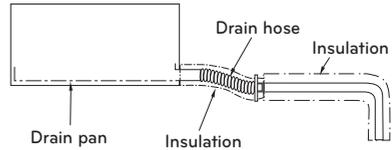
Wrap all refrigerant and condensate piping. Glue all insulation joints with no air gaps between insulation segments, and between insulation segments and the unit case. Ensure insulation material fits snugly against the refrigeration pipe with no air space between the pipe surface and the surrounding insulation.

Protect insulation inside hangers and supports with a second insulation layer. Ensure insulation on all pipe passing through pipe hangers, inside conduit, and/or sleeves is not compressed.

Connecting the Drain Pipe

Gravity Drain Pipe

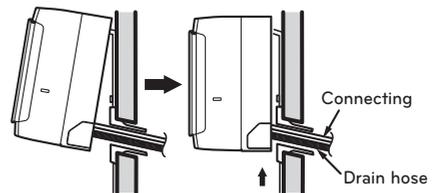
All Gallery and Wall Mounted indoor units apply the gravity drain method. Depending on the location of the indoor unit, condensation can be drained directly to the outside of the building, or a common indoor unit drainage piping system can be installed.



Drain Hose

Gallery and Wall Mounted indoor units have a builtin drain hose. If necessary, the drain hose can be extended.

- When the bottom surface of the indoor unit is at an elevation below the receiving building drain line connection, install an inverted trap at the top of the condensate pump discharge riser before connection to the building drain pipe.
- When the receiving drain line is mounted horizontal, connect the inverted trap to the top half of the pipe. The connection point of the inverted trap to the building drain pipe should always be to the top half of the pipe and should never be over 45° either side of the upper most point of the horizontal building drain line.
- If connecting to a vertical drain line or plumbing system vent line, connect the IDU condensate pump discharge line using a Y-45 fitting with the double end of the Y-45 fitting facing up. When connecting to a vertical drain line include an inverted trap at the top of the IDU condensate pump discharge riser before connection to the Y-45 fitting.



Drain Piping

- Drain piping must have down slope (1/50 to 1/100).
- Any holes through the ceilings, walls, etc., must be large enough to accommodate the drain piping and insulation.
- ⚠ To prevent reversal flow, do not provide up and down slope.
- ⚠ Do not exert extra force on the drain port on the indoor unit during drain piping connection.

Connecting Communication and Power Wiring

Connecting Communication and Power Wiring

Indoor unit installation best practices are to connect control wiring (low voltage) and then connect power wiring (high voltage). Do not apply power to the indoor unit or any system component until authorized to do so by the system commissioning agent.

⚠ DANGER

High voltage electricity is required to operate this system. Adhere to the National Electrical Codes and these instructions when wiring.

Improper connections and inadequate grounding can cause accidental injury or death.

Always ground the unit following local, state, and National Electrical Codes.

Improper connections and inadequate grounding can cause accidental injury or death.

Properly size all circuit breakers or fuses.

There is risk of fire, electric shock, explosion, physical injury or death. The Multi V indoor unit's MOP(Maximum overcurrent protection) is 15A. The Single and Multi F indoor unit got power from outdoor unit. Details of fuses or circuit breakers are indicated in installation manual of outdoor unit.

⚠ WARNING

The information contained in this manual is intended for use by a trained electrician familiar with applicable local codes and the U.S. National Electric Code (NEC), and who is equipped with the proper tools and test instruments.

Failure to carefully read and follow all instructions in this manual can result in personal injury or death.

Connect the indoor unit input power cable but do not apply power to the indoor unit until authorized to do so by the system commissioning agent.

Inappropriate power connection can result in personal injury or death.

Refer to local, state, and federal codes, and use power wires of sufficient current capacity and rating.

Wires that are too small may generate heat and cause a fire, resulting in physical injury or death.

Properly tighten all power connections.

Loose wiring may overheat at connection points, causing a fire, physical injury or death.

⚠ Don'ts

- Never use wire caps and never splice communications cables.
- Star and Wye communications cable configurations are not acceptable.
- Never connect zone controllers or other central control products such as AC Smart, PDI, or LG building management system gateway products to the IDU/ODU communications cable.

Connecting Communication and Power Wiring - continued

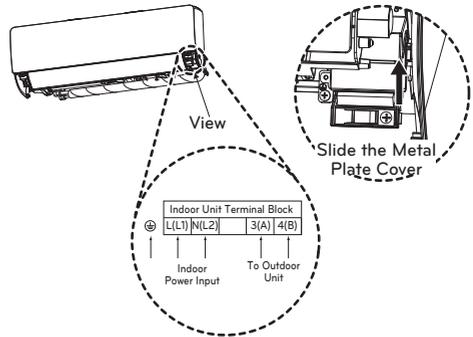
Multi V Indoor Unit Wiring Configuration

Multi V IDUs require separate power and communication cables. The IDU requires singlephase, 208-230 volt facility power. Be sure the power cables meet applicable local and national codes.

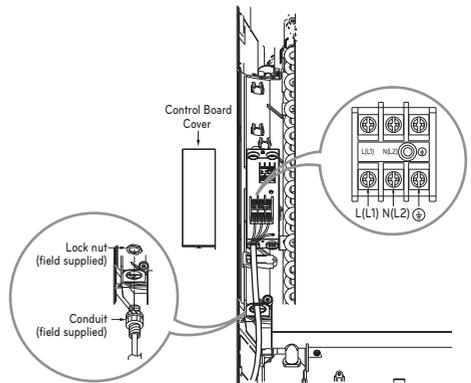
The field-supplied communications cable from the outdoor unit must be minimum AWG 18-2, stranded and shielded. Polarity matters for communication cable. When connecting the communications cable conductors at each Multi V system component, be careful the conductor connected to the IDU(A) terminal on the outdoor unit is connected to the A/3(A) terminal at each indoor unit. The conductor connected to the IDU(B) terminal on the outdoor unit must be connected to the B/4(B) terminals at each indoor unit. Cross connecting the A/3(A) and B/4(B) terminals will cause communications errors and system malfunction.

- Keep communications cables away from line voltage wiring, lighting ballasts, and other devices emitting EMF energy. Maintain a minimum of two (2) inches (50.8 mm) between line voltage wires and communications or zone controller cables.
- Field provide a minimum of AWG18-2, stranded and shielded, PVC or vinyl jacket communications wiring between the indoor units, heat recovery boxes (if applicable), and outdoor units.
- The outdoor/indoor unit communications cable must be run between components in a daisy chain configuration. Star or wye configurations are not allowed.
- Connect the communications cables to the A/3(A) and B/4(B) terminals at indoor units and/or heat recovery units. Maintain polarity throughout the communications bus. Be sure A/3(A) terminals are connected to A/3(A) terminals and B/4(B) terminals are connected to B/4(B) terminals.
- Ground the shield of the communications cable at one end only, at the master outdoor unit.
- Do not ground the ODU to IDUs / HRUs communication cable at any other point. Wiring must comply with all applicable local and national codes.

Typical Multi V Wall Mounted IDU Power Wiring / Communications Cable Terminals.



Typical Multi V Art Cool Gallery IDU Power Wiring / Communications Cable Terminals.



⚠ WARNING

Connect the indoor unit input power cable but do not apply power to the indoor unit until authorized to do so by the system commissioning agent.

Inappropriate power connection can result in personal injury or death.

Terminal screws may loosen during transport.

Properly tighten the terminal connections during installation or risk electric shock, physical injury or death.

Loose wiring may cause unit the wires to burnout or the terminal to overheat and catch fire. There is a risk of electric shock, physical injury or death.

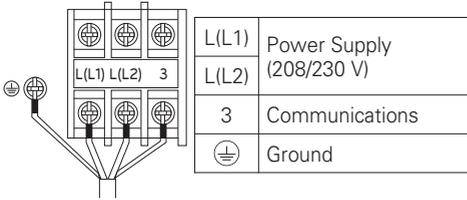
Multi F and Single Zone Indoor Unit Wiring Configuration

Multi F and Single Zone IDUs have a single cable from the outdoor unit that supplies both power and communication.

This field-supplied cable must be minimum 18-4 stranded and shielded.

- Ensure that the power conductors are connected to the line power terminals of the IDU.
- Ensure that the communication conductor is connected to the communication terminal of the IDU and ground is connected to ground.

Typical Multi F and Single Zone IDU Power Wiring and Communications Cable Terminals.



NOTE

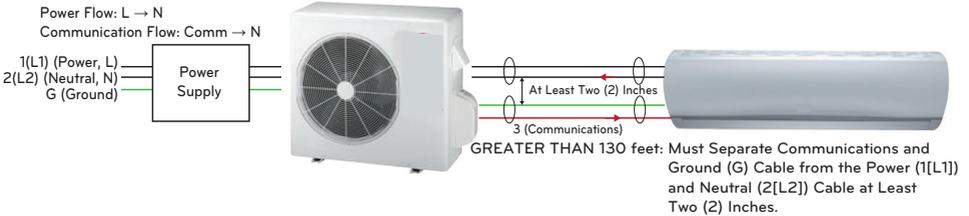
- ⚠ Never connect zone controllers or other central control products such as AC Smart, PDI, or LG building management system gateway products to the IDU/ODU communications cable.
- ⚠ Never use wire caps and never splice communications cables.

Connecting Communication and Power Wiring, continued

Single Zone Communication / Connection (Power) Cable Specifications: Outdoor Unit to Indoor Unit

- For communication / connection (power) wires between the Single Zone outdoor unit and the indoor unit for lengths up to 130 feet, use a minimum 18 gauge, four (4) conductor, stranded, shielded, or unshielded wire. If shielded, the wire must be grounded to the chassis at the outdoor unit only.
- When the communication / connection (power) wires between the indoor unit and outdoor unit is GREATER THAN 130 feet, use:
 - A two (2) conductor wire for power.
 - A two (2) conductor wire for communication / ground.
 - Separate the power AT LEAST two (2) inches away from the communication / ground wire.
 - All wiring is still minimum 18 gauge, stranded, shielded, or unshielded as cited above.
 - Insulation material as required by local code.
 - Firmly attach the cable; provide slack but secure in a way to prevent external forces from being imparted on the terminal block.
 - Wiring must be completed without splices.

Typical Single Zone System when wiring is greater than 130 feet.



NOTE

Diagram is an example of communication and power cables when the wiring is GREATER THAN 130 feet.

Terminals may be labeled differently depending on the model. Outdoor and Indoor Unit appearances may vary depending on the model.

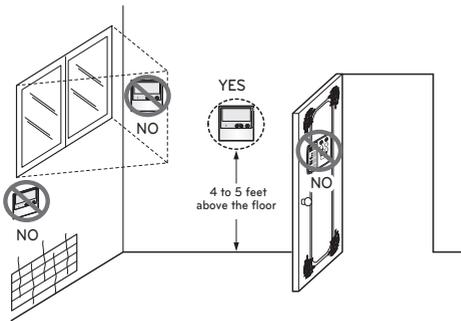
Wired Wall Controller Installation

Since the room temperature sensor is inside the remote controller, the remote controller should be installed in a place away from direct sunlight, high humidity and direct supply of hot or cold air to maintain proper space temperature. Install the remote controller about 5 ft above the floor in an area with good air circulation and an average temperature.

⊘ Do not install the remote controller where it can be affected by the following:

- Drafts or dead spots behind doors and in corners
- Hot or cold air from ducts
- Radiant heat from sun or appliances
- Concealed pipes and chimneys
- Uncontrolled areas such as an outside wall behind the remote controller

Typical Wired Remote Controller Installation.



1. Pull communications cable between the zone controller handy box (if used) and the indoor unit. Use field supplied 22-3 twisted, stranded and unshielded cable or LG supplied cable.
2. Store a minimal amount of cable in the handy box. Any additional cable should be coiled and stored near the indoor unit control panel.
3. If using LG cable and additional cable length is needed, order a thirty-three (33) foot LG Wired Remote Group Control Extension cable (Model No. PZCWRC1).
4. If using LG supplied cable and the cable between the zone controller and the indoor unit is too long, do not cut the cable and shorten. Coil any spare communications cable, tie-wrap it, and leave it next to the indoor unit location.

R32 refrigerant leakage sensor

- The refrigerant leak detector detects the concentration of refrigerant (R32) in the air.
- When the concentration of refrigerant in the air is 5 000 ppm or higher, the wired remote controller displays an error and R32 sensor Sub PCB issues an alarm so that the user realizes that there is a refrigerant leak. (The alarm function is only available in some products.)

Troubleshooting

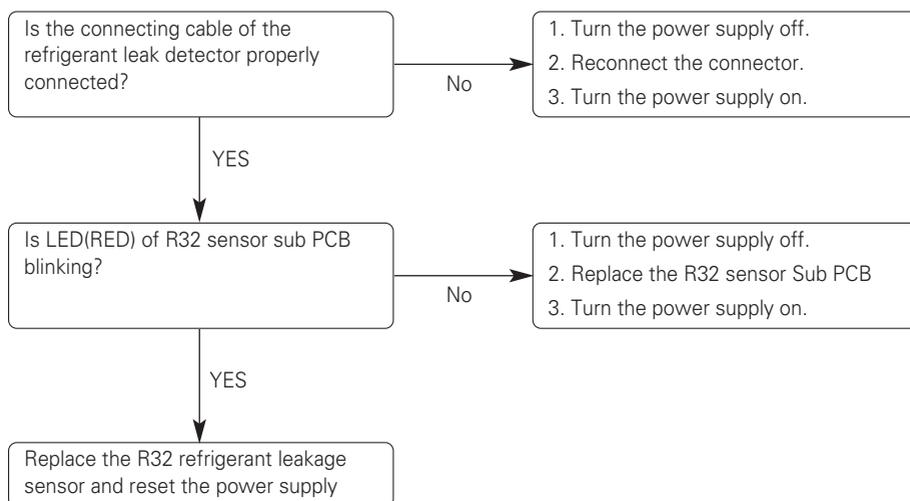
If a R32 refrigerant leakage detecting system is activated, the following actions will be operated automatically.

- Error code will be displayed.
- The fan of the indoor unit where the error code is displayed will turn on.
- The unit cannot be used until the error code disappears.

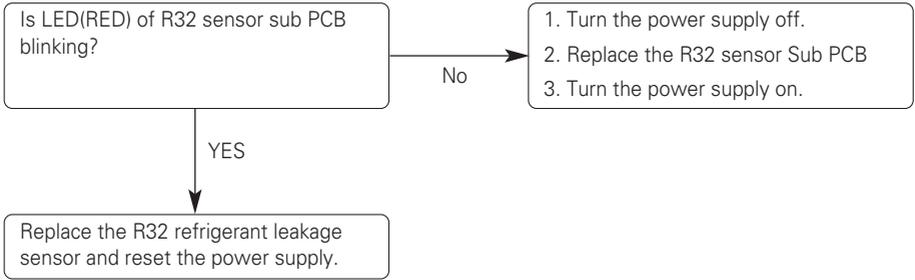
⚠ WARNING

- If there are error code such as 228,229 and 230, ventilate the room and contact authorized personnel immediately.
- If there is an error code of 236, the refrigerant leak detector has a lifetime of less than 6 months. Contact authorized personnel immediately.
- The R32 refrigerant leakage sensor must be replaced after detecting any gases or at the end of its lifetime (3650 days).
- REFRIGERANT SENSORS for REFRIGERANT DETECTION SYSTEMS shall only be replaced with sensors specified by the appliance manufacture.
- R32 refrigerant leakage detecting system replacement shall be carried out by authorized personnel only.
- There is possibility detecting other gases, not R32. Do not use highly concentrated chemicals (e.g. Ethanol, Smoke, Hair spray and pesticide) near the indoor unit. R32 refrigerant leakage sensor may detect incorrectly.

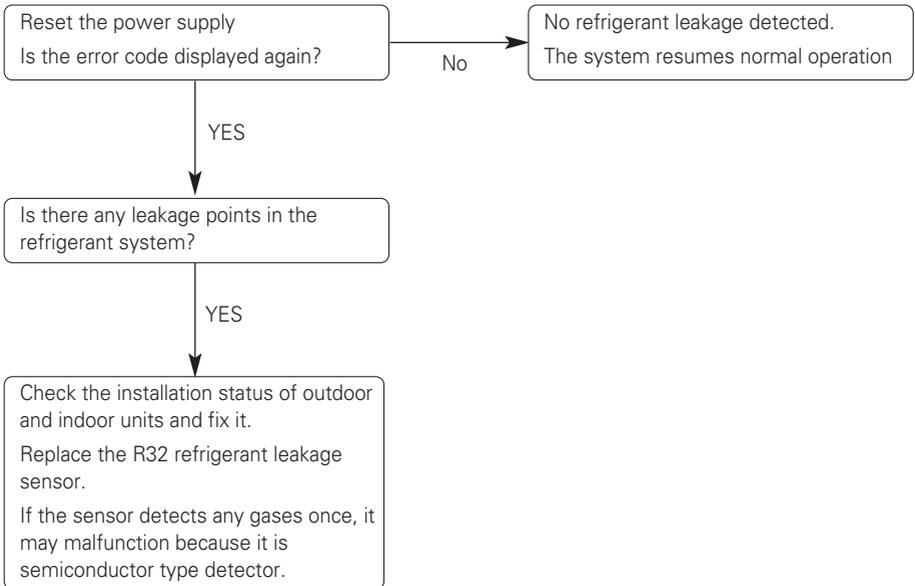
| Error Code | Error Type | Error point | Main reasons |
|------------|---|---------------------------------------|--|
| CH 228 | Refrigerant leak detector malfunction error | Refrigerant leak detector has failed. | <ul style="list-style-type: none"> • The sensor is breaking of short. • Abnormal voltage of DC converter. • Abnormal operation of microprocessor. |



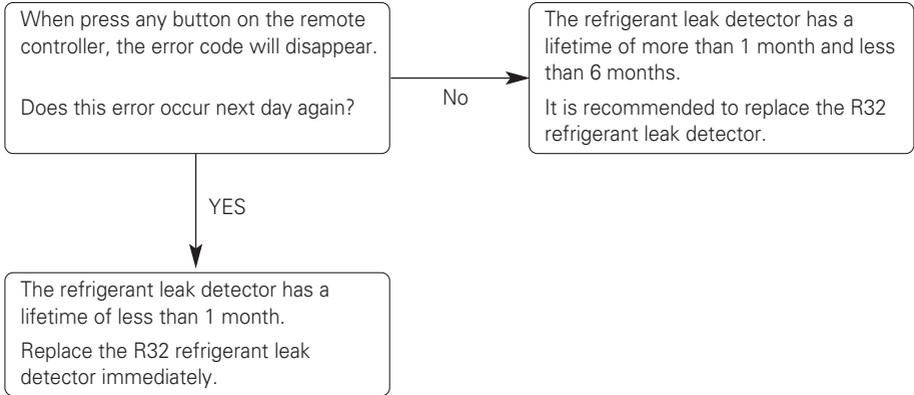
| Error Code | Error Type | Error point | Main reasons |
|------------|--|---|--|
| CH 229 | Refrigerant leak detector lifetime error | The lifetime of the refrigerant leak detector has reached the end | <ul style="list-style-type: none"> The lifetime of the refrigerant leak detector has been reached, so replace the sensor. |



| Error Code | Error Type | Error point | Main reasons |
|------------|----------------------------------|---|--|
| CH 230 | Refrigerant leak detection error | Refrigerant leak detected by refrigerant leak detector. | <ul style="list-style-type: none"> Refrigerant leak detection |



| Error Code | Error Type | Error point | Main reasons |
|------------|--|--|--|
| CH 236 | Refrigerant leak detector lifetime pre-alarm | <p>An error occurs once a month when the lifespan of the leak detector has elapsed 9 years and 6 months.</p> <p>An error occurs once a day when the lifespan of the leak detector has elapsed 9 years and 11 months.</p> | <ul style="list-style-type: none"> The refrigerant leak detector has 10 years lifespan. |



Installation Checklist

Major Component Rough-In

| Description | Check |
|--|-------|
| All Multi V 5 outdoor units are connected properly per local code and the product installation procedures. | |
| All literature and bagged accessories have been removed from the fan discharge (ducted and cassette model indoor units). | |
| All indoor units and heat recovery units (for Heat Recovery systems only) are installed, properly supported, and located indoors in a non-corrosive environment. | |
| Duct work installation completed (ducted indoor units only). | |

Piping Material, Components, and Insulation

| Description | Check |
|--|-------|
| Heat recovery systems: LG prefers the use of ACR hard drawn copper on pipe segments located between heat recovery units and outdoor units, between heat recovery units piped in series, and between heat recovery units and multiple indoor units sharing a heat recovery unit port. | |
| Heat pump systems: LG prefers the use of ACR hard drawn copper for all pipe segments in the piping system except segments located between Y-branch fittings (or header fittings) and indoor units. | |
| DOAS Units: LG prefers the use of hard drawn copper in pipe segments connecting a DOAS products and an outdoor unit. | |
| LG Y-branch fittings or headers were used as per LATS Multi V report. | |
| All refrigerant pipes and valves were insulated separately. Insulation is positioned up against the walls of the indoor units and heat recovery units (for Heat Recovery systems only). No gaps shown. Insulation was not compressed at clamps and hangers. | |

Brazing Practices

| Description | Check |
|---|-------|
| Use medical grade dry nitrogen for purging during brazing (constant 3 psi while brazing). | |
| 15 % silver brazing material only. | |

Installation Checklist

Refrigerant Piping

| Description | Check |
|--|-------|
| You must have in your possession a copy of the "As-Designed" LATS Multi V piping tree diagram. BEFORE ANY FIELD PIPE SIZE OR LENGTH CHANGES ARE MADE, PROPOSED CHANGES MUST BE FORWARDED TO THE DESIGN ENGINEER SO THAT THEY CAN INPUT THE CHANGES INTO LATS and RE-ISSUE A NEW LATS MULTI V PIPING TREE DIAGRAM. Installer must receive change authorization from the design engineer, because any change made requires the review of the entire tree diagram and verification that the change did not impact the size of piping segments in other parts of the system. | |
| All pipe materials were properly stored, capped, and clean. All burrs were removed after cutting and pipe ends were reamed before brazing. | |
| During refrigerant pipe installation, for each segment of pipe, a record was made of the pipe length (including expansion loops, off-sets, double-back sections), and sizes, as well as the quantity and type of elbows used. | |
| Expansion loops, coils or other acceptable measures are provided where necessary to absorb temperature-change based pipe movement. | |
| A torque wrench and backup wrench were used to tighten all flare connections. | |
| The back side of all flares were lubricated with a small drop of PVE refrigeration oil before tightening flare fittings. | |
| Ensure all field made flares are 45°. Use factory-supplied flare nuts only. | |
| Pipe segments, Y-branches, and/or header fittings are secured to the structure using a combination of fixed and floating clamps, and all wall penetrations were sleeved. | |
| All pipe insulation is not compressed at any point. | |
| Y-branch and header fittings were properly INSTALLED per details provided in the Multi V Outdoor Unit Installation Manual. | |
| Y-branch and header fittings were properly SUPPORTED per details provided in the Multi V Outdoor Unit Installation Manual. | |
| No oil traps, solenoid valves, sight glasses, filter driers, or any other unauthorized refrigerant specialties are present. | |
| (Optional) High quality R410A rated full port ball valves (Schradar between the valve body and the indoor units) used at all indoor units and at will in the refrigerant piping network. | |
| Best practice includes a minimum of 20 inches of straight pipe was installed between each elbow, and Y-branch or header fitting, and between two Y-branch fittings. | |
| Inverted traps on vapor lines installed if required per installation manual. | |

Installation Checklist

Heat Recovery Unit

| Description | Check |
|--|-------|
| Heat recovery unit is installed properly: Cannot be installed upside down or at any angle. It must be installed indoors, top-side up, level. | |
| Piping is insulated properly per the design engineer's specifications. Insulation is snug against the housing of the heat recovery unit. | |
| DIP switches and rotary dial settings are correct. | |
| If large capacity indoor unit, a Y-branch is installed properly. | |

Condensate Pump / Drain Installation

| Description | Check |
|--|-------|
| Indoor unit condensate drain pipes were installed correctly. | |
| Minimum 3/4 inch, maximum 1 inch condensate piping installed on indoor units – material used is acceptable under local code. Insulated to prevent condensation. | |
| All condensate vertical risers are equal to or less than 27-1/2 inches from the bottom of the indoor unit. | |
| Indoor units with condensate pumps were level. Units with gravity drains were level or slightly canted toward the drain connection and are supported properly. | |
| Pumped condensate drain lines were properly connected (do not have traps, and connect to the top surface of the main drain line). | |
| Condensate lines are properly insulated to prevent condensation. | |
| Outdoor unit's gravity condensate drain line is connected and routed where it properly drained away or, if installed in a mechanical room, is connected and properly routed to a drain terminal. | |

Installation Checklist

Power Wire and Communications Cables

| Description | Check |
|---|-------|
| Record power three phase 208-230 V source or three phase 460 V (verify system electrical requirements). R (L1) to Ground..... R - S..... S (L2) to Ground..... R - T..... T (L3) to Ground..... S - T..... Sum of the Above..... Divided by 3 = Average Voltage | |
| Ground wire was installed and properly terminated at the outdoor unit(s). | |
| The power supplied was clean with voltage fluctuations within specifications ($\pm 10\%$ of nameplate for 208-230 V units, 414-528 V for 460 V units). | |
| Power wiring to the outdoor unit(s) was installed per all local, state, and National Wiring Code requirements. | |
| Power wiring to each indoor unit was installed per all local, state, and National Wiring Code requirements. | |
| Communications cable between the outdoor unit(s) and indoor units was connected in a daisy chain configuration (i.e., single parallel chain). No "star" or multiple parallel circuits. No cable splices or wire nuts were used to connect communications cables. | |
| Record Communication Voltage Range High.....VDC Low.....VDC | |
| Proper communications cable was used between each indoor unit and its zone controller where applicable. No cables were spliced and no wire nuts are present. | |
| Communication type RS-485 BUS type. | |
| Communication cable between Master ODU to Slave ODU(s), and Master ODU to IDUs / HRUs to be 18 AWG, 2-conductor, twisted, stranded, shielded. Ensure the communication cable shield is properly grounded to the Master ODU chassis only. Cable segment shields are tied together. | |
| Use appropriate crimping tool to attach ring or fork terminals at all power wiring and control cable terminations. | |
| All power and control wires were properly separated using the recommended distance provided in the product installation manual. | |
| Only LG-supplied Y-cables were used between indoor units. | |

To access the complete Installation Manual, see :
www.lghvac.com



