SINGLE ZONE ART COOL PREMIER WALL MOUNTED INSTALLATION MANUAL

Single Zone Art Cool Premier Wall Mount:

LA090HYV1, LA120HYV1
LA180HYV1, LA240HYV1

PROPRIETARY DATA NOTICE

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Please read carefully and store in a safe place for future reference.
Content familiarity required for proper installation.

A summary list of safety precautions begins on page 3.

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For more technical materials such as submittals, engineering databooks, and catalogs, visit www.lghvac.com.

The instructions below must be followed to prevent product malfunction, property damage, injury or death to the user or other people. Incorrect operation due to ignoring any instructions will cause harm or damage. The level of seriousness is classified by the symbols described below.

TABLE OF SYMBOLS

⚠DANGER	*This symbol indicates an imminently hazardous situation which, if not avoided, will result in death or serious injury.*
⚠WARNING	*This symbol indicates a potentially hazardous situation which, if not avoided, could result in death or serious injury.*
⚠CAUTION	*This symbol indicates a potentially hazardous situation which, if not avoided, may result in minor or moderate injury.*
Note	*This symbol Indicates situations that may result in equipment or property damage accidents only.*
⃠	*This symbol indicates an action should not be completed.*

INSTALLATION

⚠DANGER

⃠ **Don't store or use flammable gas/combustibles near the unit.**
There is risk of product failure, fire, explosion, and physical injury or death.

⚠WARNING

⃠ **Do not install, remove, or re-install the unit by yourself (customer). Ask the dealer or an LG trained technician to install the unit.**
Improper installation by the user may result in fire, explosion, electric shock, physical injury or death.

For replacement of an installed unit, always contact a LG trained service provider.
There is risk of fire, electric shock, explosion, and physical injury or death.

Wear protective gloves when handling equipment. Sharp edges may cause personal injury.

⃠ **Do not change the settings of the protection devices.**
If the pressure switch, thermal switch, or other protection device is shorted and forced to operate improperly, or parts other than those specified by LG are used, there is risk of fire, electric shock, explosion, and physical injury or death.

Replace all control box and panel covers.
If cover panels are not installed securely, dust, water and animals may enter the outdoor unit, causing fire, electric shock, and physical injury 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.*

The unit is shipped with refrigerant and service valves closed. ⃠ **Do not run the compressor with the service valves closed.**
There is a risk of equipment damage, explosion, physical injury, or 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.

If the air conditioner is installed in a small space, take measures to prevent the refrigerant concentration from exceeding safety limits in the event of a refrigerant leak.
Consult the latest edition of ASHRAE (American Society of Heating, Refrigerating, and Air Conditioning Engineers) Standard 15. If the refrigerant leaks and safety limits are exceeded, it could result in personal injuries or death from oxygen depletion.

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.

SAFETY INSTRUCTIONS

INSTALLATION - CONTINUED

⚠WARNING

Replace all control box and panel covers.
If cover panels are not installed securely, dust, water and animals may enter the outdoor unit, causing fire, electric shock, and physical injury or death.

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.

Periodically check that the outdoor frame is not damaged.
There is a risk of explosion, physical injury, or death.

⚠CAUTION

Be very careful when transporting the product.
Use appropriate moving equipment to transport each unit; ensure the equipment is capable of supporting the unit's weight.
• Some products use polypropylene bands for packaging. ⃠ Do not use the polypropylene bands to lift the unit because they will not support the unit's weight.
• Suspend the outdoor unit from the base at specified positions. Support the outdoor unit a minimum of four points to avoid slippage from rigging apparatus.

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.

Note:

⃠ Do not install the product where it is exposed to directly to ocean winds.
Sea salt in the air may cause the product to corrode. Corrosion, particularly on the condenser and evaporator fins, could cause product malfunction or inefficient operation.

When installing the unit in a low-lying area, or a location that is not level, use a raised concrete pad or concrete blocks to provide a solid, level foundation.
This may prevent water damage and reduce abnormal vibration.

Properly insulate all cold surfaces to prevent "sweating."
Cold surfaces such as uninsulated piping can generate condensate that may drip and cause water damage to walls.

When installing the unit in a hospital, mechanical room, or similar electromagnetic field (EMF) sensitive environment, provide sufficient protection against electrical noise.
Inverter equipment, power generators, high-frequency medical equipment, or radio communication equipment may cause the air conditioner to operate improperly. The unit may also affect such equipment by creating electrical noise that disturbs medical treatment or image broadcasting.

⃠ Do not use the product for mission critical or special purpose applications such as preserving foods, works of art, or other precision air conditioning applications. The equipment is designed to provide comfort cooling and heating.
There is risk of property damage.

⃠ Do not make refrigerant substitutions. Use R410A only.
If a different refrigerant is used, or air mixes with original refrigerant, the unit will malfunction and be damaged.

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.

Take appropriate actions at the end of HVAC equipment life to recover, recycle, reclaim or destroy R410A refrigerant according to applicable U.S. Environmental Protection Agency (EPA) rules.

Periodically check that the outdoor frame is not damaged.
There is a risk of equipment damage
.

⃠ Do not store or use flammable gas/combustibles near the unit.
There is a risk of product failure.

Install the drain hose to ensure adequate drainage.
There is a risk of water leakage and property damage.

WIRING

⚠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.
There is risk of fire, electric shock, physical injury or death.

Turn the power off at the nearest disconnect before servicing the equipment.
Electrical shock can cause physical injury or death.

Properly size all circuit breakers or fuses.
There is risk of fire, electric shock, explosion, physical injury or death.

⚠WARNING

The information contained in this manual is intended for use by an industry-trained, experienced electrician familiar with the U.S. National Electric Code (NEC) 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.

All electric work must be performed by a licensed electrician and conform to local building codes or, in the absence of local codes, with the National Electrical Code, 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.

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.

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 result in 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.

Note:

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

The information contained in this manual is intended for use by an industry-trained, experienced, certified electrician familiar with the U.S. National Electric Code (NEC) 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 or property damage.

OPERATION

⚠DANGER

⃠ Do not provide power to or operate the unit if it is flooded or submerged.
There is risk of fire, electric shock, physical injury or death.

Use a dedicated power source for this product.
There is risk of fire, electric shock, physical injury or death.

⃠ Do not operate the disconnect switch with wet hands.
There is risk of fire, electric shock, physical injury or death.

Periodically verify the equipment mounts have not deteriorated.
If the base collapses, the unit could fall and cause physical injury or death.

Use inert (nitrogen) gas when performing leak tests or air purges. ⃠ Do not use compressed air, oxygen, or flammable gases.
Using these substances may cause fire, explosion, and physical injury or death.

If refrigerant leaks out, ventilate the area before operating the unit.
If the unit is mounted in an enclosed, low-lying, or poorly ventilated area, and the system develops a refrigerant leak, it may cause a fire, electric shock, explosion, physical injury or death.

⚠WARNING

⃠ Do not allow water, dirt, or animals to enter the unit.
There is risk of fire, electric shock, physical injury or death.

⃠ Do not touch the refrigerant piping during or after operation.
It can cause burns or frostbite.

⃠ Do not operate the unit with the panel(s) or protective cover(s) removed; keep fingers and clothing away from moving parts.
The rotating, hot, cold, and high-voltage parts of the unit can cause physical injury or death.

SAFETY INSTRUCTIONS

OPERATION - CONTINUED

⚠CAUTION

To avoid physical injury, use caution when cleaning or servicing the air conditioner.

Note:

Clean up the site after installation is finished, and check that no metal scraps, screws, or bits of wiring have been left inside or surrounding the unit.

⃠ Do not use the product for mission critical or special purpose applications such as preserving foods, works of art, or other precision air conditioning applications. The equipment is designed to provide comfort cooling and heating.
Oil, steam, sulfuric smoke, etc., can significantly reduce the performance of the unit, or damage its parts.

Turn on the power at least six (6) hours before operation begins.
Starting operation immediately after turning on the main power switch can result in severe damage to the compressor(s).

⃠ Do not turn off the main power switch after operation has been stopped.
Wait at least five (5) minutes before turning off the main power switch, otherwise it may result in product malfunction.

⃠ Do not block the inlet or outlet.
Unit may malfunction.

⃠ Do not allow water, dirt, or animals to enter the unit.
There is risk of unit failure.

⃠ Do not operate the unit with the panel(s) or protective cover(s) removed; keep fingers and clothing away from moving parts.
Non-secured covers can result in fire due to dust or water in the service panel.

Periodically verify the equipment mounts have not deteriorated.
If the base collapses, the unit could fall and cause property damage or product failure.

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GENERAL DATA

Unit Nomenclature

Single Zone Wall Mount Indoor and Outdoor Units

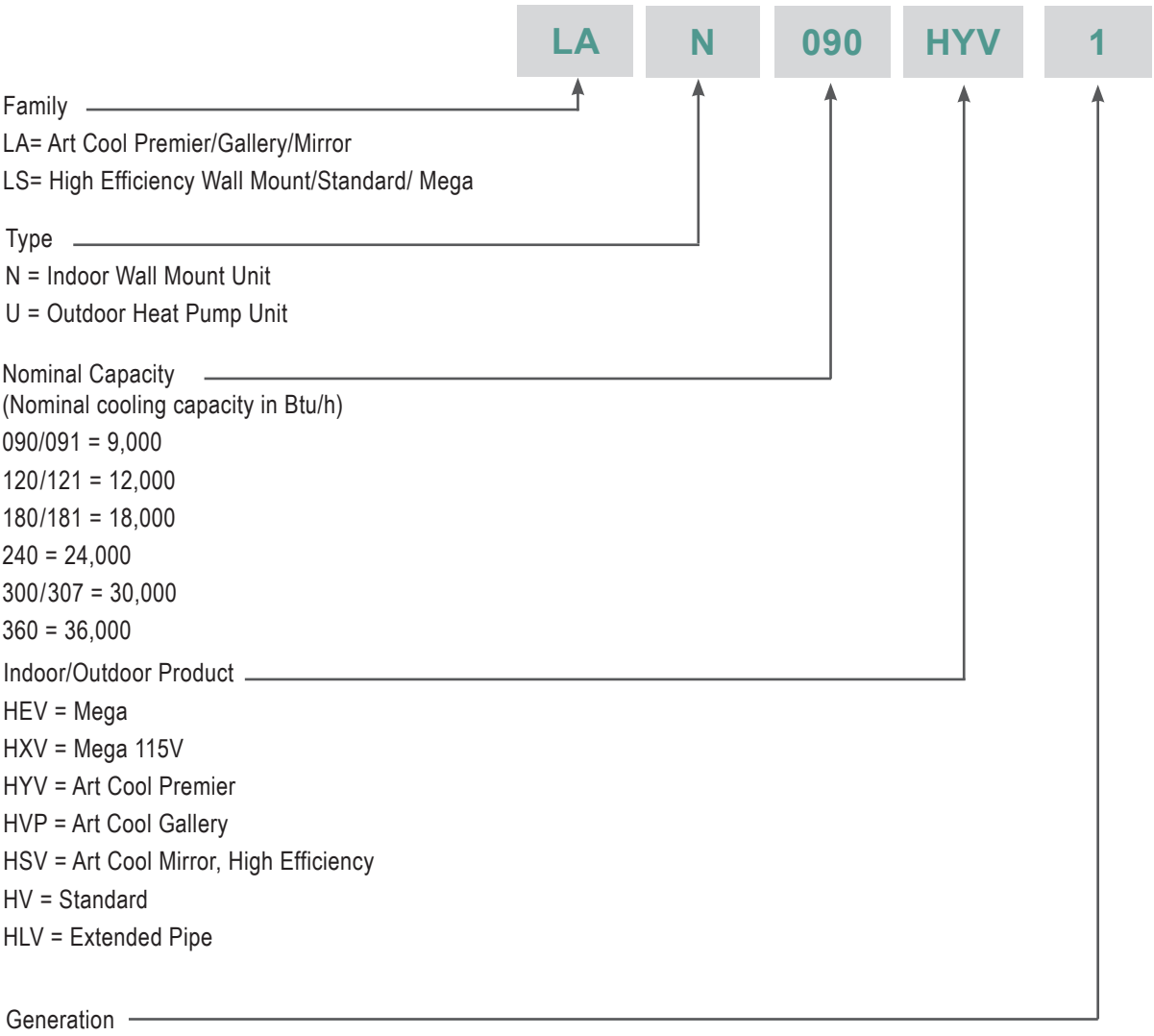


Table 1: Art Cool Premier Unit Specifications

Type	Art Cool Premier			
System (Model)	**LA090HYV1 (LAN090HYV1/ LAU090HYV1)**	**LA120HYV1 (LAN120HYV1/ LAU120HYV1)**	**LA180HYV1 (LAN180HYV1/ LAU180HYV1)**	**LA240HYV1 (LAN240HYV1/ LAU240HYV1)**
Cooling Capacity (Min~Rated~Max) (Btu/h)	1,023~9,000~12,966	1,023~11,000~13,785	3,070 ~ 18,200 ~ 29,515	3,070 ~ 22,000 ~ 30,000
Cooling Power Input[1] (kW)	0.58	0.80	1.35	1.76
Heating Capacity (Min~Rated~Max) (Btu/h)	1,023~11,000~20,472	1,023~12,000~22,178	3,070 ~ 22,000 ~ 30,709	3,070 ~ 27,000 ~ 35,200
Heating Power Input[1] (kW)	0.71	0.75	1.69	2.19
COP	4.54	4.68	3.81	3.61
Maximum Heating Capacity (Btu/h)				
Outdoor 17 °F(WB)/Indoor 70 °F(DB)	11,940 (109%)	14,650 (122%)	22,340 (102%)	27,410 (102%)
Outdoor 5°F(WB)/Indoor 70 °F(DB)	11,220 (102%)	13,720 (114%)	19,300 (88%)	23,690 (88%)
Outdoor -13 °F(WB)/Indoor 70 °F(DB)	7,920 (72%)	9,520 (79%)	14,060 (64%)	17,250 (64%)
EER	15.65	13.75	13.48	12.50
SEER	27.5	25.5	24	22
HSPF	12.0	12.0	12.5	12
Power Supply (V / Hz / Ø)	208-230/60/1			
ODU Operating Range				
Cooling (°F DB)[2]	14-118			
Heating (°F WB)	(-13)-65			
IDU Operating Range				
Cooling (°F WB)	53-75			
Heating (°F DB)	60-86			
Indoor Temperature Setting Range				
Cooling (°F)	64-86			
Heating (°F)	60-86			
Unit Data				
Refrigerant Type[3]	R410A			
Refrigerant Control	EEV			
IDU Sound Pressure[4] dB(A)+3 (H/M/L/Sleep)	42/36/25/17		47/42/37/29	
ODU Sound Pressure dB(A)	45		57	
Unit Weight (lbs)				
Indoor Unit (Net/Shipping)	24/30		34/38	
Outdoor Unit (Net/Shipping)	77/82		122/131	
Power/Communication Cable[5] (No. x AWG)	4 x 18			

EEV: Electronic Expansion Valve IDU: Indoor Unit ODU: Outdoor Unit

Power wiring is field supplied and must comply with the applicable local and national codes.

This unit comes with a dry helium charge.

This data is rated 0 ft above sea level, with 24.6 ft of refrigerant line per indoor unit and a 0 ft level difference between outdoor and indoor units.

Cooling capacity rating obtained with air entering the indoor coil at 80°F dry bulb (DB) and 67°F wet bulb (WB); and outdoor ambient conditions of 95°F dry bulb (DB) and 75°F wet bulb (WB).

Heating capacity rating obtained with air entering the indoor unit at 70°F dry bulb (DB) and 60°F wet bulb (WB); and outdoor ambient conditions of 47°F dry bulb (DB) and 43°F wet bulb (WB).

[1]Power Input is rated at high speed.

[2]ODU cooling range down to 0°F with optional wind baffle.

[3]Take appropriate actions at the end of HVAC equipment life to recover, recycle, reclaim or destroy R410A refrigerant according to applicable regulations (40 CFR Part 82, Subpart F) under section 608 of CAA.

[4]Sound Pressure levels are tested in an anechoic chamber under ISO Standard 1996.

[5]All power/communication cables to be minimum 18AWG, 4 conductor, stranded, shielded or unshielded. If shielded, must be grounded at Outdoor unit chassis only. Must comply with applicable national code.

GENERAL DATA

Art Cool Premier Unit Specifications

Table 1: Art Cool Premier Unit Specifications - Continued

Type	Art Cool Premier		Art Cool Premier	
System (Model)	LA090HYV1 (LAN090HYV1/ LAU090HYV1)	LA120HYV1 (LAN120HYV1/ LAU120HYV1)	LA180HYV1 (LAN180HYV1/ LAU180HYV1)	LA240HYV1 (LAN240HYV1/ LAU240HYV1)
Fan				
Indoor Type (Qty)	Cross Flow (1)			
Outdoor Type (Qty)	Propeller (1)			
Motor/Drive	Brushless Digitally Controlled/Direct			
Airflow Rate				
Indoor - Max/H/M/L (CFM)	547/494/417/283		742/565/424/318	777/565/424/318
Outdoor - Max (CFM)	1,165		2,119	
Piping				
Liquid Line (in, OD)	1/4		3/8	
Vapor Line (in, OD)	3/8		5/8	
Condensation Line (OD | ID)	27/32 | 5/8			
Additional Refrigerant Charge (oz/ft)	0.22		0.38	
Pipe Length (Minimum/Maximum) (ft)[5]	6.6/65.6		9.8/98.4	
Piping Length (no add'l refrigerant, ft)[5]	41.0		24.6	
Max Elevation Difference (ft)	32.8		65.6	

EEV: Electronic Expansion Valve IDU: Indoor Unit ODU: Outdoor Unit

Power wiring is field supplied and must comply with the applicable local and national codes.

This unit comes with a dry helium charge.

This data is rated 0 ft above sea level, with 24.6 ft of refrigerant line per indoor unit and a 0 ft level difference between outdoor and indoor units.

Cooling capacity rating obtained with air entering the indoor coil at 80ºF dry bulb (DB) and 67ºF wet bulb (WB); and outdoor ambient conditions of 95ºF dry bulb (DB) and 75ºF wet bulb (WB).

Heating capacity rating obtained with air entering the indoor unit at 70ºF dry bulb (DB) and 60ºF wet bulb (WB); and outdoor ambient conditions of 47ºF dry bulb (DB) and 43ºF wet bulb (WB).

[5]Piping lengths are equivalent.

Table 2: Art Cool Premier Electrical Data

Unit Model Nos.	Nom. Tons	Compressor Qty	Compressor(A) Cool/Heat	Fan Qty	ODU Fan(A)	IDU Fan(A)	MCA(A)	MOP(A)
Art Cool Premier								
LA090HYV1	3/4	1	8.3/8.3	1	0.40	0.40	11.2	15
LA120HYV1	1	1	8.3/8.3	1	0.40	0.40	11.2	15
LA180HYV1	1-1/2	1	14.5/14.5	1	0.50	0.30	19.0	25
LA240HYV1	2	1	14.5/14.5	1	0.50	0.30	19.0	25

For component model nos.
Voltage tolerance is ±10%.
Maximum allowable voltage unbalance is 2%.
MCA = Minimum Circuit Ampacity
ODU Fan = Outdoor Unit Fan Motor

IDU Fan = Indoor Unit Fan Motor
Maximum Overcurrent Protection (MOP) is calculated as follows:
(Largest motor FLA x 2.25) + (Sum of other motor FLA) rounded down to the nearest standard fuse size.

Table 3: Art Cool Premier Models

Outdoor Unit Model	Indoor Unit Model	Controller
LAU090HYV1 LAU120HYV1 	LAN090HYV1 LAN120HYV1 	AKB73835320 
LAU180HYV1 LAU240HYV1 	LAN180HYV1 LAN240HYV1 	AKB74835304 

GENERAL DATA

R410A Refrigerant

R410A Refrigerant - 0% Ozone Depleting

R410A refrigerant has a higher operating pressure in comparison to R22 refrigerant and, therefore, all piping system materials installed must have a higher resisting pressure than the materials traditionally used in R22 systems.

R410A refrigerant is an azeotrope of R32 and R125, mixed at 50:50, so the ozone depletion potential (ODP) is 0.

⚠ WARNING

- ⃠ *Do not place the refrigerant cylinder in direct sunlight. Exposure to direct sunlight can cause the refrigerant cylinder to explode, resulting in death or severe injury.*

Note:

- *Piping wall thickness must comply with the applicable local, state, and federal codes for the 551 psi design pressure of R410A.*
- ⃠ *Do not use any piping that has not been approved for use in high-pressure refrigerant systems.*
- ⃠ *Do not heat refrigerant piping more than necessary during installation. Excessive heat can cause the pipe to soften.*
- *Because R410A is a combination of R32 and R125, the required additional refrigerant must be charged in its liquid state. If the refrigerant is charged in its gaseous state, its composition changes and the system will not work properly.*

Selecting the Best Location

⚠DANGER

- ⃠ *Do not install the unit in an area where combustible gas may generate, flow, stagnate, or leak. These conditions can cause a fire, resulting in bodily injury or death.*
- ⃠ *Do not install the unit in a location where acidic solution and spray (sulfur) are often used as it can cause bodily injury or death.*
- ⃠ *Do not use the unit in environments where oil, steam, or sulfuric gas are present as it can cause bodily injury or death.*

⚠CAUTION

- *When the outdoor unit operates in defrost mode, sidewalks or parking lots near the unit may accumulate moisture that can turn to ice, resulting in slipping and personal injury.*

Note:

Select a location for installing the outdoor unit that will meet the following conditions:

- *Where the unit will not be subjected to direct thermal radiation from other heat sources.*
- *Where operating sound from the unit will not disturb inhabitants of surrounding buildings.*
- *Where the unit will not be exposed to direct, strong winds.*
- *Where there is enough strength to bear the weight of the unit.*
- *Include space for drainage to ensure condensate flows properly out of the unit when it is in heating mode.*
- *Include enough space for air flow and for service access.*
- *Install a fence to prevent vermin from crawling into the unit or unauthorized individuals from accessing it. Maintain all recommended clearances.*

Note:

To ensure the outdoor unit operates properly, certain measures are required in locations where there is a possibility of heavy snowfall or severe wind chill or cold:

1. *Prepare for severe winter wind chills and heavy snowfall, even in areas of the country where these are unusual phenomena.*
2. *Position the outdoor unit so that its airflow fans are not buried by direct, heavy snowfall. If snow piles up and blocks the airflow, the system may malfunction.*
3. *Remove any snow that has accumulated 4 inches or more on the top of the outdoor unit.*
4. *Place the outdoor unit on a raised platform at least 20 inches higher than the average annual snowfall for the area. If the frame width is wider than the outdoor unit, snow may accumulate.*
5. *Install a snow protection hood.*
6. *To prevent snow and heavy rain from entering the outdoor unit, install the suction and discharge ducts facing away from direct winds.*
7. *Additionally, the following conditions should be taken into consideration when the unit operates in defrost mode:*

- *If the outdoor unit is installed in a highly humid environment (near an ocean, lake, etc.), ensure that the site is well-ventilated and has a lot of natural light. (Example: Install on a rooftop.)*

Note:

The indoor unit may take longer to provide heat, or heating performance will be reduced in winter if the unit is installed:

1. *In a narrow, shady location.*
2. *Near a location that has a lot of ground moisture.*
3. *In a highly humid environment.*
4. *In an area in which condensate does not drain properly.*

Ambient Air Conditions

⚠WARNING

- *Avoid exposing the unit to sources of extreme temperature or gases to prevent serious bodily injury.*

Note:

- *Avoid exposing the outdoor unit to steam, combustible gases, or other corrosive elements.*
- *Avoid exposing the unit to discharge from boiler stacks, chimneys, steam relief ports, other air conditioning units, kitchen vents, plumbing vents, or substances that may degrade performance or cause damage to the unit.*
- *When installing multiple outdoor units, avoid placing the units where discharge of one outdoor unit will blow into the inlet side of an adjacent unit.*

GENERAL INSTALLATION GUIDELINES

Oceanside Applications

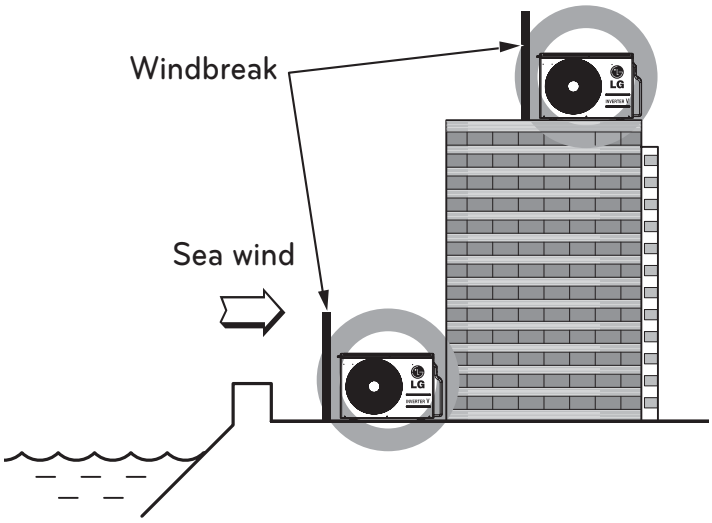
Oceanside Applications

Use of a Windbreak to Shield from Sea Wind

Note:
Ocean winds may cause corrosion, particularly on the condenser and evaporator fins, which, in turn could cause product malfunction or inefficient performance.

- Avoid installing the outdoor unit where it would be directly exposed to ocean winds.
- Install the outdoor unit on the side of the building opposite from direct ocean winds.
- Select a location with good drainage.
- Periodically clean dust or salt particles off of the heat exchanger with water.
- If the outdoor unit must be placed in a location where it would be subjected to direct ocean winds, install a concrete windbreak strong enough to block any winds.
- Windbreak should be more than 150% of the outdoor unit's height. There must be 2 to 3-1/2 inches of clearance between the outdoor unit and the windbreaker for purposes of air flow.

Figure 1: Oceanside Placement Using Windbreak



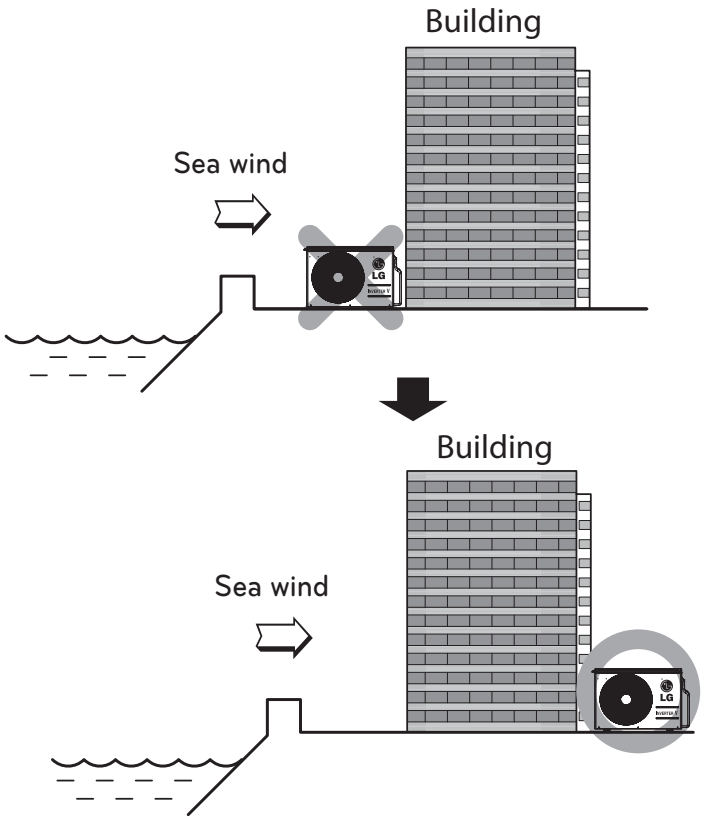
Note:
Additional anti-corrosion treatment may need to be applied to the outdoor unit at oceanside locations.

Oceanside Applications

Use of a Building to Shield from Sea Wind

If a windbreak is not possible, a building or larger structure must be used to shield the outdoor unit from direct exposure to the sea wind. The unit should be placed on the side of the building directly opposite to the direction of the wind as shown in Figure 2.

Figure 2: Placement Using Building as Shield



General Mounting

Securely attach the outdoor unit to a condenser pad, base rails, or another mounting platform that is securely anchored to the ground or building structure. Attach the outdoor unit with bolts and nuts on a concrete or rigid mount. See Figure 3. Follow applicable local codes for clearance, mounting, anchor and vibration attenuation requirements.

Note:

All referenced materials are to be field-supplied. Images are not to scale.

Mounting Platform

The underlying structure or foundation must be designed to support the weight of the unit. Avoid placing the unit in a low lying area where water may accumulate. When installing the outdoor unit on the wall, or roof top, anchor the mounting base securely to account for wind, earthquake or vibration.

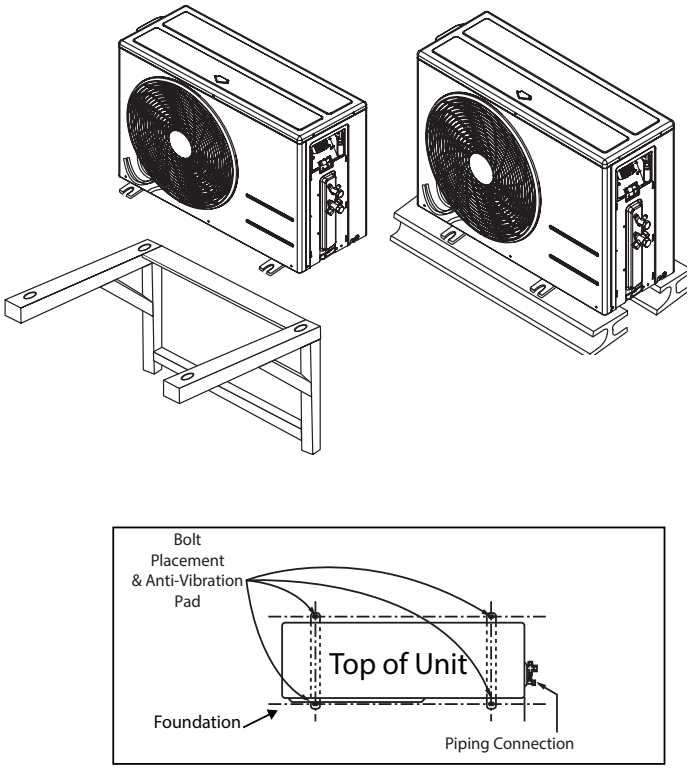
Tie-Downs and Wind Restraints

The strength of the Duct-free Split Single Zone Inverter system frame is adequate to be used with field-provided wind restraint tie-downs. The overall tie-down configuration must be approved by a local professional engineer.

Note:

Always refer to local code when designing a wind restraint system.

Figure 3: Outdoor Unit Mounting Methods



Snow and Ice Conditions

In climates that experience snow build-up, place the unit on a raised platform to ensure condenser airflow. The raised support platform must be high enough to allow the unit to remain above possible snow drifts. Mount the unit on a field-provided snow stand at a minimum height that is equal to the average annual snowfall plus 20 inches. Design the mounting base to prevent snow accumulation on the platform in front or back of the unit case. If necessary, provide a field fabricated hood to keep snow and ice and/or drifting snow from accumulating on the coil surfaces. Use inlet and discharge duct or hoods to prevent snow or rain from accumulating on the fan inlet and outlet guards. Best practice prevents snow from accumulating on top of the unit. Consider tie-down requirements in case of high winds or where required by local codes.

⚠CAUTION

When deciding on a location to place the outdoor unit, be sure to choose an area where run-off from defrost will not accumulate and freeze on sidewalks or driveways. Ice is a slipping hazard and can cause personal injury.

GENERAL INSTALLATION GUIDELINES

Required Clearances

Proper airflow through the Single Zone outdoor unit coil is critical for correct unit operation. When installing, consider service, inlet and outlet, and minimum allowable space requirements as illustrated in the diagrams below.

Minimum Clearance Requirements for Single Zone

Outdoor Unit Clearance

Specific clearance requirements in the diagram below are for the single zone wall mount systems. Figure 4 shows the overall minimum clearances that must be observed for safe operation and adequate airflow around the outdoor unit.

When placing the outdoor unit under an overhang, awning, sunroof or other roof-like structure, observe the clearance requirements (as shown in Figure 5) for height in relation to the unit. This clearance ensures that heat radiation from the condenser is not restricted around the unit.

Adhere to all clearance requirements if installing the unit on a roof. Be sure to level the unit and ensure that the unit is adequately anchored. Consult local codes for rooftop mounting requirements.

Figure 4: Outdoor Unit Clearances

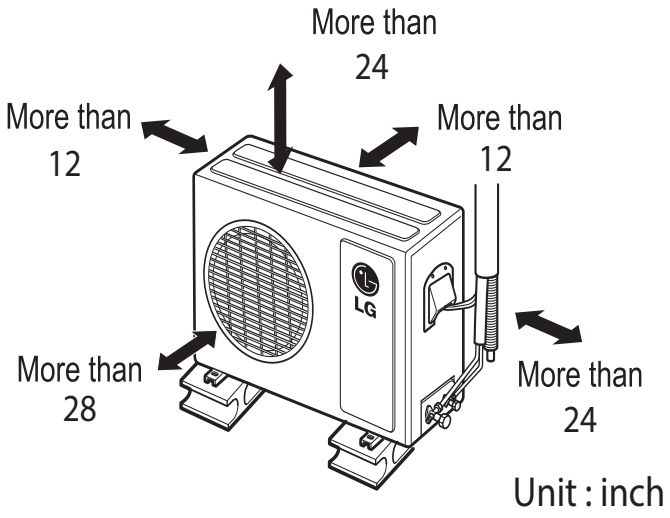
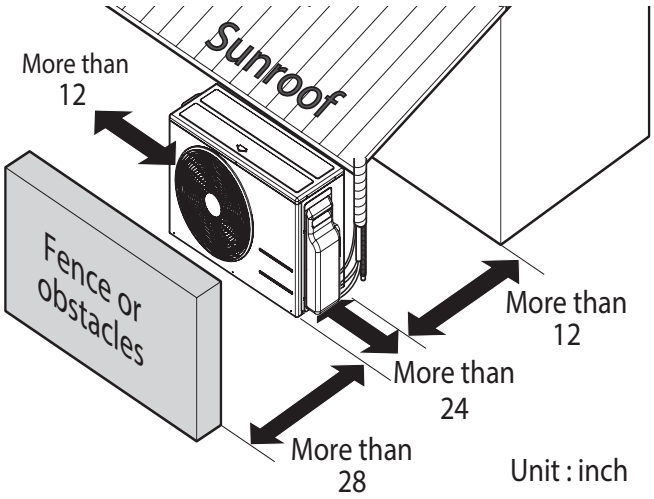


Figure 5: Outdoor Unit Sunroof/Awning Clearances



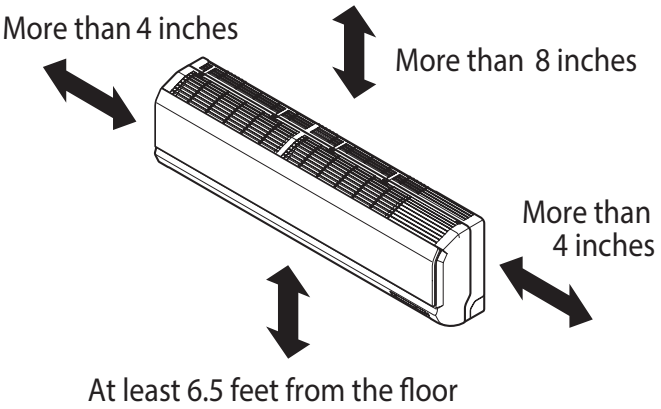
Note:

Do not place the unit where animals and/or plants will be in the path of the warm air, or where warm air and/or noise will disturb neighbors.

Indoor Unit Clearance

Follow recommended best practices when choosing an indoor location for the Single Zone indoor unit.

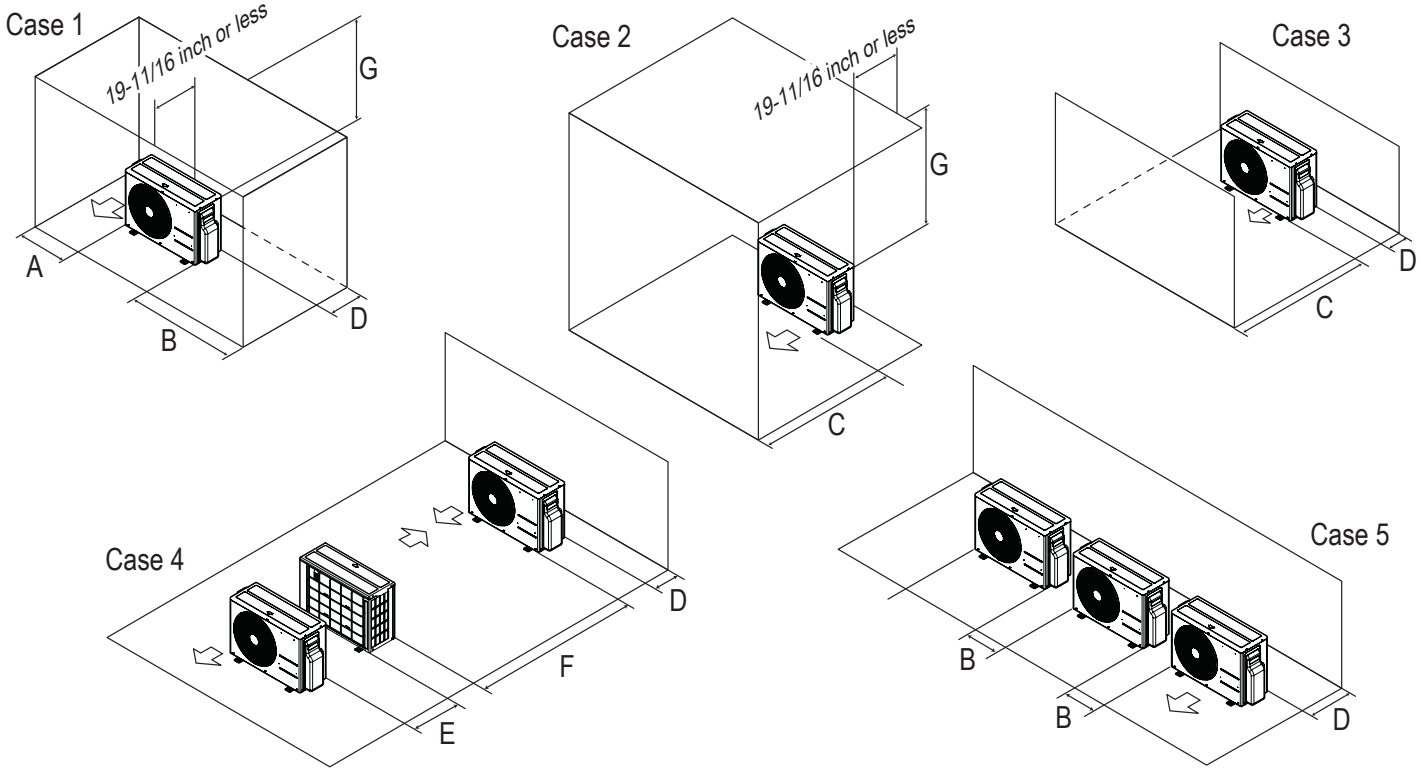
- Keep unit away from any indoor steam or excessive heat.
- No obstacles should be placed around unit.
- Condensation drain (Leakage piping) should be routed away from the unit.
- Do not install near doorway.
- Clearance gap between any wall or enclosure and the left or right side of the unit must be greater than 4 inches.
- From the top of the unit to the ceiling there must be greater than 8 inches of clearance.
- Unit should be at least 6.5 feet from the floor for adequate clearance.



Minimum Clearance Requirements for Single Zone - Continued

See Figure 6 for minimum ODU service access spacing.

Figure 6: ODU Service Access Clearance



Unit : inch		A	B	C	D	E	F	G
Case 1	Normal	11-13/16	23-19/32	—	11-13/16	—	—	—
	Minimum	3-15/16	9-27/32	—	3-15/16	—	—	39-3/8
Case 2	Normal	—	—	19-11/16	—	—	—	—
	Minimum	—	—	13-25/32	—	—	—	39-3/8
Case 3	Normal	—	—	19-11/16	11-13/16	—	—	—
	Minimum	—	—	13-25/32	3-15/16	—	—	—
Case 4	Normal	—	—	—	11-13/16	23-19/32	—	—
	Minimum	—	—	—	3-15/16	7-7/8	78-3/4	—
Case 5	Normal	—	23-19/32	—	11-13/16	—	—	—
	Minimum	—	9-27/32	—	3-15/16	—	—	—

GENERAL INSTALLATION GUIDELINES

Mounting of Indoor Unit Installation Plate

Mounting Installation Plate to Wall

Follow this procedure and best practices when mounting the indoor unit's plate to a wall.

Note:

Select location carefully. Unit should be anchored to a strong wall to prevent unnecessary vibration.

⚠WARNING

- *When choosing a location for the wall mount plate, be sure to take into consideration routing of wiring for power outlets within the wall. Touching wiring can cause serious bodily injury, or death.*
- *Use caution when drilling holes through the walls for the purposes of piping connections. Touching power wiring with tools or bare skin can cause serious bodily injury, or death.*

Procedure

1. Locate the installation plate and five Type A screws (Figure 8).
2. Position the installation plate horizontally on the wall. Align the centerline, and use a leveling tool to ensure the plate is level. (Figure 9).
3. Secure plate to the wall with the five Type A screws (Figure 10). If mounting on a concrete wall, use field-supplied anchor bolts.
4. Observe the left and right rear piping clearance when drilling into the wall.

Drilling Piping Hole in the Wall

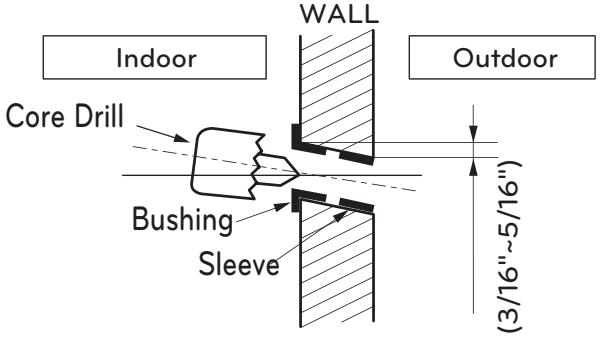
Follow the left or right piping clearance recommendations as shown in Figure 9.

1. Using a 2 5/8 (ø 65mm) inch hole core drill bit, drill a hole at either the right or left side of the wall mounting (Figure 10).

- The slant of the hole should be 3/16" to 5/16" from level with the slant being upward on the indoor unit side and downward on the outdoor unit side (Figure 7).

2. Finish off the hole as shown with bushing and sleeve covering. The sleeve and bushing prevents damage to the tubing/bundling of the piping.

Figure 7: Drilling Piping Hole



See *Refrigerant Piping Connections for Indoor Unit on page 52* to proceed with piping.

Figure 8: Provided Installation Parts

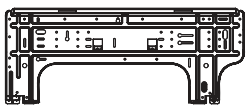
Installation plate	
Type "A" screw	
Type "B" screw	
Type "C" screw	
Type "D" screw	
Bracket	
Wireless controller holder	

Figure 9: LAN090HYV1 / LAN120HYV1 Installation Plate Dimensions

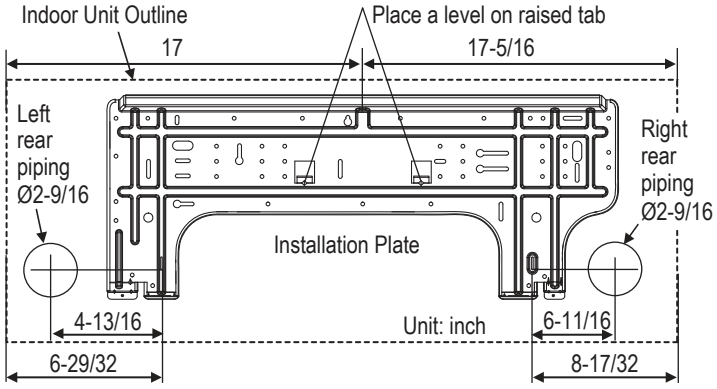


Figure 11: LAN180HYV1 / LAN240HYV1 Installation Plate Dimensions

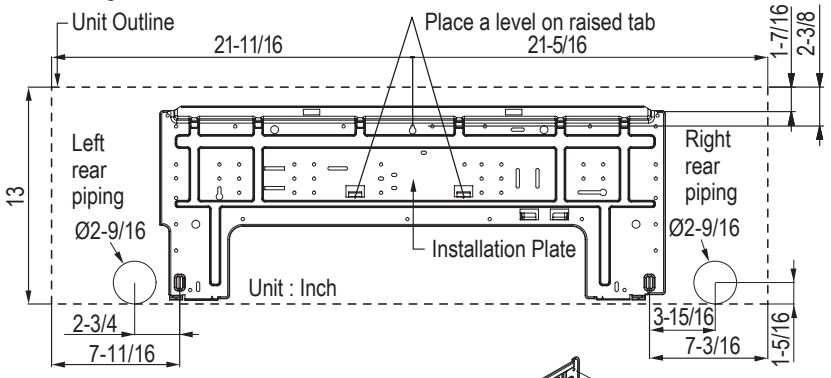
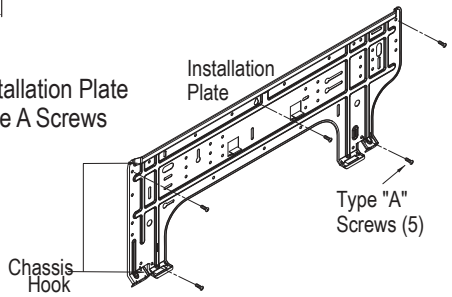


Figure 10: Installation Plate Type A Screws



Mounting the Indoor Unit to the Installation Plate

1. Hook the indoor unit onto the upper portion of the installation plate [(1) Figure 12].
2. Engage the hooks at the top of the indoor unit with the upper edge of the installation plate. Ensure that the hooks are properly seated on the installation plate by moving it left and right.
3. Unlock the Drain Hose Holder (L-bracket) from the chassis and anchor it between the chassis and the installation plate. Correct anchoring should separate the bottom of the inside unit from the wall (Figure 13).
4. Move the bottom of indoor unit towards the installation plate to anchor to wall [(2) Figure 12]. It helps to press the lower left and right sides of the unit against the installation plate until the hooks engage into their slots. You will hear a clicking sound as the bottom successfully attaches to the installation plate.
5. Finish by inserting and tightening two type "C" screws into the bottom of the installation plate (Figure 14).

• Pay attention to the positioning of the piping through any wall as shown in the figure, as you insert the screws to the indoor unit.

Preparing for Piping/Electrical Connection

1. To prepare indoor unit for piping, disengage bottom on indoor unit from installation plate by loosening screws at the bottom of the indoor unit.

• This step will separate the indoor unit's bottom side from the wall mount in order to route drain hose correctly. See Figure 15 as a reference of the rear view of the indoor unit.

2. Once hose is properly routed at rear of unit, move the bottom of the indoor unit towards the installation plate to anchor back to wall.
3. Optionally, go to *Refrigerant Piping Connections* section of this manual to continue with piping connections to the indoor unit.
4. Optionally, go to *Electrical Connections* section of this manual to continue with conduit/electrical wiring to the indoor unit.

Figure 12: Mounting Unit on Installation Plate

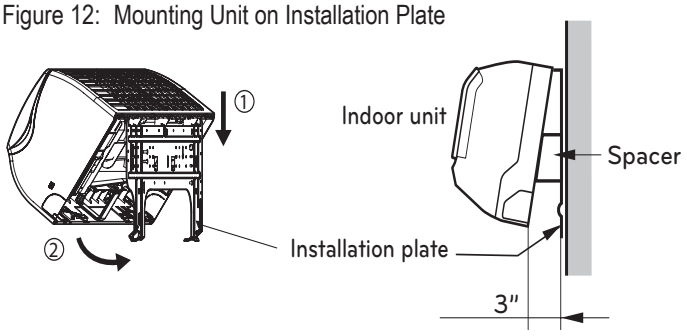


Figure 13: Mounting Unit on Installation Plate

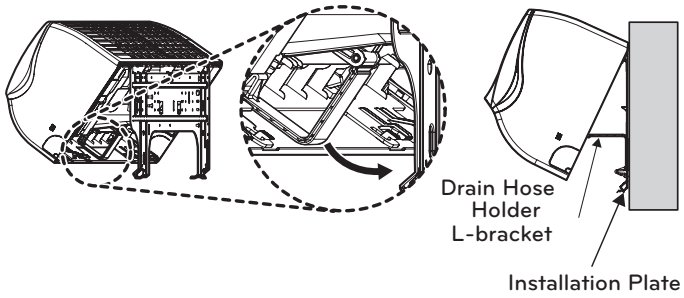


Figure 14: Chassis Cover Removal from Indoor Unit

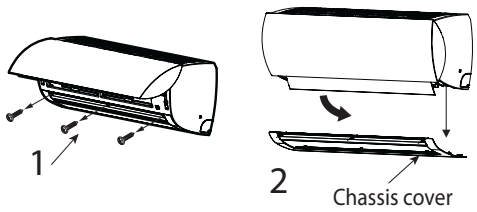
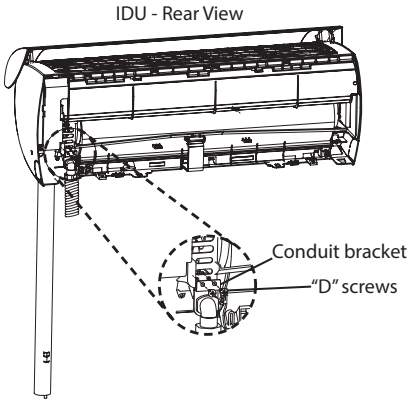


Figure 15: Rear View of IDU



GENERAL INSTALLATION GUIDELINES

Piping Preparation

Piping Preparation

⚠WARNING

- ⃠ *Do not allow the refrigerant to leak during brazing; if the refrigerant combusts, it generates a toxic gas that can cause serious bodily injury or death.*
- ⃠ *Do not braze in an enclosed location, and always test for gas leaks before/after brazing. Trapped gas from enclosed locations can lead to bodily injury or death.*

Single Zone Pipe Connections

Note:

1. ⃠ Do not use kinked pipe caused by excessive bending in one specific area on its length.
2. Braze the pipes to the service valve pipe stub of the outdoor unit.

Creating a Flare Fitting

Note:

One of the main causes of refrigerant leaks is defective flared connections. Create flared connections using the procedure shown in Figure 17.

1. Cut the pipe to length.
- Measure the distance between the indoor unit and the outdoor unit.
- Cut the pipes a little longer than measured distance.
- Cut the cable 4.9 ft longer than the pipe length.

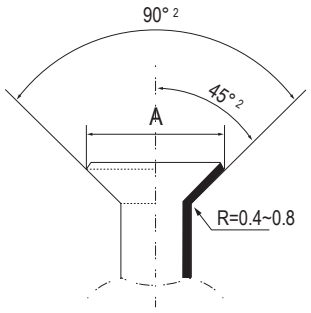
2A. Remove the burrs.
- Completely remove all burrs from pipe ends.
- When removing burrs, point the end of the copper pipe down to avoid introducing foreign materials in the pipe.

2B. Slide the flare nut onto the copper tube.

3. Flaring the pipe end.
- Use the proper size flaring tool to finish flared connections as shown.
- ALWAYS create a 45° flare when working with R410A. See WARNING on this page.

4. Carefully inspect the flared pipe end.
- Compare the geometry with the figure to the right and dimensions as detailed in Figure 16.
- If the flare is defective, cut it off and re-do procedure.
- If flare looks good, use dry nitrogen to blow clean the pipe.

Figure 16: Dimensions of the Flare



Note:

When selecting flare fittings, always use a 45° fitting rated for use with high pressure refrigerant R410A. Selected fittings must also comply with local, state, or federal standards.

Figure 17: Creating a Flare Fitting

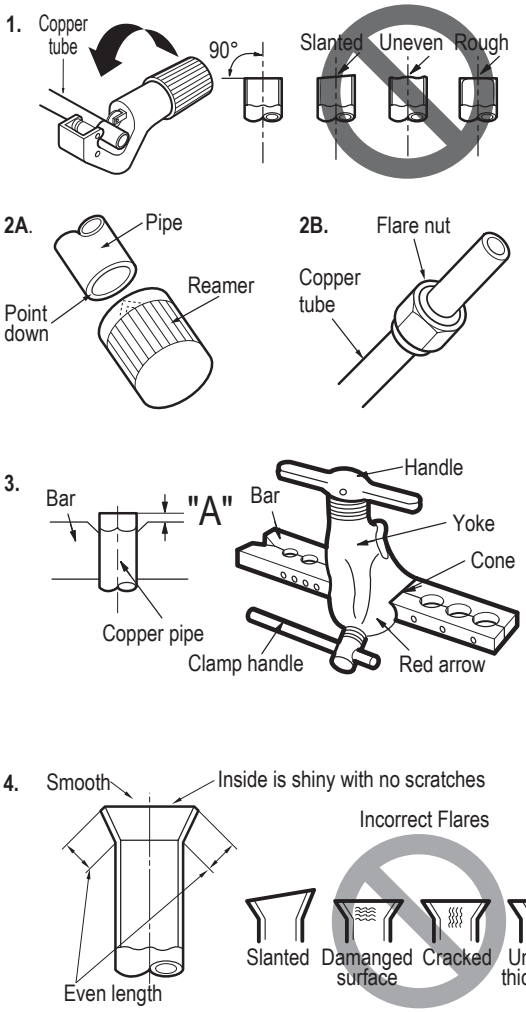


Table 4: Flared Connection Dimensions

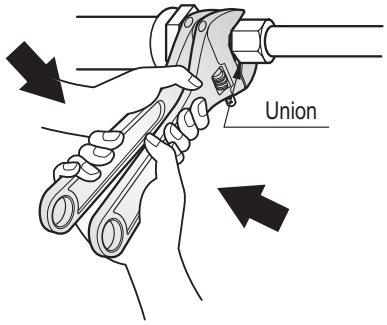
Pipe		"A" in Figure 17		Thickness	
Vapor (in. O.D.)	Liquid (in. O.D.)	Vapor (in.)	Liquid (in.)	Vapor (in.)	Liquid (in.)
1/2	1/4	1/8	1/16	1/8	1/8
5/8	3/8	1/8	1/16	1/16	1/8

Tightening the Flare Nuts

Table 5: Tightening Torque for Flare Nuts.

Pipe size (Inches O.D.)	Tightening torque (ft-lbs)	Width of the flare (A [inches])
1/4Ø	13.9 - 18	1/8
3/8Ø	24.5 - 30.3	1/8
1/2Ø	39.7 - 47.7	1/8
5/8Ø	45.5 - 59.2	1/16

Figure 18: Tightening the Flare Nuts



1. When connecting the flare nuts, coat the flare (inside and outside) with polyvinyl ether (PVE) refrigeration oil only.
2. Initially hand tighten the flare nuts using three (3) or four (4) turns.
3. To finish tightening the flare nuts, use both a torque wrench and a backup wrench.
4. After all the piping has been connected and the caps have been tightened, check for refrigerant gas leaks.

Note:

⃠ *Do not use polyolyester (POE) or any other type of mineral oil as a thread lubricant. These lubricants are not compatible with PVE oil used in this system and create oil sludge leading to equipment damage and system malfunction.*

Loosening the Flare Nuts

Always use two (2) wrenches to loosen the flare nuts.

Piping Materials and Handling

Pipes used for the refrigerant piping system must include the specified thickness, and the interior must be clean.

Do not bend or damage the pipes while handling and storing. Take care not to contaminate the interior of pipes with dust, moisture, etc. See Table 6 for care of piping.

Figure 19: Keep Piping Capped While Storing

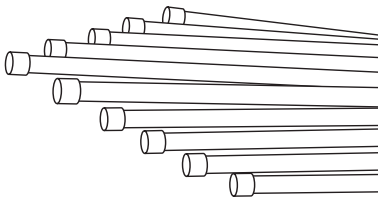
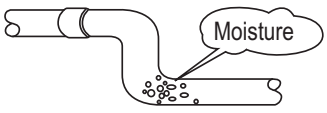
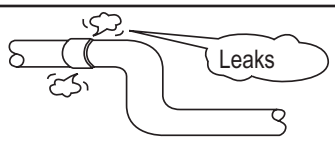


Table 6: Three Principles of Refrigerant Piping

	Dry	Clean	Airtight
Principles	No moisture should be inside the piping.	No dust should be inside the piping.	No leaks should occur.
			
Problems Caused	- Significant hydrolysis of refrigerant oil. - Refrigerant oil degradation. - Poor insulation of the compressor. - System does not operate properly. - EEVs, capillary tubes are clogged.	- Refrigerant oil degradation. - Poor insulation of the compressor. - System does not operate properly. - EEVs and capillary tubes become clogged.	- Refrigerant gas leaks/shortages. - Refrigerant oil degradation. - Poor insulation of the compressor. - System does not operate properly.
Solutions	- Remove moisture from the piping. - Piping ends should remain capped until connections are complete. - ⃠ Do not install piping on a rainy day. - Connect piping properly at the unit's side. - Remove caps only after the piping is cut, the burrs are removed, and after passing the piping through the walls. - Evacuate system to a minimum of 500 microns and ensure the vacuum holds at that level for 24 hours	- Remove dust from the piping. - Piping ends should remain capped until connections are complete. - Connect piping properly at the side of the unit. - Remove caps only after the piping is cut and burrs are removed. - Retain the cap on the piping when passing it through walls, etc.	- Test system for air tightness. - Perform brazing procedures that comply with all applicable standards. - Perform flaring procedures that comply with all applicable standards. - Perform flanging procedures that comply with all applicable standards. - Ensure that refrigerant lines are pressure tested to 550 psig.

GENERAL INSTALLATION GUIDELINES

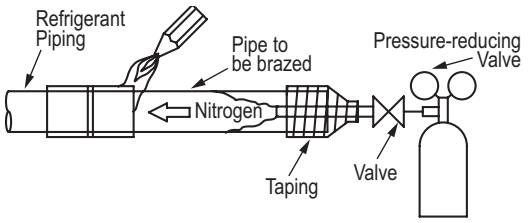
Piping Materials and Handling

Brazing Practices

Note:

It is imperative to keep the piping system free of contaminants and debris such as copper burrs, slag, or carbon dust during installation. Contaminants can result in mechanical failure of the system.

Figure 20: Refrigerant Pipe Brazing



All joints are brazed in the field. Duct Free System Single Zone Inverter refrigeration system components contain very small capillary tubes, small orifices, electronic expansion valves, oil separators, and heat exchangers that can easily become blocked. Proper system operation depends on the installer using best practices and utmost care while assembling the piping system.

- While brazing, use a dry nitrogen purge operating at a minimum pressure of three (3) psig and maintain a steady flow.
- Blow clean all pipe sections with dry nitrogen prior to assembly.
- Use a tubing cutter. ⃠ Do not use a saw to cut pipe. De-burr and clean all cuts before assembly.
- Store pipe stock in a dry place. Keep pipe capped and clean.
- Use adapters to assemble different sizes of pipe.
- ⃠ Do not use flux, soft solder, or anti-oxidant agents.
- 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 control components from excessive heat with a wet rag or a heat barrier spray product.

Refrigerant Piping System Insulation

All refrigerant piping, field-provided isolation ball valves, service valves, and elbows shall be completely insulated using closed cell pipe insulation. The liquid and vapor lines must be insulated separately.

To prevent heat loss/heat gain through the refrigerant piping, all refrigerant piping including liquid lines and vapor lines shall be insulated separately. Insulation shall be a minimum 1/2" thick, and thickness may need to be increased based on ambient conditions and local codes.

All insulation joints shall be glued with no air gaps. Insulation material shall fit snugly against the refrigeration pipe with no air space between it and the pipe. ⃠ Do not allow insulation passing through pipe hangers, inside conduit, and/or sleeves to be compressed. Protect insulation inside hangers and supports with a second layer. All pipe insulation exposed to the sun and outdoor elements shall be properly protected with PVC, aluminum vapor barrier, or alternatively placed in a weather-resistant enclosure such as a pipe rack with a top cover and meet local codes.

The design engineer should perform calculations to determine if the factory-supplied insulation jackets are sufficient to meet local codes and avoid sweating. Add additional insulation if necessary. Mark all pipes at the point where the insulation jacket ends. Remove the jacket. Install field provided insulation on the run-out and main trunk pipes first. Peel the adhesive glue protector slip from the insulation jacket and install the clam-shell jacket over the fitting.

For specific insulation procedures, see *Refrigerant Piping Connections* section in this installation manual.

Selecting Field-Supplied Copper Tubing

Copper is the only approved refrigerant pipe material for use with Duct Free System Single Zone products, and LG recommends seamless phosphorous deoxidized ACR type copper pipe, hard-drawn rigid type "K" or "L", or annealed-tempered, copper pipe.

- Drawn temper (rigid) ACR copper tubing is available in sizes 3/8 through 2-1/8 inches (ASTM B 280, clean, dry, and capped).
- Annealed temper (soft) ACR copper tubing is available in sizes 1/4 through 2-1/8 inches (ASTM B 280, clean, dry, and capped).

Note:

Tube wall thickness should meet local code requirements and be approved for an operating pressure of 551 psi. If local code does not specify wall thickness, LG suggests using tube thickness per table below. When bending tubing, try to keep the number of bends to a minimum, and use the largest radii possible to reduce the equivalent length of installed pipe; also, bending radii greater than ten (10) pipe diameters can minimize pressure drop. Be sure no traps or sags are present when rolling out soft copper tubing coils.

Table 7: ACR Copper Tubing Material

Type	Seamless Phosphorous Deoxidized
Class	UNS C12200 DHP
Straight Lengths	H58 Temper
Coils	O60 Temper

Table 8: Piping Tube Thicknesses

OD (in)	1/4	3/8	1/2	5/8	3/4	7/8	1-1/8	1-3/8	1-5/8
Material	Rigid Type "K" or "L" and Soft ACR Acceptable			Rigid Type "K" or "L" Only					
Min. Bend Radius (in)	.563	.9375	1.5	2.25	3.0	3.0	3.5	4.0	4.5
Min. Wall Thickness (in)	.03	.03	.035	.040	.042	.045	.050	.050	.050

Table 9: ACR Copper Tubing Dimensions and Physical Characteristics[1-4]

Nominal Pipe Outside Diameter (in)	**Actual Outside Diameter (in)**	**Drawn Temper**			**Annealed Temper**		
		Nominal Wall Thickness (in)	**Weight (lb/ft)**	**Cubic ft per Linear ft**	**Nominal Wall Thickness (in)**	**Weight (lb/ft)**	**Cubic ft per Linear ft**
1/4	0.250	--	--	--	0.030	0.081	.00020
3/8	0.375	0.030	0.126	.00054	0.032	0.134	.00053
1/2	0.500	0.035	0.198	.00101	0.032	0.182	.00103
5/8	0.625	0.040	0.285	.00162	0.035	0.251	.00168
3/4	0.750	0.042	0.362	.00242	0.042	0.362	.00242
7/8	0.875	0.045	0.455	.00336	0.045	0.455	.00336
1-1/8	1.125	0.050	0.655	.00573	0.050	0.655	.00573

[1]All dimensions provided are in accordance with ASTM B280 – Standard.
[2]Design pressure = 551 psig.
[3]ACR Tubing is available as hard drawn or annealed (soft) and are suitable for use with R410A refrigerant.
[4]The Copper Tube Handbook, 2010, Copper Development Association Inc., 260 Madison Avenue, New York, NY 10016.

Note:

- *Commercially available piping often contains dust and other materials. Always blow it clean with a dry inert gas.*
- *Prevent dust, water or other contaminants from entering the piping during installation. Contaminants can cause mechanical failure.*

GENERAL INSTALLATION GUIDELINES

Piping Materials and Handling

No Pipe Size Substitutions

Note:

Use only the pipe size recommended by this installation manual. Using a different size is prohibited and may result in a system malfunction or failure to work at all.

Obstacles

When an obstacle, such as an I-beam or concrete T, is in the path of the planned refrigerant pipe run, it is best practice to route the pipe over the obstacle. If adequate space is not available to route the insulated pipe over the obstacle, then route the pipe under the obstacle. In either case, it is imperative the length of the horizontal section of pipe above or below the obstacle be a minimum of three (3) times the longest vertical rise (or fall) at either end of the segment.

Copper Expansion and Contraction

Under normal operating conditions, the vapor pipe temperature of a Duct Free System can vary as much as 280°F. With this large variance in pipe temperature, the designer must consider pipe expansion and contraction to avoid pipe and fitting fatigue failures.

Refrigerant pipe along with the insulation jacket form a cohesive unit that expands and contracts together. During system operation, thermal heat transfer occurs between the pipe and the surrounding insulation.

If the pipe is mounted in free air space, no natural restriction to movement is present if mounting clamps are properly spaced and installed. When the refrigerant pipe is mounted underground in a utility duct stacked among other pipes, natural restriction to linear movement is present. In extreme cases, the restrictive force of surface friction between insulating jackets could become so great that natural expansion ceases and the pipe is “fixed” in place. In this situation, opposing force caused by change in refrigerant fluid/vapor temperature can lead to pipe/fitting stress failure.

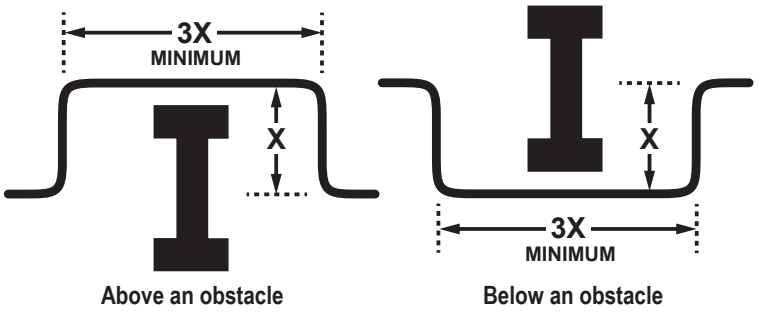
The refrigerant pipe support system must be engineered to allow free expansion to occur. When a segment of pipe is mounted between two fixed points, provisions must be provided to allow pipe expansion to naturally occur. The most common method is the inclusion of expansion Loop or U-bends. Each segment of pipe has a natural fixed point where no movement occurs. This fixed point is located at the center point of the segment assuming the entire pipe is insulated in a similar fashion. The natural fixed point of the pipe segment is typically where the expansion Loop or U-bend should be.

Linear pipe expansion can be calculated using the following formula:

$$LE = C \times L \times (T_r - T_a) \times 12$$

LE	=	Anticipated linear tubing expansion (in.)
C	=	Constant (For copper = 9.2×10^{-6} in./in.°F)
L	=	Length of pipe (ft.)
T_R	=	Refrigerant pipe temperature (°F)
T_a	=	Ambient air temperature (°F)
12	=	Inches to feet conversion (12 in./ft.)

Figure 21: Installing Piping Above and Below an Obstacle



1. From Table 10 find the row corresponding with the actual length of the straight pipe segment.
2. Estimate the minimum and maximum temperature of the pipe. In the column showing the minimum pipe temperature, look up the anticipated expansion distance. Do the same for the maximum pipe temperature.
3. Calculate the difference in the two expansion distance values. The result will be the anticipated change in pipe length.

Example:

A system is installed and the design shows that there is a 100 foot straight segment of tubing between an indoor unit and the outdoor unit. In heating, this pipe transports hot gas vapor to the indoor units at 120 °F. In cooling, the same tube is a suction line returning refrigerant vapor to the outdoor unit at 40 °F. Look up the copper tubing expansion at each temperature and calculate the difference.

Vapor Line

Transporting Hot Vapor: 100 ft. pipe at 120 °F = 1.40 in.

Transporting Suction Vapor: 100 ft. pipe at 40 °F = 0.40 in.

Anticipated Change in Length: 1.40 in. – 0.40 in. = 1.00 in.

Liquid Line

The liquid temperature remains relatively the same temperature; only the direction of flow will reverse. Therefore, no significant change in length of the liquid line is anticipated.

When creating an expansion joint, the joint height should be a minimum of two times the joint width. Although different types of expansion arrangements are available, the data for correctly sizing an Expansion Loop is provided in Table 10. Use soft copper with long radius bends on longer runs or long radius elbows for shorter pipe segments. Using the anticipated linear expansion (LE) distance calculated, look up the Expansion Loop or U-bend minimum design dimensions. If other types of expansion joints are chosen, design per ASTM B-88 Standards.

See table below for precalculated anticipated expansion for various pipe sizes and lengths of refrigerant tubing.

To find the anticipated expansion value:

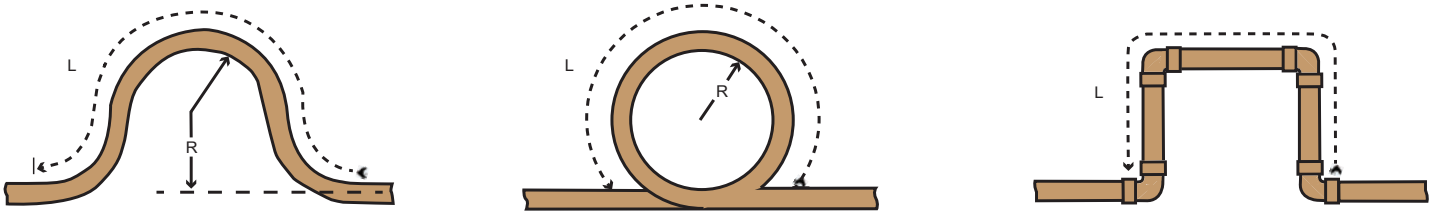
1. From the table below, find the row corresponding with the actual feet of the straight pipe segment.
2. Estimate the minimum and maximum temperature of the pipe.
3. In the column showing the minimum pipe temperature, look up the anticipated expansion distance corresponding to the segment length. Do the same for the maximum pipe temperature.
4. Calculate the difference in the two expansion distance values. The result will be the change in pipe length.

Table 10: Linear Thermal Expansion of Copper Tubing in Inches

Pipe Length[1]	Fluid Temperature °F																			
	35°	40°	45°	50°	55°	60°	65°	70°	75°	80°	85°	90°	95°	100°	105°	110°	115°	120°	125°	130°
10	0.04	0.04	0.05	0.06	0.06	0.07	0.08	0.08	0.09	0.09	0.10	0.10	0.11	0.11	0.11	0.12	0.13	0.14	0.15	0.15
20	0.08	0.08	0.10	0.12	0.13	0.14	0.15	0.16	0.17	0.18	0.19	0.20	0.21	0.22	0.22	0.23	0.26	0.28	0.29	0.30
30	0.12	0.12	0.15	0.18	0.20	0.21	0.23	0.24	0.26	0.27	0.29	0.30	0.32	0.33	0.32	0.35	0.39	0.42	0.44	0.45
40	0.16	0.16	0.20	0.24	0.26	0.28	0.30	0.32	0.34	0.36	0.38	0.40	0.42	0.44	0.43	0.46	0.52	0.56	0.58	0.60
50	0.20	0.20	0.25	0.30	0.33	0.35	0.38	0.40	0.43	0.45	0.48	0.50	0.53	0.55	0.54	0.58	0.65	0.70	0.73	0.75
60	0.24	0.24	0.30	0.36	0.39	0.42	0.45	0.48	0.51	0.54	0.57	0.60	0.63	0.66	0.65	0.69	0.78	0.84	0.87	0.90

[1]Pipe length baseline temperature = 0°F. "Expansion of Carbon, Copper and Stainless Steel Pipe," *The Engineers' Toolbox*, www.engineeringtoolbox.com.

Figure 22: Coiled Expansion Loops and Offsets



Large Tubing U-bend (>3/4 in.) | Loop | Small Tubing U-bend (<3/4 in.)

GENERAL INSTALLATION GUIDELINES

Piping Materials and Handling

Table 11: Radii of Coiled Expansion Loops and Developed Lengths of Expansion Offsets

Anticipated Linear Expansion (LE) (inches)		Nominal Tube Size (OD) inches			
		1/4	3/8	1/2	3/4
1/2	R[1]	6	7	8	9
	L[2]	38	44	50	59
1	R[1]	9	10	11	13
	L[2]	54	63	70	83
1-1/2	R[1]	11	12	14	16
	L[2]	66	77	86	101
2	R[1]	12	14	16	19
	L[2]	77	89	99	117
2-1/2	R[1]	14	16	18	21
	L[2]	86	99	111	131
3	R[1]	15	17	19	23
	L[2]	94	109	122	143
3-1/2	R[1]	16	19	21	25
	L[2]	102	117	131	155
4	R[1]	17	20	22	26
	L[2]	109	126	140	166

Pipe Bends

When bending soft copper, use long radius bends. Refer to the "Radii of Coiled Expansion Loops and Developed Lengths of Expansion Offsets" table for minimum radius specifications, as shown above.

In-line Refrigeration Components

⃠ Components such as oil traps, solenoid valves, filter-dryers, sight glasses, tee fittings, and other after-market accessories are not permitted on the refrigerant piping system between the outdoor unit and the indoor unit.

Duct-free Single Zone systems are provided with redundant systems that assure oil is properly returned to the compressor. Sight-glasses and solenoid valves may cause vapor to form in the liquid stream.

Note:

Over time, dryers may deteriorate and introduce debris into the system. The designer and installer should verify the refrigerant piping system is free of traps, sagging pipes, sight glasses, filter dryers, etc.

Field-provided Isolation Ball Valves

LG allows the installation of field-supplied ball valves with Schrader ports at each indoor unit. Full-port isolation ball valves with Schrader ports (positioned between valve and indoor unit) rated for use with R410A refrigerant should be used on both the liquid and vapor lines.

If valves are not installed and a single indoor unit needs to be removed or repaired, the entire system must be shut down and evacuated. Position valves with a minimum distance of three (3) to six (6) inches of pipe on either side of the valve, and placed between six (6) and twelve (12) inches from the run-out pipe to the upstream main pipe. If ball valves are installed closer to the indoor unit, a section of pipe becomes a dead zone when the valves are closed where oil may accumulate.

Using Elbows

Field-supplied elbows are allowed as long as they are long radius and designed for use with R410A refrigerant. The designer, however, should be cautious with the quantity and size of fittings used, and must account for the additional pressure losses in equivalent pipe length calculation.

The equivalent pipe length of each elbow must be added to each pipe segment (Figure 23).

Figure 23: Equivalent Piping Length for Piping Components

Component	Size (Inches)				
Elbow (ft.)	1/4	3/8	1/2	5/8	3/4
	0.5	0.6	0.7	0.8	1.2

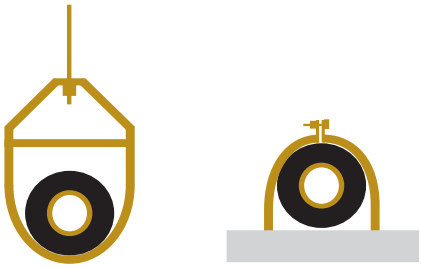
Pipe Supports

Note:

A properly installed pipe system should be adequately supported to avoid pipe sagging. Sagging pipes become oil traps that lead to equipment malfunction.

Pipe supports should never touch the pipe wall; supports shall be installed outside (around) the primary pipe insulation jacket (see Figure 24). Insulate the pipe first because pipe supports shall be installed outside (around) the primary pipe insulation jacket. Clevis hangers should be used with shields between the hangers and insulation. Field provided pipe supports should be designed to meet local codes. If allowed by code, use fiber straps or split-ring hangers suspended from the ceiling on all-thread rods (fiber straps or split ring hangers can be used as long as they do not compress the pipe insulation). Place a second layer of insulation over the pipe insulation jacket to prevent chafing and compression of the primary insulation within the confines of the support pipe clamp.

Figure 24: Pipe Hanger Details



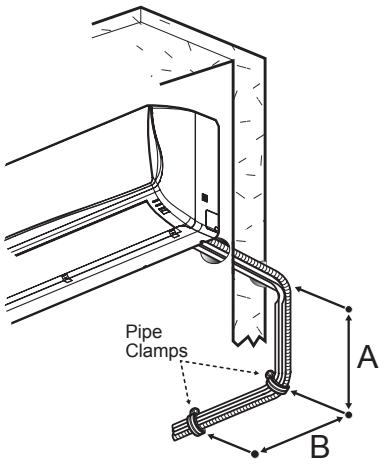
A properly installed pipe system will have sufficient supports to avoid pipes from sagging during the life of the system. As necessary, place supports closer for segments where potential sagging could occur. Maximum spacing of pipe supports shall meet local codes.

If local codes do not specify pipe support spacing, pipe shall be supported:

- Maximum of five feet (5') on center for straight segments of pipe up to 3/4" outside diameter size.
- Maximum of six feet (6') on center for pipe up to one inch (1") outside diameter size.
- Maximum of eight feet (8') on center for pipe up to two inches (2") outside diameter size.

Wherever the pipe changes direction, place pipe clamps within twelve (12) inches on one side and within twelve to nineteen (12 to 19) inches of the bend on the other side as shown in Figure 25.

Figure 25: Typical Pipe Support Location—Change in Pipe Direction



A + B ≈ 12”–19”

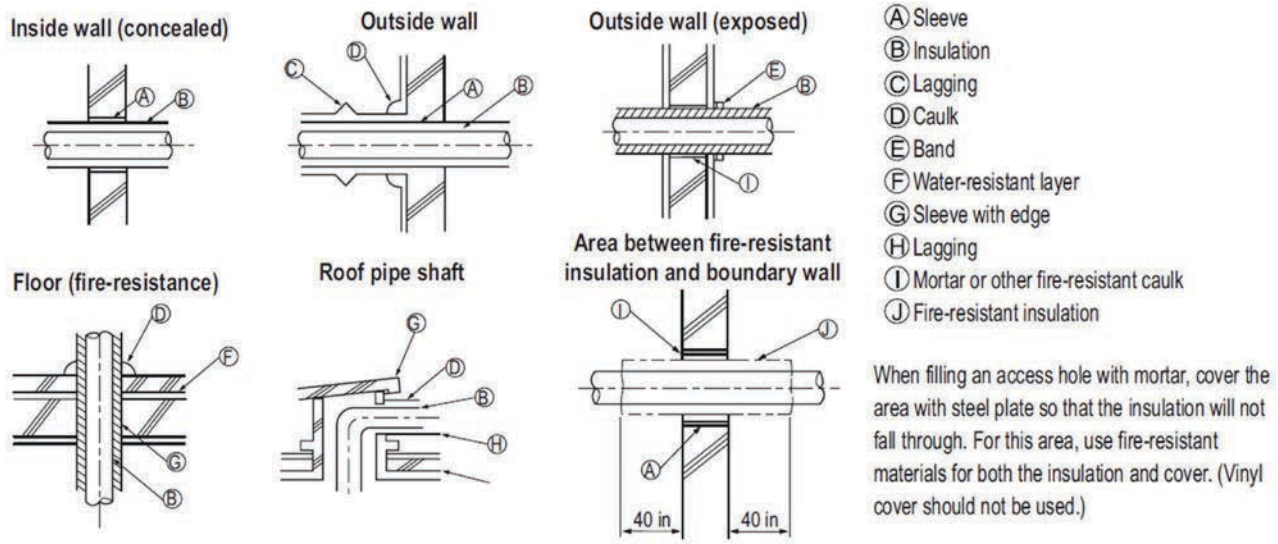
GENERAL INSTALLATION GUIDELINES

Refrigerant Piping System Layout

Pipe Sleeves at Penetrations

LG requires that all pipe penetrations through walls, floors, and pipes buried underground be properly insulated and routed through an appropriate wall sleeve of sufficient size to prevent compression of refrigerant pipe insulation and free movement of the pipe within the sleeve (Figure 26). Underground refrigerant pipe shall be routed inside a protective sleeve to prevent insulation deterioration. Refer to Figure 27.

Figure 26: Pipe Sleeve Options.



Note

Diameter of penetrations shall be determined by pipe diameter plus the thickness of the insulation.

Underground Refrigerant Piping

Refrigerant pipe installed underground should be routed inside a vapor tight protective sleeve to prevent insulation deterioration and water infiltration. Refrigerant pipe installed inside underground casing must be continuous without any joints. Underground refrigerant pipe must be located at a level **below the frost line**.

Table 12: Utility Conduit Sizes.

Liquid Pipe[1]	Vapor Pipe[1]		
	3/8 (1-1/8[2,3])	1/2 (2.0[2,4])	5/8 (2-1/8[2,4])
1/4 (1.0)[3]	4	4	4
3/8 (1-1/8)[3]	4	4	4

[1]OD pipe diameter in inches; Values in parenthesis () indicate OD of pipe with insulation jacket.

[2]Diameter of pipe with insulation. Thickness of pipe insulation is typical. Actual required thickness may vary based on surrounding ambient conditions and should be calculated and specified by the design engineer.

[3]Insulation thickness (value in parenthesis) = 3/8 inch.

[4]Insulation thickness (value in parenthesis) = 1 inch.

Figure 27: Typical Arrangement of Refrigerant Pipe and Cable(s) in a Utility Conduit

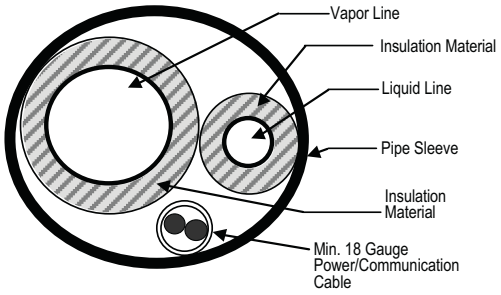


Table 13: Heat Pump Unit Refrigerant Pipe Connections (All Brazed Type)

Model	Liquid Conn. (inches)	Vapor Conn. (inches)
LAU090HYV1, LAU120HYV1	1/4	3/8
LAU180HYV1, LAU240HYV1	3/8	5/8

Connection Limitations

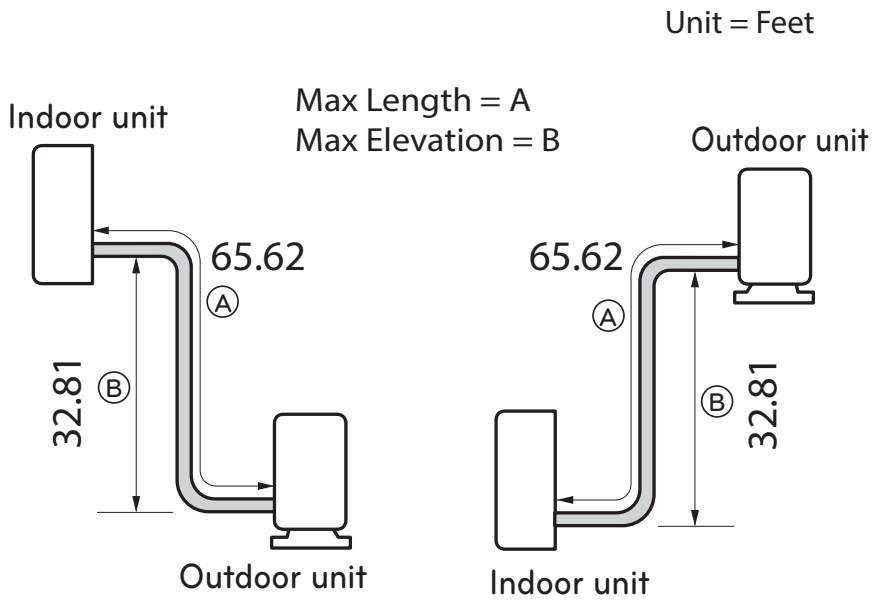
Single zone systems consist of one outdoor unit and one indoor unit.

One of the most critical elements of a single zone system is the refrigerant piping. Table 13 lists pipe length limits that must be followed in the design of a Single Zone Wall Mount refrigerant pipe system. Refer to Figure 29 for maximum length and elevation of piping.

Table 14: Art Cool Premier Refrigerant Piping System Limitations

		LA090HYV1 / LA120HYV1	LA180HYV1 / LA240HYV1
Pipe Length (ELF = Equivalent Length of pipe in Feet)	Longest total equivalent piping length	65.6 feet	98.4 feet
	Shortest total equivalent piping length	6.6 feet	9.8 feet
	Distance between fittings and indoor or outdoor units	≥ 20 inches	≥ 20 inches
	No additional refrigerant	41 feet	24.6 feet
Elevation (All Elevation Limitations are Measured in Actual Feet)	If outdoor unit is above indoor unit	32.8 feet	65.6 feet
	If outdoor unit is below indoor unit	32.8 feet	65.6 feet
Additional Refrigerant Needed (oz/ft)		0.22	0.38

Figure 28: Example System Layout with LA120HYV1



REFRIGERANT PIPING CONNECTIONS

Installation Overview

Installation

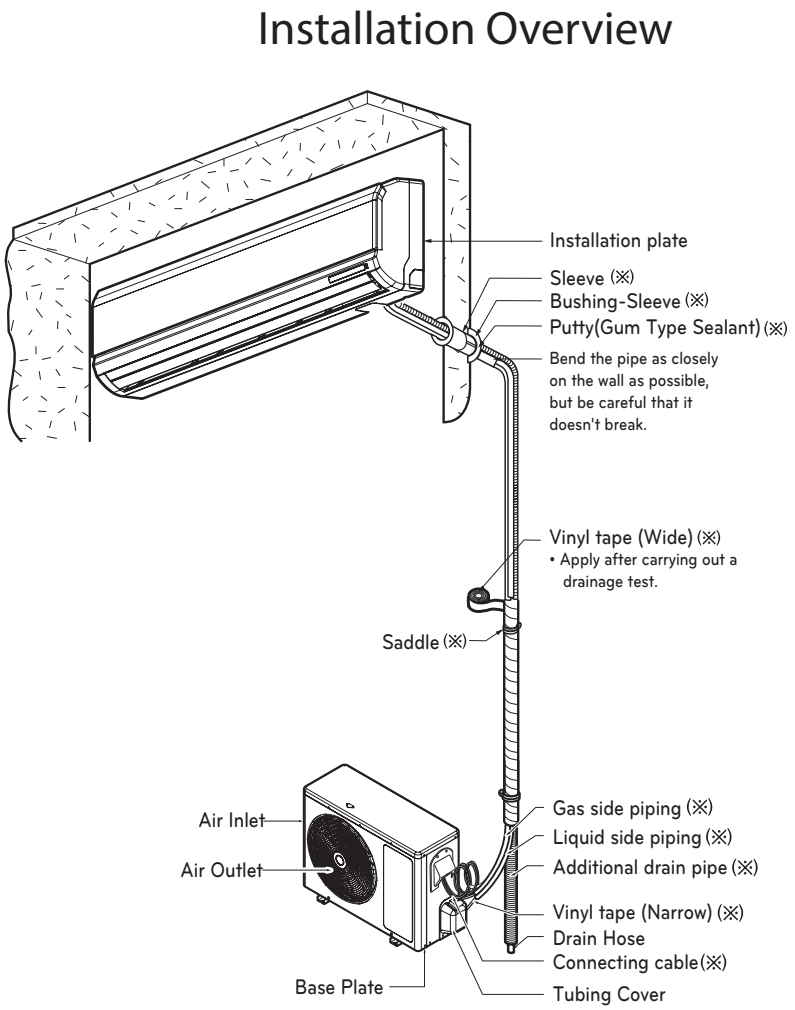
Duct Free Single Zone Wall Mounts are a one-to-one system. There is a direct piping connection between the outdoor unit and the indoor unit. Figure 29 Illustrates the basic pipe connections between the outdoor and indoor unit. Refer back to this illustration as you proceed with pipe connections. This illustration shows the indoor unit being installed at a higher position than the outdoor unit. However, should you install the outdoor unit at a higher position than the indoor unit, the basic pipe connections should be the same.

Refer back to the tables within the *"Connection Limitations"* section on the previous page for specific length limitations in conjunction with outdoor unit and indoor unit positioning.

Note:

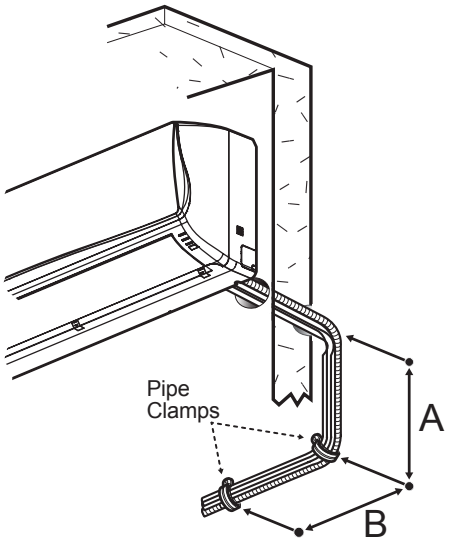
- *As you proceed with the piping connections be sure to adhere to pipe support spacing lengths as shown in Figure 30 below. Refer back to "Pipe Supports" section for in-depth information regarding using elbows, clamps and pipe supporting materials.*
- *Always adhere to local codes regarding piping and accurate support spacing along the outdoor pipe line.*

Figure 29: Installation and Piping Connection Overview



(※) Additional accessories/parts/tools that will be needed for installation but are not provided by LG.

Figure 30: Pipe Support Lengths - Outdoors



A + B ≈ 12"–19"

Pipe Bundling

See Figure 31 for proper pipe and cable bundling. Note the placement of the piping along with the necessary insulation material.

1. Be sure to wrap each pipe with proper insulation material.
2. Secure the piping by wrapping vinyl tape around the pipe. Use the narrow size tape for wrapping the actual pipe.
3. You can include the drain hose in the bundled piping and wrap all of them together using the wider vinyl tape as shown in Figure 32. The end of the drain hose outlet must be routed above ground.

Indoor Unit Installed Above Outdoor Unit

1. Refer to Figure 33 while following the procedures below.
2. Tape the piping, drain hose and connecting cable from down to up.
3. Secure the taped piping along the exterior wall using pipe clamps.
4. Create trap above the electrical connections cover to prevent water penetrating electrical components and wiring.

Indoor Unit Installed Below Outdoor Unit

1. Refer to Figure 34 while following the procedures below.
2. Tape the piping, drain hose and connection cable from down to up.
3. Secure the taped piping along the exterior wall using pipe clamps.
4. Create trap above the electrical connections cover to prevent water entering the room.

Figure 31: Cutaway of Proper Pipe and Cable Bundling

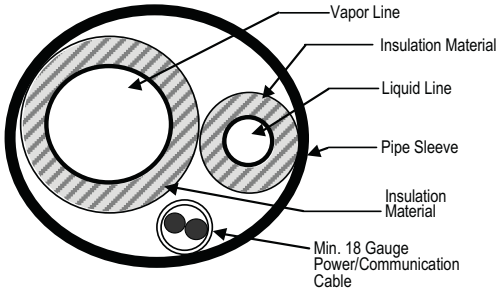


Figure 32: Bundling and Taping

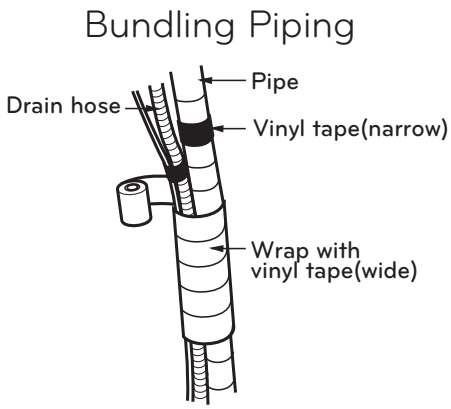


Figure 33: IDU Above ODU - Piping and Trap

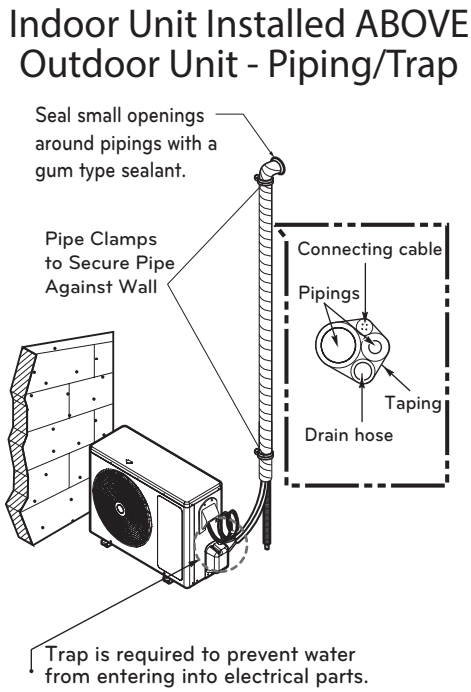
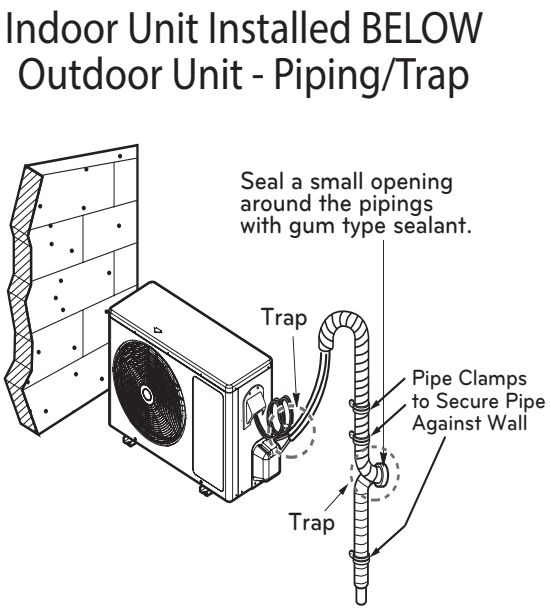


Figure 34: IDU Below ODU - Piping and Trap



REFRIGERANT PIPING CONNECTIONS

Drain Hose

Drain Hose Guidelines

Note:

Refer to the diagrams below and follow proper installation and the running of the drain hose along the pipe installation line to avoid leakage. Once drain hose is set in place, always follow with evacuation and leakage testing of all piping to be sure all piping is properly sealed. Re-check and retest as necessary.

Drain hose is routed from the indoor unit through the structure (wall) to the outdoor. It should slope at an angle where it is higher at the indoor unit and lower toward the outdoor area, thereby letting gravity push any condensation down and out. See Figure 35 for proper drainage slope. Avoid piping the drain hose as shown in Figure 36. These methods are incorrect and can cause leakage at the indoor unit site.

Figure 35: Correct Slope Angle for Drain Hose

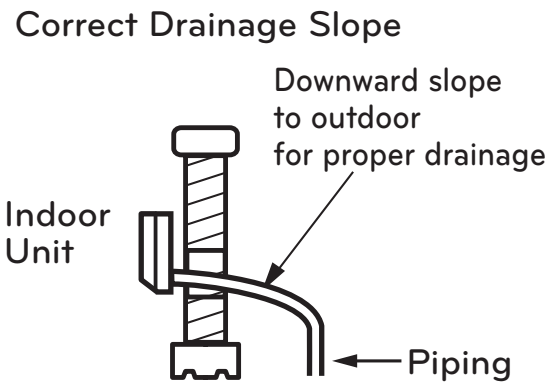
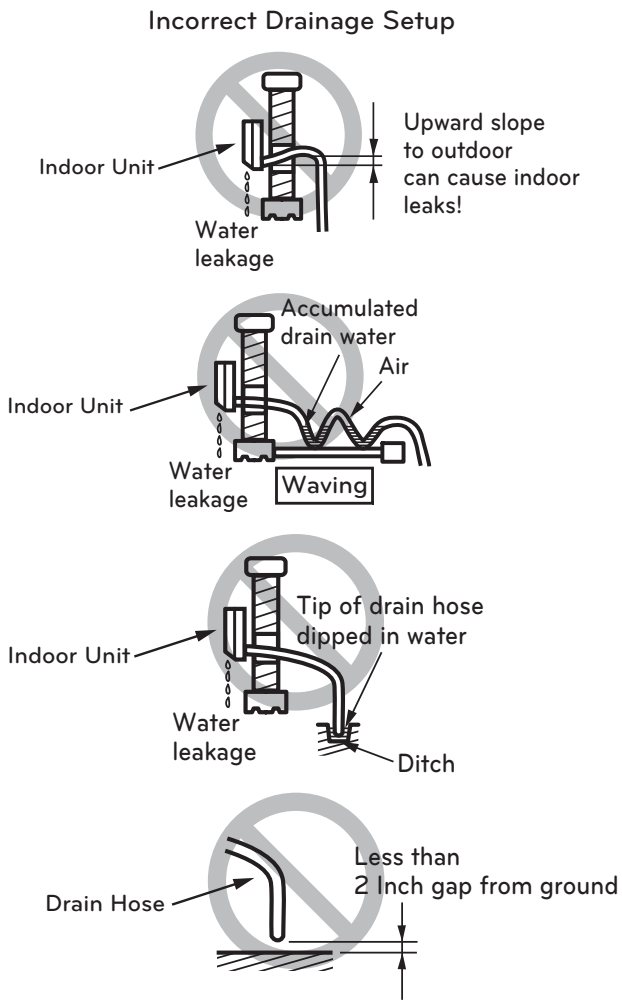


Figure 36: Correct Slope Angle for Drain Hose



Single Zone Wall Mount Outdoor Unit Connections

1. Remove the tubing cover by loosening the fastening screws. See Figure 38 or Figure 38, as appropriate for your unit.
2. Align the center of the refrigerant pipe and corresponding connection as shown in Figure 39.
3. Place a couple of drops of refrigerant oil on the opening rim of the flare before assembling.
4. Refer to Figure 40 or Figure 41 for connecting the refrigerant pipe to the outdoor unit.

Note:

- *Ensure you do not add any contaminants.*
- *Tighten the flare nut initially by hand.*

5. Finish tightening the flare nut with a torque wrench until the wrench clicks. Follow torque guidelines in Table 15.

Note:

When tightening the flare nut with a torque wrench, ensure the direction for tightening follows the arrow on the wrench.

Do not thread liquid or gas piping through bracket used to hold main power cables.

Figure 37: 9k/12k ODU Cover Removal

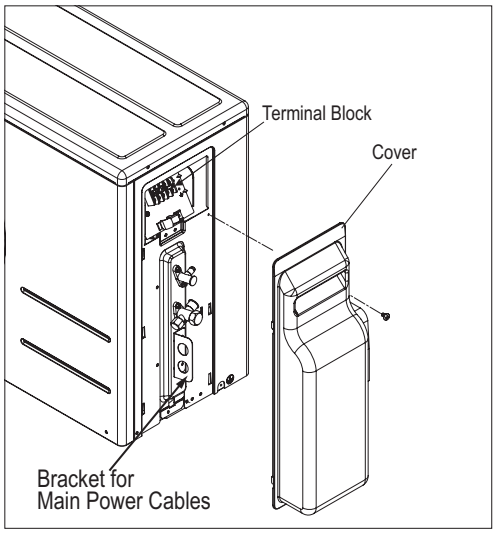


Figure 38: 18k/24k ODU Cover Removal

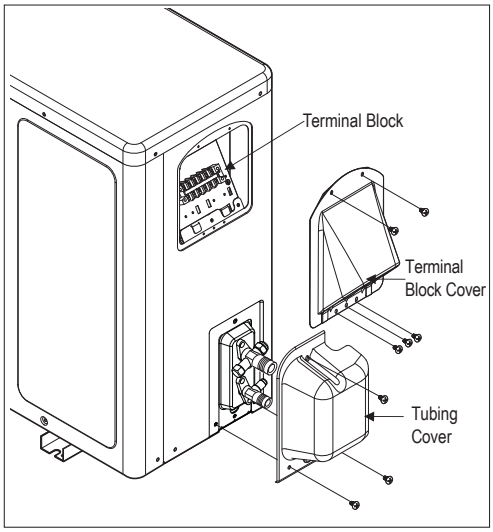


Table 15: Torque Wrench Tightening

Outside Diameter (inches)	Torque (lbs-ft)
1/4	13-18
3/8	24.6-30.4
1/2	39.8-47.7
5/8	45.6-59.3
3/4	71.6-87.5

Figure 39: Refrigerant Pipe Flare Connection

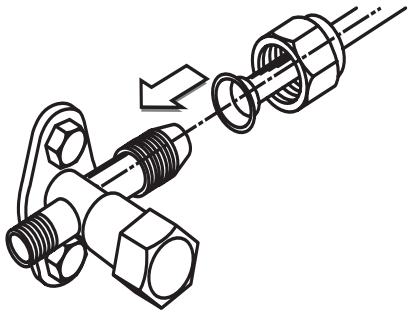


Figure 40: 9k/12k Refrigerant Pipe Connections

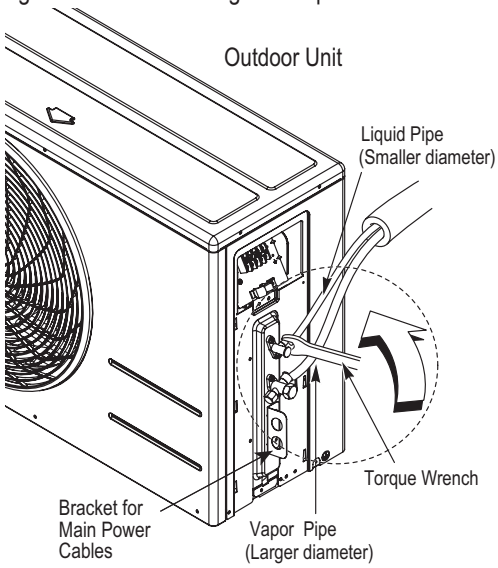
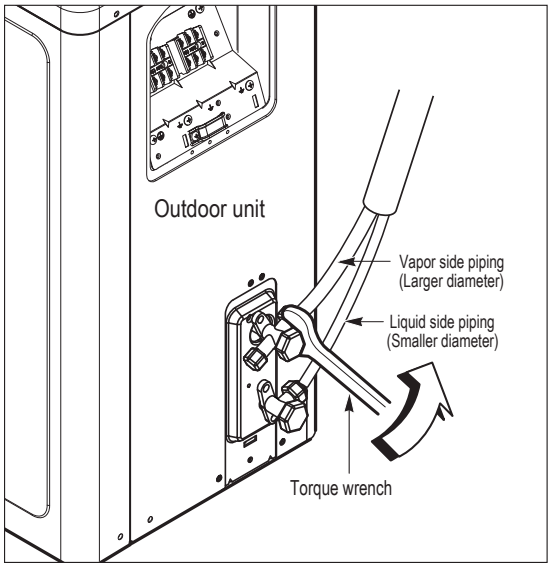


Figure 41: 18k/24k Refrigerant Pipe Connections



REFRIGERANT PIPING CONNECTIONS

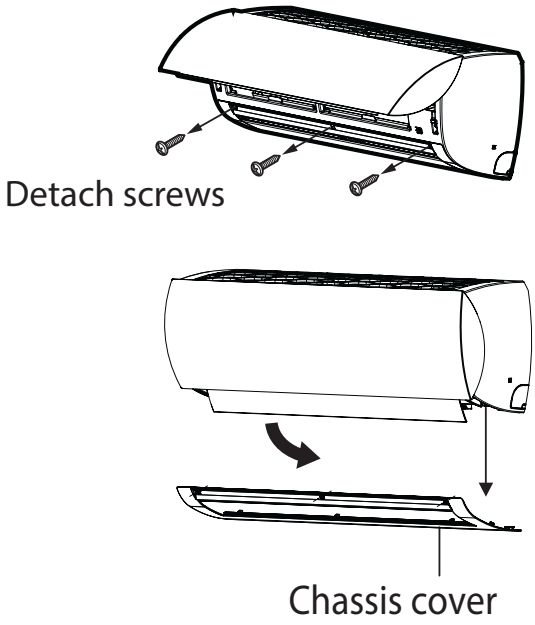
Indoor Unit Connections

Piping to Indoor Unit

Follow the steps below and refer to the illustrations on this page to connect piping to the Single Zone indoor unit. To see specific bundling of piping and drain hose, see Section, *"Bundling and Cutting Line" on page 36. Also, refer back to "Drain Hose Guidelines" section for proper drainage slope during piping procedure.*

1. Open the front panel of the indoor unit (Figure 42).
2. Unscrew the three (3) screws at the bottom of the chassis cover.
3. Remove the chassis cover, being careful not to scratch the main horizontal vane.

Figure 42: Removing Chassis Cover from Indoor Unit.

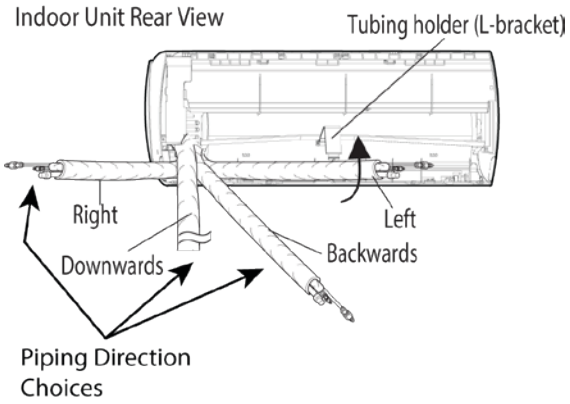


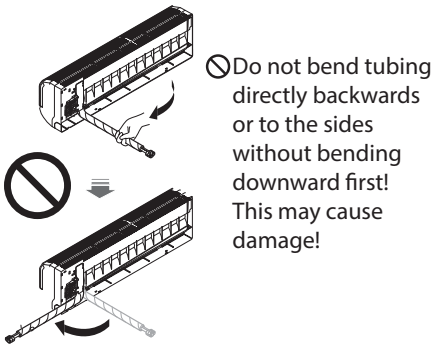
4. From the rear of the indoor unit, carefully bend the copper pipe tubing holder away from the unit to expose for conduit bracket installation area.
5. Remove the pipe port cover.
6. If conduit bracket has not been installed yet, follow Conduit Bracket Placement section instructions on next page before going to next step.
7. Position the bundled tubing by bending slowly downward first, as shown in Figure 43.

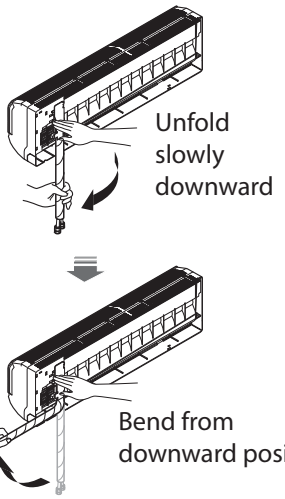
Note:

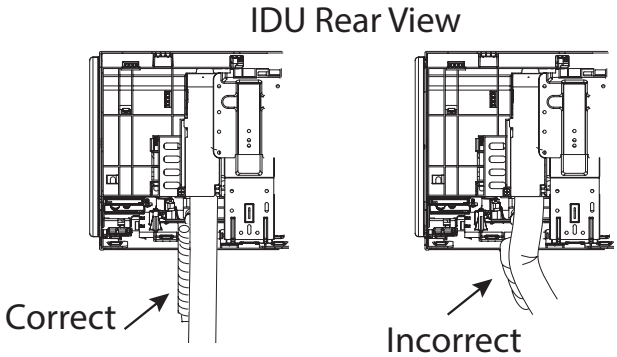
- *Bending the copper tubing directly left or right, without bending downward first, may cause damage.*
- *Always secure the piping using the piping cover.*
- ⃠ *Do not bend the pipes towards the front of the unit as this may damage the unit.*

Figure 43: Bending Pipe Tubing at Rear of Indoor Unit.









Piping to Indoor Unit - Conduit Bracket Placement

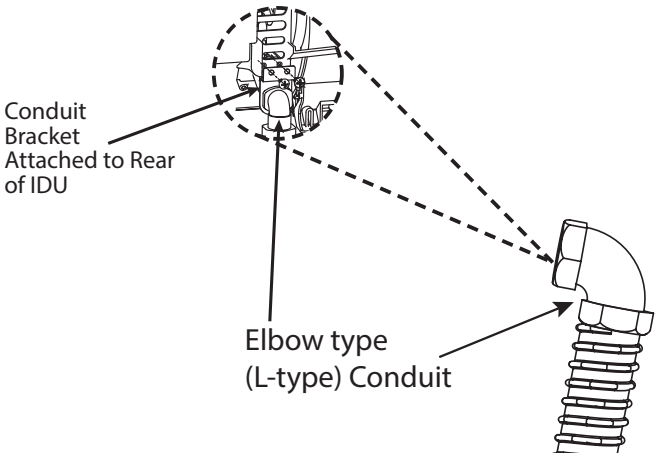
1. Follow steps 1 through 5 on the previous page to position piping at the rear of the indoor unit. Before positioning the refrigerant tubing permanently at the rear of the indoor unit, you must install the conduit bracket.

Art Cool Premier indoor units require an additional conduit "bracket/nut" to be installed at the rear. This allows the electrical connections within the elbow (L-type) conduit (Figure 45) to be held in place at the back of the unit.

2. Set the conduit wiring by using the bracket and "D" screws from the accessory kit. This must be done prior to permanent placement of the piping to the rear of the unit, otherwise you won't be able to reach the conduit once piping and drain hose are in place and anchored.

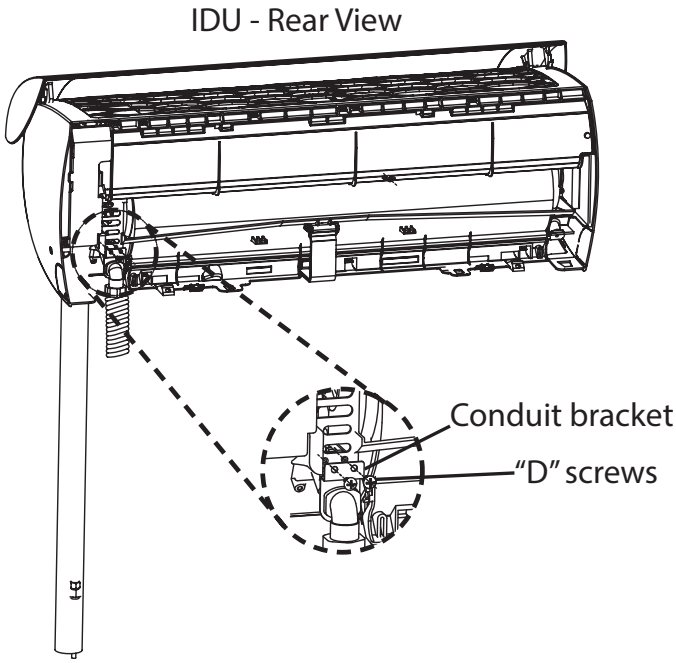
• See Figure 44 for a detailed view of the installation.

Figure 45: L-type Conduit Attachment to Conduit Bracket



For specific bundling (taping) techniques of the Pipe and Drain Hose, see Section, *"Bundling and Cutting Line"* on *page 36.*

Figure 44: Installing Bracket for Conduit



REFRIGERANT PIPING CONNECTIONS

Bundling and Cutting Line

Piping and cabling must be insulated and bundled together correctly for safety and usage. Follow proper methods and procedures as outlined here and on the next pages to ensure installation and piping are correctly installed.

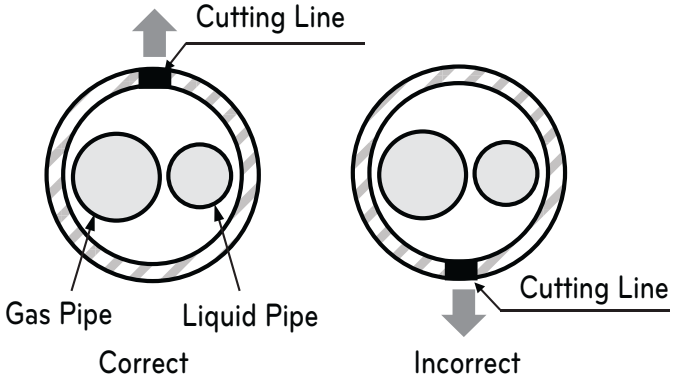
As shown in Figure 46, the connection pipe, along with the indoor unit pipe are fully encased in insulation material.

1. Bind together the two pipes, using vinyl tape. Make sure there are no gaps during the binding.
2. Be sure the tube cutting line is placed upward (Figure 47).
3. Verify that rear piping house section is wrapped with vinyl tape.

• Use a narrow type of vinyl tape for this step.

4. Continue to wrap the Indoor unit pipe as connected to the outdoor connection pipe as shown in Figure 48.

Figure 47: Correct Cutting Line Placement



5. Using a wider vinyl tape, bundle the piping and drain hose together (Figure 49).

• Tape should be sufficient to cover the piping in order to fit into the rear piping housing area at the back of the indoor unit (Figure 49 and Figure 50).

Figure 50: Bundling and Placement at Rear of IDU

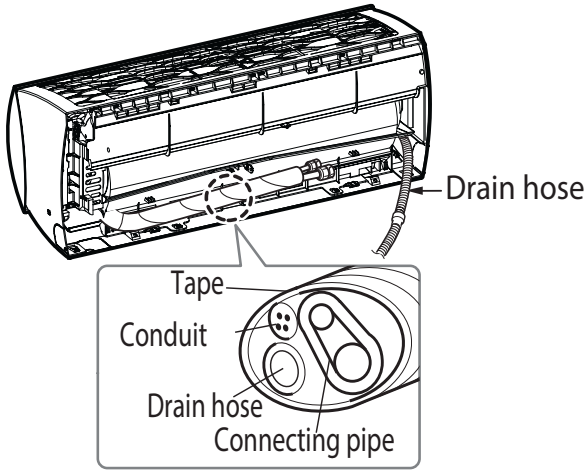


Figure 46: Piping with Insulation Material

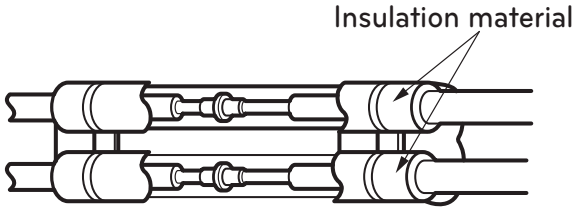


Figure 48: Wrapping Connection Pipe to Indoor Unit's Pipe

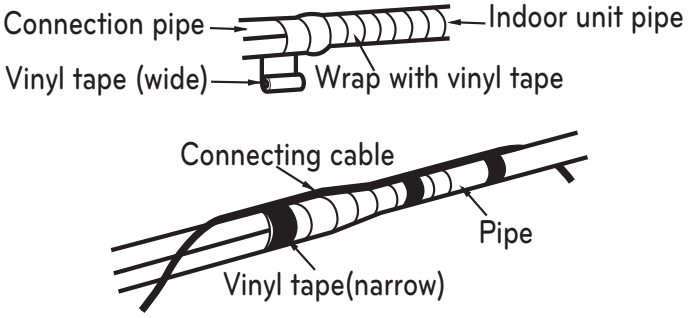
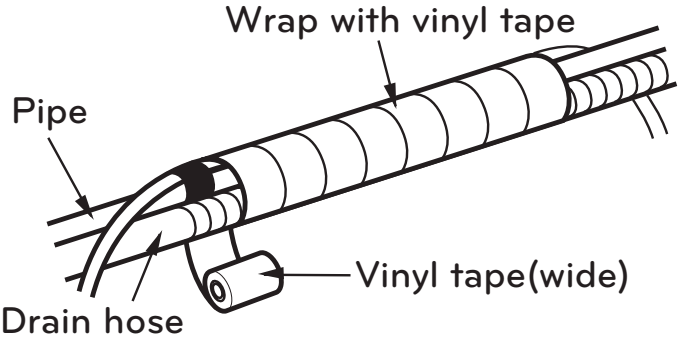


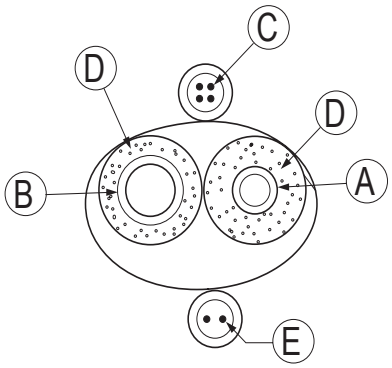
Figure 49: Bundling Pipe and Drain Hose, Rear of IDU



Refrigerant Piping Insulation

To prevent heat loss/heat gain through the refrigerant piping, all refrigerant piping including liquid lines and vapor lines must be insulated separately. Insulation must be a minimum 1/2" thick, and thickness may need to be increased based on ambient conditions and local codes. All refrigerant piping including field-provided isolation ball valves, service valves, and elbows must be completely insulated using closed-cell pipe insulation. All insulation joints must be glued with no air gaps. Insulation material must fit snugly against the refrigeration pipe with no air space between it and the pipe. Insulation passing through pipe hangers, inside conduit, and/or sleeves must not be compressed. Protect insulation inside hangers and supports with a second layer. All pipe insulation exposed to direct sunlight and deterioration-producing elements must be properly protected with a PVC-aluminum vapor barrier jacket, or alternatively placed in a weather-resistant enclosure such as a pipe rack with a top cover. The design engineer should perform calculations to determine if the factory-supplied insulation jackets have sufficient thickness to meet local codes and to avoid sweating at job site conditions. Maximum refrigerant pipe temperature is 227 °F; minimum refrigerant pipe temperature is -4 °F. Add additional insulation if necessary.

Figure 51: Typical Pipe Insulation, Power Wire and Communications Cable Arrangement



Ⓐ Liquid Pipe
Ⓑ Gas Pipe
Ⓒ Power Wiring
Ⓓ Insulation
Ⓔ Communication Cables

Figure 52: Typical Insulation Butt-Joint at Indoor Unit Casing

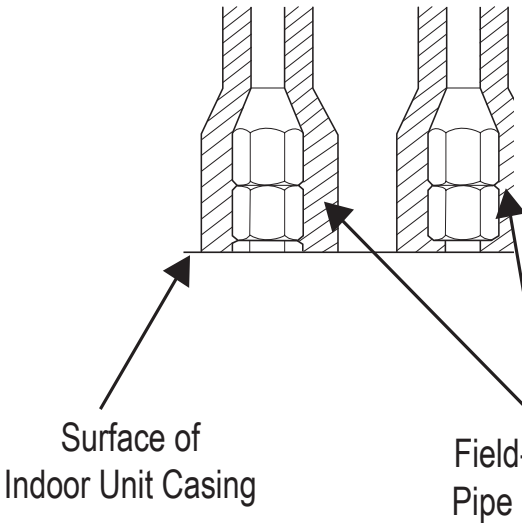
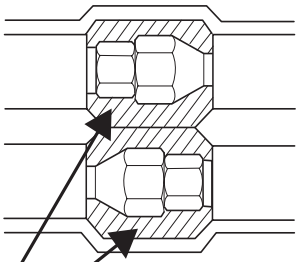


Figure 53: Typical Refrigerant Flare Fitting Insulation Detail



Note:

- ⃠ *Do not insulate gas and liquid pipes together as this can result in pipe leakage and malfunction due to extreme temperature fluctuations.*
- *Be sure to fully insulate the piping connections.*

REFRIGERANT PIPING CONNECTIONS

Refrigerant Piping Insulation

Minimum Refrigerant Pipe Ethylene Propylene Diene Methylene (EPDM) Insulation Wall Thickness Requirements

Note:
Follow locals codes when selecting EPDM insulation wall thickness.

Table 16: Insulation Guidelines for Typical and Special Circumstances

<table>
<tr><th colspan="2" rowspan="2">Classification</th><th colspan="2">Air-conditioned location</th><th colspan="2">Non-air conditioned location</th></tr>
<tr><th>1. Typical location</th><th>2. Special location</th><th>3. Typical location</th><th>4. Special location</th></tr>
<tr><td rowspan="2">Liquid pipe</td><td>ø1/4 inch</td><td rowspan="2">1/2 inch</td><td rowspan="2">1/2 inch</td><td rowspan="2">1/2 inch</td><td rowspan="2">1/2 inch</td></tr>
<tr><td>ø3/8 inch</td></tr>
<tr><td></td><td>≥ø1/2 inch</td><td>1/2 inch</td><td>1/2 inch</td><td>1/2 inch</td><td>1/2 inch</td></tr>
<tr><td rowspan="13">Vapor pipe</td><td>ø3/8 inch</td><td rowspan="7">1/2 inch</td><td rowspan="6">3/4 inch</td><td rowspan="6">3/4 inch</td><td rowspan="13">1 inch</td></tr>
<tr><td>ø1/2 inch</td></tr>
<tr><td>ø5/8 inch</td></tr>
<tr><td>ø3/4 inch</td></tr>
<tr><td>ø7/8 inch</td></tr>
<tr><td>ø1 inch</td></tr>
<tr><td>ø1-1/8 inches</td><td rowspan="6">3/4 inch</td></tr>
<tr><td>ø1-1/4 inches</td><td rowspan="5">1 inch</td><td rowspan="5">1 inch</td></tr>
<tr><td>ø1-3/8 inches</td></tr>
<tr><td>ø1-1/2 inches</td></tr>
<tr><td>ø1-3/4 inches</td></tr>
</table>

1. Typical location (Air-conditioned location): When the piping passes through an indoor area where the indoor unit operates.

• Apartment, classroom, office, mall, hospital, etc.

2. Special location (Air-conditioned location):

1. When the location is air conditioned, but there is severe temperature/humidity difference due to high ceilings.

• Church, auditorium, theater, lobby, etc.

2. When the location is air conditioned, but internal temperature/humidity are high.

• Bathroom, swimming pool, locker room, etc.

3. Typical location (Non-Air conditioned location): When the piping passes through an indoor area where the indoor unit does not operate.

• Hallway or a dormitory or school, etc.

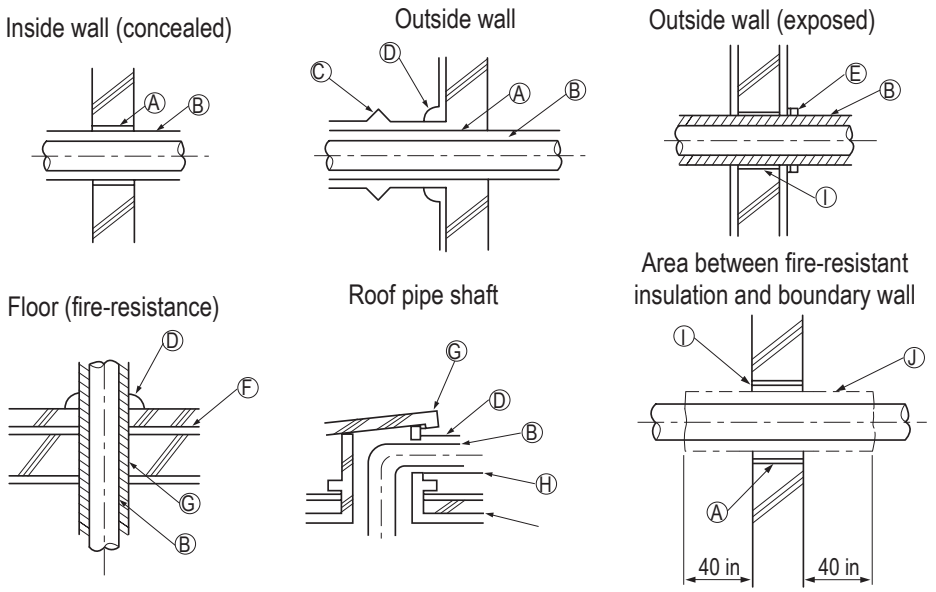
4. Special location (Non-Air conditioned location): If conditions 1 and 2 below are present.

1. When the piping passes through an indoor area where the indoor unit does not operate.
2. When the humidity is high and there is no air flow in the location where the piping is installed.
   • The thickness of the above insulation material is based on heat conductivity of 0.61 Btu/in/h/ft^2/°F.

Pipe Sleeves at Penetrations

LG requires that all pipe penetrations through walls, floors, and pipes buried underground be properly insulated and routed through an appropriate wall sleeve of sufficient size to prevent compression of refrigerant pipe insulation and free movement of the pipe within the sleeve. Underground refrigerant pipe shall be routed inside a protective sleeve to prevent insulation deterioration.

Figure 54: Pipe Sleeves at Penetrations



Ⓐ Sleeve
Ⓑ Insulation
Ⓒ Lagging
Ⓓ Caulk
Ⓔ Band
Ⓕ Water-resistant layer
Ⓖ Sleeve with edge
Ⓗ Lagging
Ⓘ Mortar or other fire-resistant caulk
Ⓙ Fire-resistant insulation

When filling an access hole with mortar, cover the area with steel plate so that the insulation will not fall through. For this area, use fire-resistant materials for both the insulation and cover.

⃠ Do not use vinyl cover.

Note:
Diameter of penetrations shall be determined by pipe diameter plus the thickness of the insulation.

REFRIGERANT PIPING CONNECTIONS

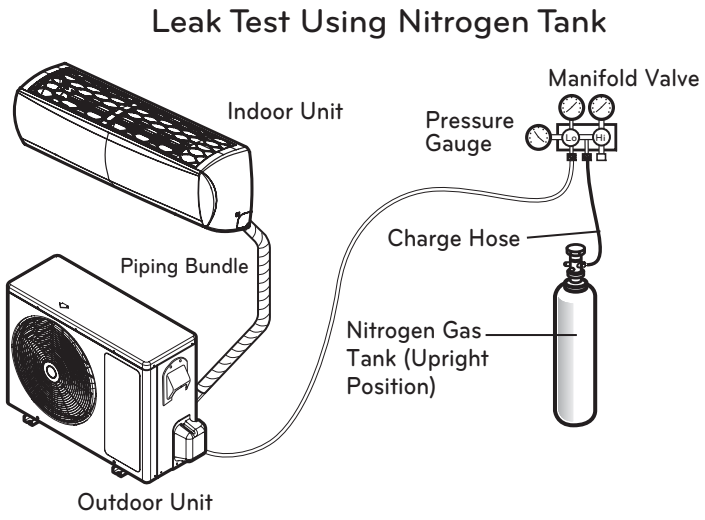
Leak Test/Soap Method Check

Leak Test

Note:

Perform the leak test by pressurizing nitrogen gas to 550 psi on both the liquid and gas pipes. Test with the piping service valves closed. If the pressure does not drop for twenty-four (24) hours, the system passes the test. If the pressure drops, there is a nitrogen leak in the system. Find the leak, repair, and then test again.

Figure 55: Leak Test Diagram.



Soap Water Method - Leak Testing

1. Remove the caps from the 2-way and 3-way valves. See Figure 53.
2. To open the 2-way valve turn the valve stem counter-clockwise approximately 90°, wait for about 2~3 sec, and close it.
3. While running the nitrogen gas tank hookup, apply a soap water or a liquid neutral detergent on the indoor unit connection or outdoor unit connections by using a soft brush.
4. While running the pressure gauge system, observe the connections for any leakage.

• If you see bubbles appearing at any of the connection points/joints (at either inside and outside units), it is an indication of leakage.

5. Make a note of where the leaks are coming from along the liquid and gas piping.
6. Disengage the nitrogen pressure by loosening the charge hose connector at the Nitrogen cylinder (Figure 55 above).
7. Once system pressure is reduced back to normal range, disconnect hose from the cylinder.
8. At this point you will need to make all repairs to connections and piping where bubbles were observed.
9. Once all repairs are made, repeat soap testing using nitrogen cylinder and check for any further leaks.
10. Once system is leak free, proceed to Evacuation steps.

Pressure Gauge Hookup

1. Connect the manifold valve (which includes the pressure gauges), along with dry nitrogen gas cylinder to the service valves using charge hose (Figure 55).
2. Pressurize the system to maximum 550 P.S.I.G. with dry nitrogen gas and close the cylinder valve when the gauge reading reaches 550 P.S.I.G.

⚠ DANGER

Using combustible gases such as oxygen runs the risk of fire and/or explosion resulting in death.

⚠ WARNING

Using combustible gases such as oxygen runs the risk of fire, explosion and personal injury. Use inert gas (nitrogen) when checking plumbing leaks, cleaning or repairs of pipes, etc.

Note:

- *To avoid nitrogen entering the refrigerant system in a liquid state, the top of the cylinder must be higher than its bottom when you pressurize the system.*
- *Be sure a cylinder is used in a vertical standing position.*

Leak Test Ambient Temperature Correction

If the ambient temperature changed between the time when pressure was applied and when the pressure drop was checked, adjust results by factoring in approximately 1.45 psi for each 2°F of temperature difference.

Correction formula = (Ambient temperature when pressure was applied - Ambient temperature when pressure drop was checked) x 0.01.

Example:

When pressure (550 psig) was applied, the ambient temperature was 80.6 °F; 24 hours later when pressure drop (540 psi) was checked, ambient temperature was 68 °F.

Thus, 80.6 - 68 x 0.01 = 0.126. In this case, the pressure drop of 0.126 was due to temperature difference, therefore, there is no leak in the refrigerant piping system.

Evacuation

After successful leak testing has been performed, follow Evacuation procedure. Follow the same steps for charge hose hookup to the system. See Figure 55 on previous page for proper hookup.

Procedure

1. Confirm that the “Lo” knob of the manifold valve is open. Refer back to Figure 55.
2. Confirm that the “Hi” knob of the manifold valve is left closed.
3. Run the Vacuum pump.

• Operate pump until system is evacuated down to 300 microns.

• Run pump an additional 15 minutes after reaching micron level.

The duration of the operation of the vacuum pump will vary according to pipe length and the capacity of the pump. Refer to Table 16 for accurate time duration.

4. Turn off the pump and leave the connections secured to the two service valves.
5. Wait 5 minutes.
6. If the system fails to hold 500 microns or less, check all connections for tight fit and repeat the evacuation procedure.
7. Once, desired vacuum is reached, close the “Lo” knob of the manifold valve and stop the vacuum pump.
8. Proceed to *Finishing the Job* section, below.

Finishing the Job

Once the Evacuation procedure has been performed, follow the steps below to turn off all valves at the outdoor unit and safely disengage the manifold valve, along with the vacuum pump. Refer back to the illustrations and tables on the previous pages as you go through the steps below.

Procedure

1. Using a wrench, turn the valve of the liquid stem counter-clockwise to fully open the valve (Figure 55 on previous page).
2. Turn valve of gas stem counter-clockwise to fully open valve.
3. Loosen the charge hose connected to the gas side service port slightly to release the pressure, and then remove the hose.
4. Replace the flare nut and its cap on the gas service port and fasten the flare nut securely using an adjustable wrench.

• This process is very important to prevent leakage from the system.

5. Replace the valve caps at both gas and liquid side service valves and then fasten them tightly.

• Once done, this will complete the air purging process with a vacuum pump.

Charging

Each outdoor unit is factory charged (nameplate charge) for the evaporator as well as a standard 41 ft line. Any time a line set is used that is longer then the standard 41 ft line set length, the refrigerant charge has to be adjusted.

You must adjust the charge based on how many feet of piping are added based on 0.22 oz. of R410A per foot for 9k/12k units and 0.38 oz for 18k/24k units. The factory charge accommodates pipe lengths up to the standard length without requiring refrigerant removal.

Test Run

After leakage testing, and evacuation procedure the system should be ready to start up for a test run. Follow the guidelines below for proper procedure.

- Check that all tubing, piping and wiring are properly connected.
- Make sure that the gas and liquid service valves are fully open.
- Start up the system and do a test run.
- As system is up and running verify all is in working order and make notes as needed to work around any issues that might crop up.

Note:

If you are uncertain of the unit charge, reclaim, evacuate and weigh in the correct charge using the unit nameplate (capacity) charge adjusting for line sets longer or shorter than 41 ft. This will prevent any interruptions to the functioning of the unit and possible damage.

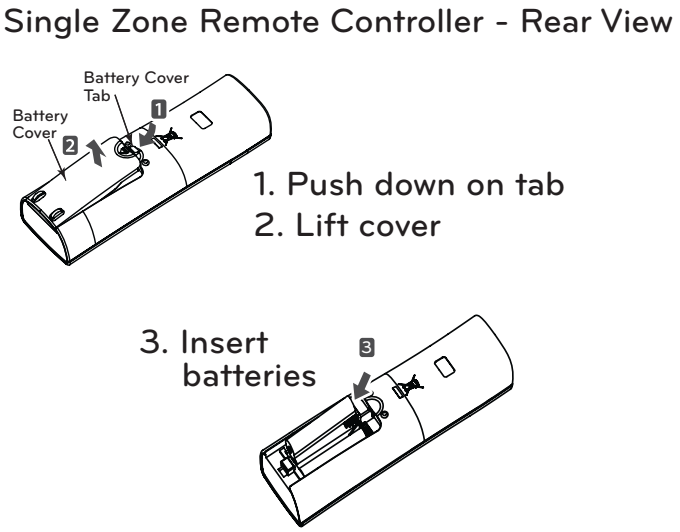
Example: A 50ft line set is used when installing a 12k unit--

9 additional feet x 0.22 oz per ft = Add 1.98 oz of R410A

Table 17: Charging - Additional Refrigerant

Capacity (Btu/h) HYV1	Pipe Size		Standard Length (ft)	Max. Elevation (ft)	Max. Length (ft)	Min. Length (ft)	Additional Refrigerant If Longer Than 41 ft. (oz/ft)
	Vapor	Liquid					
9k, 12k	3/8	1/4	41	32.8	65.6	6.6	0.22
18k, 24k	5/8	3/8	24.6	65.6	98.4	9.8	0.38

Figure 56: Wireless Controller - Installing Batteries



Installing Batteries into Wireless Controller

As part of test running, you will need to insert batteries and power on the wireless controller. Follow the steps below to insert the batteries. For information on using the wireless controller, refer to its owner's manual.

Procedure

1. The wireless controller needs two AAA (1.5V) batteries (non-re-chargeable) for operation. Remove the battery cover from the back of the wireless controller (Figure 56).

• Push downward on the tab at the top of the battery cover and then lift up to remove.

2. Insert the two new batteries.

• Align batteries by the (+) and (-) sides.

• The interior battery compartment of the wireless controller will have clear markings for the (+) and (-) placement.

3. Verify that the batteries have "clicked" into the compartment and are firmly engaged with the contacts on either side of them.
4. Reattached the back cover of the wireless controller.
5. Proceed with powering on the wireless controller and usage as needed.

⚠ WARNING

⃠ Never air purge with refrigerant as it can lead to refrigerant leakage which can cause bodily harm and injury, especially if inhaled.

Note:

Use a vacuum pump that can evacuate down to 500 microns.

1. If moisture remains in the piping after the system is evacuated for two (2) hours, break the vacuum (down to 7.5 psi with nitrogen gas).
2. Evacuate the system again with the vacuum pump for at least one (1) hour to 500 microns.
3. If the system does not reach 500 microns within two (2) hours, repeat the vacuum break and evacuation procedure until the gauge does not rise.

Pump Down Procedure

This procedure is performed when a unit has to be relocated or the refrigerant circuit is serviced. “Pumping down” is a term used to mean collecting all refrigerant into the outdoor unit without the loss of any refrigerant. Follow the procedure and guidelines below to safely collect refrigerant back into the outdoor unit. Always adhere to and be familiar with local codes regarding the handling of refrigerant.

The system must be placed in Cooling mode in order to proceed with the pump down procedure.

1. Place the system in cooling mode. If needed, refer to the section below for proper steps to place the unit into Cooling Mode.
2. Connect a low-pressure gauge with manifold hose to the charge port on the gas line service valve.
3. Open the gas line service valve halfway.
4. Purge the air in the manifold hose using the refrigerant.
5. Close the liquid line service valve all the way.
6. Turn on the unit’s power switch and start the cooling mode operation.
7. Observe the pressure gauge reading. When it gets to 1 to 0.5 kg/cm2G (14.2 to 7.1 P.S.I.G), fully close the gas line valve and then immediately turn the unit off.

• Pump down procedure is complete at this time and all refrigerant should be collected into the outdoor unit.

Enabling Cooling Only Mode

Before performing the Pump Down procedure, the system must be in Installer Mode and then must be placed into Cooling Only Mode.

1. Turn off the IDU by pointing the IDU wireless controller at the IDU infrared receiver and press the OFF button on the wireless controller.
2. Simultaneously press the recessed Reset button (small hole) and the JET MODE buttons.
3. To activate Cooling Only mode, set the code to 45 on the wireless controller display and press the Power-ON button.
4. The IDU should beep to acknowledge that code has been received.
5. Remove system power at the ODU power circuit breaker. Wait for a minimum of 30 seconds.
6. Reapply power to the system at the ODU power circuit breaker.

⚠ WARNING

⃠ Do not inhale or handle refrigerant directly. Doing so may cause bodily harm and injury.

Note:

Perform Pump Down procedure only in the cooling mode.

Disabling Cooling Only Mode

After the Pump Down procedure is successfully completed, disable Cooling Only Mode to enter normal operating mode. Follow the procedure below.

1. Turn off the IDU by pointing the IDU wireless controller at the IDU infrared receiver and press the OFF button on the wireless controller.
2. Simultaneously press the Reset button (small hole) and JET MODE buttons.
3. To deactivate Cooling Only mode, set the code to 46 on the wireless controller display and press the Power-ON button.
4. The IDU should beep to acknowledge that code has been received.
5. Remove system power at the ODU power circuit breaker. Wait for a minimum of 30 seconds.
6. Reapply power to the system at the ODU power circuit breaker.

Note:

- *Once the system is in Installer Mode (with Cooling Only Mode initiated), automatic operation is suspended.*
- *Once Cooling Only Mode is disabled, the unit will return to normal operation.*
- *Installer Code cannot be entered if the indoor unit is running. The indoor unit must be powered off.*
- *WLAN Module’s communication time will lag by about 1 minute after unit is turned back on and in normal operating mode.*
- *Entire lock or Mode lock cannot be set if you set heating or automatic operation through the central controller.*

ELECTRICAL WIRING

General Information and Safety Guidelines

⚠ WARNING

- *All power wiring and communication cable installation must be performed by trained service providers working in accordance with local, state, and National Electrical Code regulations related to electrical equipment and wiring, and following the instructions in this manual. Electric shock can cause physical injury or death.*
- *Undersized wiring may lead to unacceptable voltage at the unit and may cause a fire hazard. Fire can cause physical injury or death.*
- *Properly ground the outdoor and indoor units. Ground wiring must always be installed by a trained technician. Ground wiring is required to prevent accidental electrical shock during current leakage. Incorrect grounding can cause electric shock, physical injury, or death.*
- ⃠ *Do not connect ground wire to refrigerant, gas, or water piping; to lightning rods; to telephone ground wiring; or to the building plumbing system. Failure to properly provide a National Electrical Code-approved earth ground can result in electric shock, physical injury, or death.*
- *Verify that the branch switch and circuit breaker are set to OFF before installing the wiring system. Electric shock can cause physical injury or death.*
- *Install appropriately sized breakers/fuses/overcurrent protection switches and wiring in accordance with local, state, and National Electrical Code regulations related to electrical equipment and wiring, and following the instructions in this manual. Using an oversized breaker or fuse may result in electric shock, physical injury or death.*

Note:

- *Consider ambient conditions (temperature, direct sunlight, inclement weather, etc.) when selecting, installing, and connecting the power wiring.*
- *Properly ground the outdoor and indoor unit. Improperly grounded wire can cause communication problems from electrical noise, and motor current leakage. Ground wiring must always be installed by a trained technician.*
- *If the system operates in reversed phase, it may damage the compressor and other components.*
- *If there is a possibility of reversed phase, phase loss, momentary blackout, or the power goes on and off while the system is operating, install a field-supplied phase loss protection circuit.*
- ⃠ *Do not connect ground wire to refrigerant, gas, or water piping; to lightning rods; to telephone ground wiring; or to the building plumbing system. Failure to properly provide a National Electrical Code-approved earth ground can result in property damage and equipment malfunction.*
- *Install appropriately sized breakers/fuses/overcurrent protection switches and wiring in accordance with local, state, and National Electrical Code regulations related to electrical equipment and wiring, and following the instructions in this manual. Using an oversized breaker or fuse may result in equipment malfunction and property damage.*
- *Use only copper wiring that is stranded and shielded with the wires separately insulated.*
- ⃠ *Do not use a multi-conductor cable with more than five (5) wires in one (1) core.*
- *Power wiring and communications cable sizes must comply with applicable federal UL/ETL, state, and local codes.*
- ⃠ *Do not operate the air conditioning system until the refrigerant piping installation is complete. Operating the system before refrigerant piping is finalized may damage the compressor.*
- *Install a main shutoff switch or circuit breaker that interrupts all power sources simultaneously (circuit breaker should be resistant to electromagnetic currents).*
- *Use ring or spade terminals to attach the wiring. Verify that all power wiring and communications cable terminals are securely attached. Ensure enough slack is included in the wiring and cables to avoid damaging the connections.*
- *Use a conduit to protect the power wiring.*
- *Undersized wiring may lead to unacceptable voltage at the unit and may cause unit malfunction.*

Power Supply / Power Wiring Specifications

Note:

- *Single Zone systems operate at 1Ø, 208-230V, 60Hz, with the exception of Mega 115V, which operates at 1Ø, 115V, 60Hz.*
- *Power supply, wire type and size should be selected based on National Electrical Code and local codes. Maximum allowable voltage fluctuation ±10% or nameplate rated value. Refer to Figure 57 for wiring guidelines.*
- *Properly ground the Single Zone outdoor unit and indoor unit per National Electrical Code and local codes.*
- *Use only copper wiring that is stranded and shielded with the wires separately insulated to avoid contact.*
- *Ground wire should be longer than the common power/communication wires.*
- *Refer to the inside of the Chassis Cover for Circuit and Terminal Block Diagrams for your model unit.*
- *Always match color codes of each wire and follow wiring diagram.*

Connecting the Power Wiring Guidelines

Best practice dictates using ring or spade terminals to terminate power wiring at the power terminal block (Figure 58).

If ring terminals or spade clips are not available, then:

⚠WARNING

⃠ Do not terminate different gauge wires to the power terminal block. Slack in the wiring may generate heat and fire.

Note:

- *When terminating wires of the same thickness, follow the instructions demonstrated in the illustrations below at Figure 59.*
- *Firmly attach the wire; secure in a way to prevent external forces from being imparted on the terminal block.*
- *Use an appropriately sized screwdriver for tightening the terminals.*
- *⃠ Do not over tighten the connections; over-tightening may damage the terminals.*

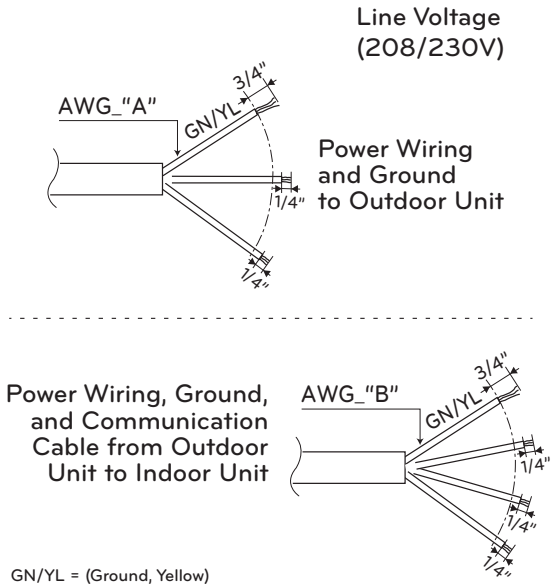


Figure 57: Single Zone Outdoor and Indoor Wiring and Communications Cable Diagram

Figure 58: Close up of a Typical Ring Terminal

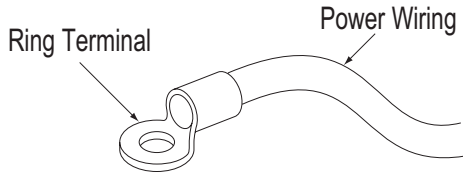
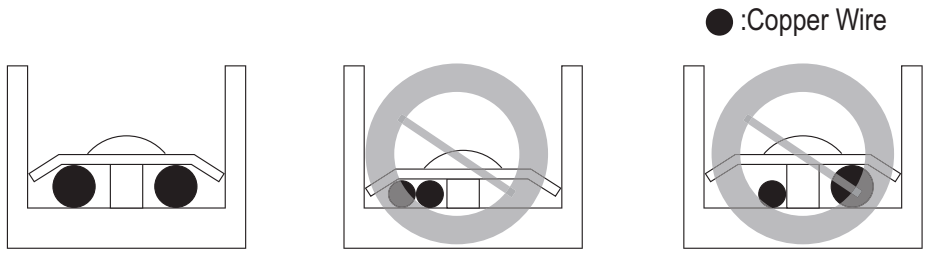


Figure 59: Proper and Improper Power Wiring Connections



ELECTRICAL WIRING

Power Wiring Specifications and Best Practices

Power Supply / Power Wiring Specifications - Continued

⚠WARNING

- *If power wires are not properly terminated and firmly attached, there is risk of fire, electric shock, and physical injury or death.*
- ⃠ *Never ground the shield of the communications cable to the indoor unit frame or other grounded entities of the building. There is risk of fire, electric shock, and physical injury or death.*

Note:

- ⃠ *Never apply line voltage power to the communications cable terminal block. If contact is made, the PCBs may be damaged.*
- *Always include some allowance in the wiring length when terminating. Provide some slack to facilitate removing the electrical panels while servicing.*

General Communication Cable Specifications

- Use a four (4)conductor, stranded, shielded or unshielded cable between the Single Zone outdoor unit and the indoor unit. If shielded, it must be grounded at Outdoor unit chassis only. Must comply with applicable national code.
- Minimum 18 gauge shielded CVVS or CPEVS cable.
- Insulation material as required by local code.
- Rated for continuous exposure of temperatures up to 140 °F.
- Maximum allowable cable length: 984 feet.
- Firmly attach the cable; provide slack but secure in a way to prevent external forces from being imparted on the terminal block.
- Wiring should be completed without splices.
- Terminate the cable shield to a grounded surface at the outdoor unit only.

Note:

- *Always verify the communication cable is connected to a communications terminal on the Single Zone unit.*
- ⃠ *Never apply line voltage power to the communication cable connection. If contact is made, the PCBs may be damaged.*
- *The shield of the communications cable connecting the outdoor unit to the indoor unit should be grounded only to the outdoor unit frame.*
- *Tie the shield of each cable segment together using a wire nut at each indoor unit. Maintain polarity throughout the communication network.*
- *Position the outdoor unit communications cables away from the power wiring.*
- *Never use a common multiple-core communications cable. Each communications bus shall be provided a separate cable (i.e., between outdoor unit and indoor unit).*

Controllers

Refer to Table 18 as to which wireless controller models to use for each Single Zone model. Once all wiring is connected to the indoor and outdoor units, be sure to test the accompanying wireless controllers for performance. As always, follow all safety warnings and notes when operating the Single Zone units using the wireless controller.

Table 18: Single Zone Model and Associated Wireless Controller Model

Single Zone Model Type	Wireless Controller Model
LA090HYV1, LA120HYV1	AKB73835320
LA180HYV1, LA240HYV1	AKB74835304

ELECTRICAL WIRING

Indoor Unit Electrical Connections

Overview - Connecting Indoor Unit Electrical Wiring

The general guidelines for connecting electrical and communication cables to the indoor unit are the same for each of the Single Zone Wall Mounted indoor units. However, the actual connections on the terminal block will differ.

⚠WARNING

- *Be sure that main power to the unit is completely off before proceeding with these steps. Failure to do so may cause shock or bodily injury.*
- *Follow all safety and warning information outlined at the beginning and throughout this manual. Failure to do so may cause bodily injury.*

Note:

- *Follow all safety and warning information outlined at the beginning and throughout this manual. Failure to do so may cause unit failure.*
- *Some units might require you to remove the Control Cover from the terminal block area. Most Control Covers are attached with a phillips screw head.*
- *Connect the electrical cable to the indoor unit by connecting the wires to the terminals on the control board individually according to the outdoor unit connection. Be sure that the color of the wires at the outdoor unit along with the terminal numbers are the same as those for the indoor unit.*

Procedure

⚠WARNING

Be sure there is no power going through the Single Zone system before proceeding with these connections as there can be a risk of electrical shock and bodily injury.

1. At the bottom panel of the indoor unit, unsnap the latches which cover the phillips screw heads as shown in Figure 60.
- Normally, there are three (3) screws on the panel, however your indoor unit model may differ.
2. Using a phillips head screwdriver, remove the screws from the bottom panel of the indoor unit and set aside (Figure 61).
3. Remove the bottom panel (Figure 62).
- Removal is necessary to gain access to the terminal block which is situated at the bottom of most indoor units.
- Note that the electrical/communications wiring is usually routed through the back/bottom of the indoor unit (through a knockout panel) as shown on the next page (Figure 63).
4. Using a screwdriver, connect the wires as shown on the next page (Figure 64).
- Each wire should be securely attached to the terminal block.
- Pay attention to the location/connection of the green/yellow ground cable.

Figure 60: Latch over Screws on Bottom Panel, Indoor Unit

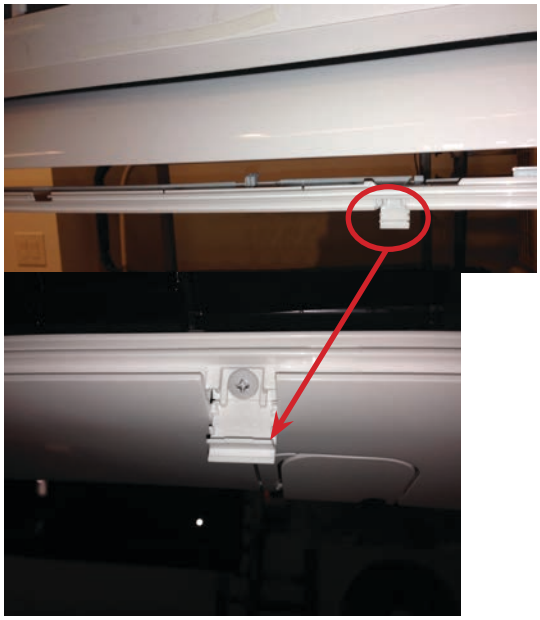


Figure 61: Remove Screws from Bottom Panel

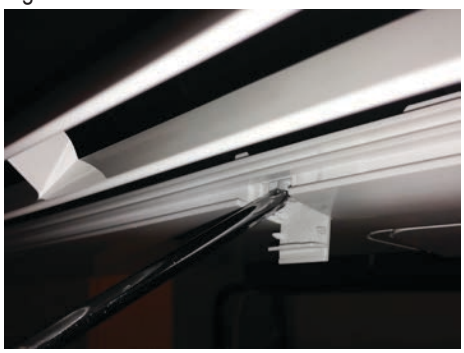


Figure 62: Remove (and Reattachment) Bottom Panel

Overview - Connecting Indoor Unit Electrical Wiring - Continued

5. When done, reattach the bottom panel to the indoor unit, being careful to align panel using the rear tabs.

• *You might need to give the panel a gentle tap with the palm of your hand to be sure it engages at the bottom.*

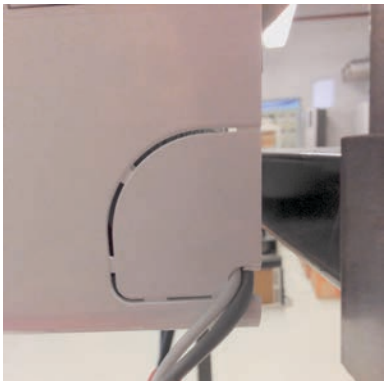
6. Using a phillips screwdriver, reattach the screws to the bottom panel and secure.
7. Once screws are in place, re-snap the latches over the screws.

• Refer back to Figure 60 as an example.

8. If all other piping and electrical wiring to the outside unit has been completed at this stage, you can turn the system on to test.

• ⃠ If you have not completed the piping connections, do not turn power on at this time. Proceed to complete all other piping (along with drain hose) and wiring to the system.

Figure 63: Indoor Unit Knockout (Communication Wires)



Indoor Terminal Block Connections

See Figure 64 and Figure 65 for typical indoor unit terminal wiring.

Figure 64: Typical Indoor Unit Terminal Block with Grounding Cable

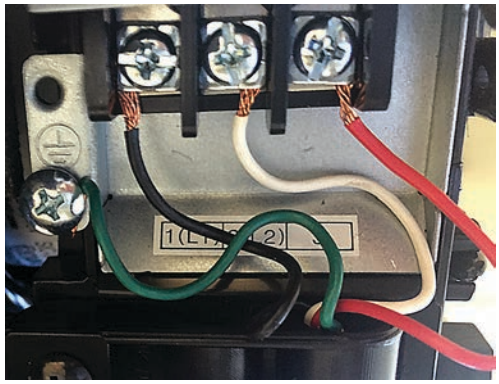
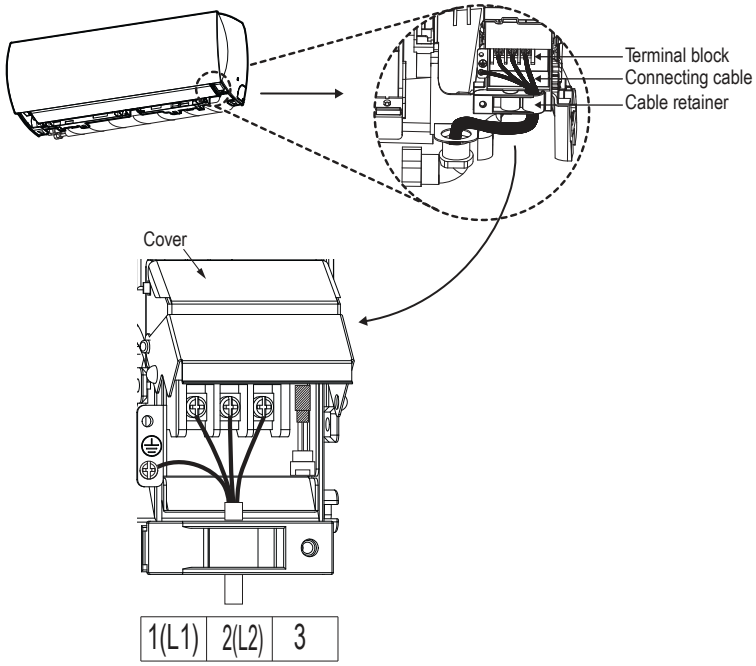


Figure 65: Typical Indoor Unit Wiring Diagram



ELECTRICAL WIRING

Outdoor Unit Electrical Connections

Connecting Outdoor Unit Electrical Wiring

The general guidelines for connecting electrical and communication cables to the outdoor unit are the same for each of the Single Zone Wall Mount units. However, the actual connections on the terminal block will differ. See each illustration for the Single Zone unit model that you are installing for correct wiring of each terminal block.

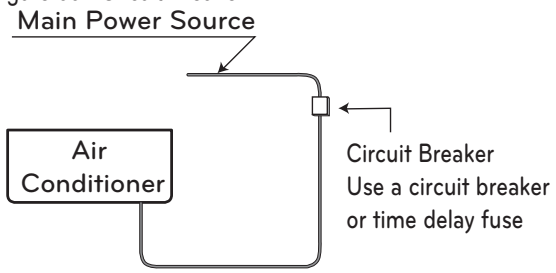
⚠WARNING

- *Be sure that main power to the unit is off before proceeding with these steps. Follow all safety and warning information outlined at the beginning of this manual. Failure to do so, may cause bodily injury.*
- *Be sure that a circuit breaker or some other emergency power cutoff device is in place before any power wiring is done to the system. Failure to do so, may cause bodily injury or death.*
- ⃠ *Never touch any power lines or live cables before all power is removed from the system. To do so may cause bodily injury or death.*

Procedure

Refer to Figure 66 below for an example of how a circuit breaker should be wired through to the Single Zone system.

Figure 66: Circuit Breaker



⚠WARNING

- *Be sure there is no power going through the Single Zone system before connecting wiring as it may result in electric shock, physical injury, or death.*
- *Familiarize yourself with the location of the circuit breaker and be sure that all power is removed from the Single Zone unit as it may result in electric shock, physical injury, or death.*

1. Using a phillips head screwdriver, remove the conduit panel cover from the outside unit. Refer to Figure 67 or Figure 68.
2. Before proceeding, inspect all wiring inside the casing to be sure they are secure and have not come loose during transportation and installation of the outdoor unit.
   - Loose wires can cause the wiring to burn out quickly.
   - Inspect wires for any damage or cracks (manufacturing defects).
3. Confirm that electrical power supply capacity is sufficient to run the unit. See specifications sheets at the beginning of this installation manual for details on power.
4. Confirm the wiring is the right gauge size to meet local code.
5. Using a screwdriver, connect the wires as shown in Figure 69 for 9k/12k units or Figure 70 for 18k/24k units.
   - Each wire should be securely attached to the terminal block.
   - Bundle the cabling by using a cable restrainer.
   - Pay attention to the location/connection of the green/yellow grounding cable. In some models the connection may be located to the side of the terminal block.
   - Maintain a minimum of .2” of wire length from terminal block to cable bundle.

Figure 67: 9k/12k ODU Cover Removal

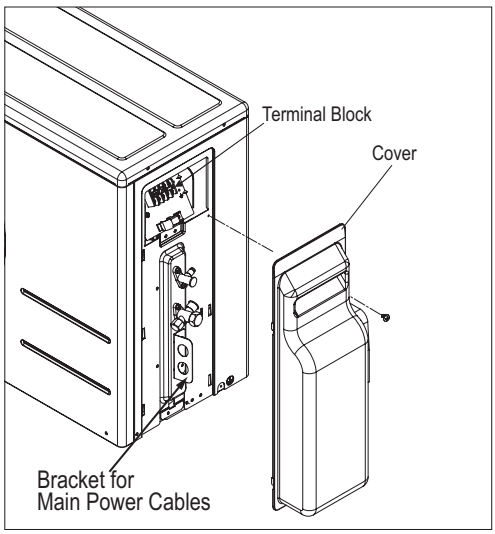


Figure 68: 18k/24k ODU Cover Removal

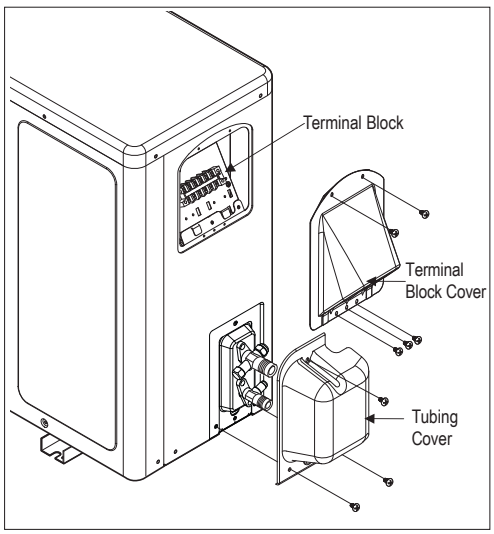


Figure 69: 9k/12k ODU to IDU Wiring

LA090HYV1/LA120HYV1

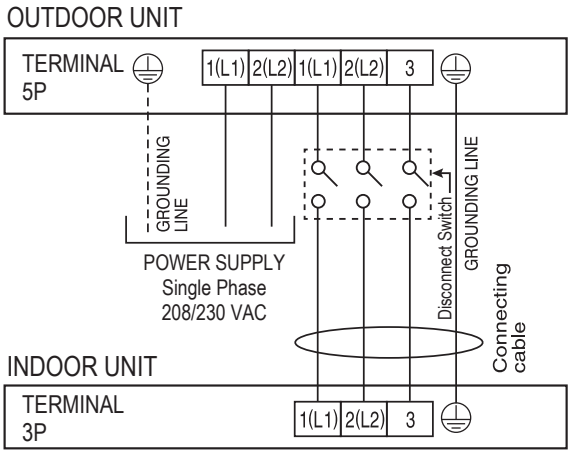
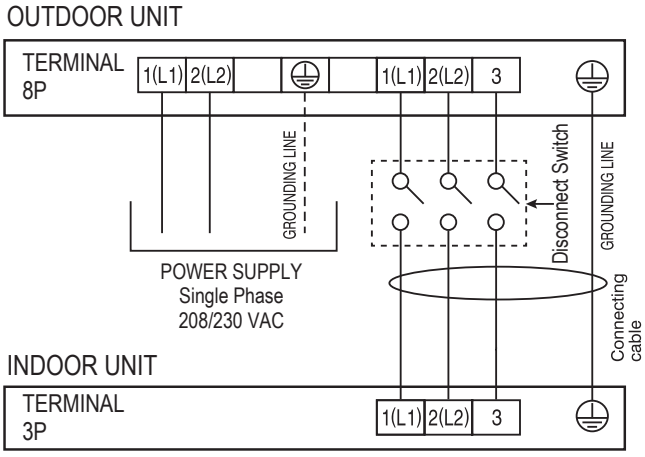


Figure 70: 18k/24k ODU to IDU Wiring

LA180HYV1/LA240HYV1



Note

- Install a field supplied disconnect switch. Refer to local code.

TROUBLESHOOTING

Self Diagnosis Functions

LG Monitoring View (LGMV) Diagnostic Software

LGMV software (PRCTSL1 and PRCTFE1) allows the service technician or commissioning agent to connect a computer USB port to the Single Zone unit's main printed circuit board (PCB) using an accessory cable without the need for a separate interface device. The monitoring screen for LGMV allows the user to view the following real time data on one screen (Figure 71):

- Actual inverter compressor speed
- Target inverter compressor speed
- Actual outdoor fan speed
- Target outdoor unit fan speed
- Actual superheat
- Target superheat
- Actual subcooler circuit superheat
- Target subcooler circuit superheat
- Main EEV position
- Subcooling EEV position
- Inverter compressor current transducer value
- Outdoor air temperature
- Actual high pressure/saturation temperature
- Actual low pressure/saturation temperature
- Suction temperature
- Inverter compressor discharge temperature
- Front outdoor coil pipe temperature
- Back outdoor coil pipe temperature
- Liquid line pipe temperature
- Subcooler inlet temperature
- Subcooler outlet temperature
- Average indoor unit (IDU) pipe temperature
- Inverter compressor operation indicator light
- Liquid injection valves' operation indicator lights
- Hot gas bypass valve operation indicator light
- Four-way reversing valve operation indicator light
- Pressure graph showing actual low pressure and high pressure levels
- Error code display
- Operating mode indicator
- Target high pressure
- Target low pressure
- PCB (printed circuit board) version
- Software version
- Installer name
- Model number of IDUs
- Site name
- Total number of connected IDUs

Figure 71: MV Real-time Data Screen

- Communication indicators
- IDU capacity
- IDU operating mode
- IDU fan speed
- IDU EEV position
- IDU room temperature
- IDU inlet pipe temperature
- IDU outlet pipe temperature
- IDU error code

Additional screens can be accessed by tabs on the main screen. Additional screens include the following:

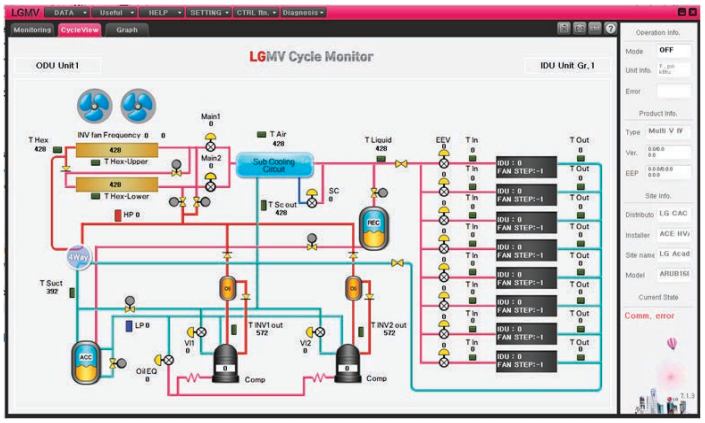
1. Cycleview (Figure 72): Graphic of internal components including:
   - Compressors showing actual speeds
   - EEVs
   - IDUs
   - Temperature and pressure sensors
   - Four-way reversing valve

2. Graph: Full screen graph of actual high and low pressures and high and low pressure limits. A sliding bar enables user to go back in time and view data.

3. Control FTN: Enables user to turn on IDUs in 1.8 °F increments.

4. Useful Tab
   - Unit Conversion: Converts metric values to imperial values.

Figure 72: MV Cycleview



Note:
Images on these pages are examples of LGMV screenshots. Actual images may differ depending on the version of the software and the unit installed.

LG Monitoring View (LGMV) Diagnostic Software and Cable - Continued

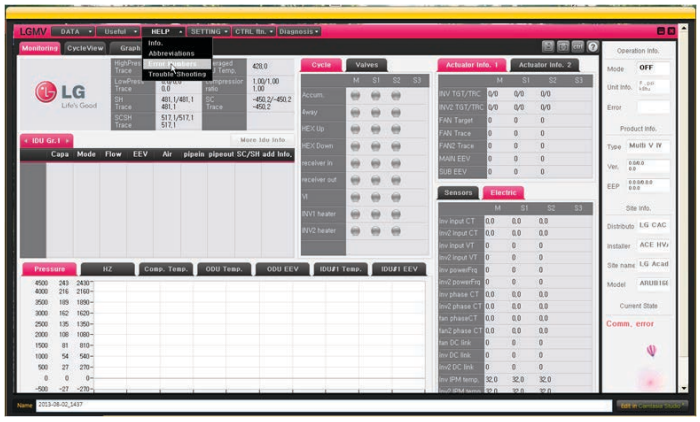
5. Data (Figure 73)
   - Data Saving Start: Recording of real time data to a separate file created to be stored on the user's computer.
   - Data Loading Start: Recorded data from a saved ".CSV" file can be loaded to create an LGMV session.
6. Monitoring
   - Electrical: The lower half of main screen is changed to show Inverter Compressor Amps, Volts, Power Hz, Inverter control board fan Hz.

Figure 73: MV Control Indoor Units Screen

Error Codes

LGMV software helps the service technician or commissioning agent to troubleshoot system operation issues by displaying malfunction codes (Figure 74). These error codes can be seen on the main screen of the LGMV software program. For an overview of Single Zone unit error codes, see Error Codes section. For detailed information on how to troubleshoot individual error codes, see the Single Zone Wall Mount Service Manual.

Figure 74: Error Code Screen



The software is available in a high version with all of the features listed above. The low version has all features as the high version without Target High Pressure and Target Low Pressure values shown on main screen.

In lieu of connecting to the Water Source Unit (WSU), user has the option to connect to IDU with the use of a USB to RS-485 connector kit. When connected through IDU, user will not be able to record data.

This software can be used to both commission new systems and troubleshoot existing systems. LGMV data can be recorded to a ".CSV" file and emailed to an LG representative to assist with diagnostic evaluations.

Recommended Minimum PC Configuration:

- CPU: Pentium® IV 1.6 GHz
- Main Memory: 1G
- Operating System: Windows® XP/Vista/7 32 bit (recommended), 64 bit
- Hard Disk: 600 MB when operating
- MS Office 2003, 2007 (recommended) for select reporting functions

Note:

Images on these pages are examples of LGMV screenshots. Actual images may differ depending on the version of the software and the units installed.

TROUBLESHOOTING

LG SIMS - Self Diagnosis Functions

The SIMs WLAN module and the smart phone app together provide monitoring and troubleshooting capability for LG Duct Free Systems. SIMs functions only with LG Duct Free products (Figure 75).

SIMs can display and graph operational data for the air conditioner system including the indoor unit and the outdoor unit. SIMs also displays error codes and a troubleshooting guide. A full copy of the LG SIMs Smart Inverter Monitoring System User's Manual is available on the www.lghvac.com website.

To use SIMs you must be a trained HVAC service technician familiar with variable refrigerant flow (VRF) systems in general and with LG's Duct Free System products. You should understand the inverter air conditioning operation cycle, the meaning of the data displayed by SIMs, and how to use the data to troubleshoot the system.

Figure 76 shows a Multi F configuration used with the SIMs module and app. LG SIMs can also be used with Single Zone one-to-one configurations such as the Single Zone Wall Mount systems.

Figure 75: LG SIMs App and WLAN Module

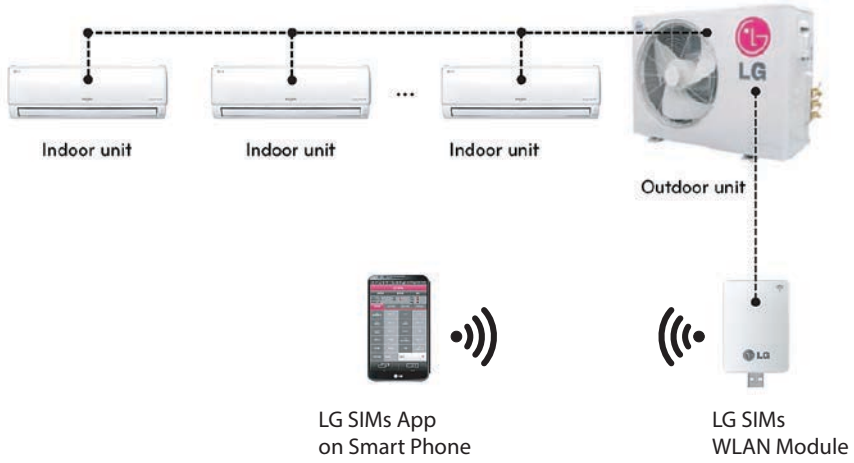


Figure 76: SIMs WLAN Module to Typical DFS System

Note:

- *The Duct Free System air conditioning system must run for at least 15–20 minutes before data collected by SIMs 2.0 is valid for troubleshooting.*
- *You must have the free SIMs app correctly installed on your smart phone before using SIMs.*
- *Some ODUs have an LGMV extension cable accessed by removing the side handle cover. If the ODU does not have this extension cable, access the LGMV connector by removing the top cover of the ODU.*

⚠WARNING

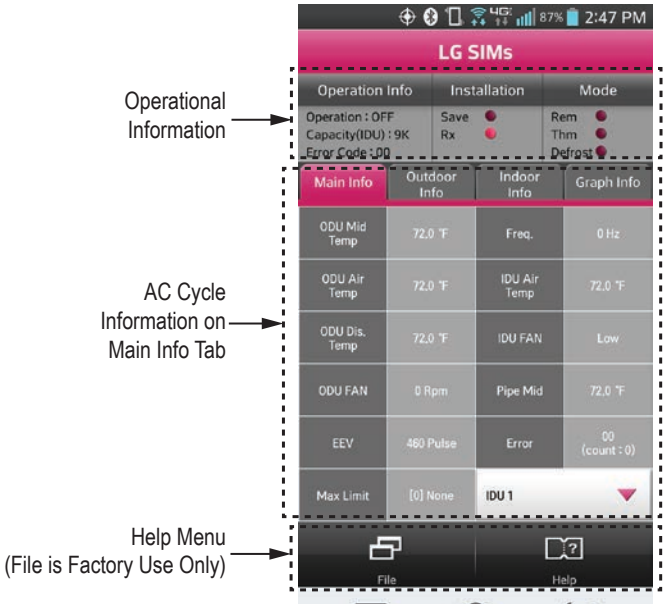
High voltages capable of causing death are used in this equipment. Outdoor unit power remains connected during this procedure. Take extreme caution not to touch electrical components or connections. Failure to observe this warning can result in death or severe injury.

SIMs App Main Info Screen

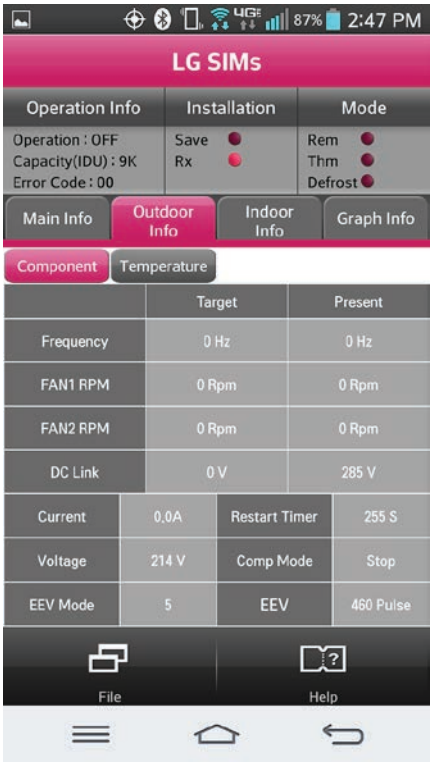
The main screen is the first screen displayed after wireless connection is established. Tap the Main Info tab to display current readings regarding your indoor and outdoor unit(s). The Operational Info area of the screen will show active functions or modes by illuminating the light to the right of the function (Figure 77).

Additional Help information can be accessed by tapping the Help Menu buttons at the bottom of this screen.

Figure 77: SIMs App Main Info Screen



SIMs App Screens



Outdoor Info/ Component Screen

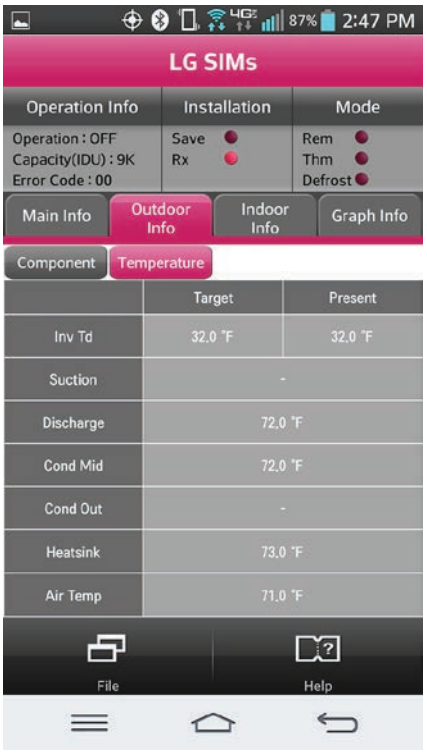
Displays the following information:

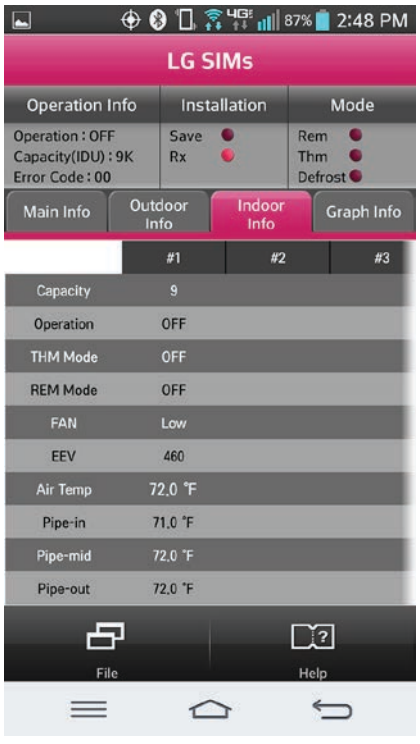
- Frequency
- FAN1 RPM
- FAN2 RPM
- DC Link
- Current
- Voltage
- EEV Mode
- Restart Timer
- Comp Mode
- EEV

Outdoor Info/ Temperature Screen

Displays the following information:

- Inv TD
- Suction
- Discharge
- Cond Mid
- Cond Out
- Heatsink
- Air Temp





Indoor Info Tab

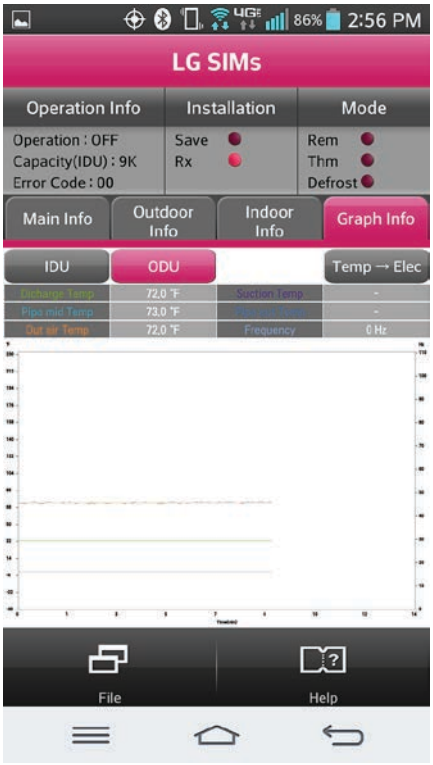
Displays the following information:

- Frequency
- Operation
- THM Mode
- REM Mode
- FAN
- EEV
- Air Temp
- Pipe-in
- Pipe-mid
- Pipe-out

Graph Info Tab

This tab has three sub sections:

- IDU - Indoor Unit Temperature graph. Displays IDU information in graph format. Information displayed is for the IDU # selected on the Main screen.
- ODU - Outdoor Unit Temperature and Frequency graph. Displays ODU information in graph format.
- ODU Electric - Outdoor Unit Electric data graph is displayed.



TROUBLESHOOTING

Error Codes

Troubleshooting Using Error Codes

Refer to Table 19 and Table 20 for error codes that are generated from the indoor and outdoor units. These codes are the most common that will manifest through these units. Your particular model duct free system might generate additional codes not listed here. Please contact LG Support if you see these types of errors and a simple power down and boot up has not corrected the issue. You should not attempt to fix the system yourself.

Error Codes

- Error codes for indoor units will be displayed on the wall controller.
- Error codes indicate different types of unit failures, assists in self-diagnosis and to track the frequency of occurrence.
- Error codes are shown on the wired remote controller, the Single Zone unit control board, and LG Monitoring View (LGMV) Diagnostic Software.
- If two or more errors occur simultaneously, the lower error code number is displayed first.
- After error is resolved, the error code does not display.

Decoding the Error Display (for Outdoor Units)

The first and second number on the LED indicates error number. Example: 21 = LED1 (Green light) 2x blink, LED2 (Red light) 1x blink

Error Code Nomenclature Definitions

- MICOM: Non-volatile memory chip where unit setup information is stored.
- EPROM: Non-volatile memory chip where device identification, size, and factory defined default component operating parameters are stored.

Table 19: Single Zone Wall Mounted Indoor Unit Error Codes

Error Code	Description
1	Indoor unit room temperature sensor error
2	Indoor unit inlet pipe sensor error
4	Float switch error (optional)
5	Communication error between indoor unit and outdoor units
6	Indoor unit outlet pipe sensor error
9	Indoor unit EEPROM error
10	Indoor unit BLDC motor fan lock
12	Indoor unit middle pipe sensor error
21	DC Peak (IPM Fault); Compressor DC voltage was too high
22	Current Transformer2 (CT2) error; Alternating current (AC) input too high
23	DC Link Low Volt
25	AC Low/High Volt
26	DC Comp Position Error (not providing rotation), Locking
27	PSC Fault; Current to inverter compressor between AC and DC converter circuit too high
28	Inverter compressor DC voltage is too high
29	Inverter compressor amperage is too high
31	Current-to-current transformer (CT) thermistor is too low
32	Inverter Compressor Discharge Pipe (D-Pipe) Overheat
40	CT Sensor Error; Thermistor is disconnected or shorted out
41	D-Pipe Sensor INV is disconnected or shorted out
44	Outdoor Air Sensor is disconnected or shorted out
45	Middle thermistor of outdoor unit condenser coil is disconnected or shorted out
46	Outdoor unit suction line thermistor is disconnected or shorted out
48	Outdoor unit coil outlet (liquid line) thermistor is disconnected or shorted out

Troubleshooting Using Error Codes - Continued

Table 32: Single Zone Wall Mounted Indoor Unit Error Codes - Continued

Error Code	Description
53	Communication failure from outdoor unit to indoor unit
60	Outdoor unit printed circuit board (PCB) EEPROM check sum error
61	Outdoor unit condenser coil temperature is too high
62	Outdoor unit inverter compressor PCB heat sink temperature is too high
63	Condenser coil pipe thermistor temperature is too low
65	Heat sink thermistor has disconnected or has shorted out
67	Outdoor brushless direct current (BLDC) fan motor lock error

Single Zone Wall Mounted Outdoor Unit Error Codes

The Single Zone Wall Mounted outdoor unit error codes below are visible on the outdoor unit. When troubleshooting the system, be sure to verify if the error codes that are being displayed are specific for indoor or outdoor units.

Table 20: Single Zone Wall Mounted Outdoor Unit Error Codes

Error Code	Description	No. of Times Outdoor Unit LEDs Blink	
		LED1 (Plasma LED)	LED2 (Power LED)
21	DC Peak (IPM Fault); Compressor DC voltage was too high	2X	1X
22	Current Transformer2 (CT2) error; Alternating current (AC) input too high	2X	2X
23	DC Link Low Volt	2X	3X
25	AC Low/High Volt	2X	5X
26	DC Comp Position Error (not providing rotation), Locking	2X	6X
27	PSC Fault; Current to inverter compressor between AC and DC converter circuit too high	2X	7X
28	Inverter compressor DC voltage is too high	2X	8X
29	Inverter compressor amperage is too high	2X	9X
31	Current-to-current transformer (CT) thermistor is too low	3X	1X
32	Inverter Compressor Discharge Pipe (D-Pipe) Overheat	3X	2X
40	CT Sensor Error; Thermistor is disconnected or is shorted out	4X	-
41	D-Pipe Sensor INV is disconnected or shorted out	4X	1X
44	Outdoor Air Sensor is disconnected or shorted out	4X	4X
45	Middle thermistor of outdoor unit condenser coil is disconnected or shorted out	4X	5X
46	Outdoor unit suction line thermistor is disconnected or shorted out	4X	6X
48	Outdoor unit coil outlet (liquid line) thermistor is disconnected or shorted out	4X	8X
53	Communication failure from outdoor unit to indoor unit	5X	3X
60	Outdoor unit printed circuit board (PCB) EEPROM check sum error	6X	-

TROUBLESHOOTING

Error Codes

Table 33: Single Zone Wall Mounted Outdoor Unit Error Codes - Continued

Error Code	Description	No. of Times Outdoor Unit LEDs Blink	
		LED1 (Plasma LED)	LED2 (Power LED)
61	Outdoor unit condenser coil temperature is too high	6X	1X
62	Outdoor unit inverter compressor PCB heat sink temperature is too high	6X	2X
63	Condenser coil pipe thermistor temperature is too low	6X	3X
65	Heat sink thermistor has disconnected or has shorted out	6X	5X
67	Outdoor brushless direct current (BLDC) fan motor lock error	6X	7X

Refer to Service Manuals posted on www.lghvac.com for a full description of all error codes and workarounds.

Cautions for Refrigerant Leaks/Introduction

ASHRAE Standards 15-2010 and 34-2010 offer guidelines that address refrigerant safety and the maximum allowable concentration of refrigerant in an occupied space. Refrigerant will dissipate into the atmosphere, but a certain volume of air is required for this to occur safely. For R410A refrigerant, the maximum allowable concentration is 0.026 lbs./ft^3 per 1,000 ft^3 of air in an occupied space. Buildings with twenty-four (24) hour occupancy allow half of that concentration.[1]

ASHRAE Standards 15 and 34 assume that if a system develops a leak, its entire refrigerant charge will dump into the area where the leak occurs. To meet ASHRAE Standards 15 and 34, calculate the refrigerant concentration that may occur in the smallest room volume on the system, and compare the results to the maximum allowable concentration number (see following pages for information on how to calculate the refrigerant concentration).[1] Also consult state and local codes in regards to refrigerant safety.

Note:

Take appropriate actions at the end of HVAC equipment life to recover, recycle, reclaim or destroy R410A refrigerant according to applicable US EPA rules.

Refrigerant Concentration Limit (RCL) Calculations

To calculate total refrigerant amount per system:

Amount of Factory-Charged Refrigerant per Outdoor Unit + **Amount of Additional Refrigerant Trim Charge** = **Total System Refrigerant Charge**

$$\text{RCL (lbs./ft}^3\text{)} = \frac{\text{Total System Refrigerant Charge (lbs.)}}{\text{Volume of Smallest Occupied Space (ft}^3\text{)}}$$

⚠WARNING

Verify the maximum refrigerant concentration level in the space where the indoor unit will be mounted meets the concentration limit for the application. Failure to do so can cause health hazards and bodily injury to occupants of the space.

To calculate the potential refrigerant concentration level (RCL):

1. Measure the occupied space dimensions (in feet).
2. Calculate the cubic foot volume of air in the smallest occupied space. (To obtain a detailed overview of the RCL, perform the same calculations to the second smallest zone, the third smallest zone until the RCL is obtained for all zones. Also, pay special attention to areas such as basements, etc., where refrigerant cannot dissipate easily.)
3. Divide the refrigerant charge of the Single Zone system serving the area in pounds by the results of step 1.
4. If the calculation indicates that the potential refrigerant concentration level is higher than the allowed RCL, increase the cubic volume of the smallest occupied space or modify the piping system design.
5. The allowable RCL limit for most applications must be equal to or less than 0.026 lbs./ft^3. However, in special occupied spaces, such as hospitals and nursing homes, where occupants may have limited mobility, the allowable RCL limit is cut in half. See ASHRAE Standard 34-2007 and local codes for detailed information.[1]

[1] American Society of Heating, Refrigeration and Air Conditioning Engineers, Inc. (ASHRAE). Atlanta, GA. ASHRAE, Inc. Information about ASHRAE Standard 15-2010 / 34-2010 and addenda current as of the date of this publication.

INSTALLATION CHECKLIST

PAGE 1

Major Component Rough-In

Description	Check
Single Zone unit was connected properly per local code and the product installation procedures.	
All literature and bagged accessories have been removed from the fan discharge.	
Indoor unit was installed, properly supported, and located indoors in a non-corrosive environment.	
Single Zone unit's gravity condensate drain line was connected and routed where it properly drains away or, if installed in a mechanical room, was connected and properly routed to a drain terminal.	

Piping and Insulation

Description	Check
Copper	
Over 5/8 inches—Rigid ACR only.	
5/8 inches and under—Can use soft ACR.	
15% silver brazing material only.	
All refrigerant pipes and valves were insulated separately. Insulation butts up against the walls of the indoor units. No gaps or cracks. Insulation was not compressed at clamps and hangers.	

Brazing Practices

Description	Check
Medical grade (there are 4 available) dry nitrogen for purging during brazing was used (constant 3 psi while brazing).	

Installation

(For more information on any procedure, refer to the detail provided in the Indoor Unit Installation Manuals.)

Refrigerant Piping

Description	Check
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, offsets, double-back sections), and sizes, as well as the quantity and type of elbows used.	
All long runs of straight pipe were provided with expansion loops.	
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 were properly supported and all wall penetrations were sleeved.	
Pipe insulation was not compressed at any point.	
No oil traps, solenoid valves, sight glasses, filter driers, or any other unauthorized refrigerant specialties were present.	
Best practice including a minimum of 20" of straight pipe was installed between each elbow.	

INSTALLATION CHECKLIST

PAGE 2

Condensate Pump / Drain Installation

Power Wire and Communications Cables

Description	Check
Power wiring was connected to a single phase 208-230V source.	
Ground wire was installed and properly terminated at the unit.	
The power supplied was clean with voltage fluctuations within specifications. (±10% of nameplate).	
Power wiring to the Single Zone outdoor unit was installed per all local electrical code requirements.	
Power wiring to the indoor unit was installed per all local electrical code requirements.	
LG-supplied cable was used between the indoor unit and its zone controller. No cables were spliced and no wire caps are present.	
Communication type RS-485–BUS type.	
All communications cables were a minimum of 18-AWG, four (4) conductor, shielded, and stranded, with insulation material per local code. Cable segment shields were tied together.	
Used appropriate crimping tool to attach ring or spade 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.	

For further technical materials such as submittals, engineering manuals, service manuals, and catalogs, visit www.lghvac.com.

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