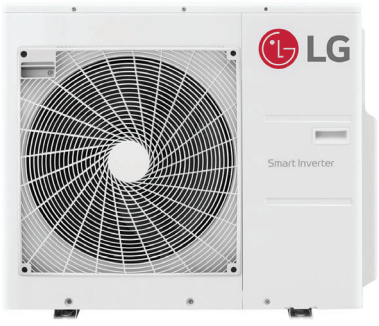
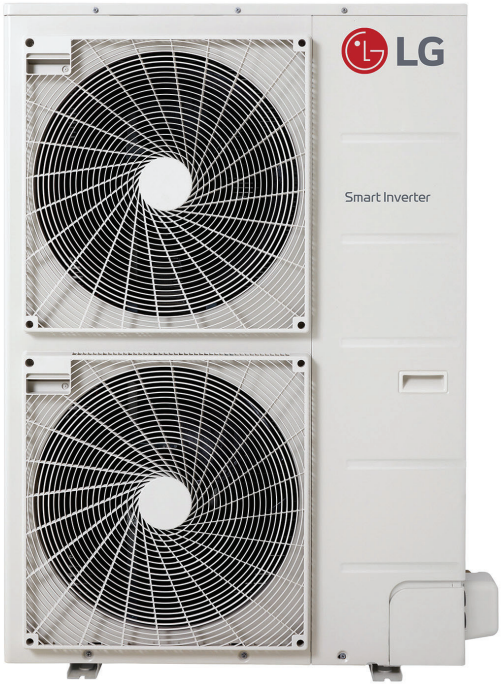
R32 MULTI F
MULTI F MAX
WITH LGRED°
OUTDOOR UNIT ENGINEERING MANUAL



Dual-, Tri-, and Quad-Zone Multi F



Five, Six, and Eight-Zone Multi F MAX

Multi-Zone Heat Pump Outdoor Units

1.5 to 4 Tons

PROPRIETARY DATA NOTICE

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A summary list of safety precautions is on page 4.

For more technical materials such as submittals, catalogs, installation, owner's, and service manuals, visit www.lghvac.com.

Proper sizing and installation of equipment is critical to achieve optimal performance. Split system air conditioners and heat pumps (excluding ductless systems) must be matched with appropriate coil components to meet ENERGY STAR® criteria. Ask your contractor for details or visit www.energystar.gov.

(ENERGY STAR and the ENERGY STAR mark are registered trademarks owned by the U.S. Environmental Protection Agency.)

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TABLE OF SYMBOLS

A2L	*Indicates that this appliance uses a flammable refrigerant. If the refrigerant leaks and is exposed to an external ignition source, there is a risk of fire.*
⚠ DANGER	*Indicates a hazardous situation that, if not avoided, WILL RESULT IN DEATH OR SERIOUS INJURY.[1]*
⚠ WARNING	*Indicates a hazardous situation that, if not avoided, COULD RESULT IN DEATH OR SERIOUS INJURY.[1]*
⚠ CAUTION	*Indicates a hazardous situation that, if not avoided, COULD RESULT IN MINOR OR MODERATE INJURY.[1]*
NOTICE	*Indicates information considered important, but not hazard-related; indicates situations that may result in equipment or property damage accidents.[1]*
⃠	*This symbol indicates an action that should not be performed.*

[1]Signal words, symbols, and definitions taken from American National Standards Institute (ANSI) Z535.6. See https://www.ansi.org/ for more information.

A2L R32 Refrigerant

LG Electronic split system heating and air conditioning (HVAC) products now contain R32 refrigerant. While R32 refrigerant is slightly flammable, it has a higher efficiency, a lower Global Warming Potential (GWP) value, and is more environmentally friendly than R410A.
R32 Ozone Depletion Potential (ODP) Value: 0.
R32 Global Warming Potential (GWP) Value: 675.

The amount of refrigerant depends on outdoor unit to indoor unit configuration. All refrigerant piping system components (copper piping, joints, and other fittings) must be selected and installed to conform with Refrigeration Safety Regulation standards. Use LG Air Conditioner Technical Solution (LATS) Software to verify the refrigerant amount needed for each installation.

⚠ WARNING

- *This HVAC system contains fluorinated greenhouse gases in the form of R32 refrigerant. ⃠ Do not leak refrigerant gas into the atmosphere.*
- *Only use R32 as the refrigerant in these HVAC systems. If other substances are added, it may cause an explosion.*
- *R32 refrigerant is slightly flammable. When handled properly, it does not leak. If the refrigerant leaks in the installation area and comes in contact with a flame, it may generate a fire and / or harmful gas.*
- *If a leak occurs, immediately turn off any combustion devices, ventilate the installation area, and contact the dealer / contractor where the HVAC unit was purchased. ⃠ Do not operate the unit until the refrigerant leaked is repaired.*

⚠ CAUTION

- *Piping wall thickness must comply with all applicable local, state, and federal regulations for the design pressures listed by the manufacturer. ⃠ Unapproved piping must not be used.*
- *To prevent piping from softening, ⃠ do not heat the piping more than necessary.*

UNIT NOMENCLATURE

Multi-Zone Systems — Outdoor Units

1. Refrigerant
K = R32

2. Component
U = Outdoor Unit

3. Product Category
M = Multi

4. Product Type
X = Null

5. Product Grade
A = LGRED°

6. Nominal Capacity (Btu/h)

18 = 18,000 Btu/h	30 = 30,000 Btu/h	42 = 42,000 Btu/h
24 = 24,000 Btu/h	36 = 36,000 Btu/h	48 = 48,000 Btu/h

7. Generation
1 to 9

8. Function
A = 208~230V

Branch Distribution Units

P = Part (Accessory)
Type: M = Multi-Zone

BD: Branch Distribution Unit

Family

Number of Port Connections
(Maximum Number of Connectable Indoor Units): 2, 3, 4

Generation: 0, 1

Refrigerant: R32

NOTICE

- *Voltage for all equipment is 208-230V, 60 Hz, 1-phase.*
- *All indoor units are compatible with wired controllers.*
- *All outdoor units are LGAP control network compatible.*
- *Compatible IDU nomenclature is listed in the Multi F / Multi F MAX Indoor Unit Engineering Manuals.*

LG AIR CONDITIONER TECHNICAL SOLUTION (LATS)

LG Air Conditioner Technical Solution (LATS) Software

A properly designed and installed refrigerant piping system is critical to the optimal performance of LG air-conditioning systems. To assist engineers, LG offers, free of charge, LG Air Conditioner Technical Solution (LATS) software—a total design solution for LG air conditioning systems. Contact your LG Rep for the best software program for your application.

NOTICE

To reduce the risk of designing an improper applied system or one that will not operate correctly, LG requires that LATS software be used on all projects.

Figure 1: LATS Example (Tree Diagram; Illustrative Purposes Only. System will Vary Depending On Modell).

Formats

LATS is available to LG customers in two user interfaces: LATS HVAC and LATS Revit. Both LATS formats are available through www.myLGHVAC.com, or contact an LG Sales Representative.

LATS HVAC is a Windows®-based application that aids engineers in designing LG Variable Refrigerant Flow (VRF), Multi F / Multi F MAX, Single-Zone, DOAS, and Energy Recovery Ventilator (ERV) systems.
**Windows® is a registered mark of Microsoft® Corporation.*

LATS Revit integrates the LG LATS program with Revit® software**. It permits engineers to layout and validate LG VRF, Multi F / Multi F MAX, Single-Zone, and DOAS directly into Revit drawings.
***Revit® is a registered mark of Autodesk, Inc.*

Features

All LG product design criteria have been loaded into the program, making LATS simple to use: double click or drag and drop the component choices. Build systems in Tree Mode where the refrigerant system can be viewed. Switch to a Schematic diagram to see the electrical and communications wiring.

LATS software permits the user to input region data, indoor and outdoor design temperatures, modify humidity default values, zoning, specify type and size of outdoor units and indoor units, and input air flow and external static pressure (ESP) for ducted indoor units.

The program can also:

- Import building loads from a separate Excel file.
- Present options for outdoor unit auto selection.
- Automatically calculate component capacity based on design conditions for the chosen region.
- Verify if the height differences between the various system components are within system limits.
- Provide the correct size of each refrigerant piping segment and LG Y-Branches and Headers.
- Adjust overall piping system length when elbows are added.
- Check for component piping limitations and flag if any parameters are broken.
- Factor operation and capacity for defrost operation.
- Calculate refrigerant charge, noting any additional trim charge.
- Suggest accessories for indoor units and outdoor units.
- Run system simulation.

NOTICE

Features depend on which LATS program is being used, and the type of system being designed. Contact your LG representative for the best software program for your application.

NOTICE

Any field changes, such as re-routing, shortening or lengthening a pipe segment, adding or eliminating elbows and/or fittings, re-sizing, adding, or eliminating indoor units, changing the mounting height, or moving the location of a device or fitting during installation must be done with caution and ALWAYS VERIFIED in LATS SOFTWARE BEFORE supplies are purchased or installed. Doing so will lead to a more profitable installation, reduce the potential for rework, and will reduce the potential for multiple visits to the job site to complete the system set up.

LATS Generates a Complete Project Report

LATS software also generates a report containing project design parameters, cooling and heating design data, system component performance, and capacity data. The report includes system combination ratio and refrigerant charge calculations; and provides detailed bill of material, including outdoor units, indoor units, control devices, accessories, refrigerant pipe sizes segregated by building, by system, by pipe size, and by pipe segments. LATS can generate an Excel GERP report that can be imported into the LG SOPS pricing and ordering system.

Proper Design to Install Procedure

LG encourages a two report design-to-install-procedure. After the design engineer determines building / zone loads and other details, the engineer opens the LATS program and inputs the project's information. When the design is complete, the "Auto Piping" and "System Check" functions must be used to verify piping sizes, limitations, and if any design errors are present. If errors are found, engineers must adjust the design, and run Auto Piping and System Check again. When the design passes the checks, then the engineer prints out a project "Shop Drawing" (LATS Tree Diagram) and provides it to the installing contractor. The contractor must follow the LATS Tree Diagram when building the piping system, but oftentimes the design changes on the building site:

- Architect has changed location and/or purpose of room(s).
- Outdoor unit cannot be placed where originally intended.
- Structural elements prevent routing the piping as planned.
- Air conditioning system conflicts with other building systems (plumbing, gas lines, etc.).

The contractor must mark any deviation from the design on the Shop Drawing, including as-built straight lines and elbows. This "Mark Up" drawing must be returned to the design engineer or Rep, who must input contractor changes into the LATS file. (Copy the original LATS software file, save and rename as a separate file, and modify all piping lengths by double-clicking on each length and editing information.) Like the shop drawing, the Auto Piping and System Check must also be run on this new "As Built" drawing. The design engineer or Rep must then provide the final As Built file to the contractor. The Mark Up version must be compared to the As Built version for:

- Differences in pipe diameter(s). If incorrect diameters have been installed, the piping must be changed out. If pipe diameters have changed, check if Y-Branches will also need to be changed.
- Changes to outdoor unit and indoor unit capacities. Capacities changes will impact line length changes.
- Additional refrigerant charge quantity ("Trim Charge"). Trim charge will change if piping lengths and diameters change. The As Built version must reflect installed piping lengths to ensure correct trim charge.

All documents submitted by the contractor, as well as the Shop Drawing and the As Built Drawing files must be provided for commissioning purposes. Model and serial numbers for all system components must also be submitted. If the steps previously detailed are not followed, and all documents are not provided to the commissioning agent, the project runs the risk of not being commissioned and voiding any limited warranty LG offers on the equipment.

NOTICE

Any field changes, such as re-routing, shortening or lengthening a pipe segment, adding or eliminating elbows and/or fittings, re-sizing, adding, or eliminating indoor units, changing the mounting height, or moving the location of a device or fitting during installation must be done with caution and ALWAYS VERIFIED in LATS SOFTWARE BEFORE supplies are purchased or installed. Doing so will lead to a more profitable installation, reduce the potential for rework, and will reduce the potential for multiple visits to the job site to complete the system commissioning.

MANUAL EQUIPMENT SELECTION PROCEDURE

NOTICE

Various tools are available to assist in properly designing LG R32 split systems. Refer to the "R32 Application Guide"; the "Simple Calculator for Capacity, Refrigerant Charge and ESP"; the "LG Air Conditioner Technical Solutions" (LATS) software program; and the local LG Sales Representative.

To use the manual equipment selection procedure in choosing the multi-zone system that is the most appropriate for the space, as with traditional air-conditioning systems, follow similar protocols outlined in Manual J from the Air Conditioning Contractors of America (ACCA; see www.acca.org).

1. Obtain the design conditions, and calculate the maximum cool and heat loads for the structure.
2. Select the equipment (choosing the appropriate indoor units and outdoor unit):
   - Determine number of zones.
   - Determine total number of indoor units (refer to zone load calculations when choosing indoor units).
   - Determine number of indoor units allocated to each outdoor unit, considering allowable indoor unit connections, both indoor unit and outdoor unit capacities, and system piping capabilities.
3. Determine the corrected capacity for the indoor units and outdoor unit using LATS Multi F software (preferred method) or:
   - System Combination Tables.
   - Capacity Tables (it may be necessary to interpolate).
   - Capacity Coefficient Factors (such as refrigerant line length derates, design condition derates, defrost operation derate [heating mode], altitude derate [if applicable]).
4. Compare corrected capacities to load calculations.
5. Reselect equipment if necessary.

Obtain Design Conditions, Calculate Maximum Cool / Heat Loads

Obtain the winter outdoor / indoor temperature and summer and winter outdoor / indoor temperature design parameters for the location in which the system is installed. Determine if summer or winter design gains, relative humidity, and building features like skylights, orientation, number of occupants, etc., would change the total heat loss / gain and sensible / latent heat gain, and then calculate the maximum cool and heat loads for the space (using Manual J or energy modeling programs).

Select the Equipment

Determine the Number of Zones

Multi F heat pump systems can cool or heat, but not simultaneously. When designing larger-capacity Multi F with LGRED heat pump systems or a Multi F MAX LGRED system, the designer may be able to combine spaces with similar load profiles located near or adjacent to each other into "thermal zones." After combining like spaces into zones that will be served by a single (or grouped) indoor unit(s), calculate the peak cooling and heating loads for each zone.

Choosing the Appropriate Indoor Units

Determine the appropriate indoor unit capacity that satisfies the given zone load calculations, and choose how many (and which styles of) indoor units will be required. See Table 1 on page 9 for allowable indoor unit to outdoor unit connections, and the maximum number of connectable indoor units on each Multi F and Multi F MAX outdoor unit. When choosing indoor units, also consider the cooling and heating CFM, featured airflow specifications, and static pressure (if applicable) for each indoor unit.

Avoid oversizing indoor units in an attempt to increase the air exchange rate in the space. Multi F and Multi F MAX systems are designed for minimum airflow over the coil to maximize latent capacity while cooling, maintain a comfortable, consistent discharge air temperature while heating, and minimize fan motor power consumption. In extreme cases, oversizing the indoor units may affect outdoor unit size selection and compromise the outdoor unit's ability to effectively match the space load(s).

For proper system operation:

1. At least two indoor units must be connected to the outdoor unit.
2. Total connected indoor unit nominal capacity must be at least the minimum connection capacity index specified for the outdoor unit (see Table 2 on page 10), and not exceed the maximum connection capacity index specified for the outdoor unit (see Table 2 on page 10).
3. To calculate the connected total indoor unit nominal capacity, simply sum up the nominal capacities of all indoor units.
   - For mid static duct and multi-position air handling indoor units, a 1.3 multiplier must first be applied before adding to the sum of other indoor units (when connected to an outdoor unit other than the KUMXA361A, KUMXA421A, and KUMXA481A).
   - When mid static duct and / or multi-position air handling indoor units are the only connected indoor units, the multiplier is 1.2.

MANUAL EQUIPMENT SELECTION PROCEDURE

NOTICE

Various tools are available to assist in properly designing LG R32 split systems. Refer to the "R32 Application Guide"; the "Simple Calculator for Capacity, Refrigerant Charge and ESP"; the "LG Air Conditioner Technical Solutions" (LATS) software program; and the local LG Sales Representative.

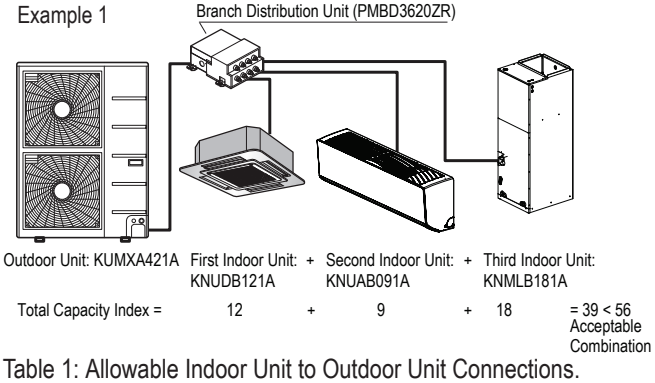
Choosing the Appropriate Indoor Units, Continued.

NOTICE

For allocated capacity information, see the combination tables in the "Multi F / Multi F MAX with LGRED Combination Data Manual" on www.lghvac.com. For performance data, see "Multi F / Multi F MAX with LGRED Performance Data Manual" on www.lghvac.com.

Examples

Example 1



Example 2

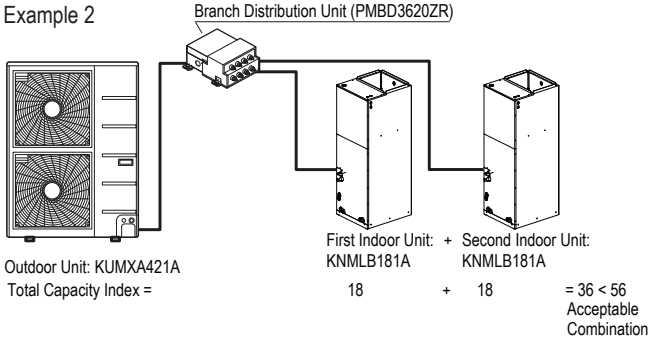


Table 1: Allowable Indoor Unit to Outdoor Unit Connections.

Indoor Units		Outdoor Units					
Model Type	IDU Nominal Capacity (Btu/h)	KUMXA181A	KUMXA241A	KUMXA301A	KUMXA361A	KUMXA421A	KUMXA481A
		Maximum No. of Connectable Indoor Units					
		2	3	4	5	6	8
ART COOL Mirror	9,000	O	O	O	O	O	O
	12,000	O	O	O	O	O	O
	18,000	-	O	O	O	O	O
Standard Wall Mounted	7,000	O	O	O	O	O	O
	9,000	O	O	O	O	O	O
	12,000	O	O	O	O	O	O
	15,000	O	O	O	O	O	O
	18,000	-	O	O	O	O	O
	24,000	-	O	O	O	O	O
Ceiling Concealed Duct-Low Static	9,000	O	O	O	O	O	O
	12,000	O	O	O	O	O	O
	18,000	-	O	O	O	O	O
Convertible Mid Static Duct	9,000	O	O	O	O	O	O
	12,000	O	O	O	O	O	O
	18,000	-	O	O	O	O	O
	24,000	-	-	O	O	O	O
Ceiling Concealed Mid Static Duct	30,000	-	-	-	O	O	O
	36,000	-	-	-	O	O	O
One-Way / Four-Way Ceiling Cassette	7,000	O	O	O	O	O	O
	9,000	O	O	O	O	O	O
	12,000	O	O	O	O	O	O
	18,000	-	O	O	O	O	O
Low-Wall Console	9,000	O	O	O	O	O	O
	12,000	O	O	O	O	O	O
	15,000	O	O	O	O	O	O
Multi-Position Air Handling Unit	12,000	O	O	O	O	O	O
	18,000	-	O	O	O	O	O
	24,000	-	-	O	O	O	O
	30,000	-	-	-	O	O	O
	36,000	-	-	-	O	O	O

Choosing the Appropriate Indoor Units, Continued.

NOTICE

Various tools are available to assist in properly designing LG R32 split systems. Refer to the "R32 Application Guide"; the "Simple Calculator for Capacity, Refrigerant Charge and ESP"; the "LG Air Conditioner Technical Solutions" (LATS) software program; and the local LG Sales Representative.

Choosing the Appropriate Outdoor Unit

After all indoor units are properly sized to offset the applicable loads in each zone, select the outdoor unit by choosing a size that meets both the load-cooling requirement, and offsets the sum of the heating load. Then, the system's combination ratio should be evaluated and confirmed it is within the allowable range (the combination ratio compares the nominal capacity of all connected indoor units to the nominal capacity of the outdoor unit serving them). The total nominal capacity of all indoor units should be smaller than the total nominal capacity of the outdoor unit. If the combination ratio is more than 100%, the designer is undersizing the outdoor unit relative to the combined nominal capacity of the connected indoor units. In some designs, oversized indoor units may be unavoidable in the case where the smallest size indoor unit available from LG is larger than what is necessary to satisfy the zone load. This scenario may also occur when an indoor unit selection one size down from the selected unit is slightly short of fulfilling the design load requirements, and the designer must choose the next largest size unit. Sometimes it is recommended to choose a larger capacity outdoor unit if the installation space is big enough. Also, it may be prudent to oversize the outdoor unit to address those times when the weather conditions may exceed the design conditions, to minimize the possibility of ventilation systems that causes the space temperature to drift outside design parameters, or when the indoor unit's entering air temperature falls outside the approved design temperature range.

Table 2: Rated Outdoor Unit Capacity.

		Outdoor Units					
		KUMXA181A	KUMXA241A	KUMXA301A	KUMXA361A	KUMXA421A	KUMXA481A
Rated Capacity (Btu/h)*	Cooling	18,000	24,000	28,400	36,000	42,000	48,000
	Heating	22,000	26,000	30,000	45,000	48,000	52,500
Connectable Indoor Units	Min. No. of IDUs	2	2	2	2	2	2
	Max. No. of IDUs	2	3	4	5	6	8
	Min. Capacity Index	14,000	14,000	14,000	18,000	18,000	18,000
	Max. Capacity Index	24,000	33,000	40,000	48,000	56,000	65,000

**Rated capacity shown is based on a non-ducted indoor unit combination. Refer to combination tables for rated capacity of other combinations.*

Determine the Corrected Capacity

The corrected cooling / heating capacity is different from the rated cooling / heating capacity. The corrected capacity includes changes in unit performance after considering design temperatures, available capacity that can be allocated from the outdoor unit, pressure drop due to refrigerant line length, defrost operation in heating mode, and (if applicable) altitude. Depending on the location of the building, additional capacity correction factors may need to be applied.

Using the Outdoor Unit Cooling and Heating Capacity Tables

Rated cooling capacity ratings are obtained with air entering the indoor unit at 80ºF dry bulb (DB) and 67ºF wet bulb (WB), and outdoor ambient conditions of 95ºF dry bulb (DB) and 75ºF wet bulb (WB). Rated heating capacity ratings are 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).

To evaluate the total outdoor unit capacity at design conditions, using LATS software (preferred method) or reference the Performance Data Capacity Tables in the Multi F / Multi F MAX with LGRED Performance Data Manual on www.lghvac.com. All design temperatures are not explicitly shown in the charts, therefore, interpolation may be necessary to calculate the capacity for specific design conditions. Based on the premise that capacity follows a linear curve, the following formula can be applied:

(y - y1) / (y2 - y1) = (x - x1) / (x2 - x1)

Where

y = Missing Capacity (Capacity at the Design Temperature).[1]
y1 = Capacity at Lower Temperature (Smaller value of the two nearest published TC datapoints).
y2 = Capacity at Higher Temperature (Higher value of the two nearest published TC datapoints).
x = Design Temperature (Temperature not shown in published capacity tables).[2]
x1 = (Smaller value of the two nearest published temperature datapoints).
x2 = (Larger value of the two nearest published temperature datapoints).

[1]Median between two published Total Capacity [TC] Btu/h datapoints in the capacity table.
[2]Median between two nearest published temperature datapoints.

NOTICE

Various tools are available to assist in properly designing LG R32 split systems. Refer to the "R32 Application Guide"; the "Simple Calculator for Capacity, Refrigerant Charge and ESP"; the "LG Air Conditioner Technical Solutions" (LATS) software program; and the local LG Sales Representative.

Using the Indoor Unit Cooling and Heating Capacity Tables

The datapoints shown in the indoor unit cooling and heating capacity charts are based on (and convey) an indoor unit operating with maximum possible refrigerant flow from the outdoor unit and before any derates are applied. In other words, the capacities displayed reflect what the indoor unit would produce if it was the only indoor unit that required capacity, and the outdoor unit did not have to allocate any capacity to another indoor unit.

System operation with a combination of indoor units is not conveyed in these charts, however, the information can be used to calculate indoor unit allocated capacity (without using the system combination tables). Simply calculate by using the formula:

$$Qidu(combi) = Qodu(rated) \times \frac{Qidu(rated)}{\Sigma Qidu(rated)}$$

Where

Qidu(combi) = Individual Indoor Unit Combination Capacity.

Qidu(rated) = Individual Indoor Unit Rated Capacity.

Qodu(rated) = Outdoor Unit Rated Capacity.

ΣQidu(rated) = Total Connected Indoor Unit Rated Capacity.

NOTICE

- *The formula can be used to find individual indoor unit capacity for Multi F MAX with LGRED systems.*
- *A more accurate method to determine expected capacity would be to apply the outdoor unit's corrected capacity instead of rated capacity.*

Using the System Combination Tables

Multi F system combination tables illustrate how each indoor unit receives a percentage of total outdoor unit rated capacity. Allocation is based on:

- Combinations of Non-Ducted Indoor Units
- Combinations of Ducted Indoor Units
- Combinations of Mixed Non-Ducted and Ducted Indoor Units

Multi F MAX with LGRED system combination tables only show the total connected indoor unit capacity, but individual indoor unit capacity can be calculated using the formula:

$$Qidu(combi) = Qodu(rated) \times \frac{Qidu(rated)}{\Sigma Qidu(rated)}$$

NOTICE

- *A more accurate method to determine expected capacity would be to apply the outdoor unit's corrected capacity instead of rated capacity.*
- *For allocated capacity information, see the combination tables in the "Multi F / Multi F MAX LGRED Combination Data Manual" on www.lghvac.com. For performance data, see "Multi F / Multi F MAX with LGRED Performance Data Manual" on www.lghvac.com.*

NOTICE

Various tools are available to assist in properly designing LG R32 split systems. Refer to the "R32 Application Guide"; the "Simple Calculator for Capacity, Refrigerant Charge and ESP"; the "LG Air Conditioner Technical Solutions" (LATS) software program; and the local LG Sales Representative.

Capacity Coefficient Factors

Refrigerant Line Length Derates

For air-cooled systems, a capacity correction factor may have to be applied to account for the length of the system's refrigerant pipe. Rate of change in capacity due to increased piping lengths is shown in the table below, and in the tables on the next page.

Table 3: Multi F with LGRED Outdoor Unit (Multiple Piping) to Indoor Unit Refrigerant Line Length Derate.

Piping Length (ft.)		16.4	24.6	32.8	49.2	65.6	82.0
Cooling Capacity Coefficient Factor							
Rate of Capacity Change (%)	KUMXA181A (18,000 Btu/h)	100	100	98.2	95.4	92.4	89.6
	KUMXA241A (24,000 Btu/h)	100	100	98.2	95.4	92.4	89.6
	KUMXA301A (30,000 Btu/h)	100	100	98.2	95.4	92.4	89.6
Heating Capacity Coefficient Factor							
Rate of Capacity Change (%)	KUMXA181A (18,000 Btu/h)	100	100	99.2	98.0	96.6	95.4
	KUMXA241A (24,000 Btu/h)	100	100	99.2	98.0	96.6	95.4
	KUMXA301A (30,000 Btu/h)	100	100	99.2	98.0	96.6	95.4

Table 4: Multi F MAX with LGRED Outdoor Unit to Branch Distribution Unit Refrigerant Line Length Derates.

Main Piping Length (feet)	16.4	32.8	49.2	65.6	82.0	98.4	114.8	131.2	147.6	164.0	180.4
Cooling Capacity (%)	100.0	98.8	97.3	95.8	94.3	92.8	91.3	89.8	88.3	86.8	85.3
Heating Capacity (%)	100.0	99.6	99.2	98.7	98.3	97.8	97.4	96.9	96.5	96.0	95.6

NOTICE

Various tools are available to assist in properly designing LG R32 split systems. Refer to the "R32 Application Guide"; the "Simple Calculator for Capacity, Refrigerant Charge and ESP"; the "LG Air Conditioner Technical Solutions" (LATS) software program; and the local LG Sales Representative.

Refrigerant Line Length Derates, Continued.

Figure 2: Multi F MAX with LGRED Outdoor Unit to Branch Distribution Unit Refrigerant Line Length Derate Chart.

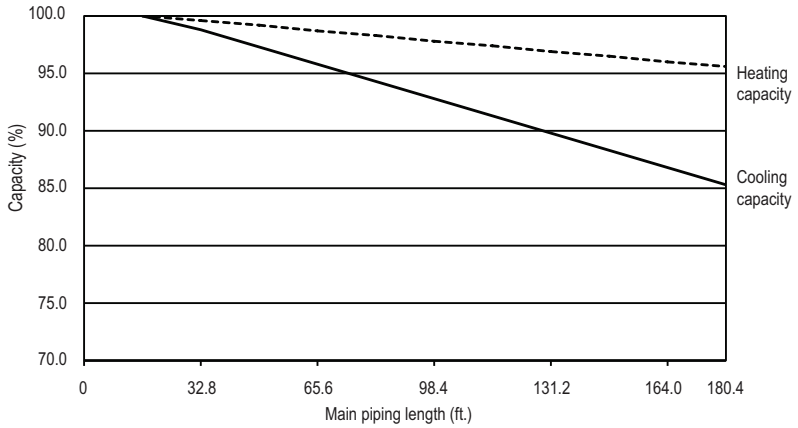


Table 5: Multi F MAX with LGRED Branch Distribution Unit to Indoor Unit Refrigerant Line Length Derates.

Piping Length (feet)	Cooling Capacity (%)	Heating Capacity (%)
7,000 Btu/h Indoor Unit Models		
16.4	100.0	100.0
32.8	98.0	99.5
49.2	96.0	98.9
9,000 Btu/h Indoor Unit Models		
16.4	100.0	100.0
32.8	97.5	98.8
49.2	95.0	97.5
12,000 Btu/h Indoor Unit Models		
16.4	100.0	100.0
32.8	97.0	98.3
49.2	94.0	96.5
15,000 Btu/h Indoor Unit Models		
16.4	100.0	100.0
32.8	97.2	98.2
49.2	93.0	95.4
18,000 Btu/h Indoor Unit Models		
16.4	100.0	100.0
32.8	98.3	99.5
49.2	96.5	99.0
24,000 Btu/h Indoor Unit Models		
16.4	100.0	100.0
32.8	97.8	99.2
49.2	95.5	98.4
30,000 Btu/h Indoor Unit Models		
16.4	100.0	100.0
32.8	97.9	98.8
49.2	95.7	97.6
36,000 Btu/h Indoor Unit Models		
16.4	100.0	100.0
32.8	97.9	98.8
49.2	95.7	97.6

Altitude Correction Factor

The impact of air density must be considered on systems installed at a significant altitude above sea level, therefore, locally accepted altitude correction factors must be applied.

MANUAL EQUIPMENT SELECTION PROCEDURE

NOTICE

Various tools are available to assist in properly designing LG R32 split systems. Refer to the "R32 Application Guide"; the "Simple Calculator for Capacity, Refrigerant Charge and ESP"; the "LG Air Conditioner Technical Solutions" (LATS) software program; and the local LG Sales Representative.

Defrost Correction Factor for Heating Operation

The outdoor unit heating capacity may need to be adjusted for frost accumulation on air-cooled systems. If design day conditions are below the dewpoint of the surrounding air, frost may not be a problem and no correction factor is needed. In certain weather conditions, however, frost may form and accumulate on the air-cooled outdoor unit coil and impact the coils ability to transfer heat. If significant frost accumulates on the outdoor unit coil, a defrost algorithm will start automatically. The timing between defrost periods is determined by the system's ability to achieve a target head pressure value.

Capacity and AHRI ratings tables do not factor in capacity reduction when frost has accumulated on the condenser coil, nor during defrost operation.

Integrated heating capacity values can be obtained using the formula:

A = B x C

Where:

A = Integrated Heating Capacity.
B = Value found in the Capacity Table.
C = Correction Factor for Frost Accumulation Factor (see right).

Table 6: Outdoor Unit Frost Accumulation Factor (Heating).[1]

Entering DB (°F)	19.4	23.0	26.6	32.0	37.4	41.0	44.6
Derate factor	0.98	0.95	0.93	0.86	0.93	0.96	1.0

[1]At 85% outdoor air relative humidity.

The frost accumulation factor does not account for effects of snow accumulation restricting airflow through the outdoor unit coil.

NOTICE

There will be a temporary reduction in capacity when frost / ice accumulates on the outside surface of the outdoor unit heat exchanger. The level of capacity reduction depends on a number of factors, for example, outdoor temperature (°F DB), relative humidity (RH), and the amount of frost present.

Check the Indoor and Outdoor Unit Selection(s)

Compare the corrected cooling and heating capacities to the load calculations. Is each capacity sufficient for the zone it serves?

For each indoor unit, the corrected capacity must be at least equal to the total of the cooling design load (plus ventilation load, if applicable) for the space(s) served by the indoor unit. For each indoor unit, the corrected capacity also must be at least equal to the total of the heating design load (plus ventilation load, if applicable) for the space(s) and / or thermal zones served by the indoor unit.

The outdoor unit selected must be within the minimum and maximum indoor unit connection capacity index, and be large enough to offset the total cooling load for all spaces it serves (account for ventilation air cooling load if the ventilation air has not been pretreated to room neutral conditions). The outdoor unit must also be large enough to offset the total heating load for all spaces it serves.

If the corrected heating capacity ratio exceeds 100%, reselect the equipment, or change the system design by moving some of the load to another system.

System Sizing Check Formulas

1. Outdoor Unit Rated Capacity.
$Q_{odu(rated)}$ (From capacity tables).

2. Outdoor Unit Capacity at Ti, To Temperature.
$Q_{odu(Ti,\ To)}$ (From capacity tables).

3. Outdoor Unit Capacity Coefficient Factor.
$F_{(Ti,\ To)} = Q_{odu(Ti,\ To)} / Q_{odu(rated)}$

4. Piping Correction Factor (From Capacity Coefficient Factor Tables).
$F_{(length)}$ for each piping length

5. Individual Indoor Unit Combination Capacity.
$Q_{idu\ (combi)} = Q_{odu(rated)} \times Q_{idu(rated)} / Q_{idu(rated\text{-}total)}$

6. Individual Indoor Unit Actual Capacity.
$Q_{idu\ (actual)} = Q_{odu(combi)} \times F_{(Ti,\ To)} \times F_{(length,\ altitude)}$

Conclusions and Recommendations

- Understand the design safety factors.
- Reference load calculations for actual cooling and heating capacities (applies in 99% of applications – consider total load when latent load is greater than 30%).
- Verify that the sensible load of the zone is satisfied.
- Use caution when sizing to meet listed capacity specifications for the scheduled manufacturer's equipment.
- If further system design assistance is needed, or you have a unique application you would like to discuss, contact your LG sales rep.

MULTI F WITH LGRED° OUTDOOR UNIT PRODUCT DATA

MULTI F WITH LGRED° OUTDOOR UNIT

Mechanical Specifications

MULTI F WITH LGRED°
MULTI F MAX

Multi F with LGRED Heat Pump Units

General

A Multi F with LGRED multi-zone system is comprised of one heat pump outdoor unit connected to two, three, or four indoor units using a shared refrigerant piping circuit between the outdoor unit and each indoor unit, and includes integrated controls supplied by LG. The outdoor unit is internally assembled, wired, and piped from the factory; all LG components are manufactured in a facility registered to ISO 9001 and ISO 14001, set by the International Organization for Standardization (ISO). The LG Multi F with LGRED multi zone heat pump system components comply with Underwriters Laboratories (UL) 1995 Heating and Cooling Equipment Standard for Safety. The units are certified to AHRI 210 / 240.

Temperature Ranges

The heat pump outdoor units are capable of operating in cooling mode from 14°F to +118°F ambient dry bulb (installing an optional Low Ambient Wind Baffle Kit will allow operation down to -4°F in cooling mode). The heat pump outdoor units are capable of operating in heating mode from -13°F to +64°F ambient wet bulb without additional low ambient controls.

Frame

The Multi F with LGRED condensing unit case is constructed from pre-coated metal that has been tested in accordance with ASTM B-117 salt spray procedure for a minimum of 1,000 hours. Case has a removable front panel to allow access to major components and control devices, and legs to secure the unit during installation.

Refrigerant System

Multi F with LGRED systems have a shared refrigerant circuit field piped to multiple (ducted, non-ducted or mixed) indoor units to effectively and efficiently control the heating or cooling operation of the multi zone system. All refrigerant lines from the outdoor unit to the indoor units are field-installed and must be insulated separately.

All Multi F with LGRED systems use R32 refrigerant. The outdoor units are equipped with a refrigerant strainer, check valves, oil separator, accumulator, four-way reversing valve, electronic expansion valve(s) (EEV), high side and low side refrigerant charging ports, and a service port. Each outdoor unit also includes sensors for suction temperature, discharge temperature, high-pressure, low-pressure, heat exchanger temperature, and outdoor temperature conditions.

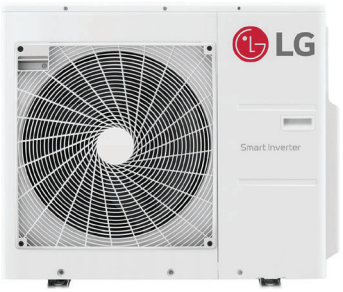
Refrigeration Oil Control

The outdoor units have an oil separator to separate oil mixed with the refrigerant gas during compression and return oil to the compressor. The outdoor units also have an oil injection mechanism to ensure a consistent film of oil on all moving compressor parts at low speed.

Compressor

Multi F with LGRED condensing units are equipped with one hermetically sealed, digitally controlled, inverter driven twin-rotary compressor that includes Teflon™ coated bearings. The inverter motor is capable of providing a modulation range of 10Hz to 70Hz in cooling, and 10Hz to 95Hz in heating with control in 1Hz increments. The compressor is protected with phase-reversal protection, uses a factory-charge of Polyvinyl Ether (PVE) oil, and is mounted to avoid the transmission of vibration.

Figure 3: Multi F with LGRED KUMXA181A, KUMXA241A , and KUMXA301A Outdoor Units.



Fan and Motors

Each outdoor unit includes one direct drive variable speed propeller fan with Brushless Digitally Controlled (BLDC) motor with a horizontal air discharge. Fan blades are statically and dynamically balanced propeller fans made of durable Acrylonitrile Butadiene Styrene (ABS) plastic, and include a raised fan guard to limit contact with moving parts. The motors have inherent overload protection, permanently lubricated bearings and a maximum speed up to 800 rpm (for KUMXA181A, KUMXA241A, and KUMXA301A models. All Multi F LGRED outdoor units have a horizontal discharge airflow.

Outdoor Unit Coil

The outdoor unit coils are factory-built of aluminum fins mechanically bonded on copper tubing. Coils have three rows, 14 fins per inch, and have been factory pressure-tested. Coil fins also have a factory applied corrosion-resistant GoldFin™ material with hydrophilic coating that has been tested in accordance with ASTM B-117 salt spray test procedure for a minimum of 1,000 hours.

Electrical

All Multi F with LGRED outdoor units shall have 208/230V, 1 phase, 60Hz electrical power capable of operating within ±10% of the rated voltage.

Controls

Factory installed microprocessor controls in the outdoor unit and indoor units perform functions to efficiently operate the multi-zone system. Outdoor units are equipped with a central control connection. Power wiring must be installed in a tree configuration from the outdoor unit to the indoor units through a three (3) wire power cable. Communication wiring can be installed in a tree configuration, daisy chain, or combination of both from the outdoor unit to the indoor units through a two (2) wire communication cable. The system is capable of performing continuous operation, even when power is turned off to an individual indoor unit.

MULTI F WITH LGRED° OUTDOOR UNIT

General Data

Table 7: Multi F with LGRED Outdoor Unit Specifications.

Model Number		KUMXA181A	KUMXA241A	KUMXA301A
Cooling (Btu/h) (Min.~Rated~ Max.)[1]		8,400~18,000~19,980	8,400~24,000~30,000	8,400~28,400~34,080
Cooling Power Input (kW) (Min.~Rated~ Max.)		0.875~1.330~1.862	0.936~1.780~2.638	0.945~2.270~3.372
Cooling Running Current (A) (Min.~Rated~ Max.)		4.0~6.0~8.4	4.2~8.1~11.9	4.3~10.3~15.3
Heating (Btu/h) (Min.~Rated~ Max.)[1]		10,248~22,000~24,000	10,248~26,000~31,200	10,248~30,000~36,000
Heating Power Input (kW) (Min.~Rated~ Max.)		1.001~1.790~2.506	1.233~2.080~3.090	1.299~2.350~3.487
Heating Running Current (A) (Min.~Rated~ Max.)		4.5~8.1~11.3	5.6~9.4~14.0	5.9~10.6~15.8
Continuous Operating Range				
Cooling (°F DB)[2]		14 to 118	14 to 118	14 to 118
Heating (°F WB)		-13 to +64	-13 to +64	-13 to +64
Compressor				
Type x Quantity		Scroll x 1	Scroll x 1	Scroll x 1
Oil/Type		PVE	PVE	PVE
Fan (Side Discharge)				
Type		Axial	Axial	Axial
Motor Output (W) x Qty.		124.2 x 1	124.2 x 1	124.2 x 1
Motor / Drive		Brushless Digitally Controlled / Direct		
Maximum Air Volume (CFM)		2,119	2,119	2,119
Maximum External Static Pressure (in. w.g.)		0.04	0.04	0.04
Unit Data				
Min. ~ Max. Number Indoor Units/System[3]		2 ~ 2	2 ~ 3	2 ~ 4
Min. ~ Max. Allowable Total Indoor Unit Connected Capacity (Btu/h)		14,000 ~ 24,000	14,000 ~ 33,000	14,000 ~ 40,000
Sound Pressure dB(A)[4]	Cooling	50	52	52
	Heating	54	55	55
Net Dimensions (W x H x D [inch])		37-13/32 x 32-27/32 x 13	37-13/32 x 32-27/32 x 13	37-13/32 x 32-27/32 x 13
Shipping Dimensions (W x H x D [inch])		41-29/32 x 36-5/16 x 18-5/32	41-29/32 x 36-5/16 x 18-5/32	41-29/32 x 36-5/16 x 18-5/32
Net / Shipping Unit Weight (lbs.)		147.7 / 165.3	149.9 / 167.6	152.1 / 169.8
Exterior Color Codes		Munsell 2.5Y 7.5/1 (RAL 7044)		
Power Supply (To Outdoor Unit; V / Hz / Ø)		208 - 230, 1 , 60		
Power Supply Wiring (Outdoor Unit) (No. x AWG)[5]		3 x 12	3 x 12	3 x 12
Power Wiring / Comm. Wiring (ODU to IDU) (No. x AWG)[5]		3 × 14 / 2 × 18	3 × 14 / 2 × 18	3 × 14 / 2 × 18
Heat Exchanger				
Material and Fin Coating		Copper Tube/Aluminum Fin and GoldFin™/Hydrophilic		
Rows / Columns/Fins per inch x Qty.		(3 × 38 × 14) x 1	(3 × 38 × 14) x 1	(3 × 38 × 14) x 1
Refrigerant				
Type[6] / Control		R32 / EEV, ODU	R32 / EEV, ODU	R32 / EEV, ODU
Factory Charge oz. of R32		77.6	84.7	84.7
Additional Charge (oz./ft.)		0.22	0.22	0.22

Rated cooling capacity obtained with air entering the indoor unit 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).
Rated heating capacity 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).

All capacities are net with a combination ratio between 95 – 105%.

[1]Capacity is rated with non-ducted indoor units, 0 ft. above sea level, with a 0 ft. level difference between outdoor and indoor units, and the following refrigerant pipe lengths:
KUMXA181A: 16.4 ft. x 2 = 32.8 ft.
KUMXA241A: 16.4 ft. x 3 = 49.2 ft.
KUMXA301A: 16.4 ft. x 4 = 65.6 ft.

[2]Cooling operation range with Low Ambient Wind Baffle Kit (sold separately) is -4°F to +118°F.

[3]At least two indoor units must be connected. For allocated capacity information, see the combination tables in the "Multi F / Multi F MAX Combination Data Manual" on www.lghvac.com. For performance data, see "Multi F / Multi F MAX Performance Data Manual" on www.lghvac.com.

[4]Sound pressure levels are tested in an anechoic chamber under ISO Standard 3745.

[5]Power wiring to the outdoor unit is field supplied, solid or stranded, and must comply with the applicable local and national codes. The power wiring and the communication wiring from the outdoor unit to the indoor unit is field supplied and must be stranded, shielded or unshielded (if shielded, it must be grounded to the chassis of the outdoor unit only). All wiring must comply with applicable local and national codes. For detailed information, please refer to electrical characteristics on page 20.

[6]Take appropriate actions at the end of HVAC equipment life to recover, recycle, reclaim or destroy R32 refrigerant according to applicable regulations (40 CFR Part 82, Subpart F) under section 608 of CAA.

Table 8: Multi F with LGRED Outdoor Unit Specifications, continued.

Model Number	KUMXA181A	KUMXA241A	KUMXA301A
Piping[1]			
Liquid Line Connection (in., OD) x Qty.	1/4 Flare x 2	1/4 Flare x 3	1/4 Flare x 4
Vapor Line Connection (in., OD) x Qty.	3/8 Flare x 2	3/8 Flare x 3	3/8 Flare x 4
Condensation Line (O.D., I.D., in.)	1-1/4, / 1	1-1/4, / 1	1-1/4, / 1
Piping Lengths[1]			
Maximum Total Piping (ft.)	164	246.1	246.1
Piping Length (No Additional Refrigerant [ft.])	82.0	123.0	123.0
Min. / Max. ODU to IDU Piping (ft.)	9.8 / 82.0	9.8 / 82.0	9.8 / 82.0
Max. Elevation between ODU and IDU (ft.)	49.2	49.2	49.2
Max. Elevation between IDU and IDU (ft.)	24.6	24.6	24.6

Capacity is rated with non-ducted IDUs, 0 ft. above sea level, with a 0 ft. level difference between ODU and IDUs, and the following refrigerant pipe lengths:
KUMXA181A: 16.4 ft. x 2 = 32.8 ft.
KUMXA241A: 16.4 ft. x 3 = 49.2 ft.
KUMXA301A: 16.4 ft. x 4 = 65.6 ft.
All capacities are net with a combination ratio between 95 – 105%.

[1]Piping lengths are equivalent.

MULTI F WITH LGRED° OUTDOOR UNIT

General Data

Table 9: KUMXA181A Efficiency Ratings.[1,2]

System	Combined With	Rated Cooling Capacity (Btu/h)	EER2 (95°F)	SEER2	Rated Heating Capacity (Btu/h)	COP (47°F)	HSPF2	Low Heating Capacity (Btu/h)	COP (17°F)	ENERGY STAR 6.1	ENERGY STAR Cold Climate
KUMXA181A	Non-Ducted Indoor Units	18,000	13.5	20.0	22,000	3.60	9.8	13,900	2.59	Yes	Yes
	Ducted Indoor Units	17,200	12.0	17.0	22,000	3.36	9.0	13,500	2.50	Yes	Yes
	Mixed Non-Ducted and Ducted Indoor Units	17,600	12.8	18.5	22,000	3.48	9.4	13,700	2.55	Yes	Yes

Table 10: KUMXA241A Efficiency Ratings.[1,2]

System	Combined With	Rated Cooling Capacity (Btu/h)	EER2 (95°F)	SEER2	Rated Heating Capacity (Btu/h)	COP (47°F)	HSPF2	Low Heating Capacity (Btu/h)	COP (17°F)	ENERGY STAR 6.1	ENERGY STAR Cold Climate
KUMXA241A	Non-Ducted Indoor Units	24,000	13.5	21.0	26,000	3.66	9.8	17,800	2.80	Yes	Yes
	Ducted Indoor Units	22,000	12.5	18.5	24,000	3.63	9.5	15,000	2.80	Yes	Yes
	Mixed Non-Ducted and Ducted Indoor Units	23,000	13.0	19.8	25,000	3.65	9.7	16,400	2.80	Yes	Yes

Table 11: KUMXA301A Efficiency Ratings.[1,2]

System	Combined With	Rated Cooling Capacity (Btu/h)	EER2 (95°F)	SEER2	Rated Heating Capacity (Btu/h)	COP (47°F)	HSPF2	Low Heating Capacity (Btu/h)	COP (17°F)	ENERGY STAR 6.1	ENERGY STAR Cold Climate
KUMXA301A	Non-Ducted Indoor Units	28,400	12.5	20.0	30,000	3.74	9.8	19.900	2.90	Yes	Yes
	Ducted Indoor Units	24,600	11.7	18.5	30,000	3.74	9.5	19.900	2.90	Yes	Yes
	Mixed Non-Ducted and Ducted Indoor Units	26,500	12.1	19.3	30,000	3.74	9.7	19.900	2.90	Yes	Yes

[1]Capacity is rated 0 ft. above sea level, with a 0 ft. level difference between ODU and IDUs, and the following refrigerant pipe lengths:
KUMXA181A: 16.4 ft. x 2 = 32.8 ft.
KUMXA241A: 16.4 ft. x 3 = 49.2 ft.
KUMXA301A: 16.4 ft. x 4 = 65.6 ft.
All capacities are net with a combination ratio between 95 – 105%.
Rated cooling capacity rating obtained with air entering the indoor unit at 80ºF dry bulb (DB) and 67ºF wet bulb (WB) and outdoor ambient conditions of 95ºF dry bulb (DB) and 75ºF wet bulb (WB).
Rated 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).
[2]Rated capacity is certified under AHRI Standard 210 / 240. EER2, SEER2, COP, and HSPF2 are subject to change. See www.ahrinet.org for the latest values.

NOTICE

At least two indoor units must be connected. For allocated capacity information, see the combination tables in the "Multi F / Multi F MAX with LGRED Combination Data Manual" on www.lghvac.com. For performance data, see "Multi F / Multi F MAX with LGRED Performance Data Manual" on www.lghvac.com.

Table 12: Electrical Data.

Nominal Tons	Unit Model No.	Hertz	Voltage	Voltage Range (Min. to Max.)	MCA	MOP	LRA	Compressor Quantity	Compressor Motor RLA	Outdoor Fan Motor		Indoor Fan Motor
										kW	FLA	FLA
1.5	KUMXA181A	60	208 - 230	187 - 253	22.7	30	23	1	17.0	0.124	0.65	0.80
2.0	KUMXA241A				23.1	30	23	1	17.0	0.124	0.65	1.20
2.5	KUMXA301A				23.5	30	23	1	17.0	0.124	0.65	1.60

Voltage tolerance is ±10%.

Maximum allowable voltage unbalance is 2%.

MCA = Minimum Circuit Ampacity.

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.

LRA = (Locked Rotor Amps)

RLA = Rated Load Amps.

FLA = Full Load Amps.

Indoor Fan Motor (FLA) is based on the max. combination of IDUs.

The maximum combination for each outdoor unit is:

- 18,000 ODU (KUMXA181A): 12,000 IDU x 2
- 24,000 ODU (KUMXA241A): 12,000 IDU x 2 + 9,000 IDU x 1
- 30,000 ODU (KUMXA301A): 12,000 IDU x 3

MULTI F WITH LGRED° OUTDOOR UNIT

Functions, Controls, Options, and Accessories

Table 13: Functions, Controls, Options, and Accessories.

Functions		KUMXA181A	KUMXA241A	KUMXA301A
Reliability	Defrost / Deicing	√	√	√
	High Pressure Switch	√	√	√
	Restart Delay (Three [3] Minutes)	√	√	√
	Self Diagnosis	√	√	√
	Soft Start	√	√	√
	Test Function	√	√	√
Convenience	Night Silent Operation	√	√	√
	Wiring Error Check	√	√	√
	Peak Control	√	√	√
	Mode Lock	√	√	√
	Forced Cooling Operation (Outdoor Unit)	√	√	√
Central Controllers	PI-485	Built-In	Bulit-In	Built-In
Integration Solution	MultiSITE Communications Manager	○ PBACNBTR0A	○ PBACNBTR0A	○ PBACNBTR0A
	ACP 5 BACnet® Gateway	○ (PACP5A000)	○ (PACP5A000)	○ (PACP5A000)
	LonWorks® Gateway	○ (ZHWLONWK0)	○ (ZHWLONWK0)	○ (ZHWLONWK0)
Central Controllers	AC Smart 5	○ PACS5A000	○ PACS5A000	○ PACS5A000
	ACP 5	○ PACP5A000	○ PACP5A000	○ PACP5A000
Installation	Y-Branch	X	X	X
	Header Branch	X	X	X
	Air Guide	X	X	X
Other	Power Distribution Indication (PDI) Premium	○ PQNUD1S41	○ PQNUD1S41	○ PQNUD1S41
	Low Ambient Wind Baffle Kit	○ ZLABGP04A (Logical Operation)	○ ZLABGP04A (Logical Operation)	○ ZLABGP04A (Logical Operation)
	Drain Pan Heater	Built-In	Bulit-In	Built-In
	LG Monitoring View (LGMV) for Computers	○ PRCTIL0	○ PRCTIL0	○ PRCTIL0
	Mobile LGMV for Android® Smartphones / Tablets or for iOS® Tablets	○ PLGMVW100	○ PLGMVW100	○ PLGMVW100

√: Standard Feature

O: Option. Optional accessories must be purchased separately.

X: Not Available

(BACnet is a registered trademark of ASHRAE. LonWorks is a registered trademark of Echelon Corp.

Android is a registered trademark of Google LLC. iOS is a registered trademark of Cisco Systems, Inc.

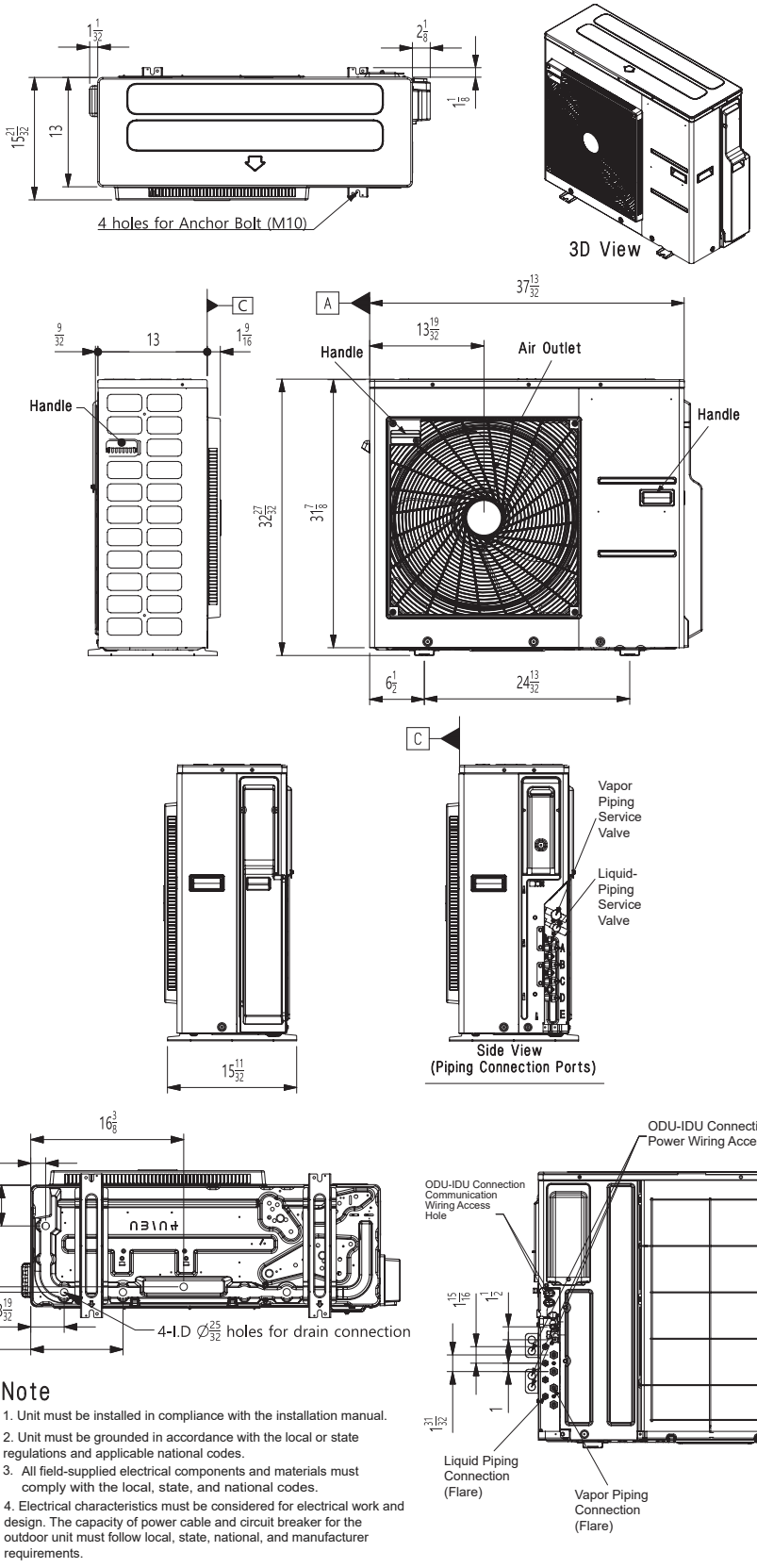
MULTI F WITH LGRED° OUTDOOR UNIT

Dimensions

Figure 4: KUMXA181A, KUMXA241A, KUMXA301A Dimensions.

Unit: inch

Model: KUMXA181A, KUMXA241A, and KUMXA301A



Symbols

- Piping Direction
- A Datum line

Note

1. Unit must be installed in compliance with the installation manual.
2. Unit must be grounded in accordance with the local or state regulations and applicable national codes.
3. All field-supplied electrical components and materials must comply with the local, state, and national codes.
4. Electrical characteristics must be considered for electrical work and design. The capacity of power cable and circuit breaker for the outdoor unit must follow local, state, national, and manufacturer requirements.

MULTI F WITH LGRED° OUTDOOR UNIT

Center of Gravity / Corner Weights

Figure 5: KUMXA181A, KUMXA241A, and KUMXA301A Center of Gravity and Corner Weight Diagram (Appearance may differ than what is depicted below).

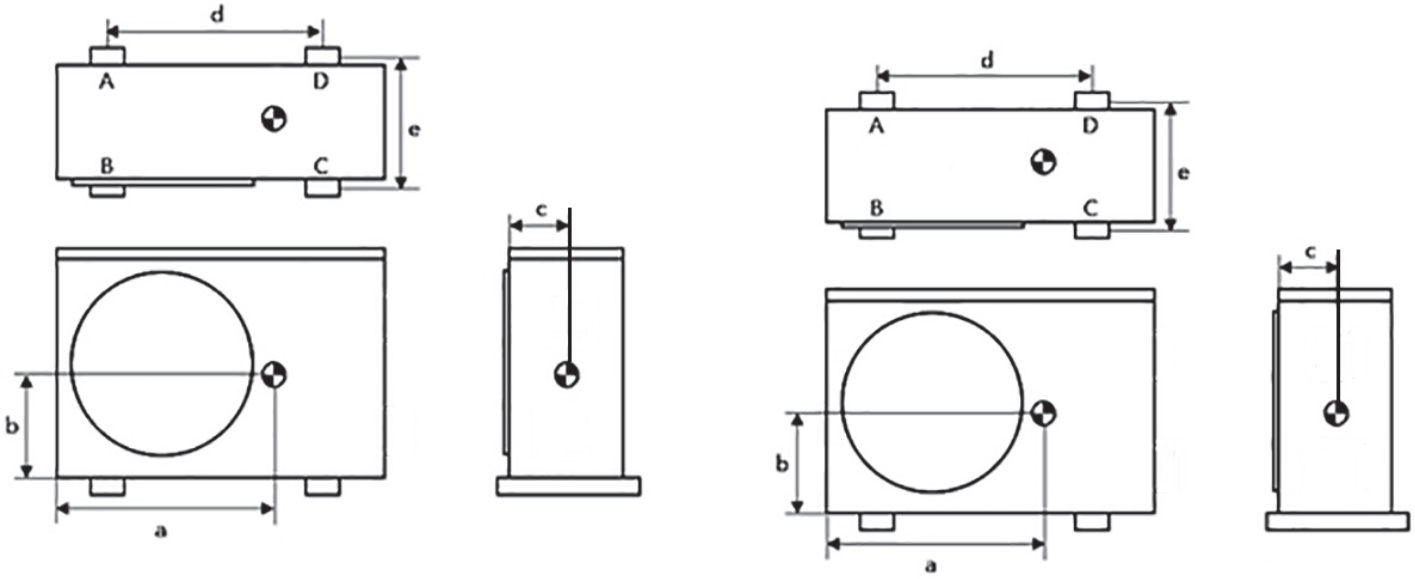
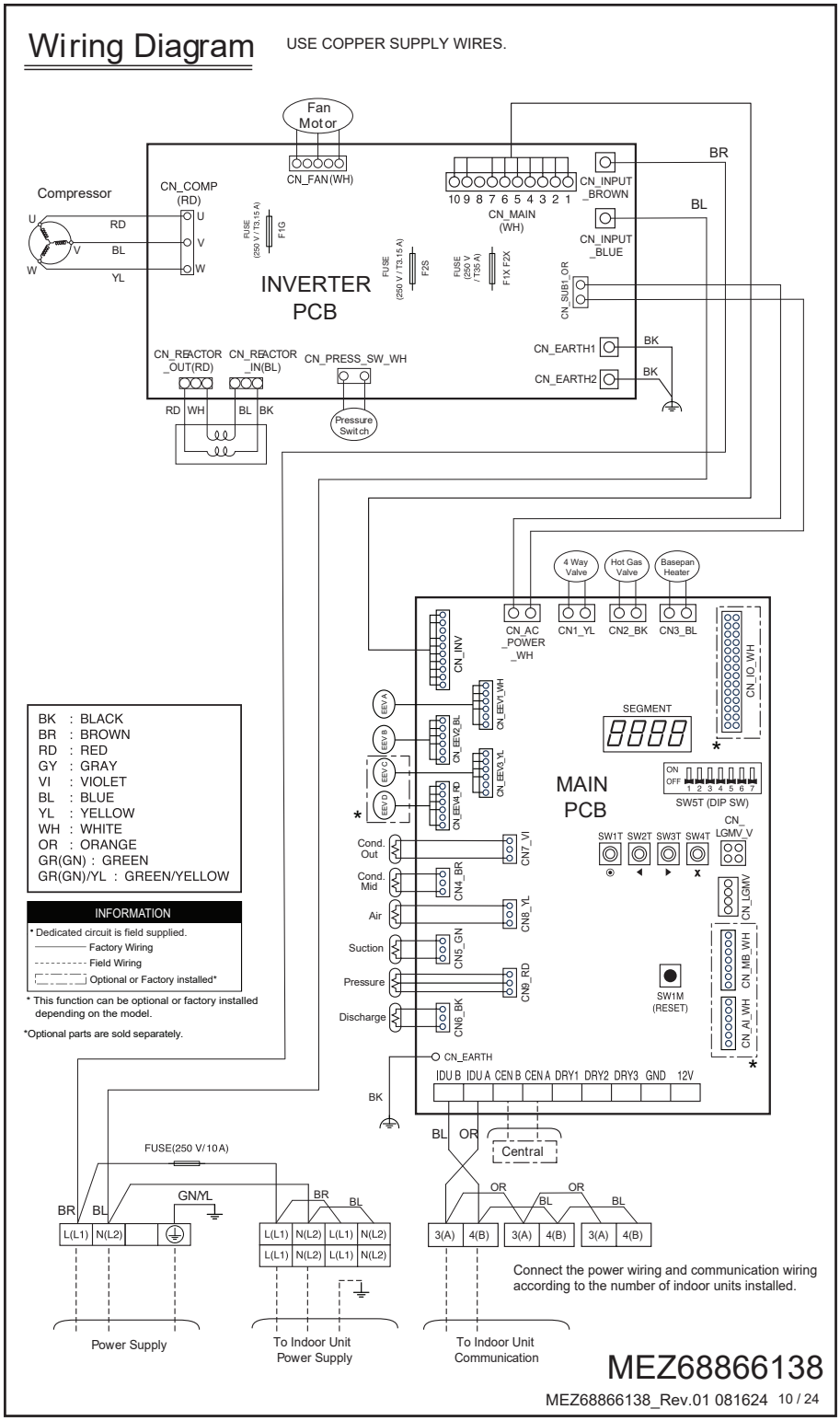


Table 14: KUMXA181A, KUMXA241A, KUMXA301A Center of Gravity and Corner Weights.

Model No.	Frame	Weight (lb.)		Center of Gravity (in.)			Leg (in.)		Corner Weight (lb.)			
		Shipping	Net	a	b	c	d	e	A	B	C	D
KUMXA181A	U36A	156.5	140.0	23-7/32	12-19/32	5-29/32	24-13/32	14-3/16	18.5	29.1	56.6	35.9
KUMXA241A	U36A	156.5	140.0	23-7/32	12-19/32	5-29/32	24-13/32	14-3/16	18.5	29.1	56.6	35.9
KUMXA301A	U36A	156.5	140.0	23-7/32	12-19/32	5-29/32	24-13/32	14-3/16	18.5	29.1	56.6	35.9

Figure 6: KUMXA181A, KUMXA241A, and KUMXA301A Wiring Diagram.



NOTICE

KUMXA181A can support no more than two indoor units; KUMXA241A can support two or three indoor units; KUMXA301A can support two, three, or four indoor units. Ensure the communication wiring and power wiring from the outdoor unit to the indoor units is installed correctly for the system and the chosen application.

MULTI F WITH LGRED° OUTDOOR UNIT

Refrigerant Flow Diagram

NOTICE

Various tools are available to assist in properly designing LG R32 split systems. Refer to the "R32 Application Guide"; the "Simple Calculator for Capacity, Refrigerant Charge and ESP"; the "LG Air Conditioner Technical Solutions" (LATS) software program; and the local LG Sales Representative.

Figure 7: KUMXA181A Refrigerant Flow Diagram.

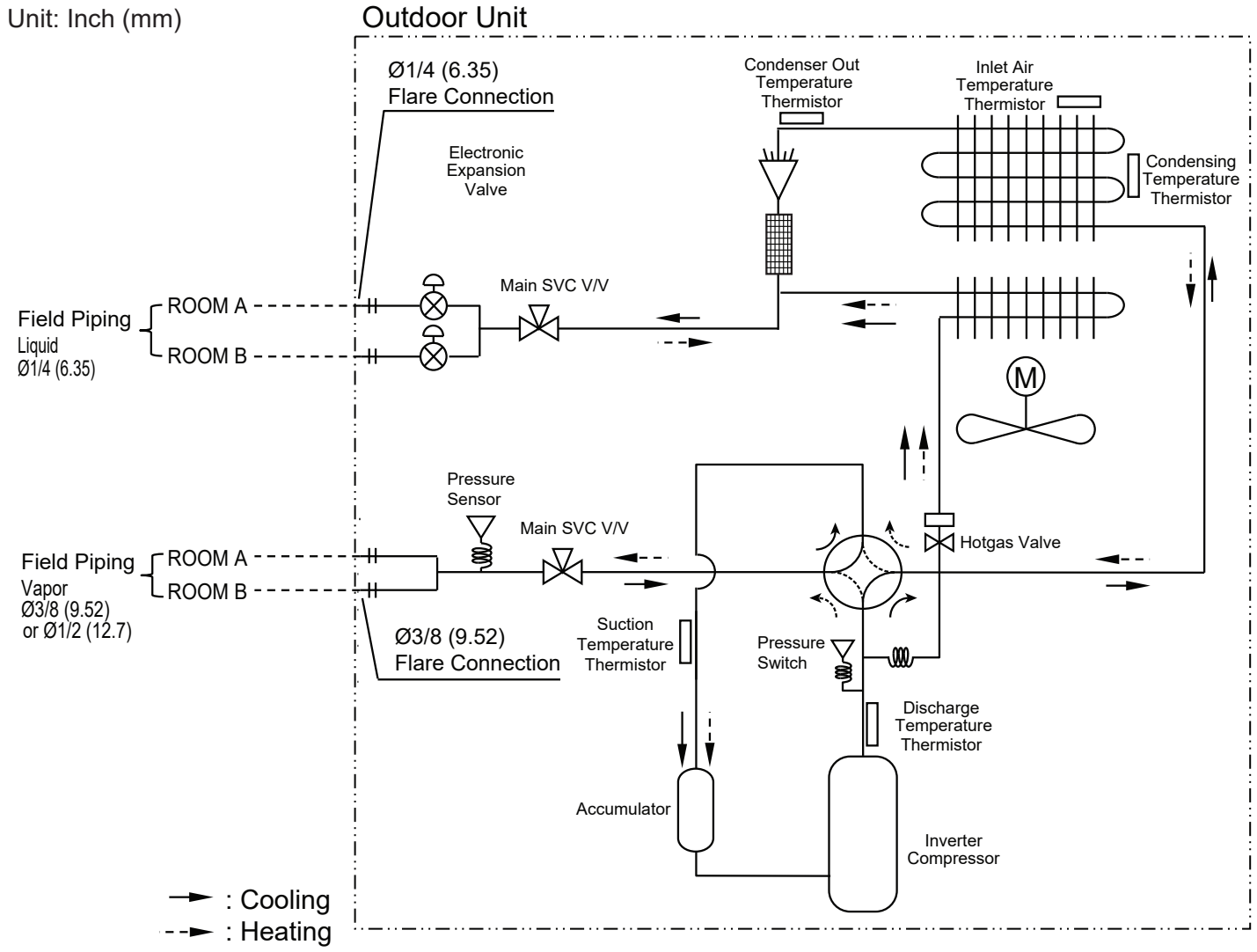


Table 15: KUMXA181A Thermistor Details.

Description	PCB Connector
Condenser Outlet Temperature Thermistor	CN_C_PIPE
Condensing Temperature Thermistor	CN_MID
Inlet Air Temperature Thermistor	CN_AIR
Discharge Temperature Thermistor	CN_DISCHARGE
Suction Temperature Thermistor	CN_SUCTION
Pressure Sensor	CN_H_PRESS

NOTICE

Various tools are available to assist in properly designing LG R32 split systems. Refer to the "R32 Application Guide"; the "Simple Calculator for Capacity, Refrigerant Charge and ESP"; the "LG Air Conditioner Technical Solutions" (LATS) software program; and the local LG Sales Representative.

Figure 8: KUMXA241A Refrigerant Flow Diagram.

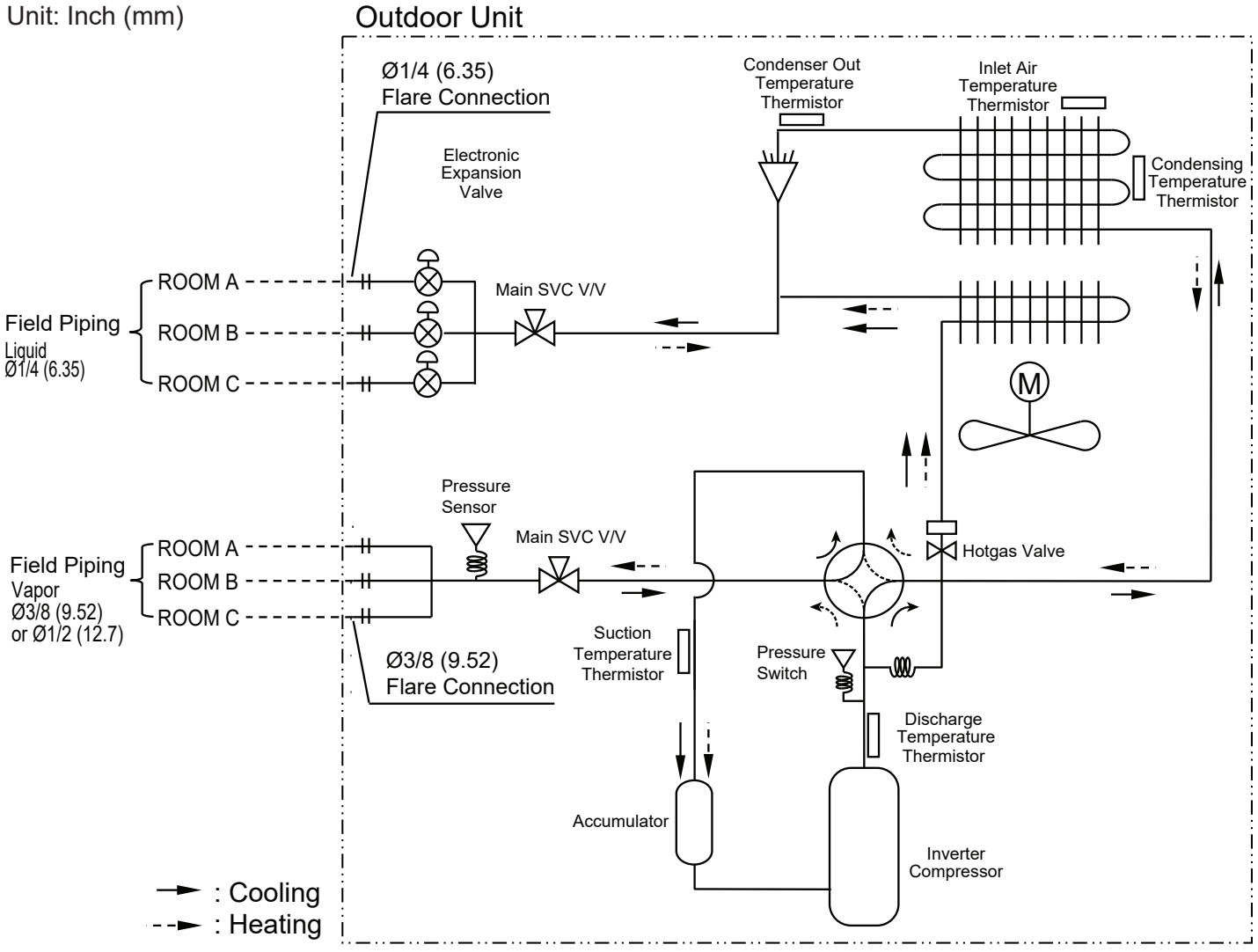


Table 16: KUMXA241A Thermistor Details.

Description	PCB Connector
Condenser Outlet Temperature Thermistor	CN_C_PIPE
Condensing Temperature Thermistor	CN_MID
Inlet Air Temperature Thermistor	CN_AIR
Discharge Temperature Thermistor	CN_DISCHARGE
Suction Temperature Thermistor	CN_SUCTION
Pressure Sensor	CN_H_PRESS

NOTICE

Various tools are available to assist in properly designing LG R32 split systems. Refer to the "R32 Application Guide"; the "Simple Calculator for Capacity, Refrigerant Charge and ESP"; the "LG Air Conditioner Technical Solutions" (LATS) software program; and the local LG Sales Representative.

Figure 9: KUMXA301A Refrigerant Flow Diagram.

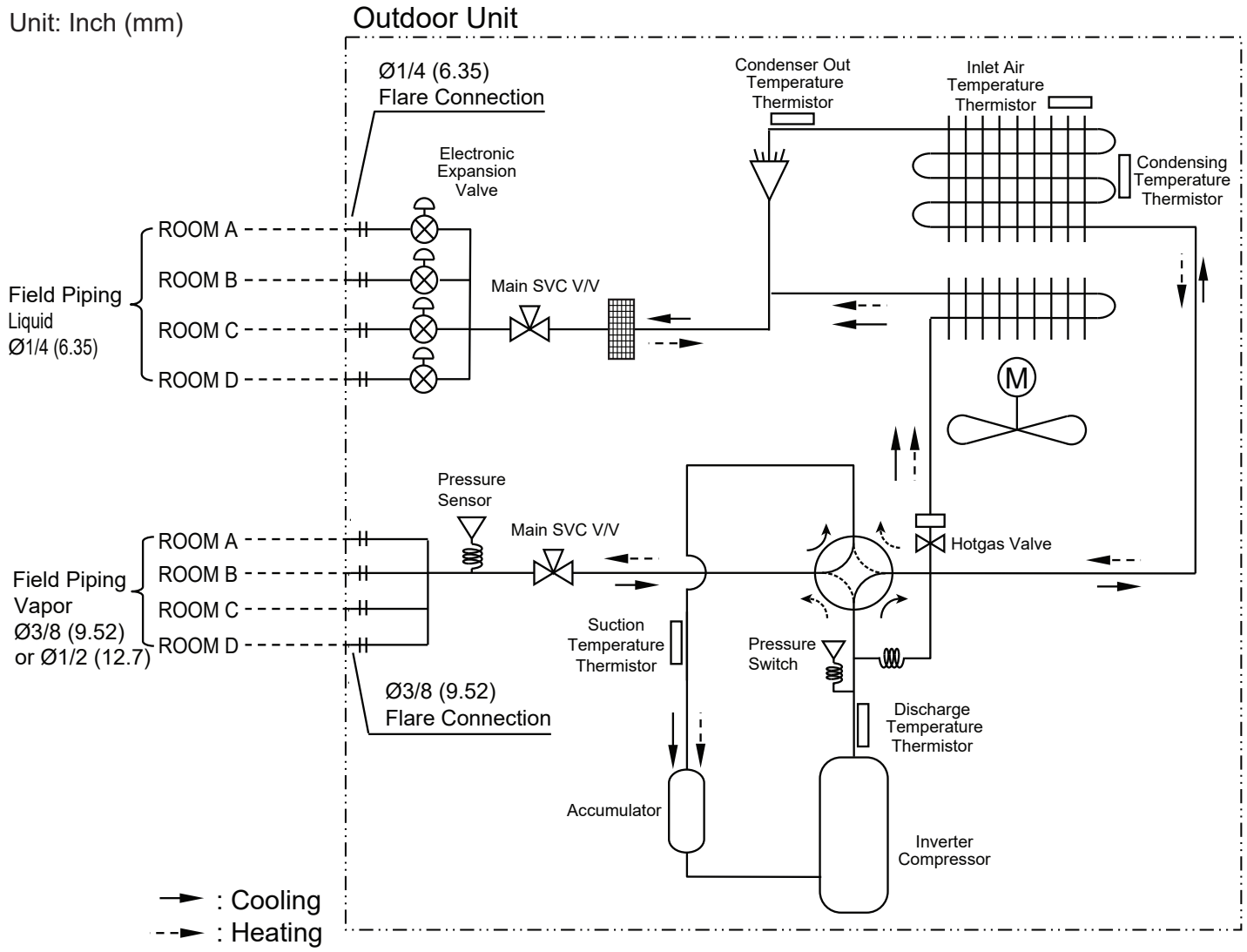
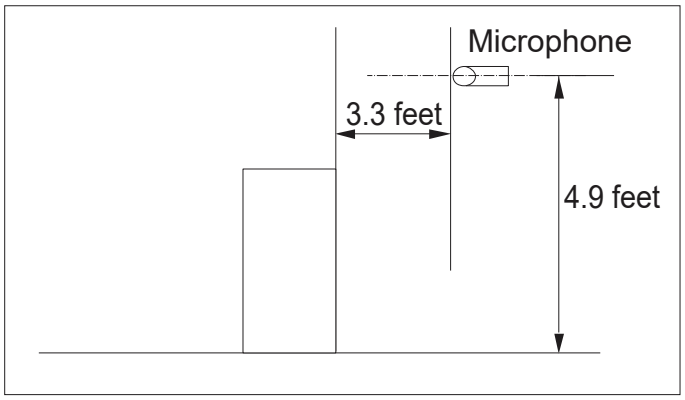


Table 17: KUMXA301A Thermistor Details.

Description	PCB Connector
Condenser Outlet Temperature Thermistor	CN_C_PIPE
Condensing Temperature Thermistor	CN_MID
Inlet Air Temperature Thermistor	CN_AIR
Discharge Temperature Thermistor	CN_DISCHARGE
Suction Temperature Thermistor	CN_SUCTION
Pressure Sensor	CN_H_PRESS

Sound Pressure Levels

Figure 10: Acoustic Measurement Location.



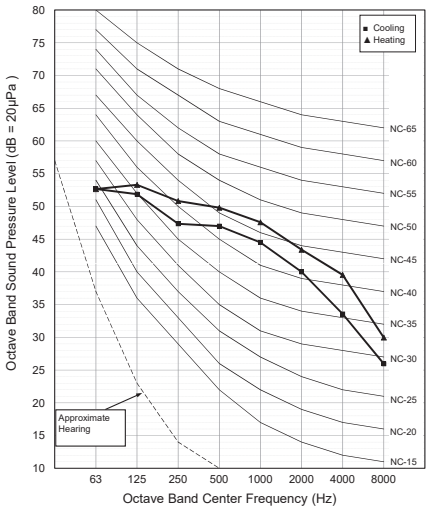
- Measurement taken 4.9' above finished floor, and at a distance of 3.3' from face of unit.
- Measurements taken with no attenuation and units operating at full load normal operating condition.
- Sound level will vary depending on a range of factors such as construction (acoustic absorption coefficient) of particular area in which the equipment is installed.
- Sound level may be increased in static pressure mode or if air guide is used.
- Sound pressure levels are measured in dB(A)±1.
- Tested in anechoic chamber per ISO Standard 3745.

Table 18: Sound Pressure Levels (dB[A]).

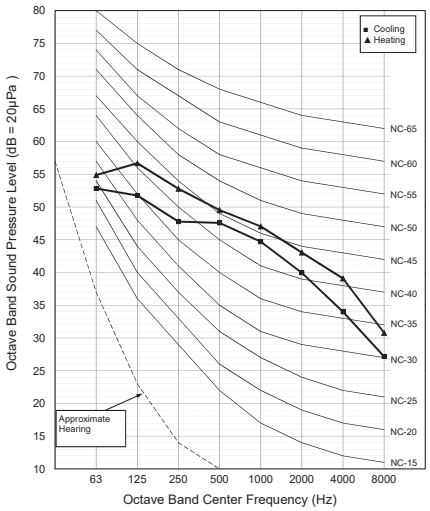
Model No.	Sound Pressure Levels (dB[A])	
	Cooling	Heating
KUMXA181A	50	54
KUMXA241A	52	55
KUMXA301A	52	55

Figure 11: Sound Pressure Level Diagrams.

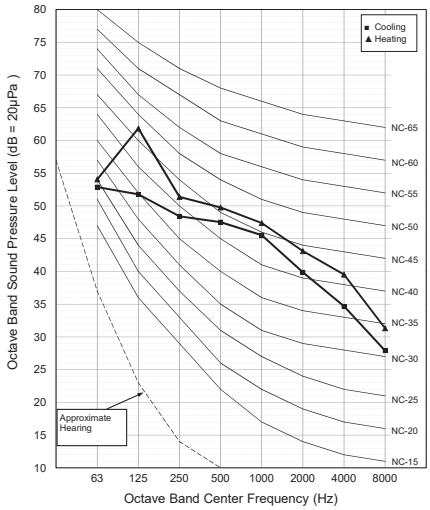
KUMXA181A



KUMXA241A



KUMXA301A



MULTI F WITH LGRED° OUTDOOR UNIT

Acoustic Data

Sound Power Levels

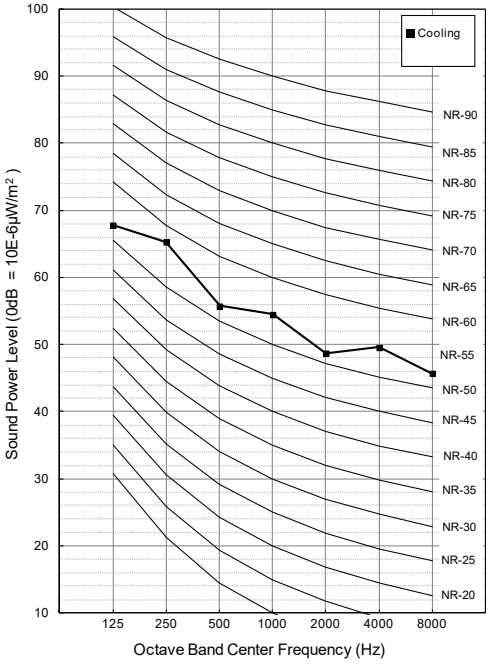
- Data is valid under diffuse field conditions.
- Data is valid under nominal operating conditions.
- Sound power level is measured using rated conditions, and tested in a reverberation room per ISO 3741 standards.
- Sound level will vary depending on a range of factors such as construction (acoustic absorption coefficient) of particular area in which the equipment is installed.
- Reference acoustic intensity: 0dB = 10E-6μW/m^2

Table 19: Sound Power Levels (dB[A]).

Model No.	Sound Power Levels (dB[A])	
	Cooling	Heating
KUMXA181A	64	66
KUMXA241A	64	66
KUMXA301A	64	66

Figure 12: Cooling Sound Power Level Diagram.

KUMXA181A,
KUMXA241A,
KUMXA301A



MULTI F MAX WITH LGRED° OUTDOOR UNIT PRODUCT DATA

MULTI F MAX WITH LGRED° OUTDOOR UNIT

Mechanical Specifications

Multi F MAX with LGRED Heat Pump Units

General

A Multi F MAX with LGRED multi-zone system is comprised of one heat pump outdoor unit connected up to eight indoor units through a branch distribution (BD) unit using a single refrigerant piping circuit, and includes integrated controls supplied by LG. Factory-designed and supplied Y-branches may be used as well.

The outdoor unit is internally assembled, wired, and piped from the factory; all LG components are manufactured in a facility registered to ISO 9001 and ISO 14001, set by the International Organization for Standardization (ISO). The LG Multi F MAX with LGRED multi-zone heat pump system components comply with Underwriters Laboratories (UL) 1995 Heating and Cooling Equipment Standard for Safety. The units are certified to AHRI 210 / 240.

Temperature Ranges

The heat pump outdoor units are capable of operating in cooling mode from 14°F to 118°F ambient dry bulb (installing an optional Low Ambient Wind Baffle Kit will allow operation down to -4°F in cooling mode for Multi F MAX with LGRED systems). The heat pump outdoor units are capable of operating in heating mode from -13°F to +64°F ambient wet bulb without additional low ambient controls.

Frame

Multi F MAX with LGRED condensing unit case is constructed from pre-coated metal that has been tested in accordance with ASTM B-117 salt spray procedure for a minimum of 1,000 hours. Case has a removable front panel to allow access to major components and control devices, and legs to secure the unit during installation.

Refrigerant System

Multi F MAX with LGRED systems have a single refrigerant circuit field piped with a manufacturer-supplied branch distribution unit(s) and Y-branches (if applicable) to multiple (ducted, non-ducted or mixed) indoor units to effectively and efficiently control the heating or cooling operation of the multi zone system. All refrigerant lines from the outdoor unit to the branch distribution unit(s) and from the branch distribution unit(s) to indoor units are field-installed and must be insulated separately.

Multi F MAX with LGRED systems use R32 refrigerant. The outdoor units are equipped with a sub-cooled heat exchanger, vapor injection, vapor bypass circuit, refrigerant strainer, check valves, oil separator, accumulator, four-way reversing valve, electronic expansion valve(s) (EEV), high side and low side refrigerant charging ports, and a service port. The outdoor unit also includes sensors for suction temperature, discharge temperature, high-pressure, low-pressure, heat exchanger temperature, and outdoor temperature conditions.

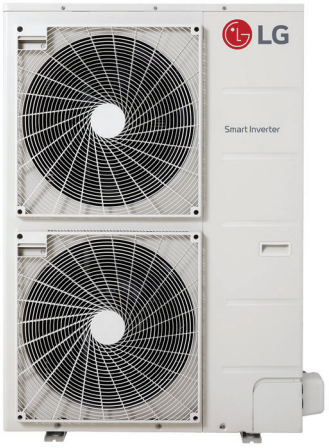
Refrigeration Oil Control

The outdoor unit has an oil separator to separate oil mixed with the refrigerant gas during compression and return oil to the compressor. The outdoor unit also has an oil injection mechanism to ensure a consistent film of oil on all moving compressor parts at low speed.

Compressor

Multi F MAX with LGRED condensing units are equipped with one hermetically sealed, digitally controlled, inverter driven scroll compressor that includes Teflon™ coated bearings. The inverter motor is capable of providing a modulation range of 10Hz to 120Hz (cooling) and 10Hz to 135Hz (heating) with control in 1Hz increments. The compressor is uses a factory-charge of Polyvinyl Ether (PVE) oil, and is mounted to avoid the transmission of vibration.

Figure 13: Multi F MAX with LGRED KUMXA361A, KUMXA421A, KUMXA481A Outdoor Units.



Fan and Motors

The Multi F MAX with LGRED outdoor unit includes two direct drive variable speed propeller fans with Brushless Digitally Controlled (BLDC) motor with a horizontal air discharge.

Fan blades are statically and dynamically balanced propeller fans made of durable Acrylonitrile Butadiene Styrene (ABS) plastic, and include a raised fan guard to limit contact with moving parts. The motors have inherent overload protection, permanently lubricated bearings, and a maximum speed up to 700 rpm in cooling, and up to 750 rpm in heating. Multi F MAX with LGRED outdoor units have a horizontal discharge airflow.

Outdoor Unit Coil

The outdoor unit coils are factory-built of aluminum fins mechanically bonded on copper tubing. Coils have a minimum of three rows, a minimum of 14 fins per inch and have been factory pressure-tested. Coil fins also have a factory applied corrosion-resistant GoldFin™ material with hydrophilic coating that has been tested in accordance with ASTM B-117 salt spray test procedure for a minimum of 1,000 hours.

Electrical

Multi F MAX with LGRED outdoor unit have 208/230V, 1 phase, 60Hz electrical power capable of operating within ±10% of the rated voltage.

Controls

Factory installed microprocessor controls in the outdoor unit, BD unit(s), and indoor units perform functions to efficiently operate the multi-zone system. Outdoor units are equipped with a central control connection. Power wiring must be installed in a tree configuration from the outdoor unit to the BD units, and from the BDU units to the indoor units through a three (3) wire power cable. Communication wiring can be installed in a tree configuration, daisy chain, or combination of both from the outdoor unit to the BD units and from the BD units to the indoor units through a two (2) wire communication cable. The system is capable of performing continuous operation, even when power is turned off to an individual indoor unit.

MULTI F MAX WITH LGRED° OUTDOOR UNIT

General Data

Table 20: Multi F MAX with LGRED Outdoor Unit Specifications.

Model Number		KUMXA361A	KUMXA421A	KUMXA481A
Cooling Capacity (Btu/h) (Minimum ~ Rated ~ Maximum)[1]		10,800~36,000~47,000	10,800~42,000~53,000	10,800~48,000~58,000
Cooling Power Input (kW) (Min.~Rated~ Max.)		0.64~2.48~4.07	0.64~3.04~4.71	0.64~3.66~5.17
Cooling Running Current (A) (Min.~Rated~ Max.)		2.9~11.2~18.5	2.9~13.8~21.3	2.9~16.6~23.4
Heating Capacity (Btu/h) (Minimum ~ Rated ~ Maximum)[1]		12,420~45,000~50,000	12,420~48,000~54,500	12,420~52,500~59,000
Heating Power Input (kW) (Min.~Rated~ Max.)		0.71~3.30~4.31	0.71~3.70~4.70	0.71~4.25~5.09
Heating Running Current (A) (Min.~Rated~ Max.)		3.2~14.9~19.5	3.2~16.8~21.3	3.2~20.0~23.0
Continuous Operating Range[2]				
Cooling (°F DB)		14 to 118	14 to 118	14 to 118
Heating (°F WB)		-13 to +64	-13 to +64	-13 to +64
Compressor				
Type x Quantity		Scroll x 1	Scroll x 1	Scroll x 1
Oil/Type		PVE	PVE	PVE
Fan (Side Discharge)				
Type		Propeller	Propeller	Propeller
Motor Output (W) x Qty.		124.2 x 2	124.2 x 2	124.2 x 2
Motor / Drive		Brushless Digitally Controlled / Direct		
Maximum Air Volume (CFM)		2,119 x 2	2,119 x 2	2,119 x 2
Maximum External Static Pressure (in. w.g.)		0.1	0.1	0.1
Unit Data				
Min. ~ Max. Number Indoor Units/System[3]		2 ~ 5	2 ~ 6	2 ~ 8
Max. Number of Branch Distribution Units		2	2	2
Min. ~ Max. Allowable Total Indoor Unit Connected Capacity (Btu/h)		18,000 ~ 48,000	18,000 ~ 56,000	18,000 ~ 65,000
Sound Pressure ±3 dB(A)[4]	Cooling	53	54	54
	Heating	55	56	56
Net Dimensions (W x H x D [inch])		37-13/32 x 54-11/32 x 13		
Shipping Dimensions (W x H x D [inch])		44-3/4 x 57-19/32 x 18-5/32		
Net / Shipping Unit Weight (lbs.)		218.3 / 239.2	218.3 / 239.2	218.3 / 239.2
Exterior Color Codes		Munsell 2.5Y 7.5/1 (RAL 7044)		
Power Supply (To Outdoor Unit; V / Hz / Ø)		208 / 230V, 60, 1		
Power Supply Wiring (To Outdoor Unit) (No. x AWG)[5]		3 x 8	3 x 8	3 x 8
Power Wiring / Communication Wiring (ODU to BDU) (No. x AWG)[5]		3 x 14 / 2 x 18	3 x 14 / 2 x 18	3 x 14 / 2 x 18
Power Wiring / Communication Wiring (BDU to IDU) (No. X AWG)[5]		3 x 14 / 2 x 18	3 x 14 / 2 x 18	3 x 14 / 2 x 18
Heat Exchanger				
Material and Fin Coating		Copper Tube / Aluminum Fin and GoldFin™ / Hydrophilic		
Rows / Columns / Fins per inch x Qty.		(2 x 32 x 14) x 2; (1 x 32 x 14) x 2	(2 x 32 x 14) x 2; (1 x 32 x 14) x 2	(2 x 32 x 14) x 2; (1 x 32 x 14) x 2
Refrigerant				
Type[6] / Control		R32, Electronic Expansion Valve / Outdoor Unit		
Factory Charge oz. of R32		148.2	148.2	148.2
Additional Charge (oz./ft.)	Main Pipe	0.54	0.54	0.54
	Branch Pipe	0.22	0.22	0.22

[1]Capacity is rated with non-ducted IDUs, 0 ft. above sea level, with a 0 ft. level difference between ODU and IDUs, and the following refrigerant pipe lengths:
KUMXA361A: 16.4 ft. Main + (16.4 ft. Branch x 5) = 98.4 ft.
KUMXA421A: 16.4 ft. Main + (16.4 ft. Branch x 6) = 114.8 ft.
KUMXA481A: 16.4 ft. Main + (16.4 ft. Branch x 8) = 147.6 ft.
All capacities are net with a combination ratio between 95 – 105%.

Rated cooling capacity obtained with air entering the indoor unit 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).
Rated heating capacity 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).

[2]Cooling operation range with Low Ambient Wind Baffle Kit (sold separately) is -4°F to +118°F.

[3]At least one Branch Distribution Unit is required for system operation; a maximum of two can be installed per outdoor unit with use of Y-branch accessory (ARBLN03321). At least two indoor units must be connected. For allocated capacity information, see the combination tables in the "Multi F / Multi F MAX with LGRED Combination Data Manual" on www.lghvac.com. For performance data, see "Multi F / Multi F MAX with LGRED Performance Data Manual" on www.lghvac.com.

[4]Sound pressure levels are tested in an anechoic chamber under ISO Standard 3745.

[5]Power wiring to the outdoor unit is field supplied, solid or stranded, and must comply with the applicable local and national codes. The power / communication wiring from the outdoor unit to the branch distribution unit, and the power wiring and communication wiring from the branch distribution unit to the indoor unit, is field supplied and must be stranded, shielded or unshielded (if shielded, it must be grounded to the chassis of the outdoor unit only). All wiring must comply with applicable local and national codes. For detailed information, please refer to electrical characteristics on page 35.

[6]Take appropriate actions at the end of HVAC equipment life to recover, recycle, reclaim or destroy R32 refrigerant according to applicable regulations (40 CFR Part 82, Subpart F) under section 608 of CAA.

MULTI F MAX WITH LGRED° OUTDOOR UNIT

Table 21: Multi F MAX with LGRED Outdoor Unit Specifications, continued.

Model Number	KUMXA361A	KUMXA421A	KUMXA481A
Piping			
Liquid Line Connection (in., OD) x Qty.	Ø3/8 Flare x 1	Ø3/8 Flare x 1	Ø3/8 Flare x 1
Vapor Line Connection (in., OD) x Qty.	Ø3/4 Flare x 1	Ø3/4 Flare x 1	Ø3/4 Flare x 1
Condensation Line (O.D., I.D., in.)	1-1/4 / 1	1-1/4 / 1	1-1/4 / 1
Piping Lengths[1]			
Maximum Total System Piping (ft.)	475.7	475.7	475.7
Piping Length (No Additional Refrigerant [ft.] Main+Branch)	49.2 + 131.2	49.2 + 131.2	49.2 + 131.2
Maximum Main Pipe Length (ODU to BDU [ft.])	180.4	180.4	180.4
Total Branch Piping (BDU to all IDUs [ft.])	295.3	295.3	295.3
Maximum Branch Pipe Length (Length between each BDU and IDU [ft.])	49.2	49.2	49.2
Maximum Outdoor Unit to Indoor Unit Pipe Length (ft.)	229.6	229.6	229.6
Maximum Elevation between ODU and IDU (ft.)	98.4	98.4	98.4
Maximum Elevation between IDU and IDU (ft.)	49.2	49.2	49.2
Maximum Elevation between BDU and IDU (ft.)	32.8	32.8	32.8
Maximum Elevation between BDU and BDU (ft.)	49.2	49.2	49.2

Capacity is rated with non-ducted IDUs, 0 ft. above sea level, with a 0 ft. level difference between ODU and IDUs, and the following refrigerant pipe lengths:
KUMXA361A: 16.4 ft. Main + (16.4 ft. Branch x 5) = 98.4 ft.
KUMXA421A: 16.4 ft. Main + (16.4 ft. Branch x 6) = 114.8 ft.
KUMXA481A: 16.4 ft. Main + (16.4 ft. Branch x 8) = 147.6 ft.
All capacities are net with a combination ratio between 95 – 105%.

[1]Piping lengths are equivalent.

MULTI F MAX WITH LGRED° OUTDOOR UNIT

General Data

Table 22: KUMXA361A Efficiency Ratings.[1,2]

System	Combined With	Rated Cooling Capacity (Btu/h)	EER2 (95°F)	SEER2	Rated Heating Capacity (Btu/h)	COP (47°F)	HSPF2	Low Heating Capacity (Btu/h)	COP (17°F)	ENERGY STAR 6.1	ENERGY STAR Cold Climate
KUMXA361A	Non-Ducted Indoor Units	36,000	14.5	22.0	45,000	4.00	11.0	29,600	2.38	Yes	Yes
	Ducted Indoor Units	36,000	13.5	19.0	45,000	3.57	10.0	29,600	2.76	Yes	Yes
	Mixed Non-Ducted and Ducted Indoor Units	36,000	14.0	20.5	45,000	3.77	10.5	29,600	2.75	Yes	Yes

Table 23: KUMXA421A Efficiency Ratings.[1,2]

System	Combined With	Rated Cooling Capacity (Btu/h)	EER2 (95°F)	SEER2	Rated Heating Capacity (Btu/h)	COP (47°F)	HSPF2	Low Heating Capacity (Btu/h)	COP (17°F)	ENERGY STAR 6.1	ENERGY STAR Cold Climate
KUMXA421A	Non-Ducted Indoor Units	42,000	13.8	21.5	48,000	3.80	11.0	31,600	2.54	Yes	Yes
	Ducted Indoor Units	42,000	13.1	19.0	48,000	3.52	10.0	31,600	2.60	Yes	Yes
	Mixed Non-Ducted and Ducted Indoor Units	42,000	13.5	20.3	48,000	3.65	10.5	31,600	2.57	Yes	Yes

Table 24: KUMXA481A Efficiency Ratings.[1,2]

System	Combined With	Rated Cooling Capacity (Btu/h)	EER2 (95°F)	SEER2	Rated Heating Capacity (Btu/h)	COP (47°F)	HSPF2	Low Heating Capacity (Btu/h)	COP (17°F)	ENERGY STAR 6.1	ENERGY STAR Cold Climate
KUMXA481A	Non-Ducted Indoor Units	48,000	13.1	20.5	52,500	3.62	10.5	35,000	2.47	Yes	Yes
	Ducted Indoor Units	48,000	12.6	18.5	52,500	3.45	10.0	34,000	2.66	Yes	Yes
	Mixed Non-Ducted and Ducted Indoor Units	48,000	12.9	19.5	52,500	3.53	10.3	34,500	2.56	Yes	Yes

[1]Capacity is rated 0 ft. above sea level, with a 0 ft. level difference between ODU and IDUs, and the following refrigerant pipe lengths:
KUMXA361A: 16.4 ft. Main + (16.4 ft. Branch x 5) = 98.4 ft.
KUMXA421A: 16.4 ft. Main + (16.4 ft. Branch x 6) = 114.8 ft.
KUMXA481A: 16.4 ft. Main + (16.4 ft. Branch x 8) = 147.6 ft.
All capacities are net with a combination ratio between 95 – 105%.
Rated cooling capacity rating obtained with air entering the indoor unit at 80ºF dry bulb (DB) and 67ºF wet bulb (WB) and outdoor ambient conditions of 95ºF dry bulb (DB) and 75ºF wet bulb (WB).
Rated 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).
[2]Rated capacity is certified under AHRI Standard 210 / 240. EER2, SEER2, COP, and HSPF2 are subject to change. See www.ahrinet.org for the latest values.

NOTICE

At least two indoor units must be connected. For allocated capacity information, see the combination tables in the "Multi F / Multi F MAX with LGRED Combination Data Manual" on www.lghvac.com. For performance data, see "Multi F / Multi F MAX with LGRED Performance Data Manual" on www.lghvac.com.

MULTI F MAX WITH LGRED° OUTDOOR UNIT

Electrical Data

Table 25: Electrical Data.

Nominal Tons	Unit Model No.	Hertz	Voltage	Voltage Range (Min. to Max.)	MCA	MOP	LRA	Compressor Quantity	Compressor Motor RLA	Outdoor Fan Motor		Indoor Fan Motor
										kW	FLA	FLA
3.0	KUMXA361A	60	208 - 230	187 - 253	32.1	40	22	1	23.0	0.124 x 2	1.30	2.00
3.5	KUMXA421A				32.5	40	22	1	23.0	0.124 x 2	1.30	2.40
4.0	KUMXA481A				33.3	40	22	1	23.0	0.124 x 2	1.30	3.20

Voltage tolerance is ±10%.
Maximum allowable voltage unbalance is 2%.
MCA = Minimum Circuit Ampacity.

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.
LRA = (Locked Rotor Amps)

RLA = Rated Load Amps.
FLA = Full Load Amps.
Indoor Fan Motor (FLA) is based on the max. combination of IDUs.

MULTI F MAX WITH LGRED° OUTDOOR UNIT

Functions, Controls, Options, and Accessories

Table 26: Functions, Controls, Options, and Accessories.

Functions		KUMXA361A	KUMXA421A	KUMXA481A
Reliability	Defrost / Deicing	√	√	√
	High Pressure Switch	√	√	√
	Restart Delay (Three [3] Minutes)	√	√	√
	Self Diagnosis	√	√	√
	Soft Start	√	√	√
	Test Function	√	√	√
Convenience	Night Silent Operation	√	√	√
	Wiring Error Check	√	√	√
	Peak Control	√	√	√
	Mode Lock	√	√	√
	Forced Cooling Operation (Outdoor Unit)	√	√	√
Central Controllers	Central Control Connectivity	Built-In	Built-In	Built-In
Integration Solution	MultiSITE Communications Manager	○ PBACNBTR0A	○ PBACNBTR0A	○ PBACNBTR0A
	ACP 5 BACnet® Gateway	○ (PACP5A000)	○ (PACP5A000)	○ (PACP5A000)
	LonWorks® Gateway	○ (ZHWLONWK0)	○ (ZHWLONWK0)	○ (ZHWLONWK0)
Central Controllers	AC Smart 5	○ PACS5A000	○ PACS5A000	○ PACS5A000
	ACP 5	○ PACP5A000	○ PACP5A000	○ PACP5A000
Installation	Branch Distribution Units	○ PMBD3620ZR, PMBD3630ZR, PMBD3640ZR, PMBD3641ZR		
	Y-Branch	○ ARBLN03321	○ ARBLN03321	○ ARBLN03321
	Header Branch	X	X	X
	Air Guide	X	X	X
Other	Power Distribution Indication (PDI) Premium	○ PQNUD1S41	○ PQNUD1S41	○ PQNUD1S41
	Low Ambient Wind Baffle Kit	○ ZLABGP04A x 2 (Logical Operation)	○ ZLABGP04A x 2 (Logical Operation)	○ ZLABGP04A x 2 (Logical Operation)
	Drain Pan Heater	Built-In	Built-In	Built-In
	LG Monitoring View (LGMV) for Computers	○ PRCTIL0	○ PRCTIL0	○ PRCTIL0
	Mobile LGMV for Android® Smartphones / Tablets or for iOS® Tablets	○ PLGMVW100	○ PLGMVW100	○ PLGMVW100

√: Standard Feature

O: Option. Optional accessories must be purchased separately.

X: Not Available

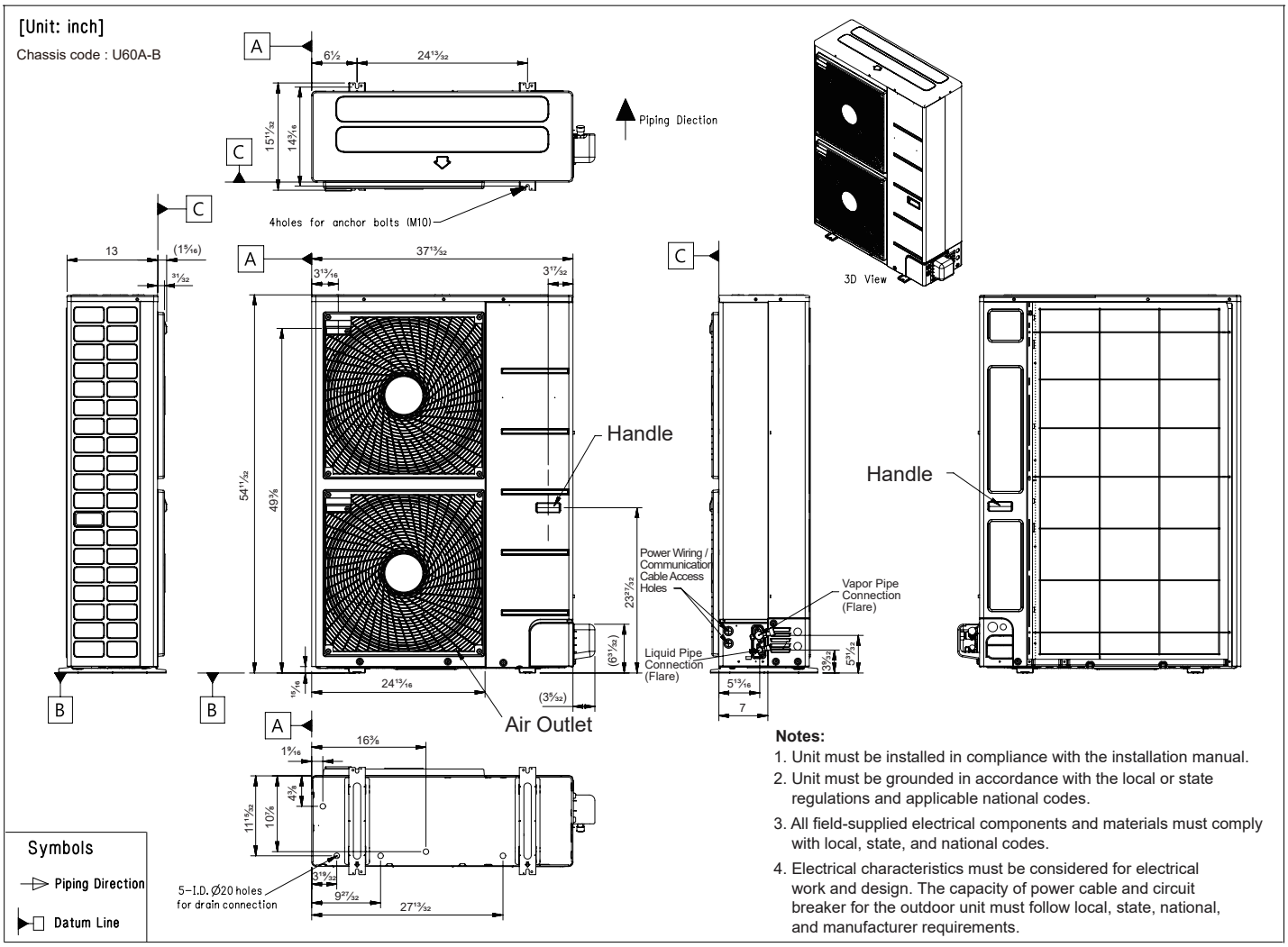
(BACnet is a registered trademark of ASHRAE. LonWorks is a registered trademark of Echelon Corp.

Android is a registered trademark of Google LLC. iOS is a registered trademark of Cisco Systems, Inc.

MULTI F MAX WITH LGRED° OUTDOOR UNIT

Dimensions

Figure 14: KUMXA361A, KUMXA421A, and KUMXA481A Dimensions.



MULTI F MAX WITH LGRED° OUTDOOR UNIT

Center of Gravity / Corner Weights

Figure 15: KUMXA361A, KUMXA421A, and KUMXA481A Center of Gravity and Corner Weight Diagram (Appearance may differ than what is depicted below).

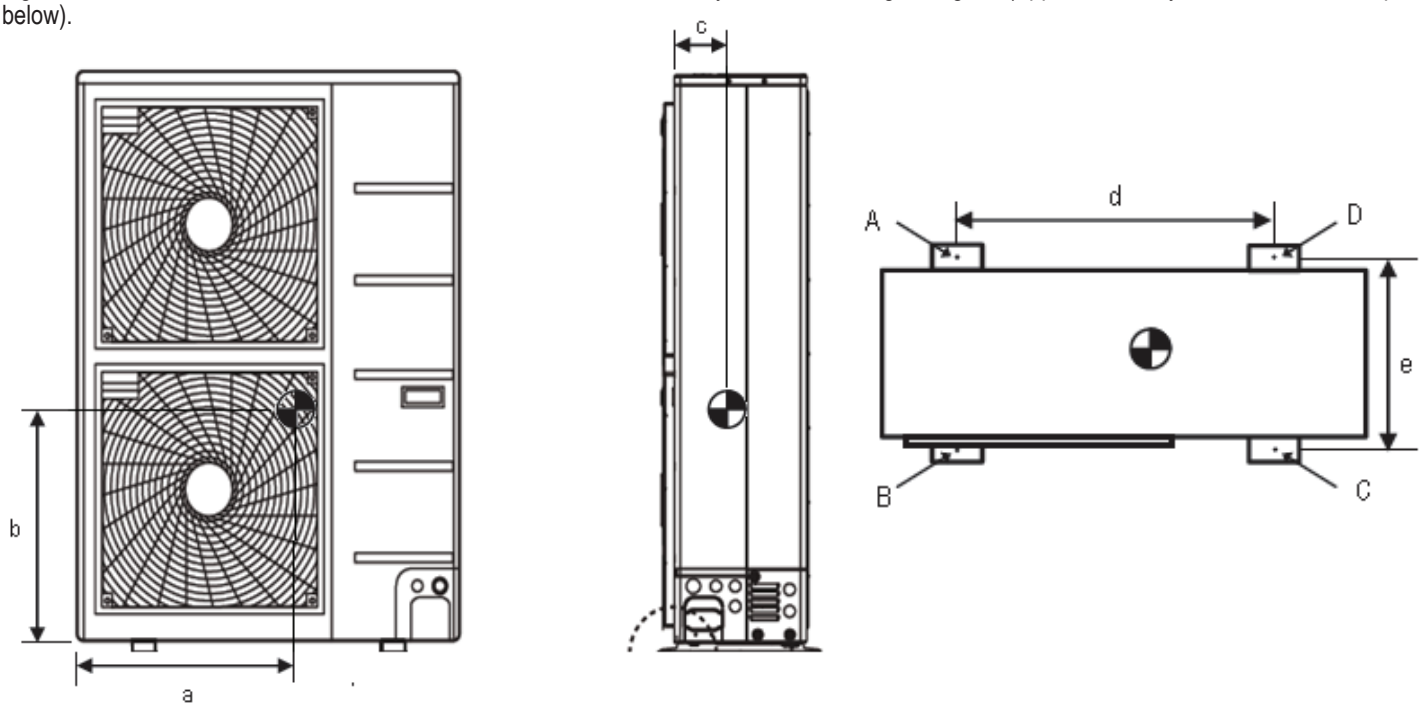


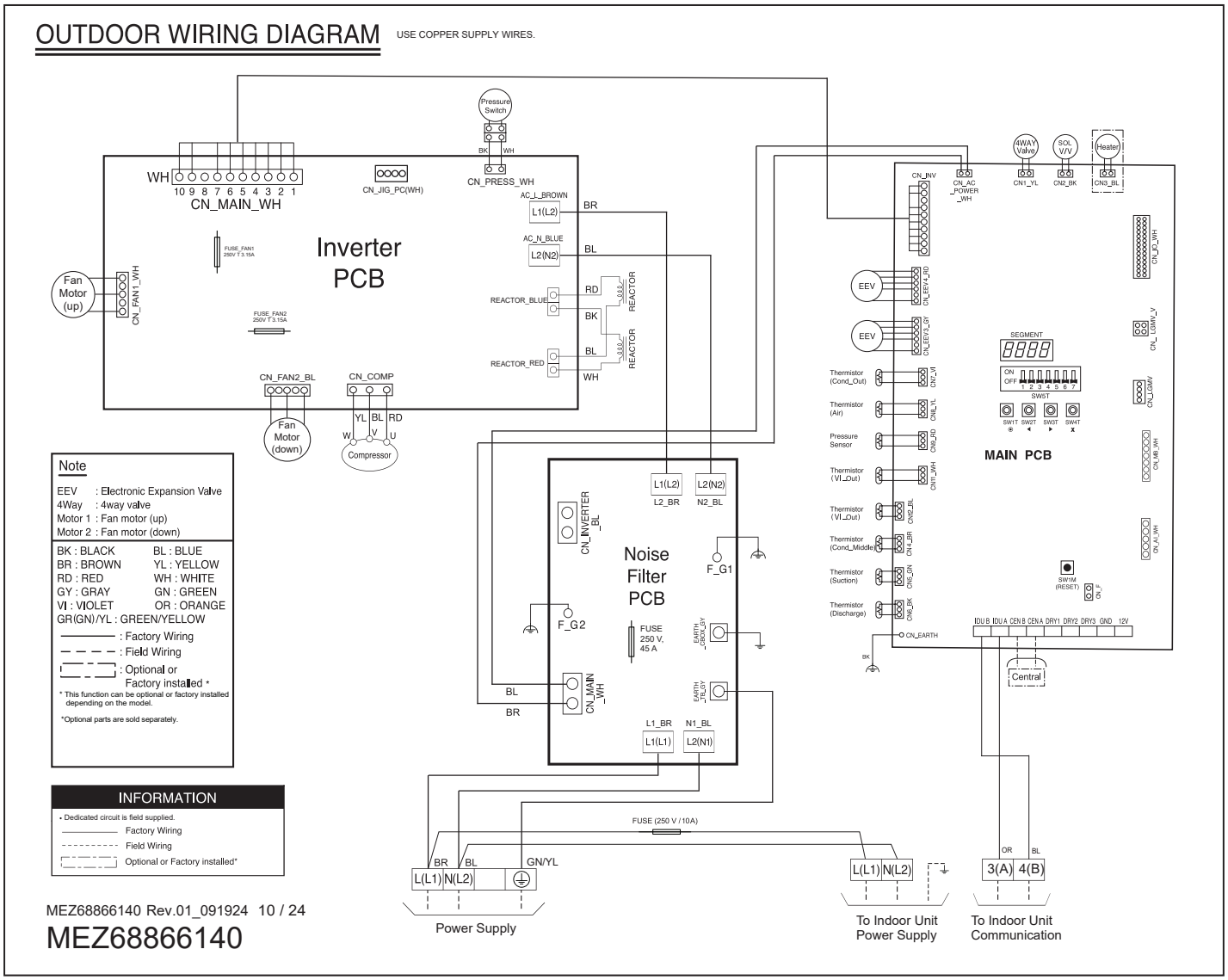
Table 27: KUMXA361A, KUMXA421A, and KUMXA481A Center of Gravity and Corner Weight Dimensions.

Model No.	Frame	Weight (lb.)		Center of Gravity (in.)			Leg (in.)		Corner Weight (lb.)			
		Shipping	Net	a	b	c	d	e	A	B	C	D
KUMXA361A	U60A-B	239.2	218.3	27-7/32	21-15/32	6-5/8	24-13/32	14-3/16	17.9	20.4	96.0	84.0
KUMXA421A	U60A-B	239.2	218.3	27-7/32	21-15/32	6-5/8	24-13/32	14-3/16	17.9	20.4	96.0	84.0
KUMXA481A	U60A-B	239.2	218.3	27-7/32	21-15/32	6-5/8	24-13/32	14-3/16	17.9	20.4	96.0	84.0

MULTI F MAX WITH LGRED° OUTDOOR UNIT

Wiring Diagram

Figure 16: KUMXA361A, KUMXA421A, and KUMXA481A Wiring Diagram.



NOTICE

KUMXA361A can support up to two branch distribution units and up to five indoor units. KUMXA421A can support up to two branch distribution units and up to six indoor units. KUMXA481A can support up to two branch distribution units and up to eight indoor units. Ensure the communication wiring and power wiring from the outdoor unit to the indoor units is installed correctly for the system and the chosen application.

MULTI F MAX WITH LGRED° OUTDOOR UNIT

Refrigerant Flow Diagram

NOTICE

Various tools are available to assist in properly designing LG R32 split systems. Refer to the "R32 Application Guide"; the "Simple Calculator for Capacity, Refrigerant Charge and ESP"; the "LG Air Conditioner Technical Solutions" (LATS) software program; and the local LG Sales Representative.

Figure 17: KUMXA361A, KUMXA421A, and KUMXA481A Refrigerant Flow Diagram.

Unit: Inch (mm)

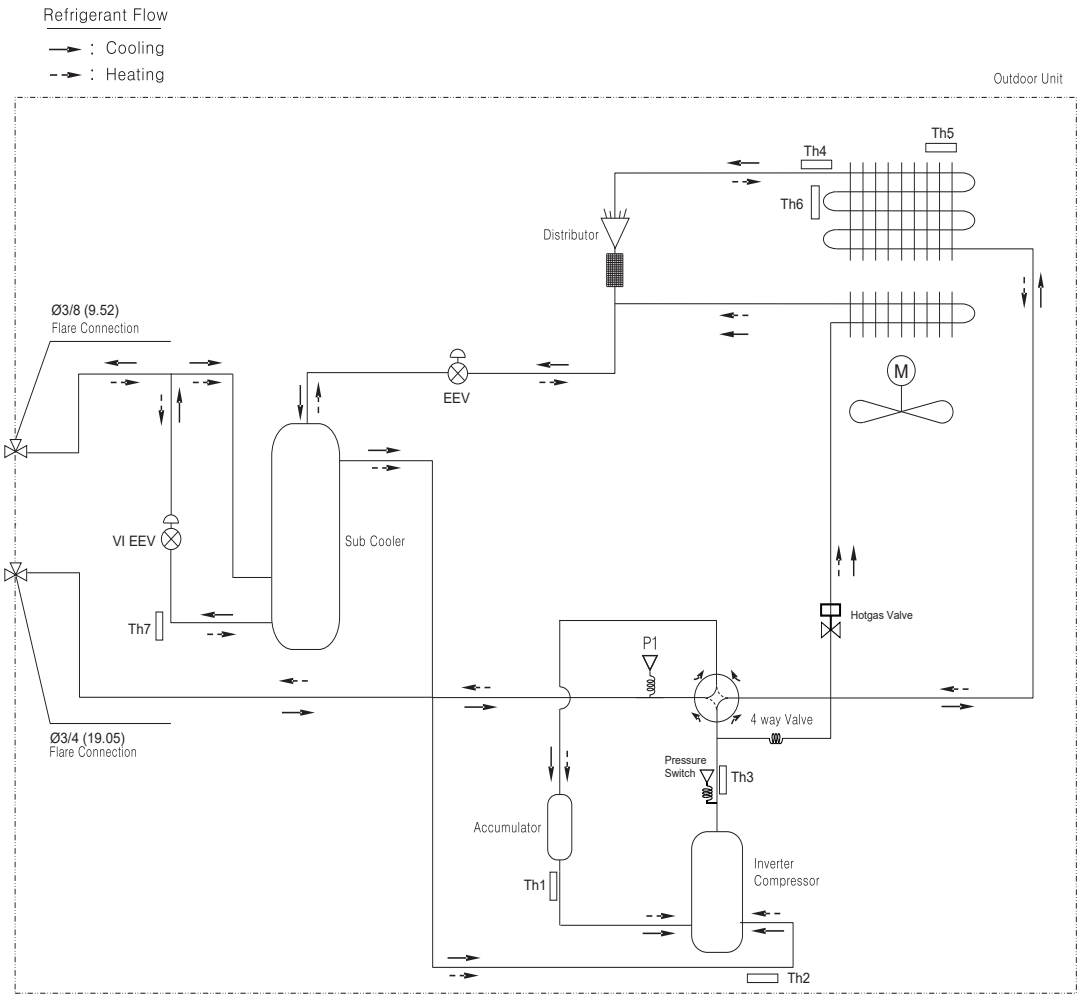


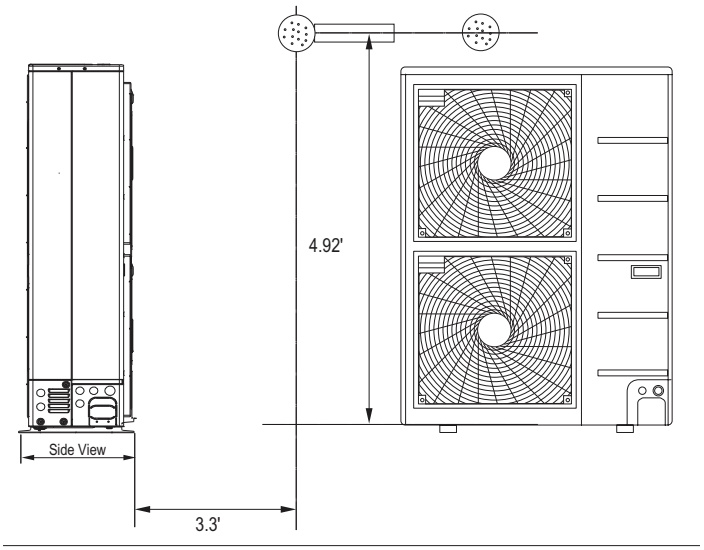
Table 28: KUMXA361A, KUMXA421A, and KUMXA481A PCB Connection Details.

Location	Description	PCB Connector
VI EEV	Vapor Injection Electronic Expansion Valve	CN_EEV7_GY
EEV	Main Electronic Expansion Valve	CN_EEV_MAIN_VI
Th1	Suction Pipe Temperature Thermistor	CN_SUCTION_GN
Th2	Vapor Injection Out Temperature Thermistor	CN_VI_OUT_BL
Th3	Discharge Pipe Temperature Thermistor	CN_DISCHA_BK
Th4	Condenser Out Pipe Temperature Thermistor	CN_C_PIPE_VI
Th5	Air Temperature Thermistor	CN_AIR_YL
Th6	Condenser Middle Pipe Temperature Thermistor	CN_MID_BR
Th7	Vapor Injection In Temperature Thermistor	CN_VI_IN_WH
P1	Pressure Sensor	CN_H_PRESS_RD

MULTI F MAX WITH LGRED° OUTDOOR UNIT

Acoustic Data

Figure 18: Acoustic Measurement Location.



Sound Pressure Levels

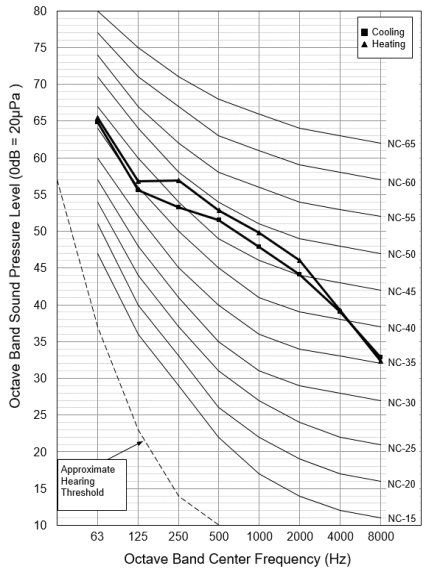
- Measurement taken 4.92' above finished floor, and at a distance of 3.3' from face of fan discharge.
- Measurements taken with no attenuation and units operating at full load normal operating condition.
- Sound level will vary depending on a range of factors such as construction (acoustic absorption coefficient) of particular area in which the equipment is installed.
- Sound pressure levels are measured in dB(A) ±3.
- Tested in anechoic chamber per ISO Standard 3745.

Table 29: Sound Pressure Levels (dB[A]).

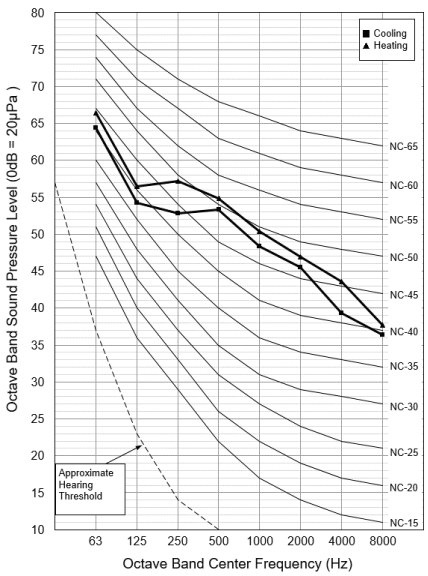
Model No.	Sound Pressure Levels (dB[A])	
	Cooling (High)	Heating (High)
KUMXA361A	53	55
KUMXA421A	54	56
KUMXA481A	54	56

Figure 19: Sound Pressure Level Diagrams.

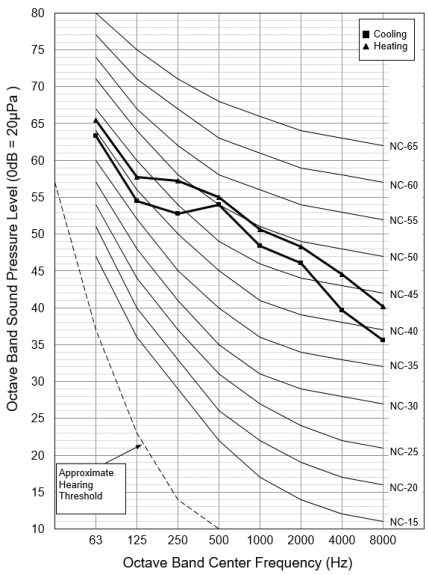
KUMXA361A



KUMXA421A



KUMXA481A



Sound Power Levels

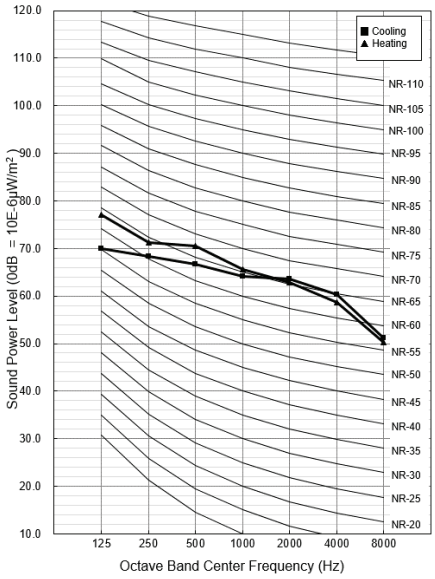
- Data is valid under diffuse field conditions.
- Data is valid under nominal operating conditions.
- Sound power level is measured using rated conditions, and tested in a reverberation room per ISO 3741 standards.
- Sound level will vary depending on a range of factors such as construction (acoustic absorption coefficient) of particular area in which the equipment is installed.
- Reference acoustic intensity: 0dB = 10E-6μW/m^2

Table 30: Sound Power Levels (dB[A]).

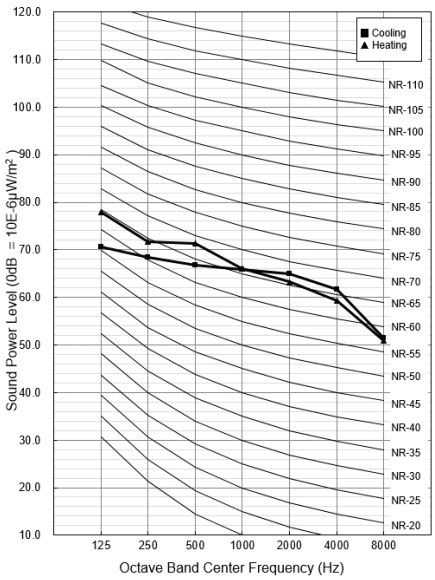
Model No.	Sound Power Levels (dB[A])	
	Cooling (High)	Heating (High)
KUMXA361A	71	72
KUMXA421A	72	73
KUMXA481A	72	73

Figure 20: Sound Power Level Diagrams.

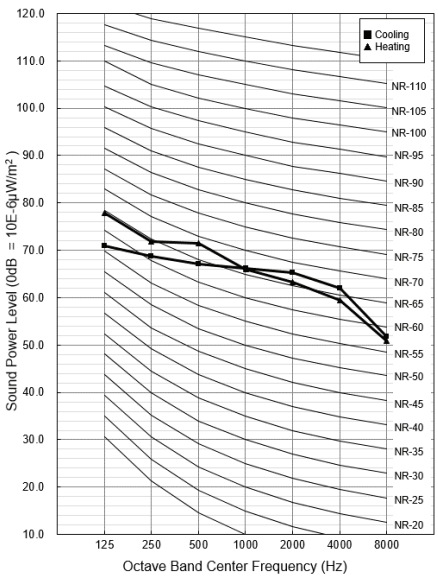
KUMXA361A



KUMXA421A



KUMXA481A



MULTI F MAX BRANCH DISTRIBUTION UNIT PRODUCT DATA

MULTI F MAX BRANCH DISTRIBUTION UNIT

Mechanical Specifications

Branch Distribution Unit

General

Branch distribution units are designed for use with LG Multi F MAX or LG Multi F MAX with LGRED outdoor units, and are internally piped, wired, assembled and run-tested at the factory. The branch distribution unit is used as an intermediate refrigerant control device between the outdoor unit and the indoor units to effectively and efficiently control the heating or cooling operation of the system through the use of electronic expansion valves.

Figure 21: PMBD3620ZRTwo-Port Branch Distribution Unit.

Figure 22: PMBD3630ZR Three-Port Branch Distribution Unit.

Figure 23: PMBD3640ZR and PMBD3641ZR Four-Port Branch Distribution Unit.

Refrigerant System

System is designed for use with R32 refrigerant. All refrigerant lines from the outdoor unit to the branch distribution unit, and from the branch distribution unit to the indoor units, must be field insulated. The units may be connected to optional field-supplied and field-installed isolation valves for servicing without evacuating the entire system.

Piping Capabilities

Maximum piping length from the branch distribution unit to the indoor unit is 49.2 equivalent feet. Maximum elevation difference between branch distribution unit and indoor unit is 32.8 feet. Maximum elevation difference between two parallel branch distribution units is 49.2 feet.

Electrical

Each branch distribution unit is designed to operate using 208–230/60/1 power with voltage variances of ±10%.

Casing

The casing is designed to mount fully concealed above a finished ceiling, is manufactured of galvanized steel plate, and is internally
insulated. Branch distribution units do not require a condensate drain.

Port Assembly

Branch distribution units have a two-pipe system consisting of one vapor pipe and one liquid pipe. Units are available in a choice of two (PMBD3620ZR), three (PMBD3630ZR) or four ports (PMBD3640ZR and PMBD3641ZR); branch distribution units include two, two-positioned solenoid valves per port. Each port for PMBD3620ZR, PMBD3630ZR, and PMBD3640ZR units connects to one indoor unit for a maximum nominal capacity of 24,000 Btu/h. For PMBD3641ZR units, ports A, B, C each connect to one indoor unit for a maximum nominal capacity of 24,000 Btu/h; port D connects to one indoor unit for a nominal capacity of 24,000 Btu/h to 36,000 Btu/h. Maximum nominal capacity per branch distribution unit is 73,000 Btu/h. Two branch distribution units can be piped in parallel using accessory Y-branch kit ARBLN03321.

Controls

The unit is provided with factory-installed control boards and an integral microprocessor to communicate with the main control board in the outdoor unit. Power wiring from the outdoor unit to the branch distribution unit is to be minimum 14 AWG, three-conductor; communication wiring is to be minimum 18 AWG, two-conductor. All wiring is to be stranded, shielded or unshielded (if shielded, it must be grounded to the chassis of the outdoor unit only), and must comply with applicable local and national codes.

MULTI F MAX BRANCH DISTRIBUTION UNIT

General Data

Table 31: Multi F MAX Branch Distribution Unit General Data.

Model Number		PMBD3620ZR	PMBD3630ZR	PMBD3640ZR	PMBD3641ZR
No. of Connectable Indoor Units[1]		1-2	1-3	1-4	1-4
Max. Nominal Capacity / Port (Btu/h)[2]		24,000	24,000	24,000	Ports A,B,C : 24,000 Ports D : 36,000
Connected Indoor Unit Capacity (Btu/h)		24,000	24,000	24,000	Ports A,B,C : 24,000 Ports D : 30,000 ~ 36,000
Max. Nominal Capacity / Branch Distribution Unit (Btu/h)		48,000	72,000	73,000	73,000
Operation Temperature Range (°F DB)		0 ~ 150	0 ~ 150	0 ~ 150	0 ~ 150
Maximum Humidity		80%	80%	80%	80%
Unit Data					
Refrigerant Type		R32	R32	R32	R32
Power Supply V, Ø, Hz		208-230, 1, 60	208-230, 1, 60	208-230, 1, 60	208-230, 1, 60
Power Input (W)		82	87	97	97
Rated Amps (A)		0.34	0.36	0.4	0.4
Dimensions W x H x D (in.)		17-1/4 x 6-7/16 x 12-1/8			
Net Unit Weight (lbs.)		17.4	18.3	19.4	19.6
Shipping Weight (lbs.)		20.9	21.8	22.9	23.4
Power Wiring[3]					
From Outdoor Unit to Branch Distribution Unit (Qty. x AWG)[3]		3C x 14	3C x 14	3C x 14	3C x 14
From Branch Distribution Unit to Indoor Unit (Qty. x AWG)[3]		3C x 14	3C x 14	3C x 14	3C x 14
Communications Wiring[3]					
From Outdoor Unit to Branch Distribution Unit (Qty. x AWG)[3]		2C x 18	2C x 18	2C x 18	2C x 18
From Branch Distribution Unit to Indoor Unit (Qty. x AWG)[3]		2C x 18	2C x 18	2C x 18	2C x 18
Piping Connections					
Outdoor Unit to Branch Distribution Unit	Liquid (in., OD)	Ø3/8 Braze	Ø3/8 Braze	Ø3/8 Braze	Ø3/8 Braze
	Vapor (in., OD)	Ø3/4 Braze	Ø3/4 Braze	Ø3/4 Braze	Ø3/4 Braze
Branch Distribution Unit to Indoor Units	Liquid (in., OD) x Qty.	Ø1/4 x 2 Flare	Ø1/4 x 3 Flare	Ø1/4 x 4 Flare	Ø1/4 x 4 Flare
	Vapor (in., OD) x Qty.	Ø3/8 x 2 Flare	Ø3/8 x 3 Flare	Ø3/8 x 4 Flare	Ø3/8 x 3 Flare; Ø1/2 x 1 Flare
Piping Lengths					
Maximum Total System Piping (ft.)[4]		475.7	475.7	475.7	475.7
Maximum Main Pipe Length (Outdoor Unit to Branch Distribution Units [ft.])		180.4	180.4	180.4	180.4
Total Branch Piping (Branch Distribution Units to Indoor Units [ft.])		295.3	295.3	295.3	295.3
Maximum Branch Pipe Length Between Branch Distribution Unit and Each Indoor Unit [ft.])		49.2	49.2	49.2	49.2
Maximum Outdoor Unit to Indoor Unit Pipe Length (ft.)		229.6	229.6	229.6	229.6
Piping Length (No Additional Refrigerant [ft.]; approx. 16.4 ft. or 49.2 ft. of Main Piping (depending on ODU model) + 131.2 ft. of Branch Piping)		147.6 or 180.4 (Depending on ODU Model)	147.6 or 180.4 (Depending on ODU Model)	147.6 or 180.4 (Depending on ODU Model)	147.6 or 180.4 (Depending on ODU Model)
Maximum Elevation between Branch Distribution Unit and Indoor Unit (ft.)		32.8	32.8	32.8	32.8
Maximum Elevation between Branch Distribution Unit and Branch Distribution Unit (ft.)		49.2	49.2	49.2	49.2

[1]At least one Branch Distribution Unit is required for system operation; a maximum of two can be installed per outdoor unit with use of Y-branch accessory (ARBLN03321) To connect only one (1) indoor unit to a branch distribution unit, the system must include another branch distribution unit with at least one (1) connected indoor unit.

2Branch Distribution Unit can accommodate from one (1) indoor unit up to four (4) indoor units depending on the ports available.

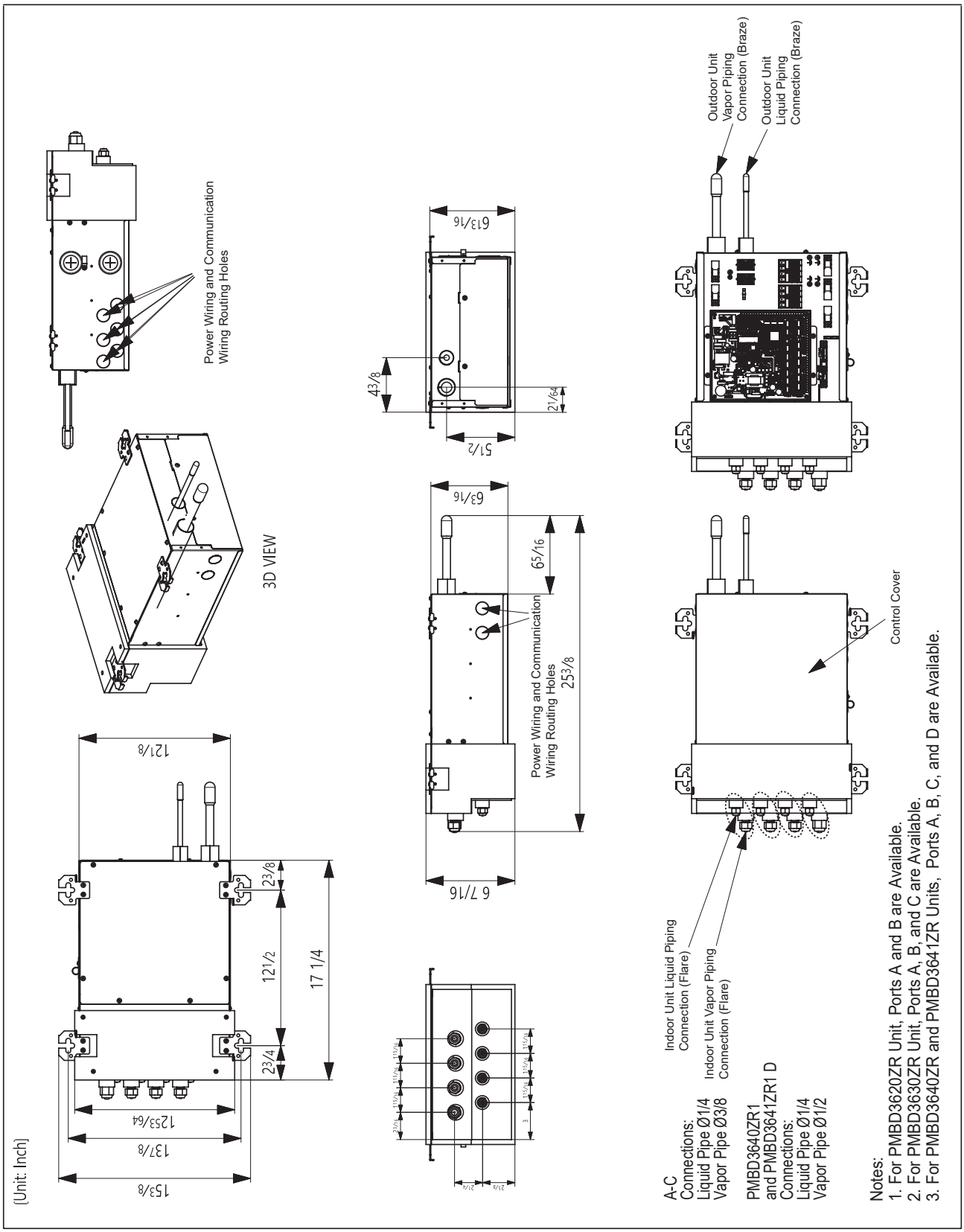
[3]All power wiring / communication wiring is to be stranded, shielded or unshielded (if shielded, it must be grounded to the chassis of the outdoor unit only), and must comply with applicable local and national codes.

[4]Piping lengths are equivalent.

MULTI F MAX BRANCH DISTRIBUTION UNIT

Dimensions

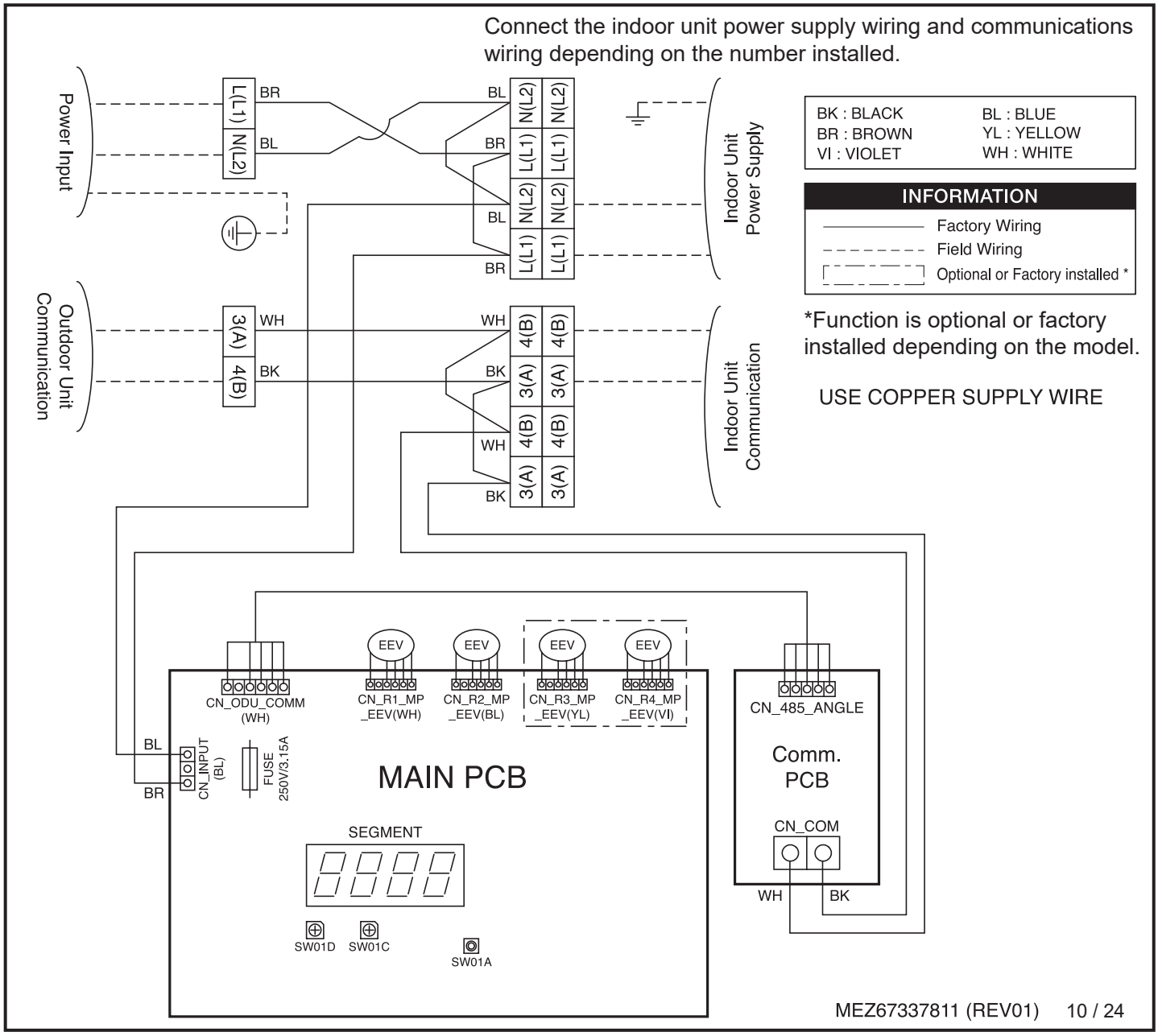
Figure 24: PMBD3620ZR, PMBD3630ZR, PMBD3640ZR, and PMBD3641ZR Dimensions.



MULTI F MAX BRANCH DISTRIBUTION UNIT

Wiring Diagram

Figure 25: PMBD3620ZR, PMBD3630ZR, PMBD3640ZR, and PMBD3641ZR Wiring Diagram.



NOTICE

- *PMBD3620ZR Branch Distribution Unit supplied with "A, B". or two indoor unit power supply terminals and communication terminals each.*
- *PMBD3630ZR Branch Distribution Unit supplied with "A, B, C" or three indoor unit power supply terminals and communication terminals each.*
- *PMBD3640ZR and PMBD3641ZR Branch Distribution Units supplied with "A, B, C, D" or four indoor unit power supply terminals and communication terminals each.*

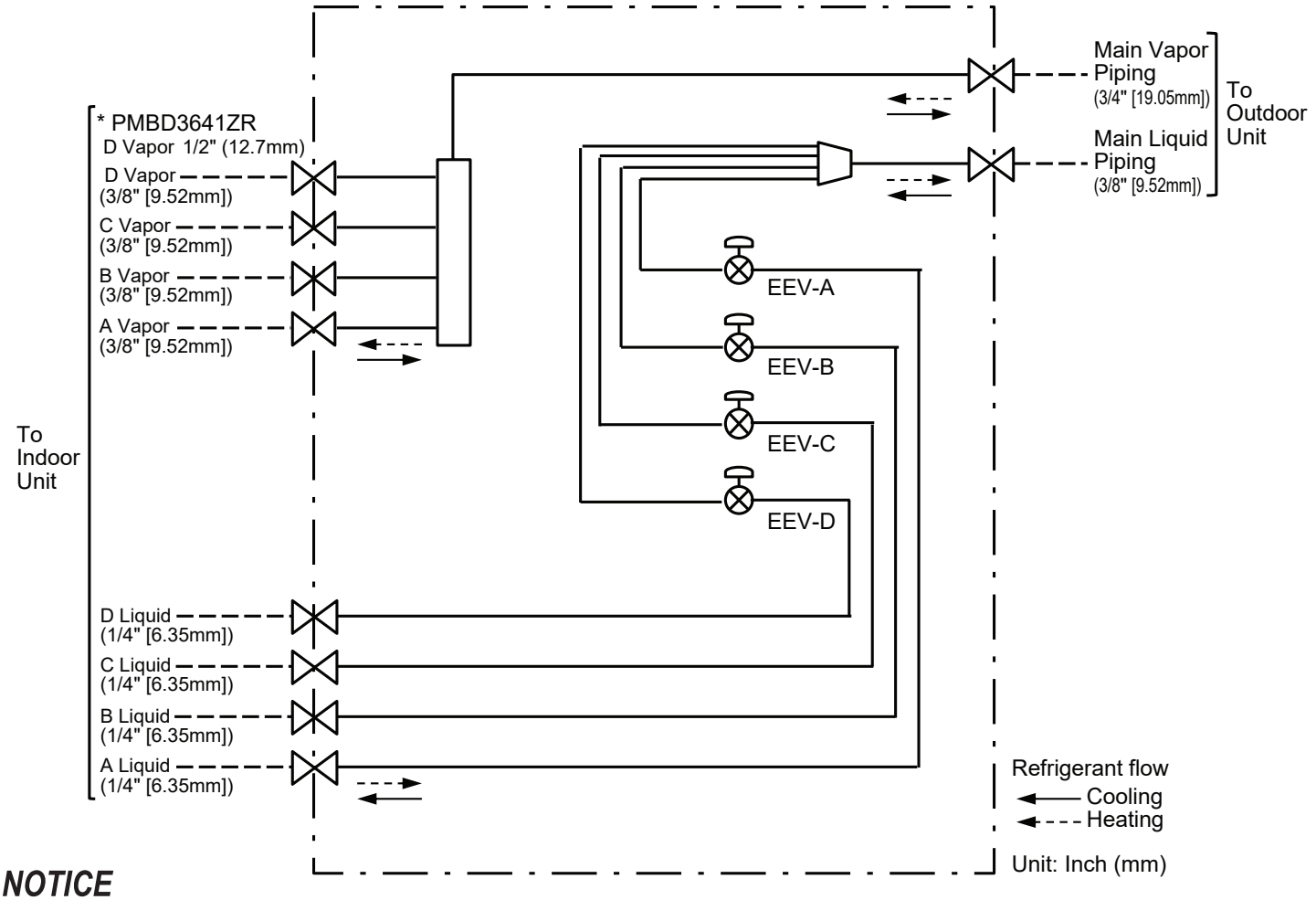
MULTI F MAX BRANCH DISTRIBUTION UNIT

Refrigerant Flow Diagram

NOTICE

Various tools are available to assist in properly designing LG R32 split systems. Refer to the "R32 Application Guide"; the "Simple Calculator for Capacity, Refrigerant Charge and ESP"; the "LG Air Conditioner Technical Solutions" (LATS) software program; and the local LG Sales Representative.

Figure 26: PMBD3620ZR, PMBD3630ZR, PMBD3640ZR, and PMBD3641ZR Refrigerant Flow Diagram.



NOTICE

1. Brazed connections for outdoor unit to branch distribution unit for field piping installation.
2. Flared connections for branch distribution unit to indoor unit for field piping installation.
3. Match the branch distribution ports to the indoor unit and outdoor unit piping sizes. Use an adapter if the piping size does not match the piping size of the connecting indoor unit.
4. EEV: Electronic Expansion Valve
5. PMBD3620ZR Branch Distribution Unit supplied with "A, B". or two indoor unit power supply terminals and communication terminals each. PMBD3630ZR Branch Distribution Unit supplied with "A, B, C" or three indoor unit power supply terminals and communication terminals each. PMBD3640ZR and PMBD3641ZR Branch Distribution Units supplied with "A, B, C, D" or four indoor unit power supply terminals and communication terminals each.

Table 32: Indoor Unit Connection Pipe Sizes.

Indoor Unit Capacity (kBtu/h)	Refrigerant Connections Pipe Size (Unit: Inch [mm])	
7, 9	Ø1/4 (6.35)	Ø3/8 (9.52)
12, 15 (High Wall Mounted)	Ø1/4 (6.35)	Ø3/8 (9.52)
15 (Console), 18, 24	Ø1/4 (6.35)	Ø1/2 (12.7)
30, 36	Ø3/8 (9.52)	Ø5/8 (15.88)

NOTICE

PMBD3641ZR Branch Distribution includes adapter accessory.
Ø1/2 (12.7) → Ø5/8 (15.88) x 1 Ea.,
Ø1/4 (6.35) → Ø3/8 (9.52) x 1 Ea.

MULTI F MAX BRANCH DISTRIBUTION UNIT

Y-Branch Kit

NOTICE

Various tools are available to assist in properly designing LG R32 split systems. Refer to the "R32 Application Guide"; the "Simple Calculator for Capacity, Refrigerant Charge and ESP"; the "LG Air Conditioner Technical Solutions" (LATS) software program; and the local LG Sales Representative.

⃠ No Substitutions on Piping Components

Only LG supplied Y-branch can be used to join one pipe segment to two or more segments. ⃠ Third-party or field-fabricated components such as tees, Y-fittings, couplings, or other branch fittings are not permitted. The only field-provided fittings allowed in a Multi F MAX / Multi F MAX with LGRED piping system are 45° and 90° long radius elbows and full port ball valves (if applicable).

Multi F MAX / Multi F MAX with LGRED Y-Branch Kits

LG-suppled Y-branch kit ARBLN03321 MUST be used when installing two (2) branch distribution units in parallel on one (1) Multi F MAX / Multi F MAX with LGRED system. Each Y-branch kit includes two (2) Y-branches (one for the liquid line and one for the vapor line) and insulation covers.

Y-branches may be installed in horizontal or vertical configurations. When installed horizontally, the straight-through leg must be within ±5° rotation. When installed vertically, the straight-through leg must be within ±3° of plumb.

Y-branches must be properly installed following instructions in the applicable LG manual. Y-branches must always be installed with the single port facing the outdoor unit and the two-port end facing the branch distribution units. ⃠ Do not install Y-branches backwards as refrigerant flow cannot make U-turns. The Y-branch kit must be located at least three (3) feet from the outdoor unit. Provide a minimum of 20 inches between a Y-branch and the branch distribution unit.

It is recommended that when a Y-branch is located in a pipe chase or other concealed space, access doors must be provided for inspection access.

The equivalent pipe length of each Y-branch (1.6') must be added to the main pipe segment entered into LATS piping design software.

Figure 27: Y-Branch Horizontal Configuration.

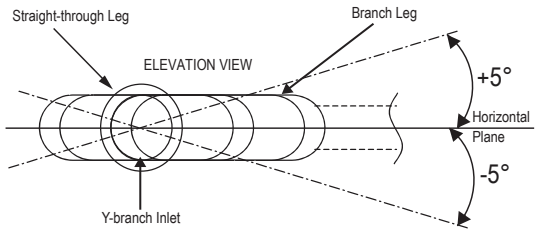
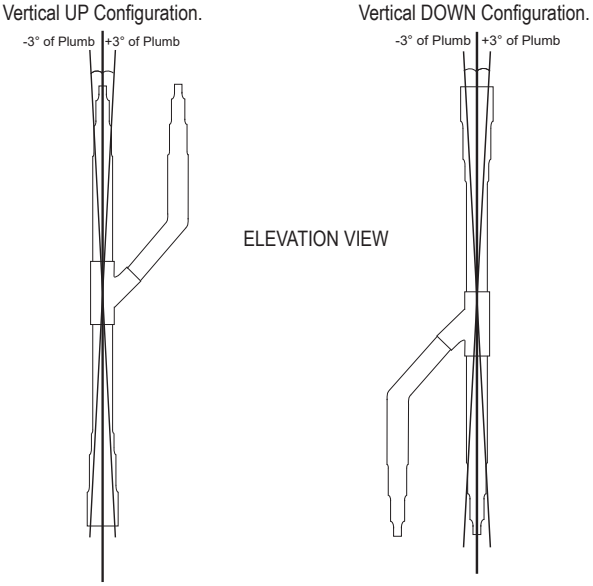


Figure 28: Y-Branch Vertical Configurations.

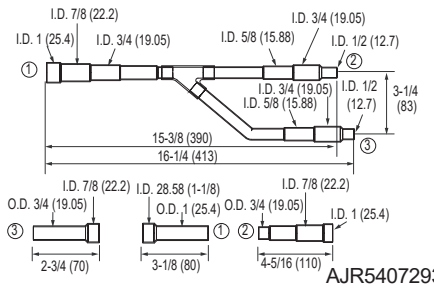
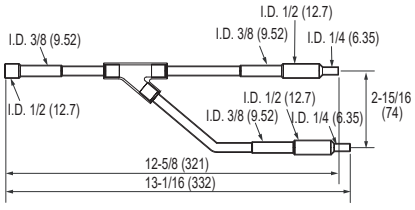


NOTICE

- *Design pressure is 626 psig.*
- *All dimensions in inches. Tolerance ±1/4 inch.*
- *Images are not to scale.*

Figure 29: Indoor Unit Y-Branch Dimensions.

Unit: Inch

Kit Model No.	Vapor Pipe Dimensions	Liquid Pipe Dimensions
ARBLN03321	 AJR54072930	 AJR54072928

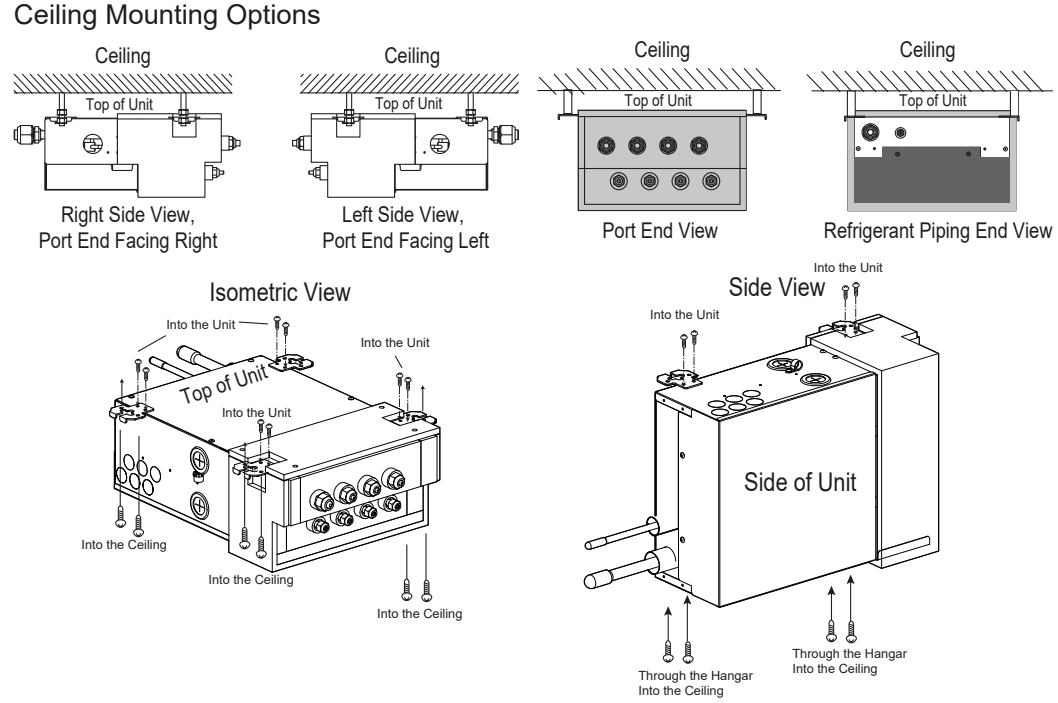
MULTI F MAX BRANCH DISTRIBUTION UNIT

Branch Distribution Unit Orientation

Branch Distribution Unit Orientation

Multi F MAX branch distribution (BD) units can be installed in a multitude of options to fit various building configurations and job or application requirements. Multi F MAX branch distribution units include electronic expansion valves that properly seat only if the branch distribution unit is installed in an acceptable orientation. Installations with improper branch distribution unit orientation risk incomplete valve seating and system performance degradation from potential refrigerant leakage through the electronic expansion valve.

Figure 30: Acceptable Branch Distribution Unit Ceiling Mount Orientations.



NOTICE

This material is for informational or educational purposes only. It is not intended to be a substitute for professional advice. Consult with your engineer or design professionals for specific applications to your system.

Figure 31: Acceptable Branch Distribution Unit Wall Mount Orientations.

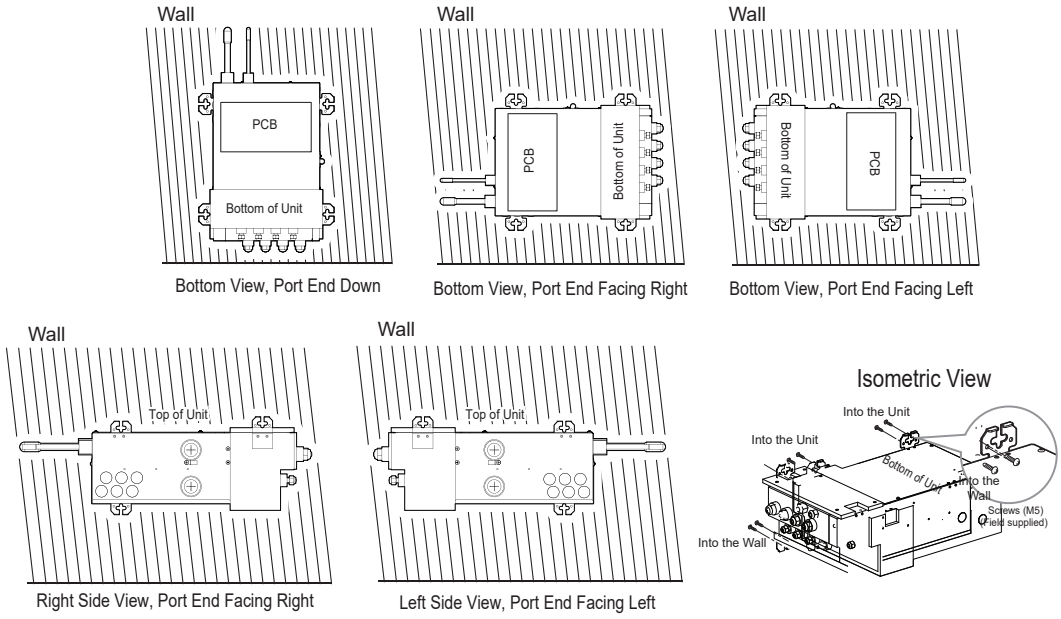
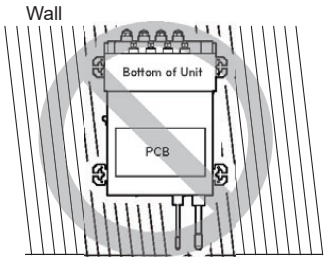


Figure 32: Unacceptable Branch Distribution Unit Orientation.



ELECTRICAL CONNECTIONS

ELECTRICAL CONNECTIONS

General Guidelines

⚠ WARNING

- *All power (line voltage) wiring and communication cable installation must be performed by trained service providers working in accordance with local, state, and National Electrical Code (NEC) / UL federal regulations related to electrical equipment and wiring, and following the manufacturer product diagrams, requirements, and instructions in this manual. Electric shock can cause physical injury or death.*
- *Be sure that main power to the unit is completely off before installing. Follow all safety and warning information. Failure to do so will cause electric shock, resulting in bodily injury or death.*
- *Install a main shutoff switch or circuit breaker that interrupts all power sources simultaneously (circuit breaker must be resistant to electromagnetic currents). Be sure that the 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 will cause bodily injury or death.*
- ⃠ *Never touch any power lines or live cables before all power is cutoff to the system. To do so will cause bodily injury or death.*
- *Power wiring and communication cable sizes must comply with all applicable federal, state, and local codes. Undersized wiring will lead to unacceptable voltage at the unit and will cause a fire, which will cause bodily injury or death.*
- *Properly ground the outdoor unit, indoor units, and branch distribution units. Ground wiring must always be installed by a trained technician. Ground wiring is required to prevent accidental electrical shock during current leakage, which will cause bodily 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 NEC regulations related to electrical equipment and wiring, and following the instructions in this manual. Generated overcurrent will include some amount of direct current. Using an oversized breaker or fuse will result in electric shock, causing physical injury or death.*
- ⃠ *Do not connect ground wire to refrigerant, gas, sewage, or water piping; to lightning rods; to telephone ground wiring; or to the building plumbing system. Failure to properly provide an NEC-approved earth ground can result in electric shock, fire, resulting in physical injury or death.*

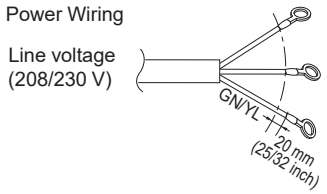
NOTICE

- *Consider ambient conditions (temperature, direct sunlight, inclement weather, etc.) when selecting, installing, and connecting the power wiring.*
- *Properly ground the outdoor unit, indoor units, and branch distribution units. Ground wiring must always be installed by a trained technician. Improperly grounded wire can cause communication problems from electrical noise, and motor current leakage.*
- *Install appropriately sized breakers / fuses / overcurrent protection switches and wiring in accordance with local, state, and NEC regulations related to electrical equipment and wiring, and following the instructions in this manual. Generated overcurrent will include some amount of direct current. Using an oversized breaker or fuse will result in equipment malfunction and property damage.*
- ⃠ *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 NEC-approved earth ground can result in property damage and equipment malfunction.*
- ⃠ *Do not operate the air conditioning system until the refrigerant piping installation is complete. Operating the system before refrigerant piping is finalized will damage the compressor.*

Power Supply / Power Wiring Specifications to the Outdoor Unit

- Multi F and Multi F MAX LGRED systems operate at 1Ø, 208-230V, 60Hz, and power is wired to the outdoor unit only.
- Power wiring to the outdoor unit(s) must be a minimum of:
  - 12 AWG, three (3) conductor for 18,000, 24,000, and 30,000 Btu/h Multi F with LGRED capacities.
  - 8 AWG, three (3) conductor for 36,000, 42,000 and 48,000 Btu/h Multi F MAX with LGRED capacities.
- Power wiring must be solid or stranded; and comply with all applicable National Electrical Code (NEC), UL, and local electrical codes.
- Wiring is allowed for lengths up to the published maximum piping length, plus recommended slack at both ends (typical slack: 6-12 inches).

Figure 33: Multi F / Multi F MAX with LGRED Outdoor Unit Power Wiring.



- Power supply to the outdoor unit must be selected based on NEC, UL, and local codes. Maximum allowable voltage fluctuation ±10% or nameplate rated value.
- Properly ground the outdoor unit and indoor unit per NEC and local codes; ground wire must be longer than the common power / communication wires.
- Firmly connect the wiring so it cannot be easily pulled out.
- Refer to the inside of the chassis cover or control cover for circuit and terminal block diagrams; always match color codes of each wire and follow wiring diagram.
- ⃠ Do not install power wiring to the outdoor unit and the power wiring / communication wiring to the indoor unit / branch distribution Unit (Multi F MAX outdoor units only) in the same conduit. Use separate conduits.

⚠ WARNING

Always have a trained service provider properly ground the outdoor unit. If the outdoor unit is not properly grounded, there is a risk of electric shock, physical injury, or death.

Power Wiring / Communications Wiring from the ODU to the IDUs / BDUs

- The outdoor unit supplies power to the indoor units / branch distribution units (Multi F MAX with LGRED systems only).
- The outdoor unit also supplies communication to the indoor units / branch distribution units (Multi F MAX with LGRED systems only).
- Wiring from the outdoor units to the indoor units / branch distribution units (Multi F MAX with LGRED systems only) must be stranded, shielded or unshielded (if shielded, it must be grounded to the chassis of the outdoor unit only), and must comply with all applicable National Electrical Code (NEC), UL, and local electrical codes.
- Insulation material as required by local code.
- Rated for continuous exposure of temperatures up to 140°F.
- Firmly attach the wiring; provide slack at both ends but secure in a way to prevent external forces from being imparted on the terminal block.
- Wiring is allowed for lengths up to the published maximum piping length, plus recommended slack at both ends (typical slack: 6-12 inches).
- Wiring must be completed without splices.
- When the power wire and communication wire length between the outdoor unit and branch distribution unit, and between the branch distribution unit and the indoor units GREATER THAN 130 feet:
  - Use minimum 14 AWG communication wiring
    OR
  - Separate the power wiring AT LEAST two (2) inches away from the communication wiring.

Figure 34: Power Wiring and Communication Wiring from ODU to IDU / BDU (Multi F MAX with LGRED Only), and from the BDU to the IDU (Multi F MAX with LGRED Only).

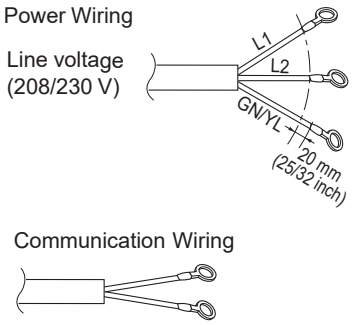
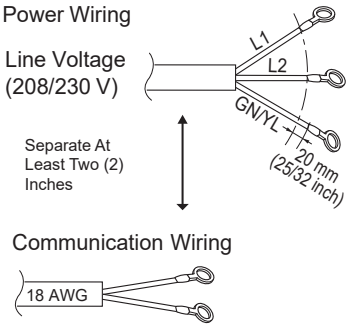


Figure 35: Power Wiring and Communication Wiring from ODU to IDU / BDU (Multi F MAX with LGRED Only), and from the BDU to the IDU (Multi F MAX with LGRED Only) GREATER THAN 130 feet.



ELECTRICAL CONNECTIONS

Wiring Specifications

Power Wiring / Communications Wiring, Continued.

Multi F with LGRED Systems (Outdoor Unit to Indoor Units):

- Power wiring must be a minimum of 14 AWG, three (3) conductor for 18,000, 24,000, and 30,000 Btu/h Multi F capacities.
- Communications wiring must be a minimum of 18 AWG, two (2) conductor for 18,000, 24,000, and 30,000 Btu/h Multi F capacities.

Multi F MAX with LGRED Systems (Outdoor Unit to Branch Distribution Units):

- Power wiring must be a minimum of 14 AWG, three (3) conductor for 36,000, 42,000, and 48,000 Btu/h Multi F MAX capacities.
- Communications wiring must be a minimum of 18 AWG, two (2) conductor for 36,000, 42,000, and 48,000 Btu/h Multi F MAX capacities.

Multi F MAX with LGRED Systems (Branch Distribution Units to Indoor Units):

- Power wiring must be a minimum of 14 AWG, three (3) conductor for 36,000, 42,000, and 48,000 Btu/h Multi F MAX capacities.
- Communications wiring must be a minimum of 18 AWG, two (2) conductor for 36,000, 42,000, and 48,000 Btu/h Multi F MAX capacities.

NOTICE

- *Never ground the shield of the communications wiring to the indoor unit / branch distribution unit frame or other grounded entities of the building. Ground the communications wiring shield only at the outdoor unit. Improperly grounding this cable can cause communications errors.*
- *Use a conduit for the power cable and the communications cable from the outdoor unit to the indoor units / branch distribution units. Electrical interference my cause product malfunction.*
- *The communications wiring from the outdoor unit to the indoor units / branch distribution unit(s) must be separated and isolated from power wiring to the outdoor unit, computers, radio and television broadcasting facilities, as well as medical imaging equipment. Electrical interference my cause product malfunction.*

Figure 36: Example of a Multi F with LGRED System General Power / Communications System Schematic.

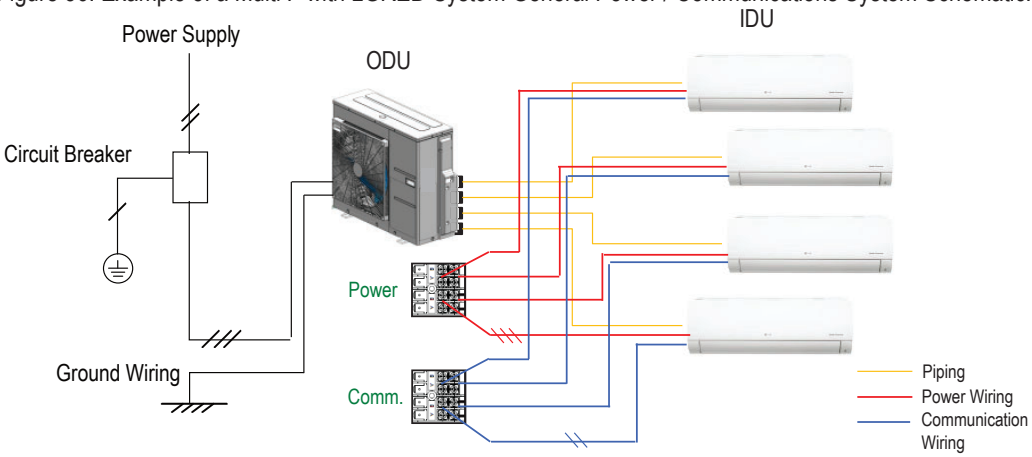


Figure 37: Example of a Multi F MAX with LGRED System General Power / Communications System Schematic.

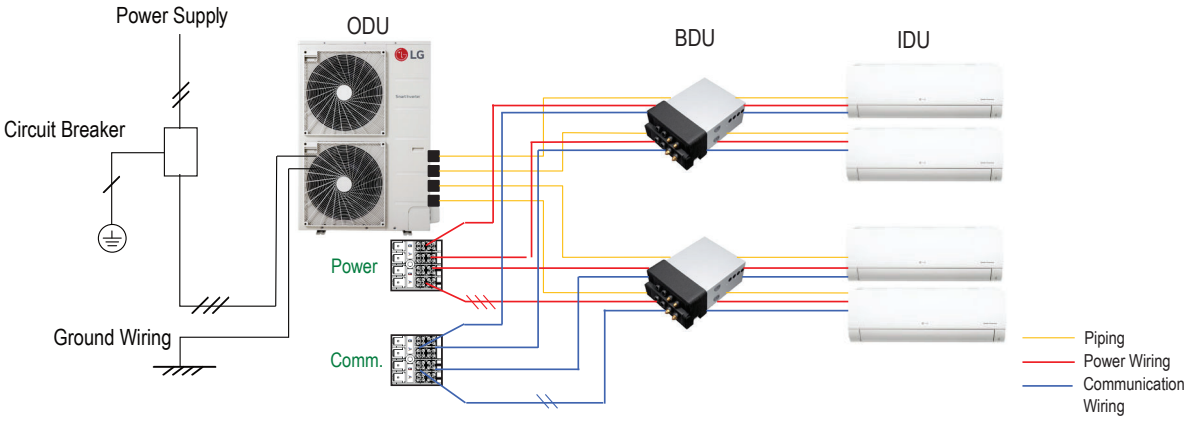
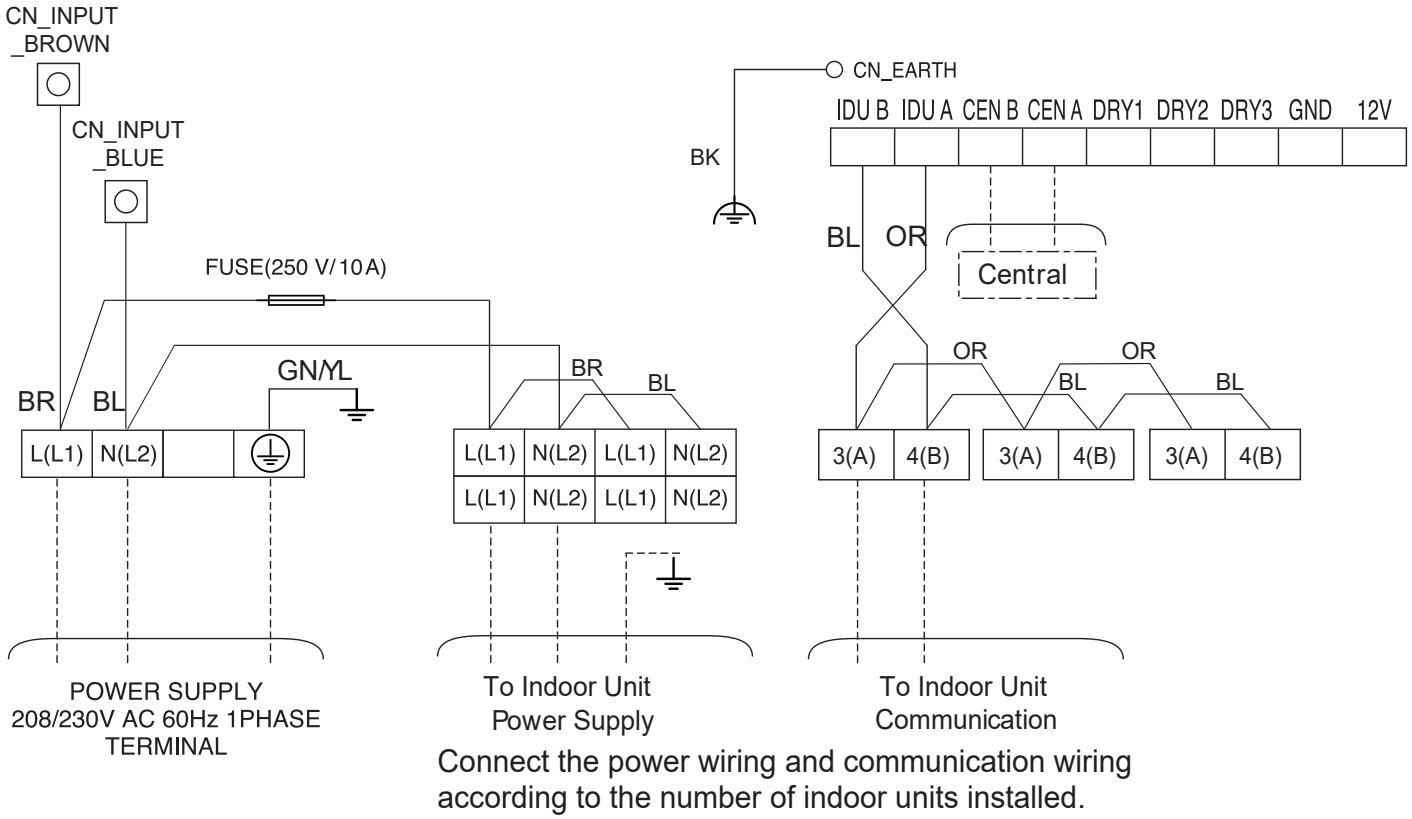


Figure 38: Multi F with LGRED KUMXA181A, KUMXA241A, and KUMXA301A System Power Wiring and Communications Cable.



Connect the power wiring and communication wiring according to the number of indoor units installed.

NOTICE

KUMXA181A can support no more than two indoor units; KUMXA241A can support two or three indoor units; KUMXA301A can support two, three, or four indoor units. Ensure the communication wiring and power wiring from the outdoor unit to the indoor units is installed correctly for the system and the chosen application.

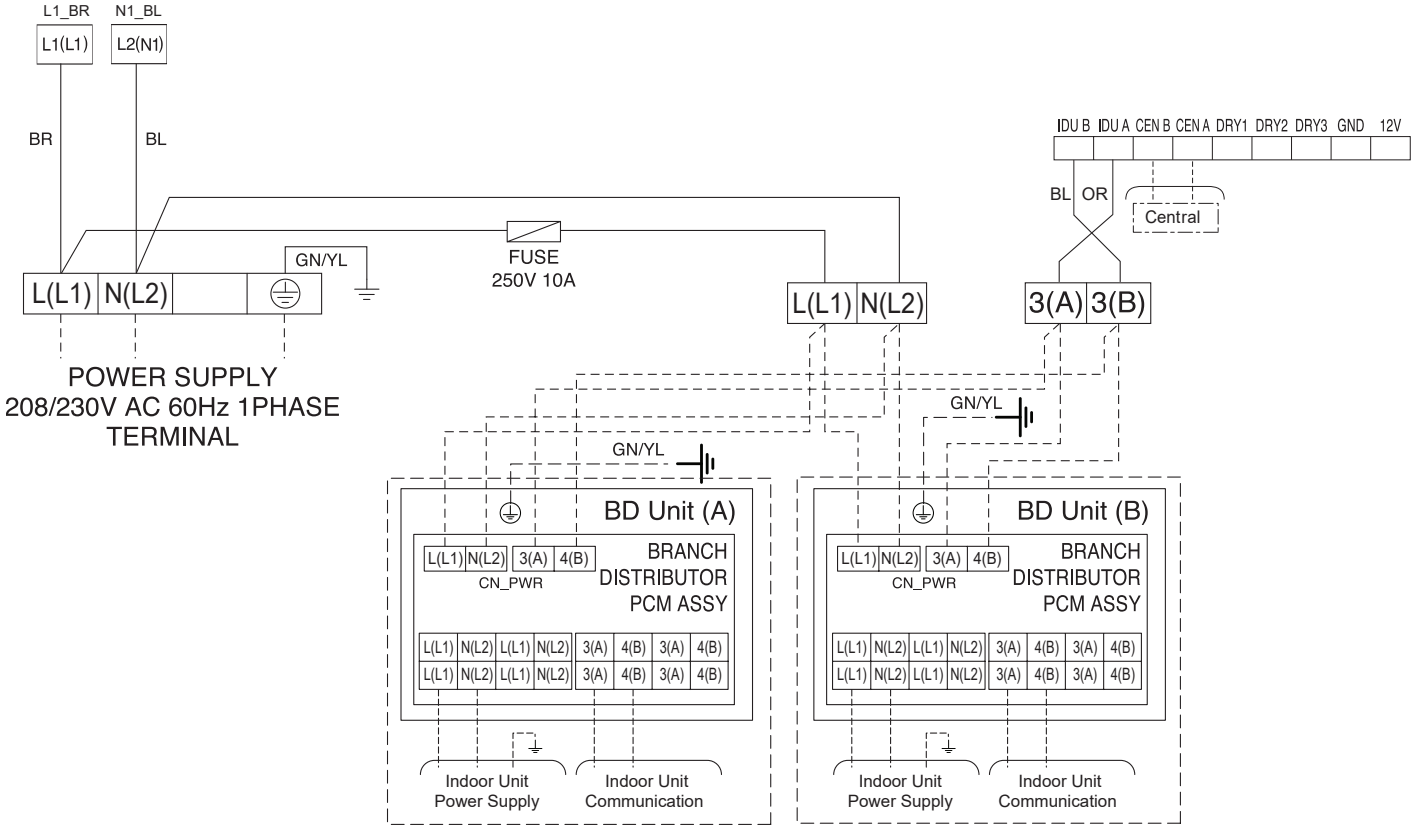
⚠ WARNING

- *All field-supplied wiring, components, and materials must comply with all applicable national, state, and local codes and requirements. Improper wiring will result in fire, electric shock, causing physical injury or death.*
- *Ground wiring is required to prevent accidental electrical shock during current leakage, communication problems from electrical noise, and motor current leakage. ⃠ Do not connect the ground line to the pipes. There is a risk of fire, electric shock, explosion, resulting in physical injury or death.*
- *Install a main shutoff switch or circuit breaker that interrupts all power sources simultaneously. There is a risk of fire, electric shock, explosion, resulting in physical injury or death.*

NOTICE

- *Terminal block labels, appearances, and location will vary depending on outdoor unit model.*
- *Maintain polarity throughout the communication network. The system will malfunction if not properly wired.*
- *All field-supplied wiring, components, sizes, and materials must comply with all applicable national, state, and local codes and requirements. Failure to install proper electrical components can result in property damage and equipment malfunction.*
- *Ground wiring is required to prevent communication problems from electrical noise, and motor current leakage. Failure to provide proper ground wiring can result in property damage and equipment malfunction.*
- *Install a main shutoff switch or circuit breaker that interrupts all power sources simultaneously. Failure to install proper electric components will result in property damage and equipment malfunction.*

Figure 39: Multi F MAX with LGRED KUMXA361A, KUMXA421A, and KUMXA481A System Power Wiring and Communications Cable.



Connect power wiring and communications wiring according to the number of indoor units installed.

NOTICE

KUMXA361A can support up to two branch distribution units and up to five indoor units. KUMXA421A can support up to two branch distribution units and up to six indoor units. KUMXA481A can support up to two branch distribution units and up to eight indoor units. Ensure the communication wiring and power wiring from the outdoor unit to the indoor units is installed correctly for the system and the chosen application.

⚠ WARNING

- *All field-supplied wiring, components, and materials must comply with all applicable national, state, and local codes and requirements. Improper wiring will result in fire, electric shock, causing physical injury or death.*
- *Ground wiring is required to prevent accidental electrical shock during current leakage, communication problems from electrical noise, and motor current leakage. ⃠ Do not connect the ground line to the pipes. There is a risk of fire, electric shock, explosion, resulting in physical injury or death.*
- *Install a main shutoff switch or circuit breaker that interrupts all power sources simultaneously. There is a risk of fire, electric shock, explosion, resulting in physical injury or death.*

NOTICE

- *Terminal block labels, appearances, and location will vary depending on outdoor unit model.*
- *Maintain polarity throughout the communication network. The system will malfunction if not properly wired.*
- *All field-supplied wiring, components, sizes, and materials must comply with all applicable national, state, and local codes and requirements. Failure to install proper electrical components can result in property damage and equipment malfunction.*
- *Ground wiring is required to prevent communication problems from electrical noise, and motor current leakage. Failure to provide proper ground wiring can result in property damage and equipment malfunction.*
- *Install a main shutoff switch or circuit breaker that interrupts all power sources simultaneously. Failure to install proper electric components will result in property damage and equipment malfunction.*

From Indoor Units to Remote Controllers

- Communication cable from indoor unit to remote controller(s) is to be 22 AWG, 3-conductor, twisted, stranded, unshielded. Wiring must comply with all applicable local and national codes.
- If using the LG Controller / Extension cable and the length needs to be extended, the LG Extension Kit (sold separately) must be used. A maximum of four (4) kits (up to 165 feet) can be used.
- Remote controllers have hardwired connections: SIG - 12V - GND (Comm.) terminals.
- Indoor unit controller connections depend on type of indoor unit being installed. Some indoor units use terminal block connections; other indoor units use Mollex connections. See diagrams below for the two options. Refer to the wiring diagram schematic found in the indoor unit itself, or to the indoor unit wiring diagrams in the Engineering Manuals for more information.
- ⃠ NEVER splice, cut, or extend cable length with field provided cable. Always include enough cable to cover distance between the indoor unit and the remote controller.
- Set the indoor unit operating parameters using DIP switches, or by setting up the remote controller. Refer to the indoor unit installation manuals for more details.

Figure 40: One Example of Indoor Unit to Zone Controller Connection.

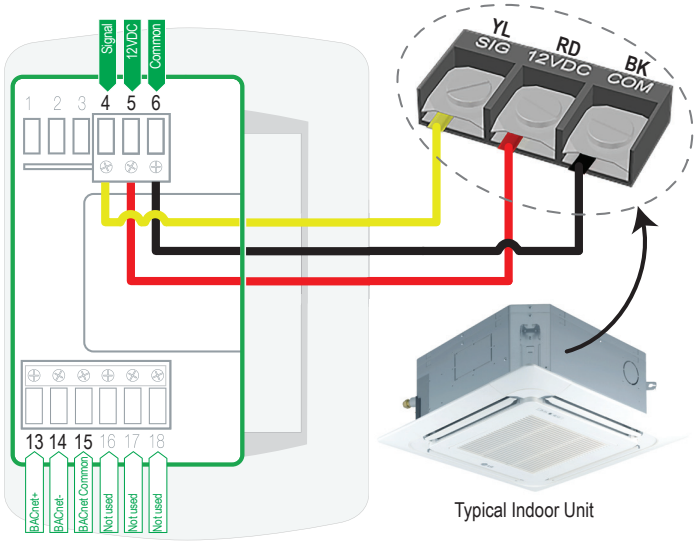
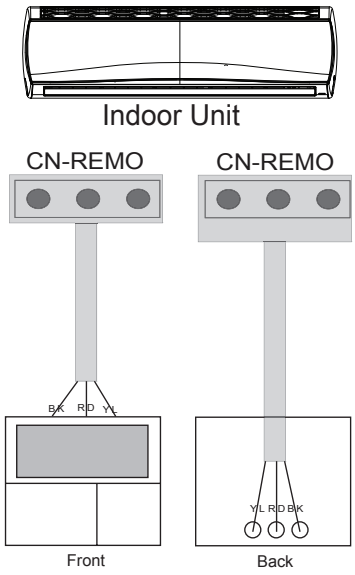


Figure 41: Another Example of Indoor Unit to Zone Controller Connection.



NOTICE

Cable connected to Zone Controller is the factory default connection.

Between Multiple Indoor Units Operating as a Group (Group Control)

If any indoor units were specified to operate in unison:

- Before running cable, decide which indoor unit will be the "Main." The other indoor units in that group will be designated as "Sub(s)." The zone controller will be connected to the "Main."
- Set the pertinent DIP switch at each indoor unit to identify the Main and Sub(s). On wall mounted indoor unit models, set the assignment using the handheld remote controller.
- Use a daisy chain configuration and connect all of the group's indoor units together starting at the "Main" unit.
- ⃠ NEVER splice, cut, or extend cable length with field provided cable. Always include enough cable to cover distance between all components.

For indoor units with hardwired connections SIG - 12V - GND (Comm.) terminals:

- From the controller to the main indoor unit, use 22 AWG, 3-conductor, twisted, stranded, unshielded. All wiring must comply with all applicable local / national codes.
- From the main indoor unit to the sub indoor unit(s), daisy chain using 22 AWG, 3-conductor, twisted, stranded, unshielded. All wiring must comply with all applicable local / national codes.
- (⃠ Do not attach wire to 12VDC terminal to the sub indoor units). All wiring must comply with all applicable local and national codes.
- ⃠ NEVER splice, cut, or extend cable length; always include enough cable to cover distance between all components.

For indoor units with CN-REMO connections:

Use one (or multiple) Group Control Kit(s) (sold separately) containing extension and Y-splitter cables. Use one (1) group control cable kit for each indoor unit in the group except for the last indoor unit. ⃠ NEVER splice, cut, or extend cable length with field provided cable.

Figure 42: Example of Indoor Unit Group to Zone Controller Connections (Sig-12V-GND [Comm.] Terminal).

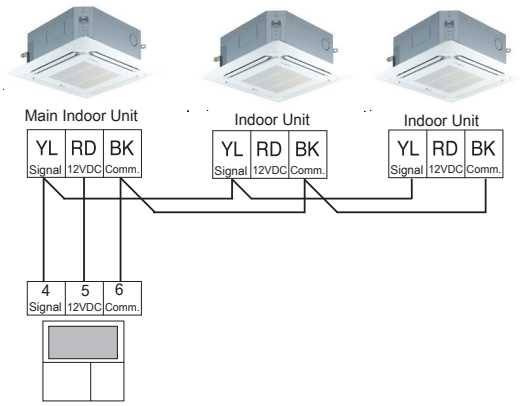
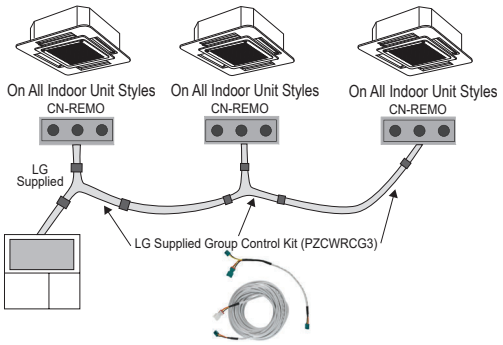


Figure 43: Example of Indoor Unit Group to Zone Controller Connections (CN-REMO).



NOTICE

- *Cable connected to zone controller is the factory default connection.*
- *Indoor unit connections depend on indoor unit type.*

Table 33: Accessories for Some Group Control Applications.

Accessory	Model No.	Image
Wired Remote Group Control Cable Assembly - Required for connecting multiple indoor units to a control group	PZCWRCG3	
Wired Remote / Wired Remote Extension Cable - Required for extending the distance between indoor units or remote controllers in a control group	PZCWRC1	

General Specifications

- Wired remote controllers can be connected to all indoor unit types.
- Wireless controllers can be used in conjunction with wired remote controllers.
- A dry contact unit can be connected with a central controller simultaneously.
  - The main indoor unit is recognized by the dry contact unit and the central controller.
  - The central controller can control indoor units after setting the address of the main indoor unit only.
  - Sub indoor unit cannot be individually controlled by central controller.
  - Sub indoor unit will operate like main indoor unit.
- If an error occurs with the indoor unit, the error will be displayed on the wired remote controller.
- The following functions are available with group control:
- Selection of operation options (operation/mode/set temperature)
- Control of air flow rate (High / Medium / Low)

PIPING LIMITATIONS AND PLACEMENT CONSIDERATIONS

PIPING LIMITATIONS

Following pages present Multi F / MAX piping limitations and are for illustrative purposes only. Designers are highly encouraged to use LATS when designing Multi F / MAX systems.

NOTICE

Various tools are available to assist in properly designing LG R32 split systems. Refer to the "R32 Application Guide"; the "Simple Calculator for Capacity, Refrigerant Charge and ESP"; the "LG Air Conditioner Technical Solutions" (LATS) software program; and the local LG Sales Representative.

Device Connection Limitations

- The minimum number of connected and operating indoor units to Multi F / Multi F MAX with LGRED systems is two, taking into consideration the minimum combination ratio.
- The maximum number of indoor units for each Multi F / Multi F MAX with LGRED heat pump system is:

KUMXA181A = 2 KUMXA241A = 3 KUMXA301A = 4 KUMXA361A= 5 KUMXA421A = 6 KUMXA481A = 8

NOTICE

For allocated capacity information, see the combination tables in the "Multi F / Multi F MAX with LGRED Combination Data Manual" on www.lghvac.com. For performance data, see "Multi F / Multi F MAX with LGRED Performance Data Manual" on www.lghvac.com.

One of the most critical elements of multi-zone systems is the refrigerant piping. The following pages list pipe length limits that must be followed in the design of Multi F and Multi F MAX with LGRED refrigerant pipe systems:

Using Refrigerant Components

Field-supplied elbows are allowed as long as they are designed for use with R32 refrigerant. The designer, however, must be cautious with the quantity and size of fittings used, and must account for the additional pressure losses in equivalent pipe length calculation for each branch. The equivalent pipe length of each elbow must be added to each pipe segment.

Table 35: Equivalent Piping Length for Elbows, Y-branches, and Branch Distribution Units.

Component	Size (Inches)				
	1/4	3/8	1/2	5/8	3/4
Elbow (ft.)	0.5	0.6	0.7	0.8	1.2
Y-Branch Kit (ft., Multi F MAX with LGRED systems only)[1]	1.6				
Branch Distribution Unit (ft., Multi F MAX with LGRED systems only)	8.2				

[1]Kit contains two Y-branches: one for liquid and one for vapor.

Example of a Multi F with LGRED System

Example: KUMXA301A outdoor unit with four (4) indoor units connected.

ODU: Outdoor Unit.

IDU: Indoor Unit.

A, B, C, D: Pipes from Outdoor Unit to Indoor Unit.

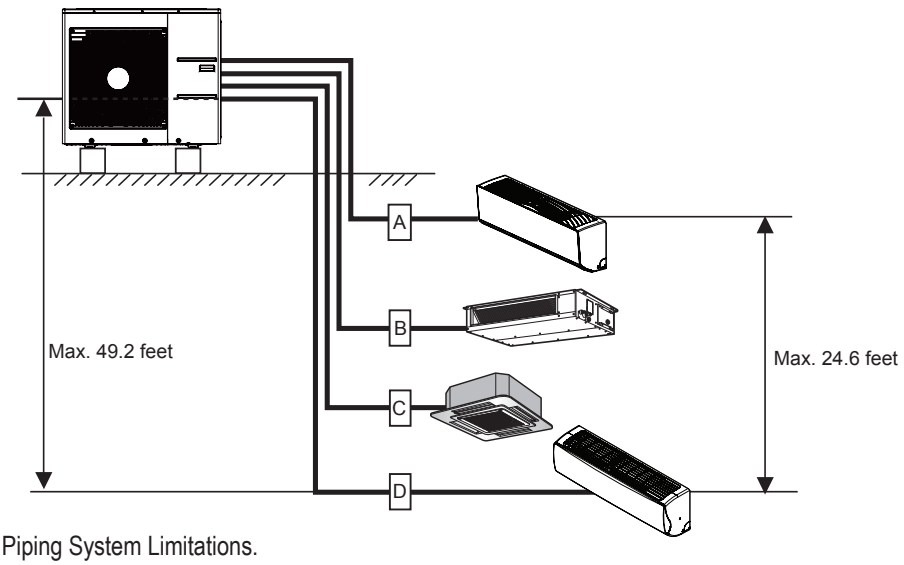


Table 34: Multi F with LGRED Outdoor Unit Refrigerant Piping System Limitations.

Outdoor Unit	Minimum Length for Each Pipe (ft.)	Maximum Piping Length to Each Indoor Unit (ft.)				Maximum Height Difference (Max. [ft.]) Outdoor Unit ~ Indoor Unit	Maximum Height Difference (Max. [ft.]) Indoor Unit ~ Indoor Unit	Maximum Total Piping Length for Each System (ft.)
		A	B	C	D			
KUMXA181A	9.8	82.0	82.0	-	-	49.2	24.6	164
KUMXA241A	9.8	82.0	82.0	82.0	-	49.2	24.6	246.1
KUMXA301A	9.8	82.0	82.0	82.0	82.0	49.2	24.6	246.1

PIPING LIMITATIONS

Following pages present Multi F / MAX piping limitations and are for illustrative purposes only. Designers are highly encouraged to use LATS when designing Multi F / MAX systems.

NOTICE

Various tools are available to assist in properly designing LG R32 split systems. Refer to the "R32 Application Guide"; the "Simple Calculator for Capacity, Refrigerant Charge and ESP"; the "LG Air Conditioner Technical Solutions" (LATS) software program; and the local LG Sales Representative.

Example of a Multi F MAX with LGRED System with One Branch Distribution Unit

Example: KUMXA361A outdoor unit with four (4) indoor units and one (1) branch distribution unit connected.

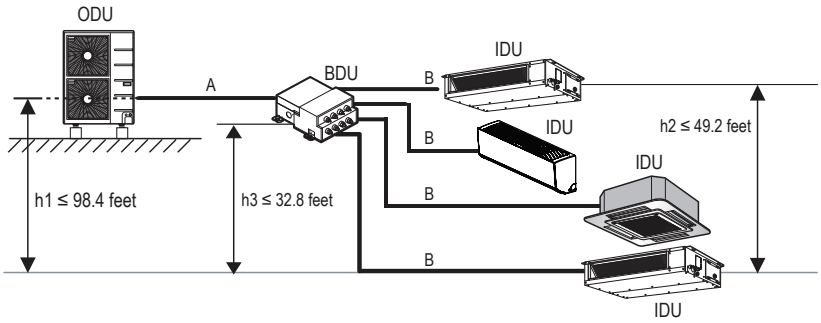
ODU: Outdoor Unit.

IDU: Indoor Unit.

BDU: Branch Distribution Unit.

A: Main Pipe.

B: Branch Pipe (Branch Distribution Unit to Indoor Unit[s]).



Example of a Multi F MAX with LGRED System with Two Branch Distribution Units

Example: KUMXA421A outdoor unit with six (6) indoor units and two (2) branch distribution units connected.

ODU: Outdoor Unit.

IDU: Indoor Unit.

BDU: Branch Distribution Unit(s).

A: Main Pipe.

B: Branch Pipe (Branch Distribution Unit[s] to Indoor Unit[s]).

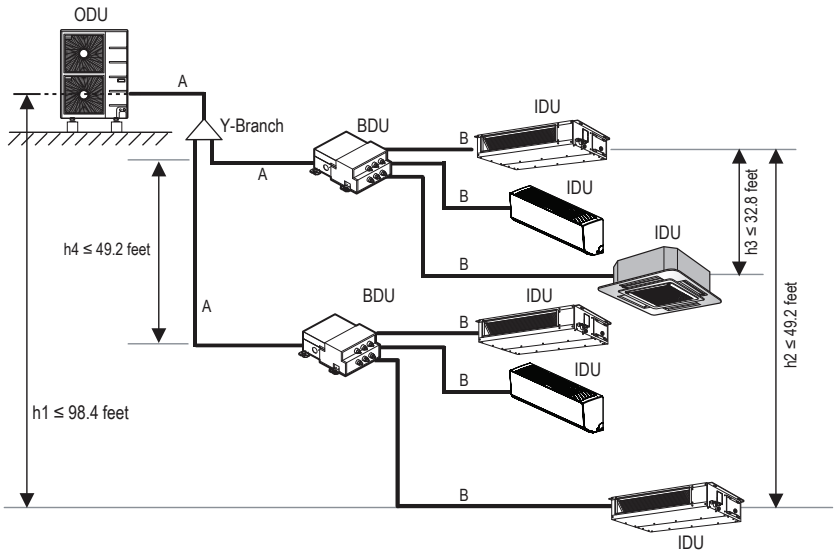


Table 36: Multi F MAX with LGRED Outdoor Unit Refrigerant Piping System Limitations.

Pipe Length (ELF = Equivalent Length of pipe in Feet)	Total piping length (ΣA + ΣB)		≤475.7 feet
	Main pipe (Outdoor Unit to Branch Distribution Units: A)	Minimum f(ΣA)	16.4 feet
		Maximum (ΣA)	≤180.4 feet
	Total branch piping length (ΣB)		≤295.3 feet
	Branch pipe (Branch Distribution Units to Indoor Units: B)	Minimum	16.4 feet
		Maximum	≤49.2 feet
Elevation Differential (All Elevation Limitations are Measured in Actual Feet)	If outdoor unit is above or below indoor unit (h1)		≤98.4 feet
	Between the farthest two indoor units (h2)		≤49.2 feet
	Between branch distribution unit and farthest connected indoor unit(s) (h3)		≤32.8 feet
	Between branch distribution units (h4)		≤49.2 feet

Table 37: Multi F MAX with LGRED Piping Sizes.

Piping	Main Pipe A (inch)	Branch Pipe B
Liquid	Ø3/8	Depends on the size of the indoor unit piping
Vapor	Ø3/4	

PLACEMENT CONSIDERATIONS

Selecting the Best Location for the Outdoor Unit(s)

Selecting the Best Location for the Outdoor Unit(s)

⚠DANGER

- ⃠ *Do not install the unit in an area where combustible gas will 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.*

⚠WARNING

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, which will create unsafe conditions. Properly install and insulate any drain hoses to prevent the hose from freezing, cracking, leaking, and causing unsafe conditions from frozen condensate.

Install a fence to prevent pests from crawling into the unit or unauthorized individuals from accessing it. Pests and unauthorized individuals can damage internal components which can cause a fire, electric shock, physical injury or death. Follow the placement guidelines set forth in "Clearance Requirements".

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

Dos

- *Where there is enough strength to bear the weight of the outdoor unit.*
- *A location that allows for optimum air flow and is easily accessible for inspection, maintenance, and service.*
- *Where piping between the outdoor unit and indoor unit (and branch distribution unit[s], if Multi F MAX) is within allowable limits.*
- *Include space for drainage to ensure condensate flows properly out of the unit when it is in heating mode.* ⃠ *Avoid placing the outdoor unit in a low-lying area where water could accumulate.*
- *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).*

⃠ Do Nots

- *Where it will be subjected to direct thermal radiation from other heat sources, or an area that would expose the outdoor unit to heat or steam like discharge from boiler stacks, chimneys, steam relief ports, other air conditioning units, kitchen vents, plumbing vents, and other sources of extreme temperatures.*
- *Where high-frequency electrical noise / electromagnetic waves will not affect operation.*
- *Where operating sound from the unit will disturb inhabitants of surrounding buildings.*
- *Where the unit will be exposed to direct, strong winds.*
- *Where the discharge of one outdoor unit will blow into the inlet side of an adjacent unit (when installing multiple outdoor units).*

NOTICE

The indoor units may take longer to provide heat, or heating performance will be reduced in winter if the outdoor 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.

Outdoor Unit Condensate Drain Piping

Outdoor unit requires condensate drain piping. Condensate drain pipe is constructed with materials approved by local code. See pages 63 to 67 for information in reference to outdoor unit placement.

PLACEMENT CONSIDERATIONS

Selecting the Best Location for the Outdoor Unit(s)

Planning for Snow and Ice

To ensure the outdoor unit operates properly, certain measures are required in locations where there is a possibility of heavy snowfall or severe windchill 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 will malfunction.
3. Remove any snow that has accumulated four (4) inches or more on the top of the outdoor unit.
4. In climates that will experience significant snow buildup, mount the outdoor unit on a raised, field-provided platform or stand. The raised support platform must be high enough to allow the unit to remain above possible snow drifts, and must be higher than the maximum anticipated snowfall for the location.
5. Design the mounting base to prevent snow accumulation on the platform in front or back of the unit frame.
6. Provide a field fabricated snow protection hood to keep snow and ice and/or drifting snow from accumulating on the coil surfaces.
7. To prevent snow and heavy rain from entering the outdoor unit, install the condenser air inlets and outlets facing away from direct winds.
8. 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, which will create unsafe conditions. Properly install and insulate any drain hoses to prevent the hose from freezing, cracking, leaking, and causing unsafe conditions from frozen condensate.

NOTICE

Choose an area where run-off from defrost mode will not accumulate and freeze on sidewalks or driveways. Properly install and insulate any drain hoses to prevent the hose from freezing, cracking, leaking, and damaging the outdoor unit.

Tie-Downs, Lightning Protection, and Wind Protection

Tie-Downs

- The strength of the roof must be checked before installing the outdoor units.
- The strength of the outdoor unit frames is adequate to be used with field-provided wind restraint tie-downs.
- If the installation site is prone to high winds or earthquakes, when installing on the wall or roof, securely anchor the mounting base using a field-provided tie-down configuration approved by a local professional engineer.
- The overall tie-down configuration must be approved by a local professional engineer.

NOTICE

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

Lightning Protection

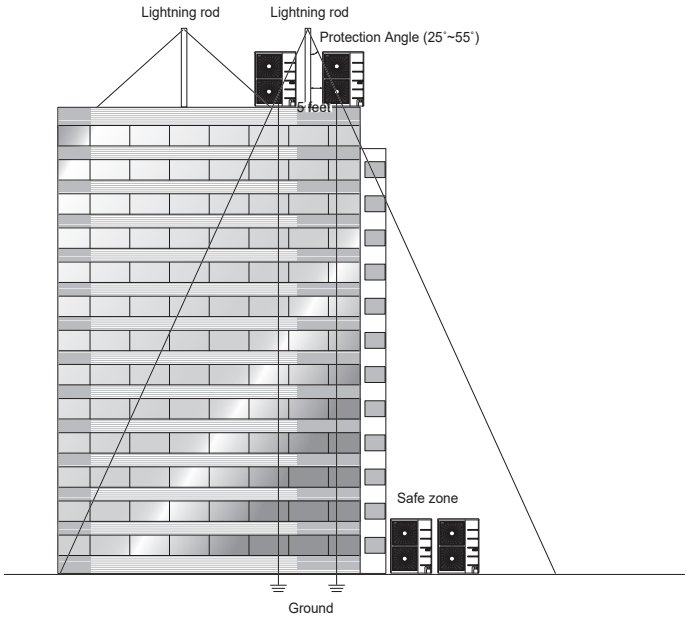
- To protect the outdoor unit from lightning, it must be placed within the specified lightning safety zone.

Table 38: Safety Zone Specifications.

Building Height (feet)	66	98	148	197
Protection Angle (˚)	55	45	35	25

- Power cable and communication cable must be installed five (5) feet away from lightning rod.
- A high-resistance ground system must be included to protect against induced lightning or indirect strike.

Figure 44: Lightning Protection Diagram (Outdoor Unit Appearances Differ According to Model).



NOTICE

If the building does not include lightning protection, the outdoor unit will be damaged from a lightning strike. Inform the customer of this possibility in advance.

PLACEMENT CONSIDERATIONS

Selecting the Best Location for the Outdoor Unit(s)

Oceanside Applications

Wind Protection

If the outdoor unit is placed on a roof, position it with the compressor end (no coil surface) in the direction of the prevailing wind as shown in the figure at right. In cooler climates, it can be beneficial to position the unit in direct sunlight to assist with defrost operations.

If the outdoor unit is not placed on a roof, place it on the leeward side of the building or in a location where the unit will not be exposed to constant wind.

If placement exposes the unit to constant wind activity, construct a wind break in front of the unit. Follow the placement guidelines set forth in "Clearance Requirements".

Figure 45: Prevailing Wind Direction.

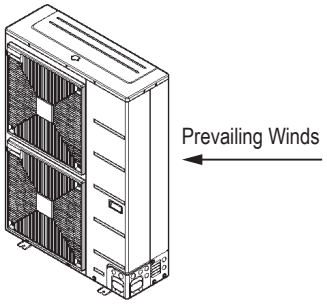
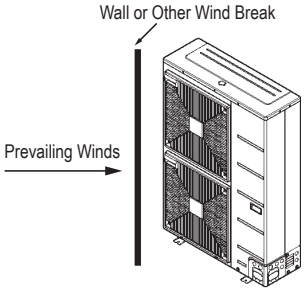


Figure 46: Leeward Side of the Building.

Figure 47: Wind Break.



Oceanside Application Precautions

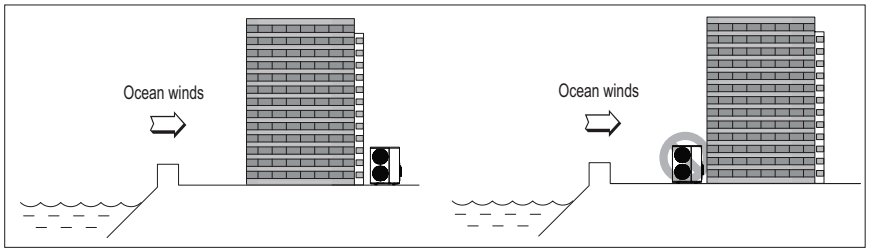
NOTICE

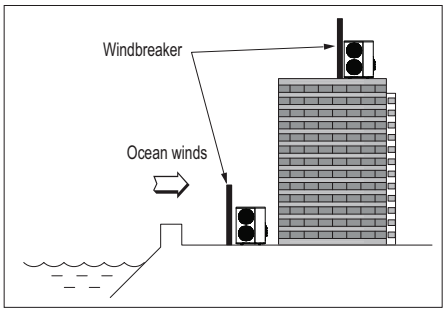
Ocean winds will cause corrosion, particularly on the condenser and evaporator fins, which, in turn could cause product malfunction or inefficient performance.

- ⃠ 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. Windbreaker height and width must be more than 150% of the outdoor unit, and be installed at least 14 to 28 inches away from the outdoor unit to allow for airflow (depending on the location and outdoor unit size).

Figure 48: Oceanside Placement Using a Building as Shield, and Placement Using a Windbreak.





NOTICE

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

PLACEMENT CONSIDERATIONS

Outdoor Unit Clearance Requirements

Minimum Allowable Clearance and Service Access Requirements

Proper clearance for the outdoor unit coil is critical for proper unit operation. When installing the outdoor unit, consider service, inlet and outlet and minimum allowable space requirements as illustrated in the diagrams below and on the following pages.

- Include enough space for airflow and for service access. If installing multiple outdoor units, ⃠ avoid placing the units where the discharge of one unit will blow into the inlet side of an adjacent unit.
- If an awning is built over the unit to prevent direct sunlight or rain exposure, make sure that the discharge air of the outdoor unit isn't restricted.
- ⃠ No obstacles to air circulation around the unit; keep proper distances from ceilings, fences, floor, walls, etc. (Install a fence to prevent pests from damaging the unit or unauthorized individuals from accessing it.)

Minimum Clearance Requirements for Multi F Single Fan Outdoor Units

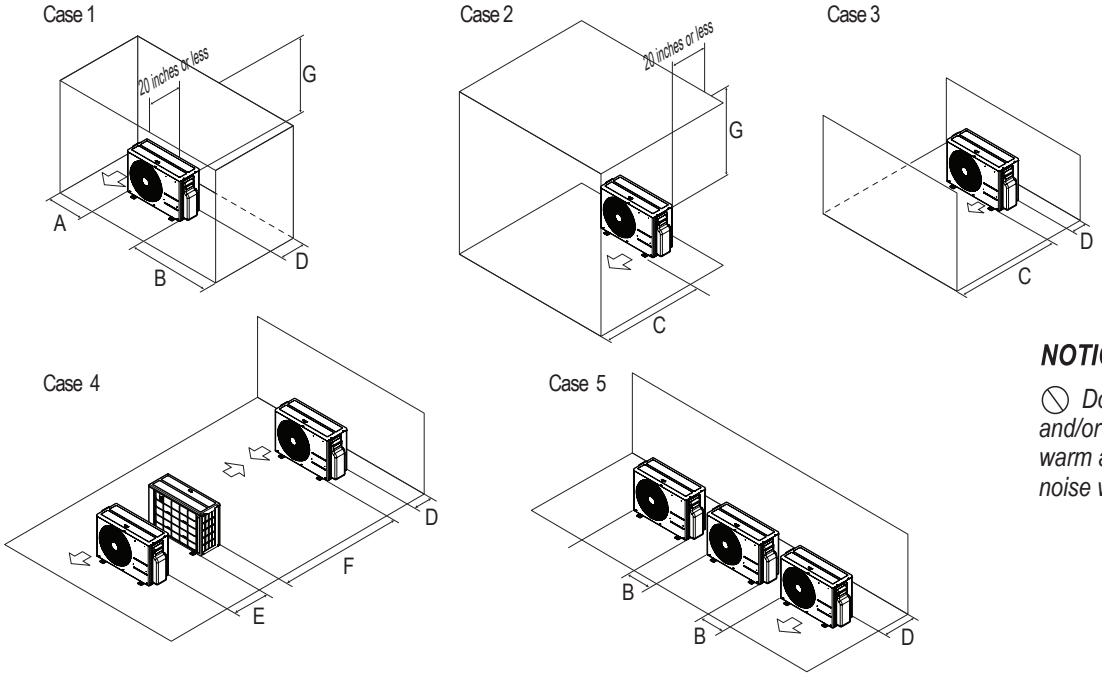
Specific clearance requirements in the diagram below are for single fan outdoor units. The figure below shows the overall minimum clearances that must be observed for safe operation and adequate airflow around the outdoor unit.

When placing the outdoor unit under an overhang, awning, sunroof or other "roof-like structure", observe the clearance requirements (as shown in Cases 1 and 2 for height in relation to the unit.. To have successful service access to the outdoor unit, see the figure below for minimum spacing. When installing multiple outdoor units, see Cases 4 and 5 for correct spacing requirements.

NOTICE

If the outdoor unit is installed between standard and minimum clearances, capacity decreases approximately 10%.

Figure 49: Single Fan Outdoor Unit Service Access and Allowable Clearances Diagram.



NOTICE

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

Table 39: Single Fan Outdoor Unit Service Access and Allowable Clearances Diagram Legend.

Unit: Inch		A	B	C	D	E	F	G
Case 1	Standard	12	24	-	12	-	-	-
	Minimum	4	10	-	4	-	-	40
Case 2	Standard	-	-	20	-	-	-	-
	Minimum	-	-	14	-	-	-	40
Case 3	Standard	-	-	20	12	-	-	-
	Minimum	-	-	14	4	-	-	-
Case 4	Standard	-	-	-	12	24	-	-
	Minimum	-	-	-	4	8	79	-
Case 5	Standard	-	24	-	12	-	-	-
	Minimum	-	10	-	4	-	-	-

PLACEMENT / CLEARANCE CONSIDERATIONS

Outdoor Units

Minimum Clearance Requirements for Dual Fan Outdoor Units

Figures below and on the next page illustrate clearance requirements for various installation scenarios for dual fan outdoor units. Use the hot isle / cold isle approach when placing multiple units in close proximity to each other. Outdoor unit fans draw air from the back of the unit and discharges out the front. Place units back to back and face to face.

NOTICE

- *Installation clearances must comply with local building codes.*
- *All figures not to scale.*
- ⃠ *Never place multiple units facing back to front or front to back as shown immediately below here or high and low system pressure problems will occur.*

Figure 50: Improper Outdoor Unit Placement.

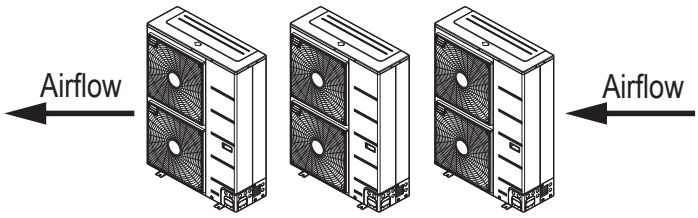
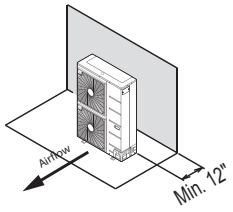
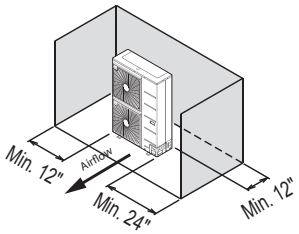


Figure 51: Proper Outdoor Unit Placement and Clearances When There Are Obstacles on the Suction Side.

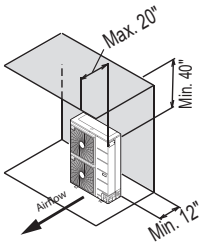
Single Unit—High Rear Wall



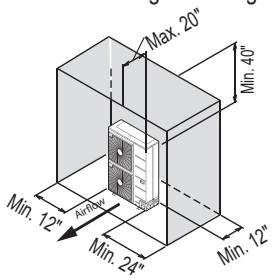
Single Unit—High Rear Wall with High Side Walls



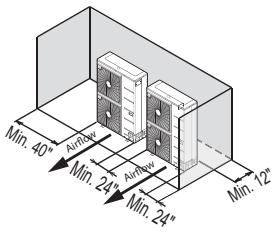
Single Unit—High Rear Wall with Building Overhang



Single Unit—High Rear and Side Walls with Building Overhang



Side by Side—High Rear and Side Walls



Side by Side—High Rear and Side Walls with Building Overhang

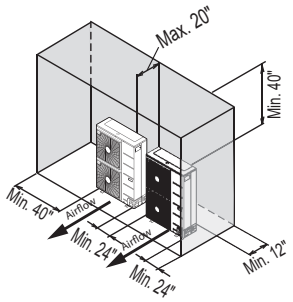
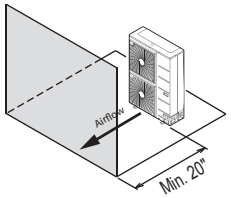
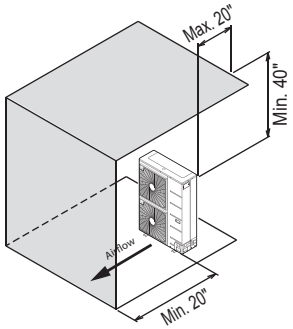


Figure 52: Proper Outdoor Unit Placement and Clearances When There Are Obstacles on the Discharge Side.

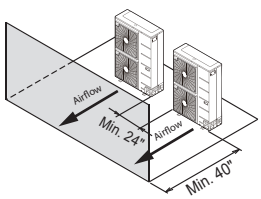
Single Unit—High Front Wall with No Side Walls



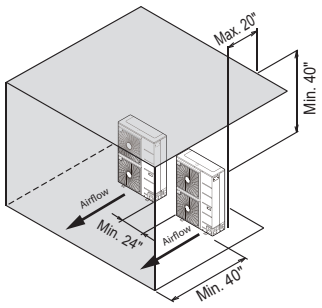
Single Unit—High Front Wall with Building Overhang and No Side Walls



Side by Side—High Front Wall with No Side Walls



Side by Side—High Front Wall with Building Overhang and No Side or Rear Walls



PLACEMENT / CLEARANCE CONSIDERATIONS

Outdoor Units

Minimum Clearance Requirements for Dual Fan Outdoor Units, Continued.

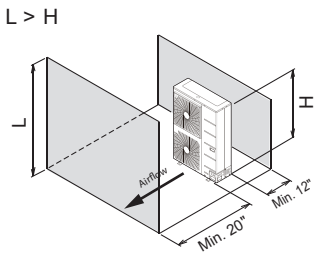
NOTICE

- *Installation clearances must comply with local building codes.*
- *All figures not to scale.*

Figure 53: Proper Outdoor Unit Placement and Clearances When There Are Obstacles on the Suction and the Discharge Sides.

When Obstacle Height of the Discharge Side is Higher than the Outdoor Unit.

Single Unit—High Rear and Front Walls with No Side Walls



Single Unit—High Rear and Front Walls with Building Overhang

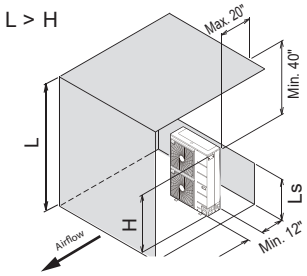


Table 40: H, A, and L Ratio.

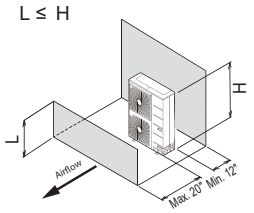
	Ls	A (Inches)
L ≤ H	0 < Ls ≤ 1/2 H	30
	1/2 H < Ls	40
H < L	Set Stand as: L ≤ H	

NOTICE

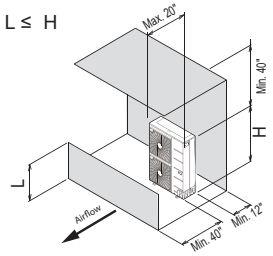
"L" must be lower than "H". If a stand is necessary, it must be made of solid material (not an open frame) to prevent the discharge air from short cycling.

Obstacle Height of Discharge Side Is Lower than the Outdoor Unit.

Single Unit—High Rear Wall and Low Front Wall with No Side Walls

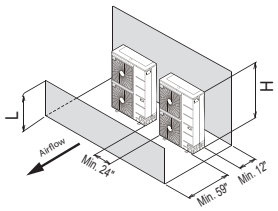


Single Unit—High Rear Wall and Low Front Wall with Building Overhang and No Side Walls



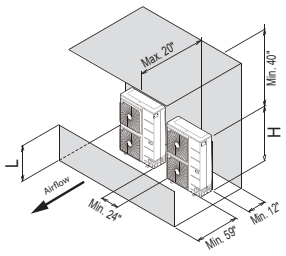
Side by Side—High Rear Wall and Low Front Wall with No Side Walls

L < H/2



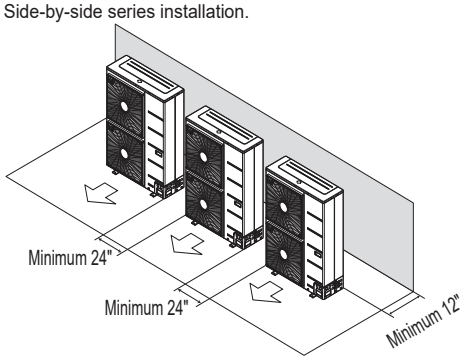
Side by Side—High Rear Wall and Low Front Wall with Building Overhang and No Side Walls

L < H/2

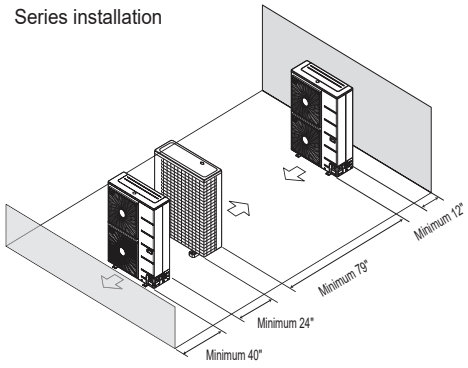


Series Installation

Side-by-side series installation.



Series installation



Installing Outdoor Units Indoors

LG Multi F / Multi F MAX outdoor units are engineered to be mounted outdoors and include technology designed to minimize the negative effects of winter weather's freezing rain, sleet, and snow. Some building projects, however, necessitate placing the HVAC outdoor units indoors:

- Lack of ground space.
- Lack of an appropriate outdoor location that meets system design requirements.
- When mounting on the roof is not an option due to a lack of roof space.
- Roof warranty will be voided if mechanical equipment is placed on the membrane.
- On retrofit projects, a former chiller / boiler / air handler equipment room, mechanical area, or penthouse already exists.
- To curtail the potential need for redundant zone heating devices such as wall-fin radiators or duct heaters.
- In extremely cold environments where there is a significant amount of run-time at temperatures well below freezing outside the outdoor unit ambient air temperature range published in this engineering manual.

Benefits of Installing Outdoor Units Indoors

- Shelters the outdoor unit from direct exposure to prevailing winds that decrease the heating capability of the outdoor unit.
- Protects equipment from freezing precipitation and / or potential ice build-up that could hinder unit operation.
- Maintains coil heat transfer efficiency by reducing the number of and shortening the cycle time for defrost operation.
- Easier maintenance and servicing during inclement weather.
- When mounted in a fully enclosed space, limiting the ambient air temperature could allow the Multi F / Multi F MAX system designer to eliminate oversizing.
- The outdoor unit to compensate for loss of capacity at low ambient temperatures.
- Can also curtail the need to provide inefficient redundant zone heating devices such as wall-fin radiators and second-stage ancillary heating devices.

Design Considerations Include:

- Enclosure types and elements such as louvers, rain hoods, dampers and controls, heating methods and sizing of heating devices
- Heating strategies
- Duct design
- Condensate handling

General Guidelines

- Follow ASHRAE 62.1 design guidelines.
- Depending on the project / application, a roof over the outdoor units in combination with a wind break could be all that is necessary.
- Consider the potential for snow accumulation near louvers / roof openings. Outside air intakes and discharge ducts/louvers must be engineered to clear anticipated snow accumulation levels by at least one (1) foot.
- In situations where operation is anticipated at temperatures lower than the product's minimum operating temperature, ancillary heat must be provided to heat the outdoor unit coils to ensure continuous compressor operation and heating.

It will be necessary to use an air guide accessory to prevent discharge air from short-cycling back to the coil inlet.

- Consider the direction of prevailing winds and opening placement. If possible, locate inlet openings upwind of discharge openings and other exhaust outlets.
- When inlet and outlet openings are placed on the same wall, minimum distance between the two openings must be approximately three (3) feet (minimum distance varies significantly with variations in outlet opening face velocity).
- If roof-mounted ventilation openings are used, strategically locate the inlet ventilation opening(s) upwind of the outlet opening(s).
- Discharge and supply ductwork must be designed to avoid weather related long periods of water entrainment.

PLACEMENT CONSIDERATIONS

Installing Outdoor Units Indoors

Provide a means to drain the condensate generated during heating mode and defrost cycle in addition to rainwater that infiltrates the inlet louver enclosed area.

- Install a field-provided drain pan under the outdoor units and provide a path to a nearby floor drain.
- If the ambient air temperature is expected to drop below 32°F in the enclosure, heat the bottom surface of the pan, drain line, and floor drain so that the condensate does not freeze before reaching the drain.

⚠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 walk-ways, which will create unsafe conditions.

Allow for ventilation intake and exhaust air based on maximum outdoor unit fan capacity.

- Select the size, type and orientation of architectural louvers with adequate "net free area" face velocity to ensure the total external static pressure from the outdoor unit fan does not exceed design limitations (see specification data tables).
- ⃠ No obstructions must be placed in front of the louver that could hamper the free flow (throw) of air.
- Roof top openings and / or discharge and supply louvers must be equipped with screens to prevent bird and insect infiltration.

NOTICE

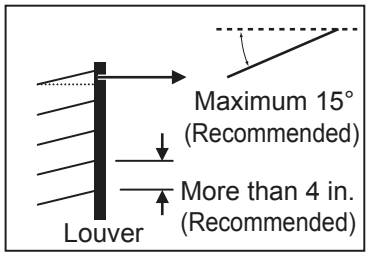
For louver recommendations, see below and on the next page.

As always, the best solution for each project balances acceptable heating performance (considering local weather conditions), capital costs, life cycle energy consumption, and limitations set forth by local building codes.

Louver Recommendations for Outdoor Unit Enclosure

1. Outdoor Unit Enclosure: Manual Door Open Type.
2. Louver Angle: No More Than 15° Horizontally.
3. Space Between Louvers: More than 4 inches (Recommend).
4. Louver Shape: Wing or Plane Type.

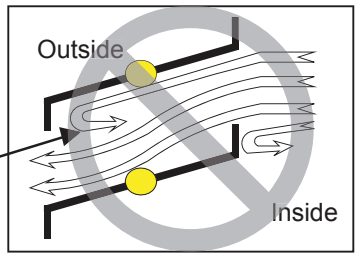
Figure 54: Louver Recommendations.



NOTICE

- *Open Rate and Inlet must be taken into consideration when designing the louvered outdoor unit enclosure.*
- ⃠ *Do not use "S" type louvers.*

Figure 55: Using "S" Type Louvers.



Air flow passing through the louver blade backwards can generate noise.

NOTICE

If the Louver Open Rate is Too Small

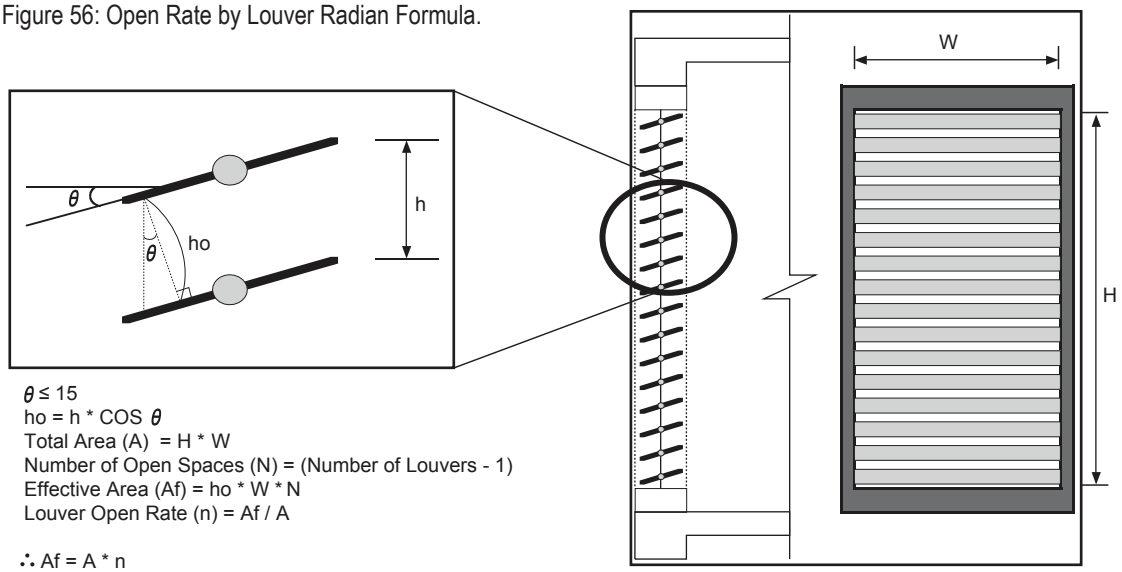
1. Noise can occur because of the increased air velocity passing through thee louver blade.
2. Noise can occur from louver blade vibrations.
3. A drop in outdoor unit fan performance (excess static pressure can cause a drop in outdoor unit performance and heat exchanger efficiency).
4. If the louver open rate is too small or there is insufficient air flow exchange, the air conditioner might stop operating.

PLACEMENT CONSIDERATIONS

Installing Outdoor Units Indoors

Open Rate by Louver Radian

Figure 56: Open Rate by Louver Radian Formula.



$\theta \leq 15$
$ho = h * COS\ \theta$
Total Area (A) = H * W
Number of Open Spaces (N) = (Number of Louvers - 1)
Effective Area (Af) = ho * W * N
Louver Open Rate (n) = Af / A

$\therefore Af = A * n$

Effective Cross Section Area

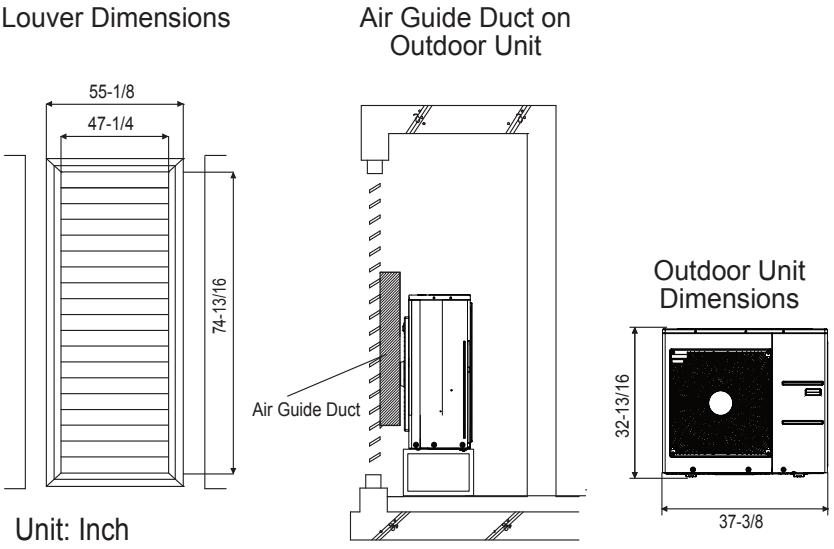
Confirming Air Flow Rate / Total Opening Rate

- Example: KUMXB361A
- Airflow Rate: 2,295 ft.^{3}/min.
- Velocity of Outlet Air: 12.9 ft./s
- Velocity of Inlet Air: 6.5 ft./s
- Open Rate = 80% or More

$$\text{Open Rate} = \frac{\text{Effective Face Area (Af)}}{\text{Total Face Area (A)}}$$

- Discharge Air Guide must be installed.

Figure 57: Example of Installing Outdoor Unit Indoors.



Formula

- Total Louver Dimension (Excluding Frame) (A) = 3.9 feet x 6.2 feet = 24.2 ft.^{2}
- Louver Shield Dimension by Product (B) = 3.12 feet x 2.74 feet = 8.55 ft.^{2}
- Inlet Louver Dimension (A - B) = 15.7 ft.^{2}
- Equivalent Inlet Dimension (Open Rate 80%) = 15.7 ft^2 x 0.8 = 12.56 ft.^{2}
- Equivalent Inlet Air Volume = 12.56 ft.^{2} x 6.5 ft./s x 60 sec./min. = 4,898 ft.^{3}/min.
- Required Air Volume / Equivalent Volume = 4,898 ft.3/min. / 2,295 ft.3/min. = 213% (Within Allowable Limits)

PLACEMENT CONSIDERATIONS

Selecting the Best Location for the Indoor Units / Branch Distribution Units

Selecting the Best Location for the Indoor Units

NOTICE

Dos

Select a location for installing the indoor units that will meet the following conditions:

- *Within allowable parameters for proper connection to the outdoor unit (or Branch Distribution unit, if a Multi F MAX system).*
- *So that condensation drainage can be conveniently routed away.*
- *Include enough space around the indoor unit so that it is accessible for maintenance and service purposes.*
- *Where electrical noise / electromagnetic waves will not affect indoor unit operation. Maintain proper distances between the indoor units and electric wires, audio and visual appliances, breaker / circuit panels, etc. If the frequency signal of the appliance is unstable, then install the indoor unit a minimum of ten (10) feet away, and run the power and transmission cables through a conduit.*
- *An area that is level and with enough strength to bear the weight of the indoor unit(s).*

⃠ **Do Not's**

- *Where there are no obstacles to air circulation around the unit; keep proper distances from ceilings, doorways, floor, walls, etc.*
- *An area where operation sound won't disturb occupants.*
- *An area that does not expose the indoor unit(s) to heat, water, steam, oil splattering or spray.*

NOTICE

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

For detailed placement considerations and installation requirements for indoor units, refer to its Indoor Unit Engineering and / or Installation Manuals.

Selecting the Best Location for the Branch Distribution (BD) Unit

NOTICE

Dos

Branch Distribution (BD) units are used only with Multi F MAX systems to distribute the refrigerant from the outdoor unit to up to eight (8) indoor units. Select location indoors that will meet the following conditions:

- *Within allowable parameters for proper connection to the Multi F MAX outdoor unit and indoor unit(s); refrigerant piping and wire lengths must not exceed amounts specified by LG Electronics, U.S.A., Inc.*
- *Condensate drain piping is not required.*
- *Ensure there is enough space in the installation area for service purposes (minimum 24 inches); install the refrigerant piping and electrical wiring system in an easily accessible location.*
- *Level where there is enough strength to bear the weight of the branch distribution unit.*

⃠ **Do Not's**

- *Install the branch distribution unit in a location where it would be subjected to strong radiation heat from heat sources.*
- *Install in an installation environment where the branch distribution unit would be exposed to heat, water, steam, oil splattering or spray.*
- *Install the unit in a location where any sound it generates will disturb occupants in the surrounding rooms.*
- *No obstacles to air circulation around the unit; keep proper distances from ceilings, doorways, floor, walls, etc.*
- *Install in an area where high-frequency electrical noise / electromagnetic waves will affect operation. Maintain proper distances between the branch distribution unit(s) and electric wires, audio and visual appliances, breaker / circuit panels, etc.*

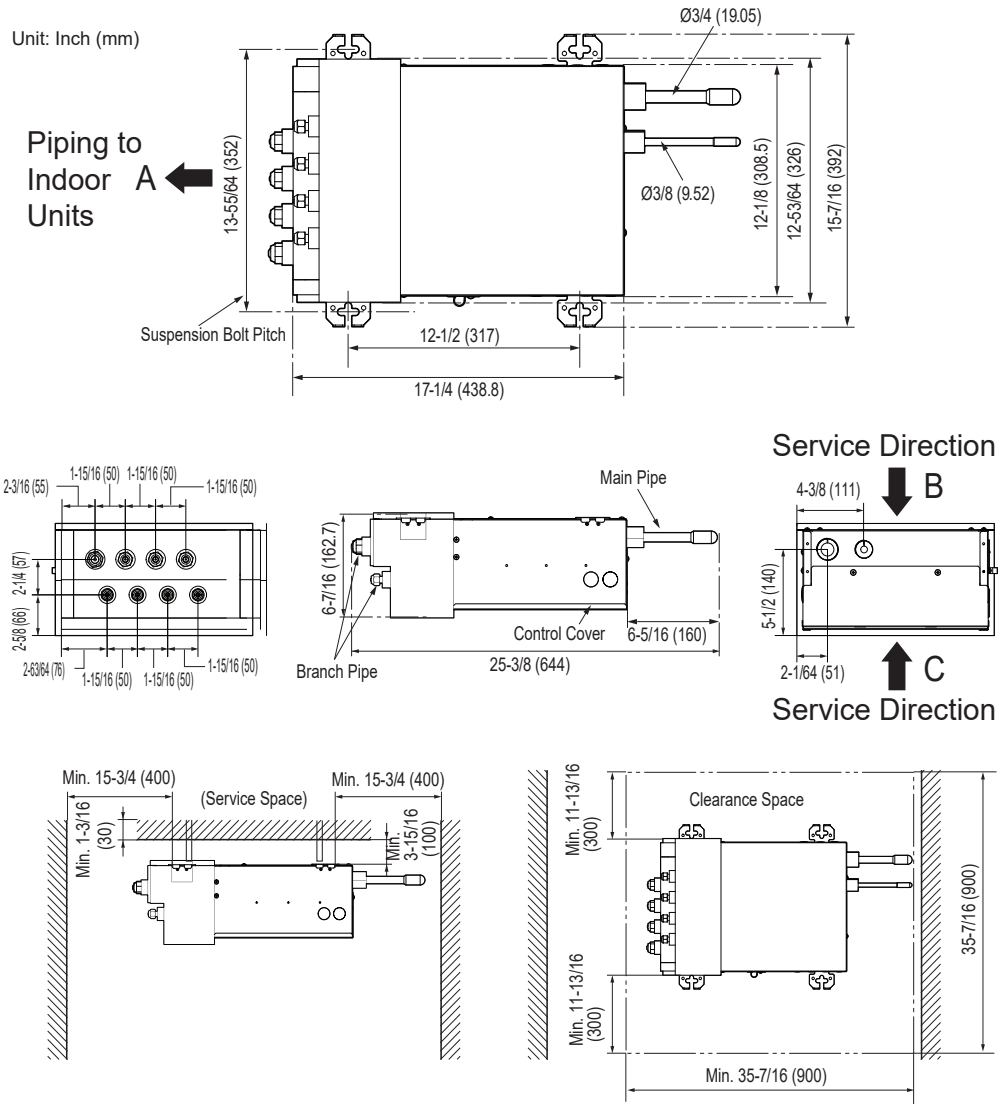
PLACEMENT CONSIDERATIONS

Selecting the Best Location for the Indoor Units / Branch Distribution Units

Branch Distribution Unit Installation

- Branch distribution units may be installed suspended from the ceiling, mounted on the wall, horizontally, or vertically. See below and the Branch Distribution Unit Product Section for details.
- Direction A indicates piping for the indoor units.
- Leave a two (2) foot square opening for clearance and service as shown below for both suspended from the ceiling and mounted on the wall installation. See Sides B and C for service sides.
- Side B (indicates top of the unit facing up) must be within ±5° forward, backward, or to the sides.
- This unit "does not require drain treatment" as it includes an internal foam for the low-pressure piping insulation.

Figure 58: Branch Distribution Unit Components and Clearances.



Branch Distribution Unit Orientation

Multi F MAX branch distribution units can be installed in a multitude of options to fit various building configurations and job or application requirements. The installation location of the PCB within the branch distribution unit can be changed for easier service access, depending on the branch distribution unit installation itself. Multi F MAX branch distribution units include electronic expansion valves that properly seat only if the branch distribution unit is installed in an acceptable orientation. Installations with improper branch distribution unit orientation risk incomplete valve seating and system performance degradation from potential refrigerant leakage through the electronic expansion valve. See the Branch Distribution Product Section for acceptable installation options.

LIMITED WARRANTY (USA)

The product's full Limited Warranty terms and conditions and arbitration requirements are available at https://www.lghvac.com.

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EM_Multi_F-MAX_LGRED_ODU_R32_05_25
Supersedes: EM_Multi_F-MAX_LGRED_ODU_R32_04_25
EM_Multi_F-MAX_LGRED_ODU_R32_12_24