LG
Life's Good

MULTI F
MULTI F MAX

INDOOR UNIT ENGINEERING MANUAL

Art Cool™ Mirror Wall-Mounted

Art Cool™ Gallery Wall-Mounted

Four-Way Ceiling Cassette

Ceiling-Concealed Duct

Indoor Units for Multi-Zone Heat Pump Systems
7,000 to 36,000 Btu/h

PROPRIETARY DATA NOTICE

EM_MultiF_IDU_7_16

TABLE OF SYMBOLS

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

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CONVERGENCE OF TECHNOLOGY, INNOVATION, FLEXIBILITY, & STYLE

About LG Electronics, Inc.

LG Electronics is a global leader and technology innovator in consumer electronics, mobile communications, and home appliances. LG Electronics comprises five business units—Home Entertainment, Mobile Communications, Air Conditioning, Business Solutions, and Home Appliance. LG is one of the world's leading producers of flat panel televisions, audio and video products, mobile handsets, air conditioners, and washing machines. LG's commercial air conditioning business unit was established in 1968 and has built its lineup of residential and commercial products to include VRF, Multi F, duct-free split systems, packaged terminal air conditioners (PTACs), and room air conditioners. In 2011, the air conditioning and energy solutions business unit grew to include LED lighting and solar products. For more information, visit www.lg.com.

Multi-Zone Systems

LG HVAC systems offer a range of solutions that are cost efficient, quiet and attractive. Multi-zone systems are "split" into indoor and outdoor units, and provide a smart alternative to both central HVAC and window-mounted air conditioners. These inverter heat pump systems are available in a variety of configurations to suit different cooling and heating situations. Installation by a trained HVAC contractor is safe and easy – little to no duct work or sheet metal is required.

Multi F Systems

LG's inverter heat pumps can support two, three, or four indoor units that are typically installed in separate rooms. Each indoor unit includes its own remote control, allowing the customer to set the temperature individually. Indoor units are available in several different configurations: Art Cool™ Mirror wall-mounted, Art Cool Gallery wall-mounted, standard wall-mounted, four-way ceiling cassettes, ceiling-concealed duct (high and low static), and vertical-horizontal air handling models. Multi F MAX systems can operate up to eight indoor units through two-, three-, or four-port branch distribution units.

Benefits of Multi F Systems

- Individual zone control
- Long refrigerant piping lengths
- High refrigerant piping elevation differences
- Maximum flexibility
- Operating ranges of 14°F to 118°F (DB) in cooling and -4°F to 64°F (WB) in heating
- Quiet and comfortable environment
- Reduced ductwork

Adaptable and Flexible

Multi F outdoor units can be adapted to a wide range of building applications and sizes such as schools, hotels, hospitals, offices, and residences. The system components are lightweight and compact so they can be placed in buildings without expensive cranes, they easily fit into most service elevators, and they can be set in place with minimal structural reinforcements requirements.

Multi F technology allows you to pipe farther by reaching areas of the building that would require the installation of a second system when using traditional direct-expansion cooling and heating equipment. Multi F provides the designer with uncompromised pipe system engineering flexibility—long pipe runs and large elevation differences. Whether your building is a condominium, a hotel, a school, or an office complex, Multi F is best suited to reach the farthest corners and elevations.

Smaller Chases and Plenums

LG Multi F systems use refrigerant piping to move heat, resulting in smaller space requirements for piping as compared to chilled water or roof top systems. This helps reduce the overall construction and material cost of the building, and gives back leasable space. Flexible and logical placement of system components, reduced back-and-forth pipe lengths, and fewer joints lowers installation costs and minimizes potential leaking.

Quality Commitment

LG is committed to the success of duct-free projects. We provide technical support during installation and commissioning. LG offers a variety of classes designed for installers and servicers on Multi F installation. Classes are conducted at LG's training centers and in field locations at various times throughout the year and on special request.

MULTI F

UNIT NOMENCLATURE

Multi-Zone Systems — Indoor Units and Outdoor Units

L	M	DN	12	6	HV

L = LG

Type: M = Multi-Zone

Component:
AN: Art Cool™ Wall-Mounted Indoor Unit
N: Standard Wall-Mounted Indoor Unit
CN: Four-Way Ceiling-Cassette Indoor Unit
DN: Ceiling-Concealed Duct (Low Static) Indoor Unit
HN: Ceiling-Concealed Duct (High Static) Indoor Unit
VN: Vertical-Horizontal Air Handling Indoor Unit
U: Outdoor Unit

Nominal Capacity
(Nominal cooling capacity in Btu/h):

07 = 7,000	15 = 15,000	30 = 30,000	54 = 54,000
09 = 9,000	18 = 18,000	36 = 36,000	
12 = 12,000	24 = 24,000	48 = 48,000	

Generation

Features:
H = Heat Pump
V = Inverter
T = High Wall-Mounted Indoor Unit
P = Art Cool Gallery Indoor Unit

Branch Distribution Units

P	M	BD	36	2	0

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

Note:

- *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 with PI-485 V-net Control Integration Board (PMNFP14A1, sold separately).*
- *Compatible single zone IDU nomenclature is listed in the Single Zone Wall-Mounted IDU Engineering Manual.*

FUNCTIONS, CONTROLS AND OPTIONS OVERVIEW

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Table 1: Indoor Units—Functions, Controls and Options.

	Indoor Unit Type	ART COOL™ Mirror Wall Mounted	ART COOL™ Gallery	Standard Wall Mounted	Ceiling Concealed (Low Static) Ducted	Ceiling Concealed (High Static) Ducted	Four-Way Ceiling Cassette	Vertical-Horizontal Air Handling Unit
Airflow	Air supply outlets	1	3	1	1	2	4	1
	Airflow direction (left/right)	Auto	Auto	Auto				
	Airflow direction (up/down)	Auto	Auto	Auto			Auto	
	Auto swing (left/right)	√	√	√				
	Auto swing (up/down)	√	√	√			√	
	Airflow steps (fan/cool/heat)	6 / 6 / 5	5 / 5 / 4	6 / 6 / 5	3 / 3 / 3	3 / 3 / 3	4 / 5 / 4	3 / 3 / 3
	Chaos wind (random fan speed)	√	√	√			√	
	Jet-cool	√	√	√			√	
	Swirl wind						√	
Filter	Washable anti-fungal[1]	√	√	√	√	√	√	
	Plasma[2]	√		√			o[3]	
	3M HAF[2]			√				
	Ventilation						√[4]	
Operation	Drain pump				√	√	√	
	E.S.P. control				√	√		√
	Electric heater							o
	High ceiling[5]						√	
	Hot Start	√	√	√	√	√	√	√
	Self diagnostics	√	√	√	√	√	√	√
	Soft Dry (dehumidification)	√	√	√	√	√	√	√
	Auto operation	√	√	√	√	√	√	√
	Auto clean (coil dry)	√	√	√				
	Auto restart	√	√	√	√	√	√	√
	Child lock	o	o	o	o	o	o	o
	Forced operation	√	√	√			√	
	Group control – Requires the use of one Group control Cable Kit (PZCWRCG3) for every additional indoor unit	o	o	o	o	o	o	o
	Sleep mode	√	√	√	√	√	√	√
	Timer (on/off)	√	√	√	√	√	√	√
	Weekly schedule	o	o	o	√	√	o	√
	Two thermistor control	o	o	o	o	o	o	o
Controllers	7-Day programmable controller	o	o	o	o	o	o	o
	Simple wired remote controller	o	o	o	√	√	o	√
	Wireless LCD remote control	√	√	√	o[5]	o[5]	√	o[5]
	Dry contact	o	o	o	o	o	o	o
	Dry contact (temperature setting)	o	o	o	o	o	o	o
	Central control (LGAP)	√	√	√	√	√	√	√
	Connector for Water Sensor	√	√	√				

[1]Primary washable filters.

[2]Secondary filter (plasma: HVT wall-mount; 3M: HSV4)

[3]Branch location and static pressure requirements. Requires PTPKQ0 Plasma kit.

[4]Requires ventilation kit PTVK430 (Temperature, humidity, and volume limitations apply).

[5]Requires wired zone controller.

√ = Standard feature
o = Unit option

FUNCTIONS, CONTROLS AND OPTIONS OVERVIEW

Table 2: Indoor Unit Accessories Overview.

Model No.	Description
For Four-Way Ceiling-Cassette Indoor Units	
PT-QCHW0	Ceiling Grille
PT-UQC	Ceiling Grille
PTVK430	Flange for All Capacities
For Vertical-Horizontal Air Handing Units	
ANEH053B1	5 kW Electric Heater
ANEH103B2	10 kW Electric Heater
For Ceiling-Concealed Duct (High Static) Indoor Units	
ZFBXBG01A	High Efficiency Filter Box
ZFBXD201A	Dynamic V8 2VL Low Profile Air Cleaner
ZPLMV201A	Dynamic 2VL Air Cleaner Low Profile Return Air Plenum
ZFBXD402A	Dynamic V8 4VL Low Profile Air Cleaner
ZPLMV402A	Dynamic 4VL Air Cleaner Low Profile Return Air Plenum
ZFLT1301A	4-Pack Dynamic V8 VL Air Cleaner Replacement Filter Pads
ZFLT1302A	24-Pack Dynamic V8 VL Air Cleaner Replacement Filter Pads
ZGRLRA01A	Dynamic V8 Air Cleaner Louvered Return Air Grille (one per plenum)
ZGRLRA02A	Dynamic V8 Air Cleaner Egg Crate Return Air Grille (one per plenum)

ART COOL™ MIRROR INDOOR UNIT DATA

ART COOL MIRROR INDOOR UNITS

Mechanical Specifications and Features

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ART COOL Mirror Wall-Mounted Indoor Units

General

All LG indoor units are factory assembled, wired, piped, and provided with a control circuit board, fan, and motor. ART COOL Mirror Wall-Mounted indoor units have a sound rating no higher than 39 dB(A) as tested per KSA0701 ISO Standard 3745.

Coil

Indoor unit coils are comprised of a minimum of two rows of aluminum fins mechanically bonded to copper tubing. The coils are pressure tested at the factory. Each unit is provided with a factory installed condensate drain pan below the coil.

Refrigerant System

System is designed for use with R410A refrigerant. The refrigeration circuit is pressure-tested at the factory and shipped with a holding charge of helium gas. Refrigerant pipe connections are 45° flare. All refrigerant lines from the outdoor unit to the indoor units must be field insulated.

Electrical

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

Casing

Units are designed to mount on a vertical surface, and are shipped with a separate back plate that secures the unit to the wall, protruding no more than ten (10) inches. Unit is designed so that refrigerant piping can be installed in one (1) of four (4) different directions.

Finish

The Art Cool Mirror unit has a flat, architectural panel with a smoked charcoal mirror finish. Unit casing has a dark grey finish and is manufactured of heavy-duty acrylonitrile butadiene styrene (ABS) and high impact polystyrene (HIPS) plastic.

Fan Assembly and Control

The unit has a single, direct-drive, crossflow fan made of high strength ABS plastic. The fan motor is brushless digitally controlled (BLDC) with permanently lubricated and sealed ball bearings. The fan and motor assembly is mounted on vibration attenuating rubber grommets. Fan speed is controlled using a microprocessor-based direct digitally controlled algorithm that provides pre-programmed, field-selectable fixed or auto fan speeds in the Heating and Cooling modes. For Art Cool Mirror Wall-Mounted units, the indoor fan has Low, Med, High, Power Cool and Auto settings for Cooling mode; and has Low, Med, High, and Auto settings for Heating mode. The Auto setting adjusts the fan speed based on the difference between the controller setpoint and space temperature. Also, the separate Chaos setting provides a simultaneous and random change in fan speed and flow direction at the discharge, simulating a natural outdoor breeze.

Figure 1: Multi F Art Cool Mirror Wall-Mounted Indoor Unit.

Air Filter

Return air inlet has a factory-supplied primary removable, washable filter. The unit is also equipped with a secondary 3M HAF filter. Filters are accessed from the front of the unit without the use of tools.

Airflow Guide Vanes

A motorized guide vane is factory installed, and allows the ability to control the direction of airflow from side to side. A motorized louver provides an automatic change in airflow by directing the air up and down to provide uniform air distribution.

Microprocessor Control

The indoor unit is provided with an integrated control panel to communicate with the outdoor unit. All unit operation parameters are stored in non-volatile memory resident on the unit microprocessor. The microprocessor controls space temperature through using the value provided by the temperature sensor within the indoor unit. The microprocessor control will activate indoor unit operation when the indoor room temperature falls below or rises above a setpoint temperature, at which point, a signal is sent to the outdoor unit to begin the appropriate mode. The microprocessor will also provide self-diagnostics and auto restart functions. A field-supplied four-wire power/communications cable must be installed to connect the indoor unit(s) to the outdoor unit.

Controls

The indoor unit casing has a factory-standard, integral infrared sensor designed to communicate with the supplied LG wireless handheld remote controller. An optional LG supplied wired controller is available as an additional accessory. Communication between the indoor units and the outdoor unit is accomplished through 18 AWG, four-core, stranded and shielded power/communication cable.

Condensate

The unit is designed for gravity draining of condensate and includes a flexible drain hose capable of installation in one of two directions. Unit includes a connection that is compatible with the AquaGuard® AG-9300-LG condensate sensor.

Features

- Inverter (Variable speed fan)
- Chaos swing
- 3M HAF filter
- Jet cool
- Group Control
- Self-cleaning indoor coil
- Auto operation
- Auto restart operation
- Dehumidifying function
- Self diagnosis function
- Wireless LCD remote control included; wired thermostat available (sold separately)

ART COOL MIRROR INDOOR UNITS

General Data / Specifications

Table 3: Multi F Art Cool Mirror Indoor Unit General Data.

Model Name	LAN090HSV4	LAN120HSV4	LAN180HSV4
Nominal Cooling Capacity (Btu/h)[1]	9,000	12,000	18,000
Nominal Heating Capacity (Btu/h)[1]	10,400	13,800	20,800
Operating Range			
Cooling (°F WB)	57-77	57-77	57-77
Heating (°F DB)	59-81	59-81	59-81
Fan			
Type	Cross Flow	Cross Flow	Cross Flow
Motor Output (W) x Qty.	14.4 x 1	14.4 x 1	76.0 x 1
Motor/Drive	Brushless Digitally Controlled / Direct	Brushless Digitally Controlled / Direct	Brushless Digitally Controlled / Direct
Airflow Rate CFM (H/M/L)	247 / 230 / 212	335 / 318 / 300	572 / 501 / 434
Unit Data			
Refrigerant Type[2]	R410A	R410A	R410A
Refrigerant Control	EEV	EEV	EEV
Power Supply V, Ø, Hz[3]	208-230, 1, 60	208-230, 1, 60	208-230, 1, 60
Rated Amps (A)	0.2	0.2	0.3
Sound Pressure Level ±3 dB(A) (H/M/L)[4]	33 / 30 / 27	39 / 36 / 31	37 / 33 / 28
Dimensions (W x H x D, in.)	34-13/16 x 11-1/4 x 8-1/16	34-13/16 x 11-1/4 x 8-1/16	40-9/16 x 12-13/16 x 9-11/16
Net Unit Weight (lbs.)	24	24	32
Shipping Weight (lbs.)	29	29	39
Power Wiring / Communications Cable (No. x AWG)[5]	4 x 18	4 x 18	4 x 18
Heat Exchanger (Row x Column x Fin / inch) x Number	(2 x 16 x 23) x 1	(2 x 16 x 23) x 1	(3 x 18 x 22) x 1
Piping			
Liquid (in.)	1/4	1/4	1/4
Vapor (in.)	3/8	3/8	1/2
Drain O.D. / I.D. (in.)	27/32, 5/8	27/32, 5/8	27/32, 5/8

[1]Nominal capacity is rated 0 ft. above sea level with corresponding refrigerant piping length in accordance with standard length of each outdoor unit and a 0 ft. level difference between outdoor and indoor units. All capacities are net with a combination ratio between 95 – 105%.

Nominal 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).
Nominal 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).

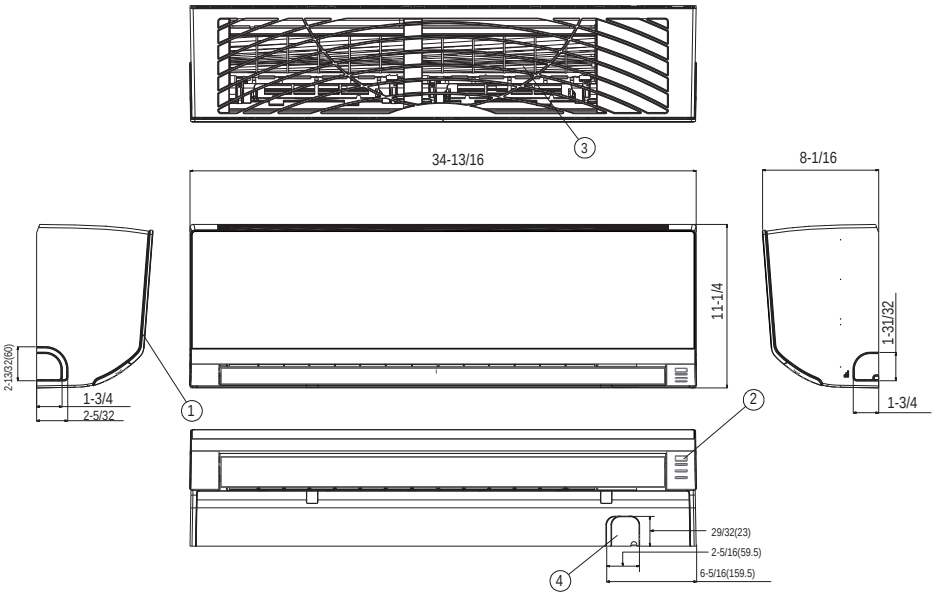
[2]This unit comes with a dry helium charge.

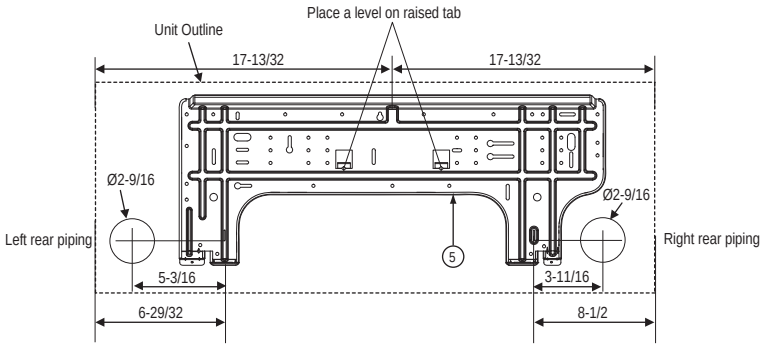
[3]Acceptable operating voltage: 187V-253V.

[4]Sound pressure levels are tested in an anechoic chamber under ISO Standard 3745 and are the same in both cooling and heating mode. These values can increase due to ambient conditions during operation.

[5]All power wiring / communications cable to the IDUs be minimum 18 AWG, 4-conductor, stranded, shielded or unshielded (if shielded, must be grounded to chassis at ODU only) and must comply with applicable local and national codes.

Figure 2: LAN090HSV4 and LAN120HSV4 Dimensions.



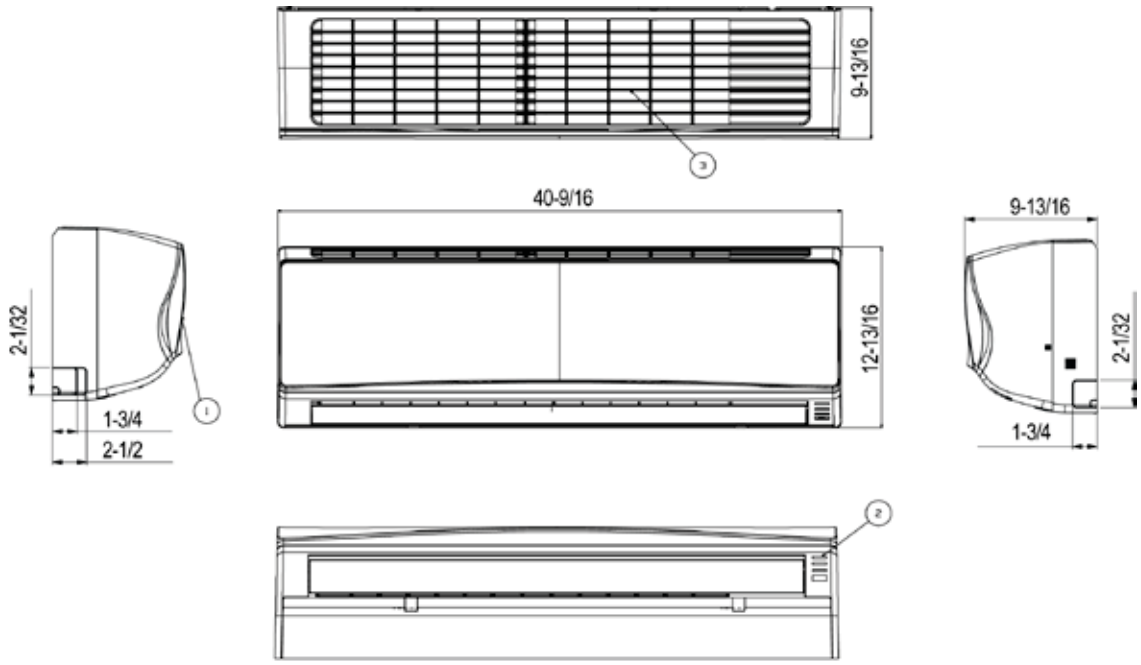


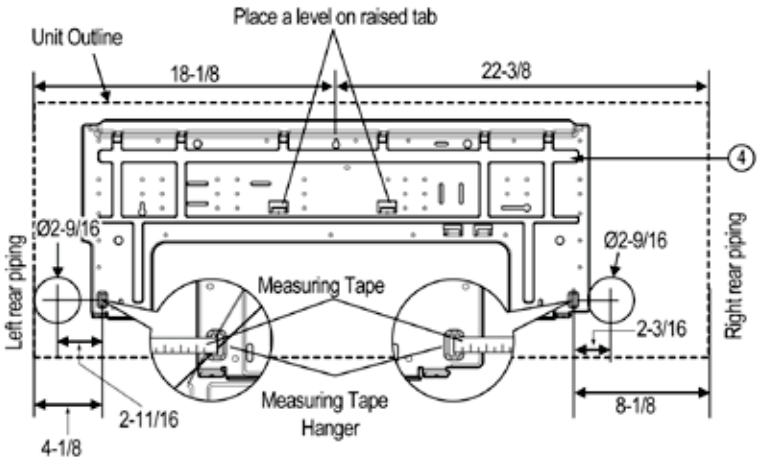
Note:
1. Install the unit according to the included installation manual.
2. The unit receives power from the outdoor unit.

Unit : inch

Item No.	Part Name	Remark
1	Front Panel	
2	Display and Signal Receiver	
3	Air Suction Grille	
4	Knockout Hole	For Pipe and Cable
5	Installation Plate	

Figure 3: LAN180HSV4 Dimensions.





[Unit : inch]

Item No.	Part Name	Remark
1	Front Panel	
2	Display & Signal Receiver	
3	Return Air Grille	
4	Installation Plate	

ART COOL MIRROR INDOOR UNITS

Cooling Capacity Table

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Table 4: Multi F Art Cool Mirror Indoor Units Cooling Capacity Table.

Model No. / Nominal Capacity of Indoor Unit (Btu/h)	Outdoor Air Temp. (°F DB)	Indoor Air Temp. °F DB / °F WB											
		68 / 57		73 / 61		77 / 64		80 / 67		86 / 72		90 / 75	
		TC	SHC	TC	SHC	TC	SHC	TC	SHC	TC	SHC	TC	SHC
LAN090HSV4 9,000	14	8.82	6.04	9.37	6.38	9.92	6.18	10.31	6.31	11.01	6.36	11.56	6.48
	20	8.82	6.09	9.36	6.43	9.91	6.23	10.31	6.36	11.01	6.41	11.55	6.53
	25	8.81	6.13	9.36	6.48	9.90	6.27	10.30	6.41	11.00	6.46	11.54	6.58
	30	8.80	6.18	9.35	6.53	9.90	6.32	10.29	6.46	10.99	6.51	11.54	6.63
	35	8.80	6.23	9.34	6.58	9.89	6.37	10.28	6.50	10.98	6.56	11.53	6.68
	40	8.79	6.28	9.33	6.63	9.88	6.42	10.27	6.55	10.97	6.61	11.52	6.73
	45	8.78	6.32	9.33	6.68	9.87	6.47	10.27	6.60	10.96	6.66	11.51	6.78
	50	8.78	6.37	9.32	6.73	9.87	6.51	10.26	6.65	10.96	6.71	11.50	6.83
	55	8.77	6.42	9.31	6.78	9.86	6.56	10.25	6.70	10.95	6.76	11.49	6.88
	60	8.76	6.46	9.31	6.83	9.85	6.61	10.24	6.75	10.94	6.81	11.48	6.93
	65	8.76	6.51	9.30	6.88	9.84	6.66	10.24	6.80	10.93	6.85	11.47	6.98
	70	8.75	6.56	9.29	6.92	9.84	6.70	10.23	6.85	10.92	6.90	11.47	7.03
	75	8.54	6.45	9.08	6.82	9.62	6.61	10.01	6.75	10.71	6.82	11.25	6.96
	80	8.33	6.34	8.87	6.71	9.41	6.51	9.80	6.66	10.49	6.73	11.03	6.87
	85	8.12	6.22	8.66	6.60	9.20	6.41	9.59	6.56	10.28	6.64	10.82	6.79
	90	7.91	6.10	8.45	6.48	8.99	6.31	9.37	6.46	10.06	6.55	10.60	6.70
	95	7.68	6.04	8.22	6.43	8.75	6.26	**9.00**	**6.32**	9.83	6.52	10.36	6.67
	100	7.50	5.88	8.03	6.26	8.57	6.11	8.88	6.22	9.64	6.37	10.17	6.53
	105	7.31	5.72	7.84	6.10	8.38	5.96	8.77	6.12	9.45	6.23	9.99	6.39
	110	7.12	5.52	7.66	5.90	8.19	5.78	8.58	5.94	9.26	6.06	9.80	6.22
	115	6.94	5.36	7.47	5.74	8.01	5.63	8.39	5.79	9.08	5.91	9.61	6.08
	118	6.82	5.32	7.36	5.70	7.89	5.60	8.28	5.76	8.96	5.89	9.50	6.06
	122	6.79	5.30	7.32	5.69	7.86	5.59	8.24	5.76	8.93	5.89	9.46	6.06
LAN120HSV4 12,000	14	11.76	8.51	12.49	8.99	13.22	8.70	13.75	8.88	14.69	8.96	15.42	9.13
	20	11.75	8.57	12.48	9.06	13.21	8.77	13.74	8.95	14.67	9.03	15.40	9.20
	25	11.75	8.64	12.48	9.13	13.20	8.84	13.73	9.02	14.66	9.10	15.39	9.27
	30	11.74	8.71	12.47	9.20	13.19	8.90	13.72	9.09	14.65	9.17	15.38	9.34
	35	11.73	8.77	12.46	9.27	13.18	8.97	13.71	9.16	14.64	9.24	15.37	9.41
	40	11.72	8.84	12.45	9.34	13.17	9.04	13.70	9.23	14.63	9.31	15.36	9.48
	45	11.71	8.90	12.44	9.41	13.16	9.11	13.69	9.30	14.62	9.38	15.35	9.55
	50	11.70	8.97	12.43	9.47	13.15	9.17	13.68	9.37	14.61	9.45	15.33	9.62
	55	11.69	9.03	12.42	9.54	13.14	9.24	13.67	9.44	14.60	9.52	15.32	9.70
	60	11.68	9.10	12.41	9.61	13.13	9.31	13.66	9.50	14.59	9.58	15.31	9.77
	65	11.67	9.17	12.40	9.68	13.12	9.38	13.65	9.57	14.57	9.65	15.30	9.84
	70	11.66	9.23	12.39	9.75	13.11	9.44	13.64	9.64	14.56	9.72	15.29	9.91
	75	11.38	9.08	12.11	9.60	12.83	9.31	13.35	9.51	14.27	9.60	15.00	9.79
	80	11.10	8.92	11.82	9.45	12.55	9.17	13.07	9.38	13.99	9.48	14.71	9.68
	85	10.83	8.76	11.54	9.29	12.26	9.03	12.78	9.24	13.70	9.36	14.42	9.56
	90	10.55	8.60	11.26	9.13	11.98	8.88	12.50	9.10	13.42	9.22	14.13	9.43
	95	10.25	8.51	10.96	9.05	11.67	8.82	**12.00**	**8.90**	13.10	9.18	13.81	9.39
	100	10.00	8.28	10.71	8.82	11.42	8.61	11.84	8.76	12.85	8.98	13.56	9.20
	105	9.75	8.05	10.46	8.59	11.17	8.40	11.69	8.62	12.60	8.78	13.31	9.01
	110	9.50	7.77	10.21	8.31	10.92	8.14	11.44	8.37	12.35	8.53	13.07	8.76
	115	9.25	7.54	9.96	8.08	10.67	7.92	11.19	8.15	12.10	8.33	12.82	8.56
	118	9.10	7.49	9.81	8.03	10.52	7.88	11.04	8.12	11.95	8.30	12.67	8.54
	122	9.05	7.47	9.76	8.01	10.48	7.87	10.99	8.11	11.90	8.29	12.62	8.53

TC = Total Capacity (kBtu/h).

SHC: Sensible Heat Capacity (kBtu/h).

Nominal capacity as rated 0 ft. above sea level and a 0 ft. level difference between outdoor and indoor units. Corresponding refrigerant piping length is accordance with standard length of each outdoor unit.

Nominal 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).

The shaded table columns and rows indicate reference data. When operating at this temperature, these values can be different if the system is not running consistently.

ART COOL MIRROR INDOOR UNITS

Cooling Capacity Table

Table 5: Multi F Art Cool Mirror Indoor Units Cooling Capacity Table (continued).

Model No. / Nominal Capacity of Indoor Unit (Btu/h)	Outdoor Air Temp. (°F DB)	Indoor Air Temp. °F DB / °F WB											
		68 / 57		73 / 61		77 / 64		80 / 67		86 / 72		90 / 75	
		TC	SHC	TC	SHC	TC	SHC	TC	SHC	TC	SHC	TC	SHC
LAN180HSV4 18,000	14	17.65	12.33	18.74	13.02	19.84	12.61	20.63	12.88	22.03	12.98	23.12	13.23
	20	17.63	12.43	18.73	13.13	19.82	12.71	20.61	12.98	22.01	13.09	23.11	13.33
	25	17.62	12.52	18.71	13.23	19.81	12.81	20.60	13.08	22.00	13.19	23.09	13.44
	30	17.60	12.62	18.70	13.33	19.79	12.91	20.58	13.18	21.98	13.29	23.07	13.54
	35	17.59	12.71	18.68	13.43	19.78	13.00	20.57	13.28	21.96	13.39	23.05	13.64
	40	17.58	12.81	18.67	13.53	19.76	13.10	20.55	13.38	21.94	13.49	23.04	13.75
	45	17.56	12.90	18.66	13.63	19.75	13.20	20.53	13.48	21.93	13.59	23.02	13.85
	50	17.55	13.00	18.64	13.73	19.73	13.30	20.52	13.58	21.91	13.69	23.00	13.95
	55	17.54	13.10	18.63	13.83	19.72	13.39	20.50	13.68	21.89	13.79	22.98	14.05
	60	17.52	13.19	18.61	13.93	19.70	13.49	20.49	13.78	21.88	13.89	22.97	14.16
	65	17.51	13.29	18.60	14.03	19.69	13.59	20.47	13.87	21.86	13.99	22.95	14.26
	70	17.50	13.38	18.58	14.13	19.67	13.69	20.46	13.97	21.84	14.09	22.93	14.36
	75	17.08	13.16	18.16	13.92	19.24	13.49	20.03	13.79	21.41	13.92	22.50	14.20
	80	16.66	12.93	17.74	13.70	18.82	13.30	19.60	13.60	20.98	13.75	22.06	14.03
	85	16.24	12.70	17.32	13.47	18.40	13.09	19.17	13.40	20.55	13.56	21.63	13.85
	90	15.82	12.46	16.90	13.23	17.97	12.88	18.75	13.19	20.12	13.37	21.20	13.67
	95	15.37	12.33	16.44	13.12	17.51	12.78	**18.00**	**12.90**	19.65	13.30	20.72	13.61
	100	14.99	12.00	16.06	12.78	17.13	12.47	17.77	12.70	19.28	13.01	20.35	13.33
	105	14.62	11.67	15.69	12.45	16.76	12.17	17.53	12.50	18.90	12.73	19.97	13.05
	110	14.24	11.27	15.32	12.05	16.39	11.79	17.16	12.13	18.53	12.36	19.60	12.70
	115	13.87	10.93	14.94	11.71	16.01	11.48	16.79	11.82	18.15	12.07	19.22	12.41
	118	13.65	10.85	14.72	11.64	15.79	11.42	16.56	11.77	17.93	12.03	19.00	12.37
	122	13.57	10.83	14.64	11.62	15.71	11.40	16.49	11.75	17.85	12.01	18.92	12.36

TC = Total Capacity (kBtu/h).

SHC: Sensible Heat Capacity (kBtu/h).

Nominal capacity as rated 0 ft. above sea level and a 0 ft. level difference between outdoor and indoor units. Corresponding refrigerant piping length is accordance with standard length of each outdoor unit.

Nominal 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).

The shaded table columns and rows indicate reference data. When operating at this temperature, these values can be different if the system is not running consistently.

ART COOL MIRROR INDOOR UNITS

Heating Capacity Table

MULTI F
MULTI F MAX

Table 6: Multi F Art Cool Mirror Indoor Units Heating Capacity Table.

Model No. / Nominal Capacity of Indoor Unit (Btu/h)	Outdoor Air Temp.		Indoor Air Temp. °F DB					
	°F DB	°F WB	61	64	68	70	72	75
			TC	TC	TC	TC	TC	TC
LAN090HSV4 9,000	0	-0.4	5.35	5.28	5.23	5.20	5.12	4.90
	5	4.5	6.03	5.95	5.90	5.88	5.80	5.58
	10	9	6.71	6.63	6.58	6.56	6.48	6.26
	17	15	7.61	7.54	7.49	**7.46**	7.39	7.14
	20	19	7.95	7.88	7.83	7.80	7.72	7.46
	25	23	8.52	8.44	8.39	8.37	8.29	7.99
	30	28	9.01	8.93	8.88	8.86	8.78	8.52
	35	32	9.50	9.42	9.37	9.34	9.27	9.04
	40	36	9.94	9.86	9.81	9.78	9.71	9.48
	45	41	10.37	10.30	10.25	10.22	10.15	9.92
	47	43	10.55	10.48	10.43	**10.40**	10.32	10.10
	50	46	10.72	10.64	10.59	10.57	10.49	10.24
	55	51	11.00	10.93	10.88	10.85	10.78	10.48
	60	56	11.00	10.93	10.88	10.85	10.78	10.52
	63	59	11.00	10.93	10.88	10.85	10.78	10.55
	68	64	11.00	10.93	10.88	10.85	10.78	10.60
LAN120HSV4 12,000	0	-0.4	7.10	7.00	6.93	6.90	6.80	6.50
	5	4.5	8.00	7.90	7.83	7.80	7.70	7.40
	10	9	8.90	8.80	8.73	8.70	8.60	8.30
	17	15	10.10	10.00	9.93	**9.90**	9.80	9.48
	20	19	10.55	10.45	10.38	10.35	10.25	9.90
	25	23	11.30	11.20	11.13	11.10	11.00	10.60
	30	28	11.95	11.85	11.78	11.75	11.65	11.30
	35	32	12.60	12.50	12.43	12.40	12.30	12.00
	40	36	13.18	13.08	13.02	12.98	12.88	12.58
	45	41	13.77	13.67	13.60	13.57	13.47	13.17
	47	43	14.00	13.90	13.83	**13.80**	13.70	13.40
	50	46	14.23	14.13	14.06	14.03	13.93	13.59
	55	51	14.60	14.50	14.43	14.40	14.30	13.90
	60	56	14.60	14.50	14.43	14.40	14.30	13.96
	63	59	14.60	14.50	14.43	14.40	14.30	14.00
	68	64	14.60	14.50	14.43	14.40	14.30	14.06
LAN180HSV4 18,000	0	-0.4	10.70	10.55	10.45	10.40	10.25	9.80
	5	4.5	12.06	11.91	11.81	11.76	11.61	11.15
	10	9	13.41	13.26	13.16	13.11	12.96	12.51
	17	15	15.22	15.07	14.97	**14.92**	14.77	14.29
	20	19	15.90	15.75	15.65	15.60	15.45	14.92
	25	23	17.03	16.88	16.78	16.73	16.58	15.98
	30	28	18.01	17.86	17.76	17.71	17.56	17.03
	35	32	18.99	18.84	18.74	18.69	18.54	18.09
	40	36	19.87	19.72	19.62	19.57	19.42	18.97
	45	41	20.75	20.60	20.50	20.45	20.30	19.85
	47	43	21.10	20.95	20.85	**20.80**	20.65	20.20
	50	46	21.44	21.29	21.19	21.14	20.99	20.48
	55	51	22.01	21.86	21.75	21.70	21.55	20.95
	60	56	22.01	21.86	21.75	21.70	21.55	21.04
	63	59	22.01	21.86	21.75	21.70	21.55	21.10
	68	64	22.01	21.86	21.75	21.70	21.55	21.20

TC = Total Capacity (kBtu/h).

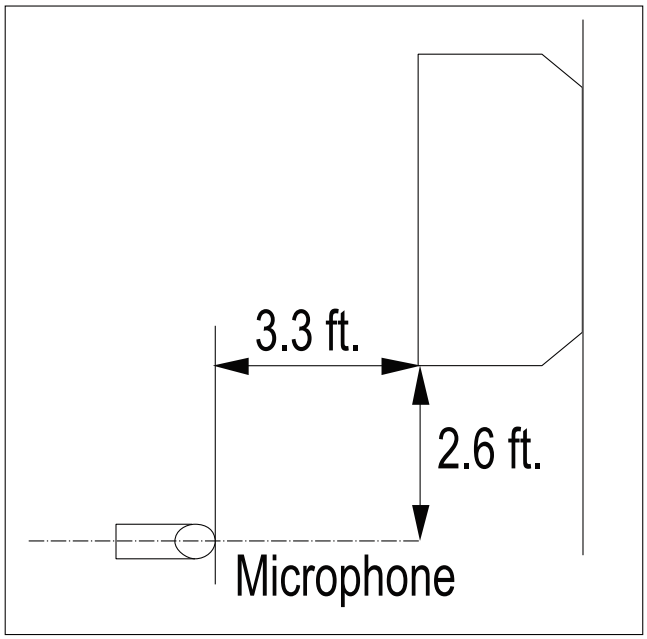
Nominal capacity as rated 0 ft. above sea level and a 0 ft. level difference between outdoor and indoor units. Corresponding refrigerant piping length is accordance with standard length of each outdoor unit.

Nominal 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).

ART COOL MIRROR INDOOR UNITS

Acoustic Data

Figure 4: Sound Pressure Level Measurement Location.



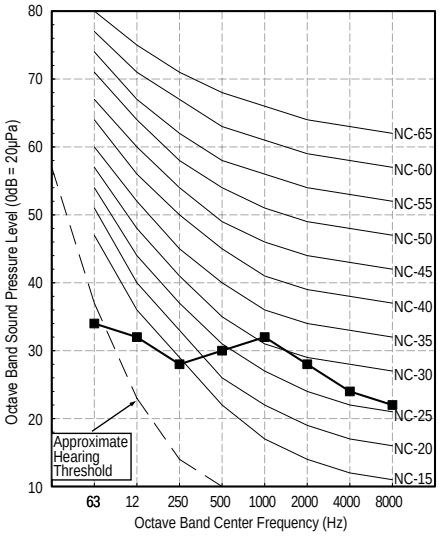
- Measurement taken 2.6' below the bottom of the unit and at a distance of 3.3' from face of unit.
- Measurements taken with no attenuation and units operating at full load normal operating condition.
- Sound level will vary depending on a range of factors such as construction (acoustic absorption coefficient) of particular area in which the equipment is installed.
- Sound power levels are measured in dB(A)±3.
- Tested in anechoic chamber per ISO Standard 3745.

Table 7: Sound Pressure Levels (dB[A]).

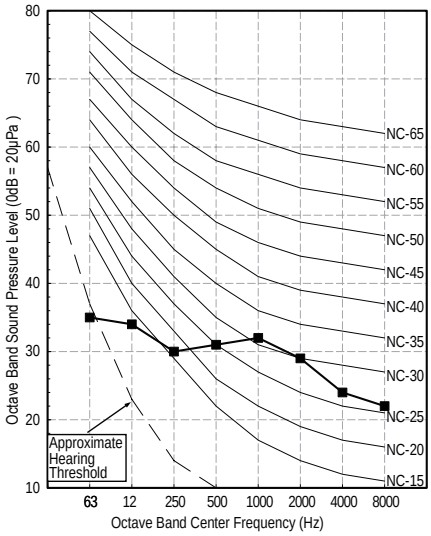
Model No.	Sound Pressure Levels (dB[A]) (Cooling and Heating)		
	High Fan Speed	Medium Fan Speed	Low Fan Speed
LAN090HSV4	33	30	27
LAN120HSV4	39	36	31
LAN180HSV4	37	33	28

Figure 5: Sound Pressure Level Diagrams.

LAN090HSV4



LAN120HSV4



LAN180HSV4

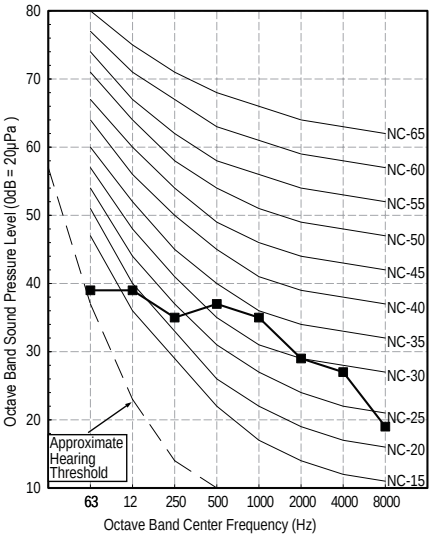


Figure 6: LAN090HSV4 Air Velocity and Temperature Distribution Charts.

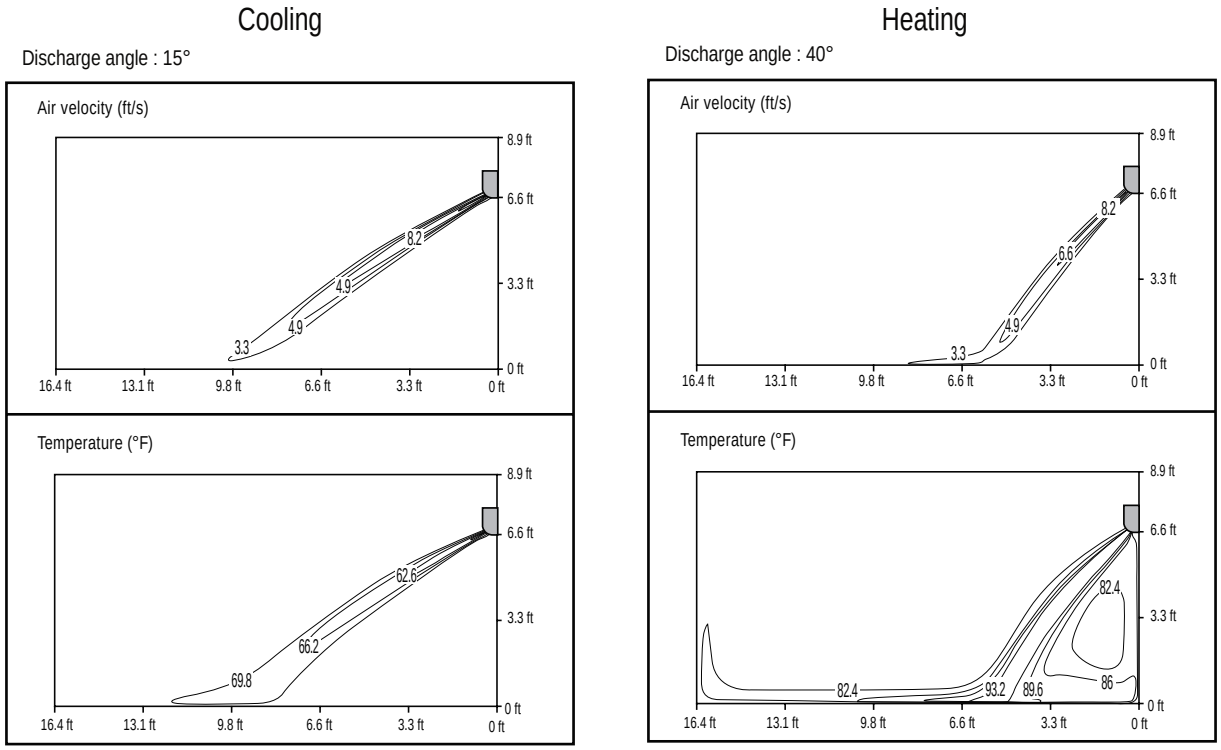
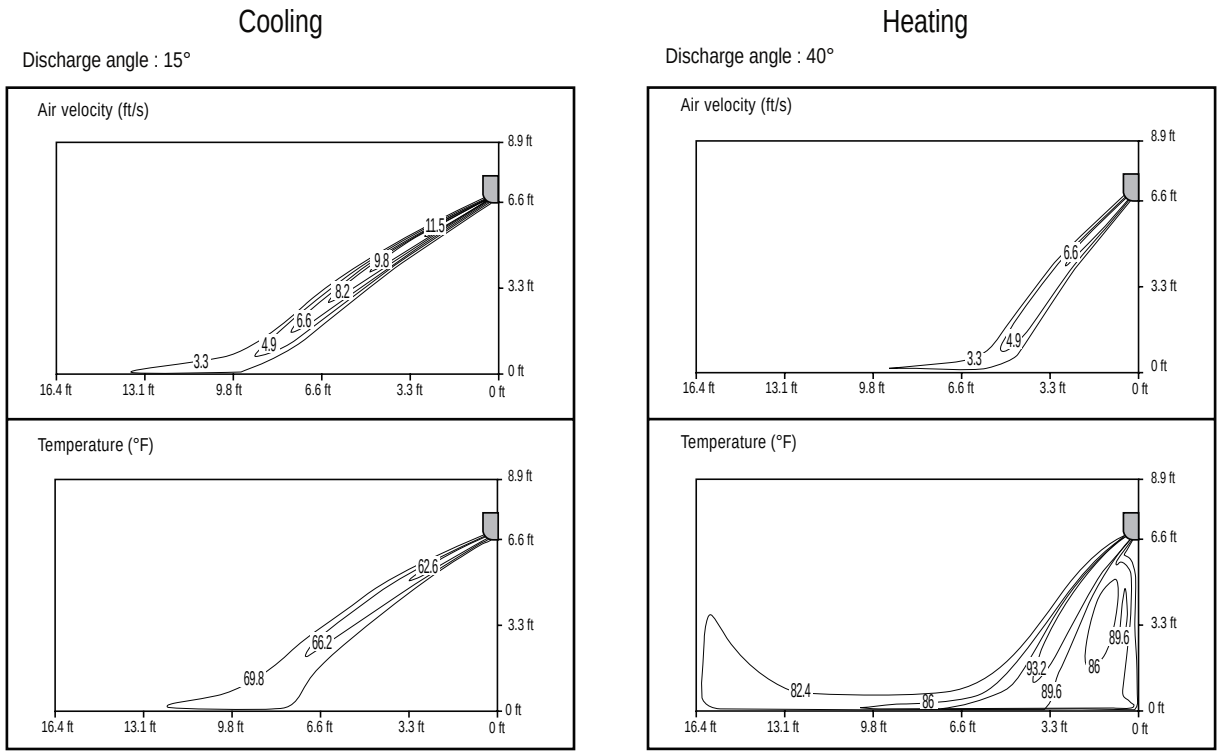


Figure 7: LAN120HSV4 Air Velocity and Temperature Distribution Charts.



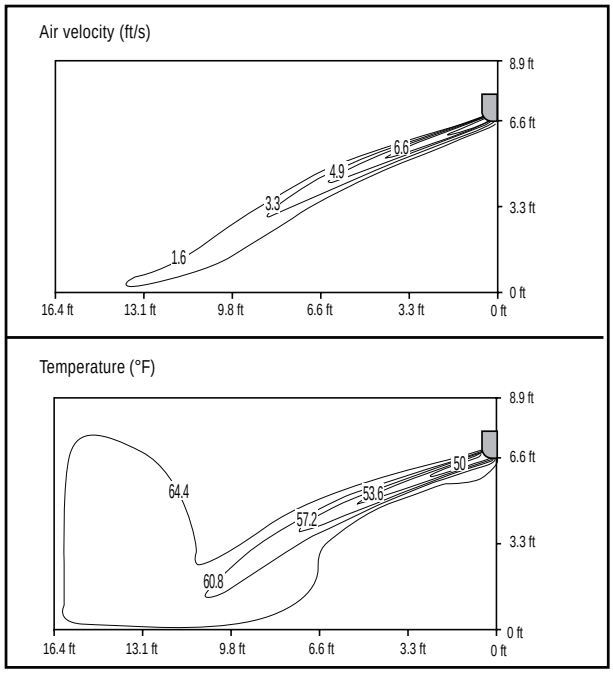
ART COOL MIRROR INDOOR UNITS

Air Velocity and Temperature Distribution

Figure 8: LAN180HSV4 Air Velocity and Temperature Distribution Charts.

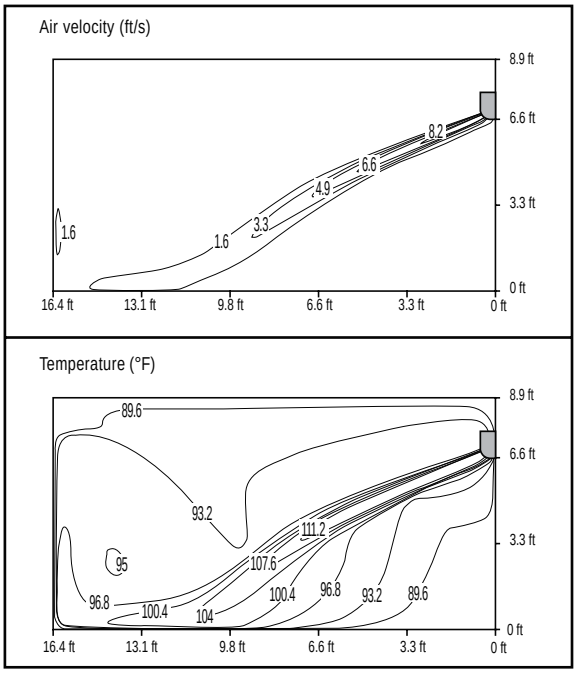
Cooling

Discharge angle : 15°



Heating

Discharge angle : 40°



Art Cool Mirror™

ART COOL MIRROR INDOOR UNITS

Refrigerant Flow Diagram

Figure 9: Art Cool Mirror Indoor Unit Refrigerant Flow Diagram.

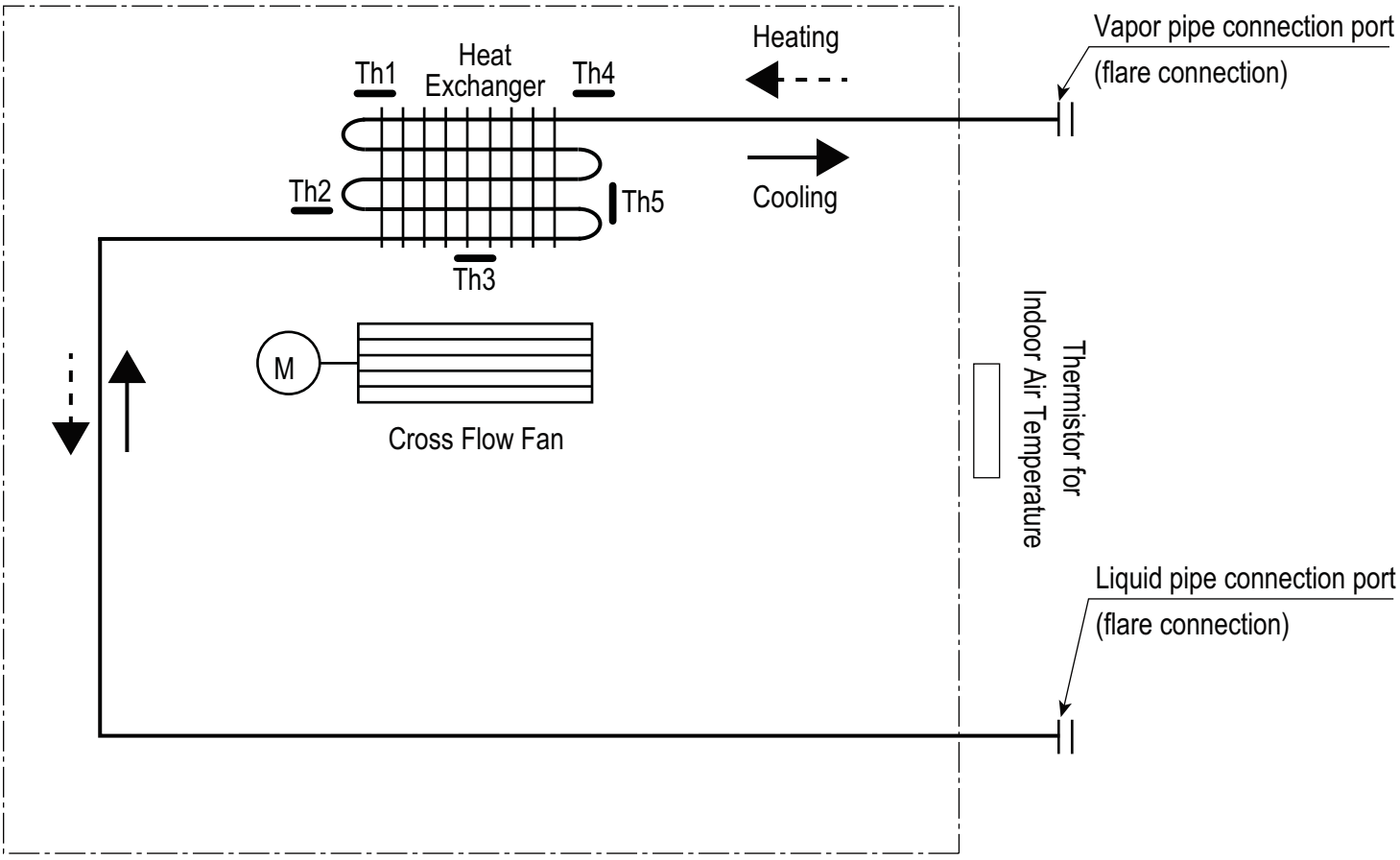


Table 8: Art Cool Mirror Indoor Unit Refrigerant Pipe Sizes.

Indoor Unit Capacity	Vapor Line Size (in., OD)	Liquid Line Size (in., OD)
9,000 Btu/h	Ø3/8	Ø1/4
12,000 Btu/h		
18,000 Btu/h	Ø1/2	

Table 9: Art Cool Mirror Indoor Unit Refrigerant Pipe Connections

Indoor Unit Capacity	Vapor Line Connection (in., OD)	Liquid Line Connection (in., OD)
9,000 Btu/h	Ø3/8	Ø1/4
12,000 Btu/h		
18,000 Btu/h	Ø5/8	Ø3/8

Table 10: Art Cool Mirror Indoor Unit Thermistor Details.

Location	Description (Based on Cooling Mode)	IDU PCB Connector
Th1	Indoor Air Temperature Thermistor	CN-TH1
Th2	Evaporator Inlet Temperature Thermistor	
Th3	Evaporator Middle Temperature Thermistor	CN-TH2
Th4	Evaporator Outlet Temperature Thermistor	
Th5	Water Level Sensor (Optional)	CN-TH3

Figure 10: Multi F Art Cool Mirror LAN090HSV4 and LAN120HSV4 Indoor Units Wiring Diagram.

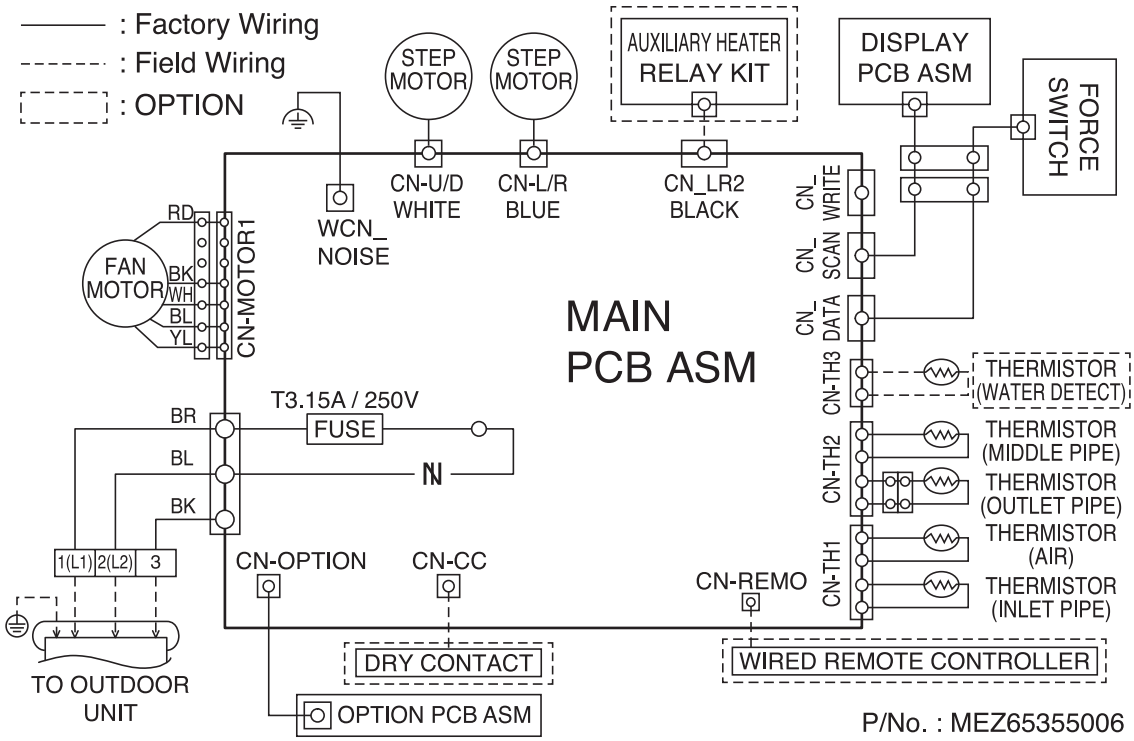
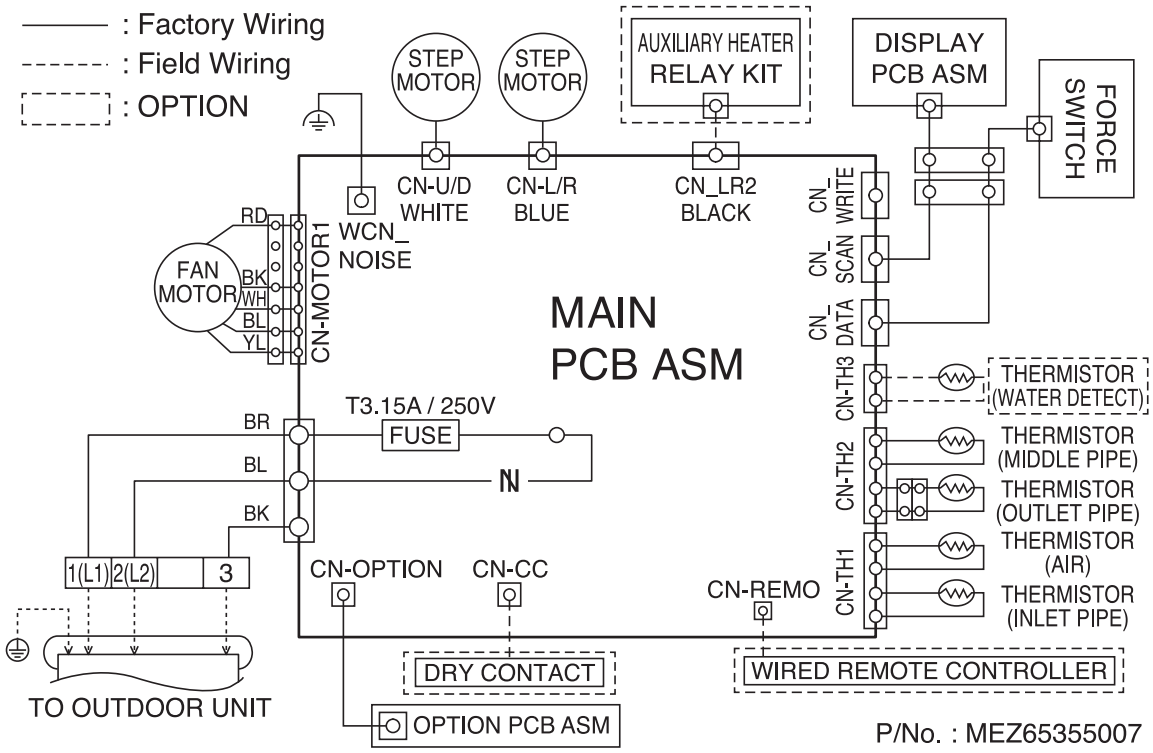


Figure 11: Multi F Art Cool Mirror LAN180HSV4 Indoor Unit Wiring Diagram.

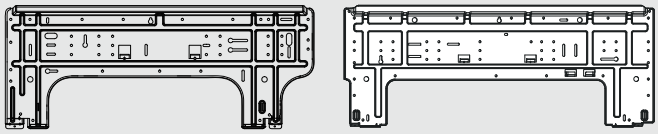
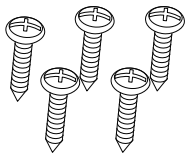
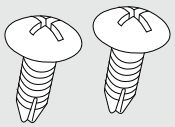


ART COOL MIRROR INDOOR UNITS

Factory Supplied Parts and Materials

Factory Supplied Parts

Table 11: Parts Table.

Part	Quantity	Image
Installation Plate	One (1)	 LAN090HSV4 and LAN120HSV4 LAN180HSV4
Type “A” Screws	Five (5)	
Type “B” Screws (M4 x 12L)	Two (2)	
Wireless Handheld Controller with Holder AKB73835317	One (1)	

Factory Supplied Materials

- Owner’s Manual
- Installation Manual

Required Tools

- Level
- Screwdriver
- Electric drill
- Hole core drill
- Flaring tool set
- Spanner (Half union)
- Thermometer

⚠WARNING

Installation work must be performed by trained personnel and in accordance with national wiring standards and all local or other applicable codes. Improper installation can result in fire, electric shock, physical injury, or death.

Note:

Read all instructions before installing this product. Become familiar with the unit’s components and connections, and the order of installation. Incorrect installation can degrade or prevent proper operation.

ART COOL MIRROR INDOOR UNITS

Installation and Best Layout Practices

MULTI F
MULTI F MAX

⚠ DANGER

To avoid the possibility of fire, do not install the unit in an area where combustible gas may generate, flow, stagnate, or leak. Failure to do so will cause serious bodily injury or death. Before beginning installation, read the safety summary at the beginning of this manual.

Select a location for installing the wall-mounted indoor unit (IDU) that meets the following conditions:

- Where there is enough structural strength to bear the weight of the unit
- Where air circulation will not be blocked
- Where noise prevention is taken into consideration
- Ensure there is sufficient space from the ceiling and floor
- Locate the indoor unit in a location where it can be easily connected to the outdoor unit/branch distribution unit
- Include space for drainage to ensure condensate flows properly out of the unit when it is in cooling mode
- Use a level indicator to ensure the unit is installed on a level plane

Note:

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

- ⃠ Do not install the unit where it will be subjected to direct thermal radiation from other heat sources.
- ⃠ Do not install the unit in an area where combustible gas may generate, flow, stagnate, or leak.
- ⃠ Do not install the unit in a location where acidic solution and spray (sulfur) are often used.
- ⃠ Do not use the unit in environments where oil, steam, or sulfuric gas are present.
- ⃠ Do not install additional ventilation products on the chassis of the unit.
- ⃠ Do not install the unit near high-frequency generator sources.
- ⃠ Do not install the unit near a doorway.

Installing in an Area Exposed to Unconditioned Air

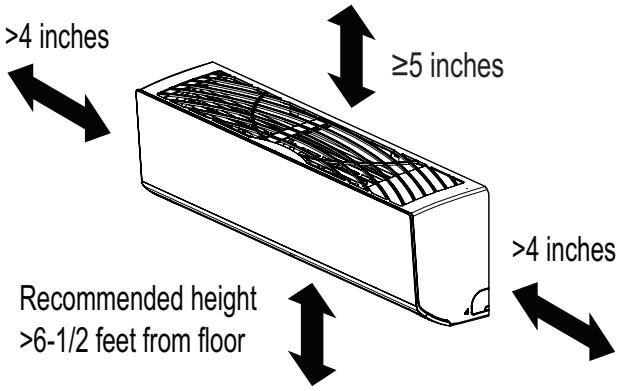
In some installation applications, areas (floors, walls) in some rooms may be exposed to unconditioned air (room may be above or next to an unheated garage or storeroom). To countermeasure:

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

Required Clearances

Figure 12 shows required clearance distances around a typical installed wall-mounted unit.

Figure 12: Minimum Clearance Requirements.



Mounting the Installation Plate

The mounting wall should be strong and solid enough to protect the unit from vibration.

- Mount the installation plate on the wall using the Type “A” screws. If mounting the unit on concrete, consider using anchor bolts.
- Always mount the installation plate horizontally. Measure the wall and mark the centerline using thread and a level.

Figure 13: Installation Plate for LAN090HSV4 and LAN120HSV4 Units.

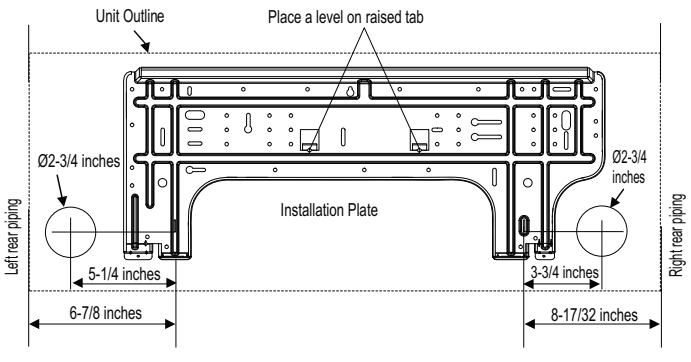
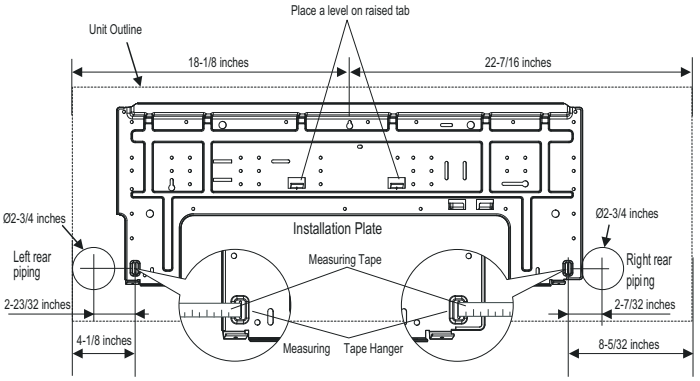


Figure 14: Installation Plate for LAN180HSV4 Units.



Drilling Piping Hole in the Wall

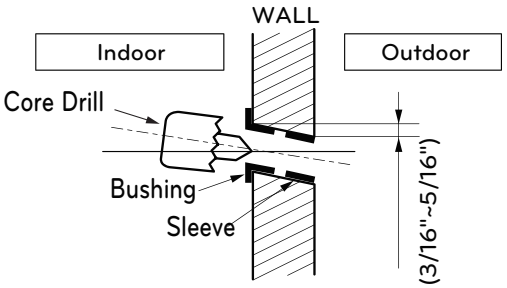
⚠ WARNING

Use caution when drilling holes through walls. Drilling into power wiring in the wall can cause serious bodily injury or death.

Follow the left or right piping clearance recommendations in Figure 3 or Figure 4.

1. Using a 2-5/8 (ø 65mm) inch hole core drill bit, drill a hole at either the right or left side of the wall mounting. The hole should slant 3/16" to 5/16" from level (upward on the indoor unit side and downward on the outdoor unit side).
2. Finish off the newly drilled hole as shown with bushing and sleeve covering. Sleeve and bushing prevents damage to the tubing/bundling of the piping.

Figure 21: Drilling Piping Hole



Hanging the Indoor Unit Chassis

1. Attach the three (3) hooks on the top of the indoor unit to the top edge of the installation plate. Verify the hooks are properly attached to the installation plate by gently shaking the indoor unit from side to side.
2. Unlock the tubing clamp from the indoor unit frame. For easier access between the bottom of the indoor unit and the wall, prop the clamp between the indoor unit frame and installation plate.
3. Remove the screw covers at the bottom of the indoor unit, unscrew the two (2) screws, remove the frame cover, remove the piping connection cover, and position the piping for installation (down, back, left, or right).

Figure 15: Locking the Indoor Unit onto the Installation Plate.

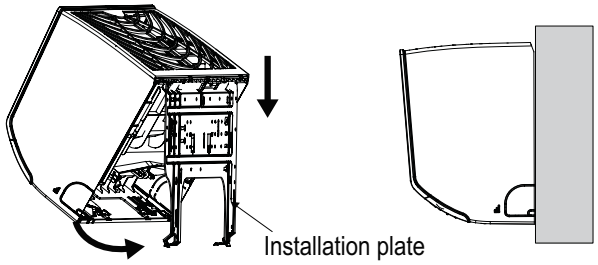


Figure 16: Accessing the Back of the Indoor Unit.

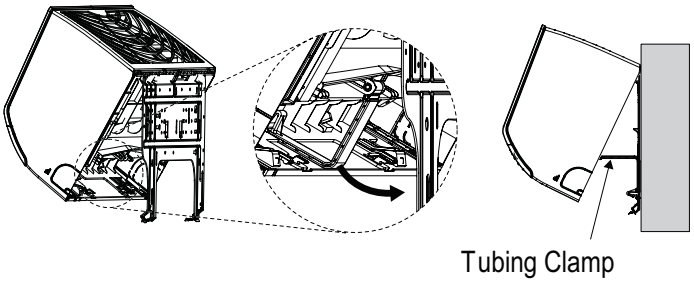


Figure 17: Removing the Frame Cover.

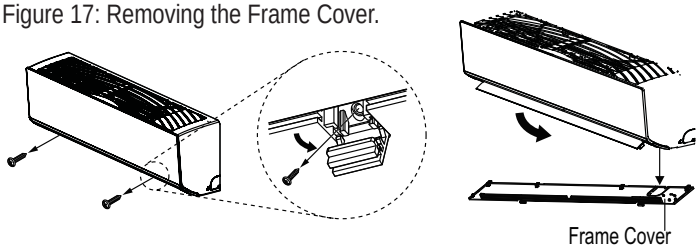


Figure 18: Exterior Back View of Indoor Unit.

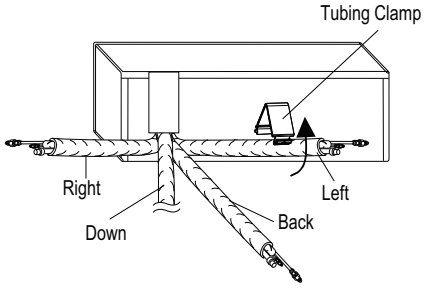


Figure 19: Piping Installed to the Left.

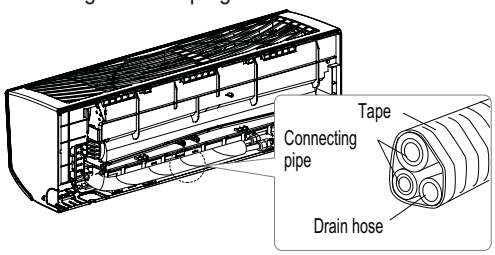
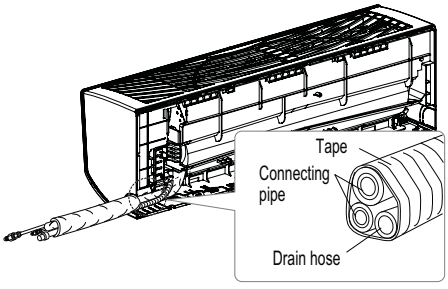


Figure 20: Piping Installed to the Right.



Connecting the Indoor Unit Piping to the Field-Installed Piping

Note:

The pipe connection sizes on the LAN180HSV4 are different than the required field-installed piping sizes. An adapter is required, and is supplied with the unit. Refer to the unit installation manual for details.

1. Center align the indoor unit piping (refrigerant and drain) and the field-installed piping, then hand tighten the flare nut.
2. Tighten the flare nut with a torque wrench.
3. Attach the drain tube piping to the door unit drain hose as shown.

Note:

If the drain hose is routed inside a room, add insulation to prevent condensation from forming.

Figure 23: Extending the Drain Hose.

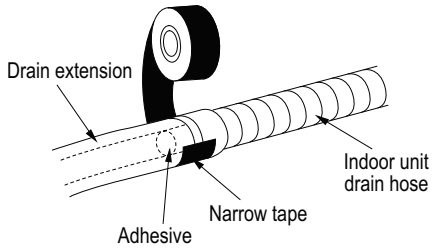
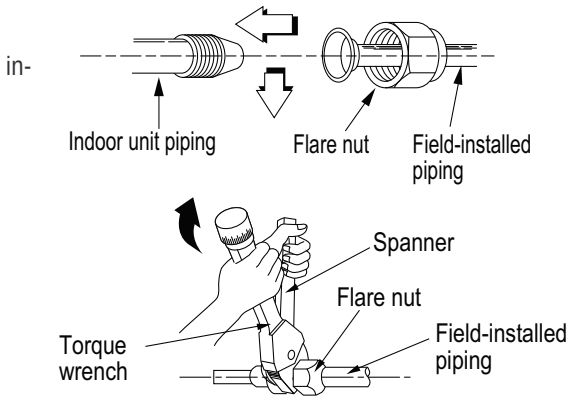


Figure 22: Indoor Unit to Field-Installed Piping Connection.



Insulating the Refrigerant and Drain Piping

⚠ WARNING

Ensure all piping is insulated. Exposed piping can cause burns if touched.

Refrigerant Piping Insulation

Field-installed vapor and liquid refrigerant piping lines must be properly and completely covered in insulation (up to the indoor unit piping connections). Exposed piping may generate condensate. Insulation for this field-installed refrigerant piping must have a minimum heat resistance of 248°F.

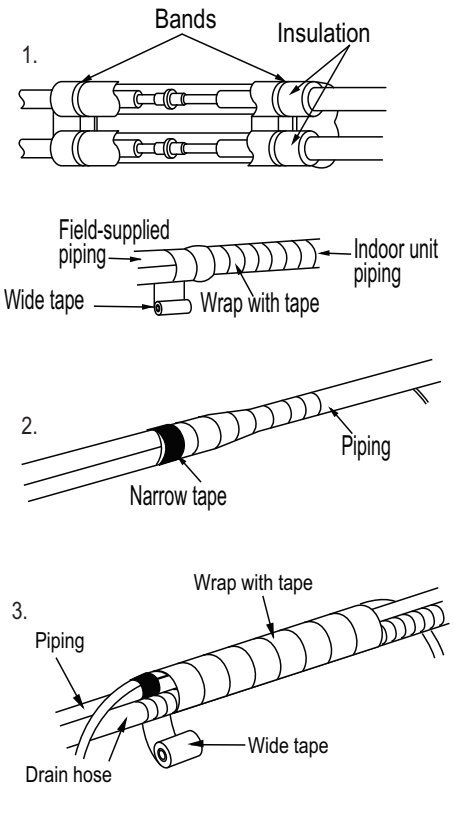
Drain Piping Insulation

Drain piping must have insulation a minimum of 7/32 inches thick.

Installing the Insulation

1. Overlap the insulation at the connection of the field-installed piping and the indoor unit piping. Tape together so that no gaps exist.
2. Secure insulation to the rear piping housing section with vinyl tape.
3. Bundle the piping and drain hose with tape where they meet at the back of the indoor unit frame. Position the drain hose at the bottom of the bundle (positioning the drain hose at the top of the bundle may cause the drain pan to overflow inside the indoor unit).

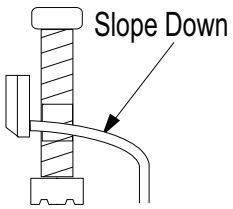
Figure 24: Insulating the Piping.



Drain Slope

Drain hose should point down so water can flow away easily.

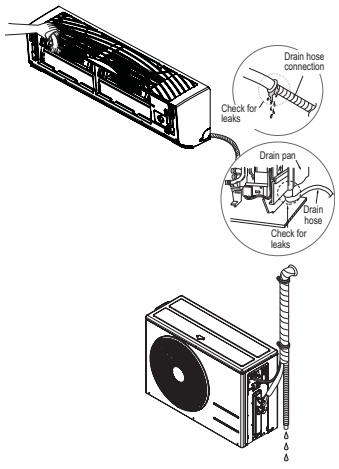
Figure 25: Drain Piping Slope.



Checking the Drainage System

1. Pour water on the indoor unit evaporator.
2. Ensure the water flows through and out of the hose and away from the indoor unit without leaking.

Figure 26: Checking the Drainage System.



Power Wiring / Communications Cable Guidelines

- Follow manufacturer's circuit diagrams in the technical manuals.
- Confirm power source specifications.
- Confirm that the electrical capacity is sufficient.
- Starting current must be maintained ±10 percent of the rated current marked on the outdoor unit name plate.
- Confirm cable thickness specifications.
- It is recommended that a circuit breaker is installed, especially if conditions could become wet or moist.
- Include a disconnect in the power wiring system, add an air gap contact separation of at least 1/8 inch in each active (phase) conductor.

⚠ WARNING

• Loose wiring may cause unit to malfunction, overheat, and catch fire, resulting in severe injury or death.

Note:

• Terminal screws may become loose during transport. Properly tighten the terminal connections during installation.
A voltage drop may cause the following problems:
• Magnetic switch vibration, fuse breaks, or disturbance to the normal function of an overload protection device.
• Compressor will not receive the proper starting current.

Connecting the Power Wiring and Communications Cable

1. Insert the power wiring/communications cable from the outdoor unit or branch distribution unit (Multi F MAX systems only) through the bottom of the indoor unit.

2. Connect each wire to its appropriate terminal on the indoor unit control board. Verify that the color and terminal numbers from the outdoor unit or branch distribution unit (Multi F MAX systems only) wiring match the color and terminal numbers on the indoor unit.

3. Secure the power wiring/communications cable with the cable restraint.

Figure 27: Connecting the Power Wiring / Communications Cable.

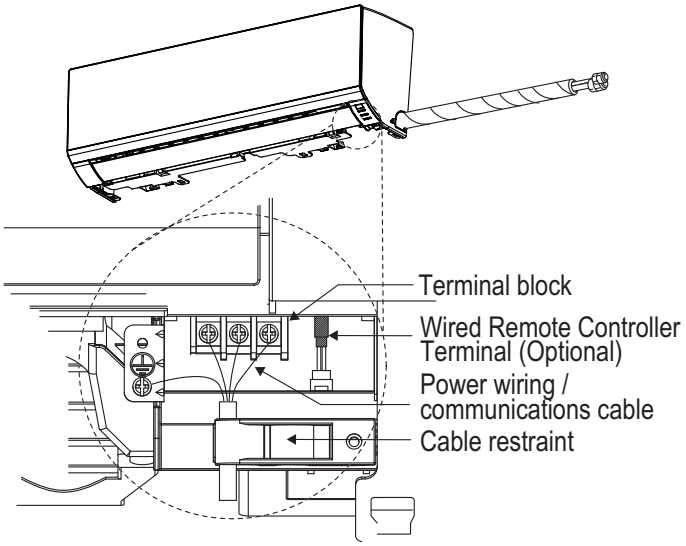


Figure 28: Simplified View of Indoor Unit to Outdoor Unit / Branch Distribution Unit Terminal Connections—LAN090HSV4 and LAN120HSV4 models.

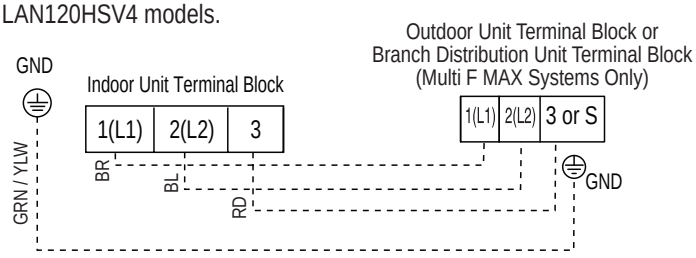
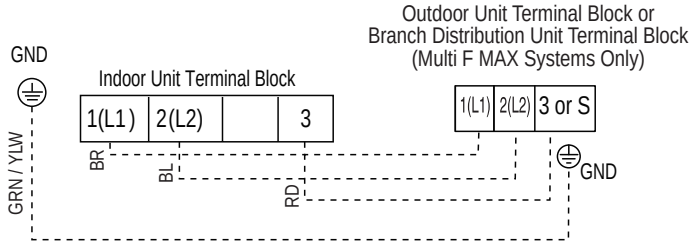


Figure 29: Simplified View of Indoor Unit to Outdoor Unit / Branch Distribution Unit Terminal Connections—LAN180HSV4 models.



Wireless Handheld Controller

Figure 30: AKB73835317 Wireless Controller.

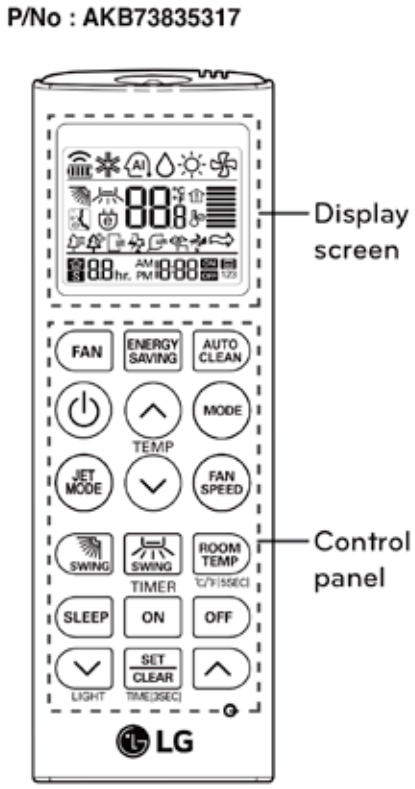


Table 12: AKB73835317 Wireless Controller Functions.

Control panel	Display screen	Description
AUTO CLEAN / ENERGY SAVING		**Functions button*** : Sets the special functions. : Auto clean. : Energy saving cooling operation.
1 TOUCH SOFT AIR		**1 Touch soft air button** : Easily adjust the air flow to deflect direct wind away.
	-	**On/Off button** : Turn the power on/off.
TEMP		**Temperature adjustment buttons** : Adjust the room temperature when cooling and heating.
	-	**On/Off button:** Turns the power on/off.
MODE		**Operation mode selection button*** : Select the operation mode. Cooling operation ( ) / Auto operation or auto changeover ( ) / Dehumidifying operation ( ) / Heating operation ( ) / Air circulation operation ( )
JET MODE		**Jet cooling/heating button*** : Warm up or cool down the indoor temperature within a short period of time.
FAN SPEED		**Indoor fan speed button** : Adjust the fan speed.
SWING / SWING		**Air flow direction buttons** : Adjust the air flow direction vertically or horizontally.
ROOM TEMP		**Temperature display button** : Display the room temperature. Also change unit from °C to °F if held for 5 seconds.
SLEEP	hr.	**Sleep mode auto button** : Set the sleep mode auto operation.
ON / OFF		**Time buttons** : Set the start / end time.
LIGHT	-	**Light button** : Adjust the brightness of the indoor unit display.
SET CLEAR	-	**Set/clear button** : Set or cancel functions. Also set the current time if held for 3 seconds.
	-	**Reset button:** Resets the air conditioner settings.

* Some functions may not be supported, depending on the model.

Wired Controller Connections

Figure 31: Wired Controller Connection on the Indoor Unit Terminal Block—LAN090HSV4 and LAN120HSV4 models.

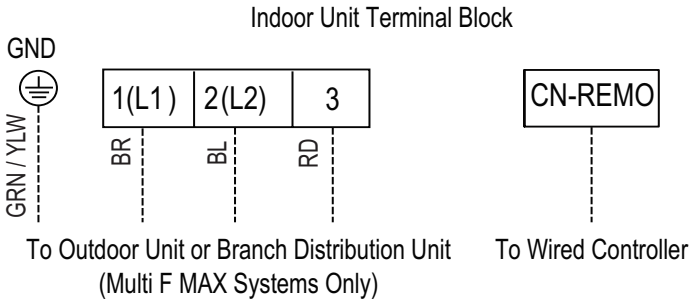
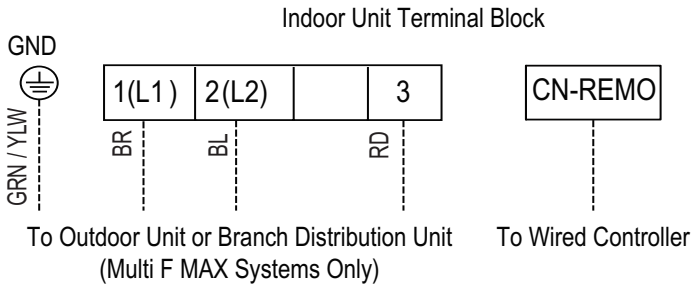


Figure 32: Wired Controller Connection on the Indoor Unit Terminal Block—LAN180HSV4 models.



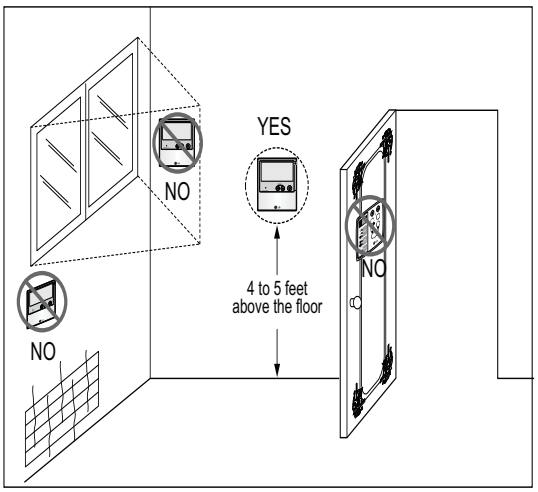
Wired Controller Placement

Wired controllers include a sensor to detect room temperature. To maintain comfort levels in the conditioned space, the wired controller must be installed in a location away from direct sunlight, high humidity, and where it could be directly exposed to cold air. Controller must be installed four (4) to five (5) feet above the floor where its LED display can be read easily, in an area with good air circulation, and where it can detect an average room temperature.

⃠ Do not install the wired controller near or in:

- Drafts or dead spots behind doors and in corners
- Hot or cold air from ducts
- Radiant heat from the sun or appliances
- Concealed pipes and chimneys
- An area where temperatures are uncontrolled, such as an outside wall

Figure 33: Proper Location for the Wired Controller.



Operation Mode Sequence

Cooling Mode
↓
Auto Operation
↓
Dehumidification Mode
↓
Heating Mode

Hanging the Wired Controller

1. The controller wiring/cable can be installed in one of three directions: top, back, or on the right side. If top or right side installation is desired, remove cable guide grooves on the controller, and then position wiring/cable on applicable side.

2. Choose and mark the area of installation, and then screw the wall plate into place (using the provided parts). Install the controller wall plate to fit the electrical box if one is present. Ensure that no gaps exist between the wall plate and the wall itself.

3. Arrange wiring/cables so as not to interfere with the controller circuitry. Position the wired controller on the wall plate. Snap into place by pressing the bottom part of the wired controller onto the wall plate. Make sure that no gaps exist between the wired controller and the wall plate on all sides.

4. To remove wired controller from the wall plate, insert a screwdriver into the two holes at the bottom. Twist screwdriver to release controller. Do not damage the controller components when removing.

Figure 34: Removing the Cable Guide Grooves.

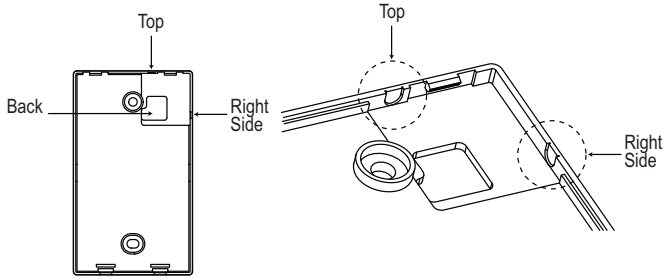


Figure 35: Attaching the Wall Plate.

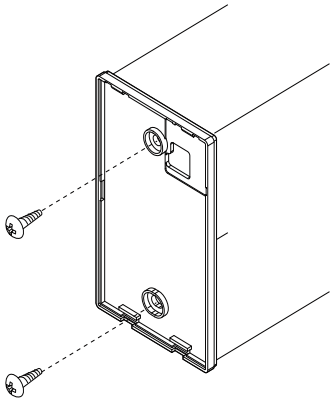
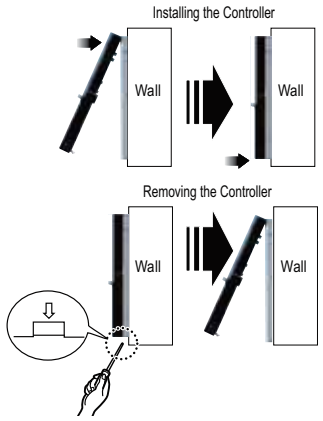


Figure 36: Installing/Removing the Controller.



Assigning the Thermistor for Temperature Detection

Each indoor unit includes a return air thermistor assigned to sense the temperature. If a wired controller is installed, there is a choice of sensing temperature with either the indoor unit return air thermistor or the thermistor in the wired controller. It is also an option to set both thermistors to sense temperature so that indoor unit bases its operation on the first thermistor to reach the designated temperature differential. For applicable indoor units, an optional Remote Temperature Sensor can be used in lieu of the return air thermistor—either alone or in conjunction with a wired controller thermistor as previously described.

ART COOL™ GALLERY INDOOR UNIT DATA

ART COOL GALLERY INDOOR UNITS

Mechanical Specifications and Features

MULTI F
MULTI F MAX

ART COOL Gallery Indoor Units

General

All LG indoor units are factory assembled, wired, piped, and provided with a control circuit board, fan, and motor. Art Cool Gallery indoor units have a sound rating no higher than 42 dB(A) as tested per KSA0701 ISO Standard 3745.

Coil

Indoor unit coils are comprised of a minimum of two rows of aluminum fins mechanically bonded to copper tubing. The coils are pressure tested at the factory. Each unit is provided with a factory installed condensate drain pan below the coil.

Refrigerant System

System is designed for use with R410A refrigerant. The refrigeration circuit is pressure-tested at the factory and shipped with a holding charge of helium gas. Refrigerant pipe connections are 45° flare. All refrigerant lines from the outdoor unit to the indoor units must be field insulated.

Electrical

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

Casing

Units are designed to mount on a vertical surface, and are shipped with a separate back plate that secures the unit to the wall, protruding no more than six (6) inches. Unit is designed so that refrigerant piping can be installed in one of four different directions.

Cases / Finishes

The Art Cool Gallery unit has a frame that can accommodate a 20" x 20" photograph, picture or artwork. Unit casing has a gray finish and is manufactured of heavy-duty acrylonitrile butadiene styrene (ABS) and high impact polystyrene (HIPS) plastic.

Fan Assembly and Control

The unit has a single, direct-drive, crossflow fan made of high strength ABS plastic. The fan motor is brushless digitally controlled (BLDC) with permanently lubricated and sealed ball bearings. The fan/motor assembly is mounted on vibration attenuating rubber grommets. Fan speed is controlled using a microprocessor-based direct digitally controlled algorithm that provides pre-programmed, field-selectable fixed or auto fan speeds in the Heating and Cooling modes. For Art Cool Gallery units, the indoor fan has Low, Med, High, Power Cool and Auto settings for Cooling mode; and has Low, Med, High, and Auto settings for Heating mode. The Auto setting adjusts the fan speed based on the difference between the controller setpoint and space temperature. Also, the separate Chaos setting provides a simultaneous and random change in fan speed and flow direction at the discharge, simulating a natural outdoor breeze.

Air Filter

Return air is filtered with a factory-supplied, removable, washable pre-filter. Filter access is from the front of the unit without the use of tools.

Figure 37: Multi F Art Cool Gallery Indoor Unit.

Airflow Guide Vanes

Motorized oscillating guide vanes are factory installed, and allows the ability to control the direction of airflow from side to side. A motorized air sweep louver provides an automatic change in airflow by directing the air up and down to provide uniform air distribution.

Microprocessor Control

The indoor unit is provided with an integrated control panel to communicate with the outdoor unit. All unit operation parameters are stored in non-volatile memory resident on the unit microprocessor. The microprocessor controls space temperature through using the value provided by the temperature sensor within the indoor unit. The microprocessor control will activate indoor unit operation when the indoor room temperature falls below or rises above a setpoint temperature, at which point, a signal is sent to the outdoor unit to begin the appropriate mode. The microprocessor will also provide self-diagnostics and auto restart functions. A field-supplied four-wire power / communications cable must be installed to connect the indoor unit(s) to the outdoor unit.

Controls

The indoor unit casing has a factory-standard, integral infrared sensor designed to communicate with the supplied LG wireless handheld remote controller. An optional LG supplied wired controller is available as an additional accessory. Communication between the indoor units and the outdoor unit is accomplished through 18 AWG, four-core, stranded and shielded power / communication cable.

Condensate

The unit is designed for gravity draining of condensate and includes a flexible drain hose capable of installation in one of two directions. Unit includes a connection that is compatible with the AquaGuard® AG-9300-LG condensate sensor.

Features

- Inverter (Variable speed fan)
- Chaos swing
- Jet cool
- Group control
- Self-cleaning indoor coil
- Auto operation / auto restart operation
- 24-Hour on/off timer
- Wireless LCD remote control included; wired thermostat available (sold separately)

ART COOL GALLERY INDOOR UNITS

General Data / Specifications

Table 13: Multi F Art Cool Gallery Indoor Unit General Data.

Model Name	LMAN097HVP	LMAN127HVP
Nominal Cooling Capacity (Btu/h)[1]	9,000	11,200
Nominal Heating Capacity (Btu/h)[1]	10,400	13,300
Operating Range		
Cooling (°F WB)	57-77	57-77
Heating (°F DB)	59-81	59-81
Fan		
Type	Turbo	Turbo
Motor Output (W) x Qty.	24 x 1	24 x 1
Motor/Drive	Brushless Digitally Controlled / Direct	Brushless Digitally Controlled / Direct
Airflow Rate CFM (H/M/L)	272 / 208 / 155	314 / 258 / 198
Unit Data		
Refrigerant Type[2]	R410A	R410A
Refrigerant Control	EEV	EEV
Power Supply V, Ø, Hz[3]	208-230, 1, 60	208-230, 1, 60
Rated Amps (A)	0.2	0.2
Sound Pressure Level ±3 dB(A) (H/M/L)[4]	39 / 35 / 31	42 / 38 / 34
Dimensions (W x H x D, in.)	23-5/8 x 23-5/8 x 5-25/32	23-5/8 x 23-5/8 x 5-25/32
Net Unit Weight (lbs.)	32	32
Shipping Weight (lbs.)	37	37
Power Wiring / Communications Cable (No. x AWG)[5]	4 x 18	4 x 18
Heat Exchanger (Row x Column x Fin / inch) x Number	(2 x 20 x 21) x 1	(2 x 20 x 21) x 1
Piping		
Liquid (in.)	1/4	1/4
Vapor (in.)	3/8	3/8
Drain O.D. / I.D. (in.)	27/32, 5/8	27/32, 5/8

[1]Nominal capacity is rated 0 ft. above sea level with corresponding refrigerant piping length in accordance with standard length of each outdoor unit and a 0 ft. level difference between outdoor and indoor units. All capacities are net with a combination ratio between 95 – 105%.

Nominal 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).
Nominal 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).

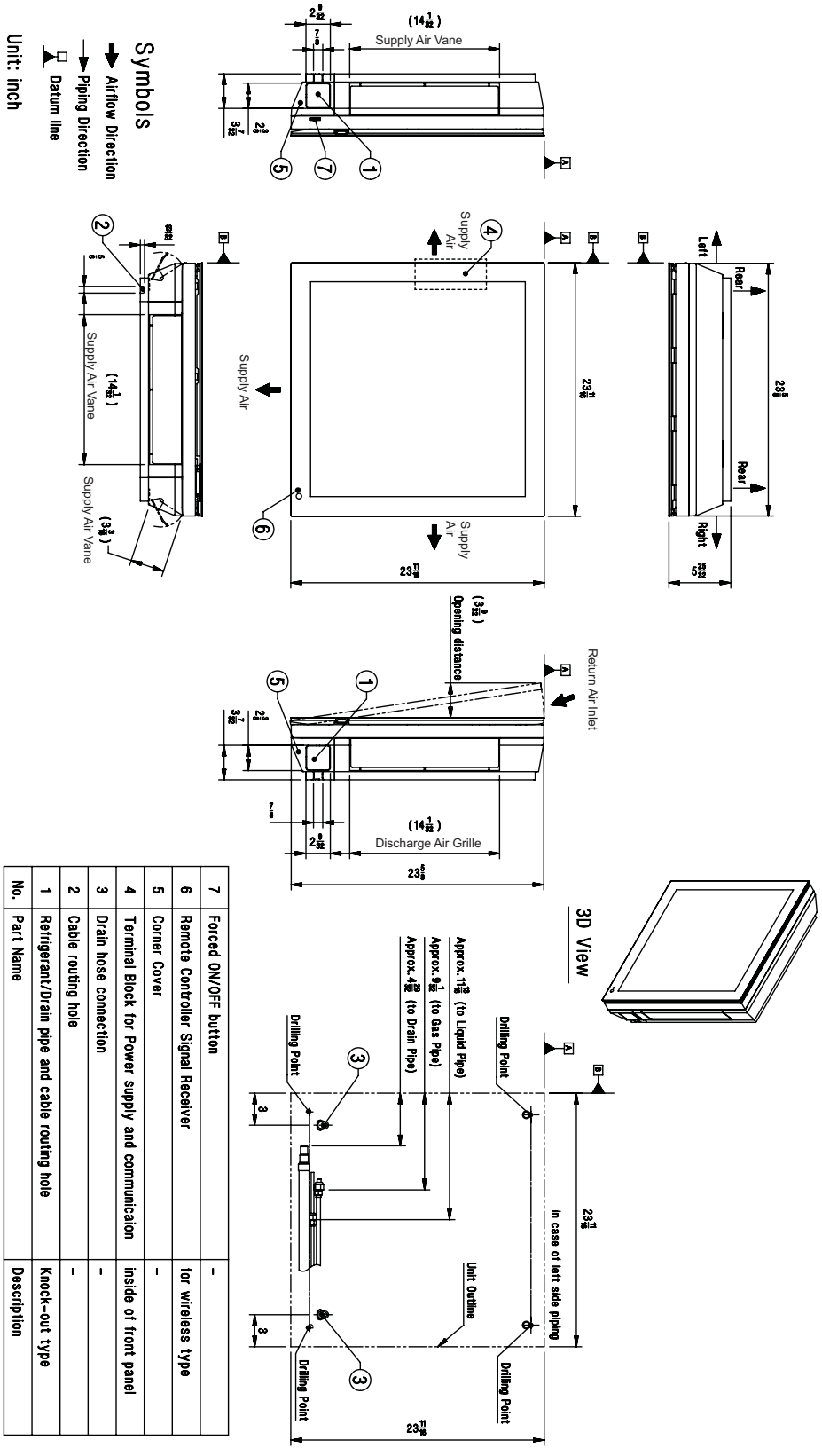
[2]This unit comes with a dry helium charge.

[3]Acceptable operating voltage: 187V-253V.

[4]Sound pressure levels are tested in an anechoic chamber under ISO Standard 3745 and are the same in both cooling and heating mode. These values can increase due to ambient conditions during operation.

[5]All power wiring / communications cable to the IDUs be minimum 18 AWG, 4-conductor, stranded, shielded or unshielded (if shielded, must be grounded to chassis at ODU only) and must comply with applicable local and national codes.

Figure 38: LMAN097HVP and LMAN127HVP Dimensions.



No.	Part Name	Description
1	Refrigerant/Drain pipe and cable routing hole	Knock-out type
2	Cable routing hole	-
3	Drain hose connection	-
4	Terminal Block for Power supply and communicaion	inside of front panel
5	Corner Cover	-
6	Remote Controller Signal Receiver	for wireless type
7	Forced ON/OFF button	-

ART COOL GALLERY INDOOR UNITS

Cooling Capacity Table

Table 14: Multi F Art Cool Gallery Indoor Units Cooling Capacity Table.

Model No. / Nominal Capacity of Indoor Unit (Btu/h)	Outdoor Air Temp. (°F DB)	Indoor Air Temp. °F DB / °F WB											
		68 / 57		73 / 61		77 / 64		80 / 67		86 / 72		90 / 75	
		TC	SHC	TC	SHC	TC	SHC	TC	SHC	TC	SHC	TC	SHC
LMAN097HVP 9,000	14	8.82	5.68	9.37	6.00	9.92	5.81	10.31	5.93	11.01	5.98	11.56	6.09
	20	8.82	5.72	9.36	6.04	9.91	5.85	10.31	5.98	11.01	6.03	11.55	6.14
	25	8.81	5.77	9.36	6.09	9.90	5.90	10.30	6.02	11.00	6.07	11.54	6.19
	30	8.80	5.81	9.35	6.14	9.90	5.94	10.29	6.07	10.99	6.12	11.54	6.23
	35	8.80	5.85	9.34	6.18	9.89	5.99	10.28	6.11	10.98	6.17	11.53	6.28
	40	8.79	5.90	9.33	6.23	9.88	6.03	10.27	6.16	10.97	6.21	11.52	6.33
	45	8.78	5.94	9.33	6.28	9.87	6.08	10.27	6.21	10.96	6.26	11.51	6.38
	50	8.78	5.99	9.32	6.32	9.87	6.12	10.26	6.25	10.96	6.30	11.50	6.42
	55	8.77	6.03	9.31	6.37	9.86	6.17	10.25	6.30	10.95	6.35	11.49	6.47
	60	8.76	6.07	9.31	6.42	9.85	6.21	10.24	6.34	10.94	6.40	11.48	6.52
	65	8.76	6.12	9.30	6.46	9.84	6.26	10.24	6.39	10.93	6.44	11.47	6.56
	70	8.75	6.16	9.29	6.51	9.84	6.30	10.23	6.43	10.92	6.49	11.47	6.61
	75	8.54	6.06	9.08	6.41	9.62	6.21	10.01	6.35	10.71	6.41	11.25	6.54
	80	8.33	5.96	8.87	6.31	9.41	6.12	9.80	6.26	10.49	6.33	11.03	6.46
	85	8.12	5.85	8.66	6.20	9.20	6.03	9.59	6.17	10.28	6.24	10.82	6.38
	90	7.91	5.74	8.45	6.09	8.99	5.93	9.37	6.07	10.06	6.16	10.60	6.30
	95	7.68	5.68	8.22	6.04	8.75	5.88	**9.00**	**5.94**	9.83	6.12	10.36	6.27
	100	7.50	5.52	8.03	5.89	8.57	5.74	8.88	5.85	9.64	5.99	10.17	6.14
	105	7.31	5.37	7.84	5.73	8.38	5.60	8.77	5.76	9.45	5.86	9.99	6.01
	110	7.12	5.19	7.66	5.55	8.19	5.43	8.58	5.58	9.26	5.69	9.80	5.85
	115	6.94	5.03	7.47	5.39	8.01	5.29	8.39	5.44	9.08	5.56	9.61	5.71
	118	6.82	5.00	7.36	5.36	7.89	5.26	8.28	5.42	8.96	5.54	9.50	5.70
	122	6.79	4.98	7.32	5.35	7.86	5.25	8.24	5.41	8.93	5.53	9.46	5.69
LMAN127HVP 12,000	14	10.98	7.06	11.66	7.46	12.34	7.22	12.84	7.38	13.71	7.44	14.39	7.58
	20	10.97	7.12	11.65	7.52	12.33	7.28	12.83	7.43	13.70	7.50	14.38	7.64
	25	10.96	7.17	11.64	7.58	12.32	7.34	12.82	7.49	13.69	7.55	14.37	7.70
	30	10.95	7.23	11.63	7.64	12.31	7.39	12.81	7.55	13.68	7.61	14.36	7.76
	35	10.95	7.28	11.63	7.69	12.31	7.45	12.80	7.61	13.66	7.67	14.34	7.82
	40	10.94	7.34	11.62	7.75	12.30	7.51	12.79	7.66	13.65	7.73	14.33	7.87
	45	10.93	7.39	11.61	7.81	12.29	7.56	12.78	7.72	13.64	7.79	14.32	7.93
	50	10.92	7.45	11.60	7.87	12.28	7.62	12.77	7.78	13.63	7.84	14.31	7.99
	55	10.91	7.50	11.59	7.92	12.27	7.67	12.76	7.83	13.62	7.90	14.30	8.05
	60	10.90	7.56	11.58	7.98	12.26	7.73	12.75	7.89	13.61	7.96	14.29	8.11
	65	10.90	7.61	11.57	8.04	12.25	7.78	12.74	7.95	13.60	8.02	14.28	8.17
	70	10.89	7.67	11.56	8.10	12.24	7.84	12.73	8.01	13.59	8.07	14.27	8.23
	75	10.63	7.54	11.30	7.97	11.97	7.73	12.46	7.90	13.32	7.97	14.00	8.13
	80	10.36	7.41	11.04	7.85	11.71	7.62	12.19	7.79	13.05	7.87	13.73	8.04
	85	10.10	7.27	10.77	7.72	11.45	7.50	11.93	7.67	12.79	7.77	13.46	7.94
	90	9.84	7.14	10.51	7.58	11.18	7.38	11.67	7.56	12.52	7.66	13.19	7.83
	95	9.56	7.06	10.23	7.51	10.89	7.32	**11.20**	**7.39**	12.23	7.62	12.89	7.80
	100	9.33	6.87	10.00	7.32	10.66	7.15	11.05	7.28	11.99	7.45	12.66	7.64
	105	9.10	6.68	9.76	7.13	10.43	6.97	10.91	7.16	11.76	7.29	12.43	7.48
	110	8.86	6.46	9.53	6.90	10.20	6.76	10.68	6.95	11.53	7.08	12.19	7.27
	115	8.63	6.26	9.30	6.71	9.96	6.58	10.44	6.77	11.30	6.91	11.96	7.11
	118	8.49	6.22	9.16	6.67	9.82	6.54	10.30	6.74	11.16	6.89	11.82	7.09
	122	8.44	6.20	9.11	6.65	9.78	6.53	10.26	6.73	11.11	6.88	11.78	7.08

TC = Total Capacity (kBtu/h).

SHC: Sensible Heat Capacity (kBtu/h).

Nominal capacity as rated 0 ft. above sea level and a 0 ft. level difference between outdoor and indoor units. Corresponding refrigerant piping length is accordance with standard length of each outdoor unit.

Nominal 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).

The shaded table columns and rows indicate reference data. When operating at this temperature, these values can be different if the system is not running consistently.

ART COOL GALLERY INDOOR UNITS

Heating Capacity Table

MULTI F
MULTI F MAX

Table 15: Multi F Art Cool Gallery Indoor Units Heating Capacity Table.

Model No. / Nominal Capacity of Indoor Unit (Btu/h)	Outdoor Air Temp.		Indoor Air Temp. °F DB					
	°F DB	°F WB	61	64	68	70	72	75
			TC	TC	TC	TC	TC	TC
LMAN097HVP 9,000	0	-0.4	5.35	5.28	5.23	5.20	5.12	4.90
	5	4.5	6.03	5.95	5.90	5.88	5.80	5.58
	10	9	6.71	6.63	6.58	6.56	6.48	6.26
	17	15	7.61	7.54	7.49	**7.46**	7.39	7.14
	20	19	7.95	7.88	7.83	7.80	7.72	7.46
	25	23	8.52	8.44	8.39	8.37	8.29	7.99
	30	28	9.01	8.93	8.88	8.86	8.78	8.52
	35	32	9.50	9.42	9.37	9.34	9.27	9.04
	40	36	9.94	9.86	9.81	9.78	9.71	9.48
	45	41	10.37	10.30	10.25	10.22	10.15	9.92
	47	43	10.55	10.48	10.43	**10.40**	10.32	10.10
	50	46	10.72	10.64	10.59	10.57	10.49	10.24
	55	51	11.00	10.93	10.88	10.85	10.78	10.48
	60	56	11.00	10.93	10.88	10.85	10.78	10.52
	63	59	11.00	10.93	10.88	10.85	10.78	10.55
	68	64	11.00	10.93	10.88	10.85	10.78	10.60
LMAN127HVP 12,000	0	-0.4	6.84	6.75	6.68	6.65	6.55	6.26
	5	4.5	7.71	7.61	7.55	7.52	7.42	7.13
	10	9	8.58	8.48	8.42	8.38	8.29	8.00
	17	15	9.73	9.64	9.57	**9.54**	9.44	9.14
	20	19	10.17	10.07	10.01	9.98	9.88	9.54
	25	23	10.89	10.79	10.73	10.70	10.60	10.22
	30	28	11.52	11.42	11.36	11.32	11.23	10.89
	35	32	12.14	12.05	11.98	11.95	11.85	11.57
	40	36	12.71	12.61	12.55	12.51	12.42	12.13
	45	41	13.27	13.17	13.11	13.08	12.98	12.69
	47	43	13.49	13.40	13.33	**13.30**	13.20	12.91
	50	46	13.71	13.61	13.55	13.52	13.42	13.10
	55	51	14.07	13.97	13.91	13.88	13.78	13.40
	60	56	14.07	13.97	13.91	13.88	13.78	13.46
	63	59	14.07	13.97	13.91	13.88	13.78	13.49
	68	64	14.07	13.97	13.91	13.88	13.78	13.55

TC = Total Capacity (kBtu/h).

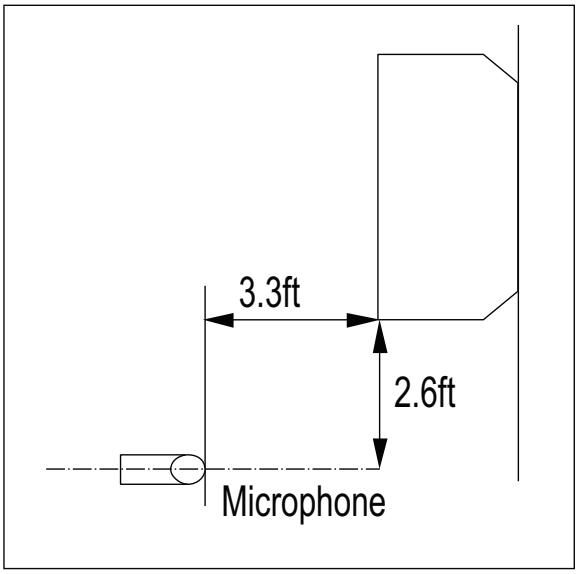
Nominal capacity as rated 0 ft. above sea level and a 0 ft. level difference between outdoor and indoor units. Corresponding refrigerant piping length is accordance with standard length of each outdoor unit.

Nominal 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).

ART COOL GALLERY INDOOR UNITS

Acoustic Data

Figure 39: Sound Pressure Level Measurement Location.



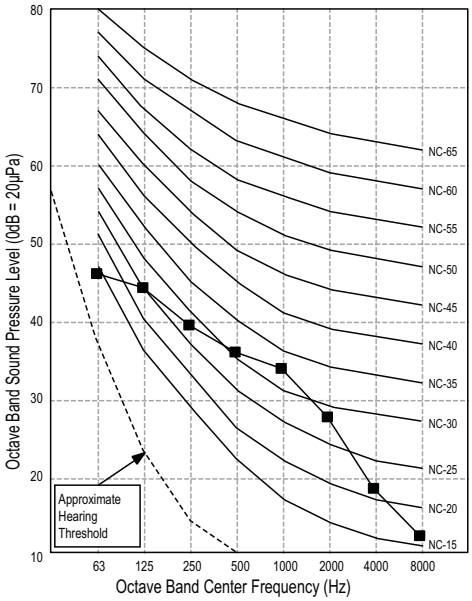
- Measurement taken 2.6' below the bottom of the unit and at a distance of 3.3' from face of unit.
- Measurements taken with no attenuation and units operating at full load normal operating condition.
- Sound level will vary depending on a range of factors such as construction (acoustic absorption coefficient) of particular area in which the equipment is installed.
- Sound power levels are measured in dB(A)±3.
- Tested in anechoic chamber per ISO Standard 3745.

Table 16: Sound Pressure Levels (dB[A]).

Model No.	Sound Pressure Levels (dB[A]) (Cooling and Heating)		
	High Fan Speed	Medium Fan Speed	Low Fan Speed
LMAN097HVP	39	35	31
LMAN127HVP	42	38	34

Figure 40: Sound Pressure Level Diagrams.

LMAN097HVP



LMAN127HVP

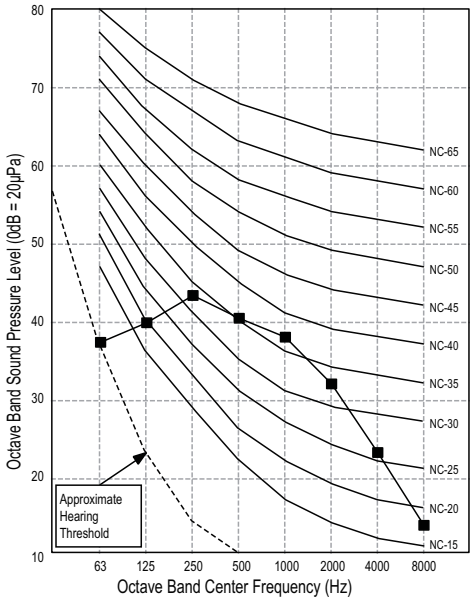
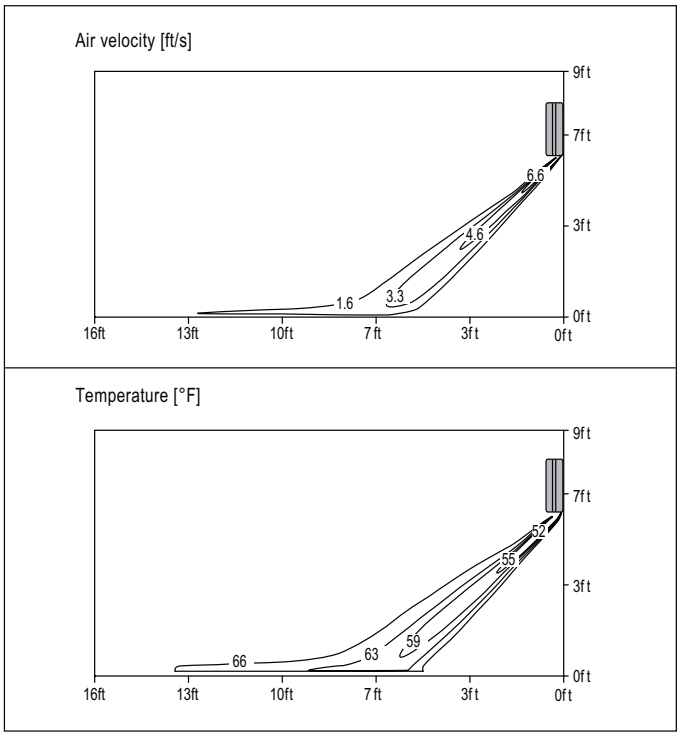


Figure 41: LMAN097HVP Air Velocity and Temperature Distribution Charts.

Cooling

Discharge angle: 40°



Heating

Discharge angle: 50°

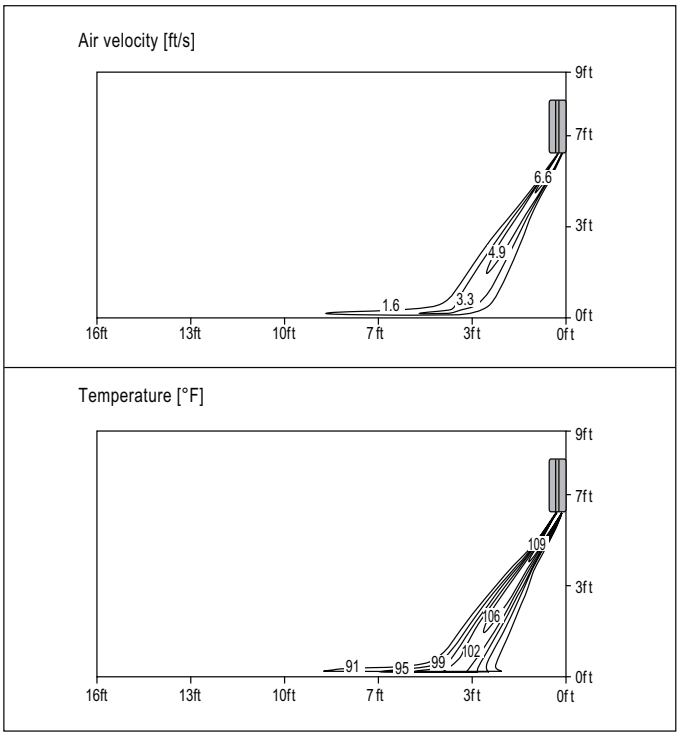
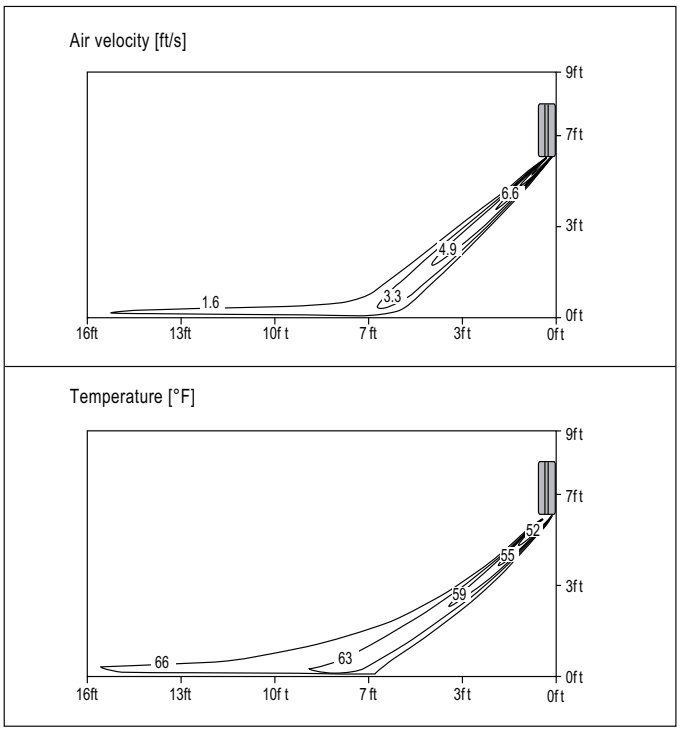


Figure 42: LMAN127HVP Air Velocity and Temperature Distribution Charts.

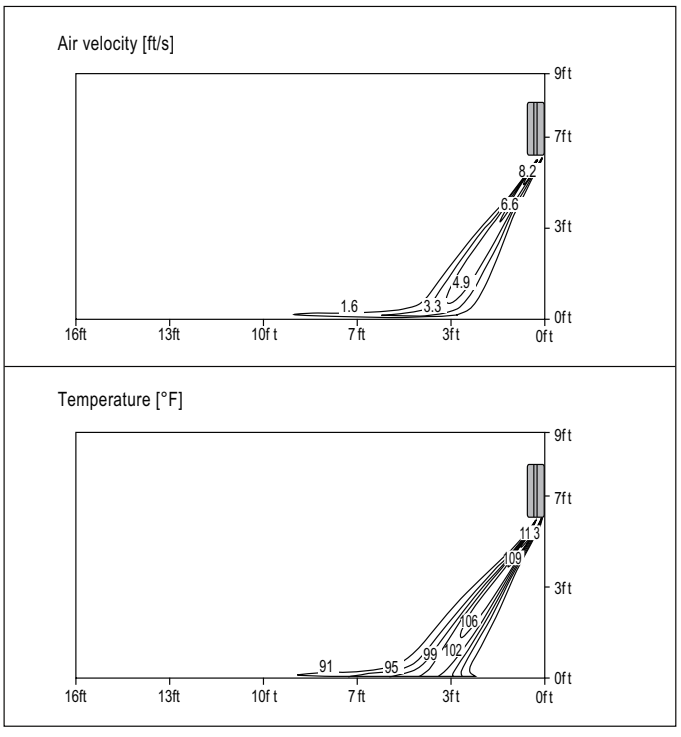
Cooling

Discharge angle : 40°



Heating

Discharge angle : 50°



ART COOL GALLERY INDOOR UNITS

Refrigerant Flow Diagram

Figure 43: Art Cool Gallery Indoor Unit Refrigerant Flow Diagram.

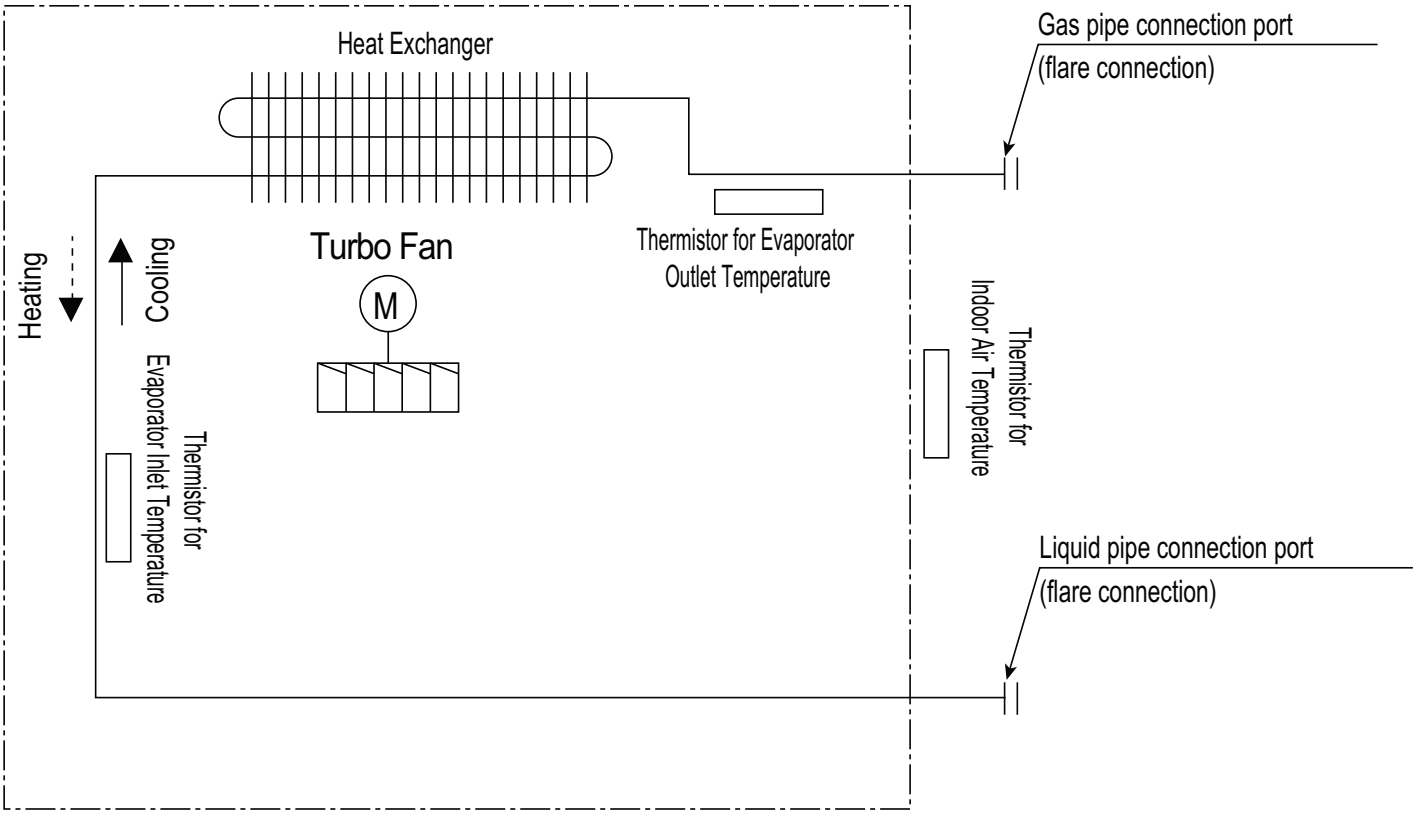


Table 17: Art Cool Gallery Indoor Unit Refrigerant Pipe Connection Port Diameters.

Model No.	Vapor (inch)	Liquid (inch)
LMAN097HVP	Ø3/8	Ø1/4
LMAN127HVP		

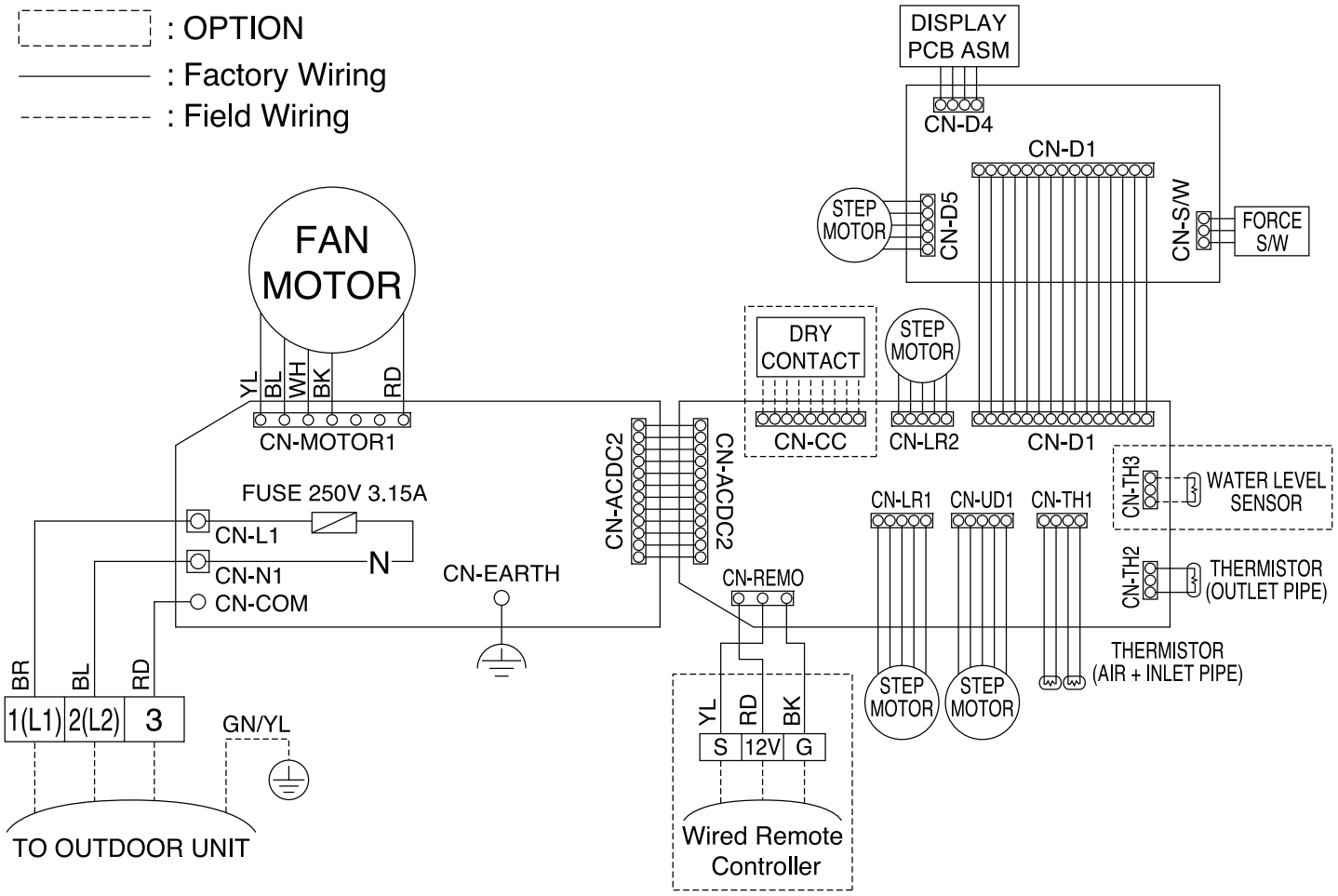
Table 18: Art Cool Gallery Indoor Unit Thermistor Details.

Description (Based on Cooling Mode)	PCB Connector
Indoor Air Temperature Thermistor	CN-TH1
Evaporator Inlet Temperature Thermistor	
Evaporator Outlet Temperature Thermistor	CN-TH2
Water Level Sensor (Optional)	CN-TH3

ART COOL GALLERY INDOOR UNITS

Wiring Diagram

Figure 44: Multi F Art Cool Gallery Indoor Units Wiring Diagram.

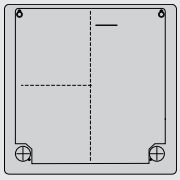
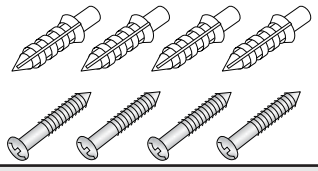
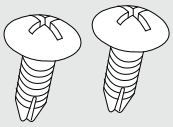


ART COOL GALLERY INDOOR UNITS

Factory Supplied Parts and Materials

Factory Supplied Parts

Table 19: Parts Table.

Part	Quantity	Image
Installation Guide	One (1)	
Type “A” Screws and Plastic Anchors	Four (4) Each	
Type “B” Screws (M4 x 12L)	Two (2)	
Wireless Handheld Controller with Holder (AKB73635607)	One (1)	

Factory Supplied Materials

- Owner’s Manual
- Installation Manual

Required Tools

- Level
- Screwdriver
- Electric drill
- Hole core drill
- Flaring tool set
- Spanner (Half union)
- Thermometer

⚠WARNING

Installation work must be performed by trained personnel and in accordance with national wiring standards and all local or other applicable codes. Improper installation can result in fire, electric shock, physical injury, or death.

Note:

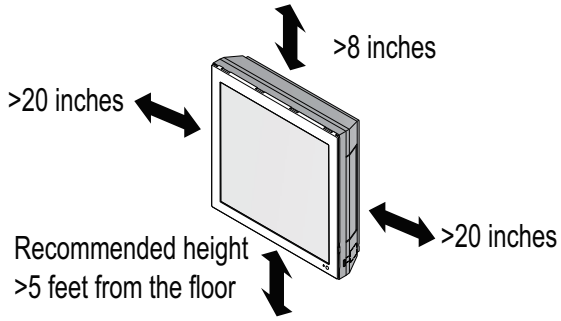
Read all instructions before installing this product. Become familiar with the unit’s components and connections, and the order of installation. Incorrect installation can degrade or prevent proper operation.

Selecting the Best Location

Do's

- Place the unit where air circulation will not be blocked.
- Place the unit where drainage can be obtained easily.
- Place the unit where noise prevention is taken into consideration.
- Ensure there is sufficient space from the ceiling and floor.
- Ensure there is sufficient maintenance space.
- Locate the indoor unit in a location where it can be easily connected to the outdoor unit/branch distribution unit.

Figure 45: Minimum Clearance Requirements.



Don'ts

- ⃠ *Do not install the unit near a heat or steam source, or where considerable amounts of oil, iron powder, or flour are used.*
- ⃠ *Do not install the unit where sulfuric acid and flammable or corrosive gases are generated, vented into, or stored.*
- ⃠ *Do not install the unit near high-frequency generators.*
- ⃠ *Do not install the unit near a doorway.*

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

Installing in an Area Exposed to Unconditioned Air

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

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

Using the Installation Guide

1. Choose an appropriate location for the indoor unit. To hang the installation guide, verify that it is level and plumb, and then tape it to the wall.

2. Drill four (4) 1/4-inch diameter holes with a depth of 1-3/16 to 1-3/8 inches for the mounting screws. Drill one (1) two (2) inch-diameter hole for the field-installed refrigerant and drain piping.

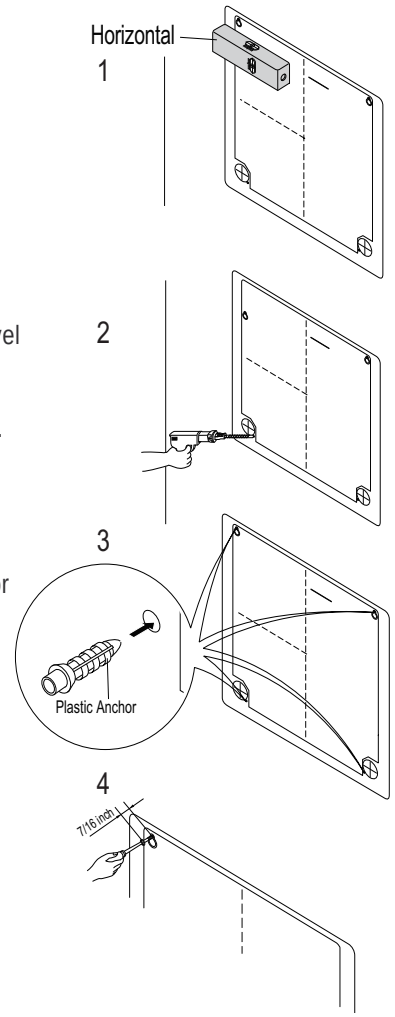
3. Insert a plastic anchor into each of the mounting holes.

4. Screw the top two (2) screws into the wall. Do not flush them to the wall; leave a 7/16 inch space for hanging the indoor unit.

Note:

If the unit is installed near a body of water, certain components are at risk of being corroded. Appropriate anti-corrosion methods should be taken for the unit and all components.

Figure 46: Using the Installation Guide.

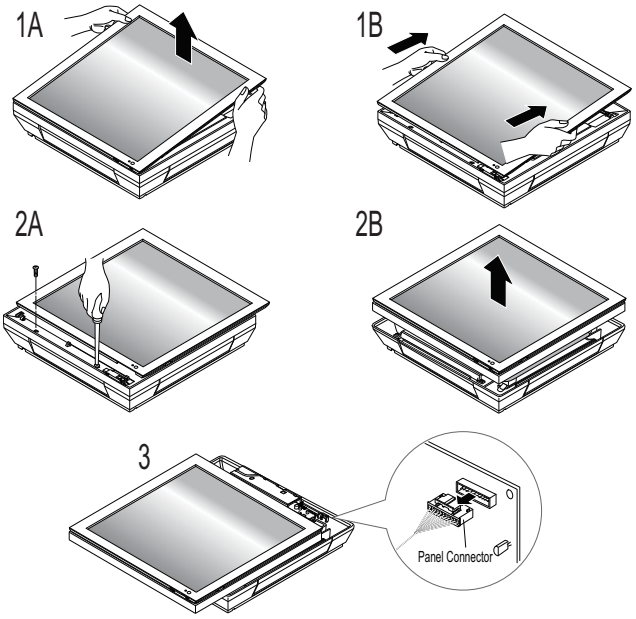


Preparing the Indoor Unit for Installation

Removing the Front Panel

1. First pull the top of the front panel up (1A) and then out (1B).
2. Remove the two (2) screws at the bottom (2A), then lift off the front panel (2B).
3. To completely detach the front panel, disconnect the panel connector found at the top of the indoor unit (3).

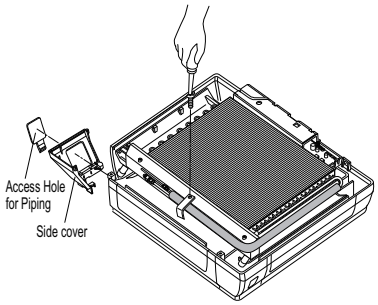
Figure 47: Preparing for Installation.



Removing the Piping and Side Covers

1. Unscrew the center cover.
2. Remove the cover from the side of the indoor unit chosen for the piping connections, and then knock out the piping access hole. If the refrigerant piping will be connected through the back of the unit, the access hole does not need to be knocked out.
3. Remove any burrs that may have been made.

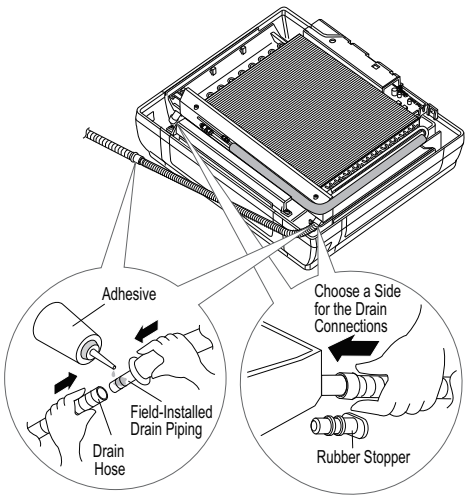
Figure 48: Removing the Piping and Side Covers.



Preparing the Drain Hose

1. Remove the rubber stopper from the chosen side of the indoor unit.
2. Insert the drain hose into the handle of the drain pan.
3. Connect the drain hose to the field-installed drain piping.

Figure 49: Preparing the Drain Hose.

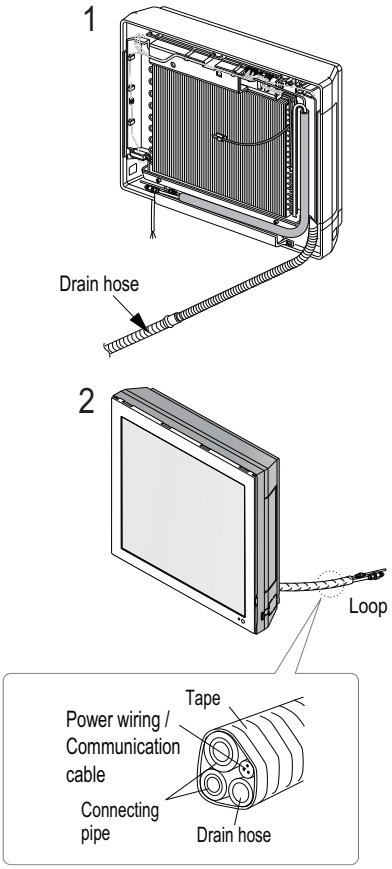


Preparing the Refrigerant and Drain Piping Connections

1. Depending on the installation requirements, route the indoor unit refrigerant piping and the drain hose to the left, right (see guidelines below), or rear of the frame.

2. Bundle the piping and drain hose with tape where they meet near the indoor unit frame. Position the drain hose at the bottom of the bundle (positioning the drain hose at the top of the bundle may cause the drain pan to overflow inside the indoor unit).

Figure 50: Preparing the Refrigerant / Drain Connections.

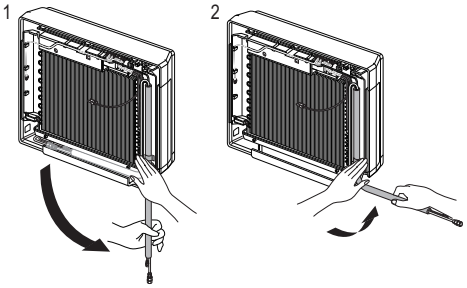


Installing Piping on the Right Side of the Indoor Unit Frame

1. Press on the top of the clamp, and then slowly guide the piping downward.

2. Bend the piping to the right side of the indoor unit frame.

Figure 51: Right Side Piping Access.



Note:

Do not bend the piping/drain hose from side to side; it may damage the components.

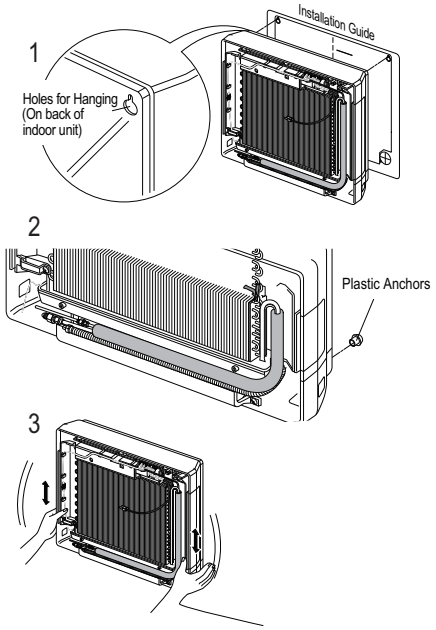
Hanging the Indoor Unit Frame

1. Remove the installation guide and hang the indoor unit on the top two (2) screws. Verify the indoor unit is hanging securely on the screws.

2. Align the holes at the bottom of the indoor unit to the mounting holes. Tighten first the top screws, then tighten the bottom screws.

3. Verify that the indoor unit is completely secured to the wall by gently shaking it up and down.

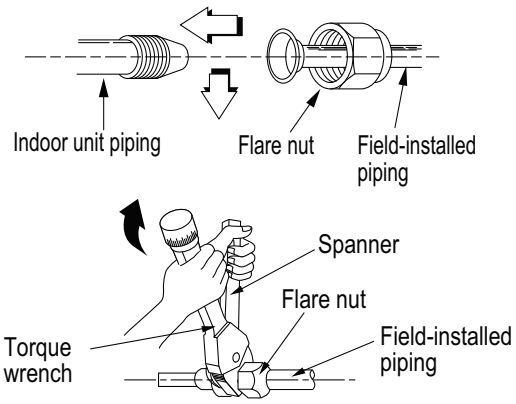
Figure 52: Hanging the Indoor Unit Frame.



Connecting the Indoor Unit Piping to the Field-Installed Piping

1. Center align the indoor unit piping (refrigerant and drain) and the field-installed piping, then hand tighten the flare nut.
2. Tighten the flare nut with a torque wrench.
3. Attach the drain tube piping to the indoor unit drain hose as shown below.

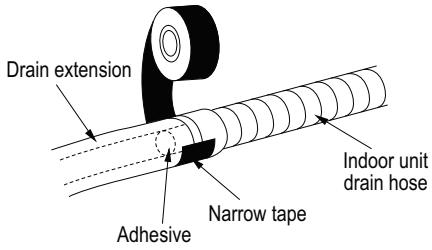
Figure 53: Indoor Unit to Field-Installed Piping Connection.



Note:

If the drain hose is routed inside a room, add insulation to prevent condensation from forming.

Figure 54: Extending the Drain Hose.



Insulating the Refrigerant and Drain Piping

⚠ WARNING

Ensure all piping is insulated. Exposed piping can cause burns if touched.

Refrigerant Piping Insulation

Field-installed vapor and liquid refrigerant piping lines must be properly and completely covered in insulation (up to the indoor unit piping connections). Any exposed piping may generate condensate or will cause burns if touched. Insulation for this field-installed refrigerant piping must have a minimum heat resistance of 248°F.

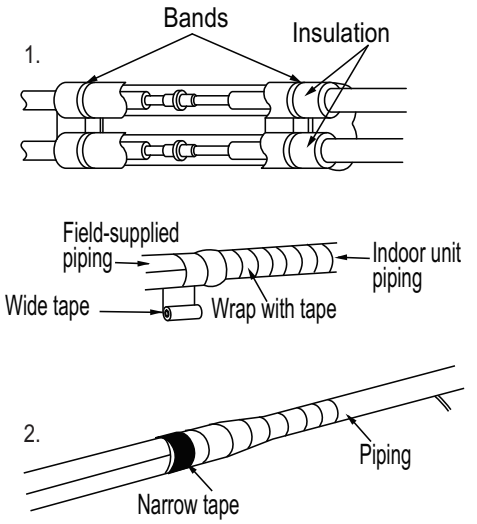
Drain Piping Insulation

Drain piping must have insulation a minimum of 7/32 inches thick.

Installing the Insulation

1. Overlap the insulation at the connection of the field-installed piping and the indoor unit piping. Tape together so there are no gaps.
2. Secure insulation to the rear piping housing section with vinyl tape.
3. Bundle the piping and drain hose with tape where they meet at the back of the indoor unit frame. Position the drain hose at the bottom of the bundle (positioning the drain hose at the top of the bundle may cause the drain pan to overflow inside the indoor unit).

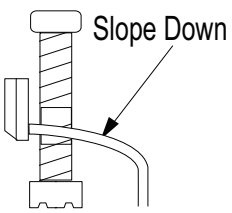
Figure 55: Insulating the Piping.



Drain Slope

Drain hose should point down so water can flow away easily.

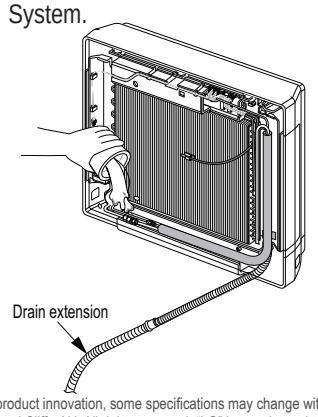
Figure 56: Drain Piping Slope.



Checking the Drainage System

1. Pour water on the indoor unit evaporator.
2. Ensure the water flows through and out of the hose and away from the indoor unit without leaking.

Figure 57: Checking the Drainage System.



Power Wiring / Communications Cable Guidelines

- Follow manufacturer's circuit diagrams in the technical manuals.
- Confirm power source specifications.
- Confirm that the electrical capacity is sufficient.
- Starting current must be maintained ±10 percent of the rated current marked on the outdoor unit name plate.
- Confirm cable thickness specifications.
- It is recommended that a circuit breaker is installed, especially if conditions could become wet or moist.
- Include a disconnect in the power wiring system, add an air gap contact separation of at least 1/8 inch in each active (phase) conductor.

⚠ WARNING

• Loose wiring may cause unit to malfunction, overheat, and catch fire, resulting in severe injury or death.

Note:

• Terminal screws may become loose during transport. Properly tighten the terminal connections during installation.
A voltage drop may cause the following problems:
• Magnetic switch vibration, fuse breaks, or disturbance to the normal function of an overload protection device.
• Compressor will not receive the proper starting current.

Connecting the Power Wiring and Communications Cable

1. Insert the power wiring/communications cable from the outdoor unit or branch distribution unit (Multi F MAX systems only) through the access hole of the indoor unit (ground wire should be longer than the other wires/cables). Unscrew the control board cover.

2. Connect each wire to its appropriate terminal on the indoor unit control board. Verify that the color and terminal numbers from the outdoor unit or branch distribution unit (Multi F MAX systems only) wiring match the color and terminal numbers on the indoor unit.

3. Secure the power wiring/communications cable to the control board.

4. Reattach the control board cover.

Figure 58: Connecting the Power Wiring / Communications Cable.

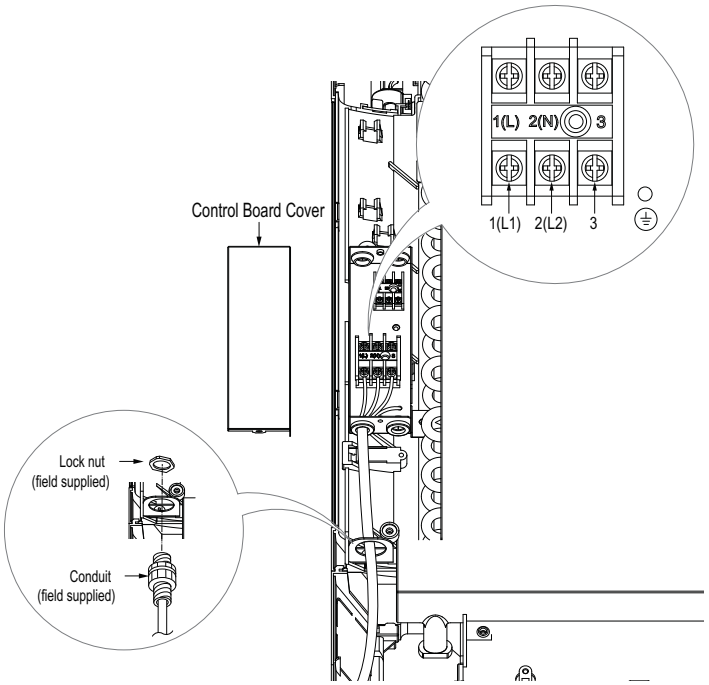
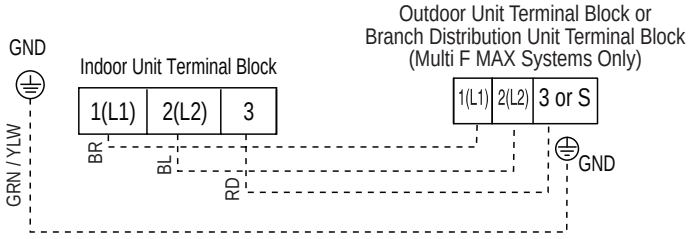


Figure 59: Simplified View of Indoor Unit to Outdoor Unit / Branch Distribution Unit Terminal Connections—LMAN097HVP and LMAN127HVP models.



Controller Options

Art Cool Gallery wall-mounted indoor units include a handheld controller (AKB73635607), but optional LG-supplied wired controllers are available.

Wireless Handheld Controller

Figure 60: AKB73635607 Wireless Controller.

Operation Mode Sequence

Cooling Mode ❄
↓
Auto Operation AI
↓
Dehumidification Mode 💧
↓
Heating Mode ☼

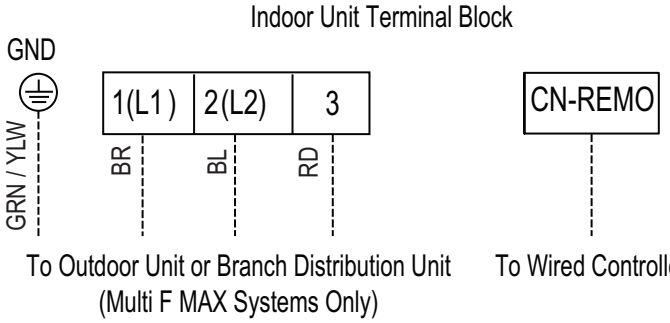
Table 20: AKB73635607 Wireless Controller Functions.

Control Panel Button	Display Screen	Description
FAN		Air circulation button[1]: Circulates the room air without operating in cooling or heating mode.
SLEEP	1hr	Sleep Mode Auto Button[1]: Sets the sleep mode auto operation.
TEMP	88 °C	Temperature Adjustment Buttons: Raises or lowers temperature setpoint in cooling and heating operation.
ON OFF	-	On / Off Button: Turns the power on/off.
FAN SPEED		Indoor Fan Speed Button: Changes the fan speed.
MODE		Operation mode selection button[1]: Selects the operation mode. Cooling operation ❄ / Auto operation or auto changeover AI / Dehumidifying operation 💧/ Heating operation ☼
JET	Po	Jet Cool / Jet Heat Button[1]: Warms up or cools down the indoor temperature within a short period.
SWING		Air Flow Direction Button: Adjusts the airflow direction.
ROOM TEMP		Temperature Display Button: Displays the room temperature. Press and hold button down for five (5) seconds to change from °C to °F.
ON OFF	AM 12:00	Timer button: Sets the current time and the start/end times.
A/CLEAN E/SAVING LIGHT		Navigation/Functions Button[1]: Adjusts the time and sets the special functions. Auto clean / Operates energy saving cooling / Adjusts the brightness of the indoor unit display
SET CLEAR	-	Set/Clear Button: Sets or cancels functions.
O	-	Reset Button: Resets the air conditioner settings.

[1]Depending on the indoor unit model, some functions may not be supported.

Wired Controller Connections

Figure 61: Wired Controller Connection on the Indoor Unit Terminal Block.



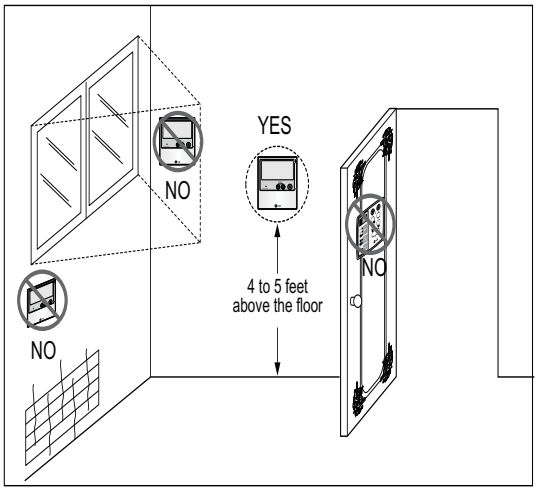
Wired Controller Placement

Wired controllers include a sensor to detect room temperature. To maintain comfort levels in the conditioned space, the wired controller must be installed in a location away from direct sunlight, high humidity, and where it could be directly exposed to cold air. Controller must be installed four (4) to five (5) feet above the floor where its LED display can be read easily, in an area with good air circulation, and where it can detect an average room temperature.

⃠ Do not install the wired controller near or in:

- Drafts or dead spots behind doors and in corners
- Hot or cold air from ducts
- Radiant heat from the sun or appliances
- Concealed pipes and chimneys
- An area where temperatures are uncontrolled, such as an outside wall

Figure 62: Proper Location for the Wired Controller.



Hanging the Wired Controller

1. The controller wiring/cable can be installed in one of three directions: top, back, or on the right side. If top or right side installation is desired, remove cable guide grooves on the controller, and then position wiring/cable on applicable side.

2. Choose and mark the area of installation, and then screw the wall plate into place (using the provided parts). Install the controller wall plate to fit the electrical box if one is present. Ensure that no gaps exist between the wall plate and the wall itself.

3. Arrange wiring/cables so as not to interfere with the controller circuitry. Position the wired controller on the wall plate. Snap into place by pressing the bottom part of the wired controller onto the wall plate. Make sure that no gaps exist between the wired controller and the wall plate on all sides.

4. To remove wired controller from the wall plate, insert a screwdriver into the two holes at the bottom. Twist screwdriver to release controller. Do not damage the controller components when removing.

Figure 63: Removing the Cable Guide Grooves.

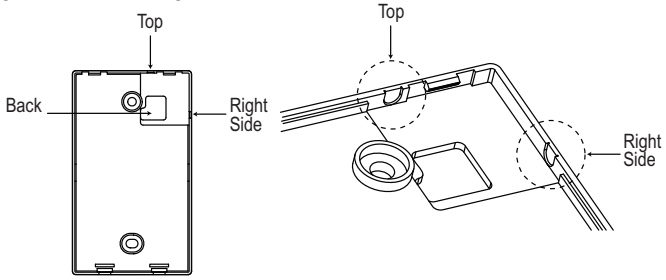


Figure 64: Attaching the Wall Plate.

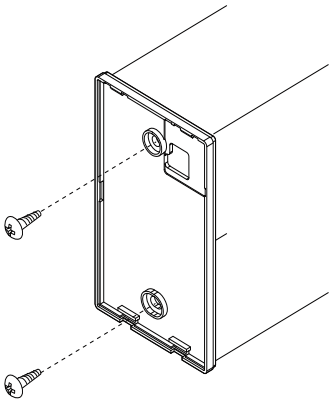
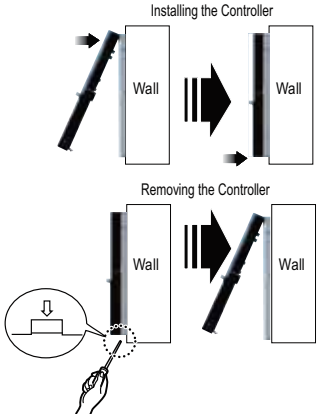


Figure 65: Installing/Removing the Controller.



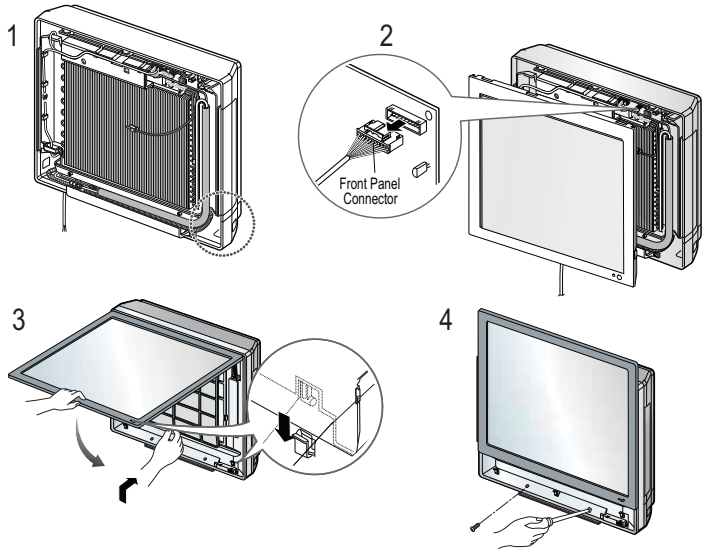
Assigning the Thermistor for Temperature Detection

Each indoor unit includes a return air thermistor assigned to sense the temperature. If a wired controller is installed, there is a choice of sensing temperature with either the indoor unit return air thermistor or the thermistor in the wired controller. It is also an option to set both thermistors to sense temperature so that indoor unit bases its operation on the first thermistor to reach the designated temperature differential. For applicable indoor units, an optional Remote Temperature Sensor can be used in lieu of the return air thermistor—either alone or in conjunction with a wired controller thermistor as previously described.

Finalizing Indoor Unit Installation

1. Verify that the side covers are closed or opened, depending on installation requirements. Place the power wiring / communications cable in the bottom groove along the left side of the frame.
2. Reconnect the panel connector found at the top of the indoor unit.
3. Attach the top part of the front panel, then position its tabs in the grooves on the bottom part of the indoor unit frame.
4. To ensure the front panel tabs are securely positioned in the grooves, adjust the panel by loosening or tightening the screws at the bottom.

Figure 66: Final Installation Step—Reattaching the Front Panel.



STANDARD WALL-MOUNTED INDOOR UNIT DATA

STANDARD WALL-MOUNTED INDOOR UNITS

Mechanical Specifications and Features

MULTI F
MULTI F MAX

Standard Wall-Mounted Indoor Units

General

All LG indoor units are factory assembled, wired, piped, and provided with a control circuit board, fan, and motor. Standard Wall-Mounted units have a sound rating no higher than 42 dB(A) as tested per KSA0701 ISO Standard 3745.

Coil

Indoor unit coils are comprised of a minimum of two rows of aluminum fins mechanically bonded to copper tubing. The coils are pressure tested at the factory. Each unit is provided with a factory installed condensate drain pan below the coil.

Refrigerant System

The system is designed for use with R410A refrigerant. The refrigeration circuit is pressure-tested at the factory and shipped with a holding charge of helium gas. Refrigerant pipe connections are 45° flare. All refrigerant lines from the outdoor unit to the indoor units must be field insulated.

Electrical

The indoor units require 208–230Vac/60Hz/1Φ power with voltage variance of no more than ±10%.

Casing

The units mount on a vertical surface. They are shipped with a separate back plate that secures the unit to the wall, protruding no more than ten (10) inches. Refrigerant piping can be installed in one (1) of four (4) different directions.

Finish

The Standard Wall-Mounted unit has a curved architectural panel with a pearl white finish. Unit casing has a pearl white or dark gray finish and is manufactured of heavy-duty acrylonitrile butadiene styrene (ABS) and high impact polystyrene (HIPS) plastic.

Fan Assembly and Control

The unit has a single, direct-drive, crossflow fan made of high strength ABS plastic. The fan motor is brushless digitally controlled (BLDC) with permanently lubricated and sealed ball bearings. The fan / motor assembly is mounted on vibration attenuating rubber grommets. Fan speed is controlled using a microprocessor-based direct digitally controlled algorithm that provides pre-programmed, field-selectable fixed or auto fan speeds in the Heating and Cooling modes. For Standard Wall-Mounted units, the indoor fan has Low, Med, High, Power Cool and Auto settings for Cooling mode; and has Low, Med, High, and Auto settings for Heating mode. The Auto setting adjusts the fan speed based on the difference between the controller setpoint and space temperature. Also, the separate Chaos setting provides a simultaneous and random change in fan speed and flow direction at the discharge, simulating a natural outdoor breeze.

Figure 67: Multi F Standard Wall-Mounted Indoor Unit.

Air Filter

The return air inlet has a factory-supplied primary removable, washable filter. The unit is also equipped with a secondary 3M filter. Filters are accessed from the front of the unit without the use of tools.

Airflow Guide Vanes

A factory-installed motorized guide vane controls the direction of airflow from side to side. A motorized louver provides an automatic change in airflow by directing the air up and down for uniform air distribution.

Microprocessor Control

The indoor unit has an integrated control panel to communicate with the outdoor unit. All unit operation parameters are stored in non-volatile memory resident on the unit microprocessor. The microprocessor controls space temperature through using the value provided by the temperature sensor within the indoor unit. The microprocessor control will activate indoor unit operation when the indoor room temperature falls below or rises above a setpoint temperature, at which point, a signal is sent to the outdoor unit to begin the appropriate mode. The microprocessor also provides self-diagnostics and auto restart functions. A field-supplied four-wire power / communications cable must be installed to connect the indoor unit(s) to the outdoor unit.

Controls

The indoor unit casing has a factory-standard, integral infrared sensor to communicate with the supplied LG wireless handheld remote controller. An optional LG supplied wired controller is available as an additional accessory. Communication between the indoor units and the outdoor unit is accomplished through 18 AWG, four-core, stranded and shielded power / communication cable.

Condensate

The unit is designed for gravity draining of condensate and includes a flexible drain hose capable of installation in one of two directions. The unit also includes a connection that is compatible with the AquaGuard® AG-9300-LG condensate sensor.

Features

- Inverter (Variable speed fan)
- Chaos swing
- Secondary filter (3M)
- Jet cool
- Group control
- Self-cleaning indoor coil
- Auto operation
- Auto restart operation
- Dehumidifying function
- Self-diagnostic function
- Wireless LCD remote control included; wired thermostat available (sold separately)

STANDARD WALL-MOUNTED INDOOR UNITS

General Data / Specifications

Table 21: Multi F Standard Wall-Mounted Indoor Unit General Data.

Model Name	LMN078HVT	LSN090HSV4	LSN120HSV4	LMN158HVT	LSN180HSV4	LMN248HVT
Nominal Cooling Capacity (Btu/h)[1]	7,000	9,000	12,000	14,300	18,000	24,000
Nominal Heating Capacity (Btu/h)[1]	8,100	10,400	13,800	16,500	20,800	27,000
Operating Range						
Cooling (°F WB)	57-77					
Heating (°F DB)	59-81					
Fan						
Type	Cross Flow					
Motor Output (W) x Qty.	14.4 x 1				76.0 x 1	
Motor/Drive	Brushless Digitally Controlled / Direct					
Airflow Rate CFM (H/M/L)	198 / 177 / 162	247 / 230 / 212	335 / 318 / 300	371 / 318 / 247	572 / 501 / 434	720 / 600 / 466
Unit Data						
Refrigerant Type[2]	R410A					
Refrigerant Control	EEV					
Power Supply V, Ø, Hz[3]	208-230, 1, 60					
Rated Amps (A)	0.2				0.3	
Sound Pressure Level ±3 dB(A) (H/M/L)[4]	33 / 30 / 26	33 / 30 / 27	39 / 36 / 31	39 / 36 / 31	37 / 33 / 28	42 / 39 / 36
Dimensions (W x H x D, in.)	35-1/4 x 11-3/8 x 8-9/32	34-13/16 x 11-1/4 x 8-1/4	34-13/16 x 11-1/4 x 8-1/4	35-1/4 x 11-3/8 x 8-9/32	40-9/16 x 12-13/16 x 9-13/16	40-9/16 x 12-13/16 x 9-13/16
Net Unit Weight (lbs.)	20				31	
Shipping Weight (lbs.)	26				36	37
Power Wiring / Communications Cable (No. x AWG)[5]	4 x 18					
Heat Exchanger (Row x Column x Fin / inch) x Number	(2 x 16 x 23) x 1				(3 x 18 x 22) x 1	
Pipe Size						
Liquid (in.)	1/4					
Vapor (in.)	3/8				1/2	
Connection Size						
Liquid (in.)	1/4				3/8	1/4
Vapor (in.)	3/8				5/8	1/2
Drain O.D. / I.D. (in.)	27/32, 5/8					

[1]Nominal capacity is rated 0 ft. above sea level with corresponding refrigerant piping length in accordance with standard length of each outdoor unit and a 0 ft. level difference between outdoor and indoor units. All capacities are net with a combination ratio between 95 – 105%.

Nominal 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).
Nominal 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]This unit comes with a dry helium charge.

[3]Acceptable operating voltage: 187V-253V.

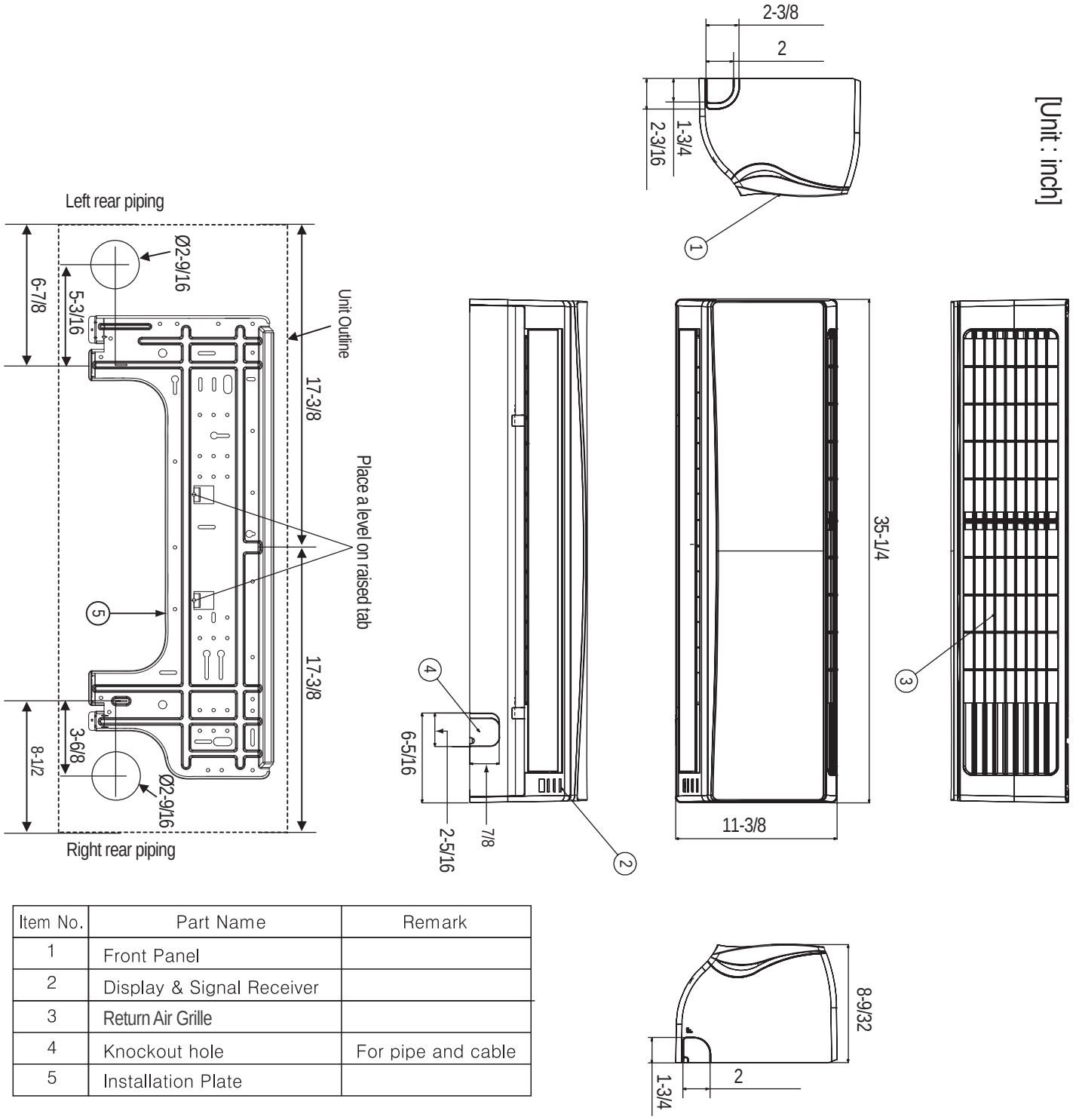
[4]Sound pressure levels are tested in an anechoic chamber under ISO Standard 3745 and are the same in both cooling and heating mode. These values can increase due to ambient conditions during operation.

[5]All power wiring / communications cable to the IDUs be minimum 18 AWG, 4-conductor, stranded, shielded or unshielded (if shielded, must be grounded to chassis at ODU only) and must comply with applicable local and national codes.

STANDARD WALL-MOUNTED INDOOR UNITS

Dimensions

Figure 68: LMN078HVT and LMN158HVT Dimensions.

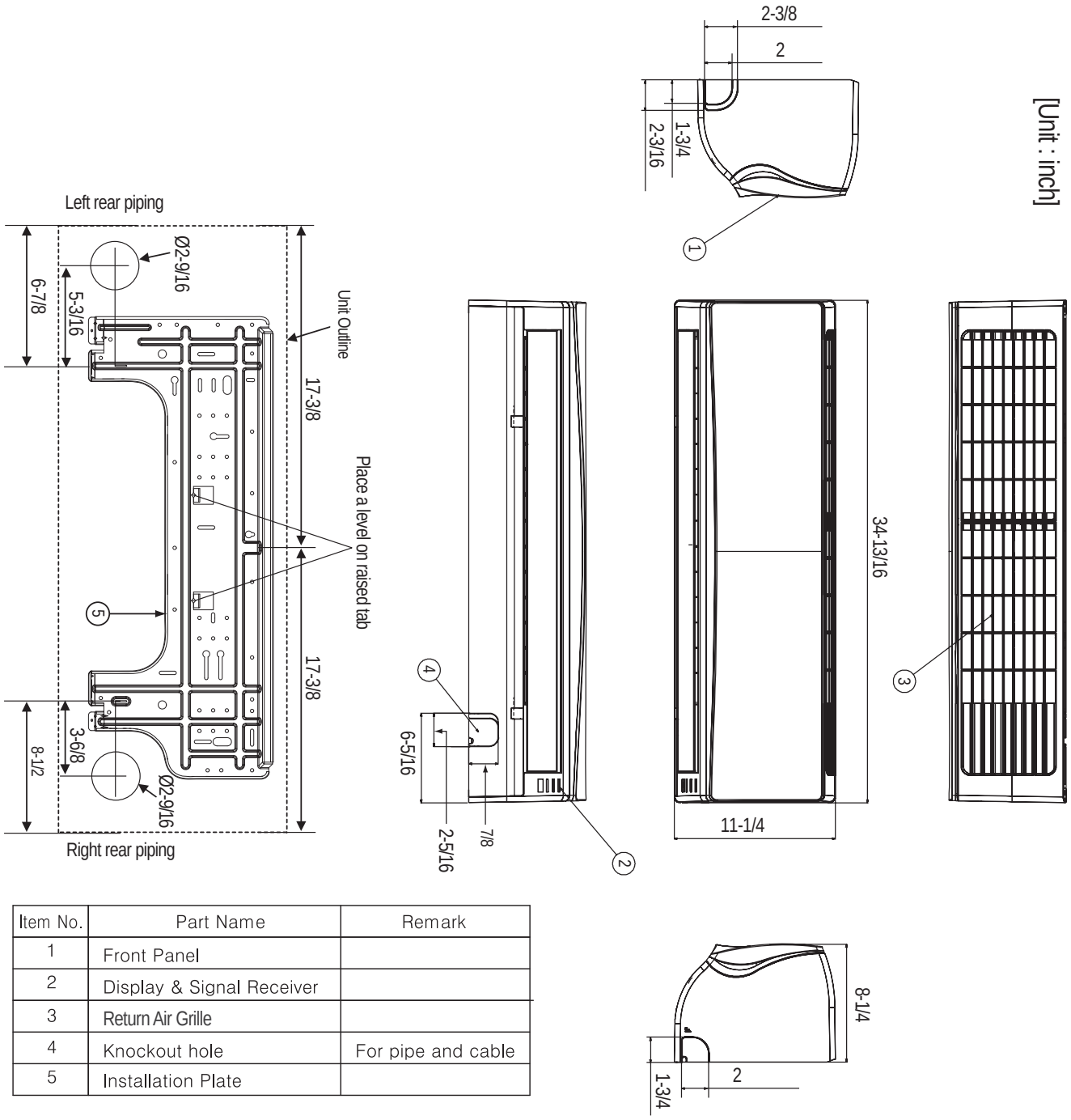


Item No.	Part Name	Remark
1	Front Panel	
2	Display & Signal Receiver	
3	Return Air Grille	
4	Knockout hole	For pipe and cable
5	Installation Plate	

STANDARD WALL-MOUNTED INDOOR UNITS

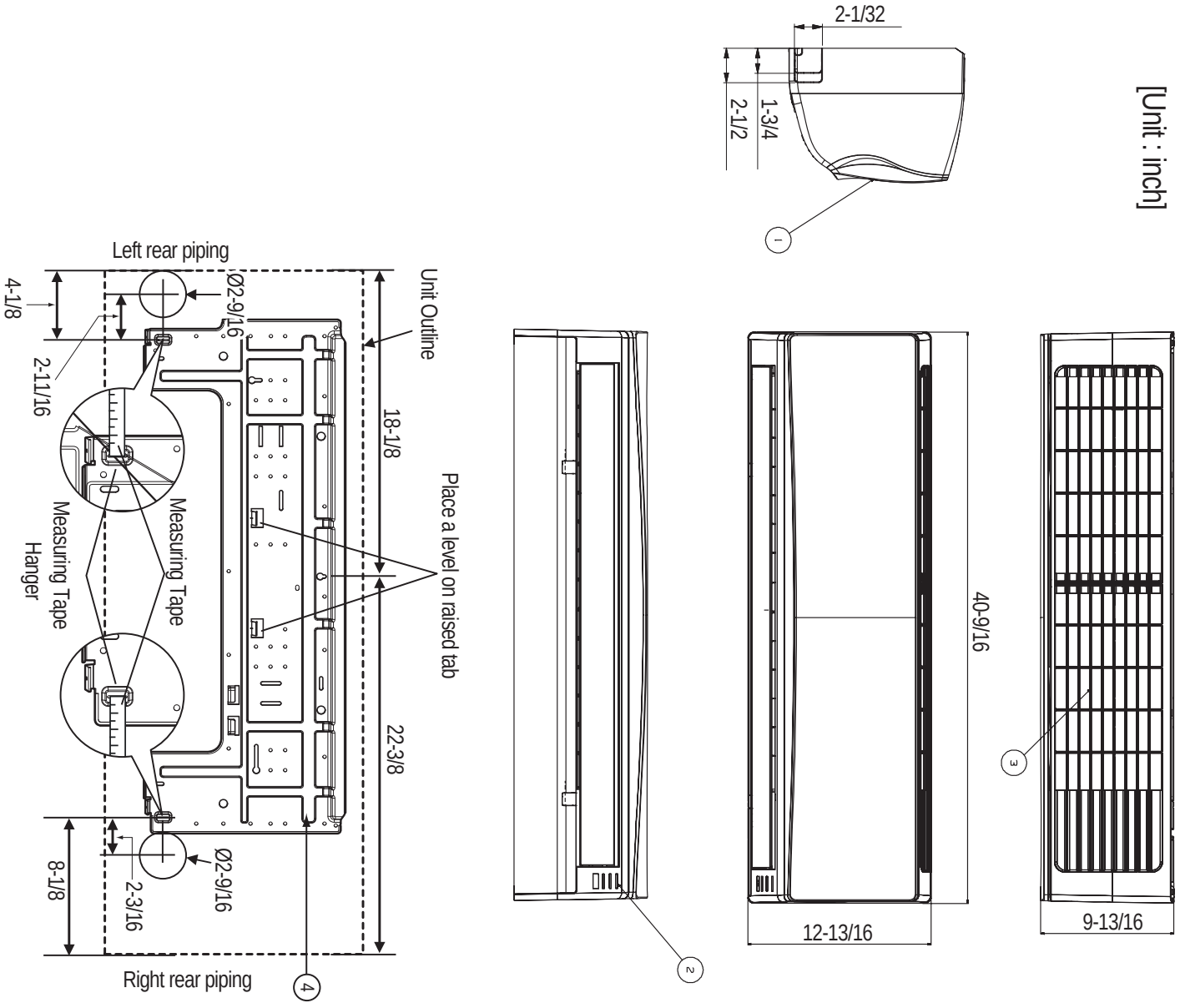
Dimensions

Figure 69: LSN090HSV4 and LSN120HSV4 Dimensions.



Item No.	Part Name	Remark
1	Front Panel	
2	Display & Signal Receiver	
3	Return Air Grille	
4	Knockout hole	For pipe and cable
5	Installation Plate	

Figure 70: LSN180HSV4 and LMN248HVT Dimensions.



Item No.	Part Name	Remark
1	Front Panel	
2	Display & Signal Receiver	
3	Return Air Grille	
4	Installation Plate	

STANDARD WALL-MOUNTED INDOOR UNITS

Cooling Capacity Table

Table 22: Multi F Standard Wall-Mounted Indoor Units Cooling Capacity Table.

Model No. / Nominal Capacity of Indoor Unit (Btu/h)	Outdoor Air Temp. (°F DB)	Indoor Air Temp. °F DB / °F WB											
		68 / 57		73 / 61		77 / 64		80 / 67		86 / 72		90 / 75	
		TC	SHC	TC	SHC	TC	SHC	TC	SHC	TC	SHC	TC	SHC
LMN078HVT 7,000	14	6.86	4.68	7.29	4.95	7.71	4.79	8.02	4.89	8.57	4.93	8.99	5.03
	20	6.86	4.72	7.28	4.99	7.71	4.83	8.02	4.93	8.56	4.97	8.99	5.06
	25	6.85	4.76	7.28	5.02	7.70	4.86	8.01	4.97	8.55	5.01	8.98	5.10
	30	6.85	4.79	7.27	5.06	7.70	4.90	8.00	5.01	8.55	5.05	8.97	5.14
	35	6.84	4.83	7.27	5.10	7.69	4.94	8.00	5.04	8.54	5.09	8.97	5.18
	40	6.84	4.87	7.26	5.14	7.68	4.98	7.99	5.08	8.53	5.12	8.96	5.22
	45	6.83	4.90	7.25	5.18	7.68	5.01	7.99	5.12	8.53	5.16	8.95	5.26
	50	6.83	4.94	7.25	5.22	7.67	5.05	7.98	5.16	8.52	5.20	8.94	5.30
	55	6.82	4.97	7.24	5.25	7.67	5.09	7.97	5.19	8.51	5.24	8.94	5.34
	60	6.81	5.01	7.24	5.29	7.66	5.12	7.97	5.23	8.51	5.28	8.93	5.38
	65	6.81	5.05	7.23	5.33	7.66	5.16	7.96	5.27	8.50	5.31	8.92	5.42
	70	6.80	5.08	7.23	5.37	7.65	5.20	7.95	5.31	8.49	5.35	8.92	5.45
	75	6.64	5.00	7.06	5.29	7.48	5.13	7.79	5.24	8.33	5.29	8.75	5.39
	80	6.48	4.91	6.90	5.20	7.32	5.05	7.62	5.16	8.16	5.22	8.58	5.33
	85	6.31	4.82	6.73	5.12	7.15	4.97	7.46	5.09	7.99	5.15	8.41	5.26
	90	6.15	4.73	6.57	5.03	6.99	4.89	7.29	5.01	7.83	5.08	8.24	5.19
	95	5.98	4.68	6.39	4.98	6.81	4.85	**7.00**	**4.90**	7.64	5.05	8.06	5.17
	100	5.83	4.56	6.25	4.86	6.66	4.74	6.91	4.82	7.50	4.94	7.91	5.06
	105	5.69	4.43	6.10	4.73	6.52	4.62	6.82	4.75	7.35	4.83	7.77	4.96
	110	5.54	4.28	5.96	4.58	6.37	4.48	6.67	4.61	7.21	4.70	7.62	4.82
	115	5.39	4.15	5.81	4.45	6.23	4.36	6.53	4.49	7.06	4.58	7.48	4.71
	118	5.31	4.12	5.72	4.42	6.14	4.34	6.44	4.47	6.97	4.57	7.39	4.70
	122	5.28	4.11	5.69	4.41	6.11	4.33	6.41	4.46	6.94	4.56	7.36	4.70
LSN090HSV4 9,000	14	8.82	6.04	9.37	6.38	9.92	6.18	10.31	6.31	11.01	6.36	11.56	6.48
	20	8.82	6.09	9.36	6.43	9.91	6.23	10.31	6.36	11.01	6.41	11.55	6.53
	25	8.81	6.13	9.36	6.48	9.90	6.27	10.30	6.41	11.00	6.46	11.54	6.58
	30	8.80	6.18	9.35	6.53	9.90	6.32	10.29	6.46	10.99	6.51	11.54	6.63
	35	8.80	6.23	9.34	6.58	9.89	6.37	10.28	6.50	10.98	6.56	11.53	6.68
	40	8.79	6.28	9.33	6.63	9.88	6.42	10.27	6.55	10.97	6.61	11.52	6.73
	45	8.78	6.32	9.33	6.68	9.87	6.47	10.27	6.60	10.96	6.66	11.51	6.78
	50	8.78	6.37	9.32	6.73	9.87	6.51	10.26	6.65	10.96	6.71	11.50	6.83
	55	8.77	6.42	9.31	6.78	9.86	6.56	10.25	6.70	10.95	6.76	11.49	6.88
	60	8.76	6.46	9.31	6.83	9.85	6.61	10.24	6.75	10.94	6.81	11.48	6.93
	65	8.76	6.51	9.30	6.88	9.84	6.66	10.24	6.80	10.93	6.85	11.47	6.98
	70	8.75	6.56	9.29	6.92	9.84	6.70	10.23	6.85	10.92	6.90	11.47	7.03
	75	8.54	6.45	9.08	6.82	9.62	6.61	10.01	6.75	10.71	6.82	11.25	6.96
	80	8.33	6.34	8.87	6.71	9.41	6.51	9.80	6.66	10.49	6.73	11.03	6.87
	85	8.12	6.22	8.66	6.60	9.20	6.41	9.59	6.56	10.28	6.64	10.82	6.79
	90	7.91	6.10	8.45	6.48	8.99	6.31	9.37	6.46	10.06	6.55	10.60	6.70
	95	7.68	6.04	8.22	6.43	8.75	6.26	**9.00**	**6.32**	9.83	6.52	10.36	6.67
	100	7.50	5.88	8.03	6.26	8.57	6.11	8.88	6.22	9.64	6.37	10.17	6.53
	105	7.31	5.72	7.84	6.10	8.38	5.96	8.77	6.12	9.45	6.23	9.99	6.39
	110	7.12	5.52	7.66	5.90	8.19	5.78	8.58	5.94	9.26	6.06	9.80	6.22
	115	6.94	5.36	7.47	5.74	8.01	5.63	8.39	5.79	9.08	5.91	9.61	6.08
	118	6.82	5.32	7.36	5.70	7.89	5.60	8.28	5.76	8.96	5.89	9.50	6.06
	122	6.79	5.30	7.32	5.69	7.86	5.59	8.24	5.76	8.93	5.89	9.46	6.06

TC = Total Capacity (kBtu/h).

SHC: Sensible Heat Capacity (kBtu/h).

Nominal capacity as rated 0 ft. above sea level and a 0 ft. level difference between outdoor and indoor units. Corresponding refrigerant piping length is accordance with standard length of each outdoor unit.

Nominal 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).

The shaded table columns and rows indicate reference data. When operating at this temperature, these values can be different if the system is not running consistently.

STANDARD WALL-MOUNTED INDOOR UNITS

Cooling Capacity Table

Table 23: Multi F Standard Wall-Mounted Indoor Units Cooling Capacity Table (continued).

Model No. / Nominal Capacity of Indoor Unit (Btu/h)	Outdoor Air Temp. (°F DB)	Indoor Air Temp. °F DB / °F WB											
		68 / 57		73 / 61		77 / 64		80 / 67		86 / 72		90 / 75	
		TC	SHC	TC	SHC	TC	SHC	TC	SHC	TC	SHC	TC	SHC
LSN120HSV4 12,000	14	11.76	8.51	12.49	8.99	13.22	8.70	13.75	8.88	14.69	8.96	15.42	9.13
	20	11.75	8.57	12.48	9.06	13.21	8.77	13.74	8.95	14.67	9.03	15.40	9.20
	25	11.75	8.64	12.48	9.13	13.20	8.84	13.73	9.02	14.66	9.10	15.39	9.27
	30	11.74	8.71	12.47	9.20	13.19	8.90	13.72	9.09	14.65	9.17	15.38	9.34
	35	11.73	8.77	12.46	9.27	13.18	8.97	13.71	9.16	14.64	9.24	15.37	9.41
	40	11.72	8.84	12.45	9.34	13.17	9.04	13.70	9.23	14.63	9.31	15.36	9.48
	45	11.71	8.90	12.44	9.41	13.16	9.11	13.69	9.30	14.62	9.38	15.35	9.55
	50	11.70	8.97	12.43	9.47	13.15	9.17	13.68	9.37	14.61	9.45	15.33	9.62
	55	11.69	9.03	12.42	9.54	13.14	9.24	13.67	9.44	14.60	9.52	15.32	9.70
	60	11.68	9.10	12.41	9.61	13.13	9.31	13.66	9.50	14.59	9.58	15.31	9.77
	65	11.67	9.17	12.40	9.68	13.12	9.38	13.65	9.57	14.57	9.65	15.30	9.84
	70	11.66	9.23	12.39	9.75	13.11	9.44	13.64	9.64	14.56	9.72	15.29	9.91
	75	11.38	9.08	12.11	9.60	12.83	9.31	13.35	9.51	14.27	9.60	15.00	9.79
	80	11.10	8.92	11.82	9.45	12.55	9.17	13.07	9.38	13.99	9.48	14.71	9.68
	85	10.83	8.76	11.54	9.29	12.26	9.03	12.78	9.24	13.70	9.36	14.42	9.56
	90	10.55	8.60	11.26	9.13	11.98	8.88	12.50	9.10	13.42	9.22	14.13	9.43
	95	10.25	8.51	10.96	9.05	11.67	8.82	**12.00**	**8.90**	13.10	9.18	13.81	9.39
	100	10.00	8.28	10.71	8.82	11.42	8.61	11.84	8.76	12.85	8.98	13.56	9.20
	105	9.75	8.05	10.46	8.59	11.17	8.40	11.69	8.62	12.60	8.78	13.31	9.01
	110	9.50	7.77	10.21	8.31	10.92	8.14	11.44	8.37	12.35	8.53	13.07	8.76
	115	9.25	7.54	9.96	8.08	10.67	7.92	11.19	8.15	12.10	8.33	12.82	8.56
	118	9.10	7.49	9.81	8.03	10.52	7.88	11.04	8.12	11.95	8.30	12.67	8.54
	122	9.05	7.47	9.76	8.01	10.48	7.87	10.99	8.11	11.90	8.29	12.62	8.53
LMN158HVT 14,300	14	14.02	10.23	14.89	10.80	15.76	10.46	16.39	10.68	17.50	10.77	18.37	10.97
	20	14.01	10.31	14.88	10.89	15.75	10.54	16.38	10.76	17.49	10.85	18.36	11.06
	25	14.00	10.39	14.87	10.97	15.74	10.62	16.36	10.85	17.47	10.94	18.34	11.15
	30	13.99	10.47	14.85	11.06	15.72	10.70	16.35	10.93	17.46	11.02	18.33	11.23
	35	13.98	10.55	14.84	11.14	15.71	10.79	16.34	11.01	17.45	11.11	18.32	11.32
	40	13.96	10.62	14.83	11.22	15.70	10.87	16.33	11.10	17.43	11.19	18.30	11.40
	45	13.95	10.70	14.82	11.31	15.69	10.95	16.31	11.18	17.42	11.27	18.29	11.49
	50	13.94	10.78	14.81	11.39	15.68	11.03	16.30	11.26	17.41	11.36	18.27	11.57
	55	13.93	10.86	14.80	11.47	15.66	11.11	16.29	11.34	17.39	11.44	18.26	11.66
	60	13.92	10.94	14.79	11.56	15.65	11.19	16.28	11.43	17.38	11.52	18.25	11.74
	65	13.91	11.02	14.78	11.64	15.64	11.27	16.26	11.51	17.37	11.61	18.23	11.83
	70	13.90	11.10	14.76	11.72	15.63	11.35	16.25	11.59	17.35	11.69	18.22	11.91
	75	13.57	10.92	14.43	11.55	15.29	11.19	15.91	11.44	17.01	11.55	17.87	11.78
	80	13.23	10.73	14.09	11.36	14.95	11.03	15.57	11.28	16.67	11.40	17.53	11.64
	85	12.90	10.53	13.76	11.17	14.61	10.86	15.23	11.11	16.33	11.25	17.18	11.49
	90	12.57	10.33	13.42	10.98	14.28	10.68	14.90	10.94	15.99	11.09	16.84	11.34
	95	12.21	10.23	13.06	10.88	13.91	10.60	**14.30**	**10.70**	15.61	11.03	16.46	11.29
	100	11.91	9.95	12.76	10.60	13.61	10.35	14.11	10.53	15.31	10.79	16.16	11.06
	105	11.61	9.68	12.46	10.33	13.32	10.09	13.93	10.37	15.02	10.56	15.87	10.83
	110	11.32	9.35	12.17	10.00	13.02	9.78	13.63	10.06	14.72	10.26	15.57	10.53
	115	11.02	9.07	11.87	9.71	12.72	9.52	13.33	9.80	14.42	10.01	15.27	10.29
	118	10.84	9.00	11.69	9.66	12.54	9.48	13.16	9.76	14.24	9.98	15.09	10.26
	122	10.78	8.98	11.63	9.64	12.48	9.46	13.10	9.74	14.18	9.97	15.03	10.25

TC = Total Capacity (kBtu/h).

SHC: Sensible Heat Capacity (kBtu/h).

Nominal capacity as rated 0 ft. above sea level and a 0 ft. level difference between outdoor and indoor units. Corresponding refrigerant piping length is accordance with standard length of each outdoor unit.

Nominal 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).

The shaded table columns and rows indicate reference data. When operating at this temperature, these values can be different if the system is not running consistently.

STANDARD WALL-MOUNTED INDOOR UNITS

Cooling Capacity Table

Table 24: Multi F Standard Wall-Mounted Indoor Units Cooling Capacity Table (continued).

Model No. / Nominal Capacity of Indoor Unit (Btu/h)	Outdoor Air Temp. (°F DB)	Indoor Air Temp. °F DB / °F WB											
		68 / 57		73 / 61		77 / 64		80 / 67		86 / 72		90 / 75	
		TC	SHC	TC	SHC	TC	SHC	TC	SHC	TC	SHC	TC	SHC
LSN180HSV4 18,000	14	17.65	12.33	18.74	13.02	19.84	12.61	20.63	12.88	22.03	12.98	23.12	13.23
	20	17.63	12.43	18.73	13.13	19.82	12.71	20.61	12.98	22.01	13.09	23.11	13.33
	25	17.62	12.52	18.71	13.23	19.81	12.81	20.60	13.08	22.00	13.19	23.09	13.44
	30	17.60	12.62	18.70	13.33	19.79	12.91	20.58	13.18	21.98	13.29	23.07	13.54
	35	17.59	12.71	18.68	13.43	19.78	13.00	20.57	13.28	21.96	13.39	23.05	13.64
	40	17.58	12.81	18.67	13.53	19.76	13.10	20.55	13.38	21.94	13.49	23.04	13.75
	45	17.56	12.90	18.66	13.63	19.75	13.20	20.53	13.48	21.93	13.59	23.02	13.85
	50	17.55	13.00	18.64	13.73	19.73	13.30	20.52	13.58	21.91	13.69	23.00	13.95
	55	17.54	13.10	18.63	13.83	19.72	13.39	20.50	13.68	21.89	13.79	22.98	14.05
	60	17.52	13.19	18.61	13.93	19.70	13.49	20.49	13.78	21.88	13.89	22.97	14.16
	65	17.51	13.29	18.60	14.03	19.69	13.59	20.47	13.87	21.86	13.99	22.95	14.26
	70	17.50	13.38	18.58	14.13	19.67	13.69	20.46	13.97	21.84	14.09	22.93	14.36
	75	17.08	13.16	18.16	13.92	19.24	13.49	20.03	13.79	21.41	13.92	22.50	14.20
	80	16.66	12.93	17.74	13.70	18.82	13.30	19.60	13.60	20.98	13.75	22.06	14.03
	85	16.24	12.70	17.32	13.47	18.40	13.09	19.17	13.40	20.55	13.56	21.63	13.85
	90	15.82	12.46	16.90	13.23	17.97	12.88	18.75	13.19	20.12	13.37	21.20	13.67
	95	15.37	12.33	16.44	13.12	17.51	12.78	**18.00**	**12.90**	19.65	13.30	20.72	13.61
	100	14.99	12.00	16.06	12.78	17.13	12.47	17.77	12.70	19.28	13.01	20.35	13.33
	105	14.62	11.67	15.69	12.45	16.76	12.17	17.53	12.50	18.90	12.73	19.97	13.05
	110	14.24	11.27	15.32	12.05	16.39	11.79	17.16	12.13	18.53	12.36	19.60	12.70
	115	13.87	10.93	14.94	11.71	16.01	11.48	16.79	11.82	18.15	12.07	19.22	12.41
	118	13.65	10.85	14.72	11.64	15.79	11.42	16.56	11.77	17.93	12.03	19.00	12.37
	122	13.57	10.83	14.64	11.62	15.71	11.40	16.49	11.75	17.85	12.01	18.92	12.36
LMN248HVT 24,000	14	23.53	16.82	24.99	17.77	26.45	17.21	27.50	17.57	29.37	17.72	30.83	18.05
	20	23.51	16.95	24.97	17.91	26.43	17.34	27.48	17.70	29.35	17.85	30.81	18.19
	25	23.49	17.08	24.95	18.05	26.41	17.47	27.46	17.84	29.33	17.99	30.79	18.33
	30	23.47	17.21	24.93	18.19	26.39	17.61	27.44	17.98	29.30	18.13	30.76	18.47
	35	23.46	17.35	24.91	18.32	26.37	17.74	27.42	18.12	29.28	18.27	30.74	18.61
	40	23.44	17.48	24.89	18.46	26.35	17.88	27.40	18.25	29.26	18.41	30.72	18.75
	45	23.42	17.61	24.87	18.60	26.33	18.01	27.38	18.39	29.24	18.54	30.69	18.89
	50	23.40	17.74	24.85	18.74	26.31	18.14	27.36	18.52	29.21	18.68	30.67	19.03
	55	23.38	17.87	24.84	18.87	26.29	18.27	27.34	18.66	29.19	18.82	30.64	19.17
	60	23.37	18.00	24.82	19.01	26.27	18.41	27.32	18.79	29.17	18.95	30.62	19.31
	65	23.35	18.13	24.80	19.15	26.25	18.54	27.29	18.93	29.15	19.09	30.60	19.45
	70	23.33	18.26	24.78	19.28	26.23	18.67	27.27	19.07	29.13	19.23	30.57	19.59
	75	22.77	17.95	24.21	18.99	25.66	18.41	26.70	18.81	28.55	18.99	29.99	19.37
	80	22.21	17.65	23.65	18.69	25.09	18.14	26.13	18.55	27.97	18.75	29.42	19.14
	85	21.65	17.33	23.09	18.38	24.53	17.86	25.57	18.28	27.40	18.50	28.84	18.90
	90	21.09	17.00	22.53	18.06	23.96	17.57	25.00	18.00	26.83	18.24	28.27	18.65
	95	20.49	16.82	21.92	17.89	23.35	17.44	**24.00**	**17.60**	26.20	18.14	27.63	18.57
	100	19.99	16.37	21.42	17.44	22.85	17.02	23.69	17.33	25.70	17.75	27.13	18.19
	105	19.49	15.92	20.92	16.99	22.35	16.60	23.38	17.06	25.20	17.36	26.63	17.81
	110	18.99	15.38	20.42	16.44	21.85	16.09	22.88	16.55	24.70	16.87	26.13	17.32
	115	18.49	14.91	19.92	15.98	21.35	15.66	22.38	16.12	24.20	16.47	25.63	16.93
	118	18.19	14.81	19.62	15.88	21.05	15.59	22.08	16.05	23.90	16.41	25.33	16.88
	122	18.10	14.77	19.52	15.85	20.95	15.56	21.98	16.03	23.81	16.39	25.23	16.86

TC = Total Capacity (kBtu/h).

SHC: Sensible Heat Capacity (kBtu/h).

Nominal capacity as rated 0 ft. above sea level and a 0 ft. level difference between outdoor and indoor units. Corresponding refrigerant piping length is accordance with standard length of each outdoor unit.

Nominal 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).

The shaded table columns and rows indicate reference data. When operating at this temperature, these values can be different if the system is not running consistently.

STANDARD WALL-MOUNTED INDOOR UNITS

Heating Capacity Table

MULTI F
MULTI F MAX

Table 25: Multi F Standard Wall-Mounted Indoor Units Heating Capacity Table.

Model No. / Nominal Capacity of Indoor Unit (Btu/h)	Outdoor Air Temp.		Indoor Air Temp. °F DB					
	°F DB	°F WB	61	64	68	70	72	75
			TC	TC	TC	TC	TC	TC
LMN078HVT 7,000	0	-0.4	4.17	4.11	4.07	4.05	3.99	3.82
	5	4.5	4.70	4.64	4.60	4.58	4.52	4.34
	10	9	5.22	5.17	5.13	5.11	5.05	4.87
	17	15	5.93	5.87	5.83	**5.81**	5.75	5.56
	20	19	6.19	6.13	6.09	6.08	6.02	5.81
	25	23	6.63	6.57	6.53	6.52	6.46	6.22
	30	28	7.01	6.96	6.92	6.90	6.84	6.63
	35	32	7.40	7.34	7.30	7.28	7.22	7.04
	40	36	7.74	7.68	7.64	7.62	7.56	7.39
	45	41	8.08	8.02	7.98	7.96	7.90	7.73
	47	43	8.22	8.16	8.12	**8.10**	8.04	7.87
	50	46	8.35	8.29	8.25	8.23	8.17	7.98
	55	51	8.57	8.51	8.47	8.45	8.39	8.16
	60	56	8.57	8.51	8.47	8.45	8.39	8.20
	63	59	8.57	8.51	8.47	8.45	8.39	8.22
	68	64	8.57	8.51	8.47	8.45	8.39	8.25
LSN090HSV4 9,000	0	-0.4	5.35	5.28	5.23	5.20	5.12	4.90
	5	4.5	6.03	5.95	5.90	5.88	5.80	5.58
	10	9	6.71	6.63	6.58	6.56	6.48	6.26
	17	15	7.61	7.54	7.49	**7.46**	7.39	7.14
	20	19	7.95	7.88	7.83	7.80	7.72	7.46
	25	23	8.52	8.44	8.39	8.37	8.29	7.99
	30	28	9.01	8.93	8.88	8.86	8.78	8.52
	35	32	9.50	9.42	9.37	9.34	9.27	9.04
	40	36	9.94	9.86	9.81	9.78	9.71	9.48
	45	41	10.37	10.30	10.25	10.22	10.15	9.92
	47	43	10.55	10.48	10.43	**10.40**	10.32	10.10
	50	46	10.72	10.64	10.59	10.57	10.49	10.24
	55	51	11.00	10.93	10.88	10.85	10.78	10.48
	60	56	11.00	10.93	10.88	10.85	10.78	10.52
	63	59	11.00	10.93	10.88	10.85	10.78	10.55
	68	64	11.00	10.93	10.88	10.85	10.78	10.60
LSN120HSV4 12,000	0	-0.4	7.10	7.00	6.93	6.90	6.80	6.50
	5	4.5	8.00	7.90	7.83	7.80	7.70	7.40
	10	9	8.90	8.80	8.73	8.70	8.60	8.30
	17	15	10.10	10.00	9.93	**9.90**	9.80	9.48
	20	19	10.55	10.45	10.38	10.35	10.25	9.90
	25	23	11.30	11.20	11.13	11.10	11.00	10.60
	30	28	11.95	11.85	11.78	11.75	11.65	11.30
	35	32	12.60	12.50	12.43	12.40	12.30	12.00
	40	36	13.18	13.08	13.02	12.98	12.88	12.58
	45	41	13.77	13.67	13.60	13.57	13.47	13.17
	47	43	14.00	13.90	13.83	**13.80**	13.70	13.40
	50	46	14.23	14.13	14.06	14.03	13.93	13.59
	55	51	14.60	14.50	14.43	14.40	14.30	13.90
	60	56	14.60	14.50	14.43	14.40	14.30	13.96
	63	59	14.60	14.50	14.43	14.40	14.30	14.00
	68	64	14.60	14.50	14.43	14.40	14.30	14.06

TC = Total Capacity (kBtu/h).

Nominal capacity as rated 0 ft. above sea level and a 0 ft. level difference between outdoor and indoor units. Corresponding refrigerant piping length is accordance with standard length of each outdoor unit.

Nominal 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).

STANDARD WALL-MOUNTED INDOOR UNITS

Heating Capacity Table

Table 26: Multi F Standard Wall-Mounted Indoor Units Heating Capacity Table.

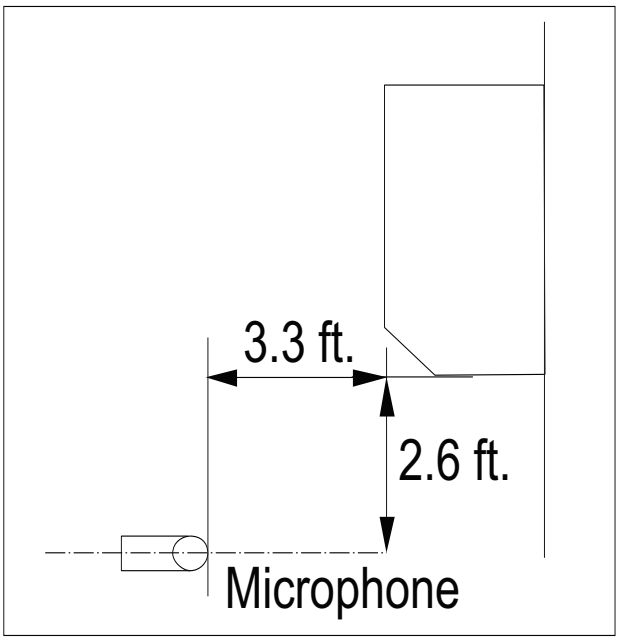
Model No. / Nominal Capacity of Indoor Unit (Btu/h)	Outdoor Air Temp.		Indoor Air Temp. °F DB					
	°F DB	°F WB	61	64	68	70	72	75
			TC	TC	TC	TC	TC	TC
LMN158HVT 14,300	0	-0.4	8.49	8.37	8.29	8.25	8.13	7.77
	5	4.5	9.57	9.45	9.37	9.33	9.21	8.85
	10	9	10.64	10.52	10.44	10.40	10.28	9.92
	17	15	12.08	11.96	11.88	**11.84**	11.72	11.33
	20	19	12.61	12.49	12.41	12.38	12.26	11.84
	25	23	13.51	13.39	13.31	13.27	13.15	12.67
	30	28	14.29	14.17	14.09	14.05	13.93	13.51
	35	32	15.07	14.95	14.87	14.83	14.71	14.35
	40	36	15.76	15.64	15.56	15.52	15.40	15.05
	45	41	16.46	16.34	16.26	16.22	16.10	15.74
	47	43	16.74	16.62	16.54	**16.50**	16.38	16.02
	50	46	17.01	16.89	16.81	16.77	16.65	16.25
	55	51	17.46	17.34	17.26	17.22	17.10	16.62
	60	56	17.46	17.34	17.26	17.22	17.10	16.69
	63	59	17.46	17.34	17.26	17.22	17.10	16.74
	68	64	17.46	17.34	17.26	17.22	17.10	16.81
LSN180HSV4 18,000	0	-0.4	10.70	10.55	10.45	10.40	10.25	9.80
	5	4.5	12.06	11.91	11.81	11.76	11.61	11.15
	10	9	13.41	13.26	13.16	13.11	12.96	12.51
	17	15	15.22	15.07	14.97	**14.92**	14.77	14.29
	20	19	15.90	15.75	15.65	15.60	15.45	14.92
	25	23	17.03	16.88	16.78	16.73	16.58	15.98
	30	28	18.01	17.86	17.76	17.71	17.56	17.03
	35	32	18.99	18.84	18.74	18.69	18.54	18.09
	40	36	19.87	19.72	19.62	19.57	19.42	18.97
	45	41	20.75	20.60	20.50	20.45	20.30	19.85
	47	43	21.10	20.95	20.85	**20.80**	20.65	20.20
	50	46	21.44	21.29	21.19	21.14	20.99	20.48
	55	51	22.01	21.86	21.75	21.70	21.55	20.95
	60	56	22.01	21.86	21.75	21.70	21.55	21.04
	63	59	22.01	21.86	21.75	21.70	21.55	21.10
	68	64	22.01	21.86	21.75	21.70	21.55	21.20
LMN248HVT 24,000	0	-0.4	13.89	13.70	13.57	13.50	13.30	12.72
	5	4.5	15.65	15.46	15.33	15.26	15.07	14.48
	10	9	17.41	17.22	17.09	17.02	16.83	16.24
	17	15	19.76	19.57	19.43	**19.37**	19.17	18.55
	20	19	20.64	20.45	20.32	20.25	20.05	19.37
	25	23	22.11	21.91	21.78	21.72	21.52	20.74
	30	28	23.38	23.18	23.05	22.99	22.79	22.11
	35	32	24.65	24.46	24.33	24.26	24.07	23.48
	40	36	25.79	25.60	25.47	25.40	25.21	24.62
	45	41	26.93	26.74	26.61	26.54	26.35	25.76
	47	43	27.39	27.20	27.07	**27.00**	26.80	26.22
	50	46	27.83	27.64	27.51	27.44	27.24	26.58
	55	51	28.57	28.37	28.24	28.17	27.98	27.20
	60	56	28.57	28.37	28.24	28.17	27.98	27.32
	63	59	28.57	28.37	28.24	28.17	27.98	27.39
	68	64	28.57	28.37	28.24	28.17	27.98	27.51

TC = Total Capacity (kBtu/h).

Nominal capacity as rated 0 ft. above sea level and a 0 ft. level difference between outdoor and indoor units. Corresponding refrigerant piping length is accordance with standard length of each outdoor unit.

Nominal 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).

Figure 71: Sound Pressure Level Measurement Location.



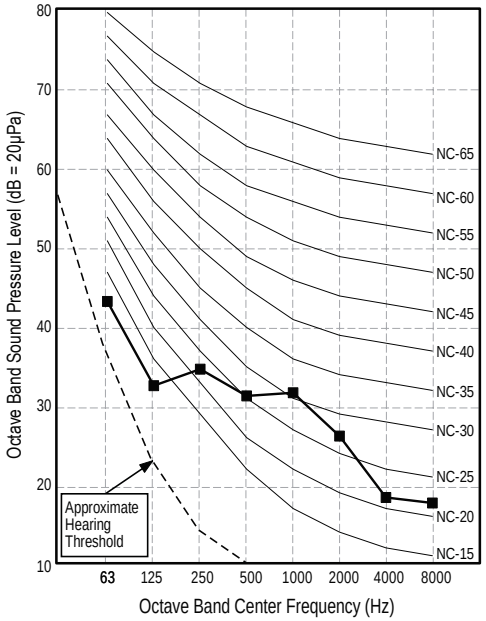
- Measurement taken 2.6' below the bottom of the unit and at a distance of 3.3' from face of unit.
- Measurements taken with no attenuation and units operating at full load normal operating condition.
- Sound level will vary depending on a range of factors such as construction (acoustic absorption coefficient) of particular area in which the equipment is installed.
- Sound power levels are measured in dB(A)±3.
- Tested in anechoic chamber per ISO Standard 3745.

Table 27: Sound Pressure Levels (dB[A]).

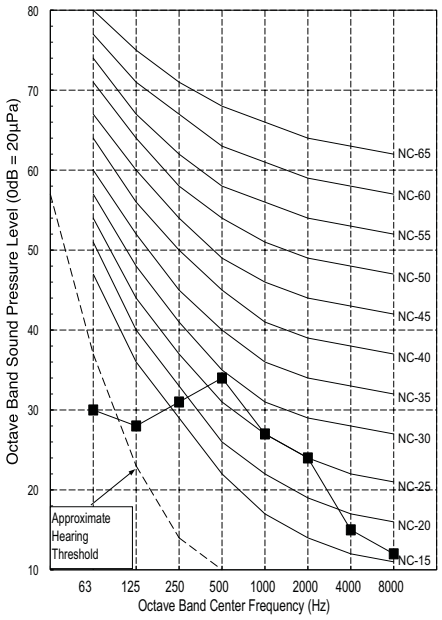
Model No.	Sound Pressure Levels (dB[A]) (Cooling and Heating)		
	High Fan Speed	Medium Fan Speed	Low Fan Speed
LMN078HVT	33	30	26
LSN090HSV4	33	30	27
LSN120HSV4	39	36	31
LMN158HVT	39	36	31
LSN180HSV4	37	33	28
LMN248HVT	42	39	36

Figure 72: LMN078HVT, LSN090HSV4, and LSN120HSV4 Sound Pressure Level Diagrams.

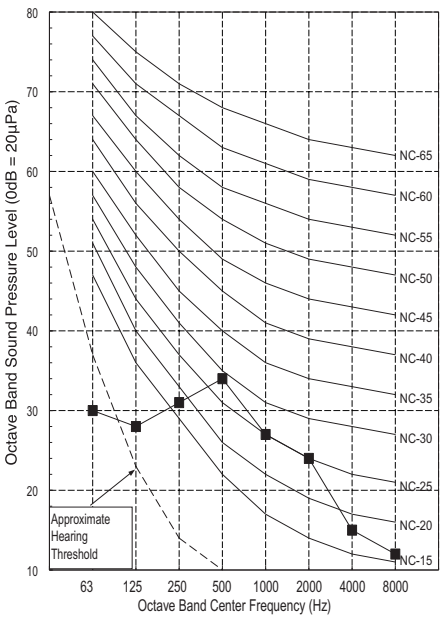
LMN078HVT



LSN090HSV4



LSN120HSV4

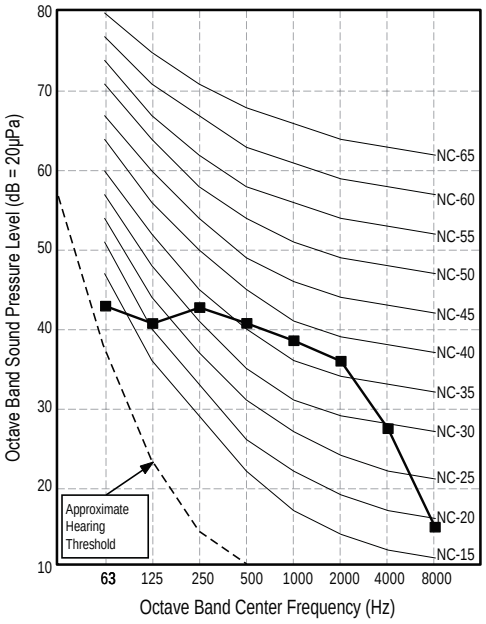


STANDARD WALL-MOUNTED INDOOR UNITS

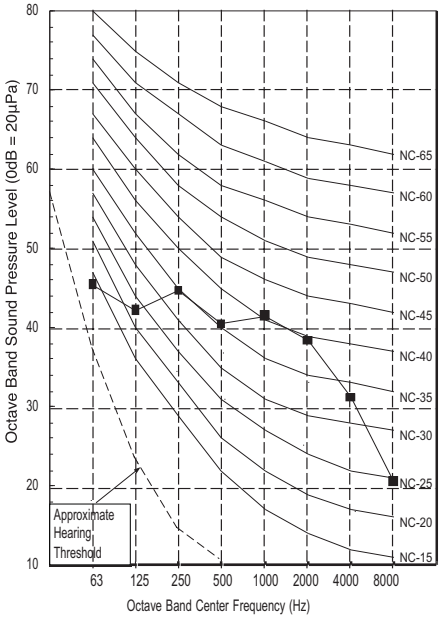
Acoustic Data

Figure 73: LMN158HVT, LSN180HSV4, and LMN248HVT Sound Pressure Level Diagrams.

LMN158HVT



LSN180HSV4



LMN248HVT

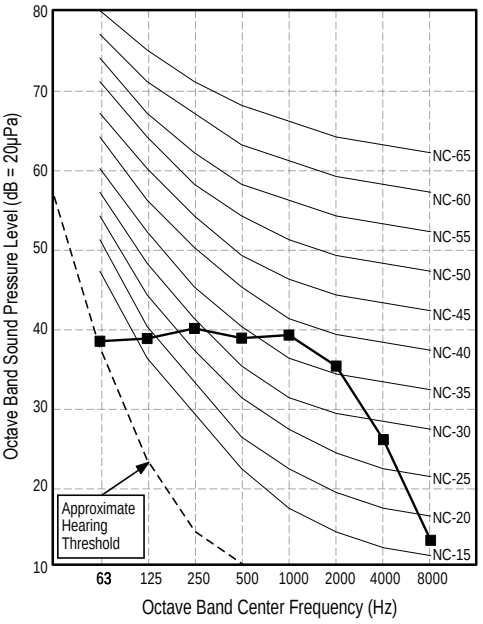
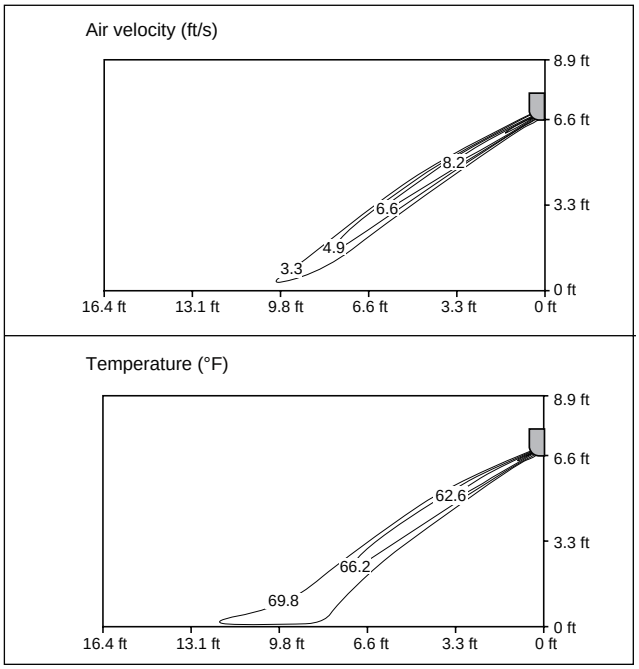


Figure 74: LMN078HVT Air Velocity and Temperature Distribution Charts.

Cooling

Discharge angle : 15°



Heating

Discharge angle : 40°

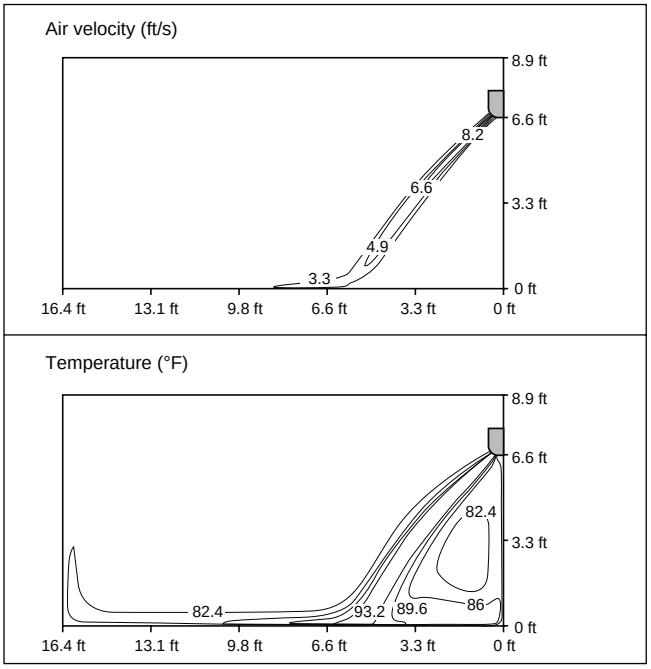
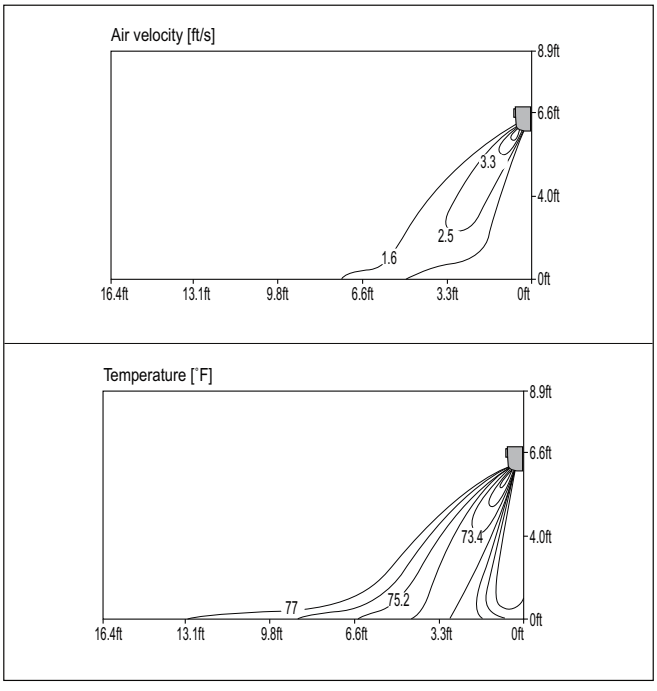


Figure 75: LSN090HSV4 Air Velocity and Temperature Distribution Charts.

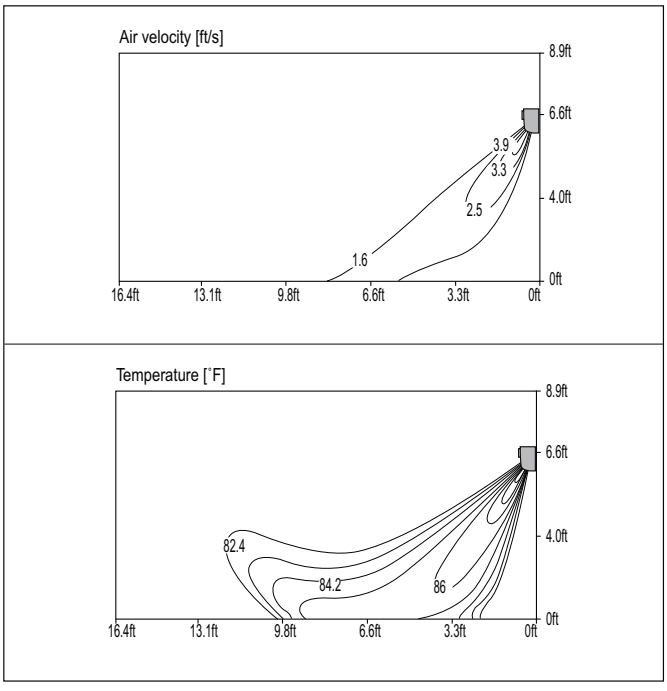
Cooling

Discharge angle:45°



Heating

Discharge angle:50°



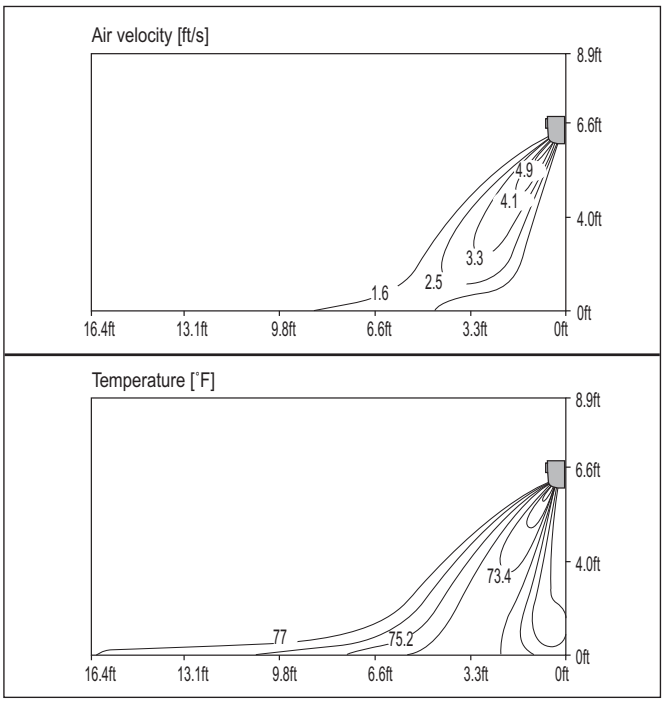
STANDARD WALL-MOUNTED INDOOR UNITS

Air Velocity and Temperature Distribution

Figure 76: LSN120HSV4 Air Velocity and Temperature Distribution Charts.

Cooling

Discharge angle:45°



Heating

Discharge angle:50°

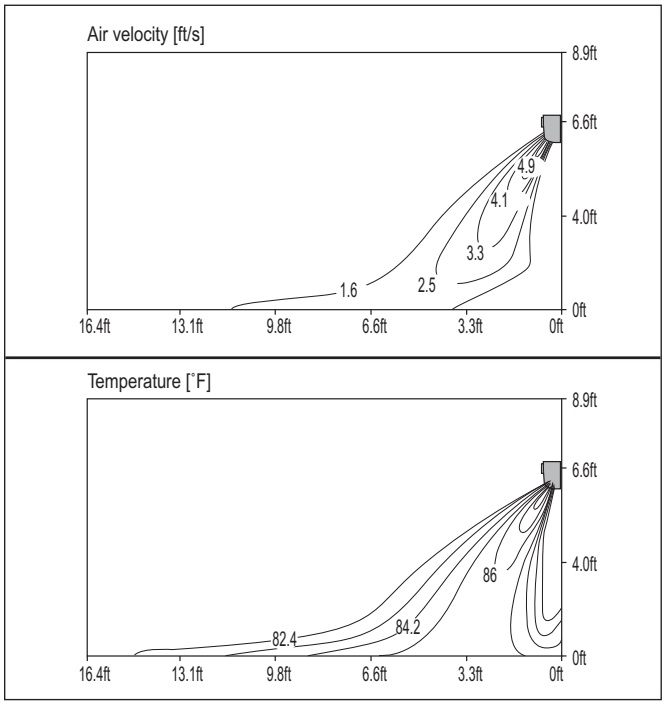
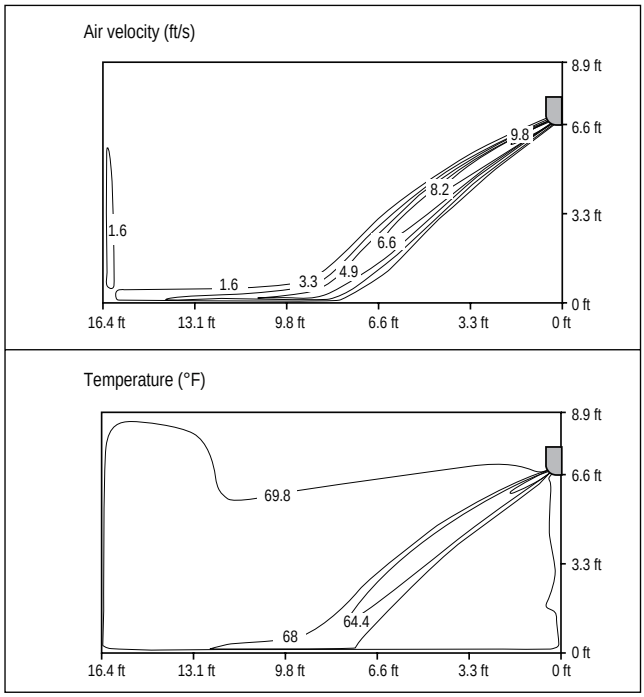


Figure 77: LMN158HVT Air Velocity and Temperature Distribution Charts.

Cooling

Discharge angle : 15°



Heating

Discharge angle : 40°

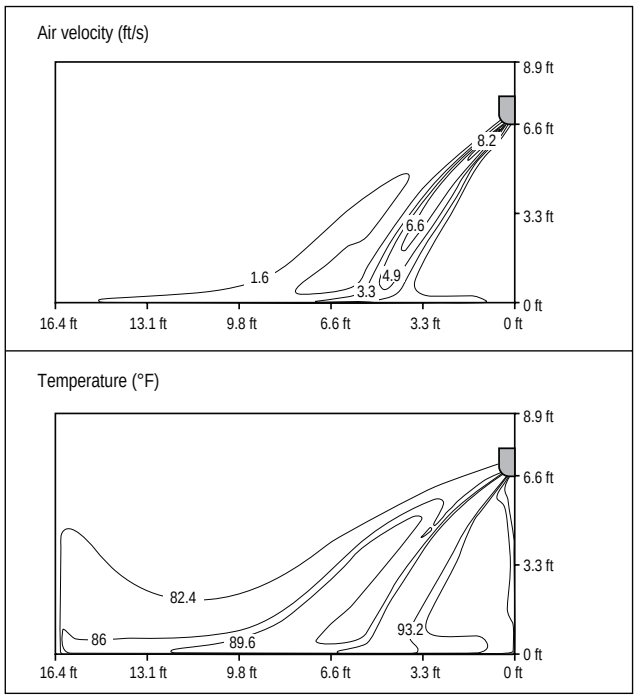
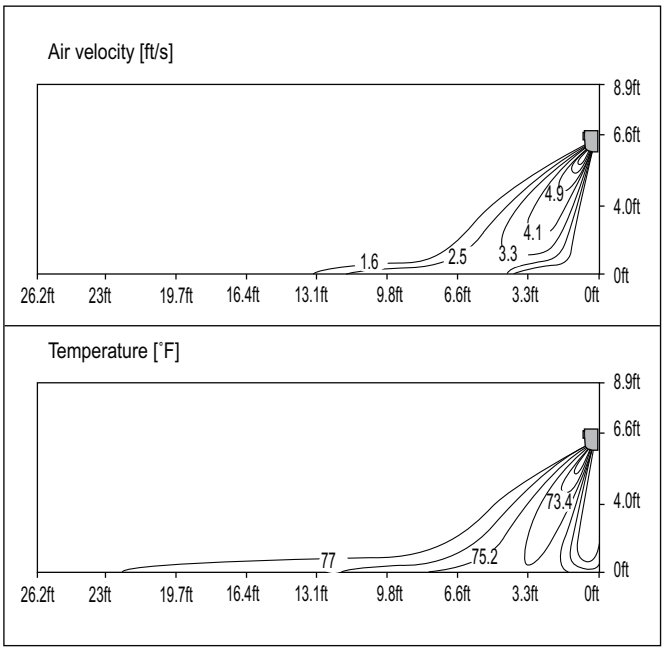


Figure 78: LSN180HSV4 Air Velocity and Temperature Distribution Charts.

Cooling

Discharge angle:45°



Heating

Discharge angle:50°

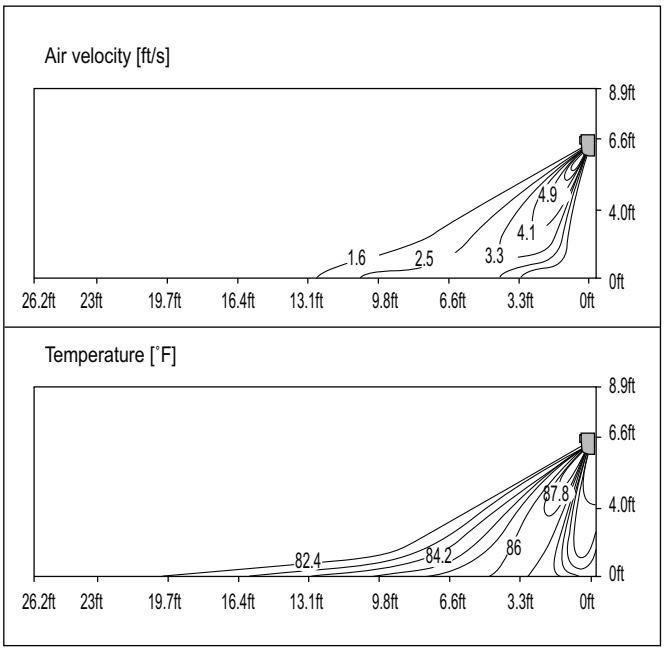
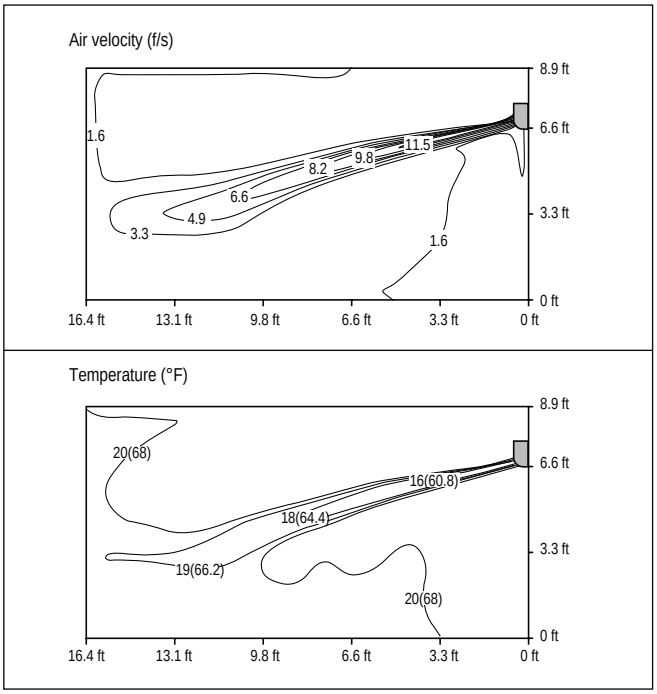


Figure 79: LMN248HVT Air Velocity and Temperature Distribution Charts.

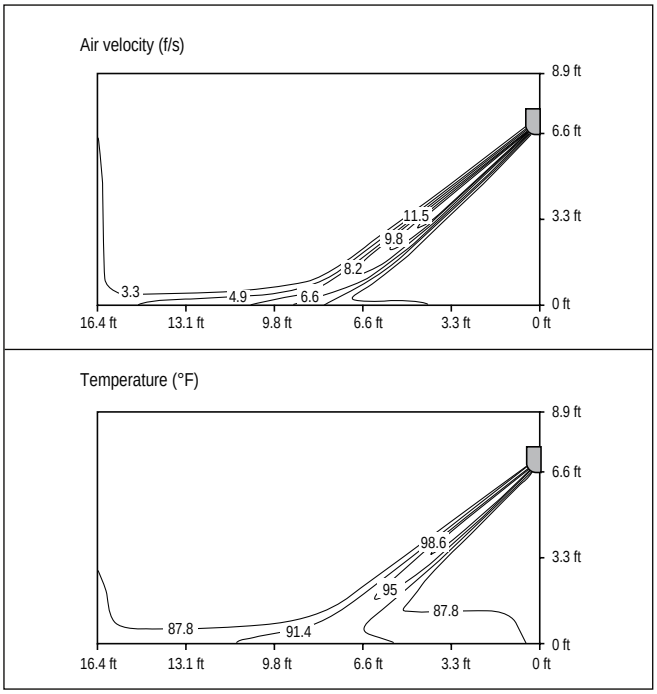
Cooling

Discharge angle: 10°



Heating

Discharge angle: 30°



STANDARD WALL-MOUNTED INDOOR UNITS

Refrigerant Flow Diagram

Figure 80: Multi F Standard Wall-Mounted Indoor Unit Refrigerant Flow Diagram.

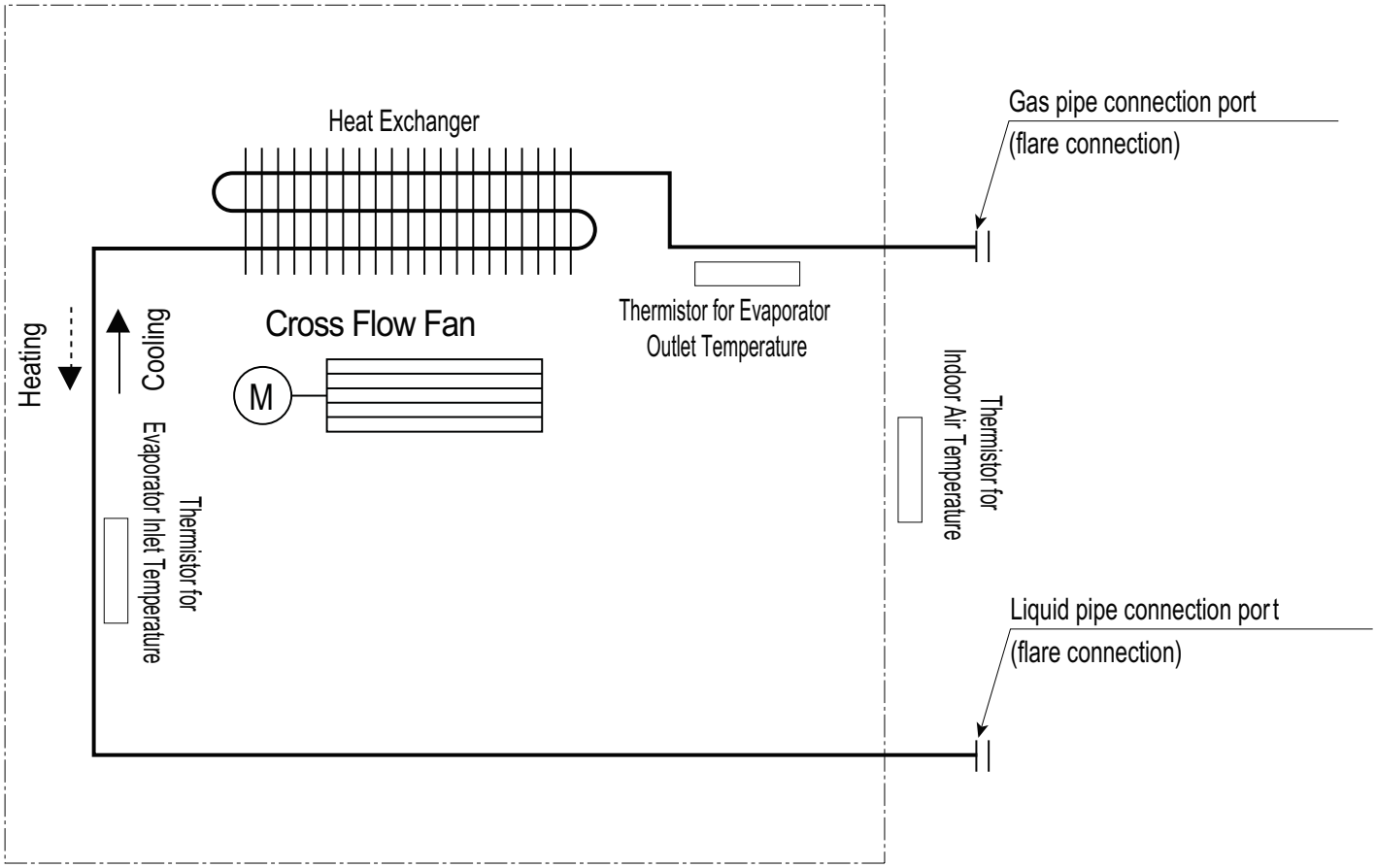


Table 28: Multi F Standard Wall-Mounted Indoor Unit Refrigerant Pipe Connection Port Diameters.

Model No.	Vapor (inch)	Liquid (inch)
LMN078HVT	Ø3/8	Ø1/4
LSN090HSV4		
LSN120HSV4		
LMN158HVT		
LSN180HSV4	Ø5/8	Ø3/8
LMN248HVT	Ø1/2	Ø1/4

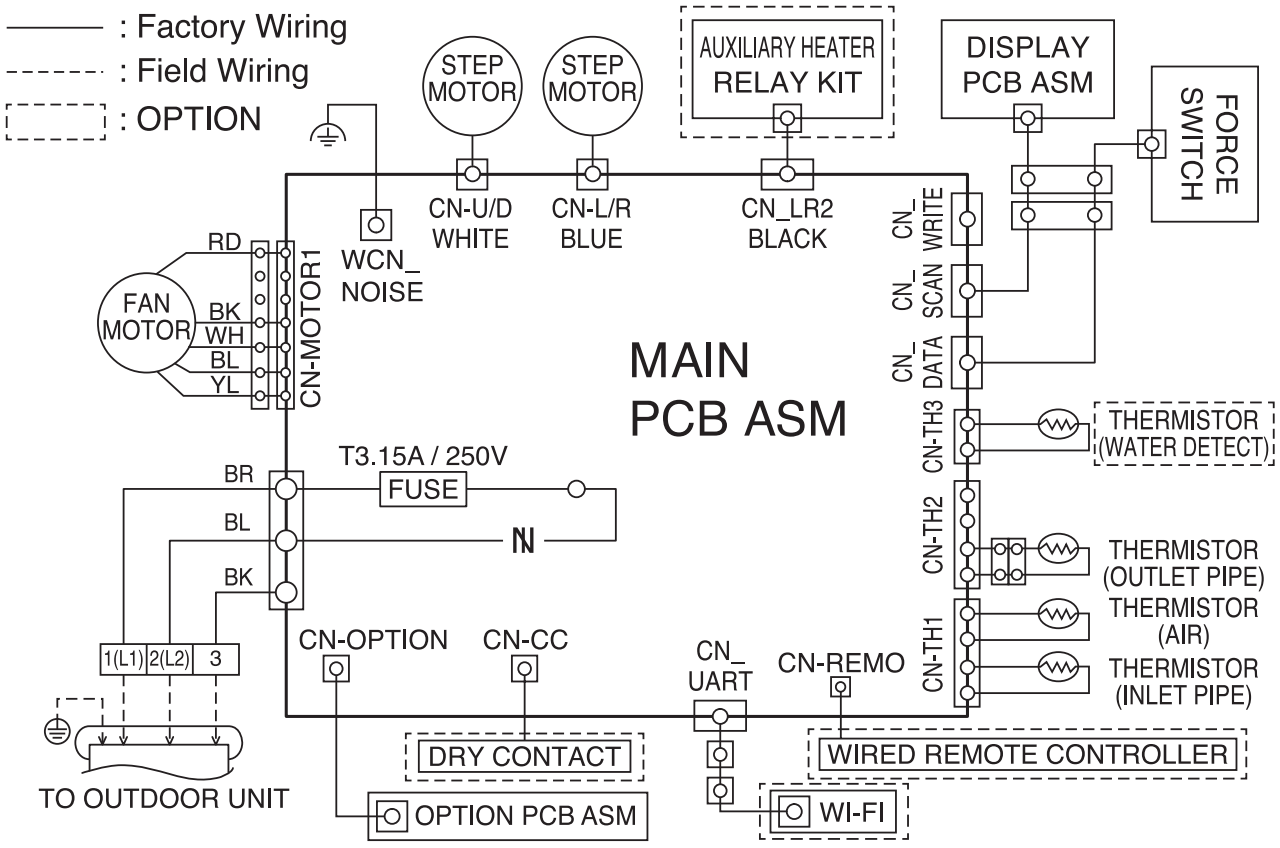
Table 29: Multi F Standard Wall-Mounted Indoor Unit Thermistor Details.

Description (Based on Cooling Mode)	PCB Connector
Indoor Air Temperature Thermistor	CN-TH1
Evaporator Inlet Temperature Thermistor	
Evaporator Outlet Temperature Thermistor	CN-TH2
Water Level Sensor (Optional)	CN-TH3

STANDARD WALL-MOUNTED INDOOR UNITS

Wiring Diagram

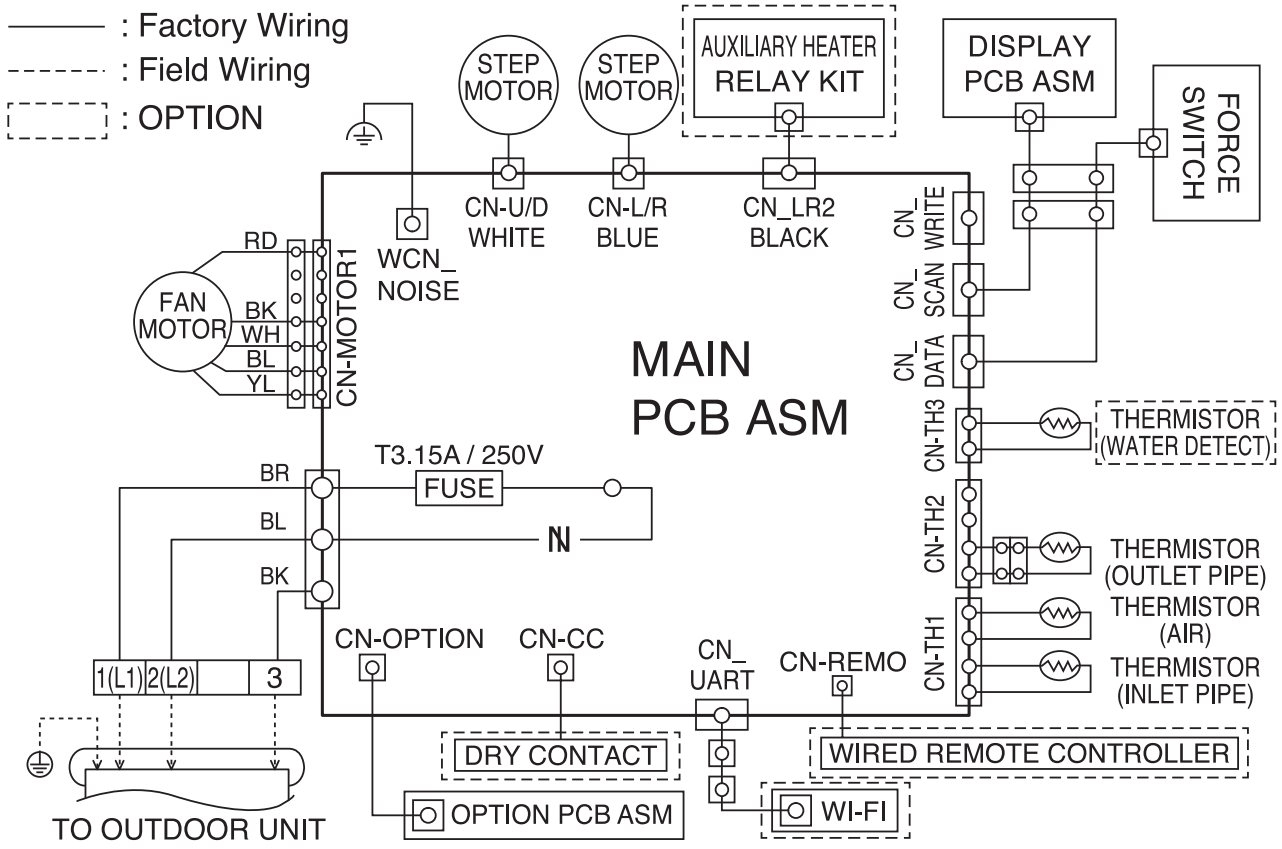
Figure 81: Multi F Standard Wall-Mounted LMN078HVT and LMN158HVT Indoor Units Wiring Diagram.



STANDARD WALL-MOUNTED INDOOR UNITS

Wiring Diagram

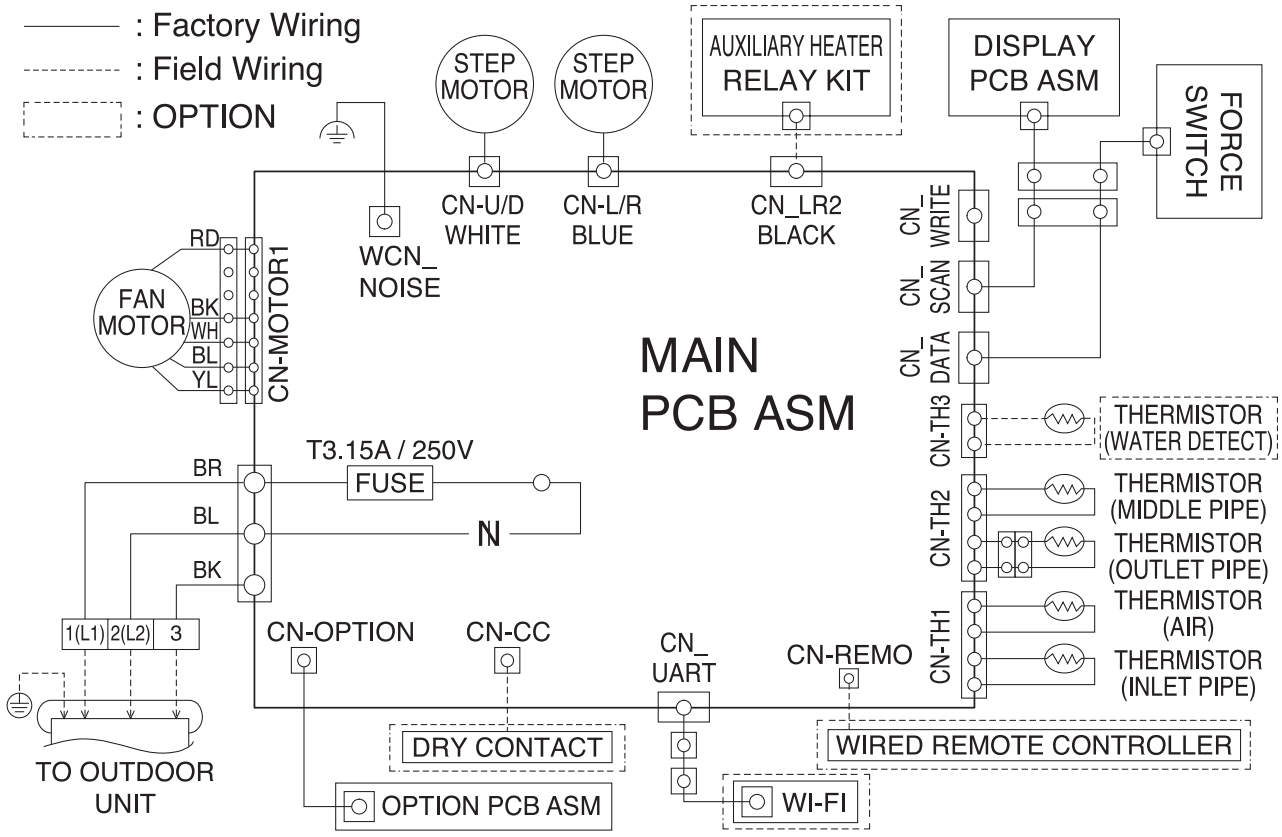
Figure 82: Multi F Standard Wall-Mounted LMN248HVT Indoor Unit Wiring Diagram.



STANDARD WALL-MOUNTED INDOOR UNITS

Wiring Diagram

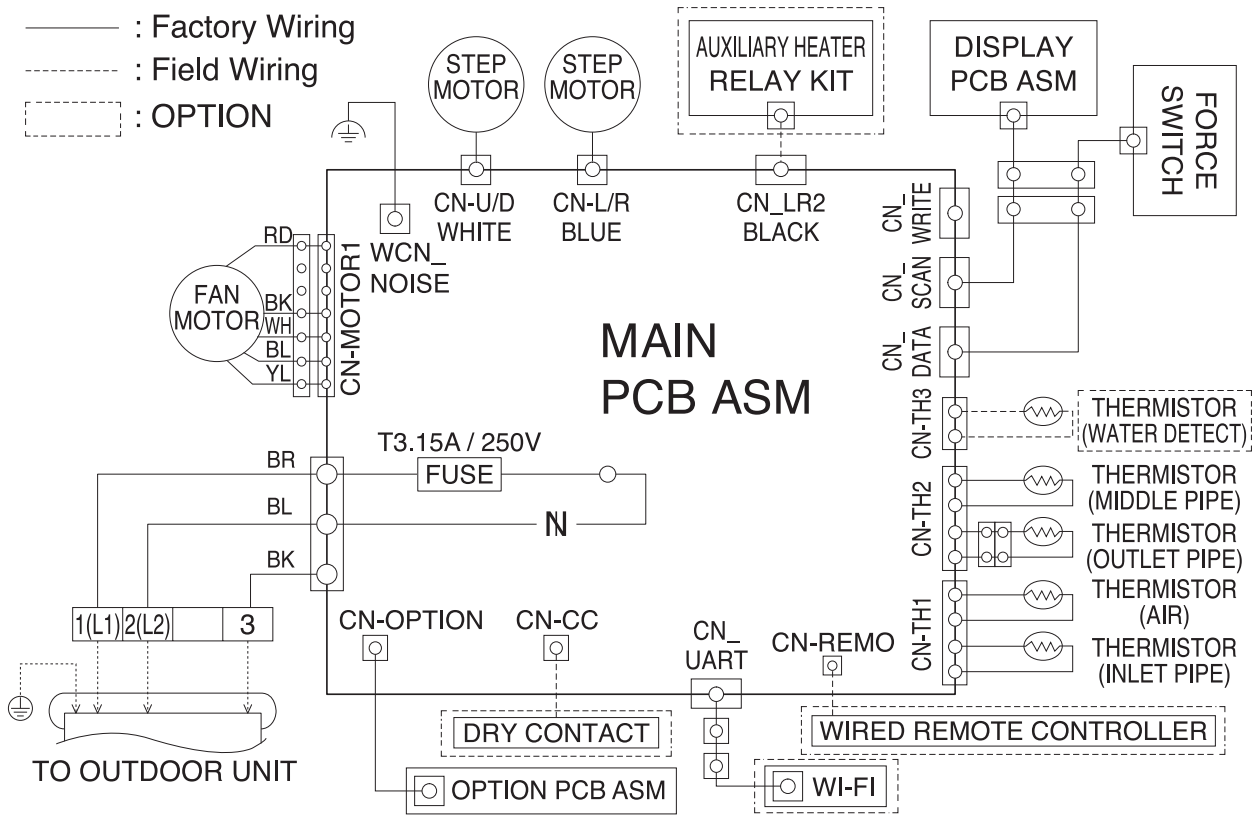
Figure 83: Multi F Standard Wall-Mounted LSN090HSV4 and LSN120HSV4 Indoor Units Wiring Diagram.



STANDARD WALL-MOUNTED INDOOR UNITS

Wiring Diagram

Figure 84: Multi F Standard Wall-Mounted LSN180HSV4 Indoor Unit Wiring Diagram.

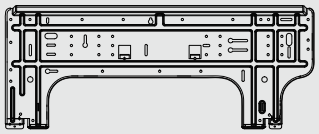
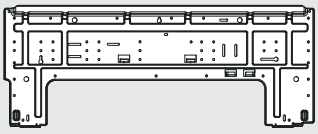
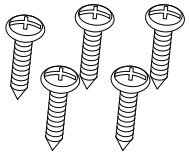
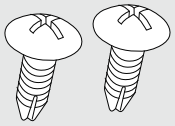


STANDARD WALL-MOUNTED INDOOR UNITS

Factory Supplied Parts and Materials

Factory Supplied Parts

Table 30: Parts Table.

Part	Quantity	Image
Installation Plate	One (1)	 7,000 ~ 15,000 Btu/h Indoor Units  18,000 and 24,000 Btu/h Indoor Units
Type “A” Screws	Five (5)	
Type “B” Screws (M4 x 12L)	Two (2)	
Wireless Controller with Holder HVT: AKB73635606 HSV: AKB73835312	One (1)	

Factory Supplied Materials

- Owner’s Manual
- Installation Manual

Required Tools

- Level
- Screwdriver
- Electric drill
- Hole core drill
- Flaring tool set
- Spanner (Half union)
- Thermometer

⚠ WARNING

Installation work must be performed by trained personnel and in accordance with national wiring standards and all local or other applicable codes. Improper installation can result in fire, electric shock, physical injury, or death.

Note:

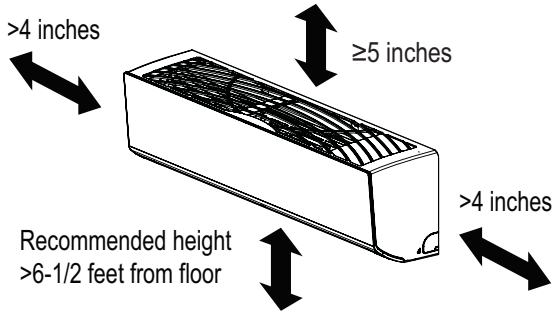
Read all instructions before installing this product. Become familiar with the unit’s components and connections, and the order of installation. Incorrect installation can degrade or prevent proper operation.

STANDARD WALL-MOUNTED INDOOR UNITS

Installation and Best Layout Practices

Selecting the Best Location

Figure 85: Minimum Clearance Requirements.



Do's

- Place the unit where air circulation will not be blocked.
- Place the unit where drainage can be obtained easily.
- Place the unit where noise prevention is taken into consideration.
- Ensure there is sufficient space from the ceiling and floor.
- Ensure there is sufficient maintenance space.
- Locate the indoor unit where it can be easily connected to the outdoor unit or branch distribution unit.

Don'ts

- ⃠ *Do not install the unit near a heat or steam source, or where considerable amounts of oil, iron powder, or flour are used.*
- ⃠ *Do not install the unit where sulfuric acid and flammable or corrosive gases are generated, vented into, or stored.*
- ⃠ *Do not install the unit near high-frequency generators.*
- ⃠ *Do not install the unit near a doorway.*

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

Installing in an Area Exposed to Unconditioned Air

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

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

Mounting the Installation Plate

The mounting wall should be strong and solid enough to protect the unit from vibration.

- Mount the installation plate on the wall using the Type "A" screws. If mounting the unit on concrete, consider using anchor bolts.
- Always mount the installation plate horizontally. Measure the wall and mark the centerline using thread and a level.

Figure 86: Installation Plate—Side View.

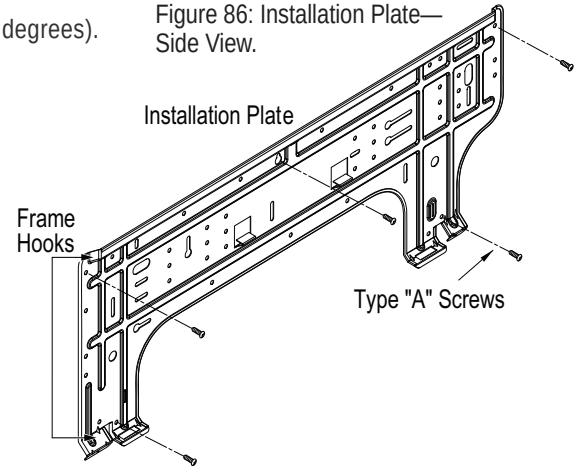


Figure 87: Installation Plate for LMN078HVT, LSN090HSV4, LSN120HSV4, and LMN158HVT Units.

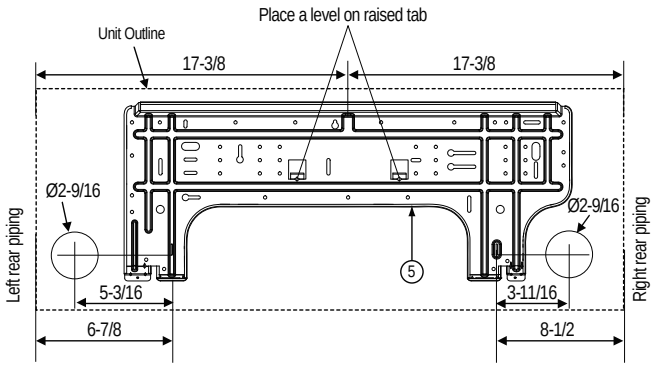
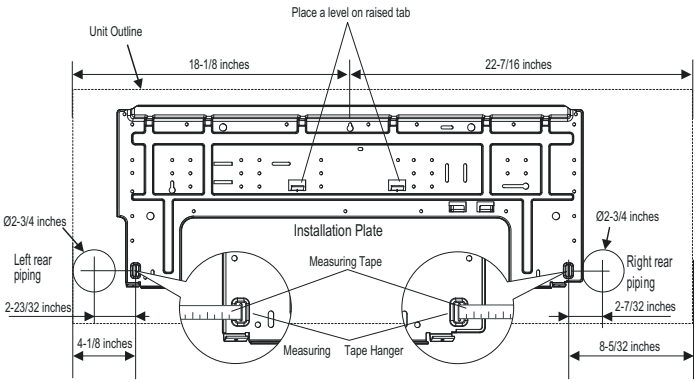


Figure 88: Installation Plate for LSN180HSV4 and LMN248HVT Units.



Note:

If the unit is installed near a body of water, certain components are at risk of being corroded. Appropriate anti-corrosion methods should be taken for the unit and all components.

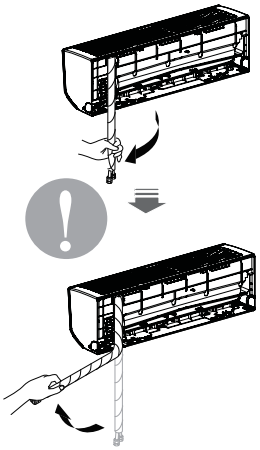
Preparing for Installation

Prepare the refrigerant piping and drain hose (indoor unit piping) for installation through the wall: press on the top of the tubing clamp and slowly guide the piping / hose down (depending on installation requirements, then to the left or right). Relock the tubing clamp after the piping / hose are released.

Note:

Do not bend the piping / drain hose from side to side; it may damage the components.

Figure 89: Preparing for Installation.



Hanging the Indoor Unit Frame

1. Attach the three (3) hooks on the top of the indoor unit to the top edge of the installation plate. Verify the hooks are properly attached to the installation plate by gently shaking the indoor unit from side to side.
2. Unlock the tubing clamp from the indoor unit frame. For easier access between the bottom of the indoor unit and the wall, prop the clamp between the indoor unit frame and installation plate.
3. Remove the screw covers at the bottom of the indoor unit, unscrew the two (2) screws, remove the frame cover, remove the piping connection cover, and position the piping for installation (down, back, left, or right).

Figure 90: Locking the Indoor Unit onto the Installation Plate.

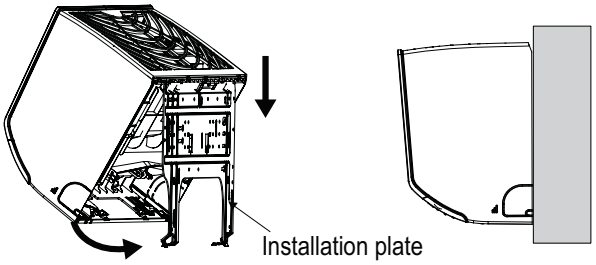


Figure 91: Accessing the Back of the Indoor Unit.

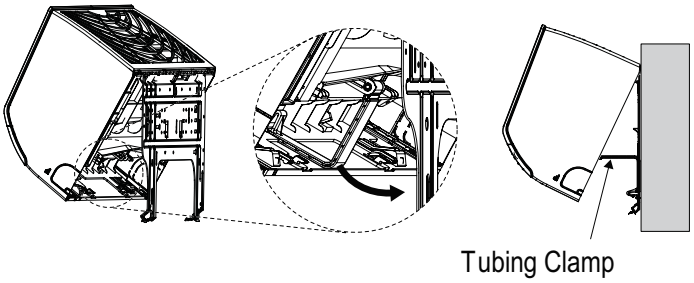


Figure 92: Removing the Frame Cover.

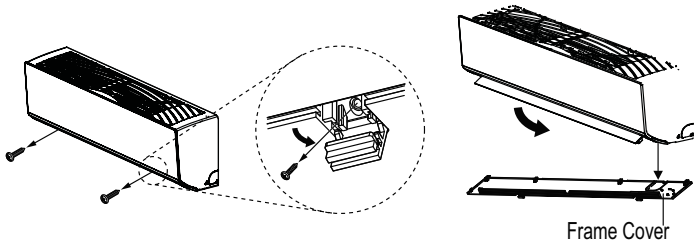


Figure 93: Exterior Back View of Indoor Unit.

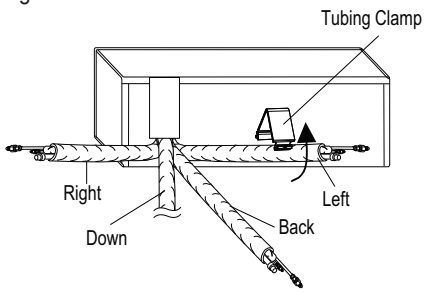


Figure 94: Piping Installed to the Left.

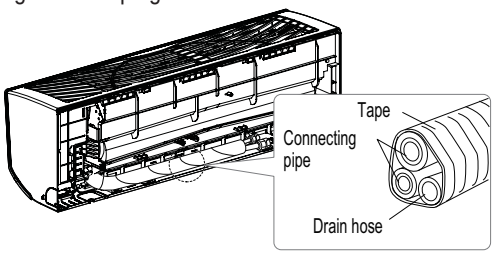
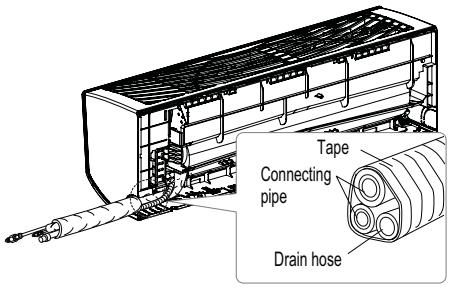


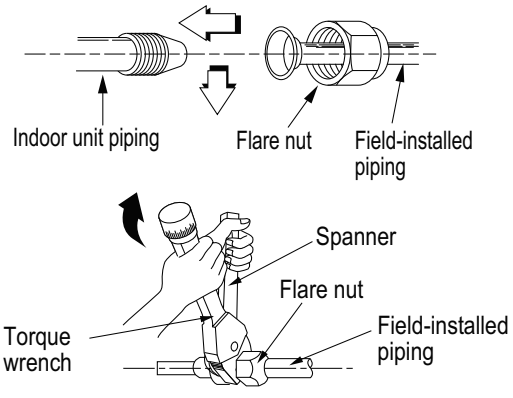
Figure 95: Piping Installed to the Right.



Connecting the Indoor Unit Piping to the Field-Installed Piping

1. Center align the indoor unit piping (refrigerant and drain) and the field-installed piping, then hand tighten the flare nut.
2. Tighten the flare nut with a torque wrench.
3. Attach the drain tube piping to the indoor unit drain hose as shown.

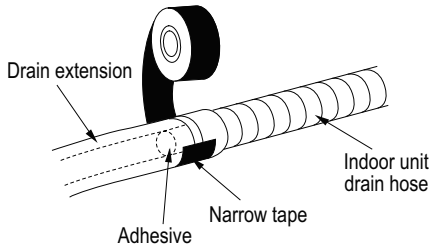
Figure 96: Indoor Unit to Field-Installed Piping Connection.



Note:

If the drain hose is routed inside a room, add insulation to prevent condensation from forming.

Figure 97: Extending the Drain Hose.



Insulating the Refrigerant and Drain Piping

⚠ WARNING

Ensure all piping is insulated. Exposed piping can cause burns if touched.

Refrigerant Piping Insulation

Field-installed vapor and liquid refrigerant piping lines must be properly and completely covered in insulation (up to the indoor unit piping connections). Any exposed piping may generate condensate or will cause burns if touched. Insulation for this field-installed refrigerant piping must have a minimum heat resistance of 248°F.

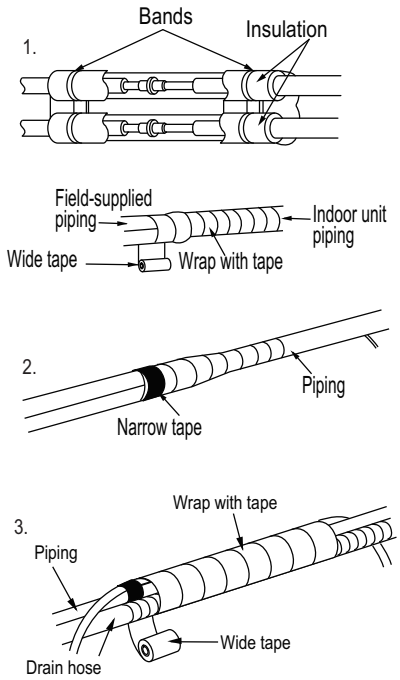
Drain Piping Insulation

Drain piping must have insulation a minimum of 7/32 inches thick.

Installing the Insulation

1. Overlap the insulation at the connection of the field-installed piping and the indoor unit piping. Tape together so that no gaps exist.
2. Secure insulation to the rear piping housing section with vinyl tape.
3. Bundle the piping and drain hose with tape where they meet at the back of the indoor unit frame. Position the drain hose at the bottom of the bundle (positioning the drain hose at the top of the bundle may cause the drain pan to overflow inside the indoor unit).

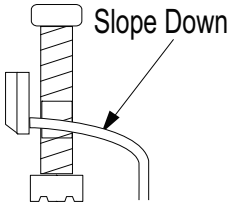
Figure 98: Insulating the Piping.



Drain Slope

Drain hose should point down so water can flow away easily.

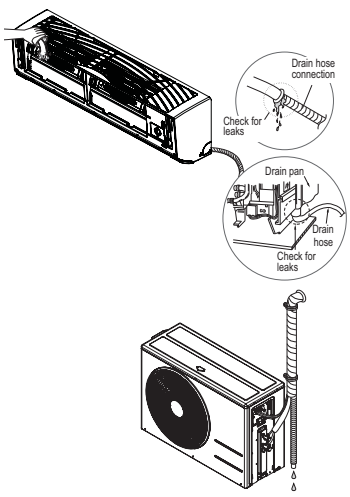
Figure 99: Drain Piping Slope.



Checking the Drainage System

1. Pour water on the indoor unit evaporator.
2. Ensure the water flows through and out of the hose and away from the indoor unit without leaking.

Figure 100: Checking the Drainage System.



Power Wiring / Communications Cable Guidelines

- Follow manufacturer's circuit diagrams in the technical manuals.
- Confirm power source specifications.
- Confirm that the electrical capacity is sufficient.
- Starting current must be maintained ±10 percent of the rated current marked on the outdoor unit name plate.
- Confirm cable thickness specifications.
- It is recommended that a circuit breaker is installed, especially if conditions could become wet or moist.
- Include a disconnect in the power wiring system, add an air gap contact separation of at least 1/8 inch in each active (phase) conductor.

⚠ WARNING

- *Loose wiring may cause unit to malfunction, overheat, and catch fire, resulting in severe injury or death.*

Note:

- *Terminal screws may become loose during transport. Properly tighten the terminal connections during installation.*

A voltage drop may cause the following problems:

- *Magnetic switch vibration, fuse breaks, or disturbance to the normal function of an overload protection device.*
- *Compressor will not receive the proper starting current.*

Connect Power Wiring and Communications Cable

1. Insert the power wiring / communications cable from the outdoor unit or branch distribution unit (Multi F MAX systems only) through the bottom of the indoor unit.
2. Connect each wire to its appropriate terminal on the indoor unit control board. Verify that the color and terminal numbers from the outdoor unit or branch distribution unit (Multi F MAX systems only) wiring match the color and terminal numbers on the indoor unit.
3. Secure power wiring/communications cable with cable restraint.

Figure 101: Connecting Power Wiring / Communications Cable.

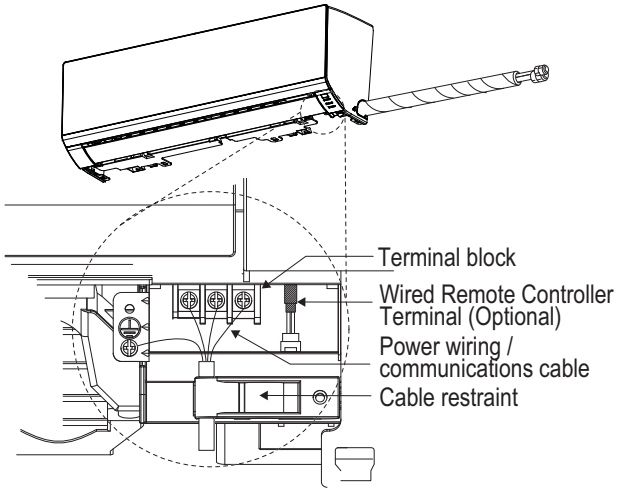


Figure 102: Simplified View of Indoor Unit to Outdoor Unit / Branch Distribution Unit Terminal Connections—LMN078HVT, LSN090HSV4, LSN120HSV4 and LMN158HVT.

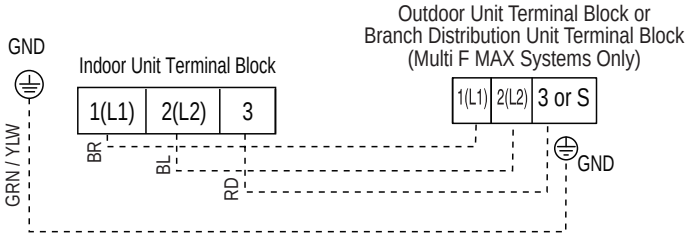
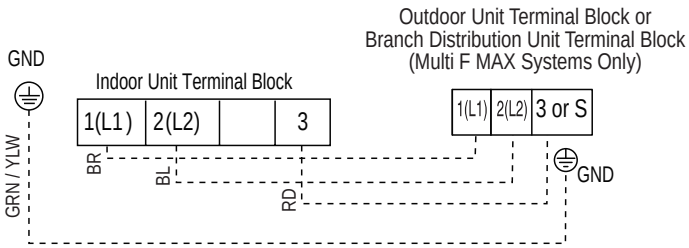


Figure 103: Simplified View of Indoor Unit to Outdoor Unit / Branch Distribution Unit Terminal Connections— LSN180HSV4 and LMN248HVT.



Controller Options

Standard wall-mounted indoor units include a wireless controller (AKB73635606), but optional LG-supplied wired controllers are available.

Wireless Controller

Figure 104: AKB73635606 Wireless Controller.

Operation Mode Sequence

Cooling Mode ❄
↓
Auto Operation AI
↓
Dehumidification Mode 💧
↓
Heating Mode ☼

Table 31: AKB73635606 Wireless Controller Functions.

Control Panel Button	Display Screen	Description
PLASMA		Plasma Button: Plasma filter helps remove air impurities.
SLEEP	1.0hr.	Sleep Mode Button[1]: Sets the sleep mode auto operation.
	88.5°F	Temperature Adjustment Buttons: Raises or lowers temperature setpoint in cooling and heating operation.
ON OFF	-	On/Off Button: Turns the power on/off.
FAN SPEED		Indoor Fan Speed Button: Changes the fan speed.
MODE		Operation mode selection button[1]: Selects the operation mode. Cooling operation ❄ / Auto operation or auto changeover AI / Dehumidifying operation 💧 / Heating operation ☼ / Air circulation
JET	Po	Jet Cool / Jet Heat Button[1]: Warms up or cools down the indoor temperature within a short period.
SWING SWING		Air Flow Direction Button: Adjusts the airflow direction vertically or horizontally.
ROOM TEMP		Temperature Display Button: Displays the room temperature. Press and hold button down for five (5) seconds. Display changes from °C to °F.
ON OFF	AM 12:00	Timer button: Sets the current time and the start / end times.
A/CLEAN E-SAVING		Navigation / Functions Button[1]: Adjusts the time and sets the special functions. Auto clean / Operates energy saving cooling / Adjusts the brightness of the indoor unit display
SET CLEAR	-	Set / Clear Button: Sets or cancels functions.
	-	Reset Button: Resets the air conditioner settings.

[1]Depending on the indoor unit model, some functions may not be supported.

Wireless Controller

Figure 105: AKB73835312 Wireless Controller.

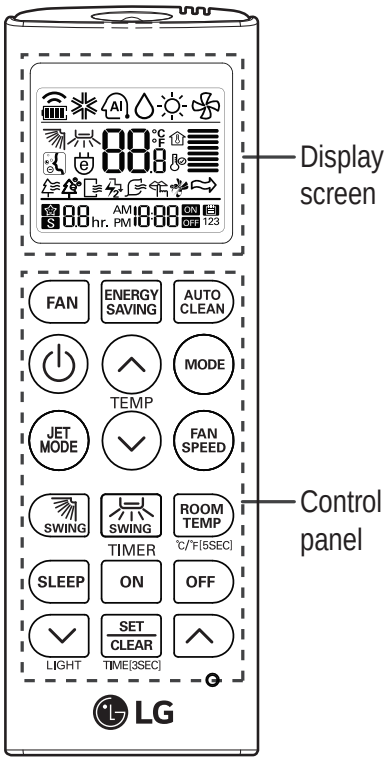


Table 32: AKB73835312 Wireless Controller Functions.

Control panel	Display screen	Description
FAN		Fan button : Air come out from the indoor unit below to the room without air temperature change.
SLEEP	hr.	Sleep mode auto button*: Sets sleep mode auto operation.
TEMP	°F	Temperature adjustment buttons: Adjusts the room temperature when cooling and heating.
	-	On/Off button: Turns the power on/off.
FAN SPEED		Indoor fan speed button: Adjusts fan speed.
MODE		Operation mode selection button*: Selects the operation mode. Cooling operation ( ) / Auto operation or auto changeover ( ) / Dehumidifying operation ( ) / Heating operation ( )
JET MODE	Po	Jet cooling button: Cools the indoor temperature within a short period of time.
SWING SWING		Air flow direction button: Adjusts the air flow direction vertically or horizontally.
LIGHT	-	Adjusts the brightness of the indoor unit display.
ROOM TEMP		Temperature display button: Displays the room temperature. Also changes unit from °C to °F if pressed for 5 seconds.
ON OFF	AM 12:00	Timer button: Sets current time and start / end time.
ENERGY SAVING AUTO CLEAN		Navigation and functions button* Selects special functions: : Auto clean : Activates energy saving cooling
SET CLEAR	-	Set/clear button: Sets or cancels functions.
	-	Reset button: Resets the air conditioner settings.

* Some functions may not be supported, depending on the model.

STANDARD WALL-MOUNTED INDOOR UNITS

Installation and Best Layout Practices

Wired Controller Connections

Figure 106: Wired Controller Connection on Indoor Unit Terminal Block—LMN078HVT, LSN090HSV4, LSN120HSV4, and LMN158HVT Models.

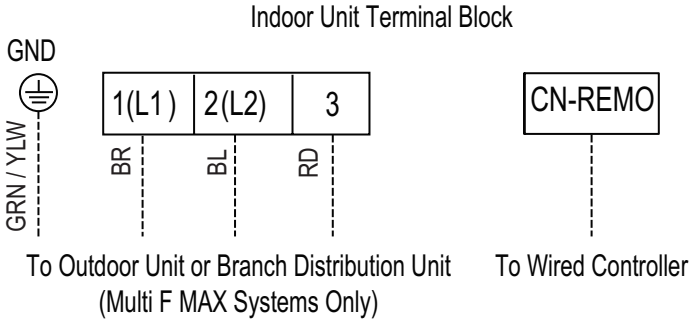
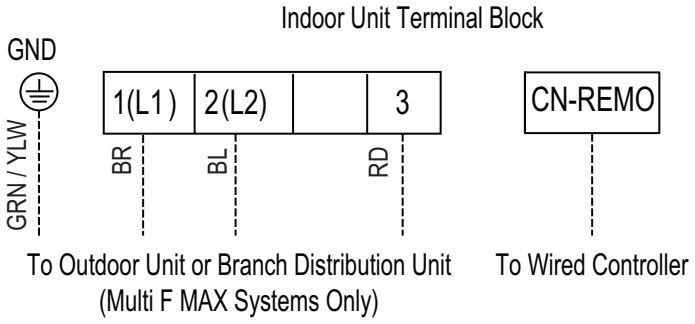


Figure 107: Wired Controller Connection on Indoor Unit Terminal Block—LSN180HSV4 and LMN248HVT Models.



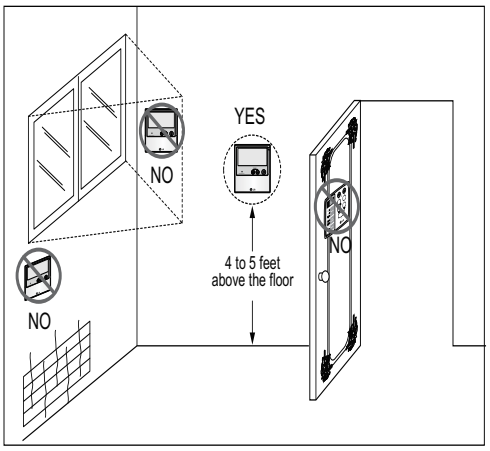
Wired Controller Placement

Wired controllers include a sensor to detect room temperature. To maintain comfort levels in the conditioned space, the wired controller must be installed in a location away from direct sunlight, high humidity, and where it could be directly exposed to cold air. Controller must be installed four (4) to five (5) feet above the floor where its LED display can be read easily, in an area with good air circulation, and where it can detect an average room temperature.

⃠ Do not install the wired controller near or in:

- Drafts or dead spots behind doors and in corners
- Hot or cold air from ducts
- Radiant heat from the sun or appliances
- Concealed pipes and chimneys
- An area where temperatures are uncontrolled, such as an outside wall

Figure 108: Proper Location for the Wired Controller.



Hanging the Wired Controller

1. The controller wiring / cable can be installed in one of three directions: top, back, or on the right side. If top or right side installation is desired, remove cable guide grooves on the controller, and then position wiring / cable on applicable side.

2. Choose and mark the area of installation. Use the provided parts and screw the wall plate into place. Install the controller wall plate to fit the electrical box if one is present. Ensure that no gaps exist between the wall plate and the wall itself.

3. Arrange wiring / cables so as not to interfere with the controller circuitry. Position the wired controller on the wall plate. Snap into place by pressing the bottom part of the wired controller onto the wall plate. Make sure that no gaps exist between the wired controller and the wall plate on all sides.

4. To remove wired controller from the wall plate, insert a screwdriver into the two holes at the bottom. Twist screwdriver to release controller. Do not damage the controller components when removing.

Figure 110: Removing the Cable Guide Grooves.

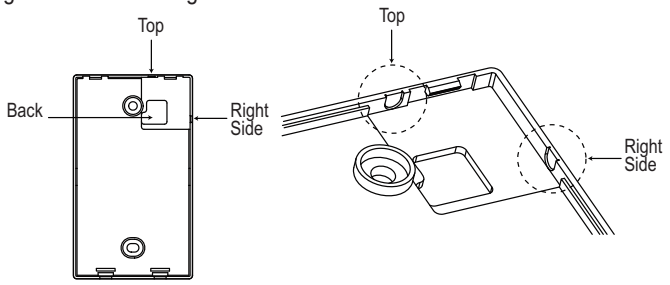


Figure 111: Attaching the Wall Plate.

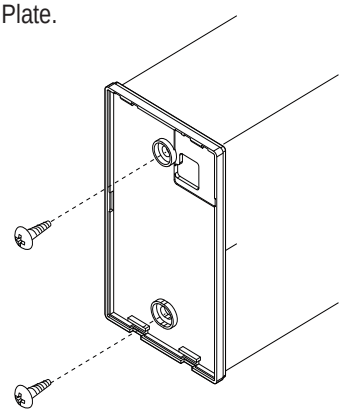
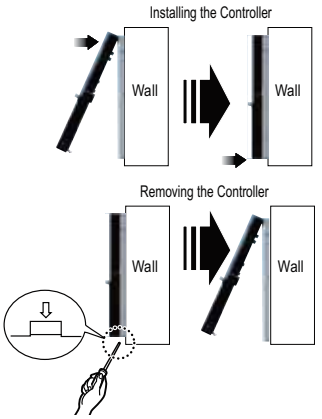


Figure 112: Installing / Removing the Controller.



Assigning the Thermistor for Temperature Detection

Each indoor unit includes a return air thermistor assigned to sense the temperature. If a wired controller is installed, there is a choice of sensing temperature with either the indoor unit return air thermistor or the thermistor in the wired controller. It is also an option to set both thermistors to sense temperature so that indoor unit bases its operation on the first thermistor to reach the designated temperature differential. For applicable indoor units, an optional Remote Temperature Sensor can be used in lieu of the return air thermistor—either alone or in conjunction with a wired controller thermistor as previously described.

Finalizing Indoor Unit Installation

1. Move the tubing clamp to its original position.

2. Ensure the three (3) hooks are properly attached to the installation plate by gently shaking the indoor unit from side to side.

3. Press the bottom left and right sides of the indoor unit against the installation plate until the hooks click firmly into their slots.

4. Using two (2) Type “C” screws, secure the bottom of the indoor unit to the installation plate.

5. Remove the two (2) tabs from the filter.

6. Replace the frame cover.

Figure 109: Attach Bottom of Indoor Unit to Installation Plate.

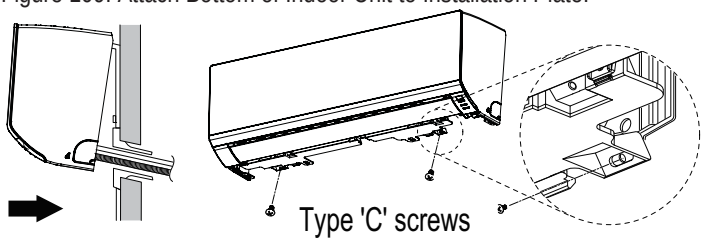
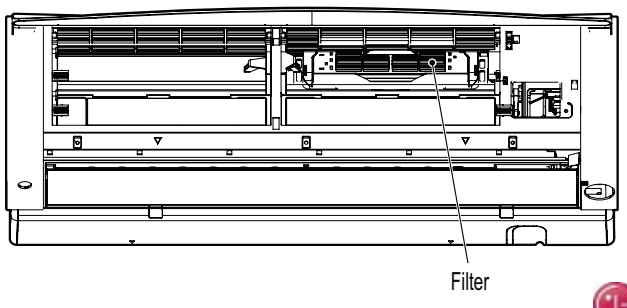


Figure 113: Removing the Filter Tabs.



CEILING-CONCEALED DUCT (LOW STATIC) INDOOR UNIT DATA

DUCT (LOW STATIC) INDOOR UNITS

Mechanical Specifications and Features

MULTI F
MULTI F MAX

Ceiling-Concealed Duct (Low Static) Indoor Unit

General

All LG indoor units are factory assembled, wired, piped, and provided with a control circuit board, fan, and motor. Ceiling-Concealed Duct (Low Static) units have a sound rating no higher than 36 dB(A) as tested per KSA0701 ISO Standard 3745, and are designed for low-static pressure up to 0.20"WG.

Coil

Indoor unit coils are factory built and are comprised of aluminum fins mechanically bonded to copper tubing. Each unit has two rows of coils, which are pressure tested at the factory. Each unit is provided with a factory installed condensate drain pan below the coil.

Refrigerant System

System is designed for use with R410A refrigerant. The refrigeration circuit is pressure-tested at the factory and shipped with a holding charge of helium gas. Refrigerant pipe connections are 45° flare, and all refrigerant lines from the outdoor unit to the indoor units must be field insulated.

Electrical

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

Casing

The case has a low profile design with a maximum height of 7.5 inches designed to mount fully concealed above a finished ceiling in as little as 8 inches vertical space. Casing is manufactured of galvanized steel plate, and provided with hanger brackets designed to support the weight on four corners. Unit has a front horizontal supply air discharge outlet, and one rear horizontal return air inlet; unit is also field-convertible for a rear bottom return.

Fan Assembly and Control

The units have at least two direct-drive, Sirocco fans made of high strength ABS HT-700 polymeric resin that are statically and dynamically balanced. The fans are mounted on a common brushless digitally controlled (BLDC) motor with permanently lubricated and sealed ball bearings. The fan / motor assembly is mounted on vibration-attenuating rubber grommets. Fan speed is controlled using a microprocessor-based direct digital control algorithm. The indoor fan has Low, Med, High, and Auto settings for Cooling mode; and has Low, Med, High, and Auto settings for Heating mode. Each of the settings can be field-adjusted from the factory setting (RPM / ESP). The Auto setting adjusts the fan speed based on the difference between the controller set-point and space temperature.

Figure 114: Ceiling-Concealed Duct (Low Static) Indoor Unit.

Air Filter

Return air is filtered with a factory-supplied, removable, washable filter accessible from the rear of the indoor unit.

Microprocessor Control

The unit is provided with an integrated control panel to communicate with the outdoor unit. All unit operation parameters are stored in non-volatile memory residing on the unit microprocessor. The microprocessor controls space temperature through using the value provided by the temperature sensor within the indoor unit. The microprocessor control will activate indoor unit operation when the indoor room temperature falls below or rises above a setpoint temperature, at which point, a signal is sent to the outdoor unit to begin the appropriate mode. The microprocessor will also provide self-diagnostics and auto restart functions. A field-supplied four-wire power / communications cable must be installed to connect the indoor unit(s) to the outdoor unit.

Controls

The indoor unit is supplied with an LG wired controller. Communication between the indoor units and the outdoor unit is accomplished through 18 AWG, four-core, stranded and shielded power / communication cable.

Condensate Lift/Pump

The indoor unit is provided with an externally mounted, factory installed and wired condensate lift/pump capable of providing a minimum 27.5 inch lift from the bottom surface of the unit. Drain pump has a safety switch to shut off the indoor unit if the condensate rises too high in the drain pan.

Features

- Inverter (Variable speed fan)
- External mounted drain pump
- Control lock function
- Auto operation
- Auto restart operation
- Dehumidification function
- Two thermistor control
- External static pressure control
- Self-diagnostics function
- Group control
- Wired thermostat included

DUCT (LOW STATIC) INDOOR UNITS

General Data / Specifications

Table 33: Multi F Ceiling-Concealed Low-Static Ducted Indoor Unit General Data.

Model Name	LDN097HV4	LDN127HV4	LMDN186HV
Nominal Cooling Capacity (Btu/h)[1]	9,000	12,000	18,000
Nominal Heating Capacity (Btu/h)[1]	10,400	13,800	20,800
Operating Range			
Cooling (°F WB)	57-77		
Heating (°F DB)	59-81		
Fan			
Type	Sirocco		
Motor Output (W) x Qty.	19 x 1	5 x 1, 19 x 1	
Motor/Drive	Brushless Digitally Controlled / Direct		
Airflow Rate CFM (H/M/L)	318 / 247 / 194	353 / 300 / 247	530 / 441 / 353
Factory Set External Static Pressure (in. wg)	0.10		
Max. External Static Pressure (in. wg)	0.20		
Unit Data			
Refrigerant Type[2]	R410A		
Refrigerant Control	EEV		
Power Supply V, Ø, Hz[3]	208-230, 1, 60		
Rated Amps (A)	0.40	0.80	
Sound Pressure Level ±3 dB(A) (H/M/L)[4]	30 / 26 / 23	31 / 28 / 27	36 / 34 / 31
Dimensions (W x H x D, in.)	27-9/16 x 7-15/32 x 27-9/16	35-7/16 x 7-15/32 x 27-9/16	
Net Unit Weight (lbs.)	39	51	
Shipping Weight (lbs.)	46	60	57
Power Wiring / Communications Cable (No. x AWG)[5]	4 x 18		
Heat Exchanger (Row x Column x Fin / inch) x Number	(2 x 11 x 14) x 1	(2 x 11 x 18) x 1	
Piping			
Liquid (in.)	1/4		
Vapor (in.)	3/8		1/2
Drain O.D. / I.D. (in.)	1-1/4, 1		

[1]Nominal capacity is rated 0 ft. above sea level with corresponding refrigerant piping length in accordance with standard length of each outdoor unit and a 0 ft. level difference between outdoor and indoor units. All capacities are net with a combination ratio between 95 – 105%.

Nominal 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).
Nominal 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]This unit comes with a dry helium charge.

[3]Acceptable operating voltage: 187V-253V.

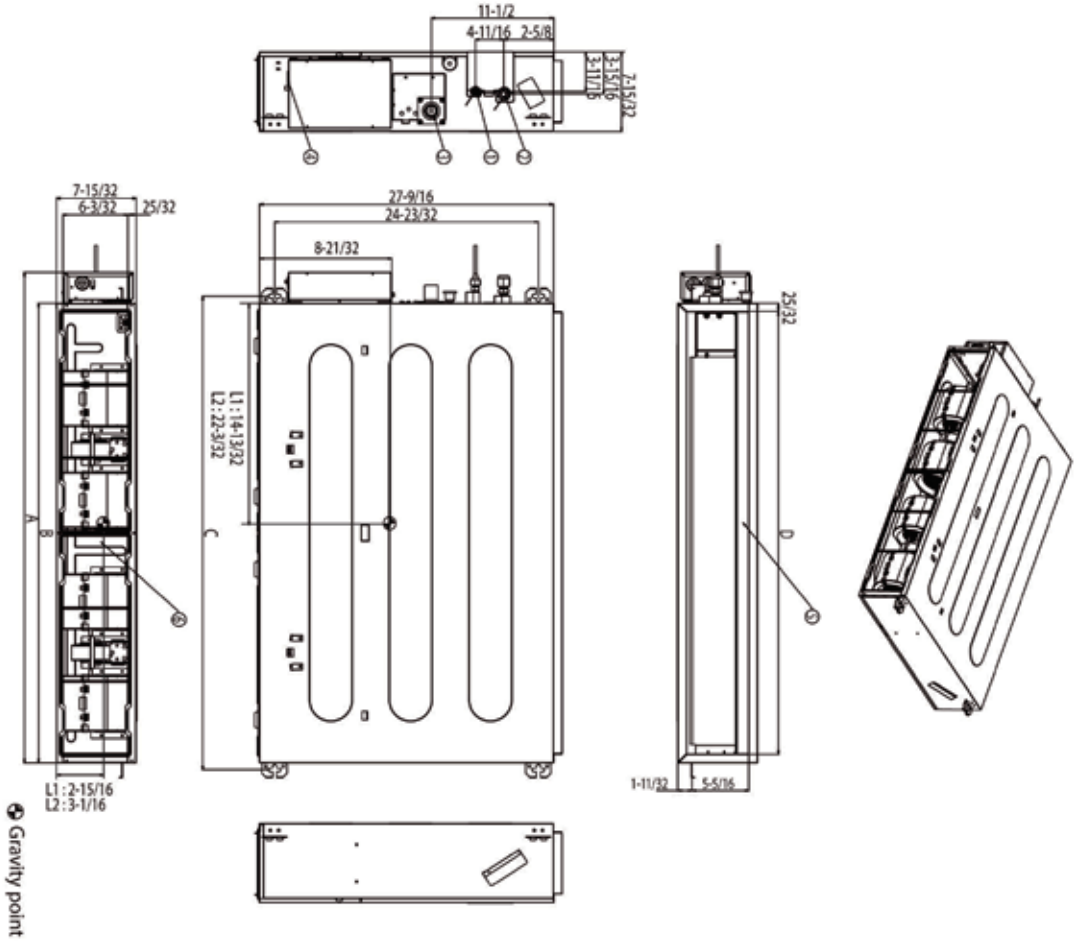
[4]Sound pressure levels are tested in an anechoic chamber under ISO Standard 3745 and are the same in both cooling and heating mode. These values can increase due to ambient conditions during operation.

[5]All power wiring / communications cable to the IDUs be minimum 18 AWG, 4-conductor, stranded, shielded or unshielded (if shielded, must be grounded to chassis at ODU only) and must comply with applicable local and national codes.

DUCT (LOW STATIC) INDOOR UNITS

Dimensions

Figure 115: LDN097HV4, LDN127HV4, and LMDN186HV Dimensions.



Model Number	A	B	C	D
LDN097HV4	30-15/32	27-9/16	28-27/32	25-31/32
LDN127HV4 LMDN186HV	38-11/32	35-7/16	36-23/32	33-27/32

(unit: inch)

Number	Name	Description
1	Liquid pipe connection	
2	Gas pipe connection	
3	Drain pipe connection	
4	Power supply connection	
5	Air discharge	
6	Air suction	

(unit: inch)

DUCT (LOW STATIC) INDOOR UNITS

Cooling Capacity Table

Table 34: Multi F Ceiling-Concealed Duct (Low Static) Indoor Units Cooling Capacity Table.

Model No. / Nominal Capacity of Indoor Unit (Btu/h)	Outdoor Air Temp. (°F DB)	Indoor Air Temp. °F DB / °F WB											
		68 / 57		73 / 61		77 / 64		80 / 67		86 / 72		90 / 75	
		TC	SHC	TC	SHC	TC	SHC	TC	SHC	TC	SHC	TC	SHC
LDN097HV4 9,000	14	8.82	7.55	9.37	7.98	9.92	7.72	10.31	7.89	11.01	7.95	11.56	8.10
	20	8.82	7.61	9.36	8.04	9.91	7.78	10.31	7.95	11.01	8.01	11.55	8.17
	25	8.81	7.67	9.36	8.10	9.90	7.84	10.30	8.01	11.00	8.08	11.54	8.23
	30	8.80	7.73	9.35	8.16	9.90	7.90	10.29	8.07	10.99	8.14	11.54	8.29
	35	8.80	7.79	9.34	8.22	9.89	7.96	10.28	8.13	10.98	8.20	11.53	8.36
	40	8.79	7.84	9.33	8.29	9.88	8.02	10.27	8.19	10.97	8.26	11.52	8.42
	45	8.78	7.90	9.33	8.35	9.87	8.08	10.27	8.25	10.96	8.32	11.51	8.48
	50	8.78	7.96	9.32	8.41	9.87	8.14	10.26	8.31	10.96	8.38	11.50	8.54
	55	8.77	8.02	9.31	8.47	9.86	8.20	10.25	8.38	10.95	8.45	11.49	8.61
	60	8.76	8.08	9.31	8.53	9.85	8.26	10.24	8.44	10.94	8.51	11.48	8.67
	65	8.76	8.14	9.30	8.59	9.84	8.32	10.24	8.50	10.93	8.57	11.47	8.73
	70	8.75	8.19	9.29	8.66	9.84	8.38	10.23	8.56	10.92	8.63	11.47	8.79
	75	8.54	8.06	9.08	8.52	9.62	8.26	10.01	8.44	10.71	8.53	11.25	8.69
	80	8.33	7.92	8.87	8.39	9.41	8.14	9.80	8.33	10.49	8.42	11.03	8.59
	85	8.12	7.78	8.66	8.25	9.20	8.02	9.59	8.20	10.28	8.30	10.82	8.48
	90	7.91	7.63	8.45	8.10	8.99	7.89	9.37	8.08	10.06	8.19	10.60	8.37
	95	7.68	7.55	8.22	8.03	8.75	7.83	9.00	7.90	9.83	8.14	10.36	8.34
	100	7.50	7.35	8.03	7.83	8.57	7.64	8.88	7.78	9.64	7.97	10.17	8.16
	105	7.31	7.15	7.84	7.63	8.38	7.45	8.77	7.66	9.45	7.79	9.99	7.99
	110	7.12	6.90	7.66	7.38	8.19	7.22	8.58	7.43	9.26	7.57	9.80	7.77
	115	6.94	6.69	7.47	7.17	8.01	7.03	8.39	7.24	9.08	7.39	9.61	7.60
	118	6.82	6.65	7.36	7.13	7.89	7.00	8.28	7.21	8.96	7.37	9.50	7.58
	122	6.79	6.63	7.32	7.11	7.86	6.98	8.24	7.19	8.93	7.36	9.46	7.57
LDN127HV4 12,000	14	11.76	9.94	12.49	10.50	13.22	10.17	13.75	10.38	14.69	10.47	15.42	10.67
	20	11.75	10.02	12.48	10.58	13.21	10.25	13.74	10.46	14.67	10.55	15.40	10.75
	25	11.75	10.09	12.48	10.66	13.20	10.33	13.73	10.54	14.66	10.63	15.39	10.83
	30	11.74	10.17	12.47	10.75	13.19	10.40	13.72	10.62	14.65	10.71	15.38	10.92
	35	11.73	10.25	12.46	10.83	13.18	10.48	13.71	10.70	14.64	10.79	15.37	11.00
	40	11.72	10.33	12.45	10.91	13.17	10.56	13.70	10.79	14.63	10.88	15.36	11.08
	45	11.71	10.40	12.44	10.99	13.16	10.64	13.69	10.87	14.62	10.96	15.35	11.16
	50	11.70	10.48	12.43	11.07	13.15	10.72	13.68	10.95	14.61	11.04	15.33	11.25
	55	11.69	10.56	12.42	11.15	13.14	10.80	13.67	11.03	14.60	11.12	15.32	11.33
	60	11.68	10.63	12.41	11.23	13.13	10.88	13.66	11.11	14.59	11.20	15.31	11.41
	65	11.67	10.71	12.40	11.31	13.12	10.96	13.65	11.19	14.57	11.28	15.30	11.49
	70	11.66	10.79	12.39	11.40	13.11	11.03	13.64	11.27	14.56	11.36	15.29	11.58
	75	11.38	10.61	12.11	11.22	12.83	10.88	13.35	11.12	14.27	11.22	15.00	11.45
	80	11.10	10.43	11.82	11.05	12.55	10.72	13.07	10.96	13.99	11.08	14.71	11.31
	85	10.83	10.24	11.54	10.86	12.26	10.55	12.78	10.80	13.70	10.93	14.42	11.17
	90	10.55	10.04	11.26	10.67	11.98	10.38	12.50	10.63	13.42	10.78	14.13	11.02
	95	10.25	9.94	10.96	10.57	11.67	10.30	12.00	10.40	13.10	10.72	13.81	10.97
	100	10.00	9.67	10.71	10.31	11.42	10.06	11.84	10.24	12.85	10.49	13.56	10.75
	105	9.75	9.41	10.46	10.04	11.17	9.81	11.69	10.08	12.60	10.26	13.31	10.52
	110	9.50	9.09	10.21	9.72	10.92	9.51	11.44	9.78	12.35	9.97	13.07	10.24
	115	9.25	8.81	9.96	9.44	10.67	9.26	11.19	9.53	12.10	9.73	12.82	10.00
	118	9.10	8.75	9.81	9.39	10.52	9.21	11.04	9.49	11.95	9.70	12.67	9.98
	122	9.05	8.73	9.76	9.37	10.48	9.19	10.99	9.47	11.90	9.69	12.62	9.97

TC = Total Capacity (kBtu/h).

SHC: Sensible Heat Capacity (kBtu/h).

Nominal capacity as rated 0 ft. above sea level and a 0 ft. level difference between outdoor and indoor units. Corresponding refrigerant piping length is accordance with standard length of each outdoor unit.

Nominal 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).

The shaded table columns and rows indicate reference data. When operating at this temperature, these values can be different if the system is not running consistently.

DUCT (LOW STATIC) INDOOR UNITS

Cooling Capacity Table

Table 35: Multi F Ceiling-Concealed Duct (Low Static) Indoor Units Cooling Capacity Table (continued).

Model No. / Nominal Capacity of Indoor Unit (Btu/h)	Outdoor Air Temp. (°F DB)	Indoor Air Temp. °F DB / °F WB											
		68 / 57		73 / 61		77 / 64		80 / 67		86 / 72		90 / 75	
		TC	SHC	TC	SHC	TC	SHC	TC	SHC	TC	SHC	TC	SHC
LMDN186HV 18,000	14	17.65	13.09	18.74	13.83	19.84	13.39	20.63	13.67	22.03	13.79	23.12	14.05
	20	17.63	13.20	18.73	13.94	19.82	13.50	20.61	13.78	22.01	13.90	23.11	14.16
	25	17.62	13.30	18.71	14.05	19.81	13.60	20.60	13.89	22.00	14.01	23.09	14.27
	30	17.60	13.40	18.70	14.16	19.79	13.71	20.58	13.99	21.98	14.11	23.07	14.38
	35	17.59	13.50	18.68	14.26	19.78	13.81	20.57	14.10	21.96	14.22	23.05	14.49
	40	17.58	13.60	18.67	14.37	19.76	13.91	20.55	14.21	21.94	14.33	23.04	14.60
	45	17.56	13.71	18.66	14.48	19.75	14.02	20.53	14.31	21.93	14.43	23.02	14.71
	50	17.55	13.81	18.64	14.58	19.73	14.12	20.52	14.42	21.91	14.54	23.00	14.82
	55	17.54	13.91	18.63	14.69	19.72	14.23	20.50	14.52	21.89	14.65	22.98	14.92
	60	17.52	14.01	18.61	14.80	19.70	14.33	20.49	14.63	21.88	14.75	22.97	15.03
	65	17.51	14.11	18.60	14.90	19.69	14.43	20.47	14.74	21.86	14.86	22.95	15.14
	70	17.50	14.21	18.58	15.01	19.67	14.53	20.46	14.84	21.84	14.97	22.93	15.25
	75	17.08	13.98	18.16	14.78	19.24	14.33	20.03	14.64	21.41	14.78	22.50	15.08
	80	16.66	13.74	17.74	14.55	18.82	14.12	19.60	14.44	20.98	14.60	22.06	14.90
	85	16.24	13.49	17.32	14.30	18.40	13.90	19.17	14.23	20.55	14.40	21.63	14.71
	90	15.82	13.23	16.90	14.06	17.97	13.68	18.75	14.01	20.12	14.20	21.20	14.52
	95	15.37	13.09	16.44	13.93	17.51	13.57	**18.00**	**13.70**	19.65	14.12	20.72	14.46
	100	14.99	12.74	16.06	13.58	17.13	13.25	17.77	13.49	19.28	13.82	20.35	14.16
	105	14.62	12.39	15.69	13.23	16.76	12.93	17.53	13.28	18.90	13.52	19.97	13.86
	110	14.24	11.97	15.32	12.80	16.39	12.53	17.16	12.88	18.53	13.13	19.60	13.48
	115	13.87	11.61	14.94	12.44	16.01	12.19	16.79	12.55	18.15	12.82	19.22	13.18
	118	13.65	11.53	14.72	12.36	15.79	12.13	16.56	12.50	17.93	12.77	19.00	13.14
	122	13.57	11.50	14.64	12.34	15.71	12.11	16.49	12.48	17.85	12.76	18.92	13.13

TC = Total Capacity (kBtu/h).

SHC: Sensible Heat Capacity (kBtu/h).

Nominal capacity as rated 0 ft. above sea level and a 0 ft. level difference between outdoor and indoor units. Corresponding refrigerant piping length is accordance with standard length of each outdoor unit.

Nominal 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).

The shaded table columns and rows indicate reference data. When operating at this temperature, these values can be different if the system is not running consistently.

DUCT (LOW STATIC) INDOOR UNITS

Heating Capacity Table

Table 36: Multi F Ceiling-Concealed Duct (Low Static) Indoor Units Heating Capacity Table.

Model No. / Nominal Capacity of Indoor Unit (Btu/h)	Outdoor Air Temp.		Indoor Air Temp. °F DB					
	°F DB	°F WB	61	64	68	70	72	75
			TC	TC	TC	TC	TC	TC
LDN097HV4 9,000	0	-0.4	5.35	5.28	5.23	5.20	5.12	4.90
	5	4.5	6.03	5.95	5.90	5.88	5.80	5.58
	10	9	6.71	6.63	6.58	6.56	6.48	6.26
	17	15	7.61	7.54	7.49	7.46	7.39	7.14
	20	19	7.95	7.88	7.83	7.80	7.72	7.46
	25	23	8.52	8.44	8.39	8.37	8.29	7.99
	30	28	9.01	8.93	8.88	8.86	8.78	8.52
	35	32	9.50	9.42	9.37	9.34	9.27	9.04
	40	36	9.94	9.86	9.81	9.78	9.71	9.48
	45	41	10.37	10.30	10.25	10.22	10.15	9.92
	47	43	10.55	10.48	10.43	10.40	10.32	10.10
	50	46	10.72	10.64	10.59	10.57	10.49	10.24
	55	51	11.00	10.93	10.88	10.85	10.78	10.48
	60	56	11.00	10.93	10.88	10.85	10.78	10.52
	63	59	11.00	10.93	10.88	10.85	10.78	10.55
	68	64	11.00	10.93	10.88	10.85	10.78	10.60
LDN127HV4 12,000	0	-0.4	7.10	7.00	6.93	6.90	6.80	6.50
	5	4.5	8.00	7.90	7.83	7.80	7.70	7.40
	10	9	8.90	8.80	8.73	8.70	8.60	8.30
	17	15	10.10	10.00	9.93	9.90	9.80	9.48
	20	19	10.55	10.45	10.38	10.35	10.25	9.90
	25	23	11.30	11.20	11.13	11.10	11.00	10.60
	30	28	11.95	11.85	11.78	11.75	11.65	11.30
	35	32	12.60	12.50	12.43	12.40	12.30	12.00
	40	36	13.18	13.08	13.02	12.98	12.88	12.58
	45	41	13.77	13.67	13.60	13.57	13.47	13.17
	47	43	14.00	13.90	13.83	13.80	13.70	13.40
	50	46	14.23	14.13	14.06	14.03	13.93	13.59
	55	51	14.60	14.50	14.43	14.40	14.30	13.90
	60	56	14.60	14.50	14.43	14.40	14.30	13.96
	63	59	14.60	14.50	14.43	14.40	14.30	14.00
	68	64	14.60	14.50	14.43	14.40	14.30	14.06
LMDN186HV 18,000	0	-0.4	10.70	10.55	10.45	10.40	10.25	9.80
	5	4.5	12.06	11.91	11.81	11.76	11.61	11.15
	10	9	13.41	13.26	13.16	13.11	12.96	12.51
	17	15	15.22	15.07	14.97	**14.92**	14.77	14.29
	20	19	15.90	15.75	15.65	15.60	15.45	14.92
	25	23	17.03	16.88	16.78	16.73	16.58	15.98
	30	28	18.01	17.86	17.76	17.71	17.56	17.03
	35	32	18.99	18.84	18.74	18.69	18.54	18.09
	40	36	19.87	19.72	19.62	19.57	19.42	18.97
	45	41	20.75	20.60	20.50	20.45	20.30	19.85
	47	43	21.10	20.95	20.85	**20.80**	20.65	20.20
	50	46	21.44	21.29	21.19	21.14	20.99	20.48
	55	51	22.01	21.86	21.75	21.70	21.55	20.95
	60	56	22.01	21.86	21.75	21.70	21.55	21.04
	63	59	22.01	21.86	21.75	21.70	21.55	21.10
	68	64	22.01	21.86	21.75	21.70	21.55	21.20

TC = Total Capacity (kBtu/h).

Nominal capacity as rated 0 ft. above sea level and a 0 ft. level difference between outdoor and indoor units. Corresponding refrigerant piping length is accordance with standard length of each outdoor unit.

Nominal 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).

DUCT (LOW STATIC) INDOOR UNITS

External Static Pressure

Table 37: Multi F Ceiling-Concealed Duct (Low Static) External Static Pressure Setting Values Table.

Static Pressure (in. wg)			0.0	0.04	0.08	0.12	0.16	0.20
Model No. / Nominal Capacity of Indoor Unit (Btu/h)	Airflow Rate / CFM		Setting Value					
LDN097HV4 9,000	High	318	98	103	108	116	123	130
	Mid	247	82	88	94	102	110	118
	Low	194	69	76	83	91	99	109
LDN127HV4 12,000	High	353	95	99	104	109	116	124
	Mid	300	86	91	96	101	108	116
	Low	247	78	82	87	93	100	108
LMDN186HV 18,000	High	530	123	125	129	134	141	145
	Mid	441	109	112	117	123	129	136
	Low	353	95	99	104	109	116	124

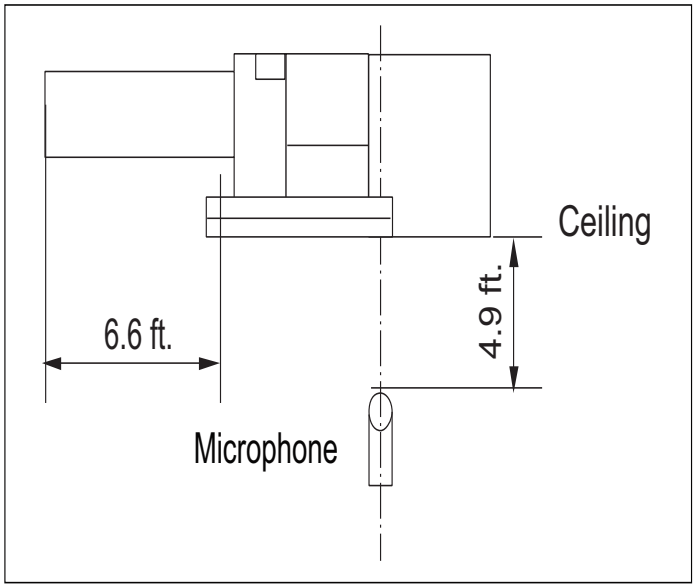
Note:

- *To get the desired air flow and external static pressure combination, use the setting value from the table. Using a setting value other than that listed in the table will not provide the desired combination.*
- *Table data is based at 230V. Air flow rate varies according to voltage fluctuation.*

DUCT (LOW STATIC) INDOOR UNITS

Acoustic Data

Figure 116: Sound Pressure Level Measurement Location.



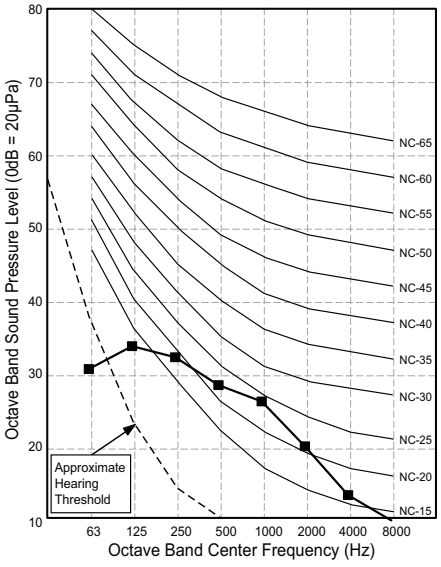
- Measurements taken with no attenuation and units operating at full load normal operating condition.
- Sound level will vary depending on a range of factors such as construction (acoustic absorption coefficient) of particular area in which the equipment is installed.
- Sound power levels are measured in dB(A)±3.
- Tested in anechoic chamber per ISO Standard 3745.

Table 38: Sound Pressure Levels (dB[A]).

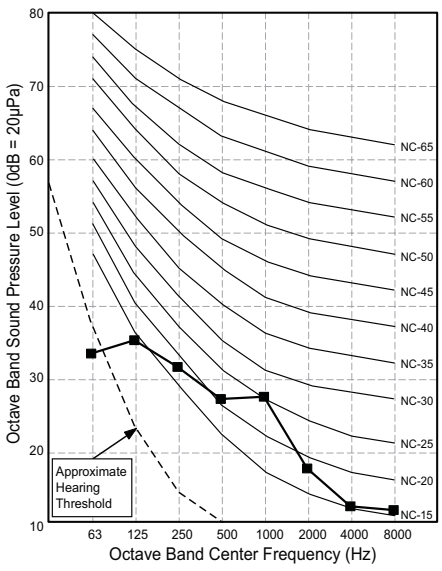
Model No.	Sound Pressure Levels (dB[A]) (Cooling and Heating)		
	High Fan Speed	Medium Fan Speed	Low Fan Speed
LDN097HV4	30	26	23
LDN127HV4	31	28	27
LMDN186HV	36	34	31

Figure 117: Sound Pressure Level Diagrams.

LDN097HV4



LDN127HV4



LMDN186HV

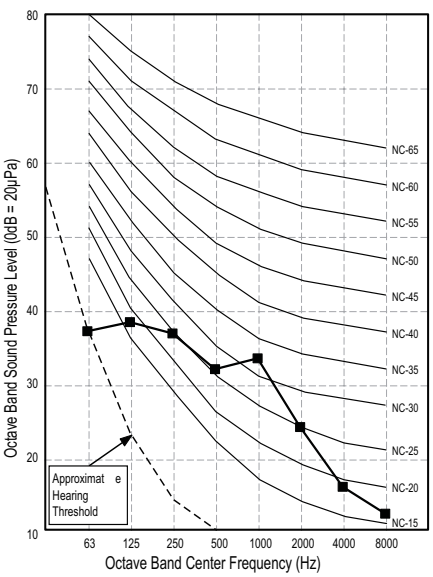


Figure 118: LDN097HV4 Refrigerant Flow Diagram.

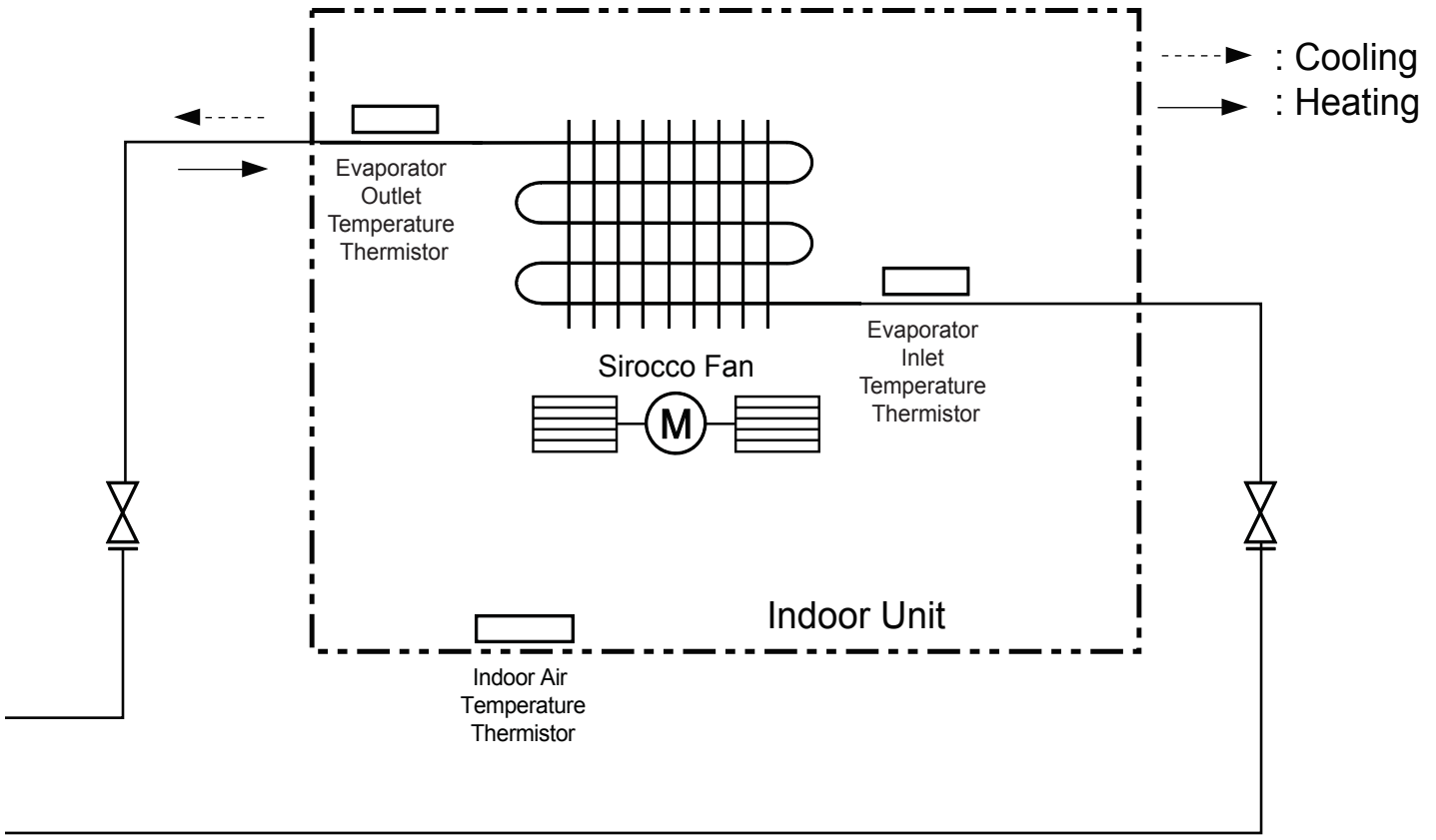


Table 39: Multi F Ceiling-Concealed Duct (Low Static) LDN097HV4 Indoor Unit Refrigerant Pipe Connection Port Diameters.

Model No.	Vapor (inch)	Liquid (inch)
LDN097HV4	Ø3/8	Ø1/4

Table 40: Multi F Ceiling-Concealed Duct (Low Static) LDN097HV4 Indoor Unit Thermistor Details.

Description (Based on Cooling Mode)	PCB Connector
Indoor Air Temperature Thermistor	CN-ROOM
Evaporator Inlet Temperature Thermistor	CN-PIPE/IN
Evaporator Outlet Temperature Thermistor	CN-PIPE/OUT

Figure 119: LDN127HV4 and LMDN186HV Refrigerant Flow Diagram.

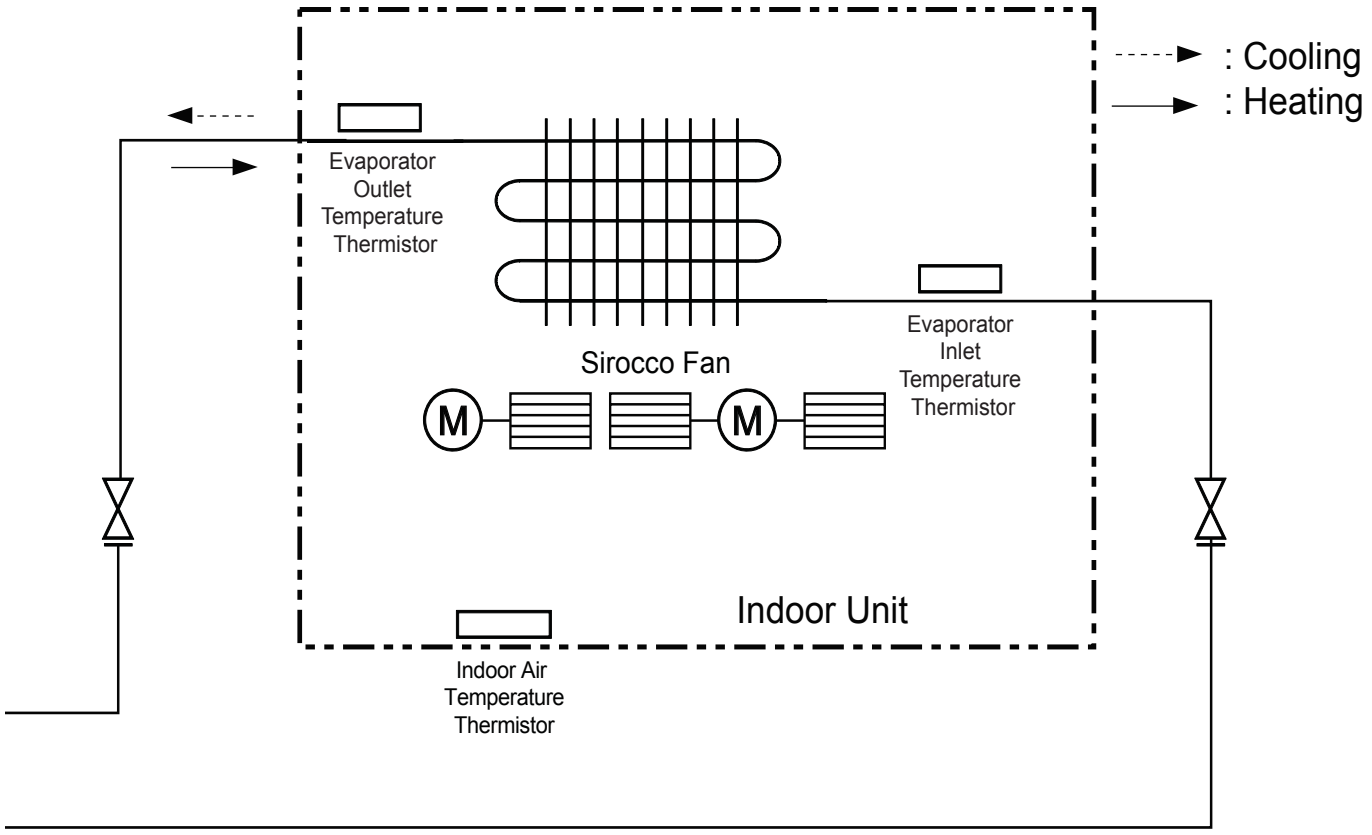


Table 41: Multi F Ceiling-Concealed Duct (Low Static) LDN127HV4 and LMDN186HV Indoor Unit Refrigerant Pipe Connection Port Diameters.

Model No.	Vapor (inch)	Liquid (inch)
LDN127HV4	Ø3/8	Ø1/4
LMDN186HV	Ø1/2	

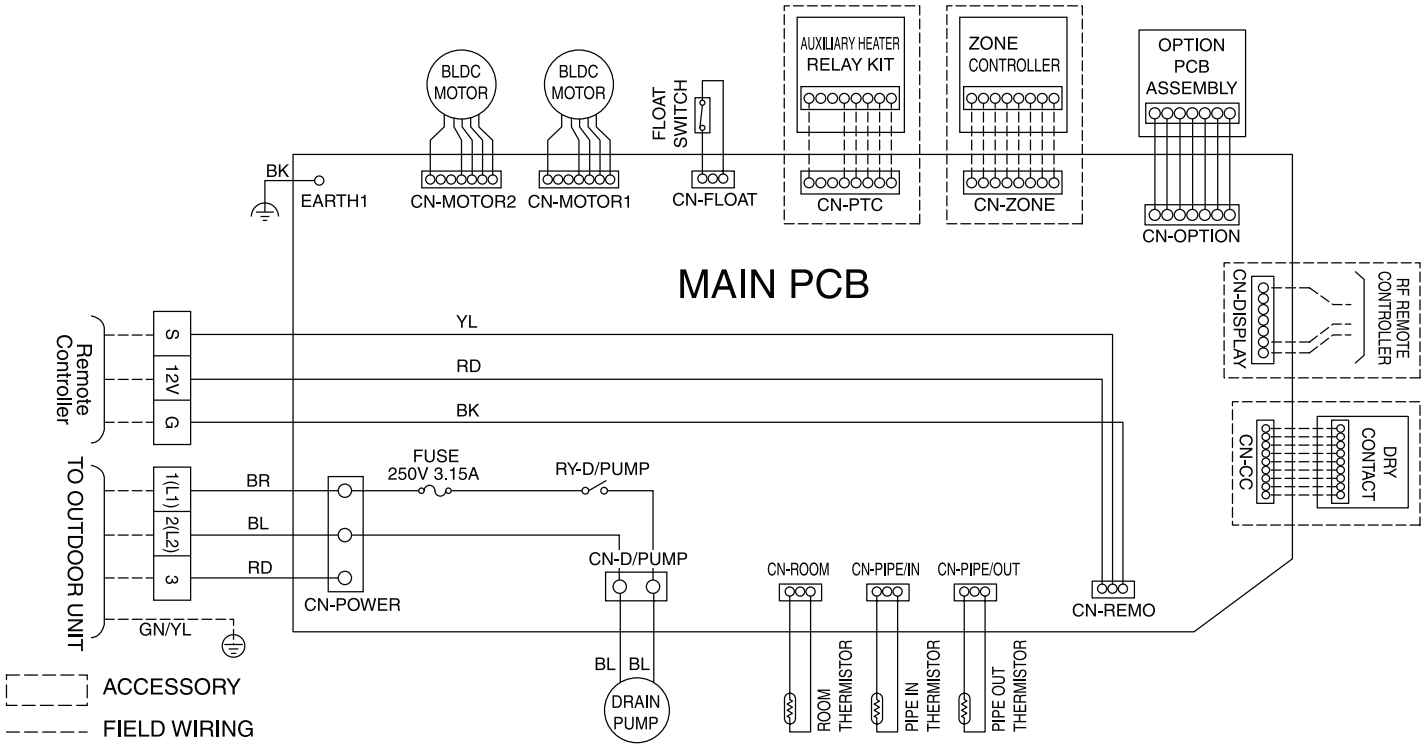
Table 42: Multi F Ceiling-Concealed Duct (Low Static) LDN127HV4 and LMDN186HV Indoor Unit Thermistor Details.

Description (Based on Cooling Mode)	PCB Connector
Indoor Air Temperature Thermistor	CN-ROOM
Evaporator Inlet Temperature Thermistor	CN-PIPE/IN
Evaporator Outlet Temperature Thermistor	CN-PIPE/OUT

DUCT (LOW STATIC) INDOOR UNITS

Wiring Diagram

Figure 120: Multi F Ceiling-Concealed Duct (Low Static) LDN097HV4, LDN127HV4, and LMDN186HV Indoor Units Wiring Diagram.

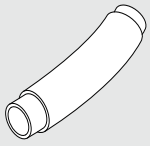
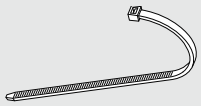
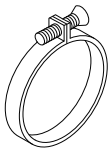
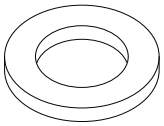
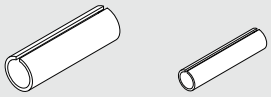


DUCT (LOW STATIC) INDOOR UNITS

Factory Supplied Parts and Materials

Factory Supplied Parts

Table 43: Parts Table.

Part	Quantity	Image	Part	Quantity	Image
Drain Hose	One (1)		Zip Ties	Four (4)	
Metal Clamp	Two (2)		Washers for Hanging Brackets	Eight (8)	
Insulation for Fittings	One (1) Set	 For Vapor Piping For Liquid Piping	Simple Controller with Mode Selection (AKB72955816)[1]	One (1)	

[1]Simple Mode Controllers for the ceiling-concealed duct (low static) indoor units are also referenced by Model No. PQRCVCL0QW.

Factory Supplied Materials

- Owner's Manual
- Installation Manual

Required Tools

- Level
- Screwdriver
- Electric drill
- Hole core drill
- Flaring tool set
- Torque wrenches
- Hexagonal wrench
- Gas-leak detector
- Thermometer

⚠WARNING

Installation work must be performed by trained personnel and in accordance with national wiring standards and all local or other applicable codes. Improper installation can result in fire, electric shock, physical injury, or death.

Note:

Read all instructions before installing this product. Become familiar with the unit's components and connections, and the order of installation. Incorrect installation can degrade or prevent proper operation.

Selecting the Best Location

Do's

- Place the unit where air circulation will not be blocked.
- Place the unit where drainage can be obtained easily.
- Place the unit where noise prevention is taken into consideration.
- Ensure there is sufficient strength to bear the load of the indoor unit.
- Ensure there is sufficient maintenance space.
- Locate the indoor unit in a location that is level, and where it can be easily connected to the outdoor unit / branch distribution unit.

Don'ts

- ⃠ *Do not install the unit near a heat or steam source, or where considerable amounts of oil, iron powder, or flour are used.*
- ⃠ *Do not install the unit where sulfuric acid and flammable or corrosive gases are generated, vented into, or stored.*
- ⃠ *Do not install the unit near high-frequency generators.*
- ⃠ *Do not install the unit near a doorway.*

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

Installing in an Area Exposed to Unconditioned Air

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

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

Installing in an Area with High Humidity Levels

If the environment is prone to humidity levels of 80% or more (near the ocean, lakes, etc.) or where steam could collect in the plenum:

- Install additional insulation to the indoor unit (glass wool insulation >13/32 inches thick).
- Install additional insulation to the refrigerant piping (insulation >13/16 inches thick).
- Seal all gaps between the indoor unit and the ceiling tiles (make the area air tight) so that humidity does not transfer from the plenum to the conditioned space. Also, add a ceiling grille for ventilation.

Note:

If the unit is installed near a body of water, certain components are at risk of being corroded. Appropriate anti-corrosion methods should be taken for the unit and all components.

Figure 121: General Installation Guidelines.

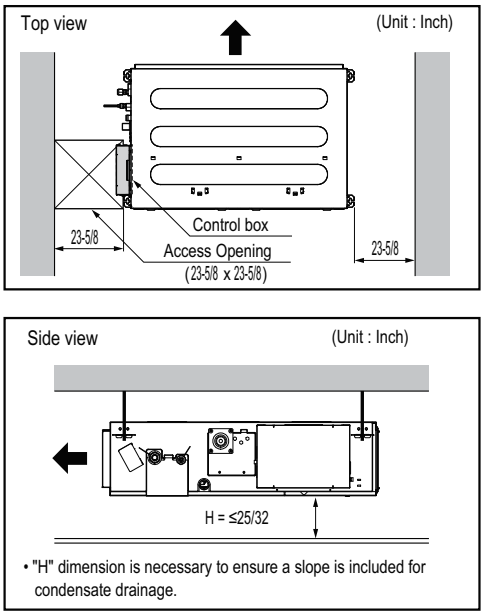


Figure 122: Service / Access Panel Dimensions.

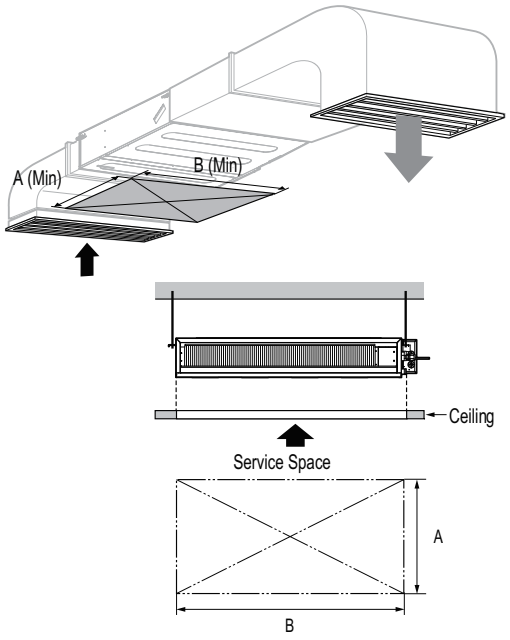


Table 44: General Access Panel Dimensions.

Model / Capacity (Btu/h)	Dimensions (in.)	
	A	B
LDN097HV4 / 9,000	31-1/2	31-1/2
LDN127HV4 / 12,000		39-3/8
LMDN186HV / 18,000		

DUCT (LOW STATIC) INDOOR UNITS

Installation and Best Layout Practices

Duct (Low Static) Indoor Units can be installed in two ways:

Figure 123: Air inlet from the back of the indoor unit.

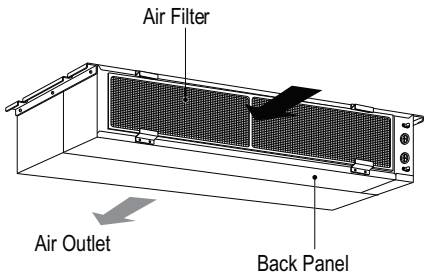


Figure 124: Air inlet from the bottom of the indoor unit.

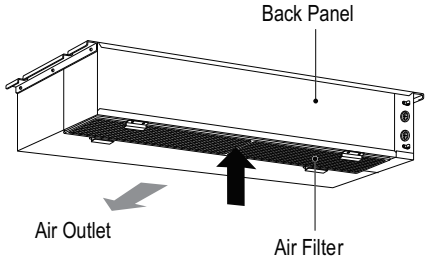


Table 46: Indoor Unit Bolt Locations.

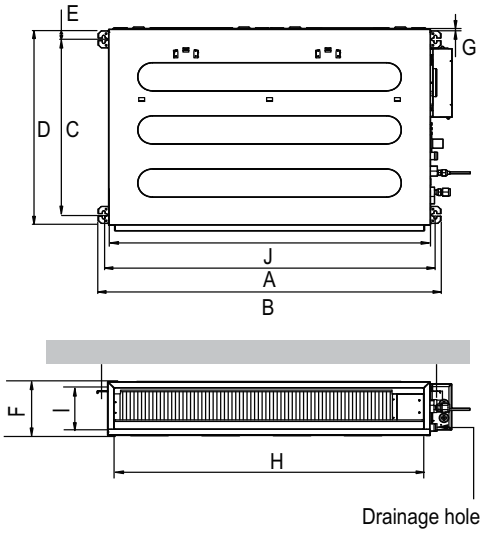


Table 45: Indoor Unit Bolt Location Dimensions.

Model / Capacity (Btu/h)	Dimensions (in.)									
	A	B	C	D	E	F	G	H	I	J
LDN097HV4 / 9,000	28-27/32	30-13/32	24-23/32	27-9/16	1-13/32	7-15/32	25/32	25-31/32	6-3/32	27-9/16
LDN127HV4 / 12,000	36-23/32	38-9/32						33-27/32		35-7/16
LMDN186HV / 18,000										

Preparing the Installation Area and Hanging the Indoor Unit Frame

1. Select and mark the area for the suspension or console bolts (use embedded inserts or anchor bolts in new buildings, and hole-in-anchors in older buildings).
2. Drill the holes.
3. Add the set-anchor and the plate washer to the bolts (bolts should be at least 13/32 inches in diameter), and then insert the bolts into the installation area.
4. Add the plate washer, spring washer, and nut to secure the bolts into the installation area.
5. Position the indoor unit installation plates onto the bolts. Secure using nuts, plate washers, and spring washers. Adjust for level as necessary.

Figure 125: Preparing the Installation Area.

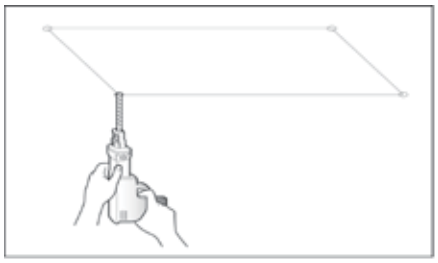


Figure 126: Console Bolt Options.

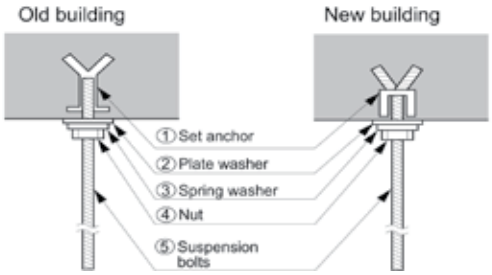
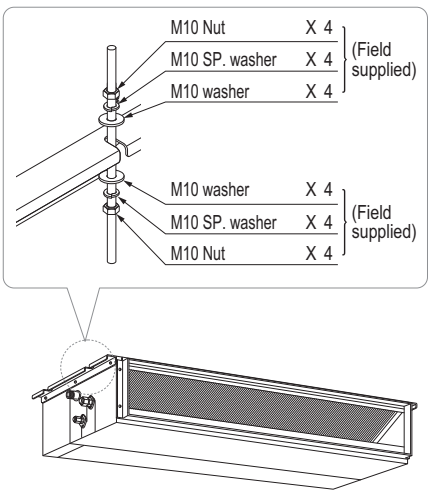


Figure 127: Hanging the Indoor Unit.



Note:

Install a canvas duct to the air outlet and air inlet so that vibration from the indoor unit does not carry to the duct or ceiling. Also, add insulation to the interior of the duct, and apply anti-vibration to the suspension bolts.

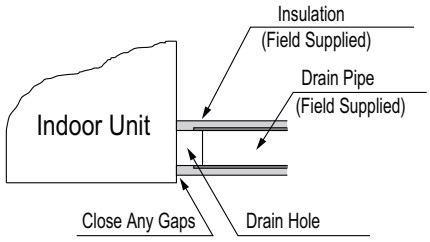
⚠ WARNING

- *Unit must be installed correctly.*
- *Tighten the nuts and bolts to prevent the unit from falling.*

Installing the Drain System

- Drain piping must have downward gradient of at least 1/50 to 1/100; to prevent reverse flow, slope should not be straight up and down.
- Do not damage the drain port on the indoor unit when connecting the field-supplied drain piping.
- Drain piping specifications:
  - Indoor Unit Drain Connection: 1-1/4 inch outside diameter.
  - Field-Supplied Drain Piping: Polyvinyl chloride piping with 1-inch inside diameter and pipe fittings.

Figure 128: Drain Connection.

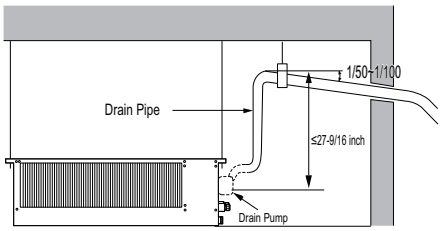


Ducted (low static) indoor units have two options for condensate drainage: Using the factory-installed drain pump, or using a gravity drain.

Using the Drain Pump

- Maximum drain lift is 27-9/16 inches, therefore, the drain piping should be placed below the maximum lift height.
- Field-installed drain piping must have downward gradient of at least 1/50 to 1/100; to prevent reverse flow, slope should not be straight up and down.

Figure 129: Indoor Unit Using Drain Pump.

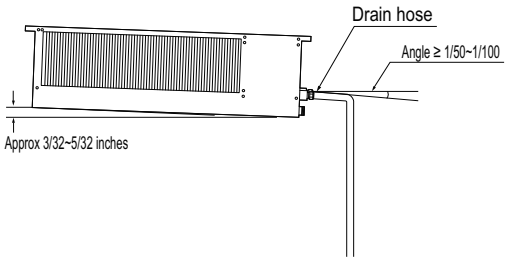


Pump location may be different on the indoor unit.

Using the Gravity Drain

Field-drain piping must have downward gradient of at least 1/50 to 1/100; to prevent reverse flow, slope should not be straight up and down.

Figure 130: Indoor Unit Using Gravity Drain.

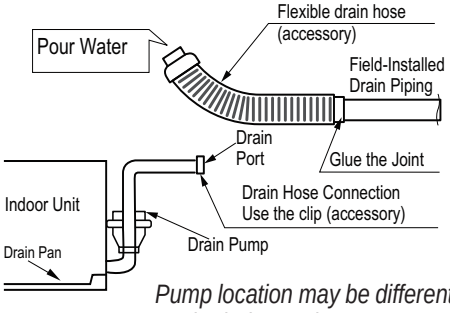


Checking the Drain Pump

The unit uses a drain pump to remove condensate. The pump must be tested before the system operates.

- Connect the flexible drain hose to the field-installed drain piping; leave it as is until the test is complete.
- Pour water into the flexible drain hose and check for leaks.
- After power wiring installation is complete, operate the drain pump to see if it sounds and functions properly.
- After the test is complete, connect the flexible drain hose to the indoor unit drain port.

Figure 131: Checking the Drain Pump.

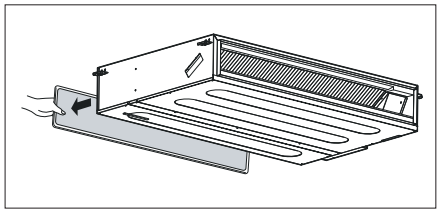


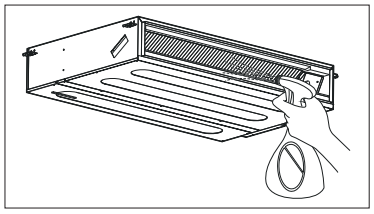
Pump location may be different on the indoor unit.

Checking the Drainage System

1. Remove the air filter.
2. Check the drainage.
   - Spray water on the evaporator.
   - Verify that water flows through the indoor unit drain hose without leaking.

Figure 132: Checking the Drainage System.





Insulating the Refrigerant and Drain Piping

⚠ WARNING

Ensure all piping is insulated. Exposed piping can cause burns if touched.

Refrigerant Piping Insulation

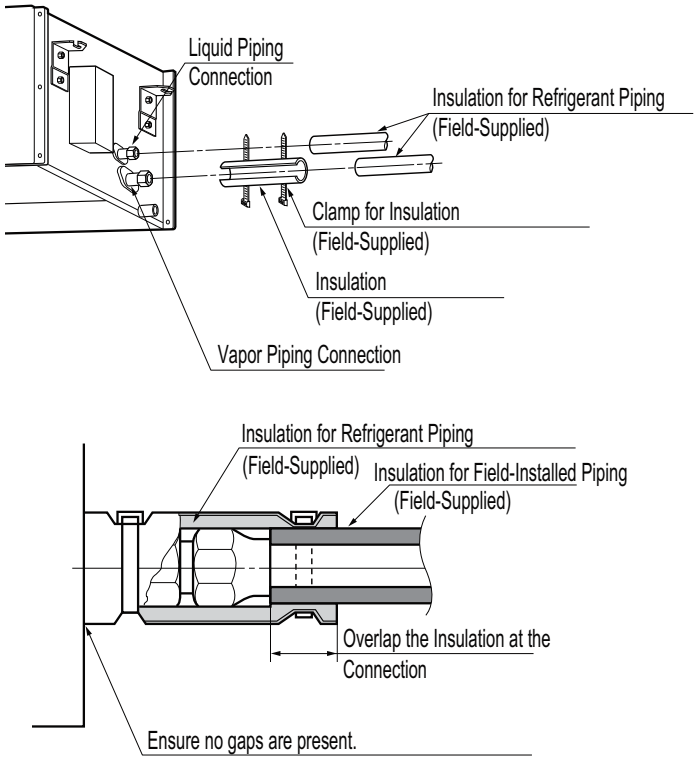
Field-installed vapor and liquid refrigerant piping lines must be properly and completely covered in insulation (up to the indoor unit piping connections). Any exposed piping may generate condensate or will cause burns if touched. Insulation for this field-installed refrigerant piping must have a minimum heat resistance of 248°F.

Duct (low static) indoor units have been tested under and meet the requirements of the "KS Conditions." If the indoor unit is installed and is operated at an extended period in a highly humid environment (dew point temperature >73°F), however, condensate will form. To prevent this phenomenon, install adiabatic glass wool insulation with a thickness or 13/32 to 13/16 inches thick. Also, install glass wool insulation on all indoor unit that are located in the ceiling plenum.

Drain Piping Insulation

Drain piping must have insulation a minimum of 7/32 inches thick.

Figure 133: Insulating the Piping.



Power Wiring / Communications Cable Guidelines

- Follow manufacturer's circuit diagrams in the technical manuals.
- Confirm power source specifications.
- Confirm that the electrical capacity is sufficient.
- Starting current must be maintained ±10 percent of the rated current marked on the outdoor unit name plate.
- Confirm cable thickness specifications.
- It is recommended that a circuit breaker is installed, especially if conditions could become wet or moist.
- Include a disconnect in the power wiring system, add an air gap contact separation of at least 1/8 inch in each active (phase) conductor.

⚠ WARNING

• Loose wiring may cause unit to malfunction, overheat, and catch fire, resulting in severe injury or death.

Note:

• Terminal screws may become loose during transport. Properly tighten the terminal connections during installation.
A voltage drop may cause the following problems:
• Magnetic switch vibration, fuse breaks, or disturbance to the normal function of an overload protection device.
• Compressor will not receive the proper starting current.

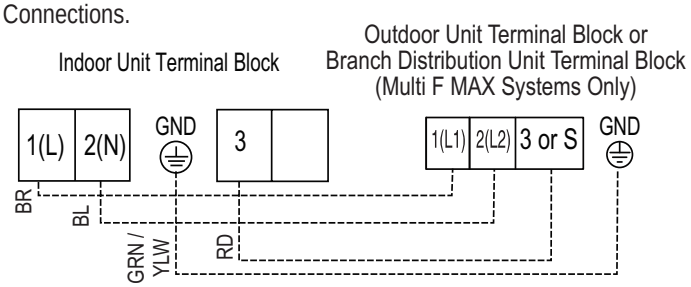
Connecting the Power Wiring and Communications Cable

1. Insert the power wiring / communications cable from the outdoor unit or branch distribution unit (Multi F MAX systems only) through the side of the indoor unit. Pass the wiring through the designated access holes to prevent damage. To prevent electromagnetic interference and product malfunction, leave a space between the power wiring and communications cable outside of the indoor unit.

2. Connect each wire to its appropriate terminal on the indoor unit control board. Verify that the color and terminal numbers from the outdoor unit or branch distribution unit (Multi F MAX systems only) wiring match the color and terminal numbers on the indoor unit.

3. Secure the power wiring / communications cable with the cable restraint.

Figure 134: Indoor Unit to Outdoor Unit / Branch Distribution Unit (Multi F MAX systems only) Power Wiring / Communications Cable Connections.



4. Screw the steel clamp to the inside of the control panel.
   - Place the wiring / cables in the clamp and tighten the plastic clamp to an open surface of the control panel.
   - When clamping, do not apply force to the wiring connections.
   - Neatly arrange the wiring, do not catch the wiring in the electric box cover, and ensure the cover firmly closes.

5. Fill in any gaps around the wiring access hole with sealant to prevent foreign particles from entering the indoor unit.

Using a Conduit

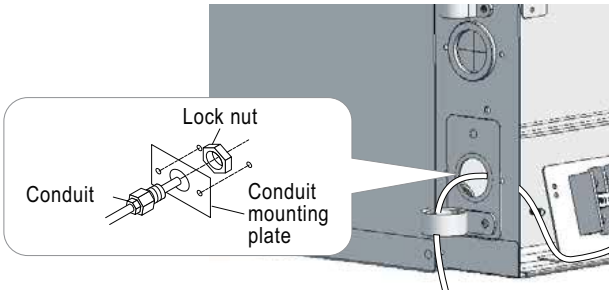
1. Remove the rubber stopper on the indoor unit. Pass the power wiring / communications cable through the conduit, the conduit mounting plate, and to the control panel of the indoor unit.

2. Connect the power wiring / communications cable to the indoor unit terminal block.

3. Screw the conduit mounting plate to the indoor unit.

4. Tighten the conduit and the conduit mounting plate together.

Figure 135: Exterior View of Conduit Installation.



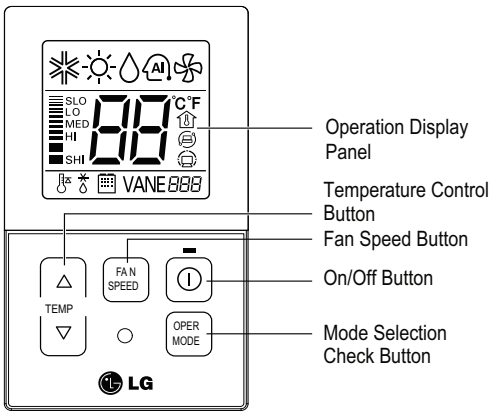
Controller Options

Ceiling-concealed duct (low static) indoor units include an LG-supplied wired controller (AKB72955816)[1], but other optional LG-supplied wired controllers are available. The wireless handheld controller (Model No. PQWRHQ0FDB) is also an optional accessory with use of the wired controller.

- Operation Display Panel: Displays operation conditions.
- Temperature Control Button: Sets desired temperature.
- Fan Speed Button: Sets desired fan speed.
- On / Off Button: Turns system operation on and off.
- Mode Selection Check Button: Selects the operation mode: Cooling, Heating, Auto, Dry (Dehumidification), or Fan.

Wired Controller

Figure 136: AKB72955816[1] Wired Controller.



Note:

Each function will display on the LED for about three (3) seconds when the power is first cycled on.

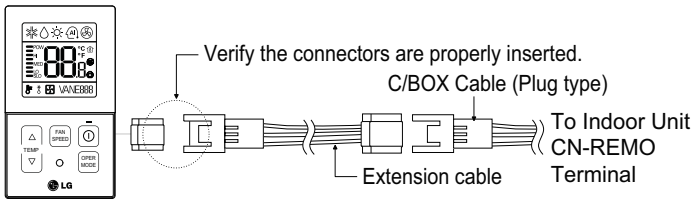
[1]Simple Mode Controllers for the ceiling-concealed duct (low static) indoor units are also referenced by Model No. PQRCVCL0QW.

Wired Controller Connections

Controllers can connect to the indoor unit in one of two different ways.

1. LG Wired Remote Extension Cable with Molex plug (PZCWRC1; sold separately) that connects to the CN-REMO terminal on the indoor unit PCB.
2. Field-supplied controller cable that connects to the indoor unit terminal block (must be at least UL2547 or UL1007, 22 AWG, two-core, one-shield core, at least FT-6 rated if local electric and building codes require plenum cable usage).

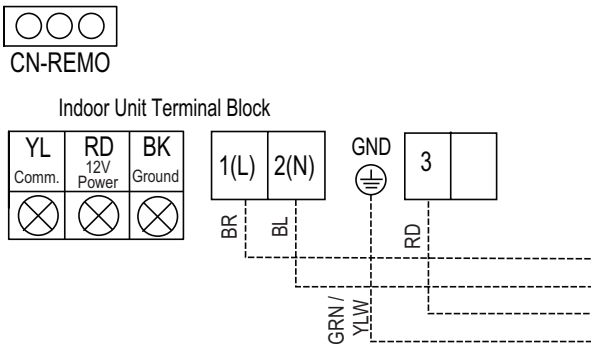
Figure 137: PZCWRC1 LG Wired Remote Extension Cable.



Note:

When using field-supplied controller cable, make sure to connect the yellow to yellow (communications wire), red to red (12V power wire), and black to black (ground wire) terminals from the remote controller to the indoor unit terminal blocks.

Figure 138: Wired Controller Connections on the Indoor Unit Terminal Block.



Hanging the Wired Controller

1. The controller wiring / cable can be installed in one of three directions: top, back, or on the right side. If top or right side installation is desired, remove cable guide grooves on the controller, and then position wiring / cable on applicable side.

2. Choose and mark the area of installation, and then screw the wall plate into place (using the provided parts). Install the controller wall plate to fit the electrical box if one is present. Ensure that no gaps exist between the wall plate and the wall itself.

3. Arrange wiring / cables so as not to interfere with the controller circuitry. Position the wired controller on the wall plate. Snap into place by pressing the bottom part of the wired controller onto the wall plate. Make sure that no gaps exist between the wired controller and the wall plate on all sides.

4. To remove wired controller from the wall plate, insert a screwdriver into the two holes at the bottom. Twist screwdriver to release controller. Do not damage the controller components when removing.

Figure 139: Removing the Cable Guide Grooves.

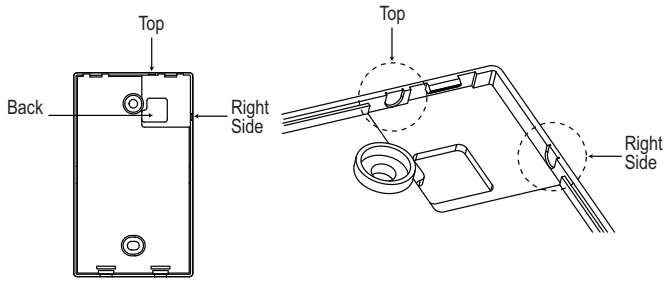


Figure 140: Attaching the Wall Plate.

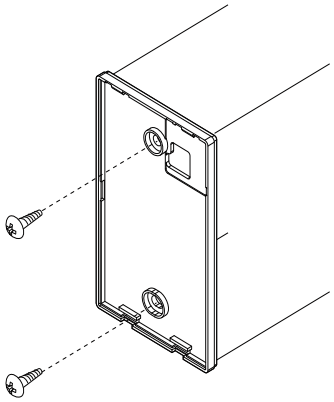
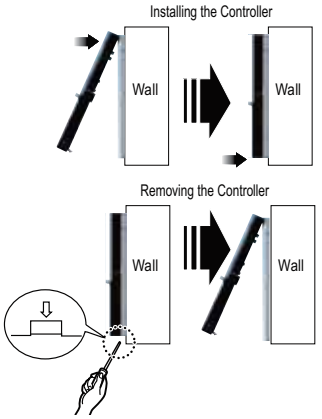


Figure 141: Installing / Removing the Controller.



Assigning the Thermistor for Temperature Detection

Each indoor unit includes a return air thermistor assigned to sense the temperature. If a wired controller is installed, there is a choice of sensing temperature with either the indoor unit return air thermistor or the thermistor in the wired controller. It is also an option to set both thermistors to sense temperature so that indoor unit bases its operation on the first thermistor to reach the designated temperature differential. For applicable indoor units, an optional Remote Temperature Sensor can be used in lieu of the return air thermistor—either alone or in conjunction with a wired controller thermistor as previously described.

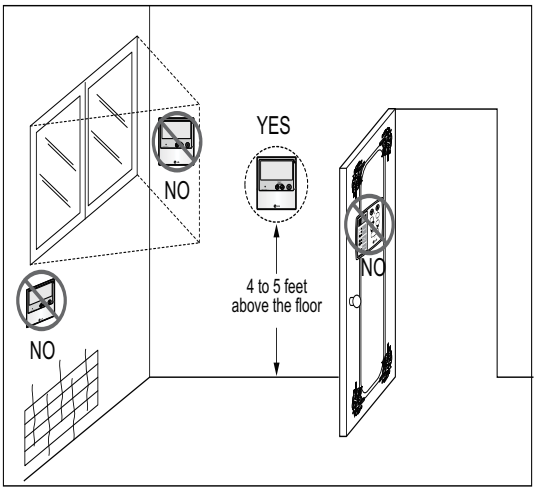
Wired Controller Placement

Wired controllers include a sensor to detect room temperature. To maintain comfort levels in the conditioned space, the wired controller must be installed in a location away from direct sunlight, high humidity, and where it could be directly exposed to cold air. Controller must be installed four (4) to five (5) feet above the floor where its LED display can be read easily, in an area with good air circulation, and where it can detect an average room temperature.

⃠ Do not install the wired controller near or in:

- Drafts or dead spots behind doors and in corners
- Hot or cold air from ducts
- Radiant heat from the sun or appliances
- Concealed pipes and chimneys
- An area where temperatures are uncontrolled, such as an outside wall

Figure 142: Proper Location for the Wired Controller.



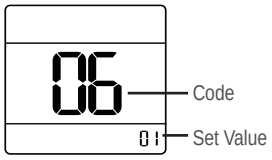
External Static Pressure Control

To provide a required air flow rate that accounts for the external static pressure change, follow the steps below.

1. To access system installer setting mode, press and hold the temperature increase and mode selection buttons simultaneously for approximately three (3) seconds. Choose setting code value “06” by pressing the mode selection button.
2. Use the temperature increase and decrease buttons to select the desired setting value.

   Setting Values
   01 : V-H 03 : V-L
   02 : F-H 04 : F-L

Figure 143: Select Code and Set Value.



3. Press the on / off button to save the established settings.
4. To deactivate system installer setting mode after the settings have been established, press and hold the temperature increase and mode selection check buttons simultaneously for approximately three (3) seconds. If a button is not pressed for more than 25 seconds, the system installer setting mode will automatically deactivate.

Figure 144: Controller External Static Pressure Setting Display.

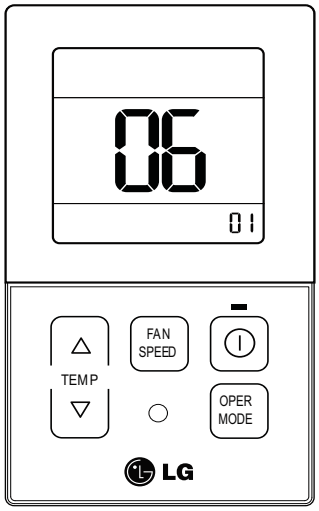


Table 47: Static Pressure Setting Table.

Pressure Selection		Function	
		Zone State	External Static Pressure Standard Value
01	V-H	Variable	High
02	F-H	Fixed	High
03	V-L	Variable	Low
04	F-L	Fixed	Low

Note:

- *Select the position after verifying duct work and the external static pressure of the indoor unit.*
- *Factory set to pressure selection F-H.*

Assigning Air Flow

To assign an air flow for each fan speed, follow the steps below.

1. To access system installer setting mode, press and hold the temperature increase and mode selection buttons simultaneously for approximately three (3) seconds. Choose setting code value “03” by pressing the mode selection button.

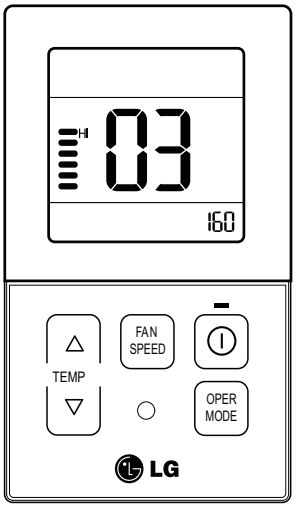
2. Use the fan speed button to select the desired fan speed. (Lo→Med→Hi will display on the LED).

3. Use the temperature increase and decrease buttons to select the desired external static pressure setting value (thereby assigning the respective airflow). External static pressure value range: 0~255; the value will display near the lower right corner of the LED.

4. Press the on / off button to save the established settings.

5. To deactivate system installer setting mode after the settings have been established, press and hold the temperature increase and mode selection check buttons simultaneously for approximately three (3) seconds. If a button is not pressed for more than 25 seconds, the system installer setting mode will automatically deactivate.

Figure 145: Controller External Static Pressure Setting Display.



Note:

- *A certified technician must set the external static pressure value(s). If the external static pressure is set incorrectly, the system may malfunction.*
- *Do not alter the external static pressure value that corresponds to each air flow level.*
- *External static pressure value can vary depending on the indoor unit.*
- *If by pressing the fan speed button during external static pressure setup, the fan speed is raised to the next level, the air flow value of the previous fan speed will be maintained (external static pressure setting value is saved).*

CEILING-CONCEALED DUCT (HIGH STATIC) INDOOR UNIT DATA

DUCT (HIGH STATIC) INDOOR UNITS

Mechanical Specifications and Features

Ceiling-Concealed Duct (High Static) Indoor Unit

General

All LG indoor units are factory assembled, wired, piped, and provided with a control circuit board, fan, and motor. Ceiling-Concealed Duct (High Static) units are designed for high-speed air volume against an external static pressure up to 0.78"WG for the 24,000 Btu/h model; up to 0.55"WG for the 36,000 Btu/h model.

Coil

Indoor unit coils are factory built and are comprised of aluminum fins mechanically bonded to copper tubing. Each unit has two rows of coils, which are pressure tested at the factory. Each unit is provided with a factory installed condensate drain pan below the coil.

Refrigerant System

System is designed for use with R410A refrigerant. The refrigeration circuit is pressure-tested at the factory and shipped with a holding charge of helium gas. Refrigerant pipe connections are 45° flare, and all refrigerant lines from the outdoor unit to the indoor units must be field insulated.

Electrical

Each indoor 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. Casing is manufactured of galvanized steel plate. Cold surfaces of the unit are covered internally with a coated polystyrene insulating material, and covered externally with sheet insulation made of ethylene propylene diene monomer (M-Class) (EPDM). External insulation is plenum rated and conforms to ASTM Standard D-1418. Hanger brackets are included on the casing to support the weight on four corners. Unit has a front horizontal supply air discharge outlet, and one dedicated rear horizontal return air inlet.

Fan Assembly and Control

The units have two direct-drive, Sirocco fans made of high strength ABS GP-2200 polymeric resin that are statically and dynamically balanced. The fans are mounted on a common brushless digitally controlled (BLDC) motor with permanently lubricated and sealed ball bearings. The fan / motor assembly is mounted on vibration-attenuating rubber grommets. Fan speed is controlled using a microprocessor-based direct digital control algorithm. The indoor fan has Low, Med, High, and Auto settings for Cooling mode; and has Low, Med, High, and Auto settings for Heating mode. Each of the settings can be field-adjusted from the factory setting (RPM / ESP). The Auto setting adjusts the fan speed based on the difference between the controller setpoint and space temperature.

Figure 146: Ceiling-Concealed Duct (High Static) Indoor Unit.

Air Filter

Return air is filtered with a factory-supplied, removable, washable filter accessible from the rear of the indoor unit. High efficiency air filter options include a return filter box and an LG / Dynamic supplied air cleaner (both sold separately).

Microprocessor Control

The unit is provided with an integrated control panel to communicate with the outdoor unit. All unit operation parameters are stored in non-volatile memory resident on the unit microprocessor. The microprocessor controls space temperature through using the value provided by the temperature sensor within the indoor unit. The microprocessor control will activate indoor unit operation when the indoor room temperature falls below or rises above a setpoint temperature, at which point, a signal is sent to the outdoor unit to begin the appropriate mode. The microprocessor will also provide self-diagnostics and auto restart functions. A field-supplied four-wire power / communications cable must be installed to connect the indoor unit(s) to the outdoor unit.

Controls

The indoor unit is supplied with an LG wired controller. Communication between the indoor units and the outdoor unit is accomplished through 18 AWG, four-core, stranded and shielded power / communication cable.

Condensate Lift/Pump

The indoor unit is provided with a factory installed and wired internal condensate lift/pump capable of providing a minimum 27.5 inch lift from the bottom surface of the unit. Drain pump has a safety switch to shut off the indoor unit if the condensate rises too high in the drain pan.

Features

- Inverter (Variable speed fan)
- Internal drain pump
- Control lock function
- Auto operation
- Auto restart operation
- Dehumidifying function
- Two thermistor control
- External static pressure control
- Group control
- Self-diagnostics function
- Wired thermostat included

DUCT (HIGH STATIC) INDOOR UNITS

General Data / Specifications

Table 48: Multi F Ceiling-Concealed High-Static Ducted Indoor Unit General Data.

Model Name	LMHN240HV	LMHN360HV
Nominal Cooling Capacity (Btu/h)[1]	24,000	36,000
Nominal Heating Capacity (Btu/h)[1]	27,000	40,000
Operating Range		
Cooling (°F WB)	57-77	57-77
Heating (°F DB)	59-81	59-81
Fan		
Type	Sirocco	Sirocco
Motor Output (W) x Qty.	154 x 1	350 x 1
Motor/Drive	Brushless Digitally Controlled / Direct	Brushless Digitally Controlled / Direct
Factory Set Airflow Rate CFM (H/M/L)	688 / 618 / 530	1,130 / 953 / 706
Factory Set External Static Pressure (in. wg)	0.39	0.39
Maximum External Static Pressure (in. wg)	0.78	0.55
Unit Data		
Refrigerant Type[2]	R410A	R410A
Refrigerant Control	EEV	EEV
Power Supply V, Ø, Hz[3]	208-230, 1, 60	208-230, 1, 60
Rated Amps (A)	0.9	1.4
Sound Pressure Level (Standard Mode) ±3 dB(A) H/M/L)[4]	37 / 36 / 35	44 / 42 / 40
Dimensions (W x H x D, in.)	46-17/32 x 11-23/32 x 17-23/32	46-17/32 x 11-23/32 x 17-23/32
Net Unit Weight (lbs.)	80	91
Shipping Weight (lbs.)	91	101
Power Wiring / Communications Cable (No. x AWG)[5]	4 x 18	4 x 18
Heat Exchanger (Row x Column x Fin / inch) x Number	(2 x 12 x 21) x 1	(3 x 12 x 21) x 1
Piping		
Liquid (in.)	1/4	3/8
Vapor (in.)	1/2	5/8
Drain O.D. / I.D. (in.)	1-1/4, 1	1-1/4, 1

[1]Nominal capacity is rated 0 ft. above sea level with corresponding refrigerant piping length in accordance with standard length of each outdoor unit and a 0 ft. level difference between outdoor and indoor units. All capacities are net with a combination ratio between 95 – 105%.

Nominal 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).
Nominal 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).

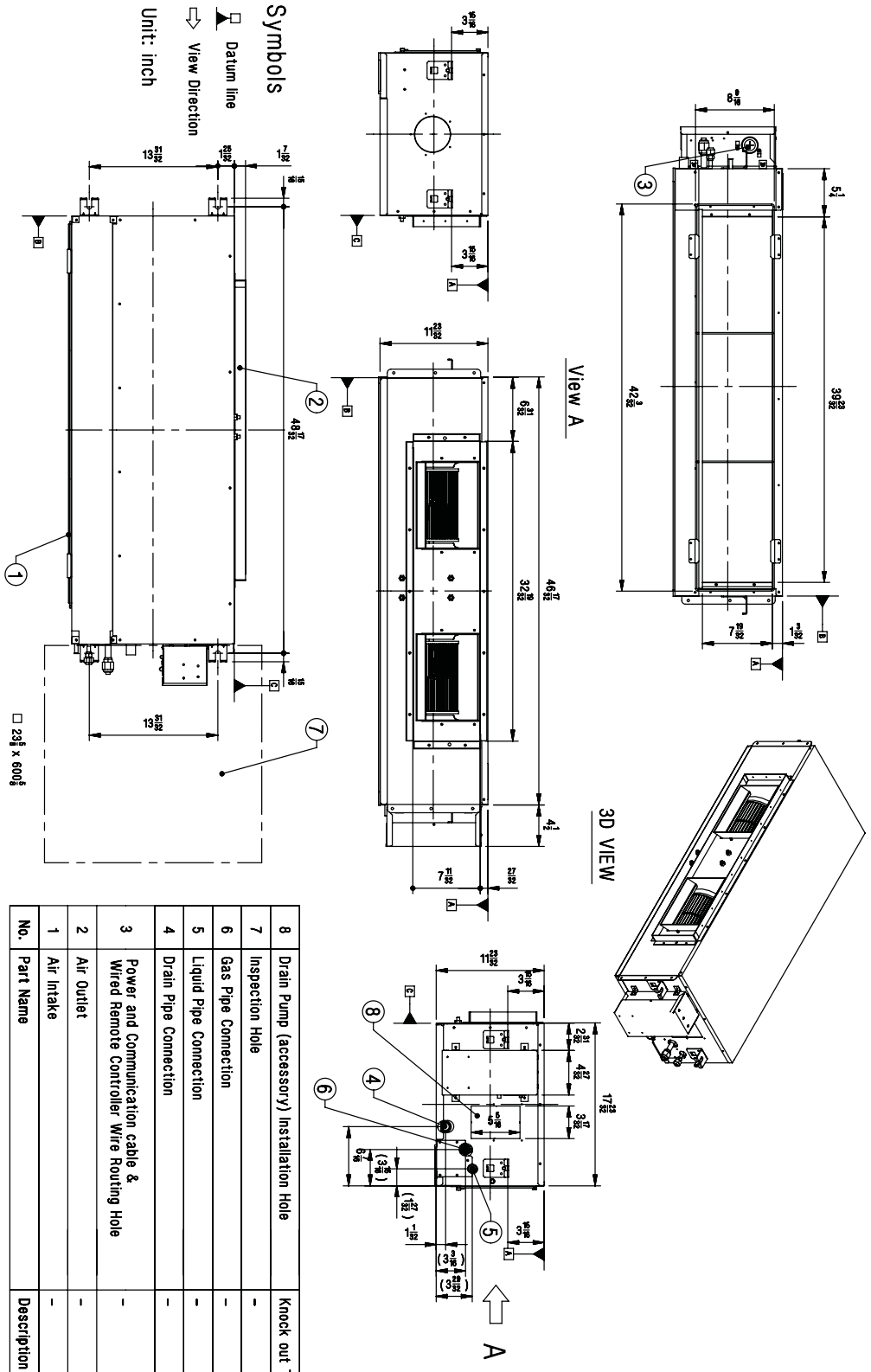
[2]This unit comes with a dry helium charge.

[3]Acceptable operating voltage: 187V-253V.

[4]Sound pressure levels are tested in an anechoic chamber under ISO Standard 3745 and are the same in both cooling and heating mode. These values can increase due to ambient conditions during operation.

[5]All power wiring / communications cable to the IDUs be minimum 18 AWG, 4-conductor, stranded, shielded or unshielded (if shielded, must be grounded to chassis at ODU only) and must comply with applicable local and national codes.

Figure 147: LMHN240HV and LMHN360HV Dimensions.



No.	Part Name	Description
1	Air Intake	-
2	Air Outlet	-
3	Power and Communication cable & Wired Remote Controller Wire Routing Hole	-
4	Drain Pipe Connection	-
5	Liquid Pipe Connection	-
6	Gas Pipe Connection	-
7	Inspection Hole	-
8	Drain Pump (accessory) Installation Hole	Knock out Type

DUCT (HIGH STATIC) INDOOR UNITS

Cooling Capacity Table

Table 49: Multi F Ceiling-Concealed Duct (High Static) Indoor Units Cooling Capacity Table.

Model No. / Nominal Capacity of Indoor Unit (Btu/h)	Outdoor Air Temp. (°F DB)	Indoor Air Temp. °F DB / °F WB											
		68 / 57		73 / 61		77 / 64		80 / 67		86 / 72		90 / 75	
		TC	SHC	TC	SHC	TC	SHC	TC	SHC	TC	SHC	TC	SHC
LMHN240HV 24,000	14	23.53	17.66	24.99	18.66	26.45	18.07	27.50	18.45	29.37	18.60	30.83	18.95
	20	23.51	17.80	24.97	18.80	26.43	18.21	27.48	18.59	29.35	18.75	30.81	19.10
	25	23.49	17.94	24.95	18.95	26.41	18.35	27.46	18.73	29.33	18.89	30.79	19.25
	30	23.47	18.08	24.93	19.09	26.39	18.49	27.44	18.88	29.30	19.04	30.76	19.40
	35	23.46	18.21	24.91	19.24	26.37	18.63	27.42	19.02	29.28	19.18	30.74	19.54
	40	23.44	18.35	24.89	19.38	26.35	18.77	27.40	19.16	29.26	19.33	30.72	19.69
	45	23.42	18.49	24.87	19.53	26.33	18.91	27.38	19.31	29.24	19.47	30.69	19.84
	50	23.40	18.62	24.85	19.67	26.31	19.05	27.36	19.45	29.21	19.61	30.67	19.99
	55	23.38	18.76	24.84	19.82	26.29	19.19	27.34	19.59	29.19	19.76	30.64	20.13
	60	23.37	18.90	24.82	19.96	26.27	19.33	27.32	19.73	29.17	19.90	30.62	20.28
	65	23.35	19.03	24.80	20.10	26.25	19.47	27.29	19.88	29.15	20.04	30.60	20.42
	70	23.33	19.17	24.78	20.25	26.23	19.61	27.27	20.02	29.13	20.19	30.57	20.57
	75	22.77	18.85	24.21	19.94	25.66	19.33	26.70	19.75	28.55	19.94	29.99	20.34
	80	22.21	18.53	23.65	19.63	25.09	19.05	26.13	19.48	27.97	19.69	29.42	20.10
	85	21.65	18.19	23.09	19.30	24.53	18.75	25.57	19.19	27.40	19.43	28.84	19.84
	90	21.09	17.85	22.53	18.96	23.96	18.45	25.00	18.90	26.83	19.15	28.27	19.59
	95	20.49	17.66	21.92	18.79	23.35	18.31	**24.00**	**18.48**	26.20	19.05	27.63	19.50
	100	19.99	17.19	21.42	18.31	22.85	17.87	23.69	18.19	25.70	18.64	27.13	19.10
	105	19.49	16.71	20.92	17.84	22.35	17.43	23.38	17.91	25.20	18.23	26.63	18.70
	110	18.99	16.14	20.42	17.26	21.85	16.90	22.88	17.37	24.70	17.71	26.13	18.19
	115	18.49	15.66	19.92	16.78	21.35	16.45	22.38	16.93	24.20	17.29	25.63	17.77
	118	18.19	15.55	19.62	16.68	21.05	16.36	22.08	16.86	23.90	17.23	25.33	17.72
	122	18.10	15.51	19.52	16.64	20.95	16.34	21.98	16.83	23.81	17.21	25.23	17.71
LMHN360HV 36,000	14	35.29	25.46	37.48	26.90	39.67	26.04	41.26	26.59	44.06	26.81	46.25	27.32
	20	35.26	25.66	37.45	27.11	39.64	26.25	41.23	26.80	44.02	27.02	46.21	27.54
	25	35.24	25.86	37.43	27.32	39.61	26.45	41.19	27.01	43.99	27.23	46.18	27.75
	30	35.21	26.06	37.40	27.53	39.58	26.65	41.16	27.21	43.96	27.44	46.14	27.96
	35	35.18	26.25	37.37	27.73	39.55	26.85	41.13	27.42	43.92	27.65	46.11	28.17
	40	35.16	26.45	37.34	27.94	39.52	27.06	41.10	27.63	43.89	27.86	46.07	28.39
	45	35.13	26.65	37.31	28.15	39.49	27.26	41.07	27.83	43.86	28.07	46.04	28.60
	50	35.10	26.85	37.28	28.36	39.46	27.46	41.04	28.04	43.82	28.27	46.00	28.81
	55	35.08	27.04	37.25	28.57	39.43	27.66	41.01	28.24	43.79	28.48	45.97	29.02
	60	35.05	27.24	37.23	28.78	39.40	27.86	40.97	28.45	43.76	28.69	45.93	29.23
	65	35.02	27.44	37.20	28.98	39.37	28.06	40.94	28.65	43.72	28.90	45.90	29.44
	70	34.99	27.63	37.17	29.19	39.34	28.26	40.91	28.86	43.69	29.10	45.86	29.65
	75	34.15	27.18	36.32	28.75	38.49	27.87	40.05	28.47	42.82	28.75	44.99	29.32
	80	33.31	26.71	35.47	28.29	37.64	27.46	39.20	28.08	41.96	28.39	44.12	28.97
	85	32.48	26.23	34.63	27.82	36.79	27.03	38.35	27.66	41.10	28.00	43.26	28.61
	90	31.64	25.73	33.79	27.33	35.94	26.59	37.50	27.24	40.25	27.61	42.40	28.23
	95	30.74	25.46	32.88	27.09	35.02	26.39	**36.00**	**26.64**	39.30	27.46	41.44	28.11
	100	29.99	24.78	32.13	26.40	34.27	25.76	35.53	26.23	38.55	26.87	40.69	27.53
	105	29.24	24.10	31.38	25.72	33.52	25.13	35.07	25.82	37.80	26.28	39.94	26.96
	110	28.49	23.27	30.63	24.89	32.77	24.36	34.32	25.04	37.05	25.54	39.20	26.22
	115	27.74	22.58	29.88	24.19	32.02	23.71	33.57	24.41	36.31	24.93	38.45	25.62
	118	27.29	22.41	29.43	24.04	31.57	23.59	33.12	24.30	35.86	24.84	38.00	25.55
	122	27.14	22.36	29.28	23.99	31.43	23.55	32.97	24.26	35.71	24.81	37.85	25.53

TC = Total Capacity (kBtu/h).

SHC: Sensible Heat Capacity (kBtu/h).

Nominal capacity as rated 0 ft. above sea level and a 0 ft. level difference between outdoor and indoor units. Corresponding refrigerant piping length is accordance with standard length of each outdoor unit.

Nominal cooling capacity rating 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).

The shaded table columns and rows indicate reference data. When operating at this temperature, these values can be different if the system is not running consistently.

DUCT (HIGH STATIC) INDOOR UNITS

Heating Capacity Table

MULTI F
MULTI F MAX

Table 50: Multi F Ceiling-Concealed Duct (High Static) Indoor Units Heating Capacity Table.

Model No. / Nominal Capacity of Indoor Unit (Btu/h)	Outdoor Air Temp.		Indoor Air Temp. °F DB					
	°F DB	°F WB	61	64	68	70	72	75
			TC	TC	TC	TC	TC	TC
LMHN240HV 24,000	0	-0.4	13.89	13.70	13.57	13.50	13.30	12.72
	5	4.5	15.65	15.46	15.33	15.26	15.07	14.48
	10	9	17.41	17.22	17.09	17.02	16.83	16.24
	17	15	19.76	19.57	19.43	**19.37**	19.17	18.55
	20	19	20.64	20.45	20.32	20.25	20.05	19.37
	25	23	22.11	21.91	21.78	21.72	21.52	20.74
	30	28	23.38	23.18	23.05	22.99	22.79	22.11
	35	32	24.65	24.46	24.33	24.26	24.07	23.48
	40	36	25.79	25.60	25.47	25.40	25.21	24.62
	45	41	26.93	26.74	26.61	26.54	26.35	25.76
	47	43	27.39	27.20	27.07	**27.00**	26.80	26.22
	50	46	27.83	27.64	27.51	27.44	27.24	26.58
	55	51	28.57	28.37	28.24	28.17	27.98	27.20
	60	56	28.57	28.37	28.24	28.17	27.98	27.32
	63	59	28.57	28.37	28.24	28.17	27.98	27.39
	68	64	28.57	28.37	28.24	28.17	27.98	27.51
LMHN360HV 36,000	0	-0.4	20.58	20.29	20.10	20.00	19.71	18.84
	5	4.5	23.19	22.90	22.71	22.61	22.32	21.45
	10	9	25.80	25.51	25.31	25.22	24.93	24.06
	17	15	29.28	28.99	28.79	**28.70**	28.41	27.48
	20	19	30.58	30.29	30.10	30.00	29.71	28.70
	25	23	32.75	32.46	32.27	32.17	31.88	30.72
	30	28	34.64	34.35	34.15	34.06	33.77	32.75
	35	32	36.52	36.23	36.04	35.94	35.65	34.78
	40	36	38.21	37.92	37.73	37.63	37.34	36.47
	45	41	39.90	39.61	39.42	39.32	39.03	38.16
	47	43	40.58	40.29	40.10	**40.00**	39.71	38.84
	50	46	41.23	40.94	40.75	40.65	40.36	39.38
	55	51	42.32	42.03	41.84	41.74	41.45	40.29
	60	56	42.32	42.03	41.84	41.74	41.45	40.47
	63	59	42.32	42.03	41.84	41.74	41.45	40.58
	68	64	42.32	42.03	41.84	41.74	41.45	40.76

TC = Total Capacity (kBtu/h).

Nominal capacity as rated 0 ft. above sea level and a 0 ft. level difference between outdoor and indoor units. Corresponding refrigerant piping length is accordance with standard length of each outdoor unit.

Nominal 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).

DUCT (HIGH STATIC) INDOOR UNITS

External Static Pressure / Acoustic Data

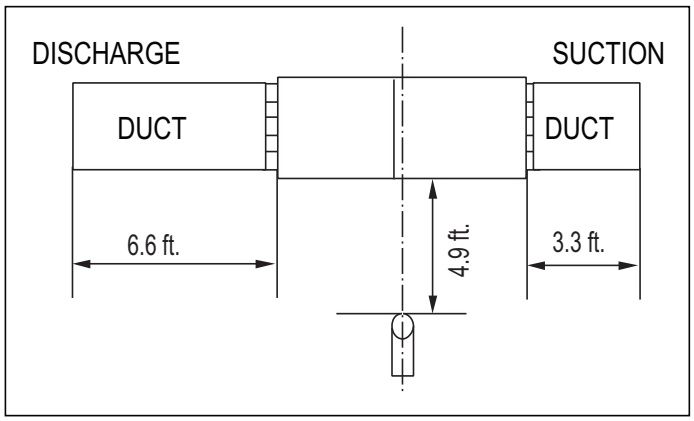
Table 51: Multi F Ceiling-Concealed Duct (High Static) External Static Pressure Setting Values Table.

Static Pressure (in. wg)			0.1	0.16	0.23	0.31	0.39	0.47	0.55	0.62	0.70	0.78
Model No. / Nominal Capacity of Indoor Unit (Btu/h)	Airflow Rate / CFM		Setting Value (in. wg)									
LMHN240HV 24,000	High	688	82	92	103	113	122	131	140	147	154	160
	Mid	618	78	89	99	110	119	128	137	144	151	157
	Low	530	73	86	96	107	116	125	134	141	148	154
LMHN360HV 36,000	High	1,130	-	124	133	140	148	154	160	-	-	-
	Mid	953	-	112	122	130	137	145	152	-	-	-
	Low	706	-	97	107	117	125	133	141	-	-	-

Note:

- *To get the desired air flow and external static pressure combination, use the setting value from the table. Using a setting value other than that listed in the table will not provide the desired combination.*
- *Table data is based at 230V. Air flow rate varies according to voltage fluctuation.*

Figure 148: Sound Pressure Level Measurement Location.



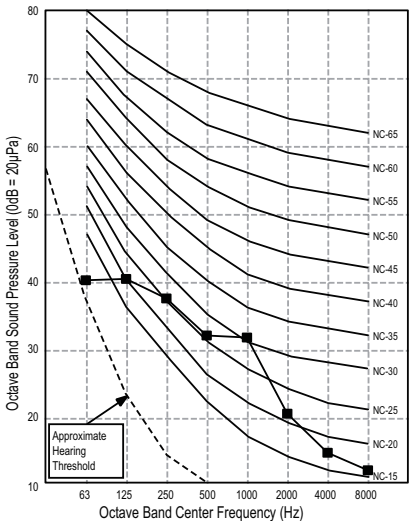
- Measurements taken with no attenuation and units operating at full load normal operating condition.
- Sound level will vary depending on a range of factors such as construction (acoustic absorption coefficient) of particular area in which the equipment is installed.
- Sound power levels are measured in dB(A)±3.
- Tested in anechoic chamber per ISO Standard 3745.

Table 52: Sound Pressure Levels (dB[A]).

Model No.	Sound Pressure Levels (dB[A]) (Cooling and Heating)		
	High Fan Speed	Medium Fan Speed	Low Fan Speed
LMHN240HV	37	36	35
LMHN360HV	44	42	40

Figure 149: Sound Pressure Level Diagrams.

LMHN240HV



LMHN360HV

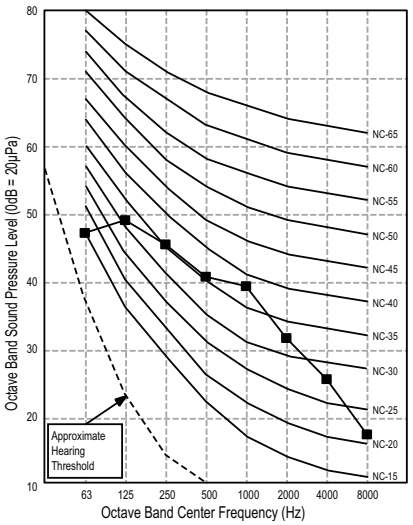


Figure 150: LMHN240HV and LMHN360HV Refrigerant Flow Diagram.

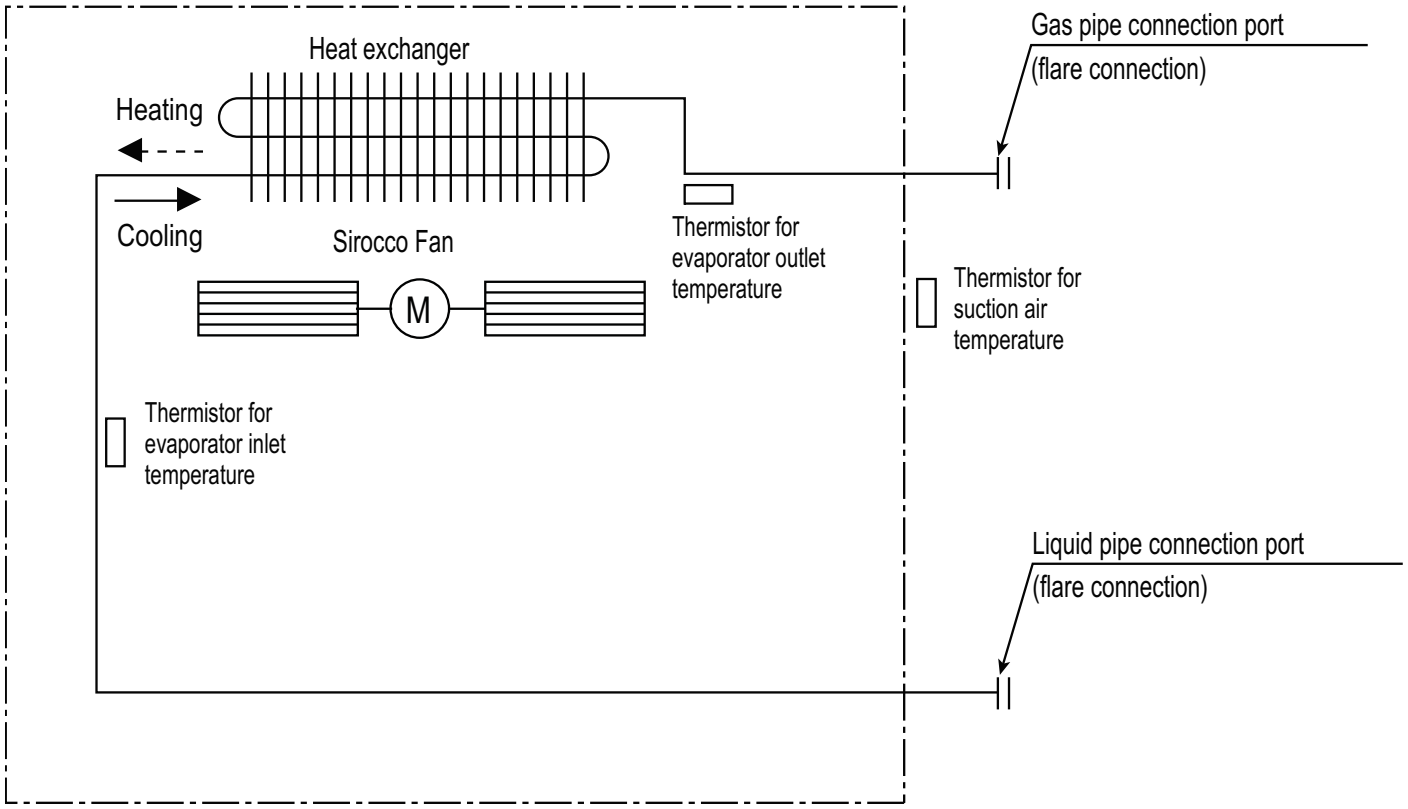


Table 53: Multi F Ceiling-Concealed Duct (High Static) Indoor Unit Refrigerant Pipe Connection Port Diameters.

Model No.	Vapor (inch)	Liquid (inch)
LMHN240HV	Ø1/2	Ø1/4
LMHN360HV	Ø5/8	Ø3/8

Table 54: Multi F Ceiling-Concealed Duct (High Static) Indoor Unit Thermistor Details.

Description (Based on Cooling Mode)	PCB Connector
Indoor Air Temperature Thermistor	CN-ROOM
Evaporator Inlet Temperature Thermistor	CN-PIPE/IN
Evaporator Outlet Temperature Thermistor	CN-PIPE/OUT

Figure 151: Multi F Ceiling-Concealed Duct (High Static) LMHN240HV Indoor Units Wiring Diagram.

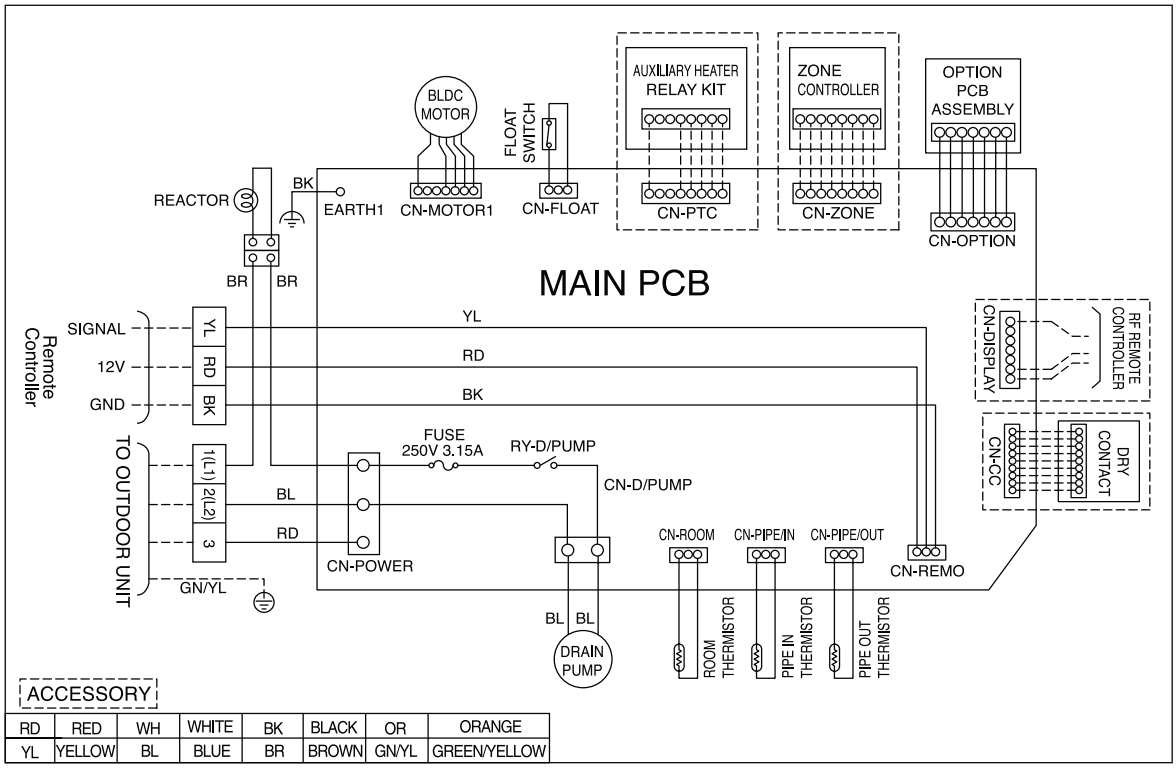
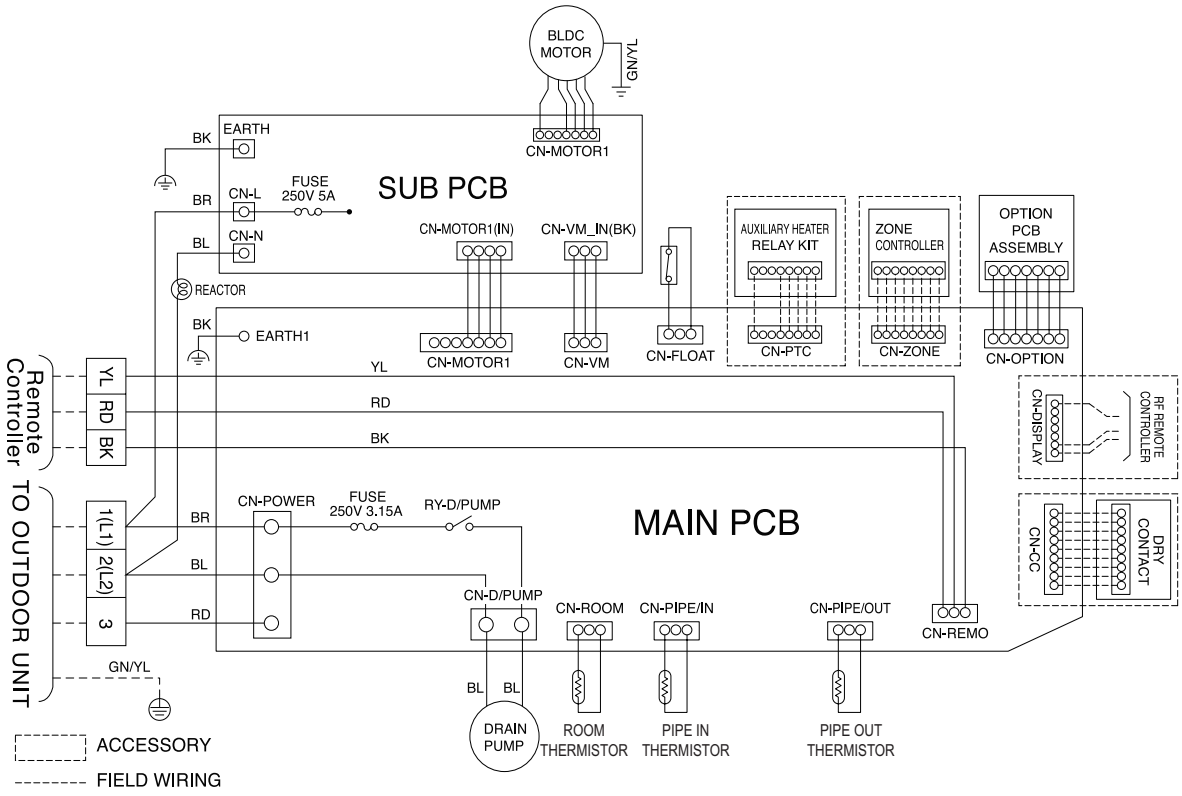


Figure 152: Multi F Ceiling-Concealed Duct (High Static) LMHN360HV Indoor Units Wiring Diagram.

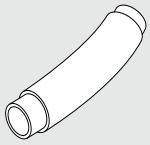
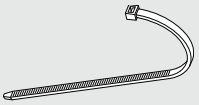
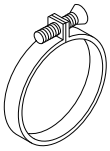
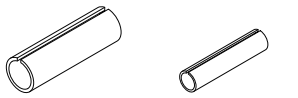
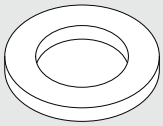


DUCT (HIGH STATIC) INDOOR UNITS

Factory Supplied Parts and Materials / Installation

Factory Supplied Parts

Table 55: Parts Table.

Part	Quantity	Image	Part	Quantity	Image
Drain Hose	One (1)		Zip Ties	Four (4)	
Metal Clamp	Two (2)		Insulation for Fittings	One (1) Set	 For Vapor Piping For Liquid Piping
Washers for Hanging Brackets	Eight (8)		Simple Controller with Mode Selection (AKB72955816)[1]	One (1)	

[1]Simple Mode Controllers for the ceiling-concealed duct (high static) indoor units are also referenced by Model No. PQRCVCL0QW.

Factory Supplied Materials

- Owner's Manual
- Installation Manual

Required Tools

- Level
- Screwdriver
- Electric drill
- Hole core drill
- Flaring tool set
- Torque wrenches
- Hexagonal wrench
- Gas-leak detector
- Thermometer

⚠ WARNING

Installation work must be performed by trained personnel and in accordance with national wiring standards and all local or other applicable codes. Improper installation can result in fire, electric shock, physical injury, or death.

Note:

Read all instructions before installing this product. Become familiar with the unit's components and connections, and the order of installation. Incorrect installation can degrade or prevent proper operation.

Selecting the Best Location

Do's

- Place the unit where air circulation will not be blocked.
- Place the unit where drainage can be obtained easily.
- Place the unit where noise prevention is taken into consideration.
- Ensure there is sufficient strength to bear the load of the indoor unit.
- Ensure there is sufficient maintenance space.
- Locate the indoor unit in a location that is level, and where it can be easily connected to the outdoor unit / branch distribution unit.

Don'ts

- ⃠ *Do not install the unit near a heat or steam source, or where considerable amounts of oil, iron powder, or flour are used.*
- ⃠ *Do not install the unit where sulfuric acid and flammable or corrosive gases are generated, vented into, or stored.*
- ⃠ *Do not install the unit near high-frequency generators.*
- ⃠ *Do not install the unit near a doorway.*

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

DUCT (HIGH STATIC) INDOOR UNITS

Installation and Best Layout Practices

Note:

If the unit is installed near a body of water, certain components are at risk of being corroded. Appropriate anti-corrosion methods should be taken for the unit and all components.

Installing in an Area Exposed to Unconditioned Air

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

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

Installing in an Area with High Humidity Levels

If the environment is prone to humidity levels of 80% or more (near the ocean, lakes, etc.) or where steam could collect in the plenum:

- Install additional insulation to the indoor unit (glass wool insulation >13/32 inches thick).
- Install additional insulation to the refrigerant piping (insulation >13/16 inches thick).
- Seal all gaps between the indoor unit and the ceiling tiles (make the area air tight) so that humidity does not transfer from the plenum to the conditioned space. Also, add a ceiling grille for ventilation.

Figure 153: Access Panel and General Service Space Required Dimensions.

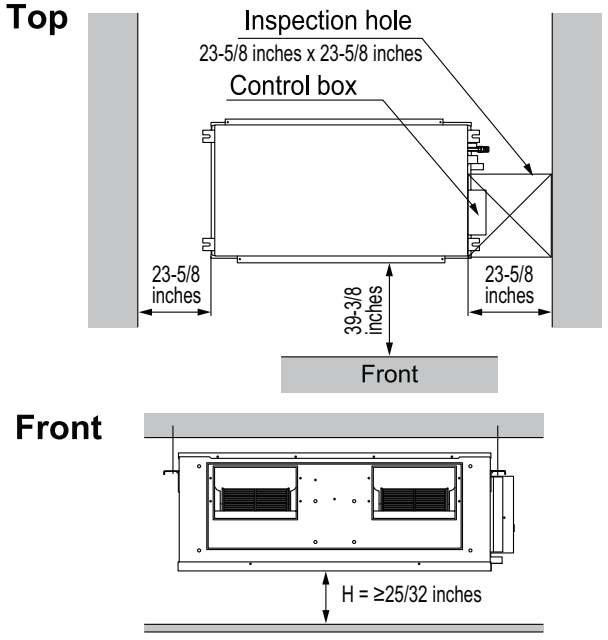


Figure 154: Indoor Unit Bolt Locations.

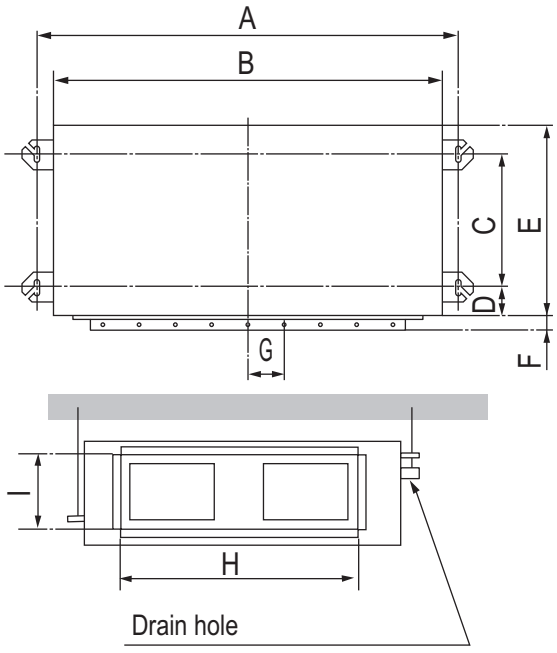


Table 56: Indoor Unit Bolt Location Dimensions.

Model / Capacity (Btu/h)	Dimensions (inches)								
	A	B	C	D	E	F	G	H	I
LMHN240HV / 24,000	48-17/32	46-17/32	13-31/32	1-25/32	17-23/32	1-7/32	3-5/8	32-19/32	7-11/32
LMHN360HV / 36,000									

Preparing the Installation Area and Hanging the Indoor Unit Frame

1. Select and mark the area for the suspension or console bolts (use embedded inserts or anchor bolts in new buildings, and hole-in-anchors in older buildings).
2. Drill the holes.
3. Add the set-anchor and the plate washer to the bolts (bolts should be at least 13/32 inches in diameter), and then insert the bolts into the installation area.
4. Add the plate washer, spring washer, and nut to secure the bolts into the installation area.
5. Position the indoor unit installation plates onto the bolts. Secure using nuts, plate washers, and spring washers. Adjust for level as necessary.

Figure 155: Preparing the Installation Area.

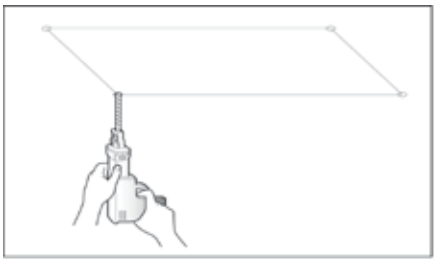


Figure 156: Suspension Bolt Options.

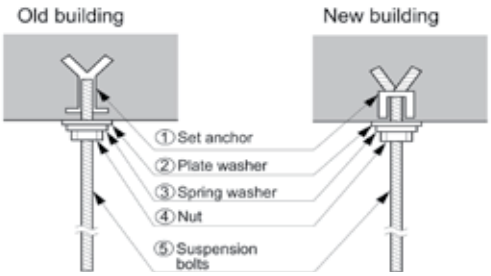
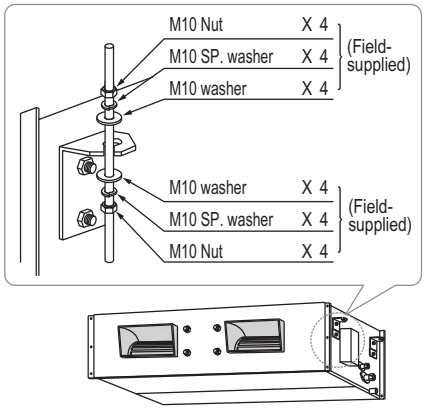


Figure 157: Hanging the Indoor Unit.



Note:

Install a canvas duct to the air outlet and air inlet so that vibration from the indoor unit does not carry to the duct or ceiling. Also, add insulation to the interior of the duct, and apply anti-vibration to the suspension bolts.

⚠ WARNING

- *Unit must be installed correctly. Tighten the nuts and bolts to prevent the unit from falling and causing severe injury or death.*

Installing the Drain System

- Drain piping must have downward gradient of at least 1/50 to 1/100; to prevent reverse flow, slope should not be straight up and down.
- ⃠ Do not damage the drain port on the indoor unit when connecting the field-supplied drain piping.
- Drain piping specifications:
  - Indoor Unit Drain Connection: 1-1/4 inch outside diameter.
  - Field-Supplied Drain Piping: Polyvinyl chloride piping with 1-inch inside diameter and pipe fittings.

Figure 158: Indoor Unit Drain Piping.

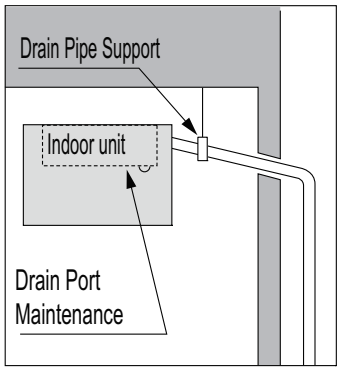
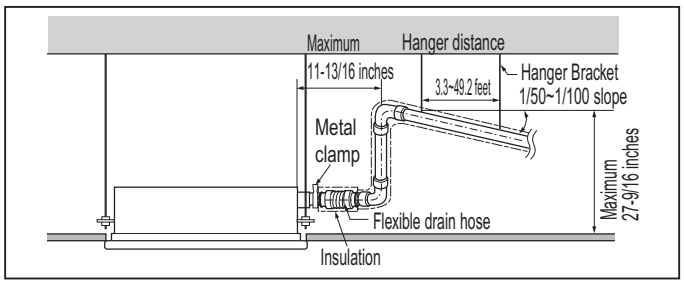
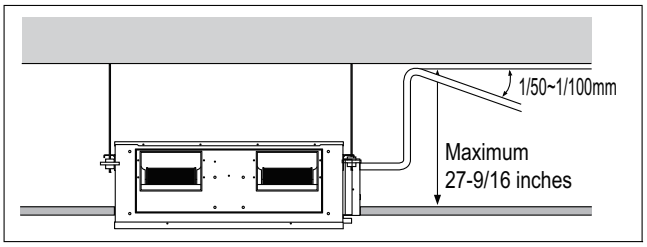


Figure 159: Drain Piping Installation Dimensions.





Note:

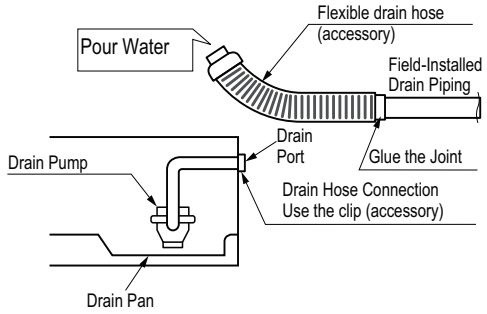
Do not apply force or twist the drain hose: it may leak.

Checking the Drain Pump

The unit uses a drain pump to remove condensate. The pump must be tested before the system operates.

- Connect (field supplied) flexible drain hose to the field-installed drain piping; leave it as is until the test is complete.
- Pour water into the flexible drain hose and check for leaks.
- After power wiring installation is complete, operate the drain pump to see if it sounds and functions properly.
- After the test is complete, connect the flexible drain hose to the indoor unit drain port.

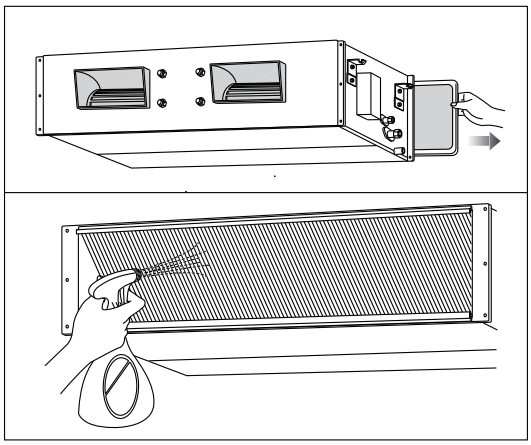
Figure 160: Checking the drain pump.



Checking the Drainage System

1. Remove the air filter.
2. Check the drainage.
   - Spray water on the evaporator.
   - Verify that water flows through the indoor unit drain hose without leaking.

Figure 161: Checking the Drainage System.



Insulating the Refrigerant and Drain Piping

⚠ WARNING

Ensure all piping is insulated. Exposed piping can cause burns if touched.

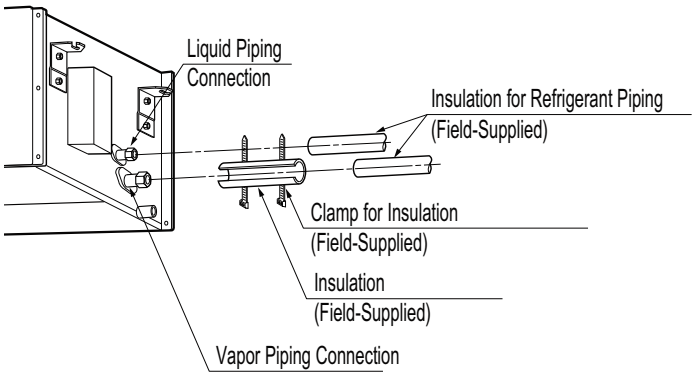
Refrigerant Piping Insulation

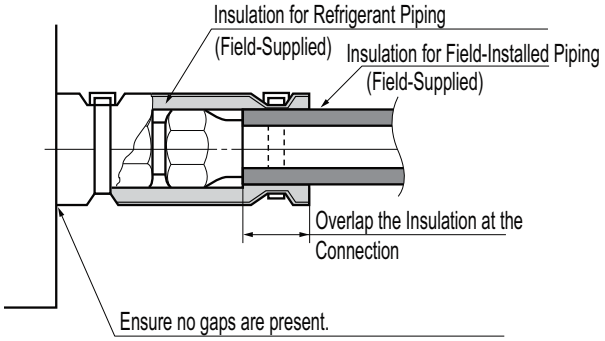
Field-installed vapor and liquid refrigerant piping lines must be properly and completely covered in insulation (up to the indoor unit piping connections). Any exposed piping may generate condensate or will cause burns if touched. Insulation for this field-installed refrigerant piping must have a minimum heat resistance of 248°F.

Drain Piping Insulation

Drain piping must have insulation a minimum of 7/32 inches thick.

Figure 162: Insulating the Piping.





Power Wiring / Communications Cable Guidelines

- Follow manufacturer's circuit diagrams in the technical manuals.
- Confirm power source specifications.
- Confirm that the electrical capacity is sufficient.
- Starting current must be maintained ±10 percent of the rated current marked on the outdoor unit name plate.
- Confirm cable thickness specifications.
- It is recommended that a circuit breaker is installed, especially if conditions could become wet or moist.
- Include a disconnect in the power wiring system, add an air gap contact separation of at least 1/8 inch in each active (phase) conductor.

⚠ WARNING

• Loose wiring may cause unit to malfunction, overheat, and catch fire, resulting in severe injury or death.

Note:

• Terminal screws may become loose during transport. Properly tighten the terminal connections during installation.
A voltage drop may cause the following problems:
• Magnetic switch vibration, fuse breaks, or disturbance to the normal function of an overload protection device.
• Compressor will not receive the proper starting current.

Connecting the Power Wiring and Communications Cable

1. To access the terminal block, first unscrew the cover from the control box.

2. Insert the power wiring / communications cable from the outdoor unit or branch distribution unit (Multi F MAX systems only) through the sides of the indoor unit and control box. Pass the wiring through the designated access holes to prevent damage. To prevent electromagnetic interference and product malfunction, leave a space between the power wiring and communications cable outside of the indoor unit.

3. Connect each wire to its appropriate terminal on the indoor unit control board. Verify that the color and terminal numbers from the outdoor unit or branch distribution unit (Multi F MAX systems only) wiring match the color and terminal numbers on the indoor unit.

4. Secure the power wiring / communications cable with the cable restraint.

5. Screw the steel clamp to the inside of the control panel.
   - Place the wiring / cables in the clamp and tighten the plastic clamp to an open surface of the control panel.
   - When clamping, do not apply force to the wiring connections.
   - Neatly arrange the wiring, do not catch the wiring in the electric box cover, and ensure the cover firmly closes.

6. Fill in any gaps around the wiring access holes with sealant to prevent foreign particles from entering the indoor unit.

Figure 163: Accessing the Indoor Unit Terminal Block.

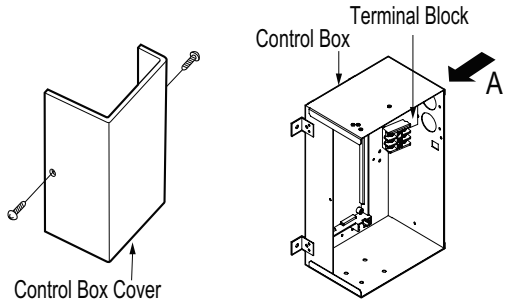
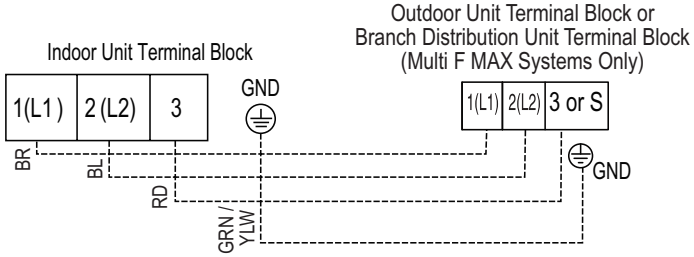


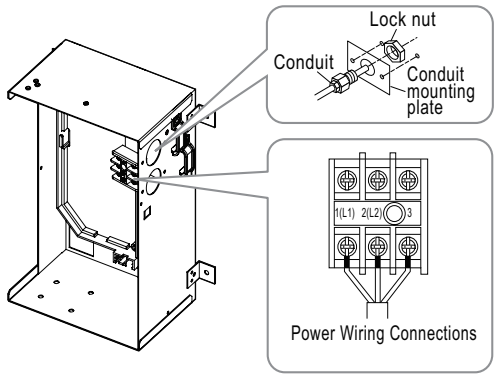
Figure 164: Indoor Unit to Outdoor Unit / Branch Distribution Unit (Multi F MAX systems only) Power Wiring / Communications Cable Connections.



Using a Conduit

1. Remove the rubber stopper on the indoor unit. Pass the power wiring / communications cable through the conduit, the conduit mounting plate, and to / through the control panel of the indoor unit.
2. Connect the power wiring / communications cable to the indoor unit terminal block.
3. Screw the conduit mounting plate to the indoor unit.
4. Tighten the conduit and the conduit mounting plate together.

Figure 165: Exterior View of Conduit Installation.



Note:

If the distance between the outdoor unit and indoor unit is greater than 131 feet, connect the power wiring and communications cable separately (i.e., a conduit cannot be used).

Controller Options

Ceiling-concealed duct (high static) indoor units include an LG-supplied wired controller (AKB72955816)[1], but other optional LG-supplied wired controllers are available. The wireless handheld controller (Model No. PQWRHQ0FDB) is also an optional accessory with use of the wired controller.

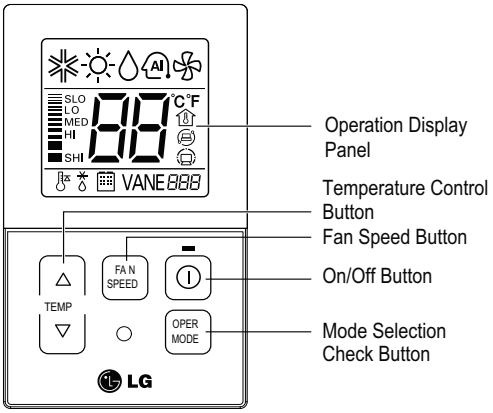
- Operation Display Panel: Displays operation conditions.
- Temperature Control Button: Sets desired temperature.
- Fan Speed Button: Sets desired fan speed.
- On / Off Button: Turns system operation on and off.
- Mode Selection Check Button: Selects the operation mode: Cooling, Heating, Auto, Dry (Dehumidification), or Fan.

Note:

Each function will display on the LED for about three (3) seconds when the power is first cycled on.

Wired Controller

Figure 166: AKB72955816[1] Wired Controller.



[1]Simple Mode Controllers for the ceiling-concealed duct (high static) indoor units are also referenced by Model No. PQRCVCL0QW.

Wired Controller Connections

Controllers can connect to the indoor unit in one of two different ways.

1. LG Wired Remote Extension Cable with Molex plug (PZCWRC1; sold separately) that connects to the CN-REMO terminal on the indoor unit PCB.

2. Field-supplied controller cable that connects to the indoor unit terminal block (must be at least UL2547 or UL1007, 22 AWG, two-core, one-shield core, at least FT-6 rated if local electric and building codes require plenum cable usage).

Figure 167: PZCWRC1 LG Wired Remote Extension Cable.

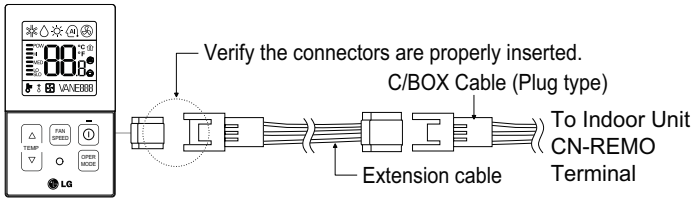
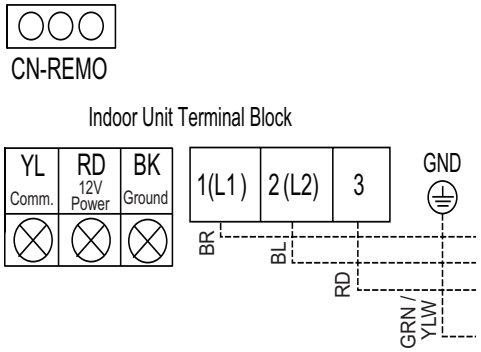


Figure 168: Wired Controller Connections on the Indoor Unit Terminal Block.



Note:

When using field-supplied controller cable, make sure to connect the yellow to yellow (communications wire), red to red (12V power wire), and black to black (ground wire) terminals from the remote controller to the indoor unit terminal blocks.

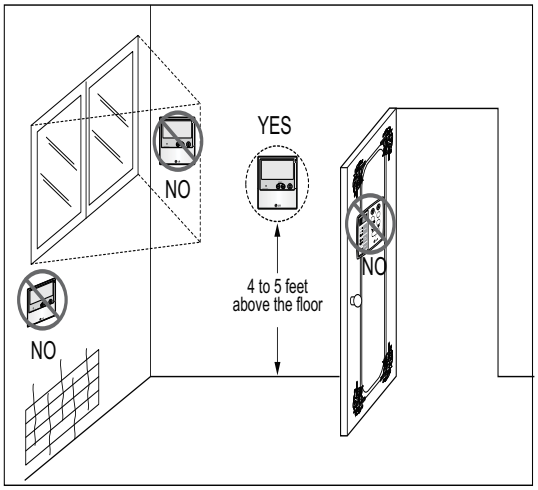
Wired Controller Placement

Wired controllers include a sensor to detect room temperature. To maintain comfort levels in the conditioned space, the wired controller must be installed in a location away from direct sunlight, high humidity, and where it could be directly exposed to cold air. Controller must be installed four (4) to five (5) feet above the floor where its LED display can be read easily, in an area with good air circulation, and where it can detect an average room temperature.

⃠ Do not install the wired controller near or in:

- Drafts or dead spots behind doors and in corners
- Hot or cold air from ducts
- Radiant heat from the sun or appliances
- Concealed pipes and chimneys
- An area where temperatures are uncontrolled, such as an outside wall

Figure 169: Proper Location for the Wired Controller.



Hanging the Wired Controller

1. The controller wiring / cable can be installed in one of three directions: top, back, or on the right side. If top or right side installation is desired, remove cable guide grooves on the controller, and then position wiring / cable on applicable side.

2. Choose and mark the area of installation, and then screw the wall plate into place (using the provided parts). Install the controller wall plate to fit the electrical box if one is present. Ensure that no gaps exist between the wall plate and the wall itself.

3. Arrange wiring / cables so as not to interfere with the controller circuitry. Position the wired controller on the wall plate. Snap into place by pressing the bottom part of the wired controller onto the wall plate. Make sure that no gaps exist between the wired controller and the wall plate on all sides.

4. To remove wired controller from the wall plate, insert a screwdriver into the two holes at the bottom. Twist screwdriver to release controller. Do not damage the controller components when removing.

Figure 170: Removing the Cable Guide Grooves.

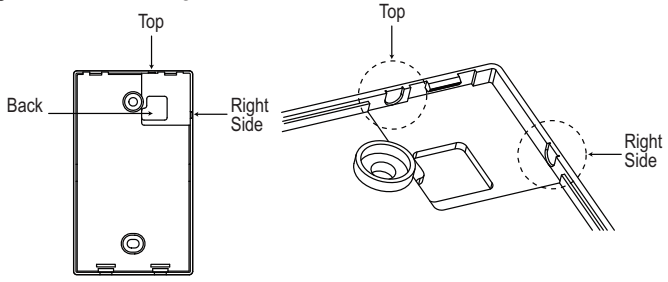


Figure 171: Attaching the Wall Plate.

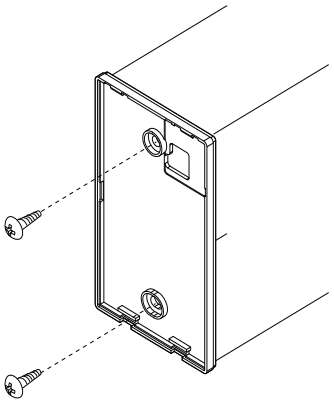
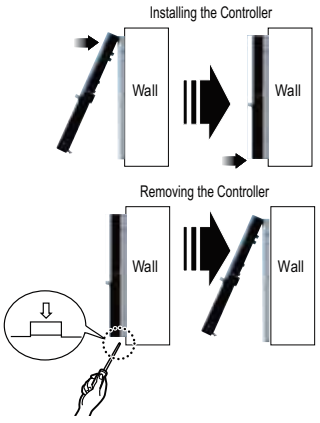


Figure 172: Installing / Removing the Controller.



Assigning the Thermistor for Temperature Detection

Each indoor unit includes a return air thermistor assigned to sense the temperature. If a wired controller is installed, there is a choice of sensing temperature with either the indoor unit return air thermistor or the thermistor in the wired controller. It is also an option to set both thermistors to sense temperature so that indoor unit bases its operation on the first thermistor to reach the designated temperature differential. For applicable indoor units, an optional Remote Temperature Sensor can be used in lieu of the return air thermistor—either alone or in conjunction with a wired controller thermistor as previously described.

External Static Pressure Control

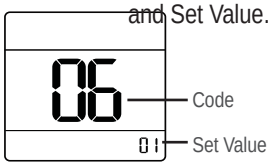
To provide a required air flow rate that accounts for the external static pressure change, follow the steps below.

1. To access system installer setting mode, press and hold the temperature increase and mode selection buttons simultaneously for approximately three (3) seconds. Choose setting code value “06” by pressing the mode selection button.

2. Use the temperature increase and decrease buttons to select the desired setting value.

   Setting Values
   01 : V-H 03 : V-L
   02 : F-H 04 : F-L

Figure 173: Select Code and Set Value.



3. Press the on / off button to save the established settings.

4. To deactivate system installer setting mode after the settings have been established, press and hold the temperature increase and mode selection check buttons simultaneously for approximately three (3) seconds. If a button is not pressed for more than 25 seconds, the system installer setting mode will automatically deactivate.

Figure 174: Controller External Static Pressure Setting Display.

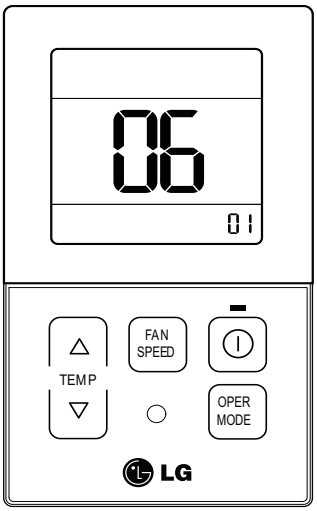


Table 63: Static Pressure Setting Table.

Pressure Selection		Function	
		Zone State	External Static Pressure Standard Value
01	V-H	Variable	High
02	F-H	Fixed	High
03	V-L	Variable	Low
04	F-L	Fixed	Low

Note:

- *Select the position after verifying duct work and the external static pressure of the indoor unit.*
- *Factory set to pressure selection F-H.*

Assigning Air Flow

To assign an air flow for each fan speed, follow the steps below.

1. To access system installer setting mode, press and hold the temperature increase and mode selection buttons simultaneously for approximately three (3) seconds. Choose setting code value “03” by pressing the mode selection button.

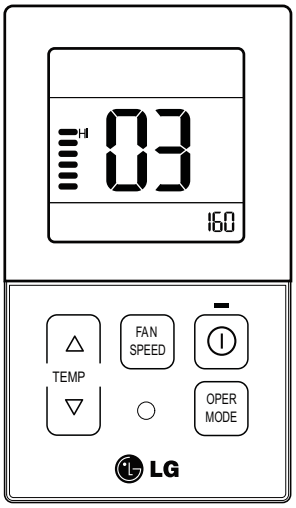
2. Use the fan speed button to select the desired fan speed. (Lo→Med→Hi will display on the LED).

3. Use the temperature increase and decrease buttons to select the desired external static pressure setting value (thereby assigning the respective airflow). External static pressure value range: 0~255; the value will display near the lower right corner of the LED.

4. Press the on / off button to save the established settings.

5. To deactivate system installer setting mode after the settings have been established, press and hold the temperature increase and mode selection check buttons simultaneously for approximately three (3) seconds. If a button is not pressed for more than 25 seconds, the system installer setting mode will automatically deactivate.

Figure 175: Controller External Static Pressure Setting Display.



Note:

- *A certified technician must set the external static pressure value(s). If the external static pressure is set incorrectly, the system may malfunction.*
- *Do not alter the external static pressure value that corresponds to each air flow level.*
- *External static pressure value can vary depending on the indoor unit.*
- *If by pressing the fan speed button during external static pressure setup, the fan speed is raised to the next level, the air flow value of the previous fan speed will be maintained (external static pressure setting value is saved).*

FOUR-WAY CEILING-CASSETTE INDOOR UNIT DATA

FOUR-WAY CEILING CASSETTE INDOOR UNITS

Mechanical Specifications and Features

MULTI F
MULTI F MAX

Four-Way Ceiling-Cassette Indoor Units

General

All LG indoor units are factory assembled, wired, piped, and provided with a control circuit board, fan, and motor. Four-way ceiling-cassette units have a sound rating no higher than 38 dB(A) as tested per KSA0701 ISO Standard 3745.

Coil

Indoor unit coils are factory built and are comprised of aluminum fins mechanically bonded to copper tubing. Each unit has two rows of coils, which are pressure tested at the factory. Each unit is provided with a factory installed condensate drain pan below the coil.

Refrigerant System

System is designed for use with R410A refrigerant. The refrigeration circuit is pressure-tested at the factory and shipped with a holding charge of helium gas. Refrigerant pipe connections are 45° flare, and all refrigerant lines from the outdoor unit to the indoor units must be field insulated.

Electrical

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

Casing

The case is constructed of a galvanized steel plate designed to recess in the ceiling, and has a surface mounted concentric grille on the bottom of the unit. Unit has four supply air outlets and one return air inlet.

Ventilation Air

The case has a factory designated knockouts to connect a field-supplied, pressurized, and filtered outside air duct.

Fan Assembly and Control

All indoor units have a single, direct-drive turbo fan. Fans are manufactured of high-strength ABS HT-700 polymeric resin that is statically and dynamically balanced. The fan motor is brushless digitally controlled (BLDC) with permanently lubricated and sealed ball bearings. The fan / motor assembly is mounted on vibration-attenuating rubber grommets. Fan speed is controlled using a microprocessor-based direct digital control algorithm that provides pre-programmed, field-selectable fixed or auto fan speeds in the Heating and Cooling modes.

The indoor fan has Low, Med, High, Power Cool and Auto settings for Cooling mode; and has Low, Med, High, and Auto settings for Heating mode. Auto setting adjusts the fan speed based on the difference between the controller setpoint and space temperature.

Air Filter

Return air is filtered with a factory-supplied, removable, washable filter accessible from the bottom of the unit. A plasma filter is also available as an optional accessory.

Architectural Grille

An architectural grille is sold as a separate required accessory. The four-way grille is off-white acrylonitrile butadiene styrene (ABS) polymeric resin with a tapered trim edge.

Figure 176: Multi F Four-Way Ceiling-Cassette Indoor Unit.

Airflow Guide Vanes

The supply air outlet has four-directional slot diffusers, each equipped with an independent oscillating motorized guide vane to change airflow direction. A guide vane algorithm sequentially changes the predominant discharge airflow direction in counterclockwise pattern, or can be used to lock each guide vane independently in a field-adjusted fixed position. The four vanes can be individually adjusted from the wired remote controller to customize the airflow pattern for the conditioned space. A setting in the cooling and heating modes can cycle the vanes up and down for uniform / random air distribution.

Microprocessor Control

The indoor unit is provided with an integrated control panel to communicate with the outdoor unit. All unit operation parameters are stored in non-volatile memory residing on the unit microprocessor. The microprocessor controls space temperature through using the value provided by the temperature sensor within the indoor unit. The microprocessor control will activate indoor unit operation when the indoor room temperature falls below or rises above a setpoint temperature, at which point, a signal is sent to the outdoor unit to begin the appropriate mode. The microprocessor will also provide self-diagnostics and auto restart functions. A field-supplied four-wire power / communications cable must be installed to connect the indoor unit(s) to the outdoor unit.

Controls

The indoor unit casing has a factory-standard, integral infrared sensor designed to communicate with the supplied LG wireless handheld remote controller. An optional wired controller is available as an additional accessory. Communication between the indoor units and the outdoor unit is accomplished through 18 AWG, four-core, stranded and shielded power / communication cable.

Condensate Lift/Pump

The indoor unit is provided with a factory installed and wired internal condensate lift/pump capable of providing a minimum 27.5 inch lift from the bottom surface of the unit. Drain pump has a safety switch to shut off the indoor unit if the condensate rises too high in the drain pan.

Features

- Inverter (Variable speed fan)
- Internal drain pump
- Jet cool
- Control lock function
- Auto operation
- Auto restart operation
- 24-Hour on/off timer
- Two thermistor control
- Required accessory grille (PT-QCHW0 or PT-UQC) sold separately
- Group Control
- Plasma kit (PTPKQ0) sold separately
- Wireless LCD remote control included; wired thermostat available (sold separately)

FOUR-WAY CEILING-CASSETTE INDOOR UNITS

General Data / Specifications

Table 64: Multi F Four-Way Ceiling-Cassette Indoor Unit General Data.

Model Name	LMCN077HV	LCN097HV4	LCN127HV4	LMCN185HV
Grille (Sold Separately)	PT-QCHW0 / PT-UQC	PT-QCHW0 / PT-UQC	PT-QCHW0 / PT-UQC	PT-QCHW0 / PT-UQC
Nominal Cooling Capacity (Btu/h)[1]	7,000	9,000	12,000	18,000
Nominal Heating Capacity (Btu/h)[1]	8,100	10,400	13,800	20,800
Operating Range				
Cooling (°F WB)	57-77			
Heating (°F DB)	59-81			
Fan				
Type	Turbo			
Motor Output (W) x Qty.	43 x 1			
Motor/Drive	Brushless Digitally Controlled / Direct			
Airflow Rate CFM (H/M/L)	265 / 212 / 177	300 / 265 / 230	335 / 283 / 247	459 / 424 / 388
Unit Data				
Refrigerant Type[2]	R410A			
Refrigerant Control	EEV			
Power Supply V, Ø, Hz[3]	208-230, 1, 60			
Rated Amps (A)	0.25			
Sound Pressure Level ±3 dB(A) (H/M/L)[4]	31 / 27 / 24	36 / 33 / 30	38 / 35 / 32	38 / 37 / 34
Body Dimensions (W x H x D, in.)	22-7/16 x 8-7/16 x 22-7/16			22-7/16 x 10-3/32 x 22-7/16
Grille (Sold separately) Dimensions (WxHxD, in.)	27-9/16 x 7/8 x 27-9/16			
Body Net Weight (lbs.)	31			34
Grille (Sold separately) Net Weight (lbs.)	7			
Body Shipping Weight (lbs.)	34	37		42
Grille (Sold separately) Shipping Weight (lbs.)	11	9	9	11
Power Wiring / Communications Cable (No. x AWG)[5]	4 x 18			
Heat Exchanger (Row x Column x Fin / inch) x Number	(2 x 8 x 18) x 1			(2 x 10 x 18) x 1
Piping				
Liquid (in.)	1/4			
Vapor (in.)	3/8			1/2
Drain O.D. / I.D. (in.)	1-1/4, 1			

[1]Nominal capacity is rated 0 ft. above sea level with a 0 ft. level difference between outdoor and indoor units. All capacities are net with a combination ratio between 95 – 105%.

Nominal 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).
Nominal 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]This unit comes with a dry helium charge.

[3]Acceptable operating voltage: 187V-253V.

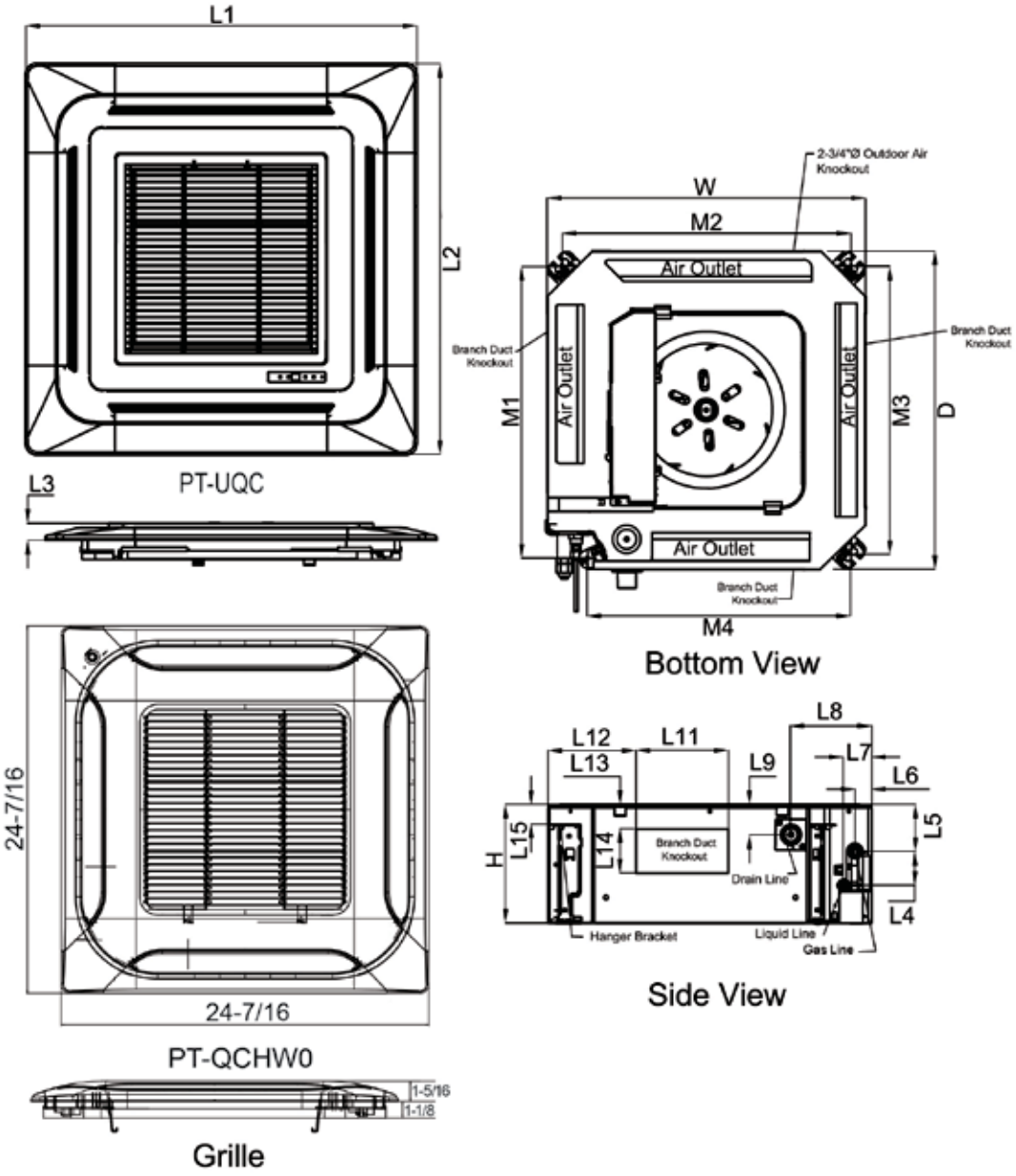
[4]Sound pressure levels are tested in an anechoic chamber under ISO Standard 3745 and are the same in both cooling and heating mode. These values can increase due to ambient conditions during operation.

[5]All power wiring / communications cable to the IDUs be minimum 18 AWG, 4-conductor, stranded, shielded or unshielded (if shielded, must be grounded to chassis at ODU only) and must comply with applicable local and national codes.

FOUR-WAY CEILING CASSETTE INDOOR UNITS

Dimensions

Figure 177: LMCN077HV, LCN097HV4, and LCN127HV4 Dimensions.

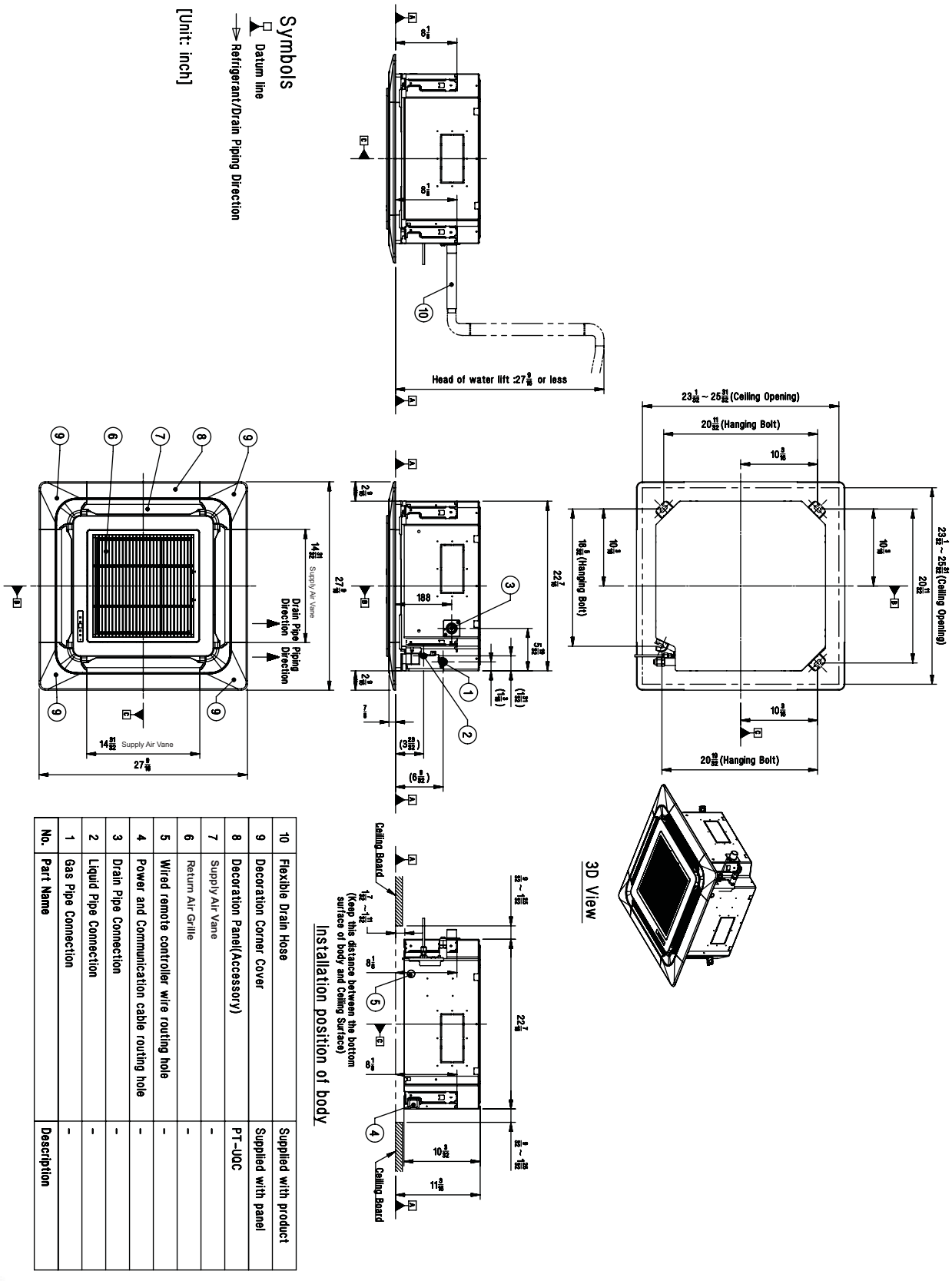


W	22-7/16"
H	8-7/16"
D	22-7/16"
L1	27-9/16"
L2	27-9/16"
L3	7/8"
L4	2-13/32"
L5	3-7/8"
L6	1-3/16"
L7	1-15/16"
L8	5-5/8"
L9	1-1/32"
L10	1-11/32"
L11	6-1/2"
L12	5-13/16"
L13	3-3/16"
L14	3-1/8"
L15	1-11/32"
M1	20-19/32"
M2	20-3/8"
M3	20-3/8"
M4	18-5/32"

FOUR-WAY CEILING-CASSETTE INDOOR UNITS

Dimensions

Figure 178: LMCN185HV Dimensions.



No.	Part Name	Description
1	Gas Pipe Connection	-
2	Liquid Pipe Connection	-
3	Drain Pipe Connection	-
4	Power and Communication cable routing hole	-
5	Wired remote controller wire routing hole	-
6	Return Air Grille	-
7	Supply Air Vane	-
8	Decoration Panel(Accessory)	PT-UQC
9	Decoration Corner Cover	Supplied with panel
10	Flexible Drain Hose	Supplied with product

FOUR-WAY CEILING CASSETTE INDOOR UNITS

MULTI F
MULTI F MAX

Cooling Capacity Table

Table 65: Multi F Four-Way Ceiling-Cassette Indoor Units Cooling Capacity Table.

Model No. / Nominal Capacity of Indoor Unit (Btu/h)	Outdoor Air Temp. (°F DB)	Indoor Air Temp. °F DB / °F WB											
		68 / 57		73 / 61		77 / 64		80 / 67		86 / 72		90 / 75	
		TC	SHC	TC	SHC	TC	SHC	TC	SHC	TC	SHC	TC	SHC
LMCN077HV 7,000	14	6.86	4.87	7.29	5.15	7.71	4.99	8.02	5.09	8.57	5.13	8.99	5.23
	20	6.86	4.91	7.28	5.19	7.71	5.02	8.02	5.13	8.56	5.17	8.99	5.27
	25	6.85	4.95	7.28	5.23	7.70	5.06	8.01	5.17	8.55	5.21	8.98	5.31
	30	6.85	4.99	7.27	5.27	7.70	5.10	8.00	5.21	8.55	5.25	8.97	5.35
	35	6.84	5.03	7.27	5.31	7.69	5.14	8.00	5.25	8.54	5.29	8.97	5.39
	40	6.84	5.06	7.26	5.35	7.68	5.18	7.99	5.29	8.53	5.33	8.96	5.43
	45	6.83	5.10	7.25	5.39	7.68	5.22	7.99	5.33	8.53	5.37	8.95	5.47
	50	6.83	5.14	7.25	5.43	7.67	5.26	7.98	5.37	8.52	5.41	8.94	5.52
	55	6.82	5.18	7.24	5.47	7.67	5.30	7.97	5.41	8.51	5.45	8.94	5.56
	60	6.81	5.21	7.24	5.51	7.66	5.33	7.97	5.45	8.51	5.49	8.93	5.60
	65	6.81	5.25	7.23	5.55	7.66	5.37	7.96	5.49	8.50	5.53	8.92	5.64
	70	6.80	5.29	7.23	5.59	7.65	5.41	7.95	5.52	8.49	5.57	8.92	5.68
	75	6.64	5.20	7.06	5.50	7.48	5.33	7.79	5.45	8.33	5.50	8.75	5.61
	80	6.48	5.11	6.90	5.42	7.32	5.26	7.62	5.38	8.16	5.43	8.58	5.55
	85	6.31	5.02	6.73	5.33	7.15	5.17	7.46	5.30	7.99	5.36	8.41	5.48
	90	6.15	4.93	6.57	5.23	6.99	5.09	7.29	5.21	7.83	5.29	8.24	5.40
	95	5.98	4.87	6.39	5.19	6.81	5.05	**7.00**	**5.10**	7.64	5.26	8.06	5.38
	100	5.83	4.74	6.25	5.05	6.66	4.93	6.91	5.02	7.50	5.14	7.91	5.27
	105	5.69	4.61	6.10	4.92	6.52	4.81	6.82	4.94	7.35	5.03	7.77	5.16
	110	5.54	4.46	5.96	4.76	6.37	4.66	6.67	4.79	7.21	4.89	7.62	5.02
	115	5.39	4.32	5.81	4.63	6.23	4.54	6.53	4.67	7.06	4.77	7.48	4.90
	118	5.31	4.29	5.72	4.60	6.14	4.52	6.44	4.65	6.97	4.76	7.39	4.89
	122	5.28	4.28	5.69	4.59	6.11	4.51	6.41	4.64	6.94	4.75	7.36	4.89
LCN097HV4 9,000	14	8.82	6.31	9.37	6.66	9.92	6.45	10.31	6.59	11.01	6.64	11.56	6.77
	20	8.82	6.36	9.36	6.72	9.91	6.50	10.31	6.64	11.01	6.70	11.55	6.82
	25	8.81	6.41	9.36	6.77	9.90	6.55	10.30	6.69	11.00	6.75	11.54	6.87
	30	8.80	6.46	9.35	6.82	9.90	6.60	10.29	6.74	10.99	6.80	11.54	6.93
	35	8.80	6.50	9.34	6.87	9.89	6.65	10.28	6.79	10.98	6.85	11.53	6.98
	40	8.79	6.55	9.33	6.92	9.88	6.70	10.27	6.84	10.97	6.90	11.52	7.03
	45	8.78	6.60	9.33	6.97	9.87	6.75	10.27	6.90	10.96	6.95	11.51	7.09
	50	8.78	6.65	9.32	7.03	9.87	6.80	10.26	6.95	10.96	7.00	11.50	7.14
	55	8.77	6.70	9.31	7.08	9.86	6.85	10.25	7.00	10.95	7.06	11.49	7.19
	60	8.76	6.75	9.31	7.13	9.85	6.90	10.24	7.05	10.94	7.11	11.48	7.24
	65	8.76	6.80	9.30	7.18	9.84	6.95	10.24	7.10	10.93	7.16	11.47	7.29
	70	8.75	6.85	9.29	7.23	9.84	7.00	10.23	7.15	10.92	7.21	11.47	7.35
	75	8.54	6.73	9.08	7.12	9.62	6.90	10.01	7.05	10.71	7.12	11.25	7.26
	80	8.33	6.62	8.87	7.01	9.41	6.80	9.80	6.96	10.49	7.03	11.03	7.18
	85	8.12	6.50	8.66	6.89	9.20	6.70	9.59	6.85	10.28	6.94	10.82	7.09
	90	7.91	6.37	8.45	6.77	8.99	6.59	9.37	6.75	10.06	6.84	10.60	6.99
	95	7.68	6.31	8.22	6.71	8.75	6.54	9.00	6.60	9.83	6.80	10.36	6.96
	100	7.50	6.14	8.03	6.54	8.57	6.38	8.88	6.50	9.64	6.66	10.17	6.82
	105	7.31	5.97	7.84	6.37	8.38	6.23	8.77	6.40	9.45	6.51	9.99	6.68
	110	7.12	5.77	7.66	6.17	8.19	6.03	8.58	6.20	9.26	6.33	9.80	6.50
	115	6.94	5.59	7.47	5.99	8.01	5.87	8.39	6.05	9.08	6.18	9.61	6.35
	118	6.82	5.55	7.36	5.96	7.89	5.84	8.28	6.02	8.96	6.15	9.50	6.33
	122	6.79	5.54	7.32	5.94	7.86	5.83	8.24	6.01	8.93	6.15	9.46	6.32

TC = Total Capacity (kBtu/h).

SHC: Sensible Heat Capacity (kBtu/h).

Nominal capacity as rated 0 ft. above sea level and a 0 ft. level difference between outdoor and indoor units. Corresponding refrigerant piping length is accordance with standard length of each outdoor unit.

Nominal 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).

The shaded table columns and rows indicate reference data. When operating at this temperature, these values can be different if the system is not running consistently.

FOUR-WAY CEILING CASSETTE INDOOR UNITS

Cooling Capacity Table

Table 66: Multi F Four-Way Ceiling-Cassette Indoor Units Cooling Capacity Table.

Model No. / Nominal Capacity of Indoor Unit (Btu/h)	Outdoor Air Temp. (°F DB)	Indoor Air Temp. °F DB / °F WB											
		68 / 57		73 / 61		77 / 64		80 / 67		86 / 72		90 / 75	
		TC	SHC	TC	SHC	TC	SHC	TC	SHC	TC	SHC	TC	SHC
LCN127HV4 12,000	14	11.76	8.51	12.49	8.99	13.22	8.70	13.75	8.88	14.69	8.96	15.42	9.13
	20	11.75	8.57	12.48	9.06	13.21	8.77	13.74	8.95	14.67	9.03	15.40	9.20
	25	11.75	8.64	12.48	9.13	13.20	8.84	13.73	9.02	14.66	9.10	15.39	9.27
	30	11.74	8.71	12.47	9.20	13.19	8.90	13.72	9.09	14.65	9.17	15.38	9.34
	35	11.73	8.77	12.46	9.27	13.18	8.97	13.71	9.16	14.64	9.24	15.37	9.41
	40	11.72	8.84	12.45	9.34	13.17	9.04	13.70	9.23	14.63	9.31	15.36	9.48
	45	11.71	8.90	12.44	9.41	13.16	9.11	13.69	9.30	14.62	9.38	15.35	9.55
	50	11.70	8.97	12.43	9.47	13.15	9.17	13.68	9.37	14.61	9.45	15.33	9.62
	55	11.69	9.03	12.42	9.54	13.14	9.24	13.67	9.44	14.60	9.52	15.32	9.70
	60	11.68	9.10	12.41	9.61	13.13	9.31	13.66	9.50	14.59	9.58	15.31	9.77
	65	11.67	9.17	12.40	9.68	13.12	9.38	13.65	9.57	14.57	9.65	15.30	9.84
	70	11.66	9.23	12.39	9.75	13.11	9.44	13.64	9.64	14.56	9.72	15.29	9.91
	75	11.38	9.08	12.11	9.60	12.83	9.31	13.35	9.51	14.27	9.60	15.00	9.79
	80	11.10	8.92	11.82	9.45	12.55	9.17	13.07	9.38	13.99	9.48	14.71	9.68
	85	10.83	8.76	11.54	9.29	12.26	9.03	12.78	9.24	13.70	9.36	14.42	9.56
	90	10.55	8.60	11.26	9.13	11.98	8.88	12.50	9.10	13.42	9.22	14.13	9.43
	95	10.25	8.51	10.96	9.05	11.67	8.82	12.00	8.90	13.10	9.18	13.81	9.39
	100	10.00	8.28	10.71	8.82	11.42	8.61	11.84	8.76	12.85	8.98	13.56	9.20
	105	9.75	8.05	10.46	8.59	11.17	8.40	11.69	8.62	12.60	8.78	13.31	9.01
	110	9.50	7.77	10.21	8.31	10.92	8.14	11.44	8.37	12.35	8.53	13.07	8.76
	115	9.25	7.54	9.96	8.08	10.67	7.92	11.19	8.15	12.10	8.33	12.82	8.56
	118	9.10	7.49	9.81	8.03	10.52	7.88	11.04	8.12	11.95	8.30	12.67	8.54
	122	9.05	7.47	9.76	8.01	10.48	7.87	10.99	8.11	11.90	8.29	12.62	8.53
LMCN185HV 18,000	14	17.65	12.33	18.74	13.02	19.84	12.61	20.63	12.88	22.03	12.98	23.12	13.23
	20	17.63	12.43	18.73	13.13	19.82	12.71	20.61	12.98	22.01	13.09	23.11	13.33
	25	17.62	12.52	18.71	13.23	19.81	12.81	20.60	13.08	22.00	13.19	23.09	13.44
	30	17.60	12.62	18.70	13.33	19.79	12.91	20.58	13.18	21.98	13.29	23.07	13.54
	35	17.59	12.71	18.68	13.43	19.78	13.00	20.57	13.28	21.96	13.39	23.05	13.64
	40	17.58	12.81	18.67	13.53	19.76	13.10	20.55	13.38	21.94	13.49	23.04	13.75
	45	17.56	12.90	18.66	13.63	19.75	13.20	20.53	13.48	21.93	13.59	23.02	13.85
	50	17.55	13.00	18.64	13.73	19.73	13.30	20.52	13.58	21.91	13.69	23.00	13.95
	55	17.54	13.10	18.63	13.83	19.72	13.39	20.50	13.68	21.89	13.79	22.98	14.05
	60	17.52	13.19	18.61	13.93	19.70	13.49	20.49	13.78	21.88	13.89	22.97	14.16
	65	17.51	13.29	18.60	14.03	19.69	13.59	20.47	13.87	21.86	13.99	22.95	14.26
	70	17.50	13.38	18.58	14.13	19.67	13.69	20.46	13.97	21.84	14.09	22.93	14.36
	75	17.08	13.16	18.16	13.92	19.24	13.49	20.03	13.79	21.41	13.92	22.50	14.20
	80	16.66	12.93	17.74	13.70	18.82	13.30	19.60	13.60	20.98	13.75	22.06	14.03
	85	16.24	12.70	17.32	13.47	18.40	13.09	19.17	13.40	20.55	13.56	21.63	13.85
	90	15.82	12.46	16.90	13.23	17.97	12.88	18.75	13.19	20.12	13.37	21.20	13.67
	95	15.37	12.33	16.44	13.12	17.51	12.78	**18.00**	**12.90**	19.65	13.30	20.72	13.61
	100	14.99	12.00	16.06	12.78	17.13	12.47	17.77	12.70	19.28	13.01	20.35	13.33
	105	14.62	11.67	15.69	12.45	16.76	12.17	17.53	12.50	18.90	12.73	19.97	13.05
	110	14.24	11.27	15.32	12.05	16.39	11.79	17.16	12.13	18.53	12.36	19.60	12.70
	115	13.87	10.93	14.94	11.71	16.01	11.48	16.79	11.82	18.15	12.07	19.22	12.41
	118	13.65	10.85	14.72	11.64	15.79	11.42	16.56	11.77	17.93	12.03	19.00	12.37
	122	13.57	10.83	14.64	11.62	15.71	11.40	16.49	11.75	17.85	12.01	18.92	12.36

TC = Total Capacity (kBtu/h).

SHC: Sensible Heat Capacity (kBtu/h).

Nominal capacity as rated 0 ft. above sea level and a 0 ft. level difference between outdoor and indoor units. Corresponding refrigerant piping length is accordance with standard length of each outdoor unit.

Nominal 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).

The shaded table columns and rows indicate reference data. When operating at this temperature, these values can be different if the system is not running consistently.

FOUR-WAY CEILING-CASSETTE INDOOR UNITS

MULTI F
MULTI F MAX

Heating Capacity Table

Table 67: Multi F Four-Way Ceiling-Cassette Indoor Units Heating Capacity Table.

Model No. / Nominal Capacity of Indoor Unit (Btu/h)	Outdoor Air Temp.		Indoor Air Temp. °F DB					
	°F DB	°F WB	61	64	68	70	72	75
			TC	TC	TC	TC	TC	TC
LMCN077HV 7,000	0	-0.4	4.17	4.11	4.07	4.05	3.99	3.82
	5	4.5	4.70	4.64	4.60	4.58	4.52	4.34
	10	9	5.22	5.17	5.13	5.11	5.05	4.87
	17	15	5.93	5.87	5.83	**5.81**	5.75	5.56
	20	19	6.19	6.13	6.09	6.08	6.02	5.81
	25	23	6.63	6.57	6.53	6.52	6.46	6.22
	30	28	7.01	6.96	6.92	6.90	6.84	6.63
	35	32	7.40	7.34	7.30	7.28	7.22	7.04
	40	36	7.74	7.68	7.64	7.62	7.56	7.39
	45	41	8.08	8.02	7.98	7.96	7.90	7.73
	47	43	8.22	8.16	8.12	**8.10**	8.04	7.87
	50	46	8.35	8.29	8.25	8.23	8.17	7.98
	55	51	8.57	8.51	8.47	8.45	8.39	8.16
	60	56	8.57	8.51	8.47	8.45	8.39	8.20
	63	59	8.57	8.51	8.47	8.45	8.39	8.22
	68	64	8.57	8.51	8.47	8.45	8.39	8.25
LCN097HV4 9,000	0	-0.4	5.35	5.28	5.23	5.20	5.12	4.90
	5	4.5	6.03	5.95	5.90	5.88	5.80	5.58
	10	9	6.71	6.63	6.58	6.56	6.48	6.26
	17	15	7.61	7.54	7.49	7.46	7.39	7.14
	20	19	7.95	7.88	7.83	7.80	7.72	7.46
	25	23	8.52	8.44	8.39	8.37	8.29	7.99
	30	28	9.01	8.93	8.88	8.86	8.78	8.52
	35	32	9.50	9.42	9.37	9.34	9.27	9.04
	40	36	9.94	9.86	9.81	9.78	9.71	9.48
	45	41	10.37	10.30	10.25	10.22	10.15	9.92
	47	43	10.55	10.48	10.43	10.40	10.32	10.10
	50	46	10.72	10.64	10.59	10.57	10.49	10.24
	55	51	11.00	10.93	10.88	10.85	10.78	10.48
	60	56	11.00	10.93	10.88	10.85	10.78	10.52
	63	59	11.00	10.93	10.88	10.85	10.78	10.55
	68	64	11.00	10.93	10.88	10.85	10.78	10.60

TC = Total Capacity (kBtu/h).

Nominal capacity as rated 0 ft. above sea level and a 0 ft. level difference between outdoor and indoor units. Corresponding refrigerant piping length is accordance with standard length of each outdoor unit.

Nominal 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).

FOUR-WAY CEILING-CASSETTE INDOOR UNITS

Heating Capacity Table

Table 68: Multi F Four-Way Ceiling-Cassette Indoor Units Heating Capacity Table.

Model No. / Nominal Capacity of Indoor Unit (Btu/h)	Outdoor Air Temp.		Indoor Air Temp. °F DB					
	°F DB	°F WB	61	64	68	70	72	75
			TC	TC	TC	TC	TC	TC
LCN127HV4 12,000	0	-0.4	7.10	7.00	6.93	6.90	6.80	6.50
	5	4.5	8.00	7.90	7.83	7.80	7.70	7.40
	10	9	8.90	8.80	8.73	8.70	8.60	8.30
	17	15	10.10	10.00	9.93	9.90	9.80	9.48
	20	19	10.55	10.45	10.38	10.35	10.25	9.90
	25	23	11.30	11.20	11.13	11.10	11.00	10.60
	30	28	11.95	11.85	11.78	11.75	11.65	11.30
	35	32	12.60	12.50	12.43	12.40	12.30	12.00
	40	36	13.18	13.08	13.02	12.98	12.88	12.58
	45	41	13.77	13.67	13.60	13.57	13.47	13.17
	47	43	14.00	13.90	13.83	13.80	13.70	13.40
	50	46	14.23	14.13	14.06	14.03	13.93	13.59
	55	51	14.60	14.50	14.43	14.40	14.30	13.90
	60	56	14.60	14.50	14.43	14.40	14.30	13.96
	63	59	14.60	14.50	14.43	14.40	14.30	14.00
	68	64	14.60	14.50	14.43	14.40	14.30	14.06
LMCN185HV 18,000	0	-0.4	10.70	10.55	10.45	10.40	10.25	9.80
	5	4.5	12.06	11.91	11.81	11.76	11.61	11.15
	10	9	13.41	13.26	13.16	13.11	12.96	12.51
	17	15	15.22	15.07	14.97	**14.92**	14.77	14.29
	20	19	15.90	15.75	15.65	15.60	15.45	14.92
	25	23	17.03	16.88	16.78	16.73	16.58	15.98
	30	28	18.01	17.86	17.76	17.71	17.56	17.03
	35	32	18.99	18.84	18.74	18.69	18.54	18.09
	40	36	19.87	19.72	19.62	19.57	19.42	18.97
	45	41	20.75	20.60	20.50	20.45	20.30	19.85
	47	43	21.10	20.95	20.85	**20.80**	20.65	20.20
	50	46	21.44	21.29	21.19	21.14	20.99	20.48
	55	51	22.01	21.86	21.75	21.70	21.55	20.95
	60	56	22.01	21.86	21.75	21.70	21.55	21.04
	63	59	22.01	21.86	21.75	21.70	21.55	21.10
	68	64	22.01	21.86	21.75	21.70	21.55	21.20

TC = Total Capacity (kBtu/h).

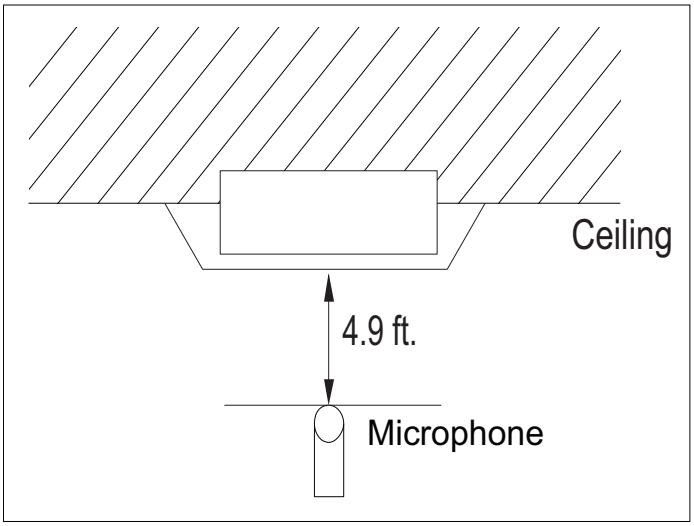
Nominal capacity as rated 0 ft. above sea level and a 0 ft. level difference between outdoor and indoor units. Corresponding refrigerant piping length is accordance with standard length of each outdoor unit.

Nominal 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).

FOUR-WAY CEILING-CASSETTE INDOOR UNITS

Acoustic Data

Figure 179: Sound Pressure Level Measurement Location.

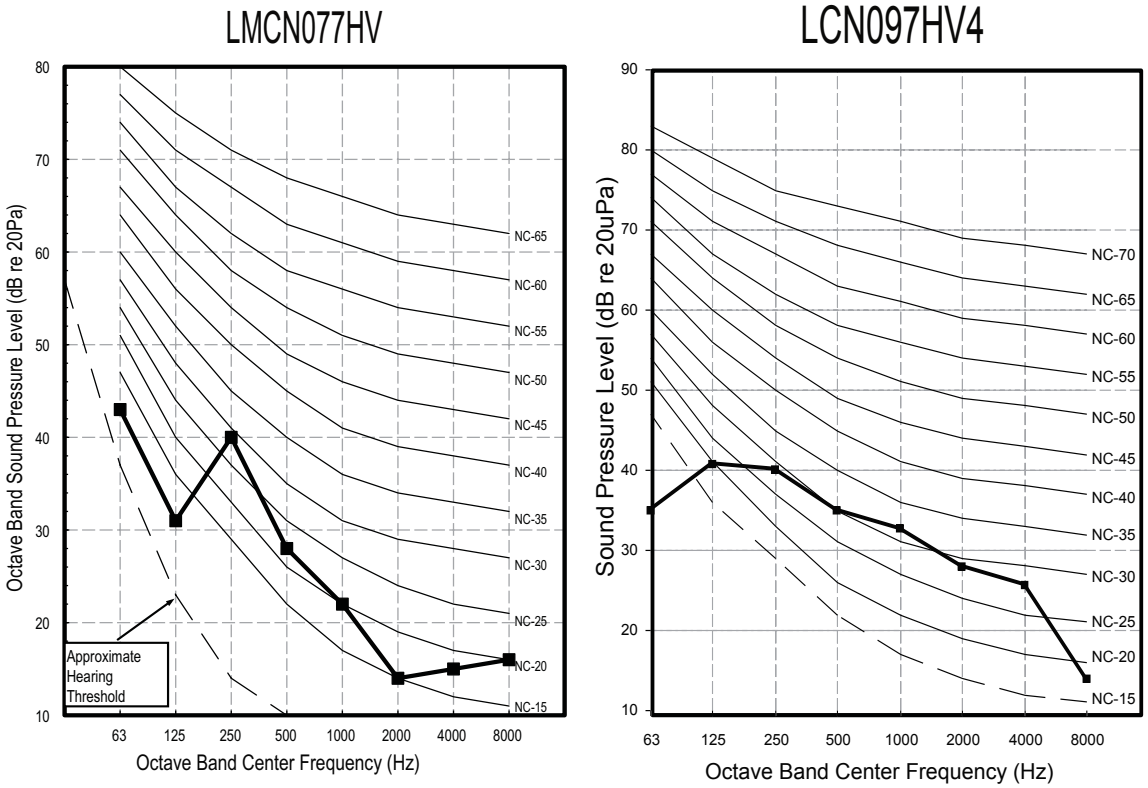


- Measurement taken 4.9' away from the unit.
- Measurements taken with no attenuation and units operating at full load normal operating condition.
- Sound level will vary depending on a range of factors such as construction (acoustic absorption coefficient) of particular area in which the equipment is installed.
- Sound power levels are measured in dB(A)±3.
- Tested in anechoic chamber per ISO Standard 3745.

Table 69: Sound Pressure Levels (dB[A]).

Model No.	Sound Pressure Levels (dB[A]) (Cooling and Heating)		
	High Fan Speed	Medium Fan Speed	Low Fan Speed
LMCN077HV	31	27	24
LCN097HV4	36	33	30
LCN127HV4	38	35	32
LMCN185HV	38	37	34

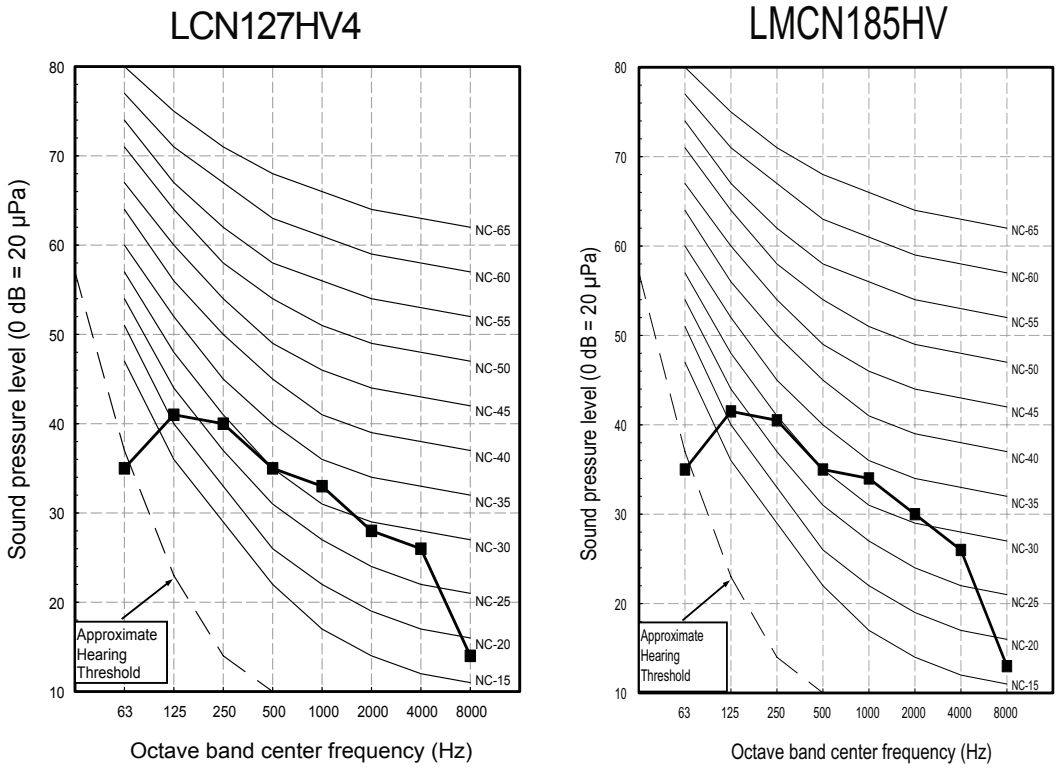
Figure 180: LMCN077HV and LCN097HV4 Sound Pressure Level Diagrams.



FOUR-WAY CEILING CASSETTE INDOOR UNITS

Acoustic Data

Figure 181: LCN127HV4 and LMCN185HV Sound Pressure Level Diagrams.



FOUR-WAY CEILING-CASSETTE INDOOR UNITS

Air Velocity and Temperature Distribution

Figure 182: LMCN077HV Air Velocity and Temperature Distribution Charts.

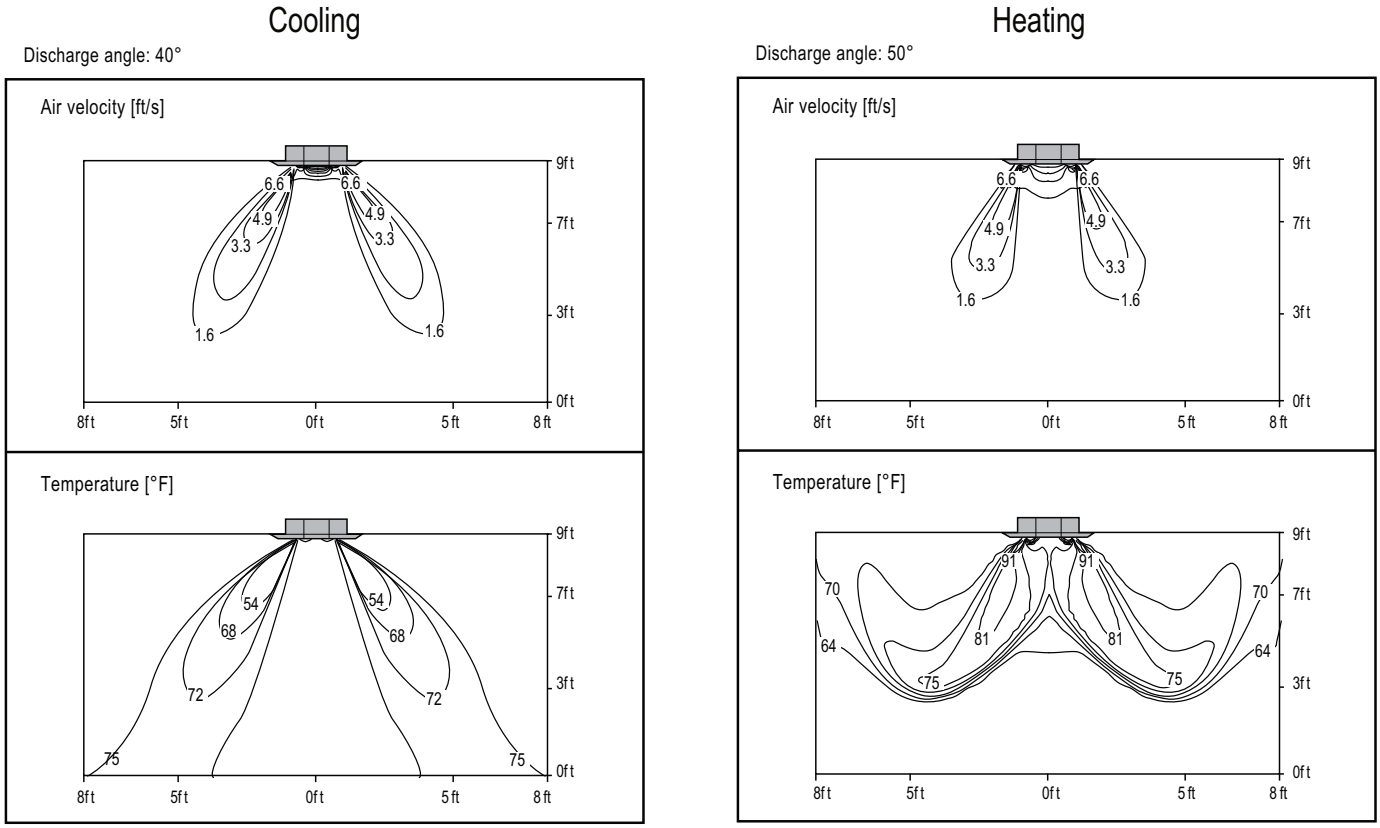
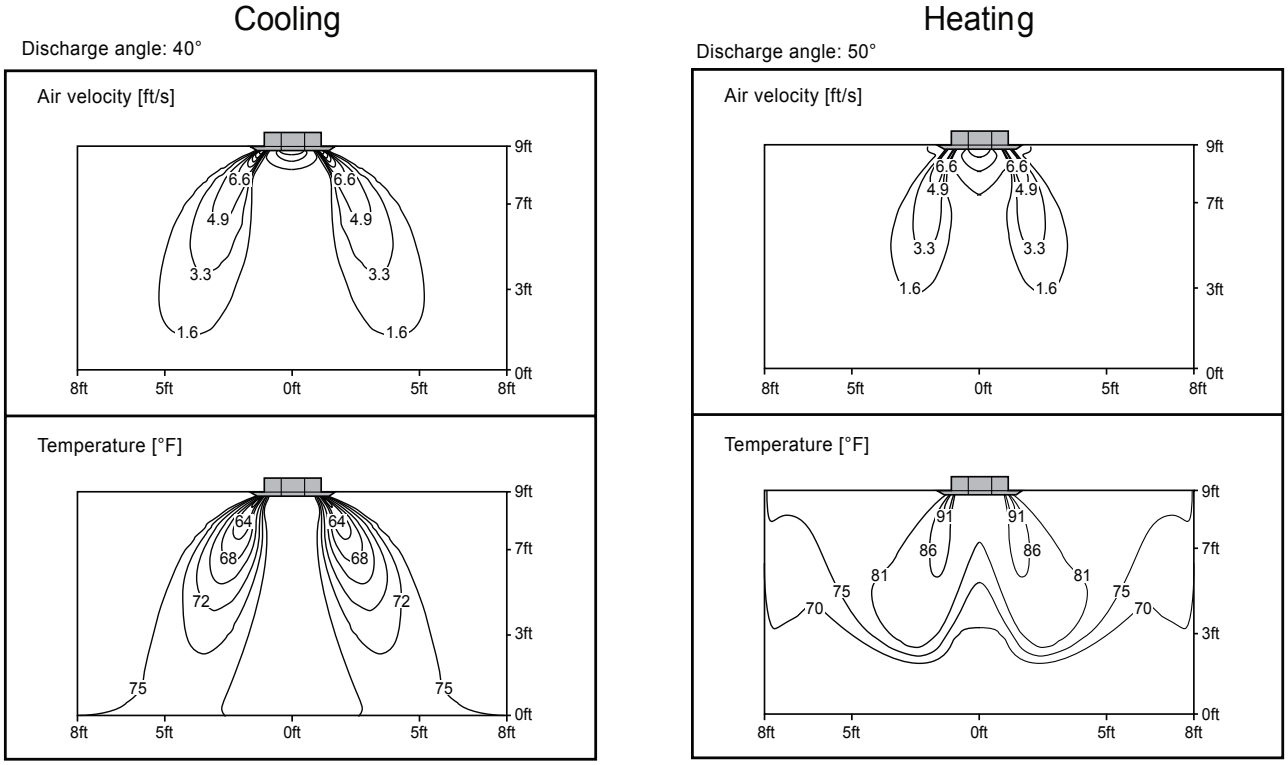


Figure 183: LCN097HV4 Air Velocity and Temperature Distribution Charts.



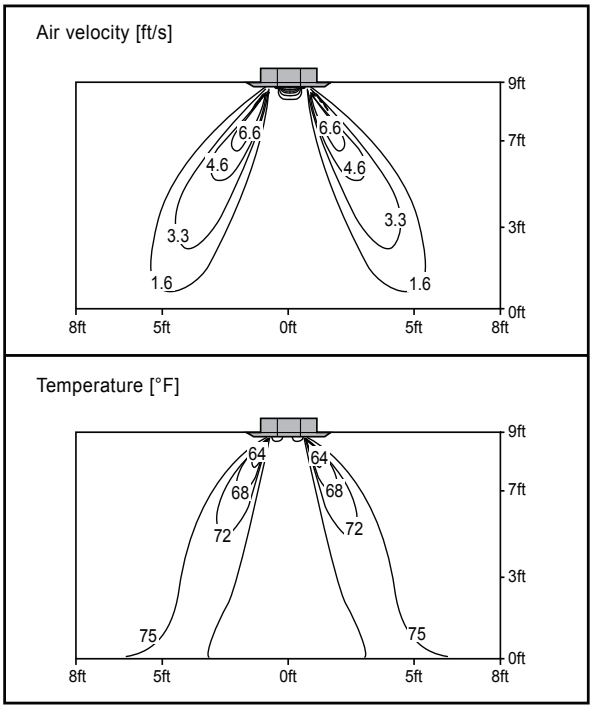
FOUR-WAY CEILING CASSETTE INDOOR UNITS

Air Velocity and Temperature Distribution

Figure 184: LCN127HV4 Air Velocity and Temperature Distribution Charts.

Cooling

Discharge angle: 40°



Heating

Discharge angle: 50°

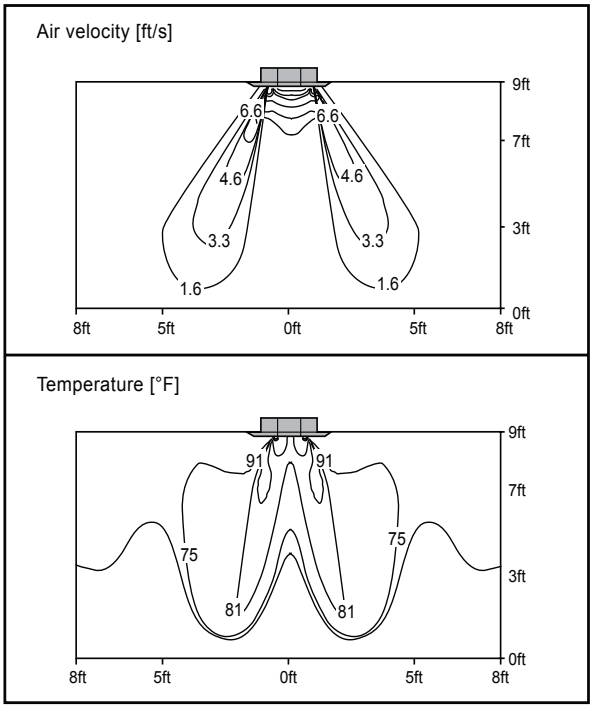
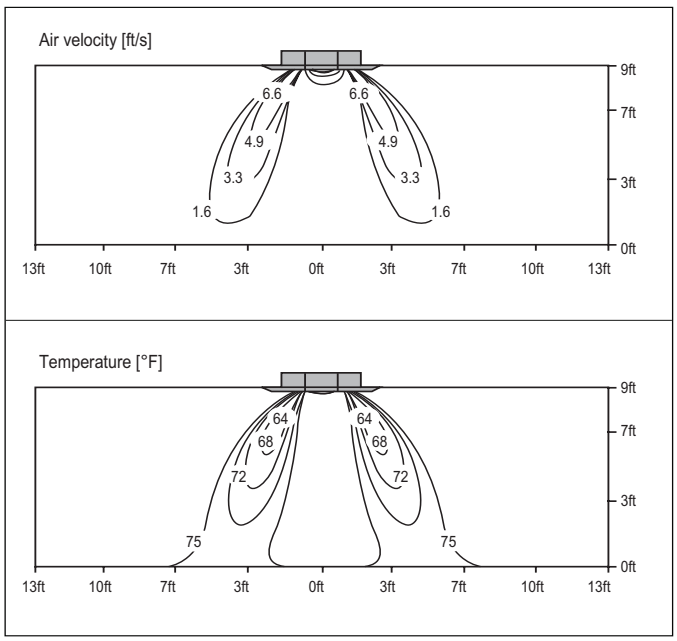


Figure 185: LMCN185HV Air Velocity and Temperature Distribution Charts.

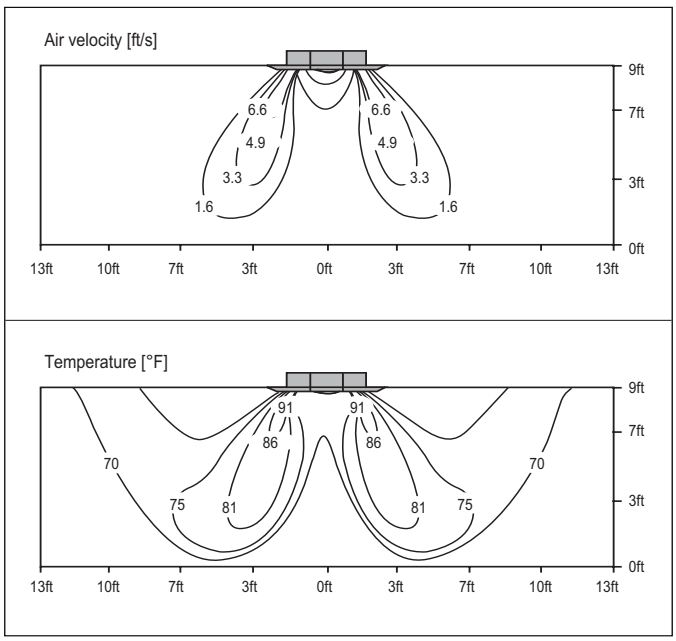
Cooling

Discharge angle : 40°



Heating

Discharge angle : 50°



FOUR-WAY CEILING-CASSETTE INDOOR UNITS

Refrigerant Flow Diagram

Figure 186: Multi F Four-Way Ceiling-Cassette Indoor Unit Refrigerant Flow Diagram.

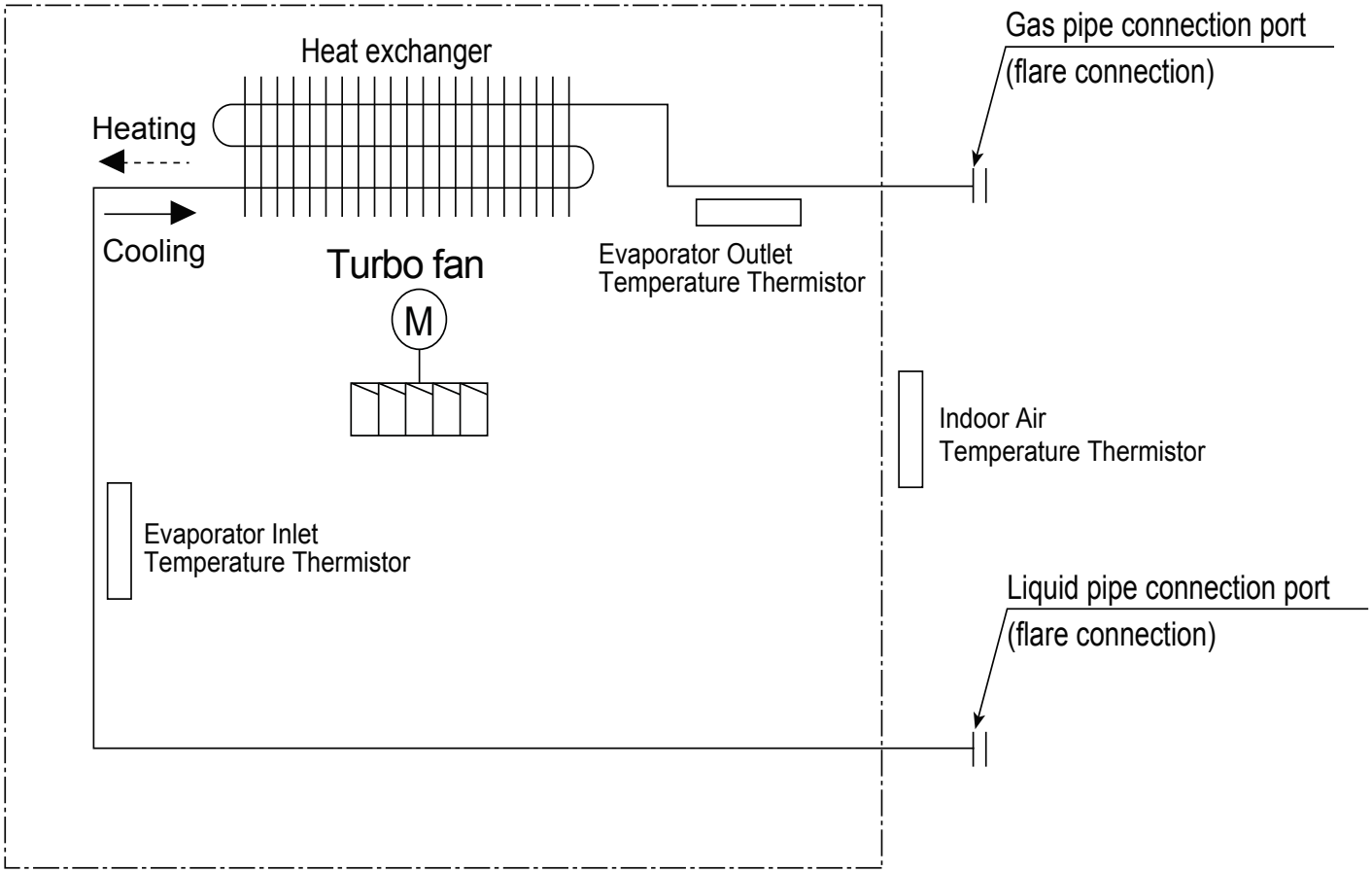


Table 70: Multi F Four-Way Ceiling-Cassette Indoor Unit Refrigerant Pipe Connection Port Diameters.

Model No.	Vapor (inch)	Liquid (inch)
LMCN077HV	Ø3/8	Ø1/4
LCN097HV4		
LCN127HV4		
LMCN185HV	Ø1/2	

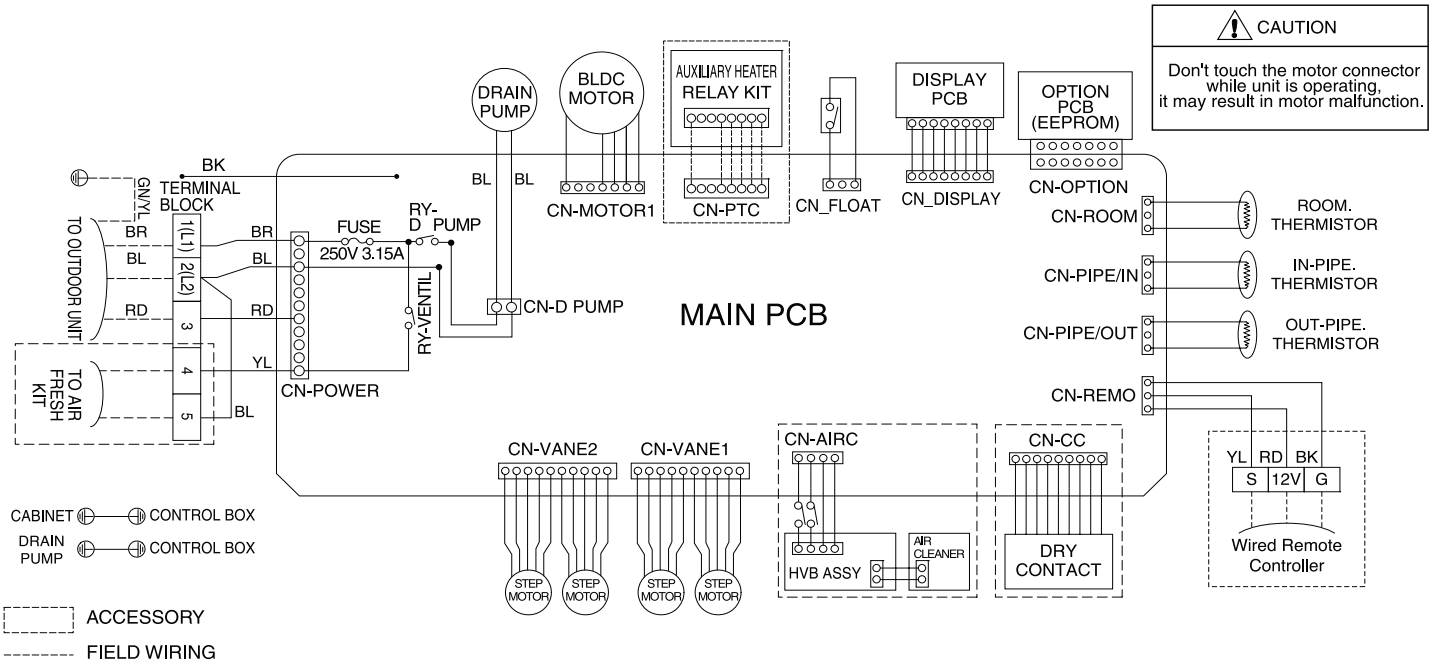
Table 71: Multi F Four-Way Ceiling-Cassette Indoor Unit Thermistor Details.

Description (Based on Cooling Mode)	PCB Connector
Indoor Air Temperature Thermistor	CN-ROOM
Evaporator Inlet Temperature Thermistor	CN-PIPE/IN
Evaporator Outlet Temperature Thermistor	CN-PIPE/OUT

FOUR-WAY CEILING CASSETTE INDOOR UNITS

Wiring Diagram

Figure 187: Multi F Four-Way Ceiling-Cassette Indoor Unit Wiring Diagram.

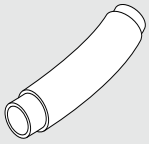
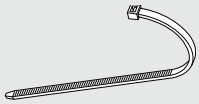
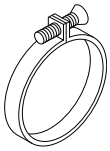
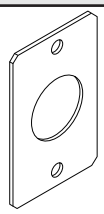
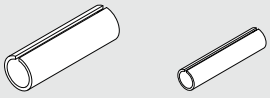
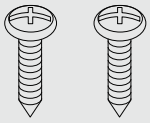
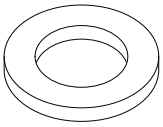


FOUR-WAY CEILING-CASSETTE INDOOR UNITS

Factory Supplied Parts and Materials

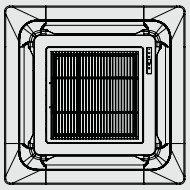
Factory Supplied Parts

Table 72: Parts Table.

Part	Quantity	Image	Part	Quantity	Image
Drain Hose	One (1)		Zip Ties	Four (4)	
Metal Clamp	Two (2)		Conduit Bracket	One (1)	
Insulation for Fittings	One (1) Set	 For Vapor Piping For Liquid Piping	M4 Screws	Two (2)	
Washer for Hanging Bracket	Eight (8)		Wireless Handheld Controller with Holder (AKB73757604)[1]	One (1)	

[1]Wireless Handheld Controller for the four-way ceiling cassette indoor units is also referenced by Model No. PQWRHQ0FDB.

Table 73: Required Accessory Table.

Part	Quantity	Image
Grille Kit (PT-QCHW0 or PT-UQC)	One (1)	

Factory Supplied Materials

- Installation Guide (template)
- Owner's Manual
- Installation Manual

Required Tools

- Level
- Screwdriver
- Electric drill
- Hole core drill
- Flaring tool set
- Torque wrenches
- Hexagonal wrench
- Gas-leak detector
- Thermometer

⚠ WARNING

Installation work must be performed by trained personnel and in accordance with national wiring standards and all local or other applicable codes. Improper installation can result in fire, electric shock, physical injury, or death.

Note:

Read all instructions before installing this product. Become familiar with the unit's components and connections, and the order of installation. Incorrect installation can degrade or prevent proper operation.

FOUR-WAY CEILING CASSETTE INDOOR UNITS

Installation and Best Layout Practices

Selecting the Best Location

Do's

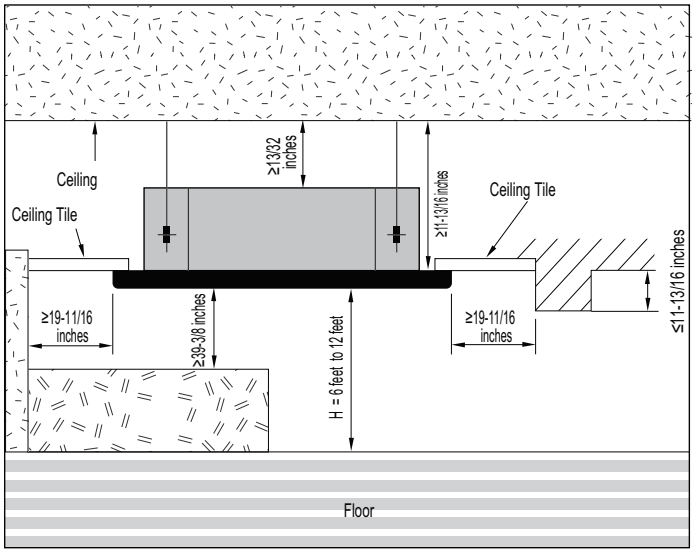
- Place the unit where air circulation will not be blocked.
- Place the unit where drainage can be obtained easily.
- Place the unit where noise prevention is taken into consideration.
- Ensure there is sufficient strength to bear the load of the indoor unit.
- Ensure there is sufficient maintenance space.
- Locate the indoor unit in a location that is level, and where it can be easily connected to the outdoor unit / branch distribution unit.

Don'ts

- ⃠ *Do not install the unit near a heat or steam source, or where considerable amounts of oil, iron powder, or flour are used.*
- ⃠ *Do not install the unit where sulfuric acid and flammable or corrosive gases are generated, vented into, or stored.*
- ⃠ *Do not install the unit near high-frequency generators.*
- ⃠ *Do not install the unit near a doorway.*

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

Figure 188: Indoor Unit Clearance Requirements.



Note:

If the unit is installed near a body of water, certain components are at risk of being corroded. Appropriate anti-corrosion methods should be taken for the unit and all components.

Installing in a High or Dropped Ceiling

High or dropped ceilings, often found in commercial buildings and offices, may cause a wide temperature differentiation. To countermeasure:

- Change the indoor unit mode selection to allow for higher ceilings (see table).
- Install an air circulator.
- Set the air discharge outlet so that heated air flows in a downward direction.
- Use a dual door system to protect the building gate or exit.

Table 74: Indoor Unit High Ceiling Mode Selection Options.

Ceiling Height	Mode Selection
≤7-1/2 feet	Low Ceiling
7-1/2 feet to 8-7/8 feet	Standard
8-7/8 feet to 10-3/16 feet	High Ceiling
10-3/16 feet to 11-13/16 feet	Very High Ceiling

Installing in an Area Exposed to Unconditioned Air

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

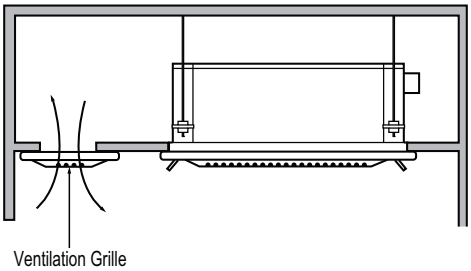
- Verify that carpet is or will be installed (carpet may increase the temperature by three (3) degrees).
- Add insulation between the floor joists.
- Install radiant heat or another type of heating system to the floor.

Installing in an Area with High Humidity Levels

If the environment is prone to humidity levels of 80% or more (near the ocean, lakes, etc.) or where steam could collect in the plenum:

- Install additional insulation to the indoor unit (glass wool insulation >13/32 inches thick).
- Install additional insulation to the refrigerant piping (insulation >13/16 inches thick).
- Seal all gaps between the indoor unit and the ceiling tiles (make the area air tight) so that humidity does not transfer from the plenum to the conditioned space. Also, add a ceiling grille for ventilation.

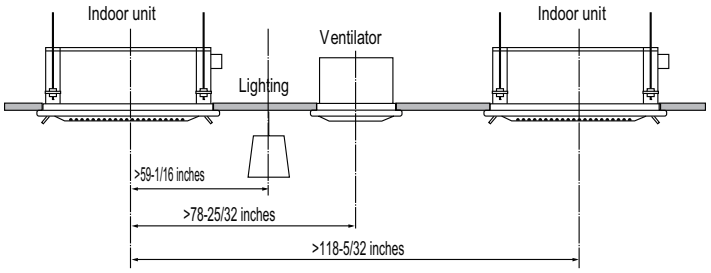
Figure 189: Installing in a Highly Humid Location.



Installing Multiple Indoor Units in One Area

Ensure there is enough space between indoor units, lighting fixtures, and ventilation fans / systems.

Figure 190: Installing Multiple Indoor Units.



Preparing the Installation Area and Hanging the Indoor Unit Frame

Preparing the Installation Area

1. Installation guide (template) depicts the exact dimensions necessary for the ceiling opening.
2. Choose the location for the indoor unit, and then mark where the bolts, refrigerant piping, and drain hose should be. Suspension bolt angle should account for drain direction.
3. Drill holes for the bolts. Use either a W 3/8 inch or a M10 size bolt.

Note:

For easier installation, attach the accessories (except for the decoration panel) before hanging the indoor unit.

Figure 191: Ceiling Opening Dimensions and Bolt Locations.

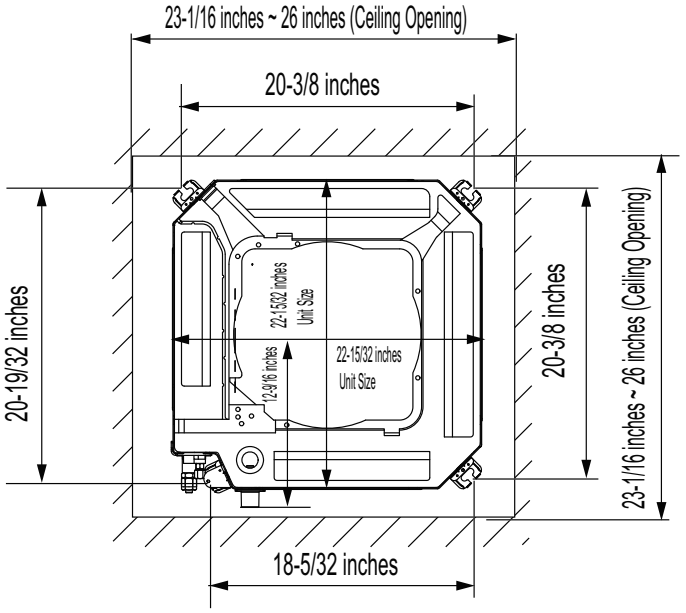


Figure 192: Installing the Hanging Bolt in the Ceiling.

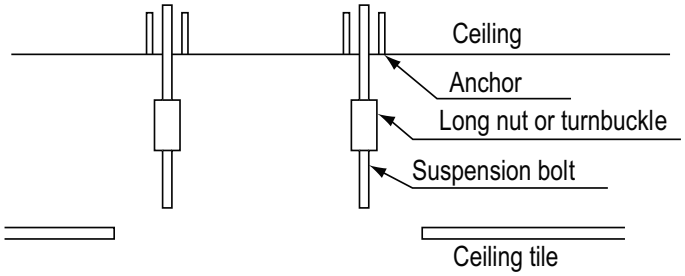
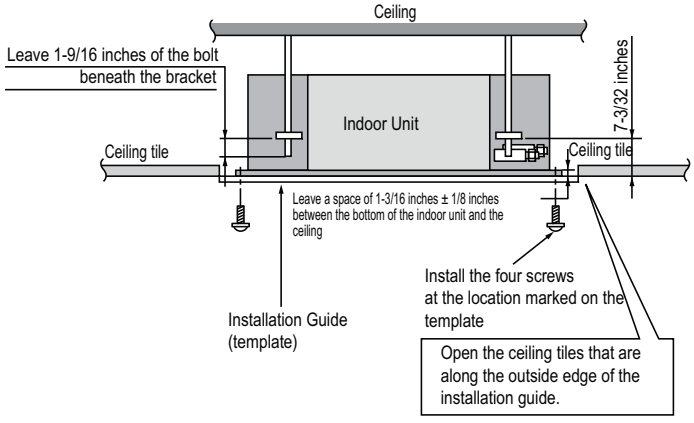


Figure 193: Installation Diagram.



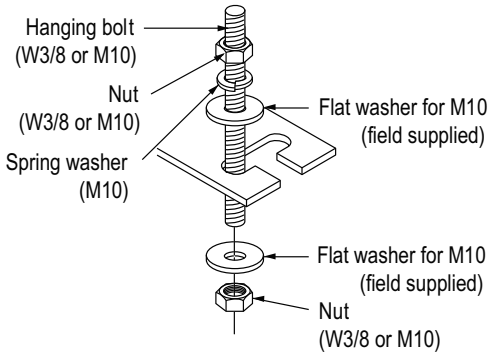
FOUR-WAY CEILING CASSETTE INDOOR UNITS

Installation and Best Layout Practices

For New Ceilings

1. Use a sunken insert, a sunken anchor, or any other field-supplied part to reinforce the ceiling so that it can bear the weight of the indoor unit. Use a temporary washer plate to more easily set up the unit suspension location.
2. Ceiling height is shown on the side of the installation guide (template). Adjust the height of the unit accordingly. Adjust the clearance before hanging the indoor unit.
3. Refer to the installation guide (template) for the dimensions to the ceiling opening. Match the center of the indoor unit (labeled) to the center indicated on the installation guide.
4. Align the installation guide (template) with the label attached to the unit (affixing the template to the unit if desired) to properly place the unit.
5. Remove the temporary washer plate and position the indoor unit hanger brackets on the bolts. Secure with nuts and washers on the top and bottom of the hanger brackets.

Figure 194: Hanging the Indoor Unit.



6. Ceiling-cassette indoor units are equipped with a built-in drain pump and float switch, therefore, the unit must be installed horizontally or condensate will drip out and cause product malfunction. Measure the unit at each corner to verify that it is level.
7. Remove the installation guide (template).

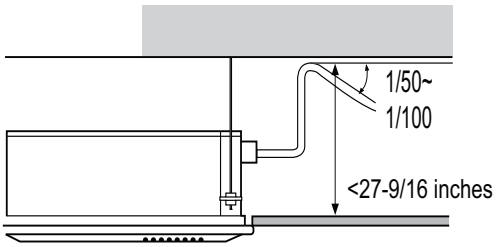
For Existing Ceilings

1. Use anchors when installing the indoor unit in an existing ceiling.
2. Ceiling height is shown on the side of the installation guide (template). Adjust the height of the unit accordingly. Adjust the clearance before hanging the indoor unit.
3. Remove the temporary washer plate and position the indoor unit hanger brackets on the bolts. Secure with nuts and washers on the top and bottom of the hanger brackets.
4. Ceiling-cassette indoor units are equipped with a built-in drain pump and float switch, therefore, the unit must be installed horizontally or condensate will drip out and cause product malfunction. Measure the unit at each corner to verify that it is level.
5. Remove the installation guide (template).

Installing the Drain System

- Drain piping must have downward gradient of at least 1/50 to 1/100; to prevent reverse flow, slope should not be straight up and down.
- ⃠ Do not damage the drain port on the indoor unit when connecting the field-supplied drain piping.
- Drain piping specifications:
  - Indoor Unit Drain Connection: 1-1/4 inch outside diameter.
  - Field-Supplied Drain Piping: Polyvinyl chloride piping with 1-inch inside diameter and pipe fittings.

Figure 195: Indoor Unit Drain Piping.

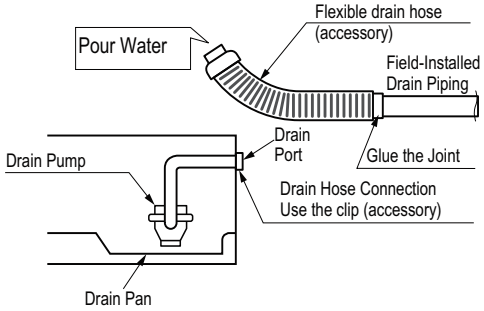


Checking the Drain Pump

The unit uses a drain pump to remove condensate. The pump must be tested before the system operates.

- Connect flexible drain hose to the field-installed drain piping; leave it as is until the test is complete.
- Pour water into the flexible drain hose and check for leaks.
- After power wiring installation is complete, operate the drain pump to see if it sounds and functions properly.
- After the test is complete, connect the flexible drain hose to the indoor unit drain port.

Figure 196: Checking the Drain Pump.



Insulating the Refrigerant and Drain Piping

⚠ WARNING

Ensure all piping is insulated. Exposed piping can cause burns if touched.

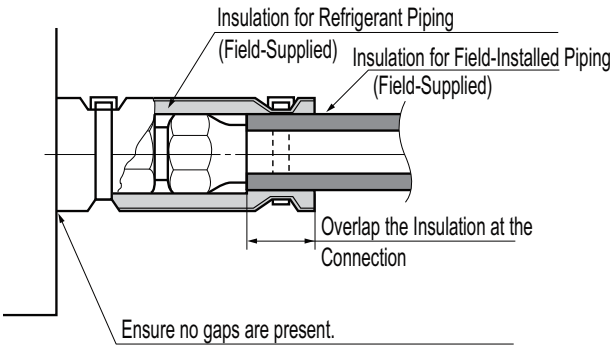
Refrigerant Piping Insulation

Field-installed vapor and liquid refrigerant piping lines must be properly and completely covered in insulation (up to the indoor unit piping connections). Any exposed piping may generate condensate or will cause burns if touched. Insulation for this field-installed refrigerant piping must have a minimum heat resistance of 248°F.

Drain Piping Insulation

Drain piping must have insulation a minimum of 7/32 inches thick.

Figure 197: Insulating the Piping.



Installing the Insulation

1. Overlap the insulation at the connection of the field-installed piping and the indoor unit piping. Tape together so that no gaps exist.
2. Secure insulation to the rear piping housing section with vinyl tape.
3. Bundle the piping and drain hose with tape where they meet at the back of the indoor unit frame. Position the drain hose at the bottom of the bundle (positioning the drain hose at the top of the bundle may cause the drain pan to overflow inside the indoor unit).

Power Wiring / Communications Cable Guidelines

- Follow manufacturer's circuit diagrams in the technical manuals.
- Confirm power source specifications.
- Confirm that the electrical capacity is sufficient.
- Starting current must be maintained ±10 percent of the rated current marked on the outdoor unit name plate.
- Confirm cable thickness specifications.
- It is recommended that a circuit breaker is installed, especially if conditions could become wet or moist.
- Include a disconnect in the power wiring system, add an air gap contact separation of at least 1/8 inch in each active (phase) conductor.

⚠ WARNING

• Loose wiring may cause unit to malfunction, overheat, and catch fire, resulting in severe injury or death.

Note:

• Terminal screws may become loose during transport. Properly tighten the terminal connections during installation.
A voltage drop may cause the following problems:
• Magnetic switch vibration, fuse breaks, or disturbance to the normal function of an overload protection device.
• Compressor will not receive the proper starting current.

Connecting the Power Wiring and Communications Cable

1. To access the terminal block, open the control box cover.

2. Insert the power wiring / communications cable from the outdoor unit or branch distribution unit (Multi F MAX systems only) through the sides of the indoor unit and control box. Pass the wiring through the designated access holes to prevent damage. To prevent electromagnetic interference and product malfunction, leave a space between the power wiring and communications cable outside of the indoor unit.

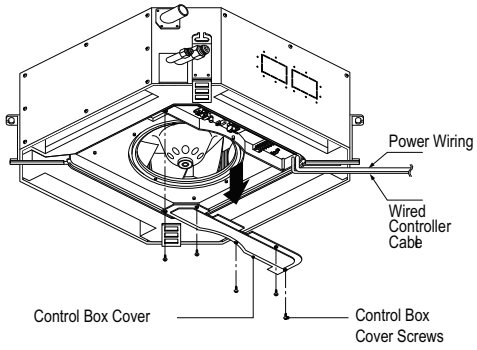
3. Connect each wire to its appropriate terminal on the indoor unit control board. Verify that the color and terminal numbers from the outdoor unit or branch distribution unit (Multi F MAX systems only) wiring match the color and terminal numbers on the indoor unit.

4. Neatly arrange power wiring / communications cable and secure with the appropriate cable restraint. ⃠ When clamping, do not apply force to the wiring connections.

5. Firmly reattach the control box cover. ⃠ Do not catch the wiring in the electric box cover and make sure the cover firmly closes.

6. Fill in any gaps around the wiring access holes with sealant to prevent foreign particles from entering the indoor unit.

Figure 198: Power Wiring and Communications Cable Connection Access.



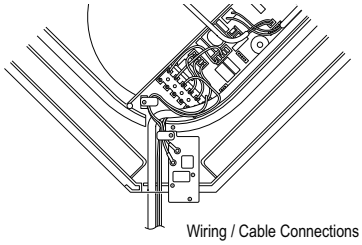
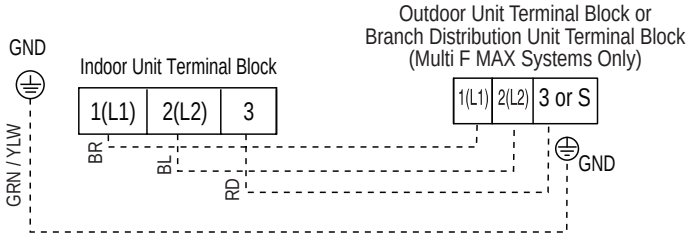


Figure 199: Simplified View of Indoor Unit to Outdoor Unit / Branch Distribution Unit Terminal Connections.



Using a Conduit

1. Remove the rubber stopper on the indoor unit. Pass the power wiring / communications cable through the conduit, the conduit mounting plate, and to / through the control panel of the indoor unit.

2. Tighten the conduit and the conduit mounting plate together.

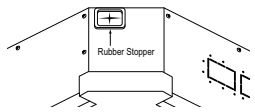
3. Connect the power wiring / communications cable to the indoor unit terminal block.

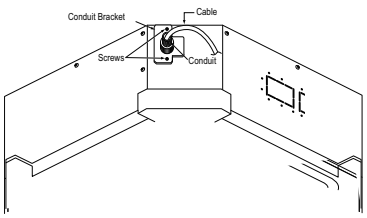
4. Screw the conduit mounting plate to the indoor unit.

Note:

If the distance between the outdoor unit and indoor unit is greater than 131 feet, connect the power wiring and communications cable separately (i.e., a conduit cannot be used).

Figure 200: Using a Conduit.





Controller Options

Four-way ceiling-concealed indoor units include a wireless handheld controller (AKB73757604)[1], but optional LG-supplied wired controllers are available.

Wireless Handheld Controller

Figure 201: AKB73757604 Wireless Handheld Controller.

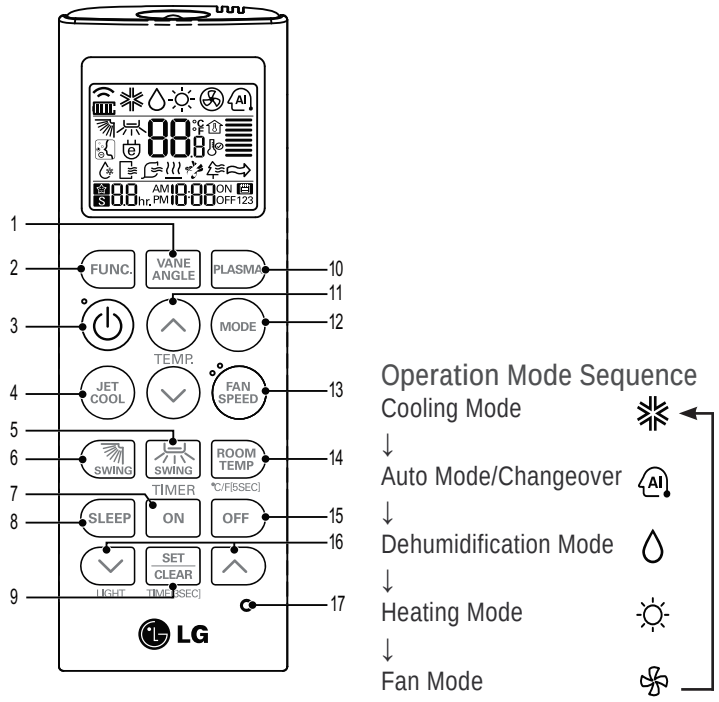


Table 75: AKB73757604[1] Wireless Handheld Controller Functions.[2]

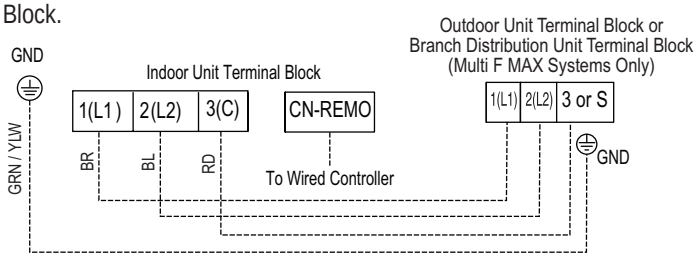
Button Label	Description
1	Vane Angle Button: Sets the angle to each vane.
2	Function Setting Button: Sets or clears auto clean, smart clean, electric heater, or individual vane angle control functions.
3	On / Off Button: Turns the power on/off.
4	Jet Cool: Sets the unit to super high fan speed when in cooling mode.
5	Left / Right Air Flow Button (optional): Sets the desired left / right (horizontal) air flow direction.
6	Up / Down Air flow Button: Stops or starts louver movement, and sets the desired air flow direction to up or down.
7	On Time Button: Sets the time when the operation begins.
8	Sleep Timer Button: Sets the sleep mode operation.
9	Set / Clear Button: Sets or cancels the timer, also sets the current time.
10	Plasma Button: Starts or stops plasma-purification functions.
11	Room Temperature Setting Button: Raises or lowers temperature setpoint in cooling and heating operation.
12	Operation mode selection button: Selects the operation mode.
13	Indoor Fan Speed Button: Changes the fan speed to one of four choices: low, medium, high, and chaos.
14	Room Temperature Check Button: Displays / checks the room temperature.
15	Off Timer button: Sets the time when the operation ends.
16	Time Setting (Up / Down) / Light Button: Sets the timer and adjusts the brightness of the LED.
17	Reset Button: Resets the remote controller.

[1]Wireless Handheld Controller for the four-way ceiling cassette indoor units is also referenced by Model No. PQWRHQ0FDB.

[2]Depending on the indoor unit model, some functions may not be supported or displayed.

Wired Controller Connections

Figure 202: Wired Controller Connection on the Indoor Unit Terminal Block.



FOUR-WAY CEILING CASSETTE INDOOR UNITS

Installation and Best Layout Practices

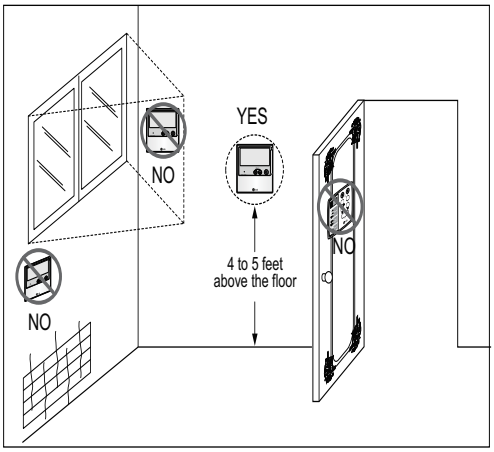
Wired Controller Placement

Wired controllers include a sensor to detect room temperature. To maintain comfort levels in the conditioned space, the wired controller must be installed in a location away from direct sunlight, high humidity, and where it could be directly exposed to cold air. Controller must be installed four (4) to five (5) feet above the floor where its LED display can be read easily, in an area with good air circulation, and where it can detect an average room temperature.

⃠ Do not install the wired controller near or in:

- Drafts or dead spots behind doors and in corners
- Hot or cold air from ducts
- Radiant heat from the sun or appliances
- Concealed pipes and chimneys
- An area where temperatures are uncontrolled, such as an outside wall

Figure 203: Proper Location for the Wired Controller.



Hanging the Wired Controller

1. The controller wiring / cable can be installed in one of three directions: top, back, or on the right side. If top or right side installation is desired, remove cable guide grooves on the controller, and then position wiring / cable on applicable side.

2. Choose and mark the area of installation, and then screw the wall plate into place (using the provided parts). Install the controller wall plate to fit the electrical box if one is present. Ensure that no gaps exist between the wall plate and the wall itself.

3. Arrange wiring / cables so as not to interfere with the controller circuitry. Position the wired controller on the wall plate. Snap into place by pressing the bottom part of the wired controller onto the wall plate. Make sure that no gaps exist between the wired controller and the wall plate on all sides.

4. To remove wired controller from the wall plate, insert a screwdriver into the two holes at the bottom. Twist screwdriver to release controller. ⃠ Do not damage the controller components when removing.

Figure 204: Removing the Cable Guide Grooves.

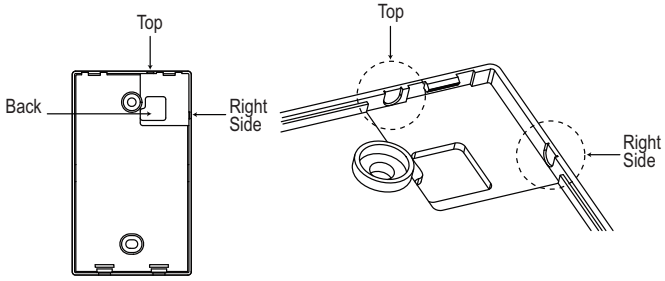


Figure 205: Attaching the Wall Plate.

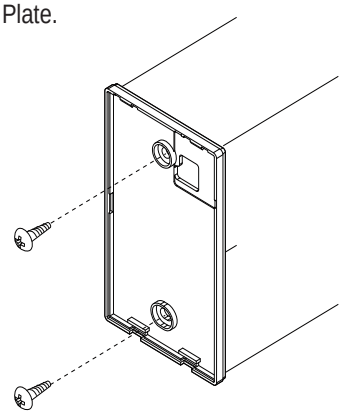
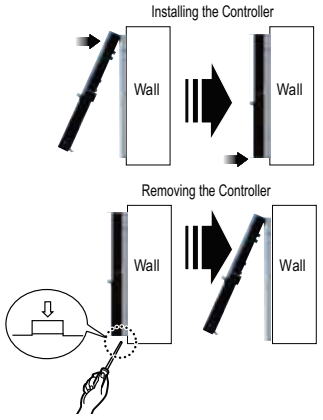


Figure 206: Installing / Removing the Controller.



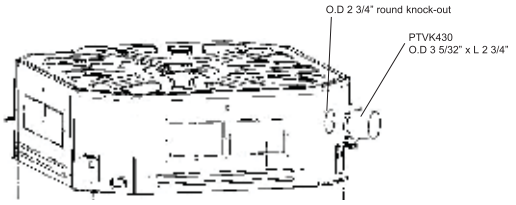
Assigning the Thermistor for Temperature Detection

Each indoor unit includes a return air thermistor assigned to sense the temperature. If a wired controller is installed, there is a choice of sensing temperature with either the indoor unit return air thermistor or the thermistor in the wired controller. It is also an option to set both thermistors to sense temperature so that indoor unit bases its operation on the first thermistor to reach the designated temperature differential. For applicable indoor units, an optional Remote Temperature Sensor can be used in lieu of the return air thermistor—either alone or in conjunction with a wired controller thermistor as previously described.

PTVK430 Ventilation Kit

PTVK430 Ventilation Kit includes a flange for field-supplied ventilation pipe connection. Easily connects at the four-way ceiling-cassette three (3) inch fresh air knockout hole.

Figure 207: PTVK430 Ventilation Kit.



Finalizing Indoor Unit Installation— Installing the Decoration Panel

Note:

Decoration panel must be installed properly; cool air will leak from any gaps found between the indoor unit frame and the decoration panel, which will cause condensation to generate.

1. Remove the packaging, take out air inlet grille from the front panel (1A), and then remove the corner covers of the panel (1B).
2. Attach the panel to the indoor frame by inserting the hooks as shown (2).
3. Attach two screws on diagonal corners of each panel, but do not tighten completely (3). Screws to attach the panel to the indoor unit frame are factory-provided and can be found in the shipping box.
4. Verify the panel is aligned with the ceiling. Adjust the height by using the hanging bolts as shown (4).
5. Attach the corner covers (5).
6. Unscrew the control panel cover (6).
7. Connect the one display connector (CN-DISP) and the two vane control connectors (CN-VANE1, CN-VANE2) of the front panel to the indoor unit PCB (7).
8. Close the control box cover. Attach the link on the front panel as shown (8). The link is supplied in the front panel shipping package.
9. Attach the other side of the link on the filter guide of the air inlet grille, then install the filter and the air inlet grille on the front panel (9).

Figure 208: Installing the Decoration Panel.

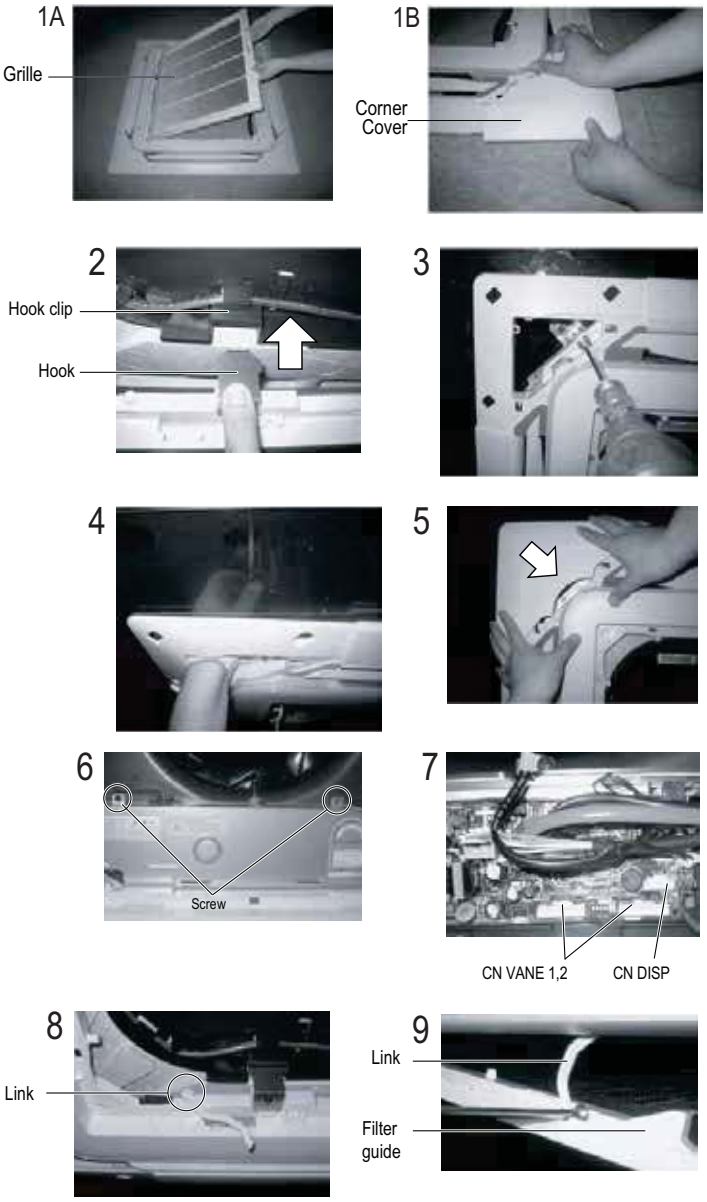
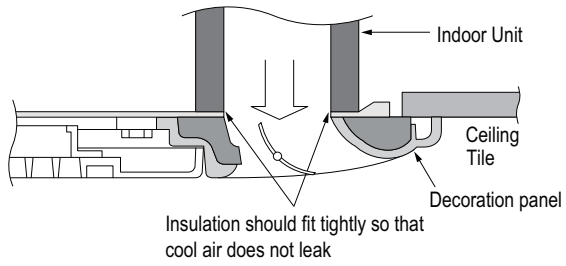


Figure 209: Ensure that no gaps are present between the indoor unit frame and the decoration panel.



VERTICAL-HORIZONTAL AIR HANDLING INDOOR UNIT DATA

VERTICAL-HORIZONTAL INDOOR UNITS

Mechanical Specifications and Features

Vertical-Horizontal Air Handing Indoor Unit

General

All LG indoor units are factory assembled, wired, piped, and provided with a control circuit board, fan, and motor. Vertical-Horizontal Air Handling units are designed for high-speed air volume against an external static pressure up to 1.00"WG. Supply air opening is flanged to accept field-installed ductwork that cannot exceed the external static pressure limit of the unit.

Coil

Indoor unit coils are factory built and are comprised of aluminum fins mechanically bonded to copper tubing. Each unit has a minimum of two rows of coils, which are pressure tested at the factory. Each unit is provided with a factory installed condensate drain pan below the coil.

Refrigerant System

System is designed for use with R410A refrigerant. The refrigeration circuit is pressure-tested at the factory and shipped with a holding charge of helium gas. Refrigerant pipe connections are 45° flare, and all refrigerant lines from the outdoor unit to the indoor units must be field insulated.

Electrical

Each indoor 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 behind a wall or above a finished ceiling. Casing is manufactured of 22-gauge precoated metal and finished with a high-gloss baked enamel finish. Cold surfaces of the unit are covered internally with 1/2-inch polystyrene fiber insulation; inside surface of the pan assembly door access panel is treated with 1/2-inch polystyrene fiber insulation, encapsulated on both sides. The access panel is sealed along the edges with reinforced foil-faced covering, all access panels also have gasket seals to minimize air leaks.

The vertical-horizontal air handling unit can operate in the vertical (upflow) configuration or horizontal (left) end discharge. Supply air is drawn from the top, and there is a dedicated bottom vertical return. Unit is also designed to accept an internal, optional LG electrical strip heater.

Fan Assembly and Control

The units have an integral fan assembly consisting of galvanized steel housing and a forward curve fan wheel. The fan motor is a brushless digitally controlled (BLDC) motor with permanently lubricated and sealed ball bearings. The fan / motor assembly is mounted on vibration-attenuating rubber grommets. Fan speed is controlled using a microprocessor-based direct digital control algorithm. The indoor fan has Low, Med, High, and Auto settings for Cooling mode; and has Low, Med, High, and Auto settings for Heating mode. Each of the settings can be field-adjusted from the factory setting (RPM / ESP). The Auto setting adjusts the fan speed to most effectively achieve setpoint.

Figure 210: Multi F Vertical-Horizontal Air Handling Indoor Unit.

Filter Assembly

The unit includes a filter rack that can accept a field-supplied 16" x 20" x 1" filter cartridge. The filter rack has a guide to assist in centering the filters, and can be accessed from the front.

Microprocessor Control

The indoor unit is provided with an integrated control panel to communicate with the outdoor unit. All unit operation parameters are stored in non-volatile memory resident on the unit microprocessor. The microprocessor controls space temperature through using the value provided by temperature sensors within the indoor unit. A field-supplied communication cable must be installed to connect the indoor unit(s) to the outdoor unit.

Controls

The indoor unit is supplied with an LG wired controller. Communication between the indoor units and the outdoor unit is accomplished through 18 AWG, four-core, stranded and shielded power / communication cable.

Condensate

The unit is designed for gravity draining of condensate.

Features

- Inverter (Variable speed fan)
- Control lock function
- Auto operation
- Auto restart operation
- Dehumidifying function
- Two thermistor control
- Group control
- External static pressure control
- Self-diagnostics function
- Wired thermostat included

VERTICAL-HORIZONTAL INDOOR UNITS

General Data / Specifications

Table 76: Multi F Vertical-Horizontal Air Handling Indoor Unit General Data.

Model Name	LMVN240HV	LMVN360HV
Nominal Cooling Capacity (Btu/h)[1]	24,000	36,000
Nominal Heating Capacity (Btu/h)[1]	27,000	40,000
Operating Range		
Cooling (°F WB)	57-77	57-77
Heating (°F DB)	59-81	59-81
Fan		
Type	Sircocco	Sircocco
Motor Output (W) x Qty.	96 x 1	182 x 1
Motor/Drive	Brushless Digitally Controlled / Direct	Brushless Digitally Controlled / Direct
Airflow Rate CFM (H/M/L) at 0.5"WG ESP	710 / 640 / 480	990 / 880 / 800
Maximum External Static Pressure (in. WG)	1.00	1.00
Unit Data		
Refrigerant Type[2]	R410A	R410A
Refrigerant Control	EEV	EEV
Power Supply V, Ø, Hz[3]	208-230, 1, 60	208-230, 1, 60
Rated Amps (A)	0.59	1.12
Sound Pressure Level ±3 dB(A) (H/M/L)[4] at 0.3"WG ESP	43 / 42 / 41	45 / 44 / 43
Dimensions (W x H x D, in.)	18 x 48-21/32 x 21-1/4	18 x 48-21/32 x 21-1/4
Net Weight (lbs.)	117	121
Shipping Weight (lbs.)	130	135
Power Wiring / Communications Cable (No. x AWG)[5]	4 x 18	4 x 18
Heat Exchanger (Row x Column x Fin / inch) x Number	(2 x 24 x 18) x 2	(3 x 24 x 18) x 2
Piping		
Liquid (in.)	1/4	3/8
Vapor (in.)	1/2	5/8
Primary Drain I.D. (in.)	3/4 FPT	3/4 FPT
Secondary Drain I.D. (in.)	3/4 FPT	3/4 FPT

[1]Nominal capacity is rated 0 ft. above sea level with corresponding refrigerant piping length in accordance with standard length of each outdoor unit and a 0 ft. level difference between outdoor and indoor units. All capacities are net with a combination ratio between 95 – 105%.

Nominal 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).
Nominal 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]This unit comes with a dry helium charge.

[3]Acceptable operating voltage: 187V-253V.

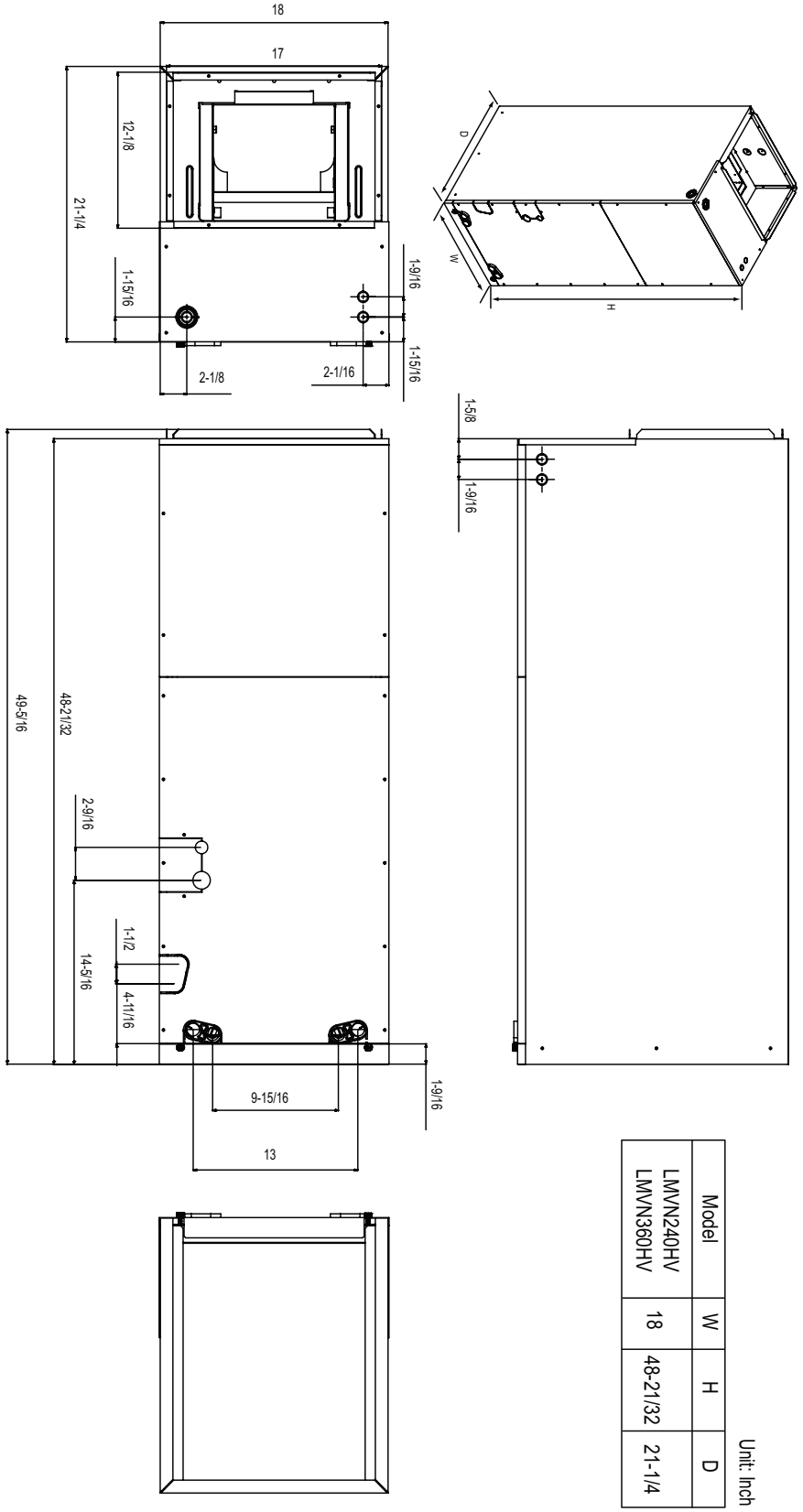
[4]Sound pressure levels are tested in an anechoic chamber under ISO Standard 3745 and are the same in both cooling and heating mode. These values can increase due to ambient conditions during operation.

[5]All power wiring / communications cable to the IDUs be minimum 18 AWG, 4-conductor, stranded, shielded or unshielded (if shielded, must be grounded to chassis at ODU only) and must comply with applicable local and national codes.

VERTICAL-HORIZONTAL INDOOR UNITS

Dimensions

Figure 211: LMVN240HV and LMVN360HV Dimensions.



Model	W	H	D
LMVN240HV LMVN360HV	18	48-21/32	21-1/4

Unit: Inch

VERTICAL-HORIZONTAL INDOOR UNITS

Cooling Capacity Table

Table 77: Multi F Vertical-Horizontal Air Handling Indoor Units Cooling Capacity Table.

Model No. / Nominal Capacity of Indoor Unit (Btu/h)	Outdoor Air Temp. (°F DB)	Indoor Air Temp. °F DB / °F WB											
		68 / 57		73 / 61		77 / 64		80 / 67		86 / 72		90 / 75	
		TC	SHC	TC	SHC	TC	SHC	TC	SHC	TC	SHC	TC	SHC
LMVN240HV 24,000	14	23.53	17.89	24.99	18.90	26.45	18.30	27.50	18.69	29.37	18.84	30.83	19.20
	20	23.51	18.03	24.97	19.05	26.43	18.44	27.48	18.83	29.35	18.99	30.81	19.35
	25	23.49	18.17	24.95	19.20	26.41	18.59	27.46	18.98	29.33	19.14	30.79	19.50
	30	23.47	18.31	24.93	19.34	26.39	18.73	27.44	19.12	29.30	19.28	30.76	19.65
	35	23.46	18.45	24.91	19.49	26.37	18.87	27.42	19.27	29.28	19.43	30.74	19.80
	40	23.44	18.59	24.89	19.64	26.35	19.01	27.40	19.41	29.26	19.58	30.72	19.95
	45	23.42	18.73	24.87	19.78	26.33	19.15	27.38	19.56	29.24	19.72	30.69	20.10
	50	23.40	18.87	24.85	19.93	26.31	19.30	27.36	19.70	29.21	19.87	30.67	20.24
	55	23.38	19.00	24.84	20.07	26.29	19.44	27.34	19.85	29.19	20.01	30.64	20.39
	60	23.37	19.14	24.82	20.22	26.27	19.58	27.32	19.99	29.17	20.16	30.62	20.54
	65	23.35	19.28	24.80	20.37	26.25	19.72	27.29	20.13	29.15	20.30	30.60	20.69
	70	23.33	19.42	24.78	20.51	26.23	19.86	27.27	20.28	29.13	20.45	30.57	20.84
	75	22.77	19.10	24.21	20.20	25.66	19.58	26.70	20.01	28.55	20.20	29.99	20.60
	80	22.21	18.77	23.65	19.88	25.09	19.30	26.13	19.73	27.97	19.95	29.42	20.36
	85	21.65	18.43	23.09	19.55	24.53	18.99	25.57	19.44	27.40	19.68	28.84	20.10
	90	21.09	18.08	22.53	19.21	23.96	18.69	25.00	19.14	26.83	19.40	28.27	19.84
	95	20.49	17.89	21.92	19.03	23.35	18.55	**24.00**	**18.72**	26.20	19.30	27.63	19.75
	100	19.99	17.41	21.42	18.55	22.85	18.10	23.69	18.43	25.70	18.88	27.13	19.35
	105	19.49	16.93	20.92	18.07	22.35	17.66	23.38	18.14	25.20	18.47	26.63	18.94
	110	18.99	16.35	20.42	17.49	21.85	17.12	22.88	17.60	24.70	17.94	26.13	18.42
	115	18.49	15.86	19.92	17.00	21.35	16.66	22.38	17.15	24.20	17.51	25.63	18.00
	118	18.19	15.75	19.62	16.89	21.05	16.58	22.08	17.07	23.90	17.46	25.33	17.96
	122	18.10	15.71	19.52	16.86	20.95	16.55	21.98	17.05	23.81	17.44	25.23	17.94
LMVN360HV 36,000	14	35.29	26.84	37.48	28.35	39.67	27.45	41.26	28.03	44.06	28.26	46.25	28.80
	20	35.26	27.05	37.45	28.57	39.64	27.66	41.23	28.25	44.02	28.49	46.21	29.02
	25	35.24	27.26	37.43	28.79	39.61	27.88	41.19	28.47	43.99	28.71	46.18	29.25
	30	35.21	27.47	37.40	29.01	39.58	28.09	41.16	28.68	43.96	28.93	46.14	29.47
	35	35.18	27.67	37.37	29.23	39.55	28.31	41.13	28.90	43.92	29.15	46.11	29.70
	40	35.16	27.88	37.34	29.45	39.52	28.52	41.10	29.12	43.89	29.37	46.07	29.92
	45	35.13	28.09	37.31	29.67	39.49	28.73	41.07	29.34	43.86	29.58	46.04	30.14
	50	35.10	28.30	37.28	29.89	39.46	28.94	41.04	29.55	43.82	29.80	46.00	30.37
	55	35.08	28.51	37.25	30.11	39.43	29.16	41.01	29.77	43.79	30.02	45.97	30.59
	60	35.05	28.71	37.23	30.33	39.40	29.37	40.97	29.99	43.76	30.24	45.93	30.81
	65	35.02	28.92	37.20	30.55	39.37	29.58	40.94	30.20	43.72	30.46	45.90	31.03
	70	34.99	29.13	37.17	30.77	39.34	29.79	40.91	30.42	43.69	30.67	45.86	31.26
	75	34.15	28.65	36.32	30.30	38.49	29.37	40.05	30.01	42.82	30.30	44.99	30.90
	80	33.31	28.16	35.47	29.82	37.64	28.94	39.20	29.60	41.96	29.92	44.12	30.54
	85	32.48	27.64	34.63	29.32	36.79	28.49	38.35	29.16	41.10	29.52	43.26	30.15
	90	31.64	27.12	33.79	28.81	35.94	28.03	37.50	28.71	40.25	29.10	42.40	29.76
	95	30.74	26.84	32.88	28.55	35.02	27.82	**36.00**	**28.08**	39.30	28.95	41.44	29.63
	100	29.99	26.12	32.13	27.83	34.27	27.15	35.53	27.65	38.55	28.32	40.69	29.02
	105	29.24	25.40	31.38	27.11	33.52	26.49	35.07	27.21	37.80	27.70	39.94	28.41
	110	28.49	24.53	30.63	26.23	32.77	25.67	34.32	26.40	37.05	26.92	39.20	27.64
	115	27.74	23.80	29.88	25.49	32.02	24.99	33.57	25.72	36.31	26.27	38.45	27.01
	118	27.29	23.62	29.43	25.34	31.57	24.87	33.12	25.61	35.86	26.18	38.00	26.93
	122	27.14	23.56	29.28	25.29	31.43	24.82	32.97	25.57	35.71	26.15	37.85	26.91

TC = Total Capacity (kBtu/h).

SHC: Sensible Heat Capacity (kBtu/h).

Nominal capacity as rated 0 ft. above sea level and a 0 ft. level difference between outdoor and indoor units. Corresponding refrigerant piping length is accordance with standard length of each outdoor unit.

Nominal 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).

The shaded table columns and rows indicate reference data. When operating at this temperature, these values can be different if the system is not running consistently.

VERTICAL-HORIZONTAL INDOOR UNITS

Heating Capacity Table

Table 78: Multi F Vertical-Horizontal Air Handling Indoor Units Heating Capacity Table.

Model No. / Nominal Capacity of Indoor Unit (Btu/h)	Outdoor Air Temp.		Indoor Air Temp. °F DB					
	°F DB	°F WB	61	64	68	70	72	75
			TC	TC	TC	TC	TC	TC
LMVN240HV 24,000	0	-0.4	13.89	13.70	13.57	13.50	13.30	12.72
	5	4.5	15.65	15.46	15.33	15.26	15.07	14.48
	10	9	17.41	17.22	17.09	17.02	16.83	16.24
	17	15	19.76	19.57	19.43	19.37	19.17	18.55
	20	19	20.64	20.45	20.32	20.25	20.05	19.37
	25	23	22.11	21.91	21.78	21.72	21.52	20.74
	30	28	23.38	23.18	23.05	22.99	22.79	22.11
	35	32	24.65	24.46	24.33	24.26	24.07	23.48
	40	36	25.79	25.60	25.47	25.40	25.21	24.62
	45	41	26.93	26.74	26.61	26.54	26.35	25.76
	47	43	27.39	27.20	27.07	27.00	26.80	26.22
	50	46	27.83	27.64	27.51	27.44	27.24	26.58
	55	51	28.57	28.37	28.24	28.17	27.98	27.20
	60	56	28.57	28.37	28.24	28.17	27.98	27.32
	63	59	28.57	28.37	28.24	28.17	27.98	27.39
	68	64	28.57	28.37	28.24	28.17	27.98	27.51
LMVN360HV 36,000	0	-0.4	20.58	20.29	20.10	20.00	19.71	18.84
	5	4.5	23.19	22.90	22.71	22.61	22.32	21.45
	10	9	25.80	25.51	25.31	25.22	24.93	24.06
	17	15	29.28	28.99	28.79	28.70	28.41	27.48
	20	19	30.58	30.29	30.10	30.00	29.71	28.70
	25	23	32.75	32.46	32.27	32.17	31.88	30.72
	30	28	34.64	34.35	34.15	34.06	33.77	32.75
	35	32	36.52	36.23	36.04	35.94	35.65	34.78
	40	36	38.21	37.92	37.73	37.63	37.34	36.47
	45	41	39.90	39.61	39.42	39.32	39.03	38.16
	47	43	40.58	40.29	40.10	40.00	39.71	38.84
	50	46	41.23	40.94	40.75	40.65	40.36	39.38
	55	51	42.32	42.03	41.84	41.74	41.45	40.29
	60	56	42.32	42.03	41.84	41.74	41.45	40.47
	63	59	42.32	42.03	41.84	41.74	41.45	40.58
	68	64	42.32	42.03	41.84	41.74	41.45	40.76

TC = Total Capacity (kBtu/h).

Nominal capacity as rated 0 ft. above sea level and a 0 ft. level difference between outdoor and indoor units. Corresponding refrigerant piping length is accordance with standard length of each outdoor unit.

Nominal 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).

VERTICAL-HORIZONTAL INDOOR UNITS

External Static Pressure

Table 79: Multi F Vertical-Horizontal Air Handling Unit External Static Pressure Setting Values Table.

Static Pressure (in. wg)			0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9	1.0
Model No. / Nominal Capacity of Indoor Unit (Btu/h)	Airflow Rate / CFM		Setting Value at (in. wg)[1]									
LMVN240HV 24,000	High	710	56	67	74	78	87	94	98	98[2]	98[2]	98[2]
	Mid	640	53	65	70	75	85	91	96	96[2]	96[2]	96[2]
	Low	480	53	55	64	70	79	84	92	92[2]	92[2]	92[2]
LMVN360HV 36,000	High	990	80	85	90	95	100	103	103[2]	103[2]	103[2]	103[2]
	Mid	880	65	72	80	85	92	98	103	103[2]	103[2]	103[2]
	Low	800	65	69	77	82	90	96	101	101[2]	101[2]	101[2]

[1]Unless otherwise noted, vertical-horizontal air handing units are UL listed up to 0.5 in. wg total static pressure, including coil, case, duct work pressure drop, air filter, and largest kW size heater. Internal static pressure includes coil and case only.

[2]Airflow rate (CFM) decreases by 3% per 0.1 in. wg.

[3]Maximum airflow rate is 400 CFM per ton. (For the 24,000 Btu/h unit, the maximum airflow rate is 2 x 400 = 800 CFM). If airflow is set at the maximum rate, the external static pressure value should be increased from high speed setting value to: From 24kBtu/h of capacity: 4; From 36kBtu/h of capacity: 5

[4]High static pressure is 0.5 in. wg (factory setting); low static pressure is 0.3 in. wg.

Note:

If external static pressure is not set correctly, the air conditioning system may not operate properly or may malfunction.

Table 80: Multi F Vertical-Horizontal Air Handling Unit Minimum Airflow by Heater Capacity.

Model No. / Nominal Capacity of Indoor Unit (Btu/h)	Heater Capacity (kW)			
	5	10	15	20
LMVN240HV (24,000)	480 CFM	480 CFM	Not Available	Not Available
LMVN360HV (36,000)	780 CFM	780 CFM	Not Available	Not Available

⚠ WARNING

Do not operate the air conditioning system using less than the minimum airflow. There is risk of fire and severe injury or death.

Note:

Do not operate the air conditioning system using less than the minimum airflow. There is risk of product damage.

Table 81: Electric Heater Static Pressure Drop.

Heater Capacity (kW)	Static Pressure Drop (in. wg)
0	0
5	-0.01
10	-0.02

Note:

- *The external static pressure value must be reset if an electric heater is installed. For each 0.01 in. wg. increase in static pressure, the external static pressure should increase by 1.*
- *If the external static pressure is not set properly, the provided safety device will turn off the heater (according to airflow).*

Table 82: Field-Supplied Air Filter Static Pressure Drop Factors.

Model No. / Nominal Capacity of Indoor Unit (Btu/h)	Airflow Rate / CFM		Static Pressure Drop (in. wg)
LMVN240HV (24,000)	High	710	-0.04
	Mid	640	-0.03
	Low	480	-0.03
LMVN360HV (36,000)	High	990	-0.07
	Mid	880	-0.05
	Low	800	-0.05

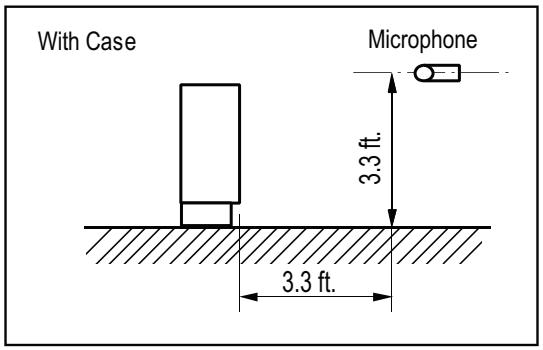
Note:

- *The external static pressure value must be reset if an air filter is installed. For each 0.01 in. wg. increase in static pressure, the external static pressure should increase by 1.*
- *Factory tested with MERV 4 filter media. Fan speed set value when the unit is used with field-supplied filter media.*

VERTICAL-HORIZONTAL INDOOR UNITS

Acoustic Data

Figure 212: Sound Pressure Level Measurement Location.



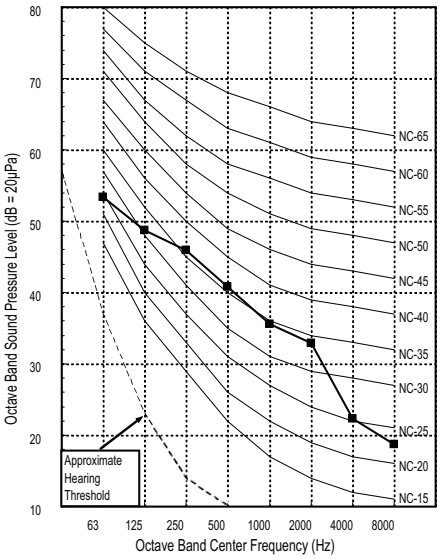
- Measurement taken 3.3' away from the unit.
- Measurements taken with no attenuation and units operating at full load normal operating condition.
- Sound level will vary depending on a range of factors such as construction (acoustic absorption coefficient) of particular area in which the equipment is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

Table 83: Sound Pressure Levels (dB[A]).

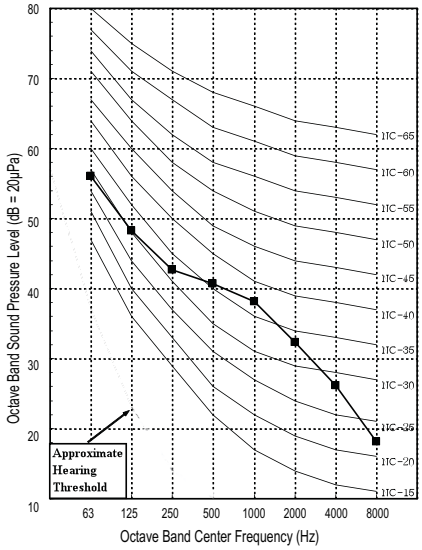
Model No.	Sound Pressure Levels (dB[A]) (Cooling and Heating)		
	High Fan Speed	Medium Fan Speed	Low Fan Speed
LMVN240HV	43	42	41
LMVN360HV	45	44	43

Figure 213: Sound Pressure Level Diagrams.

LMVN240HV



LMVN360HV



VERTICAL-HORIZONTAL INDOOR UNITS

Refrigerant Flow Diagram

Figure 214: Multi F Vertical-Horizontal Air Handling Indoor Unit Refrigerant Flow Diagram.

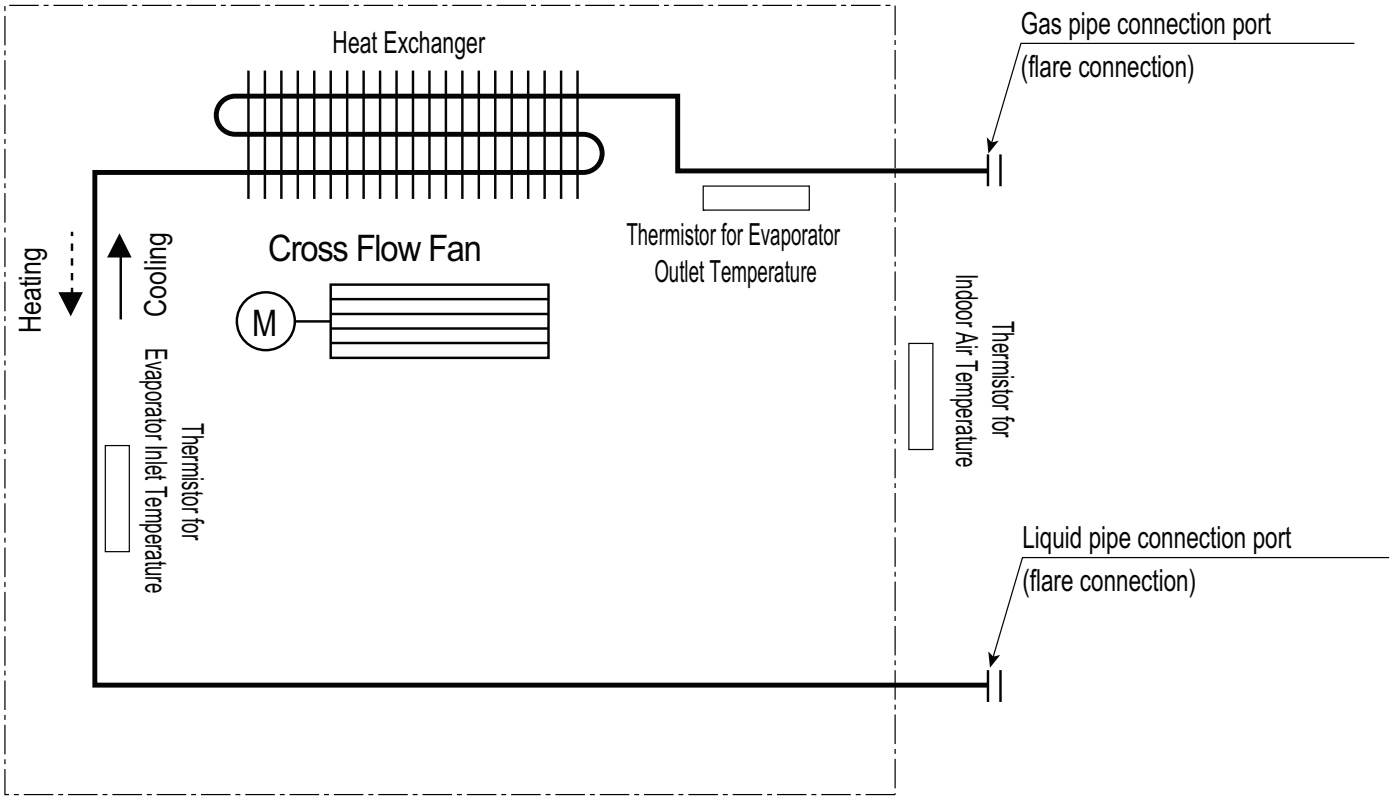


Table 84: Multi F Vertical-Horizontal Air Handling Indoor Unit Refrigerant Pipe Connection Port Diameters.

Model No.	Vapor (inch)	Liquid (inch)
LMVN240HV	1/2	1/4
LMVN360HV	5/8	3/8

Table 85: Multi F Vertical-Horizontal Air-Handling Indoor Unit Thermistor Details.

Description (Based on Cooling Mode)	PCB Connector
Indoor Air Temperature Thermistor	CN-ROOM
Evaporator Inlet Temperature Thermistor	CN-PIPE/IN
Evaporator Outlet Temperature Thermistor	CN-PIPE/OUT

VERTICAL-HORIZONTAL INDOOR UNITS

Wiring Diagram

Figure 215: Multi F Vertical-Horizontal Air-Handling Indoor Unit Wiring Diagram.

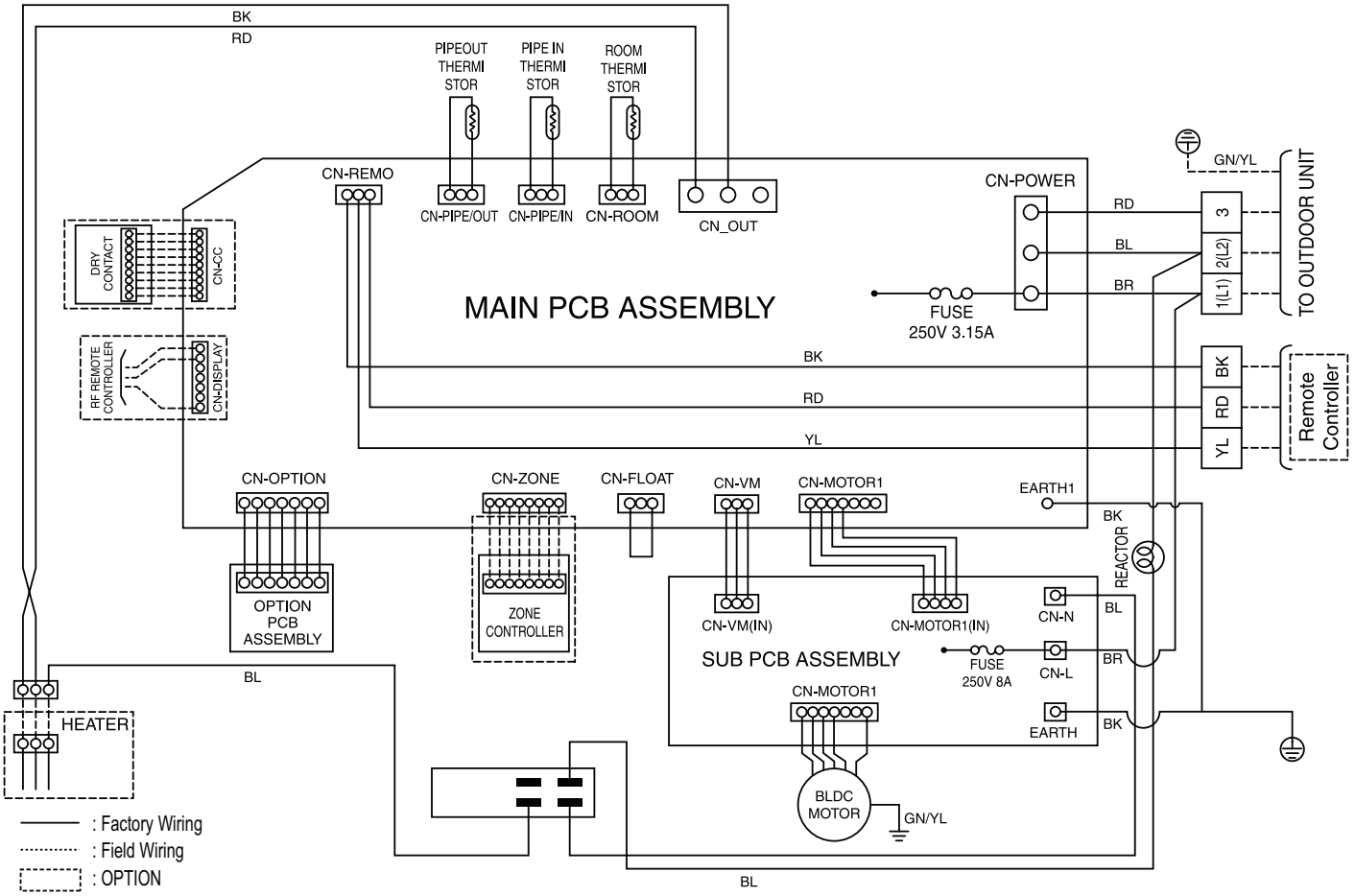


Table 86: Wiring Diagram Connections.

Connection Name	Location	Function
CN-POWER	AC power supply	AC Power line input for indoor controller
CN-MOTOR1	Fan motor output	Motor output of BLDC
CN-MOTOR2	Fan motor output	Motor output of BLDC
CN-FLOAT	Float switch input	Float switch sensing (water level sensor)
CN-PIPE/IN	Suction pipe sensor	Pipe in thermistor
CN-PIPE/OUT	Discharge pipe sensor	Pipe out thermistor
CN-ROOM	Room sensor	Room thermistor
CN-REMO	Remote controller	Remote control line
CN-OPTION	Option PCB	Communication between main and option
CN-ZONE	Zone controller	Zone control line
CN-DISPLAY	RF Remote controller	RF Remote control line
CN-CC	Dry contact	Dry contact line

Table 87: DIP Switch Settings.

Dip Switch Settings		OFF	ON	Description
SW3	GROUP	Master	Slave	Group control setting using wired remote controller.
SW4	DRY CONTACT	Variable	Auto	Dry contact mode setting. 1. Variable: Auto/manual mode can be chosen using the wide wired remote controller or wireless remote controller (factory setting is the manual mode). 2. Auto: For dry contact, it is always auto mode.
SW5	EXTRA1	Off	On	• ON: Fan operates continuously. • OFF: Default (Fan does not operate continuously).
SW6	HEATER	Off	On	• ON: Automatic heater operation. • OFF: Default (manual heater operation).

1. Indoor unit without electric heater.
   - DIP switch 1, 2, 6, 8 must be set to OFF.

2. Indoor unit with electric heater, DIP switches 5 and 6 must be set to ON.
   - SW 5 ON: Fan operates continuously. (Can have uninterrupted heating during defrost or oil return modes using continuous heater and fan operation.)
   - SW5 OFF: Fan discontinuous operation. (There would be reduction in heating capacity while defrosting or oil return operation.)
   - SW6 ON: Automatic heater operation. (Heater operates automatically using the heater algorithm.)
   - SW6 OFF: Manual heater operation. (On / off operation is set manually. Heater operation follows the heater algorithm.)

VERTICAL-HORIZONTAL INDOOR UNITS

Factory Supplied Parts and Materials

MULTI F
MULTI F MAX

Factory Supplied Materials

- Owner's Manual
- Installation Manual
- Simple Controller with Mode Selection (AKB72955816)[1]

[1]Simple Mode Controllers for the vertical-horizontal air handling indoor units are also referenced by Model No. PQRCVCL0QW.

Required Tools

- Level
- Screwdriver
- Electric drill
- Hole core drill
- Flaring tool set
- Torque wrenches
- Hexagonal wrench
- Gas-leak detector
- Thermometer

⚠WARNING

Installation work must be performed by trained personnel and in accordance with national wiring standards and all local or other applicable codes. Improper installation can result in fire, electric shock, physical injury, or death.

Note:

Read all instructions before installing this product. Become familiar with the unit's components and connections, and the order of installation. Incorrect installation can degrade or prevent proper operation.

Selecting the Best Location

Do's

- Place the unit where air circulation through the ducts will not be blocked.
- Place the unit where drainage can be obtained easily.
- Place the unit where noise prevention is taken into consideration.
- Ensure there is sufficient strength to bear the load of the indoor unit.
- Ensure there is sufficient maintenance space.
- Locate the indoor unit in a location that is level, and where it can be easily connected to the outdoor unit / branch distribution unit.

Don'ts

- ⃠ *Do not install the unit near a heat or steam source, or where considerable amounts of oil, iron powder, or flour are used.*
- ⃠ *Do not install the unit where sulfuric acid and flammable or corrosive gases are generated, vented into, or stored.*
- ⃠ *Do not install the unit near high-frequency generators.*
- ⃠ *Do not install the unit near a doorway.*

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

Note:

If the unit is installed near a body of water, certain components are at risk of being corroded. Appropriate anti-corrosion methods should be taken for the unit and all components.

Installing in an Area Exposed to Unconditioned Air

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

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

Installing in an Area with High Humidity Levels

If the environment is prone to humidity levels of 80% or more (near the ocean, lakes, etc.) or where steam could collect in the plenum:

- Install additional insulation to the indoor unit (glass wool insulation >13/32 inches thick).
- Install additional insulation to the refrigerant piping (insulation >13/16 inches thick).
- Seal all gaps between the indoor unit and the ceiling tiles (make the area air tight) so that humidity does not transfer from the plenum to the conditioned space. Also, add a ceiling grille for ventilation.

Figure 216: Clearance Requirements.

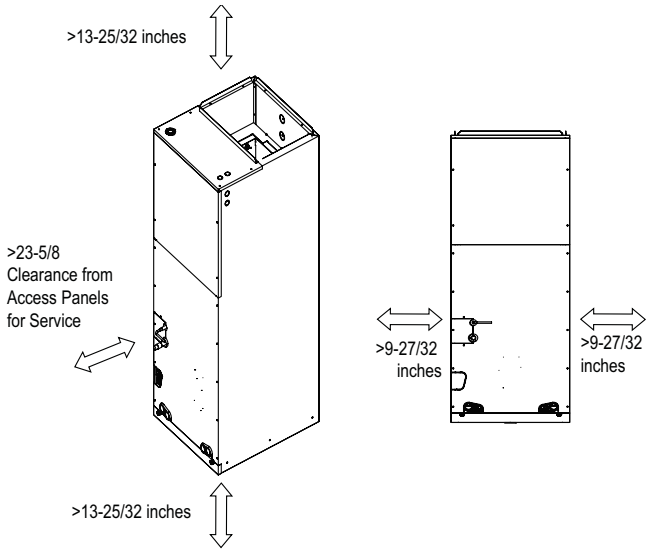


Figure 217: General and Duct Connection Dimensions.

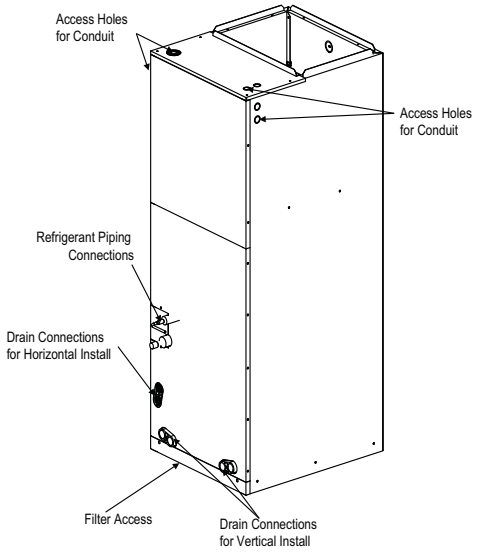


Figure 218: Location of Access Holes and Piping Connections.

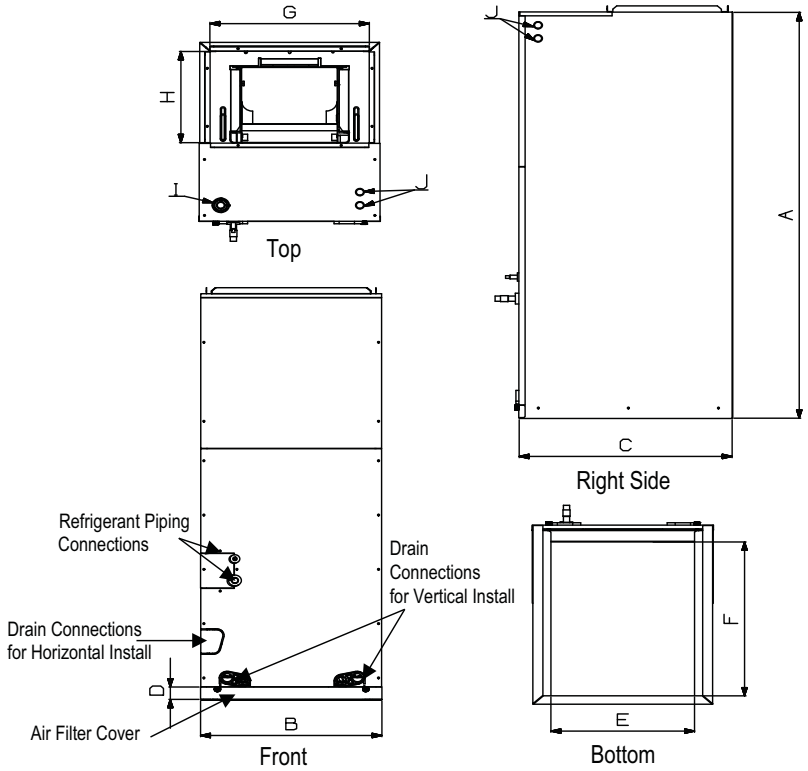


Table 88: General and Duct Connection Dimensions.

Capacity (Btu/h)	Dimensions (inches)								Access Hole for Wiring / Cable (inches)		Refrigerant Connection Sizes (inches)	
	A	B	C	D	E	F	G	H	I	J	Liquid	Vapor
	Height	Width	Depth						Power	Comm.		
24,000	48-21/32	18	21-1/4	1-9/16	17-1/2	20	17	12-1/8	1-11/16	7/8	1/4	1/2
36,000											3/8	5/8

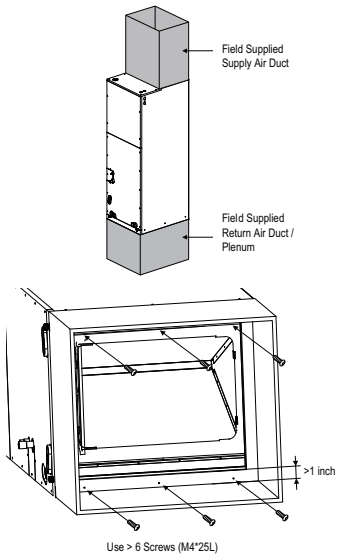
Note:

Vertical-Horizontal Air Handling Units can be installed in a choice of vertical (upflow) or horizontal (left side) configurations.

Vertical (Upflow) Installation

- Unit must be positioned properly for plenum / duct installation.
- To maintain proper air flow, minimum height clearance is 14 inches.
- Plenum must be strong and secure enough to support the installation of adapter collars to accommodate duct work.
- Air handler platform should be sturdy enough to support the frame, plus any accessories (e.g., filter box).
- To prevent air leaks, seal all duct work according to local codes, but make sure that filter access is still unobstructed.
- Vibration isolators (field supplied) must be installed between the unit frame and the platform. If necessary, provide the installing contractor with an illustration of where the vibration isolator should be added and how it should be positioned.

Figure 219: Vertical Installation / Attaching the Bottom Duct.



Note:

Do not install the screws on the front and back of the unit, doing so may block filter installation.

Horizontal Installation

- Units must be installed so that the access panels face to the side, not facing up or down.
- Installation must be in accordance with all relevant building codes, which may necessitate the installation of an external condensate pan (position the unit in or above the external condensate pan).
- If the units are going to be suspended, use angled steel support brackets with threaded rods to provide support from the bottom. The brackets / threaded rods should be comparatively bigger / longer than the unit, and each must be centered on the part of the frame it supports.
- If the unit will not be suspended, still use angled steel support brackets, but also add vibration isolators (field supplied) to avoid sound transmission. If necessary, provide the installing contractor with an illustration of where the vibration isolator should be added and how it should be positioned.
- Unit must be positioned properly for plenum / duct installation.
- Plenum must be strong and secure enough to support the installation of adapter collars to accommodate duct work.

Figure 220: Horizontal Installation.

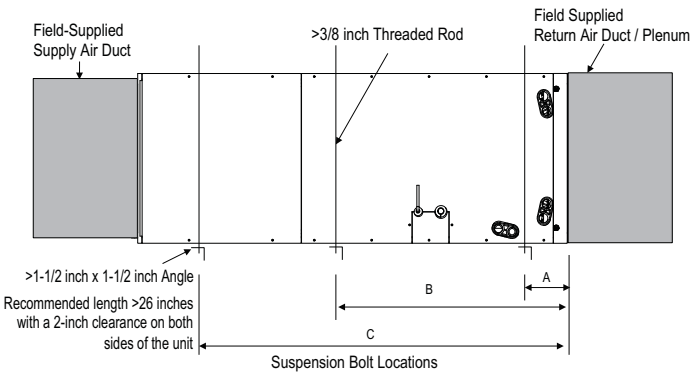


Table 89: Bracket / Bolt Position Dimensions.

Capacity (Btu/h)	Dimensions (inches)		
	A	B	C
24,000	4	23	41-11/32
36,000			

Note:

To ensure proper drainage for horizontal installations, unit must be installed within ±1/8 inches level of the unit's length and width.

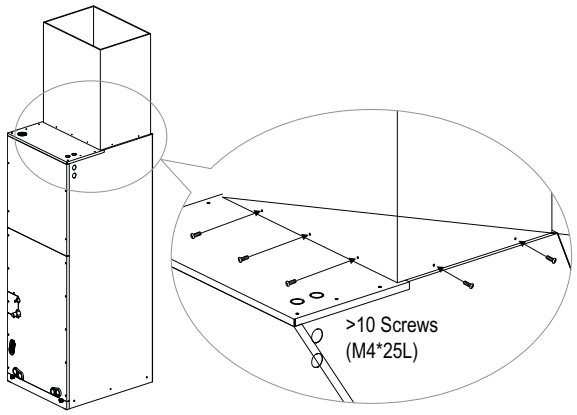
VERTICAL-HORIZONTAL INDOOR UNITS

Installation and Best Layout Practices

Installing the Ducts

- Use more than ten (10) screws to securely attach the supply ducts to the unit. To prevent air leaks, seal around the duct opening before the duct is secure.
- To prevent vibration transmission, install flexible connectors between ducts and the unit. The flexible connectors must be made of a heat-resistant material at the discharge connection if an electric heater is installed.
- Duct work must be insulated and covered with vapor barrier when routed through unconditioned spaces. Include enough insulation to prevent condensate from forming on the ducts.
- It may be necessary to add internal acoustical insulation lining for a metal duct system if it does not include a 90° elbow and ten (10) feet between the main duct and the first branch.

Figure 221: Securing the Ducts to the Unit.



- Fibrous glass ducts could be used as a substitute if built and installed in accordance with the most recent edition of the Sheet Metal and Air-Conditioning Contractors' National Associate (SMACNA) standard.
- Also, fibrous duct work and acoustical insulation lining must also follow National Fire Protection Standard 90A or B as tested by UL Standard 181 for Class 1 air ducts.

Installing the Drain System

General Specifications

- To prevent property damage, optimize drain system performance by installing both a primary and secondary drain line, and properly size the condensate traps.
- The primary and secondary drain line must be trapped to allow proper drainage of condensate water. If the secondary drain line is not used, it must be capped.
- Do not block the filter access panel when installing the condensate drain piping. Prime the primary and secondary condensate traps after running both to the drain pan.
- If the unit is installed above an inhabited space, add a field-supplied external condensate pan that runs underneath the entire frame (to prevent damage from overflow). The additional external condensate line should run from the unit to the external condensate pan.
- Drain all generated condensate from the external condensate pan to an appropriate area. Install a trap in the condensate lines as near to the indoor unit coil as possible.
- All condensate should be drained from the external condensate pan to some noticeable area.
- To prevent overflow, the outlet of each trap should be positioned below its connection to the condensate pan.
- All traps should be primed, insulated, and leak tested if located above an inhabited space.
- Use a 3/4-inch PVC male pipe thread fitting at the condensate pan connection. Tighten gently.
- Point the drain hose down for easier flow.
- Do not just use the pipe joint or PVC / CPVC piping on the indoor unit drain line connections. Use only Teflon tape.
- Design the drain system to plan for winter operation (condensate line may freeze up if condensate does not properly drain away).

Figure 222: Vertical Installation Drain System.

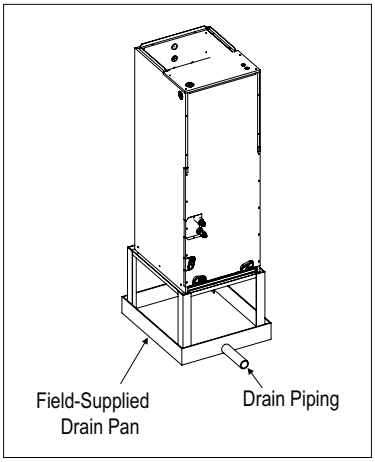
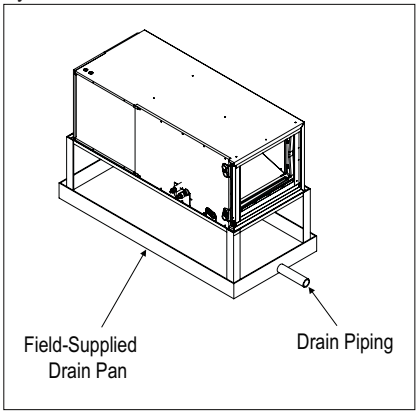


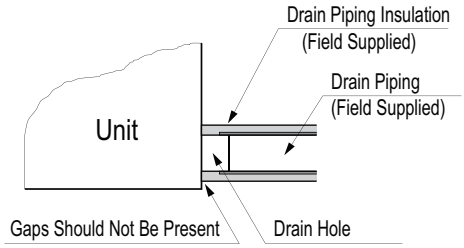
Figure 223: Horizontal Installation Drain System.



Drain Piping Specifications

- Drain piping must have downward gradient of at least 1/50 to 1/100; to prevent reverse flow, slope should not be straight up and down.
- Do not damage the drain port on the indoor unit when connecting the field-supplied drain piping.

Figure 224: Close up of Drain Piping Connection.



Field-Installed U-Trap Specifications

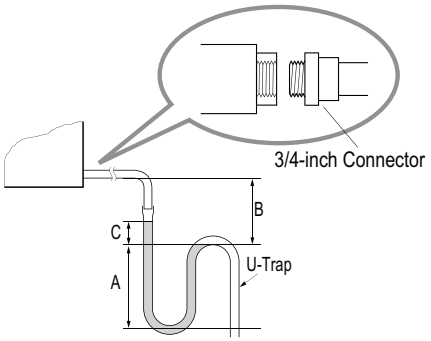
Note:

To prevent leaks cause by a block in the intake air filter, install a U-Trap.

A ≥ 2-9/16 inches
B ≥ 2C
C ≥ 2 x SP
SP = External Pressure in. WG

Example:
External Pressure= 0.4 in WG
A ≥ 2-9/16 inches
B ≥ 1-7/12 inches
C ≥ 19/24 inches

Figure 225: Installing the U-Trap.



Insulating the Refrigerant and Drain Piping

⚠ WARNING

Ensure all piping is insulated. Exposed piping can cause burns if touched.

Refrigerant Piping Insulation

Field-installed vapor and liquid refrigerant piping lines must be properly and completely covered in insulation (up to the indoor unit piping connections) and must comply with federal, state, and local requirements. Any exposed piping may generate condensate or will cause burns if touched. Insulation for this field-installed refrigerant piping must have a minimum heat resistance of 248°F.

Vertical-horizontal air handling indoor units have been tested under and meet the requirements of the "KS Conditions." If the indoor unit is installed and is operated at an extended period in a highly humid environment (dew point temperature >73°F), however, condensate will form. To prevent this phenomenon, install adiabatic glass wool insulation with a thickness of 7/16 to 13/16 inches thick. Also, install glass wool insulation on all indoor units that are located in the ceiling plenum.

Drain Piping Insulation

Drain piping insulation must be 7/32 inches thick, minimum.

Figure 228: Close Up of Refrigerant Piping Connection Insulation.

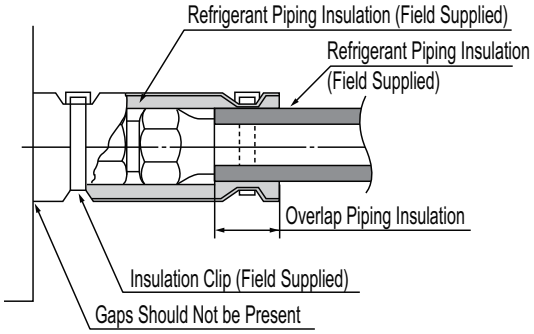


Figure 226: Vertical Primary and Secondary Drain Layout.

Figure 227: Horizontal Primary and Secondary Drain Layout.

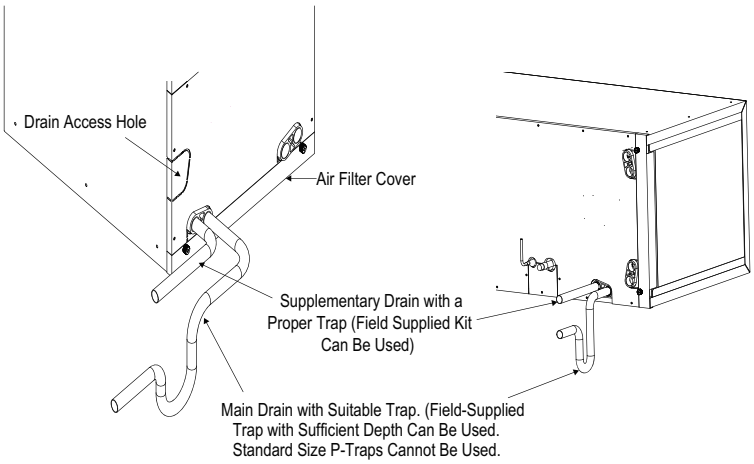
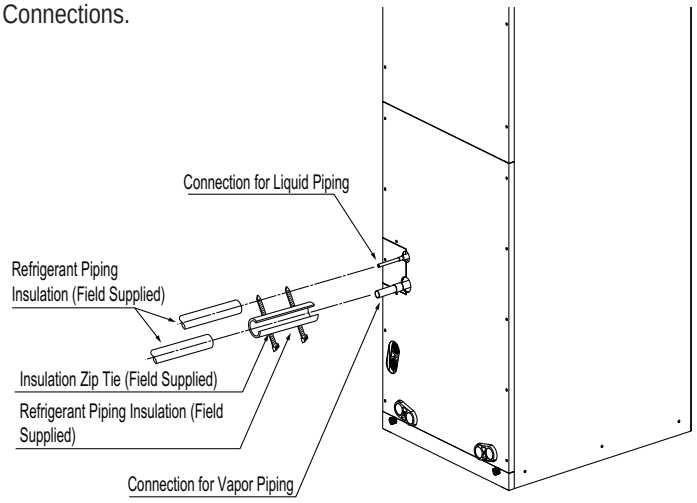


Figure 229: Insulating the Refrigerant Piping and Refrigerant Piping Connections.



Power Wiring / Communications Cable Guidelines

- Follow manufacturer's circuit diagrams in the technical manuals.
- Confirm power source specifications.
- Confirm that the electrical capacity is sufficient.
- Starting current must be maintained ±10 percent of the rated current marked on the outdoor unit name plate.
- Confirm cable thickness specifications.
- It is recommended that a circuit breaker is installed, especially if conditions could become wet or moist.
- Include a disconnect in the power wiring system, add an air gap contact separation of at least 1/8 inch in each active (phase) conductor.

⚠ WARNING

• Loose wiring may cause unit to malfunction, overheat, and catch fire, resulting in severe injury or death.

Note:

• Terminal screws may become loose during transport. Properly tighten the terminal connections during installation.
A voltage drop may cause the following problems:
• Magnetic switch vibration, fuse breaks, or disturbance to the normal function of an overload protection device.
• Compressor will not receive the proper starting current.

Connecting the Power Wiring and Communications Cable

1. To access the terminal block, first unscrew the top front panel, and then unscrew the cover from the control box.

2. Knockout the access holes for the wiring. Insert the power wiring/ communications cable from the outdoor unit or branch distribution unit (Multi F MAX systems only) through the conduits, pass the conduits through the designated access holes, and then insert the conduits into the control box. To prevent electromagnetic interference and product malfunction, leave a space between the power wiring and communications cable outside of the indoor unit.

3. Connect the power wiring and communications cables to the appropriate terminals on the indoor unit control board. Verify that the color and terminal numbers from the outdoor unit or branch distribution unit (Multi F MAX systems only) wiring match the color and terminal numbers on the indoor unit.

4. Fill in any gaps around the conduit access holes with sealant to prevent foreign particles from entering the indoor unit.

Figure 230: Connecting the Power Wiring and Communications Cable.

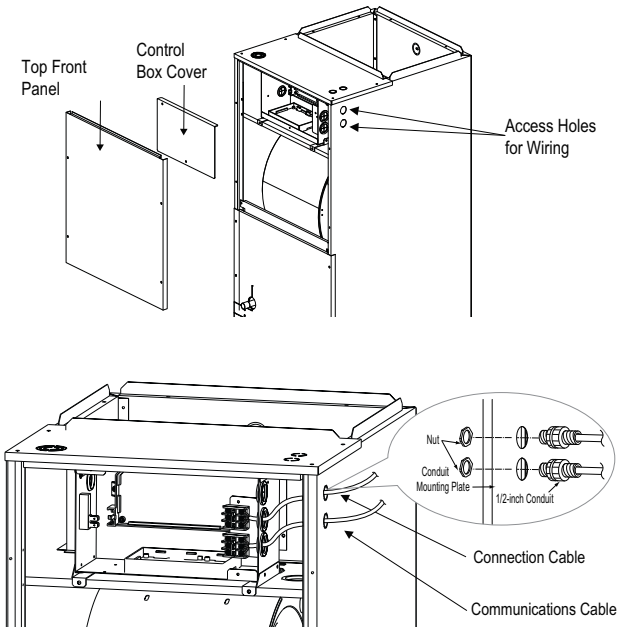
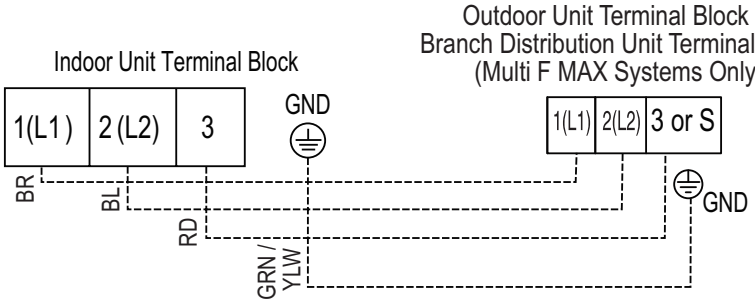


Figure 231: Indoor Unit to Outdoor Unit / Branch Distribution Unit (Multi F MAX systems only) Power Wiring / Communications Cable Connections.

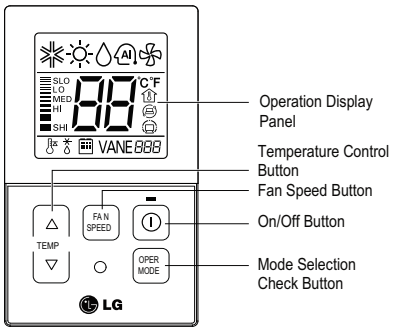


Controller Options

Vertical-Horizontal Air Handling indoor units include an LG-supplied wired controller (AKB72955816)[1], but other optional LG-supplied wired controllers are available. The wireless handheld controller (Model No. PQWRHQ0FDB) is also an optional accessory with use of the wired controller.

- Operation Display Panel: Displays operation conditions.
- Temperature Control Button: Sets desired temperature.
- Fan Speed Button: Sets desired fan speed.
- On / Off Button: Turns system operation on and off.
- Mode Selection Check Button: Selects the operation mode: Cooling, Heating, Auto, Dry (Dehumidification), or Fan.

AKB72955816[1] Wired Controller.



[1]Simple Mode Controllers for the vertical-horizontal air handling indoor units are also referenced by Model No. PQRCVCL0QW.

Note:

Each function will display on the LED for about three (3) seconds when the power is first cycled on.

Wired Controller Connections

Controllers can connect to the indoor unit in one of two different ways.

1. LG Wired Remote Extension Cable with Molex plug (PZCWRC1; sold separately) that connects to the CN-REMO terminal on the indoor unit PCB.

2. Field-supplied controller cable that connects to the indoor unit terminal block (must be at least UL2547 or UL1007, 22 AWG, two-core, one-shield core, at least FT-6 rated if local electric and building codes require plenum cable usage).

Figure 232: PZCWRC1 LG Wired Remote Extension Cable.

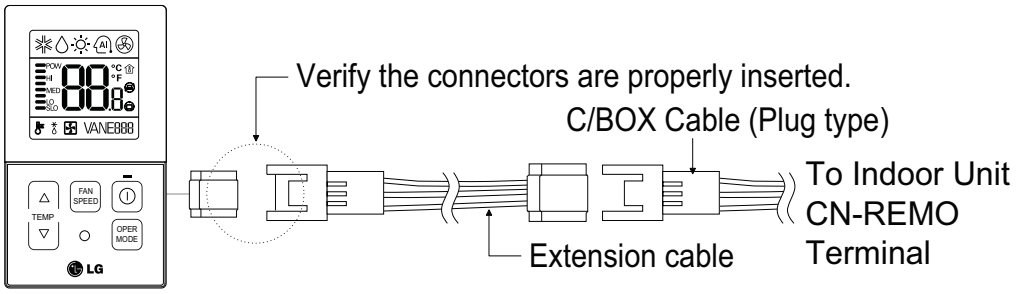
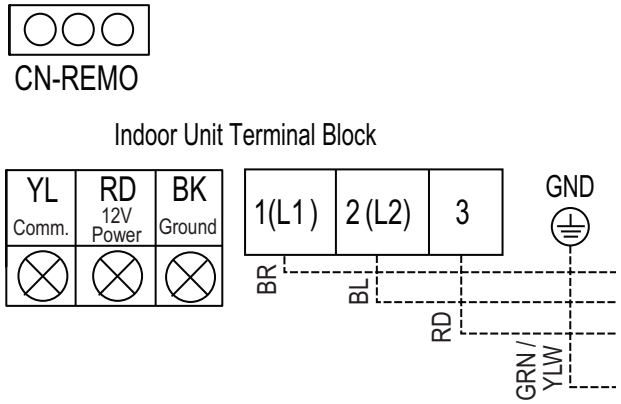


Figure 233: Wired Controller Connection on the Indoor Unit Terminal Block.



Note:

When using field-supplied controller cable, make sure to connect the yellow to yellow (communications wire), red to red (12V power wire), and black to black (ground wire) terminals from the remote controller to the indoor unit terminal blocks.

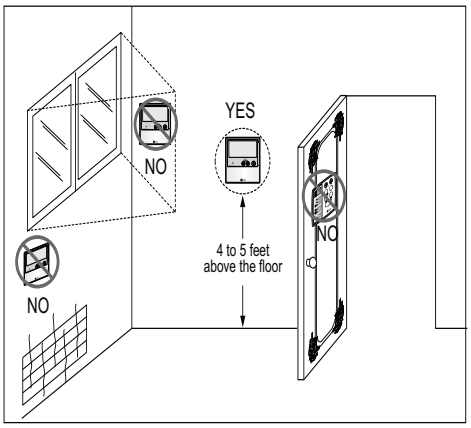
Wired Controller Placement

Wired controllers include a sensor to detect room temperature. To maintain comfort levels in the conditioned space, the wired controller must be installed in a location away from direct sunlight, high humidity, and where it could be directly exposed to cold air. Controller must be installed four (4) to five (5) feet above the floor where its LED display can be read easily, in an area with good air circulation, and where it can detect an average room temperature.

⃠ Do not install the wired controller near or in:

- Drafts or dead spots behind doors and in corners
- Hot or cold air from ducts
- Radiant heat from the sun or appliances
- Concealed pipes and chimneys
- An area where temperatures are uncontrolled, such as an outside wall

Figure 234: Proper Location for the Wired Controller.



Hanging the Wired Controller

1. The controller wiring / cable can be installed in one of three directions: top, back, or on the right side. If top or right side installation is desired, remove cable guide grooves on the controller, and then position wiring / cable on applicable side.
2. Choose and mark the area of installation, and then screw the wall plate into place (using the provided parts). Install the controller wall plate to fit the electrical box if one is present. Ensure that no gaps exist between the wall plate and the wall itself.
3. Arrange wiring / cables so as not to interfere with the controller circuitry. Position the wired controller on the wall plate. Snap into place by pressing the bottom part of the wired controller onto the wall plate. Make sure that no gaps exist between the wired controller and the wall plate on all sides.
4. To remove wired controller from the wall plate, insert a screwdriver into the two holes at the bottom. Twist screwdriver to release controller. ⃠ Do not damage the controller components when removing.

Figure 235: Removing the Cable Guide Grooves.

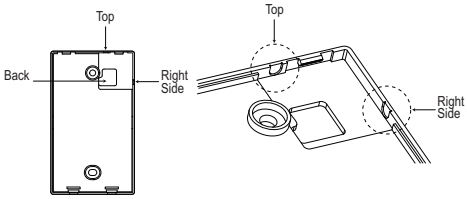


Figure 236: Attaching the Wall Plate.

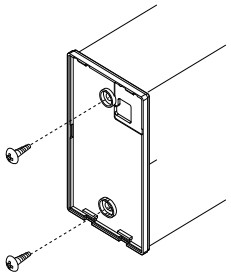
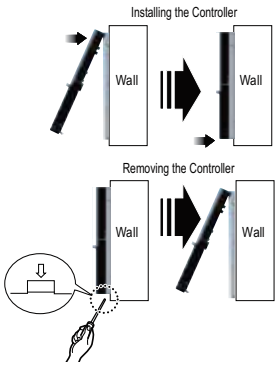


Figure 237: Installing / Removing the Controller.



Assigning the Thermistor for Temperature Detection

Each indoor unit includes a return air thermistor assigned to sense the temperature. If a wired controller is installed, there is a choice of sensing temperature with either the indoor unit return air thermistor or the thermistor in the wired controller. It is also an option to set both thermistors to sense temperature so that indoor unit bases its operation on the first thermistor to reach the designated temperature differential. For applicable indoor units, an optional Remote Temperature Sensor can be used in lieu of the return air thermistor—either alone or in conjunction with a wired controller thermistor as previously described.

APPLICATION GUIDELINES

EQUIPMENT SELECTION PROCEDURE

To choose 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 heat pump systems or a Multi F MAX 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 90 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 should be a minimum 40% and a maximum of 133% of outdoor unit nominal capacity.

3. To calculate the connected total indoor unit nominal capacity, simply sum up the nominal capacities of all indoor units.
   - For 24,000 and 36,000 Btu/h high static duct and vertical-horizontal air handling indoor units, a 1.3 multiplier must first be applied before adding to the sum of other smaller indoor units.
   - When two 24,000 Btu/h or one 24,000 Btu/h and one 36,000 Btu/h high static duct and / or vertical-horizontal air handling indoor units are the only connected indoor units, the multiplier is 1.2.

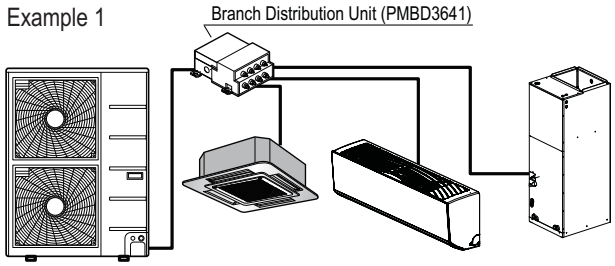
Note:

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

EQUIPMENT SELECTION PROCEDURE

Multiplier Examples

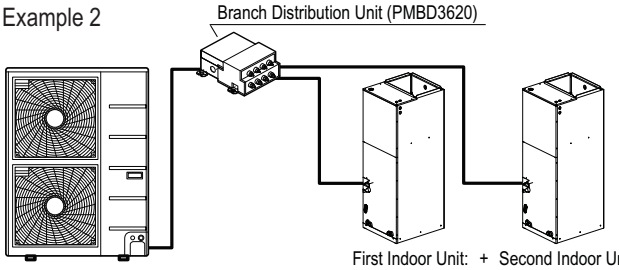
Example 1



Outdoor Unit: LMU540HV | First Indoor Unit: LMCN125HV | + | Second Indoor Unit: LSN090HSV4 | + | Third Indoor Unit: LMVN360HV

Total Capacity Index = 12 + 9 + 36 x 1.3 = 67.8 < 73 Acceptable Combination

Example 2



Outdoor Unit: LMU540HV | First Indoor Unit: LMVN240HV | + | Second Indoor Unit: LMVN240HV

Total Capacity Index = 24 x 1.2 + 24 x 1.2 = 57.6 < 73 Acceptable Combination

Table 90: Allowable Indoor Unit to Outdoor Unit Connections.

Indoor units		Outdoor units						
Model Type	Indoor Unit Nominal Capacity (Btu/h)	LMU18CHV	LMU24CHV	LMU30CHV	LMU36CHV	LMU480HV	LMU540HV	LMU600HV
		Maximum No. of Connectable Indoor Units						
		2	3	4	4	8	8	8
ART COOL Mirror	9,000	O	O	O	O	O	O	O
	12,000	O	O	O	O	O	O	O
	18,000	-	O	O	O	O	O	O
ART COOL Gallery	9,000	O	O	O	O	O	O	O
	12,000	O	O	O	O	O	O	O
Standard Wall Mounted	7,000	O	O	O	O	O	O	O
	9,000	O	O	O	O	O	O	O
	12,000	O	O	O	O	O	O	O
	15,000	O	O	O	O	O	O	O
	18,000	-	O	O	O	O	O	O
	24,000	-	O	O	O	O	O	O
Ceiling Concealed Duct-Low Static	9,000	O	O	O	O	O	O	O
	12,000	O	O	O	O	O	O	O
	18,000	-	O	O	O	O	O	O
Ceiling Concealed Duct-High Static	24,000	-	-	O	O	O	O	O
	36,000	-	-	-	-	O	O	O
Four-Way Ceiling Cassette	7,000	O	O	O	O	O	O	O
	9,000	O	O	O	O	O	O	O
	12,000	O	O	O	O	O	O	O
	18,000	-	O	O	O	O	O	O
Vertical-Horizontal Air Handler	24,000	-	-	O	O	O	O	O
	36,000	-	-	-	-	O	O	O

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 91: Rated Outdoor Unit Capacity.

		Outdoor Units						
		LMU18CHV	LMU24CHV	LMU30CHV	LMU36CHV	LMU480HV	LMU540HV	LMU600HV
Rated Capacity (Btu/h)*	Cooling	17,000	20,000	30,000	32,000	48,000	52,500	60,000
	Heating	22,000	24,000	32,000	36,000	54,000	58,000	64,000
Connectable Indoor Units	Minimum No. of Connectable IDUs	2	2	2	2	2	2	2
	Maximum No. of Connectable IDUs	2	3	4	4	8	8	8
	Maximum Capacity Index	24,000	33,000	40,000	48,000	65,000	73,000	81,000

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 perform a selection using LATS Multi F software (preferred method) or reference the Performance Data Capacity Tables found in the Multi F outdoor unit section in this manual. 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.

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.
Qodu(rated) = Outdoor Unit Rated Capacity.
Qidu(rated) = Individual Indoor Unit Rated Capacity.
ΣQidu(rated) = Total Connected Indoor Unit Rated Capacity.

Note:

- The formula can be used to find individual indoor unit capacity for Multi F MAX 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 system combination tables only show the total connected indoor unit capacity, but individual indoor unit capacity can be calculated using the formula:

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

Note:

A more accurate method to determine expected capacity would be to apply the outdoor unit's corrected capacity instead of rated capacity.

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 Table 92, Table 93, and Table 94.

Table 92: Multi F Outdoor Unit (Multiple Piping) to Indoor Unit Refrigerant Line Length Derates.

Piping Length (feet)	Cooling Capacity (%)	Heating Capacity (%)
7,000 Btu/h Indoor Unit Models		
25.0	100.0	100.0
32.8	98.4	99.2
49.2	95.8	97.8
65.6	93.2	96.4
82.0	90.6	95.0
9,000 Btu/h Indoor Unit Models		
25.0	100.0	100.0
32.8	98.0	99.0
49.2	94.8	97.4
65.6	91.6	95.8
82.0	88.4	94.2
12,000 Btu/h Indoor Unit Models		
25.0	100.0	100.0
32.8	97.6	98.6
49.2	93.8	96.4
65.6	89.9	94.1
82.0	86.1	91.9
15,000 Btu/h Indoor Unit Models		
25.0	100.0	100.0
32.8	97.2	98.2
49.2	93.0	95.4
65.6	88.8	92.6
82.0	84.6	89.8
18,000 Btu/h Indoor Unit Models		
25.0	100.0	100.0
32.8	98.6	99.6
49.2	96.4	99.0
65.6	94.1	98.3
82.0	91.9	97.7
24,000 Btu/h Indoor Unit Models		
25.0	100.0	100.0
32.8	98.2	99.2
49.2	95.4	98.0
65.6	92.4	96.6
82.0	89.6	95.4

Table 93: Multi F MAX 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

Figure 238: Multi F MAX Outdoor Unit to Branch Distribution Unit Refrigerant Line Length Derate Chart.

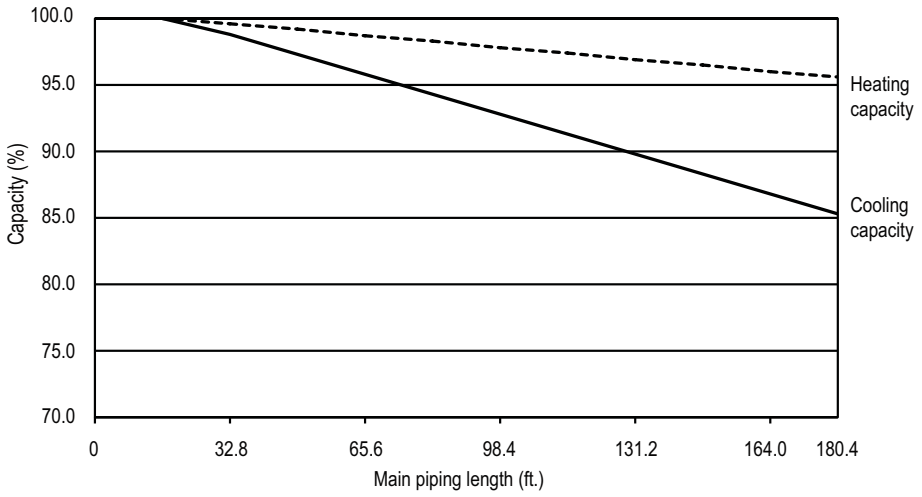


Table 94: Multi F MAX Branch Distribution Unit to Indoor Unit Refrigerant Line Length Derates.

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
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

EQUIPMENT SELECTION PROCEDURE

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.

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:

$A = B \times C$

Where:

A = Integrated Heating Capacity.
B = Value found in the Capacity Table.
C = Correction Factor for Frost Accumulation Factor (from Table 101).

Table 95: Outdoor Unit Frost Accumulation Factor (Heating)[1].

Entering DB (ºF)	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.

Note:

There will be 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 should 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 should 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.

ASHRAE Standards 62.1 and 62.2 (depending on if the building is residential or commercial), and local codes specify the minimum volume of airflow that must be provided to an occupied space. Outdoor air is required to minimize adverse health effects, and it provides acceptable indoor air quality for building occupants. Indoor units located within the zone typically require less airflow to condition the space. During the design phase, refer to the airflow capabilities listed in the specification tables for each product. Choose the best method for the application out of the five (5) ventilation options available.

Note:

Although we believe that these building ventilation methods have been portrayed accurately, none of the methods have been tested, verified, or evaluated by LG Electronics, U.S.A., Inc., In all cases, the designer, installer, and contractor should understand if the suggested method is used, it is used at their own risk. LG Electronics U.S.A., Inc., takes no responsibility and offers no warranty express, implied, or statutory and the implied warranties of merchantability and fitness for a particular purpose are excluded should the building ventilation methods fail to perform as stated or intended.

- *For a complete copy of Standard 62.1-2010, refer to the American Standard of Heating and Air Conditioning Engineers (ASHRAE) website at www.ashrae.org.*
- *For more information on how to properly size a ventilation air pretreatment system, refer to the article, "Selecting DOAS Equipment with Reserve Capacity" by John Murphy, published in the ASHRAE Journal, April 2010.*

Method 1: Natural Ventilation (Non-Ducted, Unconditioned Outdoor Air)

Natural ventilation devices, such as operable windows or louvers may be used to ventilate the building when local code permits.

Advantages

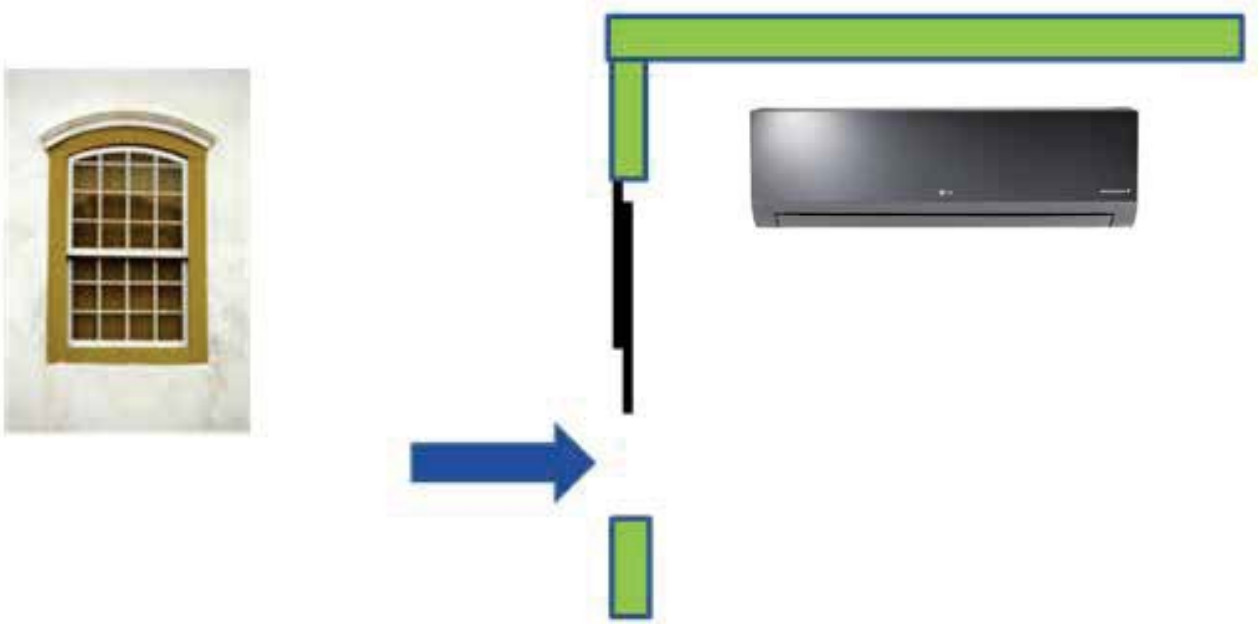
- Occupants control the volume of the ventilation air manually.
- Useful for historic buildings that have no ceiling space available for outdoor air ductwork.
- May be used with the full lineup of Multi F indoor units.

Disadvantages

- In some locations, it may be difficult to control humidity levels when windows are open.
- Thermal comfort levels may be substandard when windows are open.
- Indoor units may have to be oversized to account for the added heating and cooling loads when windows are open.
- Provides outdoor air to perimeter spaces only. Additional mechanical ventilation system may be required to satisfy requirements for interior spaces.
- Outdoor air loads may be difficult to calculate since the quantity of outdoor air is not regulated.
- May affect indoor unit proper operation when open.

Note:
Methodology illustrations are for examples only and do not depict actual indoor units for the specific outdoor unit pairing. These are generic illustrations to show ventilation design only.

Figure 239: Natural Ventilation (Non-Ducted, Unconditioned Outdoor Air).



Method 2: Unconditioned Outdoor Air (Non-Ducted, Fan Assisted Ventilation)

When approved by local codes, the fan assisted ventilation method uses exhaust fans to remove air from the building, and outdoor air is drawn into occupied spaces through a wall louver or gravity roof intake hood. Supply fans can also be used to push the outdoor air into the space and building positive pressure will vent the exhaust air through louvers or roof-mounted exhaust hoods. Outdoor air is neither cooled nor heated before entering the building.

Note:

This may result in loss of building pressurization control, increasing infiltration loads and resulting in the disadvantages described below.

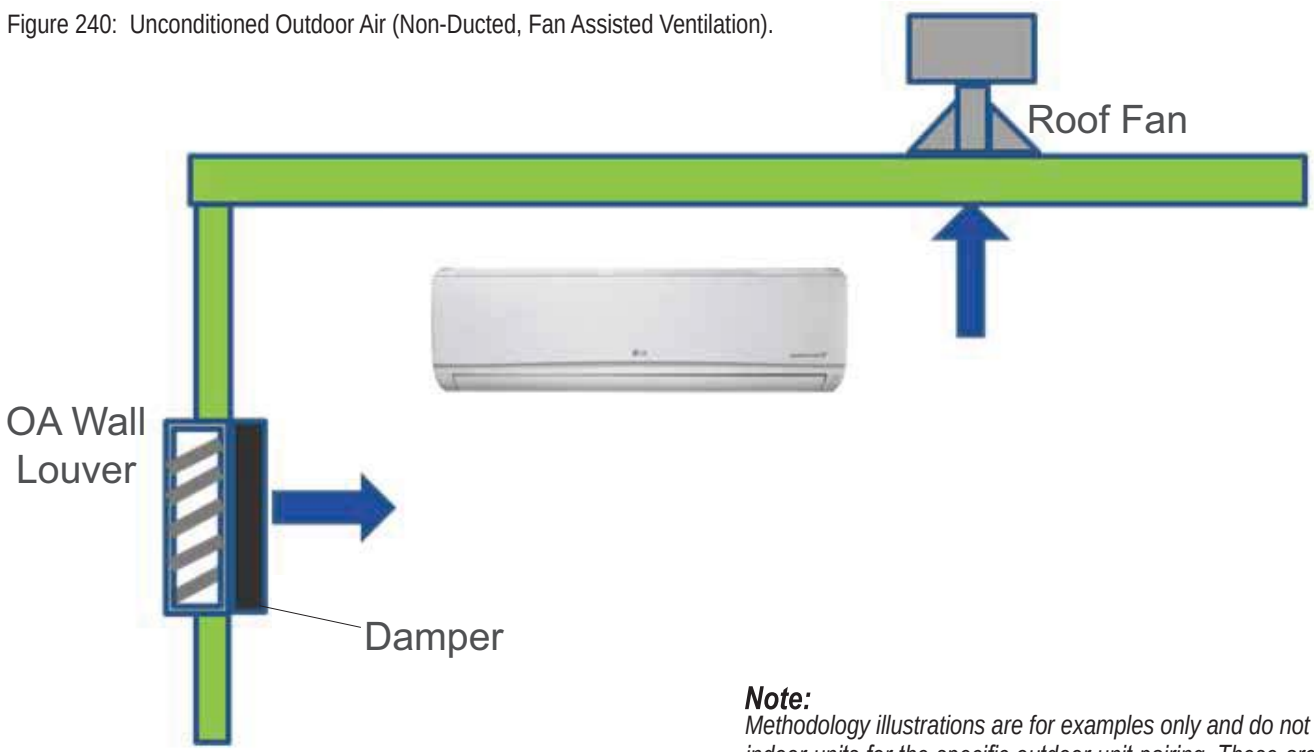
Advantages

- Outdoor air may be manually controlled by the occupant or automatic controls may be installed to open/close outdoor air dampers or to turn on/off ventilation fans.
- Useful for large open spaces like warehouses, garages, and workshops.
- Outdoor air volume is a known quantity. Air loads may be easier to calculate since fans will regulate the amount of outdoor air.
- May be used with the full lineup of Multi F indoor units.

Disadvantages

- In some locations of the country, it may be difficult to control humidity levels.
- Thermal comfort levels may be substandard when louvers/hoods are opened.
- Indoor units may have to be oversized to account for the added heating/cooling loads when louvers/hoods are open.
- Hot, cold, and/or humid areas may be present if the outdoor air is not evenly distributed to the different spaces.

Figure 240: Unconditioned Outdoor Air (Non-Ducted, Fan Assisted Ventilation).



Note:

Methodology illustrations are for examples only and do not depict actual indoor units for the specific outdoor unit pairing. These are generic illustrations to show ventilation design only.

Method 3: Unconditioned Outdoor Air Ducted to Indoor Units

Untreated outdoor air is channeled through a duct system that is piped to the return air duct on Multi F ducted indoor units or to the frame of Multi F four-way cassettes.

Note:

Outside air may flow backward through the return air-filter grille when the indoor unit fan speed slows or stops in response to changes in the space load. This may result in captured particulate on the filter media being blown back into the conditioned space.

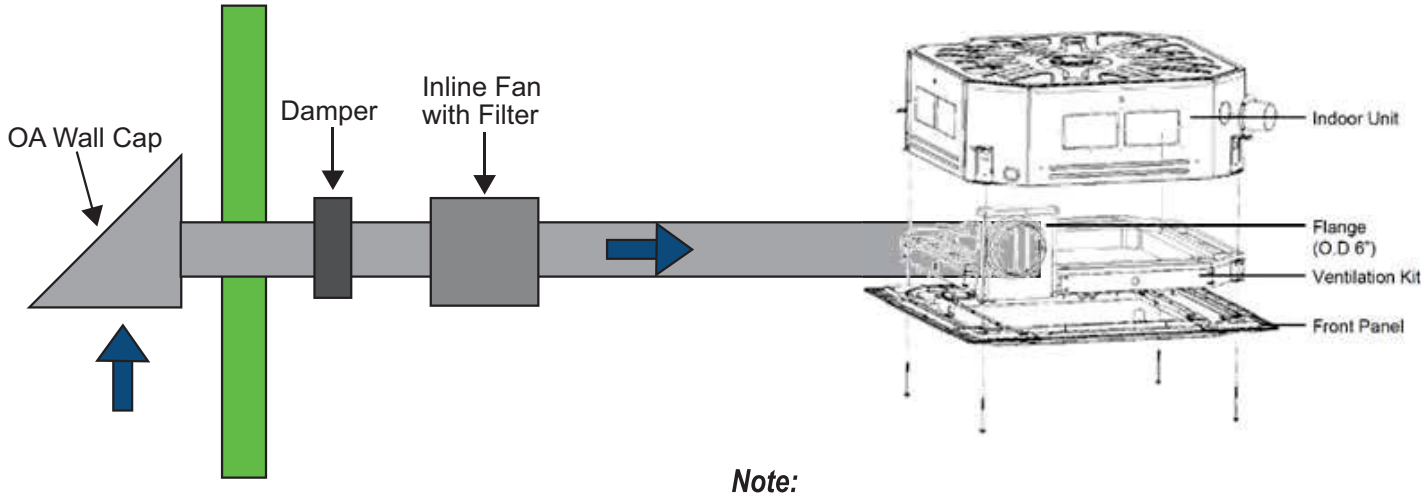
Advantages

- May require less ductwork if indoor units are placed near outdoor walls or a roof deck.
- Controls must be interlocked to shut off the outdoor air supply fan when the space is unoccupied.
- Third-party demand-control ventilation controls may be installed to regulate outdoor intake based on the CO_2 levels of the occupied space.

Disadvantages

- Fan(s) will be required to push outdoor air to the indoor unit to overcome the additional static pressure.
- Filter required to be added to the outdoor air duct.
- Ducted and four-way cassette models are the only indoor units that accept the connection of an outdoor air duct to the unit case.
- In most cases, in lieu of using the factory mounted return-air thermistor on indoor units, a remote wall temperature sensor or zone controller will be needed to provide an accurate reading of the conditioned area temperature.
- Unconditioned outdoor air may affect indoor unit performance, which may necessitate oversizing the indoor unit.

Figure 241: Unconditioned Outdoor Air Ducted to Indoor Units.



Note:

Methodology illustrations are for examples only and do not depict actual indoor units for the specific outdoor unit pairing. These are generic illustrations to show ventilation design only.

Method 4: Coupled Dedicated Outdoor Air (CDOA)

A separate, dedicated outdoor air system delivers air directly to a Multi F indoor unit or to the return air duct system. After mixing with the return air stream, ventilation air passes through the indoor unit and into the conditioned space. The pretreatment system is capable of filtering, conditioning, and dehumidifying outdoor air to room neutral conditions.

Note:

Outside air may flow backward through the return air-filter grille when the indoor unit fan speed is reduced or stops when the space load is satisfied. This may result in captured particulate on the filter media being blown back into the conditioned space.

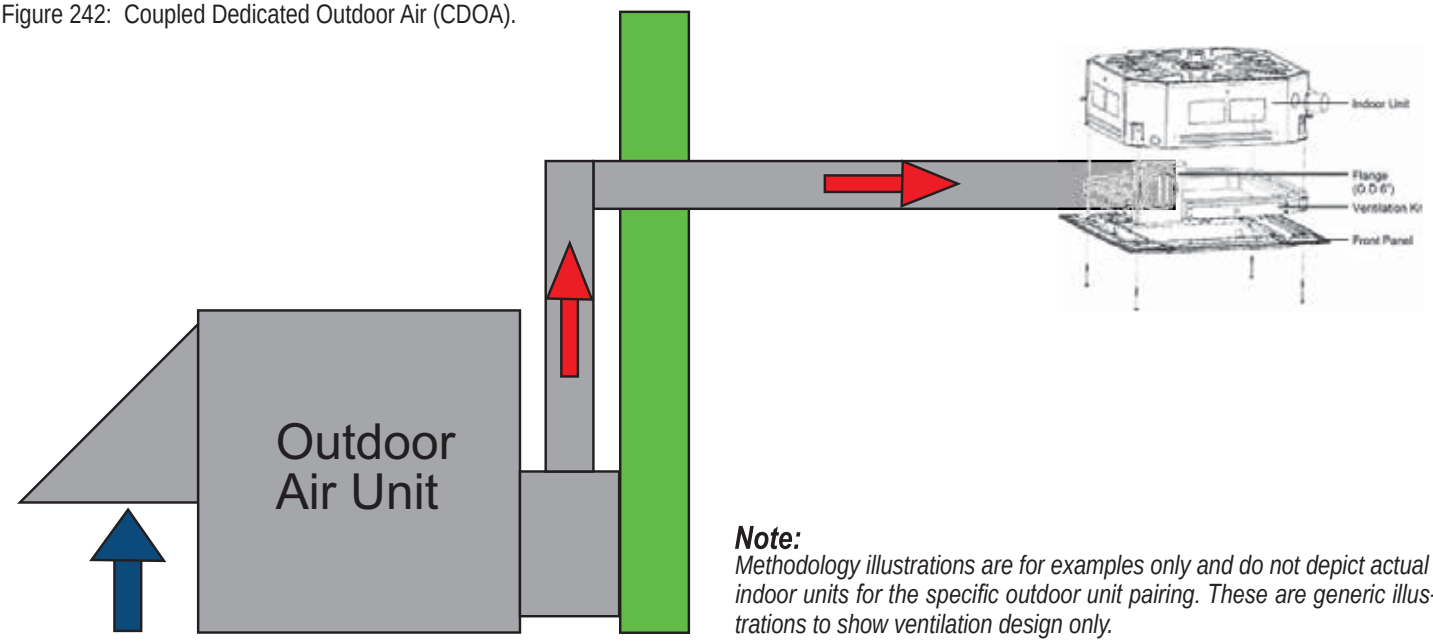
Advantages

- Indoor unit capacity may not need to be increased because of outdoor air.
- Fan and filter system is centralized to the main outdoor air unit.

Disadvantages

- Ducted and four-way cassette indoor units are the only models designed for direct connection of an outside air duct.
- Ceiling space is required for ductwork.
- Failure of outdoor air may impact indoor unit operation.
- In lieu of using the factory mounted return-air thermistor, a remote wall temperature sensor or zone controller may be required to provide an accurate conditioned space temperature reading.

Figure 242: Coupled Dedicated Outdoor Air (CDOA).



Note:

Methodology illustrations are for examples only and do not depict actual indoor units for the specific outdoor unit pairing. These are generic illustrations to show ventilation design only.

Method 5: Decoupled Dedicated Outdoor Air System (DDOAS)

Provide a separate, dedicated outdoor-air system designed to filter, condition, and dehumidify ventilation air and deliver it directly to the conditioned space through a separate register or grille. This approach requires a separate independent ventilation duct system not associated with the Multi F system.

Note:

LG recommends using the DDOAS method in all installations.

Advantages

- May be used with the full lineup of Multi F indoor units.
- The outdoor air unit may supply "neutral" air to the occupant space even when the Multi F indoor unit fan changes speed or cycles on and off. DDOAS controls do not have to be interlocked with the Multi V F system.
- In lieu of installing localized smaller outside air treatment equipment throughout the building, this method centralizes the ventilation air source making service and filter changes easier and less disruptive for the building occupants.
- Third-party demand control ventilation controls are more readily accommodated.

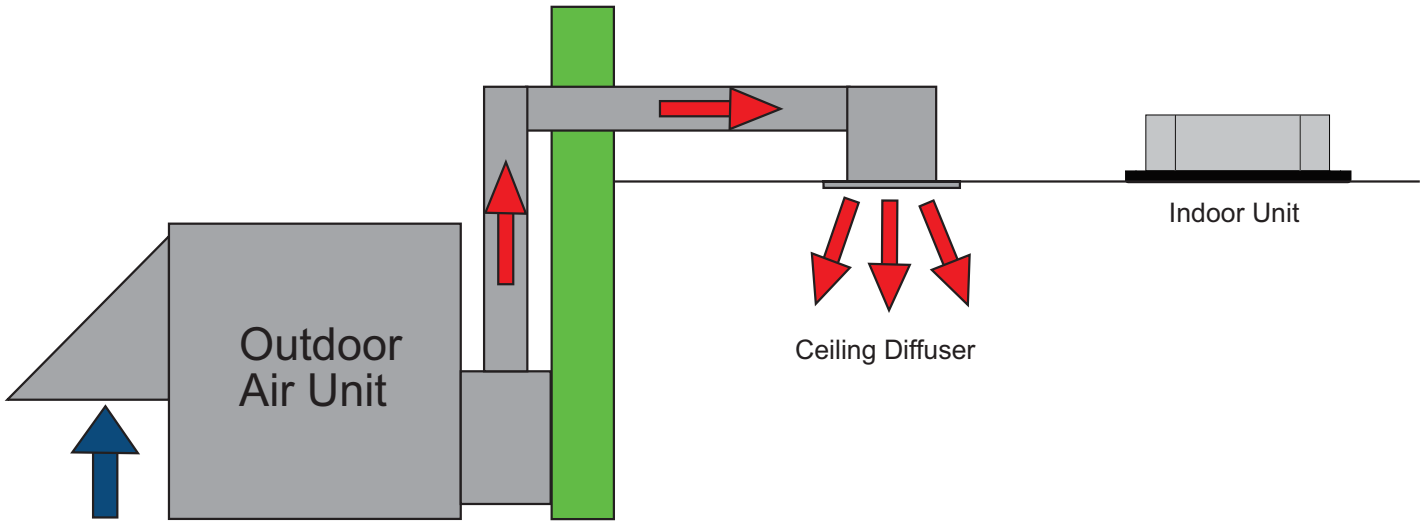
Disadvantages

- Ceiling space is required to accommodate ductwork between the outdoor air unit and ceiling diffusers.

Note:

Methodology illustrations are for examples only and do not depict actual indoor units for the specific outdoor unit pairing. These are generic illustrations to show ventilation design only.

Figure 243: Decoupled Dedicated Outdoor Air System (DDOAS).



PLACEMENT CONSIDERATIONS

Selecting the Best Location for the Indoor Units

Note:

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).

- 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.

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

Note:

Branch Distribution (BD) units are used only with Multi F MAX systems to distribute the refrigerant from the outdoor unit to up to eight 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; 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 BD unit.

- Do not install the BD unit in a location where it would be subjected to strong radiation heat from heat sources.
- Avoid an installation environment where the BD unit would be exposed to heat, water, steam, oil splattering or spray.
- Install the unit in a location where any sound it generates will not disturb occupants in the surrounding rooms.
- No obstacles to air circulation around the unit; keep proper distances from ceilings, doorways, floor, walls, etc.
- Where high-frequency electrical noise / electromagnetic waves will not affect operation. Maintain proper distances between the BD unit(s) and electric wires, audio and visual appliances, breaker / circuit panels, etc.

Selecting the Best Location for the Outdoor Unit

⚠DANGER

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

⚠WARNING

Do not install the unit in a location where acidic solution and spray (sulfur) are often used as this may cause serious bodily injury or death.
Do not use the unit in environments where oil, steam, or sulfuric gas are present as this may cause serious bodily injury or death.

⚠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 may create unsafe conditions.

Note:

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

- A location strong enough 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, indoor unit(s), and BD units (Multi F MAX systems only) are 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.

Selecting the Best Location for the Outdoor Unit, continued.

- Where it will not be subjected to direct thermal radiation from other heat sources, nor an area that would not 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 not disturb inhabitants of surrounding buildings.
- Where the unit will not be exposed to direct, strong winds.

Rooftop Installations

If the outdoor unit is installed on a roof structure, be sure to level the unit. Ensure the roof structure and anchoring method are adequate for the unit location. Consult local codes regarding rooftop mounting.

Oceanside Installation Precautions

- 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.

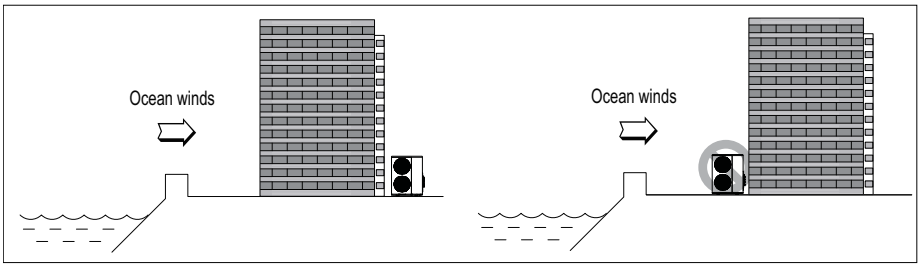
- Avoid installing the outdoor unit where it would be directly exposed to ocean winds.

Note:

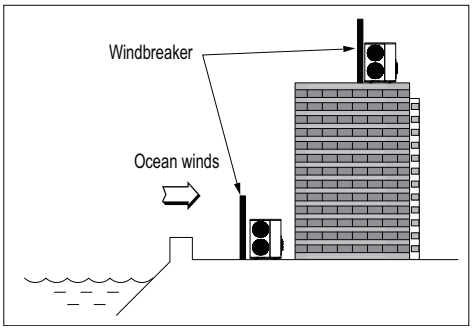
Additional anti-corrosion treatment may need to be applied to the outdoor unit at oceanside locations.

Note:

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



If the outdoor unit must be placed in a location where it would be subjected to direct ocean winds, install a concrete windbreaker strong enough to block any winds. Windbreaker height and width should be more than 150% of the outdoor unit, and be installed at least 27-1/2 inches away from the outdoor unit to allow for airflow.



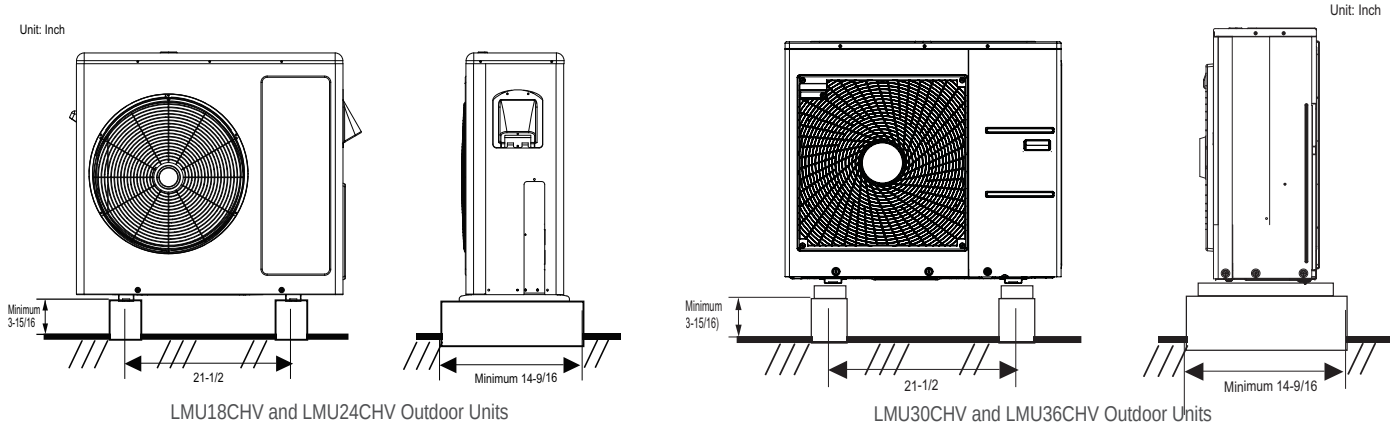
Planning for Snow and Ice

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

PLACEMENT CONSIDERATIONS

Outdoor Unit Platform Requirements

Figure 244: Outdoor Unit Foundation Requirements.

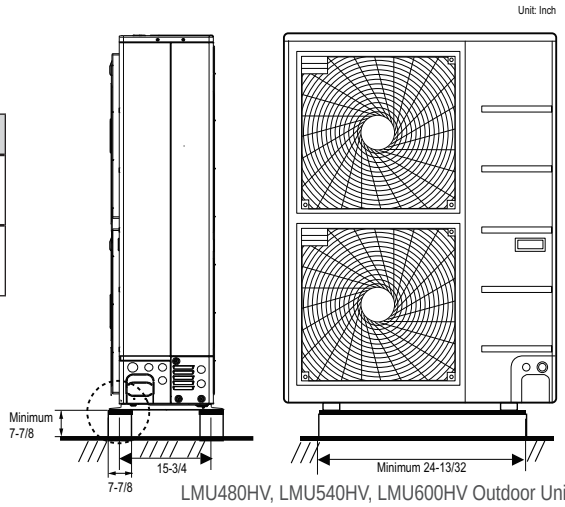


LMU18CHV and LMU24CHV Outdoor Units

LMU30CHV and LMU36CHV Outdoor Units

Table 96: Outdoor Unit Foundation Specifications.

Outdoor Unit Type	Bolt Type	Concrete Height	Bolt Depth
LMU18CHV, LMU24CHV, LMU30CHV, LMU36CHV	M10-J	Minimum 3-15/16 inches	Minimum 2-3/4 inches
LMU480HV, LMU540HV, LMU600HV	M10-J	Minimum 7-7/8 inches	Minimum 2-3/4 inches

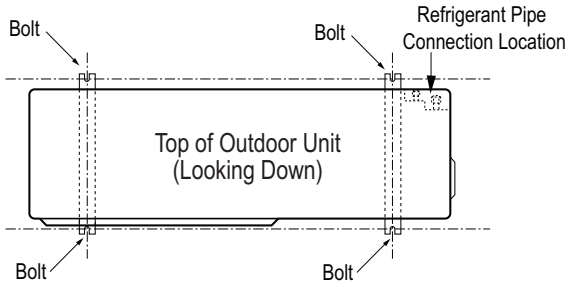


LMU480HV, LMU540HV, LMU600HV Outdoor Units

Bolting the Outdoor Unit to the Platform

1. Ensure that the concrete platform will not degrade easily, and has enough strength to bear the weight of the unit.
2. Include an H-beam support. Firmly attach the corners, otherwise the support will bend.
3. Use a hexagon nut.
4. Use anti-vibration material.
5. Include enough space around the concrete foundation for condensate drainage.
6. Seal all wiring and piping access holes to prevent bugs from entering the unit.

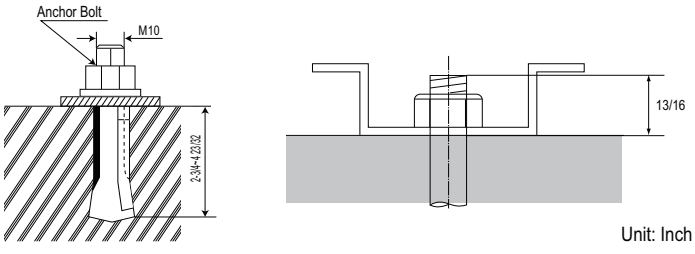
Figure 245: Bolting the Outdoor Unit to the Platform.



Concrete Platform Specifications

- Concrete foundations should be made of one part cement, two parts sand, and four parts gravel.
- The surface of the foundation should be finished with mortar with rounded edges, and weatherproofed.

Figure 246: Close up of Bolt Attachment.



Tie-Downs and Lightening Protection

Tie-Downs

- The strength of the roof must be checked before installing the outdoor units.
- 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. Always refer to local code when using a wind restraint system.

Lightening Protection

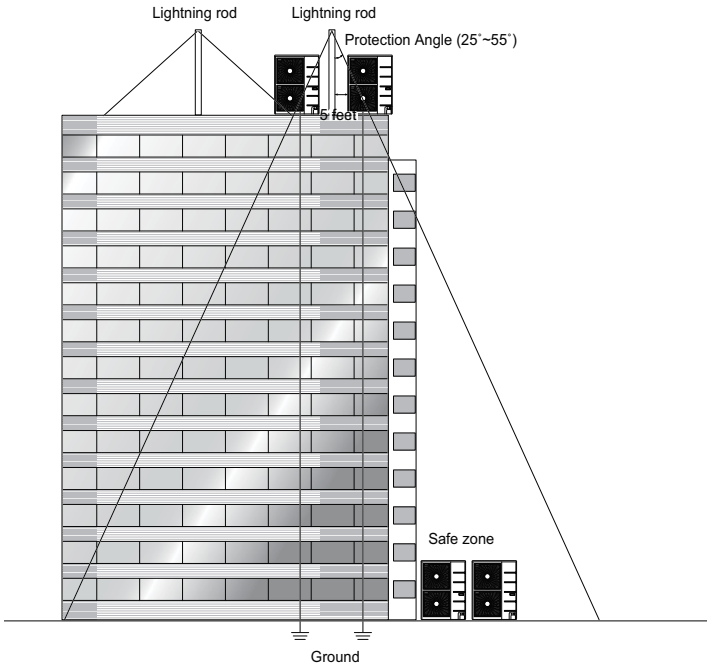
- To protect the outdoor unit from lightning, it should be placed within the specified lightning safety zone.

Table 97: Safety Zone Specifications.

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

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

Figure 247: Lightening Protection Diagram.



Note:

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

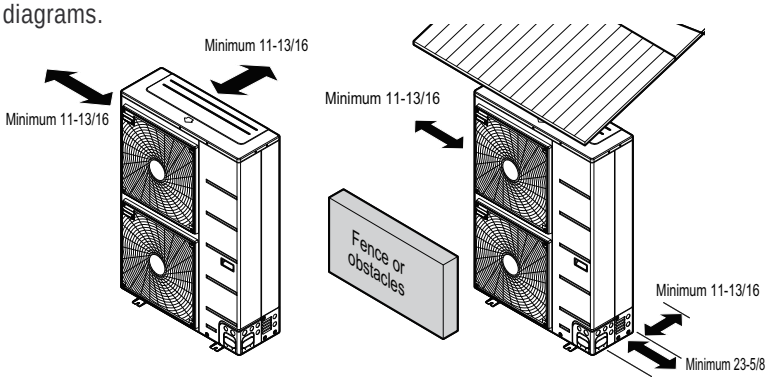
Outdoor Unit Service Access and Allowable Clearances

Appropriate airflow through the outdoor unit coil is critical for proper unit operation.

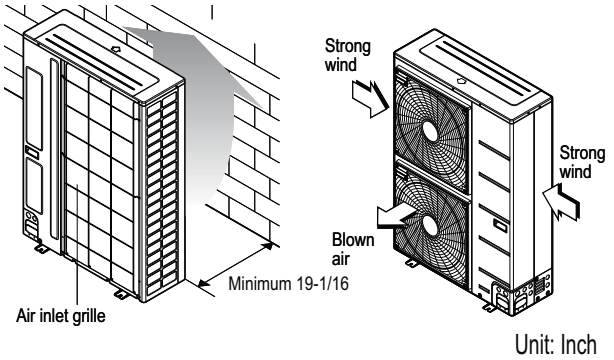
- Include enough space for airflow and for service access. If installing multiple outdoor units, avoid placing the units where the discharge of one unit will blow into the inlet side of an adjacent unit.
- If an awning is built over the unit to prevent direct sunlight or rain exposure, make sure that 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.)

When installing the outdoor unit, consider service, inlet, and outlet, and minimum allowable space requirements as illustrated in the following diagrams.



Ensure that the space at the back of the outdoor unit is a minimum of 11-13/16 inches, and include a minimum of 23-5/8 inches at the right side of the unit for service.



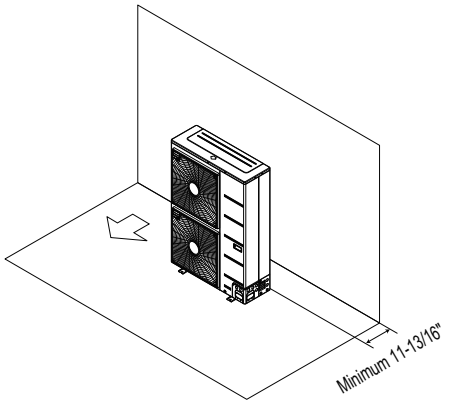
If the outdoor unit discharge side faces a wall, include a minimum of 19-11/16 inches between the outdoor unit and the wall. Install the outdoor unit so that the discharge port is set at a right angle to the wind direction.

Unit: Inch

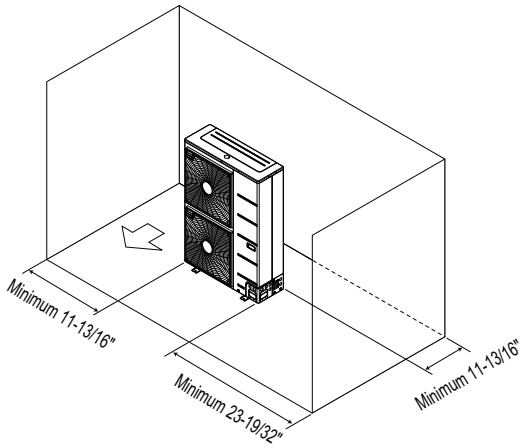
PLACEMENT CONSIDERATIONS

Clearance Requirements when Different Obstacles are Present (Unit: Inch).

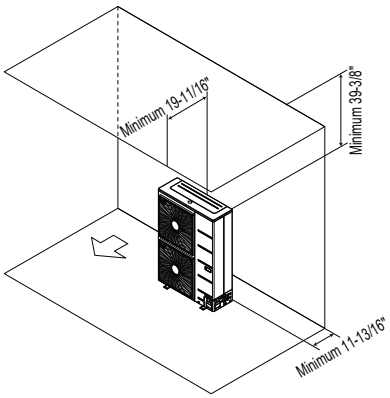
Obstacle on the suction side only.



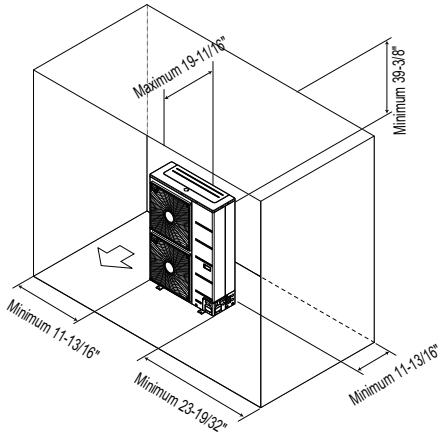
Obstacles on the suction side and on both left and right sides.



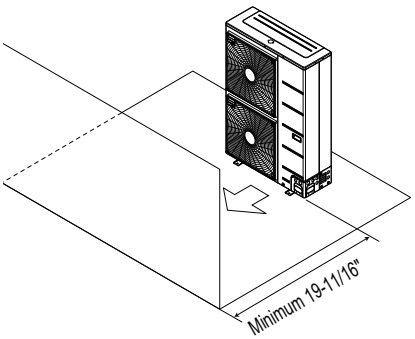
Obstacles above and on the air intake side.



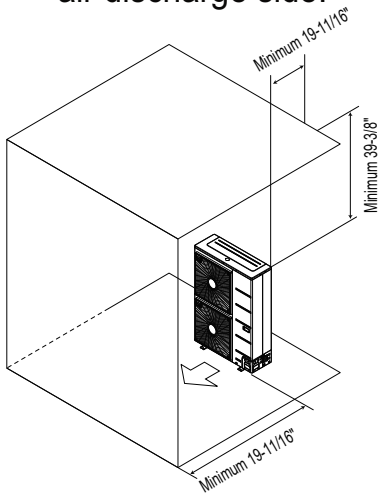
Obstacles above, on the air intake side, and on both left and right sides



Obstacle just on the air discharge side.

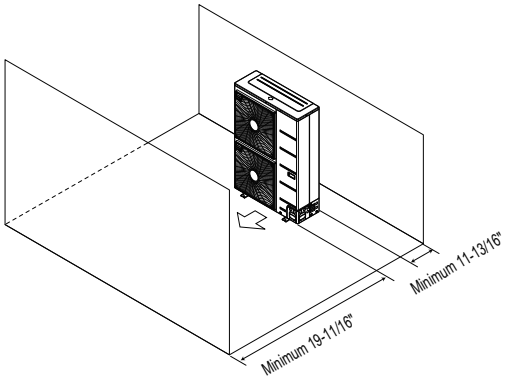


Obstacles above and on the air discharge side.



Clearance Requirements when Different Obstacles are Present, continued. (Unit: Inch)

Where there are obstacles on both suction and discharge sides (discharge side obstacle is higher than the outdoor unit).



Where there are obstacles above, and on both suction and discharge sides (discharge side obstacle is higher than the outdoor unit).

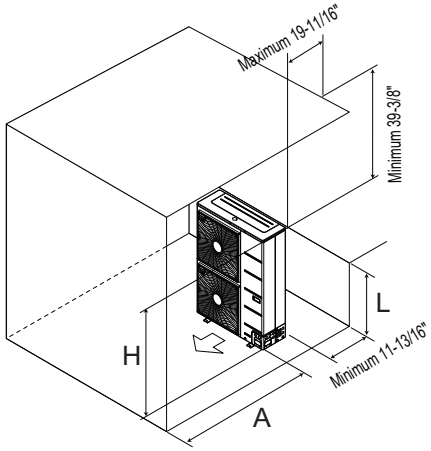
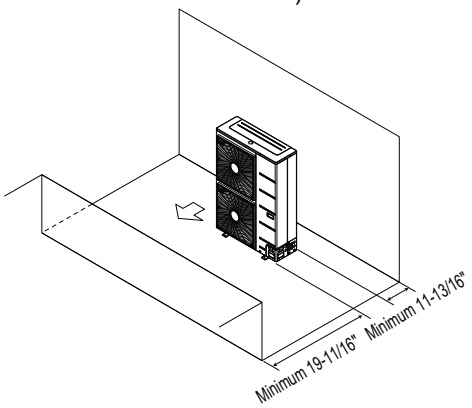


Table 98: Ratio among H, A, and L.

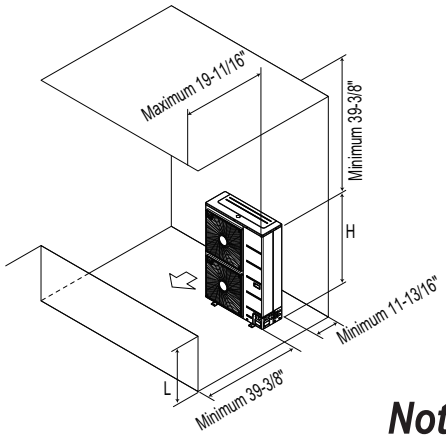
	L	A
L ≤ H	0 < L ≤ 1/2 H	29-1/32 inches
	1/2 H < L	39-3/8 inches
H < L	Set Stand as: L ≤ H	

If a stand is necessary, it should be contained (not open frame) to prevent the discharge air from short cycling.

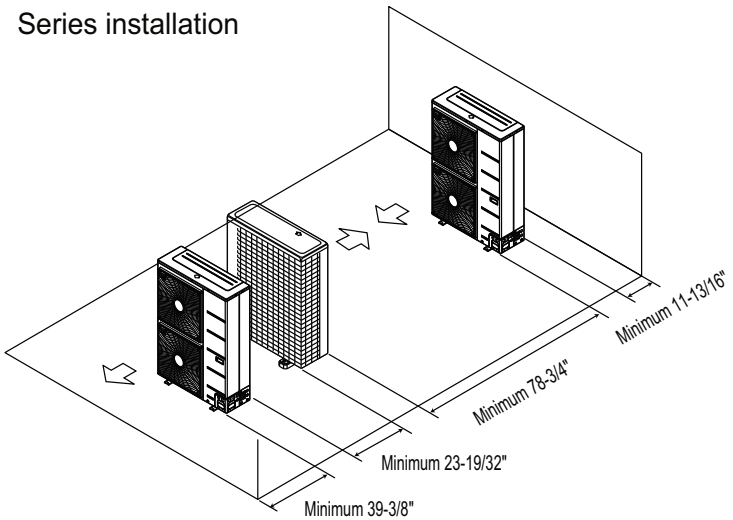
Where there are obstacles on both suction and discharge sides (discharge side obstacle is lower than the outdoor unit).



Where there are obstacles above, and on both suction and discharge sides (discharge side obstacle is lower than the outdoor unit).



Series installation



Note:

"L" should be lower than "H". If a stand is necessary, it should be contained (not open frame) to prevent the discharge air from short cycling.

PLACEMENT CONSIDERATIONS

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 may 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.
- May 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 (see next page), 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 may be all that is necessary.
- Consider the potential for snow accumulation near louvers / roof openings. Outside air intakes and discharge ducts/louvers should be engineered to clear anticipated snow accumulation levels by at least one (1) foot.
- In situations where operation is anticipated at temperatures of -4°F and lower, ancillary heat should be provided to heat the outdoor unit coils to assure continuous compressor operation and heating.

- It may be necessary to use a field-fabricated air guide 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 should 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 should be designed to avoid weather related long periods of water entrainment and the potential for microbial growth.

PLACEMENT CONSIDERATIONS

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 sidewalks or driveways which may 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 should 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 should be equipped with screens to prevent bird and insect infiltration.

Note:

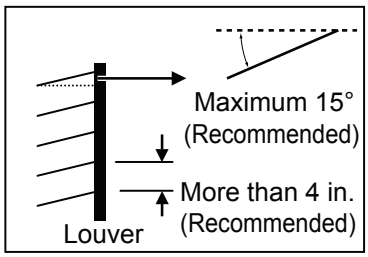
For louver recommendations, see below and on the next page.

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.

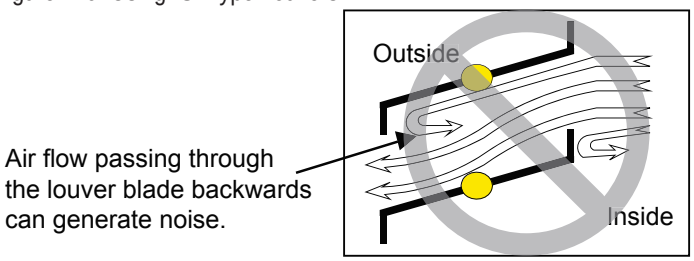
Figure 248: Louver Recommendations.



Note:

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

Figure 249: Using "S" Type Louvers.



Note:

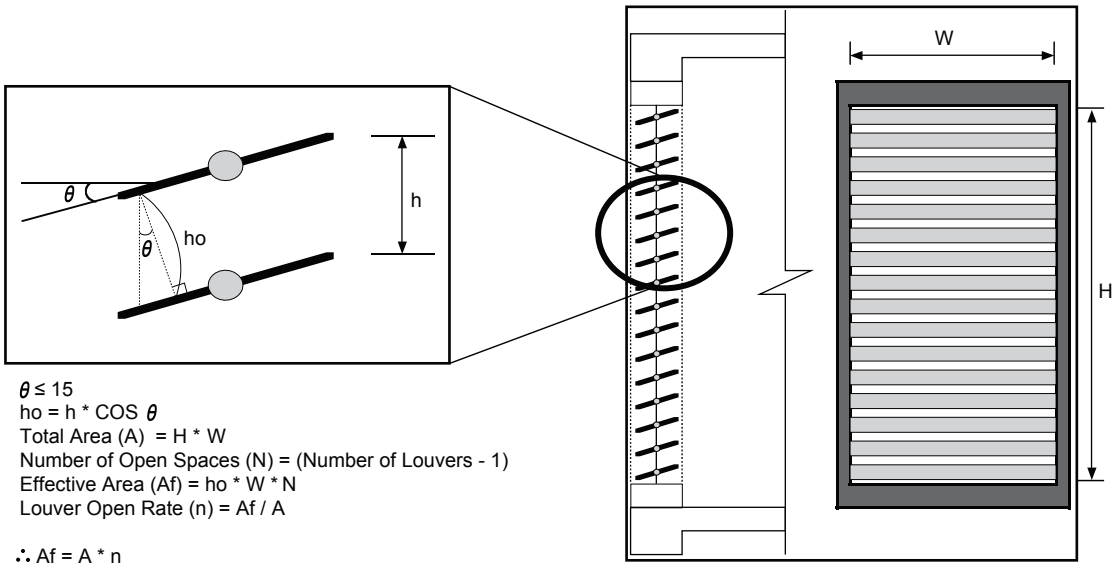
If the Louver Open Rate is Too Small

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

Open Rate by Louver Radian

Figure 250: Open Rate by Louver Radian Formula.



$\theta \leq 15$
ho = h * COS θ
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

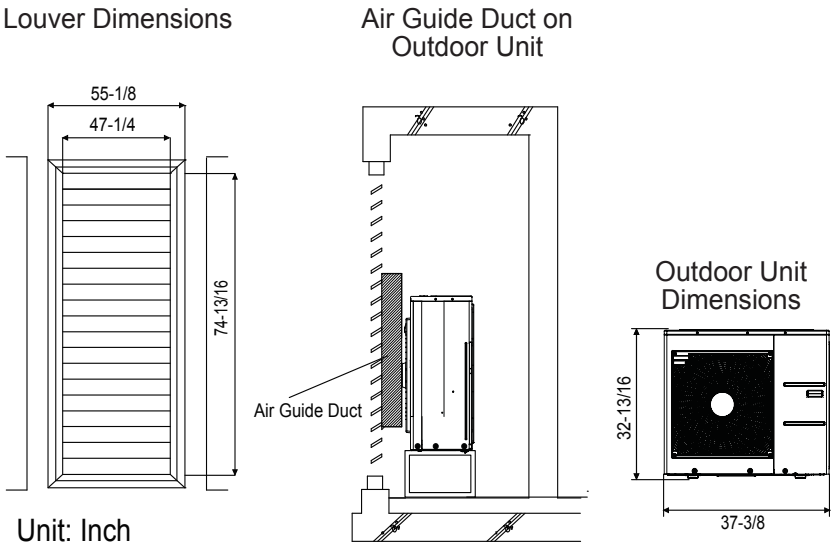
Confirming Air Flow Rate / Total Opening Rate

Figure 251: Example of Installing Outdoor Unit Indoors.

- Example: LMU36CHV
- Airflow Rate: 2,119 ft.^{3}/min.
- Velocity of Outlet Air: 16.4 ft./s
- Velocity of Inlet Air: 8.2 ft./s
- Open Rate = 80% or More

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

- Discharge Air Guide should be installed.



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 8.2 ft./s x 60 sec./min. = 6,179.5 ft.^{3}/min.
- Required Air Volume / Equivalent Volume = 6,179.5 ft.^{3}/min. / 2,119 ft.^{3}/min. = 291% (Within Allowable Limits)

REFRIGERANT PIPING DESIGN & LAYOUT BEST PRACTICES

REFRIGERANT PIPING DESIGN

MULTI F
MULTI F MAX

Design Guideline Summary

The following are examples of manual pipe size calculations. Designers are highly encouraged to use LATS for Multi F systems.

Device Connection Limitations

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

LMU18CHV = 2 LMU24CHV = 3 LMU30CHV = 4 LMU36CHV = 4 LMU480HV = 8 LMU540HV = 8 LMU600HV = 8

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 refrigerant pipe systems:

Using Refrigerant Components

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

Table 99: 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 systems only)[1]	1.6				
Branch Distribution Unit (ft., Multi F MAX systems only)	8.2				

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

Multi F System

Example: LMU36CHV 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.

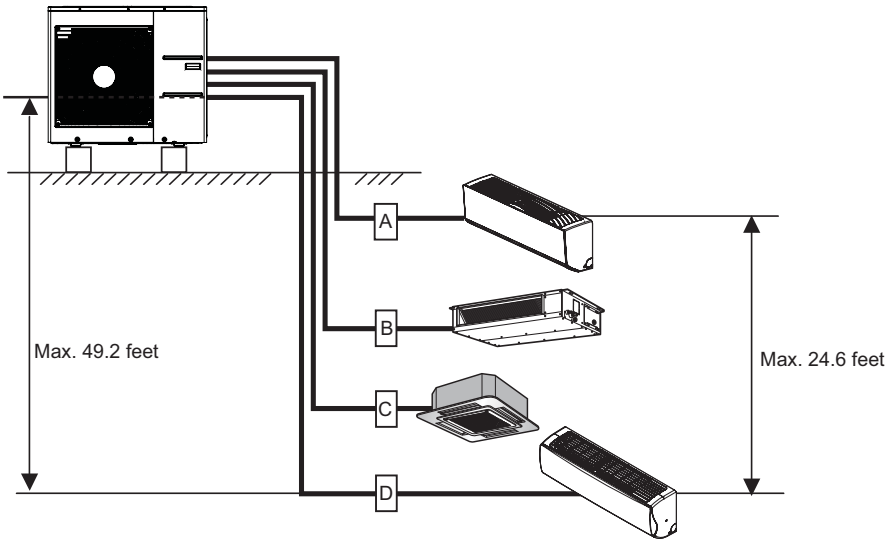


Table 100: Multi F Outdoor Unit Refrigerant Piping System Limitations.

Outdoor Unit	Minimum Length for Each Pipe (ft.)	Maximum Piping Length to Each Indoor Unit (ft.)				Maximum Total Piping Length for Each System (ft.)
		A	B	C	D	
LMU18CHV	10	82	82	-	-	164
LMU24CHV	10	82	82	82	-	246.1
LMU30CHV	10	82	82	82	82	246.1
LMU36CHV	10	82	82	82	82	246.1

REFRIGERANT PIPING DESIGN

Design Guideline Summary

The following are examples of manual pipe size calculations. Designers are highly encouraged to use LATS for Multi F systems.

Multi F MAX System with One Branch Distribution Unit

Example: LMU540HV outdoor unit with four (4) indoor units, and one (1) branch distribution unit connected.

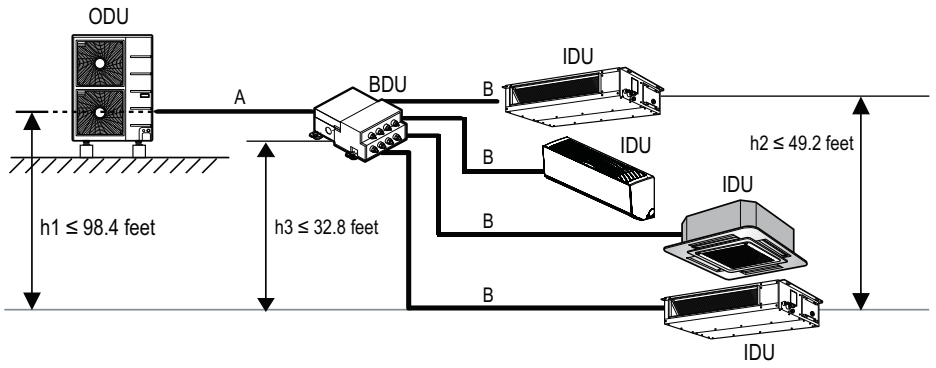
ODU: Outdoor Unit.

IDU: Indoor Unit.

BDU: Branch Distribution Unit.

A: Main Pipe.

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



Multi F MAX System with Two Branch Distribution Units

Example: LMU540HV outdoor unit with seven (7) indoor units, and two (2) branch distribution units connected.

ODU: Outdoor Unit.

IDU: Indoor Unit.

BD: Branch Distribution Unit(s).

ΣA: Main Pipe.

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

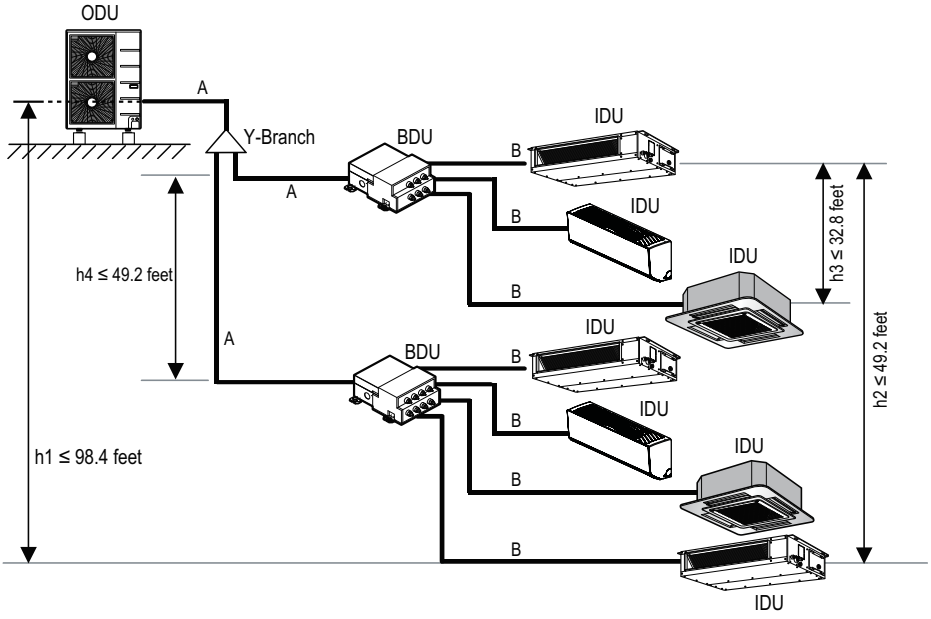


Table 101: Multi F MAX Outdoor Unit Refrigerant Piping System Limitations.

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: ΣA)	Minimum	10 feet
		Maximum	≤180.4 feet
	Total branch piping length (ΣB)		≤295.3 feet
	Branch pipe (Branch Distribution Units to Indoor Units: B)	Minimum	10 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)		≤42.9 feet
	Between branch distribution unit and farthest connected indoor unit(s) (h3)		≤32.8 feet
	Between branch distribution units (h4)		≤42.9 feet

Table 102: Multi F MAX Piping Sizes.

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

REFRIGERANT PIPING DESIGN

Creating a Balanced System / Manual Layout Procedure

Creating a Balanced / Quality Piping System

Unlike designing duct-work or chilled and hot water pipe systems where balancing dampers, ball valves, orifices, circuit setters, or other flow control devices can be installed to modify or balance the flow of cooling medium, these cannot be used in a Multi F system. Therefore, variable refrigerant flow systems have to be designed to be "self balanced." Balanced liquid refrigerant distribution is solely dependent on the designer using the correct pipe size for each segment. Pipe sizing considerations include pipe length, pipe segment pressure drop relative to other pipe segments in the system, type and quantity of elbows, bends present, fitting installation orientation, and end use device elevation differences.

Note:

The designer should avoid creating excessive pressure drop. When liquid refrigerant is subjected to excessive pressure drop, liquid refrigerant will change state and "flash" to vapor. Vapor present in a stream of liquid refrigerant before reaching the indoor unit coil (or branch distribution unit for Multi F MAX systems) results in a loss of system control and causes damage to the components. The pipe system must be designed in a manner that avoids the creation of unwanted vapor.

Refrigerant Piping System Verification

To ensure that the refrigerant piping design is suitable for the system, a LATS refrigerant piping design software report must be provided with every Multi F order. Following the installation, if any changes or variations to the design were necessary, an "as-built" LATS piping design software report must be provided to LG prior to system commissioning. User should always check the LATS report actual pipe layout versus pipe limits.

Note:

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 should be done with caution and ALWAYS VERIFIED in LATS MULTI F SOFTWARE before supplies are purchased or installed. Doing so ensures profitable installation, eliminates rework, and ensures easier system commissioning.

Manual Layout Procedure

1. Choose the location of the indoor units on the building drawing.
2. Choose the location of all Y-branch and branch distribution units (if a Multi F MAX system) and note them on the building drawing. Verify that all fittings are positioned per the guideline limitations in "LG Engineered Multi F MAX Y-Branch Kit" on page 191.
3. Plan the route for interconnecting piping. Draw a one-line depiction of the pipe route chosen on the building drawing.
4. Calculate the actual length of each pipe segment and note it on the building drawing.
5. Using the data obtained while selecting the system components, list the corrected cooling capacity next to each indoor unit on the drawing.
6. Starting at the indoor unit located farthest from the outdoor unit, sum the corrected cooling capacity of all indoor units served by the pipe segment for each branch and runout pipe (indoor units and branch distribution units [Multi F MAX systems only]). Record these values next to each segment.
7. Verify the size of the liquid and vapor lines.
8. If a Multi F MAX system, refer to the branch distribution unit information on page 201 and the Y-branch kit information on page 207 to verify the part number of each Y-branch and branch distribution unit based on the connected downstream nominal capacity served.
9. Calculate the equivalent pipe length in feet of each pipe segment. If a Multi F MAX system, Y-branch equivalent lengths should be totaled with the upstream segment only. Use equivalent pipe length data when it is provided with field-purchased fittings. If not available, use the data provided in Table 99 on page 188 to estimate the equivalent length of field-provided pipe and fittings for each segment. Equivalent lengths should be totaled with the upstream segment only.
10. For Multi F systems, verify the equivalent pipe length complies with the limitations in Table 100 on page 188. For Multi F MAX systems, verify the equivalent pipe length complies with the limitations in Table 101 on page 189. If the limitations are exceeded, either reroute the pipe or change the location of the indoor unit, Y-branch fittings and branch distribution units (if Multi F MAX systems), so the design conforms with all limitations.
11. If pipe length is adjusted as described in Step 10 above, verify again if the length of the design complies with the limitations in Table 100 (Multi F) or Table 101 (Multi F MAX).
12. Use LATS Multi F software to verify the manually sized pipe design is acceptable. When entering the length of pipe segments in LATS Multi F software, enter the equivalent pipe length. Account for the additional pressure drop created by elbows, valves, and other fittings present in each segment by adding their respective equivalent pipe length to the actual pipe length.

Multi F MAX Y-Branch Kit PMBL5620

The LG supplied Y-Branch Kit PMBL5620 MUST be used when two branch distribution units are connected on one Multi F MAX system. Field-supplied fittings are not permitted. Each Y-Branch kit comes with two (2) Y-branches (one for the liquid line and one for the vapor line) and insulation covers.

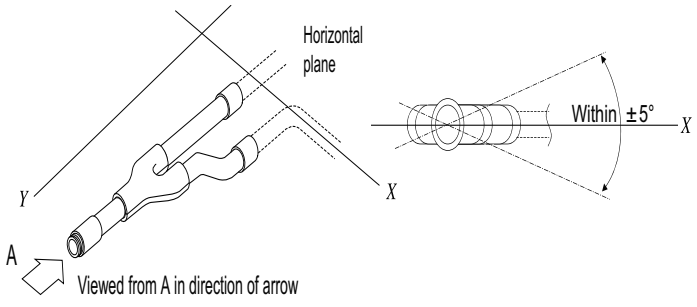
Y-branches may be installed in horizontal or vertical configurations. When installed vertically, position the Y-branch so the straight-through leg is ±3° of plumb. When installed horizontally, position the Y-branch so the take-off leg is level and shares the same horizontal plane as the straight-through leg ±10° rotation.

Y-branches must be properly installed following instructions in the applicable LG manual. Y-branches should 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 should 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 254: Horizontal Configuration End View.



Y-Branch Kit Insulation

Each Y-branch kit comes with clam-shell type peel-and-stick insulation jackets molded to fit the Y-branch fittings—one for the liquid line, one for the vapor line.

- Check the fit of the Y-branch clam-shell insulation jacket after the Y-branch is installed.
- Mark the pipe where the insulation jacket ends.
- Remove the jacket.
- Install field-provided insulation on the pipes first.
- Peel the adhesive glue protector slip and install the clam-shell jacket over the fitting

Figure 252: Y-Branch Connections.

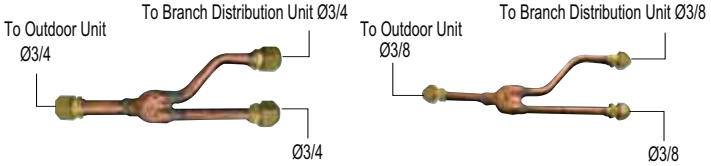
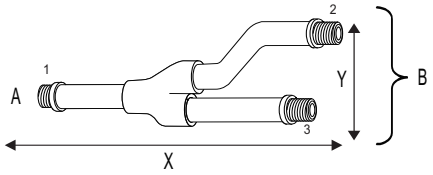


Table 103: Y-Branch Connection Diameters.

Model	Y-Branch Type	Port Identifier (inch)			Dimensions	
		1	2	3	X	Y
PMBL5620	Liquid	3/8	3/8	3/8	13.80	3.24
	Vapor	3/4	3/4	3/4	12.48	3.02

Figure 253: Y-Branch Dimensions Diagram.



A = To Outdoor Unit
B = To Branch Distribution Unit

Note:

- *Design pressure is 551 psig.*
- *All dimensions in inches. Tolerance ±1/4 inch.*
- *Images are not to scale.*

Figure 255: Y-branch Installation Alignment Specification.

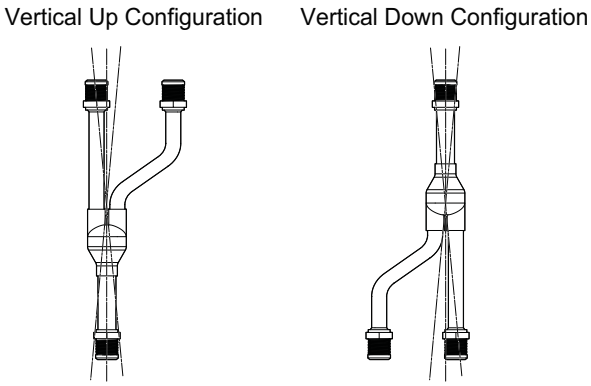
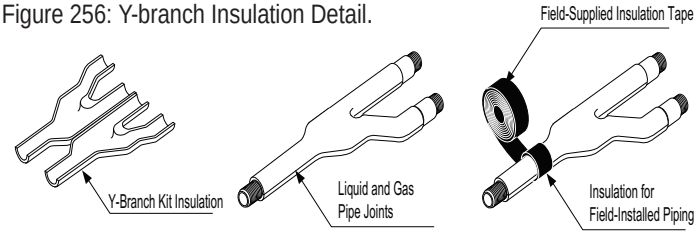


Figure 256: Y-branch Insulation Detail.



REFRIGERANT PIPING DESIGN

Refrigerant Charge

LG Multi F and Multi F MAX outdoor units ship from the factory with a charge of R410A refrigerant. A trim charge may need to be added to take into account additional piping length.

To determine the additional refrigerant that is needed, apply the formulas below, and record the results. If the total additional refrigerant charge value is a negative number, then an additional trim charge does not need to be added to the system.

Table 104: Outdoor Unit Factory Charge.

Outdoor Unit	Factory Charge lbs. of R410A
LMU18CHV	3.96
LMU24CHV	3.96
LMU30CHV	6.18
LMU36CHV	6.18
LMU480HV	9.7
LMU540HV	9.7
LMU600HV	12.3

Multi F Systems

Additional charge (lbs.) = (Installed Length of Branch [A] – Chargeless Pipe Length [L]) x a
+ (Installed Length of Branch [B] – Chargeless Pipe Length [L]) x a
+ (Installed Length of Branch [C] – Chargeless Pipe Length [L]) x a
+ (Installed Length of Branch [D] – Chargeless Pipe Length [L]) x a
- CF (Correction Factor) x 5.29

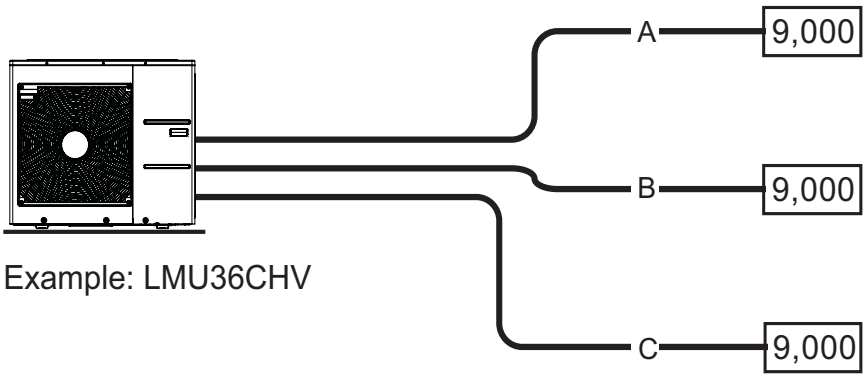
Note:

- *Number of installed length of branches depends on the specifications of the outdoor unit model.*
- *CF = Maximum number of connectable indoor units – Total number of connected indoor units.*

Table 105: Multi F Outdoor Unit Piping Specifications.

Outdoor Unit Model	Min. to Max. Piping Length for One Branch (ft.)	Max. Total System Piping Length (ft.)	Chargeless Pipe Length per Branch (L) (ft.)	Additional Charge Needed (a) (oz./ft.)
LMU18CHV	10 to 82	164	24.6	0.22
LMU24CHV	10 to 82	246.1	24.6	0.22
LMU30CHV	10 to 82	246.1	24.6	0.22
LMU36CHV	10 to 82	246.1	24.6	0.22

Figure 257: Multi F Additional Refrigerant Charge Example.



Example: LMU36CHV

Each branch pipe
A = 82 ft.
B = 16 ft.
C = 49 ft.

Additional Charge
= (82 - 24.6) x 0.22
+ (16 - 24.6) x 0.22
+ (49 - 24.6) x 0.22
- (4 - 3) x 5.29
= 10.82 oz.

Multi F MAX Systems

Additional charge (lbs.) = (Total Main Piping Length [A] - Chargeless Pipe Length of Main Pipe [L]) x a
+ (Installed Length of Branch [B1] – Chargeless Pipe Length [B]) x b
+ (Installed Length of Branch [B2] – Chargeless Pipe Length [B]) x b
+ (Installed Length of Branch [B3] – Chargeless Pipe Length [B]) x b ...
- CF (Correction Factor) x 3.53

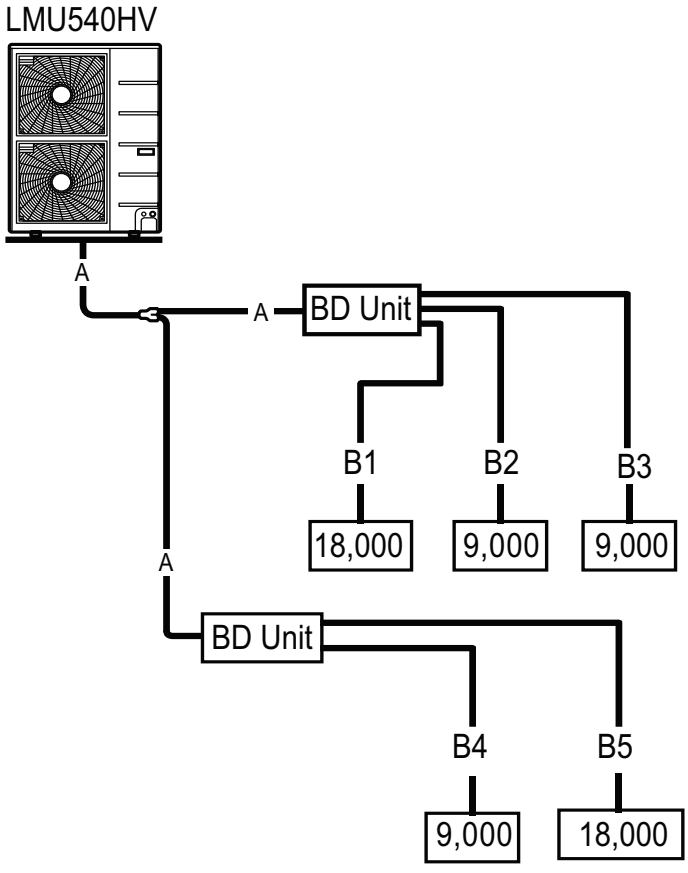
Note:

- *Number of installed length of branches depends on system specifications.*
- *CF = Maximum number of connectable indoor units – Total number of connected indoor units*

Table 106: Multi F MAX Outdoor Unit Piping Specifications.

Outdoor Unit Model	Main Piping Length		Branch Piping Length	
	Chargeless Pipe Length of Main Pipe (L) (ft.)	Additional Charge Needed (a) (oz./ft.)	Chargeless Pipe Length per Branch Pipe (B) (ft.)	Additional Charge Needed (b) (oz./ft.)
LMU480HV	16.4	0.54	16.4	0.22
LMU540HV	16.4	0.54	16.4	0.22
LMU600HV	16.4	0.54	16.4	0.22

Figure 258: Multi F MAX Additional Refrigerant Charge Example.



- Total main pipe (A) = 60 ft.
- Each branch pipe
  B1 = 49 ft.
  B2 = 17 ft.
  B3 = 17 ft.
  B4 = 10 ft.
  B5 = 23 ft.

Additional Charge
= (60 - 16.4) x 0.54
+ (49 - 16.4) x 0.22
+ (17 - 16.4) x 0.22
+ (17 - 16.4) x 0.22
+ (10 - 16.4) x 0.22
+ (23 - 16.4) x 0.22
– (8 - 5) x 3.53
= 20.43 oz.

REFRIGERANT PIPING DESIGN

Selecting Field-Supplied Copper Tubing

Type ACR copper is the only approved refrigerant pipe material for use with LG Multi F air conditioning products. ACR rated tubing is the only type that ships with yellow caps. Approved tubing for use with Multi V products will be marked “R410 RATED” along the length of the tube.

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

Tube wall thickness should meet local code requirements and be approved for a maximum operating pressure of 551 psi. When bending tubing, use the largest radii possible to reduce the equivalent length of installed pipe; also, bending radii greater than ten (10) pipe diameters can minimize pressure drop. Be sure no traps or sags are present when rolling out soft copper tubing coils.

Table 107: ACR Rated Copper Tubing Material.

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

Table 108: ACR Rated Piping Tube Thicknesses.

OD (in)	1/4	3/8	1/2	5/8	3/4
Material	Rigid or Soft ACR Acceptable			Rigid or Solid ACR Rated for R410A	
Min. Bend Radius (in)	.563	.9375	1.5	2.25	3.0
Min. Wall Thickness (in)	.031	.031	.031	.039	.039

Copper Expansion and Contraction

Under normal operating conditions, the vapor pipe temperature of a Multi F system can vary as much as 180°F. With this large variance in pipe temperature, the designer must consider pipe expansion and contraction to avoid pipe and fitting fatigue failures.

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

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

The refrigerant pipe support system must be engineered to allow free expansion to occur. When a segment of pipe is mounted between two fixed points, provisions must be provided to allow pipe expansion to naturally occur. The most common method is the inclusion of expansion Loop or U-bends mounted in the horizontal plane. When expansion loops are placed in a vertical riser, the loop is to be formed in a horizontal fashion resulting in a torsional movement during expansion and contraction. Each segment of pipe has a natural fixed point where no movement occurs. This fixed point is located at the center point of the segment assuming the entire pipe is insulated in a similar fashion. The natural fixed point of the pipe segment is typically where the expansion Loop or U-bend should be. Linear pipe expansion can be calculated using the following formula:

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

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

1. From Table 109, find the row corresponding with the actual length of the straight pipe segment.
2. Estimate the minimum and maximum temperature of the pipe. Typical pipe temperature change range: High Pressure Vapor: ambient temperature to 215°F; Low Pressure Vapor: ambient to 35°F; Liquid pipe: ambient, 80°F, 110°F. Choose the two most extreme. In the column showing the minimum pipe temperature, look up the anticipated expansion distance. Do the same for the maximum pipe temperature.
3. Calculate the difference in the two expansion distance values. The result will be the anticipated change in pipe length.

Example:

A Multi F MAX system is installed and the design shows that there is a 100 foot straight segment of tubing between a Y-branch and a branch distribution unit. The system operates 24 hours per day. In heating, this pipe transports hot gas vapor to the indoor units at 120°F. In cooling, the same tube is a suction line returning refrigerant vapor to the outdoor unit at 40°F. Look up the copper tubing expansion at each temperature and calculate the difference.

Vapor Line

Transporting Hot Vapor: 100 ft. pipe at 120°F = 1.40 in.
Transporting Suction Vapor: 100 ft. pipe at 40°F = 0.40 in.
Anticipated Change in Length: 1.40 in. – 0.40 in. = 1.00 in.

Liquid Line

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

When creating an expansion joint, the joint depth should be a minimum of two times the joint width. Although different types of expansion arrangements are available, the data for correctly sizing an expansion loop is provided in Table 110. Use soft copper with long radius bends on longer runs or long radius elbows for shorter pipe segments. Using the anticipated linear expansion (LE) distance calculated, look up the Expansion Loop or U-bend minimum design dimensions. If other types of expansion joints are chosen, design per ASTM B-88 Standards.

INSTALLATION & LAYOUT BEST PRACTICES

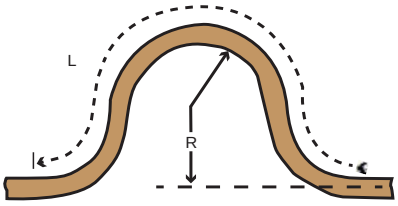
Selecting Field-Supplied Copper Tubing

Table 109: Linear Thermal Expansion of Copper Tubing in Inches.

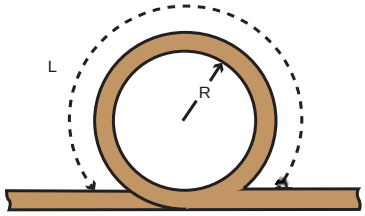
Pipe Length[1]	Fluid Temperature °F																			
	35°	40°	45°	50°	55°	60°	65°	70°	75°	80°	85°	90°	95°	100°	105°	110°	115°	120°	125°	130°
10	0.04	0.04	0.05	0.06	0.06	0.07	0.08	0.08	0.09	0.09	0.10	0.10	0.11	0.11	0.11	0.12	0.13	0.14	0.15	0.15
20	0.08	0.08	0.10	0.12	0.13	0.14	0.15	0.16	0.17	0.18	0.19	0.20	0.21	0.22	0.22	0.23	0.26	0.28	0.29	0.30
30	0.12	0.12	0.15	0.18	0.20	0.21	0.23	0.24	0.26	0.27	0.29	0.30	0.32	0.33	0.32	0.35	0.39	0.42	0.44	0.45
40	0.16	0.16	0.20	0.24	0.26	0.28	0.30	0.32	0.34	0.36	0.38	0.40	0.42	0.44	0.43	0.46	0.52	0.56	0.58	0.60
50	0.20	0.20	0.25	0.30	0.33	0.35	0.38	0.40	0.43	0.45	0.48	0.50	0.53	0.55	0.54	0.58	0.65	0.70	0.73	0.75
60	0.24	0.24	0.30	0.36	0.39	0.42	0.45	0.48	0.51	0.54	0.57	0.60	0.63	0.66	0.65	0.69	0.78	0.84	0.87	0.90
70	0.28	0.28	0.35	0.42	0.46	0.49	0.53	0.56	0.60	0.63	0.67	0.70	0.74	0.77	0.76	0.81	0.91	0.98	1.02	1.05
80	0.32	0.32	0.40	0.48	0.52	0.56	0.60	0.64	0.68	0.72	0.76	0.80	0.84	0.88	0.86	0.92	1.04	1.12	1.16	1.20
90	0.36	0.36	0.45	0.54	0.59	0.63	0.68	0.72	0.77	0.81	0.86	0.90	0.95	0.99	0.97	1.04	1.17	1.26	1.31	1.35
100	0.40	0.40	0.50	0.60	0.65	0.70	0.75	0.80	0.85	0.90	0.95	1.00	1.05	1.10	1.08	1.15	1.30	1.40	1.45	1.50
120	0.48	0.48	0.60	0.72	0.78	0.84	0.90	0.96	1.02	1.08	1.14	1.20	1.26	1.32	1.30	1.38	1.56	1.68	1.74	1.80
140	0.56	0.56	0.70	0.84	0.91	0.98	1.05	1.12	1.19	1.26	1.33	1.40	1.47	1.54	1.51	1.61	1.82	1.96	2.03	2.10
160	0.64	0.64	0.80	0.96	1.04	1.12	1.20	1.28	1.36	1.44	1.52	1.60	1.68	1.76	1.73	1.84	2.08	2.24	2.32	2.40
180	0.72	0.72	0.90	1.08	1.17	1.26	1.35	1.44	1.53	1.62	1.71	1.80	1.89	1.98	1.94	2.07	2.34	2.52	2.61	2.70

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

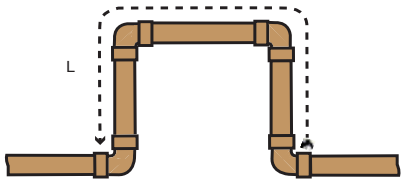
Figure 259: Coiled Expansion Loops and Offsets (Plan View shown).



Large Tubing U-bend (>3/4 in.)



Loop



Small Tubing U-bend (<3/4 in.)

Table 110: Radii of Coiled Expansion Loops and Developed Lengths of Expansion Offsets.

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

[1]R = Centerline Length of Pipe.

[2]L = Centerline Minimum Radius (inches).

Note:

All expansion Loops and Offsets should be installed in the horizontal plane to prevent the possibility of trapping oil. Loops and Offsets in vertical risers should also be installed in a horizontal plane.

INSTALLATION & LAYOUT BEST PRACTICES

Refrigerant Piping System Layout

Field-Provided Isolation Ball Valves

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

If valves are not installed and a single indoor unit needs to be removed or repaired, the entire system must be shut down and evacuated. If isolation ball valves are installed, and an indoor unit needs to be repaired, the unaffected indoor units can remain operational with the proper combination ratio. Reclamation of refrigerant, then, can be restricted to a single indoor unit.

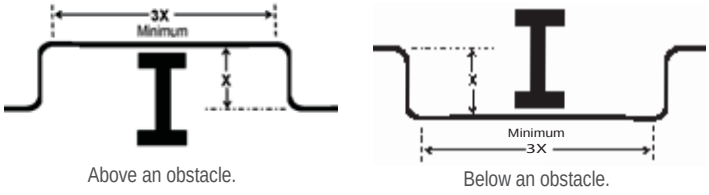
For Multi F MAX systems, position valves with a minimum distance of three (3) to six (6) inches of pipe on either side of the valve, and placed between six (6) and twelve (12) inches from the first upstream Y-branch or branch distribution unit. If ball valves are installed away from the first Y-branch and / or branch distribution unit and closer to the indoor unit, oil may accumulate where it cannot be returned to the outdoor unit and may cause a shortage of oil in the compressor.

Valves shall be easily accessible for service. If necessary, install drywall access doors or removable ceiling panels, and position the valves to face the access door or ceiling panel opening. Mount valves with adequate space between them to allow for placement of adequate pipe insulation around the valves. Recommended best practice is to clearly label and document locations of all service valves, Y-branches, and branch distribution units. The equivalent pipe length of each ball valve must be added to each pipe segment entered into the LATS program.

Obstacles

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

Figure 260: Installing Piping Above and Below an Obstacle.



Above an obstacle. Below an obstacle.

Pipe Slope

The horizontal pipe slope cannot exceed 10° up or down.

In-line Refrigeration Components

Components such as oil traps, solenoid valves, filter-dryers, sight glasses, tee fittings, and other after-market accessories are not permitted on the refrigerant piping system between the outdoor units and the indoor / branch distribution units. Multi F and Multi F MAX systems are provided with redundant systems that assure oil is properly returned to the compressor. Sight-glasses and solenoid valves may cause vapor to form in the liquid stream. Over time, dryers may deteriorate and introduce debris into the system. The designer and installer should verify the refrigerant piping system is free of traps, sagging pipes, sight glasses, filter dryers, etc.

No Pipe Size Substitutions

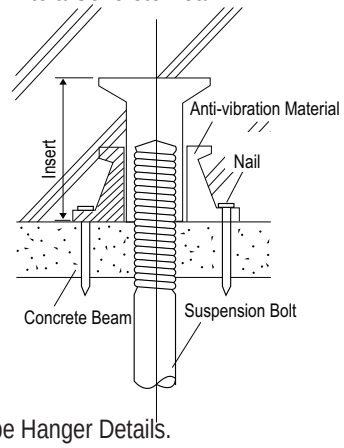
Use only the pipe size selected by the LATS Multi pipe system design software or as conveyed in the product installation instructions. Using a different size is prohibited and may result in a system malfunction or failure to work at all.

Inserts and Pipe Supports

Inserts

An insert can be installed into a floor or beam before the concrete sets so that fittings such as ducts, pipes, or suspension bolts can be added at a later time. Decide where the inserts should be placed before support installation.

Figure 261: Installing an Insert Into a Concrete Beam.



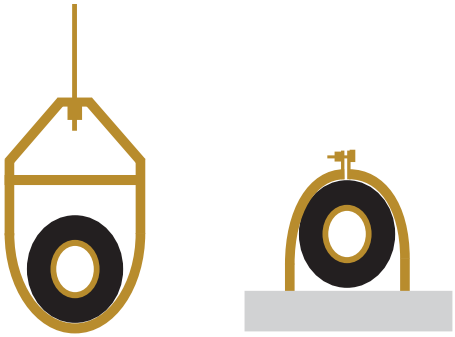
Pipe Supports

Note:

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

⃠ Pipe supports should never touch the pipe wall. Supports shall be installed outside (around) the primary pipe insulation jacket. Insulate the pipe first because pipe supports shall be installed outside (around) the primary pipe insulation jacket. Clevis hangers should be used with shields between the hangers and insulation.

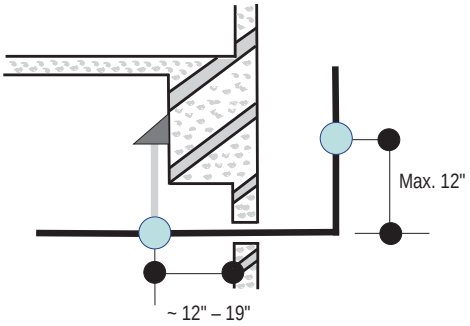
Figure 262: Pipe Hanger Details.



Field provided pipe supports should be designed to meet local codes. If allowed by code, use fiber straps or split-ring hangers suspended from the ceiling on all-thread rods (fiber straps or split ring hangers can be used as long as they do not compress the pipe insulation). Place a second layer of insulation over the pipe insulation jacket to prevent chafing and compression of the primary insulation within the confines of the support pipe clamp.

A properly installed pipe system will have sufficient supports to avoid pipes from sagging during the life of the system. As necessary, place supports closer for segments where potential sagging could occur. Maximum spacing of pipe supports shall meet local codes. If local codes do not specify pipe support spacing, pipe shall be supported a maximum of 5 feet on center for straight segments of pipe up to 3/4" outside diameter size.

Figure 263: Typical Pipe Support Location—Change in Pipe Direction.



Wherever the pipe changes direction, place a hanger within twelve (12) inches on one side and within twelve to nineteen (12 to 19) inches of the bend on the other side. Support piping at indoor units as shown. Support Y-Branch fittings as shown.

Figure 264: Pipe Support at Indoor Unit.

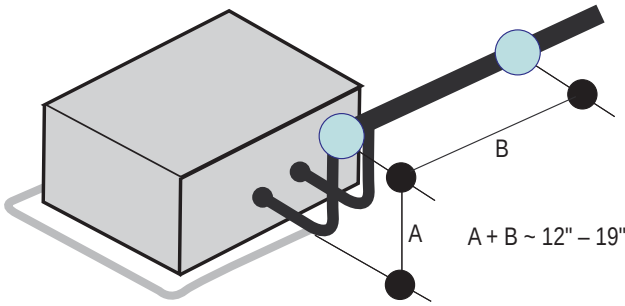
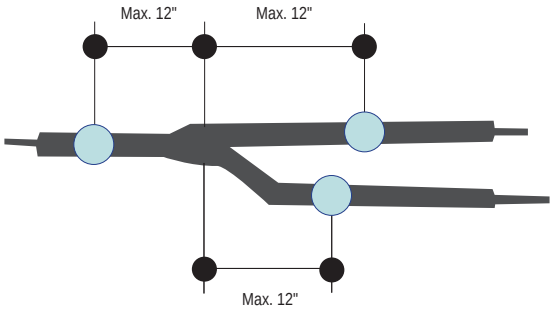


Figure 265: Pipe Support at Y-branch Fitting.



Examples of Supports

Figure 266: U-Bolt Support with Insulation.

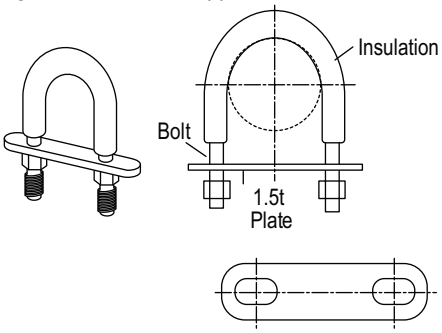


Figure 267: O-Ring Support with Insulation.

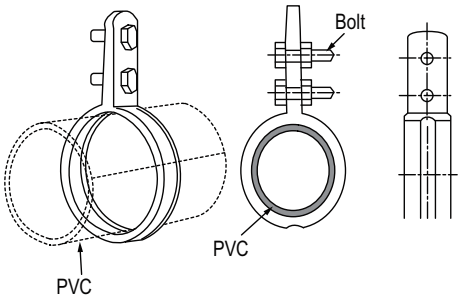
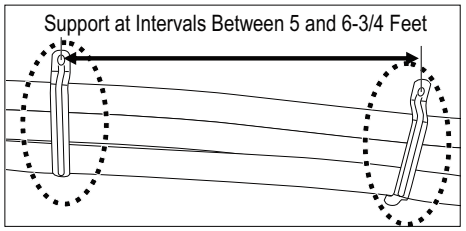


Figure 268: Saddle-Type Support.



Note:

Do not compress the insulation with the saddle-type support. If the insulation is compressed, it may tear open and allow condensation to generate during product operation.

Figure 269: U-Bolt Support with an Insulated Pipe.

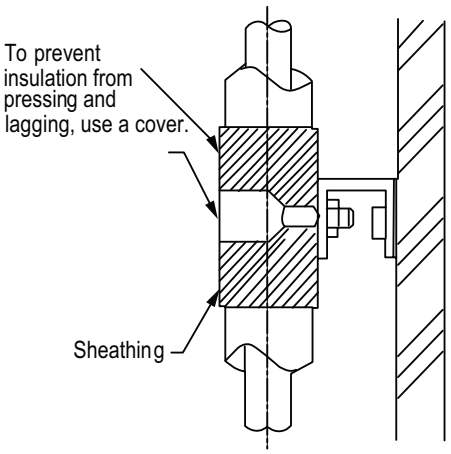


Figure 270: O-Ring Band Support with an Insulated Pipe.

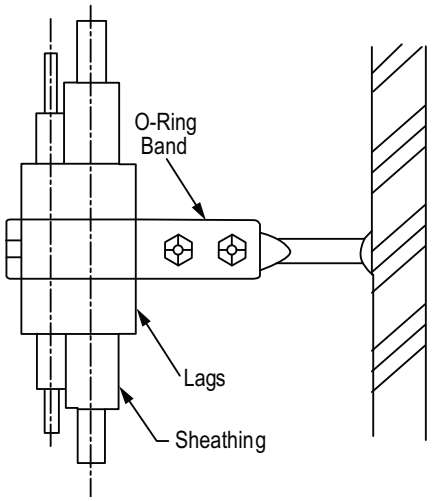


Figure 271: One-Point Down-Stop Support (>441 lbs.).

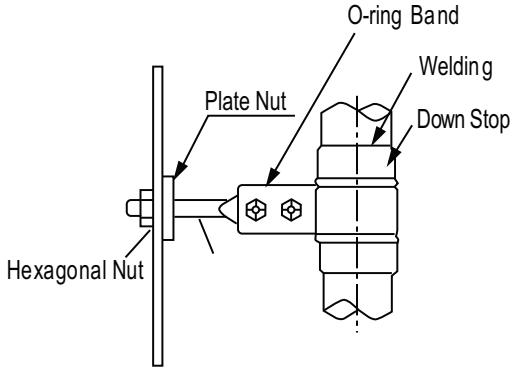
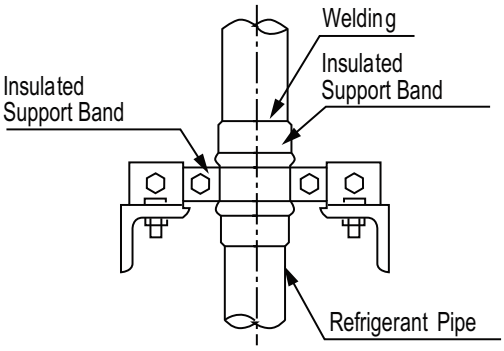


Figure 272: Two-Point Down-Stop Support.



Pipe Sleeves at Penetrations

LG requires that all pipe penetrations through walls, floors, and pipes buried underground be routed through a properly insulated sleeve that is sufficiently sized to provide free movement of the pipe and does not compress the insulation. Underground refrigerant pipe shall be routed inside a protective sleeve to prevent insulation deterioration. Also follow federal, state, and local regulations and codes when choosing a sleeve type.

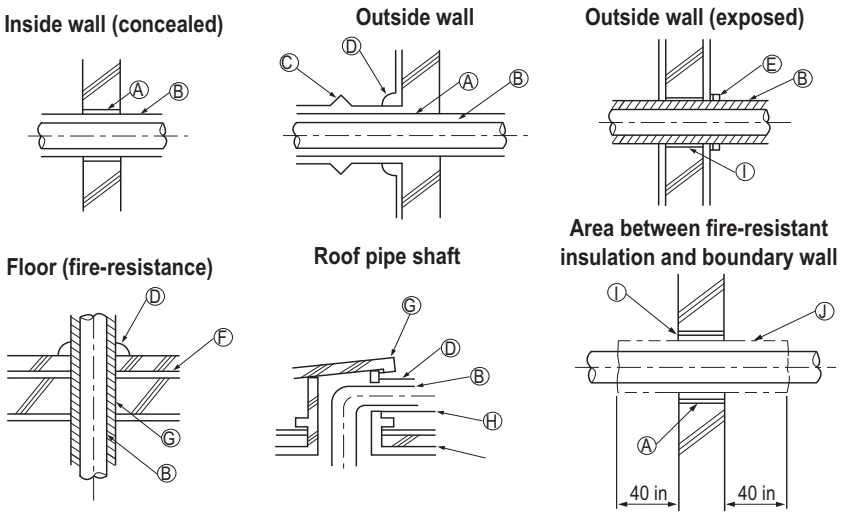
Note:

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

For example:

Diameter of Gas Piping:	1/2"
Diameter of Liquid Piping:	1/4"
Thickness of Gas Piping Insulation:	0.4" x 2
Thickness of Liquid Piping Insulation:	0.4" x 2
Surplus:	0.8"
Sleeve diameter (total):	3.1" minimum

Figure 273: Pipe Sleeve Options.



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

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

Underground Refrigerant Piping

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

Table 111: Utility Conduit Sizes.

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

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

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

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

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

[5]Insulation thickness (value in parenthesis) = 3/4 inch.

Figure 274: Typical Arrangement of Refrigerant Pipe and Cable(s) in a Utility Conduit.

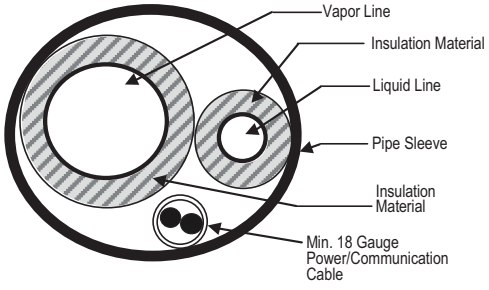


Figure 275: Underground Refrigerant Piping.

Multi F Outdoor Unit to Indoor Unit Piping Connections

Note:

Avoid Pipe Damage

- *When routing field-provided piping, avoid damaging the outdoor unit from excessive vibration.*
- *Properly insulate the liquid and gas lines separately up to the point of connection at the unit frame.*
- *See table below for Multi F outdoor unit connection types.*

- *Correctly route the piping so it does not make contact with mounting bolts. Allow room for field installation.*

Figure 276: Multi F Refrigerant Pipe Connections (LMU36CHV shown as example).

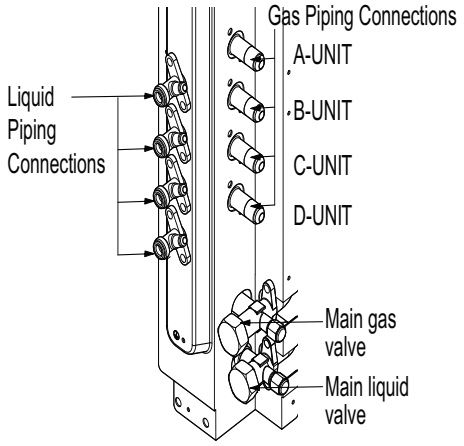


Table 112: Outdoor Unit Piping Connections.

Outdoor Unit Piping Connections	LMU18CHV	LMU24CHV	LMU30CHV	LMU36CHV
Liquid Line Connection (in., OD) x Qty.	1/4 x 2	1/4 x 3	1/4 x 4	1/4 x 4
Vapor Line Connection (in., OD) x Qty.	3/8 x 2	3/8 x 3	3/8 x 4	3/8 x 4

Table 113: Indoor Unit Pipe Sizes.

Indoor Unit Capacity	Vapor Line Connection (in., OD)	Liquid Line Connection (in., OD)
7,000 Btu/h	Ø3/8	Ø1/4
9,000 Btu/h		
12,000 Btu/h		
15,000 Btu/h		
18,000 Btu/h	Ø1/2	
24,000 Btu/h		

Connection sockets (included as a factory-supplied accessory with the indoor units) may need to be used when piping the indoor units to the outdoor unit. If a 36K indoor unit is included, the connection sockets are included with the Branch Distribution unit.

Table 114: Connection Socket Dimensions.

Indoor Unit Capacity	Vapor (in., OD)		Liquid (in., OD)	
	A	B	A	B
18,000 Btu/h: Wall-Mounted	Ø3/8 → Ø1/2,	Ø1/2 → Ø5/8	Ø1/4 → Ø3/8	
18,000 Btu/h: Low Static Duct, Four-Way Cassette	Ø3/8 → Ø1/2		N/A	
24,000 Btu/h	Ø3/8 → Ø1/2		N/A	

Using the Connection Socket

1. Align the center of the piping sections and tighten the flare nut by hand.
2. Tighten the flare nut with a torque wrench, using the arrows on the wrench as a guide, until a click is heard.

Table 115: Indoor Unit Piping Connections.

Indoor Unit Capacity	Vapor Line Conn. (in., OD)	Liquid Line Conn. (in., OD)
7,000 Btu/h	Ø3/8	Ø1/4
9,000 Btu/h		
12,000 Btu/h		
15,000 Btu/h		
18,000 Btu/h: Wall-Mounted	Ø5/8	Ø3/8
18,000 Btu/h: Low Static Duct, Four-Way Cassette	Ø1/2	Ø1/4
24,000 Btu/h	Ø1/2	Ø1/4

Figure 277: Connection Socket Diagram.

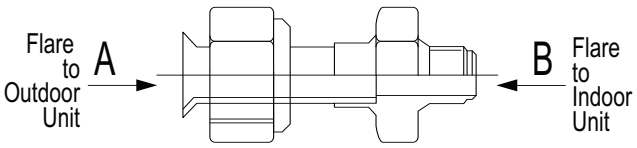
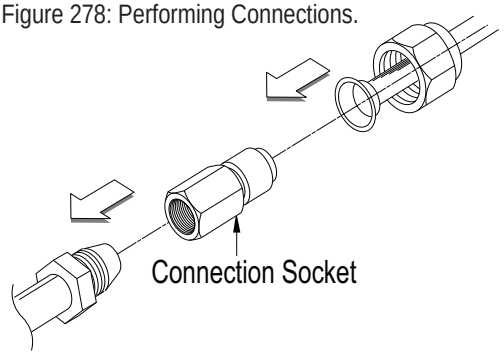


Figure 278: Performing Connections.



Multi F MAX Outdoor Unit System Piping Connections

Note:

Avoid Pipe Damage

- *When routing field-provided piping, avoid damaging the outdoor unit from excessive vibration.*
- *Properly insulate the liquid and gas lines separately up to the point of connection at the unit frame.*
- *See table below for Multi F MAX outdoor unit connection types.*

- *Correctly route the piping so it does not make contact with mounting bolts. Allow room for field installation.*

Table 116: Outdoor Unit Piping Connections.

Outdoor Unit Piping Connections	LMU540HV
Liquid Line Connection (in., OD) x Qty.	3/8 x 1
Vapor Line Connection (in., OD) x Qty.	3/4 x 1

Branch Distribution to Indoor Unit Piping Connections

- Install indoor unit liquid and vapor refrigerant pipes (and connection wiring) to the appropriate branch distribution ports.
- Clearly note on the indoor unit's refrigerant piping (liquid, vapor) which branch distribution port it is connected to (A, B, C, D).

Table 117: Branch Distribution Unit Piping Connections.

Branch Distribution Unit	PMBD3620	PMBD3630	PMBD3640	PMBD3641
Piping Connections to Outdoor Unit				
Liquid (in., OD) x Qty.	Ø3/8 x 1			
Vapor (in., OD) x Qty.	Ø3/4 x 1			
Piping Connections to Indoor Units				
Liquid (in., OD) x Qty.	Ø1/4 x 2	Ø1/4 x 3	Ø1/4 x 4	Ø1/4 x 4
Vapor (in., OD) x Qty.	Ø3/8 x 2	Ø3/8 x 3	Ø3/8 x 4	Ø3/8 x 3, Ø1/2 x 1

Figure 279: Branch Distribution Ports to Indoor Units.

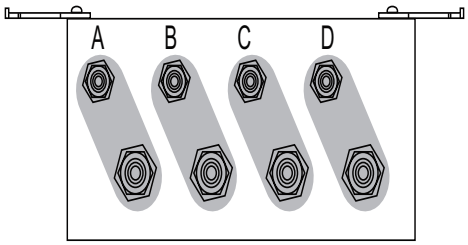


Table 118: Indoor Unit Pipe Sizes.

Indoor Unit Capacity	Vapor Line Connection (in., OD)	Liquid Line Connection (in., OD)
7,000 Btu/h	Ø3/8	Ø1/4
9,000 Btu/h		
12,000 Btu/h		
15,000 Btu/h		
18,000 Btu/h	Ø1/2	
24,000 Btu/h		
36,000 Btu/h	Ø5/8	Ø3/8

Table 120: Indoor Unit Piping Connections.

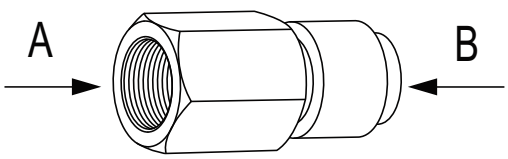
Indoor Unit Capacity	Vapor Line Conn. (in., OD)	Liquid Line Conn. (in., OD)
7,000 Btu/h	Ø3/8	Ø1/4
9,000 Btu/h		
12,000 Btu/h		
15,000 Btu/h		
18,000 Btu/h: Wall-Mounted	Ø5/8	Ø3/8
18,000 Btu/h: Low Static Duct, Four-Way Cassette	Ø1/2	Ø1/4
24,000 Btu/h	Ø1/2	Ø1/4
36,000 Btu/h	Ø5/8	Ø3/8

Connection sockets (included as a factory-supplied accessory with the indoor units) may need to be used when piping the indoor units to the branch distribution unit. If a 36K indoor unit is included, the connection sockets are included with the Branch Distribution unit.

Table 119: Connection Socket Dimensions.

Indoor Unit Capacity	Vapor (in., OD)		Liquid (in., OD)	
	A	B	A	B
18,000 Btu/h: Wall-Mounted	Ø3/8 → Ø1/2,	Ø1/2 → Ø5/8	Ø1/4 → Ø3/8	
18,000 Btu/h: Low Static Duct, Four-Way Cassette	Ø3/8 → Ø1/2		N/A	
24,000 Btu/h	Ø3/8 → Ø1/2		N/A	
36,000 Btu/h	Ø1/2 → Ø5/8		Ø1/4 → Ø3/8	

Figure 280: Connection Socket Diagram.

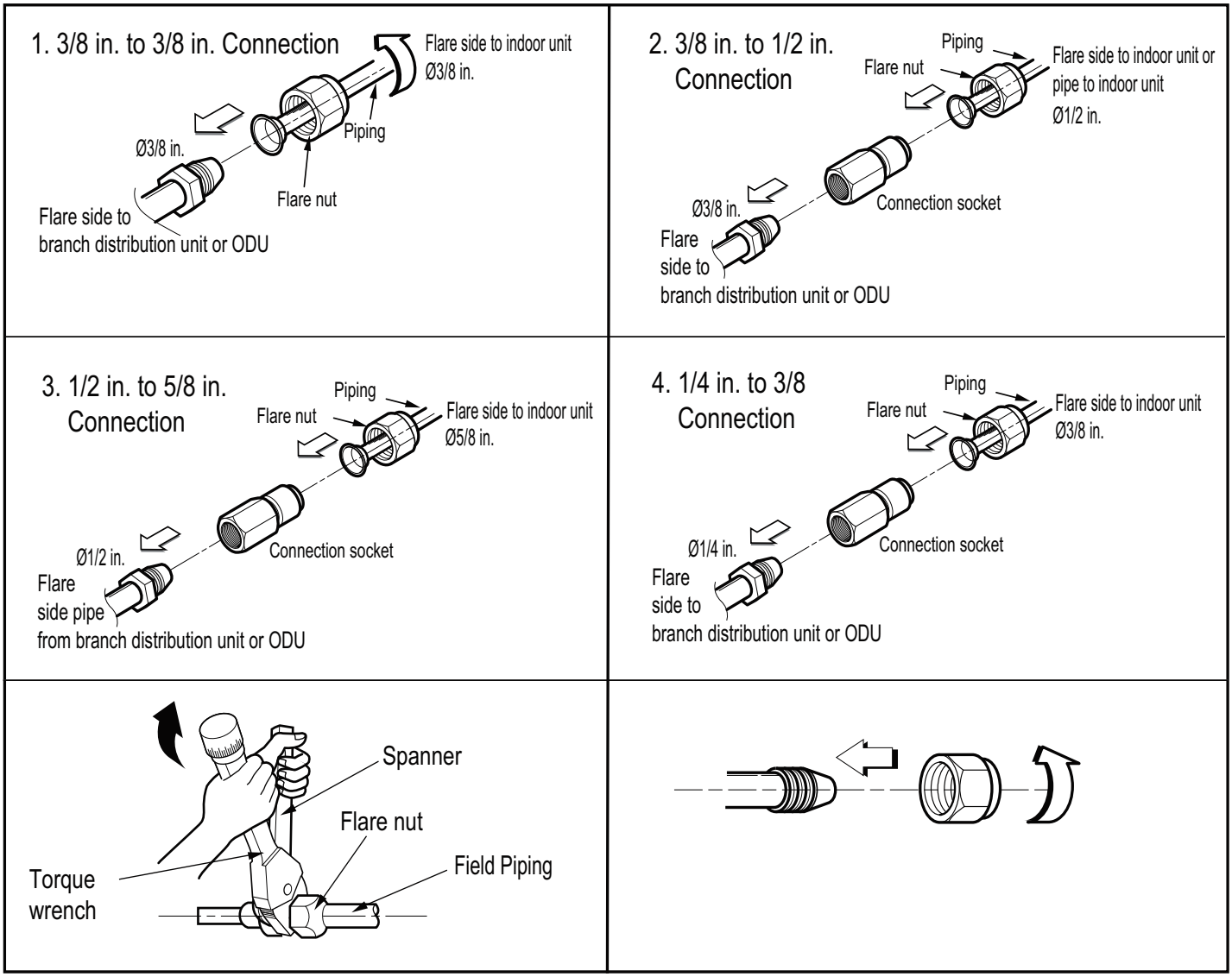


Connection Socket

Multi F System Piping Connections

1. Align the center of the piping sections and tighten the flare nut by hand.
2. Tighten the flare nut with a torque wrench, using the arrows on the wrench as a guide, until a click is heard.
3. Wrap insulation around the connection.

Figure 281: Possible Outdoor Unit or Branch Distribution Unit to Indoor Unit Connections.



INSTALLATION & LAYOUT BEST PRACTICES

Refrigerant Piping System Layout

Brazing Practices

Note:

Keep the piping system free of contaminants and debris such as copper burrs, slag, or carbon dust during installation.

1. All joints are brazed in the field. Multi F refrigeration system components contain very small capillary tubes, small orifices, electronic expansion valves, oil separators, and heat exchangers that can easily become blocked.

- Store pipe stock in a dry place; keep stored pipe capped and clean.
- Blow clean all pipe sections with dry nitrogen before assembly.

2. Proper system operation depends on the installer using best practices and utmost care while assembling the piping system.

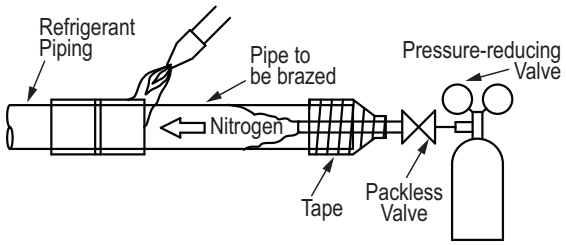
- Use adapters to assemble different sizes of pipe.
- Use a tubing cutter; De-burr and clean all cuts before assembly.

- Do not use flux, soft solder, or anti-oxidant agents.
- Do not use a saw to cut pipe.

3. Brazing Joints:

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

Figure 282: Refrigerant Pipe Brazing.



Flare Connection Practices

Note:

Improperly installed flare connections can lead to refrigerant leaks.

1. Place a couple of drops of refrigerant oil on the opening rim of the flare before assembling. Take care not to add any contaminants.

2. Align the center of the refrigerant pipe and corresponding connection and tighten the flare nut by hand.

3. Following the guidelines as outlined in Table 51 for the amount of torque to use, tighten the flare nut with a torque wrench until the wrench clicks.

4. When flare is sufficiently tightened and the system has been tested for refrigerant leaks, wrap insulation around the connection.

Figure 283: Flare Connection, Isometric View.

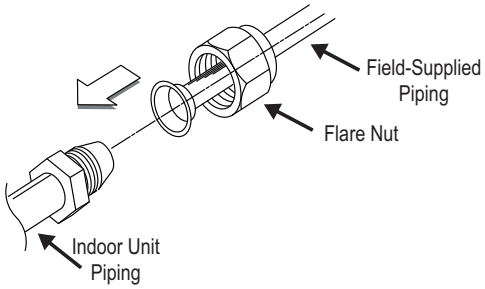
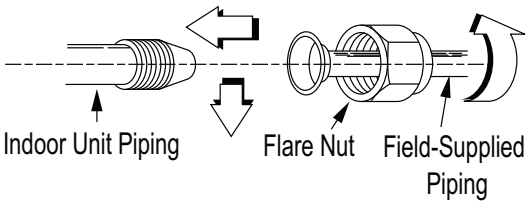


Figure 284: Flare Connection, Side View.



Note:

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

Table 121: Torque Wrench Tightening.

Piping O.D. (in.)	Torque (lbs. / ft.)
1/4	13-18
3/8	24.6-30.4
1/2	39.8-47.7
5/8	45.6-59.3
3/4	71.6-87.5

Refrigerant Piping System Insulation

All refrigerant piping including Y-branch connections, field-provided isolation ball valves, service valves, and elbows shall be completely insulated using closed cell pipe insulation.

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

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

LG-provided Y-branches are shipped from the factory with pre-formed peel-and-stick foam insulation jackets, with a 1.84 lb./ft.^{3} density, 1/2" thickness, and meet UL94 MF-1 flammability.

The design engineer should perform calculations to determine if the factory-supplied insulation jackets are sufficient to meet local codes and avoid sweating. Maximum refrigerant piping temperature is +227°F; minimum refrigerant piping temperature is -4°F. Add additional insulation if necessary. Check the fit of the insulation jacket after the header fitting and all run-out pipes are installed. Mark all pipes at the point where the insulation jacket ends. Remove the jacket. Install field provided insulation on the run-out and main trunk pipes first. Install the LG-provided insulation plugs on the ends of all unused header ports. Peel the adhesive glue protector slip from the insulation jacket and install the clam-shell jacket over the fitting.

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

Note:

Follow locals codes when selecting EPDM insulation wall thickness.

Table 122: Insulation Guidelines for Typical and Special Circumstances.

Classification		Air-conditioned location		Non-air conditioned location	
		1. Typical location	2. Special location	3. Typical location	4. Special location
Liquid pipe	ø1/4 inches	1/2 inches	1/2 inches	1/2 inches	1/2 inches
	ø3/8 inches				
	≥ø1/2 inches	1/2 inches	1/2 inches	1/2 inches	1/2 inches
Vapor pipe	ø3/8 inches	1/2 inches	3/4 inches	3/4 inches	1 inch
	ø1/2 inches				
	ø5/8 inches				
	ø3/4 inches				

1. Air-conditioned, Typical location: When the piping passes through an indoor area where the indoor unit operates.
   - Apartment, classroom, office, mall, hospital, etc.

2. Air-conditioned, Special location
   1. When the location is air conditioned, but there is severe temperature/humidity difference due to high ceilings
      - Church, auditorium, theater, lobby, etc.
   2. When the location is air conditioned, but internal temperature/humidity are high
      - Bathroom, swimming pool, locker room, etc.

3. Non-air conditioned, Typical location: When the piping passes through an indoor area where the indoor unit does not operate.
   - Hallway or a dormitory or school, etc.

4. Non-air conditioned, Special location: If conditions 1 and 2 below are present.
   1. When the piping passes through an indoor area where the indoor unit does not operate.
   2. When the humidity is high and there is no air flow in the location where the piping is installed.
      - The thickness of the above insulation material is based on heat conductivity of 0.61 Btu/in/h/ft^2/°F.

Condensate Drain Piping

Outdoor Units

Outdoor unit requires condensate drain piping. Condensate drain pipe is constructed with materials approved by local code. See "Placement Considerations" on page 176 to page 185 for information on outdoor unit placement and condensate drainage.

Indoor Units

All indoor units generate water during cooling operation, therefore, how to properly handle this condensation must be considered. Some indoor units include factory-installed drain pumps; others apply the gravity drain method.

Depending on the location of the indoor unit, condensation can be drained directly to the outside of the building, or a common indoor unit drainage piping system can be installed, both incorporating PVC piping.

Table 123: Indoor Unit Drain Piping Specifications.

Indoor Unit	Drain Type	Drain Pipe Diameter (OD / ID, in.)	Drain Amount (gal. / min. at 0.033 ft. height)
Art Cool Wall-Mounted	Gravity	13/16 / 5/8	—
Art Cool Gallery	Gravity	13/16 / 5/8	—
Standard Wall-Mounted	Gravity	13/16 / 5/8	—
Ceiling-Concealed Ducted (Low Static and High Static)	27-1/2 in. Lift Drain Pump, Factory Installed	Ø1-1/4 / Ø1	0.105
Four-Way Ceiling Cassette	27-1/2 in. Lift Drain Pump, Factory Installed	Ø1-1/4 / Ø1	0.105
Vertical-Horizontal Air Handling Unit	Gravity	Ø3/4 / —	—

Figure 285: Diagram of an Indoor Unit with a Gravity Drain.

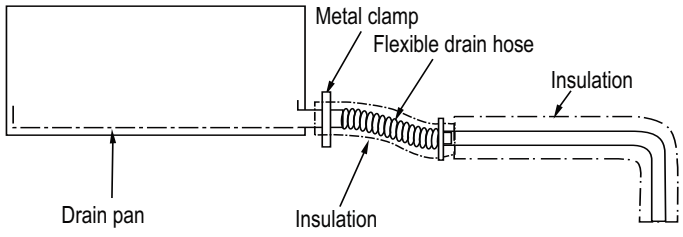
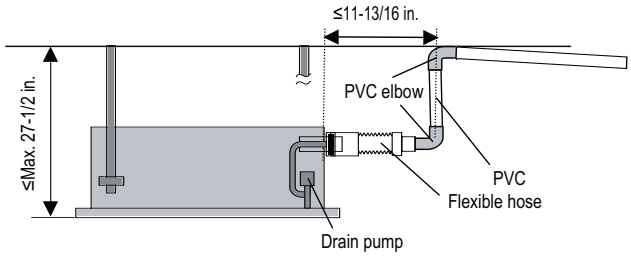


Figure 286: Diagram of an Indoor Unit with a Drain Pump.



Note:

Ensure the indoor unit, refrigerant piping, power wiring / communication cables, and drain piping is properly supported with anchor bolts and clamp hangers positioned at 3.3 to 4.9 foot intervals.

Flexible Drain Hose

Some indoor units include a factory-provided flexible drain pipe for installation.

- Install the flexible drain pipe as straight as possible; sharp angles may cause the pipe to deteriorate and may crack over time.
- Connect the flexible drain pipe with a round clamp. If the flexible drain pipe is not installed properly, water will leak from the connection.

- Do not include a reverse slope in the drain connection.

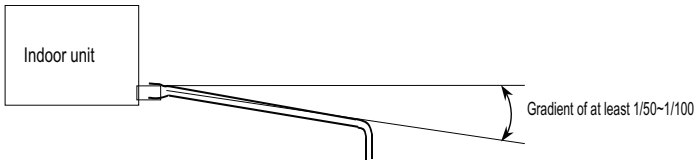
Figure 287: Flexible Drain Hose Connection.

Clamp the Flexible Drain Hose Connection

Drainage Gradient

The gradient for drain piping should be at least 1/50 to 1/100. Ensure any holes through ceilings, walls, etc., are large enough to accommodate both the drain piping and any insulation.

Figure 288: Drain Piping Gradient Recommendation.



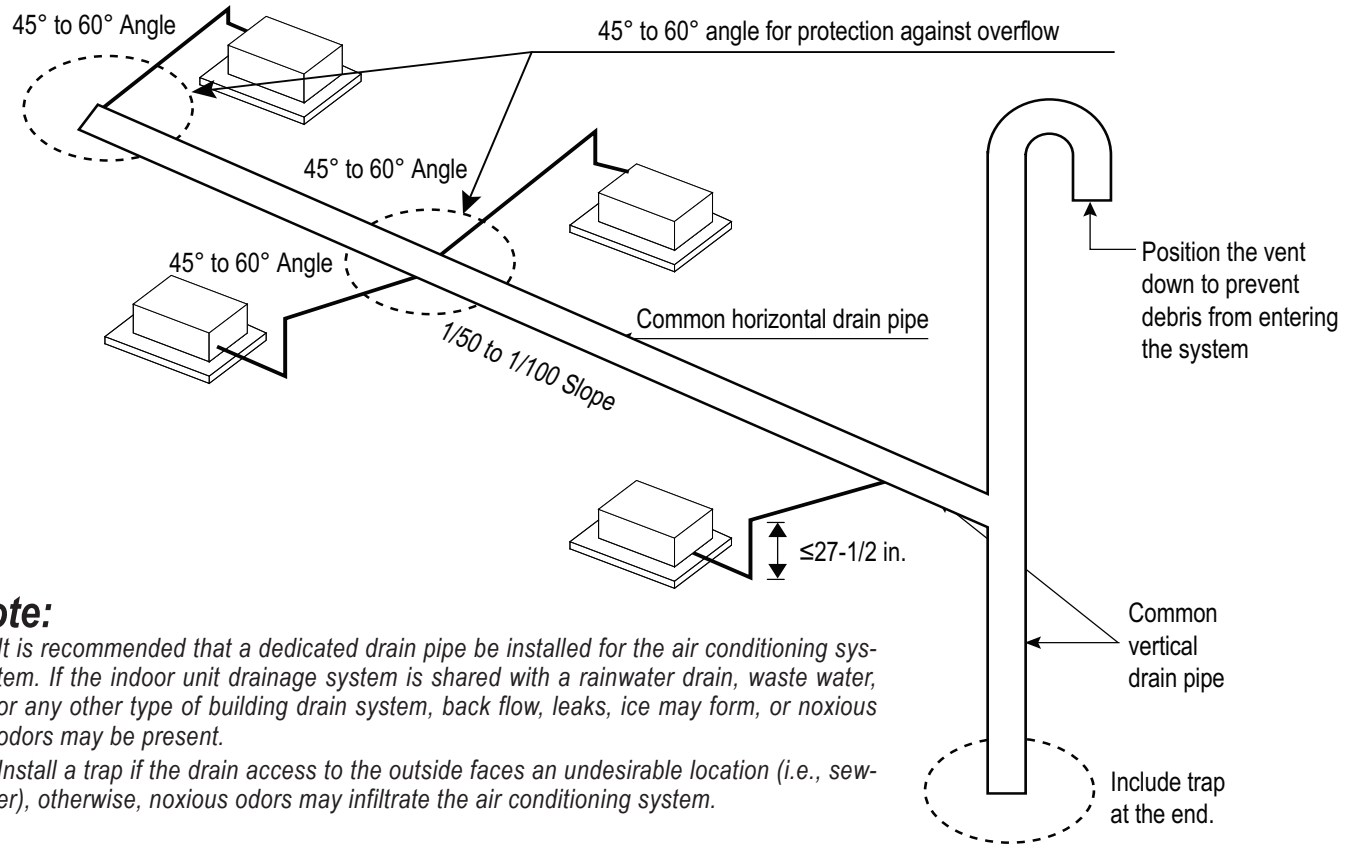
INSTALLATION & LAYOUT BEST PRACTICES

Condensate Drain Piping

Common Indoor Unit Drainage System

It is usual work practice to connect individual indoor unit drain pipes to one common indoor unit drainage system. The diameter of the common vertical drain pipe should be as large as necessary. (For systems with <80,000 Btu/h total capacity of all connected indoor units, the standard size for the common vertical drain pipe is 0.98 ID, in. and 1.26 OD, in.) The diameter of the horizontal pipe should be the same or larger than the vertical drain pipe. To avoid property damage in the event of the primary drain becoming clogged, and to optimize drain system performance, it may be prudent to install a secondary drain line. Design the drain system to plan for winter operation (condensate line may freeze up if condensate does not properly drain away). Drain all generated condensate from the external condensate pan to an appropriate area. Install a trap in the condensate lines as near to the indoor unit coil as possible; to prevent overflow the outlet of each trap should be positioned below its connection to the condensate pan. All traps should be primed, insulated, and leak tested if located above an inhabited space.

Figure 289: Example of a Common Indoor Unit Drainage System.



Note:

- *It is recommended that a dedicated drain pipe be installed for the air conditioning system. If the indoor unit drainage system is shared with a rainwater drain, waste water, or any other type of building drain system, back flow, leaks, ice may form, or noxious odors may be present.*
- *Install a trap if the drain access to the outside faces an undesirable location (i.e., sewer), otherwise, noxious odors may infiltrate the air conditioning system.*

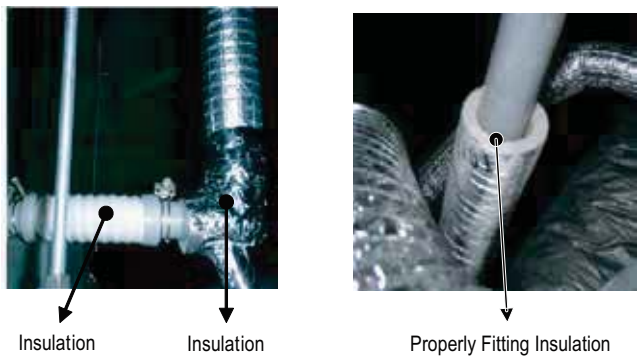
Drain Leak Test

A leak test should be performed 24 hours after the drainage system has been installed. Only use water for the test; other liquids are unacceptable.

Drain Pipe Insulation

To prevent condensate from forming on the drain piping, install field-supplied 0.4 inch thick polyethylene. The insulation should be securely fastened with all connected joints and ends properly covered.

Figure 290: Properly Insulating the Drainage Piping.



CUT SHEET

Y-Branch Kit

- LG Y-Branch Kit PMBL5620 is required when installing two branch distribution units in parallel on one LG Multi F MAX system.
- The kit must be properly installed following instructions in the applicable LG manual. Field-supplied branch fittings are not permitted.
- Kit components must be kept free of debris and be dry before installation.
- All Y-Branch Kits include a clam shell, peel-and-stick insulation jacket.

Table 124: Fitting Properties.

Material	Copper
Design Pressure	551 psig

Table 125: Multi F MAX Y-Branch Connection Diameters.

Model	Y-Branch Type	Port Identifier (inch)		
		1	2	3
PMBL5620	Liquid	Ø3/8	Ø3/8	Ø3/8
	Vapor	Ø3/4	Ø3/4	Ø3/4
	Y-Branch Type	Dimensions (inch)		
		X	Y	
	Liquid	13.80	3.24	
	Vapor	12.48	3.02	

Figure 291: Y-Branch Port Identifier Diagram.

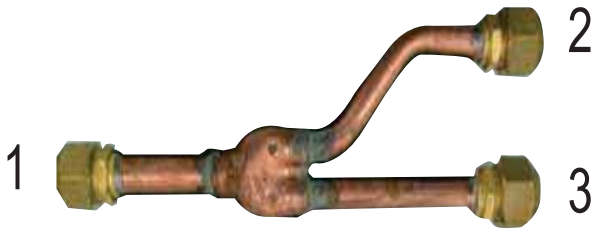
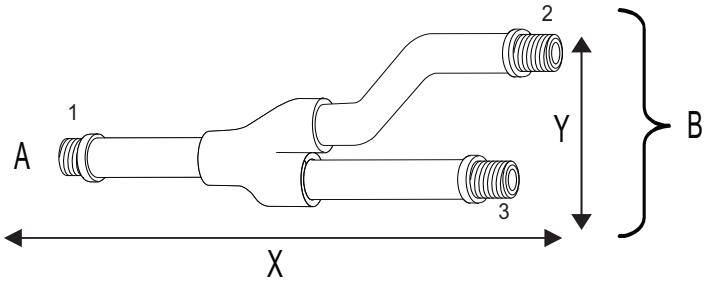


Figure 292: Y-Branch Dimensions Diagram.

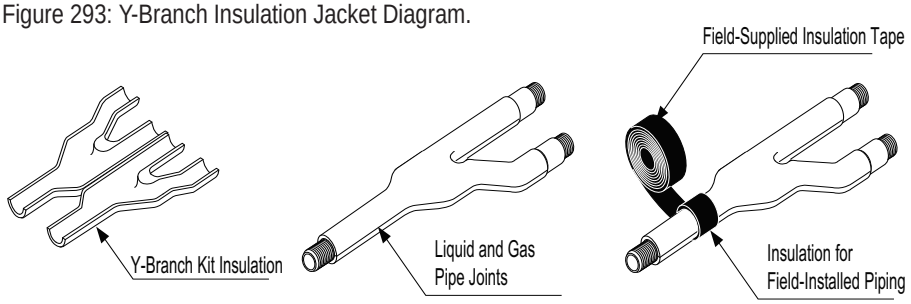


A = To Outdoor Unit
B = To Branch Distribution Unit

Table 126: Insulation Jacket Properties.

Material	Polyolefin Foam
UL94 Flame Classification	HF-1
Density	1.84 lbs./ft.^{3}
Thermal Conductivity	.0208 Btu/h/ft. ^oR
Thickness	1/2 inch

Figure 293: Y-Branch Insulation Jacket Diagram.



WIRING CONNECTIONS

WIRING CONNECTIONS

General Information

MULTI F
MULTI F MAX

⚠ 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 / ETL 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.*
- *Undersized wiring may lead to unacceptable voltage at the unit and may cause unit malfunction and be a fire hazard.*
- *Properly ground the Multi Zone outdoor, 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.*
- ⃠ *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. Use clamps to prevent the wires from touching the piping. Failure to properly provide a National Electrical Code-approved earth ground can result in explosion, electric shock, fire, physical injury or death.*
- *Verify that the branch switch and circuit breaker are set to OFF before installing the wiring system. Electric shock can cause physical injury or death.*
- *Install appropriately sized breakers / fuses / overcurrent protection switches and wiring in accordance with local, state, and National Electrical Code regulations related to electrical equipment and wiring, and following the instructions in this manual. Using an oversized breaker or fuse may result in electric shock, physical injury or death.*

Note:

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

Power Wiring and Communications Cable Installation

For both Multi F and Multi F MAX systems, power is wired to the outdoor unit only. The outdoor unit will supply power to the branch distribution units (Multi F MAX systems only) and the indoor units through the power wiring / communications cable.

Power Supply / Power Wiring Specifications

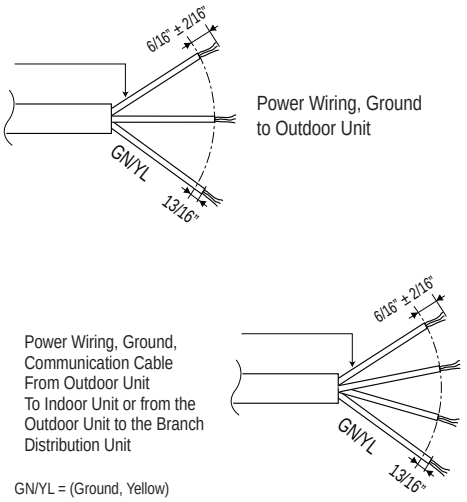
Note:

- *Multi F and Multi F MAX systems operate at 1Ø, 208-230V, 60Hz. Power supply, wire type and size should be selected based on National Electrical Code and local codes. Maximum allowable voltage fluctuation ±10% or nameplate rated value.*
- *Properly ground the outdoor units per National Electrical Code and local codes.*
- *For power to the outdoor units, use field-supplied copper wiring that is solid or stranded, and shielded with the wires separately insulated.*
- *Ground wire should be longer than the common power / communication wires.*
- *Connect the wiring firmly so the wires cannot be easily pulled out.*
- *Refer to the inside of the chassis cover for circuit and terminal block diagrams for your model unit. Always match color codes of each wire and follow wiring diagram.Outdoor unit wiring can be found on the inside of the outdoor unit control cover.*

General Communication Cable Specifications

- Multi F Systems: All power wiring / communication cable to be minimum 18 AWG from the outdoor unit to the indoor unit, 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 Systems: All power wiring / communication cable to be minimum 16 AWG from the outdoor unit to the BD unit, and 18 AWG from the BD unit to the indoor unit, 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.
- For power / communication wires between the Multi F and Multi F MAX outdoor units and the indoor units / BD units (Multi F MAX systems only), use a four (4) conductor, stranded, shielded or unshielded wire. If shielded, the wire must be grounded to the chassis at the outdoor unit only.
- Insulation material as required by local code.
- Rated for continuous exposure of temperatures up to 140°F.
- Firmly attach the cable; provide slack but secure in a way to prevent external forces from being imparted on the terminal block.
- Wiring should be completed without splices.

Figure 294:Multi F / Multi F MAX Outdoor and Indoor / Branch Distribution Unit Wiring and Communications Cable Diagram.



Connecting the Power Wiring / Communications Cable

Best practice dictates using ring or spade terminals to terminate power wiring at the power terminal block. If ring terminals or spade clips are not available, then:

- ⃠ Do not terminate different gauge wires to the power terminal block. (Slack in the wiring may generate heat.)
- When terminating wires of the same thickness, follow the instructions demonstrated in the figures below.

- Firmly attach the wire; secure in a way to prevent external forces from being imparted on the terminal block.
- Use an appropriately sized screwdriver for tightening the terminals.
- ⃠ Do not overtighten the connections; overtightening may damage the terminals.

Figure 295:Close up of a Typical Ring Terminal.

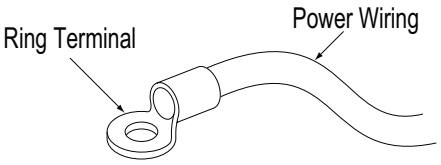


Figure 296:Proper and Improper Power Wiring Connections.

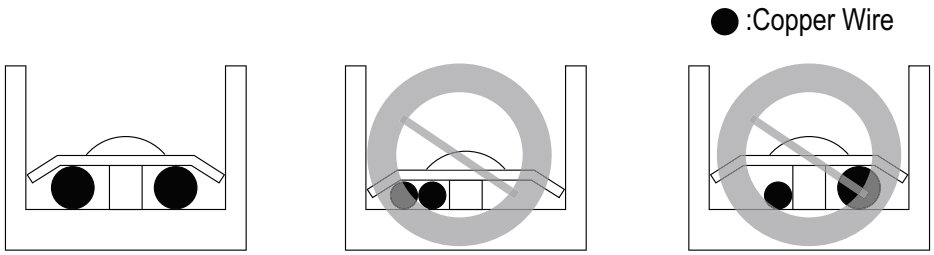
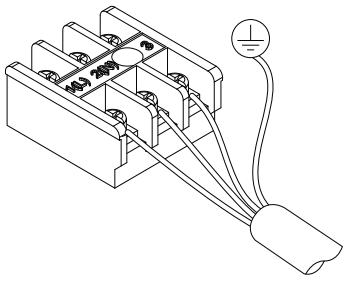


Figure 297:Close up of the Indoor Unit Terminal Block.



⚠ WARNING

- *There is a risk of fire, electric shock, physical harm or injury, or death if the power wires are not properly terminated and / or firmly attached.*
- *Never apply line voltage power to the communications cable terminal block. If contact is made, the PCBs may be damaged.*

Note:

Always include some allowance in the wiring length when terminating. Provide some slack to facilitate removing the electrical panels while servicing.

WIRING CONNECTIONS

General Information

Figure 298:Multi F System General Power / Communications System Schematic.

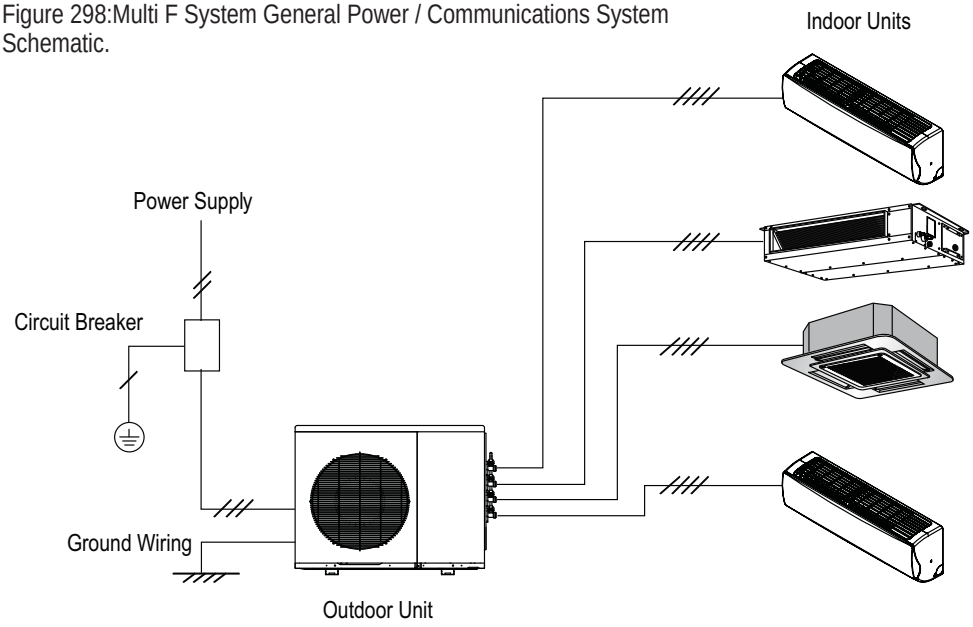
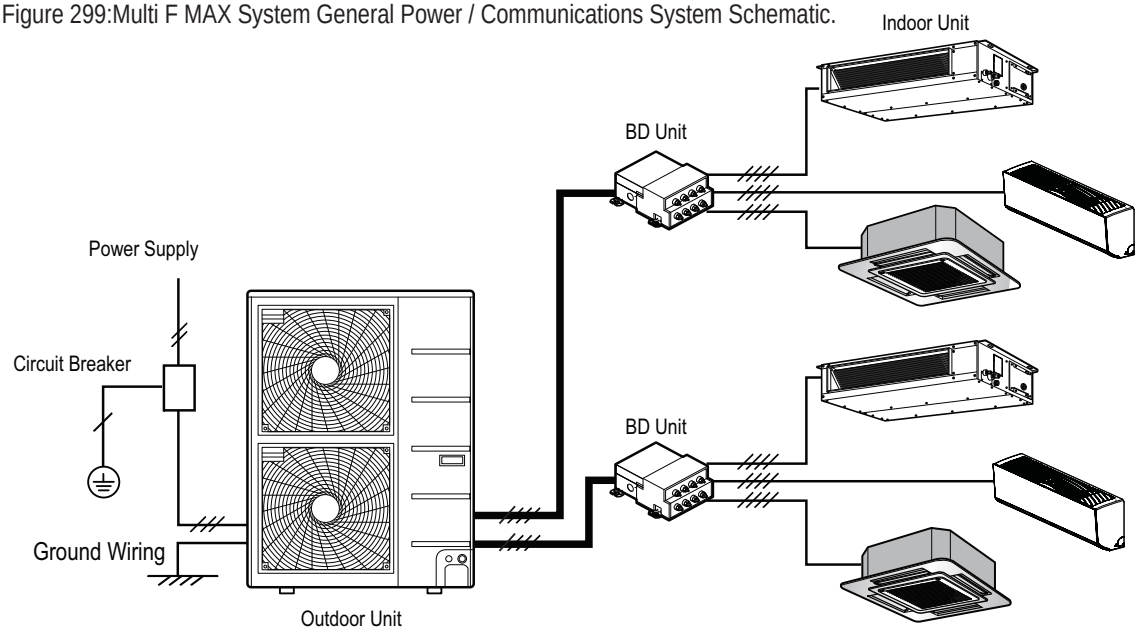


Figure 299:Multi F MAX System General Power / Communications System Schematic.



Note:

- *Secure the separate wires in the control box panel using zip ties.*
- *Secure wiring with accessory clamps so that it does not touch piping.*
- *Use a conduit for the cable.*
- *Outside the unit, make sure the communications cable and the power wiring are separately shielded, otherwise, the outdoor unit operation may be affected by electrical noise and will malfunction or fail.*

WIRING CONNECTIONS

Power Wiring (208-230V) and Communications Cable Details

- Find the outdoor unit terminal block by unscrewing the control access panel.
- Side panel of the outdoor unit has knockout holes for the conduits. After install is complete, seal up any gaps between the panel and the conduits.
- Clamp is included near the terminal block to help protect the connections from strain on the cables.

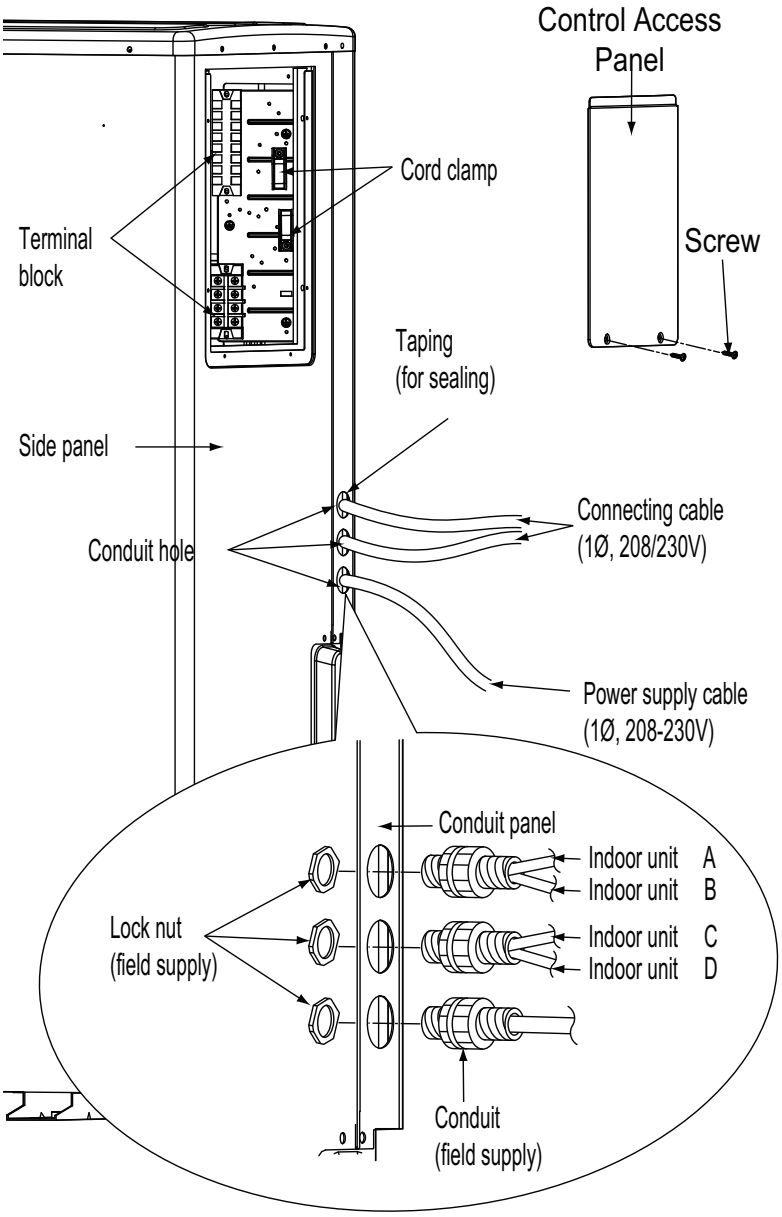
⚠ WARNING

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

Note:

- *Use a conduit for the communications cable / power wiring from the outdoor unit to the indoor / branch distribution units.*
- *The communications cable / power wiring from the outdoor unit to the indoor / branch distribution units should be separated and isolated from power wiring to the outdoor unit, computers, radio and television broadcasting facilities, as well as medical imaging equipment.*

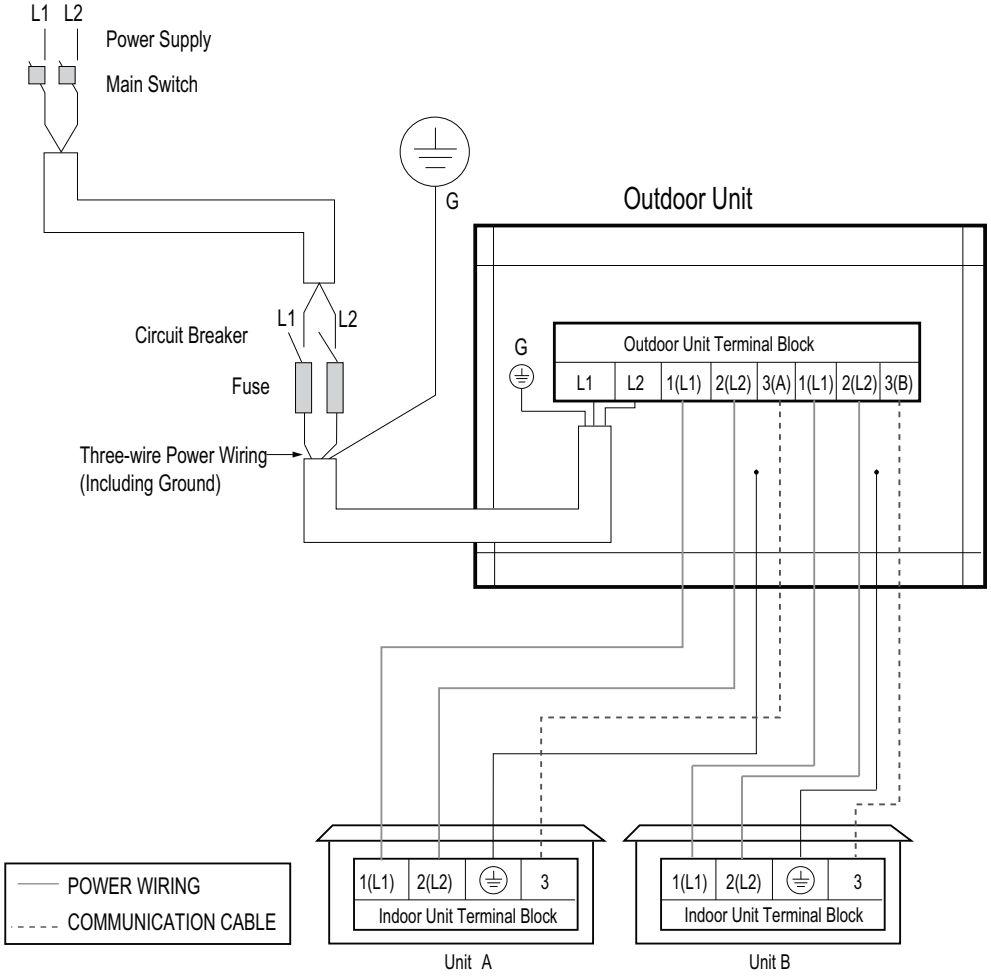
Figure 300:Example of Power Wiring and Communications Cable Terminations.



WIRING CONNECTIONS

Power Wiring (208-230V) and Communications Cable Details

Figure 301: Multi F LMU18CHV System Power Wiring and Communications Cable.



⚠ WARNING

- *All field-supplied wiring, components, and materials should follow national, state, and local codes and requirements. Electric shock can cause physical injury or death.*
- *Use only stranded, shielded or unshielded copper communications / power wiring from the outdoor unit to the indoor units. If shielded, wiring must be grounded to the chassis at the outdoor unit only. Improper wiring may result in fire, electric shock, 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. Improper wiring may result in fire, electric shock, physical injury or death.*
- *Install a main shutoff switch or circuit breaker that interrupts all power sources simultaneously. Electric shock can cause physical injury or death.*
- *Wiring cable size must comply with applicable national, state, and local codes. Improper wiring may result in fire, electric shock, physical injury or death.*

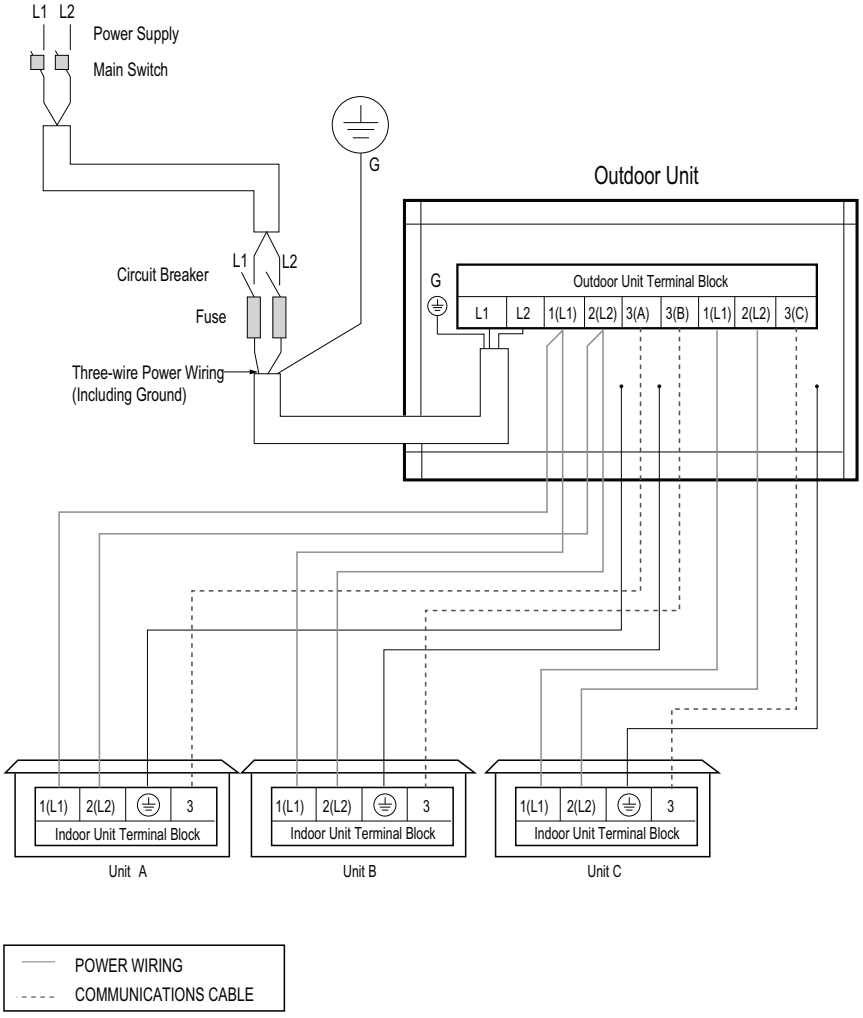
Note:

- *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.*
- *All field-supplied wiring, components, and materials should follow national, state, and local codes and requirements. Failure to install proper electrical components can result in property damage and equipment malfunction.*
- *Use only stranded, shielded or unshielded copper communications / power wiring from the outdoor unit to the indoor units. If shielded, wiring must be grounded to the chassis at the outdoor unit only. Failure to install proper 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 can result in property damage and equipment malfunction.*
- *Wiring cable size must comply with applicable national, state, and local codes. Improper wiring can result in property damage and equipment malfunction.*

WIRING CONNECTIONS

Power Wiring (208-230V) and Communications Cable Details

Figure 302:Multi F LMU24CHV System Power Wiring and Communications Cable.



⚠ WARNING

- *All field-supplied wiring, components, and materials should follow national, state, and local codes and requirements. Electric shock can cause physical injury or death.*
- *Use only stranded, shielded or unshielded copper communications / power wiring from the outdoor unit to the indoor units. If shielded, wiring must be grounded to the chassis at the outdoor unit only. Improper wiring may result in fire, electric shock, 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. Improper wiring may result in fire, electric shock, physical injury or death.*
- *Install a main shutoff switch or circuit breaker that interrupts all power sources simultaneously. Electric shock can cause physical injury or death.*
- *Wiring cable size must comply with applicable national, state, and local codes. Improper wiring may result in fire, electric shock, physical injury or death.*

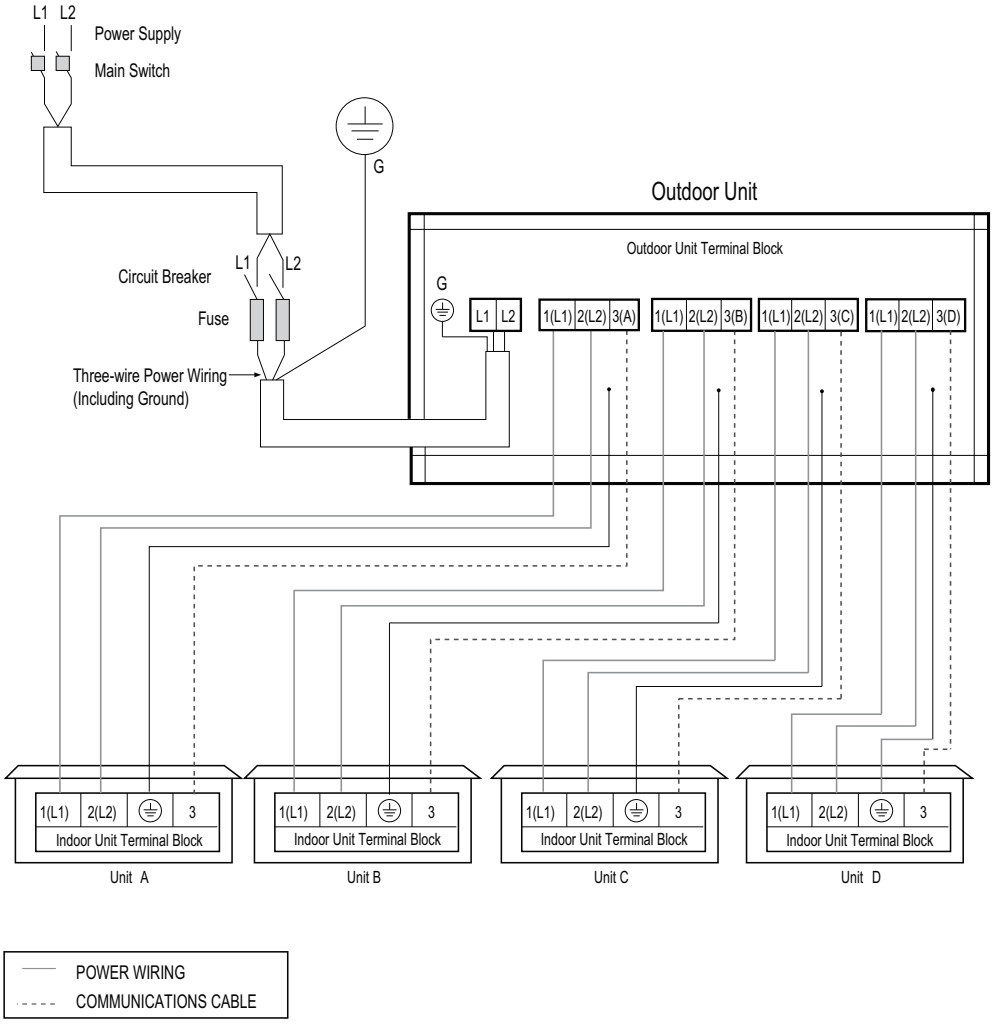
Note:

- *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.*
- *All field-supplied wiring, components, and materials should follow national, state, and local codes and requirements. Failure to install proper electrical components can result in property damage and equipment malfunction.*
- *Use only stranded, shielded or unshielded copper communications / power wiring from the outdoor unit to the indoor units. If shielded, wiring must be grounded to the chassis at the outdoor unit only. Failure to install proper 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 can result in property damage and equipment malfunction.*
- *Wiring cable size must comply with applicable national, state, and local codes. Improper wiring can result in property damage and equipment malfunction.*

WIRING CONNECTIONS

Power Wiring (208-230V) and Communications Cable Details

Figure 303:Multi F LMU30CHV and LMU36CHV System Power Wiring and Communications Cable.



⚠ WARNING

- *All field-supplied wiring, components, and materials should follow national, state, and local codes and requirements. Electric shock can cause physical injury or death.*
- *Use only stranded, shielded or unshielded copper communications / power wiring from the outdoor unit to the indoor units. If shielded, wiring must be grounded to the chassis at the outdoor unit only. Improper wiring may result in fire, electric shock, 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. Improper wiring may result in fire, electric shock, physical injury or death.*
- *Install a main shutoff switch or circuit breaker that interrupts all power sources simultaneously. Electric shock can cause physical injury or death.*
- *Wiring cable size must comply with applicable national, state, and local codes. Improper wiring may result in fire, electric shock, physical injury or death.*

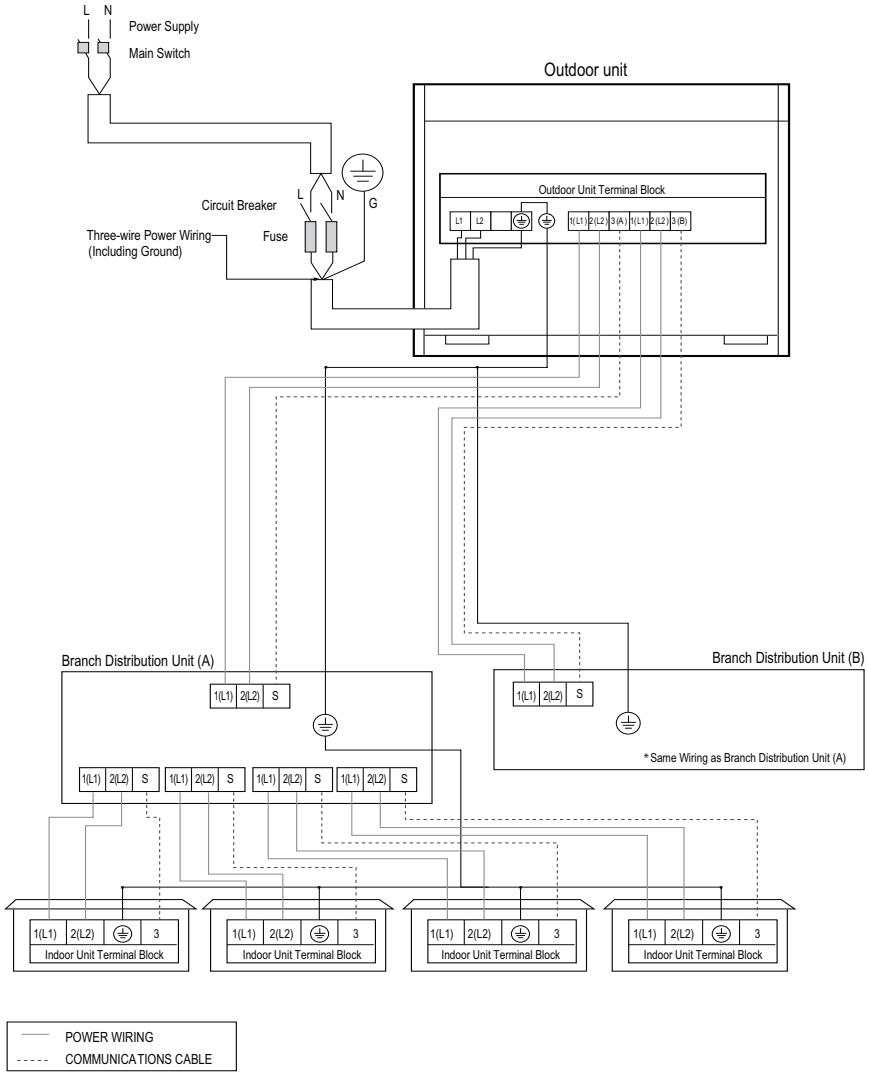
Note:

- *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.*
- *All field-supplied wiring, components, and materials should follow national, state, and local codes and requirements. Failure to install proper electrical components can result in property damage and equipment malfunction.*
- *Use only stranded, shielded or unshielded copper communications / power wiring from the outdoor unit to the indoor units. If shielded, wiring must be grounded to the chassis at the outdoor unit only. Failure to install proper 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 can result in property damage and equipment malfunction.*
- *Wiring cable size must comply with applicable national, state, and local codes. Improper wiring can result in property damage and equipment malfunction.*

WIRING CONNECTIONS

Power Wiring (208-230V) and Communications Cable Details

Figure 304:Multi F MAX LMU480HV and LMU540HV System Power Wiring and Communications Cable.



⚠ WARNING

- *All field-supplied wiring, components, and materials should follow national, state, and local codes and requirements. Electric shock can cause physical injury or death.*
- *Use only stranded, shielded or unshielded copper communications / power wiring from the outdoor unit to the indoor units. If shielded, wiring must be grounded to the chassis at the outdoor unit only. Improper wiring may result in fire, electric shock, 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. Improper wiring may result in fire, electric shock, physical injury or death.*
- *Install a main shutoff switch or circuit breaker that interrupts all power sources simultaneously. Electric shock can cause physical injury or death.*
- *Wiring cable size must comply with applicable national, state, and local codes. Improper wiring may result in fire, electric shock, physical injury or death.*

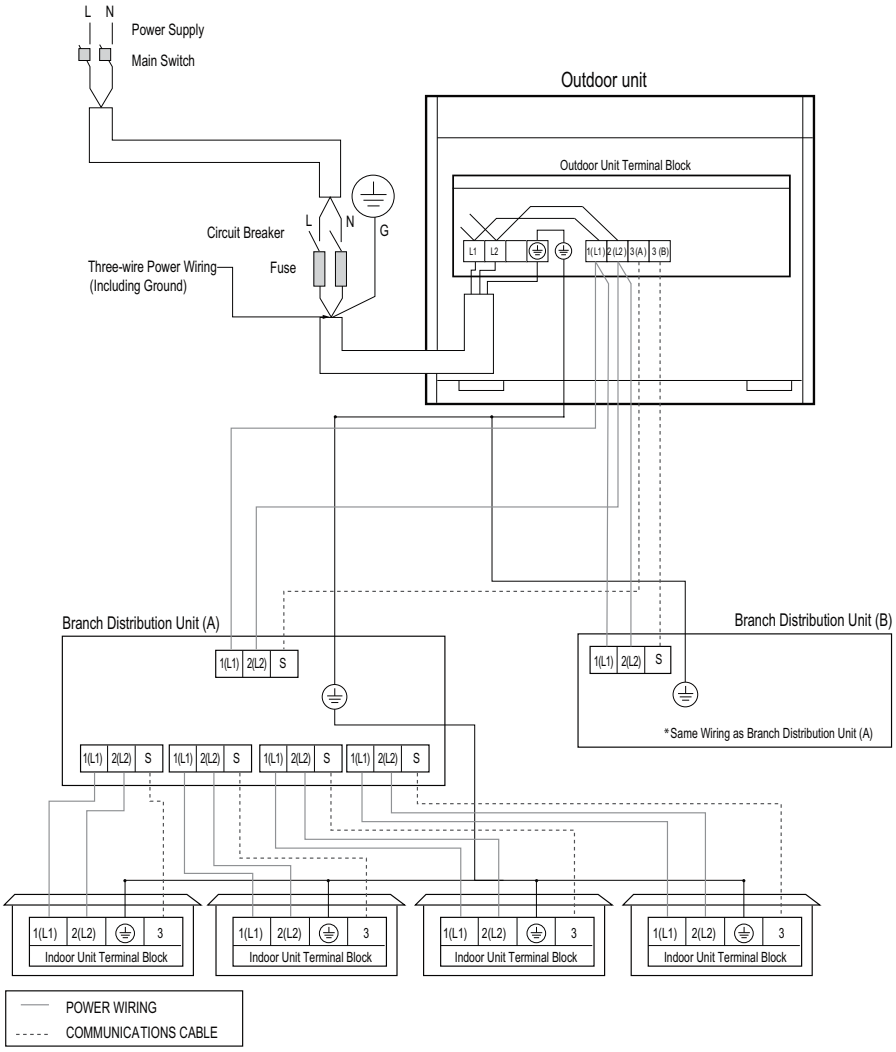
Note:

- *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.*
- *All field-supplied wiring, components, and materials should follow national, state, and local codes and requirements. Failure to install proper electrical components can result in property damage and equipment malfunction.*
- *Use only stranded, shielded or unshielded copper communications / power wiring from the outdoor unit to the indoor units. If shielded, wiring must be grounded to the chassis at the outdoor unit only. Failure to install proper 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 can result in property damage and equipment malfunction.*
- *Wiring cable size must comply with applicable national, state, and local codes. Improper wiring can result in property damage and equipment malfunction.*

WIRING CONNECTIONS

Power Wiring (208-230V) and Communications Cable Details

Figure 305:Multi F MAX LMU600HV System Power Wiring and Communications Cable.



⚠ WARNING

- *All field-supplied wiring, components, and materials should follow national, state, and local codes and requirements. Electric shock can cause physical injury or death.*
- *Use only stranded, shielded or unshielded copper communications / power wiring from the outdoor unit to the indoor units. If shielded, wiring must be grounded to the chassis at the outdoor unit only. Improper wiring may result in fire, electric shock, 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. Improper wiring may result in fire, electric shock, physical injury or death.*
- *Install a main shutoff switch or circuit breaker that interrupts all power sources simultaneously. Electric shock can cause physical injury or death.*
- *Wiring cable size must comply with applicable national, state, and local codes. Improper wiring may result in fire, electric shock, physical injury or death.*

Note:

- *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.*
- *All field-supplied wiring, components, and materials should follow national, state, and local codes and requirements. Failure to install proper electrical components can result in property damage and equipment malfunction.*
- *Use only stranded, shielded or unshielded copper communications / power wiring from the outdoor unit to the indoor units. If shielded, wiring must be grounded to the chassis at the outdoor unit only. Failure to install proper 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 can result in property damage and equipment malfunction.*
- *Wiring cable size must comply with applicable national, state, and local codes. Improper wiring can result in property damage and equipment malfunction.*

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

1. If any indoor units were specified to operate in unison, use one (or multiple) three-core Group Control Kit (sold separately) containing extension and Y-splitter cables. One (1) group control cable kit for each indoor unit in the group except for the last indoor unit.

2. Always use an LG provided group control communications cable (Group Control Kit; sold separately) between the indoor unit and the wall-mounted zone controller.

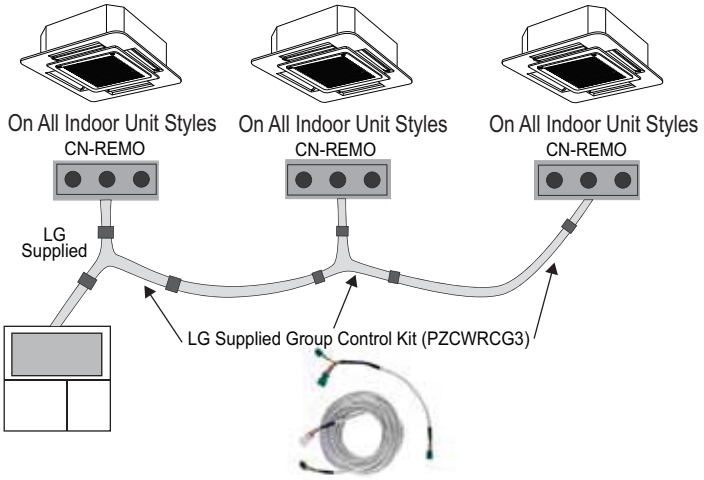
3. ⃠ NEVER splice, cut, or extend cable length with field-provided cable.

4. A maximum of 16 indoor units can be connected to a wired remote controller (maximum wire length: 164 feet). Before running cable, decide which indoor unit will be the “Master;” set the remaining as “Slave.” The zone controller will be connected to the “Master.”

5. Identify each indoor unit operating as a group as “Master” or “Slave”. Adjust the pertinent DIP switch at each indoor unit. On wall mounted indoor unit models, set the assignment using the handheld remote controller.

6. Use a daisy chain configuration and connect all of the group’s indoor units together starting at the “Master” unit.

Figure 306:Indoor Unit Group to Zone Controller Connections.



Note:

Cable connected to Zone Controller is the factory default connection.

General Specifications

- Wired remote controllers can be connected to all indoor unit types.
- Wireless handheld controllers can be used in conjunction with wired remote controllers.
- A dry contact unit can be connected with a central controller simultaneously.
  - The master indoor unit is recognized by the dry contact unit and the central controller.
  - Group Control only available for indoor units manufactured after February 2009.
  - The central controller can control indoor units after setting the address of the master indoor unit only.
  - Slave indoor unit cannot be individually controlled by central controller.
  - Slave indoor unit will operate like master 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)

Table 127:Accessories Required for Group Control.

Accessory	Model Number	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	

Table 128: Table of Acronyms.

ABS	Acrylonitrile Butadiene Styrene	IAQ	Indoor Air Quality
AC	Air Conditioner	IDU	Indoor Unit
ACP	Advanced Control Platform	IUCF	Indoor Unit Correction Factor
ARI	Air Conditioning and Refrigeration Institute	KTL	Korea Testing Laboratories
ASHRAE	American Society of Heating, Refrigeration, and Air Conditioning	LATS	LG Air Conditioning Technical Solution
AWG	American Wire Gauge	LGAP	LG Air Conditioner Protocol
BDU	Branch Distribution (Unit)	MAT	Mixed Air Temperature
Btu/h	British Thermal Units per hour	MBh	Thousands BTUs per hour
CCR	Corrected Capacity Ratio	MCA	Maximum Circuit Ampacity
CDOA	Coupled Dedicated Outdoor Air	MFS	Maximum Fuse Size
CFM	Cubic Feet per Minute	NEC	National Electrical Code
CR	Combination Ratio	OAT	Outdoor Air Temperature
DB	Dry Bulb	ODU	Outdoor Unit
dB(A)	Decibels with “A” frequency weighting	OUCF	Outdoor Unit Correction Factor
DDOAS	Decoupled Dedicated Outdoor Air	PDI	Power Distribution Indicator
DFS	Duct-Free Split	PI	Power Input
DI	Digital Input	PTAC	Packaged Terminal Air Conditioner
DO	Digital Output	PVE	Polyvinyl Ether
EEV	Electronic Expansion Valve	RAT	Return Air Temperature
ELF	Equivalent Length in Feet	RCL	Refrigerant Concentration Limit
EPDM	Ethylene Propylene Diene M-Class Rubber	SC	Sensible Capacity
ESP	External Static Pressure	TC	Total Capacity
ETL	Electronic Testing Laboratories	VAV	Variable Air Volume
HACR	Heating, Air Conditioning, and Refrigeration	VRF	Variable Refrigerant Flow
H/M/L	High / Medium / Low	VRP	Ventilation Rate Procedure

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EM_MultiF_IDU_11_16
Supersedes EM_MultiF_IDU_7_16
EM_MultiF_IDU_7_15
EM-MultiFIDU-01-15
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