Multi-Zone Heat Pump Systems
1.5 to 5 Tons

Dual and Tri-Zone Multi F
Quad-Zone Multi F
Eight-Zone Multi F MAX
PROPRIETARY DATA NOTICE

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The instructions included in this manual must be followed to prevent product malfunction, property damage, injury, or death to the user or other people. Incorrect operation due to ignoring any instructions will cause harm or damage. The level of seriousness is classified by the symbols described by the summary list of safety precautions on page 4.

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

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

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<thead>
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<th>Symbol</th>
<th>Description</th>
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<tr>
<td><img src="image" alt="DANGER" /></td>
<td>This symbol indicates an imminently hazardous situation which, if not avoided, will result in death or serious injury.</td>
</tr>
<tr>
<td><img src="image" alt="WARNING" /></td>
<td>This symbol indicates a potentially hazardous situation which, if not avoided, could result in death or serious injury.</td>
</tr>
<tr>
<td><img src="image" alt="CAUTION" /></td>
<td>This symbol indicates a potentially hazardous situation which, if not avoided, may result in minor or moderate injury.</td>
</tr>
<tr>
<td><img src="image" alt="Note" /></td>
<td>This symbol indicates situations that may result in equipment or property damage accidents only.</td>
</tr>
<tr>
<td><img src="image" alt="Action" /></td>
<td>This symbol indicates an action should not be completed.</td>
</tr>
</tbody>
</table>

### Installation

**DANGER**

⚠️ Do not store or use flammable gas or combustibles near the unit. There is risk of fire, explosion, and physical injury or death.

⚠️ Do not supply power to the unit until all wiring and piping are completed or reconnected and checked. There is risk of physical injury or death due to electric shock.

**WARNING**

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

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

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

⚠️ Do not change the settings of the protection devices. If the protection devices have been bypassed or is forced to operate improperly, or parts other than those specified by LG are used, there is risk of fire, electric shock, explosion, and physical injury or death.

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

Always check for system refrigerant leaks after the unit has been installed or serviced. Exposure to high concentration levels of refrigerant gas may lead to illness or death.

Always check for system refrigerant leaks after the unit has been installed or serviced. Exposure to high concentration levels of refrigerant gas may lead to illness or death.

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

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

The branch distribution (BD) unit must be installed indoors; do not install the BD unit in a highly humid environment. There is risk of physical injury or death due to electric shock.

Dispose the packing materials safely. • Packing materials, such as nails and other metal or wooden parts, may cause puncture wounds or other injuries. • Tear apart and throw away plastic packaging bags so that children may not play with them and risk suffocation and death.

Install the unit considering the potential for strong winds or earthquakes. Improper installation may cause the unit to fall over, resulting in physical injury or death.

Install the unit in a safe location where nobody can step, fall onto it, or place objects on it. Do not install the unit on a defective stand. It may result in an accident that causes physical injury or death.
SAFETY INSTRUCTIONS

Installation, continued

⚠️ WARNING
Properly insulate all cold surfaces to prevent “sweating.”
Cold surfaces such as uninsulated piping can generate condensate that could drip, causing a slippery surface that creates a risk of slipping, falling, and personal injury.

⚠️ CAUTION
Be very careful when transporting the product. There is a risk of the product falling and causing physical injury.
• Use appropriate moving equipment to transport each frame; ensure the equipment is capable of supporting the weights listed.
• Some products use polypropylene bands for packaging. Do not use polypropylene bands to lift the unit.
• Support the outdoor unit a minimum of four points to avoid slippage from rigging apparatus.

Note
LG Electronics U.S.A., Inc., is not responsible for any piping calculations, refrigerant leaks, degradation of performance, or any other potential problems or damages as a result of interconnecting piping, their joint connections, isolation valves, introduced debris inside the piping system, or other problems caused by the interconnecting piping system.

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

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

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

Always check for system refrigerant leaks after the unit has been installed or serviced.
Low refrigerant levels may cause product failure.

The branch distribution (BD) unit must be installed indoors;
Do not install the BD box in a highly humid environment.
There is risk of product failure and property damage.

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

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

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

Keep the unit upright during installation to avoid vibration or water leakage.

When connecting refrigerant tubing, remember to allow for pipe expansion.
Improper piping may cause refrigerant leaks and system malfunction.

Do not install the outdoor unit or BD unit in a noise-sensitive area.

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

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

Install the unit in a safe location where nobody can step on or fall onto it. Do not install the unit on a defective stand.
There is a risk of unit and property damage.

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

**DANGER**

High voltage electricity is required to operate this system. Adhere to the NEC code and these instructions when wiring. Improper connections and inadequate grounding can cause accidental injury or death.

Always ground the unit following local, state, and NEC codes. There is risk of fire, electric shock, and physical injury or death.

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

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

**WARNING**

The information contained in this manual is intended for use by an industry-qualified, experienced, certified electrician familiar with the U.S. National Electric Code (NEC) who is equipped with the proper tools and test instruments. Failure to carefully read and follow all instructions in this manual can result in equipment malfunction, property damage, personal injury or death.

All electric work must be performed by a licensed electrician and conform to local building codes or, in the absence of local codes, with the National Electrical Code, and the instructions given in this manual. If the power source capacity is inadequate or the electric work is not performed properly, it may result in fire, electric shock, physical injury or death.

Refer to local, state, and federal codes, and use power wires of sufficient current capacity and rating. Wires that are too small may generate heat and cause a fire.

Secure all field wiring connections with appropriate wire strain relief. Improperly securing wires will create undue stress on equipment power lugs. Inadequate connections may generate heat, cause a fire and physical injury or death.

Ensure the system is connected to a dedicated power source that provides adequate power. If the power source capacity is inadequate or the electric work is not performed properly, it may result in fire, electric shock, physical injury or death.

Properly tighten all power connections. Loose wiring may overheat at connection points, causing a fire, physical injury or death.

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

**Note**

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

Operation

⚠️ DANGER

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

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

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

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

⚠️ WARNING

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

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

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

⚠️ Do not open the inlet during operation.
There is risk of electric shock, physical injury or death.

⚠️ CAUTION

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

Note

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

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

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

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

⚠️ Do not open the inlet during operation.
There is risk of unit failure.

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

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

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

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

Use a only soft cloth to clean the air conditioner.
⚠️ Do not use wax, thinner, or strong detergents.
Strong cleaning products may damage the surface of the air conditioner, or may cause its appearance to deteriorate.
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### SPECIFICATIONS

**Multi F Outdoor Units**

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#### Table 1: Multi F Outdoor Unit Specifications.

<table>
<thead>
<tr>
<th>Model Number</th>
<th>LMU18CHV</th>
<th>LMU24CHV</th>
<th>LMU30CHV</th>
<th>LMU36CHV</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Cooling Capacity (Btu/h)</strong></td>
<td>8,400 – 17,000</td>
<td>8,400 – 20,000</td>
<td>8,400 – 30,000</td>
<td>8,400 – 32,000</td>
</tr>
<tr>
<td><strong>Heating Capacity (Btu/h)</strong></td>
<td>14,000 – 22,000</td>
<td>14,000 – 24,000</td>
<td>14,000 – 30,000</td>
<td>14,000 – 32,000</td>
</tr>
</tbody>
</table>

#### Operating Range

- **Cooling (°F DB)**: 14° – 118°
- **Heating (°F WB)**: -4° – 64°

#### Compressor

- **Inverter Quantity**: Twin Rotary x 1
- **Oil Type**: FVC68D
- **Fan (Side Discharge)**: Propeller
- **Motor Output (W) x Qty.**: 85.4 x 1
- **Motor/Drive**: Brushless Digitally Controlled / Direct

#### Unit Data

- **Refrigerant Type**: R410A
- **Refrigerant Control/Location**: EEV/Outdoor Unit
- **Minimum Number Indoor Units/System**: 2
- **Maximum Number Indoor Units/System**: 3
- **Maximum Allowable Total Indoor Unit Connected Capacity (Btu/h)**: 24,000
- **Sound Pressure (Cooling / Heating) dB(A)**: 49 / 52
- **Net Unit Weight (lbs.)**: 100
- **Shipping Weight (lbs.)**: 108
- **Power Wiring / Communications Cable (No. x AWG)**: 4C x 18

#### Heat Exchanger

- **Material and Fin Coating**: Copper Tube/Aluminum Fin and GoldFin™/Hydrophilic
- **Rows/Columns/Fins per inch x Qty.**: (2 x 28 x 14) x 1

#### Piping

- **Liquid Line Connection (in., OD) x Qty.**: 1/4 x 2
- **Vapor Line Connection (in., OD) x Qty.**: 3/8 x 2
- **Factory Charge lbs. of R410A**: 3.96
- **Piping Lengths**:
  - **Maximum Total Piping (ft.)**: 164.0
  - **Maximum Outdoor Unit to Indoor Unit Piping (ft.)**: 82.0
  - **Piping Length (No Additional Refrigerant (ft))**: 49.2
  - **Maximum Elevation between Outdoor Unit and Indoor Unit (ft.)**: 24.6

1. Rated capacity applied with non-ducted indoor units, and is rated 0 ft. above sea level with 25 ft. of refrigerant line per indoor unit and a 0 ft. level difference between outdoor and indoor units. All capacities are net with a combination ratio between 95 – 105%.
2. Rated cooling capacity obtained with air entering the indoor unit at 80°F dry bulb (DB) and 67°F wet bulb (WB) and outdoor ambient conditions of 95°F dry bulb (DB) and 75°F wet bulb (WB).
3. Rated heating capacity obtained with air entering the indoor unit at 70°F dry bulb (DB) and 60°F wet bulb (WB) and outdoor ambient conditions of 47°F dry bulb (DB) and 43°F wet bulb (WB).
4. At least two indoor units should be connected. 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 www.lg-dfs.com.
5. 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.
6. Power wiring to the outdoor unit is field supplied, solid or stranded, and must comply with the applicable local and national codes. For detailed information, please refer to electrical characteristics on page 11.
7. 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. For detailed electrical information, please refer to electric characteristics on page 11.
8. Piping lengths are equivalent.
9. Installation of an optional Low Ambient Wind Baffle Kit will allow operation down to -4°F in cooling mode.
## Table 2: Multi F MAX Outdoor Unit General Data.

<table>
<thead>
<tr>
<th>Model Number</th>
<th>LMU480HV</th>
<th>LMU540HV</th>
<th>LMU600HV</th>
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<tbody>
<tr>
<td>Cooling Capacity (Btu/h) (Minimum ~ Rated ~ Maximum)</td>
<td>14,400<del>48,000</del>58,000</td>
<td>14,400<del>52,500</del>63,200</td>
<td>15,600<del>60,000</del>68,000</td>
</tr>
<tr>
<td>Heating Capacity (Btu/h) (Minimum ~ Rated ~ Maximum)</td>
<td>15,840<del>54,000</del>61,000</td>
<td>16,272<del>58,000</del>64,000</td>
<td>17,940<del>64,000</del>70,000</td>
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</table>

### Operating Range

<table>
<thead>
<tr>
<th></th>
<th>Cooling (°F DB)</th>
<th>Heating (°F WB)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>14' - 118</td>
<td>-4 - 64</td>
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</table>

### Compressor

<table>
<thead>
<tr>
<th>Inverter Quantity</th>
<th>Twin Rotary x 1</th>
<th>Twin Rotary x 1</th>
<th>Twin Rotary x 1</th>
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<tbody>
<tr>
<td>Oil Type</td>
<td>FVC68D</td>
<td>FVC68D</td>
<td>FVC68D</td>
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<td>Fan (Side Discharge)</td>
<td>Propeller</td>
<td>Propeller</td>
<td>Propeller</td>
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<table>
<thead>
<tr>
<th>Type</th>
<th>Motor Output (W) x Qty.</th>
<th>Motor/Drive</th>
<th>Maximum Air Volume (CFM)</th>
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<tr>
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<td>124.2 x 2</td>
<td>Brushless Digitally Controlled/Direct</td>
<td>2,119 x 2</td>
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### Unit Data

<table>
<thead>
<tr>
<th>Refrigerant Type</th>
<th>R410A</th>
<th>R410A</th>
<th>R410A</th>
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</thead>
<tbody>
<tr>
<td>Refrigerant Control/Location</td>
<td>EEV / Outdoor Unit, Branch Distribution Unit</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Min. Number Indoor Units/System</td>
<td>2</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>Max. Number Indoor Units/System</td>
<td>8</td>
<td>8</td>
<td>8</td>
</tr>
<tr>
<td>Maximum Allowable Total Indoor Unit Connected Capacity (Btu/h)</td>
<td>65,000</td>
<td>73,000</td>
<td>81,000</td>
</tr>
<tr>
<td>Sound Pressure ≤3 dB(A)</td>
<td>54 / 56</td>
<td>54 / 56</td>
<td>56 / 58</td>
</tr>
<tr>
<td>Net Unit Weight (lbs.)</td>
<td>214</td>
<td>214</td>
<td>223</td>
</tr>
<tr>
<td>Shipping Weight (lbs.)</td>
<td>236</td>
<td>236</td>
<td>249</td>
</tr>
</tbody>
</table>

### Power/Communications Wiring Between ODU and BD Unit (No. X AWG)

| 4C X 16 | 4C X 16 | 4C X 16 |

### Heat Exchanger

<table>
<thead>
<tr>
<th>Material and Fin Coating</th>
<th>Copper Tube / Aluminum Fin and GoldFin™/Hydrophilic</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rows/Columns/Fins per inch x Qty.</td>
<td>(2 x 32 x 14) x 2</td>
</tr>
</tbody>
</table>

### Piping

| Liquid Line Connection (in., OD) x Qty. | 3/8 x 1 | 3/8 x 1 | 3/8 x 1 |
| Vapor Line Connection (in., OD) x Qty. | 3/4 x 1 | 3/4 x 1 | 3/4 x 1 |
| Factory Charge lbs. of R410A | 9.7 | 9.7 | 12.3 |

### Piping Lengths

| Maximum Total System Piping (ft.) | 475.7 | 475.7 | 475.7 |
| Maximum Main Pipe Length (Outdoor Unit to BD Unit [ft.]) | 180.4 | 180.4 | 180.4 |
| Total Branch Piping (BD Units to all Indoor Units [ft.]) | 295.3 | 295.3 | 295.3 |
| Maximum Branch Pipe Length (Length between each BDU and IDU [ft.]) | 49.2 | 49.2 | 49.2 |
| Maximum Outdoor Unit to Indoor Unit Pipe Length (ft.) | 229.6 | 229.6 | 229.6 |
| Max. Main Piping Length (No Additional Refrigerant [ft.]) | 16 | 16 | 16 |
| Max. Branch Piping Length (No Additional Refrigerant [ft.]) | 131 | 131 | 147.6 |
| Maximum Elevation between Outdoor Unit and Indoor Unit (ft.) | 98.4 | 98.4 | 98.4 |
| Maximum Elevation between BD Unit and Indoor Unit (ft.) | 32.8 | 32.8 | 32.8 |
| Maximum Elevation between BD Unit and BD Unit (ft.) | 49.2 | 49.2 | 49.2 |

1Rated capacity applied with non-ducted indoor units, and 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%.

2Rated cooling capacity obtained with air entering the indoor unit at 80°F dry bulb (DB) and 67°F wet bulb (WB) and outdoor ambient conditions of 95°F dry bulb (DB) and 75°F wet bulb (WB). Rated heating capacity obtained with air entering the indoor unit at 70°F dry bulb (DB) and 60°F wet bulb (WB) and outdoor ambient conditions of 47°F dry bulb (DB) and 43°F wet bulb (WB).

3At least one Branch Distribution Unit is required for system operation; a maximum of two can be installed per outdoor unit with use of Y-branch accessory (PMBL5620). At least two indoor units should be connected. 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 www.lg-dfs.com.

4Power wiring to the outdoor unit is field supplied, solid or stranded, and must comply with the applicable local and national codes. For detailed information, please refer to electrical characteristics on page 11.

5All power wiring / communication cable to be minimum 16 AWG from the outdoor unit to the BD unit (Multi F MAX systems only), 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 detailed electrical information, please refer to electric characteristics on page 11.

6Piping lengths are equivalent.

7Installation of an optional Low Ambient Wind Baffle Kit will allow operation down to -4°F in cooling mode.
## Table 3: Multi F MAX BD Unit General Data.

<table>
<thead>
<tr>
<th>Model Number</th>
<th>PMBD3620</th>
<th>PMBD3630</th>
<th>PMBD3640</th>
<th>PMBD3641</th>
</tr>
</thead>
<tbody>
<tr>
<td>No. of Connectible Indoor Units¹</td>
<td>1-2</td>
<td>1-3</td>
<td>1-4</td>
<td>1-4</td>
</tr>
<tr>
<td>Max. Nominal Capacity / Port (Btu/h)²</td>
<td>24,000</td>
<td>24,000</td>
<td>24,000</td>
<td>24,000 for A, B, C Ports; 36,000 for D Port</td>
</tr>
<tr>
<td>Max. Nominal Capacity / BD Unit (Btu/h)</td>
<td>48,000</td>
<td>72,000</td>
<td>73,000</td>
<td>73,000</td>
</tr>
<tr>
<td>Operation Temperature Range (°F DB)</td>
<td>0 ~ 150</td>
<td>0 ~ 150</td>
<td>0 ~ 150</td>
<td>0 ~ 150</td>
</tr>
</tbody>
</table>

### Unit Data

<table>
<thead>
<tr>
<th></th>
<th>PMBD3620</th>
<th>PMBD3630</th>
<th>PMBD3640</th>
<th>PMBD3641</th>
</tr>
</thead>
<tbody>
<tr>
<td>Refrigerant Type</td>
<td>R410A</td>
<td>R410A</td>
<td>R410A</td>
<td>R410A</td>
</tr>
<tr>
<td>Power Supply V, Ø, Hz</td>
<td>208-230, 1, 60</td>
<td>208-230, 1, 60</td>
<td>208-230, 1, 60</td>
<td>208-230, 1, 60</td>
</tr>
<tr>
<td>Power Input (W)</td>
<td>16</td>
<td>24</td>
<td>32</td>
<td>32</td>
</tr>
<tr>
<td>Rated Amps (A)</td>
<td>0.08</td>
<td>0.12</td>
<td>0.16</td>
<td>0.16</td>
</tr>
<tr>
<td>Net Unit Weight (lbs.)</td>
<td>13</td>
<td>14.3</td>
<td>15.7</td>
<td>15.7</td>
</tr>
<tr>
<td>Shipping Weight (lbs.)</td>
<td>15</td>
<td>17</td>
<td>18</td>
<td>18</td>
</tr>
</tbody>
</table>

### Power Wiring / Communication Cables³

<table>
<thead>
<tr>
<th></th>
<th>PMBD3620</th>
<th>PMBD3630</th>
<th>PMBD3640</th>
<th>PMBD3641</th>
</tr>
</thead>
<tbody>
<tr>
<td>From Outdoor Unit to BD Unit (Qty. x AWG)³</td>
<td>4 x 16</td>
<td>4 x 16</td>
<td>4 x 16</td>
<td>4 x 16</td>
</tr>
<tr>
<td>From BD Unit to Indoor Unit (Qty. x AWG)³</td>
<td>4 x 18</td>
<td>4 x 18</td>
<td>4 x 18</td>
<td>4 x 18</td>
</tr>
</tbody>
</table>

### Piping Connections

<table>
<thead>
<tr>
<th></th>
<th>PMBD3620</th>
<th>PMBD3630</th>
<th>PMBD3640</th>
<th>PMBD3641</th>
</tr>
</thead>
<tbody>
<tr>
<td>Outdoor Unit to BD Unit</td>
<td>Liquid (in., OD)</td>
<td>Ø3/8</td>
<td>Ø3/8</td>
<td>Ø3/8</td>
</tr>
<tr>
<td></td>
<td>Vapor (in., OD)</td>
<td>Ø3/4</td>
<td>Ø3/4</td>
<td>Ø3/4</td>
</tr>
<tr>
<td>BD Unit to Indoor Units</td>
<td>Liquid (in., OD) x Qty.</td>
<td>Ø1/4 x 2</td>
<td>Ø1/4 x 3</td>
<td>Ø1/4 x 4</td>
</tr>
<tr>
<td></td>
<td>Vapor (in., OD) x Qty.</td>
<td>Ø3/8 x 2</td>
<td>Ø3/8 x 3</td>
<td>Ø3/8 x 4</td>
</tr>
</tbody>
</table>

### Piping Lengths

<table>
<thead>
<tr>
<th></th>
<th>PMBD3620</th>
<th>PMBD3630</th>
<th>PMBD3640</th>
<th>PMBD3641</th>
</tr>
</thead>
<tbody>
<tr>
<td>Maximum Total System Piping (ft.)⁴</td>
<td>475.7</td>
<td>475.7</td>
<td>475.7</td>
<td>475.7</td>
</tr>
<tr>
<td>Maximum Main Pipe Length (Outdoor Unit to BD Units [ft.])</td>
<td>180.4</td>
<td>180.4</td>
<td>180.4</td>
<td>180.4</td>
</tr>
<tr>
<td>Maximum Total Branch Piping (BD Units to Indoor Units [ft.])</td>
<td>295.3</td>
<td>295.3</td>
<td>295.3</td>
<td>295.3</td>
</tr>
<tr>
<td>Maximum Branch Pipe Length Between BD Unit and Each Indoor Unit [ft.])</td>
<td>49.2</td>
<td>49.2</td>
<td>49.2</td>
<td>49.2</td>
</tr>
<tr>
<td>Maximum Outdoor Unit to Indoor Unit Pipe Length (ft.)</td>
<td>229.6</td>
<td>229.6</td>
<td>229.6</td>
<td>229.6</td>
</tr>
<tr>
<td>Main Piping Length (No Additional Refrigerant ft.)</td>
<td>16</td>
<td>16</td>
<td>16</td>
<td>16</td>
</tr>
<tr>
<td>Branch Piping Length (No Additional Refrigerant ft.)</td>
<td>131</td>
<td>131</td>
<td>131</td>
<td>131</td>
</tr>
<tr>
<td>Maximum Elevation between BD Unit and Indoor Unit (ft.)</td>
<td>32.8</td>
<td>32.8</td>
<td>32.8</td>
<td>32.8</td>
</tr>
<tr>
<td>Maximum Elevation between BD Unit and BD Unit (ft.)</td>
<td>49.2</td>
<td>49.2</td>
<td>49.2</td>
<td>49.2</td>
</tr>
</tbody>
</table>

¹At least one Branch Distribution Unit is required for system operation; a maximum of two can be installed per outdoor unit with use of Y-branch accessory (PMBL5620). To connect only one (1) indoor unit to a branch distribution unit, the system must include another branch distribution unit with at least one (1) connected indoor unit.

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

³All power wiring / communication cable to be minimum 16 AWG from the outdoor unit to the BD unit (Multi F MAX systems only), 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 detailed electrical information, please refer to electric characteristics on page 11.

⁴Piping lengths are equivalent.
**MULTI F MAX**

**ELECTRICAL DATA**

Multi F and Multi F MAX Outdoor Units

Table 4: Multi F Outdoor Unit Electrical Data.

<table>
<thead>
<tr>
<th>Nominal Tons</th>
<th>Unit Model No.</th>
<th>Hertz</th>
<th>Voltage Range (Min. to Max.)</th>
<th>MCA</th>
<th>MOP</th>
<th>Compressor Quantity</th>
<th>Compressor Motor RLA</th>
<th>Outdoor Fan Motor</th>
<th>Indoor Fan Motor</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.5</td>
<td>LMU18CHV</td>
<td>60</td>
<td>187 - 253</td>
<td>13.3</td>
<td>20</td>
<td>1</td>
<td>8.9</td>
<td>0.09</td>
<td>0.59</td>
</tr>
<tr>
<td>2</td>
<td>LMU24CHV</td>
<td>60</td>
<td>187 - 253</td>
<td>14.3</td>
<td>20</td>
<td>1</td>
<td>9.4</td>
<td>0.09</td>
<td>0.59</td>
</tr>
<tr>
<td>2.5</td>
<td>LMU30CHV</td>
<td>60</td>
<td>187 - 253</td>
<td>16.6</td>
<td>25</td>
<td>1</td>
<td>10.8</td>
<td>0.12</td>
<td>0.73</td>
</tr>
<tr>
<td>3</td>
<td>LMU36CHV</td>
<td>60</td>
<td>187 - 253</td>
<td>17.9</td>
<td>25</td>
<td>1</td>
<td>11.2</td>
<td>0.12</td>
<td>0.73</td>
</tr>
</tbody>
</table>

Voltage tolerance is ±10%.

Maximum allowable voltage unbalance is 2%.

**RLA** = Rated Load Amps.

**MCA** = Minimum Circuit Ampacity.

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

Indoor Fan Motor (FLA) is based on the maximum combination of indoor units.

The max combination for each outdoor unit is:
- 18,000 ODU (LMU18CHV): 12,000 IDU x 2
- 24,000 ODU (LMU24CHV): 12,000 IDU x 2 + 9,000 IDU x 1
- 30,000 ODU (LMU30CHV): 12,000 IDU x 3
- 36,000 ODU (LMU36CHV): 12,000 IDU x 4

Table 5: Multi F MAX Electrical Data.

<table>
<thead>
<tr>
<th>Nominal Tons</th>
<th>Unit Model No.</th>
<th>Hertz</th>
<th>Voltage Range (Min. to Max.)</th>
<th>MCA</th>
<th>MOP</th>
<th>Compressor Quantity</th>
<th>Compressor Motor RLA</th>
<th>Condenser Fan Motor(s)</th>
<th>Indoor Fan Motor</th>
</tr>
</thead>
<tbody>
<tr>
<td>4.0</td>
<td>LMU480HV</td>
<td>60</td>
<td>187 - 253</td>
<td>27.3</td>
<td>40</td>
<td>1</td>
<td>17.5</td>
<td>2 x 0.12</td>
<td>0.73 x 2</td>
</tr>
<tr>
<td>4.5</td>
<td>LMU540HV</td>
<td>60</td>
<td>187 - 253</td>
<td>29.4</td>
<td>40</td>
<td>1</td>
<td>18.5</td>
<td>2 x 0.12</td>
<td>0.73 x 2</td>
</tr>
<tr>
<td>5.0</td>
<td>LMU600HV</td>
<td>60</td>
<td>187 - 253</td>
<td>32.2</td>
<td>45</td>
<td>1</td>
<td>20.4</td>
<td>2 x 0.12</td>
<td>0.73 x 2</td>
</tr>
</tbody>
</table>

Voltage tolerance is ±10%.

Maximum allowable voltage unbalance is 2%.

**RLA** = Rated Load Amps.

**MCA** = Minimum Circuit Ampacity.

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

Indoor Fan Motor (FLA) is based on the maximum combination of indoor units.

The max combination for each outdoor unit is:
- 48,000 ODU (LMU480HV): 12,000 IDU x 5
- 54,000 ODU (LMU540HV): 12,000 IDU x 6
- 60,000 ODU (LMU600HV): 12,000 IDU x 6 + 9,000 IDU x 1

Due to our policy of continuous product innovation, some specifications may change without notification.

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R410A REFRIGERANT

R410A Refrigerant

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

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

⚠️ WARNING

🚫 Do not place refrigerant cylinder in direct sunlight. Refrigerant cylinder may explode causing severe injury or death.

Note

- Because R410A is a combination of R32 and R125, the required additional refrigerant must be charged in its liquid state. If the refrigerant is charged in its gaseous state, its composition changes and the system will not work properly.
- ☓ Do not heat piping more than necessary during installation. Piping may become soft and fail when pressurized.
- ☓ Do not use any piping that has not been approved for use in high-pressure refrigerant systems. Piping wall thickness must comply with the applicable local, state, and federal codes for the 551 psi design pressure of R410A. Inadequate piping may fail when pressurized.
选配最佳位置

危险
不要将单元安装在易燃物区域内，以免发生火灾。不要使用可能引起火灾的物质，如燃油、蒸汽、或硫酸。注意不要将单元安装在腐蚀性溶液或喷雾（如硫化物）的使用区域，否则将严重危害人体健康或生命。

警告

- 避免将单元直接暴露于海洋风中。将单元安装在建筑物的另一侧，远离海洋风。
- 选择一个有良好排水的地方。
- 定期用清水清洁热交换器上的尘土或盐颗粒。

- 当户外单元必须安装在直接接收到海洋风的地方时，应安装一个足够高度和宽度的混凝土风障来阻挡任何风。
- 风障的高度和宽度至少应为户外单元的150%，并至少距离户外单元27-1/2英寸，以确保空气流通。

- 海风可能对冷凝器和蒸发器的翅片造成腐蚀，进而导致产品故障或性能效率降低。

- 如果户外单元必须安装在风障高度和宽度至少27-1/2英寸处，并且至少相隔150%的户外单元宽度和高度，那么将风障安装在至少27-1/2英寸处，以允许空气流通。

- 补充额外的防腐处理可能需要在海洋边的户外单元上进行。
**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.

**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.

⚠️ **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.

**Tie-Downs and Lightning 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>
<thead>
<tr>
<th>Building Height (feet)</th>
<th>66</th>
<th>98</th>
<th>148</th>
<th>197</th>
</tr>
</thead>
<tbody>
<tr>
<td>Protection Angle (°)</td>
<td>55</td>
<td>45</td>
<td>35</td>
<td>25</td>
</tr>
</tbody>
</table>

- 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 1: 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.
GENERAL INSTALLATION GUIDELINES

Service Access and Allowable Clearances for Outdoor Unit

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.
- 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.)
- 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.

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.

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.
Clearance Requirements when Different Obstacles are Present, continued. (Unit: Inch)

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.
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 7: Ratio among H, A, and L.

<table>
<thead>
<tr>
<th></th>
<th>L</th>
<th>A</th>
</tr>
</thead>
<tbody>
<tr>
<td>H &lt; L</td>
<td>30 inches</td>
<td>40 inches</td>
</tr>
<tr>
<td>0 &lt; L</td>
<td>≤ 1/2 H</td>
<td>30 inches</td>
</tr>
<tr>
<td>1/2 H</td>
<td>&lt; L</td>
<td>30 inches</td>
</tr>
</tbody>
</table>

If a stand is necessary, it should be contained (not open frame) to prevent the discharge air from short cycling.

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.
**Rigging and Lifting Instructions**

**WARNING**

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

Dispense the packing materials safely.
- Packing materials, such as nails and other metal or wooden parts, may cause puncture wounds or other injuries.
- Tear apart and throw away plastic packaging bags so that children may not play with them and risk suffocation and death.

**CAUTION**

Be very careful when transporting the product. There is a risk of the product falling and causing physical injury.
- Use appropriate moving equipment to transport each frame; ensure the equipment is capable of supporting the weights listed.
- Some products use polypropylene bands for packaging. Do not use polypropylene bands to lift the unit.
- Support the outdoor unit a minimum of four points to avoid slippage from rigging apparatus.

**Note:**
- Make sure the outdoor unit is in its original packaging to avoid damage during local transport.
- At the time of delivery, the package should be checked for any damage (exterior and interior). Report any damage to the carrier claims agent immediately.
- Handle the outdoor unit with care. Keep the outdoor unit upright to avoid damaging inside components.
- If a forklift is to transport the outdoor unit, the forklift arms should pass through the openings at the bottom.
- If a crane is to suspend the outdoor unit, it is recommended that two (2) ropes at least twenty-three (23) feet in length be used.
- Pass the ropes under the unit. Pass the rope through the two (2) forklift slots each at the front and rear of the outdoor unit.
- To prevent damage to the outdoor unit, always lift the unit with the ropes attached at four (4) points at an angle of ≤40°.
- Always include padding to protect the outdoor unit from rope damage, and take into consideration the outdoor unit’s center of gravity.

**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.

**Anchoring the Outdoor Unit**

- Tightly anchor the outdoor unit with a bolt and nut to a concrete or rigid platform.
- When installing on a wall (with field-supplied brackets), roof, or rooftop, securely anchor the mounting platform with nails, taking into consideration the possibility of strong winds or earthquakes.
- If there is a possibility of vibration from the outdoor unit transmitting to the building, add an anti-vibration material to the platform.
Outdoor Unit Platform Requirements

Outdoor Unit Foundation Requirements.

Figure 4: LMU18CHV and LMU24CHV Outdoor Units.

Figure 5: LMU30CHV and LMU36CHV Outdoor Units.

Figure 6: LMU480HV, LMU540HV, LMU600HV Outdoor Units.

Table 8: Outdoor Unit Foundation Specifications.

<table>
<thead>
<tr>
<th>Outdoor Unit Type</th>
<th>Bolt Type</th>
<th>Concrete Height</th>
<th>Bolt Depth</th>
</tr>
</thead>
<tbody>
<tr>
<td>LMU18CHV, LMU24CHV, LMU30CHV, LMU36CHV</td>
<td>M10-J</td>
<td>Minimum 4 inches</td>
<td>Minimum 3 inches</td>
</tr>
<tr>
<td>LMU480HV, LMU540HV, LMU600HV</td>
<td>M10-J</td>
<td>Minimum 8 inches</td>
<td>Minimum 3 inches</td>
</tr>
</tbody>
</table>

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.
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 and inspection purposes (23-5/8 inch square opening).
  - 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.
  - Interior installation is highly recommended.
  - Allowable operating temperature range: 0°C to 150°F; Allowable maximum operating humidity range: 80%.
  - Unit can be installed no more than ±5 degrees of level.

- 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, spray or other factors that may damage the PCB.
- 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.

Figure 8: Branch Distribution Unit Key Components.
General Installation Guidelines

Location for Multi F MAX Branch Distribution Units

Figure 9: PMBD3620, PMBD3630, PMBD3640, and PMBD3641 External Dimensions.

Notes
1. PMBD3620 unit supplied with "A, B"
2. PMBD3630 unit supplied with "A, B, C"
3. PMBD3640, PMBD3641 unit supplied with "A, B, C, D"
4. * Thickness of insulation
Branch Distribution Unit Orientation

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

Ceiling Mount Installation - Hangers with Hanging Bolt

1. Drill four (4) holes in the ceiling, following the dimensions on the previous page.
2. Attach the factory-supplied hangers with two (2) screws each at the designated four (4) areas on the frame of the BD unit.
3. Install an anchor in the ceiling, and attach the hanging bolts to the ceiling.
4. Add nuts and washers to the hanging bolt as shown at right.
5. Hang the BD unit on the hanging bolts (ceiling side up), and after checking for level (±5 degrees), securely tighten all nuts.

Ceiling Mount Installation - Hangers Only

1. Attach the factory-supplied hangers with two (2) screws each at the designated four (4) areas on the frame of the BD unit.
2. Install the BD unit to the ceiling using two screws on each of the hangers as shown below. Unit should be ±5 degrees of level.
3. Cover parts of the hanger holes with polyethylene foam insulation (to prevent condensation).

Note:

If a screw has been installed on the frame of the BD unit and the screw has been removed, to prevent condensation, either re-install the screw or cover the open hole with aluminum tape.

Figure 10: Acceptable BD Unit Ceiling Mount Orientations.

Ceiling Mounting Options

Figure 11: BD Ceiling Mount Installation.
Wall Mount Installation - Hangers Only
1. Attach the factory-supplied hangers with two (2) screws each at the designated four (4) areas on the frame of the BD unit.
2. Install the BD unit to the wall using two screws on each of the hangers. Unit should be ±5 degrees of level.
3. Cover parts of the hanger holes with polyethylene foam insulation (to prevent condensation).

Figure 12: Acceptable BD Unit Wall Mount Orientations.

Wall Mounting Options

Figure 13: Unacceptable BD Unit Orientation.
Piping Preparation

**GENERAL INSTALLATION GUIDELINES**

---

**WARNING**

- Do not allow the refrigerant to leak during brazing; if the refrigerantcombusts, it generates a toxic gas.
- Do not braze in an enclosed location, and always test for gas leaks before/after brazing.
- There is risk of fire, explosion, and physical injury or death.

**Outdoor Unit Pipe Connections**

1. Do not use kinked pipe caused by excessive bending in one specific area on its length.
2. Braze the pipes to the service valve pipe stub of the outdoor unit.
3. After brazing, check for refrigerant gas leaks.
4. When selecting flare fittings, always use a 45° fitting rated for use with high pressure refrigerant R410A. Selected fittings must also comply with local, state, or federal standards.

**Creating a Flare Fitting**

One of the main causes of refrigerant leaks is defective flared connections. Create flared connections using the procedure below.

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

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

2B. Remove the flare nuts attached to the indoor and outdoor units. Slide the flare nut onto the copper tube.

3. Flaring the pipe end.
   - Use the proper size flaring tool to finish flared connections as shown.
   - ALWAYS create a 45° flare when working with R410A.
   - Firmly hold copper tube in a bar with a dimension as indicated in the table below.

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

Figure 14: Dimensions of the Flare.

<table>
<thead>
<tr>
<th>Table 9: Flared Connection Dimensions.</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Outside Diameter</strong></td>
</tr>
<tr>
<td>Inch</td>
</tr>
<tr>
<td>Ø1/4</td>
</tr>
<tr>
<td>Ø3/8</td>
</tr>
<tr>
<td>Ø1/2</td>
</tr>
<tr>
<td>Ø5/8</td>
</tr>
<tr>
<td>Ø3/4</td>
</tr>
</tbody>
</table>

---
Tightening the Flare Connections
When connecting the flare nuts, coat the flare (outside only) with polyvinyl ether (PVE) refrigeration oil only.

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

Align the center of the piping, and initially hand tighten the flare nuts using three (3) or four (4) turns. For Multi F Outdoor Units, install the flare nuts by:

1. Connecting the Gas Piping for Connections A through D first.
2. Connecting the Liquid Piping for Connections A through D last.

Then, to finish tighten the flare nut using the torque wrench and a backup wrench, following the direction arrows on the wrench and using the appropriate tightening torque, until the wrench clicks. After all the piping has been connected, check for refrigerant gas leaks.

<table>
<thead>
<tr>
<th>Pipe size (Inches O.D.)</th>
<th>Tightening torque (ft-lbs)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1/4Ø</td>
<td>13 ~ 18</td>
</tr>
<tr>
<td>3/8Ø</td>
<td>24.6 ~ 30.4</td>
</tr>
<tr>
<td>1/2Ø</td>
<td>39.8 ~ 47.7</td>
</tr>
<tr>
<td>5/8Ø</td>
<td>45.6 ~ 59.3</td>
</tr>
<tr>
<td>3/4Ø</td>
<td>71.6 ~ 87.5</td>
</tr>
</tbody>
</table>

For Multi F MAX outdoor units, piping can be installed in one of four directions: front, side, back, and down (A). If the downward installation is chosen, the knockout hole in the base pan must be accessed (B).

Whatever direction is chosen, plug the access holes with field-provided putty or insulation to fill all gaps (C).

**WARNING**
*Insects or small animals entering the outdoor unit may cause a short circuit in the electrical box, which may lead to fire, electric shock, physical injury, or death.*

**Note:**
*Insects or small animals entering the outdoor unit may cause a short circuit in the electrical box, which may lead to unit failure.*
Loosening the Flare Nuts

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

Brazing Practices

Note:
Keep the piping system free of contaminants and debris such as copper burrs, slag, or carbon dust during installation. Contaminants can result in mechanical failure of the system.

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

- While brazing, use a dry nitrogen purge operating at a minimum pressure of three (3) psig and maintain a steady flow.
- Blow clean all pipe sections with dry nitrogen prior to assembly.
- Use a tubing cutter. De-burr and clean all cuts before assembly.
- Store pipe stock in a dry place. Keep pipe capped and clean.
- Use adapters to assemble different sizes of pipe. 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.

- Do not use flux, soft solder, or anti-oxidant agents.
- Do not use a saw to cut pipe.

Piping Materials and Handling

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

- Do not bend or damage the pipes while handling and storing, and take care not to contaminate the interior with dust, moisture, etc. See Table 11 for care of piping.

Table 11: Three Principles of Refrigerant Piping

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

Type ACR copper is the only approved refrigerant pipe material for use with LG Multi V S 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).

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

### Table 14: ACR Copper Tubing Material

<table>
<thead>
<tr>
<th>Type</th>
<th>Seamless Phosphorous Deoxidized</th>
</tr>
</thead>
<tbody>
<tr>
<td>Class</td>
<td>UNS C12200 DHP</td>
</tr>
<tr>
<td>Straight Lengths</td>
<td>H58 Temper</td>
</tr>
<tr>
<td>Coils</td>
<td>O60 Temper</td>
</tr>
</tbody>
</table>

### Table 12: Piping Tube Thicknesses

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>_Material_</td>
<td>Rigid Type “K” or “L” and Soft ACR Acceptable</td>
<td>Rigid Type “K” or “L” Only</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>_Min. Bend Radius (in)_</td>
<td>.563</td>
<td>.9375</td>
<td>1.5</td>
<td>3.0</td>
<td>3.0</td>
<td>3.0</td>
<td>3.5</td>
<td>4.0</td>
<td>4.5</td>
</tr>
<tr>
<td>_Min. Wall Thickness (in)_</td>
<td>.031</td>
<td>.031</td>
<td>.031</td>
<td>.039</td>
<td>.042</td>
<td>.045</td>
<td>.050</td>
<td>.050</td>
<td>.050</td>
</tr>
</tbody>
</table>

### Table 13: ACR Copper Tubing Dimensions and Physical Characteristics\(^1-4\)

<table>
<thead>
<tr>
<th>Nominal Pipe Outside Diameter (in)</th>
<th>Actual Outside Diameter (in)</th>
<th>Nominal Wall Thickness (in)</th>
<th>Drawn Temper</th>
<th>Weight (lb/ft)</th>
<th>Cubic ft per Linear ft</th>
<th>Annealed Temper</th>
<th>Weight (lb/ft)</th>
<th>Cubic ft per Linear ft</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>Drawn Temper</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Cubic ft per Linear ft</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1/4</td>
<td>0.250</td>
<td>--</td>
<td>--</td>
<td>--</td>
<td>0.030</td>
<td>0.081</td>
<td>0.00020</td>
<td></td>
</tr>
<tr>
<td>3/8</td>
<td>0.375</td>
<td>0.030</td>
<td>0.126</td>
<td>.00054</td>
<td>0.032</td>
<td>0.134</td>
<td>0.00053</td>
<td></td>
</tr>
<tr>
<td>1/2</td>
<td>0.500</td>
<td>0.035</td>
<td>0.198</td>
<td>.00101</td>
<td>0.032</td>
<td>0.182</td>
<td>0.00103</td>
<td></td>
</tr>
<tr>
<td>5/8</td>
<td>0.625</td>
<td>0.040</td>
<td>0.285</td>
<td>.00162</td>
<td>0.035</td>
<td>0.251</td>
<td>0.00168</td>
<td></td>
</tr>
<tr>
<td>3/4</td>
<td>0.750</td>
<td>0.042</td>
<td>0.362</td>
<td>.00242</td>
<td>0.042</td>
<td>0.362</td>
<td>.00242</td>
<td></td>
</tr>
<tr>
<td>7/8</td>
<td>0.875</td>
<td>0.045</td>
<td>0.455</td>
<td>.00336</td>
<td>0.045</td>
<td>0.455</td>
<td>.00336</td>
<td></td>
</tr>
<tr>
<td>1-1/8</td>
<td>1.125</td>
<td>0.050</td>
<td>0.655</td>
<td>.00573</td>
<td>0.050</td>
<td>0.655</td>
<td>.00573</td>
<td></td>
</tr>
</tbody>
</table>

\(^1\) All dimensions provided are in accordance with ASTM B280 – Standard.

\(^2\) Design pressure = 551 psig.

\(^3\) ACR Tubing is available as hard drawn or annealed (soft) and are suitable for use with R410A refrigerant.


**Note:**
- Commercially available piping often contains dust and other materials. Always blow it clean with a dry inert gas.
- Prevent dust, water or other contaminants from entering the piping during installation. Contaminants can cause mechanical failure.
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 ±5° 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 Multi F piping design software.

Note:
- Design pressure is 551 psig.
- All dimensions in inches. Tolerance ±1/4 inch.
- Images are not to scale.

Table 15: Y-Branch Connection Diameters.

<table>
<thead>
<tr>
<th>Model</th>
<th>Y-Branch Type</th>
<th>Port Identifier (inch)</th>
<th>Dimensions</th>
</tr>
</thead>
<tbody>
<tr>
<td>PMBL5620</td>
<td>Liquid</td>
<td>3/8</td>
<td>13.80</td>
</tr>
<tr>
<td></td>
<td>Vapor</td>
<td>3/4</td>
<td>12.48</td>
</tr>
</tbody>
</table>

Figure 22: Y-Branch Port Identifier Diagram.

Figure 23: Y-Branch Dimensions Diagram.

Figure 24: Horizontal Configuration End View.

Figure 25: Y-branch Installation Alignment Specification.
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.

No Pipe Size Substitutions

Use only the pipe size selected by the LATS Multi F 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.

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.
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:

\[ LE = C x L x (T_R - T_a) x 12 \]

- \( LE \) = Anticipated linear tubing expansion (in.)
- \( C \) = Constant (For copper = 9.2 x 10^{-6} \text{ in./in.}^\circ \text{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.)

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 180°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 18. 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.
Table 17: Linear Thermal Expansion of Copper Tubing in Inches.

<table>
<thead>
<tr>
<th>Pipe Length</th>
<th>Fluid Temperature °F</th>
</tr>
</thead>
<tbody>
<tr>
<td>35°</td>
<td>40°</td>
</tr>
<tr>
<td>10</td>
<td>0.04</td>
</tr>
<tr>
<td>20</td>
<td>0.08</td>
</tr>
<tr>
<td>30</td>
<td>0.12</td>
</tr>
<tr>
<td>40</td>
<td>0.16</td>
</tr>
<tr>
<td>50</td>
<td>0.20</td>
</tr>
<tr>
<td>60</td>
<td>0.24</td>
</tr>
<tr>
<td>70</td>
<td>0.28</td>
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<tr>
<td>80</td>
<td>0.32</td>
</tr>
<tr>
<td>90</td>
<td>0.36</td>
</tr>
<tr>
<td>100</td>
<td>0.40</td>
</tr>
<tr>
<td>120</td>
<td>0.48</td>
</tr>
<tr>
<td>140</td>
<td>0.56</td>
</tr>
<tr>
<td>160</td>
<td>0.64</td>
</tr>
<tr>
<td>180</td>
<td>0.72</td>
</tr>
</tbody>
</table>

Table 18: Radii of Coiled Expansion Loops and Developed Lengths of Expansion Offsets.

<table>
<thead>
<tr>
<th>Anticipated Linear Expansion (LE) (inches)</th>
<th>Nominal Tube Size (OD) inches</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>1/4</td>
</tr>
<tr>
<td>1/2</td>
<td>6</td>
</tr>
<tr>
<td></td>
<td>38</td>
</tr>
<tr>
<td>1</td>
<td>9</td>
</tr>
<tr>
<td></td>
<td>54</td>
</tr>
<tr>
<td>1-1/2</td>
<td>11</td>
</tr>
<tr>
<td></td>
<td>66</td>
</tr>
<tr>
<td>2</td>
<td>12</td>
</tr>
<tr>
<td></td>
<td>77</td>
</tr>
<tr>
<td>2-1/2</td>
<td>14</td>
</tr>
<tr>
<td></td>
<td>86</td>
</tr>
<tr>
<td>3</td>
<td>15</td>
</tr>
<tr>
<td></td>
<td>94</td>
</tr>
<tr>
<td>3-1/2</td>
<td>16</td>
</tr>
<tr>
<td></td>
<td>102</td>
</tr>
<tr>
<td>4</td>
<td>17</td>
</tr>
<tr>
<td></td>
<td>109</td>
</tr>
</tbody>
</table>

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.
GENERAL INSTALLATION GUIDELINES
Piping Materials and Handling

**Note:**

LG Electronics U.S.A., Inc. is not responsible for any piping calculations, refrigerant leaks, degradation of performance, or any other potential problems or damages as a result of interconnecting piping, their joint connections, isolation valves, introduced debris inside the piping system, or other problems caused by the interconnecting piping system.

Pipe Bends

When bending soft copper, use long radius bends. Refer to the “Radii of Coiled Expansion Loops and Developed Lengths of Expansion Offsets” table for minimum radius specifications, page 18.

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.

Field-Provided Isolation Ball Valves

LG maintains a neutral position on using isolation valves in VRF refrigerant piping systems. LG does not endorse any manufacturer of isolation valves. It is recognized that installing isolation valves may simplify future maintenance requirements, and, if used, considerations should be taken including, but not limited to, the following:

- Pressure drops for any component used, including isolation valves, must be known in equivalent pipe length and calculated into the total and segment equivalent piping lengths and compared to product design limitations.
- In all cases, materials must be suitable for the application and any applicable codes, including, but not limited to, diameter and wall thickness continuity per ACR standards.

Failure to do so may cause significant performance degradation. Proper leak checks must be performed. Using isolation valves does not automatically void any LG product warranty; however, a limited warranty may be voided in whole or part should any field supplied accessory fail in any way that causes product failure.

Using Elbows

Field supplied elbows are allowed as long as they are designed for use with R410A refrigerant. The designer and installer, 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 in the LATS program. See page 35 for equivalent lengths.

Pipe Slope

The horizontal pipe slope cannot exceed 10° up or down.
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.

 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.

 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 five (5) feet on center for straight segments of pipe up to 3/4” outside diameter size.

 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.

 Insert 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.

 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.

 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 five (5) feet on center for straight segments of pipe up to 3/4” outside diameter size.

 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.
**GENERAL INSTALLATION GUIDELINES**

**Piping Materials and Handling**

**Examples of Supports**

Figure 34: U-Bolt Support with Insulation.

Figure 35: O-Ring Support with Insulation.

Figure 36: Saddle-Type Support.

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 37: U-Bolt Support with an Insulated Pipe.

Figure 38: O-Ring Band Support with an Insulated Pipe.

Figure 39: One-Point Down-Stop Support (>441 lbs.).

Figure 40: Two-Point Down-Stop Support.
Device Connection Limitations

- The minimum number of connected and operating indoor units to Multi F / Multi F MAX systems is two, taking into consideration 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  LMU40HV = 8  LMU54HV = 8  LMU60HV = 8

Note:

Piping Length and Elevation Limitations

One of the most critical elements of Multi F and Multi F MAX systems is the refrigerant piping. The tables on the next few 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.

Multi F Outdoor Unit Piping Length and Elevation Limitations

Table 19: Multi F Refrigerant Piping System Limitations.

<table>
<thead>
<tr>
<th>Outdoor Unit Model (Btu/h)</th>
<th>LMU18CHV / 18,000</th>
<th>LMU24CHV / 24,000</th>
<th>LMU30CHV / 30,000</th>
<th>LMU36CHV / 36,000</th>
</tr>
</thead>
<tbody>
<tr>
<td>Max. Total System Piping Length (ft.)</td>
<td>164 A+B</td>
<td>246.1 A+B+C</td>
<td>246.1 A+B+C+D</td>
<td>246.1 A+B+C+D</td>
</tr>
<tr>
<td>Min. Length for One Branch (ft.)</td>
<td>9.8</td>
<td>9.8</td>
<td>9.8</td>
<td>9.8</td>
</tr>
<tr>
<td>Max. Length for One Branch (ft.)</td>
<td>82</td>
<td>82</td>
<td>82</td>
<td>82</td>
</tr>
<tr>
<td>Max. Elevation Between Each Indoor Unit and Outdoor Unit (h1)</td>
<td>49.2</td>
<td>49.2</td>
<td>49.2</td>
<td>49.2</td>
</tr>
<tr>
<td>Max. Elevation Between Indoor Units (h2)</td>
<td>24.6</td>
<td>24.6</td>
<td>24.6</td>
<td>24.6</td>
</tr>
<tr>
<td>Max. Combination of Indoor Units</td>
<td>24,000</td>
<td>33,000</td>
<td>40,000</td>
<td>48,000</td>
</tr>
</tbody>
</table>

Multi F System Example

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.
Multi F MAX Outdoor Unit Piping Length and Elevation Limitations

Table 22: Multi F MAX Refrigerant Piping System Limitations.

<table>
<thead>
<tr>
<th>Pipe Length (ELF = Equivalent Length of pipe in Feet)</th>
<th>Total piping length (ΣA + ΣB)</th>
<th>≤475.7 feet</th>
</tr>
</thead>
<tbody>
<tr>
<td>Main pipe (Outdoor Unit to Branch Distribution Units: ΣA)</td>
<td>Minimum</td>
<td>9.8 feet</td>
</tr>
<tr>
<td>Branch pipe (Branch Distribution Units to Indoor Units: B)</td>
<td>Maximum</td>
<td>≤180.4 feet</td>
</tr>
<tr>
<td>Total branch piping length (ΣB)</td>
<td>≤295.3 feet</td>
<td></td>
</tr>
<tr>
<td>Minimum</td>
<td>10 feet</td>
<td></td>
</tr>
<tr>
<td>Maximum</td>
<td>≤49.2 feet</td>
<td></td>
</tr>
</tbody>
</table>

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 |

Max. Combination of IDUs

LMU480HV = 65,000
LMU540HV = 73,000
LMU600HV = 81,000

Table 23: Multi F MAX Piping Sizes.

<table>
<thead>
<tr>
<th>Piping</th>
<th>Main Pipe A (inch)</th>
<th>Branch Pipe B</th>
</tr>
</thead>
<tbody>
<tr>
<td>Liquid</td>
<td>Ø3/8</td>
<td>Depends on the size of the indoor unit piping</td>
</tr>
<tr>
<td>Gas</td>
<td>Ø3/4</td>
<td></td>
</tr>
</tbody>
</table>

Multi F MAX System Example 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 Example 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)).
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.

![Connection Sockets Diagram](image)

Correctly route the piping so it does not make contact with mounting bolts. Allow room for field installation.

<table>
<thead>
<tr>
<th>Outdoor Unit Piping Connections</th>
<th>LMU18CHV</th>
<th>LMU24CHV</th>
<th>LMU30CHV</th>
<th>LMU36CHV</th>
</tr>
</thead>
<tbody>
<tr>
<td>Liquid Line Connection (in., OD) x Qty.</td>
<td>1/4 x 2</td>
<td>1/4 x 3</td>
<td>1/4 x 4</td>
<td>1/4 x 4</td>
</tr>
<tr>
<td>Vapor Line Connection (in., OD) x Qty.</td>
<td>3/8 x 2</td>
<td>3/8 x 3</td>
<td>3/8 x 4</td>
<td>3/8 x 4</td>
</tr>
</tbody>
</table>

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.

<table>
<thead>
<tr>
<th>Indoor Unit Capacity</th>
<th>Vapor Line Piping Size (in., OD)</th>
<th>Liquid Line Piping Size (in., OD)</th>
</tr>
</thead>
<tbody>
<tr>
<td>7,000 Btu/h</td>
<td>Ø3/8</td>
<td>Ø1/4</td>
</tr>
<tr>
<td>9,000 Btu/h</td>
<td>Ø3/8</td>
<td>Ø1/4</td>
</tr>
<tr>
<td>12,000 Btu/h</td>
<td>Ø3/8</td>
<td>Ø1/4</td>
</tr>
<tr>
<td>15,000 Btu/h</td>
<td>Ø3/8</td>
<td>Ø1/4</td>
</tr>
<tr>
<td>18,000 Btu/h</td>
<td>Ø1/2</td>
<td></td>
</tr>
<tr>
<td>24,000 Btu/h</td>
<td>Ø1/2</td>
<td></td>
</tr>
</tbody>
</table>

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.
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.

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 29: Branch Distribution Unit Piping Connections.

<table>
<thead>
<tr>
<th>Branch Distribution Unit</th>
<th>PMBD3620</th>
<th>PMBD3630</th>
<th>PMBD3640</th>
<th>PMBD3641</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>Piping Connections to Outdoor Unit</th>
<th>Liquid (in., OD) x Qty.</th>
<th>Vapor (in., OD) x Qty.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Liquid</td>
<td>Ø3/8 x 1</td>
<td>Ø3/4 x 1</td>
</tr>
<tr>
<td>Vapor</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Piping Connections to Indoor Units</th>
<th>Liquid (in., OD) x Qty.</th>
<th>Vapor (in., OD) x Qty.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Liquid</td>
<td>Ø3/8 x 2</td>
<td>Ø3/8 x 2</td>
</tr>
<tr>
<td>Vapor</td>
<td>Ø3/8 x 3</td>
<td>Ø3/8 x 4</td>
</tr>
<tr>
<td>Liquid</td>
<td>Ø3/8 x 3, Ø3/8 x 1</td>
<td></td>
</tr>
<tr>
<td>Vapor</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Table 30: Indoor Unit Pipe Sizes.

<table>
<thead>
<tr>
<th>Indoor Unit Capacity</th>
<th>Vapor Line Piping Size (in., OD)</th>
<th>Liquid Line Piping Size (in., OD)</th>
</tr>
</thead>
<tbody>
<tr>
<td>7,000 Btu/h</td>
<td>Ø3/8</td>
<td>Ø1/4</td>
</tr>
<tr>
<td>9,000 Btu/h</td>
<td></td>
<td></td>
</tr>
<tr>
<td>12,000 Btu/h</td>
<td></td>
<td></td>
</tr>
<tr>
<td>15,000 Btu/h</td>
<td></td>
<td></td>
</tr>
<tr>
<td>18,000 Btu/h</td>
<td>Ø1/2</td>
<td></td>
</tr>
<tr>
<td>24,000 Btu/h</td>
<td></td>
<td></td>
</tr>
<tr>
<td>36,000 Btu/h</td>
<td>Ø5/8</td>
<td>Ø3/8</td>
</tr>
</tbody>
</table>

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.

Table 32: Connection Socket Dimensions.

<table>
<thead>
<tr>
<th>Indoor Unit Capacity</th>
<th>Vapor (in., OD)</th>
<th>Liquid (in., OD)</th>
</tr>
</thead>
<tbody>
<tr>
<td>18,000 Btu/h: Wall-Mounted</td>
<td>Ø3/8 → Ø1/2</td>
<td>Ø3/8 → Ø1/2</td>
</tr>
<tr>
<td>18,000 Btu/h: Low Static Duct, Four-Way Cassette</td>
<td>Ø3/8 → Ø1/2</td>
<td>N/A</td>
</tr>
<tr>
<td>24,000 Btu/h</td>
<td>Ø3/8 → Ø1/2</td>
<td>N/A</td>
</tr>
<tr>
<td>36,000 Btu/h</td>
<td>Ø1/2 → Ø5/8</td>
<td>Ø1/4 → Ø3/8</td>
</tr>
</tbody>
</table>
**Multi F MAX Outdoor Unit System Piping Connections, continued.**

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 48: Possible Outdoor Unit or Branch Distribution Unit to Indoor Unit Connections.

### Refrigerant Piping Connections

<table>
<thead>
<tr>
<th>1. 3/8 in. to 3/8 in. Connection</th>
<th>2. 3/8 in. to 1/2 in. Connection</th>
</tr>
</thead>
<tbody>
<tr>
<td>Flare side to branch distribution unit or ODU</td>
<td>Flare side to indoor unit Ø3/8 in.</td>
</tr>
<tr>
<td>Ø3/8 in.</td>
<td>Ø3/8 in.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>3. 1/2 in. to 5/8 in. Connection</th>
<th>4. 1/4 in. to 3/8 in. Connection</th>
</tr>
</thead>
<tbody>
<tr>
<td>Flare side pipe from branch distribution unit or ODU</td>
<td>Flare side to indoor unit Ø5/8 in.</td>
</tr>
<tr>
<td>Ø1/2 in.</td>
<td>Ø1/4 in.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Spanner</th>
<th>Flare nut</th>
</tr>
</thead>
<tbody>
<tr>
<td>Flare nut</td>
<td></td>
</tr>
</tbody>
</table>

**Outdoor Unit Condensate Drain Piping**

Outdoor unit requires condensate drain piping. Condensate drain pipe is constructed with materials approved by local code. See pages 13 to 17 for information in reference to outdoor unit placement and condensate drainage.
Multi F MAX Y-Branch Kit PMBL5620

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 ±5° rotation.

Y-branches should always be installed with the single port facing the outdoor unit and the two-port end facing the branch distribution units.

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

Figure 49: Y-Branch Port Identifier Diagram.

Figure 50: Horizontal Configuration End View.

Table 33: Y-Branch Connection Diameters.

<table>
<thead>
<tr>
<th>Model</th>
<th>Y-Branch Type</th>
<th>Port Identifier (inch)</th>
<th>Dimensions</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Vapor</td>
<td>3/4 3/4 3/4</td>
<td>12.48 3.02</td>
</tr>
</tbody>
</table>

Figure 51: Y-Branch Dimensions Diagram.

Figure 52: Y-branch Installation Alignment Specification.

Vertical Up Configuration

Within ± 3°

Vertically Down Configuration

Within ± 3°
Flush the Refrigerant Piping

Flushing the Refrigerant Piping

Flushing is a method of cleaning the refrigerant piping using pressurized nitrogen gas. Flushing:

1. Removes oxidation bubbles that may have formed inside the copper piping if nitrogen replacement was insufficient during soldering.
2. Removes foreign material and moisture from piping if the piping wasn’t stored properly.
3. Checks connections in pipes linking outdoor and indoor units (both liquid and gas pipes).

Flush the Refrigerant Piping Procedure

1. Attach a pressure regulator on a nitrogen cylinder.
2. Connect the charge hose from the pressure regulator to the outdoor unit liquid piping side service port before its connection to the indoor or BD (Multi F MAX systems only) unit piping.
3. Open the main valve on the nitrogen cylinder and set the pressure regulator to 0.5 MPa (72.5 psi).
4. Verify that the nitrogen is flowing through the piping correctly.
5. When flushing, block the open end of the piping with a wood insulation block. When the pressure becomes too high, quickly remove the block.
6. Repeat steps 4 and 5 until the piping is completely flushed and clean.
7. Connect the charge hose from the pressure regulator to the outdoor unit gas piping side service port before its connection to the indoor or BD (Multi F MAX systems only) unit piping.
8. Follow steps 3, 4, 5, and 6.
9. For systems with BD unit(s) (Multi F MAX only), each piping run should be flushed individually before connecting the indoor units (follow steps 3, 4, 5, and 6).

Note:

Nitrogen flushing is strongly recommended after soldering. Foreign materials in the piping will cause system malfunction.
MULTI F / MULTI F MAX Outdoor Unit Installation Manual

Due to our policy of continuous product innovation, some specifications may change without notification.
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Leak Test and Vacuum Procedures

Before performing the test run, Multi F and Multi F MAX refrigerant piping and the piping connections to the outdoor unit, the indoor units, and the BD units (Multi F MAX systems only) must be evacuated to remove any non-condensible gases and moisture that may be present in the system, and checked for leaks. Air and moisture that is left in the piping can lead to undesirable results and can cause damage to the working unit. It is important to go through a complete air purging cycle to be sure that the lines are cleared out. Note that this process may have to be repeated should any air or moisture be found to remain in the piping. After air purging and evacuating the lines, be sure to take a leak test for all piping and tubing. If any air and moisture remain in the refrigerant system:

1. Pressure in the system rises.
2. Operating current rises.
3. Cooling or heating efficiency drops.
4. Moisture in the refrigerant circuit may freeze and block capillary tubing.
5. Water may corrode parts of the refrigeration system.

Leak Test

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

Before the Leak Test

1. Check that all refrigerant piping, the drain pipe, and power wiring / communications cables are properly connected.
2. Remove the caps from both the gas and the liquid service valves on the outdoor unit. Verify that both service valves are closed.

Pressure Gauge Hookup

3. Connect the manifold valve (which includes the pressure gauges), along with the dry nitrogen gas cylinder, to the service valves using the charge hoses.

Note:
Use a manifold valve for leak testing. The high side manifold valve must always be kept closed.

Leak Test Procedure

4. Pressurize the system to maximum 550 psig with the dry nitrogen gas.

⚠️ DANGER
Use of combustible gases including oxygen, may result in fire or explosion, resulting in personal injury or death.

⚠️ WARNING
Use of combustible gases including oxygen runs the risk of fire and explosion, resulting in personal injury or death. Inert gas (nitrogen) should be used when checking leaks, cleaning or repairs of pipes, etc.

Note:
• To avoid nitrogen entering the refrigerant system in a liquid state, the top of the cylinder must be higher than its bottom when the system is pressurized.
• The cylinder should be used in a vertical standing position.

5. Close the cylinder valve when the gauge reading reaches 550 psig, and then test for leaks using the liquid soap method.
6. While running the nitrogen gas tank hookup, apply a soap water or a liquid neutral detergent to all indoor, BD, outdoor unit connection(s), and all refrigerant piping joints with a soft brush. Also test for leaks at both of the gas and liquid side service valves.
Leak Test Procedure, continued.

7. While operating the pressure gauge system, observe the connections for any leaks. If bubbles appear at any of the connections (indoor, BD, and outdoor units) or refrigerant piping joints, a leak is present.
8. Make a note of where the leaks are, and remove the soap with a clean cloth.
9. Disengage the nitrogen pressure by loosening the charge hose connector at the nitrogen cylinder. After the system pressure is back to normal range, disconnect hose from the cylinder.
10. Repair the connections and piping where bubbles / leaks were observed. When finished, repeat leak testing using the liquid soap method and nitrogen cylinder.
11. After system is leak free, depressurize by loosening the charge hose connector at the nitrogen cylinder. When system pressure returns to normal, disconnect the hose from the cylinder.

Essential Points for Leak Testing
The key to successful testing is strict adherence to the leak testing procedure.

1. The liquid and gas piping in each refrigerant system should be pressurized with nitrogen gas in accordance with the steps listed below.
   
   **Step 1:** Pressurize to 43.5 psi for three (3) minutes or more. (Will identify if major leaks are present in the system.)
   
   **Step 2:** Pressurize to 217.6 psi for three (3) minutes or more. (Will identify if major leaks are present in the system.)
   
   **Step 3:** Pressurize to 551.1 psi for approximate twenty-four (24) hours. (Will identify if minor leaks are present in the system.)

Pressurizing the system to 551.1 psi does not guarantee the identification of minor leaks if the pressure is maintained for only a short time. It is recommended that the system remain pressurized for at least 24 hours.

**Note:**
Piping system should not be pressurized to more than 551.1 psi. Pressures greater than 551.1 psi may damage the piping system and cause unit malfunction.

2. Check for pressure drop. If there is no drop in pressure, the test is successful. If the pressure drops, there is a leak in the piping system.

   If, however, there was a change in the ambient temperature between when pressure was initialized and when pressure drop is checked, then calculations must be adjusted accordingly. A difference of 1.8°F can account for a pressure change of 1.45 psi.

   Compensation Value: Temperature at Pressure Initialization – Temperature at Pressure Check × 1.45

**Example:**
During Leak Test: 551.1 psi at 77°F
Twenty-four (24) Hours Later: 543.9 psi at 68°F
Although the pressure dropped from 551.1 psi to 543.9 psi, it can be assumed that there are no leaks because pressure can also drop due to the change in outdoor temperature.
Vacuum Procedure

Vacuum drying should be performed from the service port provided on the outdoor unit's service valve to the vacuum pump commonly used for liquid pipe and the vapor pipe. Vacuum of the pipe and the indoor units should be made from the port of the outdoor unit's service valve with the service valve closed.

**Note:**
- Never perform air purging using refrigerant; it will damage the outdoor unit.
- Use a vacuum pump that can evacuate to 500 microns.

1. Evacuate the system from the liquid and vapor pipes with a vacuum pump for over two (2) hours and bring the system to 500 microns.
2. Maintain system under that condition for over one (1) hour; if the vacuum gauge rises, the system may contain moisture or a leak.
3. If there is a possibility of moisture in the piping (rainwater may have entered the piping if work was performed during a rainy season or over an extended period), then:
   - Evacuate the system for two (2) hours to 7.3 psi (vacuum break) with nitrogen gas.
   - Evacuate it again with the vacuum pump for one (1) hour to 500 microns (vacuum drying).
4. If the system cannot be evacuated to 500 microns, repeat the steps of vacuum break and drying.
5. Finally, after maintaining the system in vacuum for one (1) hour, check if the vacuum gauge rises or not.

**Note:**
- If the primary refrigerant charge is not performed in a reasonable time after the vacuum procedure is complete, wet air may infiltrate the outdoor unit. If wet air is mixed with refrigerant, the refrigerant cycle may malfunction and the unit may be damaged.
- Do not perform refrigerant charge while the compressor is operating, otherwise, liquid may leak and subsequently damage the compressor.
- Use a micron gauge to measure vacuum.
- Obtain the precise amount of refrigerant needed using calculations outlined in the following pages. Too much or too little refrigerant may cause the system to malfunction.
- If other refrigerants are mixed in the original refrigerant, the refrigerant piping system may be damaged or malfunction.
- Because R410A is a mixed refrigerant, the required additional refrigerant must be charged in its liquid state. If the refrigerant is charged in its gaseous state, its composition changes and the system will not work properly.
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.

**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 connectible indoor units – Total number of connected indoor units.**

**Table 34: Outdoor Unit Factory Charge.**

<table>
<thead>
<tr>
<th>Outdoor Unit</th>
<th>Factory Charge lbs. of R410A</th>
</tr>
</thead>
<tbody>
<tr>
<td>LMU18CHV</td>
<td>3.96</td>
</tr>
<tr>
<td>LMU24CHV</td>
<td>3.96</td>
</tr>
<tr>
<td>LMU30CHV</td>
<td>6.18</td>
</tr>
<tr>
<td>LMU36CHV</td>
<td>6.18</td>
</tr>
<tr>
<td>LMU480HV</td>
<td>9.7</td>
</tr>
<tr>
<td>LMU540HV</td>
<td>9.7</td>
</tr>
<tr>
<td>LMU600HV</td>
<td>12.3</td>
</tr>
</tbody>
</table>

**Table 35: Multi F Outdoor Unit Piping Specifications.**

<table>
<thead>
<tr>
<th>Outdoor Unit Model</th>
<th>Min. to Max. Piping Length for One Branch (ft.)</th>
<th>Max. Total System Piping Length (ft.)</th>
<th>Chargeless Pipe Length per Branch (L) (ft.)</th>
<th>Piping Length (No Additional Refrigerant [ft])</th>
<th>Additional Charge Needed (a) (oz./ft.)</th>
</tr>
</thead>
<tbody>
<tr>
<td>LMU18CHV</td>
<td>9.8 to 82</td>
<td>164</td>
<td>24.6</td>
<td>49.2</td>
<td>0.22</td>
</tr>
<tr>
<td>LMU24CHV</td>
<td>9.8 to 82</td>
<td>246.1</td>
<td>24.6</td>
<td>73.8</td>
<td>0.22</td>
</tr>
<tr>
<td>LMU30CHV</td>
<td>9.8 to 82</td>
<td>246.1</td>
<td>24.6</td>
<td>98.4</td>
<td>0.22</td>
</tr>
<tr>
<td>LMU36CHV</td>
<td>9.8 to 82</td>
<td>246.1</td>
<td>24.6</td>
<td>98.4</td>
<td>0.22</td>
</tr>
</tbody>
</table>

**Figure 57: 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.
Refrigerant Charge

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 connectible indoor units – Total number of connected indoor units

Table 36: Multi F MAX Outdoor Unit Piping Specifications.

<table>
<thead>
<tr>
<th>Outdoor Unit Model</th>
<th>Main Piping Length</th>
<th>Branch Piping Length</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Chargeless Pipe Length of Main Pipe (L) (ft.)</td>
<td>Additional Charge Needed (a) (oz./ft.)</td>
</tr>
<tr>
<td>LMU480HV</td>
<td>16.4</td>
<td>0.54</td>
</tr>
<tr>
<td>LMU540HV</td>
<td>16.4</td>
<td>0.54</td>
</tr>
<tr>
<td>LMU600HV</td>
<td>16.4</td>
<td>0.54</td>
</tr>
</tbody>
</table>

Figure 58: 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.
Charging the Refrigerant

1. Determine the refrigerant that is needed, applying the necessary formulas as outlined in the previous pages.
2. Connect the charging cylinder to the charge hose on the manifold valve.
3. Purge air from the charge hose by opening the valve at the bottom of the cylinder, and press the check valve on the manifold valve.
4. Confirm that the “Lo” knob of the manifold valve is open and charge the system with liquid refrigerant. (Because R-410A is a non-azeotrope refrigerant, it must be charged in the liquid state.)
   - If the required amount of refrigerant cannot be charged all at once, the refrigerant can be charged a little at a time (approximately 5.29 ounces) while the system operates in cooling. This procedure must be repeated until the entire amount of refrigerant gets charged into the system; perform once, then wait approximately one [1] minute before resuming.
5. Immediately disconnect the charge hose from the service port on the three-way valve. Stopping halfway allows the refrigerant to discharge.
   - If the system has been charged with liquid refrigerant while it operates, turn the system off before disconnecting the hose.
6. Mount the valve stem nuts and the service port nut. Use torque wrench to tighten the service port nut to a torque of 1.8 kg.m and check for leaks.

⚠️ WARNING

When installing or relocating the outdoor unit, make sure that no substance other than the specified refrigerant (R410A) enters the refrigerant circuit. Any presences of foreign substances such as air can cause an abnormal pressure rise and may result in explosion and physical injury.

Figure 59: Charging the Refrigerant.
Refrigerant Piping System Insulation

All refrigerant piping from the outdoor unit to the indoor units / BD units (Multi F MAX systems only) must be insulated correctly for safety and usage. Y-branch connections, refrigerant piping, field-provided isolation ball valves (if present), service valves, and elbows must be properly and completely insulated using closed cell pipe insulation (up to the indoor unit piping connections). 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. Table below lists minimum wall thickness requirements for Ethylene Propylene Diene Methylene (EPDM) insulation.

Inside the outdoor unit, maximum pipe temperature is 248°F and minimum pipe temperature is -40°F. For field insulation of refrigerant piping between outdoor units and indoor units, consider the following pipe temperature ranges for an operating heat pump system:

- Heating mode refrigerant temperature ranges: Liquid 75-118°F; High Pressure Vapor 95-220°F
- Cooling mode refrigerant temperature ranges: Liquid 75-118°F; Low Pressure Vapor 40-90°F

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

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

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

Table 37: Insulation Guidelines for Typical and Special Circumstances

<table>
<thead>
<tr>
<th>Classification</th>
<th>Air-conditioned location</th>
<th>Non-air conditioned location</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>1. Typical location</td>
<td>2. Special location</td>
</tr>
<tr>
<td>Liquid pipe</td>
<td></td>
<td></td>
</tr>
<tr>
<td>ø1/4 inch</td>
<td>1/2 inch</td>
<td>1/2 inch</td>
</tr>
<tr>
<td>ø3/8 inch</td>
<td>1/2 inch</td>
<td>1/2 inch</td>
</tr>
<tr>
<td>≥ø1/2 inch</td>
<td>1/2 inch</td>
<td>1/2 inch</td>
</tr>
<tr>
<td>Vapor pipe</td>
<td></td>
<td></td>
</tr>
<tr>
<td>ø3/8 inch</td>
<td>1/2 inch</td>
<td>3/4 inch</td>
</tr>
<tr>
<td>ø1 inch</td>
<td>1/2 inch</td>
<td></td>
</tr>
<tr>
<td>≥ø1/4 inch</td>
<td>1/2 inch</td>
<td></td>
</tr>
<tr>
<td>≥ø1/8 inches</td>
<td>3/4 inch</td>
<td>1 inch</td>
</tr>
<tr>
<td>≥ø1-1/8 inches</td>
<td>3/4 inch</td>
<td>1 inch</td>
</tr>
<tr>
<td>≥ø1-1/4 inches</td>
<td></td>
<td></td>
</tr>
<tr>
<td>≥ø1-3/8 inches</td>
<td></td>
<td></td>
</tr>
<tr>
<td>≥ø1-1/2 inches</td>
<td></td>
<td></td>
</tr>
<tr>
<td>≥ø1-3/4 inches</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
1. Typical location (Air-conditioned location): When the piping passes through an indoor area where the indoor unit operates.
   - Apartment, classroom, office, mall, hospital, etc.

2. Special location (Air-conditioned location):
   1. When the location is air conditioned, but there is severe temperature/humidity difference due to high ceilings
      - Church, auditorium, theater, lobby, etc.
   2. When the location is air conditioned, but internal temperature/humidity are high
      - Bathroom, swimming pool, locker room, etc.

3. Typical location (Non-Air conditioned location): When the piping passes through an indoor area where the indoor unit does not operate.
   - Hallway or a dormitory or school, etc.

4. Special location (Non-Air conditioned location): If conditions 1 and 2 below are present.
   1. When the piping passes through an indoor area where the indoor unit does not operate.
   2. When the humidity is high and there is no air flow in the location where the piping is installed.
      - The thickness of the above insulation material is based on heat conductivity of 0.61 Btu/in/h/ft²°F.

### 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 63: Pipe Sleeve Options.
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>
<thead>
<tr>
<th>Liquid Pipe (^1)</th>
<th>Vapor Pipe (^1)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1/4 (1.0)(^2)</td>
<td>4</td>
</tr>
<tr>
<td>3/8 (1-1/8)(^3)</td>
<td>4</td>
</tr>
<tr>
<td>1/2 (1-1/2)(^4)</td>
<td>5</td>
</tr>
<tr>
<td>5/8 (1-5/8)(^4)</td>
<td>5</td>
</tr>
<tr>
<td>3/4 (1-3/4)(^4)</td>
<td>5</td>
</tr>
</tbody>
</table>

\(^1\) 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.

Installing the Insulation

1. Insulation material should be longer than the refrigerant piping. Each vapor and liquid piping must be insulated separately.
2. Place the closed-cell ethylene propylene diene methylene (EPDM) insulation material carefully around each refrigerant pipe so as not to damage it. Be sure the insulation material cutting line is place upward.
3. Apply adhesive to both cut surfaces of the insulation and press together. Allow adhesive to dry so that the bond is secure and does not come apart.

Insulating Piping Joints

1. Push the EPDM insulation from the straight piping surrounding the joint (elbow, outdoor unit to indoor unit piping connection point, etc.) as close together as possible.
2. Cut a piece of insulation to fit the joint, overlapping the insulation on the surrounding piping by at least one (1) inch.
3. Apply adhesive to bond all the ends.
4. Secure by completely wrapping narrow vinyl tape around the insulation / joint so that there are no gaps.
5. Tape should be sufficient to cover the piping so it can fit into the rear piping housing area at the back of the indoor unit or BD unit (Multi F MAX systems only).
**Bundling**

If a conduit is not used on the connection from the outdoor unit to the interior, bundle both insulated refrigerant pipes, the drain hose, and outdoor unit to indoor unit / BD unit communication cable / power wiring together with wide vinyl tape.

**Special Applications**

If an additional drain hose is necessary, the end of drain outlet should be routed above the ground. Secure and the drain hose appropriately.

**When the Outdoor Unit is Installed Below the Indoor Unit:**
1. Wrap the vinyl tape around the separately insulated refrigerant piping, the drain hose, and the communications cable / power wiring together from the bottom to top.
2. Secure the bundle along the outside wall using saddles or a similar type of piping support.
3. Seal any openings in the wall.

**When the Outdoor Unit is Installed Above the Indoor Unit:**
1. Wrap the vinyl tape around the separately insulated refrigerant piping, the drain hose, and the communications cable / power wiring together from the bottom to top.
2. Secure a portion of the bundle along the outside wall using saddles or a similar type of piping support.
3. At the appropriate location, form a trap with the bundle to prevent water from entering interior spaces or the electrical control box of the outdoor unit.
4. Secure the rest of the bundle along the outside wall using saddles or a similar type of piping support.
5. Seal any openings in the wall.
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.

**Note:**

Additional Insulation for Y-Branches May be Required in Humid Environments.

If the system has been operating for a long time in a high humidity environment (dew point temperature: more than 73°F), condensate is likely to form. If this happens, install 3/8 inch thick ethylene propylene diene methylene (EPDM) insulation that is plenum-rated with a heat-resistance factor that follows applicable local, state, and federal codes.

---

**Y-Branch Kit Insulation Detail.**

![Y-Branch Kit Insulation](image)

Field-Supplied Insulation Tape

Liquid and Gas Pipe Joints

Insulation for Field-Installed Piping
**WARNING**

- All power wiring and communication cable installation must be performed by authorized service providers working in accordance with local, state, and National Electrical Code regulations related to electrical equipment and wiring, and following the instructions in this manual.
- Be sure that main power to the unit is completely off before proceeding. Follow all safety and warning information outlined at the beginning of this manual. Failure to do so may cause electric shock and bodily injury.
- Familiarize yourself with the location of the circuit breaker. Be sure that a circuit breaker or some other emergency power cutoff device is in place before any power wiring is done to the system. Failure to do so may cause bodily injury or death.
- Never touch any power lines or live cables before all power is cutoff to the system. To do so, may cause bodily injury or death.
- Undersized wiring may lead to unacceptable voltage at the unit and may become a fire hazard, causing bodily injury or death.
- Properly ground the outdoor units. Ground wiring is required to prevent accidental electrical shock during current leakage.
- 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.
- Do not connect ground wire to refrigerant, gas, or water piping; to lightning rods; to telephone ground wiring; or to the building plumbing system. Failure to properly provide a National Electrical Code-approved earth ground can result in electric shock, physical injury or death.

**Note:**

- Consider ambient conditions (temperature, direct sunlight, inclement weather, etc.) when selecting, installing, and connecting the power wiring.
- Properly ground the outdoor units. Improperly ground wire can cause communication problems from electrical noise and motor current leakage. Ground wiring must always be installed by a qualified 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.
- Undersized wiring may lead to unacceptable voltage at the unit and may cause unit 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.
- 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.

### 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.

**Note:**

It is highly recommended to provide a circuit breaker between the power source and the outdoor unit as shown.

### Table 39: Circuit Breaker / Fuse Size

<table>
<thead>
<tr>
<th>Outdoor Unit Model</th>
<th>Power Source</th>
<th>Fuse or Breaker Capacity</th>
</tr>
</thead>
<tbody>
<tr>
<td>LMU18CHV, LMU24CHV</td>
<td>1Ø, 208-230V</td>
<td>20A</td>
</tr>
<tr>
<td>LMU30CHV, LMU36CHV</td>
<td>1Ø, 208-230V</td>
<td>25A</td>
</tr>
<tr>
<td>LMU480HV, LMU540HV</td>
<td>1Ø, 208-230V</td>
<td>40A</td>
</tr>
<tr>
<td>LMU600HV</td>
<td>1Ø, 208-230V</td>
<td>45A</td>
</tr>
</tbody>
</table>

---

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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.

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

Outdoor Unit Wiring Connection Guidelines

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

To Install a Ring Terminal:
1. Trim the strand wiring with wire cutters or pliers, then strip the insulation to expose the strand wiring to about 3/8 inch.
2. Using a ring terminal fastener or pliers, securely clamp a ring terminal to each stripped wire end.

To Connect the Wiring to the Terminals:
1. Remove the terminal screws from the (outdoor unit, BD unit, or indoor unit) terminal plate with a screwdriver.
2. Position the ring terminal around the terminal, place the terminal screw in the ring, and tighten to the terminal plate using a screwdriver.
Outdoor Unit Wiring Connection Guidelines, continued.
If ring terminals or spade clips are not available, then:

Note:
• Do not terminate different gauge wires to the power terminal block. Slack in the wiring may generate heat and fire.
• Do not over tighten the connections; overtightening may damage the terminals.
• When terminating wires of the same thickness, follow the instructions demonstrated in the illustrations 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.

Figure 75: Proper and Improper Power Wiring Connections

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

WARNING
• If power wires are not properly terminated and firmly attached, there is risk of fire, electric shock, and physical injury or death.
• Never ground the shield of the communications cable to the indoor unit frame or other grounded entities of the building. Failure to properly provide a National Electrical Code-approved earth ground can result in electric shock, physical injury or death.

Connecting the Power Wiring / Communications Cable to the Outdoor Unit
1. Detach the outdoor unit control cover by loosening and removing the screws.
2. Remove the side panel and the conduit panel knockouts.
3. Draw the power wiring to the outdoor unit, and the power wiring / communications cable (connecting cable) to the indoor units or BD unit (Multi F MAX systems only), through field-supplied conduits. Ensure there is enough length to connect the wiring / cables to the terminals on the outdoor unit. Secure the conduit to the outdoor unit using a field-supplied lock nut on the interior of the outdoor unit frame.
4. Properly connect the power wiring, and the power wiring / communications cable (connecting cable) to the correct terminals. Refer to the outdoor unit wiring diagram.
5. To provide strain relief, (separately) secure the power wiring and the power wiring / communications cable (connecting cable) to the outdoor unit with the factory-supplied clamps (up to 35 lbs.). Zip ties can also be used to hold all wiring / cables in place.
6. Re-attach the outdoor unit cover control to the original position with the screws.

DANGER
• Do not use damaged or loose power wiring. Do not modify or extend the outdoor unit’s power wiring randomly. Ensure that the power wiring will not be pulled nor weight be placed on the power wiring during operation. There is risk of fire, electric shock, and physical injury or death.
Connecting the Power Wiring / Communications Cable to the Outdoor Unit, continued.

Figure 76: Connecting the Power Wiring / Communications Cables to the Outdoor Unit (LMU18~36CHV; LMU480, 540HV).

Figure 77: Connecting the Power Wiring / Communications Cables to the Outdoor Unit (LMU600HV).

**WARNING**

- Secure all field wiring connections with appropriate wire strain relief. Improperly securing wires will create undue stress on equipment power lugs. Inadequate connections may generate heat, cause a fire and physical injury or death.

- Properly tighten all power lugs. Loose wiring may overheat at connection points, causing a fire, physical injury or death.

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

**Note:**

- The communications cable (connecting cable) from the outdoor unit to the indoor unit should be isolated from the electrical wiring of external devices such as computers, elevators, radio and television broadcasting facilities, and medical imaging offices. Communication problems can arise from electrical noise.

- Do not install the power wiring to the outdoor unit and the power wiring / communications cable (connecting cable) to the indoor units in the same conduit. These wiring / cables should have separate conduits that are placed a reasonable distance apart. Communication problems can arise from electrical noise.
Connecting the Power Wiring / Communications Cable to the Outdoor Unit, continued.

Figure 78: Detailed View of Outdoor Unit Terminal Blocks / Connections.

Multi F LMU18CHV

Multi F LMU24CHV

Multi F LMU30CHV and LMU36CHV

Multi F MAX LMU480HV and LMU540HV

Multi F MAX LMU600HV

Connecting the Power Wiring / Communications Cable to the Outdoor Unit, continued.

Figure 78: Detailed View of Outdoor Unit Terminal Blocks / Connections.

Multi F LMU18CHV

Multi F LMU24CHV

Multi F LMU30CHV and LMU36CHV

Multi F MAX LMU480HV and LMU540HV

Multi F MAX LMU600HV

Connecting the Power Wiring / Communications Cable to the Outdoor Unit, continued.

Figure 78: Detailed View of Outdoor Unit Terminal Blocks / Connections.

Multi F LMU18CHV

Multi F LMU24CHV

Multi F LMU30CHV and LMU36CHV

Multi F MAX LMU480HV and LMU540HV

Multi F MAX LMU600HV

Connecting the Power Wiring / Communications Cable to the Outdoor Unit, continued.

Figure 78: Detailed View of Outdoor Unit Terminal Blocks / Connections.

Multi F LMU18CHV

Multi F LMU24CHV

Multi F LMU30CHV and LMU36CHV

Multi F MAX LMU480HV and LMU540HV

Multi F MAX LMU600HV

Connecting the Power Wiring / Communications Cable to the Outdoor Unit, continued.

Figure 78: Detailed View of Outdoor Unit Terminal Blocks / Connections.

Multi F LMU18CHV

Multi F LMU24CHV

Multi F LMU30CHV and LMU36CHV

Multi F MAX LMU480HV and LMU540HV

Multi F MAX LMU600HV

Connecting the Power Wiring / Communications Cable to the Outdoor Unit, continued.

Figure 78: Detailed View of Outdoor Unit Terminal Blocks / Connections.

Multi F LMU18CHV

Multi F LMU24CHV

Multi F LMU30CHV and LMU36CHV

Multi F MAX LMU480HV and LMU540HV

Multi F MAX LMU600HV

Connecting the Power Wiring / Communications Cable to the Outdoor Unit, continued.

Figure 78: Detailed View of Outdoor Unit Terminal Blocks / Connections.
Connecting the Power Wiring / Communications Cable to Indoor Units

1. Connect power wiring / communications cable (connecting cable) from the outdoor unit to the individual indoor unit terminals following the wiring diagrams on the outdoor unit and indoor unit control covers.

2. Ensure that the terminal board numbers (A, B, C; 1, 2, 3) and wiring color on the outdoor unit matches the terminal number and wiring color on the indoor unit. (Terminal board numbers are arranged from top to bottom in order from 1 to 3.)

3. Provide strain relief by securing the wiring / cable to the indoor unit with the factory-supplied clamps.

4. For more installation information for specific indoor units, refer to the separate indoor unit installation manuals on www.lg-dfs.com.

Connecting the Power Wiring / Communications Cable to the Branch Distributor (BD) Unit (Multi F MAX Systems Only)

General Instructions

- Always connect power wiring / communications cable matching the BD unit terminals to their respective indoor units (Example for three-port BD Unit PMBD3630: A, B, and C).
- Follow the instructions on the nameplates and connect wiring / cables of the outdoor unit and indoor units to the correct terminals (1, 2, 3). Always attach each ground wire separately to a grounding screw.
- After completion, secure wiring with wire clamps. Secure wiring firmly to the indoor unit.

BD Unit Wiring Connection Procedure

1. Remove the BD unit control cover. Unscrew the two (2) screws, and slide the cover off the BD frame following the arrows in the diagram (Step 1).

2. Draw the power wiring / communications cable through the field-supplied conduit so there is enough length to connect wiring / cable to the terminals on the BD unit. Secure conduit to the BD unit using a field-supplied lock nut on the interior of the BD unit frame (Step 2).

3. Connect wiring / cable from the outdoor unit to the BD unit terminals, and from the BD unit terminals to the indoor unit terminals following the wiring diagram on the outdoor unit control cover (Step 3). Allow 11-13/16 inches of slack in the wire harness. Attach wiring / cable to the BD unit with clamps at four (4) locations.

4. Replace the BD unit control cover following the arrows in the diagram. Tighten the two (2) screws to finish (Step 4).

Figure 79: Interior View of a BD Unit (Three-Port PMBD3630 Example Shown).

Figure 80: BD Unit Wiring Steps.

⚠️ WARNING

Do not use tapped wires, extension cords, or starburst-type connections as they may cause overheating, fire, electric shock, physical injury or death.

Note:
Always refer to the circuit diagram on the inside of the outdoor unit control cover.
PI485

PI485 V-net Control Integration Board for Outdoor Units adapt Multi F, Multi F MAX systems to a LG VRF system central protocol for integration with LG central controllers. The PI485 is installed in the Multi F / Multi F MAX outdoor unit. For more information on PI485 installation, see the PI485 installation manual.

Figure 82: PI485 Installation Area in Multi F and Multi F MAX Outdoor Units.

Multi F LMU18CHV, LMU24CHV

Multi F LMU30CHV, LMU36CHV

Multi F MAX LMU480HV, LMU540HV

Multi F MAX LMU600HV
**Test Run**

After checking the system for leaks and performing the evacuation procedure, perform a test run. Follow the guidelines below for proper procedure.

**Before the Test Run**

1. Check that all condensate tubing, refrigerant piping and power wiring / communications cables are properly connected.
2. Make sure that the gas and liquid service valves are fully open.

**Installing the Remote Controller Batteries**

As part of the test run, the batteries need to be inserted into the remote controller, and the remote controller needs to be powered on to operate the indoor units. To insert the batteries follow the steps below. For information on using the remote controller, refer to its owner's manual.

1. The remote controller needs two AAA (1.5V) batteries for operation. Remove the battery cover from the back of the remote controller by pushing downward on the tab at the top of the battery cover and then lift up to remove.
2. Insert the two new batteries. Align batteries by the (+) and (-) sides (the interior battery compartment of the remote controller will have clear markings for the (+) and (-) placement).
3. Verify that the batteries have “clicked” into the compartment and are firmly engaged with the contacts on either side of them.
4. Reattach the back cover of the remote controller.
5. Proceed with powering on the remote controller and usage as needed.

**Test Run Procedure**

1. Start up the system and perform a test run. Operate the system in cooling mode for 15 to 20 minutes.
2. Evaluate performance as the system runs, verifying the outdoor unit and all indoor units and BD units (Multi F MAX systems only) are working properly. Make notes as needed to address any issues that might be found.
   - Check the system refrigerant charge:
     - Measure the pressure from the gas side service valve.
     - Measure the indoor unit inlet and outlet air temperatures. See table below for the optimum condition of the gas side pressure (system is in cooling mode).

### Table 40: Optimum Conditions of the Gas Side Pressure.

<table>
<thead>
<tr>
<th>Refrigerant Type</th>
<th>Outside Ambient Temperature</th>
<th>Gas Side Service Valve Pressure</th>
</tr>
</thead>
<tbody>
<tr>
<td>R410A</td>
<td>95°F</td>
<td>113~142 psig</td>
</tr>
</tbody>
</table>

**Note:**

If the pressure is >142psig, the system is most likely overcharged, and refrigerant should be removed. If the pressure is <113 psig, the system is most likely undercharged and refrigerant should be added.
Outdoor Unit DIP Switch Settings

System must be powered off, and then turned back on to apply DIP switch settings.

**WARNING**

Turn off the circuit breaker or shut the power source of the product down before setting the DIP switch. There is risk of physical injury or death due to electric shock.

**Note:**
- Unless the applicable DIP switch is set properly, the system may not work.
- If a specific function is desired, request that the installer set the appropriate DIP switch during installation.
- Only the first four DIP switches are functional on the LMU480, 540, 600HV.

Table 41: DIP Switch Settings and Functionalities.

<table>
<thead>
<tr>
<th>DIP Switch Setting</th>
<th>Function</th>
</tr>
</thead>
<tbody>
<tr>
<td><img src="image" alt="DIP Switch Setting" /></td>
<td>Normal Operation (No Function)</td>
</tr>
<tr>
<td><img src="image" alt="DIP Switch Setting" /></td>
<td>Forced Cooling Operation</td>
</tr>
<tr>
<td><img src="image" alt="DIP Switch Setting" /></td>
<td>Wiring Error Check</td>
</tr>
<tr>
<td><img src="image" alt="DIP Switch Setting" /></td>
<td>Reducing Power Consumption (Step 1)</td>
</tr>
<tr>
<td><img src="image" alt="DIP Switch Setting" /></td>
<td>Reducing Power Consumption (Step 2)</td>
</tr>
<tr>
<td><img src="image" alt="DIP Switch Setting" /></td>
<td>Mode Lock (Cooling)</td>
</tr>
<tr>
<td><img src="image" alt="DIP Switch Setting" /></td>
<td>Mode Lock (Heating)</td>
</tr>
<tr>
<td><img src="image" alt="DIP Switch Setting" /></td>
<td>Night Quiet Mode (Step 1)</td>
</tr>
<tr>
<td><img src="image" alt="DIP Switch Setting" /></td>
<td>Night Quiet Mode (Step 2)</td>
</tr>
<tr>
<td><img src="image" alt="DIP Switch Setting" /></td>
<td>Mode Lock (Cooling) + Night Quiet Mode (Step 1)</td>
</tr>
<tr>
<td><img src="image" alt="DIP Switch Setting" /></td>
<td>Mode Lock (Cooling) + Night Quiet Mode (Step 2)</td>
</tr>
<tr>
<td><img src="image" alt="DIP Switch Setting" /></td>
<td>Reducing Power Consumption (Step 1) with Mode Lock (Cooling)</td>
</tr>
<tr>
<td><img src="image" alt="DIP Switch Setting" /></td>
<td>Reducing Power Consumption (Step 2) with Mode Lock (Cooling)</td>
</tr>
<tr>
<td><img src="image" alt="DIP Switch Setting" /></td>
<td>Reducing Power Consumption (Step 1) with Mode Lock (Heating)</td>
</tr>
<tr>
<td><img src="image" alt="DIP Switch Setting" /></td>
<td>Reducing Power Consumption (Step 2) with Mode Lock (Heating)</td>
</tr>
</tbody>
</table>
**Forced Cooling Operation Function**

Use to add refrigerant to the system when outside ambient temperatures are cool (ex.: winter).

1. Shut power down to the system.
2. Set DIP Switch 1 to ON.
3. Turn power on to the system.
4. Verify that the Red LED on the outdoor unit PCB is ON (indicates indoor units are in forced cooling operation).
5. Add refrigerant.

**Note:**
- If the green LED light on the outdoor unit PCB is ON, it indicates the compressor is OFF due to low pressure in the system.
- Turn DIP Switch 1 to OFF after finishing (Normal Operation setting).
- Only the first four DIP switches are functional on the LMU480, 540, 600HV.
Wiring Error Check

Use to verify if wiring is properly installed.
1. Shut power down to the system.
2. Set DIP Switch 2 to ON.
3. Turn power on to the system.
4. Check if the Red and Green LEDs on the outdoor unit PCB are ON (indicate indoor units are in forced operation mode).
5. If the wiring is correctly installed, the Green LED will light up. If the wiring is incorrectly installed, the Red and Green LEDs will blink, indicating which part of the system is in error.
   - Red LED = Piping Number
   - Green LED = Wiring Number (Room)

Example: If the Red LED blinks twice and the Green LED blinks three times, the second piping to the third room is in error (see at right).

**Note:**
- If the indoor unit(s) are not communicating properly to the outdoor unit, the Wiring Error Check cannot operate correctly.
- Only the part of the system in error will be displayed. System will operate correctly after the error is fixed.
- If outdoor and indoor temperatures are too low (ex.: winter), the wiring error check function will not operate (Red LED is ON).
- Turn DIP Switch 2 to OFF after finishing (Normal Operation setting).
- Only the first four DIP switches are functional on the LMU480, 540, 600HV.

Reducing Power Consumption

Enables more efficient system operation by reducing the maximum power consumption value (reducing the MCA).
1. Shut power down to the system.
2. For Step 1, set only DIP Switch 3 to ON. For Step 2, set only DIP Switch 4 to ON.
3. Turn power on to the system.

<table>
<thead>
<tr>
<th>Phase</th>
<th>1Ø</th>
<th>Multi F LMU18CHV, LMU24CHV</th>
<th>Multi F LMU30CHV, LMU36CHV</th>
<th>Multi F MAX LMU480HV, LMU540HV, LMU600HV</th>
</tr>
</thead>
<tbody>
<tr>
<td>Step 1 (A)</td>
<td>9</td>
<td>13</td>
<td>22</td>
<td></td>
</tr>
<tr>
<td>Step 2 (A)</td>
<td>8</td>
<td>11</td>
<td>21</td>
<td></td>
</tr>
</tbody>
</table>

**Note:**
- Reduced Power Consumption reduces outdoor unit capacity.
- Only the first four DIP switches are functional on the LMU480, 540, 600HV.
Reducing Power Consumption with Mode Lock

Enables more efficient system operation by lowering the maximum power consumption value, as well as locks the mode of operation (Example: In a cooling-only server room application where permission to adjust the system mode is highly limited). Changing modes can cause a change in compressor frequency, which would cause problems with the setting. As such, if this mode is used, it is locked in either cooling or heating. The function is rarely, if ever, used.

1. Shut power down to the system.
2. Set DIP Switches as indicated below, following the steps and chosen mode.
3. Turn power on to the system.

Note:

Only the first four DIP switches are functional on the LMU480, 540, 600HV.

Night Quiet Mode

Lowers the operation sound of the outdoor unit by changing the compressor frequency and fan speeds. Night quiet mode initiates eight (8) hours after the highest outdoor air temperature is measured, then is active for nine (9) hours.

1. Shut power down to the system.
2. Set DIP Switches 1 and 4 to ON.
3. Turn power on to the system.

Night Quiet Mode with Mode Lock

Lowers the operation sound of the outdoor unit by changing the compressor frequency and fan speeds, as well as locks the mode of operation. Changing modes can cause a change in compressor frequency, which would cause problems with the setting. As such, if this mode is used, it is locked in either cooling or heating. The function is rarely, if ever, used. Night quiet mode initiates eight (8) hours after the highest outdoor air temperature is measured, then is active for nine (9) hours.

1. Shut power down to the system.
2. Set DIP Switches 1 and 3 to ON.
3. Turn power on to the system.

Note:

- If compressor frequency and fan speed are decreased, cooling capacity also may decrease accordingly.
- Night Quiet Mode can only be used when system is in cooling operation.
- Change the DIP switches if Night Quiet Mode is no longer desired.
- Only the first four DIP switches are functional on the LMU480, 540, 600HV.
Mode Lock
Prevents mixed mode operation (mode change) in applications where only one mode is necessary.
1. Shut power down to the system.
2. For Only Cooling Mode Lock, set only DIP Switches 1 and 2 to ON. For Only Heating Mode Lock, set only DIP Switches 3 and 4 to ON.
3. Turn power on to the system.

Note:
Only the first four DIP switches are functional on the LMU480, 540, 600HV.

PCB Display (Multi F LMU18-24CHV and LMU600HV Models Only)
For Multi F LMU18CHV, LMU24CHV, and LMU600HV outdoor units, the cycle data can be checked without using LG Monitoring View (LGMV) Diagnostic Software by pushing TACT-SW1. See below for the types of cycle information that will be displayed in LGMV. After first page is displayed, the second page will be subsequently displayed.

⚠️ WARNING
Protect fingers / hands with a non-conducting material before pushing TACT-SW1. There is risk of physical injury or death due to electric shock.

<table>
<thead>
<tr>
<th>TACT-SW1 No. of Pushes</th>
<th>Description</th>
<th>Example</th>
<th>Display</th>
<th>First Page</th>
<th>Second Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>One (1) Time</td>
<td>Low Pressure</td>
<td>890kpa</td>
<td>“LP”</td>
<td>“89”</td>
<td></td>
</tr>
<tr>
<td>Two (2) Times</td>
<td>High Pressure</td>
<td>2,900kpa</td>
<td>“HP”</td>
<td>“290”</td>
<td></td>
</tr>
<tr>
<td>Three (3) Times</td>
<td>Discharge Temperature</td>
<td>85°C</td>
<td>“DS”</td>
<td>“85”</td>
<td></td>
</tr>
<tr>
<td>Four (4) Times</td>
<td>Condenser Outlet Temperature</td>
<td>-10°C</td>
<td>“CS”</td>
<td>“-10”</td>
<td></td>
</tr>
<tr>
<td>Five (5) Times</td>
<td>Suction Temperature</td>
<td>-10°C</td>
<td>“SS”</td>
<td>“-10”</td>
<td></td>
</tr>
<tr>
<td>Six (6) Times</td>
<td>Outdoor Unit Air Temperature</td>
<td>-10°C</td>
<td>“AS”</td>
<td>“-10”</td>
<td></td>
</tr>
<tr>
<td>Seven (7) Times</td>
<td>Current</td>
<td>15A</td>
<td>“A”</td>
<td>“15”</td>
<td></td>
</tr>
<tr>
<td>Eight (8) Times</td>
<td>Voltage</td>
<td>230V</td>
<td>“V”</td>
<td>“230”</td>
<td></td>
</tr>
<tr>
<td>Nine (9) Times</td>
<td>Compressor Hz</td>
<td>100Hz</td>
<td>“F”</td>
<td>“100”</td>
<td></td>
</tr>
<tr>
<td>Ten (10) Times</td>
<td>DC Link Voltage</td>
<td>230V</td>
<td>“dc”</td>
<td>“230”</td>
<td></td>
</tr>
</tbody>
</table>
LG Monitoring View (LGMV) Diagnostic Software

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

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

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

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

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

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

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

Note:
Images on these pages are examples of LGMV screenshots. Actual images may differ depending on the version of the software and the unit installed.
LG Monitoring View (LGMV) Diagnostic Software and Cable - Continued

5. Data
   • Data Saving Start: Recording of real time data to a separate file created to be stored on the user’s computer.
   • Data Loading Start: Recorded data from a saved “.CSV” file can be loaded to create an LGMV session.

6. Monitoring
   • Electrical: The lower half of main screen is changed to show Inverter Compressor Amps, Volts, Power Hz, Inverter control board fan Hz.

Error Codes

LGMV software helps the service technician or commissioning agent to troubleshoot system operation issues by displaying malfunction codes. These error codes can be seen on the main screen of the LGMV software program. For an overview of Multi F / Multi F MAX system error codes, see Error Codes section. For detailed information on how to troubleshoot individual error codes, see the Multi F / Multi F MAX Service Manual.

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

In lieu of connecting to the outdoor unit, user has the option to connect to IDU with the use of a USB to RS-485 connector kit. When connected through IDU, user will not be able to record data.

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

Recommended Minimum PC Configuration:

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

Note:

Images on these pages are examples of LGMV screenshots. Actual images may differ depending on the version of the software and the units installed.
MULTI F / MULTI F MAX Outdoor Unit Installation Manual

Due to our policy of continuous product innovation, some specifications may change without notification.
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Self Diagnosis Functions

LG SIMS
The SIMs WLAN module and the smart phone app together provide monitoring and troubleshooting capability for LG Multi F / Multi F MAX systems. SIMs functions only with LG Duct Free products.

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

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

Figure 106 shows a Multi F configuration used with the SIMs module and app. LG SIMs can also be used with Single Zone one-to-one configurations such as the Single Zone Wall Mount systems.

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

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

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

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

**Outdoor Info/Component Screen**
Displays the following information:
- Frequency
- FAN1 RPM
- FAN2 RPM
- DC Link
- Current
- Voltage
- EEV Mode
- Restart Timer
- Comp Mode
- EEV

**Indoor Info Tab**
Displays the following information:
- Frequency
- Operation
- THM Mode
- REM Mode
- FAN
- EEV
- Air Temp
- Pipe-in
- Pipe-mid
- Pipe-out

**Outdoor Info/Temperature Screen**
Displays the following information:
- Inv TD
- Suction
- Discharge
- Cond Mid
- Cond Out
- Heatsink
- Air Temp

**Graph Info Tab**
This tab, has three sub sections:
- IDU - Indoor Unit Temperature graph. Displays IDU information in graph format. Information displayed is for the IDU # selected on the Main screen.
- ODU - Outdoor Unit Temperature and Frequency graph. Displays ODU information in graph format.
- ODU Electric - Outdoor Unit Electric data graph is displayed.
Troubleshooting Using Error Codes

Refer to Tables 44 and 45 for error codes that are generated from the indoor and outdoor units. These codes indicate different types of unit failures, assist in self-diagnosis, and are the most common that will manifest through these units. Error codes are displayed on indoor unit LEDs, wired remote controllers, the outdoor unit PCB, and through LG Monitoring View (LGMV) diagnostic software.

Systems may generate additional codes not listed here. Contact LG Support if these types of errors are seen and a simple power down and boot up has not corrected the issue. Do not attempt to fix the system yourself.

- If two or more errors occur simultaneously, the highest error code number is displayed first.
- After error is resolved, the error code does not display.

Decoding the Error Display

See images and table below for indoor unit error codes, location of LEDs, and operation status.

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

Error Code Nomenclature Definitions

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

Table 44: Indoor Unit Error Codes.

<table>
<thead>
<tr>
<th>Error Code</th>
<th>Description</th>
<th>Indoor Unit Operation Status</th>
</tr>
</thead>
<tbody>
<tr>
<td>00</td>
<td>No error</td>
<td>ON</td>
</tr>
<tr>
<td>01</td>
<td>Indoor unit room temperature sensor error</td>
<td>OFF</td>
</tr>
<tr>
<td>02</td>
<td>Indoor unit inlet pipe sensor error</td>
<td>OFF</td>
</tr>
<tr>
<td>03</td>
<td>Controller error</td>
<td>OFF</td>
</tr>
<tr>
<td>04</td>
<td>Drain pump error (optional)</td>
<td>OFF</td>
</tr>
<tr>
<td>05</td>
<td>Communication error between indoor unit and outdoor units</td>
<td>OFF</td>
</tr>
<tr>
<td>06</td>
<td>Indoor unit outlet pipe sensor error</td>
<td>OFF</td>
</tr>
<tr>
<td>07</td>
<td>Different mode operation error</td>
<td>OFF</td>
</tr>
<tr>
<td>09</td>
<td>Indoor unit EPROM error</td>
<td>OFF</td>
</tr>
<tr>
<td>10</td>
<td>Indoor unit BLDC motor fan lock</td>
<td>OFF</td>
</tr>
</tbody>
</table>
## TROUBLESHOOTING

### Error Codes

Table 45: Outdoor Unit Error Codes.

<table>
<thead>
<tr>
<th>Error Code</th>
<th>Description</th>
<th>No. of Times Outdoor Unit LEDs Blink</th>
<th>Outdoor Operation Status</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>LED01 (Red)</td>
<td>LED02 (Green)</td>
</tr>
<tr>
<td>21</td>
<td>DC Peak (IPM Fault); Compressor DC voltage was too high</td>
<td>2X</td>
<td>1X</td>
</tr>
<tr>
<td>22</td>
<td>Current Transformer2 (CT2) error; Alternating current (AC) input too high</td>
<td>2X</td>
<td>2X</td>
</tr>
<tr>
<td>23</td>
<td>DC Link Low Voltage (DC Link Voltage is &lt;140VDC)</td>
<td>2X</td>
<td>3X</td>
</tr>
<tr>
<td></td>
<td>DC Link High Voltage (DC Link Voltage is &gt;420VDC)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>25</td>
<td>AC Low / High Voltage</td>
<td>2X</td>
<td>5X</td>
</tr>
<tr>
<td>26</td>
<td>DC Compressor Position Error (Compressor failed to start properly)</td>
<td>2X</td>
<td>6X</td>
</tr>
<tr>
<td>27</td>
<td>PSC / PFC Fault; Input current to inverter compressor PCB is too high</td>
<td>2X</td>
<td>7X</td>
</tr>
<tr>
<td>29</td>
<td>Current to inverter compressor is too high</td>
<td>2X</td>
<td>9X</td>
</tr>
<tr>
<td>32</td>
<td>Inverter compressor discharge pipe (D-Pipe) temperature is too high</td>
<td>3X</td>
<td>2X</td>
</tr>
<tr>
<td>35</td>
<td>Low Pressure Error; Pressure dropped below recommended limits</td>
<td>3X</td>
<td>5X</td>
</tr>
<tr>
<td>39</td>
<td>Communication Error between PFC MICOM and Inverter MICOM</td>
<td>3X</td>
<td>9X</td>
</tr>
<tr>
<td>40</td>
<td>CT Sensor Error; Thermistor is disconnected or has shorted out</td>
<td>4X</td>
<td>-</td>
</tr>
<tr>
<td>41</td>
<td>Inverter compressor discharge pipe (D-Pipe) sensor is disconnected or has shorted out</td>
<td>4X</td>
<td>1X</td>
</tr>
<tr>
<td>43</td>
<td>High pressure sensor is disconnected or has shorted out</td>
<td>4X</td>
<td>3X</td>
</tr>
<tr>
<td>44</td>
<td>Outdoor air sensor is disconnected or has shorted out</td>
<td>4X</td>
<td>4X</td>
</tr>
<tr>
<td>45</td>
<td>Mid-pipe thermistor of outdoor unit condenser is disconnected or has shorted out</td>
<td>4X</td>
<td>5X</td>
</tr>
<tr>
<td>46</td>
<td>Outdoor unit suction piping thermistor is disconnected or has shorted out</td>
<td>4X</td>
<td>6X</td>
</tr>
<tr>
<td>48</td>
<td>Outlet piping (liquid) of condenser is disconnected or has shorted out</td>
<td>4X</td>
<td>8X</td>
</tr>
<tr>
<td>51</td>
<td>Combination ratio (capacity) is out of range; Total nominal indoor unit capacity is &lt;50% or &gt;130% of the outdoor unit capacity</td>
<td>5X</td>
<td>1X</td>
</tr>
<tr>
<td>53</td>
<td>Communication failure between outdoor unit and indoor unit(s)</td>
<td>5X</td>
<td>3X</td>
</tr>
<tr>
<td>54</td>
<td>Outdoor unit is not wired properly (ex: reversed phase)</td>
<td>5X</td>
<td>4X</td>
</tr>
<tr>
<td>60</td>
<td>Outdoor unit printed circuit board (PCB) EPROM check sum error</td>
<td>6X</td>
<td>-</td>
</tr>
<tr>
<td>61</td>
<td>Condenser coil thermistor temperature is too high</td>
<td>6X</td>
<td>1X</td>
</tr>
<tr>
<td>62</td>
<td>Outdoor unit inverter compressor PCB heat sink temperature is too high</td>
<td>6X</td>
<td>2X</td>
</tr>
<tr>
<td>65</td>
<td>Heat sink thermistor is disconnected or has shorted out</td>
<td>6X</td>
<td>5X</td>
</tr>
<tr>
<td>67</td>
<td>Outdoor unit brushless direct current (BLDC) fan motor lock error</td>
<td>6X</td>
<td>7X</td>
</tr>
<tr>
<td>73</td>
<td>Outdoor unit PFC overcurrent (peak) error</td>
<td>7X</td>
<td>3X</td>
</tr>
</tbody>
</table>
Cautions for Refrigerant Leaks / Introduction

ASHRAE Standards 15 and 34 offer guidelines that address refrigerant safety and the maximum allowable concentration of refrigerant in an occupied space. Refrigerant will dissipate into the atmosphere, but a certain volume of air is required for this to occur safely. For R410A refrigerant, the maximum allowable concentration is 0.026 lbs./ft³ per 1,000 ft³ of air in an occupied space. Buildings with twenty-four (24) hour occupancy allow half of that concentration.¹

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

⚠️ WARNING
Verify the maximum refrigerant concentration level in the space where the indoor unit will be mounted meets the concentration limit for the application. If the refrigerant leaks and safety limits are exceeded, it could result in personal injuries or death from oxygen depletion.

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

To calculate the potential refrigerant concentration level (RCL):
1. Measure the occupied space dimensions (in feet).
2. Calculate the cubic foot volume of air in the smallest occupied space. (To obtain a detailed overview of the RCL, perform the same calculations to the second smallest zone, the third smallest zone until the RCL is obtained for all zones. Also, pay special attention to areas such as basements, etc., where refrigerant cannot dissipate easily.)
3. Divide the refrigerant charge of the Multi Zone system serving the area in pounds by the results of step 1.
4. If the calculation indicates that the potential refrigerant concentration level is higher than the allowed RCL, increase the cubic volume of the smallest occupied space or modify the piping system design.
5. The allowable RCL limit for most applications must be equal to or less than 0.026 lbs./ft³. However, in special occupied spaces, such as hospitals and nursing homes, where occupants may have limited mobility, the allowable RCL limit is cut in half. See ASHRAE Standard 34 and local codes for detailed information.¹

Refrigerant Concentration Limit (RCL) Calculations
To calculate total refrigerant amount per system:

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

Fig. 111: Example of R410A Refrigerant Leak Location.

1 American Society of Heating, Refrigeration and Air Conditioning Engineers, Inc. (ASHRAE). Atlanta, GA. ASHRAE, Inc. Information about ASHRAE Standard 15 / 34 and addenda current as of the date of this publication.
To determine the volume of an occupied space, the designer must also determine which ones are connected, not connected, or ventilated (refer to Standard 34).

If the calculated RCL is above the allowable limit, there are two primary methods used to lower the RCL:
1. Increase the volume of the occupied space.
2. Decrease the size of the refrigerant charge.

Per Standard 34-2007, acceptable methods used to increase the volume of an occupied space include:
• Install transfer ducts between rooms.
• Undercut and overcut doors (partitions ≤0.15% of cubic volume of space within a zone).
• Add an opening without a door (partitions ≤0.15% of cubic volume of space within a zone).
• Include ventilation grilles in doors; include ventilation inlets / outlets (partitions ≤0.15% of cubic volume of space within a zone).
• Include the area above the ceiling as part of the return or supply air path (partitions ≤0.15% of cubic volume of space within a zone).
• Install a mechanical ventilator linked to a gas leak detector.
• Change the indoor unit type (wall mounted to ceiling cassette) / position.

Figure 112: Examples of Zones.

Figure 113: Examples of Acceptable Ventilation Methods.
Major Component Rough-In

<table>
<thead>
<tr>
<th>Description</th>
<th>Check</th>
</tr>
</thead>
<tbody>
<tr>
<td>All Multi F / Multi F MAX outdoor units were connected properly per local code and the product installation procedures.</td>
<td></td>
</tr>
<tr>
<td>All literature and bagged accessories have been removed from the fan discharge.</td>
<td></td>
</tr>
<tr>
<td>Indoor units and branch distribution unit(s) (Multi F MAX only) are installed, properly supported, and located indoors in a non-corrosive environment.</td>
<td></td>
</tr>
<tr>
<td>Multi F / Multi F MAX gravity condensate drain line was connected and routed where it properly drains away or, if installed in a mechanical room, was connected and properly routed to a drain terminal.</td>
<td></td>
</tr>
</tbody>
</table>

Piping and Insulation

<table>
<thead>
<tr>
<th>Description</th>
<th>Check</th>
</tr>
</thead>
<tbody>
<tr>
<td>Copper</td>
<td></td>
</tr>
<tr>
<td>Over 5/8 inches—Rigid ACR only.</td>
<td></td>
</tr>
<tr>
<td>5/8 inches and under—Can use soft ACR.</td>
<td></td>
</tr>
<tr>
<td>15% silver brazing material only.</td>
<td></td>
</tr>
<tr>
<td>All refrigerant pipes and valves were insulated separately. Insulation butts up against the walls of the indoor units. No gaps or cracks. Insulation was not compressed at clamps and hangers.</td>
<td></td>
</tr>
<tr>
<td>LG Y-branches were used per manufacturer’s recommendations.</td>
<td></td>
</tr>
<tr>
<td>(Optional) Full port ball valves for all indoor units. (Schrader between the valve body and the indoor units.)</td>
<td></td>
</tr>
<tr>
<td>Condensate piping installed on indoor units—material used is acceptable under local code. Insulated as necessary to prevent condensation.</td>
<td></td>
</tr>
</tbody>
</table>

Brazing Practices

<table>
<thead>
<tr>
<th>Description</th>
<th>Check</th>
</tr>
</thead>
<tbody>
<tr>
<td>Medical grade (there are 4 available) dry nitrogen for purging during brazing was used (constant 3 psi while brazing).</td>
<td></td>
</tr>
</tbody>
</table>

Installation

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

Refrigerant Piping

<table>
<thead>
<tr>
<th>Description</th>
<th>Check</th>
</tr>
</thead>
<tbody>
<tr>
<td>Have in possession a copy of the “As-Designed” LATS Multi F piping tree diagram. BEFORE ANY FIELD PIPE SIZE OR LENGTH CHANGES ARE MADE, PROPOSED CHANGES MUST BE FORWARDERED TO THE DESIGN ENGINEER SO THAT THEY CAN INPUT THE CHANGES INTO LATS and RE-ISSUE A NEW LATS PIPING TREE DIAGRAM. Installer must receive change authorization from the design engineer, because any change made requires the review of the entire tree diagram and verification that the change did not impact the size of piping segments in other parts of the system.</td>
<td></td>
</tr>
<tr>
<td>All pipe materials were properly stored, capped, and clean. All burrs were removed after cutting and pipe ends were reamed before brazing.</td>
<td></td>
</tr>
<tr>
<td>During refrigerant pipe installation, for each segment of pipe, a record was made of the pipe length (including expansion loops, offsets, double-back sections), and sizes, as well as the quantity and type of elbows used.</td>
<td></td>
</tr>
<tr>
<td>All long runs of straight pipe were provided with expansion loops.</td>
<td></td>
</tr>
<tr>
<td>Ensure Y-branches are installed with no more than ±5° of horizontal.</td>
<td></td>
</tr>
<tr>
<td>Ensure Y-branches are installed with no more than ±3° of vertical.</td>
<td></td>
</tr>
<tr>
<td>A torque wrench and backup wrench were used to tighten all flare connections.</td>
<td></td>
</tr>
<tr>
<td>The back side of all flares were lubricated with a small drop of PVE refrigeration oil before tightening flare fittings.</td>
<td></td>
</tr>
<tr>
<td>Ensure all field made flares are 45°. Use factory-supplied flare nuts only.</td>
<td></td>
</tr>
<tr>
<td>Pipe segments were properly supported and all wall penetrations were sleeved.</td>
<td></td>
</tr>
<tr>
<td>Pipe insulation was not compressed at any point.</td>
<td></td>
</tr>
<tr>
<td>Y-branches were properly supported per details provided in the installation manual.</td>
<td></td>
</tr>
<tr>
<td>Ensure Y-branches are installed in the correct direction. Flow is always from the single end to the double end.</td>
<td></td>
</tr>
<tr>
<td>No oil traps, solenoid valves, sight glasses, filter driers, or any other unauthorized refrigerant specialties were present.</td>
<td></td>
</tr>
<tr>
<td>(Optional) R410A rated full port ball valves were used at all indoor units and wherever appropriate in the refrigerant piping network.</td>
<td></td>
</tr>
<tr>
<td>Best practice including a minimum of 20° of straight pipe was installed between each elbow.</td>
<td></td>
</tr>
</tbody>
</table>
## Condensate Pump / Drain Installation

<table>
<thead>
<tr>
<th>Description</th>
<th>Check</th>
</tr>
</thead>
<tbody>
<tr>
<td>Indoor unit condensate drain pipes were installed correctly.</td>
<td></td>
</tr>
<tr>
<td>All condensate vertical risers are equal to or less than 27-1/2&quot; from the bottom of the indoor unit.</td>
<td></td>
</tr>
<tr>
<td>Indoor units with condensate pumps were level. Units with gravity drains were level or slightly canted toward the drain connection and are supported properly.</td>
<td></td>
</tr>
<tr>
<td>Pumped condensate drain lines were properly connected (do not have traps, and connect to the top surface of the main drain line).</td>
<td></td>
</tr>
</tbody>
</table>

## Power Wire and Communications Cables

<table>
<thead>
<tr>
<th>Description</th>
<th>Check</th>
</tr>
</thead>
<tbody>
<tr>
<td>Power wiring was connected to a single phase 208-230V source.</td>
<td></td>
</tr>
<tr>
<td>Ground wire was installed and properly terminated at the unit.</td>
<td></td>
</tr>
<tr>
<td>The power supplied was clean with voltage fluctuations within specifications. (±10% of nameplate).</td>
<td></td>
</tr>
<tr>
<td>Power wiring to the Multi F / Multi F MAX outdoor unit was installed per all local electrical code requirements.</td>
<td></td>
</tr>
<tr>
<td>Power wiring to the indoor units and branch distribution unit(s) (Multi F MAX only) was installed per all local electrical code requirements.</td>
<td></td>
</tr>
<tr>
<td>LG-supplied cable was used between each indoor unit and its zone controller. No cables were spliced and no wire caps are present.</td>
<td></td>
</tr>
<tr>
<td>Communication type RS-485–BUS type.</td>
<td></td>
</tr>
<tr>
<td>Communications/power were a minimum of 18-AWG, four (4) conductor, stranded, shielded or unshielded, with insulation material per local code. If shielded, must be ground to outdoor unit only. Cable segment shields were tied together.</td>
<td></td>
</tr>
<tr>
<td>Used appropriate crimping tool to attach ring or spade terminals at all power wiring and control cable terminations.</td>
<td></td>
</tr>
<tr>
<td>Power and control wires were run in the same conduit (ODU to IDU only) as provided in the product installation manual. Power to ODU and power/communications to IDU cannot be run in the same conduit and must be separated per manufacturer’s guidelines.</td>
<td></td>
</tr>
</tbody>
</table>
Major Component Rough-In

Piping and Insulation

Brazing Practices
<table>
<thead>
<tr>
<th>Installation—Refrigerant Piping</th>
</tr>
</thead>
<tbody>
<tr>
<td>Installation—Branch Distribution Unit (Multi F MAX Systems Only)</td>
</tr>
<tr>
<td>--------------------------------</td>
</tr>
<tr>
<td>Installation—Condensate Pump / Drain Installation</td>
</tr>
<tr>
<td>--------------------------------</td>
</tr>
<tr>
<td>Installation—Power Wire and Communications Cables</td>
</tr>
</tbody>
</table>

Due to our policy of continuous product innovation, some specifications may change without notification.
©LG Electronics U.S.A., Inc., Englewood Cliffs, N.J. All rights reserved. "LG" is a registered trademark of LG Corp.
LG Multi F 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 formula 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.

**Multi F Outdoor Unit Additional Refrigerant Charge Formula**

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 connectible indoor units – Total number of connected indoor units.

**Multi F Outdoor Unit Piping Specifications**

<table>
<thead>
<tr>
<th>Multi F Outdoor Unit Model</th>
<th>Min. to Max. Piping Length for One Branch (ft.)</th>
<th>Max. Total System Piping Length (ft.)</th>
<th>Chargeless Pipe Length per Branch (L) (ft.)</th>
<th>Additional Charge Needed (a) (oz./ft.)</th>
</tr>
</thead>
<tbody>
<tr>
<td>LMU18CHV</td>
<td>10 to 82</td>
<td>164</td>
<td>24.6</td>
<td>0.22</td>
</tr>
<tr>
<td>LMU24CHV</td>
<td>10 to 82</td>
<td>246.1</td>
<td>24.6</td>
<td>0.22</td>
</tr>
<tr>
<td>LMU30CHV</td>
<td>10 to 82</td>
<td>246.1</td>
<td>24.6</td>
<td>0.22</td>
</tr>
<tr>
<td>LMU36CHV</td>
<td>10 to 82</td>
<td>246.1</td>
<td>24.6</td>
<td>0.22</td>
</tr>
</tbody>
</table>

**Multi F Refrigerant Charge Calculations**

\[
\begin{align*}
(\quad [A] - 24.6) & \times 0.22 \\
+ (\quad [B] - 24.6) & \times 0.22 \\
+ (\quad [C] - 24.6) & \times 0.22 \\
+ (\quad [D] - 24.6) & \times 0.22 \\
- \quad CF & \times 5.29 \\
= \quad & \text{Additional Charge (lbs.)}
\end{align*}
\]
LG 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 formula 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.

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 connectible indoor units – Total number of connected indoor units

### Multi F MAX Outdoor Unit Piping Specifications

<table>
<thead>
<tr>
<th>Outdoor Unit Model</th>
<th>Main Piping Length</th>
<th>Branch Piping Length</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Chargeless Pipe Length of Main Pipe (L) (ft.)</td>
<td>Additional Charge Needed (a) (oz./ft.)</td>
</tr>
<tr>
<td>LMU480HV</td>
<td>16.4</td>
<td>0.54</td>
</tr>
<tr>
<td>LMU540HV</td>
<td>16.4</td>
<td>0.54</td>
</tr>
<tr>
<td>LMU600HV</td>
<td>16.4</td>
<td>0.54</td>
</tr>
</tbody>
</table>

**Multi F MAX Refrigerant Charge Calculations**

\[
\begin{align*}
\text{LMU480HV} & : (16.4 \times 0.54) \\
\text{LMU540HV} & : (16.4 \times 0.22) \\
\text{LMU600HV} & : (16.4 \times 0.22)
\end{align*}
\]

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