**38MAQ**
**Outdoor Unit Single Zone Ductless System**
**Sizes 09 to 30**

Carrier
turn to the experts

# Installation Instructions




**NOTE**: The unit image is for illustration purposes only. The actual model may differ slightly.

**NOTE**: Read the entire instruction manual before starting the installation.

## TABLE OF CONTENTS


PAGE

SAFETY CONSIDERATIONS . . . . . 2
PARTS LIST . . . . . 3
SYSTEM REQUIREMENTS . . . . . 4
DIMENSIONS – OUTDOOR . . . . . 5
CLEARANCES – OUTDOOR . . . . . 5
INSTALLATION TIPS . . . . . 6
OUTDOOR UNIT INSTALLATION . . . . . 6
ELECTRICAL DATA . . . . . 8
CONNECTION DIAGRAMS . . . . . 8
START–UP . . . . . 10
TROUBLESHOOTING . . . . . 10

## SAFETY CONSIDERATIONS

Installing, starting up, and servicing air−conditioning equipment can be hazardous due to system pressures, electrical components, and equipment location (roofs, elevated structures, etc.).

Only trained, qualified installers and service mechanics should install, start−up, and service this equipment.

Untrained personnel can perform basic maintenance functions such as coil cleaning. All other operations should be performed by trained service personnel.

When working on the equipment, observe precautions in the literature and on tags, stickers, and labels attached to the equipment.

Follow all safety codes. Wear safety glasses and work gloves. Keep a quenching cloth and a fire extinguisher nearby when brazing. Use care in handling, rigging, and setting bulky equipment.

Read these instructions thoroughly and follow all warnings or cautions included in the literature and attached to the unit. Consult local building codes and National Electrical Code (NEC) for special requirements. Recognize safety information.

This is the safety−alert symbol ⚠. When you see this symbol on the unit and in instructions or manuals, be alert to the potential for personal injury. Understand these signal words: **DANGER**, **WARNING**, and **CAUTION**. These words are used with the safety−alert symbol.

**DANGER** identifies the most serious hazards which **will** result in severe personal injury or death. **WARNING** signifies hazards which **could** result in personal injury or death. **CAUTION** is used to identify unsafe practices which **may** result in minor personal injury or product and property damage. **NOTE** is used to highlight suggestions which **will** result in enhanced installation, reliability, or operation.

### ⚠ WARNING

**ELECTRICAL SHOCK HAZARD**

Failure to follow this warning could result in personal injury or death.

Before installing, modifying, or servicing the system, the main electrical disconnect switch must be in the OFF position. There may be more than 1 disconnect switch. Lock out and tag switch with a suitable warning label.

### ⚠ WARNING



**EXPLOSION HAZARD**

Failure to follow this warning could result in death, serious personal injury, and/or property damage.

Never use air or gases containing oxygen for leak testing or operating refrigerant compressors. Pressurized mixtures of air or gases containing oxygen can lead to an explosion.

### ⚠ CAUTION

**EQUIPMENT DAMAGE HAZARD**

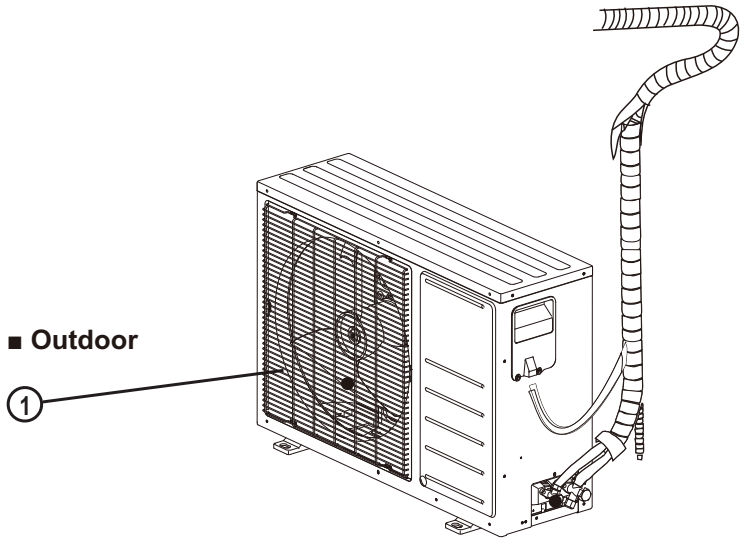
Failure to follow this caution may result in equipment damage or improper operation.

Do not bury more than 36 in. (914 mm) of refrigerant pipe in the ground. If any section of pipe is buried, there must be a 6 in. (152 mm) vertical rise to the valve connections on the outdoor units. If more than the recommended length is buried, refrigerant may migrate to the cooler buried section during extended periods of a system shutdown. This causes refrigerant slugging and could possibly damage the compressor at start−up.

# PARTS LIST

**Table 1—Parts List**

| PART No. | PART NAME | Qty. |
|---|---|---|
| 1 | Outdoor Unit | 1 |
| — | Literature package including installation instructions and warranty | 1 |
| — | Grommet to help secure the outdoor unit (helps reduce vibration during unit operation) | 4 |
| — | Clear Hose 6.5 ft. (2m) | 1 |




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**Fig. 1 — Parts List**

**NOTE**:

- If the outdoor unit is higher than the indoor unit, prevent rain from flowing into the indoor unit along the connection pipe by making a downward arc in the connection pipe before it enters the wall to the indoor unit. This ensures that rain will drip from the connection pipe before it enters the wall.
- Piping and the interconnecting wiring are field supplied.
- Figure 1 is only a sketch. Different models may be slightly different.

Table 2 lists the units covered in this document.

**Table 2—Unit Sizes**

| SYSTEM TONS | kBTUh | VOLTAGE — PHASE | OUTDOOR MODEL |
|---|---|---|---|
| 0.75 | 9,000 | 115—1 | 38MAQB09———1 |
| 1.00 | 12,000 | 115—1 | 38MAQB12———1 |
| 0.75 | 9,000 | 208/230—1 | 38MAQB09———3 |
| 1.00 | 12,000 | 208/230—1 | 38MAQB12———3 |
| 1.50 | 18,000 | 208/230—1 | 38MAQB18———3 |
| 2.00 | 24,000 | 208/230—1 | 38MAQB24———3 |
| 2.50 | 30,000 | 208/230—1 | 38MAQB30———3 |

## SYSTEM REQUIREMENTS

Allow sufficient space for airflow and service of the unit. See Fig. 3 for the required minimum distances between the unit, walls or ceilings.

**Piping**

**IMPORTANT**: **Both refrigerant lines must be insulated separately.**

Table 3 contains piping information for the product covered within this document.

**Table 3—Piping and Refrigerant Information**

| SYSTEM SIZE | | | 9K (115V) | 12K (115V) | 9K (208–230V) | 12K (208–230 V) | 18K (208–230 V) | 24K (208–230 V) | 30K (208–230 V) |
|---|---|---|---|---|---|---|---|---|---|
| Piping | Min. Piping Length | ft (m) | 10 (3) | 10 (3) | 10 (3) | 10 (3) | 10 (3) | 10 (3) | 10 (3) |
| | Standard Piping Length | ft (m) | 25 (7.5) | 25 (7.5) | 25 (7.5) | 25 (7.5) | 25 (7.5) | 25 (7.5) | 25 (7.5) |
| | Max. outdoor–indoor height difference | ft (m) | 32 (10) | 32 (10) | 32(10) | 32(10) | 65(20) | 65(20) | 82(25) |
| | Max. Piping Length with no additional refrigerant charge | ft (m) | 26 (8) | 26(8) | 26(8) | 26(8) | 26(8) | 26(8) | 26(8) |
| | Max. Piping Length | ft (m) | 82 (25) | 82(25) | 82(25) | 82(25) | 98(30) | 98(30) | 164 (50) |
| | Additional refrigerant charge (between Standard – Max piping length) | Oz/ft (g/m) | 0.16 (15) | 0.16 (15) | 0.16 (15) | 0.16 (15) | 0.16 (15) | 0.32 (30) | 0.32 (30) |
| | Gas Pipe (size – connection type) | in (mm) | 3/8 (9.52) | 1/2 (12.7) | 3/8 (9.52) | 1/2 (12.7) | 1/2 (12.7) | 5/8 (16) | 5/8 (16) |
| | Liquid Pipe (size – connection type) | in | 1/4 in | 1/4 in | 1/4 in | 1/4 in | 1/4 in | 3/8 in | 3/8 in |
| | | (mm) | 6.35 | 6.35 | 6.35 | 6.35 | 6.35 | 9.52 | 9.52 |
| Refrigerant | Refrigerant Type | | R410A | R410A | R410A | R410A | R410A | R410A | R410A |
| | Charge Amount | Lbs (kg) | 2.76 (1.25) | 2.76 (1.25) | 2.76 (1.25) | 2.76 (1.25) | 4.19 (1.90) | 5.18 (2.35) | 6.62 (3.00) |

**IMPORTANT**: All outdoor units have an electronic expansion valve which manages the refrigerant flow of the fan coil connected.

**Wiring**

All wires must be sized per NEC (National Electrical Code) or CEC (Canadian Electrical Code) and local codes. Use the Electrical Data table MCA (minimum circuit amps) and MOCP (maximum over current protection) to correctly size the wires and the disconnect fuse or breakers respectively.

Per the caution note, only stranded copper conductors with a 600 volt rating and double insulated copper wire must be used. The use of BX cable is not recommended.

**Recommended Connection Method for Power and Communication Wiring – Power and Communication Wiring:**

The main power is supplied to the outdoor unit. The field supplied 14/3 power/communication wiring from the outdoor unit to the indoor unit consists of four (4) wires and provides the power for the indoor unit. Two wires are high voltage AC power, one is communication wiring and the other is a ground wire.

**Recommended Connection Method for Power and Communication Wiring (To minimize communication wiring interference) Power Wiring:**

The main power is supplied to the outdoor unit. The field supplied power wiring from the outdoor unit to the indoor unit consists of three (3) wires and provides the power for the indoor unit. Two wires are high voltage AC power and one is a ground wire.

To minimize voltage drop, the factory recommended wire size is 14/2 stranded with a ground.

**Communication Wiring:**

A separate shielded stranded copper conductor only, with a 600 volt rating and double insulated copper wire, must be used as the communication wire from the outdoor unit to the indoor unit. Please use a separate shielded 16GA stranded control wire.

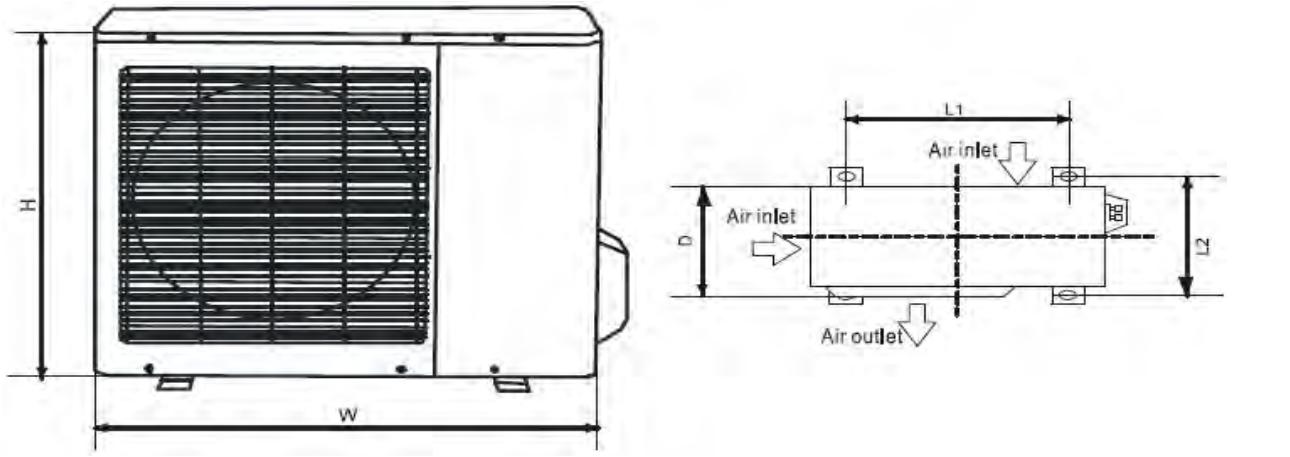
**⚠ CAUTION**

**EQUIPMENT DAMAGE HAZARD**

Failure to follow this caution may result in equipment damage or improper operation.

- Wires should be sized based on NEC and local codes.
- Use copper conductors only with a minimum 600 volt rating and double insulated copper wire.

## DIMENSIONS – OUTDOOR



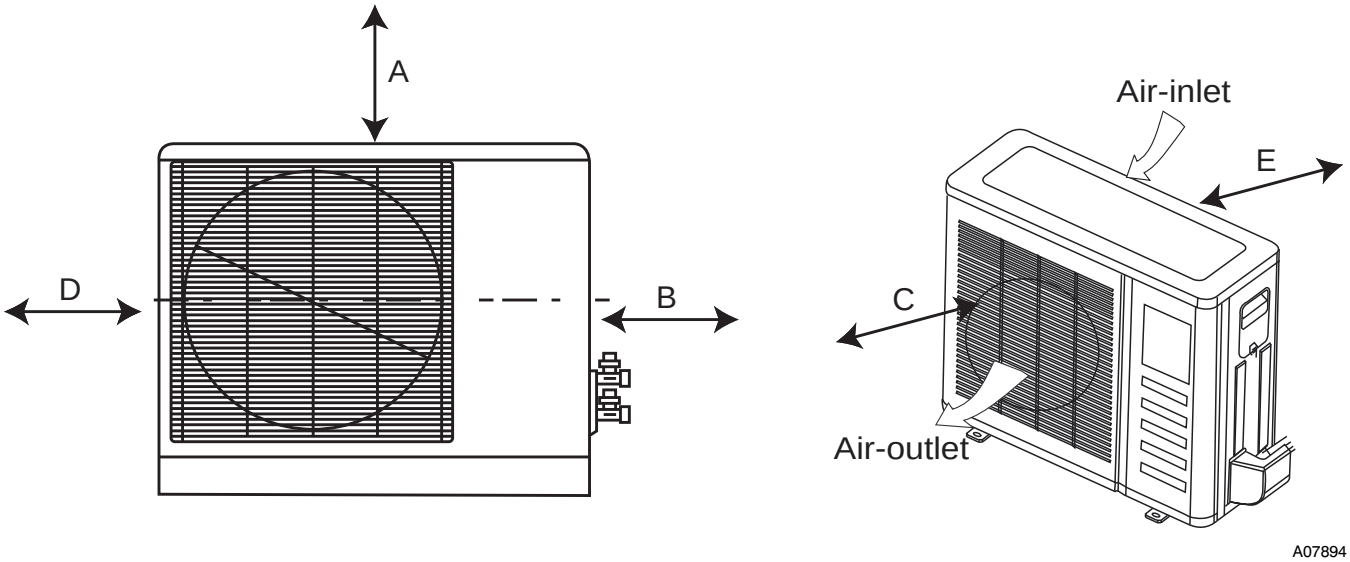

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**Fig. 2 – Outdoor Unit**

**Table 4—Unit Sizes**

| Model | Width in (mm) | Depth in (mm) | Height in (mm) | L1 in (mm) | L2 in (mm) | Operating Weight lb (kg) |
|---|---|---|---|---|---|---|
| 9K/12K | 32.0 (810) | 12.2 (310) | 22.0 (558) | 20.9 (530) | 11.4 (290) | 82.5 (37.4) |
| 18K | 32.3 (845) | 12.6 (320) | 27.6 (700) | 22.1 (560) | 13.2 (335) | 102.5 (46.5) |
| 24K | 37.2 (945) | 15.6 (395) | 31.9 (810) | 25.1 (640) | 15.9 (405) | 137.6 (62.4) |
| 30K | 37.2 (945) | 15.6 (395) | 31.9 (810) | 25.1 (640) | 15.9 (405) | 157.6 (71.5) |

## CLEARANCES – OUTDOOR




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**Fig. 3 – Outdoor Unit Clearance**

**Table 5—Outdoor Unit Clearance Dimensions**

| UNIT | MINIMUM VALUE in. (mm) |
|---|---|
| A | 24 (610) |
| B | 24 (610) |
| C | 24 (610) |
| D | 4 (101) |
| E | 4 (101) |

## INSTALLATION TIPS

**Ideal installation locations include:**

**Outdoor Unit**

- A location which is convenient to installation and not exposed to strong wind.
- A location which can bear the weight of the outdoor unit and where the outdoor unit can be mounted in a level position.
- A location which provides appropriate clearances (see Fig. 3).
- Do not install the indoor or outdoor units in a location with special environmental conditions. For those applications, contact your Ductless representative.

## OUTDOOR UNIT INSTALLATION

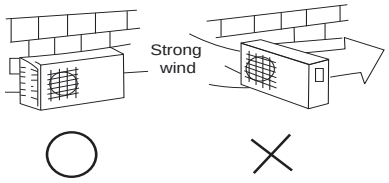
1. Use a rigid base to support the unit in a level position.
2. Locate the outdoor unit and connect the piping and wiring.

**⚠ CAUTION**

**EQUIPMENT DAMAGE HAZARD**

Failure to follow this caution may result in equipment damage or improper operation.

In regions with snowfall and cold temperatures, avoid installing the outdoor unit in areas where it can be covered by snow. If the outdoor unit is installed in areas where heavy snow is expected, a field supplied ice or snow stand and/or field supplied−installed wind baffle should be installed to protect the unit from snow accumulation and/or blocked air intake. Blocking the air intake may result in reduced airflow, significantly reduced performance and damage to the equipment.




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**Fig. 4 — High Wind Installation**

### MAKE REFRIGERANT PIPING CONNECTIONS (OUTDOOR UNIT)

**IMPORTANT**: **Use refrigeration grade tubing ONLY. No other type of tubing may be used. Use of other types of tubing will void the manufacturer's warranty.**

Do not open the service valves or remove protective caps from tubing ends until all the connections are made.

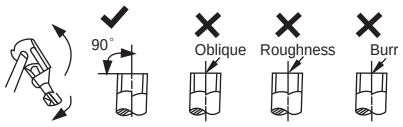
Bend tubing with bending tools to avoid kinks and flat spots.

Keep the tubing free of dirt, sand, moisture, and other contaminants to avoid damaging the refrigerant system.

Avoid sags in the suction line to prevent the formation of oil traps. Insulate each tube with minimum 3/8–in. (10 mm) wall thermal pipe insulation.

**IMPORTANT**: Inserting the tubing into the insulation before making the connections will save time and improve installation quality.

1. Remove the service valve cover, if provided with the unit.
2. Cut the pipe, with a pipe cutter, at 90° (see Fig. 5).
3. Remove the service connection, if provided with the unit.



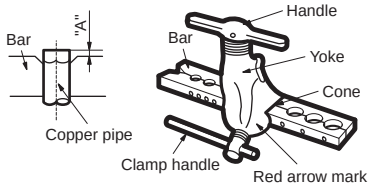

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**Fig. 5 — Cut the Pipe**

4. Remove all the burrs from the cut cross section of the pipe avoiding any burrs inside the tubes.
5. Remove the flare nuts attached to the indoor and outdoor units.
6. Install the correct size flare nut onto the tubing and make a flare connection. Refer to Table 6 for the flare nut spaces.

**Table 6—Flare Nut Spacing**

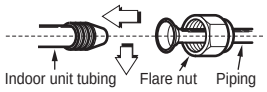
| OUTER DIAM. (mm) | A (mm) | |
|---|---|---|
| | Max. | Min. |
| Ø1/4"(6.35) | 0.05 (1.3) | 0.03(0.7) |
| Ø3/8"(9.52) | 0.06 (1.6) | 0.04(1.0) |
| Ø1/2"(12.7) | 0.07 (1.8) | 0.04(1.0) |
| Ø5/8"(15.88) | 0.09 (2.2) | 0.08(2.0) |




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**Fig. 6 — Flare Nut Spacing**

7. Apply a small amount of refrigerant oil to the flare connection on the tubing.
8. Align the center of the pipes and/or service valve.



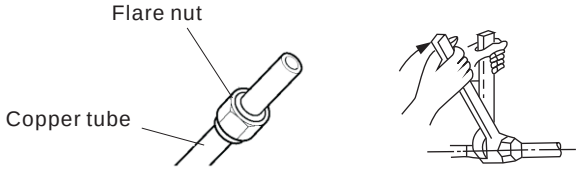

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**Fig. 7 — Align Pipe Center**

9. Connect both the liquid and gas piping to the indoor unit.
10. Tighten the flare nut using a torque wrench as specified in Table 7.
11. Complete the installation.

**Table 7—Tightening Torque**

| PIPE DIAMETER INCH (mm) | TIGHTENING TORQUE | |
|---|---|---|
| | Ft−lb | N−m |
| Ø1/4" (6.35) | 10 to 13 | 13.6 to 17.6 |
| Ø3/8" (9.52) | 24 to 31 | 32.5 to 42.0 |
| Ø1/2" (12.7) | 37 to 46 | 50.1 to 62.3 |
| Ø5/8" (15.88) | 50 to 60 | 67.7 to 81.3 |




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**Fig. 8 — Tighten the Flare Nut**

**⚠ CAUTION**

**EQUIPMENT DAMAGE HAZARD**

Failure to follow this caution may result in equipment damage or improper operation.

Excessive torque can break the flare nut depending on installation conditions.

## INSTALL ALL POWER AND INTERCONNECTING WIRING TO OUTDOOR UNITS

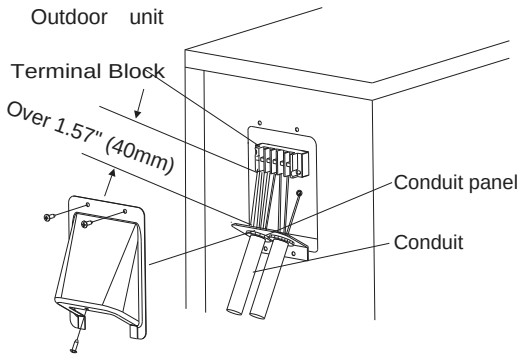
1. Mount the outdoor power disconnect.
2. Run the power wiring from the main box to disconnect per NEC and local codes.
3. Remove the field wiring cover from the unit by loosening the screws.
4. Remove the caps from the conduit panel.
5. Connect the conduit to the conduit panel (see Fig.9).
6. Properly connect both the power supply and the control lines to the terminal block per the connection diagram for the appropriate unit capacity and voltage.
7. Ground the unit in accordance with NEC and local electrical codes.
8. Use the lock nuts to secure the conduit.
9. Reinstall the field wiring cover.

**⚠ CAUTION**

**EQUIPMENT DAMAGE HAZARD**

Failure to follow this caution may result in equipment damage or improper operation.

- Be sure to comply with local codes while running wire from the indoor unit to the outdoor unit.
- Every wire must be connected firmly. Loose wiring may cause the terminal to overheat or result in a unit malfunction. A fire hazard may also exist. Therefore, be sure all wiring is tightly connected.
- No wire should be allowed to touch the refrigerant tubing, compressor or any moving parts.
- Disconnecting means must be provided and shall be located within sight and readily accessible from the air conditioner.
- Connecting the cable with the conduit shall be routed through a hole in the conduit panel.




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**Fig. 9 — Field Wiring**

## DRAIN CONNECTIONS

Install drains must meet the local sanitation codes.

**Install the outdoor unit drain joint**

Fit the seal into the drain joint, then insert the drain joint into the outdoor unit's base pan hole and then rotate 90° to securely assemble them. Connect the drain joint with an extension drain hose to avoid condensate from draining off the outdoor unit during the heating mode.

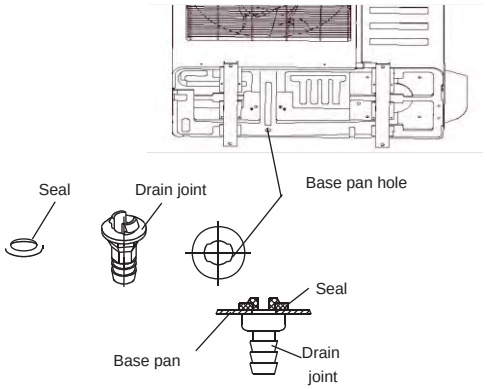



**Fig. 10 — Drain Joint**

Images are for illustration purposes only.

# ELECTRICAL DATA

**Table 8—Electrical Data**

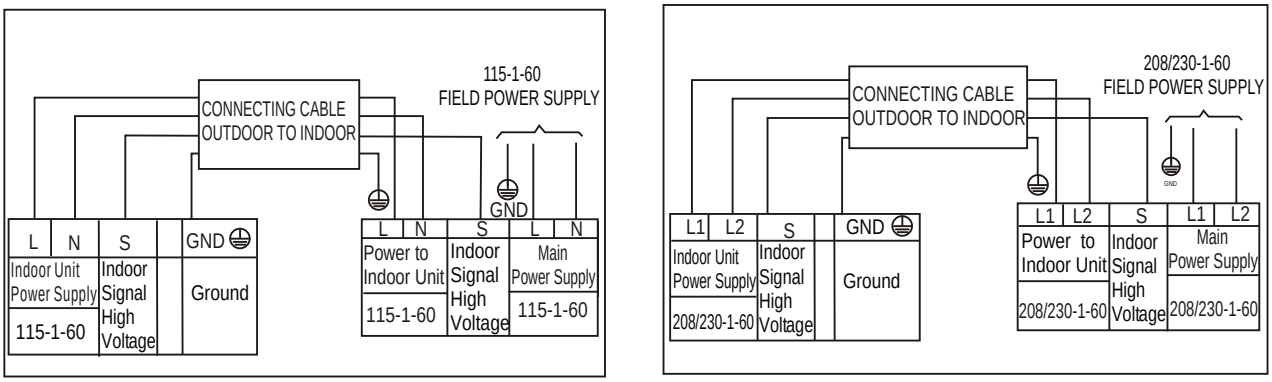
| MAQ OUTDOOR UNIT SIZE | | 9K | 12K | 9K | 12K | 18K | 24K | 30K |
|---|---|---|---|---|---|---|---|---|
| Power Supply | Volts—PH—Hz | 115—1—60 | 115—1—60 | 208/230—1—60 | 208/230—1—60 | 208/230—1—60 | 208/230—1—60 | 208/230—1—60 |
| | Max – Min* Oper. Voltage | 126—104 | 126—104 | 253—187 | 253—187 | 253—187 | 253—187 | 253—187 |
| | MCA | 15 | 15 | 15 | 15 | 13 | 15 | 20 |
| | Max Fuse/ CB AMP | 20 | 20 | 15 | 15 | 20 | 25 | 30 |
| Compressor | Volts—PH—Hz | 115—1—60 | 115—1—60 | 208/230—1—60 | 208/230—1—60 | 208/230—1—60 | 208/230—1—60 | 208/230—1—60 |
| | RLA | 5.3 | 5.7 | 5.3 | 5.7 | 7.3 | 8.8 | 13.5 |
| Outdoor Fan Motor | Volts—PH—Hz | 115—1—60 | 115—1—60 | 208/230—1—60 | 208/230—1—60 | 208/230—1—60 | 208/230—1—60 | 208/230—1—60 |
| | FLA | 0.14 | 0.14 | 0.42 | 0.42 | 0.95 | 0.47 | 1.21 |
| | Rated HP | 0.053 | 0.053 | 0.053 | 0.053 | 0.067 | 0.16 | 0.16 |
| | Output | 40 | 40 | 40 | 40 | 50 | 120 | 120 |

*Permissible limits of the voltage range at which the unit will operate satisfactorily.

**LEGEND**

FLA — Full Load Amps
MCA — Minimum Circuit Amps
RLA — Rated Load Amps

# CONNECTION DIAGRAMS




9K and 12K 115V Indoor Unit — 9K and 12K 115V Outdoor Unit — 9K to 30K 230V Indoor Unit — 9K to 30K 230V Outdoor Unit

**Fig. 11 — Connection Diagrams**

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**Notes**:

1. Do not use the thermostat wire for any connection between the indoor and outdoor units.
2. All connections between the indoor and outdoor units must be as shown in Fig. 11. **The connections are sensitive to polarity and will result in a fault code.**

## SYSTEM VACUUM AND CHARGE

**⚠ CAUTION**

**UNIT DAMAGE HAZARD**

Failure to follow this caution may result in equipment damage or improper operation.

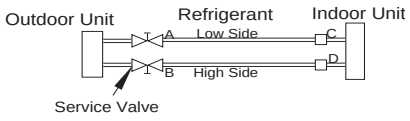
Never use the system compressor as a vacuum pump.

Refrigerant tubes and the indoor coil should be evacuated using the recommended 500 microns deep vacuum method. The alternate triple evacuation method may be used if the procedure outlined below is followed.

**NOTE**: Always break a vacuum with dry nitrogen.

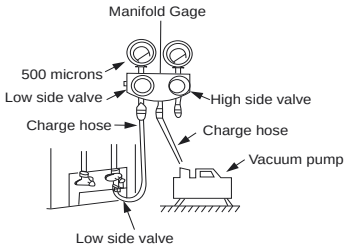
**Using Vacuum Pump**

1. Completely tighten flare nuts A, B, C, D, connect the manifold gage charge hose to a charge port of the low side service valve (see Fig. 12).
2. Connect the charge hose to the vacuum pump.
3. Fully open the low side of the manifold gage (see Fig. 13).
4. Start the vacuum pump.
5. Evacuate using either the deep vacuum or the triple evacuation method.
6. After the evacuation is complete, fully close the low side of the manifold gage and stop the vacuum pump operation.
7. The factory charge contained in the outdoor unit is good for up to 25 ft. (8 m) of line length. For refrigerant lines longer than 25 ft. (8 m), add refrigerant, up to the allowable length, as specified in the System Requirements section.
8. Disconnect the charge hose from the charge connection of the low side service valve.
9. Fully open service valves B and A.
10. Securely tighten the service valves caps.




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**Fig. 12 — Service Valve**

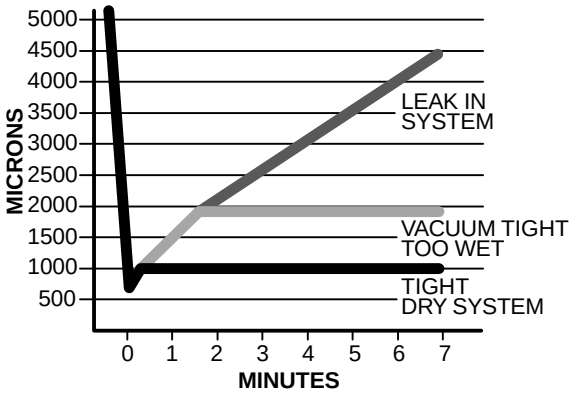



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**Fig. 13 — Manifold**

**Deep Vacuum Method**

The deep vacuum method requires a vacuum pump capable of pulling a vacuum of 500 microns and a vacuum gage capable of accurately measuring this vacuum depth. The deep vacuum method is the best way to assure a system is free of air and liquid water (see Fig. 14).




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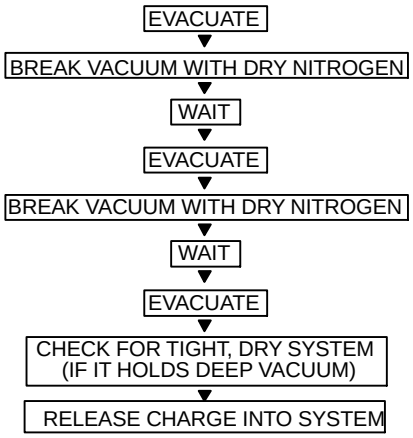
**Fig. 14 — Deep Vacuum Graph**

**Triple Evacuation Method**

The triple evacuation method should only be used when the vacuum pump is only capable of pumping down to 28 in. of mercury vacuum and system does not contain any liquid water.

Refer to Fig. 15 and proceed as follows:

1. Pump the system down to 28 in. of mercury and allow the pump to continue operating for an additional 15 minutes.
2. Close the service valves and shut off the vacuum pump.
3. Connect a nitrogen cylinder and regulator to the system and open until the system pressure is 2 psig.
4. Close the service valve and allow the system to stand for 1 hr. During this time, dry nitrogen will be able to diffuse throughout the system absorbing moisture.
5. Repeat this procedure as indicated in Fig. 15. The system will then be free of any contaminants and water vapor.




A95425

**Fig. 15 — Triple Evacuation Method**

**Final Tubing Check**

**IMPORTANT**: Ensure that certain factory tubing on both the indoor and outdoor unit has not shifted during shipment. Ensure tubes are not rubbing against each other or any sheet metal. Pay close attention to the feeder tubes and make sure the wire ties on the feeder tubes are secure and tight.

# START−UP

**Test Operation**

Perform a test operation after completing the gas leak and electrical safety check. See the indoor unit installation instructions and owner's manual for additional start up information.

## SYSTEM CHECKS

1. Conceal the tubing where possible.
2. Ensure the drain tube slopes downward along its entire length.
3. Ensure all tubing and connections are properly insulated.
4. Fasten the tubes to the outside wall, when possible.
5. Seal the hole through which the cables and tubing pass.

## OUTDOOR UNIT

1. Are there unusual noises or vibrations during operation?

**Explain the Following Items to the Customer (with the aid of the Owner's Manual):**

1. Explain care and maintenance.
2. Present the installation instructions to the customer.

# TROUBLESHOOTING

For ease of service, the systems are equipped with diagnostic code display LEDs on both the indoor and outdoor units. The outdoor diagnostic display consists of two LEDs (Red and Green) on the outdoor unit board and is limited to very few errors. The indoor diagnostic display is a combination of flashing LEDs on the display panel or the front of the unit.

There may be a few error codes displayed on the indoor unit that might relate to the outdoor unit's problems. If possible, always check the diagnostic codes displayed on the indoor unit first.

The diagnostic codes displayed in the outdoor units are listed in Table 9.

**Table 9—Outdoor Unit Diagnostic Guides**

| GREEN LED | RED LED | FAILURE MODE |
|---|---|---|
| On | X | Standby, normal |
| X | On | Operation, normal |
| On | On | High/Low voltage protection on compressor terminal |
| On | ☆ | EEPROM error |
| X | ☆ | The compressor speed is out of control |
| ☆ | On | Zero−crossing signal detection error; lack of phase; synchronization error |
| ☆ | X | IGBT or Module protection |
| ☆ | ☆ | Communication error |

☆ = Flashing, X = Off

For additional diagnostic information, refer to the Service Manual.

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Replaces: NEW