

# PRODIRECT™ Series

## Split System

## Air Conditioner

### Installation & Owner's Manual

#### MODELS:

[HAC13018FA](#)

[HAC13024FA](#)

[HAC13030FA](#)

[HAC13036FA](#)

[HAC13042FA](#)

[HAC13048FA](#)

[HAC13060FA](#)



Read this manual carefully before installation and keep it where the operator can easily find it for future reference.

Due to updates and constantly improving performance, the information and instructions within this manual are subject to change without notice.

Version Date: November 21, 2024

Please visit [www.mrcool.com/documentation](http://www.mrcool.com/documentation) to ensure you have the latest version of this manual.



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## Safety Precautions

### Read Before Using

Incorrect usage may cause serious damage or injury.

The symbols below are used throughout this manual to indicate instructions that should be followed closely or actions that should be avoided to prevent death, injury, and/or property damage.



Indicates the possibility of personal injury or loss of life.



Indicates the possibility of property damage or serious consequences.

### WARNING

1. Failure to follow these warnings could result in property damage, severe personal injury, or death. Disconnect all electrical power, including remote disconnects before servicing. Follow proper lockout/tagout procedures to ensure the power cannot be inadvertently energized.
2. Any attempt to repair a central air conditioning product may result in property damage, severe personal injury, or death. These units use R-410a refrigerant which operates at 50% to 70% higher pressures than R-22. Use only R-410a approved service equipments. Refrigerant cylinders are painted a "Rose" color to indicate the type of refrigerant and may contain a "dip" tube to allow for charging of liquid refrigerant into the system. All R-410A systems use a POE oil (VG74 or equivalent) that readily absorbs moisture from the atmosphere. To limit this 'hygroscopic' action, the system should remain sealed whenever possible. If a system has been open to the atmosphere for more than 4 hours, the compressor oil must be replaced. Never break a vacuum with air and always change the driers when opening the system for component replacement.
3. Grounding is essential before connecting electrical supply.
4. Turn valve stem counterclockwise only until the stem contacts the rolled edge. No torque is required. Failure to follow this warning will result in abrupt release of system charge and may result in personal injury and/or property damage.
5. Brazing required. Failure to inspect lines or use proper service tools may result in equipment damage or personal injury. If using existing refrigerant lines, ensure all joints are brazed, not soldered.

### CAUTION

1. This information is intended for use by individuals possessing adequate background of electrical and mechanical experience. Any attempt to repair a central air conditioning product may result in personal injury and/or property damage. The manufacturer or seller cannot be responsible for the interpretation of this information, nor can it assume any liability in connection with its use.
2. Failure to follow proper procedures can result in personal illness or injury or severe equipment damage. Systems contain oil and refrigerant under high pressure. Recover refrigerant to relieve pressure before opening a system.
3. Failure to inspect or use proper service tools may result in equipment damage or personal injury. Reconnect all grounding devices. All parts of this product that are capable of conducting electrical current are grounded. If grounding wires, screws, straps, clips, nuts, or washers used to complete a path to ground are removed for service, they must be returned to their original position and properly fastened.
4. Do not touch the top of the compressor, as it may cause minor to severe burning.

## 2 INSTALLATION PREPARATION

### 2.1 Unit Dimensions

The unit's weight value is on the cardboard box.

When mounting the outdoor unit on a roof, ensure the roof will support the unit's weight. Properly selected isolation is recommended to prevent sound or vibration transmission to the building structure.

| Unit Dimensions |              |             |              |
|-----------------|--------------|-------------|--------------|
| Model           | Height (in.) | Width (in.) | Length (in.) |
| 18/24           | 24-15/16     | 23-5/8      | 23-5/8       |
| 30              | 24-15/16     | 28          | 28           |
| 36              | 24-15/16     | 29-1/8      | 29-1/8       |
| 42/48           | 33-3/16      | 28          | 28           |
| 60              | 33-3/16      | 29-1/8      | 29-1/8       |

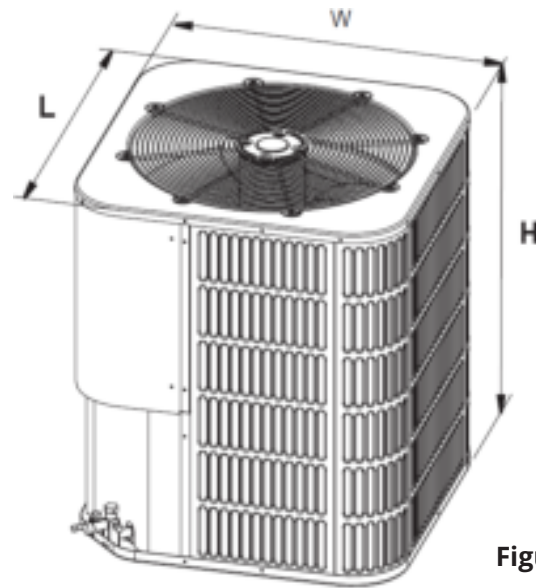


Figure 2.1

### 2.2 Location Restrictions

- Ensure the top discharge area is unrestricted for at least 60 inches above the unit.
- Do not place outdoor unit near bedrooms since normal operational sounds may be objectionable.
- Position unit to allow adequate space for unobstructed airflow, wiring, refrigerant lines, and serviceability.
- Maintain a distance of 24 inches between units.
- 24 inches clearance must be provided in front of the control box (access panels) and any other side requiring service.
- Position unit where water, snow, or ice from roof or overhang cannot fall directly on unit.
- Position the outdoor unit a minimum of 12" from any wall or surrounding shrubbery to ensure adequate airflow. See Figures 2.2 and 2.3.
- Units should be elevated 3-12 inches above the pad or rooftop, depending on local weather. This additional height will allow drainage of snow and ice melted during defrost cycle prior to its refreezing. Ensure that drain holes in unit base pan are not obstructed, preventing drainage of defrost water (Fig. 2.4).
- If possible, avoid locations that are likely to accumulate snow drifts. If not possible, a snow drift barrier should be installed around the unit to prevent a build-up of snow on the sides of the unit.

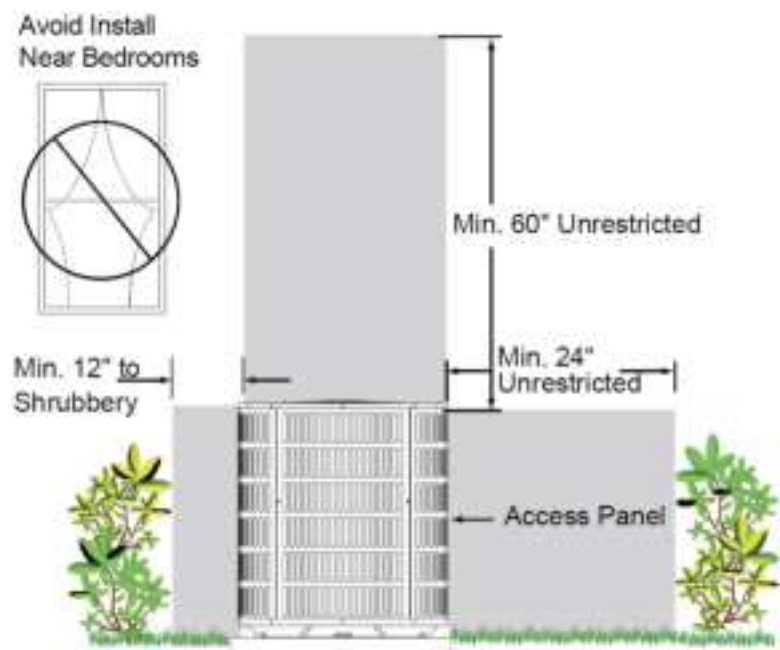


Figure 2.2

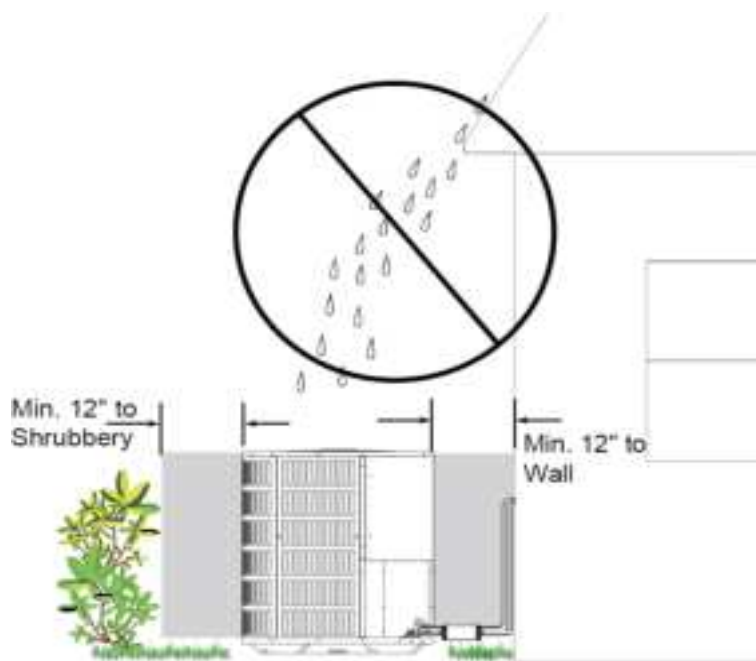


Figure 2.3

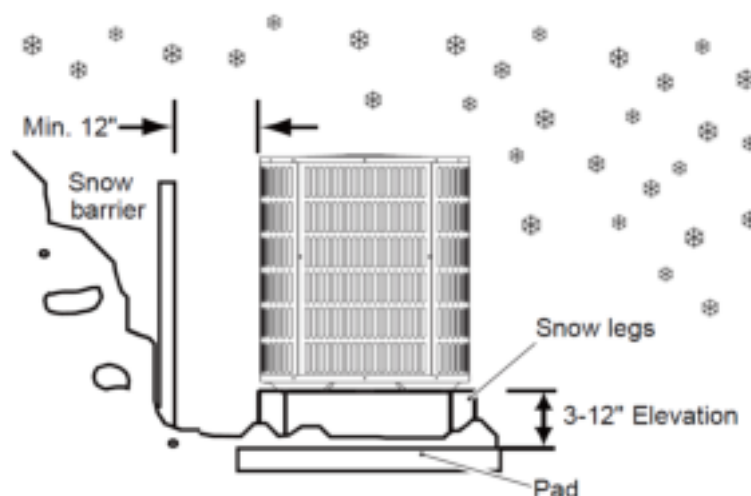


Figure 2.4

## 2.3 Pre-Installation Steps

**STEP 1** - Check for damage and report promptly to the carrier any damage found to the unit.

**STEP 2** - Instruments must be designed to install/serve R410A equipment.

- Gauge sets, hoses, refrigerant containers and recovery system must be designed to handle the POE type oils.
- Manifold sets should be 800 PSIG high side and 250 PSIG low side.
- All hoses must have a 700 PSIG service pressure rating.
- Leak detectors should be designed to detect R410a.
- Recovery equipments (including refrigerant recovery containers) must be specifically designed to handle R410a.
- Do not use R22 TXV.

## 2.4 Pad Installation

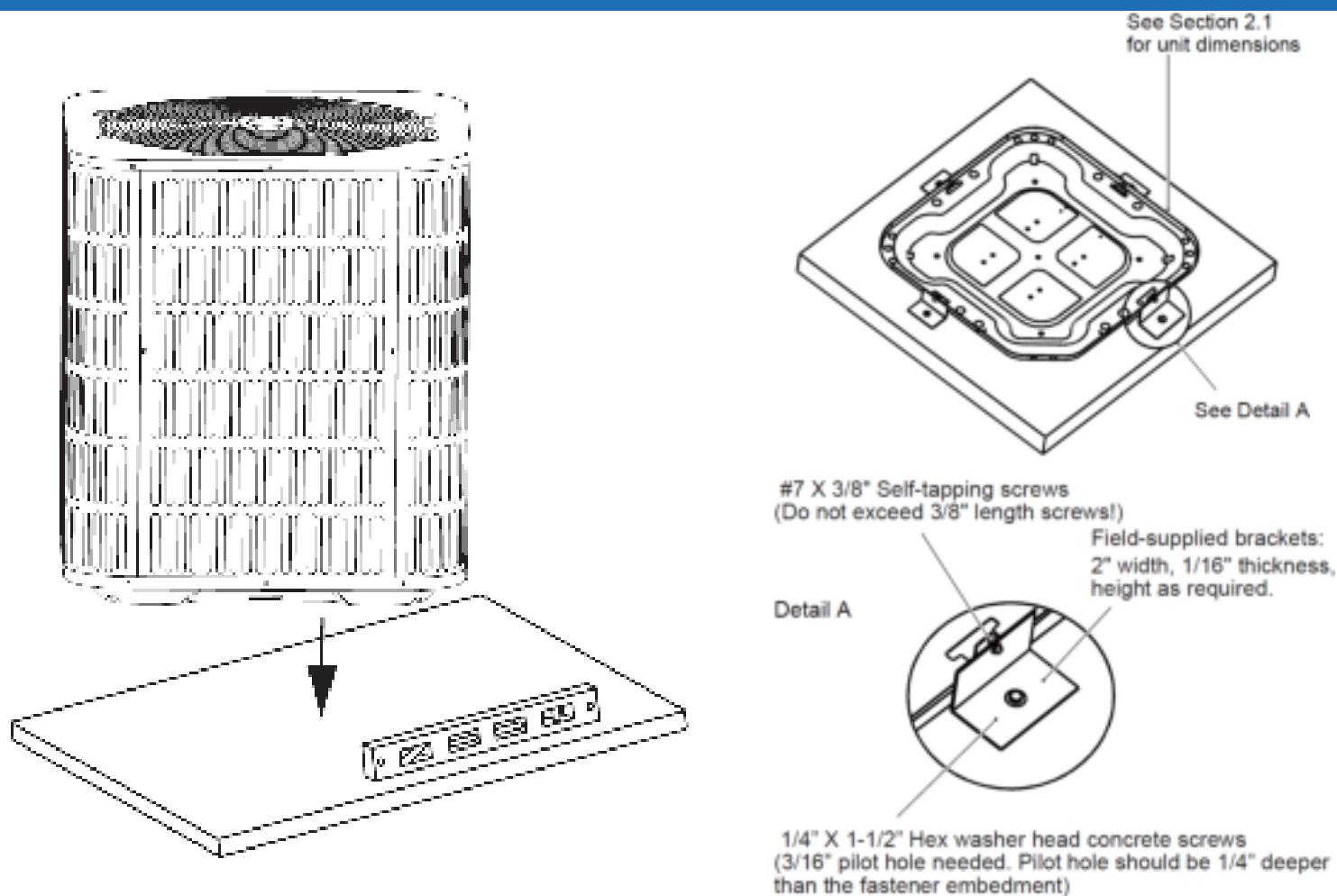
When installing the unit on a support pad, such as a concrete slab, consider the following:

- The pad must be at least 1-2" larger than the unit on all sides.
- The pad must be separate from any structure.
- The pad must be level.
- The pad must be high enough above grade to allow for drainage.
- The pad location must comply with National, State, and Local codes.

### NOTE

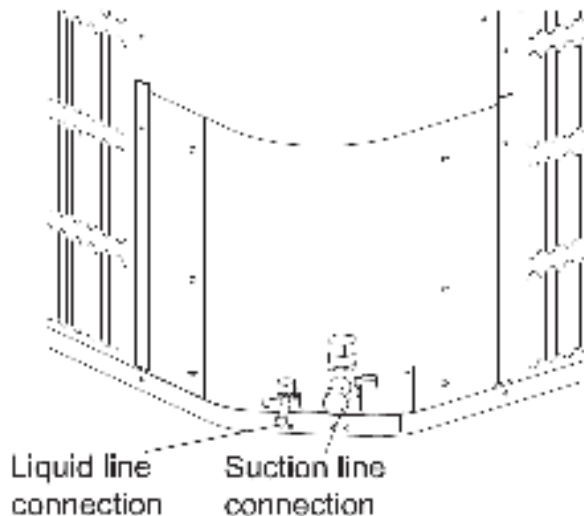
These instructions are intended to provide a method to tie-down system to concrete slab as a securing procedure for high wind areas. Check local codes for tie-down methods and protocols

# 3 REFRIGERANT



## 3.1 Service Valve Connection Sizes

| Models         | Suction Line Connection | Liquid Line Connection |
|----------------|-------------------------|------------------------|
| 18/24/30/36/42 | 3/4                     | 3/8                    |
| 48/60          | 7/8                     |                        |



## 3.2 Refrigerant Line Sizes

| Model          | Suction Line |          | Liquid Line |          |
|----------------|--------------|----------|-------------|----------|
|                | Optional     | Standard | Optional    | Standard |
| 18/24/30/36/42 | 5/8          | 3/4      | 5/16        | 3/8      |
| 48             | 3/4          | 7/8      | 1/2         |          |
| 60             | 7/8          | 1-1/8    | 1/2         |          |



## 3.3 Refrigerant Piping Limits & Required Refrigerant Line Length

| Model | Liquid Line (inches) | Total Equivalent Length (Feet) |    |    |     |     |     |
|-------|----------------------|--------------------------------|----|----|-----|-----|-----|
|       |                      | 25                             | 50 | 75 | 100 | 125 | 150 |
|       |                      | Maximum Vertical Length (Feet) |    |    |     |     |     |
| 18    | 5/16                 | 25                             | 50 | 40 | 30  | NA  | NA  |
|       | 3/8                  | 25                             | 50 | 45 | 40  | NA  | NA  |
| 24    | 5/16                 | 25                             | 40 | 30 | 20  | NA  | NA  |
|       | 3/8                  | 25                             | 50 | 45 | 40  | NA  | NA  |
| 30    | 5/16                 | 25                             | 40 | 40 | 30  | NA  | NA  |
|       | 3/8                  | 25                             | 50 | 50 | 50  | NA  | NA  |
| 36    | 5/16                 | 25                             | 50 | 40 | 30  | NA  | NA  |
|       | 3/8                  | 25                             | 50 | 50 | 50  | NA  | NA  |
| 42    | 5/16                 | 25                             | 23 | 4  | NA  | NA  | NA  |
|       | 3/8                  | 25                             | 50 | 43 | 36  | 30  | 24  |
| 48    | 1/2                  | 25                             | 50 | 56 | 55  | 40  | 30  |
|       | 3/8                  | 25                             | 46 | 38 | 30  | 22  | 15  |
| 60    | 1/2                  | 25                             | 50 | 60 | 60  | 40  | 30  |
|       | 3/8                  | 25                             | 50 | 56 | 44  | 32  | 20  |

| Model | Suction (inches) | Total Suction Line Length |      |      |      |
|-------|------------------|---------------------------|------|------|------|
|       |                  | 25                        | 50   | 100  | 150  |
|       |                  | Coefficient               |      |      |      |
| 18    | 5/8              | 1.00                      | 0.97 | 0.94 | NA   |
|       | 3/4              | 1.00                      | 0.98 | 0.95 | NA   |
| 24    | 5/8              | 1.00                      | 0.97 | 0.94 | NA   |
|       | 3/4              | 1.00                      | 0.98 | 0.95 | NA   |
| 30    | 5/8              | 1.00                      | 0.97 | 0.94 | NA   |
|       | 3/4              | 1.00                      | 0.98 | 0.96 | NA   |
| 36    | 5/8              | 1.00                      | 0.97 | 0.94 | NA   |
|       | 3/4              | 1.00                      | 0.99 | 0.97 | NA   |
| 42    | 5/8              | 1.00                      | 0.98 | 0.95 | 0.91 |
|       | 3/4              | 1.00                      | 0.98 | 0.97 | 0.96 |
| 48    | 3/4              | 1.00                      | 0.98 | 0.95 | 0.92 |
|       | 7/8              | 1.00                      | 0.98 | 0.97 | 0.96 |
| 60    | 7/8              | 1.00                      | 0.98 | 0.94 | 0.90 |
|       | 1-1/8            | 1.00                      | 0.99 | 0.98 | 0.97 |

### NOTE

Using a suction line larger than shown in the chart will result in poor oil return and is not recommended. For example: the system capacity published in AHRI is 17800 BTU/H. This data is based on the AHRI test condition and 25 feet line set with standard suction tube size (3/4" tube). If you need to add the line set more than 25 feet or use the optional suction tube size, you need to recalculate the capacity with the coefficient in the table. For 50 feet line and 5/8" suction tube, the capacity will be  $17800 \times 0.97 = 17266$  BTU/H.

Determine required line length and lift. You will need this information later.

Total line length = \_\_\_\_\_ feet

Total vertical change (lift) = \_\_\_\_\_ feet

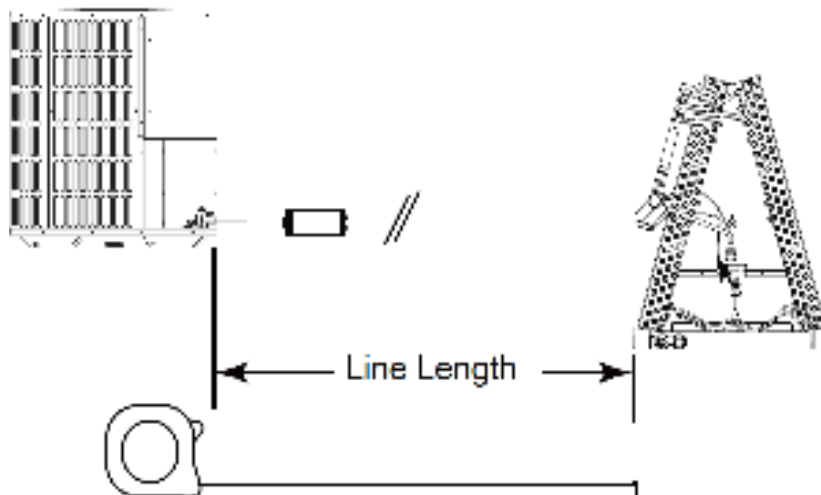


Figure 3.3

# 3 REFRIGERANT

## 3.4 Refrigerant Line Insulation

### NOTE

The suction line must always be insulated. DO NOT allow the Liquid Line and Suction Line to come in direct (metal to metal) contact.

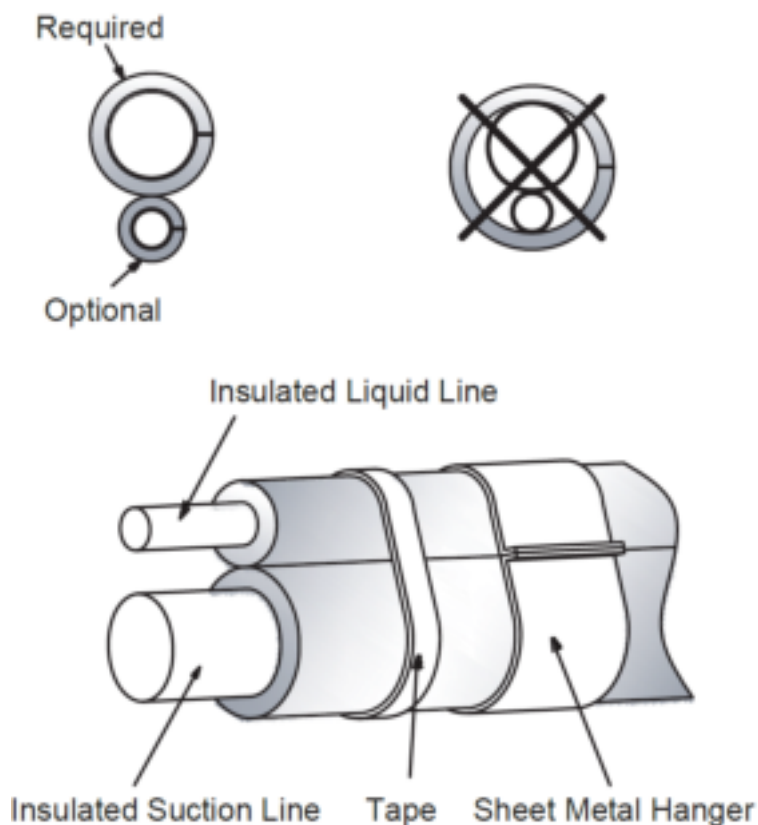


Figure 3.4

## 3.6 Line Routing

### NOTE

Take precautions to prevent noise within the building structure due to vibration transmission from the refrigerant lines. For example:

- When the refrigerant lines have to be fastened to floor joists or other framing in a structure, use isolation type hangers.
- Isolation hangers should also be used when refrigerant lines are run in stud spaces or enclosed ceilings.
- Where the refrigerant lines run through a wall or sill, they should be insulated and isolated.
- Isolate the lines from all ductwork.
- Minimize the number of 90° turns.
- Use PVC piping as a conduit for all underground installations. Buried lines should be kept as short as possible.
- The lines should not obstruct service access to the coil, air handling system, or filter.
- Care must also be taken to isolate the refrigerant lines to minimize noise transmission from the equipment to the structure.
- Comply with national, state, and local codes when isolating linesets from joists, rafters, walls, and other structural elements.

## 3.5 Existing Refrigerant Line Reuse

### ! CAUTION

If using existing refrigerant lines, make certain that all joints are brazes, not soldered.

For retrofit applications, where the existing refrigerant lines will be used, the following precautions should be taken:

- Ensure that the size of the refrigerant lines is correct.
- Ensure that the refrigerant lines are free of leaks, acid, and oil.

### NOTE

It is recommended to install only approved matched indoor and outdoor systems. All of the manufacturer's systems have been AHRI certified. Some of the benefits of installing approved matched indoor and outdoor split systems are maximum efficiency, optimum performance, and the best overall system reliability.

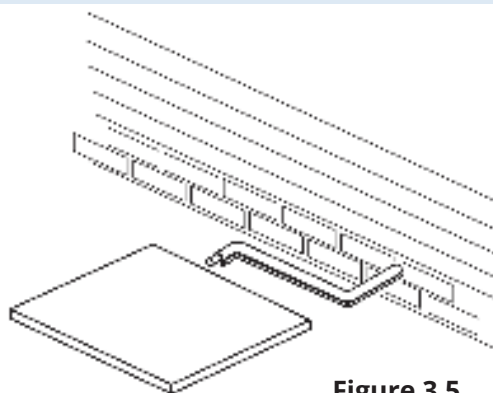




Figure 3.6

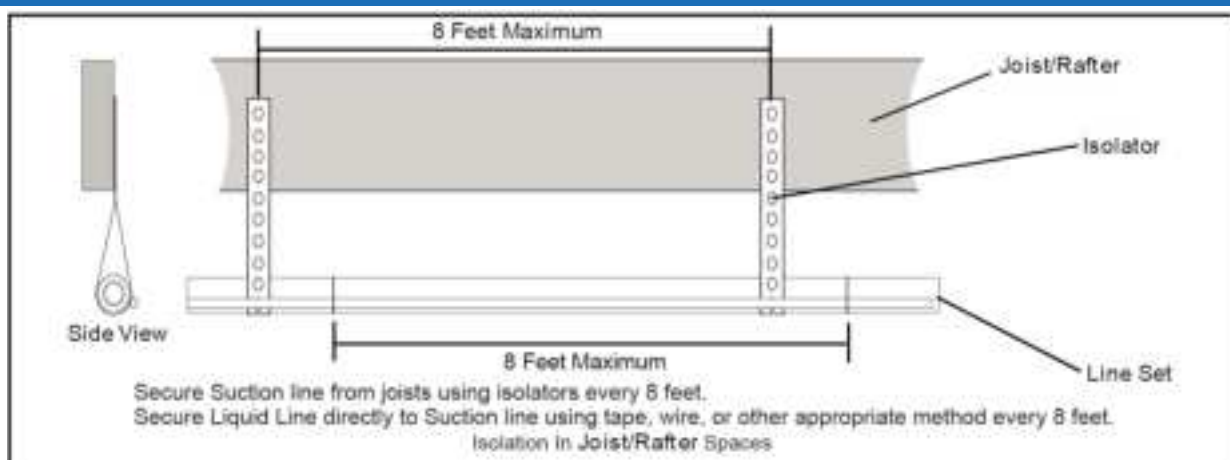


Figure 3.7

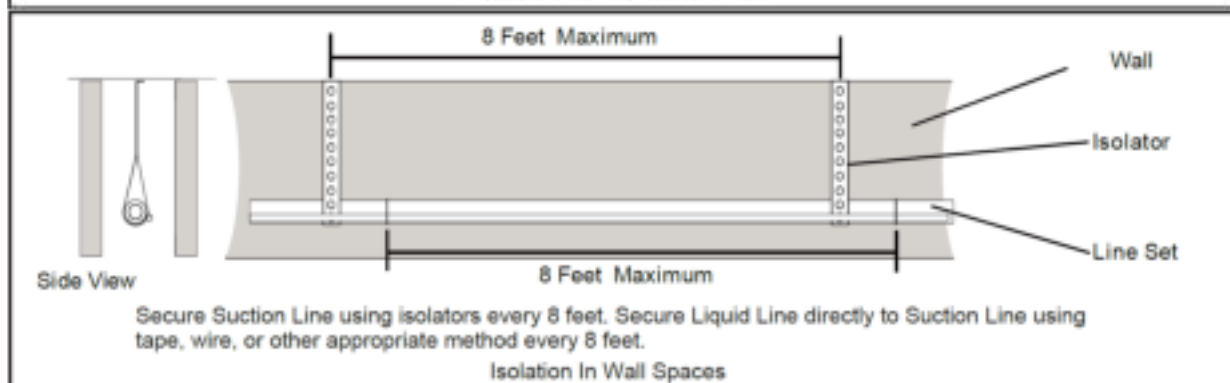


Figure 3.8

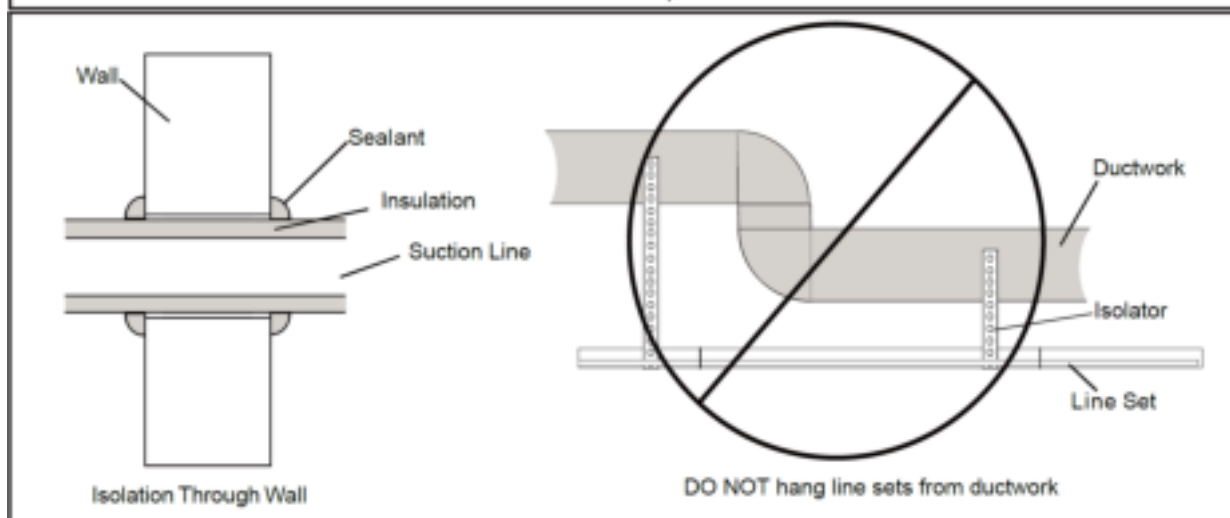
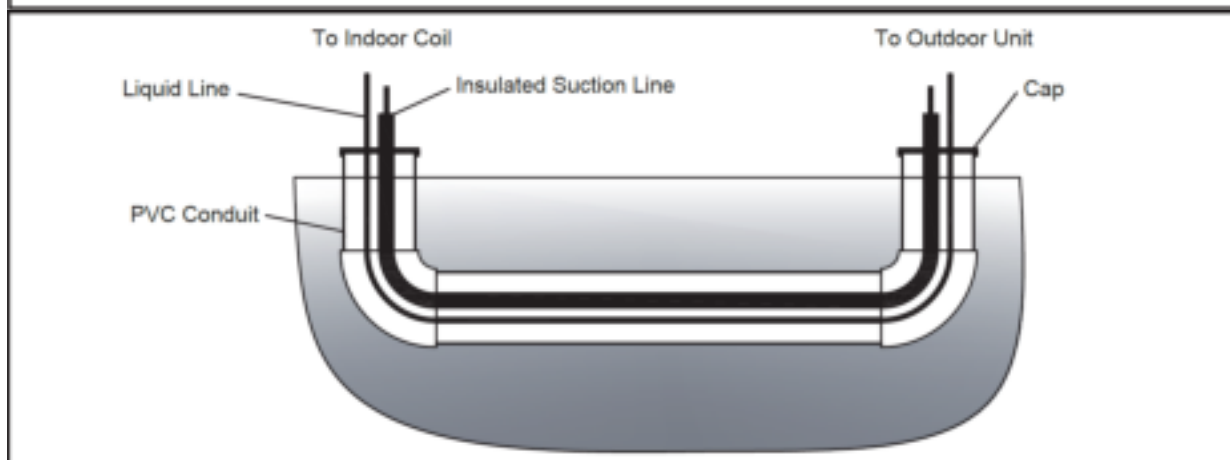


Figure 3.9



# 3 REFRIGERANT

## 3.7 Line Brazing

1. Remove caps or plugs. Use a deburring tool to deburr the pipe ends. Clean both internal and external surfaces of the tubing using an emery cloth.

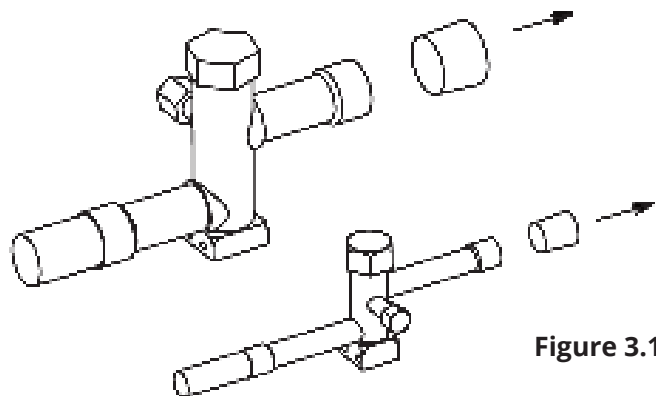


Figure 3.10

2. Remove the pressure tap cap from both service valves.

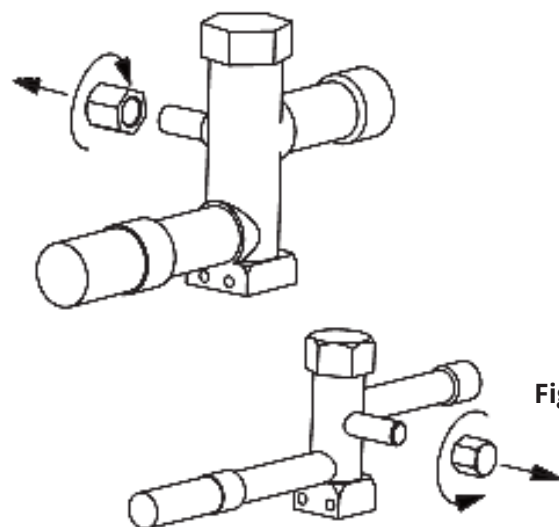


Figure 3.11

3. Purge the refrigerant lines and indoor coil with dry nitrogen.

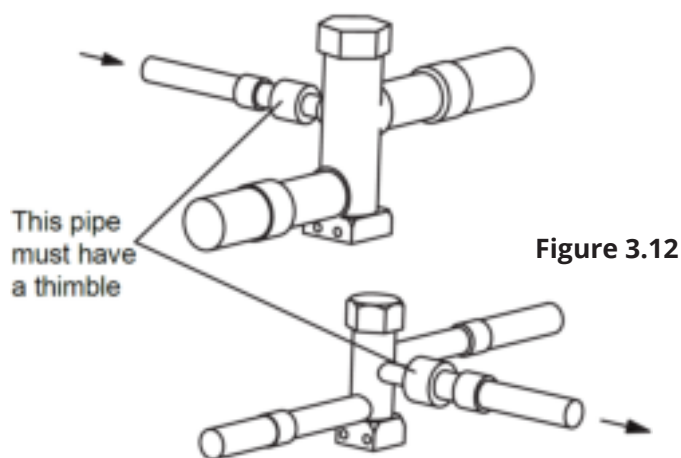


Figure 3.12

4. Wrap a wet cloth around the valve body to avoid heat damage and continue the dry nitrogen purge. (Figure 3.13).

Braze the refrigerant lines to the service valves.

Check the liquid line filter drier's directional flow arrow to confirm the correct direction of refrigeration flow (away from the outdoor unit and toward the evaporator coil) as illustrated. Braze the filter drier to the liquid line.

Continue the dry nitrogen purge. Do not remove the wet rag until all brazing is completed.

### NOTE

Remove the wet cloth before stopping the dry nitrogen purge.

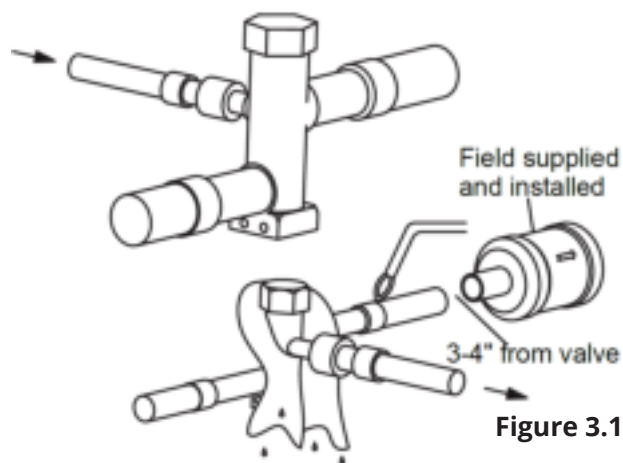


Figure 3.13

5. Replace the pressure tap caps after the service valves have cooled.

### NOTE

Do not over-tighten (between 40 and 60 inch-lbs. maximum).

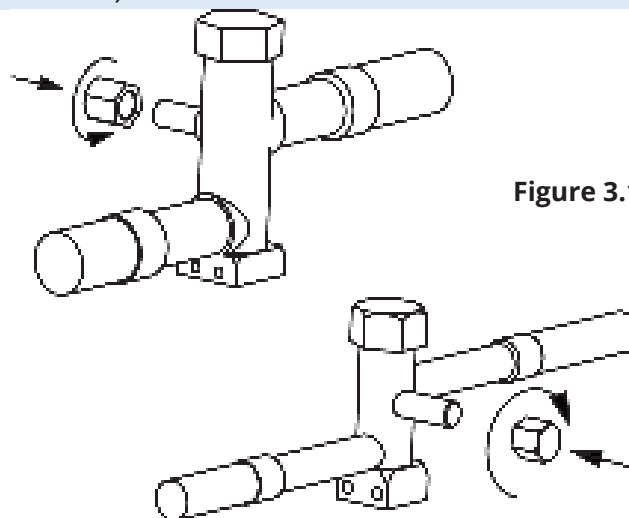


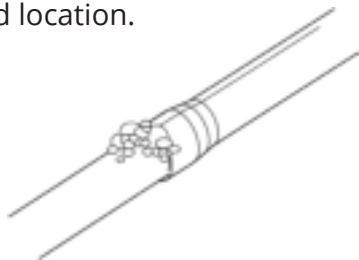
Figure 3.14

## 3.8 Leak Check

1. Pressurize the refrigerant lines and evaporator coil to 150 PSIG using dry nitrogen.



2. Check for leaks by using a soapy solution or bubbles at each brazed location.



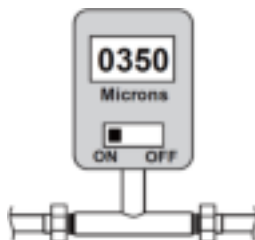
3. Remove nitrogen pressure and repair any leaks before continuing.

## 3.9 Evacuation

### NOTE

Do not open the service valves until the refrigerant lines and indoor coil leak check and evacuation are complete.

1. Evacuate until the micron gauge reads no higher than 350 microns, then close off the valve to the vacuum pump.



2. Observe the micron gauge. Evacuation is complete if the micron gauge does not rise above 500 microns in one (1) minute.

Once evacuation is complete, blank off the vacuum pump and micron gauge, and close the valves on the manifold gauge set.



## 3.10 Opening the Service Valves



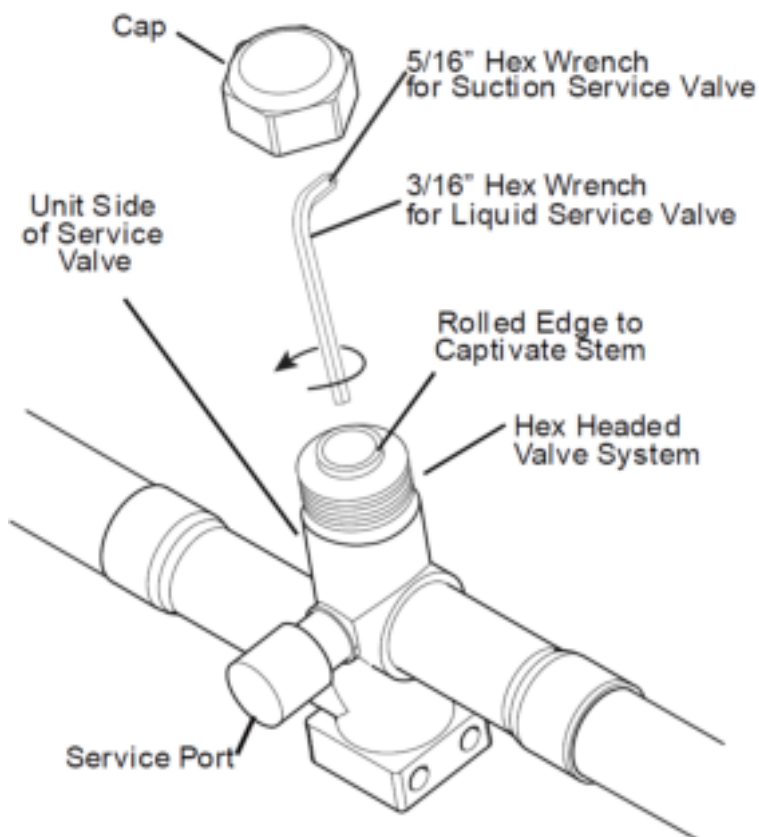
### WARNING

Exercise extreme caution when opening the liquid line service valve. Turn counterclockwise until the valve stem just touches the rolled edge. No torque is required. Failure to follow this warning will result in abrupt release of system charge and may result in personal injury and/or property damage.

### NOTE

Leak check and evacuation must be completed before opening the service valves.

1. Remove service valve cap. (Figure 3.15)
2. Fully insert hex wrench into the stem and back out counterclockwise until valve stem just touches the rolled edge.
3. Replace the valve stem cap to prevent leaks. Tighten finger tight plus an additional 1/6 turn.



# 4 ELECTRICAL

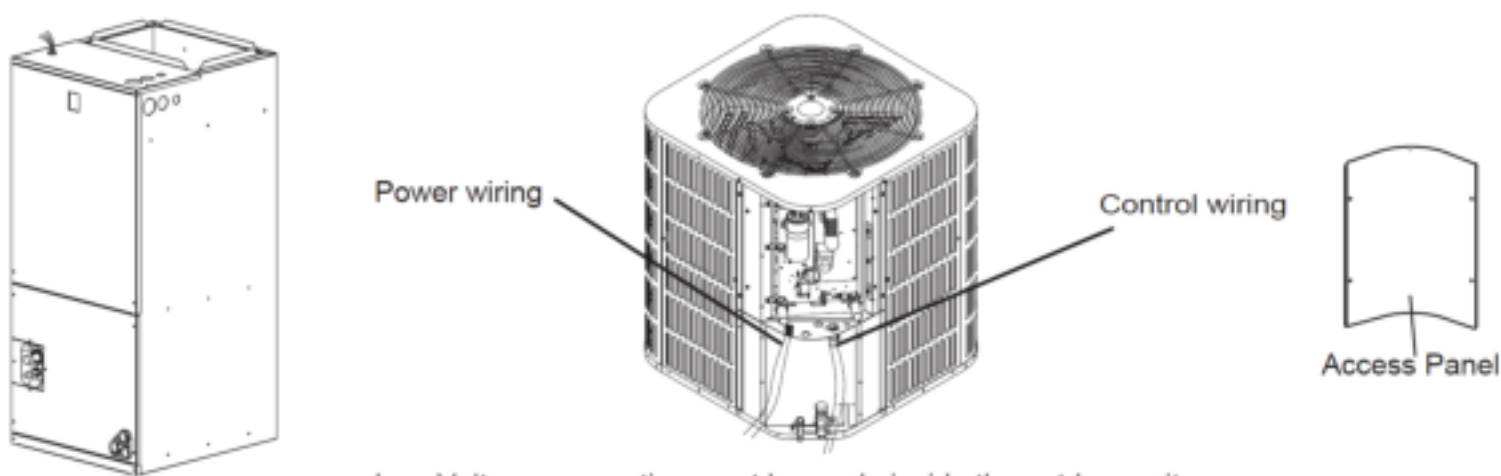
## 4.1 Low Voltage Maximum Wire Length

The following table defines the maximum total length of low voltage wiring from the outdoor unit to the indoor unit and to the thermostat.

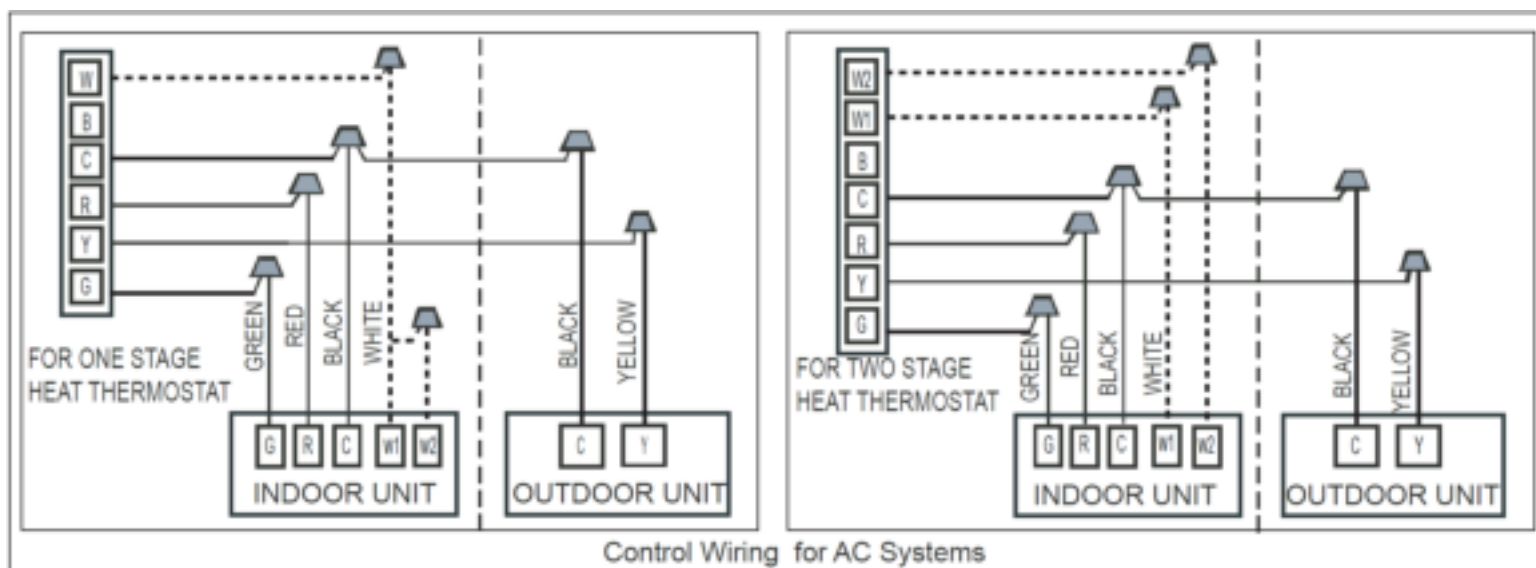
| 24 Volts - Wire Size | Maximum Wire Length |
|----------------------|---------------------|
| 18 AWG               | 150 ft.             |
| 16 AWG               | 225 ft.             |
| 14 AWG               | 300 ft.             |

## 4.2 Low Voltage Wiring Diagrams

Air Handler Hook-up Diagram



Low Voltage connection must be made inside the outdoor unit case.



Notes:

"-----" - The electric auxiliary heat connection (optional)

W - Electric auxiliary heat signal

W1 - First electric auxiliary heat signal

W2 - Second electric auxiliary heat signal

**WARNING**

Low voltage line must be connected inside the outdoor unit case through the control wiring channel on the right. High voltage line must be connected through power wiring channel on the left. Mixed channel may result in personal injury.

1. During installation or maintenance, do not cut the tie of the rubber ring on the electric control box with scissors. It can be untied by pressing the loose buckle. The tightening belt can be reused.

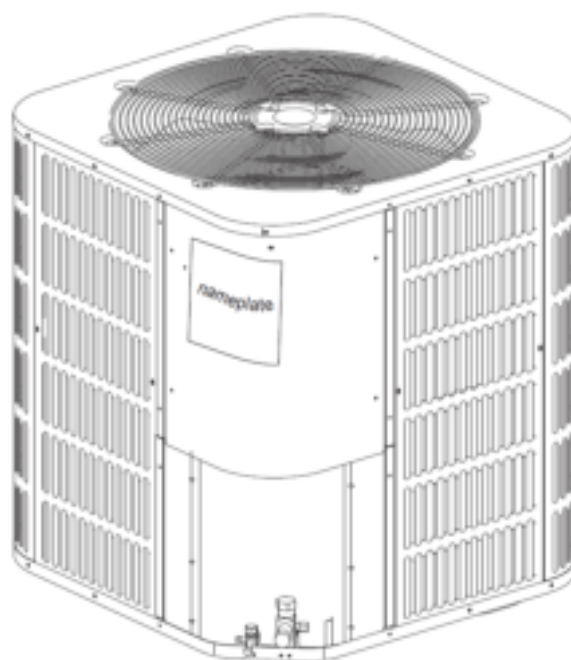


2. After installation or maintenance, the tightening belt shall be tightened, and should not be loosened or discarded. The control box access panel must be installed and the screws must be tightened.

**4.3 High Voltage Power Supply****WARNING**

During installation, testing, servicing, and troubleshooting of this product, it may be necessary to work with live electrical components. Failure to follow all electrical safety precautions when exposed to live electrical components could result in death or serious injury.

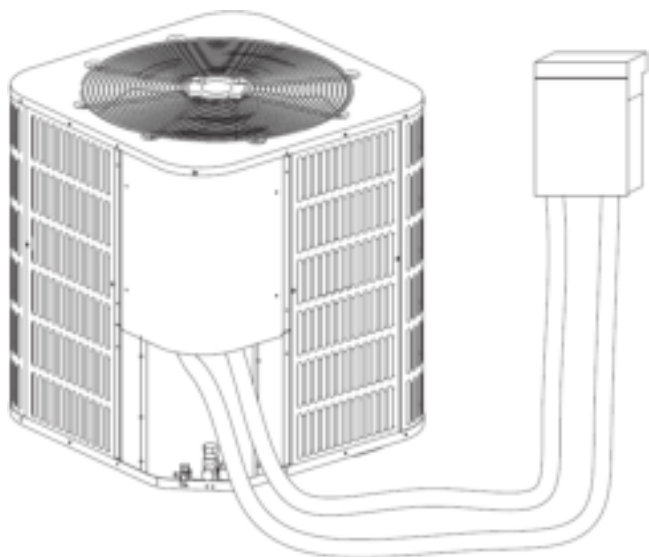
The high voltage power supply must agree with the equipment nameplate. Power wiring must comply with National, State, and Local codes. Follow the instructions on the unit wiring diagram located on the inside of the access panel.



# 4 ELECTRICAL

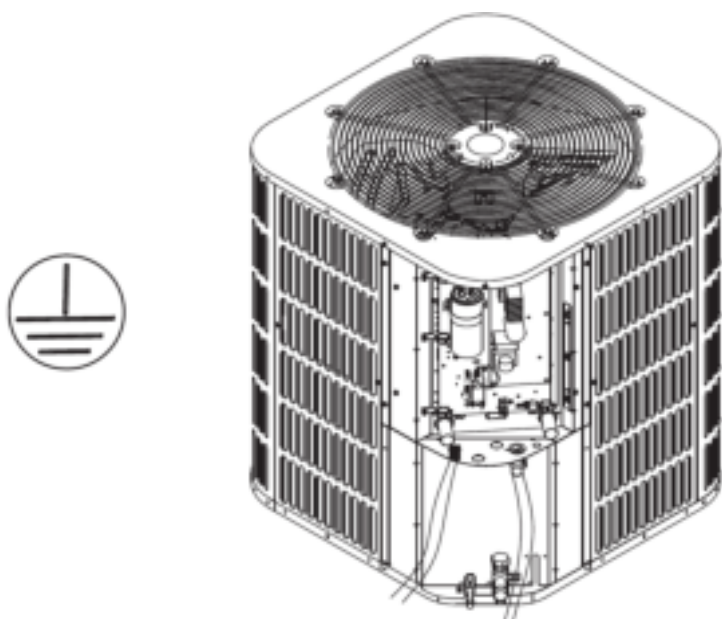
## 4.4 High Voltage Disconnect Switch

Install a separate disconnect switch at the outdoor unit. Field provided flexible electrical conduit must be used for high voltage wiring.



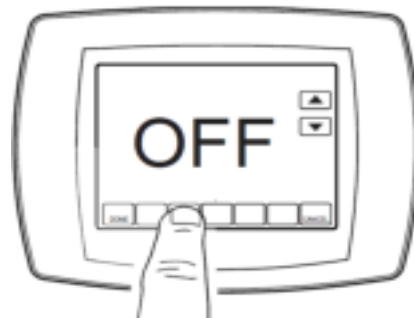
## 4.5 High Voltage Ground

Ground the outdoor unit per national, state, and local code requirements.

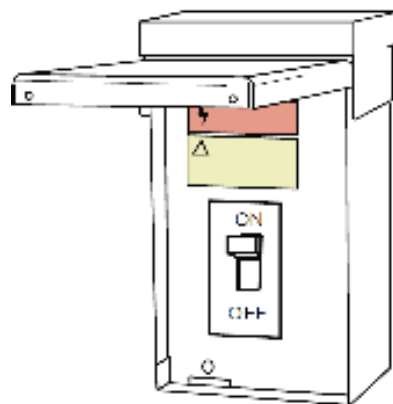


## 4.6 Start Up

1. Ensure all previous sections have been completed.
2. Set System Thermostat to OFF.



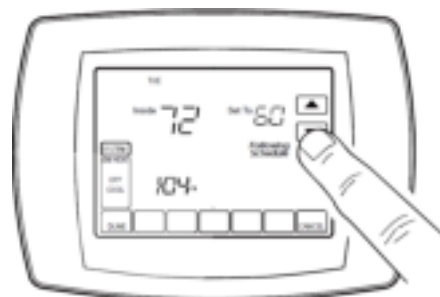
3. Turn on power to the indoor and outdoor units at the disconnect switch.



4. Wait one (1) hour before starting the unit if compressor crankcase heater is used and the outdoor ambient temperature is below 70°F.



5. Set system thermostat to ON.





# 5 SYSTEM CHARGE ADJUSTMENT

## 5.1 Charging: Weigh-In Method

The Weigh-In method can be used for the initial installation, or anytime a system charge is being replaced. The Weigh-In method can also be used when power is not available to the equipment site or operating conditions (indoor/outdoor temperatures) are not in range to verify with the suction line pressure charging method.

| Model  | Factory Charge | Charge Multiplier for Liquid Line Length |           |           |
|--------|----------------|------------------------------------------|-----------|-----------|
| 18 AWG | 150 ft.        | 5/16"                                    | 3/8"      | 1/2"      |
| 16 AWG | 225 ft.        | 0.4 oz/ft                                | 0.6 oz/ft | 1.2 oz/ft |

### NOTE

The factory charge in the outdoor unit is sufficient for 15 feet of standard size interconnecting liquid line.

### New installations:

Calculating additional charge for lineset greater than 15 feet.

1. Total Line Length (ft) = \_\_\_\_\_ (a)
2. Standard Lineset (ft) = \_\_\_\_\_ (b)
3. (a) minus (b) = \_\_\_\_\_ (c)
4. Refrigerant Multiplier = \_\_\_\_\_ (d)
5. Refrigerant Adder (c\*d) = \_\_\_\_\_ (e)

\*If lineset is less than 15 feet, (e) = 0.

### Sealed-System Repairs:

Calculating total system charge

1. Total Line Length (ft) = \_\_\_\_\_ (a)
2. Standard Lineset (ft) = \_\_\_\_\_ (b)
3. (a) minus (b) = \_\_\_\_\_ (c)
4. Refrigerant Multiplier = \_\_\_\_\_ (d)
5. Refrigerant Adder (c\*d) = \_\_\_\_\_ (e)\*
6. Factory Charge (nameplate)= \_\_\_\_\_ (f)
7. Total System Charge (e+f) = \_\_\_\_\_

\*If lineset is less than 15 feet, (e) = 0.

### NOTE

The only mode approved for validating system charge is while in Cooling Mode. Outdoor temperature must be between 55°F and 115°F with Indoor Temperature kept between 70°F and 80°F.

# 5 SYSTEM CHARGE ADJUSTMENT

## 5.2 Suction Line Pressure Charging & Refrigerant Adjustment in Cooling

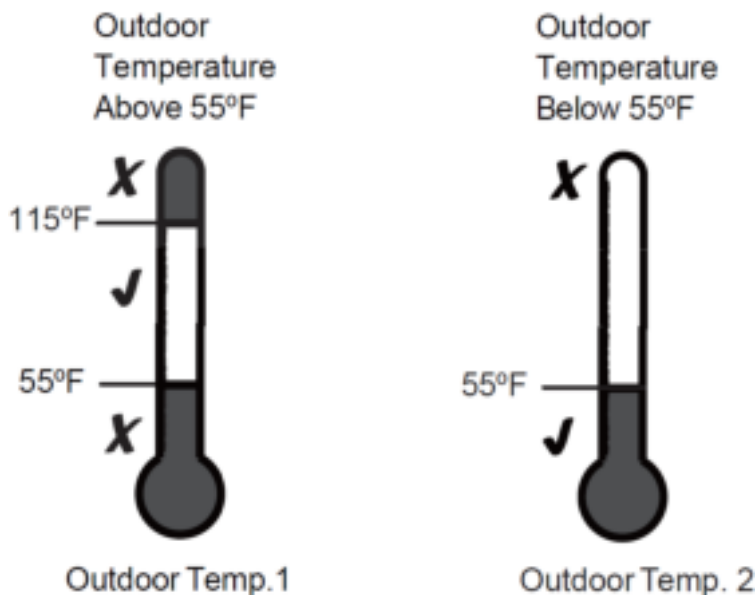
1. Check the outdoor ambient temperatures.

Suction line pressure (in cooling mode) is the only recommended method of charging above 55°F outdoor ambient temperatures.

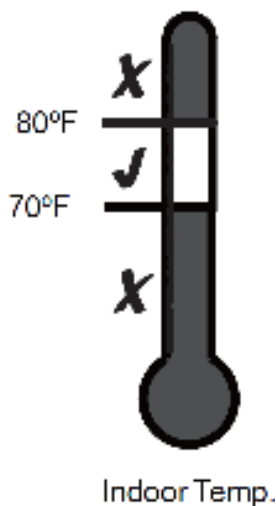
For outdoor ambient temperatures below 55°F, use weigh-in charge method.

### NOTE

It is important to return in the spring or summer to accurately charge the system in cooling mode when outdoor ambient temperature is above 55°F.



For best results, the indoor temperature should be kept between 70°F and 80°F.



2. Ensure all previous sections have been completed.

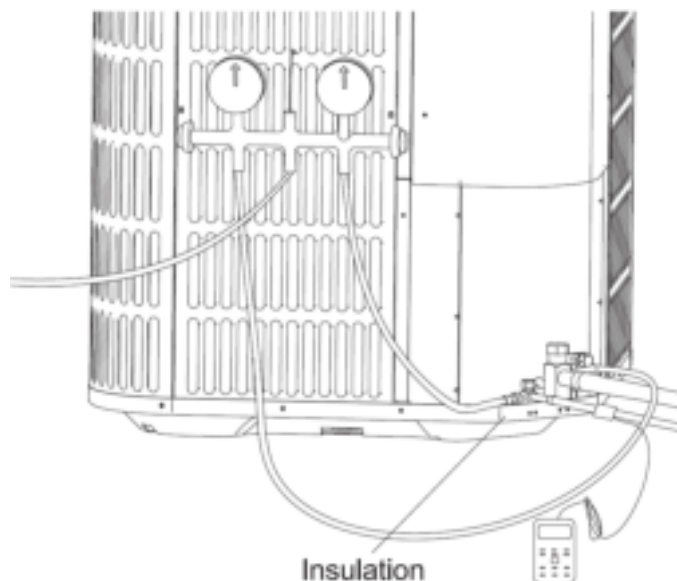
3. Stabilize the system by operating for a minimum of 20 minutes.

### NOTE

At startup, or whenever charge is removed or added, the system must be operated for a minimum of 20 minutes to stabilize before accurate measurements can be made.



- Measured Suction Line Pressure = \_\_\_\_\_ PSIG
- Outdoor Ambient Temperature = \_\_\_\_\_ °F
- Indoor Ambient Temperature = \_\_\_\_\_ °F
- Calculate Liquid Line Pressure = \_\_\_\_\_ PSIG
- Measured Suction Line Temperature = \_\_\_\_\_ °F



# 5 SYSTEM CHARGE ADJUSTMENT

## Design Superheat with TXV Throttle

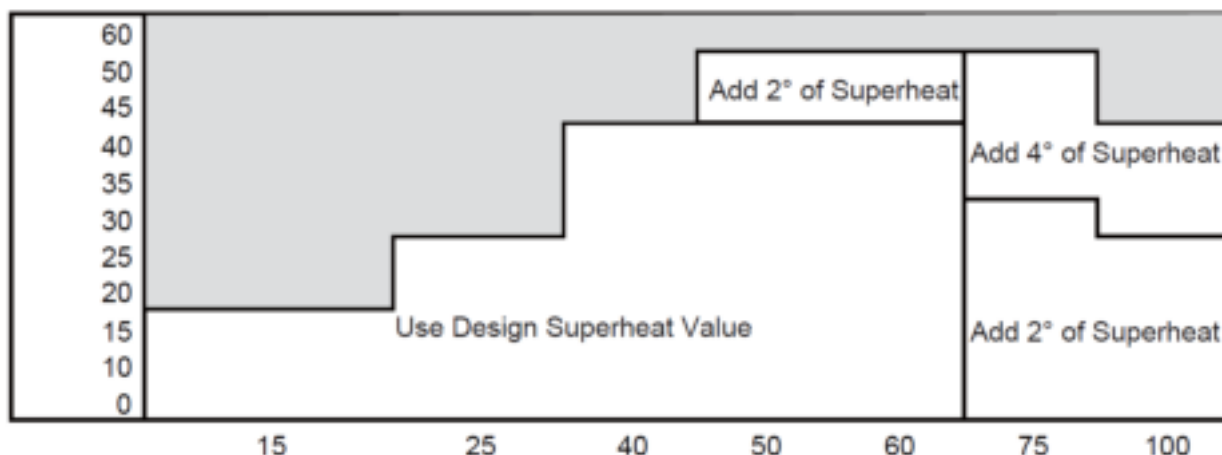
| Outdoor DB (°F) | Indoor Unit Inlet DB/WB (°F) |       |       |       |       |       |
|-----------------|------------------------------|-------|-------|-------|-------|-------|
|                 | 95/79                        | 90/75 | 85/71 | 80/67 | 75/63 | 70/58 |
| 115             | 13                           | 12    | 11    | 11    | 10    | 9     |
| 110             | 13                           | 11    | 10    | 10    | 10    | 9     |
| 105             | 12                           | 11    | 10    | 10    | 9     | 8     |
| 100             | 11                           | 10    | 10    | 10    | 9     | 8     |
| 95              | 11                           | 10    | 10    | 9     | 8     | 8     |
| 90              | 11                           | 10    | 10    | 9     | 8     | 8     |
| 85              | 12                           | 10    | 9     | 9     | 8     | 8     |
| 80              | 13                           | 11    | 9     | 9     | 8     | 8     |
| 75              | 14                           | 12    | 9     | 8     | 7     | 5     |
| 70              | 10                           | 9     | 8     | 6     | 5     | 5     |
| 65              | 7                            | 6     | 6     | 6     | 5     | 5     |
| 60              | 6                            | 5     | 5     | 5     | 5     | 5     |
| 55              | 6                            | 5     | 5     | 5     | 5     | 5     |

## Design Superheat with Piston Throttle

| Outdoor DB (°F) | Indoor Unit Inlet DB/WB (°F) |       |       |       |       |       |
|-----------------|------------------------------|-------|-------|-------|-------|-------|
|                 | 95/79                        | 90/75 | 85/71 | 80/67 | 75/63 | 70/58 |
| 115             | 16                           | 11    | 6     | 5     | 5     | 5     |
| 110             | 18                           | 13    | 8     | 5     | 5     | 5     |
| 105             | 20                           | 15    | 10    | 5     | 5     | 5     |
| 100             | 23                           | 17    | 13    | 7     | 5     | 5     |
| 95              | 25                           | 20    | 15    | 9     | 5     | 5     |
| 90              | 27                           | 22    | 17    | 12    | 5     | 5     |
| 85              | 29                           | 24    | 19    | 14    | 8     | 5     |
| 80              | 25                           | 20    | 16    | 11    | 7     | 5     |
| 75              | 22                           | 18    | 14    | 9     | 5     | 5     |
| 70              | 22                           | 18    | 13    | 8     | 5     | 5     |
| 65              | 21                           | 17    | 13    | 8     | 5     | 5     |
| 60              | 20                           | 16    | 12    | 7     | 5     | 5     |
| 55              | 19                           | 15    | 11    | 5     | 5     | 5     |

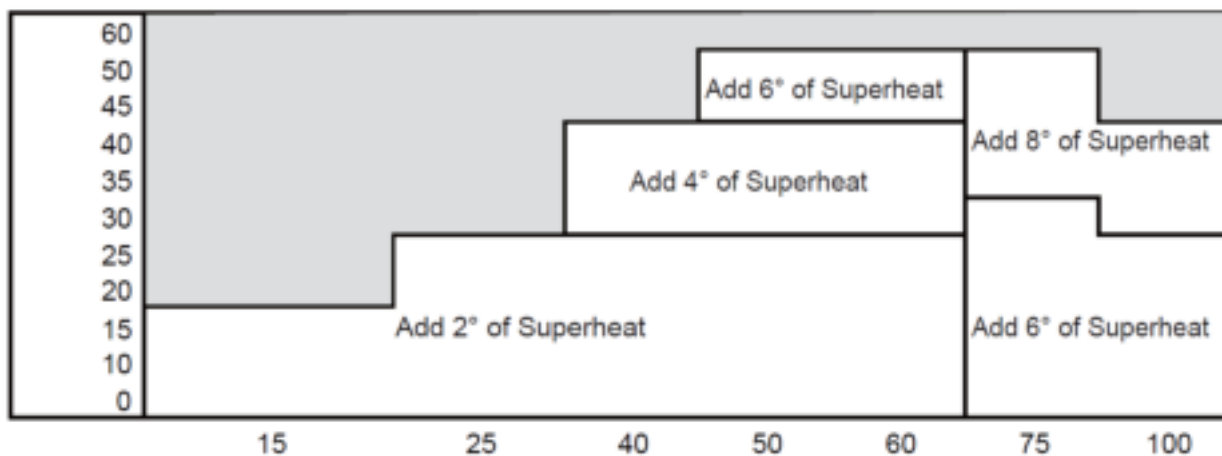
# 5 SYSTEM CHARGE ADJUSTMENT

Refrigerant Line Lift -feet



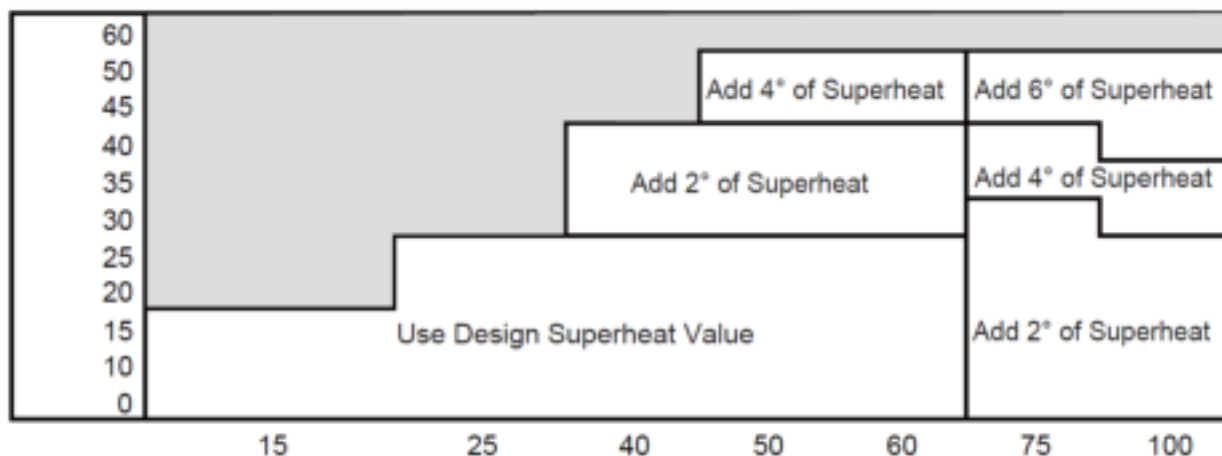
18K AC with TXV

Refrigerant Line Lift -feet



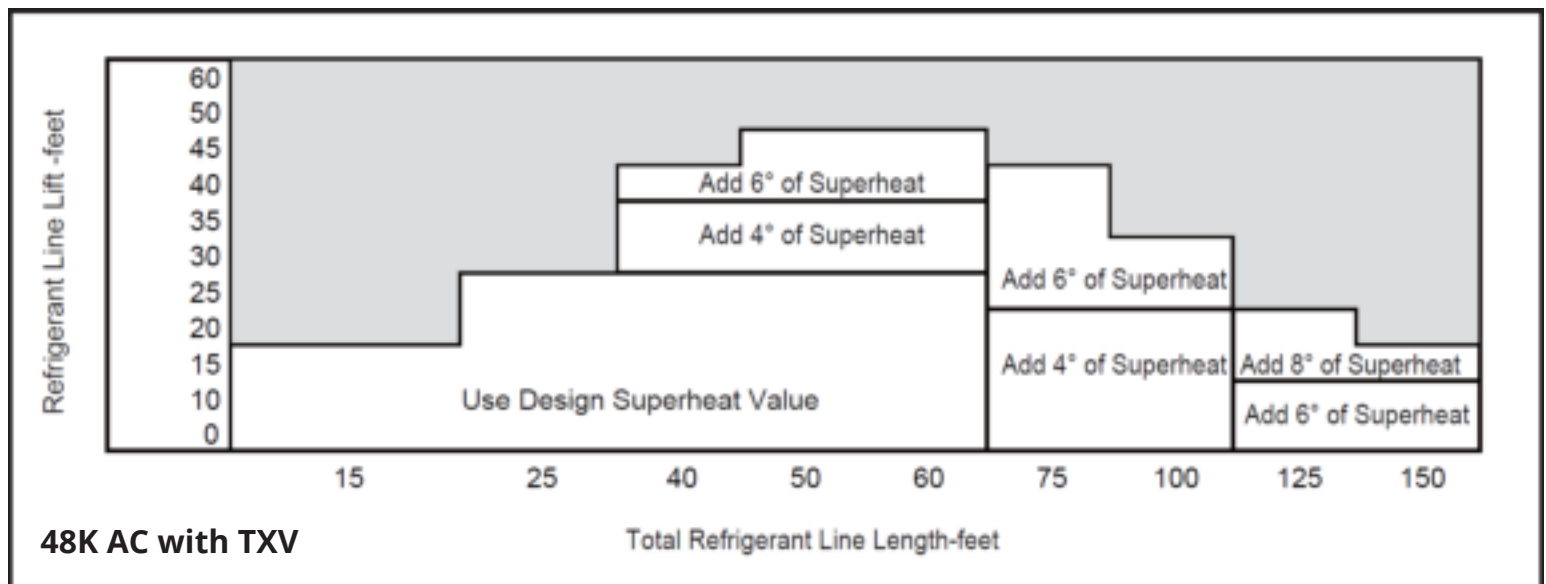
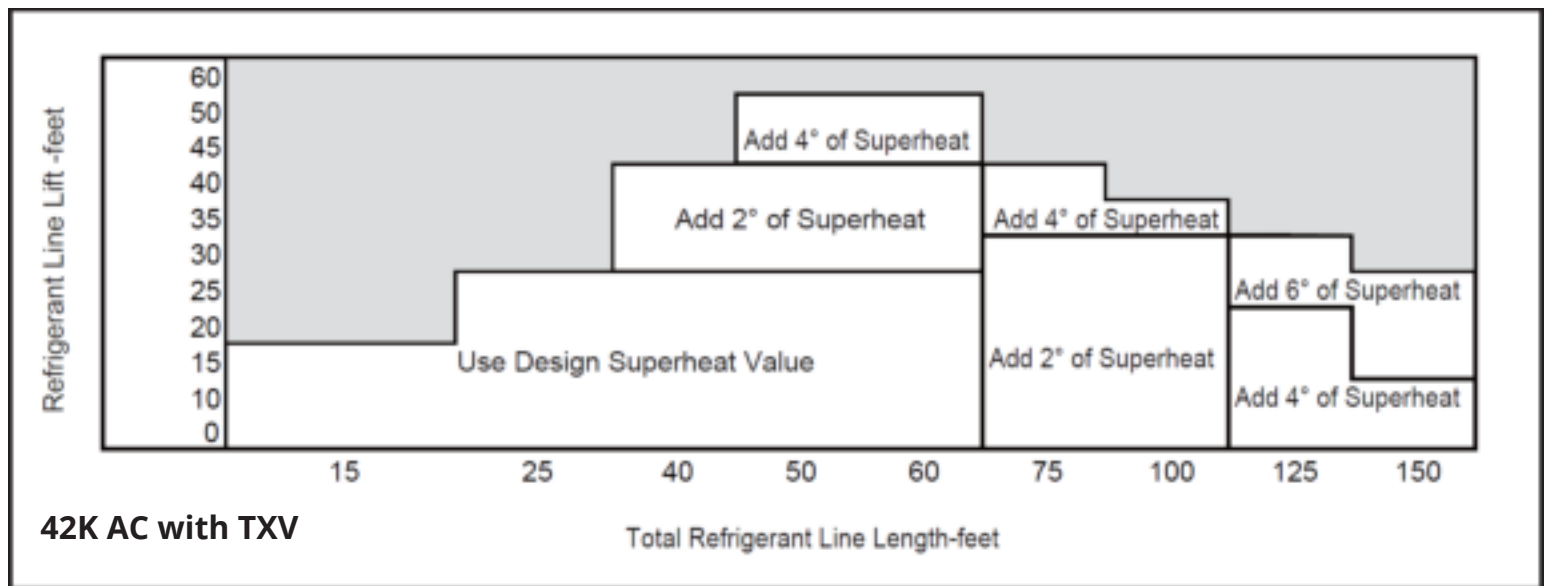
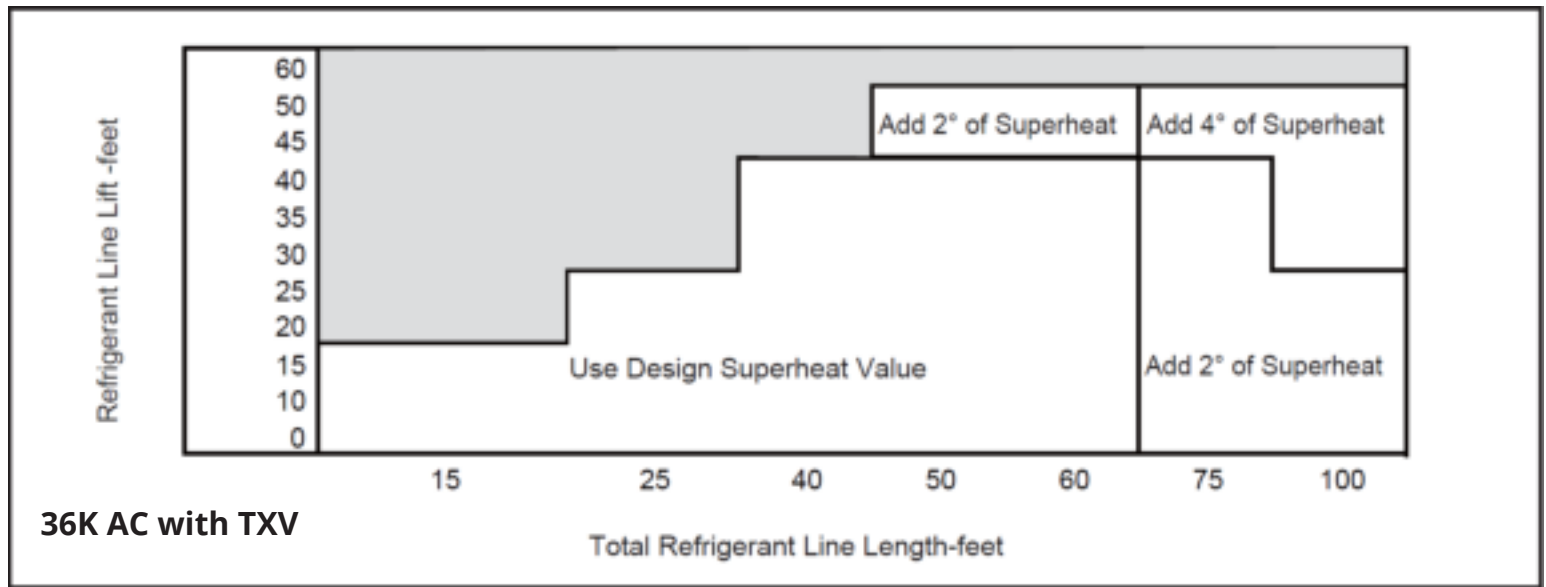
24K AC with TXV

Refrigerant Line Lift -feet

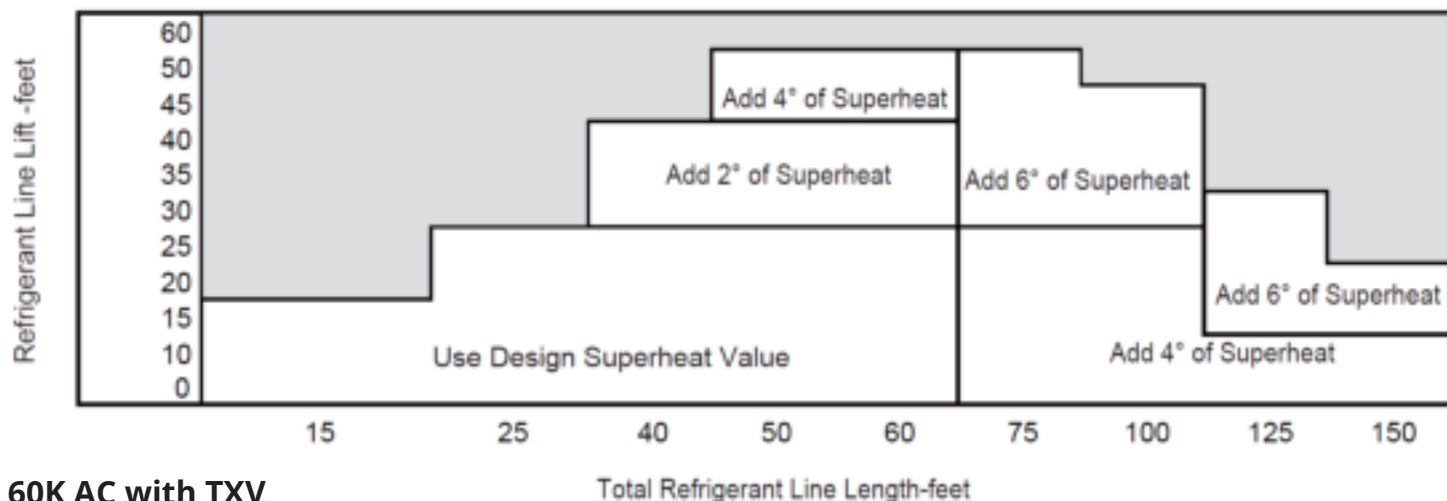


30K AC with TXV

# 5 SYSTEM CHARGE ADJUSTMENT



# 5 SYSTEM CHARGE ADJUSTMENT



5. Use the final superheat value, refrigerant temperature and pressure from step 4, to determine the proper suction gauge pressure using the R410A Refrigerant Superheat Chart below.

Example: Assume a 12°F final superheat value and suction temperature of 58°F.

1. Locate 12°F final superheat in table below.

2. Locate the Suction Temperature (58°F) in the left column.

3. The Suction Gauge Pressure should be approximately 133 PSIG. (This is the shown as the intersection of the Final Superheat column and the Suction Temperature row.)

Design Superheat Value = \_\_\_\_\_°F

Superheat Correction = \_\_\_\_\_°F

Final Superheat Value = \_\_\_\_\_°F

| R410A Refrigerant Superheat Chart |                      |     |     |     |     |     |     |
|-----------------------------------|----------------------|-----|-----|-----|-----|-----|-----|
| Suction Temp (°F)                 | Final Superheat (°F) |     |     |     |     |     |     |
|                                   | 6                    | 8   | 10  | 12  | 14  | 16  | 18  |
| Suction Gauge Pressure (PSI)      |                      |     |     |     |     |     |     |
| 40                                | 105                  | 101 | 97  | 93  | 89  | 86  | 82  |
| 42                                | 109                  | 105 | 101 | 97  | 93  | 89  | 86  |
| 44                                | 114                  | 109 | 105 | 101 | 97  | 93  | 89  |
| 46                                | 118                  | 114 | 109 | 105 | 101 | 97  | 93  |
| 48                                | 123                  | 118 | 114 | 109 | 105 | 101 | 97  |
| 50                                | 128                  | 123 | 118 | 114 | 109 | 105 | 101 |
| 52                                | 133                  | 128 | 123 | 118 | 114 | 109 | 105 |
| 54                                | 138                  | 133 | 128 | 123 | 118 | 114 | 109 |
| 56                                | 143                  | 138 | 133 | 128 | 123 | 118 | 114 |
| 58                                | 148                  | 143 | 138 | 133 | 128 | 123 | 118 |
| 60                                | 153                  | 148 | 143 | 138 | 133 | 128 | 123 |
| 62                                | 159                  | 153 | 148 | 143 | 138 | 133 | 128 |
| 64                                | 164                  | 159 | 153 | 148 | 143 | 138 | 133 |
| 66                                | 170                  | 164 | 159 | 153 | 148 | 143 | 138 |
| 68                                | 176                  | 170 | 164 | 159 | 153 | 148 | 143 |
| 70                                | 182                  | 176 | 170 | 164 | 159 | 153 | 148 |
| 72                                | 188                  | 182 | 176 | 170 | 164 | 159 | 153 |



## 6 SYSTEM OPERATION & TROUBLESHOOTING

6. Adjust refrigerant level to attain proper final superheat.

### NOTE

Add refrigerant if the measured superheat is higher than the final superheat value.

- Connect gauges to refrigerant bottle and unit as illustrated.
- Purge all hoses.
- Open bottle.
- Stop adding refrigerant when gas line pressure matches the Refrigerant Charging Chart.

### NOTE

Recover refrigerant if the measured superheat is lower than the final superheat value.

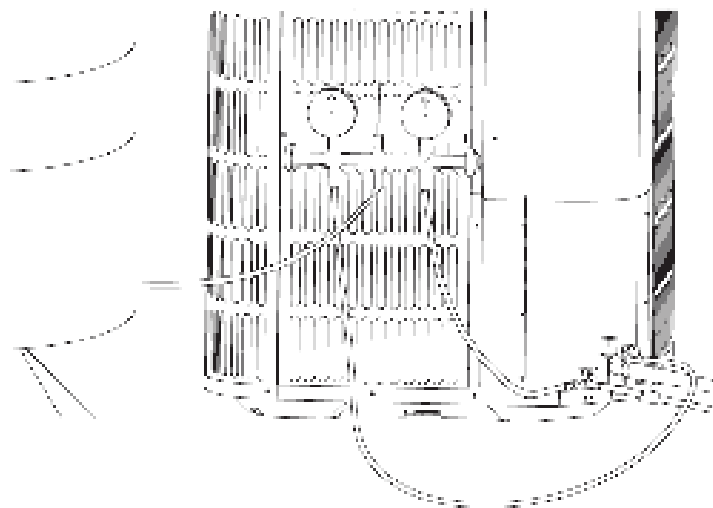
7. Stabilize the system.

- Wait 20 minutes for the system condition to stabilize between adjustments.

### NOTE

When the gas line pressure matches the chart, the system is properly charged.

- Remove gauges.
- Replace service port caps to prevent leaks. Tighten finger tight plus an additional 1/6 turn.
- Record system information, pressures, and temperatures in the following reference table after charging is complete.



### Reference Chart

| Description                          | Value |
|--------------------------------------|-------|
| Outdoor Model Number                 |       |
| Measured Outdoor Ambient Temperature | °F    |
| Measured Indoor Ambient Temperature  | °F    |
| Liquid Gauge Pressure                | PSIG  |
| Suction Gauge Pressure               | PSIG  |
| Suction Line Temperature             | °F    |

### 6.1 Protection Function

#### Discharge Temperature Protection:

Discharge Temperature > 239°F, compressor stops working.

Discharge Temperature < 167°F, compressor restarts working.

#### For 18K-30K High Pressure Protection:

High Pressure > 609 PSIG, compressor & outdoor fan motor stop working.

High Pressure < 464 PSIG, compressor & outdoor fan motor restart working (3 minute delay necessary).

T4 = Ambient Temperature

T4 < 32°F, compressor can't start

T4 ≥ 41°F, compressor restarts working

#### For 42K-60K High Pressure Protection:

High Pressure > 638 PSIG, compressor and outdoor fan motor stop working.

High Pressure < 464 PSIG, compressor and outdoor fan motor restart working (3 minute delay necessary).

# 6 SYSTEM OPERATION & TROUBLESHOOTING

## 6.2 Temperature Sensor Resistance Table

| Temperature °F | Resistance $\Omega$ | Temperature °F | Resistance $\Omega$ | Temperature °F | Resistance $\Omega$ | Temperature °F | Resistance $\Omega$ |
|----------------|---------------------|----------------|---------------------|----------------|---------------------|----------------|---------------------|
| -4             | 106.73              | 37             | 29.87               | 78             | 10                  | 119            | 3.69                |
| -3             | 103.25              | 38             | 29.22               | 79             | 9.5                 | 120            | 3.61                |
| -2             | 99.89               | 39             | 28.19               | 80             | 9.26                | 121            | 3.53                |
| -1             | 96.65               | 40             | 27.39               | 81             | 9.03                | 122            | 3.45                |
| 0              | 93.53               | 41             | 26.61               | 82             | 8.81                | 123            | 3.38                |
| 1              | 90.53               | 42             | 25.85               | 83             | 8.59                | 124            | 3.3                 |
| 2              | 87.62               | 43             | 25.12               | 84             | 8.38                | 125            | 3.23                |
| 3              | 84.83               | 44             | 24.42               | 85             | 8.17                | 126            | 3.16                |
| 4              | 82.13               | 45             | 23.73               | 86             | 7.97                | 127            | 3.1                 |
| 5              | 79.52               | 46             | 23.07               | 87             | 7.78                | 128            | 3.03                |
| 6              | 77.01               | 47             | 22.42               | 88             | 7.59                | 129            | 2.96                |
| 7              | 74.58               | 48             | 21.8                | 89             | 7.4                 | 130            | 2.9                 |
| 8              | 72.24               | 49             | 21.2                | 90             | 7.22                | 131            | 2.84                |
| 9              | 69.98               | 50             | 20.61               | 91             | 7.05                | 132            | 2.78                |
| 10             | 67.8                | 51             | 20.04               | 92             | 6.88                | 133            | 2.72                |
| 11             | 65.69               | 52             | 19.49               | 93             | 6.72                | 134            | 2.67                |
| 12             | 63.65               | 53             | 18.95               | 94             | 6.56                | 135            | 2.61                |
| 13             | 61.68               | 54             | 18.44               | 95             | 6.4                 | 136            | 2.56                |
| 14             | 59.78               | 55             | 17.94               | 96             | 6.25                | 137            | 2.5                 |
| 15             | 57.95               | 56             | 17.45               | 97             | 6.1                 | 138            | 2.45                |
| 16             | 56.17               | 57             | 16.98               | 98             | 5.96                | 139            | 2.4                 |
| 17             | 54.46               | 58             | 16.52               | 99             | 5.82                | 140            | 2.35                |
| 18             | 52.8                | 59             | 16.08               | 100            | 5.68                | 141            | 2.3                 |
| 19             | 51.2                | 60             | 15.65               | 101            | 5.55                | 142            | 2.25                |
| 20             | 49.65               | 61             | 15.23               | 10             | 5.42                | 143            | 2.21                |
| 21             | 48.16               | 62             | 14.83               | 103            | 5.3                 | 144            | 2.16                |
| 22             | 46.71               | 63             | 14.43               | 104            | 5.18                | 145            | 2.12                |
| 23             | 45.31               | 64             | 14.05               | 105            | 5.06                | 146            | 2.08                |
| 24             | 43.95               | 65             | 13.68               | 106            | 4.94                | 147            | 2.03                |
| 25             | 42.64               | 66             | 13.32               | 107            | 4.83                | 148            | 1.99                |
| 26             | 41.38               | 67             | 12.97               | 108            | 4.72                | 149            | 1.95                |
| 27             | 40.15               | 68             | 12.64               | 109            | 4.61                | 150            | 1.91                |
| 28             | 38.97               | 69             | 12.31               | 110            | 4.54                | 151            | 1.88                |
| 29             | 37.82               | 70             | 11.99               | 111            | 4.41                | 152            | 1.84                |
| 30             | 36.71               | 71             | 11.68               | 112            | 4.31                | 153            | 1.8                 |
| 31             | 35.64               | 72             | 11.38               | 113            | 4.21                | 154            | 1.77                |
| 32             | 34.6                | 73             | 11.09               | 114            | 4.12                | 155            | 1.73                |
| 33             | 33.59               | 74             | 10.8                | 115            | 4.03                | 156            | 1.7                 |
| 34             | 32.61               | 75             | 10.53               | 116            | 3.94                | 157            | 1.66                |
| 35             | 31.67               | 76             | 10                  | 117            | 3.85                | 158            | 1.63                |
| 36             | 30.76               | 77             | 10                  | 118            | 3.77                | 159            | 1.6                 |

## 6.3 Electrical Data Table

| Model                         | 18   | 24   | 30   | 36   | 42   | 48   | 60   |
|-------------------------------|------|------|------|------|------|------|------|
| Minimum Circuit Ampacity (A)  | 11.9 | 16.3 | 16.3 | 21.1 | 24.8 | 29.7 | 38.5 |
| Maximum Circuit Protector (A) | 20   | 25   | 30   | 35   | 40   | 50   | 60   |

# 6 SYSTEM OPERATION & TROUBLESHOOTING

## 6.4 Troubleshooting Table

| System Faults                                    | Refrigerant Circuit |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |  |
|--------------------------------------------------|---------------------|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|--|
|                                                  |                     |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |  |
| Head Pressure Too High                           | C                   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   | P | P | S | P | S |   |   |   |   | S |   |   |   |   |   |   |   |  |
|                                                  | H                   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   | P | P | S |   |   |   |   |   | P | S |   |   |   |   |   |   |   |  |
| Head Pressure Too Low                            | C                   |   |   |   |   |   |   |   |   |   |   |   |   | S | P |   |   |   |   |   |   | S | S |   | S | S |   | P |   |   |   |   |   |  |
|                                                  | H                   |   |   |   |   |   |   |   |   |   |   |   |   | S | P |   |   |   |   |   |   | S | S |   | S | S | S | P |   |   |   |   |   |  |
| Suction Pressure Too High                        | C                   |   |   |   |   |   |   |   |   |   |   |   |   | S |   | P | P |   |   |   |   |   | S |   |   | P |   | P |   |   |   |   |   |  |
|                                                  | H                   |   |   |   |   |   |   |   |   |   |   |   |   | S |   |   |   |   |   |   |   |   | S |   |   | P |   |   |   |   |   |   |   |  |
| Suction Pressure Too Low                         | C                   |   |   |   |   |   |   |   |   |   |   |   |   |   | P |   |   |   |   |   |   |   | S | P | S |   |   |   |   |   |   |   |   |  |
|                                                  | H                   |   |   |   |   |   |   |   |   |   |   |   |   |   | P |   |   |   |   | S | S |   | S |   | S |   | S |   |   |   |   |   |   |  |
| Liquid Refr. Floodback (TXV)                     | C                   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   | P |   |   |   |   |   | P |   |   |   |   |   |  |
|                                                  | H                   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   | P |   |   |   |   |   | P |   |   |   |   |   |  |
| I.D. Coil Frosting                               | C                   |   |   |   |   |   |   |   |   |   |   |   |   |   | P |   |   |   |   | S | S |   |   |   |   |   |   |   |   |   |   |   |   |  |
|                                                  | H                   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |  |
| Inadequate Compressor Op. or No Cooling/ Heating | C                   |   |   |   |   |   |   |   |   |   |   |   |   | S | P |   | S | S |   |   |   |   | S | P | S | S |   | S |   |   |   |   |   |  |
|                                                  | H                   |   |   |   |   |   |   |   |   |   |   |   |   | S | P |   | S |   |   |   |   |   | S | P | S | S | S | S |   |   |   |   |   |  |
| Electrical                                       |                     |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |  |
| Compressor & O.D. Fan Won't Start                | C                   | P | P |   |   |   |   | S | S | P | S | P | P |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |  |
|                                                  | H                   | P | P |   |   |   |   | S | P | S |   | P |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   | S | S | S | S | S |  |
| Compressor Will Not Start but O.D. Fan Runs      | C                   |   | P |   | P |   |   |   |   |   |   |   | P |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |  |
|                                                  | H                   |   | P |   | P |   | S |   |   |   | P |   | P |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   | S |   |   |   |   |  |
| O.D. Fan Won't Start                             | C                   |   | P |   |   | P |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |  |
|                                                  | H                   |   | P |   |   | P |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   | S |   |   |   |   |  |
| Compressor Hums But Won't Start                  | C                   |   |   |   | P |   | S |   |   |   |   |   | P |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |  |
|                                                  | H                   |   |   |   | P |   | S |   |   |   |   |   | P |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |  |
| I.D. Blower Won't Start                          | C                   | P | P | S |   |   | P |   | S | P | S |   | S |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |  |
|                                                  | H                   | P | P | S |   |   | P |   | S | P | S |   | S |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |  |
| Defrost                                          |                     |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |  |
| Unit Won't Initiate Defrost                      | C                   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |  |
|                                                  | H                   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   | P |   |   | P |   | S |  |
| Defrost Terminates on Time                       | C                   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   | P |   |   |   |   |   |   |   |   |   |   |   |   |   | P |   | S |  |
|                                                  | H                   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   | P |   |   |   |   |   |   |   |   |   |   |   |   |   | P |   | S |  |
| Unit Icing Up                                    | C                   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   | S | S |   |   | S |   |   | P |   |   | P |   |   |   |  |
|                                                  | H                   |   |   |   |   |   |   |   |   |   |   |   |   |   |   | P |   |   |   | S | S |   |   | S |   | P |   |   | P |   |   |   |   |  |

C = Cooling

H = Heating

P = Primary Causes

S = Secondary Causes

# 7 POST-INSTALLATION

## 6.5 Fault Code Table

Fault Code of Motor Driver Module

| LED1 Error Code                                                                  |                                        | Content                                      |
|----------------------------------------------------------------------------------|----------------------------------------|----------------------------------------------|
|  | Steady On                              | Normal Operation                             |
|  | OFF                                    | Power Supply Failure                         |
|  | Keep Flashing                          | Standby                                      |
|                                                                                  | 2s On<br>2s Off<br>0.2s On<br>0.2s Off | Inter-Integrated Circuit Communication Error |
|  | 1 Flash/Cycle                          | Motor Current Error                          |
|  | 2 Flash/Cycle                          | Inverter Module Temperature Error            |
|  | 3 Flash/Cycle                          | DC Bus Voltage Error                         |
|  | 4 Flash/Cycle                          | Motor Parameter Error                        |
|  | 5 Flash/Cycle                          | Motor Startup Failure                        |
|  | 6 Flash/Cycle                          | Phase Sequence Error                         |

Fault Code of Main Control Module

| LED2 Error Code                                                                   |               | Content              |
|-----------------------------------------------------------------------------------|---------------|----------------------|
|  | Steady On     | Normal Operation     |
|  | OFF           | Power Supply Failure |
|  | 1 Flash/Cycle | T3 Sensor Failure    |
|  | 2 Flash/Cycle | T4 Sensor Failure    |
|  | 3 Flash/Cycle | LPC Open             |
|  | 5 Flash/Cycle | OFM Failure          |
|  | 6 Flash/Cycle | No Machine Type      |

## 7.1 Maintenance

Dirt should not be allowed to accumulate on the indoor or outdoor coils or other parts in the air circuit. Clean as often as necessary to keep the unit clean. Use a brush, vacuum cleaner attachment, or other suitable means.

The outdoor fan motor is permanently lubricated and does not require periodic oiling.

Refer to the furnace or air handler instructions for filter and blower motor maintenance.

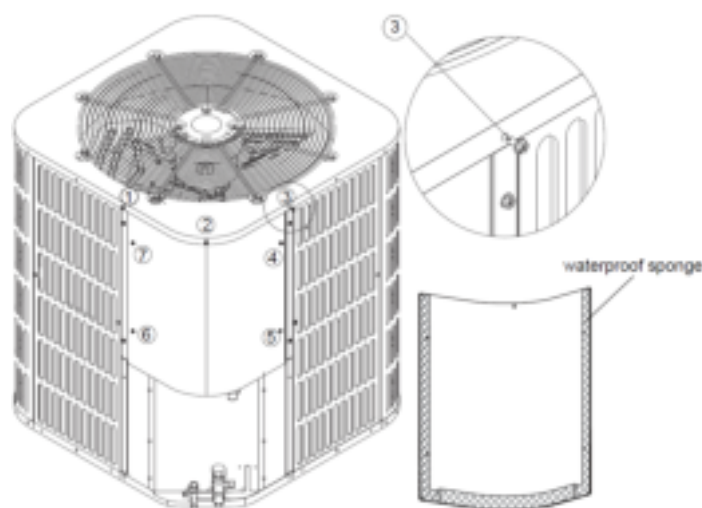
The indoor coil and drain pan should be inspected and cleaned regularly to assure proper drainage.

### NOTE

It is unlawful to knowingly vent, release, or discharge refrigerant into the open air during repair, service, maintenance, or the final disposal of this unit. When the system is functioning properly and the owner has been fully instructed, secure the owner's approval.

## 7.2 Removing & Installing the Cover Plate

1. Before removing the cover plate of the electronic control box, ensure screws 1-7 are removed first.
2. When reinstalling the cover plate, screws 1 and 3 must be installed at the last step to facilitate assembly and avoid damage to the waterproof sponge.



## 7.3 Changing the Motor

When the motor requires changing, follow the steps below:

**STEP 1** - Go into the electrical panel, and disconnect the motor power lines.

Note: Disconnect the main power to the unit. Severe burns and electrical shock will occur if the main power is not disconnected.

**STEP 2** - Remove cover (be careful of motor wires).

**STEP 3** - Be sure to place fan cover unit on the ground.

Note: Do not place or lean fan blades on ground or against surface.

**STEP 4** - Remove fan motor by removing 5/16" nuts from cover.

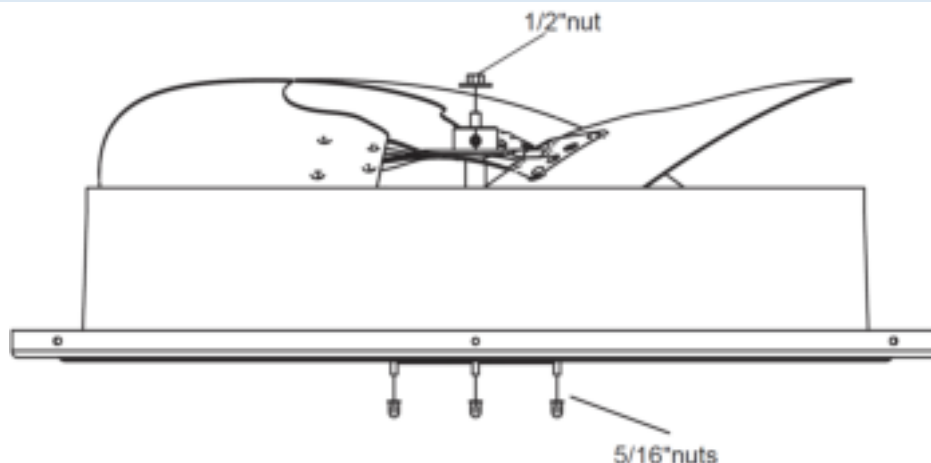
**STEP 5** - Remove fan blade from motor by removing 1/2" nut and place fan on the ground.

**STEP 6** - Reverse removal process to reinstall the fan and motor.

Note: When connecting motor wires, be sure to check motor direction.

### NOTE

Damage will occur to the condensing unit if the 5/16" nuts are removed prior to removal of the cover.



## 7.4 Operational & Checkout Procedures

Final phases of this installation are the unit Operational and Checkout Procedures. To obtain proper performance, all units must be operated and charge adjustments made.

After installation has been completed, it is recommended that the entire system be checked against the following list:

- ☐ Be sure unit suspension (if used) is secure and that there are no tools or loose debris in, around, or on top of the unit.
- ☐ Properly insulate suction lines and fittings.
- ☐ Properly secure and isolate all refrigerant lines.
- ☐ Verify that all electrical connections are tight.
- ☐ Check all duct outlets; they must be open and unrestricted.
- ☐ Check drain lines and be sure all joints are tight.
- ☐ Be sure that a return air filter is installed.
- ☐ Operate complete system in each mode to verify proper performance. Verify proper performance of supplementary electric heater if applicable.



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## **Split System**

## **Air Conditioner**

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