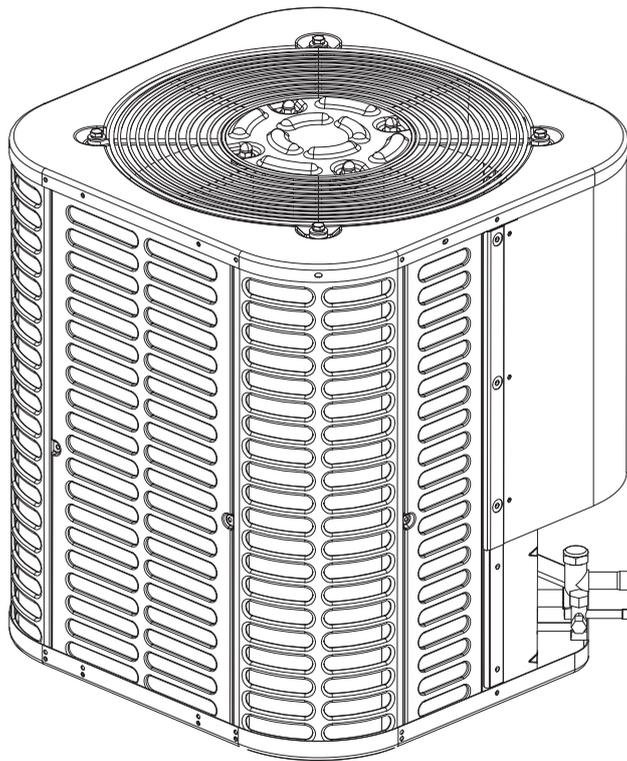




INSTALLATION INSTRUCTIONS

Split System Heat Pump & Air Conditioner



Model Size:
2-3-4-5 Tons
R410A

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1. Symbol and Key to Safety Instructions

1.1 Symbol Keywords



WARNING

The warnings in this document are identified by warning triangles printed on a gray background. The key words at the beginning of the warning indicate the type and severity of the next risk if no measures are taken to prevent it.

The following keywords are defined and used in this document:



Danger

Indicates a dangerous situation, which, if not avoided, will lead to death or serious injury.



Warning

Indicates a dangerous situation, which, if not avoided, may lead to death or serious injury.



Caution

Indicates a dangerous situation, which, if not avoided, may cause mild to moderate injury.



Note

Used to deal with behaviors unrelated to personal injury.

Important information



This symbol represents important information that is not dangerous to people or property.

1.2 Safety

Please Read Before Continuing.



WARNING



Failure to observe this warning may result in property damage, serious personal injury or death.



Before touching the electrical components, wait for 3 minutes after disconnecting the power supply.



NOTICE



This document is the property of the customer and is kept by this unit. When you are finished, please return to the service information package.



These instructions do not cover all changes in the system, nor do they provide all unexpected situations that may be encountered during installation.



If you need more information, or there are special problems that are not sufficient for the buyer, you should consult your installation dealer or local dealer.



Some benefits of installing an approved indoor and outdoor split system are maximum efficiency, best performance and best overall system reliability.



This document contains wiring diagram and maintenance information. This is the customer's property and belongs to this unit. When you are finished, please return to the service information package.

Warning:



- This appliance is not intended for use by persons (including children) with reduced physical, sensory or mental capabilities, or lack of experience and knowledge, unless they have been given supervision or instruction concerning use of the appliance by a person responsible for their safety.
 - The appliance shall be installed in accordance with national wiring regulations.
 - Children should be supervised to ensure that they do not play with the appliance.
 - Before accessing the connection terminals, all power circuits must be disconnected.
 - This information is intended for use by individuals with sufficient electrical and mechanical experience background. Attempting to repair central air conditioning products may result in personal injury and/or property damage.
-

Warning: Dangerous voltage



- Failure to observe this warning may result in property damage, serious personal injury or death.
 - Disconnect all power before maintenance, including remote disconnection. Follow proper locking/tagging procedures to ensure that the power supply will not be energized accidentally.
-

Warning: Refrigerant oil



- Attempting to repair central air-conditioning products may result in property damage, serious personal injury or death. These units use R-410A refrigerant, and its working pressure is 50-70% higher than R-22. Use only the service equipment approved by R-410A. The refrigerant cylinder is painted "rose" to indicate the type of refrigerant, and may contain a "dip" tube to allow liquid refrigerant to be filled into the system. All R-410A systems use POE oil (VG74 or equivalent), which can easily absorb moisture from the atmosphere. In order to limit this "moisture absorption" effect, the system should be sealed as much as possible. If the system is exposed to the atmosphere for more than 4 hours, the compressor oil must be changed. Do not destroy the vacuum with air, and always replace the dryer when you open the system for component replacement.
-

Warning: Hot surface



- May cause mild to severe burns. Failure to observe this caution may result in property damage or personal injury. Do not touch the top of the compressor.
-

Caution: Contains refrigerant



- Failure to follow the correct procedures will lead to personal illness or injury or serious equipment damage. The system contains high-pressure oil and refrigerant. Before opening the system, recover the refrigerant to release the pressure.
-



Note: Indoor unit is required

- The indoor unit must be matched with the thermal expansion valve. The model of TXV can be changed according to the system capacity.
-



Note: Grounding is required

- Failure to check or use the correct maintenance tools may result in equipment damage or personal injury. Reconnect all grounding devices. All parts of this product that can conduct current are grounded. If the grounding wire, screw, strap, clip, nut or washer used to complete the grounding path is removed during maintenance, it must be put back in place and properly fixed.
-



Warning: service valve

- Failure to observe this warning will result in sudden discharge of system charge, which may result in personal injury and/or property damage. When opening the liquid pipeline service valve, be extra careful. Turn the valve stem counterclockwise until the valve stem touches the bead.
-



Warning: Brazing is required

- Failure to check the wiring or use the correct maintenance tools may result in equipment damage or personal injury. If using existing refrigerant lines, make sure that all joints are brazed, not soldered.
-



Warning: High current leakage

- Failure to observe this warning may result in property damage, serious personal injury or death. Before connecting the power supply, grounding is essential.
-



Warning:

- This product may expose you to chemicals including lead and lead components, which are known to cause cancer, birth defects or other reproductive harm in California. For more information, please visit www.P65Warnings.ca.gov.
-

2. Considerations of Unit Location

2.1 Unit Size

Table 2.1 Outdoor Operating Temperature

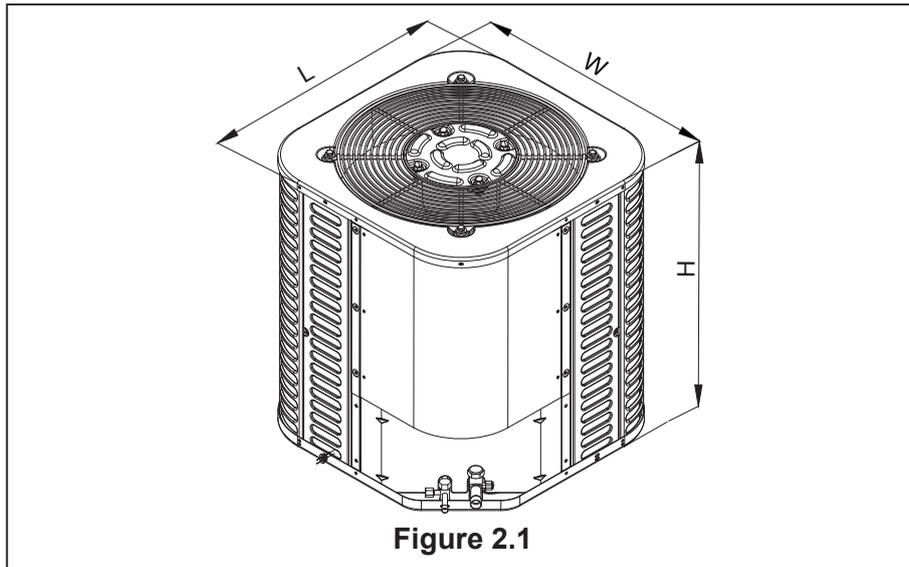
Model	Temperature
Cooling mode	64-118°F
Heating	5-75°F

Table 2.2

Unit size	
Model	H x W x L (inches)
24/36K	25 x 21-4/5 x 21-4/5
48/60K	32-7/8 x 29-1/7 x 29-1/7

The weight of the unit is attached to the carton.

When installing the outdoor unit on the roof, make sure that the roof can support the weight of the outdoor unit. It is recommended to choose appropriate isolation to prevent sound or vibration from being transmitted to the building structure.



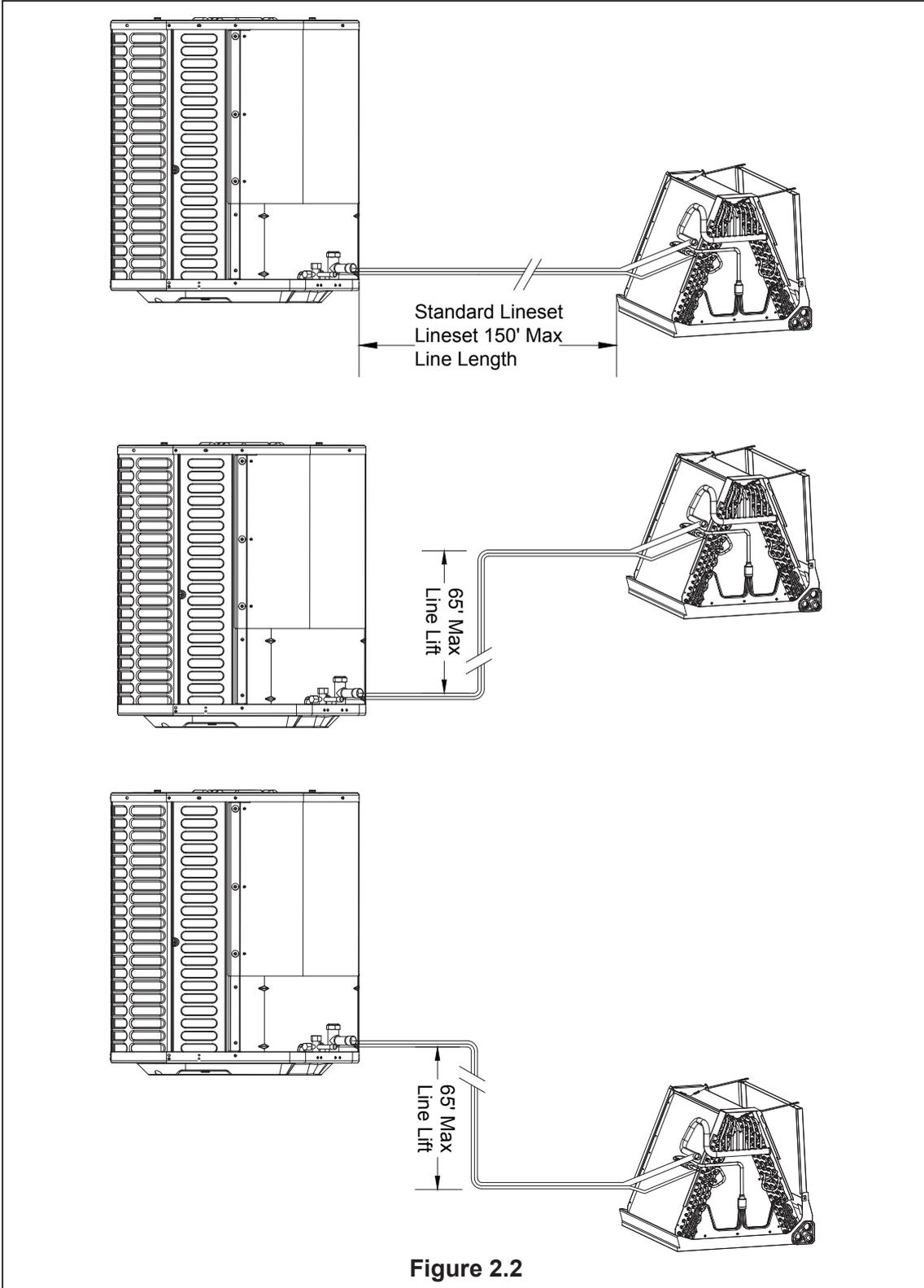
2.2 Refrigerant Pipeline Restriction

Table 2.3

Refrigerant Piping		Capacity (Kbtu/h)			
		24K	36K	48K	60K
Liquid-Gas	In.	3/8-3/4	3/8-3/4	3/8-7/8	3/8-7/8
Max.Refrigerant	Ft.	100	150		
Line Length*					
Max.Elevation	Ft.	32	65		
Vertical Lift**					

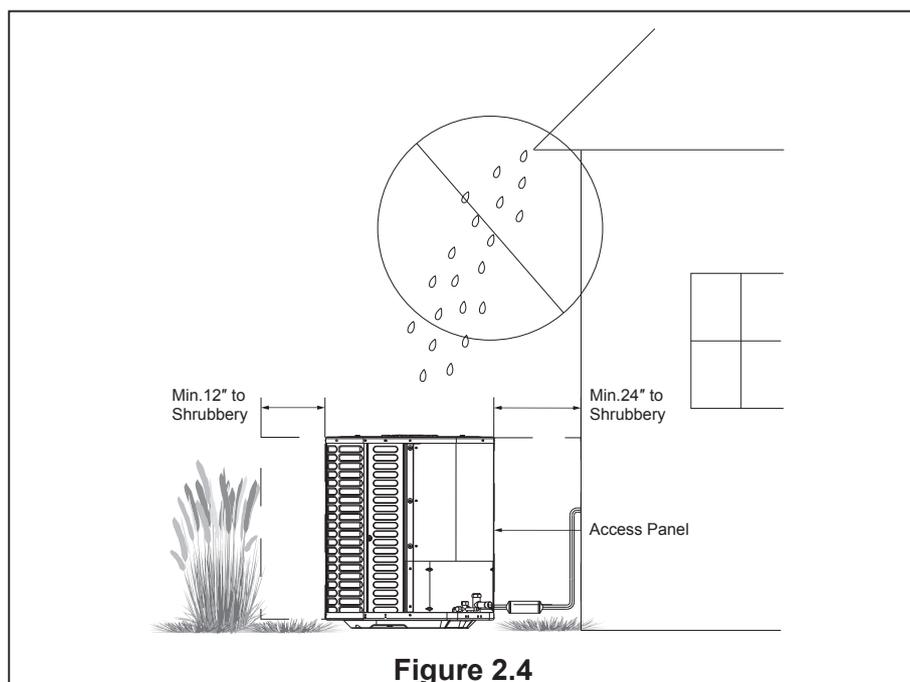
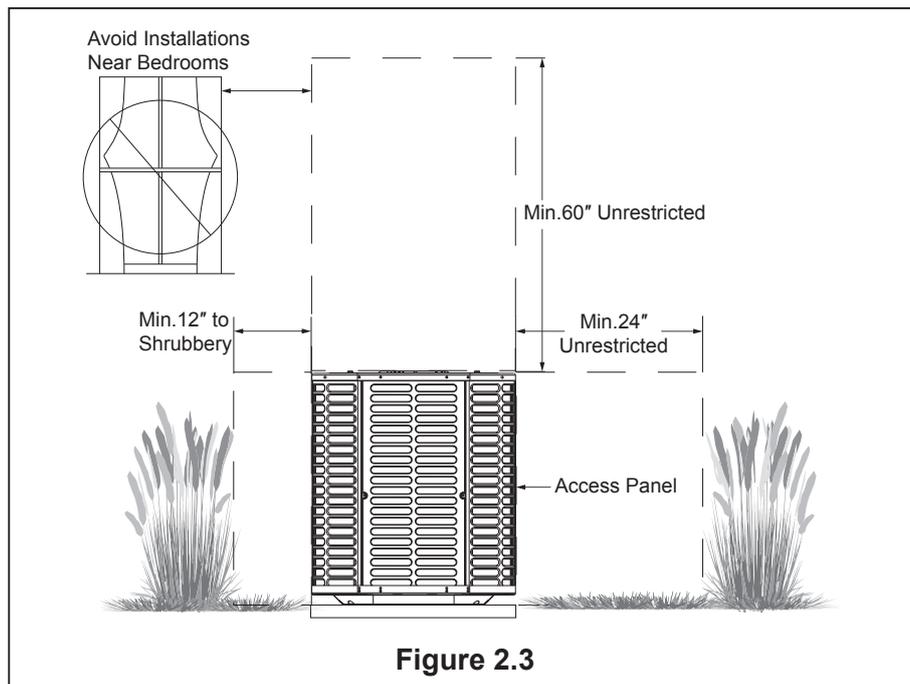
* It is recommended to adopt standard pipeline size; Refrigerant charge: see Section 14.

- ▶ Maximum equivalent length of pipeline = 150 feet.
- ▶ Maximum vertical equivalent length = 65 feet.
- ▶ Use only the pipe diameters shown in Table 2.3.
- ▶ If the suction line exceeds 65 feet, do not use a larger suction line than recommended.



2.3 Position Restriction

- Make sure that the discharge area at least 60 inches above the top of the unit is unrestricted.
- Don't put the outdoor unit near the bedroom, because the normal operating sound may be offensive.
- Position the equipment, leaving enough space for smooth airflow, wiring, refrigerant lines and maintainability.
- 12 inches minimum is allowed. The clearance from one side of the access panel to the wall should be at least 24 inches. Next to the control panel near the panel.
- Keep a distance of 24 inches between adjacent units.
- Place the unit in a place where water, snow or ice cannot fall directly on the device from the roof or overhangs.
- See figures 2.3 and 2.4.

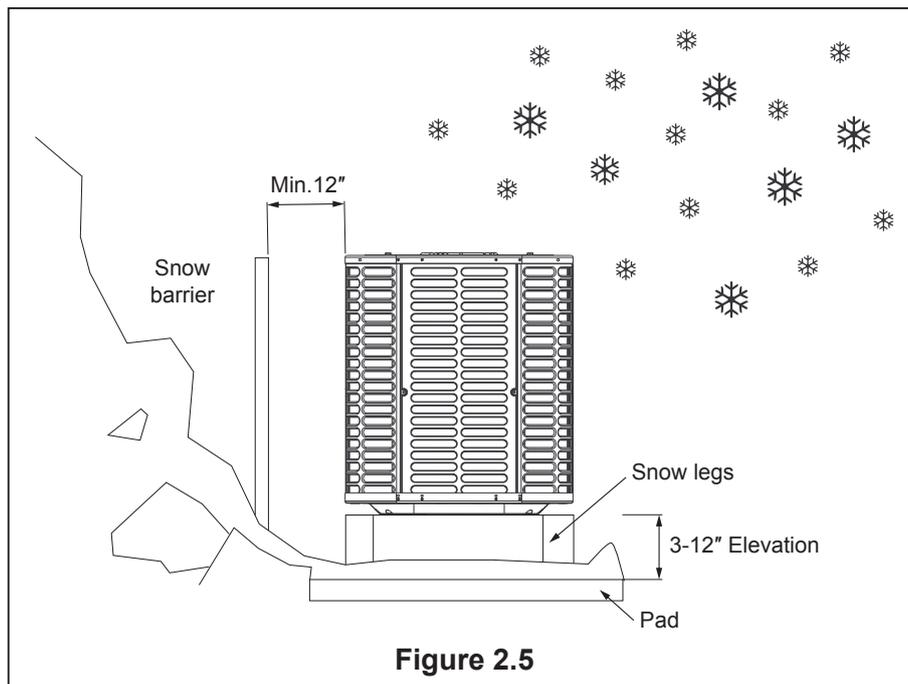


Precautions in cold climate (heat pump only)



Precautions must be taken for units installed in areas with snow and long-term temperatures below freezing point.

- Depending on the local weather conditions, the unit should be raised by 3-12 inches. This extra height will allow the snow and ice melted during the defrosting cycle to be discharged before re-freezing. Make sure that the drain hole on the unit chassis is not blocked, otherwise it will hinder the defrosting water discharge (Figure 2.5).
- If possible, avoid places that are prone to snow. If this is not feasible, a snow barrier should be installed around the unit to prevent snow accumulation on the side of the unit.



Corrosive Environment

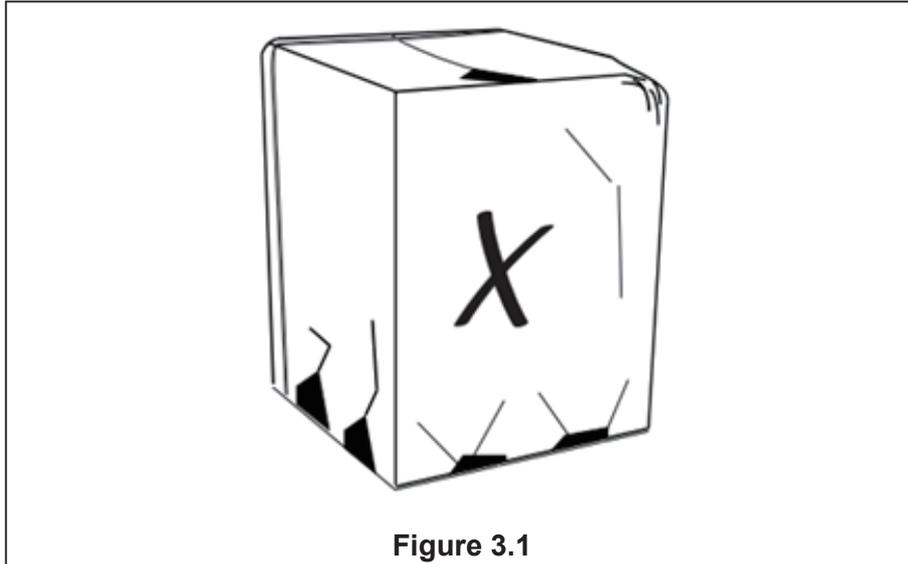
Exposure to corrosive environment may shorten the service life of unit, corrode metal parts and/or negatively affect the performance of unit. Corrosive elements include but are not limited to: sodium chloride, sodium hydroxide, sodium sulfate and other compounds commonly found in seawater, sulfur, chlorine, fluorine, fertilizers and various chemical pollutants from industrial/manufacturing plants. If it is installed in an area that may be exposed to corrosive environment, special attention should be paid to the placement and maintenance of the unit.

- Lawn sprinklers/hoses/waste water should not be sprayed directly on the outer panel of the unit for a long time.
- In coastal areas: install the unit on the side away from the waterfront.
- Fences or shrubs can provide some shielding protection for the unit, but the minimum device clearance must still be kept.
- Clean the outdoor coil and any exposed external surfaces about every three months.

3. Unit Installation Preparation

3.1 Prepare the Unit for Installation

- Check whether there is any damage and report any damage to the unit to the carrier in time (Figure 3.1).
- The filler can be used to ensure that the refrigerant charge is maintained during shipment.



4. Unit Settings

4.1 Pad Installation

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

- All sides of the pad must be at least 1-2 inches larger than the unit.
- The gasket must be separated from any structure.
- The mat must be level.
- The cushion must be high enough above the ground for drainage.
- The location of the pad must comply with national, state and local regulations.



These instructions are intended to provide a method of fixing the system to the cement slab as a fixing procedure in windy areas. Check the local regulations of tie-down methods and protocols.

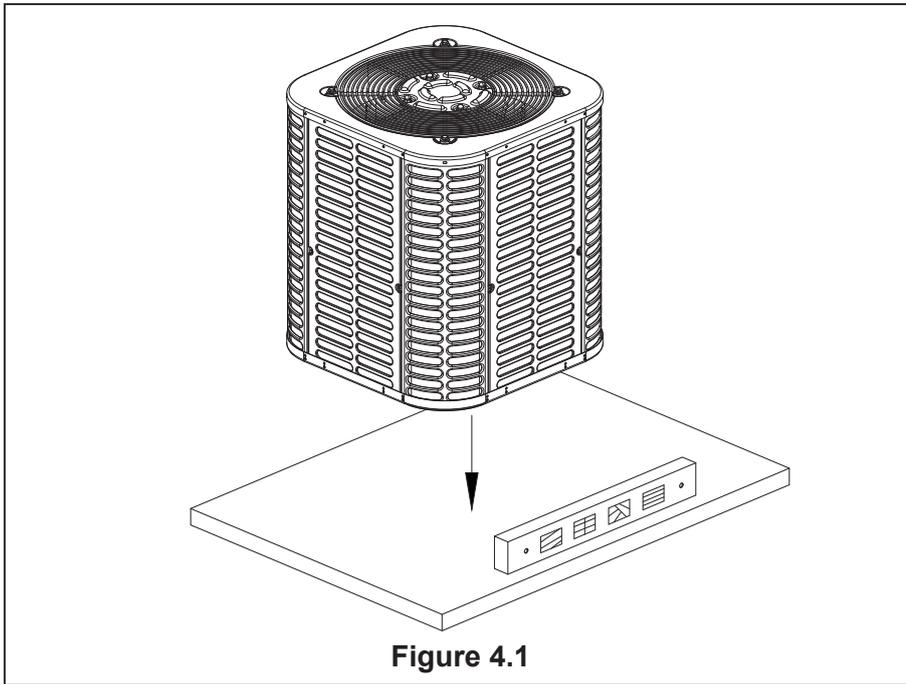


Figure 4.1

5. Precautions for Refrigerant Pipeline

5.1 Connecting Dimensions of Refrigerant Lines and Service Valves

Table 5.1

Model	Suction line	Liquid line	Suction line connection	Liquid line connection
	The dimensions are in inches.			
24K/36K	3/4	3/8	3/4	3/8
48K/60K	7/8	3/8	7/8	3/8

5.2 Required Refrigerant Line Length

Determine the required pipeline length (Figure 5.1). Please refer to Section 2.2.

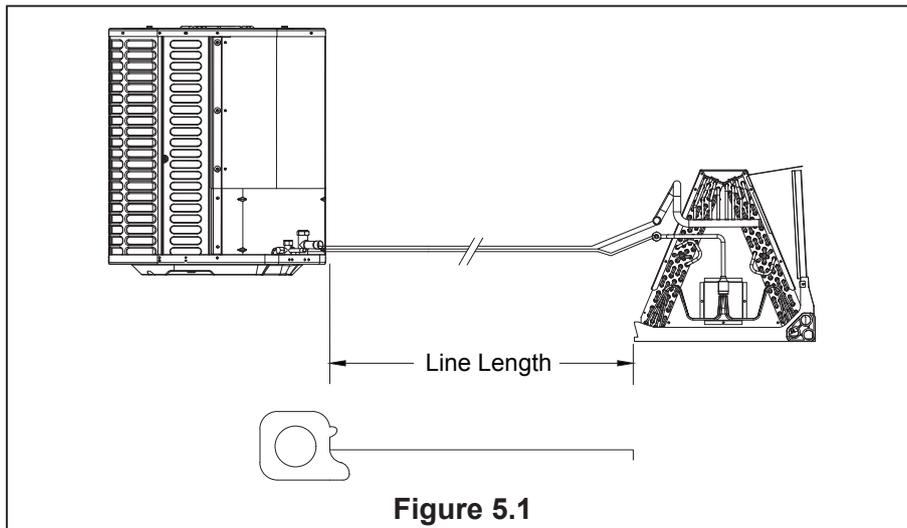
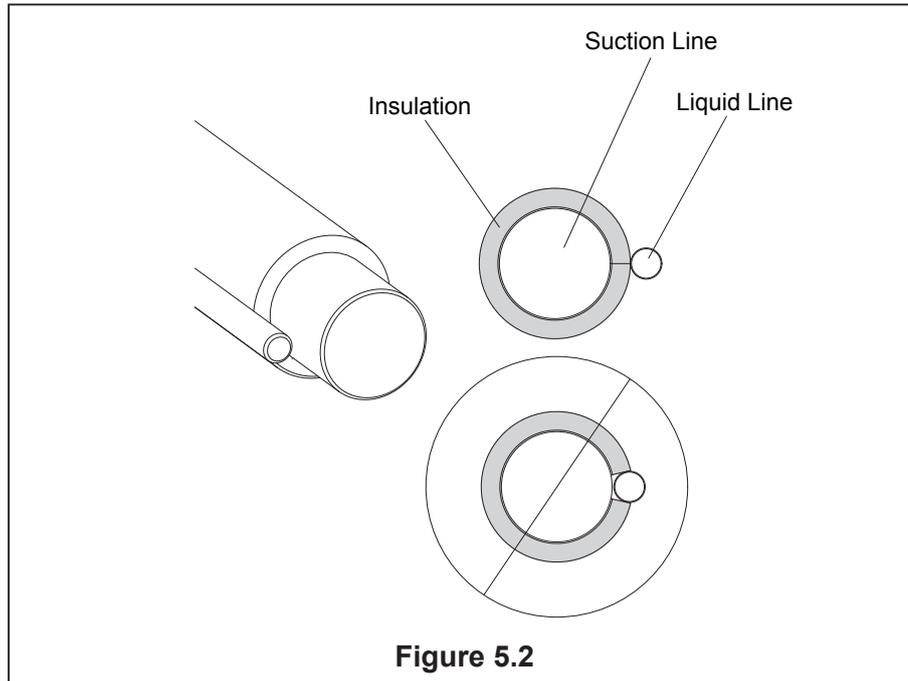


Figure 5.1

5.3 Refrigerant Pipe Insulation



The air pipe must always be insulated. Do not let the liquid pipeline and gas pipeline come into direct contact (metal to metal).



5.4 Reuse the Existing Refrigerant Lines



Note: Mild to moderate burns

- If using existing refrigerant lines, make sure that all joints are brazed, not soldered.

The following precautions should be taken for the retrofit application that will use the existing refrigerant pipeline:

- Make sure the refrigerant line size is correct. Refer to Section 2.2 and Table 2.2.
- Make sure the refrigerant line is free of leakage, acid and oil.



The manufacturer recommends that only approved matching indoor and outdoor systems be installed. All split systems of the manufacturer are AHRI-rated, only applicable to indoor units with TXV. The benefits of installing an approved indoor and outdoor split system are maximum efficiency, best performance and best overall system reliability.

6. Refrigerant Pipeline Routing

6.1 Preventive Measure

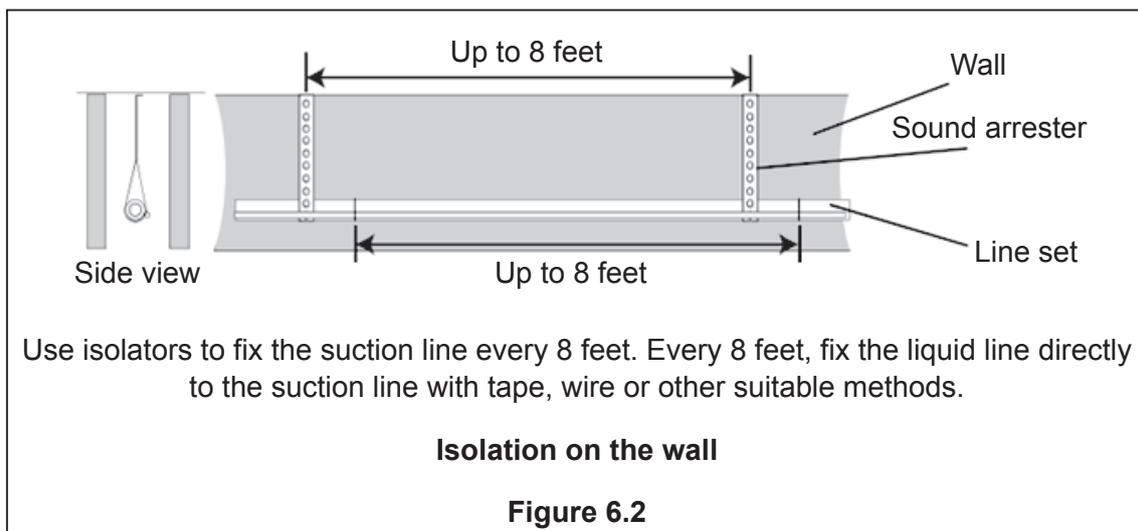
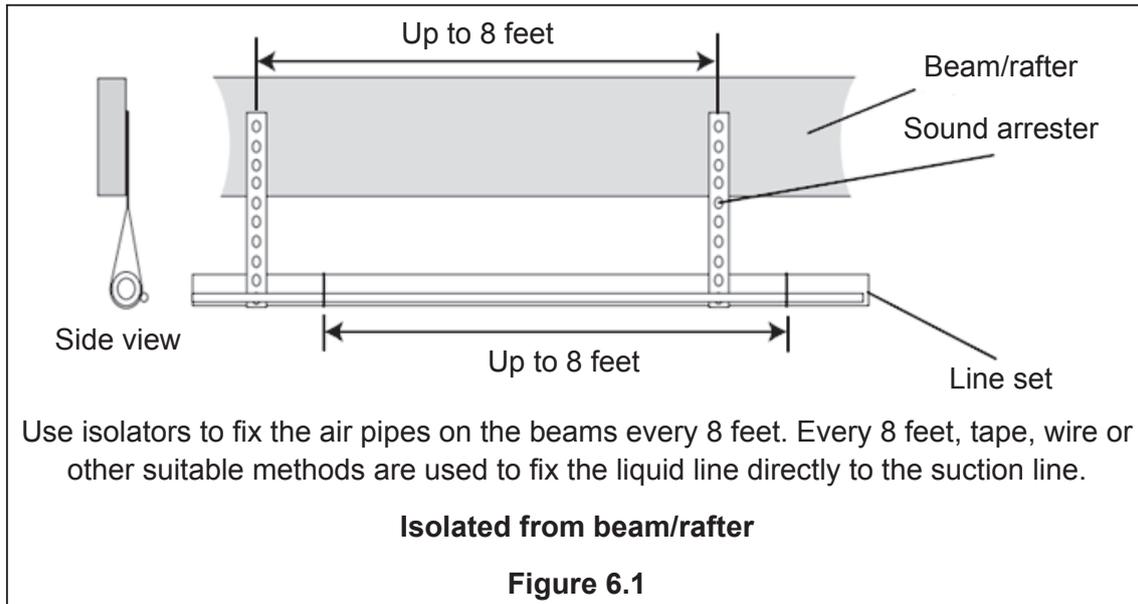


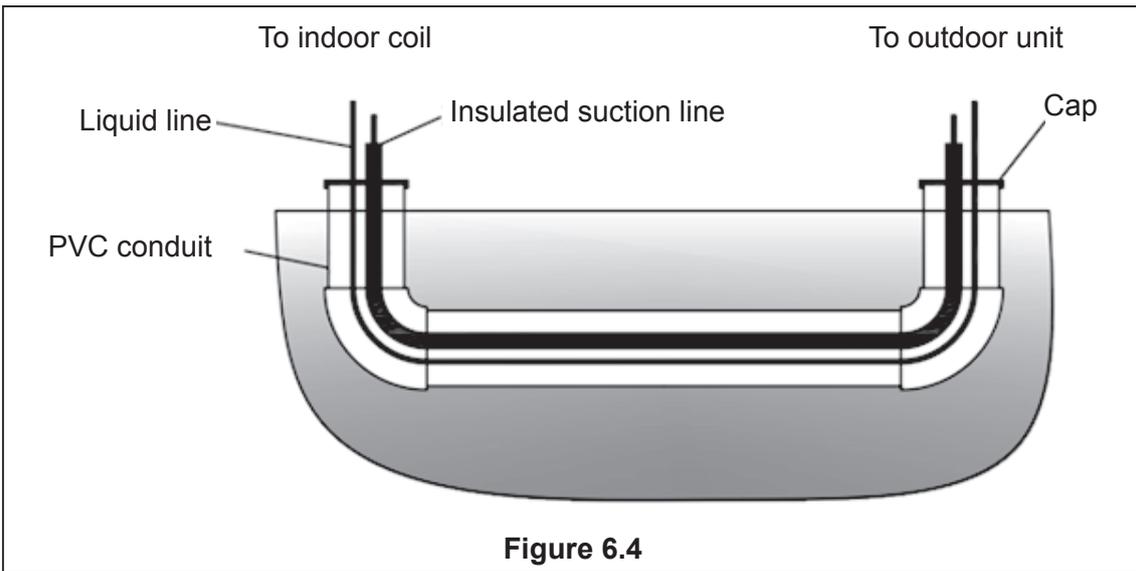
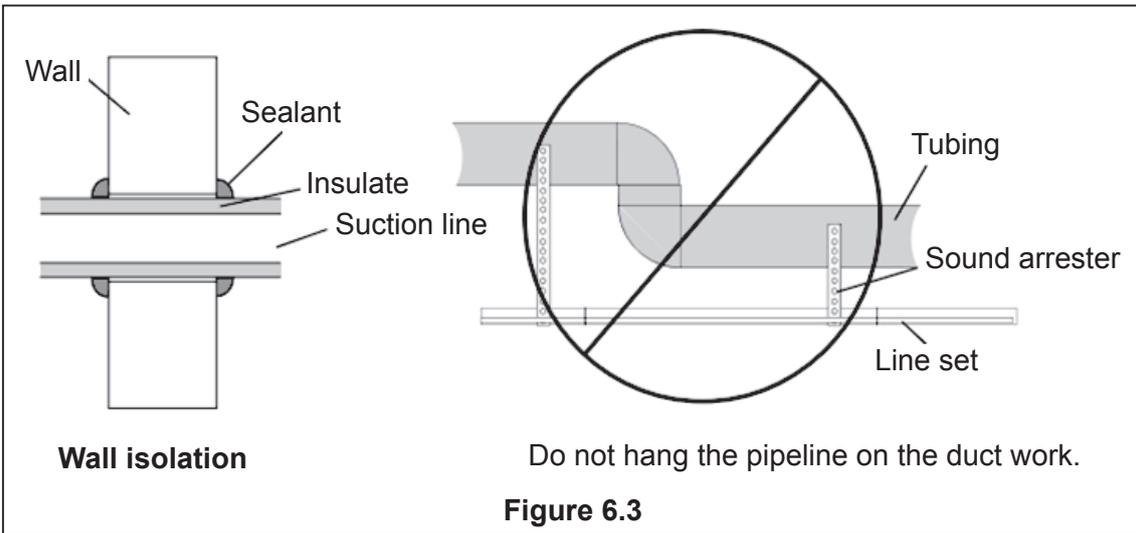
Take preventive measures to prevent noise generated by vibration transmission of refrigerant pipeline in building structure. For example:

- When the refrigerant pipeline must be fixed on floor joists or other frames in the structure, use isolated hangers.
- When the refrigerant pipeline runs in the column space or closed ceiling, the isolation hanger should also be used.
- When refrigerant lines pass through walls or windowsills, they should be insulated and isolated.
- Isolate the pipeline from all piping systems.
- Try to reduce the number of 90 ° laps.



Comply with national, state and local regulations when isolating the wire group from joists, rafters, walls or other structural elements.

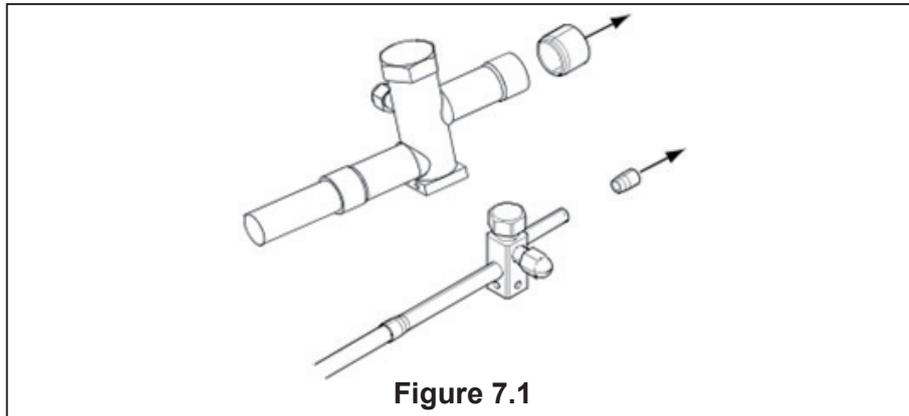




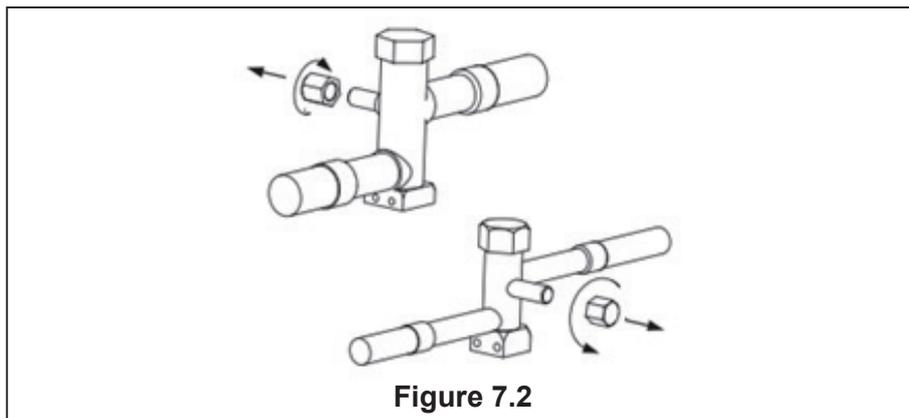
7. Refrigerant Pipeline Brazing

7.1 Brazed Refrigerant Pipeline

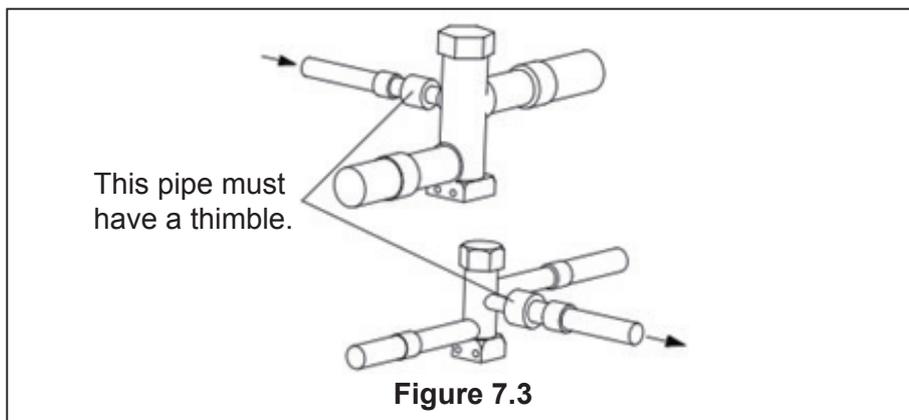
1. Remove the cover or plug. Use the deburring tool to deburr the pipe end. Clean the inner and outer surfaces of the pipeline with emery cloth.



2. Remove the pressure taps from the two service valves.



3. Purge refrigerant lines and indoor coils with dry nitrogen.



4. Wrap the valve body with a wet rag to avoid thermal damage, and continue the dry nitrogen purging (Figure 7.4).
Brazed the refrigerant line to the service valve.
Brazed the filter dryer to the liquid pipe.

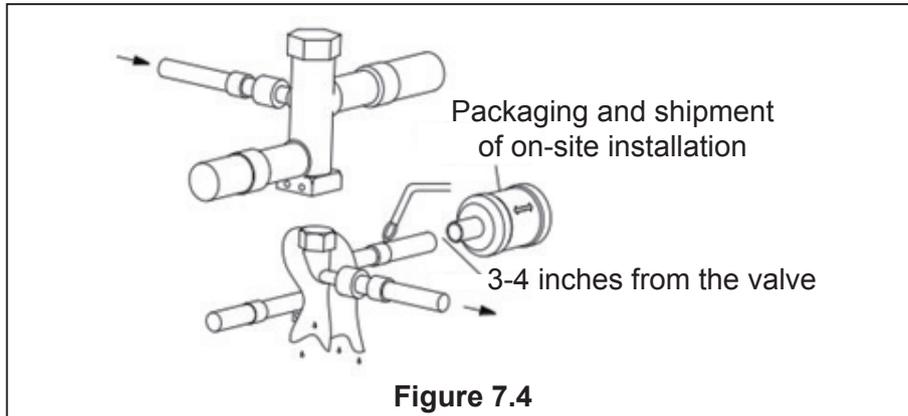


All units are recommended to install bidirectional drying filters. Braze the drying filter to the liquid pipe, taking care not to push the refrigerant pipe too hard through the stopper in the drying filter (this may damage the dryer).

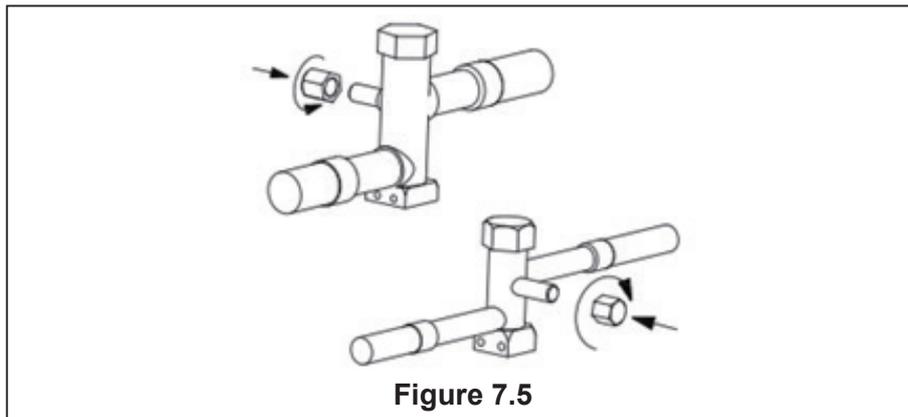
Continue the dry nitrogen purge. Don't take off the wet rag before all brazing is completed.



Before stopping the dry nitrogen purge, please remove the wet rag.



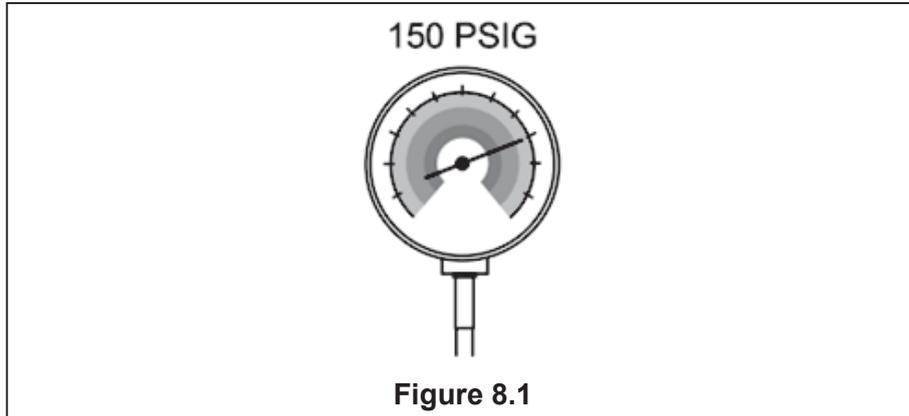
5. After the service valve cools down, replace the pressure tap.



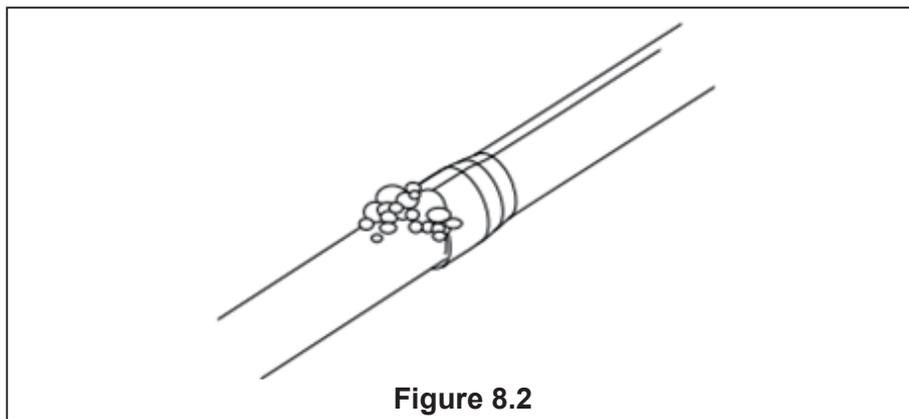
8. Refrigerant Pipeline Leakage Inspection

8.1 Check for Leaks

1. Use dry nitrogen to pressurize the refrigerant line and evaporator coil to 150 PSIG.



2. Use soapy water or foam at each soldering position to check for leaks.



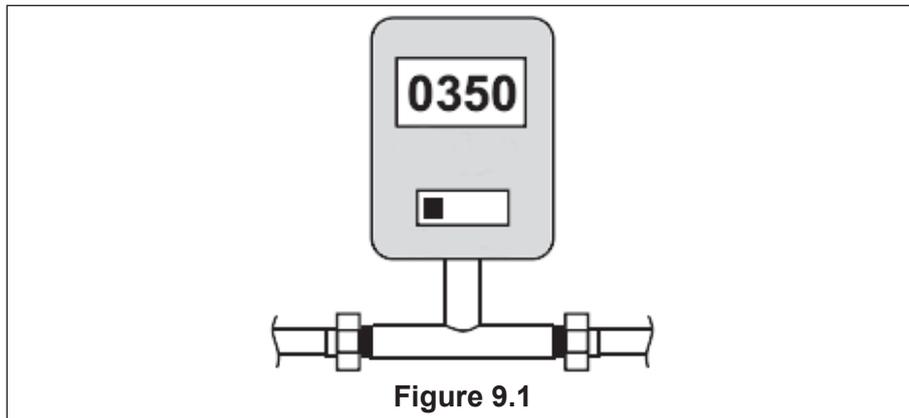
9. Emptying

9.1 Drain Refrigerant Lines and Indoor Coils



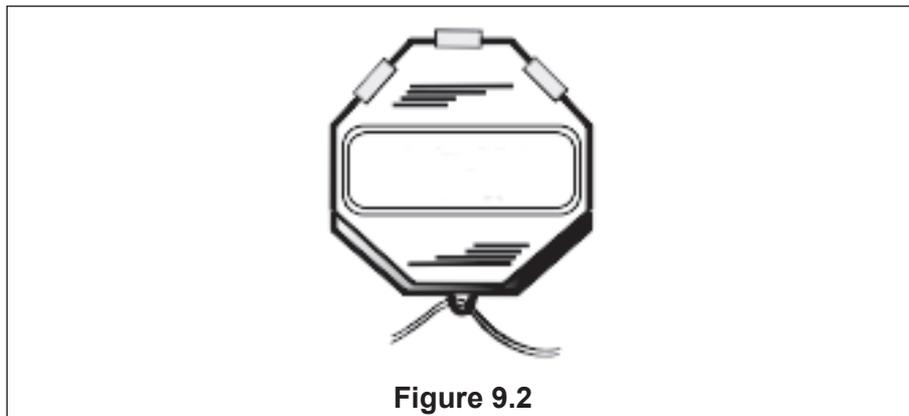
Do not open the service valve until the leakage inspection and emptying of refrigerant lines and indoor coils are completed.

1. Use dry nitrogen to pressurize the refrigerant line and evaporator coil to 150 PSIG.



2. Observe micrometer gauge. If the micrometer meter does not rise above 500 micrometers within one (1) minute, the evacuation is completed.

After the evacuation, turn off the vacuum pump and micrometer, and close the valve on the manifold instrument cluster.



10. Service Valve

10.1 Open the Service Valve

Warning: Moderate to severe burns



- When opening the liquid side service valve, be extra careful. Turn counterclockwise until the valve stem just touches the hem. No torque is required. Failure to observe this warning will result in sudden release of system pressure, and may result in personal injury and/or property damage.



Before opening the service valve, the leakage inspection and emptying must be completed. The valve of copper welded pipe installation should be used for leakage inspection and vacuum pumping. The use of a separate suction port in this process will lead to refrigerant loss.



Before opening the Liquid side service valve, the gas side service valve must be opened first.

1. Remove the valve cover (Figure 10.1).
2. Insert the hex wrench into the valve stem completely and back out counterclockwise until the valve stem just touches the bead (about five (5) turns.)
3. Replace the valve stem cap to prevent leakage. Tighten it with your fingers and turn it for another 1/6 turn.
4. Repeat steps 1-3 for the liquid side service valve.

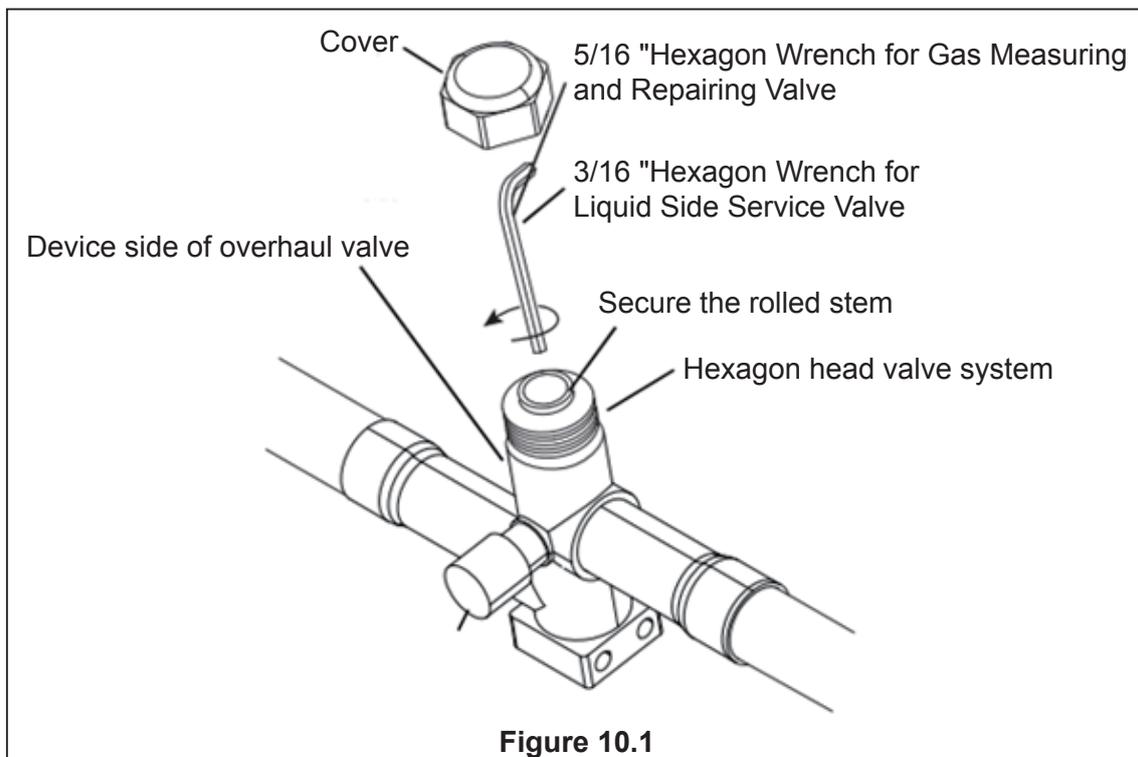
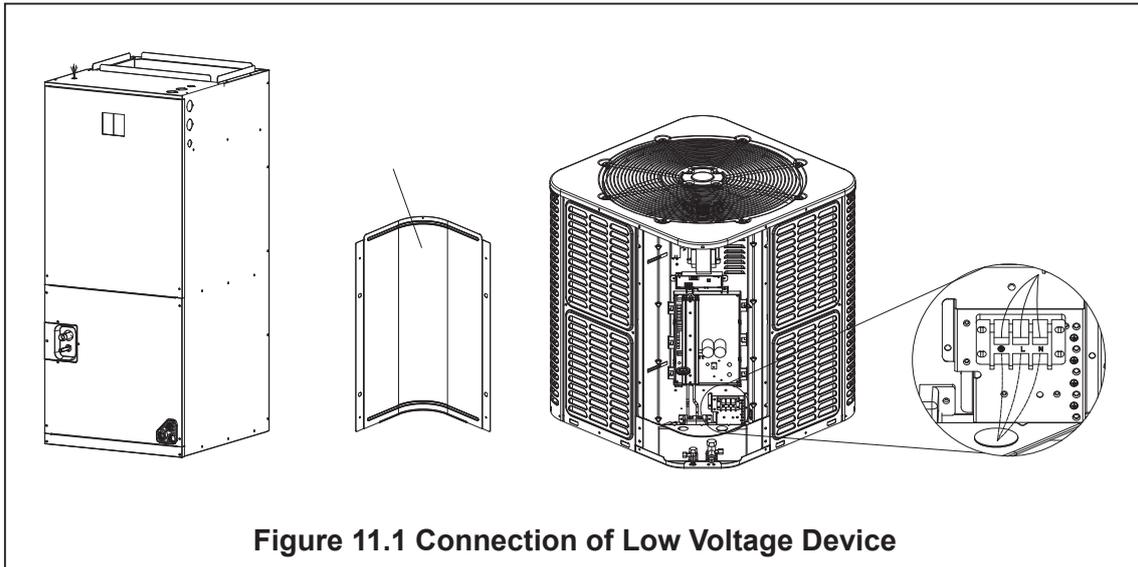


Figure 10.1

11. Electrical-Low Voltage

11.1 Low Voltage Connection Diagram



11.2 Wiring Diagram of Thermostat

- Ensure that the power supply is consistent with the nameplate of the unit.
- The power connection and grounding of the unit must comply with local regulations.
- Low-voltage wiring is the smallest conductor of NO. 22AWG.
- "-----"On-site installation of electrical auxiliary thermal connection
- Single-stage electric auxiliary heating supported by 2H thermostat
- Two-stage electric auxiliary heating supported by 3H thermostat
- W1: The first stage of electric auxiliary heating installed in the indoor unit.
- W2: The second stage of electric auxiliary heating installed in the indoor unit.
- The W signal of the outdoor unit is connected to the electric auxiliary heating or the first-stage electric auxiliary heat.



The dotted line in the following thermostat wiring diagram indicates optional wiring (wiring for passive dehumidification and/or electric heating). For the wiring of the thermostat, please refer to the user manual of the thermostat.



Terminal B will be connected with the thermostat (O/B) wiring. The reversing valve is energized during heating.

Wiring for 3H and 2C thermostat

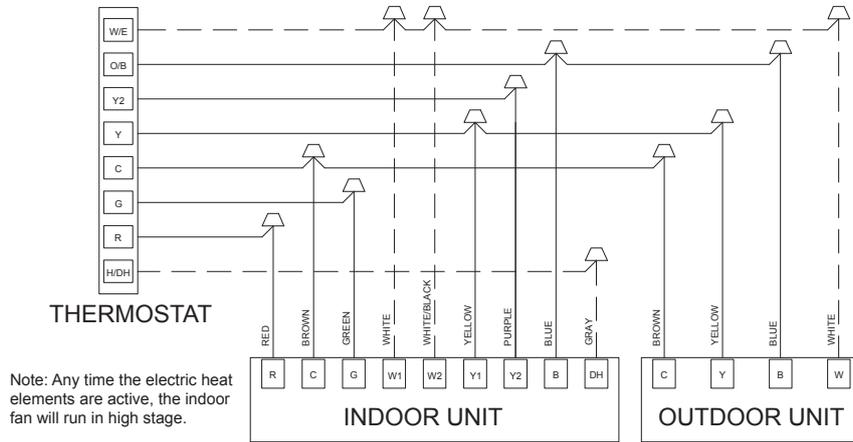


Figure 11.2 Control Wiring for HP Systems

Wiring for 4H and 2C thermostat

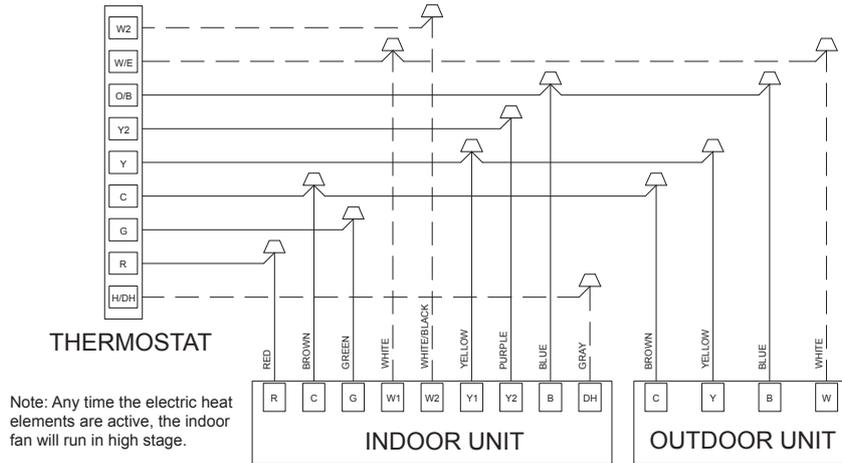


Figure 11.3 Control Wiring for HP Systems

Wiring for 3H and 1C thermostat

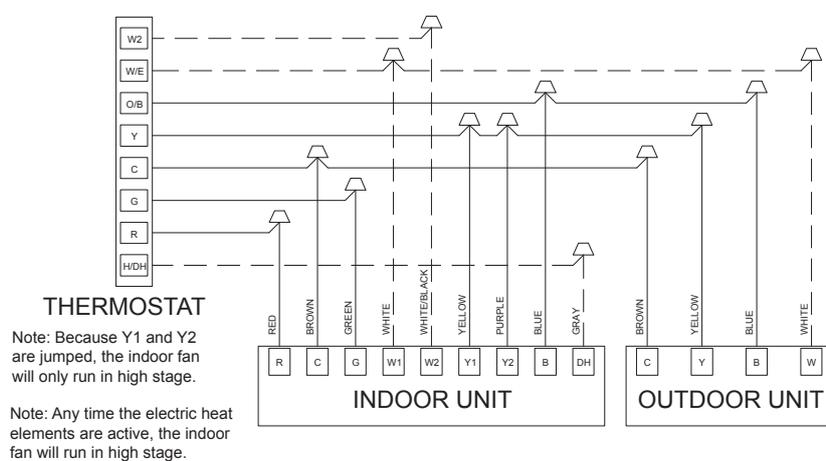
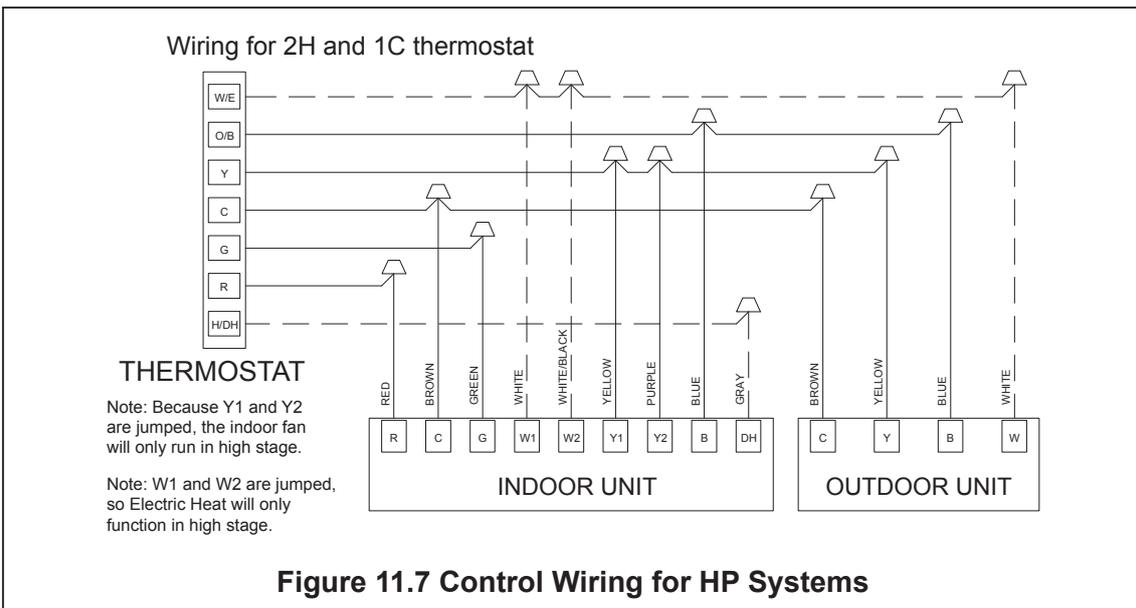
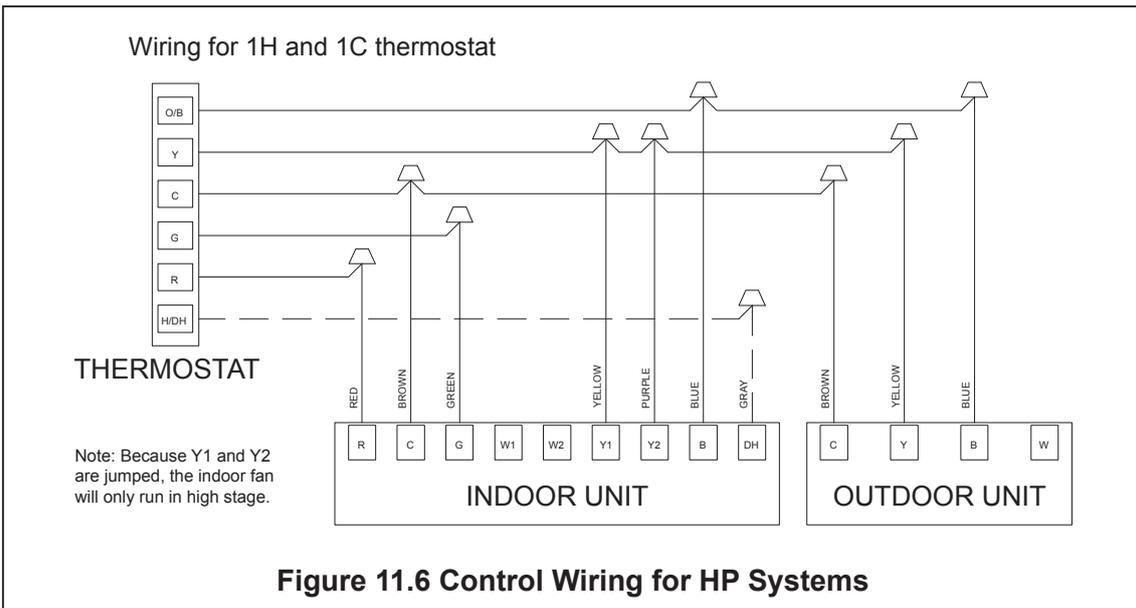
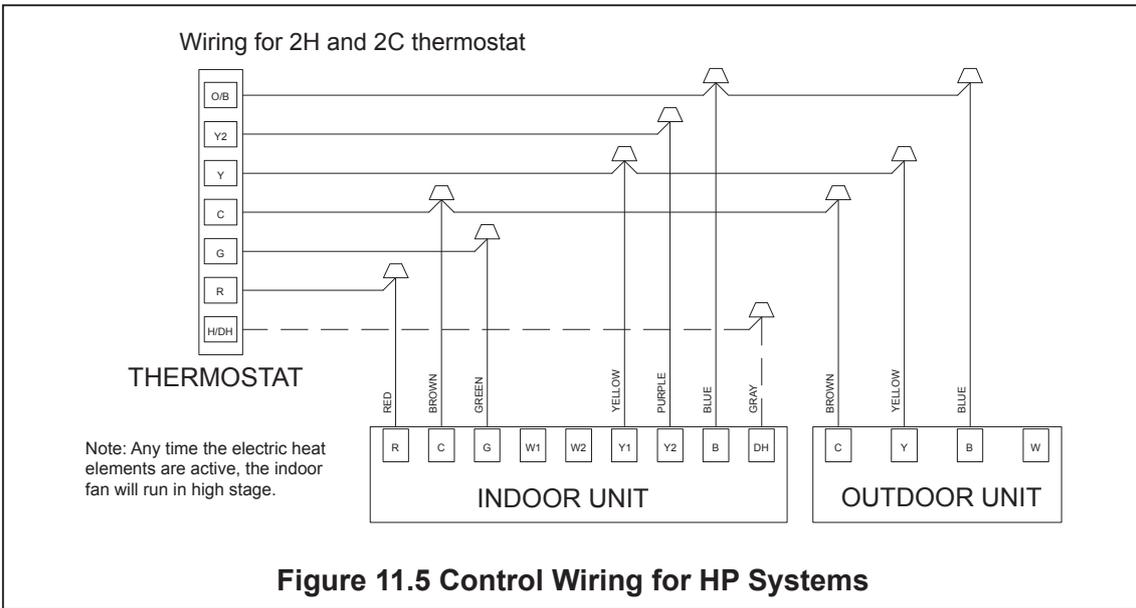


Figure 11.4 Control Wiring for HP Systems



Wiring for 3H and 2C thermostat

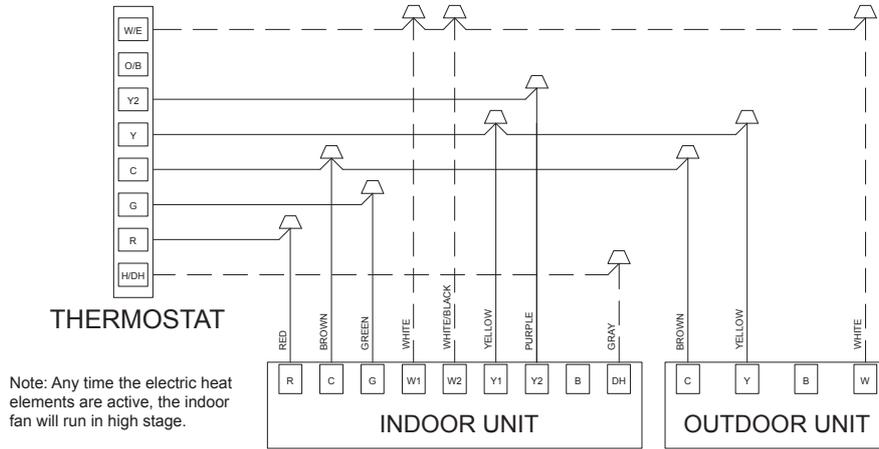


Figure 11.8 Control Wiring for AC Systems

Wiring for 4H and 2C thermostat

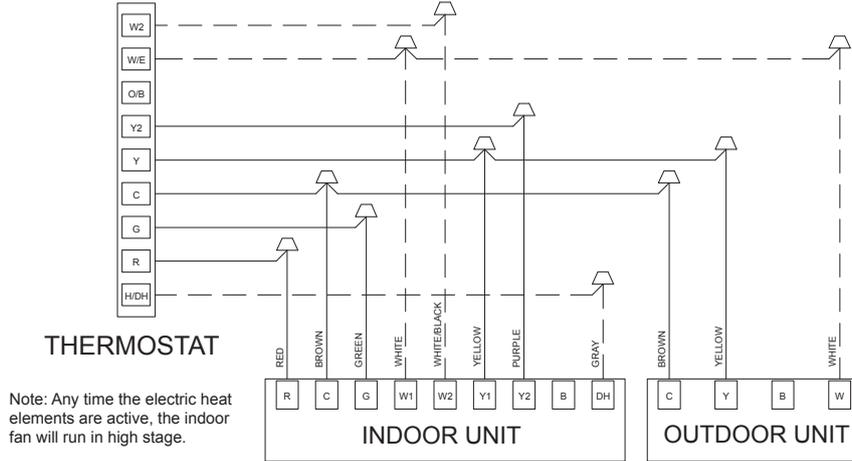


Figure 11.9 Control Wiring for AC Systems

Wiring for 3H and 1C thermostat

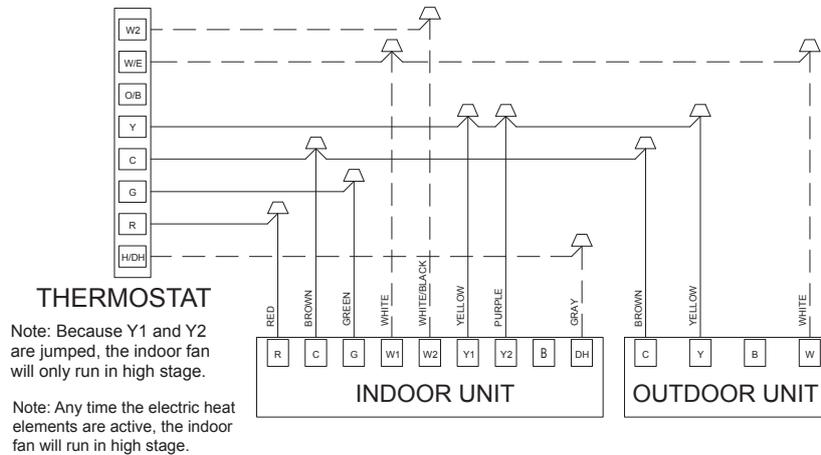


Figure 11.10 Control Wiring for AC Systems

Wiring for 2H and 2C thermostat

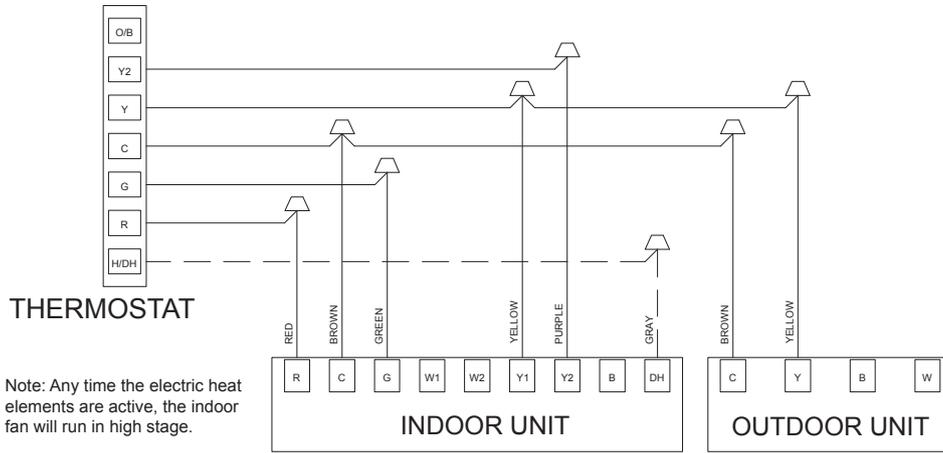


Figure 11.11 Control Wiring for AC Systems

Wiring for 1H and 1C thermostat

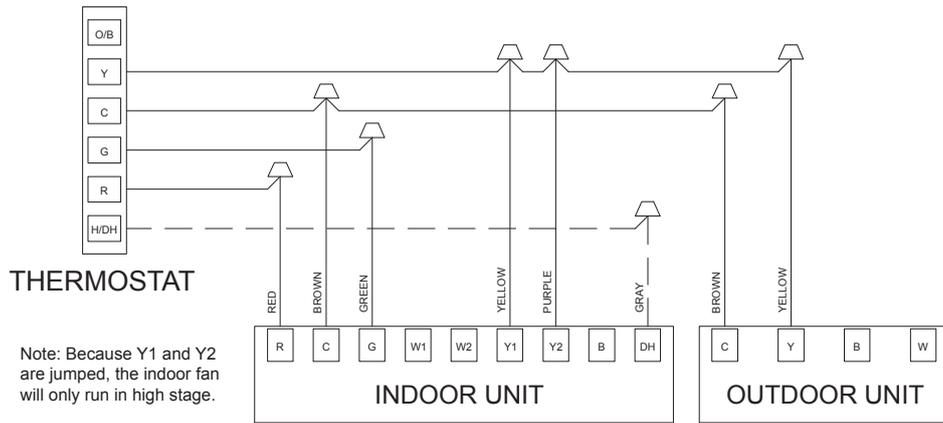


Figure 11.12 Control Wiring for AC Systems

Wiring for 2H and 1C thermostat

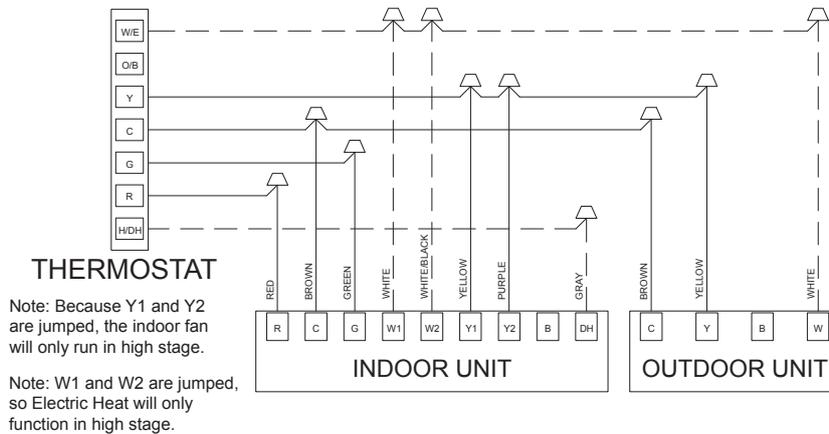


Figure 11.13 Control Wiring for AC Systems

12. Electrical-High Voltage

12.1 High Voltage Power Supply



Warning: Live electrical parts!

- During the installation, testing, maintenance and troubleshooting of this product, it may be necessary to use live electrical parts. Failure to observe all electrical safety precautions when exposed to live electrical parts may result in death or serious injury.

The high-voltage power supply must match the nameplate of the unit (208/230V, 1PH, 60Hz).



Power supply wiring must comply with national, state and local regulations.

Follow the instructions of the unit wiring diagram located inside the access panel of the control box, and refer to the wiring diagram in this IOM.

12.2 High Voltage Isolating Switch

Install a separate disconnect switch on the outdoor unit.

High-voltage wiring must use flexible electrical conduit supplied on site.

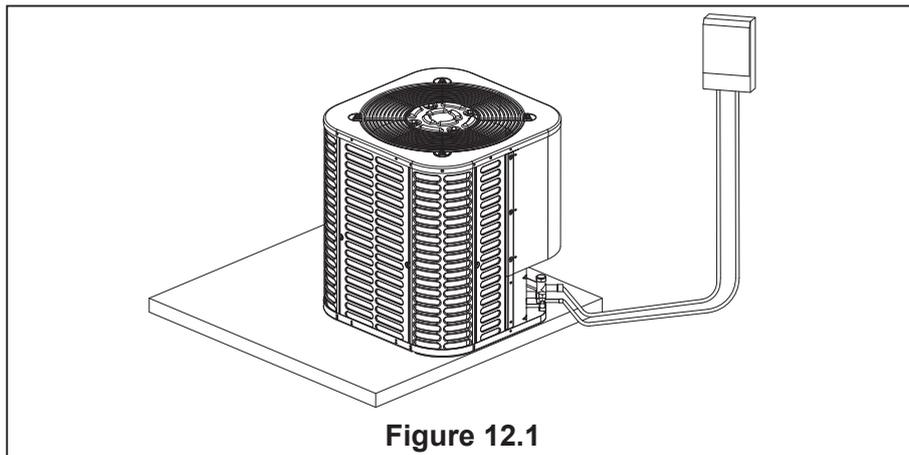


Figure 12.1

12.3 High Voltage Grounding

Ground the outdoor unit according to the requirements of national, state and local regulations.

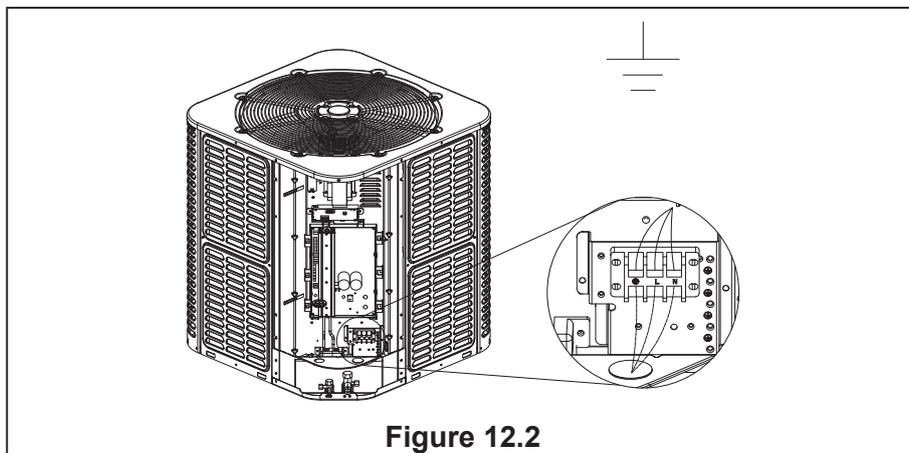


Figure 12.2

13. Start

13.1 System Startup

1. Make sure that parts 7, 8, 9, 10, 11 and 12 have been completed.
2. Set the system thermostat to off.

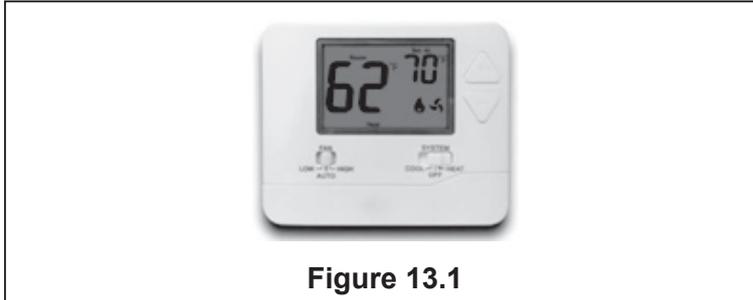


Figure 13.1

3. Turn on the disconnect switch and turn on the power of the indoor unit and outdoor unit.

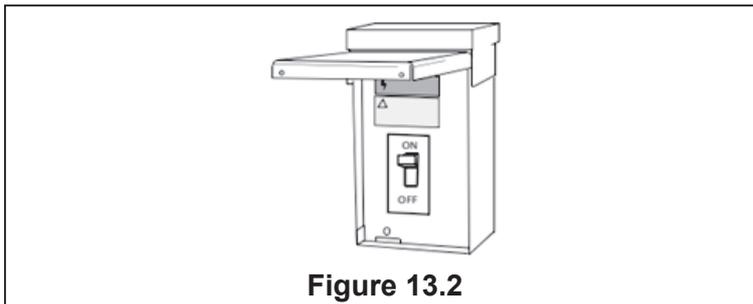


Figure 13.2

4. When installing the unit for the first time, if the compressor crankshaft heater is used and the outdoor ambient temperature is lower than 70°F, wait one (1) hour before starting the unit.

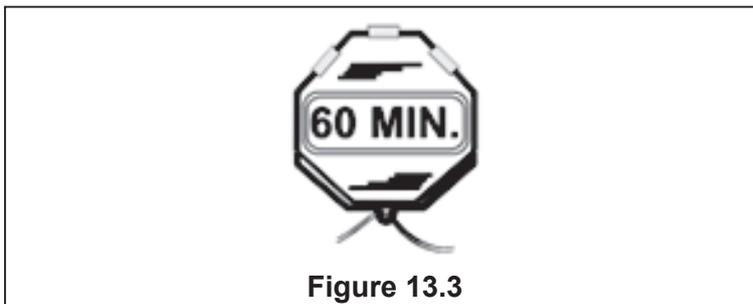


Figure 13.3

5. Set the system thermostat to ON.

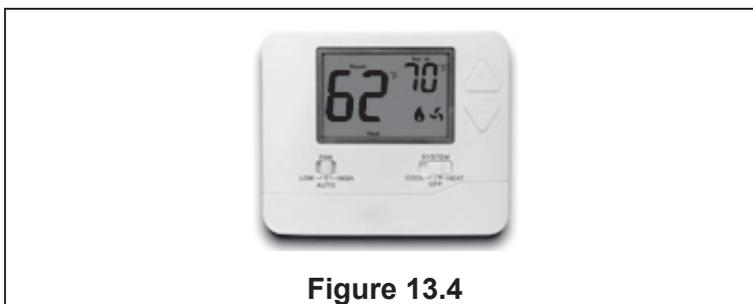


Figure 13.4

14. System Refrigerant Charging Regulation

14.1 Refrigerant Charging: Weighing Method

During the initial installation, or when the refrigerant quantity of the updated system is charged, the weighing method is used. When there is no power supply at the site of the unit or the operating conditions (indoor/outdoor temperature) are not within the range verified by Subcooling charging method. All models have a charge factor of 0.6 oz / ft for refrigerant pipe length.



For a 25-ft standard size interconnecting liquid pipe, the factory refrigerant charge of the outdoor unit is sufficient.

New installation-Calculate the charging amount of connecting pipes larger than 25 ft.

1. Total length of pipeline (ft) = _____(a)
2. Standard piping setup (ft) =25 (b)
3. (a) minus (b) = _____ (c)
4. Refrigerant multiplier = 0.6 oz/ft (d)
5. Additional refrigerant quantity (c*d) = _____(e)*

* If the line set is less than 25 feet, e=0

Closed system maintenance-calculate the total filling amount of the system.

1. Total length of pipeline (ft) = _____(a)
2. Standard piping setup (ft) =25 (b)
3. (a) minus (b) = _____ (c)
4. Refrigerant multiplier = 0.6 oz/ft (d)
5. Additional refrigerant quantity (c*d)= _____(e) *
6. Factory filling quantity (nameplate)= _____(f)
7. Total system charge (e +f) = _____

* If the line set is less than 25 feet, e =0



The only mode approved for verifying system charging is in "forced cooling mode". The outdoor temperature must be between 55°F and 120°F, and the indoor temperature should be between 70°F and 80°F.

14.2 Subcooling Charging and Refrigerant Quantity Adjustment in Cooling Mode

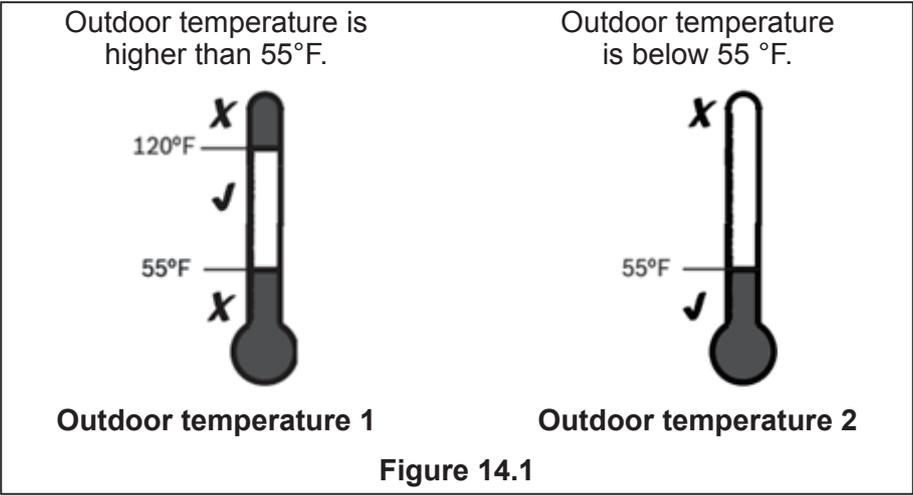
1. Check the outdoor ambient temperature.

Subcooling (cooling mode) is the only recommended charging method when the outdoor ambient temperature is higher than 55°F.

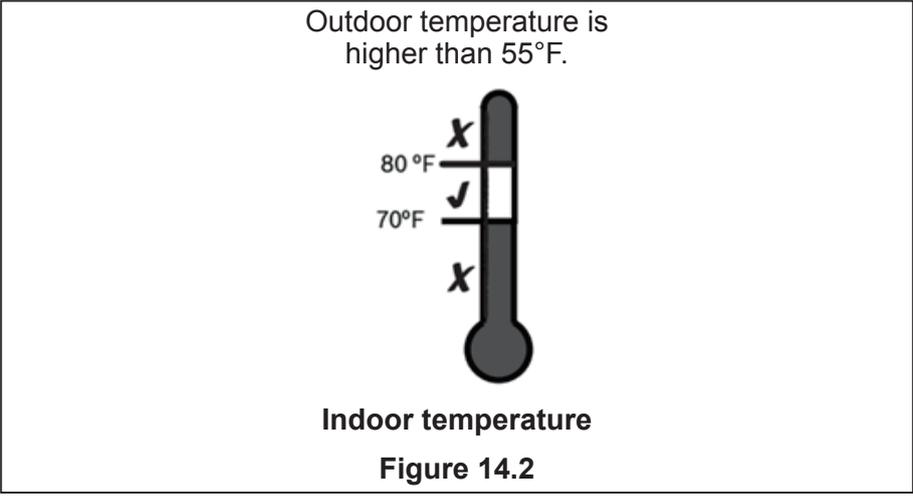
For outdoor ambient temperature below 55°F, use the weighing charging method.



When the outdoor ambient temperature is higher than 55°F, be sure to return in spring or summer, so as to accurately charge the system in cooling mode.



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



2. Make sure that parts 7, 8, 9, 10, 11, 12 and 13 have been completed.

15. System Operation and Troubleshooting

15.1 Control Logic Description

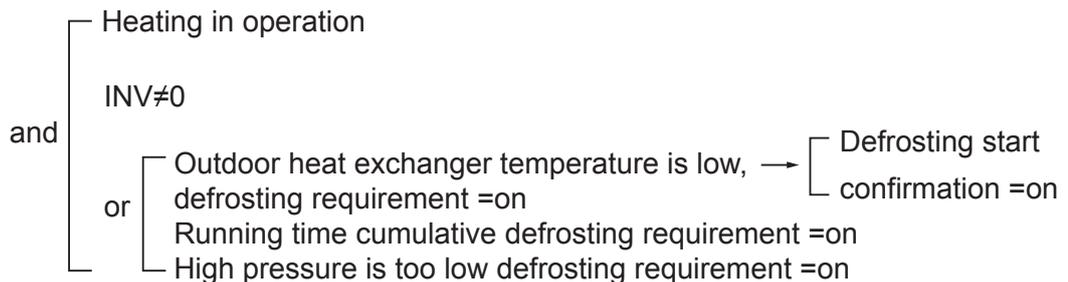
- The Inverter system adopts the same 24VAC control as any conventional heat pump.
- The working frequency of the compressor is closely related to the detection data of each sensor.
During the operation of the system, the frequency of the compressor is calculated and processed by PI algorithm, so that it can provide enough stable output capacity.

15.2 Sensor (Thermistor /Pressure Sensor)

- T3 = Outdoor coil temperature (Table 15.3)
- T4 = Outdoor ambient temperature (Table 15.3)
- T5 = Compressor discharge temperature (Table 15.4)
- Tfin = IPM radiator temperature
- HLP =Pressure sensor

15.3 Description of Defrosting

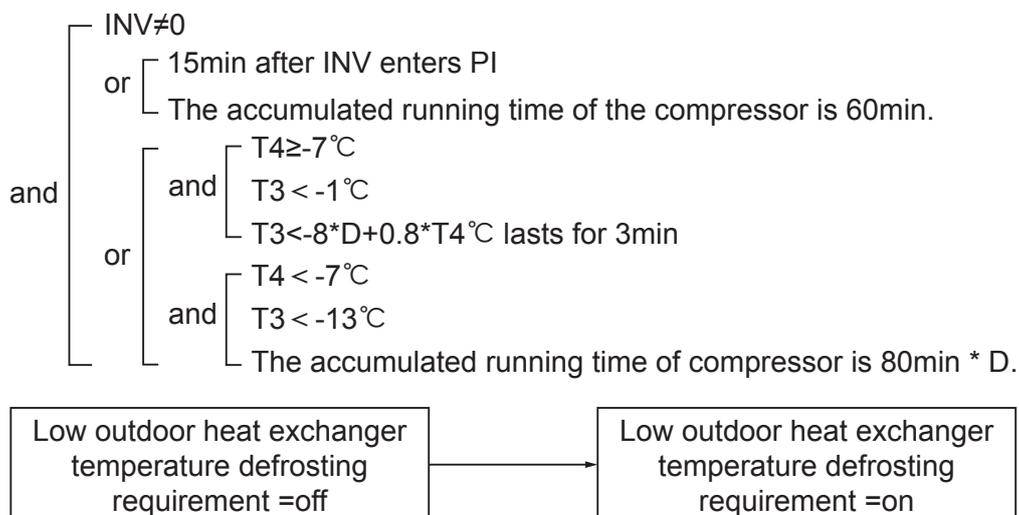
- During defrosting, D/W terminal of outdoor unit outputs 24V signal.
- The defrost mode operates under the following conditions:



- 1). Heating operation.
- 2). Compressor in operation.
- 3). Meet one of the following conditions:

①Outdoor heat exchanger temperature is low

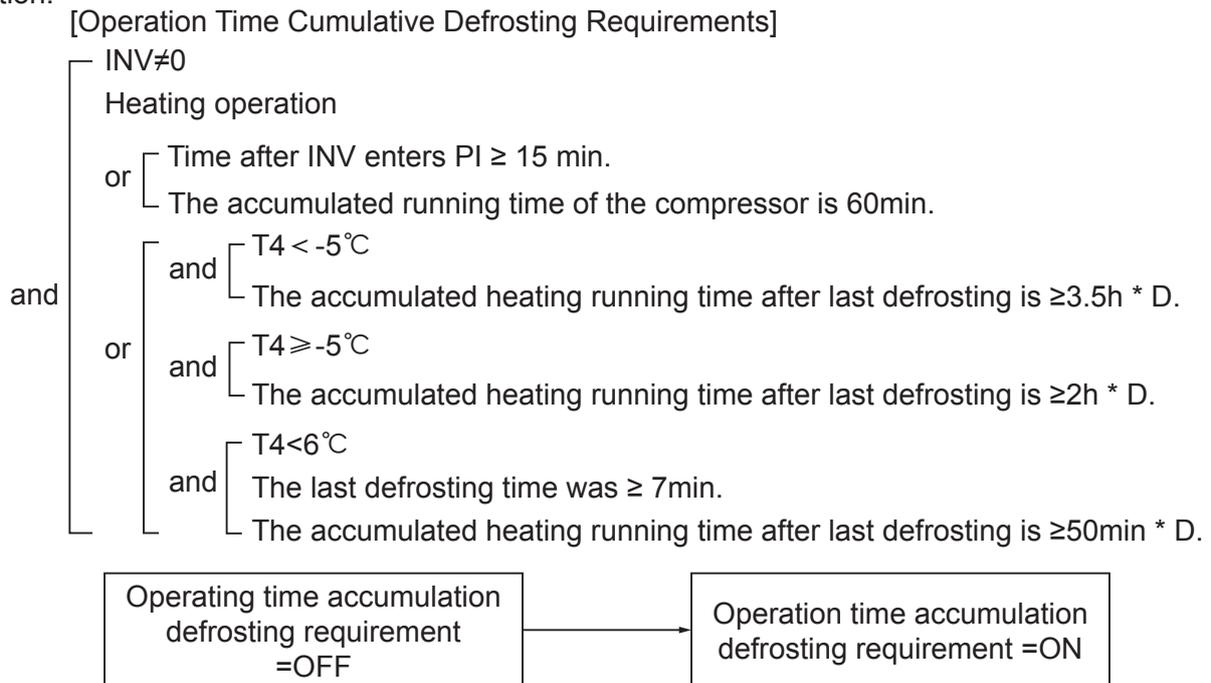
When the outdoor unit meets the following conditions, the outdoor heat exchanger requires low defrosting. = ON



1. Compressor frequency is not 0.
2. And one of the following conditions:
 - i. The time after INV enters PI is ≥ 15 min
 - ii. Cumulative running time of compressor ≥ 60 min
3. And one of the following conditions:
 - i. Condition I:
 - 1) $T4 \geq -7^{\circ}\text{C}$
 - 2) $T3 < -1^{\circ}\text{C}$
 - 3) $T3 < (-8 * D + 0.8 * T4)^{\circ}\text{C}$ for 3min (D is the programming parameter)
 - ii. Condition II:
 - 1) $T4 < -7^{\circ}\text{C}$
 - 2) $T3 < -13^{\circ}\text{C}$
 - 3) Compressor runs for $80 * D$ min in total.

②Arrival of accumulated operation time

When the outdoor unit meets the following conditions, the running time is accumulated for defrosting operation.

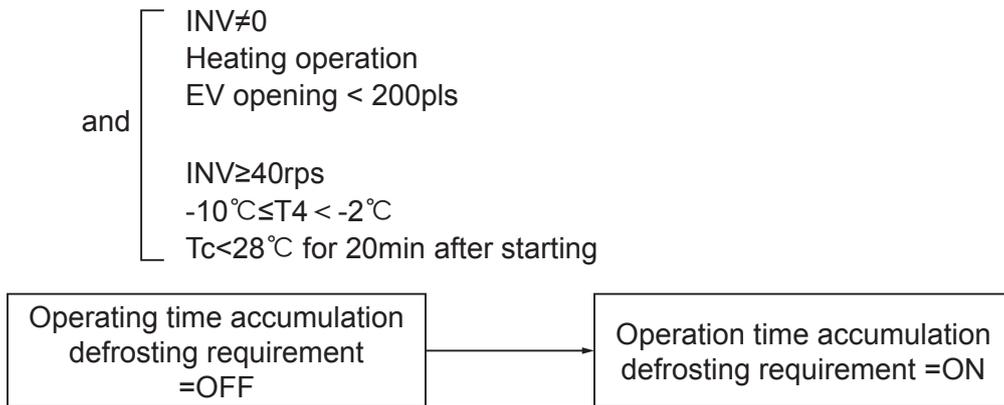


1. Compressor frequency is not 0.
 2. Heating operation.
 3. One of the following conditions:
 - i. Time after INV enters PI ≥ 15 min
 - ii. Cumulative running time of compressor ≥ 60 min
- One of the following conditions:
- i. Condition I:
 - 1) $T4 < -5^{\circ}\text{C}$
 - 2) The accumulated heating running time after last defrosting is $\geq 3.5h * D$
 - ii. Condition II:
 - 1) $T4 \geq -5^{\circ}\text{C}$
 - 2) The accumulated heating running time after last defrosting is $\geq 2h * D$.
 - 3) $T4 < 6^{\circ}\text{C}$
 - iii. Condition III:
 - 1) The last defrosting time ≥ 7 min
 - 2) The accumulated heating running time after last defrosting is $\geq 50\text{min} * D$.

③High pressure is too low

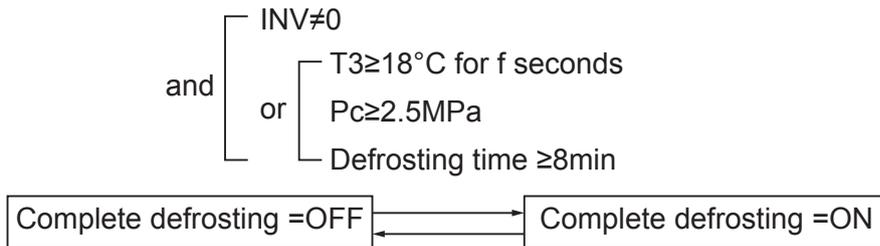
When the outdoor unit is in the following conditions, the defrosting demand under low high pressure=ON

[High pressure is too low defrosting requirements]



1. INV ≠ 0
2. Heating operation
3. EV opening < 200pls
4. INV≥40rps
5. -10 °C≤T4<-2 °C
6. Tc < 28°C for 20min after starting

④The defrost mode will exit when the following conditions are met:



1. INV≠ 0
2. And one of the following conditions is met:
 - a) T3≥18℃ for F seconds (F is the parameter set inside the program)
 - b) Pc≥2.5Mpa (Pc is the refrigerant saturation pressure corresponding to the pressure sensor)
 - c) Defrosting time ≥8min

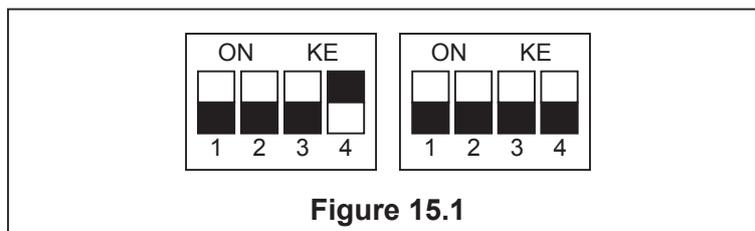


Figure 15.1

Table 15.1

Manual defrost selection	SW2-1
Open	1
Close	0
Remarks	

- Manual defrosting:

Manual defrosting mode entry method: dial code sw2-1 to 1 (only respond in heating mode)

Manual defrosting mode exit method: shutdown normal exit/power failure exit/defrosting normal exit condition.

Note:

1. Compressor does not respond to manual defrosting mode within 5min of initial operation;
2. The manual defrosting mode demand command is not memorized, and the operation command needs to be repeated if necessary;
3. When there is a need for manual defrosting during heating, immediately enter the defrosting mode;
4. After normal defrosting, it will run in the state after conventional defrosting.
5. Manual defrosting in heating mode takes precedence over test mode and forced operation mode, and the original mode is still operated after exiting.

15.4 Compressor Crankshaft Heater Control Function

1. Switch to heating mode for the first time (i.e. the first defrosting cycle)
 - i. Enter the heating mode. If $T_4 < 3\text{ }^\circ\text{C}$ is detected for 30 seconds continuously, the chassis electric heating will be forced to start (whether the compressor has been turned on or not), and the electric heating will be forced to quit after being turned on for 30 minutes.
 - ii. After defrosting, if it is judged that $T_4 < 3\text{ }^\circ\text{C}$ for 10 seconds, turn on the electric heating of the chassis.
 - iii. After defrosting, delay 5 minutes to turn it off. Memorize the defrosting cycle of the first defrosting (cumulative time of compressor operation) as T.
2. Experienced at least one defrosting:
 - i. last defrosting cycle detected by the program (cumulative time of compressor operation) is T', Then, after the last defrosting exit, when the cumulative running time of the compressor (counting from the turn-off of electric heating) $\geq T' - 10\text{min}$, it is judged that $T_4 < 1\text{ }^\circ\text{C}$ for 10 seconds continuously, and then the chassis electric heating is started. If defrosting does not occur after 15 minutes of turning on, turn off the electric heating of chassis. (15 minutes, counting from T' - 10 minutes)
 - ii. During defrosting, if it is judged that $T_4 < 1\text{ }^\circ\text{C}$ for 10 seconds continuously, turn on the electric heating of the chassis.
 - iii. After defrosting, turn off the electric heating of chassis after 5 minutes delay.
3. If you switch to the non-heating mode.

After 5 minutes in the non-heating mode, if $T_4 < 1\text{ }^\circ\text{C}$ is detected for 30 seconds continuously, the electric heating is turned on for 20 minutes and then turned off, and then T_4 is detected after 5 minutes; if $T_4 < 1\text{ }^\circ\text{C}$ is detected for 30 seconds continuously, the electric heating is turned on for 20 minutes and then turned off, and so on.
4. During the capability test, the electric heating of the chassis does not start.

15.5 Operation of Reversing Valve

- ▶ The reversing valve is energized in heating mode and de-energized in cooling mode.



During the heating signal of the first operation, the unit will run in the cooling state for about 1 minute, accumulating pressure for reversing the reversing valve.

15.6 Defensive Function

- Temperature protection of outdoor coil in cooling mode (T3)
 1. If $T3 >$ Maximum set temperature, the system stops for protection.
 2. If $T3 <$ the set recovery temperature value, the system restarts.

Note: Please consult the supplier for maximum temperature and recovery temperature.
- Exhaust temperature protection (T5)
 1. In cooling or heating mode, if the temperature is higher than the set maximum value, the system will stop for protection.
 2. In cooling or heating mode, if the temperature is lower than the set recovery temperature, the system will restart.

Note: Please consult the supplier for maximum temperature and recovery temperature.
- IPM module (inverter) protection (TF)
 1. $TF \geq$ the highest judgment value C. If the outdoor fan does not reach the highest level at this time, the fan speed will be increased one by one. At this time, the compressor frequency is not limited. If the outdoor fan is the highest fan speed, the current frequency is the highest allowable operating frequency.
 2. $TF \geq$ the highest judgment value B, the compressor reduces the frequency successively.
 3. $TF \geq$ the highest judgment value A, the compressor stands by abnormally.
 4. $TF \leq$ the highest judgment value D, the system restarts.

Note: The highest judgment value A/B/C/D are all parameters set in the program. Please consult the supplier for specific values.

Table 15.2

Code	Fault description
E4	T4 Outdoor ambient temperature sensor failure
E6	T3 Condenser temperature sensor failure
E5	T5 Exhaust temperature sensor failure
E9	Undervoltage on primary side
E10	Outdoor EEPROM failure
E12	IPM sensor failure
E13	HLP pressure sensor failure
E14	T3/T5 sensor is not plugged tightly, causing abnormal standby
E15	HPS high pressure switch failure
H0	Communication failure between main control chip and IPM chip
H1	T3 sensor high temperature failure and unit abnormally shutdown without restarting (In cooling mode)-----P5 protection occurs 20 times in 180 minutes.
H2	High pressure switch failure and unit abnormally shutdown without restarting -----P1 protection occurs 20 times in 150 minutes
H3	Condensing high pressure abnormal and unit shutdown without restarting (In heating mode)-----P13 protection occurs 20 times in 180 minutes.
H4	IPM module high temperature abnormal and unit shutdown with restarting -----P8 protection occurs 20 times in 120 minutes.
H5	Low pressure failure and unit shutdown with restarting -----P2 protection occurs 5 times within 100 minutes.
H6	T5 Exhaust high temperature abnormal-----P4 protection occurs 20 times in 100 minutes.

H7	Abnormal wet operation-----P12 protection occurs 20 times in 200 minutes.
H8	T3 condenser sensor is not plugged tightly and unit does not restart (In cooling mode)-----E14 protection occurs 20 times in 120 minutes.
H12	TP exhaust sensor is not plugged tightly and unit does not restart-----E14 protection occurs 20 times in 180 minutes.
P1	High pressure protection
P2	Low pressure protection
P3	Overcurrent protection of primary side or secondary side
P4	T5 Exhaust high temperature protection
P5	T3 Condenser high temperature protection (In cooling mode)
P6	IPM module protection
P8	Tf IPM module high temperature protection
P9	DC fan motor failure
P12	Wet operation abnormal standby
P13	Abnormal high-pressure condensing pressure standby (In heating mode)
P14	High compression ratio protection
P15	Low compression ratio protection
L1	DC cable bus low voltage protection
L2	DC cable bus high voltage protection
L4	MCE failure/synchronization failure/compressor startup failure
L5	Zero-speed fault
L7	Compressor phase loss protection
L8	Compressor stall
L9	High pressure frequency limit/High pressure frequency reduction
LA	Voltage frequency limiting
LC	Condenser temperature limiting frequency /T3 condenser temperature reducing frequency
LD	Exhaust temperature limiting frequency /T5 exhaust temperature reducing frequency
LE	IPM module high temperature frequency limit /IPM module temperature frequency reduction
LF	Current frequency limiting
Condition	State description
D0	Oil return
DF	Defrost
DH	Forced cooling

15.8 Parameter Checklist

- Check the query button to switch the display content of the nixie tube. Each short click will display the next group, which will be displayed in sequence.
 - ▲Key, check and query, and set the parameter "+"
 - ▼Key, check and query, and set the parameter "-"
- There are three digital display tubes, the display order is displayed from the left (i.e., left alignment) and the display content is displayed from the right (i.e., right alignment). If 1+2+ is empty, it means item 12; if empty +1+2, it means the display parameter is 12. The order may only be single or double digits, while the content may be single, double or three digits. When you enter an item, display the sequence first, then display the content, and stay for 20 seconds before returning to the normal state display.
- General status display: the last two digits of the digital tube display the operating frequency during operation, and the opening of the electronic expansion valve (right alignment) during standby. (When there is system protection or mode display, the first digital tube displays the operating status code, and the code meaning can be found in the fault code table).

Table 15.3

No.	Spot check content	Example	Remarks	Display
1	Outdoor unit capacity	24	Type	
2	Outdoor unit mode	3	0-Standby, 2-Cooling, 3-Heating, 4-Forced cooling	
3	Compressor target frequency	33	Hz	Actual value (target calculation)
4	Actual frequency of compressor	33	Hz	Actual value (driving feedback)
5	Compressor operating frequency	33	Hz	Actual value (Main control correction)
6	Fan gear/speed	11	top gear/low gear	Actual value
7	Pressure sensor conversion temperature	91	°F	Actual value
8	T3 condenser temperature	29	°F	Actual value
9	T4 ambient temperature	335	°F	Actual value
10	T5 exhaust temperature	105	°F	Actual value
11	AC input current (primary side)	5	A	Actual value
12	Compressor current (secondary side)	0	A	Actual value
13	AC input voltage (primary side)	334	VAC	(Valid value-60)*2
14	DC bus voltage	145	VDC	Actual value /2
15	Electronic expansion valve opening	30	Step	Actual value /4
16	Frequency amplification	0	Hz	Actual value
17	Electronic expansion valve Δ EV	2	Step	Actual value
18	Reserve			
19	Tfin module temperature	0	°F	Actual value
20	Oil spitting amount	79	CC	Actual value /8
21	Tes/Tcs target temperature	122	°F	Actual value
22	Pressure sensor pressure	48	MPa	Actual value *25
23	T3 switching pressure	16	MPa	Actual value *25

24	Reserve			
25	Target superheat degree	32	°F	Actual value
26	Exhaust superheat	14	°F	Actual value
28	Ability test mode	24	1 - 40	Gear mode
29	Software version number	4		1 - 255
31	Enter PI control flag	1		0 or 1
34	Frequency limiting term	L-		
37	The last fault code	E-		

15.9 Overview of Main Control Board

Outdoor Main Control Board

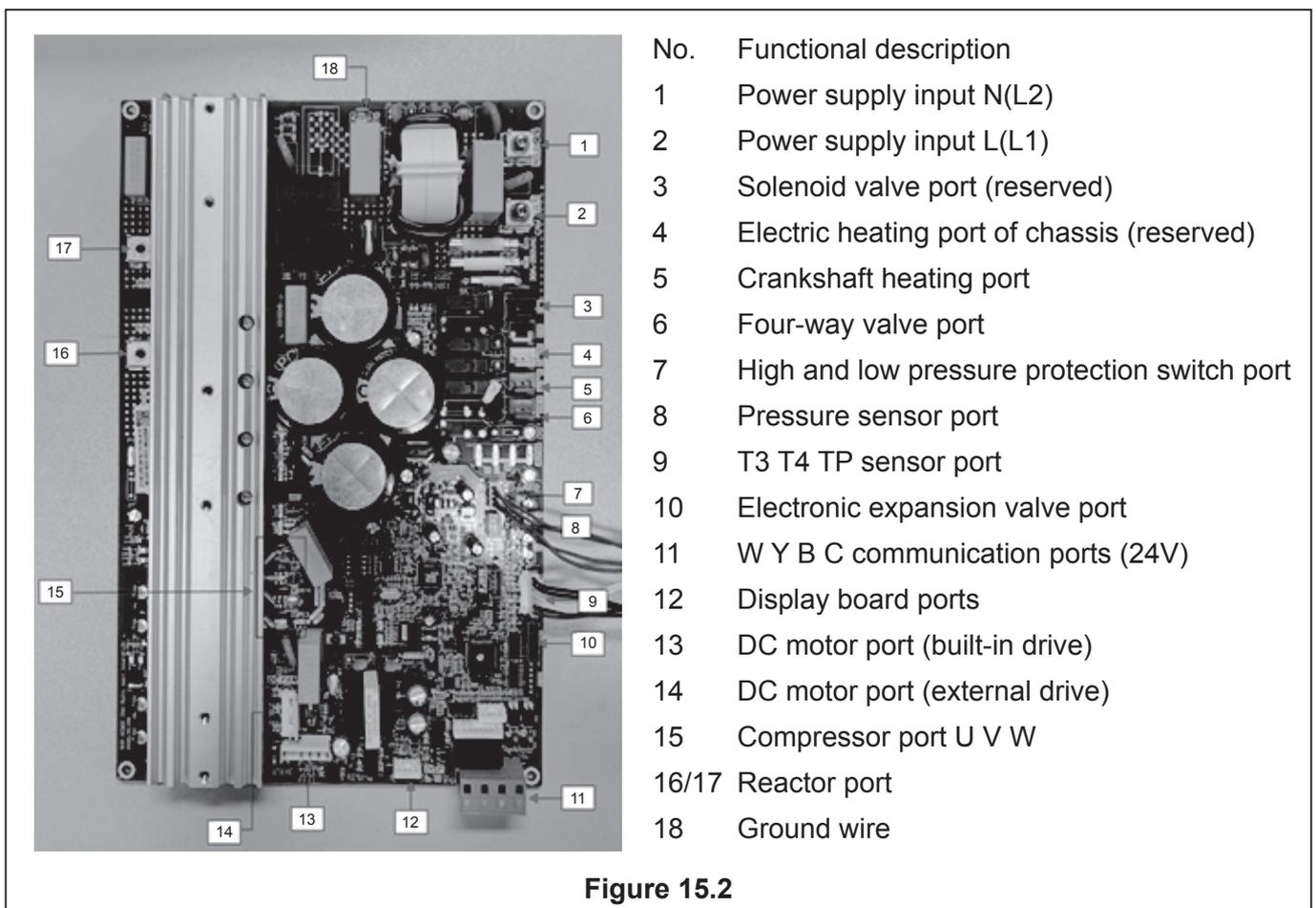


Figure 15.2

15.10 Troubleshooting of Fault Codes



Warning: Dangerous voltage

- When measuring the resistance, make sure that the power of the unit is turned off and wait for 3 minutes before measuring.

E4(T4 Outdoor ambient temp sensor failure)

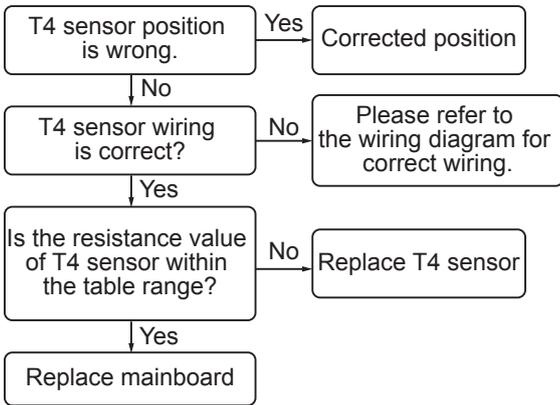


Figure 15.3

E6(T3 Condenser temp sensor failure)

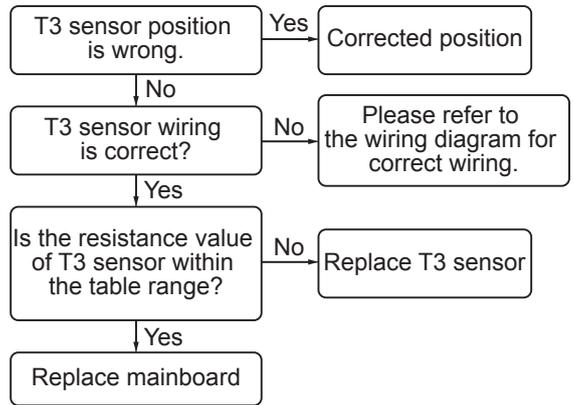


Figure 15.4

E5 (T5 Exhaust temperature sensor failure)

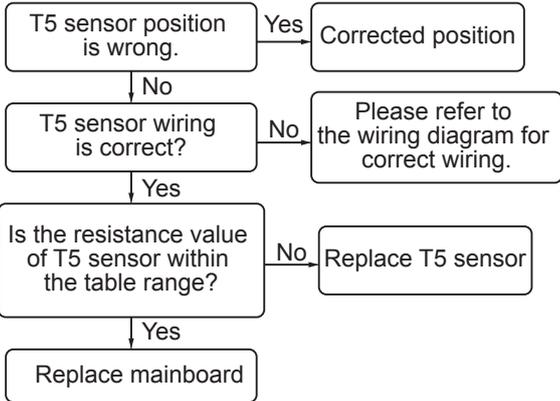


Figure 15.5

E12 /H4/P8 (IPM module sensor failure, high temperature protection)

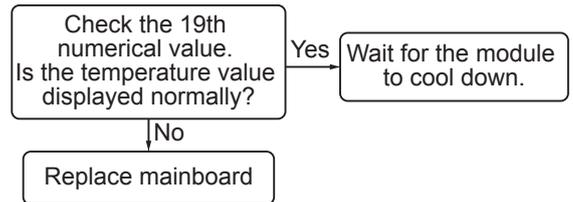


Figure 15.6

E13(HLP pressure sensor failure)

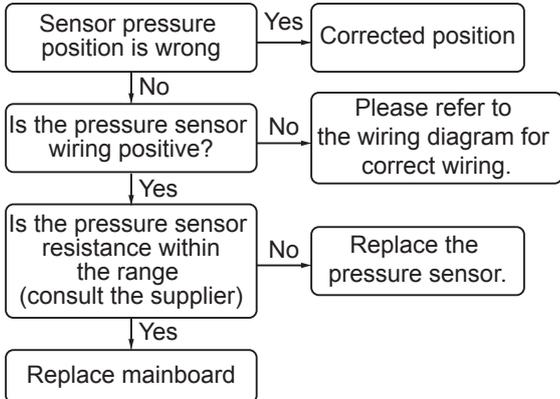


Figure 15.7

E14 (T3 / T5 sensor is not tightly plugged in, and the unit stands by abnormally)

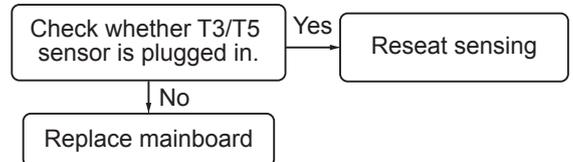
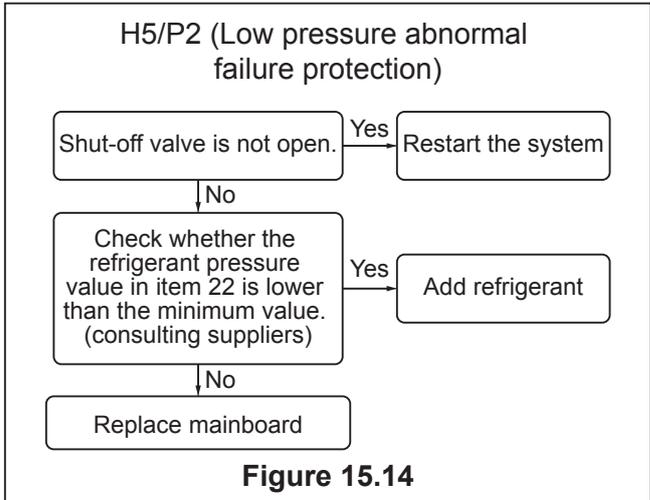
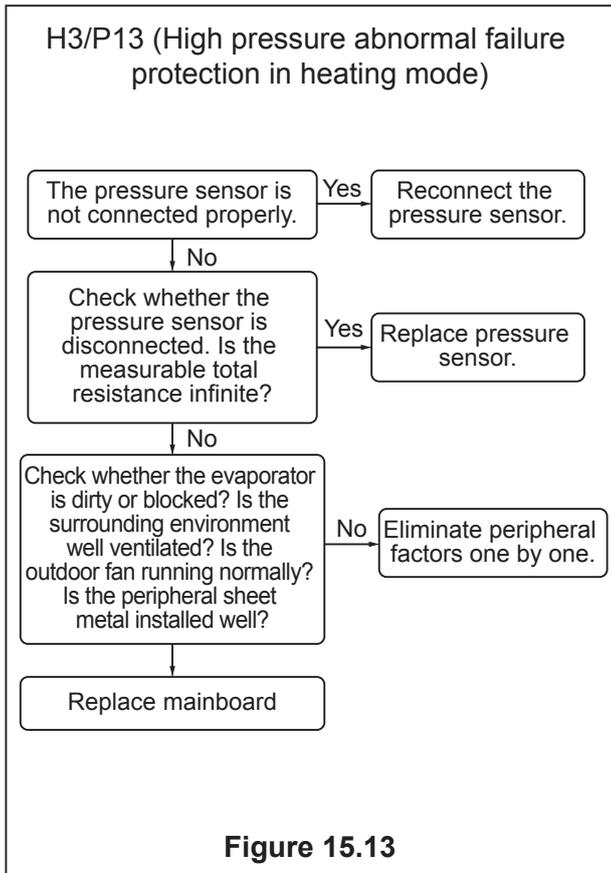
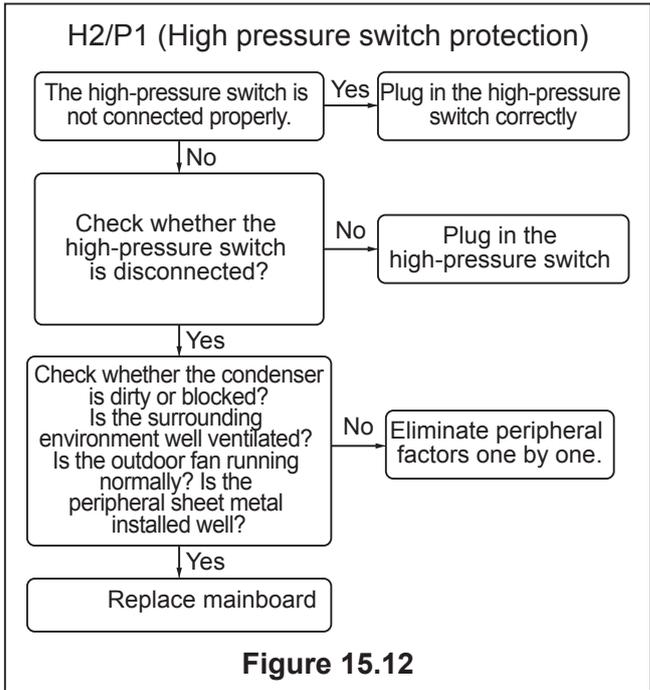
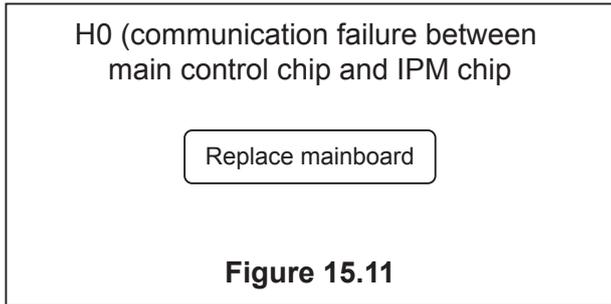
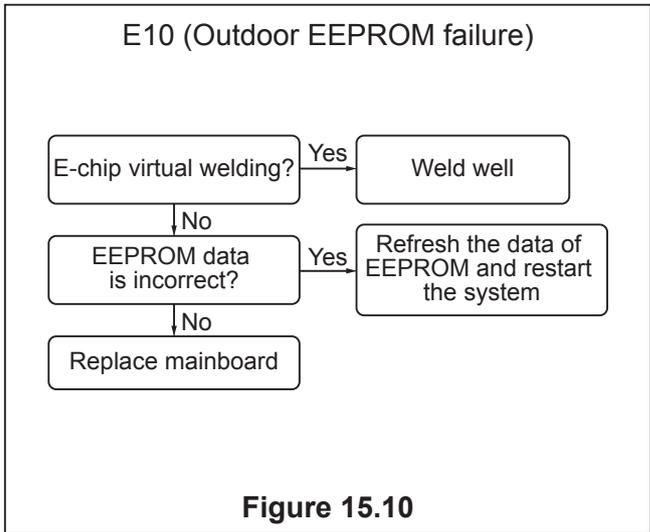
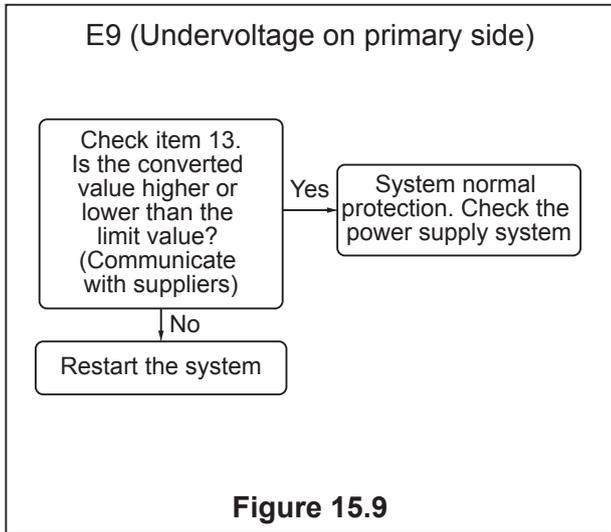
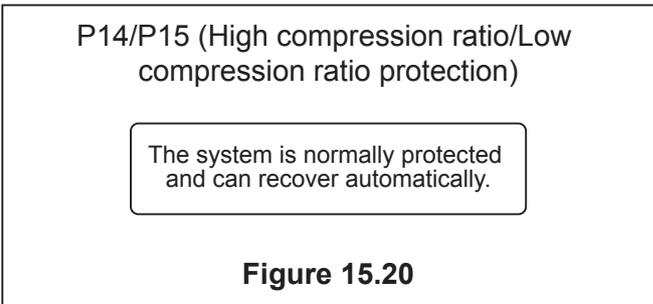
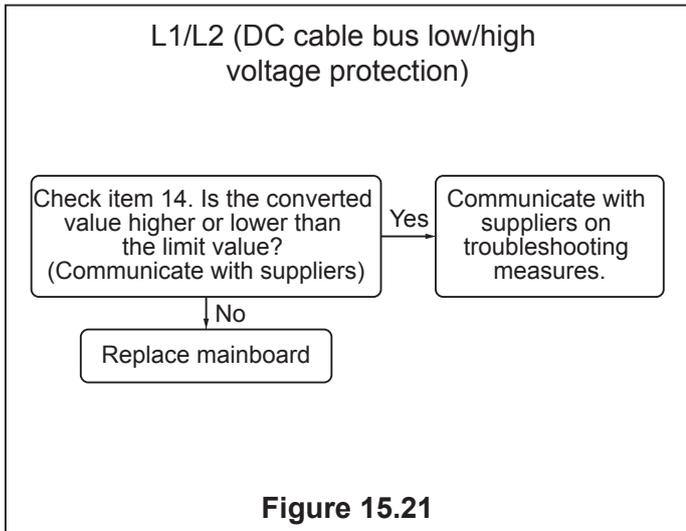
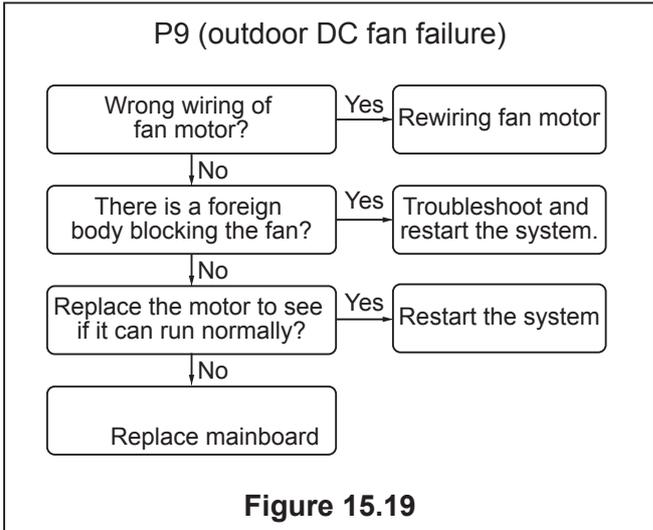
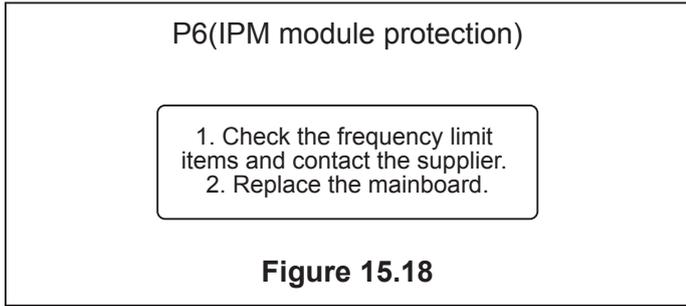
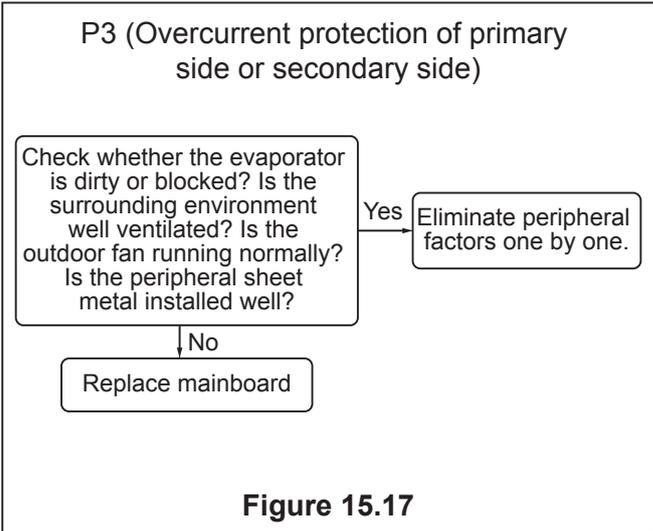
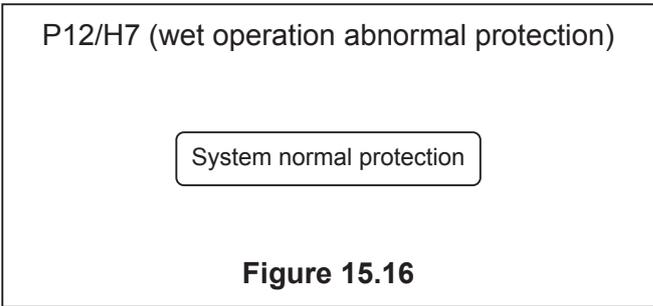
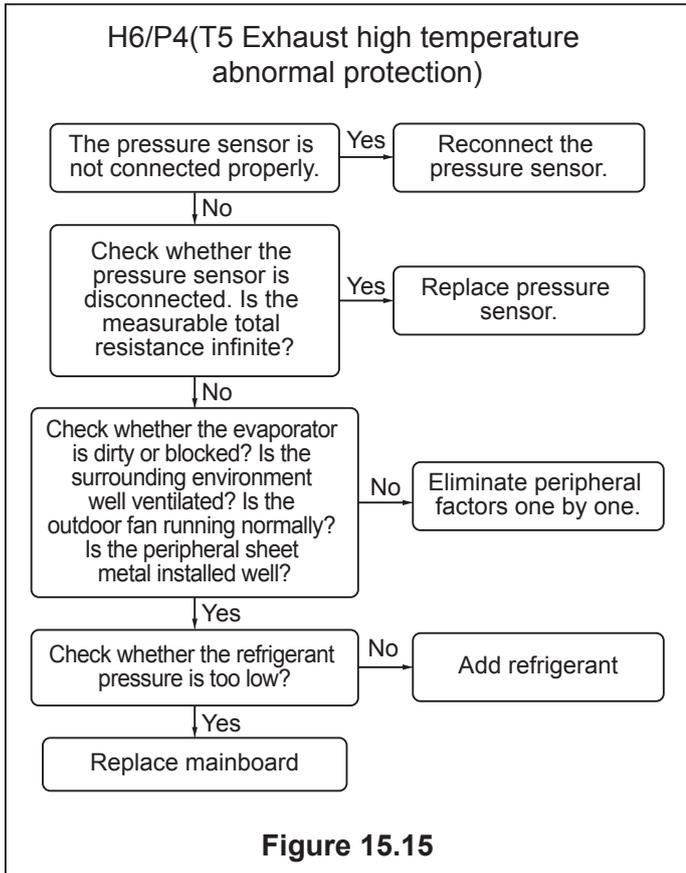


Figure 15.8





15.11 Temperature-Resistance Relationship Table (For Sensors)

Table 15.4 for T3, T4

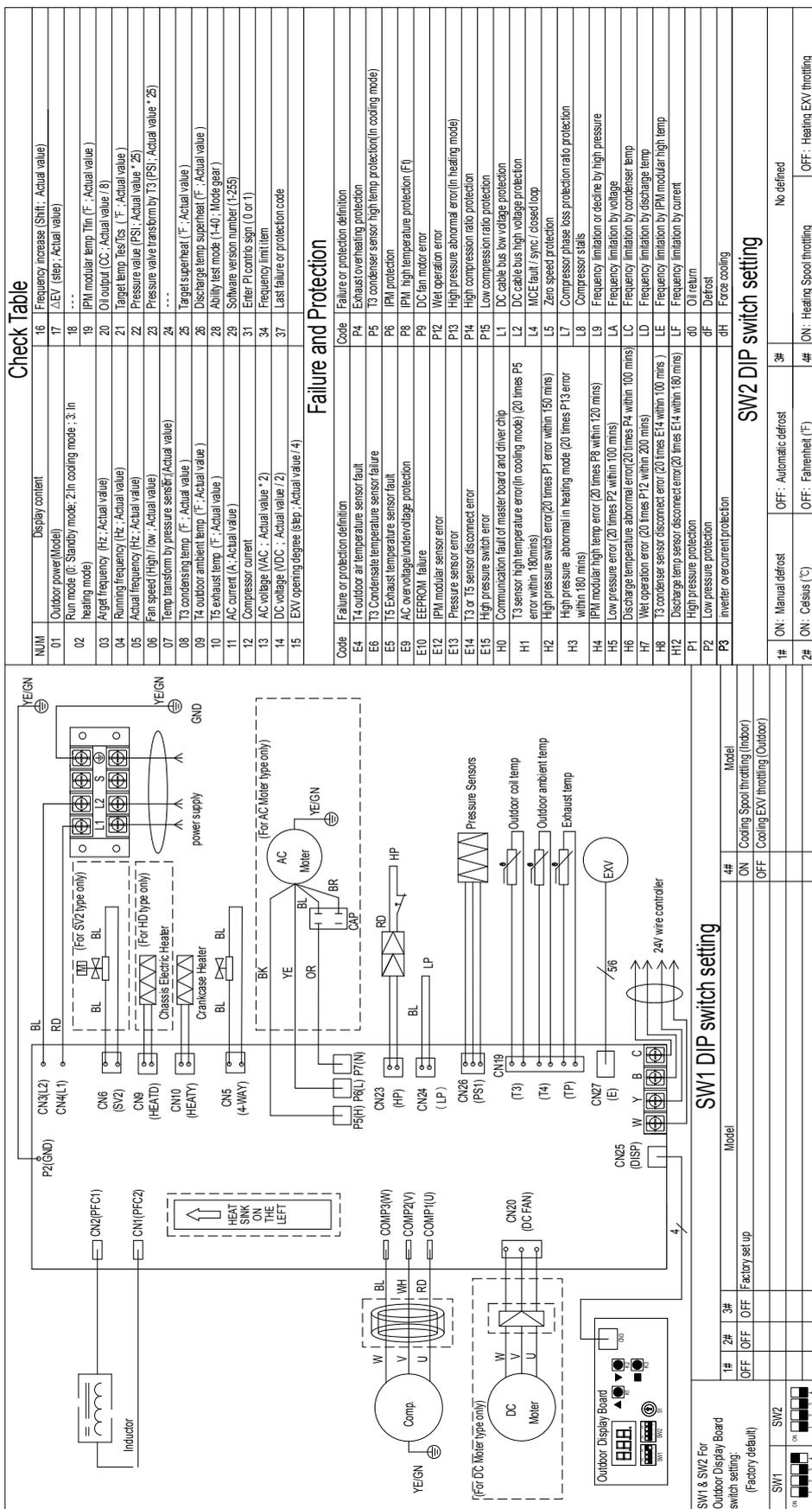
Temperature F	Temperature C	Electric resistance kΩ	Volt DC	Temperature F	Temperature C	Electric resistance kΩ	Volt DC
-5	-20.6	33.367	0.57	90	32.2	3.865	2.63
0	-17.8	29.227	0.64	95	35.0	3.508	2.75
5	-15.0	25.657	0.72	100	37.8	3.187	2.87
10	-12.2	22.595	0.80	105	40.6	2.900	2.99
15	-9.4	19.942	0.89	110	43.3	2.652	3.09
20	-6.7	17.697	0.98	115	46.1	2.421	3.20
25	-3.9	15.673	1.08	120	48.9	2.214	3.30
30	-1.1	13.917	1.18	125	51.7	2.025	3.40
40	4.4	11.060	1.40	130	54.4	1.861	3.49
45	7.2	9.867	1.52	135	57.2	1.706	3.58
50	10.0	8.823	1.64	140	60.0	1.567	3.66
55	12.8	7.884	1.76	145	62.8	1.442	3.74
60	15.6	7.101	1.89	150	65.6	1.327	3.82
65	18.3	6.409	2.01	155	68.3	1.226	3.89
70	21.1	5.767	2.14	160	71.1	1.132	3.96
75	23.9	5.150	2.28	165	73.9	1.046	4.02
80	26.7	4.700	2.39	170	76.7	0.967	4.08
85	29.4	4.266	2.51				

15.12 Temperature-resistance relationship table (for T5 sensor)

Table 15.5 for T5

Temperature F	Temperature C	Electric resistance kΩ	Volt DC	Temperature F	Temperature C	Electric resistance kΩ	Volt DC
-5	-20.6	496.38	0.08	140	60.0	12.348	1.97
0	-17.8	422.97	0.09	145	62.8	11.164	2.10
5	-15.0	361.35	0.11	150	65.6	10.106	2.22
10	-12.2	309.74	0.13	155	68.3	9.193	2.34
15	-9.4	266.152	0.15	160	71.1	8.344	2.46
20	-6.7	230.462	0.17	165	73.9	7.585	2.58
25	-3.9	198.968	0.19	170	76.7	6.904	2.69
30	-1.1	172.231	0.22	175	79.4	6.313	2.80
35	1.7	149.467	0.26	180	82.2	5.761	2.92
40	4.4	130.642	0.29	185	85.0	5.263	3.02
45	7.2	113.87	0.33	190	87.8	4.815	3.13
50	10.0	99.456	0.37	195	90.6	4.410	3.23
55	12.8	87.095	0.42	200	93.3	4.057	3.33
60	15.6	76.425	0.48	205	96.1	3.724	3.42
65	18.3	67.501	0.53	210	98.9	3.423	3.51
70	21.1	59.457	0.60	215	101.7	3.149	3.60
75	23.9	52.489	0.67	220	104.4	2.910	3.67
80	26.7	46.429	0.74	225	107.2	2.689	3.75
85	29.4	41.322	0.82	230	110	2.476	3.82
90	32.2	36.682	0.90	235	112.8	2.288	3.89
95	35.0	32.619	0.99	240	115.6	2.117	3.96
100	37.8	29.068	1.09	245	118.3	1.965	4.02
105	40.6	25.948	1.19	250	121.1	1.821	4.08
110	43.3	23.291	1.29	255	123.9	1.690	4.13
115	46.1	20.855	1.39	260	126.7	1.569	4.19
120	48.9	18.708	1.51	265	129.4	1.462	4.23
125	51.7	16.809	1.62	270	132.2	1.360	4.28
130	54.4	15.184	1.73	275	135.0	1.266	4.32
135	57.2	13.682	1.85	280	137.8	1.180	4.36

16 Wiring Diagram



NOTE: For reference only, the actual wiring diagram shall prevail

Table 16.1

17 Cleaning and Maintenance

17.1 Cleaning Precautions

-  **Warning:**
- Any maintenance and cleaning of outdoor units can only be carried out by qualified maintenance personnel.
 - Any unit maintenance can only be carried out by qualified maintenance personnel.

-  **Caution: Electric shock**
- Be sure to turn off the unit and disconnect the power supply before cleaning or maintenance.

-  **Note:**
- Do not use chemicals or chemically treated cloth to clean the unit.
 - Do not use benzene, paint thinner, polishing powder or other solvents to clean this unit.

-  **Be careful:**
- When removing the filter, do not touch the metal parts in the unit. Sharp metal edges can cut you.

17.2 Pre-Season Inspection and Maintenance

At the start of each heating or cooling season, do the following:

	Turn off the unit and disconnect the power supply.
 	Check for damaged wires, check for leaks.
	Make sure that all air inlets and outlets are not blocked.

Table 17.1

Design, material, performance specifications and components
subject to change without notice.