PIONEER®

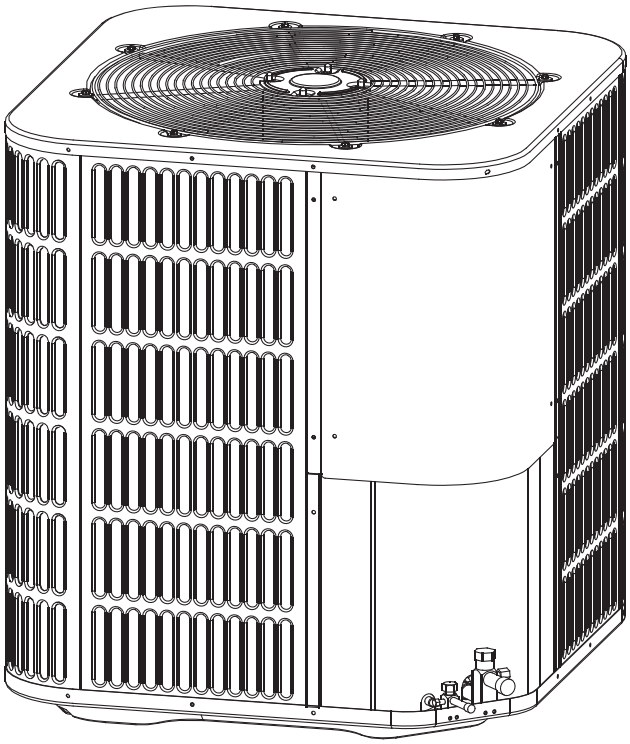
INSTALLATION INSTRUCTIONS

18 SEER DC INVERTER

Split System Heat Pump & Air Conditioner

2-5 Tons - R410A

208~230 V. 1 Ph. 60 Hz.



Models:

YD024GMFI18MR2
YD036GMFI18MR2
YD048GMFI18MR2
YD060GMFI18MR2

NOTE: Appearance of unit may vary.

RECOGNIZE THIS SYMBOL AS AN INDICATION OF IMPORTANT SAFETY INFORMATION

⚠ WARNING

These instructions are intended as an aid to qualified licensed service personnel for proper installation, adjustment and operation of this unit. Read these instructions thoroughly before attempting installation or operation. Failure to follow these instructions may result in improper installation, adjustment, service or maintenance possibly resulting in fire, electrical shock, property damage, personal injury or death.

AHRI CERTIFIED™ www.ahridirectory.org Unitary Small AC AHRI Standard 210/240

AHRI CERTIFIED™ www.ahridirectory.org Unitary Small HP AHRI Standard 210/240

ETL LISTED c US Intertek

ENERGY SAVING Green Product

DO NOT DESTROY THIS MANUAL
Please read carefully and keep in a safe place for future reference by a serviceman.

TABLE OF CONTENTS

This document is customer property and is to remain with this unit.
These instructions do not cover all the different variations of systems nor does it provide for every possible contingency to be met in connection with installation.
All phases of this installation must comply with NATIONAL, STATE, AND LOCAL CODES. If additional information is required please contact your local distributor.

1.0 SAFETY

This is a safety alert symbol. When you see this symbol on labels or in manuals, be alert to the potential for personal injury.

This is an attention alert symbol. When you see this symbol on labels or in manuals, be alert to the potential for personal injury.

Understand and pay particular attention to the signal words DANGER, WARNING, or CAUTION.

DANGER indicates an imminently hazardous situation, which, if not avoided, will result in death or serious injury.

WARNING indicates a potentially hazardous situation, which, if not avoided, could result in death or serious injury.

CAUTION indicates a potentially hazardous situation, which, if not avoided may result in minor or moderate injury. It is also used to alert against unsafe practices and hazards involving only property damage.

WARNING

Improper installation may create a condition where the operation of the product could cause personal injury or property damage.
Improper installation, adjustment, alteration, service or maintenance can cause injury or property damage. Refer to this manual for assistance or for additional information, consult a qualified contractor, installer or service agency.

CAUTION

This product must be installed in strict compliance with the installation instructions and any applicable local, state, and national codes including, but not limited to building, electrical, and mechanical codes.

WARNING

FIRE OR ELECTRICAL HAZARD
Failure to follow the safety warnings exactly could result in serious injury, death or property damage.
A fire or electrical hazard may result causing property damage, personal injury or loss of life.

CAUTION

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

CAUTION

Scroll compressor dome temperatures may be hot. Do not touch the top of compressor; it may cause minor to severe burning.

1.1 INSPECTION

As soon as a unit is received, it should be inspected for possible damage during transit. If damage is evident, the extent of the damage should be noted on the carrier's delivery receipt. A separate request for inspection by the carrier's agent should be made in writing. See Local distributor for more information.

Requirements For Installing/Servicing R410A Equipment

- Gauge sets, hoses, refrigerant containers, and recovery system must be designed to handle the POE or PVE type oils.
- Manifold sets should be 800 PSIG high side and 250 PSIG low side with 550 PSIG low side restart.
- All hoses must have a 700 PSIG service pressure rating.
- Leak detectors should be designed to detect R410A.
- Recovery equipment (including refrigerant recovery containers) must be specifically designed to handle R410A.
- **Do not use an R-22 TXV.**
- Good Refrigeration practices require the installation of a field supplied liquid line drier, as shown in Fig.1.

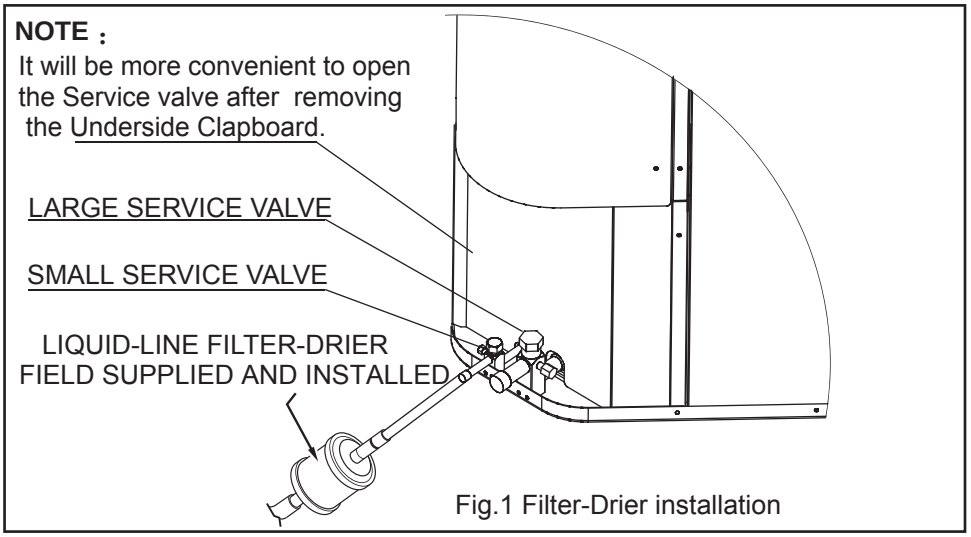


Fig.1 Filter-Drier installation

1.2 LIMITATIONS

The unit should be installed in accordance with all National, State, and Local Safety Codes and the limitations listed below:

1.Limitations for the indoor unit, coil and appropriate accessories must also be observed.
2.The outdoor unit must not be installed with any duct work in the air stream. The outdoor fan is the propeller type and is not designed to operate against any additional external static pressure.
3.The maximum and minimum conditions for operation must be observed to assure a system that will give maximum performance with minimum service.
4.This unit is not designed to operate with a low ambient kit. Do not modify the control system to operate with any kind of low ambient kit.
5.The maximum allowable line length for this product is 100 feet.

2.0 GENERAL

The outdoor units are designed to be connected to a matching indoor coil with braze connect lines. Units are factory charged with refrigerant for a matching indoor coil plus 15 feet of field supplied lines.

Matching indoor coils are available with a thermostatic expansion valve or an orifice for the most common usage. The orifice size and/or refrigerant charge may need to be changed for some indoor-outdoor unit combinations, elevation differences or total line lengths.

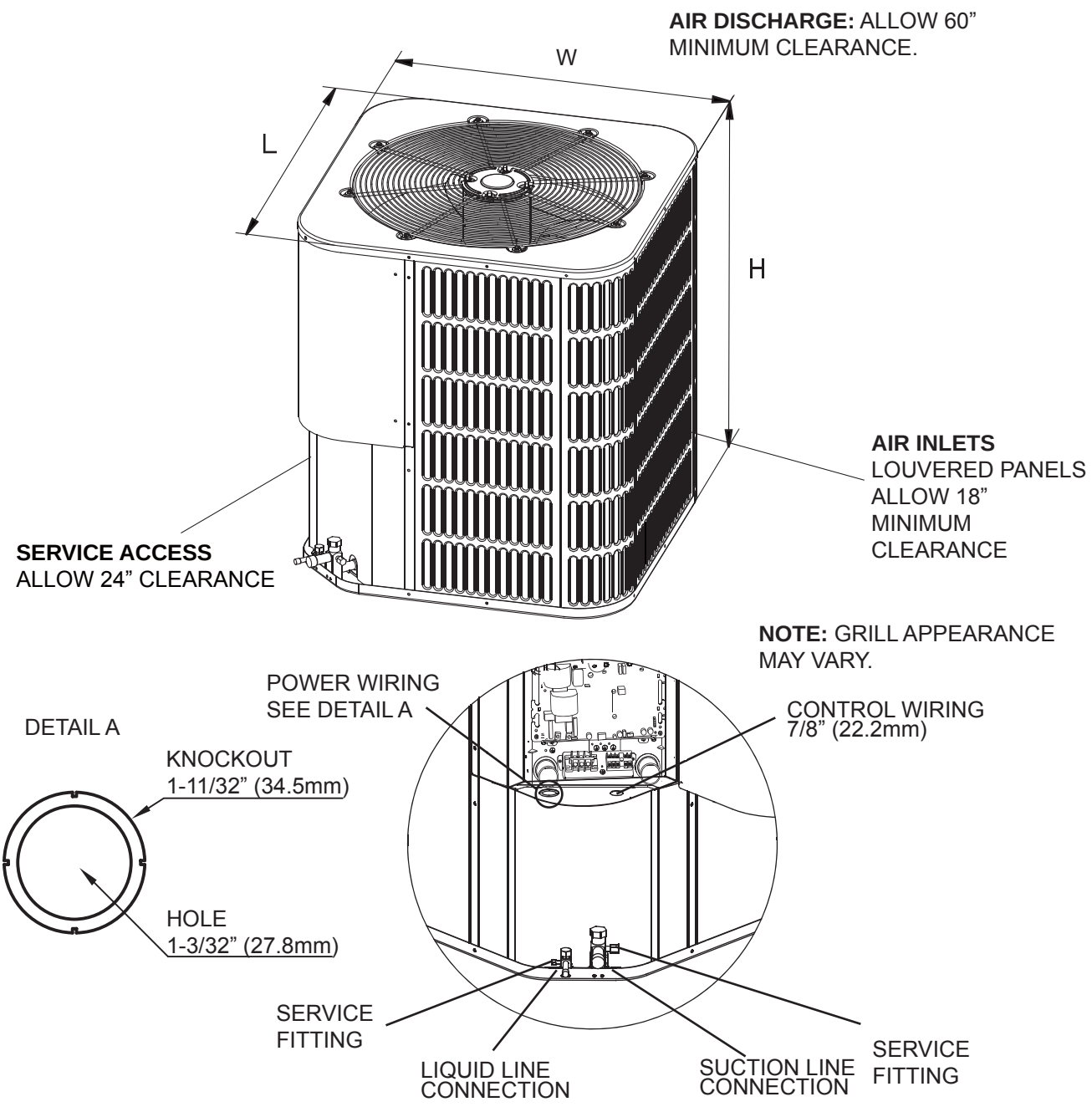


FIG.2 DIMENSIONS

DIMENSIONAL DATA

MODEL SIZE		Dimensions (Inches)			Refrigerant Connection Service Valve Size	
AC	HP	"H" in. [mm]	"W" in. [mm]	"L" in. [mm]	Liquid in.	Suction in.
24	24	24-15/16[633]	29-1/8[740]	29-1/8[740]	3/8	3/4
36	36	24-15/16[633]	29-1/8[740]	29-1/8[740]	3/8	3/4
48	48	33-3/16[843]	29-1/8[740]	29-1/8[740]	3/8	7/8
60	60	33-3/16[843]	29-1/8[740]	29-1/8[740]	3/8	7/8

NOTES: 1. AC: Air Conditioner; HP: Heat Pump;

3.0 UNIT INSTALLATION

3.1 LOCATION

Before starting the installation, select and check the suitability of the location for both the indoor and outdoor unit. Observe all limitations and clearance requirements. The outdoor unit must have sufficient clearance for air entrance to the condenser coil, for air discharge and for service access. See Fig.2

NOTE

For multiple unit installations, units must be spaced a minimum of 18 inches apart. (Coil face to coil face.)

If the unit is to be installed on a hot sun exposed roof or a black-topped ground area, the unit should be raised sufficiently above the roof or ground to avoid taking the accumulated layer of hot air into the outdoor unit.

Provide an adequate structural support.

3.2 GROUND INSTALLATION

The unit may be installed at ground level on a solid base that will not shift or settle, causing strain on the refrigerant lines and possible leaks. Maintain the clearances shown in Fig.2 and install the unit in a level position.

Normal operating sound levels may be objectionable if the unit is placed directly under windows of certain rooms (bedrooms, study, etc.).
Top of unit discharge area must be unrestricted for at least 60 inches above the unit.

WARNING

The outdoor unit should not be installed in an area where mud or ice could cause personal injury or system damage.

Elevate the unit sufficiently to prevent any blockage of the air entrances by snow in areas where there will be snow accumulation. Check the local weather bureau for the expected snow accumulation in your area. Isolate the unit from rain gutters to avoid any possible wash out of the foundation.

3.3 ROOF INSTALLATION

When installing units on a roof, the structure must be capable of supporting the total weight of the unit, including a padded frame unit, rails, etc., which should be used to minimize the transmission of sound or vibration into the conditioned space.

3.4 UNIT PLACEMENT

1. Provide a base in the pre-determined location.
2. Remove the shipping carton and inspect for possible damage.
3. Compressor tie-down nuts should remain tightened.
4. Position the unit on the base provided.

CAUTION

This system uses R410A refrigerant which operates at higher pressure than R-22. No other refrigerant may be used in this system. Gauge sets, hoses, refrigerant containers, and recovery system must be designed to handle R410A. If you are unsure, consult the equipment manufacturer.

The outdoor unit must be connected to the indoor coil using field supplied refrigerant grade copper tubing that is internally clean and dry. Units should be installed only with the tubing sizes for approved system combinations. The refrigerant charge shown in the nameplate is for standard size interconnecting liquid line lengths up to 15 feet.

NOTE

Using a larger than specified line size could result in oil return problems. Using a too small line will result in loss of capacity and other problems caused by insufficient refrigerant flow. Slope horizontal suction lines at least 1" every 20 feet toward the outdoor unit to facilitate proper oil return.

3.5 Unit Location Considerations

1. suggested Locations for Best Reliability

• Ensure the top discharge area is unrestricted for at least 5 feet above the unlt.
• Provide at least 3 feet clearance in front of the control box (access panels) and any other side requiring service.
• Do not locate close to bedrooms as operational sounds may be objectionable.
• Avoid locations near windows and similar areas where condensation and freezing defrost vapor can annoy a customer.
• Position the outdoor unit a minimum of 12" from any wall or surrounding shrubbery to ensure adequate airflow.
• Outdoor unit location must be far enough away from any structure to prevent excess roof runoff water or Icicles from ralling directly on the unit.
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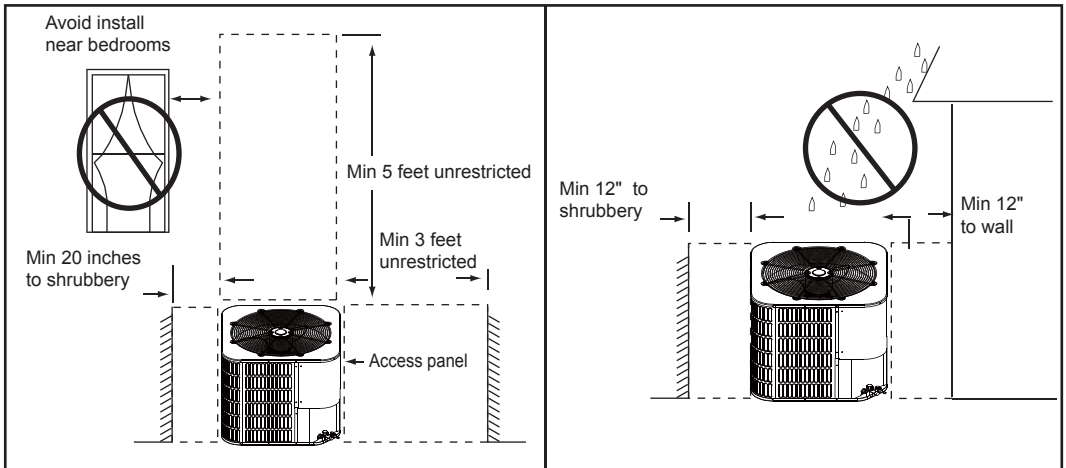


Fig. 3 suggested Locations for Best Reliability

2. Cold Climate Considerations (Heat Pump Only)

Note: It is recommended that these precautions be taken for units being installed in areas where snow accumulation and prolonged below-freezing temperatures occur.

• 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 durlng defrost cycle prior to its refreezlng. Ensure that drain holes in unit base pan are not obstructed, preventing drainage of defrost water.

• 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.

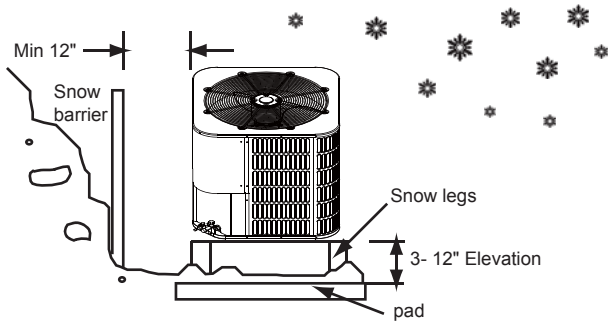


Fig.4 Cold Climate Considerations (Heat Pump Only)

3.6 UNIT MOUNTING

If elevating the heat pump, either on a flat roof or on a slab, observe the following guidelines.

1. The base pan provided elevates the heat pump 2” above the base pad.
2. If elevating a unit on a flat roof , use 4”× 4”(or equivalent) stringers positioned to distribute unit weight evenly and prevent noise and vibration (See Fig.3).

NOTE:Do not block drain openings shown in Fig.5.

3. If unit must be elevated because of anticipated snow fall, secure unit and elevating stand such that unit and/or stand will not tip over or fall off.

NOTE: To tie down unit, see 3.6.

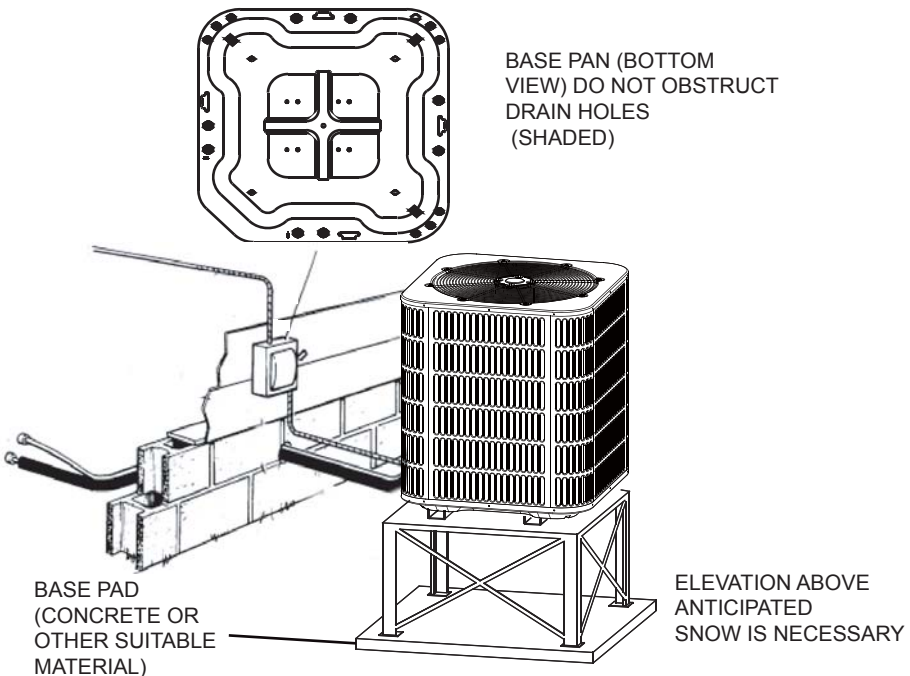


Fig.5 RECOMMENDED ELEVATED INSTALLATION

3.7 FACTORY-PREFERRED TIE-DOWN METHOD

Step 1: Prior to installing clear pad of debris.

IMPORTANT

Then cement pad must meet local codes and must be the proper thickness to accommodate fasteners.

Step 2: Center and level unit onto pad.

Step 3: Using field supplied L-shaped bracket to locate holes on concrete and drill pilot holes which is at least 1/4" deeper than fastener being used.

IMPORTANT

Self drilling screws to base pan should not exceed 3/8" long to avoid damaging coil.

Step 4: Using conventional practices to install brackets, tighten concrete fasteners and self-tapping screws (See Fig.6).

NOTE: 1. One bracket for each side. For extra stability, 2 brackets for each side.
2. Do not over-tighten the concrete fastener to avoid weakening the concrete.

IMPORTANT NOTE:

These instructions are intended to provide a method to tie-down system to cement slab as a securing procedure for high wind areas. It is recommended to check Local Codes for tie-down methods and protocols.

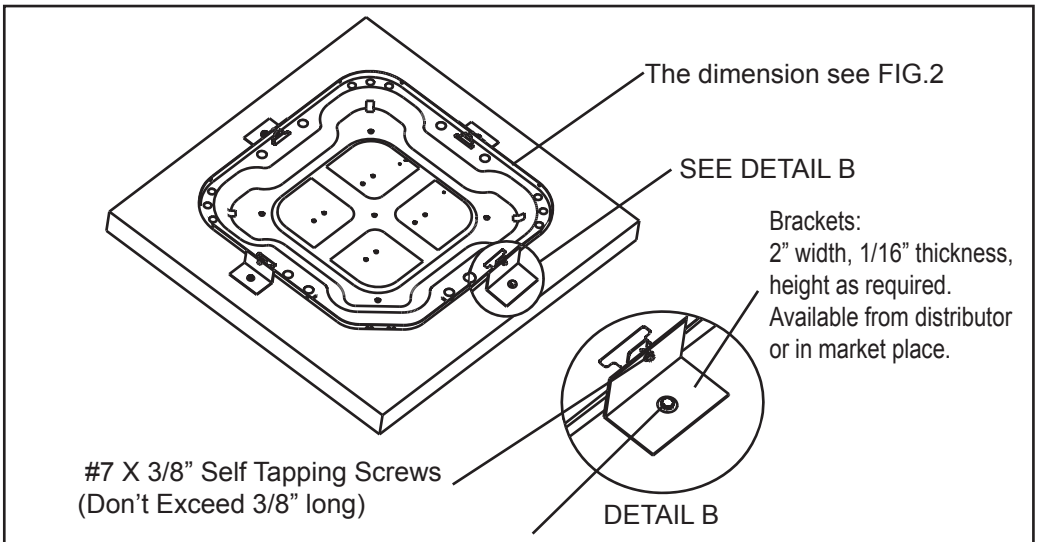


Fig.6 PREFERRED TIE-DOWN METHOD

3.8 PRECAUTIONS DURING LINE INSTALLATION

1. Install the lines with as few bends as possible. Care must be taken not to damage the couplings or kink the tubing. Use clean hard drawn copper tubing where no appreciable amount of bending around obstruction is necessary, if soft copper must be used, care must be taken to avoid sharp bends which may cause a restriction.

2. The lines should be installed so that they will not obstruct service access to the coil, air handling system or filter.

3. Care must also be taken to isolate the refrigerant lines to minimize noise transmission from the equipment to the structure.

4. The suction line must be insulated. Tape and suspend the refrigerant lines as shown. DO NOT allow tube metal-to-metal contact. See Fig.7.

5. Use PVC piping as a conduit for all underground installations as shown in Fig.8. Buried lines should be kept as short as possible to minimize the build up of liquid refrigerant in the suction line during long periods of shutdown.

6. Pack a sealing material such as perma gum around refrigerant lines where they penetrate a wall to reduce vibration and to retain some flexibility.

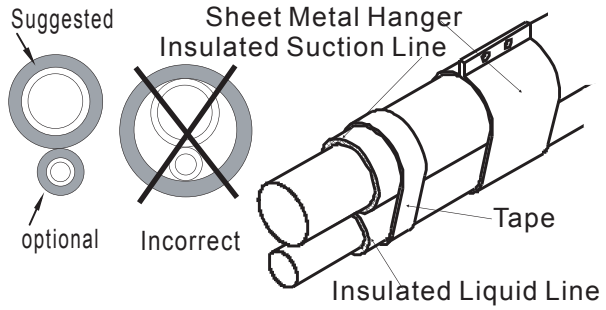


Fig.7 Tubing Hanger

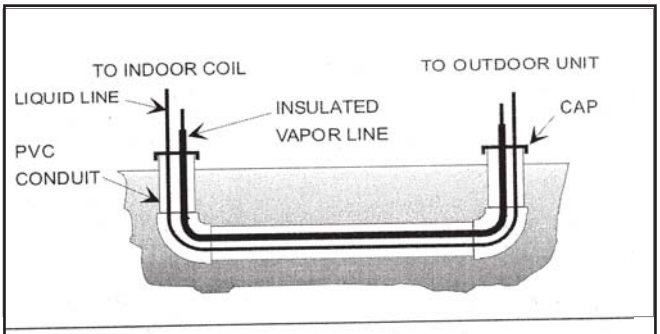
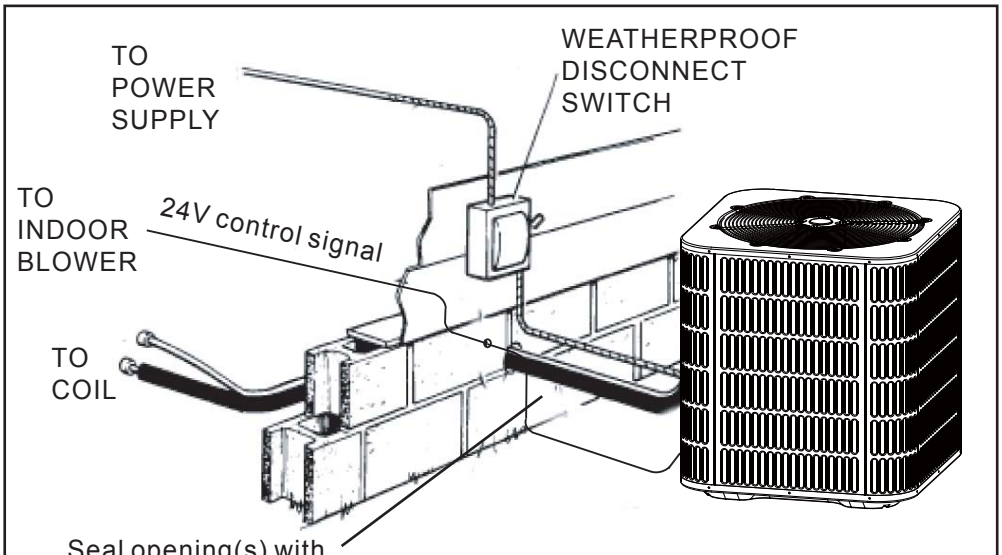


Fig.8 Underground Installation



NOTE:All outdoor wiring must be weather proof

Fig.9 Typical Installation

3.9 PRECAUTIONS DURING BRAZING OF LINES

All outdoor unit and evaporator coil connections are copper-to-copper and should be brazed with a phosphorous-copper alloy material such as Silfos-5 or equivalent. DO NOT use soft solder. The outdoor units have reusable service valves on both the liquid and suction connections. The total system refrigerant charge is retained within the outdoor unit during shipping and installation. The reusable service valves are provided to evacuate and charge per this instruction.
Serious service problems can be avoided by taking adequate precautions to assure an internally clean and dry system.

CAUTION

Dry nitrogen should always be supplied through the tubing while it is being brazed, because the temperature required is high enough to cause oxidation of the copper unless an inert atmosphere is provide. The flow of dry nitrogen should continue until the joint has cooled. Always use a pressure regulator and safety valve to insure that only low pressure dry nitrogen is introduced into the tubing.Only a small flow is necessary to displace air and prevent oxidation.

3.10 PRECAUTIONS DURING BRAZING SERVICE VALVE

Precautions should be taken to prevent heat damage to service valve by wrapping a wet rag around it as shown in Fig.10. Also, protect all painted surfaces, insulation, during brazing. After brazing cool joint with wet rag.

The valve can be opened by removing the plunger cap and fully inserting a hex wrench into the stem and backing out counter-clockwise until valve stem just touches the chamfered retaining wall.

Connect the refrigerant lines using the following procedure:

1. Remove the cap and Schrader core from both the liquid and suction service valve service ports at the outdoor unit. Connect low pressure nitrogen to the liquid line service port.

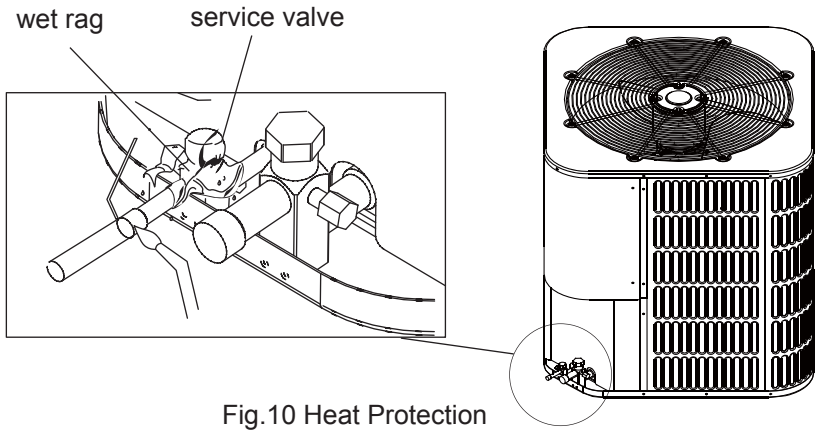


Fig.10 Heat Protection

2. Braze the liquid line to the liquid valve at the outdoor unit. Be sure to wrap the valve body with a wet rag. Allow the nitrogen to continue flowing. Refer to the Tabular Data Sheet for proper liquid line sizing.
3. Carefully remove the rubber plugs from the evaporator liquid and suction connections at the indoor coil.

4. Braze the liquid line to the evaporator liquid connection. Nitrogen should be flowing through the evaporator coil.
5. Slide the plastic cap away from the suction connection at the indoor coil. Braze the suction line to the evaporator suction connection. Refer to the Table 1 for proper suction line sizing.
6. Protect the suction valve with a wet rag and braze the suction line connection to the outdoor unit. The nitrogen flow should be exiting the system from the suction service port connection. After this connection has cooled, remove the nitrogen source from the liquid fitting service port.
7. Replace the Schrader core in the liquid and suction valves.
8. Leak test all refrigerant piping connections including the service port flare caps to be sure they are leak tight. **DO NOT OVER TIGHTEN (between 40 and 60 inch -lbs. maximum).**
9. Evacuate the suction line, evaporator, and the liquid line, to 350 microns or less.

Table 1: Recommended Liquid and Suction Tube Diameters (In.)

MODEL SIZE	LIQUID	SUCTION
	Tube Diameter	Tube Diameter
24	3/8	3/4
36	3/8	3/4
48	3/8	7/8
60	3/8	7/8

10. Replace cap on service ports. Do not remove the flare caps from the service ports except when necessary for servicing the system.
11. Release the refrigerant charge into the system. Open both the liquid and suction valves by removing the plunger cap and with an hex wrench back out counter -clockwise until valve stem just touches the chamfered retaining wall.
12. Replace plunger cap finger tight, then tighten an additional 1/12 turn (1/2 hex flat). Cap must be replaced to prevent leaks.

WARNING

Never attempt to repair any brazed connections while the system is under pressure. Personal injury could result.

See "System Charge" section for checking and recording system charge.

4.0 INTERCONNECTING TUBING

4.1 SUCTION AND LIQUID LINES

Keep all lines sealed until connection is made.
Make connections at the indoor coil first.
Refer to Line Size Information in Tables 2 and 3 for correct size and multipliers to be used to determine capacity for various suction line diameters and lengths of run. The losses due to the lines being exposed to outdoor conditions are not included.

The factory refrigerant charge in the outdoor unit is sufficient for 15 feet of standard size interconnecting liquid line. Calculate actual charge required with installed liquid line size and length as below.

5/16” ± .4 oz. per foot
3/8” ± .6 oz. per foot
1/2” ± 1.2 oz. per foot

4.2 MAXIMUM LENGTH OF LINES

The maximum length of interconnecting line is 100 feet .
Always use the shortest length possible with a minimum number of bends.

NOTE: Excessively long refrigerant lines cause loss of equipment capacity.

4.3 VERTICAL LIFT

Keep the vertical lift to a minimum. Use the following guidelines when installing the unit:

1. DO NOT exceed the vertical lift as indicated on Table 3.
2. It is recommended to use the smallest liquid line size permitted to minimize system charge which will maximize compressor reliability.
3. Table 3 may be used for sizing horizontal runs.

5.0 EVACUATION

It will be necessary to evacuate the system to 350 microns or less. If a leak is suspected, leak test with dry nitrogen to locate the leak. Repair the leak and test again. To verify that the system has no leaks, simply close the valve to the vacuum pump suction to isolate the pump and hold the system under vacuum. Watch the micron gauge for a few minutes. If the micron gauge indicates a steady and continuous rise, it's an indication of a leak. If the gauge shows a rise, then levels off after a few minutes and remains fairly constant, its an indication that the system is leak free but still contains moisture and may require further evacuation if the reading is above 350 microns.

LINE SIZING

TABLE 2: SUCTION LINE LENGTH/SIZE VS CAPACITY MULTIPLIER(R410A)

Model Size		2 Ton	3 Ton	4 Ton	5 Ton
Suction Line Connection Size		3/4" O.D.	3/4" O.D.	7/8" O.D.	7/8" O.D.
Suction Line Run - Feet		5/8 Opt.	5/8 Opt.	3/4 Opt.	1 1/8 Opt.
		3/4* Std.	3/4* Std.	7/8* Std.	7/8* Std.
25'	Optional	1.00	1.00	1.00	1.00
	Standard	1.00	1.00	1.00	0.99
50'	Optional	0.97	0.97	0.98	0.99
	Standard	0.98	0.99	0.98	0.98
100'	Optional	0.94	0.94	0.95	0.98
	Standard	0.95	0.97	0.97	0.94
150'	Optional	0.90	0.90	0.92	0.97
	Standard	0.92	0.96	0.96	0.90

NOTES:
* Standard size
Using suction line larger than shown in chart will result in poor oil return and is not recommended.

TABLE 3: LIQUID LINE SIZE (R410A)

Model Size	Line Size Connection Size (Inch O.D.)	Compressor Type	Line Size Connection And Line Size (Inch O.D.)	Liquid Line Size Outdoor unit above or below indoor coil					
				Total Equivalent Length - Feet					
				25	50	75	100	125	150
				Maximum Vertical Separation - Feet					
2 Ton	3/8"	Scroll	1/4	23	N/A	N/A	N/A	N/A	N/A
			5/16	25	36	29	23	16	9
			3/8*	25	50	60	60	40	30
		Rotary	3/8*	25	30	30	24	N/A	N/A
3 Ton	3/8"	Scroll	5/16	25	50	37	22	7	N/A
			3/8*	25	50	60	60	40	30
4 Ton	3/8"	Scroll	3/8*	25	46	38	30	22	15
			1/2	25	50	56	55	40	30
5 Ton	3/8"	Scroll	3/8*	25	50	56	44	32	20
			1/2	25	50	60	60	40	30

NOTES:
* Standard line size
N/A Application not recommended.

6.0 ELECTRICAL CONNECTIONS

6.1 GENERAL INFORMATION & GROUNDING

Check the electrical supply to be sure that it meets the values specified on the unit nameplate and wiring label.

Power wiring, control (low voltage) wiring, disconnect switches and over current protection must be supplied by the installer. Wire size should be sized per requirements.

CAUTION

All field wiring must USE COPPER CONDUCTORS ONLY and be in accordance with Local, National Fire, Safety & Electrical Codes. This unit must be grounded with a separate ground wire in accordance with the above codes.

The complete connection diagram and schematic wiring label is located on the inside surface of the unit service access panel and this instruction.

6.2 FIELD CONNECTIONS POWER WIRING

1. Install the proper size weatherproof disconnect switch outdoors and within sight of the unit.
2. Remove the screws at the side of the corner panel. Slide corner panel down and remove from unit. See Fig. 9.
3. Run power wiring from the disconnect switch to the unit.
4. Route wires from disconnect through power wiring opening provided and into the unit control box.
5. Install the proper size time-delay fuses or circuit breaker, and make the power supply connections.
6. Energize the crankcase heater if equipped to save time by preheating the compressor oil while the remaining installation is completed.

NOTE: When changing the motor, remove top cover first.

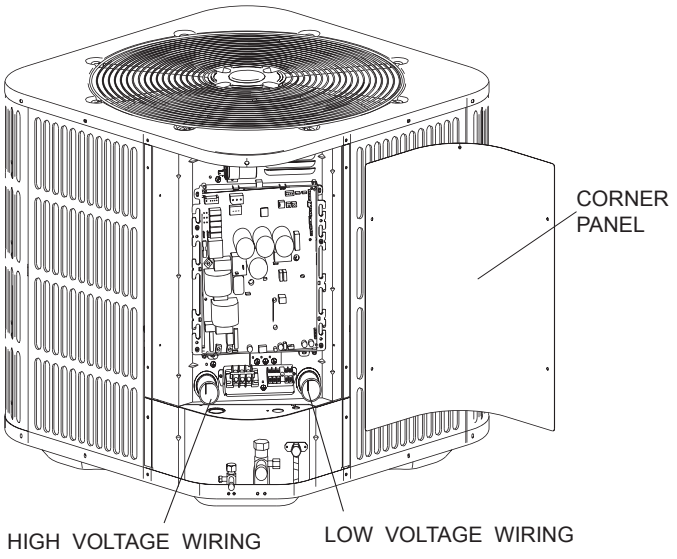
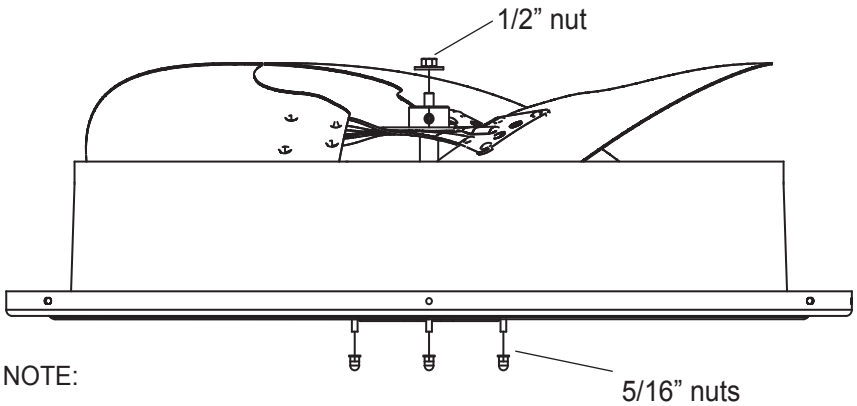


Fig.11 Typical Field Wiring

6.3 REMOVING THE TOP PANEL AND MOTOR



NOTE:

Damage will occur to condenser unit
if you remove fan nuts prior to cover removal.

Fig.12 COVER AND FAN

When motor requires changing follow the steps below:

Step 1: Go into electrical panel, disconnect motor power lines.

IMPORTANT NOTE

Disconnect main power to unit. Severe burns and electrical shock will occur if you do not disconnect main power.

Step 2: Remove cover (be careful of motor wires)

Step 3: Be sure to place fan cover unit on the ground as indicated in Fig. 12

IMPROTANT 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.

IMPROTANT NOTE

When connecting motor wires be sure to check motor direction.

7.0 CHECKING REFRIGERANT CHARGE

Charge for all systems should be checked against the Charging Chart inside the access corner panel or Charging by weight.

IMPORTANT:Do not operate the compressor without charge in system. Addition of R-410A will raise pressures (suction, liquid and discharge).

7.1 CHARGING BY LIQUID PRESSURE

In order to properly charge the system, the following conditions must be met:
1) Outdoor temperature above 60°F.
2) Indoor temperature between 70°F to 100°F.
3) Installation must be complete with brazed joints and drier visually inspected.
4) The unit electrical installation must be checked and unit powered for one (I) hour if crank case heater is used or five (5) minutes if no crankcase heater is used.

Follow these steps:
1. Run in Force cooling mode(click the FORCE button in cooling mode)at least 20 minutes.
2. Measure OUTDOOR AMBIENT TEMPERATURE within 6 inches of coil.
3. Measure SUCTION LINE PRESSURE AND TEMPERATURE.
4.According to the superheat of suction line, confirm that the TXV is working properly(Usually the superheat is between 10 to 15□). If not, it should be adjusted.
5. Find the TARGET LIQUID PRESSURE at the intersection between the SUCTION LINE PRESSURE and the OUTDOOR AMBIENT TEMPERATURE, if falls between rows or columns then estimate the TARGET LIQUID PRESSURE or SUCTION LINE PRESSURE falls between rows or columns then estimate the TARGET LIQUID PRESSURE between the rows and columns.
5. Compare the measured LIQUID LINE PRESSURE to the TARGET LIQUID PRESSURE, add charge to raise the pressure or recover charge to lower it.
6. After running unit for 10 minutes if the SUCTION LINE PRESSURE changes, go back to step 2 otherwise remove test equipment and cover the valves.

7.2 CHARGING BY WEIGHT

For a new installation,evacuation of interconnecting tubing and indoor coil is adequate; otherwise,evacuate the entire system. The factory refrigerant charge in the outdoor unit is sufficient for 15 feet of standard size interconnecting liquid line. Calculate actual charge required with installed liquid line size and length, please see 4.1 of instruction.

With an accurate scale (+/- 1 oz.) adjust charge difference between that shown on the unit data plate and that calculated for the new system Installation. if the entire system has been evacuated, add the total calculated charge.

7.3 FINAL LEAK TESTING

After the unit has been properly evacuated and charged, a halogen leak detector should be used to detect leaks in the system. All piping within the condensing unit, evaporator, and interconnecting tubing should be checked for leaks. If a leak is detected, the refrigerant should be recovered before repairing the leak. The Clean Air Act prohibits releasing refrigerant into the atmosphere.

charging: weigh-In Method

weigh-In Method can be used for the Initial installation, or anytime a system charge is being replaced. 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 subcooling charging method.

Table 17. Heat Pumps

A	B		C	D
Model	Factory Charge		charge adder for Indoor Coil	charge multiplier for interconnecting refrigerant tube length
024	7 lb.	6 oz.	6 oz.	0.6 oz/ft
036	8 lb.	3 oz.	8 oz.	0.6 oz/ft
037	9 lb.	8 oz.	12 oz.	0.6 oz/ft
048	9 lb.	13 oz.	13 oz.	0.6 oz/ft
049	10 lb.	12 oz.	15 oz.	0.6 oz/ft
060	11 lb.	14 oz.	1 lb., 2 oz.	0.6 oz/ft

Table 18. Air Conditioners

A	B		C	D
Model	Factory Charge		charge adder for Indoor Coil	charge multiplier for interconnecting refrigerant tube length
024	7 lb.	6 oz.	6 oz.	0.6 oz/ft
036	7 lb.	14 oz.	7 oz.	0.6 oz/ft
048	11 lb.	1 oz.	1 lb., 0 oz.	0.6 oz/ft
060	11 lb.	14 oz.	1 lb., 0 oz.	0.6 oz/ft

Table 19. New Installations — calculating charge using the weigh-In method

1. Measure in feet the distance between the outdoor unit and the indoor unit and record on Line 1. Include the entire length of the line from the servIce valve to the IDU. 2. Enter the charge multiplier from column D. 3. Muitply the total length of refrigerant tubing (Line 1) tImes the value on step 2. Record the result on Line 3 of the worksheet. 4. Locate the outdoor equipment size in column A. Record the value shown In column c of Table 16 for Heat Pumps or Table 17 for Air conditioners. 5. Add the values from step 3 and step 4 and record the resulting value. This Is the amount of refrigerant to weigh-in prior to opening the service valves.	New Installation weigh-In Method woriksheeto 1. Line Length (ft) _____ 2. value from Column D x _____ 3. Step1 x Step2 = _____ 4. charge Adder (column C) + _____ 5. Refrlgerant(Steps 3+4) = _____

Table 20. Sealed-System Repairs — calculating charge using the weigh-In method.

1. Meisure in feet the distance between the outdoor unit and the indoor unit and record on Line 1 Include the entire length of the line from the service valve to the IDU. 2. Enter the charge multiplIer from cotumn D. 3. MultIply the total length of refhgerant tubing (Line 1) times the value on Line 2. Record the result on Line 3 of the worksheet. 4. Locate the outdoor equipment size in column A. Record the value shown in column C of Table 16 for Heat Pumps or Table 17 for Air conditioners. 5. Record the value in column B to Line 5 of the worksheet. 6. Add the values from step 3, step 4, and step 5 and record the resulting value on Line 6. ThIs is the amount of refrigerant to weigh-in.	New Installation weigh-In Method worksheet 1. Line Length (ft) _____ 2. value from ColumnD x _____ 3. Step 1 x step 2 = _____ 4. charge Adder (column C) + _____ 5. Factory charge (column B) + _____ 6. Refrlgerant (steps 3+4+5) = _____

Note: The only mode aperoved for setting validating system charge Is using Charging Mode-cooling. ChargIng Mode-cooling is a variable speed test mode found in the 950 comfort control Technician Menu. Outdoor Temperature must be between 55^{O}F and 120^{O}F with Indoor Temperature kept between 70^{O}F and 80^{O}F.

8.0 SYSTEM OPERATION

1. Control logic description

This frequency conversion system adopts the exactly same control logic as that of common fixed frequency unit. Start-up demand signal is sent by wired controller or indoor unit and when outdoor unit receives the signal, it will start required mode according to demand. Start-up demand signal is the common 24V control signal.
Compressor operating frequency is controlled by outdoor unit completely.
To ensure stable and adequate power output, target control low pressure evaporating temperature Te when cooling and target control high pressure condensing temperature Tc when heating, control and adjust compressor PI according to control target demand. Meanwhile, Te and Tc target demand has the function of self-study according to compressor operating frequency, start/stop times so that to adjust power output autonomously ensure to well satisfy power demand load.
It can choose the initial settings of Te and Tc according to dehumidification and high capacity demands by manually adjusting the dial code as well so that to satisfy relative demands.

2.Sensor description

A working T3 Sensor is required for:
● Operating protection (high temp./low temp.)
● Outdoor fan control(cooling)
●（Heat pump only）Defrost （Heat pump only）
● Ambient temp forecast （Cooling only）

A working T4 Sensor is required for（Heat pump only）:
● Operating condition permission
● Defrosting condition determination
● Outdoor fan control(heating mode, Heat pump only)

A working T5 Sensor is required for:
● Protection(high temp./low temp.)
● Outside EEV control valve （Heat pump only）

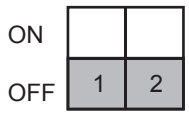
A working Tf Sensor is required for:
● Module temp. protection(high temp.)

A working Pressure Transducer Sensor is required for:
● Operating frequency control
● Outside EEV control valve （Heat pump only）
● High pressure protection(heating mode, Heat pump only)
● Low pressure protection(cooling mode)

2、Defrost description

● Outdoor defrost control needs to measure T4 ambient temp. sensor and T3 coil temp. sensor. When difference value between the two sensors has satisfied some condition, defrosting will begin. Meanwhile, Meanwhile， when operating in the condition of a low ambient temp.for a certain period or system high pressure side pressure is lower than a certain value, the system will enter defrosting mode.

● Defrosting enter
The following 3 situations were determined to enter into defrosting: ①Outdoor coil temp. T3＜1℃, and satisfy a certain correspondence of T4 ambient temp.
②When operating time accumulates to a certain value. Because of ambient temp. T4 time settings are different, when T4<-5 ℃, cumulative time is 4h, when T4≥-5 ℃ and T4 ＜4 ℃, the cumulative time is 2h to determine. ③ When high pressure lasts low, the situation that high pressure saturation temperature lower than 28℃ lasts for 20 min determines to enter into defrosting.



Defrosting choice	SW5-1	SW5-2	Remarks
ON	Operating time shorten q0%	Defrosting time is becoming longer	
OFF	Normal	Normal	Default OFF
Remarks	Enter into the situation	Quit situation	

● Dial code SW5：
Defrosting quit
According to outdoor coil temp.T3 is up to 18℃ and lasts for 1 min. Or defrosting time is up to 8 min.
● Defrosting control choice
Dial code SW5 can adjust and set the time that enters and quits defrosting
In general, adjust dial code to ON can enhance the ability of defrosting.
● Manual defrosting:
The system must operate in heating mode.
Enter into this mode after 5 min when system starts(It is suggest that stably running for 30 min, then enter)
Press Force button and hold for at least 6s to enter into defrosting.
It is suggest that manual defrost time interval is 15min above.

2、Crankcase heating zone description

● Start if crankcase heating zone can satisfy one of the 3 conditions,
1. First time to power on
2. In process of defrosting
3. Compressor stops running for 4h and the outdoor ambient temp. T4 once lower than 50℉.
Stop crankcase heating zone satisfy the following conditions
Air discharge temp. T5≥113℉

8.1 COMPRESSOR CRANKCASE HEATER (CCH) (Heat pump only,optional)

Refrigerant migration during the off cycle can result in a noisy start up. Add a crankcase heater to minimize refrigeration migration, and to help eliminate any start up noise or bearing “wash out”.
All heaters must be located on the lower half of the compressor shell. Its purpose is to drive refrigerant from the compressor shell during long off cycles, thus preventing damage to the compressor during start-up.

At initial start-up or after extended shutdown periods, make sure the heater is energized for at least 12 hours before the compressor is started. (Disconnect switch on and wall thermostat off.)

■ **The crankcase heating start condition:**
1.The crankcase heating start must meet two conditions:
A. Outdoor temperature ＜37.4° F.
B. Compressor stops working more than 3 hours.
2. Outdoor temperature ＜37.4° F and just connected to the power source.

■ **The crankcase heating stop must meet condition:**
Outdoor temperature ＞44.6° F or compressor start.

8.2 REVERSING VALVE INTRODUCTION (Heat pump only)

Reversing valve energizes at the heating conditions, and cut off at the cooling condition.

8.3 PROTECTION FUNCTION INTRODUCTION (Heat pump only)

■ **Sensor T3 (condenser pipe temperature) and T4 (outdoor ambient temperature**)
When open-circuit, compressor, outdoor fan motor and reverse valve will be OFF.
T3＞149°F,compressor stop working ; T3＜140°F,compressor start working.
When T4 < 5 °F, compressor will stop.If the electrical heater kit is installed in the indoor unit, the outdoor unit would provide a signal to drive up the heater.
When T4 > 10.4 °F, compressor will restart.

■ **Discharge temperature protection (optional)**
When discharge temp. > 275 °F, the compressor will stop.
When discharge temp. < 194 °F, the compressor will restart.

■ **High pressure protection (optional)**
When high pressure > 638 PSIG, the compressor and outdoor fan motor will stop.
When high pressure < 464 PSIG, the compressor and outdoor fan motor will restart (3 minutes delay necessary).

■ **Low pressure protection**
Low pressure < 21 PSIG, the compressor and outdoor fan motor will stop.
Low pressure > 44 PSIG, the compressor and outdoor fan motor will restart (3 minutes delay necessary).
In stand-by status, the compressor will not start in low pressure protection.
Within 30 mins, if 4 protection cycles occurs.The system will be locked. It will be restore after power cycle.

■ **Start-up conditions of defrost mode:**
When JUMP switch is set to “1”(See in Fig 11), the mode will start up in either of the two following conditions:
1. Compressor operating, when T4 is > 28.4 °F and T3 is < 32 °F last for 40 minutes;
2. Compressor operating, when T4 is < 28.4 °F and T3 is < 32 °F last for 50 minutes.
When JUMP switch is set to “0”:
Compressor operating, when T3 is < 32 °F last for 30 minutes.

■ **Shut-down conditions of defrost mode:**
The mode will shut down in either of the two following conditions:
1. The defrosted time lasting for 10 minutes;
2. T3 is ≥ 77 °F.

■ When the compressor has been running more than 10 minutes in the heating mode, holding down the FORCE button for at least 6 seconds, the systen enters to the defrost mode, and then exits the defrost mode normally by itself.

8.4 SENSORS

1. T3(condenser pipe temperature) and T4(outdoor ambient temperature, heat pump only) see TABLE 4
2.T5(compressor discharge temperature) and Tf(IPM radiator fin temperature) see TABLE 5.
3. Pressure sensor(cooling only) see TABLE 6, Pressure sensor(heat pump only) see TABLE 7.

TABLE 4

TEMP F	TEMP C	RESISTANCE kΩ	VOLTS DC	TEMP F	TEMP C	RESISTANCE kΩ	VOLTS DC
-5	-20.6	107.732	4.65	90	32.2	7.225	2.36
0	-17.8	93.535	4.6	95	35	6.401	2.21
5	-15	79.521	4.54	100	37.8	5.683	2.07
10	-12.2	67.795	4.47	105	40.6	5.057	1.93
15	-9.4	57.948	4.39	110	43.3	4.509	1.79
20	-6.7	49.652	4.3	115	46.1	4.028	1.67
25	-3.9	42.645	4.21	120	48.9	3.606	1.55
30	-1.1	36.710	4.1	125	51.7	3.233	1.43
40	4.4	27.386	3.86	130	54.4	2.902	1.32
45	7.2	23.732	3.73	135	57.2	2.610	1.22
50	10	20.610	3.59	140	60	2.350	1.13
55	12.8	17.939	3.45	145	62.8	2.119	1.04
60	15.6	15.648	3.3	150	65.6	1.914	0.96
65	18.3	13.681	3.15	155	68.3	1.731	0.88
70	21.1	11.987	2.99	160	71.1	1.574	0.82
75	23.9	10.527	2.83	165	73.9	1.416	0.75
80	26.7	9.265	2.67	170	76.7	1.276	0.68
85	29.4	8.172	2.52				

TABLE 5

TEMP F	TEMP C	RESISTANCE kΩ	VOLTS DC	TEMP F	TEMP C	RESISTANCE kΩ	VOLTS DC
-5	-20.6	600.134	4.93	140	60	13.643	3.14
0	-17.8	505.551	4.92	145	62.8	12.359	3.03
5	-15	427.463	4.91	150	65.6	11.214	2.91
10	-12.2	362.739	4.89	155	68.3	10.227	2.8
15	-9.4	308.891	4.87	160	71.1	9.308	2.68
20	-6.7	265.398	4.85	165	73.9	8.485	2.56
25	-3.9	227.481	4.83	170	76.7	7.746	2.45
30	-1.1	195.601	4.8	175	79.4	7.105	2.34
35	1.7	168.707	4.77	180	82.2	6.504	2.23
40	4.4	146.695	4.74	185	85	5.963	2.13
45	7.2	127.258	4.7	190	87.8	5.474	2.02
50	10	110.707	4.66	195	90.6	5.032	1.92
55	12.8	96.572	4.61	200	93.3	4.645	1.83
60	15.6	84.465	4.56	205	96.1	4.28	1.73
65	18.3	74.411	4.51	210	98.9	3.949	1.64
70	21.1	65.408	4.45	215	101.7	3.648	1.56
75	23.9	57.634	4.39	220	104.4	3.383	1.48
80	26.7	50.904	4.32	225	107.2	3.133	1.4
85	29.4	45.258	4.24	230	110	2.904	1.32
90	32.2	40.152	4.16	235	112.8	2.694	1.25
95	35	35.699	4.08	240	115.6	2.503	1.18
100	37.8	31.807	3.99	245	118.3	2.334	1.12
105	40.6	28.398	3.89	250	121.1	2.172	1.06
110	43.3	25.506	3.8	255	123.9	2.024	1
115	46.1	22.861	3.7	260	126.7	1.888	0.95
120	48.9	20.529	3.59	265	129.4	1.767	0.9
125	51.7	18.47	3.48	270	132.2	1.651	0.85
130	54.4	16.708	3.37	275	135	1.544	0.8
135	57.2	15.085	3.26	280	137.8	1.446	0.76

TABLE 6

For AC model: NSK-BD020I V=2*MPa+0.5					
No.	V	Te	Pe	No.	V
		℃	MPa		
1	1.04	-22	0.27	47	2
2	1.07	-21	0.28	48	2.02
3	1.1	-20	0.3	49	2.05
4	1.11	-19.5	0.31	50	2.08
5	1.13	-19	0.31	51	2.11
6	1.14	-18.5	0.32	52	2.14
7	1.16	-18	0.33	53	2.16
8	1.17	-17.5	0.34	54	2.19
9	1.19	-17	0.35	55	2.22
10	1.21	-16.5	0.35	56	2.25
11	1.22	-16	0.36	57	2.28
12	1.24	-15.5	0.37	58	2.31
13	1.26	-15	0.38	59	2.34
14	1.27	-14.5	0.39	60	2.37
15	1.29	-14	0.4	61	2.4
16	1.31	-13.5	0.41	62	2.44
17	1.33	-13	0.41	63	2.47
18	1.35	-12.5	0.42	64	2.5
19	1.37	-12	0.43	65	2.53
20	1.38	-11.5	0.44	66	2.56
21	1.4	-11	0.45	67	2.6
22	1.42	-10.5	0.46	68	2.63
23	1.44	-10	0.47	69	2.67
24	1.46	-9.5	0.48	70	2.7
25	1.48	-9	0.49	71	2.74
26	1.5	-8.5	0.5	72	2.77
27	1.52	-8	0.51	73	2.81
28	1.54	-7.5	0.52	74	2.84
29	1.57	-7	0.53	75	2.88
30	1.59	-6.5	0.54	76	2.92
31	1.61	-6	0.55	77	2.95
32	1.63	-5.5	0.57	78	2.99
33	1.65	-5	0.58	79	3.03
34	1.68	-4.5	0.59	80	3.07
35	1.7	-4	0.6	81	3.1
36	1.72	-3.5	0.61	82	3.14
37	1.75	-3	0.62	83	3.18
38	1.77	-2.5	0.64	84	3.22
39	1.79	-2	0.65	85	3.26
40	1.82	-1.5	0.66	86	3.3
41	1.84	-1	0.67	87	3.35
42	1.87	-0.5	0.68	88	3.39
43	1.89	0	0.7	89	3.43
44	1.92	0.5	0.71	90	3.47
45	1.94	1	0.72	91	3.51
46	1.97	1.5	0.74	92	3.56
17	80.2376	74	8.4881	132	1.4937
18	76.6616	75	8.166	133	1.4551
19	73.2636	76	7.8945	134	1.4177
20	70.0337	77	7.6334	135	1.3813
21	66.9628	78	7.382	136	1.3461
22	64.0424	79	7.1401	137	1.3118
23	61.2643	80	6.9072	138	1.2786
24	58.6208	81	6.683	139	1.2463
25	56.1048	82	6.467	140	1.215
26	53.7095	83	6.259		

TABLE 7

For HP model: NSK-BD035I V=(8/7)*MPa+0.5											
No.	V	Te/Tc	Pe/Pc	No.	V	Te/Tc	Pe/Pc	No.	V	Te/Tc	Pe/Pc
		℃	MPa			℃	MPa			℃	MPa
1	0.69	-30	0.17	56	1.37	2.5	0.76	111	2.54	30	1.78
2	0.7	-29	0.18	57	1.39	3	0.78	112	2.56	30.5	1.81
3	0.72	-28	0.19	58	1.4	3.5	0.79	113	2.59	31	1.83
4	0.73	-27	0.2	59	1.42	4	0.8	114	2.62	31.5	1.86
5	0.75	-26	0.22	60	1.43	4.5	0.82	115	2.65	32	1.88
6	0.76	-25	0.23	61	1.45	5	0.83	116	2.68	32.5	1.91
7	0.78	-24	0.24	62	1.47	5.5	0.85	117	2.71	33	1.93
8	0.79	-23	0.25	63	1.48	6	0.86	118	2.74	33.5	1.96
9	0.81	-22	0.27	64	1.5	6.5	0.88	119	2.77	34	1.98
10	0.82	-21	0.28	65	1.52	7	0.89	120	2.8	34.5	2.01
11	0.84	-20	0.3	66	1.53	7.5	0.91	121	2.83	35	2.04
12	0.85	-19.5	0.31	67	1.55	8	0.92	122	2.86	35.5	2.06
13	0.86	-19	0.31	68	1.57	8.5	0.94	123	2.89	36	2.09
14	0.87	-18.5	0.32	69	1.59	9	0.95	124	2.92	36.5	2.12
15	0.88	-18	0.33	70	1.61	9.5	0.97	125	2.95	37	2.15
16	0.89	-17.5	0.34	71	1.62	10	0.98	126	2.98	37.5	2.17
17	0.89	-17	0.35	72	1.64	10.5	1	127	3.02	38	2.2
18	0.9	-16.5	0.35	73	1.66	11	1.02	128	3.05	38.5	2.23
19	0.91	-16	0.36	74	1.68	11.5	1.03	129	3.08	39	2.26
20	0.92	-15.5	0.37	75	1.7	12	1.05	130	3.12	39.5	2.29
21	0.93	-15	0.38	76	1.72	12.5	1.07	131	3.15	40	2.32
22	0.94	-14.5	0.39	77	1.74	13	1.08	132	3.18	40.5	2.35
23	0.95	-14	0.4	78	1.76	13.5	1.1	133	3.22	41	2.38
24	0.96	-13.5	0.41	79	1.78	14	1.12	134	3.25	41.5	2.41
25	0.97	-13	0.41	80	1.8	14.5	1.14	135	3.29	42	2.44
26	0.98	-12.5	0.42	81	1.82	15	1.15	136	3.32	42.5	2.47
27	0.99	-12	0.43	82	1.84	15.5	1.17	137	3.36	43	2.5
28	1.01	-11.5	0.44	83	1.86	16	1.19	138	3.39	43.5	2.53
29	1.02	-11	0.45	84	1.88	16.5	1.21	139	3.43	44	2.56
30	1.03	-10.5	0.46	85	1.9	17	1.23	140	3.46	44.5	2.59
31	1.04	-10	0.47	86	1.92	17.5	1.24	141	3.5	45	2.62
32	1.05	-9.5	0.48	87	1.94	18	1.26	142	3.54	45.5	2.66
33	1.06	-9	0.49	88	1.97	18.5	1.28	143	3.57	46	2.69
34	1.07	-8.5	0.5	89	1.99	19	1.3	144	3.61	46.5	2.72
35	1.09	-8	0.51	90	2.01	19.5	1.32	145	3.65	47	2.76
36	1.1	-7.5	0.52	91	2.03	20	1.34	146	3.69	47.5	2.79
37	1.11	-7	0.53	92	2.06	20.5	1.36	147	3.73	48	2.82
38	1.12	-6.5	0.54	93	2.08	21	1.38	148	3.77	48.5	2.86
39	1.13	-6	0.55	94	2.1	21.5	1.4	149	3.8	49	2.89
40	1.15	-5.5	0.57	95	2.13	22	1.42	150	3.84	49.5	2.93
41	1.16	-5	0.58	96	2.15	22.5	1.44	151	3.88	50	2.96
42	1.17	-4.5	0.59	97	2.17	23	1.46	152	3.93	50.5	3
43	1.19	-4	0.6	98	2.2	23.5	1.49	153	3.97	51	3.03
44	1.2	-3.5	0.61	99	2.22	24	1.51	154	4.01	51.5	3.07
45	1.21	-3	0.62	100	2.25	24.5	1.53	155	4.05	52	3.1
46	1.23	-2.5	0.64	101	2.27	25	1.55	156	4.09	52.5	3.14
47	1.24	-2	0.65	102	2.3	25.5	1.57	157	4.13	53	3.18
48	1.25	-1.5	0.66	103	2.32	26	1.6	158	4.18	53.5	3.22
49	1.27	-1	0.67	104	2.35	26.5	1.62	159	4.22	54	3.25
50	1.28	-0.5	0.68	105	2.38	27	1.64	160	4.26	54.5	3.29
51	1.3	0	0.7	106	2.4	27.5	1.66	161	4.31	55	3.33
52	1.31	0.5	0.71	107	2.43	28	1.69	162	4.35	55.5	3.37
53	1.33	1	0.72	108	2.45	28.5	1.71	163	4.39	56	3.41
54	1.34	1.5	0.74	109	2.48	29	1.73	164	4.44	56.5	3.45
55	1.36	2	0.75	110	2.51	29.5	1.76	165	4.48	57	3.49

8.5 Error code table

Display content	Error or protection definition	Remark
E4	Temp. sensor error	
E5	Voltage protection(overvoltage and undervoltage)	Self-recovery for the first voltage protection, second voltage protection needs to be pow ered on and then recover.
E6	DC motor error	
Eb	2 E6 protections in 10 min	Recover w hen pow ering on again
E7	Air discharge sensor T5 loosely-inserted error	
H0	Main control chip and comm. Chip comm. error	
H3	3 (P3) protections in 120 min	Recover w hen pow ering on again
H4	3 (P6) protections in 60 min	Recover when powering on again
H5	5 (P2) protections in 100 min	Recover when powering on again
H6	3 (P4) protections in 100 min	Recover when powering on again
H8	Pressure sensor error	
Hb	Heating high pressure protection	
HH	PH standby tw ice in 200 min.	Recover when powering on again
P0	Module radiator temp. Tf protection	
P1	High pressure protection	
P2	Low pressure protection	
P3	frequency-conversion over-current protection	
P4	Air discharge overtemperature protection	
P5	Cooling high pressure protection	
	(T3 pipe high temp.)	
P6	Compressor instant over-current protection	
PH	Compressor liquid –return protection	
P8	DC fan typhoon protection	After 2 min, it w ill recover to normal status.
C3	T3 sensor loosely-inserted error	
CE	5 P1 protections in 150min	Recover when powering on again
F1	High pressure protection sw itch error	
F3	5 P5 protections in 180min	Recover when powering on again
F4	3 P0 protections in 120min	Recover when powering on again
F5	5 Hb protections in 180min	Recover when powering on again
	Frequency limited/status definition	
L	T3 high temp. protection frequency limit	
D	T5 high temp. protection frequency limit	
P	Compression ratio protection frequency limit	
F	Module temp. protection frequency limit	
C	Current protection frequency limit	
U	Voltage protection frequency limit	
H	Condensing pressure protection frequency limit	
A	Oil return	
dF	Defrost	

8.6 Parameter point check table

1、Shift to display content of data code pipe when pressing point check key shortly(check key). Display the next set of data when press the key once. The display content is accordance with the sequence.

2、There're 3 digits for LED. The first digit is sequence(only display units digit, recycling display), the second and third digits are values. For example, the 8th item is operating low pressure saturation temperature. The 11th item is operating low pressure. For detailed meanings, please refer to the point check table.3. After staying for 20s, it will recover to the normal status display

4、For normal status display, the last 2 digits of nixie tube will display ambient temp when the unit is in standby status(the first nixie tube has no display). When operating, last 2 digits of nixie tube will display operating frequency.(If there's system protection, the first digit of nixie tube will display status code, details for code meaning, please refer to the error code table)

No.	Point check content	Example	Remark
0	Outdoor unit capacity	C3	Model+RT
1	Outdoor unit mode	2	0 standby,2 cooling，3heating
2	Outdoor unit set frequency		
3	EXV opening degree		Actual value
4	T3 tube temp.		
5	T4 ambient temp.		
6	T5 air discharge temp.		
7	Reserved		
8	Te low pressure temp.(air return saturation)		
9	Tc high pressure temp.(Air dischage saturation)		
10	Tf module temp.		
11	Pe low pressure (air return pressure)		Actual value *10
12	Pc high pressure (air discharge pressure)		Actual value *10
13	Air discharge superheat		
14	Reserved		
15	Reserved		
16	Frequency conversion current		
17	Voltage value		
18	Air speed		
19	Reserved		
20	Reserved		
21	Reserved		
22	Spit oil quantity		Actual value /10
23	The last time error code		
24	Softw are version		
25	Remark"--"		

9.0 WARRANTY

Assist owner with processing Warranty cards and/or online registration.

9.1 MAINTENANCE

1. 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.
2. The outdoor fan motor is permanently lubricated and does not require periodic oiling.
3. Refer to the furnace or air handler instructions for filter and blower motor maintenance.
4. The indoor coil and drain pan should be inspected and cleaned regularly to assure proper drainage.

CAUTION

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.

10.0 WIRING DIAGRAM

CAUTION

These units must be wired and installed in accordance with all National and Local Safety Codes.

10.1 CONTROL WIRING FOR UNITS

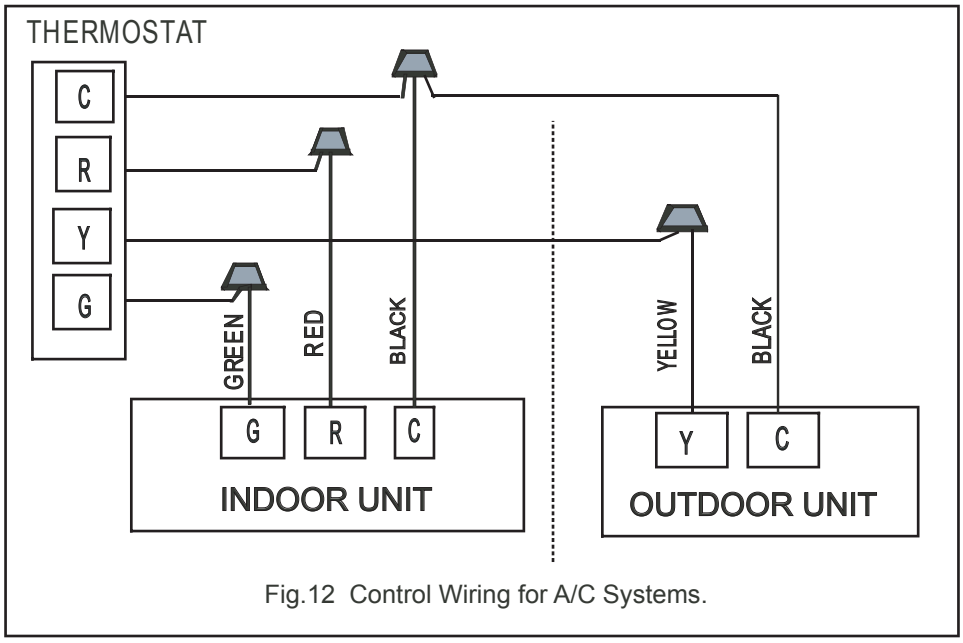


Fig.12 Control Wiring for A/C Systems.

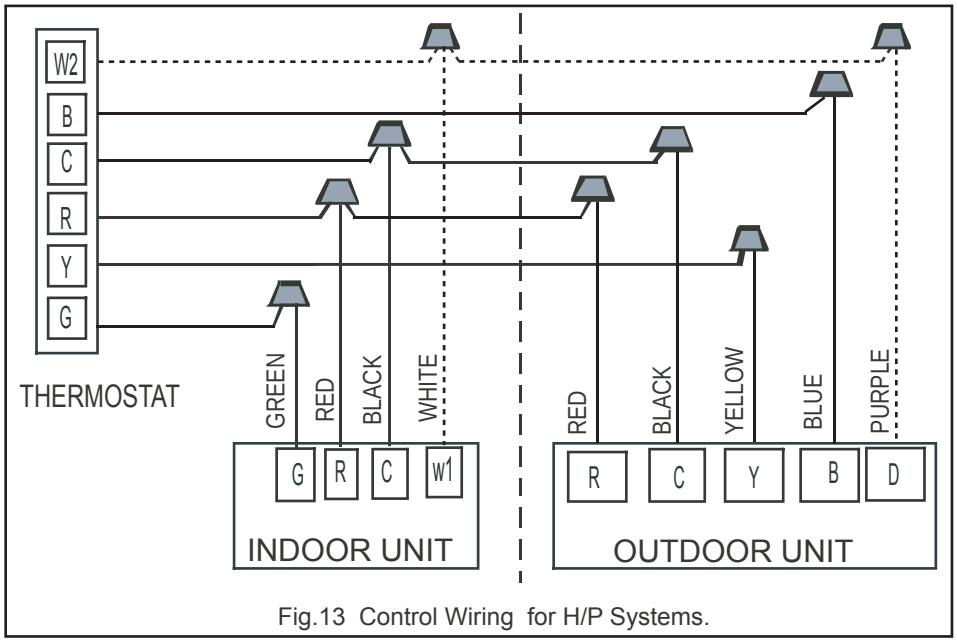
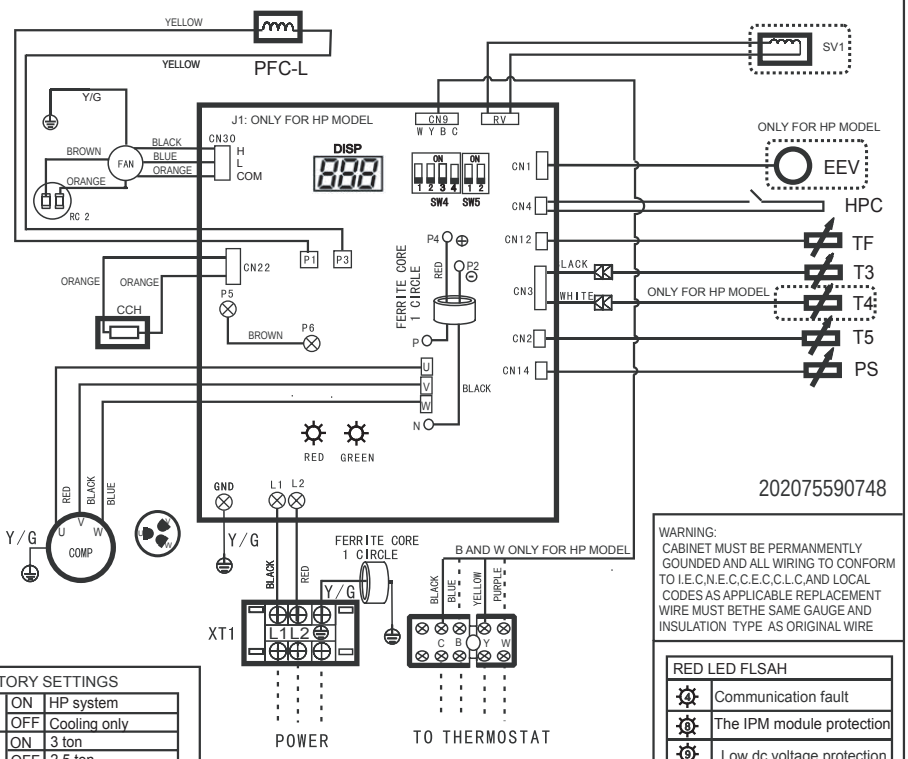


Fig.13 Control Wiring for H/P Systems.

SW5-1	ON	Advance into the defrosting
	OFF	Normal defrosting
SW5-2	ON	Time Delay of the end defrosting:120S
	OFF	Time Delay of the end defrosting:60S
SW4-1	Not used	
SW4-2	Not used	
SW4-3	ON	Adaptive capacity output disable
	OFF	Adaptive capacity output
SW4-4	ON	Accelerated cooling/heating
	OFF	Normally cooling/heating

CODE	Fault description
E4	Environmental temperature sensor fault
E5	Voltage protection
E6	Reserved
E7	The exhaust gas sensor is not seated fault
H0	Communication fault in main control chip
H4	3 times (P6) protection in 60 minutes
H5	3 times (P2) protection in 100 minutes
H6	3 times (P4) protection in 100 minutes
H8	Pressure sensor fault
H9	3 times (P9) protection in 60 minutes
Hb	high pressure protection in Heating
HC	Reserved
HH	Wet running 3 times in 180 minutes
P0	The exhaust temp. of the comp. Protection
P1	High pressure protection
P2	Low pressure Protection
P3	Over current protection
P4	The exhaust gas sensor is not seated fault
P5	High The tube temp. protection
P6	The IPM module protection
PH	Wet running standby
C3	The T3 sensor is not seated fault
CE	3 times (P1) protection in 100 minutes
F3	3 times T3 high temp. protection in180 minutes
F4	3 times (P0) protection in 120 minutes



FACTORY SETTINGS

J1	ON	HP system
	OFF	Cooling only
J2	ON	3 ton
	OFF	2.5 ton

USE COPPER CONDUCTORS ONLY

WARNING:
CABINET MUST BE PERMANMENTLY GOUNDED AND ALL WIRING TO CONFORM TO I.E.C,N.E.C,C.E.C,C.L.C,AND LOCAL CODES AS APPLICABLE REPLACEMENT WIRE MUST BETHE SAME GAUGE AND INSULATION TYPE AS ORIGINAL WIRE

TF	RADIATOR TEMP. SENSOR
COMP	COMPRESSOR
CAP	CAPACITANCE
EEV	ELECTRIC EXPANSIVE VALVE
CCH	CRANKCASE HEATING
HPC	HIGH PRESSURE SWITCH

PFC-L	PFC INDUCTANCE
SV1	4-WAY VALVE
T3	CONDENSER TEMPERATURE SENSOR
T4	OUTDOOR AMBIENT TEMPERATURE SENSOR
T5	COMP. DISCHARGE TEMPERATURE SENSOR
PS	PRESSURE SENSOR

RED LED FLSAH	
4	Communication fault
8	The IPM module protection
9	Low dc voltage protection
10	The IPM control fault
11	Compressor phase error
GREEN LED	
0	Standby
1	Electric control board fault
2	Compressor operation

Fig.14 Outdoor Unit Wiring Diagram for Systems(208/230V 1P 60Hz) (24/36K).

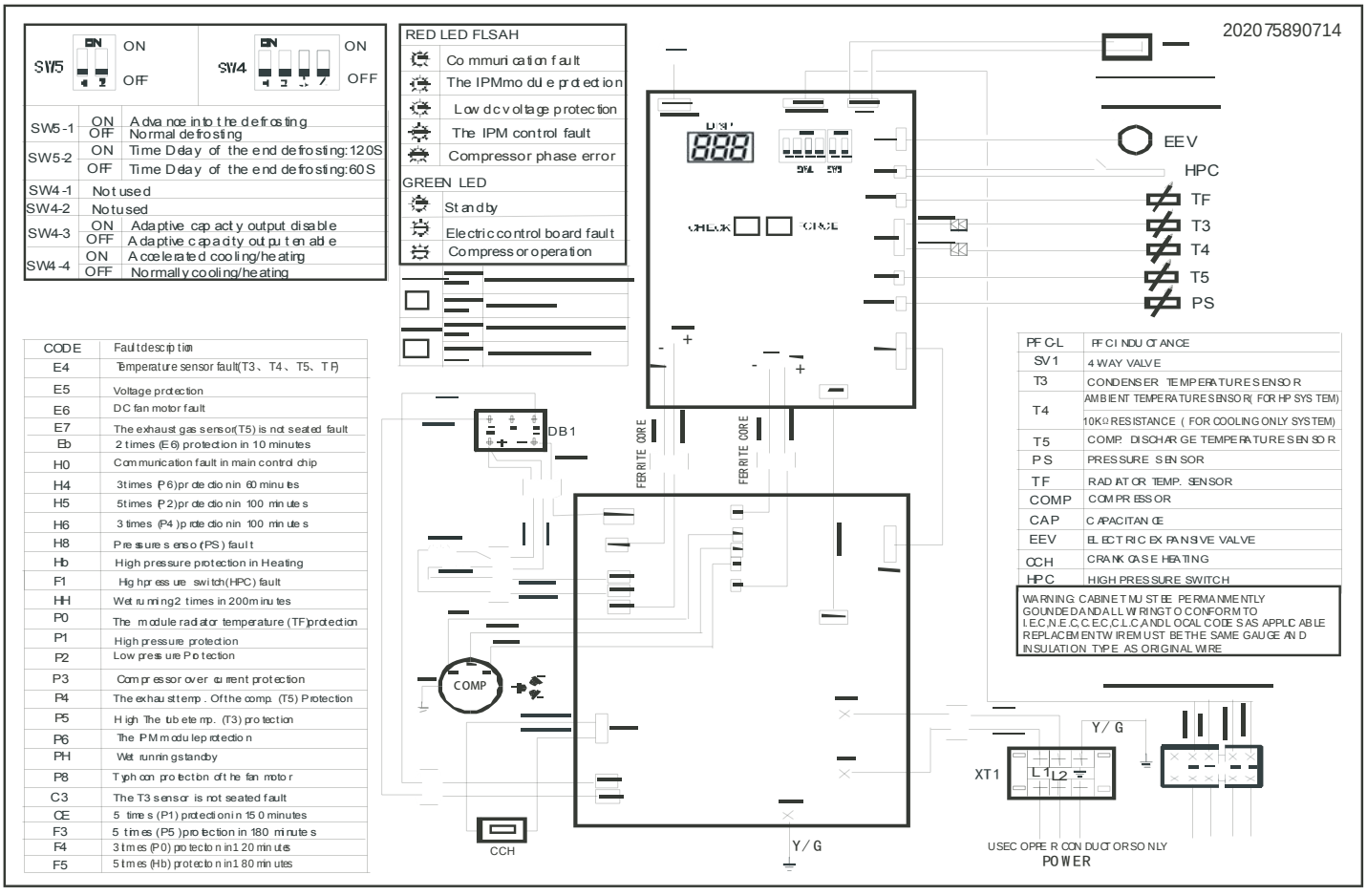
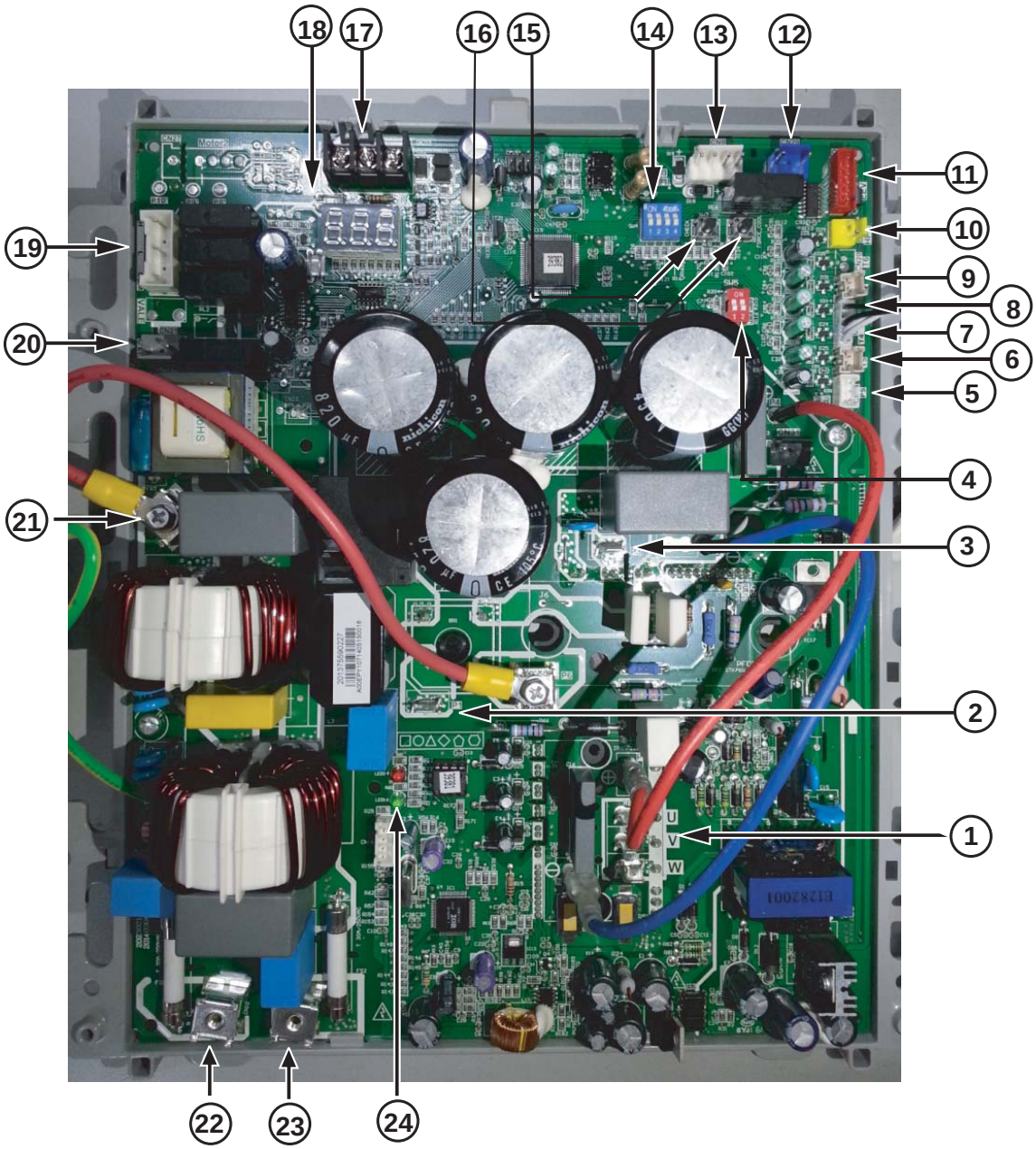


Fig.15 Outdoor Unit Wiring Diagram for Systems(208/230V 1P 60Hz) (48/60K).



Function description for the corresponding position

No.	Content	No.	Content
1	Compressor w iring terminal	13	Temp. controller connecting port
2	Reactor w iring terminal(connect a reactor betw een 2 and 3)	14	Function dial code SW4
3	Reactor w iring terminal(connect a reactor betw een 2 and 3)	15	Spot check button
4	Defrosting function dial codeSW5	16	Forced operation button
5	Pressure sensor port	17	Reserved
6	Air discharge temp.sensor port	18	Nixie tube display
7	Outdoor temp.sensor port(HP only)	19	Fan control port
8	Condenser temp.sensor port	20	Crankcase heating zone control terminal
9	Radiator temp.sensor port	21	Short w ire
10	High pressure sw itch port	22	Pow er supply connecting terminal
11	EXV drive port(HP only)	23	Pow er supply connecting terminal
12	4-w ay valve port	24	Indicator lamp

REFRIGERANT CHARGE FOR AC SYSTEM

Cooling Mode		18 SEER R410A AC Charge Chart 2 TON												
		Outdoor Ambient Temperature(°F)												
		55	60	65	70	75	80	85	90	95	100	105	110	115
		Lipuid Pressure at Small Service Valve(psig)												
Suction Pressure at Large Service Valve(psig)	177						307	330	353	376	403	430	457	484
	173					286	306	329	352	375	402	429	456	483
	169				266	285	305	328	351	374	401	428	455	482
	165			245	265	284	304	327	350	372	400	427	454	481
	161		224	244	264	283	303	326	349	371	399	426	453	480
	157	203	223	243	263	282	302	325	347	370	398	425	452	479
	153	202	222	242	262	281	301	324	346	369	396	423	450	478
	149	201	221	241	261	280	300	323	345	368	395	422	449	477
	145	200	220	240	260	279	299	322	344	367	394	421	448	476
	141	199	219	239	259	278	298	321	343	366	393	420	447	475
	137	198	218	238	258	277	297	320	342	365	392	419	446	473
	133	197	217	237	257	276	296	319	341	364	391	418	445	472
	129	196	216	236	256	275	295	318	340	363	390	417	444	471
	125	195	215	235	255	274	294	316	339	361	389	416	443	470
	121	194	214	234	254	273	293	315	338	360	388	415	442	469
	117	193	213	233	253	272	292	314	337	359	387	414	441	468
	113	192	212	232	252	271	291	313	336	358	385	412	439	467
	109	191	211	231	251	270	290	312	335	357	384	411	438	466

Cooling Mode		18 SEER R410A AC Charge Chart 3 TON												
		Outdoor Ambient Temperature(°F)												
		55	60	65	70	75	80	85	90	95	100	105	110	115
		Lipuid Pressure at Small Service Valve(psig)												
Suction Pressure at Large Service Valve(psig)	177						312	334	357	379	404	430	456	482
	173					291	311	333	355	378	403	429	455	481
	169				271	290	310	332	354	376	402	428	454	480
	165			250	269	289	309	331	353	375	401	427	453	478
	161		229	249	268	288	307	329	352	374	399	425	451	477
	157	209	228	247	267	286	306	328	350	373	398	424	450	476
	153	206	226	246	266	285	305	327	349	371	397	423	449	474
	149	207	226	245	264	284	304	326	348	370	396	422	448	473
	145	205	224	244	263	283	302	324	347	369	394	420	446	472
	141	204	223	242	262	281	301	323	345	367	393	419	445	471
	137	201	221	241	261	280	300	322	344	366	392	418	444	469
	133	202	221	240	259	279	298	321	343	365	390	416	442	468
	129	200	219	239	258	278	297	319	341	364	389	415	441	467
	125	199	218	237	257	276	296	318	340	362	388	414	440	465
	121	196	216	236	256	275	295	317	339	361	386	412	438	464
	117	195	215	235	254	274	293	315	337	360	385	411	437	463
	113	195	214	233	253	272	292	314	336	358	384	410	436	461
	109	192	212	232	252	271	291	313	335	357	383	409	435	460

Cooling Mode		18 SEER R410A AC Charge Chart 4 TON												
		Outdoor Ambient Temperature(°F)												
		55	60	65	70	75	80	85	90	95	100	105	110	115
		Lipuid Pressure at Small Service Valve(psig)												
Suction Pressure at Large Service Valve(psig)	177						304	327	349	372	398	424	450	475
	173					284	303	326	348	371	396	422	448	474
	169				264	283	302	325	347	370	395	421	447	473
	165			243	263	282	301	323	346	368	394	420	446	472
	161		223	242	261	281	300	322	345	367	393	419	445	471
	157	203	222	241	260	280	299	321	344	366	392	418	444	470
	153	202	221	240	259	279	298	320	343	365	391	417	443	469
	149	201	220	239	258	278	297	319	342	364	390	416	442	468
	145	198	218	238	257	277	296	318	341	363	389	415	441	467
	141	197	217	237	256	276	295	317	340	362	388	414	440	466
	137	197	216	235	255	274	294	316	338	361	387	413	439	464
	133	196	215	234	254	273	293	315	337	360	385	411	437	463
	129	193	213	233	253	272	292	314	336	359	384	410	436	462
	125	192	212	232	252	271	291	313	335	357	383	409	435	461
	121	191	211	231	251	270	290	312	334	356	382	408	434	460
	117	190	210	230	250	269	289	311	333	355	381	407	433	459
	113	189	209	229	249	268	288	310	332	354	380	406	432	458
	109	188	208	228	247	267	287	309	331	353	379	405	431	457

Cooling Mode		18 SEER R410A AC Charge Chart 5 TON												
		Outdoor Ambient Temperature(°F)												
		55	60	65	70	75	80	85	90	95	100	105	110	115
		Lipuid Pressure at Small Service Valve(psig)												
Suction Pressure at Large Service Valve(psig)	177						303	325	347	369	394	418	443	468
	173					284	302	324	346	368	393	418	442	467
	169				264	283	301	323	345	368	392	417	441	466
	165			244	263	282	300	322	345	367	391	416	440	465
	161		224	243	262	281	300	322	344	366	390	415	440	464
	157	204	223	242	261	280	299	321	343	365	389	414	439	463
	153	203	222	241	260	279	298	320	342	364	388	413	438	462
	149	200	220	240	259	278	297	319	341	363	388	412	437	461
	145	199	219	239	258	277	296	318	340	362	387	411	436	460
	141	199	218	238	257	276	295	317	339	361	386	410	435	460
	137	198	217	236	256	275	294	316	338	360	385	409	434	459
	133	197	216	235	255	274	293	315	337	359	384	409	433	458
	129	194	214	234	254	273	292	314	336	359	383	408	432	457
	125	193	213	233	253	272	291	313	336	358	382	407	431	456
	121	192	212	232	252	271	291	313	335	357	381	406	431	455
	117	193	212	231	250	270	290	312	334	356	380	405	430	454
	113	192	211	230	249	269	289	311	333	355	379	404	429	453
	109	189	209	229	248	268	288	310	332	354	379	403	428	452

REFRIGERANT CHARGE FOR HP SYSTEM

Cooling Mode		18 SEER R410A HP Charge Chart 2 TON (cooling mode)												
		Outdoor Ambient Temperature(°F)												
		55	60	65	70	75	80	85	90	95	100	105	110	115
		Lipuid Pressure at Small Service Valve(psig)												
Suction Pressure at Large Service Valve(psig)	177						308	331	354	378	405	432	459	486
	173					287	307	330	353	377	404	431	458	485
	169				266	286	306	329	352	376	403	430	457	484
	165			245	265	285	305	328	351	374	402	429	456	483
	161		224	244	264	284	304	327	350	373	401	428	455	482
	157	203	223	243	263	283	303	326	349	372	400	427	454	481
	153	202	222	242	262	282	302	325	348	371	398	425	452	480
	149	201	221	241	261	281	301	324	347	370	397	424	451	479
	145	200	220	240	260	280	300	323	346	369	396	423	450	478
	141	199	219	239	259	279	299	322	345	368	395	422	449	477
	137	198	218	238	258	278	298	321	344	367	394	421	448	475
	133	197	217	237	257	277	297	320	343	366	393	420	447	474
	129	196	216	236	256	276	296	319	342	365	392	419	446	473
	125	195	215	235	255	275	295	318	341	363	391	418	445	472
	121	194	214	234	254	274	294	317	340	362	390	417	444	471
	117	193	213	233	253	273	293	316	338	361	389	416	443	470
	113	192	212	232	252	272	292	315	337	360	387	414	441	469
	109	191	211	231	251	271	291	314	336	359	386	413	440	468

Cooling Mode		18 SEER R410A HP Charge Chart 3 TON (cooling mode)												
		Outdoor Ambient Temperature(°F)												
		55	60	65	70	75	80	85	90	95	100	105	110	115
		Lipuid Pressure at Small Service Valve(psig)												
Suction Pressure at Large Service Valve(psig)	177						312	335	357	380	405	431	457	483
	173					291	311	334	356	379	404	430	456	482
	169				271	290	310	332	355	377	403	429	455	481
	165			250	269	289	309	331	354	376	402	428	454	479
	161		229	249	268	288	307	330	352	375	400	426	452	478
	157	209	228	247	267	286	306	329	351	374	399	425	451	477
	153	206	226	246	266	285	305	327	350	372	398	424	450	475
	149	207	226	245	264	284	304	326	349	371	397	423	449	474
	145	205	224	244	263	283	302	325	347	370	395	421	447	473
	141	204	223	242	262	281	301	323	346	368	394	420	446	472
	137	201	221	241	261	280	300	322	345	367	393	419	445	470
	133	202	221	240	259	279	298	321	343	366	391	417	443	469
	129	200	219	239	258	278	297	320	342	365	390	416	442	468
	125	199	218	237	257	276	296	318	341	363	389	415	441	466
	121	196	216	236	256	275	295	317	339	362	387	413	439	465
	117	195	215	235	254	274	293	316	338	361	386	412	438	464
	113	195	214	233	253	272	292	314	337	359	385	411	437	462
	109	192	212	232	252	271	291	313	336	358	384	410	436	461

Cooling Mode		18 SEER R410A HP Charge Chart 4TON (cooling mode)												
		Outdoor Ambient Temperature(°F)												
		55	60	65	70	75	80	85	90	95	100	105	110	115
		Lipuid Pressure at Small Service Valve(psig)												
Suction Pressure at Large Service Valve(psig)	177						322	346	371	395	424	452	480	508
	173					301	320	344	369	393	422	450	478	506
	169				279	299	318	342	367	391	420	448	476	504
	165			258	277	297	316	340	365	389	418	446	474	502
	161		237	256	275	295	314	338	363	387	416	444	472	500
	157	216	235	254	273	293	312	336	361	385	414	442	470	498
	153	214	233	252	271	291	310	334	359	383	412	440	468	496
	149	212	231	250	269	289	308	332	357	381	410	438	466	494
	145	210	229	248	267	287	306	330	355	379	408	436	464	492
	141	208	227	246	265	285	304	328	353	377	406	434	462	490
	137	206	225	244	263	283	302	326	351	375	404	432	460	488
	133	204	223	242	261	281	300	324	349	373	402	430	458	486
	129	202	221	240	259	279	298	322	347	371	400	428	456	484
	125	200	219	238	257	277	296	320	345	369	398	426	454	482
	121	198	217	236	255	275	294	318	343	367	396	424	452	480
	117	196	215	234	253	273	292	316	341	365	394	422	450	478
	113	194	213	232	251	271	290	314	339	363	392	420	448	476
	109	192	211	230	249	269	288	312	337	361	390	418	446	474

Cooling Mode		18 SEER R410A HP Charge Chart 5 TON (cooling mode)												
		Outdoor Ambient Temperature(°F)												
		55	60	65	70	75	80	85	90	95	100	105	110	115
		Lipuid Pressure at Small Service Valve(psig)												
Suction Pressure at Large Service Valve(psig)	177						315	338	361	384	411	437	463	489
	173					294	313	336	359	382	409	435	461	487
	169				274	292	311	334	357	380	407	433	459	485
	165			253	272	290	309	332	355	378	405	431	457	483
	161		232	251	270	288	307	330	353	376	403	429	455	481
	157	211	230	249	268	286	305	328	351	374	401	427	453	479
	153	209	228	247	266	284	303	326	349	372	399	425	451	477
	149	207	226	245	264	282	301	324	347	370	397	423	449	475
	145	205	224	243	262	280	299	322	345	368	395	421	447	473
	141	203	222	241	260	278	297	320	343	366	393	419	445	471
	137	201	220	239	258	276	295	318	341	364	391	417	443	469
	133	199	218	237	256	274	293	316	339	362	389	415	441	467
	129	197	216	235	254	272	291	314	337	360	387	413	439	465
	125	195	214	233	252	270	289	312	335	358	385	411	437	463
	121	193	212	231	250	268	287	310	333	356	383	409	435	461
	117	191	210	229	248	266	285	308	331	354	381	407	433	459
	113	189	208	227	246	264	283	306	329	352	379	405	431	457
	109	187	206	225	244	262	281	304	327	350	377	403	429	455

TABLE 9. Operational And 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 in accordance with procedures found in the Service Facts of the Outdoor Unit.

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

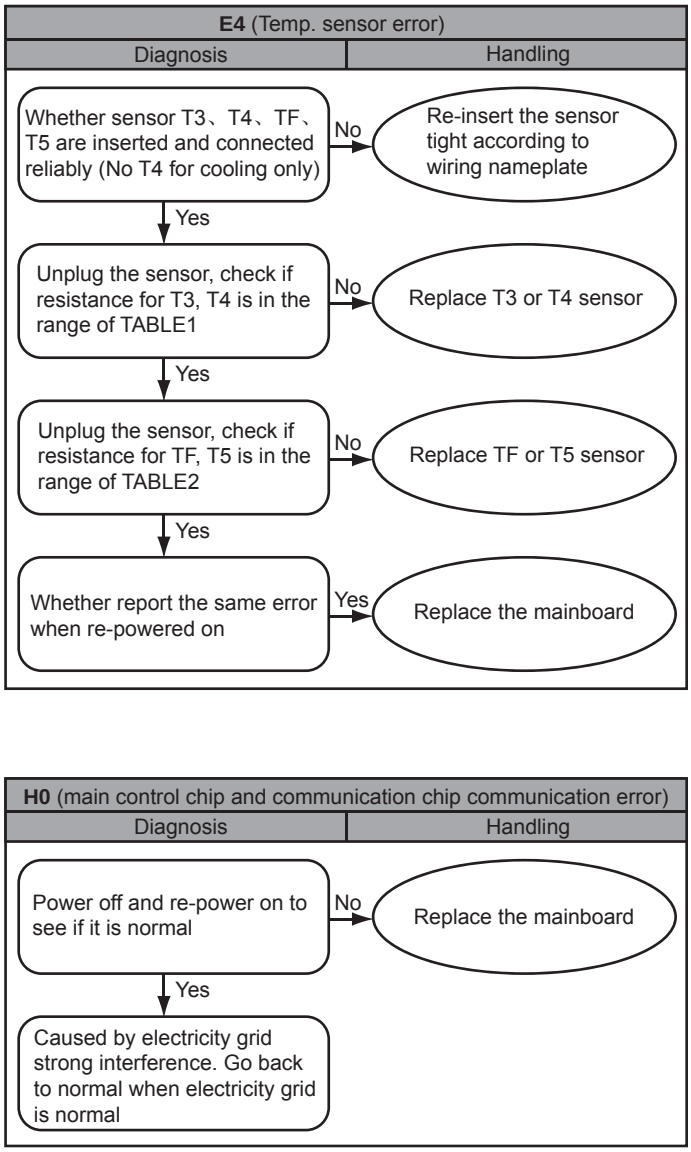
1. Be sure unit suspension(if used) is secure and that thereare no tools or loose debris in or around or on top of the unit.....[ ]
2. Properly insulate suction lines and fittings. .....[ ]
3. Properly secure and isolate all refrigerant lines... [ ]
4. Verify that all electrical connections are tight. .....[ ]
5. Check all duct outlets; they must be open and unrestricted. [ ]
6. Check drain lines and be sure all joints are tight..... [ ]
7. Be sure that a return air filter is installed. ..... [ ]
8. Operate complete system in each mode to verify proper performance. Verify operation of supplementary electric heater. .....[ ]

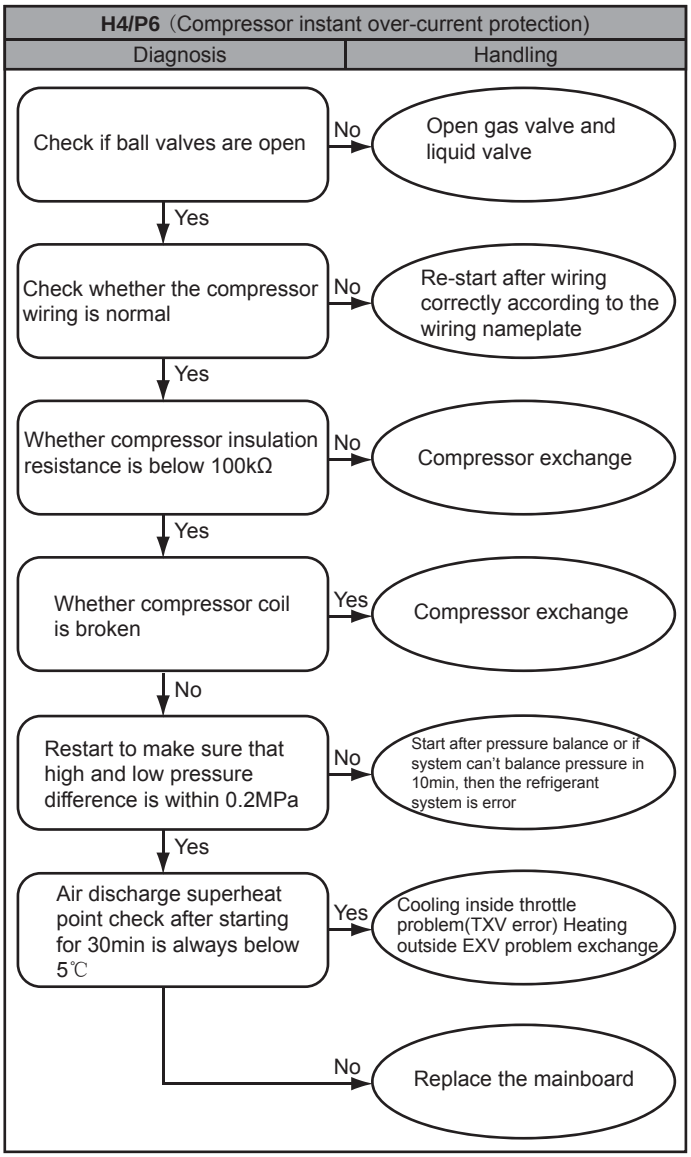
TABLE 10: Electrical Data:

Model	Minimum Circuit Ampacity(A)	Maximum Circuit Protector(A)
18AC/T	9.0	15
18HP/T	9.4	15
24/T	11.6	20
30/T	16.0	25
18/C	11.9	20
24AC/C	17.6	30
30AC/C	18.4	30
24HP/C	17.5	30

NOTES: 1.AC: Air Conditioner; HP: Heat Pump; No description:Air Conditioner & Heat Pump.
2.T: Toshiba Compressor; C: Copeland Compressor; L: LG Compressor

Diagnosisfault diagnosis





P8（DC fan typhoon protection(applicable for 48、60))

Diagnosis	Handling
Check whether motor wiring is reliably connected according to the nameplate	No → Re-insert the sensor according to wiring nameplate
Yes ↓ Check if there's 15VDC between P8 and P2	No → If wiring is correct, replace the mainboard
Yes ↓ Whether motor leads to fan high speed operating because of external force	Yes → Avoid external motor is influenced by the environment directly
No ↓ Whether it reports P8 in power-off status?	Yes → Replace the mainboard
No ↓ Replace the motor	

E5（Voltage protection)

Diagnosis	Handling
Whether the power supply voltage is between 208V-10% and 230V+10%	No → Check power supply to troubleshoot problems
Yes ↓ Check if the power supply is reliably connected, whether the power supply wire diameter meets requirements in the manual	No → Replace power supply wire or connect power supply wire well
Yes ↓ Cut off the power, and wait until electronic control indicator lamp goes out, then power on to see whether the compressor operates normally	No → Replace the mainboard
Yes ↓ Test if there's 380Vdc on the terminals of CN31 when compressor is operating	No → Replace the mainboard
Yes ↓ Check if there's high-power equipment nearby	Yes → Separate high-power equipment and power supply
	No → Caused by power supply voltage instantaneous fluctuation. Recover when power grid is normal

Eb/E6 (DC motor error)

Diagnosis	Handling
Check whether motor wiring is reliably connected according to the nameplate	No → Re-insert the sensor according to wiring nameplate
Yes ↓ Check if there's 15VDC Between P8 and P2	No → Check if wiring is correct, replace the mainboard
Yes ↓ Replace the motor to see if it is normal after restart?	No → Replace the mainboard

F4/P0（Module radiator temp. Tf protection)

Diagnosis	Handling
If the radiator is damaged or badly fixed	Yes → Fix the radiator. If radiator is damaged, replace it
No ↓ If there's dust or fallen leaves influencing radiating	Yes → Clean radiator duct
No ↓ Whether the fan and blade can normally operate	No → Replace motor or blade
Yes ↓ Whether the duct, including radiator, is blocked by debris	Yes → Troubleshoot surrounding influence to the duct
No ↓ Whether resistance of Tf is in the range of TABLE2	No → Replace Tf
Yes ↓ Re-insert Tf, power off and restart to see if there's the same error	Yes → Replace variable frequency drive

E7（air discharge temp. sensor loose error)

Diagnosis	Handling
Check whether the sensor doesn't fix to discharge pipe	Yes → Fix air discharge temp. sensor to the air discharge pipe, re-power on to start the unit
Check if wiring of T3，T5 sensors and pressure sensor are in accordance with wiring name plate	No → Wiring according to the nameplate and re-power on to start the unit
Check if there're other heat sources around T3，T5	Yes → To troubleshoot influences by surrounding heat sources
Whether resistance of T5 is in the range of TABLE2	No → Replace T5 temp. sensor
Power off and restart to see if there's the same error	Yes → Replace the mainboard

H3/P3（Frequency-conversion over-current protection)

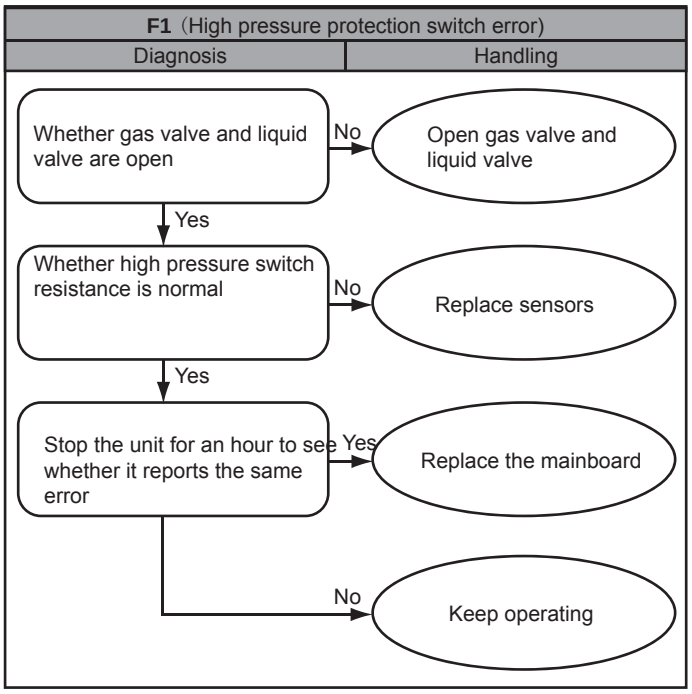
Diagnosis	Handling
If ball valves are open	No → Open gas valve and liquid valve
If compressor wiring is normal	No → Wiring according to the nameplate and re-power on to start the unit
Whether compressor insulation resistance is below 100kΩ	No → Compressor exchange
Restart after powering on to make sure that high and low pressure difference is within 0.2MPa	No → Start after pressure balance or if system can't balance pressure in 10min, then the refrigerant system is error
Power off and restart to see if there's the same error	Yes → Replace the mainboard

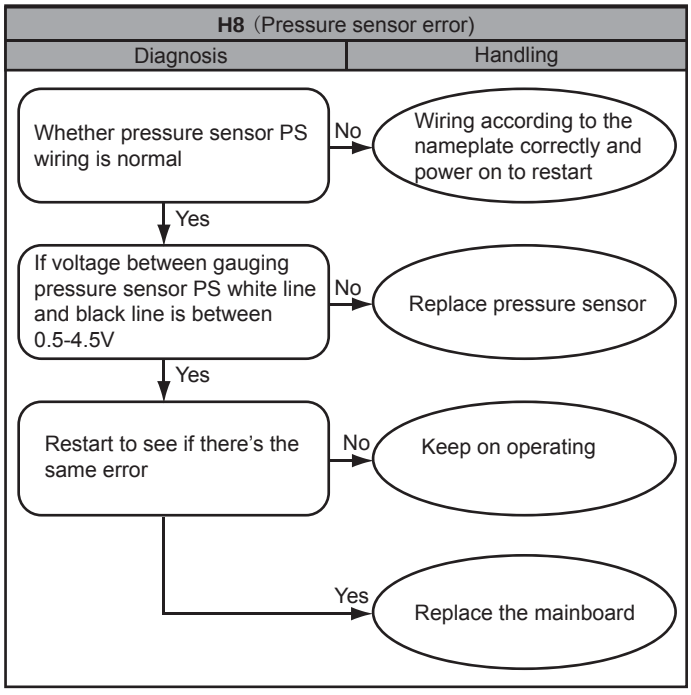
H5/P2（Low pressure protection)

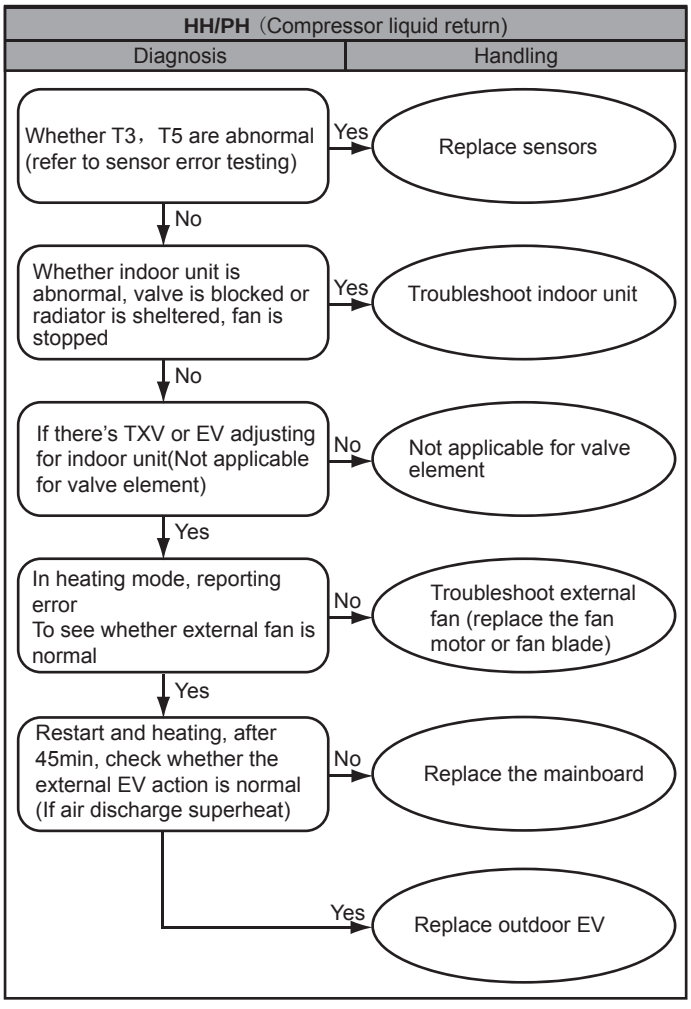
Diagnosis	Handling
Whether gas valve and liquid valve are open	No → Open gas valve and liquid valve
Whether indoor side is normal, valve is blocked or radiator is sheltered, fan is stopped	Yes → Exclude inside reasons and restart
Unplug low pressure sensor LPC to see if resistance is 0 Ω (0 Ω is normal)	Yes → Replace the mainboard
Connect a pressure gage to gas valve and restart to test if pressure is less than 0.3MPa	No → Replace low pressure sensor
Check if refrigerant system is lack of refrigerant according to refrigerant filling table	Yes → Filling refrigerant and restart
Power off and restart to see if there's the same error	Yes → Replace the mainboard

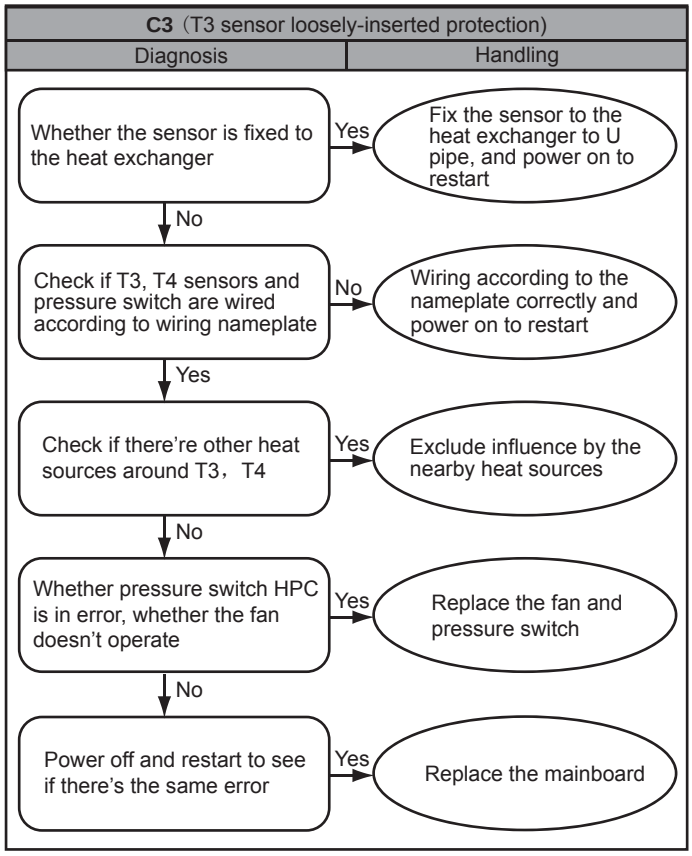
F5/Hb（Heating high pressure protection)

Diagnosis	Handling
Whether gas valve and liquid valve are open	No → Open gas valve and liquid valve
Whether indoor side is normal, valve is blocked or radiator is sheltered, fan is stopped	Yes → Exclude indoor side error
If air return temp. of the indoor side is over 35℃	Yes → Troubleshooting. e.g. indoor side E-heat or other heat sources are overheat）
Whether outdoor side ambient temp. is over 30 ℃	Yes → Not applicable to start heating
Whether outdoor unit EV is sticking.(C)	Yes → Replace EV of outdoor unit
Restart to see if there's the same error	No → Keep on operating
	Yes → Replace the mainboard


F1（High pressure protection switch error)
Diagnosis
Handling
Whether gas valve and liquid valve are open
No
Open gas valve and liquid valve
Yes
Whether high pressure switch resistance is normal
No
Replace sensors
Yes
Stop the unit for an hour to see whether it reports the same error
Yes
Replace the mainboard
No
Keep operating


H8（Pressure sensor error)
Diagnosis
Handling
Whether pressure sensor PS wiring is normal
No
Wiring according to the nameplate correctly and power on to restart
Yes
If voltage between gauging pressure sensor PS white line and black line is between 0.5-4.5V
No
Replace pressure sensor
Yes
Restart to see if there's the same error
No
Keep on operating
Yes
Replace the mainboard


HH/PH（Compressor liquid return)
Diagnosis
Handling
Whether T3，T5 are abnormal (refer to sensor error testing)
Yes
Replace sensors
No
Whether indoor unit is abnormal, valve is blocked or radiator is sheltered, fan is stopped
Yes
Troubleshoot indoor unit
No
If there's TXV or EV adjusting for indoor unit(Not applicable for valve element)
No
Not applicable for valve element
Yes
In heating mode, reporting error
To see whether external fan is normal
No
Troubleshoot external fan (replace the fan motor or fan blade)
Yes
Restart and heating, after 45min, check whether the external EV action is normal (If air discharge superheat)
No
Replace the mainboard
Yes
Replace outdoor EV


C3（T3 sensor loosely-inserted protection)
Diagnosis
Handling
Whether the sensor is fixed to the heat exchanger
Yes
Fix the sensor to the heat exchanger to U pipe, and power on to restart
No
Check if T3, T4 sensors and pressure switch are wired according to wiring nameplate
No
Wiring according to the nameplate correctly and power on to restart
Yes
Check if there're other heat sources around T3，T4
Yes
Exclude influence by the nearby heat sources
No
Whether pressure switch HPC is in error, whether the fan doesn't operate
Yes
Replace the fan and pressure switch
No
Power off and restart to see if there's the same error
Yes
Replace the mainboard

H6/P4（Air discharge overtemperature protection）

Diagnosis	Handling
Whether gas valve and liquid valve are open	No → Open gas valve and liquid valve
Yes	
Check whether air discharge temp. sensor T5 resistance is normal, refer to TABLE2	No → Replace air discharge temp. sensor
Yes	
Whether position of air discharge temp. sensor is normal. If there're other heat sources around	Yes → Troubleshooting problems and restart
No	
Whether compressor is normal（abnormal noise，abnormal vibration）	Yes → Replace compressor
No	
Check refrigerant filling conditions according to refrigerant filling method	Yes → Filling refrigerant and restart
No	
Whether in heating mode, compressor air return pressure is too low so that there's vacuum phenomenon	Yes → Replace EXV (valve sticking)
	No → Replace the mainboard

F3/P5（T3 tube high temp.protection）

Diagnosis	Handling
Whether gas valve and liquid valve are open	No → Open gas valve and liquid valve
Yes	
Whether T3，T5 are abnormal	Yes → Replace sensors
No	
Check whether outdoor unit fan is abnormal and whether the outdoor heat exchanger is blocked by debris	Yes → Replace the fan and exclude the surrounding debris of heat exchanger
No	
Whether there's short circuit in air outlet and inlet side when the ambient temp. is high	Yes → Replace installation position or rectify the surrounding goods to avoid air return short circuit
No	
Check refrigerant filling amount according to refrigerant filling method	Yes → Refill enough amount of refrigerant
No	
Restart to see if there's the same error	No → Keep operating
	Yes → Replace the mainboard

CE/P1（High pressure protection）

Diagnosis	Handling
Whether gas valve and liquid valve are open	No → Open gas valve and liquid valve
Yes	
Whether high pressure switch resistance is normal	No → Replace sensors
Yes	
Cooling mode refers to F3 Heating mode refers to Hb	

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