



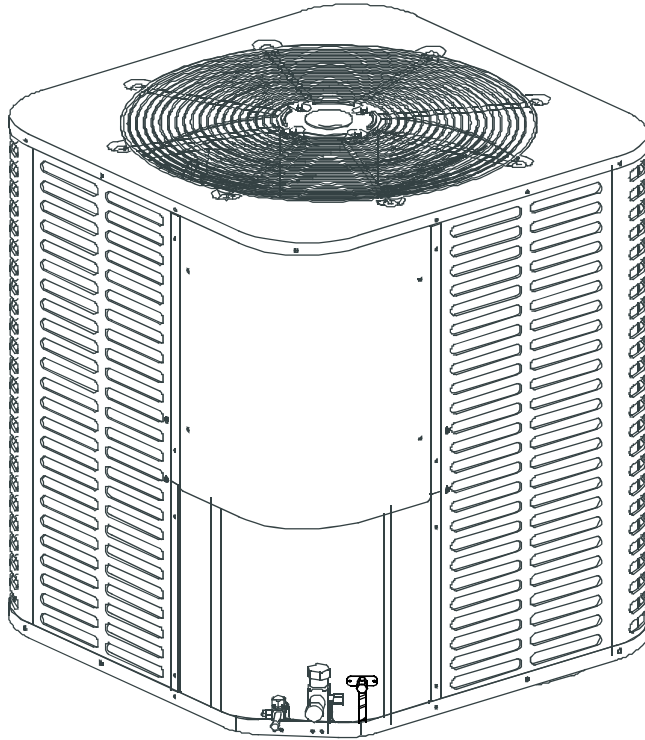
INSTALLATION INSTRUCTIONS

14 SEER

Split System Heat Pump & Air Conditioner

1.5-5 Tons

R410A



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.



Utility Small AC
AHRI Standard 210/240
Performance applies only when the complete system is used with AHRI.



Utility Small HP
AHRI Standard 210/240
Certification applies only when the complete system is used with AHRI.



DO NOT DESTROY THIS MANUAL

Please read carefully and keep in a safe place for future reference by a serviceman.

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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

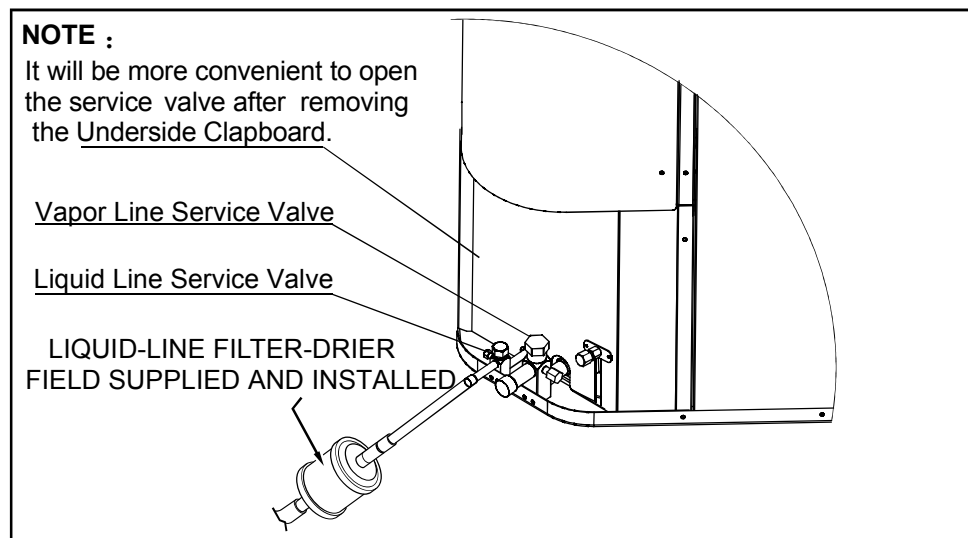
Scroll compressor dome temperatures may be hot. Do not touch the top of compressor; it may cause minor to severe burning.

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/Serviceing 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.



1.2 LIMITATIONS

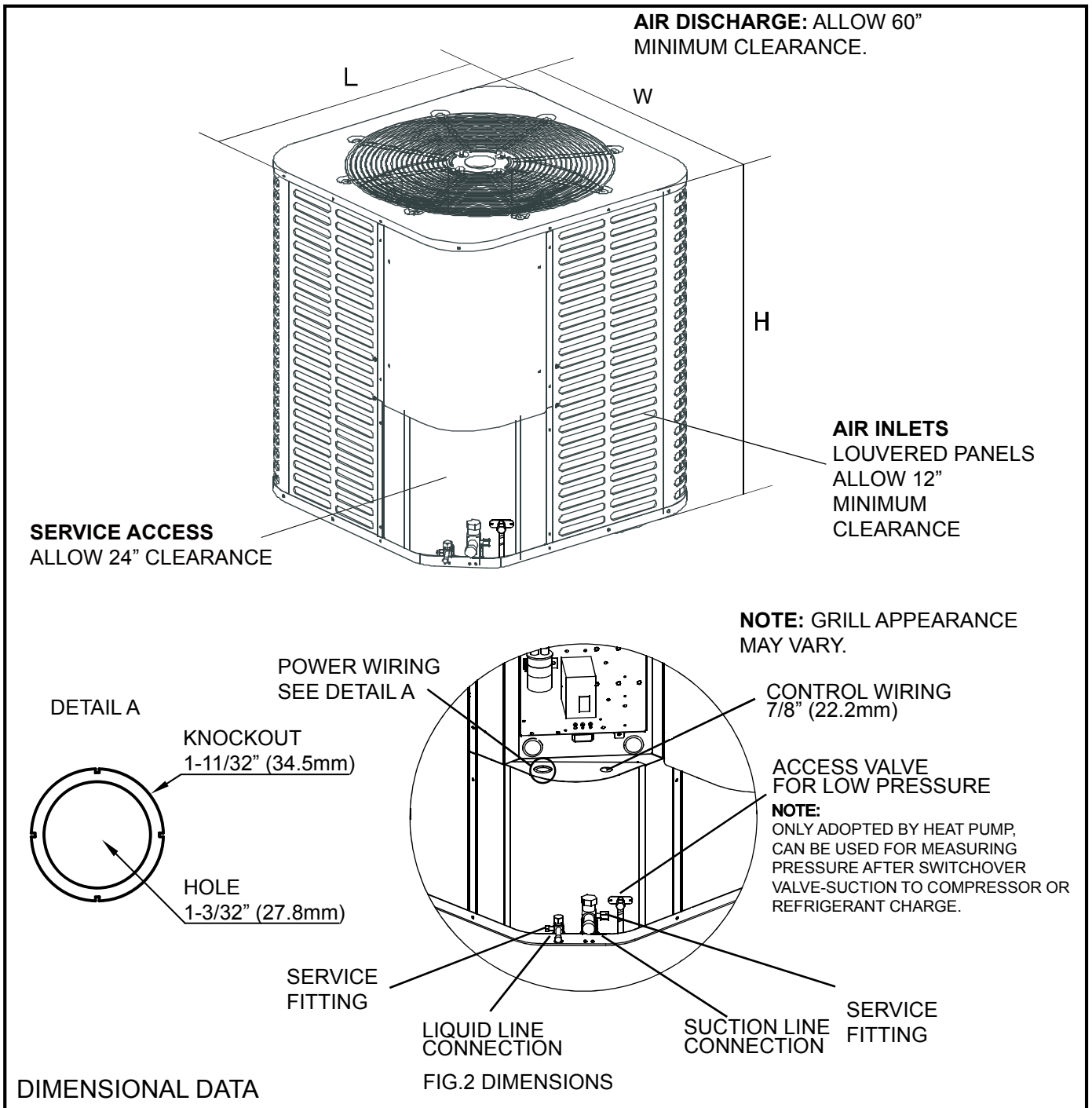
The unit should be installed in accordance with all National, State, and Local Safety Codes and the limitations listed below:

- 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 150 feet (Just for scroll compressor).

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.



MODEL SIZE		Dimensions (Inches)			Refrigerant Connection Service Valve Size	
AC	HP	"H" in. [mm]	"W" in. [mm]	"L" in. [mm]	Liquid in.	Suction in.
18		24-15/16[633]	21-7/8[554]	21-7/8[554]	3/8	3/4
24	18/24	24-15/16[633]	23-5/8[600]	23-5/8[600]	3/8	3/4
30	30	24-15/16[633]	28[710]	28[710]	3/8	3/4
36	36	24-15/16[633]	29-1/8[740]	29-1/8[740]	3/8	3/4
	42	29-7/8[759]	28[710]	28[710]	3/8	3/4
42		33-3/16[843]	28[710]	28[710]	3/8	3/4
48	48	33-3/16[843]	28[710]	28[710]	3/8	7/8
60	60	33-3/16[843]	29-1/8[740]	29-1/8[740]	3/8	7/8

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 24 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.

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

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 MOUNTING

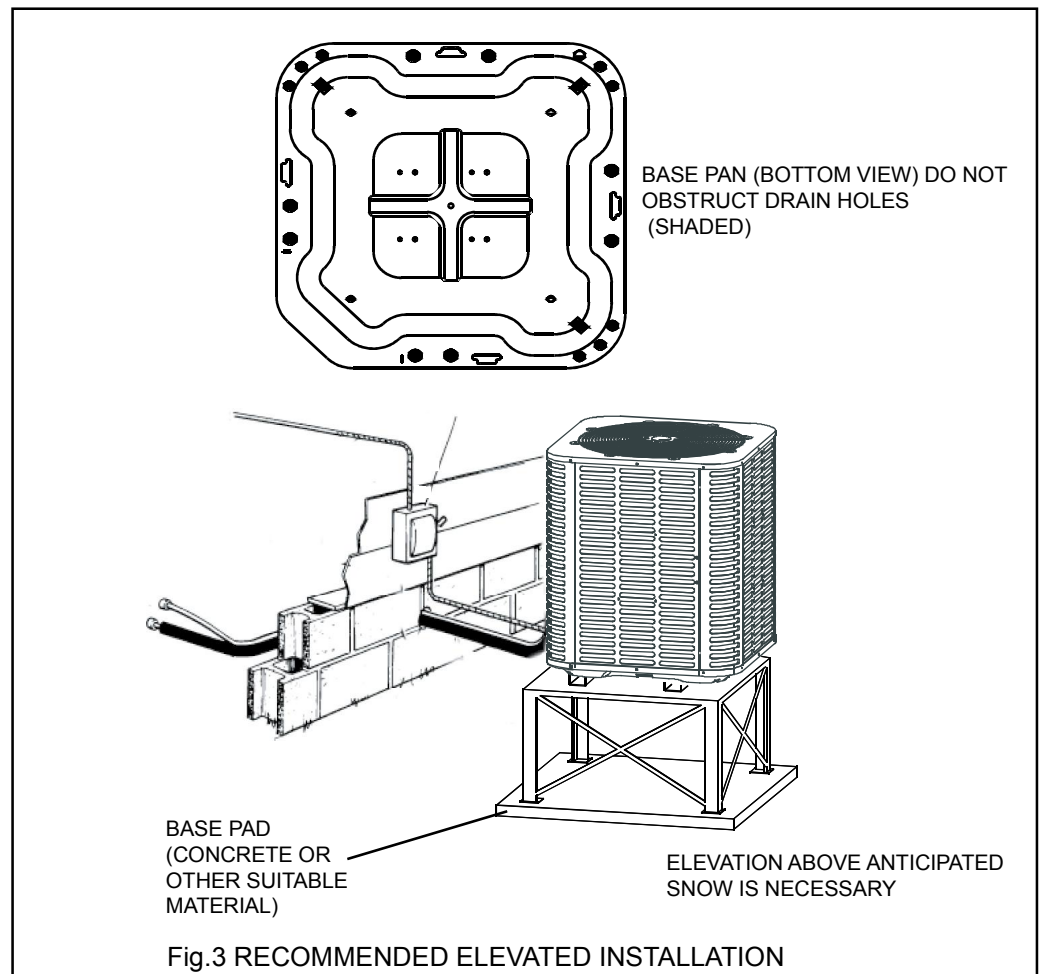
If elevating the heat pump, either on a flat roof or on a slab, observe the following guidelines.

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" x 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.3.

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.



3.6 FACTORY-PREFERRED TIE-DOWN METHOD

Step 1: Prior to installing clear pad of debris.

IMPORTANT

The 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

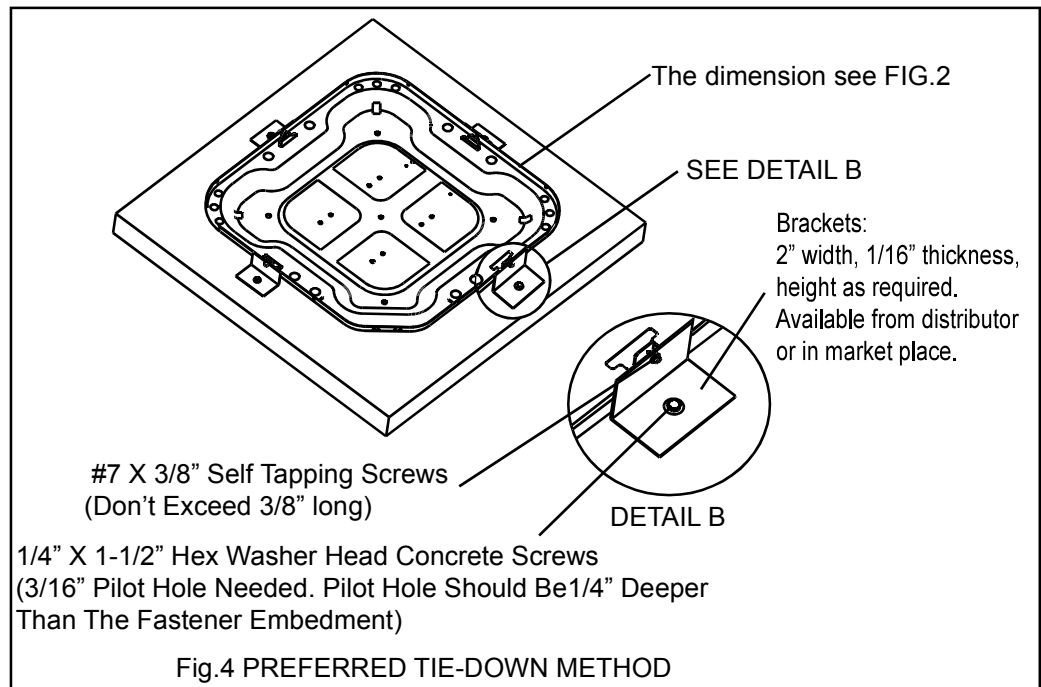
Self drilling screws to base pan should not exceed 3/8" long to avoid damaging coil.

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

- 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:

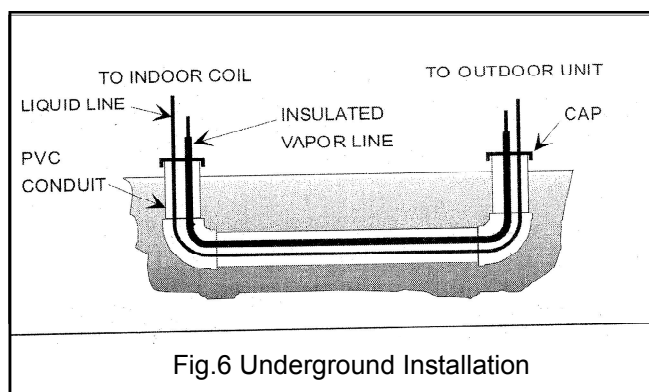
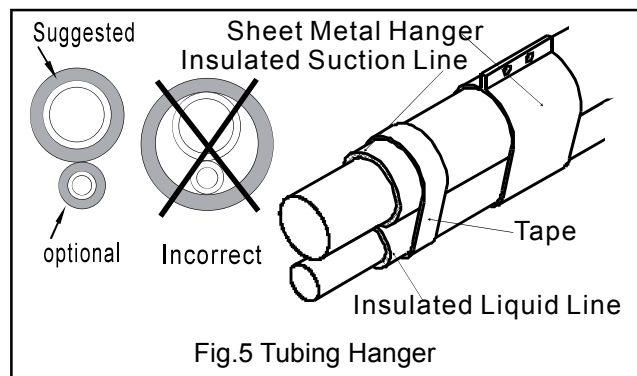
These instructions are intended to provide a method to tie-down system to cement slab as a securing procedure for high wind areas. It is recommended to check Local Codes for tie-down methods and protocols.

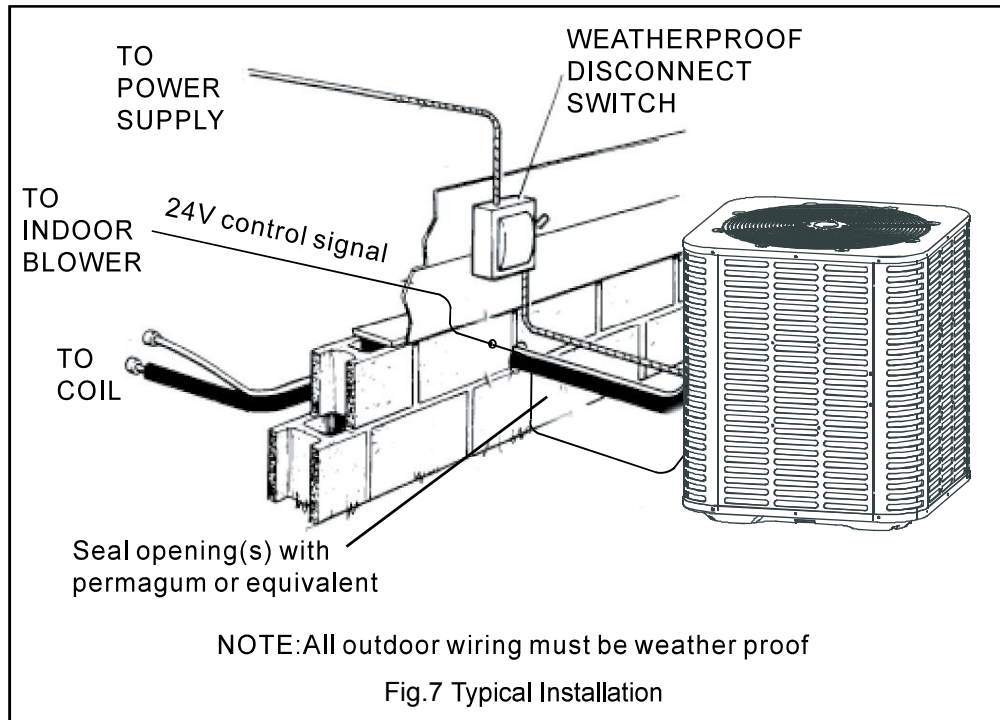


4.0 INTERCONNECTING TUBING

4.1 PRECAUTIONS DURING LINE INSTALLATION

1. Install the lines with as few bends as possible. Care should be taken not to kink or damage copper tubing. Use clean hard drawn copper tubing where no appreciable amount of bending around obstruction is necessary, 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.5.
5. Use PVC piping as a conduit for all underground installations as shown in Fig.6. 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.





4.2 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
<p>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.</p>	

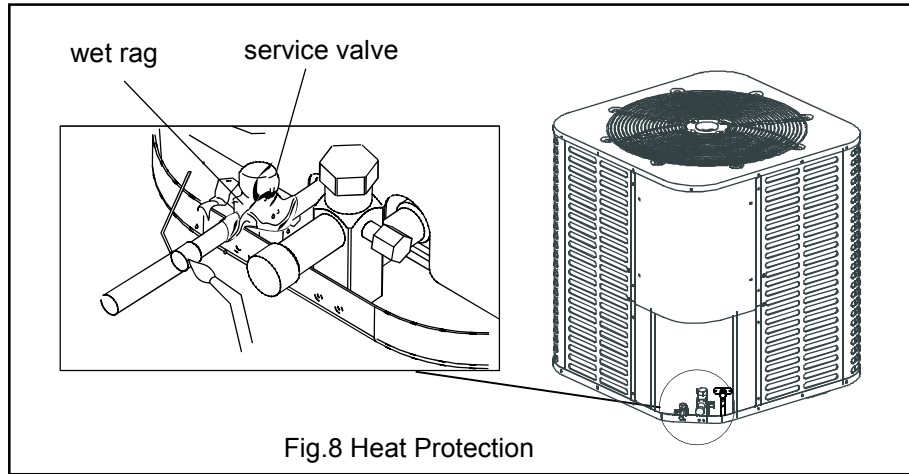
4.3 PRECAUTIONS DURING BRAZING SERVICE VALVE

Precautions should be taken to prevent heat damage to service valve by wrapping a wet rag around it as shown in Fig.8. 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.



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. Remove 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. 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.
6. Replace the Schrader core in the liquid and suction valves.
7. 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).**
8. 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
18	3/8	3/4
24	3/8	3/4
30	3/8	3/4
36	3/8	3/4
42	3/8	3/4
48	3/8	7/8
60	3/8	7/8

9. Replace cap on service ports. Do not remove the flare caps from the service ports except when necessary for servicing the system.
10. 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.
11. 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.

4.4 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

4.5 MAXIMUM LENGTH OF LINES

The maximum length of interconnecting line is 150 feet (Just for scroll compressor).

Always use the shortest length possible with a minimum number of bends.

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

4.6 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		1 1/2 Ton	2 Ton	2 1/2 Ton	3 Ton	3 1/2 Ton	4 Ton	5 Ton
Suction Line Connection Size		3/4" O.D.	3/4" O.D.	3/4" O.D.	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.	5/8 Opt.	5/8 Opt.	5/8 Opt.	3/4 Opt.	1 1/8 Opt.
		3/4* Std.	3/4* Std.	3/4* Std.	3/4* Std.	3/4* Std.	7/8* Std.	7/8* Std.
25'	Optional	1.00	1.00	1.00	1.00	1.00	1.00	1.00
	Standard	1.00	1.00	1.00	1.00	1.00	1.00	0.99
50'	Optional	0.97	0.97	0.97	0.97	0.98	0.98	0.99
	Standard	0.98	0.98	0.98	0.99	0.98	0.98	0.98
100'	Optional	0.94	0.94	0.94	0.94	0.95	0.95	0.98
	Standard	0.95	0.95	0.96	0.97	0.97	0.97	0.94
150'	Optional	0.90	0.90	0.90	0.90	0.91	0.92	0.97
	Standard	0.92	0.92	0.93	0.96	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.

the system capacity published in AHRI is 17800Btu/h. This data is based on the AHRI test condition and 25ft line set with standard suction tube size(3/4" tube). If you need to add the line set more than 25ft or use the optional suction tube size, you need to recalculate the capacity with the coefficient in the table. For example: for 50ft line and 5/8" suction tube, the capacity will be 17800*0.97=17266Btu/h.

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					
1 1/2 Ton	3/8"	Scroll	5/16	25	50	60	58	40	30
			3/8*	25	50	60	60	40	30
2 Ton	3/8"	Scroll	5/16	25	36	29	23	16	9
			3/8*	25	50	60	60	40	30
2 1/2 Ton	3/8"	Scroll	5/16	25	49	38	27	17	6
			3/8*	25	50	60	60	40	30
3 Ton	3/8"	Scroll	5/16	25	50	37	22	7	N/A
			3/8*	25	50	60	60	40	30
3 1/2 Ton	3/8"	Scroll	5/16	25	23	4	N/A	N/A	N/A
			3/8*	25	50	43	36	30	24
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.

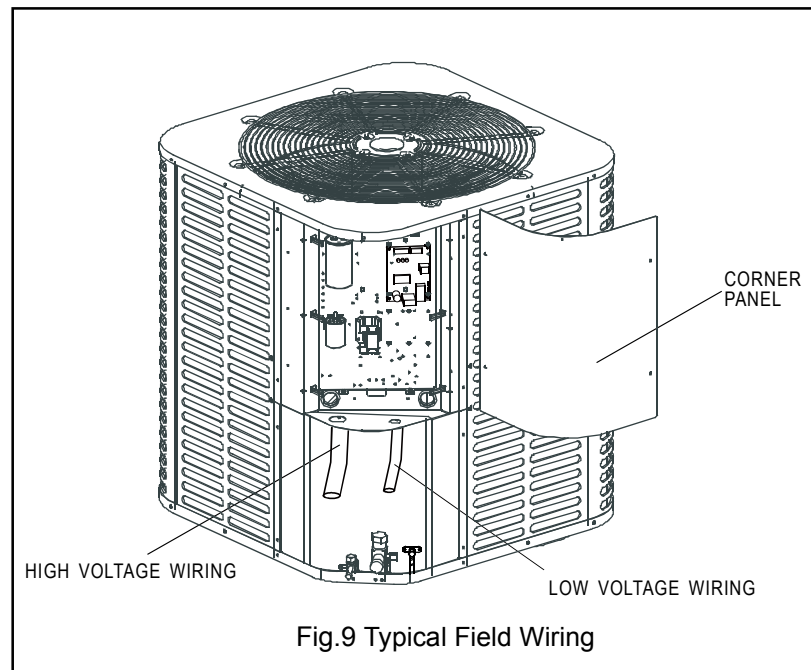
	CAUTION
<p>All field wiring must USE COPPER CONDUCTORS ONLY and be in accordance with Local, National Fire, Safety & Electrical Codes. This unit must be grounded with a separate ground wire in accordance with the above codes.</p>	

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

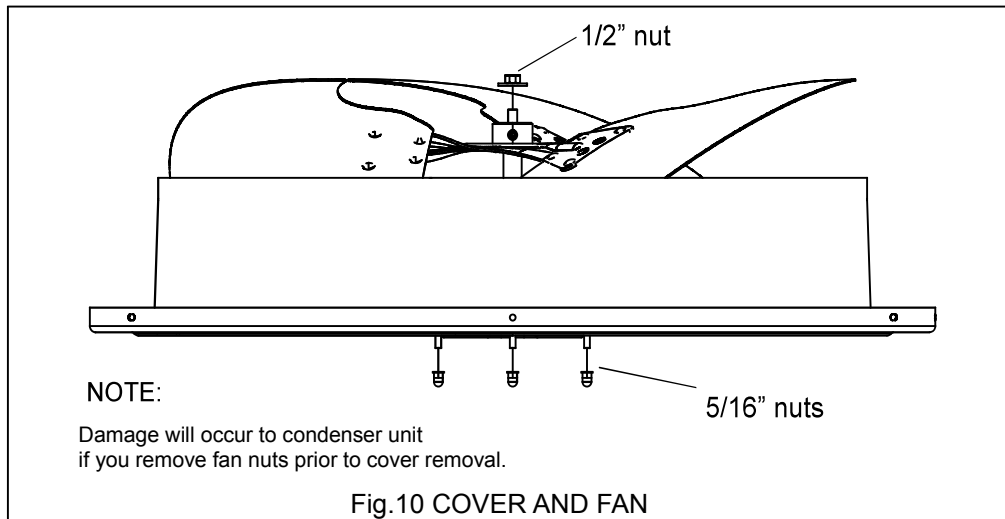
6.2 FIELD CONNECTIONS POWER WIRING

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.



6.3 REMOVING THE TOP PANEL AND MOTOR



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. 10

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 SYSTEM OPERATION

7.1 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 $<37.4^{\circ}$ F.

B. Compressor stops working more than 3 hours.

2. Outdoor temperature $<37.4^{\circ}$ F and just connected to the power source.

■ The crankcase heating stop must meet condition:

Outdoor temperature $>44.6^{\circ}$ F or compressor start.

7.2 REVERSING VALVE INTRODUCTION (Heat pump only)

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

7.3 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 > 143.6°F, compressor stop working ; T3 < 125.6°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.

7.4 DEFROST MODE INTRODUCTION (Heat pump only)

■ **Manual defrost mode**

When the switch SW3-1 is set to “ON”, the system turns to the defrost mode.
 By the logic of **Shut-down conditions of defrost mode** to exit the defrost mode.
 Caution: Once the manual defrost mode is finished, please switch the PCB switch back to “1”.

■ **Start-up conditions of defrost mode:**

7.4.1 When SW3-3 switch is set to “ON”(See in Fig 11), the mode will start up in any of the following conditions:

1. Compressor operating, when T3 is < 30.2 °F last for 30 minutes;
2. T3 is < 28.4 °F and compressor operating for the first time after connected to the power source.
3. When T3 is < 28.4 °F and The system standby two hours continuously .

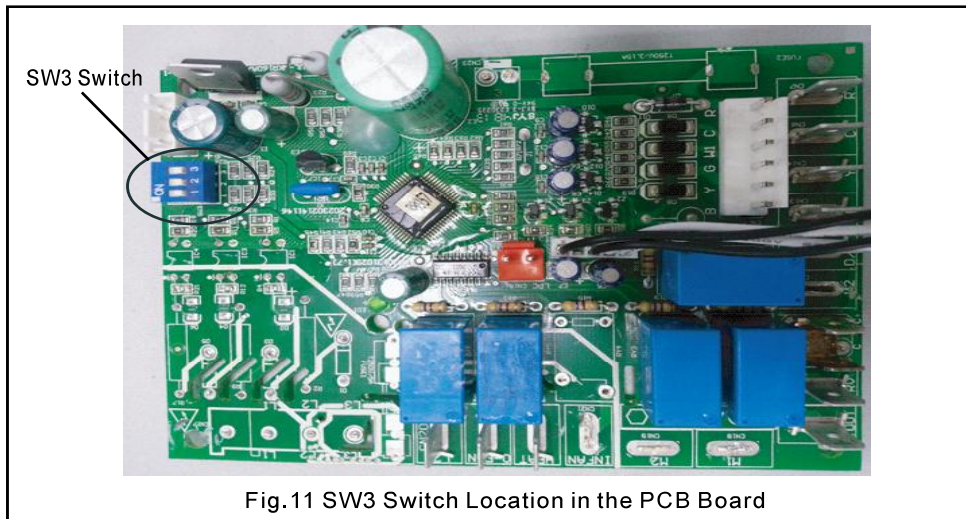


Fig.11 SW3 Switch Location in the PCB Board

	SW3-1	ON	MANUAL DEFROST
		OFF	AUTOMATIC DEFROST
	SW3-2	ON	RESERVED
		OFF	NORMAL DEFROST
	SW3-3	ON	DEFROSTING CYCLE: 30MIN
		OFF	DEFROSTING CYCLE: 60MIN

7.4.2 When SW3-3 switch is set to "OFF"(See in Fig 11), the mode will start up in any of the following conditions:

1. Compressor operating, when T3 is < 30.2 °F last for 60 minutes;
2. T3 is < 28.4 °F and compressor operating for the first time after connected to the power source.
3. When T3 is < 28.4 °F and The system is on standby for two hours .

■ **Shut-down conditions of defrost mode:**

The mode will shut down in any of the following conditions:

1. The defrosted time lasting for 10 minutes;
2. T3 is ≥ 77 °F when T4 ≥ 28.4 °F;
3. Compressor stop operating;
4. T3 is ≥ 77 °F last for 60s when T4 < 28.4 °F.

8.0 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).

8.1 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 (1) hour if crank case heater is used or five (5) minutes if no crankcase heater is used.

Follow these steps:

1. Run in cooling mode at least 20 minutes.
2. Measure OUTDOOR AMBIENT TEMPERATURE within 6 inches of coil.
3. Measure SUCTION LINE PRESSURE.
4. 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 20 minutes if the SUCTION LINE PRESSURE changes, go back to step 2 otherwise remove test equipment and cover the valves.

8.2 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.

8.3 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.

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
<p>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.</p>	

10.0 WIRING DIAGRAM

	CAUTION
<p>These units must be wired and installed in accordance with all National and Local Safety Codes.</p>	

10.1 CONTROL WIRING FOR A/C UNITS

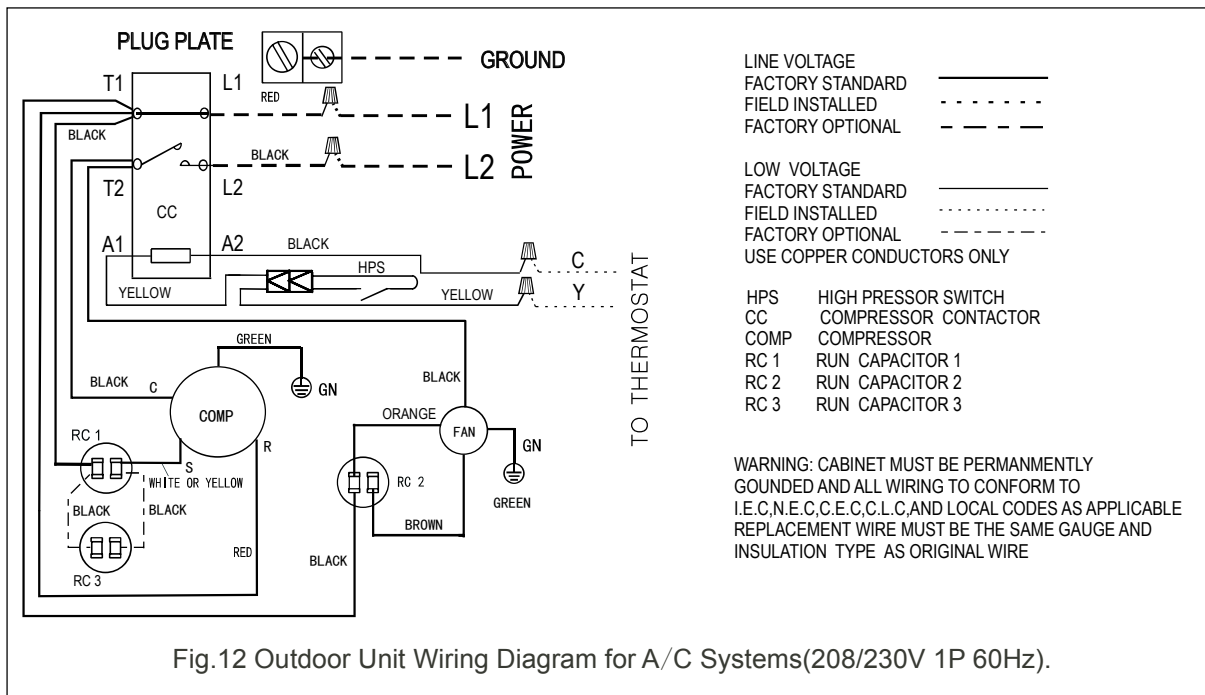
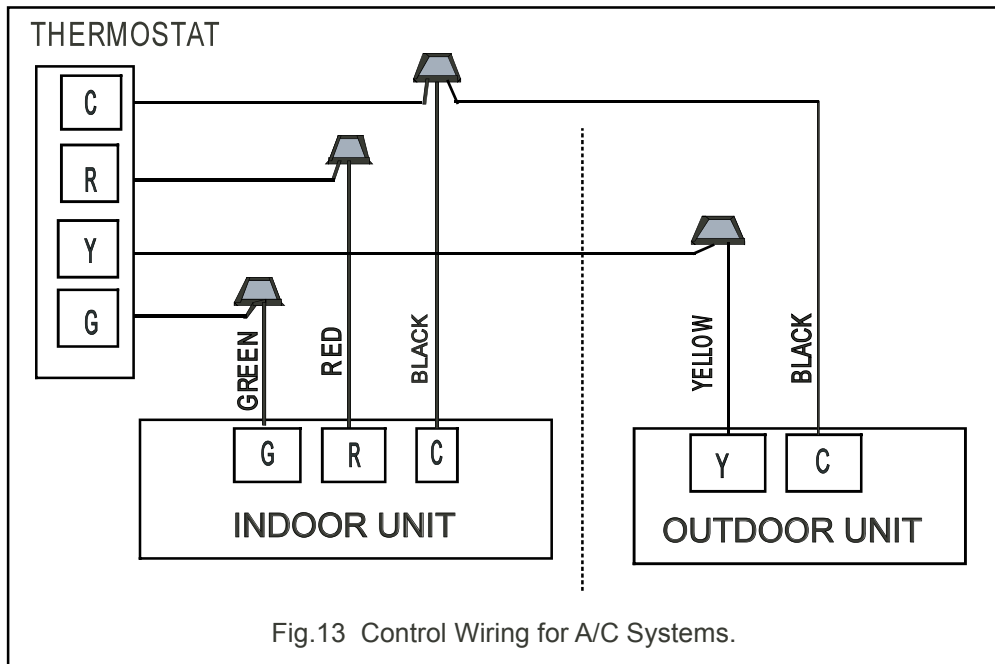
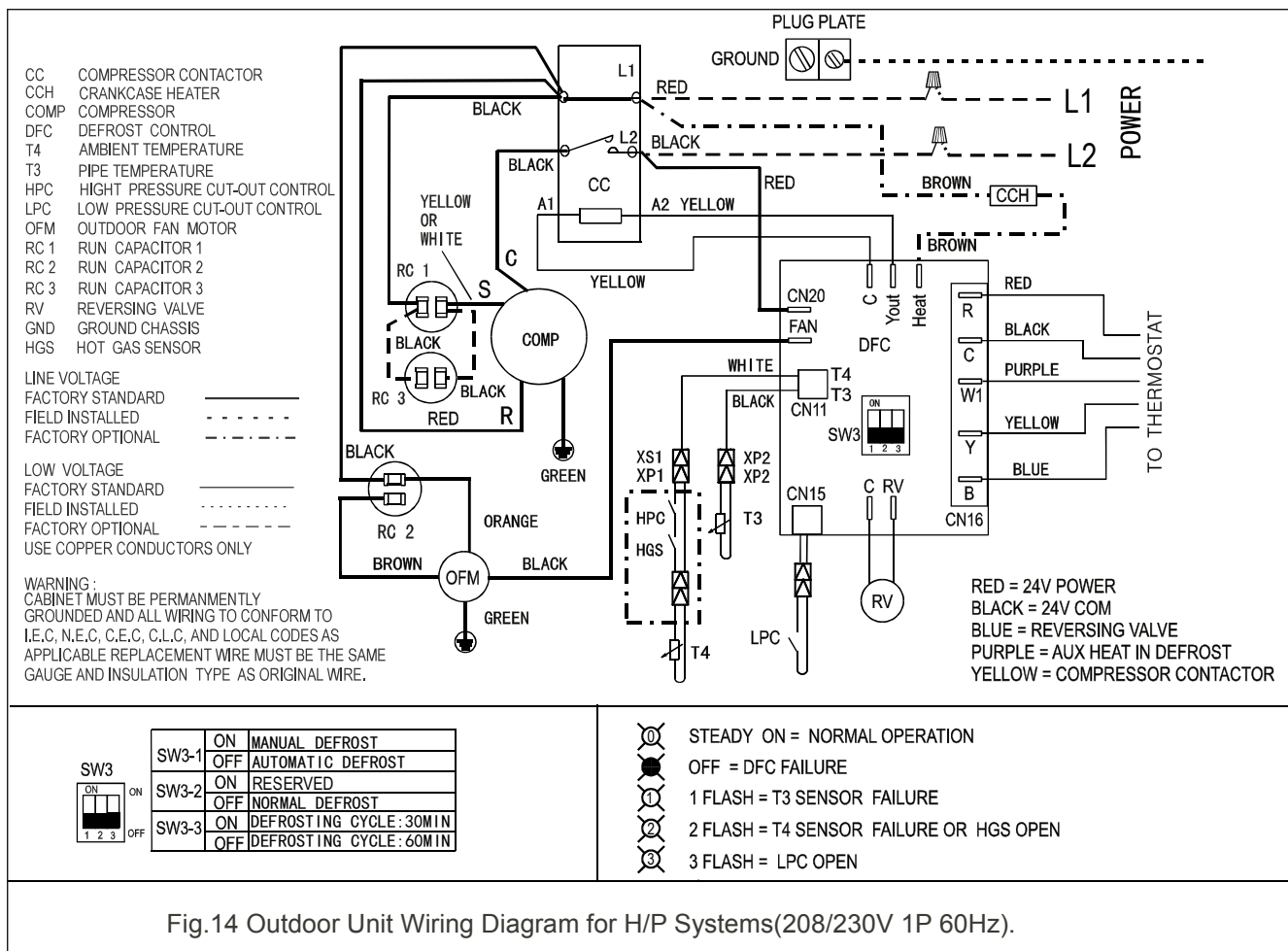


Fig.12 Outdoor Unit Wiring Diagram for A/C Systems(208/230V 1P 60Hz).



10.2 CONTROL WIRING FOR H/P UNITS



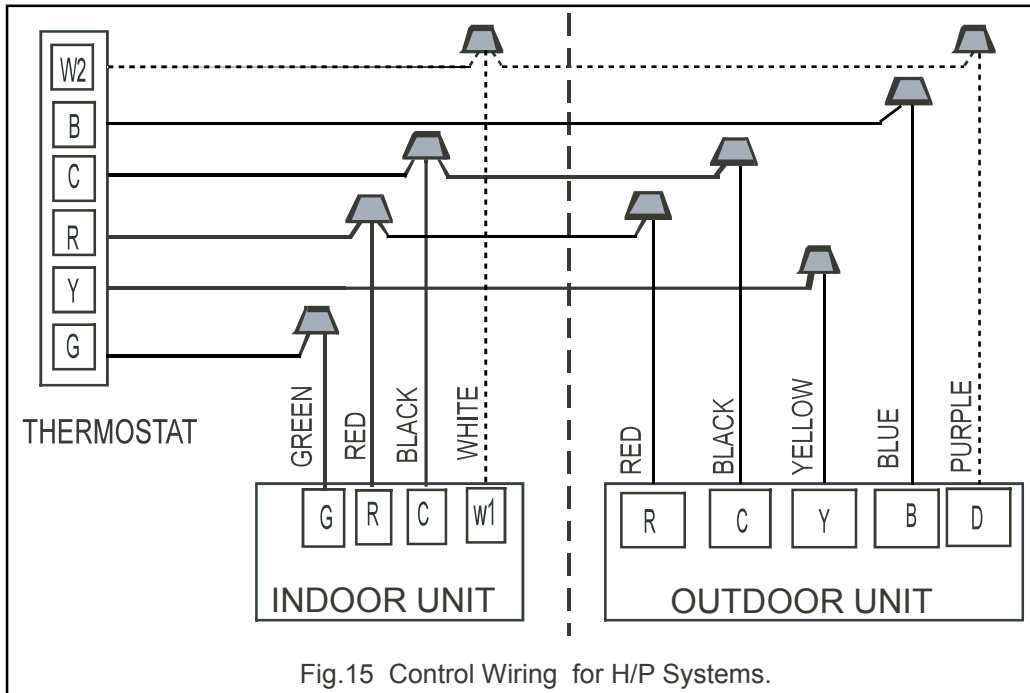


Fig.15 Control Wiring for H/P Systems.

TEMPERATURE SENSOR RESISTANCE TABLE

Temperature F	Resistance kΩ	Temperature F	Resistance kΩ	Temperature F	Resistance kΩ	Temperature F	Resistance kΩ
-4	106.73	37	29.87	78	10.00	119	3.69
-3	103.25	38	29.22	79	9.50	120	3.61
-2	99.89	39	28.19	80	9.26	121	3.53
-1	96.65	40	27.39	81	9.03	122	3.45
0	93.53	41	26.61	82	8.81	123	3.38
1	90.53	42	25.85	83	8.59	124	3.30
2	87.62	43	25.12	84	8.38	125	3.23
3	84.83	44	24.42	85	8.17	126	3.16
4	82.13	45	23.73	86	7.97	127	3.10
5	79.52	46	23.07	87	7.78	128	3.03
6	77.01	47	22.42	88	7.59	129	2.96
7	74.58	48	21.80	89	7.40	130	2.90
8	72.24	49	21.20	90	7.22	131	2.84
9	69.98	50	20.61	91	7.05	132	2.78
10	67.80	51	20.04	92	6.88	133	2.72
11	65.69	52	19.49	93	6.72	134	2.67
12	63.65	53	18.96	94	6.56	135	2.61
13	61.68	54	18.44	95	6.40	136	2.56
14	59.78	55	17.94	96	6.25	137	2.50
15	57.95	56	17.45	97	6.10	138	2.45
16	56.17	57	16.98	98	5.96	139	2.40
17	54.46	58	16.52	99	5.82	140	2.35
18	52.80	59	16.08	100	5.68	141	2.30
19	51.20	60	15.65	101	5.55	142	2.25
20	49.65	61	15.23	102	5.42	143	2.21
21	48.16	62	14.83	103	5.30	144	2.16
22	46.71	63	14.43	104	5.18	145	2.12
23	45.31	64	14.05	105	5.06	146	2.08
24	43.95	65	13.68	106	4.94	147	2.03
25	42.64	66	13.32	107	4.83	148	1.99
26	41.38	67	12.97	108	4.72	149	1.95
27	40.15	68	12.64	109	4.61	150	1.91
28	38.97	69	12.31	110	4.51	151	1.88
29	37.82	70	11.99	111	4.41	152	1.84
30	36.71	71	11.68	112	4.31	153	1.80
31	35.64	72	11.38	113	4.21	154	1.77
32	34.60	73	11.09	114	4.12	155	1.73
33	33.59	74	10.80	115	4.03	156	1.70
34	32.61	75	10.53	116	3.94	157	1.66
35	31.67	76	10.00	117	3.85	158	1.63
36	30.76	77	10.00	118	3.77	159	1.60

ELECTRICAL DATA:

Model	Minimum Circuit Ampacity(A)	Maximum Circuit Protector(A)
18AC	12.0	20
24AC	17.6	30
30AC	18.7	30
36AC	21.9	35
42AC	24.1	40
48AC	29.0	50
60AC	28.0	45
18HP	11.9	20
24HP	17.5	30
30HP	18.7	30
36HP	21.9	35
42HP	24.1	40
48HP	29.0	50
60HP	34.7	60

NOTES: AC: Air Conditioner; HP: Heat Pump

Condensing Unit	Air Handle / A-Coil	Piston Size / TXV Valve Model	SEER	If Preinstalled Piston Replace Required
M4AC4018C1000AA	M4CXC028BA1CAAA	051/(MAYTXVACHP1830AA)	14	YES
	M4CXC030BB1CAAA	051/(MAYTXVACHP1830AA)	14	YES
	M4AH4018A1000AA	051/(MAYTXVACHP1830AA)	14	YES
M4AC4024C1000AA	M4CXC028BA1CAAA	058/(MAYTXVACHP1830AA)	14	YES
	M4CXC030BB1CAAA	058/(MAYTXVACHP1830AA)	14	YES
	M4AH4025A1000AA	058/(MAYTXVACHP1830AA)	14	YES
M4AC4030C1000AA	M4CXC028BA1CAAA	064/(MAYTXVACHP1830AA)	14	NO
	M4CXC030BB1CAAA	064/(MAYTXVACHP1830AA)	14	YES
	M4AH4032A1000AA	064/(MAYTXVACHP1830AA)	14	YES
M4AC4036C1000AA	M4CXC028BA1CAAA	069/(MAYTXVACHP1830AA)	14	YES
	M4CXC030BB1CAAA	070/(MAYTXVACHP1830AA)	14	YES
	M4CXC036BC1CAAA	071/(MAYTXVACHP1830AA)	14	YES
	M4AH4036A1000AA	071/(MAYTXVACHP1830AA)	14	YES
M4AC4042C1000AA	M4CXC048AB1CAAA	077/(MAYTXVACHP3642AA)	14	YES
	M4CXC049BC1CAAA	077/(MAYTXVACHP3642AA)	14	YES
	M4CXC061BD1CAAA	077/(MAYTXVACHP3642AA)	14	YES
	M4AH4044A1000AA	077/(MAYTXVACHP3642AA)	14	YES
M4AC4048C1000AA	M4CXC049BC1CAAA	082/(MAYTXVACHP3642AA)	14	YES
	M4CXC061BD1CAAA	082/(MAYTXVACHP3642AA)	14	YES
	M4AH4048A1000AA	082/(MAYTXVACHP3642AA)	14	YES
M4AC4060C1000AA	M4CXC063AD1CAAA	MAYTXVACHP6060AA	14	YES
	M4AH3060B1000AA	090/(MAYTXVACHP6060AA)	14	YES
M4HP4018B1000AA	M4AH4018A1000AA	MAYTXVACHP1830AA/(052)	14	NO
M4HP4024B1000AA	M4AH4025A1000AA	057/(MAYTXVACHP1830AA)	14	NO
M4HP4030A1000AA	M4AH4032A1000AA	063/(MAYTXVACHP1830AA)	14	NO
M4HP4036A1000AA	M4AH4036A1000AA	MAYTXVACHP3642AA/(068)	14	YES
M4HP4042A1000AA	M4AH4044A1000AA	080/(MAYTXVACHP3642AA)	14	NO
M4HP4048A1000AA	M4AH4048A1000AA	MAYTXVACHP4848AA/(085)	14	YES
M4HP4060A1000AA	M4AH3060B1000AA	MAYTXVACHP6060AA/(096)	14	YES

*The Piston/TXV in () means the recommended model for field installation.

REFRIGERANT CHARGE FOR AC SYSTEM

Cooling Mode		14 SEER R410A AC Charge Chart 1.5 TON													
		Outdoor Ambient Temperature(°F)													
		55	60	65	70	75	80	85	90	95	100	105	110	115	
		Liquid Pressure at Small Service Valve(psig)													
Suction Pressure at Large Service Valve(psig)	165				253	274	296	317	336	354	373	400	428	455	482
	161				251	272	294	315	334	352	371	398	426	453	480
	157				249	270	292	313	332	350	369	396	424	451	478
	153		231		247	268	290	311	330	348	367	394	422	449	476
	149		229		245	266	288	309	328	346	365	392	420	447	474
	145		227		243	264	286	307	326	344	363	390	418	445	472
	141	208	225		241	262	284	305	324	342	361	388	416	443	470
	137	206	223		239	260	282	303	322	340	359	386	414	441	468
	133	204	221		237	258	280	301	320	338	357	384	412	439	466
	129	202	219		235	256	278	299	318	336	355	382	410	437	464
	125	200	217		233	254	276	297	316	334	353	380	408	435	462
	121	198	215		231	252	274	295	314	332	351	378	406	433	460
	117	196	213		229	250	272	293	312	330	349	376	404	431	458
	113	194	211		227	248	270	291	310	328	347	374	402	429	456
	109	192	209		225	246	268	289	308	326	345	372	400	427	454
105	190	207		223	244	266	287	306	324	343	370	398	425	452	

Cooling Mode		14 SEER R410A AC Charge Chart 2 TON													
		Outdoor Ambient Temperature(°F)													
		55	60	65	70	75	80	85	90	95	100	105	110	115	
		Liquid Pressure at Small Service Valve(psig)													
Suction Pressure at Large Service Valve(psig)	165				256	275	295	314	336	357	379	405	431	457	483
	161				254	273	293	312	334	355	377	403	429	455	481
	157				252	271	291	310	332	353	375	401	427	453	479
	153		233		250	269	289	308	330	351	373	399	425	451	477
	149		231		248	267	287	306	328	349	371	397	423	449	475
	145		229		246	265	285	304	326	347	369	395	421	447	473
	141	210	227		244	263	283	302	324	345	367	393	419	445	471
	137	208	225		242	261	281	300	322	343	365	391	417	443	469
	133	206	223		240	259	279	298	320	341	363	389	415	441	467
	129	204	221		238	257	277	296	318	339	361	387	413	439	465
	125	202	219		236	255	275	294	316	337	359	385	411	437	463
	121	200	217		234	253	273	292	314	335	357	383	409	435	461
	117	198	215		232	251	271	290	312	333	355	381	407	433	459
	113	196	213		230	249	269	288	310	331	353	379	405	431	457
	109	194	211		228	247	267	286	308	329	351	377	403	429	455
105	192	209		226	245	265	284	306	327	349	375	401	427	453	

Cooling Mode		14 SEER R410A AC Charge Chart 2.5 TON													
		Outdoor Ambient Temperature(°F)													
		55	60	65	70	75	80	85	90	95	100	105	110	115	
		Liquid Pressure at Small Service Valve(psig)													
Suction Pressure at Large Service Valve(psig)	165				253	273	292	312	334	355	377	404	431	457	484
	161				251	271	290	310	332	353	375	402	429	455	482
	157				249	269	288	308	330	351	373	400	427	453	480
	153		231		247	267	286	306	328	349	371	398	425	451	478
	149		229		245	265	284	304	326	347	369	396	423	449	476
	145		227		243	263	282	302	324	345	367	394	421	447	474
	141	208	225		241	261	280	300	322	343	365	392	419	445	472
	137	206	223		239	259	278	298	320	341	363	390	417	443	470
	133	204	221		237	257	276	296	318	339	361	388	415	441	468
	129	202	219		235	255	274	294	316	337	359	386	413	439	466
	125	200	217		233	253	272	292	314	335	357	384	411	437	464
	121	198	215		231	251	270	290	312	333	355	382	409	435	462
	117	196	213		229	249	268	288	310	331	353	380	407	433	460
	113	194	211		227	247	266	286	308	329	351	378	405	431	458
	109	192	209		225	245	264	284	306	327	349	376	403	429	456
105	190	207		223	243	262	282	304	325	347	374	401	427	454	

Cooling Mode		14 SEER R410A AC Charge Chart 3 TON													
		Outdoor Ambient Temperature(°F)													
		55	60	65	70	75	80	85	90	95	100	105	110	115	
		Liquid Pressure at Small Service Valve(psig)													
Suction Pressure at Large Service Valve(psig)	165				257	277	296	316	339	361	384	410	436	462	488
	161				255	275	294	314	337	359	382	408	434	460	486
	157				253	273	292	312	335	357	380	406	432	458	484
	153		235		251	271	290	310	333	355	378	404	430	456	482
	149		233		249	269	288	308	331	353	376	402	428	454	480
	145		231		247	267	286	306	329	351	374	400	426	452	478
	141	212	229		245	265	284	304	327	349	372	398	424	450	476
	137	210	227		243	263	282	302	325	347	370	396	422	448	474
	133	208	225		241	261	280	300	323	345	368	394	420	446	472
	129	206	223		239	259	278	298	321	343	366	392	418	444	470
	125	204	221		237	257	276	296	319	341	364	390	416	442	468
	121	202	219		235	255	274	294	317	339	362	388	414	440	466
	117	200	217		233	253	272	292	315	337	360	386	412	438	464
	113	198	215		231	251	270	290	313	335	358	384	410	436	462
	109	196	213		229	249	268	288	311	333	356	382	408	434	460
105	194	211		227	247	266	286	309	331	354	380	406	432	458	

Cooling Mode		14 SEER R410A AC Charge Chart 3.5 TON													
		Outdoor Ambient Temperature(°F)													
		55	60	65	70	75	80	85	90	95	100	105	110	115	
		Liquid Pressure at Small Service Valve(psig)													
Suction Pressure at Large Service Valve(psig)	165				250	269	288	307	329	351	373	400	426	453	479
	161				248	267	286	305	327	349	371	398	424	451	477
	157				246	265	284	303	325	347	369	396	422	449	475
	153		227		244	263	282	301	323	345	367	394	420	447	473
	149		225		242	261	280	299	321	343	365	392	418	445	471
	145		223		240	259	278	297	319	341	363	390	416	443	469
	141	204	221		238	257	276	295	317	339	361	388	414	441	467
	137	202	219		236	255	274	293	315	337	359	386	412	439	465
	133	200	217		234	253	272	291	313	335	357	384	410	437	463
	129	198	215		232	251	270	289	311	333	355	382	408	435	461
	125	196	213		230	249	268	287	309	331	353	380	406	433	459
	121	194	211		228	247	266	285	307	329	351	378	404	431	457
	117	192	209		226	245	264	283	305	327	349	376	402	429	455
	113	190	207		224	243	262	281	303	325	347	374	400	427	453
	109	188	205		222	241	260	279	301	323	345	372	398	425	451
105	186	203		220	239	258	277	299	321	343	370	396	423	449	

Cooling Mode		14 SEER R410A AC Charge Chart 4 TON													
		Outdoor Ambient Temperature(°F)													
		55	60	65	70	75	80	85	90	95	100	105	110	115	
Suction Pressure at Large Service Valve(psig)		Liquid Pressure at Small Service Valve(psig)													
		165			258	277	297	316	339	361	384	411	438	465	492
		161			256	275	295	314	337	359	382	409	436	463	490
		157			254	273	293	312	335	357	380	407	434	461	488
		153		234	252	271	291	310	333	355	378	405	432	459	486
		149		232	250	269	289	308	331	353	376	403	430	457	484
		145		230	248	267	287	306	329	351	374	401	428	455	482
		141	210	228	246	265	285	304	327	349	372	399	426	453	480
		137	208	226	244	263	283	302	325	347	370	397	424	451	478
		133	206	224	242	261	281	300	323	345	368	395	422	449	476
		129	204	222	240	259	279	298	321	343	366	393	420	447	474
		125	202	220	238	257	277	296	319	341	364	391	418	445	472
		121	200	218	236	255	275	294	317	339	362	389	416	443	470
		117	198	216	234	253	273	292	315	337	360	387	414	441	468
		113	196	214	232	251	271	290	313	335	358	385	412	439	466
		109	194	212	230	249	269	288	311	333	356	383	410	437	464
		105	192	210	228	247	267	286	309	331	354	381	408	435	462

Cooling Mode		14 SEER R410A AC Charge Chart 5 TON													
		Outdoor Ambient Temperature(°F)													
		55	60	65	70	75	80	85	90	95	100	105	110	115	
Suction Pressure at Large Service Valve(psig)		Liquid Pressure at Small Service Valve(psig)													
		165			265	285	305	325	348	372	395	423	450	478	505
		161			263	283	303	323	346	370	393	421	448	476	503
		157			261	281	301	321	344	368	391	419	446	474	501
		153		242	259	279	299	319	342	366	389	417	444	472	499
		149		240	257	277	297	317	340	364	387	415	442	470	497
		145		238	255	275	295	315	338	362	385	413	440	468	495
		141	219	236	253	273	293	313	336	360	383	411	438	466	493
		137	217	234	251	271	291	311	334	358	381	409	436	464	491
		133	215	232	249	269	289	309	332	356	379	407	434	462	489
		129	213	230	247	267	287	307	330	354	377	405	432	460	487
		125	211	228	245	265	285	305	328	352	375	403	430	458	485
		121	209	226	243	263	283	303	326	350	373	401	428	456	483
		117	207	224	241	261	281	301	324	348	371	399	426	454	481
		113	205	222	239	259	279	299	322	346	369	397	424	452	479
		109	203	220	237	257	277	297	320	344	367	395	422	450	477
		105	201	218	235	255	275	295	318	342	365	393	420	448	475

REFRIGERANT CHARGE FOR HP SYSTEM.

Cooling Mode		14 SEER R410A HP Charge Chart 1.5 TON (Cooling mode)													
		Outdoor Ambient Temperature(°F)													
		55	60	65	70	75	80	85	90	95	100	105	110	115	
Suction Pressure at Large Service Valve(psig)		Liquid Pressure at Small Service Valve(psig)													
		165			251	272	294	315	334	352	371	398	426	453	480
		161			249	270	292	313	332	350	369	396	424	451	478
		157			247	268	290	311	330	348	367	394	422	449	476
		153		224	245	266	288	309	328	346	365	392	420	447	474
		149		222	243	264	286	307	326	344	363	390	418	445	472
		145		220	241	262	284	305	324	342	361	388	416	443	470
		141	196	218	239	260	282	303	322	340	359	386	414	441	468
		137	194	216	237	258	280	301	320	338	357	384	412	439	466
		133	192	214	235	256	278	299	318	336	355	382	410	437	464
		129	190	212	233	254	276	297	316	334	353	380	408	435	462
		125	188	210	231	252	274	295	314	332	351	378	406	433	460
		121	186	208	229	250	272	293	312	330	349	376	404	431	458
		117	184	206	227	248	270	291	310	328	347	374	402	429	456
		113	182	204	225	246	268	289	308	326	345	372	400	427	454
		109	180	202	223	244	266	287	306	324	343	370	398	425	452
		105	178	200	221	242	264	285	304	322	341	368	396	423	450

Cooling Mode		14 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	
Suction Pressure at Large Service Valve(psig)		Liquid Pressure at Small Service Valve(psig)													
		165			271	292	312	333	351	370	388	413	439	464	489
		161			269	290	310	331	349	368	386	411	437	462	487
		157			267	288	308	329	347	366	384	409	435	460	485
		153		244	265	286	306	327	345	364	382	407	433	458	483
		149		242	263	284	304	325	343	362	380	405	431	456	481
		145		240	261	282	302	323	341	360	378	403	429	454	479
		141	218	238	259	280	300	321	339	358	376	401	427	452	477
		137	216	236	257	278	298	319	337	356	374	399	425	450	475
		133	214	234	255	276	296	317	335	354	372	397	423	448	473
		129	212	232	253	274	294	315	333	352	370	395	421	446	471
		125	210	230	251	272	292	313	331	350	368	393	419	444	469
		121	208	228	249	270	290	311	329	348	366	391	417	442	467
		117	206	226	247	268	288	309	327	346	364	389	415	440	465
		113	204	224	245	266	286	307	325	344	362	387	413	438	463
		109	202	222	243	264	284	305	323	342	360	385	411	436	461
		105	200	220	241	262	282	303	321	340	358	383	409	434	459

Cooling Mode		14 SEER R410A HP Charge Chart 2.5 TON (Cooling mode)																	
		Outdoor Ambient Temperature (°F)												105		110		115	
		55	60	65	70	75	80	85	90	95	100								
Suction Pressure at Large Service Valve (psig)		Liquid Pressure at Small Service Valve (psig)																	
		165			265	284	303	322	341	359	378	402	427	451	475				
161			263	282	301	320	339	357	376	400	425	449	473						
157			261	280	299	318	337	355	374	398	423	447	471						
153		240	259	278	297	316	335	353	372	396	421	445	469						
149		238	257	276	295	314	333	351	370	394	419	443	467						
145		236	255	274	293	312	331	349	368	392	417	441	465						
141	215	234	253	272	291	310	329	347	366	390	415	439	463						
137	213	232	251	270	289	308	327	345	364	388	413	437	461						
133	211	230	249	268	287	306	325	343	362	386	411	435	459						
129	209	228	247	266	285	304	323	341	360	384	409	433	457						
125	207	226	245	264	283	302	321	339	358	382	407	431	455						
121	205	224	243	262	281	300	319	337	356	380	405	429	453						
117	203	222	241	260	279	298	317	335	354	378	403	427	451						
113	201	220	239	258	277	296	315	333	352	376	401	425	449						
109	199	218	237	256	275	294	313	331	350	374	399	423	447						
105	197	216	235	254	273	292	311	329	348	372	397	421	445						

Cooling Mode		14 SEER R410A HP Charge Chart 3 TON (Cooling mode)																	
		Outdoor Ambient Temperature (°F)												105		110		115	
		55	60	65	70	75	80	85	90	95	100								
Suction Pressure at Large Service Valve (psig)		Liquid Pressure at Small Service Valve (psig)																	
		165			267	288	309	330	351	371	392	418	445	471	497				
161			265	286	307	328	349	369	390	416	443	469	495						
157			263	284	305	326	347	367	388	414	441	467	493						
153		240	261	282	303	324	345	365	386	412	439	465	491						
149		238	259	280	301	322	343	363	384	410	437	463	489						
145		236	257	278	299	320	341	361	382	408	435	461	487						
141	213	234	255	276	297	318	339	359	380	406	433	459	485						
137	211	232	253	274	295	316	337	357	378	404	431	457	483						
133	209	230	251	272	293	314	335	355	376	402	429	455	481						
129	207	228	249	270	291	312	333	353	374	400	427	453	479						
125	205	226	247	268	289	310	331	351	372	398	425	451	477						
121	203	224	245	266	287	308	329	349	370	396	423	449	475						
117	201	222	243	264	285	306	327	347	368	394	421	447	473						
113	199	220	241	262	283	304	325	345	366	392	419	445	471						
109	197	218	239	260	281	302	323	343	364	390	417	443	469						
105	195	216	237	258	279	300	321	341	362	388	415	441	467						

Cooling Mode		14 SEER R410A HP Charge Chart 3.5 TON (Cooling mode)																	
		Outdoor Ambient Temperature (°F)												105		110		115	
		55	60	65	70	75	80	85	90	95	100								
Suction Pressure at Large Service Valve (psig)		Liquid Pressure at Small Service Valve (psig)																	
		165			264	283	302	321	340	359	378	406	433	461	488				
161			262	281	300	319	338	357	376	404	431	459	486						
157			260	279	298	317	336	355	374	402	429	457	484						
153		239	258	277	296	315	334	353	372	400	427	455	482						
149		237	256	275	294	313	332	351	370	398	425	453	480						
145		235	254	273	292	311	330	349	368	396	423	451	478						
141	214	233	252	271	290	309	328	347	366	394	421	449	476						
137	212	231	250	269	288	307	326	345	364	392	419	447	474						
133	210	229	248	267	286	305	324	343	362	390	417	445	472						
129	208	227	246	265	284	303	322	341	360	388	415	443	470						
125	206	225	244	263	282	301	320	339	358	386	413	441	468						
121	204	223	242	261	280	299	318	337	356	384	411	439	466						
117	202	221	240	259	278	297	316	335	354	382	409	437	464						
113	200	219	238	257	276	295	314	333	352	380	407	435	462						
109	198	217	236	255	274	293	312	331	350	378	405	433	460						
105	196	215	234	253	272	291	310	329	348	376	403	431	458						

Cooling Mode		14 SEER R410A HP Charge Chart 4 TON (Cooling mode)																	
		Outdoor Ambient Temperature (°F)												105		110		115	
		55	60	65	70	75	80	85	90	95	100								
Suction Pressure at Large Service Valve (psig)		Liquid Pressure at Small Service Valve (psig)																	
		165			253	270	287	304	327	350	373	401	429	459	486				
161			251	268	285	302	325	348	371	399	427	457	483						
157			249	266	283	300	323	346	369	397	425	455	480						
153		230	247	264	281	298	321	344	367	395	423	453	478						
149		228	245	262	279	296	319	342	365	393	421	450	476						
145		226	243	260	277	294	317	339	363	390	418	447	473						
141	207	224	241	258	275	292	315	337	360	387	415	443	470						
137	205	222	239	256	273	290	313	335	358	385	412	439	467						
133	203	220	237	254	271	288	311	333	355	382	409	436	464						
129	200	218	235	251	268	285	309	330	352	378	405	431	458						
125	197	215	232	248	265	283	307	328	348	374	401	426	452						
121	195	213	229	245	263	281	305	325	346	371	397	422	446						
117	192	209	226	243	260	279	303	323	343	368	393	418	442						
113	190	207	223	241	257	277	301	321	341	366	391	416	438						
109	188	205	221	238	255	275	299	319	339	364	389	414	435						
105	185	202	219	236	253	273	297	317	337	362	387	412	433						

Cooling Mode		14 SEER R410A HP Charge Chart 5 TON (Cooling mode)																	
		Outdoor Ambient Temperature (°F)												105		110		115	
		55	60	65	70	75	80	85	90	95	100								
Suction Pressure at Large Service Valve (psig)		Liquid Pressure at Small Service Valve (psig)																	
		165			310	329	333	337	341	352	374	395	418	440	473				
161			316	321	326	330	335	347	369	390	413	436	469						
157			322	310	316	323	329	343	366	389	413	436	470						
153		279	290	299	308	318	327	340	363	386	410	434	468						
149		270	280	288	299	311	322	336	360	383	408	432	467						
145		261	271	280	294	308	322	334	357	379	404	429	464						
141	239	250	261	272	287	302	317	331	355	379	404	428	463						
137	227	237	248	259	277	296	315	330	354	379	403	427	461						
133	213	228	243	257	276	295	314	328	352	376	400	425	459						
129	203	220	237	254	273	293	313	327	351	376	398	421	454						
125	202	218	234	250	271	291	312	326	350	374	397	420	452						
121	201	217	232	248	269	289	309	323	347	371	392	414	446						
117	200	216	232	248	268	289	309	322	345	368	390	413	445						
113	197	214	230	247	270	293	316	324	343	362	383	405	436						
109	195	211	227	243	263	283	304	316	337	359	380	401	431						
105	190	207	225	242	262	282	302	313	334	355	376	397	427						

TABLE 4. Troubleshooting

SYSTEM FAULTS		WANT TO CHECK MODE	HIGH VOLTAGE SUPPLY	CONTROL TRANSFORMER	CONTROL VOLTAGE WIRING	CONTACTOR CONTACTS	CONTACTOR CAPACITOR	LOW VOLTAGE WIRING	I.D. BLOWER CAPACITOR	O.D. FAN CAPACITOR	COMPRESSOR CAPACITOR	I.D. CONTROL DEF.	REF. UNDERCHARGE	REF. OVERCHARGE	EXCESSIVE FAN LOAD	NONCONDENSABLES	RES. O.D. AIRFLOW	O.D. AIR RECIRCULATION	TXV STUCK OPEN	REF. CIR. RESTRICTIONS	RES. I.D. AIRFLOW	SUPERHEAT	SOV COIL DEFECTIVE	CHECK VALVE LEAKING	SOV LEAKING	SOV LEAKING	LPC SENSOR DEF.	DEFROST CONTROL DEF.	TA TEMP. SENSOR DEF.	T3 TEMP. SENSOR DEF.	HP/HS. SENSOR DEF.	T3 TEMP. SENSOR DEF.						
		C	H	C	H	C	H	C	H	C	H	C	H	C	H	C	H	C	H	C	H	C	H	C	H	C	H	C	H	C	H	C	H	C	H			
REFRIGERANT CIRCUIT																																						
Head Pressure Too High	C																					P	P	S	P	S												
	H																																					
Head Pressure Too Low	C													S	P							S	S	S	S	S												
	H														S	P							S	S	S	S	S											
Suction Pressure Too High	C														S	P	P																					
	H														S								S		P													
Suction Pressure Too Low	C															P							S	P	S													
	H															P							S	S	S													
Liquid Refrig. Floodback (TXV)	C																						P															
	H																						P															
I.D. Coil Frosting	C														P								S	S														
	H																																					
Compressor Runs Inadequate or No Cooling/Heating	C														S	P								S	P	S	S											
	H														S	P								S	P	S	S											
ELECTRICAL																																						
Compressor & O.D. Fan Won't Start	C	P	P					S	S	P	S	P	P																									
	H	P	P					S	S	P	S	P	P																							S	S	S
Compressor Will Not Start But O.D. Fan Runs	C		P	P											P																							
	H		P	P				S							P	P																				S	S	
O.D. Fan Won't Start	C		P		P																																	
	H		P		P																															S		
Compressor Hums But Won't Start	C			P				S							P																							
	H			P				S							P																							
I.D. Blower Won't Start	C	P	P	S				P	S	P	S	S																										
	H	P	P	S				P	S	P	S	S																										
DEFROST																																						
Unit Won't Initiate Defrost	C																																					
	H																																					
Defrost Terminates on Time	C																																					
	H																P																					
Unit Icing Up	C																																					
	H																P						S	S		S		P							P			

C- Cooling H- Heating P- Primary Causes S- Secondary Causes

TABLE 5. 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 there are 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.[]

Base Limited Warranty

Single Phase R-410A Outdoor Units, Single Phase R-22 Outdoor Units, Air Handlers, Furnaces, Packaged Units, Cased Coils, Ductless and Specific Terms for Commercial Applications.

Subject to the terms and conditions of this limited warranty, Ingersoll Rand ("Company") extends a limited warranty against manufacturing defects for the product(s) identified in **Table 1** attached hereto ("Products") that are installed in a residential/multi-family application (personal, family or household purposes) under normal use and maintenance in the United States and Canada.

In order to maximize the available benefits under this limited warranty, the Purchaser (as defined below) should read it in its entirety. All repairs of Product parts covered under this limited warranty must be made with authorized service parts and by a licensed HVAC service provider. Additionally, commercial applications are treated differently under this limited warranty as stated in **Table 1** attached hereto. For purposes of this limited warranty, "commercial applications" shall mean any application other than for personal, family, or household use.

TERM: The limited warranty period for Products is as stated in **Table 1** attached hereto. If the Purchaser properly registers the Products, the limited warranty period shall be extended as stated in **Table 1** attached hereto. Regardless of registration, the Commencement Date for a limited warranty period shall be the date that the original installation is complete and all Product start-up procedures have been properly completed and verified by an installer's invoice. If the installation and start-up date cannot be verified by the installer's invoice, the Commencement Date shall be sixty (60) days after the factory manufacture date which is verified by the Product serial number. Where a Product is installed in a newly constructed home, the Commencement Date is the date the Purchaser purchased the residence from the builder. Proof of Product purchase, installation, and/or closing date of the residence may be required to confirm the Commencement Date.

The installation of Product replacement parts under this limited warranty shall not extend the original warranty period. The warranty period for any Product part replaced under this limited warranty is the applicable warranty period remaining under the original Product warranty.

WHO IS COVERED: This limited warranty is provided only to the original owner and his or her spouse ("Purchaser") of the residence where the Products are originally installed. This warranty is not transferable except according to terms stated on the applicable website identified below under Registration Requirements. Company has the right to request any and all proof of Product purchase or installation and/or closing date of the residence.

WHAT COMPANY WILL DO: Company may request proof of Product purchase and/or installation in order to provide Product parts under this limited warranty. As Company's only responsibility and Purchaser's only remedy under this limited warranty, Company will furnish a replacement part to the licensed HVAC service provider, without charge for the part only, to replace any Product part that fails due to a manufacturing defect under normal use and maintenance. The Purchaser must pay for any and all shipping and handling charges and other costs of warranty service for the replacement part. If a Product part is not available, Company will, at its option, provide a free suitable substitute part or provide a credit in the amount of the then factory selling price for a new suitable substitute part to be used by the Purchaser towards the retail purchase price of a new Company product. Any new Product purchase shall be at Purchaser's sole cost and expense including, but not limited to, all shipping, removal, and installation costs and expenses.

REGISTRATION REQUIREMENTS: All Products must be properly registered online by the Purchaser within sixty (60) days after the Commencement Date to receive the registered limited warranty terms. To register online, go to:

<http://www.ameristarac.com>

and click "Begin Online Registration." If a Purchaser does not register within this stated time period, the base limited warranty terms shall apply.

ELIGIBILITY REQUIREMENTS: The following items are required in order for the Products to be covered under this limited warranty:

- The Products must be in the same location where they were originally installed.
- The Products must be properly installed, operated, and maintained by a licensed HVAC service provider in accordance with the Product specifications or installation, operation, and maintenance instructions provided by Company with each Product. Failure to conform to such specifications and/or instructions shall void this limited warranty. Company may request written documentation showing the proper preventative maintenance.
- All Product parts replaced by Company under this limited warranty must be given to the servicing provider for return to Company.
- Air handlers, air conditioners, heat pumps, cased or uncased coils, stand-alone furnaces, and packaged units must be part of an Air Conditioning, Heating, and Refrigeration Institute rated and matched system or a specification in a Company provided bulletin or otherwise approved in writing by a Company authorized representative.

EXCLUSIONS: The following are not covered by this limited warranty:

- Labor costs including, but not limited to, costs for diagnostic calls or the removal and reinstallation of Products and/or Product parts.
- Shipping and freight expenses required to ship Product replacement parts.
- Failures, defects, or damage (including, but not limited to, any loss of data or property) caused by (1) any third party product, service, or system connected or used in conjunction with the Products; (2) any use that is not designed or intended for the Products; (3) modification, alteration, abuse, misuse, negligence, or accident; (4) improper storage, installation, maintenance, or operation including, but not limited to, operation of electrical equipment at voltages other than the range specified on the Product nameplate; (5) any use in violation of written instructions or specifications provided by Company; (6) any acts of God including, but not limited to, fire, water, storms, lightning, or earthquakes; or any theft or riots; or (7) a corrosive atmosphere or contact with corrosive materials such as, but not limited to, chlorine, fluorine, salt, sulfur, recycled waste water, urine, fertilizers, rust, or other damaging substances or chemicals.
- Products purchased direct including, but not limited to, Internet or auction purchases and purchases made on an uninstalled basis.
- Cabinets or cabinet pieces that do not affect product performance, air filters, refrigerant, refrigerant line sets, belts, wiring, fuses, surge protection devices, non-factory installed driers, and Product accessories.
- Increased utility usage costs.

REFRIGERANT POLICY: (1) **Manufacturer-Installed Refrigerant:** Beginning on January 1, 2010, R-22 refrigerant will no longer be used as a manufacturer-installed refrigerant as required by federal regulation. All Products with manufacturer-installed refrigerant will include R410-A refrigerant. Any and all expenses or costs associated with replacing Product parts that are not R-410A compatible will not be covered by the terms and conditions of this limited warranty. (2) **Non-Manufacturer installed Refrigerant:** For Products manufactured and sold by the Company without refrigerant, only manufacturer approved and genuine alternate refrigerants shall be used. The use of contaminated, counterfeit, non-genuine, or non-manufacturer approved alternate refrigerant will void this limited warranty. (3) **All Products:** Products include a liquid line filter drier which must be replaced when a compressor replacement is necessary. A suction line filter drier must be added for compressors defined as burnouts and failure to do so will void this warranty. Non-approved refrigerant and/or non-approved refrigerant system additives including, but not limited to dyes will void this limited warranty.

ADDITIONAL TERMS:

THIS LIMITED WARRANTY AND LIABILITY SET FORTH HEREIN ARE IN LIEU OF ALL OTHER WARRANTIES AND LIABILITIES, WHETHER IN CONTRACT OR IN NEGLIGENCE, EXPRESS OR IMPLIED, IN LAW OR IN FACT. THE IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE ARE LIMITED TO THE DURATION OF THE APPLICABLE PRODUCT WARRANTY. COMPANY DOES NOT AUTHORIZE ANY PERSON TO CREATE FOR IT ANY OBLIGATION OR LIABILITY IN CONNECTION WITH THE PRODUCTS.

NOTWITHSTANDING ANYTHING IN THIS LIMITED WARRANTY TO THE CONTRARY, COMPANY SHALL NOT BE LIABLE FOR ANY INCIDENTAL, CONSEQUENTIAL, INDIRECT, SPECIAL AND/OR PUNITIVE DAMAGES, WHETHER BASED ON CONTRACT, WARRANTY, TORT (INCLUDING, BUT NOT LIMITED TO, STRICT LIABILITY OR NEGLIGENCE), PATENT INFRINGEMENT, OR OTHERWISE, EVEN IF ADVISED OF THE POSSIBILITY OF SUCH DAMAGES. COMPANY'S MAXIMUM LIABILITY HEREUNDER IS LIMITED TO THE ORIGINAL PURCHASE PRICE OF THE PRODUCTS.

No action arising out of any claimed breach of this limited warranty may be brought by a Purchaser more than one (1) year after the cause of action has arisen. This limited warranty gives you specific legal rights, and you may also have other rights as otherwise permitted by law. If this Product is considered a consumer product, please be advised that some local laws do not allow limitations on incidental or consequential damages, how long a warranty lasts based on registration, or how long an implied warranty lasts, so that the above limitations may not fully apply. Refer to your local laws for your specific rights under this limited warranty. If you have any questions regarding this limited warranty, please contact your original installation dealer, or any participating dealer, should your original installation dealer no longer be available.

TABLE 1: Warranty Time Periods

COVERAGE TERMS FOR RESIDENTIAL APPLICATIONS: Pursuant to the Ingersoll Rand ("Company") limited warranty terms and conditions, the following Products are covered for the base time periods as stated below ("Base Limited Warranty Period"). If registered, the Base Limited Warranty Periods for certain Products will be extended as stated below ("Registered Limited Warranty Period").

FURNACES:

M801P, M951P, M952V

Base Limited Warranty Period: Parts – five (5) years, Heat Exchanger – twenty (20) years.

Registered Limited Warranty Period: Parts – ten (10) years, Heat Exchanger: twenty (20) years.

AIR HANDLERS:

M4AH3, M4AH4

Base Limited Warranty Period: Indoor Coil and Parts – five (5) years.

Registered Limited Warranty Period: Indoor Coil and Parts – ten (10) years.

TMM4, TMM5

Base Limited Warranty Period: Indoor Coil and Parts – three (3) years.

Registered Limited Warranty Period: Indoor Coil and Parts – ten (10) years.

ELECTRIC HEATERS, installed in M4A3/4 AIR HANDLERS:

MAYHTR1A

Limited Warranty Period: Parts – ten (10) years.

SINGLE PHASE R410 OUTDOOR UNITS:

M4AC3 (**M4AC3018, 24, 30, 36, 42, 48, 60 only**), M4HP3, M4AC4, M4HP4

Base Limited Warranty Period: Compressor, Outdoor Coil, Parts: five (5) years.

Registered Limited Warranty Period: Compressor, Outdoor Coil, Parts – ten (10) years.

SINGLE PHASE R410 OUTDOOR UNITS:

M4AC3 (**M4AC3017, 23, 29 only**)

Base Limited Warranty Period: Compressor, Outdoor Coil, Parts: one (1) year.

Registered Limited Warranty Period: Compressor, Outdoor Coil, Parts – five (5) years.

SINGLE PHASE R22 OUTDOOR UNITS:

M2AC3, M2HP3

Base Limited Warranty Period: Compressor, Outdoor Coil, Parts - one (1) year.

Registered Limited Warranty Period: Compressor, Outdoor Coil, Parts – five (5) years.

CASED COILS:

M4CXC

Base Limited Warranty Period: Coil, Parts –five (5) years.

Registered Limited Warranty Period: Coil and Parts – ten (10) years.

4MXC, 4GXC

Base Limited Warranty Period: Coil, Parts –three (3) years.

Registered Limited Warranty Period: Coil and Parts – ten (10) years.

PACKAGED UNITS:

M4PH3, M4PG3, M4PH4, M4PW4, M4PG4

Base Limited Warranty Period: Compressor, Coil, Parts – five (5) years, Heat Exchanger – ten (10) years.

Registered Limited Warranty Period: Compressor, Coil, Parts – ten (10) years, Heat Exchanger – ten (10) years.

ELECTRIC HEATERS, installed in M4PH4 PACKAGED UNITS:

MAYHTR1P

Limited Warranty Period: Parts – ten (10) years.

DUCTLESS SYSTEMS:**

M4THS22/M4MHW22, M4THS15/M4MHW15, M4TCS15/M4MCW15:

Base Limited Warranty Period:

All Parts – five (5) year.

Registered Limited Warranty Period:

All Parts – ten (10) years.

**There is no distinction between residential and commercial use for this Limited Warranty term and coverage.

SPECIFIC TERMS FOR COMMERCIAL APPLICATIONS

Base Limited Warranty Period Applies

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