

INSTALLATION INSTRUCTIONS

4SHP20LX UNITS

(R410A REFRIGERANT)

These instructions must be read and completely understood before attempting installation.

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These units are designed for use in residential and light commercial type buildings. Units should be installed with approved indoor matches listed in the Air-Conditioning, Heating and Refrigeration Institute (AHRI) Directory of Certified Products. Refer to <http://www.ahridirectory.org>.

Before installation, inspect the unit for shipping damage. This unit is a variable speed system and can only be installed with "Comfort Sync" Wi-Fi thermostat and "Comfort Sync" enabled air handler or furnace.

⚠ WARNING

Installation or repairs made by unqualified persons CAN result in hazards to you and others. Installation MUST conform with local building codes and with the National Electric Code NFPA 70/ANSI C1-1993 or current edition and Canadian Electrical Code Part 1 CSA .

⚠ CAUTION

Improper Installation, adjustment, alteration, service or maintenance will void the warranty. The qualified installer or agency must use factory-authorized kits or accessories when modifying this product. Refer to the individual instructions packaged with the kits or accessories when installing.

NOTE

These instructions are intended as a general guide and do not supersede national, state or local codes in any way.
These instructions must be left with the property owner.

Manufactured By
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⚠ WARNING

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

Safety Precautions

Follow all safety codes. Wear safety glasses and work gloves. Use quenching cloth for brazing operations. Have fire extinguisher available. Read these instructions thoroughly and follow all warning or cautions attached to the unit.

1. Always wear proper personal protection equipment.
2. Always disconnect electrical power before removing panel or servicing equipment.
3. Keep hands and clothing away from moving parts.
4. Handle refrigerant with caution, refer to proper MSDS from refrigerant supplier.
5. Use care when lifting, avoid contact with sharp edges.

UNIT LOCATION & INSTALLATION

NOTE: In some cases noise in the living area has been traced to gas pulsations from improper installation of equipment.

1. Locate unit away from windows, patios, decks, etc. where unit operation sounds may disturb customer.
2. Ensure that vapor and liquid tube diameters are appropriate to capacity of unit.
3. Run refrigerant tubes as directly as possible by avoiding unnecessary turns and bends.
4. Leave some slack between structure and unit to absorb vibration.
5. When passing refrigerant tubes through the wall, seal opening with RTV or other silicon-based caulk.
6. Avoid direct tubing contact with water pipes, duct work, floor joists, wall studs, floors, walls, and any structure.
7. Do not suspend refrigerant tubing from joists and studs with a rigid wire or strap which comes in direct contact with tubing.
8. Ensure that tubing insulation is pliable and completely surrounds suction line.

When outdoor unit is connected to factory-approved indoor unit, outdoor unit contains system refrigerant charge for operation with indoor unit of the same size when connected by 15 ft. of field-supplied tubing. For proper unit operation, check refrigerant charge using charging information located on control box cover.

IMPORTANT: Maximum liquid-line size is 3/8 in. O.D. for all residential applications including long lines.

OUTDOOR SECTION

Zoning ordinances may govern the minimum distance the condensing unit can be installed from the property line.

Install on a Solid, Level Mounting Pad

The outdoor section is to be installed on a solid foundation. This foundation should extend a minimum of 2" (inches) beyond the sides of the outdoor section. To reduce the possibility of noise transmission, the foundation slab should NOT be in contact with or be an integral part of the building foundation.

Elevate Unit

⚠ CAUTION

Accumulation of water and ice in base pan may cause equipment damage.

Elevate unit per local climate and code requirements to provide clearance above estimated snowfall level and ensure adequate drainage of unit. Use snow stand in areas where prolonged freezing temperatures are encountered.

If conditions or local codes require the unit be attached to pad or mounting frame, tie down bolts should be used and fastened through knockouts provided in unit base pan.

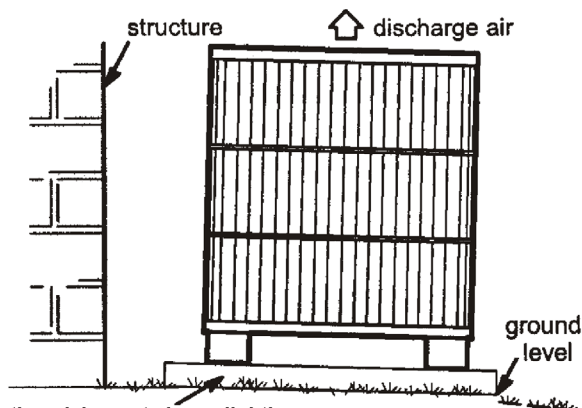
Roof Top Installations

Mount on level platform or frame 6 inches above roof surface. Place unit above a load-bearing wall and isolate unit and tubing set from structure. Arrange supporting members to adequately support unit and minimize transmission of vibration to building. Ensure roof structure and anchoring method is adequate for location. Consult local codes governing rooftop applications.

NOTE: Unit must be level to within $\pm 2^\circ$ ($\pm 3/8$ in./ft) per compressor manufacturer specifications.

Clearance Requirements

When installing, allow sufficient space for airflow clearance, wiring, refrigerant piping, and service. For proper airflow, quiet operation and maximum efficiency. Position so water, snow, or ice from roof or eaves cannot fall directly on unit.



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DO LOCATE THE UNIT:

- With proper clearances on sides and top of unit (a minimum of 12" on the three sides, service side should be 24" and 48" on top)
- On solid, level foundation or pad
- To minimize refrigerant line lengths

DO NOT LOCATE THE UNIT:

- On brick, concrete blocks or unstable surfaces
- Near clothes dryer exhaust vents
- Near sleeping area or near windows
- Under eaves where water, snow or ice can fall directly on the unit
- With clearance less than 2 ft. from a second unit
- With clearance less than 4 ft. on top of unit

Indoor Coil TXV Selection

The outdoor section must be matched to a factory approved indoor section. It is mandatory that the installer ensure that the correct TXV is installed in the indoor section. If necessary remove the existing piston and replace it with the correct TXV. See indoor unit instructions for details of changing the piston or TXV.

The 20 SEER models are only rated with TXV on the indoor coil.

Refrigeration Line Sets

Use only refrigeration grade copper tubes. Split systems may be installed with up to 50 feet of line set (no more than 20 feet verticle) without special consideration (see long line set guide lines).

Model	20 SEER	
	Liquid Line	Suction Line
24	3/8	3/4
36	3/8	7/8
48	3/8	7/8
60	3/8	1 1/8

Do not leave the lines open to the atmosphere for any period of time, moisture, dirt and bugs may contaminate the lines.

Installation Refrigerant Piping

DO NOT fasten liquid or suction lines in direct contact with the floor or ceiling joist. Use an insulated or suspension type of hanger. Keep both lines separate, and always insulate the suction line. Long liquid line runs (30 feet or more) in an attic will require insulation. Route refrigeration line sets to minimize length.

DO NOT let refrigerant lines come in direct contact with foundation. When running refrigerant lines through the foundation or wall, openings should allow for a sound and vibration absorbing material to be placed or installed between tubing and foundation. Any gap between foundation or wall and refrigeration lines should be filled with a vibration damping material.

Before making braze connections, be sure all joints are clean. Before heat is applied for brazing, dry nitrogen should be flowing through the tubing to prevent oxidation and scale formation on the inside of the tubing.

Always cap line set ends before brazing to prevent moisture and contaminants.

The following is the recommended method for making braze connections at the refrigerant line connections.

1. Debur and clean refrigerant tube end with emery cloth or steel brush.
2. Insert tubing into swage fitting connection.
3. **Wrap wet rags over valves to protect from heat.**
4. Allow dry nitrogen to flow through refrigerant lines.
5. Braze joint, using a suitable brazing alloy for copper to copper joints.
6. Quench the joint and tubing with water using a wet rag. Leave rag on fitting body and re-wet with water to help cool area.
7. All copper joints must be brazed not soldered

Leak Check

⚠ WARNING
Never use oxygen to pressurize or purge refrigerant lines, fire or explosion can occur causing injury or property damage

Refrigeration lines and indoor coil must be checked for leaks after brazing and before evacuation. The recommended procedure is to apply a trace amount of vapor refrigerant (approximately two ounces or 3 psig) into the line set and indoor coil, then pressurize with 150 psig of dry nitrogen. Use a refrigerant leak detector

to check all joints. The system may also be checked for leaks using a halide torch or pressure and soapy solution. After completion of leak check, reclaim all pressure from system before evacuation.

Evacuating And Charging Instructions

⚠ WARNING
It is against the law to release refrigerants into the atmosphere. Refrigerant can cause injury or death if inhaled.

These outdoor units are pre-charged at the factory with adequate refrigerant for **15 feet** of refrigerant tubing.

1. Connect the vacuum pump to the center hose of the manifold gauge set, the low-pressure manifold gauge to the vapor service valve and the high pressure manifold gauge to the liquid service valve.
2. The valves should be kept in the (closed) position. This will allow evacuation of the refrigeration lines and the indoor coil, without disturbing the factory charge in the outdoor unit.
3. Follow the vacuum pump manufacturer's instructions. Allow the pump to operate until the system has been evacuated down to 300 microns. Allow the pump to continue running for an additional 15 minutes. Turn OFF the pump and leave the connections secured to the two (2) service valves. hold for 5 minutes, if the system fails to hold 1000 microns or less, check all connections for tight fit and repeat the evacuation procedure.
4. Isolate the vacuum pump from the system by closing the shutoff valves on the gauge-set. Disconnect the vacuum pump.
5. After evacuation of the connecting lines, fully open the service valves.

Place service valve cap and torque to:

Valve Size	Torque (Ft-Lb)
3/8 Valve	8-11
3/4 Valve	12-15
7/8 Valve	15-20

Electrical Connections

⚠ WARNING

ELECTRICAL SHOCK HAZARD!

Turn OFF electric power before connecting unit, performing any maintenance or removing panels or doors. More than one disconnect may be required to turn off all power.

FAILURE TO DO SO COULD RESULT IN BODILY INJURY OR DEATH.

⚠ WARNING

Electric Hazard/high voltage

Wait 5 minutes after disconnecting power components may hold electric charge.

Be sure to check all local codes to determine that the unit is installed in accordance with local requirements. Consult the National Electric Code for wire size requirements. Use 60° C or higher copper wires only. Always provide ground connections to the outdoor unit. Power supply must agree with the rating on the unit nameplate.

Provide line voltage power supply to unit from a properly sized disconnect switch. Route power and ground wires from disconnect switch to unit. Line voltage connections are made at the line side of the contactor in the control box of the outdoor unit. Follow the wiring diagram attached to inside of the access panel.

Proper circuit protection recommendations are indicated on Unit Rating Plate. Time delay fuses are required to prevent blowing due to starting current (the current inrush when equipment starts is referred to as the Locked Rotor Amps or LRA) .

Remove access panel to gain access to unit wiring. Extend wires from disconnect through power wiring hole provided and into unit control box. Flexible conduit is required for the swing out control box feature.

⚠ WARNING

The unit cabinet must have an uninterrupted or unbroken ground. The ground must be installed in accordance with all electrical codes. Failure to follow this warning can result in an injury, fire, or death.

Connect ground wire to ground connection in control box for safety. Connect power wiring to contactor.

Ensure the room thermostat is properly installed per instructions shipped with room thermostat. Generally the thermostat should not be exposed to sunlight, drafts or vibration and should not be mounted on exterior walls.

⚠ WARNING

Low voltage wiring must be separated from high voltage wiring.

Low voltage connections should be in accordance to the wiring diagram.

Alarms

Alarm information is provided on the outdoor unit access panel and in the Comfort Sync Wi-Fi® Installer's System setup Guide.

Outdoor Control Seven-Segment Display and Push Button

Information concerning the outdoor control seven-segment display and push button operations are available on the unit access panel

System Component Configuration (Outdoor Unit)

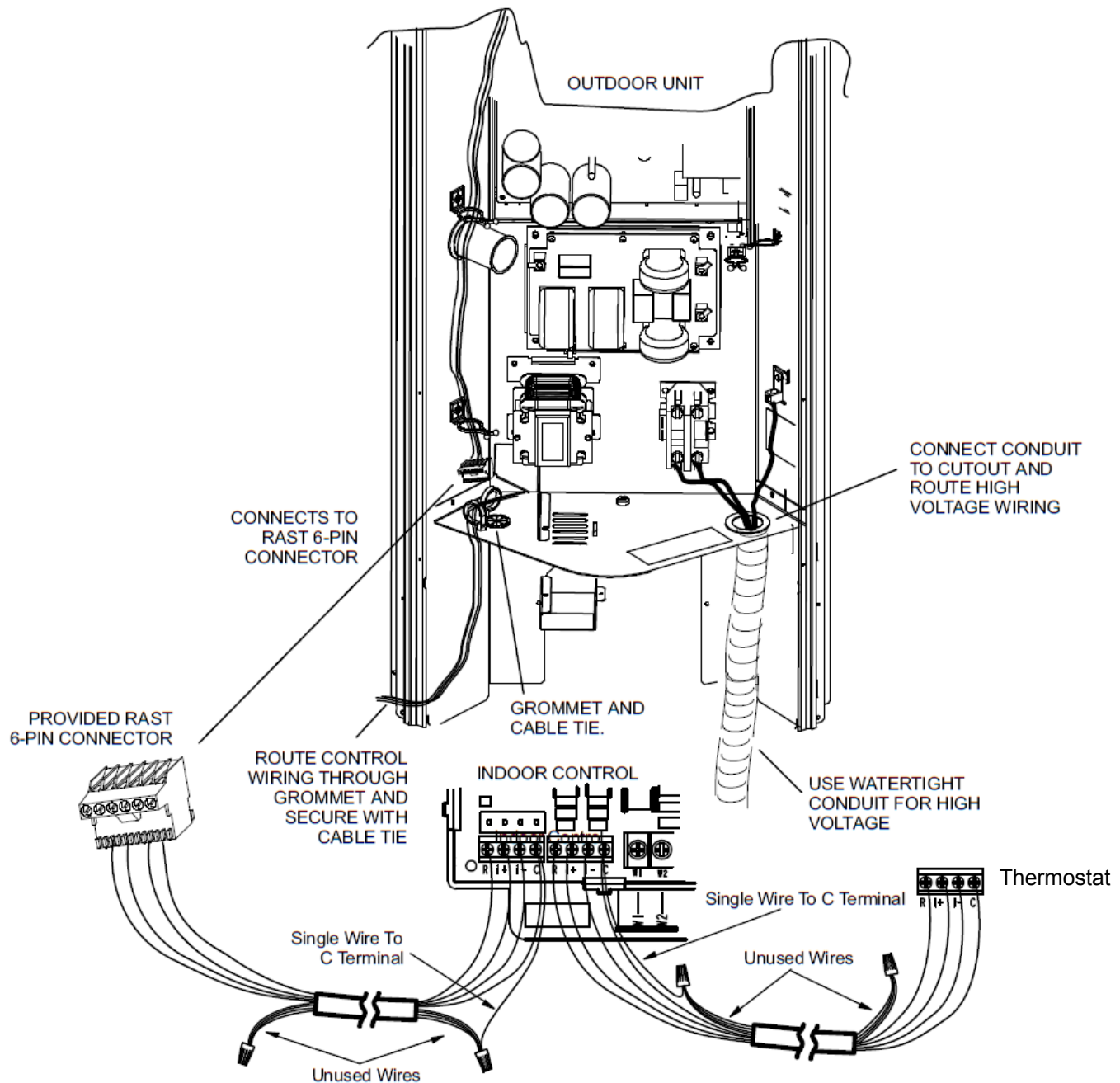
All configuration of the outdoor unit is completed using the Comfort Sync Wi-Fi® thermostat. Please refer to the Comfort Sync Wi-Fi® Installer's System setup Guide for complete details on how to integrate this unit into a Comfort Sync®-enabled system.

CONTROL WIRES

Maximum length of wiring (18 gauge) for all connections on the RSBus is 1500 feet (457 meters). Wires should be color-coded, with a temperature rating of 95°F (35°C) minimum, and solid-core (Class II Rated Wiring). All low voltage wiring must enter unit through field-provided field-installed grommet installed in electrical inlet.

The Comfort Sync Wi-Fi® thermostat requires four thermostat wires between the thermostat and the furnace / air handler Comfort Sync® control and four wires between the outdoor unit and the furnace/air handler Comfort Sync® control. When a thermostat cable with more than four wires is used, the extra wires must be properly connected to avoid electrical noise (see below).

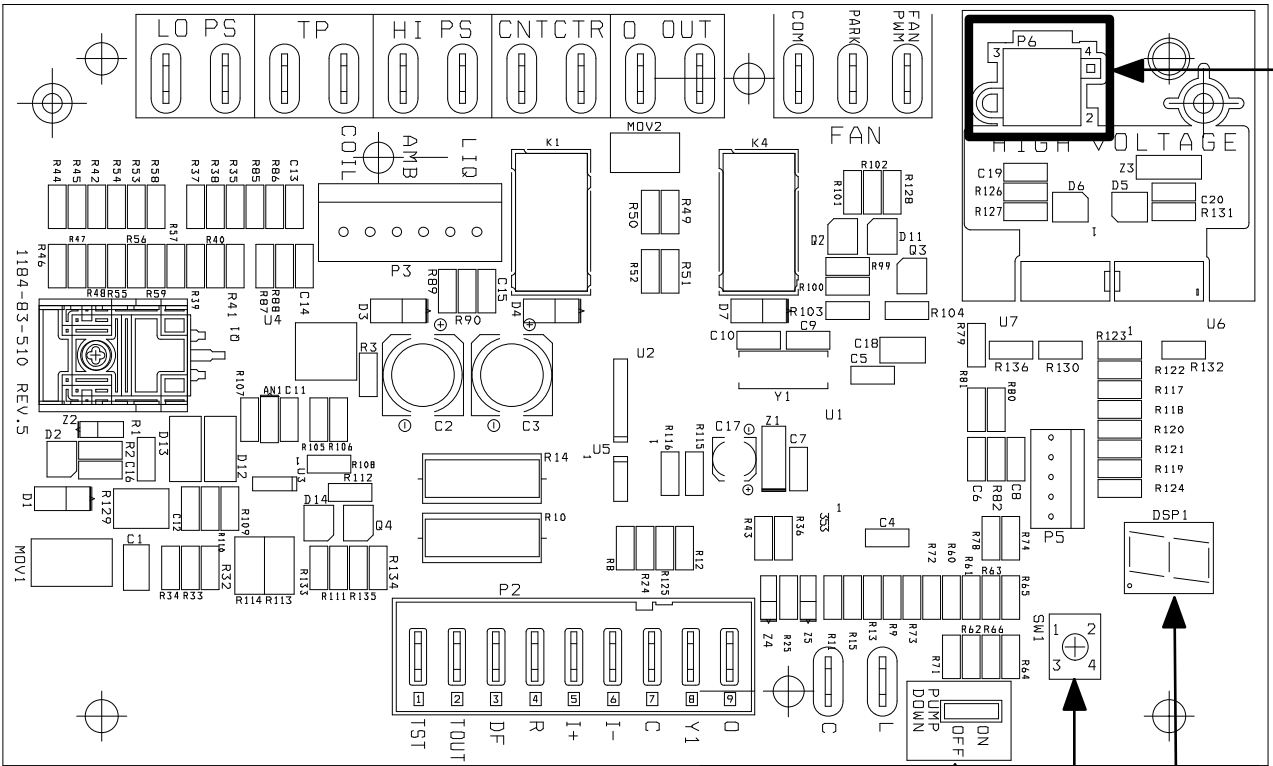
Use a wire nut to bundle the four unused wires at each end of the cable. Each bundle should also include an additional wire that should be connected on each end to the C terminal as shown in the figure below.



HIGH VOLTAGE AND GROUND WIRES

Any excess high voltage field wiring should be trimmed and secured away from any low voltage field wiring. To facilitate a conduit, a cutout is located on the bottom of the control box. Connect conduit to the control box using a proper conduit fitting.

Control Board



7-SEGMENT DISPLAY

PUSH BUTTON

PUMP DOWN - WHEN UNIT IS IN PUMP DOWN MODE, Pd WILL BE DISPLAYED ON 7-SEGMENT.

TO ACTIVATE PUMP DOWN MODE, THE CONTROL MUST BE IN THE IDLE STATE, AND THE PUMP DOWN JUMPER PLACED ACROSS THE TWO PUMP DOWN PINS. TO DEACTIVATE, REMOVE JUMPER.

DESIG.	DESCRIPTION	INPUT	OUTPUT
O OUT	REVERSING VALVE SWITCHED 24VAC		X
O OUT	REVERSING VALVE COMMON		X
CNTCTR	COMPRESSOR CONTACTOR SWITCHED 24VAC		X
CNTCTR	COMPRESSOR CONTACTOR COMMON		X
TP	THERMAL PROTECTOR SWITCH 24VAC RETURN	X	
TP	THERMAL PROTECTOR SWITCH 24VAC IN SERIES WITH HIGH PRESSURE SWITCH		X
FAN PWM	PWM FAN OUTPUT		X
FAN PARK	PWM FAN PARKING SPOT FOR UNUSED TERMINAL		X
COM	PWM FAN COMMON CONNECTION		X
HI PS	HIGH PRESSURE SWITCH 24VAC IN SERIES WITH CONTACTOR OUTPUT		X
HI PS	HIGH PRESSURE SWITCH 24VAC RETURN	X	
LO PS	LOW PRESSURE SWITCH SENSING VOLTAGE SUPPLY (2.4ma @ 18VAC)		X
LO PS	LOW PRESSURE SWITCH RETURN	X	
L	LOAD SHEDDING 24VAC INPUT	X	
C	LOAD SHEDDING COMMON		X

DESIG.	DESCRIPTION	INPUT	OUTPUT
TST	OEM TEST PIN	X	
TO	26VDC OUTPUT		X
DF	OEM TEST PIN	X	
R	NOMINAL 24VAC	X	
i+	RSBUS DATA HIGH	X	X
i-	RSBUS DATA LOW	X	X
C	NOMINAL 24VAC COMMON	X	
Y1	LEGACY 24VAC EMERGENCY INPUT	X	
O	LEGACY 24VAC EMERGENCY INPUT	X	

DESIG.	DESCRIPTION	INPUT	OUTPUT
LIQ	LIQUID LINE TEMPERATURE SENSOR SUPPLY		X
LIQ	LIQUID LINE TEMPERATURE SENSOR RETURN	X	
AMB	OUTDOOR AMBIENT TEMPERATURE SENSOR RETURN		X
AMB	OUTDOOR AMBIENT TEMPERATURE SENSOR SUPPLY	X	
COIL	OUTDOOR COIL TEMPERATURE SENSOR RETURN		X
COIL	OUTDOOR COIL TEMPERATURE SENSOR SUPPLY	X	

DESIG.	DESCRIPTION	PIN	INPUT	OUTPUT
RX	RECEIVE DATA FROM INVERTER	1	X	
TX	TRANSMIT DATA TO INVERTER	3		X
INV GND	INVERTER GROUND	2		X
INV 5V	INVERTER 5 VOLTS	4	X	

Start-Up Procedure

1. Close electrical disconnects to energize system.
2. Set room thermostat at desired temperature. Be sure set point is below indoor ambient temperature.
3. Set the system thermostat at least 5 °F below set point to operate the system at 100% capacity. The running capacity is displayed on the unit inverter.

Adjusting Charge

Factory charge is shown on the rating label located on the access panel.

All units are factory charged for 15 feet of connecting line set. Charge should be adjusted for line set lengths other than 15 feet. For line sets shorter than 15 feet in length, remove charge. For line sets longer than 15 feet, add charge. Oil charge is sufficient for all line lengths in most residential applications.

Refrigeration Charge Adjustment	
Liquid Line Diameter	Oz. Per Linear Foot
3/8"	0.6

Before final adjustment is made to the refrigerant charge, check for proper indoor airflow. Recommended airflow is **350-450 CFM per ton** (12,000 Btuh) through a **wet coil**. Refer to indoor unit instructions for methods of determining air flow and blower performance.

Cooling Cycle Charge Adjustment Procedure

Units installed with cooling mode TXV require charging with the subcooling method.

1. Operate unit a minimum of 10 minutes before checking charge.
2. Measure liquid service valve pressure by attaching an accurate gage to service port. Determine saturation temp. from T/P chart.
3. Measure liquid line temperature by attaching an accurate thermistor type or electronic thermometer to liquid line near outdoor coil.
4. Calculate subcooling (saturation temp. - measured temp.) and compare to table on back of control box cover.
5. Add refrigerant if subcooling is lower than range shown in table. Recover refrigerant to decrease subcooling.
6. If ambient temp. is lower than 65° F, weigh refrigerant according to the name plate data.

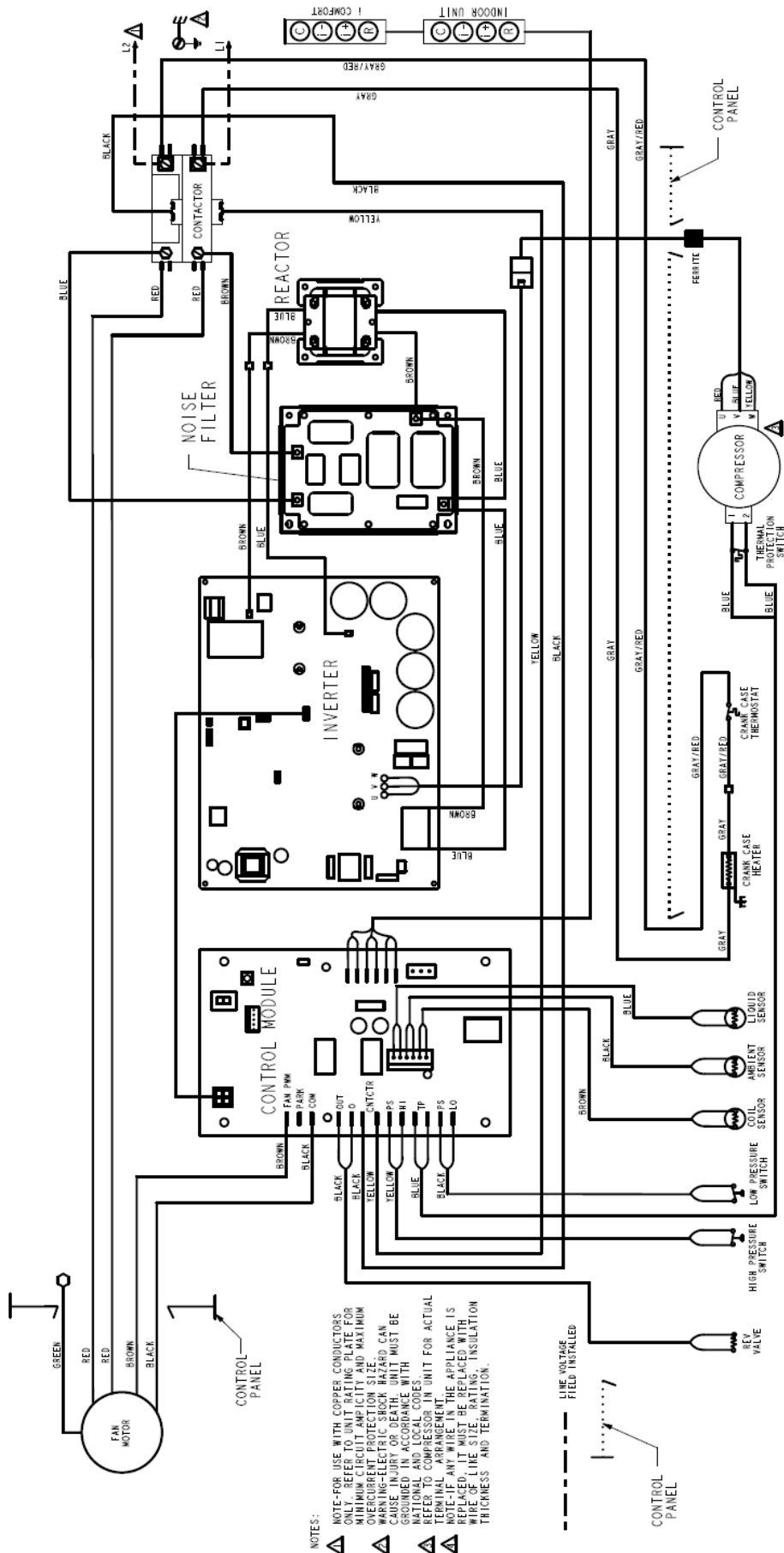
Filter Drier

The filter drier is very important for proper system operation and reliability. If the drier is shipped loose, it must be installed by the installer in the field. Unit warranty will be void, if the drier is not installed.

Heat Pump Control - Defrost Operation

The heat pump control measure differential temperatures to detect frost build-up on the outdoor coil. The heat pump control self-calibrates when the defrost system starts and after each system defrost cycle. The heat pump control monitors ambient temperature, outdoor coil temperature, and total run time to determine when defrost cycle is required. The coil temperature sensor is designed with a spring clip to allow mounting to the outside coil tubing. The location of the coil sensor is important for proper defrost operation.

Note - The heat pump control accurately measures the performance of the system as frost accumulates on the outdoor coil. This typically will translate into longer running time between defrost cycles as more frost accumulates on the outdoor coil before the heat pump control initiates defrost cycles.



NOTES:

- ▲ NOTE-FOR USE WITH COPPER CONDUCTORS ONLY. REFER TO WIRE RATING TABLE FOR WIRE SIZE AND RATING. MAXIMUM OVERCURRENT PROTECTION SIZE WARNING-ELECTRIC SHOCK HAZARD CAN CAUSE INJURY OR DEATH. UNIT MUST BE GROUNDED IN ACCORDANCE WITH RELEVANT APPLICABLE CODES FOR TERMINAL ARRANGEMENT.
- ▲ NOTE-IF ANY WIRE IN THE APPLIANCE IS REPLACED, IT MUST BE REPLACED WITH WIRE OF LINE SIZE, RATING, INSULATION THICKNESS AND TERMINATION.

48 & 60 Models

Homeowner's Information

Important System Information

- Your system should never be operated without a clean air filter properly installed.
- Return air and supply air registers should be free from restrictions or obstructions to allow full flow of air.

Regular Maintenance Requirements

Your system should be regularly inspected by a qualified service technician. These regular visits may include (among other things) checks for:

- Motor operation
- Ductwork air leaks
- Coil & drainpan cleanliness (indoor and outdoor)
- Electrical component operation & wiring check
- Proper refrigerant level & refrigerant leaks
- Proper airflow
- Drainage of condensate
- Air filter(s) performance
- Blower wheel alignment, balance & cleaning
- Primary & secondary drain line cleanliness
- Proper defrost operation (heat pumps)

There is some routine maintenance procedures you can do to help keep your system operating at peak performance between visits.

Air Filter

Inspect air filters at least monthly and replace or clean as required. Disposable filters should be replaced. Washable filters may be cleaned by soaking in mild detergent and rinsing with cold water. Replace filters with the arrows pointing in the direction of airflow. Dirty filters are the most common cause of poor heating/cooling performance and compressor failures.

Indoor Coil

If the system has been operated with a clean filter in place, it should require minimal cleaning.

Contact your dealer for periodic system maintenance.

Condensate Drain

During cooling season check at least monthly for free flow of drainage and clean if necessary.

Condenser Coils

Grass cuttings, leaves, dirt, dust, lint from clothes dryers, and fall off trees can be drawn into coils by movement of the air. Clogged condenser coils will lower the efficiency of your unit and cause damage to the condenser.

Periodically, debris should be brushed from the condenser coils.

⚠ WARNING

SHARP OBJECT HAZARD!

Condenser coils have sharp edges. Wear adequate body protection on body extremities (e.g. gloves). **FAILURE TO FOLLOW THIS WARNING COULD RESULT IN BODILY INJURY.**

Use a soft brush with light pressure only. DO NOT damage or bend condenser coil fins. Damaged or bent fins may affect unit operation.

Painted Surfaces

For maximum protection of the unit's finish, a good grade of automobile wax should be applied every year. In geographical areas where water has a high concentration of minerals (calcium, iron, sulfur, etc.) , it is recommended that lawn sprinklers not be allowed to spray the unit. In such applications, the sprinklers should be directed away from the unit. Failure to follow this precaution may result in premature deterioration of the unit finish and metal components.

In sea coast areas, special maintenance is required due to the corrosive atmosphere provided by the high salt concentration in ocean mists and the air. Periodic washing of all exposed surfaces and coil will add additional life to your unit. Please consult your installing dealer for proper procedures in your geographic area.

IF YOUR SYSTEM DOES NOT WORK, BEFORE REQUESTING A SERVICE CALL:

1. Ensure thermostat is set below (cooling) or above (heating) room temperature
2. Inspect your return air filter: If it is dirty your air conditioner may not function properly.
3. Check indoor and outdoor disconnect switches. Confirm circuit breakers are ON or that fuses have not blown. Reset breakers/replace fuses as necessary.
4. Inspect the outdoor unit for clogged condenser coils,(grass cuttings, leaves, dirt, dust or lint). Ensure that branches, twigs or other debris are not obstructing the condenser fan.

IF YOUR SYSTEM STILL DOES NOT OPERATE, CONTACT YOUR SERVICING DEALER.

Be sure to describe the problem, and have the model and serial numbers of the equipment available.

If warranted replacement parts are required, the warranty must be processed through a qualified distribution location.