

Installation Instructions

PAF3 Series PACKAGE AIR CONDITIONERS



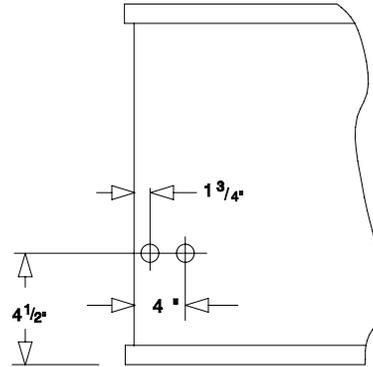
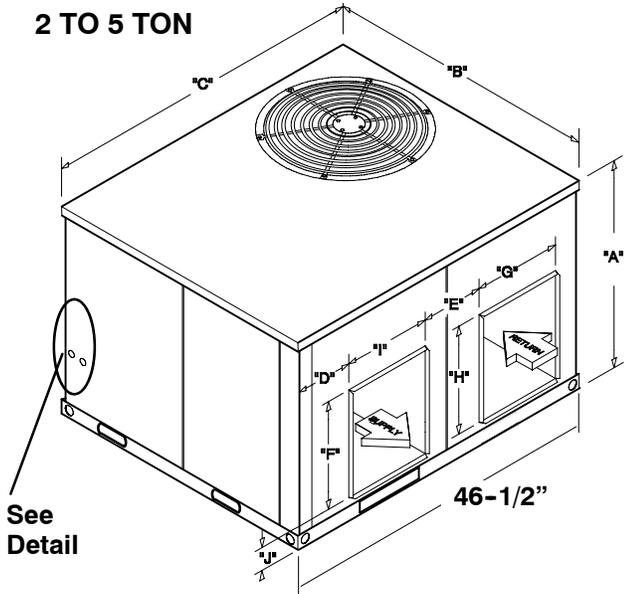
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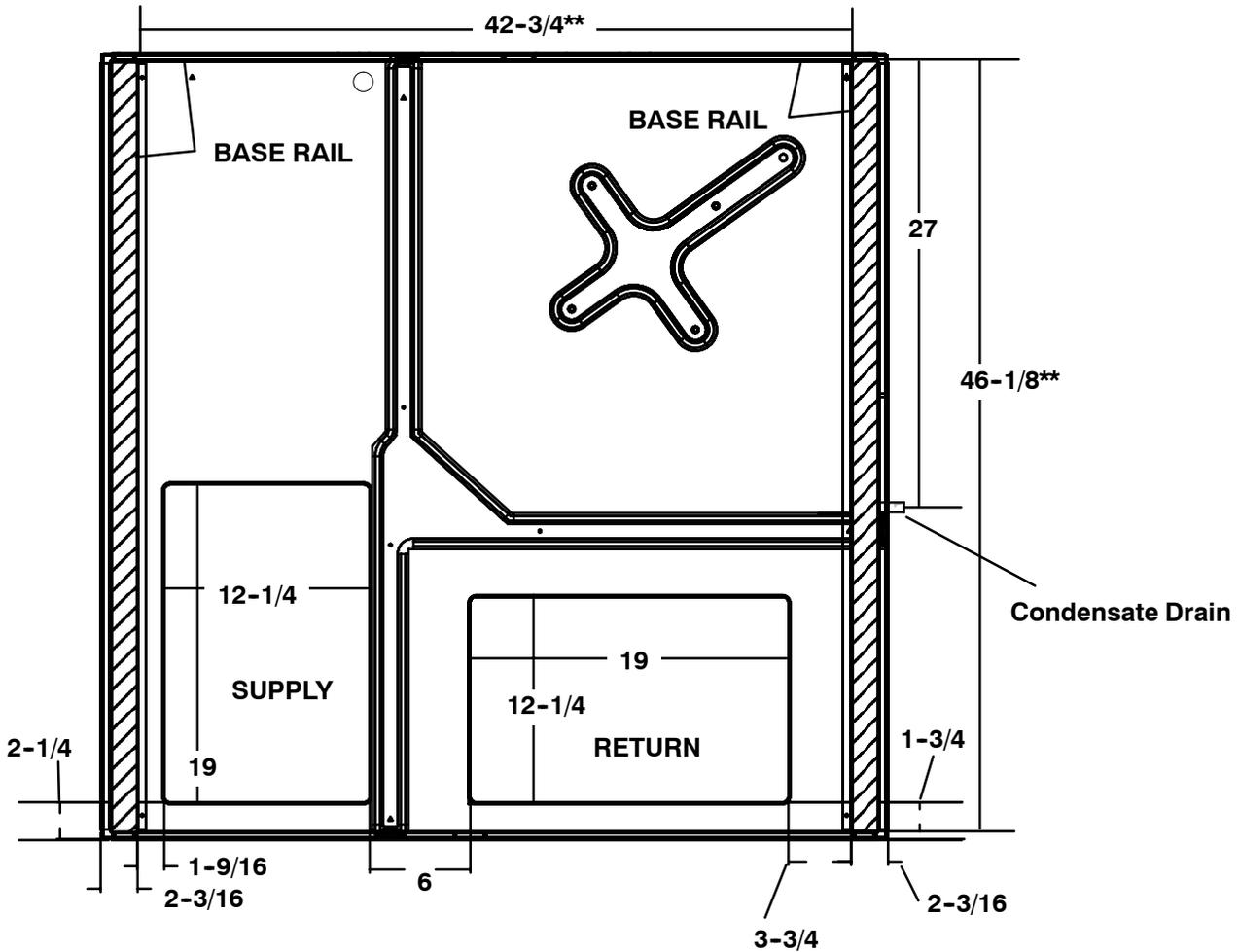


1. UNIT DIMENSIONS

2 TO 5 TON



BASE PAN - CHASSIS



UNIT SIZE	A	B	C	D	E	F	G	H	I	J
2 Ton	29-1/2	47-1/2	47-1/2	3	9-1/2	12	14	12	14	4-1/2
2-1/2 TO 5 Ton	37-1/2	47-1/2	47-1/2	3	9-1/2	12	14	12	14	4-1/2

** Measured from inside to inside on base rails.

2. SAFE INSTALLATION REQUIREMENTS

⚠ WARNING
FIRE AND ELECTRICAL SHOCK HAZARD

Failure to carefully read and follow all instructions in this manual could result in furnace malfunction, personal injury, death and/or property damage.

Installation or repairs made by unqualified persons can result in hazards to you and others. Installation **MUST** conform with local building codes or, in the absence of local codes, with the National Electrical Code NFPA70-2005 or in Canada and CSA C.22.1 - Canadian Electrical Code Part 1.

The information contained in this manual is intended for use by a qualified service technician familiar with safety procedures and equipped with the proper tools and test instruments.

- Seal supply and return air ducts.
- Check to see that filters are installed correctly and are the proper type and size.

NOTE: It is the personal responsibility and obligation of the customer to contact a qualified installer to ensure that the installation is adequate and conforms to governing codes and ordinances.

3. LOCATING THE UNIT

ACCESS PANELS

See **NO TAG** for a general view of unit and location of access panels.

CLEARANCES

The location **MUST** allow for minimum clearances and should not be adjacent to a patio or other area where the unit's operating sound level might be objectionable. The combustion air inlet openings **MUST** not be obstructed (see **NO TAG**). In addition, local codes **MUST** be observed.

NOTE: Units with available filter racks (3-1/2 to 5 ton), need a 26" minimum clearance at side of unit for removal of filters. See Minimum Clearances below if unit is going to be placed near combustible construction or materials.

While minimum clearances are acceptable for safety reasons, they may not allow adequate air circulation around the unit for proper operation in the cooling mode. Whenever possible, it is desirable to allow additional clearance, especially around the condenser inlet and discharge openings.

Do **NOT** install the unit in a location that will permit discharged air from the condenser to recirculate to the condenser inlet.

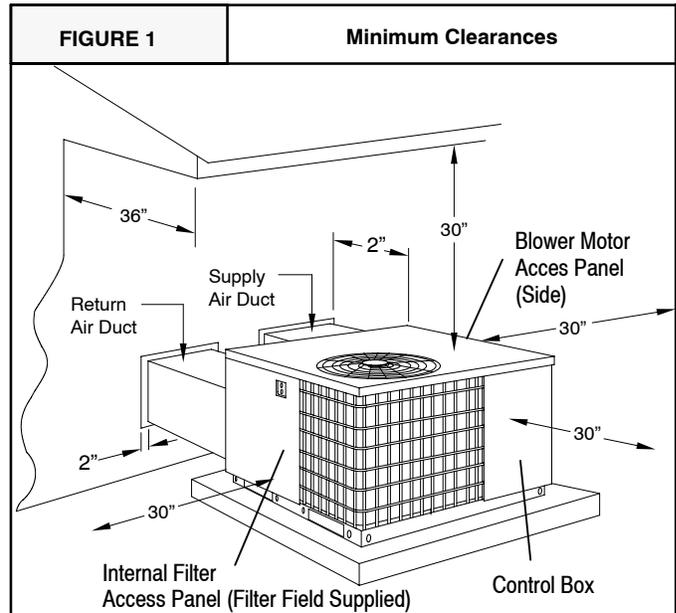
⚠ CAUTION
UNIT DAMAGE HAZARD

Failure to follow this caution may result in shorten life of unit components.

Do **NOT** operate unit in a corrosive atmosphere containing chlorine, fluorine, or any other corrosive chemicals.

Minimum Clearances to Combustible Construction

Duct Side	2" (6" on large chassis models)
Condenser Inlet	30"
Blower Service (Side)	30"
Control Service Side	
(Front Combustion Air Inlet)	30"
Clearance between 3 Ft. Overhang and Top of Unit	30"
Combustible Base	
(Wood or Class A, B or C roof covering material)	0"



INSTALLATION

NOTICE

Unit will NOT operate properly unless it is installed level front to rear and side to side. The slope MUST NOT be greater than 1/8" per foot (10mm per meter). For side to side leveling, the drain side MUST always be lower.

Ground Level Installation

Ground level platform requirements:

- The unit **MUST** be situated to provide safe access for servicing.
- Platform may be made of either concrete or pressure treated wood and **MUST** be level and strong enough to support unit weight.
- Position platform separate from building foundation.
- Install in well-drained area, with top surface of platform above grade level.
- Platform must be high enough to allow for proper condensate trap installation and drainage. See **FIGURE 2** and associated text for more information about condensate drainage.

Rooftop Installation

Rooftop platform requirements:

- The unit **MUST** be situated to provide safe access for servicing.
- The existing roof structure **MUST** be adequate to support the weight of the unit or the roof **MUST** be

reinforced.

Check the weight of the unit in relation to the roof structure and local building codes or ordinances and reinforce roof structure if necessary.

- Support for the unit **MUST** be level and strong enough to carry unit weight. The support may consist of a platform or a combination of platform and roof beams or curb.

HOISTING

NOTE: All access panels **MUST** be secured in place before hoisting.

The unit should be hoisted with two lifting slings. Attach the slings to rigging shackles that have been hooked through holes in the base rail.

Two spreader bars **MUST** be placed on top of the unit to protect the unit from damage from the pressure exerted by the slings. Make sure that all equipment is adequate to handle the weight of the unit and that the slings will not allow the unit to shift.

Refer to **Figure 8** for illustrated rigging instructions and weight chart.

DOWNFLOW CONVERSION

NOTE: In downflow applications with roof curbs or jack stands, the center rail under the unit must be removed. The center rail is attached to the base rail with screws.

These units are adaptable to downflow use. To convert to downflow use, follow these steps:

1. Remove the blockoff plates found in the return air compartment and the supply air compartment.

NOTE: Blockoff plate in the supply air compartment only contains one screw. If reinstalling plate, back part of plate **MUST** fit into mating dimples on flange. To reinstall, slant plate into dimples, then put plate into position and fasten with screw.

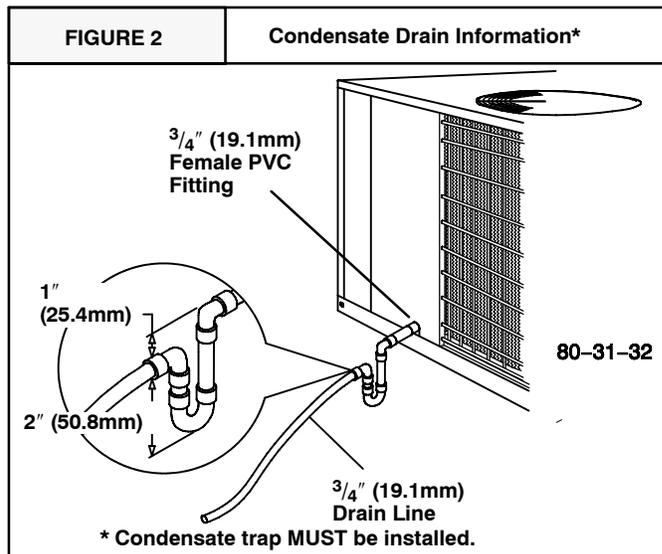
2. Install the removed plates on the horizontal return and supply air openings.
3. Install roof curb on the building. Be sure to follow all directions included with curb and all applicable building codes in your installation.

Condensate Drain

The condensate drain outlet is a $\frac{3}{4}$ " (19.1mm) female PVC connection located at the bottom on the left hand side (see **FIGURE 2**).

The circulating blower creates a negative pressure on the condensate drain line that can prevent the condensate from draining properly. To combat this negative pressure, a field supplied condensate trap that will allow a standing column of water of at least 2" (50.8mm) **MUST** be installed. Top of outlet from trap **MUST** be at least 1" (25.4mm) below top of outlet from unit. **Install the trap as near to the unit as possible for proper drainage.**

A $\frac{3}{4}$ " (19.1mm) drain line **MUST** be installed if required by local codes or if location of unit requires it. Run the drain line to an open drain or other suitable disposal point.



4. ELECTRICAL WIRING

⚠ WARNING

ELECTRICAL SHOCK HAZARD.

Failure to follow this warning could result in personal injury, death and/or property damage.

The unit cabinet must have an uninterrupted, unbroken electrical ground to minimize the possibility of serious injury if an electrical fault should occur. This ground may consist of an electrical wire connected to the unit ground lug in the control compartment, or conduit approved for electrical ground when installed in accordance with National Electric Code (NEC) NFPA 70, National Fuel Gas Code NFPA 54-2005/ANSI Z223.1-2005 and local electrical codes. In Canada, follow Canadian Electrical Code CSA (Canadian Standards Association) C22.1 and local electrical codes.

⚠ CAUTION

REDUCED EQUIPMENT LIFE HAZARD

Failure to follow these precautions could result in damage to the unit being installed.

1) Make all electrical connections in accordance with National Electric code (NEC) NFPA 70 and local electrical codes governing such wiring. In Canada, all electrical connections must be in accordance with CSA standard C22.1, Canadian Electrical Code Part 1, and applicable local codes. Refer to unit wiring diagram.

2) Use only copper conductor for connections between field-supplied electrical disconnect switch and unit. **DO NOT USE ALUMINUM WIRE.**

3) Be sure that high-voltage power to unit is within operating voltage range indicated on unit rating plate.

4) Do not damage internal components when drilling through any panel to mount electrical hardware, conduit, etc. Consult local power company for correction of improper voltage and/or phase imbalance.

Disconnect Switch

The unit must have separate electrical service with a field-supplied, waterproof, disconnect switch mounted at, or within sight from, the unit. Refer to the unit rating plate for maximum fuse/circuit breaker size and minimum circuit amps (ampacity) for wire sizing.

Ground Connections

Do **NOT** complete line voltage connections until unit is permanently grounded. All line voltage connections and the ground connection **MUST** be made with copper wire.

A ground lug is installed in the control box area for the ground connection. Use a copper conductor of the appropriate size from the unit to a grounded connection in the electrical service panel or a properly driven and electrically grounded ground rod. See warning above.

Line Voltage Wiring - (Wiring Diagrams page 12 & 13)

Connections for line voltage are made in the unit control box area. Refer to wiring diagram located on the Burner Access panel. For access, remove the burner access panel.

1. Run the high voltage (L1, L2) and ground leads into the control box.

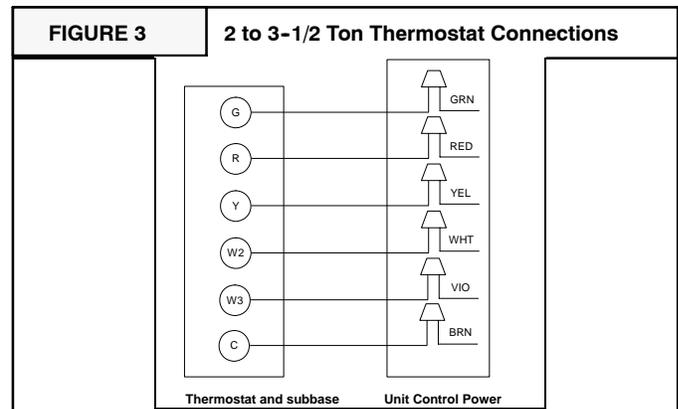
2. Connect ground lead to chassis ground connection.
3. Connect L1 to pressure lug connection 11 of the compressor contactor.
4. Connect L2 to pressure lug connection 23 of the compressor contactor.

Thermostat / Low Voltage Wiring

Location of the thermostat has an important effect on home comfort. FOLLOW THE THERMOSTAT INSTRUCTION MANUAL FOR CORRECT LOCATION, MOUNTING, AND WIRING.

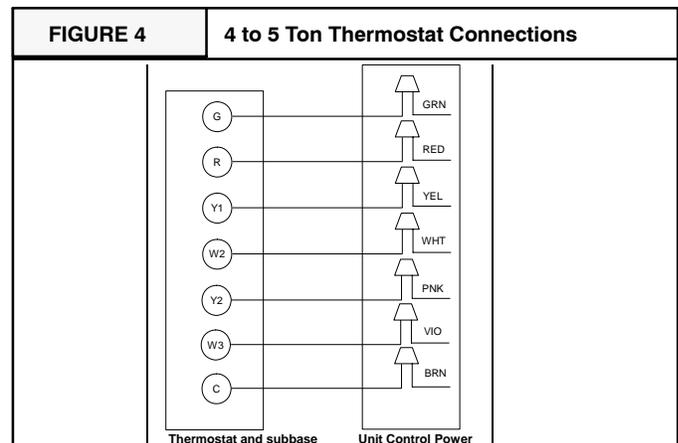
For 2 to 3-1/2 Ton Models Only:

A single stage thermostat is required for proper operation. Thermostat must have the following terminals: "R", "W", "Y", and "G". Some electronic thermostats use low voltage from the unit for power for temperature display and programming. These electronic thermostats will have a "C" terminal. The outdoor unit has color-coded wires for easy connection. Using wire nuts, follow **FIGURE 3** for proper connections:



For 4 to 5 Ton Models Only:

A two-stage thermostat is required for proper operation. Thermostat should have the following terminals: "R", "W/W1", "Y1", "Y2", and "G". Some electronic thermostats use low voltage from the unit for power for temperature display and programming. These electronic thermostats will have a "C" terminal. The outdoor unit has color-coded wires for easy connection. Using wire nuts, follow **FIGURE 4** for proper connections:



THERMOSTAT HEAT ANTICIPATOR

Some thermostats have an adjustable heat anticipator. The heat anticipator prevents temperature overshoot in heating mode. If the heat doesn't turn off until the set point temperature on the thermostat is exceeded, then the anticipator setting is too low. If the heat turns off before the thermostat reaches the set point temperature on the thermostat, then the anticipator setting is too high. Follow the thermostat instruction manual for proper adjustment of the heat anticipator.

Final Electrical Check

1. Make a final wiring check to be sure system is correctly wired. Inspect field installed wiring and the routing to ensure that rubbing or chafing due to vibration will not occur.

NOTE: Wiring **MUST** be installed so it is protected from possible mechanical damage.

5. DUCTWORK

Ductwork Sizing

The maximum recommended velocity in trunk ducts is 1000 feet per minute. The maximum recommended velocity in branch ducts is 800 feet per minute.

Ductwork sizing affects the discharge temperature, airflow velocity, and efficiency of the system. Be sure to properly size ductwork to the capacity of the unit and to the airflow requirements of the conditioned space. Failure to properly size ductwork can result in inadequate airflow and poor efficiency. Undersized ductwork may result in tripped limit controls and premature failure of compressors, motors and other components.

Ductwork Insulation

Ductwork installed outdoors must have a minimum 2" thick fiberglass "wrap" insulation and a weatherproof vapor

barrier installed around it. The insulation and vapor barrier must be protected against potential damage. Caulking, flashing, and other means of providing a permanent weather seal must be used.

Ductwork Connections

The use of flexible, non-combustible connectors between main trunk ducts and supply and return air plenums is permitted. If flexible connectors are used, they should be protected from potential mechanical damage such as punctures and tears.

NOTE: When connecting the supply and return plenums to the unit, make sure that the plenums are sealed against the side casing of the unit and do not interfere with removal of the top of the unit.

FILTERS

All return air **MUST** pass through a filter before entering the unit. An electronic air cleaner, optional filter racks, or other accessible filter arrangement must be installed in the return air ductwork. Minimum recommended filter sizes are listed in **FIGURE 5** and are based on maximum face velocities of 300 ft/min for disposable filters and 500 ft/min for washable (high velocity) filters. See **FIGURE 5** for filter sizes.

⚠ CAUTION

REDUCED EQUIPMENT LIFE HAZARD

Failure to follow this caution may result in improper unit operation.

Do not operate the unit without a filter.

FIGURE 5		Filter Sizes		
PAF3 Filter sizes				
Model	Disposable Filters		Wasable Filters	
	Nominal Size (Qty x w x d)	Minimum Area (sq inches)	Nominal Size (Qty x w x d)	Minimum Area (sq inches)
PAF324000K00A1	1 x 20" x 20"	384	1 x 12" x 20"	231
PAF330000K00A1	1 x 20" x 24"	480	1 x 15" x 20"	288
PAF336000K00A1	2 x 15" x 20"	576	1 x 18" x 20"	346
PAF342000K00A1	2 x 18" x 20"	672	1 x 20" x 20"	404
PAF348000K00A1	2 x 20" x 20"	768	1 x 20" x 24"	461
PAF354000K00A1	2 x 20" x 24"	900	1 x 24" x 24"	540

6. AIRFLOW ADJUSTMENT

CIRCULATING AIR BLOWER SPEEDS

BLOWER PERFORMANCE DATA																									
Model Number		PAF324000K00A1				PAF330000K00A1				PAF336000K00A1				PAF342000K00A1				PAF348000K00A1				PAF354000K00A1			
Speed Tap		1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
Air Delivery in CFM @ Varying External Static Pressure (in. w.c.)	0.1	891	-	1136	-	986	1076	1286	1352	1162	1278	1529	1652	1138	1240	1505	1643	1154	1245	1750	1908	1348	1449	1998	2173
	0.2	845	-	1098	-	949	1038	1225	1311	1118	1233	1484	1607	1087	1189	1467	1609	1084	1170	1696	1864	1274	1372	1943	2113
	0.3	804	-	1056	-	908	997	1186	1274	1062	1191	1440	1574	1041	1145	1431	1577	1005	1110	1643	1819	1218	1318	1895	2067
	0.4	758	-	1020	-	856	973	1158	1233	1014	1149	1402	1541	989	1104	1398	1541	940	1034	1592	1770	1151	1258	1850	2032
	0.5	707	-	980	-	819	913	1129	1203	958	1108	1364	1501	940	1063	1363	1509	880	972	1547	1720	1085	1195	1800	2003
	0.6	649	-	920	-	781	875	1085	1162	892	1060	1326	1462	865	1010	1324	1476	832	924	1497	1678	1032	1130	1750	1962
	0.7	582	-	875	-	717	840	1044	1119	826	1005	1284	1426	806	952	1283	1439	780	875	1443	1632	989	1086	1705	1904
	0.8	509	-	818	-	664	786	1004	1066	780	943	1238	1384	752	891	1234	1402	713	836	1400	1586	954	1048	1659	1822
	0.9	-	-	758	-	612	717	948	989	735	892	1179	1338	694	828	1175	1352	663	773	1354	1538	904	1000	1602	1727
	1	-	-	-	-	554	659	755	774	675	844	1123	1277	646	773	1120	1264	613	720	1302	1494	851	946	1530	1603

Notes: Air Delivery @ listed external static pressure are taken at 230Volts with Dry coil, no filter and approved heater.

For wet coil add .05 in. wc. to Static Pressure measurement. Note for 208 Volts applications, reduce airflow by 15%.

FIGURE 6		Blower Tap Connections	
		Blower Speed Tap Settings	
		Rated Airflow	High Airflow
PAF324000K		Speed Tap 1	Speed Tap 3
PAF330000K		Speed Tap 2	Speed Tap 3
PAF336000K		Speed Tap 2	Speed Tap 3
PAF342000K		Speed Tap 3	Speed Tap 4
PAF348000K		Speed Tap 3 (Hi); 2 (Lo)	Speed Tap 4 (Hi); 3 (Lo)
PAF354000K		Speed Tap 3 (Hi); 2 (Lo)	Speed Tap 4 (Hi); 3 (Lo)



Verify that the proper blower speeds for heating and cooling are selected on the blower motor by removing the blower access panel and inspecting the blower motor. The motor has 4 speeds numbered "1", "2", "3", and "4". The wires for the speed selection are as follows:

- Red** ➔ **Heating**
- Black** ➔ **High Stage Cooling**
- Violet** ➔ **Low Stage Cooling (4 & 5 ton only)**

Using the same speed for Heating and Cooling.

If the same speed is required for heating and high stage cooling the following procedure must be used:

- Set Red wire on proper speed selection on blower motor.
- Remove Black wire from "COOL" (2 - 3.5 Ton models) or "HI" (4 - 5 Ton Models) on Blower Interface Board. Tape end of Black lead using electrical tape.
- Jumper the Red wire to both the "Heat" terminal and either the "COOL" (2 - 3.5 Ton models) or "HI" (4 - 5 Ton Models) terminal on the Blower Interface Board.

If the same speed is required for heating and low stage cooling (4 & 5 Ton models only), the following procedure must be used:

- Set Red wire on proper speed selection on blower motor.
- Remove Violet wire from "LO" on Blower Interface Board. Tape end of Violet lead using electrical tape.
- Jumper the Red wire to both the "Heat" terminal and the "LO" terminal on the Blower Interface Board.

CONTINUOUS FAN OPERATION

Continuous fan speed operates at the cooling speed for 2 thru 3-1/2 ton models and at the low stage cooling speed for 4 and 5 ton models.

COOLING

- Turn electric power **OFF**
- Set thermostat Heat-Cool select to **COOL**.
- Adjust thermostat setting to below room temperature.
- Turn power **ON**, for approximately one minute, then **OFF**. During power application check the following:
 - Contactor - Contacts Closing
 - Compressor - **ON**
 - Condenser fan motor - **ON**
 - Circulating Air Blower - **ON** 0 second delay
- Turn power **OFF**, check the following:
 - Contactor contacts opening.
 - Compressor - **OFF**
 - Condenser fan motor - **OFF**
 - Circulating blower - **OFF** after a 60 second delay for 2 thru 3-1/2 ton models and a 90 second delay for 4 and 5 ton models.

7. START-UP PROCEDURES

CHECK BEFORE STARTING

1. Check that the blower motor speed terminal block is running the correct heating and cooling speeds.
2. Check to see that clean, properly sized air filters are installed.
3. Replace all service access panels.

Check the unit's operation as outlined in the following instructions. If any unusual sparking, odors or unusual noises are encountered, shut off electric power immediately. Recheck for wiring errors, or obstructions in or near blower motors.

1. Set thermostat Heat-Cool selector to **OFF**.
2. Set thermostat fan switch to **AUTO**.
3. Turn electric power **ON**. Nothing should start running.
4. Set thermostat fan switch to **ON**.
5. Reset thermostat fan switch to **AUTO**.

8. Sequence of OPERATION

⚠ WARNING

ELECTRICAL SHOCK HAZARD.

Failure to follow this warning could result in personal injury, death and/or property damage.

Turn off electric power supply at disconnect switch or service panel before removing any access or service panel from unit.

Cooling Operation (024 - 042):

With a call for cooling (Y), the indoor fan energizes immediately whereas the contactor energizes after a 5 minute time delay (incase of an initial start up) starting the compressor and the outdoor fan motor. When the cooling demand is met, (Y) de-energizes, shutting the compressor, indoor fan and the outdoor fan.

Cooling Operation (048 - 054):

These units utilize a 2 stage indoor thermostat. With a first stage call for cooling (Y1), the indoor fan (low stage) energizes immediately whereas the contactor energizes after a 5 minute time delay (incase of an initial start up) starting the compressor (low stage) and the outdoor fan motor. If the low stage operation cannot satisfy the cooling demand, the second stage cooling (Y2) energizes switching the compressor into high stage cooling through energizing an internal solenoid valve inside the scroll compressor and switching the indoor fan into high stage. When second stage cooling is satisfied, Y2 de-energizes switching the compressor and the indoor fan into low stage cooling. When the low stage cooling demand is met, Y1 de-energizes shutting the compressor, indoor fan and the outdoor fan.

Heating Operation (024 - 042):

With a call for heating (W2), the auxiliary or electric heat energizes along with the Indoor blower. Incase of staged heating, W3 is energized if the demand is not met. The highest airflow selected is run while the electric heat is in

operation. When heating demand is met, W3 and W2 sequentially de-energize shutting the indoor fan and the electric heater.

Heating Operation (048 - 054):

With a call for heating (W2), the auxiliary electric heater is energized along with the Indoor blower. If the demand is not met, W3 is energized incase of staged heating. When heating demand is satisfied, W3 and W2 sequentially de-energize along with the indoor fan blower.

Continuous Fan:

With the continuous Indoor fan option selected on the thermostat, G is continuously energized. Incase of 024 - 042 units, the selected airflow setting is provided. In the case of 048 and 060 units, the system runs low stage (Y1) airflow for continuous fan operation.

9. MAINTENANCE

MONTHLY MAINTENANCE AND INSPECTION CHECKS

Air Filters

⚠ CAUTION

REDUCED EQUIPMENT LIFE HAZARD

Failure to follow this cautions may result in damage to the unit being installed.

Do not operate the unit without a filter.

Inspect filters at least monthly and replace or clean as required. Washable filters may be cleaned by soaking in mild detergent and rinsing with cold water. Replace filters with the arrows on the side pointing in the direction of air flow. Dirty filters are the most common cause of inadequate heating or cooling performance, and of compressor failures.

COOLING SEASON CHECKS (MONTHLY)

Condenser Coil

Keep the condenser inlet and outlet area clean and free of leaves, grass clippings or other debris. Grass should be kept short in front of the condenser inlet. Shrubbery **MUST** be trimmed back so it is no closer than 30 inches to unit.

Condensate Drain

Check for condensate drainage. Clean as required.

ANNUAL MAINTENANCE AND INSPECTION

WARNING

ELECTRICAL SHOCK HAZARD.

Failure to follow this warning could result in personal injury, death and/or property damage.

Turn off electric power supply at disconnect switch or service panel before removing any access or service panel from unit.

The annual inspection should include cleaning as required to ensure efficient operation of the unit. To simplify access, remove all access panels and the top from the unit if possible .

Condenser Fan Motor

Note: The condenser fan motor is permanently lubricated. No further lubrication is required. Do not attempt to lubricate the condenser fan motor.

Clean the surrounding area and the condenser and evaporator coils. Use caution to avoid damage to coil fins.

BLOWER MOTOR ACCESS

1. Remove the blower access panel
2. Remove the three screws securing the blower motor housing. If unit has a support bracket, remove the two screws securing the bracket.

3. Remove the two red wires attached to the limit switch and remove the limit switch.

Motor removal and replacement

This method is required to replace or repair blower wheel, blower housing, or any unreachable components behind blower assembly.

1. Remove all screws around rim of unit top, (except screws which are inaccessible because of proximity to structure).
2. Raise unit top at corner of unit closest to blower at least 2" and place a sturdy brace at least 2" thick between top and unit corner. A 2X4 piece of wood is ideal for this.
3. Disconnect all wires from housing and slide housing out of unit. Reverse this process to reinstall.

Circulating Air Blower

Visually inspect the blower wheel for accumulations of dirt or lint. Clean the compartment and the blower wheel. If accumulation is excessive on blower wheel, or does not easily remove, it will be necessary to remove the blower assembly.

Note: The blower motor is permanently lubricated. No further lubrication is required. Do not attempt to lubricate the blower motor.

FIGURE 7

Control Box

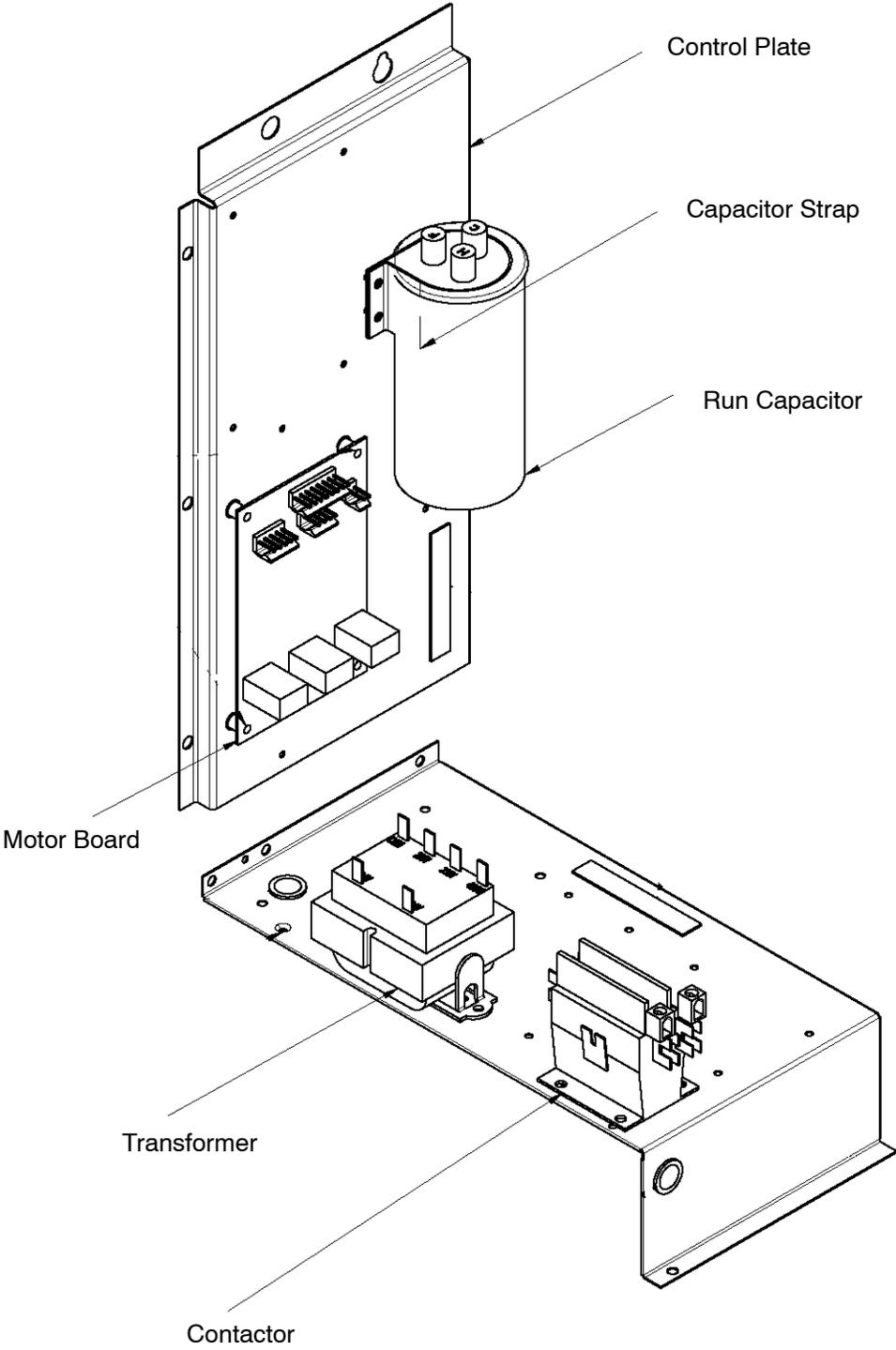


FIGURE 8

Rigging Instructions

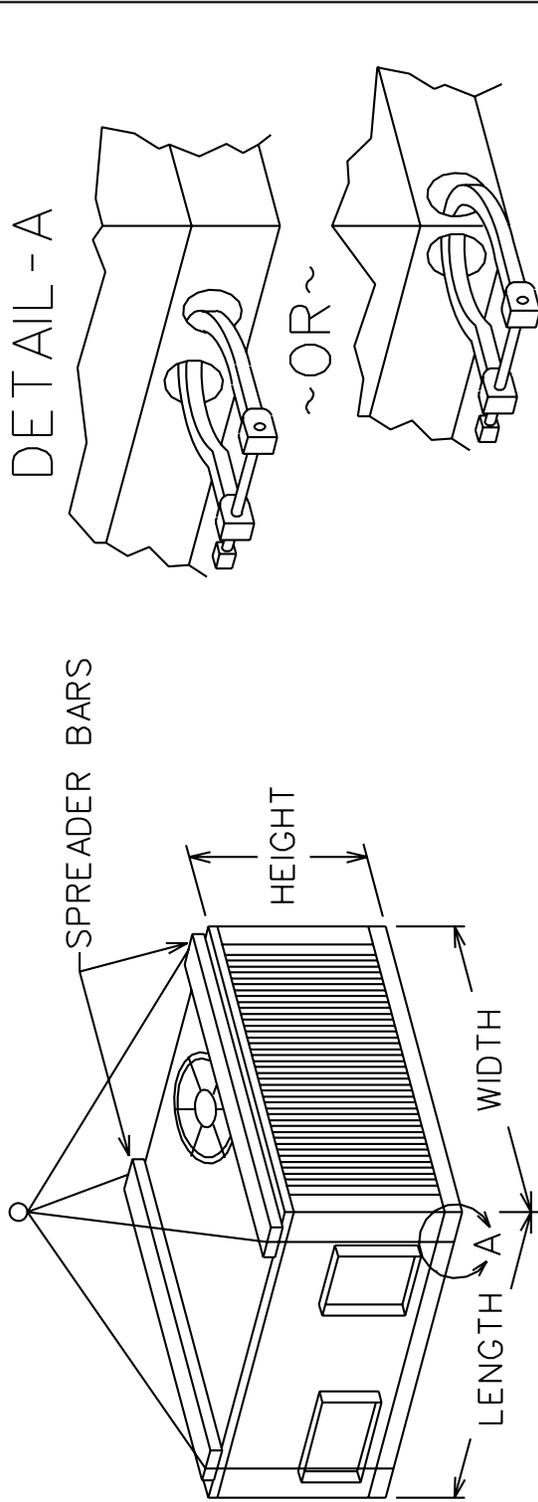
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RIGGING INSTRUCTIONS

FAILURE TO FOLLOW THESE INSTRUCTIONS CAN RESULT IN PROPERTY DAMAGE, BODILY INJURY OR DEATH.



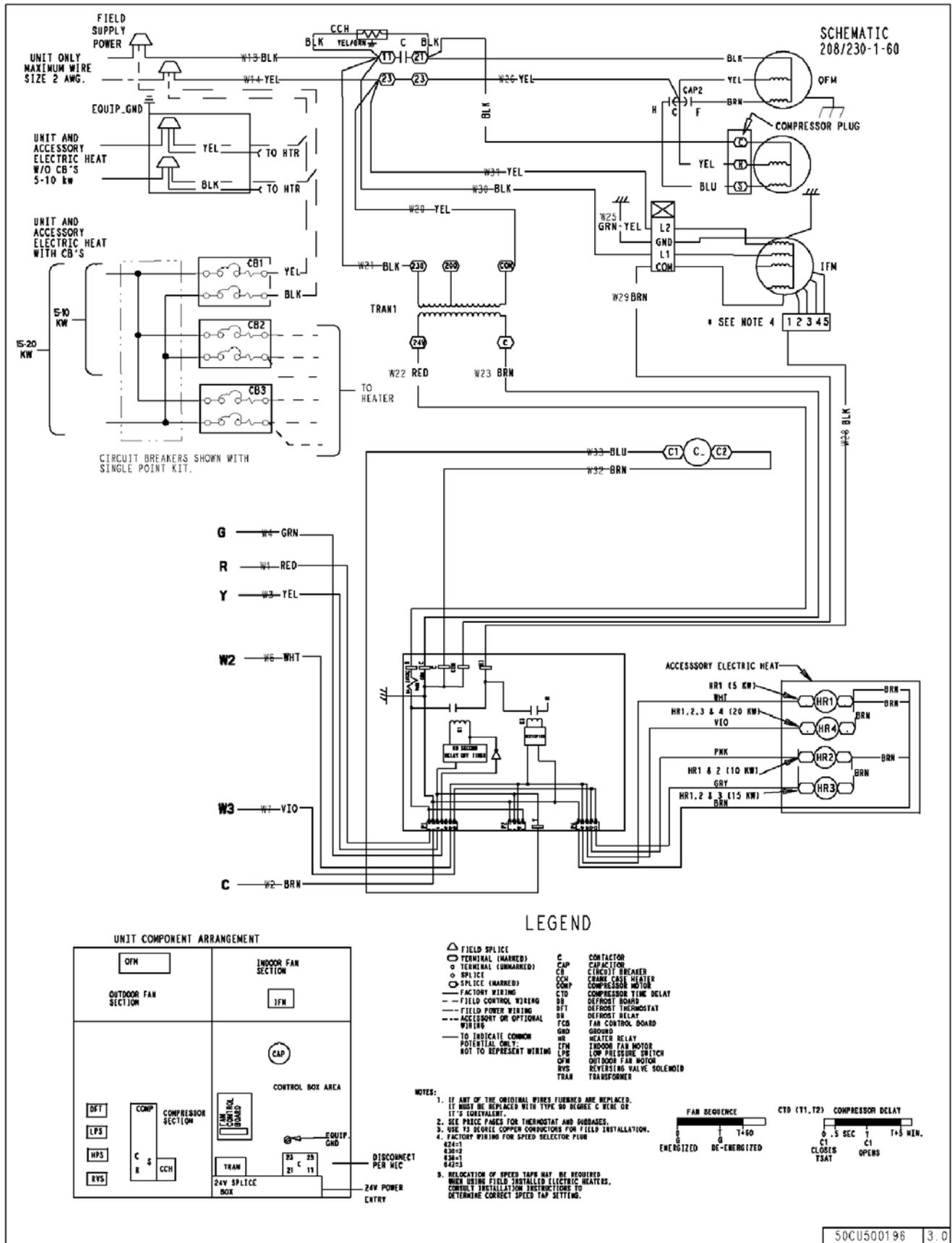
- ALL PANELS MUST BE IN PLACE WHEN RIGGING AND LIFTING.
- HOOK RIGGING SHACKLES THROUGH HOLES IN BASE RAIL, AS SHOWN IN DETAIL -A.
- USE SPREADER BARS, WHEN RIGGING, TO PREVENT UNIT DAMAGE.
- BE SURE RIGGING AND SHACKLES ARE SUFFICIENT TO HANDLE WEIGHT LISTED BELOW.



Cabinet	Max. Length		Max. Width		Max. Height		Max. Weight	
	IN	MM	IN	MM	IN	MM	LB	KG
2 Ton	48	1219	48	1219	30	762	300	137
2-1/2 to 5 Ton	48	1219	48	1219	38	965	400	182

10. Wiring Diagrams

2 to 3-1/2 Ton Wiring Diagram



50CU500196 3.0

4 to 5 Ton Wiring Diagram

