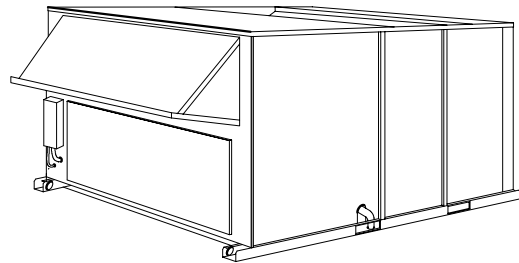


# **Installation** **Instructions**

- Safety Labeling & Rules
- Installation Requirements
- Location / Clearances
- Wiring
- Air Distribution
- Ductwork Connections
- Start-Up
- Maintenance
- Hoisting / Rigging



## **Models**

**Three Phase**  
**208-230, 460, 575 Volt**

PAS180H000	PAE180H000
PAS180L000	PAE180L000
PAS180S000	PAE180S000
PAS240H000	PAE240H000
PAS240L000	PAE240L000
PAS240S000	PAE240S000

**COMBINATION PACKAGE**  
**ELECTRIC COOLING UNITS**

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# Safety Labeling and Signal Words

## Danger, Warning and Caution

The signal words **DANGER**, **WARNING** and **CAUTION** are used to identify levels of hazard seriousness. The signal word **DANGER** is only used on product labels to signify an immediate hazard. The signal words **WARNING** and **CAUTION** will be used on product labels and throughout this manual and other manuals that may apply to the product.

## Signal Words

**DANGER** – Immediate hazards which **WILL** result in severe personal injury or death.

**WARNING** – Hazards or unsafe practices which **COULD** result in severe personal injury or death.

**CAUTION** – Hazards or unsafe practices which **COULD** result in minor personal injury or product or property damage.

## Signal Words in Manuals

The signal word **WARNING** is used throughout this manual in the following manner:

**WARNING**

The signal word **CAUTION** is used throughout this manual in the following manner:

**CAUTION**

## Product Labeling

Signal words are used in combination with colors and/or pictures on product labels. Following are examples of product labels with explanations of the colors used.

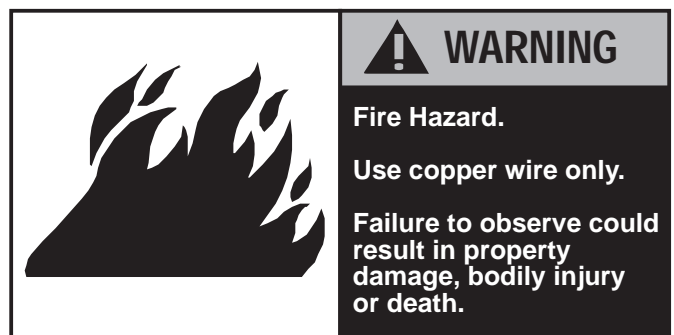
### Danger Label

White lettering on a black background except the word **DANGER** which is white with a red background.



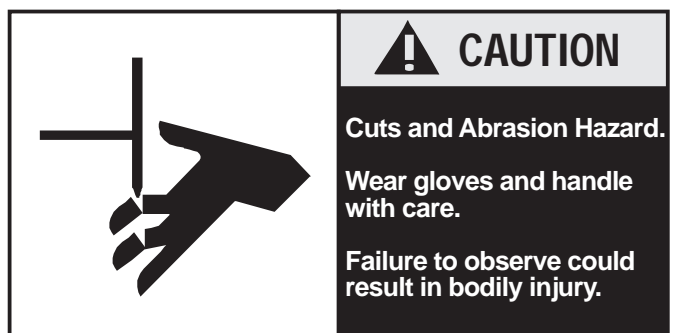
### Warning Label

White lettering on a black background except the word **WARNING** which is black with an orange background.



### Caution Label

White lettering on a black background except the word **CAUTION** which is black with a yellow background.




# BASE UNIT DIMENSIONS - PAS/PAE180

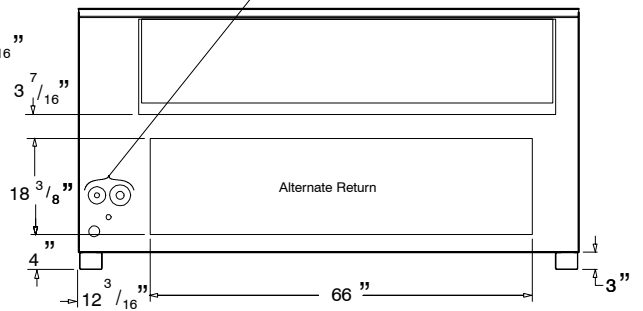
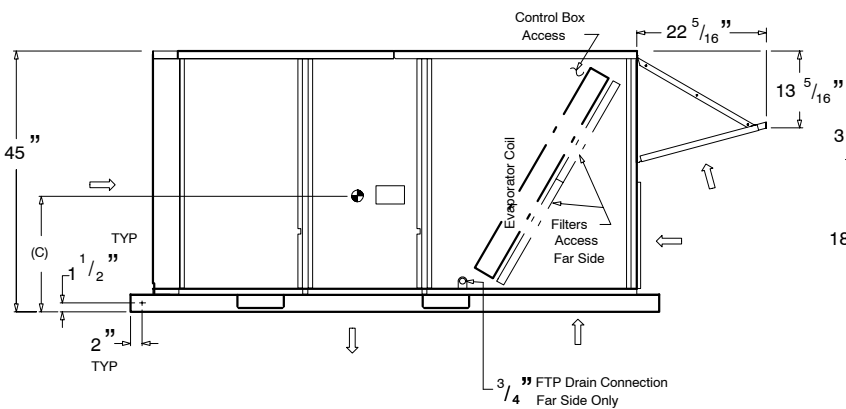
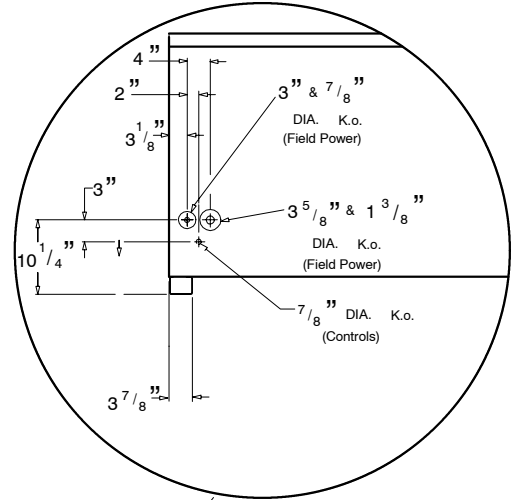
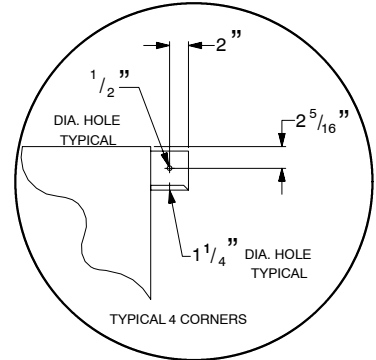
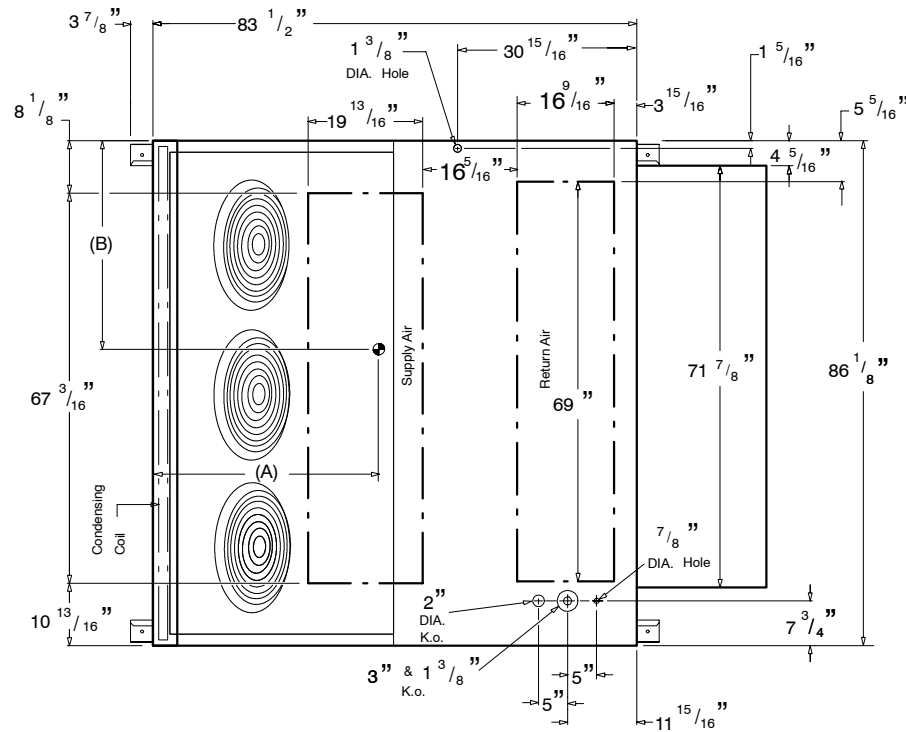
Unit Size	Total Weight		Corner A		Corner B		Corner C		Corner D		Dim A		Dim B		Dim C	
	lb	kg	lb	kg	lb	kg	lb	kg	lb	kg	ft-in	mm	ft-in	mm	ft-in	mm
180	1550	703	391	177	365	166	384	174	410	186	3-5	1041	3-6	1067	1-10	559

## NOTES:

1. Dimensions in ( ) are in millimeters.

2.  Center of Gravity.

3.  Direction of Airflow



38-11-38a


# BASE UNIT DIMENSIONS - PAS/PAE240

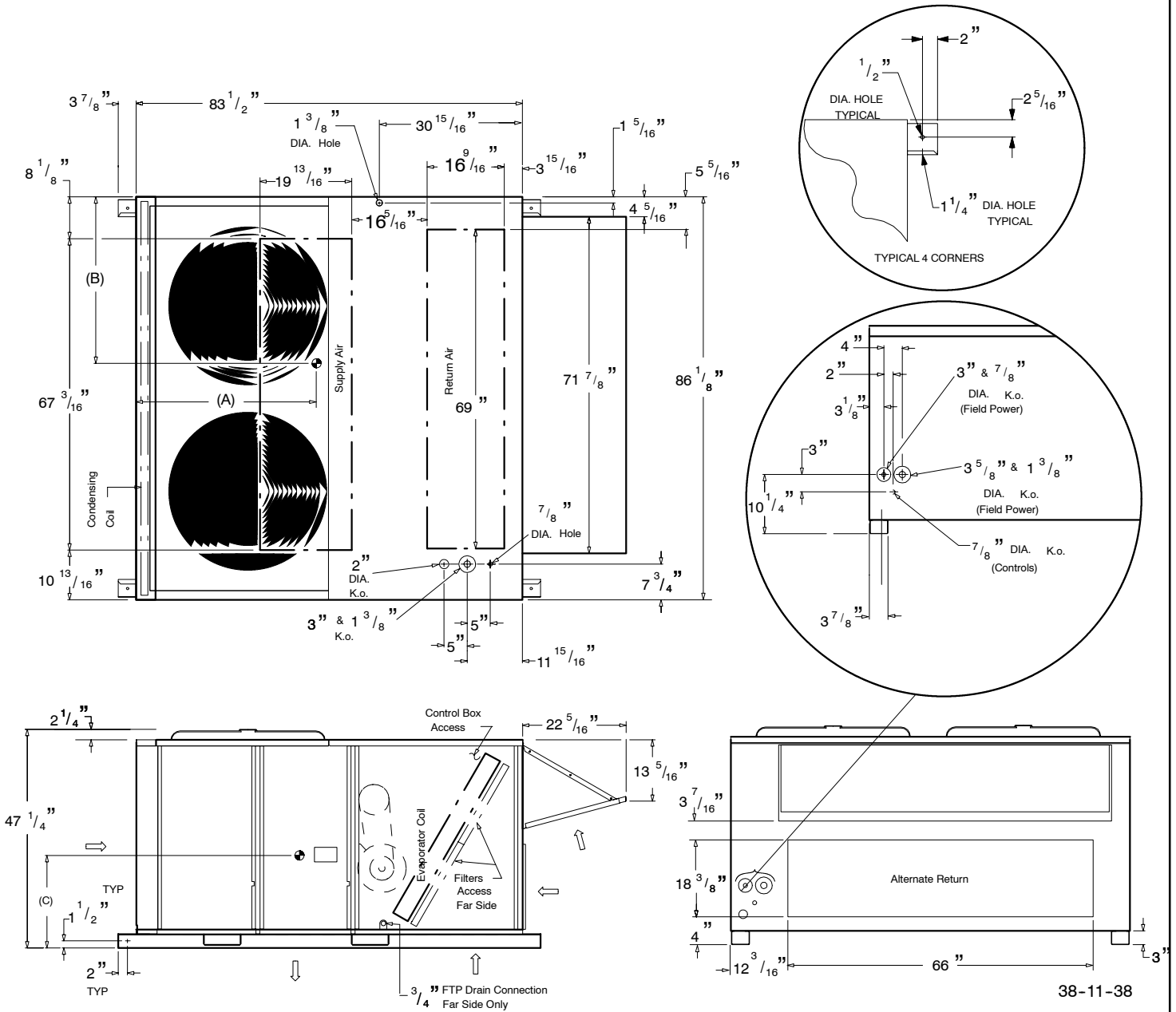
Unit Size	Total Weight		Corner A		Corner B		Corner C		Corner D		Dim A		Dim B		Dim C	
	lb	kg	lb	kg	lb	kg	lb	kg	lb	kg	ft-in	mm	ft-in	mm	ft-in	mm
240	1700	771	419	190	394	179	425	193	463	210	3-4	1016	3-5	1041	1-5	508

## NOTES:

1. Dimensions in ( ) are in millimeters.

2.  Center of Gravity.

3.  Direction of Airflow



38-11-38

# Safe Installation Requirements

---

## **WARNING**

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 National Electrical Code ANSI/NFPA 70-1990 or current edition. In Canada the CSA C.22.1 - Canadian Electrical Code Part 1 or current edition.

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

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

- Installation **MUST** conform to the most current version of the following standards or a superseding standard.

In the United States:

- National Electrical Code ANSI/NFPA 70-1990

In Canada:

- CSA C.22.1 - Canadian Electrical Code Part 1.
- Seal supply and return air ducts.

**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.

Do not install unit in an indoor location. Do not locate unit air inlets near exhaust vents or other sources of contaminated air.

Although unit is weatherproof, guard against water from higher level runoff and overhangs.

# Location And Set-up

The unit is designed for outdoor installation **ONLY**. The unit may be installed on a level concrete mounting base (or other adequate platform) at ground level or on a flat rooftop with an adequate platform. If using as a downflow model, use a roof curb. Typical installations are shown in **Figure 2**.

## Access Panels

### CAUTION

Unit will **NOT** operate properly without all access panels in place. Access panels are shown in **Figure 1**.

Unit **MUST NOT** be moved unless all access panels are in place.

## WARNING

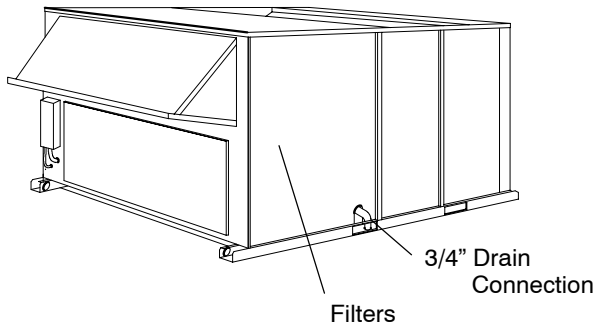
Carbon monoxide poisoning hazard.

Keep blower access panels in place.

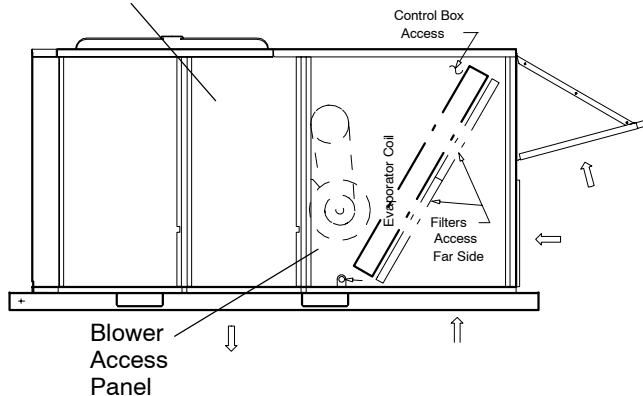
Failure to keep blower access panels in place can result in bodily injury and/or death.

Figure 1

Access Panels



Control Panel



## Clearances

The location **MUST** allow for minimum clearances and should not be adjacent to an area where the unit's operating sound level might be objectionable.

Minimum clearances, as specified below, **MUST** be maintained to provide adequate fire protection and room for service personnel. In addition, local codes **MUST** be observed.

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

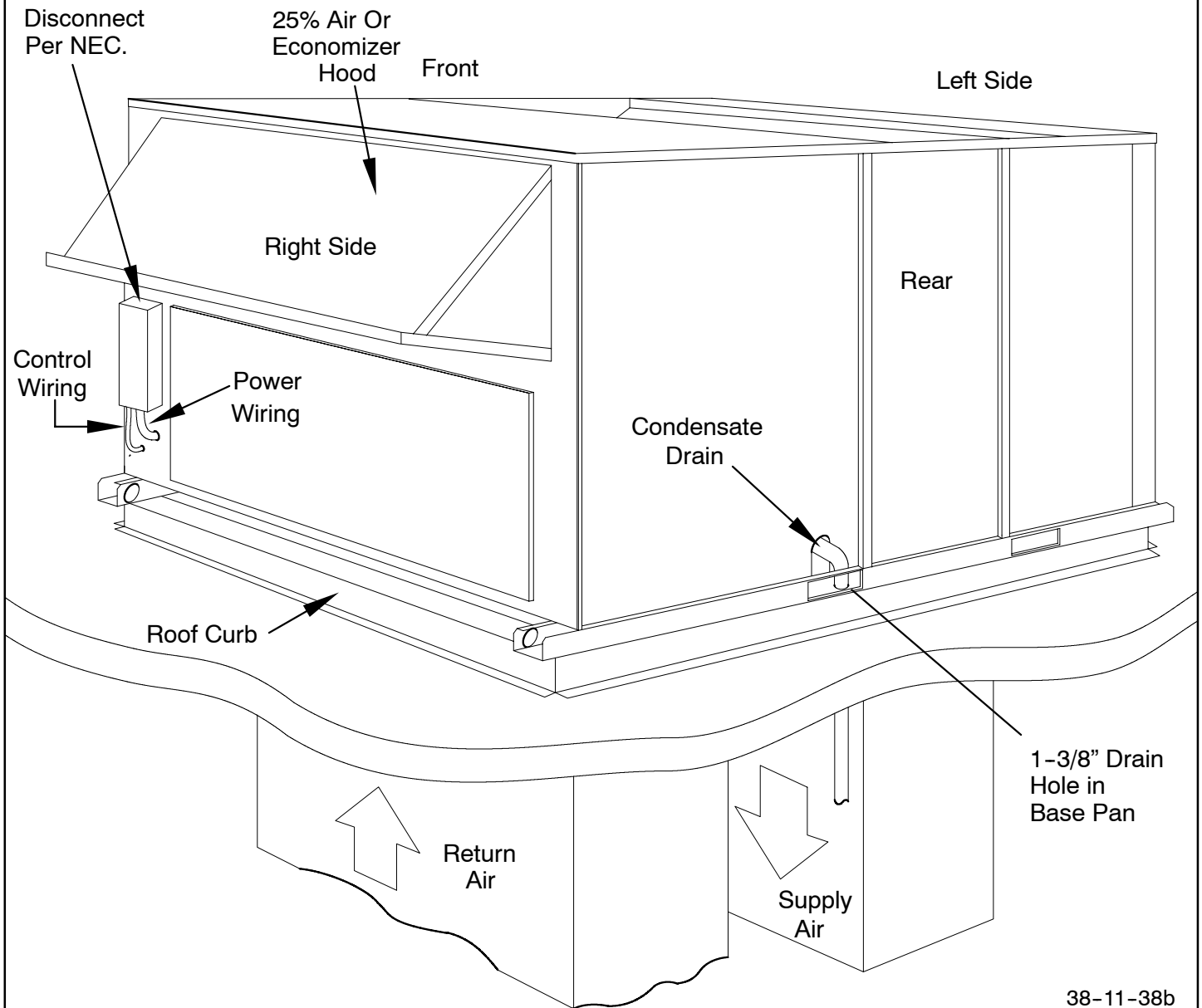
### CAUTION

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

## WARNING

For vertical supply and return units, tools or parts could drop into ductwork and cause an injury. Install a 90 degree turn in the return ductwork between the unit and the conditioned space. If a 90 degree elbow cannot be installed, then a grille of sufficient strength and density should be installed to prevent objects from falling into the conditioned space. Due to electric heater, supply duct will require 90 degree elbow.



**Figure 2****TYPICAL INSTALLATIONS & CLEARANCES**

38-11-38b

**CLEARANCES**

1. Ductwork to be attached to accessory roof curb only.
2. Minimum clearance:
  - Rear: 7'-0" (2134) for coil removal. This dimension can be reduced to 4'-0" (1219) if conditions permit coil removal from the top.
  - Left side: 4'-0" (1219) for proper condenser coil airflow.
  - Front: 4'-0" (1219) for control box access.
  - Right Side: 4'-0" (1219) for proper operation of damper and power exhaust if so equipped.
  - Top: 6'-0" (1829) to assure proper condenser fan operation.
  - Local Codes jurisdiction may prevail.
3. With the exception of clearance for the condenser coil and the damper/power exhaust as stated in Note #2, a removeable fence or barricade requires no clearance.
4. Dimensions are from outside of corner post. Allow 0-5/16" (8) on each side for top cover drip edge.
5. Units with electric heat require a 1 inch clearance for the first 24 inches of ductwork.
6. Outlet grilles must not lie directly below unit discharge.

# Installation

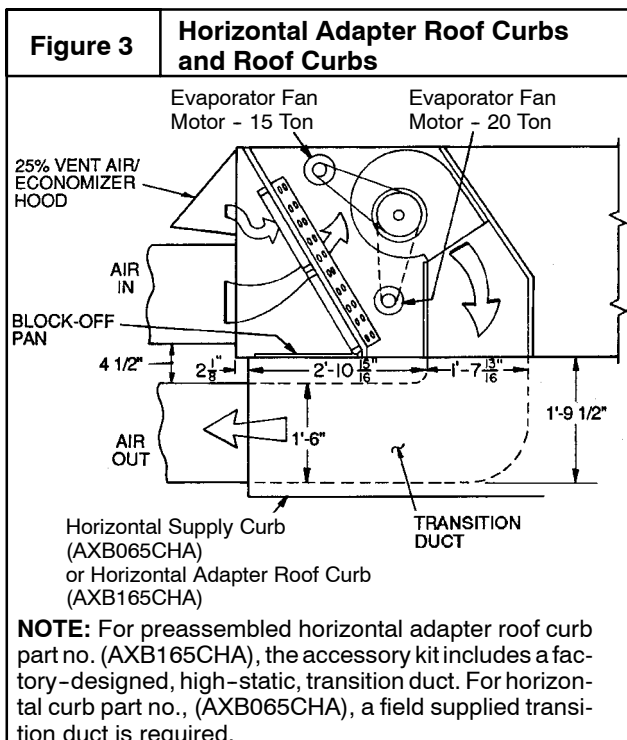
## CAUTION

Unit will **NOT** operate properly unless it is installed level front to rear and side to side.

The slope **MUST NOT** be greater than  $\frac{1}{16}$ " per foot (10mm per meter). For side to side leveling, the control box side **MUST** always be higher.

## Ground Level Installation

**ROOF CURB:** Assemble and install accessory horizontal adapter roof curb in accordance with instructions shipped with accessory. See Figure 3. Ductwork can be installed to horizontal adapter roof curb before unit is set in place. Adapter roof curb should be level. This is necessary to permit unit drain to function properly. Unit leveling tolerance is  $\pm \frac{1}{16}$ " per linear foot in any direction. Refer to Accessory Horizontal Adapter Roof Curb Installation Instructions for additional information as required. When accessory horizontal adapter roof curb is used, unit may be installed on class A, B, or C roof covering material.



**IMPORTANT:** The gasketing of the unit to the roof curb or adapter roof curb is critical for a watertight seal. Improperly applied gasket can also result in air leaks and poor unit performance.

**ALTERNATE UNIT SUPPORT:** When the curb or adapter cannot be used, install unit on a noncombustible surface. Support unit with sleepers, using unit curb support area. If sleepers cannot be used, support long sides or unit with a minimum of 3 equally spaced 4-in. x 4-in. pads on each side.

## Rooftop Installation

- 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. See product specification sheet for unit weights and corner weights.

- 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.

The platform may be constructed of pressure treated wood and may be covered with Class A, B or C roof covering.

- Platform **MUST** allow for proper condensate trap installation and drainage. See associated text for more information about condensate drainage.

**NOTE: MAKE SURE DOWNFLOW SUPPLY AND RETURN AIR DUCTS ARE FREE OF OBSTRUCTIONS BEFORE INSTALLING UNIT ON ROOF CURB OR ANY DOWNFLOW APPLICATION. Remove all forklift supports, covers, cardboard, etc., from the downflow return and supply air ducts.**

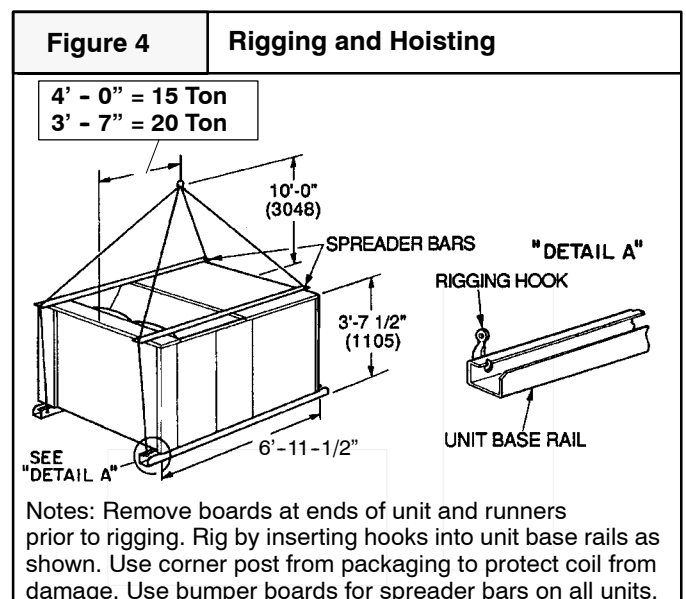
## Hoisting

**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. See **Figure 4**.

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. See **Figure 4**.

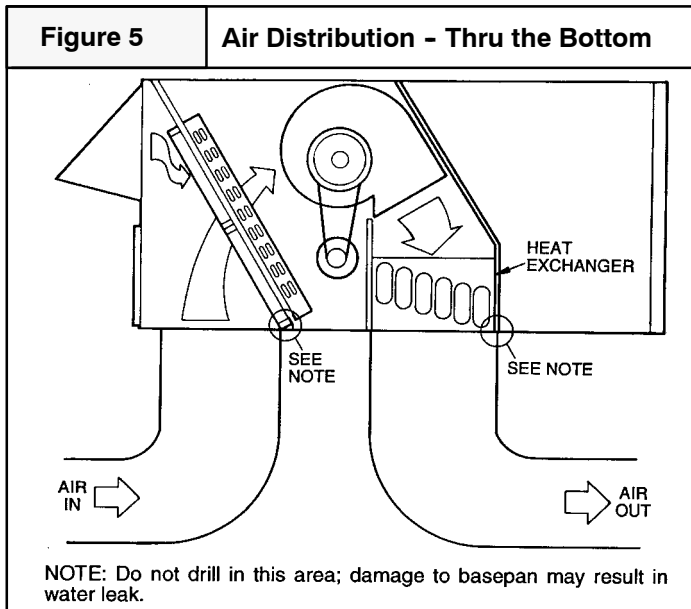
Inspect unit for transportation damage. File any claim with transportation agency. Keep unit upright and do not drop. Spreader bars are not required if top crating is left on unit.



## Unit Duct Connections

These units are shipped ready for downflow operation but are adaptable to horizontal use. To convert to horizontal operation, refer to Ground Level Installation Section of this manual.

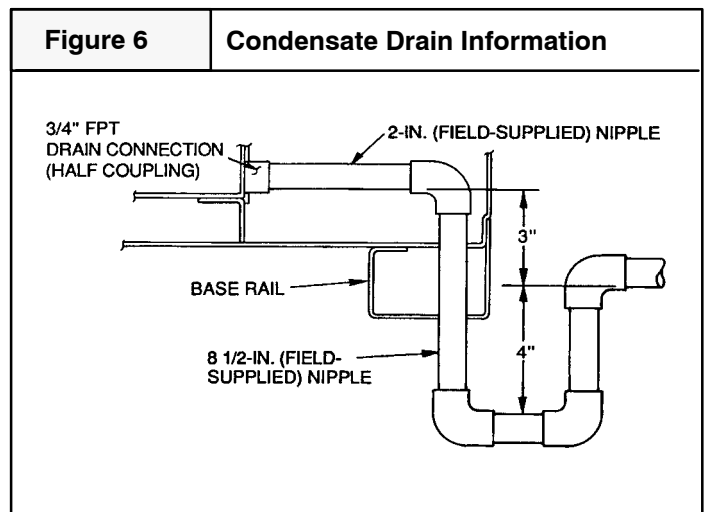
Attach all ductwork to roofcurb and roofcurb basepans. Refer to installation instructions shipped with accessory roof curb for more information.



## Condensate Drain

The condensate drain outlet is a 3/4 -in. threaded female connection located inside the evaporator section.

The circulating blower and the condenser fan create a negative pressure on the condensate drain line that will prevent the condensate from draining properly without a trap. To combat this negative pressure, a field supplied condensate trap that will allow a standing column of water of at least 4" **MUST** be installed. Bottom of outlet from trap **MUST** be at least 3" below bottom of outlet from unit. An 8-1/2" x 3/4" diameter and 2" x 3/4" pipe nipple, couple to standard 3/4" diameter elbows, provide a straight path down through hole in unit base rails. **See Figure 6.** A 3/4" 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.



WARNING

Electrical shock hazard.

Shut off electric power at unit disconnect or service panel before making any electrical connections.

Unit **MUST** be grounded to electrical service panel.

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

**NOTE:** All electrical work **MUST** conform with the requirements of local codes and ordinances and in the United States the National Electrical Code ANSI/NFPA70-1990 (or current edition) and in Canada CSA C.22.1 - Canadian Electrical Code Part 1 (or current edition). Provide line voltage power supply from a separate protected circuit with a disconnect switch (when required) located within sight of the unit. Supply voltage, amperage, wire, fuse and disconnect switch sizes **MUST** conform with specifications on the unit rating plate.

Wiring **MUST** be protected from possible mechanical damage and **MUST NOT** interfere with removal of access panels, filters, etc.

All exposed wiring or connections **MUST** be made with weatherproof cable or wire unless installed in conduit.

Field Power Supply - Unit is factory wired for voltage shown on nameplate.

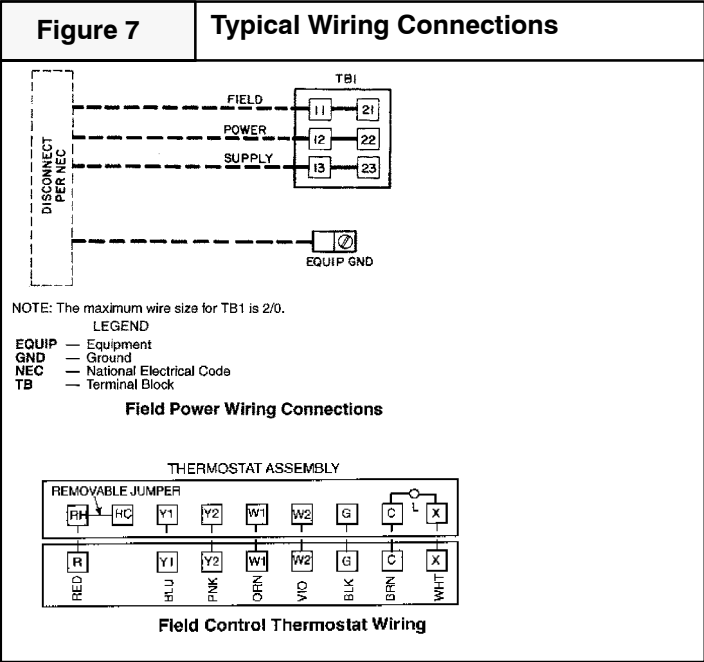
When installing units, provide a disconnect per NEC (National Electrical code) of adequate size.

For access to high and low voltage connections, remove the control box access panel. (see **Figure 1**).

Line Voltage Wiring

Route power ground lines through control box end panel or unit basepan and to connections as shown on unit wiring diagram.

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.



## CAUTION

The correct power phasing is critical in the operation of the scroll compressors. An incorrect phasing will cause the compressor to rotate in the wrong direction. This may lead to premature compressor failure.

## Converting 230V Units to 208V

Field wiring must confirm to temperature limitations for type 'T' wire. All field wiring must comply with NEC and local requirements.

Transformer # 1 is wired for 230-v unit. If 208/230-v unit is to be run with 208-v power supply, the transformer must be rewired as follows:

1. Remove cap from red (208 v) wire.
2. Remove cap from orange (230 v) spliced wire.
3. Replace orange wire with red wire.
4. Recap both wires.

**IMPORTANT: BE CERTAIN UNUSED WIRES ARE CAPPED.** Failure to do so may damage the transformers.

Operating voltage to compressor must be within voltage range indicated on unit nameplate. On 3 phase units, voltages between phases must be balanced within 2%.

Unit failure as a result of operation on improper line voltage or excessive phase imbalance constitutes abuse and may cause damage to electrical components.

## Field Installed Equipment

All wiring done in the field between the unit and other devices, or between separate devices that are field installed and located, **MUST** not exceed the temperature limitations for type T wire and **MUST** be installed according to the manufacturer's instructions for the devices.

## Low Voltage Wiring

Route thermostat cable or equivalent single leads of colored wire from subbase terminals through conduit in unit to low-voltage connections as shown on unit label wiring diagram.

NOTE: For wire runs up to 50 ft, use no. 18 AWG (American Wire Gauge) insulated wire (35 C minimum), for 50-75 ft. runs, use no. 16 AWG insulated wire (35 C minimum), for over 75 ft, use no. 14 AWG insulated wire (35 C minimum). All wire larger than no. 18 AWG cannot be directly connected at the thermostat and will require a junction box and splice at the thermostat.

## Low Voltage Wiring With Economizer Option

The economizer electrical harness taps into **Y1** and **Y2** on the low voltage terminal board. Low voltage wires from the

thermostat are connected to **Y1** and **Y2** with or without an economizer.

## Thermostat

The thermostat **MUST** be a field supplied 2 stage cooling, 2 stage heating thermostat.

The location of the thermostat has an important effect on the operation of the unit. **FOLLOW THE INSTRUCTIONS INCLUDED WITH THE THERMOSTAT FOR CORRECT LOCATION, MOUNTING AND WIRING.**

## Heat Anticipator

Unit Size	Unit Voltages	kW*	Stage 1	Stage 2
15 & 20 Ton	208/230-3-60	26 / 34	.40	.66
		42 / 56	.66	.40
		56 / 75	.66	.66
	380-3-60	20	.40	.40
		35	.40	.66
	460-3-60	32	.40	.40
		55	.40	.66
	575-3-60	80	.66	.66
		50	.66	.66
	* Heater kW is based on heater voltage of 208v, 240v, 380v, 480v, and 575v.			

Settings may be changed slightly to provide a greater degree of comfort for a particular installation.

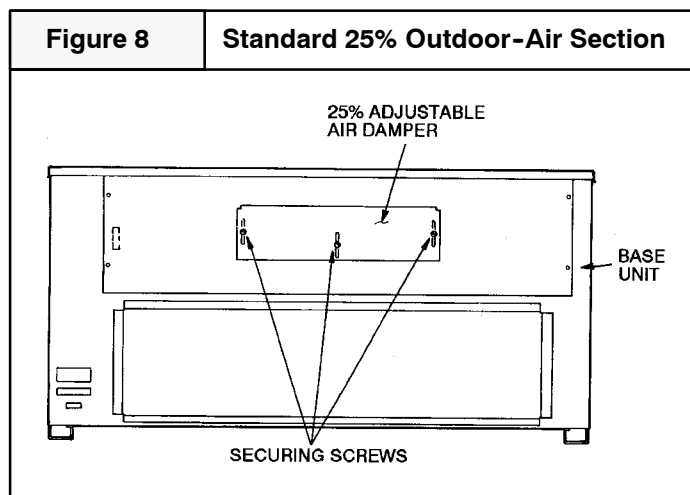
## Final Check

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.

## Make Outdoor-Air Inlet Adjustments

All units have a manual outdoor-air damper to provide ventilation air.

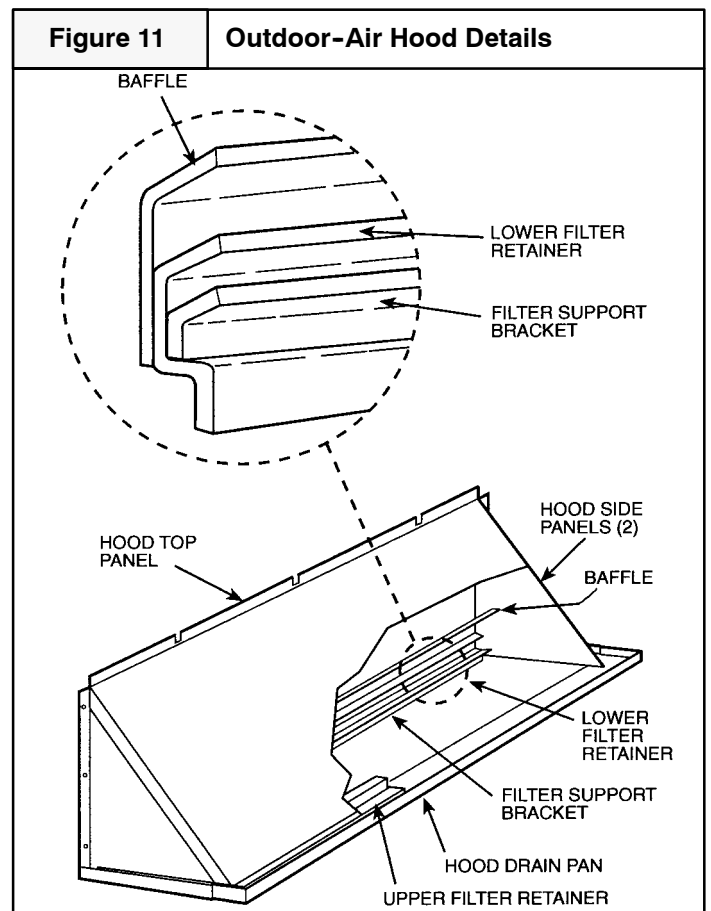
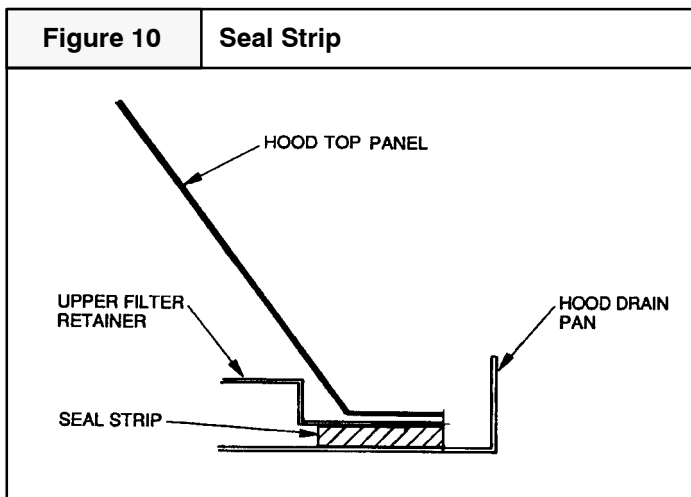
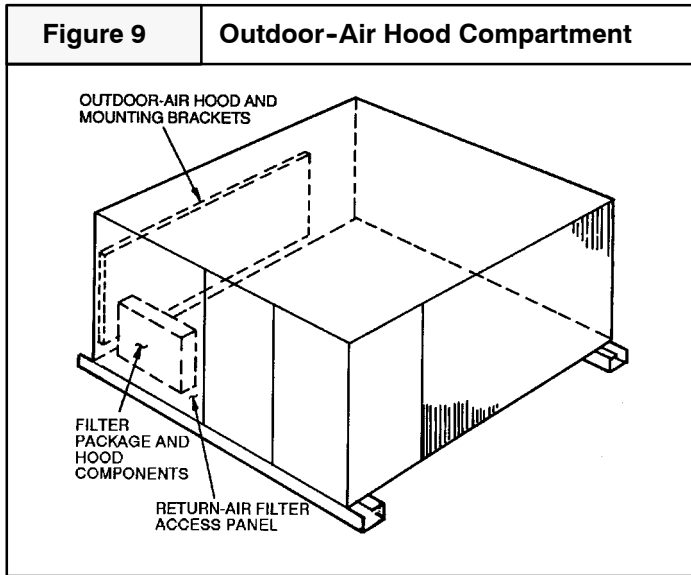
Damper can be reset to admit up to 25% outdoor air into return-air compartment. To adjust, loosen securing screws and move damper to desired setting, then retighten screws to secure damper. **See Figure 8.**



## Install Outdoor-Air Hood

NOTE: The hood top panel, upper and lower filter retainers, hood drain pan, baffle and filter support bracket are secured opposite the condenser end of the unit. The screens, hood side panels, remaining section of filter support bracket, seal strip, and hardware are in a package located inside the return-air filter access panel. **See Figure 9.**

1. Attach seal strip to upper filter retainer. **See Figure 10.**
2. Assemble hood top panel, side panels, upper filter retainer, and drain pan. **See Figure 11.**



3. Secure lower filter retainer and support bracket to unit. **See Figure 11.** Leave screws loose on 20 ton units.
4. For 20 ton units only, slide baffle behind lower filter retainer and tighten screws.
5. Loosen sheet metal screws for top panel of base unit located above outdoor-air inlet opening, and remove screws for hood side panels located on the sides of the outdoor-air inlet opening.
6. Match notches in hood top panel to unit top panel screws. Insert hood flange between top panel flange and unit. Tighten screws.
7. Hold hood side panel flanges flat against unit, and install screws removed in Step 5.
8. Insert outdoor-air inlet screens and spacer in channel created by lower filter retainer and filter support bracket.
9. Attach remaining section of filter support bracket.

# Air Distribution System

## Ductwork

**NOTE:** The total heat loss from the structure as expressed in total Btu/hr **MUST** be calculated by manufacturer's method or in accordance with "A.S.H.R.A.E. Guide" or "Manual N - Load Calculations" published by the Air Conditioning Contractors of America or in Canada H.R.A.I. "Manual N". The total heat loss calculated should be equal to or less than the heating capacity. Output based on D.O.E. test procedures, steady state efficiency times input.

Ductwork, supply registers, and return air grilles **MUST** be designed and sized to handle the greater of the units heating or cooling air volume requirements. If the unit is connected to an existing system, the ductwork **MUST** be checked to make sure it is adequate. Extra runs or larger duct sizes may have to be installed. **Use only non-combustible type insulation on supply plenum or supply ductwork within 6 feet of unit.**

Maximum recommended velocity in trunk ducts is 1000 feet per minute (5.08 m/s). Velocity in branches should not exceed 800 feet per minute (4.06 m/s).

Ductwork installed outdoors should have a minimum of 2" (50.8mm) of fiberglass insulation and a weatherproof vapor barrier. It should also be protected against damage. Caulk and flashing, or other means adequate to provide a permanent weather seal should be used.

Ductwork installed in attics or other areas exposed to outside temperatures should be installed with a minimum of 2" (50.8mm) fiberglass insulation and have an indoor type vapor barrier.

## Ductwork Connections

The use of flexible, **non-combustible** connectors between main trunk ducts and supply and return air plenums is recommended to minimize vibration transmission. Attach all ductwork to roof curb and roof curb basepans.

## Field Fabricate Ductwork

Secure all ducts to roof curb and building structure on vertical units. Do not connect ductwork to unit. For horizontal applications, field supplied flanges should be attached to horizontal discharge openings and all ductwork secured to the flanges. Insulate and weatherproof all external ductwork, joints, and roof openings with counter flashing and mastic in accordance with applicable codes.

Ducts passing through an unconditioned space must be insulated and covered with a vapor barrier.

If a plenum return is used on a vertical unit, the return should be ducted through the roof deck to comply with applicable fire codes.

A minimum clearance is not required around ductwork. Cabinet return-air static shall not exceed -.45 in. wg without an economizer.

## Filters

### CAUTION

**Do NOT operate the unit without all filters in place.**

All air **MUST** pass through a filter before entering the unit. Electronic air cleaner, optional filter racks, or other accessible filter arrangements **MUST** be installed in the return air ductwork.

**NOTE:** If the unit has an economizer or any other type of outdoor air damper, disposable filters **MUST** be used in the internal filter racks.

For replacement filter sizes and instructions, see specification sheet.

## Circulating Blower

### Determining Blower Speed

1. From the system design, determine the external static pressure (ESP) for the supply ducts, return ducts and registers, diffusers, grilles, dampers, heaters and special filters (if any).
2. If unit is to be set up in cooling mode, add .08" W.C. (20 Pa) for wet coil operation to the total ESP determined in Step 1.
3. For static additions due to installation of an economizer or manual air dampers, add .05 inches to ESP.
4. From the system design, determine the desired airflow in CFM (L/s). See **Figure 12** for CFM to L/s conversion table.
5. To determine the blower speed necessary to obtain the desired CFM (L/s), see the Circulating Blower Performance Data for the unit located on the pages that immediately follow.
6. Determine the blower RPM's needed to obtain the desired CFM (L/s).
7. Compare required RPM to unit's factory setting for blower RPM (see Blower Performance Tables). If different from the RPM your installation requires, the blower speed will need to be changed.
8. Following the circulating Blower Performance Data table is a table that shows how many turns open the adjustable blower motor pulley needs to be to obtain the required RPM.
9. To change the blower speed, see pages 18 and 19.

**Metric Conversions:** Cubic Feet per Minute (CFM) to Liters per Second (L/s);  
Inches of Water Column (In. W.C.) to Pascals (Pa)

14



## PAS Series PERFORMANCE DATA

### CIRCULATING BLOWER PERFORMANCE - 15 TON UNITS (3.7 HP Standard Motor w/891-1179 rpm drive pkg)

CFM	EXTERNAL STATIC PRESSURE IN INCHES WATER COLUMN - DRY COIL WITH FILTER															
	0.3		0.5		0.7		0.9		1.1		1.3		1.5		1.7	
	RPM	W	RPM	W	RPM	W	RPM	W	RPM	W	RPM	W	RPM	W	RPM	W
5250	763	1539	858	1732	947	1926	1029	2123	1107	2321	1180	2523	1251	2727	1319	2933
5500	788	1724	879	1920	963	2117	1042	2316	1117	2516	1188	2719	1257	2924	1322	3132
5750	814	1923	900	2122	981	2321	1057	2523	1129	2725	1198	2930	1264	3137	1327	3346
6000	845	2068	931	2273	1011	2478	1087	2685	1160	2893	1229	3103	1295	3316	1359	3530
6250	876	2224	961	2434	1042	2645	1117	2858	1191	3071	1260	3287	1326	3504		
6500	902	2456	984	2670	1061	2883	1134	3098	1204	3314	1271	3531				
6750	929	2704	1008	2920	1082	3136	1152	3353	1220	3571						

- NOTES:
- 1) Maximum motor Watts is 3775 for standard 3.7 HP motor.
  - 2) Maximum blower wheel speed is 1468 rpm.
  - 3) Motor drive range is 891 to 1179 rpm.
  - 4) Air flow data based on dry coil with filters. Deduct 0.08 inches for wet coil performance.
  - 5) Operation in shaded areas requires accessory high static motor and drive kit sold separately.
  - 6) Boldface indicates field-supplied drive is required.

### CIRCULATING BLOWER PERFORMANCE - 20 TON UNITS (7.5 HP Standard Motor w/1002-1225 rpm drive pkg)

CFM	EXTERNAL STATIC PRESSURE IN INCHES WATER COLUMN - DRY COIL WITH FILTER															
	0.3		0.5		0.7		0.9		1.1		1.3		1.5		1.7	
	RPM	W	RPM	W	RPM	W	RPM	W	RPM	W	RPM	W	RPM	W	RPM	W
6750	803	2577	869	2836	932	3102	992	3374	1049	3652	1104	3935	1158	4224	1209	4519
7000	828	2780	892	3042	953	3310	1011	3583	1067	3863	1121	4148	1173	4438	1224	4733
7250	853	3004	915	3268	975	3538	1031	3813	1086	4095	1139	4381	1190	4672	1240	4968
7500	878	3227	938	3494	996	3766	1051	4043	1105	4326	1156	4613	1207	4906	1255	5203
7750	903	3471	962	3740	1018	4015	1072	4294	1125	4578	1175	4867	1225	5161	1272	5459
8000	928	3715	985	3986	1040	4263	1093	4544	1144	4830	1194	5120	1242	5415	1289	5714
8250	954	3980	1009	4254	1063	4532	1115	4815	1165	5103	1213	5395	1261	5691	1307	5991

- NOTES:
- 1) Maximum motor Watts is 7915 for standard 7.5 HP motor.
  - 2) Maximum blower wheel speed is 1540 rpm.
  - 3) Motor drive range is 1002-1225 rpm.
  - 4) Air flow data based on dry coil with filters. Deduct 0.08 inches for wet coil performance.
  - 5) Operation in shaded areas requires accessory high static drive kit sold separately.

## PAE Series PERFORMANCE DATA

### CIRCULATING BLOWER PERFORMANCE - 15 TON UNITS (5 HP Std Motor w/873-1021 rpm drive pkg)

CFM	EXTERNAL STATIC PRESSURE IN INCHES WATER COLUMN - DRY COIL WITH FILTER															
	0.3		0.5		0.7		0.9		1.1		1.3		1.5		1.7	
	RPM	W	RPM	W	RPM	W	RPM	W	RPM	W	RPM	W	RPM	W	RPM	W
5250	740	1514	765	1599	840	1848	909	2103	974	2365	1036	2635	1095	2911	1150	3193
5500	730	1596	785	1780	856	2035	923	2295	985	2562	1045	2836	1101	3115	1155	3401
5750	734	1726	805	1972	873	2233	937	2500	998	2771	1055	3048	1110	3332	1163	3621
6000	759	1854	832	2118	901	2388	965	2663	1026	2943	1083	3228	1139	3520	1192	3817
6250	787	2003	860	2275	928	2554	992	2837	1054	3126	1111	3419	1167	3719		
6500	812	2231	881	2510	946	2794	1008	3082	1067	3375	1123	3674				
6750	837	2476	903	2761	966	3050	1026	3344	1082	3643						

- NOTES:
- 1) Maximum motor Watts is 5180 for standard 5 HP motor.
  - 2) Maximum blower wheel speed is 1550 rpm.
  - 3) Motor drive range is 873 to 1021 rpm.
  - 4) Air flow data based on dry coil with filters. Deduct 0.08 inches for wet coil performance.
  - 5) Operation in shaded areas requires accessory high static drive kit sold separately.
  - 6) Boldface indicates field-supplied drive is required.

### CIRCULATING BLOWER PERFORMANCE - 20 TON UNITS (7.5 HP Standard Motor w/1002-1225 rpm drive pkg)

CFM	EXTERNAL STATIC PRESSURE IN INCHES WATER COLUMN - DRY COIL WITH FILTER															
	0.3		0.5		0.7		0.9		1.1		1.3		1.5		1.7	
	RPM	W	RPM	W	RPM	W	RPM	W	RPM	W	RPM	W	RPM	W	RPM	W
6750	819	2945	885	3166	947	3392	1007	3623	1064	3858	1119	4095	1172	4335	1224	4579
7000	844	3151	908	3372	968	3598	1026	3828	1082	4062	1136	4299	1188	4538	1239	4780
7250	870	3374	932	3595	991	3820	1047	4050	1102	4283	1155	4519	1206	4758	1256	4999
7500	895	3596	955	3817	1013	4042	1068	4271	1121	4504	1173	4739	1223	4977	1272	5217
7750	921	3835	980	4056	1036	4280	1090	4509	1142	4741	1192	4976	1241	5213	1289	5453
8000	947	4073	1004	4294	1058	4518	1111	4747	1162	4978	1211	5212	1259	5449	1306	5688
8250	973	4328	1029	4549	1082	4773	1133	5001	1183	5232	1231	5465	1278	5702	1324	5940

- NOTES:
- 1) Maximum motor Watts is 7915 for standard 7.5 HP motor.
  - 2) Maximum blower wheel speed is 1550 rpm.
  - 3) Motor drive range is 1002-1225 rpm.
  - 4) Air flow data based on dry coil with filters. Deduct 0.08 inches for wet coil performance.
  - 5) Operation in shaded areas requires accessory high static drive kit sold separately.
  - 6) Boldface indicates field-supplied drive is required.

# PAS Series PERFORMANCE DATA (cont.)

AIR QUANTITY LIMITS		
UNIT	MINIMUM CFM	MAXIMUM CFM
PAS180	4,500	7,500
PAS240	6,000	10,000

EVAPORATOR-FAN MOTOR EFFICIENCY		
UNIT		MOTOR EFFICIENCY %
PAS180	(3.7 hP)	85.8
PAS240	(7.5 hP)	88.5

OUTDOOR SOUND POWER										
UNIT SIZE	SOUND RATING (60 Hz)	A-WEIGHTED (db)	OCTAVE BANDS							
			63	125	250	500	1000	2000	4000	8000
PAS180	8.8 Bels	87.8	90.8	88.7	86.4	84.3	83.5	78.4	75.6	66.8
PAS240	9.5 Bels	94.1	98.7	92.3	93.8	90.9	89.6	85.9	80.3	74.3

Bels - Sound Levels (1 bel = 10 decibels)

FAN RPM AT MOTOR PULLEY SETTINGS*													
UNIT PAS	MOTOR PULLEY TURNS OPEN												
	0	1/2	1	1-1/2	2	2-1/2	3	3-1/2	4	4-1/2	5	5-1/2	6
180**	****	****	1179	1150	1121	1093	1064	1035	1006	978	949	920	891
180**-575v Only	****	****	1429	1403	1376	1349	1323	1296	1269	1242	1215	1188	1159
180***	****	****	1559	1522	1488	1455	1422	1389	1356	1323	1289	1256	1227
240**	****	****	1225	1209	1187	1165	1143	1120	1098	1076	1053	1031	1002
240***	****	****	1458	1434	1407	1381	1354	1328	1301	1275	1248	1222	1193

\* Approximate fan rpm shown.

\*\* Indicates standard drive package

\*\*\*Indicates alternate drive package.

\*\*\*\*Due to belt and pulley size, pulley cannot be set to this number of turns open.

Evaporator-Fan Motor Performance				
UNIT	UNIT VOLTAGE	MAXIMUM ACCEPTABLE CONTINUOUS BHP*	MAXIMUM ACCEPTABLE CONTINUOUS WATTS	MAXIMUM AMP DRAW
PAS180	208/230	4.25	3,775	10.5
	460			4.8
	575	3.45	3,065	3.9
PAS240	208/230	8.70	7,915	22.0
	460	9.50	8,640	13.0
	575	8.70	7,915	10.0

Bhp - Brake Horsepower

\*Extensive motor and electrical testing on these units ensures that the full horsepower range of the motors can be utilized with confidence Using your fan motors up to the horsepower ratings shown in this table will not result in nuisance tripping or premature motor failure. Unit warranty will not be affected.

**NOTE:** All indoor-fan motors 5 hp and larger meet the minimum efficiency requirements as established by the Energy Policy Act of 1992 (EPACT) effective October 24, 1997.

**PAE Series PERFORMANCE DATA (cont.)**

AIR QUANTITY LIMITS		
UNIT	MINIMUM CFM	MAXIMUM CFM
PAE180	4,500	7,500
PAE240	6,000	10,000

EVAPORATOR-FAN MOTOR EFFICIENCY		
UNIT		MOTOR EFFICIENCY %
PAE180	(5.0 hP)	87.5
PAE240	(7.5 hP)	88.5

OUTDOOR SOUND POWER										
UNIT	SOUND RATING (60 Hz)	A-WEIGHTED (db)	OCTAVE BANDS							
			63	125	250	500	1000	2000	4000	8000
PAE180	8.8 Bels	87.8	90.8	88.7	86.4	84.3	83.5	78.4	75.6	66.8
PAE240	9.5 Bels	94.1	98.7	92.3	93.8	90.9	89.6	85.9	80.3	74.3

**Bels** - Sound Levels (1 bel = 10 decibels)

FAN RPM AT MOTOR PULLEY SETTINGS*													
UNIT PAE	MOTOR PULLEY TURNS OPEN												
	0	1/2	1	1-1/2	2	2-1/2	3	3-1/2	4	4-1/2	5	5-1/2	6
180**	****	****	****	****	1021	1002	984	965	947	928	910	891	873
180***	****	****	****	****	1200	1178	1156	1134	1112	1091	1069	1047	1025
240**	****	****	1225	1209	1187	1165	1143	1120	1098	1076	1053	1031	1002
240***	****	****	1458	1434	1407	1381	1354	1328	1301	1275	1248	1222	1193

\* Approximate fan rpm shown.

\*\* Indicates standard drive package

\*\*\*Indicates alternate drive package.

\*\*\*\*Due to belt and pulley size, pulley cannot be set to this number of turns open.

Evaporator-Fan Motor Performance				
UNIT	UNIT VOLTAGE	MAXIMUM ACCEPTABLE CONTINUOUS BHP*	MAXIMUM ACCEPTABLE CONTINUOUS WATTS	MAXIMUM AMP DRAW
PAE180	208/230	3.13	2700	15.8
	460			7.9
	575	3.38	3,065	6.0
PAE240	208/230	8.70	7,915	22.0
	460	9.50	8,640	13.0
	575	8.70	7,915	10.0

**Bhp** - Brake Horsepower

\*Extensive motor and electrical testing on these units ensures that the full horsepower range of the motors can be utilized with confidence Using your fan motors up to the horsepower ratings shown in this table will not result in nuisance tripping or premature motor failure. Unit warranty will not be affected.

**NOTE:** All indoor-fan motors 5 hp and larger meet the minimum efficiency requirements as established by the Energy Policy Act of 1992 (EPACT) effective October 24, 1997.

# Adjustable Belt Drive Blower

## WARNING

**Personal injury hazard.**  
**Use extreme care during the following procedures and obey Safety Information.**  
**Failure to do so may result in personal injury.**

The following safety rules **MUST** always be followed when working near belt drive.

### Always Turn The Power Off

Turn electric power to the unit **OFF** before you begin working on it.

### Always Wear Protective Clothing

**NEVER** wear loose or bulky clothes, such as neckties, exposed shirttails, loose sleeves, or lab coats around belt drives. Wear gloves while inspecting sheaves to avoid nicks, burrs, or sharply worn pulley edges.

The blower speed is changed by adjusting the variable speed pulley mounted on the blower motor.

**NOTE for 20 Ton:** A 3-1/2" bolt and threaded plate are included in the installer's packet. They can be added to the motor support channel below the motor mounting plate to aid in raising the fan motor.

If the blower speed needed is different than the speed of the blower as shipped, follow the steps below to change the blower speed. Before changing the blower speed, read the above safety rules first.

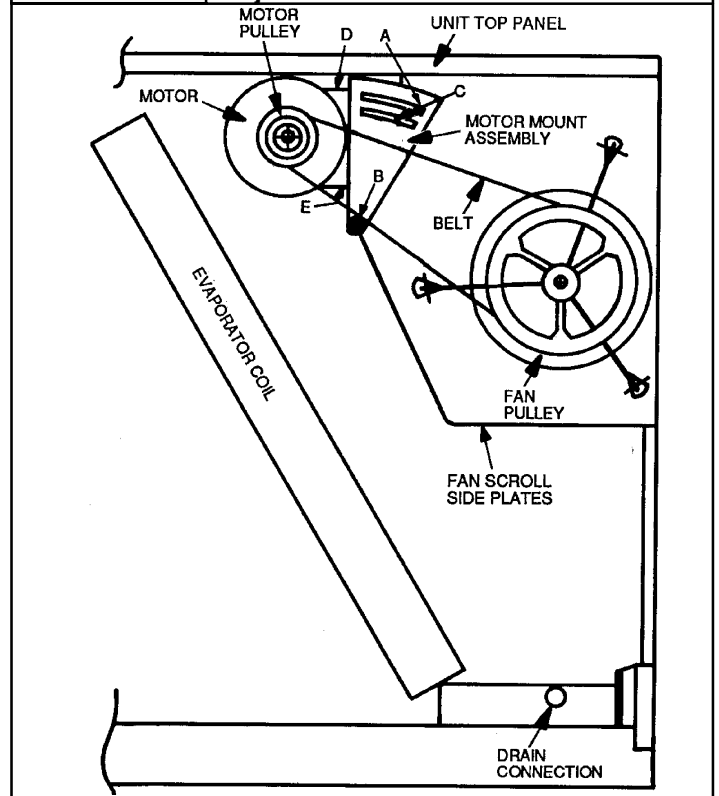
1. Turn electric power **OFF**.
2. Remove the side blower access panel (see **Figure 1**).
3. **15 Ton Only** - Loosen belt by loosening carriage nuts holding motor mount assembly to fan scroll side plates (A and B).

**20 Ton Only** - Loosen nuts on the 2 carriage bolts in the motor mounting base. Install jacking bolt and plate under motor base (bolt and plate are shipped in installer's packet). Using bolt and plate, raise motor to top of slide and remove belt. Secure motor in this position by tightening the nuts on the carriage bolts.

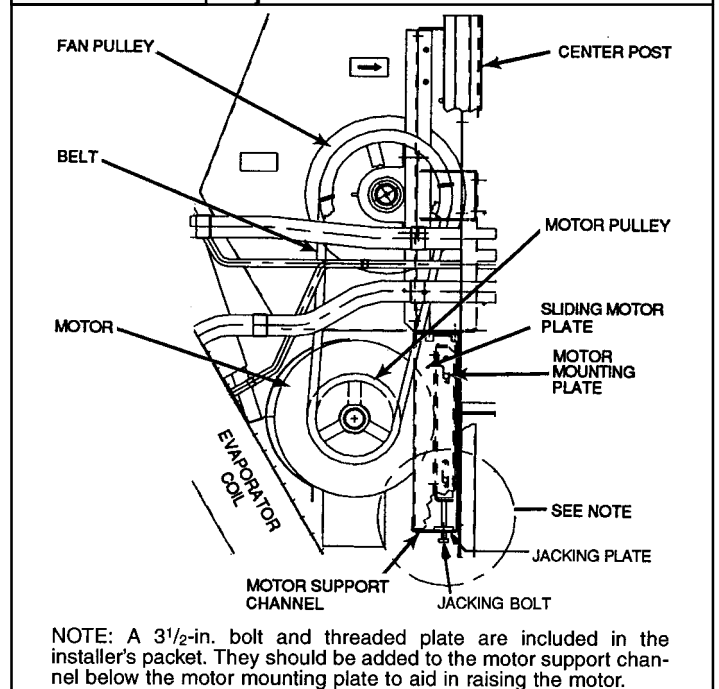
4. Loosen movable-pulley flange setscrew. See page 16 for air quantity limits.
5. Screw movable flange toward fixed flange to increase speed and away from fixed flange to decrease speed. Increasing fan speed increases load on motor. Do not exceed maximum speed specified in the performance data listed in this instruction.
6. Set movable flange at nearest keyway of pulley hub and tighten setscrew. (See Table on page 16 for speed change for each full turn of pulley flange.)

7. Replace and tighten belts. See Belt Tension Adjustment section on page 22.

**Figure 13** 15 Ton Evaporator Fan Motor Adjustment



**Figure 14** 20 Ton Evaporator Fan Motor Adjustment

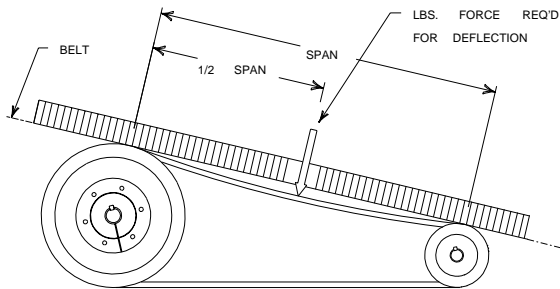


## Belt Tension Adjustment

**Figure 15**

### Checking Tension and Deflection

PA(S/E)180 - 1/2" deflection with 5-10 lbs. of force.  
PA(S/E)240 - 3/8" deflection with 8-10 lbs. of force.



1. Turn motor adjustment bolt clockwise until the belt has enough tension at the proper deflection. Use one of the commercially available belt tension gauges to set the correct tension at the proper deflection (see **Figure 20 & 21**).
2. Use a straight-edge (angle iron, straight piece of board or anything with a good straight surface or edge) to check the alignment of the blower pulley with blower motor pulley (see **Figure 21**).

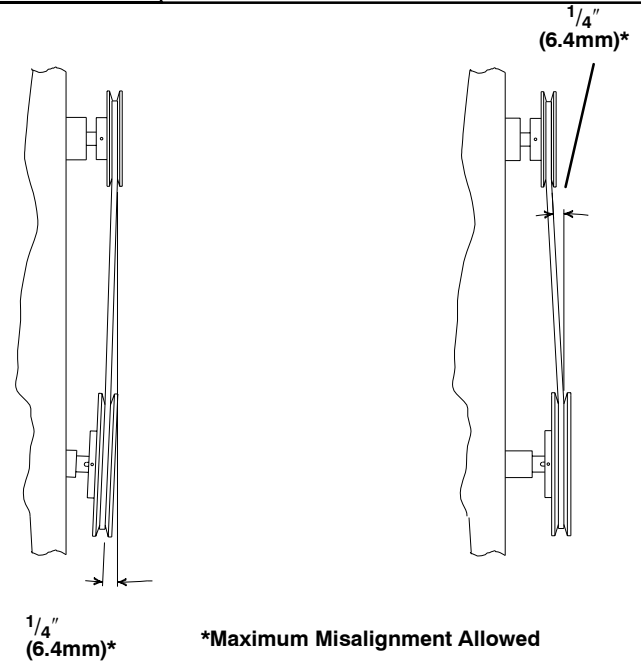
It may be necessary to back the tension off the belt temporarily and tighten one of the motor mount bolts before it is possible to adjust the angle of the blower motor.

3. Tighten all blower motor mount bolts.
4. Ensure that all bolts, nuts and screws are tightened and ensure that all tools, gloves, etc. are removed from unit.
5. Replace side blower access panel before Start-up.

6. During Start-up, listen for any unusual noises or vibrations.
7. Shut down the unit after it runs for a while and check the bearings and motor. If they feel hot, the belt tension may be too tight, bearings may be misaligned or not lubricated correctly, etc.
8. It is a good idea to retension a new belt after a run-in period of about 24 hours. A run-in period of overnight or during a lunch break is better than no run-in period at all.

**Figure 16**

### Checking Pulley Alignment



# Start-up Procedure

## WARNING

**Electrical shock, fire and/or explosion hazard.**

**Use extreme care during all of the following checks and procedures.**

**Make sure Electric Power is turned OFF as instructed in appropriate steps.**

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

Check the unit's operation as outlined in the following instructions.

## Blower and Phasing Check

1. Shut **OFF** electric power at unit disconnect.
2. Check to see that clean, properly sized air filters are installed.
3. Check to see that everything inside the unit is clear and ready to operate safely. Ensure that there are no objects in, on or around the motor, belt or blower wheel.
4. Set thermostat Heat-Cool selector to **OFF**.
5. Set thermostat fan switch to **AUTO**.

## WARNING

**Moving parts hazard.**

**Do NOT put hands or any other object in, on or around the motor, belt or blower wheel. Ensure that there are no objects in, on or around the motor, belt or blower wheel before turning electric power on.**

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

6. Turn **ON** electric power. Nothing should start running. If any unusual arcing, odors or noises are encountered, shut **OFF** electric power immediately and check for wiring errors.

**NOTE:** The circulation blower motor and compressor(s) are three phase and are factory synchronized for proper rotation. *Even if the circulation blower motor comes on and air seems to be circulating, it is possible that the blower motor rotation is incorrect due to improper phasing.* The scroll compressor(s) (if equipped) will run backwards under this condition and be damaged. It is therefore necessary to check for proper rotation.

## CAUTION

**Do NOT operate the unit with the compressor(s) running until proper blower rotation has been confirmed by running the following test.**

7. Set thermostat fan switch to **ON**. The circulating air blower should come **ON**.
8. Shut **OFF** electric power at unit disconnect and visually observe the direction of the blower rotation as it slows down. Do **NOT** put hands or any other object in, on or around the belt, motor or blower wheel.

## CAUTION

**If blower rotation is incorrect, shut electric power OFF at unit disconnect and reverse any two supply wires at field connections ONLY. Do NOT reverse the blower and/or compressor leads or rewire any internal wiring. After rewiring is done, repeat blower rotation check to ensure that blower rotation is now correct.**

9. If blower rotation is correct, reset thermostat fan switch to **AUTO**. The circulating air blower should go **OFF**. Nothing should be running.
10. Shut **OFF** electric power at unit disconnect.

## Cooling Checks

## CAUTION

**Do NOT operate the unit with the compressor(s) running until proper blower rotation has been confirmed during the Blower and Phasing Check in the previous section. If the phasing is incorrect, the scroll compressor(s) (if equipped) will run backwards and they will be damaged.**

1. Be sure that electric power is **OFF**.
2. To check cooling Stage 1, place jumper wires across low voltage terminal board terminals **R** to **G**, **R** to **Y1**.
3. Turn electric power **ON**. Check to see that the following occurs:
  - a. Compressor 1 - **ON**
  - b. Condenser fan motor(s) - **ON**
  - c. Circulation air blower - **ON** with correct rotation and adequate airflow from ductwork.
4. Shut **OFF** electric power at unit disconnect.
5. To check cooling Stage 2, remove jumper wires from **Y1** and place it on **Y2**.

**NOTE:** Allow 5 minutes between Steps 4 and 6.

6. Turn **ON** electric power. Check to see that the following occurs:
  - a. Compressors 1 & 2 - **ON**
  - b. Condenser fan motor(s) - **ON**
  - c. Circulation air blower - **ON**
7. Shut **OFF** electric power at unit disconnect.
8. Remove jumpers from low voltage terminal board.
9. Replace all service access panels.

# Operation And Maintenance Instructions

## WARNING

Electrical shock hazard.

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

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

## Starting the Unit After Shutdown

### Cooling

#### CAUTION

To prevent possible damage to the compressor(s), do NOT operate on cooling when outdoor temperature is below 35°F (2°C).

1. Turn **ON** electric power.
2. Set thermostat to desired temperature and set system switch to **COOL**. The unit will come on and operate automatically under control of the thermostat.

Close all doors and windows. The unit may run continuously for several hours or longer on the initial run because of residual heat and moisture in the building. This is normal for any air conditioning system.

## Thermostat Fan Switch Operation

The circulating air blower will run continuously with the fan selector switch in the **ON** position. When the fan selector switch is in the **AUTO** position, the blower will run during each heating or cooling cycle.

## Monthly Maintenance and Inspection Checks

### Air Filters (Factory Installed)

#### CAUTION

Do NOT operate unit without all air filters installed in the unit.

Dirty filters are the most common cause of compressor failures and inadequate heating and cooling performance. Inspect filters at least monthly and replace or clean as required. Install filters so that the arrows on the side point in the direction of air flow.

Filter racks are accessible through the filter access panel.

## Disposable Replacement Filters

For all units: 4 filters 20" x 20" x 2"  
4 filters 16" x 20" x 2"

## Condenser Coil

Keep the condenser inlet and outlet area clean and free of leaves, grass clippings and other debris. Grass should be kept short in front of the condenser inlet. Shrubby **MUST** be trimmed back so it is no closer than 30 inches (762 mm) to condenser coil.

## Condensate Drain

Check for condensate drainage. Clean as required.

## Annual Maintenance and Inspection

## WARNING

Electrical Shock, Fire and Explosion Hazards.

Turn off electric power supply at disconnect switch or service panel and gas supply at manual shutoff valve before removing any access or service panel from unit.

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

The annual inspection should include cleaning as required to ensure efficient operation of the unit.

The condenser and evaporator fan motors have permanently sealed bearings, so no field lubrication is necessary.

Fan shaft bearings on the 15 ton units are permanently lubricated. No field lubrication is required. For 20 ton units, lubricate bearings at least every 6 months with suitable bearing grease. Extended grease line is provided for far side fan bearing (opposite drive side).

Evaporator-fan motor protection – A manual reset, calibrated trip, magnetic circuit breaker protects against overcurrent. Do not bypass connections or increase the size of the breaker to correct trouble. Determine the cause and correct it before resetting the breaker.

## 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 remove easily, it will be necessary to remove the blower assembly.



## Evaporator Fan Service and Replacements - 15 Ton

NOTE: To remove belts only, follow Steps 1–6. **See Figure 13.**

1. Remove filter and supply-air section panels.
2. Remove unit top panel.
3. Loosen carriage nuts A and B holding motor mount assembly to fan scroll side plates.
4. Loosen screw C.
5. Rotate motor mount assembly (with motor attached) as far as possible away from evaporator coil.
6. Remove belt.
7. Rotate motor mount assembly back past original position toward evaporator coil.
8. Remove motor mounting nuts D and E (both sides).
9. Lift motor up through top of unit.
10. Reverse above procedure to reinstall motor.
11. Check and adjust belt tension as necessary.

## Evaporator Fan Service and Replacements - 20 Ton

The 20 ton units use a fan motor mounting system that features a slide-out motor mounting plate. To replace or service the motor, slide out the bracket. **See Figure 14.**

1. Remove the evaporator-fan access panel and the heating control access panel.
2. Remove the center post (located between the evaporator fan and heating control access panels) and all screws securing it.
3. Loosen nuts on the two carriage bolts in the motor mounting base.
4. Using jacking bolt under motor base, raise motor to top of slide and remove belt. Secure motor in the position by tightening the nuts on the carriage bolts.

5. Remove the belt drive.
6. Remove jacking bolt and tapped jacking bolt plate.
7. Remove the 2 screws that secure the motor mounting plate to the motor support channel.
8. Remove the 3 screws from the end of the motor support channel that interfere with the motor slide path.
9. Slide out the motor and motor mounting plate.
10. Disconnect wiring connections and remove the 4 mounting bolts.
11. Remove the motor.
12. To install the new motor, reverse steps 1 – 11.

## Heating Checks When Accessory Electric Heater is installed

1. To start unit, turn on main power supply.
2. Set thermostat at HEAT position and a setting above room temperature, and set fan at AUTO position. Upon a call for heating through terminal W1, IFC and heater contactor no. 1 (HC1) are energized. On units equipped for 2 stages of heat, when additional heat is needed HC2 is energized through W2.
3. If unit does not energize, reset limit switch (located on evaporator-fan scroll) by pressing button located between terminals on the switch.

## Turning Off the Unit

### Heating

1. Set system selector switch at OFF position. Resetting heating selector lever below room temperature will shut unit off temporarily until space temperature falls below thermostat setting.

### Cooling

1. Set thermostat selector to **OFF** and fan switch to **AUTO**.
2. To shut the unit down completely, shut **OFF** electric power supply at disconnect switch or service panel.

## TROUBLESHOOTING - Cooling Service

PROBLEM	CAUSE	REMEDY
<b>Compressor and condenser fans will not start.</b>	Power failure	Call power company.
	Fuse blown or circuit breaker tripped.	Replace fuse or reset circuit breaker.
	Defective thermostat, contactor, transformer, or control relay.	Replace component.
	Insufficient line voltage.	Determine cause and correct.
	Incorrect or faulty wiring.	Check wiring diagram and rewire correctly.
	Thermostat setting too high.	Lower thermostat setting below room temperature.
<b>Compressor will not start but condenser fans run.</b>	Faulty wiring or loose connections in compressor circuit.	Check wiring and repair or replace.
	Compressor motor burned out, seized, or internal overload open.	Determine cause. Replace compressor.
	Defective run/start capacitor, overload, or start relay.	Determine cause and replace.
	One leg of 3-phase power dead.	Replace fuse or reset circuit breaker.
<b>Compressor cycles (other than normally satisfying thermostat).</b>	Refrigerant overcharge or undercharge.	Recover refrigerant, evacuate system, and recharge to nameplate.
	Defective compressor	Replace and determine cause.
	Insufficient line voltage.	Determine cause and correct.
	Blocked condenser.	Determine cause and correct.
	Defective run/start capacitor, overload, or start relay.	Determine cause and replace.
	Defective thermostat.	Replace thermostat.
	Faulty condenser-fan motor or capacitor	Replace.
	Restriction in refrigerant system.	Locate restriction and remove.
<b>Compressor makes excessive noise (Scroll only)</b>	Compressor rotating in wrong direction	Reverse the 3-phase power leads as described in Start-Up section
<b>Compressor operates continuously.</b>	Dirty air filter	Replace filter.
	Unit undersized for load	Decrease load or increase unit size
	Thermostat set too low.	Reset thermostat.
	Low refrigerant charge.	Locate leak, repair, and recharge.
	Leaking valves in compressor.	Replace compressor.
	Air in system	Recover refrigerant, evacuate system, and recharge.
	Condenser coil dirty or restricted.	Clean coil or remove restriction.
<b>Excessive head pressure.</b>	Dirty air filter	Replace filter.
	Dirty condenser coil.	Clean coil.
	Refrigerant overcharged.	Remove excess refrigerant.
	Air in system.	Recover refrigerant, evacuate system, and recharge.
	Condenser air restricted or air short-cycling.	Determine cause and correct.
<b>Head pressure too low.</b>	Low refrigerant charge	Check for leaks, repair, and recharge.
	Compressor valves leaking.	Replace compressor.
	Restriction in liquid tube.	Remove restriction.
<b>Excessive suction pressure.</b>	High heat load.	Check for source and eliminate.
	Compressor valves leaking.	Replace compressor.
	Refrigerant overcharged.	Recover excess refrigerant.
<b>Suction pressure too low.</b>	Dirty air filter.	Replace filter.
	Low refrigerant charge.	Check for leaks, repair, and recharge.
	Metering device or low side restricted.	Remove source of restriction.
	Insufficient evaporator airflow	Increase air quantity. Check filter and replace if necessary.
	Temperature too low in conditioned area.	Reset thermostat.
	Field-installed filter drier restricted.	Replace.
<b>Compressor no. 2 will not run.</b>	Unit in economizer mode.	Proper operation; no remedy necessary.

<b>I. START-UP CHECKLIST</b> (Remove and store in job file)			
Model No:		Serial No:	
Date:		Technician:	
Unit No:		Job Location:	
		Job Name:	
<b>II. PRE-START-UP</b> (Insert Checkmark in box as each item is completed)			
<input type="checkbox"/>	Verify that all packing materials have been removed from unit.		
<input type="checkbox"/>	Verify installation of indoor fan motor adjustment bolt and plate. (20 ton only)		
<input type="checkbox"/>	Verify that condensate connection is installed per installation instructions.		
<input type="checkbox"/>	Check all electrical connections and terminals for tightness.		
<input type="checkbox"/>	Check that indoor-air filters are clean and in place.		
<input type="checkbox"/>	Verify that unit installation is level.		
<input type="checkbox"/>	Check fan wheels and propellers for location in housing/orifice and setscrew tightness.		
<input type="checkbox"/>	Ensure belt tension is correct and blower pulleys are properly aligned.		
<b>III. START-UP</b>			
<b>ELECTRICAL</b>			
<input type="checkbox"/>	Supply Voltage	L1-L2	L2-L3
<input type="checkbox"/>	Compressor AMPS	L1	L2
<input type="checkbox"/>	Compressor AMPS	L1	L2
<input type="checkbox"/>	Indoor-Fan AMPS	L1	L2
<input type="checkbox"/>			
<b>TEMPERATURES and PRESSURES</b>			
<input type="checkbox"/>	Outdoor-Air Temperature	°DB	
<input type="checkbox"/>	Return-Air Temperature	°DB	°WB
<input type="checkbox"/>	Cooling Supply air	°DB	°WB
<input type="checkbox"/>	Refrigerant Suction Pressure	PSIG-Circuit # 1	PSIG-Circuit # 2
<input type="checkbox"/>	Refrigerant Temp. (Suction) Pressure	Circuit # 1	Circuit # 2
<input type="checkbox"/>	Refrigerant Discharge	PSIG-Circuit # 1	PSIG-Circuit # 2
<input type="checkbox"/>	Discharge Temperature	°F/C-Circuit # 1	°F/C-Circuit # 2
<input type="checkbox"/>	Verify that 3-phase scroll compressor rotating in correct direction on select models.		

**INTERNATIONAL COMFORT PRODUCTS**  
**LIMITED WARRANTY CERTIFICATE**  
***For Cooling & Heating Products***

**SAVE THIS CERTIFICATE. It gives you specific legal rights, and you may also have other rights which may vary from state to state and province to province.**

If your unit needs servicing, contact a qualified dealer or qualified service technician of your choice. When requesting service, please have the model and serial number from each unit in your heating and/or cooling system readily available. If your dealer needs assistance, the distributor is available to provide support and we, in turn, support its efforts.

Fill in the installation date and model and serial numbers of the unit in the space provided below and retain this Limited Warranty for your files.

**GENERAL TERMS**

Subject to the conditions and limitations stated herein, during the term of this Limited Warranty, we will provide a replacement for any functional component part (as defined below) of your unit found to be defective in materials or workmanship. The term of this Limited Warranty is five years from installation on Residential Products and one year from installation on Commercial Products. Except as otherwise stated in the "Additional Terms" section, this Limited Warranty covers only the original purchaser and subsequent transferees, and only while the unit remains at the site of the original installation (except for mobile home installations), and only if the unit is installed inside the continental United States, Puerto Rico, Alaska, Hawaii or Canada. In addition, the Limited Warranty applies only if the unit is installed and operated in accordance with the printed instructions accompanying the unit, and in compliance with all applicable installation and building codes and good trade practices. As used in this Limited Warranty, "installation" means the original installation of the unit.

THERE ARE EXCEPTIONS to this Limited Warranty as described on the reverse side of this page. All replacement parts will be warranted for the unused portion of the warranty coverage period on the unit. The part to be replaced must be returned by the dealer to a distributor that sells products for International Comfort Products, in exchange for the replacement part. In lieu of providing a replacement part, we may, at our sole option, refund to you an amount equal to the distributor's component purchase price from us, or provide to you a credit equal to that amount to be applied toward the purchase of any new unit that we distribute. If a credit for a new unit is given in lieu of a replacement part, the rating plate from the unit being replaced must be submitted on a warranty claim, and your dealer must make the unit being replaced available to our distributor for disposition. As a condition to warranty coverage, the unit must receive yearly maintenance, as described in the owner's manual, by a dealer. Satisfactory proof of yearly service by a dealer may be required.

"Functional component parts" include only the following: blower motor, unit-mounted sensors & timers, condenser motor, evaporator coil, condenser coil, condenser fan, capacitor, transformer, single-phase strip heat elements, expansion device, reversing valve, solenoid valve, service valve, electronic and electro-mechanical control board, ignitor, ignition module, draft inducer assembly, burner pilot, gas valve, limit control, pressure switch, relays and contactors, blower wheel, interlock switch, crosslighter, pilot shield, gas & oil burners, oil pump assembly, accumulators and factory installed driers and strainers.

This Limited Warranty **DOES NOT COVER** any labor, material, refractory chambers, oil nozzles, refrigerant, refrigerant inspection and refrigerant reclaiming, freight and/or handling charges associated with any repair or replacement and such charges will be your responsibility.

To establish the installation date for any purpose under this Limited Warranty, you must retain the original records that can establish the installation date of your unit. If you do not provide such documents the start date of the term of this Limited Warranty will be based upon the date of unit manufacture, plus thirty (30) days. In establishing that the required yearly service has occurred, you must furnish proof of yearly service by a qualified service technician.

This Limited Warranty does not cover: (a) failure or damages caused by accident, abuse, negligence, misuse, riot, fire, flood, or Acts of God (b) damages caused by operating the unit where there is a corrosive atmosphere containing chlorine, fluorine, or any other damaging chemicals (other than those found in a normal residential environment) (c) damages caused by an unauthorized alteration or repair of the unit affecting its stability or performance (d) damages caused by improper matching or application of the unit or the unit's components (e) damages caused by failing to provide proper maintenance and service to the unit in accordance with this Limited Warranty Certificate and the printed instructions originally provided with the unit (f) any expenses incurred for erecting, disconnecting, or dismantling the unit (g) parts or supplies used in connection with service or maintenance, such as refrigerant, refractory chambers, oil nozzles, filters, or belts (h) damage, repairs, inoperation or inefficiency resulting from faulty installation or application (i) electricity or fuel costs or any increase in electricity or fuel cost whatsoever including additional or unusual use of supplemental electric heat (j) units which have not had the required yearly maintenance described elsewhere in this limited warranty.

In no event shall we be liable for any incidental, consequential, or special damages or expenses in connection with any use or failure of this unit.

**We have not made, do not make, and hereby disclaim any implied condition or implied warranty of fitness for a particular use or purpose, and any implied condition or implied warranty of merchantability, to the fullest extent allowed by law. We make no express or implied warranties except as stated in this Limited Warranty certificate.**

No one is authorized to change this Limited Warranty or to create for us any other obligation or liability in connection with this unit. Any implied warranties shall last for the term of the expressed warranty contained herein. Some states and provinces do not allow the exclusion or limitation of incidental or consequential damages or do not allow limitations on how long an implied warranty or condition lasts, so the above limitations or exclusions may not apply to you. The provisions of this Limited Warranty are in addition to and not a modification of or subtraction from any statutory warranties and other rights and remedies provided by law.

**Please refer to reverse side of this page for additional terms.**

Model No. \_\_\_\_\_

Serial No. \_\_\_\_\_ Date Installed \_\_\_\_\_

**Effective on units installed After July 1, 2002.**

USA: International Comfort Products Corporation (USA) • 650 Heil-Quaker Avenue • P.O. Box 128 • Lewisburg, Tennessee 37091 • (931-270-4100)  
CANADA: International Comfort Products division of UTC Canada Corporation • 6060 Burnside Court, Unit 1, Mississauga, Ontario L5T 2T5 (905-795-8113).

Manufacturers of Airquest, Arcoaire, Clare, Comfortmaker, Dettson, Heil, Keeprite, Lincoln, Tempstar and other quality brand name private label products.

**Part No. 401 06 1010 18 (Orig. 7/9/2002)**

## ADDITIONAL TERMS FOR RESIDENTIAL APPLICATIONS ONLY

The Additional Terms for the components listed below are in addition to, and subject to, the General Terms on the reverse side of this page.  
Warranty coverage is limited to parts that fail due to defect in materials or workmanship during the specified term.

### CENTRAL GAS & OIL FURNACE HEAT EXCHANGERS\*

**Gas Model Series: C9MPV, H9MPV, T9MPV, C9MPT, H9MPT, T9MPT, C9MPD, H9MPD, T9MPD:** Limited Lifetime Warranty on heat exchangers. If a heat exchanger on one of these furnaces fails due to defect in the part, we will provide a replacement part or, at our option, credit toward the purchase of a new furnace manufactured by us. This additional Limited Warranty runs only to the original purchaser, and lasts only for as long as the original purchaser lives in the home where the furnace is initially installed.\*\* It is not transferable to any subsequent owner. If the furnace was not installed in the home owned by the original purchaser, if the original purchaser sells the home to a subsequent owner, or if proof of original purchase cannot be provided, then the limited warranty is only for 20 years from the date of original installation.

**Gas Model Series: GDL, GNL, TNE, TDE, NTC7, NDC7, NTP6, NDP6, TDE, NTV6, VNE:** A replacement heat exchanger will be provided for any heat exchanger that fails in one of these furnaces due to defect for 25 years from the original date of installation.

**Gas Model Series: NTC6, GNE, GDE, NDN6, NTG3, NDN3, FBF, NBF, NDF, NTN3, NTN6, NNE, N9MP1, N9MP2, FUH:** A replacement heat exchanger will be provided for any heat exchanger that fails in one of these furnaces due to defect for 20 years from original date of installation.

**Oil Model Series: OLR(105, 160, 182), OCF, OLF, OUF, NOLF, NOUF, OLB, OHB, ODH, FLO, MBO, LBO, NOME:** Limited Lifetime Warranty on heat exchangers. If a heat exchanger on one of these furnaces fails due to defect in the part, we will provide a replacement part or, at our option, credit toward the purchase of a new furnace manufactured by us. This additional Limited Warranty runs only to the original purchaser, and lasts only for as long as the original purchaser lives in the home where the furnace is initially installed.\*\* It is not transferable to any subsequent owner. If the furnace was not installed in the home of the original purchaser, if the original purchaser sells the home to a subsequent owner, or if proof of original purchase cannot be provided, then the limited warranty is only for 20 years from the date of original installation.

**Oil Fired Floor Furnace: NFO:** A replacement heat exchanger will be provided for any heat exchanger that fails due to defect for 10 years from installation with the following limitation: during the sixth through tenth year, any credit toward your purchase of a component or toward the purchase of any new unit will be in an amount equal to the distributor's purchase price reduced by 20 percent for each year after the fifth year.

### ADDITIONAL TERMS FOR OIL FURNACE APPLICATIONS ONLY

1) **OIL BURNERS -** A replacement for 5 years from date of original installation for Oil Burner Parts.

2) **OPTIONAL ACCESSORIES AND FUNCTIONAL PARTS:** A replacement for 5 years from date of original installation. (Refractory and oil nozzles not included)

### GAS/ELECTRIC PACKAGED UNITS HEAT EXCHANGERS

**Model series: PGAD, PGAA, PGMD, PGME, PGF, GPFM, PGC, GPCM, PGK, GPK:** A replacement for 10 years from original date of installation.

### COMPRESSORS:\*

1) **Premium Model Units: HAC0, HAC2, HAC4, CAC0, CAC2, CAC4, KAC0, TCA0, TCA2, TCA4, HHP0, HHP2, HHP4, CHP0, CHP2, CHP4, TCH0, TCH2, TCH4, PGME, PYMC, PGK, GPK, PHAD, PGAD, PA95, PAPC, PAK, APK:** To the original purchaser a replacement for 10 years from original date of installation, only if the unit is installed with factory matched coils, except air conditioner condensing units with a nominal SEER of 10 may be matched with evaporator coils of the same nominal tonnage regardless of manufacturer and in accordance to factory recommendations. This limited 10-year warranty is not transferable to any subsequent owner. HOWEVER, if the unit was not installed in the home owned by the original purchaser, if the purchaser sells the home to a subsequent owner, or if proof of original purchase cannot be provided, then the limited warranty is only for 5 years from the original date of installation.\*\*

2) **All Other Models: Air Conditioners, Heat Pumps, & Combination Gas/Electric Units: NAC0, NAC2, NHP0, NHP2, AO, A2, HO, H2, PGF, PGC, GPFM, GPCM, PAF, APFM, PHF, HPFM, PGAA, PGMD, PA55, PH55, PAPA, PYPA:** A replacement for 5 years from date of original installation, only if: (a) air conditioner condensing units with SEER rating in the range of 10 to 11 SEER are matched with evaporator coils of the same nominal tonnage regardless of manufacturer and in accordance to factory recommendations, or (b) heat pump condensing units are used with factory matched coils, unless written approval to do otherwise is obtained from manufacturer.

### ADDITIONAL TERMS FOR COMMERCIAL APPLICATIONS ONLY

For purposes of this warranty a commercial application is one in which: the product has over 5 tons nominal cooling capacity, or is designed for operation with 3 phase electrical power, or is installed in a commercial establishment such as a beauty or hair salon, hospital, school, restaurant, church, hotel etc..

**3-Phase Models: PGF, GPFM, PGF, PGAD, PGME, PGB, PGMG, PGMF, PGS, PGE, APE, PAE, PAB, PAMD, PAS, PAF, APFM, APF, PHB, PHE, PYMD, HPB, PHS, CAC, CAC, CAE, ACE, CHC, HCC, CHE, HCE:**

The additional Terms of the components listed below are in addition to and subject to the General Terms on the reverse side of this page.

1) **GAS FIRED HEAT EXCHANGERS (ALL MODELS):\*** A replacement for 10 years from date of original installation.

2) **COMPRESSORS (ALL MODELS):\*** A replacement for 5 years from date of original installation.

3) **OPTIONAL ACCESSORIES AND FUNCTIONAL COMPONENT PARTS (ALL MODELS):\***

A replacement for 1 year from date of original installation.

4) **COMMERCIAL OIL MODELS: OLR210, OLR350, OTF210, AMT3, AMT4, AMP3:** Ten(10) Year Limited Warranty on heat exchangers.

\*To receive advantage of your limited warranty, you must provide proof of yearly service by a qualified service technician.

\*\*To receive advantage of your warranty, you must retain the original records that can establish the installation date and proof of purchase of the unit.

### MINI SPLITS:

**Summary - Mini Splits Warranted for one (1) year on all replacement parts.**

#### Additional terms for Mini Splits:

The additional Terms of the components listed below are in addition to, and subject to, the General Terms on the reverse side of this page.

1) **Compressors (All Models):** A replacement compressor will be provided for all compressors that fail due to defect for 5 years from date of original installation.

2) **Optional Accessories and Functional Components Parts (All Models):**

A replacement part will be provided for all parts that fail due to defect for one (1) year from date of original installation.

Failure to maintain the equipment through annual maintenance by a qualified service technician shall void the warranty. Proof of service will be required with all warranty claims. Proof of purchase and installation date must be submitted with all claims.