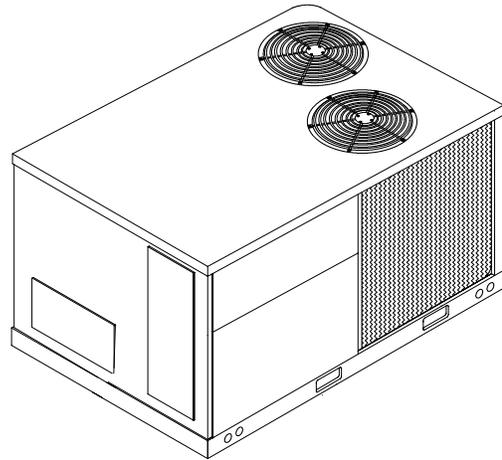


Installation Instructions

- 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

PAS090H000	PAE090H000
PAS090L000	PAE090L000
PAS090S000	PAE090S000
PAS120H000	PAE120H000
PAS120L000	PAE120L000
PAS120S000	PAE120S000
PAS150H000	PAE150H000
PAS150L000	PAE150L000
PAS150S000	PAE150S000

**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.

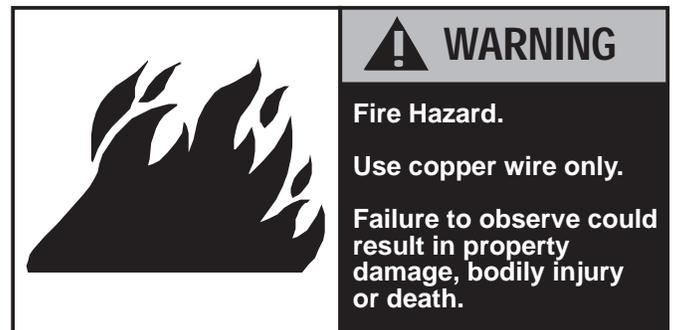
Danger Label

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



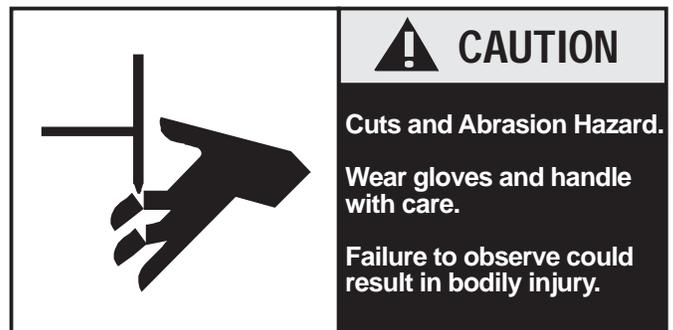
Warning Label

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.



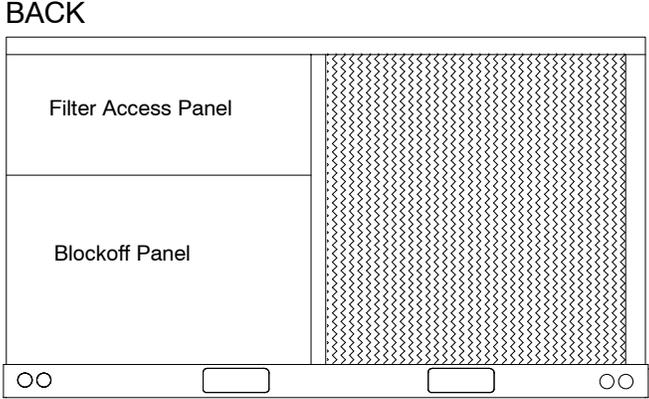
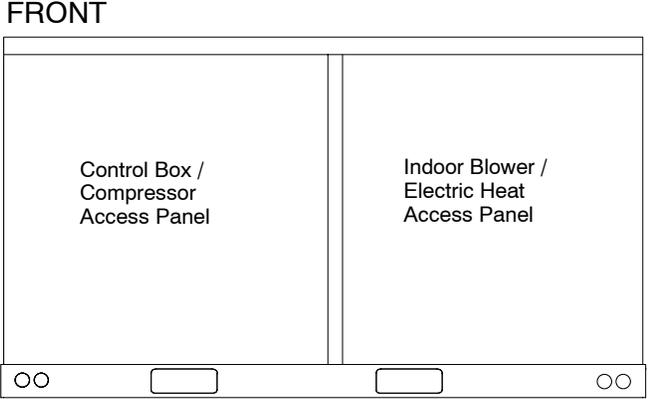
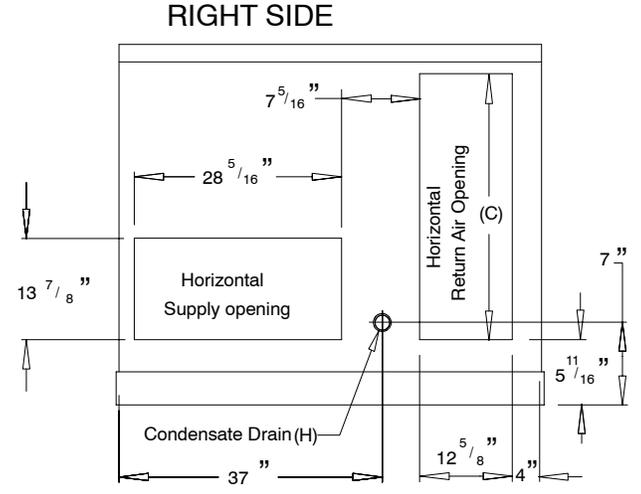
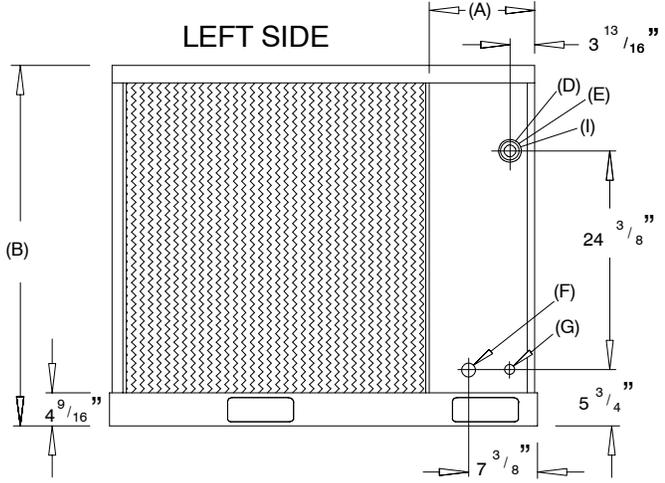
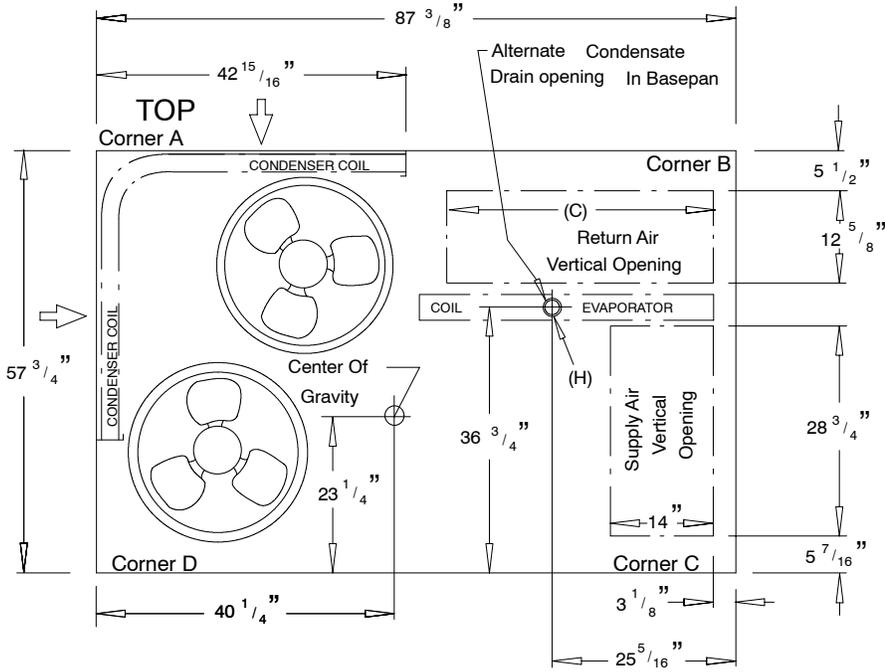
BASE UNIT DIMENSIONS PAS/PAE090-150

Unit Size	Total		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
090	755	342	164	74	140	64	208	94	243	110	1-2 ⁷ / ₈	378	3-5 ⁵ / ₁₆	1050	2-9 ¹¹ / ₁₆	856
120	915	415	199	90	170	77	252	114	294	134	2-5 ⁷ / ₈	759	4-1 ¹⁵ / ₁₆	1253	3-0 ³ / ₈	924
150	930	422	202	92	172	78	256	116	300	136	1-2 ⁷ / ₈	378	4-1 ¹⁵ / ₁₆	1253	3-0 ³ / ₈	924

THREADED CONDUIT SIZE	WIRE USE	REQUIRED HOLE SIZES (MAX.)
1/2"	24	7/8" [22]
3/4"	Power*	1-1/8" [28.4]
1-1/4" FPT	Power*	1-3/4" [44.4]

* Select either 3/4" or 1-1/4" for power, depending on wire size.

Connection Sizes	
D	1-3/8" Dia (35) Field Power Supply Hole
E	2-1/2" Dia (64) Power Supply Knockout
F	1-3/4" Dia (44) Charging Port Hole
G	7/8" Dia (22) Field Control Wiring Hole
H	3/4"-14 NPT Condensate Drain
I	2" Dia (51) Power Supply Knockout



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

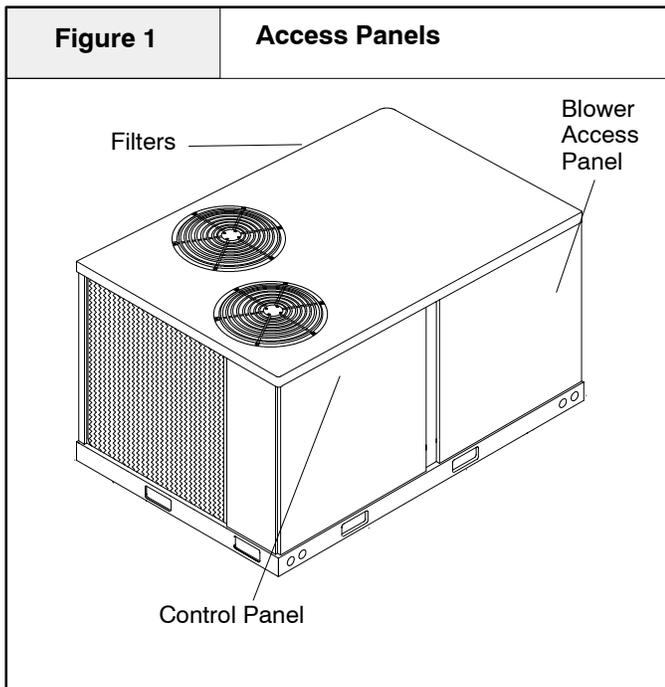
The unit is designed for outdoor installation **ONLY**. The unit may be installed on a level concrete mounting base (or other adequate platform) at ground level or on a flat rooftop with an adequate platform. If using as a downflow model, use a roof curb. Typical installations are shown in **Figures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



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.

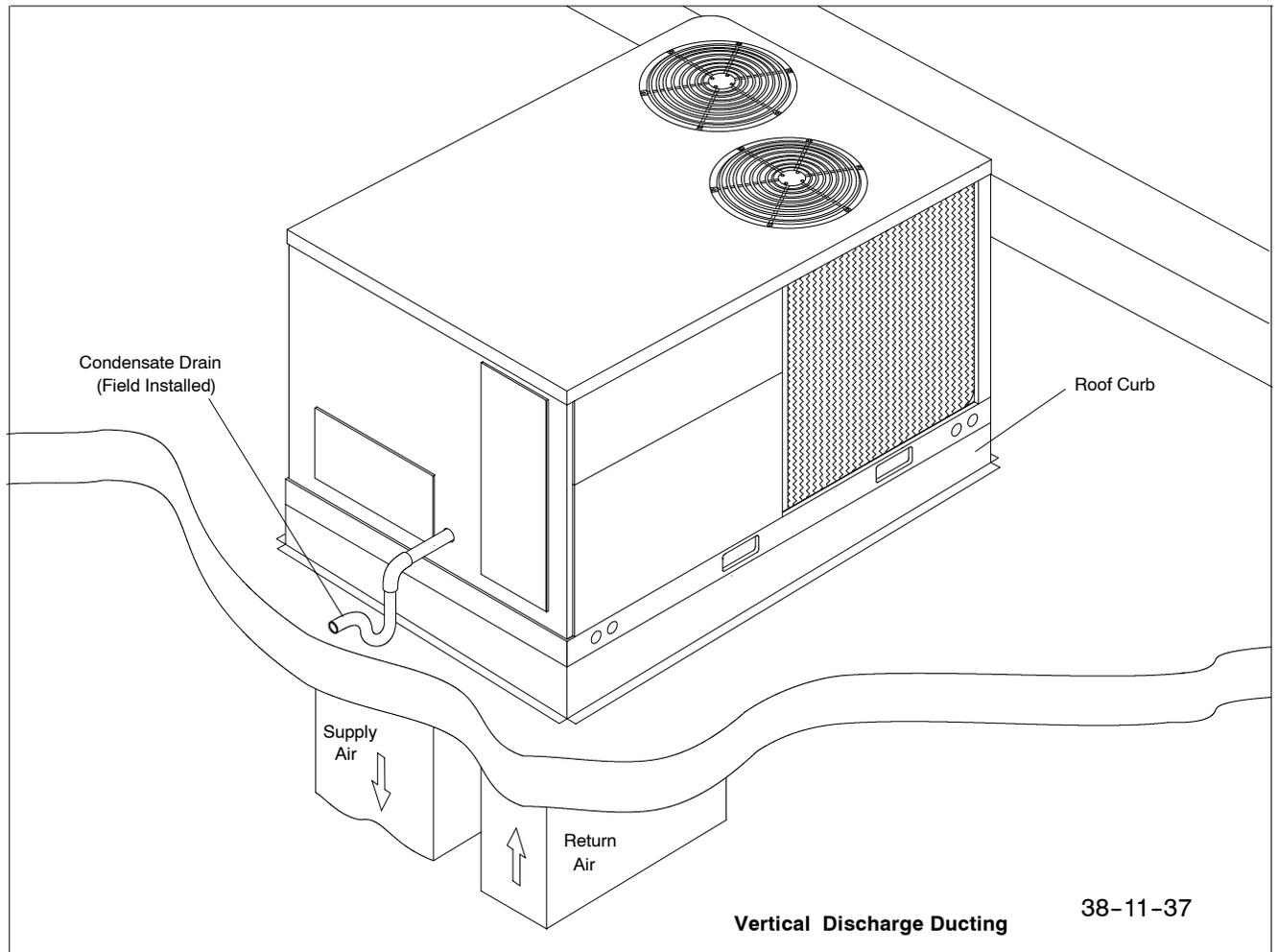
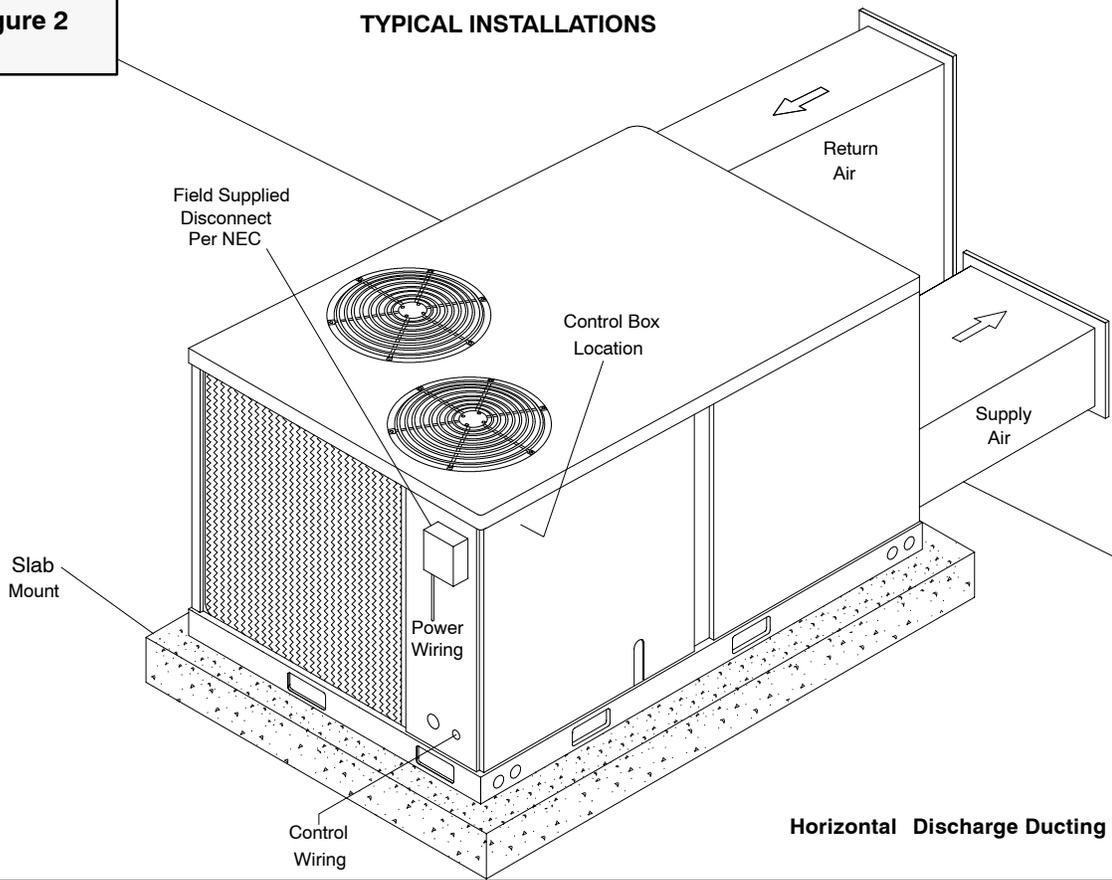
Minimum Clearances to Combustible and non-Combustible Construction (Horizontal & DownFlow)

Bottom of unit and combustible surfaces	
with no curb	0"
Condenser Coil, one side	36"
other side (which side is optional)	12"
Overhead clearance	60"
Control Box Side	42"
Horizontal Duct Connections Side	0"

Horizontal Discharge Units with Electric Heat 1 inch clearance to ductwork for one foot.

Figure 2

TYPICAL INSTALLATIONS



38-11-37

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 $\frac{1}{8}$ " per foot (10mm per meter). For side to side leveling, the control box 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 4** 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. See page 3 of this manual 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 **Figure 4** and associated text for more information about condensate drainage.

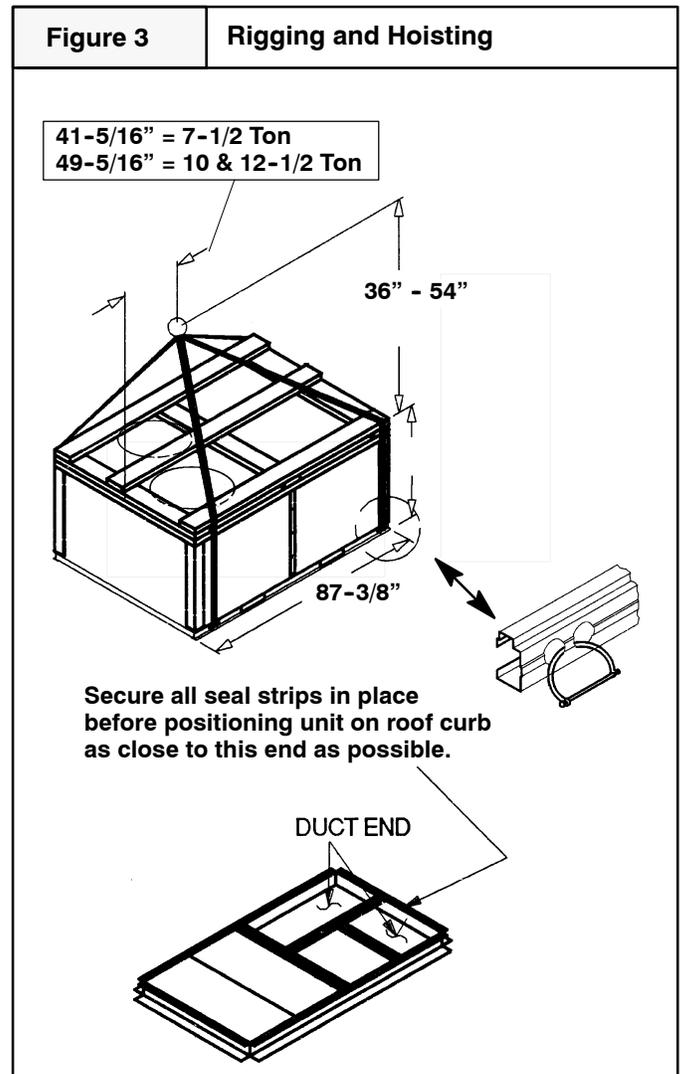
NOTE: MAKE SURE DOWNFLOW SUPPLY AND RETURN AIR DUCTS ARE FREE OF OBSTRUCTIONS BEFORE INSTALLING UNIT ON ROOF CURB OR ANY DOWNFLOW APPLICATION. Remove all forklift supports, covers, cardboard, etc., from the downflow return and supply air ducts.

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 3**.

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.



Converting to Horizontal Operation

These units are shipped ready for downflow operation but are adaptable to horizontal use. To convert to horizontal operation, follow these steps:

Remove screws from side horizontal supply and return panels (see **Figure 4**).

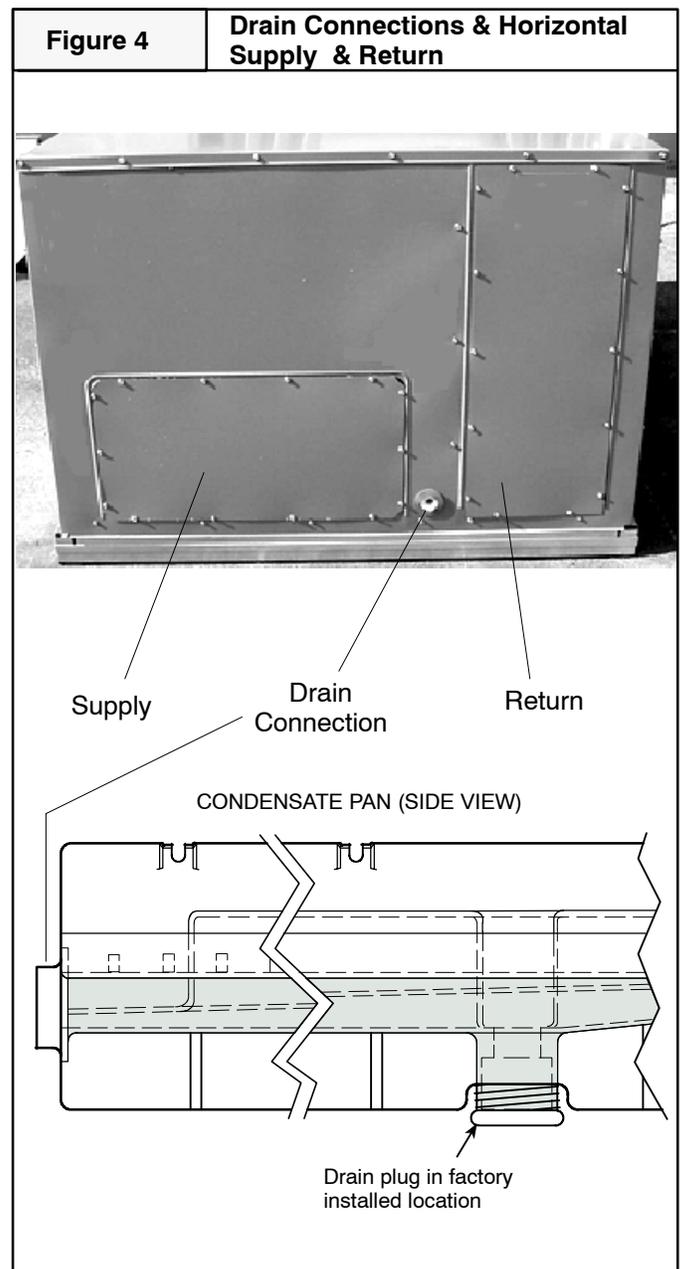
Using the same screws install horizontal supply and return panels on downflow supply and return openings with insulation side down. Install from inside of unit.

Condensate Drain

The unit's 3/4 -in. condensate drain connections are located on the bottom and side of the unit. Unit discharge connections do not determine the use of drain connections; either drain connection can be used with vertical or horizontal applications.

When using the standard side drain connection, ensure the red plug in the alternate bottom connection is tight before installing the unit.

To use the bottom drain connection for a roof curb installation, relocate the factory-installed plug from the bottom connection to the side connection. **See Fig.4**. The piping for the condensate drain and external trap can be completed after the unit is in place.



All units must have an external trap for condensate drainage. Install a trap at least 4 in. deep and protect against freeze-up. If a drain line is installed downstream from the external trap, pitch the line away from the unit at 1 in. per 10 ft of run. Do not use a pipe size smaller than the unit connection.

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.

Electrical Wiring

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.

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.

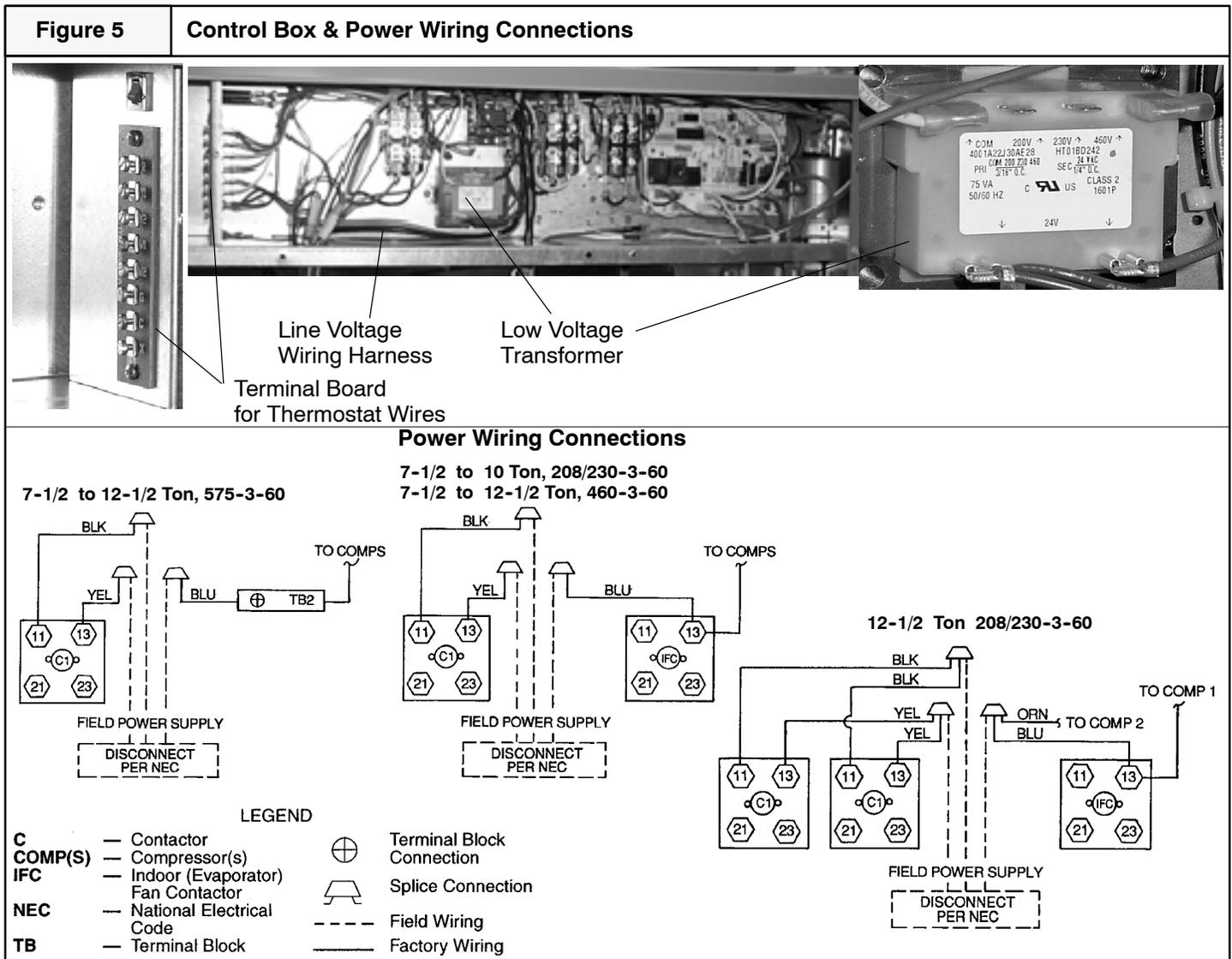
Connections for line voltage are made in the control box section. Low voltage connections are made at the terminal board on the left hand side of the control box (see **Figure 5**).

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

Line Voltage Wiring

Line voltage wires enter the unit through the double knockout on the end of the unit next to the compressors. (see **Figure 1 and page 3**). 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.

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



Line Connections

Complete the line service connections to the terminal connections in the control box. Refer to applicable wiring diagram. Check all screw terminals to ensure they are tight.

Converting 230V Units to 208V

To convert 230V units to 208V:

1. Turn electric power **OFF**.
2. Remove control box access panel and open control box. Locate the 24V control transformer.
3. Remove wires from the terminal labeled '230V' on the 24V control transformer and reconnect them to the 200V terminal of the 24V control transformer.
4. Close control box and replace control box access panel.

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

Low voltage wiring connections for the thermostat are made at the 24V terminal board which is located on the left hand side of the control box. For access, remove the compressor access panel. Refer to the wiring diagram and the instructions included with 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.

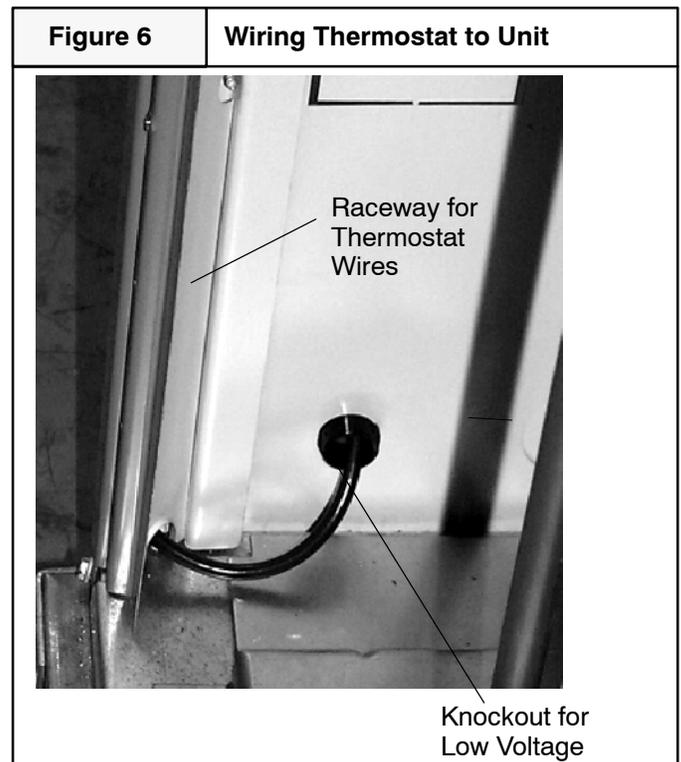
Thermostat

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.**

Route thermostat cable or equivalent single leads of colored wire from subbase terminals to low-voltage connections on unit, shown on **Figures 5 & 6**, as described in Steps 1-4 below.

1. If unit is mounted on roof curb and accessory thru-the-bottom connection is used, route wire through connector provided in accessory kit through the unit basepan.
2. Pass control wires through the hole provided on unit.
3. Feed wire through the raceway built into the corner post to the 24-v barrier located on the left side of the control box. See **Figure 6**. The raceway provides the UL-required (Underwriters' Laboratories) clearance between the high- and low-voltage wiring.
4. Connect thermostat wires to screw terminals of low-voltage terminal board.
5. If unit is to be equipped with electric heat, ensure that when the thermostat calls for heat, 'W' energizes 'G' output. This allows fan operation when heat is called for.



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.

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 .

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.

The units are designed for a minimum heating operation continuous return-air temperature of 50 F (dry bulb), or an intermittent operation down to 45 F (dry bulb), such as when used with a night set-back thermostat.

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 7** 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. 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.
7. 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.
8. To change the blower speed, see pages 16 and 17 .

Figure 7

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

CFM	L/s	CFM	L/s	CFM	L/s	In. W.C.	Pa								
50	24	2550	1203	5050	2383	0.01	2	0.51	127	1.01	251	1.51	376	2.01	501
100	47	2600	1227	5100	2407	0.02	5	0.52	130	1.02	254	1.52	379	2.02	503
150	71	2650	1251	5150	2430	0.03	7	0.53	132	1.03	257	1.53	381	2.03	506
200	94	2700	1274	5200	2454	0.04	10	0.54	135	1.04	259	1.54	384	2.04	508
250	118	2750	1298	5250	2477	0.05	12	0.55	137	1.05	262	1.55	386	2.05	511
300	142	2800	1321	5300	2501	0.06	15	0.56	139	1.06	264	1.56	389	2.06	513
350	165	2850	1345	5350	2525	0.07	17	0.57	142	1.07	267	1.57	391	2.07	516
400	189	2900	1369	5400	2548	0.08	20	0.58	144	1.08	269	1.58	394	2.08	518
450	212	2950	1392	5450	2572	0.09	22	0.59	147	1.09	271	1.59	396	2.09	521
500	236	3000	1416	5500	2595	0.10	25	0.60	149	1.10	274	1.60	399	2.10	523
550	260	3050	1439	5550	2619	0.11	27	0.61	152	1.11	276	1.61	401	2.11	526
600	283	3100	1463	5600	2643	0.12	30	0.62	154	1.12	279	1.62	404	2.12	528
650	307	3150	1486	5650	2666	0.13	32	0.63	157	1.13	281	1.63	406	2.13	531
700	330	3200	1510	5700	2690	0.14	35	0.64	159	1.14	284	1.64	408	2.14	533
750	354	3250	1534	5750	2713	0.15	37	0.65	162	1.15	286	1.65	411	2.15	536
800	378	3300	1557	5800	2737	0.16	40	0.66	164	1.16	289	1.66	413	2.16	538
850	401	3350	1581	5850	2761	0.17	42	0.67	167	1.17	291	1.67	416	2.17	541
900	425	3400	1604	5900	2784	0.18	45	0.68	169	1.18	294	1.68	418	2.18	543
950	448	3450	1628	5950	2808	0.19	47	0.69	172	1.19	296	1.69	421	2.19	545
1000	472	3500	1652	6000	2831	0.20	50	0.70	174	1.20	299	1.70	423	2.20	548
1050	495	3550	1675	6050	2855	0.21	52	0.71	177	1.21	301	1.71	426	2.21	550
1100	519	3600	1699	6100	2879	0.22	55	0.72	179	1.22	304	1.72	428	2.22	553
1150	543	3650	1722	6150	2902	0.23	57	0.73	182	1.23	306	1.73	431	2.23	555
1200	566	3700	1746	6200	2926	0.24	60	0.74	184	1.24	309	1.74	433	2.24	558
1250	590	3750	1770	6250	2949	0.25	62	0.75	187	1.25	311	1.75	436	2.25	560
1300	613	3800	1793	6300	2973	0.26	65	0.76	189	1.26	314	1.76	438	2.26	563
1350	637	3850	1817	6350	2997	0.27	67	0.77	192	1.27	316	1.77	441	2.27	565
1400	661	3900	1840	6400	3020	0.28	70	0.78	194	1.28	319	1.78	443	2.28	568
1450	684	3950	1864	6450	3044	0.29	72	0.79	197	1.29	321	1.79	446	2.29	570
1500	708	4000	1888	6500	3067	0.30	75	0.80	199	1.30	324	1.80	448	2.30	573
1550	731	4050	1911	6550	3091	0.31	77	0.81	202	1.31	326	1.81	451	2.31	575
1600	755	4100	1935	6600	3115	0.32	80	0.82	204	1.32	329	1.82	453	2.32	578
1650	779	4150	1958	6650	3138	0.33	82	0.83	207	1.33	331	1.83	456	2.33	580
1700	802	4200	1982	6700	3162	0.34	85	0.84	209	1.34	334	1.84	458	2.34	583
1750	826	4250	2006	6750	3185	0.35	87	0.85	212	1.35	336	1.85	461	2.35	585
1800	849	4300	2029	6800	3209	0.36	90	0.86	214	1.36	339	1.86	463	2.36	588
1850	873	4350	2053	6850	3233	0.37	92	0.87	217	1.37	341	1.87	466	2.37	590
1900	897	4400	2076	6900	3256	0.38	95	0.88	219	1.38	344	1.88	468	2.38	593
1950	920	4450	2100	6950	3280	0.39	97	0.89	222	1.39	346	1.89	471	2.39	595
2000	944	4500	2124	7000	3303	0.40	100	0.90	224	1.40	349	1.90	473	2.40	598
2050	967	4550	2147	7050	3327	0.41	102	0.91	227	1.41	351	1.91	476	2.41	600
2100	991	4600	2171	7100	3350	0.42	105	0.92	229	1.42	354	1.92	478	2.42	603
2150	1015	4650	2194	7150	3374	0.43	107	0.93	232	1.43	356	1.93	481	2.43	605
2200	1038	4700	2218	7200	3398	0.44	110	0.94	234	1.44	359	1.94	483	2.44	608
2250	1062	4750	2242	7250	3421	0.45	112	0.95	237	1.45	361	1.95	486	2.45	610
2300	1085	4800	2265	7300	3445	0.46	115	0.96	239	1.46	364	1.96	488	2.46	613
2350	1109	4850	2289	7350	3468	0.47	117	0.97	242	1.47	366	1.97	491	2.47	615
2400	1133	4900	2312	7400	3492	0.48	120	0.98	244	1.48	369	1.98	493	2.48	618
2450	1156	4950	2336	7450	3516	0.49	122	0.99	247	1.49	371	1.99	496	2.49	620
2500	1180	5000	2360	7500	3539	0.50	125	1.00	249	1.50	374	2.00	498	2.50	623

PAS Series PERFORMANCE DATA

CIRCULATING BLOWER PERFORMANCE - 7-1/2 TON UNITS (2.4 BHP Standard Motor w/590-840 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
2500	549	653	627	835	690	1031	750	1233	805	1456	855	1691	902	1927	949	2188
2750	589	795	659	981	725	1212	780	1426	833	1665	884	1923	930	2172	973	2428
3000	629	965	694	1156	759	1413	812	1665	862	1901	911	2171	957	2445	1000	2702
3250	671	1165	732	1383	792	1643	847	1923	894	2184	940	2445	986	2718	1031	2991
3500	712	1396	771	1639	824	1892	881	2206	928	2495	971	2759	1014	3009		

- NOTES:
- 1) Maximum motor Watts is 2120 for standard 2.4 HP motor.
 - 2) Maximum blower wheel speed is 1026 rpm.
 - 3) Motor drive range is 590 to 840 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 - 10 TON UNITS (2.4 BHP Standard Motor w/685-935 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
3500	596	867	663	1031	721	1190	777	1353	826	1517	871	1665	916	1831	956	2039
3750	629	1018	692	1203	750	1374	803	1552	852	1735	896	1897	939	2088	981	2286
4000	662	1190	722	1396	778	1578	829	1779	878	1962	922	2203	962	2371	1003	2560
4250	696	1392	753	1617	807	1814	857	2019	903	2269	948	2479	989	2689	1026	2877
4500	729	1621	785	1858	837	2076	885	2335	929	2569	973	2782	1015	2020	1051	3218

- NOTES:
- 1) Maximum motor Watts is 2120 for standard 2.4 HP motor.
 - 2) Maximum blower wheel speed is 1026 rpm.
 - 3) Motor drive range is 685-935 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 - 12-1/2 TONS (3.7 BHP Standard Motor w/860-1080 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
4000	697	1267	754	1448	806	1624	851	1785	895	1931	938	2123	979	2334	1020	2521
4500	770	1700	821	1923	871	2114	915	2325	955	2512	995	2683	1033	2882	1070	3138
5000	843	2246	892	2503	937	2746	980	2964	1019	3221	1055	3424	1091	3637	1126	3822
5500	918	2946	963	3212	1004	3516	1045	3757	1084	4027	1119	4307	1152	4549		
6000	993	3795	1035	4093	1074	4419	1112	4735								

- NOTES:
- 1) Maximum motor Watts is 3313 for standard 3.7 HP motor.
 - 2) Maximum blower wheel speed is 1280 rpm.
 - 3) Motor drive range is 860 to 1080 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.

PAE Series PERFORMANCE DATA

CIRCULATING BLOWER PERFORMANCE - 7-1/2 TON UNITS (2.4 BHP Standard Motor w/590-840 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
2500	549	653	627	835	690	1031	750	1233	805	1456	855	1691	902	1927	949	2188
2750	589	795	659	981	725	1212	780	1426	833	1665	884	1923	930	2172	973	2428
3000	629	965	694	1156	759	1413	812	1665	862	1901	911	2171	957	2445	1000	2702
3250	671	1165	732	1383	792	1643	847	1923	894	2184	940	2445	986	2718	1031	2991
3500	712	1396	771	1639	824	1892	881	2206	928	2495	971	2759	1014	3009		

- NOTES:
- 1) Maximum motor Watts is 2120 for standard 2.4 HP motor.
 - 2) Maximum blower wheel speed is 1026 rpm.
 - 3) Motor drive range is 590 to 840 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 - 10 TON UNITS (2.4 BHP Standard Motor w/685-935 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
3500	596	867	663	1031	721	1190	777	1353	826	1517	871	1665	916	1831	956	2039
3750	629	1018	692	1203	750	1374	803	1552	852	1735	896	1897	939	2088	981	2286
4000	662	1190	722	1396	778	1578	829	1779	878	1962	922	2203	962	2371	1003	2560
4250	696	1392	753	1617	807	1814	857	2019	903	2269	948	2479	989	2689	1026	2877
4500	729	1621	785	1858	837	2076	885	2335	929	2569	973	2782	1015	2020	1051	3218

- NOTES:
- 1) Maximum motor Watts is 2120 for standard 2.4 HP motor.
 - 2) Maximum blower wheel speed is 1026 rpm.
 - 3) Motor drive range is 685-935 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 - 12-1/2 TONS (5.25 BHP Standard Motor w/900-1260 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
4000									895	1922	938	2118	979	2332	1020	2519
4500									955	2510	995	2679	1033	2875	1070	3124
5000			892	2501	937	2741	980	2955	1019	3204	1055	3400	1091	3605	1126	3783
5500	918	2937	963	3195	1004	3489	1045	3720	1084	3978	1119	4245	1152	4477		
6000	993	3756	1035	4041	1074	4370	1112	4655								

- NOTES:
- 1) Maximum motor Watts is 4,673 for standard 5.25 HP motor.
 - 2) Maximum blower wheel speed is 1280 rpm.
 - 3) Motor drive range is 860 to 1080 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.

PERFORMANCE DATA (Cont.)

AIR QUANTITY LIMITS

PAS / PAE	MINIMUM CFM	MAXIMUM CFM
090	2250	3750
120	3000	5000
150	3750	6250

SOUND POWER (TOTAL UNIT)

PAS / PAE	SOUND RATING 60 Hz	A-WEIGHTED (dB)	OCTAVE BANDS							
			63	125	250	500	1000	2000	4000	8000
090	87 dB	86.4	83.2	87.4	83.5	82.8	83.0	77.7	71.8	67.0
120	88 dB	87.6	97.6	90.4	85.7	84.8	83.9	77.5	71.3	65.8
150	87 dB	86.4	83.7	87.2	83.4	82.8	83.0	77.7	71.8	67.0

PAS Series FAN RPM AT MOTOR PULLEY SETTINGS*

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
090 ¹	840	815	790	765	740	715	690	655	635	615	590	-	-
090 ²	1080	1025	1007	988	970	952	933	915	897	878	860	-	-
120 ¹	935	910	885	860	835	810	785	760	735	710	685	-	-
120 ²	1130	1112	1087	1062	1037	1012	987	962	937	912	887	862	830
150 ¹	1080	1060	1035	1015	990	970	950	925	905	880	860	-	-
150 ²	1260	1220	1185	1155	1130	1100	1075	1045	1015	990	960	930	900

* Approximate fan rpm shown.

1 - Indicates standard motor and drive package.

2 - Indicates optional high static motor and drive package.

PAE Series FAN RPM AT MOTOR PULLEY SETTINGS*

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
090 ¹	840	815	790	765	740	715	690	655	635	615	590	-	-
090 ²	1080	1025	1007	988	970	952	933	915	897	878	860	-	-
120 ¹	935	910	885	860	835	810	785	760	735	710	685	-	-
120 ²	1130	1112	1087	1062	1037	1012	987	962	937	912	887	862	830
150 ¹	1260	1220	1185	1155	1130	1100	1075	1045	1015	990	960	930	900

* Approximate fan rpm shown.

1 - Indicates standard motor and drive package.

2 - Indicates optional high static motor and drive package.

PERFORMANCE DATA (CONT.)

Evaporator-Fan Motor Efficiency	
PAS / PAE	Motor Efficiency (%)
090-120	80
150	87

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.

PAS Series EVAPORATOR-FAN MOTOR PERFORMANCE

PAS	Evaporator-Fan Motor	Unit Voltage	Max. Acceptable Continuous BHP*	Max. Acceptable Operating Watts	Max. AMP Draw
090	Standard	208/230	2.40	2120	6.7
		460			3.0
		575			3.0
	Optional High Static	208/230	3.70	3313	12.2
		460			5.5
		575			5.5
120	Standard	208/230	2.40	2120	6.7
		460			3.0
		575			3.0
	Optional High Static	208/230	5.25	4400	17.3
		460			8.5
		575			8.5
150	Standard	208/230	3.70	3313	12.2
		460			5.5
		575			5.5
	Optional High Static	208/230	5.25	4400	17.3
		460			8.5
		575			8.5

PAE Series EVAPORATOR-FAN MOTOR PERFORMANCE

PAE	Evaporator-Fan Motor	Unit Voltage	Max. Acceptable Continuous BHP*	Max. Acceptable Operating Watts	Max. AMP Draw
090	Standard	208/230	2.40	2120	6.7
		460			3.0
		575			3.0
	Optional High Static	208/230	3.70	3313	12.2
		460			5.5
		575			5.5
120	Standard	208/230	2.40	2120	6.7
		460			3.0
		575			3.0
	Optional High Static	208/230	5.25	4400	17.3
		460			8.5
		575			8.5
150	Standard	208/230	5.25	4400	17.3
		460			8.5
		575			8.5

LEGEND
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 premaure motor failure. Unit Warranty will not be affected.

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.

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. Loosen belt by loosening fan motor mounting plate nuts. Loosen movable pulley flange setscrew.
4. Remove the belt. Do **NOT** attempt to pry off belt with tools or fingers.
5. Loosen set screw on the outer half of the adjustable pulley.
6. To set the blower for a desired CFM (L/s), first turn the outer half of the adjustable pulley clockwise until it meets the inner half of the pulley.
7. Turn the outer half of the adjustable pulley counterclockwise the correct number of turns to obtain the desired CFM (L/s).

NOTE: To increase the blower speed, turn the outer half of the adjustable pulley clockwise. To decrease the blower speed, turn the outer half of the adjustable pulley counterclockwise.

Figure 8 Motor Mount Assembly

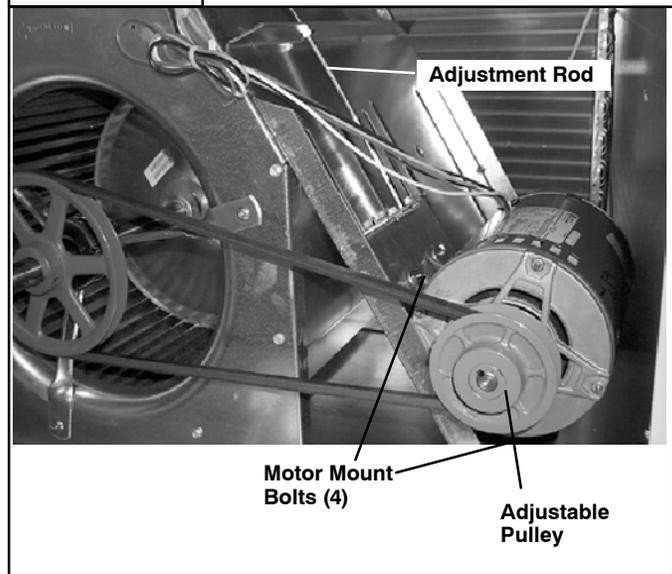
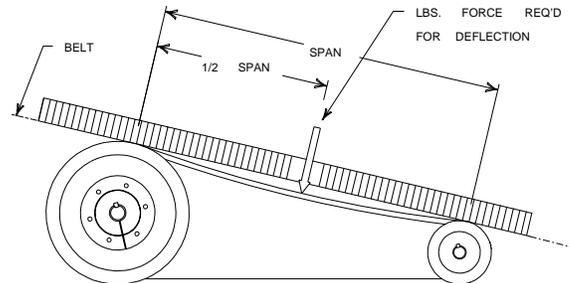
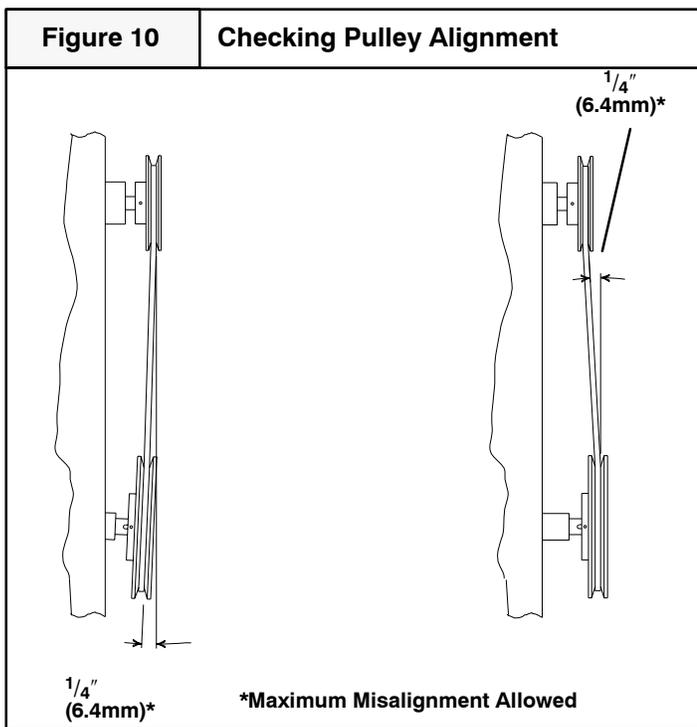


Figure 9 Checking Tension and Deflection

PA(S/E)090 - 1/2" deflection with 8-10 lbs. of force.
PA(S/E)120 - 1/2" deflection with 5-10 lbs. of force.
PA(S/E)150 - 1/2" deflection with 5-10 lbs. of force.



8. Tighten set screw(s).
9. Put on belt.
10. Slide motor mounting plate 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 8 & 9**).



11. 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 10**).

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.

12. Adjust bolt and nut on mounting plate to secure motor in fixed position.
13. Ensure that all bolts, nuts and screws are tightened and ensure that all tools, gloves, etc. are removed from unit.
14. Replace side blower access panel before Start-up.
15. During Start-up, listen for any unusual noises or vibrations.
16. 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.
17. 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.

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.

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.

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**.

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 re-wiring 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.

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.

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).

NOTE: An optional low ambient kit is available that allows the unit to operate at temperatures down to 0°F (-18°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.

If lockout occurs, unit may be adjusted by interrupting power supply to unit for at least 5 seconds.

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.

Washable filters may be cleaned by soaking in mild detergent and rinsing with cold water. 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 7-1/2 ton units: 4 filters 16" x 20" x 2"

For 10 & 12-1/2 ton units: 4 filters 20" x 20" x 2"

To replace disposable filters: (see **Figure 20**).

1. Remove filter access panel by pulling out on bottom edge.
2. Remove the top filters by pushing up on top rail of filter rack.
3. Remove the bottom filters by pushing up on middle rail of filter rack. See **Figure 20**.
4. Replace bottom filters and then top filters.
5. Replace filter access panel.

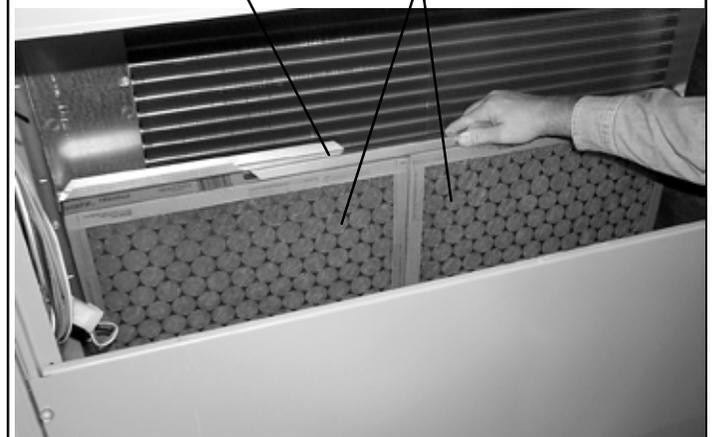
Figure 11

Replacing Filters



Middle rail

Bottom Filters



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. Shrubbery **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

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

NOTE: All bearings are sealed and no lubrication is required.

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.

TROUBLESHOOTING - Cooling Service

PROBLEM	CAUSE	REMEDY
Compressor and condenser fans will not start.	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.
Compressor will not start but condenser fans run.	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.
Compressor cycles(other than normally satisfying thermostat).	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.
Compressor makes excessive noise (Scroll only)	Compressor rotating in wrong direction	Reverse the 3-phase power leads as described in Start-Up section
Compressor operates continuously.	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.
Excessive head pressure.	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.
Head pressure too low.	Low refrigerant charge	Check for leaks, repair, and recharge.
	Compressor valves leaking.	Replace compressor.
	Restriction in liquid tube.	Remove restriction.
Excessive suction pressure.	High heat load.	Check for source and eliminate.
	Compressor valves leaking.	Replace compressor.
	Refrigerant overcharged.	Recover excess refrigerant.
Suction pressure too low.	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.
Compressor no. 2 will not run.	Unit in economizer mode.	Proper operation; no remedy necessary.

I. START-UP CHECKLIST (Remove and store in job file)			
Model No:	Serial No:		
Date:	Technician:		
Unit No:	Job Location:		
	Job Name:		
II. PRE-START-UP (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"/>	Remove shipping instructions and brackets from compressors, on select models.		
<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.		
III. START-UP			
ELECTRICAL			
Supply Voltage	L1-L2	L2-L3	L3-L1
Compressor AMPS	L1	L2	L3
Compressor AMPS	L1	L2	L3
Indoor-Fan AMPS	L1	L2	L3
TEMPERATURES and PRESSURES			
Outdoor-Air Temperature		°DB	
Return-Air Temperature		°DB	°WB
Cooling Supply air		°DB	°WB
Refrigerant Suction Pressure		PSIG-Circuit # 1	PSIG-Circuit # 2
Refrigerant Temp. (Suction) Pressure		Circuit # 1	Circuit # 2
Refrigerant Discharge		PSIG-Circuit # 1	PSIG-Circuit # 2
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.