

Installation Instructions

PGX4 Series

PACKAGED GAS / ELECTRIC UNITS



TABLE OF CONTENTS

UNIT DIMENSIONS	2 - 4	ELECTRICAL WIRING	11
SAFE INSTALLATION REQUIREMENTS	5	DUCTWORK	13
LOCATING THE UNIT	6	FILTERS	13
CLEARANCES	6	AIRFLOW ADJUSTMENT	14
INSTALLATION	6	START-UP PROCEDURES	16
GROUND LEVEL INSTALLATION	7	GAS PRESSURES	16
HOISTING	7	HEATING START-UP PROCEDURES	17
DOWNFLOW CONVERSION	7	OPERATION	18
HEATING VENT ASSEMBLY	7	MAINTENANCE	19
CONDENSATE DRAIN	8	INSPECTION AND CLEANING	20
PRE-EXISTING COMMON VENT CHECK	8	COMPONENT LOCATION	22
GAS SUPPLY AND PIPING	8	RIGGING	23
ORIFICES	9	WIRING DIAGRAMS	24- 25



International Comfort Products, LLC
Lewisburg, TN. 37091

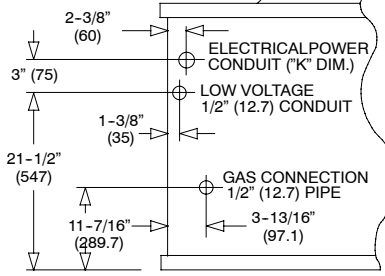
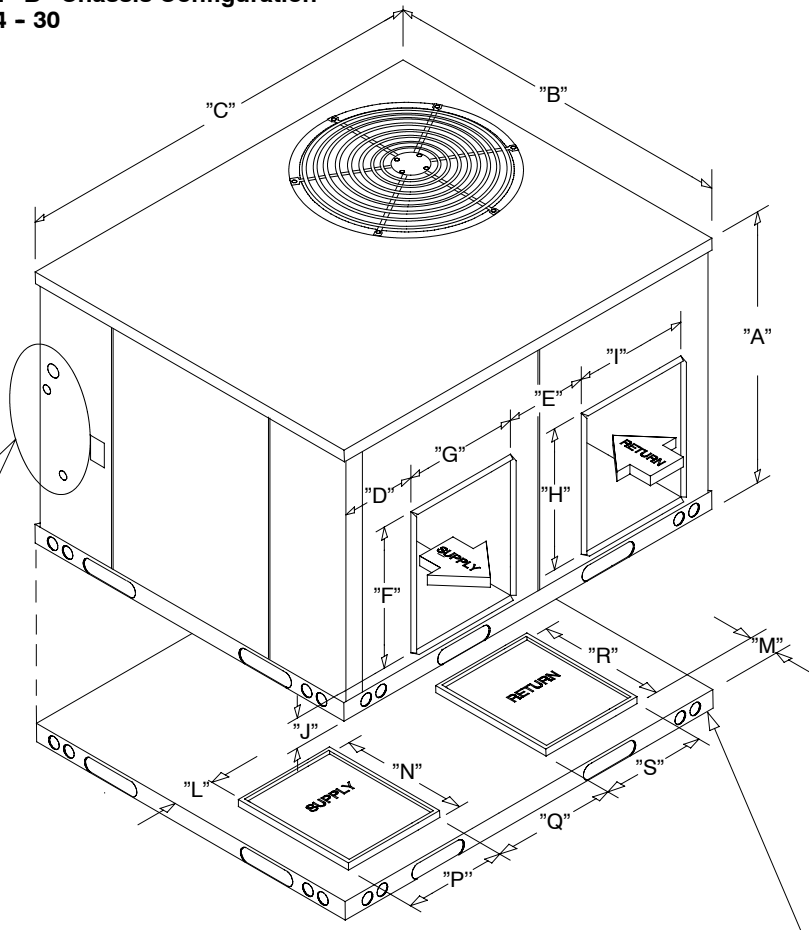
1. Unit Dimensions

"B" CHASSIS UNIT DIMENSIONS

COMBINATION GAS/ ELECTRIC UNITS "B" Chassis (47³/₈ x 47³/₈)

DIM.	INCHES	MILLIMETERS
A	32-1/2	826
B	47-3/8	1203
C	47-3/8	1203
D	3-1/8	79
E	11-1/8	283
F	12	306
G	14-1/4	363
H	14-1/4	363
I	12	306
J	4	102
K	3/4 & 1	19 & 25
L	4-1/4	108
M	4-3/8	111
N	14-1/2	368
P	12-1/4	311
Q	12-1/8	308
R	14-1/4	363
S	12-1/4	318

Units in "B" Chassis Configuration PGX424 - 30

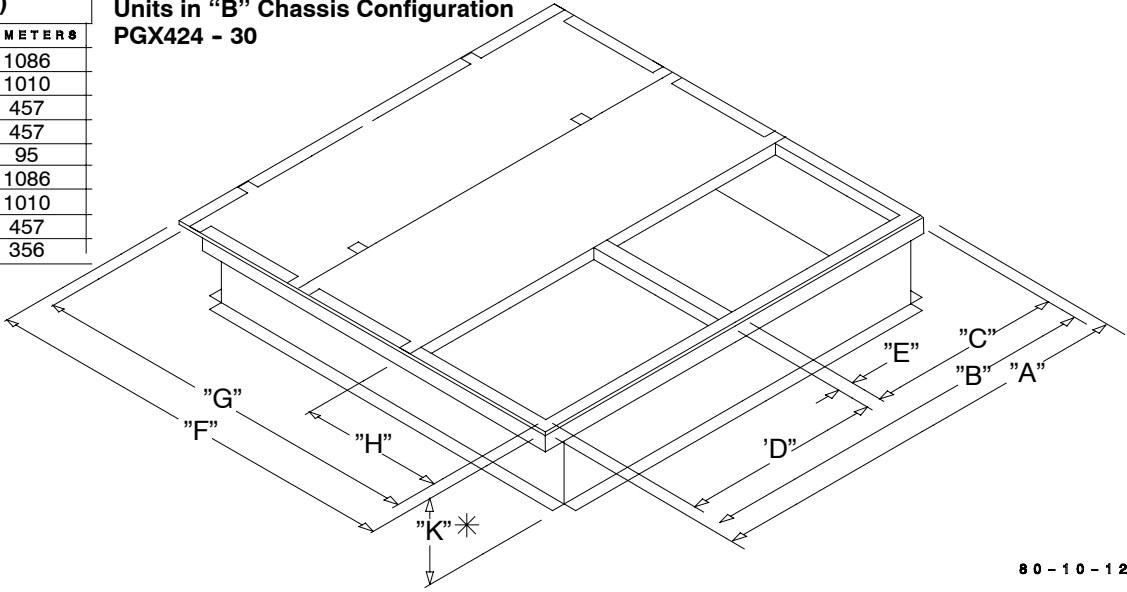


Unit Base shown separately to illustrate bottom of duct openings.

ROOF CURB for units in "B" Chassis (47³/₈ x 47³/₈)

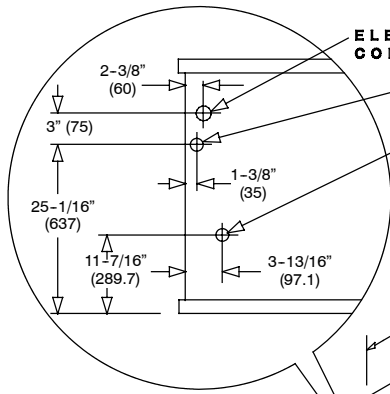
DIM.	INCHES	MILLIMETERS
A	42-3/4	1086
B	39-3/4	1010
C	18	457
D	18	457
E	3-3/4	95
F	42-3/4	1086
G	39-3/4	1010
H	18	457
K*	14	356

Units in "B" Chassis Configuration PGX424 - 30

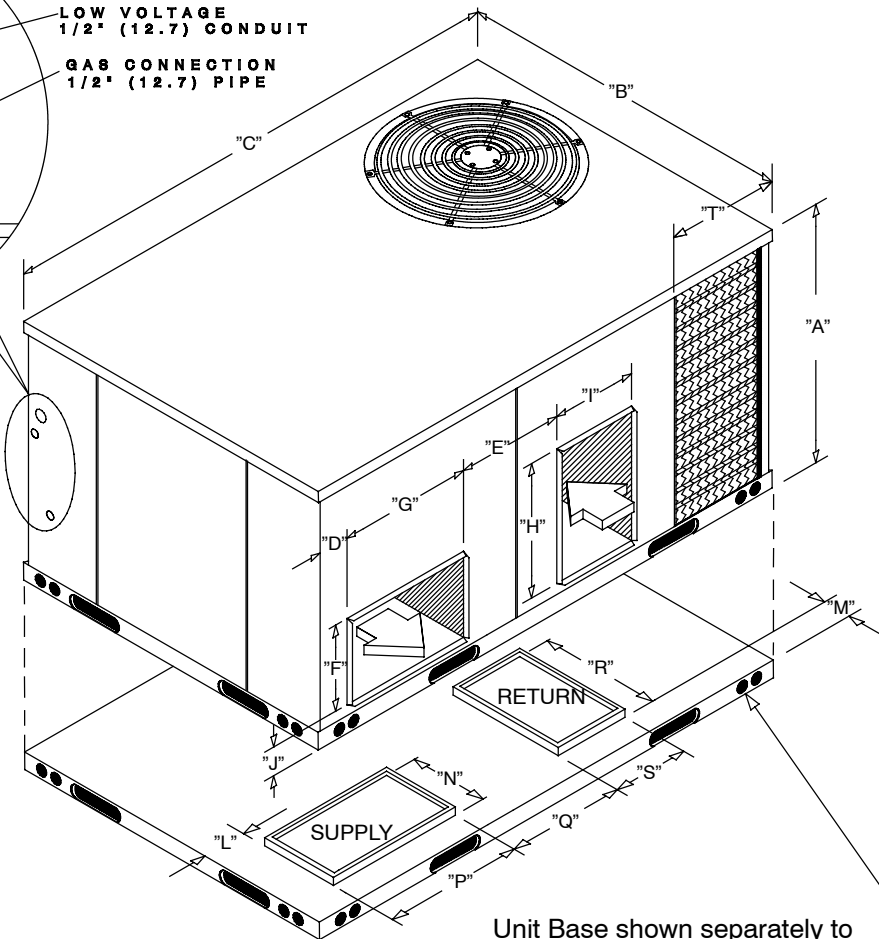


* Roof curbs are also available in 8" (203) and 24" (610) heights (K Dimensions).

"C" CHASSIS UNIT DIMENSIONS



ELECTRICAL POWER CONDUIT ('K' DIM.)
LOW VOLTAGE 1/2" (12.7) CONDUIT
GAS CONNECTION 1/2" (12.7) PIPE



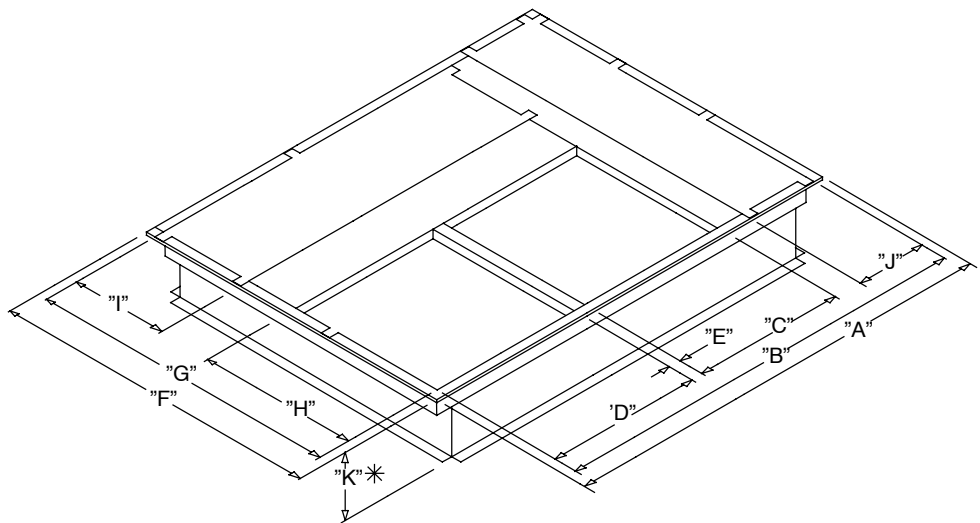
COMBINATION GAS/ELECTRIC UNITS "C" Chassis (47³/₈ x 73)

DIM.	INCHES	MILLIMETERS
A	36	914
B	47-3/8	1203
C	73	1354
D	4-5/8	117
E	15	361
F	12	307
G	18-3/4	476
H	18-3/4	476
I	12	306
J	4	102
K	1 & 1-1/4	25 & 31
L	4-1/4	108
M	5-1/4	133
N	12-1/4	311
P	19	483
Q	15	381
R	19	483
S	12-1/4	318
T	16-7/8	429

ROOF CURB for "C" Chassis (47³/₈ x 73)

DIM.	INCHES	MILLIMETERS
A	67-3/4	1721
B	64-3/4	1645
C	23	584
D	23	584
E	2-1/2	64
F	42-3/4	1086
G	39-3/4	1010
H	23	584
I	12	305
J	12	305
K*	14	356

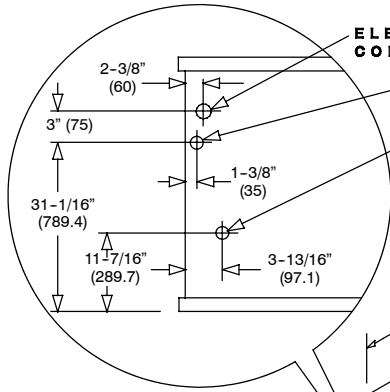
Units in "C" Chassis Configuration
PGX436-42



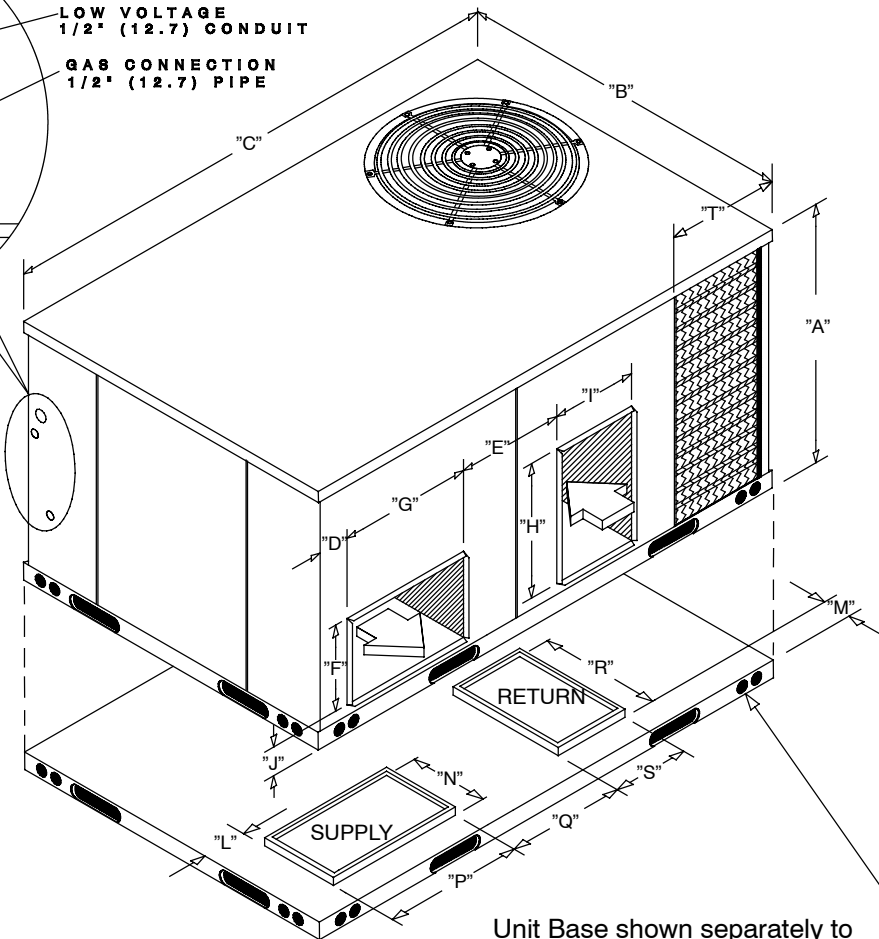
Unit Base shown separately to illustrate bottom of duct openings.

* Roof curbs are also available in 8" (203) and 24" (610) heights (K Dimensions).

"C+" CHASSIS UNIT DIMENSIONS



ELECTRICAL POWER CONDUIT ('K' DIM.)
LOW VOLTAGE 1/2" (12.7) CONDUIT
GAS CONNECTION 1/2" (12.7) PIPE



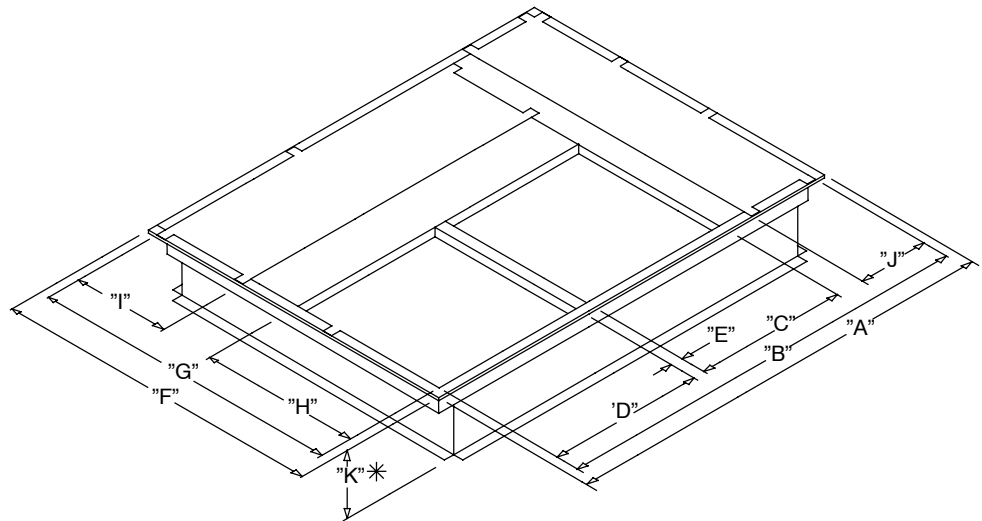
COMBINATION GAS/ELECTRIC UNITS "C" Chassis (47³/₈ x 73)

DIM.	INCHES	MILLIMETERS
A	42	1067
B	47-3/8	1203
C	73	1354
D	4-5/8	117
E	15	361
F	12	307
G	18-3/4	476
H	18-3/4	476
I	12	306
J	4	102
K	1 & 1-1/4	25 & 31
L	4-1/4	108
M	5-1/4	133
N	12-1/4	311
P	19	483
Q	15	381
R	19	483
S	12-1/4	318
T	16-7/8	429

ROOF CURB for "C" Chassis (47³/₈ x 73)

DIM.	INCHES	MILLIMETERS
A	67-3/4	1721
B	64-3/4	1645
C	23	584
D	23	584
E	2-1/2	64
F	42-3/4	1086
G	39-3/4	1010
H	23	584
I	12	305
J	12	305
K*	14	356

Units in "C" Chassis Configuration
PGX448-60



Unit Base shown separately to illustrate bottom of duct openings.

* Roof curbs are also available in 8" (203) and 24" (610) heights (K Dimensions).

2. SAFE INSTALLATION REQUIREMENTS

Installation and servicing of air-conditioning equipment can be hazardous due to system pressure and electrical components. Only trained and qualified personnel should install, repair, or service air-conditioning equipment.

Untrained personnel can perform basic maintenance functions of cleaning coils and filters. All other operations should be performed by trained service personnel. When working on air-conditioning equipment, observe precautions in the literature, tags, and labels attached to the unit, and other safety precautions that may apply.

Follow all safety codes. Wear safety glasses and work gloves. Use quenching cloth for unbrazing operations. Have fire extinguisher available for all brazing operations.


⚠ WARNING
FIRE, EXPLOSION, ELECTRICAL SHOCK, AND CARBON MONOXIDE POISON HAZARD

Improper installation, adjustment, alteration, service, maintenance, or use can cause carbon monoxide poisoning, fire, or an explosion which could result in personal injury or unit damage. Consult a qualified installer, service agency, or gas supplier for information or assistance. The qualified installer or agency must use only factory-authorized kits or accessories when modifying this product.

⚠ WARNING
FIRE, EXPLOSION, ELECTRICAL SHOCK, AND CARBON MONOXIDE POISON HAZARD

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

Before performing service or maintenance operations on unit, turn off gas supply to unit. Then turn off unit main power switch and install lockout tag.

Recognize safety information. This is the safety-alert symbol . When you see this symbol in instructions or manuals, be alert to the potential for personal injury.

Understand the signal words **DANGER**, **WARNING**, **CAUTION**, and **NOTE**. These words are used with the safety-alert symbol. **DANGER** identifies the most serious hazards which **will** result in serious injury or death. **WARNING** signifies a hazard which **could** result in serious injury or death. **CAUTION** is used to identify unsafe practices which **may** result in minor personal injury or product and property damage. **NOTE** is used to highlight suggestions which **will** result in enhanced installation, reliability, or operation.

These instructions cover minimum requirements and conform to existing national standards and safety codes. In some instances, these instructions exceed certain local codes and ordinances, especially those that may not have kept up with changing residential construction practices. We require these instructions as a minimum for a safe installation.

⚠ WARNING
FIRE, EXPLOSION, ELECTRICAL SHOCK, AND CARBON MONOXIDE POISON HAZARD

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

Installation or repairs made by unqualified persons can result in hazards to you and others. Installation **MUST** conform with local building codes or, in the absence of local codes, with the National Fuel Gas Code NFPA 54-2006/ANSI Z223.1-2006 and the National Electrical Code NFPA70-2005 or in Canada the National Standard CAN/CGA B149-1 and CSA C.22.1 - Canadian Electrical Code Part 1.

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

SAFETY CONSIDERATIONS

- Use only with type of gas approved for this unit. Refer to unit rating plate.
- Install this unit only in a location and position as specified in section 3 of this manual.
- Never test for gas leaks with an open flame. Use a commercially available soap solution made specifically for the detection of leaks to check all connections, as specified in section 5.
- Always install unit to operate within the unit's intended temperature-rise range with a duct system, which has an external static pressure within the allowable range, as specified in section 9. Refer to unit rating plate for the allowable external static pressures.
- All connecting ductwork to the unit (supply and return) must be sealed to the unit casing as specified in section 7.
- Do **NOT** use this furnace as a construction heater.
- Check to see that filters are installed correctly and are the proper type and size.

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

⚠ CAUTION
UNIT SAFETY

Failure to follow this caution may reduce unit reliability.

It is recommended that a qualified service technician check the heat exchanger integrity every two (2) years, after the first four (4) years of operation.

INTRODUCTION

The PGX4 unit is a fully self-contained, combination Category I gas heating/electric cooling unit designed for outdoor installation (See pages 2 and 3 for unit dimensions). All unit sizes have return and discharge openings for both horizontal and downflow configurations, and are factory-shipped with all downflow duct openings covered.

Units may be installed either on a rooftop, cement slab, or directly on the ground if local codes permit.

Models with a "1" in the twelfth position of the model number are dedicated Low NOx units designed for California installations. The emissions of these models do not exceed 40 nanograms of nitrogen oxide emissions per joule of heat output as shipped from the factory, and must be installed in California Air Quality Management Districts or any other regions in North America where a Low NOx rule exists.

3. LOCATING THE UNIT

ACCESS PANELS

See **Figure 1** for a general view of unit and location of access panels.

⚠ WARNING

CARBON MONOXIDE POISONING HAZARD.

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

Keep blower door closed.

CLEARANCES

The location **MUST** allow for minimum clearances and should not be adjacent to a patio or other area where the unit's operating sound level might be objectionable. The combustion air inlet openings **MUST** not be obstructed (see **Figure 1**). In addition, local codes **MUST** be observed.

NOTE: Units with available filter racks (3-1/2 to 5 ton), need a 30" (762mm) minimum clearance at side of unit for removal of filters. See chart below if unit is going to be placed near combustible construction or materials.

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

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

⚠ CAUTION

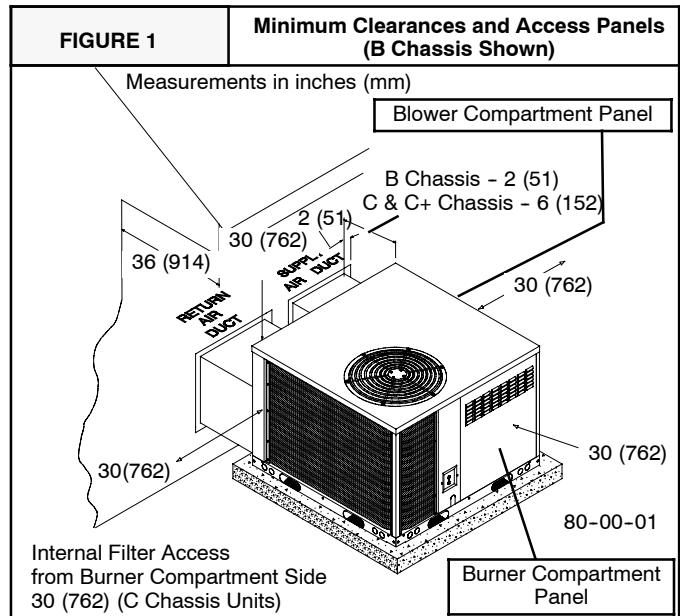
UNIT DAMAGE HAZARD

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

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

Minimum Clearances to Combustible Construction

	Inch	mm
Furnace Plenum	2	51
Duct Side	2	51
Condenser Inlet	30	762
Blower Service (Side)	30	762
Control Service Side		
(Front Combustion Air Inlet)	30	762
Clearance between 3 Ft. Overhang and Top of Unit	30	762
Combustible Base		
(Wood or Class A, B or C roof covering material)	0	0



INSTALLATION

NOTICE

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

Ground Level Installation

Ground level platform requirements:

- The unit **MUST** be situated to provide safe access for servicing.
- The unit must be level and supported above grade by beams, platform, or a pad. Platform or pad can be of open or solid construction but should be of permanent materials such as concrete, bricks, blocks, steel, or pressure-treated timbers approved for ground contact. Soil conditions must be considered so that the platform or pad does not shift or settle and leave the unit partially supported.
- 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 the last page of this manual for unit 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.

- See *Hoisting* section for hoisting instructions.

HOISTING

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

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

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

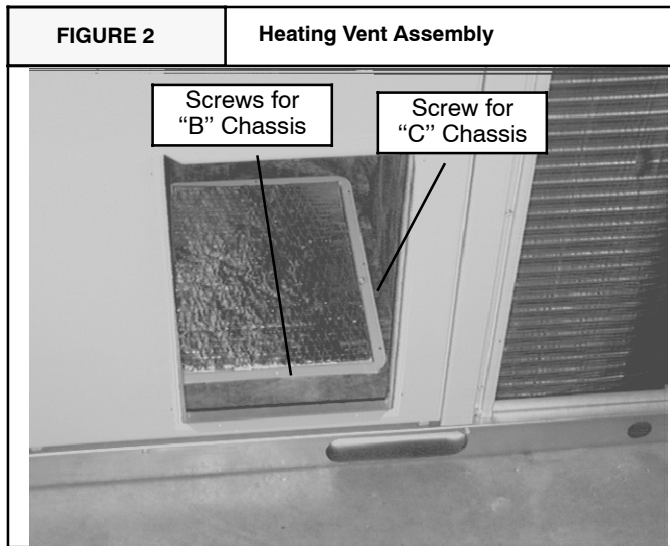
Refer to **Figure 20** for illustrated rigging instructions and weight chart.

DOWNFLOW CONVERSION

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

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

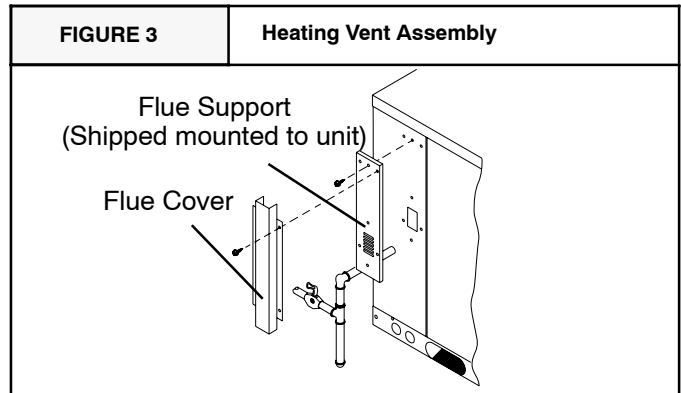
NOTE: Blockoff plate in the supply air compartment only contains one screw. If reinstalling plate, back part of plate **MUST** fit into mating dimples on flange. To reinstall, slant plate into dimples, then put plate into position and fasten with screw.



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

Heating Vent Assembly

The flue cover is packed with installation screws in the return air compartment. Refer to **FIGURE 3** and assemble as shown.



CAUTION

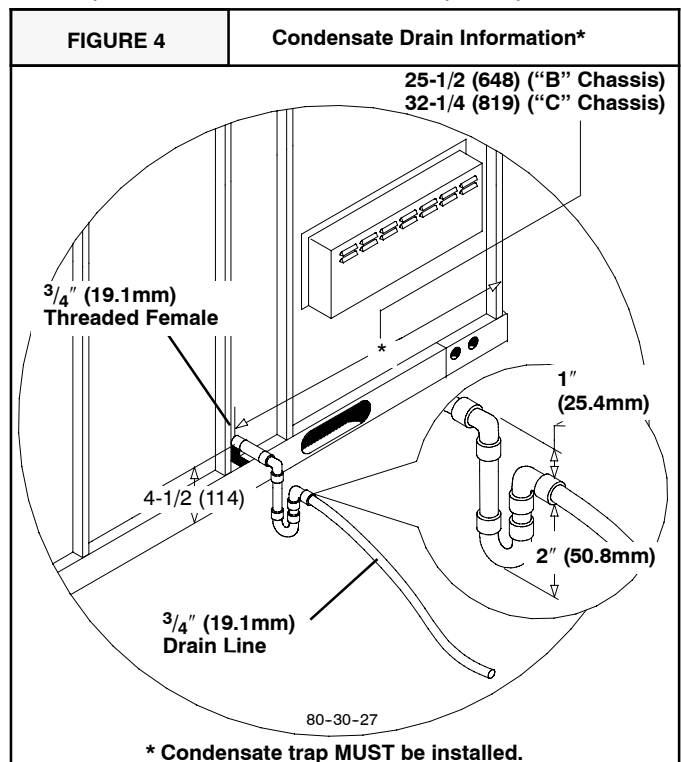
UNIT DAMAGE
Failure to follow this caution may result in unit damage.
Do not operate the unit without the vent assembly installed.

Condensate Drain

The condensate drain outlet is a $\frac{3}{4}$ " (19.1mm) female PVC connection located at the bottom of the unit to the right of the filter access panel (see **FIGURE 4**).

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

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




4. PRE-EXISTING COMMON VENT CHECK

If the installation of this new combination gas heat/electric cool unit involves removing an existing gas-fired furnace from a common vent system with other gas-fired appliances (gas-fired hot water heater, etc.), the existing vent system must be checked and inspected by a qualified technician. The qualified technician can determine if the existing vent system will properly vent the flue products of the remaining gas-fired appliances. In many cases, the existing vent system may be oversized for the remaining appliances.

5. GAS SUPPLY AND PIPING

NOTE: In Canada, installations **MUST** be performed by licensed propane installers.

The UL rating plate located on the side panel on the unit contains the model number, type of gas, gas input rating, and other important information.

 WARNING
FIRE OR EXPLOSION HAZARD Failure to follow this warning could result in personal injury, death and/or property damage. Make certain the unit is equipped to operate on the type of gas available. Models designated as natural gas are to be used with natural gas only. Models designated for use with liquefied petroleum (propane) gas are shipped with orifices sized for commercially pure propane gas. They MUST not be used with butane or a mixture of butane and propane unless properly sized orifices are installed by a licensed propane installer.

GAS PIPING

The gas supply line **MUST** be of adequate size to handle the Btu/hr requirements and length of the run for the unit being installed. Determine the minimum pipe size for natural gas from the table in **FIGURE 5** or **FIGURE 6**. Base the length of the run from the gas meter or source to the unit.

Gas Pipe Size

Btu ratings of all other gas appliances **MUST** be considered for sizing of main gas line. Check gas line to installation for compliance with local codes or, in the absence of local codes, with the National Fuel Gas Code NFPA 54-2006/ANSI Z223.1-2006 or in Canada the National Standard CAN/CGA B149-1 or current editions.

FIGURE 5		Gas Pipe Size, Length and Btu/hr Capacity for Schedule 40 Iron Pipe (English)				
NATURAL GAS						
Pipe Length (Includes Fittings)	Btu/hr (in thousands)					
	3/4"	1"	1 1/4"	1 1/2"	2"	
20'	190	350	730	1,100	2,100	
40'	130	245	500	760	1,450	
60'	105	195	400	610	1,150	
propane GAS						
Pipe Length (Includes Fittings)	Btu/hr (in thousands)					
	1/2"	3/4"	1"	1 1/4"	1 1/2"	
20'	189	393	732	1,496	2,299	
40'	129	267	504	1,039	1,559	
60'	103	217	409	834	1,275	

FIGURE 6		Gas Pipe Size, Length and Btu/hr Capacity for Schedule 40 Iron Pipe (English)				
NATURAL GAS						
Pipe Length (Includes Fittings)	kW**					
	3/4"	1"	1 1/4"	1 1/2"	2"	
6.1m	56	103	214	322	615	
12.2m	38	72	147	223	425	
18.3m	31	57	117	179	337	
Propane GAS						
Pipe Length (Includes Fittings)	kW**					
	1/2"	3/4"	1"	1 1/4"	1 1/2"	
6.1m	55	115	215	438	674	
12.2m	38	78	148	305	457	
18.3m	30	64	120	244	374	
**kW (Kilowatts) is the metric equivalent of Btu/hr.						

PIPING AT UNIT

Connections

In the state of Massachusetts:

- This product must be installed by a licensed Plumber or Gas Fitter.
- When flexible connections are used, the maximum length shall not exceed 36 inches (914mm).
- When lever type gas shutoffs are used they shall be T-handle type.
- The use of copper tubing for gas piping is not approved by the state of Massachusetts.

NOTE: The rules listed apply to natural and propane gas pipe installations.

1. If installation is for propane gas, have propane gas installer use **TWO-STAGE REGULATION** and make all connections from storage tank to unit.
2. Use black iron or steel pipe and fittings or other pipe approved by local code.
3. If copper tubing is used, it **MUST** comply with limitation set in Fuel Gas Code.

NOTE: If a flexible gas connector is used, it **MUST** be acceptable to local authority. Connector **MUST NOT** be used inside the furnace or be secured or supported by the furnace or ductwork. Do not use a connector which has

previously serviced another gas appliance. Always use a new listed connector.

⚠ WARNING
FIRE OR EXPLOSION HAZARD
Failure to do so could result in personal injury, death and/or property damage.
Gas connector **MUST** be properly installed and can **NOT** be used inside the furnace.

4. Use pipe joint compound on external (male) threads **ONLY**. Joint compound **MUST** be resistant to any chemical action of propane gases. Do **NOT** put pipe compound on last 2 threads of pipe.
5. Use ground joint unions and install a drip leg no less than 3 inches (76 mm) long to trap dirt and moisture before it can enter gas valve.

⚠ CAUTION
UNIT OPERATION AND COMPONENT DAMAGE HAZARD
Failure to follow this caution may result in misaligned burners, flame rollout and/or unit damage.
Overtightening assembly may cause damage to the gas valve and/or wiring and may misalign the burners.

6. Use a wrench on gas valve when making connections to prevent gas valve from turning. Do **NOT** use a pipe wrench on the gas valve body.
7. Provide a 1/8 inch (3mm) National Pipe Thread (NPT) plug for test gauge connection immediately upstream of the gas supply connection to the furnace if none is supplied with the gas valve of unit.
8. Install a manual shutoff valve and tighten all joints securely.

LEAK CHECK /PRESSURE TESTING OF GAS SUPPLY PIPING

⚠ WARNING
FIRE OR EXPLOSION HAZARD
Failure to follow the safety warnings could result in personal injury, death or property damage.
Never test for gas leaks with an open flame. Use a commercially available soap solution made specifically for the detection of leaks to check all connections. A fire or explosion may result causing property damage, personal injury or loss of life.

The unit and its equipment shutoff valve must be disconnected from the gas supply piping system during any pressure testing of that system at test pressures in excess of .5 psi (3.5kPa).

The unit must be isolated from the gas supply piping system by closing the equipment shut off valve during any pressure testing of the gas supply piping system at test pressures equal to or less than .5 psi (3.5 kPa).

ORIFICES

Orifice Sizes

Orifice sizes **MUST** be matched to the heating value of the gas (see **TABLE 1 & 2**). Check with your gas supplier and the National Fuel Gas Code ANSI Z223.1.

NOTE: A Propane Conversion Kit **MUST** be used for conversion to propane gas.

NOTE: For elevations above 2000 feet (610 meters), the Btu input rating **MUST** be reduced by 4% for each 1000 feet (305 meters) above sea level, unless the gas supplier's Btu/ft³ content has already been adjusted for altitude. Check **Table 1 & 2** for the proper orifice sizes.

High Altitude Conversion Labels

CSA now requires a label indicating that the unit was converted for high altitude operation and that the label be placed on the unit. Labels are in the High Altitude conversion kit.

Table 1		NATURAL GAS MANIFOLD PRESSURE ("w.c.)																									
		MEAN ELEVATION FEET ABOVE SEA LEVEL																									
HEATING VALUE at ALTITUDE BTU/CU. FT.	0 to			2001 to			3001 to			4001 to			5001 to			6001 to			7001 to			8001 to			9001 to		
	2000			3000			4000			5000			6000			7000			8000			9000			10000		
	Orifice		Mnfl'd Press	Orifice		Mnfl'd Press	Orifice		Mnfl'd Press	Orifice		Mnfl'd Press	Orifice		Mnfl'd Press	Orifice		Mnfl'd Press	Orifice		Mnfl'd Press	Orifice		Mnfl'd Press	Orifice		Mnfl'd Press
	No.	Hi	Lo	No.	Hi	Lo	No.	Hi	Lo	No.	Hi	Lo	No.	Hi	Lo	No.	Hi	Lo	No.	Hi	Lo	No.	Hi	Lo	No.	Hi	Lo
700	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	47	3.7	1.8	48	3.6	1.8	49	3.6	1.8	
725	--	--	--	--	--	--	--	--	--	--	--	--	--	--	46	3.6	1.7	47	3.5	1.7	48	3.4	1.7	49	3.4	1.7	
750	--	--	--	--	--	--	--	--	--	--	--	--	--	--	46	3.3	1.6	48	3.7	1.8	49	3.7	1.8	50	3.7	1.8	
775	--	--	--	--	--	--	--	--	--	--	--	--	46	3.6	1.8	47	3.5	1.7	48	3.5	1.7	49	3.5	1.7	50	3.5	1.7
800	--	--	--	--	--	--	--	--	45	3.7	1.8	46	3.4	1.7	47	3.3	1.6	48	3.3	1.6	49	3.3	1.6	50	3.3	1.6	
825	--	--	--	--	--	--	--	--	46	3.7	1.8	47	3.6	1.8	48	3.6	1.7	49	3.6	1.8	50	3.6	1.8	51	3.7	1.8	
850	--	--	--	--	--	45	3.7	1.8	46	3.4	1.7	47	3.4	1.7	48	3.4	1.6	49	3.4	1.7	50	3.4	1.7	51	3.5	1.7	
875	--	--	--	--	--	46	3.7	1.8	47	3.7	1.8	48	3.7	1.8	49	3.7	1.8	49	3.2	1.6	50	3.2	1.6	51	3.3	1.6	
900	--	--	--	--	--	46	3.5	1.7	47	3.5	1.7	48	3.5	1.7	49	3.5	1.7	50	3.6	1.8	51	3.7	1.8	51	3.1	1.5	
925	43	3.4	1.7	45	3.6	1.8	46	3.3	1.6	48	3.7	1.8	48	3.3	1.6	49	3.3	1.6	50	3.4	1.7	51	3.5	1.7	52	3.6	1.8
950	44	3.7	1.8	46	3.6	1.8	47	3.6	1.7	48	3.6	1.7	49	3.6	1.8	50	3.7	1.8	50	3.2	1.6	51	3.3	1.6	52	3.4	1.7
975	44	3.5	1.7	46	3.4	1.7	47	3.4	1.7	48	3.4	1.7	49	3.5	1.7	50	3.5	1.7	51	3.6	1.8	51	3.1	1.5	52	3.3	1.6
1000	44	3.3	1.6	47	3.7	1.8	48	3.7	1.8	48	3.2	1.6	49	3.3	1.6	50	3.4	1.6	51	3.4	1.7	52	3.7	1.8	52	3.1	1.5
1050	45	3.6	1.8	47	3.3	1.6	48	3.3	1.6	49	3.4	1.7	50	3.5	1.7	--	--	--	--	--	--	--	--	--	--	--	--
1100	46	3.5	1.7	48	3.4	1.7	49	3.6	1.7	50	3.7	1.8	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--

Note: The orifice sizes in the chart above derate the input rate at 4% per 1000 feet above sea level for altitudes exceeding 2000 feet above sea level.

If converting from propane (LP) gas to Natural Gas, use kit number 1175405 for altitudes up to 2000 feet above sea level.

If converting from propane (LP) gas to Natural Gas, use kit number 1175405 and altitudes exceeding 2000 feet above sea level, use kit number 1175405 with field-supplied orifices.

Natural gas data is based on .6 specific gravity.

For fuels with different specific gravity, consult the National Fuel Gas Code NFPA 54-2005/ANSI Z223.1 - 2005 or

National Standard of Canada, Natural Gas and Propane Installation Code CSA B149.1-05.

Table 2		PROPANE (LP) GAS MANIFOLD PRESSURE ("w.c.)																
		MEAN ELEVATION FEET ABOVE SEA LEVEL																
HEATING VALUE at ALTITUDE BTU/CU. FT.	0 to 2000		2001 to 3000		3001 to 4000		4001 to 5000		5001 to 6000		6001 to 7000		7001 to 8000		8001 to 9000		9001 to 10000	
	Hi	Lo	Hi	Lo	Hi	Lo	Hi	Lo	Hi	Lo	Hi	Lo	Hi	Lo	Hi	Lo	Hi	Lo
	2500	10.0	5.5	10.0	5.0	11.0	6.0	11.0	5.7	10.7	5.2	10.0	5.0	11.0	5.9	10.6	5.2	10.0
Orifice Size	# 55		# 55		# 56		# 56		# 56		# 56		# 57		# 57		# 57	
Kit Number	1175406																	

Note: The orifice sizes in the chart above derate the input rate at 4% per 1000 feet above sea level for altitudes exceeding 2000 feet above sea level.

Propane (LP) gas data is based on 1.52 specific gravity.

For fuels with different specific gravity, consult the National Fuel Gas Code NFPA 54-2005/ANSI Z223.1 - 2005 or

National Standard of Canada, Natural Gas and Propane Installation Code CSA B149.1-05.

Changing Orifices

⚠ WARNING

ELECTRICAL SHOCK, FIRE AND/OR EXPLOSION HAZARD

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

Shut off electric power at unit disconnect or service panel and shut off gas at manual shut off valve before beginning the following procedure.

Changing orifices requires a qualified service technician.

1. Shut **OFF** gas at manual shut off valve.
2. Shut **OFF** electric power at unit disconnect or service panel. If unit is still running, allow 3 minutes after gas shut off before turning off power.

3. Disconnect the wires from the gas valve, sparker, and flame sensor.
4. Remove the four screws holding the manifold to the manifold brackets.
5. Carefully remove the manifold with the gas valve attached.
6. If unit has v-shaped NOx baffles installed in the firing tubes, they must be removed when converting to propane.

⚠ WARNING

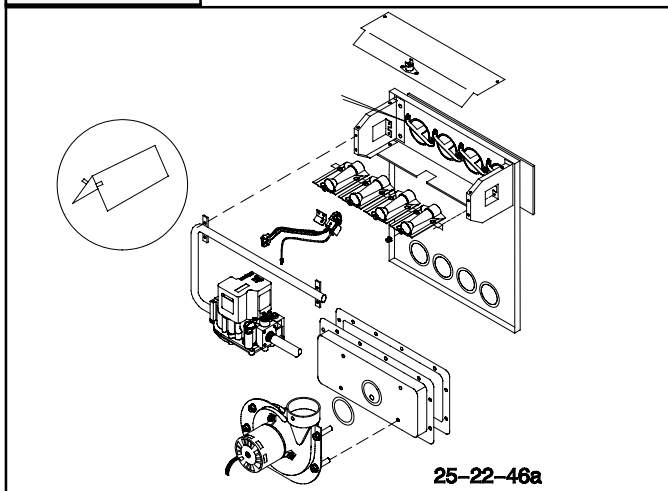
CARBON MONOXIDE HAZARD.

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

NOx baffles for use with Natural Gas units ONLY. If propane (LP) Gas is required, NOx inserts must be removed.

FIGURE 7

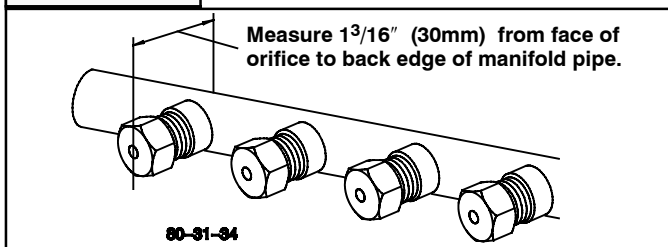
Removing NOx Baffles



7. Remove the orifices from the manifold with a $\frac{7}{16}$ " (11mm) box end or socket wrench.
8. Check to be sure that the size of each orifice is correct for the Btu input desired.

FIGURE 8

Manifold/Orifice Measurement



9. Install the correct orifices. Gauge the size of the orifices with a new twist drill bit of the correct size.

Make sure that the orifices go in straight so that they form a right angle (90°) to the manifold pipe.

Tighten the orifices so that there is a $1\frac{3}{16}$ " (30mm) distance between the faces of the orifices to the back of the manifold pipe.

Measure the distance with a set of calipers. If you do not have a calipers, you can use an adjustable wrench and measure between the face of the jaws.

10. Reassemble in reverse order.

6. ELECTRICAL WIRING

⚠ WARNING

ELECTRICAL SHOCK HAZARD.

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

The unit cabinet must have an uninterrupted, unbroken electrical ground to minimize the possibility of serious injury if an electrical fault should occur. This ground may consist of an electrical wire connected to the unit ground lug in the control compartment, or conduit approved for electrical ground when installed in accordance with National Electric Code (NEC) NFPa 70, National Fuel Gas Code NFPa 54-2006/ANSI Z223.1-2006 and local electrical codes. In Canada, follow Canadian Electrical Code CSA (Canadian Standards Association) C22.1 and local electrical codes.

⚠ CAUTION

REDUCED EQUIPMENT LIFE HAZARD

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

- 1) Make all electrical connections in accordance with National Electric code (NEC) NFPa 70, National Fuel Gas Code NFPa 54-2006/ANSI Z223.1-2006 and local electrical codes governing such wiring. In Canada, all electrical connections must be in accordance with CSA standard C22.1, Canadian Electrical Code Part 1, and applicable local codes. Refer to unit wiring diagram.
- 2) Use only copper conductor for connections between field-supplied electrical disconnect switch and unit. **DO NOT USE ALUMINUM WIRE.**
- 3) Be sure that high-voltage power to unit is within operating voltage range indicated on unit rating plate.
- 4) Do not damage internal components when drilling through any panel to mount electrical hardware, conduit, etc. Consult local power company for correction of improper voltage and/or phase imbalance.

For access, remove the burner access panel. See **Figure 1** for access panel location. Wiring **MUST** be protected from possible mechanical damage.

Disconnect Switch

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

Ground Connections

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

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

Line Voltage Wiring

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

1. Run the high voltage (L1, L2) and ground leads into the control box.
2. Connect ground lead to chassis ground connection.
3. Connect L1 to pressure lug connection 11 of the compressor contactor.
4. Connect L2 to pressure lug connection 23 of the compressor contactor.

Thermostat / Low Voltage Wiring

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

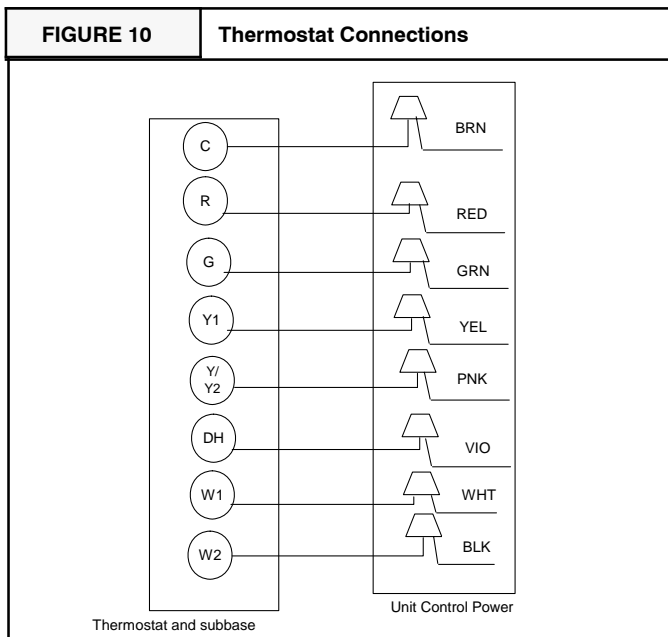
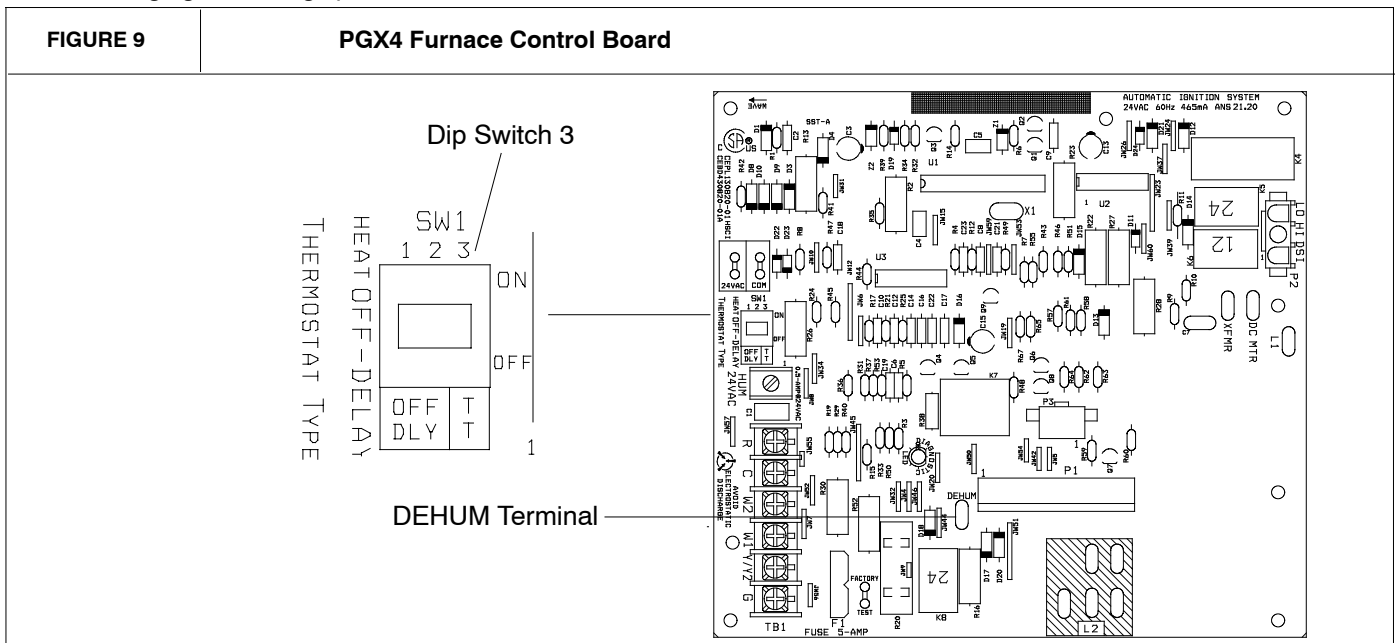
These units are designed for two-stage cooling operation and two-stage gas heating operation. In order for the unit to

operate properly in cooling a two-stage cooling thermostat is required (Y1 and Y2 terminals). Do NOT use a single-stage cooling thermostat. A single-stage cooling thermostat will not activate the second stage of cooling.

Optimal gas heating operations is achieved with a two-stage gas heating thermostat (W1 and W2). If a one-stage gas heating thermostat is used (W/W1), the unit will fire on low-stage for 12 minutes, and if the call for heat continues, it will switch to high-stage gas heat until satisfied.

NOTE: One-stage or two-stage gas heating thermostat must be selected on the furnace control board, DIP switch 3. **See Figure 9.**

Some thermostats feature a dehumidification function, designed to increase latent heat removal (moisture) when humidity is high. If the thermostat has a "DH" terminal, wire it to the "DEHUM" terminal on the control board. **See Figure 9.**



The violet-colored pigtail connects to the dehumidification feature of this unit. The dehumidification feature reduces cooling airflow by 20% to increase latent heat removal when the humidity is high. The reduced airflow occurs when there is the presence of 24V to the violet-colored pigtail. Approved thermostats that have the "DH" terminal are available through your distributor

Thermostat Heat Anticipator

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

Final Electrical Check

Make a final wiring check to be sure system is correctly wired. Inspect field installed wiring and the routing to

ensure that rubbing or chafing due to vibration will not occur.

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

7. DUCTWORK

Ductwork Sizing

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

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

Ductwork Insulation

Ductwork installed outdoors must have a minimum 2" thick fiberglass "wrap" insulation and a weatherproof vapor barrier installed around it. The insulation and vapor barrier must be protected against potential damage. Caulking, flashing, and other means of providing a permanent weather seal must be used.

Ductwork Connections

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

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

FILTERS

All return air **MUST** pass through a filter before entering the unit. An electronic air cleaner, optional filter racks, or other accessible filter arrangement must be installed in the return air ductwork. Minimum recommended filter sizes are listed in **FIGURE 11** and are based on maximum face velocities of 300 ft/min for disposable filters and 600 ft/min for washable (high velocity) filters. See figure 10 for filter sizes.

⚠ CAUTION

REDUCED EQUIPMENT LIFE HAZARD

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

Do not operate the unit without a filter.

FIGURE 11		Filter Sizes		
Model	Disposable Filters		Washable Filters ¹	
	Nominal Size (qty x w x d)	Minimum Area (sq. inches)	Nominal Size (w x d) (inches)	Minimum Area (sq. inches)
PGX424040	1 x 20" x 20"	384	1 x 10" x 20"	192
PGX424060	1 x 20" x 24"	432	1 x 12" x 20"	216
PGX430040	1 x 20" x 24"	480	1 x 12" x 20"	240
PGX430060	1 x 20" x 24"	480	1 x 12" x 20"	240
PGX436060	2 x 15" x 20"	576	1 x 15" x 20"	288
PGX436080	2 x 15" x 20"	576	1 x 15" x 20"	288
PGX442080	2 x 18" x 20"	672	1 x 18" x 20"	336
PGX448100	2 x 20" x 20"	768	1 x 20" x 20"	384
PGX448120	2 x 20" x 20"	785	1 x 20" x 20"	393
PGX460100	2 x 20" x 24"	960	1 x 20" x 24"	480
PGX460120	2 x 20" x 24"	960	1 x 20" x 24"	480

¹ Washable filter size is based on an allowable face velocity of 600 ft/min. Refer to filter manufacturer's specifications for allowable face velocity and required filter area.

8. AIRFLOW ADJUSTMENT

FIGURE 12		Airflow Adjustment															
Model	Cooling Tons	High Stage Heating						Low Stage Heating						High Stage Cooling		Low Stage Cooling	
		Heating Input (Btu/hr)	Heating Rise Range (°F)	Dip Switch 3 & 4	External Static Pressure (in wc)		Heating Input (Btu/hr)	Heating Rise Range (°F)	Dip Switch 3 & 4	External Static Pressure (in wc)		Normal Mode (CFM)	Dehumidify Mode (CFM)	Normal Mode (CFM)	Dehumidify Mode (CFM)		
					.1" - .7"	Heating Rise (°F)				.1" - .7"	Heating Rise (°F)						
PGX424040	2	40000	35 - 65	HI	904	33	28000	25 - 55	HI	800	26	800	640	560	448		
				MED HI	791	37			MED HI	700	30						
				MED LO	678	44			MED LO	600	35						
				LO*	554	52			LO*	490	42						
PGX424060	2	60000	35 - 65	HI*	904	49	42000	25 - 55	HI*	800	39	800	640	560	448		
				MED HI	791	56			MED HI	700	44						
				MED LO	678	66			MED LO	600	52						
				LO	554	NA			LO	490	NA						
PGX430040	2.5	40000	35 - 65	HI	904	33	28000	25 - 55	HI	800	26	875	700	648	518		
				MED HI	791	37			MED HI	700	30						
				MED LO	689	43			MED LO	610	34						
				LO*	554	52			LO*	490	42						
PGX430060	2.5	60000	35 - 65	HI*	904	49	42000	25 - 55	HI*	800	39	875	700	648	518		
				MED HI	791	56			MED HI	700	44						
				MED LO	689	64			MED LO	610	51						
				LO	554	NA			LO	490	NA						
PGX436060	3	60000	35 - 65	HI	1288	35	42000	25 - 55	HI	1140	27	1200	960	852	682		
				MED HI	1164	38			MED HI	1030	30						
				MED LO	1034	43			MED LO	915	34						
				LO*	904	49			LO*	800	39						
PGX436080	3	80000	35 - 65	HI*	1288	48	56000	25 - 55	HI*	1140	38	1200	960	852	682		
				MED HI	1164	53			MED HI	1030	42						
				MED LO	1034	59			MED LO	915	47						
				LO	904	NA			LO	800	NA						
PGX442080	3.5	80000	35 - 65	HI	1379	45	56000	25 - 55	HI	1220	35	1400	1120	980	784		
				MED HI*	1288	48			MED HI*	1140	38						
				MED LO	1198	51			MED LO	1060	41						
				LO	1113	55			LO	985	44						
PGX448100	4	100000	35 - 65	HI	1785	43	70000	25 - 55	HI	1580	34	1600	1280	1104	883		
				MED HI	1719	45			MED HI	1521	35						
				MED LO	1653	46			MED LO	1463	36						
				LO*	1588	48			LO*	1405	38						
PGX448120	4	120000	35 - 65	HI*	1785	51	84000	25 - 55	HI*	1580	39	1600	1280	1104	883		
				MED HI	1719	53			MED HI	1521	41						
				MED LO	1653	55			MED LO	1463	43						
				LO	1588	57			LO	1405	44						
PGX460100	5	100000	35 - 65	HI	1797	43	70000	25 - 55	HI	1590	34	1750	1400	1295	1036		
				MED HI	1732	44			MED HI	1533	35						
				MED LO	1669	46			MED LO	1477	36						
				LO*	1605	48			LO*	1420	38						
PGX460120	5	120000	35 - 65	HI*	1797	51	84000	25 - 55	HI*	1590	40	1750	1400	1295	1036		
				MED HI	1732	53			MED HI	1533	41						
				MED LO	1669	55			MED LO	1477	43						
				LO	1605	57			LO	1420	44						

NOTES:
 * Factory-shipped speed
 NA = Not Allowed for Heating Speed

CIRCULATING AIR BLOWER SPEEDS

⚠ WARNING

ELECTRICAL SHOCK HAZARD.

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

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

CONSTANT CFM MOTOR

The circulating air (indoor) blower motor is a true variable speed motor designed to deliver constant CFM. Constant CFM is valid for systems with total external static pressure between 0.1 and 0.7 inches water column.

COOLING

Motors are factory set to deliver appropriate cooling CFM for each model size. **Standard, nominal cooling CFM is not field adjustable.** As long as the duct system static pressure is between 0.1 and 0.7 inches water column, the motor will automatically adjust its speed to deliver the design CFM. Cooling CFM values are shown in **Figure 12**. Dip switch 5 and 6 have no affect because cooling size of unit is fixed.

DEHUMIDIFY

Dehumidify mode is 80% cfm of the current cooling stage.

GAS HEATING (A) (See Figure 13)

CFM values for gas heating are adjustable to account for different temperature rise values. Adjustment is made using DIP switches 3 and 4 on the motor control board. Refer to Figure 13 for location of the DIP switches on the board. Refer to Figure 12 for gas heating CFM values.

NOTE: Changes to the DIP switch settings affect both the High-stage and Low-stage gas heating CFM values: they cannot be changed independently.

UNIVERSAL CFM ADJUSTMENT (B) (See Figure 13)

In the middle of the motor control board there is a jumper plug marked "+NOM-". With this jumper, ALL the CFM values shown in Figure 11 can be adjusted up or down by approximately 10%. Factory setting is "NOM" (for "Nominal"), and this matches the CFM values shown in Figure 12. Options are provided to adjust airflow to meet individual installation needs for such things as noise, comfort, and humidity removal.

NOTE: Changing this jumper will affect ALL CFM values, heating, cooling, continuous fan, low-stage, high stage, etc.

CONTINUOUS FAN (C) (See Figure 13)

Continuous fan CFM is factory set to equal 40% of the high-stage cooling speed. Continuous fan CFM is not field adjustable. DIP switches 1 and 2 have no affect on CFM.

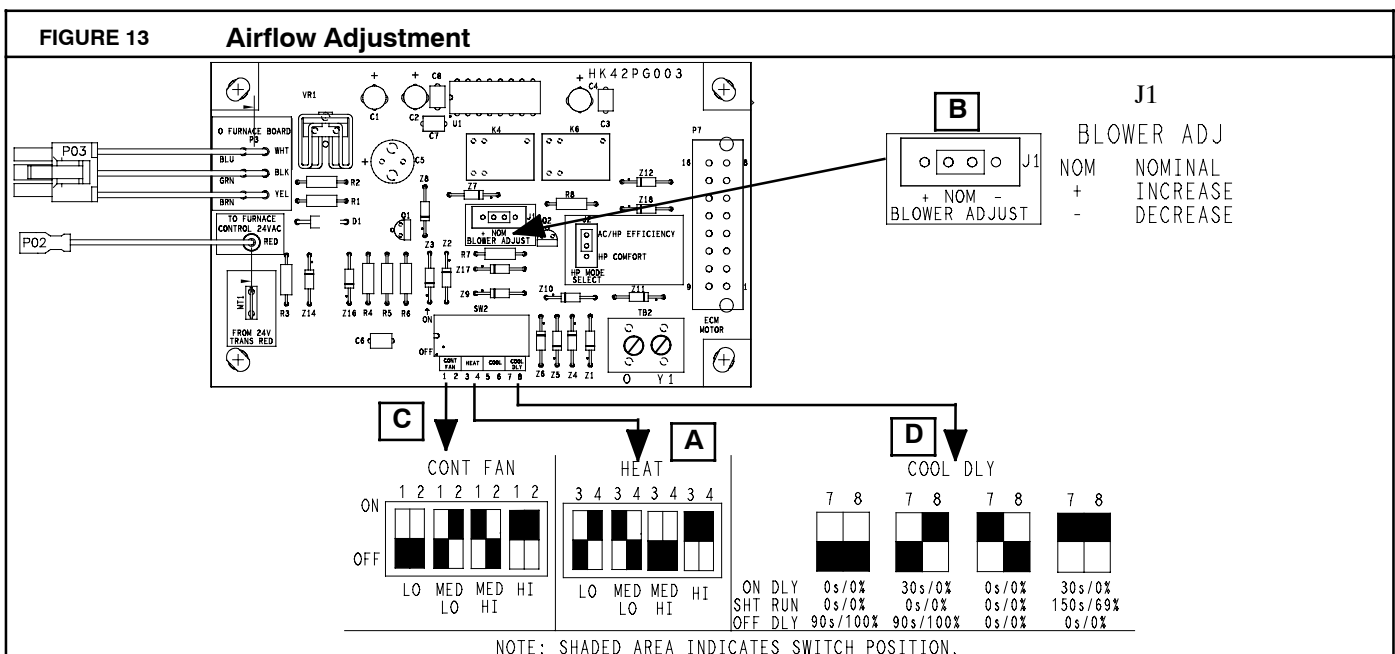
COOLING DELAY (D) (See Figure 13)

Four cooling operation delay profiles are provided to customize and enhance system operation. DIP switches 7 and 8 control cooling delay. Options are:

- 0/0/90: No on delay and 90 second off delay at 100% airflow (factory setting).
- 30/0/90: 30 second on delay with no airflow and 90 second off delay at 100% airflow profile. Used when it is desirable to allow system coils time to heat-up/cool-down in conjunction with the airflow.
- 0/0/0: No delay option. Used for servicing unit or when a thermostat is utilized to perform delay functions.
- 30/150/0: Enhanced selection provides a 30 second on delay with 0 airflow followed by 150 seconds at 70% airflow, and no off delay for added comfort. This profile will minimize cold blow in heat pump operation and could enhance system efficiency.

HEAT PUMP EFFICIENCY MODE

Not used on gas/electric models. Changing the jumper plug has no affect.



9. START-UP PROCEDURES

⚠ WARNING

FIRE OR EXPLOSION HAZARD

Failure to follow this warning could result in personal injury, death and/or property damage.
Do NOT attempt to light the burner with a match or flame of any kind.

CHECK BEFORE STARTING

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

COOLING

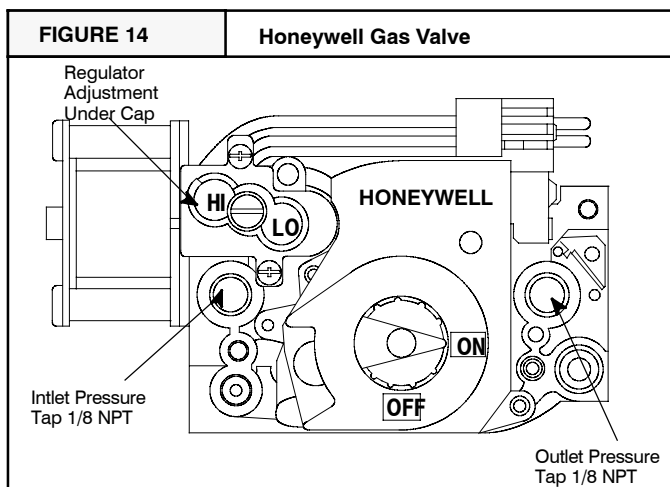
1. Turn electric power **OFF**
2. Set thermostat Heat-Cool select to **COOL**.
3. Adjust thermostat setting to below room temperature.
4. Turn power **ON**, for approximately one minute, then **OFF**. During power application check the following:
 - a. Contactor - Contacts Closing
 - b. Compressor - **ON**
 - c. Condenser fan motor - **ON**
 - d. Circulating Air Blower - **ON**, Adjustable delay ON of 0 or 30 seconds.
5. Turn power **OFF**, check the following:
 - a. Contactor contacts opening.
 - b. Compressor - **OFF**
 - c. Condenser fan motor - **OFF**
 - d. Circulating blower - **OFF**, Adjustable delay OFF of 0 or 90 seconds.

⚠ WARNING

FIRE OR EXPLOSION HAZARD.

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

Turn OFF gas at shut off before connecting U-tube manometer.



GAS PRESSURES

1. Do **NOT** allow gas supply pressure to fall below the listed minimums. Doing so will decrease input to furnace. Refer to **Figure 15** for gas supply pressures.
2. Gas input **MUST NOT** exceed rated input shown on rating plate.
3. Do **NOT** allow pressures to exceed the maximum limits as listed in **Figure 15**.

FIGURE 15	Gas Pressures	
	Natural Gas	Propane Gas
Minimum Inlet	4.5 in wc (1120 Pa)	11 in wc (2740 Pa)
Recommended Inlet	7 in wc (1740 Pa)	11 in wc (2740 Pa)
Maximum Inlet	13 in wc. (3230 Pa)	13 in wc (3230 Pa)

Manifold Pressure Adjustment

Manifold pressures are listed in **Tables 1 and 2**. Check manifold pressures using the following procedure.

1. With gas OFF, connect U-Tube manometer to outlet pressure tap on gas valve (see **figure 14**). Use a manometer with a 0" to 12" water column range.
2. Turn gas ON. Change thermostat to HEAT mode and adjust temperature so that the unit runs in High Stage. Make sure that the third (3rd) dip switch on the ignition board is set in the ON position (See wiring diagram).
3. Remove the manifold pressure adjustment screw cover on gas valve. Turn high stage adjusting screw, marked "HI", counterclockwise to decrease the manifold pressure and clockwise to increase pressure. See **figure 14**.
4. Set manifold pressure to value shown in **Table 1 or Table 2**. Replace adjustment screw cover and re-check manifold pressure.
5. Reduce the thermostat set point so that the unit runs in Low stage. Wait until unit changes to low stage before proceeding to the next steps.
6. Remove the manifold pressure adjustment screw cover on gas valve. Turn low stage adjusting screw, marked "LO", counterclockwise to decrease the manifold pressure and clockwise to increase pressure. See **figure 14**.
7. Set manifold pressure to value shown in **Table 1 or Table 2**. Replace adjustment screw cover and re-check manifold pressure.
8. Turn thermostat "OFF". Remove manometer connection from the outlet pressure tap of gas valve and replace plug in outlet pressure tap. See **figure 14**.
9. Return thermostat to customer's desired settings (mode and temperature) after final checkout.

NOTE: Adjustment screw cover **MUST** be placed on gas valve before reading manifold pressure and operating furnace.

⚠ WARNING

FIRE AND/OR EXPLOSION HAZARD

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

Do NOT adjust manifold pressure more than + 0.3 inches water column to obtain rated input.

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

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

HEATING START-UP PROCEDURE

1. Adjust thermostat setting above room temperature and set thermostat selector to **HEAT**. The combustion air blower will energize on high speed.
2. The combustion air blower will run on high speed for 15 seconds to purge the combustion chamber.
3. After the 15 second purge, the combustion air blower will remain on. The sparker will turn on to ignite the gas at the same time the gas valve is energized on low stage. Make sure the gas valve is in the "ON" position (Refer to **Figure 14** and the instruction label located on the inside of the burner access panel.
4. The sparker will remain energized for 7 seconds or until a flame is detected by the flame sensor. It may take several ignition attempts to purge the air out of the gas line at the initial start-up of the unit.
5. Once flame is proven, the ignition control will monitor the thermostat to see whether low stage gas heat or high stage gas heat is needed.
 - a. If low stage gas heat is needed, the combustion air blower will be changed to low speed, while keeping the low stage gas valve operation energized.
 - b. If high stage gas heat is needed, the combustion air blower will remain on high speed, and the high stage gas valve operation is energized.
6. 30 seconds after the burners light, the circulating air blower will begin to run.

NOTE: Regardless of whether the thermostat is calling for low stage gas heat or high stage gas heat, the unit will always start with the high inducer speed and low stage gas valve operation.

⚠ WARNING

FIRE AND/OR EXPLOSION HAZARD

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

Do NOT attempt to light the burner with a match or flame of any kind.

HEATING INPUT RATE CHECK

The gas input to the unit is determined by measuring the gas flow at the meter. Measuring gas flow at the meter is recommended for natural gas units. To measure the heating input, perform the following steps for both low and high stage:

1. Turn off all other gas appliances that use the same meter.
2. Turn off gas supply to unit and attach manifold pressure manometer as instructed in the "Manifold Pressure Adjustment" section. Turn gas ON.
3. Change thermostat to HEAT mode and adjust temperature so that the unit will run in High stage. Make sure that the third (3rd) dip switch on the ignition board is set in the ON position (See wiring diagram).
4. Record the number of seconds for the gas meter dial to make 1 revolution.
5. Divide number of seconds in step 4 into 3600 (number of seconds in 1 hour).
6. Multiply result of step 5 by the number of cubic feet shown for one revolution of the meter dial to obtain the cubic feet of gas flow per hour.
7. Multiply result of step 6 by Btu heating value of gas to obtain total measured input in Btu/hr. Compare this with the unit rating plate and make any adjustments as needed according to the "Manifold Pressure Adjustments" section. Consult with local gas supplier if the heating value of gas is not known.
8. Adjust temperature set point lower so that the unit will run in Low stage.
9. Repeat steps 4 thru 7 for low stage.
10. Return thermostat to customer's desired settings (mode and temperature) after final checkout.
11. Relight all appliances and ensure all pilots are operating.

Example: Assume that the size of the meter dial is 1 cu. ft., one revolution takes 44 seconds, and the heating value of the gas is 1020 Btu/ft³. Proceed as follows:

1. 38 sec. To complete 1 revolution
2. $3600/38 = 94.7$
3. $94.7 \times 1 = 94.7$
4. $94.7 \times 1020 = 96,632$ Btu/hr

For this example, the nameplate input is 100,000 Btu/hr, so only a minor change in manifold pressure is required. In no case should the final manifold pressure vary more than $\pm .3$ in wc from the values in **Tables 1 and 2**.

TEMPERATURE RISE CHECK

NOTE: Air temperature rise is the temperature difference between supply and return air. With a properly designed distribution system, the proper amount of temperature rise will normally be obtained when the unit is operating at rated input with the recommended blower speed.

1. The temperature rise must be within the specifications marked on the unit rating plate for each stage of gas heat.

To check the temperature rise through the unit, place thermometers in the supply and return air ducts as close to the unit as possible.

Open **ALL** registers and duct dampers. Operate unit **AT LEAST** 15 minutes before taking readings.

If the correct amount of temperature rise is not obtained when operating on the recommended blower speed, it may be necessary to change the blower speed. A faster blower speed will decrease the temperature rise. A slower blower speed will increase the temperature rise.

NOTE: The blower speed **MUST** be set to give the correct air temperature rise through the furnace as marked on the rating plate. See **Figure 13** for more information.

2. After 15 minutes of operation check the limit control function by blocking the return air grille(s).

After several minutes the main burners and pilot should go **OFF**. The circulating air blower should continue to run.

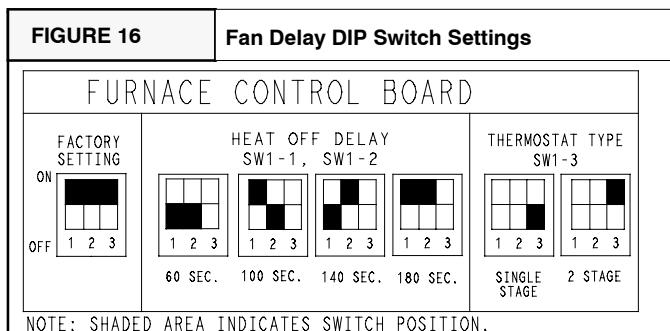
Remove air restrictions. Pilot and main burners should relight after a cool down period of a few minutes.

3. Adjust the thermostat setting below room temperature. Main burners and combustion air blower should go **OFF**.

The circulating air blower should continue to run for 60, 100, 140 or 180 seconds. This time is adjustable. See **Figure 16** for more information.

4. Set thermostat Heat-Cool selector to **OFF**.

FAN CONTROL CHECK



The Fan Control has adjustable settings for the circulating air blower to delay it "ON" and "OFF".

1. The Fan Control has a fixed "ON" delay of 45 seconds for low and 30 seconds for high stage, and a field adjustable "OFF" delay of 60, 100, 140 and 180 seconds. The "OFF" delay is factory set at 140 seconds.

Refer to **Figure 16** for proper DIP switch settings.

2. Operate the furnace and ensure that the blower turns **ON** and **OFF** at the appropriate time to provide the desired comfort level.

10. OPERATION

⚠ WARNING

ELECTRICAL SHOCK HAZARD.

Failure to follow this warning could result in personal injury or death.

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

TROUBLE SHOOTING

Models are factory equipped with the Comfort Alert™ Diagnostics device (refer to **Figure 17**) in the control box. Comfort Alert™ Diagnostics device provides compressor staging from low to high and high to low capacity. Comfort Alert™ Diagnostics device provides around-the-clock monitoring for common electrical problems, compressor defects, and broad system faults.

If trouble is detected, an alert code is displayed with a flashing LED indicator. Alert codes are listed in Figure 5. The device is factory wired and requires no modification. Low voltage lead wires are provided in the control box for connection to thermostat wires (use wire nuts). The Comfort Alert™ Diagnostics device must be powered to properly stage compressor to high capacity. Energizing the Y (Y1) terminal operates the compressor in low stage. Both the Y (Y1) and Y2 terminals must be energized for high stage operation. The Comfort Alert™ Diagnostics device operates by monitoring the compressor power leads and the thermostat demand signals Y (Y1) and Y2 terminals. It draws constant 24 VAC power at the R and C terminals. When the compressor is operating in low stage (Y or Y1), the 24v DC compressor solenoid coil is de-energized. When the compressor is operating in high stage (Y or Y1 and Y2), the 24v DC solenoid coil is energized.

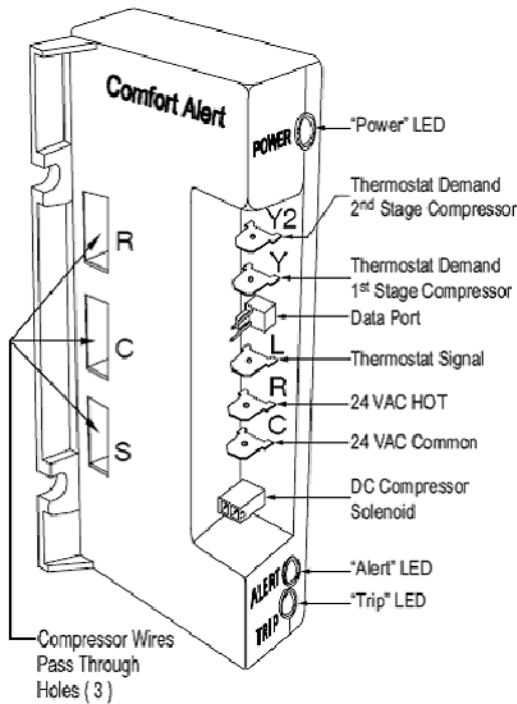
NOTE: There is a 5 sec delay from when Y2 gets energized to when the solenoid is energized.

The Comfort Alert™ Diagnostics is a passive device. This device will not shut down unit if it senses a fault.

The 24v DC plug that is connected to the compressor does NOT have an internal rectifier. **DO NOT INSTALL A PLUG WITH INTERNAL RECTIFIER.**

FIGURE 17

Comfort Alert™ Diagnostics



Status LED	Status LED Description	Status LED Troubleshooting Information
Green POWER	Module has power	Supply voltage is present at module terminals
Red TRIP	Thermostat demand signal Y is present, but the compressor is not running	<ol style="list-style-type: none"> Compressor protector is open Outdoor unit power disconnect is open Compressor circuit breaker or fuse(s) is open Broken wire or connector is not making contact Compressor contactor has failed open
Yellow "ALERT" Flash Code 1	Long Run Time Compressor is running extremely long run cycles	<ol style="list-style-type: none"> Low refrigerant charge Evaporator blower is not running Evaporator coil is frozen Faulty metering device Condenser coil is dirty Liquid line restriction (filter drier blocked if present in system) Compressor Second Stage Cooling Wiring <ul style="list-style-type: none"> Solenoid plug not connected/solenoid malfunction Comfort Alert failure Thermostat is malfunctioning
Yellow "ALERT" Flash Code 2	Internal Protector Trip	<ol style="list-style-type: none"> The internal motor protector has opened
Yellow "ALERT" Flash Code 3	Short Cycling Compressor is running only briefly	<ol style="list-style-type: none"> Thermostat demand signal is intermittent High pressure switch open Condenser coil poor air circulation (dirty, blocked, damaged) Condenser fan is not running Return air duct has substantial leakage Low pressure switch open
Yellow "ALERT" Flash Code 4	Locked Rotor	<ol style="list-style-type: none"> Run capacitor has failed Low line voltage (contact utility if voltage at disconnect is low, below 197v) Excessive liquid refrigerant in compressor Compressor bearings are seized
Yellow "ALERT" Flash Code 5	Open Circuit	<ol style="list-style-type: none"> Outdoor unit power disconnect is open Compressor circuit breaker or fuse(s) is open Compressor contactor has failed open Open circuit in compressor supply wiring or connections Unusually long compressor protector reset time due to extreme ambient temperature Compressor windings are damaged
Yellow "ALERT" Flash Code 6	Open Start Circuit Current only in run circuit	<ol style="list-style-type: none"> Run capacitor has failed Open circuit in compressor start wiring or connections Compressor start winding is damaged
Yellow "ALERT" Flash Code 7	Open Run Circuit Current only in start circuit	<ol style="list-style-type: none"> Open circuit in compressor run wiring or connections Compressor run winding is damaged
Yellow "ALERT" Flash Code 8	Welded Contactor Compressor continuously operates	<ol style="list-style-type: none"> Compressor contactor has failed closed Thermostat demand signal not connected to module
Yellow "ALERT" Flash Code 9	Low Voltage Control circuit < 17 VAC	<ol style="list-style-type: none"> Control circuit transformer is overloaded Low line voltage (contact utility if voltage at disconnect is low)

Flash Code number corresponds to a number of LED flashes, followed by a pause and then repeated. TRIP and ALERT LEDs flashing at same time means control circuit voltage is too low for operation. Reset ALERT Flash code by removing 24VAC power from module. Last ALERT Flash code is displayed for 1 minute after module is powered on.

Comfort Alert™
Diagnostics

332841-201 REV A

COMBUSTION/INDOOR FAN CONTROL

All functions of the combustion and indoor blower are controlled by the ignition control board and interface board.

On a call for heat:

The ignition control energizes the combustion blower on high speed. Once the combustion air proving switch closes, the ignition sequence begins. The ignition control will sense when the main (low stage) operator of gas valve has been energized thereby firing the burners and starting the "delay on" timing sequence of the indoor blower. After sensing flame, stage of heat is adjusted according to thermostat.

NOTE: If the control senses that one of the safety limits has opened, the combustion and indoor fans will operate until the limit resets.

On a call for cooling:

The fan interface control board starts the indoor blower on full speed immediately or after a 30 second delay (field-selectable). Once the thermostat is satisfied, the fan control will operate the blower for 0 or 90 additional seconds (field-selectable). Refer to Cooling Delay on page 15.

11. MAINTENANCE

MONTHLY MAINTENANCE AND INSPECTION CHECKS

Air Filters

⚠ CAUTION

REDUCED EQUIPMENT LIFE HAZARD

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

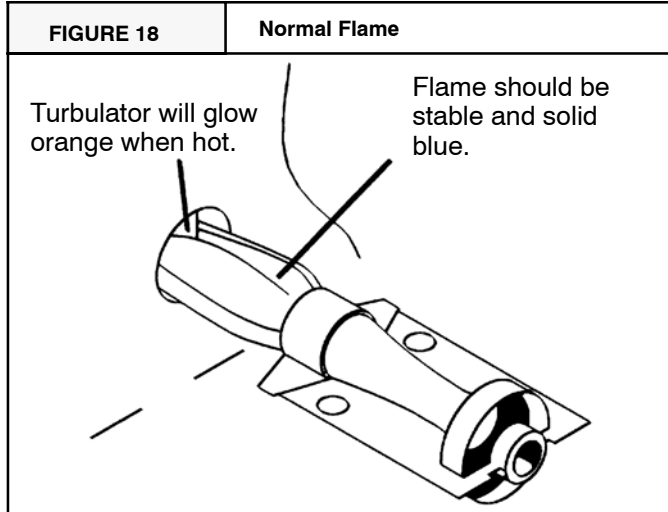
Do not operate the unit without a filter.

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

HEATING SEASON CHECKS (MONTHLY)

Main Burner Flame

Flames should be stable and solid blue, (dust may cause orange tips or they may have wisps of yellow, but they **MUST** not have solid yellow tips). They should extend directly into the heat exchanger tubes and the turbulators should glow orange (after about five minutes of operation). Main burner flame should be inspected monthly.



Using a light and mirror (as required) inspect the inside of the vent hood and the inlet air opening in the burner compartment. Look for soot and severe rust or corrosion and any obstructions due to leaves, spiderwebs, etc. Clean as required.

COOLING SEASON CHECKS (MONTHLY)

Condenser Coil

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

Condensate Drain

Check for condensate drainage. Clean as required.

ANNUAL MAINTENANCE AND INSPECTION

⚠ WARNING

ELECTRICAL SHOCK HAZARD.

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

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

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

Condenser Fan Motor

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



CAUTION

BURN HAZARD.

Failure to follow this caution may result in personal injury.

Flue cover may be hot! Allow adequate time for flue cover to cool.

BLOWER MOTOR ACCESS

Refer to **Figure 19** for a view of blower motor and compartment.

1. Remove the blower access panel
2. Remove the three screws securing the blower motor housing. If unit has a support bracket, remove the two screws securing the bracket.
3. Remove the two red wires attached to the limit switch.

Motor removal and replacement

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

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

Circulating Air Blower

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

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

Burners / Heat Exchangers / Flue Gas Passages

To inspect the burners, heat exchanger and interior flue gas passages, use a light and small mirror on an extension handle.

Check the exterior of the heat exchanger and the interior flue gas passages for any evidence of deterioration due to corrosion, cracking or other causes. If signs of scaling or sooting exist, remove the burners and clean the heat exchanger, as required.

INSPECTION AND CLEANING OF BURNER ASSEMBLY/HEAT EXCHANGERS/FLUE GAS PASSAGES

For Qualified Service Technician Only

See **Figure 19** for identification of parts.

1. Disconnect electrical power to unit.
2. Turn **OFF** gas at manual shut off valve.
3. Remove burner access panel.
4. Remove the vent assembly flue pipe.
5. Disconnect gas pipe at union.

6. Disconnect wires from gas valve, note connections.
7. Remove screws that secure the flame shield and remove gas control valve, manifold and burners as an assembly.
8. Remove collector box, injector plate, and restrictor plate, including gaskets.
9. Hold the burner assembly vertically and lightly tap it against a wood block. Clean also with a stiff brush. Severe cases of lint clogging may require washing the burners in hot water.
10. Clean flue gas passages by using small brushes and a vacuum cleaner. It may be necessary to fabricate handle extensions for the brushes to reach the areas that require cleaning. Reinspect after cleaning and replace the heat exchanger if defective.
11. Reinstall parts and gaskets in reverse order. On direct spark models check the spark gap. $\frac{1}{8}$ inch is required between the spark electrodes.
12. Turn gas on and check for leaks.
13. Install all access panels, turn power on and check for normal operation.

REFRIGERANT CIRCUIT

For Qualified Service Technician Only

Annually inspect all refrigerant tubing connections and the unit base for oil accumulations. Detecting oil generally indicates a refrigerant leak.

WARNING

FIRE AND EXPLOSION HAZARD.

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

System under pressure. Relieve pressure and recover all refrigerant before system repair or final unit disposal. Use all service ports and open all flow control devices, including solenoid valves.

If oil is detected or if low cooling performance is suspected, leak-test all refrigerant tubing using an electronic leak detector, halide torch, or liquid-soap solution.

FIGURE 19

Component Locations

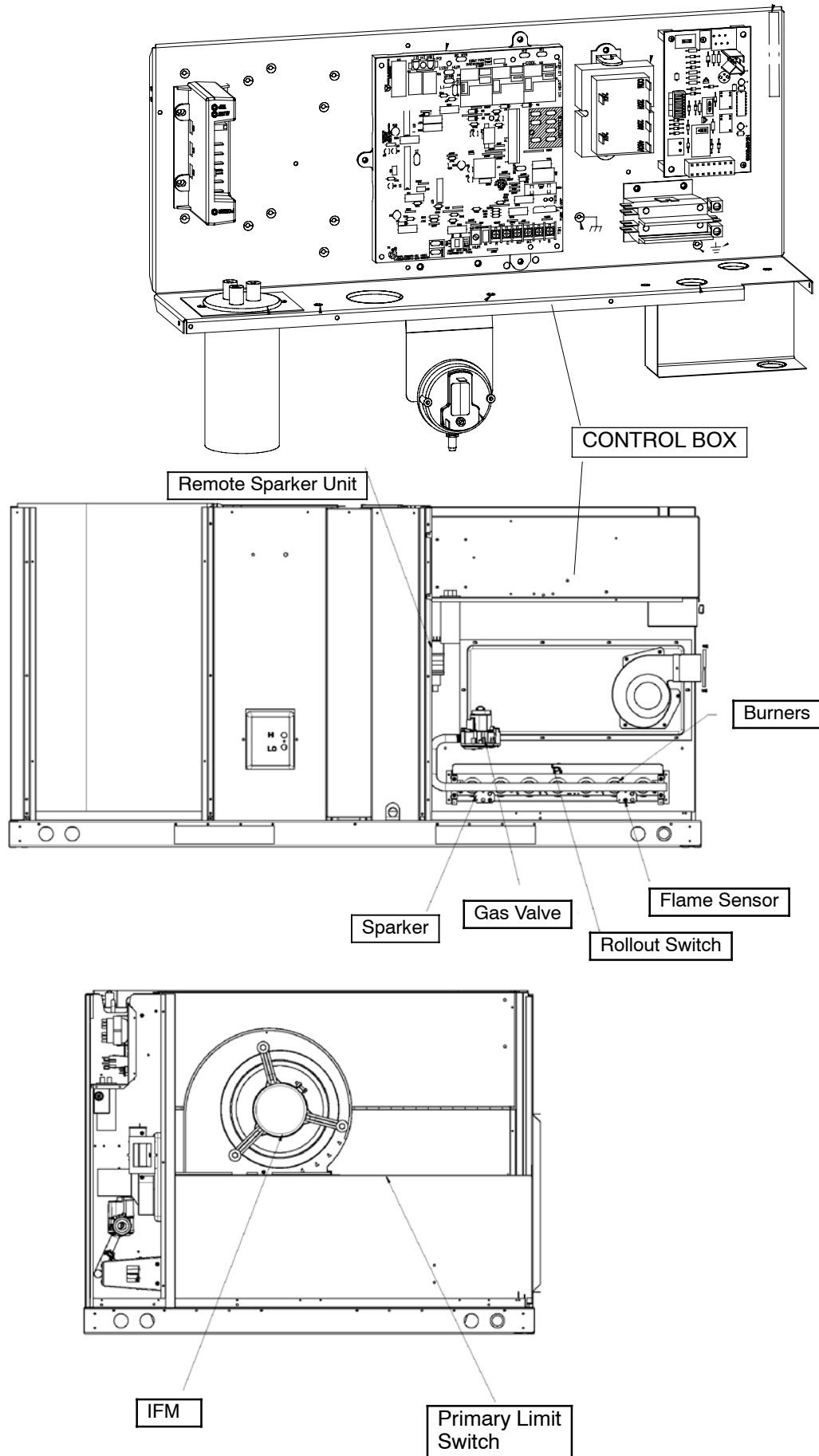


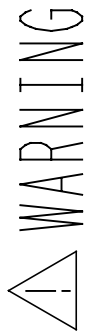
FIGURE 20

Rigging Instructions

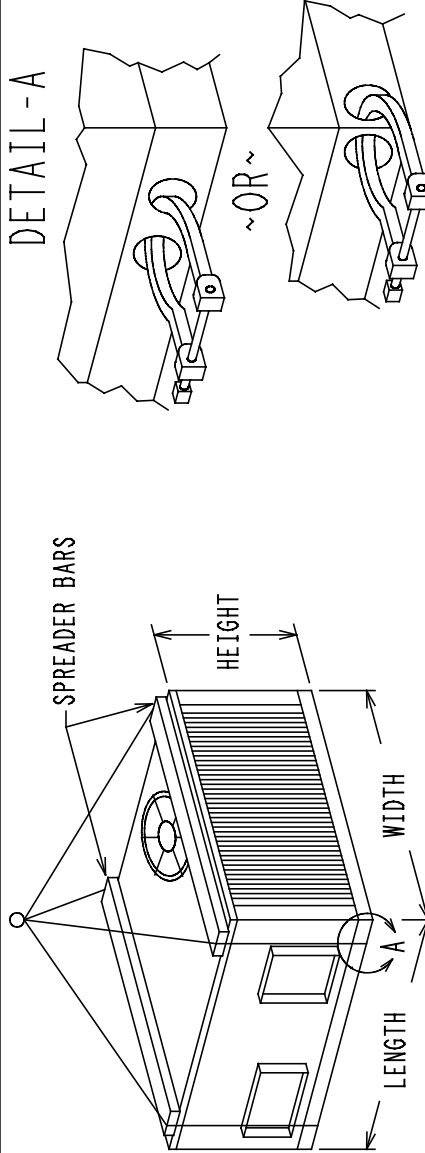
50CY501872

RIGGING INSTRUCTIONS

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



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



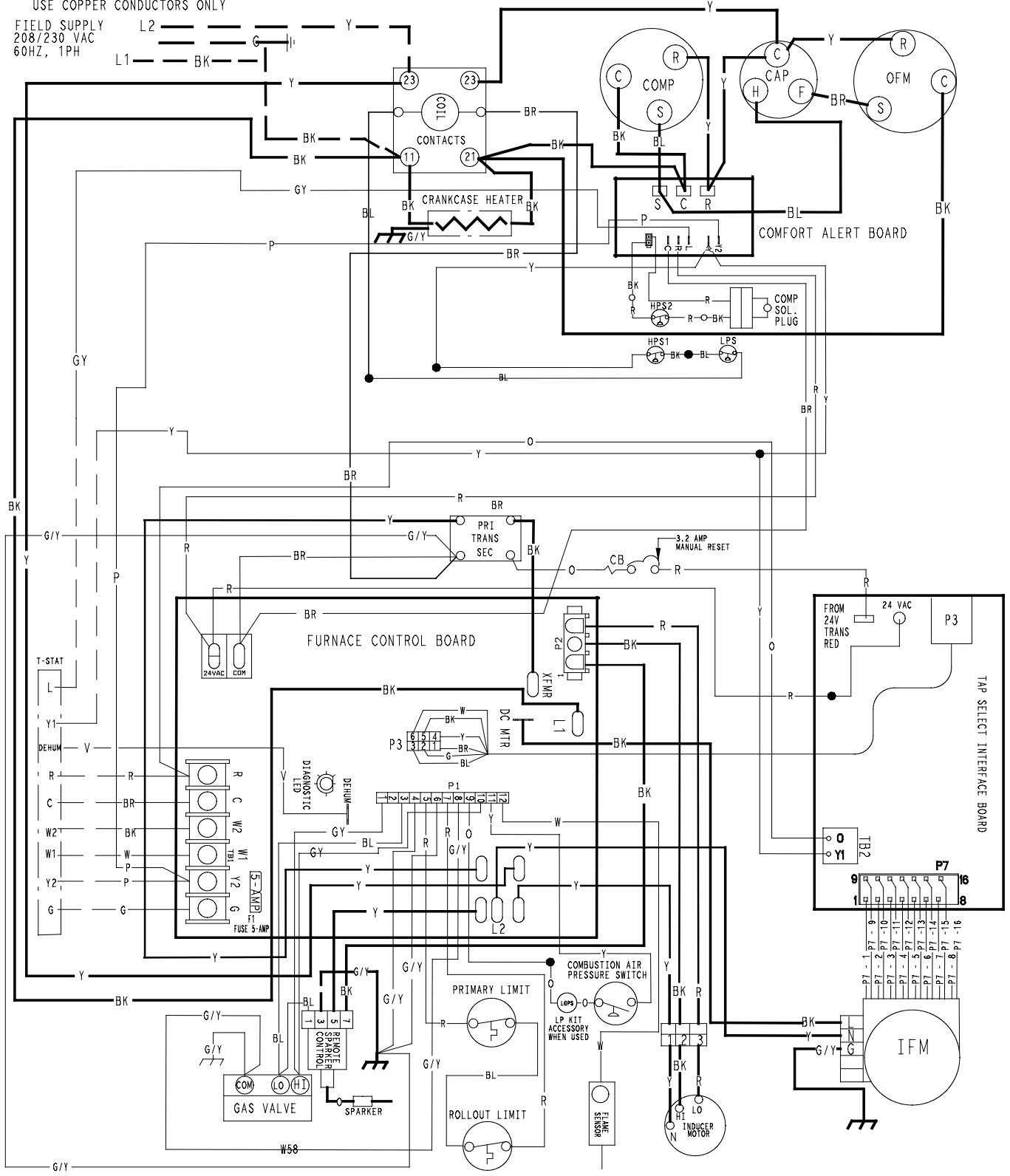
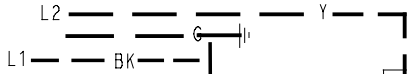
CABINET	MAX. LENGTH		MAX. WIDTH		MAX. HEIGHT		MAX. WEIGHT	
	IN	MM	IN	MM	IN	MM	LB	KG
SMALL	52.00	1219	48.00	1219	38.00	965	500	227
LARGE	73.00	1854	48.00	1219	44.00	1118	680	308

All Models Wiring Diagram

CONNECTION WIRING DIAGRAM

USE COPPER CONDUCTORS ONLY

FIELD SUPPLY
208/230 VAC
60HZ, 1PH



IF ANY OF THE ORIGINAL WIRE AS SUPPLIED WITH THE APPLIANCE MUST BE REPLACED, IT MUST BE REPLACED WITH TYPE AWM-105°C OR ITS EQUIVALENT. SEE INSTALLATION INSTRUCTIONS FOR PROPER HEATING AND COOLING CONNECTIONS FOR YOUR UNIT. INDOOR FAN MOTOR PLUGS- "Do Not Disconnect Under Load"

- LINE VOLTAGE FACTORY
- LOW VOLTAGE FIELD
- LOW VOLTAGE FACTORY
- LINE VOLTAGE FIELD
- INTERNAL CIRCUIT BOARD WIRING

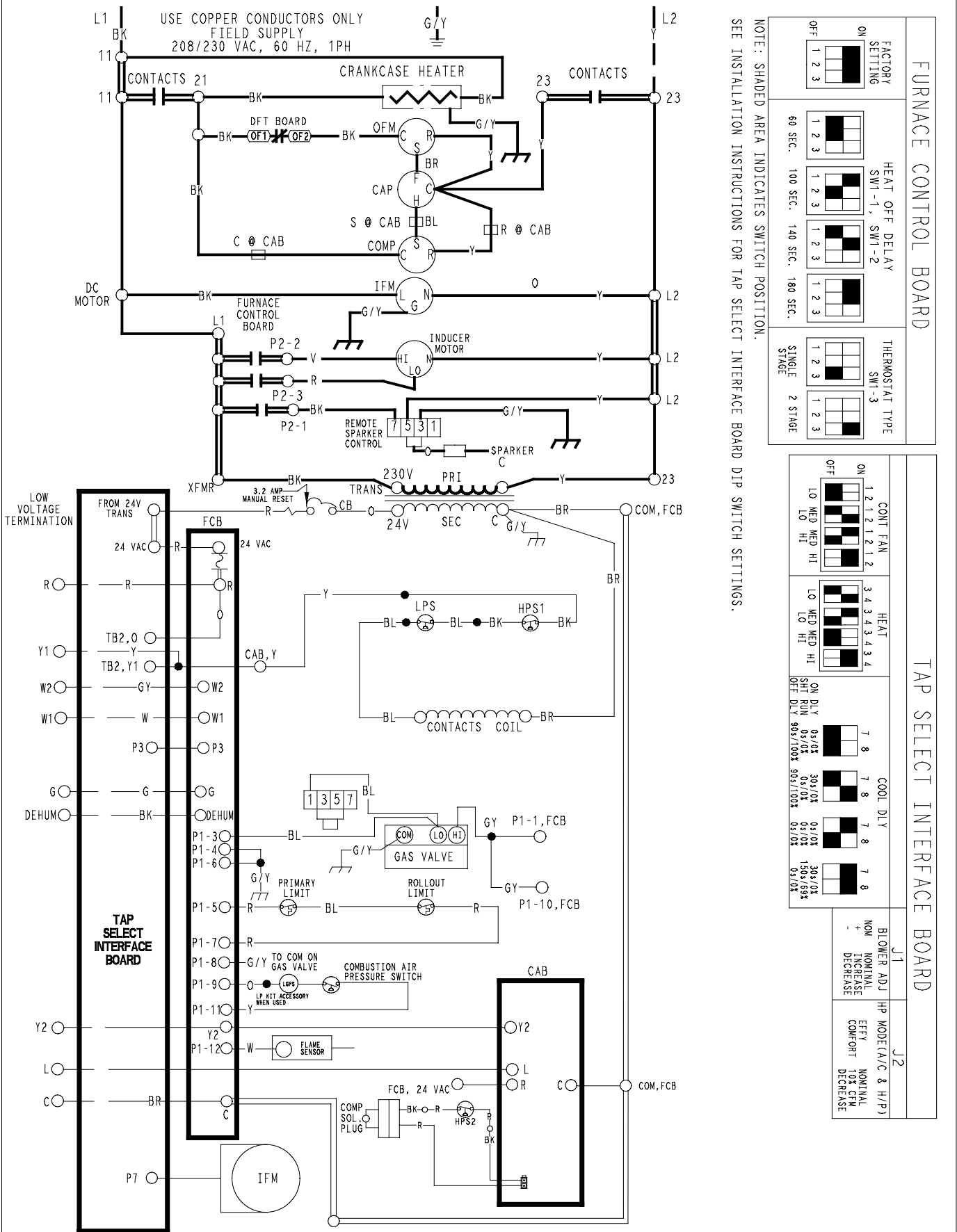
COLOR CODE :	BLACK BK	GREEN G	WHITE W
	BLUE BL	ORANGE O	YELLOW Y
	BROWN BR	RED R	
	GRAY GY	VIOLET V	
	PINK P	GRN & YEL G/Y	

- COMP = COMPRESSOR
- SOL. = SOLENOID
- CAP = CAPACITOR
- IFM = INDOOR FAN MOTOR
- PRI = PRIMARY
- SEC = SECONDARY
- DH = DEHUMIDIFIER
- CB = CIRCUIT BREAKER
- FCB = FURNACE CONTROL BOARD

- OFM = OUTDOOR FAN MOTOR
- HPS = HIGH PRESSURE SWITCH
- LPS = LOW PRESSURE SWITCH
- CAB = COMFORT ALERT BOARD
- DFT = DEFROST
- CONT = CONTINUOUS
- DH = DEHUMIDIFIER
- LLS = LIQUID LINE SOLENOID
- LGPS = LOW GAS PRESSURE SWITCH

All Models Wiring Diagram

LADDER WIRING DIAGRAM



NOTE: SHADED AREA INDICATES SWITCH POSITION.
SEE INSTALLATION INSTRUCTIONS FOR TAP SELECT INTERFACE BOARD DIP SWITCH SETTINGS.

FACTORY SETTING		HEAT OFF DELAY		THERMOSTAT TYPE	
ON	OFF	SWT-1	SWT-2	SWT-3	
1 2 3	1 2 3	1 2 3	1 2 3	1 2 3	1 2 3
60 SEC.	100 SEC.	140 SEC.	180 SEC.	SINGLE STAGE	2 STAGE

CONT. FAN		HEAT		COOL. DLY		BLOWER ADJ	
ON	OFF	LO	MED	MED	HI	+	-
1 2 1 2 1 2 1 2	1 2 1 2 1 2 1 2	3 4 3 4 3 4 3 4	3 4 3 4 3 4 3 4	7 8	7 8	7 8	7 8
ON DLY	OFF DLY	0.5/0.5	0.5/0.5	0.5/0.5	0.5/0.5	0.5/0.5	0.5/0.5
0.5/0.5	0.5/0.5	0.5/0.5	0.5/0.5	0.5/0.5	0.5/0.5	0.5/0.5	0.5/0.5

DANGER: ELECTRICAL SHOCK HAZARD DISCONNECT POWER BEFORE SERVICING 50CY501725 5.0