INSTALLATION MANUAL

OIL-FIRED WARM AIR FURNACE

P3DHX12F08001 P2DHX16F12001

(Downflow or Horizontal Models)

P2LBX16F14501 P4LBX20F19001

(Lowboy Models)

CONTENTS

Read this manual completely before beginning installation.

Important: These instructions must be kept with the furnace for future reference.

⚠WARNING

IMPROPER INSTALLATION MAY CREATE A CONDITION WHERE THE OPERATION OF THE PRODUCT COULD CAUSE PERSONAL INJURY OR PROPERTY DAMAGE.

IMPROPER INSTALLATION, ADJUSTMENT, ALTERATION, SERVICE OR MAINTENANCE CAN CAUSE INJURY OR PROPERTY DAMAGE. REFER TO THIS MANUAL FOR ASSISTANCE OR ADDITIONAL INFORMATION, CONSULT A QUALIFIED INSTALLER, SERVICE AGENCY OR THE FUEL SUPPLIER.

⚠CAUTION

THIS PRODUCT MUST BE INSTALLED IN STRICT COMPLIANCE WITH THESE INSTALLATION INSTRUCTIONS AND ANY APPLICABLE LOCAL, STATE, AND NATIONAL CODES INCLUDING BUT NOT LIMITED TO: BUILDING, ELECTRICAL AND MECHANICAL CODES.

⚠WARNING

The furnace area must not be used as a broom closet or for any other storage purposes, as a fire hazard may be created. Never store items such as the following on, near or in contact with the furnace:

1. Spray or aerosol cans, rags, brooms, dust mops, vacuum cleaners or other cleaning tools.
2. Soap powders, bleaches, waxes or other cleaning compounds; plastic items or containers, gasoline, kerosene, cigarette lighter fluid, dry cleaning fluids, or other volatile fluids.
3. Paint thinners or other painting materials and compounds.
4. Paper bags, boxes, or other paper or cardboard products.

Never operate the furnace with the blower door removed. To do so could result in serious personal injury and/or equipment damage.

⚠WARNING

DO NOT USE GASOLINE, CRANKCASE OIL, OR ANY OTHER OIL CONTAINING GASOLINE AS A FUEL FOR THIS FURNACE.

INTRODUCTION

Please read these instructions completely and carefully before installing and operating the furnace.

The furnace must be installed and set up by a qualified contractor.

Model **P3DHX12F08001** is an oil fired forced air multi-positional furnace, with an output capacity range of 60,000 BTU/Hr. to 90,000 BTU/Hr. Model **P2DHX16F12001** is an oil fired forced air multi-positional furnace, with an output capacity range of 91,000 BTU/Hr. to 128,000 BTU/Hr. These models may be installed in the down-flow position, as well as both horizontal positions.

Model **P2LBX16F14501** is a rear-breech lowboy model with an output range of 130,000 to 143,000 BTUH. Model **P4LBX20F19001** is a rear-breech lowboy model with an output range of 168,000 to 188,000 BTUH.

All models are listed with the *Canadian Standards Association*, (CSA), and comply with the standards of both the United States and Canada for use with No. 1 (Stove) and No. 2 (Furnace) Oil.

In the United States, the installation of the furnace and related equipment shall be installed in accordance with the regulations of NFPA No. 31, *Installation of Oil Burning Equipment*, as well as in accordance with local codes.

In Canada, the installation of the furnace and related equipment shall be installed in accordance with the regulations of CAN/CSA - B139, *Installation Code For Oil Burning Equipment*, as well as in accordance with local codes.

When installation or application questions arise, regulations prescribed in the National Codes and Local Regulations take precedence over the general instructions provided with this installation manual. When in doubt, please consult your local authorities.

All P*DHX models are shipped assembled, pre-wired, ready for down-flow operation. P*DHX furnace models are air conditioning ready. The furnace should be carefully inspected for damage when being unpacked.

The P2LBX16F14501 model is shipped assembled, pre-wired, and ready for lowboy furnace applications. The P2LBX16F14501 model is air conditioning ready.

The P4LBX20F19001 is shipped in two pieces, a furnace section and a blower section, and must be assembled at the installation site. Some field wiring is required. The P4LBX20F19001 is shipped as a heating only furnace; however, air conditioning may be added with the addition of field-installed controls.

HEAT LOSS

To determine the correct furnace and firing rate for an application, it is necessary to calculate the maximum hourly heat loss of the building based on local design conditions. In new construction, the heat loss should be calculated on a room-by-room basis to enable proper sizing of the trunk and branch ductwork. In retrofit applications, a building shell (overall) heat loss calculation may be used.

In the United States, Manual J. titled, "Load Calculation" published by the Air Conditioning Contractors of America, (ACCA), describes a suitable procedure for calculating the maximum hourly heat loss.

In Canada, the maximum hourly heat loss may be calculated in accordance with the procedures described in the manuals of the Heating, Refrigeration and Air Conditioning Institute (HRAI), or by other method prescribed by authorities having jurisdiction that are suitable for local conditions.

LOCATION OF UNIT

The furnace should be located such that the flue connection to the chimney is short, direct and consists of as few elbows as possible. When possible, the unit should be centralized with respect to the supply and return air ductwork. A central location minimizes the trunk duct sizing.

Minimum installation clearances are listed in Table 1.

NOTE: The recommended installation clearances do not necessarily take into consideration the clearances necessary to replace the air filter or perform other routine maintenance.

Table 1: Clearance to Combustibles

Furnace	P2LBX	P3DHX12F08001		P2DHX16F12001	
Location	Upflow	Downflow	Horizontal	Downflow	Horizontal
Top	3 in.	0 in.	6 in.	0 in.	3 in.
Bottom	0 in.	0 in.	1 in.	1 in.	1 in.
S/A Plenum	0 in.	1 in.	1 in.	1 in.	3 in.
Rear	1 in.[1]	1 in.	1 in.	1 in.	1 in
Sides	6 in.[2]	1 in.	1 in.	1 in.	0 in.
Front	24 in.	6 in.[1]	24 in.	16 in.[1]	24 in.
Flue Pipe	9 in.[3]	9 in.[3]	9 in.[3]	9 in.[3]	9 in.[3]
Enclosure	Standard	Closet	- - -	Closet	Alcove

[1] 24 inches is required for servicing.
[2] 18 inches is required on one side as service access to rear.
[3] 18 inches required in some U.S. jurisdictions

DOWN-FLOW INSTALLATION

All P*DHX furnace models have been assembled for installation in the down-flow position. Maintain all clearances to combustibles as outlined in Table 1. P*DHX models have available sub-bases for installations on combustible floors. The sub-bases provide a means of effectively mating the supply air plenum with the furnace, and providing the necessary one-inch clearance to combustibles around the supply air plenum.

HORIZONTAL INSTALLATION

P*DHX furnaces models may be installed in either of the horizontal positions; warm air discharging left or warm air-discharging right by following these steps:

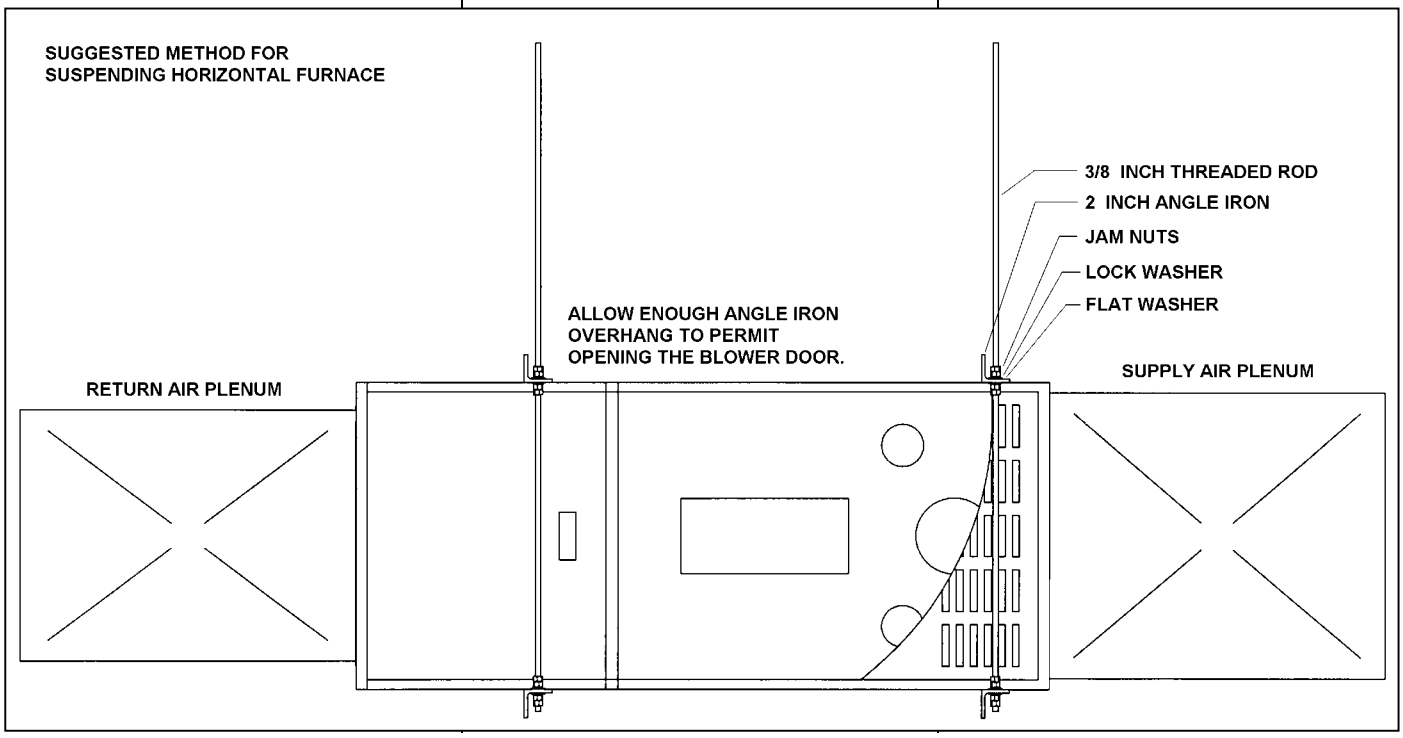
1. Rotate the furnace 90° to the desired position.
2. Remove the three nut and washer sets fastening the oil burner assembly to the furnace. Rotate the oil burner assembly to be in the normal upright position.
3. Re-align the oil burner assembly to the combustion chamber (fire-pot), and then secure into place with the three nut and washer sets.

IMPORTANT: Model P3DHX12F08001 has an auxiliary limit control that must be in the upper position. Be sure that the auxiliary limit control is above the oil burner assembly.

NON-SUSPENDED INSTALLATION

Maintain clearances to combustibles as outlined in Table 1. Installation on a combustible floor requires a clearance of 1 inch. This can be done by using a non-combustible material such as one inch thick channel iron or similar material. The furnace must be supported in such a way as to not allow twisting or sagging of the cabinet. Suggestion; as a measure to prevent fuel oil from accumulating in locations other than the fire pot, as could be the case in the event of nozzle drip, install the furnace with an approximate 2 degree slope from the oil burner casing towards the fire pot. Use shims made of noncombustible material.

Fig. 1: Typical Suspended Application



SUSPENDED INSTALLATION

Refer to Figure 1. Maintain clearances to combustibles as outlined in Table 1. The furnace may be suspended by field fabricating a cradle of angle iron and threaded rod. Secure the furnace with 2 inch minimum slotted angle or equivalent, as shown in Figure 1. The furnace must be supported in such a way as to not allow twisting or sagging of the cabinet. Position the supports so as to not interfere with accessing the burner and blower compartments. Suggestion; as a measure to prevent fuel oil from accumulating in locations other than the fire pot, as could be the case in the event of nozzle drip, install the furnace with an approximate 2 degree slope from the oil burner casing towards the fire pot.

AIR CONDITIONING

If the furnace is used in conjunction with air conditioning, the furnace shall be installed in parallel with or upstream from the evaporator coil to avoid condensation in the heat exchanger. In a parallel installation, the dampers or air controlling means must prevent chilled air from entering the furnace. If the dampers are manually operated, there must be a means of control to prevent the operation of either system unless the dampers are in the full heat or full cool position. The air heated by the furnace shall not pass through a refrigeration unit unless the unit is specifically approved for such service.

Generally, a six-inch clearance between the air conditioning evaporator coil and the heat exchanger will provide adequate airflow through the evaporator coil.

The blower speed must be checked and adjusted to compensate for the pressure drop caused by the evaporator coil. Refer to Appendix B for recommended wiring and electrical connections of the air conditioning controls.

COMBUSTION AIR

When a furnace is installed in the full basement of a typical frame or brick house, infiltration is normally adequate to provide air for combustion and draft operation. If the furnace is installed in a closet or utility room, two (2) ventilation openings must be provided connecting to a well ventilated space (full basement, living room or other room opening thereto, but not a bedroom or bathroom). One opening shall be located 6" from the top and bottom of the enclosure at the front of the furnace. For furnaces located in buildings of unusually tight construction, such as those with high quality weather stripping, caulking, windows and doors, or storm sashed windows, or where basement windows are well sealed, a permanent opening communicating with a well ventilated attic or with the outdoors shall be provided, using a duct if necessary. Size all of the openings and associated ductwork by the standards provided in the latest Oil Installation Code editions; NFPA 31 in the United States, CAN/CSA B139 in Canada. Take all fuel burning appliances in the area into consideration when calculating combustion and ventilation air requirements.

The Model CAS-2B-90E Furnace Boot manufactured by Field Controls, Inc. may be used with the furnace to obtain combustion air directly from outdoors. Use of this device does not alter the need for ventilation air; however, it does provide a good direct source of combustion air and is connected directly to the oil burner.

CHIMNEY VENTING

The chimney must be sized correctly and be in good repair. If the chimney is oversized, there is a high risk of the flue gases condensing resulting in damage to the chimney and other venting parts. This problem may be corrected by the use of an appropriately sized chimney liner.

If the chimney serves the P3DHX12F08001 furnace only, the vent should be sized at 4-inch minimum, 5-inch maximum. If the chimney serves the P2DHX16F12001 or P2LBX16F14501 furnace only, the vent should be sized at 4-inch minimum, 6-inch maximum. If the chimney serves the P4LBX20F19001 furnace only, the vent should be sized at 5-inch minimum, 7-inch maximum. The data provided in Table 3 is based on dedicated venting. If the furnace is to be co-vented with other appliances, refer to NFPA 211, *Standard for Chimneys, Fireplaces, Vents, and Solid Fuel-Burning Appliances,* NFPA 31, *Standard for the Installation of Oil Burning Equipment* or CAN/CSA B139, *Installation Code For Oil Burning Equipment* for correct sizing information.

NOTE: This furnace is approved for use with L-Vent.

NOTE: Maximum temperature for L-Vent is 575°F (300°C).

IMPORTANT: The chimney must be capable of providing sufficient draft at all times for the safe removal of the products of combustion.

The chimney should be tested under "winter" conditions; doors and windows closed, all other fossil fuel burning appliances on, clothes dryer on, bathroom fans on, etc. If the chimney cannot overcome the competition for air, it will be necessary to access the reason for it, and take corrective action. If the chimney is found to be sized correctly and in good repair, it will probably be necessary to re-evaluate the availability of combustion and ventilation air, and take corrective action.

The flue pipe should be as short as possible with horizontal pipes sloping upward toward the chimney at a rate of one-quarter inch to the foot. The flue pipe should not be smaller in cross sectional area than the flue collar on the furnace. The flue pipe may be reduced in size to fit a smaller diameter chimney with the use of a tapered reducer fitting at the chimney inlet. The flue pipe should connect to the chimney such that the flue pipe extends into, and terminates flush with the inside surface of the chimney liner. Seal the joint between the pipe and the lining. The chimney outlet should be at least two feet above the highest point of a peaked roof. All unused chimney openings should be closed. Chimneys must conform to local, provincial or state codes, or in the absence of local regulations, to the requirements of the National Building Code.

See Figure 2 and Table 2 for common chimney problems and their remedies.

⚠CAUTION

THE FURNACE MUST BE CONNECTED TO A FLUE HAVING SUFFICIENT DRAFT AT ALL TIMES TO ENSURE SAFE AND PROPER OPERATION OF THE APPLIANCE.

The flue pipe must not be routed through concealed space, because it must be visually checked for signs of deterioration during the annual inspection and servicing. The flue pipe must not pass through any floor or ceiling, but may pass through a wall where suitable fire protection provisions have been installed. In the United States, refer to the latest edition of NFPA 31 for regulations governing the installation of oil burning equipment. In Canada, refer to the latest edition of CAN/CSA B139 for rules governing the installation of oil burning equipment.

Fig. 2: Common Chimney Problems

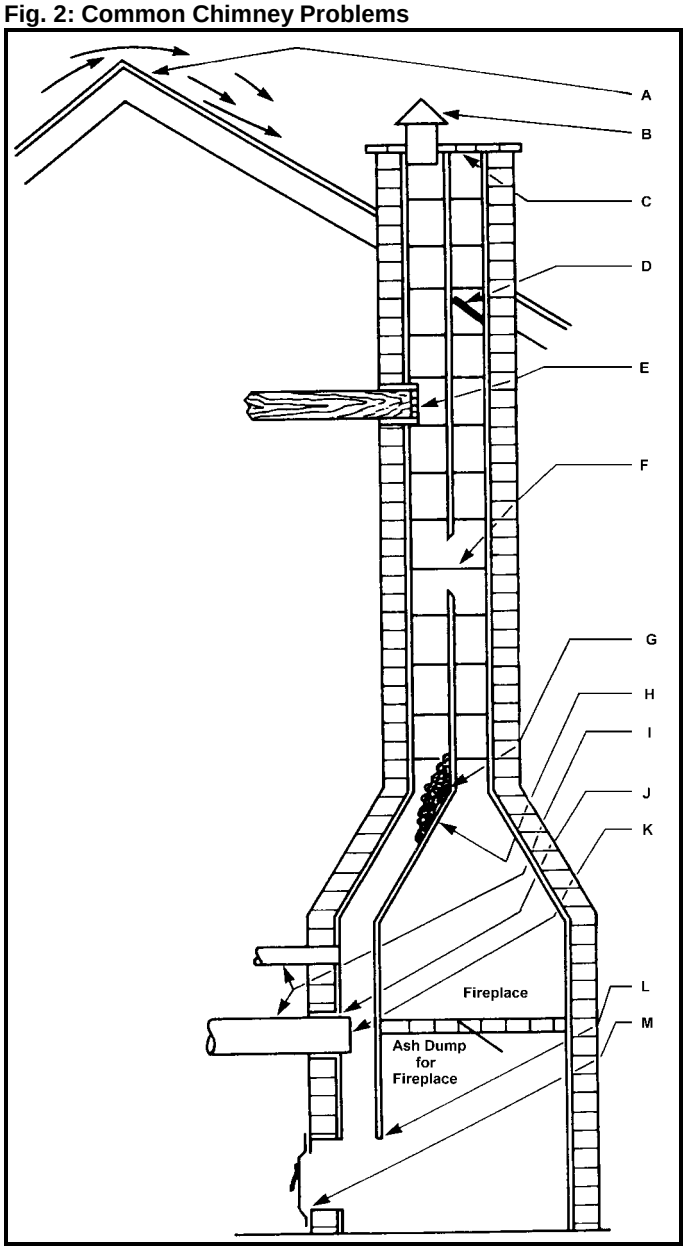


Table 2: Common Chimney Problems

Refer to Figure 2			
Key	Trouble	Diagnostic	Remedy
A	Top of chimney lower than surrounding objects	Observation	Extend chimney above all surrounding objects within 30 feet.
B	Chimney Cap or ventilator.	Observation	Remove
C	Coping restricts opening.	Observation	Make opening as large as inside of chimney.
D	Obstruction in chimney	Can be found by light and mirror reflecting conditions in chimney.	Use weight to break and dislodge.
E	Joist protruding into chimney.	Lowering a light on an extension cord.	Must be handled by competent masonry contractor.
F	Break in chimney lining.	Smoke test - build smudge fire blocking off other opening, watching for smoke to escape.	Must be handled by competent masonry contractor.
G	Collection of soot at narrow space in flue opening.	Lower light on extension cord.	Clean out with weighted brush or bag of loose gravel on end of line.
H	Offset	Lower light on extension cord.	Change to straight or to long offset.
I	Two or more openings to the same chimney.	Found by inspection from basement.	The least important opening must be closed, using some other chimney flue.
J	Loose-seated pipe in flue opening.	Smoke test.	Leaks should be eliminated by cementing all pipe openings.
K	Smoke pipe extends into chimney.	Measurement of pipe from within or observation of pipe by means of a lowered light.	Length of pipe must be reduced to allow end of pipe to be flush with inside of tile.
L	Failure to extend the length of flue partition to the floor.	By inspection or smoke test.	Extend partition to floor level.
M	Loose-fitted clean-out door.	Smoke test.	Close all leaks with cement.

DRAFT REGULATOR CONTROL

This device is used in conjunction with conventional chimney venting. This control (or draft regulator) automatically maintains a constant negative pressure in the furnace to obtain maximum efficiency. It ensures that proper pressures are not exceeded. If the chimney does not develop sufficient draft, the draft control cannot function properly. The draft regulator, must be installed within the same room or enclosure as the furnace, and should not interfere with the combustion air supplied to the burner. The control should be located a minimum of 3 flue pipe diameters from the furnace breeching and installed in accordance to the instructions supplied with the regulator.

Table 3: Minimum Chimney Base Temperatures (°F)

Nozzle	Chimney Height (ft.)			
	11	20	28	36
Chimney Thermal Resistance < R6				
0.50	300	400	535	725
0.65	275	340	430	535
0.75	260	320	380	475
0.85	250	300	355	430
1.00	245	300	355	430
1.10	245	290	345	400
1.20	240	275	320	365
1.50	240	275	320	365
1.65	235	270	300	345
Nozzle	Chimney Height (ft.)			
	11	20	28	36
Chimney Thermal Resistance > R6				
0.50	185	200	220	250
0.65	175	185	205	220
0.75	175	185	195	210
0.85	165	185	195	205
1.00	165	185	195	205
1.10	165	185	195	205
1.20	165	180	190	200
1.50	165	175	185	195
1.65	165	175	180	190
< - less than, > - greater than				

OIL TANK

Oil storage tanks must be selected and installed in compliance with applicable codes; in the United States, NFPA 31, *Standard for the Installation of Oil Burning Equipment*, Chapter 2. and in Canada, CAN/CSA-B139, *Installation Code for Oil Burning Equipment*, Section 6. Observe all local codes and by-laws.

In general, the oil tank must be properly supported and remain stable in both empty and full condition. The oil tank must be fitted with vent and supply pipes to the outdoors. Refer to the above-mentioned codes for sizing. The vent pipe must be no less than 1¼ inches I.P.S., and terminate with an appropriate vent cap in a location where it will not be blocked. The fill pipe must be no less than 2 inches I.P.S., and terminate with an appropriate cap in a location where debris will not enter the fill pipe during oil delivery.

If located indoors, the tank should normally be in the lowest level, (cellar, basement, etc.). It must be equipped with a shut-off valve at the tank outlet used for the oil supply. The oil tank must be located as to not block the furnace / room exit pathway. Observe all clearances specified in the above-mentioned codes.

PIPING INSTALLATION

In the United States, NFPA 31, Standard for the Installation of Oil Burning Equipment, Chapter 2.

In Canada, the entire fuel system should be installed in accordance with the requirements of CAN/CSA B139, and local regulations. Use only approved fuel oil tanks piping, fittings and oil filters.

Ensure that all fittings used in a copper oil line system are high quality flare fittings. Do not use compression fittings.

Do not use Teflon tape on any fittings.

Pressurized or gravity feed installations must not exceed 3 PSIG. Pressures greater than 10 PSIG may cause damage to the shaft seal. If the height of the oil stored in a tank above the oil burner exceeds 11½ feet, it may be necessary to use a pressure-regulating device approved for this purpose.

The furnace may be installed with a one-pipe system with gravity feed or lift. The maximum allowable lift on a single line system is 8 feet. Lift should be measured from the bottom (outlet) of the tank, to the inlet of the burner. Sizing a single line system is complex because of the difficulty estimating the pressure drop through each fitting, bend and component in the line. In general, keep single line systems short as possible. 2-stage oil pumps are not available for either the P*HMX or P*LBX furnaces. The following chart shows the allowable line lengths (horizontal + vertical) for single and two-line oil piping systems. All distances are in feet.

Table 4: Oil Lines

Copper Tubing Oil Line Length (Feet)				
Lift (Feet)	Single-Pipe		Two-Pipe	
	⅜" OD	½" OD	⅜" OD	½" OD
0	53	100	68	100
1	49	100	65	100
2	45	100	63	100
3	41	100	60	100
4	37	100	58	100
Continue				
5	33	100	55	100
6	29	100	53	100
7	25	99	50	100
8	21	83	48	100
9	17	68	45	100
10	13	52	42	100
12	- - -	- - -	37	100
14	- - -	- - -	32	100
16	- - -	- - -	27	100
18	- - -	- - -	22	88

In retrofit applications, where an existing oil line system is in place, a vacuum check will help determine the efficacy of the existing oil line system The vacuum in a system should not exceed 6" Hg. for a single pipe system, nor 12" Hg. for a two-pipe system.

NOTE: The oil burner requires the use of a bypass plug when converting from single-pipe to two-pipe oil piping systems. See burner manufacturer's instructions.

All fuel systems should include an oil filter between the fuel oil storage tank and the oil burner. For best results, install the oil filter as close to the burner as possible. When using an indoor oil tank, the oil filter may be installed at the tank downstream from the shut-off valve. If firing the furnace under the 0.65 gph rate, a 7 to 10 micron line filter should be installed as close to the oil burner as possible.

ELECTRICAL CONNECTIONS

The furnace is listed by the Canadian Standards Association (CSA). All models except for the P4LBX20F19001 are factory wired and require minimal field wiring. The P4LBX20F19001 model is prewired except for the wiring connections to the blower motor. The wires from the furnace section are routed through the grommet in the blower section blower division panel, and then connected to the blower motor. In the United States, the wiring must be in accordance with the National Fire Protection Association NFPA-70, National Electrical Code, and with local codes and regulations. In Canada, all field wiring should conform to CAN/CSA C22.1 Canadian Electrical Code, Part 1, and by local codes, where they prevail.

The furnace should be wired to a separate and dedicated circuit in the main electrical panel; however, accessory equipment such as electronic air clean-

ers and humidifiers may be included on the furnace circuit. Although a suitably located circuit breaker can be used as a service switch, a separate service switch is advisable. The service switch is necessary if reaching the circuit breaker involves becoming close to the furnace, or if the furnace is located between the circuit breaker and the means of entry to the furnace room. The furnace switch (service switch) should be clearly marked, installed in an easily accessible area between the furnace and furnace room entry, and be located in such a manner to reduce the likelihood that it would be mistaken as a light switch or similar device.

The power requirements for all models: 120 VAC, 1 ∅, 60 Hz.

Maximum fuse size for the P*DHX models and P2LBX16F14501 model: 15 amps. Maximum fuse size for the P4LBX20F19001 model: 20 amps.

Accessories requiring 120 VAC power sources such as electronic air cleaners and humidifier transformers may be powered from the furnace circuit. Do not use the direct drive motor connections as a power source, since there is a high risk of damaging the accessories by exposure to high voltage from the auto-generating windings of the direct drive motor.

Thermostat wiring connections and air conditioning contactor low voltage connections are shown in the wiring diagrams. Some micro-electronic thermostats require additional controls and wiring. Refer to the thermostat manufacturer's instructions.

The thermostat should be located approximately 5 feet above the floor, on an inside wall where there is good natural air circulation, and where the thermostat will be exposed to average room temperatures. Avoid locations where the thermostat will be exposed to cold drafts, heat from nearby lamps and appliances, exposure to sunlight, heat from inside wall stacks, etc.

Normal heat anticipator setting: for the P*LBX models is 0.1 A. Normal heat anticipator setting: for the P*DHX models is 0.4 A .For more precise adjustment, the heat anticipator may be adjusted to the amperage draw of the heating control circuit as measured between the "R" and "W" terminals of the thermostat. To reduce the risk of damaging the heat anticipator, do not measure circuit without first removing one of the two wires first.

To determine the heating circuit amperage draw:

1. Disconnect one of the “R” or “W” wires from the thermostat terminal.
2. Connect an ammeter between the wire and the thermostat terminal to which it was attached.
3. Note the amperage reading when the heating contacts are closed. (System switch must be on “HEAT” if so equipped.
4. Re-connect the thermostat wire. If the thermostat is serving a combination heating and air conditioning system, pay particular attention to polarity.
5. When the thermostat is reconnected and re-plumbed, adjust the heat anticipator setting to match the observed amperage reading.

CIRCULATING AIR BLOWER

Both P*DHX and the P2LBX16F14501 furnace models are equipped with a direct drive blower system. Direct drive blower speed adjustments are not normally required in properly sized extended plenum duct systems. The motor RPM and air CFM delivery will vary automatically to accommodate conditions within the usual range of external static pressures typical of residential duct systems. Under-sized duct systems may require a higher blower speed to obtain a reasonable system temperature rise. Some older duct systems were not designed to provide static pressure. They typically feature special reducing fittings at each branch run and lack block ends on the trunk ducts. These systems may require modification to provide some resistance to the airflow to prevent over- amping of the direct drive blower motor. Selecting a lower blower speed may correct this problem.

Direct drive blower speeds are adjusted by changing the "hot" wires to the motor winding connections. Please refer to wiring diagram in Appendix B or the wiring diagram label affixed to the furnace. **THE NEUTRAL WIRE (normally the white wire) IS NEVER MOVED TO ADJUST THE BLOWER SPEED**.

⚠CAUTION

DO NOT CONNECT POWER LEADS BETWEEN MOTOR SPEEDS. THE NEUTRAL WIRE MUST ALWAYS BE CONNECTED TO THE MOTOR'S DESIGNATED NEUTRAL TERMINAL.

It is possible and acceptable to use a single blower speed for both heating and cooling modes. The simplest method to connect the wiring from both modes is to use a "piggy-back connector" accommodating both wires on a single motor tap. It is also acceptable to connect the selected motor speed with a pigtail joined to both heating and cooling speed wires with a wire nut. As a safety precaution against accidental disconnection of the wires by vibration, it is advisable to secure the wire nut and wires with a few wraps of electricians tape.

If the joining of the blower speed wiring is done in the furnace junction box, tape off both ends of the unused wire.

The P4LBX20F19001 furnace model is equipped with a belt drive blower system. The blower speed (RPM) and resultant airflow can be varied by adjusting the variable speed motor pulley.

⚠CAUTION

DISCONNECT THE POWER SUPPLY TO THE FURNACE BEFORE OPENING THE BLOWER ACCESS DOOR TO SERVICE THE AIR FILTER, FAN AND MOTOR. FAILURE TO SHUT OFF POWER COULD ALLOW THE BLOWER TO START UNEXPECTEDLY, CREATING A RISK OF DEATH OR PERSONAL INJURY.

Do not use the blower speed wires as a source of power to accessories as electronic air cleaners and humidifier transformers. The unused motor taps auto-generate sufficiently high voltages to damage accessory equipment.

⚠CAUTION

Do not start the burner or blower fan unless the blower access door is securely in place.

OIL BURNER

P*LBX furnaces are equipped with Beckett AF Series oil burners with the Beckett CleanCut pump and R7184B oil primary control. P*DHX furnaces are equipped with Beckett AF Series oil burners with the R8184N oil primary control. The oil burner must align properly with the cerafelt fiber chamber (firepot). The cerafelt fiber chamber is initially quite soft, but hardens and becomes quite brittle after the first firing. The firepot is held in place by a retaining bracket; however, it is possible for the firepot to shift if subjected to rough handling during transit.

⚠CAUTION

BEFORE OPERATING THE FURNACE CHECK BURNER ALIGNMENT WITH COMBUSTION CHAMBER. THE END CONE OF THE AIR TUBE MUST BE CENTRED TO THE ACCOMODATING RING PROVIDED IN THE DESIGN OF THE COMBUSTION CHAMBER. ADJUST ALIGNMENT AS NECESSARY BEFORE THE FIRST FIRING.

OIL BURNER NOZZLES

All furnace models are certified for multiple firing rates. Choose the firing rate that most closely matches the calculated heat loss of the building. Models, firing rates and nozzles are listed in Appendix A: AF Burner Set-Up.

BURNER ELECTRODES

Correct positioning of the electrode tips with respect to each other, to the fuel oil nozzle, and to the rest of the burners is essential for smooth light ups and proper operation. The electrode tips should be adjusted to a gap of 5/32", 1/16" ahead of the nozzle, 5/16" above the centerline of the nozzle. The "Z" dimension (front edge of the burner head to the front face of the nozzle is 1-1/8 inches.

Electrode positioning should be checked before the first firing of the furnace.

The electrode porcelains should be free of cracks, the electrode tips should be tapered and free of burrs, and the contact rods must be clean and be in firm contact with the ignition transformer contact springs. The electrodes must not come into contact with the burner head.

OIL BURNER SET-UP

The burner air supply is adjusted to maintain the *fuel to air ratio* to obtain ideal combustion conditions. A lack of air causes "soft" and "sooty" flames, resulting in soot build-up throughout the heat exchanger passages. Excess combustion air causes a bright roaring fire and high stack temperatures resulting in poor fuel efficiency.

PREPARATIONS:

Drill a ¼" test port in the venting, ideally at least 2 flue pipe diameters away from the furnace breeching, if venting horizontally from the furnace, (typically P*LBX) or from the flue pipe elbow if venting vertically (typically P*DHX) before reaching the furnace. (see Figures 4 and 5).

The test port will allow flue gas samples to be taken and stack temperatures to be measured.

Before starting the burner, check the burner alignment with the combustion chamber (fire pot), check that the correct nozzle is tightened into place, and that the burner electrodes are properly positioned.

The Beckett burner bulk air band should be closed, and the air shutter initial setting should be approximately 7.00.

Note A: Locate hole at least 6 inches on the furnace side of the draft control.

Note B: Ideally, hole should be at least 12 inches from breeching or elbow.

PROCEDURE:

Start the burner and allow it to run at least ten minutes. Set the air shutter to give a good flame visually. The combustion air supply to the burner is controlled by adjusting the air shutter on the left side of the burner, and, if necessary, the bulk air band. To adjust, loosen the bolt on the movable shutter. Move the shutter gradually until a good flame (visually) has been achieved. Re-snug the bolt.

Check the initial draft setting as the furnace warms up. The draft may be measured at the test port. The final breech draft should be - 0.02 inches w.c. to provide adequate over-fire draft.

Fig. 4: Horizontal Smoke Test Port Location

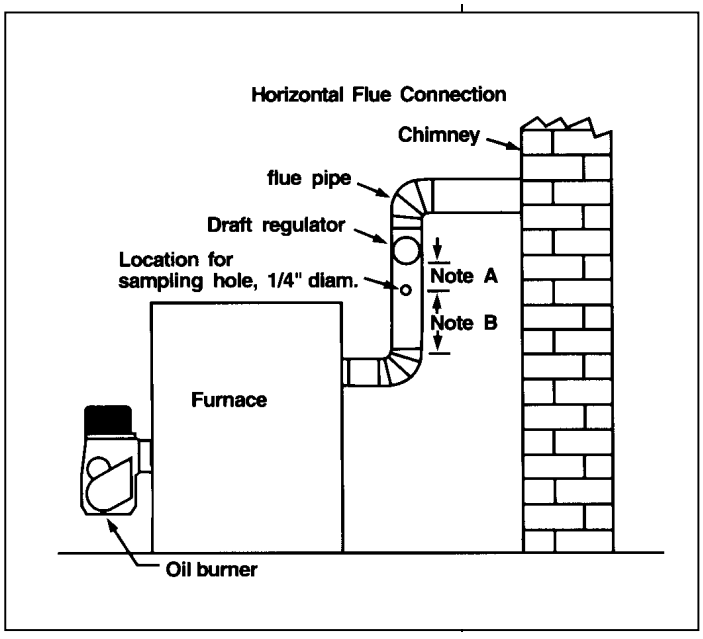
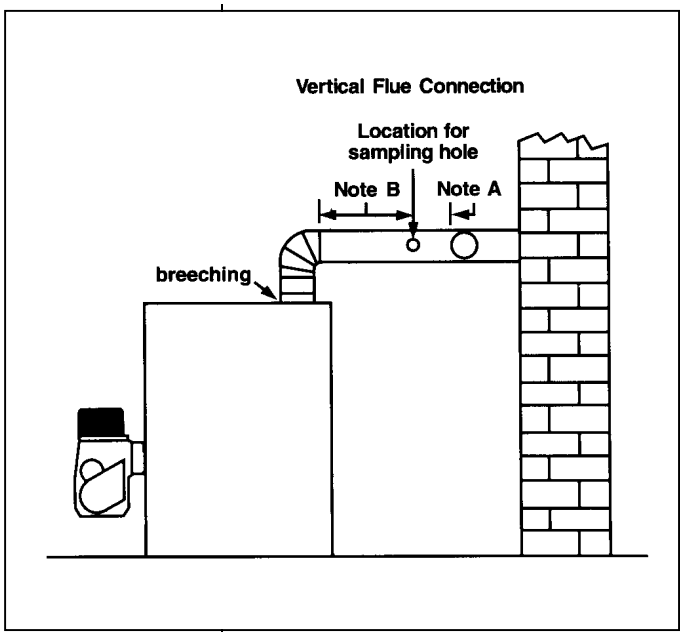


Fig. 5: Vertical Smoke Test Port Location



Check the oil pump pressure. Standard operating pressure is 100 PSIG.

After reaching steady state, take a smoke test. If not indicating a trace, set the combustion air controls to provide a trace.

Typically, the CO_2 reading will range from 11.5% to 13.5%.

After the air adjustments have been completed, and the air shutter or air adjustment plate has been secured, recheck the breech draft and take another smoke test to ensure that the values have not changed.

SMOKE TEST NOTE:

If oily or yellow smoke spots are found on the smoke test filter paper, it is usually a sign of unburned fuel. This indicates poor combustion. This type of problem may be caused by excess draft, excess air, or contaminated fuel. Do not ignore this indicator.

STACK TEMPERATURE:

Stack temperature will vary depending on fuel input, circulating air blower speed, and burner set up, etc. In general, stack temperature should typically range between 380°F to 550°F, assuming that the combustion air is approximately room temperature (65°F - 70°F). In general, lower stack temperature indicates greater efficiency; however, excessively low stack temperature can lead to condensation forming in the chimney and / or venting. Sulphur and similar contaminants in the fuel oil will mix with condensation to form acids. Acids and resultant chemical salts will cause rapid deterioration of the chimney and venting components, and may attack the furnace.

If the flue gases are below the range, it may be necessary to slow down the blower fan. If the flue gases are above the range, the blower fan may require speeding up. Stack temperature varies directly with the system temperature rise. System temperature rise is the difference between the furnace outlet temperature and furnace inlet temperature as measured in the vicinity of the connection between the plenum take-offs and the trunk ducts. Typical temperature rise values range between 70°F and 85°F.

If the venting from the furnace to the chimney is long, or exposed to cold ambient temperatures, it may be necessary to use L-Vent as the vent connector to reduce stack temperature loss to prevent condensation. The venting should be inspected annually to ensure that it is intact.

FURNACE INSTALLATION SET-UP

The furnace must be set up as the final step in the installation.

A) The oil burner must be set up following the procedures outlined above.

B) The furnace should operate within a temperature rise of 85°F ±15°F. To determine the temperature rise, measure the supply air and return air temperatures when the furnace has reached steady state conditions. This is the point at which the supply air temperature stops increasing relative to the return air temperature. The furnace may have to run 10 to 15 minutes to reach steady state conditions. The measurements may be made with duct thermometers or thermocouples used in conjunction with multimeters with temperature measurement capabilities.

The return air should be measured at a point where the thermometer will be well within the air stream near the furnace return air inlet. Actual location is not particularly critical; however, avoid locations where the temperature readings could be affected by humidifier bypass ducts, the inside radius of elbows, etc.

The supply air temperature should be measured at a point where the thermometer will be well within the air stream near the furnace supply air outlet. Usually, the side mid-point of the supply air plenum take-off is ideal, providing it is out of the line of sight to the heat exchanger. If the thermometer is within the line of sight of the heat exchanger, the supply air readings may be skewed by radiant heat from the heat exchanger. If the plenum take-off is unsuitable, the supply air temperature may be measured within the first 18 inches of the first segment of supply air trunk duct.

If the temperature rise is outside the recommended range, it may be adjusted on direct drive equipped units by selecting alternate circulation fan motor speeds, on belt drive equipped units by adjusting the variable speed motor pulley. If the temperature rise is too high, speed the fan up. If the temperature rise is too low, slow the fan down.

C) Keep in mind that the stack temperature varies directly with the temperature rise. The higher the temperature rise, the higher the stack temperature will be, resulting in lower efficiency. The lower the temperature rise, the lower the stack temperature will be, which, in some cases, may allow condensation to form in the chimney and other vent parts.

D) Test the high limit control to ensure that it is operating correctly. For direct drive equipped units, this may be done by temporarily removing the circulator fan heating wire or neutral wire. For belt drive equipped units, temporarily remove the fan belt. Turn of electrical power to the furnace before working with the motor wires or fan belt. Be sure to protect any removed wires from shorting out on metal furnace parts. If the high limit test is successful, shut off the electrical power to the furnace, restore the proper motor wiring. Finally, restore power to the furnace.

E) Adjust the “Fan Off” setting on the L6064A or L4064W fan limit controller. In most cases, the “Fan Off” temperature should be 90° to 100°F as indicated on the thermometer used to measure the supply air temperature. Once the “Fan Off” setting has been established, set the “Fan On” setting. In most cases, the “Fan On” setting should be approximately 30°F higher than the Fan Off” setting.

NOTE: The L4064W fan/limit controller has an auxiliary “fan on” function that activates when the thermostat is calling for heat. The controller is designed to start the circulating fan in 20 to 30 seconds. Adjust the “fan on” setting on the controller dial 30°F higher than the “fan off” setting even though the circulating fan will normally be started by the auxiliary “fan on” function.

F) Operate the furnace through a minimum of three full heating cycles. During this time, check for fuel oil leaks, gross air leakage from the supply air ductwork, unusual noises originating anywhere within the heating system which may cause some concern or annoyance to the home owner, etc.

G) Be sure that the homeowner is familiar with the furnace. The homeowner should be aware of the location of electrical circuit breaker or fuse, the location of any electrical switches controlling the furnace, the location of the oil tank shut-off valve and how to operate the valve. The homeowner should be informed where the oil tank gauge is located and how to read it.

It would be beneficial to review safety issues with the home owner, such as the danger of storing combustibles too close to the furnace, hanging anything on the furnace vent pipe, and especially the dangers of indiscriminately pressing the burner reset button.

IMPORTANT: Be sure that the home owner knows where the burner reset switch is located, and is aware that the reset switch is not to be activated more than once without a thorough look for the cause of the problem, (lack of fuel, etc.). Be sure that the homeowner knows when to quit trying to start the furnace during these conditions and who to call for emergency service.

MAINTENANCE AND SERVICE

A: Routine Maintenance By Home Owner

Other than remembering to arrange for the annual professional servicing of the furnace by the service or installation contractor, the most important routine service performed by the homeowner is to maintain the air filter or filters. A dirty filter can cause the furnace to over-heat, fail to maintain indoor temperature during cold weather, increase fuel consumption and cause component failure.

The furnace filter(s) should be inspected, cleaned or replaced monthly. The furnace is factory equipped with a semi-permanent type filter. If the filter is damaged, replace with filters of the same size and type.

During the routine service, inspect the general condition of the furnace watching for signs of oil leaks in the vicinity of the oil burner, soot forming on any external part of the furnace, soot forming around the joints in the vent pipe, etc. If any of these conditions are present, please advice your service or installation contractor.

B: Annual Service By Contractor

⚠CAUTION

THE Combustion chamber (firepot) IS FRAGILE. use care when inspecting and cleaning this area.

The heat exchanger should be inspected periodically and cleaned if necessary. if cleaning is necessary, **SHUT OFF POWER TO THE FURNACE** and remove the burner. Using a stiff brush with a wire handle, brush off scale and soot from inside the drum and flue pipe. To clean the heat exchanger radiator, remove the covers on the front or inner front panel, and then loosen the brass nuts on the radiator clean-out yoke assembly. Do not remove the brass nuts. The yoke assembly, once loosened, may be removed to gain access to the heat exchanger outer radiator.

A wire brush can be used to loosen dirt and debris on the inside surfaces of the radiator. Clean out all accumulated dirt, soot and debris with a wire handled brush and an industrial vacuum cleaner. Replace the clean-out yoke assemblies and clean-out covers.

Most circulating fan motors are permanently lubricated by the motor manufacturer. These motors will have no oil ports. If the blower motor does contain oil ports, under normal operating conditions it will not require oiling for the first two years. Oil sparingly; a few drops in each oil port with SAE 20 non-detergent oil. Oiling is most easily done with a "tele-spout" oiler. This oiler has a long flexible plastic spout. DO NOT OVER-LUBRICATE. Excess oil may result in premature electric motor failure.

Inspect the blower fan. Clean it if necessary.

Oil Burner Maintenance: Follow the instructions of the oil burner manufacturer. (See oil burner manufacturer's instructions supplied with furnace). The oil burner nozzle should be replaced annually. We recommend that the oil filter be changed on an annual basis.

The venting system should be cleaned and inspected for signs of deterioration. Replace pitted or perforated vent pipe and fittings. The barometric draft regulator should open and close freely.

All electrical connections should be checked to ensure tight connections. Safety controls such as the high limit controls should be tested for functionality. The fan control functions should be checked to ensure that all fan speeds are operating properly.

OPERATING INSTRUCTIONS

Before Lighting

Open all supply and return air registers and grilles.

Open all valves in oil pipes.

Turn on electric power supply.

To Light Unit

Set the thermostat above room temperature to call for heat. The burner will start. NOTE: If the furnace has been off for an extended period of time, it may be necessary to press the RESET button on the primary combustion control relay, (<u>once only</u>). If pressing the reset button does not start the furnace, refer to Appendix C, Troubleshooting.

After the furnace warms sufficiently, the circulation fan will start.

The furnace will continue to run until the thermostat call for heat is satisfied.

Set the thermostat below room temperature. The oil burner will stop.

The air circulation blower will continue to run until the furnace has cooled sufficiently.

To Shut Down Unit

Set the thermostat to the lowest possible setting. Set the manual switch (if installed) in the Electrical Power Supply Line to "OFF".

NOTE: If the furnace is to be shut down for an extended period of time, close the oil supply valve to the oil burner.

⚠WARNING

DO NOT ATTEMPT TO START THE BURNER WHEN EXCESS OIL HAS ACCUMULATED, WHEN THE FURNACE IS FULL OF VAPOUR, OR WHEN THE COMBUSTION CHAMBER IS VERY HOT. NEVER BURN GARBAGE OR PAPER IN THE FURNACE, AND NEVER LEAVE PAPER OR RAGS AROUND THE UNIT.

TABLE A-1: BECKETT OIL BURNER SET-UP

BECKETT AF SERIES OIL BURNERS							
FURNACE MODEL	**OUTPUT BTU/Hr.**	**BURNER MODEL**	**NOZZLE (Delavan)**	**PUMP PRESSURE**	**FLOW RATE**	**HEAD**	**STATIC PLATE**
P3DHX12F08001	60,000 [3]	AF76BNHS	0.50 / 80°A	100 PSIG	0.50 GPH	F3 [1]	3-3/8 in.
	78,000 [2]	AF76BNHS	0.65 / 80°A	100 PSIG	0.65 GPH	F3 [1]	3-3/8 in.
	90,000	AF76BNHS	0.75 / 80°A	100 PSIG	0.75 GPH	F3 [1]	3-3/8 in.
P2DHX16F12001	91,000	AF76XN	0.75 / 80°A	100 PSIG	0.75 GPH	F3	2-3/4 in.
	101,000	AF76XN	0.85 / 80°A	100 PSIG	0.85 GPH	F3	2-3/4 in.
	117,000 [2]	AF76XN	1.00 / 60°A	100 PSIG	1.00 GPH	F3	2-3/4 in.
	128,000	AF76YB	1.10 / 70°A	100 PSIG	1.10 GPH	F6	2-3/4 in.
P2LBX16F14501	130,000	AF65YB	1.10 / 70°A	100 PSIG	1.10 GPH	F6	2-3/4 in.
	143,000 [2]	AF65YB	1.20 / 60°A	100 PSIG	1.20 GPH	F6	2-3/4 in.
P4LBX20F19001	168,000	AF81WF	1.50 / 70°B	100 PSIG	1.50 GPH	F16	2-3/4 in.
	188,000 [2]	AF81WF	1.65 / 70°B	100 PSIG	1.65 GPH	F16	2-3/4 in.

[1] Used with ceramic insulator.

[2] Factory supplied nozzle.

[3] Requires a low firing rate baffle.

In the United States, the R. W. Beckett “AF” Burner may be equipped with Beckett’s “Inlet Air Shut-Off”, Beckett Part No. AF/A 5861, to increase efficiency. It reduces the amount of air passing through the oil burner, combustion chamber, breeching, etc. up the chimney between burner cycles.
NOTE: THE USE OF THIS CONTROL CAN OCCASIONALLY CAUSE POST COMBUSTION NOZZLE DRIP.

TABLE A-2: DIRECT DRIVE BLOWER SET-UP

FURNACE	OUTPUT BTU/Hr.	BLOWER	MOTOR HP	BLOWER SET-UP			COOLING CAPACITY		
				0.20 in. w.c. Speed	0.50 in. w.c. Speed	Htg. CFM Range [1]	Tons [2]	MOTOR HP	Clg. CFM Range
P3DHX12F08001	60,000	GT10 DD	1/2	Low	Med-Low	615 - 790	3	1/2	690 - 1200
	78,000			Med-Low	Med-High	799 - 1027			
	90,000			Med-High	High	922 - 1185			
P2DHX16F12001	91,000	GT12-10 DD	1/2	Med-Low	Med-High	932 - 1199	4	1/2	1000 - 1600
	101,000			Med-Low	Med-High	1035 - 1330			
	117,000			Med-High	High	1198 - 1540			
	128,000			Med-High	High	1311 - 1685			
P2LBX16F14501	130,000	G10 DD	1/2	High	High	1332 - 1712	4	1/2	1065 - 1600
	143,000			High	High	1465 - 1883			

(1) Heating Range values based on temperature rise. Upper values may exceed measured airflow values in Table A-3.
(2) Nominal values only.

TABLE A-3: BELT DRIVE BLOWER SET-UP

Furnace Model	Blower	Motor	Blower Set-Up						Cooling Capacity	
			0.20 in. w.c.			0.50 in. w.c.			Tons	CFM Range
			Pulley		Belt	Pulley		Belt		
			Motor	Blower		Motor	Blower			
P4LBX20F19001	G12	3/4 HP	3½ x ⅝	7 x ¾	4L430	3½ x ⅝	7 x ¾	4L430	4	1300 - 1535
			3½ x ⅝	7 x ¾	4L430	3½ x ⅝	7 x ¾	4L430		

TABLE A-4: DIRECT DRIVE BLOWER CHARACTERISTICS

FURNACE MODEL	BLOWER	MOTOR HP	MOTOR FLA	TEMP. RISE (ΔT)	SPEED	CFM				
						External Static Pressure – inches w.c.				
						0.20	0.30	0.40	0.50	0.60
P3DHX12F08001	GT10	½	7.7	70° - 90°F	High	1469	1386	1308	1213	1123
					Med-High	1377	1308	1224	1143	1063
					Med-Low	1088	1075	1038	985	916
					Low	721	721	712	688	649
P2DHX16F12001	G12-10	1/2	7.7	70° - 90°F	High	1752	1691	1659	1593	1525
					Med-High	1454	1454	1417	1379	1300
					Med-Low	975	944	912	879	844
					Low	631	593	552	515	486
P2LBX16F14501	G10	1/2	7.7	70° - 90°F	High	1810	1740	1675	1585	1510
					Med-High	1570	1540	1495	1445	1375
					Med-Low	1090	1080	1070	1065	1050
					Low	710	700	690	665	650

TABLE A-5: BELT DRIVE BLOWER CHARACTERISTICS

Furnace Model	Motor HP	Motor FLA	ΔT	Blower	Blower Pulley	Motor Pulley Turns Out	CFM				
							External Static Pressure – Inches water column				
							0.20	0.30	0.40	0.50	0.60
P4LBX20F19001	3/4 HP	13.0	85°F	G12	7 x ¾	0	2274	2080	1847	1532	1099
						2	2107	1927	1712	1420	1019
						4	1939	1775	1576	1308	939
						6	1772	1622	1441	1196	859

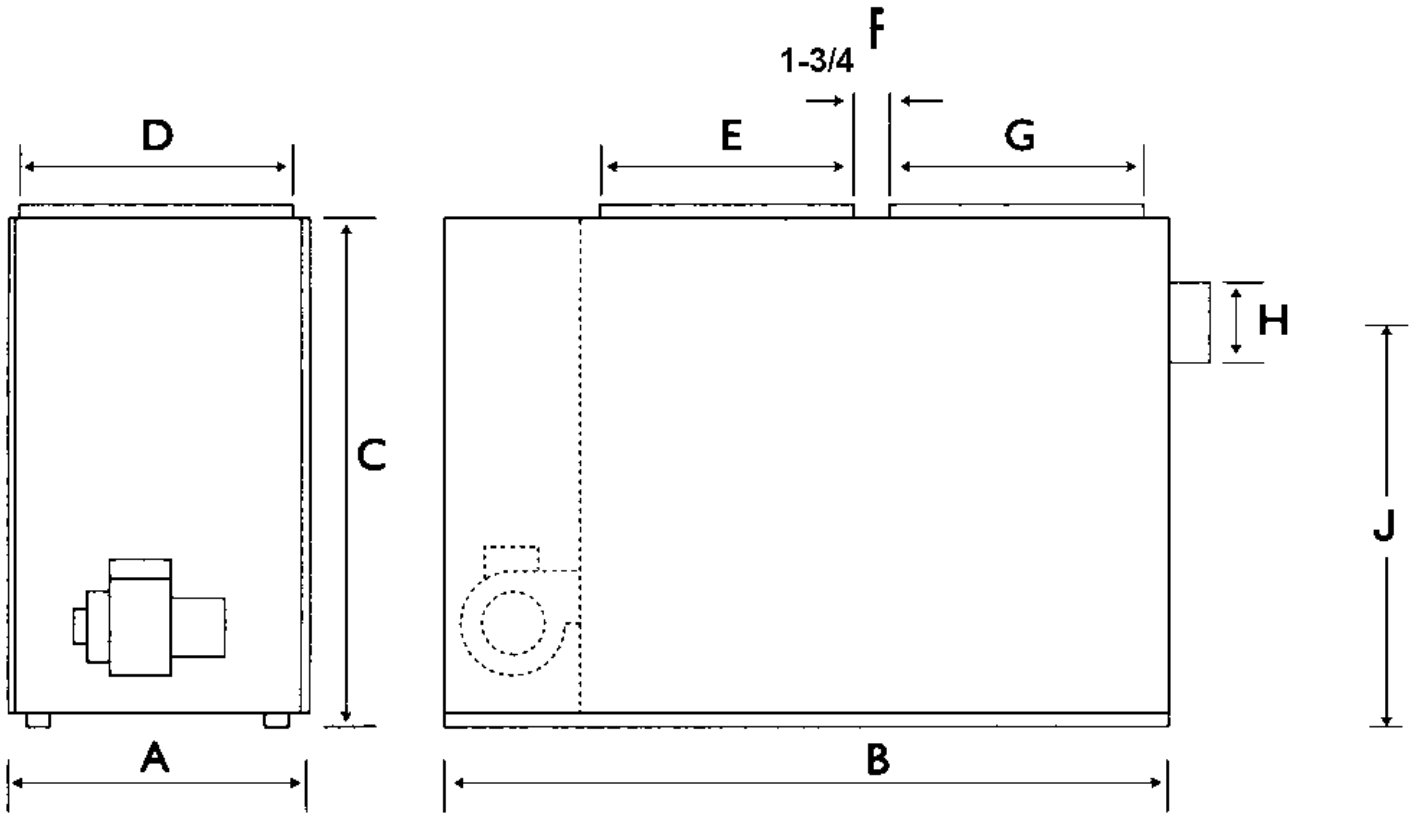
TIP:
These formulae will assist with the design of the ductwork and the determination of airflow delivery:

$$CFM = \frac{Bonnet\ Output}{\left(1.085\ x\ System\ Temperature\ Rise\right)}$$

$$System\ Temperature\ Rise = \frac{Bonnet\ Output}{\left(1.085\ x\ CFM\right)}$$

GENERAL DIMENSIONS - P2LBX16F14501

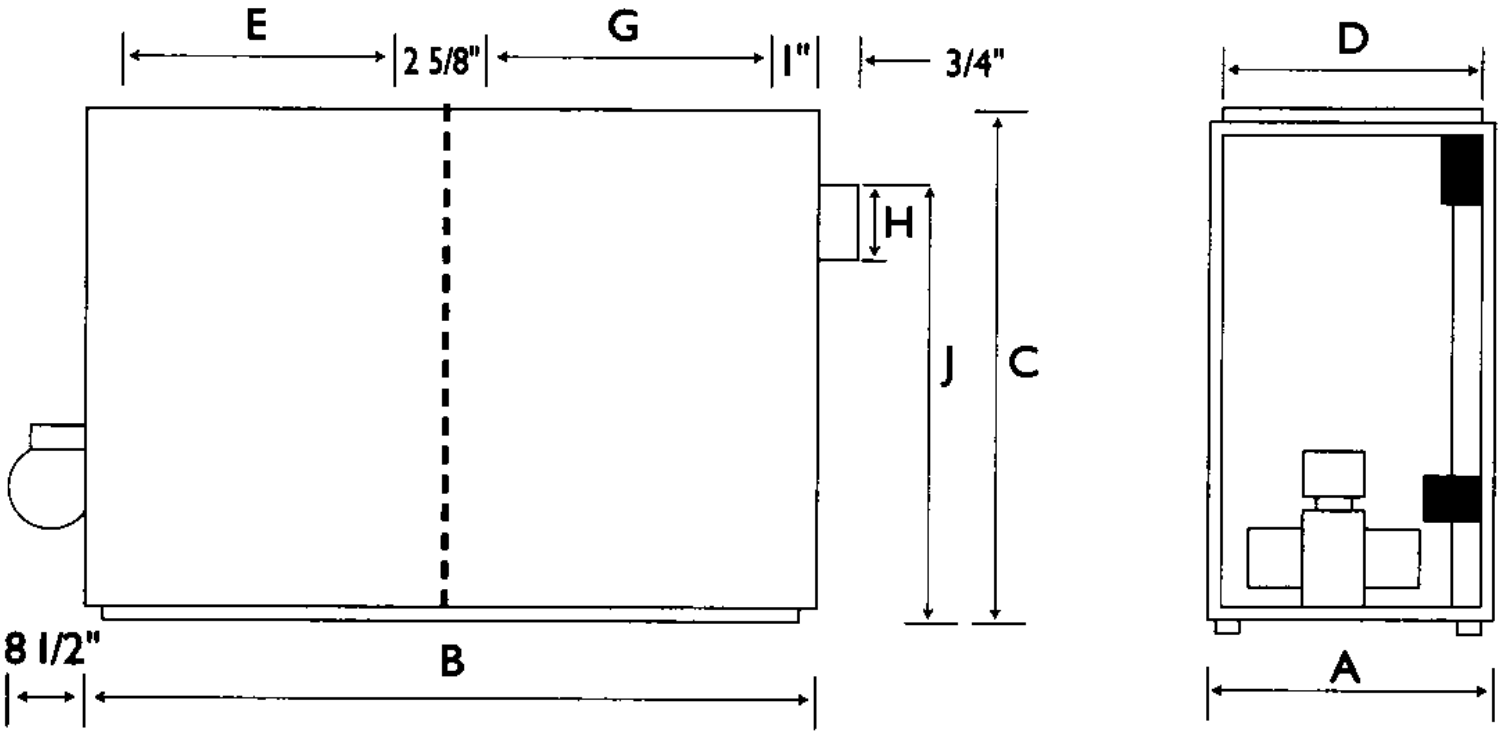
Cabinet			Plenum Openings			Flue		Filter	Shipping Weight
Width (A)	Depth (B)	Height (C)	Supply Air (D x E)	Return Air (D x G)	Gap (F)	Dia. (H)	Height (J)		
22	51-½	41	20-½ x 18-⅝	20-½ x 18-⅝	1-¾	6	34-⅜	20 x 25 x 1	290 lb.
All dimensions in inches.									



GENERAL DIMENSIONS - P4LBX20F19001

Cabinet			Plenum Openings			Flue		Filter (2)	Shipping Weight
Width (A)	Depth (B)	Height (C)	Supply Air (D x E)	Return Air (D x G)	Gap	Dia. (H)	Height (J)		
26	46 [1]	56	24 x 22	24 x 22	2-⅝	7	50-¼	20 x 25 x 1	390 lb.

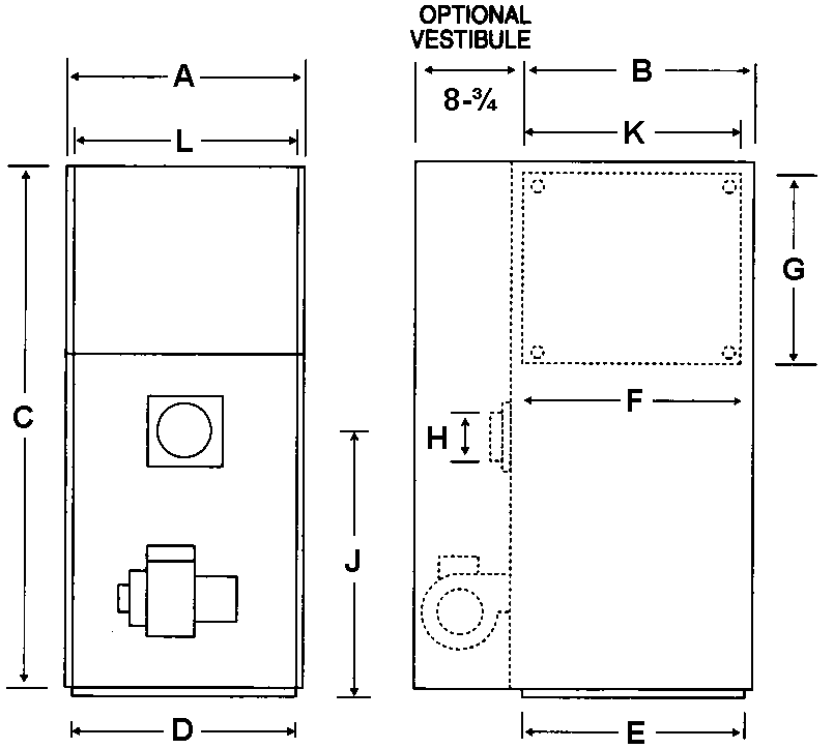
[1] Add 8-½ inches to allow for oil burner, (54-½ inches total). All dimensions in inches.



GENERAL DIMENSIONS - P3DHX12F08001

Cabinet			Plenum Openings			Flue		Filter	Shipping Weight
Width (A)	Depth (B)	Height (C)	Supply Air (D x E)	Return Air		Dia. (H)	Height (J)		
				Top (K x L)	Side (F x G)				
22-¼	22-¼ [1]	54-¾	19 x 19	18 x 18	18 x 18	5	28-¼	20 x 20 x 1	263 lb.

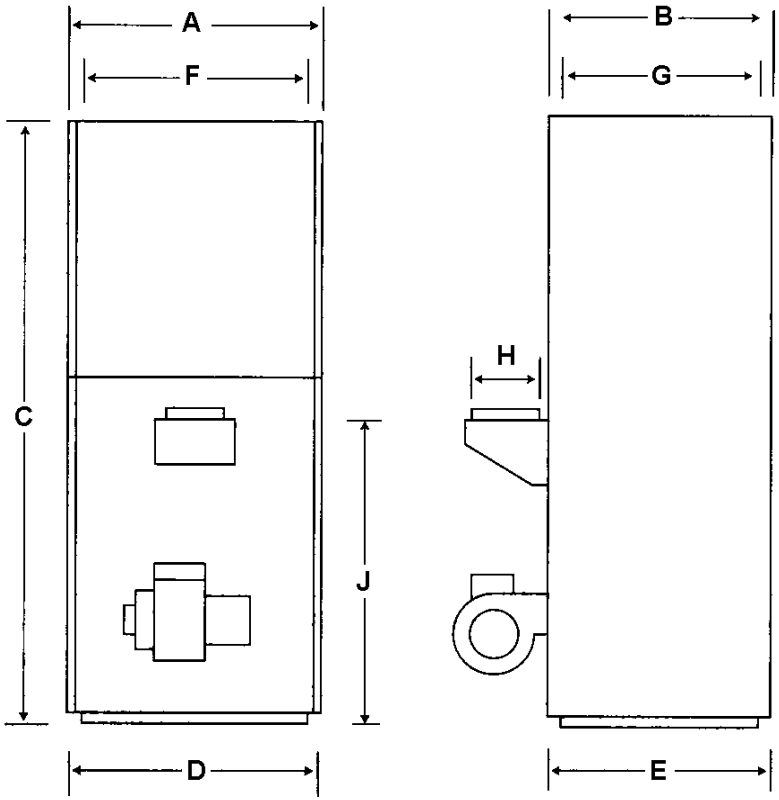
[1] Add 8-½ inches to allow for burner, (30-¾ inches total).
Add 8-¾ inches to allow for add-on vestibule cabinet, (31 inches total). All dimensions in inches.



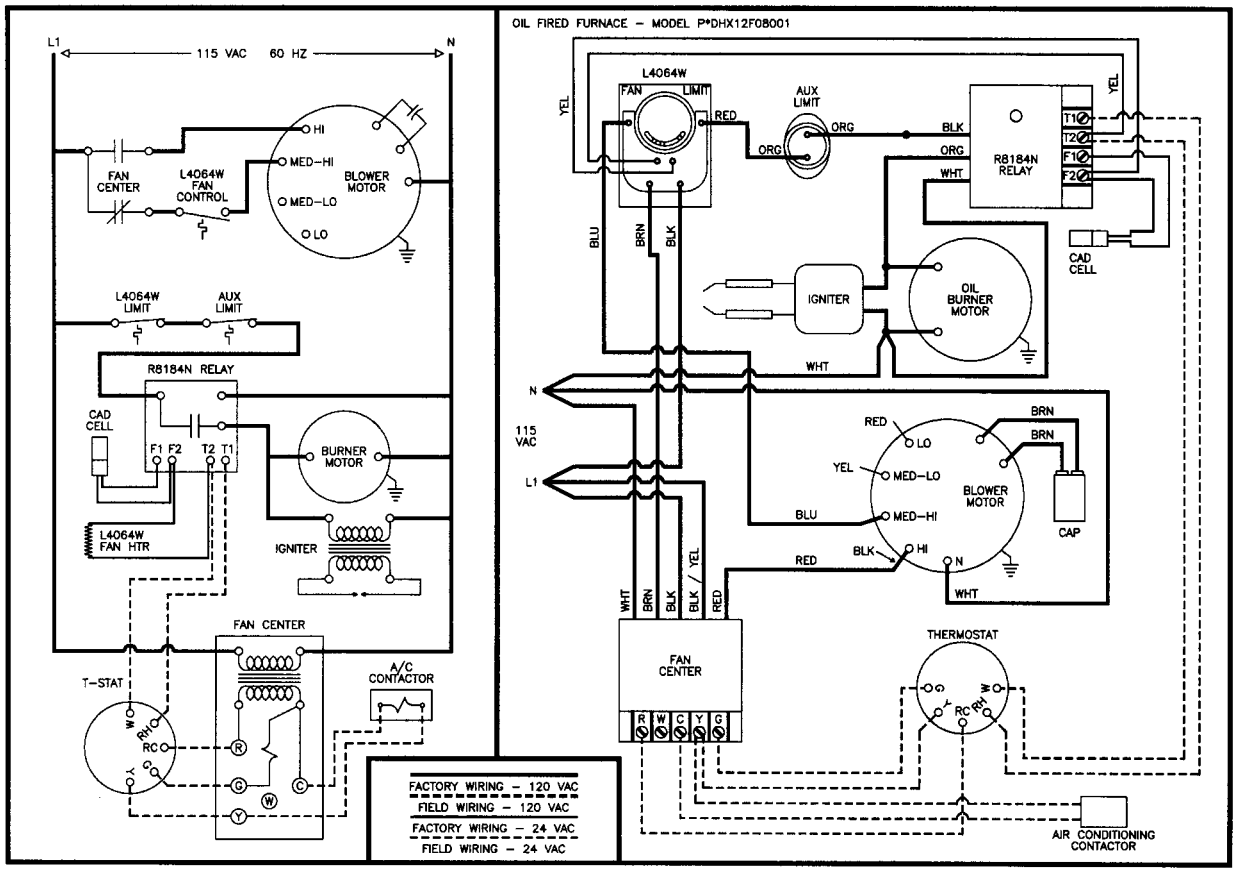
GENERAL DIMENSIONS - P2DHX16F12001

Cabinet			Plenum Openings		Flue		Filter	Shipping Weight
Width (A)	Depth (B)	Height (C)	Supply Air (D x E)	Return Air (F x G)	Dia. (H)	Height (J)		
22-¼	22-¼ [1]	62-¼	20-¾ x 20-¾	18 x 18	6	37-¼	20 x 20 x 1	320 lb.

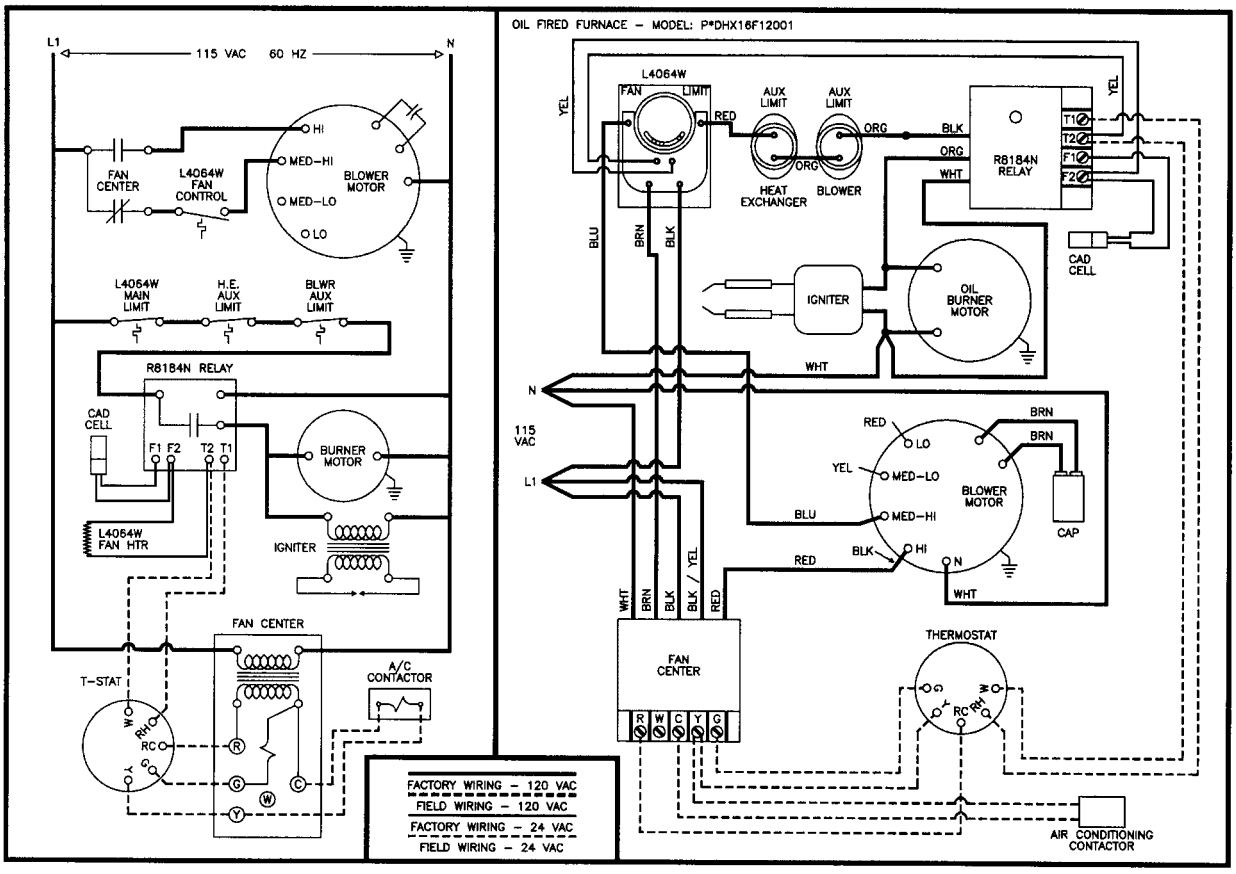
[1] Add 8-½ inches to allow for burner, (30-¾ inches total). All dimensions in inches.



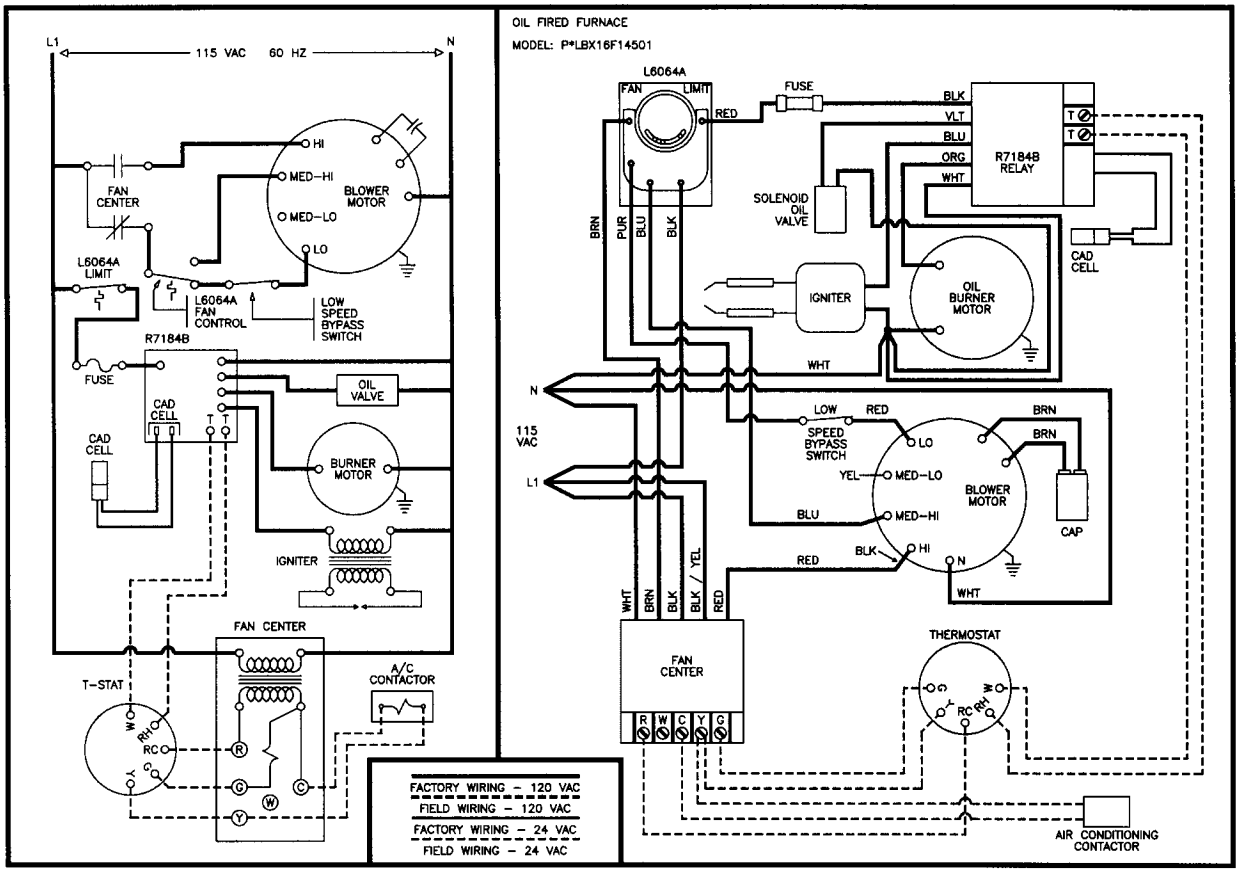
WIRING DIAGRAM: MODEL P3DHX12F08001



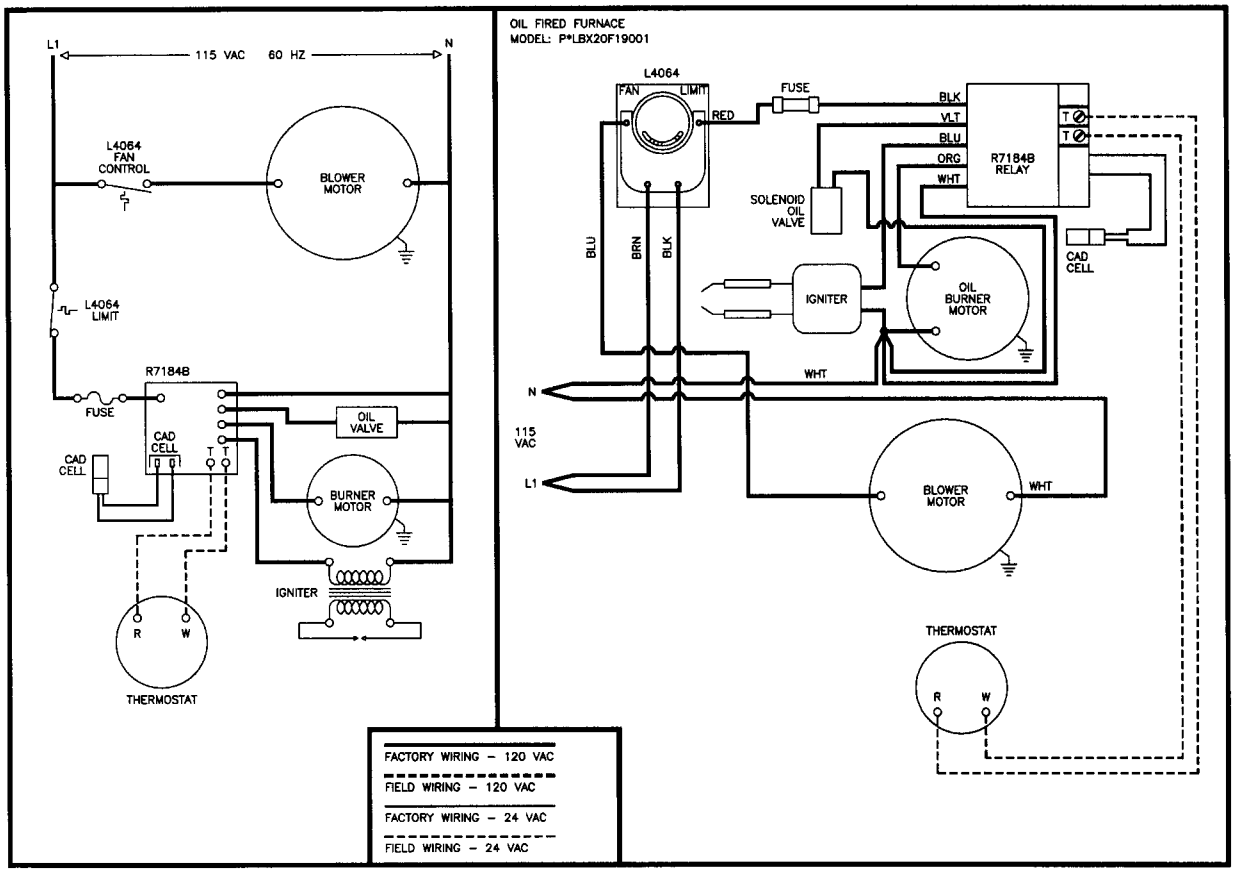
WIRING DIAGRAM: MODEL P2DHX16F12001



WIRING DIAGRAM: MODEL P2LBX16F14501



WIRING DIAGRAM: MODEL P4LBX20F19001



R7184 DETAILED SEQUENCE OF OPERATION

Power is applied to unit. The R7184 completes a self-diagnostic procedure. If no light or flame is present, and unit passes its self-diagnostic procedure, the control enters into the idle mode.

Thermostat calls for heat:

A) Safety check is made for flame (4 second delay).
   1) When flame is not present, the R7184 will apply power to the burner motor and igniter.
   2) When flame is present, the control remains in the idle state.

B) Unit enters and completes a pre-purge period of 15 seconds, then applies power to the solenoid valve.

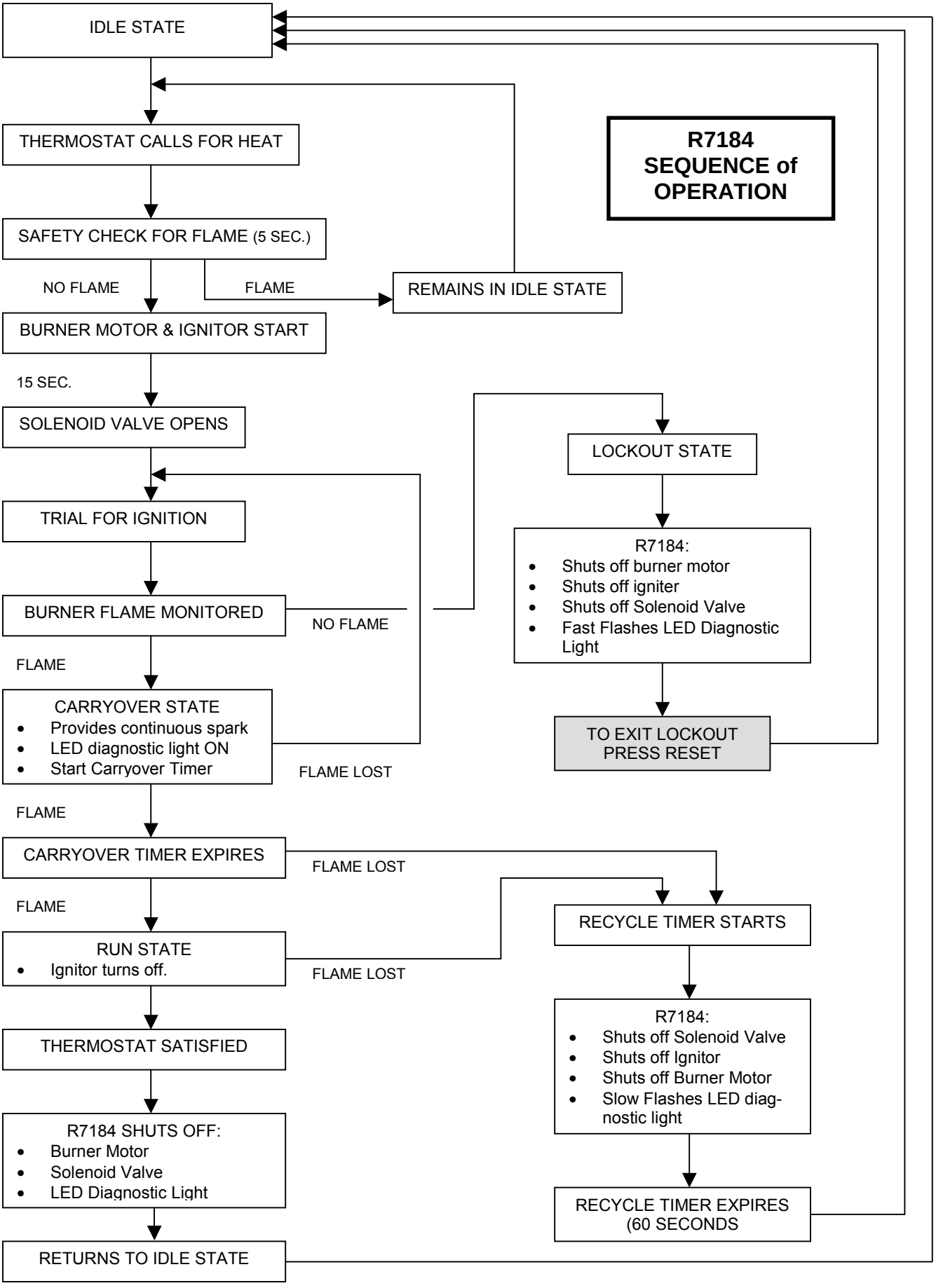
C) Control enters the trial for ignition state.

D) Control monitors the burner flame.
   1) When flame is present, the control enters ignition carryover state. (Continues to spark for 10 sec.).
      a) Provides continuous spark after flame is sensed to assure that burner remains lit.
      b) Turns on LED diagnostic light.
      c) Starts carryover timer.
         (i) Flame and call for heat are monitored.
         - If flame is lost and lockout timer has not expired, R7184 will return to trial for ignition state.
         - If flame is lost and lockout timer has expired, R7184 will enter the recycle state.
           - Recycle timer starts.
           - Burner motor and igniter and solenoid valve are turned off.
           - LED diagnostic light flashes slow.
           - Returns to idle state when recycle timer expires (60 seconds).

E) Carryover timer expires.
   1) Enters run state.
      a) Igniter turns off.

Combustion continues until thermostat is satisfied, or R7184 detects a loss of flame and enters into Recycle Mode.

F) Thermostat is satisfied - call for heat is terminated:
      a) R7184 shuts off burner motor and solenoid valve.
      b) LED diagnostic light is off.
      c) R7184 returns to idle state.


IDLE STATE
THERMOSTAT CALLS FOR HEAT
SAFETY CHECK FOR FLAME (5 SEC.)
NO FLAME
FLAME
REMAINS IN IDLE STATE
BURNER MOTOR & IGNITOR START
15 SEC.
SOLENOID VALVE OPENS
TRIAL FOR IGNITION
BURNER FLAME MONITORED
NO FLAME
FLAME
CARRYOVER STATE
• Provides continuous spark
• LED diagnostic light ON
• Start Carryover Timer
FLAME LOST
FLAME
CARRYOVER TIMER EXPIRES
FLAME LOST
FLAME
RUN STATE
• Ignitor turns off.
FLAME LOST
THERMOSTAT SATISFIED
R7184 SHUTS OFF:
• Burner Motor
• Solenoid Valve
• LED Diagnostic Light
RETURNS TO IDLE STATE
LOCKOUT STATE
R7184:
• Shuts off burner motor
• Shuts off igniter
• Shuts off Solenoid Valve
• Fast Flashes LED Diagnostic Light
TO EXIT LOCKOUT PRESS RESET
RECYCLE TIMER STARTS
R7184:
• Shuts off Solenoid Valve
• Shuts off Ignitor
• Shuts off Burner Motor
• Slow Flashes LED diagnostic light
RECYCLE TIMER EXPIRES (60 SECONDS
R7184 SEQUENCE of OPERATION

R7184 LED DIAGNOSTIC LIGHT

The LED diagnostic light has several functions. It indicates the state or mode in which the oil burner is operating. It will also indicate fault conditions, and help determine cad cell resistance while the burner is operating.

NORMAL CONDITIONS:

The LED diagnostic light will turn on when the burner enters the carryover state; the point at which ignition spark is on, and will remain on through the run state, where the ignition spark is terminated but the burner continues to fire.

The LED diagnostic light will turn off at the end of the burner cycle as the R7184 enters the idle state, and will remain off until the next heating cycle.

FAULT CONDITIONS:

If the LED diagnostic light is flashing quickly; 1 Hz (½ second on / ½ second off), the R7184 is in the lockout state or in restricted mode. To exit the lockout state, press the reset button.

If the LED diagnostic light is flashing slowly; ¼ Hz (2 seconds on / 2 seconds off), the R7184 is in the recycle state. This indicates that flame sensing was lost after the lockout timer expired during the ignition carryover state. The R7184 will return to the idle state within 60 seconds.

CAD CELL CONDITION:

If the LED diagnostic light is off, the cad cell is not sensing flame.

If the LED diagnostic light is on, the cad cell is sensing flame, or viewing ambient light.

The resistance of the cad cell may be checked while the R7184 is in the run state by pressing the reset button. The LED diagnostic light will flash the following code:

Table C-1: Cad Cell Resistance

Flashes	Resistance in Ohms
1	Less than 400
2	Between 400 - 800
3	Between 800 – 1600
4	Between 1600 - 5000

Troubleshooting

IMPORTANT:

Due to the potential hazard of line voltage, only a trained, experienced service technician should perform the troubleshooting procedure.

PRELIMINARY STEPS:

Check the diagnostic light for indications of burner condition. Refer to R7184 LED DIAGNOSTIC LIGHT section for details.

⚠CAUTION

When simulating a call for heat at the R7184, disconnect at least one thermostat lead wire from the T1 - T2 terminals to prevent damage to the thermostat. Neglecting this procedure may burn out the heat anticipator of a standard 24 VAC thermostat, or cause harm to components within a micro-electronic thermostat.

Before checking the oil primary control, perform these preliminary checks, (repair or replace controls as necessary):

- check the power supply; fuse box or breaker, any service switches, all wiring connections, and burner motor reset button (if equipped).
- check the limit switches to ensure that the switch contacts are closed.
- check the electrode gap and position.
- check the contacts between the oil primary control and the electrodes.
- check oil supply (tank gauge).
- check the oil nozzle, oil filter, and oil valves.
- check the piping or tubing to the oil tank.
- check the oil pump pressure.

CHECK OIL PRIMARY CONTROL AND IGNITOR

If the trouble does not appear to be in the burner or ignition hardware, check the oil primary control and the ignitor by using the following equipment:

screwdriver.

voltmeter (0 - 150 VAC)

insulated jumper wires with both ends stripped.

⚠WARNING

Electrical Shock Hazard.

Troubleshooting is done with the system powered. Be careful to observe all necessary precautions to prevent electrical shock or equipment damage.

Preliminary Checks:

Make sure that limit switches are closed and that contacts are clean.

Check for line voltage power on the oil primary control black and white lead wires.

Refer to Table C-4 or C-5 for further troubleshooting information.

R8184N NOTES

The R8184N oil primary control is a standard intermittent ignition control with a 45 second timing.

The low voltage wires to the L4064W fan/limit controller must be connected to “F2” and “T2”. Incorrect wiring connections will cause nuisance lockouts.

The R8184N oil primary control has an enhanced power supply to enable powering the L4064W fan/limit controller heater circuit. Substitute oil primary controls such as the R8184G and others will not work with this system.

Cad cell resistance can be checked with an ohmmeter. During normal combustion, the resistance should be less than 1500 Ω, preferably under 900 Ω. To measure the resistance, start the oil burner. After one minute of operation, place a temporary jumper across “F1” and “F2”. Remove one of the cad cell wires then read the resistance by connecting the ohmmeter probes to the two cad cell wires. Next, remove the jumper. The oil burner should stop immediately. Shut off the power to the furnace then refasten the cad cell wire to the terminal from which it was removed. Restore power to the furnace to continue normal operation.

TABLE C-2: R7184 TROUBLESHOOTING

Condition: Burner motor does not start when there is a call for heat.

Procedure	Status	Corrective Action
1. Check that limit switches are closed and contacts are clean. This includes the burner motor reset button.	N/A	N/A
2. Check for line voltage power at the oil primary control. Voltage should be 120 Vac between the black and white lead wires on the oil primary control.	N/A	N/A
3. Check indicator light with burner off, no call for heat (no flame).	Indicator light is on.	Cad cell is defective, sees external light, or connections have shorted. Go to step 4.
	Indicator light is off.	Go to step 5.
4. Shield cad cell from external light.	Indicator light turns off.	Eliminate external light source or permanently shield cad cell.
	Indicator light stays on.	• Replace cad cell with new cad cell and recheck. • If indicator light does not turn off, remove yellow leadwires from R7184 and recheck. • If indicator light is still on, replace the R7184 control. • If the indicator light turns off, replace cad cell bracket assembly.
5. Jumper thermostat (T -T) terminals on R7184 IMPORTANT First remove one thermostat lead wire.	Burner starts.	Trouble is in thermostat circuit. Check thermostat wiring connections. If connections are clean and tight, check thermostat wires for continuity.
	Burner does not start.	• Disconnect line voltage power and open line switch. • Check all wiring connections. • Tighten any loose connections and recheck. • If burner still doesn't start, replace R7184
		If burner still doesn't start, check the oil burner motor. It may be seized or burned out.

Condition: Burner starts then locks out on safety with indicator light flashing at 1 Hz rate (½ second on, ½ second off)

Procedure	Status	Corrective Action
1. Check that the limit switches are closed and contacts are clean.	- - -	- - -
2. Check for line voltage power at the oil primary control. Voltage should be 120 vac (nominal)	- - -	- - -
3. Check indicator light with burner off, no call for heat (no flame).	Indicator light is on.	Cad cell or controller is defective, sees external light, or connections are shorted. Go to step 4.
	Indicator light is off.	Go to step 5.

Continues on next page

Table C-2: R7184 Troubleshooting *continued from previous page*		
Procedure	**Status**	**Corrective Action**
4. Shield cad cell from external light.	Indicator light turns off.	Eliminate external light source or permanently shield cad cell.
	Indicator light stays on.	4. Replace cad cell with new cad cell and recheck. 5. If indicator light does not turn off, remove cad cell leadwires from R7184 and recheck. 6. If indicator light turns off, replace cad cell bracket assembly. 7. If indicator light does not turn off, replace controller.
5. Jumper thermostat (T -T) terminals on R7184	Burner starts.	Trouble in thermostat or limit circuit. Check thermostat or limit wiring connections.
IMPORTANT First remove one thermostat lead wire.	Burner does not start.	Disconnect the line voltage power and open line switch. Check all wiring connections. Tighten any loose connections and recheck. If burner does not start, replace R7184

Condition: Burner starts then locks out on safety with indicator light flashing at 1 hz rate (½ second on, ½ second off)

6. Reset oil primary control by pushing in and releasing red reset button.	Indicator light stops flashing.	Go to Step 7.
	Indicator light continues to flash at 1 Hz rate.	Verify that the control is not in restricted mode. (See notes at end of this table.). If not in restricted mode, replace R7184
7. Listen for spark after burner turns on (after 2 second delay).	Ignition is off	Spark ignitor could be defective. Check for line voltage at ignitor terminals. If line voltage is present, replace R7484.
	Ignition is on.	Go to Step 8.
	Ignition is on but no oil is being sprayed into the combustion chamber.	Wait for "Valve ON" delay to complete. Check oil supply, and oil line valve. Check for filter blockage or seized oil pump.
8. Check indicator light after flame is established, but before oil primary control locks out.	Indicator light is on until the control locks out and starts flashing during lockout.	Replace R7184
	Indicator light stays off.	Go to step 9.
9. Check cad cell sighting for view of flame. • Disconnect line voltage power and open line switch. • Unplug cad cell and clean cad cell face with soft cloth. Check sighting for clear view of flame. Replace cad cell in socket. • Reconnect line voltage power and close line switch. • Start burner.	Burner locks out.	Go to step 10.
	Burner keeps running.	System is OK.

Continues on next page

Table C-2: R7184 Troubleshooting *continued from previous page*

Procedure	Status	Corrective Action
10. Check cad cell. • Disconnect line voltage power and open line switch. • Remove existing cad cell and replace with new cad cell. • Disconnect all wires from thermostat terminals to ensure that there is no call for heat. • Reconnect line voltage power and close line switch. • Expose new cad cell to bright light such as a flashlight.	Indicator light is on.	Remount control onto burner housing. Go to step 6.
	Indicator light is off.	Go to step 11.
11. Check cad cell bracket assembly. • Disconnect line voltage power and open line switch. • Remove cad cell wires from quick connect connectors on the and leave control leadwires open. • Apply power to device. • Place jumper across cad cell terminals after burner motor turns on.	Indicator light is on.	Replace cad cell bracket assembly.
	Indicator light is off.	Replace R7184.
NOTE: Restricted Mode - (Limited Reset): In order to limit the accumulation of unburned oil in the combustion chamber, the control can be reset only 3 times, after which, the control locks out. The reset count returns to zero each time a call for heat is successfully completed. To reset from RESTRICTED MODE: press and hold the reset button for 30 seconds. When the LED flashes twice, the device has reset.		
NOTE: Disable function: Pressing and holding the reset button will disable all functions until the button is released. The burner will restart at the beginning of the normal heat cycle on SAFETY CHECK.		

TABLE C-3: SYSTEM AND GENERAL TROUBLESHOOTING

Problem	Possible Cause	Remedy
Furnace will not start.	Thermostat not calling for heat.	Check thermostat and adjust. Also, check thermostat for accuracy; if it is a mercury switch type, it might be off level.
	No power to furnace.	Check furnace switch, main electrical panel furnace fuse or circuit breaker. Also look for any other hand operated switch, such as an old poorly located furnace switch, which was not removed during furnace replacement.
	Thermostat faulty.	Remove thermostat wires from oil primary control terminals T-T. Place a jumper across T-T. If furnace starts, replace thermostat, thermostat sub-base (if equipped), or both.
	Oil primary control faulty.	Check reset button on oil primary control. Remove thermostat wires from oil primary control terminals T1 - T2. Check for 24v across T -T. If no voltage is present, check for 115v to oil primary control. If 115v is present, go to Table C-2.

Continues on next page

Table C-3: System and General Troubleshooting *continued*

Problem	Possible Cause	Remedy
Furnace will not start.	Photo Cell wiring shorted or room light leaking into photo cell compartment	Check photo cell (cad cell) wiring for short circuits. Also, check for room light leaking into cad cell compartment. Repair light leak if necessary. See Table C-2.
	Open safety switch.	Check for open limit or auxiliary limit. Also, check internal wiring connections; loose connectors, etc.
Furnace will not start without first pushing oil primary control reset button. (Happens on frequent basis)	No fuel oil.	Check fuel oil supply. Check that all hand operated fuel oil valves are in the open position. Fill oil storage tank if necessary.
	Clogged nozzle.	Replace nozzle with high quality replacement. Use rating plate or Tables in Appendix A as a guide.
	Clogged oil filter.	Replace oil tank filter or in-line filter if used.
	Low oil pump pressure.	Connect pressure gauge to oil pump. Adjust pump pressure, or replace oil pump if necessary. Ensure that erratic pressure readings are not caused by defective fuel oil line.
	Air getting into fuel oil lines, or fuel oil line dirty, clogged, or in some manner defective.	Check fuel oil lines. Replace any compression fittings found with high quality flared fittings. Check for any signs of oil leaks. Any oil leak is a potential source of air or contaminants.
	Defective burner motor.	Check burner motor. If burner motor is cutting out on over-load, determine why. Replace if necessary.
Furnace starts, but cuts out requiring manually resetting the oil protector reset button.	Photo Cell (Cad Cell) defective.	If cad cell is dirty, clean it. (Determine why cad cell is getting dirty). If cad cell is poorly aimed, realign it. NOTE: The photocell should have a resistance of 100K Ω in absence of light; a maximum of 1500 Ω in the presence of light. Ensure that room light is not leaking into the cad cell compartment. (see diagnostic light section, or manually measure cad cell resistance).
Furnace starts, but cuts out requiring manually resetting the oil protector reset button.	No fuel oil.	Check fuel oil supply. Check that all hand operated fuel oil valves are in the open position. Fill oil storage tank if necessary.
	Clogged nozzle.	Replace nozzle with high quality replacement. Use rating plate or Tables in Appendix A as a guide.
	Clogged oil filter.	Replace oil tank filter or in-line filter if used.
	Low oil pump pressure.	Connect pressure gauge to oil pump. Adjust pump pressure, or replace oil pump if necessary. Ensure that erratic pressure readings are not caused by defective fuel oil line.
	Air getting into fuel oil lines, or fuel oil line dirty, clogged, or in some manner defective.	Check fuel oil lines. Replace any compression fittings found with high quality flared fittings. Check for any signs of oil leaks. Any oil leak is a potential source of air or contaminants.
	Defective burner motor.	Check burner motor. If burner motor is cutting out on over-load, determine why. Replace if necessary.
	Water or contaminants in oil.	Drain fuel oil storage tank; replace fuel oil. (Consult with fuel oil supplier).
	Frozen oil line.	Gently warm oil line. Insulate oil line. (Outdoor piping size may require increased diameter).
Oil burner sputtering at nozzle	Electrodes out of adjustment or defective.	Check electrode settings. Check electrodes for dirt build-up or cracks in porcelain.
	Poor transformer high voltage connections or defective transformer.	Check contacts between the igniter and electrodes. If OK, replace the igniter
	Fuel oil filter clogged.	Replace fuel oil storage tank filter and / or fuel oil in-line filter.
	Defective oil pump.	Check burner motor / fuel oil pump coupling. Check oil pump pressure. Replace fuel oil pump if necessary.
	Fuel oil line partially clogged or contains air.	Bleed air from oil line. If problem persists, replace oil line.

Continues on next page

Table C-3: System and General Troubleshooting *continued*

Problem	Possible Cause	Remedy
Excessive fuel oil consumption.	System temperature rise too high.	System temperature rise ideally should not exceed 85°F. Check for clogged air filters. Check blower fan for excess dirt build-up or debris. Speed up blower fan if necessary.
	Poor "fan off" delay timing selection, (fan stops too soon).	Check "fan off" delay timing setting. Use a duct thermometer in the supply air plenum take-off or first few inches of the supply air trunk duct. Ideally, the fan will shut off at a temperature of 90° - 100°F. Manipulate the dip switch settings to come as close as possible to this "fan off" temperature.
	Fuel oil leak.	Check fuel oil line for leaks. Repair or replace if necessary.
	Stack temperature too high.	Check stack temperature. Stack temperatures will normally range from 350° to 450°F. Check draft regulator. Draft should be set to 0.02 in. w.c.
	Thermostat improperly adjusted or in poor location.	Check thermostat heat anticipator setting against measured amperage draw. Increase heat anticipator setting if necessary. If the thermostat is being influenced by drafts, sunlight, duct work, etc., relocate to more suitable location.
Too much smoke.	Insufficient combustion air adjustment at oil burner, or improper draft pressure.	Adjust the oil burner combustion air band and draft regulator to gain the highest practical CO_2 or lowest practical O_2 content in the flue gases. See Burner Set Up.
	Heat exchanger partially clogged.	Check for soot build-up in heat exchanger flue passages, especially in the outer radiator.
Soot building up on blast tube (end coning).	Poor alignment between oil burner blast tube and fire pot.	Check alignment. air tube should be centered with fire pot burner opening. Oil burner head should be ¼ inch back from the inside surface of the fire pot.
	Flame impingement caused by Incorrect nozzle angle.	Check nozzle size and angle. (See Appendix A). Check distance from head to inside surface of the fire pot.
	Defective fire-pot	Check fire-pot. Repair or replace.
Furnace will not warm home to desired temperature.	Airflow blocked or dirty air filter.	Clean or replace air filter.
	Thermostat adjustments or location.	Check thermostat heat anticipator setting against measured amperage draw. Increase heat anticipator setting if necessary. If the thermostat is being influenced by drafts, sunlight, duct work, etc., relocate to more suitable location.
	Insufficient airflow.	Check all dampers. Open closed dampers including registers in unused rooms. Check system temperature rise. If temperature rise is too high, speed up blower fan.
	Defective high limit control.	Test high limit function of all limit switches. Use a duct thermometer to assess accuracy of limit control. Check for obstructions to airflow around limit switch bi-metal elements. Replace control if necessary.
	Under-sized nozzle.	Check nozzle. If problem is not caused by air flow problems, use larger nozzle, if permitted by rating plate.
	Blower fan motor stopping intermittently on overload.	Check blower fan motor amperage draw. Check motor ventilation ports, clean if necessary. Replace motor if necessary.
	Burner motor stopping intermittently on overload.	Check burner motor. Replace if necessary.
Home does not heat evenly	Improper distribution of heat.	This is not likely to be a furnace problem. Balance duct system.

Continues on next page

Table C-3: System and General Troubleshooting *continued*

Problem	Possible Cause	Remedy
Supply air temperature too hot.	Airflow blocked or dirty air filter.	Clean or replace air filter.
	Insufficient airflow.	Check all dampers. Open closed dampers including registers in unused rooms. Check system temperature rise. If temperature rise is too high, speed up blower fan.
Supply air temperature too cool.	Excess airflow.	Check system temperature rise. Slow down blower fan if necessary.
	Excessive duct losses.	Check supply air ductwork. Seal leaky joints and seams. Insulate ductwork if necessary.
Supply air temperature too cool during first moments of furnace cycle.	Fan control "fan on" setting too low.	Increase differential between fan control "fan off" and "fan on" settings. (L4064B, L6064A fan / limit controls only, no adjustments available for L4064W fan / limit control). Register air deflectors may help.
	Excessive duct losses.	Check supply air ductwork. Seal leaky joints and seams. Insulate ductwork if necessary.

P4LBX20F19001 ASSEMBLY NOTES

The P4LBX20F19001 oil-fired furnace is shipped in two pieces; the furnace section and the blower section. These two sections must be assembled together at the installation site.

1. Remove the crating and packaging materials from each section. Remove the flue pipe flange gasket packed with the furnace section. The flue pipe gasket will be lying loose on the floor of the furnace section.
2. Remove the shipping brace from the furnace section flue pipe flange and cabinet. Remove and save all of the screws from the flue pipe flange, and the ten screws from the rear edges of the furnace section cabinet, (5 per side). The screws will be re-used.
3. Place the furnace section and blower section in close proximity. Route the wiring harness from the base of the furnace section through the plastic grommet in the blower section blower division panel.
4. Position and align the flue pipe flange gasket between the furnace section and blower section flue pipe flanges, and hold it in place with a pair of awls or similar tool.
5. Begin fastening the flue pipe flanges together from inside the blower section to the furnace section with the six ¼-20 x ¾ inch screws saved from the removal of the shipping brace. Start each screw carefully so as not to damage the flue pipe flange gasket. After all six screws have been started, and proper gasket alignment has been confirmed, tighten all six screws evenly.
6. Align the screw holes in the blower section blower division panel with the screw holes in the furnace section cabinet rear edge, from which the ten screws were removed. The screws are started from the inside of the blower section to the furnace section. Tighten all ten screws evenly.
7. In a similar manner, start four of the extra screws removed and saved from the furnace section flue pipe flange into the screw holes along the top of the two furnace sections.
8. Remove the blower motor electric wiring cover plate. Connect the black lead from the wiring harness to motor terminal L1, the white lead to motor terminal L2, and the green lead to the motor casing ground terminal. Position the wires in the motor casing indentations and reinstall the blower motor electric wiring cover plate.

P3DHX SERIES DOWNFLOW CONFIGURATION NOTES

When the P3DHX12F08001 or P2DHX16F12001 are installed in the downflow configuration on a wooden floor, it should be mounted on a sub-base.

The sub-base provides a means of maintaining the supply air plenum clearance to combustibles, and a means of mating the supply air plenum to the furnace.

Model	Sub-base
P3DHX12F08001	1CB1312
P2DHX16F12001	1CB0316

If the furnace is to be installed on a wood floor over joists on 12 inch or 16 inch centers, framing modifications are necessary.

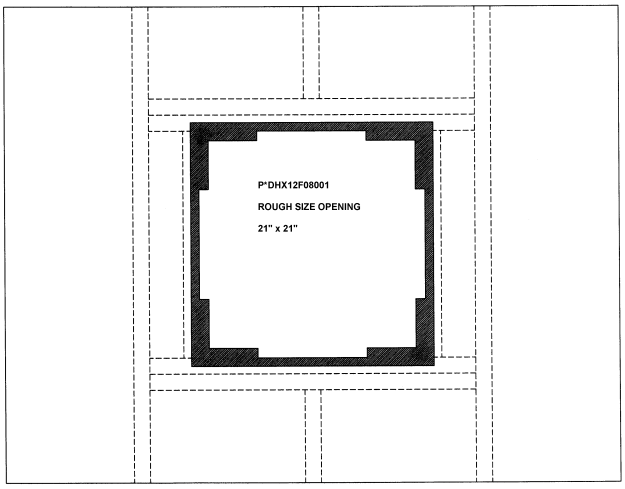
Rough Size Openings:

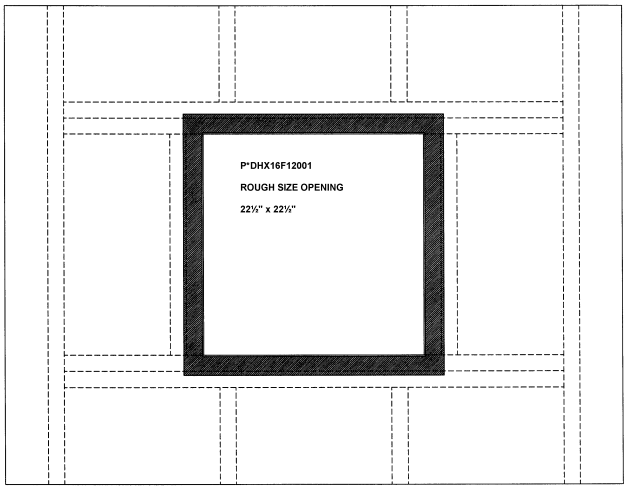
P3DHX12F08001: 21” x 21”.

P2DHX16F12001: 22½” x 22½”.

The edges of the rough size opening must be well supported by the joist framing to take the weight of the furnace.

The sub-base may support the supply air plenum. Fold a ¾ inch, 90° flange, then drop the supply air plenum through the sub-base opening. The flanges will rest on the sub-base, and the furnace placed on the flange will lock the plenum into place.





The above diagrams show typical approaches to framing the rough size opening for the P*DHX series furnaces. Be sure to follow local building code requirements with respect to framing modifications.

P3DHX12F08001 VESTIBULE KIT

When the P3DHX12F08001 furnace is installed in the downflow position, the Part No. 1VP1280 Vestibule Kit may be used. The vestibule kit encloses the oil burner assembly and provides a pleasing exterior finish.

NOTE: The vestibule kit should be installed before installation of the electrical wiring, venting and fuel line or lines.

1. Fasten the right hand panel to the base panel using 2 10-¾ sheet metal screws. The right hand panel has the large opening in the lower end to accommodate a combustion air pipe to the oil burner. The base panel has screw holes along the rear edge, which will later be used to fasten the vestibule to the furnace.
2. Fasten the left hand panel to the base panel using 2 10-¾ sheet metal screws.
3. Fasten the top panel to the two sides using 10-¾ sheet metal screws, 3 per side.

Note the pattern of small and large holes along the base panel and two side panels. The vestibule unit will use the screws in the front of the furnace which correspond to the small holes noted above.

4. Remove the sheet metal screws in the furnace front panel which correspond to the <u>small holes only</u> along the rear edge of the vestibule base and side panels.

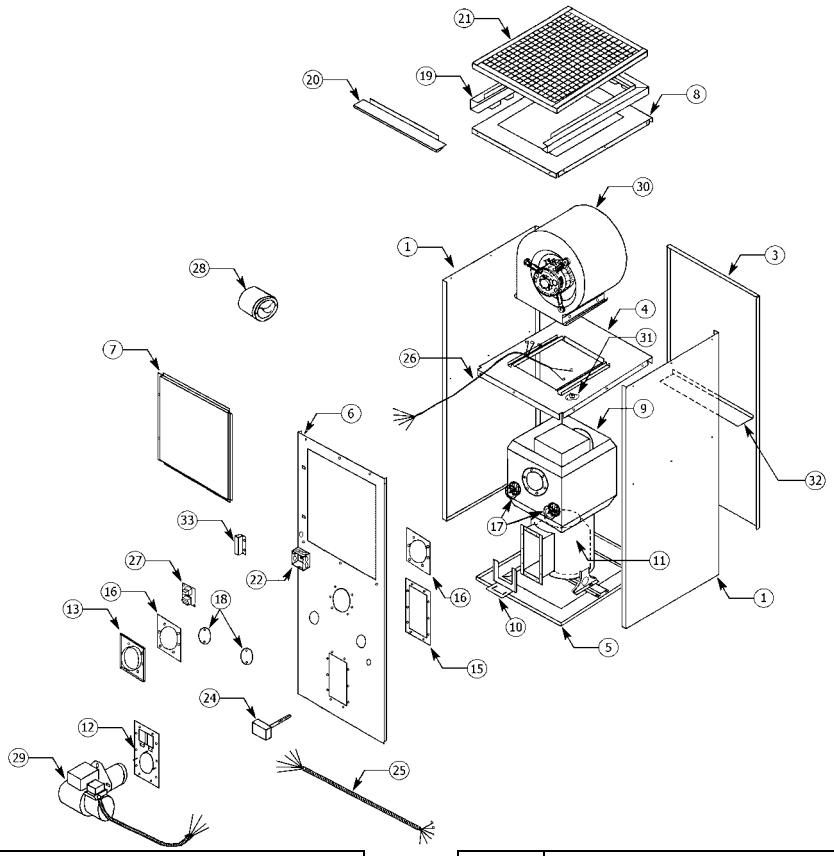
NOTE: Do not remove all screws from the front panel of the furnace.

5. Place the assembled vestibule against the front panel of the furnace, and align the vestibule screw holes with the furnace front panel screw holes.
6. Fasten the vestibule into place using the screws which were removed from the furnace.

HINT: To help with fastener alignment, do not tighten any of the screws all the way in until each screw has been started 2 or 3 turns.

NOTE: Extra sheet metal screws are provided with this kit in case screws removed from the furnace are accidentally dropped or lost.

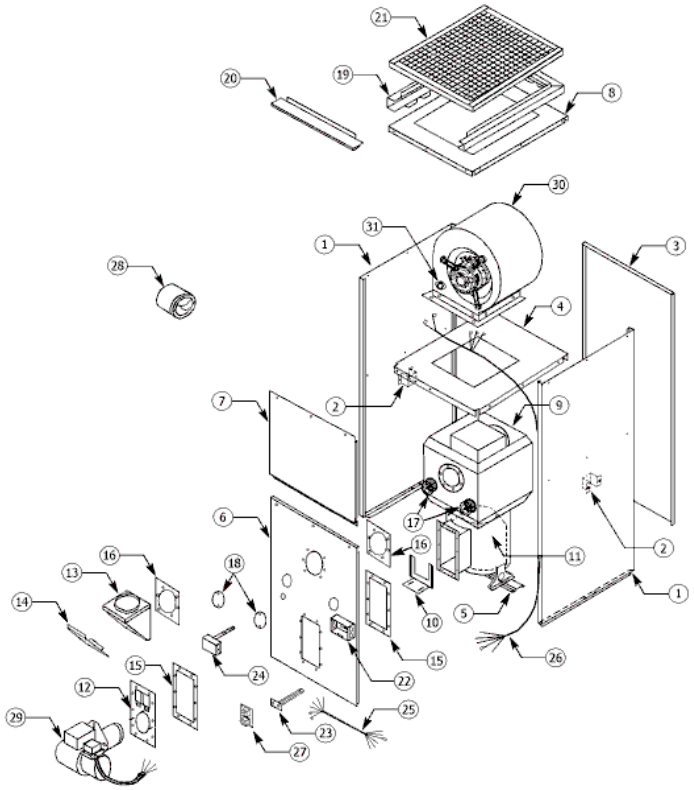
REPAIR PART LIST – P3DHX12F08001A



ITEM	DESCRIPTION
1	Assembly, Right Side Panel
2	Assembly, Left Side Panel
3	Panel, Rear
4	Assembly, Blower Division Panel
5	Assembly, Base Panel
6	Panel, Inner Front
7	Door, Blower Access
7A	Handle, Door
7B	Bezel, Logo
7C	Label, Logo
8	Panel Assembly, Top
9	Assembly, Heat Exchanger
10	Bracket, Firepot Retainer
11	Chamber, Replacement Combustion
12	Assembly, Oil Burner Mounting Plate
12A	Gasket, Inspection Door (Right)
12B	Gasket, Inspection Door (Left)
12C	Gasket, Inspection Door (Center)
13	Assembly, Flue Collector
14	
15	Gasket, Pouch
16	Gasket, Flue Pipe (2 Req'd)
17	Assembly, Radiator Cleanout Cover (2 Req'd)
17A	Gasket, Clean-out Cover (2 Req'd)
18	Cover, Casing Clean-out (2 Req'd)
19	Frame, Filter
20	End Support, Filter Frame
21	Filter, Air - 16 x 25 x 1 (Permanent)
22	Box, Junction

ITEM	DESCRIPTION
23	
24	Control, Fan & Limit (set @ 250 Deg. F.)
25	Harness, Fan & Limit Wire
26	Blower Direct, Wire Harness
27	Center, Fan
27A	Relay, Replacement
28	Regulator, Draft
29	Burner, Oil
29A	Burner, Motor
29B	Pump, Oil
29C	Ignitor, Solid State
29D	Control, Primary Combustion
29E	Combination, Air Tube
29F	Head, Flame Retention
29G	Nozzle 0.65/ 60 Deg. A
30	Assembly, Blower (Complete)
30A	Housing and Wheel, Blower
30B	Wheel, Blower
30C	Motor, Blower
30D	Band, Motor Mount
30E	Arms, Motor Mount (3 Req'd)
30F	Capacitor, Run
30G	Strap, Capacitor
30H	Insulator, Capacitor
30I	Side Rail, Blower (2 Req'd)
30J	Bracket Blower Front
31	Limit, Auxillary (160 Deg. F.)
32	Baffle, Rear Panel
33	Retainer Channel, Wire

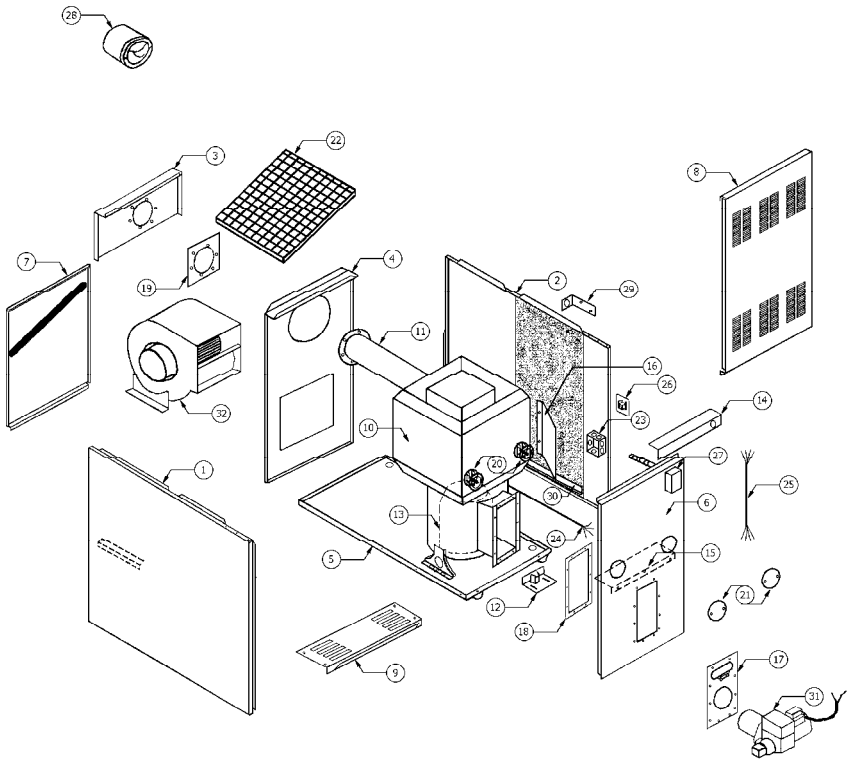
REPAIR PART LIST – P2DHX16F12001A



ITEM	DESCRIPTION
1	Side Panel, Right and Left (2 Req'd)
2	Side Panel (Heat Exchanger (2 Req'd)
3	Panel, Rear
4	Assembly, Blower Division Panel
5	Support, Base Heat Exchanger
6	Panel, Front
7	Door, Blower Access
7A	Handle, Door
7B	Bezel, Logo
7C	Label, Logo
8	Panel, End
9	Assembly, Heat Exchanger
10	Bracket, Firepot Retainer
11	Chamber, Replacement Combustion
12	Assembly, Oil Burner Mounting Plate
12A	Gasket, Inspection Door (Right)
12B	Gasket, Inspection Door (Left)
12C	Gasket, Inspection Door (Center)
13	Assembly, Flue Collector
14	Cover, Flue Collector
15	Gasket, Pouch (2 Req'd)
16	Gasket, Flue Pipe (2 Req'd)
17	Assembly, Radiator Cleanout Cover (2 Req'd)
17A	Gasket, Cleanout Cover (2 Req'd)
18	Cover, Casing Clean-out (2 Req'd)
19	Frame, Filter
20	End Support, Filter Frame
21	Filter, Air - 16 x 25 x 1 (Permanent)
22	Box, Junction
23	Limit Switch, Secondary - 200 Deg. F.

ITEM	DESCRIPTION
24	Control, Fan & Limit (set @ 220 Deg. F.)
25	Harness, Fan & Limit Wire
26	Blower Direct, Wire Harness
27	Center, Fan
27A	Relay, Replacement
28	Regulator, Draft
29	Burner, Oil
29A	Burner, Motor
29B	Pump, Oil
29C	Ignitor, Solid State
29D	Control, Primary Combustion
29E	Combination, Air Tube
29F	Head, Flame Retention (120,000 BTU)
	Head, Flame Retention (130,000 BTU)
29G	Nozzle 1.00/ 60 Deg. A
	Nozzle 1.00/ 70 Deg. A
30	Assembly, Blower (Complete)
30A	Housing and Wheel, Blower
30B	Wheel, Blower
30C	Motor, Blower
30D	Band, Motor Mount
30E	Arms, Motor Mount (3 Req'd)
30F	Capacitor, Run
30G	Strap, Capacitor
30H	Insulator, Capacitor
30I	Side Rail, Blower (2 Req'd)
30J	Bracket Blower Front
31	Limit, Auxillary (130 Deg. F.)

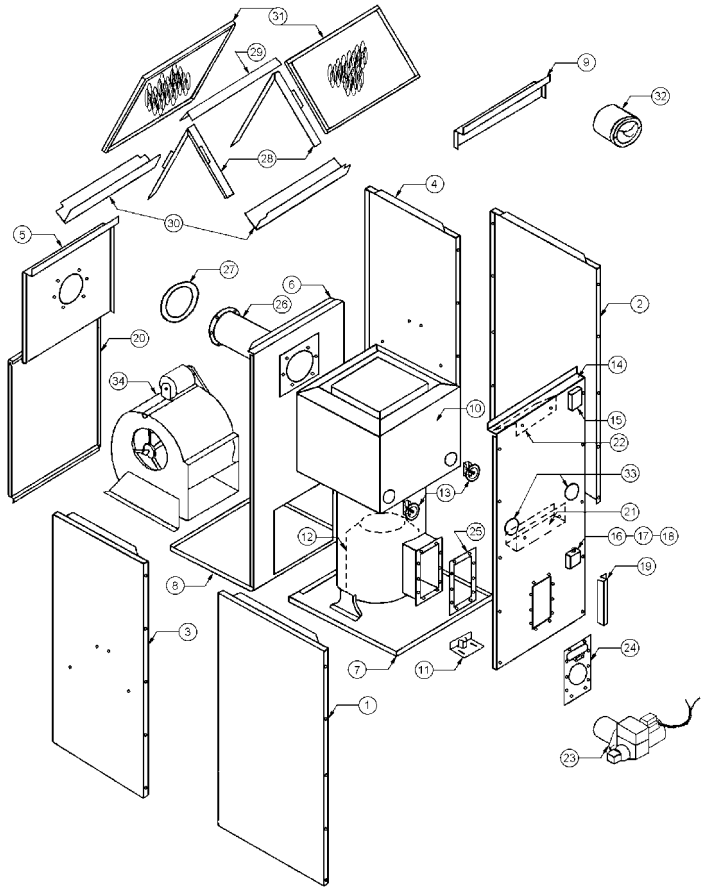
REPAIR PART LIST – P2LBX16F14501A



ITEM	DESCRIPTION
1	Panel, Side (Left)
2	Panel, Side (Right)
3	Panel, Rear (Upper)
4	Panel, Blower Division
5	Panel Assembly, Base
6	Panel, Inner Front
6A	Bezel, Logo
6B	Label, Logo
7	Door, Blower Access
7A	Handle, Door
8	Panel, Front Door
9	Panel, Top Front
10	Heat Exchanger Assembly
11	Flue Pipe Assembly
12	Retaining Bracket, Firepot
13	Chamber, Replacement Combustion
14	Baffle, Top Front
15	Baffle, Inner Front
16	Baffle, Right Side Panel
17	Mounting Plate Assy., Oil Burner
17A	Gasket, Inspection Door
18	Gasket, Pouch
19	Gasket, Flue Pipe (2 Req'd)
20	Cover Assembly, Radiator Cleanout (2Req'd)
20A	Gasket, Clean Out Cover (2 Req'd)
21	Clean-out Cover, Casing (2 req'd)
22	Filter, Air (20"x 20"x1", Permanent)
23	Box, Junction
24	Wire Harness, Blower Direct Drive
25	Wire Harness, Fan and LImit

ITEM	DESCRIPTION
26	Centre, Fan
26A	Relay, Replacement (Centre Fan)
27	Control, Fan and LImit (5", 200 Deg.)
27A	Fuse ABC 15 Amp Slow Blow
27B	Fuse Holder
28	Regulator, Draft (6")
29	Support, Fan & LImit/Insulation Retainer
30	Insulation Retainer, Side Panel (2 Req'd)
31	Burner, Oil
31A	Motor, Burner
31B	Pump, Oil
31C	Ignitor, Solid State
31D	Combustion Control, Primary
31E	Tube Combination, Air
31F	Retention Head, Flame
31G	Nozzle, (1.00/80 Deg.A)
	Nozzle, (1.20/60 Deg.A)
32	Blower Assembly, Complete
32A	Housing, Blower and Wheel
32B	Wheel, Blower
32C	Motor, Blower
32D	Mount Band, Motor
32E	Mount Arms, Motor (3 Req'd)
32F	Run Capacitor, Motor (10MFD/370VAC)
32G	Strap, Capacitor
32H	Insulator, Capacitor
32I	Blower Feet, Blower (LH)
32J	Blower Feet, Blower (RH)

REPAIR PART LIST – P4LB SERIES



ITEM	DESCRIPTION
1	Panel, Left Side (Heating Compartment)
2	Panel, Right Side (Heating Compartment)
3	Panel, Left Side (Blower Compartment)
4	Panel, Right Side (Blower Compartment)
5	Panel, Upper Rear (Blower Compartment)
6	Panel, Blower Partition
7	Panel Assembly, Base (Heating Compartment)
8	Panel Assembly, Base (Blower Compartment)
9	Panel, Upper Rear (Heating Compartment)
10	Heat Exchanger Assembly
11	Firepot Bracket Assembly
12	Combustion Chamber, Replacement
13	Clean-out Cover Assembly (Radiator) (2 Req'd)
13A	Yoke Assembly
13B	Cover, Clean-out
13C	Gasket, Clean-out Cover
14	Panel, Front
14A	Logo Bezel
14B	Logo Label
15	Control, Fan & Limit (8" Insertion, Set @ 200 Deg.F)
16	Box, Junction
17	Fuse Holder
18	Fuse (ABC-15)
19	Retainer Channel, Wire
20	Access Panel, Blower Door
20A	Handle, Door
21	Baffle, Front Panel
22	Baffle, Top Front Panel
23	Burner Assembly, Oil
23A	Motor, Burner

ITEM	DESCRIPTION
23B	Pump, Oil
23C	Ignitor, Solid State
23D	Control, Primary Combustion
23E	Air Tube Combination
23F	Retention Head, Flame (F16)
23G	Nozzle, 1.65/70 Deg.B
24	Mounting Plate Assembly, Oil Burner
24A	Door, Inspection
24B	Gasket, Inspection Door
25	Gasket, Pouch
26	Flue Pipe Assembly
27	Gasket, Flue Pipe (2 Req'd)
28	Filter Rail Assembly (2 Req'd)
29	Filter Support, Top
30	Filter Support, Front and Rear (2 Req'd)
31	Filter (2 Req'd) (Disposable 20"x 25"x 1")
	Filter (2 Req'd) (Permanent 20"x 25"x 1")
32	Regulator, Draft (7")
33	Cover, Casing Clean-out (2 Req'd)
34	Blower Assembly
34A	Housing and Wheel, Blower
34B	Motor, Blower
34C	Pulley, Motor
34D	Pulley, Blower
34E	Belt, Fan
34F	Base Feet, Blower (RH)
34G	Base Feet, Blower (LH)

REPLACEMENT PART CONTACT INFORMATION

This is a generic parts list. To request a complete parts list, refer to the contact information below:

- Call Consumer Relations at 1-877-874-7378. Follow the instructions to contact the department and/or representative that can assist you.
- Visit our website at www.source1parts.com for the following information:
  1. Search for a part or browse the catalog.
  2. Find a dealer or distributor.
  3. Customer Service contact information.
     a. Click on the “Brand Links” button
     b. Click on the “Customer Service” button
- You can contact us by mail. Just send a written request to:

York International
Consumer Relations
5005 York Drive
Norman, OK 73069

NOTES

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Unitary Products Group

5005 York Drive

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