INSTALLATION INSTRUCTION

HIGH-EFFICIENCY GAS-FIRED FURNACES INDUCED-DRAFT UPFLOW, DOWNFLOW

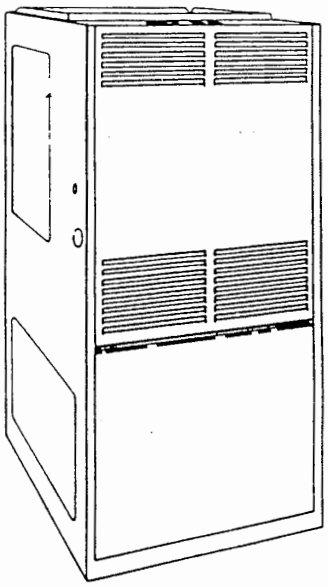
Supersedes: 650.64-N3W (191)
650.64-N3W (Supl 1) (191)

650.64-N3W (391)

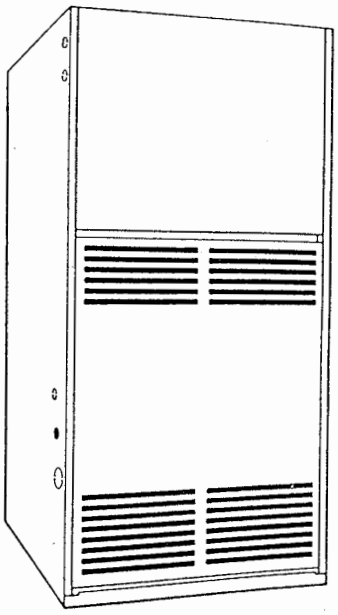
035-09107

MODELS :

PCMU (STYLE B) UPFLOW 57 thru 133 MBH INPUT
PCMD (STYLE B) DOWNFLOW 57 thru 133 INPUT
PKMU (STYLE B) UPFLOW 57 thru133 MBH INPUT
PKMD (STYLE B) DOWNFLOW 57 thru 133 MBH INPUT



UPFLOW MODELS



DOWNFLOW MODELS

FOR YOUR SAFETY

WHAT TO DO IF YOU SMELL GAS

- Do not try to light any appliance.
- Open windows.
- Do not touch any electrical switch; do not use any phone in your building.
- Extinguish any open flame.
- Immediately call your gas supplier from a neighbor's phone. Follow the gas supplier's instructions.
- If you cannot reach your gas supplier, call the fire department.

FOR YOUR SAFETY

Do not store or use gasoline or other flammable vapors and liquids in the vicinity of this or any other appliance.

WARNING: 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 gas supplier.

16. Replace the access doors and restore the electrical supply to the unit.

TROUBLESHOOTING

The following visual checks should be made before troubleshooting:

1. Check to see that the power to the furnace and the 50E47 control module is ON.
2. The manual shutoff valves in the gas line to the furnace must be open.
3. Make sure all wiring connections are secure.
4. Review the sequence of operation.

Start the system by setting the thermostat above room temperature. Observe the system's response. Then use the Troubleshooting Table on page 16 to check the system's operation.

Use the table by reading the upper left-hand box and then following the instructions in each box. If the condition described in the box is true (yes answer), go down to the next box. If the condition is not true (no answer), go to the box to the right.

Continue checking and answering the questions in the boxes until the problem is explained and corrective action is described. After any maintenance or repair, the troubleshooting sequence can be repeated until normal system operation is obtained.

WARNING: *Do not try to repair controls. Replace defective controls with CES Source 1 Parts.*

Burner Removal/Cleaning

The main burners should be checked periodically for dirt accumulation.

If cleaning is required, follow this procedure:

1. Turn off the electrical power to the unit.
2. Remove the access door.
3. Remove the igniter.
4. Turn off the gas supply at the external manual shutoff valve and loosen the ground union joint.
5. Remove the airshield.
6. Remove the four screws that hold the burner assembly to the vest panel and remove the assembly.
7. Remove burners from the burner assembly.
8. Burners may be cleaned by rinsing in hot water.
9. Reassemble the burners in the reverse order, making sure the burner shield is tightened securely in place.

Cleaning the Heat Exchanger

1. Turn off the main manual gas valve external to the furnace.
2. Turn off electrical power to the furnace.
3. Remove the upper access door.
4. Disconnect wires from HSI sensor, rollout switch and HSI igniter. Remove igniter carefully, as it is easily broken.
5. Remove the airshield. Remove the four screws that hold the burner assembly to the vestibule panel and remove the assembly. The lower portion of the heat exchanger will now be exposed.
6. Remove inducer blower and motor at the top of the furnace. Remove upper plate.
7. With upper exchanger opening exposed, remove restrictor baffle from each cell. Upper portion of the heat exchanger is now exposed.
8. With a stiff wire brush, brush inside cells at top and bottom. Vacuum loose scales and dirt from each cell.
9. Clean - vacuum all burners.
10. Replace all components in reverse order. Reconnect all wiring.
11. Restore electrical power and gas supply to the furnace.
12. Check furnace operation.

BLOWER CARE

Even with good filters properly in place, blower wheels and motors will become dust laden after long months of operation. The entire blower assembly should be inspected annually. If the motor and wheel are heavily coated with dust, they can be brushed and cleaned with a vacuum cleaner.

The procedure for removing the blower assembly for cleaning is as follows:

1. Disconnect the electrical supply to the furnace.
2. Remove the access panels.
3. Disconnect the two wire harness plugs from the top of the control box.
4. Remove the four screws holding the control box and position it out of the way.

NOTE: Steps 5, 6, and 7 apply to downflow models only.

5. Disconnect the flue pipe at the top of the unit.
6. Loosen the screws holding the top panel and move the panel aside.
7. Lift out the flue passage pipe an inner flue pipe as an assembly and set aside.
8. Remove the screws which retain blower to blower deck.
9. Remove the blower assembly with the control wiring still attached.
10. Vacuum the motor and the blower using a soft brush attachment. Care must be used not to disturb any balance weights (clips) on the blower wheel vanes.
11. Before reinstalling the blower assembly, inspect the heat exchanger which is visible in the blower opening of the blower deck. If it requires cleaning, vacuum it with a soft brush attachment.
12. Reinstall the blower assembly. Replace mounting screws that hold the blower assembly to the front portion of the blower deck. Two mounting screws used on the sides of the blower are used for shipping purposes only, and are not necessary after the furnace has been installed.

NOTE: Steps 13 and 14 apply to downflow models only.

13. Replace the flue passage pipe/inner flue pipe assembly and top panel.
14. Connect the flue pipe at the top of the unit.
15. Reinstall the control box and reconnect the wiring harness plugs.

OPERATION AND MAINTENANCE

SEQUENCE OF OPERATION

Hot Surface Ignition System

WARNING: Do not attempt to relight this furnace by hand(with a match or any other means). There may be a potential shock hazard from the components of the hot surface ignition system. The furnace can only be lit automatically by its hot surface ignition system.

The following describes the sequence of operation of the furnace. Refer to the schematic wiring diagram (page 15) for component locations.

CONTINUOUS BLOWER

On cooling/heating units with fan switch, when the fan switch is set in the ON position, a circuit is completed between terminals R and G of the thermostat. This energizes the 1R relay. Contact 1R-1 closes and contact 1R-2 opens. The motor is energized through the black, high speed tap. The blower then operates on high speed.

INTERMITTENT BLOWER

When the system is set on HEAT and the fan switch is set on AUTO, and the room thermostat calls for heat, a circuit is completed between terminals R and W of the thermostat. This energizes the venter relay 3R, which energizes the venter. When the proper amount of combustion air is being provided, a pressure switch (1LP) activates the 50E47 ignition control. The rollout switch control, primary limit and auxiliary limit are also in this circuit and must be in the closed position for the ignition control to be activated.

The 50E47 ignition control provides a 45-second warm-up period. The gas valve then opens for four (4) seconds.

As gas starts to flow and ignition occurs, the flame sensor begins its sensing function. If a flame is detected within four (4) seconds after ignition, normal furnace operation continues until the thermostat circuit between terminals R and W is opened. After approximately 60 seconds (or the supply air temperature reaches 155° to 125°F), the fan switch closes.

When the thermostat opens, the venter is de-energized, along with the ignition control. With the ignition control de-energized, the gas flow stops and the burner flames are extinguished.

The blower motor continues to operate until the supply air temperature drops to between 85°and 100°F. When this occurs, the fan switch opens, de-energizing the blower motor. The heating cycle is then complete, and the unit is ready for the start of the next heating cycle.

If flame is not detected in the four second sensing period, the gas valve is de-energized. The 50E47 control is equipped with a re-try option. This provides a 60-second wait following an unsuccessful ignition attempt (flame not detected). After the 60 second wait, the ignition sequence is restarted with an additional 10 seconds of igniter warm-up time. If this ignition attempt is unsuccessful, one more re-try will be made before lockout.

50E47 SERIES HOT SURFACE IGNITION CONTROL

All White-Rodgers 50E47 controls will repeat the ignition sequence for a total of five (5) recycles is flame is lost within the first 10 seconds of establishment.

If flame is established for more than 10 seconds after ignition, the controller will clear the ignition attempt (re-try) counter. If flame is lost after 10 seconds, it will restart the ignition sequence. This can occur a maximum of five (5) times.

During burner operation, a momentary loss of power of 50 milliseconds or longer will drop out the main gas valve. When power is restored, the gas valve will remain de-energized, and a restart of the ignition sequence will begin immediately.

A momentary loss of gas supply, flame blowout, or a shorted or open condition in the flame probe circuit will be sensed with 0.8 seconds. The gas valve will de-energize and the control will restart the ignition sequence after waiting 60 seconds. Recycles will begin and the burner will operate normally if the gas supply returns, or the fault condition is connected prior to the last ignition attempt. Otherwise, the control will lock out.

If the control is locked out, it may be reset by momentary power interruption of 1/20 second or longer. Either the 24-volt thermostat or line voltage may be interrupted.

MAINTENANCE

Air Filters

The filters should be checked periodically for dirt accumulation. Dirty filters greatly restrict the flow of air and overburden the system.

Clean the filters at least every three months. See the section titled "Filters" for filter removal instructions. On new construction, check the filters every week for the first four weeks. Inspect the filters every three weeks after that, especially if the system is running constantly.

All filters supplied with the furnace are the high-velocity, cleanable type. Clean these filters by washing in warm water. Make sure to shake all the water out of the filter and have it reasonably dry before installing it in the furnace. When replacing filters, be sure to use the same size and type as originally supplied.

Lubrication

Blower motors in these furnaces are permanently lubricated and do not require periodic oiling.

NOTE: *To find the Btuh input, multiply the number of cubic feet of gas consumed per hour by the BTU content of the gas in your particular locality. Contract your gas company for this information, as it varies widely from city to city.*

EXAMPLE: It is found by measurement that it takes 26 seconds for the hand to turn on the 2 cubic foot dial to make a revolution with only a 120,000 Btuh furnace running. Using this information, locate 26 seconds in the first column of Table 4. Read across to the column headed "1 Cubic Foot" where you will see that 138 cubic feet of gas per hour ar consumed by the furnace at that rate. Multiply 138 by 850 (the BTU rating of the gas obtained from the local gas company). The result is 117,300 Btuh, which is close to the 120,000 Btuh rating of the furnace.

CAUTION: *Be sure to relight any gas appliances that were turned off at the start of this input check.*

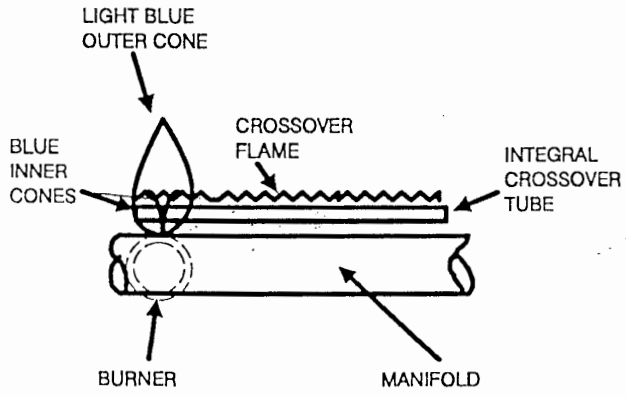


FIGURE 6 - PROPER FLAME APPEARANCE

ADJUSTMENT OF TEMPERATURE RISE

The temperature rise, or temperature difference between the return air and the heated air from the furnace, must be within the range shown on the furnace rating plate and within the application limitations shown in Tables 1 and 2. After the temperature rise has been determined, the cfm can be calculated.

After about 20 minutes of operation, determine the furnace temperature rise. Take readings of both the return air and the heated air in the ducts, about six feet from the furnace where they will not be affected by radiant heat. Increase the blower speed to decrease the temperature rise; decrease the blower speed to increase the rise.

All direct-drive blowers have multi-speed motors. Refer to the unit wiring diagram and connect the blower motor for the desired sped. The blower motor speed taps are located in the control box in the blower compartment.

ADJUSTMENT OF FAN CONTROL SETTINGS

Place a thermometer in the heated air duct, about six feet from the furnace, where it won't be affected by radiant heat. Usually the fan control is set so that the thermometer reads about 125° F when the blower starts, and about 85° F when it stops.

The Fan On setting of the fan control must be high enough to allow the air in the furnace to be heated enough so that no cold air is blown into the heated space, but no so high that the furnace might be damaged by excessive heat.

To adjust the Fan On setting (Upflow Models Only):

1. Turn the furnace on.
2. Read the thermometer when the blower starts.
3. If this temperature is too high when the blower starts, lower the fan on setting. If the temperature is too low, raise the setting.
4. If adjustments are made to the fan on setting, check the operation of the furnace by repeating the previous steps.

The Fan Off setting must be low enough to adequately cool the furnace, but not so low that cold air is blown into the heated space.

To adjust the Fan Off setting:

1. Turn the furnace on.
2. Let the furnace operate for 20 minutes.
3. Turn the furnace off.
4. Read the thermometer when the blower stops.
5. If this temperature is too high when the blower stops,lower the fan off setting. If the temperature is too low, raise the setting.
6. If adjustments are made to the fan off setting, check the operation of the furnace by repeating the previous steps.

CAUTION: *When fan on and fan off adjustments are made, be careful not to rotate the fan control dial. If the dial is allowed to rotate, the control could be damaged and operate erratically.*

CHECKING LIMIT CONTROL

With the main burners operating, cover all return air grilles with paper to restrict the flow of return air. In a few minutes the burners should be shut off by the limit control. Remove the return air restrictions. The main blower will cool the unit. The limit switch should reclose and the main burners relight after the proper re-start period.

ADJUSTMENT OF MANIFOLD GAS PRESSURE

Measure the manifold gas pressure. The manifold pressure should be set at 3.5" W.C. for natural gas.

This manifold pressure should easily be attainable when the line pressure is between the maximum and minimum supply pressures stated on the rating plate. The minimum supply pressure listed on the rating plate should only be used if a higher pressure within the allowable range is not attainable.

Refer to Figure 5 (Gas Valve) for plug location for installing pressure tap to check gas pressure to burners.

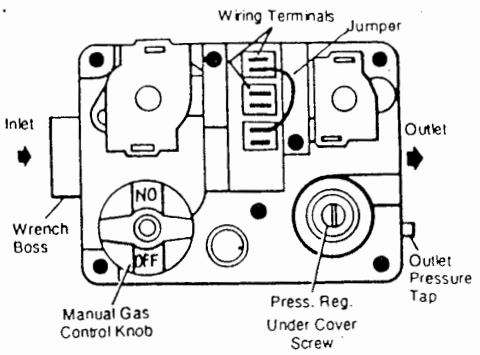


FIGURE 5 - GAS VALVE (White-Rodgers 36E01)

WARNING: *The stated gas pressure should always be used. If the pressure is too high, overfiring and premature failure of the heat exchanger could occur. If the pressure is too low, sooting and eventual clogging of the heat exchanger could occur.*

NOTE: *The screw-off cap for the pressure regulator must be removed entirely to gain access to the adjustment screw. Loosening or tightening the cap does not adjust gas flow.*

The gas flow may be adjusted by turning the pressure regulator adjustment screw clockwise to increase the pressure or counter-clockwise to decrease the pressure.

WARNING: *Once the correct gas pressure to the burners has been established, turn the gas valve knob to OFF and turn the electrical supply switch OFF; then, remove the pressure tap at the gas valve and re-install the plug using a compound (on the threads) resistant to the action of LP gases. Replace cap on regulator adjusting screw.*

Turn the electrical and gas supplies back on, and with the burners in operation, check for gas leakage around the plug with a soap and water solution.

ADJUSTMENT OF PRIMARY AIR

The main burners should be in operation for 15 minutes before making the primary air adjustment. The burner flame should not contain any yellow color. With the furnace operating at full input, adjust the primary air of the burners as follows:

Natural Gas - All models are shipped with the air shutters partially open.

Local variations in the gas supply may require changes in the settings described above. To change the air shutter settings; use the following procedure:

1. Remove the front access door.
2. Loosen shutter locking screw.
3. Adjust the air shutters with power to the unit "OFF", and retighten the locking screws.
4. Observe through the observation port to see if all flames are now blue in color. See Figure 6 for proper flame pattern. If yellow flames ar still visible, repeat steps 2 thru 4.
5. Cycle the burners on and off a few times to verify the burners are lighting promptly and properly.
6. Replace the front access door.

CHECKING GAS INPUT

1. Turn off all other gas appliances connected to gas meter.
2. With the furnace turned on, measure the time needed for one revolution of the hand on the smallest dial on the meter. A typical domestic gas meter usually has a 1/2 or 1 cubic foot test dial.
3. Using the number of seconds for each revolution and the size of the test dial increment, find the cubic feet of gas consumed per hour from Table 4.

TABLE 4 – GAS RATE (CUBIC FEET PER HOUR)

Seconds for One Revolution	Size of Test Dial	
	1/2 cubic foot	1 cubic foot
10	180	360
12	150	300
14	129	257
16	113	225
18	100	200
20	90	180
22	82	164
24	75	150
26	69	138
28	64	129
30	60	120
32	56	113
34	53	106
36	50	100
38	47	95
40	45	90
42	43	86
44	41	82
46	39	78
48	37	75
50	36	72
52	35	69
54	34	67
56	32	64
58	31	62
60	30	60

Provide a power supply separate from all other circuits. Install overcurrent protection and disconnect switch per local/national electrical codes. The switch should be reasonable close to the unit for convenience in servicing. With the disconnect switch in the OFF position, check all wiring against the unit wiring label. Also, see the wiring diagram in this instruction.

Install the field-supplied thermostat. The thermostat instructions for wiring are packed with the thermostat. With the thermostat set in the OFF position and the main electrical source disconnected, complete the low-voltage wiring from the thermostat to the terminal board on the low-voltage transformer. Set the heat anticipator on the thermostat to 1.24 amps.

The 24-volt, 40 VA transformer is sized for the furnace components only, and should not be connected to auxiliary devices such as humidifiers, air cleaners, etc.

NOTE: *Some thermostats do not have adjustable anticipators. On such thermostats, adjust cycle rate to prevent possible short on/off cycles.*

SAFETY CONTROLS

Blower Door Safety Switch

This unit is equipped with an electrical interlock switch mounted in the blower compartment. This switch interrupts all power at the unit when the panel covering the blower compartment is removed.

WARNING: *Blower and burner must never be operated without the blower panel in place.*

Electrical supply to the unit is dependent upon the panel that covers the blower compartment being in place and properly positioned.

CAUTION: *Main power supply to the unit must still be interrupted at the main power disconnect switch before any service or repair work is to be done to the unit. Do not rely upon the interlock switch as a main power disconnect.*

Rollout Switch Control

This control is mounted on the burner assembly. If the temperature in the burner compartment exceeds its set point, the igniter control and the gas valve are de-energized. This is manual reset control and must be reset before operation can continue. The operation of this control indicates a malfunction in the combustion air blower or a blocked vent pipe connection.

Pressure Switch

This furnace is supplied with a differential pressure switch which monitors the flow through the furnace and venting system. This switch de-energizes the ignition control module and the gas valve if any of the following conditions are present:

1. Blockage of internal flue gas passageways.
2. Blockage of vent piping.
3. Failure of combustion air blower/motor.

Vent Safety Switch (Canadian Models Only)

This unit is equipped with a vent safety system. This vent safety switch de-energizes the pressure switch when a blocked vent condition is present. Refer to venting instructions for location and installation.

Auxiliary Limit (Downflow models only)

The auxiliary limit is used to provide protection from excessive temperatures under reversed air flow conditions, or blower or motor failure.

START-UP AND ADJUSTMENTS

The initial start-up of the furnace requires the following additional procedures.

1. When the gas supply is initially connected to the furnace, the gas piping may be full of air. In order to purge this air, it is recommended that the ground joint union be loosened until the odor of gas is detected. When gas is detected, immediately retighten the union and check for leaks. Allow five (5) minutes for any gas to dissipate before continuing with the start-up procedure.
2. All electrical connections made in the field and in the factory should be checked for proper tightness.

IGNITION SYSTEM CHECKOUT/ADJUSTMENT

1. Turn control system power ON, and turn gas supply OFF.
2. Check the control module operation as follows:
   a. Set thermostat above room temperature to call for heat.
   b. Watch for the hot surface igniter to glow in burner compartment.
   c. Turn the thermostat down to end the call for heat.
3. Turn the gas supply ON.
4. Set the thermostat above room temperature to call for heat.
5. Start the system as follows:
   a. The venter comes up to proper speed and the hot surface igniter begins to glow for 45 seconds.
   b. After this warm-up period, the main valve is energized for four (4) seconds as the hot surface igniter is de-energized.
   c. The burners light and are sensed by the remote sensor.

NOTE: *Burner ignition may not be satisfactory until the gas input and combustion air have been adjusted.*

6. With the main burner in operation, paint the pipe joints and valve gasket lines with a rich soap and water solution. Bubbles indicate gas leakage. To stop the leaks, tighten all joints and screws. If the leak persists, replace the component.

WARNING: *DO NOT omit this test! NEVER use a flame to check for gas leaks!*

Downflow Models

Two 14" x 20" x 1" permanent washable filters are supplied with each unit. Downflow furnace filters are installed above the furnace, extending into the ductwork as shown in Figure 3. Branch ducts must enter above the height of dimension FH.

The filter rack should be secured to the center of the front and rear flanges at the furnace's return air opening. Drill a hole through the rear duct flange into the filter rack and secure it with a sheet metal screw.

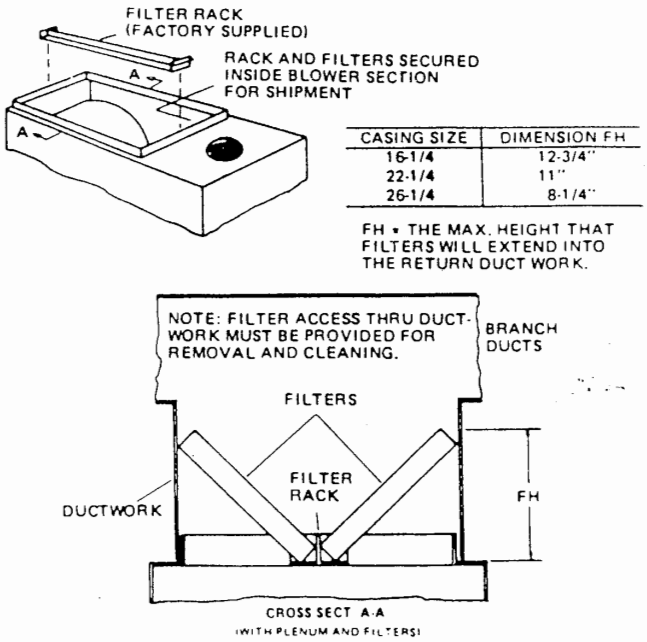


FIGURE 3 - DOWNFLOW FILTERS

GAS PIPING

NOTE: *An accessible manual shutoff valve must be installed upstream of the furnace gas controls and within 6 feet of the furnace. A 1/8" NPT plugged tapping, accessible for test gauge connection, should be installed immediately upstream of the gas supply connection to the furnace.*

The furnace and its individual shutoff valve must be disconnected from the gas supply piping system during any pressure testing of that system at test pressures in excess of 1/2 psig (3.48 kPa).

The furnace must be isolated from the gas supply piping system by closing its individual external manual shutoff valve during any pressure testing of the gas supply piping system at test pressures equal to or less than 1/2 psig (3.48 kPa).

CAUTION: *Never apply a pipe wrench to the body of the combination automatic gas valve. A wrench must be placed on the projection or wrench boss of the valve when installing piping to it.*

Gas piping may be connected from either side of the furnace. Sizing and installation of the supply gas line should comply with the local utility requirements. The gas supply should be a separate line, installed in accordance with the National Fuel Gas Code, ANSI Z223.1, or CAN1 B149.1 or .2 Installation Codes (latest editions).

Some utility companies require pipe sizes larger than the maximum sizes listed. Using the properly sized wrought iron, steel pipe or approved flexible pipe, make gas connections to the unit. Installation of a drop leg and ground union is required (See Figure 4).

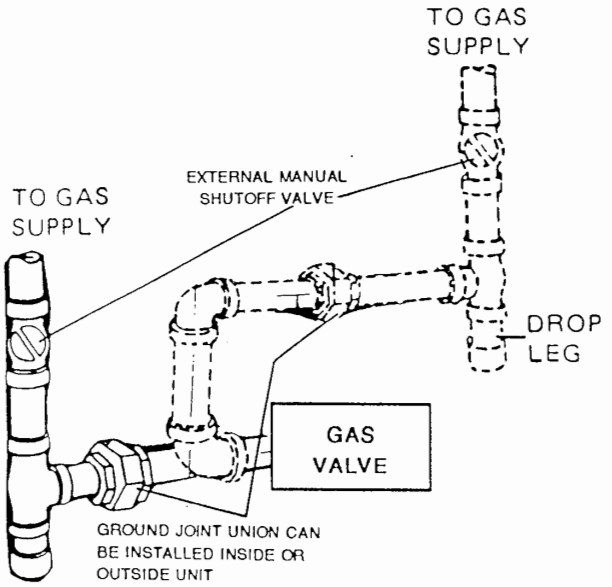


FIGURE 4 - GAS PIPING

WARNING: *Compounds used on threaded joints of gas piping must be resistant to the action of liquified petroleum gases. After connections are made, leak-test all pipe connections.*

WARNING: *Do not use an open flame or other source of ignition for leak testing. Set the manual gas valve to the off position.*

For the purpose of input adjustment, the minimum inlet gas pressure must be equal to or greater than that shown on the rating label.

ELECTRICAL DATA

USE COPPER CONDUCTORS ONLY!

Field wiring to the unit must conform to and be grounded in accordance with the provisions of the National Electrical Code -ANSI/NFPA No. 70-1987, Canadian Electric Code and /or local codes. Electrical wires which are field installed shall conform with the temperature limitation for 63°F/35°C rise wire when installed in accordance with instructions. Specific electrical data is given on the furnace rating plate and Tables 1 and 2 of this instruction.

ELECTRICAL CONNECTIONS

The furnace's control system depends on correct polarity of the power supply. Connect the power supply as shown on the unit wiring label on the inside of the blower compartment door.

return duct systems must terminate outside the space containing the furnace.

4. Generally complete a path for heated or cooled air to circulate through the air conditioning and heating equipment and to and from the conditioned space

After the unit is in the desired position, fasten the supply ductwork to the furnace duct flanges. A removable access panel should be provided in the outlet duct such that smoke or reflected light would be observable inside the casing to indicate the presence of leaks in the heat exchanger. This access cover shall be attached in such a manner as to prevent leaks. Flexible duct connectors are recommended to connect both the supply and return ducts to the furnace.

Ductwork - Upflow Models

Return air ductwork may be connected to an upflow furnace in one of the following two ways:

1. Bottom Return - Before attaching the ductwork to the furnace bottom, see the "Filters" section of this instruction.

2. Side return - Cut a hole in the side panel of the furnace using the right-angle markings (See Figure 1) as a guide for position and size of the opening. Install a single side return filter frame accessory if one is required. If this accessory is not needed, the ductwork can be fastened directly to the furnace opening.

NOTE: Some accessory side filter packages require cutting a slightly larger opening.

Where the return duct system is not complete, the return connection must run full size to a location outside the utility room or basement. For further details, consult Section 5.3 (Air for Combustion and Ventilation) of the National Fuel Gas Code, ASNI Z223.1, or Can1 B149.1 or .2, Installation Code,latest editions.

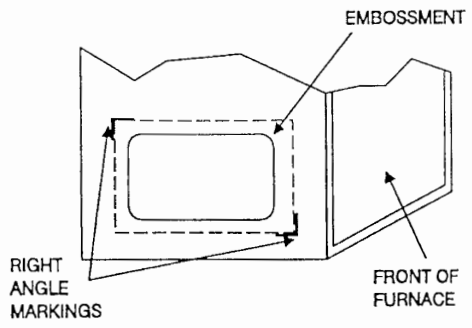


FIGURE 1 - SIDE RETURN CUTOFF MARKINGS

Ductwork - Downflow Models

Return air ductwork flanges are provided at the top of the unit. Before connecting the return air ductwork to the furnace, refer to the "Filters" section of this instruction. The supply air ductwork connects to the bottom of the furnace.

FILTERS

Upflow Models

16-1/4" Width Furnaces

All 16-1/4" wide furnaces are shipped with filters mounted on the left side. Filters may be located to the bottom or right side as follows:

The wire filter retainer must be moved if the return air application requires moving of the filter from the side to the bottom location, or vice versa. When relocating filters, it may be necessary to trim the filter to the proper size.

The ends of the retainer are attached to the rear panel in two metal loops (See Figure 2). The ends must be squeezed together to free them from the loops. The retainer may then be moved to the new location, and the ends inserted in the loops on the rear panel at the new location. Loops are provided for retainer location to accommodate filter application on the bottom or either side of the furnace.

To remove a filter from the bottom location, push the closed end of the filter retainer to the left until it clears the lip on the front of the furnace base, which acts as a catch for the retainer. When the retainer is clear of the lip, lift up. The retainer will pivot in the loops. This will expose the filter to allow removal. To re-install the filter, simply reverse this procedure.

To remove a filter from the side location, push the closed end of the filter down until it clears the flange on the side panel, which acts as a catch for the retainer. When the retainer is clear of the flange, it will pivot in the loops. Swing the retainer toward the center of the furnace. This will expose the filter to allow removal. To re-install the filter, simply reverse this procedure.

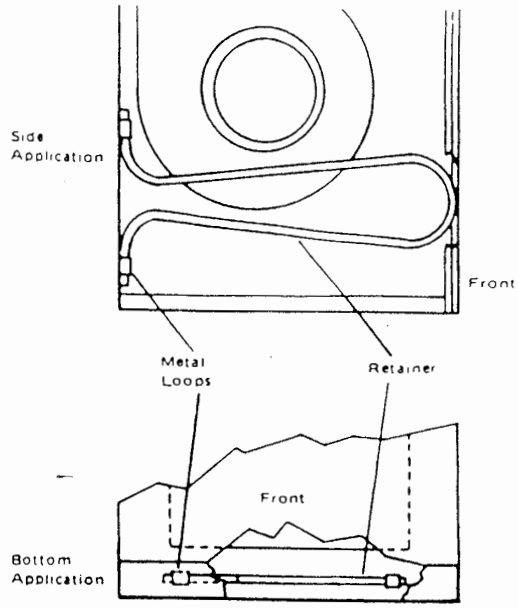


FIGURE 2 - FILTER RETAINER

22-1/4" Width Furnaces

22-1/4" wide furnaces are shipped with filters mounted in the bottom and left side.

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GENERAL INFORMATION

DESCRIPTION

This Category I furnace is designed for residential installation in a garage, closet, recreation room or alcove or any other location where all required clearances to combustibles and other restrictions are met. It is designed for natural gas-fired operation.

High altitude and propane (LP) changes or conversions required in order for the appliance to satisfactorily meet the application must be made by a CES distributor, in Canada a certified conversion station or other qualified agency, using factory specified and/or approved parts.

The appliance shall be installed so that all electrical components are protected from water.

INSPECTION

As soon as a unit is received, it should be inspected for possible damage during transit. If the damage is evident, the extent of the damage should be noted on the carrier's freight bill. A separate request for inspection by the carrier's agent should be made in writing. Also, before installation, the unit should be checked for screws or bolts which may have loosened in transit. A sheet metal bracket, fastened between the blower assembly and the blower housing is used to support the blower assembly during shipment. Loosen two screws to remove bracket, then replace screws.

NOTES, CAUTIONS & WARNINGS

The installer should pay particular attention to the words: NOTE, CAUTION and WARNING. NOTES are intended to clarify or make the installation easier. CAUTIONS are given to prevent equipment damage. WARNINGS are given to alert the installer that personal injury and/or equipment or property damage may occur if installation procedures are not handled properly.

CAUTION: *The cooling coil must be installed in the supply air duct downstream of the furnace. 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 fluid.*
3. *Paint thinners and other painting compounds.*
4. *Paper bags or other paper products.*

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

WARNING: *Each furnace in this series is a Category I furnace, suitable for common venting with another non-induced, gas-fired appliance. Each furnace in this series is a Category III furnace when vented horizontally using the high temperature plastic pipe specified in Application Date 650.64-AD2V- "Venting Guide for High Efficiency Induced Draft Upflow/Downflow Furnaces."*

If this furnace is replacing a common-vented furnace, it may be necessary to resize the existing vent line and chimney to prevent oversizing problems for the new combination of units. See National Fuel Gas Code (ANSI Z223.1-), or CAN1-B149.1 or .2, Installation Code (latest editions).

The following steps shall be followed with each appliance remaining connected to the common venting system placed in operation, while the other appliances remaining connected to the common venting system are not in operation.

1. Seal any unused openings in the common venting system.
2. Visually inspect venting system for proper size and horizontal pitch and determine there is no blockage or restriction, leakage, corrosion or other deficiencies which could cause an unsafe condition.

The furnace should be located:

1. Where a minimum amount of vent piping and elbows will be required.

2. As centralized with the air distribution as possible.

3. In an area where ventilation facilities provide for safe limits of ambient temperature under normal operating conditions.

4. Where it will not interfere with proper air circulation in the confined space.

5. Where the vent will not be blocked or restricted.

6. Where it will not interfere with the cleaning, servicing or removal of other appliances.

COMBUSTION AIR AND VENT SYSTEM

The following must be considered to obtain proper air for combustion and ventilation in confined spaces:

1. Air Source from Inside the Building -

   Two permanent openings, one within 12 inches of the top of the confined space and one within 12 inches of the bottom, shall each have a free area of not less than one square inch per 1,000 Btuh of total input rating of all appliances located in the space. The openings shall communicate freely with interior areas having adequate infiltration from the outside.

NOTE: *At least 100 square inches free area shall be used for each opening.*

2. Air Source from Outdoors -

   Two permanent openings, one within 12 inches of the top of the confined space and one within 12 inches of the bottom, shall communicate directly, or by means of ducts, with the outdoors or to such crawl or attic spaces that freely communicate with the outdoors.

   a. Vertical Ducts - Each opening shall have a free area of not less than one square inch per 4,000 Btuh of total input of all appliances located in the space.

EXAMPLE:

$$\frac{\text{Total Input of All Appliances}}{4000} = \text{Square Inches Free Area}$$

   b. Horizontal Ducts - Each opening shall have a free area of not less than one square inch per 2,000 Btuh of total input of all appliances located in the space.

NOTE: *Ducts shall have the same cross-sectional area as the free area in the opening to which they are connected. The minimum dimension of rectangular ducts shall be three (3) inches.*

3. Louvers, Grilles and Screens

   a. In calculating free area, consideration must be given to the blocking effects of louvers, grilles and screens.

   b. If the free area of a specific louver or grille is not known, refer to Table 3 to estimate free area.

TABLE 3 - ESTIMATED FREE AREA

Wood or Metal Louvers or Grilles	Wood 20-25%* Metal 60-75%*
Screens**	1/4" mesh or larger 100%

* Do not use less than 1/4" mesh.

** Free area of louvers and grilles varies widely; installer should follow louver or grille manufacturer's instructions.

4. Special Combustion and Ventilation Considerations

   Operation of a mechanical exhaust, such as an exhaust fan, kitchen ventilation system, clothes dryer or fireplace may create conditions requiring special attention to avoid unsatisfactory operation of gas appliances.

The size of combustion air openings previously discussed shall not necessarily govern when a special engineering design ensures an adequate supply of air for combustion and ventilation.

Where the return duct system is not complete, the return connection must be run full size from the furnace to a location outside the utility room or basement. For further details, consult Section 5.3, Air combustion and Ventilation of the National Fuel Gas Code, ANSI Z223.1 or CAN1 B149.1 or .2 Installation Code-latest editions.

UNIT INSTALLATION

VENTING

The furnace should be vented in accordance with the National Gas Code, ANSI Z223.1 or CAN1 149.1 or .2 Installation Code (latest edition, and requirements or codes of the local utility or other authority having jurisdiction.

This furnace may be vertically or horizontally vented. Refer to Application Data (Form 650.64-AD2V) for information on venting procedures and requirements for this furnace.

CAN NOT BE VENTED HORIZONTALLY !!

DUCTWORK - GENERAL

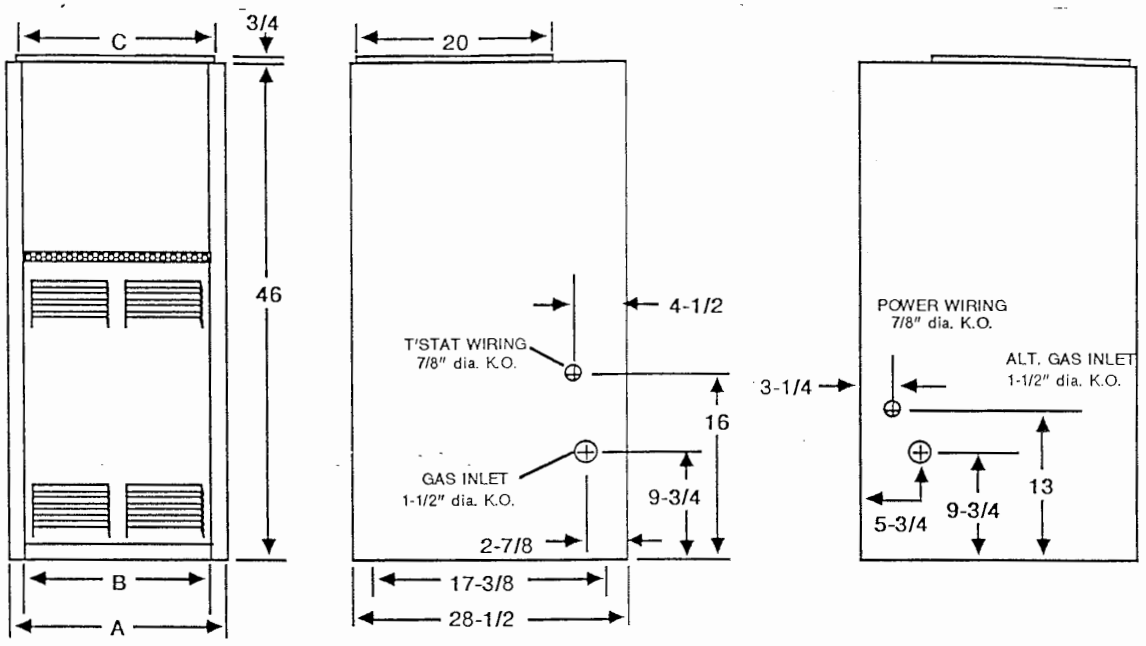
The duct system's design and installation must:

1. Handle an air volume appropriate for the served space and within the operating parameters of the furnace specifications.

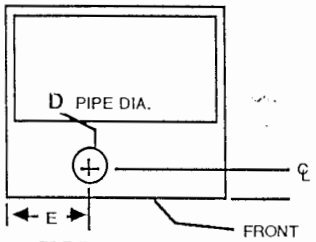
2. Be installed in accordance with standards of NFPA (National Fire Protection Association) as outlined in NFPA pamphlets 90A and 90B.

3. Create a closed duct system. The supply system must be connected to the furnace outlet and the return duct system must be connected to the furnace inlet. Both supply and

DIMENSIONS - DOWNFLOW MODELS



FRONT LEFT SIDE RIGHT SIDE



TOP IMAGE

MODEL	A	B	C	D (U.S.)	D (Canada)	E
P*MD-LD08N057	16-1/4	13-1/2	15	3	4[2]	5-5/32
P*MD-LD12N076	16-1/4	13-1/2	15	4[1]	4[2]	5-5/32
P*MD-LD12N095	22-1/4	19-1/2	21	4[1]	4[2]	8-5/32
P*MD-LD16N095	22-1/4	19-1/2	21	4[1]	4[2]	8-5/32
P*MD-LD16N114	22-1/4	19-1/2	21	4[1]	4[2]	8-5/32
P*MD-LD20N133	26-1/4	24-1/2	25	4[1]	5[2]	10-5/32
PCMD-LD08L057	16-1/4	13-1/2	15	3	–	5-5/32
PCMD-LD12L076	16-1/4	13-1/2	15	4[1]	–	5-5/32
PCMD-LD16L095	22-1/4	19-1/2	21	4[1]	–	8-5/32
PCMD-LD20L133	26-1/4	24-1/4	25	4[1]	–	10-5/32

All dimensions are in inches, and are approximate. Certified dimensions are available upon request

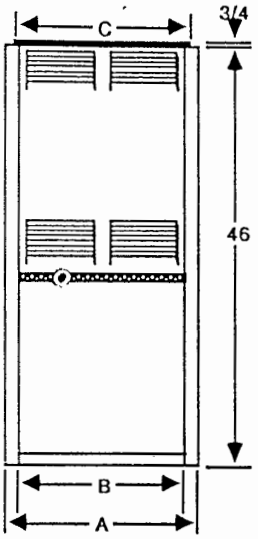
* May be either C (U.S. models), or K (Canadian models)
[1] A 3" to 4" adapter is factory supplied for U.S. units
[2] A flue adapter is supplied for Canadian models when vertically vented, and must be field installed.

TABLE 2 - RATINGS & PHYSICAL DATA - DOWNFLOW MODELS

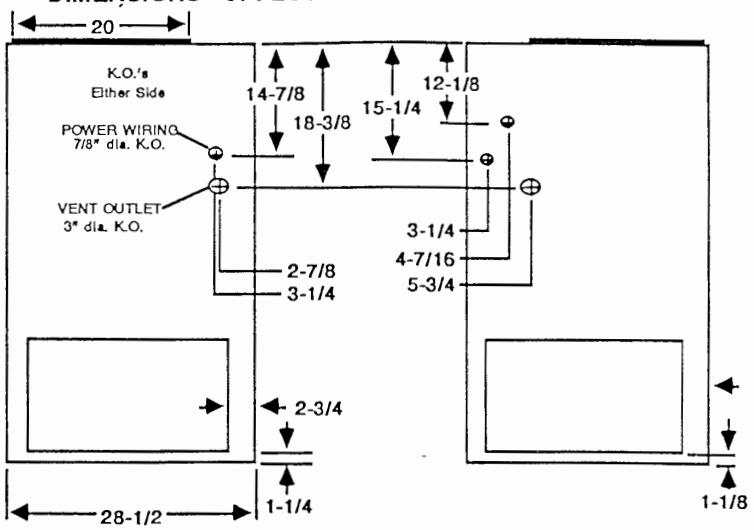
Model	Air Temp Rise °F	Maximum Outlet Temp °F	Blower		Filter Size	Total Unit Ampacity	Max. Over-Current Protect.	Min. Wire Size (AWG) @ 75'
			HP	Size				
P*MD-LD08N057	45-75	190	1/5	10–6	(2) 14X20	<15	15	14
P*MD-LD12N076	45-75	190	1/4	10–8	(2) 14X20	<15	15	14
P*MD-LD12N095	45-75	190	1/3	10–9	(2) 14X20	<15	15	14
P*MD-LD16N095	45-75	190	1/2	10–10	(2) 14X20	<15	15	14
P*MD-LD16N114	45-75	190	1/2	10–10	(2) 14X20	<15	15	14
P*MD-LD20N133	45-75	190	1	11–10	(2) 14X20	<17	20	12
LOW NOx MODELS								
PCMD-LD08L057	45-75	190	1/5	10–6	(2) 14X20	<15	15	14
PCMD-LD12L076	45-75	190	1/4	10–8	(2) 14X20	<15	15	14
PCMD-LD16L095	45-75	190	1	10–10	(2) 14X20	<15	15	14
PCMD-LD20L133	45–75	190	1	11–10	(2) 14X20	<17	20	12

* May be either C (U.S. models), or K (Canadian models).
NOTES: 1. Wire size based on copper conductors, 60°C, 3% voltage drop.
2. Continous return air temperature should not be below 55°F.

DIMENSIONS - UPFLOW MODELS

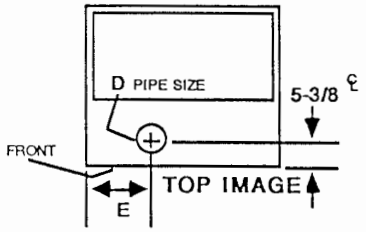


FRONT



LEFT SIDE

RIGHT SIDE



MODEL	A	B	C	D (U.S.)	D (Canada)	E
P*MU-LD12N057	16-1/4	12	15	3	4[2]	5-5/32
P*MU-LD08N076	16-1/4	12	15	4[1]	4[2]	5-5/32
P*MU-LD12N076	16-1/4	12	15	4[1]	4[2]	5-5/32
P*MU-LD12N095	22-1/4	18	21	4[1]	4[2]	8-5/32
P*MU-LD16N095	22-1/4	18	21	4[1]	4[2]	8-5/32
P*MU-LD20N114	22-1/4	18	21	4[1]	5[2]	8-5/32
P*MU-LD20N133	26-1/4	22	25	4[1]	5[2]	10-5/32
PCMU-LD12L057	16-1/4	12	15	3	–	5-5/32
PCMU-LD16L095	22-1/4	18	21	4[1]	–	8-5/32
PCMU-LD20L114	22-1/4	18	21	4[1]	–	8-5/32

All dimensions are in inches, and are approximate. Certified dimensions are available upon request

* May be either C (U.S. models), or K (Canadian models)
1 A 3" to 4" adapter is supplied for U.S. units and must be field installed.
2 A flue adapter is supplied for Canadian models when vertically vented, and must be field installed.

TABLE 1 –RATINGS & PHYSICAL DATA–UPFLOW MODELS

Model	Air Temp Rise °F	Maximum Outlet Temp. °F	Blower		Filter Size		Unit Amps	Max. Over-Current Protect.	Min. Wire Size (AWG) @ 75 Ft. One Way
			HP	Size	Supplied	Suggested Bottom			
P*MU-LD12N057	35-65	190	1/4	10–7	16X26 Side	16x26	<15	15	14
P*MU-LD08N076	45-75	190	1/4	9–6	16X26 Side	16x26	<15	15	14
P*MU-LD12N076	45-75	190	1/3	10–7	16X26 Side	16x26	<15	15	14
P*MU-LD12N095	45-75	190	1/3	10–9	20X26 Btm See Note 3	20x26	<15	15	14
P*MU-LD16N095	45-75	190	1/2	10–10	20X26 Btm See Note 3	20x26	<15	15	14
P*MU-LD20N114**	45-75	190	1	10–10	20X26 Btm 16x26 Side	20x26	<17	20	12
P*MU-LD20N133**	45-75	190	1	10–10	24X26 Btm 16x26 Side	24x26	<17	20	12
LOW NOx MODELS									
PCMU-LD12L057	35-65	190	1/4	10-7	16x26 Side	16x26	<15	15	14
PCMU-LD16L095	45-75	190	1/2	10-10	20x26 Btm See Note 3	20x26	<15	15	14
PCMU-LD20L114**	45-75	190	1	10-10	20x26 Btm 16x26 Side	20x26	<17	20	12

* May be either C (U.S. models), or K (Canadian models)

** For side return applications, these models require either both side inlets or the use of the optional single-side return filter frame accessory to provide the necessary filter area

NOTES: 1. All furnaces are factory wired for 115-1-60 operation.
2. All filters supplied with the furnace are high-veolocty, cleanable type.
3. Recommended filter size for side return is 16x26.

3. Insofar as is practical, close all building doors and windows and all doors between the space in which the appliances remaining connected to the common venting system are located and other spaces of the building. Turn on clothes dryers and any other appliances not connected to the common venting system. Turn on any exhaust fans, such as range hoods and bathroom exhausts so they will operate at maximum speed. Do not operate a summer exhaust fan. Close fireplace dampers.

4. Follow the lighting instructions. Place the appliance being operated in operation. Adjust thermostat so appliance will operate continuously.

5. After it has been determined that each appliance remaining connected to the common venting system properly vents when tested as outlined above, return doors, windows, exhaust fans, fireplace dampers and any other gas-burning appliance to their previously conditions of use.

6. If improper venting is observed during any of the previous tests, the common venting system must be corrected.

7. Any corrections to the common venting system must be in accordance with the National Fuel Gas Code Z223.1, or CAN1 B149.1 or .2 Installation Code (latest editions). If the common vent system must be resized, it should be resized to approach the minimum size as determined using the appropriate tables in Appendix G of the above codes.

LIMITATIONS AND LOCATION

This furnace should be installed in accordance with all national and local building/safety codes and requirements, or, in the absence of local codes, with the National Fuel Gas Code, ANSI Z223.1, or CAN1 B149.1 or .2 Installation Code, local plumbing or waste water codes, and other applicable codes.

WARNING: *Upflow furnaces shall not be installed directly on carpeting, tile or other combustible material other than wood flooring. For downflow furnaces, an accessory combustible floor base is available to allow installation on combustible flooring.*

The size of the unit should be based on an acceptable heat loss calculation for the structure.

Check the rating plate to make certain the unit is equipped for the type of gas supplied, and proper electrical characteristics are available.

For installations above 2,000 feet, reduce input 4% for each 1,000 feet above sea level.

DO NOT INSTALL THIS UNIT IN A MOBILE HOME.

A furnace installed in a residential garage shall be located so that all burners and burner ignition devices are located no less than 18" above the garage floor, and located or protected to prevent damage by vehicles.

Allow clearances from combustible materials as listed under "CLEARANCES TO COMBUSTIBLES" ensuring that service access is allowed for both the burners and blower.

When the furnace is used in conjunction with a cooling coil, the furnace must be installed parallel with or on the upstream side of the cooling unit to avoid condensation in the primary heat exchanger. When a parallel flow arrangement is used, the dampers or other means used to control air flow shall be adequate to prevent chilled air from entering the furnace, and if manually operated, must be equipped with means to prevent operating of either unit unless the damper is in the full heat or cool position.

SPECIFIC UNIT INFORMATION

CLEARANCES TO COMBUSTIBLES

Minimum clearances from combustible construction are in inches:

Top	1
Front	6
Vent Piping	6*
Rear	0
Sides	0

***May be 1" for Type B-1/BH vent**

CLEARANCES FOR ACCESS

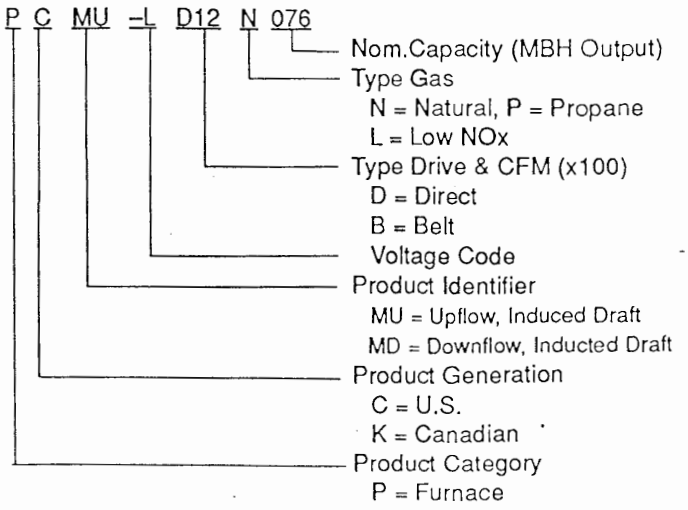
Ample clearances should be provided to permit easy access to the unit. The following minimum clearances are recommended:

1. Twenty-four (24) inches between the front of the furnace and an adjacent wall or another appliance, when access is required for servicing and cleaning.

2. Eighteen (18) inches at the side where access is required for passage to the front when servicing or for inspection or replacement of flue/vent connections.

NOTE: *In all cases, accessibility clearances shall take precedence over clearances for combustible materials where accessibility clearances are greater.*

NOMENCLATURE



Limited Warranty

STANDARD RESIDENTIAL PARTS WARRANTY

Central Environmental Systems ("CES") warrants this product to be free from defects in factory workmanship and material under normal use and service and will repair or replace, at its option, all parts that prove to have such defects, within a period of five (5) years from the date of product installation. This warranty covers only the equipment described by the Product Model Number and Serial Number listed on the warranty registration card.

For your benefit and protection, return the warranty registration card to CES promptly after installation. This will initiate the warranty period, and allow us to contact you, should it become necessary. In the absence of a recorded warranty registration card, the warranty period will begin on the date of product shipment from CES.

This warranty extends to the original purchaser and subsequent purchaser. For this warranty to apply, the product must be installed according to CES recommendations and specifications and in accordance with all local, state and national codes, and the product must not be removed from its place of original installation. Repair or replacement parts shall not be warranted beyond the applicable warranty period stated above.

This warranty applies to products installed in the United States or Canada.

EXCLUSIONS

This warranty does not cover any:

1. Shipping, labor, or material charges.
2. Damages resulting from transportation, installation, or servicing.
3. Damages resulting from accident, abuse, fire, flood, alteration, or acts of God. Tampering, altering, defacing or removing the product serial number will serve to void this warranty.
4. Damages resulting from use of the product in a corrosive atmosphere.
5. Damages resulting from inadequacy or interruption of electrical service or fuel supply, improper voltage conditions, blown fuses, or other similar causes.
6. Cleaning or replacement of filters.
7. Damages resulting from failure to properly and regularly clean air and/or water side of condenser and evaporator.
8. Damages resulting from: (I) freezing of condenser water or condensate; (II) inadequate or interrupted water supply; (III) use of corrosive water; (IV) fouling or restriction of the water circuit by foreign material or similar causes.
9. Damages resulting from operation with inadequate supply of air or water.
10. Damages resulting from use of components or accessories not approved by CES (vent dampers, etc).

THIS WARRANTY IS IN LIEU OF ALL OTHER WARRANTIES, EXPRESSED OR IMPLIED, RELATIVE TO THIS PRODUCT, INCLUDING IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE.

SOME STATES DO NOT ALLOW THE DISCLAIMER OF IMPLIED WARRANTY, SO THAT THE ABOVE DISCLAIMER MAY NOT APPLY TO YOU.

SOME STATES ALLOW ONLY A PARTIAL LIMITATION ON IMPLIED WARRANTIES TO LIMIT THE DURATION OF IMPLIED WARRANTIES TO THE DURATION OF THE EXPRESS WARRANTY. IN SUCH STATES, THE DURATION OF IMPLIED WARRANTIES IS HEREBY EXPRESSLY LIMITED TO THE DURATION OF THE EXPRESS WARRANTY ON THE FACE HEREOF.

IN NO EVENT, WHETHER AS A RESULT OF BREACH OF WARRANTY OR CONTRACT, TORT (INCLUDING NEGLIGENCE) STRICT LIABILITY OR OTHERWISE, SHALL CES BE LIABLE FOR SPECIAL, INCIDENTAL, OR CONSEQUENTIAL DAMAGES, INCLUDING BUT NOT LIMITED TO LOSS OF USE OF THE EQUIPMENT OR ASSOCIATED EQUIPMENT, LOST REVENUES OR PROFITS, COST OF SUBSTITUTE EQUIPMENT OR COST OF FUEL OR ELECTRICITY. THE ABOVE LIMITATIONS SHALL INURE TO THE BENEFIT OF CES' SUPPLIER AND SUBCONTRACTORS. THE ABOVE LIMITATION ON CONSEQUENTIAL DAMAGES SHALL NOT APPLY TO INJURIES TO PERSONS IN THE CASE OF CONSUMER GOODS.

SOME STATES DO NOT ALLOW THE EXCLUSION OR LIMITATION OF LIABILITY FOR CONSEQUENTIAL OR INCIDENTAL DAMAGES, OR FOR STRICT LIABILITY IN TORT, SO THAT THE ABOVE EXCLUSIONS AND LIMITATIONS MAY NOT APPLY TO YOU.

CES DOES NOT ASSUME, OR AUTHORIZE ANY OTHER PERSON TO ASSUME FOR CES, ANY OTHER LIABILITY FOR THE SALE OF THIS PRODUCT.

THIS WARRANTY GIVES YOU SPECIFIC LEGAL RIGHTS. YOU MAY ALSO HAVE OTHER RIGHTS WHICH VARY FROM STATE TO STATE.

TO OBTAIN WARRANTY SERVICE

Notify your installing dealer, preferable in writing, of the problem as soon as possible after its discovery. Be sure to include product model number, serial number, installation date, and the nature of the problem.

If response is not received with a reasonable times, notify CES Field Service Dept., P.O. Box 1592-362M, York, PA 17405. Service requests sent to CES without prior dealer contact will be referred back to a dealer through the CES Distributor. Because this is a time consuming process, it is in the best interest of the consumer to contact a dealer directly.

For Owner's Information

PRODUCT MODEL NO. _____ INSTALLATION DATE _____

UNIT SERIAL NO. _____ INSTALLING DEALER _____

Printed in U.S.A.

SHU 50M 892 .05

50.05-WC11W (992)
035-09493

Limited Warranty

GAS FURNACE HEAT EXCHANGER WARRANTY

Central Environmental Systems ("CES") warrants the heat exchanger in this product to be free from defects in factory workmanship and material under normal use and service for a period as defined in the table below and will at its option, repair or furnish a replacement heat exchanger, either new or reconditioned, that meets the intended use, fit and function of the original heat exchanger for any heat exchanger which proves to have such defects within the duration of warranty coverage. Alternatively, CES may, at its option, provide a replacement allowance to be applied toward the purchase of a new unit marketed by CES. The amount of the allowance will be determined at the discretion of CES, based upon current market conditions, but in no case shall this allowance exceed thirty (30) percent of the original consumer purchase price of the furnace, excluding such items as ductwork, wiring, piping and installation costs.

For your benefit and protection, return the warranty card to CES promptly after installation. This will initiate the warranty period and allow us to contact you, should it become necessary. In the absence of a recorded warranty registration card, the warranty period will begin on the date of product shipment from CES.

Product Family	Standard Warranty	Non-Residential Applications
90+ AFUE Deluxe High Efficiency Gas Furnace	Lifetime	5 Years
78+ AFUE High Efficiency Gas Furnace	20 Years	

This warranty covers the heat exchanger only, provided the product has been installed according to CES recommendations and specifications and in compliance with the following conditions:

1. The product has been installed according to the accepted practices by the National Warm Air Heating and Air Conditioning Association and in accordance with all local, state and national codes and in compliance with CES installation and operation instructions.
2. The product has not been operated with an input rate in excess of the rating plate attached to the unit.
3. The product has not been allowed to operate without the use of the proper automatic limit control on the maximum warm air temperature and/or without adequate circulation.
4. The product has not been moved from its place of original installation.
5. The product is installed so that the combustion air is not contaminated by compounds of chlorine, flourine, or other damaging chemicals (or vapors).
6. The furnace must be installed upstream from any cooling or heat pump coil.
7. The furnace installation must be made so that the heat exchangers are not exposed to return air temperatures below stated ratings.

IMPORTANT NOTICE: When a furnace is used in conjunction with an external air conditioner, it must be so installed that no cooled air is allowed to circulate over the heat exchanger. This precaution must be observed or the warranty will become null and void.

Non-Residential application heat exchanger warranty coverage is five (5) years from registered installation date, or in case of failure to register, from date of shipment from CES.

This warranty applies to products installed in the United States or Canada.

EXCLUSIONS

This warranty does not cover any:

1. Shipping, labor, or material charges.
2. Damages resulting from transportation, installation, or servicing.
3. Damages resulting from accident, abuse, fire, flood, alteration, or acts of God. Tampering, altering, defacing or removing the product serial number will serve to void this warranty.
4. Damages resulting from use of the product in a corrosive atmosphere.
5. Damages resulting from inadequacy or interruption of electrical service or fuel supply, improper voltage conditions, blown fuses, or other similar causes.
6. Cleaning or replacement of filters.
7. Damages resulting from failure to properly and regularly clean air and/or water side of condenser and evaporator.
8. Damages resulting from: (I) freezing of condenser water or condensate; (II) inadequate or interrupted water supply; (III) use of corrosive water; (IV) fouling or restriction of the water circuit by foreign material or similar causes.
9. Damages resulting from operation with inadequate supply of air or water.
10. Damages resulting from use of components or accessories not approved by CES (vent dampers, etc).

THIS WARRANTY IS IN LIEU OF ALL OTHER WARRANTIES, EXPRESSED OR IMPLIED, RELATIVE TO THIS PRODUCT, INCLUDING IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE.

SOME STATES DO NOT ALLOW THE DISCLAIMER OF IMPLIED WARRANTY, SO THAT THE ABOVE DISCLAIMER MAY NOT APPLY TO YOU.

(OVER)