# INSTALLATION INSTRUCTION

## *MID-EFFICIENCY*

## *GAS-FIRED FURNACES*

## *TUBULAR HEAT EXCHANGER SERIES*

**MODELS: P*HU / G8T-UH / FL8-UH / L8T-UH (Upflow/Horizontal)**
**40 - 130 MBH INPUT**

**P*DN / G8T-DN / L8T-DN (Downflow)**
**40 - 130 MBH INPUT**

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**CAUTION: READ ALL SAFETY GUIDES BEFORE YOU START TO INSTALL YOUR FURNACE.**

SAVE THIS MANUAL

**⚠ 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 GAS SUPPLIER.*

**⚠ CAUTION**

*THIS PRODUCT MUST BE INSTALLED IN STRICT COMPLIANCE WITH THE ENCLOSED 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 bay 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, boxes or other paper products*

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

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# GENERAL INFORMATION

## DESCRIPTION

This Category I furnace is designed for installation in a residential or commercial application. A Category I furnace has a fan assisted combustion system equipped with an integral mechanical means to draw products of combustion through the combustion chamber and heat exchanger. It may be installed in a basement, garage, equipment room, alcove, attic or any other indoor location where all required clearances to combustibles and other restrictions are met. It is designed for natural gas-fired operation, but may be converted to propane (LP).

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

Upflow/horizontal furnaces and downflow furnaces may be used only as Category I units.

The furnace must 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 any 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.

## 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.

## LIMITATIONS AND LOCATION

This furnace should be installed in accordance with all national/local building/safety codes and requirements, or in the absence of local codes, with the National Fuel Gas Code, ANSI Z223.1 - (latest edition) or, in Canada, CAN/CGA B149.1 or.2 - (latest edition), and other applicable codes.

**⚠ WARNING**

*Each furnace in this series is a Category I furnace, suitable for common venting with other gas-fired appliances as allowed by the National Fuel Gas Code, NFPA 54/ANSI Z223.1 (latest edition).*

*This appliance is not to be used for temporary heating of buildings or structures under construction.*

*Do not install this furnace in a corrosive or contaminated atmosphere.*

*Do not install this furnace in a mobile home or recreational vehicle.*

*Furnaces shall not be installed directly on carpeting, tile or other combustible material other than wood flooring. When installing a counterflow furnace on a wood floor, a combustible floor base must be used.*

Use only the type of gas approved for this furnace; refer to the furnace rating plate.

**⚠ WARNING**

*Only use natural gas in furnaces designed for natural gas. Only use propane (LP) gas for furnaces that have been properly converted to use propane (LP) gas. Do not use this furnace with butane. Using wrong gas could create a hazard, resulting in damage, injury or death.*

For installations above 2,000 feet, reduce input 4% for each 1,000 feet above sea level. Canadian installations must be derated 10% for elevations from 2,000 ft. to 4,500 ft. See Form 650.74-N1.1V for information to properly derate furnace.

Furnace shall not be connected to a chimney flue serving a separate appliance designed to burn solid fuel.

Check the rating plate and power supply to be sure that electrical characteristics match. All models use nominal 115 vac, 1 phase, 60 Hz. power supply.

A furnace installed in a residential garage must 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.

The size of the unit should be based on an acceptable heat loss calculation for the structure. ACCA, Manual J or other approved methods may be used.

The furnace should be located using these guidelines:

1. Where a minimum amount of vent piping and elbows will be required.
2. As centralized with the air distribution as possible.
3. 3.Where adequate combustion air will be available.
4. In an area where ventilation facilities provide for safe limits of ambient temperature under normal operating conditions.
5. Where it will not interfere with proper air circulation in the confined space.
6. Where the vent will not be blocked or restricted.
7. Where sufficient space is provided to allow proper service access. Minimum recommended service clearances are as follows:

   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.

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

### CLEARANCES TO COMBUSTIBLES

Minimum clearances from combustible construction are shown in Table 1 on page 4, “Unit Clearances to Combustibles”. These minimum clearances must be maintained in the installation.

## UNIT INSTALLATION

### COMBUSTION AIR

All installations must comply with Section 5.3, Air for Combustion and Ventilation of the National Fuel Gas Code, ANSI Z223.1 or Sections 7.2, 7.3 or 7.4 of CAN/CGA B149.1 or.2 Installation Code - latest editions.

**An unconfined space** is not less than 50 cubic feet per 1000 Btu/hr input rating for all appliances installed in that area.

Rooms communicating directly with the space containing the appliances are considered part of the unconfined space, if openings are not furnished with doors.

**A confined space** is an area with less than 50 cubic feet per 1000 Btu/hr input rating for all appliances installed in that area.

**TABLE 1: UNIT CLEARANCES TO COMBUSTIBLES (ALL DIMENSIONS IN INCHES)**
(All surfaces identified with the unit in an upflow configuration)

| APPLICATION | TOP | FRONT | REAR | LEFT SIDE | RIGHT SIDE | FLUE | FLOOR/ BOTTOM | CLOSET | ALCOVE | ATTIC | LINE CONTACT |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **UPFLOW / HORIZONTAL MODELS P*HU/ G8T-UH / L8T-UH / FL8-UH** | | | | | | | | | | | |
| UPFLOW | 1 | 6 | 0 | 0 | 3 | 6 | COMBUSTIBLE | YES | YES | YES | NO |
| UPFLOW B-VENT | 1 | 3 | 0 | 0 | 0 | 1 | COMBUSTIBLE | YES | YES | YES | NO |
| HORIZONTAL | 1 | 6 | 0 | 0 | 3 | 6 | COMBUSTIBLE | NO | YES | YES | YES* |
| HORIZONTAL B-VENT | 1 | 3 | 0 | 0 | 0 | 1 | COMBUSTIBLE | NO | YES | YES | YES* |
| **DOWNFLOW MODELS P*DN / G8T-DN / L8T-DN** | | | | | | | | | | | |
| DOWNFLOW | 1 | 6 | 0 | 0 | 3 | 6 | 1† | YES | YES | YES | NO |
| DOWNFLOW B-VENT | 1 | 3 | 0 | 0 | 0 | 1 | 1† | YES | YES | YES | NO |

*. Line contact only permitted between lines formed by the intersection of the rear panel and side panel (top in horizontal position) of the furnace jacket and building joists, studs or framing.

†. Special floor base or air conditioning coil required for use on combustible floor.

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

**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.*

**Air Source from Outdoors -**

1. 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 must 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 must 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 must 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 inches.*

2. One permanent opening, commencing within 12 inches of the top of the enclosure shall be permitted where the equipment has clearances of at least 1 inch from the sides and back and 6 inches from the front of the appliance. The opening shall communicate through a vertical or horizontal duct to the outdoors, or spaces (crawl or attic) that freely communicate with the outdoors and shall have a minimum free area of:

    a. 1 sq. in. per 3000 Btu per hr of the total input rating of all equipment located in the enclosure.

    b. Not less than the sum of the areas of all vent connectors in the confined space.

3. Louvers, Grilles and Screens

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

    b. To estimate free area of a specific louver or grille: Refer to Table 2 on page 5.

**TABLE 2: ESTIMATED FREE AREA**

| | |
|---|---|
| Wood or Metal Louvers or Grilles | Wood 20-25%*<br>Metal 60-70%* |
| Screens† | 1/4 in. mesh or larger 100% |

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

†. Free area or louvers an grilles varies widely; installer should follow louver or grille manufacturer's instructions.

***NOTE:*** *If mechanically operated louvers are used, a means to prevent main burner ignition and operation must be provided should louvers close during startup or operation.*

**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.

**Specially Engineered Installations**

The above requirements shall be permitted to be waived where special engineering, approved by the authority having jurisdiction, provides an adequate supply of air for combustion, ventilation and dilution of flue gases.

**Combustion Air Quality**

The recommended source of combustion air is to use the outdoor air supply. Excessive exposure to contaminated combustion air will result in safety and performance related problems. However, the use of indoor air in most applications is acceptable, except as follows:

1. If the furnace is installed in a confined space it is recommended that the necessary combustion air come from the outdoors by way of attic, crawl space, air duct or direct opening.
2. If outdoor combustion air is used, there must be no exposure to the installations or substances listed in 3" below.
3. The following types of installations may require OUTDOOR AIR for combustion, due to chemical exposure.

    a. Commercial buildings

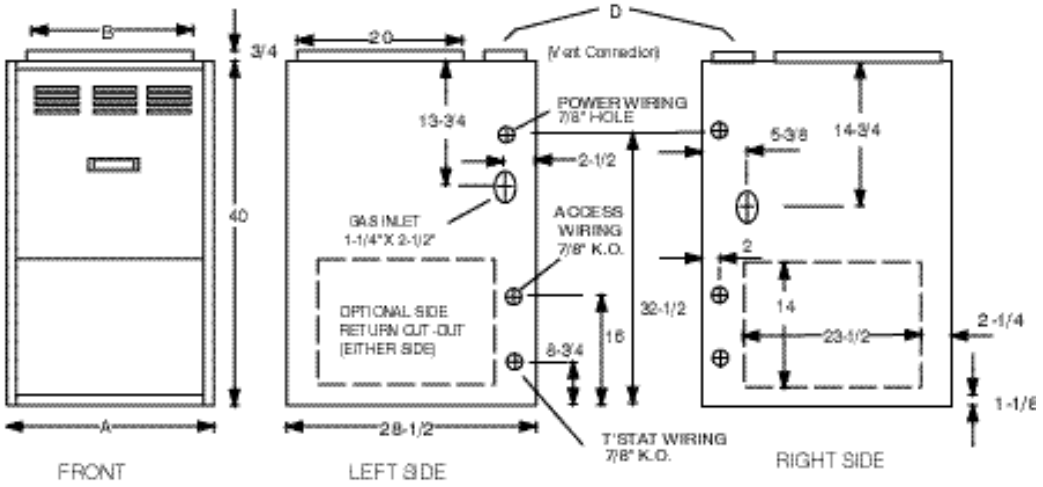
    b. Buildings with indoor pools

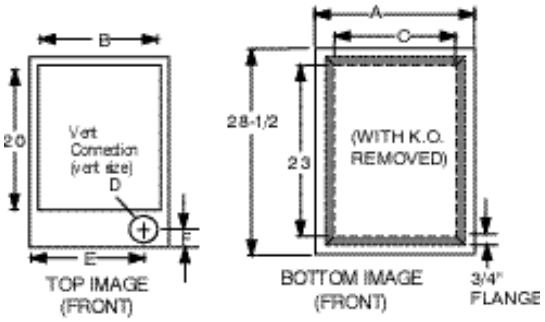
    c. Furnaces installed in laundry rooms

    d. Furnaces installed in hobby or craft rooms

    e. Furnaces installed near chemical storage areas

    f. Permanent wave solutions




| MODELS P*HU / G8T-UH / L8T-UH & FL8-UH*,† | A | B | C | D | E | F |
|---|---|---|---|---|---|---|
| 40 / 32 / 1200 / "A" | 14-1/2 | 13-1/4 | 10-1/8 | 4 | 10-1/8 | 3-3/4 |
| 57 / 46 / 1200 / "A" | 14-1/2 | 13-1/4 | 10-1/8 | 4 | 10-1/8 | 3-3/4 |
| 80 / 64 / 1200 / "A" | 14-1/2 | 13-1/4 | 10-1/8 | 4 | 10-1/8 | 3-3/4 |
| 80 / 64 / 1600 / "B" | 17-1/2 | 16-1/4 | 13-1/8 | 4 | 11-5/8 | 3-3/4 |
| 80 / 64 / 2000 / "C" | 21 | 19-3/4 | 16-5/8 | 4 | 13-3/8 | 3-3/4 |
| 100 / 80 / 1200 / "B" | 17-1/2 | 16-1/4 | 13-1/8 | 4 | 11-5/8 | 3-3/4 |
| 100 / 80 / 1600 / "B" | 17-1/2 | 16-1/4 | 13-1/8 | 4 | 11-5/8 | 3-3/4 |
| 100 / 80 /2000 / "C" | 21 | 19-3/4 | 16-5/8 | 4 | 13-3/8 | 3-3/4 |
| 115 / 92 / 1600 / "C" | 21 | 19-3/4 | 16-5/8 | 4 | 13-3/8 | 3-3/4 |
| 115 / 92 / 2000 / "C" | 21 | 19-3/4 | 16-5/8 | 4 | 13-3/8 | 3-3/4 |
| 130 / 105 / 2000 / "D" | 24-1/2 | 23-1/4 | 20-1/8 | 4 | 15-1/8 | 3-3/4 |

*. Input / Output / CFM / Cabinet

†. An "L" in the 1st or 8th position of the model number indicates a LoNox unit.

All dimensions are in inches and are approximate.

**FIGURE 1: UPFLOW/HORIZONTAL FURNACE DIMENSIONS**

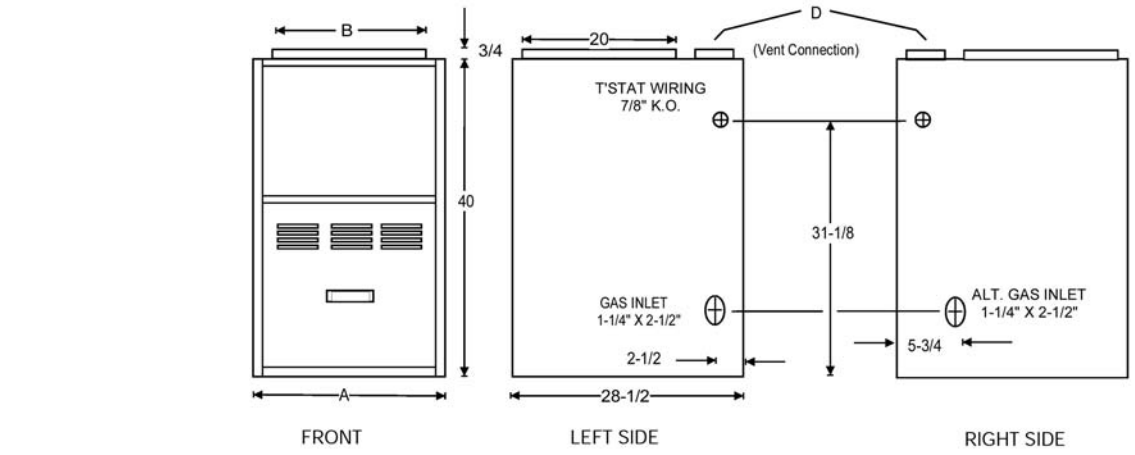
**TABLE 3: UPFLOW/HORIZONTAL RATINGS & PHYSICAL/ELECTRICAL DATA**

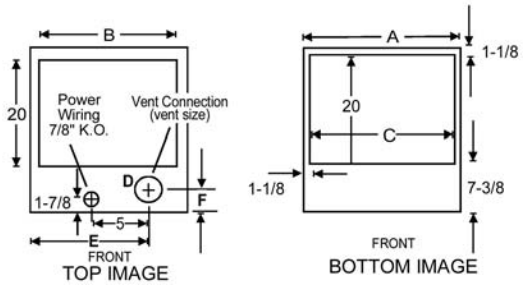
| P*HU / G8T-UH / L8T-UH & FL8-UH | | | CABINET WIDTH | AFUE* | AIR TEMP RISE | MAX. OUTLET TEMP. °F | BLOWER | | | TOTAL UNIT AMPS | MAX.OVER-CURRENT PROTECT† | MIN. WIRE SIZE (AWG) @ 75 FT. ONE WAY | OPER. WGT. (LBS) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| INPUT MBH | OUTPUT MBH | NOM CFM | | | | | HP | AMPS | SIZE | | | | |
| 40 | 32 | 1200 | "A" 14-1/2 | 80.0 | 25 - 55 | 155 | 1/3 | 6.2 | 10 x 7 | 9.0 | 20 | 14 | 105 |
| 60 | 48 | 1200 | "A" 14-1/2 | 80.0 | 25 - 55 | 155 | 1/3 | 6.2 | 10 x 7 | 9.0 | 20 | 14 | 110 |
| 80 | 64 | 1200 | "A" 14-1/2 | 80.0 | 35 - 65 | 170 | 1/3 | 6.2 | 10 x 7 | 9.0 | 20 | 14 | 117 |
| 80 | 64 | 1600 | "B" 17-1/2 | 80.0 | 25 - 55 | 155 | 3/4 | 11.5 | 11 x 8 | 12.0 | 20 | 14 | 126 |
| 80 | 64 | 2000 | "C" 21 | 80.0 | 25 - 55 | 165 | 1 | 12.2 | 11 x 10 | 14.0 | 20 | 12 | 140 |
| 100 | 80 | 1200 | "B" 17-1/2 | 80.0 | 40 - 70 | 170 | 1/2 | 7.0 | 10 x 8 | 12.0 | 20 | 14 | 128 |
| 100 | 80 | 1600 | "B" 17-1/2 | 80.0 | 35 - 65 | 165 | 1/2 | 10.4 | 10 x 10 | 12.0 | 20 | 14 | 134 |
| 100 | 80 | 2000 | "C" 21 | 80.0 | 25 - 55 | 155 | 1 | 12.2 | 11 x 10 | 14.0 | 20 | 12 | 145 |
| 115 | 92 | 1600 | "C" 21 | 80.0 | 35 - 65 | 170 | 1/2 | 10.4 | 10 x 10 | 12.0 | 20 | 14 | 145 |
| 115 | 93 | 2000 | "C" 21 | 80.0 | 30 - 60 | 170 | 1 | 12.2 | 11 x 10 | 14.0 | 20 | 12 | 147 |
| 130 | 105 | 2000 | "D" 24-1/2 | 80.0 | 35 - 65 | 165 | 1 | 12.2 | 11 x 10 | 14.0 | 20 | 12 | 158 |

*. AFUE numbers are determined in accordance with DOE test procedures.

†. Wire size and overcurrent protection must comply with the National Electrical Code (NFPA-70-latest edition)

- For altitudes above 2,000 ft., reduce capacity 4% for each 1,000 ft. above sea level. Refer to Form 650.74-N1,1V.
- Wire size based on copper conductors, 60° C, 3% voltage drop.
- Continuous return air temperature must not be below 55°F.




All dimensions are in inches and are approximate.

| MODELS P*DN / G8T-DN / L8T-DN*,† | A | B | C | D | E | F |
|---|---|---|---|---|---|---|
| 40 / 32 / 1200 / "A" | 14-1/2 | 13-1/4 | 12-1/4 | 4 | 10-1/8 | 3-3/4 |
| 60 / 48 / 1200 / "A" | 14-1/2 | 13-1/4 | 12-1/4 | 4 | 10-1/8 | 3-3/4 |
| 80 / 64 / 1200 / "B" | 14-1/2 | 13-1/4 | 12-1/4 | 4 | 10-1/8 | 3-3/4 |
| 80 / 64 / 1600 / "B" | 17-1/2 | 16-1/4 | 15-1/4 | 4 | 11-5/8 | 3-3/4 |
| 100 / 80 / 1200 / "B" | 17-1/2 | 16-1/4 | 15-1/4 | 4 | 11-5/8 | 3-3/4 |
| 100 / 80 / 2000 / "C" | 21 | 19-3/4 | 18-3/4 | 4 | 13-3/8 | 3-3/4 |
| 115 / 92 / 1600 / "C" | 21 | 19-3/4 | 18-3/4 | 4 | 13-3/8 | 3-3/4 |
| 115 / 92 / 2000 / "C" | 21 | 19-3/4 | 18-3/4 | 4 | 13-3/8 | 3-3/4 |
| 130 / 204 / 2000 / "C" | 24-1/2 | 23-1/4 | 22-1/4 | 4 | 15-1/8 | 3-3/4 |

*. Input / Output / CFM / Cabinet

†. An "L" in the 1st or 8th position of the model number indicates a LoNox unit.

**FIGURE 2 : DOWNFLOW FURNACE DIMENSIONS**

## TABLE 4: RATINGS & PHYSICAL/ELECTRICAL DATA

| DOWNFLOW MODELS P*DN / G8T-DN / L8T-DN | | | CABINET WIDTH | AFUE* | AIR TEMP RISE | MAX. OUTLET TEMP. °F | BLOWER | | | TOTAL UNIT AMPS | MAX.OVER-CURRENT PROTECT† | MIN. WIRE SIZE (AWG) @ 75 FT. ONE WAY† | OPER. WGT. (LBS) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| INPUT MBH | OUTPUT MBH | NOM CFM | | | | | HP | AMPS | SIZE | | | | |
| 40 | 32 | 1200 | "A" 14-1/2 | 80.0 | 20 - 50 | 150 | 1/3 | 6.2 | 10 x 8 | 9.0 | 20 | 14 | 100 |
| 60 | 48 | 1200 | "A" 14-1/2 | 80.0 | 25 - 55 | 155 | 1/3 | 6.2 | 10 x 8 | 9.0 | 20 | 14 | 110 |
| 80 | 64 | 1200 | "A" 14-1/2 | 80.0 | 35 - 65 | 165 | 1/3 | 6.2 | 10 x 8 | 9.0 | 20 | 14 | 120 |
| 80 | 64 | 1600 | "B"17-1/2 | 80.0 | 25 - 55 | 160 | 3/4 | 11.0 | 11 x 10 | 12.0 | 20 | 14 | 130 |
| 100 | 80 | 1200 | "B" 17-1/2 | 80.0 | 40 - 70 | 170 | 1/2 | 7.0 | 10 x 8 | 12.0 | 20 | 14 | 125 |
| 100 | 80 | 2000 | "C" 21 | 80.0 | 25 - 55 | 155 | 1 | 12.2 | 11 x 10 | 14.0 | 20 | 12 | 140 |
| 115 | 92 | 1600 | "C" 21 | 80.0 | 35 - 65 | 165 | 3/4 | 11.0 | 11 x 10 | 12.0 | 20 | 14 | 150 |
| 115 | 92 | 2000 | "C" 21 | 80.0 | 30 - 60 | 160 | 1 | 12.2 | 11 x 10 | 14.0 | 20 | 12 | 150 |
| 130 | 104 | 2000 | "D" 24-1/2 | 80.0 | 40 - 70 | 170 | 1 | 12.2 | 11 x 10 | 14.0 | 20 | 12 | 160 |

*. AFUE numbers are determined in accordance with DOE test procedures.

†. Wire size and overcurrent protection must comply with the National Electrical Code (NFPA-70-latest edition)

- For altitudes above 2,000 ft., reduce capacity 4% for each 1,000 ft. above sea level. Refer to Form 650.74-N1,1V.
- Wire size based on copper conductors, 60° C, 3% voltage drop.
- Continuous return air temperature must not be below 55°F.

g. Chlorinated waxes and cleaners
h. Chlorine based swimming pool chemicals
i. Water softening chemicals
j. De-icing salts or chemicals
k. Carbon tetrachloride
l. Halogen type refrigerants
m. Cleaning solvents (such as perchloroethylene)
n. Printing inks, paint removers, varnishes, etc.
o. Hydrochloric acids
p. Cements and glues
q. Antistatic fabric softeners for clothes dryers
r. Masonry acid washing chemicals

# VENTING

## CATEGORY I VERTICAL VENTING

Category I venting consists of vertically venting one or more appliances in B-vent or masonry chimney (as allowed), using single wall metal pipe or B-vent connectors. Type B-vent system extends in a general vertical direction and does not contain offsets exceeding 45 degrees, except that a vent system having not more than one 60-degree offset is permitted.

***NOTE:*** *This appliance may be common vented with another gas appliance as allowed by the following codes and standards.*

The furnace rating plate lists the maximum vent gas temperature. This temperature must be used to select appropriate venting materials and clearances. A typical example is shown below.

**CATEGORY 1 - 450 F. MAX. VENT TEMP.**

All installations must be vented in accordance with the National Fuel Gas Code, NFPA 54/ANSI Z223.1 - latest edition. For reference, the National Fuel Gas Code Handbook, available from NFPA (item JP-54HB96) is recommended. The appliance must also be vented in compliance with all local utility and code requirements. In Canada, the furnace must be vented in accordance with the National Standard of Canada, CAN/CGA-B149.1 and .2 - latest editions.

**⚠ WARNING**

*A furnace shall not be connected to a chimney flue serving a separate appliance designed to burn solid fuel.*

## HORIZONTAL SIDEWALL VENTING

For applications where vertical venting is not possible, the only approved method of horizontal venting is through the use of an auxiliary power venter. Approved power venters are Fields Controls Model SWG-4Y or Tjernlund Model GPAK-JT. Follow all application and installation details provided by the manufacturer of the power venter.

## VENT SAFETY CHECK PROCEDURE

**⚠ WARNING**

*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. Refer to the National Fuel Gas Code, ANSI Z223.1 or CAN/CGA B149.1 or .2 Installation Code - latest editions.*

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

1. Seal any unused openings in the common venting system.
2. Inspect venting system for proper size and horizontal pitch, as required in the National Fuel Gas Code ANSI Z223.1 or the CAN/CGA B149 Installation Codes and these instructions. Determine that there is no blockage or restriction, leakage, corrosion or other deficiencies which could cause an unsafe condition.
3. Insofar as is practical, close all building doors and windows and all doors between the space in which the appliance(s) connected to the 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. Test for draft hood equipped appliance spillage at the draft hood relief opening after 5 minutes of main burner operation. Use the flame of a match or candle.
6. After it has been determined that each appliance connected to the venting system properly vents when tested

as outlined above, return doors, windows, exhaust fans, fireplace dampers and any other gas-burning appliance to their previous conditions of use.

7. If improper venting is observed during any of the above tests, the venting system must be corrected.
8. Any corrections or resizing of the common venting system must be in accordance with the National Fuel Gas Code, ANSI Z223.1 or Section 7, Venting Systems and Air Supply for Appliances, CAN/CGA 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.

## DUCTWORK

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 (latest editions).
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 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.

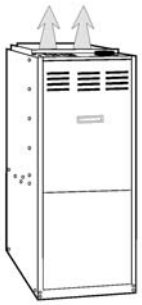
**⚠ CAUTION**

*The cooling coil must be installed in the supply air duct.*

When the furnace is used in conjunction with a cooling coil, the furnace must be installed parallel with, or in the supply plenum 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 must 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.

## UPFLOW/HORIZONTAL MODELS - UPFLOW APPLICATION



### Supply Plenum Connection

Attach the supply plenum to the furnace outlet duct connection flanges. This is typically through the use of S cleat material when a metal plenum is used. The use of an approved flexible duct connector is recommended on all installations. This connection should be sealed to prevent air leakage.

If a matching cooling coil is used, it may be placed directly on the furnace outlet and sealed to prevent leakage. Follow the coil instructions for installing the supply plenum.

On all installations without a coil, a removable access panel is recommended 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.

### Return Duct Connection

Return air may enter the furnace through the side(s) or bottom depending on the type of application. **Return air may not be connected into the rear panel of the unit.** Refer to the “Filters Installation” section for the type of application desired for specific installation details.

***NOTE:****In order to achieve the airflow indicated in the table, it is recommended for those applications over 1800 CFM use return air from two sides, one side and the bottom, or bottom only. For bottom only application, see data and notes on blower performance data tables in this manual.*

### FILTERS INSTALLATION - (UPFLOW/HORIZONTAL)

All applications require the use of a filter. A high velocity filter and retainer are provided for field installation.

### Internal Installation

1. Select desired filter position (left/right side, and/or bottom). Remove the corresponding cabinet cut-outs per instructions provided.
2. Install snap-in retainer clips into the corresponding slots from the outside rear of the cabinet. Refer to Figure 3 on page 10. To prevent cabinet air leaks, install snap-in plugs (provided) into the unused slots at the outside rear of the cabinet.
3. Install the wire retainer inside the cabinet. Insert the open ends of the wire retainer into the clip loops at the rear of the blower compartment. The retainer wire should

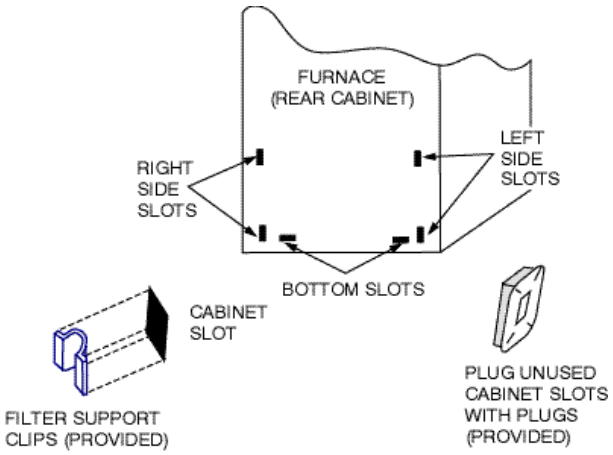



**FIGURE 3 : FURNACE FILTER SLOT LOCATIONS**

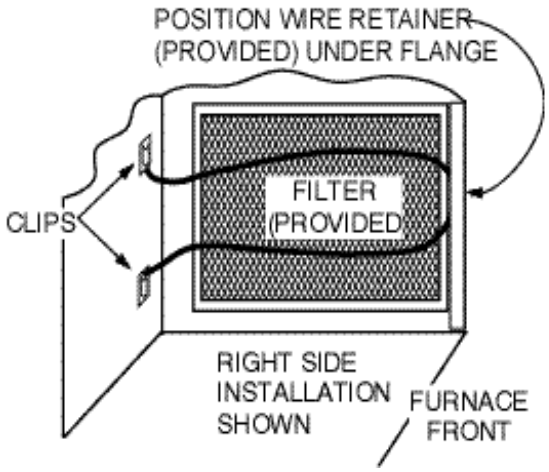



**FIGURE 4 : SIDE FILTER RETAINER PLACEMENT**

pivot freely like a hinge, on the clips at the rear of the cabinet. Refer to Figure 4.

4. Install the filter(s) provided. Cut filter if necessary to match air opening in cabinet. Filter should extend beyond opening edge as much as possible to prevent air from bypassing the filter. DO NOT remove stiffening rods from inside the filter. Shorten the rods, if necessary, to match final filter size.

5. Position the filter between the wire retainer and the cabinet wall (or floor) so it completely covers the cabinet air opening and secure the filter in place at the front of the cabinet by fastening the closed (looped) end of the retainer wire under the flanged edge of the cabinet. When properly installed the filter should fit flush with all four sides of the cabinet wall.

***NOTE:*** *Air velocity through throw-away type filters may not exceed 300 feet per minute. All velocities over this require the use of high velocity filters.*

**Side Return - External Filter**

Locate and knock out the square corner locators. These indicate the size of the cutout to be made in the furnace side panel. Refer to Figure 5 on page 10.

Install the side filter rack following the instructions provided with that accessory. If a filter(s) is provided at another location in the return air system, the ductwork may be directly attached to the furnace side panel.

***NOTE:*** *Some accessories such as electronic air cleaners and pleated media may require a larger side opening. Follow the instructions supplied with that accessory for side opening requirements*.

**⚠ CAUTION**

*All installations must have a filter installed.*

The return duct may be attached to the furnace by S-cleat, bend tabs or other approved methods. Be sure to seal the duct to the furnace to prevent air leakage.

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

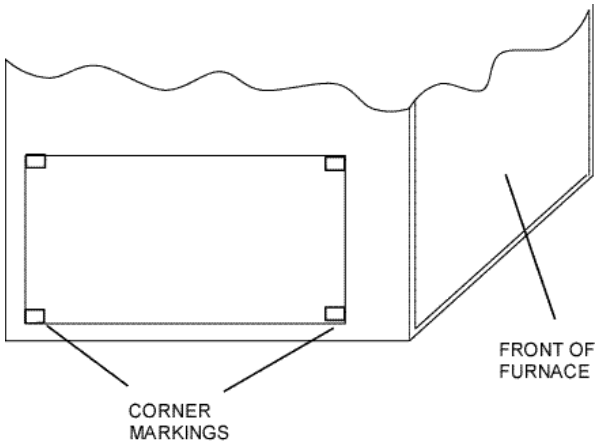



**FIGURE 5 : SIDE RETURN CUTOUT MARKINGS**

**Bottom Return**

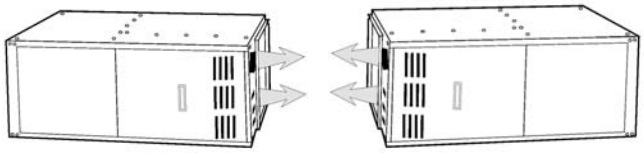
Bottom return applications normally pull return air through a base platform or return air plenum. Be sure the return platform structure is suitable to support the weight of the furnace. Refer to Figure 1 on page 6, for unit dimensions and Table 3 for unit weights. Be sure to seal the furnace to plenum connection to prevent air leakage.

The bottom panel is equipped with a perforated opening for easy removal. Tabs must be cut with sheet metal snips to allow removing knock-out. Scribe marks are included for forming flanges for attachment of the return air ductwork.

***NOTE:*** *If an external mounted filter rack is being used, see the instructions provided with that accessory for proper hole cut size.*

Upflow attic installations must meet all minimum clearances to combustibles and have floor support with required service accessibility.

## UPFLOW/HORIZONTAL MODELS HORIZONTAL APPLICATION



Upflow furnaces may be installed horizontally with the supply airflow toward the left or right by laying the unit on the left or right side panel.

**⚠ WARNING**

*Do not install the unit on the rear panel.*

After determining the best orientation, lay the unit on top of the shipping carton to protect the finish.

The appropriate electrical knock-outs for power wiring, control wiring and gas piping should be removed at this time.

For horizontal application, return air may enter through the bottom, left side or right side panel or any combination of these openings. **Return air may not be connected into the rear panel of the unit.**

To convert the upflow model furnace to open bottom, refer to the upflow application, “Bottom Return” section on page 11, of this manual.

## ATTIC INSTALLATION

This appliance is design certified for line contact for furnaces installed horizontally. The intersection of the furnace top and sides form a line.

This line may be in contact with combustible material. However, refer to “VENTING” section on page 8, and “Clearances to Combustibles” section on page 4, in this manual for additional information.

Secure a platform constructed of plywood or other building material to the floor joists. Sheet metal, 12" in front of the furnace combustion air openings is recommended. Refer to Figure 6.

**⚠ WARNING**

*When a furnace is installed in an attic or other insulated space, keep all insulating materials at least 12" away from furnace and burner combustion air openings.*

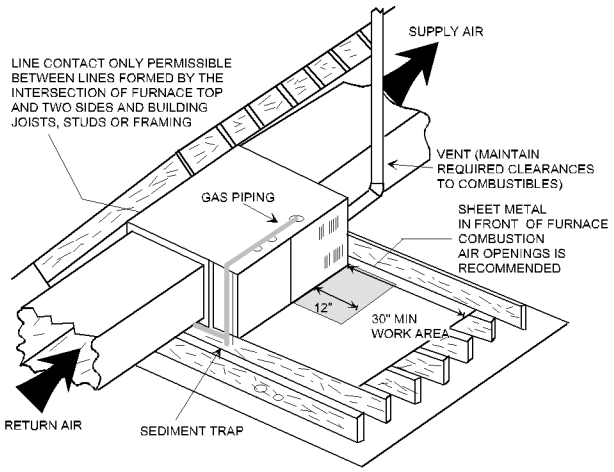



**FIGURE 6 : TYPICAL ATTIC INSTALLATION**

***NOTE:*** *See crawl space installation for suspending the furnace in attic installations.*

## CRAWL SPACE INSTALLATION

The furnace can be hung from floor joists or installed on suitable blocks or pad. Blocks or pad installations shall provide adequate height to ensure the unit will not be subject to water damage.

When suspending the furnace from rafters or floor joists using rod, pipe or straps, for furnace weights to determine suitable means of suspension. Refer to Table 3 on page 6.

Angle supports should be placed at the supply air end and near the blower deck. Refer to Figure 7 on page 12. **Do not support at return air end of unit**.

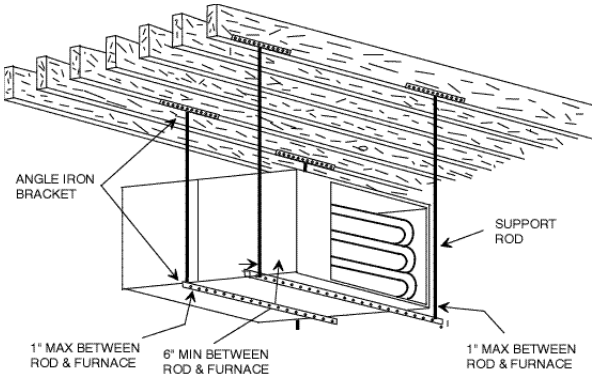



**FIGURE 7 : TYPICAL FURNACE INSTALLATION USING SUSPENSION MATERIALS**

Units may also be suspended by using straps or other material at the same location. All four suspension points must be level to ensure quiet furnace operation.

## DOWNFLOW MODEL APPLICATION DOWNFLOW FILTERS

A top return filter rack is supplied with the furnace. Two 14" x 20" permanent washable filters are supplied with each unit.

Downflow furnaces typically are installed with the filters located above the furnace, extending into the return air duct.

Any branch duct must attach to the vertical ductwork above the filter height (FH). See dimensions for proper installation. Refer to Figure 8.

The filter rack (provided) should be secured to the center of the front and rear flanges at the furnace top. Drill a hole through the front and rear duct flange into the filter rack and secure it with a sheet metal screw.

Refer to the unit rating plate for furnace model then see the dimensions page of this instruction for return air plenum dimensions. Install the plenum following instructions under Ductwork in this instruction.

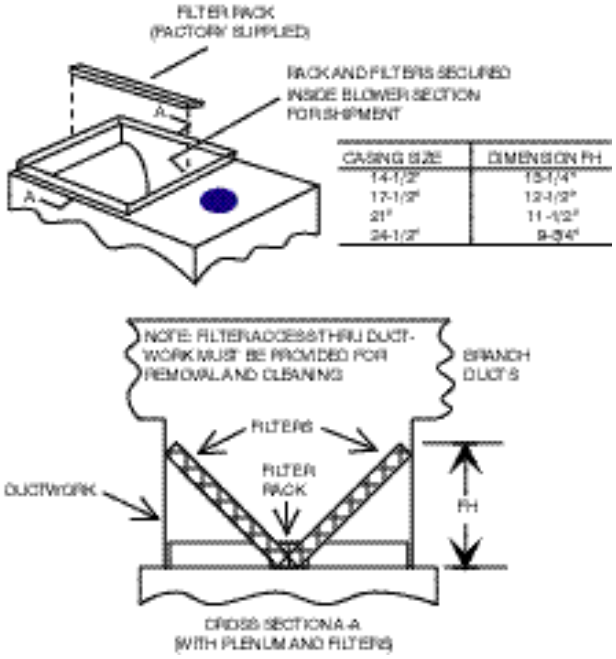



**FIGURE 8 : DOWNFLOW FILTERS**

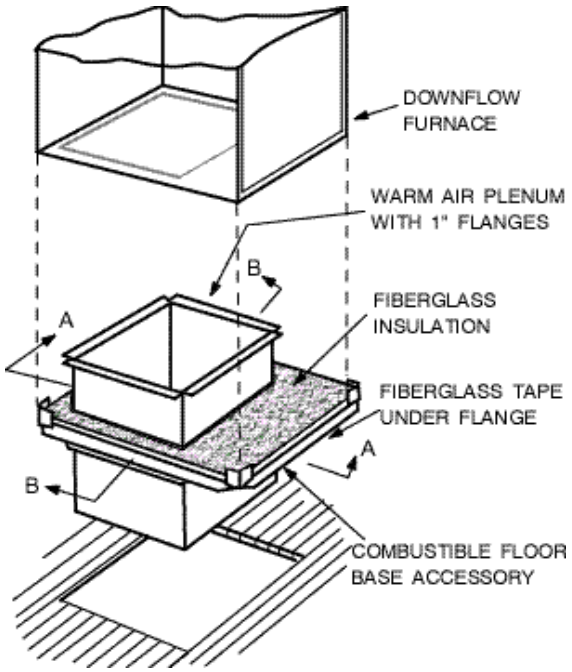



**FIGURE 9 : COMBUSTIBLE FLOOR BASE ACCESSORY**

### SUPPLY AIR DUCTS

Installations on combustible material or floors must use a combustible floor base 1CB0314, 17, 21 & 24, as specified on the rating plate or a matching cooling coil. Refer to Figure 9 on page 12. Follow the instructions supplied with the combustible floor base accessory for proper installation.

This base can be replaced with a matching cooling coil, properly sealed to prevent leaks. Follow the cooling coil instructions for installing the plenum.

## GAS PIPING

**⚠ WARNING**

*An overpressure protection device, such as a pressure regulator, which conforms to the National Fuel Gas Code, ANSI Z223.1 (U.S.) or CAN-B149.1 or .2 (Canada) and acts to limit the downstream pressure to value that does not exceed 0.5 PSI (14" w.c.), must be installed in the gas piping system upstream of the furnace. Failure to do so may result in a fire or explosion or cause damage to the furnace or some of its components.*

***NOTE:*** *An accessible manual shutoff valve must be installed upstream of the furnace gas controls and within 6 feet of 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.*

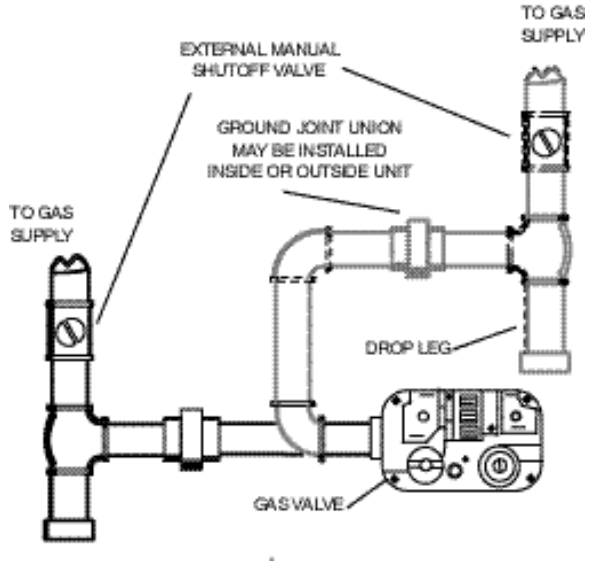



**FIGURE 10 : GAS PIPING**

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.

| INLET GAS PRESSURE RANGE | | |
|---|---|---|
| | Natural Gas | Propane (LP) |
| Minimum | 4.5 In. W.C. | 11 In. W.C. |
| Maximum | 13.9 In W.C. | 13.9 In. W.C. |

The gas supply should be a separate line, installed in accordance with the National Fuel Gas Code, ANSI Z223.1, or CAN/CGA B149.1 or .2 Installation Codes - (latest editions).

Some utility companies, or local codes, require pipe sizes larger than the minimum sizes listed. Using the properly sized wrought iron, approved flexible or steel pipe, make gas connections to the unit. Installation of a drop leg and ground union is required. Refer to Figure 10.

**⚠ WARNING**

*Compounds used on threaded joints of gas piping must be resistant to the action of liquefied petroleum gases.*

***NOTE:*** *A 1/8" NPT plug is included in the inlet side of the gas valve for measuring incoming gas pressure.*

**⚠ WARNING**

*After all gas piping connections are completed, leak test all joints, fittings and furnace connections with rich soap and water solution, commercial available bubble type leak detection fluid, or other approved means.*

*Do not use an open flame or other source of ignition for leak testing.*

## ELECTRICAL POWER CONNECTION

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 - latest edition, Canadian Electric Code C22.1 Part 1 - (latest edition) and/or local codes. Electrical wires which are field installed shall conform with the temperature limitation for 63F/35C rise wire when installed in accordance with instructions. Specific electrical data is given on the furnace rating plate.

Provide a power supply separate from all other circuits. Install overcurrent protection and disconnect switch per local/ national electrical codes. The switch should be reasonably 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.

***NOTE:*** *The furnace's control system depends on correct polarity of the power supply and a proper ground connection. Refer to the furnace control diagnostics section for symptoms of reversed power supply polarity.*

**⚠ WARNING**

*Use copper conductors only.*

Connect the power supply as shown on the unit wiring label on the inside of the blower compartment door. The black furnace lead must be connected to the L1 (hot) wire from the power supply.

The white furnace lead must be connected to neutral. Also, the green equipment ground wire must be connected to the power supply ground.

Remove the screws retaining the wiring box cover. Route the power wiring through the unit side panel with a conduit connector or other proper connection. Make wiring connections,. Replace the wiring box cover and screws. Refer to Figure 11.

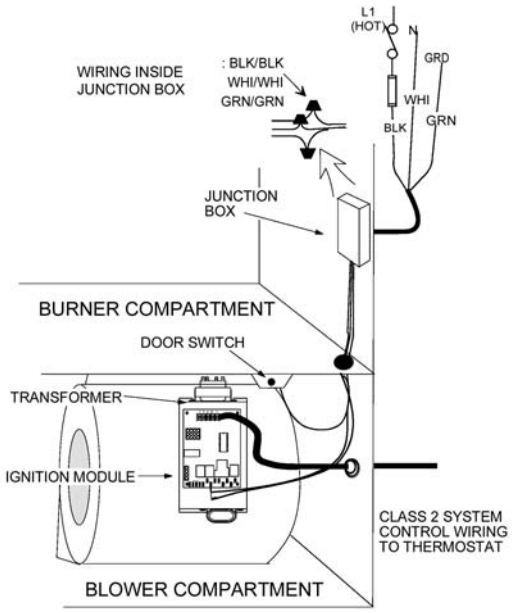



**FIGURE 11 : ELECTRICAL WIRING - UPFLOW MODELS P*HU/G8T-UH/L8T-UH & FL8-UH**

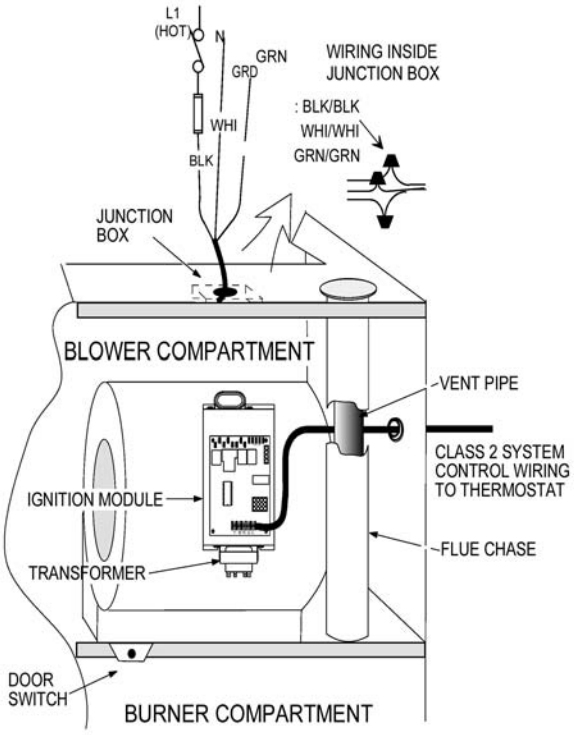



**FIGURE 12 : ELECTRICAL WIRING - DOWNFLOW MODELS P*DN/G8T-DN/L8T-DN**

An alternate wiring method is to use a field provided 2 x 4 box and cover on the outside of the furnace. Route the furnace leads into the box using a protective bushing where the wires pass through the furnace panel.

***NOTE:*** *The power connection leads and wiring box on upflow units may be relocated to the left side of the furnace. Remove the screws and cut wire tie holding excess wiring. Reposition on the left side of the furnace and fasten using holes provided.*

## ELECTRICAL CONTROL CONNECTIONS

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. Connect Class 2 control wiring, refer to Figure 13.

Apply strain relief to thermostat wires passing through the cabinet.

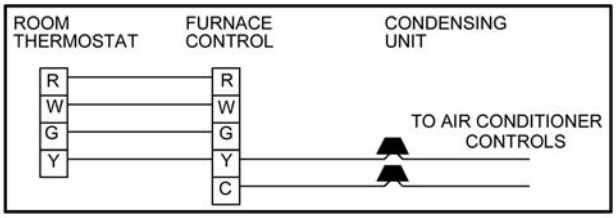



**FIGURE 13 : TYPICAL HEATING AND COOLING**

**Set the heat anticipator in the room thermostat to.45 amps. Setting it lower will cause short cycles. Setting it higher will cause the room temperature to exceed the set point.**

***NOTE:*** *Some electronic thermostats do not have adjustable heat anticipators. They may have other type cycle rate adjustments. Follow the thermostat manufacturer's instructions.*

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. The transformer may provide power for an air conditioning unit contactor.

## 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 Controls:**These controls are mounted on the burner assembly. If the temperature in the burner compartment exceeds its set point, the ignition control and the gas valve are de-energized. This is a 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 of combustion products 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.

**Limit Control:**The high temperature limit control is located on the furnace vestibule panel just to the right and below the gas valve. This is an automatic reset control and provides over temperature protection due to reduced airflow, such as a dirty filter.

**Auxiliary Limit Controls:**These high temperature limit controls are located in the blower compartment, one on each side on upflow/horizontal unit. Downflow units have a single limit mounted on the blower assembly. These are manual reset controls and provide high temperature protection when the unit is applied in the horizontal position.

**Control Circuit Fuse:** A 3 amp fuse is provided to protect the 24 volt transformer from overload caused by control circuit wiring errors. This is an ATO 3, automotive type fuse and is located on the ignition control module refer to Figure 14.

## 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 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 the gas supply ON at external manual shut-off valve and main gas valve.
2. Set the thermostat above the room temperature to call for heat.
3. System start-up will occur as follows:
   a. The venter motor will start and come up to speed. Shortly after venter start-up, the hot surface igniter will glow for about 17 seconds.
   b. After this warm-up cycle, the ignition module will energize (open) the main gas valve for seven seconds.

***NOTE:*** *Burner ignition may not be satisfactory on first start-up due to residual air in gas line, or until gas pressure (manifold) is adjusted. The control will make 3 attempts to light before locking out.*

With the furnace in operation, paint the pipe joints and valve gasket lines with a rich soap and water solution. Bubbles indicate a gas leak. Take appropriate steps to stop the leaks. If the leak persists, replace the component.

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

### CHECKING GAS INPUT

1. Turn off all other gas appliances connected to gas meter.

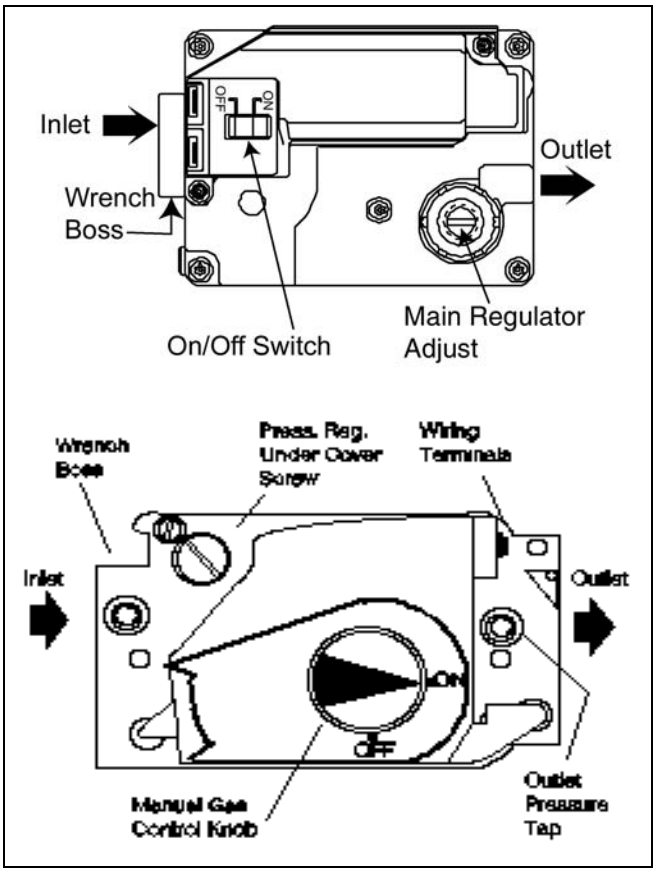



**FIGURE 14 : GAS VALVES**
(Top) Whit-Rodgers 36E24
(Bottom) Honeywell VR8205
(approved for field replacement)

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. Refer to Table 5 on page 17.

***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. Contact 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 1 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 5 .

Read across to the column headed 1 Cubic Foot where you will see that 138 cubic feet of gas per hour are 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

### TABLE 5 : 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 |

117,300 Btuh, which is close to the 120,000 Btuh rating of the furnace.

If the actual input is not within 2% of the furnace rating, with allowance being made for the permissible range of the regulator setting (0.3 inches W.C.), replace the orifice spuds with spuds of the proper size.

**⚠ CAUTION**

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

### ADJUSTMENT OF MANIFOLD GAS PRESSURE

1. Turn gas off at main gas valve. Remove 1/8" NPT plug from the outlet pressure tap in the main gas valve body and install proper manometer tube adapter fitting. Connect line from gas valve tap to a manometer.
2. Refer to Figure 14 on page 16, for location of outlet pressure tap and pressure regulator adjustment cap and screw on main gas valve.

***NOTE:*** *The screw-off cap for the pressure regulator must be removed entirely to gain access to the adjustment screw.*

**⚠ WARNING**

*The cap must be replaced in order for the furnace to operate properly.*

3. Turn gas and electrical supplies ON. Turn gas valve switch to ON position. Start furnace and observe manifold pressure on manometer.
4. Adjust manifold pressure by adjusting gas valve regulator screw.

| MANIFOLD PRESSURE | |
|---|---|
| NATURAL GAS | 3.5” W.C. |
| PROPANE (LP) GAS | 10.0” W.C. |

If gas valve regulator is turned in, or clockwise, manifold pressure is increased. If screw is turned out, or counter clockwise, manifold pressure will decrease.

**⚠ WARNING**

*The manifold pressure must be checked with the screw-off cap in place on the pressure regulator.*

*If manifold pressure is too high, an over-fire condition exists which could cause heat exchanger failure. If the manifold pressure is too low, sooting and eventual clogging of the heat exchanger could occur.*

5. Once the correct gas pressure to the burners has been established, turn the gas valve switch 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.

6. 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.

**⚠ WARNING**

*Be sure that the gas valve pressure regulator cap is replaced.*

## 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 3 or 4. After the temperature rise has been determined, the airflow (cfm) can be calculated.

After about 20 minutes of operation, determine the furnace temperature rise. Take readings of both the return air and the supply (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. The blower motor speed taps are located on the control module in the blower compartment. Refer to Figure 15, and the unit wiring label to change the blower speed.

You may select a heating speed and a cooling speed. They may be the same speed or a different speed.

To use the same speed tap for heating and cooling, the heat terminal and cool terminal must be connected using a jumper wire and connected to the desired motor lead. Place all unused motor leads on Park terminals. Two are provided.

**⚠ CAUTION**

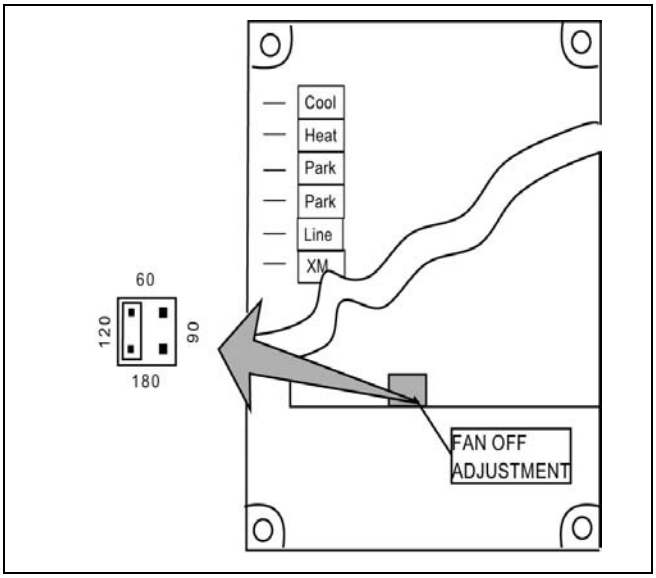
*Do not energize more than one motor speed at a time or damage will result.*

## ADJUSTMENT OF FAN-OFF CONTROL SETTINGS

This furnace is equipped with a time-on/time-off heating fan control. The fan on delay is fixed at 30 seconds. The fan off delay is field adjustable from 60 to 180 seconds. The fan off delay is factory set to 120 seconds.

The fan-off setting must be long enough to adequately cool the furnace, but not so long that cold air is blown into the heated space.

The fan-off timing may be adjusted by positioning the jumper located on the control board. Refer to Figure 15.



## ACCESSORY CONNECTIONS

The furnace control will allow power switching control of various accessories. Refer to Figure 16, for connection details.

### Electronic Air Cleaner Connection

Two 1/4" spade terminals (EAC and EAC N) for electronic air cleaner connections are located on the control board. The terminals provide 115 VAC (1.0 amp maximum) during circulating blower operation.

### Humidifier Connection

Two 1/4" spade terminals (HUM and HUM N) for humidifier connections are located on the control board. The terminals provide 115 VAC (1.0 amp maximum) during heating system operation.

### Twinning

When two furnaces are installed using the same duct system, it is very important that the two furnace circulating air blowers operate simultaneously. If one blower starts before the second blower, the duct system will become pressurized with air and the second blower will be made to turn backwards. During heating operation, this will cause overheating of the second furnace, possibly causing an unsafe condition and damage to the furnace. If twinning of two furnaces is desired, it is necessary to use the accessory twinning kit that is designed for use with these furnaces.

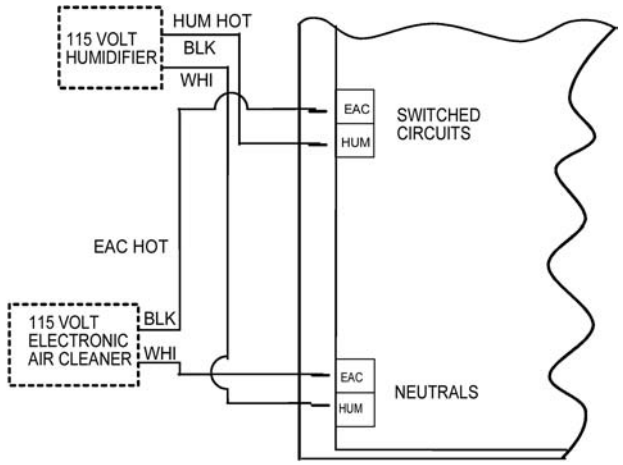



**FIGURE 16 : ACCESSORY CONNECTIONS**

***Note:*** *Wires for Electronic Air Cleaner and Humidifier or any other accessories must be routed through junction box.*

## FURNACE ACCESSORIES

| | |
|---|---|
| **ELECTRICAL** | |
| 2TH07700124 | Single Stage Thermostat, One-Stage Heat/One-Stage Cool |
| 2TH13700424 | Deluxe 24V Thermostat - with heat only subbase (must be used w/subbase 2TB17700424) |
| 2TB17700424 | Subbase (24V) One-Stage Heat/One-Stage Cool |
| 2ET07700224 | Programmable, Electronic Thermostat, One-Stage Heat/One-Stage Cool |
| 2TC03700124 | Twinning Control |
| **NON-ELECTRICAL** | |
| 1NP0347 | Propane (LP) Conversion Kit |
| 1NP0348 | Propane (LP) Conversion Kit |
| 1PS0301 | High Altitude Pressure Switch (See Form 650.74-N1.1V for proper application) |
| 1PS0302 | |
| 1PS0311 | |
| 1PS0312 | |
| 1SR0302 | External Side Filter Rack (6-Pack) |
| 1BR0314 | External Bottom Filter Rack - Cabinet “A” |
| 1BR0317 | External Bottom Filter Rack - Cabinet “B” |
| 1BR0321 | External Bottom Filter Rack - Cabinet “C” |
| 1BR0324 | External Bottom Filter Rack - Cabinet “D” |
| 1PS0313 | High Altitude Pressure Switch Kit |
| 1PS0314 | High Altitude Pressure Switch Kit |
| 1CB0314 | Combustible Floor Base - Cabinet “A” |
| 1CB0317 | Combustible Floor Base - Cabinet “B” |
| 1CB0321 | Combustible Floor Base - Cabinet “C” |
| 1CB0324 | Combustible Floor Base - Cabinet “D” |

## TABLE 6: BLOWER PERFORMANCE CFM - UPFLOW/HORIZONTAL (WITHOUT FILTER)

**Note:** Data below reflects airflows with single return opening, either left or right side or bottom

| MODELS P*HU/G8T-UH/ L8T-UH / FL8-UH* | SPEED TAP | EXTERNAL STATIC PRESSURE, INCHES W.C. | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | 0.10 | 0.20 | 0.30 | 0.40 | 0.50 | 0.60 | 0.70 | 0.80 | 0.90 | 1.00 |
| 40 / 32 / 1200 / "A"† 60 / 48 / 1200 / "A"† 80 / 64 / 1200 / "A"† | HIGH | 1580 | 1530 | 1470 | 1405 | 1330 | 1245 | 1150 | 1045 | 890 | 650 |
| | MED-HIGH | 1110 | 1100 | 1075 | 1060 | 1030 | 980 | 920 | 835 | 680 | 520 |
| | MED-LOW | 845 | 840 | 830 | 815 | 790 | 750 | 670 | 595 | 480 | 320 |
| | LOW | 675 | 665 | 660 | 645 | 620 | 585 | 530 | 455 | 360 | 255 |
| 100 / 80 / 1200 / "B"† | HIGH | 1675 | 1645 | 1595 | 1530 | 1465 | 1385 | 1280 | 1155 | 1025 | 810 |
| | MED | 1270 | 1260 | 1250 | 1240 | 1215 | 1185 | 1125 | 1035 | 910 | 695 |
| | LOW | 955 | 950 | 945 | 935 | 920 | 905 | 865 | 810 | 685 | 510 |
| 80 / 64 / 1600 / "B"† | HIGH | 1970 | 1935 | 1900 | 1850 | 1795 | 1735 | 1660 | 1590 | 1495 | 1395 |
| | MED | 1445 | 1435 | 1425 | 1415 | 1405 | 1375 | 1350 | 1300 | 1240 | 1160 |
| | LOW | 1245 | 1235 | 1225 | 1215 | 1205 | 1190 | 1170 | 1135 | 1090 | 995 |
| 100 / 80 / 1600 / "B"† | HIGH | 2050 | 1990 | 1935 | 1860 | 1770 | 1680 | 1580 | 1490 | 1370 | 1255 |
| | MED | 1630 | 1615 | 1600 | 1585 | 1550 | 1510 | 1445 | 1355 | 1270 | 1135 |
| | LOW | 1340 | 1325 | 1310 | 1295 | 1285 | 1270 | 1245 | 1195 | 1125 | 1005 |
| 115 / 92 / 1600 / "C" | HIGH | 2040 | 1975 | 1925 | 1855 | 1780 | 1695 | 1610 | 1505 | 1380 | 1225 |
| | MED | 1725 | 1685 | 1650 | 1610 | 1555 | 1500 | 1425 | 1340 | 1220 | 1075 |
| | LOW | 1365 | 1355 | 1325 | 1290 | 1265 | 1250 | 1210 | 1140 | 1045 | 940 |
| 80 / 64 / 2000 / "C" 100 / 80 / 2000 / "C"† 115 / 92 / 2000 / "C"† | HIGH | 2400 | 2320 | 2275 | 2200 | 2115 | 2025 | 1930 | 1825 | 1700 | 1570 |
| | MED | 2050 | 2025 | 1980 | 1930 | 1855 | 1805 | 1720 | 1635 | 1530 | 1400 |
| | LOW | 1690 | 1675 | 1660 | 1630 | 1610 | 1560 | 1500 | 1430 | 1330 | 1225 |
| 130 / 104 / 2000 / "D"† | HIGH | 2380 | 2330 | 2270 | 2205 | 2120 | 2025 | 1920 | 1815 | 1705 | 1565 |
| | MED | 2040 | 2010 | 1980 | 1920 | 1875 | 1790 | 1705 | 1610 | 1515 | 1385 |
| | LOW | 1690 | 1680 | 1655 | 1630 | 1590 | 1530 | 1490 | 1425 | 1350 | 1235 |
| **NOTE: Data below reflects airflows with two return openings - two sides or one side and bottom.** | | | | | | | | | | | |
| 80 / 64 / 2000 / "C" 100 / 80 / 2000 / "C"† 115 / 92 / 2000 / "C"† | HIGH | 2405 | 2340 | 2275 | 2210 | 2130 | 2050 | 1955 | 1840 | 1725 | 1600 |
| | MED | 2005 | 1990 | 1965 | 1935 | 1880 | 1815 | 1725 | 1635 | 1535 | 1410 |
| | LOW | 1655 | 1640 | 1625 | 1610 | 1585 | 1540 | 1485 | 1420 | 1340 | 1235 |
| 130 / 104 / 2000 / "D"† | HIGH | 2385 | 2335 | 2275 | 2195 | 2120 | 2040 | 1935 | 1820 | 1700 | 1555 |
| | MED | 2005 | 1980 | 1955 | 1905 | 1845 | 1775 | 1700 | 1610 | 1500 | 1370 |
| | LOW | 1640 | 1635 | 1620 | 1605 | 1575 | 1540 | 1480 | 1400 | 1330 | 1225 |

*. Input / Output / CFM / Cabinet Width (A=14-1/2, B=17-1/2, C=21, D=24-1/2)

NOTES:

- Airflow is expressed in standard cubic feet per minute.
- Motor voltage at 115V

†. Indicates model available in LoNox.

### TABLE 7: BLOWER PERFORMANCE CFM - DOWNFLOW (WITHOUT FILTER)

| MODELS P*DN / G8T-DN / L8T-DN* | SPEED TAP | EXTERNAL STATIC PRESSURE, INCHES W.C. | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | 0.10 | 0.20 | 0.30 | 0.40 | 0.50 | 0.60 | 0.70 | 0.80 | 0.90 | 1.00 |
| 40 / 32 / 1200/ “A” †<br>57 / 46 / 1200 / "A" †<br>80 / 64 / 1200 / "A"† | HIGH | 1580 | 1540 | 1475 | 1405 | 1305 | 1230 | 1130 | 1015 | 855 | 695 |
| | MED/HI | 1140 | 1125 | 1110 | 1075 | 1035 | 980 | 920 | 815 | 700 | 570 |
| | MED/LO | 870 | 860 | 840 | 815 | 770 | 725 | 675 | 600 | 530 | 425 |
| | LOW | 695 | 675 | 655 | 635 | 610 | 575 | 530 | 470 | 400 | 290 |
| 100 / 80 / 1200 / "B" † | HIGH | 1775 | 1720 | 1660 | 1585 | 1510 | 1420 | 1315 | 1195 | 1055 | 865 |
| | MED | 1380 | 1360 | 1350 | 1330 | 1280 | 1230 | 1150 | 1050 | 920 | 760 |
| | LOW | 1030 | 1015 | 1000 | 985 | 965 | 950 | 895 | 805 | 710 | 595 |
| 80 / 64 / 1600 / "B"† | HIGH | 2110 | 2050 | 1995 | 1910 | 1840 | 1780 | 1690 | 1610 | 1515 | 1415 |
| | MED | 1895 | 1860 | 1825 | 1765 | 1700 | 1630 | 1560 | 1495 | 1410 | 1310 |
| | LOW | 1690 | 1675 | 1660 | 1605 | 1550 | 1490 | 1440 | 1360 | 1280 | 1200 |
| 115 / 92 / 1600 / "C" | HIGH | 2235 | 2160 | 2095 | 2025 | 1940 | 1865 | 1770 | 1680 | 1575 | 1465 |
| | MED | 1965 | 1920 | 1885 | 1825 | 1760 | 1720 | 1620 | 1545 | 1470 | 1340 |
| | LOW | 1645 | 1635 | 1625 | 1600 | 1575 | 1520 | 1455 | 1395 | 1320 | 1220 |
| 100 / 80 / 2000 “C”†<br>115 / 92 / 2000 / "C"† | HIGH | 2515 | 2440 | 2355 | 2265 | 2190 | 2100 | 1990 | 1875 | 1740 | 1600 |
| | MED | 2085 | 2070 | 2040 | 2000 | 1925 | 1850 | 1765 | 1660 | 1555 | 1430 |
| | LOW | 1720 | 1710 | 1695 | 1685 | 1625 | 1580 | 1515 | 1440 | 1345 | 1215 |
| 130 / 104 / 2000 / "D"† | HIGH | 2395 | 2335 | 2265 | 2185 | 2095 | 2005 | 1900 | 1780 | 1660 | 1490 |
| | MED | 2050 | 2015 | 1980 | 1920 | 1850 | 1785 | 1685 | 1580 | 1455 | 1305 |
| | LOW | 1710 | 1705 | 1690 | 1650 | 1615 | 1555 | 1490 | 1400 | 1300 | 1160 |

*. Input / Output / CFM / Cabinet Width (A=14-1/2, B=17-1/2, C=21, D=24-1/2)
NOTES:
- Airflow is expressed in standard cubic feet per minute.
- Motor voltage at 115V

†. Indicates models available in LoNox

## FILTER PERFORMANCE

The airflow capacity data published in Tables 6 & 7 represents blower performance WITHOUT filters. To determine the approximate blower performance of the system, apply the filter drop value for the filter being used or select an appropriate value from the Table 8.

***NOTE:*** *The filter pressure drop values in Table 8 are typical values for the type of filter listed and should only be used as a guideline. Actual pressure drop ratings for each filter type vary between filter manufacturer.*

### TABLE 8: FILTER PERFORMANCE - PRESSURE DROP INCHES W.C.

| Airflow Range | Minimum Opening Size (in.$^2$) | | Filter Type | | | | | |
|---|---|---|---|---|---|---|---|---|
| | | | Disposable | | Hogs Hair* | | Pleated | |
| | 1 Opening | 2 Openings | 1 Opening | 2 Openings | 1 Opening | 2 Openings | 1 Opening | 2 Openings |
| 0 - 750 | 230 | | 0.01 | | 0.01 | | 0.15 | |
| 751 - 1000 | 330 | | 0.05 | | 0.05 | | 0.20 | |
| 1001 - 1250 | 330 | | 0.10 | | 0.10 | | 0.20 | |
| 1251 - 1500 | 330 | | 0.10 | | 0.10 | | 0.25 | |
| 1501 - 1750 | 380 | 658 | 0.15 | 0.09 | 0.14 | 0.08 | 0.30 | 0.17 |
| 1751 - 2000 | 380 | 658 | 0.19 | 0.11 | 0.18 | 0.10 | 0.30 | 0.17 |
| 2001 & Above | 463 | 658 | 0.19 | 0.11 | 0.18 | 0.10 | 0.30 | 0.17 |

*. Hogs Hair Filters are the type supplied with furnace (if supplied).

### APPLYING FILTER PRESSURE DROP TO DETERMINE SYSTEM AIRFLOW

To determine the approximate airflow of the unit with a filter in place, follow the steps below:

1. Select the filter type.
2. Select the number of return air openings or calculate the return opening size in square inches to determine the proper filter pressure drop.
3. Determine the External System Static Pressure (ESP) without the filter.
4. Select a filter pressure drop from the table based upon the number of return air openings or return air opening size and add to the ESP from Step 3 to determine the total system static.
5. If total system static matches a ESP value in the airflow table (i.e. 0.20, 0.60, etc.,) the system airflow corresponds to the intersection of the ESP column and Model/ Blower Speed row.
6. If the total system static falls between ESP values in the table (i.e. 0.58, 0.75, etc.), the static pressure may be rounded to the nearest value in the table determining the airflow using Step 5 or calculate the airflow by using the following example.

**Example:** For a 130,000 Btuh furnace with 2 return openings and operating on high speed blower, it is found that total system static is 0.58" w.c. To determine the system airflow, complete the following steps:

1. Obtain the airflow values at 0.50" & 0.60" ESP.

   Airflow @ 0.50": 2120 CFM
   Airflow @ 0.60": 2040 CFM

2. Subtract the airflow @ 0.50" from the airflow @ 0.60" to obtain airflow difference.

   2040 - 2120 = -80 CFM

3. Subtract the total system static from 0.50" and divide this difference by the difference in ESP values in the table, 0.60" - 0.50", to obtain a percentage.

   (0.58 - 0.50) / (0.60 - 0.50) = 0.8

4. Multiply percentage by airflow difference to obtain airflow reduction.

   (0.8)x(-80) = -64

5. Subtract airflow reduction value to airflow @ 0.50" to obtain actual airflow @ 0.58" ESP.

   2120 - 64 = 2056

## OPERATION AND MAINTENANCE

### SEQUENCE OF OPERATION

The following describes the sequence of operation of the furnace. Refer to the schematic wiring diagrams for component location. Refer to Figure 17 on page 27, for event schedule.

#### CONTINUOUS BLOWER

On cooling/heating thermostats 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. The blower motor is energized through the cool fan terminal on the ignition control module.

#### INTERMITTENT BLOWER - COOLING

On cooling/heating thermostats with fan switch, when the fan switch is set in the auto position and the thermostat calls for cooling, a circuit is completed between the R, Y and G terminals. The motor is energized through the cool fan terminal and runs on the selected speed. The fan off setting is fixed at 60 seconds for SEER enhancement.

### HEATING CYCLE

**⚠ CAUTION**

*Label all wires prior to disconnecting when servicing controls. Wiring errors can cause improper and dangerous operation. Verify proper operation after servicing.*

When the system switch is set on HEAT and the fan is set on AUTO, and the room thermostat calls for heat, a circuit is completed between terminals R and W of the thermostat. When the proper amount of combustion air is being provided, a pressure switch activates the ignition control.

The ignition control provides a 17-second warm-up period. The gas valve then opens for 10 seconds.

As the gas starts to flow and ignition occurs, the flame sensor begins its sensing function. If a flame is detected during the 10 second flame stabilization period the circulating blower will energize 30 seconds after the gas valve opens (20 seconds after the flame stabilization period ends). Normal furnace operation will continue until the thermostat circuit between R and W is opened. When the thermostat circuit opens, the ignition control is de-energized. When the ignition control is de-energized, the gas flow stops, and the burner flames are extinguished. The ventor continues to operate for 15 seconds after the gas flow stops.

The blower motor continues to operate for the amount of time set by the fan-off delay "Jumper" located on the ignition control board (Figure 16). The heating cycle is complete, and the furnace is ready for the start of the next heating cycle.

If the flame is not detected within 2 seconds of the gas valve opening, the gas valve is shut off and a retry operation begins. If the flame is lost for 2 seconds during the 10 second stabilization period, the gas valve is shut off and a retry operation begins. During a retry operation the ventor starts a 15 second inter-purge and the ignitor warm-up time is extended to 27 seconds. If the flame is established for more than 10 seconds after ignition, during a retry, the control will clear the ignition attempt (retry) counter. If three retries occur during a call for heat, the furnace will shut down for one hour. If at the end of the one hour shut down there is a call for heat, the furnace will initiate a normal start cycle. If the problem has not been corrected the furnace will again lockout after three retries.

A momentary loss of gas supply, flame blowout, or a faulty flame probe circuit will result in a disruption in the flame and be sensed within 0.8 seconds. The gas valve will de-energize and the control will begin a recycle operation. A normal ignition sequence will begin after a 15 second inter-purge. If during the five recycles the gas supply does not return, or the fault condition is not corrected the ignition control will lock-out for 60 minutes.

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

**Hot Surface Ignition System**

**⚠ WARNING**

*Do not attempt to light 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.*

## 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. On new construction installations, 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 if 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.

**⚠ WARNING**

*When replacing filters DO NOT use a type with excessively high pressure drop. Some high efficiency filters available will cause the furnace to operate improperly and could result in a safety hazard.*

**Upflow / Horizontal Installations - Filter Removal**

1. Turn off electrical power supply to the furnace at disconnect switch. Remove access doors.
2. In the blower compartment disengage the looped end of the filter retainer wire from the front edge of the cabinet. The wire will now pivot on the hinged ends at the rear of the cabinet.
3. Remove the filter and follow the cleaning instructions above. DO NOT remove the filter stiffener rods, if provided.
4. When reinstalling the filter, be sure the filter completely covers the cabinet opening and is secured in place by the wire retainer.
5. To reassemble, reverse the procedure, restore power to the furnace and verify operation.

**Downflow Installations - Filter Removal**

1. Turn off electrical power supply to the furnace at disconnect switch. Remove access doors.
2. Filters are installed in the plenum area above the blower assembly. Filters rest against the side of the plenum wall and are supported in the middle by a frame. Lift filter slightly to dislodge and remove for service.
3. Remove the filter and follow the cleaning instructions above. DO NOT remove the filter stiffener rods, if provided. When reinstalling the filter(s) be sure it completely covers the plenum opening.
4. To reassemble, reverse the procedure, restore power to the furnace and verify operation.

**Lubrication**

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

## 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 direct drive blower assembly for cleaning is as follows:

### Upflow / Horizontal Installations

1. Turn off electrical power supply to the furnace at disconnect switch. Remove access doors.
2. Remove the two auxiliary limit wires on the left side of the blower deck inside the blower compartment.
3. Remove blower assembly mounting screws and slide the blower assembly out of the slots in the deck. If the two shipping screws were not previously removed, also remove and discard these two screws located on each front corner of the blower assembly.
4. Note the wire/terminal location and then remove the blower wiring from the furnace control. Remove the protective boot and disconnect run capacitor wires. Remove the screws securing the electrical panel to the blower housing. Pull blower assembly out of the unit. When cleaning or servicing the blower assembly, DO NOT remove or change the balance clips on the blower wheel.
5. To reassemble, reverse the procedure, restore power to the furnace and verify operation.

### Downflow Installations

1. Disconnect the electrical supply to the furnace and remove the access doors.
2. Remove the two wires leading to the auxiliary limit switch mounted on the top of the blower housing.
3. Remove the four top panel screws and lift the top panel enough to disengage and remove the flue chase assembly. Prior to removing the vent pipe, first remove the screw attaching the vent pipe to the flue collar.
4. Remove blower assembly mounting screws and slide the blower assembly out of the slots in the deck. If the two shipping screws were not previously removed, also remove and discard these two screws located on each front corner of the blower assembly.
5. Note the wire/terminal location and then remove the blower wiring from the furnace control. Remove the protective boot and disconnect run capacitor wires. Remove the screws securing the electrical panel to the blower housing. Pull blower assembly out of the unit. When cleaning or servicing the blower assembly, DO NOT remove or change the balance clips on the blower wheel.
6. To reassemble, reverse the procedure, restore power to the furnace and verify operation.

### 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 and turn off gas supply at the shutoff valve.
2. Remove the blower and burner compartment access doors.
3. Unplug igniter from the wire harness and remove the igniter/bracket assembly from the burner air shield. Handle the ignitor carefully as it is fragile and easily broken.
4. Note the location and then disconnect the sensor and rollout switch wires located on the top of the air shield and remove the shield.
5. Remove the two screws securing each burner to the burner assembly. Note the orientation of the burner (flanged side down) before removing. Burners may be cleaned by rinsing in hot water or by using a vacuum cleaner.
6. To reassemble, reverse the procedure, restore power to the furnace and verify operation.

## CLEANING THE HEAT EXCHANGER

### Lower Heat Exchanger Access

1. Turn off the electrical power to the unit and turn off gas supply at the shutoff valve.
2. Remove the blower and burner compartment access doors. Disconnect the gas supply piping at the union to permit removal of the entire burner and gas control assembly from the vestibule panel. Use the wrench boss on the gas valve when removing or installing this piping.
3. Unplug the igniter from the wire harness. Disconnect sensor and rollout switch wires located on top of the air shield. Identify and note the location of all leads for ease of reinstallation. Also disconnect the wires at the side rollout switches (upflow only) and the gas valve wires.
4. Remove the screws holding the burner assembly to the vestibule panel and remove this assembly. Handle the assembly carefully since it contains the igniter which is fragile and easily broken. The lower portion of the heat exchanger will now be exposed. To clean the burner assembly, use a vacuum cleaner, or remove the burners as outlined in burner cleaning, and clean in hot water.

### Upper Heat Exchanger Access

1. Perform steps 1-4 above.

2. Disconnect vent piping from the vent motor assembly at the top panel on the furnace (upflow only). On downflow models, the vent pipe is attached to the vent motor outlet. Remove this screw before proceeding.
3. Unplug the vent motor wires and ground wire. Remove the pressure switch tubing at the tap on the vent motor housing.

***NOTE:*** *It is recommended that replacement gaskets be available before removing vent motor.*

4. Remove six mounting screws that hold the vent motor to the restrictor plate. The surface is gasketed and gasket can be reused if it is carefully removed. It is necessary to remove this assembly to gain access to the restrictor plate mounting holes. The assembly may be vacuumed if cleaning is necessary. If any vent assembly parts are damaged, replace with an entire new assembly (except for gaskets).
5. Remove the perimeter screws attaching the restrictor plate assembly to the vestibule panel. The surface is also gasketed. The assembly, including the flue baffle plate (rear) may be vacuumed or cleaned with hot water if necessary.
6. The upper portion of the heat exchanger is now accessible. With a long flexible wire brush, clean inside each tube at both the top and bottom. The brush must pass around the rear heat exchanger tubes. Vacuum loose scale and dirt from each tube.
7. Clean - Replace all components in reverse order. Regasket all surfaces which required a gasket. Reconnect all wiring. Reattach vent pipe and gas supply lines before restoring service to furnace. Restore electrical power, check gas supply piping for leaks, then verify furnace operation.

### TROUBLESHOOTING

The following visual checks should be made before troubleshooting:

1. Check to see that the power to the furnace and the ignition 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 the room temperature. Observe the system's response. Then use the troubleshooting section in this manual to check the system's operation.

## FURNACE CONTROL DIAGNOSTICS

The furnace has built-in, self diagnostic capability. If a system problem occurs, a fault code is shown by a blinking red LED. It is located behind a clear view port in the blower compartment door. DO NOT remove the furnace blower compartment panel OR turn off furnace power as either action will clear the control's memory of the fault.

The control continuously monitors its own operation and the operation of the system. If a failure occurs, the LED will indicate the failure code. If the failure is internal to the control, the light will stay on continuously. In this case, the entire control should be replaced as the control is not field repairable.

Flash sequence codes 1 through 11 are as follows: LED will turn “on” for one second and “off” for one second. This pattern will be repeated the number of times equal to the code. For example, six “on” flashes equals a number 6 fault code.

All flash code sequences are broken by a 2 second “off” period.

| IGNITION CONTROL (P/N 031-01267-001) |
|---|
| Normal flame sense current is approximately |
| 3.7 microamps DC (υa) |
| Low flame signal control lockout point is |
| 0.9 microamps DC (υa) |

**1 FLASH:**This indicates that flame was sensed when there was not a call for heat. With this fault code the control will turn on both the inducer motor and supply air blower. This fault would typically be caused by a gas valve that leaks through or is slow closing.

**2 FLASH:**This indicates that the normally open pressure switch contacts are stuck in the closed position. The control confirms these contacts are open at the beginning of each heat cycle. This would indicate a faulty pressure switch or mis-wiring.

**3 FLASH:**This indicates the normally open pressure switch contact did not close at the beginning of the heat cycle. This could be caused by a number of problems; faulty inducer, blocked vent pipe, broken pressure switch hose or faulty pressure switch.

**4 FLASH:**This indicates that a primary or auxiliary limit switch has opened its normally closed contacts. With this fault code the control will operate the supply air blower and inducer. This condition may be caused by: dirty filter, improperly sized duct system, incorrect blower speed setting, incorrect firing rate or faulty blower motor.

**5 FLASH:**This fault is indicated if the normally closed contacts in the rollout switch opens. The rollout control is manually reset. If it has opened, check for proper combustion air, proper inducer operation, primary heat exchanger failure or burner problem. Be sure to reset the switch after correcting the failure condition.

**6 FLASH:** This indicates that after the unit was operating, the pressure switch opened 4 times during the call for heat. If the main blower is in a "Delay on" mode it will complete it, and any subsequent delay off period. The ventor continues to operate until the pressure switch re-closes or a call for heat is removed.

**7 FLASH:** This fault code indicates that the flame could not be established. This no-light condition occurred 3 times (3 retries) during the call for heat before locking out. This may be caused by low gas pressure, faulty gas valve, faulty hot surface ignitor or burner problem.

**8 FLASH:** This fault is indicated if the flame is lost 5 times (5 recycles) during the heating cycle. This could be caused by low gas pressure or faulty gas valve.

**9 FLASH:** Indicates reversed line voltage polarity. Both heating and cooling operations will be affected. Check polarity at furnace and branch.

**11 FLASH:** This fault will be indicated if the rollout jumper wire connection soldered into the board, is broken. If this fault occurs the control will have to be replaced.

**STEADY ON:** This fault occurs if the gas valve is energized when there is no call for heat. If this happens the ventor is energized and will remain energized for 5 seconds or until the fault clears itself at which point the ventor de-energizes. This failure is counted as a recycle. Check the gas valve and control for proper operation.

**60 MINUTE AUTOMATIC RESET FROM LOCKOUT:** This control includes a "watchdog" type circuit that will reset from a lockout condition after 60 minutes. Operational faults 1,6,7,8 and Steady On will be reset. This provides protection to an unoccupied structure if a temporary condition exists causing a furnace malfunction. An example would be a low incoming gas supply pressure preventing unit operation. When the gas pressure is restored, at some point the "watchdog" would restart the unit and provide heat for the house.

***NOTE:*** *If a flame is detected the control flashes the LED for 1/8 of a second and then enters a flame stabilization period*.

**⚠ WARNING**

*Never jump pressure switch to allow furnace operation. To do so will allow furnace to operate under potentially hazardous conditions.*

*Do not try to repair controls. Replace defective controls with UPG Source 1 Parts.*

*Never adjust pressure switch to allow furnace operation.*

.

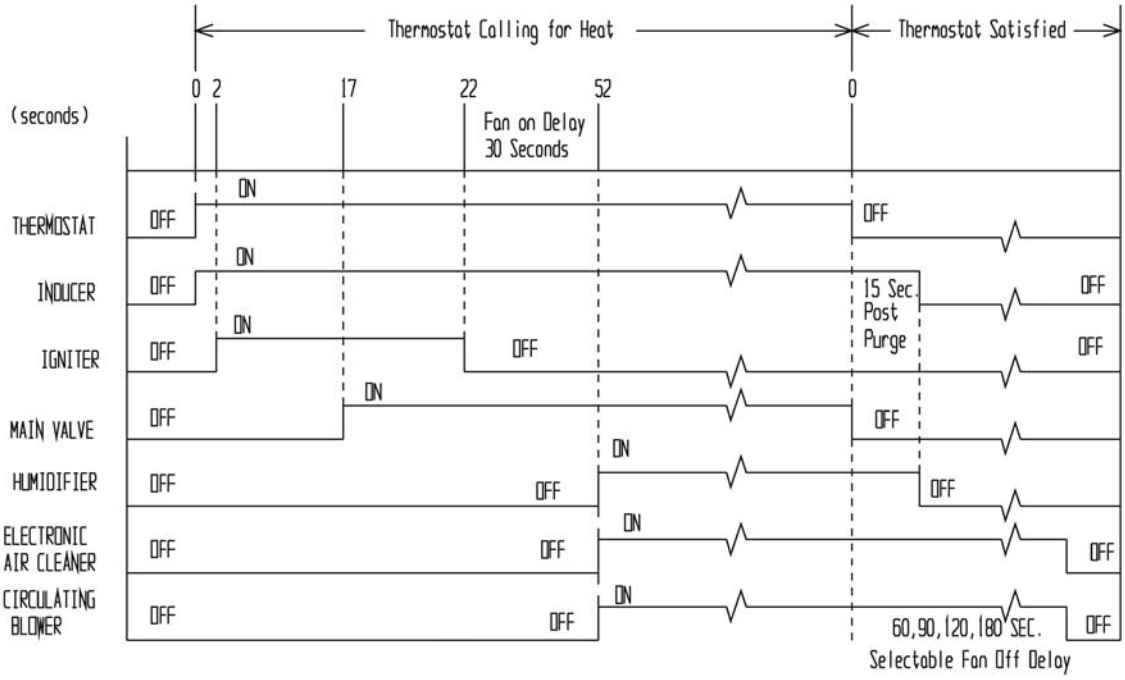
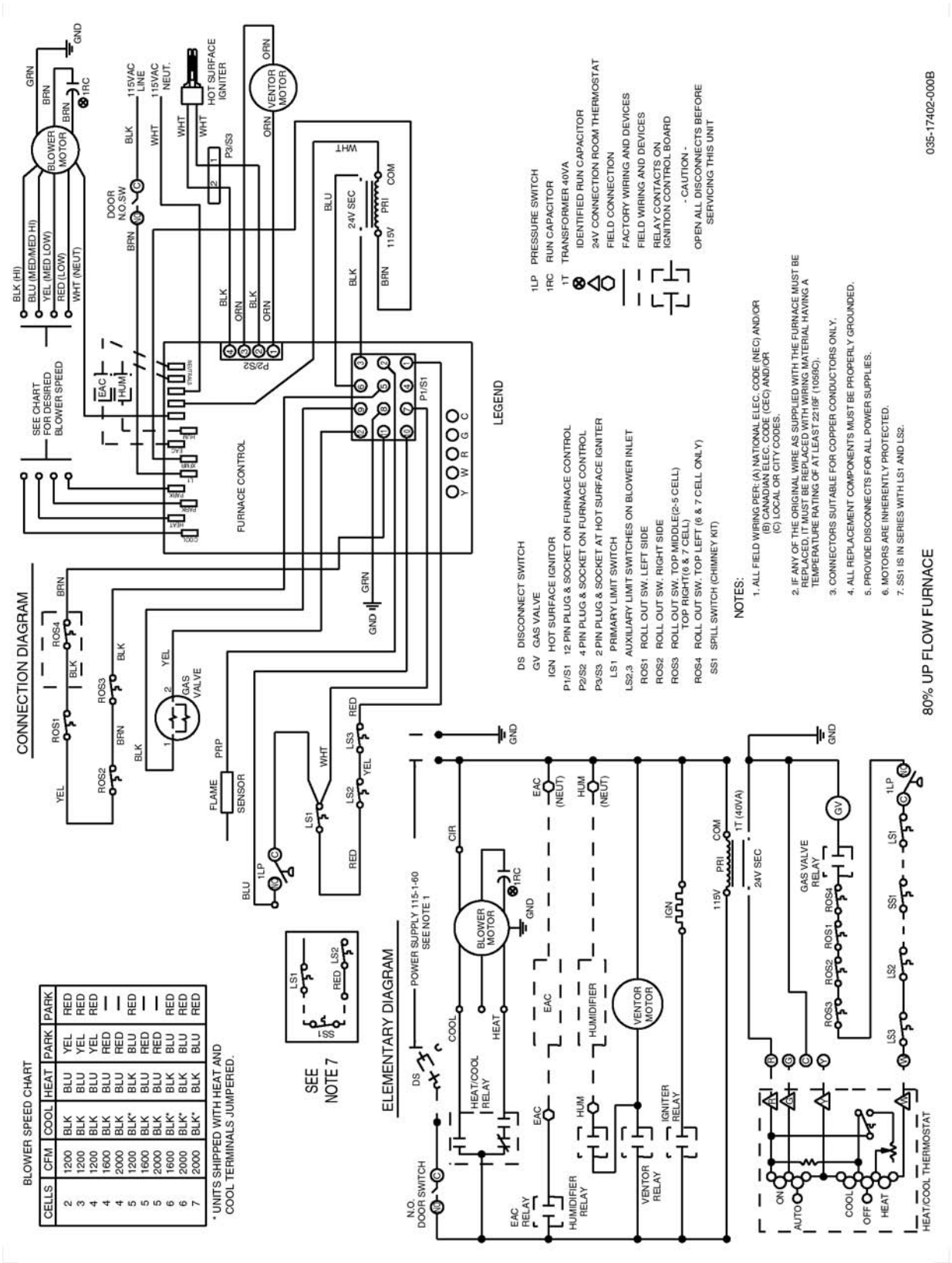



**FIGURE 17 : FURNACE EVENT CONTROL SCHEDULE**

## WIRING DIAGRAM - UPFLOW/HORIZONTAL MODELS P*HU/G8T-UH/L8T-UH & FL8-UH

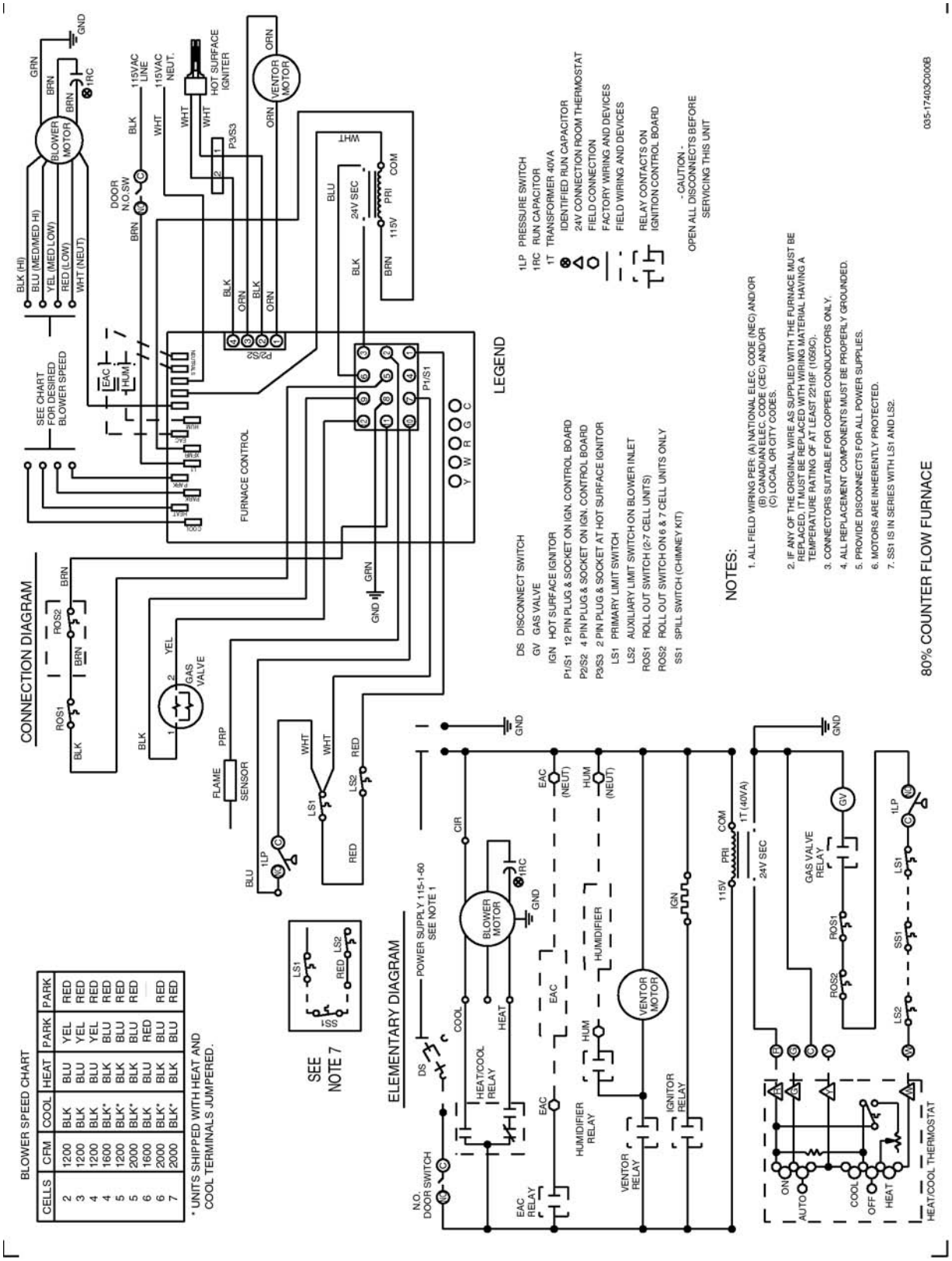
(***NOTE:*** *The furnace's control system depends on correct polarity of the power supply.*)




| CELLS | CFM | COOL | HEAT | PARK | PARK |
|---|---|---|---|---|---|
| 2 | 1200 | BLK | BLU | YEL | RED |
| 3 | 1200 | BLK | BLU | YEL | RED |
| 4 | 1200 | BLK | BLU | YEL | RED |
| 4 | 1600 | BLK | BLU | RED | — |
| 4 | 2000 | BLK | BLU | RED | — |
| 5 | 1200 | BLK* | BLK | BLU | RED |
| 5 | 1600 | BLK | BLU | RED | — |
| 5 | 2000 | BLK | BLU | RED | — |
| 6 | 1600 | BLK* | BLK | BLU | RED |
| 6 | 2000 | BLK* | BLK | BLU | RED |
| 7 | 2000 | BLK* | BLK | BLU | RED |

## WIRING DIAGRAM - DOWNFLOW MODELS P*DN/G8T-DN/L8T-DN

(***NOTE:*** *The furnace's control system depends on correct polarity of the power supply.*)




| CELLS | CFM | COOL | HEAT | PARK | PARK |
|---|---|---|---|---|---|
| 2 | 1200 | BLK | BLU | YEL | RED |
| 3 | 1200 | BLK | BLU | YEL | RED |
| 4 | 1200 | BLK | BLU | YEL | RED |
| 4 | 1600 | BLK* | BLK | BLU | RED |
| 5 | 1200 | BLK* | BLK | BLU | RED |
| 5 | 2000 | BLK* | BLK | BLU | RED |
| 6 | 1600 | BLK | BLU | RED | |
| 6 | 2000 | BLK* | BLK | BLU | RED |
| 7 | 2000 | BLK* | BLK | BLU | RED |

# NOTES

# NOTES

035-17405-000 Rev. B (900)
Supersedes: 035-17405-000 Rev. A (4/00)

# TECHNICAL GUIDE

## MODELS: G8T-UP

## 80 AFUE UPFLOW/HORIZONTAL GAS-FIRED FURNACES

40-130 MBH INPUT
HIGH-EFFICIENCY
INDUCED COMBUSTION

This product was manufactured in a plant whose quality system is certified/registered as being in conformity with ISO 9001.

**Due to continuous product improvement, specifications are subject to change without notice.**

**Visit us on the web at www.york.com for the most up-to-date technical information.**

**Additional information can be found at www.gamanet.org.**

### DESCRIPTION

These high efficiency, compact units employ induced combustion, reliable hot surface ignition and high heat transfer tubular heat exchangers. The units are factory shipped for installation in upflow or horizontal applications.

These furnaces are designed for residential installation in a basement, closet, alcove, attic, recreation room or garage and are also ideal for commercial applications. All units are factory assembled, wired and tested to assure safe dependable and economical installation and operation.

These units are Category I listed and may be common vented with another gas appliance as allowed by the National Fuel Gas Code.

### WARRANTY

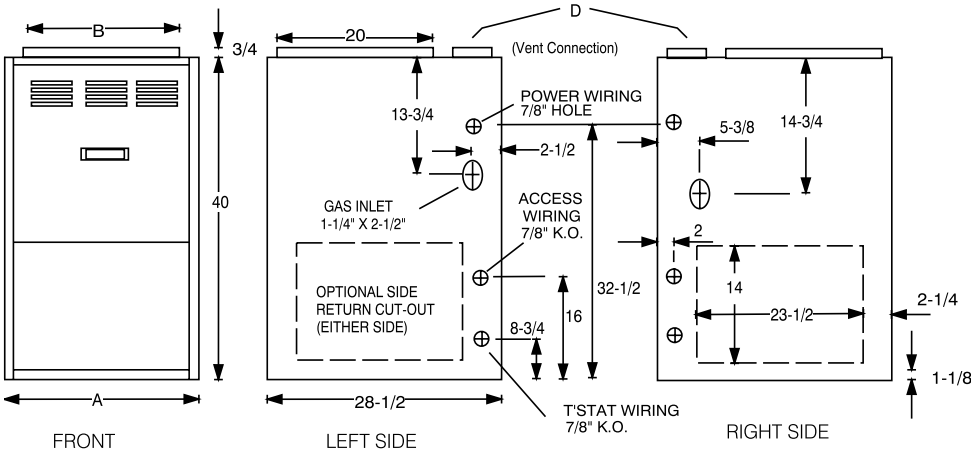
20-year limited warranty on the heat exchanger.

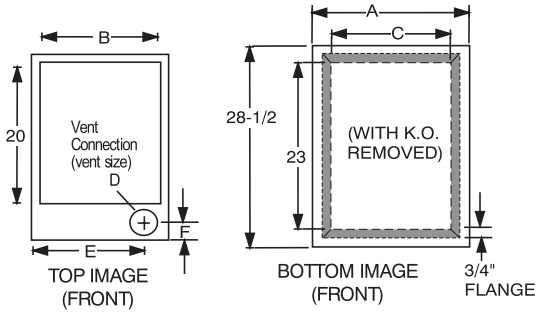
10-year heat exchanger warranty on commercial applications.

5-year limited parts warranty.

### FEATURES

- Easily applied in upflow, horizontal left or horizontal right installation with no conversion necessary
- Electronic hot surface ignition with high reliability and dependability
- 100% shut off main gas valve for added safety
- Rollout safety control
- Low unit amp requirement for easy application
- High quality inducer motor for quiet operation
- Built-in self diagnostics with fault code display
- High velocity filter provided for field installation
- Standard terminals for controlling humidifiers and EAC's
- 40 VA control transformer fuse protected
- Easy to connect power and control wiring
- Efficiency ratings of 80 AFUE attained by using tubular heat exchangers
- Cooling relay supplied for easy installation of add-on cooling
- Multi-speed PSC, direct-drive blower motors to match cooling requirements
- Adjustable fan-off settings to eliminate “cold-blow”
- Compact 40-in height allows installation in small space confines
- Lo NOx models have been designed to meet specific code requirements. Lo NOx units may not be converted to propane.




All dimensions are in inches, and are approximate.

| MODEL[1] | A | B | C | D | E | F |
|---|---|---|---|---|---|---|
| G8T04012UHA11 | 14-1/2 | 13-1/4 | 10-1/8 | 4 | 10-1/8 | 3-3/4 |
| G8T06012UHA11 | 14-1/2 | 13-1/4 | 10-1/8 | 4 | 10-1/8 | 3-3/4 |
| G8T08012UHA11 | 14-1/2 | 13-1/4 | 10-1/8 | 4 | 10-1/8 | 3-3/4 |
| G8T08016UHB11 | 17-1/2 | 16-1/4 | 13-1/8 | 4 | 11-5/8 | 3-3/4 |
| G8T08022UHC11 | 21 | 19-3/4 | 16-5/8 | 4 | 13-3/8 | 3-3/4 |
| G8T10012UHB11 | 17-1/2 | 16-1/4 | 13-1/8 | 4 | 11-5/8 | 3-3/4 |
| G8T10016UHB11 | 17-1/2 | 16-1/4 | 13-1/8 | 4 | 11-5/8 | 3-3/4 |
| G8T10020UHC11 | 21 | 19-3/4 | 16-5/8 | 4 | 13-3/8 | 3-3/4 |
| G8T11516UHC11 | 21 | 19-3/4 | 16-5/8 | 4 | 13-3/8 | 3-3/4 |
| G8T11520UHC11 | 21 | 19-3/4 | 16-5/8 | 4 | 13-3/8 | 3-3/4 |
| G8T13020UHD11 | 24-1/2 | 23-1/4 | 20-1/8 | 4 | 15-1/8 | 3-3/4 |

1. “L” in model number indicates Lo NOx unit

**FIGURE 1 : DIMENSIONS**

## RATINGS & PHYSICAL / ELECTRICAL DATA

| MODEL[1] | INPUT MBH | OUTPUT MBH | AFUE[2] | AIR TEMP RISE °F | MAX OUTLET TEMP °F | BLOWER | | | TOTAL UNIT AMPS | MAX OVER-CURRENT PROTECT.[3] | MIN. WIRE SIZE (AWG) @ 75 FT. ONE WAY | OPER. WEIGHT. (LBS) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | HP | AMPS | SIZE | | | | |
| G8T04012UHA11 | 40 | 32 | 80.0 | 25 - 55 | 155 | 1/3 | 6.2 | 10 x 7 | 9.0 | 20 | 14 | 105 |
| G8T06012UHA11 | 57 | 46 | 80.0 | 25 - 55 | 155 | 1/3 | 6.2 | 10 x 7 | 9.0 | 20 | 14 | 110 |
| G8T08012UHA11 | 80 | 64 | 80.0 | 35 - 65 | 170 | 1/3 | 6.2 | 10 x 7 | 9.0 | 20 | 14 | 117 |
| G8T08016UHB11 | 80 | 64 | 80.0 | 25 - 55 | 155 | 3/4 | 11.5 | 11 x 8 | 12.0 | 20 | 14 | 126 |
| G8T08022UHC11 | 80 | 64 | 80.0 | 25 - 55 | 165 | 1 | 12.2 | 11 x 10 | 14.0 | 20 | 12 | 140 |
| G8T10012UHB11 | 100 | 80 | 80.0 | 40 - 70 | 170 | 1/2 | 7.0 | 10 x 8 | 12.0 | 20 | 14 | 128 |
| G8T10016UHB11 | 100 | 80 | 80.0 | 35 - 65 | 165 | 1/2 | 10.4 | 10 x 10 | 12.0 | 20 | 14 | 134 |
| G8T10020UHC11 | 100 | 80 | 80.0 | 25 - 55 | 155 | 1 | 12.2 | 11 x 10 | 14.0 | 20 | 12 | 145 |
| G8T11516UHC11 | 115 | 92 | 80.0 | 35 - 65 | 170 | 1/2 | 10.4 | 10 x 10 | 12.0 | 20 | 14 | 145 |
| G8T11520UHC11 | 115 | 92 | 80.0 | 30 - 60 | 170 | 1 | 12.2 | 11 x 10 | 14.0 | 20 | 12 | 147 |
| G8T13020UHD11 | 130 | 105 | 80.0 | 35 - 65 | 165 | 1 | 12.2 | 11 x 10 | 14.0 | 20 | 12 | 158 |

1. “L” in model designator indicates factory built Lo Nox units.
2. AFUE numbers are determined in accordance with DOE test procedures.
3. Wire size and overcurrent protection must comply with the National Electrical Code (NFPA-70-latest edition)

- For altitudes above 2,000 ft., reduce capacity 4% for each 1,000 ft. above sea level.
- Wire size based on copper conductors, 60°C, 3% voltage drop.
- Continuous return air temperature must not be below 55°F.

## BLOWER PERFORMANCE CFM - UPFLOW/HORIZONTAL (WITHOUT FILTER)

Note: Data below reflects airflows with single return opening, either left or right side or bottom

| MODELS[1] | SPEED TAP | EXTERNAL STATIC PRESSURE, INCHES W.C. | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | 0.10 | 0.20 | 0.30 | 0.40 | 0.50 | 0.60 | 0.70 | 0.80 | 0.90 | 1.00 |
| 40 / 32 / 1200 / "A"[2]<br>57 / 46 / 1200 / "A"[2]<br>80 / 64 / 1200 / "A" | HIGH | 1580 | 1530 | 1470 | 1405 | 1330 | 1245 | 1150 | 1045 | 890 | 650 |
| | MED-HIGH | 1110 | 1100 | 1075 | 1060 | 1030 | 980 | 920 | 835 | 680 | 520 |
| | MED-LOW | 845 | 840 | 830 | 815 | 790 | 750 | 670 | 595 | 480 | 320 |
| | LOW | 675 | 665 | 660 | 645 | 620 | 585 | 530 | 455 | 360 | 255 |
| 100 / 80 / 1200 / "B" | HIGH | 1675 | 1645 | 1595 | 1530 | 1465 | 1385 | 1280 | 1155 | 1025 | 810 |
| | MED | 1270 | 1260 | 1250 | 1240 | 1215 | 1185 | 1125 | 1035 | 910 | 695 |
| | LOW | 955 | 950 | 945 | 935 | 920 | 905 | 865 | 810 | 685 | 510 |
| 80 / 64 / 1600 / "B"[2] | HIGH | 1970 | 1935 | 1900 | 1850 | 1795 | 1735 | 1660 | 1590 | 1495 | 1395 |
| | MED | 1445 | 1435 | 1425 | 1415 | 1405 | 1375 | 1350 | 1300 | 1240 | 1160 |
| | LOW | 1245 | 1235 | 1225 | 1215 | 1205 | 1190 | 1170 | 1135 | 1090 | 995 |
| 100 / 80 / 1600 / "B"[2] | HIGH | 2050 | 1990 | 1935 | 1860 | 1770 | 1680 | 1580 | 1490 | 1370 | 1255 |
| | MED | 1630 | 1615 | 1600 | 1585 | 1550 | 1510 | 1445 | 1355 | 1270 | 1135 |
| | LOW | 1340 | 1325 | 1310 | 1295 | 1285 | 1270 | 1245 | 1195 | 1125 | 1005 |
| 115 / 92 / 1600 / "C" | HIGH | 2040 | 1975 | 1925 | 1855 | 1780 | 1695 | 1610 | 1505 | 1380 | 1225 |
| | MED | 1725 | 1685 | 1650 | 1610 | 1555 | 1500 | 1425 | 1340 | 1220 | 1075 |
| | LOW | 1365 | 1355 | 1325 | 1290 | 1265 | 1250 | 1210 | 1140 | 1045 | 940 |
| 80 / 64 / 2200 / "C" | HIGH | 2533 | 2442 | 2355 | 2279 | 2193 | 2110 | 2009 | 1895 | 1790 | 1670 |
| | MED-HIGH | 1978 | 1942 | 1906 | 1869 | 1819 | 1754 | 1694 | 1617 | 1521 | 1402 |
| | MED-LOW | 1566 | 1544 | 1514 | 1475 | 1443 | 1419 | 1377 | 1317 | 1245 | 1141 |
| | LOW | 1281 | 1262 | 1243 | 1198 | 1168 | 1135 | 1103 | 1047 | 988 | 912 |
| 100 / 80 / 2000 / "C"[2]<br>115 / 92 / 2000 / "C"[2] | HIGH | 2400 | 2320 | 2275 | 2200 | 2115 | 2025 | 1930 | 1825 | 1700 | 1570 |
| | MED | 2050 | 2025 | 1980 | 1930 | 1855 | 1805 | 1720 | 1635 | 1530 | 1400 |
| | LOW | 1690 | 1675 | 1660 | 1630 | 1610 | 1560 | 1500 | 1430 | 1330 | 1225 |
| 130 / 105 / 2000 / "D"[2] | HIGH | 2380 | 2330 | 2270 | 2205 | 2120 | 2025 | 1920 | 1815 | 1705 | 1565 |
| | MED | 2040 | 2010 | 1980 | 1920 | 1875 | 1790 | 1705 | 1610 | 1515 | 1385 |
| | LOW | 1690 | 1680 | 1655 | 1630 | 1590 | 1530 | 1490 | 1425 | 1350 | 1235 |
| **NOTE: Data below reflects airflows with two return openings - two sides or one side and bottom.** | | | | | | | | | | | |
| 100 / 80 / 2000 / "C"[2]<br>115 / 92 / 2000 / "C"[2] | HIGH | 2405 | 2340 | 2275 | 2210 | 2130 | 2050 | 1955 | 1840 | 1725 | 1600 |
| | MED | 2005 | 1990 | 1965 | 1935 | 1880 | 1815 | 1725 | 1635 | 1535 | 1410 |
| | LOW | 1655 | 1640 | 1625 | 1610 | 1585 | 1540 | 1485 | 1420 | 1340 | 1235 |
| 130 / 105 / 2000 / "D"[2] | HIGH | 2385 | 2335 | 2275 | 2195 | 2120 | 2040 | 1935 | 1820 | 1700 | 1555 |
| | MED | 2005 | 1980 | 1955 | 1905 | 1845 | 1775 | 1700 | 1610 | 1500 | 1370 |
| | LOW | 1640 | 1635 | 1620 | 1605 | 1575 | 1540 | 1480 | 1400 | 1330 | 1225 |

1. Input / Output / CFM / Cabinet Width (A=14-1/2, B=17-1/2, C=21, D=24-1/2)

NOTES:

- Airflow is expressed in standard cubic feet per minute.
- Motor voltage at 115V

2. Indicates model available in LoNox.

## FILTER PERFORMANCE

The airflow capacity data published in the Blower Performance Tables represents blower performance WITHOUT filters. To determine the approximate blower performance of the system, apply the filter drop value for the filter being used or select an appropriate value from the Table .

**NOTE:** The filter pressure drop values in the Table below are typical values for the type of filter listed and should only be used as a guideline. Actual pressure drop ratings for each filter type vary between filter manufacturer.

## FILTER PERFORMANCE - PRESSURE DROP INCHES W.C.

| Airflow Range | Minimum Opening Size ($in.^2$) | | Filter Type | | | | | |
|---|---|---|---|---|---|---|---|---|
| | | | Disposable | | Hogs Hair[1] | | Pleated | |
| | 1 Opening | 2 Openings | 1 Opening | 2 Openings | 1 Opening | 2 Openings | 1 Opening | 2 Openings |
| 0 - 750 | 230 | | 0.01 | | 0.01 | | 0.15 | |
| 751 - 1000 | 330 | | 0.05 | | 0.05 | | 0.20 | |
| 1001 - 1250 | 330 | | 0.10 | | 0.10 | | 0.20 | |
| 1251 - 1500 | 330 | | 0.10 | | 0.10 | | 0.25 | |
| 1501 - 1750 | 380 | 658 | 0.15 | 0.09 | 0.14 | 0.08 | 0.30 | 0.17 |
| 1751 - 2000 | 380 | 658 | 0.19 | 0.11 | 0.18 | 0.10 | 0.30 | 0.17 |
| 2001 & Above | 463 | 658 | 0.19 | 0.11 | 0.18 | 0.10 | 0.30 | 0.17 |

1. Hogs Hair Filters are the type supplied with furnace (if supplied).

## APPLYING FILTER PRESSURE DROP TO DETERMINE SYSTEM AIRFLOW

To determine the approximate airflow of the unit with a filter in place, follow the steps below:

1. Select the filter type.
2. Select the number of return air openings or calculate the return opening size in square inches to determine the proper filter pressure drop.
3. Determine the External System Static Pressure (ESP) without the filter.
4. Select a filter pressure drop from the table based upon the number of return air openings or return air opening size and add to the ESP from Step 3 to determine the total system static.
5. If total system static matches a ESP value in the airflow table (i.e. 0.20, 0.60, etc,) the system airflow corresponds to the intersection of the ESP column and Model/ Blower Speed row.
6. If the total system static falls between ESP values in the table (i.e. 0.58, 0.75, etc.), the static pressure may be rounded to the nearest value in the table determining the airflow using Step 5 or calculate the airflow by using the following example.

Example: For a 130,000 Btuh furnace with 2 return openings and operating on high speed blower, it is found that total system static is 0.58" w.c. To determine the system airflow, complete the following steps:

7. Obtain the airflow values at 0.50" & 0.60" ESP.
   Airflow @ 0.50": 2120 CFM
   Airflow @ 0.60": 2040 CFM
8. Subtract the airflow @ 0.50" from the airflow @ 0.60" to obtain airflow difference.
   2040 - 2120 = -80 CFM
9. Subtract the total system static from 0.50" and divide this difference by the difference in ESP values in the table, 0.60" - 0.50", to obtain a percentage.
   (0.58 - 0.50) / (0.60 - 0.50) = 0.8
10. Multiply percentage by airflow difference to obtain airflow reduction.
    (0.8) x (-80) = -64
11. Subract airflow reduction value to airflow @ 0.50" to obtain actual airflow @ 0.58" ESP.
    2120 - 64 = 2056

## UNIT CLEARANCES TO COMBUSTIBLES

(All surfaces identified with the unit in a vertical position)

| APPLICATION | TOP | FRONT | REAR | LEFT SIDE | RIGHT SIDE | FLUE | FLOOR/ BOTTOM | CLOSET | ALCOVE | ATTIC | LINE CONTACT |
|---|---|---|---|---|---|---|---|---|---|---|---|
| UPFLOW | 1 | 6 | 0 | 0 | 3 | 6 | COMBUSTIBLE | YES | YES | YES | NO |
| UPFLOW B-VENT | 1 | 3 | 0 | 0 | 0 | 1 | COMBUSTIBLE | YES | YES | YES | NO |
| HORIZONTAL | 1 | 6 | 0 | 0 | 3 | 6 | COMBUSTIBLE | NO | YES | YES | YES[1] |
| HORIZ. B-VENT | 1 | 3 | 0 | 0 | 0 | 1 | COMBUSTIBLE | NO | YES | YES | YES[1] |

1. Line contact only permitted between lines formed by the intersection of the rear panel and side panel (top in horizontal postion) of the furance jacket and building joists, studs or framing.

## FILTER SIZE/ADD-ON COOLING

| MODEL* | FILTER SIZE | | ADD-ON COOLING | |
|---|---|---|---|---|
| | SIDE | BOTTOM | TONS | CFM @ .5 ESP[1] |
| G8T04012UHA11 | 16 x 26 | 14 x 26 | 2, 2- 1/2, 3 | 1330 |
| G8T06012UHA11 | 16 x 26 | 14 x 26 | 2, 2- 1/2,, 3 | 1330 |
| G8T08012UHA11 | 16 x 26 | 14 x 26 | 2, 2- 1/2, 3 | 1330 |
| G8T08016UHB11 | 16 x 26 | 16 x 26 | 3, 3- 1/2, 4 | 1795 |
| G8T08022UHC11 | (2) 16 x 26 | 20 x 26 | 3- 1/2, 4, 5 | 2130 |
| G8T10012UHB11 | 16 x 26 | 16 x 26 | 2, 2- 1/2, 3 | 1465 |
| G8T10016UHB11 | 16 x 26 | 16 x 26 | 3, 3- 1/2, 4 | 1770 |
| G8T10020UHC11 | (2) 16 x 26 | 20 x 26 | 3- 1/2, 4 ,5 | 2130 |
| G8T11516UHC11 | 16 x 26 | 20 x 26 | 3, 3- 1/2, 4 | 1780 |
| G8T11520UHC11 | (2) 16 X 26 | 20 X 26 | 3- 1/2, 4, 5 | 2130 |
| G8T13020UHD11 | (2) 16 x 26 | 24 x 26 | 3- 1/2, 4, 5 | 2120 |

1. ESP (External Static Pressure) .5" W.C. is at furnace outlet ahead of cooling coil, and does not include filter.

- High velocity filters provided
- "L" in model number indicates Lo NOx unit.

## ACCESSORIES

**Propane Conversion Kit –** 1NP0347 40, 80 & 100 MBH
1NP0348 60, 115 & 130 MBH

This accessory conversion kit may be used to convert natural gas units for propane (LP) operation. Conversion must be made by qualified distributor or dealer personnel.

**High Altitude Pressure Switch Kits**

These accessory kits may be used to convert units for high altitude operation. Conversion must be made by qualified distributor or dealer personnel.

| KIT | APPLICATION | MODELS (INPUT) |
|---|---|---|
| 1PS0301 | 2000 - 5500 FT | 40, 57 MBH |
| 1PS0302 | | 80 MBH |
| 1PS0312 | | 100, 115, 130 MBH |
| 1PS0301 | 5500 - 10,000 FT. | 40, 60, 80 MBH |
| 1PS0311 | | 100, 115, 130 MBH |

**NOTE:** For high altitude conversion, an orifice change may also be required. See Form 650.74-N1.1V for application information.

**External Side Return Filter Rack - 1SR0302 (Upflow)**

Provides a 16 x 25 cleanable, high velocity type filter and attaches to the furnace side panel and the return air duct.The filteris easily replaced. Package contains six filter racks with filters.

**External Bottom Return Upflow or Horizontal End Return Filter Rack**

Provides a cleanable, high velocity type filter and rack. Attaches to the end of the furnace and provides duct flanges.

1BR0314 - 14-1/2" "A" cabinet

1BR0317 - 17-1/2" "B" cabinet

1BR0321 - 21" "C" cabinet

1BR0324 - 24-1/2" "D" cabinet

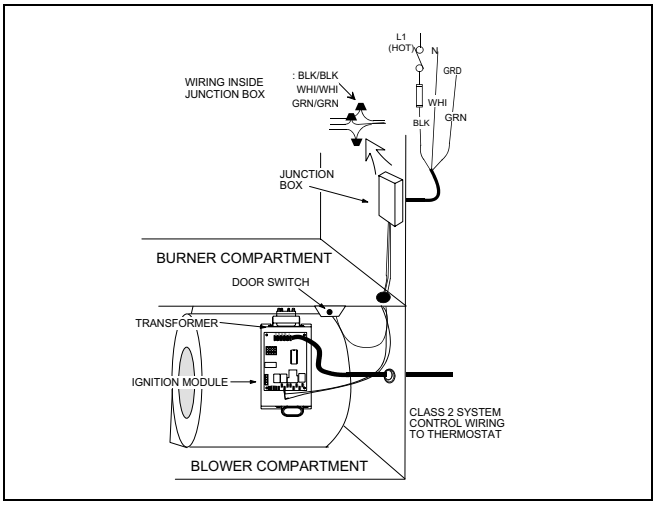



**FIGURE 2 : FIELD WIRING**

# NOTES

036-21070-002 Rev. A (0204)
Supersedes: 036-21070-001 Rev. B (0303)

**Unitary Products Group** **5005 York Drive** **Norman OK 73069**

# TECHNICAL GUIDE

## 80 AFUE DOWNFLOW

## GAS-FIRED FURNACES

## MODELS: G8T-DN

40-130 MBH INPUT
HIGH-EFFICIENCY
INDUCED COMBUSTION

This product was manufactured in a plant whose quality system is certified/registered as being in conformity with ISO 9001.

**Due to continuous product improvement, specifications are subject to change without notice.**

**Visit us on the web at www.york.com for the most up-to-date technical information.**

**Additional information can be found at www.gamanet.org.**

### DESCRIPTION

These high efficiency, dedicated downflow compact units employ induced combustion, reliable hot surface ignition and high heat transfer tubular heat exchangers.

These furnaces are designed for residential installation in a closet, attic or garage and are ideal for commercial applications. All units are factory assembled, wired and tested to assure safe dependable and economical installation and operation.

These units are Category I listed and may be common vented with another gas appliance as allowed by the National Fuel Gas Code.

### WARRANTY

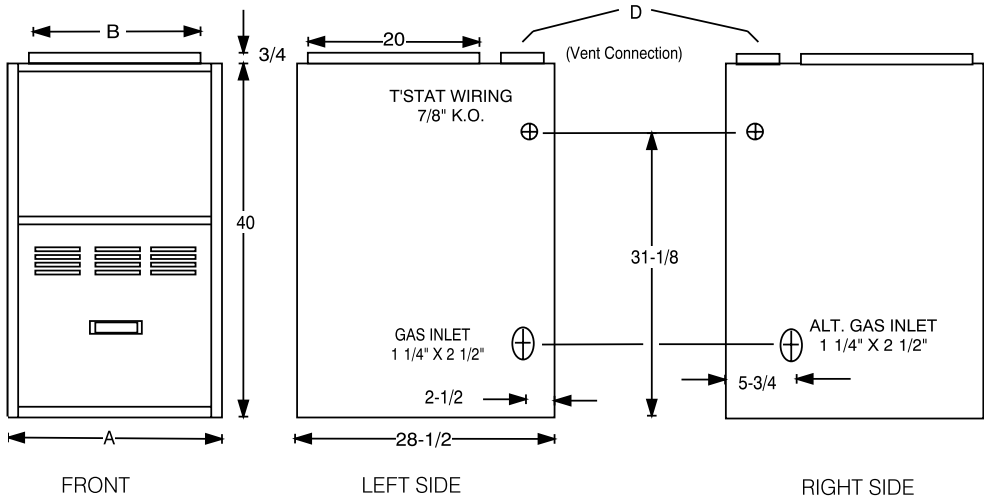
*20-year limited warranty on the heat exchanger.*

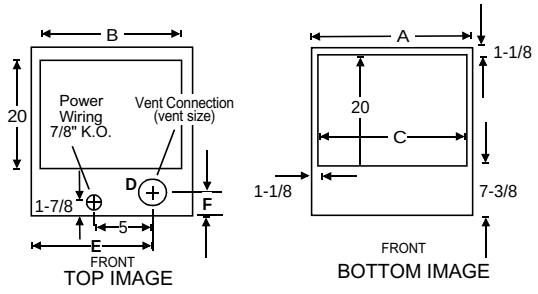
*10-year heat exchanger warranty on commercial applications.*

*5-year limited parts warranty.*

### FEATURES

- Dedicated downflow models may be easily applied without any field conversion
- Top vent connection allows installation in narrowlocations
- Electronic hot surface ignition with high reliability and dependability
- 100% shut off main gas valve for added safety
- High velocity filter provided for field installation
- High quality inducer motor for quiet operation
- Standard terminals for controlling humidifiers & EAC's
- 40 VA control transformer, fuse protected
- Easy to connect power and control wiring
- Efficiency ratings of 80 AFUE attained by usingtubular heat exchangers
- Cooling relay standard for easy installation of add-on cooling
- Blower off-delay for cooling SEER improvement
- Multi-speed PSC, direct-drive blower motors to match cooling requirements
- Adjustable fan-off settings to eliminate "cold-blow"
- Compact 40-in height allows installation in small space confines
- Lo NOx models available to meet specific area requirements. Lo NOx models may not be converted to propane.
- All standard "N" models are propane convertable
- Attractive baked enamel finish for durability




All dimensions are in inches, and are approximate.

| MODEL,* | A | B | C | D | E | F |
|---|---|---|---|---|---|---|
| G8T04012DNA11 | 14-1/2 | 13-1/4 | 12-1/4 | 4 | 10-1/8 | 3-3/4 |
| G8T06012DNA11 | 14-1/2 | 13-1/4 | 12-1/4 | 4 | 10-1/8 | 3-3/4 |
| G8T08012DNA11 | 14-1/2 | 13-1/4 | 12-1/4 | 4 | 10-1/8 | 3-3/4 |
| G8T08016DNB11 | 17-1/2 | 16-1/4 | 15-1/4 | 4 | 11-5/8 | 3-3/4 |
| G8T10020DNC11 | 17-1/2 | 16-1/4 | 15-1/4 | 4 | 11-5/8 | 3-3/4 |
| G8T10012DNB11 | 21 | 19-3/4 | 18-3/4 | 4 | 13-3/8 | 3-3/4 |
| G8T11516DNC11 | 21 | 19-3/4 | 18-3/4 | 4 | 13-3/8 | 3-3/4 |
| G8T11520DNC11 | 21 | 19-3/4 | 18-3/4 | 4 | 13-3/8 | 3-3/4 |
| G8T13020DND11 | 24-1/2 | 23-1/4 | 22-1/4 | 4 | 15-1/8 | 3-3/4 |

*. An "L" in the 1st position of the model number indi

## RATINGS & PHYSICAL / ELECTRICAL DATA

| MODEL* | INPUT MBH | OUTPUT MBH | AFUE† | AIR TEMP RISE °F | MAX OUTLET TEMP °F | BLOWER | | | TOTAL UNIT AMPS | MAX OVER CURRENT PROTECT.‡ | MIN. WIRE SIZE (AWG) @ 75 FT. ONE WAY | OPER. WGT. (LBS) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | HP | AMPS | SIZE | | | | |
| G8T04012DNA11 | 40 | 32 | 80.0 | 20 - 50 | 150 | 1/3 | 6.2 | 10 x 8 | 9.0 | 20 | 14 | 100 |
| G8T06012DNA11 | 57 | 46 | 80.0 | 25 - 55 | 155 | 1/3 | 6.2 | 10 x 8 | 9.0 | 20 | 14 | 110 |
| G8T08012DNA11 | 80 | 64 | 80.0 | 35 - 65 | 165 | 1/3 | 6.2 | 10 x 8 | 9.0 | 20 | 14 | 120 |
| G8T08016DNB11 | 80 | 64 | 80.0 | 25 - 55 | 160 | 3/4 | 11.0 | 11 x 10 | 12.0 | 20 | 14 | 130 |
| G8T10020DNC11 | 100 | 80 | 80.0 | 40 - 70 | 170 | 1/2 | 7.0 | 10 x 8 | 12.0 | 20 | 14 | 125 |
| G8T10012DNB11 | 100 | 80 | 80.0 | 25 - 55 | 155 | 1 | 12.2 | 11 x 10 | 14.0 | 20 | 12 | 140 |
| G8T11516DNC11 | 115 | 92 | 80.0 | 35 - 65 | 165 | 3/4 | 11.0 | 11 x 10 | 12.0 | 20 | 14 | 150 |
| G8T11520DNC11 | 115 | 92 | 80.0 | 30 - 60 | 160 | 1 | 12.2 | 11 x 10 | 14.0 | 20 | 12 | 150 |
| G8T13020DND11 | 130 | 104 | 80.0 | 40 - 70 | 170 | 1 | 12.2 | 11 x 10 | 14.0 | 20 | 12 | 160 |

*. "L" in model designator indicates factory built Lo Nox units.
†. AFUE numbers are determined in accordance with DOE test procedures.
‡. Wire size and overcurrent protection must comply with the National Electrical Code (NFPA-70-latest edition)
- For altitudes above 2,000 ft., reduce capacity 4% for each 1,000 ft. above sea level.
- Wire size based on copper conductors, 60°C, 3% voltage drop.
- Continuous return air temperature **must not** be below 55°F.

## FILTER SIZE/ADD-ON COOLING

| MODEL NUMBER * | FILTER SIZE | ADD-ON COOLING TONS | CFM @.5 ESP† |
|---|---|---|---|
| G8T04012DNA11 | (2) 14 x 20 | 1, 1-1/2, 2 | 1305 |
| G8T06012DNA11 | (2) 14 x 20 | 1, 1-1/2, 2 | 1305 |
| G8T08012DNA11 | (2) 14 x 20 | 2, 2-1/2, 3 | 1305 |
| G8T08016DNB11 | (2) 14 x 20 | 2, 2-1/2, 3 | 1840 |
| G8T10020DNC11 | (2) 14 x 20 | 3, 3-1/2, 4 | 1510 |
| G8T10012DNB11 | (2) 14 x 20 | 2, 2-1/2, 3 | 2190 |
| G8T11516DNC11 | (2) 14 x 20 | 3-1/2, 4 ,5 | 1940 |
| G8T11520DNC11 | (2) 14 x 20 | 3, 3-1/2, 4 | 2190 |
| G8T13020DND11 | (2) 14 x 20 | 3-1/2, 4 ,5 | 2095 |

*. "L" in model designator indicates factory built Lo Nox units.

†. ESP (External Static Pressure) .5" W.C. is at furnace outlet ahead of cooling coil.

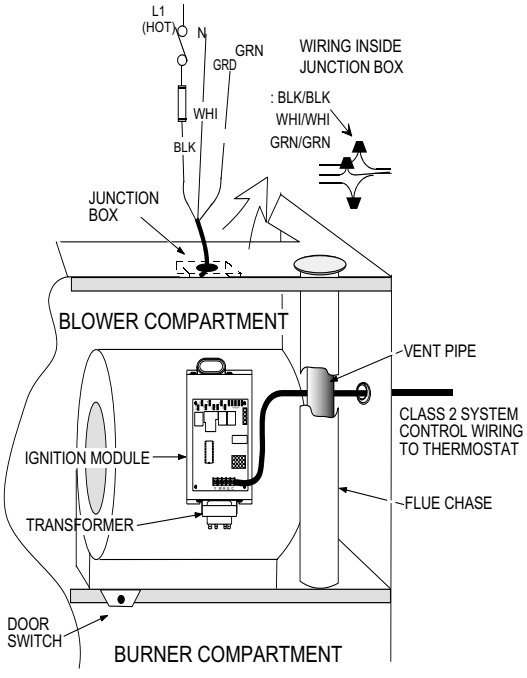
NOTES: High velocity, cleanable filters are provided.

## UNIT CLEARANCES TO COMBUSTIBLES

| APPLICATION | TOP | FRONT | BACK | LEFT SIDE | RIGHT SIDE | FLUE | FLOOR/ BOTTOM | CLOSET | ALCOVE | ATTIC | LINE CONTACT |
|---|---|---|---|---|---|---|---|---|---|---|---|
| DOWNFLOW | 1 | 6 | 0 | 0 | 3 | 6 | 1* | YES | YES | YES | NO |
| DOWNFLOW B-VENT | 1 | 3 | 0 | 0 | 0 | 1 | 1* | YES | YES | YES | NO |

*. Special accessory floor base or air conditioning coil required for use on combustible floor.

## FIELD WIRING CONNECTION



## BLOWER PERFORMANCE

| MODELS P*DN / G8T-DN / L8T-DN* | SPEED TAP | EXTERNAL STATIC PRESSURE, INCHES W.C. | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | 0.10 | 0.20 | 0.30 | 0.40 | 0.50 | 0.60 | 0.70 | 0.80 | 0.90 | 1.00 |
| 40 / 32 / 1200/ "A" † 57 / 46 / 1200 / "A" † 80 / 64 / 1200 / "A"† | HIGH | 1580 | 1540 | 1475 | 1405 | 1305 | 1230 | 1130 | 1015 | 855 | 695 |
| | MED/HI | 1140 | 1125 | 1110 | 1075 | 1035 | 980 | 920 | 815 | 700 | 570 |
| | MED/LO | 870 | 860 | 840 | 815 | 770 | 725 | 675 | 600 | 530 | 425 |
| | LOW | 695 | 675 | 655 | 635 | 610 | 575 | 530 | 470 | 400 | 290 |
| 100 / 80 / 1200 / "B" † | HIGH | 1775 | 1720 | 1660 | 1585 | 1510 | 1420 | 1315 | 1195 | 1055 | 865 |
| | MED | 1380 | 1360 | 1350 | 1330 | 1280 | 1230 | 1150 | 1050 | 920 | 760 |
| | LOW | 1030 | 1015 | 1000 | 985 | 965 | 950 | 895 | 805 | 710 | 595 |
| 80 / 64 / 1600 / "B"† | HIGH | 2110 | 2050 | 1995 | 1910 | 1840 | 1780 | 1690 | 1610 | 1515 | 1415 |
| | MED | 1895 | 1860 | 1825 | 1765 | 1700 | 1630 | 1560 | 1495 | 1410 | 1310 |
| | LOW | 1690 | 1675 | 1660 | 1605 | 1550 | 1490 | 1440 | 1360 | 1280 | 1200 |
| 115 / 92 / 1600 / "C" | HIGH | 2235 | 2160 | 2095 | 2025 | 1940 | 1865 | 1770 | 1680 | 1575 | 1465 |
| | MED | 1965 | 1920 | 1885 | 1825 | 1760 | 1720 | 1620 | 1545 | 1470 | 1340 |
| | LOW | 1645 | 1635 | 1625 | 1600 | 1575 | 1520 | 1455 | 1395 | 1320 | 1220 |
| 100 / 80 / 2000 "C"† 115 / 92 / 2000 / "C"† | HIGH | 2515 | 2440 | 2355 | 2265 | 2190 | 2100 | 1990 | 1875 | 1740 | 1600 |
| | MED | 2085 | 2070 | 2040 | 2000 | 1925 | 1850 | 1765 | 1660 | 1555 | 1430 |
| | LOW | 1720 | 1710 | 1695 | 1685 | 1625 | 1580 | 1515 | 1440 | 1345 | 1215 |
| 130 / 104 / 2000 / "D"† | HIGH | 2395 | 2335 | 2265 | 2185 | 2095 | 2005 | 1900 | 1780 | 1660 | 1490 |
| | MED | 2050 | 2015 | 1980 | 1920 | 1850 | 1785 | 1685 | 1580 | 1455 | 1305 |
| | LOW | 1710 | 1705 | 1690 | 1650 | 1615 | 1555 | 1490 | 1400 | 1300 | 1160 |

*. Input / Output / CFM / Cabinet Width (A=14-1/2, B=17-1/2, C=21, D=24-1/2)
NOTES:
•Airflow is expressed in standard cubic feet per minute.
•Motor voltage at 115V

†. Indicates models available in LoNox

## FILTER PERFORMANCE

The airflow capacity data published in the Blower Performance Tables represents blower performance WITHOUT filters. To determine the approximate blower performance of the system, apply the filter drop value for the filter being used or select an appropriate value from the Table.

**NOTE:** *The filter pressure drop values in the Table below are typical values for the type of filter listed and should only be used as a guideline. Actual pressure drop ratings for each filter type vary between filter manufacturer.*

## FILTER PERFORMANCE - Pressure Drop Inches W.C.

| Airflow Range | Minimum Opening Size ($in.^2$) | | Filter Type | | | | | |
|---|---|---|---|---|---|---|---|---|
| | | | Disposable | | Hogs Hair* | | Pleated | |
| | 1 Opening | 2 Openings | 1 Opening | 2 Openings | 1 Opening | 2 Openings | 1 Opening | 2 Openings |
| 0 - 750 | 230 | | 0.01 | | 0.01 | | 0.15 | |
| 751 - 1000 | 330 | | 0.05 | | 0.05 | | 0.20 | |
| 1001 - 1250 | 330 | | 0.10 | | 0.10 | | 0.20 | |
| 1251 - 1500 | 330 | | 0.10 | | 0.10 | | 0.25 | |
| 1501 - 1750 | 380 | 658 | 0.15 | 0.09 | 0.14 | 0.08 | 0.30 | 0.17 |
| 1751 - 2000 | 380 | 658 | 0.19 | 0.11 | 0.18 | 0.10 | 0.30 | 0.17 |
| 2001 & Above | 463 | 658 | 0.19 | 0.11 | 0.18 | 0.10 | 0.30 | 0.17 |

*. Hogs Hair Filters are the type supplied with furnace (if supplied).

## APPLYING FILTER PRESSURE DROP TO DETERMINE SYSTEM AIRFLOW

To determine the approximate airflow of the unit with a filter in place, follow the steps below:

1. Select the filter type.
2. Select the number of return air openings or calculate the return opening size in square inches to determine the proper filter pressure drop.
3. Determine the External System Static Pressure (ESP) without the filter.
4. Select a filter pressure drop from the table based upon the number of return air openings or return air opening size and add to the ESP from Step 3 to determine the total system static.
5. If total system static matches a ESP value in the airflow table (i.e. 0.20, 0.60, etc,) the system airflow corresponds to the intersection of the ESP column and Model/ Blower Speed row.
6. If the total system static falls between ESP values in the table (i.e. 0.58, 0.75, etc.), the static pressure may be rounded to the nearest value in the table determining the airflow using Step 5 or calculate the airflow by using the following example.

**Example:** For a 130,000 Btuh furnace with 2 return openings and operating on high speed blower, it is found that total system static is 0.58" w.c. To determine the system airflow, complete the following steps:

1. Obtain the airflow values at 0.50" & 0.60" ESP.
   Airflow @ 0.50": 2120 CFM
   Airflow @ 0.60": 2040 CFM

2. Subtract the airflow @ 0.50" from the airflow @ 0.60" to obtain airflow difference.
   2040 - 2120 = -80 CFM

3. Subtract the total system static from 0.50" and divide this difference by the difference in ESP values in the table, 0.60" - 0.50", to obtain a percentage.
   (0.58 - 0.50) / (0.60 - 0.50) = 0.8

4. Multiply percentage by airflow difference to obtain airflow reduction.
   (0.8)x(-80) = -64

5. Subract airflow reduction value to airflow @ 0.50" to obtain actual airflow @ 0.58" ESP.
   2120 - 64 = 2056

## ACCESSORIES

**PROPANE**
**CONVERSION KIT -- 1NP0347 (32, 64 & 80 MBH)**
**1NP0348 (48, 92,& 104 MBH)**

This accessory conversion kit may be used to convert natural gas units for propane (LP) operation at altitudes up to 2,000 ft. Conversion should be made by qualified distributor or dealer personnel.

## COMBUSTIBLE FLOOR BASE

**1CB0314 =** For 14-1/4" cabinet models
**1CB0317** = For 17-1/2" cabinet models
**1CB0321** = For 21" cabinet models
**1CB0324** = For 24-1/2" cabinet models

## HIGH ALTITUDE PRESSURE SWITCH

This accessory will allow furnace operation when used with proper sized burner orifices. Refer to 650.74-N1.1V for orifice selection.

| HIGH ALTITUDE PRESSURE SWITCH USAGE | | | |
|---|---|---|---|
| Input (MBH) | Output (MBH) | 2,000 Ft. to 5,500 Ft. | >5,500 To 10,000 Ft. |
| 40 | 32 | 1PS0301 | 1PS0301 |
| 57 | 46 | 1PS0301 | 1PS0301 |
| 80 | 64 | 1PS0302 | 1PS0301 |
| 100 | 80 | 1PS0312 | 1PS0311 |
| 115 | 92 | 1PS0312 | 1PS0311 |
| 130 | 104 | 1PS0312 | 1PS0311 |

# NOTES

036-21057-001 Rev. B (0303)
Supersedes: 036-21054-001 Rev. A (0400), 036-21056-001 Rev. A (0400), 036-21055-001 Rev. A (0400)

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