INSTALLATION INSTRUCTIONS
FOR UPFLOW/HORIZONTAL & DOWNFLOW TWO-STAGE INDUCED DRAFT GAS FURNACES
(-)GPQ UPFLOW/HORIZONTAL SERIES
(-)GLQ DOWNFLOW SERIES





RECOGNIZE THIS SYMBOL AS AN INDICATION OF IMPORTANT SAFETY INFORMATION!

⚠WARNING

IF THE INFORMATION IN THESE INSTRUCTIONS IS NOT FOLLOWED EXACTLY, A FIRE OR EXPLOSION MAY RESULT, CAUSING PROPERTY DAMAGE, PERSONAL INJURY OR DEATH.

⚠WARNING

THESE INSTRUCTIONS ARE INTENDED AS AN AID TO QUALIFIED SERVICE PERSONNEL FOR PROPER INSTALLATION, ADJUSTMENT AND OPERATION OF THIS UNIT. READ THESE INSTRUCTIONS THOROUGHLY BEFORE ATTEMPTING INSTALLATION OR OPERATION. FAILURE TO FOLLOW THESE INSTRUCTIONS MAY RESULT IN IMPROPER INSTALLATION, ADJUSTMENT, SERVICE OR MAINTENANCE, POSSIBLY RESULTING IN FIRE, ELECTRICAL SHOCK, CARBON MONOXIDE POISONING, EXPLOSION, PROPERTY DAMAGE, PERSONAL INJURY OR DEATH.

⚠WARNING

PROPOSITION 65 WARNING: THIS PRODUCT CONTAINS CHEMICALS KNOWN TO THE STATE OF CALIFORNIA TO CAUSE CANCER, BIRTH DEFECTS OR OTHER REPRODUCTIVE HARM.

⚠WARNING

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

— WHAT TO DO IF YOU SMELL GAS
- Do not try to light any appliance.
- Do not touch any electrical switch; do not use any phone in your building.
- Immediately call your gas supplier from a neighbor's phone. Follow the gas supplier's instructions.
- If you cannot reach your gas supplier, call the fire department.
- Do not return to your home until authorized by the gas supplier or fire department.

— DO NOT RELY ON SMELL ALONE TO DETECT LEAKS. DUE TO VARIOUS FACTORS, YOU MAY NOT BE ABLE TO SMELL FUEL GASES.
- U.L. recognized fuel gas and CO (Carbon Monoxide) detectors are recommended in all applications, and their installation should be in accordance with the manufacturer's recommendations and/or local laws, rules, regulations, or customs.

— Improper installation, adjustment, alteration, service or maintenance can cause injury, property damage or death. Refer to this manual. Installation and service must be performed by a qualified installer, service agency or the gas supplier. In the commonwealth of Massachusetts, installation must be performed by a licensed plumber or gas fitter for appropriate fuel.

B4001-02

DO NOT DESTROY THIS MANUAL. PLEASE READ CAREFULLY AND KEEP IN A SAFE PLACE FOR FUTURE REFERENCE BY A SERVICEMAN.

Accredited by the RvA

ISO 9001:2000
Certificate Number: 30164

92-24161-51-04
SUPERSEDES 92-24161-51-03

Before beginning any troubleshooting procedure, complete the following installation checklist. A furnace malfunction is sometimes caused by an improper installation. By completing this checklist, the problem may be found and corrected. Make copies of the checklist and complete one for every Low Profile Furnace service call for your records.

INSTALLATION CHECKLIST

(Refer to this manual for specifics.)

GAS SUPPLY

_____ Adequate pipe size

_____ No gas leaks

_____ Proper supply and manifold gas pressure (check with an accurate U-tube manometer with the furnace and all other gas appliances operating.)

ELECTRICAL

_____ Correct thermostat and subbase _____ Thermostat model _____ Subbase model

_____ Correct thermostat mode and setting

_____ Correct line supply voltage

_____ Correct power supply polarity is required with electronic ignition

_____ Correct furnace ground to electrical panel

_____ DC microamp (μA) flame signal (hot surface ignition units)

_____ Correct control voltage

_____ Measure and set heat anticipator amperage

_____ Air conditioning low voltage wires connected to terminals “Y” “C” - **not with wire nuts**

VENTING

_____ Correct vent pipe diameter and length (according to CSA tables) _____ Vent connection size

_____ Correct venting material (according to CSA tables)

_____ Correct lining for masonry chimneys

_____ Adequate clearance from combustibles

_____ Proper negative pressure reading in the vent

_____ Vent pipe secured to induced draft blower housing

COMBUSTION AIR

_____ Proper source of combustion air

_____ Correct combustion air opening size

_____ Optional attic combustion air pull

_____ Non-attic combustion air pull

FURNACE INSTALLATION

_____ Adequate clearance from combustibles

_____ Adequate clearance for service

_____ Proper air temperature rise (See furnace rating plate)

_____ External static pressure _____ inches w.c.

_____ Correct filter(s)

_____ Correct cooling coil or accessories (if equipped)

_____ Adequate supply and return air ducting _____ Return Air Duct Size _____ Supply Air Duct Size

_____ Air ducts sealed to prevent leakage

Important: All manufacturer products meet current Federal OSHA Guidelines for safety. California Proposition 65 warnings are required for certain products, which are not covered by the OSHA standards.

California's Proposition 65 requires warnings for products sold in California that contain, or produce, any of over 600 listed chemicals known to the State of California to cause cancer or birth defects such as fiberglass insulation, lead in brass, and combustion products from natural gas.

All “new equipment” shipped for sale in California will have labels stating that the product contains and/or produces Proposition 65 chemicals. Although we have not changed our processes, having the same label on all our products facilitates manufacturing and shipping. We cannot always know “when, or if” products will be sold in the California market.

You may receive inquiries from customers about chemicals found in, or produced by, some of our heating and air-conditioning equipment, or found in natural gas used with some of our products. Listed below are those chemicals and substances commonly associated with similar equipment in our industry and other manufacturers.

- Glass Wool (Fiberglass) Insulation
- Carbon Monoxide (CO)
- Formaldehyde
- Benzene

More details are available at the Websites for OSHA (Occupational Safety and Health Administration), at www.osha.gov and the State of California's OEHHA (Office of Environmental Health Hazard Assessment), at www.oehha.org. Consumer education is important since the chemicals and substances on the list are found in our daily lives. Most consumers are aware that products present safety and health risks, when improperly used, handled and maintained.

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IMPORTANT: *TO INSURE PROPER INSTALLATION AND OPERATION OF THIS PRODUCT, COMPLETELY READ ALL INSTRUCTIONS PRIOR TO ATTEMPTING TO ASSEMBLE, INSTALL, OPERATE, MAINTAIN OR REPAIR THIS PRODUCT. UPON UNPACKING OF THE FURNACE, INSPECT ALL PARTS FOR DAMAGE PRIOR TO INSTALLATION AND START-UP.*

SAFETY INFORMATION

⚠ WARNING

USE ONLY WITH TYPE OF GAS APPROVED FOR THIS FURNACE. REFER TO THE FURNACE RATING PLATE.

⚠ WARNING

INSTALL THIS FURNACE ONLY IN A LOCATION AND POSITION AS SPECIFIED IN THE LOCATION REQUIREMENTS AND CONSIDERATIONS SECTION OF THESE INSTRUCTIONS.

⚠ WARNING

PROVIDE ADEQUATE COMBUSTION AND VENTILATION AIR TO THE FURNACE SPACE AS SPECIFIED IN THE VENTING SECTION OF THESE INSTRUCTIONS.

⚠ WARNING

COMBUSTION PRODUCTS MUST BE DISCHARGED OUTDOORS. CONNECT THIS FURNACE TO AN APPROVED VENT SYSTEM ONLY, AS SPECIFIED IN VENT PIPE INSTALLATION SECTION OF THESE INSTRUCTIONS.

⚠ WARNING

THE MANUFACTURER IS NOT RESPONSIBLE FOR EQUIPMENT THAT IS MISMATCHED OR IMPROPERLY INSTALLED. NEVER TEST FOR GAS LEAKS

⚠ WARNING

WITH AN OPEN FLAME. USE A COMMERCIALLY AVAILABLE SOAP SOLUTION MADE SPECIFICALLY FOR THE DETECTION OF LEAKS TO CHECK ALL CONNECTIONS, AS SPECIFIED IN GAS SUPPLY AND PIPING SECTION OF THESE INSTRUCTIONS.

⚠ WARNING

ALWAYS INSTALL FURNACE TO OPERATE WITHIN THE FURNACE'S INTENDED TEMPERATURE-RISE RANGE WITH A DUCT SYSTEM WHICH HAS AN EXTERNAL STATIC PRESSURE WITHIN THE ALLOWABLE RANGE, AS SPECIFIED IN DUCTING SECTION OF THESE INSTRUCTIONS. SEE ALSO FURNACE RATING PLATE.

⚠ WARNING

WHEN A FURNACE IS INSTALLED SO THAT SUPPLY DUCTS CARRY AIR CIRCULATED BY THE FURNACE TO AREAS OUTSIDE THE SPACE CONTAINING THE FURNACE, THE RETURN AIR SHALL ALSO BE HANDLED BY DUCT(S) SEALED TO THE FURNACE CASING AND TERMINATING OUTSIDE THE SPACE CONTAINING THE FURNACE.

⚠ WARNING

WHEN THIS FURNACE IS INSTALLED IN A RESIDENTIAL GARAGE, IT MUST BE INSTALLED SO THE BURNERS AND IGNITION SOURCE ARE LOCATED NO LESS THAN 18 INCHES ABOVE THE FLOOR. THIS IS TO REDUCE THE RISK OF IGNITING FLAMMABLE VAPORS WHICH MAY BE PRESENT IN A GARAGE. ALSO, THE FURNACE MUST BE LOCATED OR PROTECTED TO AVOID PHYSICAL DAMAGE BY VEHICLES. FAILURE TO FOLLOW THESE WARNINGS CAN CAUSE A FIRE OR EXPLOSION, RESULTING IN PROPERTY DAMAGE, PERSONAL INJURY OR DEATH.

⚠ WARNING

USE OF THIS FURNACE IS ALLOWED DURING CONSTRUCTION IF THE FOLLOWING TEMPORARY INSTALLATION REQUIREMENTS ARE MET. INSTALLATION MUST COMPLY WITH ALL INSTALLATION INSTRUCTIONS INCLUDING:

- **PROPER VENT INSTALLATION;**
- **FURNACE OPERATING UNDER THERMOSTATIC CONTROL;**
- **RETURN AIR DUCT SEALED TO THE FURNACE;**
- **AIR FILTERS IN PLACE;**
- **SET FURNACE INPUT RATE AND TEMPERATURE RISE PER RATING PLATE MARKING;**
- **MEANS FOR PROVIDING OUTDOOR AIR REQUIRED FOR COMBUSTION;**
- **RETURN AIR TEMPERATURE MAINTAINED BETWEEN 55°F (13°C) AND 80°F (27°C); AND**
- **CLEAN FURNACE, DUCT WORK AND COMPONENTS UPON SUBSTANTIAL COMPLETION OF THE CONSTRUCTION PROCESS, AND VERIFY FURNACE OPERATING CONDITIONS INCLUDING IGNITION, INPUT RATE, TEMPERATURE RISE AND VENTING, ACCORDING TO THE INSTRUCTIONS.**

⚠ WARNING

DUCT LEAKS CAN CREATE AN UNBALANCED SYSTEM AND DRAW POLLUTANTS SUCH AS DIRT, DUST, FUMES AND ODORS INTO THE HOME CAUSING PROPERTY DAMAGE. FUMES AND ODORS FROM TOXIC, VOLATILE OR FLAMMABLE CHEMICALS, AS WELL AS AUTOMOBILE EXHAUST AND CARBON MONOXIDE (CO), CAN BE DRAWN INTO THE LIVING SPACE THROUGH LEAKING DUCTS AND UNBALANCED DUCT SYSTEMS CAUSING PERSONAL INJURY OR DEATH (SEE FIGURE 1).

- **IF AIR-MOVING EQUIPMENT OR DUCTWORK IS LOCATED IN GARAGES OR OFF-GARAGE STORAGE AREAS - ALL JOINTS, SEAMS, AND OPENINGS IN THE EQUIPMENT AND DUCT MUST BE SEALED TO LIMIT THE MIGRATION OF TOXIC FUMES AND ODORS INCLUDING CARBON MONOXIDE FROM MIGRATING INTO THE LIVING SPACE.**
- **IF AIR-MOVING EQUIPMENT OR DUCTWORK IS LOCATED IN SPACES CONTAINING FUEL BURNING APPLIANCES SUCH AS WATER HEATERS OR BOILERS - ALL JOINTS, SEAMS, AND OPENINGS IN THE EQUIPMENT AND DUCT MUST ALSO BE SEALED TO PREVENT DEPRESSURIZATION OF THE SPACE AND POSSIBLE MIGRATION OF COMBUSTION BYPRODUCTS INCLUDING CARBON MONOXIDE INTO THE LIVING SPACE.**

NOTICE

IMPROPER INSTALLATION, OR INSTALLATION NOT MADE IN ACCORDANCE WITH THE CSA INTERNATIONAL (CSA) CERTIFICATION OR THESE INSTRUCTIONS, CAN RESULT IN UNSATISFACTORY OPERATION AND/OR DANGEROUS CONDITIONS AND ARE NOT COVERED BY THE UNIT WARRANTY.

NOTICE

IN COMPLIANCE WITH RECOGNIZED CODES, IT IS RECOMMENDED THAT AN AUXILIARY DRAIN PAN BE INSTALLED UNDER ALL EVAPORATOR COILS OR UNITS CONTAINING EVAPORATOR COILS OR GAS FURNACES USED WITH EVAPORATOR COILS THAT ARE LOCATED IN ANY AREA OF A STRUCTURE WHERE DAMAGE TO THE BUILDING OR BUILDING CONTENTS MAY OCCUR AS A RESULT OF AN OVERFLOW OF THE COIL DRAIN PAN OR A STOPPAGE IN THE PRIMARY CONDENSATE DRAIN PIPING.

GENERAL INFORMATION

The (-)GPQ/(-)GLQ series furnaces are design certified by CSA for use with natural and propane gases as follows:

As a Category I furnace, it may be vented vertically with type B-1 vent pipe and also may be common vented as described in these instructions.

This furnace should be installed in accordance with the American National Standard Z223.1 - latest edition booklet entitled “National Fuel Gas Code” (NFPA 54) (in Canada, CSA B149.1 and .2 Installation Codes for gas burning appliances), and the requirements or codes of the local utility or other authority having jurisdiction including local plumbing or waste water codes.

The National Appliance Energy Conservation Act (NAECA) of 1987 states that any gas furnace manufactured after January 1, 1992, must have a minimum Annual Fuel Utilization Efficiency (AFUE) of 78%. The higher the AFUE percentage the more usable heat energy the consumer gets for every dollar of fuel purchased. This is similar to the EPA's minimum gas mileage requirement for automobiles. It gives the consumer a relatively easy way to make direct efficiency comparisons between different furnace brands and styles.

A high AFUE value, which translates into a low operating cost, is not the only concern that consumers have. They also want a furnace with a reasonable installed cost. They want a furnace that provides them with comfort – their main concern. And they expect a furnace with exceptional reliability and longevity.

Gas furnace manufacturers are always striving to provide consumers with the best furnace value. The Low Profile Furnace addresses all those consumer needs. It gives exceptional efficiency with a low installation cost. It delivers the comfort the customer wants along with the reliability they expect.

The key to all these customer benefits is the furnace's heat exchanger. The materials used to construct the furnace in general and the heat exchanger in particular make it a rugged, long lasting unit. The unique heat exchanger design provides the customer with a furnace only 34 inches high. This gives the consumer a unit easily installed in almost every location that accepts all customary accessories.

With the introduction of higher efficiency furnaces, special attention must be paid to the venting system. Only listed venting systems may be used as stated in the installation instructions and the *National Fuel Gas Code, ANSI Z223.1 (NFPA 54), or the Canadian CAN/CGA B149.1 and B149.2 Installation Codes for Gas Burning Appliances.* Since furnace technology and venting requirements are changing, awareness of local, state, and federal codes and industry changes is imperative.

NOTE: Always perform a proper heat loss calculation before specifying the furnace size. This ensures that the furnace is sized to adequately, economically, heat the building and provide the correct airflow for your application.

IMPORTANT: PROPER APPLICATION, INSTALLATION AND MAINTENANCE OF THIS FURNACE IS A MUST IF CONSUMERS ARE TO RECEIVE THE FULL BENEFITS FOR WHICH THEY HAVE PAID.

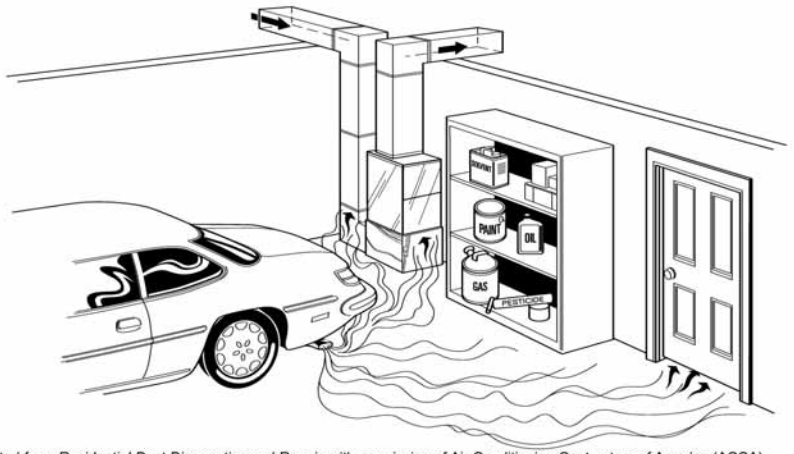
Additional helpful publications available from the “National Fire Protection Association” are: NFPA-90A – Installation of Air Conditioning and Ventilating Systems 1985 or latest edition. NFPA-90B – Warm Air Heating and Air Conditioning Systems 1984.

These publications are available from:

National Fire Protection Association, Inc.
Batterymarch Park
Quincy, MA 02269

CSA-INTERNATIONAL
178 Rexdale Blvd.
Etobicoke (Toronto), Ontario
Canada M9W, 1R3

FIGURE 1
MIGRATION OF DANGEROUS SUBSTANCES, FUMES, AND ODORS INTO LIVING SPACES



Adapted from *Residential Duct Diagnostics and Repair,* with permission of Air Conditioning Contractors of America (ACCA).

IMPORTANT INFORMATION ABOUT EFFICIENCY AND INDOOR AIR QUALITY

Central cooling and heating equipment is only as efficient as the duct system that carries the cooled or heated air. To maintain efficiency, comfort and good indoor air quality, it is important to have the proper balance between the air being supplied to each room and the air returning to the cooling and heating equipment.

Proper balance and sealing of the duct system improves the efficiency of the heating and air conditioning system and improves the indoor air quality of the home by reducing the amount of airborne pollutants that enter homes from spaces where the ductwork and / or equipment is located. The manufacturer and the U.S. Environmental Protection Agency’s Energy Star Program recommend that central duct systems be checked by a qualified contractor for proper balance and sealing.

⚠ WARNING

DUCT LEAKS CAN CREATE AN UNBALANCED SYSTEM AND DRAW POLLUTANTS SUCH AS DIRT, DUST, FUMES AND ODORS INTO THE HOME CAUSING PROPERTY DAMAGE. FUMES AND ODORS FROM TOXIC, VOLATILE OR FLAMMABLE CHEMICALS, AS WELL AS AUTOMOBILE EXHAUST AND CARBON MONOXIDE (CO), CAN BE DRAWN INTO THE LIVING SPACE THROUGH LEAKING DUCTS AND UNBALANCED DUCT SYSTEMS CAUSING PERSONAL INJURY OR DEATH (SEE FIGURE 1).

- **IF AIR-MOVING EQUIPMENT OR DUCTWORK IS LOCATED IN GARAGES OR OFF-GARAGE STORAGE AREAS - ALL JOINTS, SEAMS, AND OPENINGS IN THE EQUIPMENT AND DUCT MUST BE SEALED TO LIMIT THE MIGRATION OF TOXIC FUMES AND ODORS INCLUDING CARBON MONOXIDE FROM MIGRATING INTO THE LIVING SPACE.**

- **IF AIR-MOVING EQUIPMENT OR DUCTWORK IS LOCATED IN SPACES CONTAINING FUEL BURNING APPLIANCES SUCH AS WATER HEATERS OR BOILERS - ALL JOINTS, SEAMS, AND OPENINGS IN THE EQUIPMENT AND DUCT MUST ALSO BE SEALED TO PREVENT DEPRESSURIZATION OF THE SPACE AND POSSIBLE MIGRATION OF COMBUSTION BYPRODUCTS INCLUDING CARBON MONOXIDE INTO THE LIVING SPACE.**

NOTICE

IMPROPER INSTALLATION, OR INSTALLATION NOT MADE IN ACCORDANCE WITH THE CSA INTERNATIONAL (CSA) CERTIFICATION OR THESE INSTRUCTIONS, CAN RESULT IN UNSATISFACTORY OPERATION AND/OR DANGEROUS CONDITIONS AND ARE NOT COVERED BY THE UNIT WARRANTY.

NOTICE

IN COMPLIANCE WITH RECOGNIZED CODES, IT IS RECOMMENDED THAT AN AUXILIARY DRAIN PAN BE INSTALLED UNDER ALL EVAPORATOR COILS OR UNITS CONTAINING EVAPORATOR COILS OR GAS FURNACES USED WITH EVAPORATOR COILS THAT ARE LOCATED IN ANY AREA OF A STRUCTURE WHERE DAMAGE TO THE BUILDING OR BUILDING CONTENTS MAY OCCUR AS A RESULT OF AN OVERFLOW OF THE COIL DRAIN PAN OR A STOPPAGE IN THE PRIMARY CONDENSATE DRAIN PIPING.

RECEIVING

Immediately upon receipt, all cartons and contents should be inspected for transit damage. Units with damaged cartons should be opened immediately. If damage is found, it should be noted on the delivery papers, and a damage claim filed with the last carrier.

- After unit has been delivered to job site, remove carton taking care not to damage unit.
- Check the unit rating plate for unit size, electric heat, coil, voltage, phase, etc. to be sure equipment matches what is required for the job specification.
- Read the entire instructions before starting the installation.
- Some building codes require extra cabinet insulation and gasketing when unit is installed in attic applications.
- If installed in an unconditioned space, apply caulking around the power wires, control wires, refrigerant tubing and condensate line where they enter the cabinet. Seal the power wires on the inside where they exit conduit opening. Caulking is required to prevent air leakage into and condensate from forming inside the unit, control box, and on electrical controls.
- Install the unit in such a way as to allow necessary access to the coil/filter rack and blower/control compartment.
- Install the unit in a level position to ensure proper condensate drainage. Make sure unit is level in both directions within 1/8".
- Install the unit in accordance with any local code which may apply and the national codes. Latest editions are available from: "National Fire Protection Association, Inc., Batterymarch Park, Quincy, MA 02269." These publications are:
- ANSI/NFPA No. 70-(Latest Edition) National Electrical Code.
- NFPA90A Installation of Air Conditioning and Ventilating Systems.
- NFPA90B Installation of warm air heating and air conditioning systems.
- The equipment has been evaluated in accordance with the Code of Federal Regulations, Chapter XX, Part 3280.

LOCATION REQUIREMENTS AND CONSIDERATIONS

GENERAL INFORMATION

1. **NOTE:** This furnace is shipped with heat exchanger support brackets installed under the back of the heat exchanger. These may be removed before installation, but it is not required.

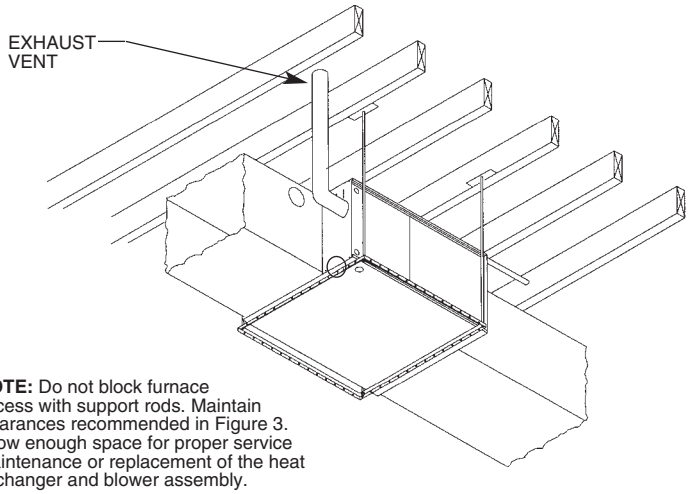
LOCATION

⚠ WARNING

THIS FURNACE IS NOT APPROVED FOR INSTALLATION IN A MOBILE HOME. INSTALLATION IN A MOBILE HOME COULD CAUSE FIRE, PROPERTY DAMAGE, PERSONAL INJURY OR DEATH.

2. IMPORTANT: *This furnace is not approved or recommended for installation on its back, with access doors facing upwards.*
3. This furnace is suitable for installation in buildings constructed on-site. This heating unit should be centralized with respect to the heat distribution system as much as practicable.
4. **NOTE:** These furnaces are approved for installation in attics, as well as alcoves, utility rooms, closets and crawlspaces.
5. **IMPORTANT**: *Support this unit when installed. For attic or crawl space installation, horizontal furnaces may be installed on wood flooring or by using support brackets. See Figure 2.*
6. **IMPORTANT**: *If installing in a utility room, be sure the door is wide enough to:*
   a. *allow the largest part of the furnace to pass; or*
   b. *allow any other appliance (such as a water heater) to pass.*

FIGURE 2
HORIZONTAL FURNACE INSTALLED W/SUPPORT BRACKETS



NOTE: Do not block furnace access with support rods. Maintain clearances recommended in Figure 3. Allow enough space for proper service maintenance or replacement of the heat exchanger and blower assembly.

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CLEARANCE – ACCESSIBILITY

The design of forced air furnaces with input ratings as listed in the tables on the following pages are certified by CSA for the clearances to combustible materials shown in inches.

See name/rating plate and clearance label for specific model number and clearance information.

Service clearance of at least 24 inches is recommended in front of all furnaces.

ACCESSIBILITY CLEARANCES, WHERE GREATER, MUST TAKE PRECEDENCE OVER FIRE PROTECTION CLEARANCES.

⚠ WARNING

UPFLOW AND HORIZONTAL FURNACES MUST NOT BE INSTALLED DIRECTLY ON CARPETING, TILE OR OTHER COMBUSTIBLE MATERIAL OTHER THAN WOOD FLOORING. INSTALLATION ON A COMBUSTIBLE MATERIAL CAN RESULT IN FIRE CAUSING PROPERTY DAMAGE, SEVERE PERSONAL INJURY OR DEATH.

A gas-fired furnace for installation in a residential garage must be installed so that the burner(s) and the ignition source are located not less than 18" above the floor and the furnace is located or protected to avoid physical damage by vehicles.

⚠ WARNING

DOWNFLOW UNIT DESIGN IS CERTIFIED FOR INSTALLATION ON NON-COMBUSTIBLE FLOOR. A SPECIAL COMBUSTIBLE FLOOR SUB-BASE IS REQUIRED WHEN INSTALLING ON A COMBUSTIBLE FLOOR. FAILURE TO INSTALL THE SUB-BASE MAY RESULT IN FIRE, PROPERTY DAMAGE, PERSONAL INJURY OR DEATH. THIS SPECIAL BASE IS OFFERED AS AN ACCESSORY FROM THE FACTORY. SEE THE CLEARANCE LABEL LOCATED INSIDE THE FURNACE FOR THE APPROPRIATE MODEL NUMBER.

THE SPECIAL BASE IS NOT REQUIRED WHEN THE FURNACE IS INSTALLED ON TOP OF AN AIR CONDITIONING PLENUM.

TABLE 1

FURNACE WIDTH	BASE PLATE NO.	BASE PLATE SIZE
14"	RXGB-D14	$11\frac{5}{8}$" x $23\frac{9}{16}$"
$17\frac{1}{2}$"	RXGB-D17	$15\frac{1}{8}$" x $23\frac{9}{16}$"
21"	RXGB-D21	$18\frac{5}{8}$" x $23\frac{9}{16}$"
$24\frac{1}{2}$"	RXGB-D24	$25\frac{5}{8}$" x $23\frac{9}{16}$"

SITE SELECTION

1. Select a site in the building near the center of the proposed, or existing, duct system.
2. Give consideration to the vent system piping when selecting the furnace location. Be sure the venting system can travel from the furnace to the termination with minimal length and elbows.
3. Locate the furnace near the existing gas piping. Or, if running a new gas line, locate the furnace to minimize the length and elbows in the gas piping.
4. Locate the furnace to maintain proper clearance to combustibles as shown in Figures 3 and 4.

⚠ CAUTION

WHEN COILS ARE USED WITH AIR HANDLERS OR FURNACES AND INSTALLED ABOVE A FINISHED CEILING OR LIVING AREA, IT IS RECOMMENDED THAT AN AUXILIARY SHEET METAL CONDENSATE DRAIN PAN BE FABRICATED AND INSTALLED UNDER ENTIRE UNIT. FAILURE TO DO SO CAN RESULT IN PROPERTY DAMAGE. RUN CONDENSATE TO A LOCATION WHERE IT IS NOTICEABLE.

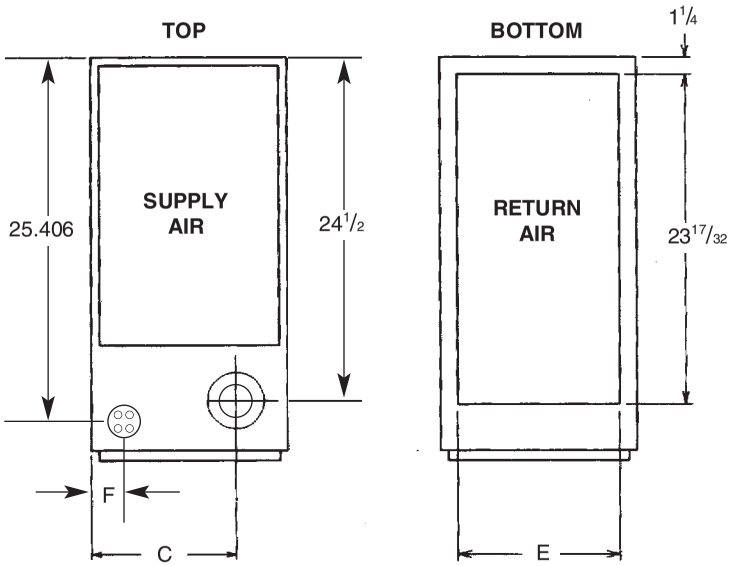
⚠ WARNING

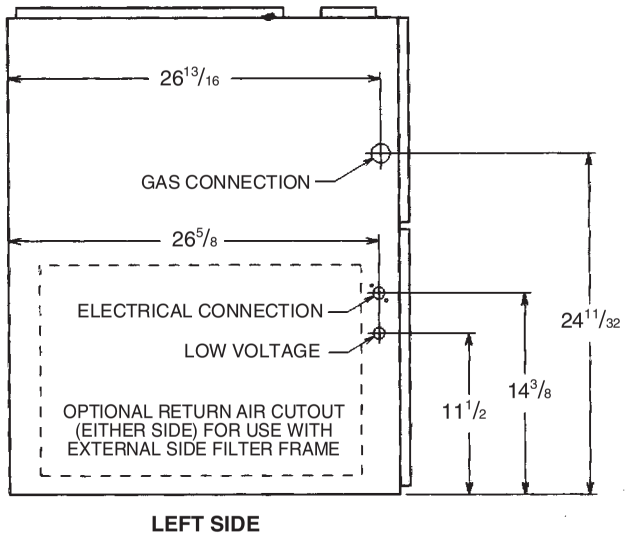
COMBUSTIBLE MATERIAL MUST NOT BE PLACED ON OR AGAINST THE FURNACE JACKET OR WITHIN THE SPECIFIED CLEARANCES OF THE VENT PIPE. THE AREA AROUND THE FURNACE MUST BE KEPT CLEAR AND FREE OF ALL COMBUSTIBLE MATERIALS INCLUDING GASOLINE AND OTHER FLAMMABLE VAPORS AND LIQUIDS. PLACEMENT OF COMBUSTIBLE MATERIALS ON, AGAINST OR AROUND THE FURNACE JACKET CAN CAUSE AN EXPLOSION OR FIRE RESULTING IN PROPERTY DAMAGE, PERSONAL INJURY OR DEATH. THE FURNACE OWNER SHOULD BE CAUTIONED THAT THE FURNACE AREA MUST NOT BE USED AS A BROOM CLOSET OR FOR ANY OTHER STORAGE PURPOSES.

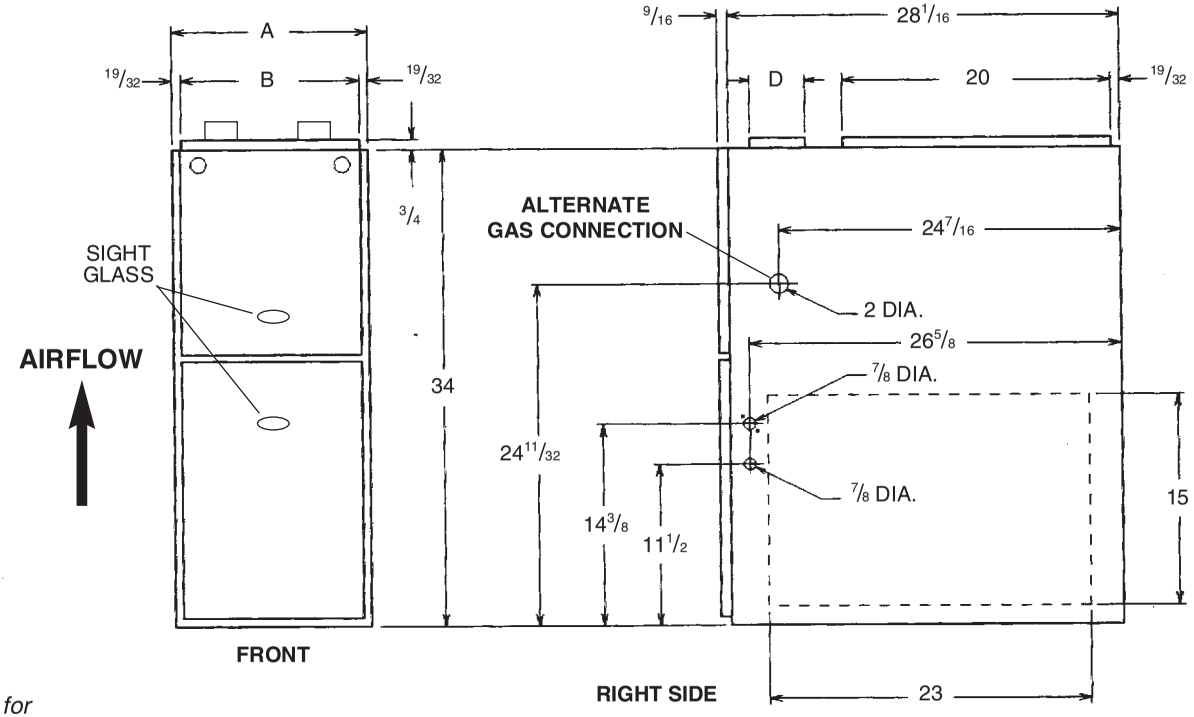
CLEARANCE TO COMBUSTIBLE MATERIAL (INCHES) UPFLOW/HORIZONTAL MODELS

Model (-)GPQ	A	B	C	D	E	F	REDUCED CLEARANCE (IN.) Left Side	Right Side	Back	Top	Front	Vent	Ship. Wgts.
05	14	$12^{27}/_{32}$	$10^{5}/_{8}$	①	$11^{1}/_{2}$	$1^{7}/_{8}$	0	4②	0	1	3	6③	85 lbs.
07	$17^{1}/_{2}$	$16^{11}/_{32}$	$12^{3}/_{8}$	①	15	$2^{1}/_{2}$	0	3②	0	1	3	6③	105 lbs.
10(A)	$17^{1}/_{2}$	$16^{11}/_{32}$	$12^{3}/_{8}$	①	15	$2^{1}/_{2}$	0	3②	0	1	3	6③	115 lbs.
10(B)	21	$19^{27}/_{32}$	$14^{1}/_{8}$	①	$18^{1}/_{2}$	$2^{1}/_{2}$	0	0	0	1	3	6③	120 lbs.
12	$24^{1}/_{2}$	$23^{11}/_{32}$	$15^{7}/_{8}$	①	22	$2^{1}/_{2}$	0	0	0	1	3	6③	140 lbs.
15	$24^{1}/_{2}$	$23^{11}/_{32}$	$15^{7}/_{8}$	①	22	$2^{1}/_{2}$	0	0	0	1	3	6③	150 lbs.

① May require 3" to 4" or 3" or 5" adapter.
② May be 0" with type B vent.
③ May be 1" with type B vent.







IMPORTANT: *This furnace is not approved or recommended for installation on its back, with access doors facing upwards.*

FIGURE 3
UPFLOW/HORIZONTAL DIMENSIONS

CLEARANCE TO COMBUSTIBLE MATERIAL (INCHES) DOWNFLOW MODELS

Model (-)GLQ	A	B	C	D	E	REDUCED CLEARANCE (IN.) Left Side	Right Side	Back	Top	Front	Vent	Ship. Wgts.
05	14	12 27/32	10 3/8	①	13 1/8	0	4②	0	1	3	6③	85 lbs.
07	17 1/2	16 11/32	12 1/8	①	16 5/8	0	3②	0	1	3	6③	105 lbs.
10(A)	17 1/2	16 11/32	12 1/8	①	16 5/8	0	3②	0	1	3	6③	115 lbs.
10(B)	21	19 27/32	13 7/8	①	20 1/8	0	0	0	1	3	6③	120 lbs.
12	24 1/2	23 11/32	15 5/8	①	23 5/8	0	0	0	1	3	6③	140 lbs.
15	24 1/2	23 11/32	15 5/8	①	23 5/8	0	0	0	1	3	6③	150 lbs.

① May require 3" to 4" or 3" or 5" adapter.
② May be 0" with type B vent.
③ May be 1" with type B vent.

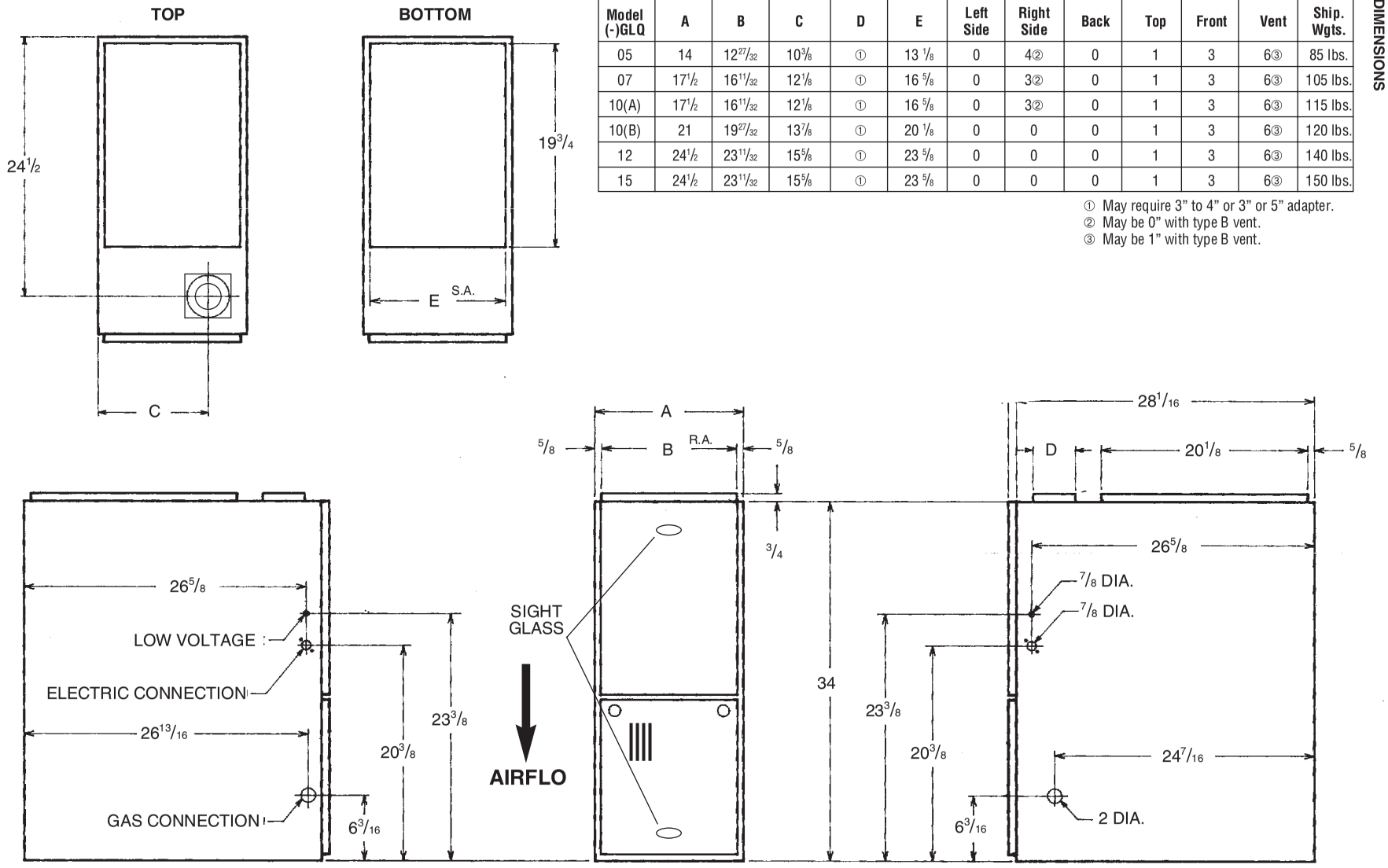


FIGURE 4
DOWNFLOW DIMENSIONS

NOTE: IN DOWNFLOW CONFIGURATION, OPTIONAL AIR CUTOUT IS NOT PERMITTED.

DUCTING

Proper air flow is required for the correct operation of this furnace. Too little air flow can cause erratic operation and can damage the heat exchanger. The duct system must carry the correct amount of air for heating and cooling. Position the unit minimize long runs or runs with many turns and elbows.

Size the ducts according to acceptable industry standards and methods. The total static pressure drop (including evaporator coil, if used) of the entire system should not exceed 0.5" w.c. Be sure to have adequate space for unit filter. **NOTE:** Airflow external static pressure measurements do not include filter or coil.

IMPORTANT: *Some high efficiency filters have a greater than normal resistance to air flow. This can adversely affect furnace operation. BE SURE TO CHECK AIR FLOW if using any filter other than the factory-provided filter.*

NOTE: DO NOT take return air from bathrooms, kitchens, furnace rooms, garages, utility or laundry rooms, or cold areas.

IMPORTANT: *When using outside air, design and adjust the system to maintain a return air temperature* ***above 55°F*** *during the heating season.*

⚠ WARNING

NEVER ALLOW PRODUCTS OF COMBUSTION OR THE FLUE PRODUCTS TO ENTER THE RETURN AIR DUCTWORK, OR THE CIRCULATING AIR SUPPLY. ALL RETURN DUCTWORK MUST BE ADEQUATELY SEALED AND SECURED TO THE FURNACE WITH SHEET METAL SCREWS, AND JOINTS TAPED. WHEN A FURNACE IS MOUNTED ON A PLATFORM, WITH RETURN THROUGH THE BOTTOM, IT MUST BE SEALED AIRTIGHT BETWEEN THE FURNACE AND THE RETURN AIR PLENUM. THE RETURN AIR PLENUM MUST BE PERMANENTLY ENCLOSED. NEVER USE A DOOR AS A PART OF THE RETURN AIR PLENUM. THE FLOOR OR PLATFORM MUST PROVIDE SOUND PHYSICAL SUPPORT OF THE FURNACE, WITHOUT SAGGING, CRACKS, GAPS, ETC., AROUND THE BASE AS TO PROVIDE A SEAL BETWEEN THE SUPPORT AND THE BASE.

FAILURE TO PREVENT PRODUCTS OF COMBUSTION FROM BEING CIRCULATED INTO THE LIVING SPACE CAN CREATE POTENTIALLY HAZARDOUS CONDITIONS, INCLUDING CARBON MONOXIDE POISONING THAT COULD RESULT IN PERSONAL INJURY OR DEATH.

DO NOT, UNDER ANY CIRCUMSTANCES, CONNECT RETURN OR SUPPLY DUCTWORK TO OR FROM ANY OTHER HEAT PRODUCING DEVICE SUCH AS A FIREPLACE INSERT, STOVE, ETC. DOING SO MAY RESULT IN FIRE, CARBON MONOXIDE POISONING, EXPLOSION, PERSONAL INJURY OR PROPERTY DAMAGE.

⚠ WARNING

BLOWER AND BURNERS MUST NEVER BE OPERATED WITHOUT THE BLOWER DOOR IN PLACE. THIS IS TO PREVENT DRAWING GAS FUMES (WHICH COULD CONTAIN HAZARDOUS CARBON MONOXIDE) INTO THE HOME THAT COULD RESULT IN PERSONAL INJURY OR DEATH.

UPFLOW UNITS

1. Set furnace in place and connect the return duct or return air cabinet to unit. Make the connection air-tight to prevent entraining combustion gases from any adjacent fuel-burning appliances. Unit return air may be connected on the sides or bottom of the return air compartment.

   a. Openings in the side must be cut out the full width of the knockouts on the unit. If using side return air, **THE BOTTOM base plate must be installed**.

      NOTE: Where the maximum airflow is 1800 CFM or more, both sides or the bottom must be used for return air.

   b. If using bottom return air, place furnace over return air plenum and seal furnace bottom to return air plenum.

⚠ WARNING

A SOLID METAL BASE PLATE, (SEE TABLE 1) MUST BE IN PLACE WHEN THE FURNACE IS INSTALLED WITH SIDE AIR RETURN DUCTS. FAILURE TO INSTALL A BASE PLATE COULD CAUSE PRODUCTS OF COMBUSTION TO BE CIRCULATED INTO THE LIVING SPACE AND CREATE POTENTIALLY HAZARDOUS CONDITIONS, INCLUDING CARBON MONOXIDE POISONING OR DEATH.

2. If summer air conditioning is desired, position the indoor coil on the supply air side of the furnace. Insure that no air can bypass this coil.
3. Connect the supply air plenum to the furnace plenum opening.

DOWNFLOW UNITS

⚠ WARNING

THE DOWNFLOW FURNACE DESIGN IS CERTIFIED FOR INSTALLATION ON A NON-COMBUSTIBLE FLOOR. IF INSTALLED ON A COMBUSTIBLE FLOOR, USE THE SPECIAL BASE SPECIFIED ON THE FURNACE CLEARANCE LABEL. FAILURE TO INSTALL THE SPECIAL BASE MAY RESULT IN FIRE, PROPERTY DAMAGE, PERSONAL INJURY OR DEATH. THIS SPECIAL BASE IS SHIPPED FROM THE FACTORY AS AN ACCESSORY.

1. Position the unit over the supply air plenum and connect.
   a. If installing on a combustible floor **and not using an evaporator coil box,** install the special combustible floor base. See Figure 5.

   b. If summer air conditioning is desired, position the indoor coil on the bottom of the unit. Insure that no air can bypass this coil.
2. Connect the return air ducting to the return air opening at the top of the unit. Make the connection air tight to prevent entraining combustion gases from an adjacent fuel-burning appliance.

HORIZONTAL UNITS

1. Unit can be mounted left or right side airflow configuration.
2. Position the unit on adequate supports or by using support brackets (see Figure 2) and connect supply plenum.
3. If summer air conditioning is desired, position the indoor coil on the supply air side of the unit. Insure that no air can bypass this coil.
4. Secure the four angle brackets shipped with the unit to the return air opening. See Figure 6. Connect the return air ducting to the return air opening at the top of the unit. Make the connection air tight to prevent entraining combustion gases from an adjacent fuel-burning appliance.

NOTE: Do not block furnace access with support rods. Maintain clearances recommended in Figure 3. Allow enough space for proper service maintenance or replacement of the heat exchanger and blower assembly.

FIGURE 5
COMBUSTIBLE FLOOR BASE (RXGC -B14, -B17, -B21 OR -B24)

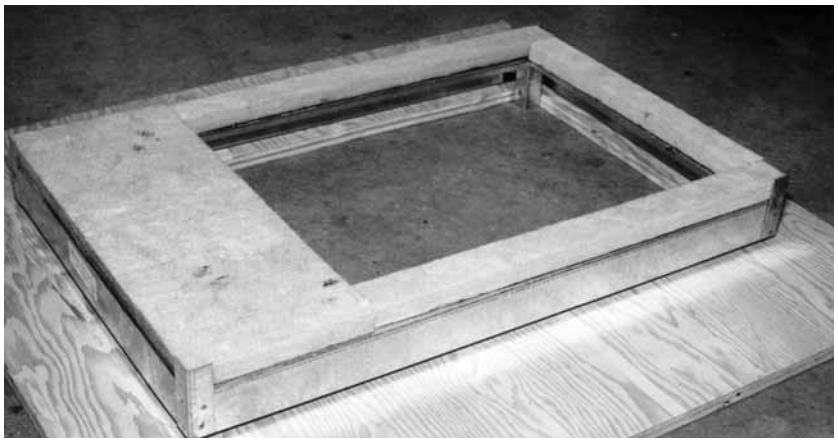
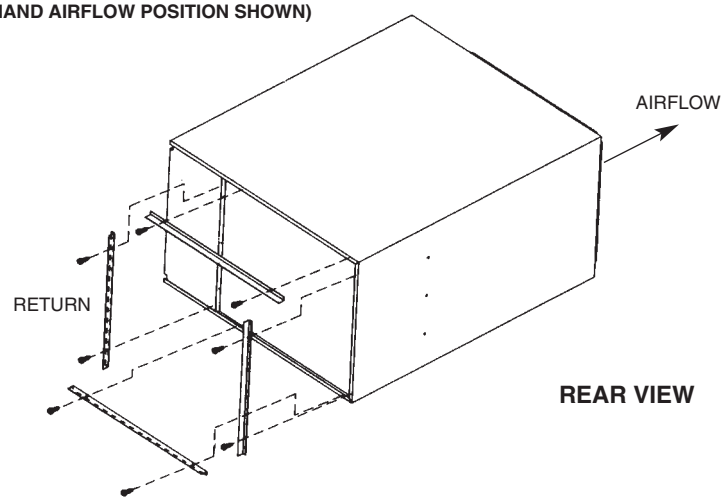


FIGURE 6
HORIZONTAL RETURN AIR DUCT
(LEFT-HAND AIRFLOW POSITION SHOWN)



FOUR ANGLE BRACKETS ARE SHIPPED WITH EACH UNIT THAT CAN BE INSTALLED HORIZONTALLY. THESE BRACKETS MAY BE USED TO SECURE THE RETURN AIR DUCT TO A HORIZONTAL UNIT.

COMBUSTION AND VENTILATION AIR

IMPORTANT: *This is not a direct vent furnace. Review venting instructions before installing.*

⚠ WARNING

THIS FURNACE AND ANY OTHER FUEL-BURNING APPLIANCE MUST BE PROVIDED WITH ENOUGH FRESH AIR FOR PROPER COMBUSTION AND VENTILATION OF THE FLUE GASES. MOST HOMES WILL REQUIRE THAT OUTSIDE AIR BE SUPPLIED INTO THE FURNACE AREA. FAILURE TO DO SO CAN CAUSE DEATH FROM CARBON MONOXIDE POISONING.

Adequate facilities for providing air for combustion and ventilation must be provided in accordance with section 5.3, Air for Combustion and Ventilation, of the National Fuel Gas Code, ANSI, Z223.1 latest edition or CSA B149.1 and .2 or, applicable provisions for the local building codes, and not obstructed so as to prevent the flow of air to the furnace.

COMBUSTION AIR REQUIREMENTS

IMPORTANT: *Air for combustion and ventilation must not come from a corrosive atmosphere. Any failure due to corrosive elements in the atmosphere is excluded from warranty coverage.*

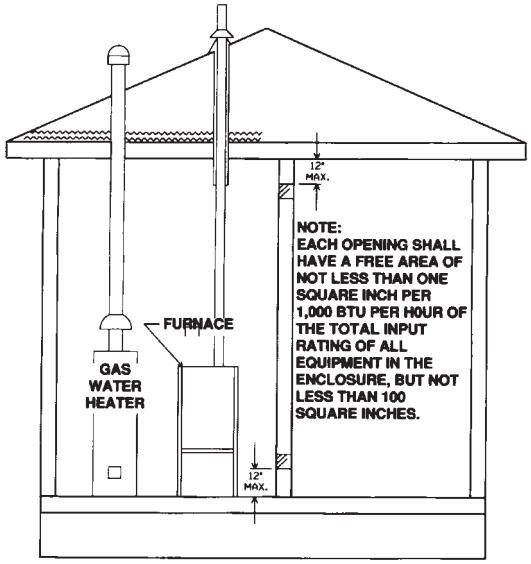
The following types of installation may require OUTDOOR AIR for combustion, due to chemical exposures:

- Commercial buildings
- Buildings with indoor pools
- Furnaces installed in laundry rooms
- Furnaces in hobby or craft rooms
- Furnaces installed near chemical storage areas.

Exposure to the following substances in the combustion air supply may also require OUTDOOR AIR for combustion:

- Permanent wave solutions
- Chlorinated waxes and cleaners
- Chlorine-based swimming pool chemicals
- Water softening chemicals
- De-icing salts or chemicals
- Carbon tetrachloride
- Halogen type refrigerants
- Cleaning solvents (such as perchloroethylene)
- Printing inks, paint removers, varnishes, etc.
- Hydrochloric acid
- Cements and glues
- Antistatic fabric softeners for clothes dryers
- Masonry acid washing materials

FIGURE 7
AIR FROM HEATED SPACE



Combustion air must be free of acid forming chemicals; such as sulphur, fluorine and chlorine. These elements are found in aerosol sprays, detergents, bleaches, cleaning solvents, air fresheners, paint and varnish removers, refrigerants and many other commercial and household products. Vapors from these products when burned in a gas flame form acid compounds. The acid compounds increase the dew point temperature of the flue products and are highly corrosive after they condense.

⚠ WARNING

ALL FURNACE INSTALLATIONS MUST COMPLY WITH THE NATIONAL FUEL GAS CODE AND LOCAL CODES TO PROVIDE ADEQUATE COMBUSTION AND VENTILATION AIR FOR THE FURNACE. FAILURE TO DO SO CAN CREATE HAZARDOUS CONDITIONS RESULTING IN PROPERTY DAMAGE, BODILY INJURY OR DEATH FROM SMOKE, FIRE OR CARBON MONOXIDE.

Combustion air requirements are determined by whether the furnace is in an open (unconfined) area or in a confined space such as a closet or small room. See Figures 7 and 8.

EXAMPLE 1. FURNACE LOCATED IN AN UNCONFINED SPACE

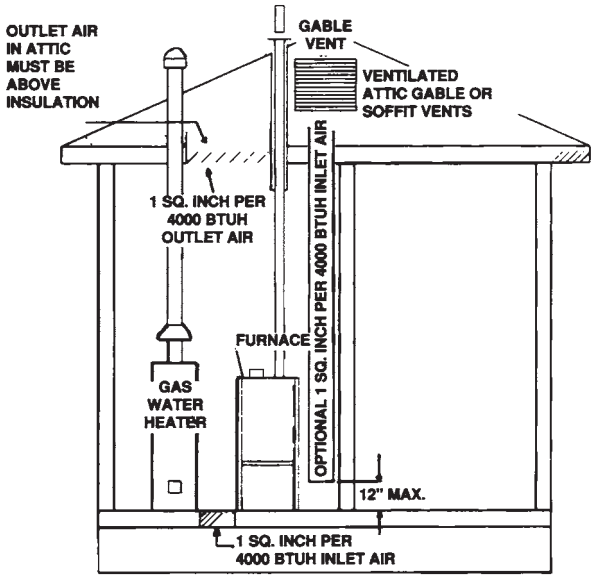
Using indoor air for combustion.

An unconfined space must have at least 50 cubic feet for each 1,000 BTUH of the total input for all appliances in the space. Here are a few examples of the room sizes required for different inputs. The sizes are based on 8 foot ceilings.

BTUH Input	Minimum Sq. Feet With 8' Ceiling	Typical Room Size With 8' Ceiling
50,000	312	14*x24* or 18*x18*
75,000	469	15*x31* or 20*x24*
100,000	625	20*x31* or 25*x25*
125,000	833	23*x34* or 26*x30*
150,000	938	25*x38* or 30*x31*

If the open space containing the furnace is in a building with tight construction (contemporary construction), outside air may still be required for the furnace to operate and vent properly. Outside air openings should be sized the same as for a confined space.

FIGURE 8
AIR FROM ATTIC/CRAWL SPACE



EXAMPLE 2. FURNACE LOCATED IN A CONFINED SPACE

A confined space (any space smaller than shown above as "unconfined") must have openings into the space which are located in accordance with the requirements set forth in the following subsections A and B. Size the openings by how they are connected to the heated area or to the outside, and by the input of all appliances in the space.

If confined space is within a building with tight construction, combustion air must be taken from outdoors or area freely communicating with the outdoors.

A. USING INDOOR AIR FOR COMBUSTION, ALL OF THE MODELS (GPQ, GLQ)

IMPORTANT: *Air should not be taken from a heated space with a fireplace, exhaust fan or other device that may produce a negative pressure.*

If combustion air is taken from the heated area, the openings must each have at least 100 square inches of free area. Each opening must have at least one square inch of free area for each 1,000 Btuh of total input in the space. Here are some examples of typical openings required.

Btuh Input	Free Area Each Opening
100,000	100 Square Inches
150,000	150 Square Inches

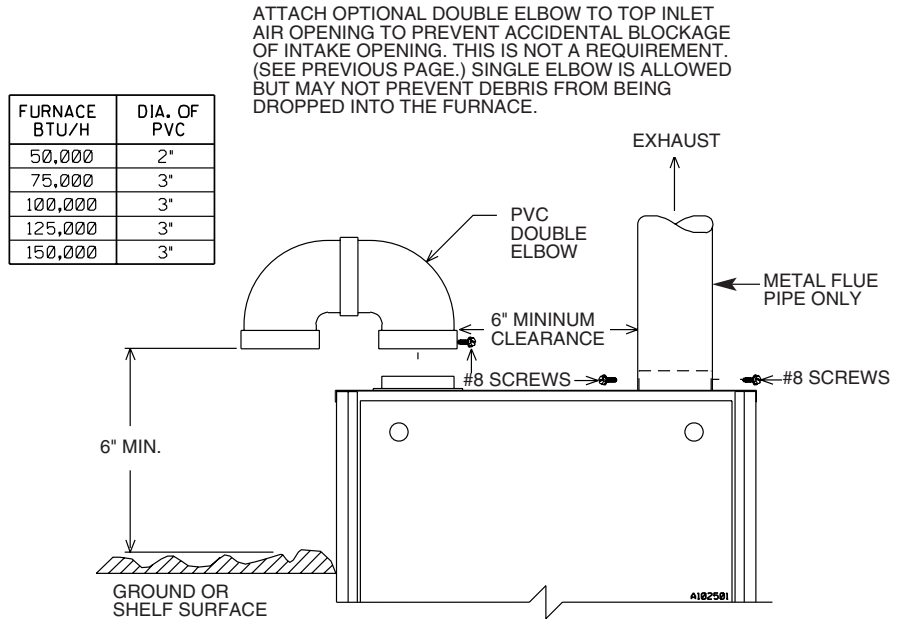
AIR INTAKE PIPE CONNECTION (GPQ ONLY)

A single or double-elbow may be installed to top inlet air opening, BUT IS NOT REQUIRED. This will help to prevent accidental blockage of the intake opening. Reference Figure 9 for proper elbow diameter.

NOTE: Inlet is specifically designed to prevent material from being pulled into furnace. If elbows are not used, the intake opening must be kept clean and free of debris.

It is also acceptable to run the condensate drain (or refrigerant) line access over the air intake hole as long as a 1" minimum clearance is maintained.

FIGURE 9
COMBUSTION AIR FITTING – NON-ATTIC COMBUSTION AIR PULL, GPQ ONLY



B. USING OUTDOOR AIR FOR COMBUSTION, ALL OF THE MODELS (GPQ, GLQ)

IMPORTANT: *Never take combustion air from an attic space that is equipped with power ventilation.*

The confined space must communicate with the outdoors according to Methods 1 and 2. The minimum air opening dimension shall not be less than 3 inches. When using ducts, they shall be of the same cross-sectional area as the free area of the openings to which they connect.

B: Method 1

Provide two permanent openings, one located within 12 inches of the top and one located within 12 inches of the bottom of the enclosure. Each opening shall communicate directly, or by ducts, with the outdoors or spaces (crawl or attic) that freely communicate with the outdoors.

a. Where directly communicating with the outdoors or where communicating to the outdoors through **VERTICAL DUCTS,** each opening shall have a minimum free area of **1 square inch for each 4000 BTUH** of total appliance input rating in the enclosure. Here are typical duct sizes:

VERTICAL OUTDOOR AIR OPENING DIMENSIONS

BTUH Input	Free Area Each Opening	Round Pipe Size
50,000	12.50 sq. inches	4”
75,000	18.75 sq. inches	5”
100,000	25.00 sq. inches	6”
125,000	31.25 sq. inches	7”
150,000	37.50 sq. inches	7”

b. Where communicating with outdoors through **HORIZONTAL DUCTS,** each opening shall have a minimum free area of **1 square inch for each 2000 BTUH** of total input rating for all equipment in the enclosure. Here are typical duct sizes:

HORIZONTAL OUTDOOR AIR OPENING DIMENSIONS

BTUH Input	Free Area Each Opening	Round Pipe Size
50,000	25.00 sq. inches	6”
75,000	37.50 sq. inches	7”
100,000	50.00 sq. inches	8”
125,000	62.50 sq. inches	9”
150,000	75.00 sq. inches	10”

B: Method 2

One permanent opening, located 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 directly communicate with the outdoors or communicate through a vertical or horizontal duct to the outdoors or spaces (crawl or attic) that freely communicate with the outdoors and have a minimum free area of:

a. One square inch for each 3000 BTUH of the total input rating of all equipment located in the enclosure, **AND**

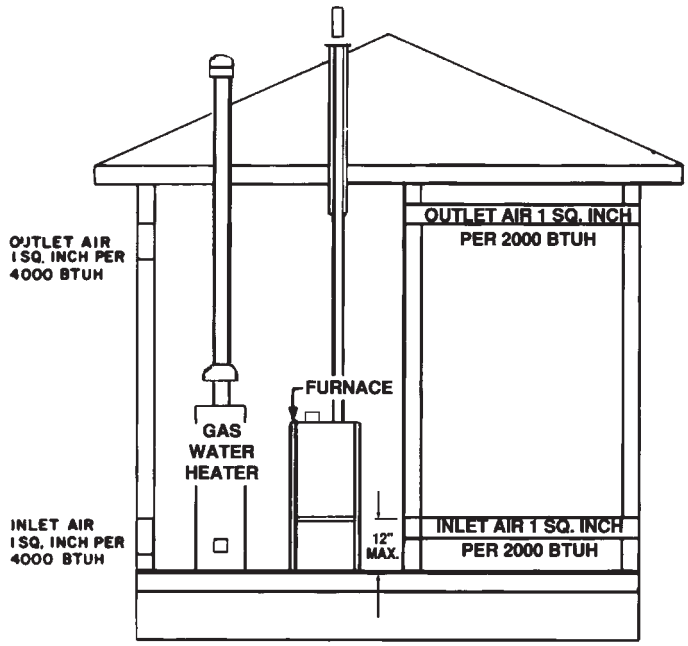
b. Not less than the sum of the areas of all vent connectors in the confined space.

IMPORTANT: *If the furnace is in a location with an exhaust fan, there must be sufficient ventilation to prevent the exhaust fan from creating a negative pressure in the room.*

Combustion air openings must **NOT BE RESTRICTED** in any manner.

CONSULT LOCAL CODES FOR SPECIAL REQUIREMENTS.

FIGURE 10
OUTSIDE AIR USING A HORIZONTAL INLET & OUTLET



B: Method 3, (-)GPQ only

For the optimum in quiet operation, attic air may be brought directly to the furnace.

IMPORTANT: In applications using Method 3 for combustion air, the attic must be ventilated by gable or soffit vents. See Figure 8.

⚠ CAUTION

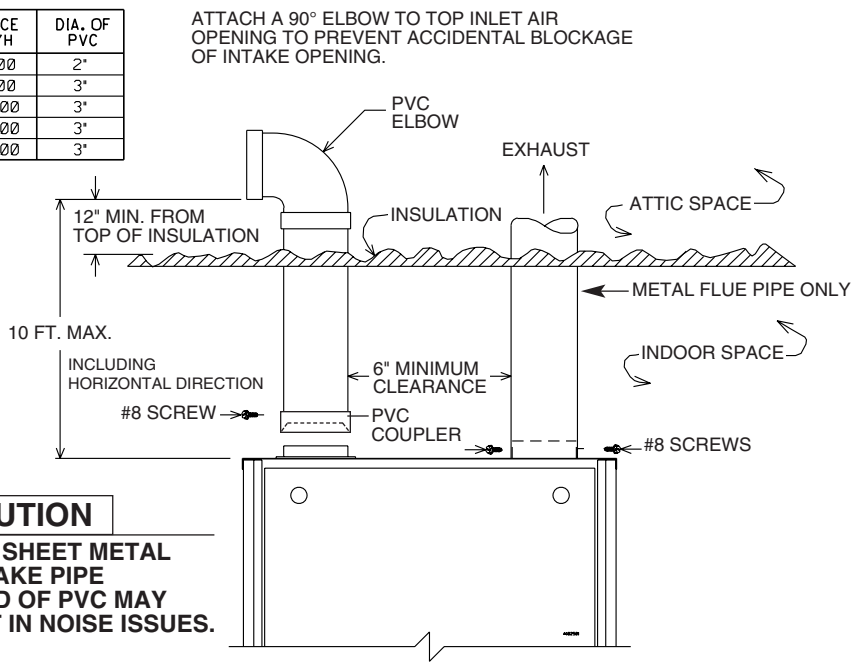
COMBUSTION AIR INTAKES CANNOT BE TERMINATED OUTSIDE. DOING SO CAN CAUSE IMPROPER OPERATION OF THE FURNACE.

If attic combustion air is used, the inlet air opening at the furnace must be protected from accidental blockage. Install a 90° elbow pointing horizontally at the top of inlet air pipe. See Figure 11 (maximum of two, 22.5°, 45° or 90° elbows, allowed).

NOTE: Maximum length of pipe that may be used for combustion air is 10 feet with two elbows. Lengths of more than 10 feet can result in nuisance pressure switch trips.

FIGURE 11
B: METHOD 3 ILLUSTRATION
COMBUSTION AIR FITTING – OPTIONAL ATTIC COMBUSTION AIR PULL, (-)GPQ ONLY

FURNACE BTU/H	DIA. OF PVC
50,000	2"
75,000	3"
100,000	3"
125,000	3"
150,000	3"



⚠ CAUTION

USE OF SHEET METAL AIR INTAKE PIPE INSTEAD OF PVC MAY RESULT IN NOISE ISSUES.

VENTING

GENERAL INFORMATION

The furnace must be vented in accordance with these instructions, National Fuel Gas Code, ANSI Z223.1 and/or the Natural Gas Installation Code, CSA-B149.1 & .2 and requirements or codes of the local utility or other authority having jurisdiction.

⚠ WARNING

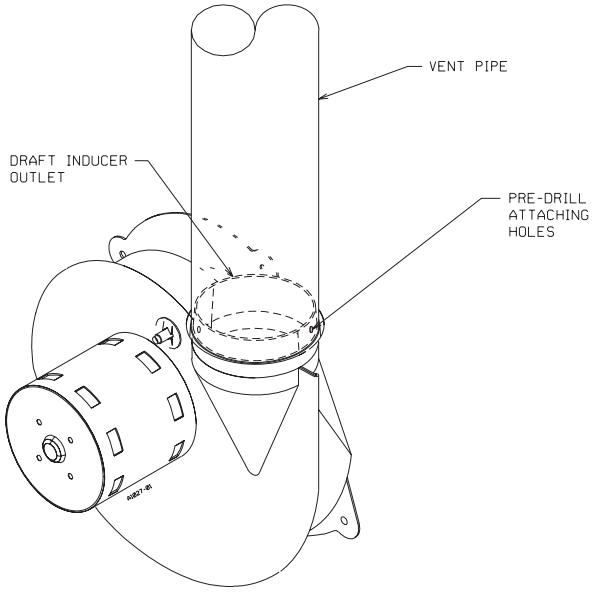
DEVICES ATTACHED TO THE FLUE OR VENT FOR THE PURPOSE OF REDUCING HEAT LOSS UP THE CHIMNEY HAVE NOT BEEN TESTED AND HAVE NOT BEEN INCLUDED IN THE DESIGN CERTIFICATION OF THIS FURNACE. WE, THE MANUFACTURER, CANNOT AND WILL NOT BE RESPONSIBLE FOR INJURY OR DAMAGE CAUSED BY THE USE OF SUCH UNTESTED AND/OR UNCERTIFIED DEVICES, ACCESSORIES OR COMPONENTS.

DRAFT INDUCER

⚠ WARNING

VENT PIPE ATTACHING HOLES MUST BE PREDRILLED IN THE DRAFT INDUCER COLLAR TO PREVENT DAMAGING THE INDUCER. DRILL 1/8" DIAMETER HOLES THROUGH THE VENT PIPE AND COLLAR AND USE #8 SCREWS TO ATTACH. SEE FIGURE 12. FAILURE TO FOLLOW THIS WARNING CAN CAUSE RECIRCULATION OF FLUE PRODUCTS CAUSING CARBON MONOXIDE POISONING RESULTING IN PERSONAL INJURY OR DEATH.

FIGURE 12
ATTACHING TO DRAFT INDUCER COLLAR



A0991-01

FURNACE CATEGORY INFORMATION

This furnace is shipped as a Category I type induced draft furnace. A Category I furnace operates with a nonpositive vent pressure and has a vent gas temperature at least 140°F above the dew point of the vent gases. A Category I type may be a draft hood equipped furnace or have a fan assisted combustion system (induced draft). The inducer is used to pull flue products through the combustion chamber and as they leave the furnace, most of the energy has been dissipated. The buoyant effect of the flue gases provides venting to the outdoors.

During the off cycle, the inducer is off and there is very little flow through the vent, cooling the vent. During the on cycle there is no dilution airflow, as with a draft hood type furnace. Although the vent heats up rapidly without dilution air, the flue products contain more water vapor, which results in a higher dew point temperature. It is most **important** that you follow the guidelines in these instructions to prevent the possible formation of condensation in the venting system.

As a Category I furnace it may be vented vertically with type B-1 vent pipe and also may be common vented, as described in these instructions.

IMPORTANT APPLICATION NOTES

When the furnace is used as a replacement, the existing vent system should be inspected to assure that there are no obstructions, blockage, or any signs of corrosion and is properly sized for use with this furnace.

NOTE: When the vent table permits more than one diameter of pipe for a connector or vent, the smallest permitted diameter must be used.

Vent pipe may be type "B-1," either rigid or suitable flexible construction that carries a u.l. listing.

Common venting is allowed with vertical B-1 vent systems, and lined masonry chimneys. Follow the National Fuel Gas Code, ANSI Z223.1 and/or the Natural Gas Installation Code, CSA-B149.1 & .2 for proper installation practices.

NOTE: Follow combustion air instructions as outlined in this manual.

Single wall vent connectors to "B-1 vent or masonry chimneys" may be used under the guidelines of the National Fuel Gas Code, ANSI Z223.1 and/or the Natural Gas Installation Code, CSA-B149.1 & .2.

The entire length of the vent connector shall be readily accessible for inspection, cleaning and replacement.

"B-1" VERTICAL VENTING

Type "B-1" vents must be installed in accordance with the terms of their listings and the vent manufacturer's instructions.

"B-1" vents must be supported and spaced in accordance with their listings and the manufacturer's instructions. All vents must be supported to maintain their minimum clearances from combustible material.

IMPORTANT:

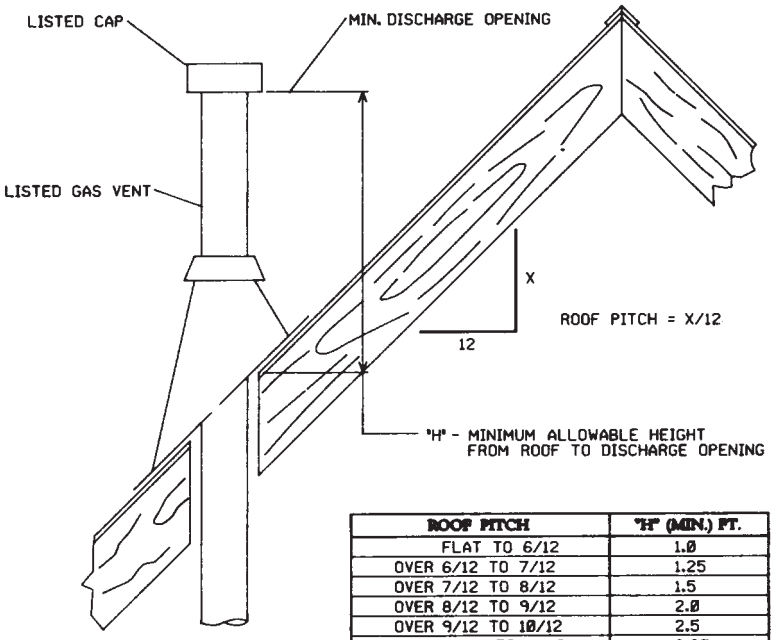
VERTICAL VENTING	
Input	**Categorized Furnace Vent Size Required**
50K	**3"**
75K	***4"**
100K	***4"**
125K	***5"**
150K	***5"**

*NOTE: All furnaces have a 3" vent connection as shipped from the factory. A 3" to 4" or 3" to 5" vent transition is required on all but the 50,000 BTUH models when vertically vented or common vented with metal vent pipes. **THE VENT TRANSITION CONNECTION MUST BE MADE AT THE FURNACE VENT EXIT.** It must originate with an adapter if required, at the furnace flue collar and terminate either in a listed cap or roof assembly. When common venting, the vent connector size may differ from the above diameters depending on application. See ANSI Z21.47-1993/CSA-2.3-M93 or latest edition tables.

VERTICAL VENT SYSTEMS:

1. A gas vent shall terminate above the roof surface with a listed cap or listed roof assembly. Gas vents 12 inches in size or smaller with listed caps shall be permitted to be terminated in accordance with Figure 13, provided they are at least 8 feet from a vertical wall or similar obstruction. All other gas vents shall terminate not less than 2 feet above the highest point where they pass through the roof and at least 2 feet higher than any portion of a building within 10 feet.
2. A type B-1 gas vent shall terminate at least 5 feet in vertical height above the highest connected equipment draft hood or flue collar.
3. Must rise ¼" per foot away from the furnace on horizontal runs and be supported with straps or hangers so it has no sags or dips. Supports at 4 foot intervals and at all elbows are recommended.

FIGURE 13
TYPICAL VENTING WITH "B-1" VENT



ROOF PITCH	"H" (MIN.) FT.
FLAT TO 6/12	1.0
OVER 6/12 TO 7/12	1.25
OVER 7/12 TO 8/12	1.5
OVER 8/12 TO 9/12	2.0
OVER 9/12 TO 10/12	2.5
OVER 10/12 TO 11/12	3.25
OVER 11/12 TO 12/12	4.0
OVER 12/12 TO 14/12	5.0
OVER 14/12 TO 16/12	6.0
OVER 16/12 TO 18/12	7.0
OVER 18/12 TO 20/12	7.5
OVER 20/12 TO 21/12	8.0

4. The vent connector must be mechanically fastened to the outlet collar of the furnace with at least (2) sheet metal screws except vent connectors that are B-1 material. These shall be assembled in accordance with the manufacturer's instructions. See Figure 12.
5. Any angle greater than 45 degrees from the vertical is considered horizontal. The total horizontal distance of a vent plus the horizontal vent connector serving draft-hood equipped appliances shall not be greater than 75 percent of the vertical height of the vent.

NOTE: Refer to the National Fuel Gas Code, ANSI Z223.1 and/or the Natural Gas Installation Code, CSA-B149.1 & .2.

Single appliance venting of a fan assisted furnace into a tile-lined masonry chimney is prohibited. The chimney must be lined with either Type B vent or with a listed, single wall, metal lining system. Reference National Fuel Gas Code, ANSI Z223.1 and/or the Natural Gas Installation Code, CSA-B149.1 & .2. See Figure 14 for typical B-1 vent chase.

⚠ WARNING

DO NOT CONNECT THIS FURNACE TO A CHIMNEY USED TO VENT A SOLID FUEL APPLIANCE (WOOD OR COAL). VENTING WITH A SOLID FUEL APPLIANCE CAN LEAD TO IMPROPER FUNCTIONING OF THE UNIT, AND DUE TO SOOTING, THE POSSIBILITY OF FIRE RESULTING IN PROPERTY DAMAGE, PERSONAL INJURY OR DEATH.

SPECIAL VENT SYSTEMS (SVS)

IMPORTANT: *It is THE FURNACE MANUFACTURER's position now that new installations of any HTPV pipe used in a category III vent application, including Selkirk's Selvent™ II HTPV product, should cease immediately.*

POWER VENT SYSTEMS

When vertical venting is not possible, the only acceptable method for horizontal venting is with the use of Tjernlund model GPAK-1TR or Field Controls models SWG-4R power venter. Type B vent pipe and fittings must be used. Common venting is not permitted

All application and installation instructions supplied with the power venter must be followed.

Please address all questions regarding power venter installation, agency listings and furnace model compatibility to:

Tjernlund Products, Inc.
(800) 255-4208 or (612) 426-2993

Field Controls L.L.C.
(800) 742-8368 or (919) 522-0214

EXISTING VENT SYSTEMS

IMPORTANT RETROFIT VENTING INSTRUCTIONS

If this furnace is a replacement installation, **ALWAYS INSPECT** the existing vent system to be sure there are no obstructions, blockages, or signs of corrosion.

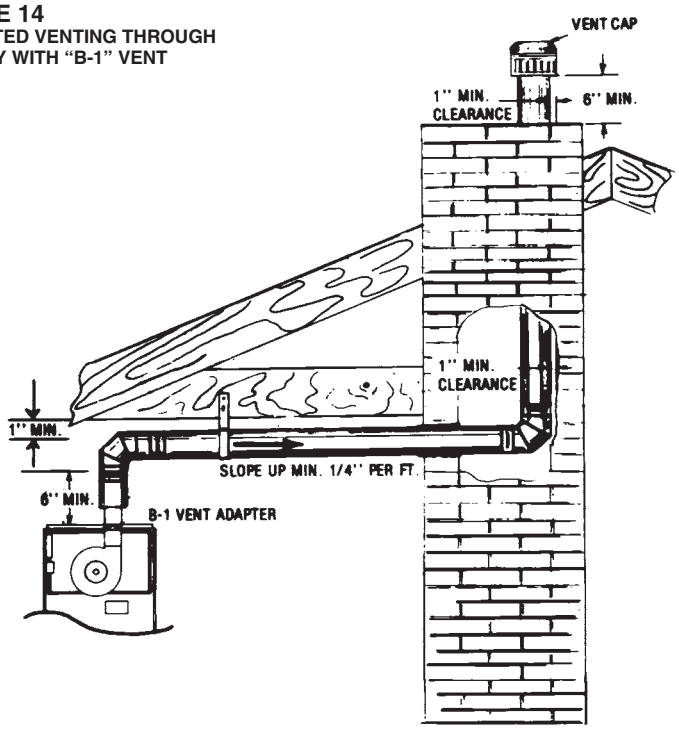
When the existing furnace is removed from a venting system serving other appliances, the venting is likely to be too large to properly vent the remaining attached appliances.

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

NOTE: When the vent table permits more than one diameter of pipe for a connector or vent, the smallest permitted diameter must be used.1. Seal any unused openings in the common venting system.

1. Visually inspect the venting system for proper size and horizontal pitch and determine that there is no blockage, restriction, leakage, corrosion or other deficiencies which could cause an unsafe condition.
2. Insofar as is practical, close all building doors, windows and all doors between the space where the appliances remaining connected to the common venting system are located. Turn on clothes dryers and any appliance 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.
3. Follow the lighting instructions. Place the appliance being inspected into operation. Adjust the thermostat so the appliance will operate continuously.
4. Test for spillage at the draft hood relief opening after 5 minutes of main burner operation. Use the flame of a match or candle, or smoke from a cigarette, cigar, or pipe.
5. After it has been determined that each appliance that remains connected to the common venting system properly vents (when tested as outlined above) return doors, windows, exhaust fans, fireplace dampers and any other gas-burning appliance to their previous conditions of use.
6. If improper venting is observed during any of the above tests, the common venting system must be resized. Refer to National Fuel Gas Code, ANSI Z223.1 and/or the Natural Gas Installation Code, CSA-B149.1 & .2.

FIGURE 14
DEDICATED VENTING THROUGH CHIMNEY WITH "B-1" VENT



GAS SUPPLY AND PIPING

GAS SUPPLY

⚠ WARNING

THIS FURNACE IS EQUIPPED AT THE FACTORY FOR USE ON NATURAL GAS ONLY. CONVERSION TO LP GAS REQUIRES A SPECIAL KIT AVAILABLE FROM THE DISTRIBUTOR. FAILURE TO USE THE PROPER CONVERSION KIT CAN CAUSE FIRE, CARBON MONOXIDE POISONING, EXPLOSION, PROPERTY DAMAGE, PERSONAL INJURY OR DEATH.

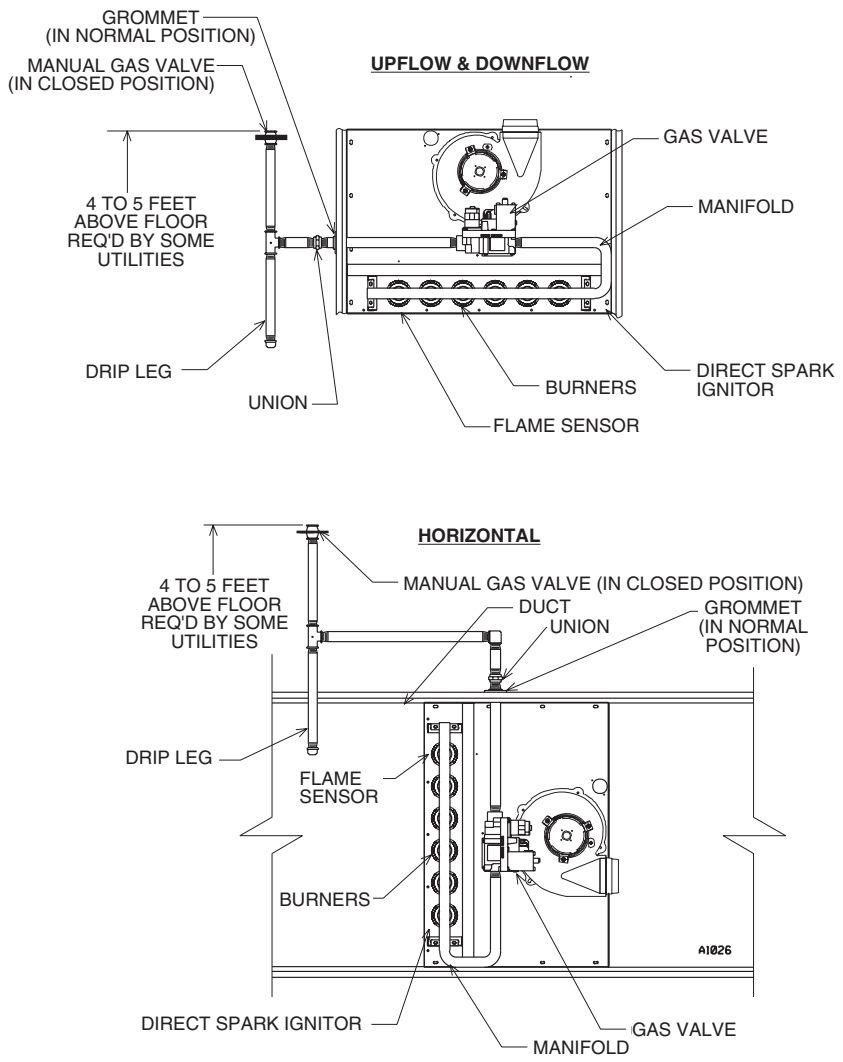
See the conversion kit index supplied with the furnace. This index identifies the proper LP Gas Conversion Kit required for each particular furnace.

IMPORTANT: *Any additions, changes or conversions required for the furnace to satisfactorily meet the application should be made by a qualified installer, service agency or the gas supplier, using factory-specified or approved parts. In the commonwealth of Massachusetts, installation must be performed by a licensed plumber or gas fitter for appropriate fuel.*

IMPORTANT: *Connect this furnace only to gas supplied by a commercial utility.*

IMPORTANT: *A U.L. recognized fuel gas and CO detector(s) are recommended in all applications, and their installation should be in accordance with the detector manufacturer's recommendations and/or local laws, rules, regulations or customs.*

FIGURE 15
GAS PIPING INSTALLATION



GAS PIPING (SEE FIGURE 15)

Install the gas piping according to all local codes, state codes and regulations of the utility company, whichever holds jurisdiction.

If possible, run a separate gas supply line directly from the meter to the furnace. Consult the local gas company for the location of the manual main shut-off valve. **The gas line and manual gas valve must be adequate in size to prevent undue pressure drop and never smaller than the pipe size to the combination gas valve on the furnace.** Refer to Tables 2 and 3, on the following pages, for the recommended pipe sizes for natural and LP gas.

IMPORTANT: *It is permissible to run flexible gas connector inside the unit to a piece of black pipe. If local codes allow the use of a flexible gas appliance connector, always use a new listed connector. Do not use a connector which has previously serviced another gas appliance. Massachusetts law limits flexible gas connectors to a maximum of 36".*

Install a ground joint union outside the cabinet to easily remove the control valve assembly. Install a manual shut-off valve in the gas line outside the furnace casing. The valve should be readily accessible to turn the gas supply on or off. Install a drip leg in the gas supply line as close to the furnace as possible. Always use a pipe compound resistant to the action of liquefied petroleum gases on all threaded connections.

IMPORTANT: *When making gas pipe connections, use a back-up wrench to prevent any twisting of the control assembly and gas valve. Do not overtighten the connection.*

Any strains on the gas valve can change the position of the gas orifices in the burners. This can cause erratic furnace operation.

IMPORTANT: *ENSURE that the furnace gas control valve not be subjected to high gas line supply pressures.*

DISCONNECT the furnace and its individual shut-off valve from the gas supply piping during **any pressure testing that exceeds 1/2 PSIG (14" W.C. or 3.48 kPa).**

GAS PRESSURE

IMPORTANT: *The maximum gas supply pressure to the furnace should be 10.5" w.c. for natural gas and 13" w.c. for LP gas.*

Natural gas supply pressure should operate between 5" to 10.5" w.c. LP gas supply pressure should be 11" to 13" w.c. **This pressure must be maintained with all other gas-fired appliances in operation.**

NOTE: Do not exceed a gas pressure of 13" w.c.

⚠ CAUTION

ELEVATIONS ABOVE 2000 FT REQUIRE THAT THE FURNACE INPUT RATING BE ADJUSTED AND THAT THE SIZE OF THE BURNER ORIFICES BE RE-CALCULATED BASED ON ELEVATION AND GAS HEATING VALUE. THE BURNER ORIFICES MAY (OR MAY NOT) NEED TO BE CHANGED. SEE THE SECTION TITLED "HIGH ALTITUDE INSTALLATIONS" OF THIS BOOK FOR INSTRUCTIONS.

⚠ WARNING

NEVER PURGE A GAS LINE INTO THE COMBUSTION CHAMBER. NEVER USE MATCHES, FLAME OR ANY IGNITION SOURCE FOR CHECKING LEAKAGE. FAILURE TO FOLLOW THIS WARNING CAN CAUSE AN EXPLOSION OR FIRE RESULTING IN PROPERTY DAMAGE, PERSONAL INJURY OR DEATH.

To check for gas leakage, use an approved chloride-free soap and water solution, an electronic combustible gas detector, or other approved method.

LP CONVERSION

NOTE: For installation, see specific LP kit installation instructions included with this furnace.

NOTE: Order the correct LP conversion kit from the local distributor. Furnace conversion to LP gas must be performed by a qualified technician.

More information found in the high altitude orifice section.

⚠ CAUTION

ELEVATIONS ABOVE 2000 FT REQUIRE THAT THE FURNACE INPUT RATING BE ADJUSTED AND THAT THE SIZE OF THE BURNER ORIFICES BE RE-CALCULATED BASED ON ELEVATION AND GAS HEATING VALUE. THE BURNER ORIFICES MAY (OR MAY NOT) NEED TO BE CHANGED. SEE THE SECTION TITLED "HIGH ALTITUDE INSTALLATIONS" OF THIS BOOK FOR INSTRUCTIONS.

NOx MODELS

When converting furnaces equipped with NOx inserts to LP gas, remove the NOx insert assemblies. Steps for removal are listed below:

1. Turn off all electrical power and the gas supply to the furnace.
2. Remove the burner door from the furnace.
3. Remove the igniter assembly – **handle with care.**
4. Remove the two screws attaching the NOx insert retainer brackets to the center panel. Pull the retainer rod.
5. Put the two screws back into the holes in the center panel.
6. Re-install the igniter and burner assemblies.
7. Replace burner door.
8. Turn on electrical power and gas supply to the unit.

NOTE: Some NOx models may have one less NOx insert.

SETTING GAS PRESSURE

The maximum gas supply pressure to the furnace should be 10.5" w.c. natural gas, or 13" w.c. LP gas. The minimum supply gas pressure to the gas valve should be 5" w.c. natural gas or 11" w.c. LP gas. A properly calibrated manometer is required for accurate gas pressure measurements.

⚠ CAUTION

ELEVATIONS ABOVE 2000 FT REQUIRE THAT THE FURNACE INPUT RATING BE ADJUSTED AND THAT THE SIZE OF THE BURNER ORIFICES BE RE-CALCULATED BASED ON ELEVATION AND GAS HEATING VALUE. THE BURNER ORIFICES MAY (OR MAY NOT) NEED TO BE CHANGED. SEE THE SECTION TITLED "HIGH ALTITUDE INSTALLATIONS" OF THIS BOOK FOR INSTRUCTIONS.

Supply Gas Pressure Measurement. A line pressure tap is on the inlet side of the gas valve.

1. With gas shut off to the furnace at the manual gas valve outside the unit, remove the input pressure tap plug.
2. Connect a U-Tube manometer to the pressure tap. See Figure 16.
3. Turn on the gas supply and operate the furnace and all other gas-fired units on the same gas line as the furnace.
4. Adjust the line gas pressure to supply:
   A. 5" - 10.5" w.c. for natural gas.
   B. 11" - 13" w.c. for LP gas.
5. Shut off the gas at the manual gas valve and remove the U-Tube manometer.
6. Replace the pressure tap plug before turning on the gas.

NATURAL GAS:
If the supply gas line pressure is above the operating range, install an in-line gas regulator to the furnace. If supply gas line pressure is below the operating range, either remove any restrictions in the gas supply piping or enlarge the gas pipe. See Table 2.

LP GAS:
If the supply gas line pressure is above the operating range, have the LP supplier reduce the line pressure at the regulator. If supply gas line pressure is below operating range, have the LP supplier adjust the line pressure at the regulator. See Table 3.

NOTE: Depending on the amount of LP vapor and the outdoor ambient temperature, the LP storage tank may require supplemental heat to maintain proper pressure levels. Ensure LP storage tank does not drop below 15% capacity during heating season.

FIGURE 16
TYPICAL HOSE CONNECTION TO LINE PRESSURE TAP

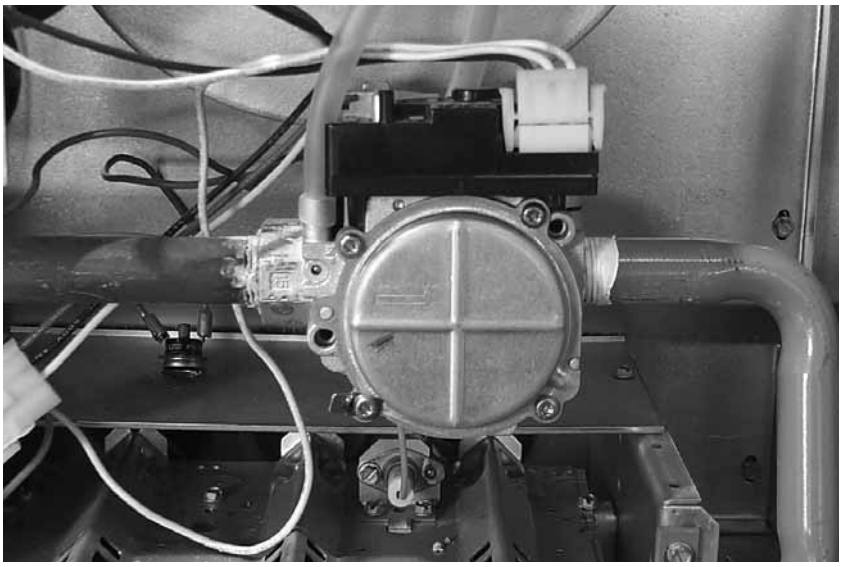


TABLE 2
NATURAL GAS PIPE CAPACITY TABLE (CU. FT./HR.)

Capacity of gas pipe of different diameters and lengths in cu. ft. per hr. with pressure drop of 0.3 in. and specific gravity of 0.60 (natural gas).

Nominal Iron Pipe Size, Inches	Length of Pipe, Feet							
	10	20	30	40	50	60	70	80
1/2	132	92	73	63	56	50	46	43
3/4	278	190	152	130	115	105	96	90
1	520	350	285	245	215	195	180	170
1-1/4	1,050	730	590	500	440	400	370	350
1-1/2	1,600	1,100	890	760	670	610	560	530

After the length of pipe has been determined, select the pipe size which will provide the minimum cubic feet per hour required for the gas input rating of the furnace. By formula:

$$\text{Cu. Ft. Per Hr. Required} = \frac{\text{Gas Input of Furnace (BTU/HR)}}{\text{Heating Value of Gas (BTU/FT3)}}$$

The gas input of the furnace is marked on the furnace rating plate. The heating value of the gas (BTU/FT3) may be determined by consulting the local natural gas utility or the LP gas supplier.

TABLE 3
LP GAS PIPE CAPACITY TABLE (CU. FT./HR.)

Maximum capacity of pipe in thousands of BTU per hour of undiluted liquefied petroleum gases (at 11 inches water column inlet pressure).
(Based on a Pressure Drop of 0.5 Inch Water Column)

Nominal Iron Pipe Size, Inches	Length of Pipe, Feet											
	10	20	30	40	50	60	70	80	90	100	125	150
1/2	275	189	152	129	114	103	96	89	83	78	69	63
3/4	567	393	315	267	237	217	196	182	173	162	146	132
1	1,071	732	590	504	448	409	378	346	322	307	275	252
1-1/4	2,205	1,496	1,212	1,039	913	834	771	724	677	630	567	511
1-1/2	3,307	2,299	1,858	1,559	1,417	1,275	1,181	1,086	1,023	976	866	787
2	6,221	4,331	3,465	2,992	2,646	2,394	2,205	2,047	1,921	1,811	1,606	1,496

Example (LP): Input BTU requirement of unit, 150,000
Equivalent length of pipe, 60 ft. = 3/4" IPS required.

ADJUSTING OR CHECKING FURNACE INPUT

⚠ CAUTION

ELEVATIONS ABOVE 2000 FT REQUIRE THAT THE FURNACE INPUT RATE BE ADJUSTED AND THAT THE SIZE OF THE BURNER ORIFICES BE RE-CALCULATED BASED ON ELEVATION AND GAS HEATING VALUE. THE BURNER ORIFICES MAY (OR MAY NOT) NEED TO BE CHANGED. SEE THE SECTION TITLED "HIGH ALTITUDE INSTALLATIONS" OF THIS BOOK FOR INSTRUCTIONS.

NATURAL GAS:
The maximum gas supply pressure to the furnace should be 10.5" W.C. for natural gas. The minimum gas supply pressure for purposes of input adjustment to the furnace should be 5" W.C.

A properly calibrated manometer or gauge is required for accurate gas pressure readings.

The manifold pressure should be set at 3.5" W.C. for natural gas. Only small variations in the gas flow should be made by means of the pressure regulator adjustment.

To adjust the pressure regulator:

1. Remove the regulator cap.
2. Turn the adjustment screw clockwise to increase pressure or counterclockwise to decrease pressure.
3. Replace the regulator cap securely.

LP GAS:
Furnaces for use on LP gas, the LP gas supply pressure must be set between 11.0" and 13.0" W.C. by means of the tank or branch supply regulators. The furnace manifold pressure should be set at 10" W.C. at the gas control valve. For elevations up to 7,000 feet, rating plate input ratings apply. For high altitudes (elevations 7,000 and over) and for any necessary major changes in the gas flow rate the orifice spud must be changed.

TO CHANGE ORIFICE SPUDS:

1. Shut off the manual main gas valve and remove the gas manifold.
2. Replace the orifice spuds.
3. Reassemble in reverse order.
4. Turn the gas supply back on and check for leaks.
5. Check for proper operation and manifold pressure.

Check of input is important to prevent over firing of the furnace beyond its design-rated input. NEVER SET INPUT ABOVE THAT SHOWN ON THE RATING PLATE.

TO CHECK FURNACE INPUT:

1. Make certain that all other gas appliances are shut off, with the exception of pilot burners.
2. Start the furnace
3. Time the meter to measure the time required to burn one cubic foot of gas.
4. Use Table 4 to determine input rate.

A properly calibrated manometer or gauge is required for accurate gas pressure readings.

1. When adjusting the furnace input, the high fire input should be checked. The high fire manifold pressure should be 3.5' W.C. Follow these steps to be sure the furnace is high fire mode:
   a. With a single stage thermostat, the furnace runs for 12 minutes on low fire before shifting to high fire. To be certain that it is on high fire, jump terminals "W" and "W2" on the control board in the blower compartment.
   b. With a two stage thermostat, set the thermostat to its highest setting to keep the furnace operating in the high fire mode.
2. To adjust high fire manifold pressure, remove the adjustment cover screw on the outlet end of the gas valve and turn the adjustment screw clockwise to increase the pressure and counterclockwise to reduce the pressure. Replace the cover screw securely.
3. The low fire manifold pressure should be 1.7" W.C. As mentioned above, the furnace remains in the low fire mode for 12 minutes upon a heat call with a single stage thermostat. With a two stage thermostat, disconnect the thermostat lead to the "W2" terminal on the control board and the furnace will remain in the low fire mode. To adjust the pressure, remove the regulator cover, on top of the valve, and adjust as noted under Step 2, above. After the adjustment replace the screw cover securely.

NOTE: Use a 3/32″ allen wrench for making the pressure adjustment.

TABLE 4

METER TIME IN MINUTES AND SECONDS FOR NORMAL INPUT RATING OF FURNACES EQUIPPED FOR NATURAL OR LP GAS

INPUT BTU/HR	METER SIZE CU. FT.	HEATING VALUE OF GAS BTU PER CU. FT.									
		900		1000		1040		1100		LP 2500	
		MIN.	SEC.	MIN.	SEC.	MIN.	SEC.	MIN.	SEC.	MIN.	SEC.
50,000	ONE	1	5	1	12	1	15	1	18	3	20
	TEN	10	50	12	00	12	30	13	12	30	00
75,000	ONE	0	44	0	48	0	50	0	53	2	0
	TEN	7	12	8	0	8	19	8	48	20	0
100,000	ONE	0	33	0	36	0	38	0	40	1	30
	TEN	5	24	6	0	6	15	6	36	15	0
125,000	ONE	0	26	0	29	0	30	0	32	1	12
	TEN	4	19	4	48	5	0	5	17	12	0
150,000	ONE	0	31	0	24	0	25	0	26	1	0
	TEN	3	36	4	0	4	10	4	20	10	0

$$\text{Input BTU/HR} = \frac{\text{Heating Value of Gas (BTU/Ft}^3\text{) x 3600 x correction factor}}{\text{Time in Seconds (for 1 cu.ft.) of Gas}}$$

ELECTRICAL WIRING

⚠ WARNING

TURN OFF ELECTRIC POWER AT THE FUSE BOX OR SERVICE PANEL BEFORE MAKING ANY ELECTRICAL CONNECTIONS.

ALSO, THE GROUND CONNECTION MUST BE COMPLETED BEFORE MAKING LINE VOLTAGE CONNECTIONS. FAILURE TO DO SO CAN RESULT IN ELECTRICAL SHOCK, SEVERE PERSONAL INJURY OR DEATH.

IMPORTANT: *The furnace must be installed so that the electrical components are protected from water due to improper flue installation or evaporator condensate drain run-off, etc.*

NOTE: Electric power to the furnace must be supplied by a commercial utility. Proper operating voltage is 110-125 volts.

ELECTRICAL CONNECTIONS

⚠ WARNING

THE CABINET MUST BE PERMANENTLY GROUNDED. A GROUND SCREW IS PROVIDED IN THE JUNCTION BOX FOR THIS PURPOSE. FAILURE TO DO SO CAN RESULT IN FIRE, ELECTRICAL SHOCK, PERSONAL INJURY OR DEATH.

The electrical supply requirements are listed on the furnace rating plate.

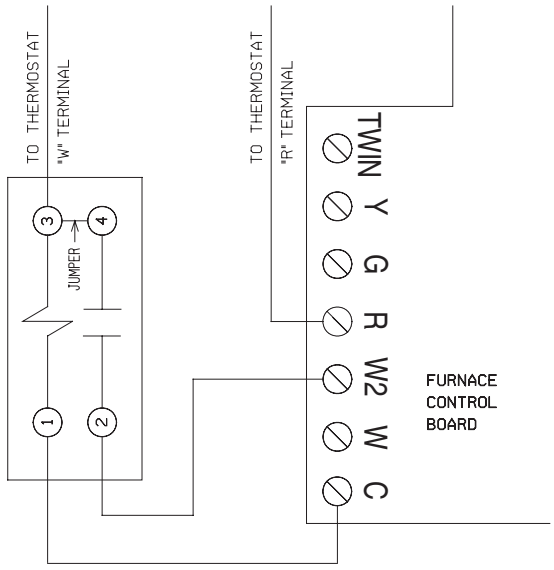
Use a separate fused branch electrical circuit containing a properly sized fuse or circuit breaker. Run this circuit directly from the main switch box to an electrical disconnect which must be readily accessible and located within sight of the furnace. Connect from the disconnect to the junction box on the left side of the furnace, inside the control compartment. See appropriate wiring diagram.

NOTE: The electrical junction box inside the furnace control compartment may be relocated to the right side if necessary. A knockout is provided.

NOTE: L1 (hot) and neutral polarity must be observed when making field connections to the furnace. The ignition control on electric ignition models will not sense flame if L1 and neutral are reversed.

When “Line” and “Neutral” are reversed, a diagnostic code of 6 blinks followed by a pause and 6 blinks (repeats) will be displayed on the “STATUS” LED.

FIGURE 17
ISOLATION RELAY



ST-A0804-01

Installation of the electric supply line should be in accordance with the National Electric Code ANSI/NFPA No. 70, latest edition, or Canadian Electrical Code Part 1 - CSA Standard C22.1 and local building codes.

These can be obtained from:

National Electric Code:
National Fire Protection Association
Batterymarch Park
Quincy, MA 02269

CSA Standard:
Canadian Standards Association
178 Rexdale Blvd.
Etobicoke (Toronto), Ontario
Canada M9W, 1R3

THERMOSTAT

The room thermostat must be compatible with the integrated furnace control on the furnace. Generally, all thermostats that are not of the “current robbing” type are compatible with the integrated furnace control used.

ISOLATION RELAY

IMPORTANT: NOT ALL ELECTRONIC NIGHT SETBACK THERMOSTATS ARE COMPATIBLE WITH THE FURNACE CONTROL SYSTEM. SOME MAY REQUIRE AN ISOLATION RELAY

If an isolation relay is needed, install it as close to the control board as possible. Use a single-pole, single-throw relay with a 24 volt operating coil. The relay contacts should be designed for 24 volt loads.

Connect one end of the operating coil to the thermostat “W” terminal. Connect the other end of the coil to the “C” terminal on the control board.

➢ Connect a jumper from the coil terminal connected to the thermostat to one of the normally open relay contacts.

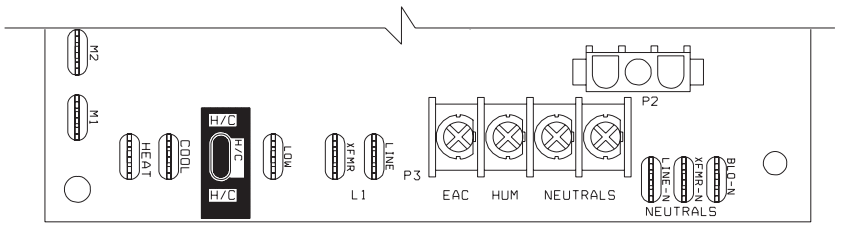
➢ Connect the other side of the normally open relay contacts to the control board “W” terminal if using a two stage thermostat. Connect that one side of the normally open relay contacts to the control board “W2” terminal if using a single stage thermostat.

TABLE 5
FIELD WIRE SIZE FOR 24 VOLT CONTROL CIRCUITS

	SOLID COPPER WIRE - AWG			
THERMOSTAT LOAD - AMPS	3.0	16	14	12
	2.5	16	14	12
	2.0	18	16	14
		50	100	150
		LENGTH OF RUN - FEET ①		

① Wire length equals twice the run distance
NOTE: Do not use 24 volt control wiring smaller than No. 18.

FIGURE 18
LINE VOLTAGE CONNECTIONS
UTEC 1095-201 CONTROL BOARD



A108601

When the thermostat calls for heat, it powers the 24 volt operating coil. This closes the relay contacts and conducts power from terminal 3 and 4 to terminal "W" on the control board and starts the furnace ignition sequence. See Figure 17.

➢ **NOTE:** Use of an isolation relay with the two stage furnace is not normally needed.

Install the room thermostat in accordance with the instruction sheet in the box with the thermostat. Run the thermostat lead wires inside the control compartment. Connect the thermostat as shown on the wiring diagram. Never install the thermostat on an outside wall or where it will be influenced by drafts, concealed hot or cold water pipes, lighting fixtures, radiation from fireplace, rays of sun, lamps, television, radios or air streams from registers. Refer to the instructions packed with the thermostat for best anticipator adjustment or selection or see below.

HEAT ANTICIPATOR SETTINGS

For adjusting the thermostat heat anticipator setting; (a) add the current draw of the various components in the system or (b) using jumper wire, measure the current flow between the R and W thermostat circuits. Set the thermostat heat anticipator according to the current flow measured.

FIELD INSTALLED OPTION ACCESSORIES

ELECTRONIC AIR CLEANER

Electronic air cleaner line voltage power can be supplied from the screw terminal "EAC" and a line voltage neutral screw terminal on the control board. Power is on any time the blower is activated. See Figure 18.

HUMIDIFIER

Humidifier line voltage power can be supplied from screw terminal "HUM" to a line voltage neutral screw terminal on the control board. See Figure 18. This will power the humidifier whenever the inducer is operating in the heating mode.

NOTE: Maximum current –1.0 amps for each option.

FOSSIL FUEL KIT

Refer to specification sheet for approved fossil fuel kit number.

RXGW-B01 CHIMNEY ADAPTER

IMPORTANT: *CHIMNEY ADAPTER IS CERTIFIED FOR USE ON UPFLOW (-)GPQ ONLY.*

This appliance is CSA certified for use with RXGW-B01 Chimney Adapter. Refer to Kit Installation Instructions 92-101682-01.

FURNACE TWINNING INSTALLATIONS

NOTE: Limit of two furnaces per thermostat.

IMPORTANT: No more than two furnaces can share the same supply and return. Furnaces must have same heating and blower capacity. Twinning furnaces must operate off the same phase of power.

Twinning operation of two furnaces, installed side-by-side, connected by a common duct system with main power supplied by the same source, and controlled by a common thermostat can be done with the UTEC 1095-201 integrated control boards.

The Status LED will flash 5 times if the twinning is not set up properly.

Single Stage Thermostat
(See Figure 18)

a. Control board "ONE" is on furnace connected to the thermostat.
b. The 24 VAC supply to both control boards must be in phase with each other.
c. Connect the "W2", "C" and "TWIN" terminals to counterparts on each control.
d. Both control boards must have switch #3 in "ON" position.
e. Adjust the heat anticipator current to 0.15 amps.

Two Stage Thermostat
(See Figure 19)

a. The 24 VAC supply to both control boards must be in phase with each other.
b. Control board "ONE" is on the furnace connected to the thermostat.
c. Connect the "W", "W2", "C" and "TWIN" terminals from one control to the "W", "W2", "C" and "TWIN" terminals of the second control respectively.
d. Both control boards must have "Twin" switch #3 in "ON" position.
e. Adjust the heat anticipator current to 0.15 amps.

NOTE: Leave Switch #4 in the "OFF" position. It does not affect the twinning operation.

FIGURE 19
UT ELECTRONIC CONTROLS NO. 1095-201 CONTROL BOARD
TWINNING CONNECTION SINGLE STAGE OPERATION

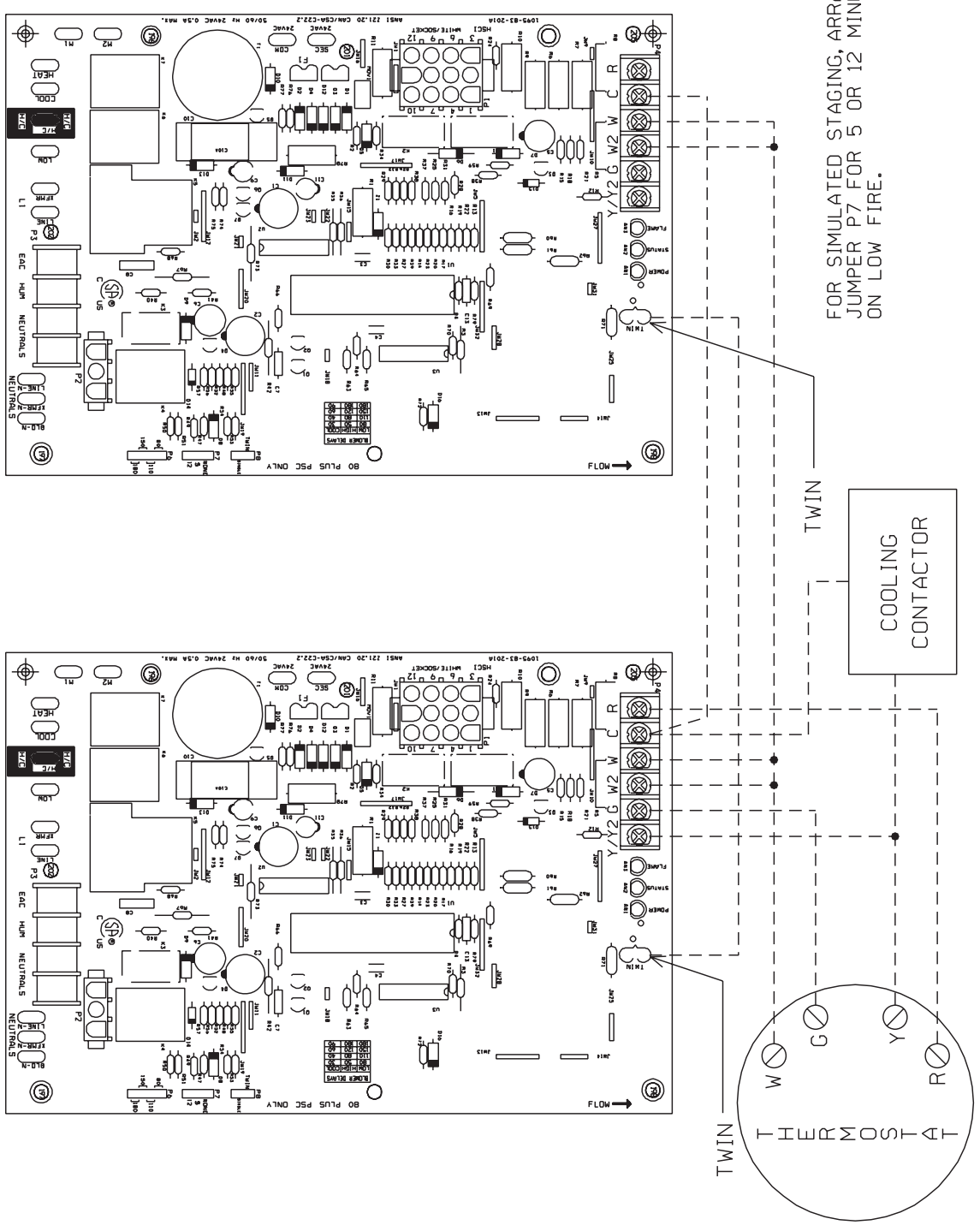
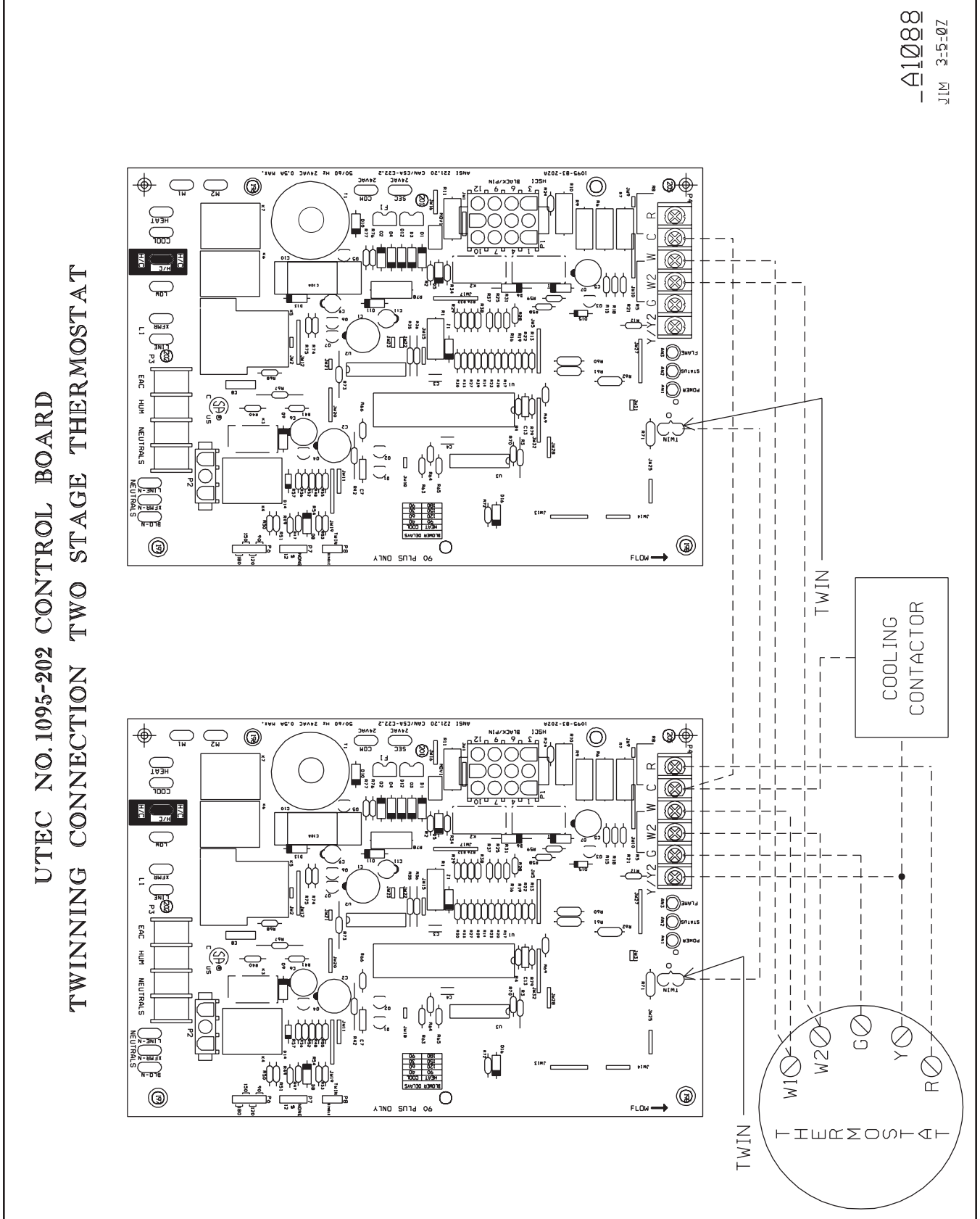


FIGURE 20
UT ELECTRONIC CONTROLS NO. 1095-202 CONTROL BOARD
TWINNING CONNECTION TWO STAGE OPERATION



80+ HIGH ALTITUDE INSTRUCTIONS (TABLES 6 & 9)

⚠ CAUTION

INSTALLATION OF THIS FURNACE AT ALTITUDES ABOVE 2000 FT (610 m) SHALL BE IN ACCORDANCE WITH LOCAL CODES, OR IN THE ABSENCE OF LOCAL CODES, THE NATIONAL FUEL GAS CODE, ANSI Z223.1/NFPA 54 OR NATIONAL STANDARD OF CANADA, NATURAL GAS AND PROPANE INSTALLATION CODE, CAN B149.1.

34" 80 Plus furnaces installed above 2,000 ft. require the furnace to be de-rated 4% per thousand feet.

IMPORTANT: *Factory installed orifices (#42) are calculated and sized based on a sea level Natural Gas heating value of 1075 BTU per cubic ft.*

NOTE: Orifices are available through your local distributor.

Reference Tables 6 and 9 for appropriate orifice sizing.

The following are examples of orifice sizing using the National Fuel Gas Code Appendix F:

For a simplified estimation of orifice size based on gas heating value and elevation, Tables 6 and 9 may be used. However, calculations are the best method.

Example: 900 BTU/ft³ Regional Natural Gas Heating Value

I/H = Q
25000 / 900 = 27.78 ft³

I = Sea Level input (per burner): 25000
H = Sea Level Heating Value: 900
Q = 27.78 ft³ Natural Gas per hour.

From Table F.1 of *National Fuel Gas Code Handbook, 2002* (3.5″ w.c. column).

Orifice required at Sea Level: #40

From Table F.4 of *National Fuel Gas Code Handbook, 2002*
Orifice required at 5000 ft. elevation (4% de-rate per thousand ft): #42

Orifice required at 8000 ft. elevation (4% de-rate per thousand ft.): #44

Example: 1050 BTU/ft3 Regional Natural Gas Heating Value

I / H = Q
25000 / 1050 = 23.81ft³

I = Sea Level input (per burner): 25000
H = Sea Level Heating Value: 1050
Q = 23.81 ft³ Natural Gas per hour.

From Table F.1 of *Natural Fuel Gas Code Handbook, 2002* (3.5″ w.c. column).

Orifice required at Sea Level: #43

From Table F.4 of *National Fuel Gas Code Handbook, 2002*

Orifice required at 5000 ft. elevation (4% de-rate per thousand ft.): #45

Orifice required at 8000 ft elevation (4% de-rate per thousand ft): #47

LP GAS (TABLE 7)

NOTE: Keep any parts removed during LP conversion procedure stored with the product literature for future use.

LP Gas is a manufactured gas that has consistent heating value across most regions.

The NFGC guidelines are used with the following exception:

The recommended LP Gas high altitude orifice selections differ slightly in that the NFGC LP orifice chart, as they are not accurate for Rheem products. The National Fuel Gas Code LP orifices are based on an 11" of water column pressure at the orifice, which differs from products that use 10" of water column at the orifice. This difference requires a deviation from the NFGC orifice size recommendations. The Sea Level input should still be reduced by 4% per thousand ft. and the orifice size must be selected based on the reduced input in Table 7.

TABLE 6

Natural Gas Orifice Drill Size (4% per 1000 ft. De-Rate)
IMPORTANT: 80+ Models only. Do not use this chart for any 90+ Models.
Burner Input (per burner) 25,000 BTU @ Sea Level

Annual Avg. Heat Value (btu per ft³)	Sea level to 1999 ft	2000 to 2999 ft	3000 to 3999 ft	4000 to 4999 ft	5000 to 5999 ft	6000 to 5999 ft	7000 to 7999 ft	8000 to 8999 ft
850	38	39	40	41	41	42	42	43
900	40	41	42	42	42	43	43	44
975	41	42	42	42	43	43	44	44
1075	42	42	43	43	43	44	44	45
1170	43	44	44	44	45	45	46	47

TABLE 7
LP GAS
IMPORTANT: 80+ MODELS ONLY! DO NOT USE THIS CHART WITH ANY 90+ MODELS.

Altitude	Input (per burner) 25000	Orifice Size
0 to 2000 ft.	25000	#54
2000′-3000′	24000	#54
3000′-4000′	23000	#54
4000′-5000′	22000	#54
5000′-6000′	21000	#54
6000′-7000′	20000	#54
7000′-8000′	19000	#55
8000′-9000′	18000	#55
9000′-10000′	17000	#55

FIGURE 21
MANIFOLD PRESSURE-CHANGE LABEL

THE MANIFOLD PRESSURE OF THIS APPLIANCE HAS BEEN FIELD ADJUSTED TO OBTAIN THE CORRECT INPUT RATING FOR INSTALLATION AT ALTITUDES BETWEEN 2,000 FEET AND 4,500 FEET ELEVATION.

LA PRESSION DU DISTRIBUTEUR D'ALIMENTATION DE CET APPAREIL A ÉTÉ AJUSTÉ SUR LES LIEUX AFIN D'OBTENIR LA BONNE PUISSANCE D'ENTRÉE POUR UNE INSTALLATION ENTRE 2000 ET 4500 PIEDS D'ALTITUDE.

92-24399-01-01

ORIFICE ORDERING INFORMATION

Orifice sizes are selected by adding the 2-digit drill size required in the orifice part number. Drill sizes available are 39 through 64; metric sizes available 1.10mm (-90) and 1.15mm (-91):

Orifice Part Number 62-22175-(drill size)

Example 1:
60 drill size orifice required
Part # 62-22175-60

Example 2:
1.15mm drill size orifice required
Part # 62-22175-91

ALTERNATE METHOD FOR CANADIAN HIGH-ALTITUDE DERATE

In Canada, unless an orifice change is specifically mandated by local codes, an alternate method of altitude deration through a reduction in manifold pressure is acceptable as described in Table 8. This information is based on a heating value of 1000 BTU per cubic feet of natural gas, and 2500 BTU per cubic feet of LP gas.

IMPORTANT: *Actual input rates must be measured onsite with manifold pressure adjustment to ensure that an actual 10% reduction in input rate is achieved.*

Once this field adjustment has been made, the label shown in Figure 21 must be affixed in a conspicuous location on the front of the furnace cabinet.

NOTE: This label is supplied in the information packet shipped with each furnace.

TABLE 8
ALTERNATE METHOD FOR CANADIAN HIGH-ALTITUDE DERATE
IMPORTANT: 80+ MODELS ONLY! DO NOT USE THIS CHART WITH ANY 90+ MODELS.

NATURAL GAS

ALTITUDE	INPUT	OUTPUT	ORIFICE SIZE	MANIFOLD PRESSURE
0' - 2000'	50,000 75,000 100,000 125,000 150,000	40,000 60,000 80,000 100,000 120,000	#42	3.5" W.C.
2001' - 4500'	45,000 67,500 90,000 112,500 135,000	36,000 54,000 72,000 90,000 108,000	#42	2.9" W.C.

LP GAS

ALTITUDE	INPUT	OUTPUT	ORIFICE SIZE	MANIFOLD PRESSURE
0' - 2000'	50,000 75,000 100,000 125,000 150,000	40,000 60,000 80,000 100,000 120,000	#54	10" W.C.
2001' - 4500'	45,000 67,500 90,000 112,500 135,000	36,000 54,000 72,000 90,000 108,000	#54	8.1" W.C.

TABLE 9
SUPPLEMENTAL ORIFICE SIZE CHART

80 Plus Models only with 25,000 Btu's per Burner. Do not use this chart for any 90+ models.

NATURAL GAS QUICK REFERENCE CHART FOR ORIFICE SELECTION, AT 3.5" W.C. AND APPROXIMATE FINAL FIRING RATES											
Sea Level Orifice Size	**Sea Level Cubic Foot at 3.5" W.C.**	**80 Plus Heat Value at 25,000**	**ELEVATION CHART (NFG recommended orifice based on 4% derate for each 1000 foot of elevation, based on the intersection of the orifice required at Sea Level and the elevation required below)**									
			0-999	**1000-1999**	**2000-2999**	**3000-3999**	**4000-4999**	**5000-5999**	**6000-6999**	**7000-7999**	**8000-8999**	**9000-9999**
37	30.63	816	37	37	38	39	39	40	41	42	42	43
38	29.25	855	38	38	39	40	41	41	42	42	43	43
39	28.2	887	39	39	40	41	41	42	42	43	43	44
40	27.03	925	40	40	41	42	42	42	43	43	44	44
41	25.98	962	41	41	42	42	42	43	43	44	44	45
42	24.95	1002	42	42	42	43	43	43	44	44	45	46
43	22.39	1117	43	43	44	44	44	45	45	46	47	47
44	21.01	1190	44	44	45	45	45	46	47	47	48	48
Final Firing Rate per Burner			25,000	24,000	23,000	22,000	21,000	20,000	19,000	18,000	17,000	16,000

All calculations are performed by using the first three columns of information only. Before beginning any calculations, determine the individual burner Btu size and heating value at Sea Level for the installation site. Each value shown in the Heat Value column is per burner at 3.5" W.C.

NOTE:
Heat Value at Sea Level, for the location of the installation, is available from the Natural Gas Supplier to that site. Orifices for all altitudes are based on Sea Level values.

Divide the individual burner capacity (25,000 for 80 plus) by the Heat Value for the site to determine the Cubic Foot value at Sea Level, or divide burner capacity by the Cubic Foot value for the Heat Value. Once you have either the Cubic Foot Value or the Heat Value you can estimate the Sea Level orifice for the site. To select the corresponding high altitude orifice, locate the site elevation on the chart above and the orifice required at Sea Level from your calculation in the first column. The correct high altitude orifice that must be installed in each individual burner is the intersection of these two points on the chart above.

START-UP PROCEDURE

DIRECT SPARK IGNITION LIGHTING INSTRUCTIONS

This appliance is equipped with a direct spark ignition device. This device lights the main burners each time the room thermostat (closes) calls for heat. See lighting instructions on the furnace.

During initial start-up, it is not unusual for odor or smoke to come out of any room registers. It is recommended to ensure proper ventilation by opening windows and doors, before initial firing.

The furnace has a negative pressure switch that is a safety during a call for heat. The induced draft blower must pull a negative pressure on the heat exchanger to close the negative pressure switch. The induced draft blower must maintain at least the negative pressure switch set point for the furnace to operate. If the induced draft blower fails to close or maintain the closing of the negative pressure switch, a “no heat call” would result.

TO START FURNACE

1. Remove the control access door.

⚠ WARNING

2. **BE SURE THAT THE MANUAL GAS CONTROL HAS BEEN IN THE “OFF” POSITION FOR AT LEAST FIVE MINUTES. DO NOT ATTEMPT TO MANUALLY LIGHT THE MAIN BURNERS. FAILURE TO FOLLOW THIS WARNING CAN CAUSE A FIRE OR AN EXPLOSION RESULTING IN PROPERTY DAMAGE, PERSONAL INJURY OR DEATH.**
3. Turn off the furnace electrical power and set the room thermostat to the lowest setting.
4. Turn the gas control knob to the “On” position, or move the gas control lever to the “On” position.
5. Replace the control access door.
6. Turn on the electrical power.
7. Set the room thermostat to a point above room temperature to light the main burners. After the burners are lit, set room thermostat to a desired temperature.

TO SHUT DOWN FURNACE

1. Set the room thermostat to off and its lowest setting.
2. Turn manual gas stop to the closed position.
3. Turn off the electrical power to the furnace.
4. Remove burner compartment door.
5. Move the main gas valve knob or lever to the off position.
6. Replace the burner compartment door.

⚠ WARNING

SHOULD OVERHEATING OCCUR OR THE GAS SUPPLY FAIL TO SHUT OFF, SHUT OFF THE MANUAL GAS VALVE TO THE APPLIANCE BEFORE SHUTTING OFF THE ELECTRICAL SUPPLY. FAILURE TO DO SO CAN CAUSE AN EXPLOSION OR FIRE RESULTING IN PROPERTY DAMAGE, PERSONAL INJURY OR DEATH.

Sequence of operation with a single stage thermostat

NOTE: Single stage operation is determined by the position of the jumper at P7 on the control board. Options are: (1) No Delay (None), (2) 5 minutes between 1st and 2nd stage and (3) 12 minutes between 1st and 2nd stage.

a. Connect the “W” terminal on the thermostat to the W2 terminal on the control board.

b. When there is a call for heat, the “R” and “W2” contacts close and the IFC runs a self check routine to verify that the pressure switch contacts are open. The limit switch contacts are constantly monitored.

c. The induced draft motor starts on high until the low pressure switch contacts close (a maximum of 60 seconds), and then changes to low speed. After a 30 second pre-purge, the spark ignitor energizes and the low stage of the gas valve opens, lighting the burners.

d. After the gas valve opens, the remote flame sensor must prove ignition for one second using the process of flame rectification. If the burners do not light, the system goes through another ignition sequence. It does this up to 4 times. (2 tries on low fire and 2 tries on high fire.)

e. The main blower starts on low speed 30 seconds after the burners light. The furnace operates on low fire for 5 or 12 minutes and then, if the thermostat is not satisfied, shifts to high fire, causing the draft inducer to go to high speed, the gas valve to 100% and the main blower goes to heat speed.

f. When the thermostat cycle ends, the gas valve closes, and the burners go out.

g. The draft inducer will continue running for a 10 second (low speed) or 5 second (high speed) post purge.

h. The main blower will run for 90 seconds on high speed or 120 seconds on low speed. (This timing is field adjustable, for 60, 90, 120 or 150 seconds). See Figure 22 for switch settings.

Sequence if the system doesn’t light or doesn’t sense flame:

a. If flame is not sensed within 8 seconds after the gas valve opens, the valve closes and the ignitor is de-energized. The induced draft motor will run for 60 seconds on low, stop momentarily, and then restart.

b. The ignition process goes through one more attempt on low fire. If this fails, there are two attempts on high fire with a 30 second interpurge between trials. During high fire ignition attempts, the inducer steps to high speed, the high pressure switch closes (both pressure switch closes (both pressure switches are now closed), and the gas valve steps to 100%.

c. If there is no ignition after the 2nd trial on high fire, the furnace goes into soft lockout for one hour.

d. The sequence repeats after a one hour delay and continues repeating until ignition is successful or the call for heat is terminated.

e. To reset the lockout, make and break power either at the thermostat or at the unit disconnect switch for 5 to 10 seconds. The furnace will then go through another set of trials for ignition (provided call for heat is still present).

f. If flame is established and maintained during the trial for ignition period and flame is lost, the gas valve is de-energized, the draft inducer continues to run, and control begins timing the inter-purge delay. The indoor blower motor will be energized and/or remain energized on low speed for low fire and heat speed for high fire for the selected delay off time.

When the inter-purge delay is over, the control initiates another ignition trial period. The control will recycle up to 5 flame losses (4 re-cycles) within a single call for heat before going into lockout.

Sequence of operation with two stage thermostat

Connect W1 and W2 terminals on the thermostat to W and W2 terminals on the control board.

Call for 1st stage heat

a. R and W thermostat contacts close and the control module runs a self-check routine. After the control module verifies that both sets of pressure switch contacts are open, the induced draft motor starts on high until the low pressure switch contacts close (a maximum of 60 seconds), then changes to low speed.

b. After a 30 second pre-purge the spark igniter energizes and the gas valve (low stage) opens, lighting the burners.

c. After the burners light, the remote flame sensor must prove ignition. If the burners do not light, the system goes through another ignition sequence. It does this up to 4 times (2 attempts on low fire and 2 tries on high fire).

d. The main blower starts on low speed 30 seconds after the gas valve opens. The furnace continues to run on low until the call for heat is satisfied or the 2nd stage contacts close. If the 1st stage call for heat is satisfied the gas valve closes and the induced draft motor continues running for a 10 second post purge time. the main blower runs for 120 seconds (this timing is field adjustable). See Figure 22 for switch settings.

Call for 2nd stage heat after 1st stage

R and W2 thermostat contacts close, calling for 2 stage heat. The induced draft motor then switches to high speed and the high pressure switch contacts will close. The gas valve to switches to high fire and the main blower to switch to heating speed.

2nd stage heat satisfied, 1st stage heat still required.

R and W2 thermostat contacts open. The induced draft motor switches to low speed, the main blower motor switches to low speed and the gas valve changes to low fire. The furnace continues to run in this mode until the 1st stage heat call is satisfied. The system will shut down as noted in "c," under 1st stage call for heat.

NOTE: Under extreme cold conditions, the 2-stage thermostat may call for the furnace to cycle between 1st and 2nd stage operation.

FAN CONTROL

The furnace is equipped with an integrated furnace control which automatically starts the main blower 30 seconds after the gas valve opens. It stops the main blower a set time after the heat call ends. The off timing is controlled by the jumper at P6 on the control board. See Figure 22.

The blower runs on low speed when the furnace is in the low fire mode and on the HEAT speed in the high fire mode.

The integrated control board also contains the low voltage terminals for the thermostat connection, and is located in the blower compartment.

SETTING BLOWER TIMINGS

The control board has six quick connect terminals for connecting motor speed leads. These are:

1. LOW – This is low speed. The motor runs on low when the furnace is in the low fire mode or when the thermostat is in the "FAN" position.
2. COOL – Factory wired at high speed. This may be changed if a lower cooling speed is desired.
3. HEAT – Factory wired at the normal high input blower speed.
4. HEAT/COOL (H/C) – Connect here if the required HEAT and COOL speeds are the same.

IMPORTANT: Do not connect any leads to the HEAT or COOL terminals if the HEAT/COOL terminal is used.

5. M1 – Connect unused motor lead.
6. M2 – Connect unused motor lead.

The unit comes from the factory set to stop the blower 120 seconds after the thermostat is satisfied in heating and 45 seconds after the thermostat is satisfied in cooling. This timing can be field adjusted. To change the blower off timing, move the jumper of P6 to the appropriate location (see Figure 22).

FIGURE 22
TWO-STAGE, 80 PLUS IFC JUMPER SELECTIONS

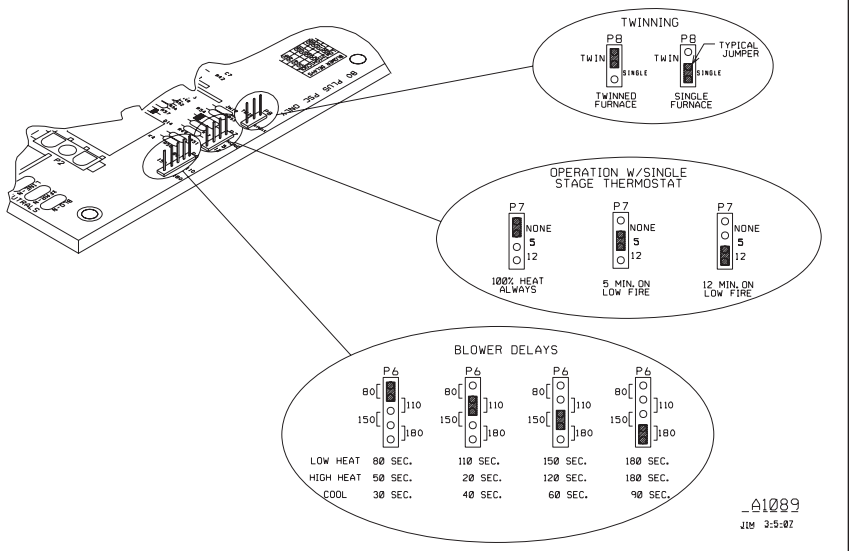
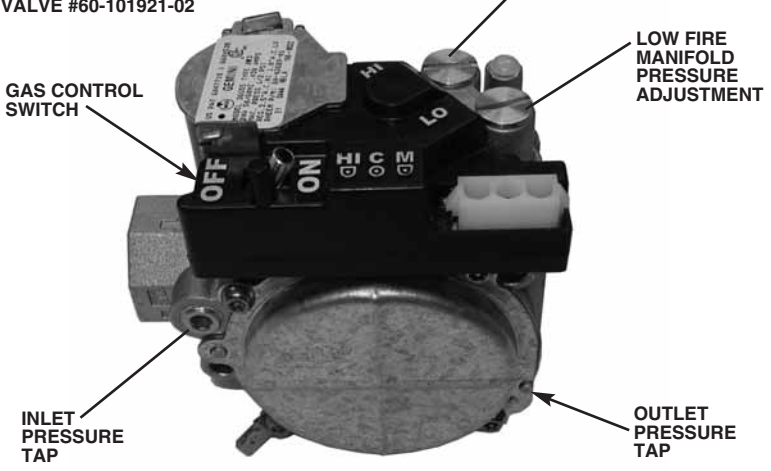


FIGURE 23
TYPICAL GAS VALVE
GAS VALVE #60-101921-02



GAS FURNACE (DIRECT DRIVE) INSTRUCTIONS FOR CHANGING BLOWER SPEED

⚠ WARNING

DISCONNECT THE ELECTRICAL SUPPLY TO THE FURNACE BEFORE ATTEMPTING TO CHANGE THE BLOWER SPEED. FAILURE TO DO SO CAN CAUSE ELECTRICAL SHOCK RESULTING IN SEVERE PERSONAL INJURY OR DEATH.

The blower motor is wired for blower speeds required for normal operation. The LOW speed, which is for the low fire operation should never be increased. The HEAT speed is factory wired for the regular high fire speed. This may be changed if required to maintain the proper rise range. Reconnect the unused lead to the M1 or M2 terminal. Check motor lead for speed designation. Do not reduce the heating speeds where it could cause the furnace air temperature rise to exceed the maximum outlet air temperatures specified for the unit.

IMPORTANT: Always check air temperature rise after changing the heating speed for any reason.

It is recommended to use the next higher blower speed tap, if the main limit tripped at a premature condition.

ADJUSTING OR CHECKING FURNACE INPUT

The maximum gas supply pressure to the furnace should be 10.5″ W.C. for natural gas. The minimum gas supply pressure for purposes of input adjustment to the furnace should be 5″ W.C.

A properly calibrated manometer or gauge is required for accurate gas pressure readings.

1. When adjusting the furnace input, the high fire input should be checked. The high fire manifold pressure should be 3.5' W.C. Follow these steps to be sure the furnace is high fire mode:
   a. With a single stage thermostat, the furnace runs for 12 minutes on low fire before shifting to high fire. To be certain that it is on high fire, jump terminals "W" and "W2" on the control board in the blower compartment.
   b. With a two stage thermostat, set the thermostat to its highest setting to keep the furnace operating in the high fire mode.
2. To adjust high fire manifold pressure, remove the adjustment cover screw on the outlet end of the gas valve and turn the adjustment screw clockwise to increase the pressure and counterclockwise to reduce the pressure. Replace the cover screw securely. See Figure 23.
3. The low fire manifold pressure should be 1.7″ W.C. As mentioned above, the furnace remains in the low fire mode for 12 minutes upon a heat call with a single stage thermostat. With a two stage thermostat, disconnect the thermostat lead to the "W2" terminal on the control board and the furnace will remain in the low fire mode. To adjust the pressure, remove the regulator cover, on top of the valve, and adjust as noted under Step 2, above. After the adjustment replace the screw cover securely.

NOTE: Use a 3/32″ allen wrench for making the pressure adjustment.

LP GAS:
Furnaces for use on LP gas, the LP gas supply pressure must be set between 11.0″ and 13.0″ W.C. by means of the tank or branch supply regulators. The furnace manifold pressure should be set at 10″ W.C. at the gas control valve. For elevations up to 7,000 feet, rating plate input ratings apply. For high altitudes (elevations 7,000 and over) and for any necessary major changes in the gas flow rate the orifice spud must be changed.

TO CHANGE ORIFICE SPUDS

1. Shut off the manual main gas valve and remove the gas manifold.
2. Replace the orifice spuds.
3. Reassemble in reverse order.
4. Turn the gas supply back on and check for leaks.
5. Check for proper operation and set to proper manifold pressure.

Check of input is important to prevent over firing of the furnace beyond its design-rated input. NEVER SET INPUT ABOVE THAT SHOWN ON THE RATING PLATE.

To check furnace input:

1. Make certain that all other gas appliances are shut off, with the exception of pilot burners.
2. Start the furnace
3. Time the meter to measure the time required to burn one cubic foot of gas.
4. Use Table 10 to determine input rate.

TABLE 10

METER TIME IN MINUTES AND SECONDS FOR NORMAL INPUT RATING OF FURNACES EQUIPPED FOR NATURAL OR LP GAS

INPUT BTU/HR	METER SIZE CU. FT.	HEATING VALUE OF GAS BTU PER CU. FT.									
		900		1000		1040		1100		2500	
		MIN.	SEC.	MIN.	SEC.	MIN.	SEC.	MIN.	SEC.	MIN.	SEC.
50,000	ONE	1	5	1	12	1	15	1	18	3	20
	TEN	10	50	12	00	12	30	13	12	30	00
75,000	ONE	0	44	0	48	0	50	0	53	2	0
	TEN	7	12	8	0	8	19	8	48	20	0
100,000	ONE	0	33	0	36	0	38	0	40	1	30
	TEN	5	24	6	0	6	15	6	36	15	0
125,000	ONE	0	26	0	29	0	30	0	32	1	12
	TEN	4	19	4	48	5	0	5	17	12	0
150,000	ONE	0	31	0	24	0	25	0	26	1	0
	TEN	3	36	4	0	4	10	4	20	10	0

$$\text{Input BTU/HR} = \frac{\text{Heating Value of Gas (BTU/Ft}^3\text{) x 3600 x correction factor}}{\text{Time in Seconds (for 1 cu.ft.) of Gas}}$$

AIR FLOW

The importance of proper air flow over the heat exchanger cannot be over emphasized.

⚠ CAUTION

IT IS IMPORTANT THAT EACH DUCT SYSTEM BE SIZED AND INSTALLED FOR THE SPECIFIC APPLICATION BY PROPERLY APPLYING THE APPROPRIATE INDUSTRY ACCEPTED STANDARD. IF LESS THAN MINIMUM STANDARDS ARE APPLIED, THE EQUIPMENT USER COULD EXPECT TO EXPERIENCE HIGHER UTILITY BILLS, MAJOR COMPONENT FAILURE, VARYING DEGREES OF AIR NOISE OR OTHER UNSATISFACTORY ISSUES, OVER WHICH THE MANUFACTURER HAS NO CONTROL.

TEMPERATURE RISE CHECK

To determine if the air flow is correct, make a temperature rise check.

1. Insert a thermometer in the supply air duct as close to the furnace as possible yet out of a direct line from the heat exchanger. See Figure 23.
2. Insert a thermometer in the return air duct as close to the furnace as possible.
3. Operate the furnace.
4. When the thermometer in the supply air duct stops rising (approximately five minutes), subtract the return air temperature from the supply air temperature. The difference is the temperature rise.
5. Compare the measured temperature rise to the approved temperature rise range listed on the furnace name plate. See Figure 24.

If the measured temperature rise is above the approved range, the air flow is too low. More air must be moved by speeding up the blower, by removing restrictions in the duct system, or by adding more supply or return air duct. If the measured temperature rise is below the approved range, the air flow is too much. Use lower speed tap on the multi-speed blower.

IMPORTANT: *The measured temperature rise should be in the middle of the range. See product specification sheet and name plate located on furnace.*

IMPORTANT: *Some high-efficiency filters have a greater than normal resistance to airflow. This can adversely affect furnace operation. BE SURE TO CHECK AIRFLOW if using any filter other than factory-provided filter.*

FIGURE 24
TEMPERATURE RISE MEASUREMENT

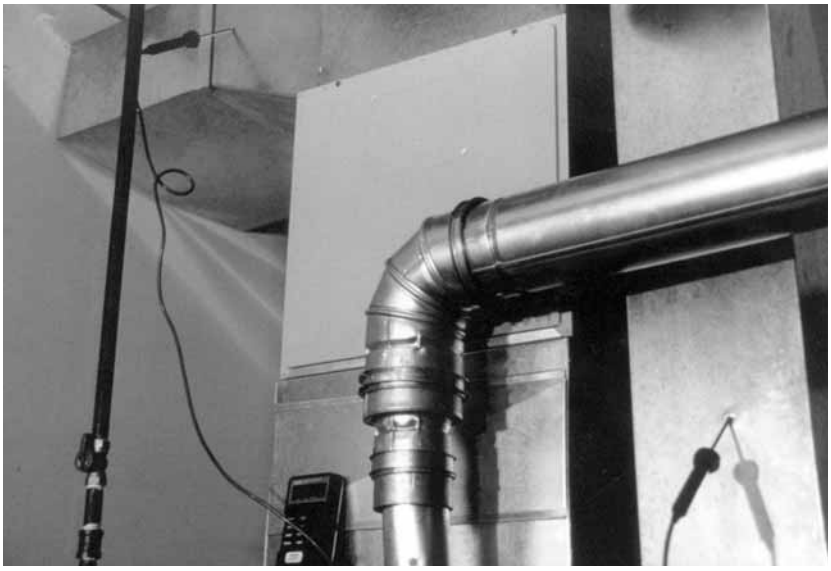


FIGURE 25
TYPICAL FURNACE NAME PLATE

AIR CONDITIONING DIVISION
FORT SMITH, ARKANSAS

CANADIAN ENERGY PERFORMANCE VERIFIED
RENDEMENT ENERGETIQUE VERIFIE

MODEL NO./NUMERO DE MODELE:
SERIAL NO./NUMERO DE SERIE: MFG. DATE

CATEGORY IV FORCED AIR FURNACE WHEN USING INDOOR AIR FOR COMBUSTION. CATEGORY IV TYPE FSP DIRECT VENT FORCED AIR FURNACE WHEN USING OUTDOOR AIR FOR COMBUSTION. FOR INDOOR INSTALLATION ONLY, IN A BUILDING CONSTRUCTED ON-SITE.
CATÉGORIE IV GÉNÉRATEUR D'AIR CHAUD À AIR FORCÉE LORSOUE DE L'AIR INTÉRIEUR EST EMPLOYÉ POUR LA COMBUSTION CATÉGORIE IV TYPE FSP ÉVACUATION DIRECTE GÉNÉRATEUR D'AIR CHAUD À AIR FORCÉE LORSOUE DE L'AIR EXTÉRIEUR EST EMPLOYÉ POUR LA COMBUSTION. POUR INSTALLATION À L'INTÉREIER SEULEMENT, DANS UN BATIMENT CONSTRUIT SUR LE SITE.

ELECTRIC 115 V. 60 HZ. 1 PH., MAXIMUM TOTAL INPUT 6.3 AMPS

ELECTRIQUE 115 V 60 HZ 1 PH, PUISSANCE D'ENTRÉE TOTALE MAXIMUM 6.3 A.

MAXIMUM OVERCURRENT PROTECTION 15 AMPERES. DISJONCTEUR À MAXIMA 15 A.

HOURLY INPUT RATING DEBIT CALORIFQUE MAXIMUM Btu/hr (Kw)	HOURLY INPUT RATING DEBIT CALORIFQUE MINIMUM Btu/hr (Kw)	FACTORY EQUIPPED FOR AGENCE A L'USINE POUR FOR GAS / GAZ
75000 (21.98)		NATURAL / NATUREL

••PLEASE REFER TO BOOKLET #92-101825-01 FOR INPUT CALCULATIONS
IN THE U.S., AT ELEVATIONS ABOVE 2,000 FT. (610M), DERATE THE INPUT 4% PER 1,000 FT (305M) ABOVE SEA LEVEL
THIS APPLIANCE EQUIPPED FOR ALTITUDES / CET APPAREIL EST EQUIPÉ POUR ALTITUDES COMPRISES ENTIRE 0-2,000' / (0-610) FT.(M)/PIEDS(M)

	NATURAL GAS/ GAZ NATUREL	LP GAS OR PROP./ GAZ DE PÉTROLE LIQUÉFIÉ OU PROP.
ORIFICE / INJECTEUR 50 DMS		
LIMIT SETTING/LIMITE COUPE-CIRCUIT 190° (88°) °F(°C)		
AUXILIARY LIMIT SETTING/ LIMITE COUPE-CIRCUIT AUXILIAIRE °F(°C)	IN. W.C.(kPa)/ PO C.E. (kPa)	IN. W.C.(kPa)/ PO C.E. (kPa)
MAXIMUM PERMISSIBLE GAS SUPPLY PRESSURE TO FURNACE	10.5 (2.61)	13.0 (3.23)
PRESSION MAXIMUM D'ALIMENTATION EN GAZ À CHAUDIÈRE	10.5 (2.61)	13.0 (3.23)
MINIMUM GAS SUPPLY PRESSURE FOR PURPOSES OF INPUT ADJUSTMENT	5.0 (1.24)	11.0 (2.73)
PRESSION MINIMUM D'ALIMENTATION EN GAZ POUR LE RÉGLAGE DE PUISSANCE D'ENTRÉE	5.0 (1.24)	11.0 (2.73)
MANIFOLD PRESSURE / PRESSION A LA TUBULURE	3.5 (0.87)	10.0 (2.49)

AIR TEMPERATURE RISE/
AUGMENTATIONDE LA TEMPÉATUREDE L'AIR 45° (25°)– 75° (42°)° F (C°)

MAXIMUM EXTERNAL STATIC PRESSURE PRESSION STATIQUE EXTÉRIEURE MAXIMAL INCHES W.C. (kPa)-PO C.E (kPa)	BLOWER/ SOUFFLEUR INCH (mm)/PO.(mm)	MOTOR FORCE HP (W)
.12 (.030)	11-7 (279-178)	1/2 (373)
.50 (.125)	11-7 (279-178)	1/2 (373)

ASSEMBLED IN THE USA 91-22176-09

BLOWER PERFORMANCE DATA – (-)GPQ UPFLOW/HORIZONTAL MODELS

MODEL (BTU)	BLOWER SIZE	MOTOR H.P.	BLOWER SPEED	CFM AIR DELIVERY EXTERNAL STATIC PRESSURE INCHES WATER COLUMN						
				.1	.2	.3	.4	.5	.6	.7
50,000	11 x 6	1/2	LOW	675	655	635	610	585	555	520
			MED-LO	950	930	905	880	860	830	800
			MED-HI	1115	1090	1070	1040	1015	985	945
			HI	1270	1250	1225	1200	1165	1130	1085
75,000	11 x 7	1/2	LOW	921	897	872	845	818	795	746
			MED-LO	1093	1066	1039	1008	977	941	905
			MED-HI	1241	1212	1183	1150	1118	1076	1033
			HI	1393	1359	1326	1293	1259	1214	1169
75,000	11 x 7	3/4	LOW	1245	1220	1195	1165	1135	1105	1065
			MED-LO	1555	1515	1475	1435	1395	1350	1300
			MED-HI	1810	1755	1705	1645	1585	1530	1470
			HI	2050	1985	1915	1845	1785	1715	1655
100,000	11 x 7	1/2	LOW	925	890	865	835	810	775	745
			MED-LO	1050	1040	1030	990	960	920	890
			MED-HI	1220	1195	1160	1140	1105	1065	1020
			HI	1360	1327	1295	1263	1231	1179	1128
100,000	11 x 10	3/4	LOW	1295	1275	1250	1225	1195	1165	1135
			MED-LO	1645	1615	1580	1550	1510	1465	1425
			MED-HI	2045	2000	1955	1905	1845	1785	1720
			HI	2320	2260	2200	2130	2060	1985	1910
125,000	11 x 10	3/4	LOW	1280	1275	1265	1245	1215	1185	1145
			MED-LO	1645	1635	1615	1590	1560	1520	1470
			MED-HI	2050	2015	1960	1935	1885	1835	1775
			HI	2365	2310	2250	2185	2115	2035	1950
150,000	11 x 10	3/4	LOW	1270	1250	1220	1195	1165	1135	1105
			MED-LO	1620	1595	1570	1545	1515	1480	1440
			MED-HI	2010	1985	1960	1915	1850	1800	1730
			HI	2340	2275	2215	2145	2080	2010	1940

BLOWER PERFORMANCE DATA – (-)GLQ DOWNFLOW MODELS

MODEL (BTU)	BLOWER SIZE	MOTOR H.P.	BLOWER SPEED	CFM AIR DELIVERY EXTERNAL STATIC PRESSURE INCHES WATER COLUMN						
				.1	.2	.3	.4	.5	.6	.7
50,000	11 x 6	1/2	LOW	655	630	600	565	532	500	467
			MED-LO	975	943	915	886	852	813	770
			MED-HI	1180	1140	1105	1067	1027	980	924
			HI	1335	1290	1250	1202	1157	1110	1060
75,000	11 x 7	1/2	LOW	910	887	863	839	814	776	738
			MED-LO	1074	1054	1034	1007	979	944	908
			MED-HI	1229	1207	1184	1159	1134	1099	1063
			HI	1409	1385	1361	1329	1297	1260	1223
100,000	11 x 7	1/2	LOW	895	874	852	825	798	766	734
			MED-LO	1052	1033	1013	991	968	930	891
			MED-HI	1238	1217	1196	1169	1143	1094	1044
			HI	1383	1366	1348	1317	1286	1245	1203
100,000	11 x 10	3/4	LOW	1374	1356	1339	1323	1286	1249	1212
			MED-LO	1709	1686	1663	1635	1607	1562	1516
			MED-HI	2132	2085	2038	1988	1937	1882	1827
			HI	2362	2300	2237	2173	2108	2036	1964
125,000	11 x 10	3/4	LOW	1315	1292	1269	1250	1231	1194	1157
			MED-LO	1618	1597	1576	1552	1528	1486	1443
			MED-HI	2065	2025	1984	1938	1891	1824	1756
			HI	2275	2219	2163	2103	2042	1982	1921
150,000	11 x 10	3/4	LOW	1300	1280	1230	1205	1170	1115	1030
			MED-LO	1675	1650	1620	1570	1545	1485	1425
			MED-HI	2105	2075	2035	1990	1955	1900	1815
			HI	—	2340	2290	2215	2145	2080	1995

SAFETY FEATURES

LIMIT CONTROL

The high limit cut-off temperature is set at the factory and cannot be adjusted. The temperature setting prevents the air temperature leaving the furnace from exceeding the maximum outlet air temperature, which, if exceeded, will shut the furnace down.

There are several reasons for a limit switch to open and almost always involve low airflow through the furnace.

1. A dirty or restricted air filter.
2. A dirty or restricted cooling coil.
3. Undersized or restricted return air system.
4. Undersized or restricted supply air system.
5. A problem affecting the main blower:
   - A. A wrong speed tap selection.
   - B. Failing motor bearings.
   - C. Low voltage to the motor.
   - D. Dirty blower wheel.
   - E. Wrong motor rotation.
   - F. Blower wheel slipping on the motor shaft.
6. Overfiring the furnace with too much gas pressure.
7. Ventilation problems.

FLAME ROLL-OUT SAFETY SWITCHES

Furnaces are equipped with safety switches to protect against flame roll-out conditions in the burner compartment, which, if tripped, will terminate the heating cycle. In the event of a flame roll-out condition, the switch will shut the furnace down. Switches for the (-)GPQ furnaces are located on either side of the burner cover plate and just above the burners on the blower divider panel. The (-)GLQ requires only one switch on the left side of burner cover plate. If a switch is tripped, it must be manually reset. DO NOT jumper or reset this switch. If this switch should trip, a qualified installer, service agency or the gas supplier should be called to diagnose and/or correct the source of tripping. If this unit is mounted in a closet, the door must be closed when making this check.

PRESSURE SWITCH

This furnace is equipped with a normally-open pressure switch that monitors pressure conditions within the furnace vent system during the heating cycle.

There are several reasons for the pressure switch not to close.

1. An inoperative induced draft blower.
2. A loose or leaky pressure switch hose.
3. A blockage in the vent.
4. Severe downdrafts canceling the draft from the inducer fan.
5. A leaky gasket at the induced draft blower.
6. Improperly sized or installed vent.

The pressure switch contacts must open before the unit can go through another heating cycle.

See troubleshooting chart in this book for troubleshooting recommendations.

MAINTENANCE

⚠ WARNING

DISCONNECT MAIN ELECTRICAL POWER TO THE UNIT BEFORE ATTEMPTING ANY MAINTENANCE. FAILURE TO DO SO CAN CAUSE ELECTRICAL SHOCK RESULTING IN SEVERE PERSONAL INJURY OR DEATH.

FILTERS

Filter application and placement are critical to airflow, which may affect the heating and cooling system performance. Reduced airflow can shorten the life of the systems major components, such as motor, limits, elements, heat exchanger, evaporator coil or compressor. Consequently, we recommend that the return air duct system have only one filter location. The most common location will be inside the furnace or air handler or a filter base. For systems with a return air filter grill or multiple filter grills, can have a filter installed at each of the return air openings. DO NOT DOUBLE FILTER THE RETURN AIR DUCT SYSTEM. DO NOT FILTER THE SUPPLY AIR DUCT SYSTEM.

If high efficiency filters or electronic air cleaners are used in the system, it is important that the airflow is not reduced to maximize system performance and life. Always verify that the systems airflow is not impaired by the filtering system that has been installed, by performing a temperature rise and temperature drop test.

Keep the air filters clean at all times. Vacuum dirt from filter, wash with detergent and water, air dry thoroughly and reinstall.

See Table 10 and Figures 27 and 28 for proper filter sizes and locations.

1. 14”- 50,000 BTUH unit requires removal of 3½” segment of filter and frame to get proper width for a bottom filter.
2. 21”-100,000 BTUH unit requires removal of 3½” segment of filter and frame to get proper width for a side filter.
3. 24½”-125,000 and 150,000 BTUH units require removal of 7” segment of filter and frame to get proper width for a side filter.

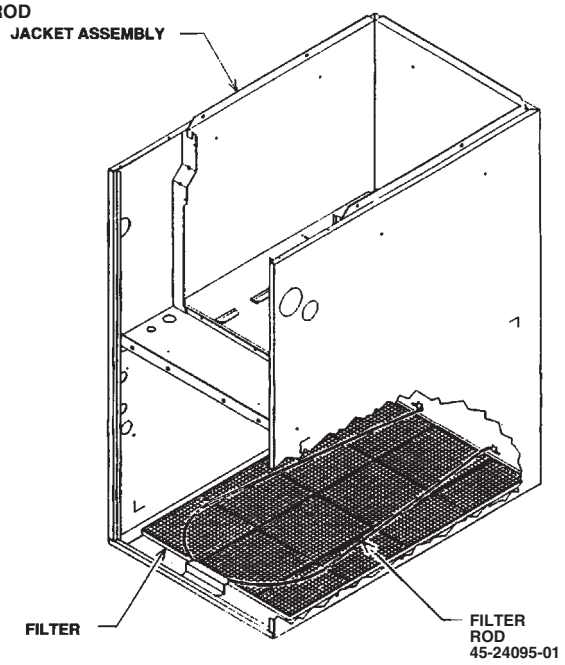
TABLE 10 FILTER SIZES

UPFLOW FILTER SIZES AS SHIPPED				
FURNACE WIDTH	INPUT BTUH	BOTTOM SIZE	SIDE SIZE	QUANTITY
14	50	12¼" X 25"	15¾" X 25"	1
17½"	75 & 100	15¾" X 25"	15¾" X 25"	1
21"	100	19¼" X 25"	15¾" X 25"	1
24½"	125 & 150	22¾" X 25"	15¾" X 25"	1

***NOTE:** Some filters must be ordered or resized to fit certain units and applications.

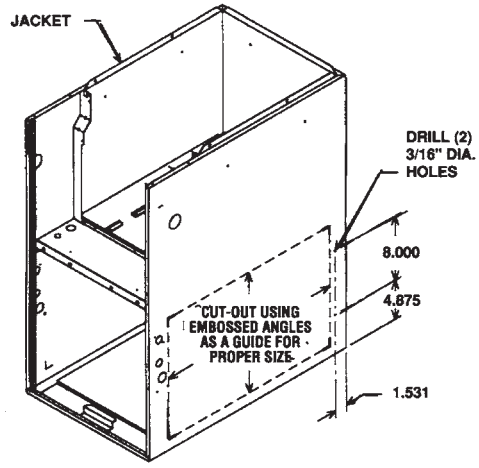
IMPORTANT: *Do not operate the system without filters. A portion of the dust entrained in the air may temporarily lodge in the air duct runs and at the supply registers. Any circulated dust particles will be heated and charred by contact with the furnace heat exchanger. This sooty residue will soil ceilings, walls, drapes, carpets, and other household articles. Soot damage may also result with, or without, filters in place, when certain types of candles are burned, or candlewicks are left untrimmed.*

FIGURE 26
FILTER RETAINING ROD

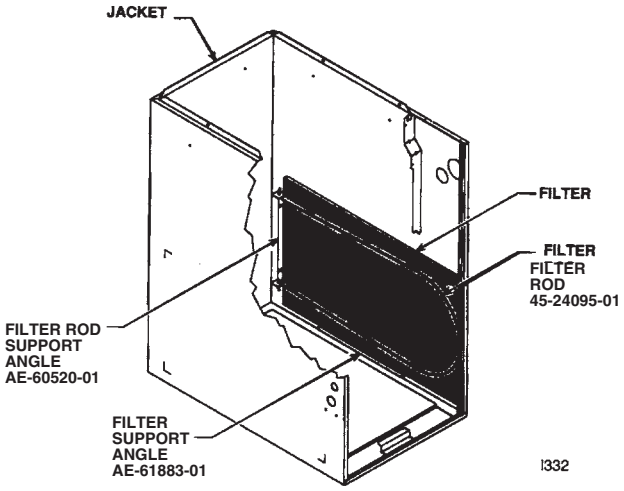


FILTER & ROD LOCATION

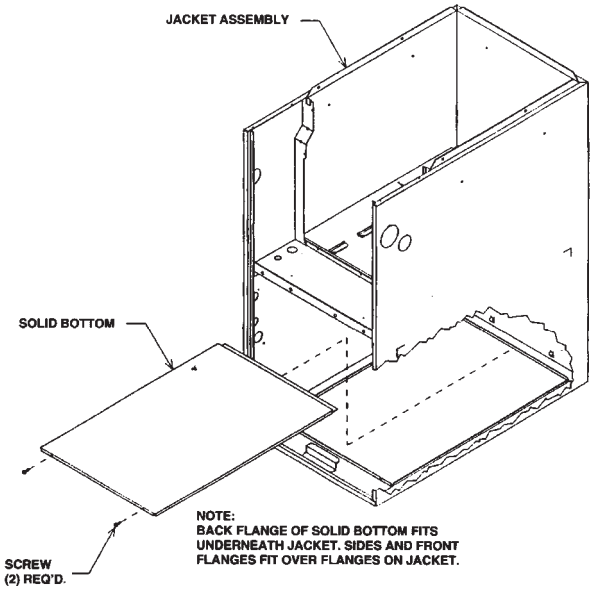
FIGURE 27
UPFLOW FILTER RETAINING ROD (SIDE RETURN)

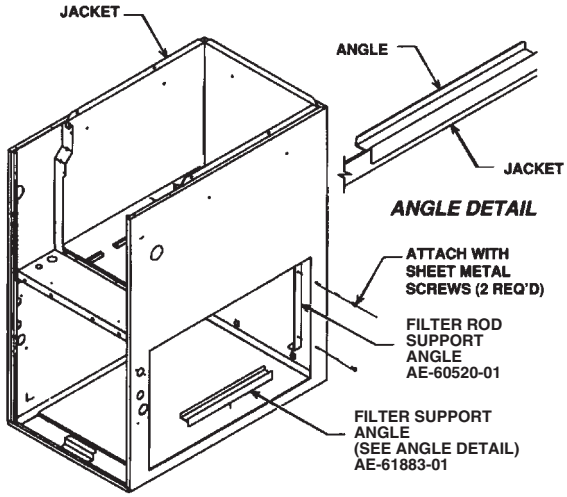


CUT-OUT AND DRILL DETAIL



FILTER AND ROD ASSEMBLY

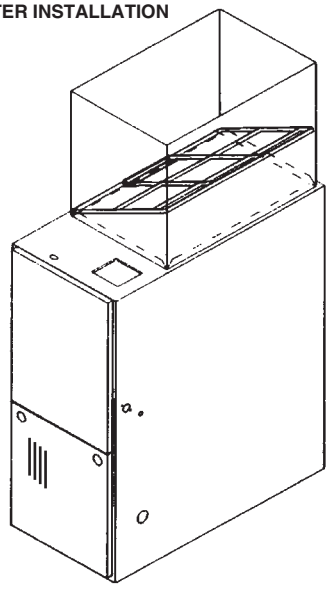


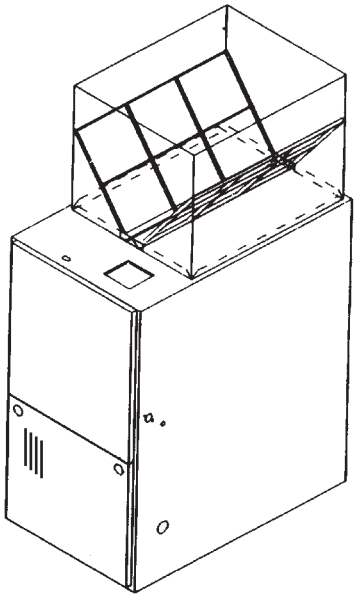


ROD & FILTER SUPPORT ANGLE ASSEMBLY

SOLID BOTTOM MAY BE ORDERED FROM THE FACTORY.

FIGURE 28
DOWNFLOW FILTER INSTALLATION





SYSTEM OPERATION INFORMATION

Advise The Customer To:

1. Keep the air filters clean. The heating system will operate better, more efficiently and more economically.
2. Arrange the furniture and drapes so that the supply air registers and the return air grilles are unobstructed.
3. Close doors and windows. This will reduce the heating load on the system.
4. Avoid excessive use of kitchen & bathroom exhaust fans.
5. Do not permit the heat generated by television, lamps or radios to influence the thermostat operation.
6 Except for the mounting platform, keep all combustible articles three feet from the furnace and vent system.
7. **IMPORTANT**: *Replace all blower doors and compartment covers after servicing the furnace. Do not operate the unit without all panels and doors securely in place.*
8. Proper operation of the system with constant air circulation.

⚠ WARNING

COMBUSTIBLE MATERIAL MUST NOT BE PLACED ON OR AGAINST THE FURNACE JACKET OR WITHIN THE SPECIFIED CLEARANCES OF THE VENT PIPE. THE AREA AROUND THE FURNACE MUST BE KEPT CLEAR AND FREE OF ALL COMBUSTIBLE MATERIALS INCLUDING GASOLINE AND OTHER FLAMMABLE VAPORS AND LIQUIDS. PLACEMENT OF COMBUSTIBLE MATERIALS ON, AGAINST OR AROUND THE FURNACE JACKET CAN CAUSE AN EXPLOSION OR FIRE RESULTING IN PROPERTY DAMAGE, PERSONAL INJURY OR DEATH. THE FURNACE OWNER SHOULD BE CAUTIONED THAT THE FURNACE AREA MUST NOT BE USED AS A BROOM CLOSET OR FOR ANY OTHER STORAGE PURPOSES.

ANNUAL INSPECTION

The furnace should operate for many years without excessive scale build-up in the flue passageways, however, it is recommended that a qualified installer, service agency, or the gas supplier actually inspect the flue passageways, the vent system and the main burners for continued safe operation paying particular attention to deterioration from

⚠ WARNING corrosion or other sources.

HOLES IN THE VENT PIPE OR HEAT EXCHANGER CAN CAUSE TOXIC FUMES TO ENTER THE HOME RESULTING IN CARBON MONOXIDE POISONING OR DEATH. THE VENT PIPE OR HEAT EXCHANGER MUST BE REPLACED IF THEY LEAK.

- **IMPORTANT:** *It is recommended that at the beginning of the heating season and approximately midway in the heating season a visual inspection be made of the main burner flames for the desired flame appearance by a qualified installer, service agency, or the gas supplier.*
- **IMPORTANT:** *It is also recommended that at the beginning of the heating season, the flame sensor be cleaned with steel wool by a qualified installer, service agency, or the gas supplier.*
- **IMPORTANT:** *It is recommended that an annual inspection and cleaning of all furnace markings be made to assure legibility. Attach a replacement marking, which can be obtained through the distributor, if any are found to be illegible or missing.*

IMPORTANT: ***FOR Nox MODELS –*** *At the beginning of the heating season a visual inspection of the Nox device should be made to ensure they have not become obstructed by insects nests or anything else which may effect performance.*

LUBRICATION

The indoor blower motor and induced draft motor are prelubricated by the motor manufacturer and do not require further attention.

The motors must be cleaned periodically by a qualified installer, service agency, or the gas supplier to prevent the possibility of overheating due to an accumulation of dust and dirt on the windings or on the motor exterior. Air filters should be kept clean. Dirty filters can restrict airflow and results in motor overheating.

REPLACEMENT PARTS

Contact your local distributor for a complete parts list.

NOx MODELS

When converting furnaces equipped with NOx inserts to LP gas, remove the NOx insert assemblies.

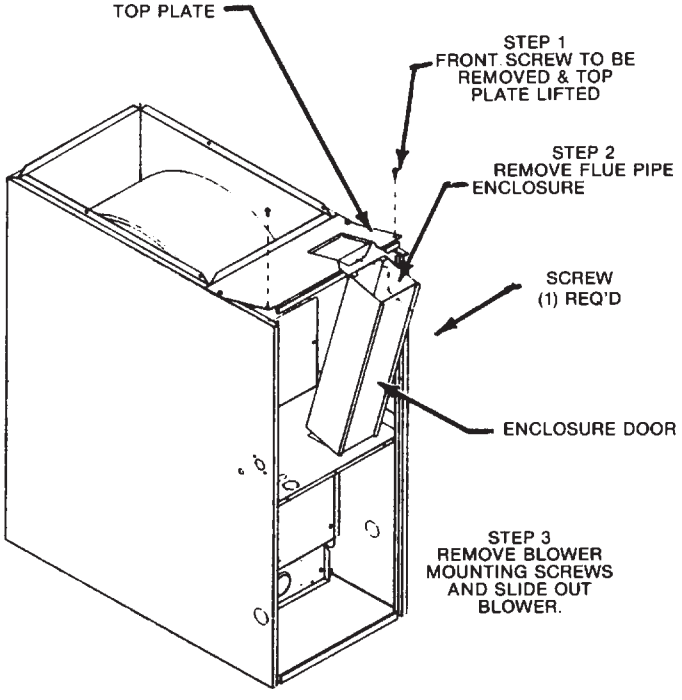
TROUBLESHOOTING

Refer to Figure 30 for determining cause of unit problems.

WIRING DIAGRAM

Figure 31 is a complete wiring diagram for the furnace and power sources.

FIGURE 29
DOWNFLOW BLOWER REMOVAL



NOTE: FLUE PIPE ENCLOSURE & ENCLOSURE DOOR MUST BE REMOVED FOR BLOWER REMOVAL.

➤ **FIGURE 30**
INTEGRATED FURNACE CONTROL (IFC) TROUBLESHOOTING GUIDE FOR UTEC 1095-101

TWO-STAGE INTEGRATED FURNACE CONTROL (IFC) TROUBLESHOOTING GUIDE USING TWO-STAGE THERMOSTAT

NOTE: Many problems are due to a missing grounding screw, which is often not replaced when the IFC* is replaced. Ensure grounding screw is present before beginning troubleshooting.

NOTE: Most failures are not due to the IFC. Double check all other possibilities, including the ground connection, before replacing the IFC.

WARNING

HAZARDOUS VOLTAGE LINE VOLTAGE CONNECTIONS

DISCONNECT POWER BEFORE SERVICING. SERVICE MUST BE BY A TRAINED, QUALIFIED SERVICE TECHNICIAN.

KEY TO ABBREVIATIONS
ECM = Constant CFM Blower (electrically commutated motor)
IBM = Indoor Blower Motor (or Blower Motor).
IDM = Induced Draft Motor (or Inducer).
IFC = Integrated Furnace Control (or control board).
PS = Pressure Switch(es).
PSC = Permanent Split Capacitor Motor.
SE = Spark Electrode (s).

BLINK CODES – STATUS (Green) L.E.D.
1 Blink - Soft lockout Reset System power and start over from beginning
2 Blinks - PS Circuit open Go to point "F"
3 Blinks - Limit circuit open Go to point "D"
4 Blinks - PS Circuit closed. Go to point "G"
5 Blinks - Twin Fault. Go to point "H"
6 Blinks - "Line" & "Neutral" Reversed

FLAME (Amber) L.E.D.
No Blink - No Flame
Slow Blink - Marginal Flame Sensed
Rapid Blink - Unexpected Flame Sensed
Steady On - Good Flame Present

START

1) Set FAN switch to "AUTO"
2) Set thermostat to call for heat (set temp. differential to greater than 10°F
3) Ensure units in high fire (W to C = 24V and W2 to C = 24V).

PREPURGE

Does the IDM Start on High Speed? NO → "POWER" LED ON? NO → - Check 24V at IFC. - Check Fuse. - Check Door Switch and Line Power. - Check Transformer. - Check Breaker.

YES → "POWER" LED ON? YES → 24V on W & W2 to IFC? NO → - Check thermostat in "heat" mode, battery, wire, and connections.

24V on W & W2 to IFC? YES → Is "STATUS" LED blinking, steady-on, or off?

Is "STATUS" LED blinking, steady-on, or off? OFF → Check IFC*.

Is "STATUS" LED blinking, steady-on, or off? BLINKING → SEE BLINK CODES

SEE BLINK CODES → G → - Check PS contacts. - Check wires for short. - Check IFC*.

Is "STATUS" LED blinking, steady-on, or off? STEADY-ON → - Check line voltage at IDM. - Check wires and connections between IDM and IFC. - Ensure line voltage between P2-2 and P2-3 on IFC. - Check IDM capacitor.

Does the IDM Start on High Speed? YES → 90+ Furnace / 80+ Furnace → Does inducer run on high speed for a few seconds and then switch to low speed?

Does inducer run on high speed for a few seconds and then switch to low speed? NO (Inducer remains on high speed) → Does IDM run indefinitely? YES → - Check for open limit or limit circuit. - Check for intermittent PS operation. - Check for vent restrictions. - Ensure vent lengths not excessive. - Check for blocked heat exchanger.

Does IDM run indefinitely? NO → Check IFC*.

Does inducer run on high speed for a few seconds and then switch to low speed? YES → IDM Runs for 30 sec. pre-purge? Low speed for 80+ and high speed for 90+

IDM Runs for 30 sec. pre-purge? Low speed for 80+ and high speed for 90+ NO → Does IDM Run for 60 sec. and then off for Five minutes?

Does IDM Run for 60 sec. and then off for Five minutes? YES → - Check PS, PS Hoses, and wires. - Check for blocked vent, excessive vent length or elbows, or blocked heat exchanger. - Check IDM wired correctly. - Ensure against excessive wind, which can open pressure switch. - Check elevation. Installation may require high-altitude kit. ← F

Does Inducer switch to High Speed? NO → - Check line voltage between "HEAT" and "NEU" on IFC. - Check wires, connections, and continuity between IFC and IBM.

- Check IBM capacitor (PSC only). - Check IBM. PSC BLOWERS

- ECM furnaces; check all connections between IFC and daughter control. - Check all connection between daughter control and ECM Blower. - Check 24V to ECM control. - Check dip switch setting. - Check daughter controller. ECM BLOWERS

IGNITION TRIAL

Spark Ignitor (SE) Energizes? NO → - Check SE wire & connections. - Clean SE with sandpaper. Replace SE if necessary. - If problem persists, check IFC*. - Check SE wire for spark arcing to metal before electrode. - Check SE gap and proper SE ground.

Spark Ignitor (SE) Energizes? YES → Does Main Burner Light and stay lit? 90+ = High Fire 80+ = Low Fire ** NO → Is the Gas valve Energized at the correct rate? YES → GO TO I → PROBLEM PERSISTS → - Check gas supply and manifold pressure. - Check SE alignment. - Check orifice or other restrictions to gas flow. - Check flame sense rod (clean with sandpaper). - Check flame carry over. - Ensure L1 and Neutral not swapped on IFC (Fault Code 6).

Is the Gas valve Energized at the correct rate? NO → - Check wires, continuity, and connection between IFC and gas valve. - Ensure 24 V between pins P1-7 to P1-8 and P1-4 to P1-8 on IFC. - Ensure manual switch on valve is in "ON" position. - Check gas supply and manifold pressure correct. ← J

Does Main Burner Light and stay lit? 90+ = High Fire 80+ = Low Fire ** YES → 90+ Furnaces / 80+ Furnaces → Does Inducer switch to High Speed?

Does Inducer switch to High Speed? 80+ Furnaces YES → Does gas valve energize on High Fire? (80+)

Does gas valve energize on High Fire? (80+) YES → **IBM "ON" DELAY** → Does IBM start on high heat speed 15-30 seconds after burners light?

Does gas valve energize on High Fire? (80+) NO → GO TO F → PROBLEM PERSISTS → GO TO J

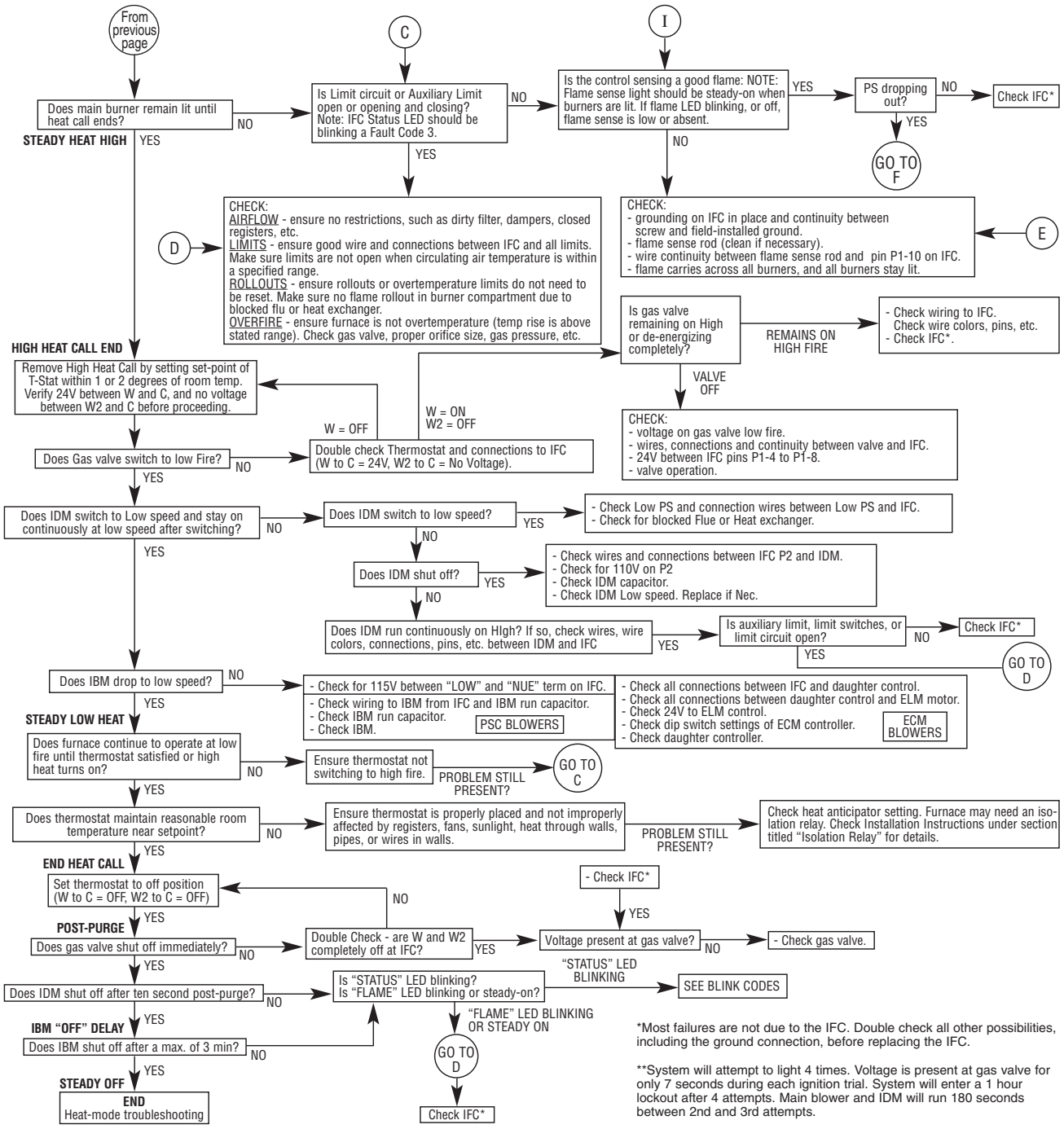
Does IBM start on high heat speed 15-30 seconds after burners light? NO → Is the Gas valve Energized at the correct rate?

Does IBM start on high heat speed 15-30 seconds after burners light? YES → Go to next page

NOTE: If IFC goes into lockout ("STATUS" LED will flash code "1"), shut off main power to unit, wait 30 seconds and then reset power.

CONTINUED➜

FIGURE 30
TROUBLESHOOTING FLOWCHART (CONTINUED)



REPEAT THIS PROCEDURE UNTIL TROUBLE-FREE OPERATION IS OBTAINED.

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FIGURE 31

FOR MODELS WITH UT ELECTRONIC CONTROLS 1028-928 INTEGRATED FURNACE CONTROL AND DIRECT SPARK IGNITION

