LENNOX

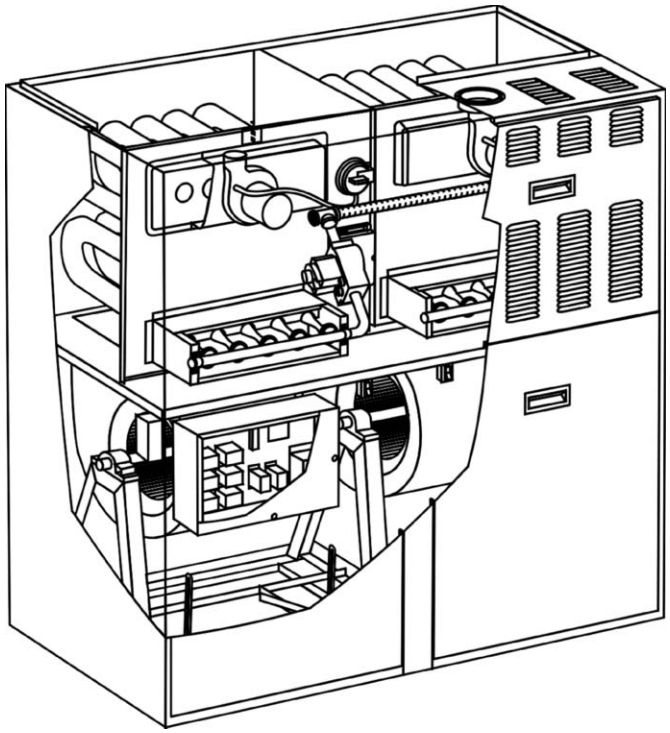
PRODUCT LITERATURE

INSTALLATION INSTRUCTIONS

G24-200

UPFLOW GAS FURNACE
Direct Spark Ignition
503,613M
8/2005
Supersedes 7/2003

Technical Publications
Litho USA



RETAIN THESE INSTRUCTIONS FOR FUTURE REFERENCE

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DESIGN CERTIFIED

⚠ WARNING

FIRE OR EXPLOSION HAZARD.

Failure to follow safety warnings exactly could result in serious injury, death, or property damage.

CERTIFIED

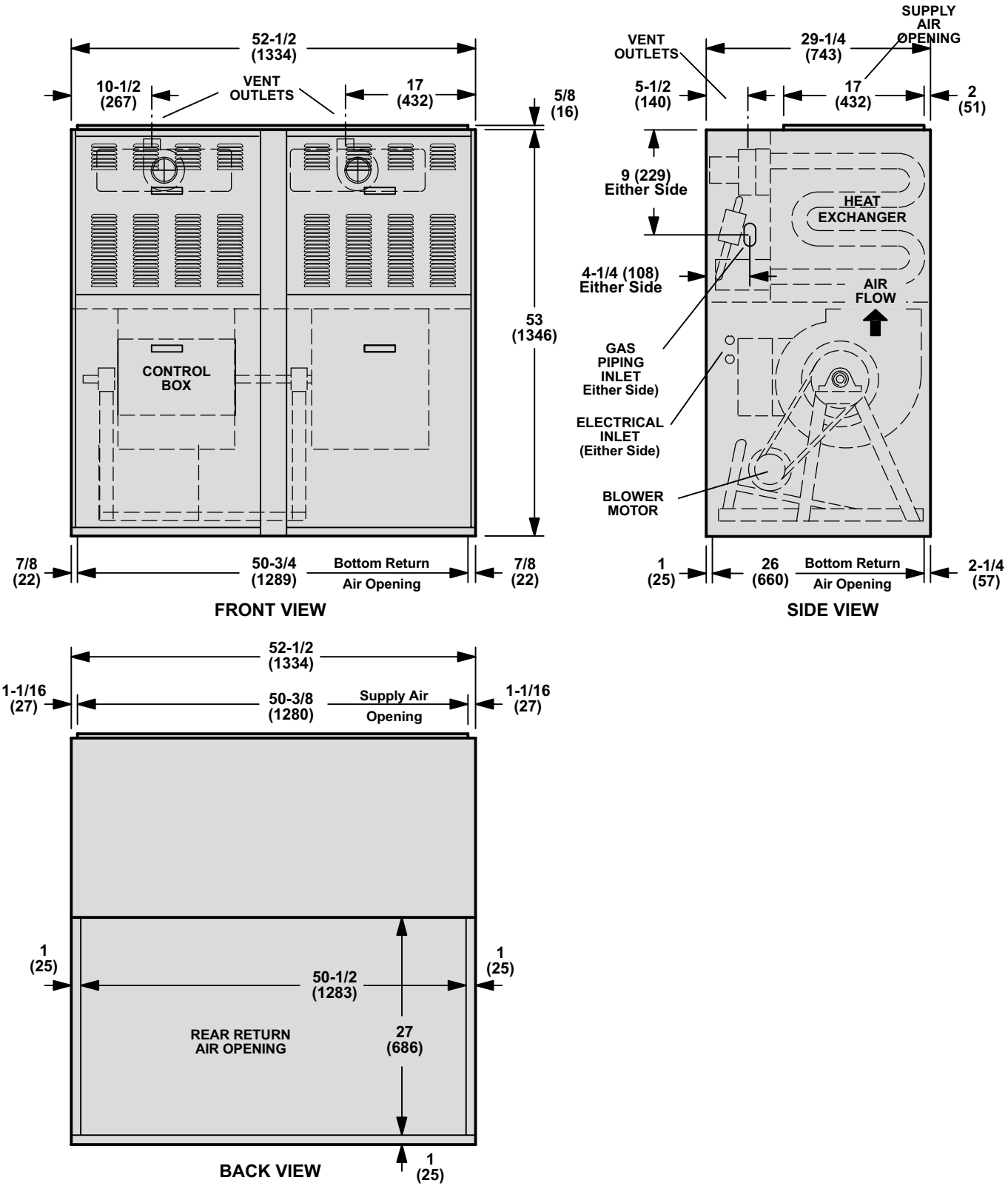
Do not store or use gasoline or other flammable vapors and liquids in the vicinity of this or any other appliance.

Installation and service must be performed by a qualified installer, service agency or the gas supplier.

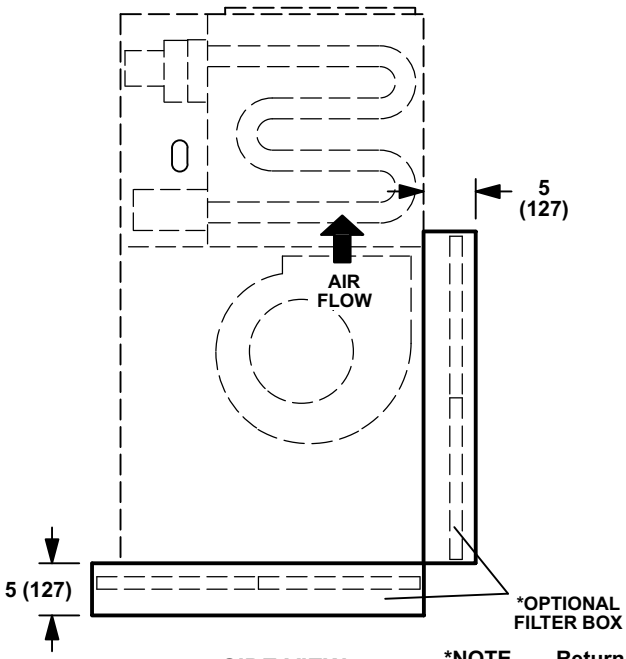
WHAT TO DO IF YOU SMELL GAS:

- **Do not try to light any appliance.**
- **Extinguish any open flame.**
- **Do not touch any electrical switch; do not use any phone in your building.**
- **Leave the building immediately.**
- **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.**

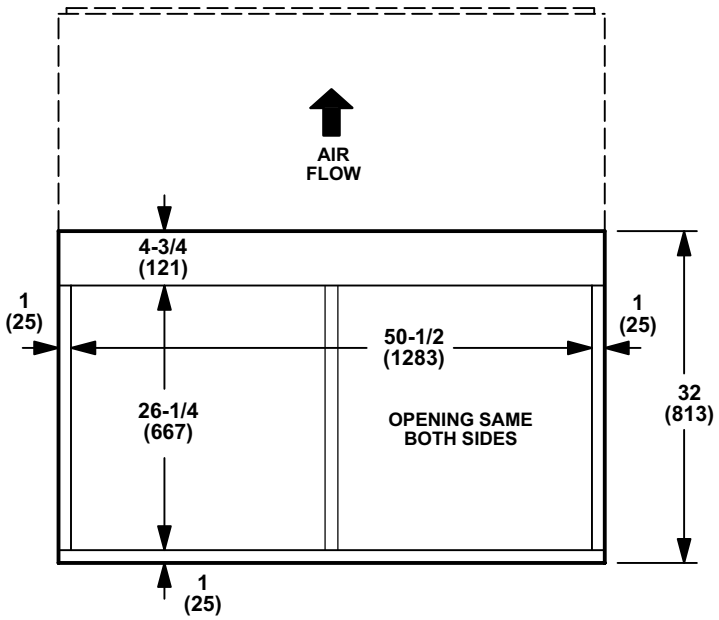
G24-200 Unit Dimensions - inches (mm)



G24-200 Filter Box Dimensions - inches (mm)

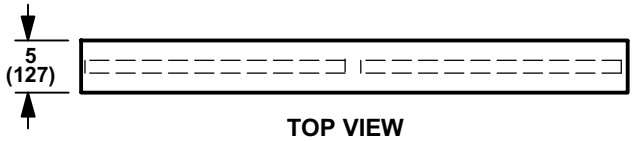


SIDE VIEW

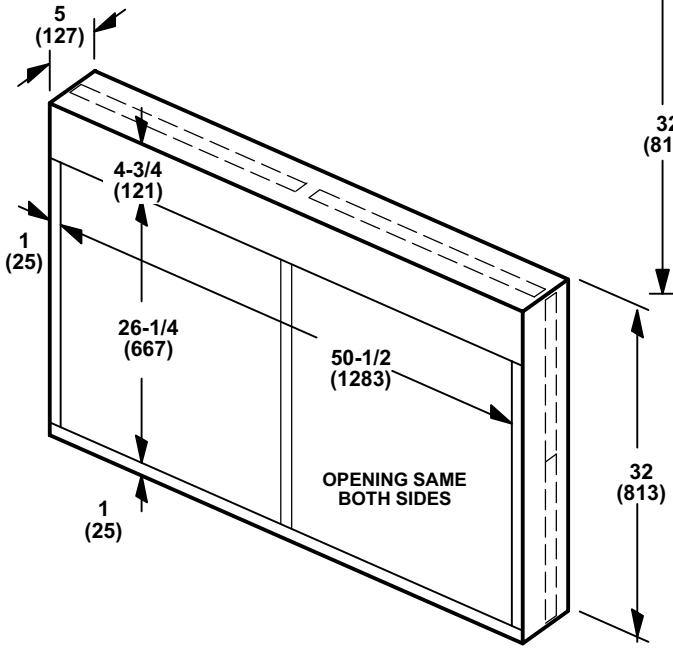


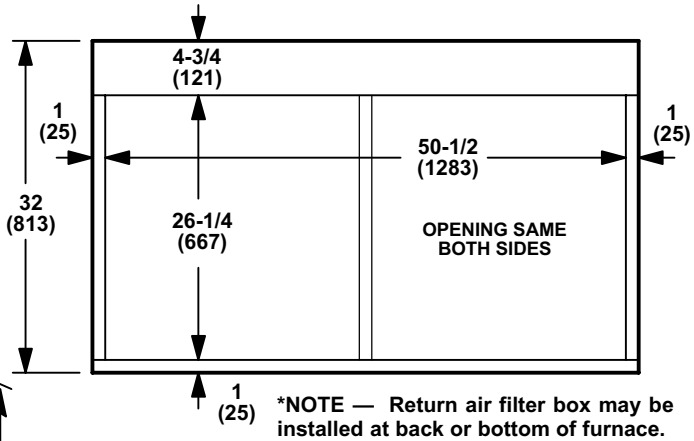
BACK VIEW

*NOTE — Return air filter box may be installed at back or bottom of furnace.



TOP VIEW

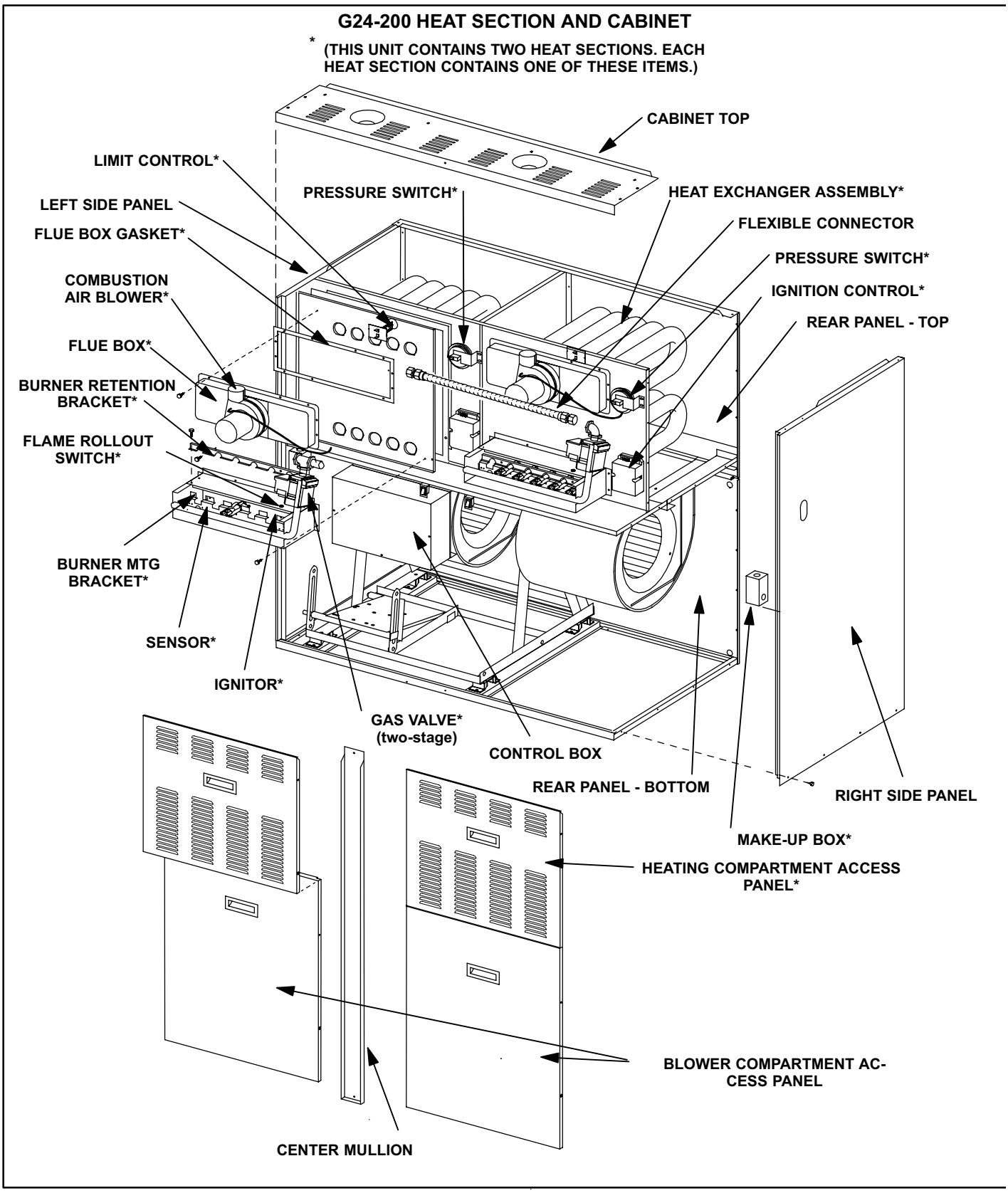




*NOTE — Return air filter box may be installed at back or bottom of furnace.

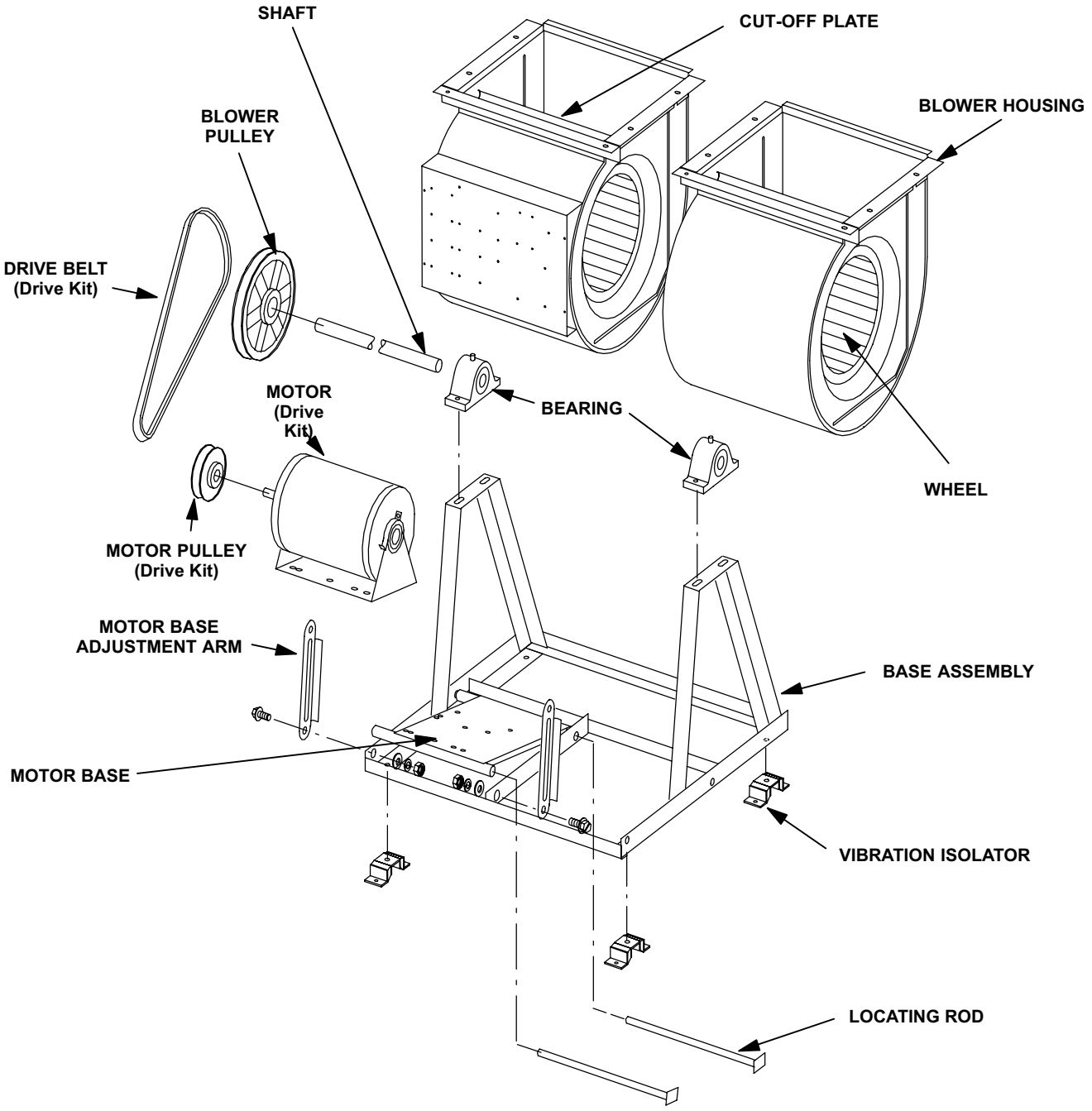
FRONT VIEW

G24-200 Parts Arrangement



G24-200 Parts Arrangement Continued

G24-200 BLOWER SECTION



G24-200 Gas Furnace

The G24-200 upflow gas furnace is for use with natural gas only.

Each G24-200 requires the installation of a separately ordered drive kit. The available drive kits are listed in tables 10 and 15. Provided in each drive kit is the following: the furnace's blower motor, its 24 volt control transformer, and (in non-208/230 volt models) an autotransformer for each of the furnaces's induced draft blowers.

Also available for order separately is a filter box kit for rear or bottom return air applications.

This furnace has two independently controlled heat sections, each with an input of 100MBH and each operating in a two-stage (low heat/high heat) mode. The C17-090/120 cooling coil has been designed for use with this furnace and can be connected to either a single condensing unit or to two condensing units. (See C17 coil installation instructions.)

Shipping and Packing List

Package 1 of 3 contains:

1 - Assembled unit (vent adapters are factory-installed)
1 - Flexible gas connector

Package 2 of 3 contains:

1 - Filter box assembly

Package 3 of 3 contains:

1 - Blower drive kit consisting of:
- 1 - Blower motor
- 1 - Motor pulley
- 1 - Belt
- 1 or 3 - Transformer(s)
- 1 - Bag assembly containing wiring parts
- 1 - Bag assembly containing securing hardware

Check equipment for shipping damage. If you find any damage, immediately contact the last carrier.

Safety

⚠WARNING

Improper installation, adjustment, alteration, service or maintenance can cause property damage, personal injury or loss of life. Installation and service must be performed by a qualified installer, service agency or the gas supplier.

⚠CAUTION

As with any mechanical equipment, personal injury can result from contact with sharp sheet metal edges. Be careful when you handle this equipment.

Use only the type of gas approved for use with this furnace. Refer to unit nameplate.

Lennox G24-200 units are CSA international certified to ANSI Z21.47 and CSA 2.3 standard.

In the USA, installation of Lennox gas central furnaces must conform with local building codes. In the absence of local codes, units must be installed in accordance with the current National Fuel Gas Code (ANSI-Z223.1/NFPA54). The National Fuel Gas Code is available from:

American National Standards Institute, Inc.
11 West 42nd Street
New York, NY 10036

In Canada, installation must conform with current National Standard of Canada CSA-B149.1 "Natural Gas and Propane Installation Codes", local plumbing or waste water codes and other applicable local codes.

Adequate clearance must be made around the air openings into the vestibule area. Provisions must be made for proper operation and for combustion air and ventilation air supply according to the current National Fuel Gas Code or CSA-B149 standards.

In the U.S.A, vent installations shall be in accordance with the venting tables provided in this manual and the applicable provisions of local building codes.

In Canada, vent installations shall be in accordance with the venting tables in the current editions of the CSA B149 codes and the applicable provisions of local building codes.

This furnace is CSA international certified for installation clearances to combustible material as listed on unit rating plate and in table 1. Accessibility and service clearances must take precedence over fire protection clearances.

TABLE 1

INSTALLATION CLEARANCES INCHES (mm)		
CLEARANCE	VENT CONNECTOR TYPE	
	TYPE C	TYPE B1
TOP	1 (25)	1 (25)
FRONT*	3 (76)	3 (76)
BACK	0	0
SIDES	0	0
VENT	6 (152)	1 (25)
FLOOR	0**	0**

** Front clearance must be 24 inches (610mm) minimum for service access.*

*** For installation on combustible floors, appliance shall not be installed directly on carpeting, tile, or other combustible material other than wood flooring.*

Maintain adequate clearance for filter access. See section on "Return Air Plenum/Filter Box Installation."

For installation in a residential garage, the furnace must be installed so that the burner(s) and the ignition source are located no less than 18 inches (457 mm) above the floor. The furnace must be located or protected to avoid physical damage by vehicles. When a furnace is installed in a public garage, hangar, or other building that has a hazardous atmosphere, the furnace must be installed according to recommended good practice requirements and current National Fuel Gas Code or CSA B149.1 standard.

The furnace must be adjusted to obtain a temperature rise range and within the allowable external static pressure on furnaces with a duct system as listed on unit nameplate.

Installation in parking structures must be in accordance with the Standard for Parking Structures (ANSI/NFPA No. 88A-1991). Installation in repair garages must be in accordance with the Standard for Repair Garages (ANSI/NFPA No. 88B-1991).

The G24-200 furnace must be installed so that electrical components are protected from water.

When the furnace is used with cooling units, it shall be installed in parallel with, or on the upstream side of, cooling units to avoid condensation in the heating compartment. With a parallel flow arrangement, a damper (or other means to control the flow of air) must adequately prevent chilled air from entering the furnace. If the damper is manually operated, it must be equipped to prevent operation of either the heating or the cooling unit, unless it is in the full “HEAT” or “COOL” setting.

When installed, the furnace must be electrically grounded according to local codes. In addition, in the United States, installation must conform with the current National Electric Code, ANSI/NFPA No. 70. The National Electric Code (ANSI/NFPA No. 70) is available from the following address:

National Fire Protection Association
1 Battery March Park
Quincy, MA 02269

In Canada, all electrical wiring and grounding for the unit must be installed according to the current regulations of the Canadian Electrical Code Part I (CSA Standard C22.1) and/or local codes.

Never test for gas leaks with an open flame. Check all connections with a commercially available soap solution made specifically for leak detection.

NOTE - Furnace must be adjusted to obtain a temperature rise (high and low fire) within the range(s) specified on the unit nameplate. Failure to do so may cause erratic limit operation.

Field wiring connection must meet or exceed specifications of type T wire and withstand a maximum temperature rise of 180°F (82°C).

When the furnace is installed so that supply ducts carry air circulated by the furnace to areas outside of the space containing the furnace, return air shall be handled by a duct(s) sealed to the furnace casing and terminating outside space containing furnace.

NOTE - This furnace is designed for a minimum continuous return air temperature of 60°F (16°C) or an intermittent operation down to 55°F (13°C) dry bulb for cases where a night setback thermostat is used. Return air temperature must not exceed 85°F (29°C) dry bulb.

Use of this unit as a construction heater or air conditioner is not recommended during any phase of construction. Very low return air temperatures, harmful vapors and operation of the unit with clogged or misplaced filters will damage the unit.

If this unit has been used for heating or cooling of buildings or structures under construction, the following conditions must be met or the warranty will be void:

- The vent hood must be installed per these installation instructions.
- A room thermostat must control the unit. The use of fixed jumpers that will provide continuous heating or cooling is not allowed.
- A pre-filter must be installed at the entry to the return air duct.
- The return air duct must be provided and sealed to the unit.
- Return air temperature range between 55°F (13°C) and 80°F (27°C) must be maintained.
- Air filters must be replaced and pre-filters must be removed upon construction completion.
- The input rate and temperature rise must be set per the unit rating plate.
- The heat exchanger, components, duct system, air filters and evaporator coil must be thoroughly cleaned following final construction clean-up.
- The unit operating conditions (including airflow, cooling operation, ignition, input rate, temperature rise and venting) must be verified according to these installation instructions.

NOTE - The Commonwealth of Massachusetts stipulates these additional requirements:

- **Gas units shall be installed by a licensed plumber or gas fitter only.**
- **The gas cock must be “T handle” type.**

The Lennox G24-200 furnace may be installed in alcoves, closets, basements, garages and utility rooms.

This furnace design has not been CSA international certified for installation in mobile homes, recreational vehicles, or outdoors.

⚠WARNING

The blower access panel must be securely in place when the blower and burners are operating. Gas fumes, which could contain carbon monoxide, can be drawn into living space resulting in personal injury or death.

General

These instructions are intended as a general guide and do not supersede local codes in any way. Consult authorities having jurisdiction before installation.

In addition to the requirements indicated previously, the following general recommendations should be considered when installing the Lennox G24-200 furnace.

The furnace should be placed as close to the center of the air distribution system as possible. The furnace should also be located close to the chimney or vent termination point.

Do not install the furnace where drafts might blow directly into it. This could cause improper combustion and unsafe operation.

Do not block furnace combustion air openings with clothing, boxes, doors, etc. Combustion air is needed for proper combustion and safe unit operation.

When the furnace is installed in an attic or other insulated space, keep insulation away from the furnace.

⚠WARNING

Product contains fiberglass wool.

Disturbing the insulation in this product during installation, maintenance, or repair will expose you to fiberglass wool. Breathing this may cause lung cancer. (Fiberglass wool is known to the State of California to cause cancer.)

Fiberglass wool may also cause respiratory, skin, and eye irritation.

To reduce exposure to this substance or for further information, consult material safety data sheets available from address shown below, or contact your supervisor.

Lennox Industries Inc.
P.O. Box 799900
Dallas, TX 75379-9900 USA

Combustion, Dilution & Ventilation Air

In the past, there was no problem in bringing in sufficient outdoor air for combustion. Infiltration provided all the air that was needed. In today's homes, tight construction practices make it necessary to bring in air from outside for combustion. Take into account that exhaust fans, appliance vents, chimneys, and fireplaces force additional air that could be used for combustion out of the house. Unless outside air is brought into the house for combustion, negative pressure (outside pressure is greater than inside pressure) will build to the point that a downdraft can occur in the furnace vent pipe or chimney. As a result, combustion gases enter the living space creating a potentially dangerous situation.

In the absence of local codes concerning air for combustion and ventilation, use the guidelines and procedures in this section to install G24-200 furnaces to ensure efficient and safe operation. You must consider combustion air needs and requirements for exhaust vents and gas piping. A portion of this information has been reprinted with permission from the National Fuel Gas Code (ANSI-Z223.1/NFPA54). This reprinted material is not the complete and official position of the ANSI on the referenced subject, which is represented only by the standard in its entirety.

In Canada, refer to the standard CSA B149.1 installation code.

⚠CAUTION

Do not install furnace in a corrosive or contaminated atmosphere. Meet all combustion and ventilation air requirements, as well as all local codes.

Combustion Air Requirements

⚠CAUTION

Insufficient combustion air can cause headaches, nausea, dizziness or asphyxiation. It will also cause excess water in the heat exchanger resulting in rusting and premature heat exchanger failure. Excessive exposure to contaminated combustion air will result in safety and performance related problems. Avoid exposure to the following substances in the combustion air supply:

- **Permanent wave solutions**
- **Chlorinated waxes and cleaners**
- **Chlorine base 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**

All gas-fired appliances require air for the combustion process. If sufficient combustion air is not available, the furnace or other appliance will operate inefficiently and unsafely. Enough air must be provided to meet the needs of all fuel-burning appliances and appliances such as exhaust fans which force air out of the house. When fireplaces, exhaust fans, or clothes dryers are used at the same time as the furnace, much more air is required to ensure proper combustion and to prevent a downdraft. Insufficient air causes incomplete combustion which can result in carbon monoxide.

In addition to providing combustion air, fresh outdoor air dilutes contaminants in the indoor air. These contaminants may include bleaches, adhesives, detergents, solvents and other contaminants which can corrode furnace components.

The requirements for providing air for combustion and ventilation depend largely on whether the furnace is installed in an unconfined or a confined space.

Unconfined Space

An unconfined space is an area such as a basement or large equipment room with a volume greater than 50 cubic feet (1.42 m^3) per 1,000 Btu (.29 kW) per hour of the combined input rating of all appliances installed in that space. This space also includes adjacent rooms which are not separated by a door. Though an area may appear to be unconfined, it might be necessary to bring in outdoor air for combustion if the structure does not provide enough air by infiltration. If the furnace is located in a building of tight construction with weather stripping and caulking around the windows and doors, follow the procedures in the air from outside section.

Confined Space

A confined space is an area with a volume less than 50 cubic feet (1.42 m^3) per 1,000 Btu (.29 kW) per hour of the combined input rating of all appliances installed in that space. This definition includes furnace closets or small equipment rooms.

When the furnace is installed so that supply ducts carry air circulated by the furnace to areas outside the space containing the furnace, the return air must be handled by ducts which are sealed to the furnace casing and which terminate outside the space containing the furnace. This is especially important when the furnace is mounted on a platform in a confined space such as a closet or small equipment room. Even a small leak around the base of the unit at the platform or at the return air duct connection can cause a potentially dangerous negative pressure condition. Air for combustion and ventilation can be brought into the confined space either from inside the building or from outside.

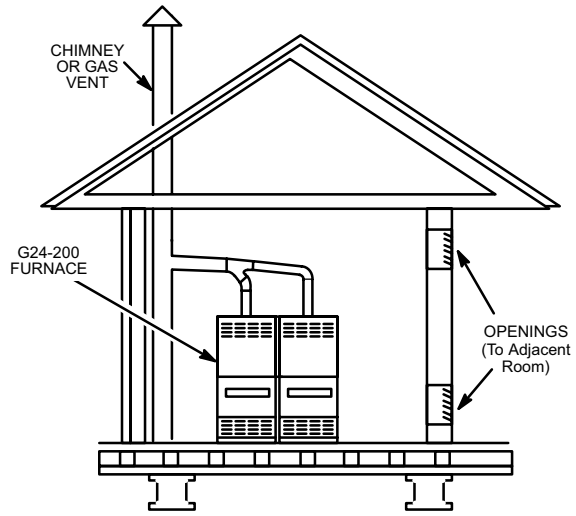
Air from Inside

If the confined space that houses the furnace adjoins a space categorized as unconfined, air can be brought in by providing two permanent openings between the two spaces. Each opening must have a minimum free area of 1 square inch (645 mm^2) per 1,000 Btu (.29 kW) per hour of total input rating of all gas-fired equipment in the confined space. Each opening must be at least 100 square inches (64516 mm^2). One opening shall be within 12 inches (305 mm) of the top of the enclosure and one opening within 12 inches (305 mm) of the bottom. See figure 1.

Air from Outside

If air from outside is brought in for combustion and ventilation, the confined space must have two permanent openings. One opening shall be within 12 inches (305 mm) of the top of the enclosure and one opening within 12 inches (305 mm) of the bottom. These openings must communicate directly or by ducts with the outdoors or spaces (crawl or attic) that freely communicate with the outdoors or indirectly through vertical ducts. Each opening shall have a minimum free area of 1 square inch (645 mm^2) per 4,000 Btu (1.17 kW) per hour of total input rating of all equipment in the enclosure. See figures 2 and 3. When communicating with the outdoors through horizontal ducts, each opening shall have a minimum free area of 1 square inch (645 mm^2) per 2,000 Btu (.56 kW) per total input rating of all equipment in the enclosure. See figure 4.

EQUIPMENT IN CONFINED SPACE
ALL AIR FROM INSIDE

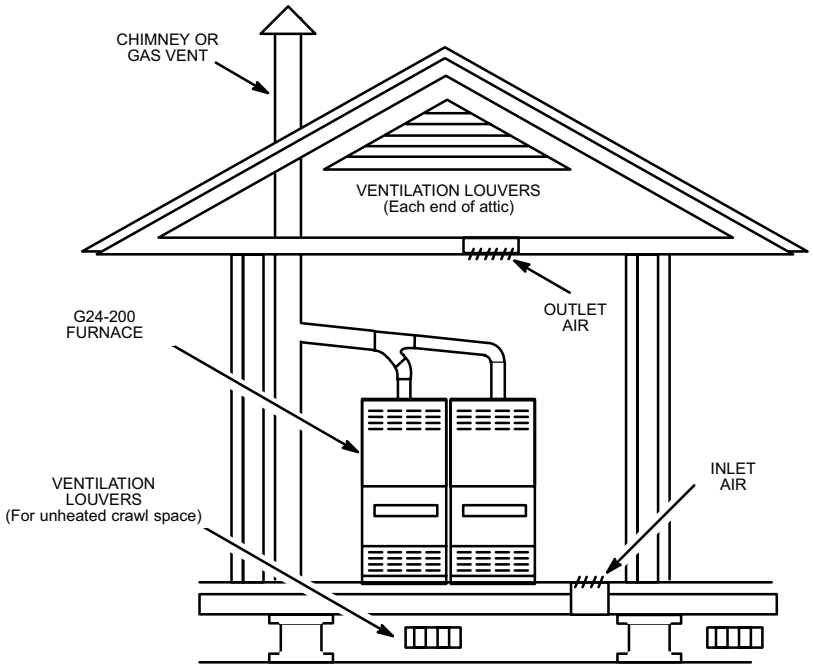


NOTE-Each opening shall have a free area of at least one square inch (645 mm^2) per 1,000 Btu (.29 kW) per hour of the total input rating of all equipment in the enclosure, but not less than 100 square inches (64516 mm^2).

FIGURE 1

When ducts are used, they shall be of the same cross-sectional area as the free area of the openings to which they connect. The minimum dimension of rectangular air ducts shall be no less than 3 inches (75 mm). In calculating free area, the blocking effect of louvers, grilles, or screens must be considered. If the design and free area of protective covering is not known for calculating the size opening required, it may be assumed that wood louvers will have 20 to 25 percent free area and metal louvers and grilles will have 60 to 75 percent free area. Louvers and grilles must be fixed in the open position or interlocked with the equipment so that they are opened automatically during equipment operation.

EQUIPMENT IN CONFINED SPACE ALL AIR FROM OUTSIDE
(Inlet Air from Crawl Space and Outlet Air to Ventilated Attic)



NOTE-The inlet and outlet air openings shall each have a free area of at least one square inch (645 mm^2) *per 4,000 Btu (1.17 kW) per hour of the total input rating of all equipment in the enclosure.*

FIGURE 2

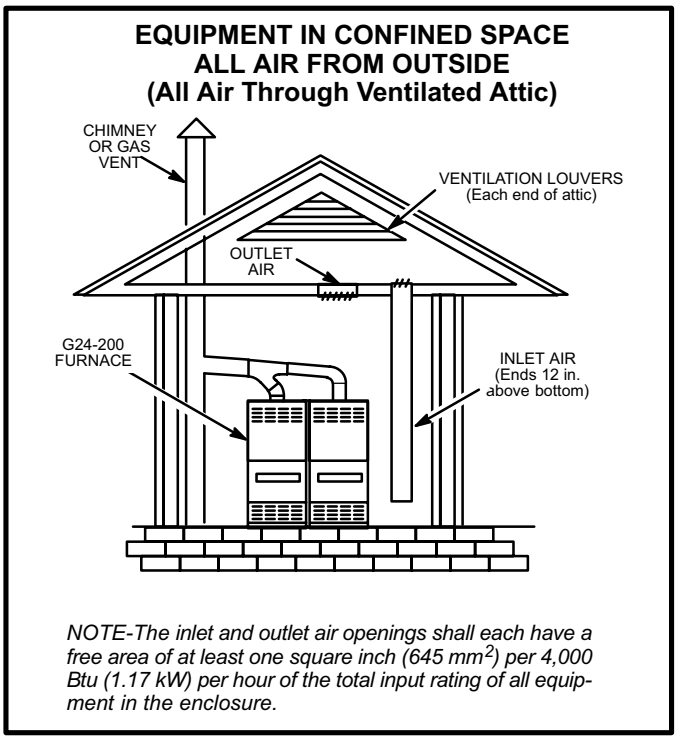


FIGURE 3

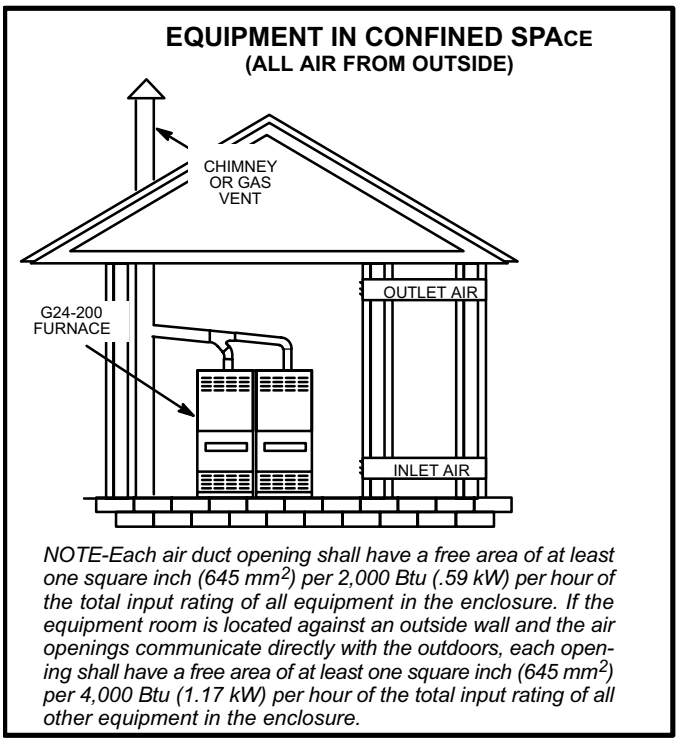


FIGURE 4

Setting Equipment

⚠WARNING

Do not install the furnace on its front or its back. Doing so will adversely affect the operation of the safety control devices, which could result in personal injury or death.

The Lennox G24-200 upflow gas furnace can be installed with rear or bottom return air. If unit is installed on a platform with bottom return air, furnace/filter box must be sealed airtight at the platform to ensure proper and safe operation.

Select a location that allows for required clearances listed on unit rating plate. Also consider gas supply connections, electrical supply, vent connection, installation and service clearances [24 inches (610mm) at unit front] and filter accessibility.

The furnace must be leveled using shims or leveling bolts (field provided). The corner gussets provided in the furnace base will accept leveling bolts.

Return Air Plenum / Filter Box Installation

Return air openings are provided at rear and in bottom of unit. A return air closure panel is shipped secured to the rear opening.

A - Bottom Return Air (Refer to figure 5)

1 - Determine the location of the furnace/filter box.

2 - Cut 50-5/8 x 26-1/8 (128.6cm x 66.4cm) opening in the return air platform.

3 - Fabricate the return air plenum with right angle flanges and insert into the floor opening.

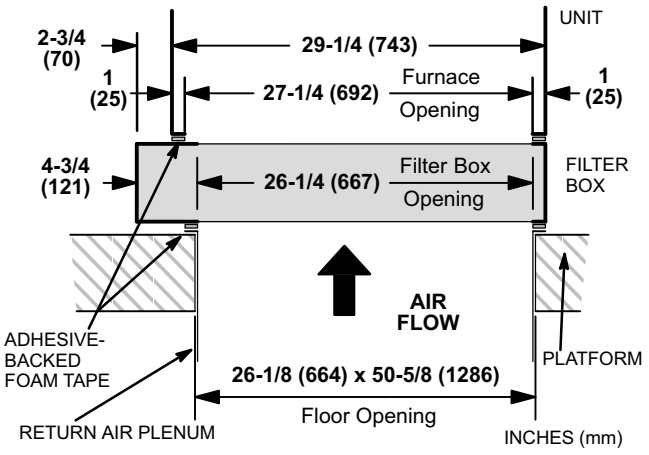
4 - Remove filter box access door and filters.

5 - Apply adhesive-backed foam tape to the bottom of the filter box all around the opening. Position the filter box over the return air plenum. Fasten as required using self-tapping screws provided.
Make sure there is an air tight seal between the platform/return air plenum and filter box.

6 - Apply adhesive-backed foam to the top of the filter box all around the opening. Place furnace over the filter box with sides and rear of furnace and filter box flush. Fasten as required.
Make sure there is an air tight seal between the furnace and the filter box.

7 - Install the filters and the filter access door.

BOTTOM RETURN AIR FILTER BOX INSTALLATION



SIDE VIEW

FIGURE 5

⚠WARNING

Improper installation of the furnace can result in personal injury or death. Combustion and flue products must never be allowed to enter the return air system or the living space. Use screws and joint tape to seal the return air system to the furnace.

In platform installations with bottom return air, the furnace should be sealed airtight to the return air plenum. A door must never be used as a portion of the return air duct system. The base must provide a stable support and an airtight seal to the furnace. Allow absolutely no sagging, cracks, gaps, etc.

The return and supply air duct systems must never be connected to or from other heating devices such as a fireplace or stove, etc. Fire, explosion, carbon monoxide poisoning, personal injury and/or property damage could result.

B - Rear Return Air (Refer to figure 6)

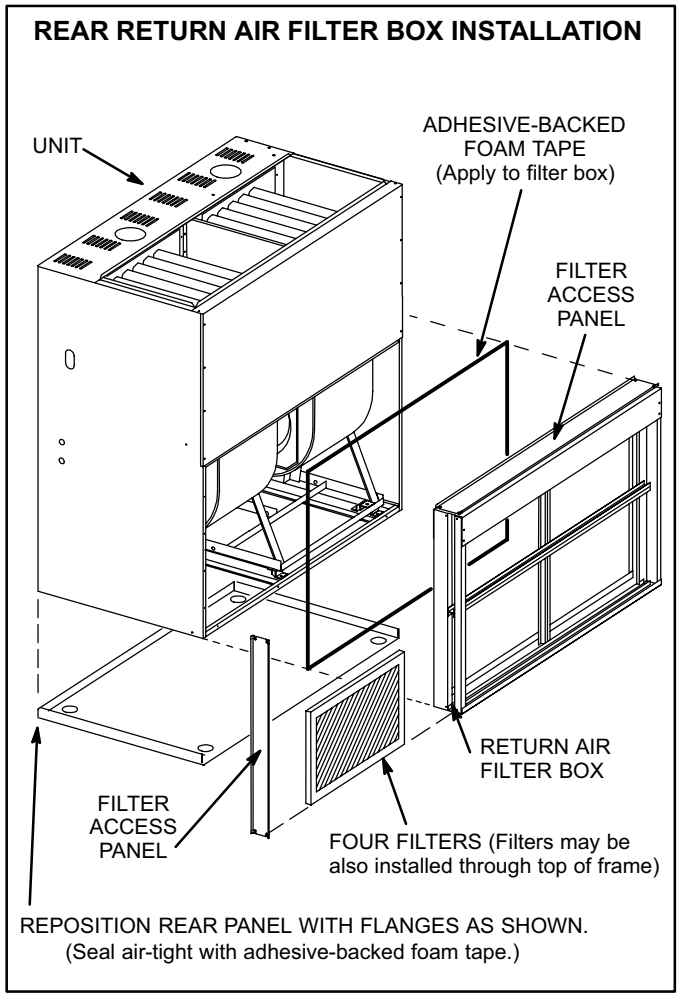


FIGURE 6

1 - Determine the location of the furnace/filter box. *NOTE - Filter box can be installed with right or left side filter access or top-rear filter access. Allow enough room when positioning the furnace for filter access.*

2 - Remove the bottom-rear panel from the furnace and re-install on the bottom of the furnace as shown. **Seal air-tight with adhesive-backed foam tape.**

3 - Apply adhesive-backed foam tape to the filter box (side facing furnace) all around the opening. Refer to figure 6.

4 - Position the filter box over the furnace return air opening. The top of the filter box should be in the “up” position and the filter box and the furnace edges flush at the sides and bottom.

5 - Fasten using self-drilling self-tapping screws provided with the filter box. Use the frame clearance holes as a guide.

6 - Install the four filters and the filter access door.

7 - Size the return air plenum to fit the filter box and then seal the joint air tight.

Duct System

Size and install supply and return air duct system using industry-approved standards that result in a quiet and low-static system with uniform air distribution.

Supply Air Plenum

Furnaces installed without a cooling coil require the installation of a removable access panel in the supply air duct. The access panel should be large enough to permit inspection (either by smoke or reflected light) of the heat exchanger for leaks after installation. The furnace access panel must always be in place when the furnace is operating and it must not allow leaks into the supply air duct system.

In applications requiring air conditioning, see installation instructions provided with C17-090/120 evaporator coil for supply air plenum size and connection.

Return Air Plenum

Return air must not be drawn from a room where this furnace, or any other gas appliance (i.e., a water heater), is installed. When return air is drawn from a room, a negative pressure is created in the room. If a gas appliance is operating in a room with negative pressure, the flue products can be pulled back down the vent pipe and into the room. This reverse flow of the flue gas may result in incomplete combustion and the formation of carbon monoxide gas. This toxic gas might then be distributed throughout the house by the furnace duct system.

Size and install return air plenum as indicated in previous section.

Blower Motor / Drive Installation

A - Motor Installation

Refer to figure 7.

1 - Check the box on the rating plate to indicate which of the drive kits are being installed.

2 - Secure the blower motor to the motor base with the hardware provided.

3 - Slide the motor pulley onto the motor shaft and align with the blower pulley.

4 - Install the belt.

5 - Refer to “Setting Blower CFM Section” to determine blower RPM setting and the following section for adjusting belt tension.

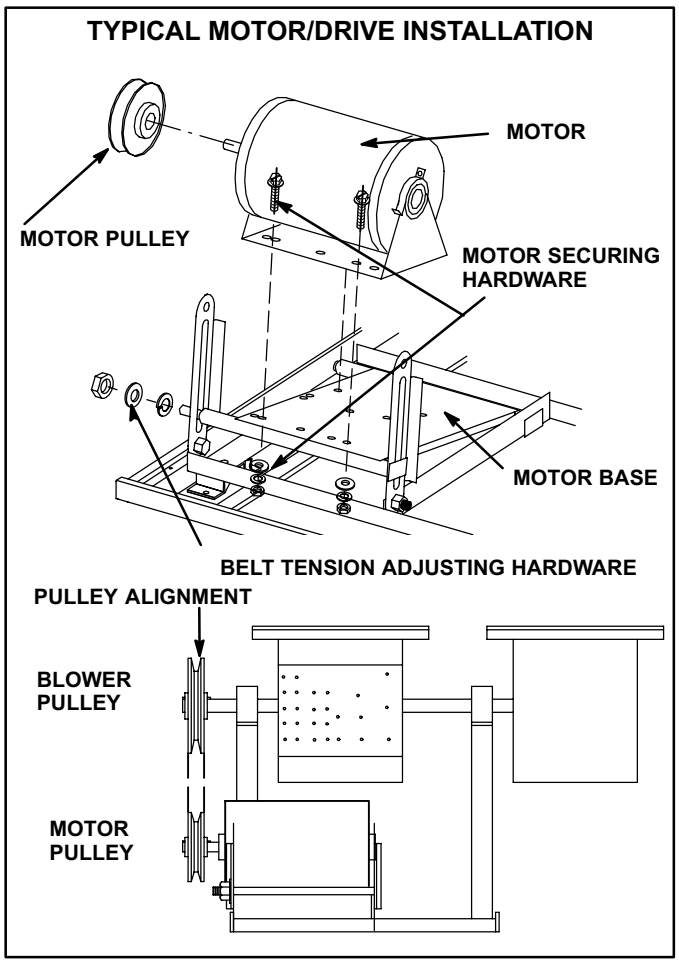


FIGURE 7

B - Blower Belt Adjustment

Maximum life and wear can be obtained from belts only if the proper pulley alignment and belt tension are maintained. Tension new belts after a 24 to 48 hour period of operation. This will allow the belt to stretch and seat in the grooves.

1 - Loosen belt adjusting hardware. See figure 7.

2 - *To increase belt tension -*
Move the motor base away from the blower housing.

To loosen belt tension -
Move the motor toward the blower housing.

3 - Tighten the belt adjusting hardware.

C - Check Belt Tension

Over-tensioning a belt shortens belt and bearing life. Check belt tension as follows:

1 - Measure span length X. See figure 8.

2 - Apply perpendicular force to the center of span (X) with enough pressure to deflect belt 1/64 inch for every inch of span length or 1.5mm per 100mm of span length.

Example: Deflection distance of a 40 inch span would be 40/64 inch or 5/8 inch.

Example: Deflection distance of a 400mm span would be 6mm.

3 - Measure the belt deflection force. For a used belt, the deflection force should be 5 lbs. (35kPa). A new belt deflection force should be 7 lbs. (48kPa).

A force below these values indicates an under-tensioned belt. A force above these values indicates an over-tensioned belt.

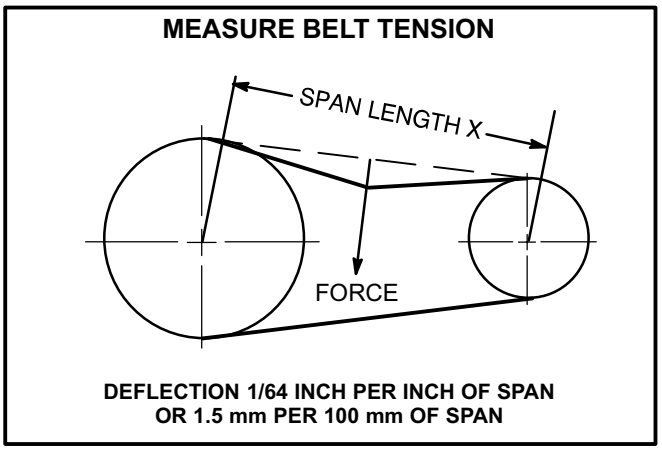


FIGURE 8

Venting

A vent adapter is factory-installed on each of the combustion air blower outlets. **Modification of, or removal of the adapter(s) will cause unsafe unit operation and will void CSA unit certification.** The vent adapter does not require insulation.

The G24-200 units are classified as fan assisted Category I type furnaces when vertically vented according to the latest edition of ANSI Z21.47 Gas-fired Central Furnace Standard in the USA and the current standard CSA 2.3 Gas-fired Central Furnace in Canada. The definition of a fan assisted furnace is an appliance equipped with an integral mechanical means to either draw or force products of combustion through the combustion chamber and/or heat exchanger.

NOTE - Use these instructions as a guide. They do not supersede local codes.

The vent sizing tables in this manual have been extracted from the Current edition of the National Fuel Gas Code (NFPA 54 / ANSI Z223.1) and are provided as a guide for proper vent installation. Proper application, termination, construction and location of vents must conform to local codes having jurisdiction. In the absence of local codes, the NFGC serves as the defining document in the U.S.A., while the CSA-B149 codes serve as the defining documents in Canada.

Refer to the tables and the venting information contained in these instructions to properly size and install the venting system.

Install the first vent connector elbow a minimum of 6 in. (152mm) from the furnace vent outlet.

Venting Using a Masonry Chimney

The following additional requirements apply when a lined masonry chimney is used to vent a G24-200 furnace:

Masonry chimneys used to vent Category I central furnaces must be either tile-lined or lined with a listed metal lining system or dedicated gas vent. Unlined masonry chimneys are prohibited. See figures 9 and 10 for common venting.

A Category I appliance must never be connected to a chimney that is servicing a solid-fuel appliance. If a fireplace chimney flue is used to vent this appliance, the fireplace opening must be permanently sealed.

A fan-assisted furnace may be commonly vented into an existing lined masonry chimney if the following conditions are met:

1 - The chimney is currently serving at least one drafthood equipped appliance.

2 - The vent connectors and chimney are sized according to the provided venting tables for the USA, and the appropriate venting tables in the standards of CSA B149.1 of the Natural Gas and Propane Installation Code in Canada.

⚠IMPORTANT

SINGLE appliance venting of a fan-assisted furnace into a tile-lined masonry chimney (interior or outside wall) is PROHIBITED. The chimney must first be lined with either type B1 vent or an insulated single wall flexible vent lining system, sized according to the provided venting tables.

A type B1 vent or masonry chimney liner shall terminate above the roof surface with a listed cap or a listed roof assembly according to the terms of their respective listings and the vent manufacturer's instructions.

Do not install a manual damper, barometric draft regulator, or flue restrictor between the furnace and the chimney.

If type B1 double-wall vent is used inside a chimney, no other appliance can be vented into the chimney. Outer wall of type B1 vent pipe must not be exposed to flue products.

Insulation for the flexible vent pipe must be an encapsulated fiberglass sleeve recommended by the flexible vent pipe manufacturer. See figure 9.

The space between the liner and the chimney wall should NOT be insulated with puffed mica or any other loose granular insulating material.

If B1 vent or an insulated flexible vent pipe cannot be used as liners, the chimney must be rebuilt to accommodate one of these methods or some alternate approved method must be found to vent the appliance.

When inspection reveals that an existing chimney is not safe for the intended purpose, it shall be rebuilt to conform to nationally recognized standards, lined or relined with suitable materials or replaced with a gas vent or chimney suitable for venting G24-200 units. The chimney passageway must be checked periodically to ensure that it is clear and free of obstructions.

COMMON VENTING USING METAL-LINED MASONRY CHIMNEY

NOTE 1 - Refer to the provided venting tables for installations in the USA and the venting tables in CSA-B149.1 for installations Canada.

NOTE 2 - Either single-walled or double-walled vent connector may be used. Refer to the capacity requirements shown in the provided venting tables for installations in USA and the venting tables in current CSA-B149.1 for installations in Canada.

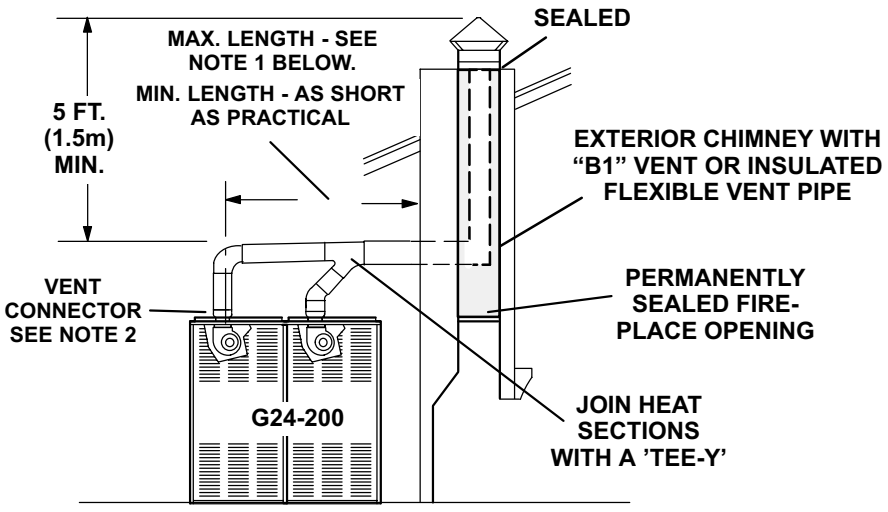


FIGURE 9

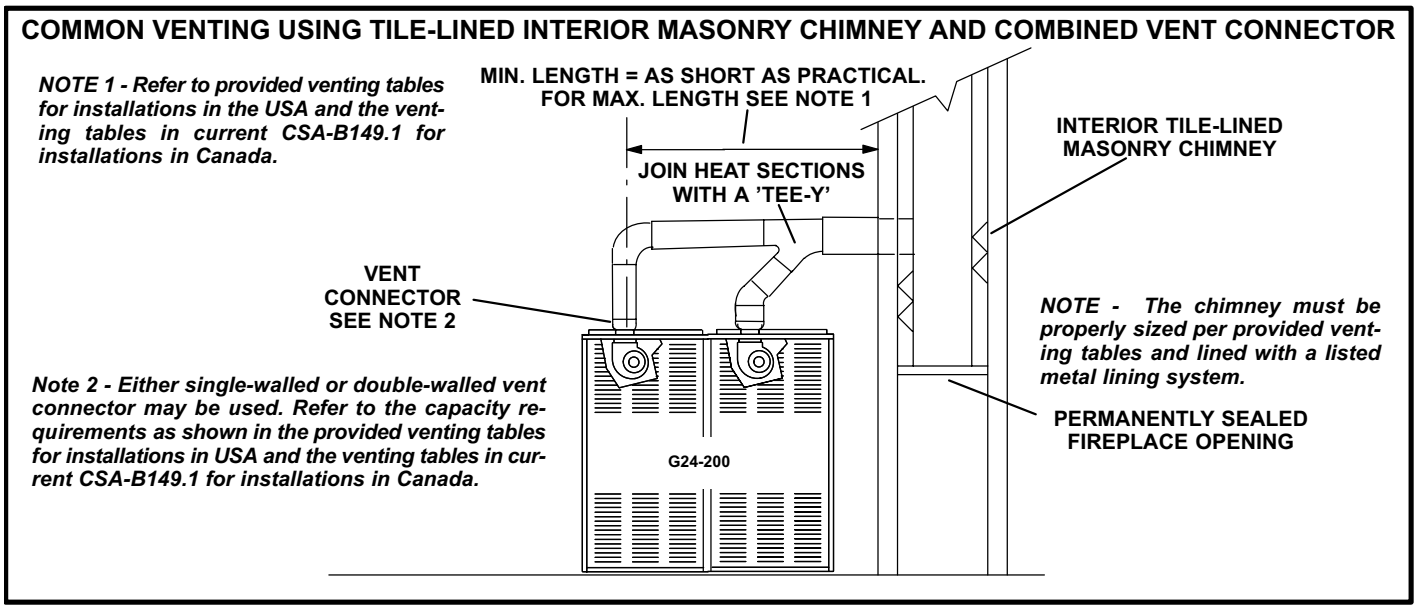


FIGURE 10

General Venting Requirements

All G24-200 furnaces must be vented according to these instructions.

1 - Vent diameter recommendations and maximum allowable piping runs are found in the provided venting tables for the USA, and the appropriate venting tables in the standards of CSA B149.1 of the Natural Gas and Propane Installation Code for Canada.

2 - In no case should the vent or vent connector diameter be less than the diameter specified in the provided venting tables for the USA, and the appropriate venting tables in the standards of CSA B149.1 of the Natural Gas and Propane Installation Code for Canada.

3 - *Single Appliance Vent* - If the vertical vent or tile-lined chimney has a larger diameter or flow area than the vent connector, use the ***vertical vent diameter*** to determine the ***minimum vent capacity*** and the **vent connector diameter** to determine the **maximum vent capacity**. The flow area of the vertical vent, however, shall not exceed 7 times the flow area of the listed appliance categorized vent area, drafthood outlet area or flue collar area unless designed according to approved engineering methods.

4 - *Multiple Appliance Vents* - The flow area of the largest section of vertical vent or chimney shall not exceed 7 times the smallest listed appliance categorized vent area, flue collar area or drafthood outlet area unless designed according to engineering methods.

5 - The entire length of single wall metal vent connector shall be readily accessible for inspection, cleaning, and replacement.

6 - Single appliance venting configurations with zero lateral lengths, see tables 3 and 4, are assumed to have no elbows in the vent system. For all other vent configurations, the vent system is assumed to have two 90° elbows. For each additional 90° elbow or equivalent (for example two 45° elbows equal one 90° elbow) beyond two, the maximum capacity listed in the venting table should be reduced by 10 percent (0.90 x maximum listed capacity).

7 - The common venting tables 5, 6, 7, and 8 were generated using a maximum horizontal vent connector length of 1-1/2 feet (18 inches) for each inch of connector diameter as follows:

TABLE 2

Connector Diameter inches (mm)	Maximum Horizontal Connector Length feet (m)
3 (76)	4-1/2 (1.37)
4 (102)	6 (1.83)
5 (127)	7-1/2 (2.29)
6 (152)	9 (2.74)
7 (178)	10-1/2 (3.20)

8 - If the common vertical vent is offset, the maximum common vent capacity listed in the common venting tables should be reduced by 20%, the equivalent of two 90° elbows (0.80 x maximum common vent capacity). The horizontal length of the offset shall not exceed 1-1/2 feet (.46 m) for each inch (25 mm) of common vent diameter.

9 - The vent pipe should be as short as possible with the least number of elbows and angles to do the job. The vent connector should be routed to the vent using the shortest possible route.

10- A vent connector shall be supported without any dips or sags and shall slope a minimum of 1/4inch (6.4 mm) per linear foot (305 mm) of connector, back toward the appliance. See local and national installation codes for support intervals and methods. National installation code in the U.S.A is current edition of National fuel Gas Code (ANSI-Z223.1/NFPA54). National installation codes in Canada are current editions of CSA-B149 codes.

11- Vent connectors shall be firmly attached to furnace flue collars by sheet metal screws or other approved means, except vent connectors of listed Type B vent material which shall be assembled according to the manufacturer's instructions. Joints between sections of single wall connector piping shall be fastened by sheet metal screws or other approved means.

12- When the vent connector used for Category I appliances must be located in or pass through a crawl space or other areas which may be cold, that portion of the vent connector shall be constructed of listed double-wall Type B vent material or material having equivalent insulation qualities.

13- All venting pipe passing through floors, walls, and ceilings must be installed with the listed clearance to combustible materials and be fire stopped according to local codes. In absence of local codes, refer to NFGC (Z223.1/NFPA54).

14- No portion of the venting system can extend into, or pass through any circulation air duct or plenum.

15- Vent connectors serving Category I appliances shall not be connected to any portion of mechanical draft systems operating under positive pressure such as Category III or IV venting systems.

16- If vent connectors are combined prior to entering the common vent, the maximum common vent capacity listed in the common venting tables must be reduced by 10 percent, the equivalent of one 90° elbow (0.90 x maximum common vent capacity).

17- The common vent diameter must always be at least as large as the largest vent connector diameter.

18- In no case, shall the vent connector be sized more than two consecutive table size diameters over the size of the flue collar outlet.

19- Do not install a manual damper, barometric draft regulator or flue restrictor between the furnace and the chimney.

20- When connecting this appliance to an existing dedicated or common venting system, the venting system must be inspected for signs of corrosion and general condition. The sizing of the vent system must be reviewed and must conform to these instructions and the provided venting tables for the USA, and the appropriate venting tables in the standards of CSA B149.1 of the Natural Gas and Propane Installation Code for Canada. If the existing system is in conflict with these requirements, the venting system must be resized.

TABLE 3
CAPACITY OF TYPE B DOUBLE-WALL VENTS WITH TYPE B DOUBLE-WALL CONNECTORS SERVING A SINGLE CATEGORY I APPLIANCE

Height H (feet)	Lateral L (feet)	Vent and Connector Diameter - D (inches)							
		3 Inch		4 Inch		5 Inch		6 Inch	
		Appliance Input Rating in Thousands of Btu Per Hour							
		MIN	MAX	MIN	MAX	MIN	MAX	MIN	MAX
6	0	0	78	0	152	0	251	0	375
	2	13	51	18	97	27	157	32	232
	4	21	49	30	94	39	153	50	227
	6	25	46	36	91	47	149	59	223
8	0	0	84	0	165	0	276	0	415
	2	12	57	16	109	25	178	28	263
	5	23	53	32	103	42	171	53	255
	8	28	49	39	98	51	164	64	247
10	0	0	88	0	175	0	295	0	447
	2	12	61	17	118	23	194	26	289
	5	23	57	32	113	41	187	52	280
	10	30	51	41	104	54	176	67	267
15	0	0	94	0	191	0	327	0	502
	2	11	69	15	136	20	226	22	339
	5	22	65	30	130	39	219	49	330
	10	29	59	40	121	51	206	64	315
	15	35	53	48	112	61	195	76	301
20	0	0	97	0	202	0	349	0	540
	2	10	75	14	149	18	250	20	377
	5	21	71	29	143	38	242	47	367
	10	28	64	38	133	50	229	62	351
	15	34	58	46	124	59	217	73	337
	20	48	52	55	116	69	206	84	322
30	0	0	100	0	213	0	374	0	587
	2	9	81	13	166	14	283	18	432
	5	21	77	28	160	36	275	45	421
	10	27	70	37	150	48	262	59	405
	15	33	64	44	141	57	249	70	389
	20	56	58	53	132	66	237	80	374
	30	NR	NR	73	113	88	214	104	346

NOTE - Single appliance venting configurations with zero lateral lengths are assumed to have no elbows in the vent system. For all other vent configurations, the vent system is assumed to have two 90° elbows. For each additional 90° elbow or equivalent (for example two 45° elbows equal one 90° elbow) beyond two, the maximum capacity listed in the venting table should be reduced by 10 percent (0.90 x maximum listed capacity).

TABLE 4
CAPACITY OF TYPE B DOUBLE-WALL VENTS WITH SINGLE-WALL METAL CONNECTORS SERVING A SINGLE CATEGORY I APPLIANCE

Height H (feet)	Lateral L (feet)	Vent and Connector Diameter - D (inches)							
		3 Inch		4 Inch		5 Inch		6 Inch	
		Appliance Input Rating in Thousands of Btu Per Hour							
		MIN	MAX	MIN	MAX	MIN	MAX	MIN	MAX
6	0	38	77	59	151	85	249	126	373
	2	39	51	60	96	85	156	123	231
	4	NR	NR	74	92	102	152	146	225
	6	NR	NR	83	89	114	147	163	220
8	0	37	83	58	164	83	273	123	412
	2	39	56	59	108	83	176	121	261
	5	NR	NR	77	102	107	168	151	252
	8	NR	NR	90	95	122	161	175	243
10	0	37	87	57	174	82	293	120	444
	2	39	61	59	117	82	193	119	287
	5	52	56	76	111	105	185	148	277
	10	NR	NR	97	100	132	171	188	261
15	0	36	93	56	190	80	325	116	499
	2	38	69	57	136	80	225	115	337
	5	51	63	75	128	102	216	144	326
	10	NR	NR	95	116	128	201	182	308
	15	NR	NR	NR	NR	158	186	220	290
20	0	35	96	54	200	78	346	114	537
	2	37	74	56	148	78	248	113	375
	5	50	68	73	140	100	239	141	363
	10	NR	NR	93	129	125	223	177	344
	15	NR	NR	NR	NR	155	208	216	325
	20	NR	NR	NR	NR	186	192	254	306
30	0	34	99	53	211	76	372	110	584
	2	37	80	55	164	76	281	109	429
	5	49	74	72	157	98	271	136	417
	10	NR	NR	91	144	122	255	171	397
	15	NR	NR	115	131	151	239	208	377
	20	NR	NR	NR	NR	181	223	246	357
	30	NR	NR	NR	NR	NR	NR	NR	NR

NOTE - Single appliance venting configurations with zero lateral lengths are assumed to have no elbows in the vent system. For all other vent configurations, the vent system is assumed to have two 90° elbows. For each additional 90° elbow or equivalent (for example two 45° elbows equal one 90° elbow) beyond two, the maximum capacity listed in the venting table should be reduced by 10 percent (0.90 x maximum listed capacity).

TABLE 5
CAPACITY OF TYPE B DOUBLE-WALL VENTS WITH TYPE B DOUBLE-WALL CONNECTORS SERVING TWO OR MORE CATEGORY I APPLIANCES
VENT CONNECTOR CAPACITY

Vent Height H (feet)	Connector Rise R (feet)	Vent and Connector Diameter - D (inches)							
		4 Inch		5 Inch		6 Inch		7 Inch	
		Appliance Input Rating in Thousands of Btu Per Hour							
		MIN	MAX	MIN	MAX	MIN	MAX	MIN	MAX
6	1	35	66	46	106	58	164	77	225
	2	37	75	48	121	60	183	79	253
	3	38	81	49	132	62	199	82	275
8	1	35	72	49	114	64	176	84	243
	2	36	80	51	128	66	195	86	269
	3	37	87	53	139	67	210	88	290
10	1	34	78	49	123	65	189	89	257
	2	36	86	51	136	67	206	91	282
	3	37	92	52	146	69	220	94	303
15	1	33	89	47	142	64	220	88	298
	2	35	96	49	153	66	235	91	320
	3	36	102	51	163	68	248	93	339
20	1	33	99	46	157	62	246	86	334
	2	34	105	48	167	64	259	89	354
	3	35	110	50	176	66	271	91	371
30	1	31	113	45	181	60	288	83	391
	2	33	118	47	190	62	299	85	408
	3	34	123	48	198	64	309	88	423

TABLE 6
CAPACITY OF TYPE B DOUBLE-WALL VENTS WITH TYPE B DOUBLE-WALL CONNECTORS SERVING TWO OR MORE CATEGORY I APPLIANCES
COMMON VENT CAPACITY

Vent Height H (feet)	Common Vent Diameter - D (inches)							
	4 Inch		5 Inch		6 Inch		7 Inch	
	Appliance Input Rating in Thousands of Btu Per Hour							
	FAN + FAN	FAN + NAT	FAN + FAN	FAN + NAT	FAN + FAN	FAN + NAT	FAN + FAN	FAN + NAT
6	92	81	140	116	204	161	309	248
8	101	90	155	129	224	178	339	275
10	110	97	169	141	243	194	367	299
15	125	112	195	164	283	228	427	352
20	136	123	215	183	314	255	475	394
30	152	138	244	210	361	297	547	459

TABLE 7
CAPACITY OF TYPE B DOUBLE-WALL VENT WITH SINGLE-WALL METAL CONNECTORS SERVING TWO OR MORE CATEGORY I APPLIANCES - VENT CONNECTOR CAPACITY

Vent Height H (feet)	Connector Rise R (feet)	Vent and Connector Diameter - D (inches)							
		4 Inch		5 Inch		6 Inch		7 Inch	
		Appliance Input Rating in Thousands of Btu Per Hour							
		MIN	MAX	MIN	MAX	MIN	MAX	MIN	MAX
6	1	NR	NR	NR	NR	NR	NR	207	223
	2	NR	NR	NR	NR	168	182	215	251
	3	NR	NR	121	131	174	198	222	273
15	1	79	87	116	138	177	214	238	291
	2	83	94	121	150	185	230	246	314
	3	87	100	127	160	193	243	255	333
30	1	77	110	113	175	169	278	226	380
	2	81	115	117	185	177	290	236	397
	3	85	119	122	193	185	300	244	412

TABLE 8
CAPACITY OF TYPE B DOUBLE-WALL VENTS WITH SINGLE-WALL METAL CONNECTORS SERVING TWO OR MORE CATEGORY I APPLIANCES - COMMON VENT CAPACITY

Vent Height H (feet)	Common Vent Diameter - D (inches)							
	4 Inch		5 Inch		6 Inch		7 Inch	
	Appliance Input Rating in Thousands of Btu Per Hour							
	FAN + FAN	FAN + NAT	FAN + FAN	FAN + NAT	FAN + FAN	FAN + NAT	FAN + FAN	FAN + NAT
6	89	78	136	113	200	158	304	244
8	98	87	151	126	218	173	331	269
10	106	94	163	137	237	189	357	292
15	121	108	189	159	275	221	416	343
20	131	118	208	177	305	247	463	383
30	145	132	236	202	350	286	533	446

Removal of the Furnace from Common Vent

In the event that an existing furnace is removed from a venting system commonly run with separate gas appliances, the venting system is likely to be too large to properly vent the remaining attached appliances. The following test should be conducted while each appliance in operation and the other appliances not in operation remain connected to the common venting system. If the venting system has been installed improperly, the system must be corrected as indicated in the general venting requirements section.

1 - Seal any unused openings in the common venting system.

2 - Visually inspect the venting system for proper size and horizontal pitch. Determine there is no blockage or restriction, leakage, corrosion, or other deficiencies which could cause an unsafe condition.

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

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

5 - Test for spillage of the flue gases 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.

6 - After determining that each appliance remaining connected to the common venting system properly vents when tested as indicated instep 3, return doors, windows, exhaust fans, fireplace dampers and any other gas-burning appliance to their previous condition of use.

7 - If improper venting is observed during any of the above tests, the common venting system must be corrected. The common venting system should be resized to approach the minimum size as determined by using the appropriate tables in appendix G in the current standards of the National Fuel Gas Code ANSI Z223.1 /NFPA54 in the USA, and the appropriate Category 1 Natural Gas appliances venting sizing tables in the current standards of the CSA-B149.1 Natural Gas Installation Code in Canada.

Testing for Proper Venting and Sufficient Combustion Air (Non-Direct Vent Applications Only)

⚠ WARNING

CARBON MONOXIDE POISONING HAZARD!

Failure to follow the steps outlined below for each appliance connected to the venting system being placed into operation could result in carbon monoxide poisoning or death.
The following steps shall be followed for each appliance connected to the venting system being placed into operation, while all other appliances connected to the venting system are not in operation.

After the furnace has been started, the following test should be conducted to ensure proper venting and sufficient combustion air has been provided to the furnace, as well as to other gas-fired appliances which are separately vented. The test should be conducted while all appliances (both in operation and those not in operation) are connected to the venting system being tested.

1 - Seal any unused openings in the venting system.

2 - Visually inspect the venting system for proper size and horizontal pitch. Determine there is no blockage or restriction, leakage, corrosion, or other deficiencies which could cause an unsafe condition.

3 - To the extent that it is practical, close all building doors and windows and all doors between the space in which the appliances connected to the venting system are located and other spaces of the building.

4 - Close fireplace dampers.

5 - Turn on clothes dryers and any appliances not connected to the 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.

6 - Follow the lighting instruction to place the appliance being inspected into operation. Adjust thermostat so appliance will operate continuously.

7 - Test for spillage of flue gases at the draft hood relief opening after 5 minutes of main burner operation. Use the flame of match or candle, or smoke from a cigarette, cigar.

8 - If improper venting is observed during any of the above tests, the venting system must be corrected or sufficient combustion/make-up air must be provided. The venting system should be re-sized to approach the minimum size as determined by using the appropriate tables in appendix G in the current standards of the National Fuel Gas Code ANSI-Z223.1/NPFA 54 in the U.S.A., and the appropriate Natural Gas and Propane appliances venting sizing tables in the current standard of the CSA-B149.1 Natural Gas and Propane Installation Code in Canada.

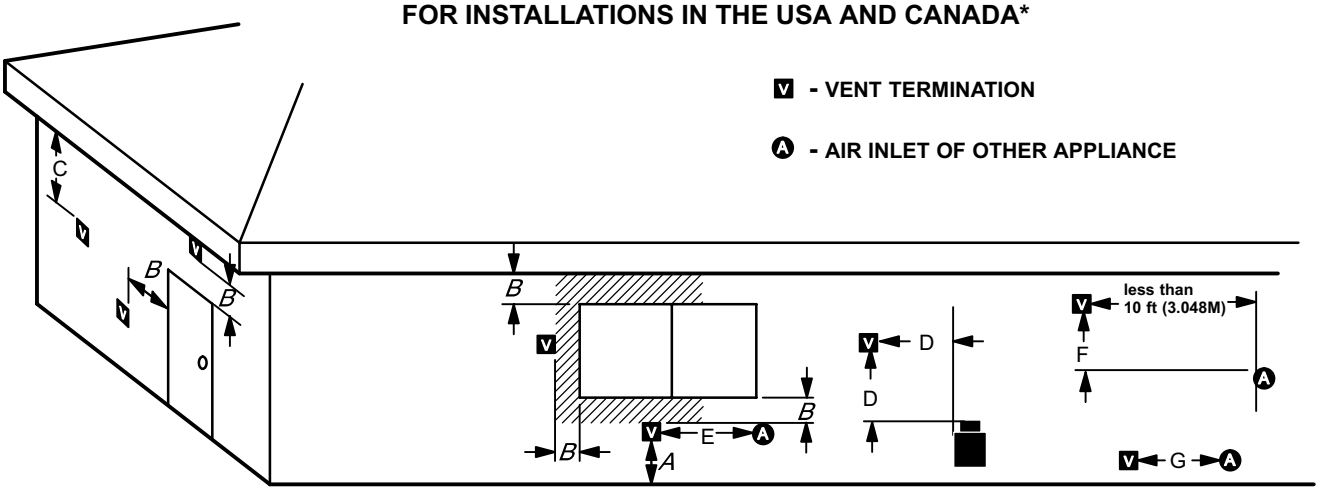
9 - After determining that each appliance remaining connected to the common venting system properly vents when tested as indicated in step 3, return doors, windows, exhaust fans, fireplace dampers and any other gas-burning appliance to their previous condition of use.

General Guidelines for Vent Terminations for Non-Direct Vent Installations.

In Non-Direct Vent applications, combustion air is taken from indoors and the flue gases are discharged to the outdoors. The furnace is then classified as a non-direct vent, Category IV gas furnace. In Non-Direct Vent applications, the vent termination is limited by local building codes. In the absence of local codes, refer to the current National Fuel Gas Code ANSI Z223-1/NFPA 54 in U.S.A., and current standards CSA-B149.1 of the Natural Gas and Propane Installation Codes in Canada for details.

Position termination end according to location given in figure 11. In addition, position termination end so it is free from any obstructions and above the level of snow accumulation (where applicable). The termination should be at least 12 inches (305mm) from any opening through which flue products could enter the building.

VENT TERMINATION CLEARANCES
FOR INSTALLATIONS IN THE USA AND CANADA*



A - *Clearance above grade* - 12 in. (305mm) minimum.

B - *Clearance to window or door* -
for vent installations in USA - 48 in. (1219mm) minimum horizontal and below, 12 in. (305mm) minimum above.
for vent installations in Canada - 12 in. (305mm) minimum for appliances $\leq$ 100,000 Btuh (30 kW);
36 in. (0.9m) minimum for appliances > 100,000 Btuh (30 kW).

C - *Do not position terminations directly under roof eaves.*

D - *Clearance to electric meters, gas meters, regulators, and relief equipment* -
for vent installations in USA - 48 in (1219mm) minimum.
for vent installations in Canada - see current edition of CSA B149 Code.

E - *Clearance to non-mechanical air supply inlet*
for vent installations in USA - 48 in. (1219mm) minimum horizontal and below, 12 in. (305mm) minimum above.
for vent installations in Canada - 12 in. (305mm) minimum for appliances $\leq$ 100,000 Btuh (30 kW);
36 in. (0.9m) minimum for appliances > 100,000 Btuh (30 kW).

F - *Clearance to mechanical air supply inlet* --
for vent installations in USA - 36 in. minimum (914mm**).**

G - *Clearance to mechanical air supply inlet* --
for vent installations in Canada - 72 in. (1829mm) minimum.

H - *Do not point terminations into recessed areas such as window wells, stairwells or alcoves.*

J - *Do not position terminations directly above a walkway.*

* Note -
(I) Dimensions are from the current edition of The National Fuel Gas Code - ANSI-Z223.1/NFPA 54 for USA installations. In Canada, refer to current edition of CSA building code. Local codes or regulations may require different clearances.

(II) In Non-Direct Vent installations, combustion air is taken from indoors and the flue gases are discharged to the outdoors.

FIGURE 11

Horizontal Venting

This furnace design is certified by CSA international for horizontal venting through an outside wall, only with the use of two Field Controls Company Model SWG-4L sidewall venting kits, available from any Lennox Dealer Service Center. No other Field brand venting kits or any other manufacturer's venting kits are acceptable. Horizontal venting of this furnace without the use of the above stated kits is prohibited.

NOTE - Each heat section of the G24-200 unit requires its own sidewall venting kit. The two venting systems shall be completely separate starting at the outlet of each heat section and ending with the vent terminal of each Field Controls Venting Kit. (See figure 12 for field wiring of the two sidewall horizontal venting kits.)

When horizontally vented, the minimum clearance for terminations from electric meters, gas meters, regulators and relief equipment is 4 ft. (1.2m) for US installations. Refer to the current CSA-B149.1 for installations in Canada or with authorities having local jurisdiction.

At vent terminations, care must be taken to maintain protective coatings over building materials (prolonged exposure to exhaust condensate can destroy protective coatings). It is recommended that the exhaust outlet not be located within 6 feet (1.8 m) of a condensing unit because the condensate can damage the painted coating.

WIRING FOR SIDEWALL VENTING KITS
(Two kits are required - one for each heat section.)

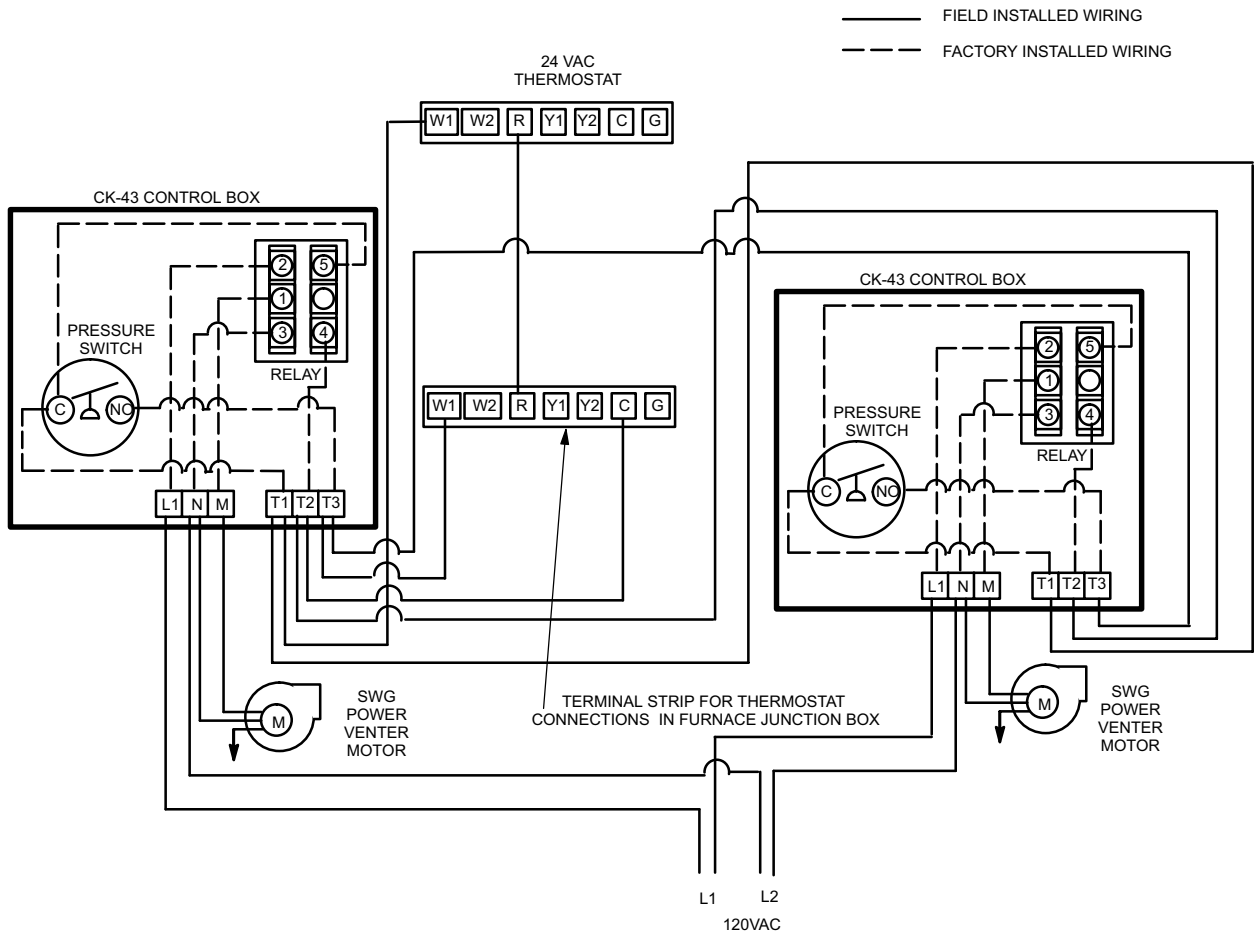


FIGURE 12

Gas Piping

NOTE - The flexible connector supplied with the unit must not be modified and must be installed between the two combination gas controls.

1 - Piping can be installed to enter either side of cabinet. Refer to figure 13.

Left-Side Installation - Install flexible connector (supplied with unit) between gas valves and connect supply piping as shown.

Right-Side Installation -

a - Remove tee and 1/2 in. NPTx1/2 in. male brass fitting from left side gas valve.

b - Remove 1/2 in. elbow and nipple from right side gas valve and re-install on left side gas valve facing toward right side cabinet entry.

c - Re-install tee and 1/2 in. NPTx1/2 in. male brass fitting on right side gas valve with 3/4 in. side of tee facing the right side cabinet entry.

d - Install flexible connector (supplied with unit) between gas valves and connect supply piping as shown.

NOTE - Flexible gas connector must be routed so that connector does NOT come in contact or interfere with any wiring.

2 - When connecting the gas supply, factors such as length of run, number of fittings and furnace rating must be considered to avoid excessive pressure drop. Table 9 lists recommended pipe sizes for typical applications.

3 - The gas piping must not run in or through air ducts, clothes chutes, gas vents or chimneys, dumbwaiters or elevator shafts.

4 - The piping should be sloped 1/4 inch (6.4 mm) per 15 feet (4.57 m) upward toward the meter from the furnace. The piping must be supported at proper intervals [every 8 to 10 feet (2.44 to 3.01 m) using suitable hangers or straps. A drip leg should be installed in vertical pipe runs to the unit.

5 - In some localities, codes may require installation of a manual main shut-off valve and union (furnished by the installer) external to the unit. Union must be of the ground joint type.

6 - A 1/8" N.P.T. plugged tap is located on gas valve for test gauge connection. See figure 20 for tap location.

⚠IMPORTANT

Compounds used on threaded joints of gas piping must be resistant to the actions of liquified petroleum gases.

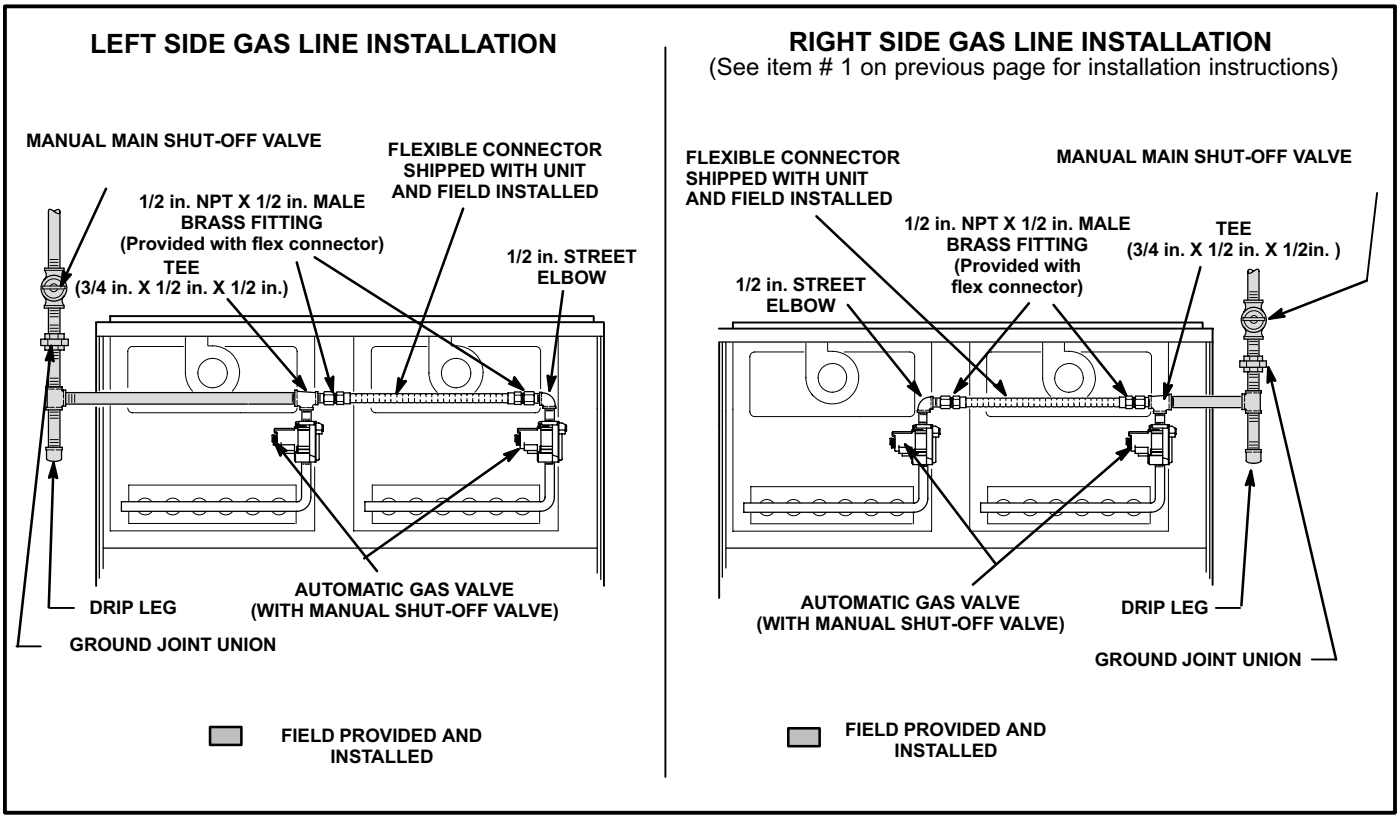


FIGURE 13

TABLE 9
GAS PIPE CAPACITY - FT³/HR (KL/HR)

Nominal Iron Pipe Size Inches(mm)	Internal Diameter Inches(mm)	Length of Pipe - Feet (m)									
		10 (3.048)	20 (6.096)	30 (9.144)	40 (12.192)	50 (15.240)	60 (18.288)	70 (21.336)	80 (24.384)	90 (27.432)	100 (30.480)
1/4 (6.35)	.364 (9.246)	43 (1.13)	29 (.82)	24 (.68)	20 (.57)	18 (.51)	16 (.45)	15 (.42)	14 (.40)	13 (.37)	12 (.34)
3/8 (9.53)	.493 (12.522)	95 (2.69)	65 (1.84)	52 (1.47)	45 (1.27)	40 (1.13)	36 (1.02)	33 (.73)	31 (.88)	29 (.82)	27 (.76)
1/2 (12.7)	.622 (17.799)	175 (4.96)	120 (3.40)	97 (2.75)	82 (2.32)	73 (2.07)	66 (1.87)	61 (1.73)	57 (1.61)	53 (1.50)	50 (1.42)
3/4 (19.05)	.824 (20.930)	360 (10.19)	250 (7.08)	200 (5.66)	170 (4.81)	151 (4.28)	138 (3.91)	125 (3.54)	118 (3.34)	110 (3.11)	103 (2.92)
1 (25.4)	1.049 (26.645)	680 (919.25)	465 (13.17)	375 (10.62)	320 (9.06)	285 (8.07)	260 (7.36)	240 (6.80)	220 (6.23)	205 (5.80)	195 (5.52)
1-1/4 (31.75)	1.380 (35.052)	1400 (39.64)	950 (26.90)	770 (21.80)	660 (18.69)	580 (16.42)	530 (15.01)	490 (13.87)	460 (13.03)	430 (12.18)	400 (11.33)
1-1/2 (38.1)	1.610 (40.894)	2100 (59.46)	460 (41.34)	1180 (33.41)	990 (28.03)	900 (25.48)	810 (22.94)	750 (21.24)	690 (19.54)	650 (18.41)	620 (17.56)
2 (50.8)	2.067 (52.502)	3950 (111.85)	2750 (77.87)	2200 (62.30)	1900 (53.80)	1680 (47.57)	1520 (43.04)	1400 (39.64)	1300 (36.81)	1220 (34.55)	1150 (32.56)
2-1/2 (63.5)	2.469 (67.713)	6300 (178.39)	4350 (123.17)	3520 (99.67)	3000 (84.95)	2650 (75.04)	2400 (67.96)	2250 (63.71)	2050 (58.05)	1950 (55.22)	1850 (52.38)
3 (76.2)	3.068 (77.927)	11000 (311.48)	7700 (218.03)	6250 (176.98)	5300 (150.07)	4750 (134.50)	4300 (121.76)	3900 (110.43)	3700 (104.77)	3450 (97.69)	3250 (92.03)
4 (101.6)	4.026 (102.260)	23000 (651.27)	15800 (447.39)	12800 (362.44)	10900 (308.64)	9700 (274.67)	8800 (249.18)	8100 (229.36)	7500 (212.37)	7200 (203.88)	6700 (189.72)

NOTE - Capacity given in cubic feet (m^3) of gas per hour and based on 0.60 specific gravity gas.

Leak Check

After gas piping is completed, carefully check all piping connections (factory- and field-installed) for gas leaks. Use a leak detecting solution or other preferred means.

⚠WARNING

FIRE OR EXPLOSION HAZARD

Failure to follow the safety warnings exactly could result in serious injury, death or property damage.

Never test for gas leaks with an open flame. Use a commercially available soap solution made specifically for the detection of leaks to check all connections. A fire or explosion may result causing property damage, personal injury or loss of life.

NOTE - In case emergency shutdown is required, shut off the main manual gas valve and disconnect the main power to the furnace. These devices should be properly labeled by the installer.

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

⚠IMPORTANT

When testing pressure of gas lines, gas valve must be disconnected and isolated. See figure 14. Gas valves can be damaged if subjected to more than 1/2 psig (3.48 kPa).

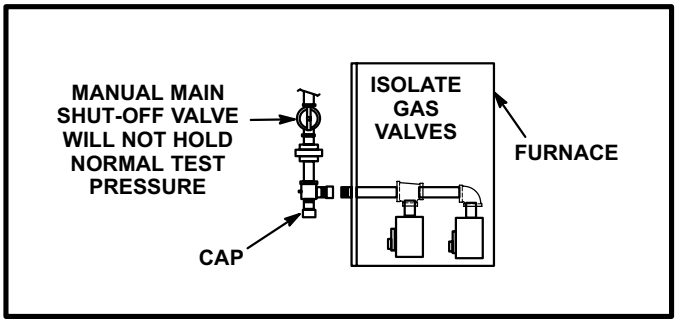


FIGURE 14

Electrical

⚠CAUTION

Electrostatic discharge can affect electronic components. Take precautions during furnace installation and service to protect the furnace's electronic controls. Precautions will help to avoid control exposure to electrostatic discharge by putting the furnace, the control and the technician at the same electrostatic potential. Neutralize electrostatic charge by touching hand and all tools on an unpainted unit surface, such as the gas valve or blower deck, before performing any service procedure.

Refer to figure 15, 16, and 17 for field wiring and figures 18 and 19 for schematic wiring diagram and troubleshooting.

1 - Select circuit protection and wire size according to requirements listed on unit rating plate.

2 - Install a separate disconnect switch (protected by either fuse or circuit breaker) near the unit so power can be turned off for servicing.

3 - Make power supply wire connections at unit make-up boxes (both left and right side boxes are provided).

4 - Install the room thermostat according to the instructions provided with the thermostat and make connections according to the appropriate field wiring diagram. Install a field-provided 150 ohm, 10 watt resistor (Lennox part number P-8-6256) in two-stage applications when using an electro-mechanical thermostat.

5 - All applications require a control transformer to power the furnace's 24 volt circuit. In all applications except those where a 208/230 volt power supply is used, an autotransformer is required to power each of the induced draft blowers. These transformer(s) are provided in the drive kit which has been selected for use with the furnace. Transformer part numbers and voltages are given in table 10.
Install the transformer(s) in the control box using the holes pre-drilled for them.
Select a field wiring diagram according to the power supply voltage and phase being used (see figure 15, 16, or 17), and make the wiring connections between the transformers and the furnace.

6 - Select a field wiring diagram according to the power supply voltage and phase being used (see figure 15, 16, or 17), and make wiring connections between the blower motor and the furnace. The connecting wires are provided in the drive kit.

7 - An accessory relay (K109) is provided with the G24-200 furnace. Any accessory with a rated voltage equal to the supply voltage can be connected to terminal "5" of this relay. The relay is energized with the blower.

8 - To add an accessory which is energized on a heating demand (such as a humidifier), a relay with coil wired to terminal "W1" of the TB1 terminal strip must be added.

9 - The "TB1" terminal strip includes a terminal for economizer connection. See the field wiring diagrams.

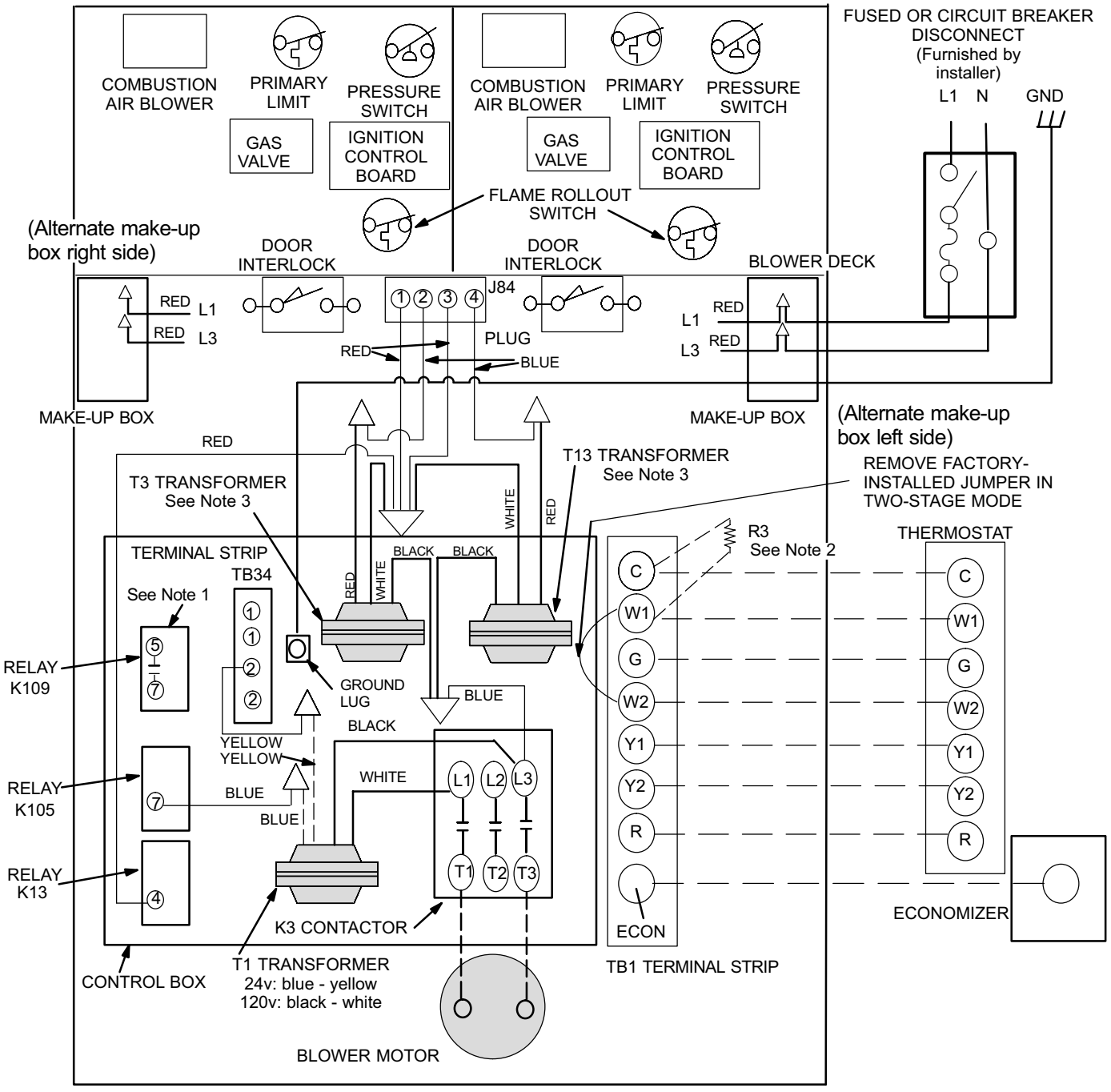
10 - Electrically ground the unit according to local codes or, in the absence of local codes, according to the current National Electric Code (ANSI/NFPA No. 70) for the USA or current Canadian Electric Code part 1 (CSA standard C22.1) for Canada.

TABLE 10
DRIVE KIT TRANSFORMER VOLTAGES AND PART NUMBERS

Drive Kit Model No.	Furnace Supply Voltage, Phase, Frequency	**Induced Draft Blower Autotransformers				Control Circuit Transformer			
		Transformer Part Number & (Quantity)	Wiring Diagram Designation	Input Voltage	Output Voltage	Transformer Part Number	Wiring Diagram Designation	Primary Voltage	Secondary-Voltage
DKG24-200-1	120v, 1ph, 60hz	54G5201* (2)	T3, T13	115*	230*	LB-66256G (99K0601)	T1	120	24
DKG24-200-2	208/230v, 1ph, 60hz	- - - -	- - - -	- - - -	- - - -	LB-66256G (99K0601)	T1	208 or 240	24
DKG24S-200-3, DKG24-200-6	208/230v, 3ph, 60hz	- - - -	- - - -	- - - -	- - - -	LB-66256K (13H2801)	T1	208 or 240	24
DKG24S-200-4, DKG24-200-7	460v, 3ph, 60hz	54G5201 (2)	T3, T13	460	230	LB-66256H (51H7901)	T1	480	24
DKG24S-200-5, DKG24-200-8	575v, 3ph, 60hz	54G3101 (2)	T3, T13	575	230	LB-66256J (66J5401)	T1	600	24

*Note - This transformer has a nominal 230 volt output rating and a 460 volt input rating; however, when wired to the furnace as shown in figure 15, a 115 volt input will produce a 230 volt output.
**Note - The induced draft blowers are rated at 230 volts, single phase, 60 hz.

G24-200 FIELD WIRING DIAGRAM (120V SINGLE PH 60HZ)



NOTES : 1 - Relay K109 can be used for an accessory rated at the same voltage as power supply.

2 - Field installed and supplied resistor (R3), is required in two-stage applications when using electro-mechanical thermostat. (Use a 150 ohm, 10 watt resistor - Lennox part number P-8-6256.)

3 - The T3 and T13 transformers (54G5201) are marked as follows: 230v between white and black leads and 460v between white and red leads. However, in this application, each transformer has been used to supply 230v (available between the white and red leads) to an induce draft blower when 115v is applied between the white and black leads of each transformer.

FIELD-INSTALLED DRIVE KIT COMPONENT
FACTORY INSTALLED
LINE VOLTAGE FIELD INSTALLED
24 VOLTS FIELD INSTALLED

FIGURE 15

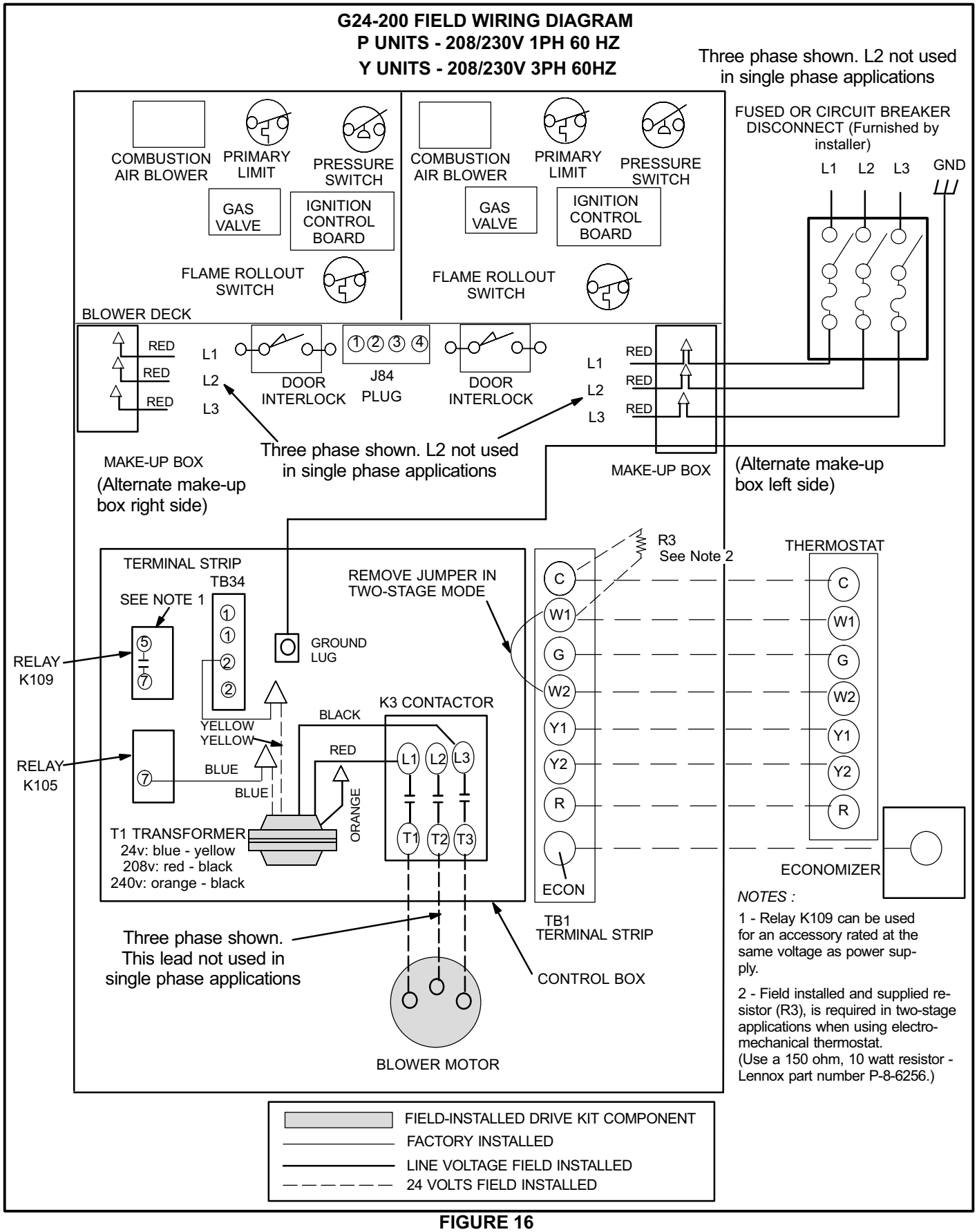
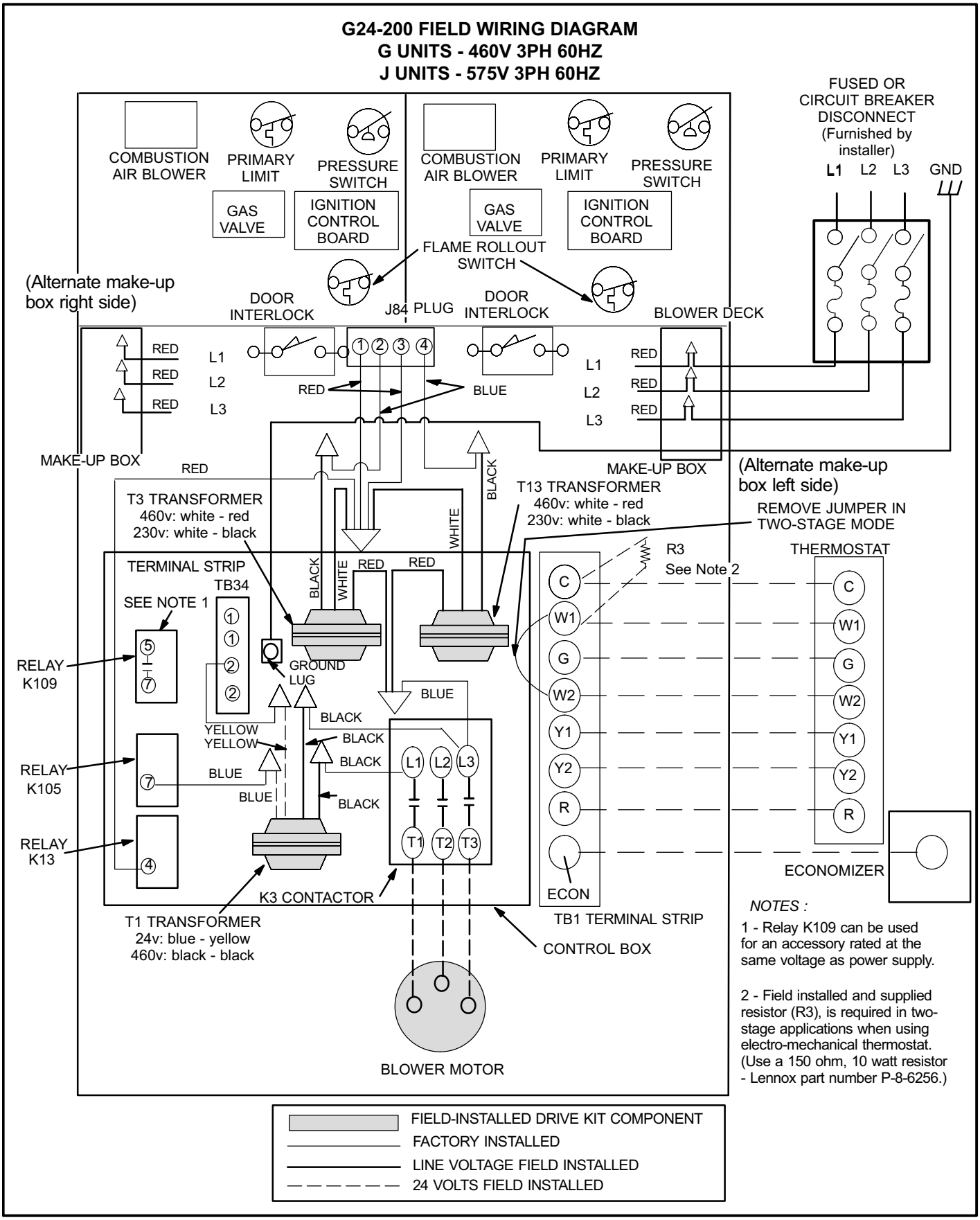

G24-200 FIELD WIRING DIAGRAM
P UNITS - 208/230V 1PH 60 HZ
Y UNITS - 208/230V 3PH 60HZ
Three phase shown. L2 not used in single phase applications
COMBUSTION AIR BLOWER
PRIMARY LIMIT
PRESSURE SWITCH
GAS VALVE
IGNITION CONTROL BOARD
FLAME ROLLOUT SWITCH
BLOWER DECK
FUSED OR CIRCUIT BREAKER DISCONNECT (Furnished by installer)
L1 L2 L3 GND
RED
L1
L2
L3
DOOR INTERLOCK
J84 PLUG
MAKE-UP BOX
(Alternate make-up box right side)
(Alternate make-up box left side)
TERMINAL STRIP
TB34
SEE NOTE 1
REMOVE JUMPER IN TWO-STAGE MODE
R3
See Note 2
THERMOSTAT
C
W1
G
W2
Y1
Y2
R
ECON
RELAY K109
RELAY K105
GROUND LUG
K3 CONTACTOR
YELLOW
BLACK
BLUE
ORANGE
T1 TRANSFORMER
24v: blue - yellow
208v: red - black
240v: orange - black
TB1 TERMINAL STRIP
ECONOMIZER
CONTROL BOX
BLOWER MOTOR
NOTES :
1 - Relay K109 can be used for an accessory rated at the same voltage as power supply.
2 - Field installed and supplied resistor (R3), is required in two-stage applications when using electro-mechanical thermostat. (Use a 150 ohm, 10 watt resistor - Lennox part number P-8-6256.)
FIELD-INSTALLED DRIVE KIT COMPONENT
FACTORY INSTALLED
LINE VOLTAGE FIELD INSTALLED
24 VOLTS FIELD INSTALLED

FIGURE 16

G24-200 FIELD WIRING DIAGRAM
G UNITS - 460V 3PH 60HZ
J UNITS - 575V 3PH 60HZ



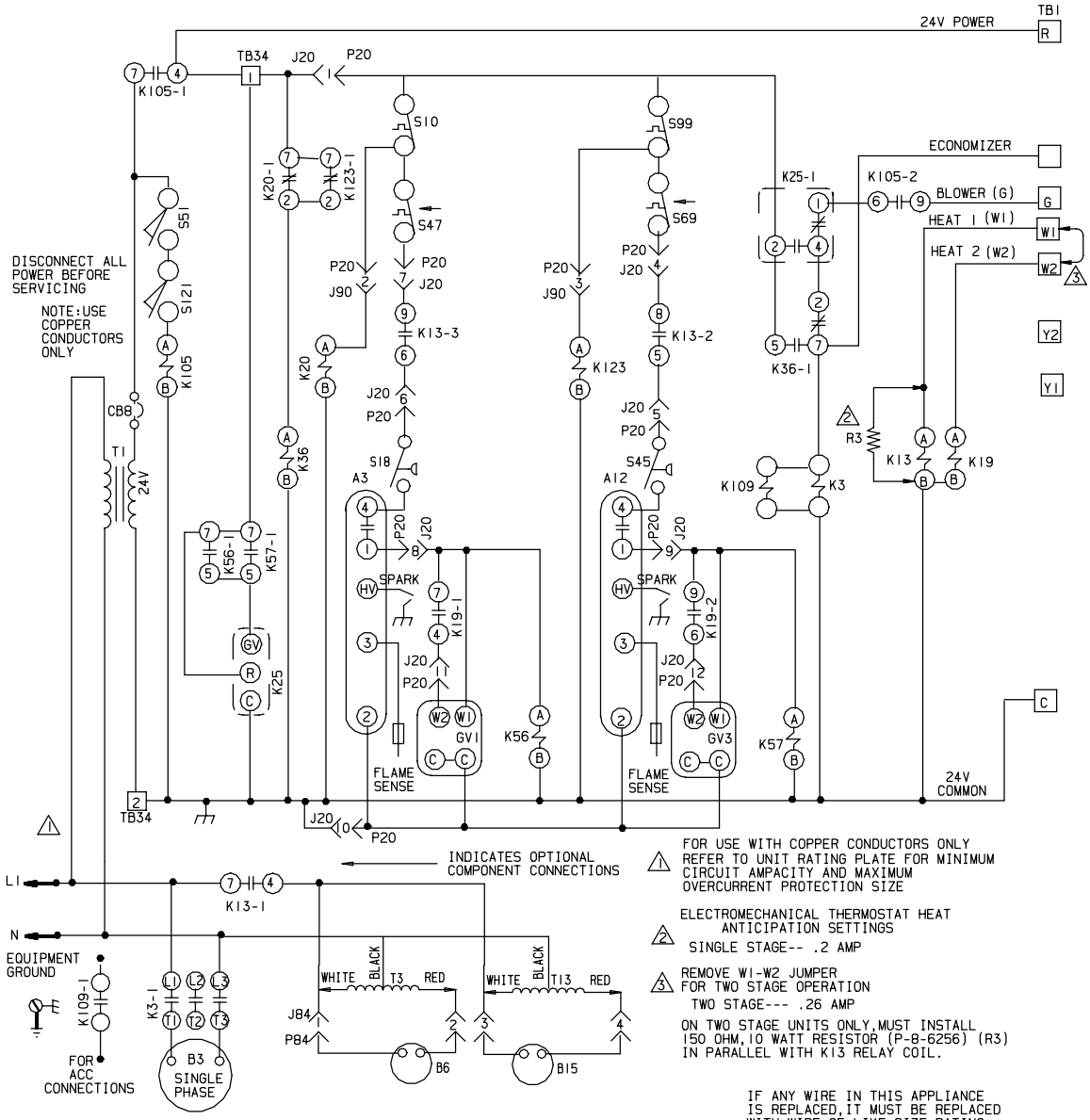
NOTES :

1 - Relay K109 can be used for an accessory rated at the same voltage as power supply.

2 - Field installed and supplied resistor (R3), is required in two-stage applications when using electro-mechanical thermostat. (Use a 150 ohm, 10 watt resistor - Lennox part number P-8-6256.)

FIGURE 17

SCHEMATIC WIRING DIAGRAM FOR G24-200 UNITS (120V SINGLE PHASE 60HZ)



DESCRIPTION	
KEY	COMPONENT
A3	CONTROL-BURNER 1
A12	CONTROL-BURNER 2
B3	MOTOR-BLOWER
B6	MOTOR-COMB AIR BLOWER 1
B15	MOTOR-COMB AIR BLOWER 2
CB8	CIRCUIT BREAKER-TRANS T1
GV1	VALVE-GAS 1
GV3	VALVE-GAS 2
J20	JACK-GAS
J84	JACK-COMB AIR BLOWER
K3,-1	CONTACTOR-BLOWER
K13,-1,2,3	RELAY-COMB AIR BLOWER
K19,-1,2	RELAY-STAGE 2 HEAT
K20,-1	RELAY-LIMIT, BLOWER
K25,-1	RELAY-BLOWER DELAY
K36,-1	RELAY-HEAT BLOWER
K56,-1	RELAY-HEAT BLOWER 1
K57,-1	RELAY-HEAT BLOWER 2

DESCRIPTION	
KEY	COMPONENT
K105,-1,2	RELAY-BLOWER SENSE
K109,-1	RELAY-ACCESSORY
K123,-1	RELAY-LIMIT
P20	PLUG-GAS
P84	PLUG-COMB AIR BLOWER
R3	RESISTOR-ANTICIPATOR
S10	SWITCH-LIMIT, PRIMARY
S18	SWITCH-COMB AIR BLOWER,PROVE
S45	SWITCH-COMB AIR BLO. PROVE 2
S47	SWITCH-FLAME ROLLOUT 1
S51	SWITCH-DOOR INTERLOCK 1
S69	SWITCH-FLAME ROLLOUT 2
S99	SWITCH-LIMIT,PRI.BURNER 2
S121	SWITCH-DOOR INTERLOCK 2
T1	TRANSFORMER-CONTROL
T3	TRANSFORMER-COMB. AIR BLO. 1
T13	TRANSFORMER-COMB. AIR BLO. 2
TB1	TERMINAL STRIP- CLASS 2
TB34	TERMINAL STRIP-TRANSFORMER T1

LENNOX® Industries Inc. | WIRING DIAGRAM | 12/99

HEATING UNITS-GAS

G24-200-1
(120V)
(TWO STAGE GAS VALVE)

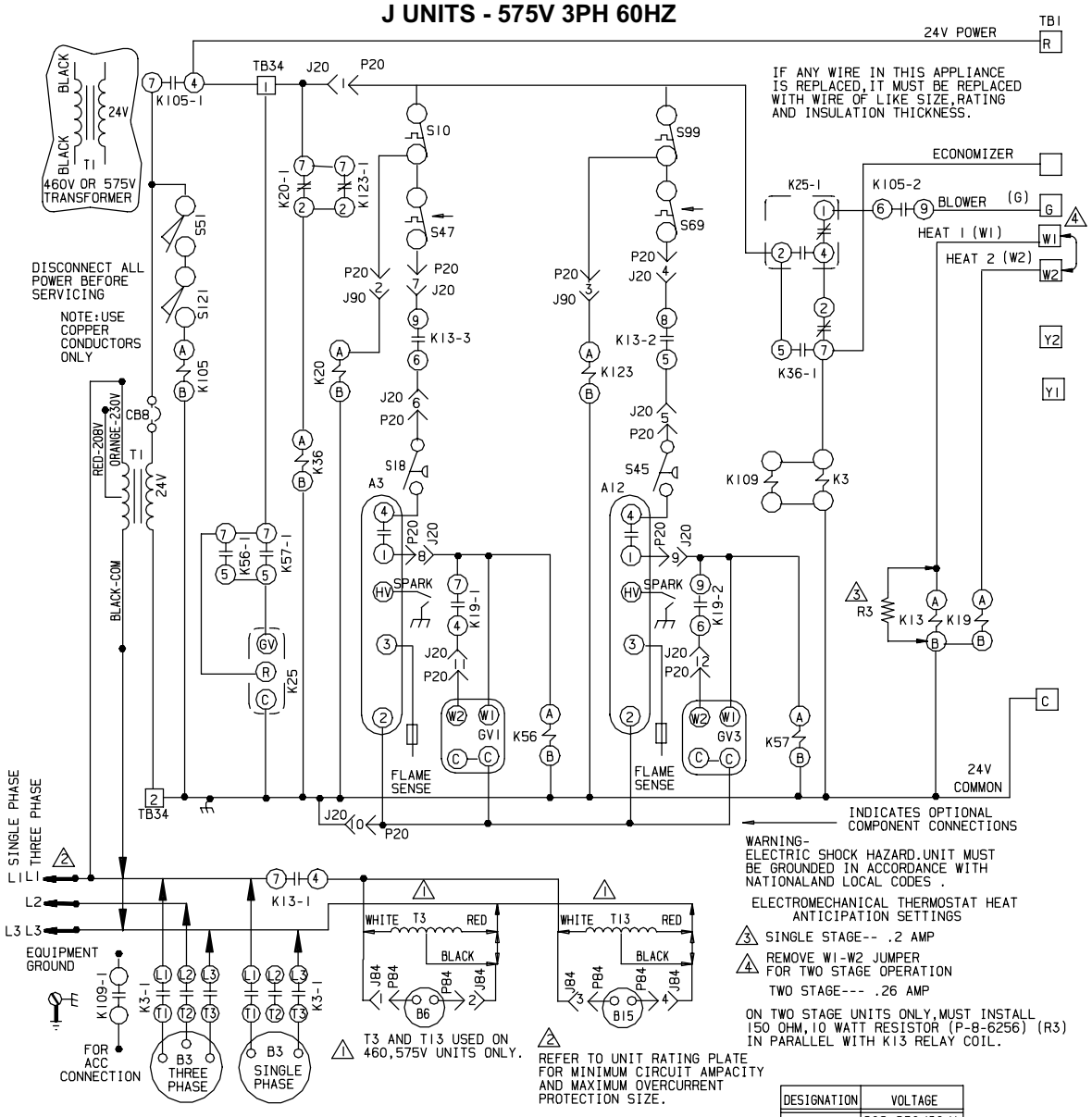
SECTION A

Supersedes Form No.	New Form No.
	532,692W

 Litho U.S.A.

FIGURE 18

WIRING SCHEMATIC DIAGRAM FOR G24-200
P UNITS - 208/230V 1PH 60 HZ
Y UNITS - 208/230V 3PH 60HZ
G UNITS - 460V 3PH 60HZ
J UNITS - 575V 3PH 60HZ



DESIGNATION	VOLTAGE
P	208-230/60/1
Y	208-230/60/3
G	460/60/3
J	575/60/3

FOR USE WITH COPPER CONDUCTORS ONLY
LINE VOLTAGE FIELD INSTALLED

KEY	DESCRIPTION COMPONENT
A3	CONTROL-BURNER 1
A12	CONTROL-BURNER 2
B3	MOTOR-BLOWER
B6	MOTOR-COMB AIR BLOWER 1
B15	MOTOR-COMB AIR BLOWER 2
CB8	CIRCUIT BREAKER-TRANS T1
GV1	VALVE-GAS 1
GV3	VALVE-GAS 2
J20	JACK-GAS
J84	JACK-COMB AIR BLOWER
K3,-1	CONTACTOR-BLOWER
K8,-1,2	RELAY-TRANSFER
K13,-1,2,3	RELAY-COMB AIR BLOWER
K19,-1,2	RELAY-STAGE 2 HEAT
K20,-1	RELAY-LIMIT, BLOWER
K25,-1	RELAY-BLOWER DELAY
K36,-1	RELAY-HEAT BLOWER
K56,-1	RELAY-HEAT BLOWER 1
K57,-1	RELAY-HEAT BLOWER 2

KEY	DESCRIPTION COMPONENT
K105,-1,2	RELAY-BLOWER SENSE
K109,-1	RELAY-ACCESSORY
K123,-1	RELAY-LIMIT
P20	PLUG-GAS
P84	PLUG-COMB AIR BLOWER
R3	RESISTOR,ANTICIPATOR
S10	SWITCH-LIMIT, PRIMARY
S18	SWITCH-COMB AIR BLOWER,PROVE
S45	SWITCH-COMB AIR BLO. PROVE 2
S47	SWITCH-FLAME ROLLOUT 1
S51	SWITCH-DOOR INTERLOCK 1
S69	SWITCH-FLAME ROLLOUT 2
S99	SWITCH-LIMIT,PRI.BURNER 2
S121	SWITCH-DOOR INTERLOCK 2
T1	TRANSFORMER-CONTROL
T3	TRANSFORMER-COMB. AIR BLO. 1
T13	TRANSFORMER-COMB. AIR BLO. 2
TB1	TERMINAL STRIP- CLASS 2
TB34	TERMINAL STRIP-TRANSFORMER T1

LENNOX® Industries Inc. WIRING DIAGRAM 12/99

HEATING UNITS-GAS

G24-200-1-G,J,P,Y
(TWO STAGE GAS VALVE)

SECTION A

Supersedes Form No.	New Form No.
	532,693W

 Litho U.S.A.

FIGURE 19

Unit Start-Up

FOR YOUR SAFETY READ BEFORE LIGHTING

⚠WARNING

Do not use this furnace if any part has been under water. A flood-damaged furnace is extremely dangerous. Attempts to use the furnace can result in fire or explosion. A qualified service agency should be contacted to inspect the furnace and to replace all gas controls, control system parts, electrical parts that have been wet or the furnace if deemed necessary.

⚠WARNING

Danger of explosion. Can cause injury or product or property damage. Should the gas supply fail to shut off or if overheating occurs, shut off the gas valve to the furnace before shutting off the electrical supply.

⚠WARNING

SMOKE POTENTIAL

The heat exchanger in this unit could be a source of smoke on initial firing. Take precautions with respect to building occupants and property. Vent initial supply air outside when possible.

⚠WARNING

Electric shock hazard. Can cause injury or death. Before attempting to perform any service or maintenance, turn the electrical power to unit OFF at disconnect switch(es). Unit may have multiple power supplies.

⚠WARNING

Danger of explosion. Can cause injury or death. Do not attempt to light manually. Unit has a direct spark ignition system.

BEFORE LIGHTING smell all around the appliance area for gas. Be sure to smell next to the floor because some gas is heavier than air and will settle on the floor.

Use only your hand to push in or turn the gas control knob. Never use tools. If the knob will not push in or turn by hand, do not try to repair it, call a qualified service technician. Force or attempted repair may result in a fire or explosion.

Placing Furnace Into Operation

G24-200 units are equipped with two direct spark ignition systems - one for each heat section. Do not attempt to manually light burners on these furnaces. Each time thermostat calls for heat, the burners will automatically light.

⚠WARNING

Danger of explosion and fire. Can cause injury or product or property damage. You must follow these instructions exactly.

Gas Valve Operation - White Rodgers 36E Two-Stage Gas Valve (Figure 20)

1 - Set the thermostat to the lowest setting.

2 - Turn off all electrical power to the unit.

3 - This furnace is equipped with an ignition device which automatically lights the burners. Do **not** try to light the burners by hand.

4 - Remove the control access panels.

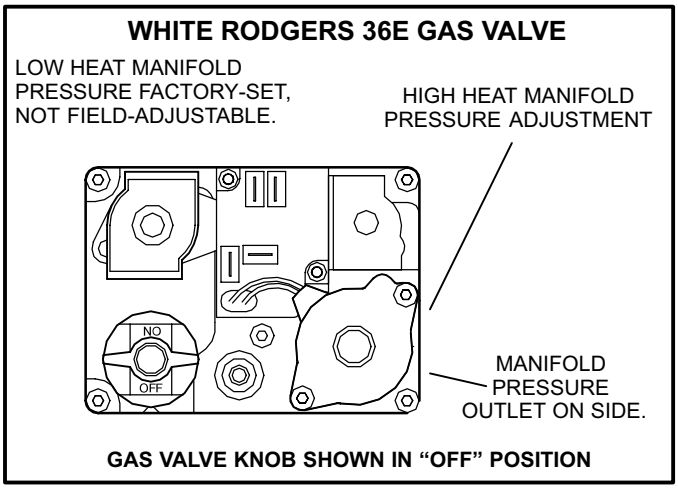


FIGURE 20

5 - Perform the following to **both** gas valves - Turn knob on gas valve 180° either way to **OFF.** Do not force.

6 - Wait five minutes to clear out any gas. If you then smell gas, **STOP!** Immediately call your gas supplier from your neighbor's phone. Follow the gas supplier's instructions. If you don't smell gas go to next step.

7 - Perform the following to **both** gas valves - Turn knob on gas valve 180° either way to **ON** position.

8 - Replace the control access panels.

9 - Turn on all electrical power to the unit.

10 - Set the thermostat to desired setting.

11 - Both combustion air blowers will start. The burners in both heat sections will light after a 45-second prepurge.

12 - If the furnace does not light the first time (the gas line may not be fully purged), it will attempt up to two more ignitions before locking out.

13 - If lockout occurs, repeat steps 1 through 10.

14 - If the appliance will not operate, follow the instructions "Turning Off Gas To Unit" and call your service technician or gas supplier.

B - Turning Off Gas To Unit

1 - Set the thermostat to the lowest setting.

2 - Turn off all electrical power to the unit if service is to be performed.

3 - Remove the control access panels.

4 - Perform the following to **both** gas valves - Turn knob on gas valve 180° either way to **OFF.** Do not force.

5 - Replace the control access panels.

Heating Sequence of Operation

A - Applications with Single-Stage Thermostat

1 - When the thermostat calls for heat, the K13 and K19 relay contacts close (W1 and W2 jumpered on furnace terminal strip) and **both** combustion air blowers (B6 and B16) start.

2 - The combustion air pressure switches (S18 and S45) prove blower operation, then ignition controls (A3 and A12) are energized. The pressure switches are factory set and require no adjustment.

3 - After a pre-purge of 30 seconds, the two spark ignitors energize and the gas valves (GV1 and GV3) open on **low** heat and after approximately 3 seconds open on **high** heat.

4 - The sparks ignite the gas, the ignition sensors prove the flames and the combustion process continues.

5 - In the event that the flames are not detected after the first trial for ignition (8 seconds trial duration), the ignition controls will repeat steps 3 and 4 two more times before locking out. (The two ignition controls operate independently. If one control locks out its gas valve, the other control maintains its gas valve in operation.)

6 - When W1 heating demand is satisfied, the K13 and K19 relay contacts open and both gas valves (GV1 and GV3) close on second-stage after 3 seconds and then close on first-stage.

7 - For troubleshooting purposes, an ignition attempt after lockout may be re-established manually. Move thermostat from "Heat" to "OFF" then back to "Heat." The heating sequence then restarts at step 1.

B - Applications with Two-Stage Thermostat

1 - When the thermostat calls for heat, the K13 relay contacts close (W1 and W2 **not** jumpered on furnace terminal strip) and **both** combustion air blowers (B6 and B16) start.

2 - The combustion air pressure switches (S18 and S45) prove blower operation, then the ignition controls (A3 and A12) are energized. The pressure switches are factory set and require no adjustment.

3 - After a pre-purge of 30 seconds, the two spark ignitors energize and the gas valves (GV1 and GV3) open on **low** heat.

4 - The sparks ignite the gas, the ignition sensors prove the flames and the combustion process continues.

5 - In the event that the flames are not detected after the first trial for ignition, the ignition controls will repeat steps 3 and 4 two more times before locking out. (The two ignition controls operate independently. If one control locks out its gas valve, the other control maintains its gas valve in operation.)

6 - If the temperature of the conditioned space continues to drop, the thermostat's second-stage contacts close (W2 powered).

7 - The K19 relay contacts close and the gas valves (GV1 and GV3) open on **high** heat after approximately 3 seconds.

8 - When the W2 heating demand is satisfied, the K19 relay contacts open and both gas valves (GV1 and GV3) close second-stage after 3 seconds and then return to **low** heat operation. When the W1 heating demand is satisfied, the K13 relay contacts open and both gas valves (GV1 and GV3) close first-stage.

9 - For troubleshooting purposes,an ignition attempt after lock-out may be re-established manually. Move the thermostat from "Heat" to "OFF" then back to "Heat." The heating sequence then restarts at step 1.

Gas Pressure Adjustment

Gas Flow (Approximate)

1- Operate unit at least 15 minutes before checking gas flow. Determine the time in seconds for **two** revolutions of gas through the meter. (Two revolutions assures a more accurate time.) A portable LP gas meter (17Y44) is available for LP applications.

2- **Divide the number of seconds by two** and compare to the time in table 11. If manifold pressure is correct and rate is incorrect, check gas orifices for proper size and restriction.

3- Remove temporary gas meter if installed.

NOTE- To obtain accurate reading, shut off all other gas appliances connected to meter.

TABLE 11

GAS METER CLOCKING CHART				
Unit Input Rate (Btuh)	Seconds for One Revolution			
	Natural		LP	
	1 cu ft Dial	2 cu ft Dial	1 cu ft Dial	2 cu ft Dial
75,000	48	96	120	240
125,000	29	58	72	144
130,000	28	55	69	138
235,000	15	31	38	77
260,000	14	28	35	69
470,000	8	15	19	38
Natural-1000 btu/cu ft LP-2500 btu/cu ft				

Note: Table assumes standard temperature (60°F), pressure (30in.Hg.), and fuel heating values (Btuh/Ft.^{3}). Apply pressure corrections in altitudes above 2000 ft.

Gas Pressure

1 - Check the gas line pressure with the unit (both heat sections) firing at the high heat input rate. A minimum of 4.5 in. w.c. for natural gas should be maintained.

2 - After the line pressure has been checked and adjusted, check the high heat regulator pressure on both gas valves. See figure 20 for gas pressure adjustment screw location. The low heat setting is factory-set and is not field-adjustable. The high heat manifold pressure settings are given in table 12.

TABLE 12
MANIFOLD GAS PRESSURES (HIGH HEAT)

ALTITUDE feet (m)	GAS FUEL	MANIFOLD PRESSURE in. w.c. (kPa)
0 - 2000 (0 - 610)	Natural	3.5 (0.87)
2000 - 4500 (610 - 1372)	Natural	3.5 (0.87)
4500 - 7500* (1372 - 2286)	Natural	3.2 (0.80)

**In Canada, certification for installation at altitudes over 4500 feet (1372m) above sea level is the jurisdiction of the local authorities.*

High Altitude Information

In Canada, certification for installation at altitudes over 4500 feet (1372m) above sea level is the jurisdiction of the local authorities.

See table 12 for the correct high heat manifold pressures to be maintained for natural gas.

Check the gas line pressure with the unit (both heat sections) firing at high heat input rate The minimum pressure as shown on the nameplate for natural gas must be maintained.

No orifice change is required. No pressure switch change is required.

Other Unit Adjustments and Operation

Primary (S10 and S99) Limits

Each heat section has a primary limit located on the heating compartment vestibule panel. These limits are factory set and do not require field adjustment.

Flame Rollout Switches (S47 and S69)

Each heat section has a manually reset flame rollout switch. Each switch is located on the burner top plate. If tripped, a check for adequate combustion air should be made before resetting. The switches are non-adjustable.

Combustion Air Pressure Switches (S18 and S45)

Each heat section has a combustion air pressure switch located on the heating compartment vestibule panel. Each switch checks for proper combustion air blower operation before allowing ignition trial. The switches are factory set and require no field adjustment.

Blower Motor Controls (K25 Circuit Board), (K20 Relay), (K123 Relay) and (K36 Relay)

When the gas valves are powered, the blower motor starts after a delay of 45 seconds. When the gas valves lose power because the thermostat demand is satisfied, the blower motor remains running for 150 seconds. These timings are programmed into the K25 control board and are non-adjustable. The board is located in the control box.
If abnormal furnace operation causes either high limit (S10 or S99) to open, the relays K20, K123 and K36 maintain blower operation until the limit(s) is reset.

Temperature Rise

Check the temperature rise and, if necessary, adjust the blower speed to maintain the temperature rise within the range shown on the unit rating plate.

Electro-mechanical Thermostat Heat Anticipation

In single-stage heat applications, set the heat anticipation to 0.2 amps.
In two-stage heat applications, set the heat anticipation to 0.26 amps and install a field-provided resistor (150 ohm, 10 watt rating -Lennox part number P-8-6256) in parallel with K13 relay coil.

Electrical

1 - Check all wiring for loose connections.

2 - Check for the correct voltage at the furnace (furnace operating).

3 - Check amp-draw on blower motor.
Motor service factor amps
Nameplate _____Actual_____

Flue And Chimney

1 - Check flue pipe, chimney and all connections for tightness and to make sure there is no blockage.

2 - Check unit for proper draft.

3 - Are pressure switches closed? Obstructed flue will open pressure switches and cause unit to shut down. Check flue and outlet for blockages.

4 - Reset manual flame rollout switches on burner box covers.

Burner Flame Adjustment

The G24-200 burner flame is not adjustable; however, the flame should be inspected at the beginning of each heating season. If necessary, clean the burners. Burner flame should be blue when burning natural gas. See figure 21.

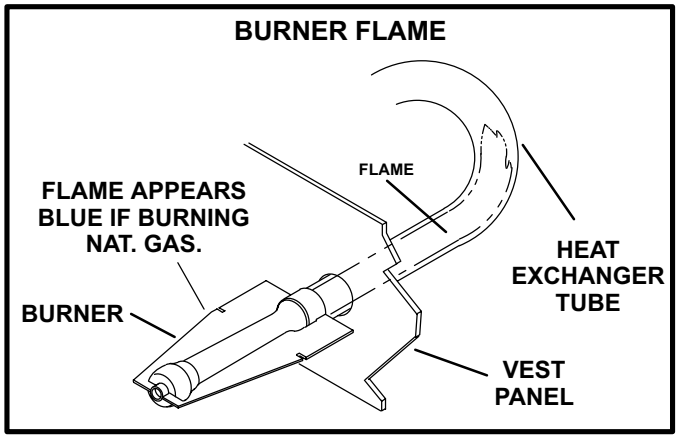


FIGURE 21

Failure To Operate

If unit fails to operate check the following:

1 - Is the thermostat calling for heat?

2 - Are access panels securely in place?

3 - Is the main disconnect switch closed?

4 - Is there a blown fuse or tripped circuit breaker?

5 - Are the filters dirty or plugged? Dirty or plugged filters will cause the limit controls to shut the unit off.

6 - Is gas turned on at the meter?

7 - Is the manual main shut-off valve open?

8 - Are the internal manual shut-off valves open?

9 - Are the unit ignition systems in lock out mode? If unit locks out again, call serviceman to inspect unit for blockages.

Setting blower CFM

Note - Turn electrical power off when adjusting motor pulley. *Blower RPM adjustment is accomplished by changing the motor pulley opening. Loosen Allen screw and turn pulley clockwise to increase RPM or turn counterclockwise to decrease. Re-tighten Allen screw. (See Blower motor/drive installation section for the pulley alignment and belt tensioning method.)*

1 - Enter table 13 at design CFM and total external static pressure. (Design total external static pressure equals the sum of all pressure drops across all accessories which are installed external to furnace and all ductwork/accessories. See table 14 for external filter box with filters pressure drops, C17 coil pressure drops and EMD17M economizer pressure drops.)

2 - The table yields a value for design BHP and RPM.

3 - Select drive kit so that motor maximum BHP (as shown in table 15) exceeds the value from table13.

4 - Run the blowers and measure the actual blower shaft RPM and total external static pressure.

5 - Adjust RPM to the value in table13 which will result in the design CFM. From design CFM and actual Total External Static Pressure reading, Table 13 gives required BHP. This value should still be lower than the maximum BHP delivered by the motor as shown in table 15.

6 - As a final check, measure the motor's current draw and compare it to the motor's nameplate service factor amps rating (SFA). If the current draw is not less than or equal to the SFA rating, reduce the motor's load until it is.

TABLE 13

CFM vs TOTAL EXTERNAL STATIC PRESSURE

Air Volume cfm (L/s)	Total External Static Pressure - in. w.g. (Pa)																			
	.10 (25)		.20 (50)		.30 (75)		.40 (100)		.50 (125)		.60 (150)		.70 (175)		.80 (200)		.90 (225)		1.00 (250)		1.10 (275)	
	RPM	BHP (kW)	RPM	BHP (kW)	RPM	BHP (kW)	RPM	BHP (kW)	RPM	BHP (kW)	RPM	BHP (kW)	RPM	BHP (kW)	RPM	BHP (kW)	RPM	BHP (kW)	RPM	BHP (kW)	RPM	BHP (kW)
2400 (1135)	----		----		535	0.30 (0.22)	600	0.35 (0.26)	665	0.45 (0.34)	720	0.55 (0.41)	755	0.65 (0.48)	825	0.75 (0.56)	875	0.85 (0.63)	920	0.95 (0.71)	965	1.05 (0.78)
2600 (1225)	----		----		545	0.35 (0.26)	610	0.40 (0.30)	670	0.50 (0.37)	725	0.60 (0.45)	780	0.70 (0.52)	830	0.80 (0.60)	875	0.90 (0.67)	920	1.00 (0.75)	965	1.10 (0.82)
2800 (1320)	----		----		560	0.40 (0.30)	620	0.45 (0.34)	680	0.55 (0.41)	735	1.05 (0.48)	785	0.75 (0.56)	835	0.85 (0.63)	880	0.95 (0.71)	925	1.05 (0.78)	965	1.15 (0.86)
3000 (1415)	----		----		570	0.45 (0.34)	630	0.55 (0.41)	690	0.60 (0.45)	740	0.70 (0.52)	790	0.90 (0.60)	840	0.90 (0.67)	865	1.00 (0.75)	930	1.15 (0.86)	970	1.25 (0.93)
3200 (1510)	----		----		585	0.50 (0.37)	640	0.85 (0.45)	685	0.70 (0.52)	750	0.80 (0.60)	800	0.90 (0.67)	845	1.00 (0.75)	890	1.10 (0.82)	935	1.20 (0.90)	975	1.35 (1.34)
3400 (1605)	----		535	0.50 (0.37)	595	0.55 (0.41)	655	0.65 (0.48)	710	0.75 (0.56)	760	0.85 (0.63)	805	0.95 (0.71)	855	1.05 (0.78)	895	1.20 (0.90)	940	1.30 (0.97)	----	
3600 (1700)	----		550	0.55 (0.41)	610	0.65 (0.48)	665	0.75 (0.56)	720	0.85 (0.63)	770	0.95 (0.71)	815	1.05 (0.78)	860	1.15 (0.86)	905	1.25 (0.93)	945	1.40 (1.04)	----	
3800 (1795)	----		570	0.60 (0.45)	625	0.70 (0.52)	680	0.80 (0.60)	730	0.90 (0.67)	780	1.05 (0.78)	825	1.15 (0.86)	870	1.25 (0.93)	910	1.35 (1.01)	955	1.50 (1.12)	----	
4000 (1890)	----		585	0.70 (0.52)	645	0.80 (0.60)	695	0.90 (0.67)	745	1.00 (0.75)	790	1.10 (0.82)	835	1.25 (0.93)	880	1.35 (1.01)	920	1.45 (1.08)	960	1.60 (1.19)	----	
4200 (1980)	550	0.70 (0.52)	605	0.80 (0.60)	660	0.90 (0.67)	710	1.00 (0.75)	760	1.10 (0.82)	805	1.25 (0.93)	850	1.35 (1.01)	890	1.45 (1.08)	930	1.60 (1.19)	970	1.70 (1.27)	----	
4400 (2075)	570	0.80 (0.60)	625	0.90 (0.67)	675	1.00 (0.75)	725	1.10 (0.82)	770	1.20 (0.90)	815	1.35 (1.01)	860	1.45 (1.08)	900	1.60 (1.19)	940	1.70 (1.27)	----		----	
4600 (2170)	590	0.90 (0.67)	645	1.00 (0.75)	695	1.10 (0.82)	740	1.25 (0.93)	785	1.35 (1.01)	830	1.45 (1.08)	870	1.60 (1.19)	**915**	**1.75 (1.31)**	**950**	**1.85 (1.38)**	----		----	
4800 (2265)	610	1.00 (0.75)	660	1.10 (0.82)	710	1.25 (0.93)	755	1.35 (1.01)	800	1.45 (1.08)	845	1.60 (1.19)	**885**	**1.75 (1.31)**	**925**	**1.85 (1.38)**	**965**	**2.00 (1.49)**	----		----	
5000 (2360)	630	1.10 (0.82)	680	1.25 (0.93)	730	1.35 (1.01)	775	1.50 (1.12)	815	1.60 (1.19)	**860**	**1.75 (1.31)**	**900**	**1.90 (1.42)**	**940**	**2.00 (1.49)**	**975**	**2.15 (1.60)**	----		----	

NOTE - All air data is measured external to furnace using rear return air opening without air filters in place.
Bold text indicates 2 H.P. (1.5 kW) drive kits.

TABLE 14
ACCESSORY AIR RESISTANCE

Model		C17-090/120 Coil		Pleated Filter - 1 in. (25 mm)		*Disposable Filter - 1 in. (25 mm)		EMD17M-95		EMD17M-135	
cfm	L/s	in. w.g.	Pa	in. w.g.	Pa	in. w.g.	Pa	in. w.g.	Pa	in. w.g.	Pa
2400	1135	0.14	35	0.17	42	0.05	12	.04	10	----	----
2600	1225	0.16	40	0.18	45	0.06	15	.05	12	----	----
2800	1320	0.19	47	0.20	50	0.07	17	.06	15	----	----
3000	1415	0.22	55	0.22	55	0.08	20	.07	17	.03	7
3200	1510	0.24	60	0.23	57	0.09	22	.08	20	.04	10
3400	1605	0.27	67	0.25	62	0.10	25	.09	22	.05	12
3600	1700	0.30	75	0.27	67	0.10	25	.10	25	.06	15
3800	1795	0.33	82	0.29	72	0.11	27	.11	27	.07	17
4000	1890	0.36	90	0.31	77	0.12	30	.12	30	.07	17
4200	1980	0.38	95	0.34	85	0.13	32	----	----	.08	20
4400	2075	0.42	104	0.36	90	0.14	35	----	----	.09	22
4600	2170	0.45	112	0.39	97	0.16	40	----	----	.10	25
4800	2265	0.48	119	0.42	104	0.17	42	----	----	.11	27
5000	2360	0.51	127	0.44	109	0.18	45	----	----	.11	27

* Furnished with filter box.

TABLE 15
DRIVE KIT SPECIFICATIONS

Additive Cooling Tons (kW)	Drive Kit Model No.	Voltage & Phase	Motor Output hp (kW)		[2] Minimum Circuit Ampacity	Motor Pulley (in.) & Groove	Blower Pulley (in.) & Groove	RPM Range	Belt	Shipping Weight lbs. (kg)
			min.	[1] max.						
7.5 or 10 (26.4 or 35.2)	DKG24-200-1	115v-1ph	1.5 (1.1)	1.7 (1.3)	25	7/8 x 4-3/4 - A	1 x 10 - A	535 - 772	A - 52	42 (19)
	DKG24-200-2	230v-1ph			14					42 (19)
	DKG24S-200-3	208/230v-3ph			9					48 (22)
	DKG24S-200-4	460v-3ph			4					48 (22)
	DKG24S-200-5	575v-3ph			3					48 (22)
10 (35.2)	DKG24-200-6	208/230v-3ph	2 (1.5)	2.3 (1.7)	9	7/8 x 6 - A	1 x 10 - A	802 - 977	A - 52	57 (26)
	DKG24-200-7	460v-3ph			4					57 (26)
	DKG24-200-8	575v-3ph			3					57 (26)

[1] Maximum usable output of motors furnished by Lennox are shown. In Canada, nominal motor output is also maximum usable motor output. If motors of comparable output are used, keep within the service factor limitations specified on motor nameplate.
[2] At rated voltages shown.
NOTE - All drive kits include matching 24 volt control transformer. All kits (except 208/230v) include matching auto-transformer for combustion air blower operation.

Repair Parts List

The following repair parts are available through independent Lennox dealers. When ordering parts, include the complete furnace model number listed on the CSA international. rating plate — Example: G24-200. Refer to page 4 and 5 for parts identification.

Cabinet Parts	Electrical Parts	Heating Parts	Blower Parts
Front louver door (2)	Transformer(s)	Heat exchanger (2)	Wheel (2)
Blower access panel (2)	Ignition control board (2)	Main burners	Motor
Cabinet cap	Door interlock (2)	Main burner orifices	Cut-off plate (2)
Cabinet top-rear	Ignition cable (2)	Gas manifold/burner box assembly (2)	Shaft
Cabinet bottom-rear	Ignitor (2)	Gas valve (2)	Motor pulley
Flue adapter (2)	Flame sensor (2)	Flue box (2)	Wheel pulley
	Roll-out switch (2)	Combustion air blower (2)	Belt
	Primary limit (2)	Flexible gas connector	Bearing (2)
	Pressure switch (2)		Vibration isolators (4)
	Blower timing control board		Locating rods (2)
	Accessory relay		
	Blower operation relays		
	Contactor		
	Combustion air blower operation relays		

G24-200 Start-up and Performance Check List

Job Name_____ Job Number _____ Date_____
Job Location_____ City_____ State/Province_____ Installer___
_____ City_____ State/Province_____
Unit Model No._____ Serial Number_____ Serviceman_____

HEATING SECTION

Electrical Connections Tight? ☐ Supply Voltage_____

Blower Motor Amps_____ Blower Motor Horsepower/Kw_____

Blower Motor Lubrication OK? ☐ Blower Shaft Lubrication OK? ☐

Gas Piping Connections Tight & Leaks Tested? ☐

Fuel Type: Natural Gas? ☐

Furnace Btu (kw) Input_____ Line Pressure w.c./Pa - Nat._____

Regulator Pressure w.c./Pa -- Nat._____

Connections Tight? ☐ Proper Draft? ☐

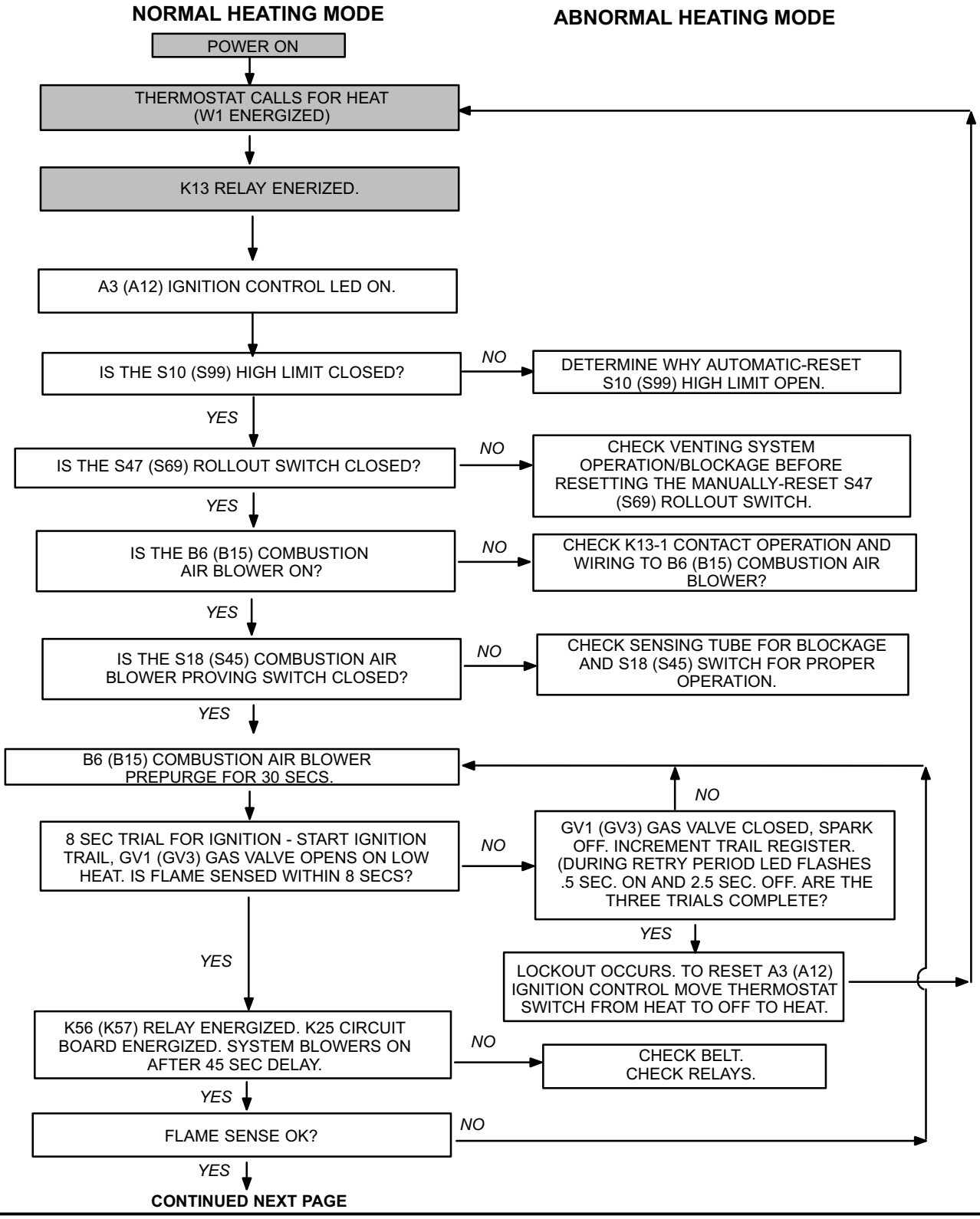
Temperature Rise_____ Filter Clean & Secure? ☐ Vent Clear? ☐

THERMOSTAT

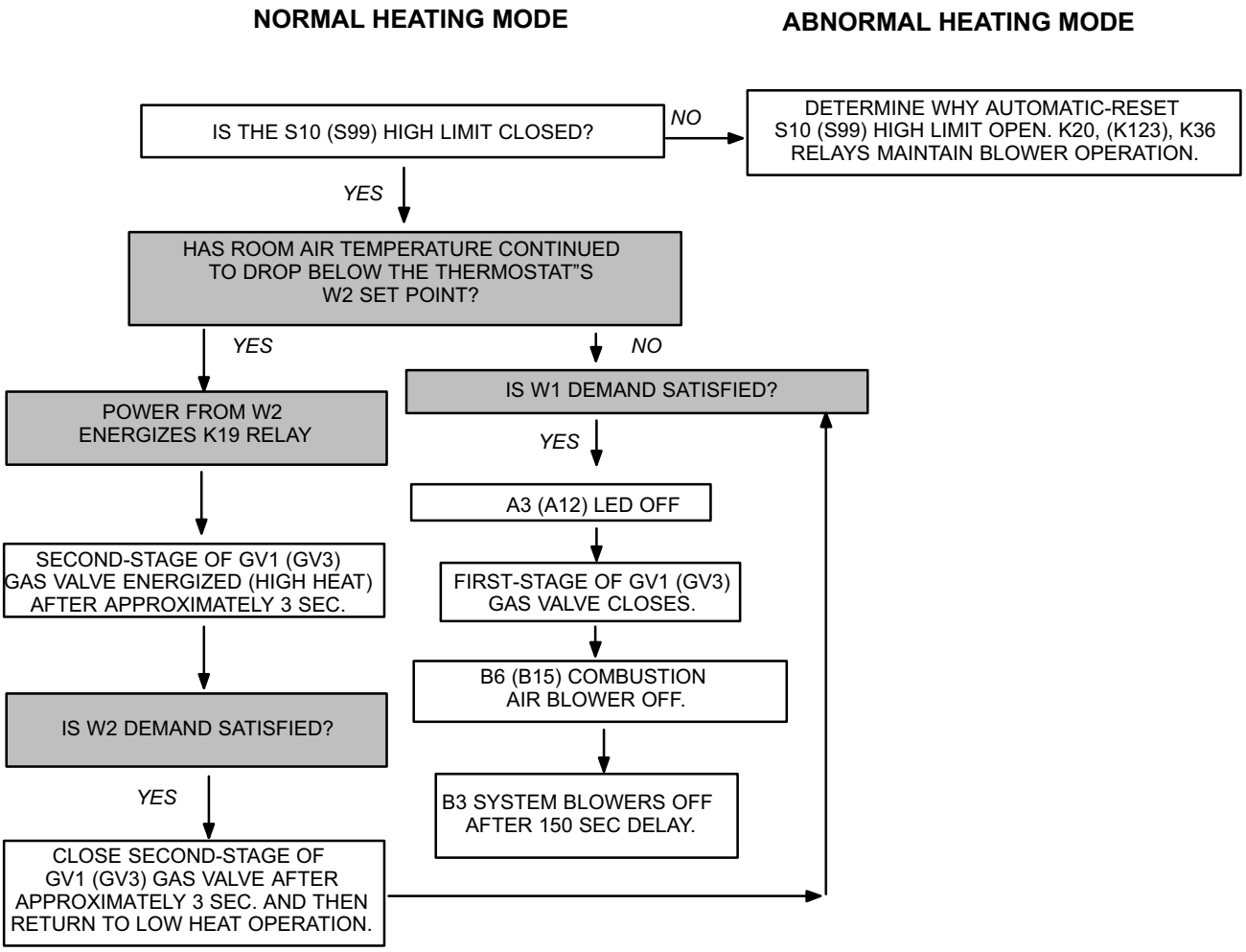
Calibrated? ☐ Heat Anticipator Properly Set? ☐ Level? ☐

HEATING SEQUENCE OF OPERATION WITH TWO-STAGE THERMOSTAT

NOTE - THIS FURNACE FUNCTIONS WITH TWO INDEDPENDENTLY CONTROLLED HEAT SECTIONS.
THE GRAY BOXES INDICATE COMPONENTS WHICH EFFECT BOTH HEAT SECTIONS SIMULTANEOUSLY.



HEATING SEQUENCE OF OPERATION WITH TWO-STAGE THERMOSTAT CONTINUED



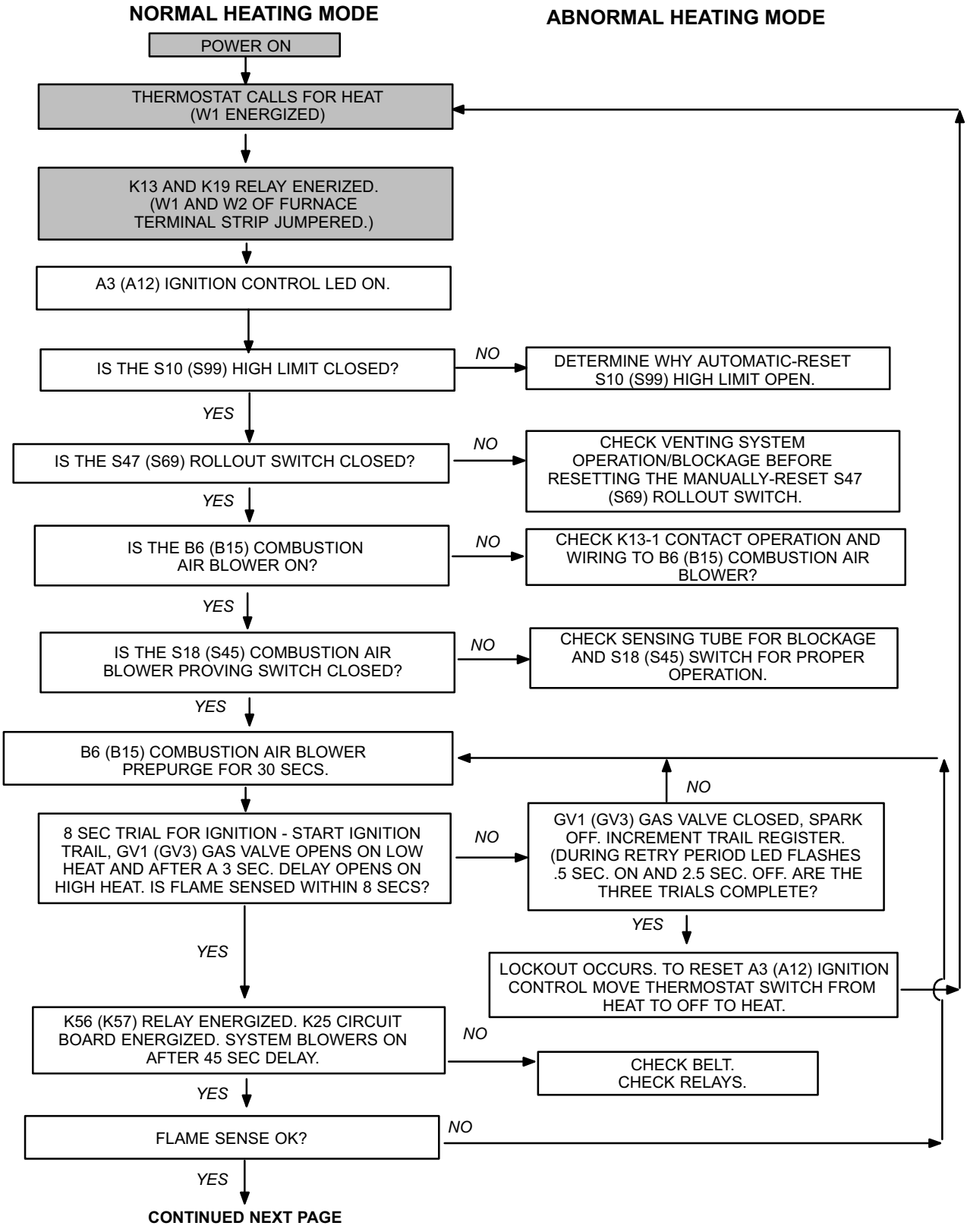
NOTE - IF ECONOMIZER INSTALLED, ECONOMIZER OPERATES WHEN BLOWER POWERED.

LED CODES

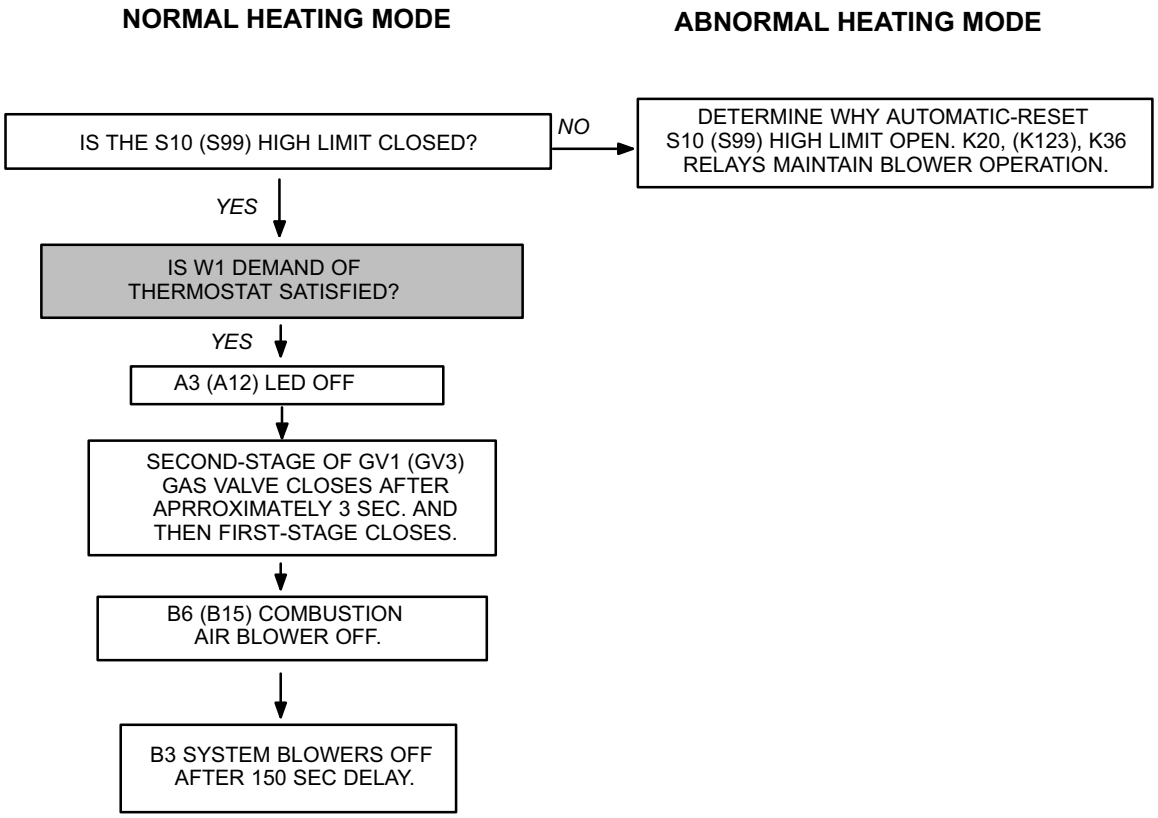
1 - **ON** NORMAL OPERATION WITH THERMOSTAT CALLING FOR HEAT.
2 - **0.5 SEC ON AND 2.5 SECS OFF** IN IGNITION RETRY PERIOD.
3 - **OFF** NO POWER OR DETECTED FAULT.

HEATING SEQUENCE OF OPERATION WITH SINGLE-STAGE THERMOSTAT

NOTE - THIS FURNACE FUNCTIONS WITH TWO INDEPENDENTLY CONTROLLED HEAT SECTIONS. THE GRAY BOXES INDICATE COMPONENTS WHICH EFFECT BOTH HEAT SECTIONS SIMULTANEOUSLY.



HEATING SEQUENCE OF OPERATION WITH SINGLE-STAGE THERMOSTAT CONTINUED



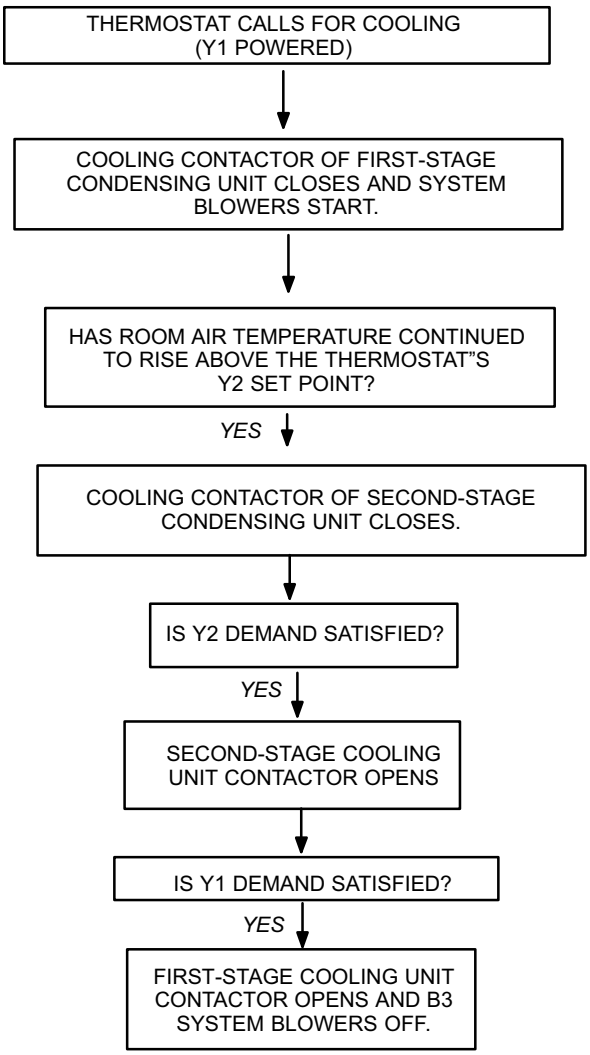
NOTE - IF ECONOMIZER INSTALLED, ECONOMIZER OPERATES WHEN BLOWER POWERED.

LED CODES

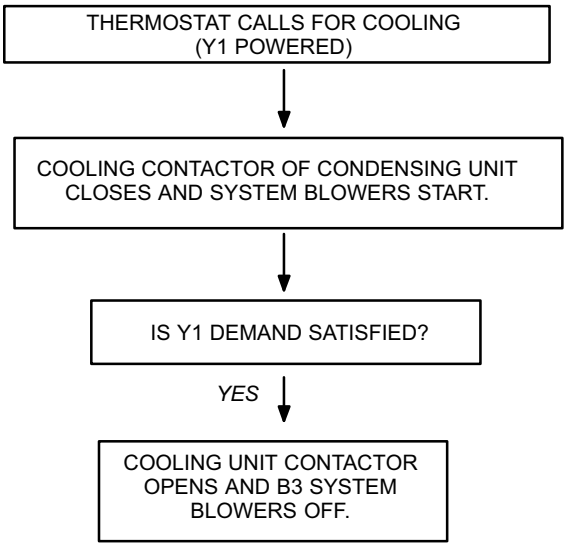
1 - **ON** NORMAL OPERATION WITH THERMOSTAT CALLING FOR HEAT.
2 - **0.5 SEC ON AND 2.5 SECS OFF** IN IGNITION RETRY PERIOD.
3 - **OFF** NO POWER OR DETECTED FAULT.

COOLING SEQUENCE OF OPERATION

FOR TWO CONDENSING UNITS



FOR A SINGLE CONDENSING UNIT



MANUAL FAN OPERATION