

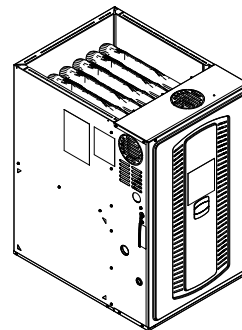


# Installation, Operation, and Maintenance

## Upflow/Horizontal Left/Right Gas-Fired, Single Stage Induced Draft Furnace with Variable Speed Blower Motor

For use with natural gas only.

Single Stage  
L8V1A040U3VSBA  
L8V1A060U3VSBA  
L8V1B080U4VSBA  
L8V1C100U5VSBA



**Notes:**

- *Graphics in this document are for representation only. Actual model may differ in appearance.*
- *This product complies with SJVUAPCD 4905 and SCAQMD 1111 with NO<sub>x</sub> levels below 14 ng/J.*



FNR-SVX007A-EN

### **⚠ SAFETY WARNING**

Only qualified personnel should install and service the equipment. The installation, starting up, and servicing of heating, ventilating, and air-conditioning equipment can be hazardous and requires specific knowledge and training. Improperly installed, adjusted or altered equipment by an unqualified person could result in death or serious injury. When working on the equipment, observe all precautions in the literature and on the tags, stickers, and labels that are attached to the equipment.

# Introduction

Read this manual thoroughly before operating or servicing this unit.

This document is customer property and is to remain with this unit. Return to the service information pack upon completion of work.

## Warnings, Cautions, and Notices

Safety advisories appear throughout this manual as required. Your personal safety and the proper operation of this machine depend upon the strict observance of these precautions.

The three types of advisories are defined as follows:



Indicates a potentially hazardous situation which, if not avoided, could result in death or serious injury.



Indicates a potentially hazardous situation which, if not avoided, could result in minor or moderate injury. It could also be used to alert against unsafe practices.



Indicates a situation that could result in equipment or property-damage only accidents.

### **⚠ WARNING**

#### **Proper Field Wiring and Grounding Required!**

**Failure to follow code could result in death or serious injury.**

**All field wiring MUST be performed by qualified personnel. Improperly installed and grounded field wiring poses FIRE and ELECTROCUTION hazards. To avoid these hazards, you MUST follow requirements for field wiring installation and grounding as described in NEC and your local/state/national electrical codes.**

### **⚠ WARNING**

#### **Personal Protective Equipment (PPE) Required!**

**Failure to wear proper PPE for the job being undertaken could result in death or serious injury.**

**Technicians, in order to protect themselves from potential electrical, mechanical, and chemical hazards, MUST follow precautions in this manual and on the tags, stickers, and labels, as well as the instructions below:**

- **Before installing/servicing this unit, technicians MUST put on all PPE required for the work being undertaken (Examples; cut resistant gloves/sleeves, butyl gloves, safety glasses, hard hat/bump cap, fall protection, electrical PPE and arc flash clothing). ALWAYS refer to appropriate Safety Data Sheets (SDS) and OSHA guidelines for proper PPE.**
- **When working with or around hazardous chemicals, ALWAYS refer to the appropriate SDS and OSHA/GHS (Global Harmonized System of Classification and Labelling of Chemicals) guidelines for information on allowable personal exposure levels, proper respiratory protection and handling instructions.**
- **If there is a risk of energized electrical contact, arc, or flash, technicians MUST put on all PPE in accordance with OSHA, NFPA 70E, or other country-specific requirements for arc flash protection, PRIOR to servicing the unit. NEVER PERFORM ANY SWITCHING, DISCONNECTING, OR VOLTAGE TESTING WITHOUT PROPER ELECTRICAL PPE AND ARC FLASH CLOTHING. ENSURE ELECTRICAL METERS AND EQUIPMENT ARE PROPERLY RATED FOR INTENDED VOLTAGE.**

**⚠ WARNING****Follow EHS Policies!**

Failure to follow instructions below could result in death or serious injury.

- All Trane personnel must follow the Environmental, Health and Safety (EHS) policies when performing work such as hot work, electrical, fall protection, and lockout/tagout. Where local regulations are more stringent than these policies, those regulations supersede these policies.
- Non-Trane personnel should always follow local regulations.

**⚠ WARNING****Cancer and Reproductive Harm!**

This product can expose you to chemicals, including lead, which are known to the State of California to cause cancer and birth defects or other reproductive harm. For more information go to [www.P65Warnings.ca.gov](http://www.P65Warnings.ca.gov).

**⚠ WARNING****Safety Hazard!**

Failure to follow instructions below could result in death or serious injury or property damage.

This unit is not to be used by persons (including children) with reduced physical, sensory, or mental capabilities, or lack of experience and knowledge, unless they have been given supervision or instruction concerning the use of the appliance by a person responsible for their safety.

Do not allow children to play or climb on the unit or to clean or maintain the unit without supervision.

**⚠ WARNING****Fire Hazard!**

Failure to follow instructions below could result in death or serious injury or property damage.

For installations with flammable refrigeration system, the furnace must be powered at all times except during servicing. The furnace must be installed and connected according to installation instructions and wiring diagrams provided with the evaporator coil.

**⚠ WARNING****Fire or Explosion Hazard!**

Failure to follow safety warnings exactly could result in a fire or explosion causing property damage, personal injury or loss of life.

Do not store or use gasoline or other flammable vapors and liquids in the vicinity of this or any other appliance. **WHAT TO DO IF YOU SMELL GAS:**

- Do not try to light any appliance.
- Do not touch any electrical switch; do not use any phone in your building.
- Immediately call your gas supplier from a neighbor's phone. Follow the gas supplier's instructions. If you cannot reach your gas supplier, call the fire department.
- Installation and service must be performed by a qualified installer, service agency, or the gas supplier.

**⚠ WARNING****Explosion Hazard!**

Failure to follow instruction below could result in death or serious injury or property damage.

Install a gas detector for leak warnings. The manufacturer does not test or endorse any specific brand or type of detector.

**⚠ WARNING****Fire or Explosion Hazard!**

Failure to follow safety warnings exactly could result in serious injury, death, or 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 can result causing property damage, personal injury, or loss of life.

**⚠ WARNING****Electrical Shock, Fire, or Explosion Hazard!**

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

Improper servicing could result in dangerous operation, serious injury, death, or property damage.

- Before servicing, disconnect all electrical power to the furnace.
- When servicing controls, label all wires prior to disconnecting. Reconnect wires correctly.
- Verify proper operation after servicing.

**⚠ WARNING**

**Carbon Monoxide Poisoning!**

Failure to follow instructions below could result in death or serious injury, or property damage.

- To confirm the furnace is vented properly, do not replace factory-supplied venting components with field fabricated parts. Fabricating parts can result in damaged vents and components, allowing carbon monoxide to escape the venting system.
- Follow the service and/or periodic maintenance and installation and operation instructions for the furnace and the venting system. Do not attempt to change the venting system.
- Verify the blower door is in place and not ajar. Dangerous fumes could escape an improperly secured door.
- Inspect the chimney liner thoroughly to verify no cracks or other potential areas for flue gas leaks are present in the liner. Liner leaks will result in early damage to the chimney. Furnace venting into an unlined masonry chimney or concrete chimney is prohibited.

**⚠ WARNING**

**Carbon Monoxide Poisoning!**

Failure to follow instructions below could result in death or serious injury, and property damage. When replacing a furnace, confirm the venting system is adequate for the new furnace.

**⚠ WARNING**

**Fire Hazard!**

Failure to follow instructions below could result in death or serious injury or property damage. Do not install the furnace directly on carpet, tile, or other combustible material other than wood flooring.

**⚠ WARNING**

**Electrical Shock Hazard!**

Failure to follow instructions below could result in death or serious injury or property damage. Do not bypass the door switch or the panel loop permanently.

**⚠ WARNING**

**Electrical Shock Hazard!**

Failure to follow instructions below could result in death or serious injury or property damage.. Do not touch any components other than the Menu and Option buttons on IFC when setting up the system or during fault code recovery.

**⚠ WARNING**

**Risk of Fire or Explosion!**

Failure to follow instruction below could result in death or serious injury or property damage. Do NOT attempt to manually light the furnace.

**⚠ WARNING**

**Electrical Shock Hazard!**

Failure to follow instructions below could result in death or serious injury or property damage. Disconnect power to the unit before removing the blower door and wait at least 10 seconds for the IFC power supply to discharge to 0 volts.

**⚠ WARNING**

**Safety Hazard!**

Failure to follow instructions below could result in death or serious injury or property damage. Do not install these furnaces in manufactured housing (mobile), trailers, or recreational vehicles.

**⚠ WARNING**

**Explosion Hazard!**

Failure to follow instruction below could result in death or serious injury or property damage. If electrical, fuel, or mechanical failures occur, shut off the gas supply at the manual valve on the supply piping before turning off the furnace's electrical power. Contact your dealer's designated service agency.

**⚠ WARNING**

**Safety Hazard!**

Failure to follow instructions below could result in death or serious injury or property damage. Do not use semi-rigid metallic gas connectors (flexible gas lines) within the furnace cabinet.

**⚠ WARNING**

**High Voltage Moving Parts!**

Failure to follow instructions below could result in death or serious injury or property damage due to high voltage electrical components, fast-moving fans, and combustible gas. During installation and servicing, turn off the main gas valve and disconnect the electrical supply. If operating checks must be performed with the unit operating, the technician must recognize these hazards and proceed safely.

**⚠ WARNING****Safety Hazard!**

Failure to follow instructions below could result in death or serious injury or property damage.  
Do not install the filter in the return duct directly above the furnace in horizontal applications. Install the filter remotely.

**⚠ WARNING****Safety Hazard!**

Failure to follow instructions below could result in death or serious injury or property damage.  
Turn off the power to the furnace before servicing filters to avoid contact with moving parts.

**⚠ WARNING****Shock Hazard!**

Failure to follow instructions below could result in death or serious injury or property damage.  
If a disconnect switch is present, always lock in the open position before servicing the unit.

**⚠ WARNING****Overheating and Explosion Hazard!**

Failure to follow this warning could result in property damage, personal injury, or death.  
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.

**⚠ CAUTION****Improper Voltage Connection!**

Failure to follow instructions below could result in personal injury or equipment damage.  
Do NOT connect the furnace line voltage to a GFCI-protected circuit.

**⚠ CAUTION****Corrosion Hazard!**

Failure to follow instructions below could result in minor to moderate injury or property damage.  
Do not install the furnace in a corrosive or contaminated atmosphere.

**⚠ CAUTION****Sharp Edges!**

Failure to follow instructions below could result in minor to moderate injury or property damage.  
Be careful of sharp edges on equipment or any cuts made on sheet metal while installing or servicing.

**⚠ CAUTION****Valve Damage!**

Failure to follow instructions below could result in minor to moderate injury or equipment damage.  
Use a backup wrench on the gas valve when installing gas piping to prevent damage to the valve and manifold assembly.

**⚠ CAUTION****Freeze Damage!**

Failure to follow instructions below could result in minor to moderate injury or property damage.  
During complete furnace shutdown during cold weather, take measures to prevent water pipes and receptacles from freezing.

**⚠ CAUTION****Freeze Damage!**

Failure to follow instructions below could result in minor to moderate injury or property damage.  
Schedule a qualified personnel to inspect the temperature if a house is vacant during freezing weather. If your furnace fails to operate, it could lead to frozen water pipes.

**⚠ CAUTION****Ignition Function!**

Failure to follow instructions below could result in minor to severe injury and result in poor ignition characteristics.  
Maintain manifold pressure in high altitude installations.

**⚠ CAUTION****Water Damage!**

Failure to follow instructions below could result in minor to moderate injury or property damage.  
Install an external overflow drain pan in all applications over a finished ceiling to prevent leaking condensate.

**⚠ CAUTION****Hot Surface!**

Failure to follow instructions below could result in minor to moderate injuries.  
Do not touch igniter. It is extremely hot.

**⚠ CAUTION**

**FURNACE SERVICE CAUTION!**

Failure to follow instructions below could result in property damage or personal injury.  
Label all wires prior to disconnection when servicing controls. Verify proper operation after servicing.  
Wiring errors can cause improper and dangerous operation.

**⚠ CAUTION**

**Do NOT Use as Construction Heater!**

Failure to follow instructions below could result in property damage or personal injury.  
To prevent shortening its service life, do not use the furnace as a construction heater.

**⚠ CAUTION**

**Wiring Hazard!**

Failure to follow instructions below could result in minor to moderate injury or property damage.  
The integrated furnace control is polarity sensitive.  
Connect the hot leg of the 120 VAC power to the black field lead.

**NOTICE**

**Equipment Damage!**

Failure to follow instructions below could result in equipment damage.  
UV light exposure can deteriorate plastic blower material, potentially damaging the blower housing.  
For units with plastic blower housings, do not install third-party UV air cleaners where the blower housing is exposed to UV light.

For more information, visit [www.trane.com](http://www.trane.com) and [www.americanstandardair.com](http://www.americanstandardair.com) or contact your installing dealer.  
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Tyler, TX 75707

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**Revision History**

- L8V1-SVX001-1A-EN replaced by a new literature number FNR-SVX007A-EN.
- Corrected the high altitude kits list.

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# Accessories

**Table 1. Accessories**

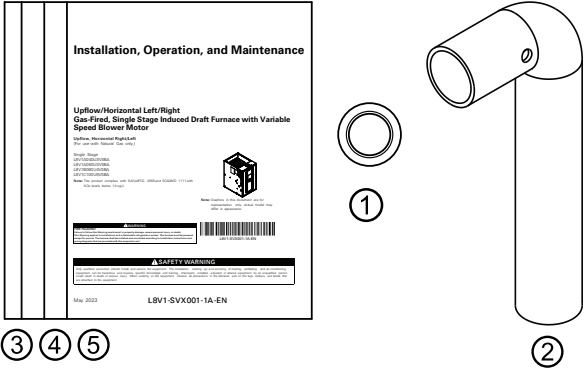
Model Number	Description	Use with
BAYHANG	Horizontal Hanging Kit	All furnaces
BAYLIFTB <sup>(a)</sup>	Dual Return Kit (B size extension)	All B cabinet furnaces
BAYLIFTC <sup>(a)</sup>	Dual Return Kit (C size extension)	All C cabinet furnaces
BAYFLTR203	Horizontal Filter Kit	B cabinet furnace in Horizontal
BAYFLTR204	Horizontal Filter Kit	C cabinet furnace in Horizontal
BAYFLTR205	Horizontal Filter Kit	D cabinet furnace in Horizontal
BAYSF1165 <sup>(b)</sup> (a)	1 in. SlimFit Cabinet with MERV 4 filter	All Upflow furnaces
BAYSF1255 <sup>(b)</sup>	1 in. SlimFit Rack with MERV 4 filter	All furnaces when used in side return application, B-cabinet furnaces only when in bottom return application.
FLRSF1255	1 in. Filter Replacement (Qty 12)	BAYSF1255 <sup>(b)</sup>
BAYHALTMOD0008	High Altitude Module	L8V1A040U3VSB <sup>(b)</sup>
BAYHALTMOD0009	High Altitude Module	L8V1A060U3VSB <sup>(b)</sup>
BAYHALTMOD0010	High Altitude Module	L8V1B080U4VSB <sup>(b)</sup>
BAYHALTMOD0011	High Altitude Module	L8V1C100U5VSB <sup>(b)</sup>
BAYVENT800B	Masonry Chimney Vent Kit	All furnaces in Upflow orientation only
PIP02095	U Fitting for Gas Piping	All furnaces for right hand gas entry

<sup>(a)</sup> Airflow greater than 1600 CFM, furnace will require return air openings and filters on: (1) both sides, (2) one side and the bottom, or (3) just on the bottom.

<sup>(b)</sup> Latest revision.

## Document Pack Contents

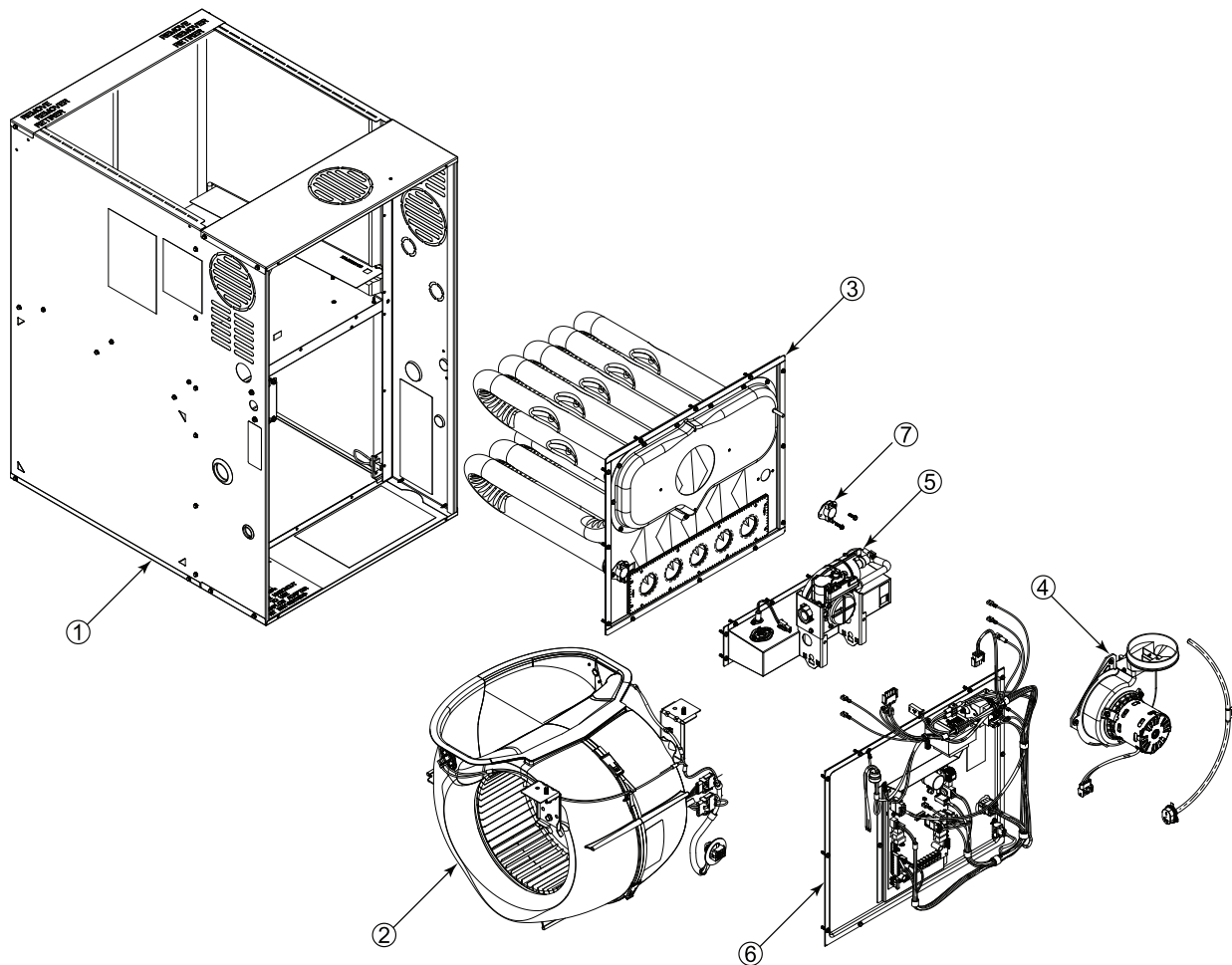
Item	Qty.	Description
1	1	Plug – Gas
2	1	Combustion Air Duct <b>Note:</b> For L8V1C100U5VS Only <sup>(a)</sup>
3	1	Installation, Operation, and Maintenance
4	1	Owner Guide
5	1	Limited Warranty
6	2	Tinnerman Clips (not pictured) <b>Note:</b> Tinnerman Clips should be kept with unit and are used if the door panel flange hole(s) becomes stripped.



<sup>(a)</sup> Future C100 furnaces with the Burner Box limit on the bottom DO NOT require the Combustion Air Duct.

## Parts List

Figure 1. L8V1 Parts Exploded View



- |  |  |
|--|--|
| <p>1. Furnace cabinet assembly</p> <ul style="list-style-type: none"> <li>a. Blower deck</li> <li>b. Panel loop interlock (door switch)</li> </ul> <p>2. Blower assembly</p> <ul style="list-style-type: none"> <li>a. Variable speed motor</li> <li>b. Vortica blower housing</li> <li>c. RAF – Reverse airflow limit switches</li> </ul> <p>3. Heat exchanger assembly</p> <ul style="list-style-type: none"> <li>a. Burner tube insulation sleeves</li> <li>b. Burner box insulation</li> <li>c. Flue collector box</li> </ul> <p>4. Inducer assembly</p> <ul style="list-style-type: none"> <li>a. Combustion motor</li> <li>b. Pressure transducer</li> </ul> | <p>5. Burner assembly</p> <ul style="list-style-type: none"> <li>a. Ignitor</li> <li>b. Flame sensor</li> <li>c. Burner box limit</li> <li>d. Orifice</li> <li>e. J-tube</li> </ul> <p>6. Control assembly</p> <ul style="list-style-type: none"> <li>a. IFC - Integrated Furnace Control</li> <li>b. Transformer</li> <li>c. Motor choke(B80)</li> <li>d. Wire assemblies</li> </ul> <p>7. Primary limit switch</p> |
|--|--|

# Product Specifications

**Table 2. Models L8V1A040U3VSBA, L8V1A060U3VSBA, L8V1B080U4VSBA, L8V1C100U5VSBA**

MODEL	L8V1A040U3VSBA (a)	L8V1A060U3VSBA (a)	L8V1B080U4VSBA (a)	L8V1C100U5VSBA (a)
TYPE	Upflow / Horizontal	Upflow / Horizontal	Upflow / Horizontal	Upflow / Horizontal
RATINGS (b)				
Input BTUH	40,000	60,000	80,000	100,000
Capacity BTUH (ICS) (c)	31,700	48,100	63,000	80,200
Temp. Rise (Min. - Max.) °F	30 - 60	30 - 60	30 - 60	30 - 60
AFUE – Rating (c)	80	80	80	80
Return Air Temp. (Min. - Max.) °F	55°F - 80°F	55°F - 80°F	55°F - 80°F	55°F - 80°F
<b>BLOWER DRIVE</b>	DIRECT	DIRECT	DIRECT	DIRECT
Diameter – Width (In.)	11 X 8	11 X 8	11 X 8	11 X 10
No. Used	1	1	1	1
Speeds (No.)	Variable	Variable	Variable	Variable
CFM vs. in. w.g.	See Fan Performance Table	See Fan Performance Table	See Fan Performance Table	See Fan Performance Table
Motor HP	0.5	0.5	0.75	1
RPM	Variable	Variable	Variable	Variable
Volts / Ph / Hz	120 / 1 / 60	120 / 1 / 60	120 / 1 / 60	120 / 1 / 60
FLA	6.4	6.4	9.6	10
<b>COMBUSTION FAN – Type</b>	Centrifugal	Centrifugal	Centrifugal	Centrifugal
Drive – No. Speeds	Variable	Variable	Variable	Variable
Motor RPM	4700	4700	4700	4700
Volts/Ph/Hz	120 / 1 / 60	120 / 1 / 60	120 / 1 / 60	120 / 1 / 60
FLA	1.00	1.00	1.00	1.00
Inducer Orifice	3.15	3.15	3.15	3.15
<b>FILTER – Furnished?</b>	No	No	No	No
Type recommended	High Velocity	High Velocity	High Velocity	High Velocity
High Vel. (No.-Size-Thk.)	1 - 14 X 25 - 1 in.	1 - 14 X 25 - 1 in.	1 - 16 X 25 - 1 in.	1 - 20 X 25 - 1 in.
<b>VENT PIPE DIAMETER – Min (in.)</b>	4 Round	4 Round	4 Round	4 Round
<b>HEAT EXCHANGER – Type</b>	Stainless Steel	Stainless Steel	Stainless Steel	Stainless Steel
Gauge (Fired)	20	20	20	20
<b>ORIFICES – Main</b>				
Nat. Gas Qty. - Drill Size	1 - 3.2 mm	1 - #23	1 - #15	1 - #11
<b>GAS VALVE</b>	Redundant - Two Stage	Redundant - Two Stage	Redundant - Two Stage	Redundant - Two Stage
<b>PILOT SAFETY DEVICE – Type</b>	120 V SiNi Igniter	120 V SiNi Igniter	120 V SiNi Igniter	120 V SiNi Igniter
<b>BURNERS</b>				
Type	Premix-ULN	Premix-ULN	Premix-ULN	Premix-ULN
Quantity	1	1	1	1
<b>POWER CONN. – V/Ph/Hz (d)</b>	120 / 1 / 60	120 / 1 / 60	120 / 1 / 60	120 / 1 / 60
Ampacity (Amps)	9.2	9.2	13.2	13.7
Max. Overcurrent Protection (Amps)	15	15	15	15
<b>PIPE CONN. SIZE (in.)</b>	1/2	1/2	1/2	1/2

(a) Central Furnace heating designs are certified to ANSI Z21.47 — latest edition.

(b) For U.S. applications, above input ratings (BTUH) are up to 2,000 feet, derate 4% per 1,000 feet for elevations above 2,000 feet above sea level.

(c) Based on U.S. government standard tests.

(d) The above wiring specifications are in accordance with National Electrical Code; however, installations must comply with local codes.

# Furnace Installation Guidelines

## Safety Practices and Precautions

The following safety practices and precautions must be followed during the installation, servicing, and operation of this Furnace.

1. Use only with the type gas approved for this Furnace. Refer to the Furnace rating plate.
2. Install the Furnace only in a location and position as specified in "Locations and Clearances" of these instructions.
3. Provide adequate combustion and ventilation air to the Furnace space as specified in "Air for Combustion and Ventilation" of these instructions.
4. Combustion products must be discharged outdoors. Connect this Furnace to an approved vent system only, as specified in the "Venting" section of these instructions.
5. 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, as specified in the "Gas Piping" section of these instructions.
6. Always install the Furnace to operate within the Furnace's intended temperature-rise range with a duct system which has an external static pressure within the allowable range, as specified on the unit rating plate. Airflow within temperature rise for cfm versus static is shown in the Airflow Tables section of these instructions
7. When a Furnace is installed so that the supply ducts carry air circulated by the Furnace to areas outside the space containing the Furnace, the return air shall also be handled by a duct(s) sealed to the Furnace casing and terminating outside the space containing the Furnace.
8. A gas-fired Furnace for installation in a residential garage must be installed as specified in "Location and Clearances" section of these instructions.
9. The Furnace return air temperature range is between 55 and 80 Fahrenheit.
10. The furnace, under any circumstance may NOT be used during construction phase of the building or structure.
11. In the Commonwealth of Massachusetts, this product must be gas piped by a Licensed Plumber or Gas Fitter.

This Furnace is certified to leak 1% or less of nominal air conditioning CFM delivered when pressurized to .5" water column with all inlets, outlets, and drains sealed.

## General Guidelines

### **WARNING**

#### **Safety Hazard!**

**Failure to follow instructions below could result in death or serious injury or property damage. Do not install these furnaces in manufactured housing (mobile), trailers, or recreational vehicles.**

The manufacturer assumes no responsibility for equipment installed in violation of any code or regulation.

It is recommended that Manual J of the Air Conditioning Contractors Association (ACCA) or A.R.I. 230 be followed in estimating heating requirements. When estimating heating requirements for installation at Altitudes above 2000 ft., remember the gas input must be reduced. See Combustion and Input Check.

Material in this shipment has been inspected at the factory and released to the transportation agency without known damage. Inspect exterior of carton for evidence of rough handling in shipment. Unpack carefully after moving equipment to approximate location. If damage to contents is found, report the damage immediately to the delivering agency.

Codes and local utility requirements governing the installation of gas fired equipment, wiring, plumbing, and flue connections must be adhered to. In the absence of local codes, the installation must conform with latest edition of the National Fuel Gas Code ANSI Z223.1 / NFPA 54. The latest code may be obtained from the American Gas Association Laboratories, 400 N. Capitol St. NW, Washington D.C. 20001.  
1-800-699-9277 or [www.aga.org](http://www.aga.org).

These furnaces have been classified as Fan Assisted Combustion system category I furnaces as required by ANSI Z21.47 "latest edition". Therefore they do not require any special provisions for venting other than what is indicated in these instructions.

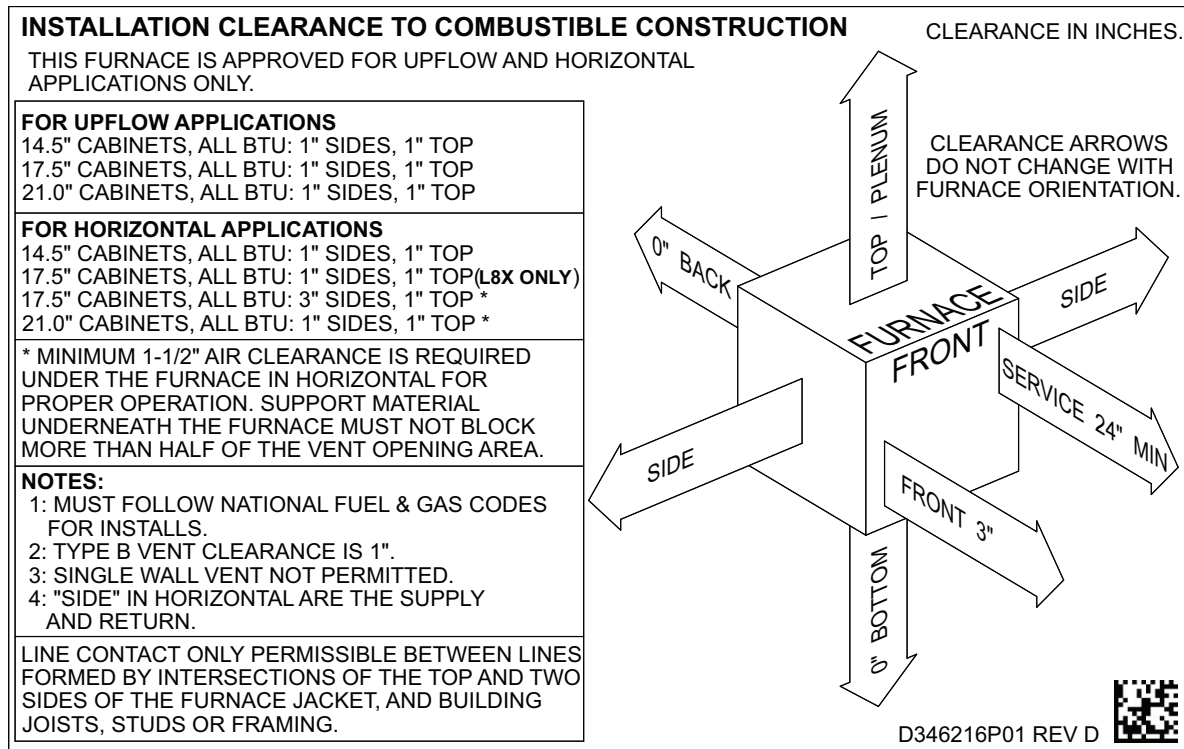
## Locations and Clearances

The location of the Furnace is normally selected by the architect, the builder, or the installer. However, before the Furnace is moved into place, be sure to consider the following requirements:

1. Is the location selected as near the chimney or vent and as centralized for heat distribution as practical?
2. Do all clearances between the Furnace and enclosure equal or exceed the minimums stated below?

## Furnace Installation Guidelines

Figure 2. Minimum clearance to combustible materials



3. Is there sufficient space for servicing the Furnace and other equipment? A minimum of 24 inches front accessibility to the Furnace must be provided. Any access door or panel must permit removal of the largest component.
4. Are there at least 3 inches of clearance between the Furnace combustion air openings in the front panel and any closed panel or door provided?
5. Are the ventilation and combustion air openings large enough and will they remain unobstructed? If outside air is used, are the openings set 12" above the highest snow accumulation level?
6. Allow sufficient height in supply plenum above the furnace to provide for cooling coil installation, if the cooling coil is not installed at the time of this Furnace installation.
7. The Furnace shall be installed so electrical components are protected from water.
8. If the Furnace is installed in a garage, it must be installed so that the burners, and the ignition source are located not less than 18 inches above the floor and the Furnace must be located or protected to avoid physical damage from vehicles.
9. The gas furnace must not be located where excessive exposure to contaminated combustion air will result in safety and performance related problems. Avoid the following known contaminants:
  - a. Permanent wave solutions
  - b. Chlorinated waxes and cleaners
  - c. Chlorine based swimming pool chemicals
  - d. Water softening chemicals
  - e. De-icing salts or chemicals
  - f. Carbon tetrachloride
  - g. Halogen type refrigerants
  - h. Cleaning solvents (such as perchloroethylene)
  - i. Printing inks, paint removers, varnishes, etc.
  - j. Hydrochloric acid
  - k. Cements and glues
  - l. Antistatic fabric softeners for clothes dryers
  - m. Masonry acid washing materials



# Wiring Diagrams

Figure 4. L8V1 – wiring diagram

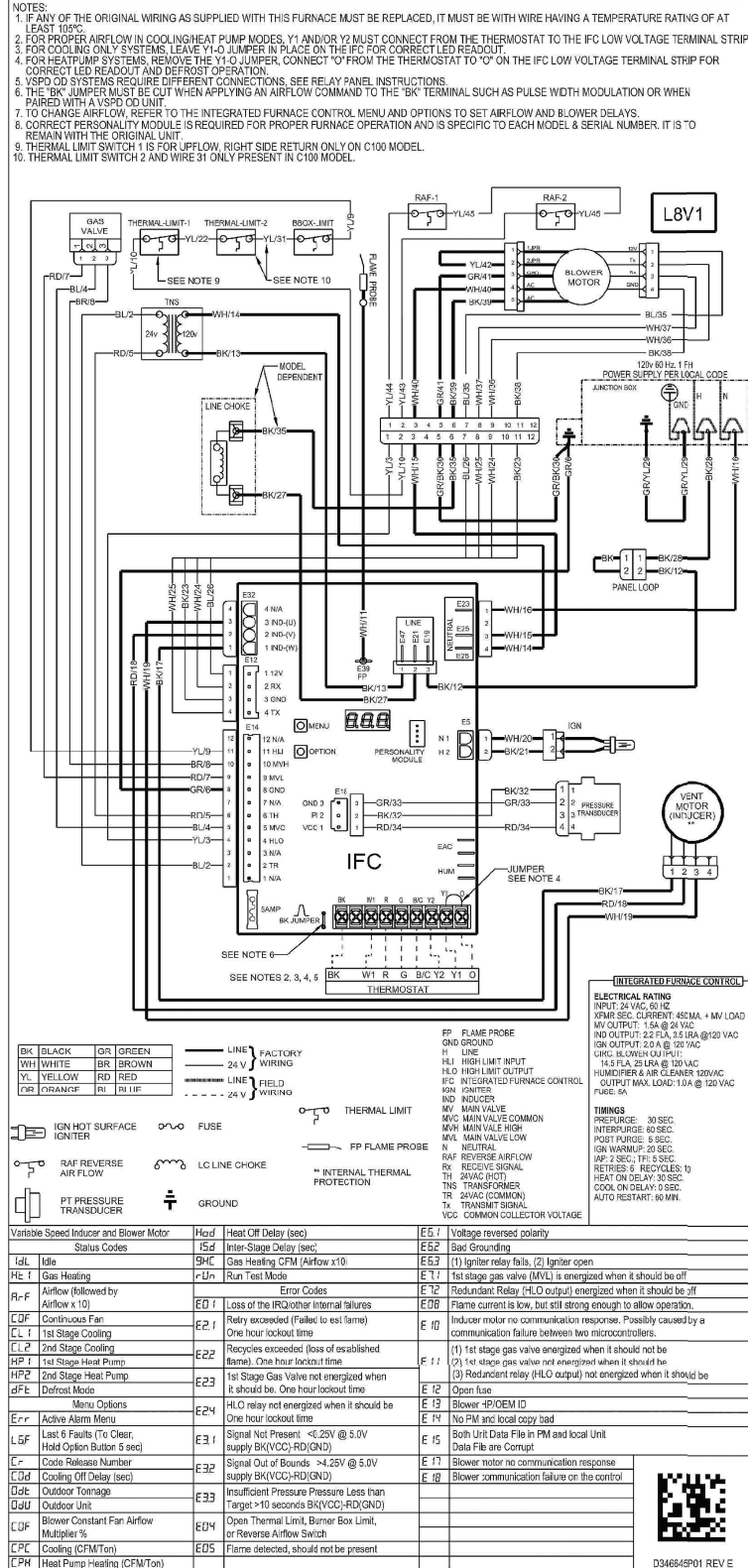
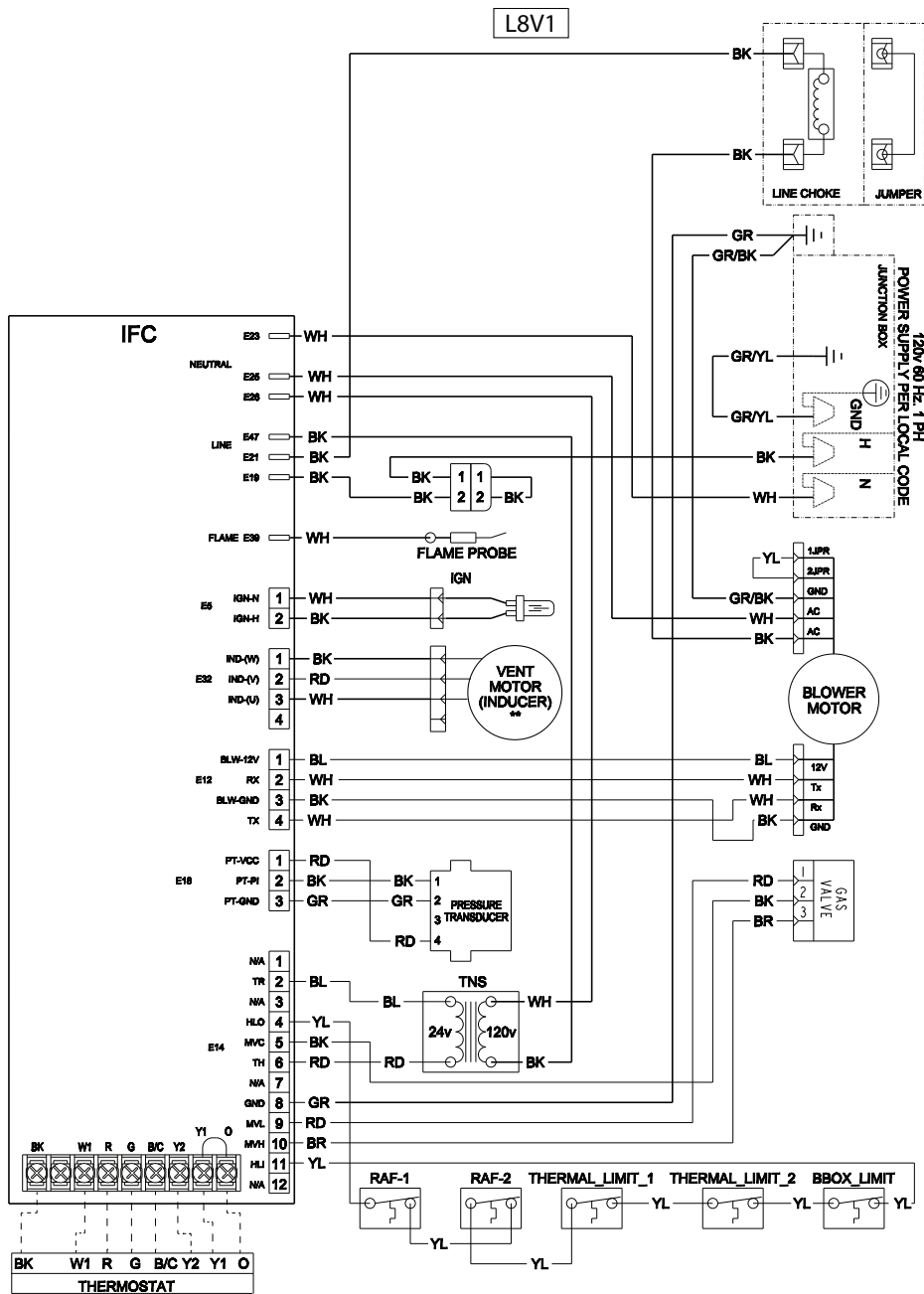


Figure 5. L8V1 – ladder diagram



# Airflow Tables

**Table 3. Heating airflow performance – L8V1A040U3VS**

L8V1A040U3VS Furnace Heating Airflow (CFM), Temp. Rise (°F), and Power (Watts) vs. External Static Pressure (iwc) with Filter						
Airflow Setting		External Static Pressure				
		0.1	0.3	0.5	0.7	0.9
550	CFM/Watts	594/20	614/66	633/112	653/158	672/204
	Temp. Rise	49	48	46	45	44
610 <sup>(a)</sup>	CFM/Watts	668/28	683/75	698/123	714/171	729/219
	Temp. Rise	44	43	42	41	40
630	CFM/Watts	704/30	715/79	725/128	735/176	746/225
	Temp. Rise	41	41	40	40	39
700	CFM/Watts	792/43	796/93	801/143	805/193	810/243
	Temp. Rise	37	37	37	36	36

<sup>(a)</sup> Factory Setting

**Table 4. Cooling airflow performance – L8V1A040U3VS**

L8V1A040U3VS Furnace Cooling Airflow (CFM) and Power (Watts) vs. External Static Pressure with Filter							
Outdoor Tonnage - ODT	Airflow Setting (CFM/Ton)		EXTERNAL STATIC PRESSURE (IN. W. C.)				
			0.1	0.3	0.5	0.7	0.9
1.5	450	CFM / WATTS	687 / 58	682 / 99	677 / 143	673 / 190	668 / 239
	420	CFM / WATTS	642 / 51	638 / 90	635 / 133	632 / 178	628 / 226
	400	CFM / WATTS	612 / 46	609 / 84	607 / 126	604 / 170	602 / 217
	370	CFM / WATTS	566 / 40	566 / 76	565 / 116	564 / 159	563 / 205
	350	CFM / WATTS	536 / 36	536 / 71	536 / 110	536 / 152	536 / 198
	330	CFM / WATTS	506 / 33	507 / 67	508 / 105	509 / 146	510 / 190
	310	CFM / WATTS	476 / 29	478 / 62	480 / 99	482 / 140	484 / 182
	290	CFM / WATTS	446 / 26	449 / 58	452 / 94	455 / 135	458 / 178
2.0	450	CFM / WATTS	913 / 106	901 / 157	889 / 210	877 / 263	865 / 317
	420	CFM / WATTS	853 / 92	843 / 139	833 / 189	822 / 241	812 / 296
	400	CFM / WATTS	813 / 83	804 / 129	795 / 177	786 / 228	777 / 281
	370	CFM / WATTS	752 / 70	746 / 114	739 / 160	732 / 209	725 / 260
	350	CFM / WATTS	712 / 59	707 / 106	701 / 149	695 / 196	690 / 247
	330	CFM / WATTS	672 / 56	668 / 96	663 / 140	659 / 186	655 / 234
	310	CFM / WATTS	632 / 49	629 / 88	626 / 130	623 / 175	620 / 223
	290	CFM / WATTS	592 / 43	590 / 81	588 / 122	586 / 165	585 / 211
2.5	450	CFM / WATTS	1140 / 177	1120 / 236	1101 / 297	1081 / 359	1062 / 422
	420	CFM / WATTS	1064 / 151	1047 / 207	1030 / 265	1013 / 324	996 / 385
	400	CFM / WATTS	1014 / 135	998 / 189	983 / 245	968 / 300	952 / 362
	370	CFM / WATTS	938 / 114	925 / 164	913 / 217	900 / 272	887 / 329
	350	CFM / WATTS	888 / 100	877 / 149	866 / 201	854 / 254	843 / 309
	330	CFM / WATTS	838 / 88	828 / 135	818 / 185	809 / 236	799 / 290
	310	CFM / WATTS	788 / 77	780 / 122	771 / 170	763 / 220	755 / 272
	290	CFM / WATTS	737 / 67	731 / 110	724 / 156	718 / 204	712 / 255
3.0 <sup>(a)</sup>	450	CFM / WATTS	1366 / 273	1339 / 362	1312 / 413	1285 / 476	1259 / 553
	420	CFM / WATTS	1275 / 232	1251 / 295	1228 / 361	1204 / 428	1180 / 495
	400	CFM / WATTS	1215 / 207	1193 / 267	1171 / 331	1149 / 396	1127 / 461
	370	CFM / WATTS	1124 / 172	1105 / 230	1087 / 290	1068 / 351	1049 / 415
	350 <sup>(a)</sup>	CFM / WATTS	1064 / 151	1047 / 207	1030 / 265	1013 / 324	996 / 385
	330	CFM / WATTS	1004 / 132	989 / 185	974 / 242	959 / 298	944 / 357
	310	CFM / WATTS	943 / 115	930 / 166	917 / 219	904 / 275	891 / 331
	290	CFM / WATTS	883 / 99	872 / 148	861 / 199	850 / 252	838 / 306

<sup>(a)</sup> Factory Setting

**Table 5. Heating airflow performance – L8V1A060U3VS**

L8V1A060U3VS Furnace Heating Airflow (CFM), Temp. Rise (°F), and Power (Watts) vs. External Static Pressure (iwc) with Filter						
Airflow Setting		External Static Pressure				
		0.1	0.3	0.5	0.7	0.9
830	CFM/Watts	856/50	849/101	843/153	836/204	829/255
	Temp. Rise	51	51	52	52	53

**Table 5. Heating airflow performance – L8V1A060U3VS (continued)**

L8V1A060U3VS Furnace Heating Airflow (CFM), Temp. Rise (°F), and Power (Watts) vs. External Static Pressure (iwc) with Filter						
960	CFM/Watts	993/76	981/131	969/186	957/240	946/295
	Temp. Rise	44	45	45	46	47
990 <sup>(a)</sup>	CFM/Watts	1014/81	1009/139	1005/196	1000/254	996/312
	Temp. Rise	43	43	44	44	44
1130	CFM/Watts	1162/120	1153/182	1143/244	1133/306	1123/368
	Temp. Rise	38	38	38	39	39

<sup>(a)</sup> Factory Setting

**Table 6. Cooling airflow performance – L8V1A060U3VS**

L8V1A060U3VS Furnace Cooling Airflow (CFM) and Power (Watts) vs. External Static Pressure with Filter							
Outdoor Tonnage - ODT	Airflow Setting (CFM/Ton)		EXTERNAL STATIC PRESSURE (IN. W. C.)				
			0.1	0.3	0.5	0.7	0.9
1.5	450	CFM / WATTS	718 / 56	706 / 96	694 / 140	682 / 185	670 / 232
	420	CFM / WATTS	673 / 49	661 / 87	649 / 129	637 / 173	625 / 219
	400	CFM / WATTS	642 / 44	630 / 82	618 / 122	606 / 165	594 / 210
	370	CFM / WATTS	596 / 38	584 / 74	572 / 113	560 / 154	548 / 198
	350	CFM / WATTS	565 / 35	553 / 69	541 / 107	529 / 147	517 / 190
	330	CFM / WATTS	534 / 31	522 / 65	510 / 101	498 / 141	485 / 183
	310	CFM / WATTS	502 / 28	490 / 60	478 / 96	466 / 135	454 / 176
	290	CFM / WATTS	470 / 25	458 / 56	446 / 91	434 / 128	422 / 169
2.0	450	CFM / WATTS	938 / 103	926 / 153	914 / 204	902 / 258	890 / 313
	420	CFM / WATTS	881 / 88	868 / 136	856 / 185	844 / 237	832 / 289
	400	CFM / WATTS	842 / 80	830 / 125	818 / 173	806 / 223	794 / 274
	370	CFM / WATTS	783 / 67	771 / 111	759 / 156	747 / 204	735 / 253
	350	CFM / WATTS	743 / 61	731 / 102	719 / 146	707 / 192	695 / 240
	330	CFM / WATTS	703 / 53	691 / 93	679 / 136	667 / 181	655 / 228
	310	CFM / WATTS	663 / 47	651 / 86	638 / 127	626 / 170	614 / 216
	290	CFM / WATTS	622 / 41	610 / 78	598 / 118	586 / 160	574 / 205
2.5	450	CFM / WATTS	1146 / 172	1134 / 230	1122 / 291	1110 / 352	1098 / 416
	420	CFM / WATTS	1078 / 146	1066 / 202	1054 / 259	1042 / 318	1030 / 379
	400	CFM / WATTS	1032 / 131	1020 / 184	1008 / 240	996 / 297	984 / 356
	370	CFM / WATTS	962 / 110	950 / 160	938 / 213	926 / 267	914 / 323
	350	CFM / WATTS	914 / 97	902 / 145	890 / 196	878 / 249	866 / 303
	330	CFM / WATTS	866 / 85	854 / 132	842 / 180	830 / 231	818 / 284
	310	CFM / WATTS	817 / 74	805 / 119	793 / 166	781 / 215	769 / 265
	290	CFM / WATTS	768 / 65	756 / 107	744 / 152	732 / 199	720 / 249
3.0 <sup>(a)</sup>	450	CFM / WATTS	1342 / 266	1330 / 333	1318 / 402	1306 / 472	1294 / 543
	420	CFM / WATTS	1265 / 225	1253 / 289	1241 / 354	1229 / 421	1217 / 489
	400	CFM / WATTS	1213 / 200	1201 / 262	1188 / 325	1176 / 389	1164 / 455
	370	CFM / WATTS	1132 / 167	1120 / 224	1108 / 284	1096 / 345	1084 / 408
	350 <sup>(a)</sup>	CFM / WATTS	1078 / 146	1066 / 202	1054 / 259	1042 / 318	1030 / 379
	330	CFM / WATTS	1023 / 128	1011 / 181	999 / 236	986 / 293	974 / 351
	310	CFM / WATTS	966 / 111	954 / 162	942 / 214	930 / 269	918 / 325
	290	CFM / WATTS	909 / 96	897 / 144	885 / 195	873 / 247	861 / 301

<sup>(a)</sup> Factory Setting

## Airflow Tables

**Table 7. Heating airflow performance – L8V1B080U4VS**

L8V1B080U4VS Furnace Heating Airflow (CFM), Temp. Rise (°F), and Power (Watts) vs. External Static Pressure (iwc) with Filter						
Airflow Setting		External Static Pressure				
		0.1	0.3	0.5	0.7	0.9
1180	CFM/Watts	1253/123	1243/184	1233/244	1223/304	1214/365
	Temp. Rise	47	47	48	48	49
1250	CFM/Watts	1313/141	1298/203	1283/265	1268/328	1253/390
	Temp. Rise	45	45	46	46	47
1350 <sup>(a)</sup>	CFM/Watts	1437/183	1413/248	1389/313	1365/378	1341/443
	Temp. Rise	41	42	42	43	43
1400	CFM/Watts	1454/193	1441/262	1429/331	1416/400	1403/469
	Temp. Rise	41	41	41	41	42

<sup>(a)</sup> Factory Setting

**Table 8. Cooling airflow performance – L8V1B080U4VS**

L8V1B080U4VS Furnace Cooling Airflow (CFM) and Power (Watts) vs. External Static Pressure with Filter							
Outdoor Tonnage - ODT	Airflow Setting (CFM/Ton)		EXTERNAL STATIC PRESSURE (IN. W. C.)				
			0.1	0.3	0.5	0.7	0.9
2.0	450	CFM / WATTS	911 / 90	905 / 140	893 / 191	881 / 241	878 / 292
	420	CFM / WATTS	853 / 77	849 / 125	833 / 172	823 / 221	816 / 269
	400	CFM / WATTS	814 / 69	811 / 115	795 / 161	781 / 208	774 / 255
	370	CFM / WATTS	757 / 58	755 / 102	738 / 145	722 / 190	714 / 235
	350	CFM / WATTS	719 / 52	719 / 94	700 / 136	683 / 179	671 / 223
	330	CFM / WATTS	682 / 46	681 / 86	662 / 127	644 / 169	631 / 212
	310	CFM / WATTS	645 / 41	645 / 79	625 / 118	603 / 159	588 / 201
2.5	290	CFM / WATTS	608 / 36	609 / 72	587 / 110	565 / 150	548 / 191
	450	CFM / WATTS	1130 / 152	1121 / 214	1113 / 274	1110 / 334	1117 / 393
	420	CFM / WATTS	1058 / 129	1049 / 187	1039 / 244	1034 / 301	1035 / 356
	400	CFM / WATTS	1008 / 115	1000 / 170	990 / 225	981 / 279	981 / 333
	370	CFM / WATTS	936 / 95	927 / 147	917 / 199	907 / 250	906 / 302
	350	CFM / WATTS	887 / 84	882 / 134	868 / 183	859 / 233	853 / 282
	330	CFM / WATTS	838 / 74	835 / 121	819 / 168	806 / 216	802 / 264
3.0	310	CFM / WATTS	790 / 64	787 / 109	771 / 154	758 / 200	750 / 247
	290	CFM / WATTS	743 / 56	742 / 99	724 / 142	708 / 186	698 / 231
	450	CFM / WATTS	1349 / 241	1340 / 313	1337 / 384	1339 / 453	1357 / 523
	420	CFM / WATTS	1261 / 202	1253 / 270	1246 / 336	1249 / 402	1260 / 467
	400	CFM / WATTS	1203 / 179	1195 / 244	1187 / 308	1186 / 370	1198 / 434
	370	CFM / WATTS	1116 / 147	1106 / 208	1097 / 268	1095 / 327	1101 / 386
	350	CFM / WATTS	1058 / 129	1049 / 187	1039 / 244	1034 / 301	1035 / 356
3.5	330	CFM / WATTS	998 / 112	991 / 167	980 / 221	972 / 275	972 / 329
	310	CFM / WATTS	940 / 97	933 / 149	921 / 201	911 / 252	911 / 304
	290	CFM / WATTS	882 / 83	877 / 132	863 / 182	852 / 231	848 / 280
	450	CFM / WATTS	1565 / 360	1559 / 442	1562 / 523	1575 / 604	1597 / 682
	420	CFM / WATTS	1465 / 300	1457 / 378	1455 / 454	1463 / 528	1484 / 603
	400	CFM / WATTS	1397 / 264	1388 / 339	1384 / 411	1392 / 484	1408 / 555
	370	CFM / WATTS	1295 / 216	1285 / 286	1280 / 354	1283 / 421	1296 / 488
4.0 <sup>(a)</sup>	350	CFM / WATTS	1227 / 188	1219 / 254	1213 / 320	1210 / 383	1221 / 447
	330	CFM / WATTS	1159 / 162	1151 / 225	1142 / 287	1139 / 348	1148 / 409
	310	CFM / WATTS	1091 / 139	1083 / 199	1073 / 258	1068 / 315	1073 / 373
	290	CFM / WATTS	1023 / 119	1015 / 175	1004 / 230	998 / 286	1000 / 341
	450	CFM / WATTS	1779 / 513	1779 / 607	1788 / 698	1807 / 788	1839 / 877
	420	CFM / WATTS	1665 / 427	1661 / 514	1666 / 600	1683 / 685	1712 / 769
	400	CFM / WATTS	1589 / 375	1584 / 459	1587 / 541	1600 / 622	1623 / 702
4.0 <sup>(a)</sup>	370	CFM / WATTS	1474 / 305	1465 / 383	1466 / 460	1475 / 536	1495 / 611
	350 <sup>(a)</sup>	CFM / WATTS	1397 / 264	1388 / 339	1384 / 411	1392 / 484	1408 / 555
	330	CFM / WATTS	1319 / 227	1310 / 298	1304 / 367	1308 / 435	1323 / 503
	310	CFM / WATTS	1241 / 194	1232 / 261	1227 / 327	1226 / 391	1237 / 455
	290	CFM / WATTS	1164 / 164	1155 / 227	1147 / 289	1144 / 350	1153 / 411

<sup>(a)</sup> Factory Setting

**Table 9. Heating airflow performance – L8V1C100U5VS**

L8V1C100U5VS Furnace Heating Airflow (CFM), Temp. Rise (°F), and Power (Watts) vs. External Static Pressure (iwc) with Filter						
Airflow Setting		External Static Pressure				
		0.1	0.3	0.5	0.7	0.9
1500 <sup>(a)</sup>	CFM/Watts	1608/231	1624/300	1640/370	1655/440	1671/509
	Temp. Rise	46	45	45	45	44
1600	CFM/Watts	1684/264	1700/342	1716/421	1731/500	1747/578
	Temp. Rise	44	43	43	43	42
1900	CFM/Watts	2014/434	2020/523	2026/613	2033/702	2039/791
	Temp. Rise	37	37	37	37	37
2000	CFM/Watts	2085/510	2085/605	2084/700	2083/796	2082/891
	Temp. Rise	36	36	36	36	36

<sup>(a)</sup> Factory Setting

**Table 10. Cooling airflow performance – L8V1C100U5VS**

L8V1C100U5VS Furnace Cooling Airflow (CFM) and Power (Watts) vs. External Static Pressure with Filter							
Outdoor Tonnage - ODT	Airflow Setting (CFM/Ton)		EXTERNAL STATIC PRESSURE (IN. W. C.)				
			0.1	0.3	0.5	0.7	0.9
2.5	450	CFM / WATTS	1107 / 105	1105 / 152	1101 / 205	1094 / 261	1085 / 321
	420	CFM / WATTS	1033 / 88	1029 / 134	1023 / 184	1015 / 239	1004 / 297
	400	CFM / WATTS	983 / 78	978 / 122	971 / 172	961 / 225	950 / 282
	370	CFM / WATTS	909 / 65	901 / 107	892 / 155	880 / 206	866 / 262
	350	CFM / WATTS	860 / 57	850 / 98	838 / 144	824 / 195	808 / 250
	330	CFM / WATTS	810 / 50	797 / 90	783 / 135	767 / 185	750 / 238
	310	CFM / WATTS	760 / 44	744 / 82	728 / 126	710 / 175	691 / 228
3.0	290	CFM / WATTS	710 / 38	691 / 75	671 / 118	651 / 167	631 / 220
	450	CFM / WATTS	1328 / 167	1328 / 221	1327 / 280	1324 / 342	1318 / 407
	420	CFM / WATTS	1240 / 140	1239 / 191	1237 / 247	1233 / 307	1226 / 370
	400	CFM / WATTS	1180 / 123	1180 / 173	1177 / 227	1172 / 286	1164 / 347
	370	CFM / WATTS	1092 / 101	1090 / 148	1085 / 201	1079 / 257	1069 / 316
	350	CFM / WATTS	1033 / 88	1029 / 134	1023 / 184	1015 / 239	1004 / 297
	330	CFM / WATTS	973 / 76	968 / 120	961 / 170	951 / 223	938 / 279
3.5	310	CFM / WATTS	914 / 66	907 / 108	897 / 156	885 / 208	871 / 263
	290	CFM / WATTS	855 / 56	844 / 97	832 / 143	818 / 194	803 / 248
	450	CFM / WATTS	1550 / 253	1549 / 312	1548 / 377	1545 / 446	1540 / 517
	420	CFM / WATTS	1447 / 210	1446 / 267	1445 / 328	1442 / 394	1437 / 462
	400	CFM / WATTS	1378 / 184	1377 / 239	1377 / 299	1374 / 363	1368 / 429
	370	CFM / WATTS	1274 / 150	1274 / 202	1272 / 259	1269 / 320	1262 / 384
	350	CFM / WATTS	1205 / 130	1204 / 180	1202 / 235	1198 / 294	1190 / 356
4.0	330	CFM / WATTS	1136 / 112	1135 / 160	1131 / 214	1126 / 271	1117 / 331
	310	CFM / WATTS	1067 / 95	1064 / 142	1060 / 194	1052 / 249	1042 / 307
	290	CFM / WATTS	998 / 81	994 / 126	987 / 176	978 / 229	966 / 286
	450	CFM / WATTS	1773 / 364	1769 / 430	1765 / 501	1760 / 576	1754 / 653
	420	CFM / WATTS	1654 / 301	1652 / 364	1649 / 431	1646 / 503	1640 / 577
	400	CFM / WATTS	1575 / 264	1574 / 324	1572 / 390	1569 / 459	1564 / 530
	370	CFM / WATTS	1456 / 214	1456 / 271	1455 / 333	1452 / 399	1447 / 467
4.5	350	CFM / WATTS	1378 / 184	1377 / 239	1377 / 299	1374 / 363	1368 / 429
	330	CFM / WATTS	1299 / 158	1299 / 210	1297 / 268	1294 / 330	1288 / 394
	310	CFM / WATTS	1220 / 134	1219 / 185	1217 / 240	1213 / 300	1206 / 362
	290	CFM / WATTS	1141 / 113	1140 / 161	1137 / 215	1131 / 272	1122 / 333
	450	CFM / WATTS	1996 / 506	1988 / 578	1980 / 655	1971 / 736	1962 / 819
	420	CFM / WATTS	1862 / 417	1856 / 486	1851 / 559	1845 / 636	1837 / 715
	400	CFM / WATTS	1773 / 364	1769 / 430	1765 / 501	1760 / 576	1754 / 653
4.5	370	CFM / WATTS	1639 / 294	1637 / 356	1635 / 423	1631 / 494	1626 / 568
	350	CFM / WATTS	1550 / 253	1549 / 312	1548 / 377	1545 / 446	1540 / 517
	330	CFM / WATTS	1461 / 216	1461 / 273	1460 / 335	1457 / 401	1452 / 470
	310	CFM / WATTS	1373 / 182	1373 / 237	1372 / 297	1369 / 361	1363 / 427
	290	CFM / WATTS	1284 / 153	1284 / 205	1282 / 263	1279 / 324	1272 / 388

## Airflow Tables

**Table 10. Cooling airflow performance – L8V1C100U5VS (continued)**

L8V1C100U5VS Furnace Cooling Airflow (CFM) and Power (Watts) vs. External Static Pressure with Filter							
5.0 <sup>(a)</sup>	450	CFM / WATTS	2220 / 680	2206 / 759	2194 / 842	2181 / 929	2167 / 1018
	420	CFM / WATTS	2071 / 560	2061 / 635	2051 / 714	2041 / 796	2031 / 882
	400	CFM / WATTS	1971 / 488	1963 / 560	1956 / 636	1948 / 716	1939 / 799
	370	CFM / WATTS	1823 / 393	1817 / 461	1813 / 533	1807 / 608	1800 / 687
	350 <sup>(a)</sup>	CFM / WATTS	1723 / 337	1720 / 402	1717 / 471	1712 / 544	1707 / 620
	330	CFM / WATTS	1624 / 287	1622 / 349	1620 / 415	1617 / 486	1612 / 559
	310	CFM / WATTS	1526 / 242	1525 / 301	1523 / 365	1520 / 433	1515 / 503
	290	CFM / WATTS	1427 / 202	1427 / 258	1426 / 320	1423 / 385	1418 / 453

<sup>(a)</sup> Factory Setting

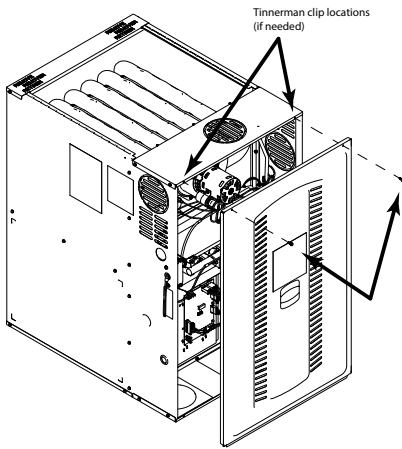
# Furnace General Installation

## Furnace Panel Removal

### Notes:

- For the L8V1 furnace, a 1/4" nut driver is required to remove the two screws at the top of the front panel. The front panel can then be removed by lifting upwards.
- Tinnerman clips are provided in the doc pack if the door panel flange hole(s) becomes stripped.

Figure 6. Panel removal



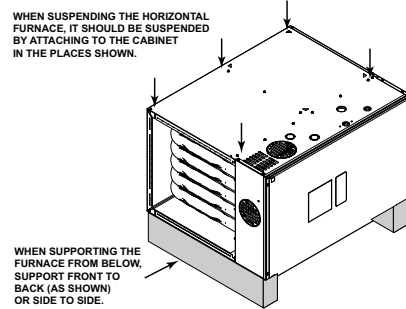
## Horizontal Installation in an Attic or Crawlspace

The non-condensing furnace may be installed in an attic or crawl space in the horizontal position by placing the furnace on its left or right side (as viewed from the front in the vertical position). The horizontal furnace installation in an attic should be on a service platform large enough to allow for proper clearances on all sides and service access to the front of the furnace. See the "[Locations and Clearances](#)," p. 11. Minimum 1.5" air clearance is required under the furnace when in horizontal. Support material if underneath the furnace, must not block more than half of the vent opening area. See [Figure 7](#), p. 21. Line contact is only permissible between lines formed by intersections of the top and two sides of the furnace casing and building joists, studs, or framing.

The furnace may be placed horizontally in a crawl space on a pad or other noncombustible material. Place blocks underneath to support the furnace and raise the unit for sufficient protection from moisture.

The furnace may be installed in a hanging position using straps. The furnace should be supported at both ends and have an additional support in the center of the furnace in back.

Figure 7. Horizontal Furnace



## Gas Piping

**Important:** The furnace default is left side gas piping.

**Note:** For ease of installation, optional accessory part PIP02095 is recommended for gas piping.

Figure 8. Upflow orientation with gas piping on left

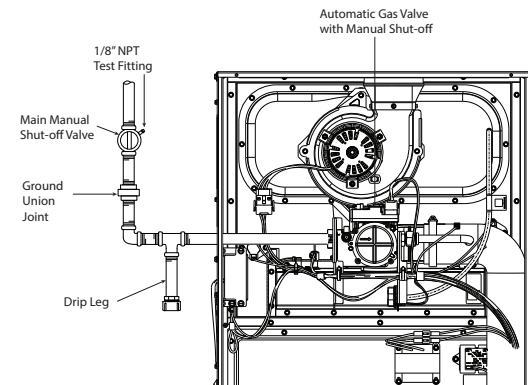
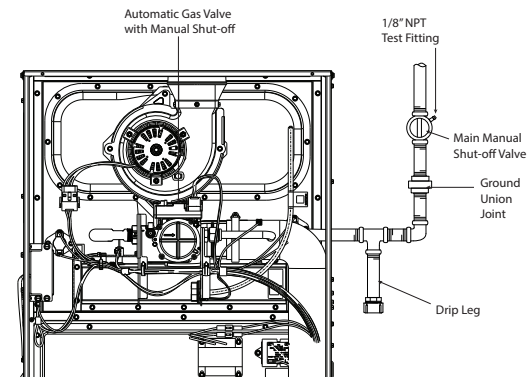
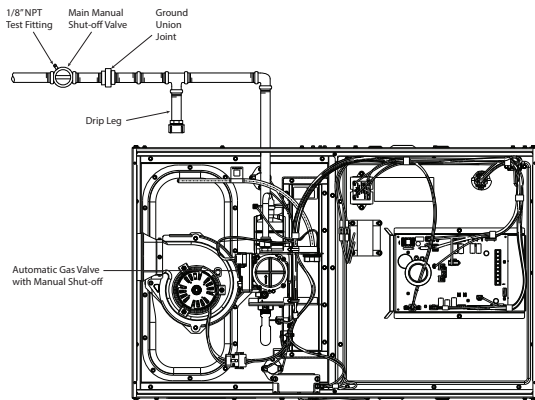


Figure 9. Upflow orientation with gas piping on right

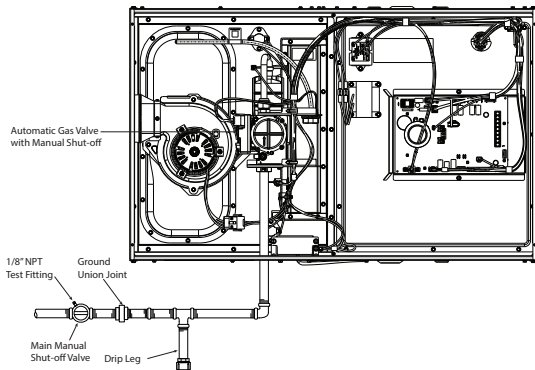


# Furnace General Installation

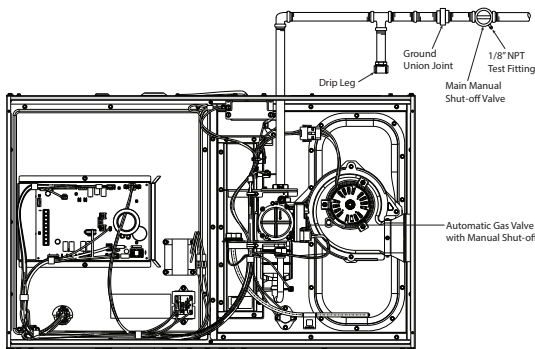
**Figure 10. Horizontal left orientation with gas piping out top**



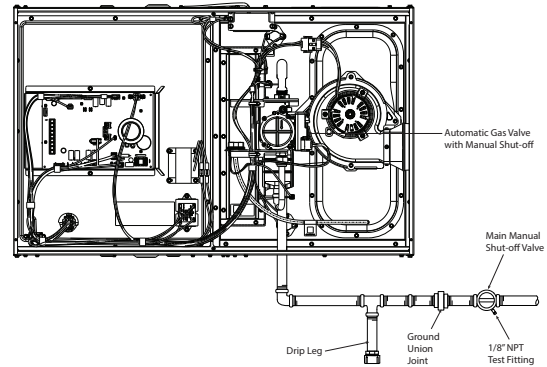
**Figure 11. Horizontal left orientation with gas piping out bottom**



**Figure 12. Horizontal right orientation with gas piping out top**



**Figure 13. Horizontal right orientation with gas piping out bottom**



The furnace is shipped standard for left side installation of gas piping. A cutout with plug is provided on the right side for an alternate gas piping arrangement.

The installation of piping shall be in accordance with piping codes and the regulations of the local gas company. Pipe joint compound must be resistant to the chemical reaction with liquefied petroleum gases.

**Important:** If local codes allow the use of flexible gas appliance connector, always use a new listed connector. Do not use a connector which has previously serviced another gas appliance.

Refer to the piping table for delivery sizes. Connect gas supply to the unit, using a ground joint union and a manual shut-off valve. National codes require a condensation drip leg to be installed ahead of the gas valve.

The furnace and its individual shut-off valve must be disconnected from the gas supply piping system during any pressure testing of that system at test pressures in excess of 1/2 psig (3.5 kPa).

The furnace must be isolated from the gas supply piping by closing its individual manual shut-off valve during any pressure testing of the gas supply piping system at test pressures equal to or less than 1/2 psig (3.5 kPa).

**Note:** Maximum pressure to the gas valve for natural gas is 13.8" W.C. Minimum pressure is 5.0" W.C.

**Table 11. Cubic feet per hour of gas for various pipe sizes and lengths (natural gas only)**

Pipe size	Length of pipe						
	10	20	30	40	50	60	70
1/2	131	90	72	62	55	50	46
3/4	273	188	151	129	114	104	95
1	514	353	284	243	215	195	179
1-1/4	1060	726	583	499	442	400	368

**Note:** This table is based on Pressure Drop of 0.3 inch W.C. and 0.6 SP. GR. Gas

All gas fittings must be checked for leaks using a soapy solution before lighting the furnace. **Do not check with an open flame.**

**Table 12. Orifice sizes**

INPUT RATING (BTUH)	NUMBER OF BURNERS	MAIN BURNER ORIFICE DRILL SIZE (NAT Gas)
40,000	1	1 - 3.2 mm
60,000	1	1 - #23
80,000	1	1 - #15
100,000	1	1 - #11

**Combustion and Input Check**

1. Make sure all gas appliances are off except the furnace.
2. Clock the gas meter with the furnace operating (determine the dial rating of the meter) for one revolution.
3. Match the "Sec" column in the gas flow table with the time clocked.
4. Read the "Flow" column opposite the number of seconds clocked.
5. Use the following factors if necessary:
  - a. For 1 Cu. Ft. Dial Gas Flow CFH = Chart Flow Reading ÷ 2
  - b. For 1/2 Cu Ft. Dial Gas Flow CFH = Chart Flow Reading ÷ 4
  - c. For 5 Cu. Ft. Dial Gas Flow CFH = 10X Chart Flow Reading ÷ 4
6. Multiply the final figure by the heating value of the gas obtained from the utility company and compare to the nameplate rating. This must not exceed the nameplate rating.

**Table 13. Gas flow in cubic feet per hour (2 cubic foot dial)**

Sec.	Flow	Sec.	Flow	Sec.	Flow	Sec.	Flow
10	732	31	236	52	141	86	85
11	666	32	229	53	138	88	83
12	610	33	222	54	136	90	81
13	563	34	215	55	133	94	78
14	523	35	209	56	131	98	75
15	488	36	203	57	128	100	73
16	458	37	198	58	126	104	70
17	431	38	193	59	124	108	68
18	407	39	188	60	122	112	65
19	385	40	183	62	118	116	63
20	366	41	179	64	114	120	61
21	349	42	174	66	111	130	56
22	333	43	170	68	108	140	52
23	318	44	166	70	105	150	49
24	305	45	163	72	102	160	46
25	293	46	159	74	99	170	43
26	282	47	156	76	96	180	41

**Table 13. Gas flow in cubic feet per hour (2 cubic foot dial) (continued)**

Sec.	Flow	Sec.	Flow	Sec.	Flow	Sec.	Flow
27	271	48	153	78	94	190	39
28	262	49	149	80	92	200	37
29	253	50	146	82	89		
30	244	51	144	84	87		

**Gas Valve Adjustment**

*Note: The gas valve supplied with this unit has been calibrated specifically for the Ultra Lo-NOx ignition system. Adjustment is not typically necessary.*

Manifold pressure adjustments are only recommended when there are ignition light-off, flame stabilization, or tonal issues with the furnace.

To adjust the manifold pressure:

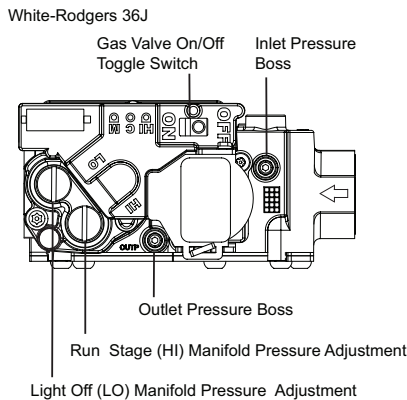
1. Turn off all electrical power to the system.
2. Attach a manifold pressure gauge with flexible tubing to the outlet pressure boss marked "OUT P" on White-Rodgers gas valve model 36J.
3. Loosen (Do Not remove) the pressure tap test set screw one turn with 3/32" hex wrench.
  - a. The pressure tap adjustment kit (KIT07611) contains a 3/32" hex wrench, a 5/16" hose and a connector and can be ordered through Global Parts.
4. Turn on system power and make a call for heating.
5. To adjust the run manifold pressure, remove the high (HI) adjustment regulator cover screw.
  - a. To increase outlet pressure, turn the regulator adjust screw clockwise.
  - b. To decrease outlet pressure, turn the regulator adjust screw counterclockwise.
  - c. Adjust regulator until pressure shown on manometer matches the pressure specified in the table.  
  
The input of no more than nameplate rating and no less than 93% of the nameplate rating, unless the unit is derated for high altitude.
  - d. Replace and tighten the regulator cover screw securely.
6. To adjust the light off manifold pressure, remove the low (LO) adjustment regulator cover screw.
  - a. To increase outlet pressure, turn the regulator adjust screw clockwise.
  - b. To decrease outlet pressure, turn the regulator adjust screw counterclockwise.
  - c. Adjust regulator until pressure shown on manometer matches the pressure specified in the table.

## Furnace General Installation

The input of no more than nameplate rating and no less than 93% of the nameplate rating, unless the unit is derated for high altitude.

- d. Replace and tighten the regulator cover screw securely.
7. Cycle the furnace several times to verify regulator setting.
  - a. Repeat steps 5-7 if needed.
8. Turn off all electrical power to the system.
9. Remove the manometer and flexible tubing and tighten the pressure tap screw.
10. Using a leak detection solution or soap suds, check for leaks at the pressure outlet boss and pressure tap test screw.
11. Turn on system power and check operation of the unit.

**Figure 14. Gas valve adjustment**



**Table 14. Maximum and minimum inlet pressure (inches w.c.)**

	Natural Gas
<b>Maximum</b>	13.8
<b>Minimum</b>	5
<b>Recommended Fuel Manifold Settings (inches w.c.)</b>	
L8V1A040U3VS	2.1" Light-Off (LO) / 3.0" Run (HI)
L8V1A060U3VS	
L8V1B080U4VS	
L8V1C100U5VS	
<b>Orifice Sizes for Natural Gas</b>	
L8V1A040U3VS	3.2 mm
L8V1A060U3VS	#23
L8V1B080U4VS	#15
L8V1C100U5VS	#11

**Note:** Adjust RUN / (HI) manifold pressure to ~ 2.7" if high pitch combustion sound develops.

## High Altitude Derate

Input ratings (BTUH) of these Furnaces are based on sea level operation and should not be changed at elevations up to 2,000 ft. (610 m).

If the installation is 2,000 ft. (610 m) or above, the Furnace input rate (BTUH) shall be reduced 4% for each 1,000 ft. above sea level.

The Furnace input rate shall be checked by clocking the gas flow rate (CFH) and multiplying by the heating value obtained from the local utility supplier for the gas being delivered at the installed altitude. Input rate changes can be made by adjusting the Manifold Pressure (min 2.7 - max 3.0 in. W.C. - Natural Gas).

If the desired input rate can not be achieved with a change in Manifold Pressure, then the orifices must be changed.

**Table 15. Part numbers for replacement orifices**

DRILL SIZE	J-TUBE PART NUMBER
A040 = 3.2 mm	TUB15871
A060 = #23	TUB15353
B080 = #15	TUB15443
C100 = #11	TUB15780

Turn the main Gas Valve toggle switch within the unit to OFF. Turn the external gas valve to ON. Purge the air from the gas lines. After purging, check all gas connections for leaks with a soapy solution – Do Not Check With An Open Flame. Allow 5 minutes for any gas that might have escaped to dissipate.

**Note:** For furnaces requiring modifications other than manifold pressure adjustment for installation at high altitude, installation of this furnace at altitudes above 2000 ft (610 m) shall be made in accordance with the listed High Altitude Conversion Kit available for this furnace.

**Table 16. High altitude kits**

Attributes	0 - 4000 ft	4001 - 7800 ft
L8V1A040U3VSB*	N/A	BAYHALTMOD0008
L8V1A060U3VSB*	N/A	BAYHALTMOD0009
L8V1B080U4VSB*	N/A	BAYHALTMOD0010
L8V1C100U5VSB*	N/A	BAYHALTMOD0011

## General Venting

### VENT PIPING

### **⚠ WARNING**

### **Carbon Monoxide Poisoning!**

Failure to follow instructions below could result in death or serious injury, and property damage.

When removing or placing an existing Category I furnace, confirm the venting system is properly sized.

These furnaces have been classified as Fan-Assisted Combustion System, Category I furnaces under the "latest edition" provisions of ANSI Z21.47 standards. Category I furnaces operate with a non-positive vent static pressure and with a flue loss of not less than 17 percent.

**Important:** *To reduce the combustion back pressure tones that may occur, the minimum overall length of B-vent must be 7 feet.*

Multistory and common venting are permitted for these furnaces. Venting systems shall be in accordance with the National Fuel Gas Code, ANSI Z223.1/NFPA 54, local codes, and this installation manual.

**Notes:**

- Side wall termination with the use of an add-on draft inducer is not allowed with this furnace.
- The furnace must be connected to a factory built chimney or vent complying with a recognized standard, or a masonry or concrete chimney lined with a lining material acceptable to the authority having jurisdiction.

**VENTING INTO A MASONRY CHIMNEY**

If the chimney is oversized, the liner is inadequate, or flue-gas condensation is a problem in your area, consider using the chimney as a pathway or chase for type "B" vent or flexible vent liner. If flexible liner material is used, size the vent using the "B" vent tables, then reduce the maximum capacity by 20% (multiply 0.80 times the maximum capacity). Masonry Chimney Kit BAYVENT800B may be used with these furnaces (**Upflow model furnaces only**) to allow venting into a masonry chimney. Refer to the BAYVENT800B Installer's Guide for application requirements.

**INTERNAL MASONRY CHIMNEYS**

Venting of fan assisted appliances into a lined, internal masonry chimney is allowed only if it is common vented with at least one natural draft appliance; **OR**, if the chimney is lined with type "B", double wall vent or suitable flexible liner material

<p><b>⚠ WARNING</b></p> <p><b>Carbon Monoxide Poisoning!</b></p> <p>Failure to follow instructions below could result in death, serious injury, or property damage. Inspect the chimney liner thoroughly to verify no cracks or other potential areas for flue gas leaks are present in the liner. Liner leaks will result in early damage to the chimney.</p>
--

**Note:** *The following section does not apply if BAYVENT800B (Masonry Chimney Vent Kit) is used. All instructions with the kit must be followed.*

**Table 17. Masonry chimney venting**

Type Furnace	Tile Lined Chimney		Chimney Lining	
	Internal	External	"B" Vent	Flexible Metal Liner
Single Fan Assist	No	No	Yes	Yes <sup>(a)</sup>
Fan Assist + Fan Assist	No	No	Yes	Yes <sup>(a)</sup>
Fan Assist + Natural	Yes	No	Yes	Yes <sup>(a)</sup>

<sup>(a)</sup> Flexible chimney liner size is determined by using the type "B" vent size for the available BTUH input, then reducing the maximum capacity by 20% (multiply maximum capacity times 0.80). The minimum capacity is the same as shown in the "B" vent tables.

**EXTERNAL MASONRY CHIMNEY**

Venting of fan assisted appliances into external chimneys (one or more walls exposed to outdoor temperatures), requires the chimney be lined with type "B", double wall vent or suitable flexible chimney liner material. This applies in all combinations of common venting as well as for fan assisted appliances vented alone.

The following installation practices are recommended to minimize corrosion caused by condensation of flue products in the furnace and flue gas system.

1. Avoid an excessive number of bends.
2. Horizontal runs should pitch upward at least 1/4" per foot.
3. Horizontal runs should be as short as possible.
4. All vent pipe or connectors should be securely supported and must be inserted into, but not beyond the inside wall at the chimney vent.
5. When vent connections must pass through walls or partitions of combustible material, a thimble must be used and installed according to local codes.
6. Vent pipe through the roof should be extended to a height determined by National Fuel Gas Code or local codes. It should be capped properly to prevent rain water from entering the vent. Roof exit should be waterproofed.
7. Use type "B" double wall vent when vent pipe is routed through cool spaces (below 60° F.).
8. Where long periods of airflow are desired for comfort, use long fan cycles instead of continuous airflow.
9. Apply other good venting practices as stated in the venting section of the National Fuel Gas Code ANSI Z223.1 "latest edition".
10. **Vent connectors serving appliance vented by natural draft or non-positive pressure shall not be connected into any portion of a mechanized draft system operating under positive pressure.**
11. Horizontal pipe runs must be supported by hangers, straps or other suitable material in intervals at a minimum of every 3 feet of pipe.

## Furnace General Installation

12. A furnace shall not be connected to a chimney or flue serving a separate appliance designed to burn solid fuel.
13. 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 draft hood outlet area unless designed in accordance with approved engineering methods.

**Maximum Vent or Tile Lined Chimney Flow Area =  $[\pi (D^*)^2 / 4] \times 7$**

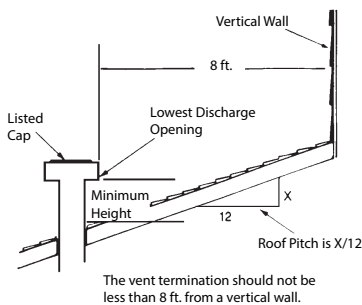
\* Draft hood outlet diameter, flue collar diameter, or listed appliance categorized vent diameter.

**Table 18. Gas vent termination**

Roof Pitch	Minimum Height
Flat to 6/12	1.0 Feet <sup>(a)</sup>
Over 6/12 to 7/12	1.25 Feet
Over 7/12 to 8/12	1.5 Feet
Over 8/12 to 9/12	2.0 Feet
Over 9/12 to 10/12	2.5 Feet
Over 10/12 to 11/12	3.25 Feet
Over 11/12 to 12/12	4.0 Feet
Over 12/12 to 14/12	5.0 Feet
Over 14/12 to 16/12	6.0 Feet
Over 16/12 to 18/12	7.0 Feet
Over 18/12 to 20/12	7.5 Feet
Over 20/12 to 21/12	8.0 Feet

<sup>(a)</sup> This requirement covers most installations

**Figure 15. Gas vent termination**



## Air for Combustion and Ventilation

Adequate flow of combustion and ventilating air must not be obstructed from reaching the Furnace. Air openings provided in the Furnace casing must be kept free of obstructions which restrict the flow of air. Airflow restrictions affect the efficiency and safe operation of the Furnace. Keep this in mind should you choose to remodel

or change the area which contains your Furnace. Furnaces must have a free flow of air for proper performance.

Provisions for combustion and ventilation air shall be made in accordance with "latest edition" of Section 9.3, Air for Combustion and Ventilation, of the National Fuel Gas Code, ANSI Z223.1 / NFPA 54. Installation Codes, and applicable provisions of the local building codes. Special conditions created by mechanical exhausting of air and fireplaces must be considered to avoid unsatisfactory Furnace operation.

Furnace location may be in an **unconfined** space or a **confined** space.

**Unconfined** space are installations with 50 cu. ft. or more per 1000 BTU/hr input from all equipment installed. Unconfined spaces are defined in the table and illustration for various furnace sizes. These spaces may have adequate air by infiltration to provide air for combustion, ventilation, and dilution of flue gases. Buildings with tight construction (for example, weather stripping, heavily insulated, caulked, vapor barrier, etc.), may need additional air provided as described for confined space.

**Table 19. Minimum Area in Square Feet for Unconfined Space Installations**

Furnace Maximum BTUH Input Rating	With 8 Ft. Ceiling; Minimum Area in Square Feet of Unconfined Space
40,000	250
60,000	375
80,000	500
100,000	625

**Figure 16. Unconfined space**



**Confined** spaces are installations with less than 50 cu. ft. of space per 1000 BTU/ hr input from all equipment installed. Confined spaces are defined in the table and illustration for various furnace sizes. Air for combustion and ventilation requirements can be supplied from inside the building.

1. The following types of installations will **require** use of **OUTDOOR AIR** for combustion, due to chemical exposures:

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

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

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

**Note:** Extended warranties are not available in some instances. Extended warranty does not cover repairs to equipment installed in establishments with corrosive atmospheres, including but not limited to, dry cleaners, beauty shops, and printing facilities.

**Table 20. Minimum free area in square inches each opening (furnace only) in a confined space**

Furnace Max BTUH Input Rtg.	Air From Inside	Air From Outside	
		Vertical Duct (a)	Horizontal Duct (b)
40,000	250	10	20
60,000	375	15	30
80,000	500	20	40
100,000	100	25	50

(a) 1 square inch per 4000 BTU/hr vertical duct  
 (b) 1 square inch per 2000 BTU/hr horizontal duct

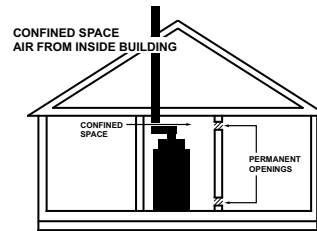
**Figure 17. Confined space**



**LESS THAN 50 CU. FT. PER 1000 BTU/HR INPUT ALL EQUIP. INSTALLED**

**All air from inside the building:** The confined space is provided with two permanent openings communicating directly with an additional room(s) of sufficient volume so that the combined volume of all spaces meets the criteria for an unconfined space. The total input of all gas utilization equipment installed in the combined space shall be considered in making this determination. Refer to the Minimum Free Area in square inches for confined spaces table, for minimum open areas required.

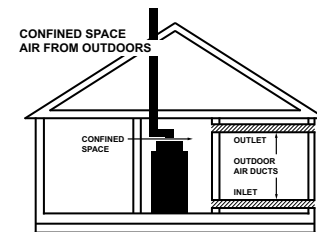
**Figure 18. Air from inside building**



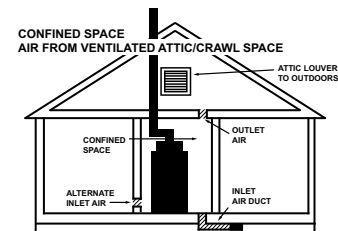
**All air from outdoors:** The confined space is provided with two permanent openings, one commencing within 12 inches of the top and one commencing within 12 inches of the bottom of the enclosure.

The openings shall communicate directly, or by ducts, with the outdoors or spaces (crawl or attic) that freely communicate with the outdoors. Refer to the Minimum Free Area in square inches for confined spaces table, for minimum open areas required.

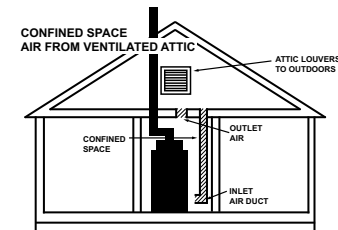
**Figure 19. Air from outdoors**



**Figure 20. Air from ventilated attic/crawl space**



**Figure 21. Air from ventilated attic**



## Duct Connections

Air duct systems should be installed in accordance with standards for air conditioning systems, National Fire Protection Association Pamphlet No. 90. They should be sized in accordance with ACCA Manual D or whichever is applicable. Check on controls to make certain they are correct for the electrical supply.

## Furnace General Installation

Central furnaces, when used in connection with cooling units, shall be installed in parallel or on the upstream side of the cooling units to avoid condensation in the heating element, unless the furnace has been specifically approved for downstream installation. With a parallel flow arrangement, the dampers or other means used to control flow of air shall be adequate to prevent chilled air from entering the furnace, and if manually operated, must be equipped with means to prevent operation of either unit unless the damper is in full heat or cool position.

Flexible connections of nonflammable material may be used for return air and discharge connections to reduce the transmission of vibration. Though these units have been specifically designed for quiet, vibration free operation, air ducts can act as sounding boards and could, if poorly installed, amplify the slightest vibration to the annoyance level.

When the furnace is located in a utility room adjacent to the living area, the system should be carefully designed with returns which minimize noise transmission through the return air grille. Although these winter air conditioners are designed with large blowers operating at moderate speeds, any blower moving a high volume of air will produce audible noise which could be objectionable when the unit is located very close to a living area. It is often advisable to route the return air ducts under the floor or through the attic. Such design permits the installation of air return remote from the living area (i.e. central hall).

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

For furnaces not equipped with a cooling coil, it is recommended that the outlet duct be provided with a removable access panel. The opening shall be accessible when the furnace is installed and shall be of such a size that the heat exchanger can be viewed for possible openings using light assistance or a probe can be inserted for sampling the air stream. The removable cover must be sealed to prevent air leaks.

**Where there is no complete return duct system, the return connection must be run full size from the Furnace to a location outside the utility room, basement, attic, or crawl space.**

**Do Not** install return air through the back of the Furnace cabinet.

**Do Not** install return air through the side of the furnace cabinet on horizontal applications without following the guidelines in the Return Air Filters section in the figure for Horizontal furnace with side return.

Carbon monoxide, fire or smoke can cause serious bodily injury, death, and/or property damage.

A variety of potential sources of carbon monoxide can be found in a building or dwelling such as gas-fired clothes dryers, gas cooking stoves, water heaters, furnaces and fireplaces. The U.S. Consumer Product Safety

Commission recommends that users of gas-burning appliances install carbon monoxide detectors as well as fire and smoke detectors per the manufacturer's installation instructions to help alert dwelling occupants of the presence of fire, smoke or unsafe levels of carbon monoxide. These devices should be listed by Underwriters Laboratories, Inc. *Standards for Single and Multiple Station Carbon Monoxide Alarms, UL 2034.*

### Notes:

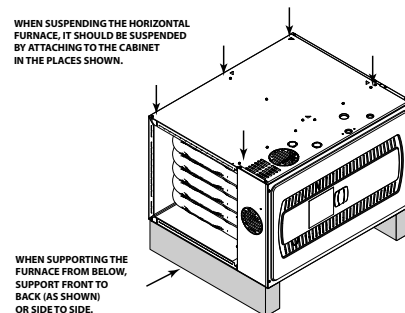
- *The manufacturer of your Furnace DOES NOT test any detectors and makes no representations regarding any brand or type of detector.*
- *Seal per local codes*

In horizontal applications, the furnace must be supported with one of the following methods.

1. Support below with non-combustible material as shown in the illustration.
2. Use BAYHANG kit. See kit instructions.
3. Use unistrut with cabling to provide support from under the unit.
4. Use strapping material in locations shown in illustration.

**Note:** *When supporting from underneath, unit must have 1.5" minimum air clearance. Block the minimum amount of vent holes as possible.*

**Figure 22. Suspending the horizontal furnace**



## Supply Duct Connections

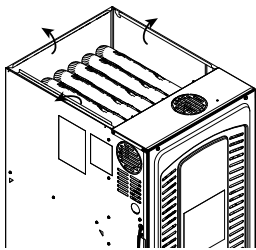
### Installation Instructions

1. Bend furnace flanges up.
2. Set the coil on top of the furnace.
3. Screw through the coil cabinet into the furnace flange. Guide holes are located on the coil.
4. Seal per local codes and requirements.
5. Support the furnace and coil independently.
6. Set the coil on top of the furnace.
7. Bend furnace flanges down.
8. Match the coil up flush to the back of the furnace.

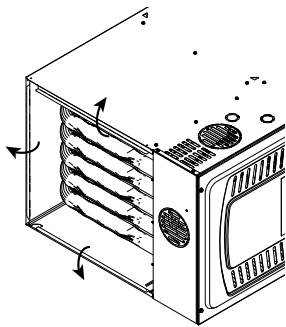
**Table 21. Supply duct connections**

Furnace Orientation	Steps to be followed
Upflow Furnace with Coil	Refer to <a href="#">Step 1.</a> <a href="#">Step 2.</a> <a href="#">Step 3.</a> <a href="#">Step 4.</a>
Furnace in Horizontal Left with Coil	Refer to <a href="#">Step 1.</a> <a href="#">Step 5.</a> <a href="#">Step 3.</a> <a href="#">Step 4.</a>
Furnace in Horizontal Right with "A" Coil (Flat or dedicated horizontal coils may require flanges to be bent upward.)	Refer to <a href="#">Step 7.</a> <a href="#">Step 5.</a> <a href="#">Step 8.</a> <a href="#">Step 4.</a>

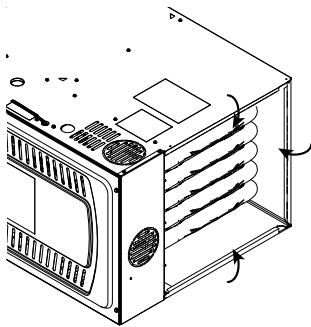
**Figure 23. Upflow Furnace with Coil**



**Figure 24. Furnace in Horizontal Left with Coil**



**Figure 25. Furnace in Horizontal Right with A Coil**



## Return Duct Connections

### Return Ducting General Guidelines

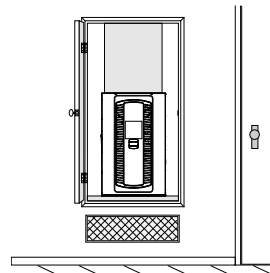
- Back returns are not allowed on any S-Series Furnaces
- Side returns are not allowed on downflow or horizontal S-Series Furnaces
- Mounting flanges must be located on ducting

- Shoot screws through the mount flanges into the furnace cabinet
- Always seal per local codes and requirements
- Furnace, coil, and ducting must be supported separately
- An external overflow drain pan must be installed in all applications over a finished ceiling to prevent property damage
- Minimum return air is 55°F and maximum is 80°F.

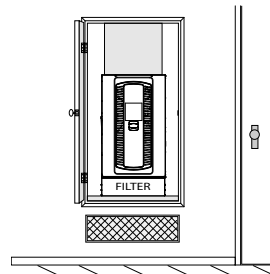
**Table 22. Return duct connections**

Furnace Orientation	Steps to be followed
Upflow Furnace with Bottom Return in Closet with Remote Filter	Refer to <a href="#">Step 1.</a> <a href="#">Step 2.</a> <a href="#">Step 3.</a> <a href="#">Step 4.</a>
Upflow Furnace with Bottom Return in Closet with Filter Box	Refer to <a href="#">Step 1.</a> <a href="#">Step 5.</a> <a href="#">Step 6.</a> <a href="#">Step 4.</a>
Upflow Furnace with Bottom Return Mounted on a Ducted Pedestal	Refer to <a href="#">Step 1.</a> <a href="#">Step 7.</a> <a href="#">Step 8.</a> <a href="#">Step 4.</a>
Upflow Furnace with Bottom Return Mounted on a Ducted Pedestal with Filter Box	Refer to <a href="#">Step 1.</a> <a href="#">Step 9.</a> <a href="#">Step 4.</a>
Upflow Furnace with Bottom and Side Returns Mounted on a Ducted Pedestal with Side Return and Filter Box	Refer to <a href="#">Step 1.</a> <a href="#">Step 10.</a> <a href="#">Step 11.</a> <a href="#">Step 12.</a> <a href="#">Step 13.</a> <a href="#">Step 14.</a> <a href="#">Step 15.</a> <a href="#">Step 4.</a>
Upflow Furnace with Side Return and Two Side Returns	Refer to <a href="#">Step 16.</a> <a href="#">Step 17.</a> <a href="#">Step 18.</a> <a href="#">Step 19.</a>

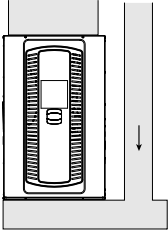
**Figure 26. Upflow furnace with bottom return in closet with remote filter**



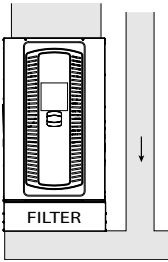
**Figure 27. Upflow furnace with bottom return in closet with filter box**



**Figure 28. Upflow furnace with bottom return mounted on a ducted pedestal**



**Figure 29. Upflow furnace with bottom return mounted on a ducted pedestal with filter box**



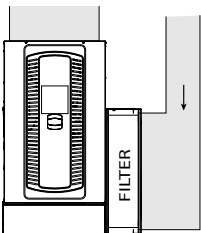
**Important:** Make sure the thermostat wiring hole is sealed on the cabinet side with the side return.

**Important:** Make sure not to cut the cabinet in the “No Cut” area.

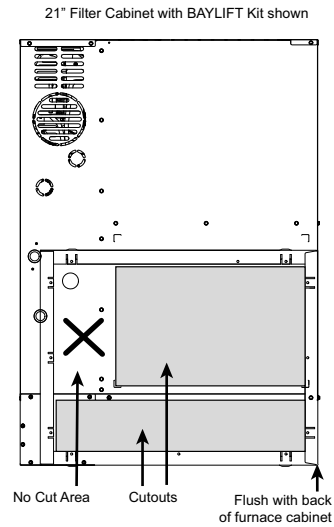
**Note:** Use Optional BAYLIFT kit to lift furnace. Follow kit instructions.

**Note:** The furnace bottom pedestal must be a minimum of 6” in height.

**Figure 30. Upflow furnace with bottom and side returns mounted on a ducted pedestal with side return and filter box**



**Figure 31. Cabinet cutout when used with BAYLIFT**



**Important:** Make sure the thermostat wiring hole is sealed on the cabinet side with the side return.

**Important:** Make sure not to cut the cabinet in the “No Cut” area.

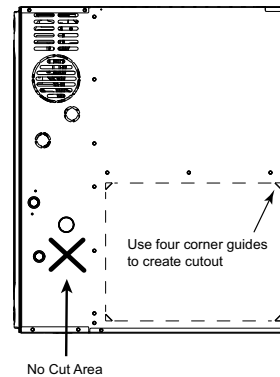
**Note:** If using a filter box, use a transition, if possible, to attach the filter box to the furnace cabinet.

**Important:** For two side return, one of the sides must have a transition to allow the thermostat wiring to exit the cabinet.

**Important:** If transition is not a viable option, a hole must be drilled in the side of the cabinet for the thermostat wiring to exit.

**Note:** If using one transition, the thermostat wiring will exit on the transition side.

**Figure 32. Upflow furnace with side return and two side return**



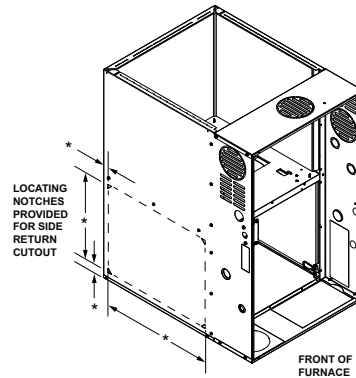
### Installation Instructions

1. Remove the bottom plate.
2. Set the furnace on the base inside closet.
3. Install remote filter.
4. Seal per local codes and requirements.

5. Set the furnace on the filter box inside closet.
6. Must have grille present for air.
7. Set the furnace on the ducted pedestal. The ducted pedestal will use ducted air from a remote location.
8. Install filter at a remote location.
9. Set the furnace on the filter box. The ducted pedestal will use ducted air from a remote location.
10. Create ducting and set the furnace in place.
11. Match the filter cabinet flush to the back and bottom sides of the furnace cabinet and secure in place with screws.
12. Mark the two areas to be cut out for the return air.
13. Cut out the two sections of the cabinet and BAYLIFT kit to be removed.
14. Attach ducting to the filter box.
15. The ducted pedestal will use ducted air from a remote location.
16. Using guides, remove the cutout for the side return.
17. Create ducting and set the furnace in place. Use screws to attach ducting to the furnace cabinet.
18. Seal bottom panel per local codes and requirements.
19. Seal all other panels per local codes and requirements.

1. Determine the appropriate position to set the furnace in order to connect to existing supply and return ductwork.
2. For upflow side return installations, remove the insulation around the opening in the blower compartment
3. The side panels of the upflow furnace include locating notches that are used as guides for cutting an opening for return air, refer to the figure and the upflow furnace outline drawing for duct connection dimensions for various furnaces.
4. If a 3/4" flange is to be used for attaching the air inlet duct, add to cut where indicated by dotted lines. Cut corners diagonally and bend outward to form flange.
5. If flanges are not required, and a filter frame is installed, cut between locating notches as in illustration.
6. The bottom panel of the upflow furnace must be removed for bottom return air.

Figure 33. Upflow furnaces only



## Return Air Filters

### TYPICAL AIR FILTER INSTALLATIONS

Filters are not factory supplied for furnaces. Filter size needed will be dependent on type of filter and CFM requirement. Filters must be installed externally to the unit.

**Important:** It is recommended to transition return ducting to the same size as the opening. It is acceptable for return duct or filter frame to extend forward of the opening but plastic plugs **MUST** be installed in any opening that the duct or filter frame may cover.

**Note:** For upflow airflow furnaces where the airflow requirement exceeds 1600 CFM - Furnaces will require return air openings and filters on: (1) both sides, or (2) one side and the bottom, or (3) just on the bottom.

Table 23. Return Air Filters

Furnace Width (inches)	Bottom Return Filter Quantity and Size (inches)
14.5	1 — 14 x 25 x 1
17.5	1 — 16 x 25 x 1
21.0	1 — 20 x 25 x 1

### Preparation for Upflow Bottom and Side Return Air Filter Installations

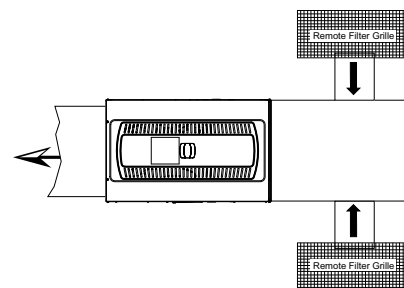
All return air duct systems should provide for installation of return air filters.

### RETURN AIR FILTERS FOR MODULAR BLOWER IN HORIZONTAL CONFIGURATION

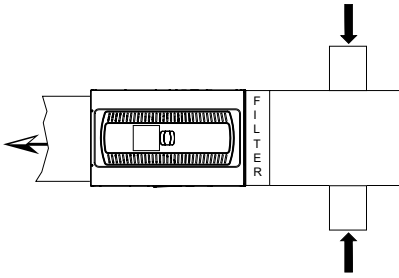
When the modular blower is installed in the horizontal configuration, the return air filters must be installed exterior to the modular blower cabinet. Remote filter grilles may be used for homeowner convenience, refer to Figure 34, p. 31 or the filters may be installed in the duct work upstream of the modular blower, refer to Figure 35, p. 32.

Filter kits are available for horizontal applications. Direct coupled side returns are not allowed to the blower cabinet.

Figure 34. Remote filter installation



**Figure 35. Duct filter installation**



## Electrical Connections

Make wiring connections to the unit as indicated on enclosed wiring diagram. As with all gas appliances using electrical power, this furnace shall be connected into a permanently live electric circuit. It is recommended that furnace be provided with a separate "circuit protection device" electric circuit. The furnace must be electrically grounded in accordance with local codes or in the absence of local codes with the National Electrical Code, ANSI/

NFPA 70 or CSA C22.1 Electrical Code, if an external electrical source is utilized. The integrated furnace control is polarity sensitive. The hot leg of the 120V power supply must be connected to the black power lead as indicated on the wiring diagram.

Refer to the SERVICE FACT Literature and unit wiring diagram attached to furnace.

### **⚠ WARNING**

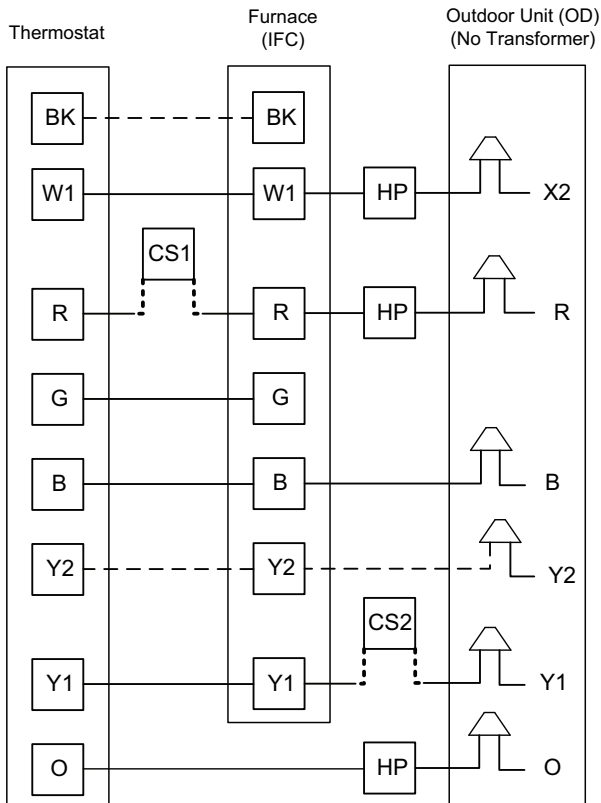
#### **Fire Hazard!**

**Failure to follow instructions below could result in death or serious injury or property damage.**

**For installations with flammable refrigeration system, the furnace must be powered at all times except during servicing. The furnace must be installed and connected according to installation instructions and wiring diagrams provided with the evaporator coil.**

## Field Wiring

**Figure 36. Field wiring for L8V1 with one or two stage AC or heat pump**



**NOTES:**

- 1) HP = Wiring used for Heat Pump System.
- 2) CS = wiring used for Condensate Switch (2 Options).
- 3) Y1 and/or Y2 must be connected from the thermostat to the IFC for proper airflow.
- 4) Remove Y1-O jumper for HP systems. O terminal must be connected as shown for gas heating operation during defrost.
- 5) A/TCONT824 thermostats do not require the use of X2.
- 6) For PWM (BK) enabled thermostats, cut the BK jumper on the IFC and connect wiring.

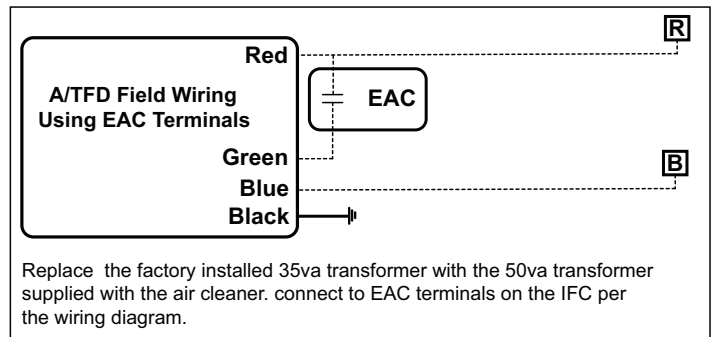
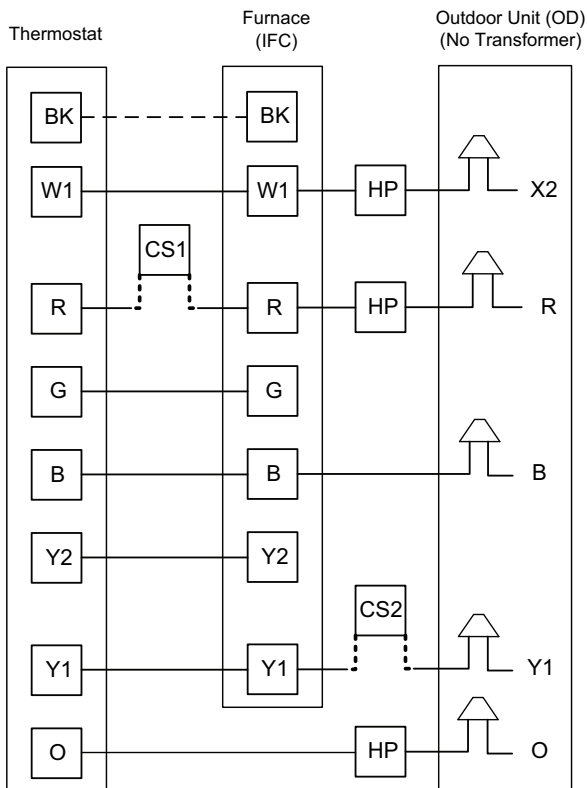


Figure 37. Field wiring for L8V1 with single stage AC or heat pump with two stage airflow



**NOTES:**

- 1) HP = Wiring used for Heat Pump System.
- 2) CS = wiring used for Condensate Switch (2 Options).
- 3) Y1 and/or Y2 must be connected from the thermostat to the IFC for proper airflow.
- 4) Remove Y1-O jumper for HP systems. O terminal must be connected as shown for gas heating operation during defrost.
- 5) A/TFD824 thermostats do not require the use of X2.
- 6) For PWM (BK) enabled thermostats, cut the BK jumper on the IFC and connect wiring.

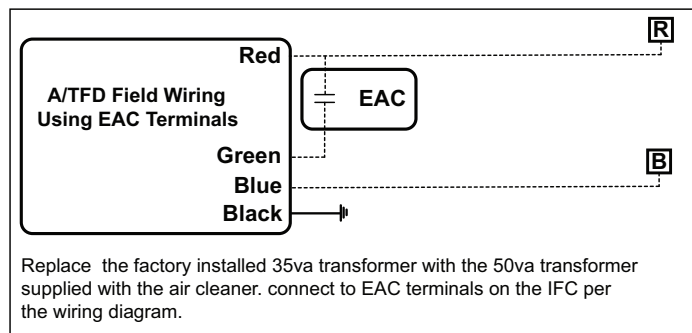
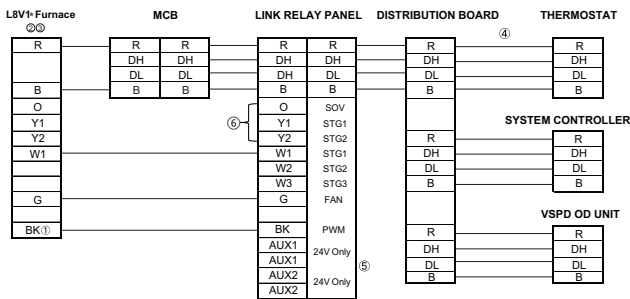


Figure 38. R454-B – link communicating vs heat pump or AC with non communicating L8V1 furnace



**Notes:**

- 1) Cut the BK jumper on the IFC and connect wiring per the diagram
- 2) CFM/Ton must be set to 400 (CPC AND CPH)
- 3) Furnace LED's will display "CoF", continuous airflow during compressor operation
- 4) Wire condensate switch in series with R to the thermostat
- 5) See note on page 7 regarding Aux terminals
- 6) Terminals O, Y1 and Y2 are not used

# General Start-up and Adjustment

## Preliminary Inspections

With gas and electrical power OFF, confirm:

- Duct connections are properly sealed.
- Filters are in place.
- Venting is properly assembled.
- Blower vestibule panel is in place and all screws in place.

Turn knob on main gas valve within the unit to OFF and external gas valve to ON. Purge the air from the gas lines and check all gas connections for leaks with a soapy solution. Do not check with an open flame. Allow 5 minutes for any gas that might have escaped to dissipate. Turn the gas valve in the unit to ON.

## Lighting Instructions

Lighting instructions appear on each unit. Each installation must be checked out at the time of initial start up to ensure proper operation of all components. Check out should include putting the unit through one complete cycle as outlined below.

Turn on the main electrical supply and set the comfort control above the indicated temperature. The igniter will automatically heat and the gas valve is energized to permit the flow of gas to the burners. After ignition and flame is established, the flame control module monitors the flame and supplies power to the gas valve until the comfort control is satisfied.

### **⚠ WARNING**

#### **Risk of Fire or Explosion!**

**Failure to follow instruction below could result in death or serious injury or property damage.  
Do NOT attempt to manually light the furnace.**

#### **To shut off**

For complete shutdown, turn the toggle or control switch located on the main gas valve inside the unit to OFF and the external main gas shutoff valve to OFF. Disconnect the electrical supply to the unit.

Inspect temperature in a vacant house especially during freezing weather. If for any reason your furnace should fail to operate damage could result, such as frozen water pipes.

### **⚠ CAUTION**

#### **Freeze Damage!**

**Failure to follow instructions below could result in minor to moderate injury or property damage.**

**Insulate vent pipes with 1/2 inch (12.7 mm) Armaflex-type insulation or equivalent when passing through unheated spaces exposed to freezing temperatures. Insulation is not needed if the space is heated enough to prevent freezing. If domestic water pipes are not protected from freezing, the space is considered heated. Schedule qualified personnel to inspect the temperature if the house is vacant during freezing weather. A furnace failure could lead to frozen water pipes.**

## Control and Safety Switch Adjustment

### **Limit Switch Check Out**

The limit switch is a safety device designed to close the gas valve should the furnace become overheated. Since proper operation of this switch is important to the safety of the unit, it must be checked out on initial start up by the installer.

To check for proper operation of the limit switches, set the thermostat to a temperature higher than the indicated temperature to bring on the gas valve. Restrict the airflow by blocking the return air to the blower. When the furnace reaches the maximum outlet temperature as shown on the rating plate, the burners must shut off. If they do not shut off after a reasonable time and overheating is evident, a faulty limit switch is probable and the limit switch must be replaced. After checking the operation of the limit control, be sure to remove the paper or cardboard from the return air inlet, or reconnect the blower.

# Furnace Combustion Air Exhaust Options

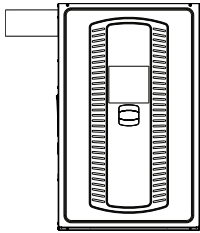
**Note:** Default is left side for electric and gas connections.

The following sections give instructions for different furnace orientations and options for venting the exhaust combustion air.

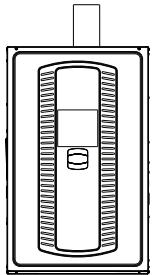
**Important:**

- When looking at the different orientations, the direction of the combustion air exhaust in the illustration's description is after the furnace has been rotated, if needed.
- The exhaust must be vented to the outdoors.

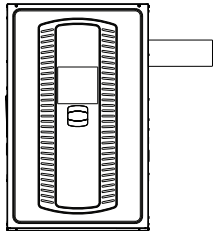
**Figure 39. Approved venting options for upflow applications — vented through left side**



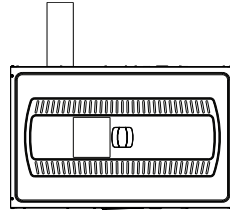
**Figure 40. Approved venting options for upflow applications — vented out top**



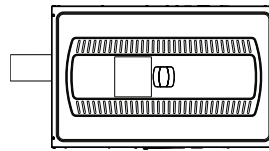
**Figure 41. Approved venting options for upflow applications — vented through right side**



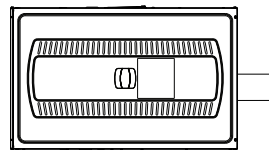
**Figure 42. Approved venting options for horizontal left applications – vented out top.**



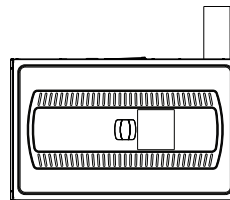
**Figure 43. Approved venting options for horizontal left applications – vented through left side.**



**Figure 44. Approved venting options for horizontal right applications – vented through right side**



**Figure 45. Approved venting options for horizontal right applications – vented out top**



## Inducer Venting Conversion Instructions

**Important:**

- After deciding the orientation of the flue outlet, cut the metal tabs around the appropriate 5" metal cutout on the furnace cabinet and remove the cutout, if necessary.
- The combustion air duct **MUST** be installed on **C100 upflow** applications. Failure to install will result in nuisance burner box limit trips.

# Furnace Combustion Air Exhaust Options

## Notes:

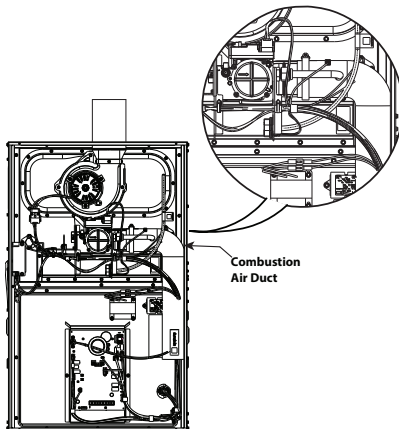
- Self-tapping screws are recommended for attaching the vent pipe to the inducer outlet.
- Future C100 furnaces with the Burner Box limit on the bottom DO NOT require the Combustion Air Duct.
- When rotating the inducer it may be necessary to cut the wire tie. A new wire tie must be installed once the inducer is rotated.

**Pressure Switch locations:** The pressure transducer connects to the hot header.

## Upflow orientation with top venting

1. Install combustion air duct by sliding the split section of the duct around the J-tube until it reaches the clearance hole of the duct.
2. Install hose clamp and hand tighten.
3. No changes need to be made to the inducer when installing the furnace in upflow position when vented through the top.

**Figure 46. Upflow orientation with top venting**

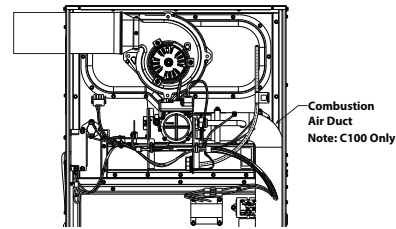


## Upflow orientation with left side venting

Before proceeding, lay unit on its back to make the conversion easier. The following changes need to be made to the inducer when installing the furnace in upflow position with the combustion air vented out the left side.

1. Remove the four screws holding the inducer in place.
2. Rotate the inducer so the inducer outlet is pointing towards the 5" cutout.
3. Secure the inducer in place using the screws removed in step 1.
4. Attach the vent to the inducer outlet.

**Figure 47. Upflow orientation with left side venting**



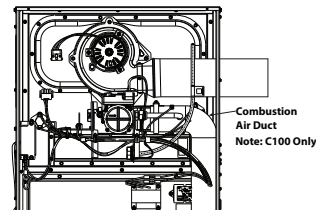
## Upflow orientation with right side venting

Before proceeding, lay unit on its back to make the conversion easier.

The following changes need to be made to the inducer when installing the furnace in upflow position with the combustion air vented out the left side.

1. Remove the four screws holding the inducer in place.
2. Rotate the inducer so the inducer outlet is pointing towards the 5" cutout.
3. Secure the inducer in place using the screws removed in step 1.
4. Attach the vent to the inducer outlet.

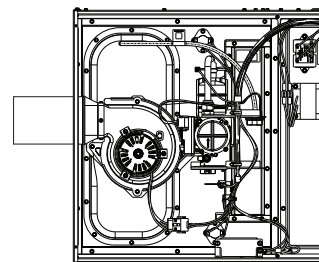
**Figure 48. Upflow orientation with right side venting**



## Horizontal left orientation with left side venting

No changes need to be made to the inducer when installing the furnace in upflow position with the combustion air vented through the top.

**Figure 49. Horizontal left orientation with left side venting**



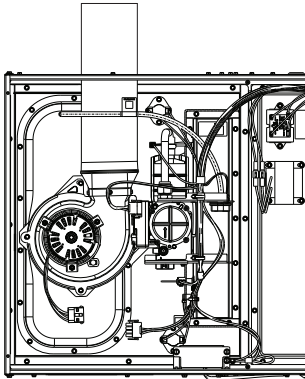
## Horizontal left orientation with top venting

Before proceeding, lay unit on its back to make the conversion easier.

The following changes need to be made to the inducer when installing the furnace in upflow position with the combustion air vented out the left side.

1. Remove the four screws holding the inducer in place.
2. Rotate the inducer so the inducer outlet is pointing towards the 5" cutout.
3. Secure the inducer in place using the screws removed in step 1.
4. Attach the vent to the inducer outlet.

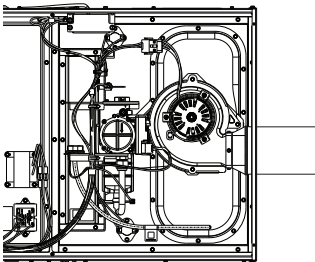
**Figure 50. Horizontal left orientation with top venting**



### Horizontal right orientation with right side venting

No changes need to be made to the inducer when installing the furnace in upflow position with the combustion air vented through the top.

**Figure 51. Horizontal right orientation with right side venting**

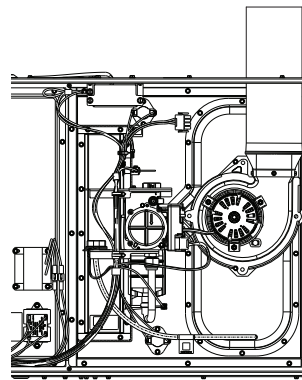


### Horizontal right orientation with top venting

Before proceeding, lay unit on its back to make the conversion easier. The following changes need to be made to the inducer when installing the furnace in upflow position with the combustion air vented out the left side.

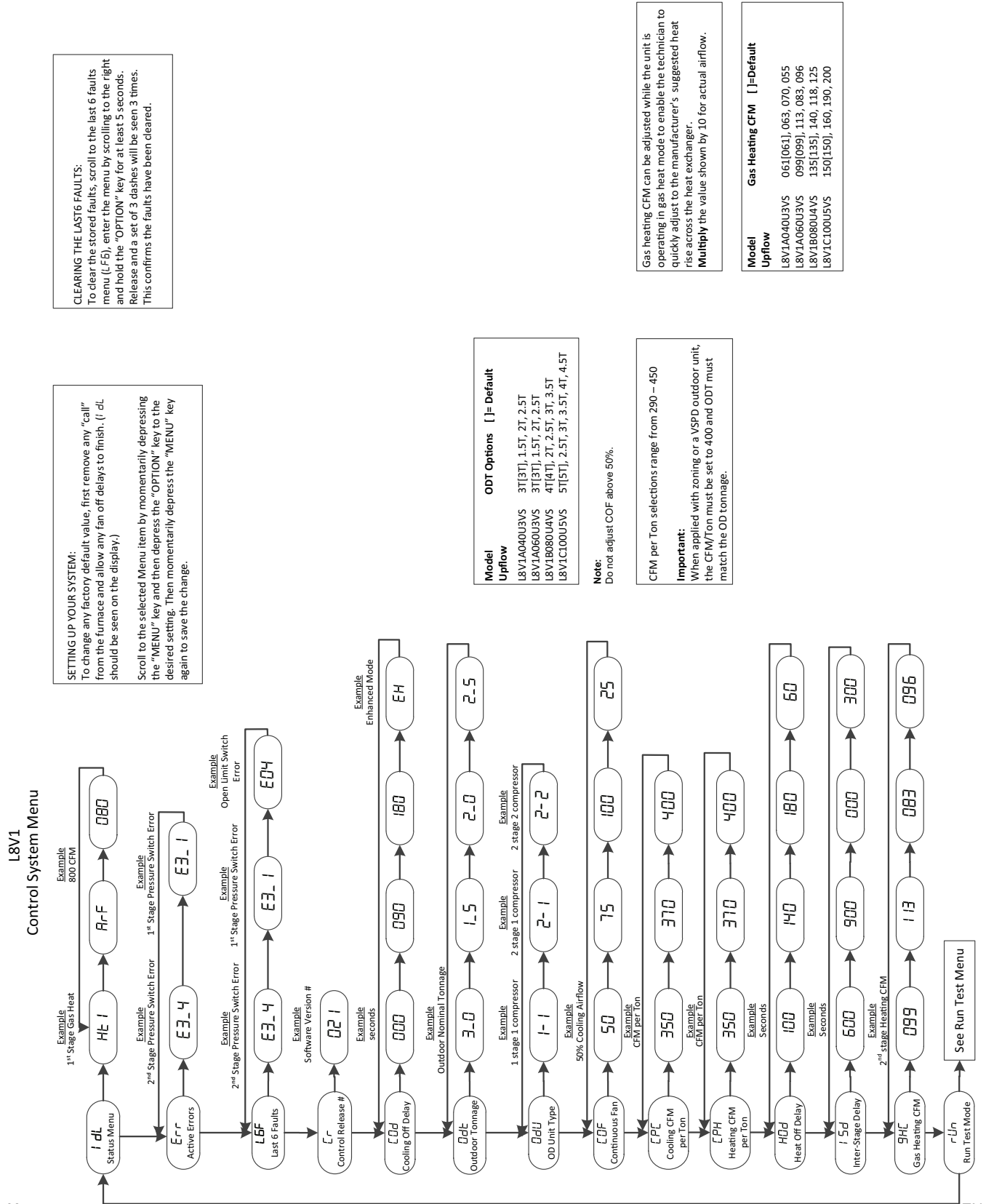
1. Remove the four screws holding the inducer in place.
2. Rotate the inducer so the inducer outlet is pointing towards the 5" cutout.
3. Secure the inducer in place using the screws removed in step 1.
4. Attach the vent outlet gasket to the vent outlet.

**Figure 52. Horizontal right orientation with top venting**



# Integrated Furnace Control Menu

Figure 53. Control system menu



**CLEARING THE LAST 6 FAULTS:**  
To clear the stored faults, scroll to the last 6 faults menu (L6F), enter the menu by scrolling to the right and hold the "OPTION" key for at least 5 seconds. Release and a set of 3 dashes will be seen 3 times. This confirms the faults have been cleared.

**SETTING UP YOUR SYSTEM:**  
To change any factory default value, first remove any "call" from the furnace and allow any fan off delays to finish. (i dL should be seen on the display).  
Scroll to the selected Menu item by momentarily depressing the "MENU" key and then depress the "OPTION" key to the desired setting. Then momentarily depress the "MENU" key again to save the change.

Model	ODT Options	[ ] = Default
L8V1A040U3VS	3T[3T], 1.5T, 2T, 2.5T	
L8V1A060U3VS	3T[3T], 1.5T, 2T, 2.5T	
L8V1B080U4VS	4T[4T], 2T, 2.5T, 3T, 3.5T	
L8V1C100U5VS	5T[5T], 2.5T, 3T, 3.5T, 4T, 4.5T	

**Note:**  
Do not adjust COF above 50%.

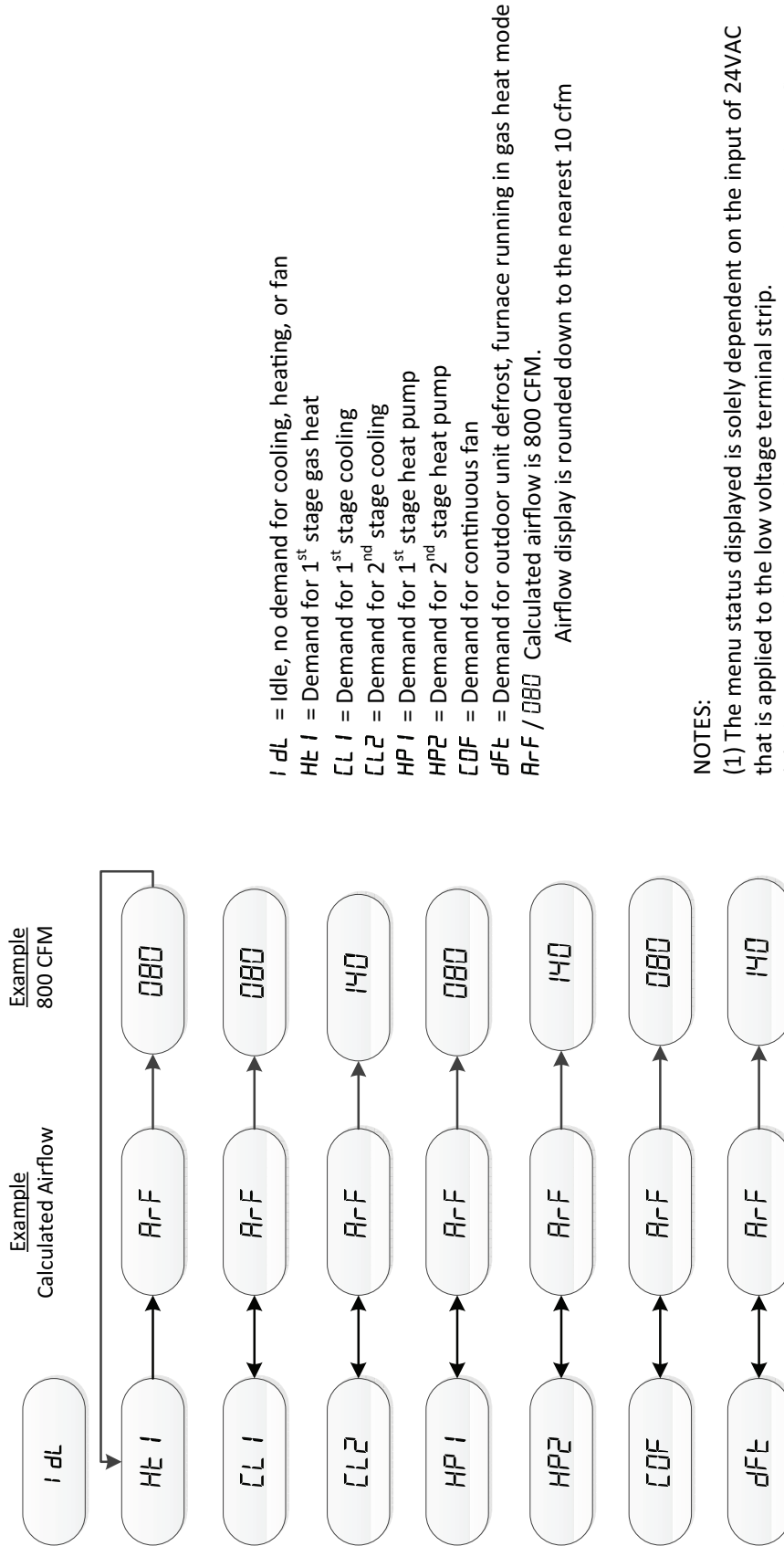
CFM per Ton selections range from 290 – 450  
**Important:**  
When applied with zoning or a VSPD outdoor unit, the CFM/Ton must be set to 400 and ODT must match the OD tonnage.

Gas heating CFM can be adjusted while the unit is operating in gas heat mode to enable the technician to quickly adjust to the manufacturer's suggested heat rise across the heat exchanger.  
**Multiply** the value shown by 10 for actual airflow.

Model	Gas Heating CFM	[ ] = Default
L8V1A040U3VS	061[061], 063, 070, 055	
L8V1A060U3VS	099[099], 113, 083, 096	
L8V1B080U4VS	135[135], 140, 118, 125	
L8V1C100U5VS	150[150], 160, 190, 200	

Figure 54. System status example

# L8V1 Examples of System Status



*i dL* = Idle, no demand for cooling, heating, or fan  
*HE 1* = Demand for 1<sup>st</sup> stage gas heat  
*CL 1* = Demand for 1<sup>st</sup> stage cooling  
*CL 2* = Demand for 2<sup>nd</sup> stage cooling  
*HP 1* = Demand for 1<sup>st</sup> stage heat pump  
*HP 2* = Demand for 2<sup>nd</sup> stage heat pump  
*COF* = Demand for continuous fan  
*dFE* = Demand for outdoor unit defrost, furnace running in gas heat mode  
*ArF / 080* Calculated airflow is 800 CFM.

Airflow display is rounded down to the nearest 10 cfm

**NOTES:**

- (1) The menu status displayed is solely dependent on the input of 24VAC that is applied to the low voltage terminal strip.
- (2) The status will alternate between the system mode and the airflow request every 2 seconds.
- (3) If an error occurs, an E\*.\* will alternately flash with the system mode and airflow request. See first example
- (4) Multiply the value shown by 10 for actual airflow

**Figure 55. Run test mode**

Note: During run test mode, depressing the option key will allow the user to hold (HLD) that test sequence if measurements want to be taken. The exception is RU3 (ignitor).



**Run Test Mode:**  
 To enter Run Test Mode, scroll to *rUn* using the Menu key, then push the option key. The LED will flash *rUn* three times, then begin the test.  
 To exit the test mode, momentarily push the Menu key, cycle power to the furnace, or make a valid thermostat call for capacity or fan.

**Sequence of Run Test Mode**  
*rU1* – Turns the inducer on in 1<sup>st</sup> stage for 30 seconds  
*rU3* – Turns the ignitor on for 10 seconds  
*rU4* – Turns the circulating blower on 1st stage compressor speed for 10 seconds  
*rU5* – Turns the circulating blower on 2nd stage compressor speed for 10 seconds  
*rU6* – Turns the circulating blower on 1<sup>st</sup> stage gas heat speed for 10 seconds

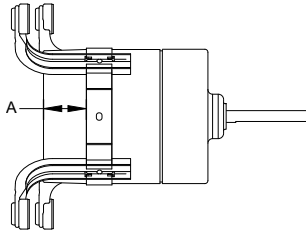
The above sequence will repeat two more times unless the Run Test Mode is exited, see above

**Important:** The Run Test Mode does not test fire the furnace or bring the outdoor unit on. It is designed to allow the technician to observe each mode to ensure the IFC, inducer, and circulating blower are performing as intended.

## Belly Band Location

Distance from belly band to the front face of motor for minimum vibration

**Figure 56. Belly band distance**



**Table 24. Belly band dimensions**

Furnace Cabinet Size	Dimension A (inches)
A	3.87
B	5.04
C	1.79

# Integrated Furnace Control Display Codes

**Table 25. Inducer with ECM blower motor**

<i>i dL</i>	Idle
<i>Ht1</i>	Gas Heating
<i>RrF</i>	Calculated Airflow (Followed by Airflow times 10)
<i>CDf</i>	Continuous Fan
<i>CL1</i>	First Stage Cooling
<i>CL2</i>	Second Stage Cooling
<i>HPI</i>	First Stage Heat Pump
<i>HP2</i>	Second Stage Heat Pump
<i>dFt</i>	Defrost Mode

**Table 26. Menu options**

<i>Err</i>	Active Alarm Menu
<i>L6F</i>	Last 6 Faults (To clear — Hold Option button down for 5 seconds)
<i>Cr</i>	Code Release Number
<i>COd</i>	Cooling Off Delay (Seconds)
<i>OdT</i>	Outdoor Tonnage
<i>OdU</i>	Outdoor Unit
<i>COF</i>	Blower Constant Fan Airflow Multiplier (Percentage)
<i>CPc</i>	Cooling (CFM/Ton)
<i>CPH</i>	Heat Pump Heating (CFM/Ton)
<i>Hod</i>	Heat Off Delay (Seconds)
<i>iSd</i>	Inter-Stage Delay (Seconds)
<i>gHc</i>	Gas Heating CFM (Airflow times 10)
<i>rUn</i>	Run Test Mode

## Fault Code Recovery

1. To view the last 6 faults, press the “Menu” key until the “Last 6 Faults” (*L6F*) menu appears.
2. Enter the menu by pressing the “Option” key.

3. The last 6 faults can be viewed.

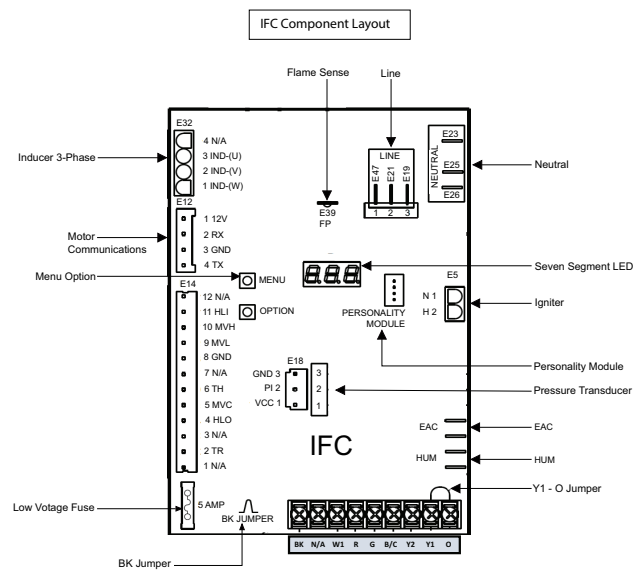
## Clearing the Last 6 Faults

1. To clear the last 6 faults, press the “Menu” key until the “Last 6 Faults” (*L6F*) menu appears.
2. Enter the menu by pressing the “Option” key.
3. Hold the “Option” key for at least 5 seconds.
4. Release and a set of 3 dashes will be seen 3 times. This confirms the faults have been cleared.

## Resetting Factory Defaults

1. Display must be in Idle Mode.
2. Push the “Menu” and “Option” buttons at the same time for 15 seconds then release.
3. The 7 segment will flash “Fd” 3 times. This confirms the unit has been reset to the factory defaults.

**Figure 57. IFC component layout**

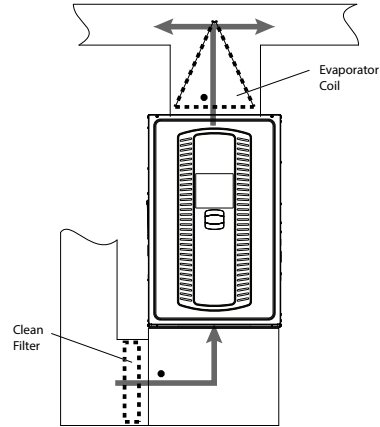


# Setting Airflow

With all ductwork connected and a clean filter in place, measure the External Static Pressure (ESP) of the unit in locations below. Use the appropriate airflow table for the furnace and outdoor unit installed.

Measurements must be made prior to the evaporator coil, if equipped, and after the filter.

**Figure 58. Setting airflow**



**Table 27. Furnace cooling airflow (CFM) and power (Watts) vs. external static pressure with filter**

Model	Airflow Setting CFM/Ton		EXTERNAL STATIC PRESSURE (IN. W. C.)				
			0.1	0.3	0.5	0.7	0.9
<b>L8V1C100U5VSBA</b>	450	CFM / WATTS	1773 / 364	1769 / 430	1765 / 501	1760 / 576	1754 / 653
	420	CFM / WATTS	1654 / 301	1652 / 364	1649 / 431	1646 / 503	1640 / 577
	400	CFM / WATTS	1575 / 264	1574 / 324	1572 / 390	1569 / 459	1564 / 530
	370	CFM / WATTS	1456 / 214	1456 / 271	1455 / 333	1452 / 399	1447 / 467
	350	CFM / WATTS	1378 / 184	1377 / 239	1377 / 299	1374 / 363	1368 / 429
	330	CFM / WATTS	1299 / 158	1299 / 210	1297 / 268	1294 / 330	1288 / 394
	310	CFM / WATTS	1220 / 134	1219 / 185	1217 / 240	1213 / 300	1206 / 362
	290	CFM / WATTS	1141 / 113	1140 / 161	1137 / 215	1131 / 272	1122 / 333

This is an example Airflow Table only. See "Airflow Tables," p. 16 for complete airflow data.

# LED Fault Codes

LED	ERROR	ERROR EXPLANATION	POSSIBLE CAUSE/ACTION
E01	Loss of IRQ	Internal IFC failure	Replace IFC
E2.1	Retries Exceeded (5 retries, 6 total)	Flame never sensed (5 retries, 6 total results in one hour lockout)	Gas valve not energized, flame sensor faulty, low manifold pressure
E2.2	Recycles Exceeded (9 recycles, 10 total)	Flame sensed and lost (9 recycles, 10 total results in one hour lockout)	Low manifold pressure, dirty burner system, weak flame sensor
E2.3	External Lockout	First stage gas valve not energized when it should be	Replace IFC
E2.4		HLO relay not energized when it should be	Replace IFC
E3.1	Pressure Transducer Error	Signal Not Present Less than 0.25VDC @ 5.0VDC supply for 2 secs. (RD - GND)	Verify transducer tubing is connected and connector is fully seated on the IFC Remove transducer from IFC and verify ~4.8VDC from VCC - GND Low supply voltage, replace IFC. Nominal supply voltage, replace transducer
E3.2		Signal Out of Bounds Greater than 4.25V @ 5.0V supply for 10 secs. (RD - GND)	Verify transducer tubing is connected and connector is fully seated on the IFC Remove transducer from IFC and verify ~4.8VDC from VCC - GND Nominal supply voltage, replace transducer
E3.3		Insufficient Pressure Inducer is unable to reach pressure setting at maximum speed after 10 seconds. (PI - GND)	Verify transducer tubing is connected and connector is fully seated on the IFC Remove transducer from IFC and verify ~4.8VDC from VCC - GND
E04	Open Limit Switch	A thermal limit has opened in the safety circuit	Primary, burner box, or reverse airflow limit tripped Primary Limit - Dirty filter, restricted airflow Burner Box Limit - High manifold pressure, clogged burner inlet, dirty burner system
E05	Flame Sense Error	Flame sensed when no flame should be present	Verify drip leg/sediment trap is installed. Remove gas valve and inspect for signs of debris. Clear debris of gas system and replace gas valve if necessary
E6.1	Reversed Polarity	Hot & neutral reversed	Triggered when Neutral - Ground voltage is greater than 50VAC
E6.2	Ground Error	Ground not detected	Triggered when Neutral - Ground voltage is greater than 20VAC but less than 50VAC
E7.1	External Gas Valve Error	1st Stage Gas Valve (MVL) is Energized when it should be Off	Verify 24VAC is not present on gas valve. Replace IFC
E7.2		Redundant Relay (HLO output) Energized when it should be Off	Verify 24VAC is not present on gas valve. Replace IFC
E08	Low Flame Sense	Flame current is low, but still strong enough to allow operation	Clean flame rod with steelwool only. Replace as necessary
E10	Inducer Communication Error	Inducer motor no communication response	Possibly caused by a communication failure between two microcontrollers. Replace IFC
E11	Internal Gas Valve Error	1st stage gas valve energized when it should not be	Verify all wiring is correct and intact. Replace IFC
		1st stage gas valve not energized when it should be	Verify all wiring is correct and intact. Replace IFC
		Redundant relay (HLO output) not energized when it should be. After 10 unsuccessful tries, E11 will populate and enter into a one hour lockout	Verify all wiring is correct and intact. Replace IFC
E12	Open Fuse	Low voltage fuse blown	Verify approved accessories are connected to xfmr power. Reconnect low voltage field wiring, wire by wire if necessary to eliminate components.
E13	PM Motor ID Error	PM motor information does not match the motor installed	Verify correct motor HP in this document. Replacement motor is not approved
E14	Personality Module Missing	PM is not plugged in	Verify PM is fully seated, cycle power to unit

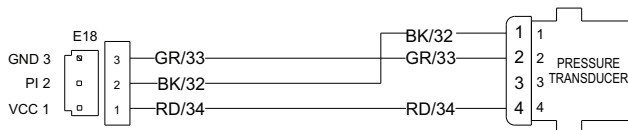
# LED Fault Codes

LED	ERROR	ERROR EXPLANATION	POSSIBLE CAUSE/ACTION
E15	Personality Module Memory Error	Internal PM error	Cycle power to unit. Replace PM
E17	Blower Communication Error on Motor	IFC Rx not detecting motor feedback	Verify wiring from IFC to motor paying close attention to bulkhead connectors and motor connectors behind bulkhead
E18	Blower Communication Error on IFC	IFC Tx not detecting IFC feedback	Remove 4 pin motor connector from IFC. If E17 populates, the IFC is good. Verify wiring from IFC to motor. If wiring is verified, replace motor

**Table 28. Inducer Pressure Transducer**

Model	Inducer Mode	Pressure (in/ H2O)	VDC Pins 2 and 3
L8V1A040U3V-S*	OFF	0	0.5
	Pre-Purge	- 1.3	1.8
	Light-Off	- 1.3	1.8
	Stabilization	- 1.4	1.9
	Run	- 1.75	2.25
L8V1A060U3V-S*	OFF	0	0.5
	Pre-Purge	- 1.6	0.1
	Light-Off	- 1.1	1.6
	Stabilization	- 1.3	1.8
	Run	- 1.6	2.1
L8V1B080U4V-S*	OFF	0	0.5
	Pre-Purge	- 1.5	2
	Light-Off	- 0.75	1.25
	Stabilization	- 1	1.5
	Run	- 1.68	2.18
L8V1C100U5V-S*	OFF	0	0.5
	Pre-Purge	- 1.5	2
	Light-Off	- 0.9	1.4
	Stabilization	- 1.2	1.7
	Run	- 1.6	2.1

*Note: Source voltage = ~4.8 VDC with pressure transducer removed Pins 2 and 3.*



**Table 29. Pressure Transducer – E18 Source Voltage 5Vdc Pins 1-2 (GR-RD)**

Hot Header Pressure (inches W.C.)	Transducer Signal Vdc Pins 1-3 (GR-BK @ E18)
0.00	0.50
0.10	0.60
0.20	0.70

**Table 29. Pressure Transducer – E18 Source Voltage 5Vdc Pins 1-2 (GR-RD) (continued)**

Hot Header Pressure (inches W.C.)	Transducer Signal Vdc Pins 1-3 (GR-BK @ E18)
0.30	0.80
0.40	0.90
0.50	1.00
0.60	1.10
0.70	1.20
0.80	1.30
0.90	1.40
1.00	1.50
1.10	1.60
1.20	1.70
1.30	1.80
1.40	1.90
1.50	2.00
1.60	2.10
1.70	2.20
1.80	2.30
1.90	2.40
2.00	2.50
2.10	2.60
2.20	2.70
2.30	2.80
2.40	2.90
2.50	3.00
2.60	3.10
2.70	3.20
2.80	3.30
2.90	3.40
3.00	3.50
3.10	3.60
3.20	3.70
3.30	3.80
3.40	3.90
3.50	4.00
3.60	4.10
3.70	4.20
3.80	4.30

**Table 29. Pressure Transducer – E18 Source Voltage 5Vdc Pins 1-2 (GR-RD) (continued)**

Hot Header Pressure (inches W.C.)	Transducer Signal Vdc Pins 1-3 (GR-BK @ E18)
3.90	4.40

**Table 29. Pressure Transducer – E18 Source Voltage 5Vdc Pins 1-2 (GR-RD) (continued)**

Hot Header Pressure (inches W.C.)	Transducer Signal Vdc Pins 1-3 (GR-BK @ E18)
4.00	4.50

# Sequence of Operation

## EAC and HUM Timing

- EAC relay closes approximately 5 seconds after the blower starts.
- EAC relay opens when the blower motor stops.
- HUM relay closes on a gas heating call when the blower motor starts and flame is sensed.
- HUM relay opens when flame is no longer sensed, i.e. thermostat is satisfied.

**Note:** The EAC and HUM terminals are dry contacts, no power output.

## Gas Heating

**Note:** There are two main thermal limits on this unit.

*Thermal Limit 1 is the primary limit for upflow applications with right side return ducting. Thermal Limit 2 is the primary limit for all other applications.*

1. R – W contacts close on the thermostat sending 24VAC to the W low voltage terminal of the IFC. Technician should read 24VAC from W to C. The seven segment LED display will show **HL 1**.
2. The IFC performs a self-check routine and then confirms that the:
  - a. Main thermal limits (HI LIMIT), burner box limit (BBOX LIMIT), and reverse air flow (RAF) switches are closed by sending 24VAC out of the HLO terminal and monitoring the HLI input for 24VAC.
  - b. The IFC then checks the inducer and blower motor communications.
3. Once step 2a and 2b are confirmed, the variable speed inducer motor is energized and performs a 30 seconds pre-purge and then shuts down.
4. Once the pre-purge, the igniter warm up period begins.
  - a. Eight seconds after the igniter warm-up begins, the inducer is energized and ramps up to meet the Light-Off pressure.
  - b. Once the Light-Off pressure feedback is sensed and the igniter warm-up time has elapsed (~17 seconds), the 1<sup>st</sup> stage gas valve is energized.

**Note:** If the feedback is not correct, the IFC will time out and flash the proper fault code.
5. The burner system will ignite, providing current to the flame sensor. Proof of flame must be established within 4 seconds or a retry will occur.

**Note:** Typical flame current ranges from 0.75 – 3.0µa.

6. Once flame sense has been established, the igniter is de-energized, the blower on timer begins and the inducer ramps to the “Pre-Run” speed. During this transition, the combustion pressure increases until the Pre-Run pressure is sensed.
7. Once the Pre-Run pressure feedback is sensed, the IFC will energize the 2nd stage of the gas valve.
8. After the blower on timer has completed, the indoor blower will run at the selected gas heating speed.
9. The seven segment LED will alternately read:
  - **HL 1** = Gas heating, Stage 1
  - **R-F** = Airflow
  - **060** = 600 calculated cfm (value shown x 10) (example value)
10. When the temperature raises enough to satisfy the thermostat setting, contacts R-W will open.
11. The gas valve relay will open, closing the gas valve. The inducer continues to run for ~5 seconds to remove any combustion by-products from inside the furnace.
12. The indoor blower continues to run to remove heat from the heat exchangers. The Heat Off Delay is field adjustable. The seven segment LED will return to **IdL** (Idle) assuming there is no other demand from the thermostat, i.e., continuous fan call.

## Single Stage Cooling

**Note:** Factory supplied Y1-O jumper must remain in place for proper seven segment LED readout. If removed, seven segment LED will read **HP 1**

1. R-Y1-G contacts on the thermostat close sending 24VAC to the Y1 and G low voltage terminals on the IFC. Technician should read 24VAC between Y1-B/C and between G-B/C.
2. 24VAC is sent to the OD unit via thermostat wiring.
3. The indoor blower ramps to the cooling airflow. The seven segment LED for example will alternately read:
  - **CL 1** = Cooling, Stage 1
  - **R-F** = Airflow
  - **080** = 800 calculated cfm (value shown x 10)
4. When the temperature is lowered enough to satisfy the thermostat setting, contacts R-Y-G will open.
5. The OD unit shuts off and the indoor blower shuts off, unless a blower off delay has been enabled in the IFC setup menu options. The seven segment LED will read **IdL** = Idle, no thermostat demand.

### Two Stage Cooling

1. See sequence of operation for Single stage cooling operation above (steps 1-3).
2. R-Y2 contact on the thermostat close sending 24VAC to Y2 low voltage terminal on the IFC. Technician should read 24VAC between Y2 and B/C.
3. 24VAC is sent to the OD unit via thermostat wiring.
4. The indoor airflow ramps to 2nd stage airflow. The seven segment LED for example will read:
  - $LL2$  = Cooling, Stage 2
  - $RrF$  = Airflow
  - $150$  = 1600 calculated cfm (value shown x 10)
5. When the temperature is lowered enough to satisfy the thermostat setting, contacts R-Y1-Y2-G will open.  
The OD unit shuts off and the indoor blower shuts off, unless a blower off delay has been enabled in the IFC setup menu options. The seven segment LED will read  $IdL$  = Idle, no thermostat demand.

### Single Stage Heat Pump

**Note:** Factory supplied Y1-O jumper must be removed for proper seven segment LED readout and defrost operation.

1. R-Y1-G contacts on the thermostat close sending 24VAC to the Y1 and G low voltage terminals on the IFC. Technician should read 24VAC between Y1-B/C and between G-B/C.
2. 24VAC is sent to the OD unit via thermostat wiring.
3. The indoor blower ramps to the HP heating airflow. The seven segment LED for example will alternately read:

- $HP1$  = Heat Pump Heating, Stage 1
  - $RrF$  = Airflow
  - $080$  = 800 calculated cfm (value shown x 10)
4. When the temperature is raised enough to satisfy the thermostat setting, contacts R-Y-G will open.
  5. The OD unit shuts off and the indoor blower shuts off, unless a blower off delay has been enabled in the IFC setup menu options. The seven segment LED will read  $IdL$  = Idle, no thermostat demand.

### Two Stage Heat Pump

1. See sequence of operation for single stage heat pump operation above (steps 1-3)
2. R-Y2 contact on the thermostat close sending 24VAC to Y2 low voltage terminal on the IFC. Technician should read 24VAC between Y2 and B/C.
3. 24VAC is sent to the OD unit via thermostat wiring.
4. The indoor airflow ramps to 2nd stage airflow. The seven segment LED for example will read:
  - $HP2$  = Heat Pump Heating, Stage 2
  - $RrF$  = Airflow
  - $150$  = 1600 calculated cfm (value shown x 10)
5. When the temperature is raised enough to satisfy the thermostat setting, contacts R-Y1-Y2-G will open.
6. The OD unit shuts off and the indoor blower shuts off, unless a blower off delay has been enabled in the IFC setup menu options. The seven segment LED will read  $IdL$  = Idle, no thermostat demand.

# Periodic Servicing Requirements

1. GENERAL INSPECTION – **Examine the furnace installation annually for the following items:**
  - a. All flue product carrying areas external to the Furnace (i.e. chimney, vent connector) are clear and free of obstruction. A vent screen in the end of the Vent (flue) Pipe must be inspected for blockage annually, if applicable.
  - b. The vent connector is in place, slopes upward and is physically sound without holes or excessive corrosion.
  - c. The return air duct connection(s) is physically sound, is sealed to the Furnace and terminates outside the space containing the Furnace.
  - d. The physical support of the Furnace should be sound without sagging, cracks, gaps, etc., around the base so as to provide a seal between the support and the base.
2. FILTERS – Filters should be cleaned or replaced (with high velocity filters only), monthly and more frequently during high use times of the year such as midsummer or midwinter.
3. BLOWERS – The Blower size and speed determine the air volume delivered by the Furnace. The Blower motor bearings are factory lubricated and under normal operating conditions do not require servicing. Annual cleaning of the Blower wheel and housing is recommended for maximum air output, and this must be performed only by a qualified servicer or service agency.
4. IGNITER – This unit has a special hot surface direct ignition device that automatically lights the burners. Please note that it is very fragile and should be handled with care. ! CAUTION Do NOT touch igniter. It is extremely hot.
5. HEAT EXCHANGER/ FLUE PIPE – These items must be inspected for signs of corrosion, and/ or deterioration at the beginning of each heating season by a qualified service technician and cleaned annually for best operation. To clean flue gas passages, follow recommendations below:
  - a. Turn off gas and electric power supply.
  - b. Inspect flue pipe exterior for cracks, leaks, holes or leaky joints.
  - c. Remove door from Furnace.
  - d. Inspect induced draft Blower connections to the flue pipe connection.
  - e. Use a mirror and flashlight to inspect interior of Heat Exchanger, be careful not to damage the Igniter, Flame Sensor or other components.
  - f. If any corrosion is present, the Heat Exchanger should be cleaned by a qualified service technician.
  - g. After inspection is complete replace burner and Furnace door.

- h. Restore gas supply. Check for leaks using a soap solution. Restore electrical supply. Check unit for normal operation.
6. COOLING COIL CONDENSATE DRAIN - If a cooling coil is installed with the Furnace, condensate drains should be checked and cleaned periodically to assure that condensate can drain freely from coil to drain. If condensate cannot drain freely water damage could occur.

## General Maintenance and Cleaning

### Heat Exchanger

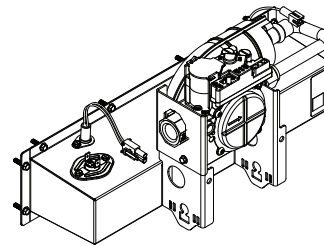
**Note:** If the heat exchanger gets a heavy accumulation of soot or carbon, it should be replaced rather than trying to clean. A heavy build-up of soot and/or carbon indicates that a problem exists which needs to be corrected, such as improper adjustment of gas valve outlet pressure, insufficient or poor quality combustion air, incorrect size or damaged orifice(s), improper gas, or a restricted heat exchanger. Action must be taken to correct the problem.

### Burner Assembly

**Important:** Proper use of Personal Protective Equipment (PPE) must be followed, including safety glasses, gloves, and dust mask when removing and reinstalling the burner assembly.

**Note:** Disassembly of the burner assembly during annual maintenance should not be required in most applications but may vary depending on the location and application of the furnace. Inspection of all components, wiring, and verifying proper operation should be part of the annual maintenance work performed.

Figure 59. Representative burner assembly



### Maintenance Instructions

The following steps should be performed only by a qualified service technician:

1. Turn OFF gas and electrical power to furnace.
2. Remove door panel.
3. Visually inspect the overall condition of the furnace components: looking for signs of corrosion, excessive

wear, loose, or frayed wiring, and overall cleanliness of the furnace.

4. The venting system should be checked for proper pitch, loose connections, and signs of corrosion.
5. Disconnect the wire to the flame sensor and remove the 1/4" retaining screw. Remove the sensor and clean if necessary.

**Note:** *Cleaning the sensor with steel wool is the approved method. Use of sand paper or similar materials will eventually result in the glass deposits of the sandpaper becoming molten and insulating the small current flow and loss of operation.*

6. Disconnect the wiring to the ignitor. With the ignitor still in place, measure the resistance of the ignitor. Resistance should be between 37-70 ohms.

### Cleaning Instructions

The following steps should be performed only by a qualified service technician:

1. Turn OFF gas and electrical power to furnace.
2. Remove door panel.
3. Disconnect wires to the following components after identifying and marking the wires. Taking pictures with a smart phone is also a good aid in when it's time for re-connection:
  - a. Burner box limit switch
  - b. Primary limit switch
  - c. Gas valve
  - d. Hot surface igniter
  - e. Flame sensor
  - f. Pressure transducer
4. With the use of a back-up wrench on the gas valve, disconnect the gas supply line from gas valve.

5. Remove screws that attach the burner assembly to the vestibule panel. The gas valve and J-tube do not need to be removed from burner box.

**Note:** *Be careful when removing burner assembly to avoid breaking igniter.*

6. Remove burner box insulation and discard. Re-use of the burner box insulation is not recommended.
7. Remove insulation sleeves from each tube inlet. Inspect each sleeve for signs of damage or overheating. Replace as needed, as a set.
8. Using vacuum cleaner with soft brush attachment, clean burner assembly. Regulated compressed air can be used to aid in cleaning.
9. Clean flame sensor with fine steel wool.
10. Inspect ignitor for visible signs of damage or overheating. Measure resistance of the ignitor with a VOM. Resistance should be between 37-70 ohms. Replace if needed.
11. Reinstall the burner box insulation assembly.
12. Reinstall burner assembly.
13. Reconnect wires to the following components:
  - a. Burner box limit switch
  - b. Primary limit switch
  - c. Gas valve
  - d. Hot surface igniter
  - e. Flame sensor
  - f. Pressure transducer
14. Re-connect gas supply and check for leaks.
15. Set thermostat above room temperature and check furnace for proper operation.
16. Verify blower airflow and temperature rise is within the specified range stated on the nameplate.





## About Trane and American Standard Heating and Air Conditioning

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