

# Installation, Operation, and Maintenance

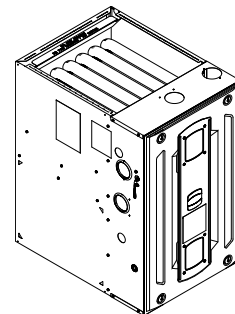
## Upflow/Horizontal and Dedicated Downflow Gas-Fired, Direct/Non-Direct Vent, 2-Stage Condensing Variable Speed Furnaces with Variable Speed Draft Inducer

Upflow, Convertible to Horizontal Right or Horizontal Left

S9V2B040U3VSBB  
S9V2B060U4VSBB  
S9V2B080U4VSBB  
S9V2C080U5VSBB  
S9V2C100U5VSBB  
S9V2D120U5VSBB

Downflow Only

S9V2B040D3VSBB  
S9V2B060D3VSBB  
S9V2B080D4VSBB  
S9V2C100D5VSBB  
S9V2D120D5VSBB



*Note: Graphics in this document are for representation only. Actual model may differ in appearance.*

### ⚠ WARNING

#### FIRE HAZARD!

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

This Warning applies to installations with a flammable refrigeration system. The furnace must be powered except for service. The furnace shall be installed and connected according to installation instructions and wiring diagrams that are provided with the evaporator coil.

### ⚠ CAUTION

#### COIL REQUIREMENT!

Failure to follow this Caution could result in property damage or personal injury. 4GXC\* and 4MXC\* coils installed on upflow furnaces in vertical, horizontal left, or horizontal right orientations without a factory installed metal drain pan shield must use a MAY\*FERCOLKITAA kit. Coils installed on upflow furnaces must have drain pans that are suitable for 400° F (205°C) or have a metal drain pan shield. Downflow furnaces do not require a metal drain pan shield or the use of the MAY\*FERCOLKITAA kit.



S9V2-VS-SVX001-1D-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.

# SAFETY SECTION – FURNACES

**Important:** – This document pack contains a wiring diagram and service information. This is customer property and is to remain with this unit. Please return to service information pack upon completion of work.

## ⚠ 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 this Warning could result in property damage, personal injury or death. Install a gas detecting warning device in case of a gas leak. **NOTE: The manufacturer of your furnace does not test any detectors and makes no representations regarding any brand or type of detector.**

## ⚠ WARNING

### FIRE OR EXPLOSION HAZARD!

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

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

## ⚠ WARNING

### ELECTRICAL SHOCK, FIRE, OR EXPLOSION HAZARD!

Failure to follow this Warning could result in dangerous operation, property damage, severe personal injury, or death.

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

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

## ⚠ WARNING

### CARBON MONOXIDE POISONING HAZARD!

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

To ensure 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.

## ⚠ WARNING

### CARBON MONOXIDE HAZARD!

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

Do not attempt to change the venting system. Follow the installation and operation instructions for the venting system.

## ⚠ WARNING

### FIRE HAZARD!

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

Do not install the furnace directly on carpeting, tile or other combustible material other than wood flooring. For vertical downflow applications, subbase (BAYBASE205) must be used between the furnace and combustible flooring. When the downflow furnace is installed vertically with a cased coil, a subbase is not required.

**⚠ WARNING****WARNING!**

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****EXPLOSION HAZARD!**

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

Propane gas is heavier than air and may collect in any low areas or confined spaces. In addition, odorant fade may make the gas undetectable except with a warning device. If the gas furnace is installed in a basement, an excavated area or a confined space, it is strongly recommended to contact a gas supplier to install a gas detecting warning device in case of leak. The manufacturer of your furnace does not test any detectors and makes no representations regarding any brand or type of detector.

**⚠ WARNING****ELECTRICAL SHOCK HAZARD!**

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

Do not bypass the door switch or panel loop by any permanent means.

**⚠ WARNING****ELECTRICAL SHOCK HAZARD!**

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

Do not touch any components other than the Menu and Option buttons on the IFC when setting up the system or during fault code recovery.

**⚠ WARNING****FIRE OR EXPLOSION HAZARD!**

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

Do **NOT** attempt to manually light the furnace.

**⚠ WARNING****CARBON MONOXIDE POISONING HAZARD!**

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

Follow the service and/or periodic maintenance instructions for the Furnace and venting system.

**⚠ WARNING****CARBON MONOXIDE POISONING HAZARD!**

Failure to follow this Warning could result in serious personal injury or death.

Make sure that the blower door is in place and not ajar. Dangerous fumes could escape an improperly secured door.

**⚠ WARNING****ELECTRICAL SHOCK HAZARD!**

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

Disconnect power to the unit before removing the blower door. Allow a minimum of 10 seconds for IFC power supply to discharge to 0 volts.

**⚠ WARNING****SAFETY HAZARD!**

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

These furnaces are not approved or intended for installation in trailers or recreational vehicles. Installation in manufactured (mobile) housing is only approved with BAYMFGH Kit.

**⚠ WARNING****EXPLOSION HAZARD!**

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

In the event that electrical, fuel, or mechanical failures occur, shut gas supply off at the manual gas valve located on the supply gas piping coming into the furnace before turning off the electrical power to the furnace. Contact the service agency designated by your dealer.

**⚠ WARNING**

**EXPLOSION HAZARD!**

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

Do not store combustible materials, gasoline, or other flammable vapors or liquids near the unit.

**⚠ WARNING**

**SAFETY HAZARD!**

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

Do not use semi-rigid metallic gas connectors (flexible gas lines) within the furnace cabinet.

**⚠ WARNING**

**INSTALLATION WARNING – HIGH VOLTAGE MOVING PARTS!**

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

Bodily injury can result from high voltage electrical components, fast moving fans, and combustible gas. For protection from these inherent hazards during installation and servicing, the main gas valve must be turned off and the electrical supply must be disconnected. If operating checks must be performed with the unit operating, it is the technician's responsibility to recognize these hazards and proceed safely.

**⚠ WARNING**

**SAFETY HAZARD!**

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

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 this Warning could result in property damage, severe personal injury, or death.

Turn the power to the furnace off before servicing filters to avoid contact with moving parts.

**⚠ WARNING**

**CARBON MONOXIDE HAZARD!**

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

Furnace venting into an unlined masonry chimney or concrete chimney is prohibited.

**⚠ WARNING**

**CARBON MONOXIDE HAZARD!**

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

The chimney liner must be thoroughly inspected to insure no cracks or other potential areas for flue gas leaks are present in the liner. Liner leaks will result in early deterioration of the chimney.

**⚠ WARNING**

**SHOCK HAZARD!**

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

If a disconnect switch is present, it must always be locked in the open position before servicing the unit.

**⚠ WARNING**

**ELECTRICAL SHOCK HAZARD!**

Failure to follow this Warning could result in an electrical shock, fire, injury or death.

Ensure cabinet has an uninterrupted or unbroken ground in accordance with National Electrical Code, ANSI/ NFPA 70 – 'latest edition' and Canadian Electrical Code, CSA C22.1 or local codes to minimize personal injury if an electrical fault should occur.

**⚠ WARNING**

**OVERHEATING AND EXPLOSION HAZARD!**

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

Should overheating occur, or the gas supply fail to shut off, shut off the gas valve to the unit before shutting off the electrical supply.



**⚠ CAUTION****IMPROPER VOLTAGE CONNECTION!**

Failure to follow this Caution could result in property damage.  
Do NOT connect the furnace line voltage to a GFCI protected circuit.

**⚠ CAUTION****CORROSION WARNING!**

Failure to follow this Caution could result in property damage or personal injury.  
Do not install the furnace in a corrosive or contaminated atmosphere.

**⚠ CAUTION****SAFETY HAZARD!**

Failure to follow this Caution could result in property damage or personal injury.  
The vent for this appliance shall not terminate; (1) Over public walkways; or (2) Near soffit vents or crawl space vents or other areas where condensate or vapor could create a nuisance or hazard or cause property damage; or (3) Where condensate vapor could cause damage or could be detrimental to the operation of regulators, relief valves, or other equipment.

**⚠ CAUTION****SHARP EDGE HAZARD!**

Failure to follow this Caution could result in property damage or personal injury.  
Be careful of sharp edges on equipment or any cuts made on sheet metal while installing or servicing.

**⚠ CAUTION****BACKUP WRENCH REQUIRED!**

Failure to follow this Caution could result in property damage or personal injury.  
Use a backup wrench on the gas valve when installing gas piping to prevent damage to the gas valve and manifold assembly.

**⚠ CAUTION****FREEZE CAUTION!**

Failure to follow this Caution could result in property damage or personal injury.  
If complete furnace shutdown is done during the cold weather months, provisions must be taken to prevent freeze-up of all water pipes and water receptacles.

**⚠ CAUTION****FREEZE CAUTION!**

Failure to follow this Caution could result in property damage or personal injury.  
When the vent pipe is exposed to temperatures below freezing, i.e., when it passes through unheated spaces, etc., the pipe must be insulated with 1/2 inch (12.7 mm) thick Armaflex-type insulation or equal. If the space is heated sufficiently to prevent freezing, then the insulation would not be required. If domestic water pipes are not protected from freezing then the space meets the condition of a heated space.

**⚠ CAUTION****FREEZE CAUTION!**

Failure to follow this Caution could result in property damage or personal injury.  
Whenever your house is to be vacant, arrange to have someone inspect your house for proper temperature. This is very important during freezing weather. If for any reason your furnace should fail to operate damage could result, such as frozen water pipes.

**⚠ CAUTION****FREEZE CAUTION!**

Failure to follow this Caution could result in property damage or personal injury.  
Caution should be taken to prevent drains from freezing or causing slippery conditions. Excessive draining of condensate may cause saturated ground conditions that may result in damage to plants.

**⚠ CAUTION****IGNITION FUNCTION!**

Failure to follow this Caution may result in poor ignition characteristics.  
Maintain manifold pressure in high altitude installations.

**⚠ CAUTION****WATER DAMAGE!**

Failure to follow this Caution could result in property damage or personal injury.  
It is recommended that an external overflow drain pan be installed in all applications over a finished ceiling to prevent property damage or personal injury from leaking condensate.

**⚠ CAUTION**

**HOT SURFACE!**

Failure to follow this Caution could result in personal injury.  
Do NOT touch igniter. It is extremely hot.

**⚠ CAUTION**

**FURNACE SERVICE CAUTION!**

Failure to follow this Caution 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 this Caution could result in property damage or personal injury.  
In order to prevent shortening its service life, the Furnace should NOT be used as a “Construction Heater” during the finishing phases of construction until the requirements listed in the Furnace Installation Guidelines section have been met. Condensate in the presence of chlorides and fluorides from paint, varnish, stains, adhesives, cleaning compounds, and cement create a corrosive condition which may cause rapid deterioration of the heat exchanger.

**⚠ CAUTION**

**WIRING INFORMATION!**

Failure to follow this Caution could result in property damage or personal injury.  
The integrated furnace control is polarity sensitive. The hot leg of the 120 VAC power must be connected to the BLACK field lead.

**⚠ WARNING**

**CARBON MONOXIDE POISONING HAZARD!**

Failure to follow the steps outlined below for each appliance connected to the venting system being placed into operation could result in carbon monoxide poisoning or death.

**The following steps shall be followed for each appliance connected to the venting system being placed into operation, while all other appliances connected to the venting system are not in operation:**

- Inspect the venting system for proper size and horizontal pitch as required in the National Fuel Gas Code, ANSI Z223.1/NFPA 54 or the CSA B149.1 *Natural Gas and Propane Installation Code* and these instructions. Determine there is no blockage or restriction, leakage, corrosion or other deficiencies which could cause an unsafe condition.
- Close all doors and windows between the space in which the appliance(s) connected to the venting system are located. Also close fireplace dampers.
- Turn on clothes dryers and any appliance not connected to the venting system. Turn on any exhaust fans such as range hoods so they are operating at maximum speed. Do not operate a summer exhaust fan.
- Follow the lighting instructions. Place the appliance being inspected into operation. Adjust the thermostat so appliance is operating continuously.
- Test for spillage from draft hood equipped appliances at the draft hood relief opening after 5 minutes of main burner operation. Use the flame of a match or candle.
- If improper venting is observed during any of the above tests, the venting system must be corrected in accordance with the National Fuel Gas Code, ANSI Z221.1/NFPA 54 and/or CSA B149.1 *Natural Gas and Propane Installation Code*.
- After it has been determined that each appliance connected to the venting system properly vents when tested, return all doors, windows, exhaust fans, etc. to their previous condition of use.

**⚠ CAUTION****VENTING REQUIREMENT!**

Failure to follow this Caution could result in property damage or personal injury. For condensing furnaces, Do NOT run vent through chimney for wood burning or oil Furnaces or incinerators. If remaining free area between single wall flue pipe and masonry chimney is to be used for another gas appliance, venting area must be sufficient to vent that appliance and that appliance must be connected to chimney with separate entry openings.

**IMPORTANT** – *The single wall flue pipe joints must be sealed. The 90° elbow connection to vertical pipe must be sealed to prevent condensate leakage to base of masonry chimney.*

**⚠ CAUTION****VENTING REQUIREMENT!**

Failure to follow this Caution could result in property damage or personal injury. Condensing furnaces may be vented through UNUSED chimneys. Do NOT run vent through chimney for wood burning or oil Furnaces or incinerators or any other gas appliance.

**IMPORTANT** – *The single wall flue pipe joints must be sealed. The 90° elbow connection to vertical pipe must be sealed to prevent condensate leakage to base of masonry chimney.*

**⚠ CAUTION****EQUIPMENT DAMAGE!**

UV light exposure can cause the plastic blower material to deteriorate which could lead to Blower Housing Damage.

For units containing a plastic Blower Housing, Do NOT install third party Ultra-Violet Air Cleaners where the Blower Housing can be 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.  
6200 Troup Highway  
Tyler, TX 75707

**Coil Caution****⚠ CAUTION****COIL REQUIREMENT!!**

Failure to follow this Caution could result in property damage or personal injury. 4GXC\* and 4MXC\* coils installed on upflow furnaces in vertical, horizontal left, or horizontal right orientations without a factory installed metal drain pan shield must use a MAY\*FERCOLKITAA kit. Coils installed on upflow furnaces must have drain pans that are suitable for 400° F (205° C) or have a metal drain pan shield. Downflow furnaces do not require a metal drain pan shield or the use of the MAY\*FERCOLKITAA kit.

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# Accessories

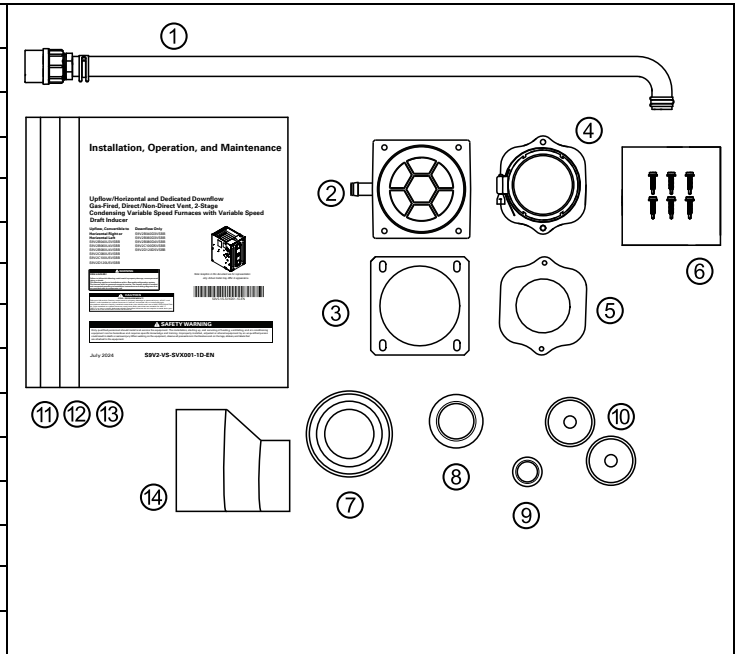
**Table 1. Accessories**

Model Number	Description	Use with
BAYHANG	Horizontal Hanging Kit	All Upflow Furnaces
BAYVENT200B	Sidewall Vent Termination Kit	All Furnaces
BAYVENTCN200B	Sidewall Vent Termination Kit (Canada – CPVC)	All Furnaces
BAYAIR30AVENTA	Concentric Vent Kit	All Furnaces
BAYAIR30CNVENT	Concentric Vent Kit (Canada – CPVC)	All Furnaces
BAYREDUCE	Reducing Coupling (CPVC)	All Furnaces
BAYLIFTB	Dual Return Kit (B size extension)	B Cabinet Upflow Furnaces
BAYLIFTC	Dual Return Kit (C size extension)	C Cabinet Upflow Furnaces
BAYLIFTD	Dual Return Kit (D size extension)	D Cabinet Upflow Furnaces
BAYBASE205	Downflow Subbase	All Downflow Furnaces
BAYFLTR203	Horizontal Filter Kit	B Cabinet Modular Blowers in Downflow/ Horizontal
BAYFLTR204	Horizontal Filter Kit	C Cabinet Modular Blowers in Downflow/ Horizontal
BAYFLTR205	Horizontal Filter Kit	D Cabinet Modular Blowers in Downflow/ Horizontal
BAYFLTR206	Filter Access Door Kit (Downflow only)	All Downflow Furnaces
BAYSF1165*(a)	1" SlimFit Box with MERV 4 Filter	All Upflow Furnaces
BAYSF1255*	2" SlimFit Filter Box with MERV 4 Filter	All furnaces when used in side return application. B-Cabinet Furnaces only when in bottom return application.
BAYLPSS400*	Propane Conversion Kit with Stainless Steel Burners	All Furnaces
BAYMFGH200B	Manufactured/Mobile Housing Kit	All Furnaces
BAYHALT255	High Altitude Pressure Switch Kit	S9V2B060D3VSB & Later
BAYHALT256	High Altitude Pressure Switch Kit	S9V2B040U3VSBB & Later S9V2B040D3VSBB & Later
BAYHALT257	High Altitude Pressure Switch Kit	S9V2B080D4VSBB & Later
BAYHALT258	High Altitude Pressure Switch Kit	S9V2B080U4VSBB & Later S9V2C100U5VSBB & Later S9V2C120U5VSBB & Later S9V2C120D5VSBB & Later
BAYHALT259	High Altitude Pressure Switch Kit	S9V2B060U4VSBB & Later S9V2C080U5VSBB & Later S9V2C100D5VSBB & Later
BAYCNDTRAP2	Inline Condensate Trap Kit used with Special Venting on 2" Vent Pipe	All Furnaces
BAYCNDTRAP3	Inline Condensate Trap Kit used with Special Venting on 3" Vent Pipe	All Furnaces
FLRSF1255	1" Filter replacement (Qty 12)	BAYSF1255*

(a) Airflow greater than 1600 CFM requires dual returns

## Document Pack Contents S9V2-VS

Item	Qty.	Description
1	1	Condensate Drain Tube Assembly
2	1	Inlet Vent (2"- ADP01586 and 3" - ADP01587) <sup>(a)</sup>
3	1	Inlet Vent Gasket
4	1	Outlet Vent Assembly
5	1	Outlet Vent Gasket
6	6	Screws
7	1	Condensate Trap Grommet
8	1	Plug – Condensate/Gas
9	1	Plug – Electrical
10	2	Grommet – Condensate/Gas
11	1	Installation, Operation, and Maintenance
12	1	Owner Guide
13	1	Limited Warranty
14	1	2" to 3" Coupling – CPL01544 <sup>(b)</sup>



<sup>(a)</sup> 3" inlet vent supplied with S9V2D120U5VS only. 2" inlet vent supplied with all other models.

<sup>(b)</sup> Supplied with S9V2D120U5VS only.

## Part List

<ul style="list-style-type: none"> <li>• Igniter</li> <li>• Flame Sensor</li> <li>• In-shot Burner(s)</li> <li>• Gas Valve</li> </ul>	<ul style="list-style-type: none"> <li>• Inducer Assembly</li> <li>• Blower Motor</li> <li>• Blower Wheel</li> <li>• IFC (Integrated Furnace Control)</li> </ul>	<ul style="list-style-type: none"> <li>• Pressure Switch(es)</li> <li>• Main Thermal Limit</li> <li>• Roll-Out Switch(es)</li> <li>• Reverse Air Switch(es)</li> </ul>
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# Product Specification

Model	S9V2B040U3 VSBB(a), (b)	S9V2B060U4 VSBB(a), (b)	S9V2B080U4 VSBB(a), (b)	S9V2C080U5 VSBB(a), (b)	S9V2C100U5 VSBB(a), (b)	S9V2D120U5 VSBB(a), (b)
<b>Type</b>	Upflow / Horizontal					
<b>RATINGS</b> (c)						
1st Stage Input BTUH	26,000	39,000	52,000	52,000	65,000	78,000
1st Stage Capacity BTUH (ICS)	25,700	38,300	51,050	51,300	63,800	77,050
2nd Stage Input BTUH	40,000	60,000	80,000	80,000	100,000	120,000
2nd Stage Capacity BTUH (ICS) (d)	39,350	57,900	76,700	77,450	97,650	116,250
1st Stage Temp. Rise (Min. - Max.) °F	25 - 55	25 - 55	30 - 60	30 - 60	25 - 55	35 - 65
2nd Stage Temp. Rise (Min. - Max.) °F	30 - 60	35 - 65	35 - 65	35 - 65	35 - 65	40 - 70
AFUE (%) (d)	97.0					
Return Air Temp. (Min. - Max.) °F	45°F - 80°F					
<b>BLOWER DRIVE</b>	DIRECT					
Diameter - Width (in.)	11 X 8				11 X 10	
No. Used	1					
Speeds (No.)	Variable					
CFM vs. in. w.g.	See Fan Performance Table					
Motor HP	1/2	3/4		1		
R.P.M.	Variable					
Volts / Ph / Hz	120 / 1 / 60					
FLA	6.4	9.6		10		
<b>COMBUSTION FAN - Type</b>	Variable Speed					
Drive - No. Speeds	Direct - Variable					
Motor RPM	1/50 - 5000					
Volts/Ph/Hz	33 - 110 / 3 / 60 - 180					
FLA	0.77					
Inducer Orifice	0.61	0.79	0.96	0.88	1.05	1.19
<b>FILTER - Furnished?</b>	No					
Type Recommended	High Velocity					
Hi Vel. (No.-Size-Thk.)	1 - 16 X 25 - 1 in.			1 - 20 X 25 - 1 in.		1 - 24 X 25 - 1 in.
<b>VENT OUTLET DIA - MIN. (in.)</b> (e)	2 Round				3 Round	
<b>INLET AIR DIA - MIN. (in.)</b> (e)	2 Round				3 Round	
<b>HEAT EXCHANGER - Type</b>						
Fired	409 Stainless Steel					
Unfired	29-4C Stainless Steel					
Gauge (Fired)	20					
<b>ORIFICES - Main</b>						
Nat. Gas (Qty. - Drill Size)	2 - 45	3 - 45	4 - 45		5 - 45	6 - 45
Propane Gas (Qty. - Drill Size)	2 - 56	3 - 56	4 - 56		5 - 56	6 - 56
<b>GAS VALVE</b>	Redundant - Two Stage					
<b>PILOT SAFETY DEVICE - TYPE</b>	120 V SiNi Igniter					
<b>BURNERS - TYPE - QTY</b>	Inshot - 2	Inshot - 3	Inshot - 4		Inshot - 5	Inshot - 6
<b>POWER CONN. - V/Ph/HZ</b> (f)	120 / 1 / 60					
Ampacity (Amps)	8.9	12.9		13.4		
Max. Overcurrent Protection (Amps)	15					
<b>PIPE CONN. SIZE (IN.)</b>	1/2					

## Product Specification

Model	S9V2B040 D3VSBB(a), (b)	S9V2B060 D3VSBB(a), (b)	S9V2B080 D4VSBB(a), (b)	S9V2C100 D5VSBB(a), (b)	S9V2D120 D5VSBB(a), (b)
Type	Downflow				
<b>RATINGS</b> (c)					
1st Stage Input BTUH	26,000	39,000	52,000	65,000	78,000
1st Stage Capacity BTUH (ICS)	25,050	38,500	51,150	64,000	76,700
2nd Stage Input BTUH	40,000	60,000	80,000	100,000	120,000
2nd Stage Capacity BTUH (ICS) (d)	38,800	58,200	76,900	97,350	116,350
1st Stage Temp. Rise (Min. - Max.) °F	25 - 55		30 - 60		
2nd Stage Temp. Rise (Min. - Max.) °F	30 - 60	35 - 65			
AFUE (%) (d)	97.0				
Return Air Temp. (Min. - Max.) °F	45°F - 80°F				
<b>BLOWER DRIVE</b>	DIRECT				
Diameter - Width (in.)	11 X 8			11 X 10	
No. Used	1				
Speeds (No.)	Variable				
CFM vs. in. w.g.	See Fan Performance Table				
Motor HP	1/2		3/4	1	
R.P.M.	Variable				
Volts / Ph / Hz	120 / 1 / 60				
FLA	6.4		9.6	10	
<b>COMBUSTION FAN - Type</b>	Variable Speed				
Drive - No. Speeds	Direct - Variable				
Motor RPM	1/50 - 5000				
Volts/Ph/Hz	33 - 110 / 3 / 60 - 180				
FLA	0.77				
Inducer Orifice	0.61	0.79	0.96	1.05	1.19
<b>FILTER - Furnished?</b>	No				
Type Recommended	High Velocity				
Hi Vel. (No.-Size-Thk.)	1 - 16 X 25 - 1 in.			1 - 20 X 25 - 1 in.	1 - 24 X 25 - 1 in.
<b>VENT OUTLET DIA - MIN. (in.)</b> (e)	2 Round				
<b>INLET AIR DIA - MIN. (in.)</b> (e)	2 Round				
<b>HEAT EXCHANGER - Type</b>					
Fired	409 Stainless Steel				
Unfired	29-4C Stainless Steel				
Gauge (Fired)	20				
<b>ORIFICES - Main</b>					
Nat. Gas (Qty. - Drill Size)	2- 45	3- 45	4 - 45	5 - 45	6- 45
Propane Gas (Qty. - Drill Size)	2- 56	3- 56	4 - 56	5 - 56	6- 56
<b>GAS VALVE</b>	Redundant - Two Stage				
<b>PILOT SAFETY DEVICE - TYPE</b>	120 V SiNi Igniter				
<b>BURNERS - TYPE - QTY</b>	Inshot - 2	Inshot - 3	Inshot - 4	Inshot - 5	Inshot - 6
<b>POWER CONN. - V/Ph/HZ</b> (f)	120 / 1 / 60				
Ampacity (Amps)	8.9		12.9	13.4	
Max. Overcurrent Protection (Amps)	15				
<b>PIPE CONN. SIZE (IN.)</b>	1/2				

(a) Meets Energy Star

(b) Central Furnace heating designs are certified to ANSI Z21.47 / CSA 2.3 - latest edition.

(c) 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. For Canadian applications, above input ratings (BTUH) are up to 4,500 feet, derate 4% per 1,000 feet for elevations above 4,500 feet above sea level.

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

(e) Refer to Vent Length Table in this document.

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

# Furnace Installation Guidelines

The following sections give general guidelines for the installation of the gas furnaces.

## 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 this document accompanying this furnace.
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 may be used for temporary heating of buildings or structures under construction only when the following conditions have been met:
  - a. The furnace venting system must be complete and installed per manufacturer's instructions.
  - b. The furnace is controlled only by a room Comfort Control (no field jumpers).
  - c. The furnace return air duct must be complete and sealed to the furnace.
  - d. The furnace input rate and temperature rise must be verified to be within the nameplate marking.

- e. A minimum 4" MERV 11 air filter must be in place.
- f. 100% of the furnace combustion air requirement must come from outside the structure.
- g. The Furnace return air temperature range is between 45 and 80 Fahrenheit.  
80% models = 55°F  
90%+ models = 45°F
- h. Clean the furnace, duct work, and components upon substantial completion of the construction process, and verify furnace operating conditions including ignition, input rate, temperature rise, and venting, according to the manufacturer's instructions.

### 10. In the Commonwealth of Massachusetts, this product must be gas piped by a Licensed Plumber or Gas Fitter.

This furnace is certified to leak 2% or less of nominal air conditioning CFM delivered when pressurized to .5" water column with all inlets, outlets, and drains sealed.

## General Guidelines

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 • National Installation Code, CAN/CGA B149.1. The latest code may be obtained from the American Gas Association, 400 N. Capitol St. NW, Suite 450 Washington, D.C. 20001, 1-855-999-9870 or [www.aga.org](http://www.aga.org).

These furnaces have been classified as CATEGORY IV furnaces in accordance with latest edition of ANSI Z21.47 standards • CSA 2.3. Category IV furnaces operate with positive vent static pressure and with a

## Furnace Installation Guidelines

flue loss less than 17 percent. These conditions require special venting systems, which must be gas tight and water tight. These Category IV Direct Vent furnaces are approved for installation in Manufactured/ Mobile housing when used with BAYMFGH200B.

A manufactured (mobile) home installation must conform with the *Manufactured Home Construction and Safety Standard, Title 24 CFR, Part 3280*, or when this standard is not applicable, the *Standard for Model Manufactured Home Installation, NFPA 225*, or the *Canadian Standard for Manufactured Homes, CSA Z240 MH*.

### 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 in Clearance Table below?

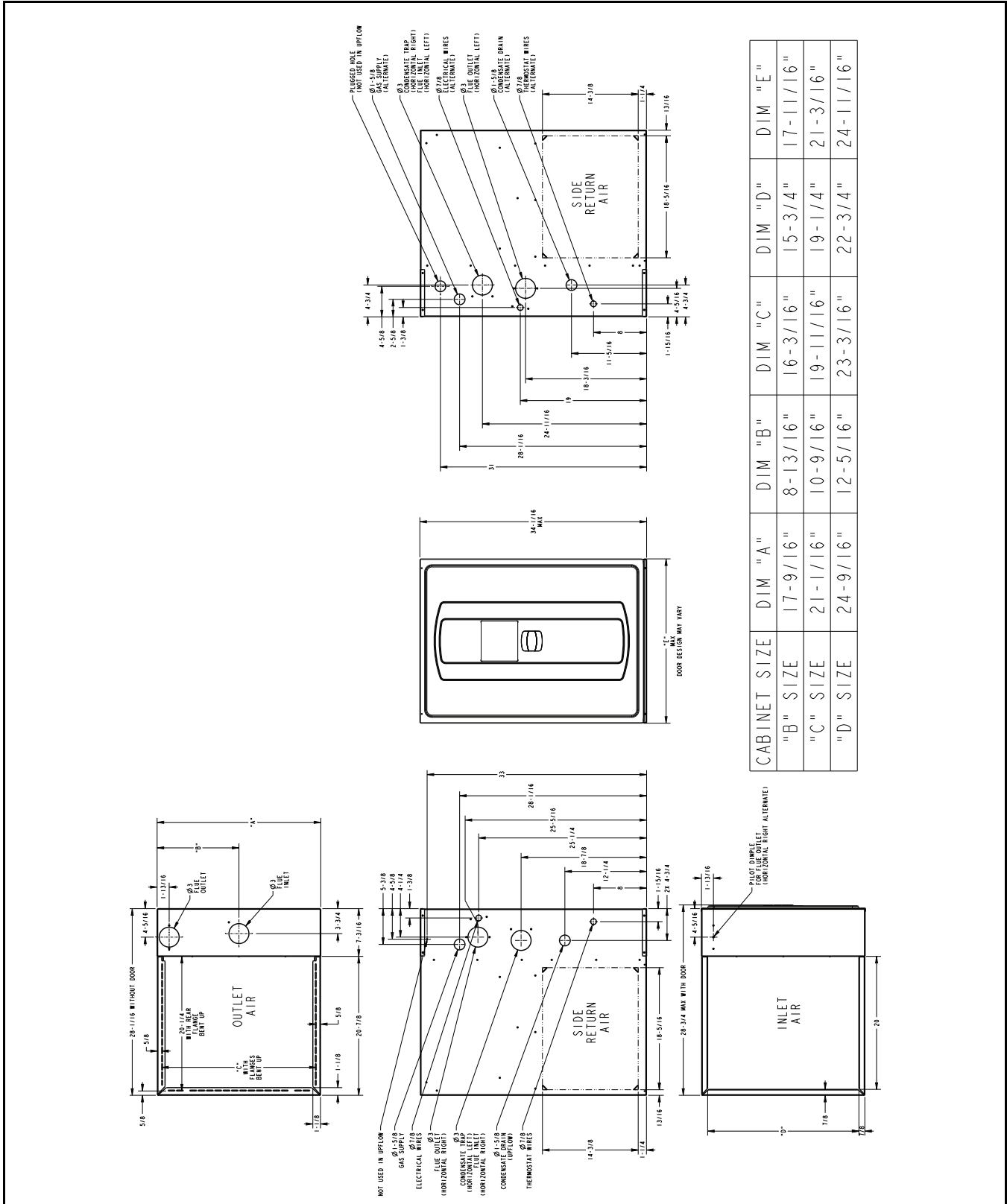
<b>Minimum clearance to combustible materials</b>	
<b>Closet</b>	
Sides	0 in.
Back	1 in.
Top	1 in.
Front	0 in.
Bottom	0 in.
Flue	0 in.
24 in. minimum front clearance recommended for service	
<b>Horizontal Closet and Alcove</b>	
Right Side	0 in.
Left Side	0 in.
Back	1 in.
Top	1 in.
Bottom	0 in.
Flue	0 in.
<b>Horizontal Flue (discharge on left)</b>	
<b>Closet</b>	
Right Side	0 in.
Left Side	0 in.
Rear	1 in.
Top	1 in.
Bottom	0 in.
Flue	0 in.

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. A vertical downflow furnace without a coil, must use BAYBASE205 when installed on combustible flooring.
9. 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.
10. 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 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, Cements and glues
  - k. Antistatic fabric softeners for clothes dryers
  - l. Masonry acid washing materials

**IMPORTANT:** The furnace must be installed level. The only allowable variation would be slightly to the left and/ or forward in upflow installations or slightly toward the front in horizontal installations. This is necessary for proper condensate drainage.

# Outline Drawings

Table 2. 17.5", 21" and 24.5" Upflow Cabinets

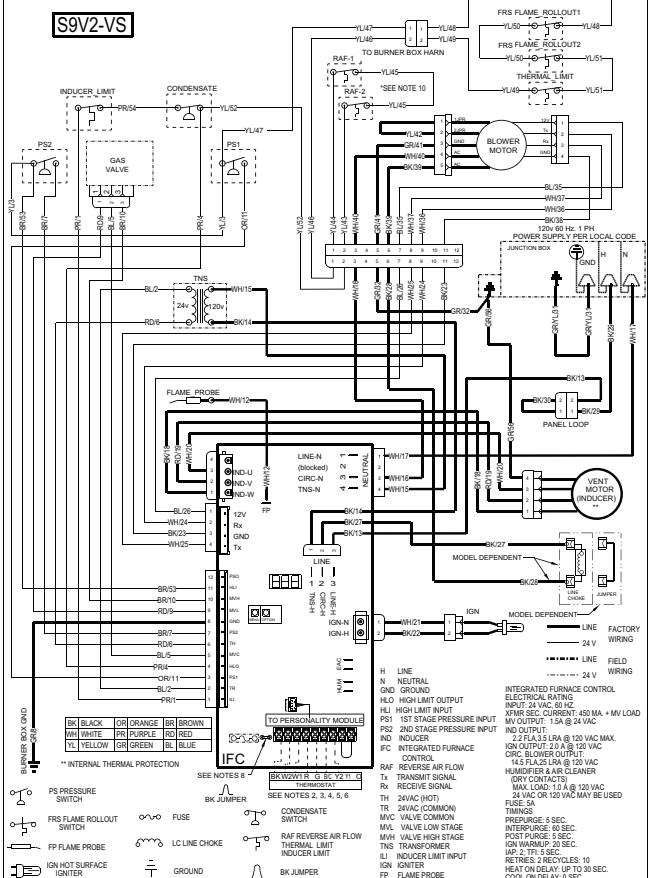




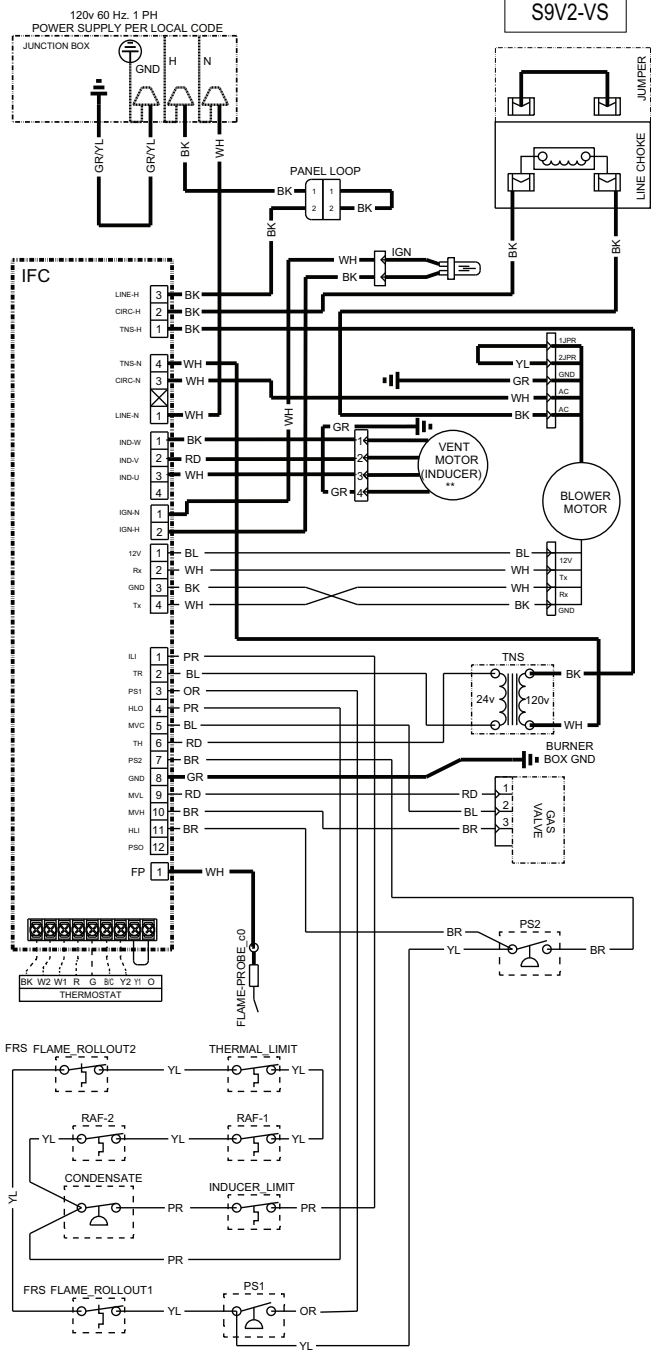


# S9V2-VS Wiring Diagram

- NOTES:
1. IF ANY OF THE ORIGINAL WIRING AS SUPPLIED WITH THIS FURNACE MUST BE REPLACED, IT MUST BE WITH WIRE HAVING A TEMPERATURE RATING OF AT LEAST 105°C. WIRES 12, 40, 50, AND 51 REQUIRE A TEMPERATURE RATING OF AT LEAST 250°C.
  2. FOR PROPER AIRFLOW IN COOLING/HEAT PUMP MODES, Y1 AND/OR Y2 MUST CONNECT FROM THE THERMOSTAT TO THE IFC LOW VOLTAGE TERMINAL STRIP.
  3. FOR COOLING ONLY SYSTEMS, LEAVE Y1-Y2 JUMPER IN PLACE ON THE IFC FOR CORRECT LED READOUT.
  4. FOR HEATPUMP SYSTEMS, REMOVE THE Y1-Y2 JUMPER, CONNECT "O" FROM THE THERMOSTAT TO "O" ON THE IFC LOW VOLTAGE TERMINAL STRIP FOR CORRECT LED READOUT AND DEFROST OPERATION.
  5. VSPD OD SYSTEMS REQUIRE DIFFERENT CONNECTIONS. SEE RELAY PANEL INSTRUCTIONS.
  6. IF USING A SINGLE STAGE HEATING THERMOSTAT, JUMPER W1 AND W2 TERMINALS AT THE LOW VOLTAGE TERMINAL STRIP, HT2 WILL BE SHOWN ON THE SEVEN SEGMENT DISPLAY AT ALL TIMES. SECOND STAGE OPERATION WILL BEGIN AFTER THE INTERSTAGE DELAY HAS COMPLETED.
  7. TO CHANGE AIRFLOW, REFER TO THE INTEGRATED FURNACE CONTROL MENU AND OPTIONS TO SET AIRFLOW AND BLOWER DELAYS.
  8. THE "BK" JUMPER MUST BE CUT WHEN APPLYING AN AIRFLOW COMMAND TO THE "BK" TERMINAL, SUCH AS PULSE WIDTH MODULATION.
  9. CORRECT PERSONALITY MODULE IS REQUIRED FOR PROPER FURNACE OPERATION AND IS SPECIFIC TO EACH MODEL AND SERIAL NUMBER. IT IS TO REMAIN WITH THE ORIGINAL UNIT.
  10. WIRE YL45 AND RAF-2 ARE NOT PRESENT ON DOWNFLOW MODELS.



Variable Speed (3-Phase) Inducer w/ ECM Blower Motor	Status Codes	Outdoor Unit
I dL Idle	CDF Blower Constant Fan Airflow Multiplier %	E04 Open Thermal Limit, Rollout Switch, or Reverse Airflow Switch
Hb 1 1st Stage Gas Heating	CPC Cooling (CFM/Ton)	E05 Flame detected, should not be present
L r 1 1st Stage Gas Heating Learning Routine	CPH Heat Pump Heating (CFM/Ton)	E06 Voltage reversed polarity or Bad Grounding
Hb 2 2nd Stage Heating	HDC Heat Off Delay (sec)	E09 (1) Igniter relay fails, (2) Igniter open
L r 2 2nd Stage Gas Heat Learning Routine	ISd Inter-Stage Delay (sec)	E10 Redundant Relay (HLO output) Energized when it should be off
Rr-F Airflow (followed by Airflow times 10)	9HC Gas Heating CFM 2nd Stage (1st Stage is not adjustable) (Airflow x10)	E12 Redundant Relay (HLO output) not energized when it should be
CDF Continuous Fan	Run Test Mode	E08 Flame current is low, but still strong enough to allow operation.
CL 1 1st Stage Cooling	Error Codes	E09 Inducer Motor no communication response, could be communication failure between two micro-controllers.
CL 2 2nd Stage Cooling	E 0 1 Loss of the IRQ/other internal failures	E 1 1 (1) 2nd stage gas valve energized when it should NOT be
HP 1 1st Stage Heat Pump	E 2 1 Retry exceeded (Failed to est flame)	(2) 2nd stage gas valve not energized when it should be
HP 2 2nd Stage Heat Pump	E 2 2 Retries exceeded (loss of established flame) or 10X PS1 open	(3) 1st stage gas valve not energized when it should be
dFd Defrost Mode	E 2 3 1st Stage Gas Valve not energized when it should be exceeded after 10 times	(4) Redundant relay (HLO output) not energized when it should be
Menu Options	E 2 4 Redundant Relay (HLO output) Not Energized when it should be	E 1 2 Open Issue
Ecc Active Alarm Menu	E 2 5 Run Test Mode	E 1 3 Blower HPI/DEM ID
L6 F Last 6 Faults (To Clear, Hold Option Button 5 sec)	E 2 6 Error Codes	E 1 4 No PM and local copy bad
Cc Code Release Number	E 2 7 Shorted Pressure Switch, 1st Stage	E 1 5 Both of Unit Data File in PM and local Unit Data File are Corrupt
Cd Cooling Off Delay (sec)	E 2 8 Shorted Pressure Switch, 2nd Stage	E 1 7 Blower motor no communication response
Od Outdoor Tonnage	E 2 9 Open Pressure Switch, 2nd Stage	E 1 8 Blower communication failure on the control



# Heating and Cooling Airflow Tables

**Table 4. S9V2B040U3VS Heating Airflow**

S9V2B040U3VS Furnace Heating Airflow (CFM), Temp. Rise (°F), and Power (Watts) vs. External Static Pressure with Filter (iwc)								
				1st Stage Capacity = 25,700 2nd Stage Capacity = 39,350				
Heating	Airflow Setting	Target Airflow		External Static Pressure				
				0.1	0.3	0.5	0.7	0.9
Heating 1st Stage	Low	468	CFM	468	452	437	421	406
			Temp. Rise	49	51	54	56	58
			Watts	27	58	90	121	152
	Medium Low	598	CFM	552	600	647	694	741
			Temp. Rise	43	39	36	32	28
			Watts	41	76	112	147	183
	Medium (a)	634	CFM	583	635	687	739	791
			Temp. Rise	39	36	33	30	27
			Watts	48	83	118	153	189
	High	864	CFM	753	786	818	850	883
			Temp. Rise	30	29	28	27	26
			Watts	87	129	171	214	256
Heating 2nd Stage	Low	650	CFM	633	636	639	643	646
			Temp. Rise	57	57	57	56	56
			Watts	48	92	135	179	223
	Medium Low	830	CFM	760	786	813	840	866
			Temp. Rise	48	46	45	43	41
			Watts	82	132	182	232	282
	Medium (a)	880	CFM	792	817	842	867	892
			Temp. Rise	44	44	43	43	42
			Watts	94	142	189	237	284
	High	1200	CFM	1023	1044	1066	1088	1109
			Temp. Rise	34	34	33	33	32
			Watts	192	251	310	369	428

**Table 5. S9V2B040D3VS Heating Airflow**

S9V2B040D3VS Furnace Heating Airflow (CFM), Temp. Rise (°F), and Power (Watts) vs. External Static Pressure with Filter (iwc)								
				1st Stage Capacity = 25,050 2nd Stage Capacity = 38,800				
Heating	Airflow Setting	Target Airflow		External Static Pressure				
				0.1	0.3	0.5	0.7	0.9
Heating 1st Stage	Low	468	CFM	495	488	481	473	466
			Temp. Rise	47	48	49	49	50
			Watts	27	58	89	120	152
	Medium Low(a)	590	CFM	593	601	609	616	624
			Temp. Rise	40	39	39	38	37
			Watts	39	76	114	152	189
	Medium	684	CFM	657	684	712	740	768
			Temp. Rise	36	35	33	32	30
			Watts	53	92	131	170	209
	High	900	CFM	832	867	902	936	971
			Temp. Rise	28	27	26	25	24
			Watts	94	139	184	229	275
Heating 2nd Stage	Low	650	CFM	661	659	658	657	655
			Temp. Rise	54	54	54	55	55
			Watts	42	83	124	166	207
	Medium Low(a)	820	CFM	813	817	820	824	828
			Temp. Rise	44	44	44	44	44
			Watts	71	118	165	212	260
	Medium	950	CFM	911	917	923	929	935
			Temp. Rise	39	39	39	39	39
			Watts	103	152	202	252	301
	High	1250	CFM	1122	1130	1138	1146	1154
			Temp. Rise	32	32	32	32	31
			Watts	206	260	313	367	421

Table 6. S9V2B040U3VS and S9V2B040D3VS Cooling Airflow

S9V2B040U3VS and S9V2B040D3VS Furnace Cooling Airflow (CFM) and Power (Watts) vs. External Static Pressure with Filter (iwc)							
Outdoor Tonnage - "Odt" (tons)	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	675 / 47	675 / 81	675 / 121	675 / 166	675 / 215
	420	CFM / WATTS	630 / 40	630 / 72	630 / 111	630 / 154	630 / 202
	400	CFM / WATTS	600 / 36	600 / 67	600 / 105	600 / 147	600 / 193
	370	CFM / WATTS	555 / 30	555 / 60	555 / 96	555 / 136	555 / 181
	350	CFM / WATTS	525 / 27	525 / 56	525 / 90	525 / 130	525 / 174
	330	CFM / WATTS	495 / 24	495 / 51	495 / 85	495 / 124	495 / 167
	310	CFM / WATTS	465 / 21	465 / 48	465 / 80	465 / 118	465 / 161
2.0	290	CFM / WATTS	435 / 19	435 / 44	435 / 76	435 / 113	435 / 155
	450	CFM / WATTS	900 / 94	900 / 137	900 / 186	900 / 240	900 / 298
	420	CFM / WATTS	840 / 79	840 / 120	840 / 166	840 / 218	840 / 273
	400	CFM / WATTS	800 / 70	800 / 109	800 / 154	800 / 204	800 / 258
	370	CFM / WATTS	740 / 58	740 / 95	740 / 138	740 / 185	740 / 236
	350	CFM / WATTS	700 / 51	700 / 86	700 / 127	700 / 173	700 / 223
	330	CFM / WATTS	660 / 44	660 / 78	660 / 118	660 / 162	660 / 211
2.5	310	CFM / WATTS	620 / 38	620 / 71	620 / 109	620 / 152	620 / 199
	290	CFM / WATTS	580 / 33	580 / 64	580 / 101	580 / 142	580 / 188
	450	CFM / WATTS	1125 / 167	1125 / 219	1125 / 278	1125 / 341	1125 / 408
	420	CFM / WATTS	1050 / 139	1050 / 188	1050 / 244	1050 / 304	1050 / 368
	400	CFM / WATTS	1000 / 123	1000 / 170	1000 / 223	1000 / 281	1000 / 343
	370	CFM / WATTS	925 / 100	925 / 145	925 / 195	925 / 250	925 / 308
	350	CFM / WATTS	875 / 87	875 / 129	875 / 178	875 / 230	875 / 287
3.0 (a)	330	CFM / WATTS	825 / 121	825 / 160	825 / 205	825 / 254	825 / 308
	310	CFM / WATTS	775 / 101	775 / 139	775 / 182	775 / 229	775 / 281
	290	CFM / WATTS	725 / 88	725 / 123	725 / 164	725 / 210	725 / 260
	450	CFM / WATTS	1350 / 272	1350 / 334	1350 / 402	1298 / 440	1198 / 450
	420	CFM / WATTS	1260 / 226	1260 / 284	1260 / 348	1260 / 417	1198 / 450
	400	CFM / WATTS	1200 / 198	1200 / 254	1200 / 315	1200 / 381	1198 / 450
	370	CFM / WATTS	1110 / 161	1110 / 213	1110 / 271	1110 / 333	1110 / 399
3.0 (a)	350 (a)	CFM / WATTS	1050 / 139	1050 / 188	1050 / 244	1050 / 304	1050 / 368
	330	CFM / WATTS	990 / 119	990 / 166	990 / 219	990 / 277	990 / 338
	310	CFM / WATTS	930 / 102	930 / 146	930 / 197	930 / 252	930 / 311
	290	CFM / WATTS	870 / 86	870 / 128	870 / 176	870 / 229	870 / 285

Table 7. S9V2B060D3VS Heating Airflow

S9V2B060D3VS Furnace Heating Airflow (CFM), Temp. Rise (°F), and Power (Watts) vs. External Static Pressure with Filter (iwc)								
				1st Stage Capacity = 38,500 2nd Stage Capacity = 58,200				
Heating	Airflow Setting	Target Airflow	External Static Pressure					
			0.1	0.3	0.5	0.7	0.9	
Heating 1st Stage	Low	711	CFM	636	649	662	675	688
			Temp. Rise	55	53	52	51	50
			Watts	49	86	124	161	199
	Medium Low(a)	814	CFM	732	740	748	756	764
			Temp. Rise	47	47	47	46	46
			Watts	65	105	146	186	226
	Medium	893	CFM	817	820	823	826	828
			Temp. Rise	42	42	42	42	42
			Watts	82	123	164	206	247
	High	1067	CFM	969	962	956	950	944
			Temp. Rise	36	36	36	37	37
			Watts	126	170	214	258	302
Heating 2nd Stage	Low	900	CFM	836	840	844	848	852
			Temp. Rise	64	64	63	63	62
			Watts	79	126	173	219	266
	Medium Low(a)	1030	CFM	951	955	959	963	967
			Temp. Rise	56	56	56	55	55
			Watts	112	163	213	264	314
	Medium	1130	CFM	1051	1052	1054	1055	1056
			Temp. Rise	51	51	51	51	51
			Watts	145	197	249	301	352
	High	1350	CFM	1251	1238	1225	1212	1199
			Temp. Rise	43	43	44	44	45
			Watts	236	291	347	402	458

# Heating and Cooling Airflow Tables

**Table 8. S9V2B060D3VS Cooling Airflow**

S9V2B060D3VS Furnace Cooling Airflow (CFM) and Power (Watts) vs. External Static Pressure with Filter (iwc)							
Outdoor Tonnage - "Odt" (tons)	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	663 / 47	673 / 83	666 / 119	641 / 155	596 / 192
	420	CFM / WATTS	621 / 41	630 / 75	621 / 109	595 / 144	549 / 180
	400	CFM / WATTS	582 / 36	580 / 67	566 / 99	528 / 130	507 / 170
	370	CFM / WATTS	549 / 32	556 / 63	546 / 95	517 / 128	469 / 162
	350	CFM / WATTS	521 / 29	527 / 59	516 / 90	486 / 122	437 / 156
	330	CFM / WATTS	492 / 26	497 / 55	486 / 85	455 / 117	405 / 150
	310	CFM / WATTS	463 / 23	468 / 51	455 / 81	423 / 112	372 / 145
	290	CFM / WATTS	435 / 21	438 / 48	424 / 77	391 / 107	339 / 141
2.0	450	CFM / WATTS	878 / 90	893 / 135	890 / 179	869 / 223	829 / 266
	420	CFM / WATTS	821 / 76	834 / 119	830 / 161	808 / 202	767 / 244
	400	CFM / WATTS	770 / 66	778 / 105	770 / 144	742 / 182	725 / 230
	370	CFM / WATTS	725 / 57	737 / 96	731 / 134	707 / 172	664 / 211
	350	CFM / WATTS	687 / 51	698 / 88	691 / 124	666 / 161	622 / 199
	330	CFM / WATTS	649 / 45	659 / 80	651 / 115	625 / 151	580 / 188
	310	CFM / WATTS	611 / 39	620 / 73	611 / 107	584 / 142	538 / 177
	290	CFM / WATTS	573 / 34	581 / 67	571 / 99	543 / 133	496 / 168
2.5	450	CFM / WATTS	1097 / 159	1114 / 212	1114 / 265	1097 / 317	1061 / 368
	420	CFM / WATTS	1023 / 133	1040 / 184	1039 / 233	1020 / 282	984 / 331
	400	CFM / WATTS	976 / 117	989 / 166	990 / 214	970 / 261	932 / 308
	370	CFM / WATTS	902 / 97	917 / 142	915 / 187	894 / 232	855 / 276
	350	CFM / WATTS	854 / 84	868 / 128	865 / 171	843 / 214	803 / 257
	330	CFM / WATTS	806 / 73	819 / 115	815 / 157	793 / 198	752 / 239
	310	CFM / WATTS	759 / 63	771 / 103	766 / 143	742 / 182	700 / 222
	290	CFM / WATTS	711 / 55	722 / 93	716 / 130	692 / 168	648 / 206
3.0 (a)	450	CFM / WATTS	1319 / 260	1340 / 321	1343 / 382	1328 / 441	1295 / 501
	420	CFM / WATTS	1229 / 215	1249 / 274	1251 / 331	1235 / 387	1201 / 443
	400	CFM / WATTS	1170 / 189	1189 / 245	1190 / 300	1173 / 354	1139 / 408
	370	CFM / WATTS	1082 / 154	1100 / 206	1099 / 258	1081 / 309	1046 / 360
	350 (a)	CFM / WATTS	1023 / 133	1040 / 184	1039 / 233	1020 / 282	984 / 331
	330	CFM / WATTS	965 / 114	981 / 163	979 / 210	960 / 257	922 / 304
	310	CFM / WATTS	907 / 98	922 / 144	919 / 189	899 / 234	860 / 278
	290	CFM / WATTS	850 / 83	863 / 127	860 / 170	838 / 212	798 / 255

**Table 9. S9V2B060U4VS Heating Airflow**

S9V2B060U4VS Furnace Heating Airflow (CFM), Temp. Rise (°F), and Power (Watts) vs. External Static Pressure with Filter (iwc)								
				1st Stage Capacity = 38,300 2nd Stage Capacity = 57,900				
Heating	Airflow Setting	Target Airflow		External Static Pressure				
				0.1	0.3	0.5	0.7	0.9
Heating 1st Stage	Low	782	CFM	741	741	742	742	742
			Temp. Rise	47	48	48	48	48
			Watts	74	112	151	189	228
	Medium Low	861	CFM	810	811	812	813	814
			Temp. Rise	44	43	43	43	43
			Watts	90	132	175	217	259
	Medium(a)	916	CFM	860	860	859	859	859
			Temp. Rise	41	41	41	41	41
			Watts	105	148	192	236	280
	High	1027	CFM	963	957	951	945	939
			Temp. Rise	37	37	37	37	37
			Watts	141	183	226	268	310
Heating 2nd Stage	Low	990	CFM	975	978	982	986	989
			Temp. Rise	55	55	55	55	55
			Watts	126	174	223	272	321
	Medium Low	1090	CFM	1063	1070	1078	1086	1093
			Temp. Rise	51	51	50	50	49
			Watts	157	210	263	317	370
	Medium(a)	1160	CFM	1120	1133	1146	1159	1172
			Temp. Rise	48	48	47	47	46
			Watts	182	240	299	357	415
	High	1300	CFM	1260	1266	1272	1279	1285
			Temp. Rise	43	43	43	42	42
			Watts	254	312	369	427	484

Table 10. S9V2B060U4VS Cooling Airflow

S9V2B060U4VS Furnace Cooling Airflow (CFM) and Power (Watts) vs. External Static Pressure with Filter (iwc)							
Outdoor Tonnage - "Odt" (tons)	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	878 / 90	893 / 135	890 / 179	869 / 223	829 / 266
	420	CFM / WATTS	821 / 76	834 / 119	830 / 161	808 / 202	767 / 244
	400	CFM / WATTS	770 / 66	778 / 105	770 / 144	742 / 182	725 / 230
	370	CFM / WATTS	725 / 57	737 / 96	731 / 134	707 / 172	664 / 211
	350	CFM / WATTS	687 / 51	698 / 88	691 / 124	666 / 161	622 / 199
	330	CFM / WATTS	649 / 45	659 / 80	651 / 115	625 / 151	580 / 188
	310	CFM / WATTS	611 / 39	620 / 73	611 / 107	584 / 142	538 / 177
	290	CFM / WATTS	573 / 34	581 / 67	571 / 99	543 / 133	496 / 168
2.5	450	CFM / WATTS	1097 / 159	1114 / 212	1114 / 265	1097 / 317	1061 / 368
	420	CFM / WATTS	1023 / 133	1040 / 184	1039 / 233	1020 / 282	984 / 331
	400	CFM / WATTS	976 / 117	989 / 166	990 / 214	970 / 261	932 / 308
	370	CFM / WATTS	902 / 97	917 / 142	915 / 187	894 / 232	855 / 276
	350	CFM / WATTS	854 / 84	868 / 128	865 / 171	843 / 214	803 / 257
	330	CFM / WATTS	806 / 73	819 / 115	815 / 157	793 / 198	752 / 239
	310	CFM / WATTS	759 / 63	771 / 103	766 / 143	742 / 182	700 / 222
	290	CFM / WATTS	711 / 55	722 / 93	716 / 130	692 / 168	648 / 206
3.0	450	CFM / WATTS	1319 / 260	1340 / 321	1343 / 382	1328 / 441	1295 / 501
	420	CFM / WATTS	1229 / 215	1249 / 274	1251 / 331	1235 / 387	1201 / 443
	400	CFM / WATTS	1170 / 189	1189 / 245	1190 / 300	1173 / 354	1139 / 408
	370	CFM / WATTS	1082 / 154	1100 / 206	1099 / 258	1081 / 309	1046 / 360
	350	CFM / WATTS	1023 / 133	1040 / 184	1039 / 233	1020 / 282	984 / 331
	330	CFM / WATTS	965 / 114	981 / 163	979 / 210	960 / 257	922 / 304
	310	CFM / WATTS	907 / 98	922 / 144	919 / 189	899 / 234	860 / 278
	290	CFM / WATTS	850 / 83	863 / 127	860 / 170	838 / 212	798 / 255
4.0 <sup>(a)</sup>	450	CFM / WATTS	1779 / 585	1806 / 661	1814 / 737	1805 / 812	1778 / 886
	420	CFM / WATTS	1654 / 480	1679 / 552	1686 / 624	1676 / 695	1647 / 765
	400	CFM / WATTS	1572 / 418	1596 / 488	1602 / 557	1590 / 625	1561 / 693
	370	CFM / WATTS	1450 / 335	1472 / 401	1477 / 466	1464 / 530	1433 / 594
	350 <sup>(a)</sup>	CFM / WATTS	1369 / 287	1391 / 350	1394 / 413	1380 / 474	1348 / 535
	330	CFM / WATTS	1289 / 244	1310 / 305	1312 / 364	1297 / 423	1264 / 481
	310	CFM / WATTS	1210 / 206	1229 / 264	1231 / 320	1214 / 376	1180 / 431
	290	CFM / WATTS	1131 / 172	1149 / 227	1150 / 281	1132 / 334	1097 / 386

Table 11. S9V2B080U4VS Heating Airflow

S9V2B080U4VS Furnace Heating Airflow (CFM), Temp. Rise (°F), and Power (Watts) vs. External Static Pressure with Filter (iwc)								
				1st Stage Capacity = 51,300 2nd Stage Capacity = 77,450				
Heating	Airflow Setting	Target Airflow		External Static Pressure				
				0.1	0.3	0.5	0.7	0.9
Heating 1st Stage	Low	864	CFM	860	849	838	827	816
			Temp. Rise	54	55	56	57	58
			Watts	87	125	163	200	238
	Medium Low	907	CFM	907	893	879	865	852
			Temp. Rise	51	52	53	54	54
			Watts	97	135	174	212	251
	Medium <sup>(a)</sup>	958	CFM	957	930	903	876	849
			Temp. Rise	49	50	51	52	53
			Watts	112	153	194	234	275
	High	1051	CFM	1042	1015	989	962	936
			Temp. Rise	45	46	47	47	48
			Watts	140	182	225	267	310
Heating 2nd Stage	Low	1200	CFM	1211	1206	1201	1197	1192
			Temp. Rise	60	60	60	60	60
			Watts	196	248	300	352	404
	Medium Low	1260	CFM	1258	1261	1263	1265	1268
			Temp. Rise	58	57	57	57	57
			Watts	215	271	326	381	436
	Medium <sup>(a)</sup>	1330	CFM	1307	1303	1299	1296	1292
			Temp. Rise	55	55	55	55	55
			Watts	260	312	364	416	468
	High	1460	CFM	1431	1412	1393	1374	1355
			Temp. Rise	50	51	52	52	53
			Watts	334	390	445	501	557

# Heating and Cooling Airflow Tables

**Table 12. S9V2B080D4VS Heating Airflow**

S9V2B080D4VS Furnace Heating Airflow (CFM), Temp. Rise (°F), and Power (Watts) vs. External Static Pressure with Filter (iwc)								
				1st Stage Capacity = 51,150 2nd Stage Capacity = 76,900				
Heating	Airflow Setting	Target Airflow		External Static Pressure				
				0.1	0.3	0.5	0.7	0.9
Heating 1st Stage	Low	864	CFM	780	776	772	768	764
			Temp. Rise	60	60	61	61	61
			Watts	94	135	176	216	257
	Medium Low	907	CFM	807	811	814	818	822
			Temp. Rise	57	57	58	58	58
			Watts	101	151	201	252	302
	Medium (a)	958	CFM	862	862	862	861	861
			Temp. Rise	54	54	54	54	54
			Watts	117	168	219	271	322
	High	1066	CFM	977	963	949	934	920
			Temp. Rise	48	49	50	51	52
			Watts	128	179	230	281	332
Heating 2nd Stage	Low	1200	CFM	1111	1104	1096	1088	1081
			Temp. Rise	66	66	66	66	66
			Watts	204	260	317	373	429
	Medium Low	1260	CFM	1193	1201	1209	1217	1225
			Temp. Rise	59	59	59	59	59
			Watts	232	296	360	424	488
	Medium (a)	1330	CFM	1217	1217	1216	1215	1215
			Temp. Rise	58	58	58	58	59
			Watts	273	335	396	457	518
	High	1480	CFM	1342	1328	1313	1299	1284
			Temp. Rise	53	54	55	56	56
			Watts	329	389	448	508	567

**Table 13. S9V2B080U4VS and S9V2B080D4VS Cooling Airflow**

S9V2B080U4VS and S9V2B080D4VS Furnace Cooling Airflow (CFM) and Power (Watts) vs. External Static Pressure with Filter (iwc)							
Outdoor Tonnage - "Odt" (tons)	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	892 / 91	899 / 136	893 / 180	872 / 222	838 / 265
	420	CFM / WATTS	834 / 77	841 / 120	834 / 161	813 / 202	777 / 243
	400	CFM / WATTS	785 / 67	785 / 106	781 / 146	754 / 183	737 / 229
	370	CFM / WATTS	738 / 58	744 / 97	736 / 134	714 / 172	677 / 210
	350	CFM / WATTS	700 / 52	705 / 89	697 / 125	675 / 161	638 / 198
	330	CFM / WATTS	662 / 46	666 / 81	658 / 116	635 / 151	598 / 187
	310	CFM / WATTS	624 / 40	627 / 74	619 / 107	596 / 142	558 / 177
	290	CFM / WATTS	585 / 35	588 / 67	580 / 100	557 / 133	518 / 168
2.5	450	CFM / WATTS	1108 / 159	1120 / 213	1116 / 265	1098 / 315	1065 / 365
	420	CFM / WATTS	1035 / 133	1046 / 184	1041 / 233	1022 / 281	989 / 328
	400	CFM / WATTS	988 / 118	997 / 167	992 / 214	972 / 260	938 / 306
	370	CFM / WATTS	916 / 97	924 / 143	918 / 188	897 / 231	863 / 275
	350	CFM / WATTS	868 / 85	875 / 129	868 / 172	848 / 213	813 / 255
	330	CFM / WATTS	820 / 74	826 / 116	819 / 157	798 / 197	762 / 237
	310	CFM / WATTS	772 / 64	778 / 104	770 / 143	749 / 182	712 / 221
	290	CFM / WATTS	724 / 56	729 / 94	721 / 131	699 / 168	663 / 205
3.0	450	CFM / WATTS	1326 / 257	1341 / 320	1341 / 380	1325 / 439	1296 / 497
	420	CFM / WATTS	1239 / 214	1252 / 273	1250 / 330	1234 / 385	1203 / 440
	400	CFM / WATTS	1181 / 188	1193 / 245	1191 / 299	1173 / 353	1142 / 405
	370	CFM / WATTS	1094 / 153	1105 / 207	1101 / 258	1083 / 308	1050 / 358
	350	CFM / WATTS	1036 / 133	1046 / 184	1041 / 233	1022 / 281	989 / 329
	330	CFM / WATTS	978 / 115	987 / 164	982 / 210	962 / 256	928 / 302
	310	CFM / WATTS	920 / 99	929 / 145	923 / 189	902 / 233	868 / 277
	290	CFM / WATTS	863 / 84	870 / 128	863 / 170	843 / 212	807 / 253
4.0 (a)	450	CFM / WATTS	1769 / 570	1791 / 648	1797 / 725	1789 / 799	1766 / 873
	420	CFM / WATTS	1650 / 469	1670 / 544	1675 / 616	1664 / 686	1639 / 756
	400	CFM / WATTS	1571 / 410	1590 / 481	1593 / 550	1582 / 618	1555 / 685
	370	CFM / WATTS	1453 / 330	1470 / 397	1472 / 462	1458 / 526	1430 / 588
	350 (a)	CFM / WATTS	1375 / 284	1391 / 348	1391 / 410	1376 / 471	1347 / 530
	330	CFM / WATTS	1297 / 242	1312 / 303	1311 / 363	1295 / 420	1265 / 477
	310	CFM / WATTS	1219 / 205	1233 / 263	1230 / 319	1214 / 374	1183 / 428
	290	CFM / WATTS	1142 / 172	1154 / 227	1151 / 280	1133 / 332	1101 / 384



## Heating and Cooling Airflow Tables

**Table 14. S9V2C080U5VS Heating Airflow**

S9V2C080U5VS Furnace Heating Airflow (CFM), Temp. Rise (°F), and Power (Watts) vs. External Static Pressure with Filter (iwc)								
				1st Stage Capacity = 51,300 2nd Stage Capacity = 77,450				
Heating	Airflow Setting	Target Airflow		External Static Pressure				
				0.1	0.3	0.5	0.7	0.9
Heating 1st Stage	Low	857	CFM	800	803	806	810	813
			Temp. Rise	58	59	59	59	59
			Watts	78	118	157	197	237
	Medium Low	1044	CFM	939	944	950	955	961
			Temp. Rise	50	50	50	50	50
			Watts	114	160	207	254	301
	Medium (a)	1145	CFM	1018	1020	1021	1022	1023
			Temp. Rise	46	46	46	46	47
			Watts	139	190	240	291	341
	High	1124	CFM	1083	1086	1089	1093	1096
			Temp. Rise	43	43	43	43	43
			Watts	164	217	271	324	378
Heating 2nd Stage	Low	1190	CFM	1102	1116	1130	1144	1158
			Temp. Rise	65	65	64	63	62
			Watts	153	213	272	332	392
	Medium Low	1450	CFM	443	905	1368	1830	2293
			Temp. Rise	54	54	53	52	51
			Watts	258	333	407	482	557
	Medium (a)	1590	CFM	1461	1478	1495	1513	1530
			Temp. Rise	49	49	48	48	47
			Watts	334	416	498	580	662
	High	1700	CFM	1558	1571	1584	1597	1610
			Temp. Rise	46	46	45	45	45
			Watts	404	496	587	678	770

**Table 15. S9V2C080U5VS Cooling Airflow**

S9V2C080U5VS Furnace Cooling Airflow (CFM) and Power (Watts) vs. External Static Pressure with Filter (iwc)							
Outdoor Tonnage - "Odt" (tons)	Airflow Setting - (CFM/ton)		EXTERNAL STATIC PRESSURE (IN. W. C.)				
			0.1	0.3	0.5	0.7	0.9
3.0	450	CFM / WATTS	1335 / 182	1347 / 241	1356 / 303	1362 / 366	1366 / 431
	420	CFM / WATTS	1246 / 152	1259 / 208	1267 / 266	1273 / 326	1277 / 387
	400	CFM / WATTS	1188 / 134	1200 / 188	1208 / 243	1214 / 301	1217 / 360
	370	CFM / WATTS	1100 / 110	1111 / 160	1118 / 212	1123 / 266	1125 / 322
	350	CFM / WATTS	1041 / 96	1052 / 143	1058 / 193	1061 / 245	1063 / 299
	330	CFM / WATTS	983 / 83	993 / 128	997 / 176	999 / 225	1000 / 277
	310	CFM / WATTS	925 / 72	933 / 114	936 / 159	937 / 207	936 / 257
	290	CFM / WATTS	867 / 61	873 / 101	874 / 144	873 / 190	871 / 239
3.5	450	CFM / WATTS	1557 / 273	1568 / 342	1576 / 413	1581 / 486	1585 / 559
	420	CFM / WATTS	1453 / 228	1465 / 292	1473 / 359	1480 / 427	1483 / 496
	400	CFM / WATTS	1384 / 200	1396 / 262	1405 / 325	1411 / 391	1415 / 457
	370	CFM / WATTS	1281 / 163	1293 / 221	1302 / 280	1308 / 341	1312 / 404
	350	CFM / WATTS	1212 / 142	1224 / 196	1233 / 253	1239 / 311	1242 / 371
	330	CFM / WATTS	1144 / 122	1155 / 173	1163 / 227	1168 / 283	1171 / 341
	310	CFM / WATTS	1076 / 104	1086 / 153	1093 / 204	1097 / 257	1099 / 312
	290	CFM / WATTS	1007 / 88	1017 / 134	1023 / 183	1025 / 233	1026 / 286
4.0	450	CFM / WATTS	1782 / 392	1789 / 471	1794 / 551	1797 / 632	1798 / 715
	420	CFM / WATTS	1662 / 325	1671 / 399	1678 / 474	1682 / 550	1685 / 628
	400	CFM / WATTS	1582 / 285	1592 / 355	1600 / 427	1606 / 500	1609 / 575
	370	CFM / WATTS	1463 / 232	1474 / 297	1483 / 364	1489 / 432	1493 / 502
	350	CFM / WATTS	1384 / 200	1396 / 262	1405 / 325	1411 / 391	1415 / 457
	330	CFM / WATTS	1305 / 172	1317 / 230	1327 / 290	1333 / 352	1337 / 416
	310	CFM / WATTS	1227 / 146	1239 / 201	1248 / 258	1254 / 317	1257 / 378
	290	CFM / WATTS	1149 / 123	1160 / 175	1168 / 229	1173 / 285	1176 / 343
5.0 (a)	450	CFM / WATTS	2235 / 726	2233 / 824	2230 / 923	2224 / 1023	2216 / 1125
	420	CFM / WATTS	2084 / 599	2085 / 690	2084 / 783	2082 / 877	2078 / 973
	400	CFM / WATTS	1983 / 524	1986 / 611	1988 / 699	1988 / 789	1985 / 880
	370	CFM / WATTS	1832 / 423	1838 / 503	1843 / 586	1845 / 669	1845 / 754
	350 (a)	CFM / WATTS	1732 / 363	1740 / 440	1746 / 518	1749 / 597	1751 / 678
	330	CFM / WATTS	1632 / 310	1641 / 382	1649 / 456	1654 / 531	1656 / 608
	310	CFM / WATTS	1533 / 262	1543 / 330	1551 / 400	1557 / 471	1561 / 544
	290	CFM / WATTS	1434 / 219	1445 / 283	1454 / 349	1460 / 416	1464 / 485

# Heating and Cooling Airflow Tables

**Table 16. S9V2C100U5VS Heating Airflow**

S9V2C100U5VS Furnace Heating Airflow (CFM), Temp. Rise (°F), and Power (Watts) vs. External Static Pressure with Filter (iwc)								
				1st Stage Capacity = 63,800 2nd Stage Capacity = 97,650				
Heating	Airflow Setting	Target Airflow		External Static Pressure				
				0.1	0.3	0.5	0.7	0.9
Heating 1st Stage	Low	1146	CFM	1183	1172	1161	1150	1138
			Temp. Rise	50	50	51	51	52
			Watts	141	197	253	310	366
	Medium Low	1280	CFM	1300	1297	1294	1290	1287
			Temp. Rise	45	45	45	46	46
			Watts	185	245	306	366	426
	Medium	1359	CFM	1425	1404	1384	1364	1343
			Temp. Rise	41	42	42	43	43
			Watts	214	276	338	400	462
	High (a)	1446	CFM	1454	1452	1450	1449	1447
			Temp. Rise	40	40	40	41	41
			Watts	257	321	386	451	515
Heating 2nd Stage	Low	1450	CFM	1513	1507	1502	1497	1491
			Temp. Rise	60	60	60	60	61
			Watts	260	329	398	468	537
	Medium Low	1620	CFM	1656	1651	1646	1642	1637
			Temp. Rise	55	55	55	55	55
			Watts	339	416	494	571	648
	Medium	1720	CFM	1781	1771	1762	1752	1743
			Temp. Rise	51	51	51	52	52
			Watts	398	477	556	635	715
	High (a)	1830	CFM	1842	1832	1822	1812	1803
			Temp. Rise	49	49	49	50	50
			Watts	481	562	644	726	807

**Table 17. S9V2C100D5VS Heating Airflow**

S9V2C100D5VS Furnace Heating Airflow (CFM), Temp. Rise (°F), and Power (Watts) vs. External Static Pressure with Filter (iwc)								
				1st Stage Capacity = 64,000 2nd Stage Capacity = 97,350				
Heating	Airflow Setting	Target Airflow		External Static Pressure				
				0.1	0.3	0.5	0.7	0.9
Heating 1st Stage	Low	1094	CFM	1093	1092	1090	1089	1088
			Temp. Rise	53	53	53	52	52
			Watts	126	183	240	296	353
	Medium Low	1296	CFM	1234	1238	1242	1247	1251
			Temp. Rise	47	47	47	47	47
			Watts	186	243	299	356	413
	Medium (a)	1346	CFM	1279	1268	1256	1245	1234
			Temp. Rise	45	45	46	46	47
			Watts	214	268	321	375	428
	High	1512	CFM	1453	1429	1405	1381	1358
			Temp. Rise	40	40	41	41	42
			Watts	277	344	411	478	545
Heating 2nd Stage	Low	1520	CFM	1484	1477	1469	1461	1453
			Temp. Rise	60	60	61	61	61
			Watts	296	370	444	518	592
	Medium Low	1800	CFM	1693	1688	1684	1679	1674
			Temp. Rise	53	53	53	53	53
			Watts	449	533	618	702	786
	Medium (a)	1870	CFM	1768	1772	1775	1778	1781
			Temp. Rise	51	50	50	50	50
			Watts	505	591	678	765	852
	High	2100	CFM	1969	1956	1944	1931	1918
			Temp. Rise	45	45	46	46	46
			Watts	723	789	854	920	986

Table 18. S9V2C100U5VS and S9V2C100D5VS Cooling Airflow

S9V2C100U5VS and S9V2C100D5VS Furnace Cooling Airflow (CFM) and Power (Watts) vs. External Static Pressure with Filter (iwc)							
Outdoor Tonnage - "Odt" (tons)	Airflow Setting - (CFM/ton)		EXTERNAL STATIC PRESSURE (IN. W. C.)				
			0.1	0.3	0.5	0.7	0.9
3.0	450	CFM / WATTS	1378 / 178	1376 / 234	1374 / 292	1372 / 352	1368 / 413
	420	CFM / WATTS	1289 / 149	1286 / 201	1284 / 256	1282 / 312	1277 / 371
	400	CFM / WATTS	1228 / 131	1225 / 181	1223 / 234	1221 / 288	1217 / 345
	370	CFM / WATTS	1138 / 108	1134 / 154	1132 / 203	1130 / 255	1125 / 309
	350	CFM / WATTS	1077 / 94	1073 / 138	1071 / 185	1068 / 235	1064 / 287
	330	CFM / WATTS	1016 / 81	1011 / 123	1009 / 168	1006 / 216	1002 / 266
	290	CFM / WATTS	955 / 70	950 / 110	947 / 153	944 / 199	940 / 248
3.5	450	CFM / WATTS	1601 / 269	1599 / 334	1597 / 401	1594 / 469	1590 / 539
	420	CFM / WATTS	1498 / 224	1496 / 284	1494 / 347	1491 / 411	1487 / 477
	400	CFM / WATTS	1428 / 196	1426 / 254	1424 / 314	1422 / 376	1417 / 439
	370	CFM / WATTS	1324 / 160	1321 / 214	1319 / 270	1317 / 327	1313 / 387
	350	CFM / WATTS	1253 / 138	1251 / 190	1249 / 243	1246 / 298	1242 / 355
	330	CFM / WATTS	1183 / 119	1180 / 167	1178 / 218	1175 / 271	1171 / 326
	290	CFM / WATTS	1112 / 102	1109 / 147	1107 / 196	1104 / 246	1100 / 299
4.0	450	CFM / WATTS	1820 / 388	1819 / 462	1816 / 538	1812 / 615	1807 / 693
	420	CFM / WATTS	1704 / 321	1702 / 390	1700 / 461	1697 / 533	1692 / 607
	400	CFM / WATTS	1626 / 281	1624 / 347	1622 / 415	1619 / 484	1614 / 554
	370	CFM / WATTS	1507 / 228	1505 / 289	1504 / 352	1501 / 417	1497 / 482
	350	CFM / WATTS	1428 / 196	1426 / 254	1424 / 314	1422 / 376	1417 / 439
	330	CFM / WATTS	1348 / 168	1346 / 223	1344 / 280	1342 / 338	1338 / 399
	290	CFM / WATTS	1268 / 143	1266 / 195	1264 / 248	1261 / 304	1257 / 362
5.0 (a)	450	CFM / WATTS	2249 / 722	2246 / 815	2241 / 909	2236 / 1004	2228 / 1101
	420	CFM / WATTS	2108 / 595	2105 / 681	2101 / 770	2096 / 859	2090 / 949
	400	CFM / WATTS	2013 / 519	2010 / 602	2007 / 685	2003 / 771	1997 / 857
	370	CFM / WATTS	1869 / 418	1867 / 494	1864 / 572	1860 / 651	1855 / 731
	350 (a)	CFM / WATTS	1772 / 359	1770 / 431	1768 / 505	1764 / 580	1759 / 656
	330	CFM / WATTS	1675 / 305	1673 / 374	1671 / 443	1667 / 514	1663 / 587
	290	CFM / WATTS	1576 / 258	1575 / 322	1573 / 388	1570 / 455	1565 / 523
			1478 / 216	1476 / 276	1474 / 337	1471 / 401	1467 / 466

Table 19. S9V2D120U5VS Heating Airflow

S9V2D120U5VS Furnace Heating Airflow (CFM), Temp. Rise (°F), and Power (Watts) vs. External Static Pressure with Filter (iwc)								
Heating	Airflow Setting	Target Airflow	1st Stage Capacity = 77,050 2nd Stage Capacity = 116,250					
			External Static Pressure					
			0.1	0.3	0.5	0.7	0.9	
Heating 1st Stage	Low	1123	CFM	1138	1158	1178	1198	1218
			Temp. Rise	61	60	59	58	57
			Watts	115	176	236	297	358
	Medium Low	1332	CFM	1371	1383	1394	1406	1417
			Temp. Rise	51	50	50	49	49
			Watts	182	251	320	389	457
	Medium (a)	1404	CFM	1440	1450	1461	1471	1482
			Temp. Rise	48	48	48	47	47
			Watts	208	283	357	431	505
	High	1620	CFM	1669	1674	1680	1685	1691
			Temp. Rise	42	42	41	41	41
			Watts	315	388	460	533	605
Heating 2nd Stage	Low	1560	CFM	1654	1637	1621	1604	1587
			Temp. Rise	65	66	67	67	68
			Watts	291	360	430	499	568
	Medium Low	1850	CFM	1980	1951	1922	1893	1864
			Temp. Rise	55	56	57	58	58
			Watts	456	539	621	704	787
	Medium (a)	1950	CFM	2075	2037	1999	1961	1923
			Temp. Rise	52	53	54	55	56
			Watts	527	611	696	781	865
	High	2250	CFM	2280	2197	2114	2032	1949
			Temp. Rise	48	50	52	54	56
			Watts	795	819	842	865	888

# Heating and Cooling Airflow Tables

**Table 20. S9V2D120D5VS Heating Airflow**

S9V2D120D5VS Furnace Heating Airflow (CFM), Temp. Rise (°F), and Power (Watts) vs. External Static Pressure with Filter (iwc)								
				1st Stage Capacity = 76,700 2nd Stage Capacity = 116,350				
Heating	Airflow Setting	Target Airflow		External Static Pressure				
				0.1	0.3	0.5	0.7	0.9
Heating 1st Stage	Low	1260	CFM	1194	1195	1196	1197	1198
			Temp. Rise	59	59	59	59	59
			Watts	139	191	243	295	347
	Medium Low	1332	CFM	1271	1280	1289	1298	1307
			Temp. Rise	56	55	55	54	54
			Watts	160	214	268	322	376
	Medium	1404	CFM	1329	1331	1332	1334	1335
			Temp. Rise	53	53	53	53	54
			Watts	183	238	293	348	404
	High <sup>(a)</sup>	1620	CFM	1515	1560	1605	1649	1694
			Temp. Rise	46	45	45	44	43
			Watts	258	330	403	476	549
Heating 2nd Stage	Low	1750	CFM	1716	1715	1714	1714	1713
			Temp. Rise	63	63	63	63	63
			Watts	318	396	473	551	628
	Medium Low	1850	CFM	1814	1818	1823	1827	1831
			Temp. Rise	59	59	59	59	59
			Watts	374	453	533	612	691
	Medium	1950	CFM	1917	1904	1891	1877	1864
			Temp. Rise	56	57	57	57	58
			Watts	434	514	595	676	756
	High <sup>(a)</sup>	2250	CFM	2130	2140	2151	2162	2172
			Temp. Rise	51	50	50	50	49
			Watts	628	725	822	919	1016

**Table 21. S9V2D120U5VS and S9V2D120D5VS Cooling Airflow**

S9V2D120U5VS and S9V2D120D5VS Furnace Cooling Airflow (CFM) and Power (Watts) vs. External Static Pressure with Filter (iwc)							
Outdoor Tonnage - "Odt" (tons)	Airflow Setting - (CFM/ton)		EXTERNAL STATIC PRESSURE (IN. W. C.)				
			0.1	0.3	0.5	0.7	0.9
3.0	450	CFM / WATTS	1336 / 163	1346 / 221	1354 / 281	1360 / 341	1363 / 402
	420	CFM / WATTS	1248 / 137	1258 / 191	1265 / 247	1271 / 304	1274 / 361
	400	CFM / WATTS	1189 / 121	1199 / 173	1206 / 227	1211 / 281	1214 / 336
	370	CFM / WATTS	1102 / 100	1110 / 148	1116 / 198	1121 / 249	1123 / 301
	350	CFM / WATTS	1043 / 87	1051 / 133	1057 / 181	1060 / 230	1062 / 279
	330	CFM / WATTS	985 / 76	991 / 119	996 / 165	999 / 211	1000 / 259
	310	CFM / WATTS	927 / 65	932 / 107	936 / 150	937 / 195	938 / 241
	290	CFM / WATTS	869 / 56	872 / 95	874 / 136	875 / 179	875 / 223
3.5	450	CFM / WATTS	1559 / 244	1567 / 312	1574 / 381	1579 / 450	1583 / 519
	420	CFM / WATTS	1455 / 204	1464 / 267	1472 / 331	1477 / 396	1481 / 462
	400	CFM / WATTS	1386 / 179	1395 / 240	1403 / 301	1409 / 363	1413 / 426
	370	CFM / WATTS	1282 / 147	1292 / 203	1300 / 260	1305 / 318	1309 / 376
	350	CFM / WATTS	1214 / 127	1223 / 181	1231 / 235	1236 / 290	1239 / 346
	330	CFM / WATTS	1145 / 110	1154 / 160	1161 / 212	1166 / 265	1169 / 318
	310	CFM / WATTS	1077 / 94	1085 / 142	1092 / 191	1096 / 241	1098 / 292
	290	CFM / WATTS	1009 / 80	1016 / 125	1021 / 171	1025 / 219	1026 / 267
4.0	450	CFM / WATTS	1783 / 350	1789 / 427	1793 / 505	1796 / 584	1798 / 663
	420	CFM / WATTS	1663 / 290	1671 / 362	1677 / 436	1681 / 509	1683 / 583
	400	CFM / WATTS	1584 / 255	1592 / 324	1599 / 393	1603 / 464	1607 / 534
	370	CFM / WATTS	1465 / 207	1474 / 271	1481 / 336	1487 / 401	1491 / 467
	350	CFM / WATTS	1386 / 179	1395 / 240	1403 / 301	1409 / 363	1413 / 426
	330	CFM / WATTS	1307 / 154	1317 / 211	1324 / 269	1330 / 328	1334 / 388
	310	CFM / WATTS	1228 / 131	1238 / 185	1246 / 240	1251 / 296	1254 / 352
	290	CFM / WATTS	1150 / 111	1159 / 162	1166 / 214	1171 / 266	1174 / 320
5.0 <sup>(a)</sup>	450	CFM / WATTS	2238 / 646	2235 / 742	2230 / 840	2226 / 938	2220 / 1036
	420	CFM / WATTS	2086 / 533	2086 / 623	2085 / 714	2083 / 806	2080 / 897
	400	CFM / WATTS	1985 / 466	1987 / 552	1988 / 639	1988 / 726	1986 / 813
	370	CFM / WATTS	1834 / 377	1838 / 456	1842 / 536	1844 / 617	1845 / 698
	350 <sup>(a)</sup>	CFM / WATTS	1733 / 324	1740 / 399	1745 / 475	1748 / 552	1750 / 628
	330	CFM / WATTS	1633 / 277	1641 / 347	1647 / 419	1652 / 492	1655 / 564
	310	CFM / WATTS	1534 / 234	1543 / 301	1550 / 369	1555 / 437	1558 / 505
	290	CFM / WATTS	1435 / 196	1444 / 259	1452 / 322	1458 / 387	1461 / 451

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

# Furnace General Installation

The following sections give general instructions for the installation of the gas furnaces.

## S-Series Furnace Panel Removal

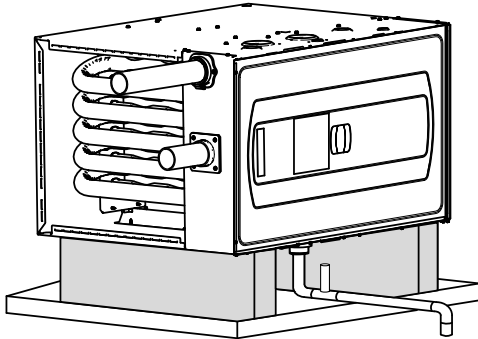
**Note:** Use a 5/16" Allen wrench to turn the four latches on the front panel a quarter turn.

## Horizontal Installation in an Attic or Crawl Space

The S-Series upflow condensing furnace may be installed in an attic or crawl space in the horizontal let or right position for needed airflow direction. 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 Clearance section," p. 14. 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 which will raise the unit for sufficient protection from moisture.

The Furnace must be supported at both ends and the middle when installed horizontally. The Furnace must also be elevated approximately 6 inches to allow clearance for the condensate drain to exit the cabinet in the **horizontal position**.

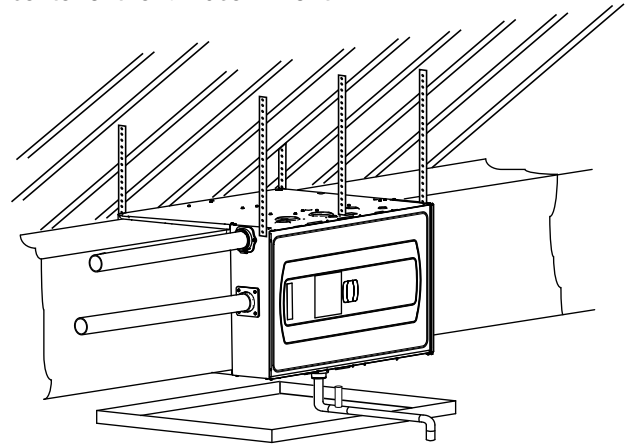


FURNACE MUST BE SUPPORTED AT ALL FOUR CORNERS. BAYHANG - OPTIONAL HORIZONTAL HANGING BRACKET KIT TO APPROVED OPEN / VENTED DRAIN

**Note:** The overflow stand pipe termination must be even with or slightly below the bottom of the condensate trap.  
**Note:** Water from the overflow pipe must drain into the emergency drain pan.

## Horizontal Installation Hanging Using Straps

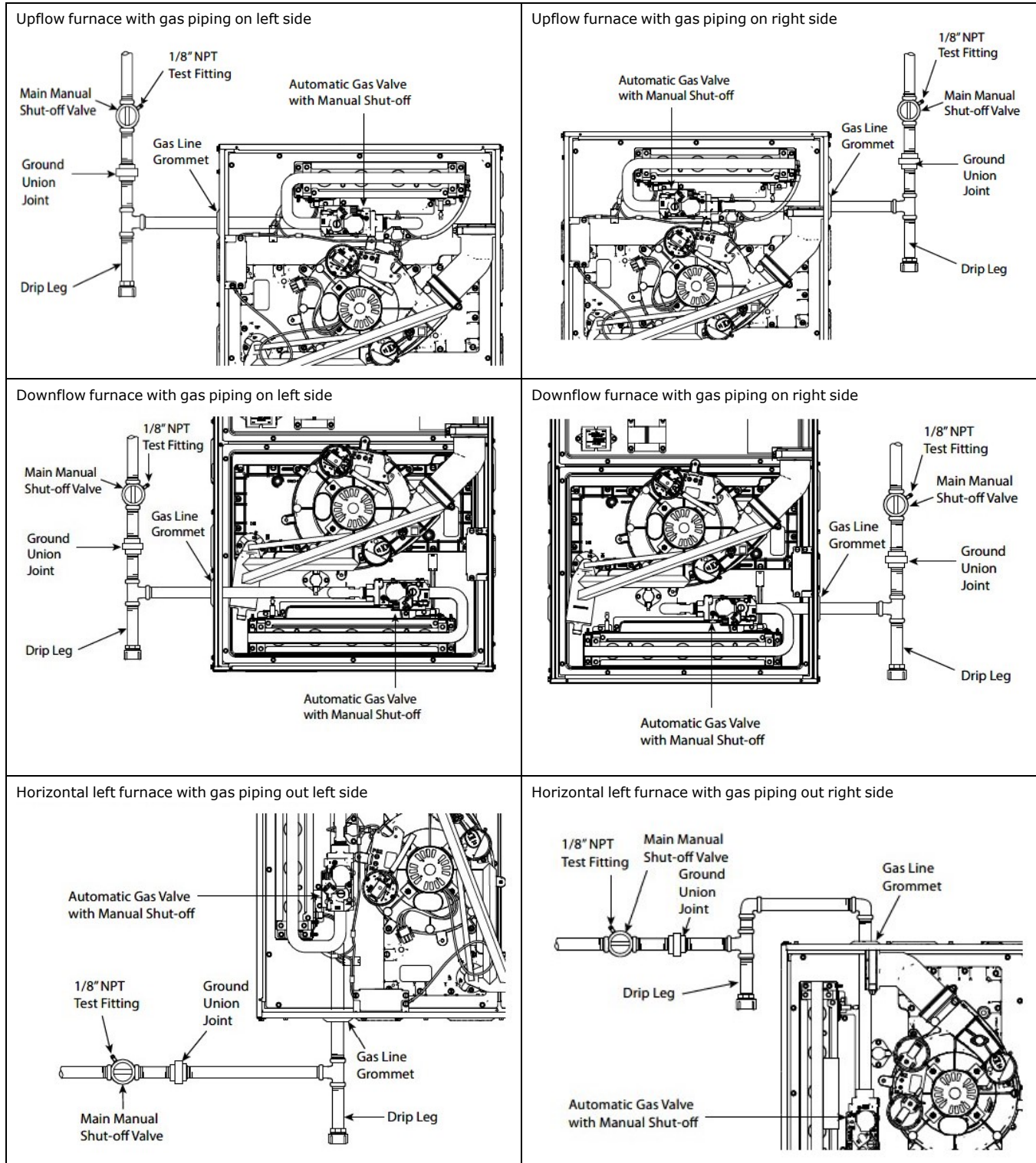
The furnace may be installed hanging in a hanging position using straps. The furnace should be supported at both ends and have an additional support in the center of the furnace in front.



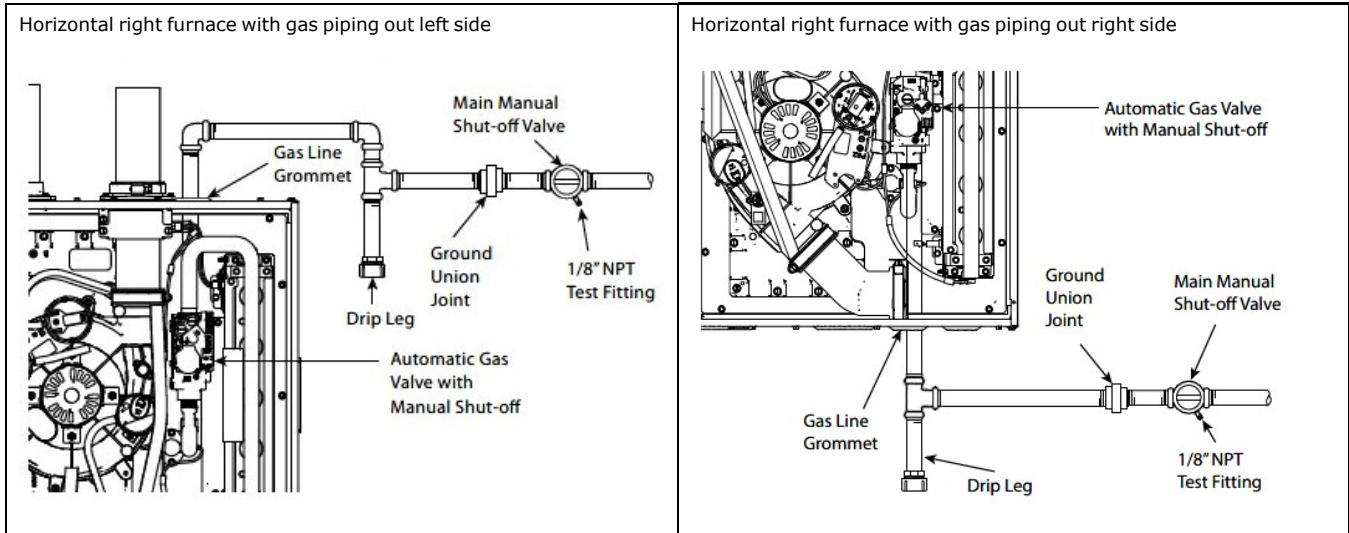
# Furnace General Installation

## Gas Piping

**Important:** When converting the gas piping from the factory default, the plug must be removed from the new gas piping location and swapped with the grommet from the default location. The upflow furnace default is left side gas piping. The downflow furnace default is right side gas piping.







The upflow/horizontal furnace is shipped standard for left side installation of gas piping. An opening 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. Maximum pressure to the gas valve for propane is 13.8" W.C. Minimum pressure is 11.0" W.C.*

NATURAL GAS ONLY							
TABLE OF CUBIC FEET PER HOUR OF GAS FOR VARIOUS PIPE SIZES AND LENGTHS							
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

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!*

For propane conversions on all S-Series Furnaces, use BAYLPSS400\* conversion kit with stainless steel burners.

When installing our furnaces in a manufactured house, use Manufactured Housing Accessory Kit, BAYMFGH200B.

ORIFICE SIZES			
INPUT RATING BTUH	NUMBER OF BURNERS	MAIN BURNER ORIFICE DRILL SIZE	
		NAT. GAS	PROPANE GAS
40,000	2	45	56
60,000	3	45	56
80,000	4	45	56
100,000	5	45	56
120,000	6	45	56

# Furnace General Installation

## 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.

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
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

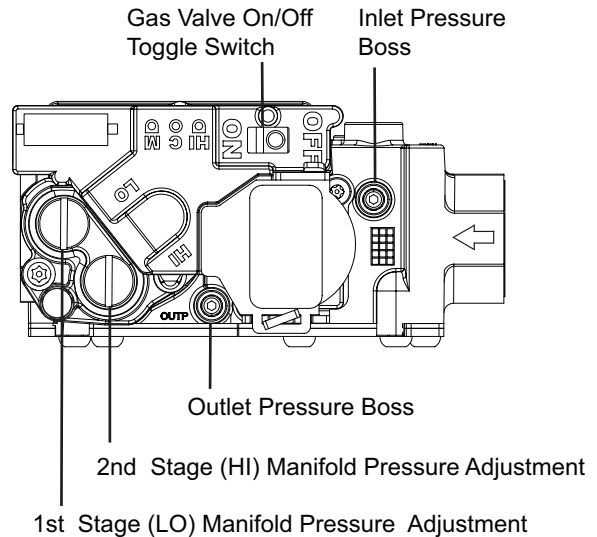
Changes can be made by adjusting the manifold pressure, or changing orifices (orifice change may not always be required). To adjust the manifold pressure:

1. Turn off all electrical power to the system.
2. 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.
3. Attach a manifold pressure gauge with flexible tubing to the outlet pressure boss marked "OUT P" on White- Rodgers gas valve model 36J.
4. Turn on system power and energize valve.

**Important:** Adjust 2nd stage on the gas valve before attempting to adjust 1st stage.

5. Adjust 2nd stage gas heat by removing 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. Adjust 1st stage gas heat by removing 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.  
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 valve 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.

White-Rodgers 36J



Fuel Manifold Pressure Settings (inches w.c.)		
Fuel	2nd Stage Max.	1st Stage Max.
Natural Gas	3.5" W.C.	1.7" W.C.
Propane Gas	10.0" W.C.	6.0" W.C.

# Furnace General Installation

## High Altitude Derate

<p>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).</p> <p>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.</p> <p>Installations of this furnace at altitudes above 2,000 ft. (610 m) shall be made utilizing the Vent Length table and/or Part Numbers for Replacement Orifices table in these installation instructions. 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 3.0 - max 3.7 in. W.C. - Natural Gas) or changing orifices (orifice change may not always be required).</p> <p>If the desired input rate can not be achieved with a change in Manifold Pressure, then the orifices must be changed. Propane installations will require an orifice change.</p> <p><b>Important:</b> Reinstall the replacement orifices to the same depth as the orifices supplied with the equipment.</p> <p>See the table for help in selecting orifices if orifice change is required. Furnace input rate and temperature rise should be checked again after changing orifices to confirm the proper rate for the altitude.</p> <p>The vent length table shows the required vent lengths for installations at various altitudes. Optional high altitude kits are available for installations over 5000 feet. Installations above 12,000 feet are not allowed.</p> <p>Turn the main Gas Valve toggle switch within the unit to the "OFF" position. 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 – <b>DO NOT CHECK WITH AN OPEN FLAME</b>. Allow 5 minutes for any gas that might have escaped to dissipate.</p> <p>Propane Gas being heavier than air may require forced ventilation. Turn the toggle switch on the Gas Valve in the unit to the "ON" position.</p>	<table border="1"> <thead> <tr> <th colspan="4">PART NUMBERS FOR REPLACEMENT ORIFICES</th> </tr> <tr> <th>DRILL SIZE</th> <th>PART NUMBER</th> <th>DRILL SIZE</th> <th>PART NUMBER</th> </tr> </thead> <tbody> <tr> <td>44</td> <td>ORF00501</td> <td>54</td> <td>ORF00555</td> </tr> <tr> <td>45</td> <td>ORF00644</td> <td>55</td> <td>ORF00693</td> </tr> <tr> <td>46</td> <td>ORF00909</td> <td>56</td> <td>ORF00907</td> </tr> <tr> <td>47</td> <td>ORF00910</td> <td>57</td> <td>ORF00908</td> </tr> <tr> <td>48</td> <td>ORF01099</td> <td>58</td> <td>ORF01338</td> </tr> <tr> <td>49</td> <td>ORF00503</td> <td>59</td> <td>ORF01339</td> </tr> <tr> <td>50</td> <td>ORF00493</td> <td></td> <td></td> </tr> </tbody> </table>	PART NUMBERS FOR REPLACEMENT ORIFICES				DRILL SIZE	PART NUMBER	DRILL SIZE	PART NUMBER	44	ORF00501	54	ORF00555	45	ORF00644	55	ORF00693	46	ORF00909	56	ORF00907	47	ORF00910	57	ORF00908	48	ORF01099	58	ORF01338	49	ORF00503	59	ORF01339	50	ORF00493		
PART NUMBERS FOR REPLACEMENT ORIFICES																																					
DRILL SIZE	PART NUMBER	DRILL SIZE	PART NUMBER																																		
44	ORF00501	54	ORF00555																																		
45	ORF00644	55	ORF00693																																		
46	ORF00909	56	ORF00907																																		
47	ORF00910	57	ORF00908																																		
48	ORF01099	58	ORF01338																																		
49	ORF00503	59	ORF01339																																		
50	ORF00493																																				

<p>The table lists the main burner orifices used with the furnace. If a change of orifices is required to correct the furnace input rating refer to the part number for replacement orifices table.</p> <p>Installation of this furnace at altitudes above 2000 ft (610m) shall be in accordance with local codes, or in the absence of local codes, the <i>National Fuel Gas Code, ANSI Z223.1/NFPA 54</i> or <i>National Standard of Canada, Natural Gas and Propane Installation Code, CSA B149.1</i>. Installation of this furnace at altitudes above 2,000 ft (610 m) shall be made in accordance with the listed high altitude conversion kit available with the furnace.</p>	<table border="1"> <thead> <tr> <th rowspan="2">Orifice Twist Drill Size If Installed at Sea Level</th> <th colspan="9">Altitude Above Sea Level and Orifice Required at Other Elevations</th> </tr> <tr> <th>2000</th> <th>3000</th> <th>4000</th> <th>5000</th> <th>6000</th> <th>7000</th> <th>8000</th> <th>9000</th> <th>10000</th> </tr> </thead> <tbody> <tr> <td>42</td> <td>42</td> <td>43</td> <td>43</td> <td>43</td> <td>44</td> <td>44</td> <td>45</td> <td>46</td> <td>47</td> </tr> <tr> <td>43</td> <td>44</td> <td>44</td> <td>44</td> <td>45</td> <td>45</td> <td>46</td> <td>47</td> <td>47</td> <td>48</td> </tr> <tr> <td>44</td> <td>45</td> <td>45</td> <td>45</td> <td>46</td> <td>47</td> <td>47</td> <td>48</td> <td>48</td> <td>50</td> </tr> <tr> <td>45</td> <td>46</td> <td>47</td> <td>47</td> <td>47</td> <td>48</td> <td>48</td> <td>49</td> <td>49</td> <td>50</td> </tr> <tr> <td>46</td> <td>47</td> <td>47</td> <td>47</td> <td>48</td> <td>48</td> <td>49</td> <td>49</td> <td>50</td> <td>51</td> </tr> <tr> <td>47</td> <td>48</td> <td>48</td> <td>49</td> <td>49</td> <td>49</td> <td>50</td> <td>50</td> <td>51</td> <td>52</td> </tr> <tr> <td>54</td> <td>54</td> <td>55</td> <td>55</td> <td>55</td> <td>55</td> <td>55</td> <td>56</td> <td>56</td> <td>56</td> </tr> <tr> <td>55</td> <td>55</td> <td>55</td> <td>55</td> <td>56</td> <td>56</td> <td>56</td> <td>56</td> <td>56</td> <td>57</td> </tr> <tr> <td>56</td> <td>56</td> <td>56</td> <td>57</td> <td>57</td> <td>57</td> <td>58</td> <td>59</td> <td>59</td> <td>60</td> </tr> <tr> <td>57</td> <td>58</td> <td>59</td> <td>59</td> <td>60</td> <td>60</td> <td>61</td> <td>62</td> <td>63</td> <td>63</td> </tr> <tr> <td>58</td> <td>59</td> <td>60</td> <td>60</td> <td>61</td> <td>62</td> <td>62</td> <td>63</td> <td>63</td> <td>64</td> </tr> </tbody> </table> <p>From National Fuel Gas Code — Table E.1.1(d)</p>	Orifice Twist Drill Size If Installed at Sea Level	Altitude Above Sea Level and Orifice Required at Other Elevations									2000	3000	4000	5000	6000	7000	8000	9000	10000	42	42	43	43	43	44	44	45	46	47	43	44	44	44	45	45	46	47	47	48	44	45	45	45	46	47	47	48	48	50	45	46	47	47	47	48	48	49	49	50	46	47	47	47	48	48	49	49	50	51	47	48	48	49	49	49	50	50	51	52	54	54	55	55	55	55	55	56	56	56	55	55	55	55	56	56	56	56	56	57	56	56	56	57	57	57	58	59	59	60	57	58	59	59	60	60	61	62	63	63	58	59	60	60	61	62	62	63	63	64
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## General Venting

FURNACE EXHAUST MUST BE VENTED TO THE OUTDOORS. THESE FURNACES ARE INDUCED DRAFT VENTED AND MUST **NOT** BE CONNECTED TO ANY VENT SERVING ANOTHER APPLIANCE. PLEASE NOTE THAT THESE FURNACES USE **POSITIVE-PRESSURE** VENT SYSTEMS.

Proper venting is essential to obtain maximum efficiency from a condensing Furnace. Proper installation of the vent system is necessary to assure drainage of the condensate and prevent deterioration of the vent system.

ETL has certified the design of condensing Furnaces for a minimum of 0" clearance from combustible materials to single wall plastic vent pipe.

The recommended system is assembled from 2" or 3" plastic pipe and fittings found in the Approved Vent Pipe Materials Table. Where the system is routed to the outdoors through an existing masonry chimney containing flue products from another gas appliance, or where required by local codes, then 3" venting of Type 29- 4C stainless steel must be used in place of PVC material.

These Furnaces have been classified as CATEGORY IV Furnaces in accordance with ANSI Z21.47 "latest edition" standards. Category IV - a central furnace that operates with a positive vent static pressure and with a flue loss less than 17 percent. These conditions require special venting systems, which must be gas tight and water tight.

**Note:** When an existing Furnace is removed from a venting system serving other gas appliances, the venting system is likely to be too large to properly vent the remaining attached appliances.

**Important:** These Furnaces may be installed as Direct Vent (sealed combustion) or as Nondirect Vent (single pipe). The Furnaces are shipped **DIRECT VENT** with sealed combustion.

**Important:** Products installed in Canada must use vent systems that are certified to the Standard for Type BH Gas Venting Systems (ULC S636) for Class II-A venting systems (up to 65°C). Components of the vent system must not be interchanged with other vent systems or unlisted pipe or fittings. Plastic components, specified primers, and glues must be from a single system manufacturer and not intermixed with other system manufacturer's vent system parts. In addition, the first three feet of the vent pipe must be visible for inspection.

**When the vent pipe is exposed to temperatures below freezing, e.g., when it passes through unheated spaces, etc., the pipe must be insulated with 1/2 inch (12.7 mm) thick Armaflex-type insulation or equal.**

**If the space is heated sufficiently to prevent freezing, then the insulation will not be required. If domestic water pipes are not protected from freezing then the space meets the condition of a heated space.**

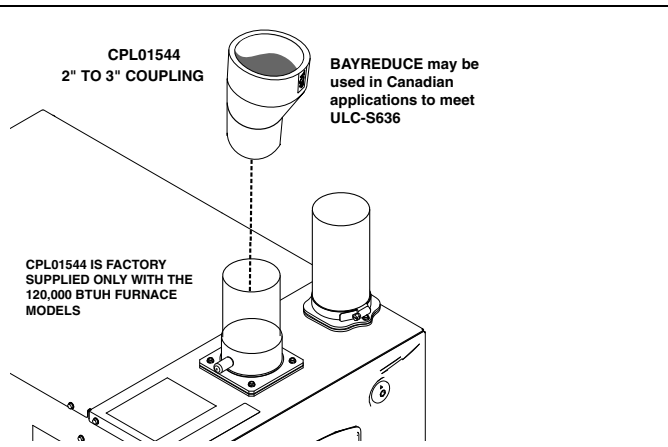
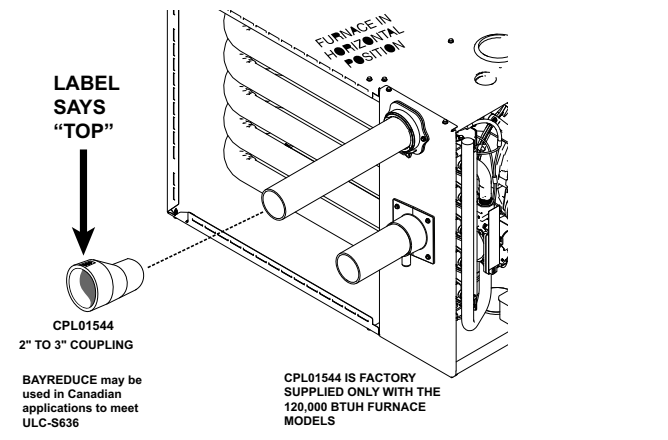
### 3" Venting requirements

**Important:** To determine if your application requires 3" venting, see the Maximum Vent Length Table.

**Important:** Horizontal venting application must use the 2" x 3" offset reducing coupling. Vertical venting applications do not require the reducing coupling to be offset.

**Note:** If your furnace comes with a factory supplied 2" X 3" offset reducing coupling it is used for 3" vent pipe installation. Make sure the marking "TOP" is located on the top side of the pipe in horizontal venting applications. The straight side of the coupling must be on bottom for proper drainage of condensate

**Note:** For Canadian applications, BAYREDUCE 2" x 3" offset reducing coupling meets ULC-S636 requirements. Make sure the marking "TOP" is located on the top side of the pipe. The straight side of the coupling must be on bottom for proper drainage of condensate in horizontal venting.



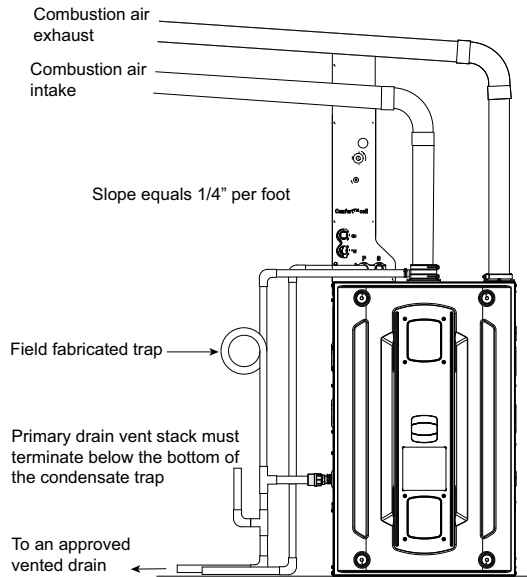
## Typical Venting

This combustion air intake has a built-in condensate collection system. Condensate that may collect is drained by field supplied 1/2" ID tubing. The tubing must be routed to form a trap and water seal ( see Figure 1, p. 34, Figure 2, p. 34, and Figure 3, p. 34).

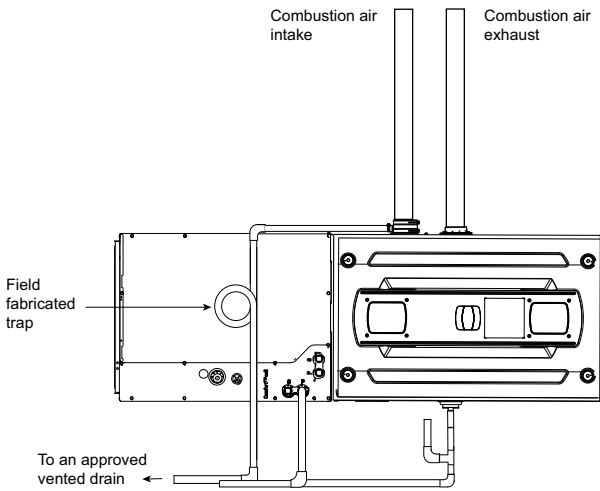
A field supplied hose clamp is recommended but not be required. The tubing is not under pressure.

Combustion air piping must be square cut and de-burred for proper drainage. For side entry combustion inlet applications, ensure the drain is pointed downwards.

**Figure 1. Upflow Top Entry**

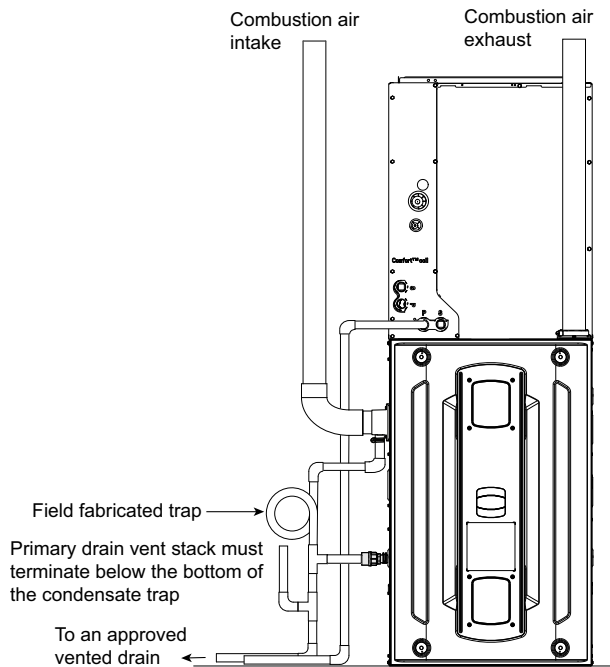


**Figure 2. Horizontal Top Entry**



**Note:** Primary drain vent stack must terminate below the bottom of the condensate trap.

**Figure 3. Upflow Side Entry**



## Special Case Venting

### Special instructions for direct vent furnace air intake.

In certain applications, particularly when the furnace is located in a basement, there are certain conditions that can be met where warm humid air from the outside is drawn into combustion air piping. If the area where the piping is located is conditioned below 70° F, condensation could occur inside the piping and ultimately drain into the furnace compartment, which could lead to premature component failure. We recommend following one of the options to prevent this condition from occurring and possibly damaging components within the furnace:

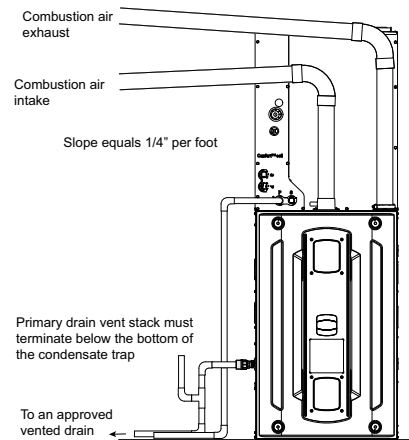
**Note:** Inlet air piping is not considered to be part of the venting system. The inlet air piping may be made from PVC.

### Option 1

If possible, slope the inlet combustion air piping away from the furnace. Condensation that may occur will now drain outside of the home. The combustion air exhaust must be sloped back to the furnace.

**Note:** Combustion air drain fitting must remain capped if not using the drain function. See "Condensate Drain Instructions," p. 61 section.

#### Option 1

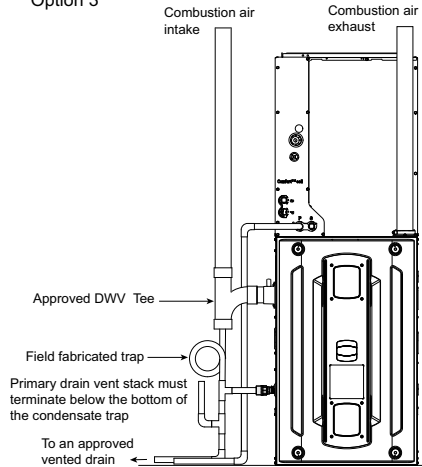


### Option 3 – Side combustion air intake

If sloping the combustion air intake pipe is not possible, install an approved DWV Tee as close to the furnace as possible with drain and trap.

**Note:** Combustion air drain fitting must remain capped if not using the drain function. See "Condensate Drain Instructions," p. 61 section.

#### Option 3

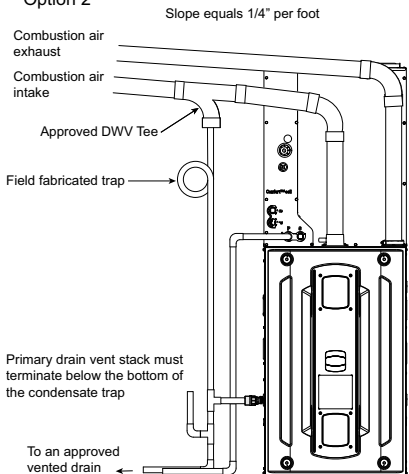


### Option 2– Top combustion air intake

If sloping the combustion air intake pipe is not possible, install a DWV Tee as close to the furnace as possible with drain and trap to prevent condensation from occurring in the furnace cabinet. Do not tee AC condensate and combustion air condensate trap together.

**Note:** Combustion air drain fitting must remain capped if not using the drain function. See "Condensate Drain Instructions," p. 61 section.

#### Option 2

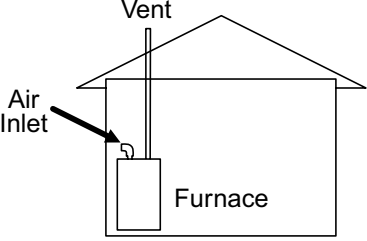
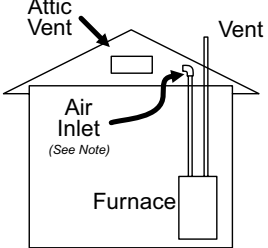
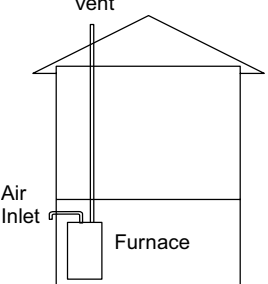


# Furnace General Installation

## Vent Terminations

<p>For <b>DIRECT VENT APPLICATION:</b> The Furnaces must be vented to the exterior of the house and combustion air <b>MUST</b> come through the inlet air pipe from <b>OUTSIDE AIR</b>.</p> <p><b>Note:</b> BAYVENT* accessories can be used for inlet and outlet terminals when the pipes do not exit the structure together. For Canadian applications, venting systems must meet ULC-S636 requirements.</p> <p>For <b>NONDIRECT VENT APPLICATION:</b> The Furnace shall be vented to the exterior of the house, but combustion air may enter from the surrounding area as long as combustion air requirements are met. (See AIR FOR COMBUSTION AND VENTILATION)</p>	<p>Vent terminations</p> <ul style="list-style-type: none"> <li>• BAYVENT200B</li> <li>• BAYAIR30AVENTA</li> </ul> <p>Vent terminations – Canadian applications. Meets ULC-S636 requirements.</p> <ul style="list-style-type: none"> <li>• BAYVENTCN200B</li> <li>• BAYAIR30CNVENT</li> </ul>
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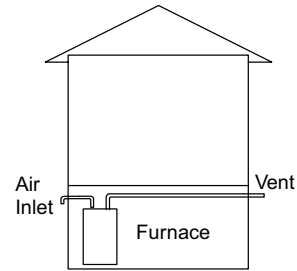
<p><b>FURNACE VENT / INLET PIPE INSTALLATION IN TWO PRESSURE ZONE CONFIGURATIONS</b></p> <p>There are many different variations of the vent / inlet air pipe combination. The vent / inlet air combination used for installation of these Furnaces depends on the needs of the location. However, these guidelines must be followed:</p> <ol style="list-style-type: none"> <li>1. The Furnace must vent outside the structure.</li> <li>2. Furnace combustion air requirements must be met for non-direct, single pipe applications.</li> <li>3. For direct vent application of these Furnaces, the vent pipe and air inlet pipe do not have to exit in the same air space or even on the same surface of the structure. However, the longest individual pipe will decide the value for the longest allowable equivalent vent/ inlet air length as shown in the vent length table.</li> </ol> <p><b>Note:</b> For single pressure zone applications, see the Horizontal Venting section.</p>
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<p>The following are <b>EXAMPLES ONLY</b>.</p>	
<p><b>EX. 1 –</b></p> <p>Example 1 shows the vent pipe exhausting through the roof and the inlet air coming from the interior of the house. The inlet air coming from the interior of the house must meet combustion requirements for area, etc., as shown in the section AIR FOR COMBUSTION AND VENTILATION.</p> <p><b>Note:</b> If only the flue gas pipe is to the outside of the structure, a straight section of pipe (long enough to exit the Furnace cabinet) must be attached to the inlet air side with an elbow (which is 5 to 10 equiv. ft.) installed on the end to prevent dust and debris from falling directly into the Furnace.</p>	
<p><b>EX. 2 –</b></p> <p>The inlet air does not have to come from outside the structure. Example 2 shows the inlet air, may come from the attic if the requirements for combustion air are met as shown in the section AIR FOR COMBUSTION AND VENTILATION.</p> <p><b>Note:</b> If only the flue gas pipe is to the outside of the structure, a straight section of pipe (long enough to exit the Furnace cabinet) must be attached to the inlet air side with an elbow (which is 5 to 10 equiv. ft.) installed on the end to prevent dust and debris from falling directly into the Furnace.</p>	
<p><b>EX. 3 –</b></p> <p>Example 3 shows that the exhaust vent may go vertical while the inlet air may be on any side of the structure. The vent pipe would decide the maximum equivalent length for the pip depending on the furnace and pipe size.</p>	



**EX. 4 -**

Example 4 shows the vent exiting one side of the house while the inlet air is on the opposite side of the structure. Here the vent pipe length must be within the allowable length for the size of Furnace and size of the vent pipe. This example demonstrates that the pipes do not have to exit on the same side of the structure.



**Attaching Vent Piping**

**VENT FITTING MATERIAL - PLASTIC**

Gas and liquid tight single wall vent fittings, designed for resistance to corrosive flue condensate, MUST be used throughout. Listed in the Approved Vent Pipe Materials table are designations for different types of 2" and 3" size pipe and fittings that meet these requirements. The materials listed are various grades of PVC, CPVC, ABS, PolyPro® by DuraVent, Z-Dens by Novaflex Group, Innoflue® by Centrotherm, ECCO™ polypropylene venting system, and PolyFlue™ polypropylene venting systems.

**ATTACHING VENT PIPING**

**Important:** Products installed in Canada must use vent systems that are certified to the Standard for Type BH Gas Venting Systems (ULC S636) for Class II-A venting systems (up to 65°C). Components of the vent system must not be interchanged with other vent systems or unlisted pipe or fittings. Plastic components, specified primers, and glues must be from a single system manufacturer and not intermixed with other system manufacturer's vent system parts. In addition, the first three feet of the vent pipe must be visible for inspection.

PIPE JOINTS: All joints must be fastened and sealed per manufacturer instructions and local and national codes to prevent escape of combustion products into the building.

**MANUFACTURED MODULAR VENTING SYSTEMS**

**⚠ WARNING**

**CARBON MONOXIDE POISONING HAZARD!**

Failure to follow this Warning may result in property damage, severe personal injury, or death. See the Approved Vent Pipe Materials table for manufactured modular venting systems that are approved for use with this product. Follow the manufacturer's installation instructions when installing the venting system.

**⚠ WARNING**

**CARBON MONOXIDE POISONING HAZARD!**

Failure to follow this Warning may result in property damage, severe personal injury, or death. Do not use cement on polypropylene venting systems. Follow the manufacturer's installation instructions when installing the venting system.

For manufactured modular venting systems that are approved with this product see PVC vent fitting material table. Do not drill into polypropylene venting pipes

# Furnace General Installation

**BONDING OF PVC**

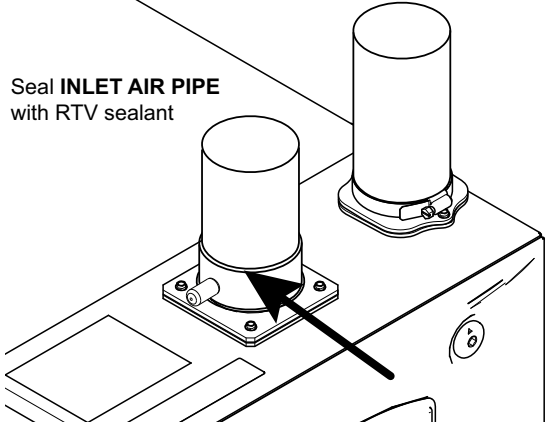
**Note:** It is recommended that the first joints from the Furnace be connected and sealed with high temperature RTV. This will enable the pipes to be removed later without cutting. Be sure to properly support these joints.

Commercially available solvent cement for PVC must be used to join PVC pipe fittings. Follow instructions on container carefully.  
 Pipe and Fitting – ASTM D1785, D2466, D2661, & D2665  
 PVC Primer and Solvent Cement – ASTM D2564  
 Procedure for Cementing Joints – Ref ASTM D2855

1. Cut pipe square, remove ragged edges and burrs. Chamfer end of pipe, then clean fitting socket and pipe joint area of all dirt, grease, moisture or chips.
2. After checking pipe and socket for proper fit, wipe socket and pipe with cleaner-primer. Apply a liberal coat of primer to inside surface of socket and outside of pipe.  
DO NOT ALLOW PRIMER TO DRY BEFORE APPLYING CEMENT.
3. Apply a thin coat of cement evenly in the socket. Quickly apply a heavy coat of cement to the pipe end and insert pipe into fitting with a slight twisting movement until it bottoms out.
4. Hold the pipe in the fitting for 30 seconds to prevent tapered socket from pushing the pipe out of the fitting.
5. Wipe all excess cement from the joint with a rag. Allow 15 minutes before handling. Cure time varies according to fit, temperature and humidity.

Connection of the pipe and collar of the combustion air inlet should just be a friction fit. It is recommended that the inlet air joint be sealed with RTV type sealant to allow the joint to be separated for possible future service. The inlet and vent pipes must be properly supported throughout the entire length.

**Note:** Follow venting instructions carefully when using PVC cement.  
**Important:** All joints must be water tight. Flue condensate is somewhat acidic, and leaks can cause equipment damage.



**APPROVED VENT PIPE MATERIALS**

**PVC VENT FITTING MATERIAL**  
 These fittings are available from your Gas Furnace Distributors.

ANSI/UL 1738 APPROVED VENT PIPE MATERIAL			
ASTM STANDARD	PIPE TYPE	ALLOWABLE TEMPERATURE °F	MARKING
N/A	N/A	158	UL 1738
PVC			
ASTM STANDARD	PIPE TYPE	ALLOWABLE TEMPERATURE °F	MARKING
D2665	DWV PIPE	158	ASTM D2665
D1785	SCH 40, 80, 120	158	ASTM 1785
D2241	SDR SERIES	158	ASTM D2241
CPVC			
ASTM STANDARD	PIPE TYPE	ALLOWABLE TEMPERATURE °F	MARKING
D2846	CPVC 41	212	ASTM D2846
F441	SCH 40, 80	212	ASTM F441
F442	SDR SERIES	212	ASTM F442
ABS			
ASTM STANDARD	PIPE TYPE	ALLOWABLE TEMPERATURE °F	MARKING
D2661	SCH 40 DWV	180	ASTM D2661
PolyPro® by DuraVent, Z-Dens by Novaflex Group, Innoflue® by Centrotherm, System 1738 by IPEX, ECCO™ polypropylene venting system, and PolyFlue™ polypropylene venting systems.			
ASTM STANDARD	PIPE TYPE	ALLOWABLE TEMPERATURE °F	MARKING
N/A	N/A	230	ULC-S636

## Maximum Vent Length Table

Maximum Vent Length Table Installation Instructions must be followed for installation of the venting system.		
Maximum Total Equivalent Length In Feet for Vent or Inlet Air, not combined total (See Notes)		
Model	2 inch Pipe	3 inch or 4 inch Pipe
Altitude 0–2,000 Feet		
S9V2B040, S9V2B060	200	200
S9V2B080, S9V2C080	100	200
S9V2C100	50	200
S9V2D120	Note 1	200
Altitude 2,001–5,400 Feet		
S9V2B040, S9V2B060	200	200
S9V2B080, S9V2C080	80	120
S9V2C100	50	150
S9V2D120	Note 1	200
Altitude 5,401–7,800 Feet		
S9V2B040, S9V2B060	100	150
S9V2B080, S9V2C080	50	70
S9V2C100	Note 1	100
S9V2D120	Note 1	100
Altitude 7,801–10,100 Feet		
S9V2B040, S9V2B060	50	90
S9V2B080, S9V2C080	Note 1	50
S9V2C100	Note 1	50
S9V2D120	Note 1	50

**Notes:**

1. Not allowed
2. Minimum vent length for all models: 15 feet.
3. The INLET AIR of one pipe systems require the installation of a minimum of one 90° elbow (to prevent dust and debris from falling straight into the furnace).

## Horizontal Venting

**Note:** Insure that vent piping is sloped 1/4" per foot and that piping is supported properly to prevent sags and condensate pooling.

3" Venting requirements

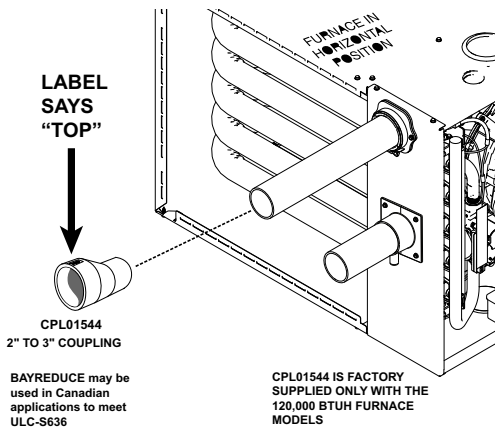
**Important:** To determine if your application requires 3" venting, see the Maximum Vent Length Table.

**Important:** Horizontal venting application must use the 2" x 3" offset reducing coupling. Vertical venting applications do not require the reducing coupling to be offset.

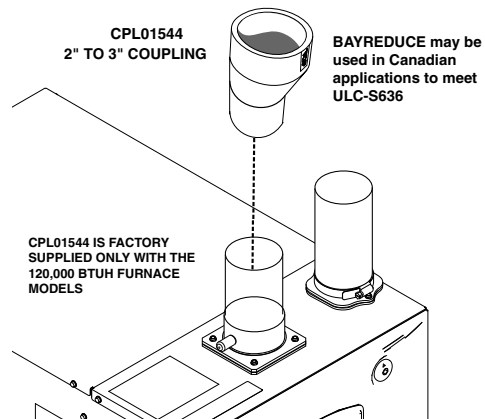
**When the vent pipe is exposed to temperatures below freezing, e.g., when it passes through unheated spaces, etc., the pipe must be insulated with 1/2 inch (12.7 mm) thick Armaflex-type insulation or equal.**

**If the space is heated sufficiently to prevent freezing, then the insulation will not be required. If domestic water pipes are not protected from freezing then the space meets the condition of a heated space.**

**Note:** If your furnace comes with a factory supplied 2" X 3" offset reducing coupling it is used for 3" vent pipe installation. Make sure the marking "TOP" is located on the top side of the pipe in horizontal venting applications. The straight side of the coupling must be on bottom for proper drainage of condensate.

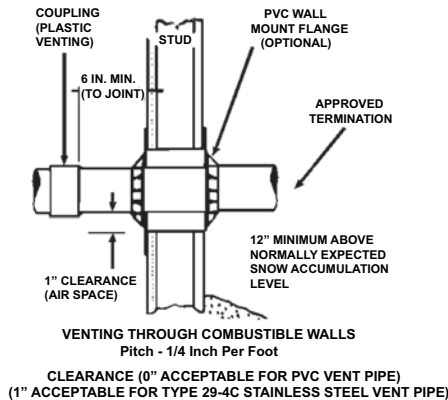


**Note:** For Canadian applications, BAYREDUCE 2" x 3" offset reducing coupling meets ULC-S636 requirements. Make sure the marking "TOP" is located on the top side of the pipe. The straight side of the coupling must be on bottom for proper drainage of condensate in horizontal venting.



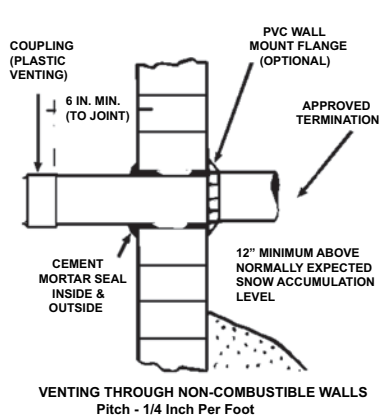
### COMBUSTIBLE MATERIAL WALL

A minimum clearance of 1" to combustible materials must be maintained when using single wall stainless steel venting. Shield material to be a minimum of 24 gauge stainless or aluminized sheet metal. Minimum dimensions are 12"x12". Shield must be fastened to both inside and outside of wall. Use screws or anchor type fasteners suited to the outside or inside wall surfaces.



### NONCOMBUSTIBLE MATERIAL WALL

The hole through the wall must be large enough to maintain pitch of vent and properly seal. Use cement mortar seal on inside and outside of wall.



**Table 22. Horizontal Venting Through Wall**

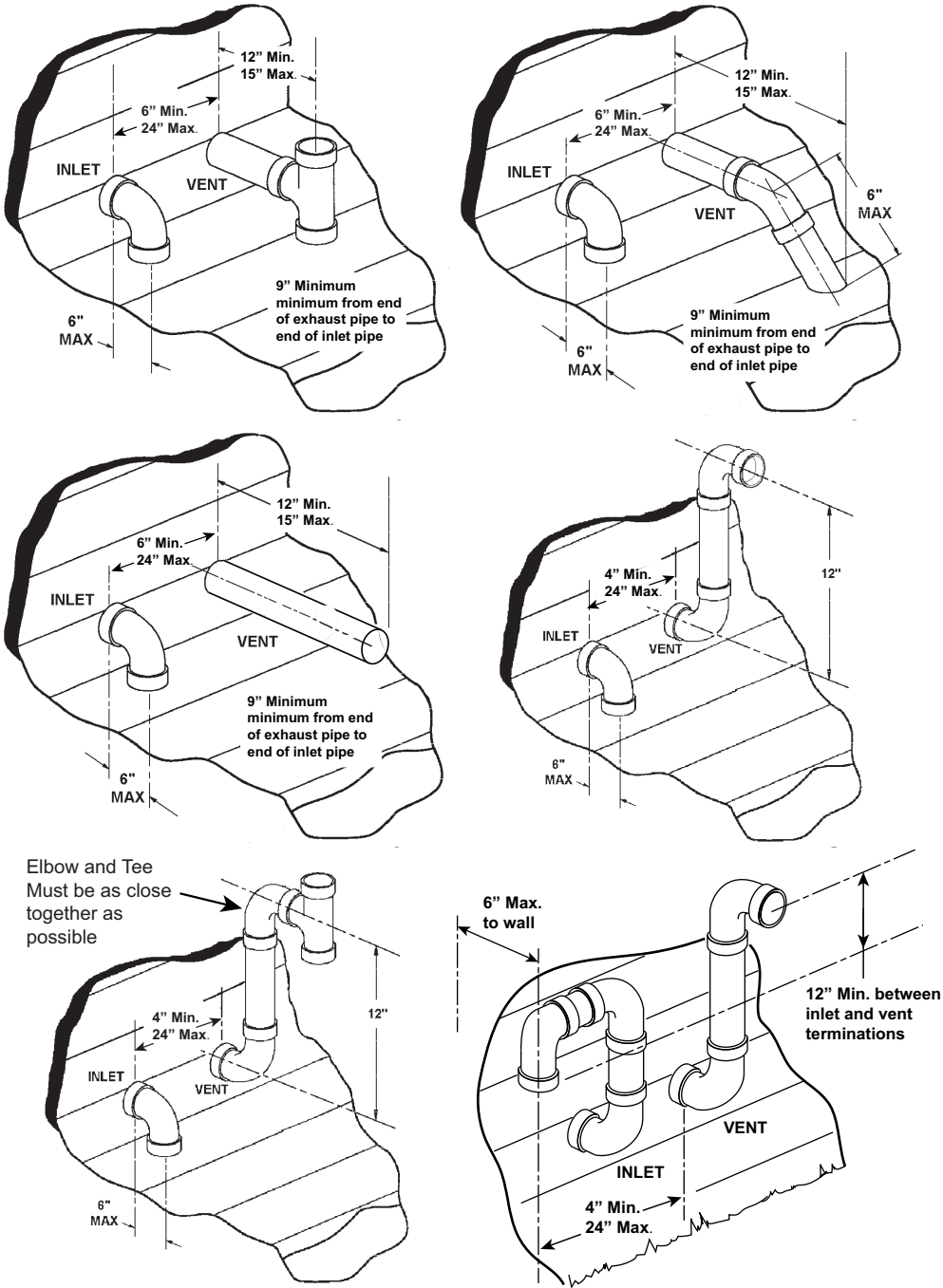
The vent for this appliance shall not terminate

1. Over public walkways; or
2. Near soffit vents or crawl space vents or other areas where condensate or vapor could create a nuisance or hazard or cause property damage; or
3. Where condensate vapor could cause damage or could be detrimental to the operation of regulators, relief valves, or other equipment.

**Possible configurations for two pipe venting systems located in the same pressure zone.**

**Important:** Maintain 12" minimum clearance above highest anticipated snow level or grade, whichever is greater.

**Note:** All distances are centerline to centerline.



## Horizontal Venting Through Wall with Concentric Vent Kit

**These Furnaces may be installed as direct vent (as shipped) or as nondirect vent. Installation must conform to national, state, and local codes.**

The BAYVENT200B, BAYVENTCN200B, BAYAIR30AVENTA, and BAYAIR30CNVENT vent & inlet terminals kits must be located at least 12" minimum above normally expected snow accumulation level.

Avoid areas where staining or condensate drippage may be a problem.

Location of the vent/wind terminal should be chosen to meet the requirements for either direct or non-direct vent applications.

**PITCH** — Venting through the wall must maintain 1/4" per foot pitched upward to insure that condensate drains back to the Furnace.

**FLUE GAS DEGRADATION** — The moisture content of the flue gas may have a detrimental effect on some building materials.

This can be avoided by using the roof or chimney venting option. When wall venting is used on any surface that can be affected by moisture, it is recommended that a corrosion resistant shield (24 inches square) be used behind the vent terminal.

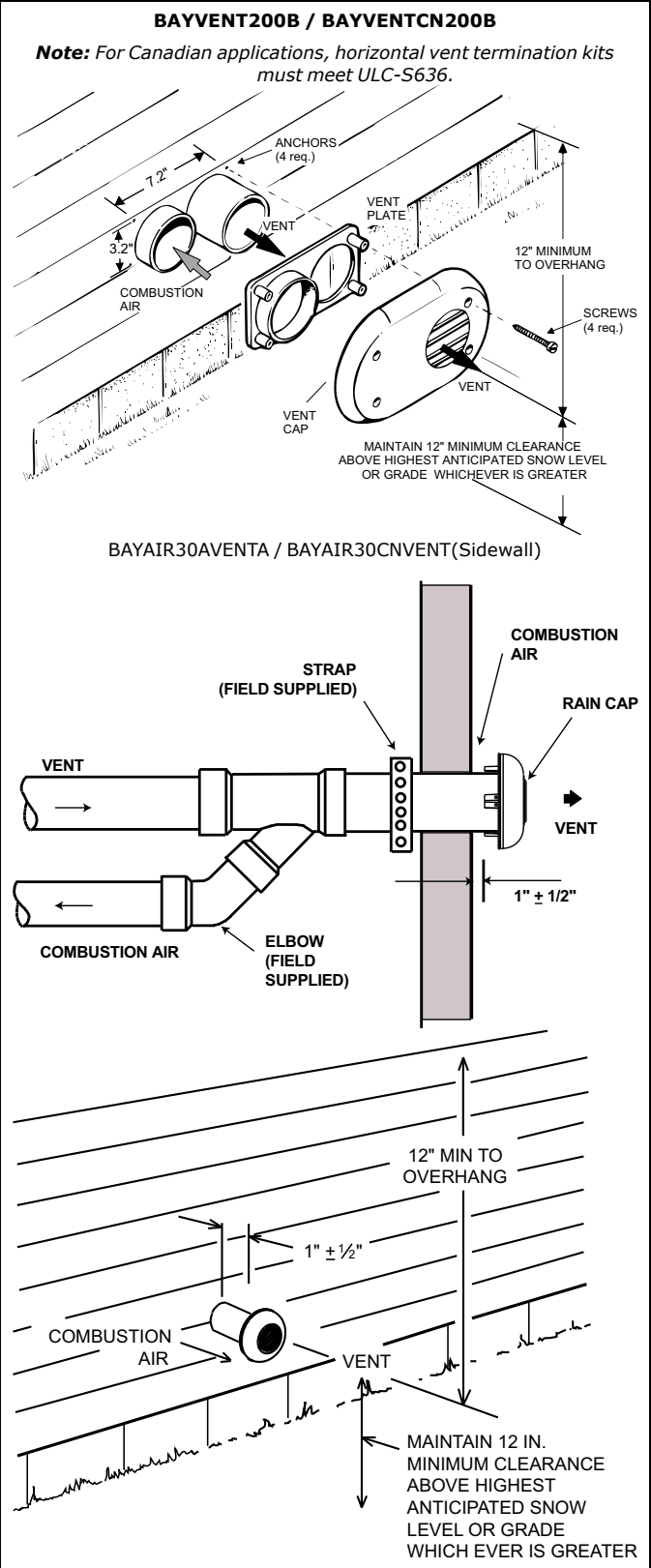
This shield can be wood, plastic, sheet metal, etc. Also, silicone caulk all cracks, seams and joints within 3 feet of the vent terminal.

*The vent for this appliance shall not terminate*

1. Over public walkways; or
2. Near soffit vents or crawl space vents or other areas where condensate or vapor could create a nuisance or hazard or cause property damage; or
3. Where condensate vapor could cause damage or could be detrimental to the operation of regulators, relief valves, or other equipment.

For Canadian installations, if you used a ULC-S636 approved manufactured modular venting system, a copy of the manufacturer's instructions should remain with the system.

The installation instruction can be obtained from the vent termination manufacturer. BAYVENTCN200B and BAYAIR30CNVENT meet ULC-S636 requirements.



**Important:** The Commonwealth of Massachusetts requires compliance with regulation 248 CMR 4.00 and 5.00 for installation of through – the – wall vented gas appliances as follows:

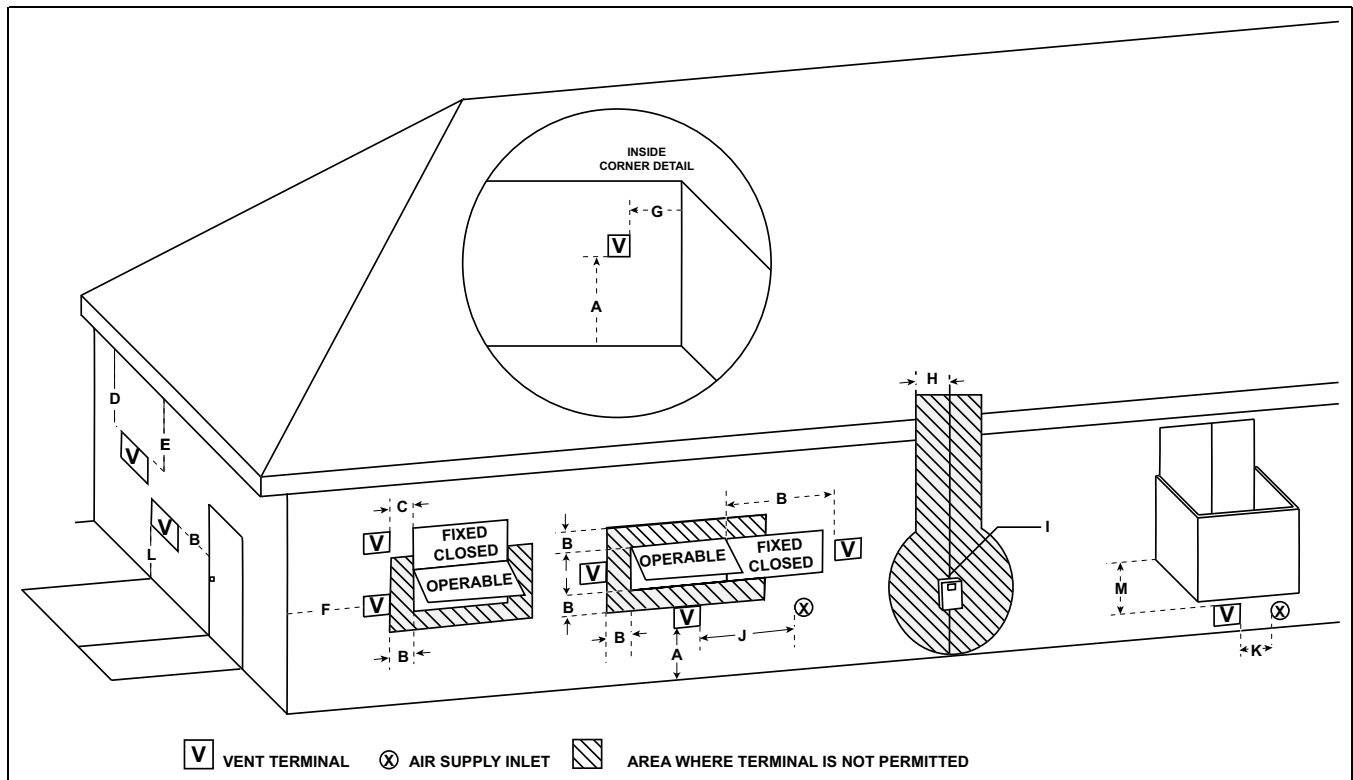
For all side wall horizontally vented gas fueled equipment installed in every dwelling, building or structure used in whole or in part for residential purposes, including those owned or operated by the Commonwealth and where the side wall exhaust vent termination is less than seven (7) feet above finished grade in the area of the venting, including but not limited to decks and porches, the following requirements shall be satisfied:

1. **INSTALLATION OF CARBON MONOXIDE DETECTORS.** At the time of installation of the side wall horizontal vented gas fueled equipment, the installing plumber or gasfitter shall observe that a hard wired carbon monoxide detector with an alarm and battery back-up is installed on the floor level where the gas equipment is to be installed. In addition, the installing plumber or gasfitter shall observe that a battery operated or hard wired carbon monoxide detector with an alarm is installed on each additional level of the dwelling, building or structure served by the side wall horizontal vented gas fueled equipment. It shall be the responsibility of the property owner to secure the services of qualified licensed professionals for the installation of hard wired carbon monoxide detectors.
  - a. In the event that the side wall horizontally vented gas fueled equipment is installed in a crawl space or an attic, the hard wired carbon monoxide detector with alarm and battery back-up may be installed on the next adjacent floor level.
  - b. In the event that the requirements of this subdivision can not be met at the time of completion of installation, the owner shall have a period of thirty (30) days to comply with the above requirements; provided, however, that during said thirty (30) day period, a battery operated carbon monoxide detector with an alarm shall be installed.
2. **APPROVED CARBON MONOXIDE DETECTORS.** Each carbon monoxide detector as required in accordance with the above provisions shall comply with NFPA 72 and be ANSI/UL 2034 listed, IAS 6-96 certified, or CSA 6.19.
3. **SIGNAGE.** A metal or plastic identification plate shall be permanently mounted to the exterior of the building at a minimum height of eight (8) feet above grade directly in line with the exhaust vent terminal for the horizontally vented gas fueled heating appliance or equipment. The sign shall read, in print size no less than one-half (1/2) inch in size, "GAS VENT DIRECTLY BELOW. KEEP CLEAR OF ALL OBSTRUCTIONS".
4. **INSPECTION.** The state or local gas inspector of the side wall horizontally vented gas fueled equipment shall not approve the installation unless, upon inspection, the inspector observes carbon monoxide detectors and signage installed in accordance with the provisions of 248 CMR 9.1.23 and 12.9.7 respectively.

This appliance requires a special venting system. If BAYAIR30AVENTA or BAYVENT200B are used, a copy of the installation instructions for the kit shall remain with the appliance or equipment at the completion of installation. The venting system installation instructions can be obtained from the manufacturer by writing to the following address:

Trane and American Standard  
 6200 Troup Highway  
 Tyler, TX 75707  
 Attention: Manager of Field Operations Excellence

### Horizontal Vent Clearances



## Furnace General Installation

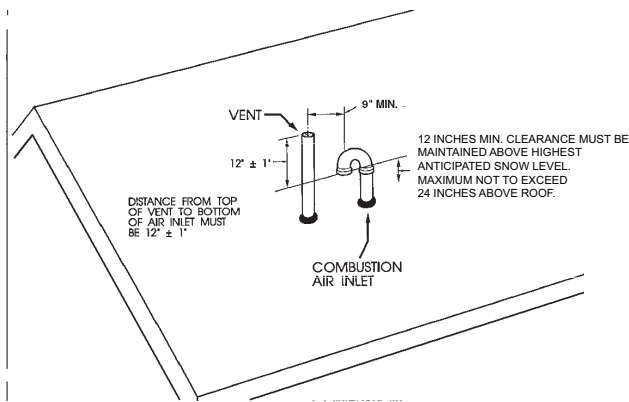
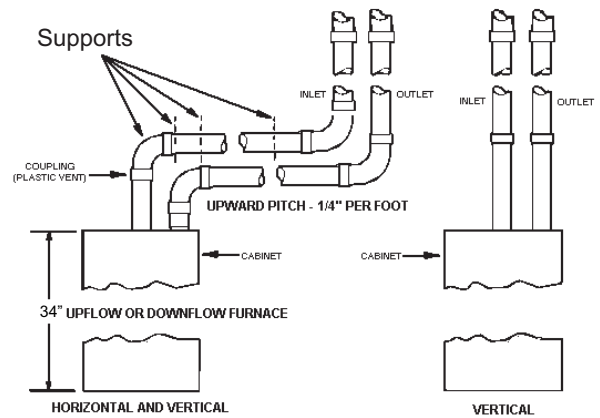
Non-Direct Vent Termination Clearances			
		Canadian Installations	US Installations
A=	Clearance above grade, veranda, porch, deck, or balcony	12 inches (30 cm)	12 inches (30 cm)
B=	Clearance to window or door that may be opened	12 inches (30 cm) for appliances > 10,000 BTUH (3 kw) and ≤ 100,000 BTUH (30 kw), 36 inches (91 cm) for appliances > 100,000 BTUH (30 kw)	4 feet (1.2m) below or to the side of opening; 1 foot (0.3m) above opening
C=	Clearance to permanently closed window	*	*
D=	Vertical clearance to ventilated soffit located above the terminal within a horizontal distance of 2 feet (61 cm) from the center line of the terminal	*	*
E=	Clearance to unventilated soffit	*	*
F=	Clearance to outside corner	*	*
G=	Clearance to inside corner	*	*
H=	Clearance to each side of center line extended above meter/regulator assembly	3 feet (91 cm) with a height 15 feet (4.5 m) above the meter/regulator assembly	*
I=	Clearance to service regulator vent outlet	3 feet (91 cm)	*
J=	Clearance to nonmechanical air supply inlet to building or the combustion air inlet to any other appliance	12 inches (30 cm) for appliances > 10,000 BTUH (3 kw) and ≤ 100,000 BTUH (30 kw), 36 inches (91 cm) for appliances > 100,000 BTUH (30 kw)	4 feet (1.2 m) below or to side of opening; 1 foot (300 m) above opening
K=	Clearance to a mechanical air supply inlet	6 feet (1.83m)	3 feet (91 cm) above if within 10 feet (3m) horizontally
L=	Clearance above a paved sidewalk or paved driveway located on public property	7 feet (2.13 m) and not located above public walkways or other areas where condensate or vapor can cause a nuisance or hazard	7 feet (2.13 m) and not located above public walkways or other areas where condensate or vapor can cause a nuisance or hazard
M=	Clearance under veranda, porch, deck, or balcony	12 inches (30 cm) if veranda, porch, deck, or balcony is fully open on a minimum of two sides beneath the floor	12 inches (30 cm) where the area beneath the veranda, porch, deck, or balcony is open on not less than two sides. The vent terminal is prohibited in this location where only one side is open
Notes:			
<ol style="list-style-type: none"> <li>1. The Canadian venting installations must be in accordance with local codes or in the absence of local codes with the current CSA B149.1 Natural Gas and Propane Installation Code.</li> <li>2. The US venting installations must be in accordance with local codes or in the absence of local codes with the current ANSI Z223.1/NFPA 54 National Fuel Gas Code.</li> </ol>			
* Clearance in accordance with local installation codes and the requirements of the gas supplier.			



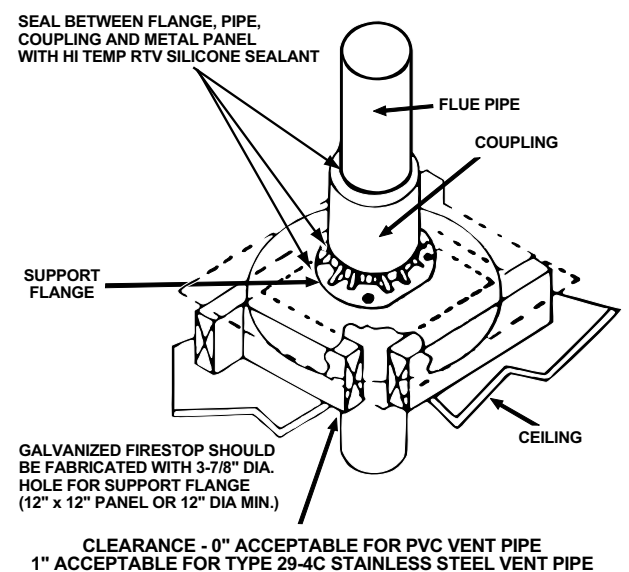
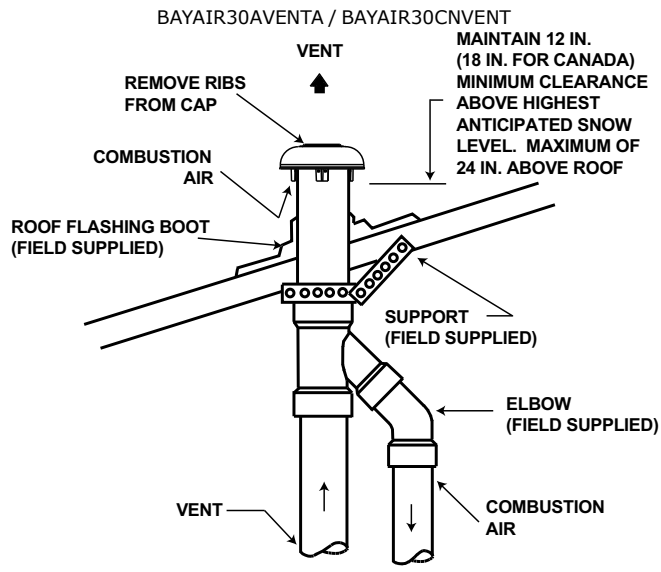
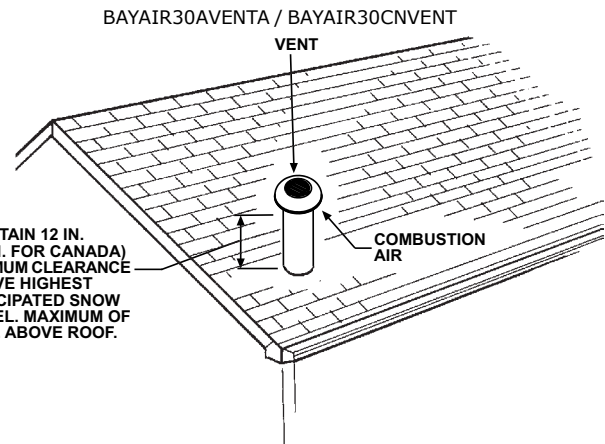
Direct Vent Termination Clearances			
		Canadian Installations	US Installations
A=	Clearance above grade, veranda, porch, deck, or balcony	12 inches (30 cm)	12 inches (30 cm)
B=	Clearance to window or door that may be opened	12 inches (30 cm) for appliances > 10,000 BTUH (3 kw) and ≤ 100,000 BTUH (30 kw), 36 inches (91 cm) for appliances > 100,000 BTUH (30 kw)	9 inches (23 cm) for appliances > 10,000 BTUH (3 kw) and ≤ 50,000 BTUH (15 kw), 12 inches (30 cm) for appliances > 50,000 BTUH (15 kw)
C=	Clearance to permanently closed window	*	*
D=	Vertical clearance to ventilated soffit located above the terminal within a horizontal distance of 2 feet (61 cm) from the center line of the terminal	*	*
E=	Clearance to unventilated soffit	*	*
F=	Clearance to outside corner	*	*
G=	Clearance to inside corner	*	*
H=	Clearance to each side of center line extended above meter/regulator assembly	3 feet (91 cm) with a height 15 feet (4.5 m) above the meter/regulator assembly	*
I=	Clearance to service regulator vent outlet	3 feet (91 cm)	*
J=	Clearance to nonmechanical air supply inlet to building or the combustion air inlet to any other appliance	12 inches (30 cm) for appliances > 10,000 BTUH (3 kw) and ≤ 100,000 BTUH (30 kw), 36 inches (91 cm) for appliances > 100,000 BTUH (30 kw)	9 inches (23 cm) for appliances > 10,000 BTUH (3 kw) and ≤ 50,000 BTUH (15 kw); 12 inches (30 cm) for appliances > 50,000 BTUH (15 kw)
K=	Clearance to a mechanical air supply inlet	6 feet (1.83m)	3 feet (91 cm) above if within 10 feet (3m) horizontally
L=	Clearance above a paved sidewalk or paved driveway located on public property	7 feet (2.13 m) and not located above public walkways or other areas where condensate or vapor can cause a nuisance or hazard	7 feet (2.13 m) and not located above public walkways or other areas where condensate or vapor can cause a nuisance or hazard
M=	Clearance under veranda, porch, deck, or balcony	12 inches (30 cm) if veranda, porch, deck, or balcony is fully open on a minimum of two sides beneath the floor	12 inches (30 cm) where the area beneath the veranda, porch, deck, or balcony is open on not less than two sides. The vent terminal is prohibited in this location where only one side is open
Notes:			
<ol style="list-style-type: none"> <li>1. The Canadian venting installations must be in accordance with local codes or in the absence of local codes with the current CSA B149.1 Natural Gas and Propane Installation Code.</li> <li>2. The US venting installations must be in accordance with local codes or in the absence of local codes with the current ANSI Z223.1/NFPA 54 National Fuel Gas Code.</li> </ol>			
* Clearance in accordance with local installation codes and the requirements of the gas supplier.			

## Venting Through The Roof

Support horizontal pipe every 3'0" with the first support as close to the furnace as possible. Induced draft blower, housing, and furnace must not support the weight of the flue pipe.



**Note:** All measurements are from centerline to centerline.

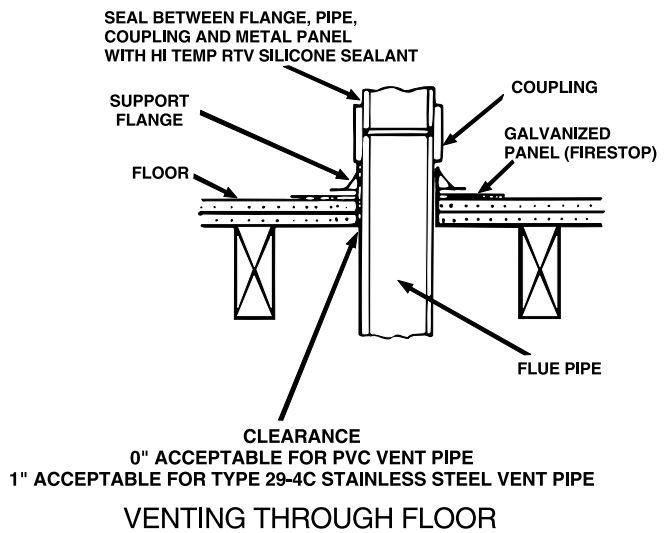


### VENTING THROUGH CEILING

When penetrating roof with PVC vent pipe, a flexible flashing may be used for a weather tight seal. Lubricate flexible seal on flashing before PVC pipe is pushed through the seal. (Field Supplied)

**Note:** No vent cap is the preferred method for vertical vent termination in extremely cold climates.

**Note:** In extreme climate conditions, insulate the exposed pipe above the roof line with Armaflex type insulation.

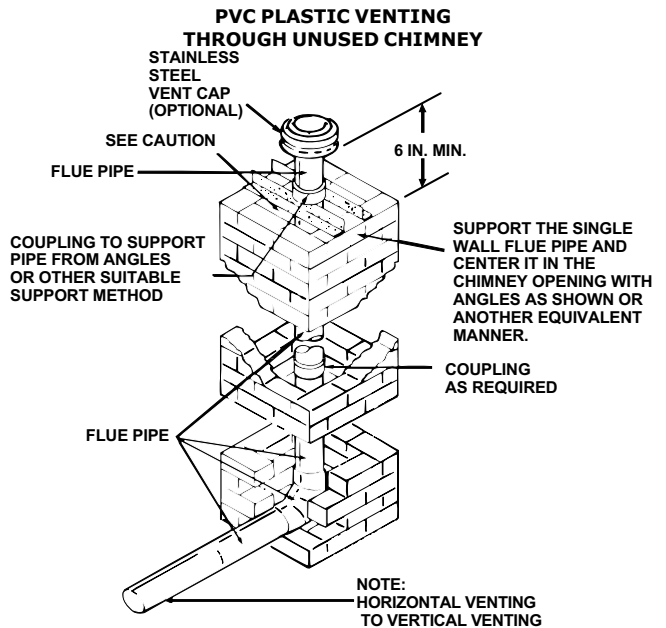


### Venting Through an UNUSED Chimney

Venting Routed Through a Masonry Chimney

**Important:** Refer to Section 12.6.8 of NFPA 54 / ANSI 223.1 2012 when routing vent piping through a chimney.

**Important:** The single wall flue pipe joints must be sealed. The 90° elbow connection to vertical pipe must be sealed to prevent condensate leakage to base of masonry chimney.



### Venting Through an UNUSED Chimney

**Important:** Refer to Section 12.6.8 of NFPA 54 / ANSI 223.1 2012 when routing vent piping through a chimney.

**Important:** The single wall flue pipe joints must be sealed. The 90° elbow connection to vertical pipe must be sealed to prevent condensate leakage to base of masonry chimney.

#### VENT FITTING MATERIAL – STAINLESS STEEL

Gas and liquid tight single wall metal vent fitting, designed for resistance to corrosive flue condensate such as Type 29-4C MUST be used throughout.

These fittings and fitting accessories are to be field supplied.

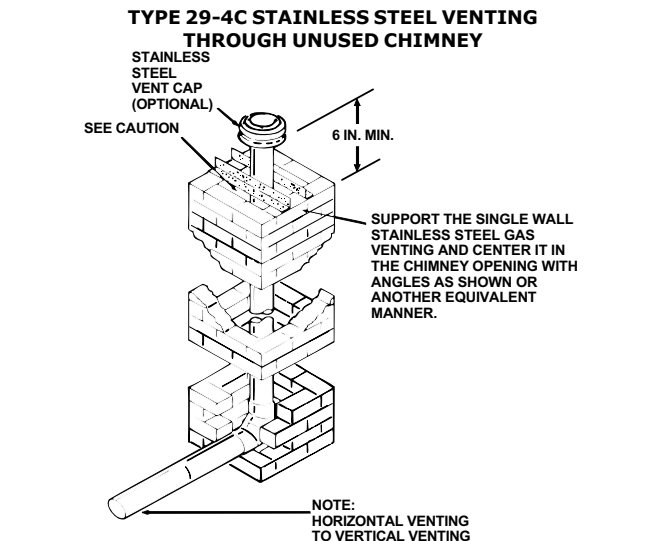
#### DIRECTION OF STAINLESS STEEL FITTING

All stainless steel fitting must be installed with male end towards the Furnace.

All horizontal stainless steel sections must be positioned with the seam on top.

All long horizontal sections must be supported to prevent sagging.

All pipe joints must be fastened and sealed to prevent escape of combustion products into the building.



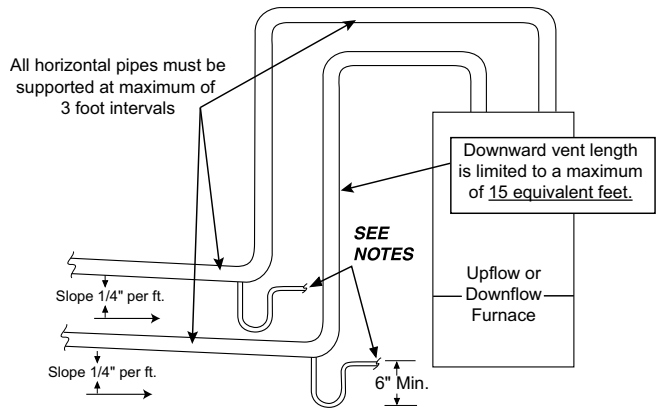
# Furnace General Installation

## Downward Venting

Furnace may be in vertical or horizontal configuration.

**Notes:**

1. Condensate trap for vent pipe must be a minimum of 6 inches in height.
2. Condensate trap for vent and inlet pipe must be connected into a condensate drain pump; an open or vented drain; or it can be connected to the outlet hose of the Furnace condensate trap. Outdoor draining of the Furnace and coil condensate is permissible if allowed by local codes.
3. The condensate trap should be primed at initial start up prior to heating season operation.



Caution should be taken to prevent drains from freezing or causing slippery conditions that could lead to personal injury. Excessive draining of condensate may cause saturated ground conditions that may result in damage to plants.

## Air for Combustion and Ventilation

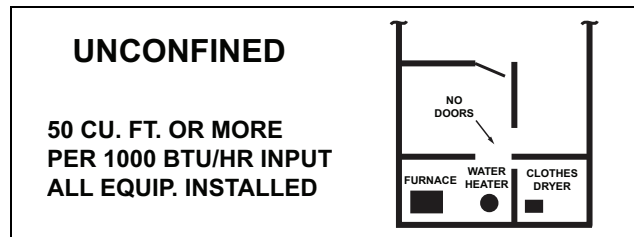
Adequate flow of combustion and ventilating air must not be obstructed from reaching the Furnace. Air openings provided in the Furnace casing must be kept free of obstructions which restrict the flow of air. Airflow restrictions affect the efficiency and safe operation of the Furnace. Keep this in mind 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, or Sections 8.2, 8.3 or 8.4 of CSA B149.1 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.

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
120,000	750



**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.*

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	100	10	20
60,000	100	15	30
80,000	100	20	40
100,000	100	25	50
120,000	120	30	60

(a) 1 Square inch per 4000 BTU/hr Vertical Duct.  
 (b) 1 Square inch per 2000 BTU/hr Horizontal Duct.

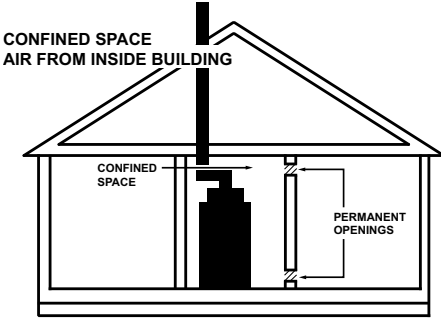
**CONFINED**

**FURNACE**



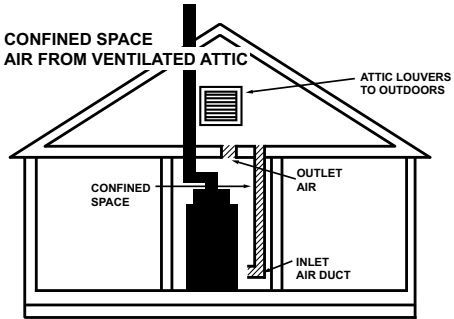
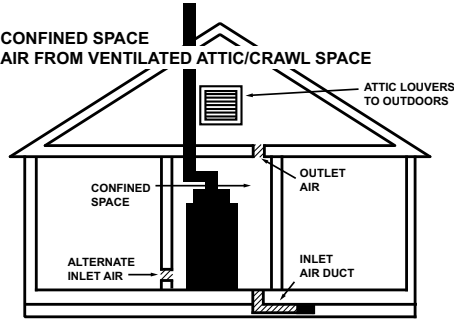
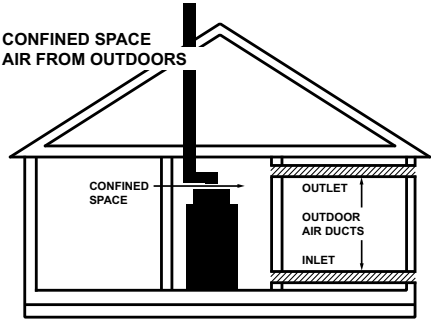
**LESS THAN 50 CU. FT. PER 1000 BTU/HR INPUT ALL EQUIP. INSTALLED**

All air from inside the building The confined space shall be 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.



All air from outdoors The confined space shall be 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.

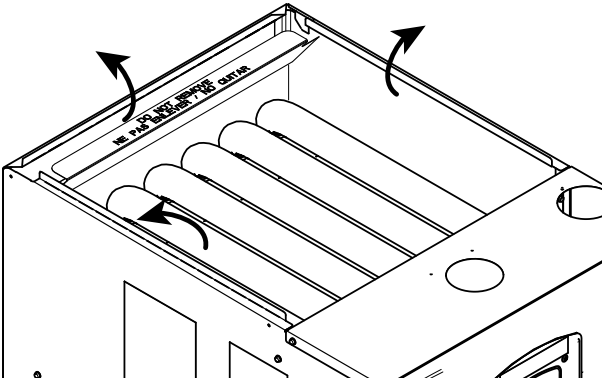
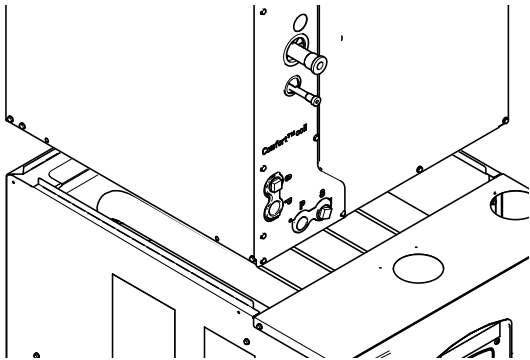
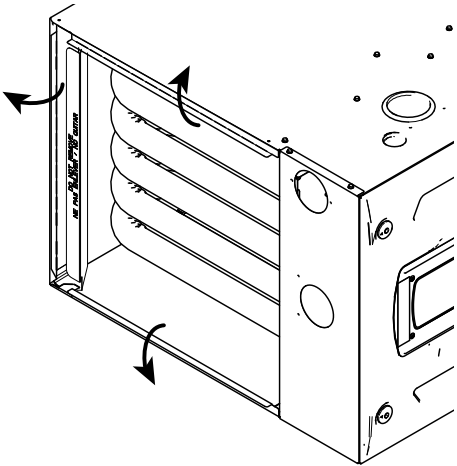
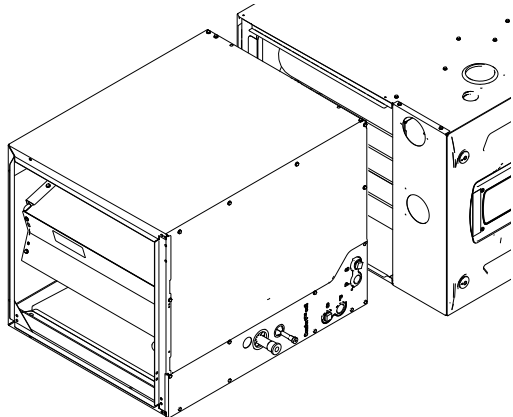
The openings shall communicate directly, or by ducts, with the outdoors or spaces (crawl or attic) that freely communicate with the outdoors. Refer to the Minimum Free Area in square inches for confined spaces table, for minimum open areas required.



## Duct Connections

<p>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.</p> <p>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.</p> <p>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.</p>	<p>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).</p> <p>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.</p> <p>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.</p>
<p><b>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.</b>  <b>Do Not</b> install return air through the back of the Furnace cabinet.  <b>Do Not</b> install return air through the side of the furnace cabinet on horizontal applications without following the guidelines in .</p>	
<p>Carbon monoxide, fire or smoke can cause serious bodily injury, death, and/or property damage.</p> <p>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 manufactures 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. <i>Standards for Single and Multiple Station Carbon Monoxide Alarms, UL 2034</i> or CSA International Standard, <i>Residential Carbon Monoxide Alarming Devices, CSA 6.19</i>.</p>	<p><b>Note:</b> <i>The manufacturer of your Furnace DOES NOT test any detectors and makes no representations regarding any brand or type of detector.</i></p>
<p><b>Note:</b> <i>Seal per local codes</i></p>	

Table 23. Supply Duct Connections

<p style="text-align: center;"><b>⚠ CAUTION</b></p> <p><b>COIL REQUIREMENT!!</b></p> <p>Failure to follow this Caution could result in property damage or personal injury. 4GXC* and 4MXC* coils installed on upflow furnaces in vertical, horizontal left, or horizontal right orientations without a factory installed metal drain pan shield must use a MAY*FERCOLKITAA kit. Coils installed on upflow furnaces must have drain pans that are suitable for 400° F (205° C) or have a metal drain pan shield. Downflow furnaces do not require a metal drain pan shield or the use of the MAY*FERCOLKITAA kit.</p>	<p><b>Note:</b> The "Coil Requirement" caution is applicable to:          Upflow furnace with coil,          Furnace in horizontal left with coil and          Furnace in horizontal right with "A" coil</p>
<p style="text-align: center;"><b>Upflow Furnace with Coil</b></p>  <p style="text-align: center;">Refer to <a href="#">Step 1</a>.</p>	<p style="text-align: center;"><b>Upflow Furnace with Coil</b></p> <p><b>Note:</b> There are no longer guide holes located on the furnace flange.</p>  <p style="text-align: center;">Refer to <a href="#">Step 2</a>, <a href="#">Step 3</a>, <a href="#">Step 4</a>.</p>
<p style="text-align: center;"><b>Furnace in Horizontal Left with Coil</b></p>  <p style="text-align: center;">Refer to <a href="#">Step 1</a>.</p>	<p style="text-align: center;"><b>Furnace in Horizontal Left with Coil</b></p> <p><b>Note:</b> There are no longer guide holes located on the furnace flange.</p>  <p style="text-align: center;">Refer to <a href="#">Step 6</a>, <a href="#">Step 3</a>, <a href="#">Step 4</a>.</p>

**Table 23. Supply Duct Connections (continued)**

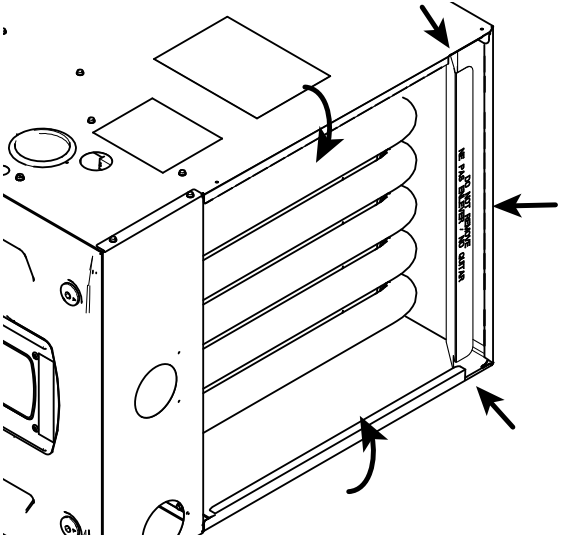
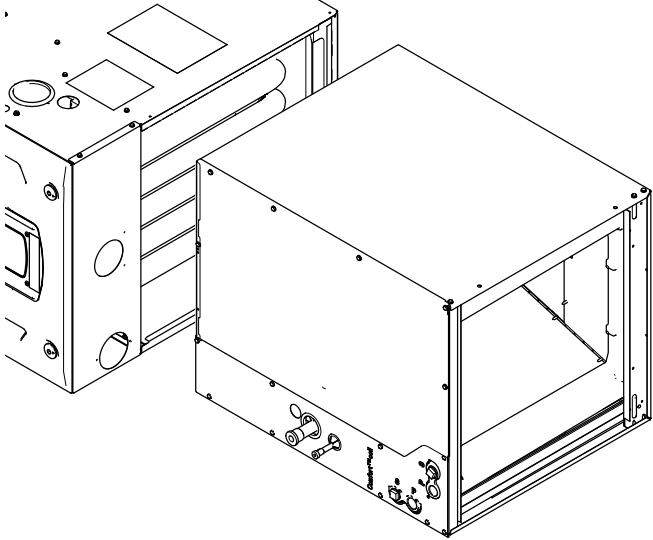
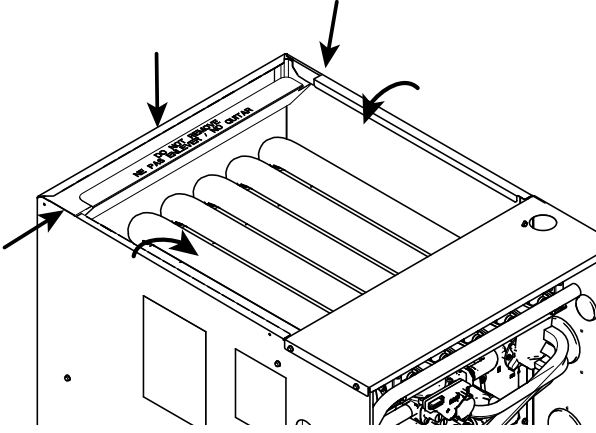
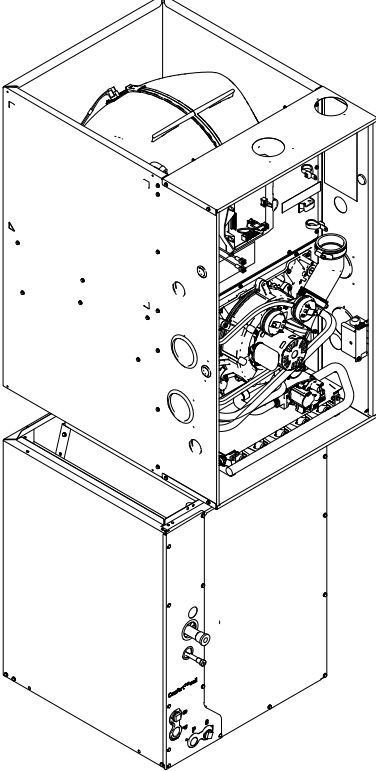
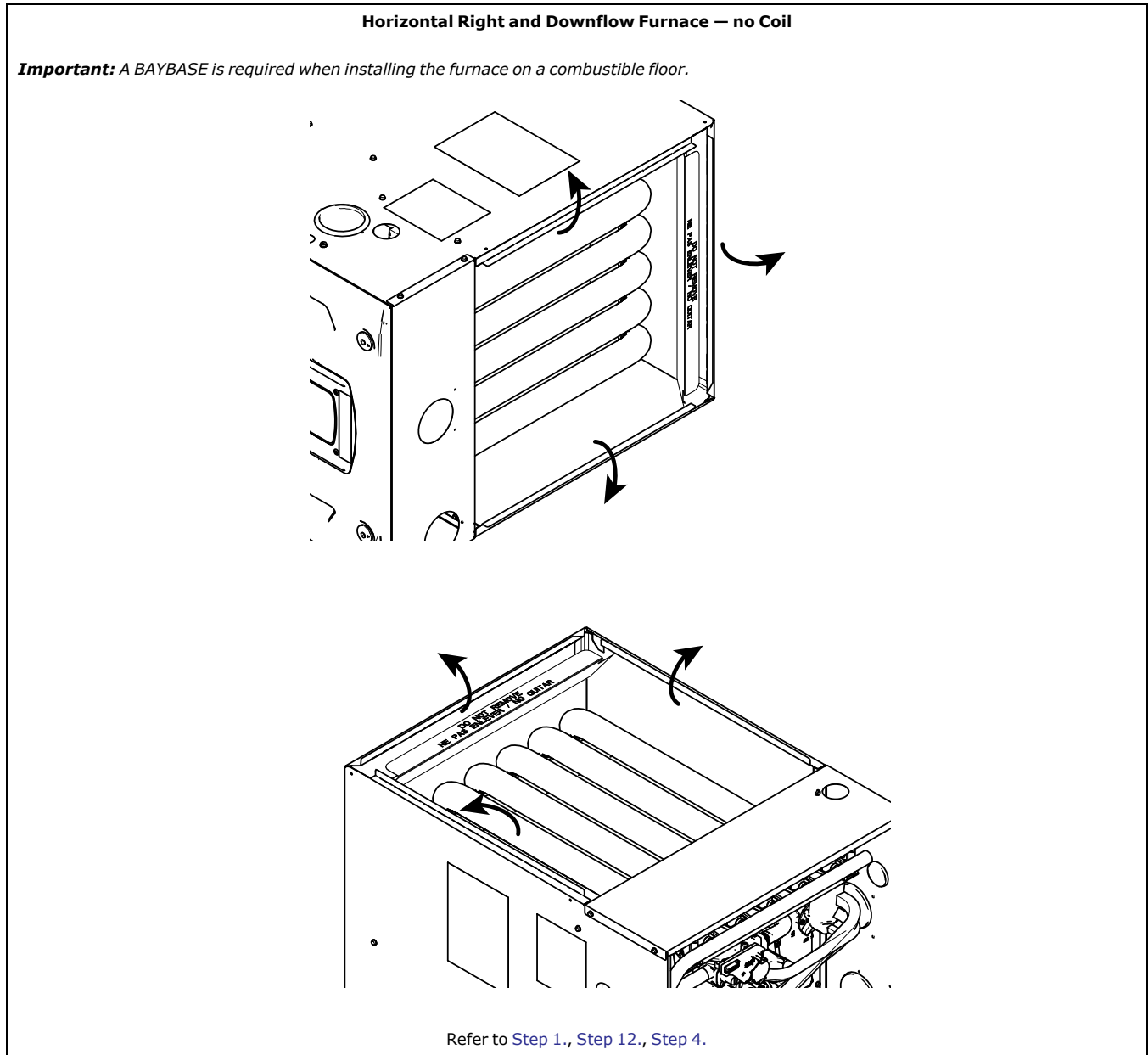
<p style="text-align: center;"><b>Furnace in Horizontal Right with "A" Coil</b></p> <p><b>Note:</b> Flat or dedicated horizontal coils may require flanges to be bent upward.</p>  <p style="text-align: center;">Refer to <a href="#">Step 7.</a>, <a href="#">Step 8.</a>, <a href="#">Step 9.</a>, <a href="#">Step 6.</a></p>	<p style="text-align: center;"><b>Furnace in Horizontal Right with "A" Coil</b></p>  <p style="text-align: center;">Refer to <a href="#">Step 10.</a>, <a href="#">Step 4.</a></p>
<p style="text-align: center;"><b>Downflow Furnace with Coil</b></p> <p><b>Note:</b> 4GXC* or 4MXC* coils installed on a downflow furnace do not require a metal drain pan shield or the use of the MAY*FERCOLKITAA kit.</p>  <p style="text-align: center;">Refer to <a href="#">Step 7.</a>, <a href="#">Step 8.</a>, <a href="#">Step 9.</a>, <a href="#">Step 6.</a></p>	<p style="text-align: center;"><b>Downflow Furnace with Coil</b></p>  <p style="text-align: center;">Refer to <a href="#">Step 11.</a>, <a href="#">Step 4.</a></p>



Table 23. Supply Duct Connections (continued)



**Installation Instructions**

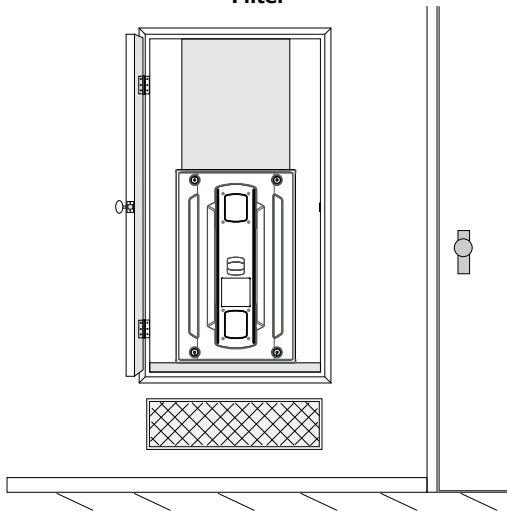
1. Bend furnace flanges up.
2. Set the coil on top of the furnace.
3. Screw through the coil cabinet into the furnace flange. Guide holes are located on the coil.
4. Seal per local codes and requirements.
5. Insulate the first 6–12 inches of the supply duct.
6. Support the furnace and coil independently.
7. Cut the back flange along perforation.
8. Starting at the back of the furnace, cut the side flanges along perforations until past the end of the heat shield to avoid interference when bending.
9. Bend furnace side flanges down.
10. Match the coil up flush to the back of the furnace.
11. Set the furnace on top of the coil so that it is flush with the back of the furnace.
12. Attach ducting.

**Table 24. Return Duct Connections**

**Return Ducting General Guidelines**

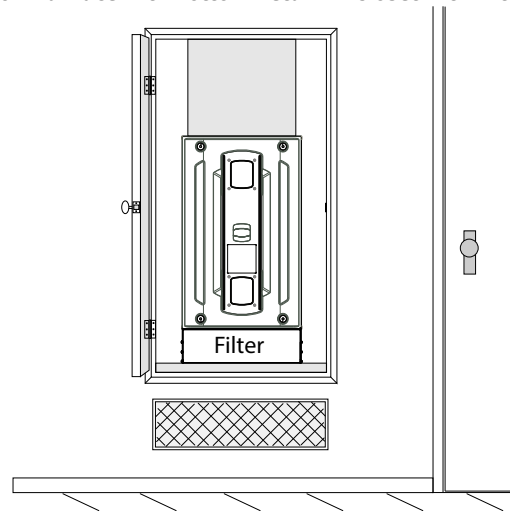
- Back returns are not allowed on any S-Series furnaces
- Side returns are not allowed on downflow S-Series furnaces
- Mounting flanges must be located on ducting
- Shoot screws through the mount flanges into the furnace cabinet
- Always seal per local codes and requirements
- Furnace, coil, and ducting must be supported separately
- An external overflow drain pan must be installed in all applications over a finished ceiling to prevent property damage

**Upflow Furnace with Bottom Return in Closet with Remote Filter**



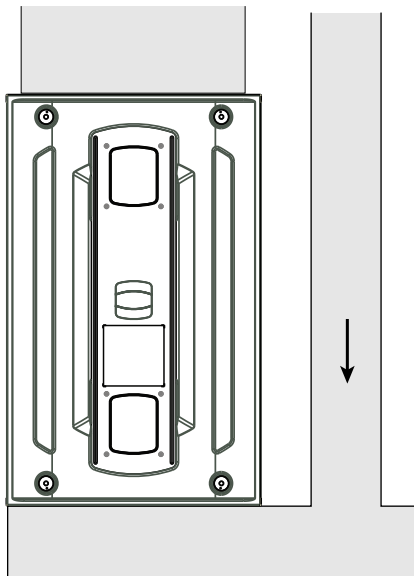
Refer to [Step 1.](#), [Step 2.](#), [Step 3.](#), [Step 4.](#)

**Upflow Furnace with Bottom Return in Closet with Filter Box**



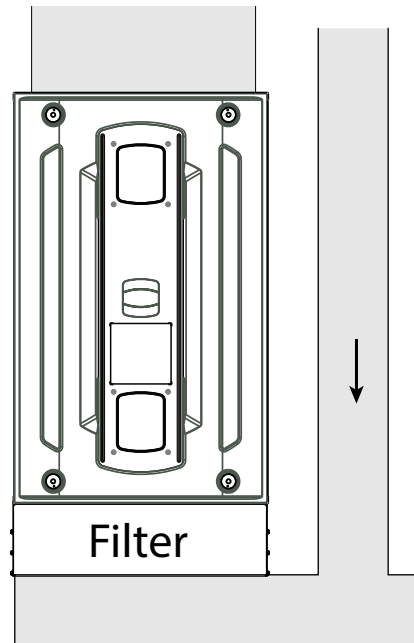
Refer to [Step 1.](#), [Step 5.](#), [Step 6.](#), [Step 4.](#)

**Upflow Furnace with Bottom Return Mounted on a Ducted Pedestal**



Refer to [Step 1.](#), [Step 7.](#), [Step 8.](#), [Step 4.](#)

**Upflow Furnace with Bottom Return Mounted on a Ducted Pedestal with Filter Box**

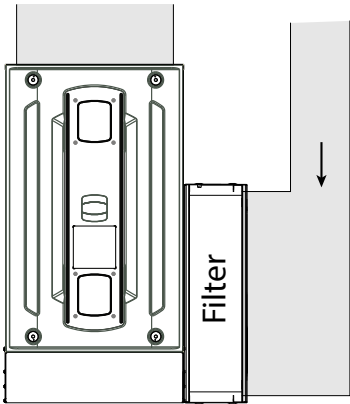


Refer to [Step 1.](#), [Step 9.](#), [Step 4.](#)

Table 24. Return Duct Connections (continued)

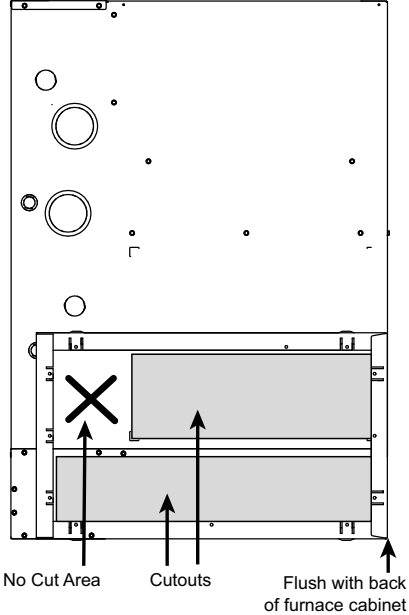
**Upflow Furnace with Bottom and Side Returns Mounted on a Ducted Pedestal with Side Return and Filter Box**

- Important:** Make sure the condensate and thermostat wiring holes are sealed on the cabinet side with the side return. The plugs and grommets may need to be changed with those on the opposite side of the cabinet.
- 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.



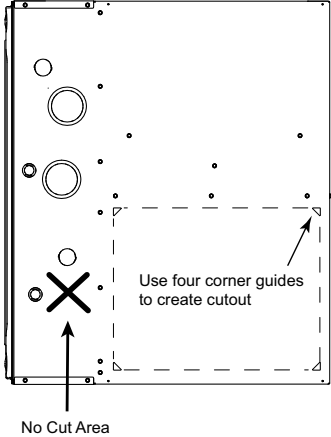
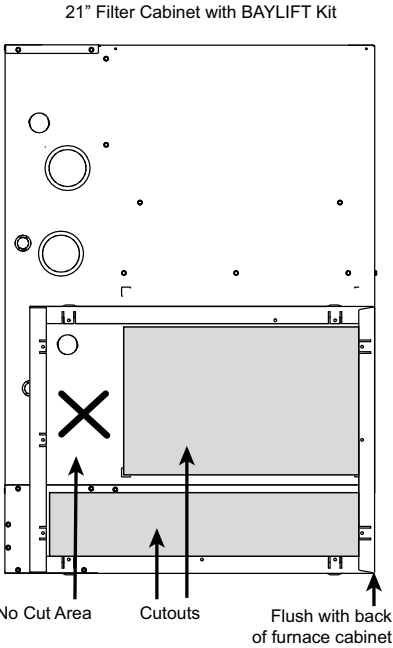
Refer to Step 1., Step 10., Step 11., Step 12., Step 13., Step 14., Step 15., Step 4.

17.5" Filter Cabinet with BAYLIFT Kit



**Upflow Furnace with Side Return**

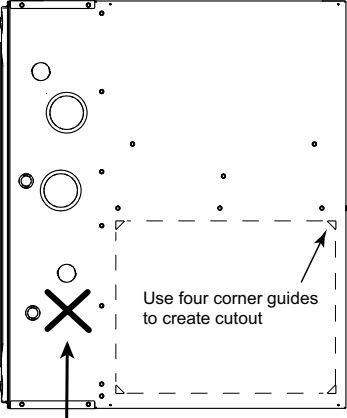
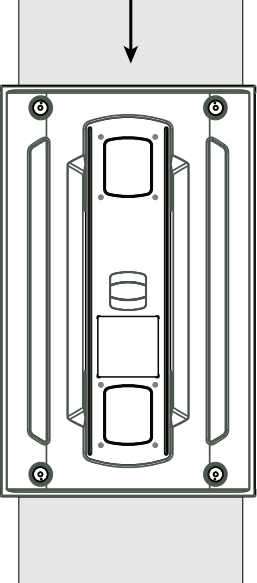
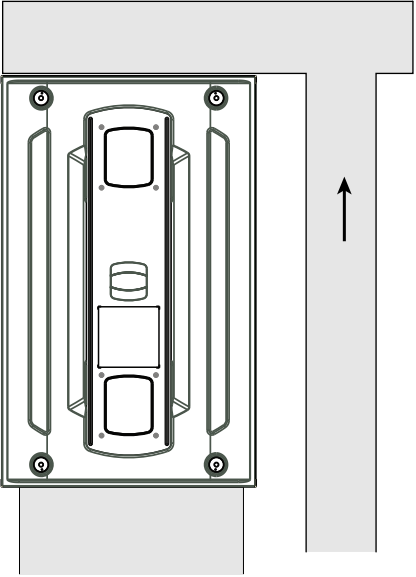
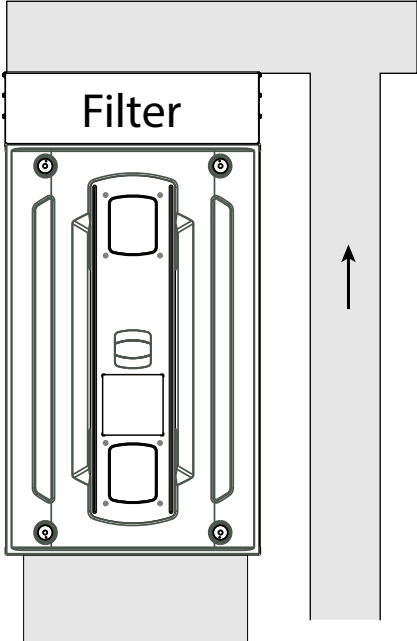
- Important:** Make sure the condensate and thermostat wiring holes are sealed on the cabinet side with the side return. The plugs and grommets may need to be changes with those on the opposite side of the cabinet.
- Important:** Make sure not to cut the cabinet in the "No Cut" area.
- Note:** Return air on right side with the condensate on the left or return air on left with the condensate on the right do not require a transition.
- Note:** If using a filter box, use a transition, if possible, to attach the filter box to the furnace cabinet.



Refer to Step 16., Step 17., Step 18., Step 19.

# Furnace General Installation

**Table 24. Return Duct Connections (continued)**

<p style="text-align: center;"><b>Upflow Furnace with Two Side Returns</b></p> <p><b>Important:</b> One of the sides must have a transition to allow the condensate and thermostat wiring to exit the cabinet.</p> <p><b>Important:</b> If a transition is not a viable option, a hole may be drilled in the bottom of the cabinet to allow the condensate to exit. Also, a hole will need to be drilled in the side of the cabinet for the thermostat wiring to exit.</p> <p><b>Important:</b> Make sure not to cut the cabinet in the "No Cut" area.</p> <p><b>Note:</b> If using one transition, the condensate and thermostat wiring will exit on the transition side.</p> <p><b>Note:</b> If using a filter boxes, use transitions, if possible, to attach the filter boxes to the furnace cabinet. If transitions are not used, condensate may exit through the bottom of the furnace.</p>  <p style="text-align: center;">No Cut Area</p> <p style="text-align: center;">Refer to <a href="#">Step 16.</a>, <a href="#">Step 17.</a>, <a href="#">Step 18.</a>, <a href="#">Step 19.</a></p>	<p style="text-align: center;"><b>Downflow Furnace with Top Return</b></p>  <p style="text-align: center;">Refer to <a href="#">Step 20.</a>, <a href="#">Step 21.</a>, <a href="#">Step 3.</a>, <a href="#">Step 4.</a></p>
<p style="text-align: center;"><b>Downflow Furnace with Top Return and Plenum</b></p>  <p style="text-align: center;">Refer to <a href="#">Step 20.</a>, <a href="#">Step 22.</a>, <a href="#">Step 3.</a>, <a href="#">Step 4.</a></p>	<p style="text-align: center;"><b>Downflow Furnace with Top Return and Plenum with Filter Box</b></p>  <p style="text-align: center;">Refer to <a href="#">Step 20.</a>, <a href="#">Step 23.</a>, <a href="#">Step 24.</a>, <a href="#">Step 4.</a></p>

### 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 grill 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.
20. Remove the top plate.
21. Attach the ducting to the top of the furnace.
22. Attach the plenum ducting to the top of the furnace.
23. Attach the filter box to the top of the furnace.
24. Attach ducting.

## Return Air Filters

### TYPICAL UPFLOW RETURN AIR FILTER INSTALLATIONS

Filters are not factory supplied for upflow 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.*

### Upflow Return Air Filters

Furnace Width	Filter Qty and Size
17-1/2"	1 – 16" x 25" x 1"
21"	1 – 20" x 25" x 1"
24-1/2"	1 – 24" x 25" x 1"

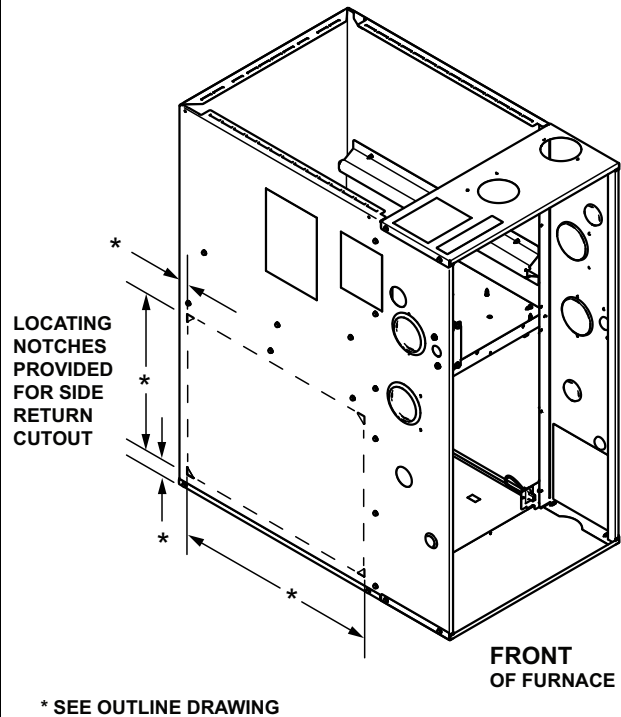
**Note:** *For upflow furnace models in any configuration, where the airflow requirement exceeds 1600 CFM - Furnaces will require return air openings and filters on: (1) both sides, or (2) one side and the bottom, or (3) just on the bottom.*

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

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

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.

### UPFLOW FURNACES ONLY

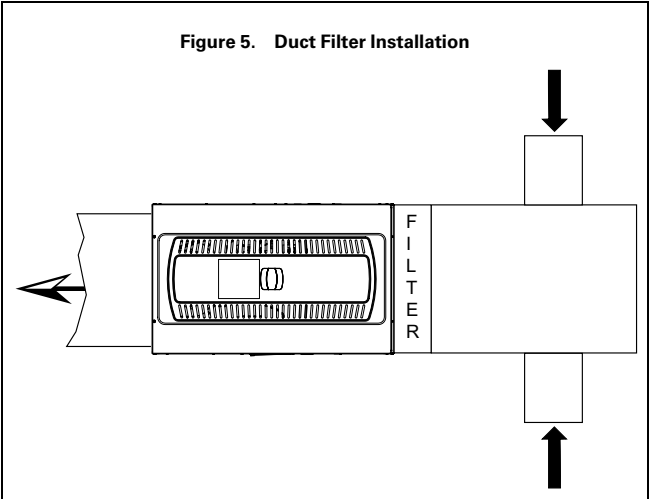
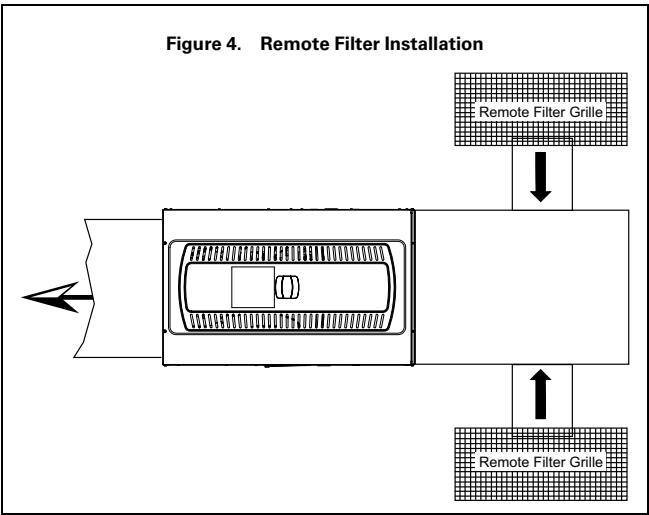


**RETURN AIR FILTERS FOR FURNACE IN HORIZONTAL CONFIGURATION**

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 4, p. 59 or the filters may be installed in the duct work upstream of the modular blower, refer to Figure 5, p. 59.

Filter kits are available for horizontal applications.

**Note:** Direct coupled side returns are not allowed to the blower cabinet.



**TYPICAL DOWNFLOW FURNACE RETURN AIR FILTER INSTALLATIONS**

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

Downflow Return Air Filters

Furnace Width	Filter Qty and Size
17-1/2"	2 - 14" x 20" x 1"
21"	2 - 16" x 20" x 1"
24-1/2"	2 - 16" x 20" x 1"

# Furnace General 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 Wiring Diagram section in this document and unit wiring diagram attached to furnace.

### ⚠ WARNING

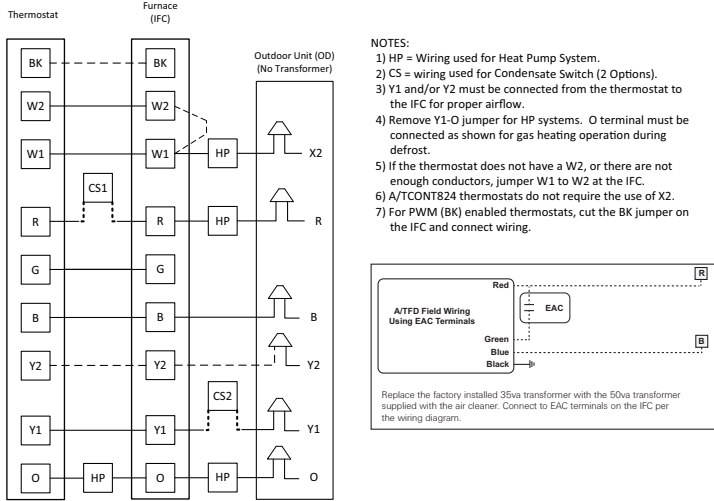
#### FIRE HAZARD!

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

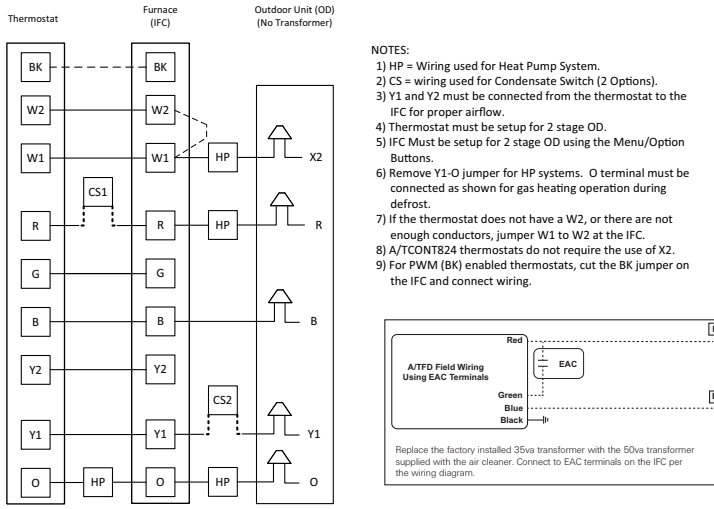
This Warning applies to installations with a flammable refrigeration system. The furnace must be powered except for service. The furnace shall be installed and connected according to installation instructions and wiring diagrams that are provided with the evaporator coil.

## Field Wiring

FIELD WIRING DIAGRAM FOR S9V2-VS WITH ONE / TWO STAGE AC OR HEAT PUMP



FIELD WIRING DIAGRAM FOR S9V2-VS WITH SINGLE STAGE AC OR HEAT PUMP WITH 2 STAGE AIRFLOW





# Condensate Drain Instructions

The following sections give general instructions for the installation of the gas furnace condensate drains. Repositioning of the condensate trap is covered in the exhaust air options section.

Cutouts with plugs and grommets are provided on the left and right hand side of the furnace cabinets for drain connections *IN VERTICAL APPLICATIONS*. The standard arrangement is for the drain connection on the left side. The tubing may have to be trimmed in this application to avoid kinking.

The **upflow (vertical application)** also has provisions for right side drain connections. Exchange the grommet and plugs from the left and right side. Trim all excess tubing to avoid kinking.

It is always recommended that an auxiliary drain pan be installed under a horizontally installed evaporator or 90% Gas Furnace. Connect the auxiliary drain line to a separate drain line (no trap is needed in this line).

**Horizontal applications require repositioning the condensate canister trap. Additionally the drain tubing connected to the inducer housing may need to be repositioned for removing the plug and reconnecting the tubing to the lower connection on the inducer housing.**

Connections must be made to an **OPEN/ VENTED DRAIN**.

**Note:** All condensate drain piping supplies included with the furnace are intended for internal piping only and should not be applied external to the furnace. All external piping must use 1/2" minimum size PVC pipe and fittings throughout for drain connections (fittings, pipe and PVC solvent cement not provided with furnace, must be field supplied). A 3/4" coupling is supplied to connect to systems that are using 3/4" piping with an air conditioner coil.

**Note:** A corrosion resistant condensate pump must be used if a pump is required for a specific drain system.

## Vertical Applications

<p><b>Upflow furnace</b></p> <ol style="list-style-type: none"> <li>1. Remove the plug from the side panel where the condensate will exit.</li> <li>2. Install the condensate grommet into the side panel.</li> <li>3. Install the connection tubing from the trap to the side of the unit and trim all excess tubing to avoid kinks.</li> </ol>	<p><b>Note:</b> For easiest installation, remove the spring clip from the end of the condensate line and feed through the grommet.</p> <p><b>Important:</b> Condensate grommet must be installed for proper operation.</p>
--	--

**⚠ CAUTION**

**Water Damage/Property Damage!**  
It is recommended that a drain pan be installed under the furnace to prevent property damage or personal injury from leaking condensate.

**Important:** The condensate drain should be installed with provisions to prevent winter freeze-up of the condensate drain line. Frozen condensate will block drains, resulting in furnace shutdown. If the drain line cannot be installed in a conditioned space and/ or its surrounding ambient temperature is expected to fall below freezing, then heat tape should be applied as required to prevent freezing (per manufacturer's instructions). The heat tape should be rated at 5 or 6 watts per foot at 120 volts. Self-regulating (preferred) or thermostatically controlled heat tape is required.

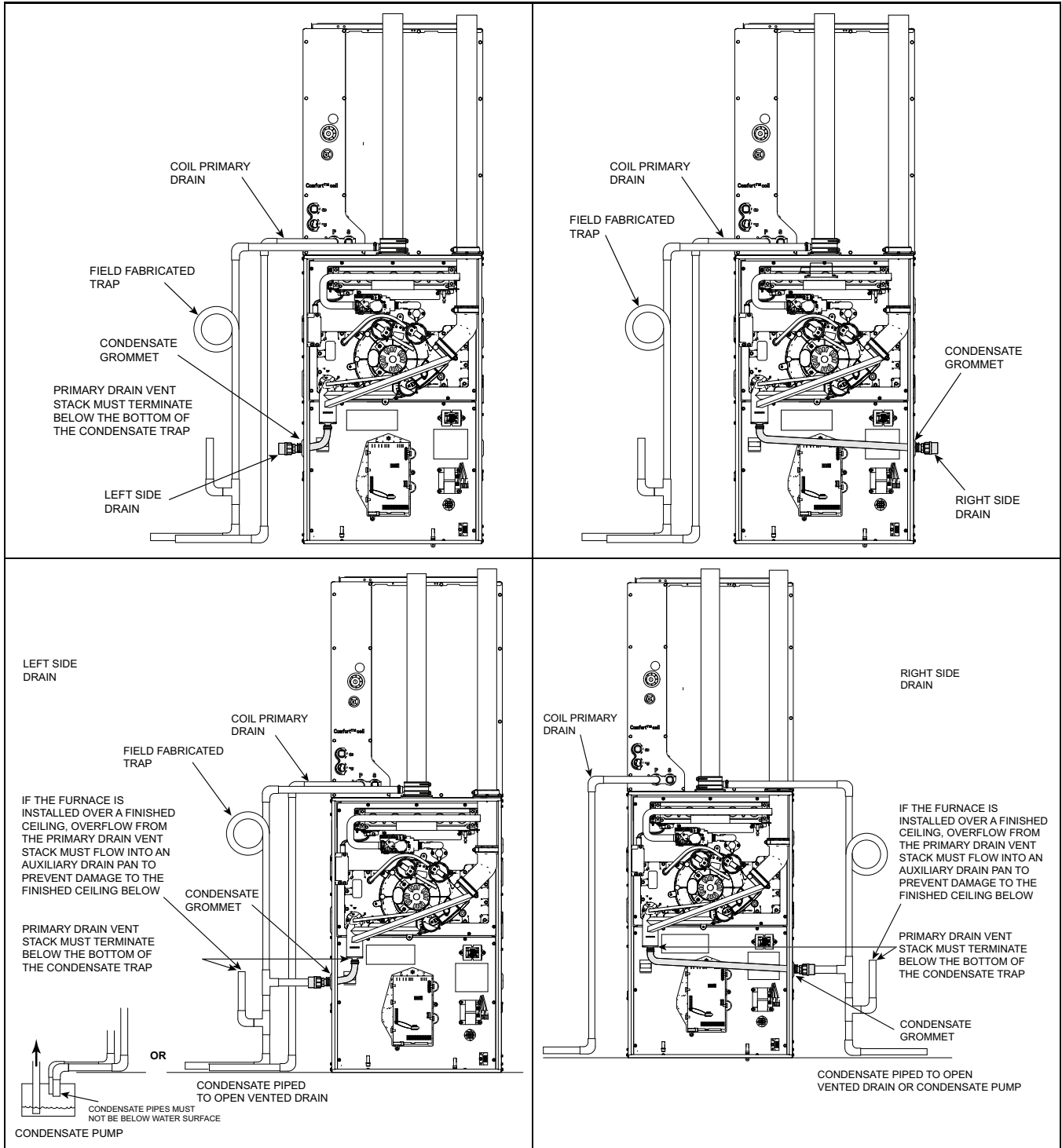
Typical sources of UL listed heat tapes are W.W. Granger, Inc. (Wintergard Plus™ Series), McMaster Carr Supply Co. (3554 Series), or your equipment supplier.

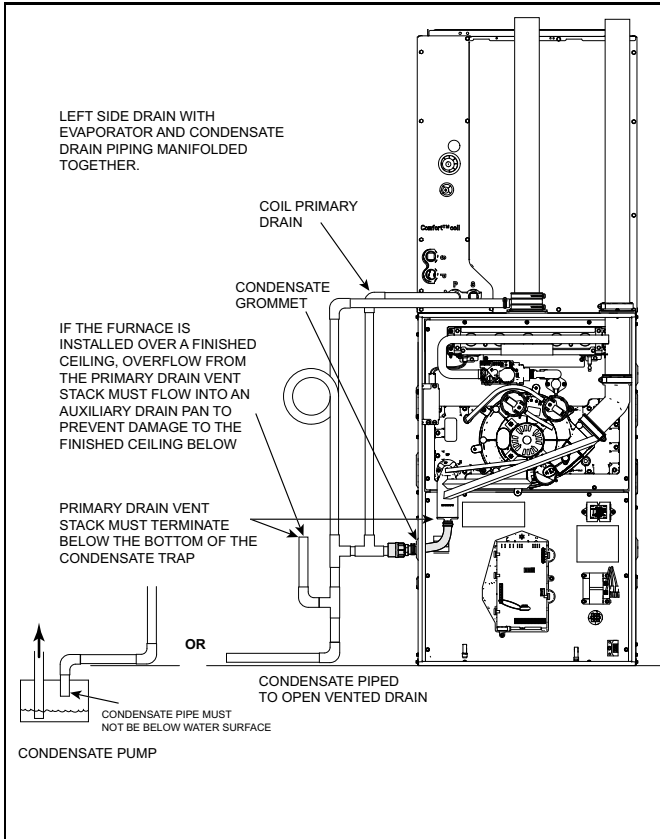
The condensate drain may be cleaned or inspected by removal of the drain tube at the header.

Evaporator and Furnace condensate drain piping may be manifolded together. A primary drain vent stack must be installed and terminated below the outlet of the secondary heat exchanger drain connection to prevent water from damaging Furnace controls if the primary drain outlet plugs up.

**Where the Furnace is installed above a finished ceiling, the primary drain vent stack must be installed such that overflow from the vent stack opening will flow into an auxiliary drain pan in order to prevent water damage to the finished ceiling below.**

# Condensate Drain Instructions





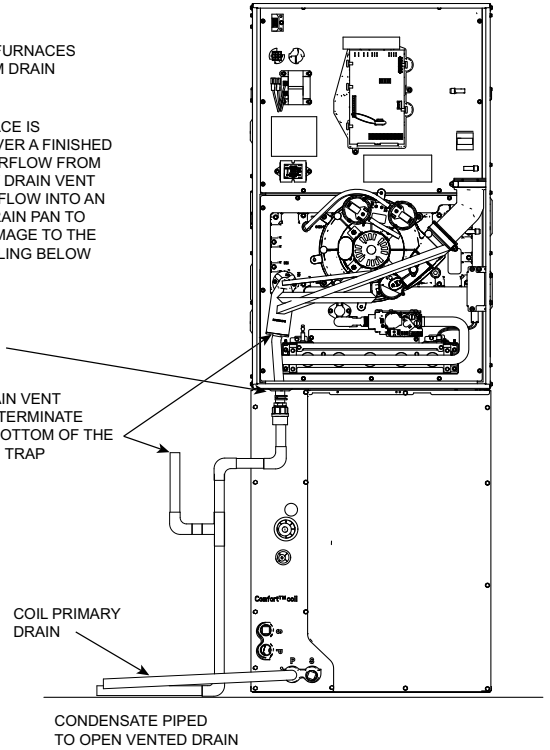
**Downflow furnace** - Cut the 90 degree section of the condensate tubing off and connect the tubing to the condensate trap. Install the condensate grommet into the bottom panel. Cut to length as needed.

**DOWNFLOW FURNACES WITH BOTTOM DRAIN**

IF THE FURNACE IS INSTALLED OVER A FINISHED CEILING, OVERFLOW FROM THE PRIMARY DRAIN VENT STACK MUST FLOW INTO AN AUXILIARY DRAIN PAN TO PREVENT DAMAGE TO THE FINISHED CEILING BELOW

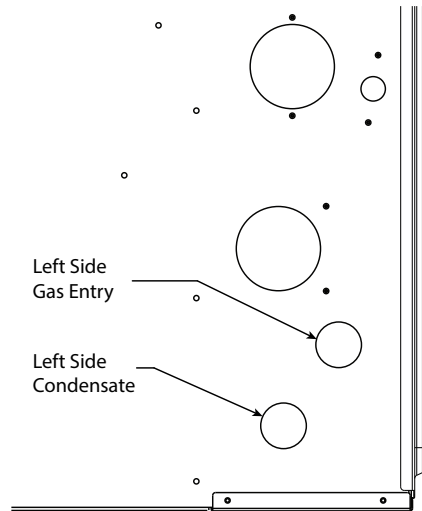
CONDENSATE GROMMET

PRIMARY DRAIN VENT STACK MUST TERMINATE BELOW THE BOTTOM OF THE CONDENSATE TRAP

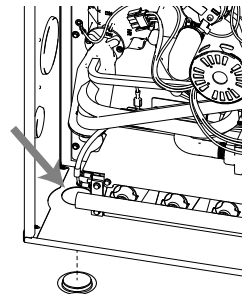


**Downflow furnace with Left Side Condensate**

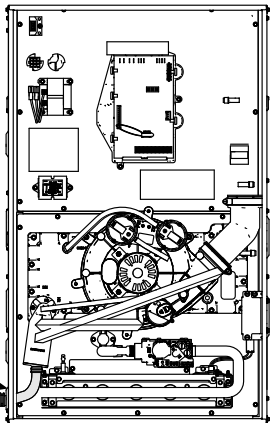
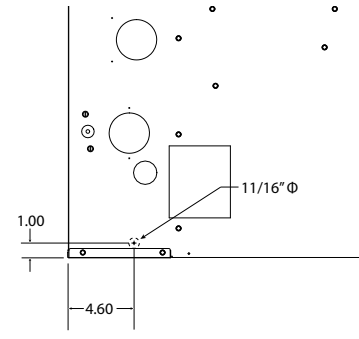
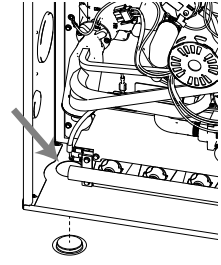
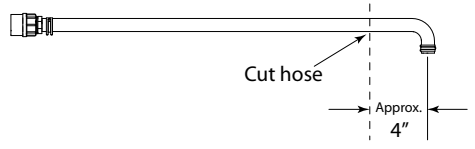
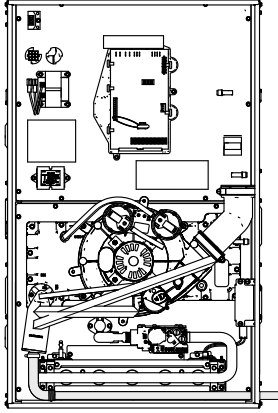
1. Remove left hand condensate plug.
2. Install into bottom cross member.



Plug the bottom hole with plug provided in document pack.



# Condensate Drain Instructions

<p>Attaching the condensate drain line.</p> <ol style="list-style-type: none"> <li>1. Locate the condensate grommet and the condensate drain line assembly in the doc pack.</li> <li>2. Insert the condensate grommet in the 1-5/8" hole in the side of the cabinet.</li> <li>3. Remove the fitting at the end of the drain line assembly and insert it through the cabinet from the inside out. Attach the 90 degree section of the hose to the condensate drain trap.</li> <li>4. Cut off the excess tube and reinstall the end fitting to the drain hose.</li> </ol>	<p>DOWNFLOW FURNACES LEFT SIDE DRAIN</p> <p>BOTTOM HOLE MUST BE PLUGGED.</p> <p>IF THE FURNACE IS INSTALLED OVER A FINISHED CEILING, OVERFLOW FROM THE PRIMARY DRAIN VENT STACK MUST FLOW INTO AN AUXILIARY DRAIN PAN TO PREVENT DAMAGE TO THE FINISHED CEILING BELOW</p>  <p>CONDENSATE GROMMET</p>
<p><b>Downflow furnace with Right Side Condensate</b> - Drill an 11/16 inch diameter hole in the right side of the case at the dimensions shown.</p>	 <p>11/16" <math>\Phi</math></p> <p>1.00</p> <p>4.60</p>
<p>Plug the bottom hole with plug provided in document pack.</p>	
<p>Attaching the condensate drain line.</p> <ol style="list-style-type: none"> <li>1. Locate the condensate drain line assembly in the doc pack.</li> </ol> <p><b>Important:</b> <i>It is best to cut the condensate drain hose assembly longer than 4 inches and then fit in place. It can then be trimmed to needed length. The 4 inch measurement is an approximation.</i></p> <ol style="list-style-type: none"> <li>2. Cut the condensate drain line assembly as shown.</li> <li>3. Use a field supplied hose clamp to secure the condensate drain line to the condensate trap.</li> <li>4. Insert a field supplied piece of 1/2" CPVC pipe through the 11/16" hole drilled through the cabinet and insert into drain line hose. Secure with the spring clip.</li> </ol> <p><b>Note:</b> <i>Seal around the condensate drain tubing where it exits the cabinet.</i></p>	 <p>Cut hose</p> <p>Approx. 4"</p> <p>DOWNFLOW FURNACES RIGHT SIDE DRAIN</p> <p>11/16" DIAMETER HOLE MUST BE CUT IN RIGHT SIDE OF CASE. BOTTOM HOLE MUST BE PLUGGED. CUT FACTORY SUPPLIED CONDENSATE ASSEMBLY HOSE AND ATTACH TO FIELD SUPPLIED CPVC TUBE. SECURE WITH SPRING CLIP AND FIELD SUPPLIED HOSE CLAMP.</p> <p>IF THE FURNACE IS INSTALLED OVER A FINISHED CEILING, OVERFLOW FROM THE PRIMARY DRAIN VENT STACK MUST FLOW INTO AN AUXILIARY DRAIN PAN TO PREVENT DAMAGE TO THE FINISHED CEILING BELOW</p> 

Horizontal Applications

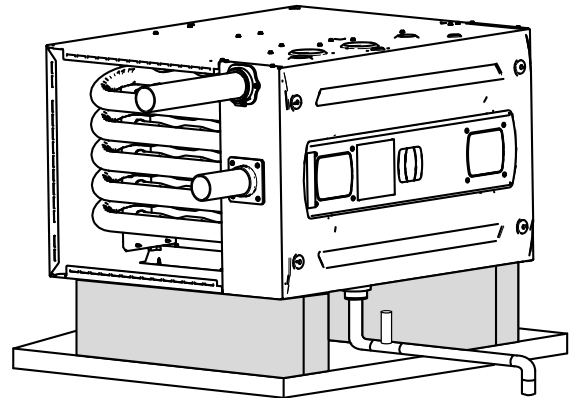
**HORIZONTAL APPLICATIONS**

**Upflow models in horizontal** - It is always recommended that the auxiliary drain pan be installed under a horizontally installed evaporator and/or 90% gas furnace. Connect the auxiliary drain pan to a separate drain line (no trap is needed in this line). Connections must be made to an **OPEN/VENTED DRAIN**. Outdoor draining of the furnace and coil condensate is permissible if allowed by local codes. Caution should be taken to prevent drains from freezing or causing slippery conditions that could lead to personal injury. Excessive draining of condensate may cause saturated ground conditions that may result in damage to plants.

**Note:** Use 1/2" or larger PVC or CPVC pipe and fittings as required for drain connections (fittings, pipe and solvent cement not provided).

**Note:** A corrosion resistant condensate pump must be used if a pump is required for a specific drain system.

**Important:** The condensate drain should be installed with provisions to prevent winter freeze-up of the condensate drain line. Frozen condensate will block drains, resulting in furnace shutdown. If the drain line cannot be installed in a conditioned space, then UL listed heat tape should be applied as required to prevent freezing (per manufacturer's instructions). The heat tape should be rated at 5 or 6 watts per foot at 120 volts. Self-regulating (preferred) or thermostatically controlled heat tape is required.



FURNACE MUST BE SUPPORTED AT ALL FOUR CORNERS. BAYHANG - OPTIONAL HORIZONTAL HANGING BRACKET KIT

TO APPROVED OPEN / VENTED DRAIN

**Note:** The overflow stand pipe termination must be even with or slightly below the bottom of the condensate trap.

**Note:** Water from the overflow pipe must drain into the emergency drain pan.

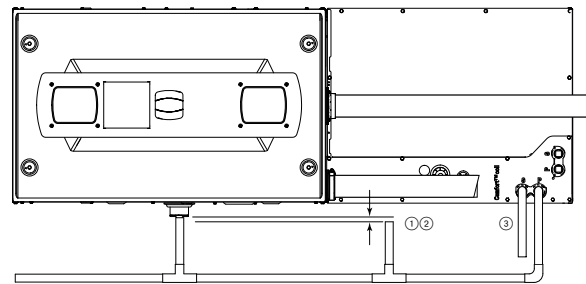
To prevent AC condensate from backing up into the furnaces, follow these instructions for condensate drainage.

**Note:** 1. The overflow stand pipe termination must be even with or slightly below than the bottom of the condensate trap.

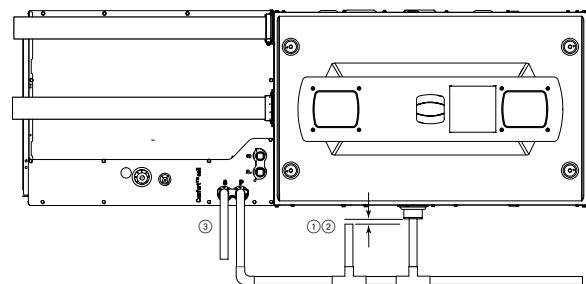
**Note:** 2. Water from the overflow pipe must drain into the emergency drain pan.

**Note:** 3. It is recommended to use the secondary drain. The secondary drain pipe must terminate over the emergency drain pan.

**Note:** 4. Emergency drain pan.



Horizontal Right



Horizontal Left

**NOTICE**

**PROPERTY DAMAGE!**

Failure to follow this Notice could result in intermittent operation, improper operation, or product damage.

A blocked main drain with an overflow standpipe that is higher than the bottom of the condensate trap and/or a condensate pressure switch hose that is not trimmed to fit can result in an E09 Condensate Pressure Switch Trip error or in extreme cases, an E04 Rollout Thermal Limit Trip error.

An overflow standpipe must be installed. The overflow standpipe must have an opening even with or slightly below the bottom of the condensate trap. The condensate pressure switch hose must be trimmed to fit.

# General Start-up and Adjustment

The following sections give instructions for the general start-up and adjustment of the gas furnaces.

## Preliminary Inspections

<p><b>With gas and electrical power "OFF", ensure:</b></p> <ol style="list-style-type: none"> <li>1. Duct connections are properly sealed.</li> <li>2. Filters are in place.</li> <li>3. Venting is properly assembled.</li> <li>4. Blower vestibule panel is in place and all screws in place.</li> </ol>	<p>Turn knob on main gas valve within the unit to the "<b>OFF</b>" position. 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.</p> <p>— <b>DO NOT CHECK WITH AN OPEN FLAME.</b> Allow 5 minutes for any gas that might have escaped to dissipate. Turn the gas valve in the unit to the "ON" position.</p> <p>Propane Gas being heavier than air may require forced ventilation. Turn the toggle switch on the Gas Valve in the unit to the "ON" position.</p>
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## Lighting Instructions

<p>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.</p> <p>Turn on the main electrical supply and set the comfort control above the indicated temperature. The igniter will automatically heat, then 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.</p>	<p style="text-align: center;"><b>⚠ WARNING</b></p> <p><b>FIRE OR EXPLOSION HAZARD!</b></p> <p>Failure to follow this Warning could result in property damage, severe personal injury, or death. Do <b>NOT</b> attempt to manually light the furnace.</p>
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<p><b>To shut off</b></p> <p>For complete shutdown: Turn the toggle or control switch located on the main gas valve inside the unit to the "OFF" position and the external main gas shutoff valve to the "OFF" position. Disconnect the electrical supply to the unit.</p>	
<p>Whenever your house is to be vacant, arrange to have someone inspect your house for proper temperature. This is very important during freezing weather. If for any reason your furnace should fail to operate damage could result, such as frozen water pipes.</p>	<p style="text-align: center;"><b>⚠ CAUTION</b></p> <p><b>FREEZE CAUTION!</b></p> <p>Failure to follow this Caution could result in property damage or personal injury. If complete furnace shutdown is done during the cold weather months, provisions must be taken to prevent freeze-up of all water pipes and water receptacles.</p>

## Control and Safety Switch Adjustment

<p><b>LIMIT SWITCH CHECK OUT</b></p> <p>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 <b>must be checked out on initial start up by the installer.</b></p>	<p>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.</p>
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# Furnace Combustion Air Exhaust Options

**Important:** All plugs must be in place for sealed combustion.

**Note:** Default is left side for electric and natural gas connections. Default for the combustion air inlet and exhaust is top of the furnace.

**Important:** If the locations are changed from the defaults, the default holes not being used must be plugged.

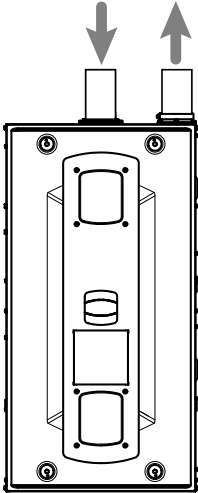
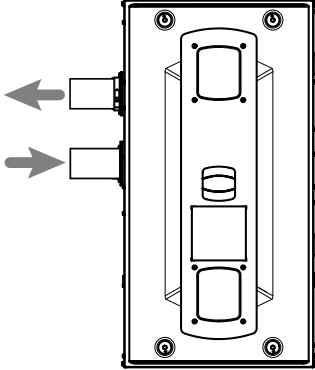
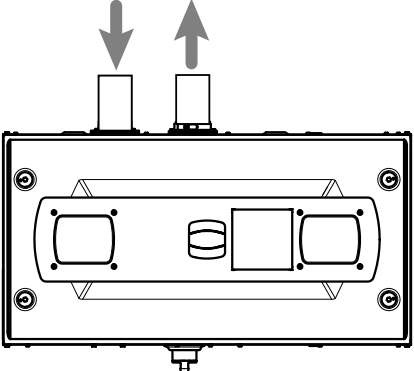
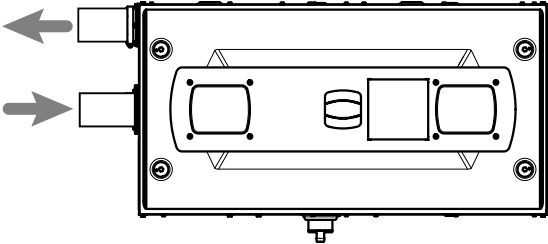
**Note:** If the electrical and natural gas connections are moved to the right side, remove the plugs and move them to the left side. The grommets will move from the left side to the right side.

**Note:** The grommets are different for the natural gas and condensate connections.

The following sections give instructions for the different furnace orientations and the options for venting the inlet and 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.

**Table 25. Combustion Air Venting Options**

<p><b>Refer to the illustrations below to find the approved venting options for upflow and horizontal left furnace models.</b></p> <p><b>Important:</b> The combustion air exhaust must be vented to the outdoors.</p> <p><b>Note:</b> The combustion air inlet does not have to be on the same side as the combustion air exhaust.</p> <p><b>Note:</b> Right side combustion air entry is allowed in upflow applications.</p>	
Upflow Orientation or Installation	
<p>Combustion air exhaust vented out top.</p> 	<p>Combustion air exhaust vented through left side.</p> 
Horizontal Left Orientation or Installation	
<p>Combustion air exhaust vented out top.</p> 	<p>Combustion air exhaust vented through left side.</p> 

# Furnace Combustion Air Exhaust Options

**Table 26. Combustion Air Venting Options Continued**

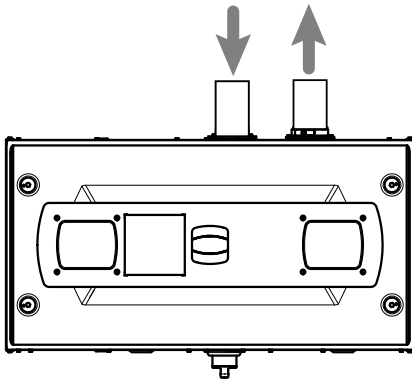
Refer to the illustrations below to find the approved venting options for horizontal right furnace models.

**Important:** The combustion air exhaust must be vented to the outdoors.

**Note:** The combustion air inlet does not have to be on the same side as the combustion air exhaust.

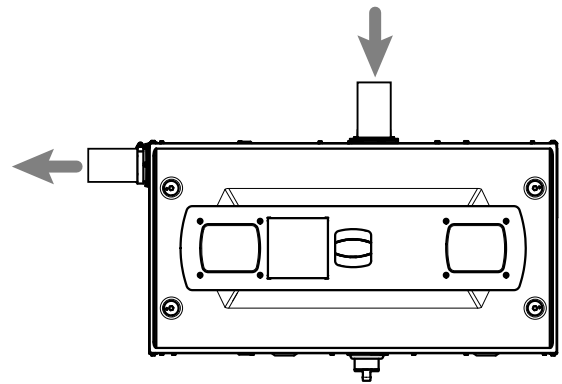
**Horizontal Right Orientation or Installation**

Combustion air exhaust vented out top.



Combustion air exhaust vented through left side.

**Note:** Requires a hole to be drilled in the case.



Refer to the illustrations below to find the approved venting options for downflow furnace models.

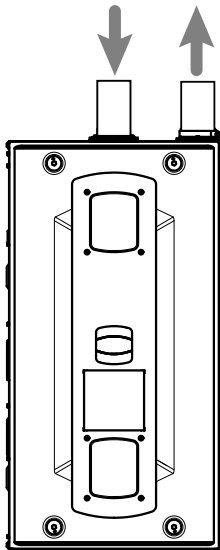
**Important:** The combustion air exhaust must be vented to the outdoors.

**Note:** The combustion air inlet does not have to be on the same side as the combustion air exhaust.

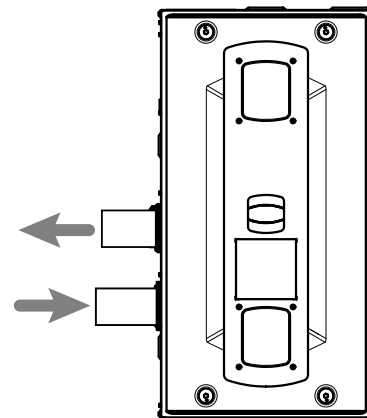
**Note:** Right side combustion air entry is allowed.

**Downflow Orientation or Installation**

Combustion air exhaust vented out top.



Combustion air exhaust vented through left side.

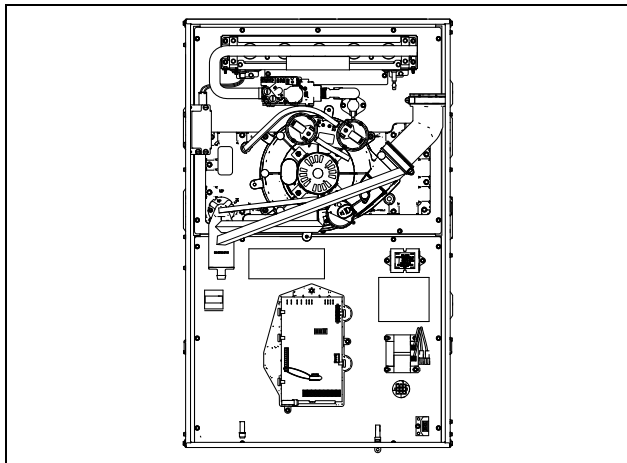




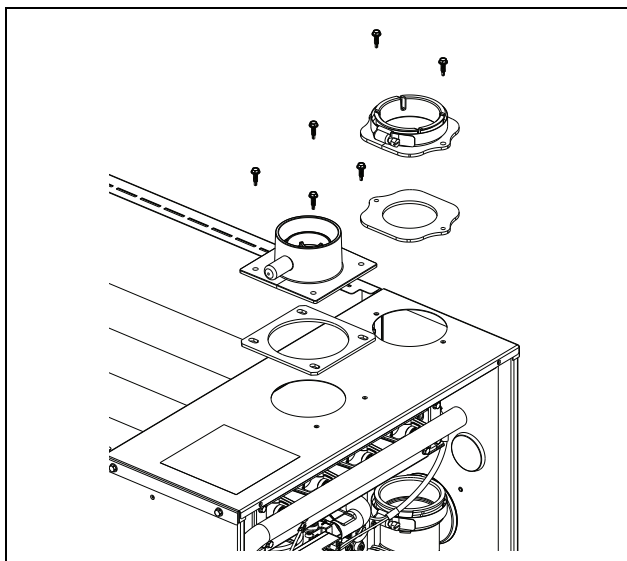
## Upflow Furnace in Upflow Position - Top Vented Combustion Air

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

**Important:** Trim the condensate pressure switch tubing to length to ensure there is no sag or trap created.



1. Attach the vent outlet gasket to the vent outlet.
2. Install vent outlet to top of cabinet using 2 screws supplied in the doc pack.
3. Install vent inlet gasket and vent inlet using 4 screws supplied in the doc pack.



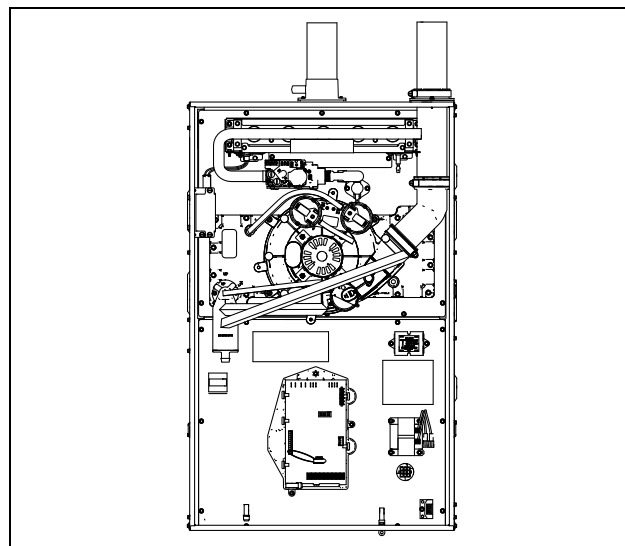
4. Slide PVC pipe through vent outlet adaptor and insert into inducer outlet.
5. Twist to insure PVC is fully inserted.

6. Tighten the clamp on the end of the 45 degree elbow.
7. Tighten the clamp on the outlet vent adapter.

**Note:** The vent outlet adapter is used for strain relief against the weight of the venting. The clamp should be tightened after the internal connection is made.

8. Install the combustion air inlet PVC pipe.

**Note:** If required, transition to larger venting within 2' of the cabinet. CPL01544 - 2" x 3" offset coupling may be used and is factory supplied with 120 KBTUH furnaces. Canadian applications may use BAYREDUCE to meet ULC-S636 requirements.



## Upflow Furnace in Upflow Position - Left Side Vented Combustion Air

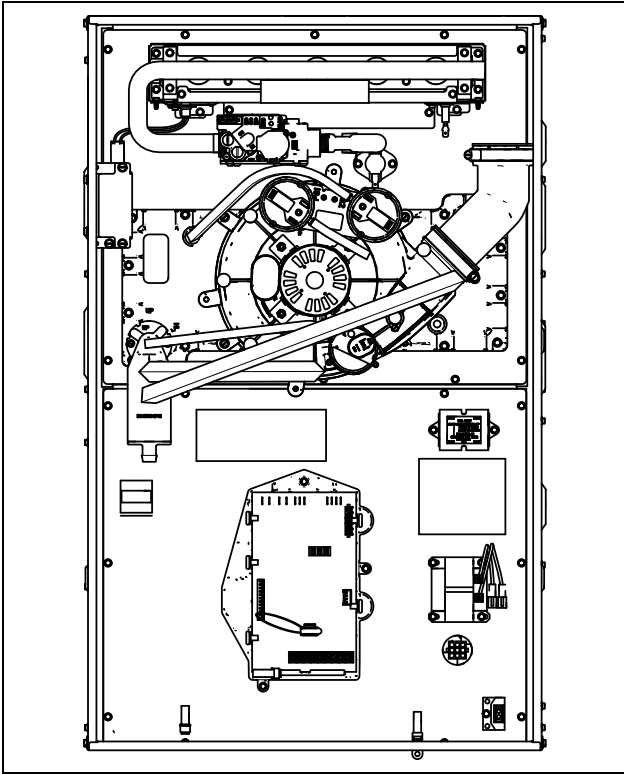
Changes need to be made to the inducer orientation when installing the upflow furnace with the combustion air vented through the side. Additional changes are needed for hose routing and PS2 rotation.

The figure to the top left in next page shows the furnace as it is sent from the factory.

Use the following steps to modify the furnace for upflow with side venting of combustion air.

**Important:** Right side vent outlet is not allowed because condensate will not drain.

## Furnace Combustion Air Exhaust Options

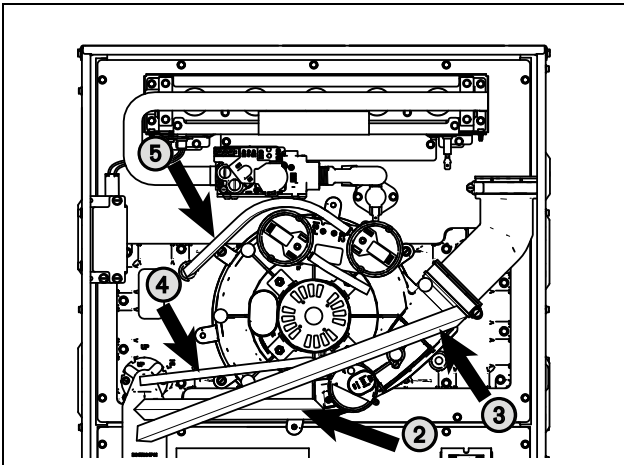


Before proceeding, lay unit on its back to make conversion easier.

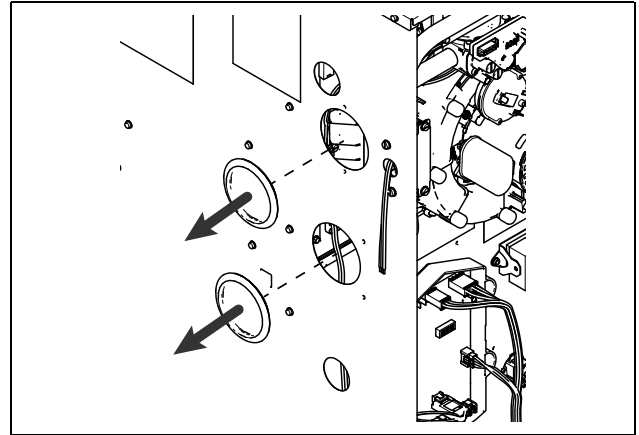
1. Disconnect all drain tubes from condensate trap.

**Note:** When removing condensate hoses from the condensate trap, hold the trap with your hand to prevent the trap from breaking. Removing the trap before the hoses is also an option.

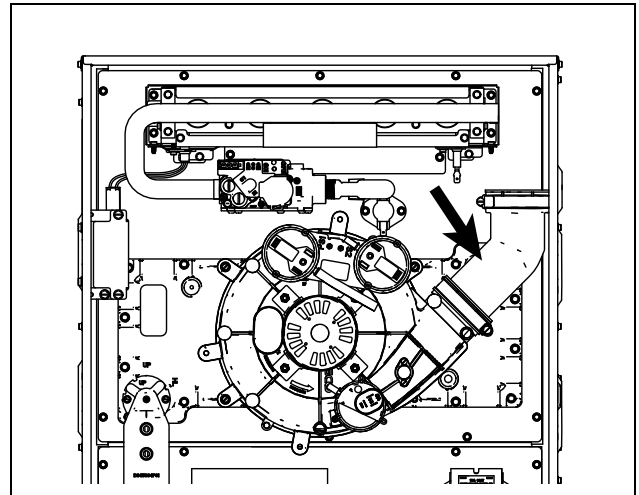
2. Remove drain tubing from bottom of inducer housing.
3. Remove rain gutter tubing from inducer outlet.
4. Remove tubing from condensate pressure switch.
5. Remove tubing from PS2 to cold header.



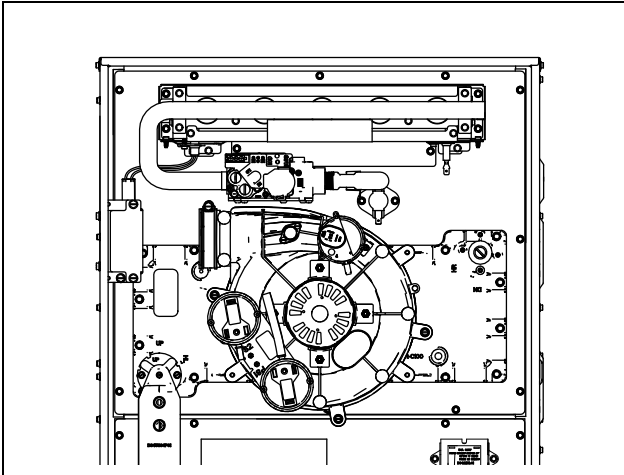
6. Remove two 3" plugs on left side of cabinet. To be used for combustion air and vent exhaust.
7. Install the two 3" plugs into the two 3" default openings on the top of the cabinet.



8. Loosen the clamp holding the 45° elbow. Remove the elbow and discard.

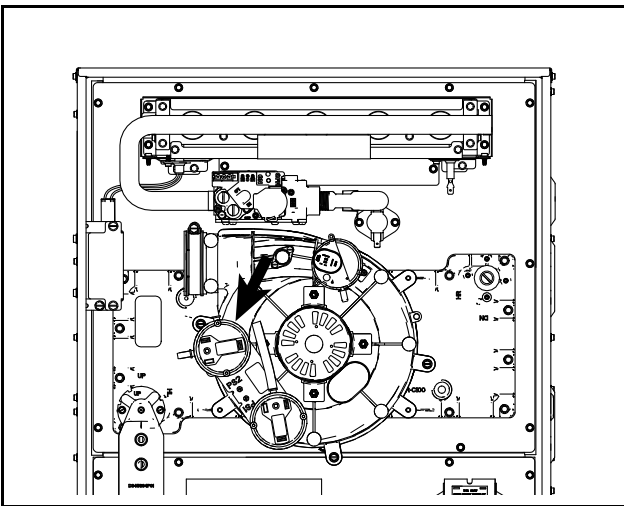


9. Remove the three inducer mounting screws.
10. Rotate inducer counter-clockwise so that the inducer outlet aligns with the exhaust vent outlet.
11. Insert and re-tighten screws to 30 in.-lbs. Do not overtighten.

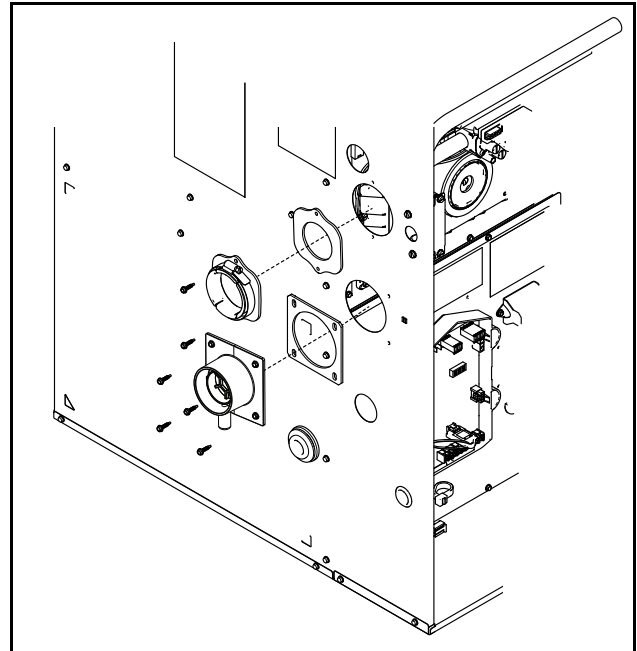


12. Remove the pressure switch bracket assembly.
13. Remove the screw that holds PS2, rotate 90 degrees clockwise, and reattach.
14. Reattach the pressure switch bracket assembly.

**Note:** Illustration below shows the PS2 pressure switch in the final rotated position.



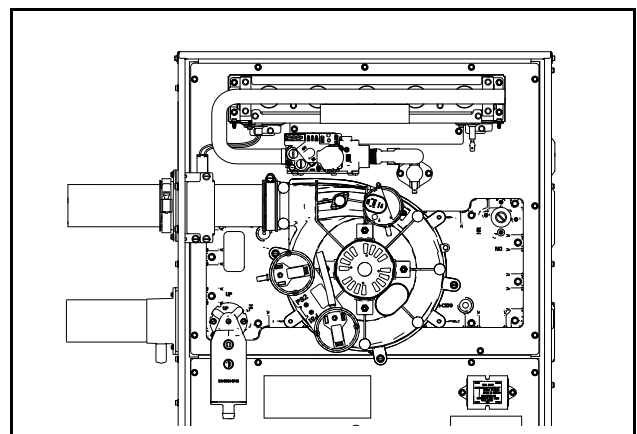
15. Attach the vent outlet gasket to the vent outlet.
16. Install vent outlet to top of cabinet using 2 screws supplied in the dock pack.
17. Install vent inlet gasket and vent inlet using 4 screws supplied in the dock pack.
18. Install the grommet for the condensate drain tube. The drain may be located on either side of the cabinet.



19. Slide PVC through vent outlet adaptor and insert into inducer outlet.
20. Twist to insure PVC is fully inserted.
21. Tighten the two clamps.
22. Install the combustion air inlet pipe.

**Note:** The vent outlet adaptor is used for strain relief against the weight of the venting. The clamp should be tightened after the internal connection is made.

**Note:** If required, transition to larger venting within 2' of the cabinet. An 2" x 3" offset coupling is required if the transition is made in a horizontal plane. Use coupling CPL01544 (Canadian applications may use BAYREDUCE to meet ULC-S636 requirements.) See Horizontal Venting section for proper orientation of 2" x 3" offset coupling.



23. Connect PS2 tubing to switch and sensing location.

## Furnace Combustion Air Exhaust Options

**Important:** Trim the condensate pressure switch tubing to length to ensure there is no sag or trap created.

24. Remove port cap at bottom of inducer and connect inducer condensate tubing. Connect other end of inducer condensate tubing to top port on the condensate trap. Cut tubing to length, if necessary.

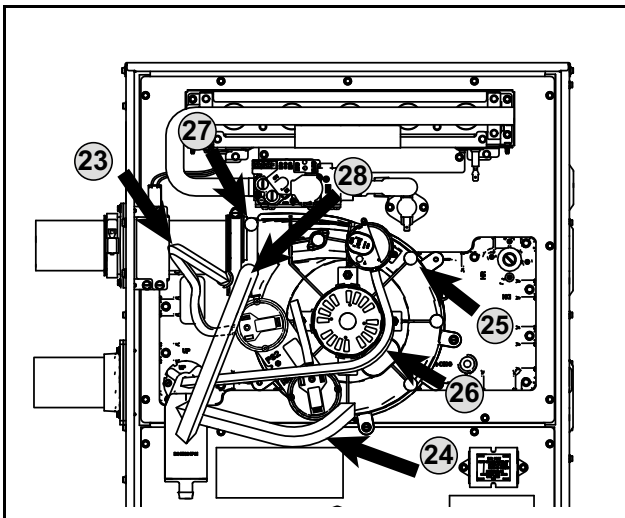
25. Install previously removed port cap onto bottom port of the inducer. (As viewed in upflow)

26. Connect condensate pressure switch tubing to pressure port on the condensate trap.

**Important:** Trim the condensate pressure switch tubing to length to ensure there is no sag or trap created.

27. Remove port plug from rain gutter and install in new position on opposite side of the rain gutter.

28. Connect rain gutter condensate hose to the rain gutter and the lower port of the condensate trap. Cut to length, if necessary.

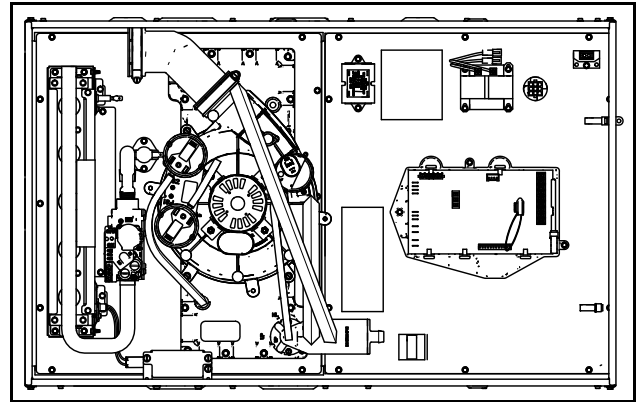


### Upflow Furnace in Horizontal Left Position - Top Vented Combustion Air

Changes need to be made to the inducer orientation when installing the upflow furnace in the horizontal left position with the combustion air vented through the side. Additional changes are needed for hose routing, condensate trap orientation, and inducer hoses.

The figure to the top right shows the furnace as it is sent from the factory.

Use the following steps to modify the furnace for horizontal left with side venting of combustion air.



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

1. Remove all drain hoses from condensate trap.

**Note:** When removing condensate hoses from the condensate trap, hold the trap with your hand to prevent the trap from breaking. Removing the trap before the hoses is also an option.

2. Remove tubing from PS2 to cold header.

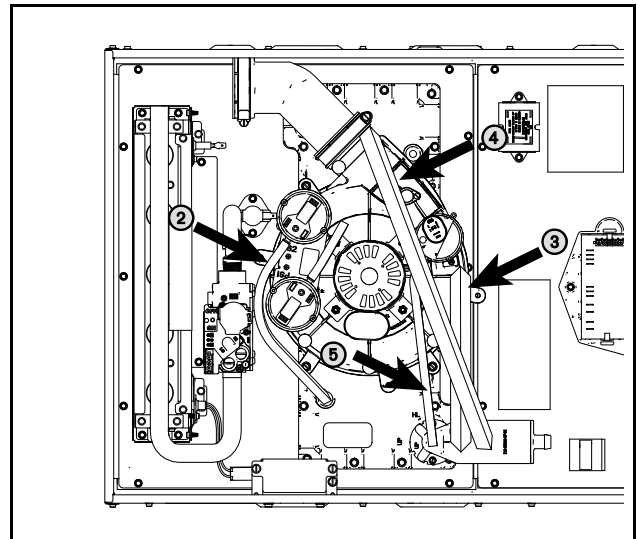
3. Remove drain tubing from bottom of inducer housing.

4. Remove rain gutter tubing from inducer outlet.

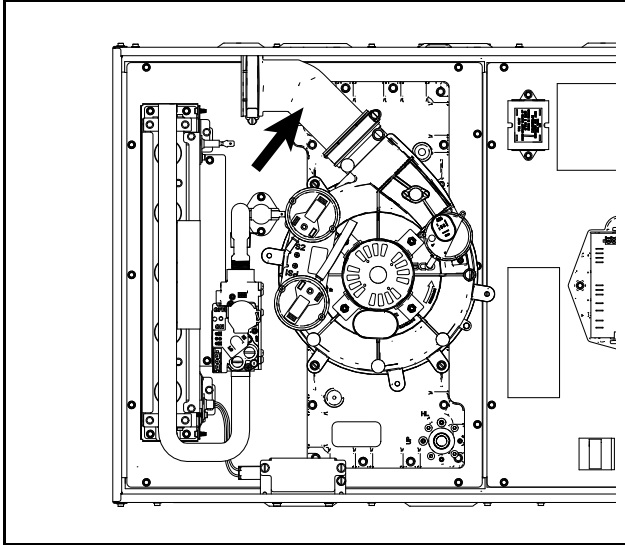
5. Remove tubing from condensate pressure switch.

6. Remove the screws that hold the condensate trap bracket. The condensate trap should not be removed from the condensate trap bracket. Remove assembly and retain for later installation.

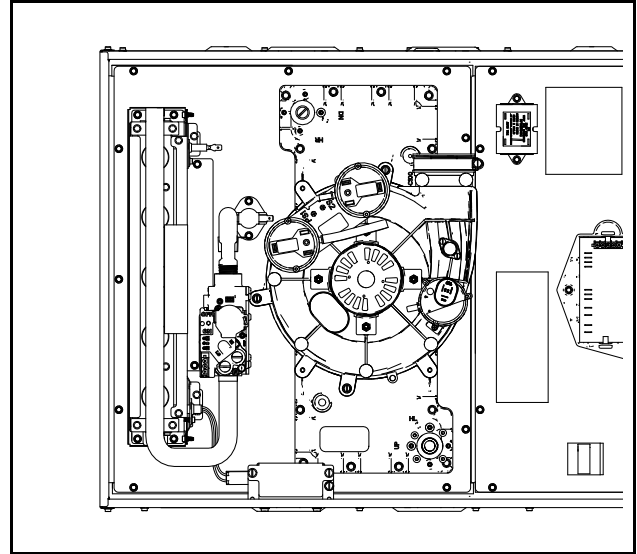
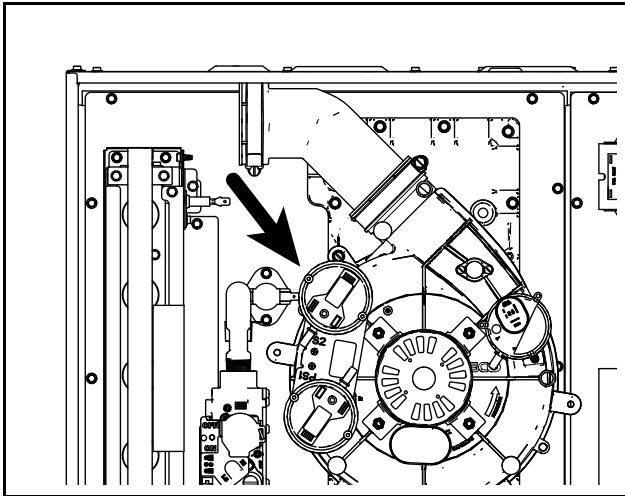
**Note:** There is a plastic adapter with O-rings located inside the cold header that is held in place by the condensate trap bracket. Do not lose this adapter. This adapter needs to be in place when the condensate trap bracket is reattached.



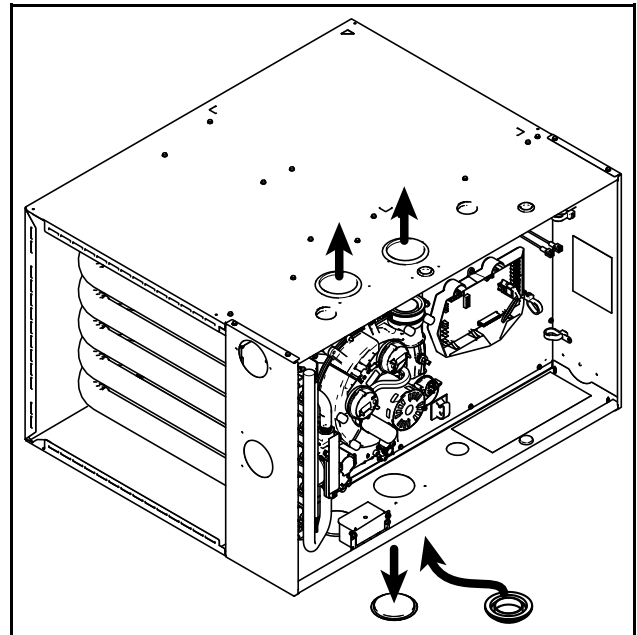
7. Loosen the clamp holding the 45° elbow. Remove the elbow and discard.



8. Remove three inducer screws.  
 9. Rotate the inducer so that the outlet is pointing vertically.  
 10. Use the three screws to reattach the inducer to the cold header to 30 in.-lbs. Do not overtighten.

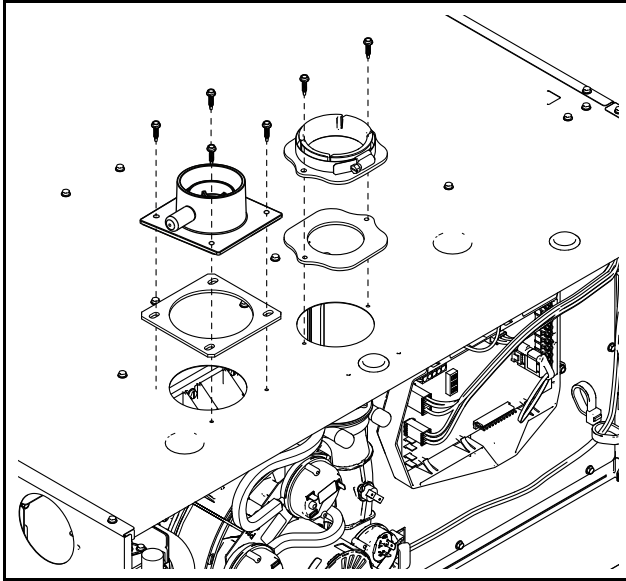


11. Remove 3" plug on left side of unit. To be used for condensate trap.  
 12. Install condensate trap grommet.  
 13. Remove two 3" plugs on right side of cabinet. To be used for combustion air exhaust and inlet.  
 14. Reuse the two 3" plugs to seal the two 3" default openings on the top of the furnace.



15. Attach the vent outlet gasket to the vent outlet.  
 16. Install vent outlet to top of cabinet using 2 screws supplied in the dock pack.  
 17. Install vent inlet gasket and vent inlet using 4 screws supplied in the dock pack.

## Furnace Combustion Air Exhaust Options



18. Slide PVC through vent outlet adaptor and insert into inducer outlet.

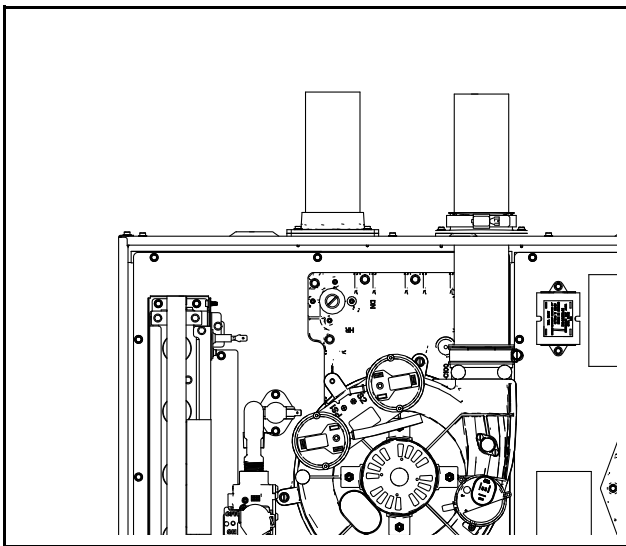
19. Twist to insure PVC is fully inserted.

20. Tighten the two clamps.

21. Install the combustion air inlet PVC pipe.

**Note:** The vent outlet adaptor is used for strain relief against the weight of the venting. The clamp should be tightened after the internal connection is made.

**Note:** If required, transition to larger venting within 2' of the cabinet. CPL01544 – 2" x 3" offset coupling may be used and is factory supplied with 120 MBTUH furnaces. Canadian applications may use BAYREDUCE to meet ULC-S636 requirements.



Condensate Trap Installation

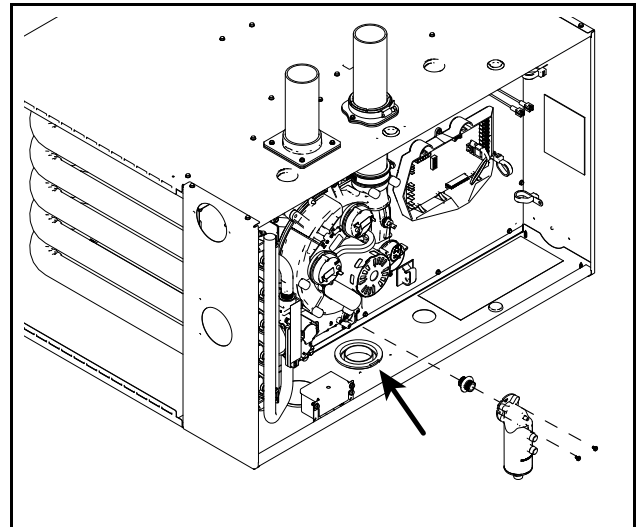
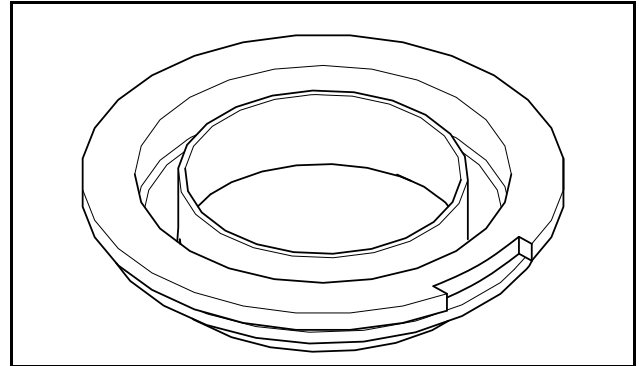
22. Reinstall the condensate adapter if it was earlier removed or ensure adapter is still in place.

**Important:** The condensate adapter must be present for proper condensate drain operation.

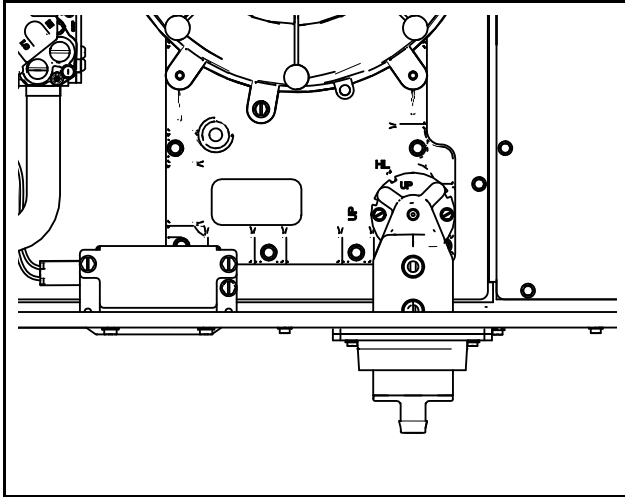
23. Install condensate trap into new location by fitting into grommet and aligning the hole on the condensate trap with the hole labeled "HL".

**Important:** When installing a 21.0" wide S-Series furnace, the condenser trap grommet must be rotated so that the notch in the grommet faces the outer edge of the furnace cabinet as shown in the illustrations below and to the top left in next page. This allows the rain gutter tubing to fully seat onto the lower condensate port trap.

24. Hand tighten screws.







25. Connect PS2 tubing to switch and new sensing location.

**Important:** Trim the condensate pressure switch tubing to length to ensure there is no sag or trap created.

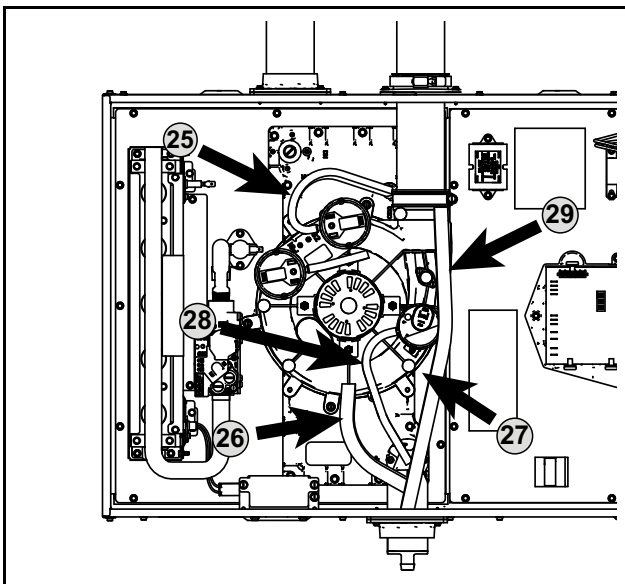
26. Remove port cap on left of inducer and connect inducer condensate tubing. Connect other end of inducer condensate tubing to top port on the condensate trap. Cut tubing to length, if necessary.

27. Install previously removed port cap onto bottom port of the inducer.

28. Connect condensate pressure switch tubing to pressure port on the condensate trap.

**Important:** Trim the condensate pressure switch tubing to length to ensure there is no sag or trap created

29. Connect rain gutter condensate hose to the rain gutter and the lower port of the condensate trap.

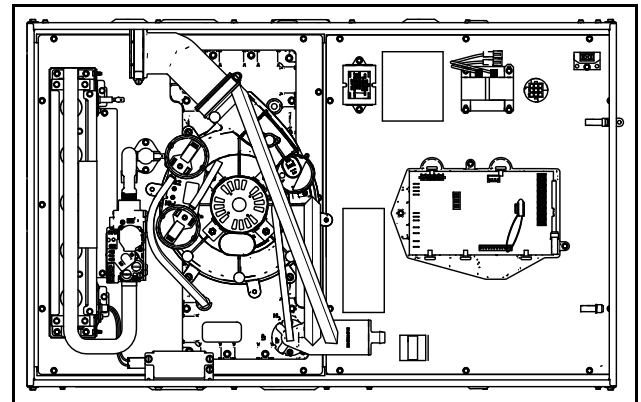


## Upflow Furnace in Horizontal Left Position - Side Vented Combustion Air

Changes do not need to be made to the inducer orientation when installing the upflow furnace in the horizontal left position with the combustion air vented through the top. Changes are needed for hose routing, condensate trap orientation, and inducer port caps.

The figure below shows the furnace as it is sent from the factory.

Use the following steps to modify the furnace for horizontal left with top venting of combustion air.



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

1. Remove all drain hoses from condensate trap.

**Note:** When removing condensate hoses from the condensate trap, hold the trap with your hand to prevent the trap from breaking. Removing the trap before the hoses is also an option.

2. Remove tubing from PS2 to cold header.

3. Remove drain tubing from bottom of inducer housing.

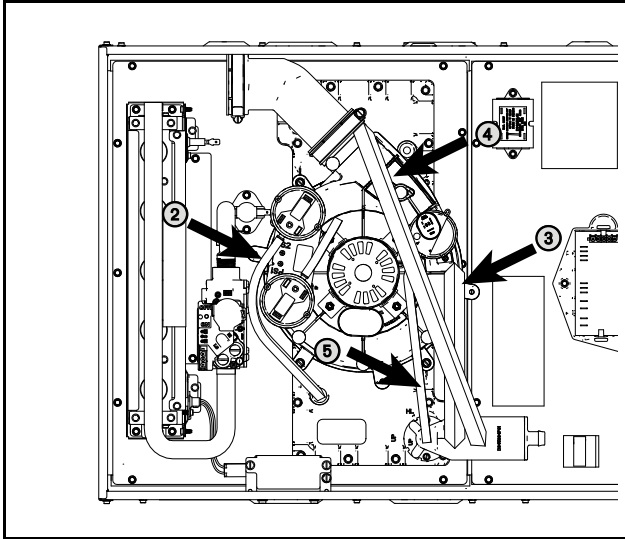
4. Remove rain gutter tubing from inducer outlet.

5. Remove tubing from condensate pressure switch.

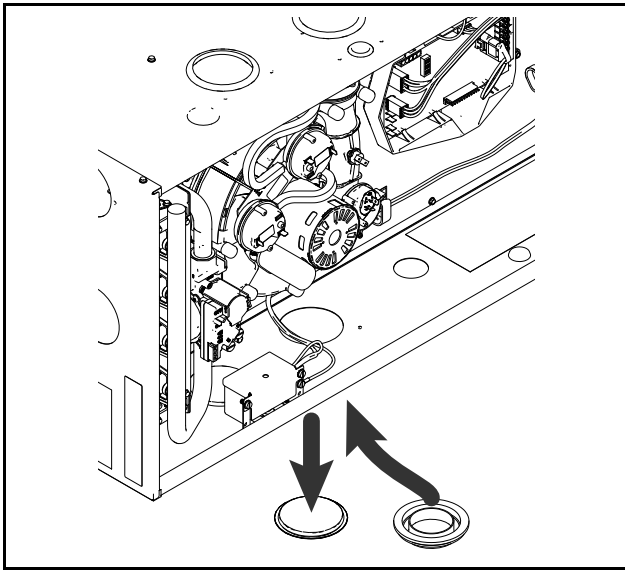
6. Remove the screws that hold the condensate trap bracket. The condensate trap should not be removed from the condensate trap bracket. Remove assembly and retain for later installation.

**Note:** There is a plastic adapter with O-rings located inside the cold header that is held in place by the condensate trap bracket. Do not lose this adapter. This adapter needs to be in place when the condensate trap bracket is reattached.

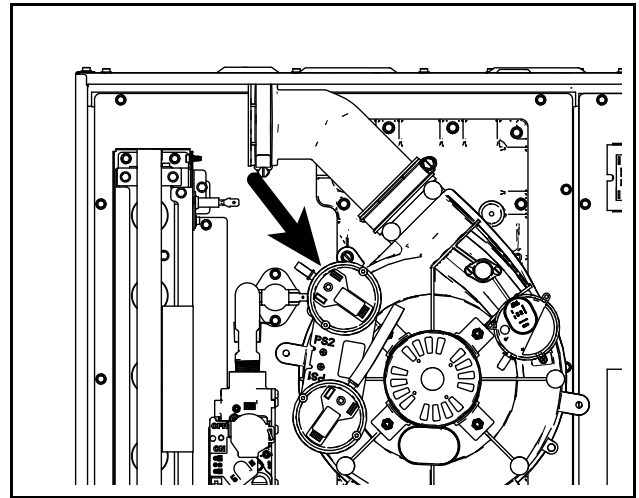
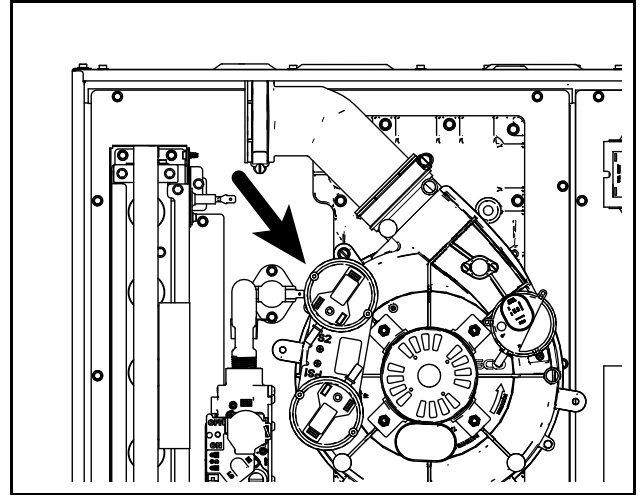
## Furnace Combustion Air Exhaust Options



7. Remove plug from 3" hole.
8. Install condensate trap grommet.

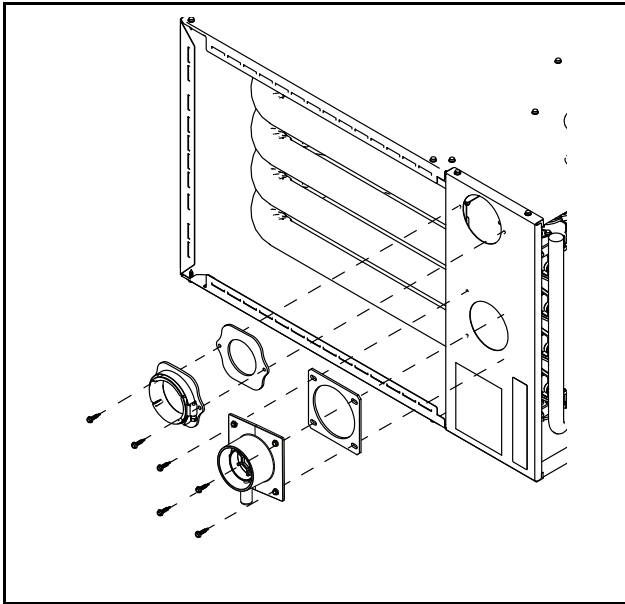


9. Remove the pressure switch bracket assembly.
10. Remove the screw that holds PS2, rotate 90 degrees clockwise, and reattach.
11. Reattach the pressure switch bracket assembly.



12. Attach the vent outlet gasket to the vent outlet.
13. Install vent outlet to top of cabinet using 2 screws supplied in the doc pack.
14. Install vent inlet gasket and vent inlet using 4 screws supplied in the doc pack.





15. Slide PVC through vent outlet adaptor and insert into inducer outlet.

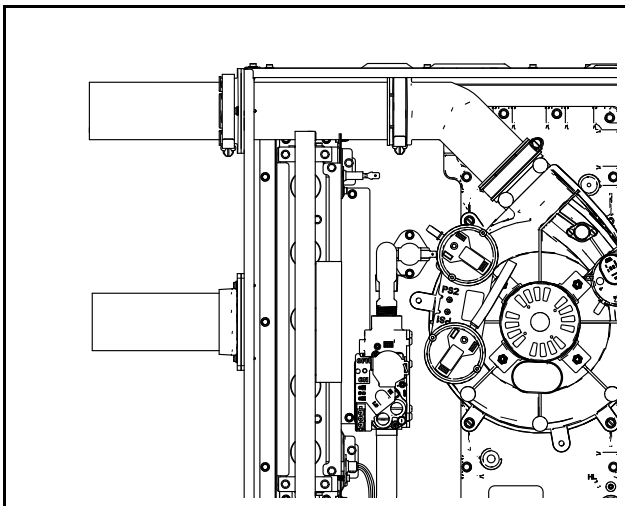
16. Twist to insure PVC is fully inserted.

17. Tighten the two clamps.

18. Install the combustion air inlet PVC pipe.

**Note:** The vent outlet adaptor is used for strain relief against the weight of the venting. The clamp should be tightened after the internal connection is made.

**Note:** If required, transition to larger venting within 2' of the cabinet. An 2" x 3" offset coupling is required if the transition is made in a horizontal plane. Use coupling CPL01544 (Canadian applications may use BAYREDUCE to meet ULC-S636 requirements.) See Horizontal Venting section for proper orientation of 2" x 3" offset coupling.



### Condensate Trap Installation

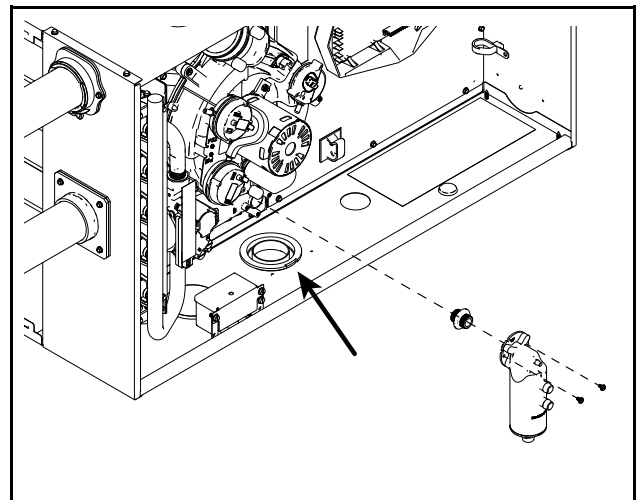
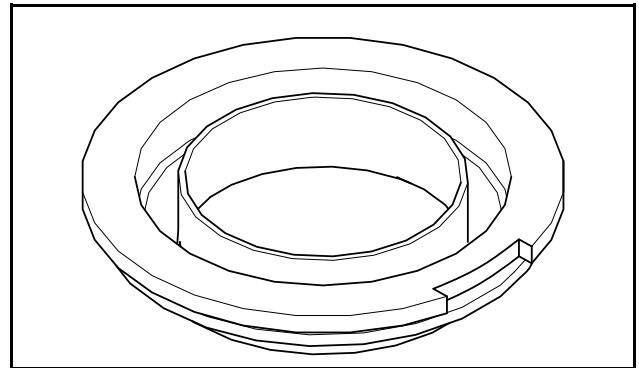
19. Reinstall the condensate adapter if it was earlier removed or ensure adapter is still in place.

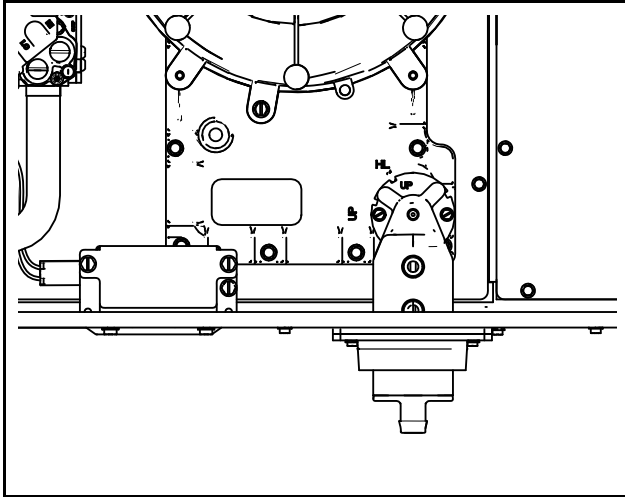
**Important:** The condensate adapter must be present for proper condensate drain operation.

20. Install condensate trap into new location by fitting into grommet and aligning the hole on the condensate trap with the hole labeled "HL".

When installing a 21.0" wide S-Series furnace, the condenser trap grommet must be rotated so that the notch in the grommet faces the outer edge of the furnace cabinet as shown in the illustrations below and to the top left in next page. This allows the rain gutter tubing to fully seat onto the lower condensate port trap.

21. Hand tighten screws.





22. Connect PS2 tubing to switch and new sensing location.

**Important:** Cut to length but insure there is a rise in the tubing to avoid condensed flue gases from entering pressure switch.

23. Remove port cap on left side of inducer and connect inducer condensate tubing. Connect other end of inducer condensate tubing to top port on the condensate trap. Cut tubing to length, if necessary.

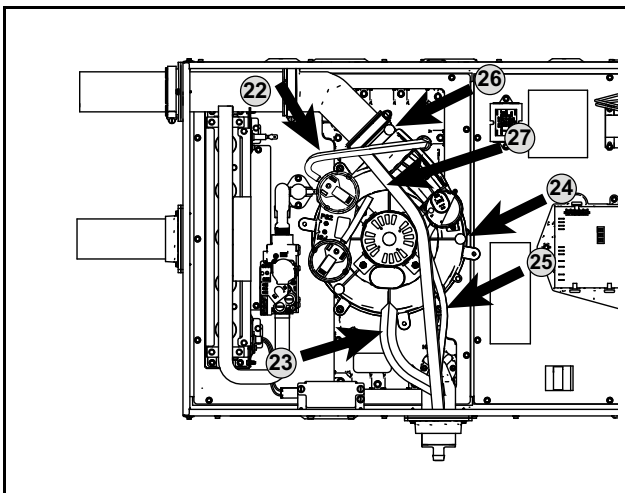
24. Install previously removed port cap onto bottom port of the inducer. (As viewed in upflow)

25. Connect condensate pressure switch tubing to pressure port on the condensate trap.

**Important:** Trim the condensate pressure switch tubing to length to ensure there is no sag or trap created.

26. Remove port plug from rain gutter and install in new position on opposite side of the rain gutter.

27. Connect rain gutter condensate hose to the rain gutter and the lower port of the condensate trap. Route rain gutter condensate hose to the right of the inducer motor.

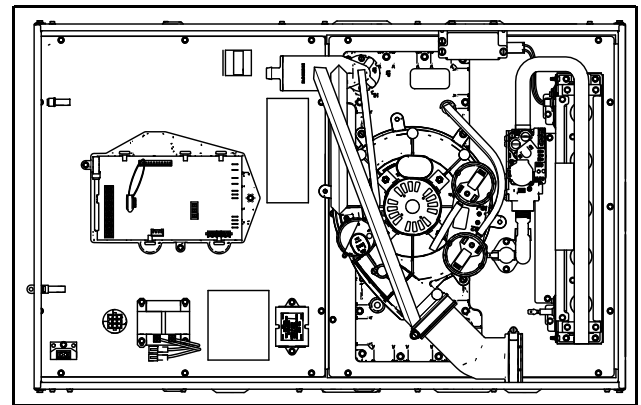


## Upflow Furnace in Horizontal Right Position - Top Vented Combustion Air

Changes need to be made to the inducer orientation when installing the upflow furnace in the horizontal right position with the combustion air vented through the left side. Additional changes are needed for hose routing, condensate trap location, and inducer port caps, and the condensate plug.

The figure below shows the furnace as it is sent from the factory.

Use the following steps to modify the furnace for horizontal right with left side venting of combustion air.



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

1. Remove all drain hoses from condensate trap.

**Note:** When removing condensate hoses from the condensate trap, hold the trap with your hand to prevent the trap from breaking. Removing the trap before the hoses is also an option.

2. Remove tubing from PS2 to cold header.

3. Remove drain tubing from bottom of inducer housing.

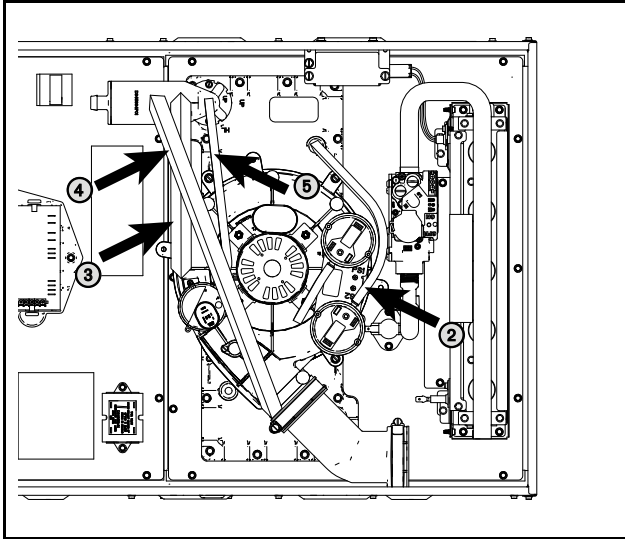
4. Remove rain gutter tubing from inducer outlet.

5. Remove tubing from condensate pressure switch.

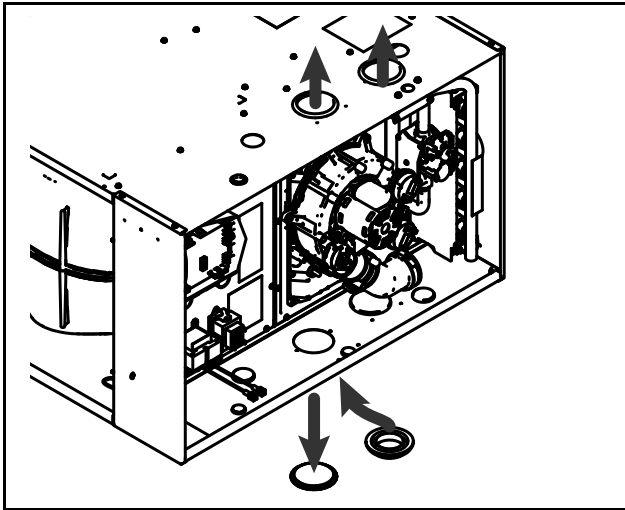
6. Remove the screws that hold the condensate trap bracket. The condensate trap should not be removed from the condensate trap bracket. Remove assembly and retain for later installation.

7. Remove the adapter located inside the condensate trap connection on the cold header and retain for later installation.

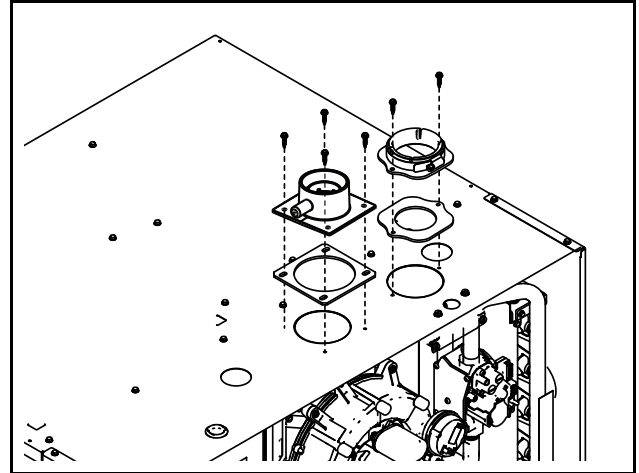
**Note:** The plastic adapter with O-rings located inside the cold header that is held in place by the condensate trap bracket. Do not lose this adapter. This adapter needs to be in place when the condensate trap bracket is reattached.



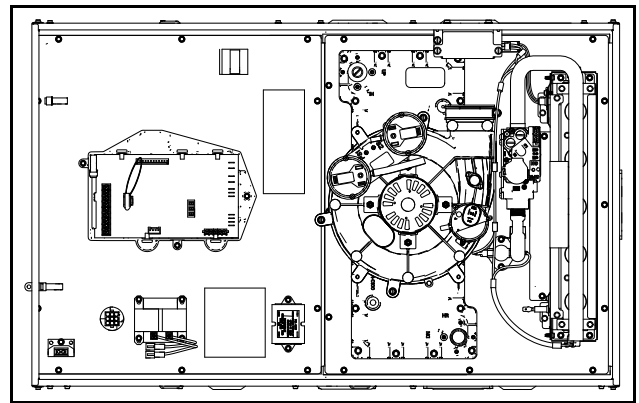
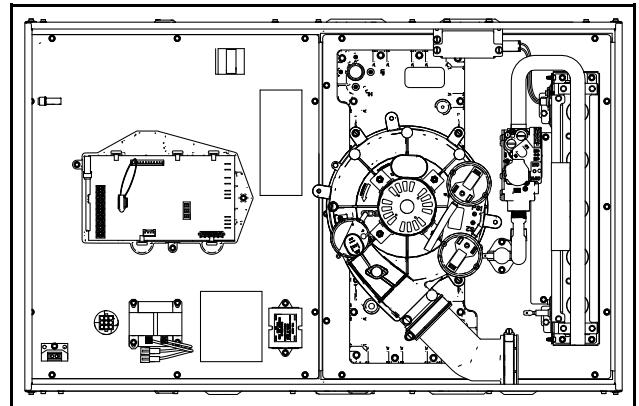
8. Remove 3" plug on right side of unit. To be used for condensate trap.
9. Install condensate trap grommet.
10. Remove two 3" plugs on left side of cabinet.
11. Reuse the two 3" plugs to seal the two 3" default openings on the top of the cabinet.



12. Attach the vent outlet gasket to the vent outlet.
13. Install vent outlet to top of cabinet using 2 screws supplied in the doc pack.
14. Install vent inlet gasket and vent inlet using 4 screws supplied in the doc pack.

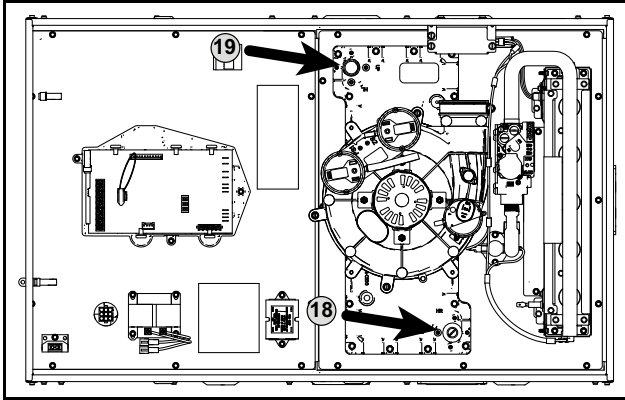


15. Remove three inducer screws.
16. Rotate the inducer so that the outlet is pointing vertically.
17. Use the three inducer screws to reattach the inducer to the cold header. Torque to 30 in.-lbs. Do not overtighten.



18. Remove condensate drain plug from top right location on cold header.
19. Place condensate drain plug onto the cold header outlet located on the bottom left of the cold header.

## Furnace Combustion Air Exhaust Options



20. Slide PVC through vent outlet adaptor and insert into inducer outlet.

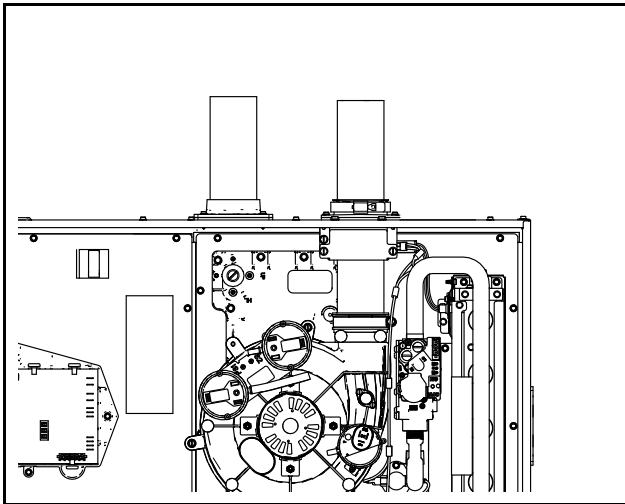
21. Twist to insure PVC is fully inserted.

22. Tighten the two clamps.

23. Install the combustion air inlet PVC pipe.

**Note:** The vent outlet adapter is used for strain relief against the weight of the venting. The clamp should be tightened after the internal connection is made.

**Note:** If required, transition to larger venting within 2' of the cabinet. CPL01544 – 2" x 3" offset coupling may be used and is factory supplied with 120 MBTUH furnaces. Canadian applications may use BAYREDUCE to meet ULC-S636 requirements.



### Condensate Trap Installation

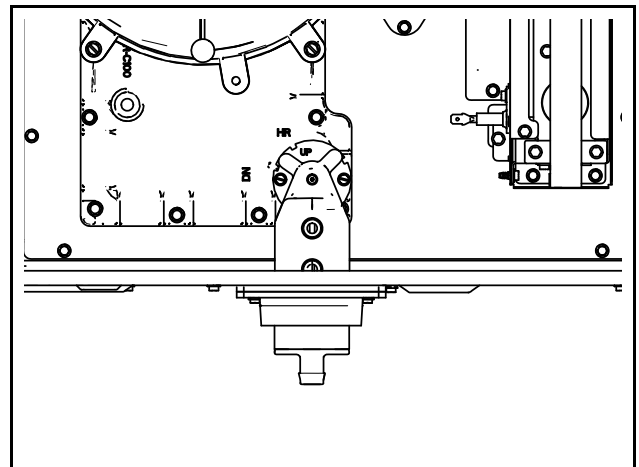
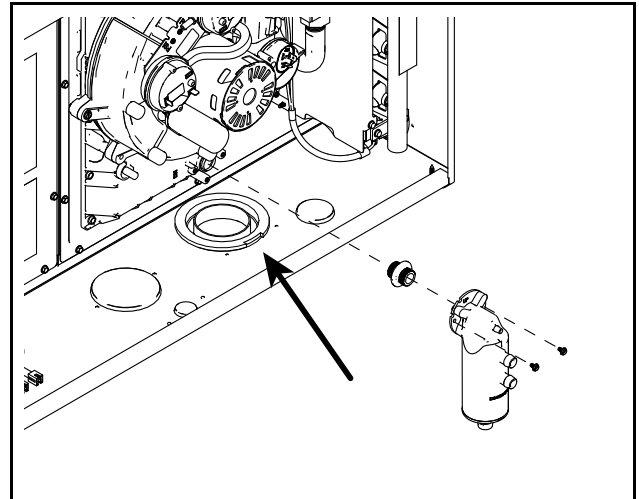
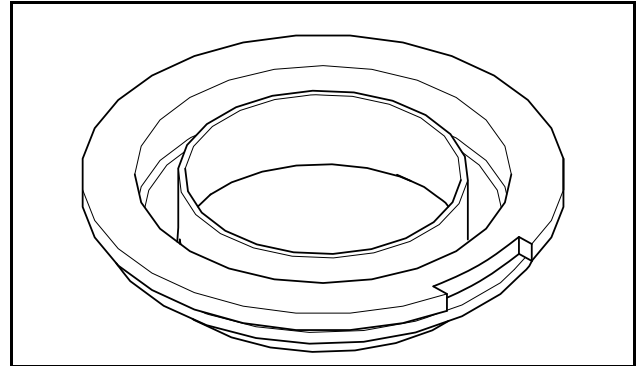
24. Reinstall the condensate adapter if it was earlier removed or ensure adapter is still in place.

**Important:** The condensate adapter must be present for proper condensate drain operation.

25. Install condensate trap into new location by fitting into grommet and aligning the hole on the condensate trap with the hole labeled "HR".

**Important:** When installing a 21.0" wide S-Series furnace, the condenser trap grommet must be rotated so that the notch in the grommet faces the outer edge of the furnace cabinet as shown in the illustrations below and to the top left in next page. This allows the rain gutter tubing to fully seat onto the lower condensate port trap.

26. Hand tighten screw.



27. Connect PS2 tubing to switch and new sensing location.

**Important:** Trim the condensate pressure switch tubing to length to ensure there is no sag or trap created.

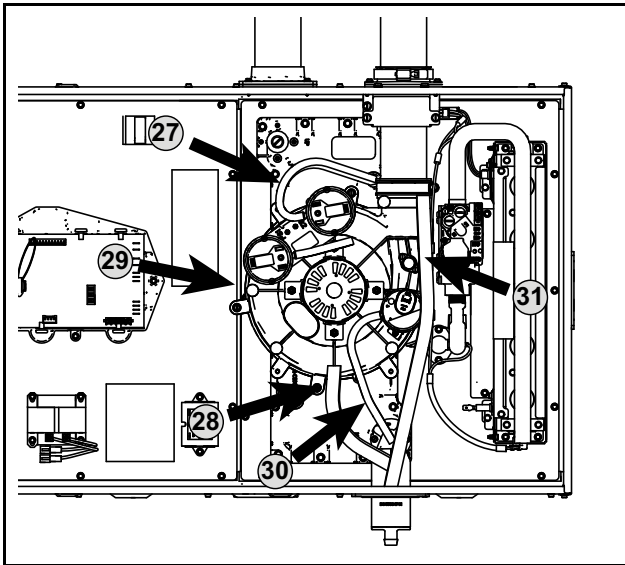
28. Remove port cap on the right side of the inducer and connect inducer condensate tubing. Connect other end of inducer condensate tubing to top port on the condensate trap. Cut tubing to length, if necessary.

29. Install previously removed port cap onto bottom port of the inducer.

30. Connect condensate pressure switch tubing to pressure port on the condensate trap.

**Important:** Cut to length to ensure there is no sag or trap created.

31. Connect rain gutter condensate hose to the rain gutter and the lower port of the condensate trap.

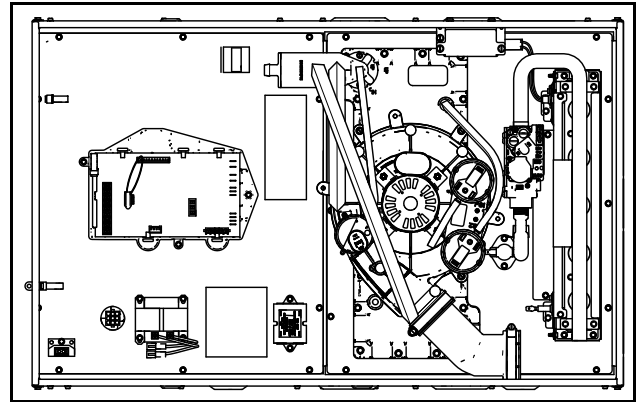


### Upflow Furnace in Horizontal Right Position - Left Side Vented Combustion Air

Changes need to be made to the inducer orientation when installing the upflow furnace in the horizontal right position with the combustion air vented through the bottom. Additional changes are needed for hose routing, condensate trap location, and inducer port caps, and the condensate plug.

The figure below shows the furnace as it is sent from the factory.

Use the following steps to modify the furnace for horizontal right with bottom venting of combustion air.



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

1. Remove all drain hoses from condensate trap.

**Note:** When removing condensate hoses from the condensate trap, hold the trap with your hand to prevent the trap from breaking. Removing the trap before the hoses is also an option.

2. Remove tubing from PS2 pressure switch.

3. Remove drain tubing from bottom of inducer housing.

4. Remove rain gutter tubing from inducer outlet.

5. Remove tubing from condensate pressure switch.

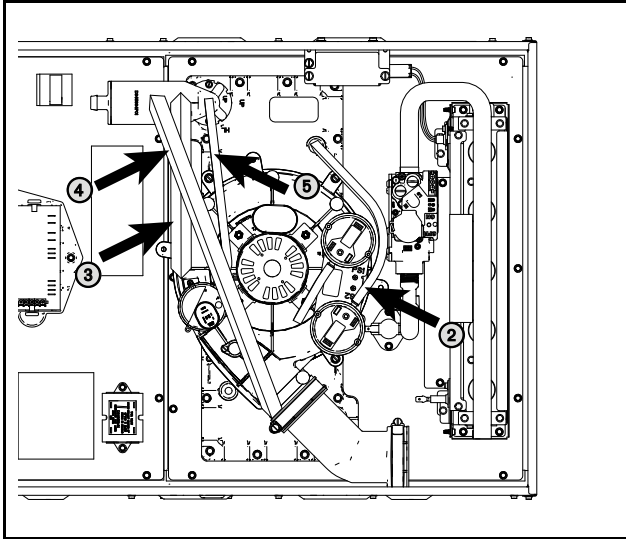
6. Remove the screws that hold the condensate trap bracket. The condensate trap should not be removed from the condensate trap bracket. Remove assembly and retain for later installation.

7. Remove the condensate adapter located inside the condensate trap connection on the cold header and retain for later installation.

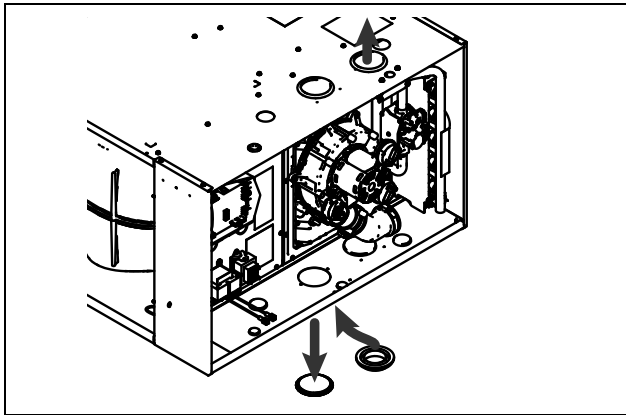
**Note:** The plastic condensate adapter with O-rings located inside the cold header that is held in place by the condensate trap bracket. Do not lose this adapter. The condensate adapter needs to be in place when the condensate trap bracket is reattached.



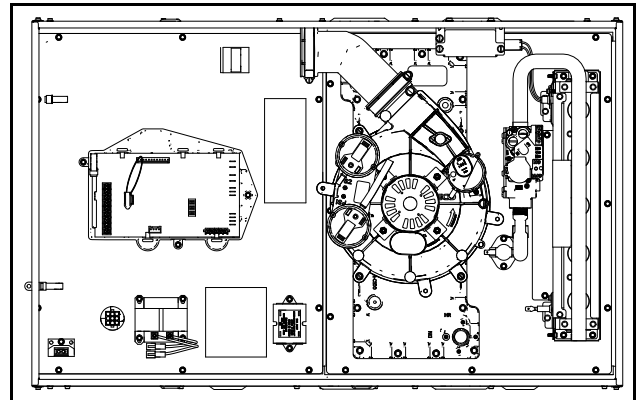
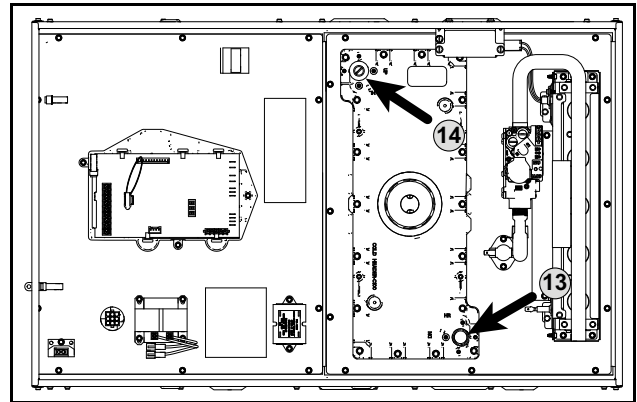
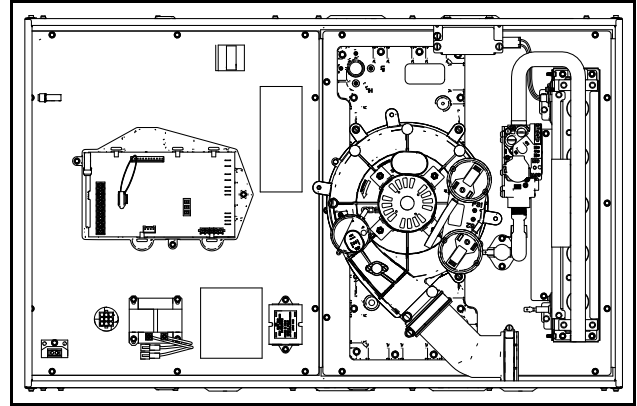
## Furnace Combustion Air Exhaust Options



8. Remove 3" plug on right side of unit. To be used for condensate trap.
9. Install condensate trap grommet.
10. Remove 3" plugs on the left side of the cabinet. To be used for combustion air inlet.
11. Reuse the two 3" plugs to seal the two 3" default openings on the top of the furnace.

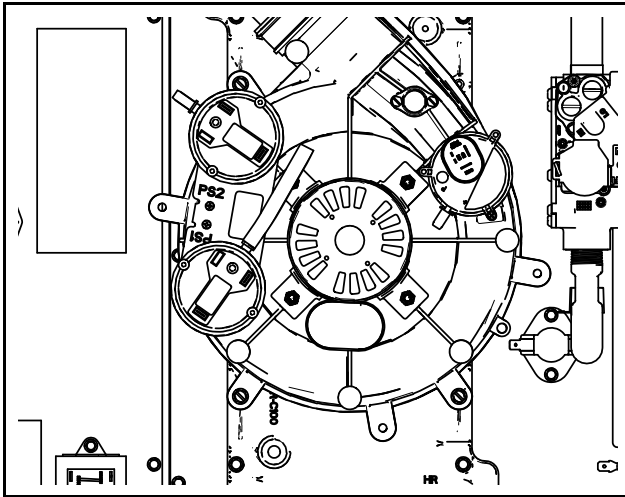


12. Remove three inducer screws.
13. While the inducer is loose, remove condensate drain plug from top right location on cold header.
14. Place condensate drain plug onto the cold header outlet located on the bottom left of the cold header.
15. Rotate the inducer 180 degrees so that the elbow is pointing towards the left.
16. Use the three inducer screws to reattach the inducer to the cold header. Torque to 30 in.-lbs. Do not overtighten.

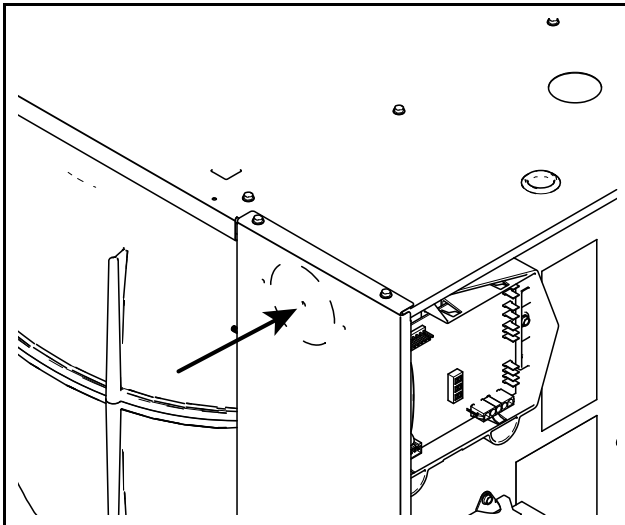


17. Remove the pressure switch bracket assembly.
18. Remove the screw that holds PS2, rotate 90 degrees clockwise, and reattach.
19. Reattach the pressure switch bracket assembly.

**Note:** The inducer is shown rotated into its final position in the illustration below.



20. Cut 3" hole in bottom panel using large dimple as guide.



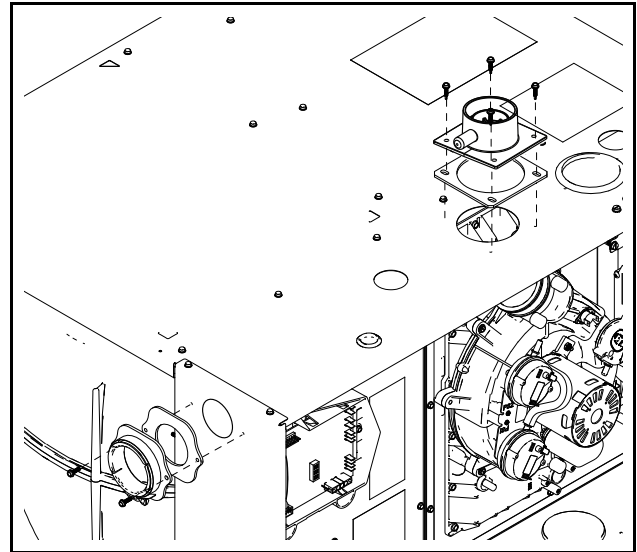
21. Attach the vent outlet gasket to the vent outlet.

22. Install vent outlet to top of cabinet using 2 screws supplied in the doc pack.

23. Install vent inlet gasket and vent inlet using 4 screws supplied in the doc pack.

**Note:** The vent outlet adapter is used for strain relief against the weight of the venting. The clamp should be tightened after the internal connection is made.

**Note:** If required, transition to larger venting within 2' of the cabinet. An 2" x 3" offset coupling is required if the transition is made in a horizontal plane. Use coupling CPL01544 (Canadian applications may use BAYREDUCE to meet ULC-S636 requirements.) See Horizontal Venting section for proper orientation of 2" x 3" offset coupling.

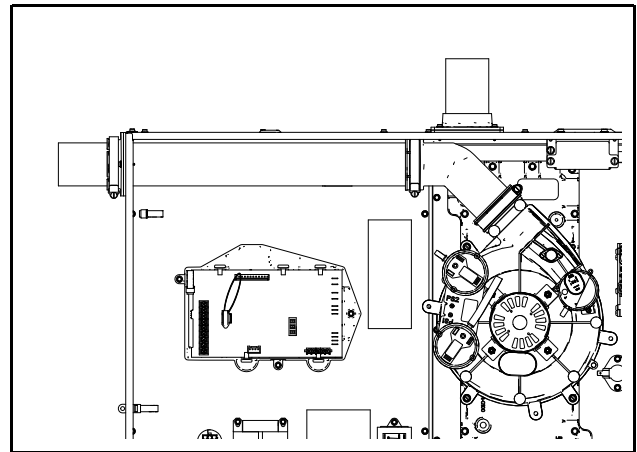


24. Slide PVC through vent outlet adaptor and insert into inducer outlet.

25. Twist to insure PVC is fully inserted.

26. Tighten the two clamps.

27. Install the combustion air inlet PVC pipe.



### Condensate Trap Installation

28. Reinstall the condensate adapter if it was earlier removed or ensure adapter is still in place.

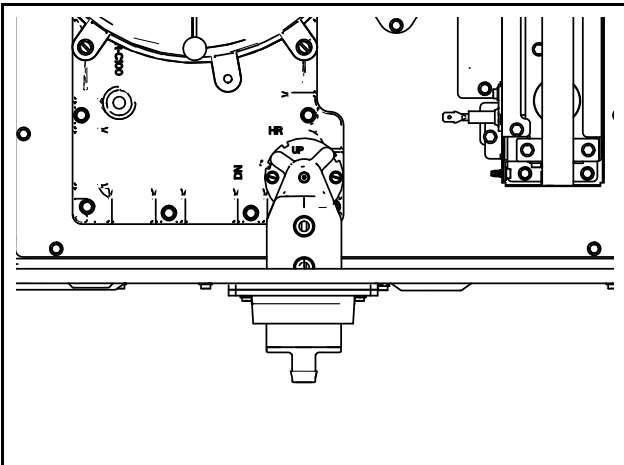
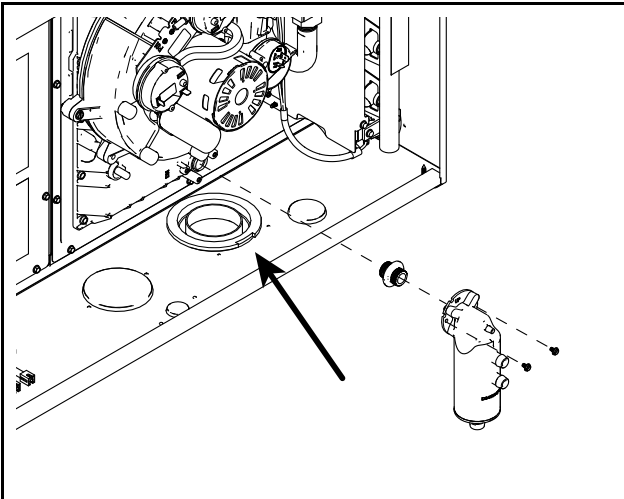
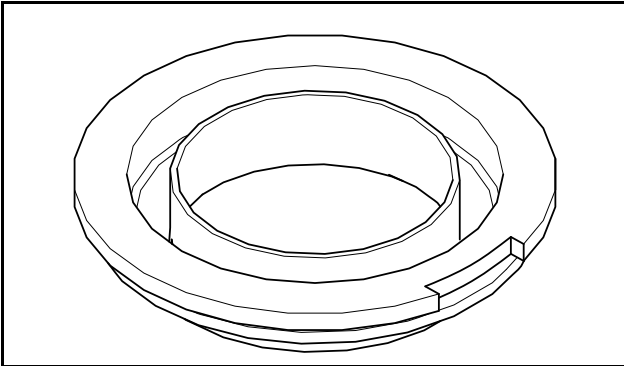
**Important:** The condensate adapter must be present for proper condensate drain operation.

29. Install condensate trap into new location by fitting into grommet and aligning the hole on the condensate trap with the hole labeled "HR".

## Furnace Combustion Air Exhaust Options

**Important:** When installing a 21.0" wide S-Series furnace, the condenser trap grommet must be rotated so that the notch in the grommet faces the outer edge of the furnace cabinet as shown in the illustrations below and to the top right. This allows the rain gutter tubing to fully seat onto the lower condensate port trap.

30. Hand tighten screw.



31. Connect PS2 tubing to switch and new sensing location. Use additional tubing in ship with bag, if necessary.

**Important:** Trim the condensate pressure switch tubing to length to ensure there is no sag or trap created.

32. Remove port cap on the right side of inducer and connect inducer condensate tubing. Connect other end of inducer condensate tubing to top port on the condensate trap. Cut tubing to length, if necessary.

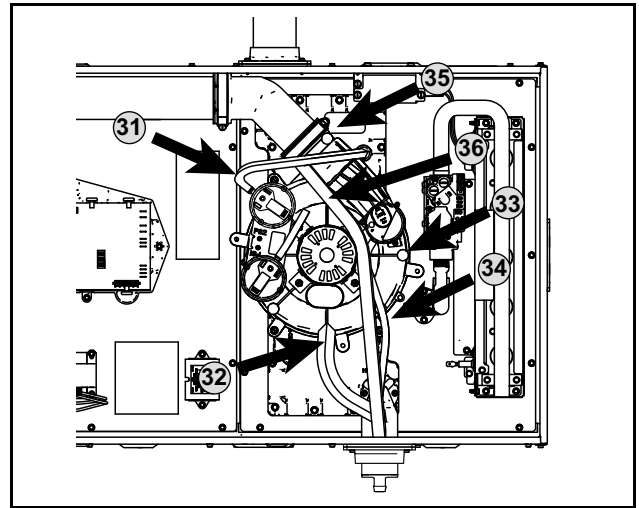
33. Install previously removed port cap onto bottom port of the inducer. (As viewed in upflow)

34. Connect condensate pressure switch tubing to pressure port on the condensate trap.

**Important:** Cut to length to ensure there is no sag or trap created.

35. Remove port plug from rain gutter and install in new position on opposite side of the rain gutter.

36. Connect rain gutter condensate hose to the rain gutter and the lower port of the condensate trap. Route rain gutter condensate hose to the right of the inducer motor.

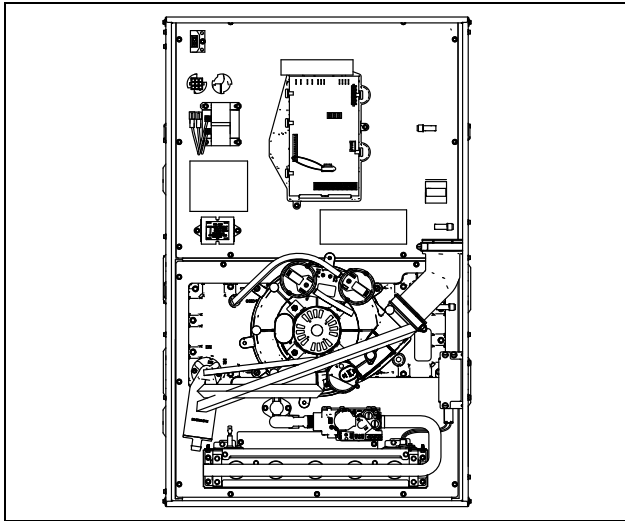




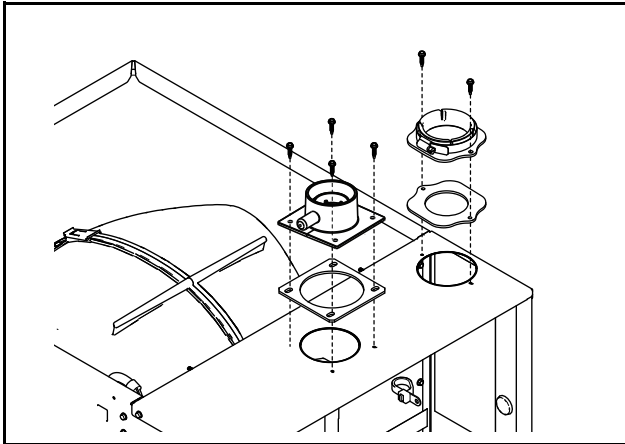
## Downflow Furnace - Top Vented Combustion Air

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

**Important:** Trim the condensate pressure switch tubing to length to ensure there is no sag or trap created.



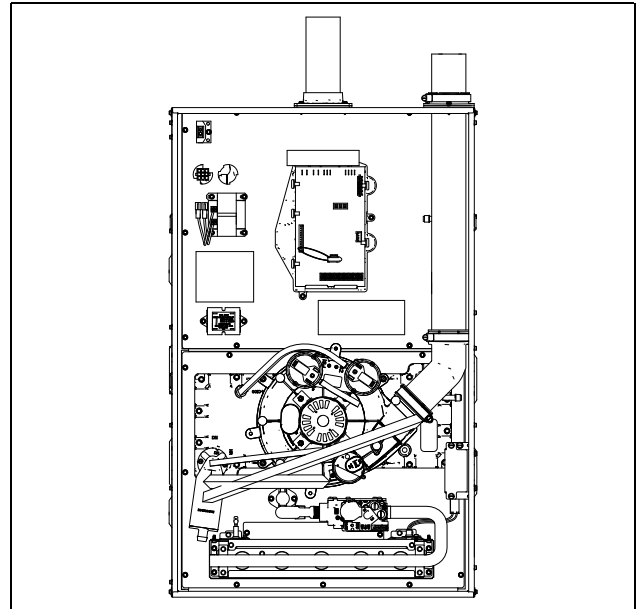
1. Attach the vent outlet gasket to the vent outlet.
2. Install vent outlet to top of cabinet using 2 screws supplied in the doc pack.
3. Install vent inlet gasket and vent inlet using 4 screws supplied in the doc pack.



4. Slide PVC pipe through vent outlet adaptor and insert into inducer outlet.
5. Twist to insure PVC is fully inserted.
6. Tighten the two clamps.
7. Install the combustion air inlet PVC pipe.

**Note:** The vent outlet adapter is used for strain relief against the weight of the venting. The clamp should be tightened after the internal connection is made.

**Note:** If required, transition to larger venting within 2' of the cabinet. CPL01544 - 2" x 3" offset coupling may be used and is factory supplied with 120 MBTUH furnaces. Canadian applications may use BAYREDUCE to meet ULC-S636 requirements.



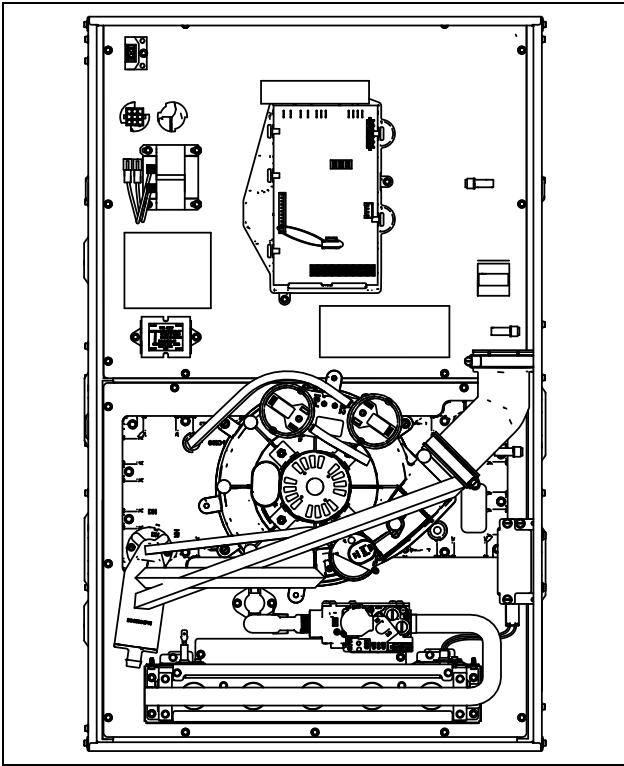
### Downflow Furnace - Left Side Vented Combustion Air

Changes need to be made to the inducer orientation when installing the downflow furnace with the combustion air vented through the side. Additional changes are needed for hose routing and PS2 rotation.

The figure below shows the furnace as it is sent from the factory.

Use the following steps to modify the furnace for downflow with side venting of combustion air.

**Important:** Right side vent outlet is not allowed because condensate will not drain.

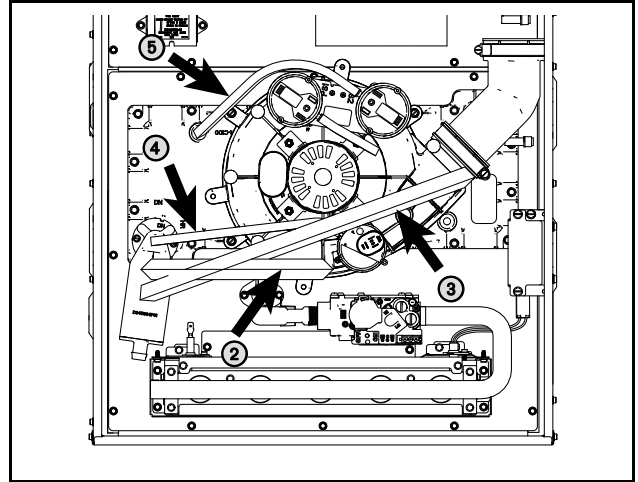


Before proceeding, lay unit on its back to make conversion easier.

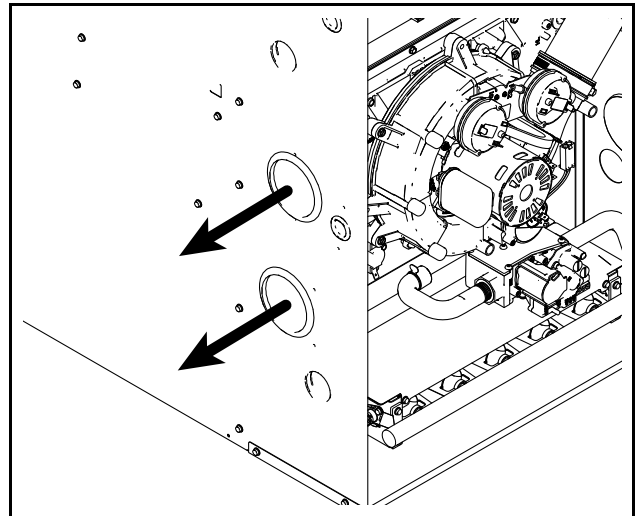
1. Disconnect all drain tubes from condensate trap.

**Note:** When removing condensate hoses from the condensate trap, hold the trap with your hand to prevent the trap from breaking.

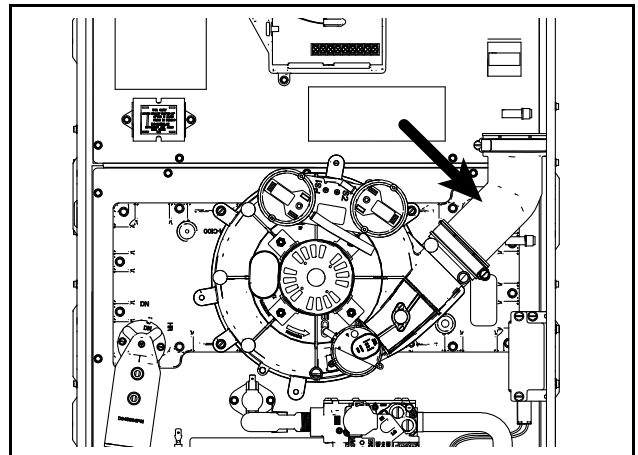
2. Remove drain tubing from bottom of inducer housing.
3. Remove rain gutter tubing from inducer outlet.
4. Remove tubing from condensate pressure switch.
5. Remove tubing from PS2 to cold header.



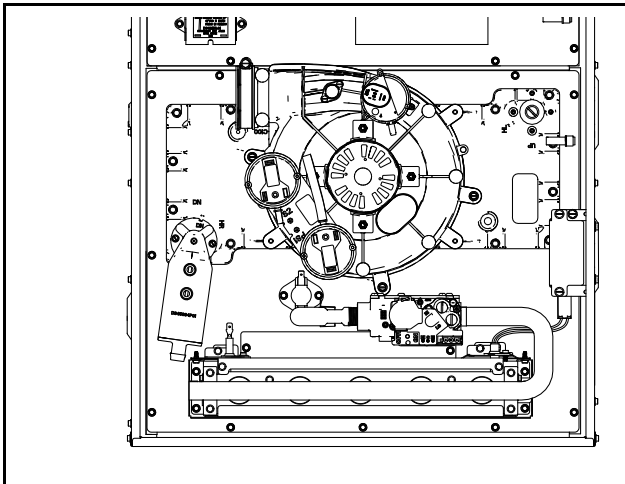
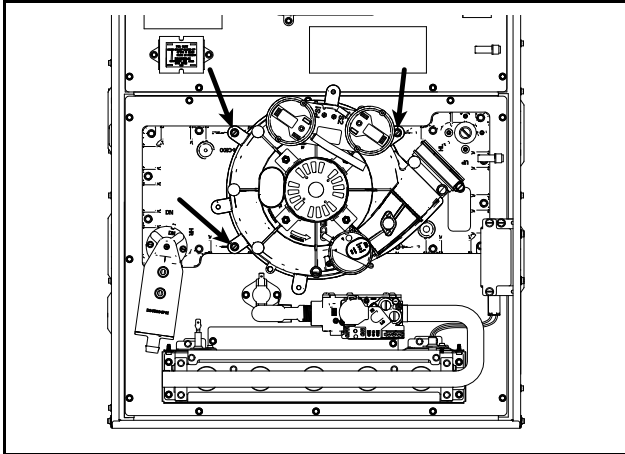
6. Remove two 3" plugs on left side of cabinet. To be used for combustion air exhaust and inlet.
7. Reuse the two 3" plugs to seal the two 3" default openings on the top of the cabinet.



8. Loosen the clamp holding the 45° elbow. Remove the elbow and discard.

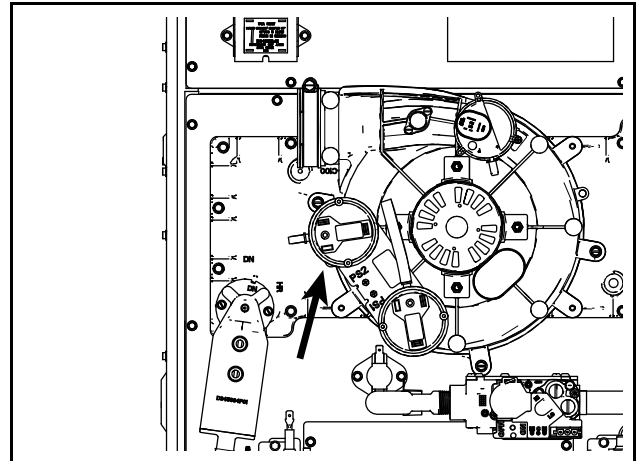


9. Remove the three inducer mounting screws.
10. Rotate inducer counterclockwise so that the inducer outlet aligns with the exhaust vent outlet.
11. Reinsert and tighten screws to 30 in.-lbs. Do not overtighten.

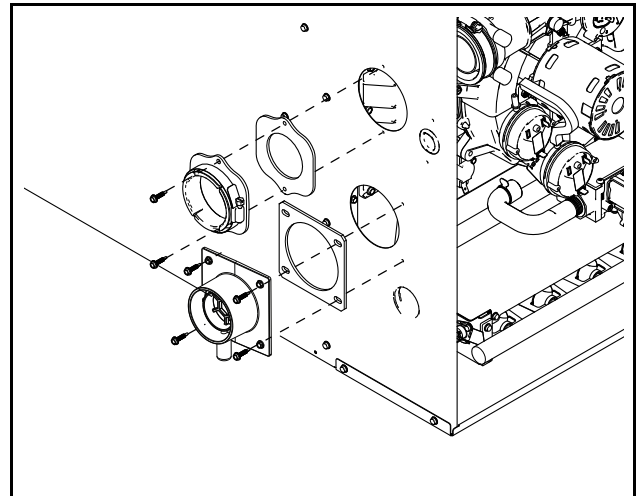


12. Remove the pressure switch bracket assembly.
13. Remove the screw that holds PS2, rotate 90 degrees counterclockwise, and reattach.
14. Reattach the pressure switch bracket assembly.

**Note:** The illustration below shows PS2 in its final position after being rotated.



15. Attach the vent outlet gasket to the vent outlet.
16. Install vent outlet to cabinet using 2 screws supplied in the doc pack.
17. Install vent inlet gasket and vent inlet using 4 screws supplied in the doc pack.
18. Install the grommet for the condensate drain tube. The drain may be located on either side of the cabinet.

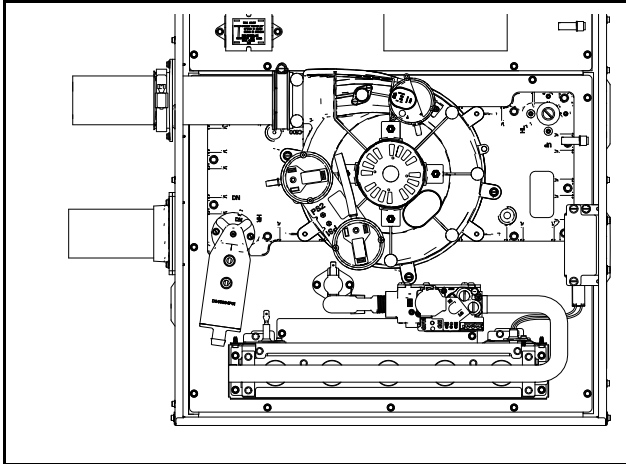


19. Slide PVC through vent outlet adaptor and insert into inducer outlet.
20. Twist to insure PVC is fully inserted.
21. Tighten the two clamps.
22. Install the combustion air inlet PVC pipe.

**Note:** The vent outlet adaptor is used for strain relief against the weight of the venting. The clamp should be tightened after the internal connection is made.

## Furnace Combustion Air Exhaust Options

**Note:** If required, transition to larger venting within 2' of the cabinet. An 2" x 3" offset coupling is required if the transition is made in a horizontal plane. Use coupling CPL01544 (Canadian applications may use BAYREDUCE to meet ULC-S636 requirements.) See Horizontal Venting section for proper orientation of 2" x 3" offset coupling.



23. Connect PS2 tubing to switch and sensing location.

**Important:** Trim the condensate pressure switch tubing to length to ensure there is no sag or trap created.

24. Remove port cap at bottom of inducer and connect inducer condensate tubing. Connect other end of

inducer condensate tubing to top port on the condensate trap. Cut tubing to length, if necessary.

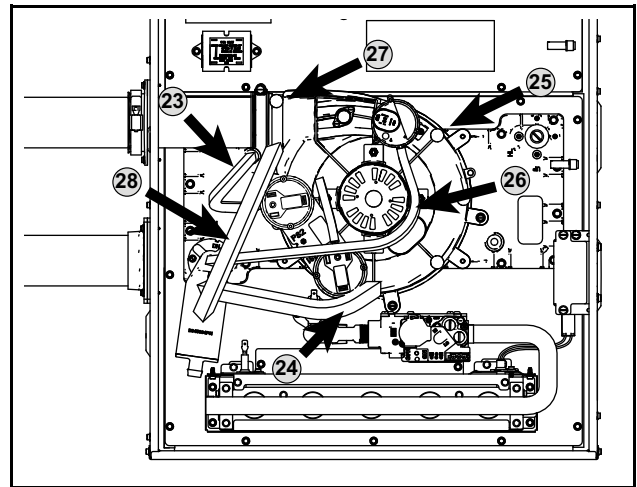
25. Install previously removed port cap onto bottom port of the inducer.

26. Connect condensate pressure switch tubing to pressure port on the condensate trap.

**Important:** Cut to length to ensure there is no sag or trap created.

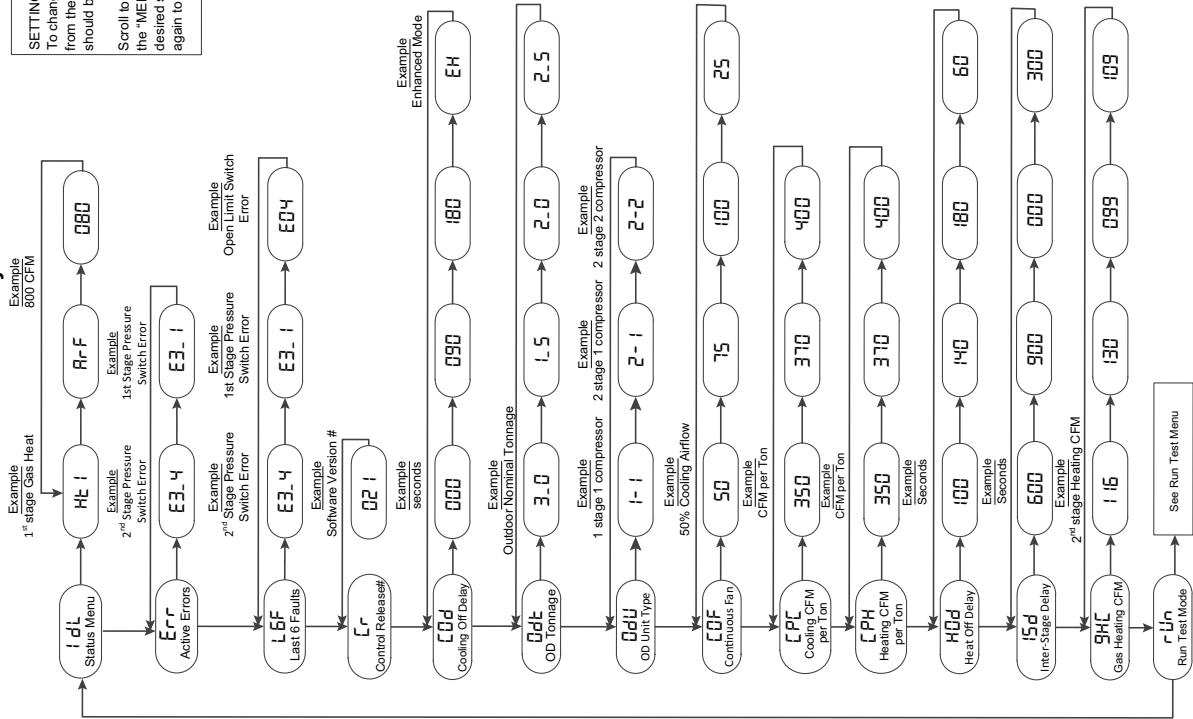
27. Remove port plug from rain gutter and install in new position on opposite side of the rain gutter.

28. Connect rain gutter condensate hose to the rain gutter and the lower port of the condensate trap. Cut to length, as required.



# Integrated Furnace Control Menu

## S9V2-VS Control System Menu



**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. (1 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.

**CLEARING THE LAST6 FAULTS:**  
To clear the stored faults, scroll to the last 6 fault 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.

**Model**  
S9V2B040U3VS  
S9V2B060U4VS  
S9V2B080U4VS  
S9V2C080U5VS  
S9V2C100U5VS  
S9V2D120U5VS

**ODT Options [] = Default**  
3T[3T], 1.5T, 2T, 2.5T  
4T[4T], 2T, 2.5T, 3T  
5T[5T], 3T, 3.5T, 4T  
5T[5T], 3T, 3.5T, 4T  
5T[5T], 3T, 3.5T, 4T

**Downflow**  
S9V2B040D3VS  
S9V2B060D3VS  
S9V2B080D4VS  
S9V2C100D5VS  
S9V2D120D5VS

**Model**  
S9V2B040U3VS  
S9V2B060U4VS  
S9V2B080U4VS  
S9V2C080U5VS  
S9V2C100U5VS  
S9V2D120U5VS

**ODT Options [] = Default**  
3T[3T], 1.5T, 2T, 2.5T  
4T[4T], 2T, 2.5T, 3T  
5T[5T], 3T, 3.5T, 4T  
5T[5T], 3T, 3.5T, 4T  
5T[5T], 3T, 3.5T, 4T

**Downflow**  
S9V2B040D3VS  
S9V2B060D3VS  
S9V2B080D4VS  
S9V2C100D5VS  
S9V2D120D5VS

Gas Heating CFM shown is 2<sup>nd</sup> stage airflow. 4<sup>th</sup> stage airflow is ~80% of the selected 2<sup>nd</sup> stage airflow and cannot be adjusted.  
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.

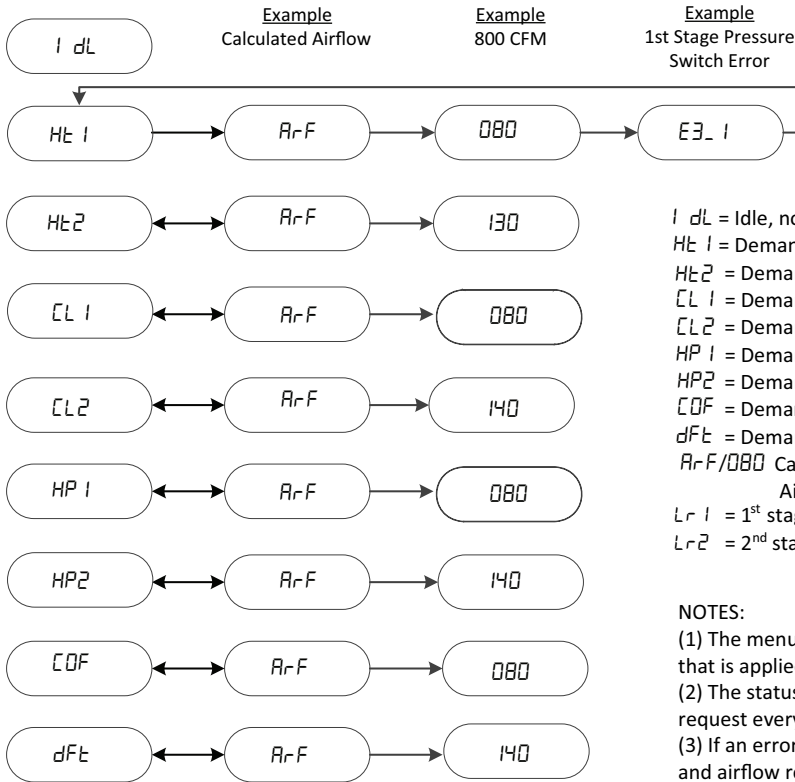
**Note:**  
Do not adjust COF above 50%.

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.

Model	Gas Heating CFM	[] = Default
<b>Upflow</b>		
S9V2B040U3VS	088 [088]	120, 065, 083
S9V2B060U4VS	116 [116]	130, 099, 109
S9V2B080U4VS	126 [126]	133, 146, 120
S9V2C080U5VS	145 [145]	156, 170, 119
S9V2C100U5VS	183 [183]	145, 162, 172
S9V2D120U5VS	195 [195]	225, 156, 185
<b>Downflow</b>		
S9V2B040D3VS	082 [082]	095, 125, 065
S9V2B060D3VS	103 [103]	113, 135, 090
S9V2B080D4VS	133 [133]	148, 120, 126
S9V2C100D5VS	187 [187]	210, 152, 180
S9V2D120D5VS	225 [225]	175, 185, 195

## S9V2-VS Examples of System Status



*1 dL* = Idle, no demand for cooling, heating, or fan  
*Ht 1* = Demand for 1<sup>st</sup> stage gas heat  
*Ht 2* = Demand for 2<sup>nd</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  
*CDF* = Demand for continuous fan  
*dFt* = Demand for outdoor unit defrost, furnace running in gas heat mode  
*Ar-F/080* Calculated airflow is 800 CFM.  
 Airflow display is rounded down to the nearest 10 cfm  
*Lr 1* = 1<sup>st</sup> stage gas heat learning routine  
*Lr 2* = 2<sup>nd</sup> stage gas heat learning routine

**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

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).



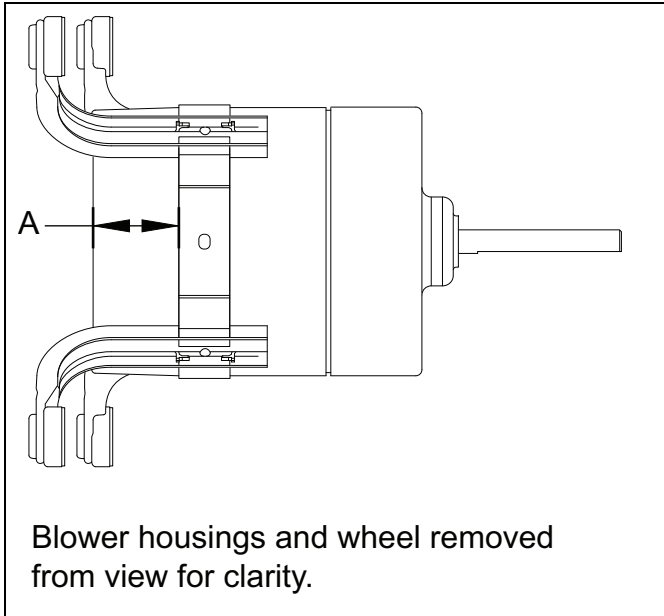
**Run Test Mode:**  
 To enter Run Test Mode, scroll to *rUn* using the Menu key, then push the option key. The LED will flash *rUn* three times, then begin the test.  
 To exit the test mode, momentarily push the Menu key, cycle power to the furnace, or make a valid thermostat call for capacity or fan.

**Sequence of Run Test Mode**  
*rU1* – Turns the inducer on in 1<sup>st</sup> stage for 30 seconds  
*rU2* – Turns on the inducer on 2<sup>nd</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  
*rU7* – Turns on the circulating blower on 2<sup>nd</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



For B Models only	
Furnace Cabinet Size	Dimension "A" (inches)
B	2.75
C	3.54
D	3.79

# Integrated Furnace Control Display Codes

2 Stage Inducer with ECM Blower Motor	
<i>i dL</i>	Idle
<i>Ht1</i>	First Stage Gas Heating
<i>Lr1</i>	First Stage Gas Heat Learning Routine
<i>Ht2</i>	Second Stage Heating
<i>Lr2</i>	Second Stage Gas Heat Learning Routine
<i>ArF</i>	Calculated Airflow (Followed by Airflow times 10)
<i>COF</i>	Continuous Fan
<i>CL1</i>	First Stage Cooling
<i>CL2</i>	Second Stage Cooling
<i>HP1</i>	First Stage Heat Pump
<i>HP2</i>	Second Stage Heat Pump
<i>dFt</i>	Defrost Mode
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>	Control Release Number
<i>COd</i>	Cooling Off Delay (Seconds)
<i>OdL</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>I5d</i>	Inter-Stage Delay (Seconds)
<i>gHC</i>	Gas Heating CFM 2nd Stage (1st Stage is not adjustable) (Airflow times 10)
<i>rUn</i>	Run Test Mode

**Table 27. Fault Code Recovery**

<p><b>Fault Code Recovery</b></p> <ol style="list-style-type: none"> <li>To view the last 6 faults, press the "Menu" key until the "Last 6 Faults" (<i>L6F</i>) menu appears.</li> <li>Enter the menu by pressing the "Option" key.</li> <li>The last 6 faults can be viewed.</li> </ol> <p><b>Clearing the Last 6 Faults</b></p> <ol style="list-style-type: none"> <li>To clear the last 6 faults, press the "Menu" key until the "Last 6 Faults" (<i>L6F</i>) menu appears.</li> <li>Enter the menu by pressing the "Option" key.</li> <li>Hold the "Option" key for at least 5 seconds.</li> <li>Release and a set of 3 dashes with be seen 3 times. This confirms the faults have been cleared.</li> </ol> <p><b>Resetting Factory Defaults</b></p> <ol style="list-style-type: none"> <li>Display must be in Idle Mode.</li> <li>Push the "Menu" and "Option" buttons at the same time for 15 seconds then release.</li> <li>The 7 segment will flash "Fd" 3 times. This confirms the unit has been reset to the factory defaults.</li> </ol>	<p>The diagram shows the physical layout of the control panel. A 7-segment LED display is at the top center, currently showing three dashes. Below it are two buttons labeled 'MENU' and 'OPTION'. Arrows from the text on the left point to these buttons and the LED. The panel includes several terminal blocks: a top block with terminals for 'FP', 'LINE', 'NEUTRAL', 'EAC', 'HUM', and 'E10'; a bottom block with terminals for 'F3', 'L1', 'S', 'BK', 'W2', 'W1', 'R', 'G', 'B/C', 'Y2', 'Y1', and 'D'; and a side block with terminals for 'E1', 'E2', 'E3', 'E4', 'E5', 'E6', 'E7', 'E8', 'E9', 'E10', 'E11', 'E12', 'E13', 'E14', 'E15', 'E16', 'E17', 'E18', 'E19', 'E20', 'E21', 'E22', 'E23', 'E24', 'E25', 'E26', 'E27', 'E28', 'E29', 'E30', 'E31', 'E32', 'E33', 'E34', 'E35', 'E36', 'E37', 'E38', 'E39', 'E40', 'E41', 'E42', 'E43', 'E44', 'E45', 'E46', 'E47', 'E48', 'E49', 'E50', 'E51', 'E52', 'E53', 'E54', 'E55', 'E56', 'E57', 'E58', 'E59', 'E60', 'E61', 'E62', 'E63', 'E64', 'E65', 'E66', 'E67', 'E68', 'E69', 'E70', 'E71', 'E72', 'E73', 'E74', 'E75', 'E76', 'E77', 'E78', 'E79', 'E80', 'E81', 'E82', 'E83', 'E84', 'E85', 'E86', 'E87', 'E88', 'E89', 'E90', 'E91', 'E92', 'E93', 'E94', 'E95', 'E96', 'E97', 'E98', 'E99', 'E100'.</p>
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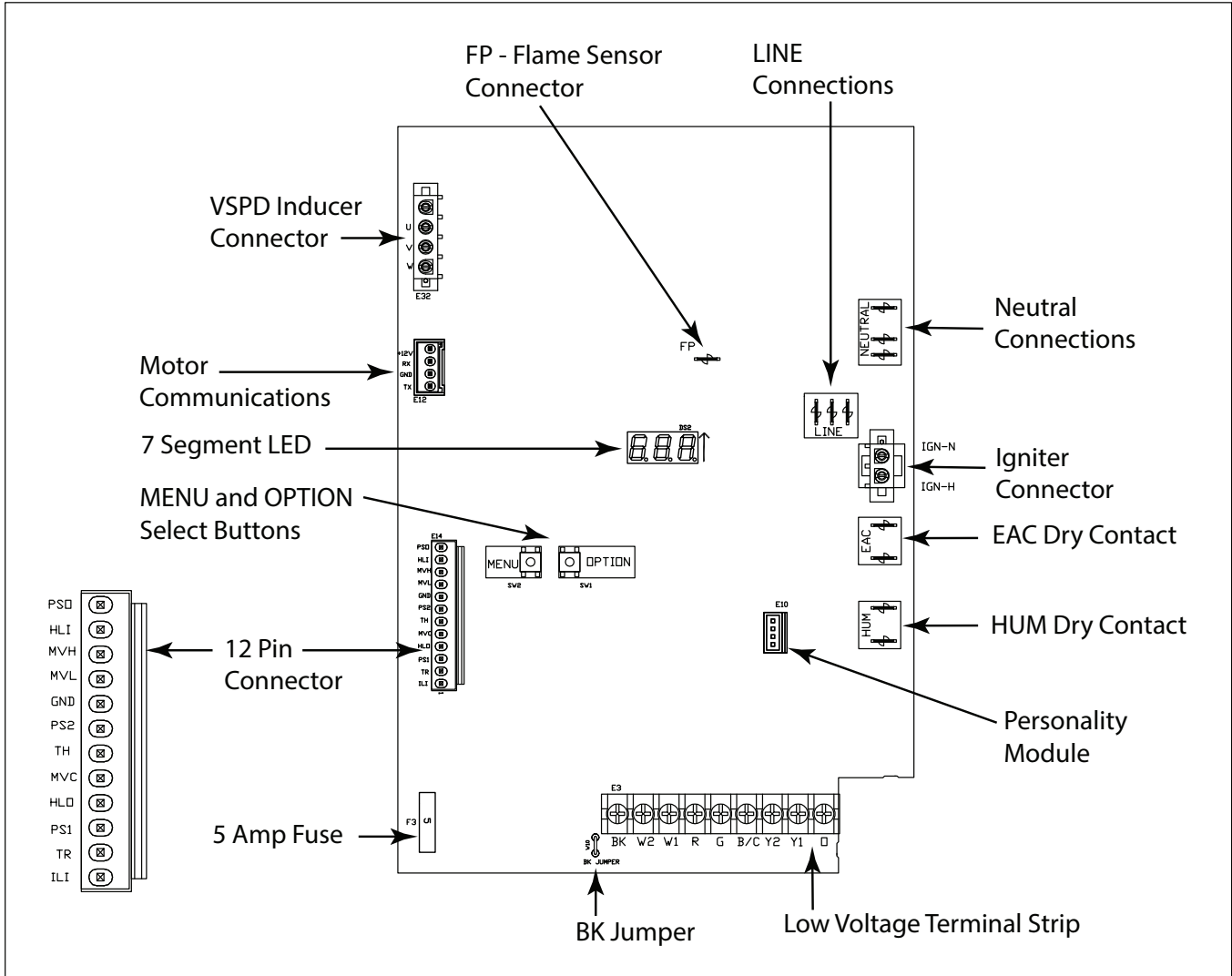


# Troubleshooting

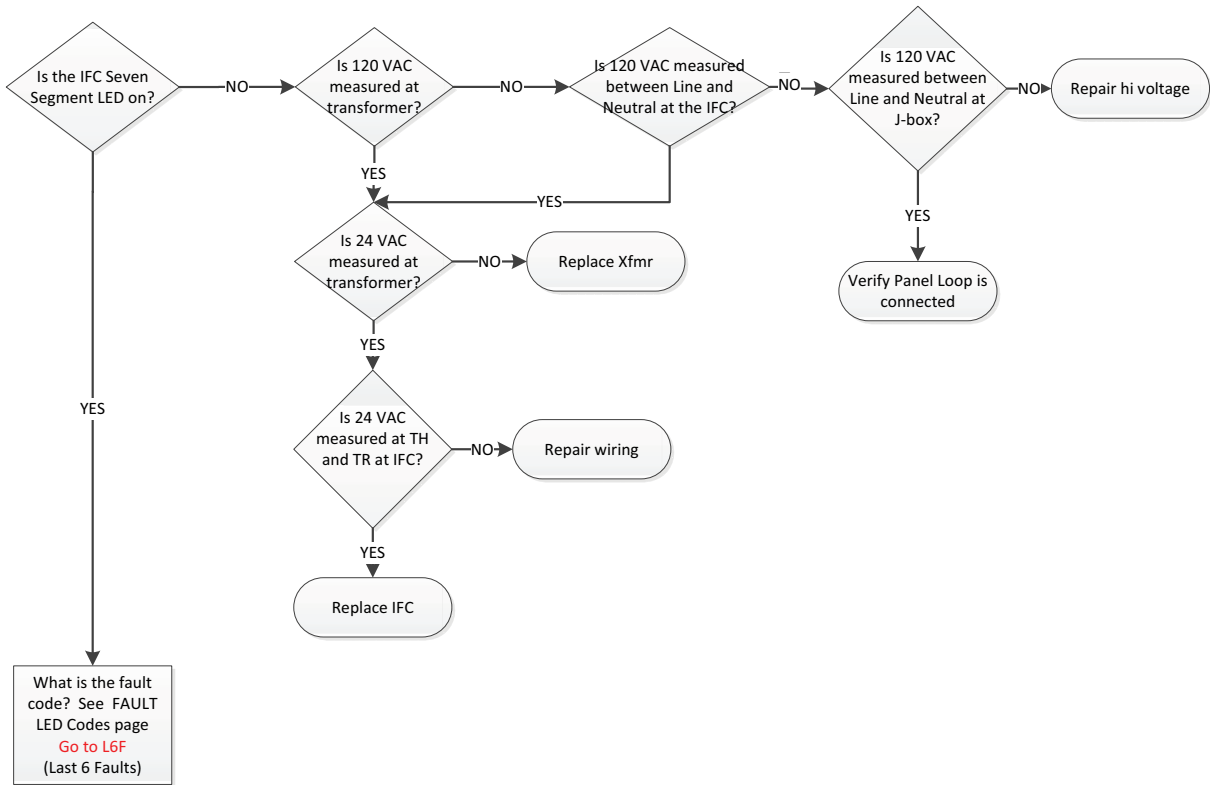
The following pages include troubleshooting flowcharts in reference for the 2 Stage S9V2\* family of furnaces only. The information contained is for reference only and does not cover all scenarios or problems that may be encountered. ONLY qualified technicians should attempt to install, troubleshoot, or repair this appliance. Failure to follow all cautions and /or warnings could result in personal or property damage, including death.

Error Codes	
Alarm Error Code	Alarm Explanation
E01	Loss of the IRQ or other internal failures (Internal IFC error)
E2.1	Retry Exceeded (Failed to Establish Flame)
E2.2	Recycles exceeded (Loss of Established Flame) or 10X PS1 Open
E2.3	1st Stage Gas Valve Not Energized When It Should Be exceeded after 10 times
E2.4	Redundant Relay (HLO output) Not Energized when it should be exceeded after 10 times
E3.1	Shorted Pressure Switch, 1st Stage
E3.2	Open Pressure Switch, 1st Stage
E3.3	Shorted Pressure Switch, 2nd Stage
E3.4	Open Pressure Switch, 2nd Stage
E04	Open Limit (Main Thermal, Rollout Switch, or Reverse Airflow Switch)
E05	Flame detected, should not be present
E06	Voltage reversed polarity or Bad Grounding
E6.3	(1) Igniter relay fails
	(2) Igniter open
E7.1	1st stage gas valve (MVL) is energized when it should be off
E7.2	Redundant Relay (HLO output) Energized when it should Not be
E08	Flame current is low, but still strong enough to allow operation
E09	Open Inducer Limit Switch or Condensate Pressure Switch
E10	Communication error between variable speed inducer and blower motor microprocessor
E11	(1) 2nd stage gas valve energized when it should NOT be
	(2) 2nd stage gas valve not energized when it should be
	(3) 1st stage gas valve not energized when it should be
	(4) Redundant relay (HLO output) not energized when it should be
E12	Open fuse
E13	Blower HP/OEM ID
E14	No PM and local copy bad
E15	Both of unit Data File in PM and local Unit Data File are corrupt
E17	Blower motor no communication response
E18	Blower communication failure on the control

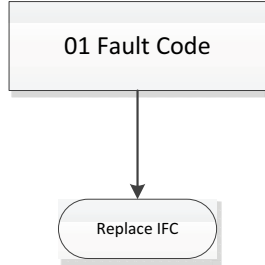
IFC Component Layout



GETTING STARTED



DEFINITION:  
Internal failure of the control board



# Troubleshooting

## DEFINITION

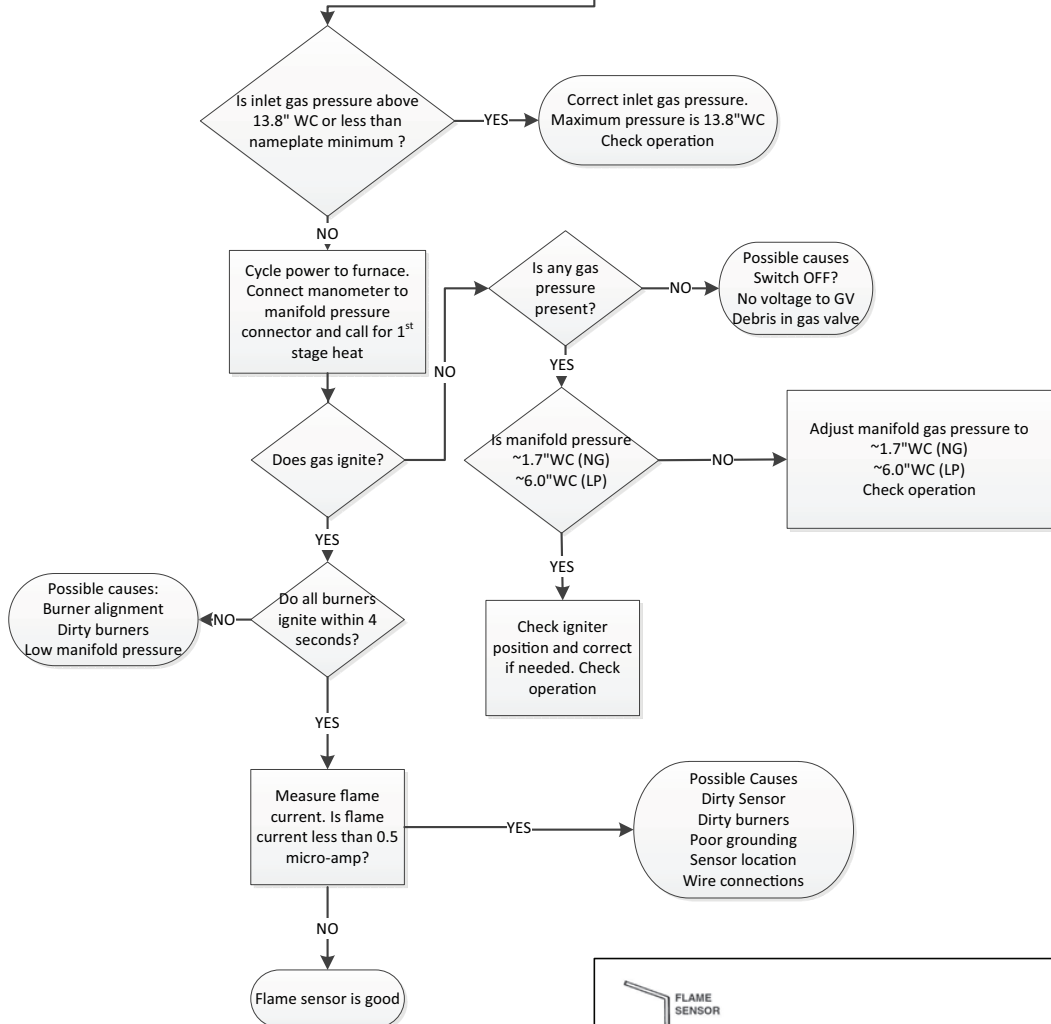
RETRY Lock Out = 3 unsuccessful tries for ignition within a single call for heat. Lockout period is for one hour

**Flame has never been sensed**

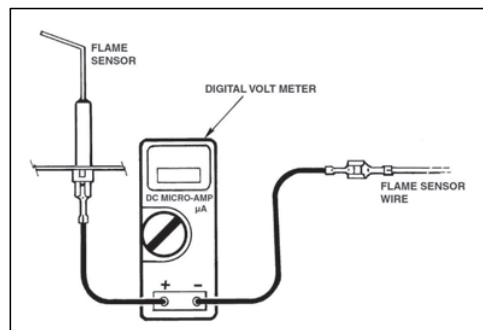
**All gas appliances in the home should be turned on to verify gas pressure**

## 2.1 Fault Code

Disconnect electrical power to furnace.  
Connect manometer to inlet gas pressure connector

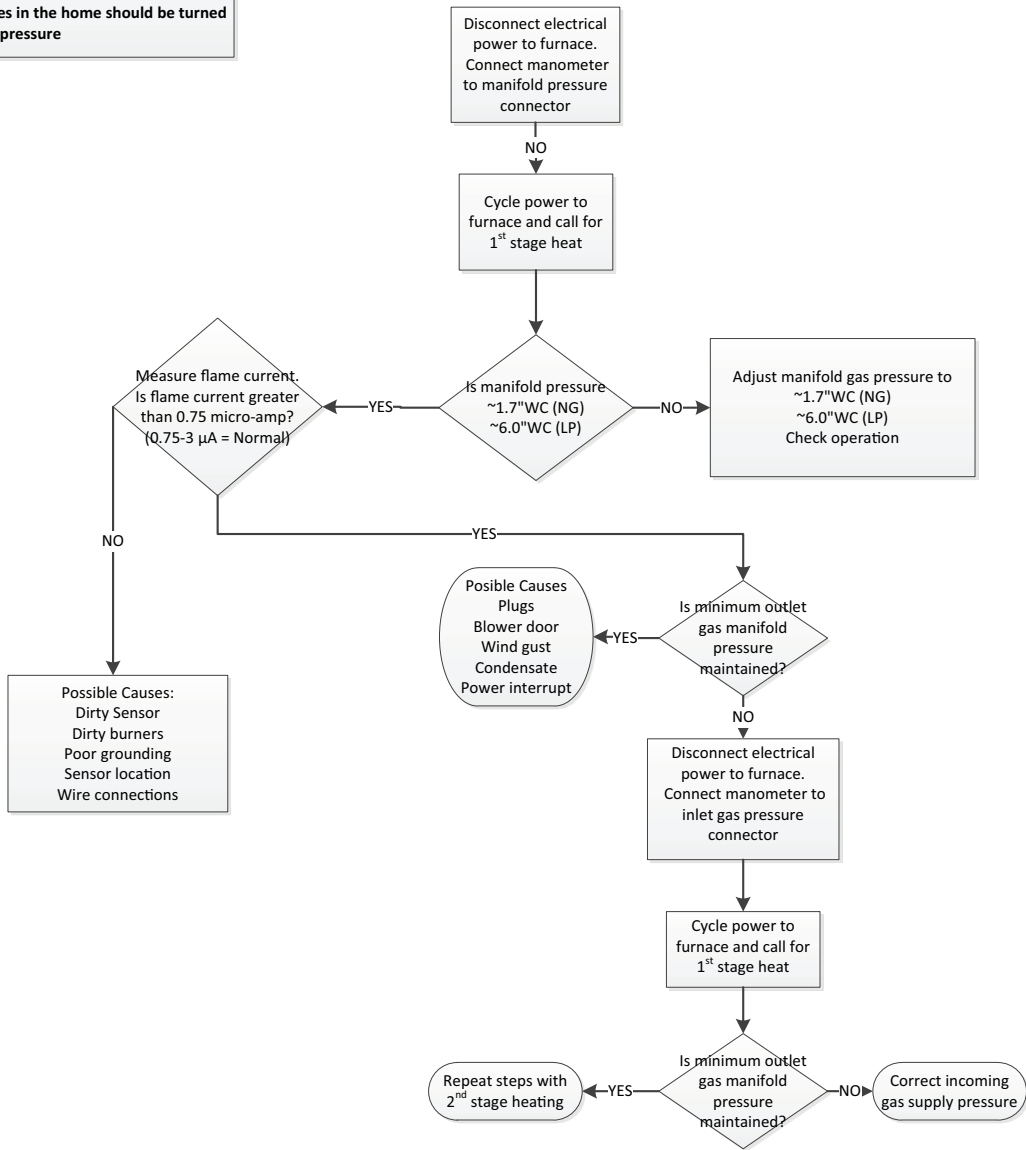


To measure flame current, use a VOM set to DC micro-amps. Connect voltmeter leads in series with flame sensor circuit, see illustration

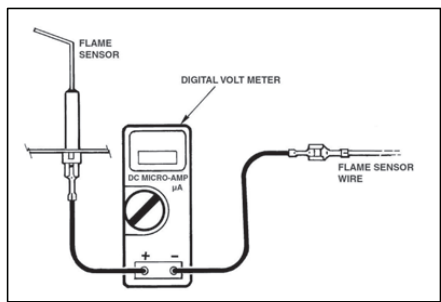


**DEFINITION**  
 RECYCLE Lock Out = 10 recycles within a single call for heat. Lockout period is for one hour.  
**Flame is sensed & then lost**  
**All gas appliances in the home should be turned on to verify gas pressure**

**2.2 Fault Code**

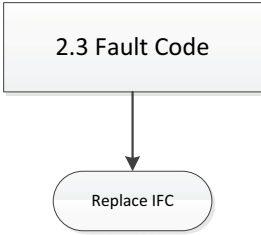


To measure flame current, use a VOM set to DC micro-amps. Connect voltmeter leads in series with flame sensor circuit, see illustration

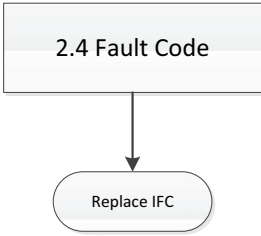


# Troubleshooting

**DEFINITION**  
 1<sup>st</sup> Stage Gas Valve not energized when it should be 10 times within the same call for heat .  
**24VAC not sensed on MVL 10 times**



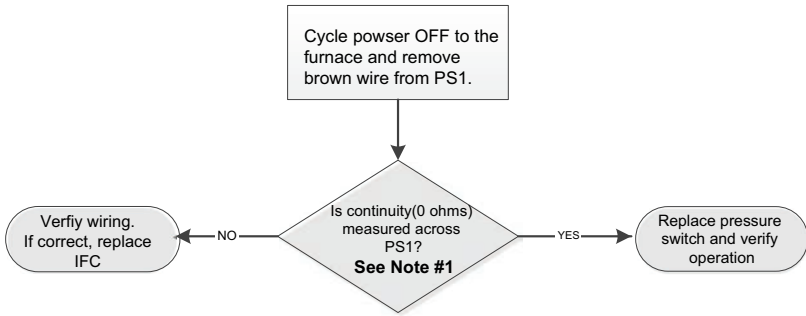
**DEFINITION**  
 High limit output relay is not closed when it should be  
**24VAC not sensed on HLO 10 times**



**DEFINITION**  
 An error has occurred with the PS1, indicating that the pressure switch is closed when it should be open.  
**In most cases, the pressure switch is not the problem.**  
 NOTE: Verify pressure switch wiring and tube routing are correct.

**Note #1**  
 OL = Open Switch  
 0 ohms = Closed Switch

## 3.1 Fault Code



**DEFINITION**  
 An error has occurred with the PS1 indicating that the pressure switch is open when it should be closed.

**In most cases, the pressure switch is not the problem.**

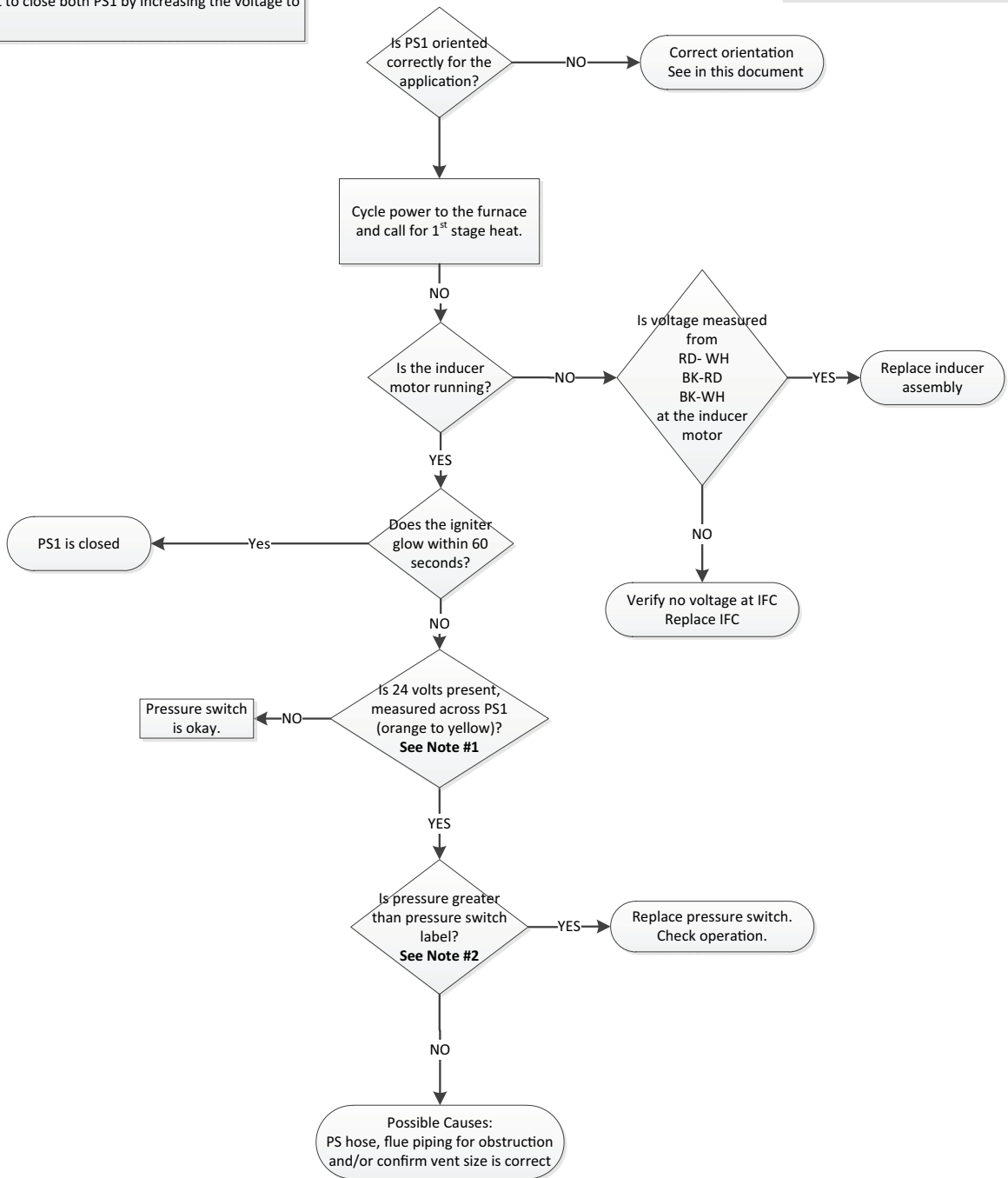
**NOTE:** Verify pressure switch wiring and tube routing are correct.

PS1 Open errors can occasionally occur when wind gusts occur. The IFC will attempt to close both PS1 by increasing the voltage to the inducer motor

**Note #1**  
 24 volts = Open Switch  
 0 volts = Closed Switch

**Note #2**  
 Measured pressure is negative, greater than refers to magnitude only.

### 3.2 Fault Code



**DEFINITION**

An error has occurred with the PS2, indicating that the pressure switch is closed when it should be open.

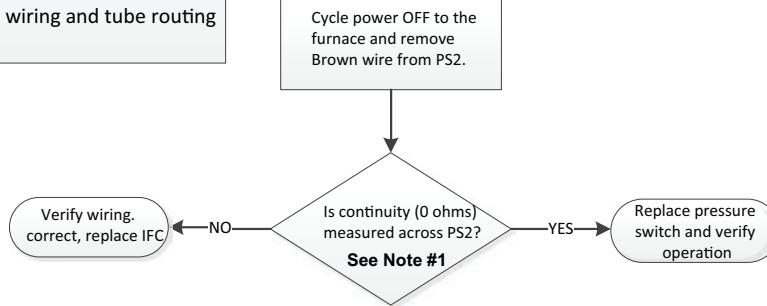
**In most cases, the pressure switch is not the problem.**

**NOTE:** Verify pressure switch wiring and tube routing are correct.

## 3.3 Fault Code

**Note #1**

OL = Open Switch  
0 ohms = Closed Switch



**DEFINITION**

An error has occurred with the PS2 indicating that the pressure switch is open when it should be closed.

**In most cases, the pressure switch is not the problem.**

**NOTE:** Verify pressure switch wiring and tube routing are correct.

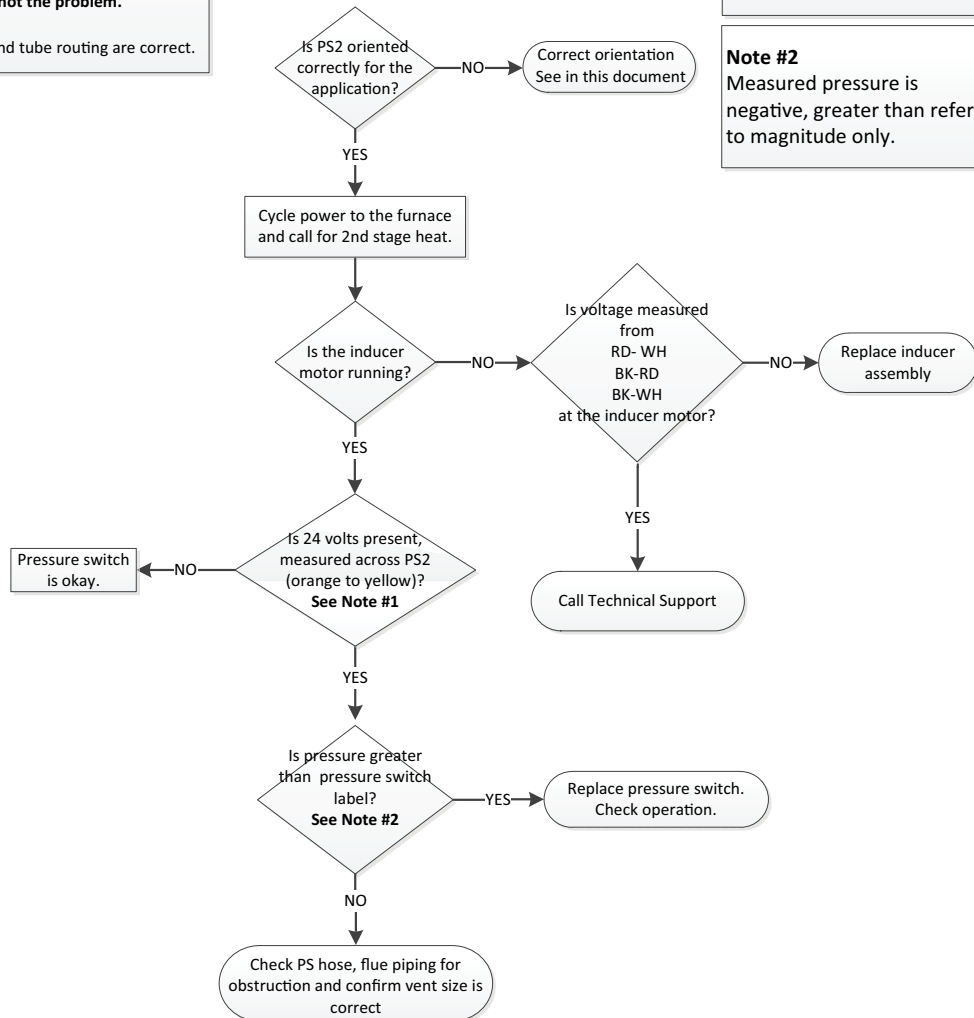
## 3.4 Fault Code

**Note #1**

24 volts = Open Switch  
0 volts = Closed Switch

**Note #2**

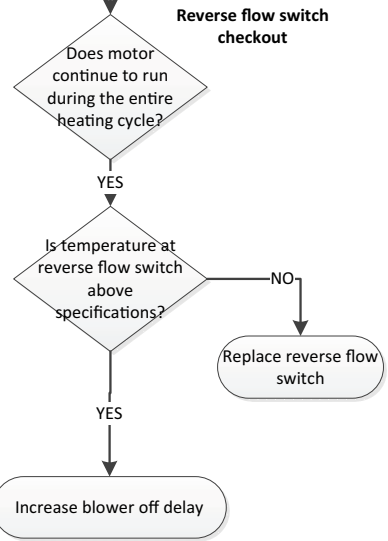
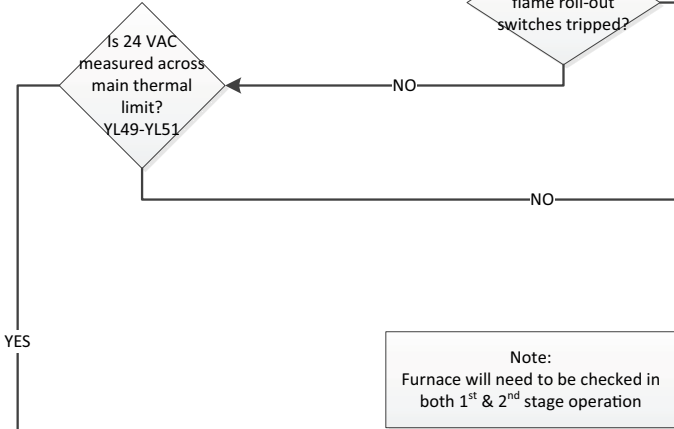
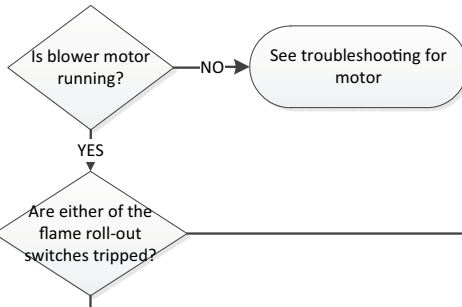
Measured pressure is negative, greater than refers to magnitude only.





**DEFINITION**  
 Limit switches are safety devices that will open when an abnormal high temperature has been sensed. REMOVE ALL JUMPER WIRING TO SWITCHES!  
 Under no circumstances, shall these switches be left jumpered when not troubleshooting.  
 Verify filters and blower wheels are clean

**04 Fault Code** → See next page for additional 04 faults



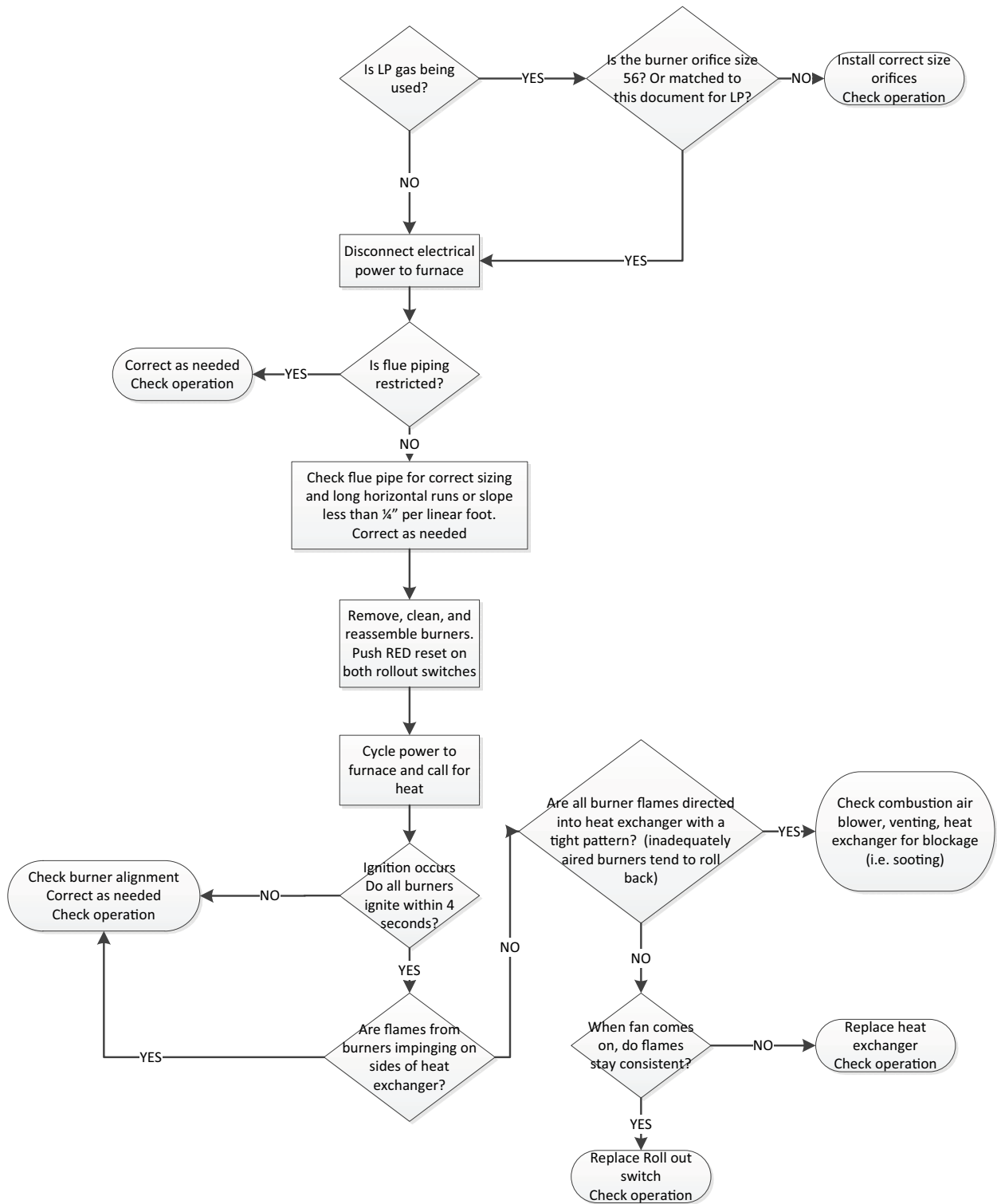
# Troubleshooting

## DEFINITION

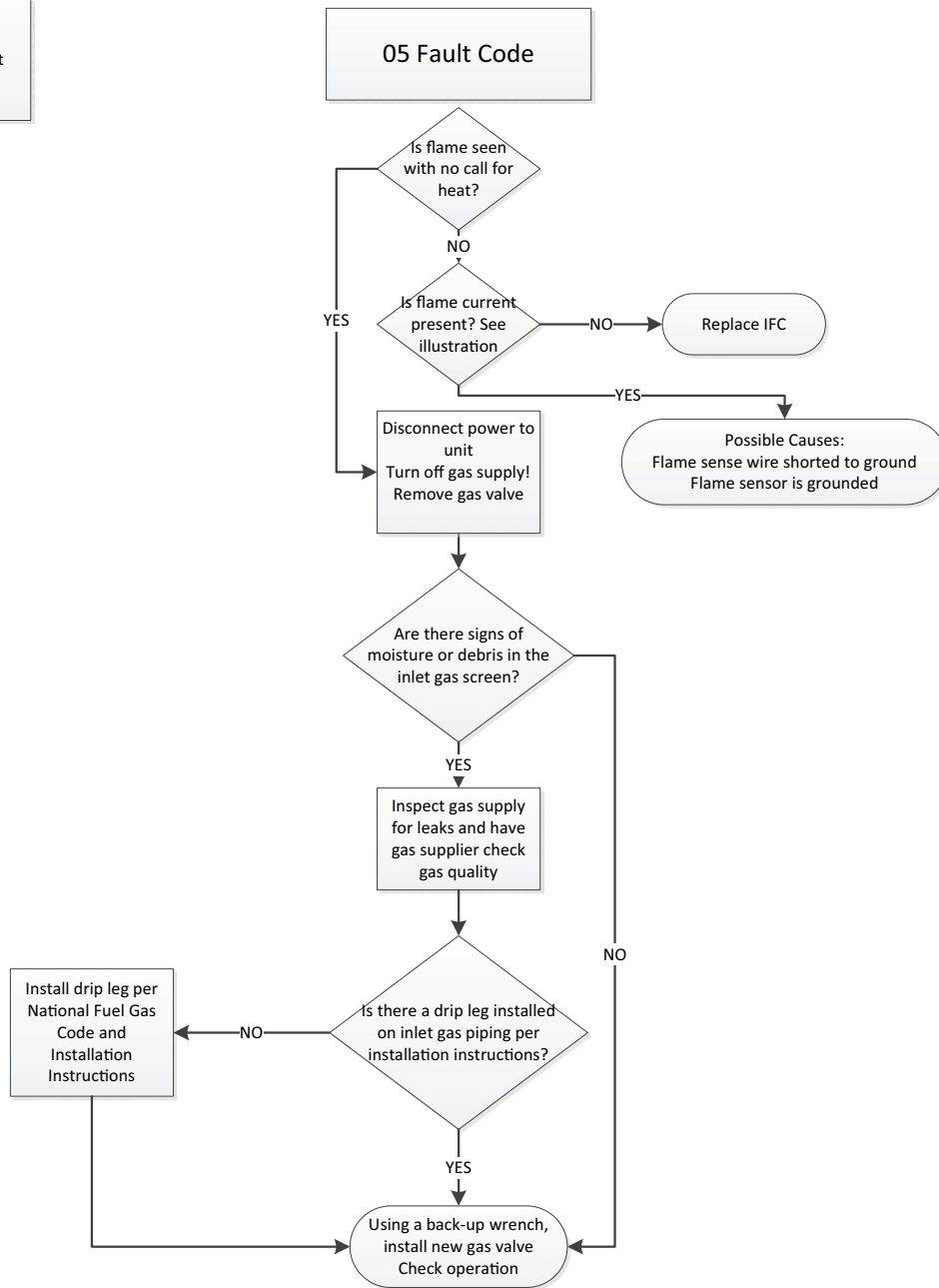
Limit switches are safety devices that will open when an abnormal high temperature has been sensed.

**REMOVE ALL JUMPER WIRING TO SWITCHES!**  
Under no circumstances, shall these switches be left jumpered when not troubleshooting.

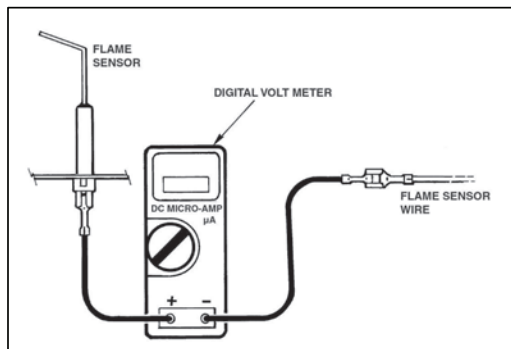
## 04 Fault Code Flame Rollout



**DEFINITION:**  
Flame is sensed when it should not be.



To measure flame current, use a VOM set to DC micro-amps. Connect voltmeter leads in series with flame sensor circuit, see illustration

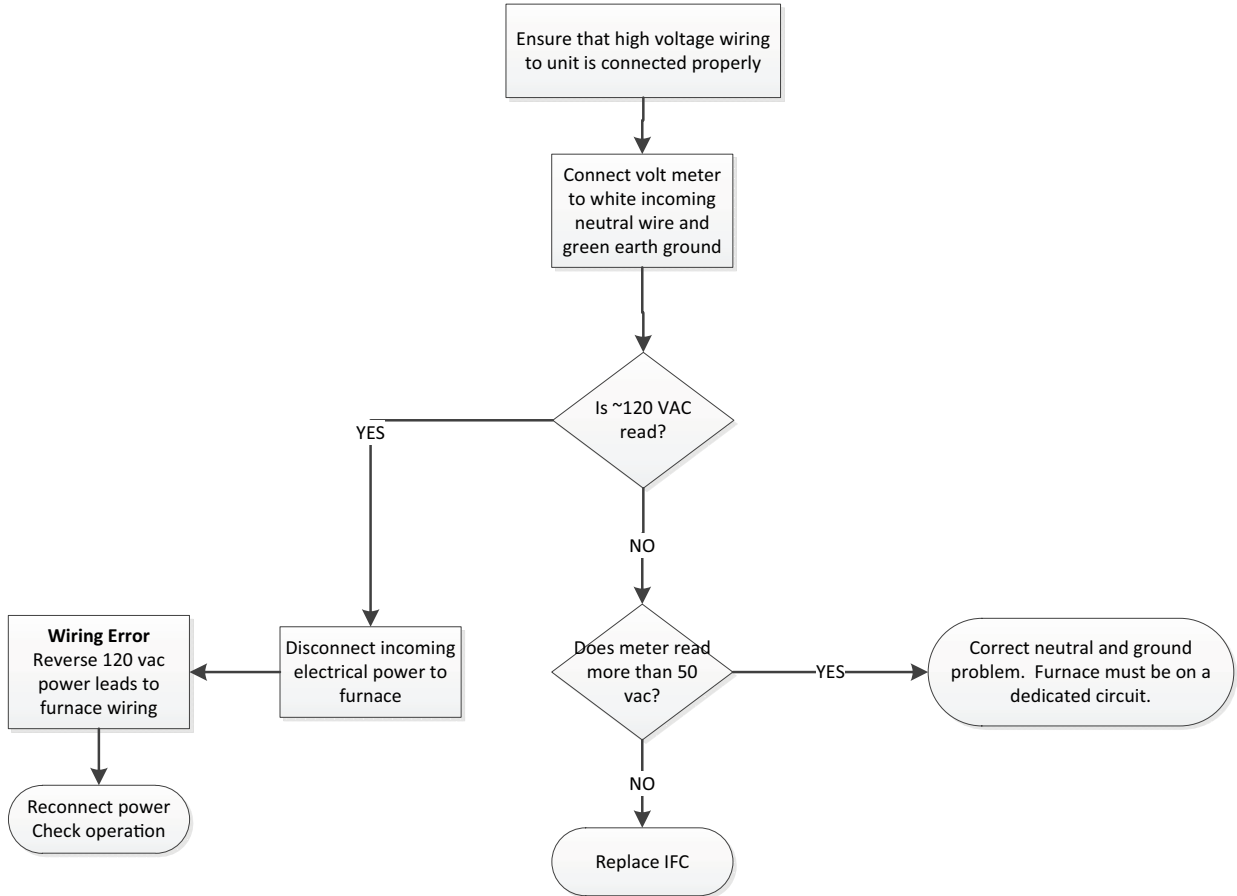


# Troubleshooting

**DEFINITION:**

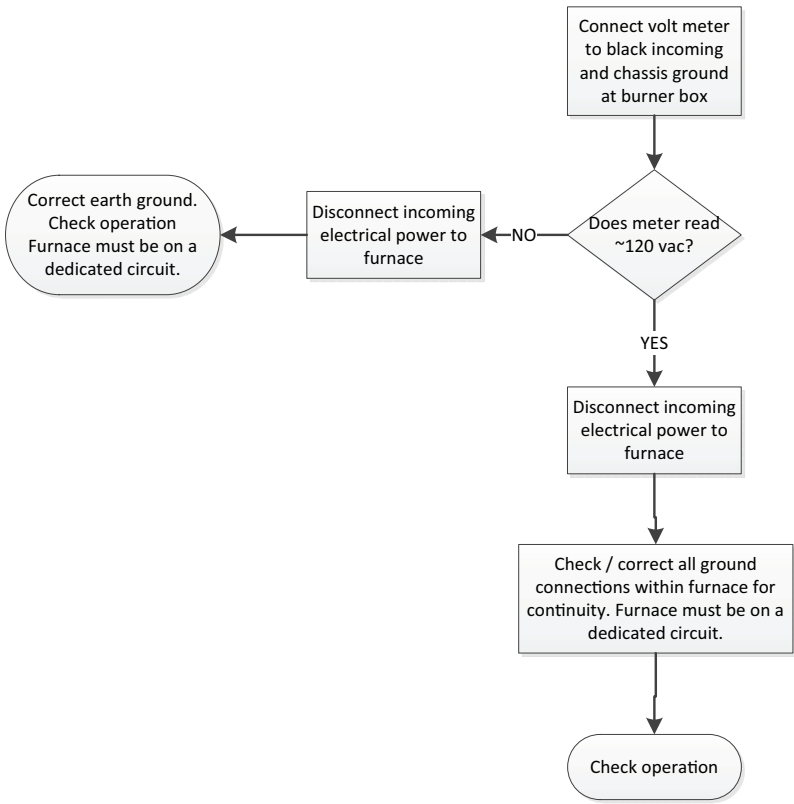
Polarity Fault – Incoming high voltage wiring is reversed

## 06 Fault Code Reversed Polarity

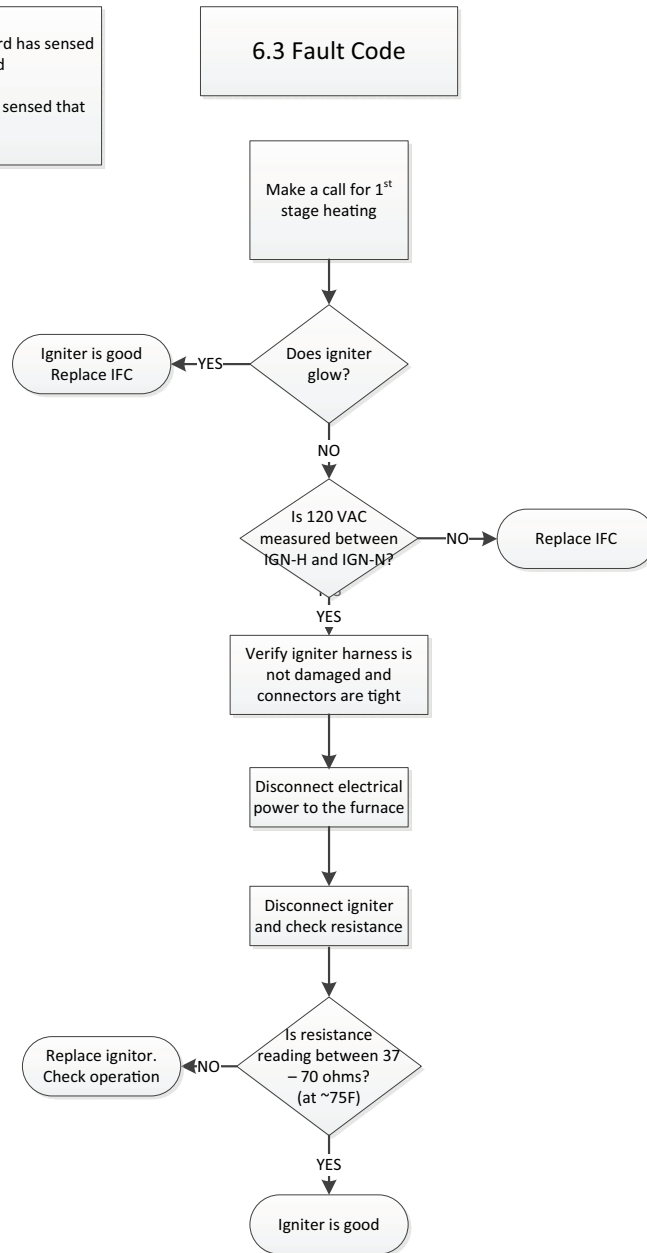


**DEFINITION:**  
Ground Fault - Incoming or chassis ground connection is not sensed

**06 Fault Code**  
**Faulty Ground**

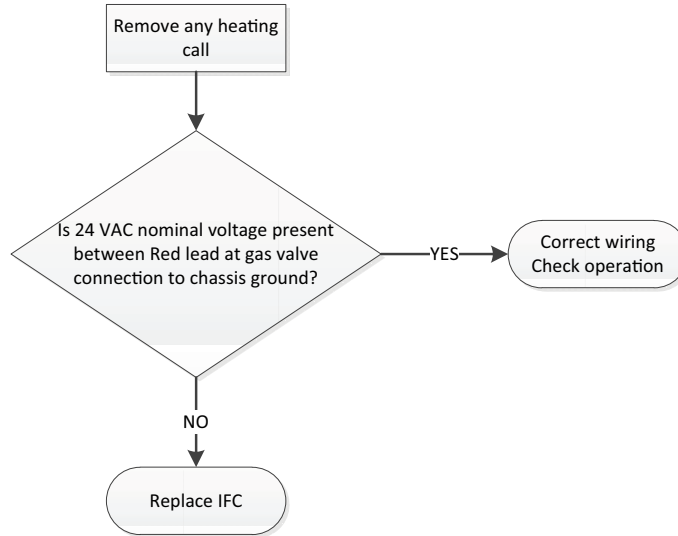


**DEFINITION:**  
Igniter Relay Fault – The control board has sensed that the igniter relay has stuck closed  
  
Ignitor Fault – The control board has sensed that the ignitor circuit is open or shorted.



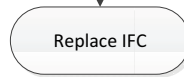
DEFINITION: External Gas Valve  
Circuit Error (24 volts is present  
when it should not be present)

### 7.1 Fault Code



DEFINITION:  
Internal control board error  
Redundant HLO relay closed  
when it should not be

### 7.2 Fault Code

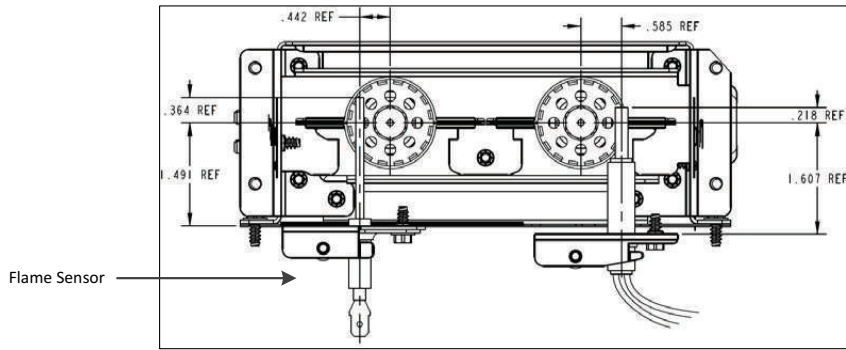
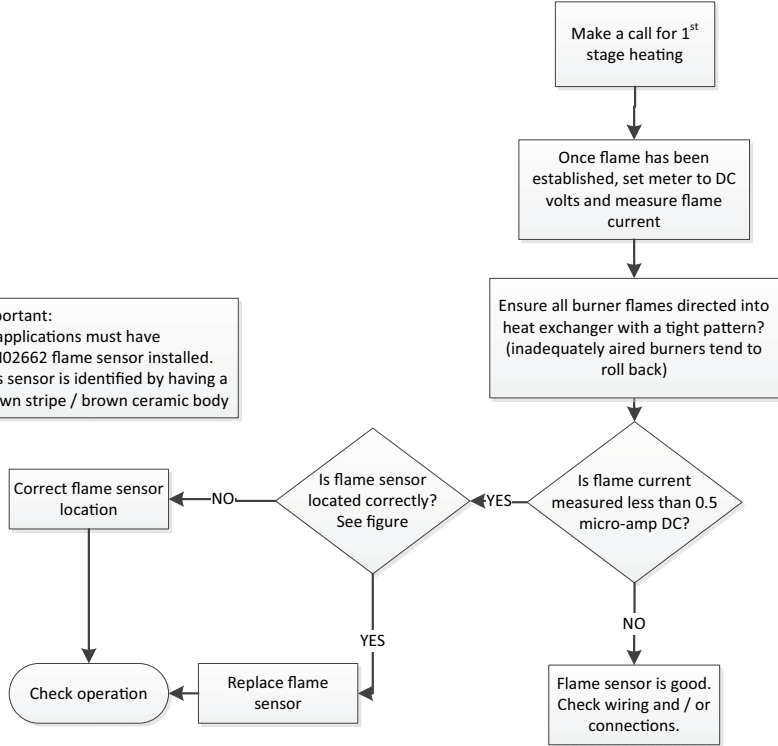


# Troubleshooting

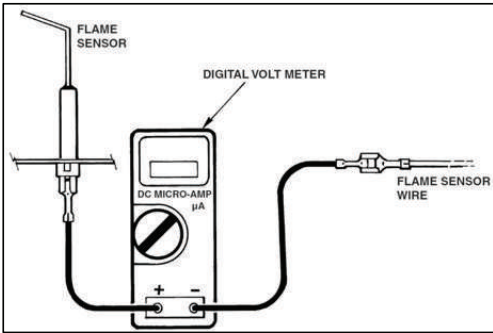
**DEFINITION:**  
The flame sense current is less than 0.5 micro-amp DC

**08 Fault Code**

**Important:**  
LP applications must have SEN02662 flame sensor installed. This sensor is identified by having a brown stripe / brown ceramic body



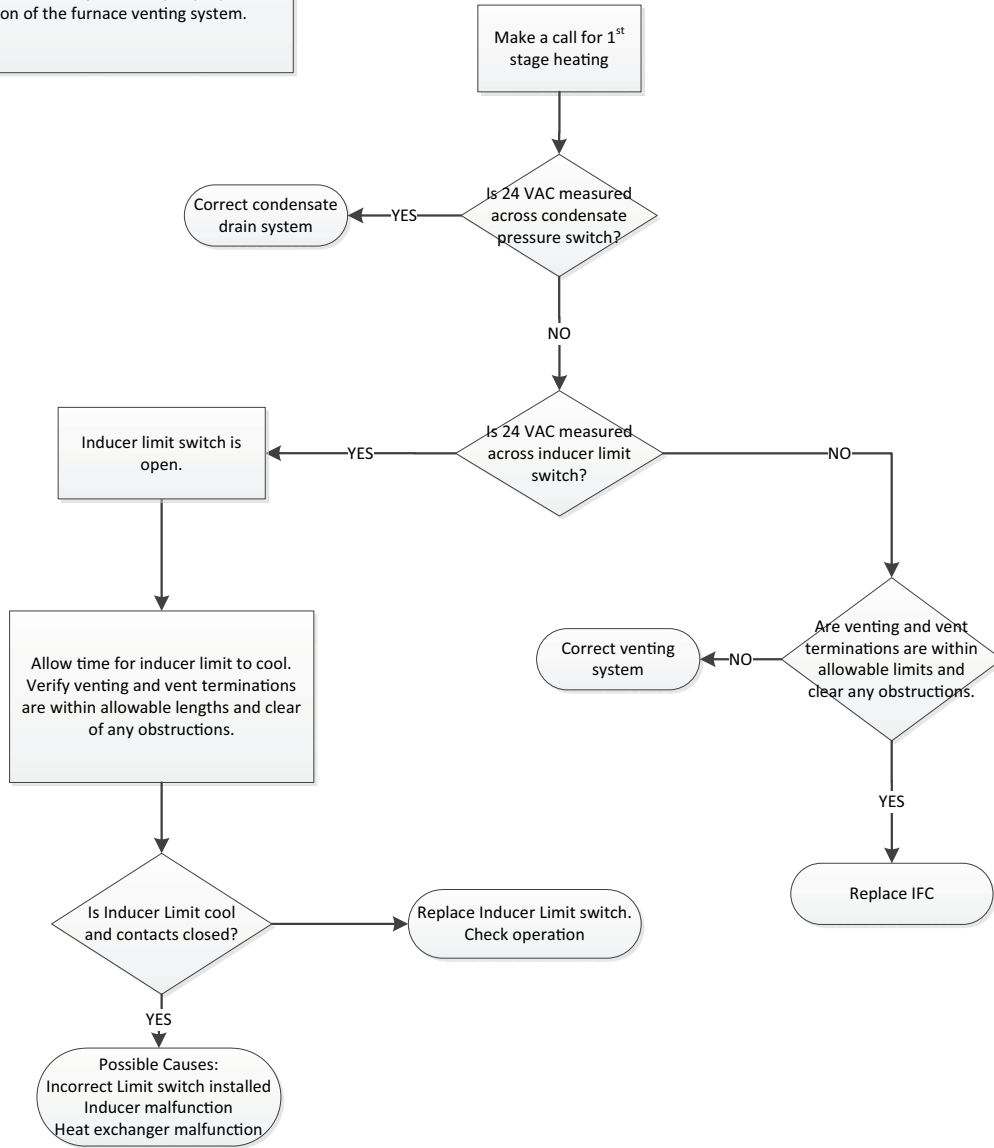
To measure flame current, use a VOM set to DC micro-amps. Connect voltmeter leads in series with flame sensor circuit, see illustration





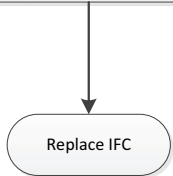
Definition:  
 Condensate Pressure Switch Open: The condensate system is not free flowing and opened the safety switch OR  
 Inducer Limit: This error is normally caused by improper installation or application of the furnace venting system.

09 Fault Code



DEFINITION:  
 Internal control board error. Communication error between the inducer and blower motor micro-processors

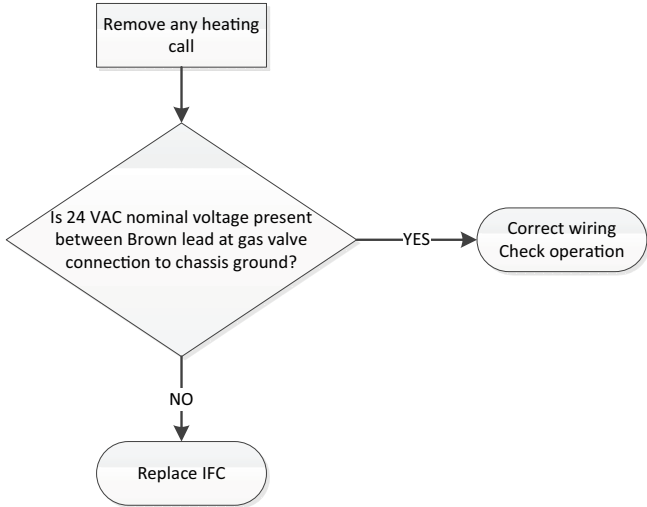
10 Fault Code



# Troubleshooting

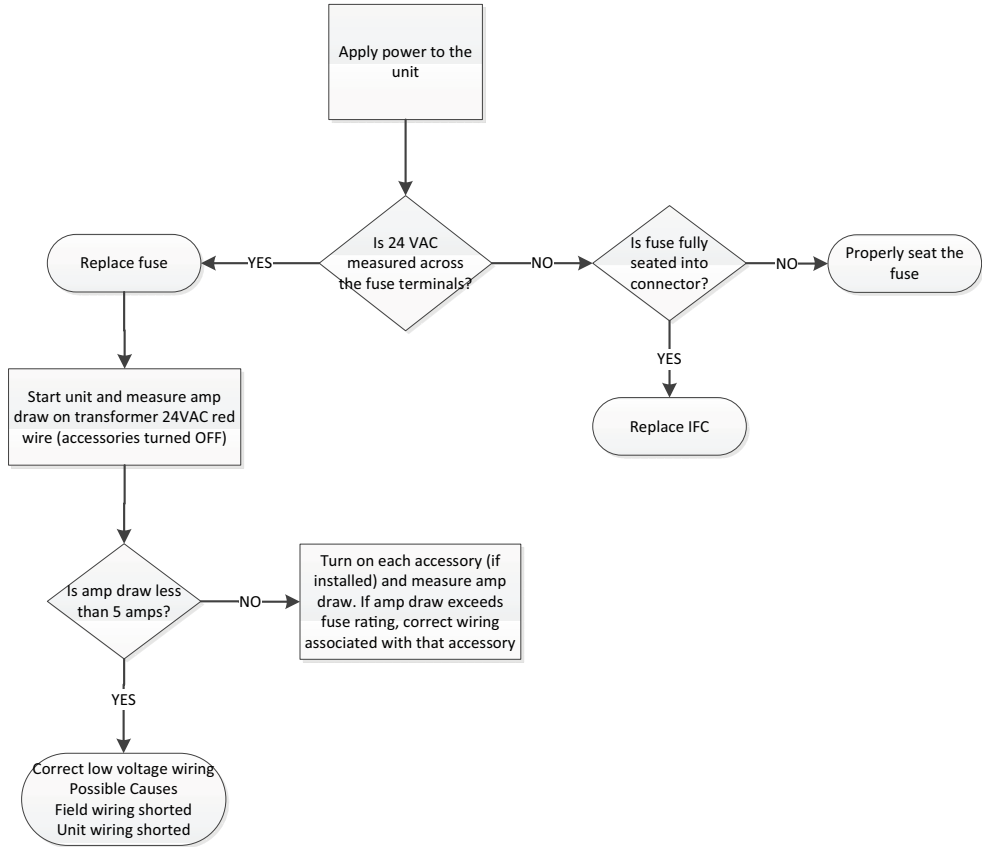
**Definition**  
 The IFC has detected that internal gas valve relays have failed  
 OR 24 VAC is being sensed at 2<sup>nd</sup> stage gas valve

## 11 Fault Code



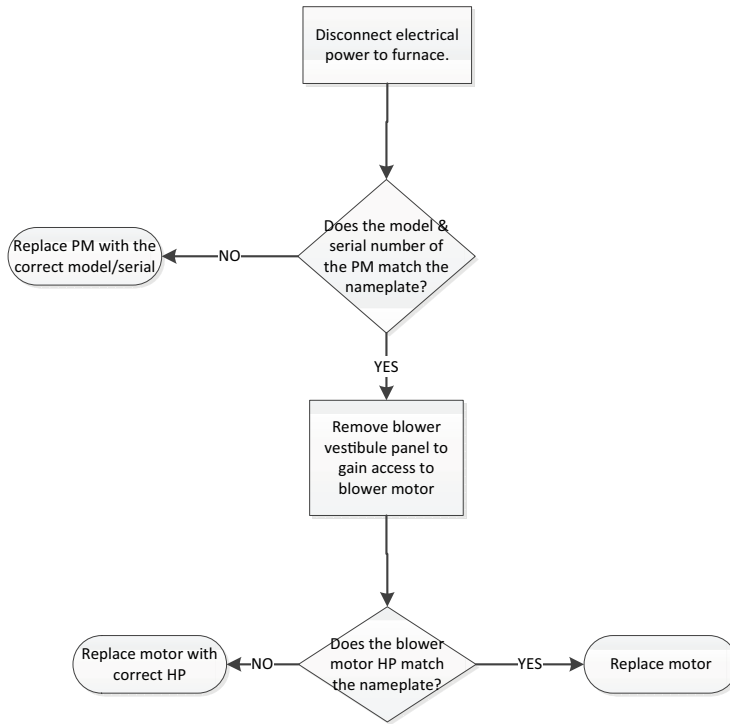
**Definition:**  
 The onboard 5 amp fuse is open or missing.

## 12 Fault Code



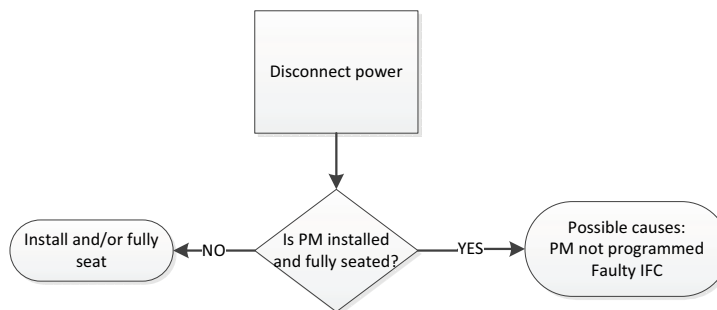
DEFINITION:  
This fault is generated when the HP or OEM ID of the blower motor does not match the value that is programmed on the Personality Module

### 13 Fault Code



DEFINITION:  
This fault is generated when the PM is missing and the onboard information cannot be read

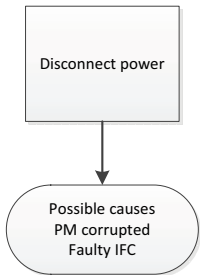
### 14 Fault Code



# Troubleshooting

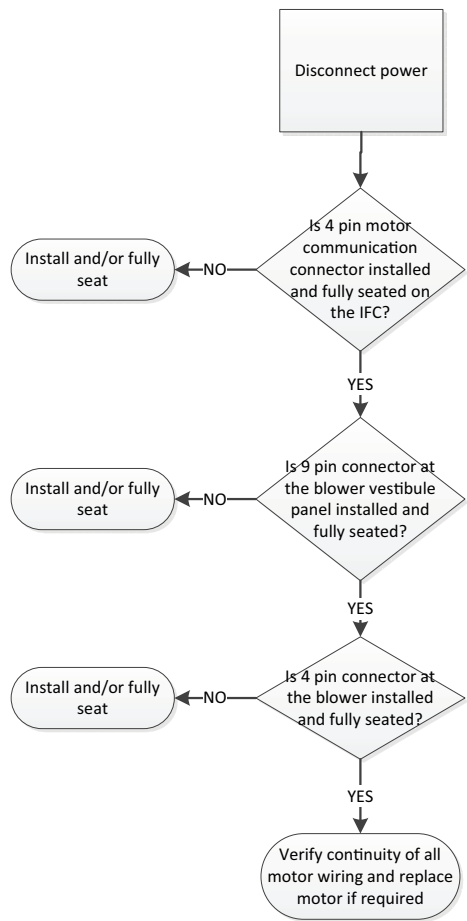
**DEFINITION:**  
This fault is generated when the PM and the IFC information is corrupted

**15 Fault Code**



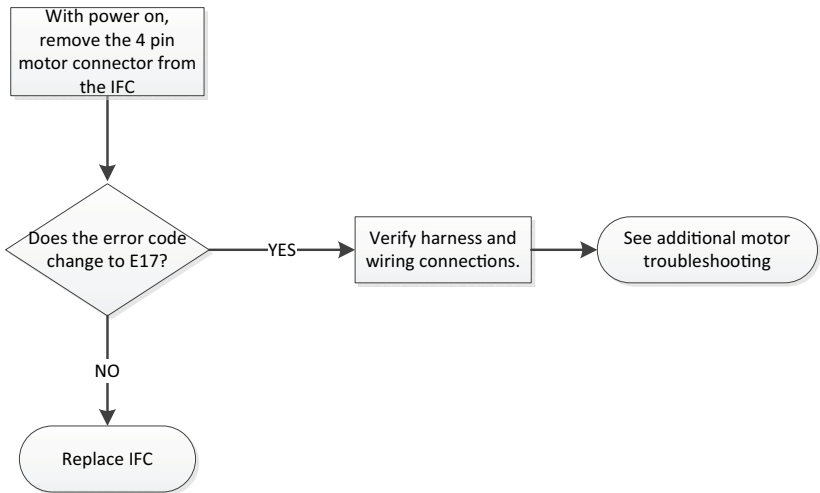
**DEFINITION:**  
This fault is generated when IFC does not see a return signal from the blower motor

**17 Fault Code**



**DEFINITION:**  
This fault is generated when the IFC does not see a send message itself.

## 18 Fault Code



Serial Motor  
Troubleshooting

Serial Motor Troubleshooting

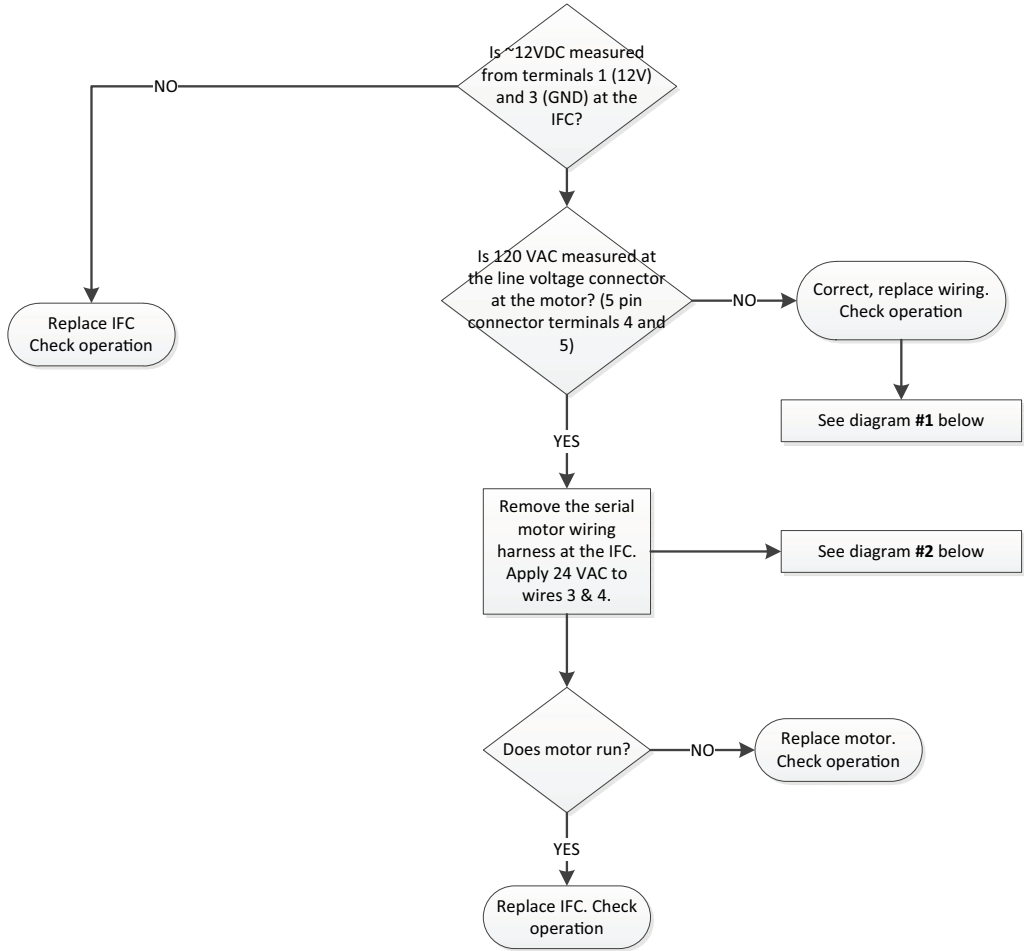


DIAGRAM #1

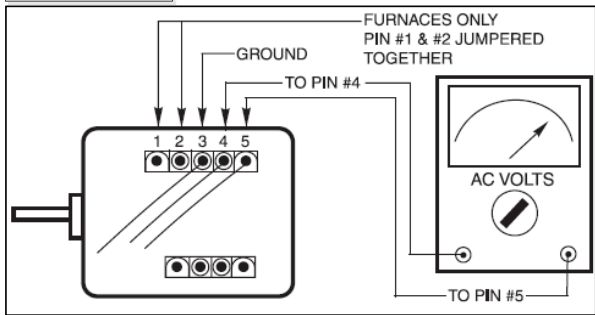
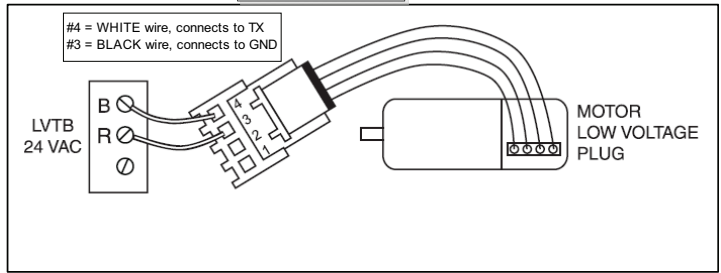


DIAGRAM #2



# Sequence of Operation

**Note:** The seven segment LED readout is based on thermostat input. During a simultaneous call for W1 and W2, the seven segment LED will read "Ht 2", although the IFC will process the call for 1<sup>st</sup> stage heat first.

## 1<sup>st</sup> Stage Gas Heating

1. R – W1 contacts close on the thermostat sending 24VAC to the W1 low voltage terminal of the IFC. Technician should read 24VAC from W1 to B/C. The seven segment LED will read "Ht 1".
2. **The IFC performs a self-check routine and then confirms:**
  - a. Condensate pressure switch and Inducer limit switch are closed by sending 24VAC out the HLO terminal and monitoring the ILI input.
  - b. Flame roll-out switches (FRS) 1 & 2, main thermal limit (TCO), and any reverse air flow (RAF) switches are closed by sending 24VAC out the HLO terminal and monitoring the HLI input.

**Note:** Downflow units will have one reverse air flow switch (RAF).

Upflow units will have two reverse air flow switches (RAF).

- c. Pressure switch 1 (PS1) and pressure switch 2 (PS2) are opened by sending 24VAC out the HLO terminal, through the limit switches, and monitoring the PS1 and PS2 inputs.

**Note:** If a thermal limit is open, 24VAC will not be present at either pressure switch.
3. After steps 2a, b, and c are confirmed, the variable speed inducer is energized and will run at the predetermined factory default 1<sup>st</sup> stage inducer speed. As the inducer ramps up, PS1 will close.
  4. When PS1 closes, the ignitor relay on the IFC will close. The ignitor is energized and warm up is approximately 20 seconds.
  5. After the ignitor warm up, the 1<sup>st</sup> stage gas valve relay is closed, energizing the 1<sup>st</sup> stage gas valve solenoid to allow ignition.
  6. The first burner will ignite and flame will crossover to the remaining burners, establishing current to the flame sensor. Flame sensing must take place within 4 seconds.
  7. Once flame sense has been achieved, a timer on the IFC starts and after the "Blower On" delay has completed, the indoor blower will energize and run at the 1<sup>st</sup> stage gas heating speed.
    - During this time, the variable speed inducer will start its 1<sup>st</sup> stage learning routine, seen as Lr 1 on the seven segment LED display. Ht 1 and Lr 1 will alternately be displayed until the learning routine has been successfully completed. See [Learning Routine](#) section below for specifics.

8. Once the 1<sup>st</sup> stage learning routine has successfully been achieved, the seven segment LED will alternately read:

Ht 1 = Gas heating, Stage 1

RrF = Airflow

660 = 600 calculated cfm (value shown x 10)

9. When the temperature raises enough to satisfy the thermostat setting, contacts R-W1 will open.
10. The gas valve relay will open, closing the gas valve. The inducer will continue to run the post-purge for approximately 5 seconds to remove any combustion byproducts from inside the furnace.
11. The indoor blower continues to run the heat off delay to remove heat from the heat exchangers. The blower off time is field adjustable through the IFC menu setup option. The seven segment LED will read "i dL" = Idle, no thermostat demand.

## 2<sup>nd</sup> Stage Gas Heating

**Note:** 2<sup>nd</sup> stage heating cannot operate without 1<sup>st</sup> stage operation.

1. R – W1 contacts close on the thermostat sending 24VAC to the W1 low voltage terminal of the IFC. Technician should read 24VAC from W1 to B/C. The seven segment LED will read "Ht 1".
2. **The IFC performs a self-check routine and then confirms:**
  - a. Condensate pressure switch and Inducer limit switch are closed by sending 24VAC out the HLO terminal and monitoring the ILI input.
  - b. Flame roll-out switches (FRS) 1 & 2, main thermal limit (TCO), and any reverse air flow (RAF) switches are closed by sending 24VAC out the HLO terminal and monitoring the HLI input.

**Note:** Downflow units will have one reverse air flow switch (RAF).  
Upflow units will have two reverse air flow switches (RAF).
  - c. Pressure switch 1 (PS1) and pressure switch 2 (PS2) are opened by sending 24VAC out the HLO terminal, through the limit switches, and monitoring the PS1 and PS2 inputs.

**Note:** If a thermal limit is open, 24VAC will not be present at either pressure switch.

3. After steps 2a, b, and c are confirmed, the variable speed inducer is energized and will run at the predetermined factory default 1<sup>st</sup> stage inducer speed. As the inducer ramps up, PS1 will close.
4. When PS1 closes, the ignitor relay on the IFC will close. The ignitor is energized and warm up is approximately 20 seconds.

## Sequence of Operation

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5. After the ignitor warm up, the 1<sup>st</sup> stage gas valve relay is closed, energizing the 1<sup>st</sup> stage gas valve solenoid to allow ignition.
6. The first burner will ignite and flame will crossover to the remaining burners, establishing current to the flame sensor. Flame sensing must take place within 4 seconds.
7. Once flame sense has been achieved, a timer on the IFC starts and after the "Blower On" delay has completed, the indoor blower will energize and run at the 1<sup>st</sup> stage gas heating speed.
  - During this time, the variable speed inducer will start its 1<sup>st</sup> stage learning routine, seen as  $Lr1$  on the seven segment LED display.  $Ht1$  and  $Lr1$  will alternately be displayed until the learning routine has been successfully completed. See [Learning Routine](#) section below for specifics.
8. Once the 1<sup>st</sup> stage learning routine has successfully been achieved, the seven segment LED will alternately read:  
 $Ht1$  = Gas heating, Stage 1  
 $RrF$  = Airflow  
 $DBD$  = 600 calculated cfm (value shown x 10)
9. R-W2 contacts close on the thermostat sending 24VAC to the W2 low voltage terminal of the IFC. Technician should read 24VAC from W2 to B/C. The seven segment LED will read " $Ht2$ ".
10. The IFC checks to insure that PS2 is open and the inducer is ramped up to the predetermined factory default 2<sup>nd</sup> stage speed, closing PS2 pressure switch. The second stage gas valve relay on the IFC closes, energizing second stage gas valve. The indoor blower motor will ramp up to the 2<sup>nd</sup> stage gas heating speed.
  - During this time, the variable speed inducer will start its 2<sup>nd</sup> stage learning routine, seen as  $Lr2$  on the seven segment LED display.  $Ht2$  and  $Lr2$  will alternately be displayed until the learning routine has been successfully completed. See [Learning Routine](#) section below for specifics
11. Once the the 2<sup>nd</sup> stage learning routine has successfully been completed, the seven segment LED will alternately read:  
 $Ht2$  = Gas heating, Stage 2  
 $RrF$  = Airflow  
 $i23$  = 1230 calculated cfm (value shown x 10)
12. When the temperature raises enough to satisfy the thermostat setting, contacts R-W2 will open, 2<sup>nd</sup> stage gas valve will close, the indoor blower motor will ramp down to 1<sup>st</sup> stage, and the unit will continue to run until R-W1 contacts open.
13. When the temperature raises enough to satisfy the thermostat setting, contacts R-W1 will open.
14. The gas valve relay will open, closing the gas valve. The inducer will continue to run for approximately 5 seconds to remove any combustion byproducts from inside the furnace.

15. The indoor blower continues to run to remove heat from the heat exchangers. This blower off time is field adjustable through the IFC menu setup option. The seven segment LED will read " $i dL$ " = Idle, no thermostat demand.

### Single Stage Cooling

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.  
**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".*
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:  
 $CL1$  = Cooling, Stage 1  
 $RrF$  = Airflow  
 $DBD$  = 800 calculated cfm (value shown x 10)
4. When the temperature is lowered enough to satisfy the thermostat setting, contacts R-Y1-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 " $i dL$ " = Idle, no thermostat demand.

### Two Stage Cooling

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.  
**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".*
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:  
 $CL1$  = Cooling, Stage 1  
 $RrF$  = Airflow  
 $DBD$  = 800 calculated cfm (value shown x 10)
4. R-Y2 contact on the thermostat closes sending 24VAC to Y2 low voltage terminal on the IFC. Technician should read 24VAC between Y2 and B/C.
5. 24VAC is sent to the OD unit via thermostat wiring.
6. The indoor airflow ramps to 2<sup>nd</sup> stage cooling airflow. The seven segment LED for example will read:  
 $CL2$  = Cooling, Stage 2  
 $RrF$  = Airflow  
 $i60$  = 1600 calculated cfm (value shown x 10)



7. When the temperature is lowered enough to satisfy the thermostat setting, contacts R-Y1-Y2-G will open.
8. 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 "i dL" = Idle, no thermostat demand.

### Variable Speed Inducer Learning Routine

The purpose of the learning routine is to determine the most efficient inducer operating speed for the furnace in a given heat stage. On a call for gas heat, or transition to a given gas heat stage, the inducer is commanded to a speed in order to close the pressure switch for that stage.

**Note:** *NOTE: Gas manifold measurements or adjustments must not be made until the learning routine for each stage has been successfully completed.*

There are two learning routines, one for 1<sup>st</sup> stage gas heat and another for 2<sup>nd</sup> stage gas heat. Each learning routine is separate and will occur:

1. Upon initial commissioning of the furnace
2. When power to the furnace has been interrupted
3. After the below number of heating cycles has been reached
  - a. 150 1<sup>st</sup> stage cycles
  - b. 100 2<sup>nd</sup> stage cycles

### 1<sup>st</sup> Stage Heat

1. When 1<sup>st</sup> stage gas heat is requested, the variable speed inducer is energized and will run at the predetermined factory default 1<sup>st</sup> stage inducer speed. Once the ignition process and the blower on delay have successfully completed the IFC will begin the Inducer Learning Routine as outlined below

#### PS1 closes at default speed

- a. The inducer speed is reduced every 2 seconds until PS1 opens
- b. At the time PS1 opens, the IFC stores the inducer RPM

- c. The inducer RPM is then raised every 3 seconds to re-close PS1. Upon PS1 closing, the IFC has now learned the most efficient inducer speed for 1<sup>st</sup> stage gas heat operation.

#### PS1 does not close at default speed

The IFC will increase the speed of the inducer until:

- a. The maximum RPM for 1<sup>st</sup> stage gas heat is reached
- b. Or PS1 closes
 

Once PS1 closes, the learning routine will begin as stated above.

### 2<sup>nd</sup> Stage Heat

1. When 2<sup>nd</sup> stage gas heat is requested, the variable speed inducer will run at the predetermined factory default 2<sup>nd</sup> stage inducer speed.

#### PS2 closes at default speed

- a. The inducer speed is reduced every 2 seconds until PS2 opens
- b. At the time PS2 opens, the IFC stores the inducer RPM
- c. The inducer RPM is then raised every 3 seconds to re-close PS2. Upon PS2 closing, the IFC has now learned the most efficient inducer speed for 2<sup>nd</sup> stage gas heat operation.

#### PS2 does not close at default speed

The IFC will increase the speed of the inducer until:

- a. The maximum RPM for 2<sup>nd</sup> stage gas heat is reached
- b. Or PS2 closes
 

Once PS2 closes, the learning routine will begin as stated above. If PS2 does not close after reaching the maximum RPM, a PS2 open error will be reported and the furnace will continue to run in 1<sup>st</sup> stage for 10 minutes and retry 2<sup>nd</sup> stage. This process will repeat until the request for 2<sup>nd</sup> stage heat is removed.

# 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. BURNER – Gas burners do not normally require scheduled servicing, however, accumulation of foreign material may cause a yellowing flame or delayed ignition. Either condition indicates that a service call is required. For best operation, burners must be cleaned annually using brushes and vacuum cleaner. Turn off gas and electric power supply. To clean burners, remove burner bottom plate (2 screws) and bottom burner bracket (2 screws). Twist burner towards slot, lift, and push forward away from orifice. Remove burners.

Alternate method — Remove manifold assembly, bottom burner plate, and bottom burner bracket. Remove burners.

**Note:** Be careful NOT to break igniter when removing burners.

Clean burners with brush and/ or vacuum cleaner. Reassemble parts by reversal of the above procedure.

**Note:** Natural gas units should not have any yellow tipped flames. This condition indicates that a service call is required. For best operation, burners must be cleaned annually using brushes and vacuum cleaner

**Note:** On Propane units, due to variations in BTU content and altitude, servicing may be required at shorter intervals.

6. 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. Some discoloration of PVC pipe is normal.
  - c. Remove door from Furnace.
  - d. Inspect around insulation covering flue collector box. Inspect induced draft Blower connections from recuperative cell and to the flue pipe connection.
  - e. Remove burners. (See 5. Burner)
  - f. Use a mirror and flashlight to inspect interior of Heat Exchanger, be careful not to damage the Igniter, Flame Sensor or other components.
  - g. If any corrosion is present, the Heat Exchanger should be cleaned by a qualified service technician.
  - h. After inspection is complete replace burners and Furnace door.
  - i. Restore gas supply. Check for leaks using a soap solution. Restore electrical supply. Check unit for normal operation.
7. 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.



## About Trane and American Standard Heating and Air Conditioning

Trane and American Standard create comfortable, energy efficient indoor environments for residential applications. For more information, please visit [www.trane.com](http://www.trane.com) or [www.americanstandardair.com](http://www.americanstandardair.com).



The manufacturer has a policy of continuous data improvement and it reserves the right to change design and specifications without notice. We are committed to using environmentally conscious print practices.

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