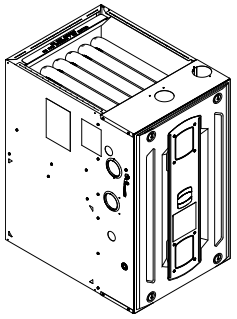
Installation, Operation, and Maintenance

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.*

FNR-SVX001A-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.

October 2025 **FNR-SVX001A-EN**

Introduction

Read this manual thoroughly before operating or servicing this unit.

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

Warnings, Cautions, and Notices

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

The three types of advisories are defined as follows:

⚠ WARNING	Indicates a potentially hazardous situation which, if not avoided, could result in death or serious injury.
⚠ CAUTION	Indicates a potentially hazardous situation which, if not avoided, could result in minor or moderate injury. It could also be used to alert against unsafe practices.
NOTICE	Indicates a situation that could result in equipment or property-damage only accidents.

⚠ WARNING

Proper Field Wiring and Grounding Required!

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

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

⚠ WARNING

Personal Protective Equipment (PPE) Required!

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

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

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

⚠ WARNING

Follow EHS Policies!

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

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

⚠ WARNING

Cancer and Reproductive Harm!

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

⚠ WARNING

Safety Hazard!

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

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

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

⚠ WARNING

Fire or Explosion Hazard!

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

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

⚠ WARNING

Electrical Shock, Fire, or Explosion Hazard!

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

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

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

⚠ WARNING

Fire Hazard!

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

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

⚠ WARNING

Carbon Monoxide Poisoning!

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

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

⚠ WARNING

Fire Hazard!

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

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

⚠ WARNING

Explosion Hazard!

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

Propane gas is heavier than air and can accumulate in low areas or confined spaces. Odorant fade may make it undetectable without a warning device. If a gas furnace is installed in a basement, excavated areas, or a confined space, it is strongly recommended to contact a gas supplier to install a gas detector for leak warnings. The manufacturer does not test or endorse any specific brand or type of detector.

⚠ WARNING

Electrical Shock Hazard!

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

Do not bypass the door switch or the panel loop permanently.

⚠ WARNING

Electrical Shock Hazard!

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

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

⚠ WARNING

Risk of Fire or Explosion!

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

Do NOT attempt to manually light the furnace.

⚠ WARNING

Electrical Shock Hazard!

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

Disconnect power to the unit before removing the blower door and wait at least 10 seconds for the IFC power supply to discharge to 0 volts.

⚠ WARNING

Safety Hazard!

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

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

If electrical, fuel, or mechanical failures occur, shut off the gas supply at the manual valve on the supply piping before turning off the furnace's electrical power. Contact your dealer's designated service agency.

⚠ WARNING

Safety Hazard!

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

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

⚠ WARNING

High Voltage Moving Parts!

Failure to follow instructions below could result in death or serious injury or property damage due to high voltage electrical components, fast-moving fans, and combustible gas.

During installation and servicing, turn off the main gas valve and disconnect the electrical supply. If operating checks must be performed with the unit operating, the technician must recognize these hazards and proceed safely.

⚠ WARNING

Safety Hazard!

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

Do not install the filter in the return duct directly above the furnace in horizontal applications. Install the filter remotely.

⚠ WARNING

Shock Hazard!

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

If a disconnect switch is present, always lock in the open position before servicing the unit.

⚠ WARNING

Electrical Shock Hazard!

Failure to follow this warning could result in an electric 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 in case of an electrical fault.

⚠ WARNING

Overheating and Explosion Hazard!

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

Should the gas supply fail to shut off or if overheating occurs, shut off the gas valve to the furnace before shutting off the electrical supply.

⚠ WARNING

Safety Hazard!

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

The vent for this appliance must not terminate over public walkways, near soffit or crawl space vents, or where condensate could cause damage or be detrimental to the operation of regulators, relief valves, or other equipment.

⚠ WARNING

Hot Surface!

Failure to follow instructions below could result in minor to moderate injuries.

Do not touch igniter. It is extremely hot.

⚠ 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:

- **Seal any unused openings in the venting system.**
- **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 Natural Gas and Propane Installation Code, CSA B149.1 and these instructions. Determine there is no blockage or restriction, leakage, corrosion, or other deficiencies which could cause an unsafe condition.**
- **As far as practical, close all building doors and windows and all doors between the space in which the appliance(s) connected to the venting system are located and other spaces of the building.**
- **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 and bathroom exhausts, 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, correct the venting system in accordance with the National Fuel Gas Code, ANSI Z223.1/NFPA and/or Natural Gas and Propane Installation Code, CSA B149.1 .**
- **After it has been determined that each appliance connected to the venting system properly vents when tested as outlined above, return doors, windows, exhaust fans, fireplace dampers, and any other gas-fired burning appliance to their previous conditions of use.**

⚠ CAUTION

Improper Voltage Connection!

Failure to follow instructions below could result in personal injury or equipment damage.

Do NOT connect the furnace line voltage to a GFCI-protected circuit.

⚠ CAUTION

Corrosion Hazard!

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

Do not install the furnace in a corrosive or contaminated atmosphere.

⚠ CAUTION

Valve Damage!

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

Use a backup wrench on the gas valve when installing gas piping to prevent damage to the valve and manifold assembly.

⚠ CAUTION

Freeze Damage!

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

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

⚠ CAUTION

Freeze Damage!

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

Take measures 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 instructions below could result in minor to severe injury and result in poor ignition characteristics.

Maintain manifold pressure in high altitude installations.

⚠ CAUTION

Water Damage!

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

Install an external overflow drain pan in all applications over a finished ceiling to prevent leaking condensate.

⚠ CAUTION

FURNACE SERVICE CAUTION!

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

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

⚠ CAUTION

Do NOT Use as Construction Heater!

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

To prevent shortening its service life, do not use the furnace as a construction heater during the finishing phases of construction until the furnace installation guidelines are 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 Hazard!

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

The integrated furnace control is polarity sensitive. Connect the hot leg of the 120 VAC power to the black field lead.

⚠ CAUTION

Venting Required!

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

- **Condensing furnaces may be vented through unused chimneys. Do not vent through chimneys used for wood-burning, oil furnaces, incinerators or any other gas appliance. If remaining free area between single wall flue pipe and masonry chimney is used for another gas appliance, venting area must be sufficient and that appliance must be connected to the chimney with separate entry openings.**
- **The single wall flue pipe joints must be sealed. The 90° elbow connection to the vertical pipe must be sealed to prevent condensate leakage to base of the masonry chimney.**

⚠ CAUTION

Coil Requirement!

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

For 4GXC* and 4MXC* coils 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 suitable for 400° F (205° C) or metal drain pan shield. Downflow furnaces do not require a metal drain pan shield or MAY*FERCOLKITAA kit.

NOTICE

Equipment Damage!

Failure to follow instructions below could result in equipment damage.

UV light exposure can deteriorate plastic blower material, potentially damaging the blower housing. For units with plastic blower housings, do not install third-party UV air cleaners where the blower housing is exposed to UV light.

For more information, visit www.trane.com and www.americanstandardair.com or contact your installing dealer.

6200 Troup Highway
Tyler, TX 75707

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Revision History

- This literature supersedes the existing literature S9V2-VS-SVX001-1*-EN.
- Updated the front matter and hazards.
- Updated the maximum vent data.
- Updated the troubleshooting steps.
- Updated the Furnace General Installation chapter including part numbers.
- Updated the Accessories chapter.

Table of Contents

Accessories

Table 1. Accessories

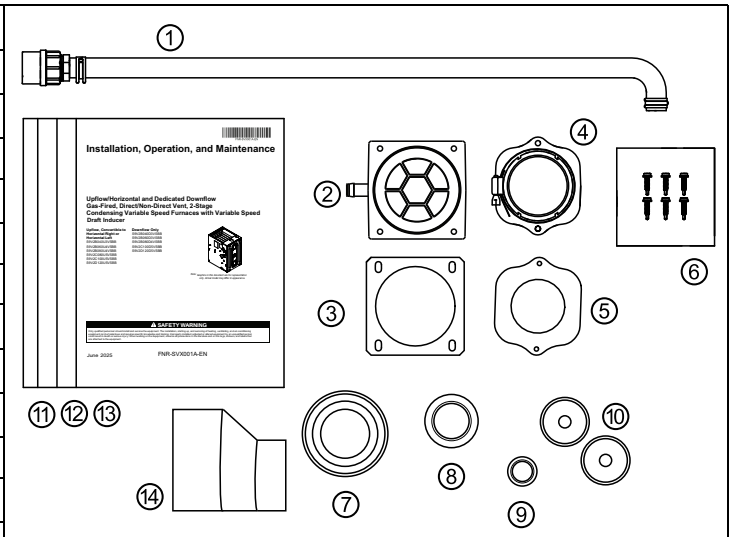
Model Number	Description	Use With
BACS9V2CA22MUAA	Conversion Kit to add P2 Link Communication	All Furnaces
MAYBFERCOLKITA	Heat Shield Kit for B-sidth 4GXCB or 4MCXB Coils	B width 4GXCB or 4MCXB Coils when installed with Upflow Furnace in all orientations.
MAYCFERCOLKITA	Heat Shield Kit for C-sidth 4GXCC or 4MCXC Coils	C width 4GXCC or 4MCXC Coils when installed with Upflow Furnace in all orientations.
MAYDFERCOLKITA	Heat Shield Kit for D-sidth 4GXCD or 4MCXD Coils	D width 4GXCD or 4MCXD Coils when installed with Upflow Furnace in all orientations.
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 (Canada - CPVC)	All Furnaces
BAYLIFTB[a]	Dual Return Kit (B size extension)	B Cabinet Upflow Furnaces
BAYLIFTC[a]	Dual Return Kit (C size extension)	C Cabinet Upflow Furnaces
BAYLIFTD[a]	Dual Return Kit (D size extension)	D Cabinet Upflow Furnaces
BAYBASE205	Downflow Subbase	All Downflow Furnaces
BAYFLTR203	Horizontal Filter Kit	B Cabinet Furnaces in Downflow/Horizontal
BAYFLTR204	Horizontal Filter Kit	C Cabinet Furnaces in Downflow/Horizontal
BAYFLTR205	Horizontal Filter Kit	D Cabinet Furnaces in Downflow Horizontal
BAYFLTR206	Filter Access Door Kit (Downflow only)	All Downflow Furnaces
BAYSF1165[a] [b]	1-in. SlimFit Cabinet with MERV 4 Filter	All Upflow Furnaces
BAYSF1255[b]	1-in. SlimFit Rack with MERV 4 Filter	All Furnaces[c]
FLRSF1255	1-in. Filter Replacement (Qty 12)	BAYSF1255[b]
BAYLPSS400[b]	Propane Conversion Kit with Stainless Steel Burners	All Furnaces
BAYBURNERSS	All Stainless Steel Natural Gas Burners - Set of Six	All Upflow Furnaces - Special Case
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 S9V2D120U5VSBB & Later S9V2D120D5VSBB & Later
BAYHALT259	High Altitude Pressure Switch Kit	S9V2B060U4VSBB & Later S9V2C080U5VSBB & Later S9V2C100D5VSBB & Later
BAYCNDTRAP2A	Inline Condensate Trap Kit used with Special Venting on 2-in. Vent Pipe	All Furnaces
BAYCNDTRAP3A	Inline Condensate Trap Kit used with Special Venting on 3-in. Vent Pipe	All Furnaces

[a] Airflow greater than 1600 CFM, Furnace will require return air openings and filters on: (1) both sides, (2) one side and the bottom, or (3) just on the bottom.
[b] Latest revision.
[c] Designed to fit all S-Series furnaces with or without transition when used in side return. Fits B width cabinet without a transition in upflow/downflow application.

Document Pack Contents S9V2-VS

Table 2. Document pack contents

Item	Qty.	Description
1	1	Condensate Drain Tube Assembly
2	1	Inlet Vent (2-in. - ADP01586 and 3-in. - ADP01587)[a]
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-in. to 3-in. Coupling – CPL01544[b]



(a) 3-inch inlet vent supplied with S9V2D120 only. 2-inch inlet vent supplied with all other models.
(b) Supplied with S9V2D120 only.

Product Specification

Table 3. Models S9V2B040U3VSBB, S9V2B060U4VSBB, S9V2B080U4VSBB, S9V2C080U5VSBB, S9V2C100U5VSBB, and S9V2D120U5VSBB

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]
Type	Upflow / Horizontal					
Ratings[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					
Blower Drive	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		
Combustion Fan - Type	Variable Speed					
Drive - No. Speeds	Direct - Variable					
HP and Max 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
Filter - Furnished?	No					
Type Recommended	High Velocity					
Hi Vel. (No.-Size-Thk.)	1 - 16 X 25 X 1 in.			1 - 20 X 25 X 1 in.		1 - 24 X 25 X 1 in.
Vent Outlet Dia - Min. (in.)[e]	2 Round					3 Round
Inlet Air Dia - Min. (in.)[e]	2 Round					3 Round
Heat Exchanger – Type						
Fired	409 Stainless Steel					
Unfired	29-4C Stainless Steel					
Gauge (Fired)	20					
Orifices - Main						
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
Gas Valve	Redundant - Two Stage					
Pilot Safety Device – Type	120 V SiNi Igniter					
Burners - Type - Qty	Inshot - 2	Inshot - 3	Inshot - 4		Inshot - 5	Inshot - 6
Power Conn. - V/Ph/HZ[f]	120 / 1 / 60					
Ampacity (Amps)	8.9	12.9		13.4		
Max. Overcurrent Protection (Amps)	15					
Pipe Conn. Size (in.)	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.

Table 4. Models S9V2B040D3VSBB, S9V2B060D3VSBB, S9V2B080D4VSBB, S9V2C100D5VSBB, and S9V2D120D5VSBB

Model	S9V2B040 D3VSBB[a], [b]	S9V2B060 D3VSBB[a], [b]	S9V2B080 D4VSBB[a], [b]	S9V2C100 D5VSBB[a], [b]	S9V2D120 D5VSBB[a], [b]
Type	Downflow				
Ratings[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 (%)	97.0				
Return Air Temp. (Min. - Max.) °F	45°F - 80°F				
Blower Drive	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 RPM	1/2		3/4	1	
R.P.M.	Variable				
Volts / Ph / Hz	120 / 1 / 60				
FLA	6.4		9.6	10	
Combustion Fan - Type	Variable Speed				
Drive - No. Speeds	Direct - Variable				
HP and Max 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
Filter - Furnished?	No				
Type Recommended	High Velocity				
Hi Vel. (No.-Size-Thk.)	1 - 16 X 25 X 1 in.			1 - 20 X 25 X 1 in.	1 - 24 X 25 X 1 in.
Vent Outlet Dia - Min. (in.) [e]	2 Round				
Inlet Air Dia - Min. (in.)[e]	2 Round				
Heat Exchanger – Type					
Fired	409 Stainless Steel				
Unfired	29-4C Stainless Steel				
Gauge (Fired)	20				
Orifices - Main					
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
Gas Valve	Redundant - Two Stage				
Pilot Safety Device – Type	120 V SiNi Igniter				
Burners - Type - Qty	Inshot - 2	Inshot - 3	Inshot - 4	Inshot - 5	Inshot - 6
Power Conn. - V/Ph/HZ [f]	120 / 1 / 60				
Ampacity (Amps)	8.9		12.9	13.4	
Max. Overcurrent Protection (Amps)	15				
Pipe Conn. Size (in.)	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,” p. 14 of these instructions.
3. Provide adequate combustion and ventilation air to the furnace space as specified in “Air for Combustion and Ventilation,” p. 48 of these instructions.
4. Combustion products must be discharged outdoors. Connect this furnace to an approved vent system only, as specified in the “General Venting,” p. 33 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,” p. 28 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 “Locations and Clearances,” p. 14 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-inch 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 1% or less of nominal air conditioning cfm delivered when pressurized to 0.5-inch 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.

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 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 the table below?

Table 5. Location and clearances

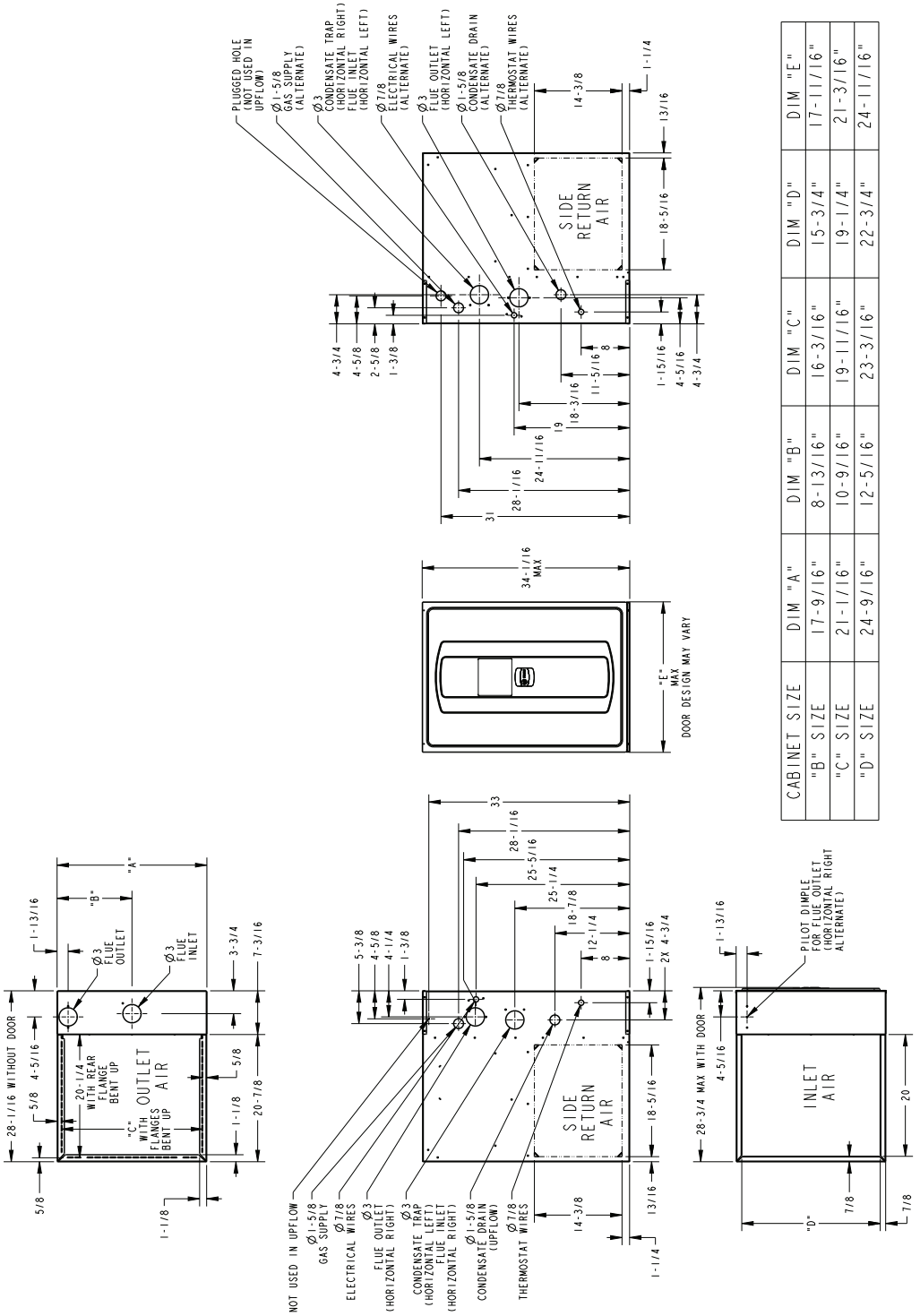
Minimum clearance to combustible materials (in.)	
Closet	
Sides	0
Back	1
Top	1
Front	0
Bottom	0
Flue	0
24 in. minimum front clearance recommended for service	
Horizontal Closet and Alcove	
Right Side	0
Left Side	0
Back	1
Top	1
Bottom	0
Flue	0
Horizontal Flue (discharge on left)	
Closet	
Right Side	0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

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 or downflow installations or slightly toward the front in horizontal installations. This is necessary for proper condensate drainage.*

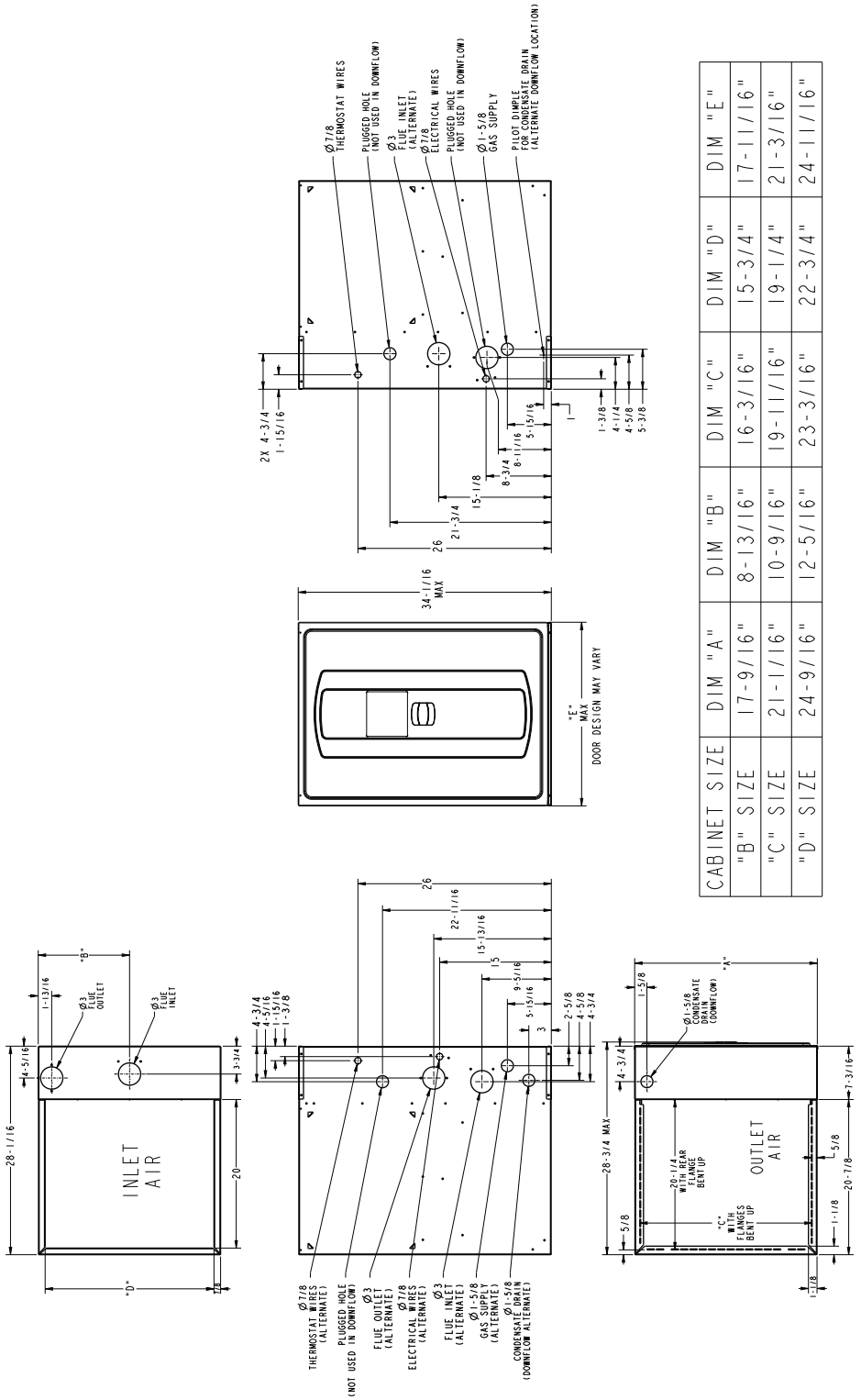
Dimensional Data

Figure 1. Upflow cabinets — 17.5-inch, 21-inch, and 24.5-inch



CABINET SIZE	DIM "A"	DIM "B"	DIM "C"	DIM "D"	DIM "E"
"B" SIZE	17-9/16"	8-13/16"	16-3/16"	15-3/4"	17-11/16"
"C" SIZE	21-1/16"	10-9/16"	19-11/16"	19-1/4"	21-3/16"
"D" SIZE	24-9/16"	12-5/16"	23-3/16"	22-3/4"	24-11/16"

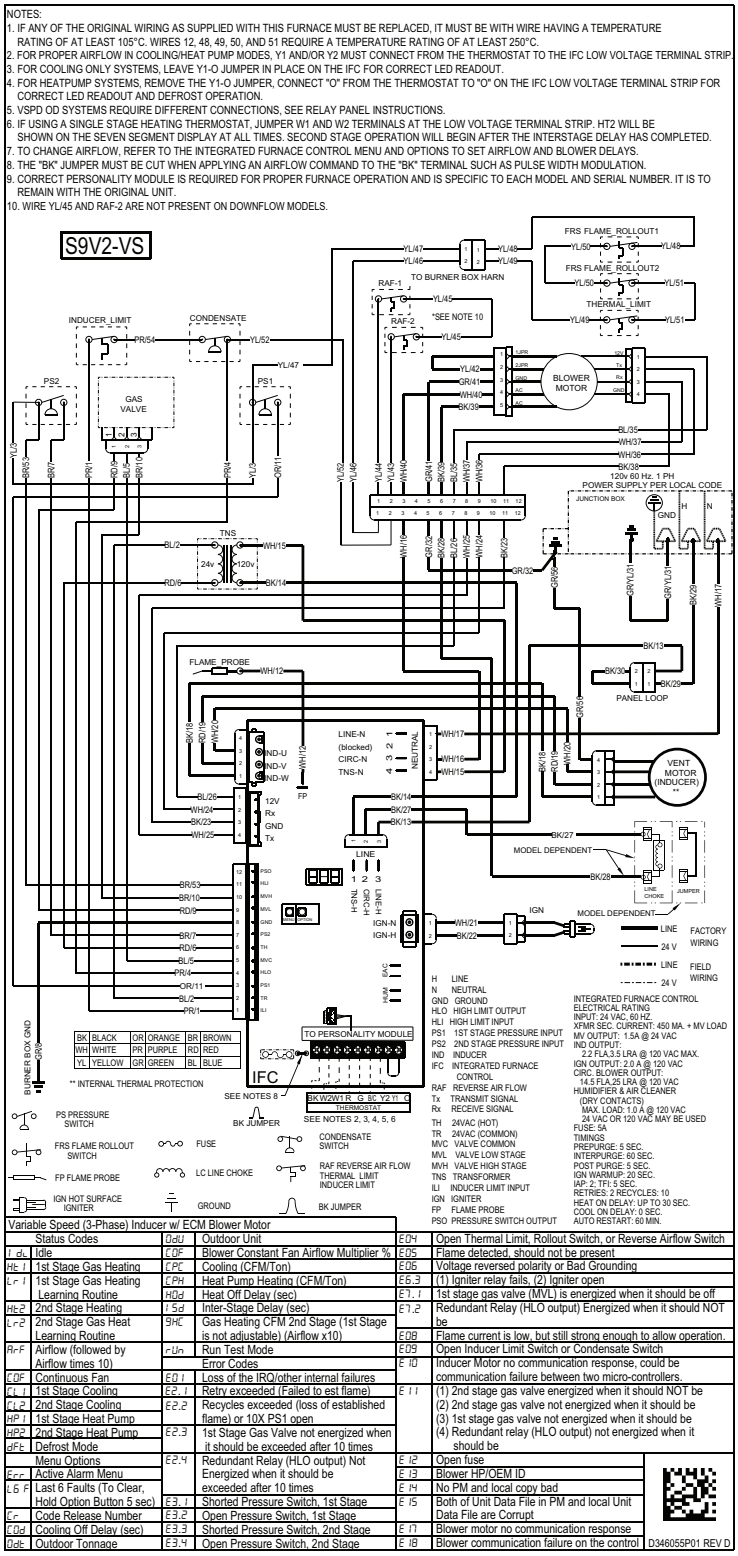
Figure 2. Downflow cabinets — 17.5-inch, 21-inch, and 24.5-inch



CABINET SIZE	DIM "A"	DIM "B"	DIM "C"	DIM "D"	DIM "E"
"B" SIZE	17-9/16"	8-13/16"	16-3/16"	15-3/4"	17-11/16"
"C" SIZE	21-1/16"	10-9/16"	19-11/16"	19-1/4"	21-3/16"
"D" SIZE	24-9/16"	12-5/16"	23-3/16"	22-3/4"	24-11/16"

Wiring Diagrams

Figure 3. S9V2-VS wiring diagram



Variable Speed (3-Phase) Inducer w/ ECM Blower Motor					
Status Codes					
1dL	Idle	odU	Outdoor Unit	E04	Open Thermal Limit, Rollout Switch, or Reverse Airflow Switch
Ht 1	1st Stage Gas Heating	CFC	Cooling (CFM/Ton)	E05	Flame detected, should not be present
Lr 1	1st Stage Gas Heating Learning Routine	CFH	Heat Pump Heating (CFM/Ton)	E06	Voltage reversed polarity or Bad Grounding
Ht2	2nd Stage Heating	1Sd	Inter-Stage Delay (sec)	E6.3	(1) Igniter relay fails, (2) Igniter open
Lr2	2nd Stage Gas Heat Learning Routine	9HC	Gas Heating CFM 2nd Stage (1st Stage is not adjustable) (Airflow x10)	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
AirF	Airflow (followed by Airflow times 10)	rUn	Run Test Mode	E08	Flame current is low, but still strong enough to allow operation.
			Error Codes	E09	Open Inducer Limit Switch or Condensate Switch
CDF	Continuous Fan	E01	Loss of the IRQ/other internal failures	E10	Inducer Motor no communication response, could be communication failure between two micro-controllers.
CL 1	1st Stage Cooling	E2.1	Retry exceeded (Failed to est flame)	E11	(1) 2nd stage gas valve energized when it should NOT be
CL2	2nd Stage Cooling	E2.2	Recycles exceeded (loss of established flame) or 10X PS1 open		(2) 2nd stage gas valve not energized when it should be
HP 1	1st Stage Heat Pump				(3) 1st stage gas valve not energized when it should be
HP2	2nd Stage Heat Pump	E2.3	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
dFt	Defrost Mode				
	Menu Options	E2.4	Redundant Relay (HLO output) Not Energized when it should be exceeded after 10 times	E12	Open fuse
Err	Active Alarm Menu			E13	Blower HP/OEM ID
L6 F	Last 6 Faults (To Clear, Hold Option Button 5 sec)			E14	No PM and local copy bad
Cr	Code Release Number	E3.1	Shorted Pressure Switch, 1st Stage	E15	Both of Unit Data File in PM and local Unit Data File are Corrupt
CDd	Cooling Off Delay (sec)	E3.2	Open Pressure Switch, 1st Stage		
Ode	Outdoor Tonnage	E3.3	Shorted Pressure Switch, 2nd Stage	E17	Blower motor no communication response
		E3.4	Open Pressure Switch, 2nd Stage	E18	Blower communication failure on the control

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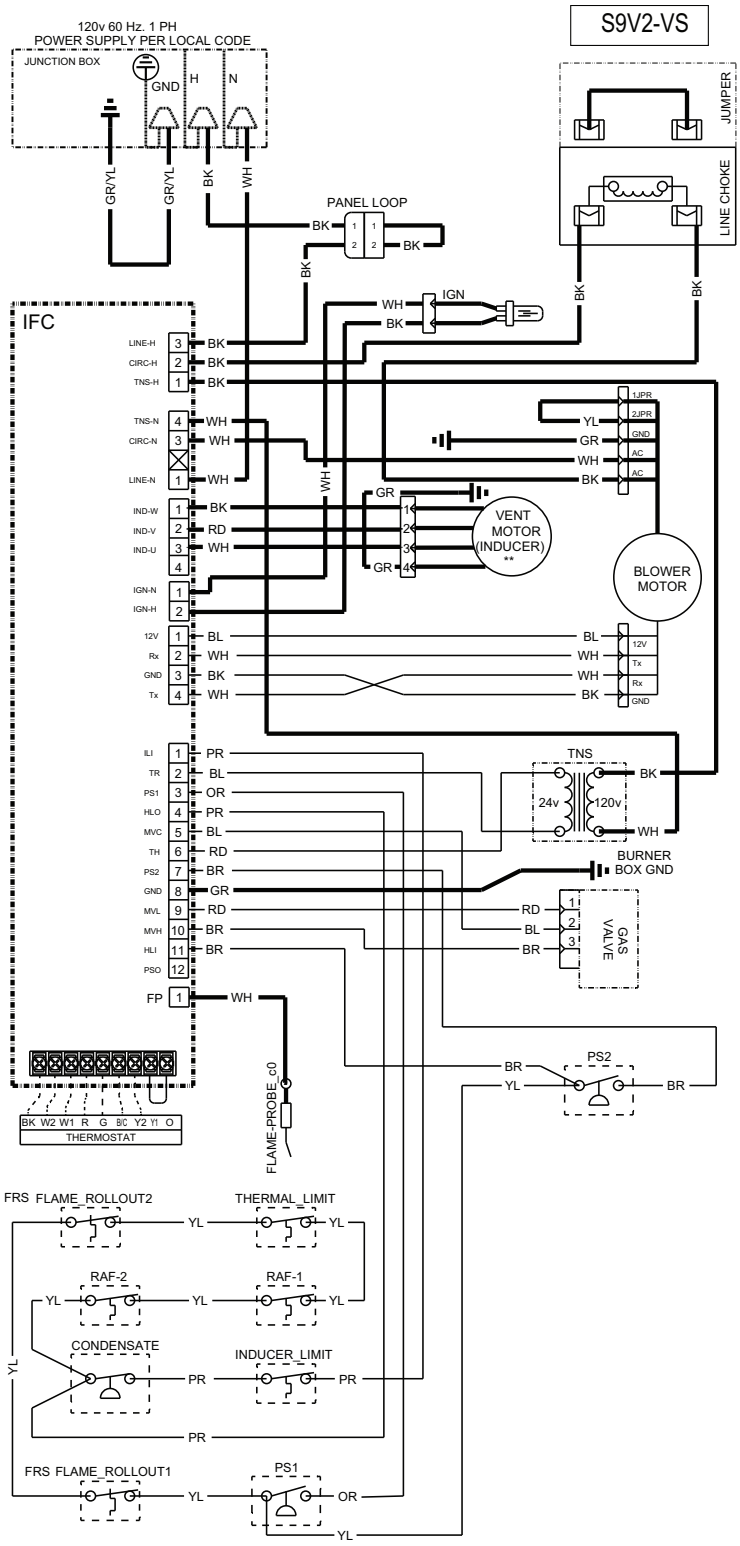
Figure 4. S9V2-VS - ladder diagram



Airflow Tables

Table 6. S9V2B040U3VS Heating airflow

Furnace Heating Airflow (CFM), Power (Watts), and Temp. Rise (°F) vs. External Static Pressure with Filter (iwc)								
Airflow Setting	**Heating Stage**	**Target Airflow**		**External Static Pressure**				
				0.1	**0.3**	**0.5**	**0.7**	**0.9**
650	1st Stage	468	CFM/Watts	468 / 27	452 / 58	437 / 90	421 / 121	406 / 152
			Temp. Rise	49	51	54	56	58
	2nd Stage	650	CFM/Watts	633 / 48	636 / 92	639 / 135	643 / 179	646 / 223
			Temp. Rise	57	57	57	56	56
830	1st Stage	598	CFM/Watts	552 / 41	600 / 76	647 / 112	694 / 147	741 / 183
			Temp. Rise	43	39	36	32	28
	2nd Stage	830	CFM/Watts	760 / 82	786 / 132	813 / 182	840 / 232	866 / 282
			Temp. Rise	48	46	45	43	41
880[a]	1st Stage	634	CFM/Watts	583 / 48	635 / 83	687 / 118	739 / 153	791 / 189
			Temp. Rise	39	36	33	30	27
	2nd Stage	880	CFM/Watts	792 / 94	817 / 142	842 / 189	867 / 237	892 / 284
			Temp. Rise	44	44	43	43	42
1200	1st Stage	864	CFM/Watts	753 / 86	785 / 129	818 / 171	850 / 213	882 / 256
			Temp. Rise	30	29	28	27	26
	2nd Stage	1200	CFM/Watts	1022 / 191	1044 / 250	1065 / 309	1087 / 368	1109 / 427
			Temp. Rise	34	33	33	32	32

[a] Factory Setting.

Table 7. S9V2B040D3VS Heating airflow

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

[a] Factory Setting.

Table 8. S9V2B040U3VS and S9V2B040D3VS Cooling airflow

Outdoor Tonnage (tons)	Airflow Setting - (CFM/ton)	EXTERNAL STATIC PRESSURE (IN. W. C.) VS. CFM/WATTS				
		0.1	0.3	0.5	0.7	0.9
1.5	450	675 / 47	675 / 81	675 / 121	675 / 166	675 / 215
	420	630 / 40	630 / 72	630 / 111	630 / 154	630 / 202
	400	600 / 36	600 / 67	600 / 105	600 / 147	600 / 193
	370	555 / 30	555 / 60	555 / 96	555 / 136	555 / 181
	350	525 / 27	525 / 56	525 / 90	525 / 130	525 / 174
	330	495 / 24	495 / 51	495 / 85	495 / 124	495 / 167
	310	465 / 21	465 / 48	465 / 80	465 / 118	465 / 161
	290	435 / 19	435 / 44	435 / 76	435 / 113	435 / 155
2.0	450	900 / 94	900 / 137	900 / 186	900 / 240	900 / 298
	420	840 / 79	840 / 120	840 / 166	840 / 218	840 / 273
	400	800 / 70	800 / 109	800 / 154	800 / 204	800 / 258
	370	740 / 58	740 / 95	740 / 138	740 / 185	740 / 236
	350	700 / 51	700 / 86	700 / 127	700 / 173	700 / 223
	330	660 / 44	660 / 78	660 / 118	660 / 162	660 / 211
	310	620 / 38	620 / 71	620 / 109	620 / 152	620 / 199
	290	580 / 33	580 / 64	580 / 101	580 / 142	580 / 188
2.5	450	1125 / 167	1125 / 219	1125 / 278	1125 / 341	1125 / 408
	420	1050 / 139	1050 / 188	1050 / 244	1050 / 304	1050 / 368
	400	1000 / 123	1000 / 170	1000 / 223	1000 / 281	1000 / 343
	370	925 / 100	925 / 145	925 / 195	925 / 250	925 / 308
	350	875 / 87	875 / 129	875 / 178	875 / 230	875 / 287
	330	825 / 121	825 / 160	825 / 205	825 / 254	825 / 308
	310	775 / 101	775 / 139	775 / 182	775 / 229	775 / 281
	290	725 / 88	725 / 123	725 / 164	725 / 210	725 / 260
3.0[a]	450	1350 / 272	1350 / 334	1350 / 402	1298 / 440	1198 / 450
	420	1260 / 226	1260 / 284	1260 / 348	1260 / 417	1198 / 450
	400	1200 / 198	1200 / 254	1200 / 315	1200 / 381	1198 / 450
	370	1110 / 161	1110 / 213	1110 / 271	1110 / 333	1110 / 399
	350 [a]	1050 / 139	1050 / 188	1050 / 244	1050 / 304	1050 / 368
	330	990 / 119	990 / 166	990 / 219	990 / 277	990 / 338
	310	930 / 102	930 / 146	930 / 197	930 / 252	930 / 311
	290	870 / 86	870 / 128	870 / 176	870 / 229	870 / 285

[a] Factory Setting.

Table 9. S9V2B060D3VS Heating airflow

Furnace Heating Airflow (CFM), Power (Watts), and Temp. Rise (°F) vs. External Static Pressure with Filter (iwc)								
Airflow Setting	Heating Stage	Target Airflow		External Static Pressure				
				0.1	0.3	0.5	0.7	0.9
900	1st Stage	711	CFM/Watts	635 / 48	648 / 86	661 / 123	674 / 161	687 / 198
			Temp. Rise	54	53	52	50	49
	2nd Stage	900	CFM/Watts	836 / 79	840 / 125	844 / 172	847 / 219	851 / 266
			Temp. Rise	64	63	63	62	62
1030[a]	1st Stage	814	CFM/Watts	731 / 65	740 / 105	748 / 145	756 / 185	764 / 225
			Temp. Rise	47	47	46	46	46
	2nd Stage	1030	CFM/Watts	951 / 112	955 / 162	958 / 213	962 / 263	966 / 314
			Temp. Rise	56	56	55	55	55
1130	1st Stage	893	CFM/Watts	817 / 81	820 / 122	822 / 164	825 / 205	828 / 247
			Temp. Rise	42	42	41	41	41
	2nd Stage	1130	CFM/Watts	1051 / 145	1052 / 197	1053 / 248	1054 / 300	1056 / 352
			Temp. Rise	50	50	50	50	50
1350	1st Stage	1067	CFM/Watts	968 / 126	962 / 170	956 / 214	949 / 258	943 / 302
			Temp. Rise	35	36	36	36	36
	2nd Stage	1350	CFM/Watts	1250 / 235	1238 / 291	1225 / 346	1212 / 402	1199 / 457
			Temp. Rise	42	43	43	44	44

[a] Factory Setting.

Table 10. S9V2B060D3VS Cooling airflow

Outdoor Tonnage (tons)	Airflow Setting - (CFM/ton)	EXTERNAL STATIC PRESSURE (IN. W. C.) VS. CFM/WATTS				
		0.1	0.3	0.5	0.7	0.9
1.5	450	663 / 47	673 / 83	666 / 119	641 / 155	596 / 192
	420	621 / 41	630 / 75	621 / 109	595 / 144	549 / 180
	400	582 / 36	580 / 67	566 / 99	528 / 130	507 / 170
	370	549 / 32	556 / 63	546 / 95	517 / 128	469 / 162
	350	521 / 29	527 / 59	516 / 90	486 / 122	437 / 156
	330	492 / 26	497 / 55	486 / 85	455 / 117	405 / 150
	310	463 / 23	468 / 51	455 / 81	423 / 112	372 / 145
	290	435 / 21	438 / 48	424 / 77	391 / 107	339 / 141
2.0	450	878 / 90	893 / 135	890 / 179	869 / 223	829 / 266
	420	821 / 76	834 / 119	830 / 161	808 / 202	767 / 244
	400	770 / 66	778 / 105	770 / 144	742 / 182	725 / 230
	370	725 / 57	737 / 96	731 / 134	707 / 172	664 / 211
	350	687 / 51	698 / 88	691 / 124	666 / 161	622 / 199
	330	649 / 45	659 / 80	651 / 115	625 / 151	580 / 188
	310	611 / 39	620 / 73	611 / 107	584 / 142	538 / 177
	290	573 / 34	581 / 67	571 / 99	543 / 133	496 / 168
2.5	450	1097 / 159	1114 / 212	1114 / 265	1097 / 317	1061 / 368
	420	1023 / 133	1040 / 184	1039 / 233	1020 / 282	984 / 331
	400	976 / 117	989 / 166	990 / 214	970 / 261	932 / 308
	370	902 / 97	917 / 142	915 / 187	894 / 232	855 / 276
	350	854 / 84	868 / 128	865 / 171	843 / 214	803 / 257
	330	806 / 73	819 / 115	815 / 157	793 / 198	752 / 239
	310	759 / 63	771 / 103	766 / 143	742 / 182	700 / 222
	290	711 / 55	722 / 93	716 / 130	692 / 168	648 / 206
3.0[(a)]	450	1319 / 260	1340 / 321	1343 / 382	1328 / 441	1295 / 501
	420	1229 / 215	1249 / 274	1251 / 331	1235 / 387	1201 / 443
	400	1170 / 189	1189 / 245	1190 / 300	1173 / 354	1139 / 408
	370	1082 / 154	1100 / 206	1099 / 258	1081 / 309	1046 / 360
	350 [(a)]	1023 / 133	1040 / 184	1039 / 233	1020 / 282	984 / 331
	330	965 / 114	981 / 163	979 / 210	960 / 257	922 / 304
	310	907 / 98	922 / 144	919 / 189	899 / 234	860 / 278
	290	850 / 83	863 / 127	860 / 170	838 / 212	798 / 255

[(a)] Factory Setting.

Table 11. S9V2B060U4VS Heating airflow

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

[(a)] Factory Setting.

Table 12. S9V2B060U4VS Cooling airflow

Outdoor Tonnage (tons)	Airflow Setting - (CFM/ton)	EXTERNAL STATIC PRESSURE (IN. W. C.) VS. CFM/WATTS				
		0.1	0.3	0.5	0.7	0.9
2.0	450	878 / 90	893 / 135	890 / 179	869 / 223	829 / 266
	420	821 / 76	834 / 119	830 / 161	808 / 202	767 / 244
	400	770 / 66	778 / 105	770 / 144	742 / 182	725 / 230
	370	725 / 57	737 / 96	731 / 134	707 / 172	664 / 211
	350	687 / 51	698 / 88	691 / 124	666 / 161	622 / 199
	330	649 / 45	659 / 80	651 / 115	625 / 151	580 / 188
	310	611 / 39	620 / 73	611 / 107	584 / 142	538 / 177
	290	573 / 34	581 / 67	571 / 99	543 / 133	496 / 168
2.5	450	1097 / 159	1114 / 212	1114 / 265	1097 / 317	1061 / 368
	420	1023 / 133	1040 / 184	1039 / 233	1020 / 282	984 / 331
	400	976 / 117	989 / 166	990 / 214	970 / 261	932 / 308
	370	902 / 97	917 / 142	915 / 187	894 / 232	855 / 276
	350	854 / 84	868 / 128	865 / 171	843 / 214	803 / 257
	330	806 / 73	819 / 115	815 / 157	793 / 198	752 / 239
	310	759 / 63	771 / 103	766 / 143	742 / 182	700 / 222
	290	711 / 55	722 / 93	716 / 130	692 / 168	648 / 206
3.0	450	1319 / 260	1340 / 321	1343 / 382	1328 / 441	1295 / 501
	420	1229 / 215	1249 / 274	1251 / 331	1235 / 387	1201 / 443
	400	1170 / 189	1189 / 245	1190 / 300	1173 / 354	1139 / 408
	370	1082 / 154	1100 / 206	1099 / 258	1081 / 309	1046 / 360
	350	1023 / 133	1040 / 184	1039 / 233	1020 / 282	984 / 331
	330	965 / 114	981 / 163	979 / 210	960 / 257	922 / 304
	310	907 / 98	922 / 144	919 / 189	899 / 234	860 / 278
	290	850 / 83	863 / 127	860 / 170	838 / 212	798 / 255
4.0[(a)]	450	1779 / 585	1806 / 661	1814 / 737	1805 / 812	1778 / 886
	420	1654 / 480	1679 / 552	1686 / 624	1676 / 695	1647 / 765
	400	1572 / 418	1596 / 488	1602 / 557	1590 / 625	1561 / 693
	370	1450 / 335	1472 / 401	1477 / 466	1464 / 530	1433 / 594
	350[(a)]	1369 / 287	1391 / 350	1394 / 413	1380 / 474	1348 / 535
	330	1289 / 244	1310 / 305	1312 / 364	1297 / 423	1264 / 481
	310	1210 / 206	1229 / 264	1231 / 320	1214 / 376	1180 / 431
	290	1131 / 172	1149 / 227	1150 / 281	1132 / 334	1097 / 386

[(a)] Factory Setting.

Table 13. S9V2B080U4VS Heating airflow

Furnace Heating Airflow (CFM), Power (Watts), and Temp. Rise (°F) vs. External Static Pressure with Filter (iwc)								
Airflow Setting	Heating Stage	Target Airflow		External Static Pressure				
				0.1	0.3	0.5	0.7	0.9
1200	1st Stage	864	CFM/Watts	859 / 87	848 / 124	837 / 162	826 / 200	816 / 237
			Temp. Rise	53	54	55	57	58
	2nd Stage	1200	CFM/Watts	1211 / 196	1206 / 248	1201 / 300	1196 / 352	1191 / 404
			Temp. Rise	60	60	60	60	60
1260	1st Stage	907	CFM/Watts	906 / 97	892 / 135	879 / 173	865 / 212	851 / 250
			Temp. Rise	51	52	52	53	54
	2nd Stage	1260	CFM/Watts	1258 / 215	1260 / 270	1263 / 325	1265 / 381	1267 / 436
			Temp. Rise	57	57	57	57	56
1330[(a)]	1st Stage	958	CFM/Watts	957 / 112	930 / 152	903 / 193	876 / 234	849 / 275
			Temp. Rise	48	49	50	51	52
	2nd Stage	1330	CFM/Watts	1306 / 260	1303 / 312	1299 / 364	1295 / 416	1291 / 468
			Temp. Rise	55	55	55	55	55
1460	1st Stage	1051	CFM/Watts	1041 / 140	1015 / 182	988 / 224	962 / 267	935 / 309
			Temp. Rise	45	45	46	47	47
	2nd Stage	1460	CFM/Watts	1430 / 334	1411 / 389	1392 / 445	1373 / 501	1354 / 556
			Temp. Rise	50	50	51	52	53

[(a)] Factory Setting.

Table 14. S9V2B080D4VS Heating airflow

Furnace Heating Airflow (CFM), Power (Watts), and Temp. Rise (°F) vs. External Static Pressure with Filter (iwc)								
Airflow Setting	Heating Stage	Target Airflow		External Static Pressure				
				0.1	0.3	0.5	0.7	0.9
1200	1st Stage	864	CFM/Watts	780 / 94	776 / 134	772 / 175	768 / 216	763 / 257
			Temp. Rise	60	60	60	60	60
	2nd Stage	1200	CFM/Watts	1111 / 203	1103 / 260	1095 / 316	1088 / 373	1080 / 429
			Temp. Rise	66	65	65	65	65
1260	1st Stage	907	CFM/Watts	806 / 101	810 / 151	814 / 201	818 / 251	822 / 301
			Temp. Rise	57	57	57	57	57
	2nd Stage	1260	CFM/Watts	1192 / 232	1200 / 296	1208 / 360	1217 / 424	1225 / 488
			Temp. Rise	59	59	58	58	58
1330[a]	1st Stage	958	CFM/Watts	861 / 117	861 / 168	861 / 219	861 / 270	861 / 321
			Temp. Rise	53	53	53	53	53
	2nd Stage	1330	CFM/Watts	1217 / 273	1216 / 334	1216 / 395	1215 / 457	1214 / 518
			Temp. Rise	58	58	58	58	58
1480	1st Stage	1066	CFM/Watts	977 / 127	962 / 178	948 / 230	934 / 281	920 / 332
			Temp. Rise	47	48	49	50	51
	2nd Stage	1480	CFM/Watts	1342 / 329	1327 / 388	1313 / 448	1298 / 507	1284 / 567
			Temp. Rise	53	54	54	55	56

[a] Factory Setting.

Table 15. S9V2B080U4VS and S9V2B080D4VS Cooling airflow

Outdoor Tonnage (tons)	Airflow Setting - (CFM/ton)	EXTERNAL STATIC PRESSURE (IN. W. C.) VS. CFM/WATTS				
		0.1	0.3	0.5	0.7	0.9
2.0	450	892 / 91	899 / 136	893 / 180	872 / 222	838 / 265
	420	834 / 77	841 / 120	834 / 161	813 / 202	777 / 243
	400	785 / 67	785 / 106	781 / 146	754 / 183	737 / 229
	370	738 / 58	744 / 97	736 / 134	714 / 172	677 / 210
	350	700 / 52	705 / 89	697 / 125	675 / 161	638 / 198
	330	662 / 46	666 / 81	658 / 116	635 / 151	598 / 187
	310	624 / 40	627 / 74	619 / 107	596 / 142	558 / 177
	290	585 / 35	588 / 67	580 / 100	557 / 133	518 / 168
2.5	450	1108 / 159	1120 / 213	1116 / 265	1098 / 315	1065 / 365
	420	1035 / 133	1046 / 184	1041 / 233	1022 / 281	989 / 328
	400	988 / 118	997 / 167	992 / 214	972 / 260	938 / 306
	370	916 / 97	924 / 143	918 / 188	897 / 231	863 / 275
	350	868 / 85	875 / 129	868 / 172	848 / 213	813 / 255
	330	820 / 74	826 / 116	819 / 157	798 / 197	762 / 237
	310	772 / 64	778 / 104	770 / 143	749 / 182	712 / 221
	290	724 / 56	729 / 94	721 / 131	699 / 168	663 / 205
3.0	450	1326 / 257	1341 / 320	1341 / 380	1325 / 439	1296 / 497
	420	1239 / 214	1252 / 273	1250 / 330	1234 / 385	1203 / 440
	400	1181 / 188	1193 / 245	1191 / 299	1173 / 353	1142 / 405
	370	1094 / 153	1105 / 207	1101 / 258	1083 / 308	1050 / 358
	350	1036 / 133	1046 / 184	1041 / 233	1022 / 281	989 / 329
	330	978 / 115	987 / 164	982 / 210	962 / 256	928 / 302
	310	920 / 99	929 / 145	923 / 189	902 / 233	868 / 277
	290	863 / 84	870 / 128	863 / 170	843 / 212	807 / 253
4.0[a]	450	1769 / 570	1791 / 648	1797 / 725	1789 / 799	1766 / 873
	420	1650 / 469	1670 / 544	1675 / 616	1664 / 686	1639 / 756
	400	1571 / 410	1590 / 481	1593 / 550	1582 / 618	1555 / 685
	370	1453 / 330	1470 / 397	1472 / 462	1458 / 526	1430 / 588
	350 [a]	1375 / 284	1391 / 348	1391 / 410	1376 / 471	1347 / 530
	330	1297 / 242	1312 / 303	1311 / 363	1295 / 420	1265 / 477
	310	1219 / 205	1233 / 263	1230 / 319	1214 / 374	1183 / 428
	290	1142 / 172	1154 / 227	1151 / 280	1133 / 332	1101 / 384

[a] Factory Setting.

Table 16. S9V2C080U5VS Heating airflow

Furnace Heating Airflow (CFM), Power (Watts), and Temp. Rise (°F) vs. External Static Pressure with Filter (iwc)								
Airflow Setting	Heating Stage	Target Airflow		External Static Pressure				
				0.1	0.3	0.5	0.7	0.9
1190	1st Stage	857	CFM/Watts	800 / 78	803 / 118	806 / 157	810 / 197	813 / 237
			Temp. Rise	58	59	59	59	59
	2nd Stage	1190	CFM/Watts	1102 / 153	1116 / 213	1130 / 272	1144 / 332	1158 / 392
			Temp. Rise	65	65	64	63	62
1450[a]	1st Stage	1044	CFM/Watts	939 / 114	944 / 160	950 / 207	955 / 254	961 / 301
			Temp. Rise	50	50	50	50	50
	2nd Stage	1450	CFM/Watts	1322 / 257	1342 / 332	1363 / 407	1383 / 482	1404/ 557
			Temp. Rise	54	54	53	52	51
1590	1st Stage	1145	CFM/Watts	1018 / 139	1020 / 190	1021 / 240	1022 / 291	1023 / 341
			Temp. Rise	46	46	46	46	47
	2nd Stage	1590	CFM/Watts	1461 / 334	1478 / 416	1495 / 498	1513 / 580	1530 / 662
			Temp. Rise	49	49	48	48	47
1700	1st Stage	1124	CFM/Watts	1083 / 164	1086 / 217	1089 / 271	1093 / 324	1096 / 378
			Temp. Rise	43	43	43	43	43
	2nd Stage	1700	CFM/Watts	1558 / 404	1571 / 496	1584 / 587	1597 / 678	1610 / 770
			Temp. Rise	46	46	45	45	45

[a] Factory Setting.

Table 17. S9V2C080U5VS Cooling airflow

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

[a] Factory Setting.

Table 18. S9V2C100U5VS Heating airflow

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

[a] Factory Setting.

Table 19. S9V2C100D5VS Heating airflow

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

[a] Factory Setting.

Table 20. S9V2C100U5VS and S9V2C100D5VS Cooling airflow

Outdoor Tonnage (tons)	Airflow Setting - (CFM/ton)	EXTERNAL STATIC PRESSURE (IN. W. C.) VS. CFM/WATTS				
		0.1	0.3	0.5	0.7	0.9
3.0	450	1378 / 178	1376 / 234	1374 / 292	1372 / 352	1368 / 413
	420	1289 / 149	1286 / 201	1284 / 256	1282 / 312	1277 / 371
	400	1228 / 131	1225 / 181	1223 / 234	1221 / 288	1217 / 345
	370	1138 / 108	1134 / 154	1132 / 203	1130 / 255	1125 / 309
	350	1077 / 94	1073 / 138	1071 / 185	1068 / 235	1064 / 287
	330	1016 / 81	1011 / 123	1009 / 168	1006 / 216	1002 / 266
	310	955 / 70	950 / 110	947 / 153	944 / 199	940 / 248
	290	894 / 59	888 / 97	885 / 138	882 / 183	877 / 231
3.5	450	1601 / 269	1599 / 334	1597 / 401	1594 / 469	1590 / 539
	420	1498 / 224	1496 / 284	1494 / 347	1491 / 411	1487 / 477
	400	1428 / 196	1426 / 254	1424 / 314	1422 / 376	1417 / 439
	370	1324 / 160	1321 / 214	1319 / 270	1317 / 327	1313 / 387
	350	1253 / 138	1251 / 190	1249 / 243	1246 / 298	1242 / 355
	330	1183 / 119	1180 / 167	1178 / 218	1175 / 271	1171 / 326
	310	1112 / 102	1109 / 147	1107 / 196	1104 / 246	1100 / 299
	290	1041 / 86	1037 / 129	1035 / 175	1032 / 223	1028 / 275
4.0	450	1820 / 388	1819 / 462	1816 / 538	1812 / 615	1807 / 693
	420	1704 / 321	1702 / 390	1700 / 461	1697 / 533	1692 / 607
	400	1626 / 281	1624 / 347	1622 / 415	1619 / 484	1614 / 554
	370	1507 / 228	1505 / 289	1504 / 352	1501 / 417	1497 / 482
	350	1428 / 196	1426 / 254	1424 / 314	1422 / 376	1417 / 439
	330	1348 / 168	1346 / 223	1344 / 280	1342 / 338	1338 / 399
	310	1268 / 143	1266 / 195	1264 / 248	1261 / 304	1257 / 362
	290	1188 / 120	1185 / 169	1183 / 220	1180 / 273	1176 / 328
5.0[a]	450	2249 / 722	2246 / 815	2241 / 909	2236 / 1004	2228 / 1101
	420	2108 / 595	2105 / 681	2101 / 770	2096 / 859	2090 / 949
	400	2013 / 519	2010 / 602	2007 / 685	2003 / 771	1997 / 857
	370	1869 / 418	1867 / 494	1864 / 572	1860 / 651	1855 / 731
	350[a]	1772 / 359	1770 / 431	1768 / 505	1764 / 580	1759 / 656
	330	1675 / 305	1673 / 374	1671 / 443	1667 / 514	1663 / 587
	310	1576 / 258	1575 / 322	1573 / 388	1570 / 455	1565 / 523
	290	1478 / 216	1476 / 276	1474 / 337	1471 / 401	1467 / 466

[a] Factory Setting.

Table 21. S9V2D120U5VS Heating airflow

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

[a] Factory Setting.

Table 22. S9V2D120D5VS Heating airflow

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

[a] Factory Setting.

Table 23. S9V2D120U5VS and S9V2D120D5VS Cooling airflow

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

[a] 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.*

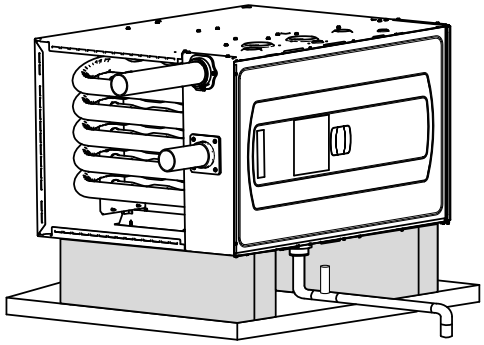
Horizontal Installation in an Attic or Crawlspace

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.***

Figure 5. Horizontal installation hanging using straps



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

TO APPROVED OPEN / VENTED DRAIN

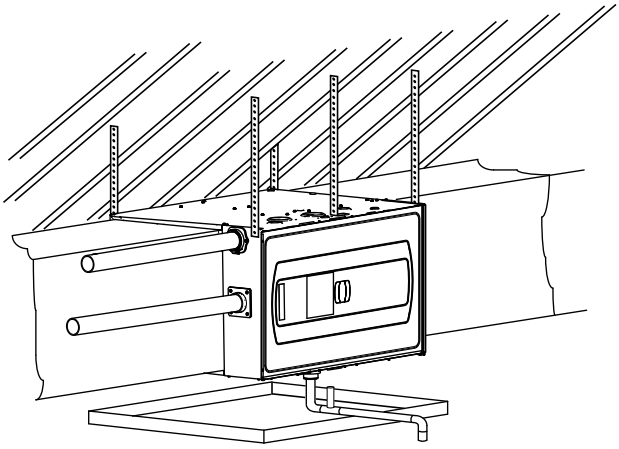
Note: The overflow stand pipe termination must be even with or slightly below the bottom of the condensate trap.

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

Figure 6. Horizontal installation in an attic or crawlspace



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.*

Figure 7. Upflow furnace with gas piping on left side

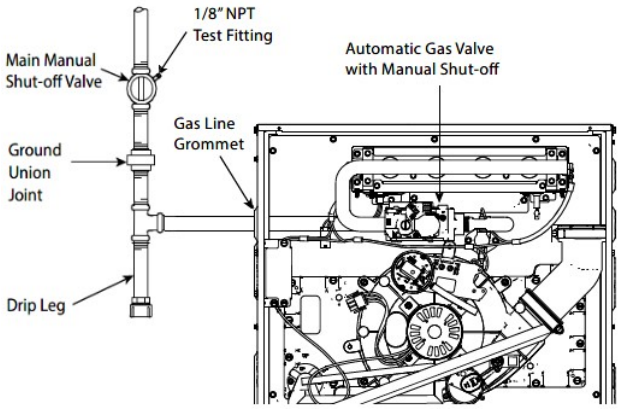


Figure 8. Upflow furnace with gas piping on right side

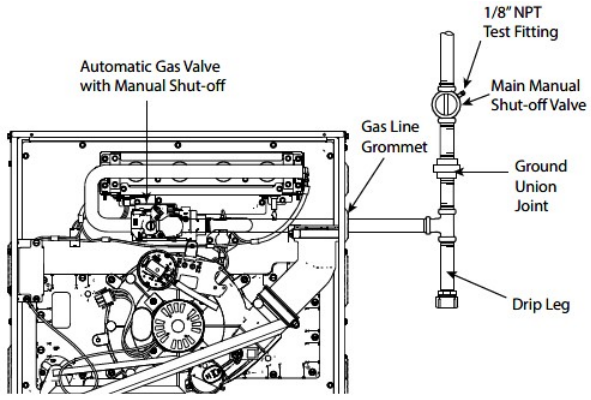


Figure 9. Downflow furnace with gas piping on left side

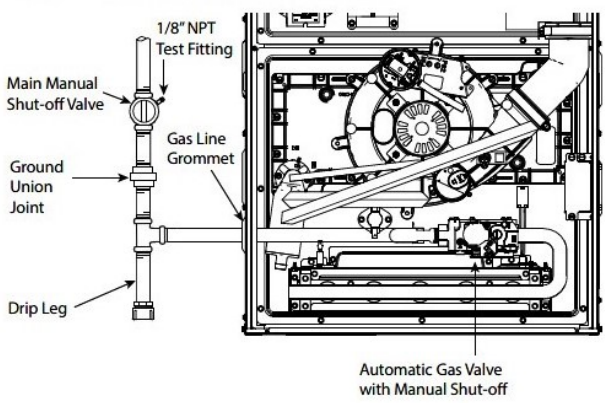


Figure 10. Downflow furnace with gas piping on right side

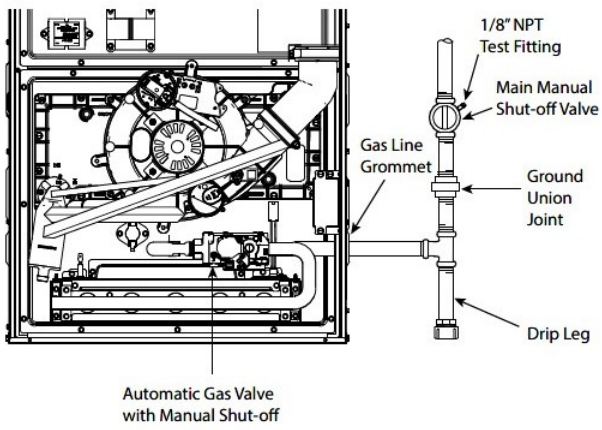


Figure 11. Horizontal left furnace with gas piping out left side

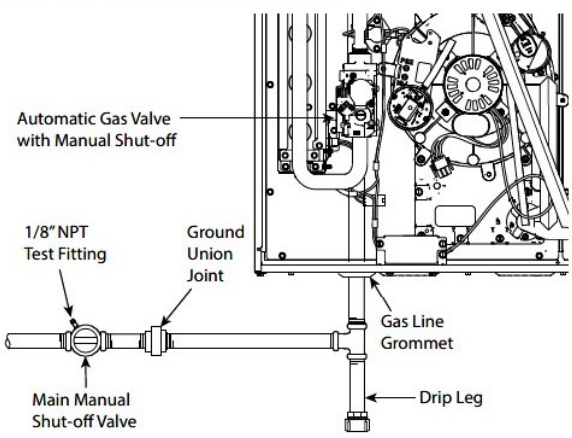


Figure 12. Horizontal left furnace with gas piping out right side

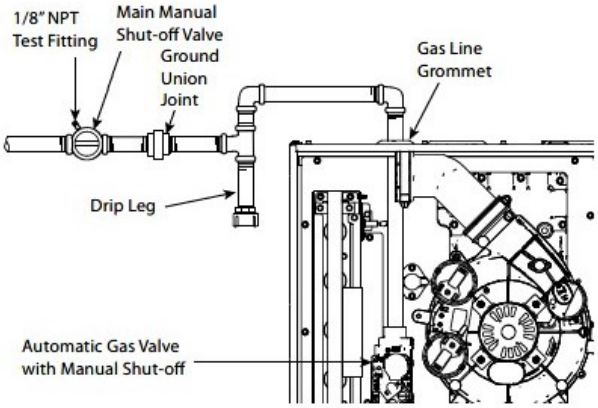


Figure 13. Horizontal right furnace with gas piping out left side

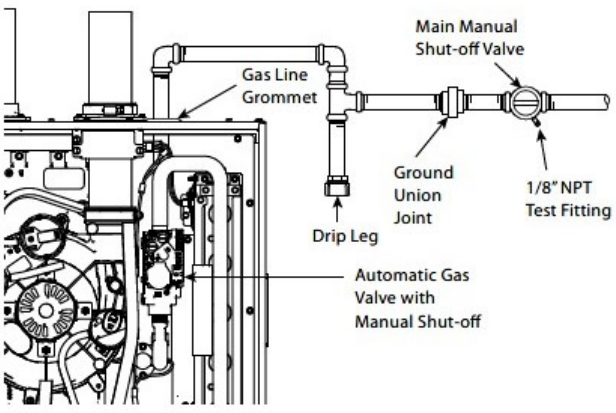
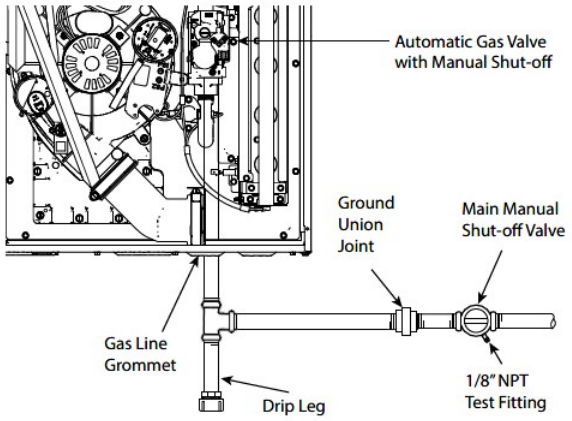


Figure 14. Horizontal right furnace with gas piping out right side



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.*

Table 24. Cubic feet per hour of gas for various pipe sizes and lengths (natural gas only)

Pipe size	Length of pipe						
	10	20	30	40	50	60	70
1/2	131	90	72	62	55	50	46
3/4	273	188	151	129	114	104	95

Table 24. Cubic feet per hour of gas for various pipe sizes and lengths (natural gas only) (continued)

Pipe size	Length of pipe						
	10	20	30	40	50	60	70
1	514	353	284	243	215	195	179
1–1/4	1060	726	583	499	442	400	368

Notes:

1. *This table is based on Pressure Drop of 0.3 inch W.C. and 0.6 SP.GR. Gas.*
2. *Excerpted from NFPA Table 6.2.1(a).*

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.

Table 25. 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

Combustion and Input Check

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

Table 26. Gas flow in cubic feet per hour

2 Cubic Foot Dial							
Sec.	**Flow**	**Sec.**	**Flow**	**Sec.**	**Flow**	**Sec.**	**Flow**
30	244	46	159	64	114	100	73
31	236	47	156	66	111	104	70
32	229	48	153	68	108	108	68
33	222	49	149	70	105	112	65
34	215	50	146	72	102	116	63
35	209	51	144	74	99	120	61
36	203	52	141	76	96	130	56
37	198	53	138	78	94	140	52
38	193	54	136	80	92	150	49
39	188	55	133	82	89	160	46
40	183	56	131	84	87	170	43
41	179	57	128	86	85	180	41
42	174	58	126	88	83	190	39
43	170	59	124	90	81	200	37
44	166	60	122	94	78	—	—
45	163	62	118	98	75	—	—

Note: Excerpted from NFPA 54/ANSI Z223.1 Table A.11.1.1

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-inch hex wrench.
   a. The pressure tap adjustment kit (KIT07611) contains a 3/32-inch hex wrench, a 5/16-inch 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 Step 5. to Step 7. if needed.
8. Turn off all electrical power to the system.
9. Remove the manometer and flexible tubing and tighten the pressure tap screw.

10. Using a leak detection solution or soap suds, check for leaks at the pressure outlet boss and pressure tap test screw.
11. Turn on system power and check operation of the unit.

Figure 15. Gas valve adjustment

White-Rodgers 36J

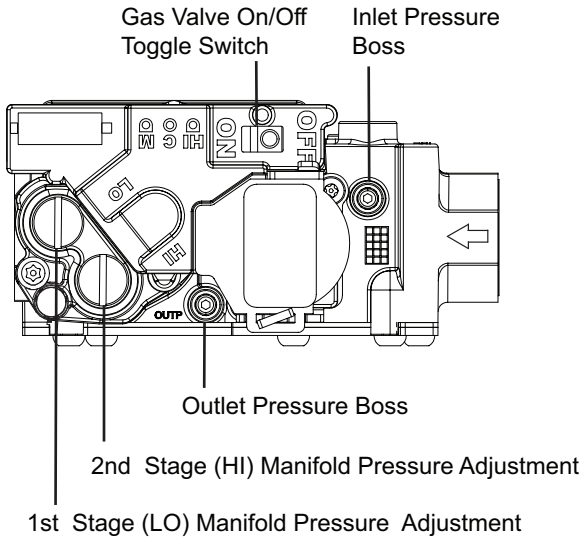


Table 27. Fuel manifold pressure settings (inches w. c.)

Fuel	2nd Stage Max.	1st Stage Max.
Natural Gas	3.5-in. W.C.	1.7-in. W.C.
Propane Gas	10.0-in. W.C.	6.0-in. W.C.

High Altitude Derate

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

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

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).

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.

Important: *Reinstall the replacement orifices to the same depth as the orifices supplied with the equipment.*

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.

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.

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 – **DO NOT CHECK WITH AN OPEN FLAME.** Allow 5 minutes for any gas that might have escaped to dissipate.

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.

Table 28. Part numbers for replacement orifices

Drill Size	Part Number	Drill Size	Part Number
44	ORF00501	54	ORF00555
45	ORF00644	55	ORF00693
—	—	56	ORF00907
47	ORF00910	—	—
—	—	58	ORF01338
49	ORF00503	59	ORF01339

Note: If 46, 48, 50, or 57 orifice is required, use the next smaller drill size and reduce the manifold pressure to achieve rate.

The table below 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.

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 *National Fuel Gas Code, ANSI Z223.1/ NFPA 54* or *National Standard of Canada, Natural Gas and Propane Installation Code, CSA B149.1*. 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.

Table 29. Main burner orifices

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

Note: Excerpted from NFPA 54 Table E.1.1(d).

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-inch or 3-inch plastic pipe and fittings found in the Table 30, p. 38. 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-inch 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.*
- *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, that is, when it passes through unheated spaces, 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-inch Venting requirements

Important:

- *To determine if your application requires 3-inch venting, see the Maximum Vent Length Table.*
- *Horizontal venting application must use the 2-inch x 3-inch offset reducing coupling. Vertical venting applications do not require the reducing coupling to be offset.*

Notes:

- *If your furnace comes with a factory supplied 2-inch x 3-inch offset reducing coupling it is used for 3-inch 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.*
- *For Canadian applications, BAYREDUCE 2-inch x 3-inch 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.*

Figure 16. Horizontal coupling

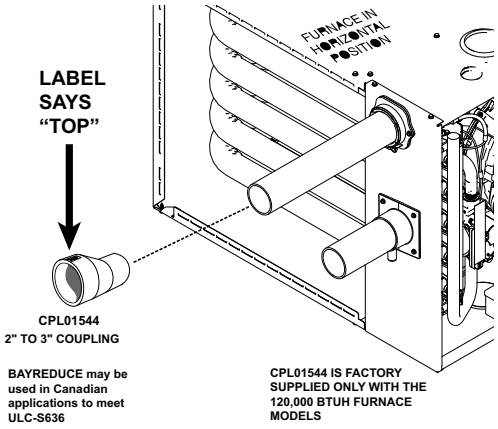
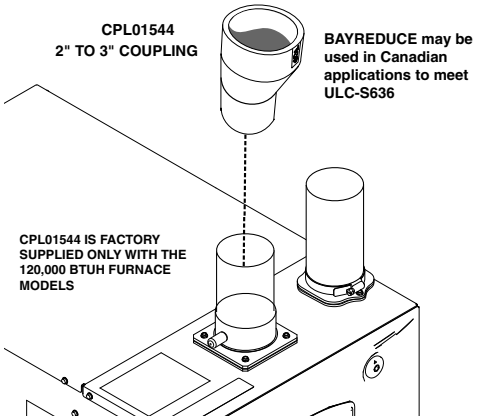


Figure 17. Vertical coupling



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 18, p. 34, Figure 19, p. 35, and Figure 20, p. 35).

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 18. Upflow top entry

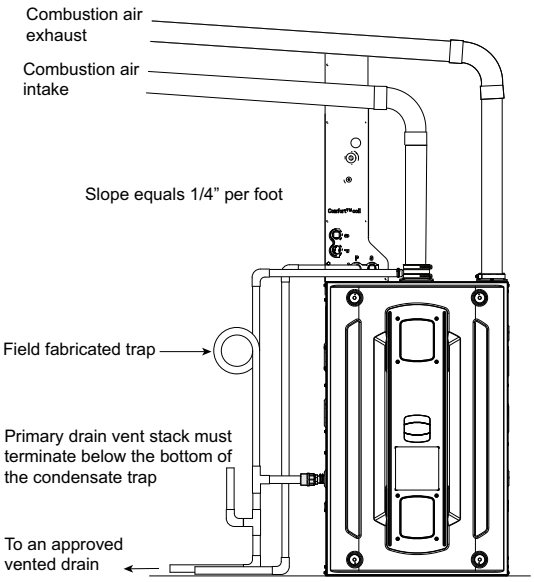


Figure 19. Horizontal top entry

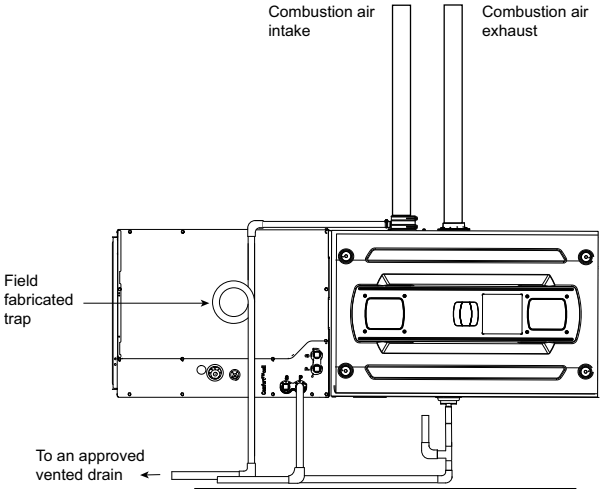
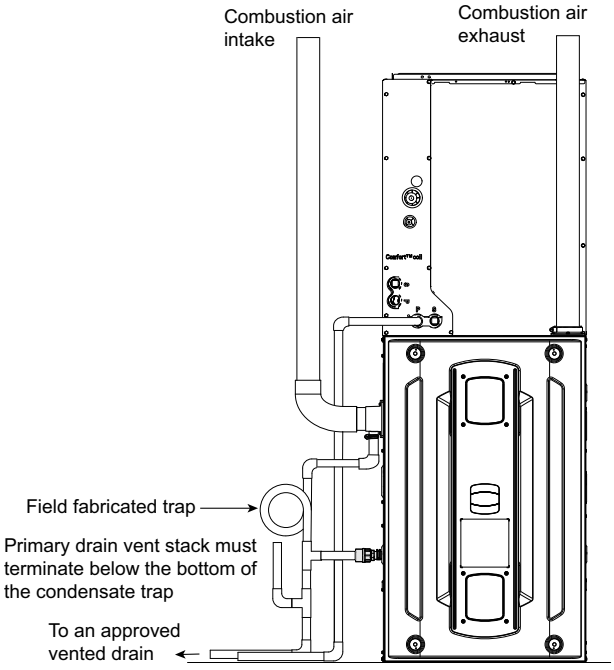


Figure 20. Upflow side entry



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.

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

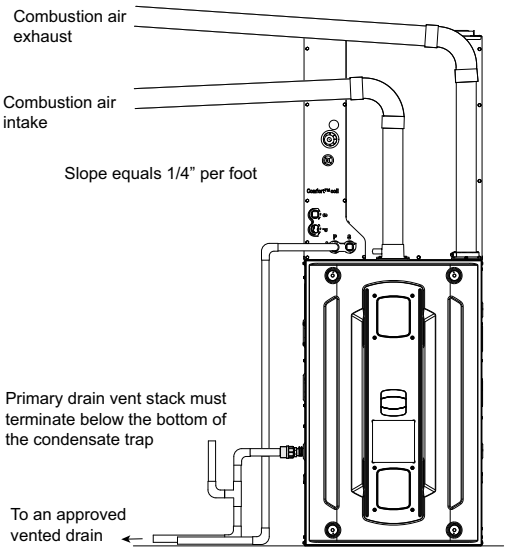
We recommend following one of the options to prevent this condition from occurring and possibly damaging components within the furnace:

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. 58 section.*

Figure 21. Option 1

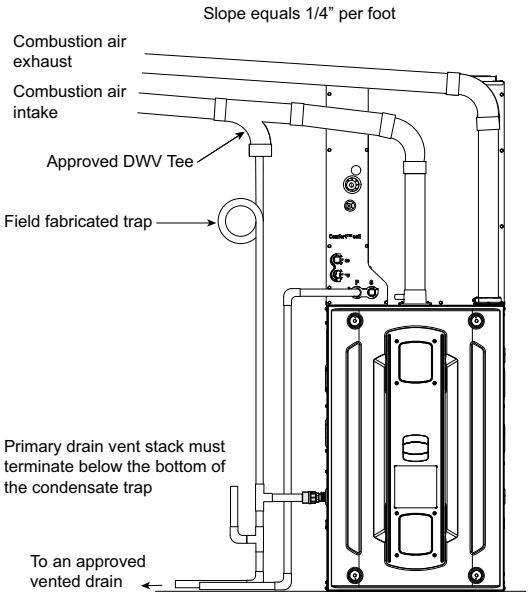


Option 2

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. 58 section.*

Figure 22. Option 2

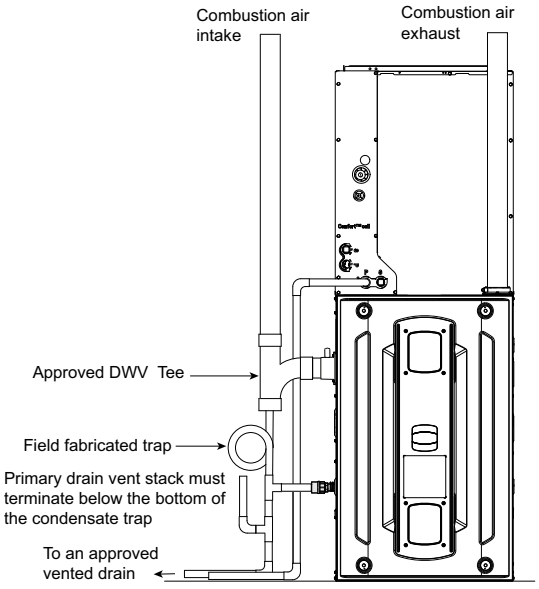


Option 3

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. 58 section.*

Figure 23. Option 3



Vent Terminations

For **Direct Vent Spplication:** The Furnaces must be vented to the exterior of the house and combustion air MUST come through the inlet air pipe from OUTSIDE AIR.

Note: *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.*

For **Non-direct Vent Application:** 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. 48.)

Vent terminations

- BAYVENT200B
- BAYAIR30AVENTA

Vent terminations – Canadian applications. Meets ULC-S636 requirements.

- BAYVENTCN200B
- BAYAIR30CNVENT

Furnace Vent / Inlet Pipe Installation in Two Pressure Zone Configurations

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:

1. The Furnace must vent outside the structure.
2. Furnace combustion air requirements must be met for non-direct, single pipe applications.
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 determine the value for the longest allowable equivalent vent/ inlet air length as shown in the vent length table.

Note: *For single pressure zone applications, see the "Horizontal Venting," p. 40 section.*

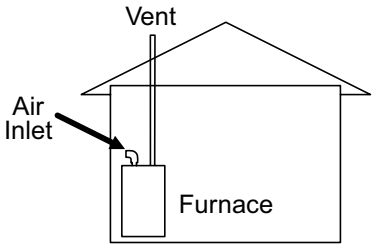
The following are **Examples Only**.

Example 1

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. 48.

Note: *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.*

Figure 24. Example 1

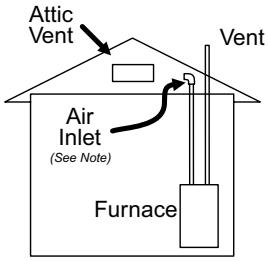


Example 2

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. 48.

Note: *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.*

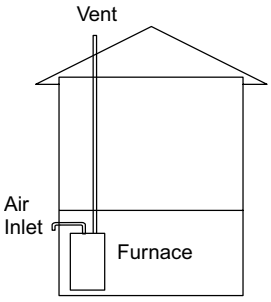
Figure 25. Example 2



Example 3

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 pipe depending on the furnace and pipe size.

Figure 26. Example 3

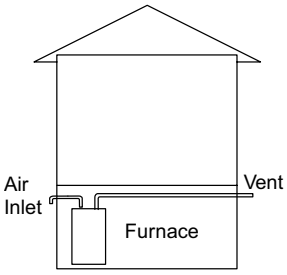


Example 4

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.

Figure 27. Example 4



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-inch and 3-inch 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!

Failure to follow instructions below could result in death or serious injury, or property damage.
Refer to the Approved Vent Pipe Materials table for manufactured modular venting systems approved for use with this product. Follow the manufacturer's installation instructions when installing the venting system.

⚠ WARNING

Carbon Monoxide Poisoning!

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

Do not use cement on polypropylene venting systems. Follow the manufacturer's installation instructions when installing the venting system.

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

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, and 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.*

Figure 28. Sealing inlet air pipe

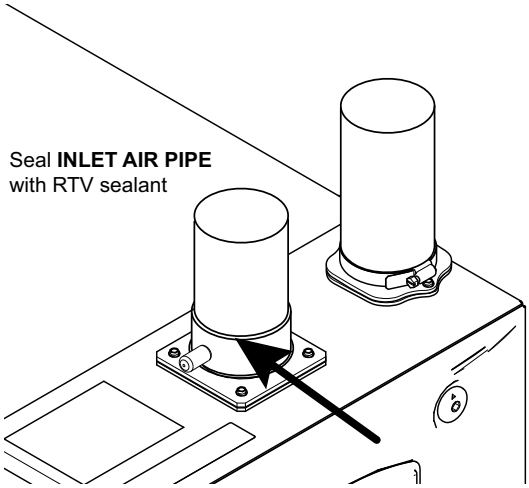


Table 30. Approved vent pipe materials

Vent Fitting Material			
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			

Table 30. Approved vent pipe materials (continued)

Vent Fitting Material			
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

Note: These fittings are available from your Gas Furnace Distributors.

Maximum Vent Length Table

Table 31. Maximum vent length

Model	2-inch or 2.5-inch Pipe	3-inch or 4-inch Pipe
Altitude 0-2,000 FT.		
S9V2B040, S9V2B060	200	200
S9V2B080, S9V2C080	100	200
S9V2C100	50	200
S9V2D120	[a]	200
Altitude 2,001- 5400 FT		
S9V2B040, S9V2B060	200	200
S9V2B080, S9V2C080	80	120
S9V2C100	50	150
S9V2D120	[a]	200
Altitude 5,401-7,800 FT		
S9V2B040, S9V2B060	100	150
S9V2B080, S9V2C080	50	70
S9V2C100	[a]	100
S9V2D120	[a]	100
Altitude 7,801-10,100 FT		
S9V2B040, S9V2B060	50	90
S9V2B080, S9V2C080	[a]	50
S9V2C100	[a]	50
S9V2D120	[a]	50

Notes:

1. *Installation Instructions must be followed for installation of the venting system.*
2. *Maximum Total Equivalent Length In Feet for Vent or Inlet Air, not combined total.*
3. *For PolyPro® by Duravent, Z-DENS by Novaflex Group, InnoFlue® by Centrotherm, ECCO™ polypropylene venting system, and Polyflue™ manufactured modular venting systems that are in the approved vent pipe material table, fitting equivalent vent lengths may be different from what is shown in Note 5. Refer to the venting system manufacturer's installation instruction for appropriate venting diameters and equivalent lengths.*
4. *Minimum vent length for all models: 15ft equivalent.*
5. *Do not mix pipe diameters in the same length of pipe outside the furnace cabinet (except adapters at the top of the furnace). If different inlet and vent pipe sizes are used, the vent pipe must adhere to the maximum length limit shown in the table above (See Note 6 below for exception). The inlet pipe can be of a larger diameter, but never smaller than the vent pipe.*
6. *Maximum pipe lengths must not be exceeded. The length shown is not a combined total, it is the maximum length of each (Vent or Inlet air pipes).*
7. *One short radius 90° elbow is equivalent to 10ft of 4-inch pipe, 10ft of 3-inch pipe, or 8ft of 2-inch pipe. One long radius elbow is equivalent to 6ft of 4-inch pipe, 7ft of 3-inch pipe, or 5ft of 2-inch pipe. Two 45° elbows equal one 90° long elbow. One mitered elbow is equivalent to 12ft of 3-inch pipe or 12ft of 2-inch pipe.*
8. *The termination tee or bend must be included in the total number of elbows. If the BAYAIR30AVENTA or BAYAIR30CNVENT termination kit is used, the equivalent length of pipe is 5 feet. For BAYVENT200B and BAYVENTCN200B the equivalent length is 0 feet.*
9. *For Canadian applications, venting systems must meet ULC-S636 requirements.*
10. *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).*

[a] Not allowed.

Horizontal Venting

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

3-inch Venting requirements

Important:

- *To determine if your application requires 3-inch venting, see the "Maximum Vent Length Table," p. 39.*
- *Horizontal venting application must use the 2-inch x 3-inch 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, (for example when it passes through unheated spaces), 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.

Figure 29. Horizontal venting

Note: *If your furnace comes with a factory supplied 2-inch x 3-inch offset reducing coupling it is used for 3-inch 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.*

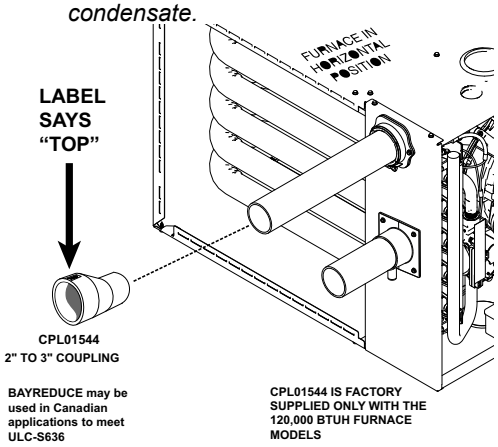
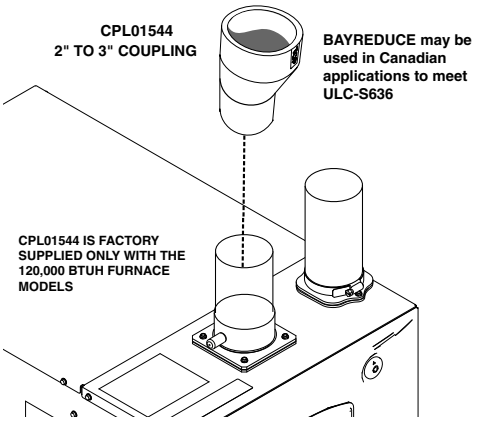


Figure 30. Vertical venting

Note: *For Canadian applications, BAYREDUCE 2-inch x 3-inch 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.*

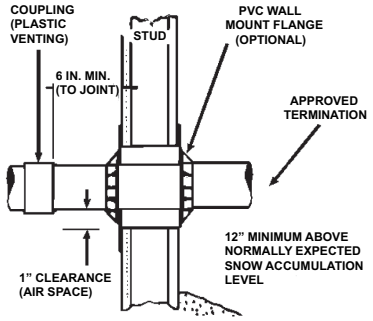


Combustible Material Wall

A minimum clearance of 1-inch 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-inch x 12-inch. 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.

Figure 31. Combustible material wall

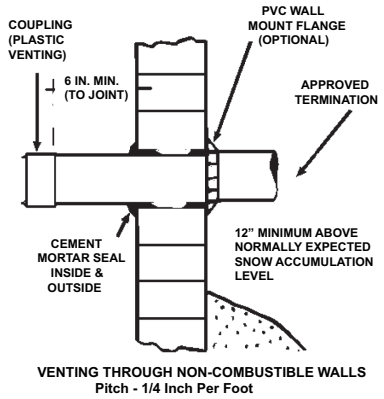


Non-combustible Material Wall

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.

Figure 32. Non-combustible material wall



Horizontal Venting Through Wall

The vent for this appliance shall not terminate:

- Over public walkways.
- Near soffit vents or crawl space vents or other areas where condensate or vapor could create a nuisance or hazard or cause property damage.
- 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-inch minimum clearance above highest anticipated snow level or grade, whichever is greater.*

Note: *All distances are center line to center line.*

Figure 33. Configurations one pipe venting systems — type 1

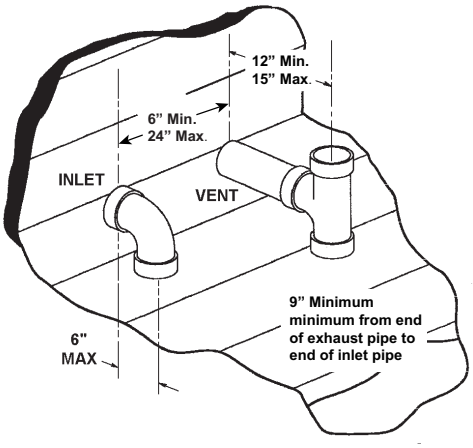


Figure 34. Configurations for two pipe venting systems — type 2

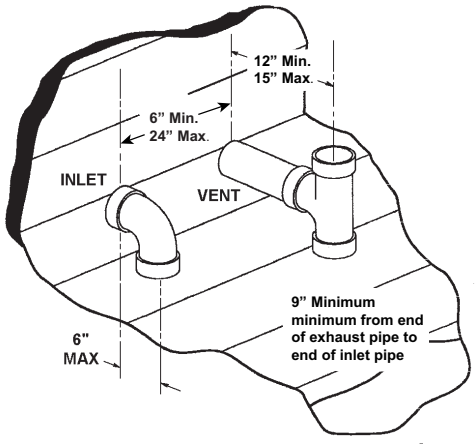


Figure 35. Configurations for two pipe venting systems — type 3

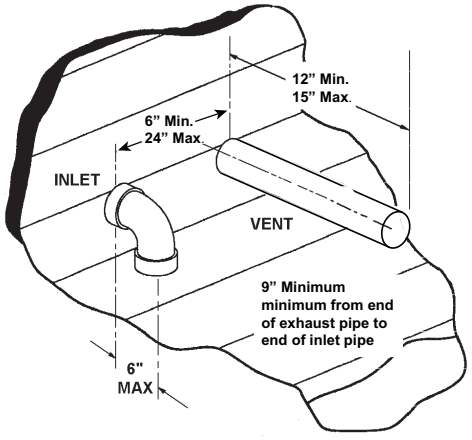


Figure 36. Configurations for two pipe venting systems — type 4

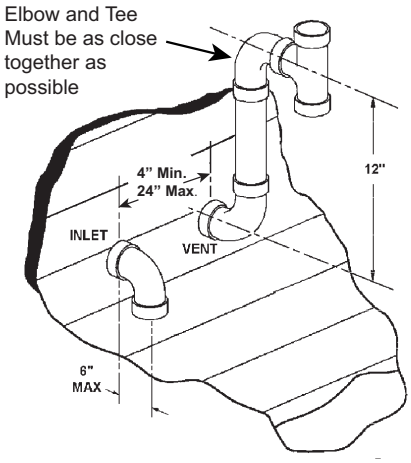


Figure 37. Configurations for two pipe venting systems — type 5

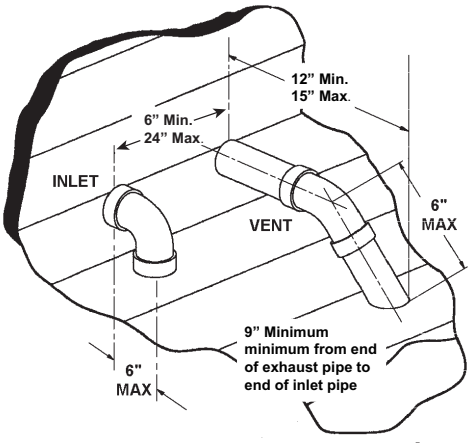


Figure 38. Configurations for two pipe venting systems — type 6

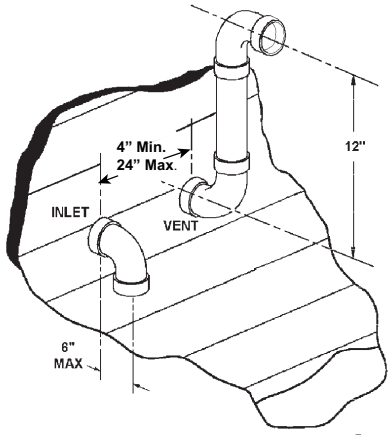
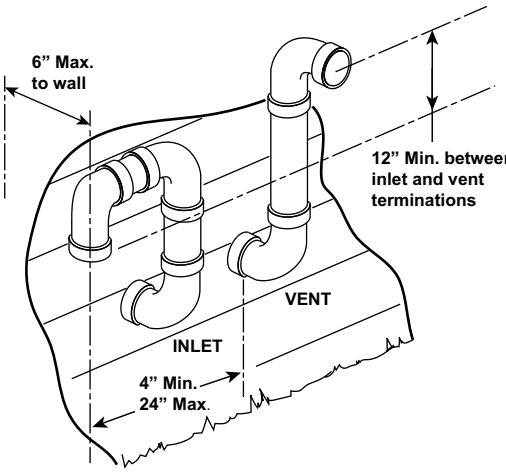


Figure 39. Cconfigurations for two pipe venting systems — type 7



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 and 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-inch 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:

- Over public walkways
- Near soffit vents or crawl space vents or other areas where condensate or vapor could create a nuisance or hazard or cause property damage
- 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.

Figure 40. BAYVENT200B / BAYVENTCN200B

Note: *For Canadian applications, horizontal vent termination kits must meet ULC-S636.*

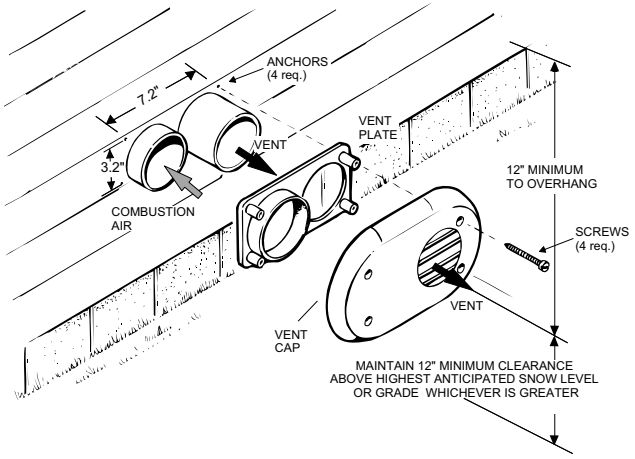
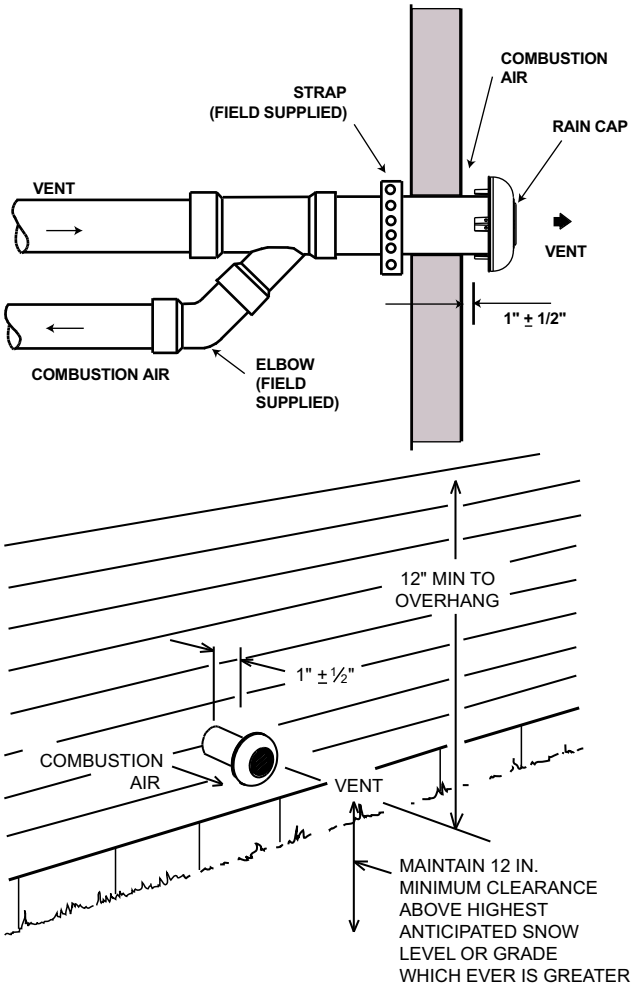


Figure 41. BAYAIR30AVENTA / BAYAIR30CNVENT (Sidewall)



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

Figure 42. Horizontal vent clearances

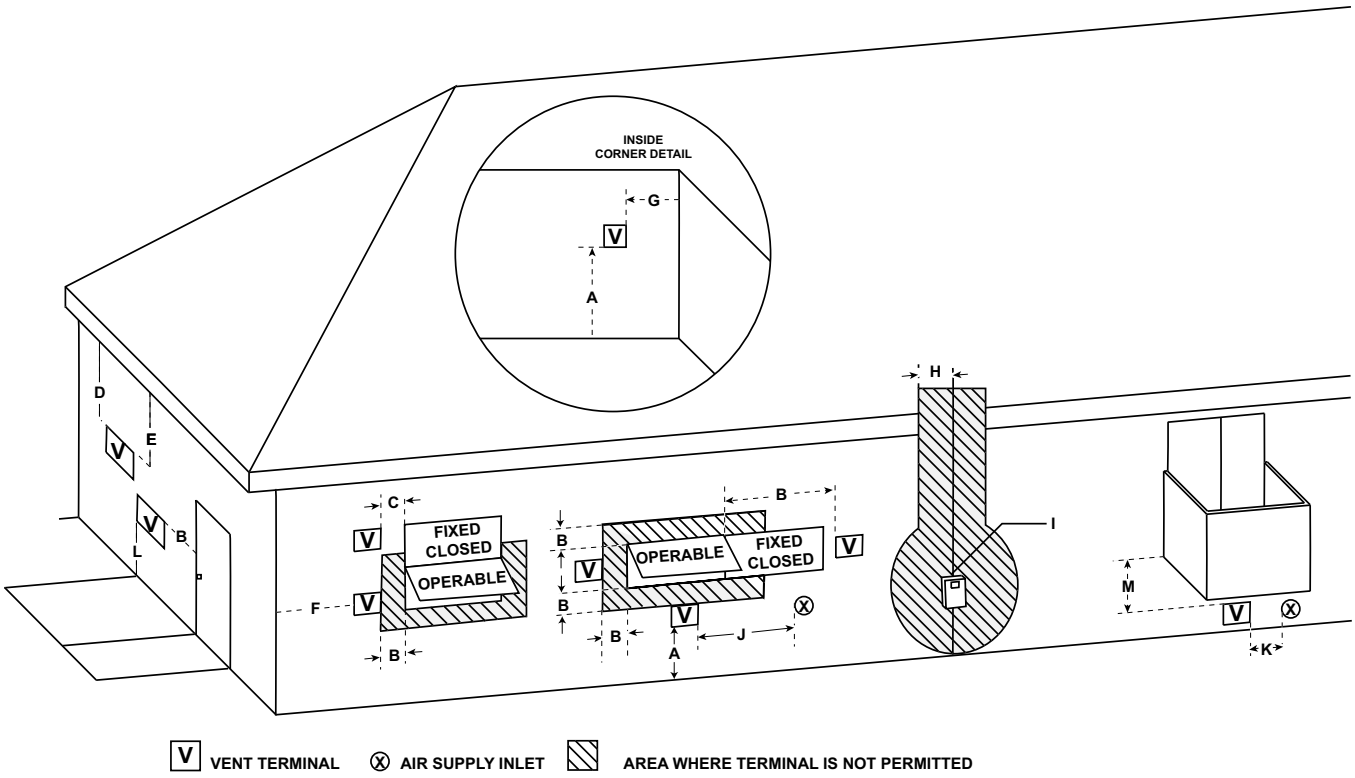


Table 32. Vent termination clearances - direct/non-direct

Vent Termination Clearances- Direct/Non-Direct				
		Canadian Installations	**US Installations Non-Direct**	**US Installations Direct**
A=	Clearance above grade, veranda, porch, deck, or balcony	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	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	(a)	(a)	(a)
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	(a)	(a)	(a)
E=	Clearance to unventilated soffit	(a)	(a)	(a)

Table 32. Vent termination clearances - direct/non-direct (continued)

Vent Termination Clearances- Direct/Non-Direct				
		Canadian Installations	**US Installations Non-Direct**	**US Installations Direct**
F=	Clearance to outside corner	(a)	(a)	(a)
G=	Clearance to inside corner	(a)	(a)	(a)
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	(a)	(a)
I=	Clearance to service regulator vent outlet	3 feet (91 cm)	(a)	(a)
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	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	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		
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:

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.
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.

(a) 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.

Figure 43. Supports

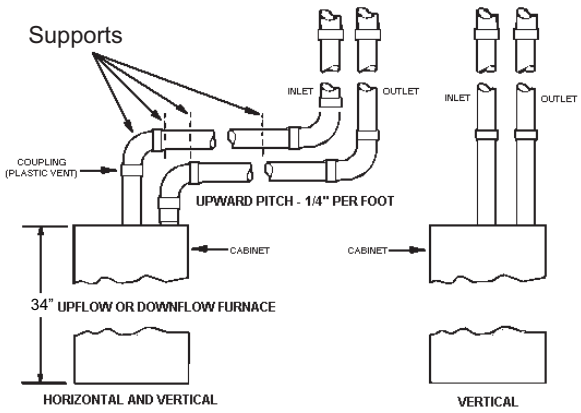
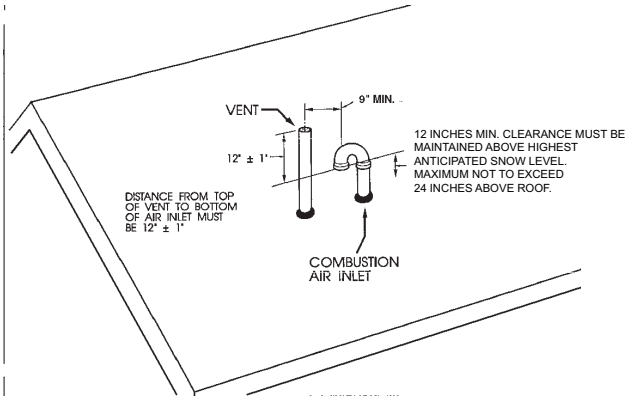


Figure 44. Pipe roof vents



Note: *All measurements are from center line to center line.*

Figure 45. BAYAIR30AVENTA / BAYAIR30CNVENT

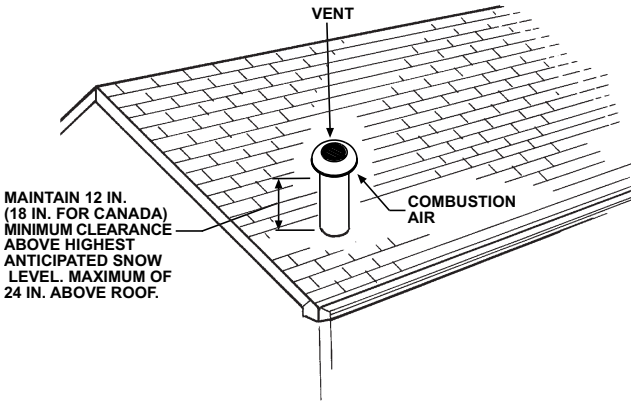
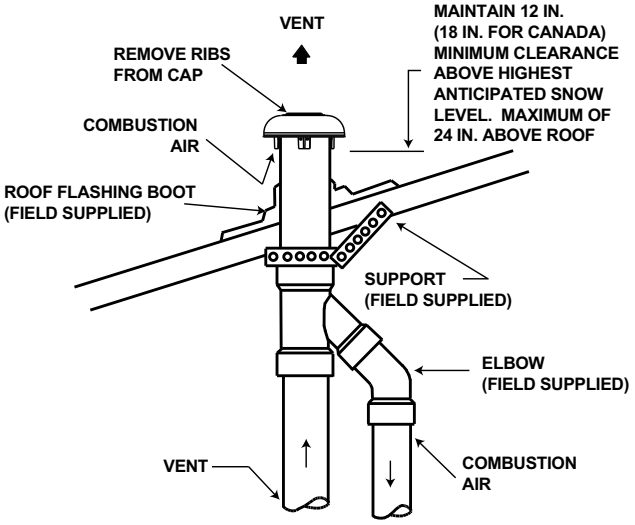


Figure 46. BAYAIR30AVENTA / BAYAIR30CNVENT

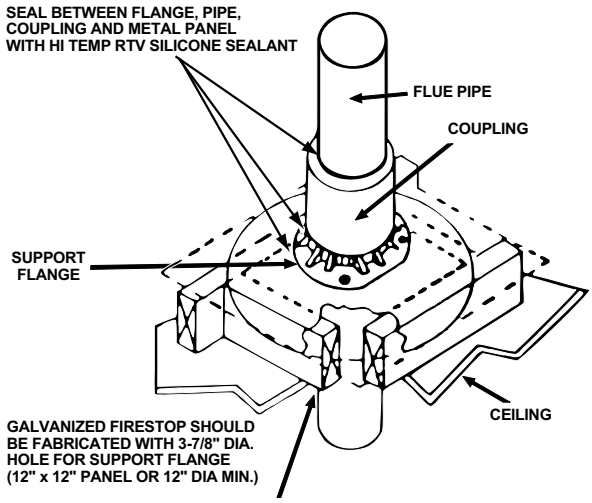


When penetrating roof with PVC vent pipe, a flexible flashing may be used for a weather tight seal. Lubricate flexible seal on flashing before PVC pipe is pushed through the seal. (Field Supplied)

Notes:

- *No vent cap is the preferred method for vertical vent termination in extremely cold climates.*
- *In extreme climate conditions, insulate the exposed pipe above the roof line with Armaflex type insulation.*

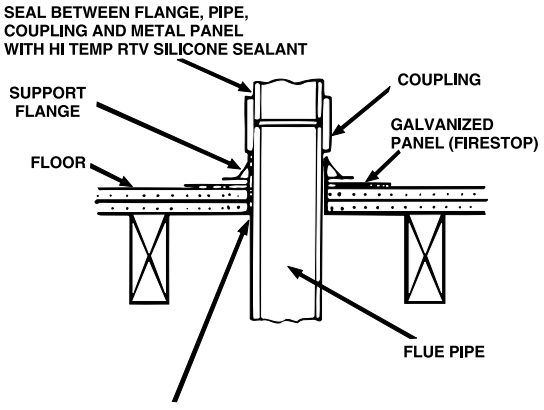
Figure 47. Venting through ceiling



CLEARANCE - 0" ACCEPTABLE FOR PVC VENT PIPE
1" ACCEPTABLE FOR TYPE 29-4C STAINLESS STEEL VENT PIPE

VENTING THROUGH CEILING

Figure 48. Venting through floor



CLEARANCE
0" ACCEPTABLE FOR PVC VENT PIPE
1" ACCEPTABLE FOR TYPE 29-4C STAINLESS STEEL VENT PIPE

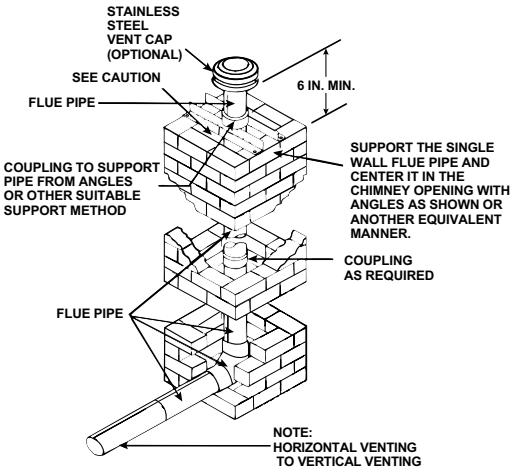
VENTING THROUGH FLOOR

Venting Through an Unused Chimney / Venting Routed Through a Masonry Chimney

Important:

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

Figure 49. PVC plastic venting through unused chimney



Venting Through an UNUSED Chimney

Important:

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

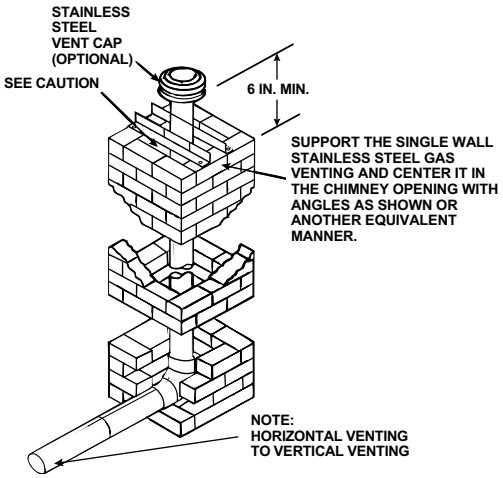
All stainless steel fitting must be installed with male end towards the Furnace.

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.

Figure 50. Type 29–4C stainless steel venting through unused chimney



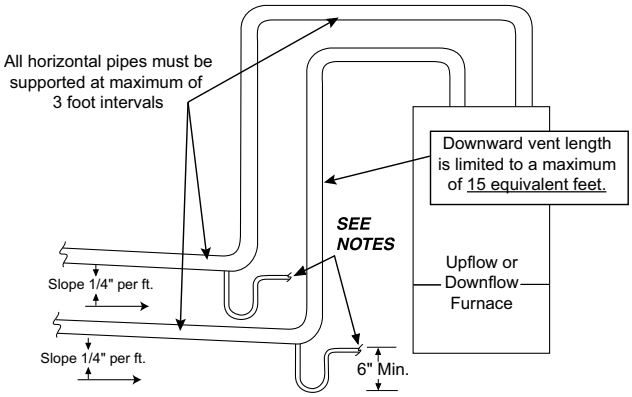
Downward Venting

Furnace may be in vertical or horizontal configuration.

Notes:

- *Condensate trap for vent pipe must be a minimum of 6 inches in height.*
- *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.*
- *The condensate trap should be primed at initial start up prior to heating season operation.*

Figure 51. Downward venting



Important: *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.

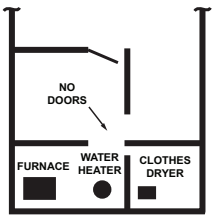
Table 33. Minimum area in square feet for unconfined space installations

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

Note: *Calculated from NFPA 54 clause 9.3.2.1*

Figure 52. Unconfined space

50 CU. FT. OR MORE PER 1000 BTU/HR INPUT ALL EQUIP. INSTALLED



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.

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

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

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

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

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

Table 34. Minimum free area in square inches each opening (furnace only) in a confined space

Furnace Max BTUH.Input Rtg.	Air From Inside[a]	Air From Outside	
		Vertical Duct [b] [c]	Horizontal Duct[d] [e]
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

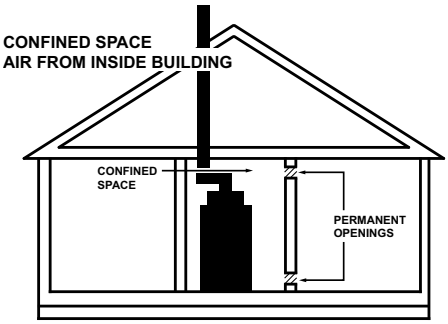
[a] Calculated from NFPA 54 Clause 9.3.2.3(1).
[b] Calculated from NFPA 54 Clause 9.3.3.1(1).
[c] 1 Square inch per 4000 BTU/hr Vertical Duct.
[d] Calculated from NFPA 54 Clause 9.3.3.1(2).
[e] 1 Square inch per 2000 BTU/hr Horizontal Duct.

Figure 53. Confined space

**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.

Figure 54. Air from inside building



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.

Figure 55. Air from outdoors

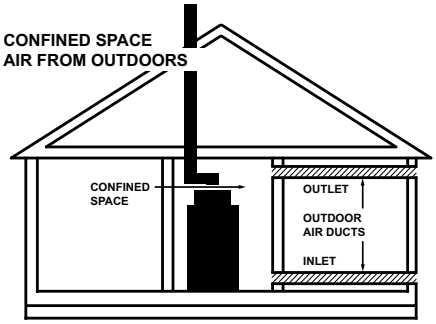


Figure 56. Air from ventilated attic/crawl space

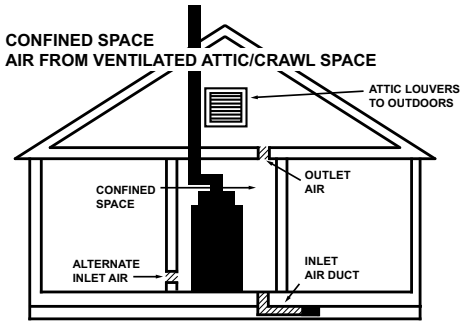
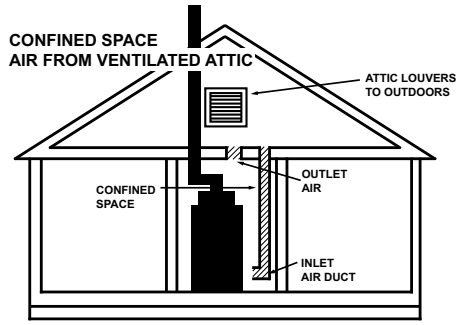


Figure 57. Air from ventilated attic



Duct Connections

Air duct systems should be installed in accordance with standards for air conditioning systems, National Fire Protection Association Pamphlet No. 90. They should be sized in accordance with ACCA Manual D or whichever is applicable. Verify electrical supply controls.

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

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

When the furnace is located in a utility room adjacent to the living area, the system should be carefully designed with returns which minimize noise transmission through the return air grille. Although these winter air conditioners are designed with large blowers operating at moderate speeds, any blower moving a high volume of air produces audible noise. Route the return air ducts under the floor or through

the attic allowing installation of air return away from the living area.

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

For furnaces not equipped with a cooling coil, it is recommended that the outlet duct be provided with a removable access panel. The opening must 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. Seal removable cover to prevent air leaks.

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

Important: *Do not install return air through the back of the furnace cabinet and through the side of the furnace cabinet on horizontal applications without following the guidelines in "Return Air Filters," p. 55.*

Carbon monoxide, fire or smoke can cause serious bodily injury, death, and/or property damage. Carbon monoxide can be found in places 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 and fire and smoke detectors per the manufacturer's installation instructions. These devices should be listed by Underwriters Laboratories, Inc. *Standards for Single and Multiple Station Carbon Monoxide Alarms, UL 2034* or CSA International Standard, *Residential Carbon Monoxide Alarming Devices*, CSA 6.19.

Notes:

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

Supply Duct Connections

Table 35. Supply duct connections

Furnace Orientation	Steps to be followed	Images for Reference
Furnace in upflow with or without coil	Step 1., Step 2., Step 3., Step 4.	Figure 58, p. 50, Figure 59, p. 50, Figure 61, p. 50
Furnace in horizontal left with or without coil	Step 1., Step 5., Step 3., Step 4.	Figure 58, p. 50, Figure 59, p. 50, Figure 62, p. 51
Furnace in horizontal right with "A" coil	Step 6., Step 7., Step 8., Step 5., Step 9., Step 4.	Figure 58, p. 50, Figure 60, p. 50, Figure 63, p. 51
Furnace in downflow furnace with coil	Step 6., Step 7., Step 8., Step 5., Step 9., Step 4.	Figure 58, p. 50, Figure 60, p. 50, Figure 64, p. 51
Furnace in horizontal right and downflow without coil	Step 1., Step 12., Step 4.	Figure 58, p. 50, Figure 60, p. 50

Figure 58. Initial position

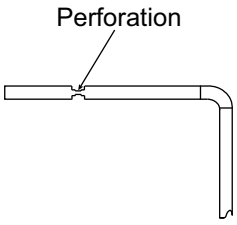


Figure 59. Flange orientation for upflow and horizontal left

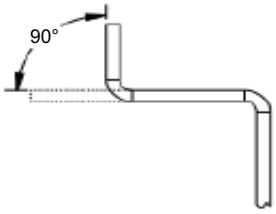


Figure 60. Flange orientation for downflow and horizontal right

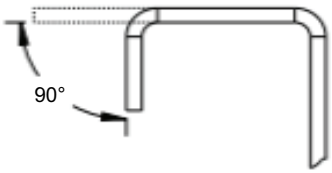


Figure 61. Upflow furnace with coil

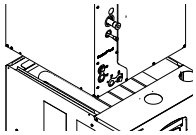


Figure 62. Horizontal left with or without coil

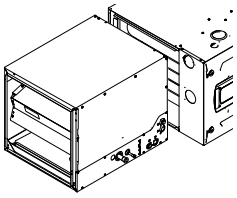


Figure 63. Horizontal right furnace with or without coil

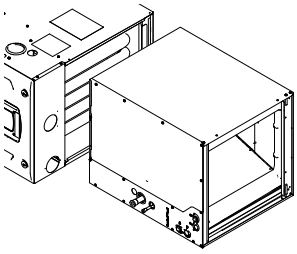
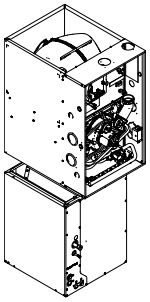


Figure 64. Downflow furnace with coil



Installation Steps

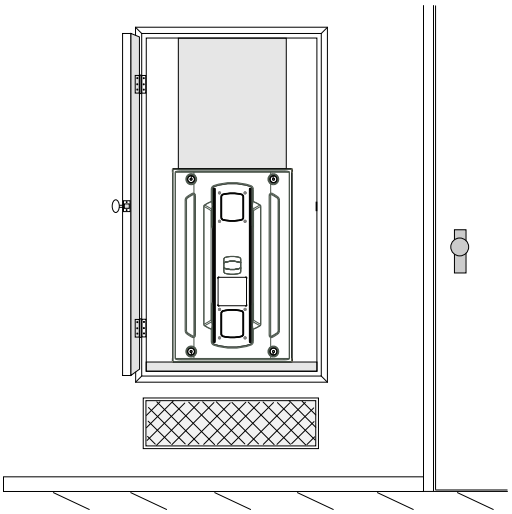
1. Bend furnace flanges up.
2. Set the coil on top of the furnace.
3. Screw through the coil cabinet into the furnace flange. Guide holes are located on the coil.
4. Seal per local codes and requirements.
5. Insulate the first 6 to 12 inches of the supply duct.
6. Support the furnace and coil independently.
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.

Return Duct Connections

Return Ducting General Guidelines

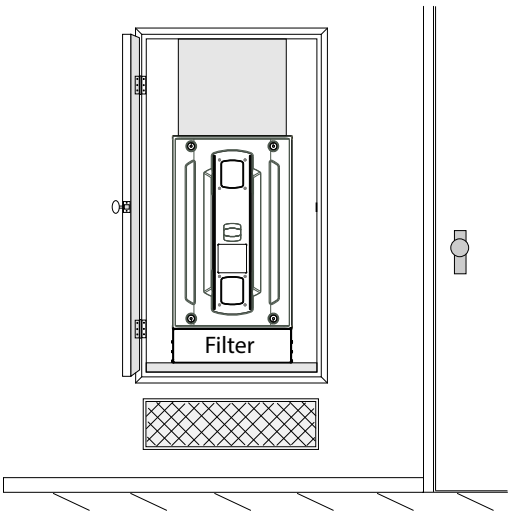
- Back returns are not allowed on any S-Series furnaces.
- Side returns are not allowed on downflow S-Series furnaces.
- Mounting flanges must be located on ducting.
- Shoot screws through the mount flanges into the furnace cabinet.
- Always seal per local codes and requirements.
- Furnace, coil, and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

Figure 65. Upflow furnace with bottom return in closet with remote filter



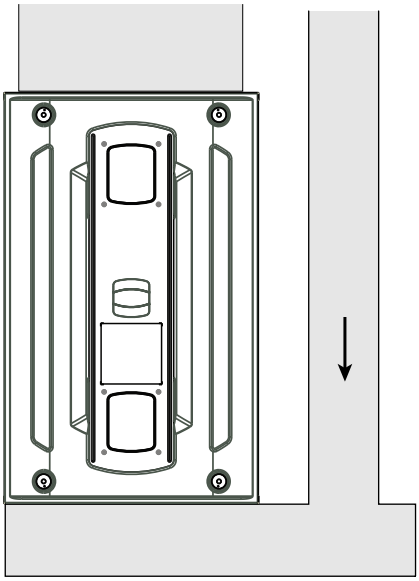
Refer to Step 1., Step 2., Step 3., Step 4.

Figure 66. Upflow furnace with bottom return in closet with filter box



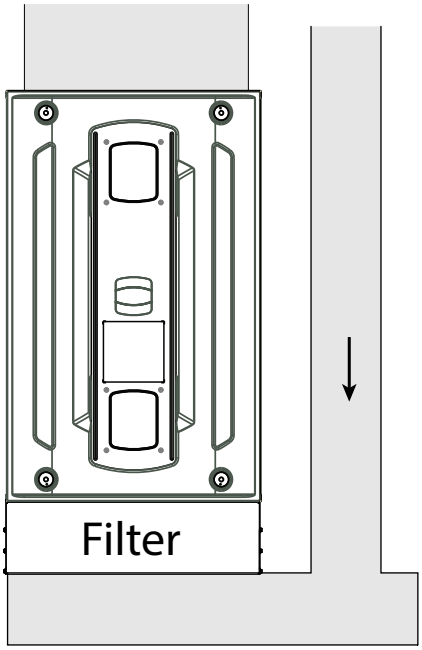
Refer to Step 1., Step 5., Step 6., Step 4.

Figure 67. Upflow furnace with bottom return mounted on a ducted pedestal



Refer to Step 1., Step 7., Step 8., Step 4.

Figure 68. Upflow furnace with bottom return mounted on a ducted pedestal with filter box



Refer to Step 1., Step 9., Step 4.

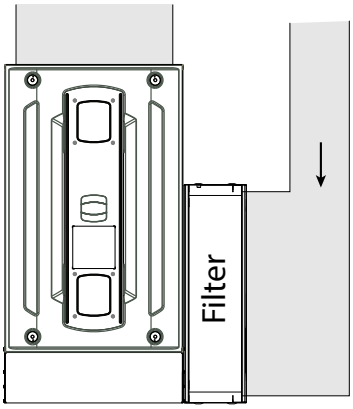
Important:

- *Confirm 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.*
- *Do not cut the cabinet in the "No Cut" area.*

Notes:

- *Use pptional BAYLIFT kit to lift furnace. Follow kit instructions.*
- *The furnace bottom pedestal must be a minimum of 6-inch in height.*

Figure 69. Upflow furnace with bottom and side returns mounted on a ducted pedestal with side return and filter box



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

Figure 70. 17.5–inch filter cabinet with BAYLIFT kit

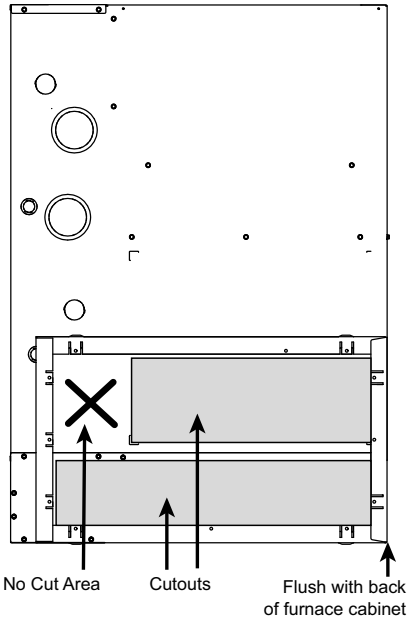
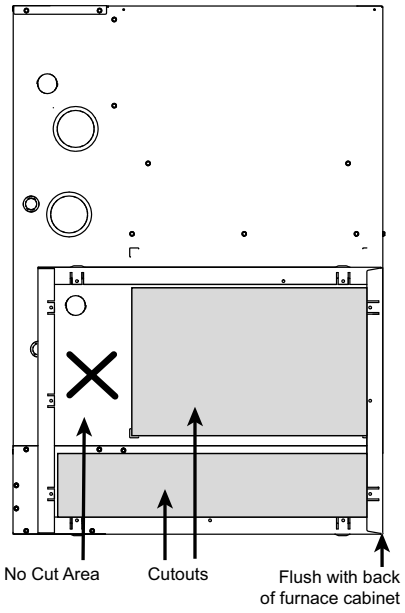


Figure 71. 21–inch filter cabinet with BAYLIFT kit



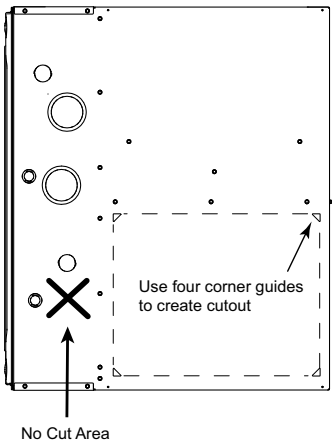
Important:

- *Confirm 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.*
- *Do not cut the cabinet in the "No Cut" area.*

Notes:

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

Figure 72. Upflow furnace with side return



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

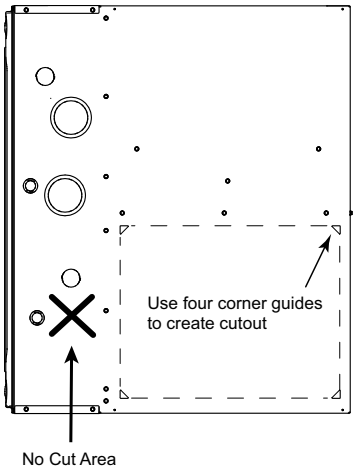
Important:

- *One of the sides must have a transition to allow the condensate and thermostat wiring to exit the cabinet.*
- *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.*
- *Do not cut the cabinet in the "No Cut" area.*

Notes:

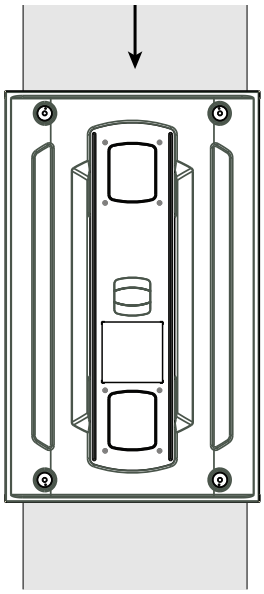
- *If using one transition, the condensate and thermostat wiring will exit on the transition side.*
- *If using a filter boxes, use transitions, if possible, to attach the filter boxes to the furnace cabinet. If transitions are not used, condensate may exit through the bottom of the furnace.*

Figure 73. Upflow furnace with two side returns



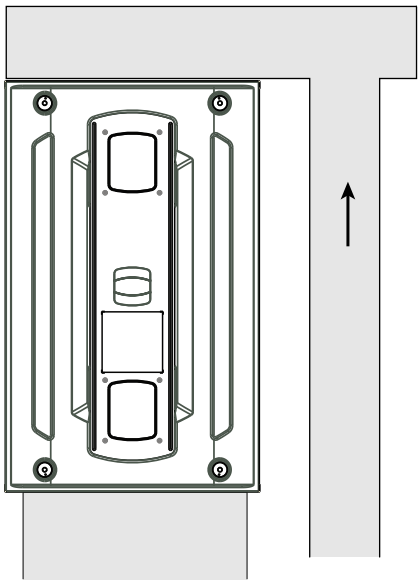
Refer to Step 16., Step 17., Step 18., Step 19.

Figure 74. Downflow furnace with top return



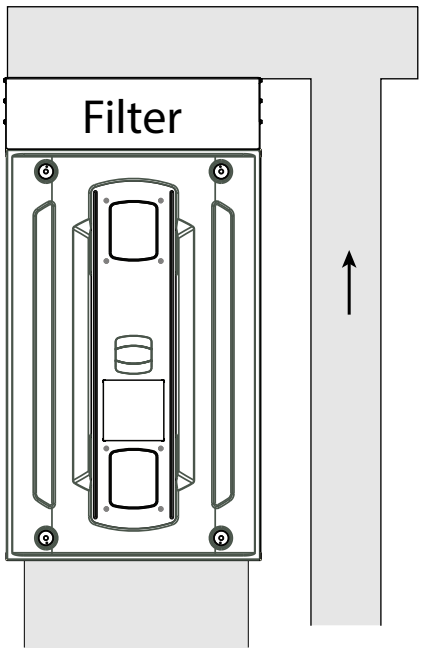
Refer to Step 20., Step 21., Step 3., Step 4.

Figure 75. Downflow furnace with top return and plenum



Refer to Step 20., Step 22., Step 3., Step 4.

Figure 76. Downflow furnace with top return and plenum with filter box



Refer to Step 20., Step 23., Step 24., Step 4.

Installation Steps

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.*

Table 36. Upflow return air filters

Furnace Width (in.)	Filter Qty and Size(in.)
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

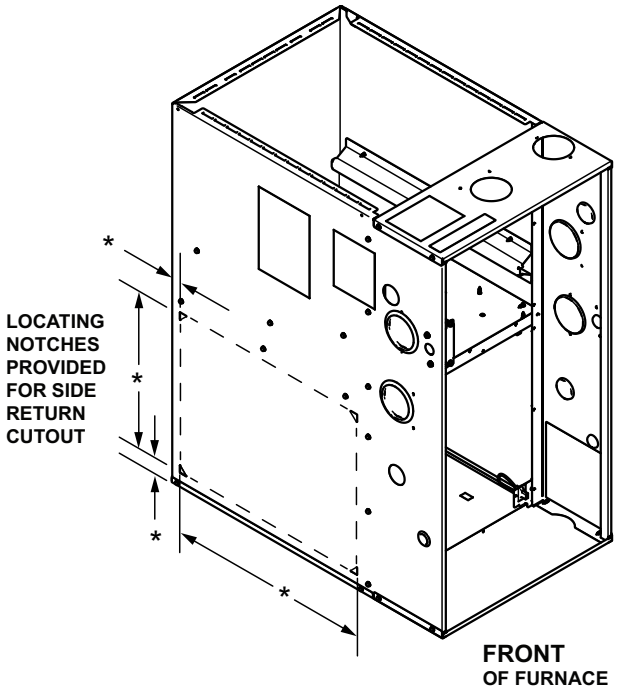
Note: *For upflow furnace models in any configuration, where the airflow requirement exceeds 1600 CFM - Furnaces will require return air openings and filters on: (1) both sides, or (2) one side and the bottom, or (3) just on the bottom.*

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.

Figure 77. Upflow furnaces only



Note: *See outline drawing.*

Return Air Filters for Furnace in Horizontal Configuration

When the furnace is installed in the horizontal configuration, the return air filters must be installed exterior to the furnace cabinet. Remote filter grilles may be used for homeowner convenience, refer to Figure 78, p. 55 or the filters may be installed in the duct work upstream of the furnace, refer to Figure 79, p. 56.

Filter kits are available for horizontal applications.

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

Figure 78. Remote filter installation

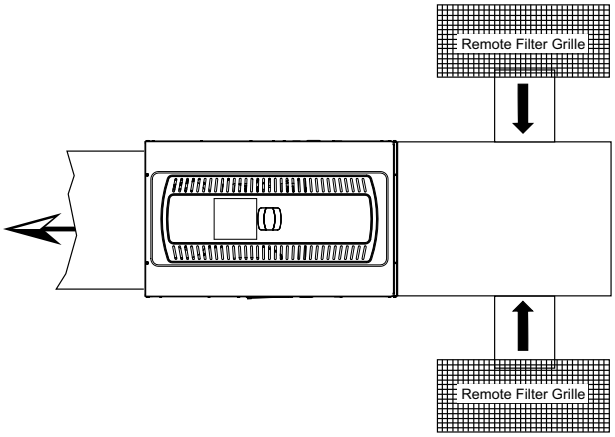
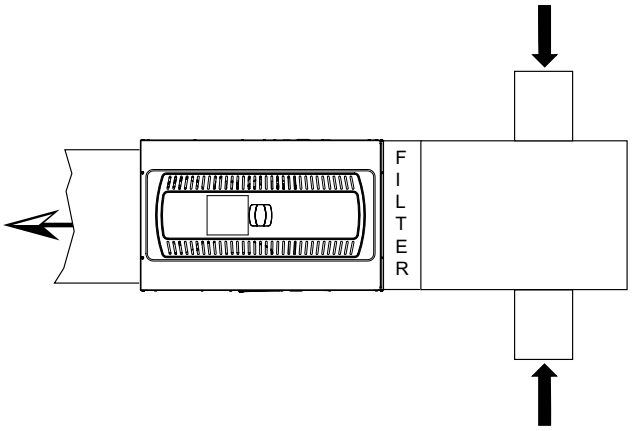


Figure 79. Duct filter installation



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.

Table 37. Downflow return air filters

Furnace Width (in.)	Filter Qty and Size (in.)
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

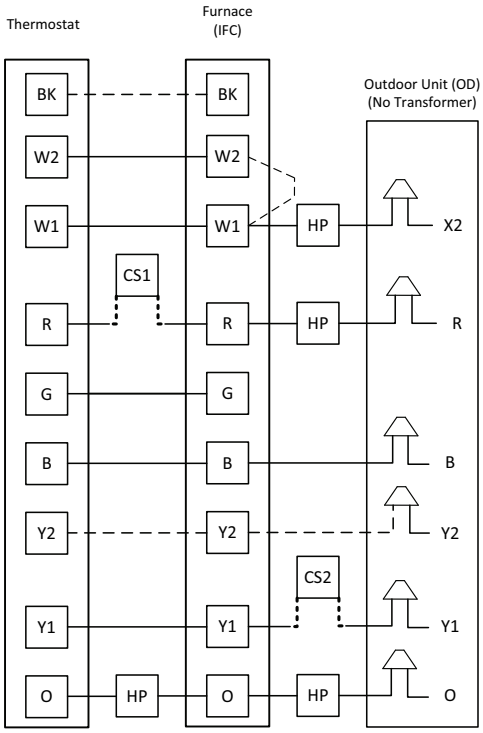
Electrical Connections

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.

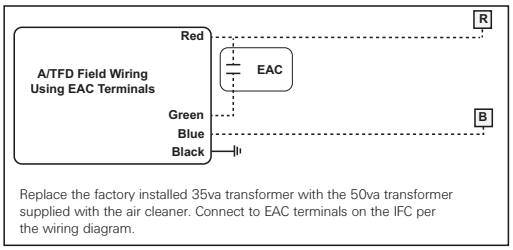
See the "Wiring Diagrams," p. 17 and unit wiring diagram attached to furnace.

Field Wiring

Figure 80. Field wiring diagram for S9V2-VS with one or two stage AC or heat pump

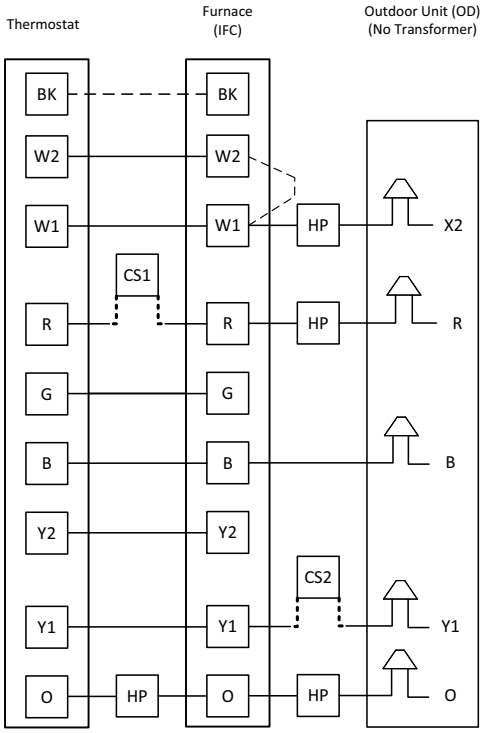


NOTES:
1) HP = Wiring used for Heat Pump System.
2) CS = wiring used for Condensate Switch (2 Options).
3) Y1 and/or Y2 must be connected from the thermostat to the IFC for proper airflow.
4) Remove Y1-O jumper for HP systems. O terminal must be connected as shown for gas heating operation during defrost.
5) If the thermostat does not have a W2, or there are not enough conductors, jumper W1 to W2 at the IFC.
6) A/TCONT824 thermostats do not require the use of X2.
7) For PWM (BK) enabled thermostats, cut the BK jumper on the IFC and connect wiring.

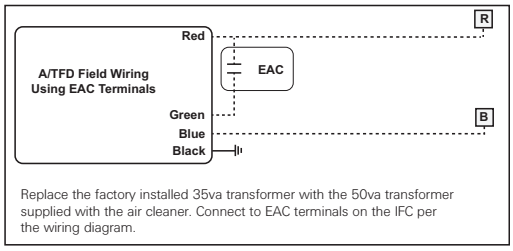


Replace the factory installed 35va transformer with the 50va transformer supplied with the air cleaner. Connect to EAC terminals on the IFC per the wiring diagram.

Figure 81. Field wiring diagram for S9V2-VS with single stage AC or heat pump with 2 stage airflow



NOTES:
1) HP = Wiring used for Heat Pump System.
2) CS = wiring used for Condensate Switch (2 Options).
3) Y1 and Y2 must be connected from the thermostat to the IFC for proper airflow.
4) Thermostat must be setup for 2 stage OD.
5) IFC Must be setup for 2 stage OD using the Menu/Option Buttons.
6) Remove Y1-O jumper for HP systems. O terminal must be connected as shown for gas heating operation during defrost.
7) If the thermostat does not have a W2, or there are not enough conductors, jumper W1 to W2 at the IFC.
8) A/TCONT824 thermostats do not require the use of X2.
9) For PWM (BK) enabled thermostats, cut the BK jumper on the IFC and connect wiring.



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.

Notes:

- *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-inch 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-inch coupling is supplied to connect to systems that are using 3/ 4-inch piping with an air conditioner coil.*
- *A corrosion resistant condensate pump must be used if a pump is required for a specific drain system.*

⚠ CAUTION

Water Damage!

Failure to follow instructions below could result in minor to moderate injury or equipment damage
Install a drain pan under the furnace to prevent 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 PlusTM 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.

Vertical Applications

Upflow furnace – Remove the plug from the side panel where the condensate will exit. Install the condensate grommet in to the side panel. Install the connection tubing from the trap to the side of the unit and trim all excess tubing to avoid kinks.

Note: *For easiest installation, remove the spring clip from the end of the condensate line and feed through the grommet.*

Important: *Condensate grommet must be installed for proper operation.*

Figure 82. Upflow furnace with left side drain

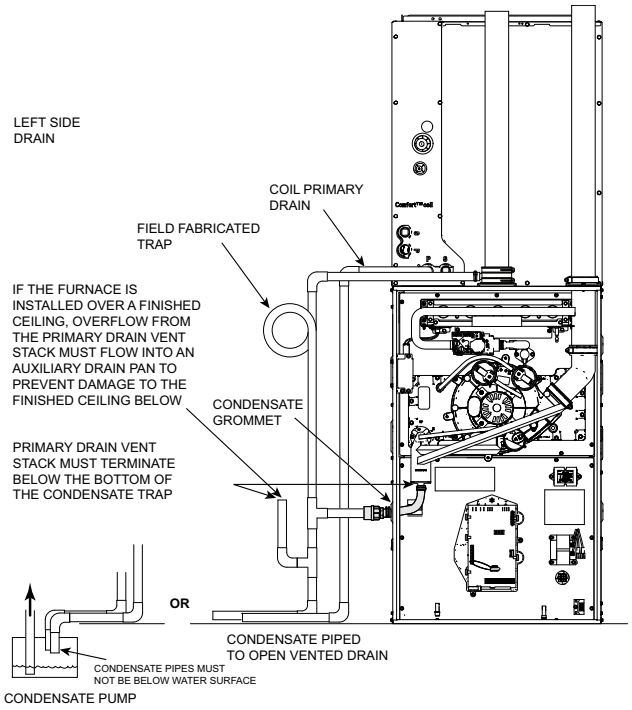
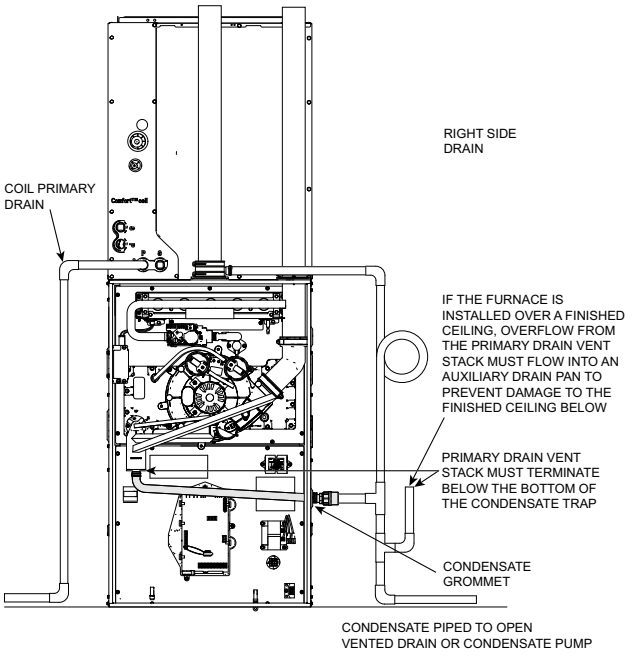
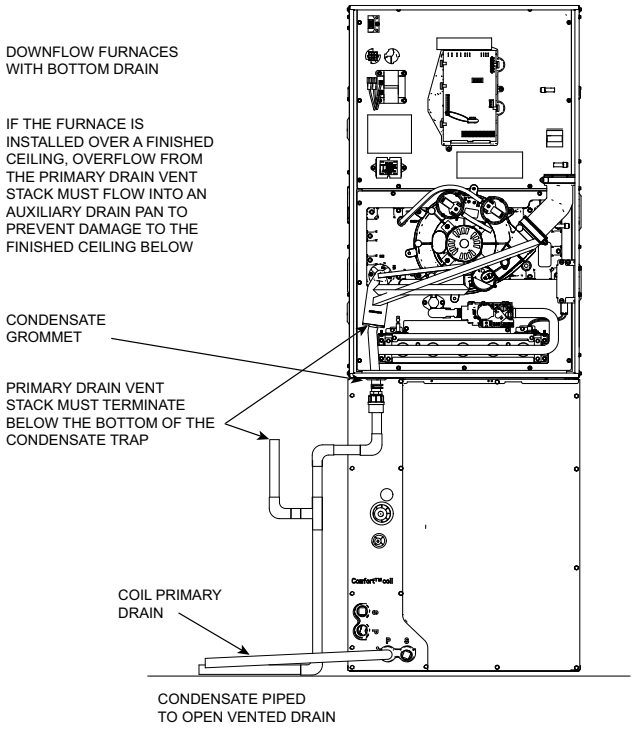


Figure 83. Upflow furnace with right side drain



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.

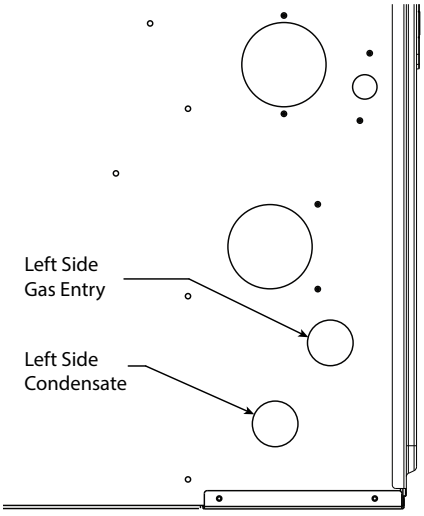
Figure 84. Downflow furnaces with bottom drain



Downflow furnace with left side condensate

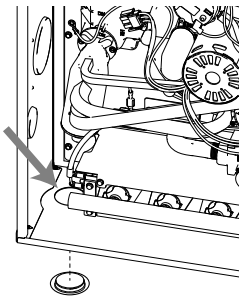
1. Remove left hand condensate plug.
2. Install into bottom cross member.

Figure 85. Downflow furnace with left side condensate



3. Plug the bottom hole with plug provided in document pack.
4. Follow the same step for right side condensate.

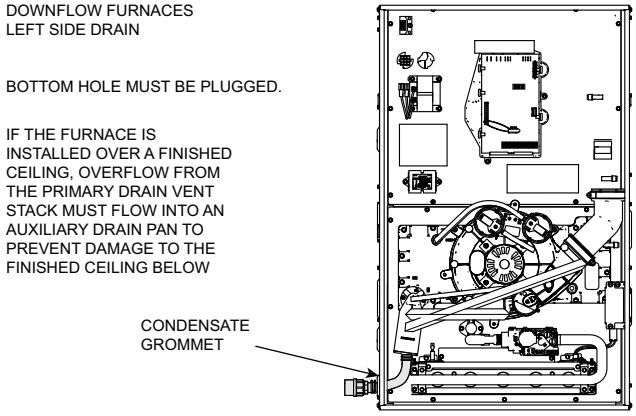
Figure 86. Downflow furnace with right side condensate — plug installation



Attaching the condensate drain line

1. Locate the condensate grommet and the condensate drain line assembly in the doc pack.
2. Insert the condensate grommet in the 1–5/8-inch hole in the side of the cabinet.
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.
4. Cut off the excess tube and reinstall the end fitting to the drain hose.

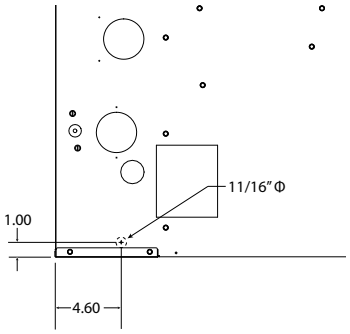
Figure 87. Downflow furnaces with left side drain



Downflow furnace with right side condensate

Drill an 11/16-inch diameter hole in the right side of the case (see dimensions). Plug the bottom hole with plug provided in the bottom pack. Refer Figure 86, p. 60.

Figure 88. Downflow furnace with right side condensate



Attaching the condensate drain line.

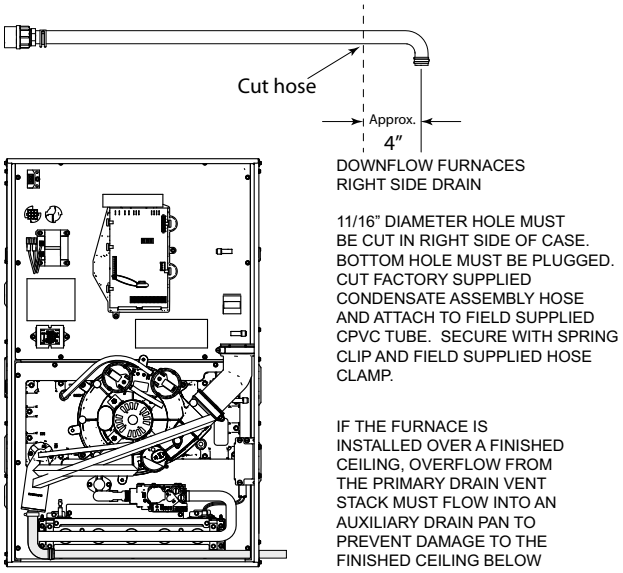
1. Locate the condensate drain line assembly in the doc pack.

Important: *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.*

2. Cut the condensate drain line assembly as shown.
3. Use a field supplied hose clamp to secure the condensate drain line to the condensate trap.
4. Insert a field supplied piece of 1/2-inch CPVC pipe though the 11/16-inch hole drilled through the cabinet and insert into drain line hose. Secure with the spring clip.

Note: *Seal around the condensate drain tubing where it exits the cabinet.*

Figure 89. Downflow furnaces with right side drain



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).

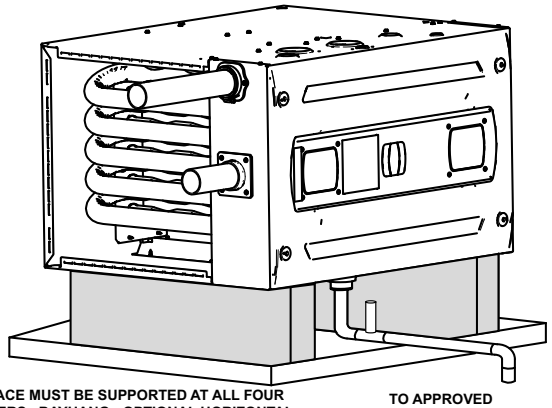
Connections must be made to an open/vented drain. Outdoor draining of the furnace and coil condensate is permissible if allowed by local codes. Caution should be taken to prevent drains from freezing or causing slippery conditions that could lead to personal injury. Excessive draining of condensate may cause saturated ground conditions that may result in damage to plants.

Notes:

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

Figure 90. Horizontal applications



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.

- The overflow stand pipe termination must be even with or slightly below than the bottom of the condensate trap.
- Water from the overflow pipe must drain into the emergency drain pan.
- It is recommended to use the secondary drain. The secondary drain pipe must terminate over the emergency drain pan.
- Emergency drain pan.

NOTICE

Equipment Damage!

Failure to follow instructions below could result in intermittent or improper operation, or equipment damage.

A blocked main drain with an overflow standpipe that is higher than the bottom of the condensate trap can result in an E09 Condensate Pressure Switch Trip error. Additionally, a condensate pressure switch hose that is not trimmed to fit can also cause this error. In extreme cases, these issues can lead to an E04 Rollout Thermal Limit Trip error.

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

Figure 91. Horizontal right

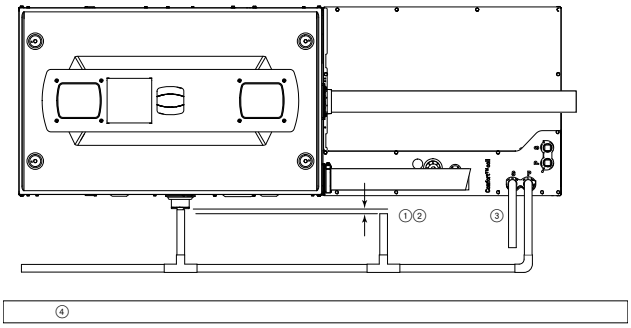
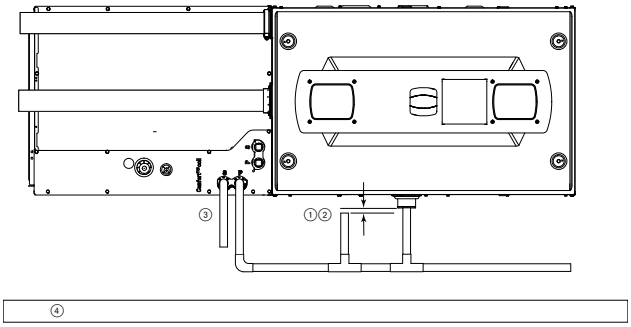


Figure 92. Horizontal left



General Start-up and Adjustment

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

Preliminary Inspections

With gas and electrical power "OFF", confirm:

1. Duct connections are properly sealed.
2. Filters are in place.
3. Venting is properly assembled.
4. Blower vestibule panel and all screws are in place.

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

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.

Lighting Instructions

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

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

⚠ WARNING

Risk of Fire or Explosion!

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

To shut off

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

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

⚠ CAUTION

Freeze Damage!

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

Furnace Combustion Air Exhaust Options

Important:

- *All plugs must be in place for sealed combustion.*
- *If the locations are changed from the defaults, the default holes not being used must be plugged.*
- *The combustion air exhaust must be vented to the outdoors.*

Notes:

- *For electric and natural gas connections, default is left side . For the combustion air inlet and exhaust, default is top of the furnace.*
- *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.*
- *The grommets are different for the natural gas and condensate connections.*
- *The combustion air inlet does not have to be on the same side as the combustion air exhaust.*
- *Right side combustion air entry is allowed in upflow applications.*

Refer to the illustrations below to find the approved venting options for upflow and horizontal left furnace applications.

Note: *Choose any combination such that it must have one inlet and one outlet.*

Figure 93. Upflow application

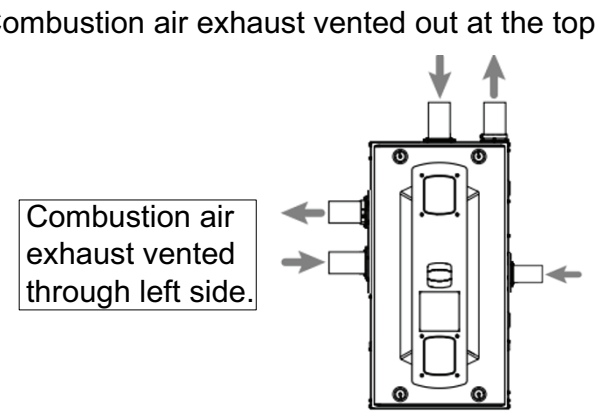


Figure 94. Horizontal left application

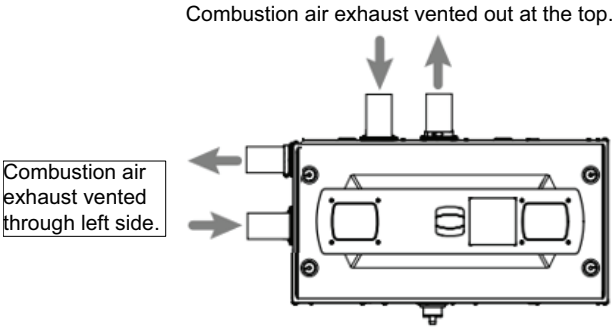


Figure 95. Horizontal right application

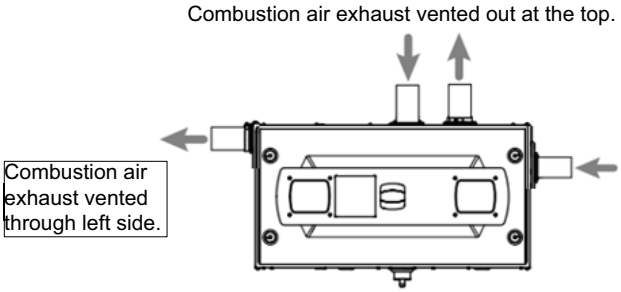
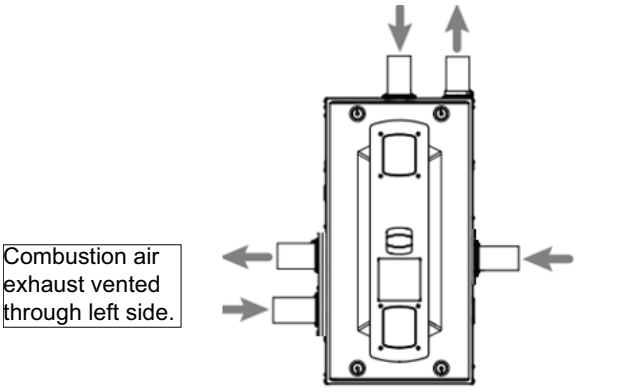


Figure 96. Downflow application



Factory Set Up - Upflow and Downflow Orientation

Figure 97. Upflow, horizontal left, and horizontal right orientations

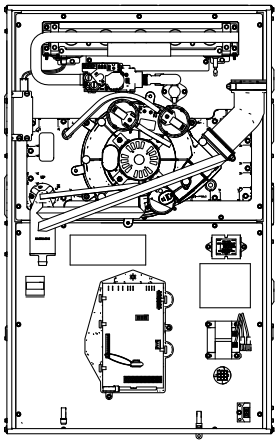


Figure 98. Downflow orientation

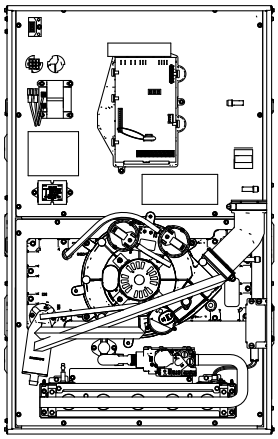


Figure 99. Grommet trap for horizontal left and right application

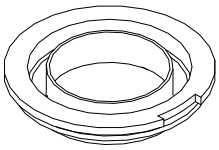


Figure 100. Conversion instructions

Conversion Instructions

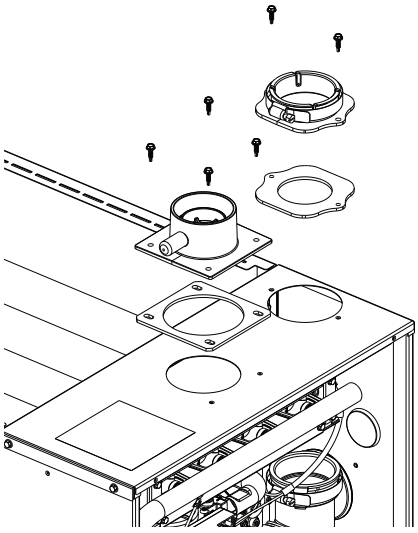
Upflow Furnace in Upflow Position - Top Vented Combustion Air

Important:

- *Trim the condensate pressure switch tubing to length to ensure there is no sag or trap created.*
- *Refer to the image at the initial part of this section to see the furnace as seen from the factory.*

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

Figure 101. Vent inlet/outlet



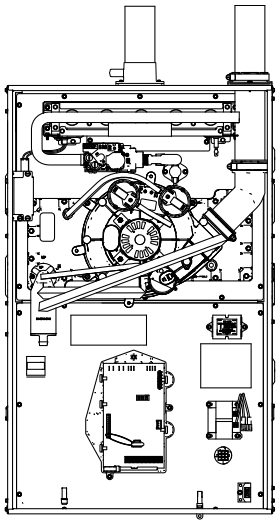
4. Slide PVC pipe through vent outlet adaptor and insert into inducer outlet.
5. Twist to ensure PVC is fully inserted.
6. Tighten the clamp on the end of the 45° elbow.
7. Tighten the clamp on the outlet vent adapter.

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. CPL00938 – 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.*

Figure 102. Upflow furnace in upflow position



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.

Important:

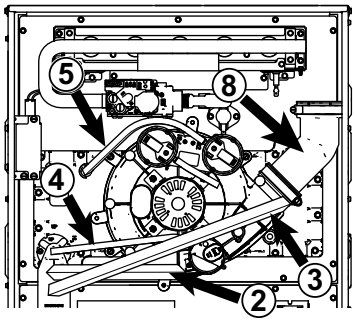
- *Refer to the image at the initial part of this section to see the furnace as seen from the factory.*
- *Right side vent outlet is not allowed because condensate will not drain.*

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. 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.

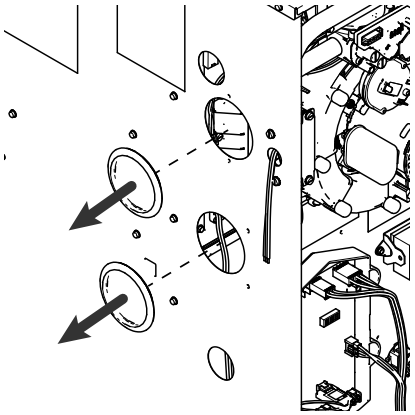
Figure 103. Removing tubing



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.

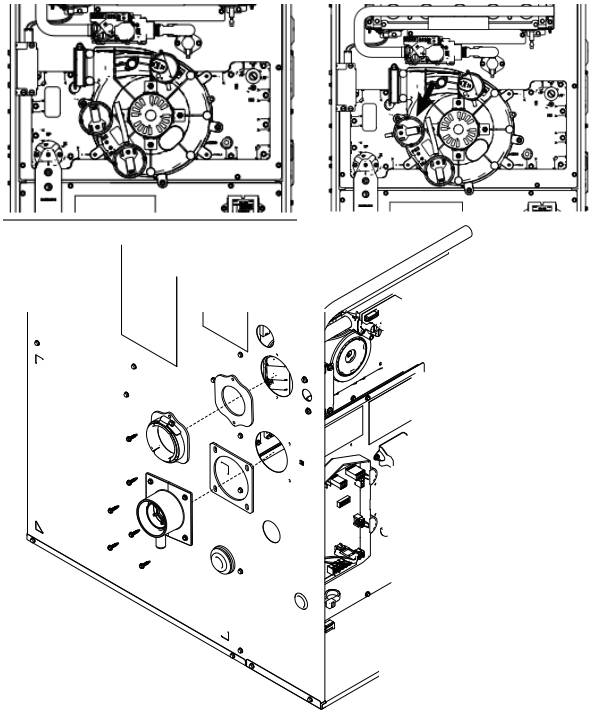
Figure 104. Plug installation



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. 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° clockwise and reattach.
14. Reattach the pressure switch bracket assembly.
15. Attach the vent outlet gasket to the vent outlet.
16. Install vent outlet to top of cabinet using two screws supplied in the dock pack.
17. Install vent inlet gasket and vent inlet using four 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 ensure PVC is fully inserted

Figure 105. PVC pipe installation



21. Tighten the two clamps.
22. Install the combustion air inlet pipe.

Notes:

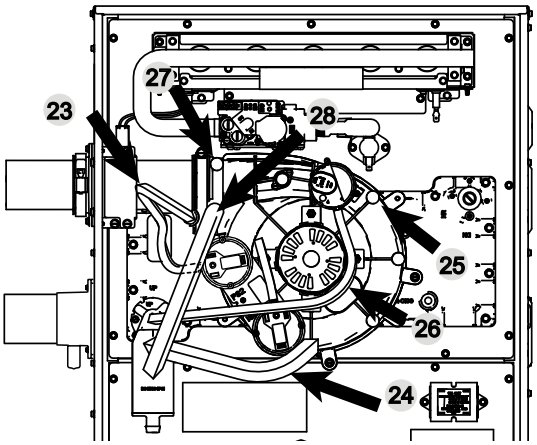
- *The vent outlet adapter is used for strain relief against the weight of the venting. The clamp should be tightened after the internal connection is made.*
- *If required, transition to larger venting within 2" of the cabinet. An 2" x 3" offset coupling is required if the transition is made in a horizontal plane. Use coupling CPL00938 (Canadian applications may use BAYREDUCE to meet ULCS636 requirements.) See Horizontal Venting section for proper orientation of 2" x 3" offset coupling.*

23. Connect PS2 tubing to switch and sensing location.
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.

Figure 106. Condensate tubing



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.

Important: *See the initial part of this section to refer to images of the furnace as seen from the factory.*

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

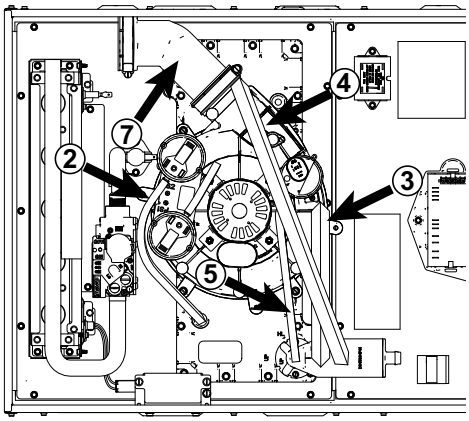
1. Remove all drain hoses from condensate trap. Removing the trap before the hoses is also an option.

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

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.

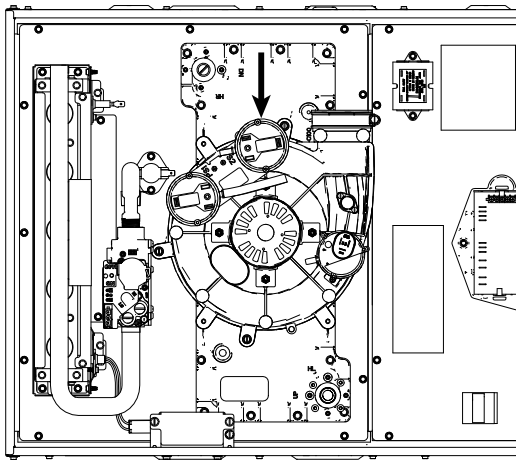
Note: *There is a plastic adapter with O-rings located inside the cold header that is held in place by the condensate trap bracket. Do not lose this adapter. This adapter needs to be in place when the condensate trap bracket is reattached.*

Figure 107. Removing tubing



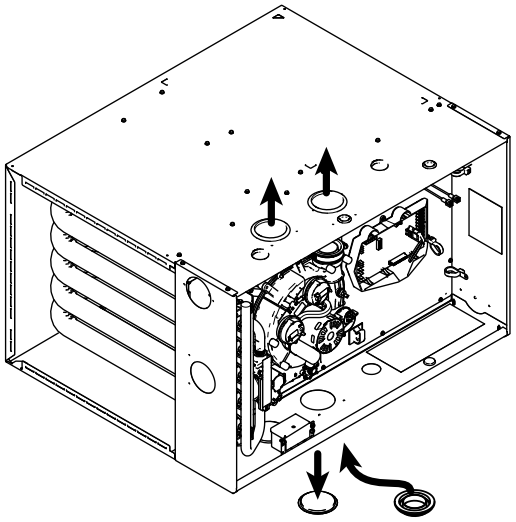
7. Loosen the clamp holding the 45° elbow. Remove the elbow and discard.
8. Remove three inducer screws.
9. Rotate the inducer so that the outlet is pointing vertically.
10. Use the three screws to reattach the inducer to the cold header to 30 in.-lbs. Do not overtighten.

Figure 108. Inducer positioning



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.

Figure 109. Sealing default openings



15. Slide PVC through vent outlet adaptor and insert into inducer outlet.
16. Twist to ensure PVC is fully inserted.
17. Tighten the two clamps.
18. Install the combustion air inlet PVC pipe.

Notes:

- *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.*
- *If required, transition to larger venting within 2' of the cabinet. CPL00938 – 2" x 3" offset coupling may be used and is factory supplied with 120 MBTUH furnaces. Canadian applications may use BAYREDUCE to meet ULCS636 requirements.*

Condensate Trap Installation

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

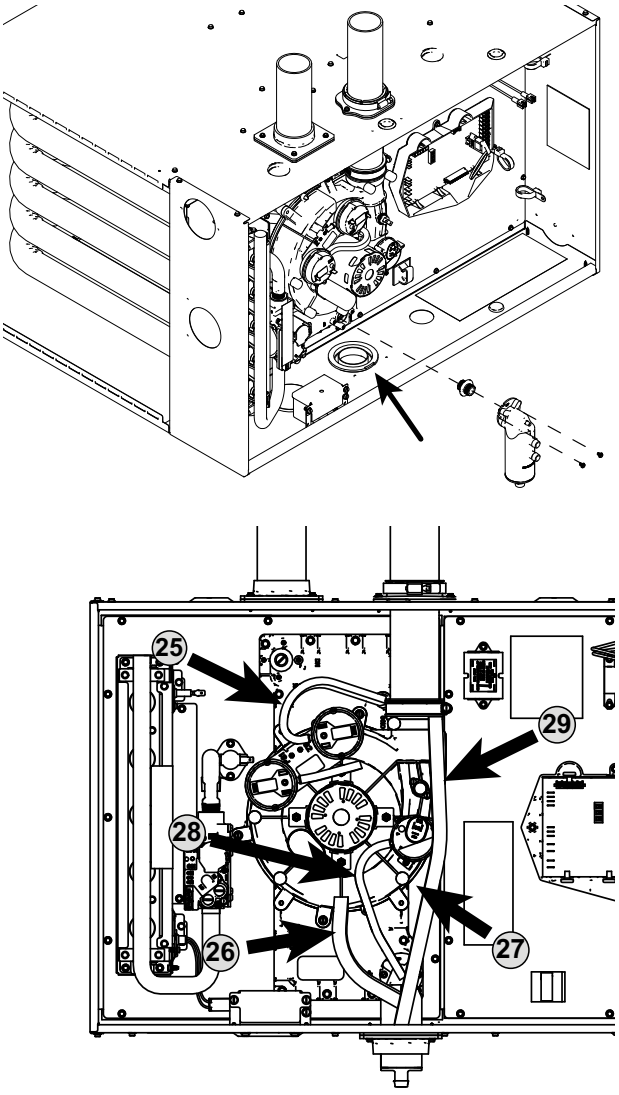
Important: *The condensate adapter must be present for proper condensate drain operation.*

20. Install condensate trap into new location by fitting into grommet and aligning the hole on the condensate trap with the hole labelled “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.*

21. Hand tighten screws

Figure 110. Tightening screws



22. 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.
23. 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.
24. Install previously removed port cap onto bottom port of the inducer.
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. 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 are needed for hose routing, condensate trap orientation, and inducer port caps only.

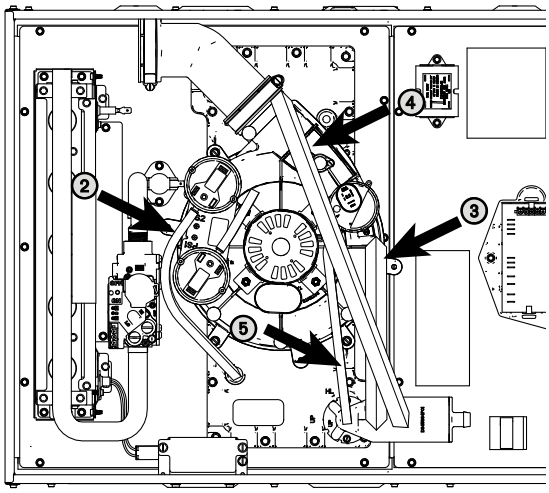
Important: *Refer to the image at the initial part of this section to see the furnace as seen from the factory.*

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

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.

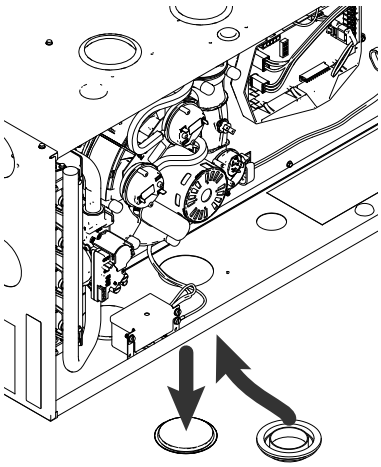
Note: *There is a plastic adapter with O-rings located inside the cold header that is held in place by the condensate trap bracket. Do not lose this adapter. This adapter needs to be in place when the condensate trap bracket is reattached.*

Figure 111. Removing tubing



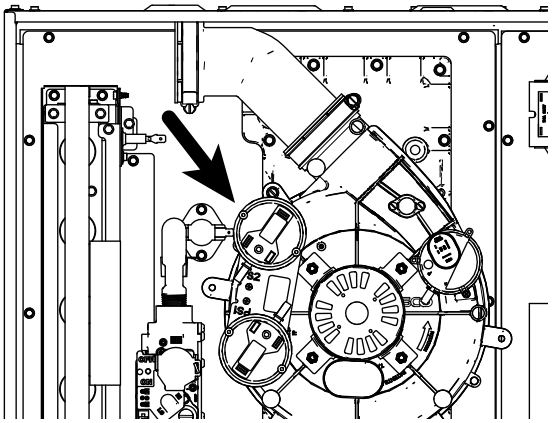
7. Remove plug from 3” hole.
8. Install condensate trap grommet.

Figure 112. Condensate trap grommet



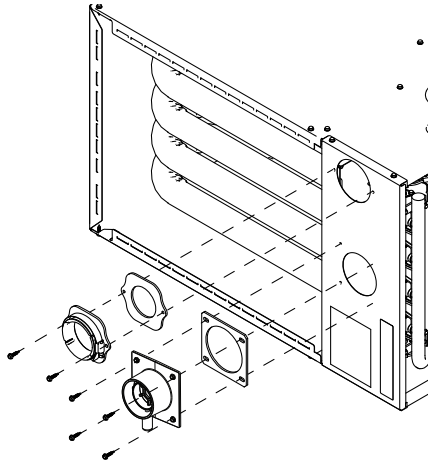
9. Remove the pressure switch bracket assembly.
10. Remove the screw that holds PS2, rotate 90 degrees clockwise, and reattach.
11. Reattach the pressure switch bracket assembly.

Figure 113. Pressure switch



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

Figure 114. Vent inlet/outlet



15. Slide PVC through vent outlet adaptor and insert into inducer outlet.
16. Twist to ensure PVC is fully inserted.
17. Tighten the two clamps.
18. Install the combustion air inlet PVC pipe.

Notes:

- *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.*
- *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 CPL00938 (Canadian applications may use BAYREDUCE to meet ULCS636 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.

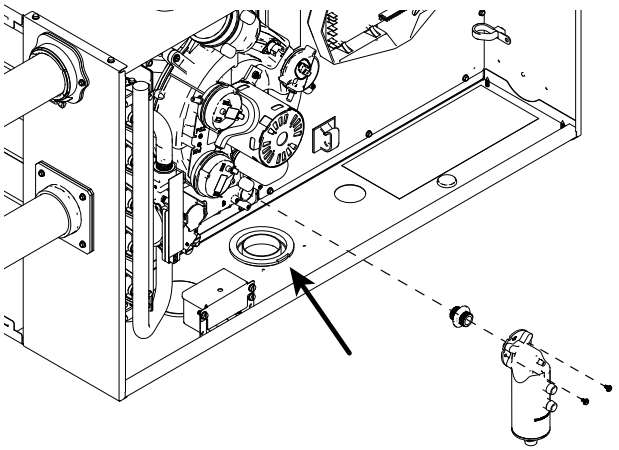
Important: *The condensate adapter must be present for proper condensate drain operation.*

20. Install condensate trap into new location by fitting into grommet and aligning the hole on the condensate trap with the hole labelled “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 right. This allows the rain gutter tubing to fully seat onto the lower condensate port trap.*

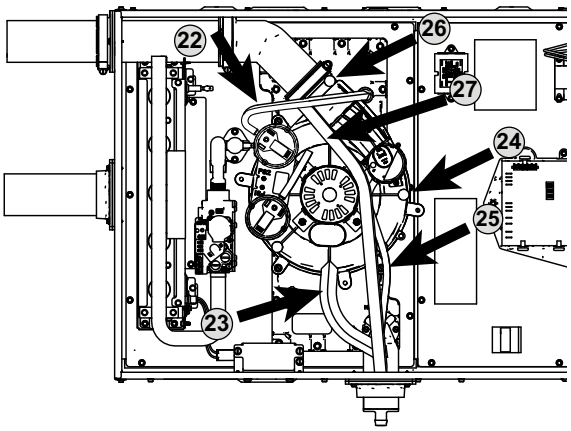
21. Hand tighten screws.

Figure 115. Tightening 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.

Figure 116. Condensate tubing



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.

Important: *Refer to the image at the initial part of this section to see the furnace as seen from the factory.*

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

1. Remove all drain hoses from condensate trap.

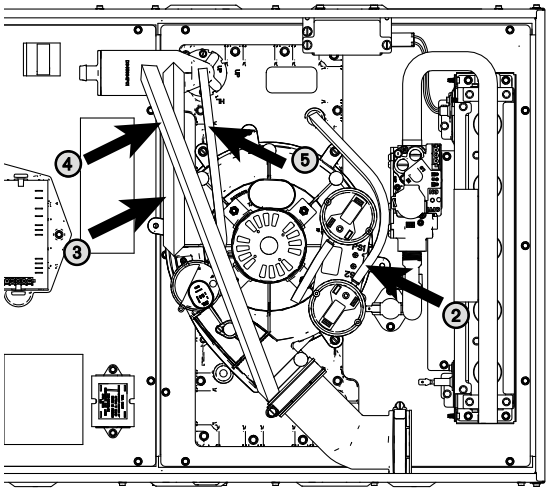
Note: *When removing condensate hoses from the condensate trap, hold the trap with your hand to prevent the trap from breaking. Removing the trap before the hoses is also an option.*

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.

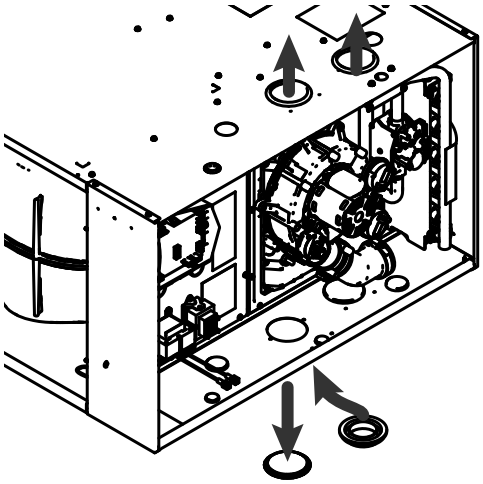
Note: *The plastic adapter with O-rings located inside the cold header that is held in place by the condensate trap bracket. Do not lose this adapter. This adapter needs to be in place when the condensate trap bracket is reattached.*

Figure 117. Removing tubing



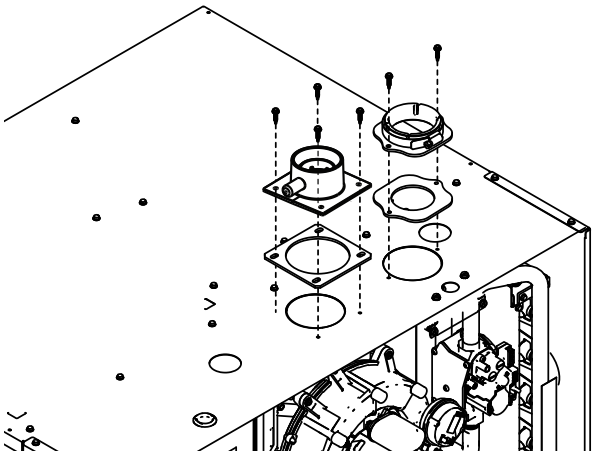
8. Remove 3” plug on right side of unit. To be used for condensate trap.
9. Install condensate trap grommet.
10. Remove two 3” plugs on left side of cabinet.
11. Reuse the two 3” plugs to seal the two 3” default openings on the top of the cabinet.

Figure 118. Sealing default openings



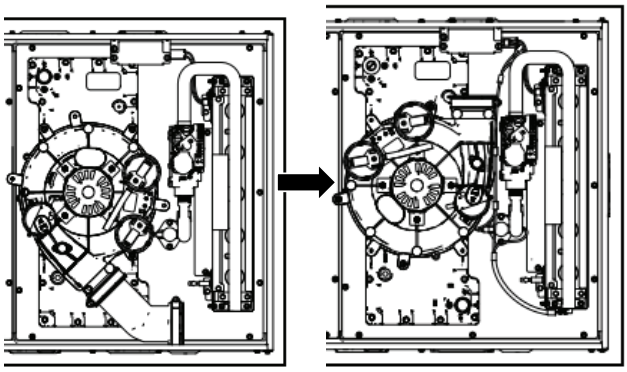
12. Attach the vent outlet gasket to the vent outlet.
13. Install vent outlet to top of cabinet using two screws supplied in the doc pack.
14. Install vent inlet gasket and vent inlet using four screws supplied in the doc pack.

Figure 119. Vent inlet/outlet



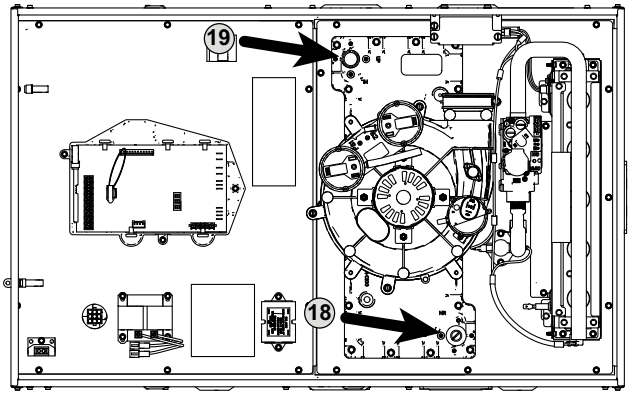
15. Remove three inducer screws.
16. Rotate the inducer so that the outlet is pointing vertically.
17. Use the three inducer screws to reattach the inducer to the cold header. Torque to 30 in.-lbs. Do not overtighten.

Figure 120. Inducer positioning



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.

Figure 121. Condensate drain plug



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

Notes:

- *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.*
- *If required, transition to larger venting within 2" of the cabinet. CPL00938 — 2" x 3" offset coupling may be used and is factory supplied with 120 MBTUH furnaces. Canadian applications may use BAYREDUCE to meet ULCS636 requirements.*

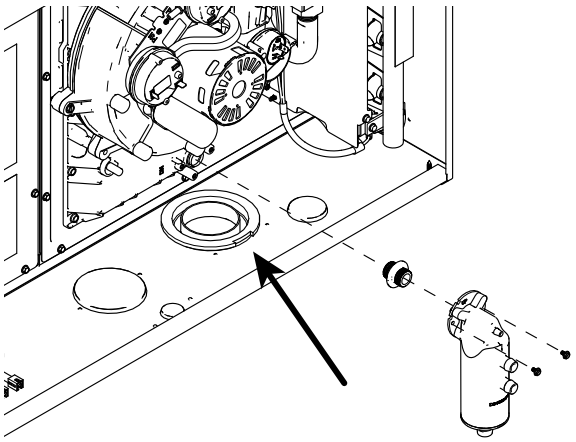
Condensate Trap Installation

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 labelled 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 right. This allows the rain gutter tubing to fully seat onto the lower condensate port trap.*

26. Hand tighten screw.

Figure 122. Tightening screws

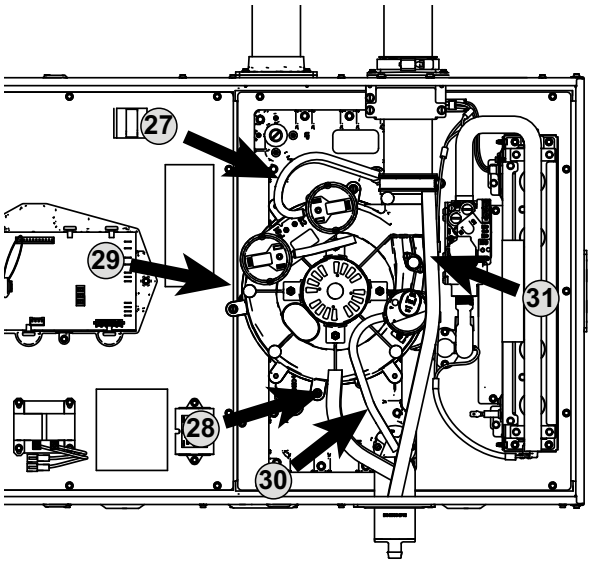


27. Connect PS2 tubing to switch and new sensing location. Important: Trim the condensate pressure switch tubing to length to ensure there is no sag or trap created.
28. Remove port cap on the right side of the inducer and connect inducer condensate tubing. Connect other end of inducer condensate tubing 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.

Figure 123. Condensate tubing



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

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.

Important: *Refer to the image at the initial part of this section to see the furnace as seen from the factory.*

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

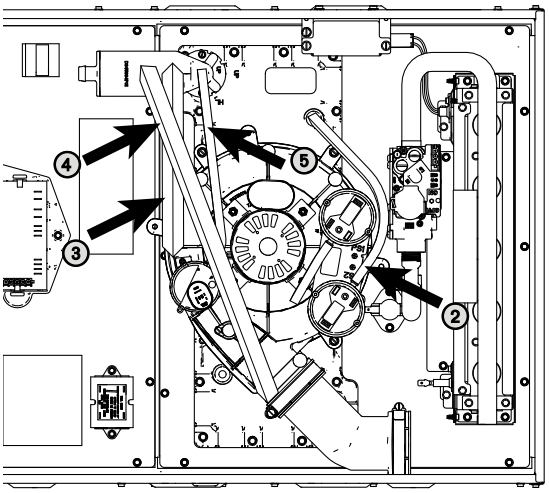
1. Remove all drain hoses from condensate trap.

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.

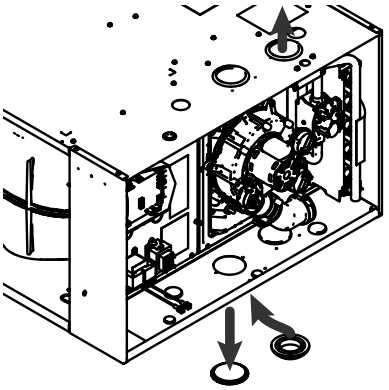
Note: *The plastic condensate adapter with Orings located inside the cold header that is held in place by the condensate trap bracket. Do not lose this adapter. The condensate adapter needs to be in place when the condensate trap bracket is reattached.*

Figure 124. Removing tubing



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.

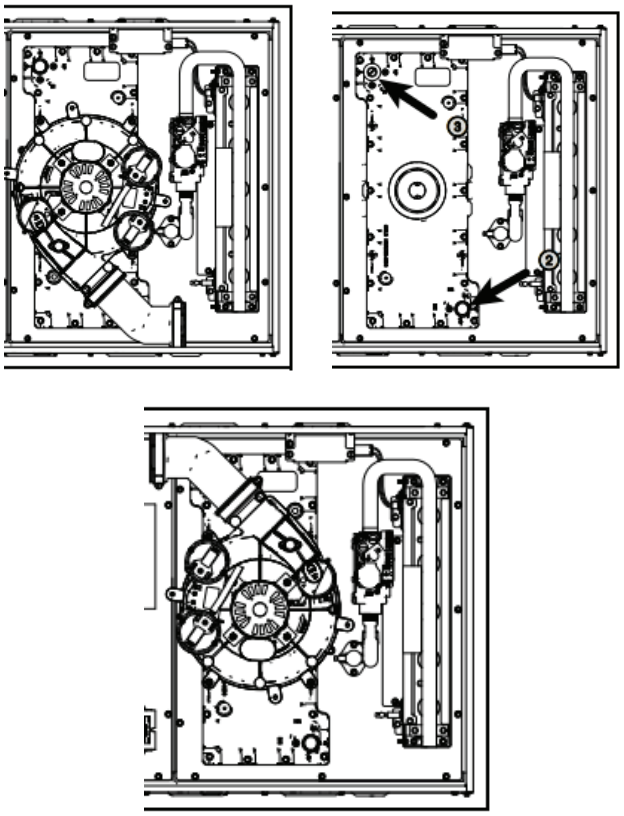
Figure 125. Sealing default openings



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° to point the elbow 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.

Figure 126. Inducer positioning

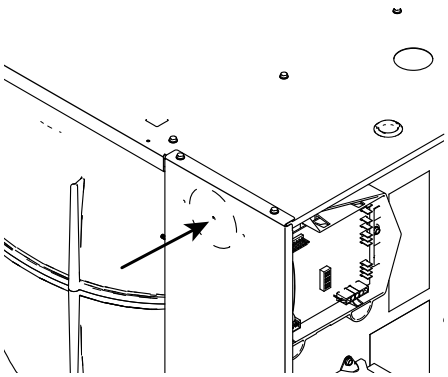


17. Remove the pressure switch bracket assembly.
18. Remove the screw that holds PS2, rotate 90 degrees clockwise, and reattach.
19. Reattach the pressure switch bracket assembly.

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

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

Figure 127. Bottom panel

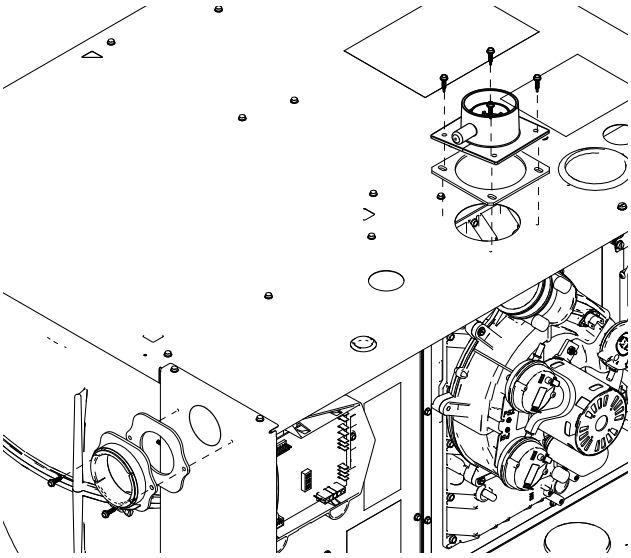


21. Attach the vent outlet gasket to the vent outlet.
22. Install vent outlet to top of cabinet using two screws supplied in the doc pack.
23. Install vent inlet gasket and vent inlet using four screws supplied in the doc pack.

Notes:

- *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.*
- *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 CPL00938 (Canadian applications may use BAYREDUCE to meet ULCS636 requirements.) See Horizontal Venting section for proper orientation of 2” x 3” offset coupling.*

Figure 128. Vent inlet/outlet



24. Slide PVC through vent outlet adaptor and insert into inducer outlet.
25. Twist to ensure 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.

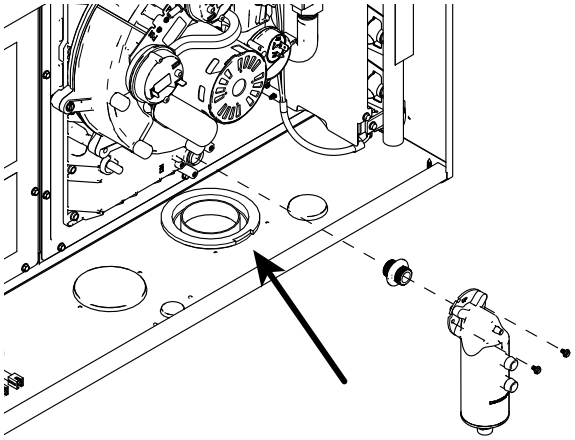
Important: *The condensate adapter must be present for proper condensate drain operation.*

29. Install condensate trap into new location by fitting into grommet and aligning the hole on the condensate trap with the hole labelled “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.*

30. Hand tighten screw.

Figure 129. Tightening screws



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

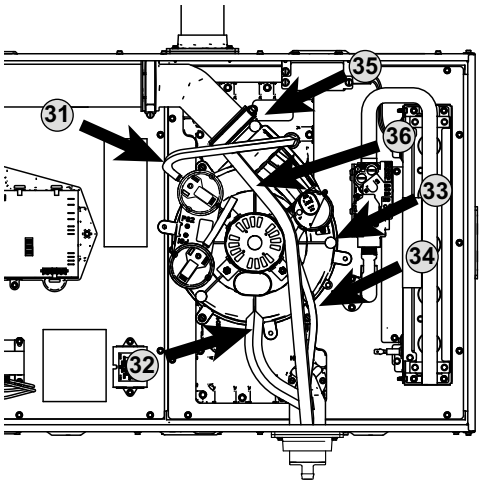
Important: *Trim the condensate pressure switch tubing to length to ensure there is no sag or trap created.*

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.

Figure 130. Condensate tubing



Downflow Furnace - Top Vented Combustion Air

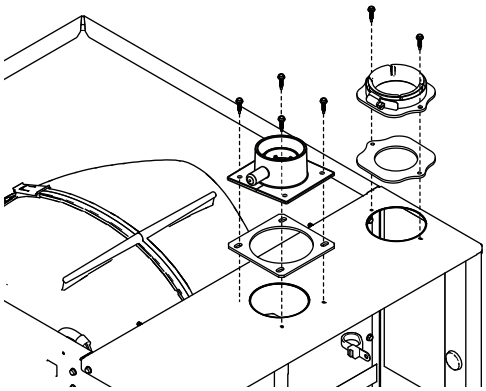
No changes need to be made to the inducer when installing the downflow furnace with the combustion air vented through the top.

Important:

- *Refer to the image at the initial part of this section to see the furnace as seen from the factory.*
- *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 two screws supplied in the doc pack.
3. Install vent inlet gasket and vent inlet using four screws supplied in the doc pack.

Figure 131. Vent inlet/outlet



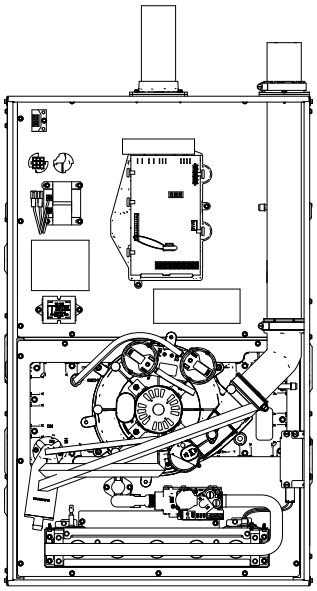
4. Slide PVC pipe through vent outlet adaptor and insert into inducer outlet.

5. Twist to ensure PVC is fully inserted.
6. Tighten the two clamps.
7. Install the combustion air inlet PVC pipe.

Notes:

- *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.*
- *If required, transition to larger venting within 2" of the cabinet. CPL00938 – 2" x 3" offset coupling may be used and is factory supplied with 120 MBTUH furnaces. Canadian applications may use BAYREDUCE to meet ULCS636 requirements.*

Figure 132. PVC pipe installation



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.

Important:

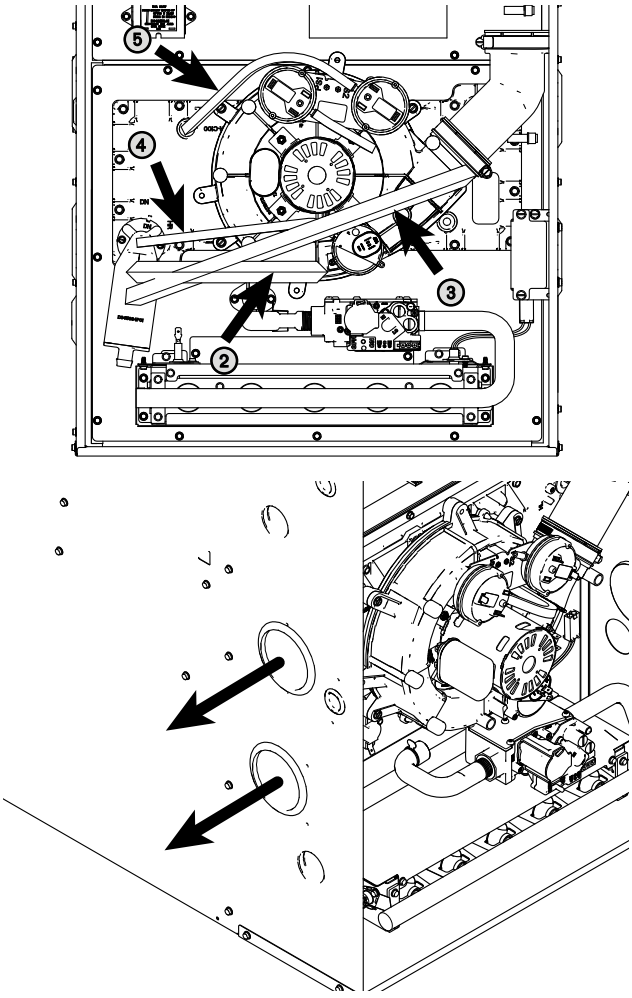
- *Refer to the image at the initial part of this section to see the furnace as seen from the factory.*
- *Right side vent outlet is not allowed because condensate will not drain.*

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.*

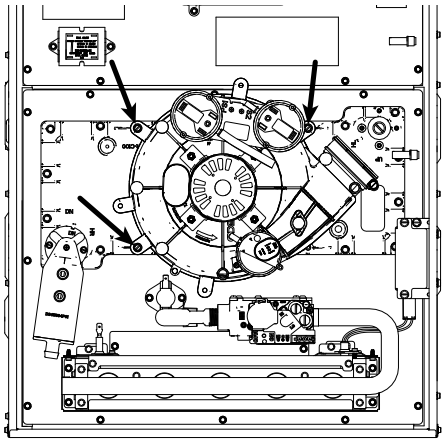
2. Remove drain tubing from bottom of inducer housing.
3. Remove rain gutter tubing from inducer outlet.
4. Remove tubing from condensate pressure switch.
5. Remove tubing from PS2 to cold header.
6. Remove two 3” plugs on left side of cabinet. To be used for combustion air exhaust and inlet.
7. Reuse the two 3” plugs to seal the two 3” default openings on the top of the cabinet.

Figure 133. Removing tubing



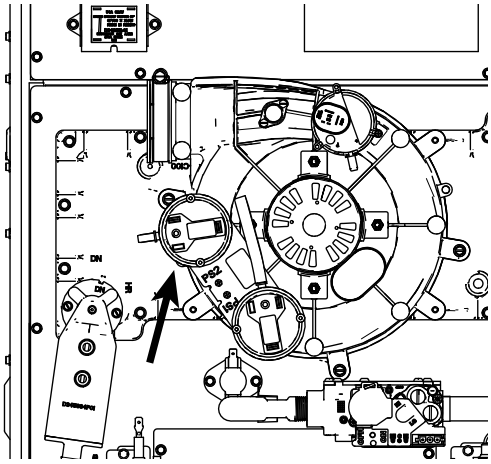
8. Loosen the clamp holding the 45° elbow. Remove the elbow and discard.
9. Remove the three inducer mounting screws.
10. Rotate inducer counterclockwise so that the inducer outlet aligns with the exhaust vent outlet.
11. Reinsert and tighten screws to 30 in.-lbs. Do not overtighten.

Figure 134. Tightening screws



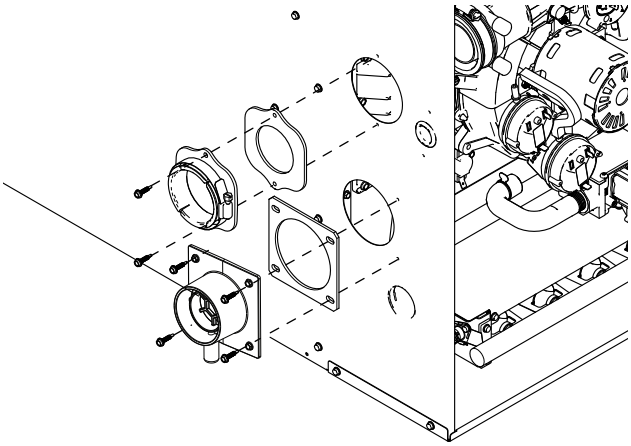
12. Remove the pressure switch bracket assembly.
13. Remove the screw that holds PS2, rotate 90° counterclockwise and reattach.
14. Reattach the pressure switch bracket assembly.

Figure 135. Pressure switch



15. Attach the vent outlet gasket to the vent outlet.
16. Install vent outlet to cabinet using two screws supplied in the doc pack.
17. Install vent inlet gasket and vent inlet using four 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.

Figure 136. Grommet installation



19. Slide PVC through vent outlet adaptor and insert into inducer outlet.
20. Twist to ensure PVC is fully inserted.
21. Tighten the two clamps.
22. 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.*

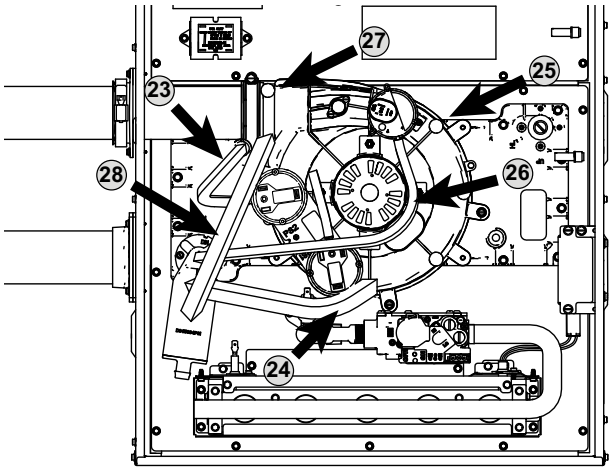
Note: *If required, transition to larger venting within 2" of the cabinet. An 2" x 3" offset coupling is required if the transition is made in a horizontal plane. Use coupling CPL00938 (Canadian applications may use BAYREDUCE to meet ULCS636 requirements.) See Horizontal Venting section for proper orientation 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.

Figure 137. Condensate tubing



Integrated Furnace Control Menu

Figure 138. Control system menu

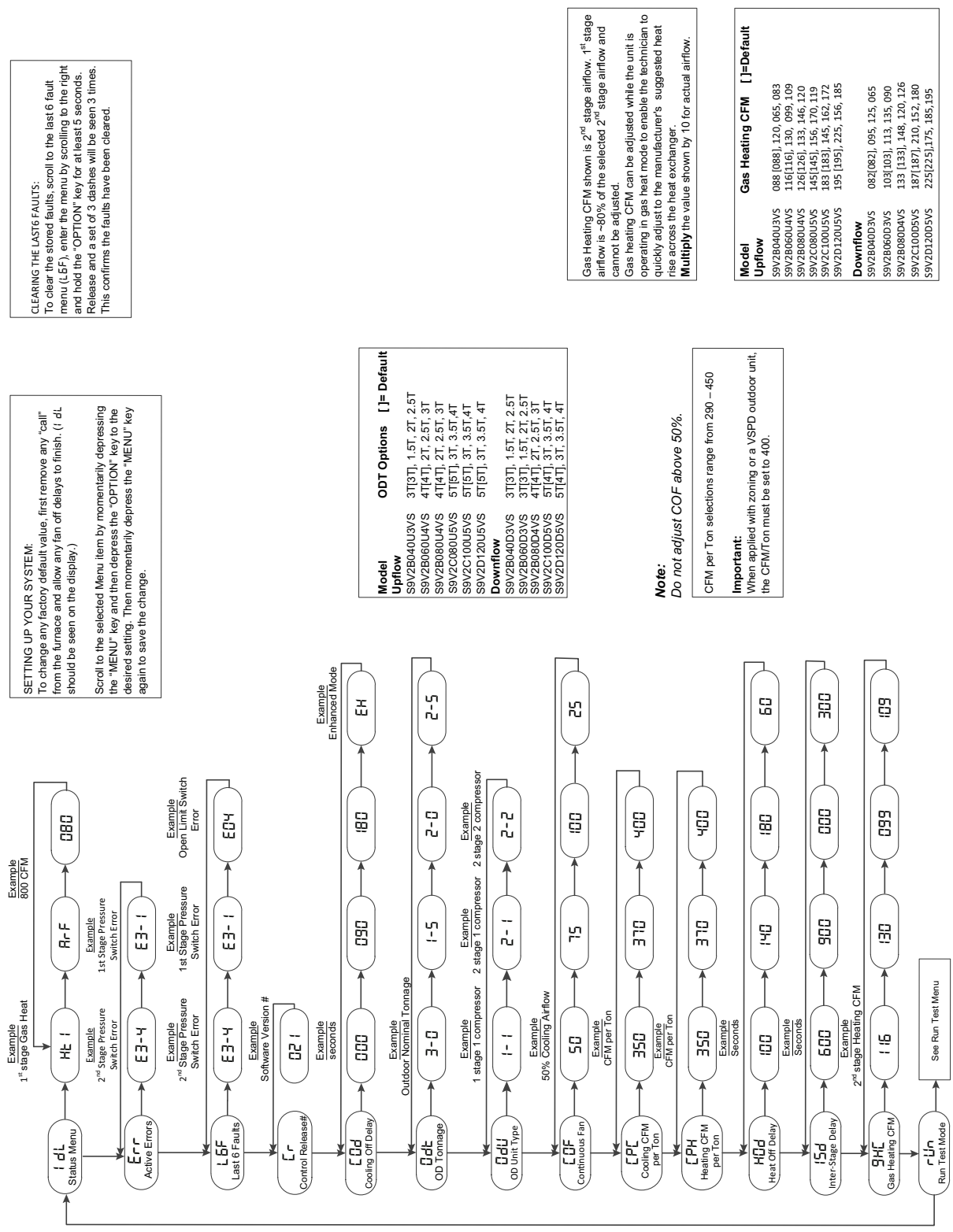
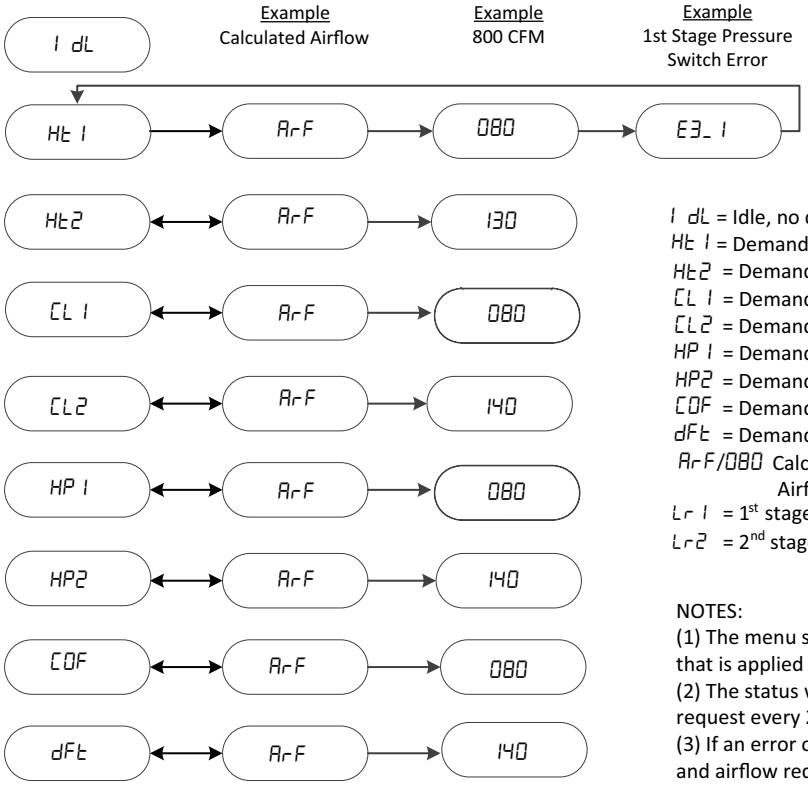


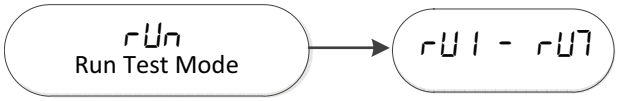
Figure 139. System status example



I dL = Idle, no demand for cooling, heating, or fan
Ht 1 = Demand for 1st stage gas heat
Ht2 = Demand for 2nd stage gas heat
CL 1 = Demand for 1st stage cooling
CL2 = Demand for 2nd stage cooling
HP 1 = Demand for 1st stage heat pump
HP2 = Demand for 2nd stage heat pump
COF = Demand for continuous fan
dFt = Demand for outdoor unit defrost, furnace running in gas heat mode
ArF/080 Calculated airflow is 800 CFM.
Airflow display is rounded down to the nearest 10 cfm
Lr 1 = 1st stage gas heat learning routine
Lr2 = 2nd 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

Figure 140. Segment menu



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 1st stage for 30 seconds
rU2 – Turns on the inducer on 2nd 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 1st stage gas heat speed for 10 seconds
rU7 – Turns on the circulating blower on 2nd 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.

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).*

Integrated Furnace Control Display Codes

Table 38. IFC display codes

2 Stage Inducer with ECM Blower Motor	
IdL	Idle
Ht1	First Stage Gas Heating
Lr1	First Stage Gas Heat Learning Routine
Ht2	Second Stage Heating
Lr2	Second Stage Gas Heat Learning Routine
ArF	Calculated Airflow (Followed by Airflow times 10)
COF	Continuous Fan
CL1	First Stage Cooling
CL2	Second Stage Cooling
HP1	First Stage Heat Pump
HP2	Second Stage Heat Pump
dFt	Defrost Mode
Menu Options	
Err	Active Alarm Menu
LbF	Last 6 Faults (To clear — Hold Option button down for 5 seconds)
Cr	Control Release Number
COd	Cooling Off Delay (Seconds)
Odt	Outdoor Tonnage
OdU	Outdoor Unit
COF	Blower Constant Fan Airflow Multiplier (Percentage)
CPC	Cooling (CFM/Ton)
CPH	Heat Pump Heating (CFM/Ton)
Hod	Heat Off Delay (Seconds)
ISd	Inter-Stage Delay (Seconds)
GHC	Gas Heating CFM 2nd Stage (1st Stage is not adjustable) (Airflow times 10)
rUn	Run Test Mode

Fault Code Recovery

Recovering Fault Code

1. To view the last 6 faults, press the “Menu” key until the “Last 6 Faults” (LbF) menu appears.
2. Enter the menu by pressing the “Option” key. The last 6 faults can be viewed.

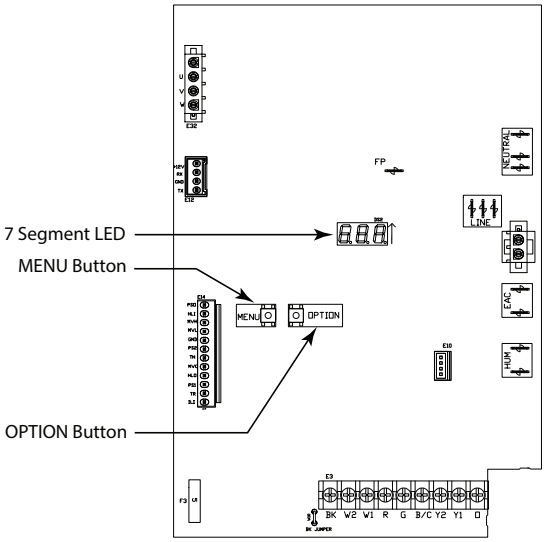
Clearing the Last 6 Faults

1. To clear the last 6 faults, press the “Menu” key until the “Last 6 Faults” (LbF) menu appears.
2. Enter the menu by pressing the “Option” key.
3. Hold the “Option” key for at least 5 seconds and release. A set of 3 dashes is seen three times. This confirms the faults have been cleared.

Resetting Factory Defaults

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

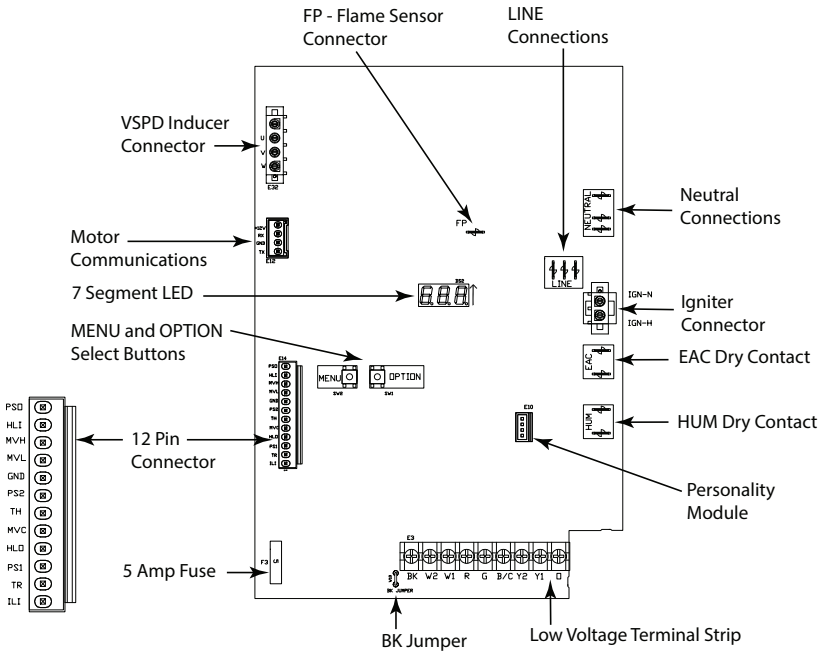
Figure 141. IFC



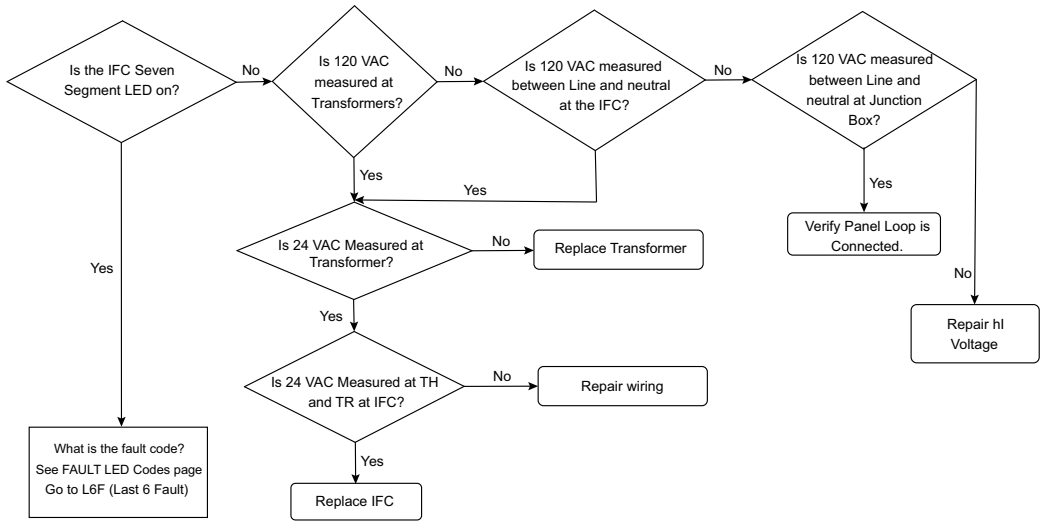
Troubleshooting

The following pages include troubleshooting flowcharts in reference for the 2 Stage S9V2* family of furnaces only. The information 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.

Figure 142. . IFC component layout



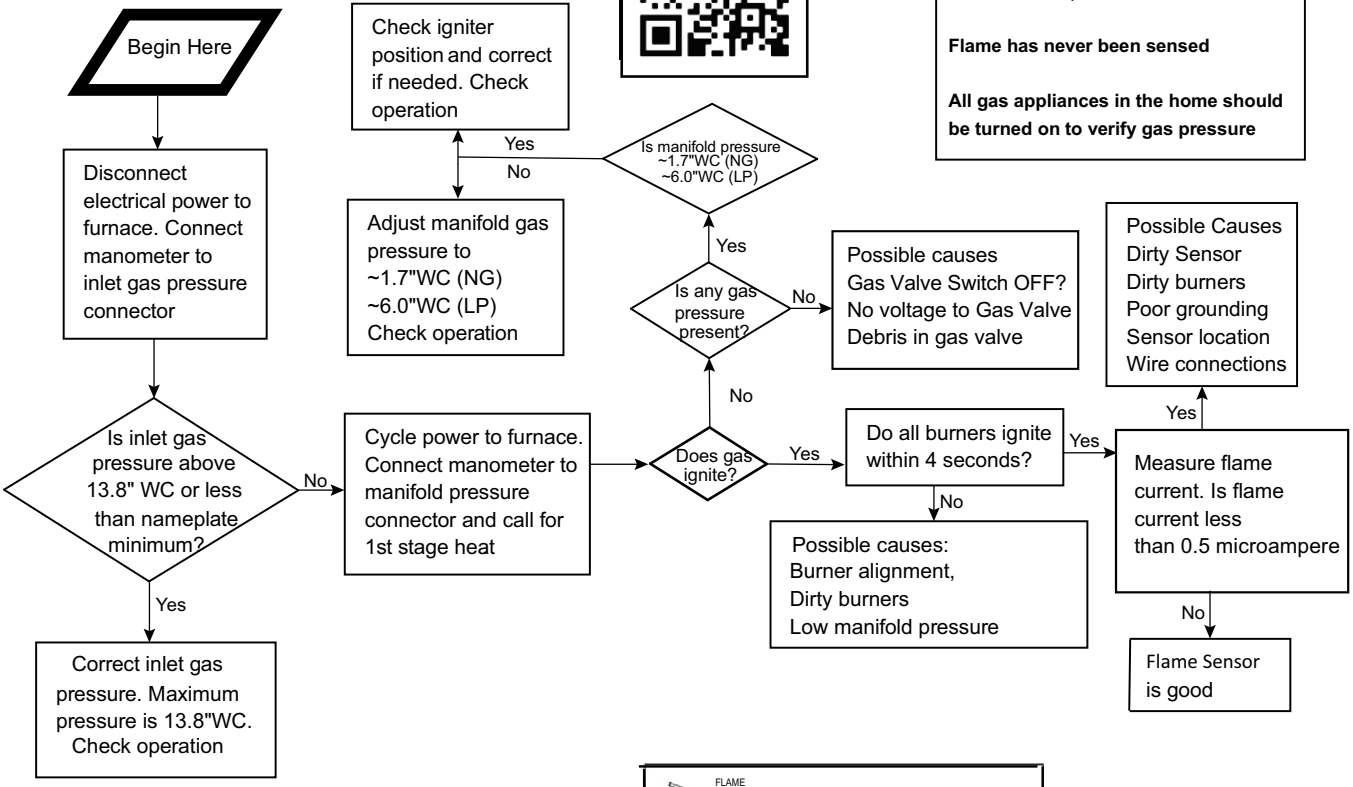
GETTING STARTED



01 Fault Code	→	Replace IFC

DEFINITION:
Internal Failure of the Control Board.

2.1 Fault Code

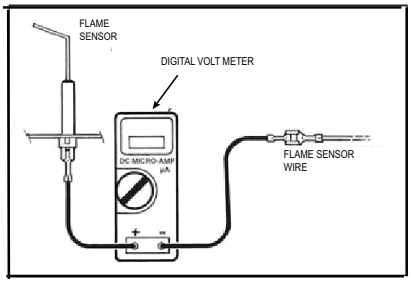


DEFINITION:
RETRY Lock Out = 3 unsuccessful tries for ignition within a single call for heat. Lockout period is for one hour.

Flame has never been sensed

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

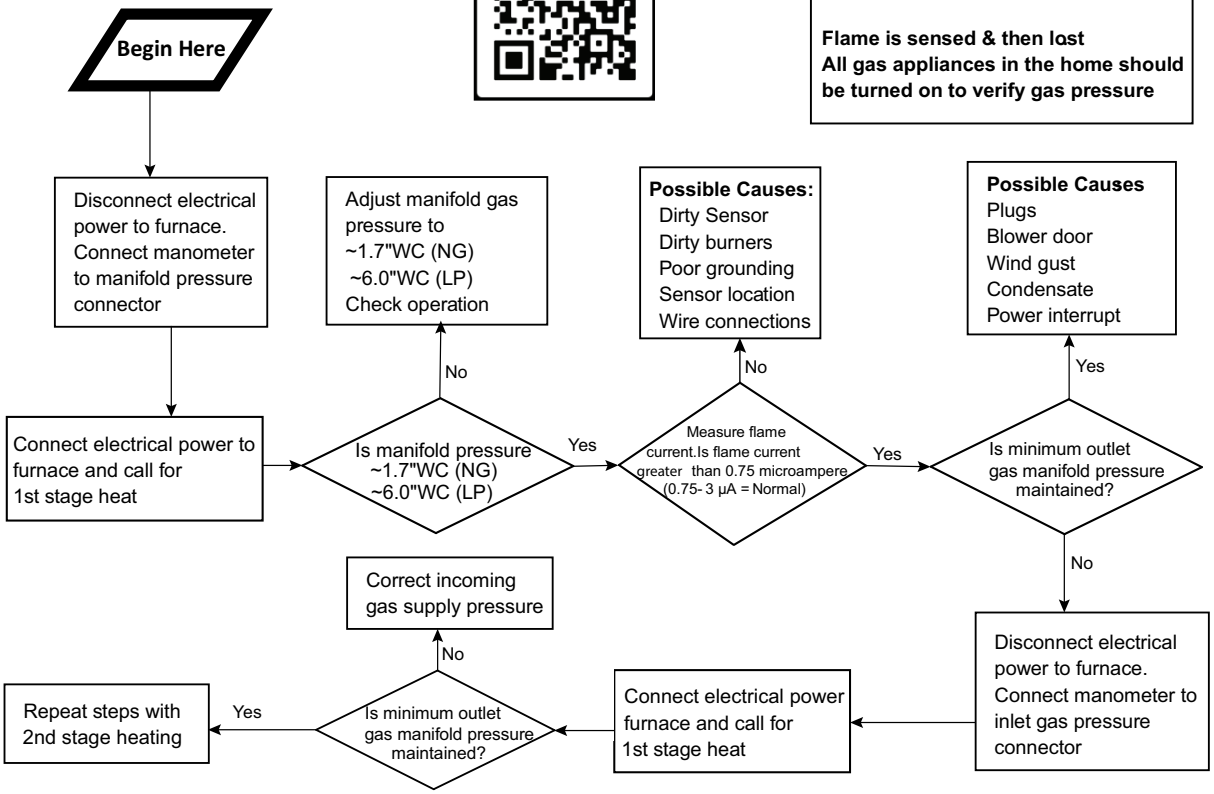
To measure flame current, use a VOM set to DC microampere. Connect voltmeter leads in series with flame sensor circuit, see illustration.



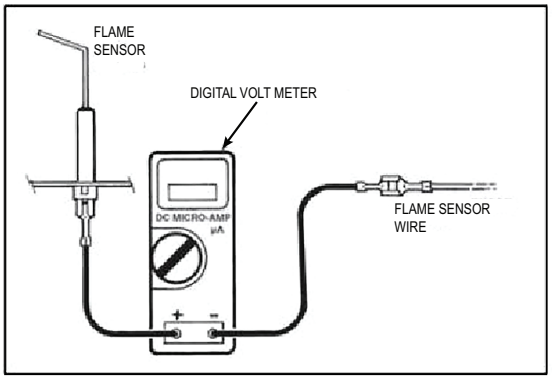
2.2 Fault Code

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



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



2.3 Fault Code → Replace IFC

DEFINITION:
1st Stage Gas Valve not energized when it should be 10 times within the same call for heat.
24VAC not sensed on MVL 10 TIMES

2.4 Fault Code

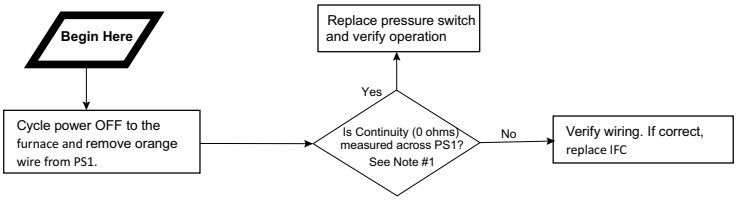
Replace IFC

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

3.1 Fault Code

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

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



3.2 Fault Code

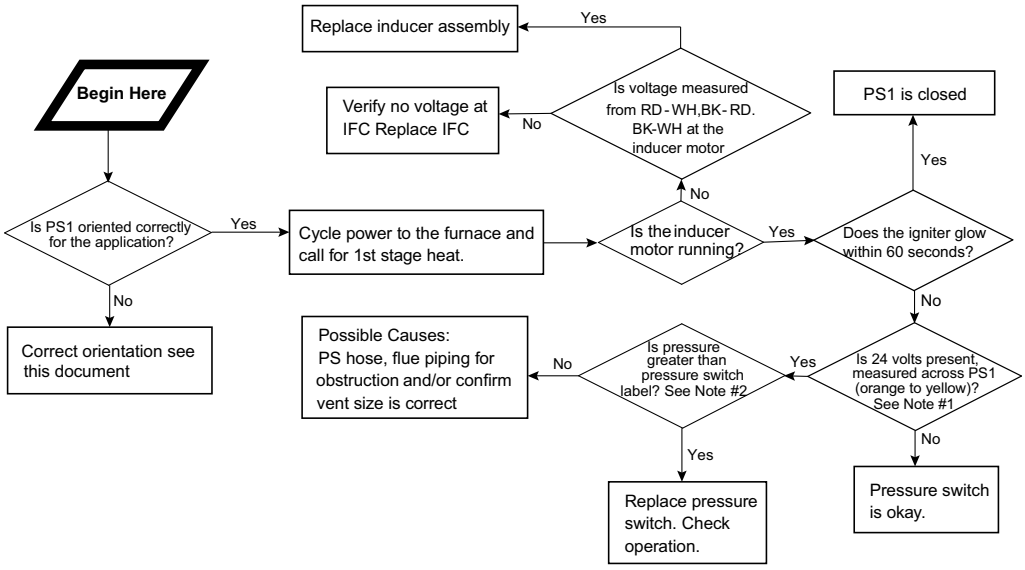
DEFINITION:
An error has occurred with the PS1 indicating that the pressure switch is open when it should be closed.
In most cases, thepressure switch is not the problem.

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 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.



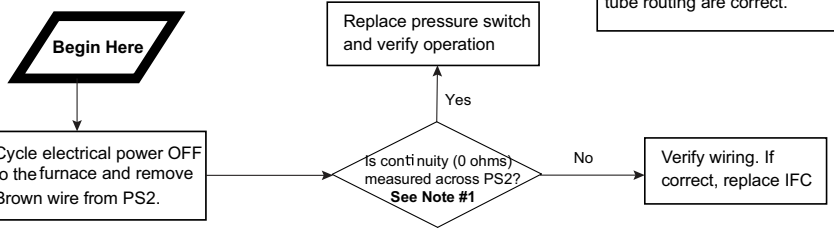
3.3 Fault Code

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

DEFINITION:
An error has occurred with the PS2, indicating that the pressure switch is 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.



3.4 Fault Code

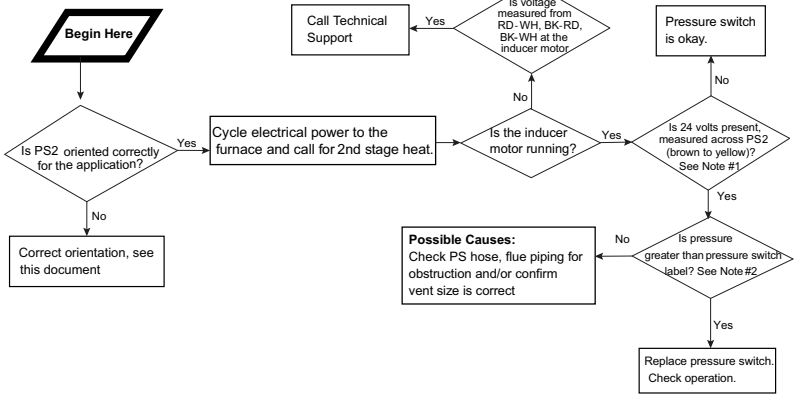
Note #1
24 volts = Open Switch
0 volts = Closed Switch

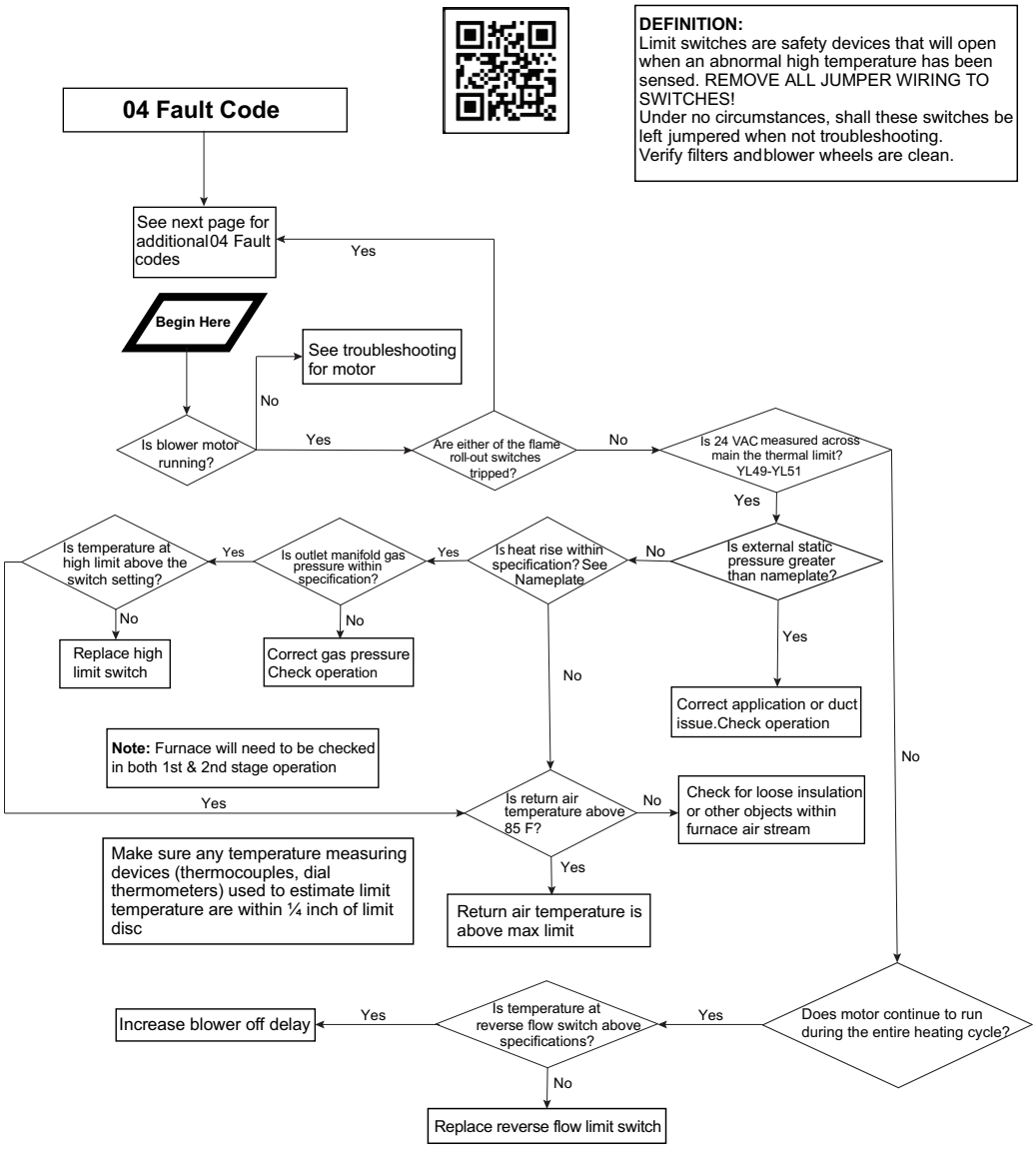
Note #2
Measured pressure is negative, greater than refers to magnitude only.

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

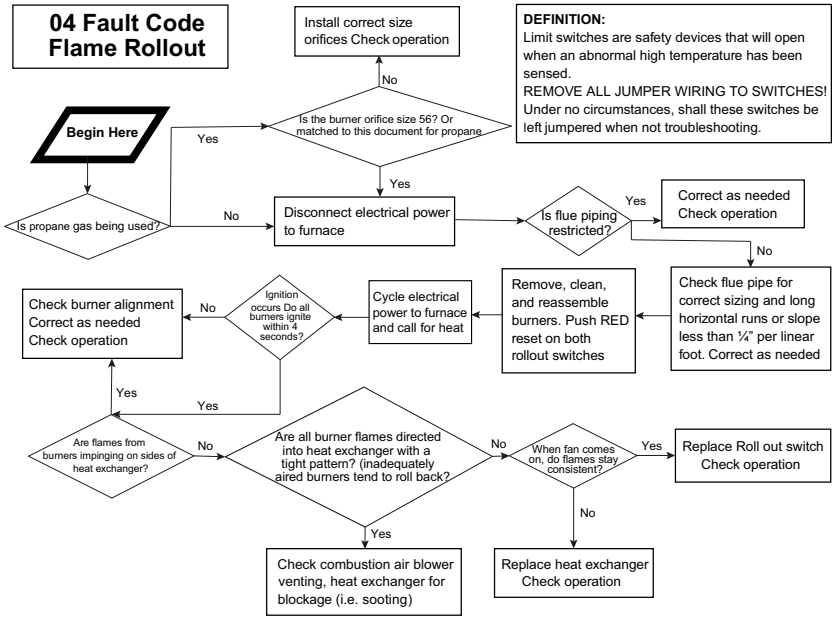
In most cases, the pressure switch is not the problem.

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



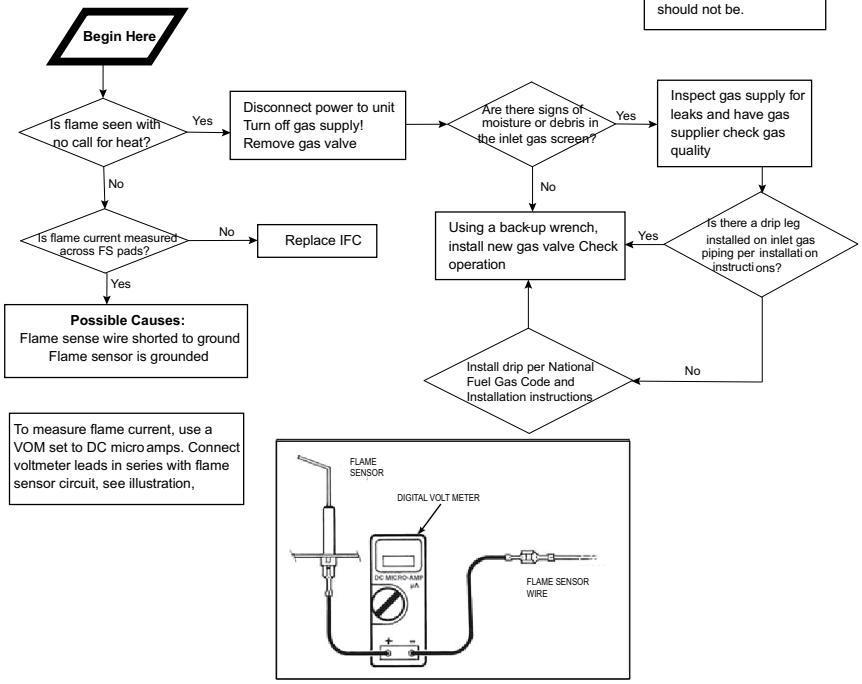

04 Fault Code
DEFINITION:
Limit switches are safety devices that will open when an abnormal high temperature has been sensed. REMOVE ALL JUMPER WIRING TO SWITCHES!
Under no circumstances, shall these switches be left jumpered when not troubleshooting.
Verify filters and blower wheels are clean.
See next page for additional 04 Fault codes
Yes
Begin Here
See troubleshooting for motor
No
Is blower motor running?
Yes
Are either of the flame roll-out switches tripped?
No
Is 24 VAC measured across main the thermal limit? YL49-YL51
Yes
Is external static pressure greater than nameplate?
No
Is heat rise within specification? See Nameplate
Yes
Is outlet manifold gas pressure within specification?
Yes
Is temperature at high limit above the switch setting?
Yes
No
Replace high limit switch
No
Correct gas pressure Check operation
No
Yes
Correct application or duct issue.Check operation
No
Note: Furnace will need to be checked in both 1st & 2nd stage operation
Yes
Is return air temperature above 85 F?
No
Check for loose insulation or other objects within furnace air stream
Make sure any temperature measuring devices (thermocouples, dial thermometers) used to estimate limit temperature are within ¼ inch of limit disc
Yes
Return air temperature is above max limit
Does motor continue to run during the entire heating cycle?
Yes
Is temperature at reverse flow switch above specifications?
Yes
Increase blower off delay
No
Replace reverse flow limit switch

04 Fault Code Flame Rollout



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.

05 Fault Code

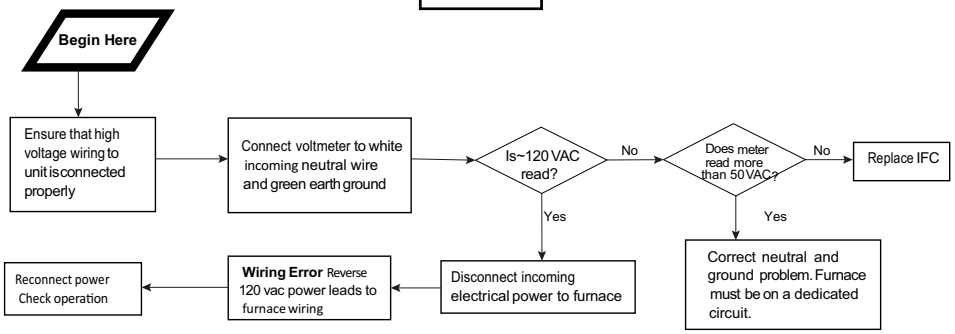


DEFINITION:
Flame is sensed when it should not be.

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

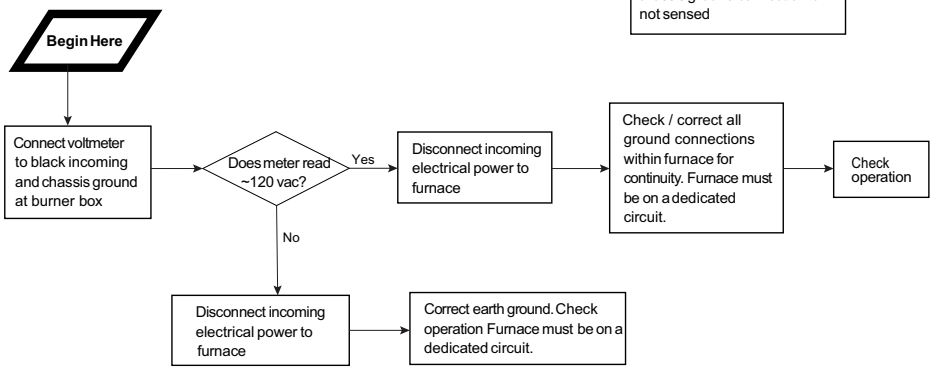
6.1 Fault Code Reversed Polarity

DEFINITION:
Polarity Fault– Incoming high voltage wiring is reversed



6.2 Fault Code Faulty Ground

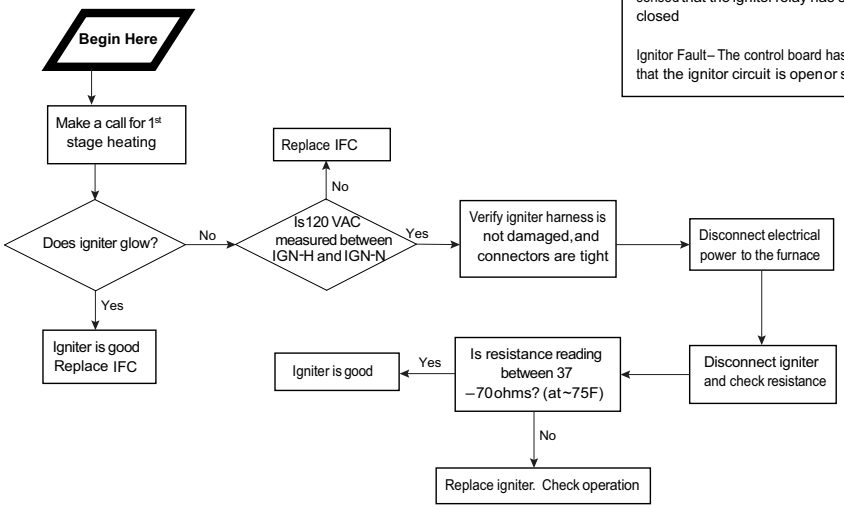
DEFINITION:
Ground Fault- Incoming or chassis ground connection is not sensed



6.3 Fault Code

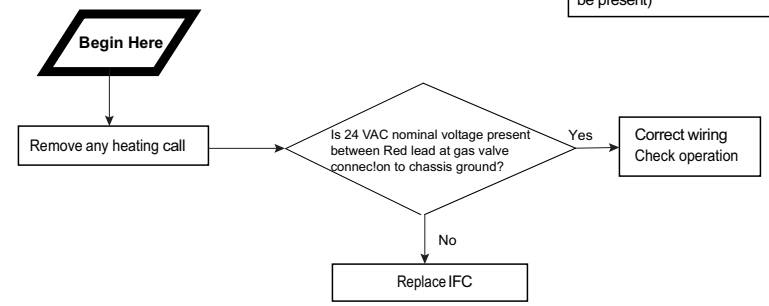
DEFINITION:
Igniter Relay Fault – The control board has sensed that the igniter relay has stuck closed

Ignitor Fault – The control board has sensed that the ignitor circuit is open or shorted.

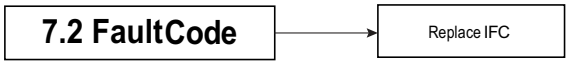


7.1 Fault Code

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



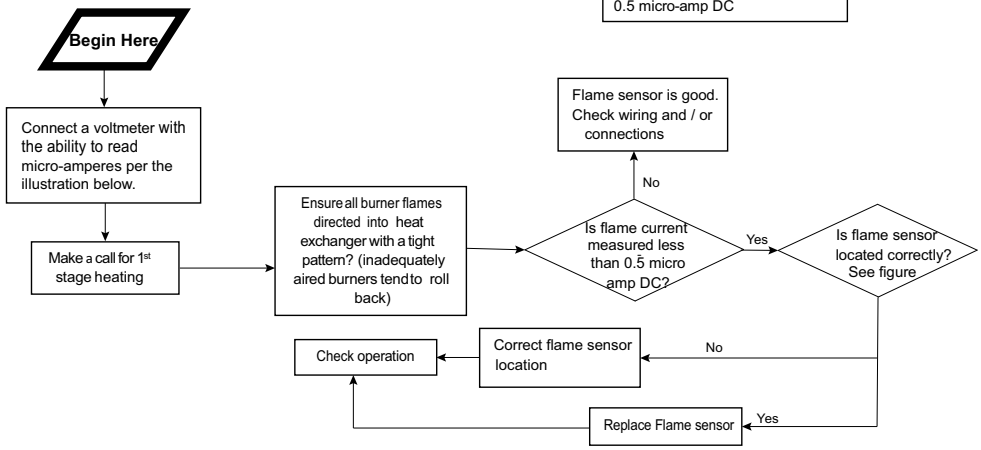
7.2 Fault Code

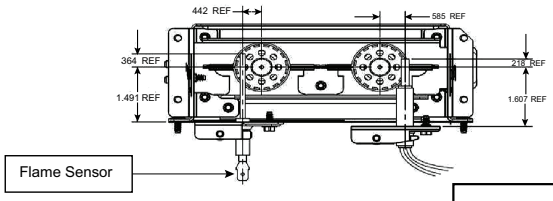


DEFINITION:
Internal control board error Redundant HLO relay closed when it should not be.

8 Fault Code

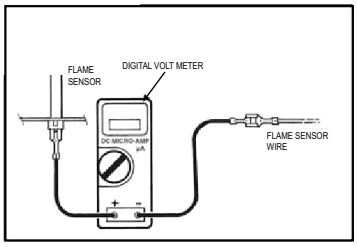
DEFINITION:
The flame sense current is less than 0.5 micro-amp DC



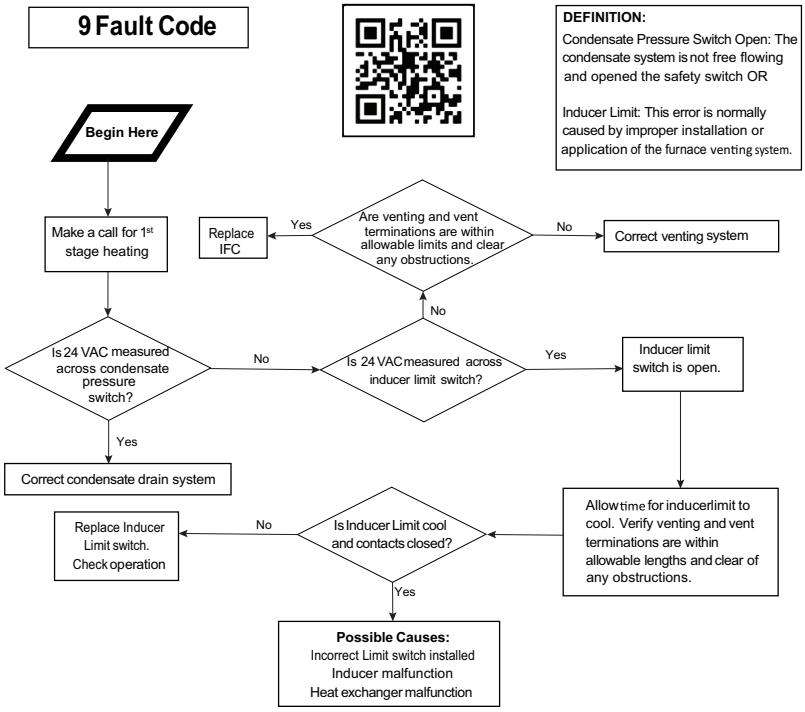


Flame Sensor

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



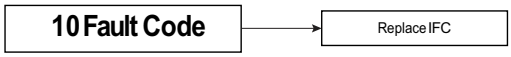
9 Fault Code



DEFINITION:
Condensate Pressure Switch Open: The condensate system is not free flowing and opened the safety switch OR

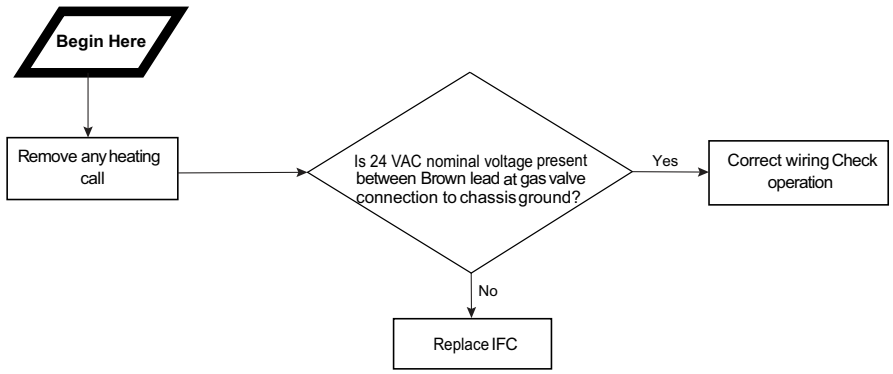
Inducer Limit: This error is normally caused by improper installation or application of the furnace venting system.

10 Fault Code



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

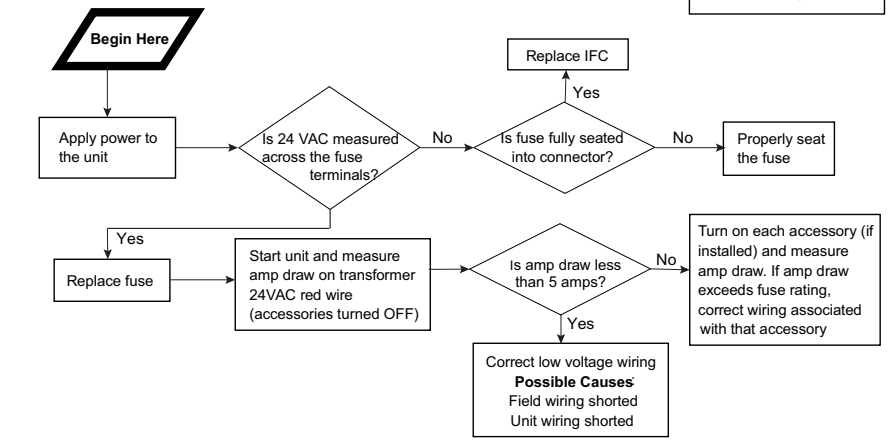
11 Fault Code



DEFINITION:
The IFC has detected that internal gas valve relays have failed OR 24 VAC is being sensed at 2nd stage gas valve

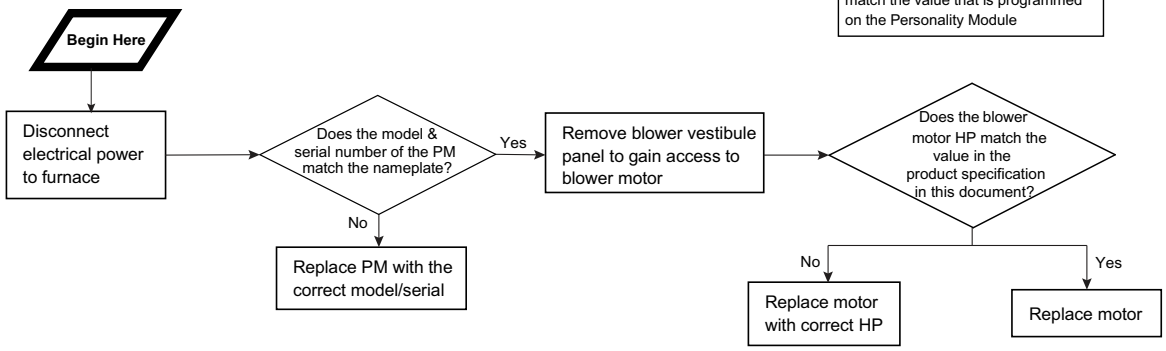
12 Fault Code

DEFINITION:
The onboard 5 amp fuse is open or missing.



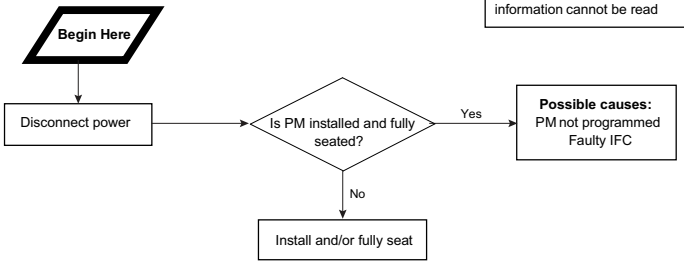
13 Fault Code

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



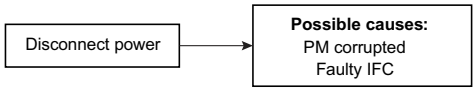
14 Fault Code

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



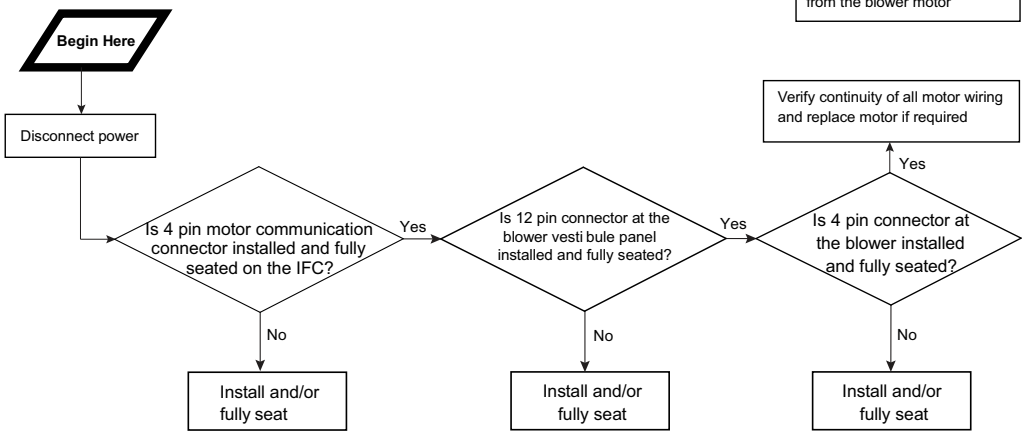
15 Fault Code

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



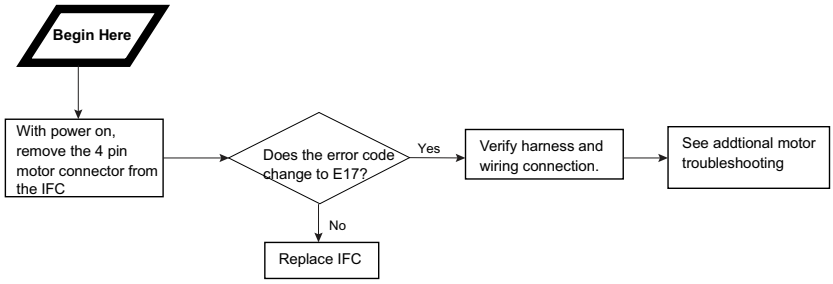
17 Fault Code

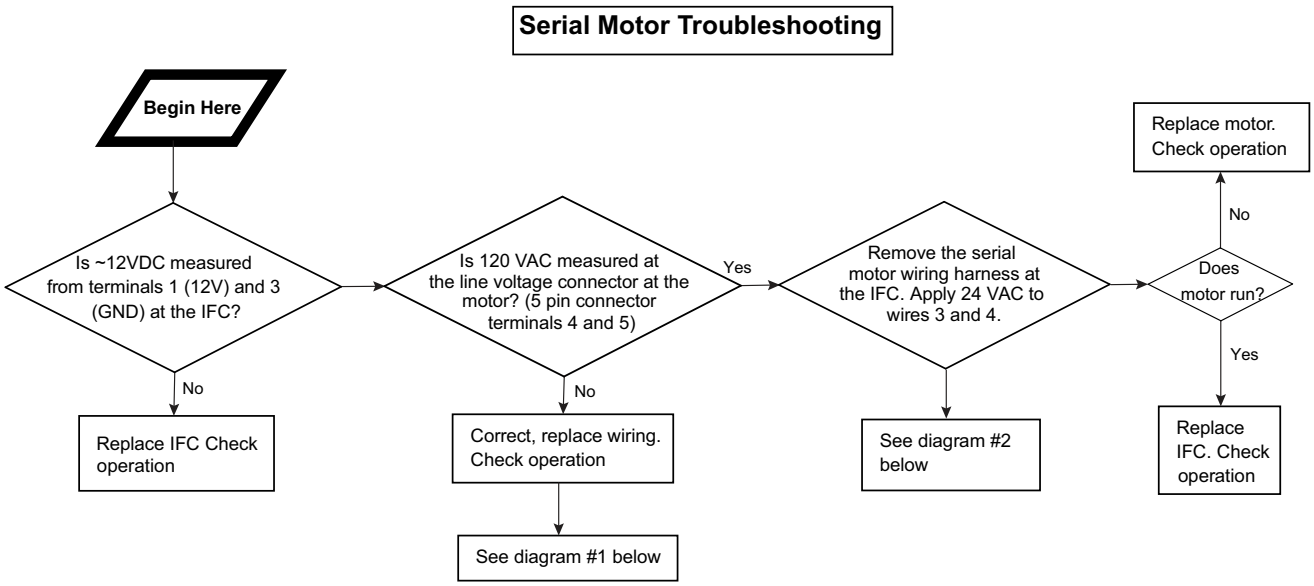
DEFINITION:
This fault is generated when IFC does not see a return signal from the blower motor

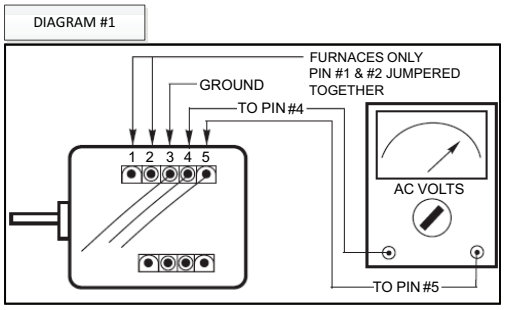


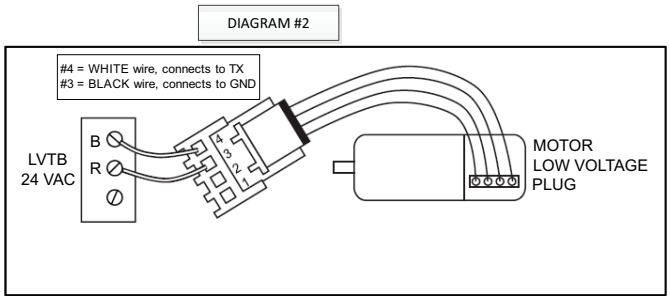
18 Fault Code

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



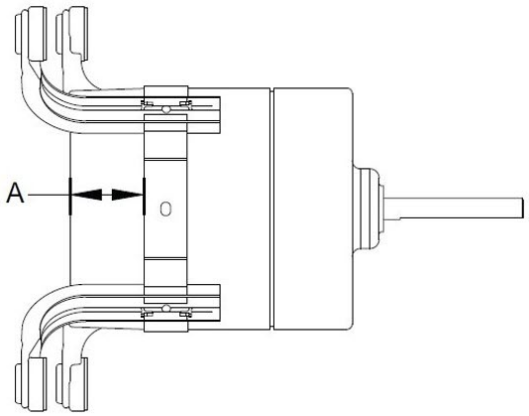






Belly Band Location

Figure 143. Distance from belly band to the lead end of motor for minimum vibration



Note: *Blower housings and wheel removed from view for clarity.*

Table 39. Regal Rexnord Eon+ motor (D346803P02-P04)

Furnace Cabinet Size	Dimension "A" (inches)
B040U3, B040D3, and B060D3	2.75
B060U4, B080U4, and B080D4	3.54
All C and D	3.79

Table 40. Panasonic V2 motor (D345263P01-P03)

Furnace Cabinet Size	Dimension "A" (inches)
B040U3, B040D3, and B060D3	2.71
B060U4, B080U4, and B080D4	3.42
All C and D	1.79

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 "HtE", although the IFC will process the call for 1st stage heat first.*

1st 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 <u>will not</u> 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 1st 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 1st stage gas valve relay is closed, energizing the 1st 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 1st stage gas heating speed.
   - During this time, the variable speed inducer will start its 1st 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 <u>Learning Routine</u> section below for specifics.
8. Once the 1st stage learning routine has successfully been achieved, the seven segment LED will alternately read:
   Ht1 = Gas heating, Stage 1
   ArF = Airflow
   060 = 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.

2nd Stage Gas Heating

Note: *2nd stage heating cannot operate without 1st 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 <u>will not</u> 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 1st 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 1st stage gas valve relay is closed, energizing the 1st 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 1st stage gas heating speed.
   - During this time, the variable speed inducer will start its 1st stage learning routine, seen as Lr 1 on the seven segment LED display. HE 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 1st stage learning routine has successfully been achieved, the seven segment LED will alternately read:

   HE1 = Gas heating, Stage 1

   ArF = Airflow

   060 = 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 "HE2".
10. The IFC checks to insure that PS2 is open and the inducer is ramped up to the predetermined factory default 2nd 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 2nd stage gas heating speed.
    - During this time, the variable speed inducer will start its 2nd stage learning routine, seen as Lr2 on the seven segment LED display. HE2 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 2nd stage learning routine has successfully been completed, the seven segment LED will alternately read:

    HE2 = Gas heating, Stage 2

    ArF = Airflow

    123 = 1230 calculated cfm (value shown x 10)
12. When the temperature raises enough to satisfy the thermostat setting, contacts R-W2 will open, 2nd stage gas valve will close, the indoor blower motor will ramp down to 1st 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 I".*
2. 24VAC is sent to the OD unit via thermostat wiring.
3. The indoor blower ramps to the cooling airflow. The seven segment LED for example will alternately read:

   CL 1 = Cooling, Stage 1

   ArF = Airflow

   080 = 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 I".*
2. 24VAC is sent to the OD unit via thermostat wiring.
3. The indoor blower ramps to the cooling airflow. The seven segment LED for example will alternately read:

   CL 1 = Cooling, Stage 1

   ArF = Airflow

   080 = 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 2nd stage cooling airflow. The seven segment LED for example will read:

   CL2 = Cooling, Stage 2

   ArF = Airflow

   160 = 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 1st stage gas heat and another for 2nd 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 1st stage cycles
   b. 100 2nd stage cycles

1st Stage Heat

1. When 1st stage gas heat is requested, the variable speed inducer is energized and will run at the predetermined factory default 1st 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 1st 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 1st stage gas heat is reached
   b. Or PS1 closes

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

2nd Stage Heat

1. When 2nd stage gas heat is requested, the variable speed inducer will run at the predetermined factory default 2nd 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 2nd 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 2nd 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 1st stage for 10 minutes and retry 2nd stage. This process will repeat until the request for 2nd 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 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 or 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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