18-CD30D1-9

Installer's Guide

Upflow/ Horizontal and Downflow/ Horizontal, Gas-Fired, Direct Vent, Variable Speed Inducer, Modulating Condensing Communicating Furnaces

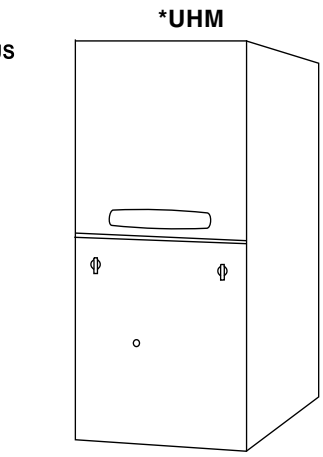
*UHMB060ACV3VA	*DHMB060BCV3VA	* First letter may be "A" or "T"
*UHMB080ACV3VA	*DHMB080ACV3VA	
*UHMC100ACV4VA	*DHMC100ACV4VA	
*UHMD120ACV5VA	*DHMD120BCV5VA	

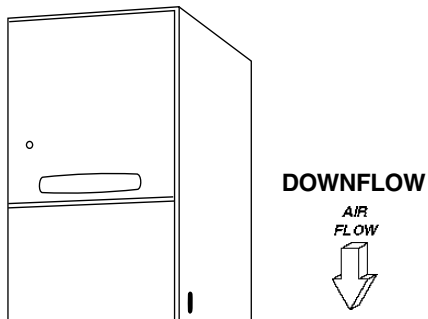
ALL phases of this installation must comply with NATIONAL, STATE AND LOCAL CODES

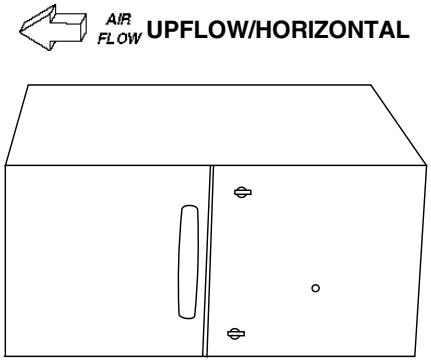
IMPORTANT — This Document is **customer property** and is to remain with this unit.
Please return to service information pack upon completion of work.

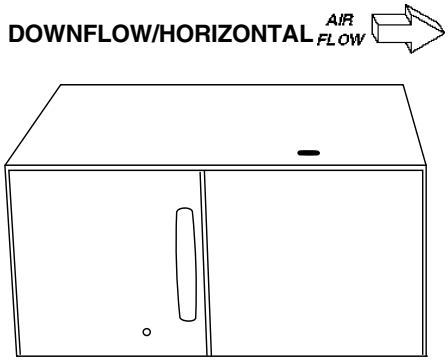
NOTE:

This furnace can be configured for Communicating or 24 VAC modes. Using fully Communicating or 24 VAC modes, the furnace can support single or multi-stage heat pump, AC, or heating only applications. Combined with a communicating Comfort Control only, the furnace will support a single stage 24 VAC cooling outdoor unit only.









Safety signal words are used to designate a degree or level of seriousness associated with a particular hazard. The signal words for safety markings are **WARNING**, and **CAUTION**.

a. **WARNING** indicates a potentially hazardous situation which, if not avoided, could result in death or serious injury.
b. **CAUTION** indicates a potentially hazardous situation which, if not avoided, may result in minor or moderate injury. It is also used to alert against unsafe practices and hazards involving only property damage.

⚠ 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:

1. Seal any unused openings in the venting system.
2. Inspect the venting system for proper size and horizontal pitch, as required in the National Fuel Gas Code, ANSI Z223.1/NFPA 54 or the CSA B149.1 *Natural Gas and Propane Installation Code* and these instructions. Determine that there is no blockage or restriction, leakage, corrosion and other deficiencies which could cause an unsafe condition.
3. 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 deficiencies which could cause an unsafe condition.
4. Close fireplace dampers.
5. 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.
6. Follow the lighting instructions. Place the appliance being inspected into operation. Adjust the thermostat so appliance is operating continuously.
7. 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.
8. If improper venting is observed during any of the above tests, the venting system must be corrected in accordance with the National Fuel Gas Code, ANSI Z221.1/NFPA 54 and/or CSA B149.1 *Natural Gas and Propane Installation Code*.
9. After it has been determined that each appliance connected to the venting system properly vents where when tested as outlined above, return doors, windows, exhaust fans, fireplace dampers and any other gas-fired burning appliance to their previous condition of use.

⚠ WARNING

FIRE OR EXPLOSION HAZARD

FAILURE TO FOLLOW THE SAFETY WARNINGS EXACTLY COULD RESULT IN SERIOUS PERSONAL INJURY, PROPERTY DAMAGE, OR DEATH. IMPROPER SERVICING COULD RESULT IN DANGEROUS OPERATION, SERIOUS PERSONAL INJURY , PROPERTY DAMAGE, OR DEATH.

The following warning complies with State of California law, Proposition 65.

⚠ WARNING

Hazardous Gases!

Exposure to fuel substances or by-products of incomplete fuel combustion is believed by the state of California to cause cancer, birth defects, or other reproductive harm.

⚠ WARNING

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

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

— WHAT TO DO IF YOU SMELL GAS

- **Do not try to light any appliance.**
- **Do not touch any electrical switch; do not use any phone in your building.**
- **Immediately call your gas supplier from a neighbor's phone. Follow the gas supplier's instructions.**
- **If you cannot reach your gas supplier, call the fire department.**

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

⚠ WARNING

EXPLOSION HAZARD!

PROPANE GAS IS HEAVIER THAN AIR AND MAY COLLECT IN ANY LOW AREAS OR CONFINED SPACES. IN ADDITION, ODORANT FADE MAY MAKE THE GAS UNDETECTABLE EXCEPT WITH A WARNING DEVICE. IF THE GAS FURNACE IS INSTALLED IN A BASEMENT, AN EXCAVATED AREA OR A CONFINED SPACE, IT IS STRONGLY RECOMMENDED TO CONTACT A GAS SUPPLIER TO INSTALL A GAS DETECTING WARNING DEVICE IN CASE OF A GAS LEAK.

NOTE: *The manufacturer of your furnace does NOT test any detectors and makes no representations regarding any brand or type of detector.*

⚠ WARNING

SAFETY HAZARD

THIS INFORMATION IS INTENDED FOR USE BY INDIVIDUALS POSSESSING ADEQUATE BACKGROUNDS OF ELECTRICAL AND MECHANICAL EXPERIENCE. ANY ATTEMPT TO REPAIR A CENTRAL AIR CONDITIONING PRODUCT MAY RESULT IN PERSONAL INJURY AND OR PROPERTY DAMAGE. THE MANUFACTURER OR SELLER CANNOT BE RESPONSIBLE FOR THE INTERPRETATION OF THIS INFORMATION, NOR CAN IT ASSUME ANY LIABILITY IN CONNECTION WITH ITS USE.

⚠ CAUTION

Sharp Edge Hazard. Be careful of sharp edges on equipment or any cuts made on sheet metal while installing or servicing. Personal injury may result.

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⚠ WARNING

EXPLOSION HAZARD!

NEVER USE AN OPEN FLAME TO DETECT GAS LEAKS. EXPLOSIVE CONDITIONS MAY OCCUR. USE A LEAK TEST SOLUTION OR OTHER APPROVED METHODS FOR LEAK TESTING. FAILURE TO FOLLOW THIS WARNING COULD RESULT IN PROPERTY DAMAGE, PERSONAL INJURY OR DEATH.

⚠ CAUTION

To prevent shortening its service life, the Furnace should NOT be used as a "Construction Heater" during the finishing phases of construction until the requirements listed in item 9, a-h of the safety section of this publication have been met. Condensate in the presence of chlorides and fluorides from paint, varnish, stains, adhesives, cleaning compounds, and cement create a corrosive condition which may cause rapid deterioration of the heat exchanger.

⚠ WARNING

SAFETY HAZARD

DO NOT USE SEMI-RIGID METALLIC GAS CONNECTORS (flexible GAS lines) within the Furnace cabinet. Failure to follow this warning could result in property damage, personal injury or death.

⚠ CAUTION

Do NOT install the furnace in a corrosive or contaminated atmosphere.
Failure to follow this caution could result in early equipment failure.

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

⚠ WARNING

SAFETY HAZARD

DO NOT INSTALL THE FURNACE DIRECTLY ON CARPETING, TILE OR OTHER COMBUSTIBLE MATERIAL OTHER THAN WOOD FLOORING. FOR VERTICAL DOWNFLOW APPLICATIONS, SUBBASE (BAYBASE205) MUST BE USED BETWEEN THE FURNACE AND COMBUSTIBLE FLOORING. WHEN THE DOWNFLOW FURNACE IS INSTALLED VERTICALLY WITH A CASED COIL, A SUBBASE IS NOT REQUIRED. FAILURE TO FOLLOW THE WARNING EXACTLY COULD RESULT IN SERIOUS PERSONAL INJURY, PROPERTY DAMAGE OR DEATH.

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

1. Use only with the type of gas approved for this Furnace. Refer to the furnace rating plate.
2. Install this furnace only in a location and position as specified in "Location and Clearances" on page 6 of these instructions.
3. Provide adequate combustion and ventilation air to the Furnace space as specified in "Air for Combustion and Ventilation" of these instructions.
4. Combustion products must be discharged outdoors. Connect this furnace to an approved vent system only, as specified in the "Venting" section (pages 15-27), of these instructions.
5. Never test for gas leaks with an open flame. Use a commercially available soap solution made specifically for the detection of leaks to check all connections, as specified in the "Gas Piping" section starting on page 34.
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 with temperature rise for cfm versus static is shown in the Service Facts accompanying this Furnace.

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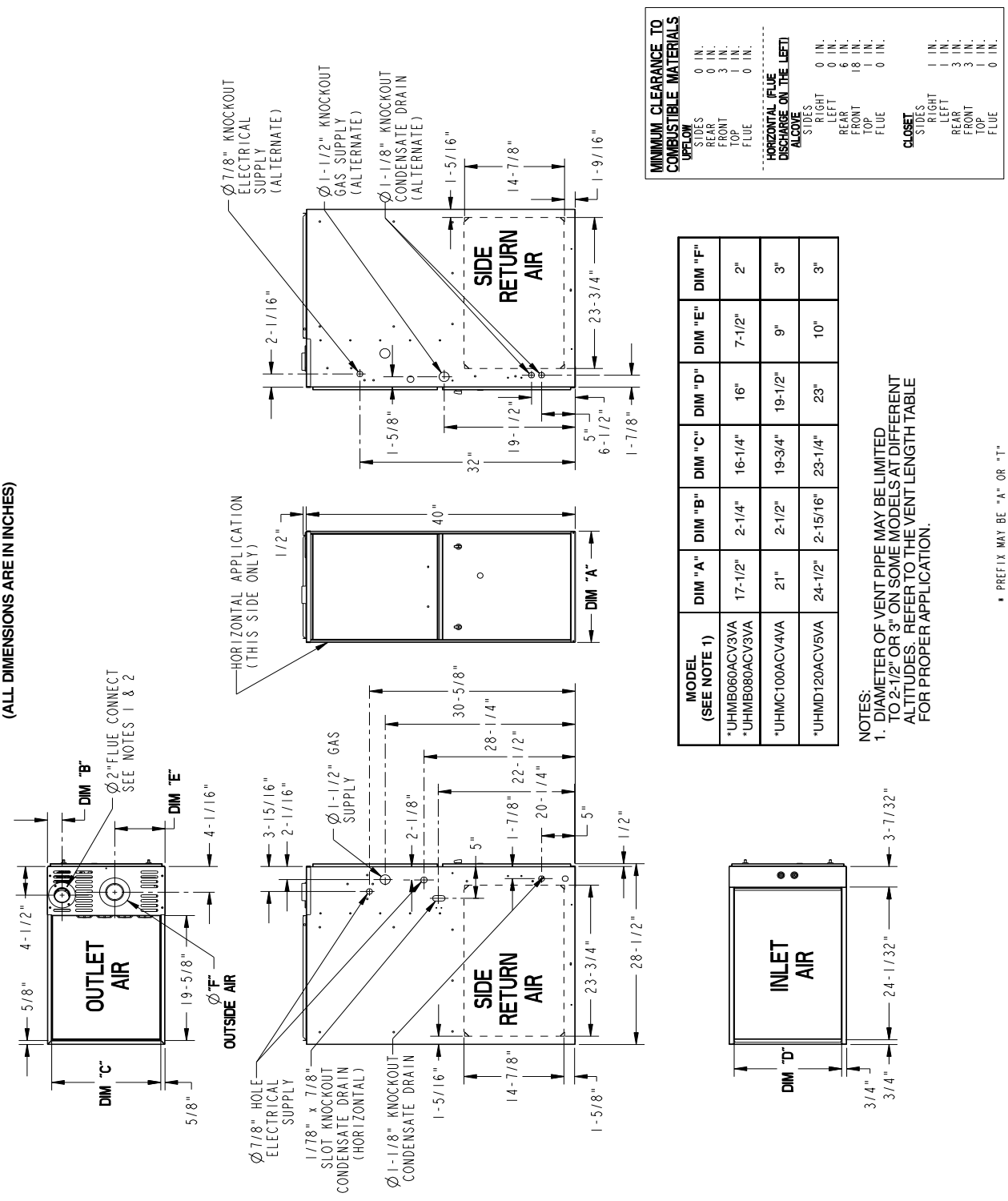
*UHM-ACV OUTLINE DRAWING

(ALL DIMENSIONS ARE IN INCHES)



MODEL (SEE NOTE 1)	DIM "A"	DIM "B"	DIM "C"	DIM "D"	DIM "E"	DIM "F"
*UHMB060ACV3VA *UHMB080ACV3VA	17-1/2"	2-1/4"	16-1/4"	16"	7-1/2"	2"
*UHMC100ACV4VA	21"	2-1/2"	19-3/4"	19-1/2"	9"	3"
*UHMD120ACV5VA	24-1/2"	2-15/16"	23-1/4"	23"	10"	3"

MINIMUM CLEARANCE TO COMBUSTIBLE MATERIALS

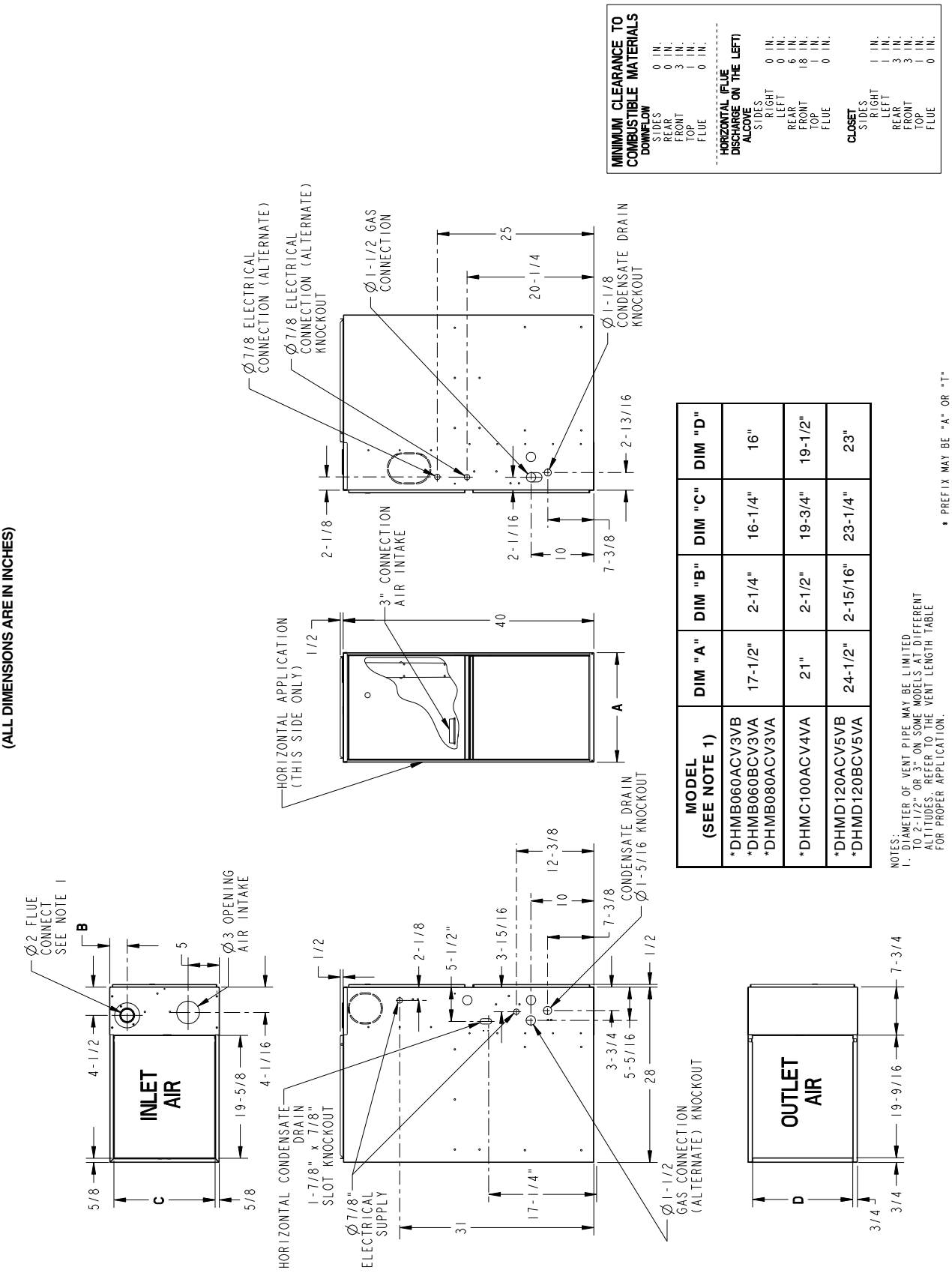
UPFLOW	
SIDES	0 IN.
REAR	0 IN.
FRONT	3 IN.
TOP	1 IN.
FLUE	0 IN.
HORIZONTAL (FLUE DISCHARGE ON THE LEFT)	
ALCOVE	
SIDES	
RIGHT	0 IN.
LEFT	0 IN.
REAR	6 IN.
FRONT	18 IN.
TOP	1 IN.
FLUE	0 IN.
CLOSET	
SIDES	
RIGHT	1 IN.
LEFT	1 IN.
REAR	3 IN.
FRONT	3 IN.
TOP	1 IN.
FLUE	0 IN.

NOTES:
1. DIAMETER OF VENT PIPE MAY BE LIMITED TO 2-1/2" OR 3" ON SOME MODELS AT DIFFERENT ALTITUDES. REFER TO THE VENT LENGTH TABLE FOR PROPER APPLICATION.

* PREFIX MAY BE "A" OR "T"

*DHM-ACV DOWNFLOW/ HORIZONTAL OUTLINE DRAWING

(ALL DIMENSIONS ARE IN INCHES)



MODEL (SEE NOTE 1)	DIM "A"	DIM "B"	DIM "C"	DIM "D"
*DHMB060ACV3VB *DHMB060BCV3VA *DHMB080ACV3VA	17-1/2"	2-1/4"	16-1/4"	16"
*DHMC100ACV4VA	21"	2-1/2"	19-3/4"	19-1/2"
*DHMD120ACV5VB *DHMD120BCV5VA	24-1/2"	2-15/16"	23-1/4"	23"

NOTES:
1. DIAMETER OF VENT PIPE MAY BE LIMITED TO 2-1/2" OR 3" ON SOME MODELS AT DIFFERENT ALTITUDES. REFER TO THE VENT LENGTH TABLE FOR PROPER APPLICATION.

* PREFIX MAY BE "A" OR "T"

MINIMUM CLEARANCE TO COMBUSTIBLE MATERIALS

DOWNFLOW	
SIDES	0 IN.
REAR	0 IN.
FRONT	3 IN.
TOP	1 IN.
FLUE	0 IN.
HORIZONTAL (FLUE DISCHARGE ON THE LEFT)	
ALCOVE	
SIDES	
RIGHT	0 IN.
LEFT	0 IN.
REAR	6 IN.
FRONT	18 IN.
TOP	1 IN.
FLUE	0 IN.
CLOSET	
SIDES	
RIGHT	1 IN.
LEFT	1 IN.
REAR	3 IN.
FRONT	3 IN.
TOP	1 IN.
FLUE	0 IN.

7. When a furnace is installed so that supply ducts carry air circulated by the furnace to areas outside the space containing the furnace, the return air shall also be handled by a duct(s) sealed to the furnace casing and terminating outside the space containing the furnace.
8. A gas-fired furnace for installation in a residential garage must be installed as specified in "Location and Clearances" section of these instructions.
9. The furnace may be used for temporary heating of buildings or structures under construction only when the following conditions have been met:
   a. The furnace venting system must be complete and installed per manufacturers 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 nameplate marking.
   e. 100% of the furnace combustion air requirement must come from outside the structure.
   f. The Furnace return air temperature range is between 55^0 and 80^0 Fahrenheit.
   g. Clean the Furnace, duct work, and components upon substantial completion of the construction process, and verify Furnace operating condition including ignition, input rate, temperature rise and venting, according to the manufacturer's instructions.
   h. An external field supplied air filter must be used during construction.
10. This product must be gas piped by a Licensed Plumber or Gas Fitter in the Commonwealth of Massachusetts.

LOCATION AND CLEARANCES

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

1. Is the location selected as near the chimney or vent and as centralized for heat distribution as practical?
2. Do all clearances between the furnace and enclosure equal or exceed the minimums stated in Clearance Table on the Outline Drawings on pages 4 and 5?
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 at least 12" above the highest expected snow accumulation level (18" minimum for Canadian applications)?
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. A furnace shall be installed so electrical components are protected from water.
8. If the furnace is installed in a **residential 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.

GENERAL INSTALLATION INSTRUCTIONS

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 GAS INPUT ADJUSTMENT).

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 • National Installation Code, CAN/CGA B149.1. The latest code may be obtained from the American Gas Association Laboratories, 400 N. Capitol St. NW, Washington D.C. 20001.
1-800-699-9277 or www.aga.org

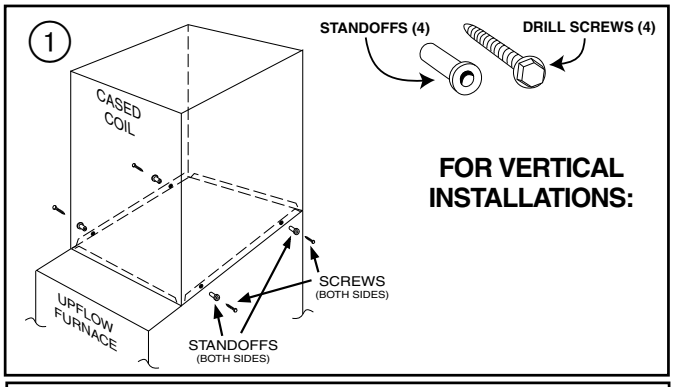
These furnaces have been classified as CATEGORY IV furnaces in accordance with latest edition of ANSI Z21.47 standards • CAN/CGA 2.3. Category IV furnaces operate with positive vent static pressure and with a flue loss less than 17 percent. These conditions require special venting systems, which must be gas tight and water tight. These Category IV Direct Vent furnaces are not approved for installation in Manufactured/ Mobile housing.

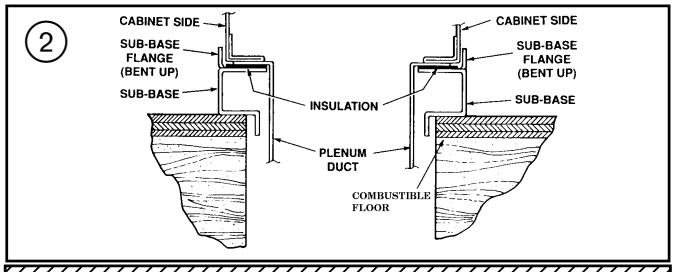
⚠ WARNING

SAFETY HAZARD
DO NOT INSTALL THE FURNACE DIRECTLY ON CARPETING, TILE OR OTHER COMBUSTIBLE MATERIAL OTHER THAN WOOD FLOORING. FOR VERTICAL DOWNFLOW APPLICATIONS, SUBBASE (BAYBASE205) MUST BE USED BETWEEN THE FURNACE AND COMBUSTIBLE FLOORING. WHEN THE DOWNFLOW FURNACE IS INSTALLED VERTICALLY WITH A CASED COIL, A SUBBASE IS NOT REQUIRED. FAILURE TO FOLLOW THE WARNING EXACTLY COULD RESULT IN SERIOUS PERSONAL INJURY, PROPERTY DAMAGE OR DEATH.

UPFLOW INSTALLATION

Standoffs and screws (See Figure 1) are included with the cased coils for attachment to the furnace. There are clearance alignment holes near the bottom of the coil wrapper. Drill screws are used to engage the furnace top flanges. The standoff is inserted into the cabinet alignment hole. The drill screws are inserted through the standoffs then screwed into the furnace flange. The coil is always placed downstream of the furnace airflow.





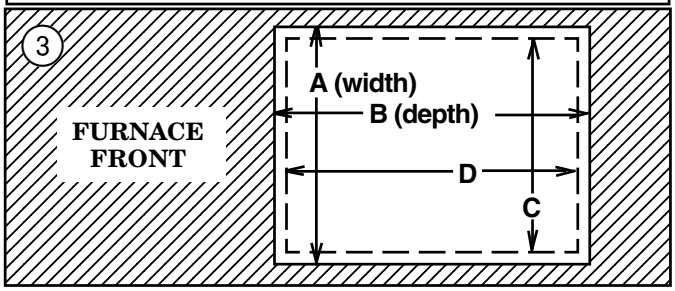


TABLE 1

CABINET WIDTH	RETURN DUCT WIDTH	FLOOR OPENING		PLENUM OPENING	
		"A"	"B"	"C"	"D"
17-1/2"	16-1/4"	16-5/8"	20-1/8"	15-5/8"	19-3/8"
21"	19-3/4"	20-1/8"	20-1/8"	19-1/8"	19-3/8"
24-1/2"	23-1/4"	23-5/8"	20-1/8"	22-5/8"	19-3/8"

DOWNFLOW INSTALLATIONS

REQUIRED FLOOR OPENING: (DOWNFLOW)
SEE FIGURE 2 AND FIGURE 3, AND TABLE 1

HORIZONTAL INSTALLATION

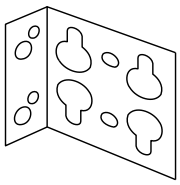
IMPORTANT:
The 2/4TXC cased coil must be placed downstream of the furnace. In horizontal installations, the apex of the coil may point either toward or away from the furnace. See the 2/4TXC coil Installer's Guide for more details.

The coil and furnace must be fully supported when used in the horizontal position. It is always recommended that an auxiliary drain pan be installed under a horizontally installed evaporator coil or 90% or greater Gas Furnace. Connect the auxiliary drain line to a separate drain line (no trap is needed in this line).

Three brackets (with screws) are included with downflow furnaces for installation to stabilize and secure the furnace and TXC cased coil in the **horizontal position**. See Figure 4. The coil is placed downstream of the furnace, with the apex of the coil pointing in either direction of the airflow for **horizontal installation**. The cased coil is secured to the furnace and both the furnace **and** the cased coil must be properly supported.

4 CASED COIL CONNECTION BRACKET FOR DOWNFLOW FURNACE IN HORIZONTAL

DOWNFLOW ONLY

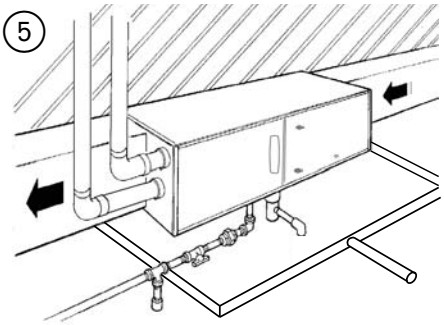


The brackets mount using the rear screws on the coil case and use the screws provided to secure the bracket to the furnace. The remaining bracket is placed as close to center as possible (horizontally) between the coil case front and the furnace bottom channel (for downflow/horizontal furnace). Use four of the screws provided to secure the bracket. The coil requires additional support.

The furnace may be installed in an attic or crawl space in the horizontal position by placing the furnace *on the left side* (as viewed from the front in the vertical position). The horizontal furnace installation in an attic should be on a service platform large enough to allow for proper clearances on all sides and service access to the front of the furnace (See Figure 5 & Clearance Tables, on the Outline drawings on pages 4-5). 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.

5



UPFLOW/ HORIZONTAL SHOWN WITH DIRECT VENT

The furnace must be supported at both ends and the middle when installed horizontally. The furnace must also be elevated approximately 4-6 inches to allow clearance for the condensate drain to exit the cabinet in the horizontal position.

The horizontal furnace may also be suspended from the joists using all-thread rods with a substantial metal support frame that supports the entire length of the furnace. The rods need to be of sufficient length to allow for proper clearances from combustible materials. The frame needs to be at least 32" in length to allow for access to service panels.

If the furnace is suspended using steel strap, it must be supported at all four corners and in the middle at the front of the furnace.

AIR FOR COMBUSTION AND VENTILATION

If these furnaces are installed in a nondirect vent capacity then the adequate flow of combustion and ventilating air must not be obstructed from reaching the furnace. Air openings provided for combustion air 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 5.3, Air for Combustion and Ventilation, of the National Fuel Gas Code, ANSI Z223.1 — CAN/CGA B149.1 or 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.

OUTSIDE AIR IS RECOMMENDED

The use of indoor air for most applications is acceptable, unless there is the presence of corrosive chemicals or contamination. Certain types of installation will require the use of outside air for combustion.

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 "confined" laundry rooms
* Furnaces installed in "confined" 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:

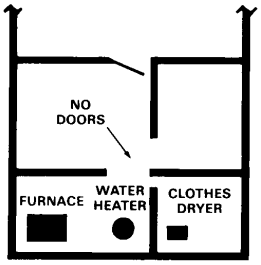
* Permanent wave solutions
* Chlorinated waxes and cleaners
* Chlorine based swimming pool chemicals
* Water softening chemicals
* Deicing salts or chemicals
* Carbon Tetrachloride
* Halogen type refrigerants
* Cleaning solvents (such as perchloroethylene)
* Printing inks, paint removers, varnish, etc.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

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

Unconfined space is defined in Figure 6. These spaces may have adequate air by infiltration to provide air for combustion and ventilation. Buildings with tight construction (for example, weather stripping, heavily insulated, caulked, vapor barrier, etc.), may need additional air to be provided as described for *confined space*. See Table 2 for minimum area.

6

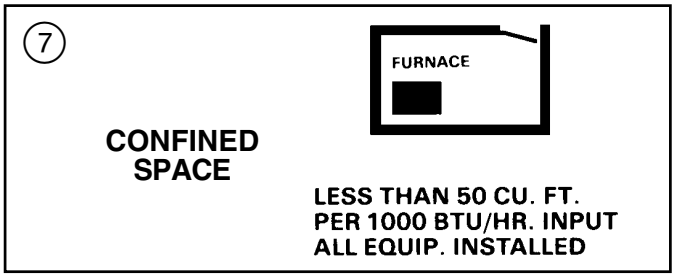
50 CU. FT. OR MORE PER 1000 BTU/HR. INPUT ALL EQUIP. INSTALLED



UNCONFINED

TABLE 2

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
60,000	375
80,000	500
100,000	625
120,000	875



Confined spaces are installations with less than 50 cu. ft. of space per 1000 BTU/hr input from all equipment installed. Air for combustion and ventilation requirements can be supplied from inside the building as in Figure 8 or from the outdoors, as in Figure 9.

1. All air from inside the building as in Figure 8: 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 Table 3 for minimum open areas requirements.
2. All air from outdoors as in Figure 9: 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 Table 3, for minimum open areas requirements.

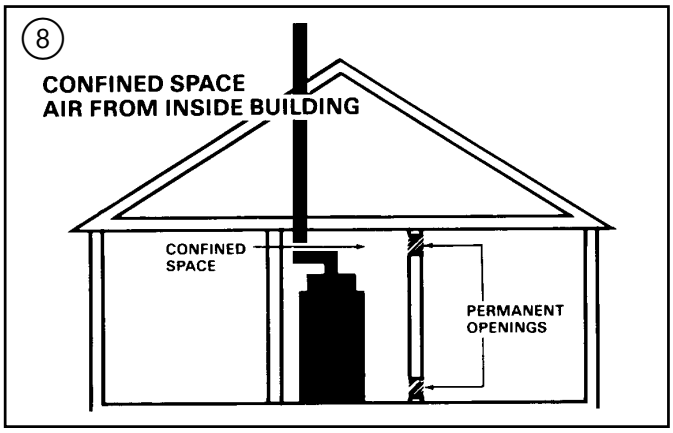
TABLE 3
MINIMUM FREE AREA IN SQUARE INCHES EACH OPENING (FURNACE ONLY)

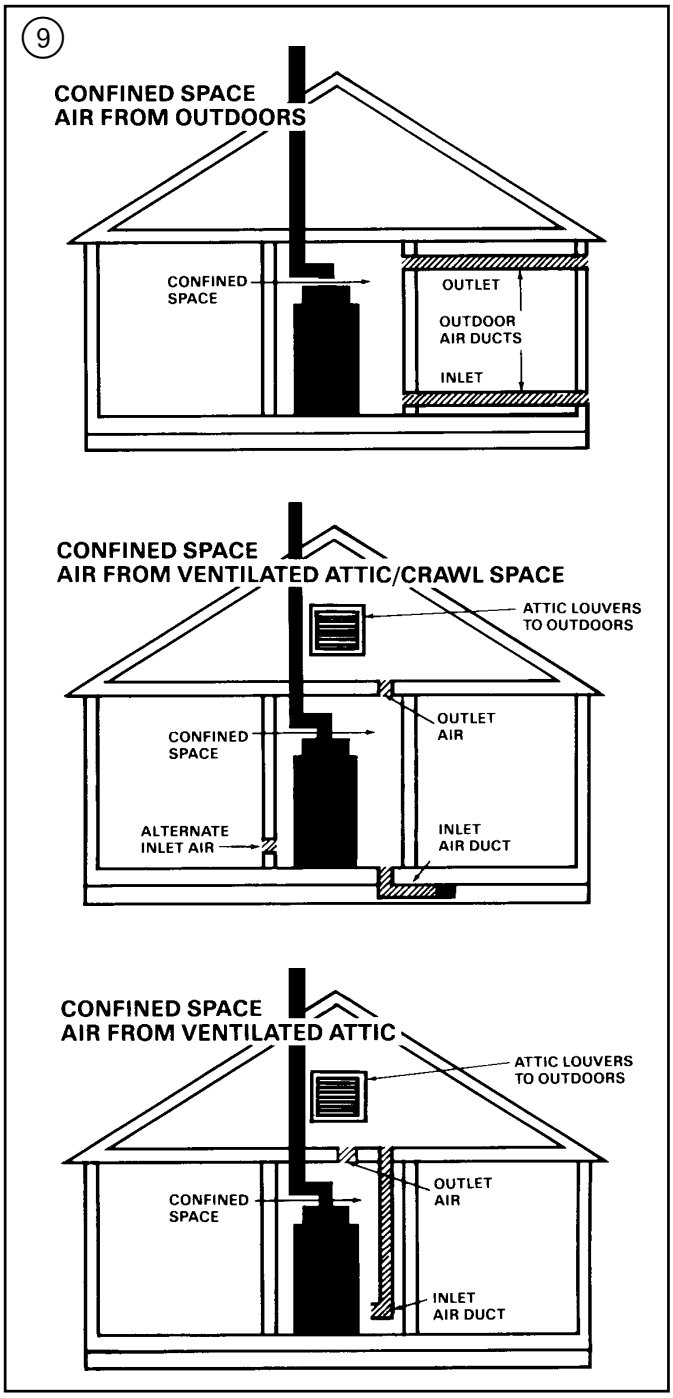
Furnace Maximum BTUH/INPUT Rating	Air From Inside	Air From Outside	
		Vertical Duct	Horizontal Duct
60,000	100	15	30
80,000	100	20	40
100,000	100	25	50
120,000	120	30	60

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.

Central furnaces, when used in connection with cooling units, shall be installed in parallel or on the upstream side of the cooling coil to avoid condensation in the heat exchanger.





With a parallel flow arrangement, the dampers or other means used to control flow of air shall be adequate to prevent chilled air from entering the Furnace, and if manually operated, must be equipped with means to prevent operation of either unit unless the damper is in full heat or cool position.

On any job, flexible connections of nonflammable material may be used for return air and discharge connections to prevent 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 to minimize noise transmission through the return air grille. Although these furnaces are designed with large blowers operating at moderate speeds, any blower moving a high volume of air will produce audible noise which could be objectionable when the unit is located very close to a living area. It is often advisable to route the return air ducts under the floor or through the attic. Such design permits the installation of air return remote from the living area (i.e. central hall).

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

RETURN AIR DUCT SYSTEMS

⚠ CAUTION

Safety Hazard

Sharp Edge Hazard

Be careful of sharp edges on equipment or any cuts made on sheet metal while installing or servicing. Personal injury may result.

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

Do NOT *install return air through the back of the furnace cabinet.*

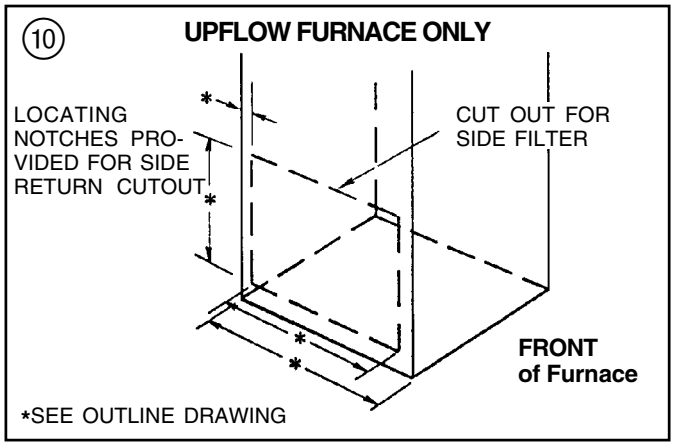
Do NOT *install return air through the side of the furnace cabinet on horizontal applications.*

NOTE:
Minimum return air temperature is 55°F.

PREPARATION FOR UPFLOW BOTTOM AND SIDE RETURN AIR FILTER INSTALLATION

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. The return air filter is shipped in either the bottom or side location. Remove the filter by first turning the two latches on the blower door and tilting the door forward to remove. Remove the filter by sliding it out.
3. For upflow side return installations, remove the insulation around the opening in the blower compartment.
4. The side panels of the upflow furnace include locating notches that are used as guides for cutting an opening for return air, refer to Figure 10 and the outline drawing on page 4 for duct connection dimensions for various furnaces.



5. If a 3/4" flange is to be used for attaching the air inlet duct, add to cut where indicated by dotted lines in Figure 10. Cut corners diagonally and bend outward to form flange.
6. If flanges are not required, and a filter frame is installed, cut between locating notches (See Figure 10).
7. The bottom panel of the upflow furnace must be removed for bottom return air. After removing the filter, lay the furnace on its back. Remove the two 5/16" hex screws securing the front of the bottom channel to the cabinet.

Rotate the channel downward (or remove by lowering the front edge of the channel and pulling forward). Slide the bottom return air panel out of the cabinet. Rotate the front channel to its original position and reinstall the two 5/16" screws.

8. ***The horizontal installation of the upflow furnace requires an external filter section. Do NOT use the bottom return filter within the furnace. Filter kits are available for horizontal applications.***
9. Connect duct work to furnace. See Outline Drawing for supply and return duct size and location. Flexible duct connectors are recommended to connect both supply and return air ducts to the furnace. If only the front of the furnace is accessible, it is recommended that both supply and return air plenums are removable.

RETURN AIR FILTERS

TYPICAL UPFLOW RETURN AIR FILTER INSTALLATIONS

Filters are factory supplied for these furnaces. These furnaces require high velocity type air filters. The filters may be installed within the furnace blower compartment for UPFLOW furnaces in either a BOTTOM or SIDE (left side or right side) return air inlet. Some filters may need to be trimmed for side or bottom filter use.

TABLE 4

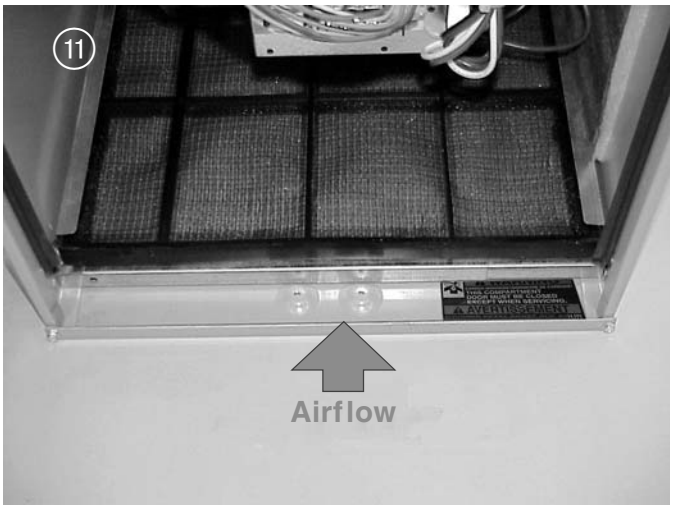
MODELS NUMBERS	CABINET WIDTH	FILTER QTY & SIZE
*UHMB060ACV3VA *UHMB080ACV3VA	17-1/2"	1 - 17" X 25" X 1"
*UHMC100ACV4VA	21"	1 - 20" X 25" X 1"
*UHMD120ACV5VA	24-1/2"	1 - 24" X 25" X 1"
* First letter may be "A" or "T"		

NOTE: For upflow 5 ton airflow models where the airflow requirement exceeds 1800 CFM - Models will require return air openings and filters on: (1) both sides, or (2) one side and the bottom, or (3) just the bottom. The filter rack installation is not allowed for right side return on the following models: *UHMB060ACV3V, *UHMB080ACV3V & *UHMC100ACV4V.

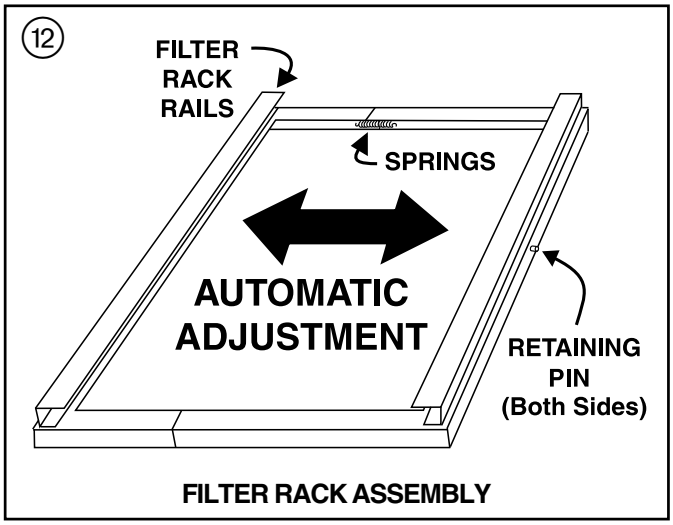
The furnace and the bottom filter rack, BAYRACK960, installation can be seen in Figure 11.

The furnace filter in the bottom or side configuration can be removed by simply turning the two latches on the blower door and tilting the door forward.

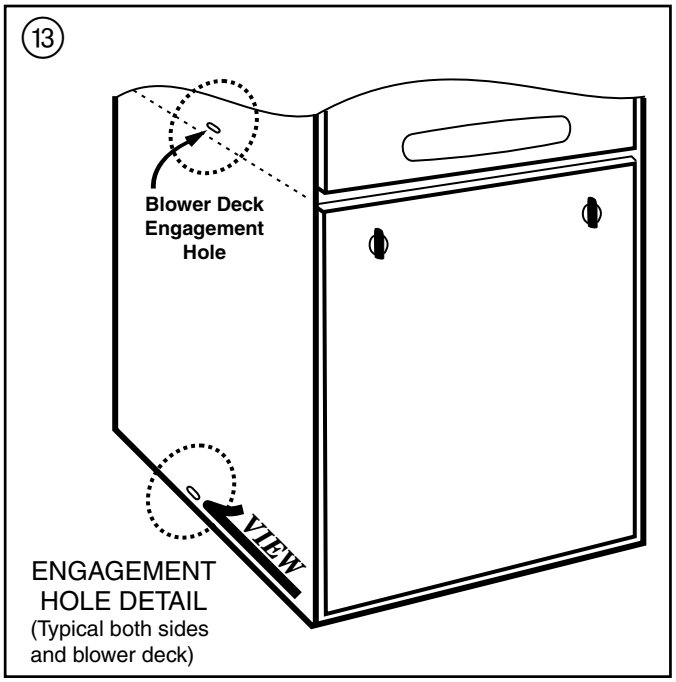
The Filter rails are spring loaded for automatic adjustment to allow standard size, locally obtainable replacement filters. The filter rack itself slides to adjust to the required width needed for bottom or side return (See Figure 12).



BOTTOM FILTER RACK INSTALLATION



FILTER RACK ASSEMBLY



ALTERNATE FILTER RACK INSTALLATION FOR BOTTOM RETURN - BAYRACK960

The following checklist should be used when installing a bottom return filter on an upflow furnace:

a. Remove the filter.

b. Remove the bottom panel.

c. With the filter removed, the filter rack is compressed and then inserted into the bottom of the furnace. The retaining screw/pin on each side inserts into engagement holes at the bottom of the furnace cabinet side. See Figure 14.

d. Reinstall the furnace filter in the bottom position by inserting the chamfer end first into the filter rack. See Figure 19.

ALTERNATE FILTER RACK INSTALLATION FOR SIDE RETURN AIR ON UPFLOW FURNACES (LEFT OR RIGHT) - BAYRACK960

NOTE:
The filter rack installation is not allowed for right side return on the following models: *UHMB060ACV3V, *UHMB080ACV3V & *UHMC100ACV4V. See Figure 21 for alternate upflow filter clip/ bracket installation.

The following checklist should be used when installing a right or left side return filter on an upflow furnace:

a. Remove the filter.

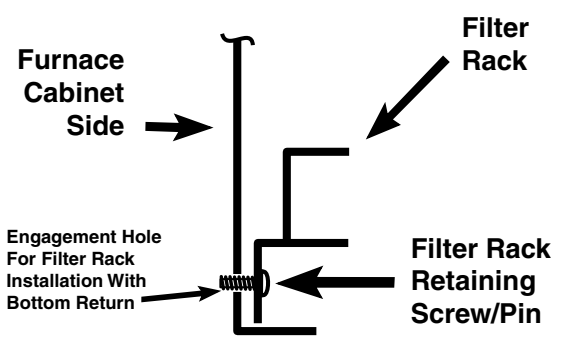
b. Leave the bottom panel in place.

c. Make side cutout by following the directions in the "Return Air Duct Connections" section on page 10,

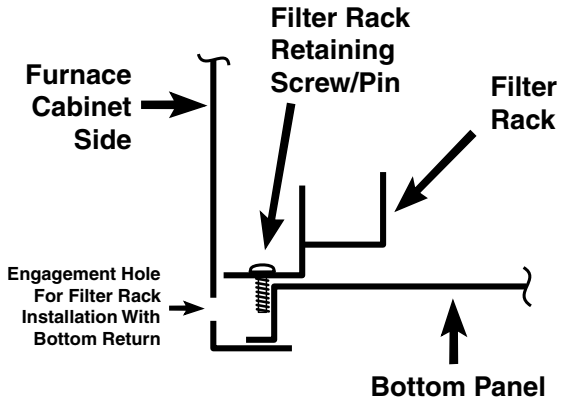
d. Compress the filter rack and reinstall in the side position on the furnace. Confirm that the upper retaining pin/screw locks into the engagement hole in the blower deck and the lower pin/screw rests against the side of the bottom panel. See Figures 13, 15-18.

e. Reinstall the furnace filter in the side position by inserting the chamfer end first into the filter rack.

14 *SIDE ENGAGEMENT*



15 *BOTTOM ENGAGEMENT*



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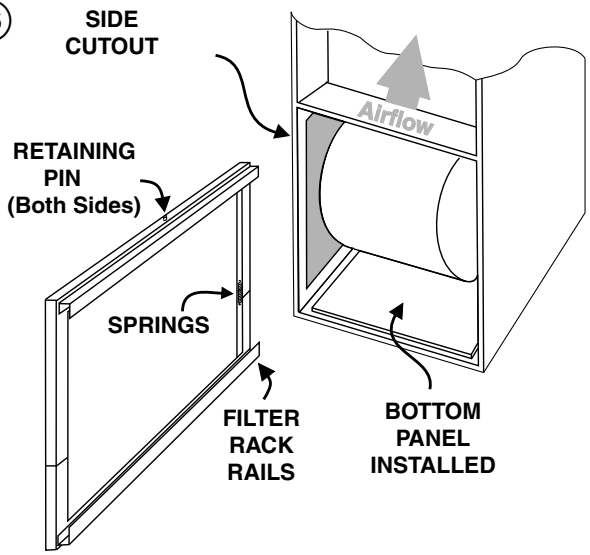
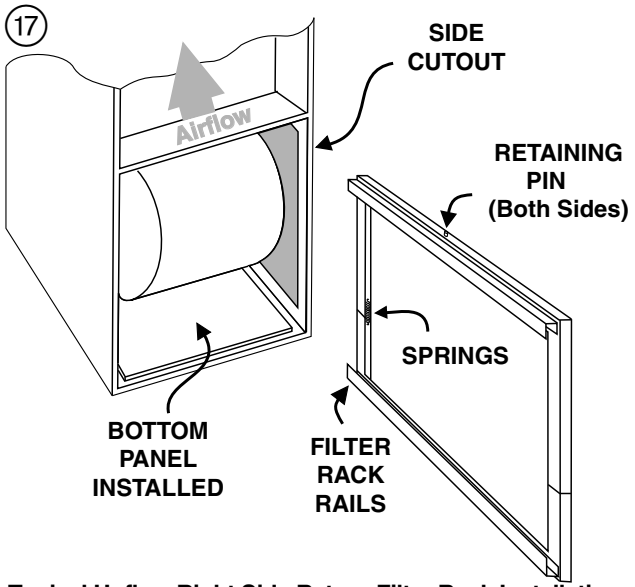
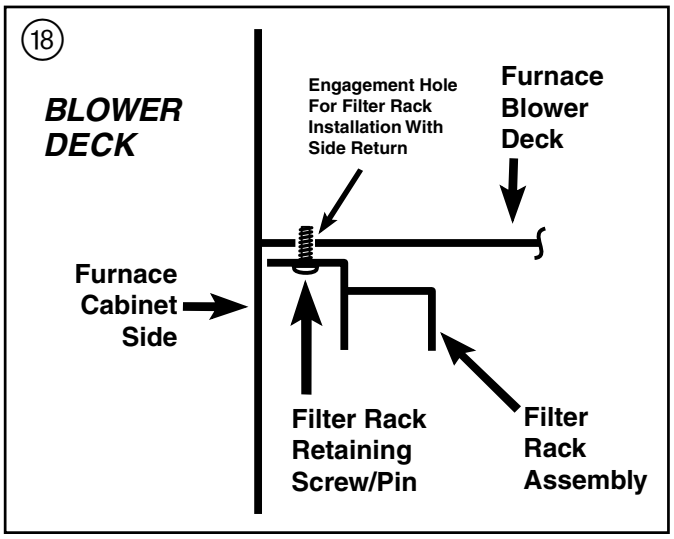


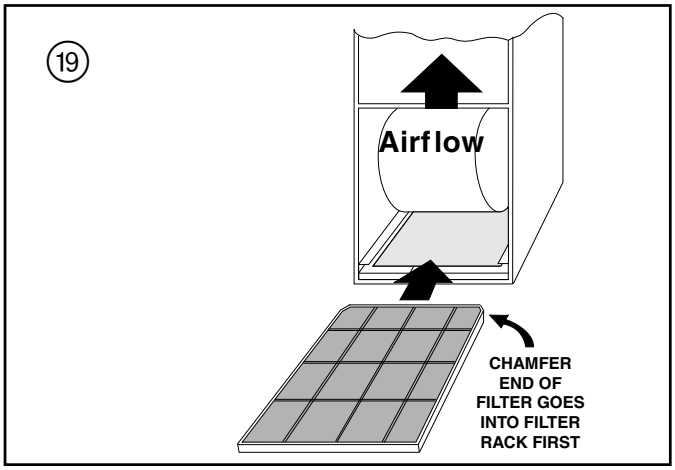
Typical Upflow Left Side Return Filter Rack Installation

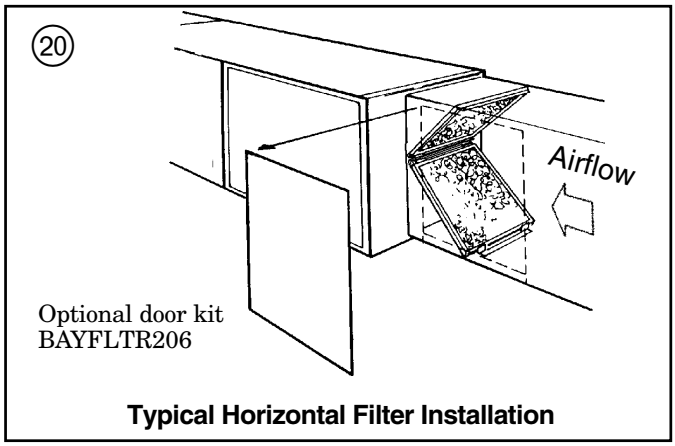
17



Typical Upflow Right Side Return Filter Rack Installation







Typical Horizontal Filter Installation

Table 4A CONVERSION KITS FOR HORIZONTAL FILTERS

MODEL NUMBERS	CABINET WIDTH	CONVERSION KIT NUMBER
*UHMB060ACV3VA *UHMB080ACV3VA	17-1/2"	BAYFLTR203
*UHMC100ACV4VA	21"	BAYFLTR204
*UHMD120ACV5VA	24-1/2"	BAYFLTR205

1. *First letter may be "A" or "T"
2. Kit includes Filters and Brackets necessary for Horizontal Filters.
3. Optional Door Kit BAYFLTR206 is also available.

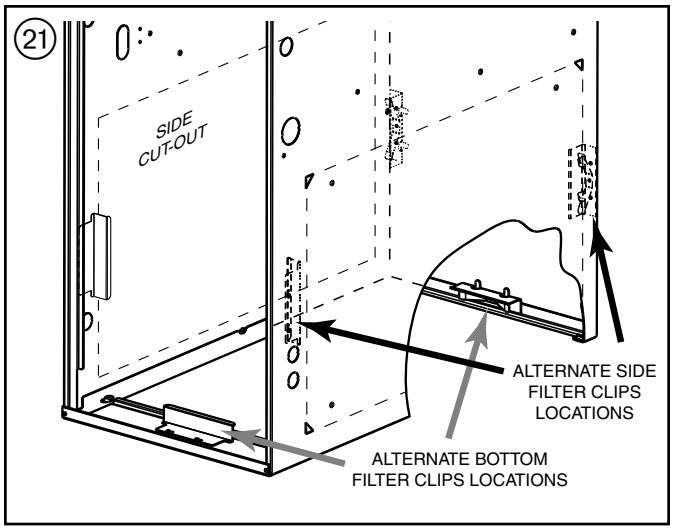
RETURN AIR FILTERS FOR UPFLOW FURNACE IN HORIZONTAL CONFIGURATION

When the upflow 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 or the filters may be installed in the duct work upstream of the furnace. See Figure 20. Conversion kits for horizontal filter installation are shown in Table 4A.

Conversion kits for horizontal filters are BAYFLTR203 for 17 1/2" width cabinets, BAYFLTR204 for 21" width cabinets, and BAYFLTR205 for 24" width cabinets. These include filters and brackets necessary for horizontal filters. In addition, optional door kit BAYFLTR206 is also available. See Figures 20 and 22.

UPFLOW FILTER CLIP/ BRACKET INSTALLATION

1. Determine the location to be used. The furnace cabinet has dimples for location of the alternate furnace clips (*Side return only*). Pre-drill clearance holes with a 3/16" drill. Bottom return holes are pre-drilled. Attach clip to bottom channel and rear of unit with screws provided for bottom return.
2. Install the clips in front and rear of the desired location using the screws provided. The filter clip with the leaf spring mounts in the rear of the cabinet. See Figure 21.



INSTALLING THE FILTER

The filter may need to be cut to fit the unit depending on the location of the return air filter.

A score line and the words "CUT HERE" are located on the end of the filter. If your application requires cutting the filter, do so as indicted by the score mark.

TABLE 5

UNIT SIZE	RETURN AIR	
	BOTTOM	SIDE
17-1/2"	DO NOT CUT	DO NOT CUT
21"	DO NOT CUT	CUT ON LINE
24-1/2"	DO NOT CUT	CUT ON LINE

TYPICAL DOWNFLOW FURNACE RETURN AIR FILTER INSTALLATIONS

Two filters are factory supplied for each downflow furnace. These furnaces require high velocity type air filters.

Downflow furnace filters must be located outside the furnace cabinet. Typical installations are shown in Figure 22. Tables 6 and 7 provide information for installation of the filter retaining brackets shipped with downflow furnaces.

TABLE 6

MODELS NUMBERS	CABINET WIDTH	FILTER QTY & SIZE
*DHMB060ACV3VB *DHMB060BCV3VA *DHMB080ACV3VA	17-1/2"	2 - 14" X 20" X 1"
*DHMC100ACV4VA	21"	2 - 16" X 20" X 1"
*DHMD120ACV5VB *DHMD120BCV5VA	24-1/2"	2 - 16" X 20" X 1"
*First letter may be "A" or "T"		

TABLE 7

LOCATING FILTER RETAINER BRACKETS IN DUCTWORK

CABINET WIDTH	RETURN DUCT WIDTH	DIMENSION "A"	DIMENSION "B"	FILTER BRACKET LOCATION*
17-1/2"	16-1/4"	15"	14"	14-3/8"
21"	19-3/4"	19-1/2"	14"	13-1/8"
24-1/2"	23-1/4"	22"	14"	13-5/8"
* LOCATION DIMENSION IS FROM END OF DUCT AGAINST THE FURNACE TO THE SCREW HOLES FOR THE BRACKET.				

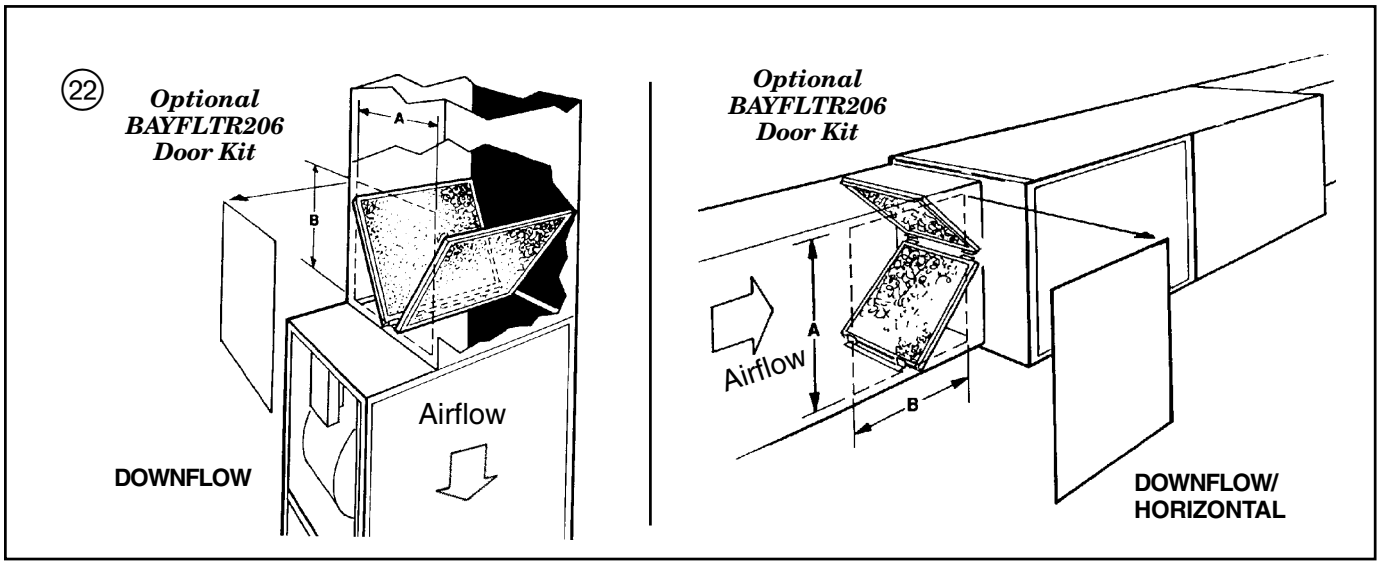


TABLE 8

MINIMUM CLEARANCE FROM COMBUSTIBLE MATERIALS FOR UPFLOW/HORIZONTAL AND DOWNFLOW/ HORIZONTAL FURNACES			
	UNIT LOCATION		
FURNACE SURFACE	VERTICAL CLOSET	HORIZONTAL CLOSET	HORIZONTAL ALCOVE / ATTIC
SIDES	0"	1"	0"
BACK	0"	3"	6"
TOP	1"	1"	1"
FRONT	3"	3"	18"
VENT	0"	0"	0"
NOTE: CLEARANCE REQUIRED AT TOP OF PLENUM IS 1"			

GENERAL VENTING INFORMATION

THIS FURNACE 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.

⚠ WARNING

CARBON MONOXIDE HAZARD
FURNACE MUST BE VENTED PROPERLY.
FAILURE TO FOLLOW THIS WARNING COULD RESULT IN CARBON MONOXIDE, FIRE OR SMOKE THAT CAN CAUSE SERIOUS BODILY INJURY, DEATH OR PROPERTY DAMAGE.

IMPORTANT:
The building owner/maintenance provider must keep the area around the vent clear from snow.

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.

American Gas Association has certified the design of condensing Furnaces for a minimum of 0" clearance from combustible materials with a single wall plastic vent pipe. See Table 8.

The recommended system is assembled from 2", 2-1/2", or 3" plastic pipe and fittings (See Table 9, page 18) for material specifications. Where the system is routed to the outdoors through an existing masonry chimney containing flue products from another gas appliance, or where required by local codes, then 3" venting of Type 29-4C stainless steel must be used in place of PVC material.

These furnaces have been classified as CATEGORY IV Furnaces in accordance with ANSI Z21.47 "latest edition" standards. Category IV Furnaces operate with positive vent pressure and with a vent gas temperature less than 140°F. above the dewpoint. 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.

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

⚠ 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:

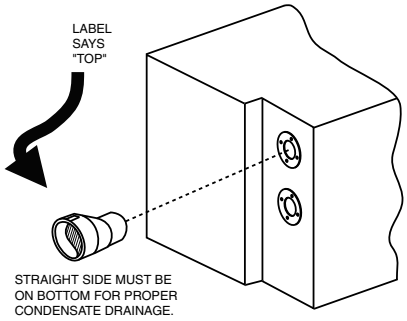
1. Seal any unused openings in the venting system.
2. Inspect the venting system for proper size and horizontal pitch, as required in the National Fuel Gas Code, ANSI Z223.1/NFPA 54 or the CSA B149.1 *Natural Gas and Propane Installation Code* and these instructions. Determine that there is no blockage or restriction, leakage, corrosion and other deficiencies which could cause an unsafe condition.
3. 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 deficiencies which could cause an unsafe condition.
4. Close fireplace dampers.
5. 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.
6. Follow the lighting instructions. Place the appliance being inspected into operation. Adjust the thermostat so appliance is operating continuously.
7. 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.
8. If improper venting is observed during any of the above tests, the venting system must be corrected in accordance with the National Fuel Gas Code, ANSI Z221.1/NFPA 54 and/or CSA B149.1 *Natural Gas and Propane Installation Code*.
9. After it has been determined that each appliance connected to the venting system properly vents where when tested as outlined above, return doors, windows, exhaust fans, fireplace dampers and any other gas-fired burning appliance to their previous condition of use.

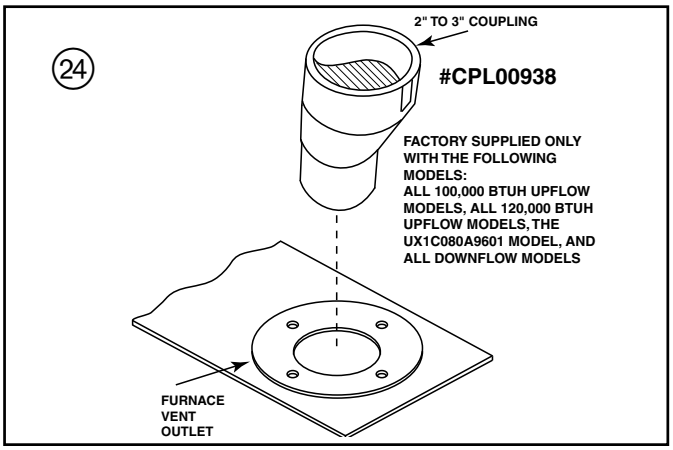
#CPL00938

WHEN THE FACTORY SUPPLIED "OFF-SET" (2X3 REDUCING COUPLING) IS USED FOR 3" VENT PIPE INSTALLATION, MAKE SURE THE MARKING "TOP" IS LOCATED ON THE TOP SIDE OF THE PIPE.

23

FACTORY SUPPLIED ONLY WITH THE FOLLOWING MODELS: ALL 100,000 BTUH UPFLOW MODELS, ALL 120,000 BTUH UPFLOW MODELS, AND ALL DOWNFLOW MODELS





HORIZONTAL INSTALLATION

(UPFLOW/ HORIZONTAL OR DOWNFLOW/ HORIZONTAL)

NOTE:

See Figures 23 & 24. In horizontal venting when the factory supplied "off-set" (2X3 reducing coupling) is used for 3" vent pipe installation, make sure the marking "Top" is located on the top side of the pipe. The straight side must be on bottom for proper condensate drainage. This coupling is factory supplied with the following models: *UHMC100, *UHMD120, & all downflow models.

⚠ WARNING

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

A variety of potential sources of carbon monoxide can be found in a building or dwelling such as gas-fired clothes dryers, gas cooking stoves, water heaters, Furnaces and fireplaces. The U.S. Consumer Product Safety Commission recommends that users of gas-burning appliances install carbon monoxide detectors as well as fire and smoke detectors per the manufacturer's installation instructions to help alert dwelling occupants of the presence of fire, smoke or unsafe levels of carbon monoxide. These devices should meet 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

NOTE:

The manufacturer of your furnace does not test any detectors and makes no representations regarding any brand or type of detector.

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.*

For ***DIRECT VENT APPLICATION:***

The furnaces must be vented to the exterior of the house and combustion air MUST come through the inlet air pipe FROM OUTSIDE AIR. The pipes ***DO NOT*** *have to exit the exterior of the house together or on the same side of the house.*

For ***NONDIRECT 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)

FURNACE VENT/ INLET PIPE INSTALLATION

⚠ WARNING

CARBON MONOXIDE POISONING HAZARD

Failure to follow the installation instructions for the venting system being placed into operation could result in carbon monoxide poisoning or death.

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 nondirect, single pipe applications (See example 2).
3. For direct vent application of these furnaces, the vent pipe and air inlet pipe do not have to exit in the same air space or even on the same surface of the structure.

However, the longest individual pipe will decide the value for the longest allowable equivalent vent/ inlet air length as shown in the vent length table.

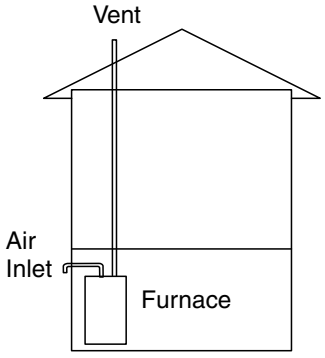
NOTE:

BAYVENT200B accessories can be used for inlet and outlet terminals when the pipes do not exit the structure together. For Canadian applications ONLY, IPEX 196006 may be used for horizontal and vertical terminations. IPEX 081216, IPEX 081218, and IPEX 081219 may be only used for horizontal vent terminations.

The following are **EXAMPLES ONLY**:

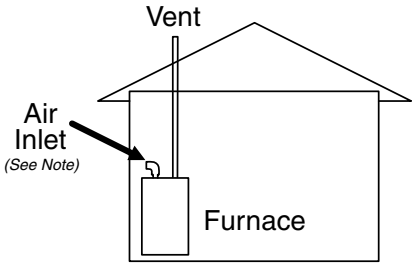
EX. 1 —

Example 1 shows that the 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.



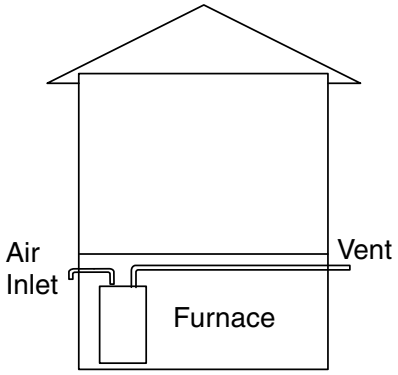
EX. 2 —

Example 2 shows the vent pipe exhausting through the roof and the inlet air coming from the interior of the house (See Note). 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 in this Installer's Guide.



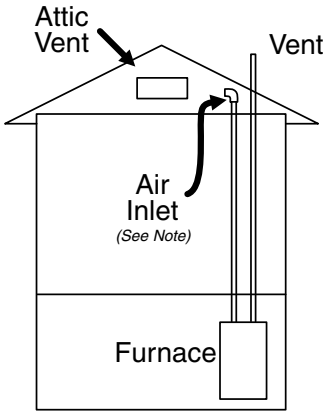
EX. 3 —

Example 3 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.



EX. 4 —

The inlet air does not have to come from outside the structure. Example 4 shows the inlet air (See Note), may come from the attic if the requirements for combustion air are met as shown in the section AIR FOR COMBUSTION AND VENTILATION.



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 equivalent feet) installed on the end to prevent dust and debris from falling directly into the Furnace.

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 Table 9 are materials that meet these requirements. The materials listed are various grades of PVC and ABS plastic.

PIPE JOINTS: All joints must be fastened and sealed to prevent escape of combustion products into the building. These materials are acceptable for U.S. applications only. All Canadian installations must conform to ULC S636.

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.

BONDING OF PVC

Commercially available solvent cement for PVC must be used to join PVC pipe fittings. Follow instructions on container carefully for U.S. applications only. Canadian applications require primer and cement that are from a single system manufacturer.

For U.S. applications only:

Pipe and Fittings – ASTM D1785, D2466, D2661, & D2665

PVC Primer and Solvent Cement – ASTM D2564.

Procedure for Cementing Joints Ref – ASTM D2855

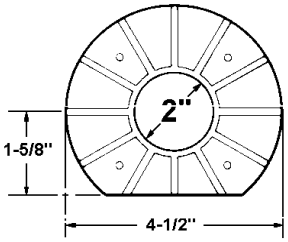
1. Cut pipe square, remove ragged edges and burrs. Chamfer end of pipe, then clean fitting socket and pipe joint area of all dirt, grease, moisture or chips.
2. After checking pipe and socket for proper fit, wipe socket and pipe with cleaner-primer. Apply a liberal coat of primer to inside surface of socket and outside of pipe.

DO NOT ALLOW PRIMER TO DRY BEFORE APPLYING CEMENT.

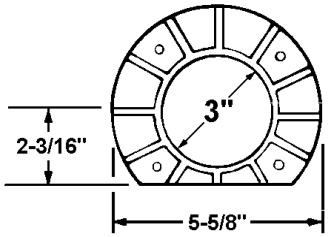
3. Apply a thin coat of cement evenly in the socket. Quickly apply a heavy coat of cement to the pipe end and insert pipe into fitting with a slight twisting movement until it bottoms out.
4. Hold the pipe in the fitting for 30 seconds to prevent tapered socket from pushing the pipe out of the fitting.

TABLE 9

PVC VENT FITTING MATERIAL These fittings are available from your Gas Furnace Distributors for U.S. applications only.



WALL MOUNT FLANGE
BAY69X148
KIT02282



WALL MOUNT FLANGE
BAY69X147
KIT02281

PLASTIC PIPE DESIGNATIONS			
PVC			
ASTM STANDARD	PIPE TYPE	ALLOWABLE TEMPERATURE	MARKING
F891	CELLULAR CORE	*158	ASTM F891
D2665	DWV PIPE	**158	ASTM D2665
D1785	SCH 40, 80, 120	**158	ASTM D1785
D2241	SDR SERIES	**158	ASTM D2241
CPVC			
ASTM STANDARD	PIPE TYPE	ALLOWABLE TEMPERATURE	MARKING
D2846	CPVC 41	**212	ASTM D2846
F441	SCH 40, 80	**212	ASTM F441
F442	SDR SERIES	**212	ASTM F442
ABS			
ASTM STANDARD	PIPE TYPE	ALLOWABLE TEMPERATURE	MARKING
D2661	SCH 40 DWV	***180	ASTM D2661
F628	SCH 40 DWV CELLULAR CORE	***180	ASTM F628

* - Allowable temperatures based on classifications covered in ASTM D4396 [Deflection Temps Under Load (264 PSI)]
** - Allowable temperatures based on classifications covered in ASTM D1784 [Deflection Temps Under Load (264 PSI)]
*** - Allowable temperatures based on classifications covered in ASTM D3965 [Deflection Temps Under Load (264 PSI)]

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.

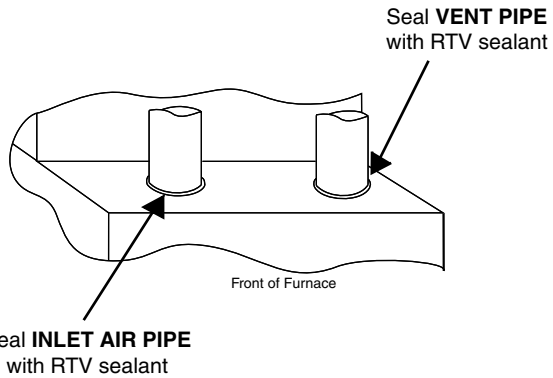
NOTE:
Follow venting instructions carefully when using PVC cement.

IMPORTANT:
All joints must be water tight. Flue condensate is somewhat acidic, and leaks can cause equipment damage.

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 degrees 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.

(25) VENT AND INLET AIR CONNECTIONS



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.

TABLE 10

VENT LENGTH TABLE - MODULATING FURNACE						
ALTITUDE	MAXIMUM TOTAL EQUIVALENT LENGTH IN FEET FOR VENT AND INLET AIR (SEE NOTES)					
0-7000 Feet	2 INCH PIPE		2.5 INCH PIPE		3 or 4 INCH PIPE	
	NATURAL GAS	PROPANE	NATURAL GAS	PROPANE	NATURAL GAS	PROPANE
UH/DHMB060ACV3V DHMB060BCV3VA	200	Not Allowed	200	Not Allowed	200	150
UH/DHMB080ACV3V	50	Not Allowed	120	Not Allowed	200	150
UH/DHMC100ACV4V	Not Allowed	Not Allowed	60	Not Allowed	200	150
UHMD120ACV5V	Not Allowed	Not Allowed	Not Allowed	Not Allowed	200	150
DHMD120ACV5VB DHMD120BCV5VA	Not Allowed	Not Allowed	Not Allowed	Not Allowed	200	100
7000-9500 Feet	2 INCH PIPE		2.5 INCH PIPE		3 or 4 INCH PIPE	
	NATURAL GAS	PROPANE	NATURAL GAS	PROPANE	NATURAL GAS	PROPANE
UH/DHMB060ACV3V DHMB060BCV3VA	100	Not Allowed	100	Not Allowed	100	100
UH/DHMB080ACV3V	25	Not Allowed	60	Not Allowed	100	100
UH/DHMC100ACV4V	Not Allowed	Not Allowed	30	Not Allowed	100	100
UHMD120ACV5V	Not Allowed	Not Allowed	Not Allowed	Not Allowed	100	100
DHMD120ACV5VB DHMD120BCV5VA	Not Allowed	Not Allowed	Not Allowed	Not Allowed	100	50
9500-12000 Feet	2 INCH PIPE		2.5 INCH PIPE		3 or 4 INCH PIPE	
	NATURAL GAS	PROPANE	NATURAL GAS	PROPANE	NATURAL GAS	PROPANE
UH/DHMB060ACV3V DHMB060BCV3VA	50	Not Allowed	50	Not Allowed	50	38
UH/DHMB080ACV3V	Not Allowed	Not Allowed	30	Not Allowed	50	38
UH/DHMC100ACV4V	Not Allowed	Not Allowed	Not Allowed	Not Allowed	50	38
UHMD120ACV5V	Not Allowed	Not Allowed	Not Allowed	Not Allowed	50	38
DHMD120ACV5VB DHMD120BCV5VA	Not Allowed	Not Allowed	Not Allowed	Not Allowed	50	25

Notes: * - First letter may be "A" or "T", ** - Last two digits may be "A" thru "Z"

1. Minimum vent length for all models: 3' horizontal or 3' vertical
2. 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.
3. 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).
4. One SHORT radius 90° elbow is equivalent to 10' of 3" pipe and one LONG radius elbow is equivalent to 6' of 3" pipe. One 90° elbow is equivalent to 7½' of 2½" pipe or 5' of 2" pipe. Two 45° elbows equal one 90° elbow.
5. The termination tee or bend must be included in the total number of elbows. If the BAYAIR30AVENTA termination kit is used, the equivalent length of pipe is 5 feet. BAYVENT200B equivalent length is 0 feet.
6. Pipe adapters are field supplied. Downflow models, UHM 100 and UHM 120 models include the 2" x 3" adapter.
7. For Canadian applications ONLY, IPEX 196006 may be used for horizontal and vertical terminations. IPEX 081216, IPEX 081218, and IPEX 081219 may only be used for horizontal vent terminations. Equivalent lengths are IPEX 196009 = 5 feet, IPEX 081216 = 11 feet, IPEX 081218 = 16 feet, and IPEX 081219 = 21 feet

Connection of the vent pipe to the vent collar should also be accomplished using RTV type sealant. This type sealant provides a connection which remains flexible and can be separated in the future if service needs require the removal of the Vent Pipe for service or clearance.

The vent length Table 10 above shows the required vent lengths for installations at various altitudes. Optional high altitude kits are available for installations above 5000 feet (Installations above 12,000 feet are not allowed) as follows:

For *UHM/DHMB060 use BAYSWT07AHALTA.

For *UHM/DHMB080, C100 use BAYSWT09AHALTA.

For *UHM/DHMD120 use BAYSWT08AHALTA.

For Canadian applications, use the appropriate tables in the latest edition of the National Fuel Gas Code (ANSI Z223.1 • CAN/CGA B149.1 Installation Codes or "Exhibit J" of ANSI Z21.47 • CAN/CGA-2.3 Standards. "Exhibit J" includes examples and drawings of typical venting systems.

⚠ WARNING

CARBON MONOXIDE POISONING HAZARD
DO NOT REPLACE ANY OF THE FACTORY SUPPLIED VENTING COMPONENTS WITH FIELD FABRICATED PARTS. FAILURE TO FOLLOW THIS SAFETY WARNING EXACTLY COULD RESULT IN DAMAGED VENTS, DAMAGED COMPONENTS, CARBON MONOXIDE POISONING, OR DEATH.

HORIZONTAL VENTING

NOTE:
Vent termination kit BAYAIR30AVENTA or BAYVENT200B may be used in addition to the horizontal and vertical termination options shown in Figure 26. See Figure 31.
For Canadian applications ONLY: IPEX 196006 may be used for horizontal and vertical terminations. IPEX 081216, IPEX 081218, and IPEX 081219 may only be used for horizontal vent terminations.

⚠ CAUTION

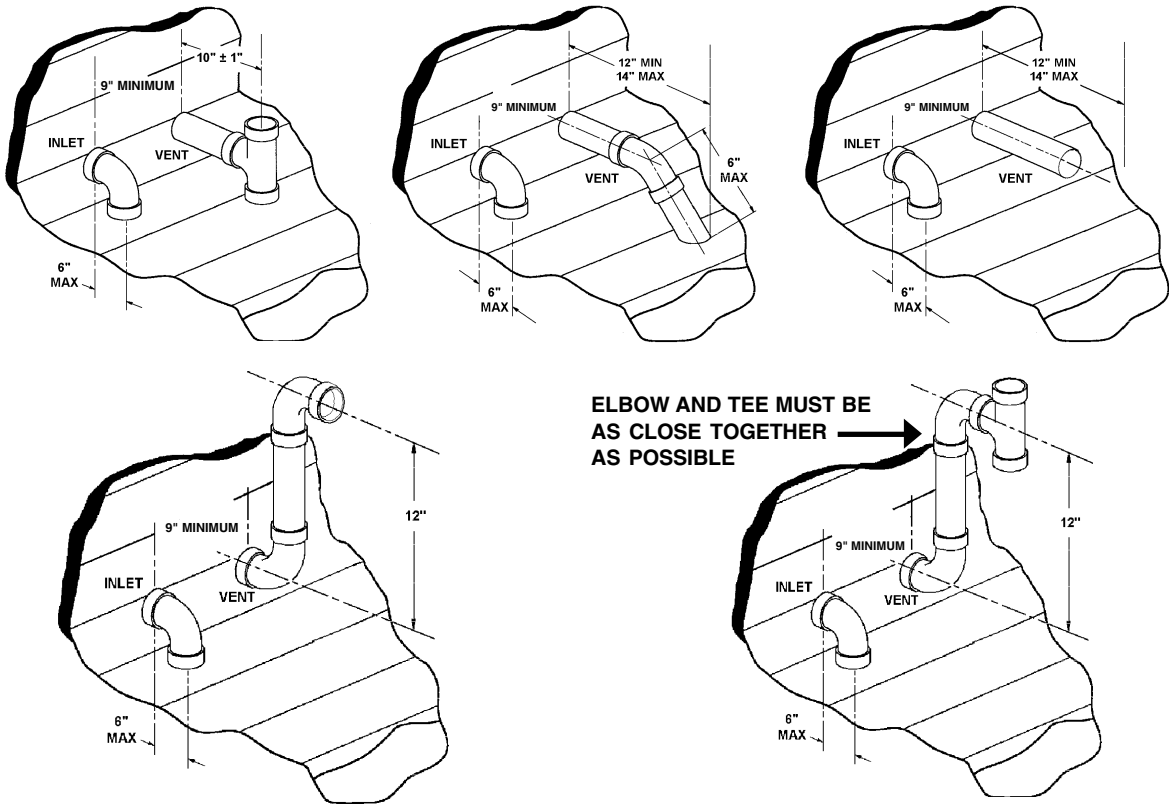
When the vent pipe is exposed to temperatures below freezing, i.e., when it passes through unheated spaces, etc., the pipe must be insulated with 1/2 inch (22.7 mm) thick Armaflex-type insulation or equal. If the space is heated sufficiently to prevent freezing, then the insulation would not be required. If domestic water pipes are not protected from freezing then the space meets the condition of a heated space.

VENTING THROUGH THE ROOF

When penetrating roof with a 2" PVC Vent Pipe, a 2" electrical conduit flashing may be used for a weather tight seal. Lubricate flexible seal on flashing before PVC pipe is pushed through the seal. (Field Supplied)

NOTE:
No Vent Cap as shown in Figure 35 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.

26



POSSIBLE CONFIGURATIONS FOR TWO PIPE VENTING SYSTEMS

HORIZONTAL VENTING THROUGH WALL

***IMPORTANT*:**

The building owner/maintenance provider must keep the area around the vent clear from snow.

These furnaces may be installed as direct vent (as shipped) or as non-direct vent. Installation must conform to national, state, and local codes.

The vent & inlet terminals must be located at least 12" minimum above normally expected snow accumulation level. See Figure 29.

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

Location of the vent/ wind terminal should be chosen to meet the requirements of Figure 30 and Tables 11 and 12 for either direct or non-direct vent applications.

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

FLUE GAS DEGRADATION – The moisture content of the flue gas may have a detrimental effect on some building materials. This can be avoided by using the roof or chimney venting option. When wall venting is used on any surface that can be affected by this 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.

⚠ CAUTION

The vent for this appliance shall not terminate

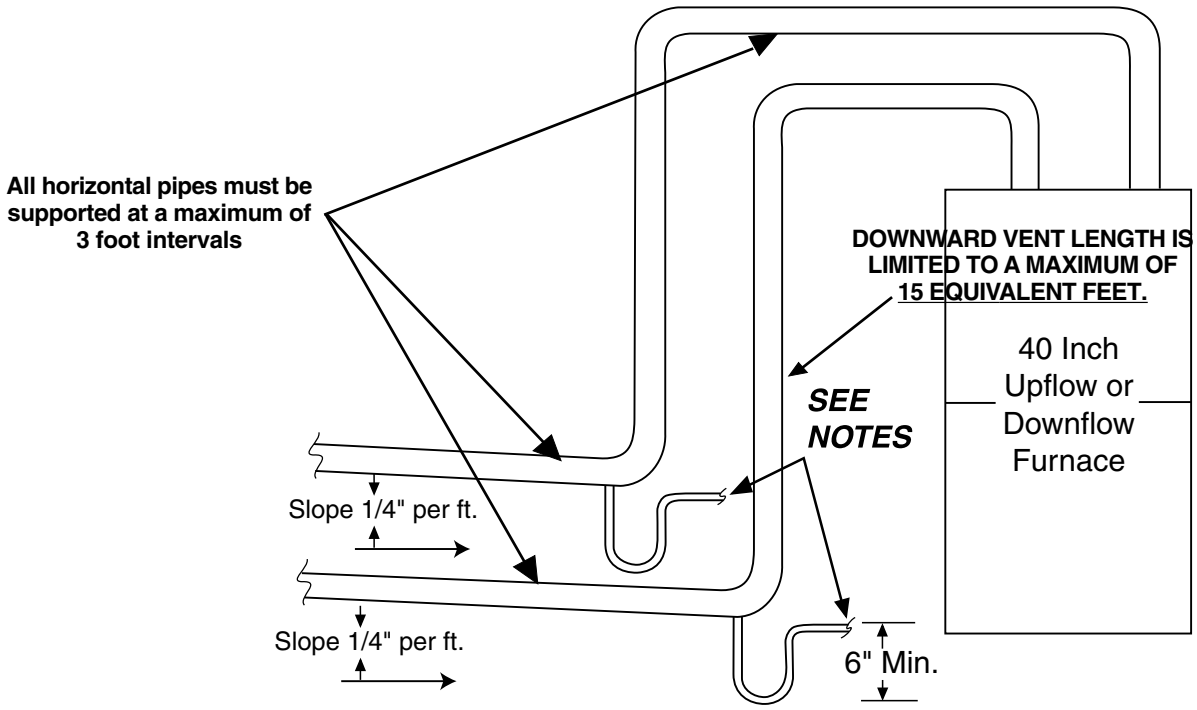
(1) Over public walkways; or

(2) Near soffit vents or crawl space vents or other areas where condensate or vapor could create a nuisance or hazard or cause property damage; or

(3) Where condensate vapor could cause damage or could be detrimental to the operation of regulators, relief valves, or other equipment.

㉗ DOWNWARD VENTING

Furnace may be in vertical or horizontal configuration.



NOTES:

A) Condensate trap for Vent Pipe must be a minimum of 6 inches in height.

B) 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's condensate trap. 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.

C) The condensate trap should be primed at initial start up prior to heating season operation.

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 720 and be ANSI/UL 2034 listed and IAS certified. The manufacturer of the furnace does not test any carbon monoxide detectors and makes no representation regarding any brand of carbon monoxide detector.

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 5.08(2)(a)1 through 4.

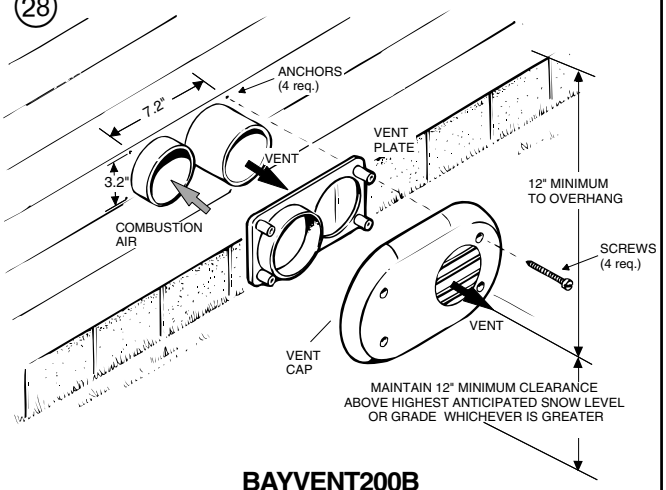
This appliance requires a special venting system. If BAYAIR30AVENTA or BAYVENT200B are used, a copy of the installation instructions for the kit shall remain with the appliance or equipment at the completion of installation. The venting system installation instructions can be obtained from the manufacturer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

Residential Systems
6200 Troup Highway
Tyler, TX 75707
Attention: Manager of Field Operations Excellence

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.

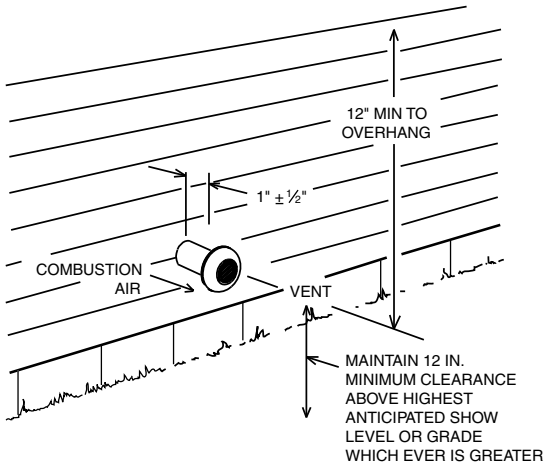
28



BAYVENT200B

For Canadian applications only, IPEX 196006, IPEX 081216, IPEX 081218, and IPEX 081219 may be used for horizontal vent terminations.

29



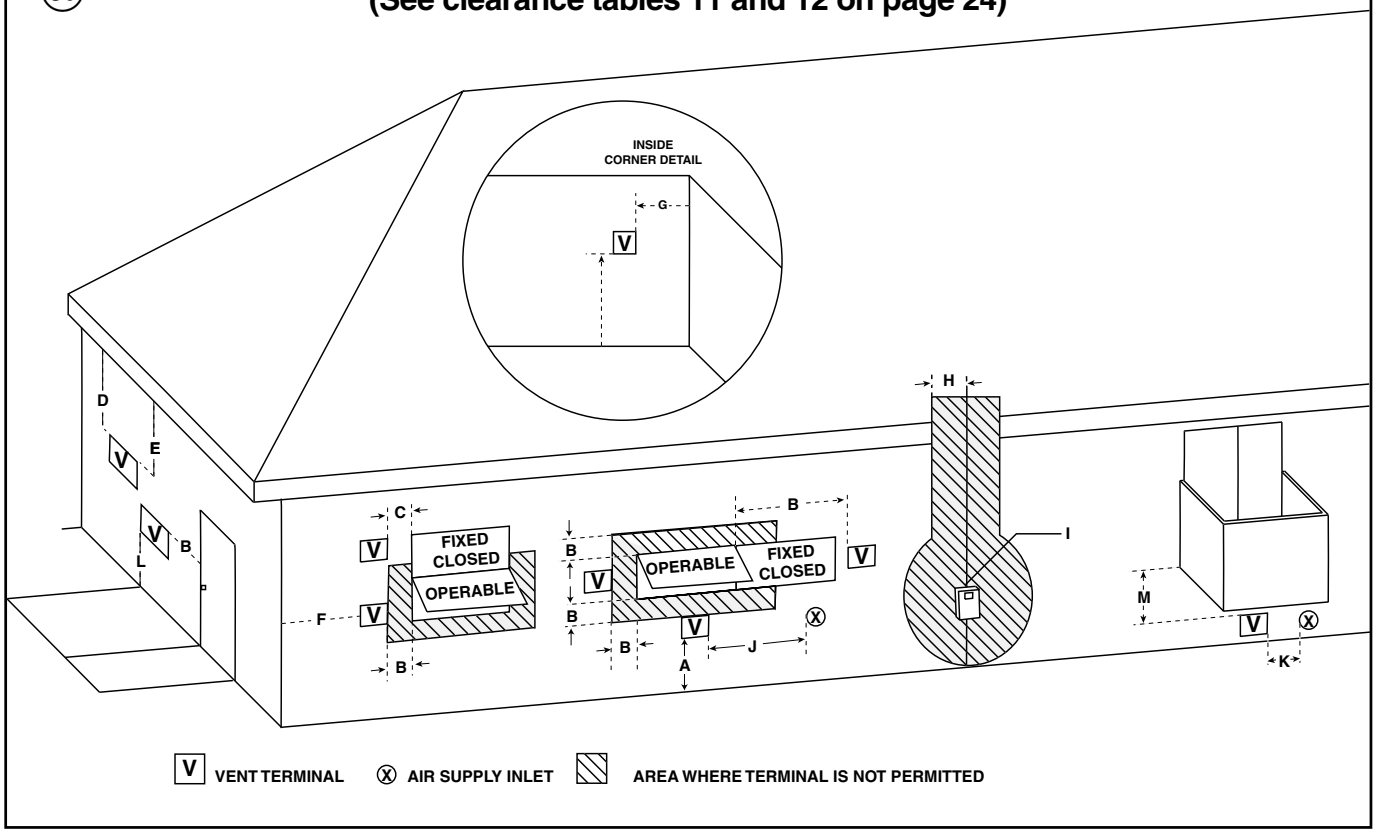
BAYAIR30AVENTA (Side wall)

CONCENTRIC VENT SIDE WALL INSTALLATION

For Canadian applications only, IPEX 196006, IPEX 081216, IPEX 081218, and IPEX 081219 may be used for horizontal vent terminations.

30

HORIZONTAL VENT CLEARANCES (See clearance tables 11 and 12 on page 24)



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 supplied locally.

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.

Table 11	Non-Direct Vent Terminal Clearances		
		Canadian Installations	US Installations
A=	Clearance above grade, veranda, porch, deck, or balcony	12 inches (30 cm)	12 inches (30 cm)
B=	Clearance to window or door that may be opened	6 inches (15 cm) for appliances =/< 10,000 Btuh (3 kw), 12 inches (30 cm) for appliances > 10,000 Btuh (3 kw) and =/< 100,000 Btuh (30 kw), 36 inches (91 cm) for appliances > 100,000 Btuh (30 kw)	4 feet (1.2m) below or to the side of opening; 1 foot (0.3m) above opening.
C=	Clearance to permanently closed window	*	*
D=	Vertical clearance to ventilated soffit located above the terminal within a horizontal distance of 2 feet (61 cm) from the center line of the terminal	*	*
E=	Clearance to unventilated soffit	*	*
F=	Clearance to outside corner	*	*
G=	Clearance to inside corner	*	*
H=	Clearance to each side of center line extended above meter/regulator assembly	3 feet (91 cm) with a height 15 feet (4.5 m) above the meter/regulator assembly	*
I=	Clearance to service regulator vent outlet	3 feet (91 cm)	*
J=	Clearance to nonmechanical air supply inlet to building or the combustion air inlet to any other appliance	6 inches (15 cm) for appliances =/< 10,000 Btuh (3 kw), 12 inches (30 cm) for appliances > 10,000 Btuh (3 kw) and =/< 100,000 Btuh (30 kw), 36 inches (91 cm) for appliances > 100,000 Btuh (30 kw)	4 feet (1.2 m) below or to side of opening; 1 foot (300 m) above opening
K=	Clearance to a mechanical air supply inlet	6 feet (1.83m)	3 feet (91 cm) above if within 10 feet (3m) horizontally
L=	Clearance above a paved sidewalk or paved driveway located on public property	7 feet (2.13 m) †	7 feet (2.13 m)
M=	Clearance under veranda, porch, deck, or balcony	12 inches (30 cm) ‡	*

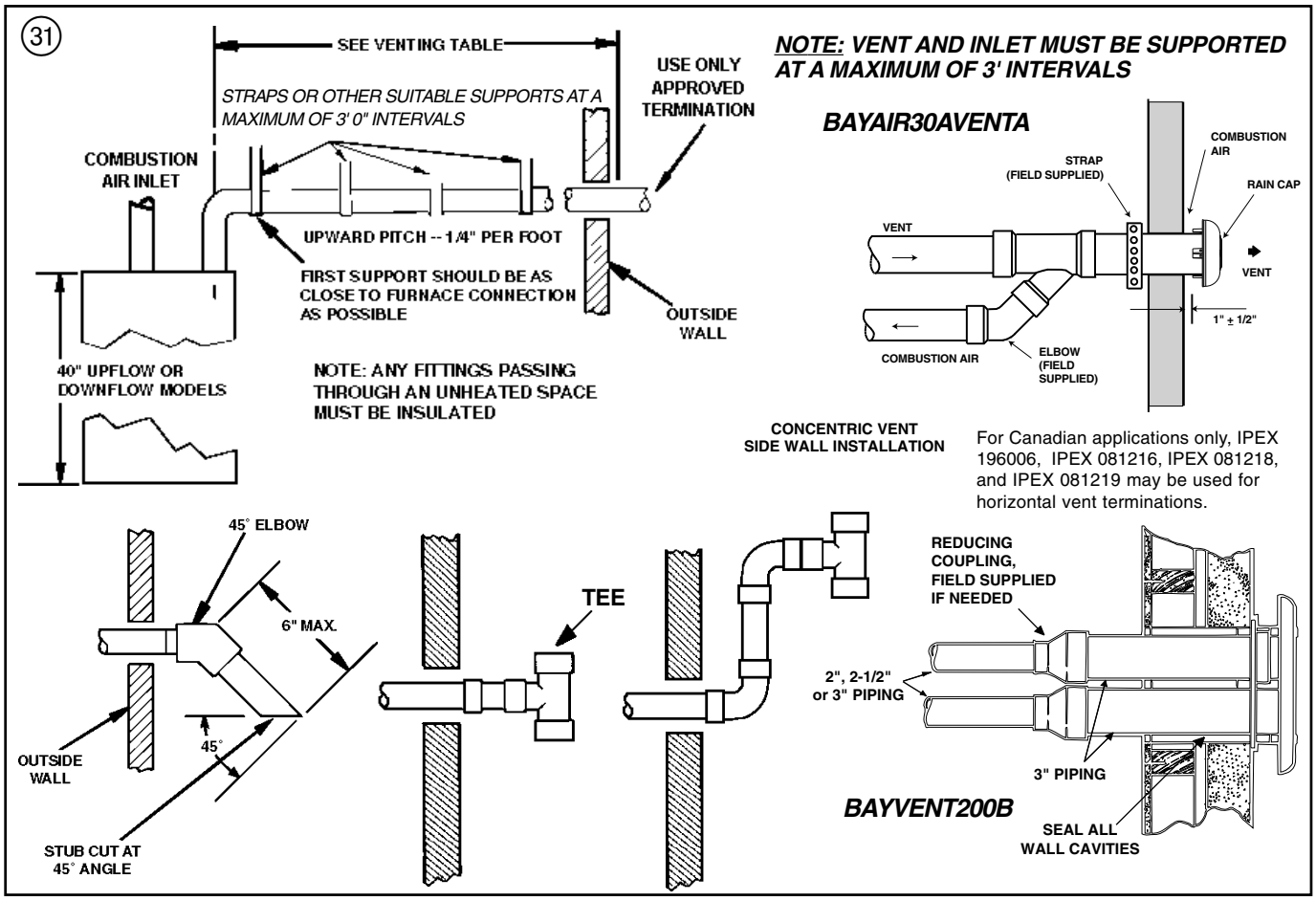
Notes:
1. In accordance with the current CSA B149.1 Natural Gas and Propane Installation Code.
2. In accordance with the current ANSI Z223.1/NFPA 54 National Fuel Gas Code.

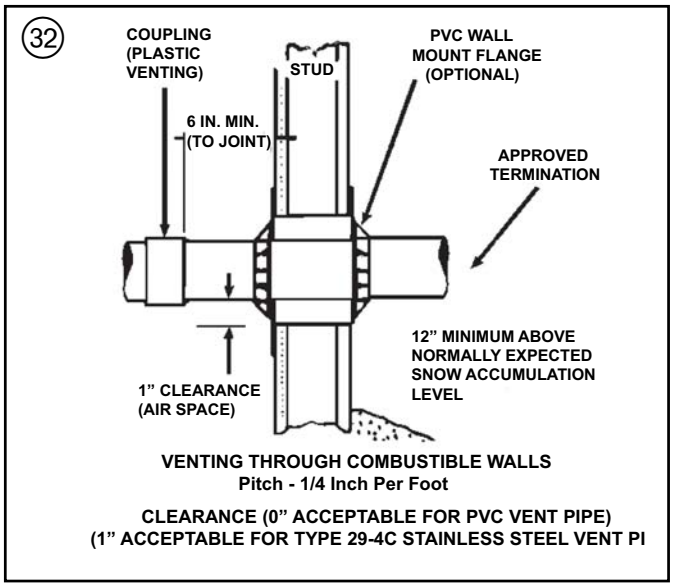
†. A vent shall not terminate directly above a sidewalk or paved driveway that is located between two single family dwelling and serves both dwellings.
‡. Pemitted only if veranda, porch, deck, or balcony is fully open on a minimum of two sides beneath the floor.
* Clearance in accordance with local installation codes and the requirements of the gas supplier and the manufacturer's Installation Instructions.

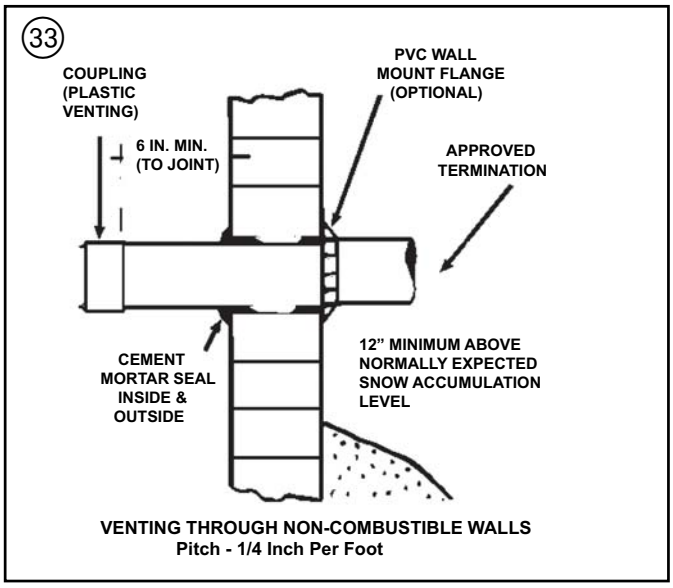
Table 12	Direct Vent Terminal Clearances		
		Canadian Installations	US Installations
A=	Clearance above grade, veranda, porch, deck, or balcony	12 inches (30 cm)	12 inches (30 cm)
B=	Clearance to window or door that may be opened	6 inches (15 cm) for appliances =/< 10,000 Btuh (3 kw), 12 inches (30 cm) for appliances > 10,000 Btuh (3 kw) and =/< 100,000 Btuh (30 kw), 36 inches (91 cm) for appliances > 100,000 Btuh (30 kw)	6 inches (15 cm) for appliances =/< 10,000 Btuh (3 kw), 9 inches (23 cm) for appliances > 10,000 Btuh (3 kw) and =/< 50,000 Btuh (15 kw), 12 inches (30 cm) for appliances > 50,000 Btuh (15 kw)
C=	Clearance to permanently closed window	*	*
D=	Vertical clearance to ventilated soffit located above the terminal within a horizontal distance of 2 feet (61 cm) from the center line of the terminal	*	*
E=	Clearance to unventilated soffit	*	*
F=	Clearance to outside corner	*	*
G=	Clearance to inside corner	*	*
H=	Clearance to each side of center line extended above meter/regulator assembly	3 feet (91 cm) with a height 15 feet (4.5 m) above the meter/regulator assembly	*
I=	Clearance to service regulator vent outlet	3 feet (91 cm)	*
J=	Clearance to nonmechanical air supply inlet to building or the combustion air inlet to any other appliance	6 inches (15 cm) for appliances =/< 10,000 Btuh (3 kw), 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)	6 inches (15 cm) for appliances =/< 10,000 Btuh (3 kw), 9 inches (23 cm) for appliances > 10,000 Btuh (3 kw) and =/< 50,000 Btuh (15 kw), 12 inches (30 cm) for appliances > 50,000 Btuh (15 kw)
K=	Clearance to a mechanical air supply inlet	6 feet (1.83m)	3 feet (91 cm) above if within 10 feet (3m) horizontally
L=	Clearance above a paved sidewalk or paved driveway located on public property	7 feet (2.13 m) †	*
M=	Clearance under veranda, porch, deck, or balcony	12 inches (30 cm) ‡	*

Notes:
1. In accordance with the current CSA B149.1 Natural Gas and Propane Installation Code.
2. In accordance with the current ANSI Z223.1/NFPA 54 National Fuel Gas Code.

†. A vent shall not terminate directly above a sidewalk or paved driveway that is located between two single family dwelling and serves both dwellings.
‡. Pemitted only if veranda, porch, deck, or balcony is fully open on a minimum of two sides beneath the floor.
* Clearance in accordance with local installation codes and the requirements of the gas supplier and the manufacturer's Installation Instructions.







COMBUSTIBLE MATERIAL WALL

A minimum clearance of 1" to combustible materials must be maintained when using single wall stainless steel venting. See Figure 32.

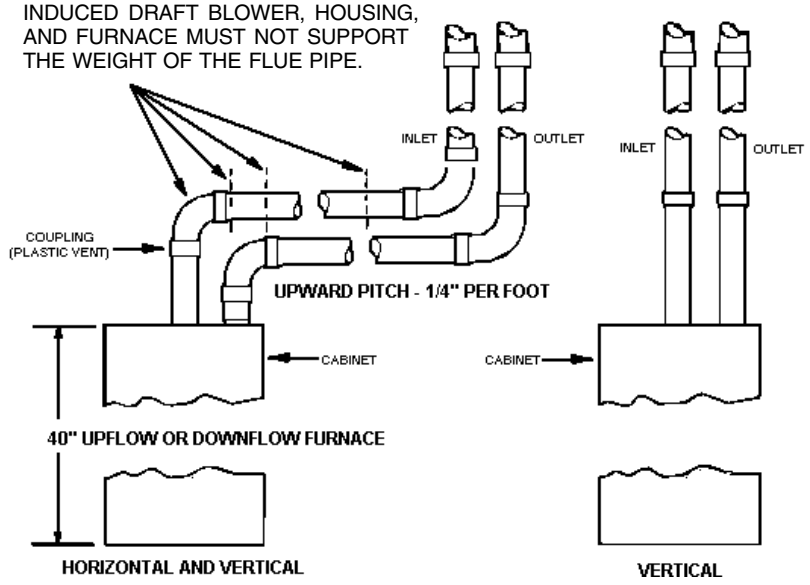
Shield material to be a minimum of 24 gauge stainless or aluminized sheet metal. Minimum dimensions are 12"x12". Shield must be fastened to both inside and outside of wall. Use screws or anchor type fasteners suited to the outside or inside wall surfaces.

NONCOMBUSTIBLE MATERIAL WALL

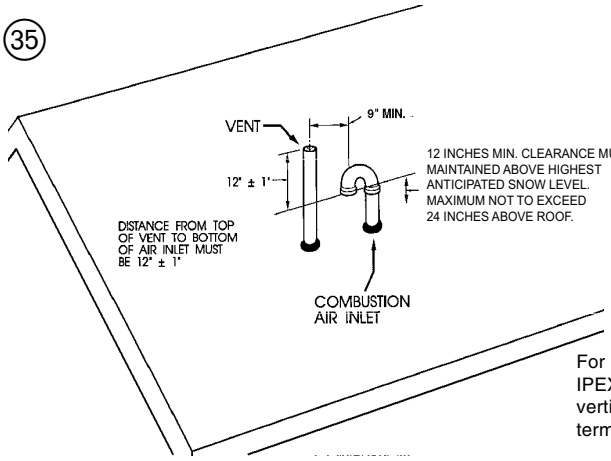
The hole through the wall must be large enough to maintain pitch of vent and properly seal.

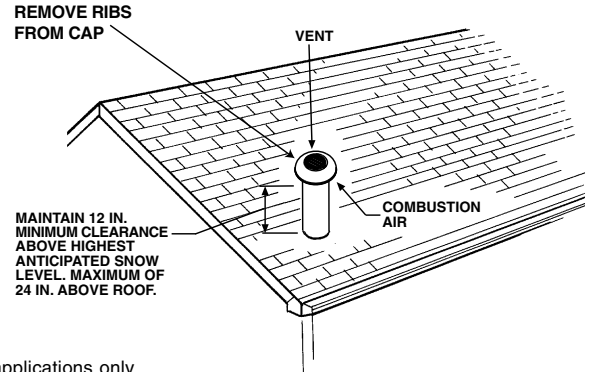
Use cement mortar seal on inside and outside of wall. See Figure 33.

34 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.



35

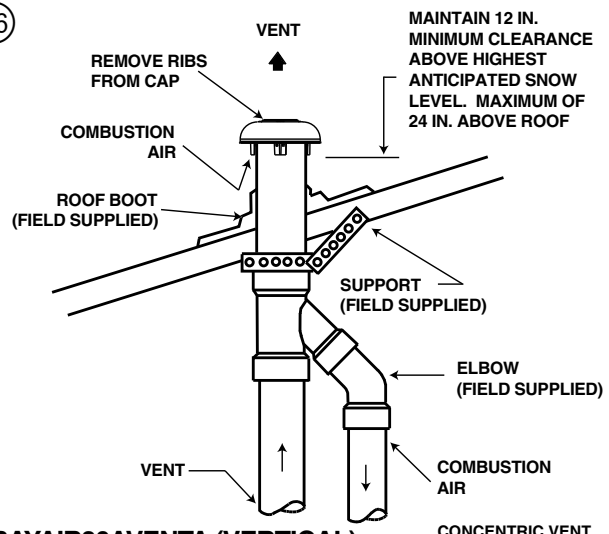




For Canadian applications only, IPEX 196006 may be used for vertical or horizontal vent terminations.

CONCENTRIC VENT ROOF TOP APPLICATION

36

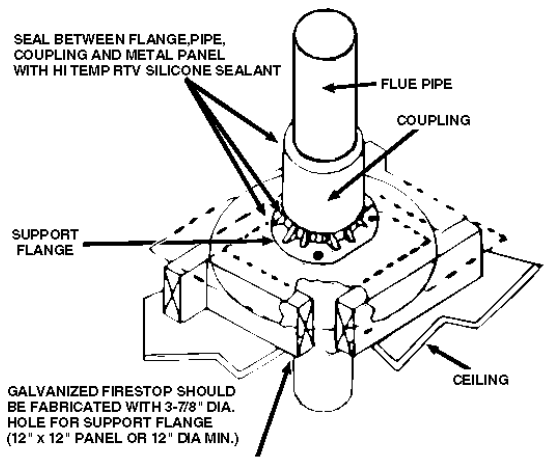


BAYAIR30AVENTA (VERTICAL)

CONCENTRIC VENT ROOF INSTALLATION

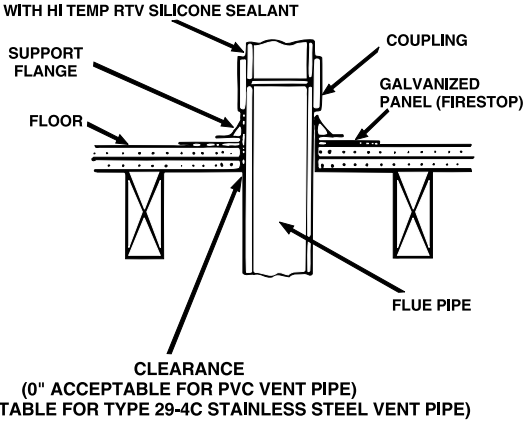
For Canadian applications only, IPEX 196006 may be used for vertical or horizontal vent terminations.

37



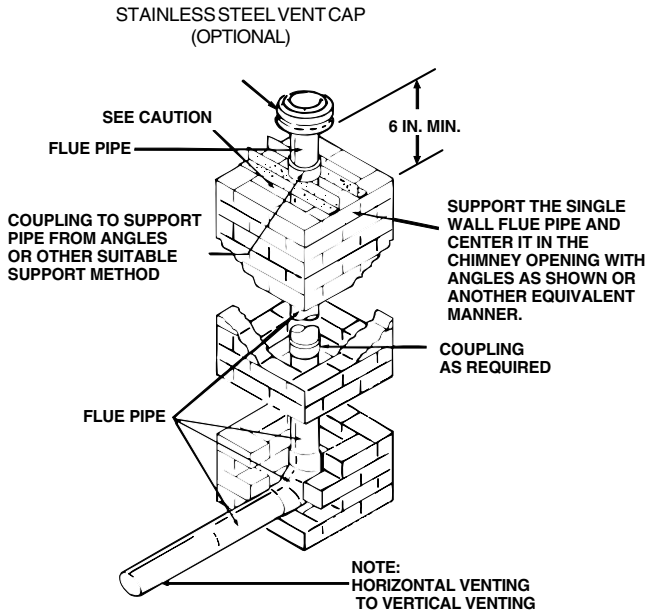
VENTING THROUGH CEILING

38



39

PVC PLASTIC VENTING – ONLY THROUGH UNUSED CHIMNEY



⚠ CAUTION

Do NOT run vent through chimney for wood burning or oil Furnaces or incinerators or any other gas appliance.

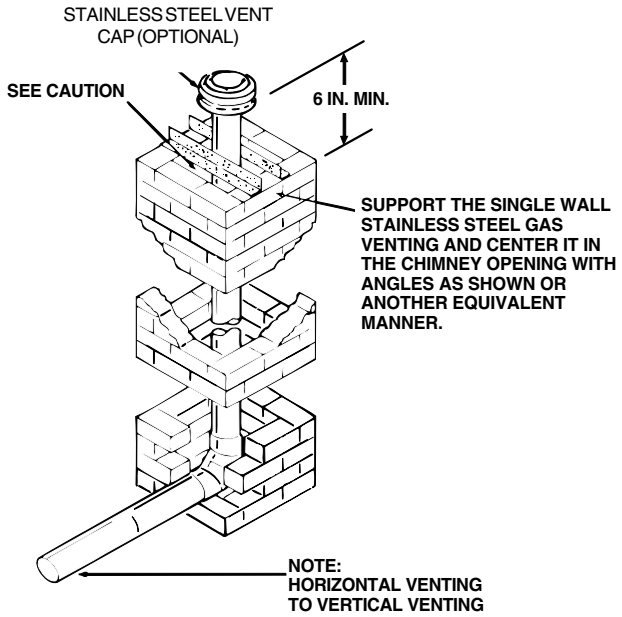
IMPORTANT –

The single wall flue pipe joints must be sealed.

The 90° elbow connection to vertical pipe must be sealed to prevent condensate leakage to base of masonry chimney.

40

TYPE 29-4C STAINLESS STEEL VENTING – USED THROUGH CHIMNEY THAT VENTS ANOTHER GAS APPLIANCE



⚠ CAUTION

Do NOT run vent through chimney for wood burning or oil Furnaces or incinerators.

If remaining free area between single wall flue pipe and masonry chimney is to be used for another gas appliance venting area must be sufficient to vent that appliance and that appliance must be connected to chimney with separate entry openings.

IMPORTANT –

The single wall flue pipe joints must be sealed.

The 90° elbow connection to vertical pipe must be sealed to prevent condensate leakage to base of masonry chimney.

ELECTRICAL CONNECTIONS

⚠ CAUTION

Protect from Property Damage
Do NOT connect the furnace line voltage to a GFCI protected circuit.
Failure to follow this warning could result in property damage.

Make wiring connections to the unit as indicated on the following field 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. Provision for hooking up an Electronic Air Cleaner and/ or Humidifier is provided on the Integrated Control.

Refer to the SERVICE FACTS literature and unit wiring diagram attached to the furnace.

NOTE:
The maximum total cable length for the entire Comfort Control communicating system is 500 ft. 18 AWG. The maximum distance of any single cable from a transformer is 250 ft. 18 AWG.

NON-COMMUNICATING WHOLE HOUSE AIR CLEANER

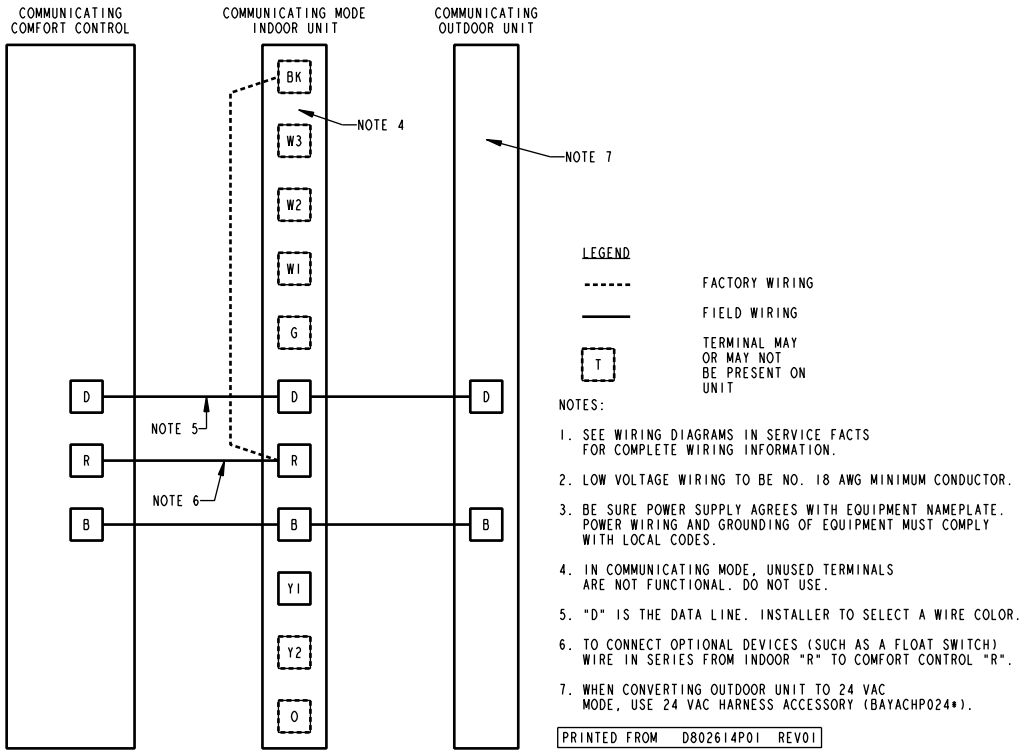
NOTE:
When connecting a *FD whole house air cleaner with this furnace, order BAYACCECOMM101.

NOTE:
The BAYACCECOMM101 must be used when connecting a *FD whole house air cleaner to a furnace in communicating mode. For 24 volt mode, see the installation in the whole house air cleaner Installer's Guide.

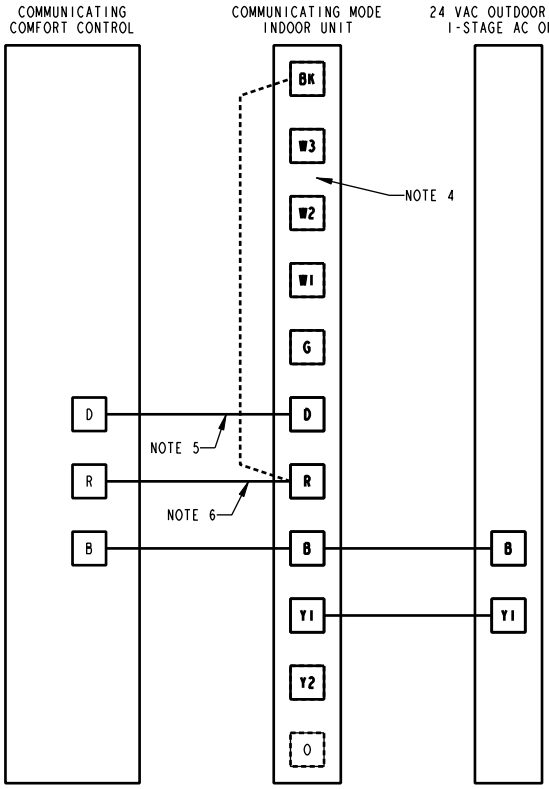
NOTE:
The B/C terminal will require three wires to be connected. Rather than connecting the three wired to the low voltage terminal strip, create a pigtail using a short length of thermostat wire and a wire nut (field supplied) to attach to the B/C terminal.

(41) Field Wiring Diagrams

41A -Communicating Indoor Unit with Communicating Comfort Control and Communicating Outdoor Unit



41B - Communicating Indoor Unit with Communicating Comfort Control and 24VAC Single Stage Cooling



LEGEND

------ FACTORY WIRING

——— FIELD WIRING

T TERMINAL MAY OR MAY NOT BE PRESENT ON UNIT

NOTES:

1. SEE WIRING DIAGRAMS IN SERVICE FACTS FOR COMPLETE WIRING INFORMATION.
2. LOW VOLTAGE WIRING TO BE NO. 18 AWG MINIMUM CONDUCTOR.
3. BE SURE POWER SUPPLY AGREES WITH EQUIPMENT NAMEPLATE. POWER WIRING AND GROUNDING OF EQUIPMENT MUST COMPLY WITH LOCAL CODES.
4. IN COMMUNICATING MODE, UNUSED TERMINALS ARE NOT FUNCTIONAL. DO NOT USE.
5. "D" IS THE DATA LINE. INSTALLER TO SELECT A WIRE COLOR.
6. TO CONNECT OPTIONAL DEVICES (SUCH AS A FLOAT SWITCH) WIRE IN SERIES FROM INDOOR "R" TO COMFORT CONTROL "R".

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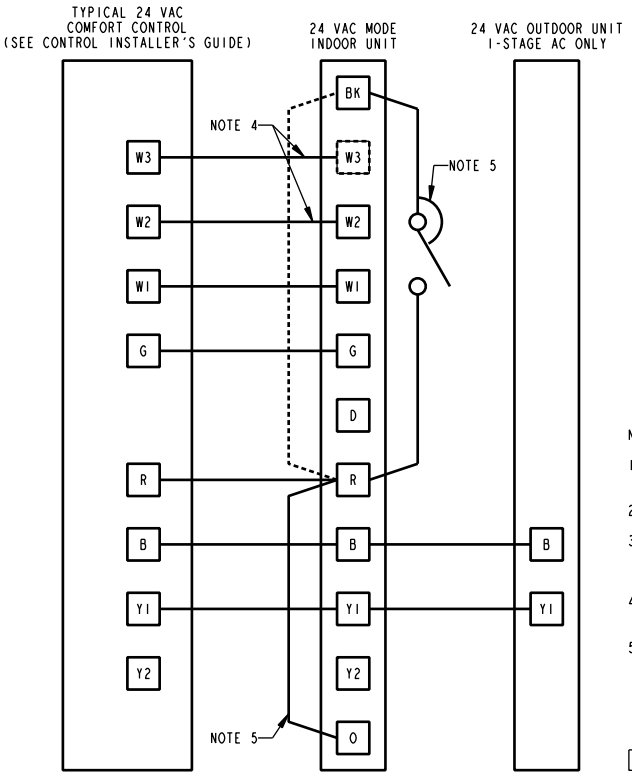
41C - 24 VAC Mode Indoor Unit with 24 VAC Comfort Control and 24VAC Single Stage Cooling



LEGEND

------ FACTORY WIRING

——— FIELD WIRING

T TERMINAL MAY OR MAY NOT BE PRESENT ON UNIT

NOTES:

1. SEE WIRING DIAGRAMS IN SERVICE FACTS FOR COMPLETE WIRING INFORMATION.
2. LOW VOLTAGE WIRING TO BE NO. 18 AWG MINIMUM CONDUCTOR.
3. BE SURE POWER SUPPLY AGREES WITH EQUIPMENT NAMEPLATE. POWER WIRING AND GROUNDING OF EQUIPMENT MUST COMPLY WITH LOCAL CODES.
4. OPTIONAL FIELD WIRING. CONNECT ONLY IF THESE HEATING STAGES ARE USED.
5. CONNECTIONS TO "R" , "BK", AND "O" MUST BE MADE AS SHOWN FOR PROPER OPERATION WITH OPTIONAL HUMIDISTAT IN COOLING. FACTORY "R" TO "BK" JUMPER ON TERMINAL BLOCK MUST BE REMOVED ON AIR HANDLING UNITS. FACTORY "R" TO "BK" JUMPER ON FURNACE CONTROL MUST BE CUT ON FURNACES.

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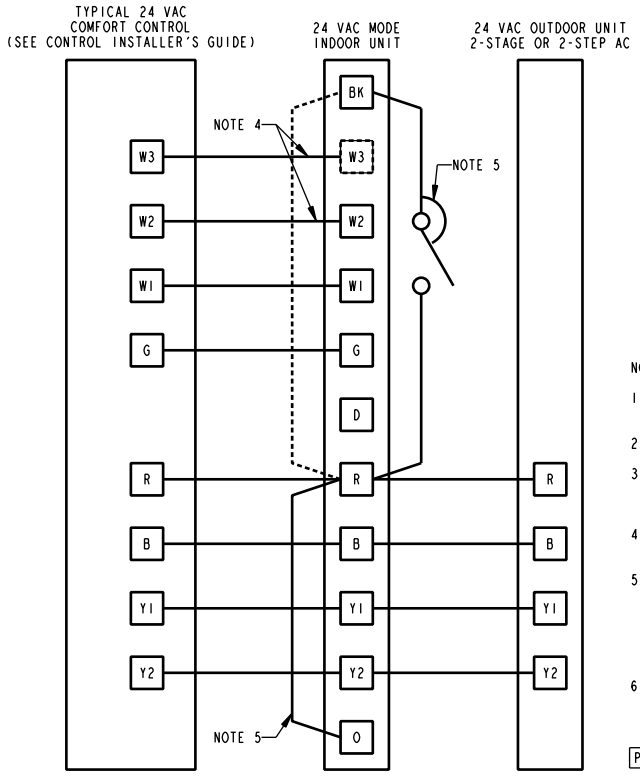
Field Wiring Diagrams continued

41D - 24 VAC Mode Indoor Unit with 24 VAC Comfort Control and 24VAC 2-Stage or 2-Step Cooling



LEGEND

------ FACTORY WIRING

——— FIELD WIRING

[T] TERMINAL MAY OR MAY NOT BE PRESENT ON UNIT

NOTES:

1. SEE WIRING DIAGRAMS IN SERVICE FACTS FOR COMPLETE WIRING INFORMATION.
2. LOW VOLTAGE WIRING TO BE NO. 18 AWG MINIMUM CONDUCTOR.
3. BE SURE POWER SUPPLY AGREES WITH EQUIPMENT NAMEPLATE. POWER WIRING AND GROUNDING OF EQUIPMENT MUST COMPLY WITH LOCAL CODES.
4. OPTIONAL FIELD WIRING. CONNECT ONLY IF THESE HEATING STAGES ARE USED.
5. CONNECTIONS TO "R" , "BK", AND "O" MUST BE MADE AS SHOWN FOR PROPER OPERATION WITH OPTIONAL HUMIDISTAT IN COOLING. FACTORY "R" TO "BK" JUMPER ON TERMINAL BLOCK MUST BE REMOVED ON AIR HANDLING UNITS. FACTORY "R" TO "BK" JUMPER ON FURNACE CONTROL MUST BE CUT ON FURNACES.
6. SEE USER INTERFACE 24 VAC MODE SETUP MENU FOR 1ST STAGE CFM OPTIONS.
   2-STAGE = 39-64%
   2-STEP = 65-80%

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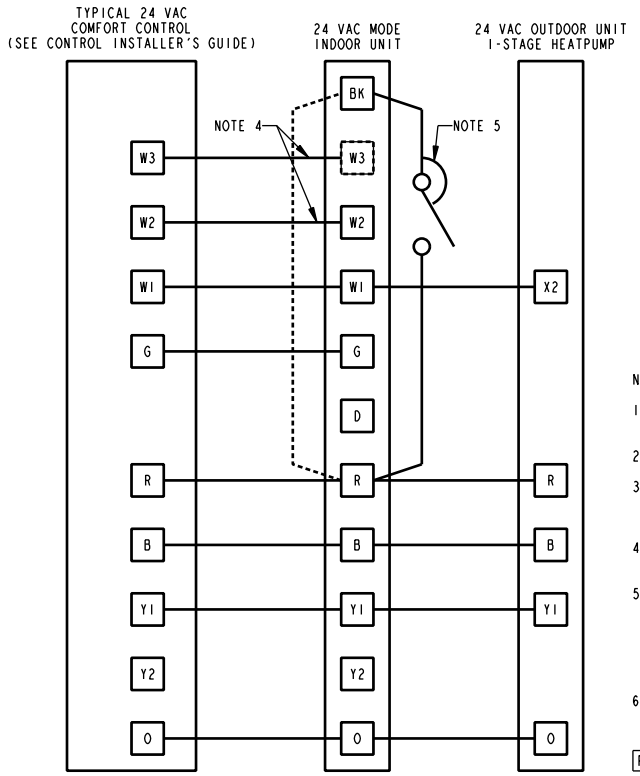
41E - 24 VAC Mode Indoor Unit with 24 VAC Comfort Control and 24VAC Single Stage Heat Pump



LEGEND

------ FACTORY WIRING

——— FIELD WIRING

[T] TERMINAL MAY OR MAY NOT BE PRESENT ON UNIT

NOTES:

1. SEE WIRING DIAGRAMS IN SERVICE FACTS FOR COMPLETE WIRING INFORMATION.
2. LOW VOLTAGE WIRING TO BE NO. 18 AWG MINIMUM CONDUCTOR.
3. BE SURE POWER SUPPLY AGREES WITH EQUIPMENT NAMEPLATE. POWER WIRING AND GROUNDING OF EQUIPMENT MUST COMPLY WITH LOCAL CODES.
4. OPTIONAL FIELD WIRING. CONNECT ONLY IF THESE HEATING STAGES ARE USED.
5. CONNECTIONS TO "R" , "BK", AND "O" MUST BE MADE AS SHOWN FOR PROPER OPERATION WITH OPTIONAL HUMIDISTAT IN COOLING. FACTORY "R" TO "BK" JUMPER ON TERMINAL BLOCK MUST BE REMOVED ON AIR HANDLING UNITS. FACTORY "R" TO "BK" JUMPER ON FURNACE CONTROL MUST BE CUT ON FURNACES.
6. ON FURNACE APPLICATIONS, COMFORT CONTROL MUST BE DUAL FUEL COMPATIBLE (SEE CONTROL INSTALLERS GUIDE) OR MUST USE TAYPLUS103.

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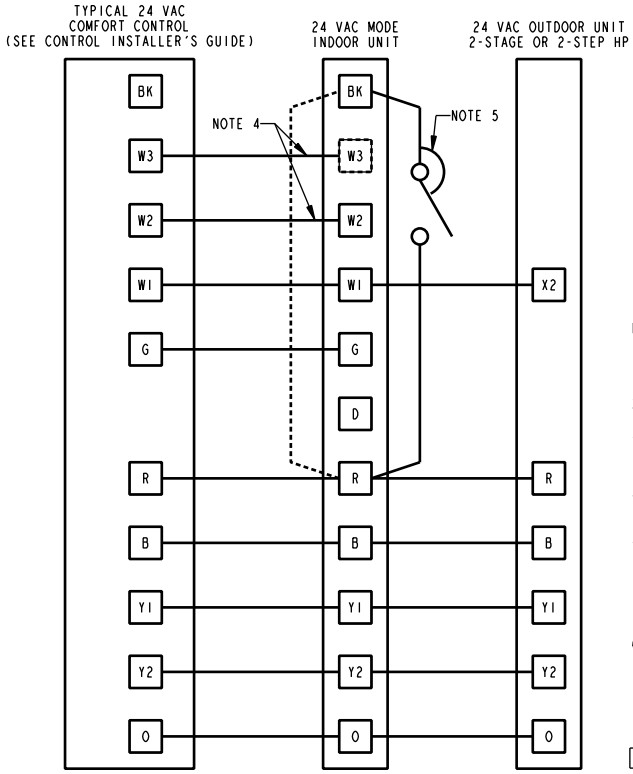
41F - 24 VAC Mode Indoor Unit with 24 VAC Comfort Control and 24VAC 2-Stage or 2-Step Heat Pump



LEGEND

FACTORY WIRING

FIELD WIRING

T — TERMINAL MAY OR MAY NOT BE PRESENT ON UNIT

NOTES:

1. SEE WIRING DIAGRAMS IN SERVICE FACTS FOR COMPLETE WIRING INFORMATION.
2. LOW VOLTAGE WIRING TO BE NO. 18 AWG MINIMUM CONDUCTOR.
3. BE SURE POWER SUPPLY AGREES WITH EQUIPMENT NAMEPLATE. POWER WIRING AND GROUNDING OF EQUIPMENT MUST COMPLY WITH LOCAL CODES.
4. OPTIONAL FIELD WIRING. CONNECT ONLY IF THESE HEATING STAGES ARE USED.
5. CONNECTIONS TO "R" , "BK", AND "O" MUST BE MADE AS SHOWN FOR PROPER OPERATION WITH OPTIONAL HUMIDISTAT IN COOLING. FACTORY "R" TO "BK" JUMPER ON TERMINAL BLOCK MUST BE REMOVED ON AIR HANDLING UNITS. FACTORY "R" TO "BK" JUMPER ON FURNACE CONTROL MUST BE CUT ON FURNACES.
6. ON FURNACE APPLICATIONS, COMFORT CONTROL MUST BE DUAL FUEL COMPATIBLE (SEE CONTROL INSTALLERS GUIDE) OR MUST USE TAYPLUS103.
7. SEE USER INTERFACE 24 VAC MODE SETUP MENU FOR 1ST STAGE CFM OPTIONS.
   2-STAGE = 39-64%
   2-STEP = 65-80%

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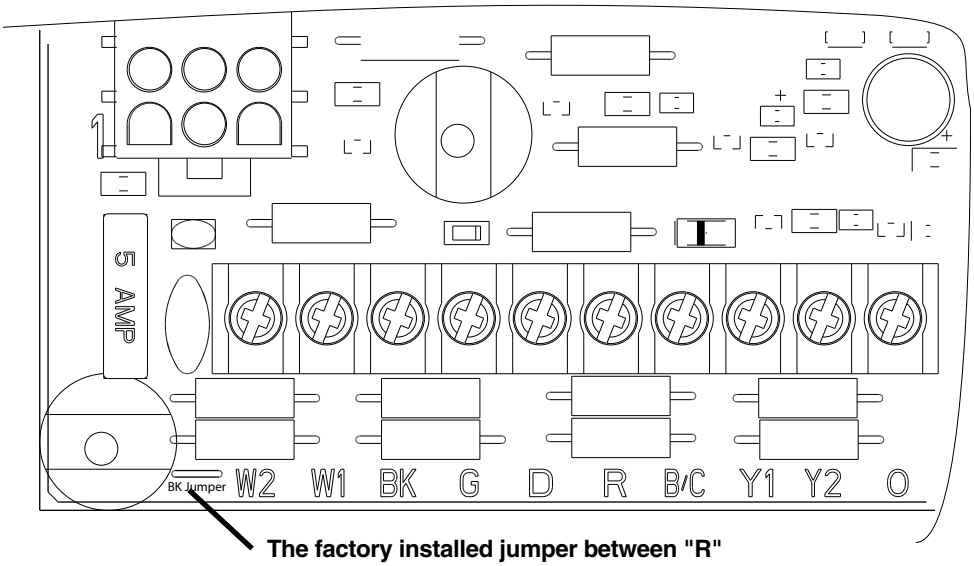
41G - Humidistat Hookup - 24 V Mode ONLY



The factory installed jumper between "R" and "BK" on the circuit board must be cut if an optional humidistat is installed.

HUMIDISTAT HOOKUP - 24 V ONLY

If an optional humidistat for humidity control in cooling is used, the factory installed "BK Jumper" must be cut.

The BK Jumper must also be cut if a multi-zone controller is connected to *CONT402 is installed and using the BK enabled feature.

See the 24VAC field wiring diagrams for mor information.

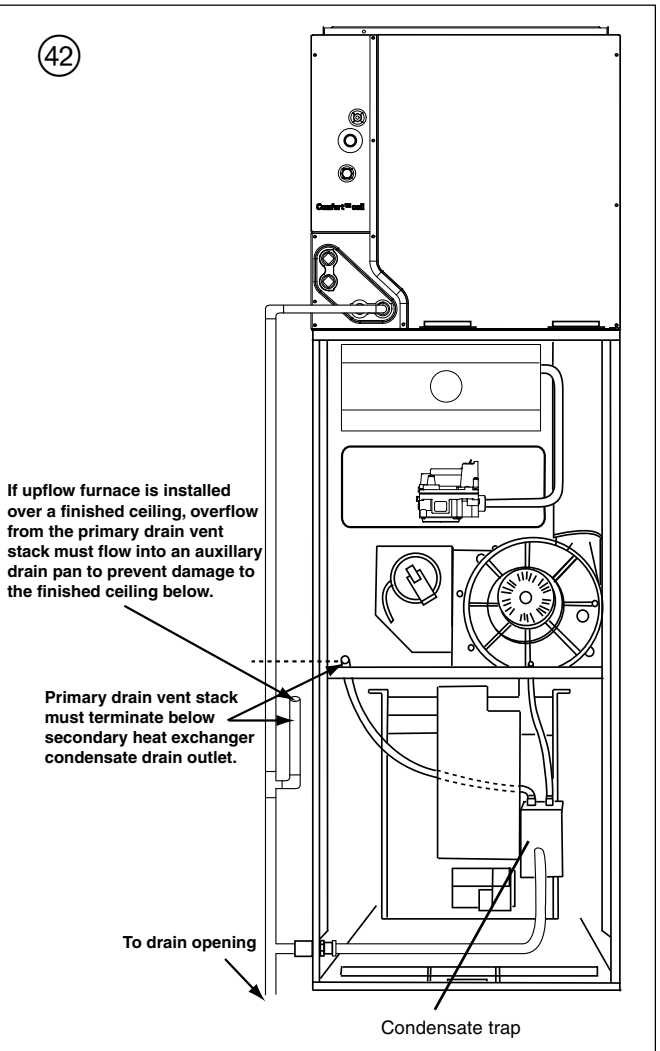
CONDENSATE DRAIN INSTRUCTIONS

⚠ CAUTION

It is recommended that an external overflow drain pan be installed under the furnace to prevent property damage or personal injury from leaking condensate.

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. See Figure 42.

(42)

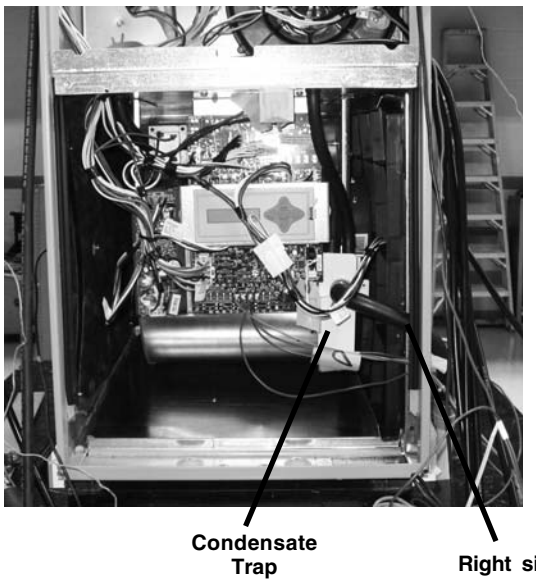


NOTE:
The condensate trap must be primed before operation.

VERTICAL APPLICATIONS

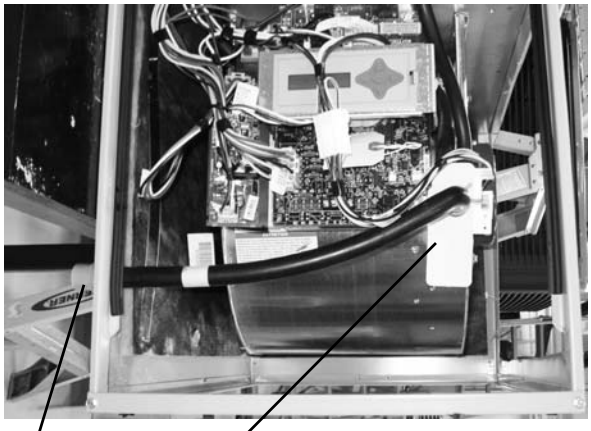
Upflow Vertical Furnace - The connection tubing for left and right side drainage is shipped in the blower compartment. Install the connection tubing from the trap to the side of the unit and trim all excess tubing to avoid kinks. See Figures 43 & 44.

(43)



UPFLOW (VERTICAL)

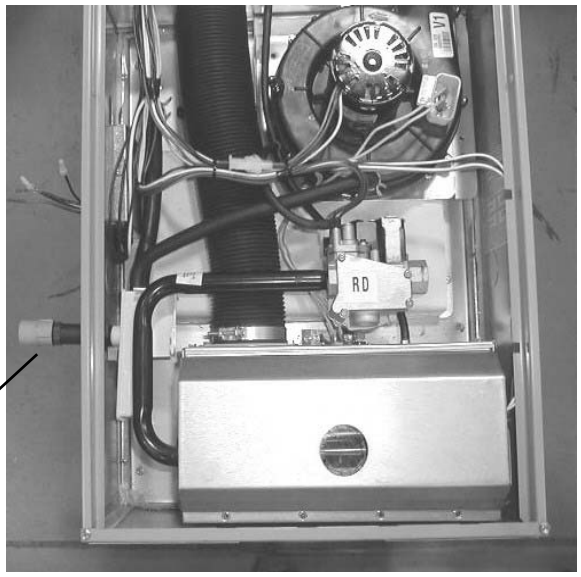
(44)



UPFLOW (VERTICAL)

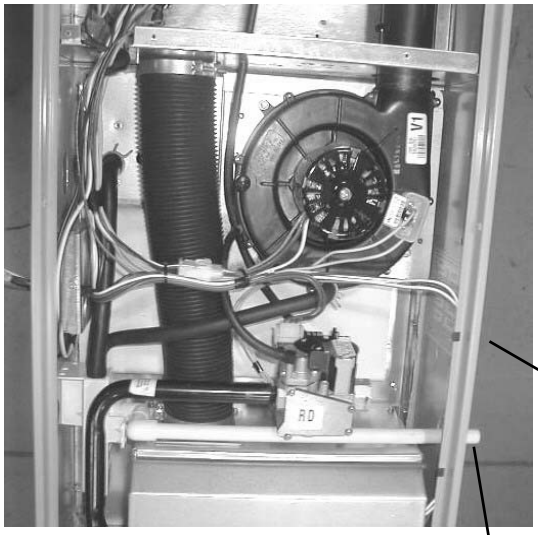
D**ownflow Vertical Furnace -** The furnace is shipped with the left side drainage setup. To change the right side drain, remove the drain lines from the trap, rotate the trap 180° so it exits to the right, reconnect the lines, and run a 1/2" CPVC pipe from the trap out through the right side knock-out. Use RTV silicone sealant to connect the CPVC pipe to the trap for ease of removing to clean the trap. See Figures 45 and 46.

45



DOWNFLOW (VERTICAL)

46



DOWNFLOW (VERTICAL)

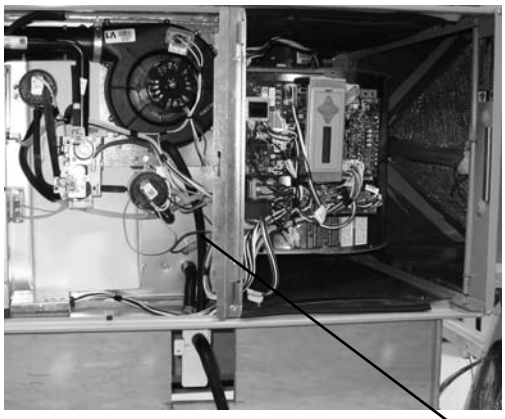
HORIZONTAL APPLICATIONS

Upflow and Downflow Horizontal Furnaces - See Figures 47 and 48. All horizontal applications are left side only. It is always recommended that the auxiliary drain pan be installed under a horizontally installed evaporator and/or 95% Gas Furnace. Connect the auxiliary drain pan to a separate drain line (no trap is needed in this line).

The furnace trap must be repositioned to the exterior of the cabinet. Remove the trap from its present location and reposition the trap outside of the unit, through the long circular hole, next to the secondary recuperative cell. Remove the larger drain line (from the secondary cell) and trim to fit between the secondary cell and the new trap location. On upflow units, plug the hole in the blower deck where the tube went through with factory supplied cap.

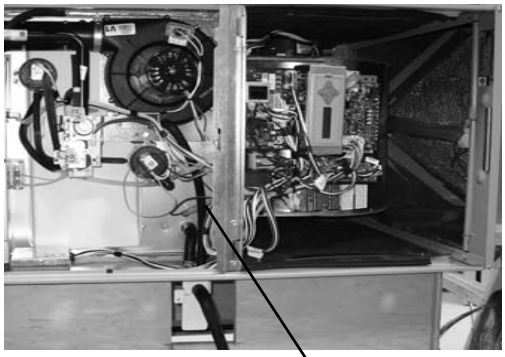
Remove the hose from the induced blower and reposition into the other drain tap of the inducer, which is located 90° clockwise around the inducer. Move the cap from that drain tap to the unused drain tap. On upflow units, plug the hole in the blower deck where the tube went through with factory supplied cap.

47

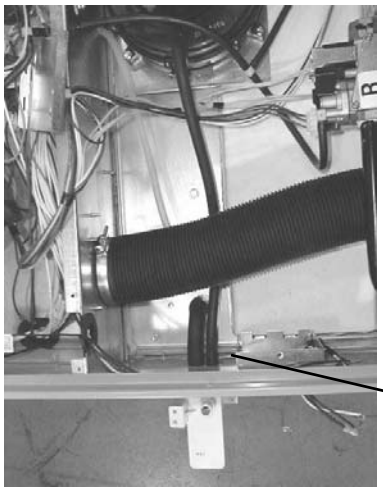


**UPFLOW HORIZONTAL 21" & 24" UNITS
(LEFT SIDE ONLY)**

48



**UPFLOW HORIZONTAL 17" UNITS
(LEFT SIDE ONLY)**



DOWNFLOW (HORIZONTAL)

This tube on downflow units will need to be cut to fit between the Inducer and the trap. On upflow units, this tube may need to be extended, using the tubing shipped with the furnace.

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

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

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

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

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

NOTE:
All supplied flexible condensate piping is for internal use only. All condensate piping external to the unit must be CPVC or PVC piping.

GAS PIPING

⚠ WARNING

FIRE - EXPLOSION HAZARD
DO NOT RUN FLEXIBLE GAS LINE THROUGH THE FURNACE CABINET WALL OR WITHIN THE FURNACE CABINET. FAILURE TO FOLLOW THIS WARNING COULD RESULT IN PROPERTY DAMAGE, SERIOUS PERSONAL INJURY, OR DEATH.

⚠ CAUTION

Use a backup wrench on the Gas Valve when installing Gas Piping to prevent damage to the Gas Valve and Manifold Assembly.

The upflow/ horizontal furnace is shipped standard for left side installation of Gas Piping. A knockout 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. Flexible gas connections, if applied, must not be routed through the cabinet of the furnace.
Refer to Natural Gas Piping Table 13 for delivery sizes.

NOTE: Refer to local codes and the National Fuel Gas Code, current edition, for gas pipe requirements.

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).

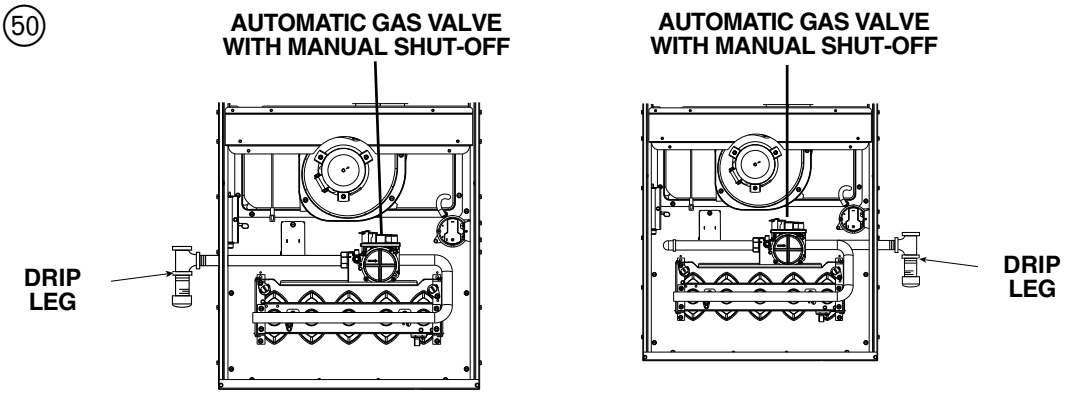
NOTE:
Maximum pressure to the Gas Valve for natural gas is 13.8" W.C. Minimum pressure is 5.0" W.C. Maximum pressure to the Gas Valve for Propane is 13.8" W.C. Minimum pressure is 11.0" W.C.

TABLE 13
NATURAL GAS ONLY

TABLE OF CUBIC FEET PER HOUR OF GAS FOR VARIOUS PIPE SIZES AND LENGTHS							
PIPE SIZE	LENGTH OF PIPE						
	10	20	30	40	50	60	70
1/2	132	92	73	63	56	50	46
3/4	278	190	152	130	115	105	96
1	520	350	285	245	215	195	180
1-1/4	1050	730	590	520	440	400	370
This table is based on Pressure Drop of 0.3 inch W.C. and 0.6 SP.GR. Gas							

All Gas fittings must be checked for leaks using a soapy solution before lighting the furnace. ***DO NOT CHECK WITH AN OPEN FLAME!***

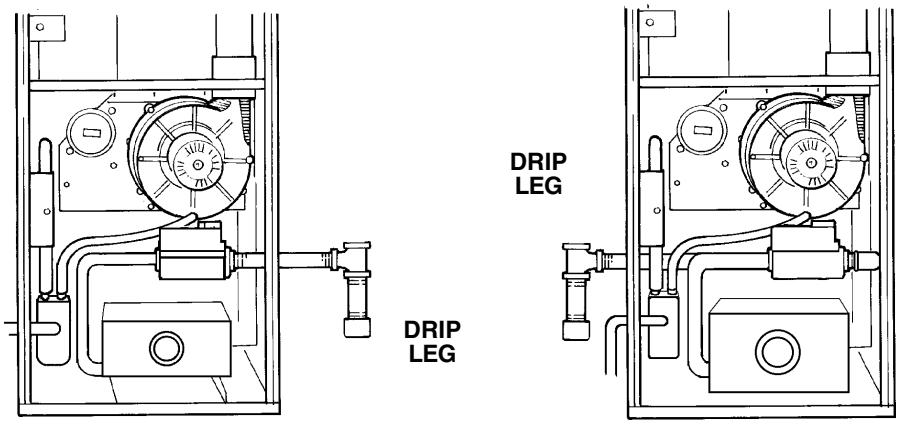
(50)



IMPORTANT:
A sediment trap must be installed in the gas line before the furnace gas valve. The sediment trap must be located as close to the furnace cabinet as practical.

UPFLOW MAY BE LEFT OR RIGHT HAND GAS PIPING

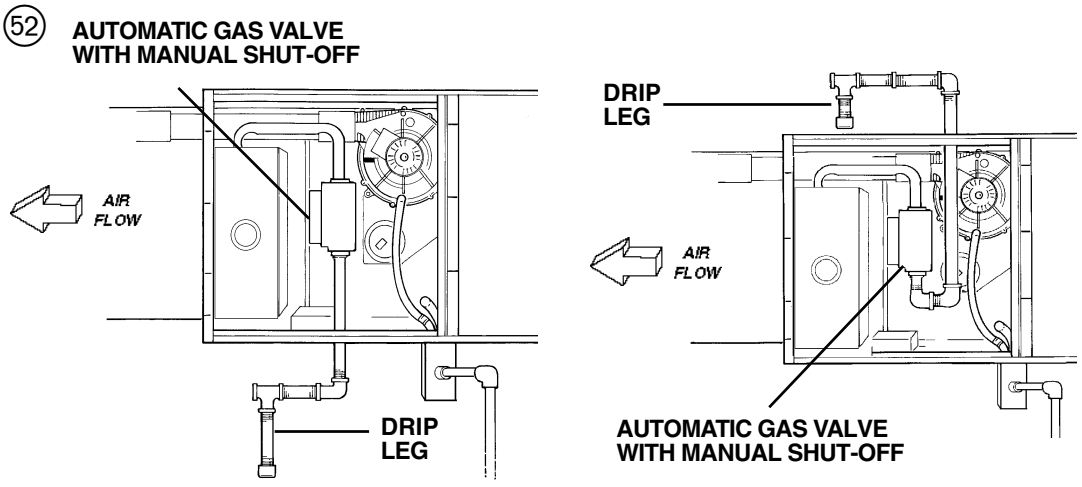
(51)



IMPORTANT:
A sediment trap must be installed in the gas line before the furnace gas valve. The sediment trap must be located as close to the furnace cabinet as practical.

THE DOWNFLOW (VERTICAL) MAY BE INSTALLED LEFT OR RIGHT SIDE GAS PIPING

(52)



IMPORTANT:
A sediment trap must be installed in the gas line before the furnace gas valve. The sediment trap must be located as close to the furnace cabinet as practical.

HORIZONTAL FURNACE GAS PIPING MAY BE FROM EITHER SIDE
(TYPICAL UPFLOW FURNACE IN HORIZONTAL CONFIGURATION SHOWN)

COMBUSTION AND INPUT CHECK
(SEE ALSO HIGH ALTITUDE DERATE)

NOTE: Before checking or adjusting the gas pressure, make sure the condensate trap has been primed.

1. Make sure all Gas appliances are off except the furnace.
2. Clock the Gas Meter with the furnace operating on high heat for one revolution. Table 18 shows the flow rate in cubic feet per hour for a measured time of one revolution for a meter on which one revolution indicates 2 cubic feet per hour of gas flow. For other meters, use the following conversions:
   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
3. 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.
4. Repeat steps 2 and 3 with the furnace operating on low heat.
5. Changes can be made by adjusting the manifold pressure (See Table 15), or changing orifices (orifice change may not always be required).

TABLE 15

Furnace Input rate (KBTU/hr)	FINAL NG MANIFOLD PRESSURE SETTINGS (inches w.c.)		
	40%	65%	100%
60	0.7 + 0.2 / - 0.0	Not Adjustable	3.5 ± 0.2
80	0.7 + 0.2 / - 0.0	Not Adjustable	3.5 ± 0.2
100	0.7 + 0.2 / - 0.0	Not Adjustable	3.5 ± 0.2
Downflow 120	0.7 + 0.2 / - 0.0	Not Adjustable	3.5 ± 0.2
Upflow 120	0.9 + 0.2 / - 0.0	Not Adjustable	3.5 ± 0.2
For upflow 120KBTU/hr model, 1st stage is 45% Manifold pressures apply for Natural Gas applications ONLY			

Furnace Input rate (KBTU/hr)	FINAL LP MANIFOLD PRESSURE SETTINGS (inches w.c.)		
	40%	65%	100%
60	2.1 ± 0.5	Not Adjustable	10.0 ± 0.5
80	2.1 ± 0.5	Not Adjustable	10.0 ± 0.5
100	2.1 ± 0.5	Not Adjustable	10.0 ± 0.5
Downflow 120	2.1 ± 0.5	Not Adjustable	10.0 ± 0.5
Upflow 120	2.9 ± 0.5	Not Adjustable	10.0 ± 0.5
For upflow 120KBTU/hr model, 1st stage is 45% Manifold pressures apply for Propane applications ONLY			

HIGH ALTITUDE DERATE

⚠ CAUTION

CAUTION

Maintain manifold pressure as specified in Table 15 in high altitude installations. Failure to do so may result in poor ignition characteristics.

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

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

Installation of this furnace at altitudes above 2,000 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.*

The furnace input rate shall be checked by using the methods of Combustion and Input Check. High altitude kits are listed in Table 15A.

Table 15A

High Altitude Kit	Used with Model:
BAYSWT07AHALTA	*UHMB060ACV3V *DHMB060ACV3V *DHMB060BCV3V
BAYSWT09AHALTA	*UHMB080ACV3V *DHMB080ACV3V *UHMC100ACV4V *DHMC100ACV4V
BAYSWT08AHALTA	*UHMD120ACV5V *DHMD120ACV5V *DHMD120BCV5V
* May be "A" or "T"	

If the desired input rate cannot be achieved with a change in manifold pressure, then the orifices must be changed. See Table 16 for replacement orifice part numbers.

LP installations will require an orifice and gas valve change. Order kit BAYLPKT220B or BAYLPSS220B.

IMPORTANT:
Reinstall the propane orifices to the same depth as the orifices supplied with the equipment.

See Table 17 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 on page 19 shows the required vent lengths for installations at various altitudes. An optional high altitude kit is available for installations above 4000 feet (Installations above 12,000 feet are not allowed). Use Table 15A to select the appropriate high altitude kit for your furnace model.

TABLE 16

PART NUMBERS FOR REPLACEMENT ORIFICES

DRILL SIZE	PART NUMBER	DRILL SIZE	PART NUMBER
44	ORF00501	52	ORF00495
45	ORF01427	53	ORF00504
46	ORF00909	54	ORF00555
47	ORF01429	55	ORF00693
48	ORF01099	56	ORF01428
49	ORF00503	57	ORF00908
50	ORF00493	58	ORF01338
51	ORF00494	59	ORF01339

TABLE 17

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
48	49	49	49	50	50	50	51	51	52
49	50	50	50	51	51	51	52	52	52
50	51	51	51	51	52	52	52	53	53
51	51	52	52	52	52	53	53	53	54
52	52	53	53	53	53	53	54	54	54
53	54	54	54	54	54	54	55	55	55
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

From National Fuel Gas Code - Table F-4

TABLE 18

GAS FLOW IN CUBIC FEET PER HOUR

2 CUBIC FOOT DIAL

SEC.	FLOW	SEC.	FLOW	SEC.	FLOW	SEC.	FLOW
8	900	29	248	50	144	82	88
9	800	30	240	51	141	84	86
10	720	31	232	52	138	86	84
11	655	32	225	53	136	88	82
12	600	33	218	54	133	90	80
13	555	34	212	55	131	92	78
14	514	35	206	56	129	94	76
15	480	36	200	57	126	96	75
16	450	37	195	58	124	98	73
17	424	38	189	59	122	100	72
18	400	39	185	60	120	104	69
19	379	40	180	62	116	108	67
20	360	41	176	64	112	112	64
21	343	42	172	66	109	116	62
22	327	43	167	68	106	120	60
23	313	44	164	70	103	124	58
24	300	45	160	72	100	128	56
25	288	46	157	74	97	132	54
26	277	47	153	76	95	136	53
27	267	48	150	78	92	140	51
28	257	49	147	80	90	144	50

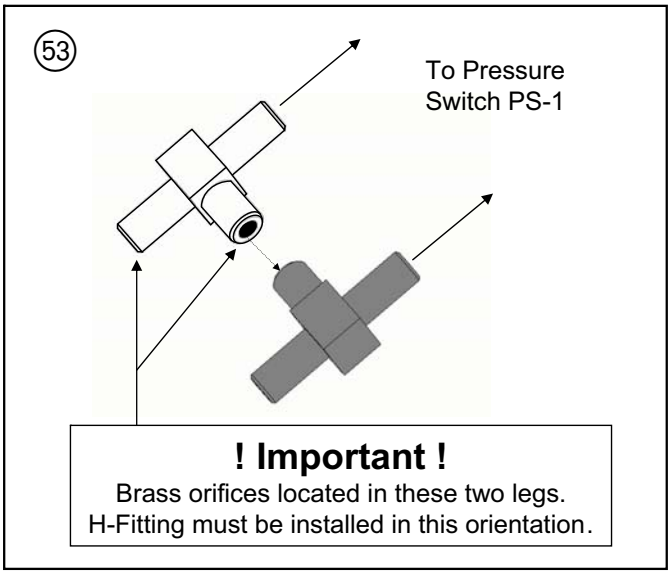
NOTE:
Natural gas input rate should be clocked at gas meter in high heat when the gas valve is replaced or gas valve pressure adjustments are made.

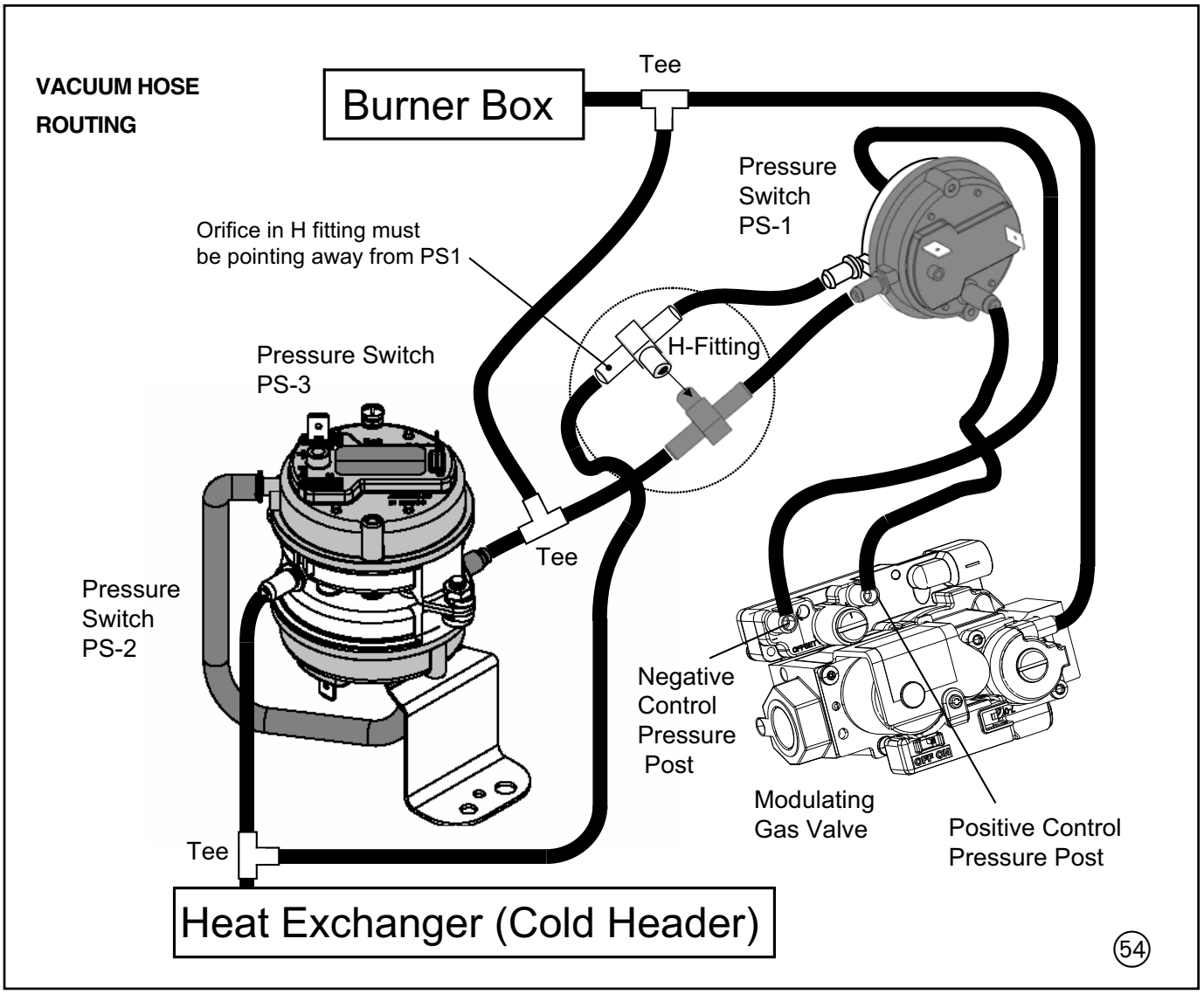
Table 19 lists the main burner orifices used with the Furnace.

Table 19 ORIFICE SIZES

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

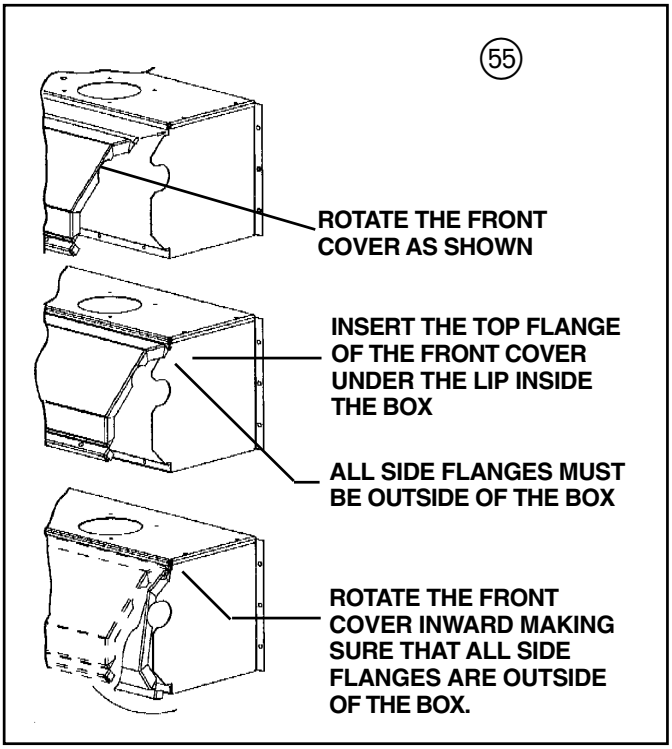
NOTE:
The LP Conversion Kit used with the modulating furnace is BAYLPSS220B or BAYLPKT220B.


53
To Pressure
Switch PS-1
! Important !
Brass orifices located in these two legs.
H-Fitting must be installed in this orientation.


VACUUM HOSE
ROUTING
Burner Box
Tee
Pressure
Switch
PS-1
Orifice in H fitting must
be pointing away from PS1
H-Fitting
Pressure Switch
PS-3
Tee
Pressure
Switch
PS-2
Negative
Control
Pressure
Post
Modulating
Gas Valve
Positive Control
Pressure Post
Tee
Heat Exchanger (Cold Header)
54

REINSTALLATION OF THE BURNER BOX COVER

Figure 55 shows the correct way to reinstall the Burner Box cover if adjustment or replacement of the Flame Sensor, Hot Surface Igniter, or Main Burner orifices have required removal of the cover.



START-UP AND ADJUSTMENT

PRELIMINARY INSPECTIONS

⚠ WARNING

ELECTRICAL SHOCK HAZARD

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

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

NOTE:

The condensate trap must be primed before operation.

With gas and electrical power "OFF"

1. Duct connections are properly sealed.
2. Filters are in place.
3. Venting is properly assembled.
4. Blower door is in place.

Turn the main Gas Valve toggle switch (See Figure 59) within the unit to the "**OFF**" position. Turn the external shutoff valve to the "**OPEN**" position (See Figures 50 and 52). 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. LP Gas being heavier than air may require forced ventilation. Turn the toggle switch on the Gas Valve in the unit to the "ON" position.

All soap solution should be cleaned off gas piping after gas leak testing is complete.

LIGHTING INSTRUCTIONS

⚠ WARNING

FIRE OR EXPLOSION HAZARD

Do NOT attempt to manually light the burner.

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

⚠ CAUTION

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

Lighting instructions appear on each unit. Each installation must be checked out at the time of initial start up to insure 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 Ignitor will automatically heat, then the Gas Valve is energized to permit the flow of gas to the burners. After ignition and flame is established, the Flame Control Module monitors the flame and supplies power to the Gas Valve until the Comfort Control is satisfied.

TO SHUT OFF

For complete shutdown: Turn the Gas Valve toggle switch on the main Gas Valve to the "OFF" position (See Figures 59). Disconnect the electrical supply to the unit.

⚠ CAUTION

If complete shutdown is done during the cold weather months, provisions must be taken to prevent freeze-up of all water pipes and water receptacles.

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.

USER INTERFACE MENU

SERVICE PROCEDURE TO ACCESS USER INTERFACE FOR THE MODULATING FURNACE

This procedure should only be performed by trained service personnel.

⚠ WARNING

ELECTRICAL SHOCK HAZARD
DO NOT BYPASS THE DOOR SWITCH BY ANY PERMANENT MEANS.
FAILURE TO FOLLOW WARNING COULD RESULT IN SERIOUS PERSONAL INJURY OR DEATH.

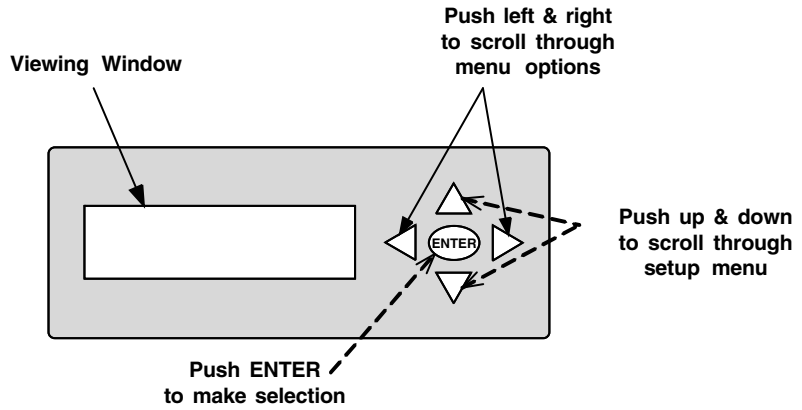
⚠ WARNING

ELECTRICAL SHOCK HAZARD
DO NOT TOUCH ANY COMPONENTS OTHER THAN THE DISPLAY ASSEMBLY AND THE DOOR SWITCH DURING THIS PROCEDURE.
FAILURE TO FOLLOW WARNING COULD RESULT IN SERIOUS PERSONAL INJURY OR DEATH.

1. Remove Blower Door panel by turning the two door latches.
2. Lower door panel and remove from service access area.
3. Use one hand depress the door switch (there must be power to the control system for the display assembly to function) and keep the door switch depressed during programming.
4. Using the other hand move through the Display Assembly menu using the arrow buttons.
5. The User Interface menu on pages 41-42 is a guide to the menu options.
6. When programming is complete release Door Switch and replace the Blower Door.

NOTE:
If power is lost during programming, all changes made will be saved.

(56) **USER INTERFACE**



User Interface pictured above adjusts Variable Speed Airflow options and is used for custom setup of Furnace operations- See menu options in User Interface on pages 45-46.

TABLE 20 - USER INTERFACE MENU

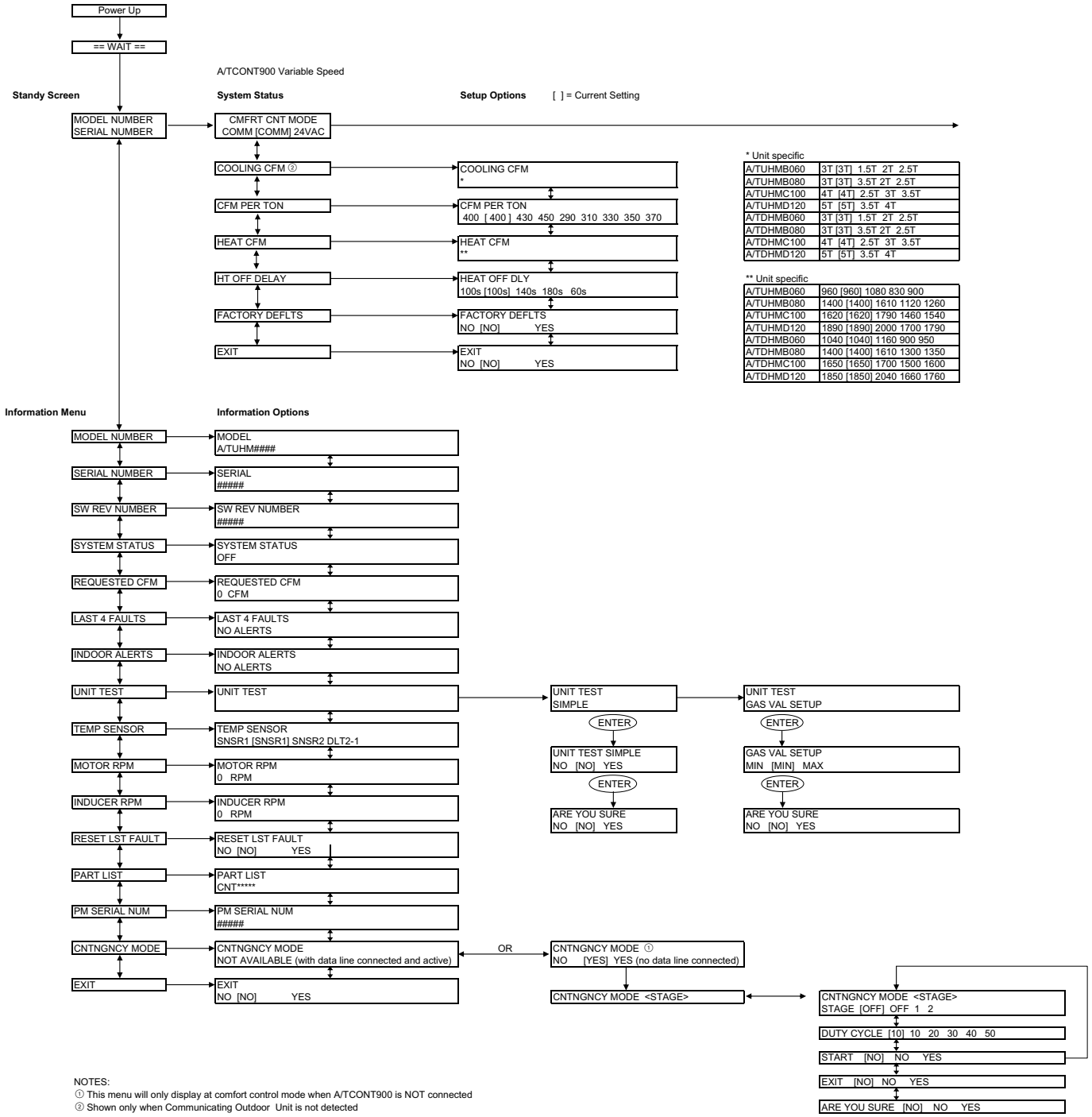
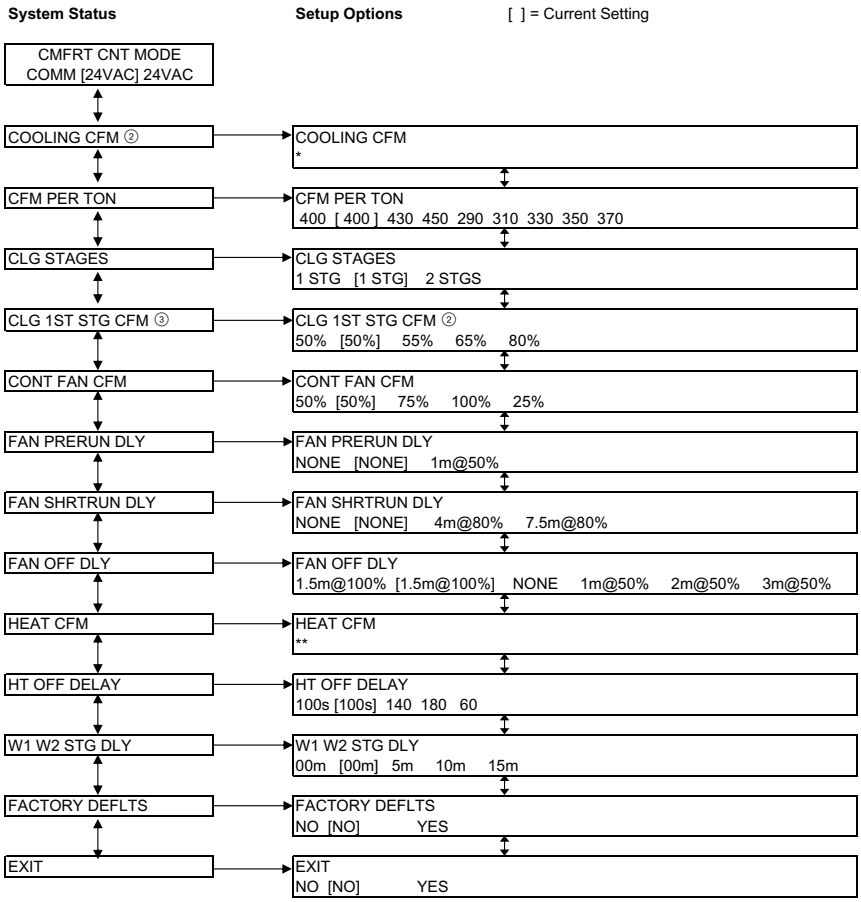


TABLE 20 - USER INTERFACE MENU - 24VOLT MENU (CONTINUED)

24V Variable Speed



* Unit specific

A/TUHMB060	3T [3T] 1.5T 2T 2.5T
A/TUHMB080	3T [3T] 3.5T 2T 2.5T
A/TUHMC100	4T [4T] 2.5T 3T 3.5T
A/TUHMD120	5T [5T] 3.5T 4T
A/TDHMB060	3T [3T] 1.5T 2T 2.5T
A/TDHMB080	3T [3T] 3.5T 2T 2.5T
A/TDHMC100	4T [4T] 2.5T 3T 3.5T
A/TDHMD120	5T [5T] 3.5T 4T

** Unit specific

A/TUHMB060	960 [960] 1080 830 900
A/TUHMB080	1400 [1400] 1610 1120 1260
A/TUHMC100	1620 [1620] 1790 1460 1540
A/TUHMD120	1890 [1890] 2000 1700 1790
A/TDHMB060	1040 [1040] 1160 900 950
A/TDHMB080	1400 [1400] 1610 1300 1350
A/TDHMC100	1650 [1650] 1700 1500 1600
A/TDHMD120	1850 [1850] 2040 1660 1760

NOTES:
② Shown only when Communicating Outdoor Unit is not detected
③ This menu will only display when 2 STGS is chosen in previous menu.

SEQUENCE OF OPERATION

SEQUENCE OF OPERATION – COMMUNICATING MODE

1. This furnace is fully modulating between 40% and 100% of capacity in 1% increments. The furnace always lights at approximately 65% and will modulate up or down; depending on the communicating comfort control demand. Requested capacity can be seen in the "STATUS" section of the User Interface menu.

Note:

Pressure Switch 1 closes at approximately 40% of capacity.
Pressure Switch 2 closes at approximately 65% of capacity.
Pressure Switch 3 closes at approximately 95% of capacity.

2. The communicating comfort control signals the furnace IFC for heat.
3. The IFC then checks all safeties, thermostats, and pressure switches PS1, PS2, and PS3.
4. The IFC signals the variable speed inducer drive to start the vent motor at the speed needed to close pressure switches PS1 and PS2.
5. PS1 and PS2 close.
6. The IFC receives a 24 VAC signal from PS1 and PS2 when they close. This verifies the vent motor is moving the correct amount of combustion air through the furnace and the vent system.
7. IFC starts the hot surface ignitor learning routine warm-up time cycle.
8. IFC turns on the gas valve. Trial time for ignition is 5 seconds.

Note:
The furnace lights at approximately 65% of capacity.

9. The IFC verifies ignition by the flame current sensing method. If a flame is not detected, the IFC will cycle the furnace three times to try and verify a flame.
   If no flame is detected, the IFC will lockout for one hour. The IFC will send an alert code to the communicating comfort control (ERR 22) and User Interface (RETRY LO). The Red alert LED two times repeatedly.
10. If a flame is detected, the IFC will start the heat exchanger warm-up time delay for the indoor blower.
11. "IGNITION" will now be displayed in the "STATUS" section of the User Interface menu.
12. After 45 seconds, the IFC signals the indoor blower motor and run at the programmed ignition sequence speed.
13. Depending on the communicating comfort control demand, the IFC will then signal the variable speed inducer motor drive board and the indoor blower motor to ramp up or down.
14. With a heat demand less than 65% from the communicating comfort control, the IFC signals the variable speed inducer motor drive board to ramp down to that corresponding demand speed. The reduction of the vent motor speed in steps allows the gas flow through the gas valve to also be reduced in steps, decreasing the chance of burner flame out. The minimum capacity change is 1%.
15. The minimum capacity of all furnaces is 40%, with the exception of the *UHMC120. The minimum capacity for this furnace is 45%.
16. The communicating comfort control will continue to call for the requested capacity demand until the indoor temperature is back at the set point OR,
17. If the communicating comfort control does not detect that the indoor temperature is moving back towards its set point or the indoor temperature is still moving away from the set point, it will signal the IFC to go to a higher capacity of heat.
18. The IFC then signals the variable speed inducer drive to ramp up the vent motor in steps. As the vent motor speed increases the amount of gas coming through the gas valve will increase. The IFC will also increase the indoor blower motor speed.
19. The communicating comfort control will continue to monitor the indoor temperature and send signals to the IFC to modulate the heating capacity or turn off to maintain the homeowner's set point.
20. Once the communicating comfort control senses that the heating requirements have been satisfied, the gas valve will be de-energized and gas flow will cease. The variable speed vent motor will de-energize approximately after a 5 second post purge. All pressure switches will open and the indoor blower motor will then run the heat off delay that is selected in the User Interface menu.

Indoor Blower motor operation thermostat fan switch "ON" (Communicating Mode)

The communicating comfort control signals a continuous fan call. The factory setting is 50% of the cooling cfm selected but can be adjusted from 25% - 100% through the Installer Setup menu on the communicating comfort control. If the outdoor unit is a 2 stage system, the factory setting is 50% of the 2nd stage cooling cfm. If the outdoor unit is a 24 volt single stage cooling system, the factory setting is 50% of the cooling cfm.

NOTE: If the actual relative humidity (RH) is at or below the set-point, the fan will run until the continuous fan call is removed or the actual RH exceeds the set-point. If the actual RH is above the set-point, the fan will not turn on.

See the communicating comfort control Installer's Guide for additional information.

SEQUENCE OF OPERATION – 24VAC Mode

1. This furnace modulates between 40% and 100% of capacity, in 3% increments, every 1 minute. The furnace always lights at approximately 65% and will modulate up or down; depending on the 24VAC thermostat signal. Requested capacity can be seen in the "STATUS" section of the User Interface menu.

Note:

Pressure Switch 1 closes at approximately 40% of capacity.

Pressure Switch 2 closes at approximately 65% of capacity.

Pressure Switch 3 closes at approximately 95% of capacity.

Thermostat call for W1 (2 stage heating thermostat)

2. R and W1 contacts close signaling the control board (IFC) to run its self- check routine. After the control has verified that all safeties are closed and PS1, PS2, and PS3 pressure switch contacts are open, the IFC signals the variable speed inducer drive to start the vent motor at the speed needed to close pressure switches PS1 and PS2.

Note:

The furnace lights at approximately 65% of capacity.

3. PS1 and PS2 close.
4. The IFC receives a 24 VAC signal from PS1 and PS2 when they close. This verifies the vent motor is moving the correct amount of combustion air through the furnace and the vent system.
5. IFC starts the hot surface ignitor learning routine warm-up time cycle.
6. IFC turns on the gas valve. Trial time for ignition is 5 seconds.
7. The IFC verifies ignition by the flame current sensing method. If a flame is not detected, the IFC will cycle the furnace three times to try and verify a flame. If no flame is detected, the IFC will lockout for one hour. The IFC will send an alert code to the communicating comfort control (ERR 22) and User Interface (RETRY LO) as well as flash its Red alert LED two times repeatedly.
8. If a flame is detected, the IFC will start the heat exchanger warm-up time delay for the indoor blower.
9. "IGNITION" will now be displayed in the "STATUS" section of the User Interface menu.
10. After 45 seconds, the IFC signals the indoor blower motor to run at the programmed ignition sequence speed.
11. The IFC then signals the variable speed inducer motor drive board to ramp down to the corresponding speed to keep PS1 closed. The reduction of the vent motor speed in steps allows the gas flow through the gas valve to also be reduced in steps, decreasing the chance of burner flame out. The W1 heating capacity is 40%. The IFC will also decrease the indoor blower motor speed.

Thermostat call for W2 after W1

12. R and W2 thermostat contacts close signaling a call for W2 heat. The IFC then signals the variable speed inducer drive to ramp up the vent motor allowing flow through the gas valve to also be increased in 3% steps.
13. If the call for W2 remains, this 3% increase will be repeated every 1 minute until the capacity requested is 100%. The IFC will also increase the indoor blower motor speed in appropriate steps.

W2 satisfied, W1 still called for

14. R and W2 thermostat contacts open signaling that W2 heating requirements have been satisfied. The IFC will signal the variable speed vent motor to slow down to its learned W1 speed. The gas valve will reduce the gas flow to 40% capacity and the indoor blower motor speed will be reduced.

W1 satisfied

15. R and W1 thermostat contacts open signaling that W1 heating requirements have been satisfied. The gas valve will be de-energized and gas flow will cease.
    The variable speed vent motor will de-energize approximately after a 5 second post purge.
    The indoor blower motor will be de-energized after the fan off delay period has ended. (The indoor blower heat fan off delay is field selectable and can be adjusted using the User Interface menu. It is factory set at 100 seconds but can be set to 60, 140, or 180 seconds)

Thermostat call for heat (1 stage heating thermostat)

Note: The inter-stage delay is field selectable and can be adjusted through the User interface menu.
It is factory set at 0 minutes but can be adjusted to 5, 10, or 15 minutes. This option can help optimize the furnace to try to satisfy the heating requirement during low heating load conditions.

16. W1 and W2 must be jumpered at the IFC. R and W1 contacts close signaling the control board (IFC) to run its self- check routine. After the control has verified that all safeties are closed and PS1, PS2, and PS3 pressure switch contacts are open, the IFC signals the variable speed inducer drive to start the vent motor at the speed needed to close pressure switches PS1 and PS2.

Note:

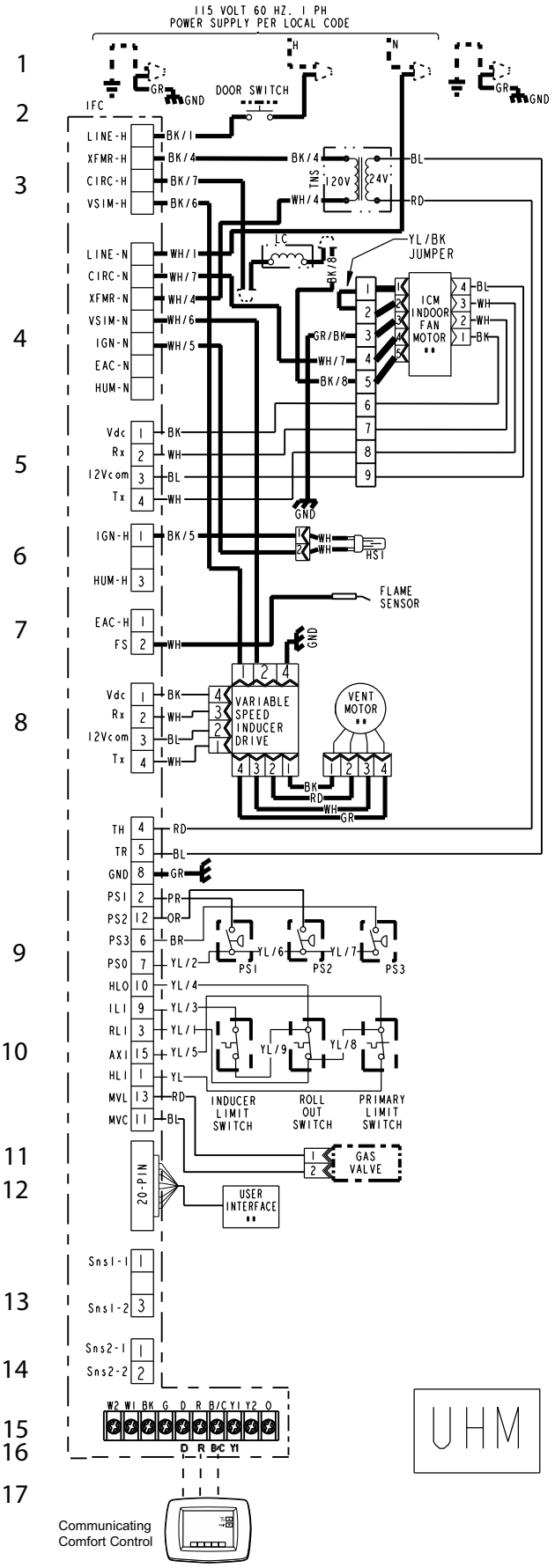
The furnace lights at approximately 65% of capacity.

17. PS1 and PS2 close.
18. The IFC receives a 24 VAC signal from PS1 and PS2 when they close. This verifies the vent motor is moving the correct amount of combustion air through the furnace and the vent system.
19. IFC starts the hot surface ignitor learning routine warm-up time cycle.
20. IFC turns on the gas valve. Trial time for ignition is 5 seconds.
21. The IFC verifies ignition by the flame current sensing method. If a flame is not detected, the IFC will cycle the furnace three times to try and verify a flame. If no flame is detected, the IFC will lockout for one hour. The IFC will send an alert code to the communicating comfort control (ERR 22) and User Interface (RETRY LO) as well as flash its Red alert LED two times repeatedly.
22. If a flame is detected, the IFC will start the heat exchanger warm-up time delay for the indoor blower.
23. "IGNITION" will now be displayed in the "STATUS" section of the User Interface menu.
24. After 45 seconds, the IFC signals the indoor blower motor to run at the programmed ignition sequence speed.
25. Every 1 minute, the IFC will signal the vent motor to ramp up. The increase of the vent motor speed allows the gas flow through the gas valve to also be increased in 3% steps. This 3% increase will be repeated every 1 minute until the capacity requested is 100%. Pressure switch 3 closes at approximately 95% of capacity.
26. The IFC will also increase the indoor blower motor speed in appropriate steps.

Indoor Blower motor operation thermostat fan switch "CONTINUOUS" (24V Mode)

R and G comfort control contacts close signaling a continuous fan call. The continuous fan cfm is field selectable and can be adjusted through the User Interface menu. The factory setting is 50% of the cooling cfm selected but can be set at 25%, 50%, 75%, or 100%. If the system has a 2 stage outdoor unit, the setting is 50% of the 2nd stage cooling cfm.

(57)



UNIT TEST MODE

A) SIMPLE

Note:
Stage 1 = 40% (low) heat, Stage 2 = 100% (high) heat

A qualified technician can cycle the Variable Speed Indoor Blower and the Modulating Gas Furnace through its operation at the User Interface.

- The unit test cycle is entered at the user interface**.**
- The test cycle can only be entered when the comfort control has **no demand** and the furnace IFC is **not reporting a fault.** Turn the comfort control to the Off position and turn the fan control to Auto. This will ensure the unit test cycle will not be interrupted.
- Scroll down using the ▼ **button** at the user interface until the display reads:
- **UNIT TEST.** Press the **Enter** button**.**
- **UNIT TEST** and ◀ **NO (NO)** ▶ will now be displayed**.** Use the ◀ or ▶ arrow button to change the **NO** to a **YES** and then press **ENTER**.
- **ARE YOU SURE** and **NO (NO)** will now be displayed. Use the ◀ or ▶ arrow button to change the **NO** to a **YES** and then press **ENTER**.
- **UNIT TEST** and **Y1 ON FAN ON** will now be displayed. The variable speed indoor blower will then be turned on by the IFC for 10 seconds and then off.
- Furnace will then transition to the ignition sequence. **STAGE OFF** will now be displayed. After a 45 second heat fan on delay, **Stage 1** will be displayed and 40% (low) heat inducer speed will be energized for 10 seconds.
- **Stage 2** will be displayed and 100% (high) heat inducer speed will be energized for 10 seconds.
- The control transitions to off.
- The **Model** and **Serial Number** will be displayed.
- The variable speed indoor blower will now operate for the heat exchanger cool down cycle and then shut off at the end of the cycle.
- The comfort control can now be returned to the homeowner's desired settings.

B) GAS VALVE SETUP (MANIFOLD PRESSURE ADJUSTMENT)

NOTE: To obtain an accurate manifold pressure measurement ,the manifold pressure must be referenced to the burner box, since the burner box pressure tap equalizes the gas valve pressure regulator. To do so, install a tee and section of tube (field supplied) in the tubing between the tee coming from the burner box tube and the gas valve manifold pressure measurement fitting. This tube and tee is <u>in addition</u> to the tube attached to the gas valve pressure tap on the outlet side of the gas valve. See Figure 58.

NOTE: In order to properly set the manifold gas pressure, the incoming line gas pressure should be tested with the unit off and again with the unit operating at the high heat setting to ensure adequate fuel supply to the furnace. The incoming gas pressure should be 5" W.C. minimum and 13.8" W.C. maximum for natural gas.

1) **<u>Before Setting Manifold Gas Pressure</u>**

Setting the manifold gas pressures is critical for the correct operation of this furnace.

<u>Before</u> entering the Gas Valve Setup mode:

a. Turn comfort control system switch to the OFF position and fan switch to the AUTO position.

b. Prime the furnace condensate trap.

Any call for heat or fan by the comfort control will abort or cancel the Gas Valve Setup mode. The unit will stay in Gas Valve Setup mode for a maximum of 20 minutes.

c. Connect dual port manometer & field tubing per Figure 58 on page 47.

Note: MIN = 40% (low) heat, MAX = 100% (high) heat

<u>Setting Manifold Gas Pressure</u>

2) Setting "MIN" manifold gas pressure

To enter the Gas Valve Setup mode:

a. Scroll down on the user interface to Unit Test.

b. Scroll to the right and select "Gas Val Setup".

c. Push the Enter button.

d. Select "MIN" and push the Enter button.

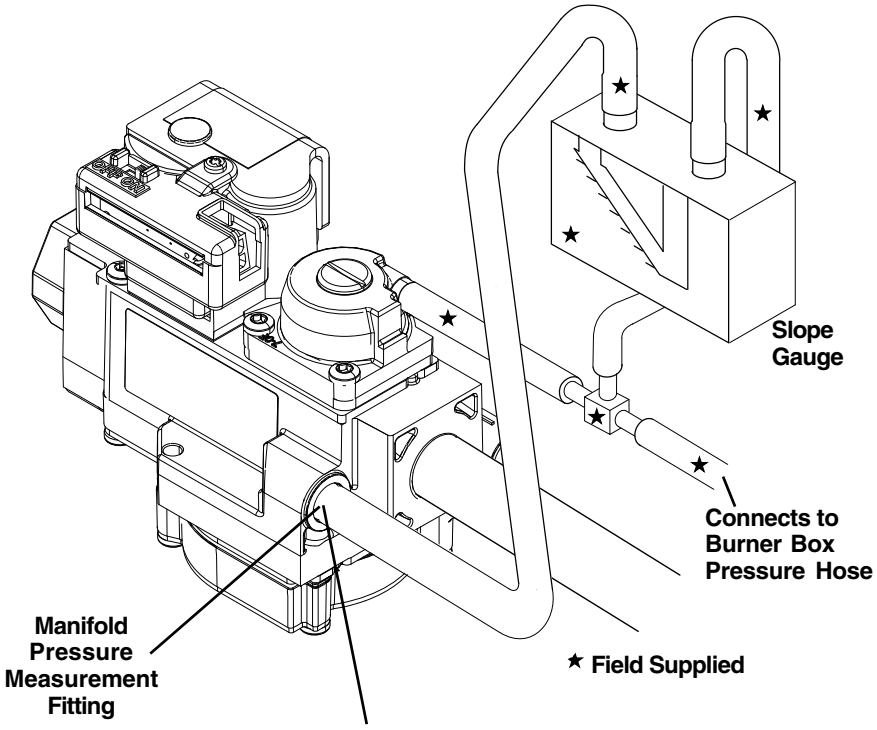
e. When asked "Are You Sure", select Yes, and push the Enter button.

f. The furnace will now begin the ignition sequence.

g. If pressure switch 1 & 2 learning routines have not been performed; after successful ignition, the inducer will go through this operation. (see Inducer Learning Routine section).

58

CORRECT METHOD OF CHECKING DIRECT VENT MANIFOLD PRESSURE WITH BURNER BOX REFERENCED



A Field Supplied barb fitting must be used on the gas valve to attach the hose

⚠ WARNING

EXPLOSION HAZARD
REPLACE AND/OR TIGHTEN ALL PLUGS REMOVED OR LOOSENED WHEN ADJUSTING GAS PRESSURE. LEAK CHECK THE FITTINGS BEFORE PLACING INTO REGULAR SERVICE. FAILURE TO FOLLOW THIS WARNING COULD RESULT IN SERIOUS PERSONAL INJURY, PROPERTY DAMAGE, OR DEATH

TABLE 21

Furnace Input rate (KBTU/hr)	FINAL NG MANIFOLD PRESSURE SETTINGS (inches w.c.)		
	40%	65%	100%
60	0.7 + 0.2 / - 0.0	Not Adjustable	3.5 ± 0.2
80	0.7 + 0.2 / - 0.0	Not Adjustable	3.5 ± 0.2
100	0.7 + 0.2 / - 0.0	Not Adjustable	3.5 ± 0.2
Downflow 120	0.7 + 0.2 / - 0.0	Not Adjustable	3.5 ± 0.2
Upflow 120	0.9 + 0.2 / - 0.0	Not Adjustable	3.5 ± 0.2
For upflow 120KBTU/hr model, 1st stage is 45% Manifold pressures apply for Natural Gas applications ONLY			

Furnace Input rate (KBTU/hr)	FINAL LP MANIFOLD PRESSURE SETTINGS (inches w.c.)		
	40%	65%	100%
60	2.1 ± 0.5	Not Adjustable	10.0 ± 0.5
80	2.1 ± 0.5	Not Adjustable	10.0 ± 0.5
100	2.1 ± 0.5	Not Adjustable	10.0 ± 0.5
Downflow 120	2.1 ± 0.5	Not Adjustable	10.0 ± 0.5
Upflow 120	2.9 ± 0.5	Not Adjustable	10.0 ± 0.5
For upflow 120KBTU/hr model, 1st stage is 45% Manifold pressures apply for Propane applications ONLY			

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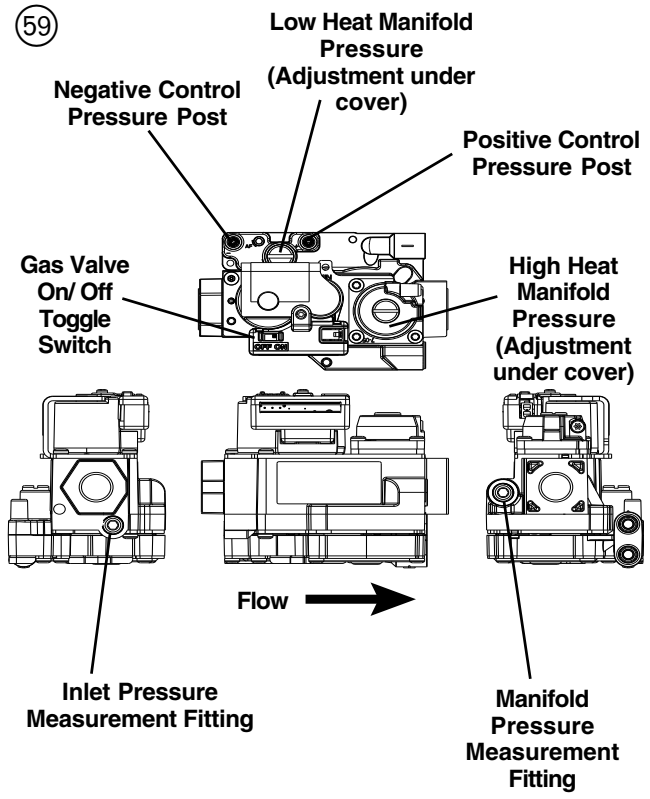

h. Allow 5 minutes to pass before attempting to adjust the 40% manifold pressure. This will insure that the learning routine is complete and that the heat rise is stable.

j. Read the 40% manifold pressure.

k. If needed, remove the low heat manifold adjustment cover and adjust to obtain the correct manifold pressure. See Figure 59.

40% (LOW) HEAT ADJUSTMENT: TURN CLOCKWISE TO DECREASE MANIFOLD PRESSURE OR COUNTERCLOCKWISE TO INCREASE MANIFOLD PRESSURE.

l. Use Manifold Pressure Settings Table 21 for the correct manifold pressure setting in Inches of Water Column.

m. Once the 40% manifold pressure has been adjusted; push the Enter button on the user interface. This will stop the gas valve setup mode and take you back to the home screen.

3) Setting "MAX" manifold gas pressure

To enter the Gas Valve Setup mode:

a. Scroll down on the user interface to Unit Test.

b. Scroll to the right and select "Gas Val Setup".

c. Push the Enter button.

d. Scroll to the right and select MAX; then push the Enter button.

e. Select "MAX" and push the Enter button.

f. When asked "Are You Sure", select Yes, and push the Enter button.

g. The furnace will now begin another ignition sequence.

h. If pressure switch 2 & 3 learning routines have not been performed; after successful ignition, the inducer will go through this operation. (see Inducer Learning Routine section).

i. Allow 5 minutes to pass before attempting to adjust the 100% manifold pressure. This will insure that the learning routine is complete and that the heat rise is stable.

j. Read the 100% manifold pressure.

k. If needed, remove the high heat manifold adjustment cover and adjust to obtain the correct manifold pressure. See Figure 59.

100% (HIGH) HEAT ADJUSTMENT: COUNTERCLOCKWISE TO DECREASE MANIFOLD PRESSURE OR CLOCKWISE TO INCREASE MANIFOLD PRESSURE.

l. Use Manifold Pressure Settings Table 22 for the correct manifold pressure setting in Inches of Water Column.

m. Replace and tighten the adjustment cover for the high heat and read the manifold pressure again. This procedure may need to be repeated until the correct manifold pressure is obtained.

NOTE: The adjustment cover over the high heat must be in place during manifold gas pressure readings. See Figure 53.

n. If the firing rate cannot be obtained with the manifold pressures specified in Table 22, the orifices must be changed. If a change of orifices is required to correct the furnace input rating, refer to Table 17 on page 37.

o. Once the 100% manifold pressure has been adjusted; push the Enter button on the user interface. This will stop the gas valve setup mode and take you back to the home screen.

⚠ WARNING

EXPLOSION HAZARD
REPLACE AND/OR TIGHTEN ALL PLUGS REMOVED OR LOOSENED WHEN ADJUSTING GAS PRESSURE. LEAK CHECK THE FITTINGS BEFORE PLACING INTO REGULAR SERVICE.
FAILURE TO FOLLOW THIS WARNING COULD RESULT IN SERIOUS PERSONAL INJURY, PROPERTY DAMAGE, OR DEATH.

p. Remove all field supplied tubing and measurement devices. Reinstall and tighten all covers and outlet pressure tap screw.

q. Leak test all gas fittings using a leak detection solution or soap suds.

r. Turn comfort control to home owners desired temperature.

TABLE 22

Furnace Input rate (KBTU/hr)	FINAL NG MANIFOLD PRESSURE SETTINGS (inches w.c.)		
	40%	65%	100%
60	0.7 + 0.2 / - 0.0	Not Adjustable	3.5 ± 0.2
80	0.7 + 0.2 / - 0.0	Not Adjustable	3.5 ± 0.2
100	0.7 + 0.2 / - 0.0	Not Adjustable	3.5 ± 0.2
Downflow 120	0.7 + 0.2 / - 0.0	Not Adjustable	3.5 ± 0.2
Upflow 120	0.9 + 0.2 / - 0.0	Not Adjustable	3.5 ± 0.2
For upflow 120KBTU/hr model, 1st stage is 45% Manifold pressures apply for Natural Gas applications ONLY			

Furnace Input rate (KBTU/hr)	FINAL LP MANIFOLD PRESSURE SETTINGS (inches w.c.)		
	40%	65%	100%
60	2.1 ± 0.5	Not Adjustable	10.0 ± 0.5
80	2.1 ± 0.5	Not Adjustable	10.0 ± 0.5
100	2.1 ± 0.5	Not Adjustable	10.0 ± 0.5
Downflow 120	2.1 ± 0.5	Not Adjustable	10.0 ± 0.5
Upflow 120	2.9 ± 0.5	Not Adjustable	10.0 ± 0.5
For upflow 120KBTU/hr model, 1st stage is 45% Manifold pressures apply for Propane applications ONLY			

PERSONALITY MODULE

The Personality Module is a removable memory device, on which is stored model specific data required for proper furnace operation. The Personality Module is tethered to the unit and must remain with the furnace at all times. The Personality module must remain plugged into the furnace IFC.

STAND ALONE OPERATION (CONTINGENCY MODE)

The Contingency Mode allows the installer to set the equipment to operate in an ON/ OFF Duty Cycle mode. This mode will be activated using the User Interface. Contingency Mode is NOT available in 24VAC mode. The user will select the desired level of capacity required, Stage 1 (40%) or 2 (100%). The user will select the desired ON/ OFF Duty Cycle, 10% minimum to 50% maximum, (10% increments, 10% = 2 minutes On, 18 minutes Off; 50% = 10 minutes on, 10 minutes off).

CONTINGENCY MODE

Note:

Stage 1 = 40% (low) heat, Stage 2 = 100% (high) heat

Note:

If a communicating comfort control is detected to be present and the contingency mode is selected, NOT AVAILABLE will be displayed on the User Interface.

- Stand alone operation can only be entered at the user interface.
- Stand alone operation can be set up to operate the furnace in **Heating Only.**
- The contingency mode is used when the communicating comfort Control is not communicating with the furnace or when setting gas manifold pressures.
- Before attempting to enter contingency mode, disconnect the Data wire "D" from the Furnace IFC terminal block.
- The contingency mode will function only when the Furnace IFC is not flashing a fault code at its Fault LED.
- To enter the contingency mode of operation, turn 115 VAC power off. When the Green LED on the variable speed inducer drive goes out, turn 115 VAC power back on.
- Scroll down using the down arrow ▼ at the User Interface until you see **CNTNGNCY Mode**, then press the **Enter** button.
- **CNTNGNCY MODE** and ◀ **STAGE** ▶ will now be displayed. Press the **Enter** button.
- **STAGE** and ◀ **OFF [OFF]** will now be displayed. First or Second heat stage **must** be selected. Use the ◀ or ▶ arrows to select the stage of heat wanted and then push the **Enter** button and then the ▼ button.
- **DUTY CYCLE** and **10% [10%]** will now be displayed. A duty cycle **must** now be selected from 10 to 50%. A 10% duty cycle will run the furnace for 2 minutes and then off for 18 minutes. A 50% duty cycle will run the furnace for 10 minutes and then be off for 10 minutes.
  These duty cycles will be repeated 3 times per hour. Use the ◀ or ▶ arrows to select a duty cycle and then push the **Enter** button and then the ▼ button.

- **Start** and **NO [NO]** will now be displayed. With a **NO/NO** question being asked, use the ◂ or ▸ arrows to select the **YES** and then press the **ENTER** button.
- **Are you Sure and NO [NO]** will now be displayed. With a **NO/ NO** question being asked, use the ◂ or ▸ arrows to select the **YES** and then press the **ENTER** button.
- Turn 115VAC power off. When the Green LED on the variable speed inducer drive goes out, turn 115 VAC power back on.
- When the furnace is operating in the contingency mode (stand alone operating cycle), the user interface will display the following information. The top line will say **CNTNGNCY MODE**. The bottom line will show the duty cycle stage number **STG** (**1 or 2)** selected, and the percent number **10-50 %** selected.
- All furnace operating controls, pressure switches and communications between the IFC and the variable speed inducer drive and the variable speed indoor blower will be functional during contingency mode operation of the furnace.
- The ◂ ▸ ▴ ▾ and **ENTER** buttons do not function in the contingency mode of operation.
- To exit the contingency mode of operation turn off the 115 VAC power to the furnace.
- The contingency mode will stop for any of the following reasons:
  - **(1)** If the furnace IFC receives a signal from the communicating comfort control. This will only happen if the data wire "D" from the comfort control has been reconnected to the furnace IFC terminal board terminal "D".
  - **(2)** Power is removed from the furnace and then turned back on.
  - **(3)** The Furnace IFC enters a **RESET** mode of operation.
  - **(4)** A fault is detected by the furnace IFC. Fault LED will be flashing an Alert Code.

24V CONTINGENCY MODE

An alternative method for the contingency mode can be used by changing the mode of operation in the Use Interface to 24V mode and installing a conventional 24V comfort control.

To set this mode of operation:

Remove all wiring from the *CONT900 comfort control and install a 24V comfort control. If the comfort control requires a 24V common; connect R and B to respective terminals. Connect a third wire to "W". At the IFC, connect the same three wires to the corresponding terminals. Jumper W1 to W2 at the IFC. The stage delay between W1 and W2 can be set by scrolling through the User Interface. It is factory set to zero minutes but can be adjusted to 5, 10, or 15 minutes.

IFC INDUCER LEARNING ROUTINE SEQUENCE

- The furnace IFC will go through an inducer learning routine for three pressure switches.
- The learning routine is done to determine the correct amount of ventilation air for complete combustion.
- The inducer motor speed may be different for each installation due to the different length and size of the ventilation pipe, exhaust vent pipe, number of pipe fittings used, and the type of vent cap installed.
- The inducer learning routine is repeated each time the power to the furnace is interrupted. Once power is restored and the furnace receives a call for heat, the PS-1, PS-2 inducer learning routine will be initiated. The furnace IFC will not go through a PS-3 inducer learning routine until it receives a call for 100% (high) heat.
- To ensure the furnace heating efficiency is maintained the furnace IFC will repeat the inducer motor learning routine after :
  - 150 Cycles at 40% (low) heat
  - 100 Cycles at 65% (medium) heat
  - 50 Cycles at 100% (high) heat

PS-1, PS-2 Inducer Learning Routine

- The furnace IFC checks pressure switches PS-1, PS-2, and PS-3. They all have to be open before a heating cycle can begin.
- The furnace IFC sends a digital signal to the variable speed inducer drive to run the inducer motor at the preset factory 65% (medium) heat RPM.
- The furnace IFC waits for the PS-1 and PS-2 pressure switches to close. A 24 Volt AC signal is sent to the furnace IFC when a pressure switch closes.
- If PS-1 and PS-2 do not close at the preset factory 65% (medium) heat RPM, the furnace IFC will continue to signal the variable speed inducer drive to increase the inducer speed in steps until PS-1 and PS-2 close or until the maximum RPM for 65% (medium) heat is reached.
- When PS-1 and PS-2 switches close, the furnace IFC will then start the ignition cycle.
- The IFC now starts the igniter warm up cycle.
- Approximately 20 seconds later, the furnace IFC will turn on the gas valve.

NOTE: The furnace lights at approximately 65% of capacity.

- When the burner flame is detected by the furnace IFC, a forty-five second time delay for indoor blower operation begins. The forty-five second time delay allows the heat exchanger and the recuperative cell to warm up.
- The furnace IFC will now start its 65% (medium) heat inducer learning routine.
- The furnace IFC will signal the variable speed inducer drive beginning to reduce the inducer motor speed in steps until the furnace IFC detects that PS-2 is open.
- When PS-2 opens, the furnace IFC will NOTE the inducer motor RPM.
- The furnace IFC then adds an additional number of RPM to the 65% (medium) heat inducer motor NOTED RPM until PS-2 closes.
- The additional number of RPM plus this NOTED RPM is the learned 65% (medium) heat inducer operating RPM.
- The furnace IFC now stores this learned operating inducer RPM for 65% (medium) heat in its memory.
- The furnace IFC will use this stored learned operating inducer RPM for 65% (medium) heat calls it receives in the future.
- If the furnace IFC is still receiving a call for low heat operation it will now start the learning routine for 40% (low) heat.
- The furnace IFC will then continue to reduce the inducer motor RPM in steps until the furnace IFC detects that PS-1 is open.
- When PS-1 opens, the furnace IFC will NOTE the inducer motor RPM.
- The furnace IFC then adds an additional number of RPM to the 40% (low) heat inducer motor NOTED RPM until PS-1 closes.
- The additional number of RPM plus this NOTED RPM is the learned 40% (low) heat inducer operating RPM.
- The furnace IFC now stores this learned inducer operating RPM for 40% (low) heat in its memory.
- The furnace IFC will use this stored learned inducer operating RPM for 40% (low) heat calls it receives in the future.
- Whenever the furnace is powered up or after a RESET, the furnace IFC will not go through a learning routine for 100% (high) heat until it receives a call for 100% (high) heat.

PS-3 INDUCER LEARNING ROUTINE

- When the furnace IFC receives a digital signal for 100% (high) heat from the comfort control it will begin the PS-3 inducer learning routine.
- The furnace will start the heating cycle in 65% (medium) heat, if not already on, and then begins the PS-3 inducer learning routine.
- The furnace IFC will send a digital signal to the variable speed inducer drive to run the inducer motor at the preset factory 100% (high) heat RPM.
- The furnace IFC waits for PS-3 pressure switch to close. A 24 Volt AC signal is sent to the furnace IFC when the pressure switch closes.
- If PS-3 does not close at the factory preset 100% (high) heat RPM, the furnace IFC will continue to signal the variable speed inducer drive to increase the inducer speed in steps until PS-3 closes or until the maximum RPM for 100% (high) heat is reached.
- The furnace IFC enters a time delay so that the heat exchanger and the recuperative cell warm up to their high heat operating temperature. At the end of this time delay, the inducer discharge air temperature will be at its high heat operating temperature and the density of the products of combustion will be stabilized.
- The furnace will now signal the variable speed inducer drive to reduce the inducer speed in steps until PS-3 opens.
- When PS-3 opens, the furnace IFC will NOTE the inducer motor RPM.
- The furnace IFC then adds an additional number of RPM to the 100% (high) heat inducer motor NOTED RPM until PS-3 closes.
- The furnace IFC now stores this learned inducer operating RPM for 100% (high) heat in its memory.
- The furnace IFC will use this stored learned inducer operating RPM for 100% (high) heat calls it receives in the future.
- If PS-3 is not closed when the inducer reaches its maximum RPM, the furnace IFC will signal the variable speed inducer drive to reduce the inducer Motor speed in steps to its low heat LEARNED SPEED.
- The furnace IFC flashes its Red Fault LED three times repeatedly. The furnace IFC will keep operating at low heat for 10 minutes and then retry the PS-3 learning routine.

CONTROL AND SAFETY SWITCH ADJUSTMENTS

LIMIT SWITCH CHECK OUT

The Limit Switch is a safety device designed to close the Gas Valve should the Furnace become overheated. Since proper operation of this switch is important to the safe operation of the unit, it **must be checked out on initial start up by the installer.**

To check for proper operation of the Limit Switches, set the Comfort Control to a temperature higher than the indicated room temperature to start the furnace. Restrict the airflow by blocking the return air (disconnecting the Indoor Blower may trip the Inducer Limit). When the Furnace reaches the maximum outlet temperature as shown on the rating plate, the burners must shut off. If they do not shut off after a reasonable time and overheating is evident, a faulty Limit Switch is probable and the Limit Switch must be replaced. After checking the operation of the Limit Control, be sure to remove the restriction from the return air inlet.

AIRFLOW ADJUSTMENT

Check inlet and outlet air temperatures to make sure they are within the range specified on the Furnace rating nameplate. If the airflow needs to be increased or decreased, see the Airflow Label on the Furnace or the unit's Service Facts for information on changing the speed of the Blower Motor for your specific model. Blower speed changes are made on the User Interface.

⚠ WARNING

ELECTRICAL SHOCK HAZARD

DO NOT TOUCH ANY COMPONENTS OTHER THAN THE DISPLAY ASSEMBLY AND THE DOOR SWITCH DURING THIS PROCEDURE.

FAILURE TO FOLLOW WARNING COULD RESULT IN SERIOUS PERSONAL INJURY OR DEATH.

⚠ WARNING

ELECTRICAL SHOCK HAZARD

DISCONNECT POWER TO THE UNIT BEFORE REMOVING THE BLOWER DOOR. ALLOW A MINIMUM OF 10 SECONDS FOR IFC POWER SUPPLY TO DISCHARGE TO 0 VOLTS.

FAILURE TO FOLLOW THIS WARNING COULD RESULT IN PROPERTY DAMAGE, PERSONAL INJURY OR DEATH.

INDOOR BLOWER TIMING

Heating: The Integrated Furnace Control module controls the Indoor Blower. The Blower start is fixed at 45 seconds after ignition. The FAN-OFF period is field selectable via the User Interface menu at 60, 100, 140, or 180 seconds. The factory setting is 100 seconds.

Cooling: Continuous Fan mode is 50% of the cooling CFM. This is a selectable range on the Comfort Control menu.

When in communicating mode, see Use Interface Menu in furnace Installer's Guide.

⚠ WARNING

SAFETY HAZARD

MAKE SURE THAT THE BLOWER DOOR IS IN PLACE AND NOT AJAR. DANGEROUS FUMES COULD ESCAPE.

FAILURE TO FOLLOW WARNING COULD RESULT IN SERIOUS PERSONAL INJURY OR DEATH.

This unit is equipped with a Blower Door Switch which cuts power to the Furnace causing shutdown when the door is removed. Operation with the door removed or ajar can permit the escape of dangerous fumes. All panels must be securely closed at all times for safe operation of the Furnace.

NOTE TO INSTALLER

Review the following instructions with the homeowner. Review contents of USER'S INFORMATION MANUAL with the homeowner.

INSTRUCTIONS TO THE HOMEOWNER

⚠ WARNING

EXPLOSION HAZARD

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

CONDITIONS AFFECTING FURNACE OPERATION

NOTE:
CONTINUOUS fan mode during COOLING operation may not be appropriate in humid climates. If the indoor air exceeds 60% relative humidity or simply feels uncomfortably humid, it is recommended that the fan only be used in the AUTO mode.

1. EXCESSIVE COMBUSTION PRESSURE (WIND IN EXCESS OF 40 M.P.H.) VENT OR FLUE BLOCKAGE

On a call for heat, the Variable Speed Draft Inducer must first ramp up to speed and close the Pressure Switch before the Ignition Sequence is allowed to begin. If the Pressure Switch does not close, the Motor will ramp up to maximum speed and continue to operate at maximum speed for about one minute. After one minute, the Integrated Furnace Control will turn the Motor off for about 30 seconds then back on in an attempt to reestablish proper operation. This condition is indicative of a highly restricted or blocked inlet or outlet Vent Pipe or a failed Pressure Switch.

If pressure against induced draft Blower outlet becomes excessive, the Pressure Switch will open. If the Pressure Switch is open for more than 3.5 seconds, the Variable Speed Draft Inducer will speed up and attempt to close the Pressure Switch.

If the Pressure Switch is not closed within 12 to 15 seconds or if the maximum speed of the Motor is reached, the Draft Inducer sends a Fault Signal to the Integrated Furnace Control. If the unit is operating in high heat, an Inducer Fault will cause the Furnace control to transition the system to medium heat and it will operate there for 10 minutes before attempting to run again in high heat. If the unit is operating in medium heat, an Inducer Fault will cause the Furnace control to transition the system to low heat and it will operate there for 10 minutes before attempting to run again in medium heat. If the unit is operating in low heat, an Inducer Fault will cause the Furnace control to shut the system down and wait 30 seconds before attempting to reestablish operation in low heat.

2. LOSS OF FLAME

If loss of flame occurs during a Heating Cycle, or flame is not present at the sensor, the Integrated Furnace Control (IFC) will close the Gas Valve. The Integrated Furnace Control will then recycle the Ignition Sequence. If Ignition is not achieved, it will shut off the Gas Valve and lock out the system.

3. POWER FAILURE

If there is a power failure during a Heating Cycle, the system will restart the Ignition Sequence automatically when power is restored, if the Comfort Control still calls for heat.

4. GAS SUPPLY FAILURE

If a gas supply failure occurs during a Heating Cycle, the system Integrated Furnace Control will recycle the Ignition Sequence, then if Ignition is not achieved, the Integrated Furnace Control will shut off the Gas Valve and lock out the system.

5. INDUCED DRAFT BLOWER FAILURE

Please refer to the "Communicating Controls Service Manual," publication number 34-4093 (latest revision), for diagnostic assistance.

6. CONDENSATE DRAIN BLOCKAGE

If the condensate drain is blocked, either by debris, improper draining, or by freezing condensate, the pressure switch will receive a signal warning of the accumulation of condensate in the heat exchanger assembly. The pressure switch contacts will open and remain open, not allowing unit operation. The unit will not operate until the condensate drain has been cleared, and the condensate flows freely.

7. RESET AFTER LOCKOUT

When the Integrated Furnace Control has shut the system down and gone into lockout, the system may be manually reset. The system can be reset by turning the system power off.

8. RESET AFTER BURNER BOX LIMIT SHUTDOWN

BURNER BOX TEMPERATURE LIMIT DEVICE

All models are equipped with a Manual Reset Temperature Limit located on the Burner Box. In case of excessive temperature, the Limit will open and cause the circuit to open which shuts off all flow of gas.

If the Furnace shuts down check the Burner Box Temperature Limit Switch. It is located on the bottom of the Burner Box. The Vent and Combustion Air Inlet terminations must first be checked for blockage. If blockage exists, clear the problem and then the Reset Button may be depressed. **If there is no blockage of the terminations, do not reset the Burner Box Limit Switch. A qualified service professional should be called to determine the problem and reset the Limit Switch.**

ALERT CODE RECOVERY

On power up, last 4 Alerts, if any, will be flashed on the Red Alert LED. The newest Alert detected will flash first and the oldest last. There will be a 2 second delay between Alert Code flashes. Solid Red LED error codes will not be displayed.

The Green BM LED will be on solid when the control is powered. The Green status LED indicator light will operate as shown in the table and the Red LED will flash (one flash) every 20 seconds.

NOTE:

Use the flash code menu for detail of the alerts. Alert codes also are displayed on the User Interface menu using a descriptive text message and on the comfort control display using an alert code number. A complete list of the alert codes is included with the comfort control.

Table 23		
LED	DESCRIPTION	FUNCTION
GREEN	STATUS LED	FAST FLASH - CALL FOR HEAT SLOW FLASH - NO CALL FOR HEAT
RED	ALERT LED	NO. OF FLASHES - SEE DIAGNOSTIC CODES
GREEN (BM)	BITMASTER	ON SOLID WHEN UNIT POWERED
AMBER	COM	FLASHES DEVICE COUNT

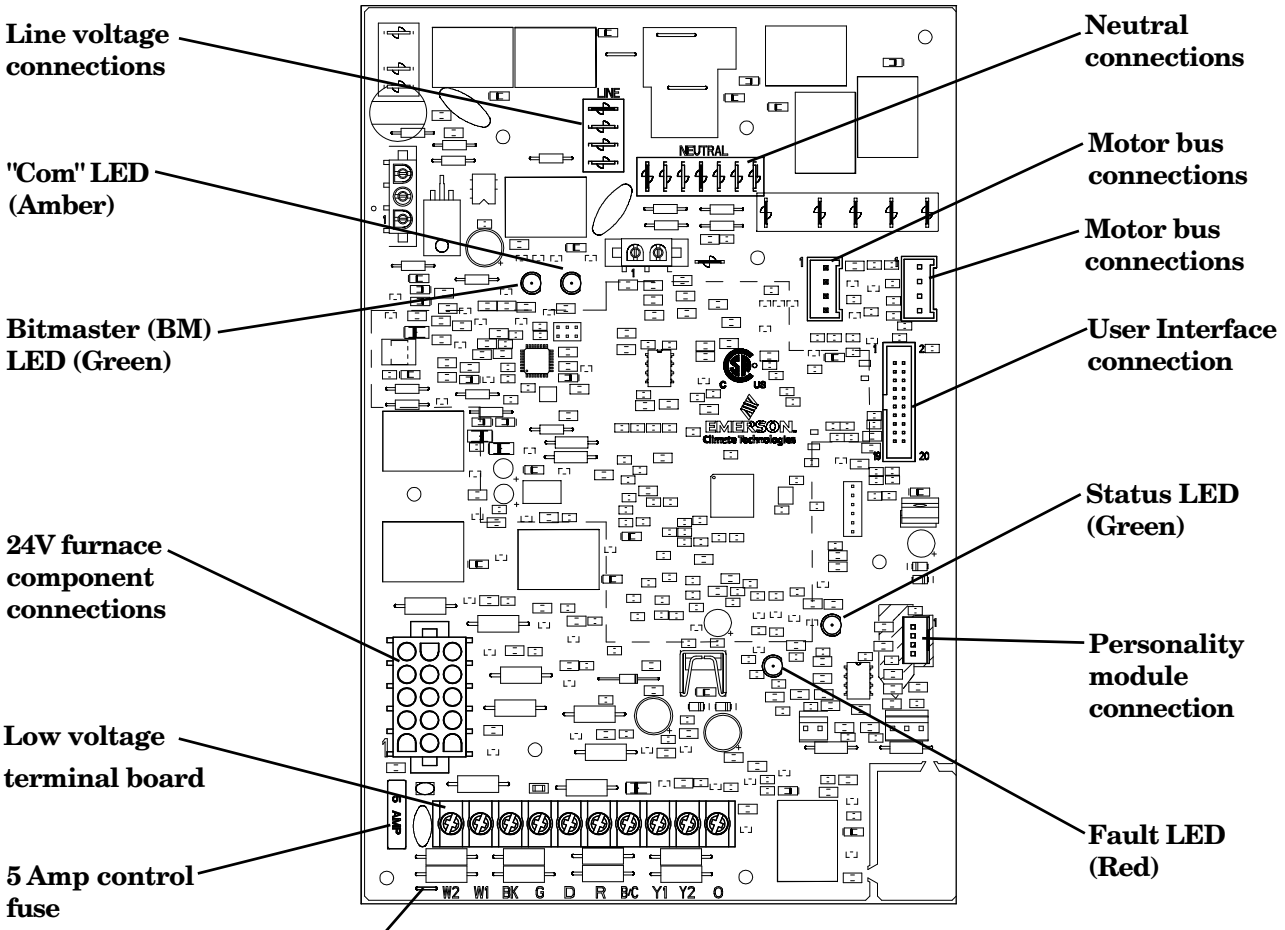

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TABLE 24- FURNACE ALERT CODES

Alert Notification				Alert Code	Alert Group	Alert Description
Fault LED	COM LED	User Interface Display	Control Display			
2 Flash	Device count	RECYCLE	N/A	20	Flame lost or Ignition failure	Flame is off when flame should be detected. Furnace tries to relight itself.
		RETRY				Furnace tries to light, but no flame is detected.
		RECYCLE LO	ERR 22	22	Soft lockout due to flame lost or ignition retries	10 recycles within a single call for heat will cause 1hr lockout.
		RETRY LO				3 ignition attempts in a row within a single call for heat results in 1 hr lockout.
3 Flash	Device count	PS3 OPEN	N/A	1	Pressure Switch Failure	Open Pressure Switch, third stage
		PS3 CLOSED				Shorted Pressure Switch, third stage
		PS2 OPEN				Open Pressure Switch, second stage
		PS2 CLOSED				Shorted Pressure Switch, second stage
		PS1 OPEN				Open Pressure Switch, first stage
		PS1 CLOSED				Shorted Pressure Switch, first stage
4 Flash	Device count	AUX LIMIT	ERR 26	26	High Temp Limit Fault	Open Reverse Flow - Heat exchanger temperature too high. Could be caused by low airflow or fan failure.
		HIGH LIMIT				Open High Limit - Heat exchanger temperature too high. Could be caused by low airflow or fan failure.
		ROLLOUT OPEN	ERR 87	87	Roll Out Fault	Open flame rollout
5 Flash	Device count	FLAME ERROR	ERR 34	34	Flame Detect Fault	Flame detected, should not be present
6 Flash	Device count	POLARITY ERR	N/A	33	Line Polarity Fault	Voltage reverse polarity
		GND FAULT	N/A	88	Ground Fault	Occurs when proper earth ground is not detected.
		IGNITER ERR	ERR 10	10	Ignition Means Fault	Igniter fault
		TRIAC ERR				Triac fault
7 Flash	Device count	EXT GV ERR	ERR 93	93	Gas Valve Fault	Control senses 24V present at the gas valve when it should not be present.
Solid ON		INT GV ERR				Control tried to turn on gas valve, but 24V not sensed.
						Control senses 24V present at the gas valve when it should not be present.
8 Flash	Device count	LO FLAME SNS	N/A	4	Low Flame Signal	Flame current is low, but still strong enough to allow operation.
9 Flash	Device count	IND LIMIT	ERR 26	26	High Temp Limit Fault	Flue gas temperature too high. Could be caused by low airflow or fan failure.
10 Flash	Device count	SYS COMM CRC	N/A	90	Communication Busy Fault	COMM system unrecognized response
		IND COMM CRC				Inducer Motor unrecognized response
		BLW COMM CRC				Blower motor unrecognized response
	Device count	BLW COMM ERR	ERR 91	91	Communication Fault	Blower motor no COMM response [1]
		IND COMM ERR				Inducer motor no COMM response
	Fast Flash	SYS COMM ERR				Loss of heat/cool demand
		NO SYS CLK				Loss of clock signal
	Device count	24V COMM MSMTCH	ERR 139	139	Communication Failure	Communication Message has been detected while configured for 24V Mode
Solid ON	Device count	CNTRL FAULT	ERR 18	18	Control Failure	Internal control failure
None	Device count	TWIN ERROR	N/A	19	Twinning Fault	Twinning Not Allowed with Variable Speed
None	Device count	PM DATA ERR	N/A	114	Bad or Missing PM	Data Section is Corrupt but PM is useable
		CAP MISMATCH				Compressor size does not match capacity in PM
		ID MTR ERR	ERR 114			Blower HP/OEM does not match PM Data
		PM MISSING				No PM
		PM UNIT ERR	N/A			Primary Copy of Unit Data File is Corrupt.
		PM MEM ERROR	ERR 114			Primary and Secondary copies of Unit Data File are Corrupt
None	Device count	AC VOLTS LOW	N/A	59	AC Line Fault	Voltage too low
		AC VOLTS HI				Voltage too high
None	Device count	CHECK FUSE	N/A	92	Fuse	24V Fuse Open
None	Device count	Y1 OFF ERR	ERR 101	101	Y1 Relay Failure	Y1 Output OFF when it should be ON
		Y1 ON ERR				Y1 Output ON when it should be OFF
None	Device count	TS 1 SHORT	N/A	119	Temperature Sensor Failure	Temperature sensor 1 shorted.
		TS 1 OPEN				Temperature sensor 1 open.
		TS 2 SHORT				Temperature sensor 2 shorted.
		TS 2 OPEN				Temperature sensor 2 open.
Notes:	[1] Comfort Control will switch system to "OFF" until this fault condition clears					
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For more information contact your local dealer (distributor)

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Since the manufacturer has a policy of continuous product and product data improvement, it reserves the right to change design and specifications without notice.