



41-5016-07

INSTALLATION, OPERATION, AND MAINTENANCE GUIDE

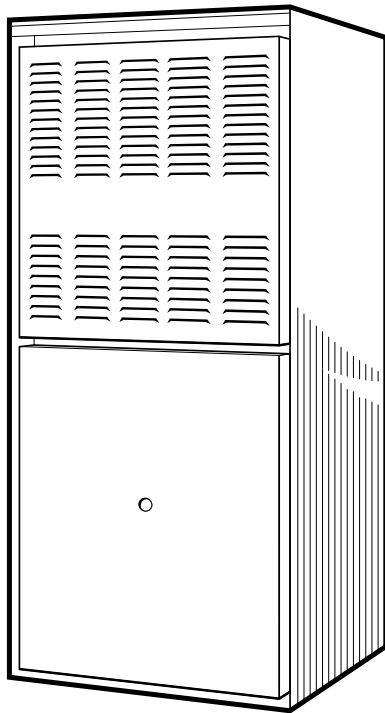
ALL phases of this installation must comply with NATIONAL, STATE AND LOCAL CODES

Model:

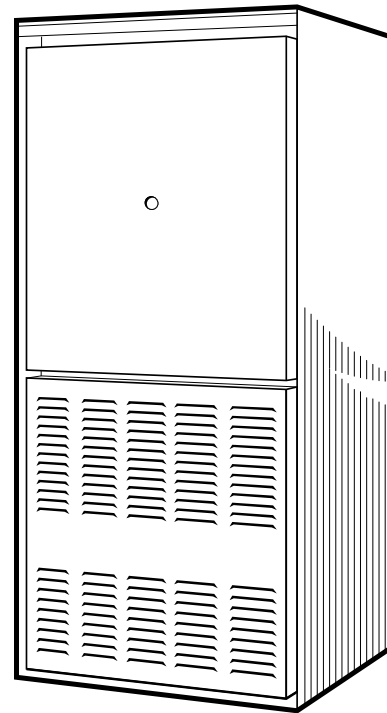
CUX1B040A9241A	CDX1B040A9241A
CUX1B060A9361A	CDX1B060A9361A
CUX1B080A9421A	CDX1B080A9421A
CUX1C100A9481A	CDX1C100A9481A
CUX1D100A9601A	CDX1D120A9601A
CUX1D120A9601A	

Upflow / Horizontal* and Downflow / Horizontal*, Single Stage Direct Vent Gas- Fired Condensing Furnaces

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



Upflow / Horizontal*



Downflow / Horizontal*

* Models can ONLY be rotated
to LEFT Side for horizontal installation

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

Installation Instructions

SAFETY SECTION

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" (page 3), of these instructions.
3. Provide adequate combustion and ventilation air to the furnace space as specified in "Air for Combustion and Ventilation" (pages 7-8), 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 11-21), 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 "Gas Piping" (page 27), of these instructions.
6. Always install the furnace to operate within the furnace's intended temperature-rise range with a duct system which has an external static pressure within the allowable range, as specified on the unit rating plate. Airflow with temperature rise for cfm versus static is shown in the Service Facts accompanying this furnace.
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 (page 3), of these instructions.
9. The furnace may be used for temporary heating of buildings or structures under construction only when the following conditions have been met:
 - a. The furnace venting system must be complete and installed per manufacturer's instructions.
 - b. The furnace is controlled only by a room thermostat (no field jumpers).
 - c. The furnace return air duct must be complete and sealed to the furnace and clean air filters are in place.
 - 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 and 80 degrees Fahrenheit.
 - g. Clean the furnace, duct work, and components upon substantial completion of the construction process, and verify furnace operating conditions including ignition, input rate, temperature rise and venting, according to the manufacturer's instructions.

10. This product must be gas piped by a Licensed Plumber or Gas Fitter in the Commonwealth of Massachusetts.

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 CAN/CGA B149 Installation Codes 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. 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 CAN/CGA B149 Installation Codes.
8. After it has been determined that each appliance connected to the venting system properly vents where tested as outlined above, return doors, windows, exhaust fans, fireplace dampers and any other gas-fired burning appliance to their previous conditions of use.

WARNING

FIRE OR EXPLOSION HAZARD

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

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

GENERAL

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 may need to be reduced (See High Altitude Installation).

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 • CAN/CGA 2.3 standards. 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.

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?
3. Is there sufficient space for servicing the furnace and other equipment? A minimum of 24 inches front accessibility to the furnace must be provided. Any access door or panel must permit removal of the largest component.
4. Are there at least 3 inches of clearance between the furnace combustion air openings in the front panel and any closed panel or door provided?
5. Are the ventilation and combustion air openings large enough and will they remain unobstructed? If outside air is used, are the openings set above the highest snow accumulation level? (See the Air for Combustion and Ventilation section.)
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.

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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-g 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.

CAUTION

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

CAUTION

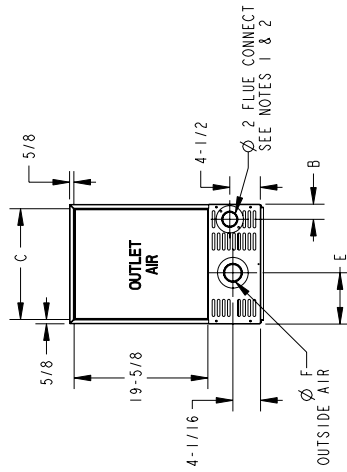
Disconnect all electric power including remote disconnects before servicing, insure that all motor capacitors have discharged stored voltage.

IMPORTANT:

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

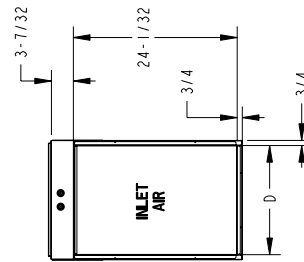
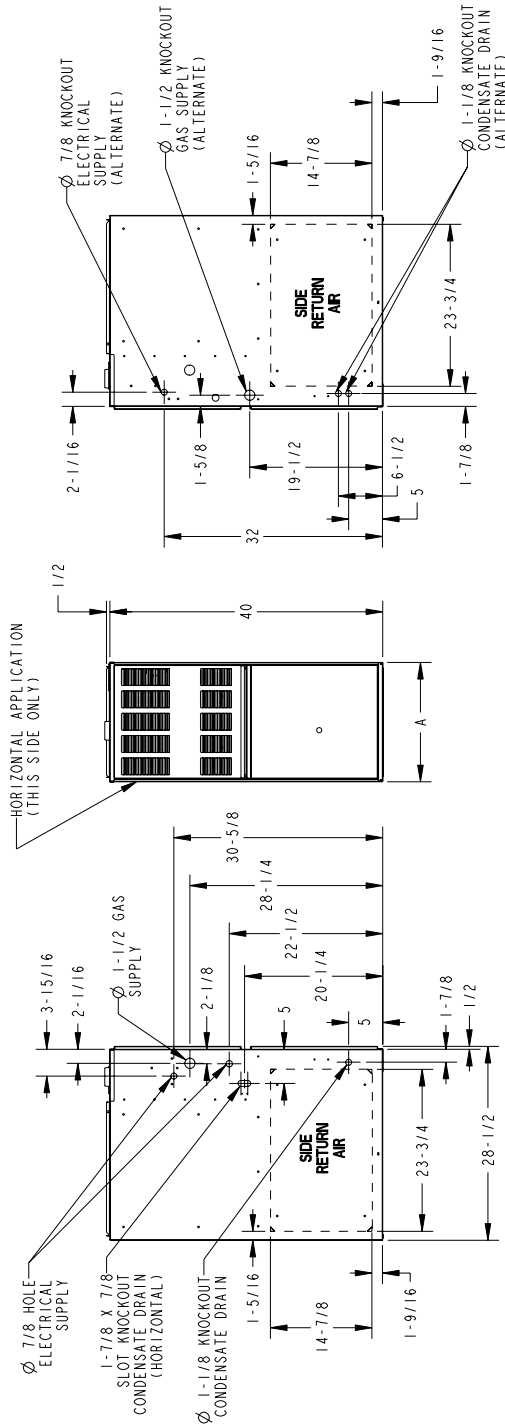
OUTLINE DRAWING FOR CUX1 FURNACES

(ALL DIMENSIONS ARE IN INCHES)



MINIMUM CLEARANCE TO COMBUSTIBLE MATERIALS UPFLOW	
SIDES	0"
REAR	0"
FRONT	3"
TOP	1"
FLUE	0"
HORIZONTAL (FLUE DISCHARGE ON THE LEFT) ALCOVE	
RIGHT SIDE	0"
LEFT SIDE	0"
REAR	6"
FRONT	18"
TOP	1"
FLUE	0"
HORIZONTAL (FLUE DISCHARGE ON THE LEFT) CLOSET	
RIGHT SIDE	1"
LEFT SIDE	1"
REAR	3"
FRONT	3"
TOP	1"
FLUE	0"

CUX1 OUTLINE DRAWING (ALL DIMENSIONS ARE IN INCHES)

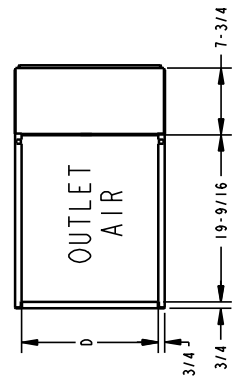
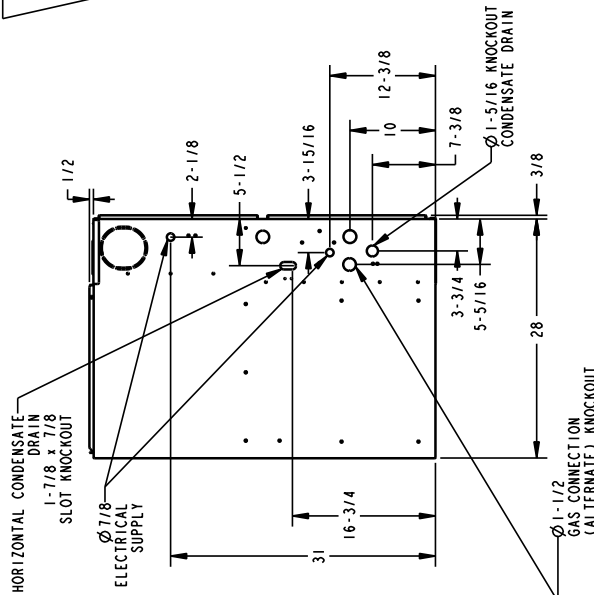
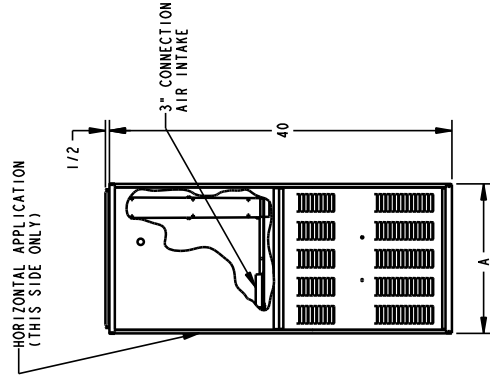
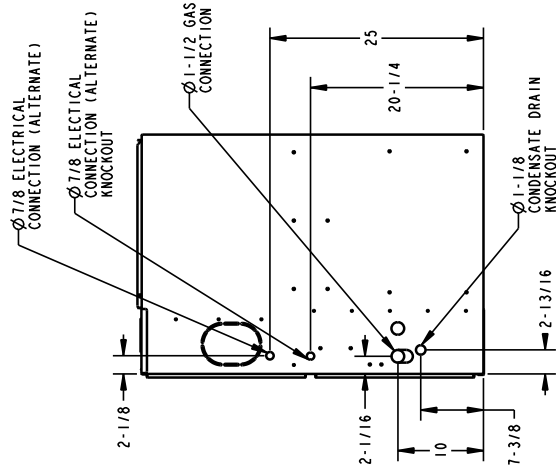
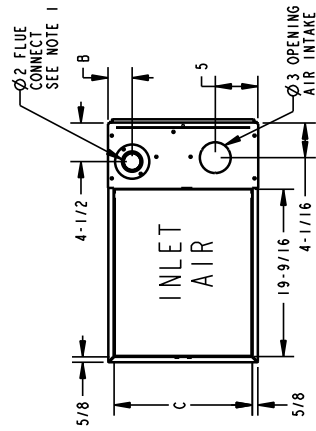


MODEL	DIM "A"	DIM "B"	DIM "C"	DIM "D"	DIM "E"	DIM "F"
CUXIB040A9241^^	17-1/2"	2-1/4"	16-1/4"	16"	7-1/2"	2"
CUXIB060A9361^^	21"	2-1/2"	19-3/4"	19-1/2"	9"	3"
CUXIB080A9421^^	24-1/2"	2-15/16"	23-1/4"	23"	10"	3"

CUXID120A9601^^^ REQUIRES 3" DIAMETER VENT PIPE.
 CUXIC100A9481^^^ & CUXID100A9601^^^ REQUIRES 2-1/2" OR 3" DIAMETER VENT PIPE.
 ^^ SUFFIX LETTER MAY BE AA THRU ZZ

OUTLINE DRAWING FOR CDX1 FURNACES

(ALL DIMENSIONS ARE IN INCHES)



MINIMUM CLEARANCE TO COMBUSTIBLE MATERIALS UPFLOW	
SIDES	0"
REAR	0"
FRONT	3"
TOP	1"
FLUE	0"
HORIZONTAL (FLUE DISCHARGE ON THE LEFT) ALCOVE	
RIGHT SIDE	0"
LEFT SIDE	0"
REAR	6"
FRONT	18"
TOP	1"
FLUE	0"
HORIZONTAL (FLUE DISCHARGE ON THE RIGHT) CLOSET	
RIGHT SIDE	1"
LEFT SIDE	1"
REAR	3"
FRONT	3"
TOP	1"
FLUE	0"

MODEL (SEE NOTE 1)	DIM "A"	DIM "B"	DIM "C"	DIM "D"
CDX1B040A9241A*				
#DC1B040A9241A*				
CDX1B060A9361A*	17-1/2"	2-1/4"	16-1/4"	16"
#DC1B060A9361A*				
CDX1B080A9421A*				
#DC1B080A9421A*				
CDX1C100A9481A*	21"	2-1/2"	19-3/4"	19-1/2"
#DC1C100A9481A*				
CDX1D120A9601A*	24-1/2"	2-15/16"	23-1/4"	23"
#DC1D120A9601A*				

- NOTES:
1. DIAMETER OF VENT PIPE MAY BE LIMITED TO 2-1/2" OR 3" ON SOME MODELS AT DIFFERENT FOR PROPER APPLICATION. REFER TO THE VENT LENGTH TABLE FOR PROPER APPLICATION.
 2. *SUFFIX LETTER MAY BE "A" THRU "Z".
 3. #PREFIX LETTER MAY BE "1" OR "A".

Installation Instructions

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. The above instructions only apply if the coil is on top of an upflow furnace.

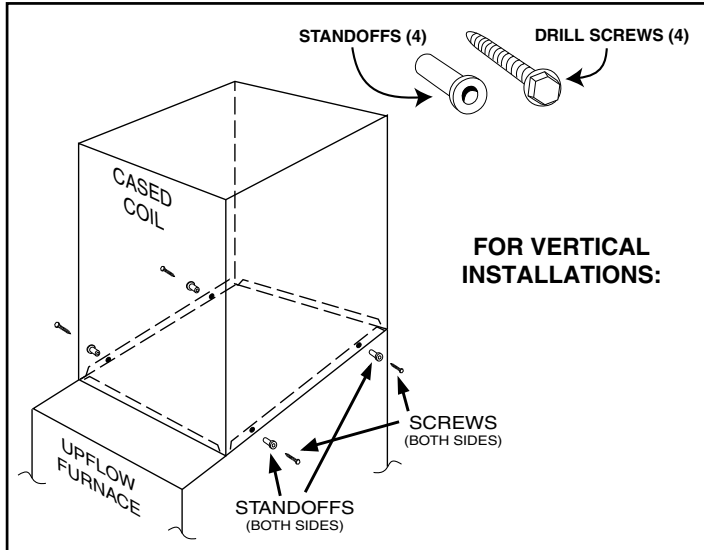


FIGURE 1

DOWNFLOW INSTALLATION

⚠ WARNING

Do not install the furnace directly on carpeting, tile or other combustible material other than wood flooring. For vertical downflow application, 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.

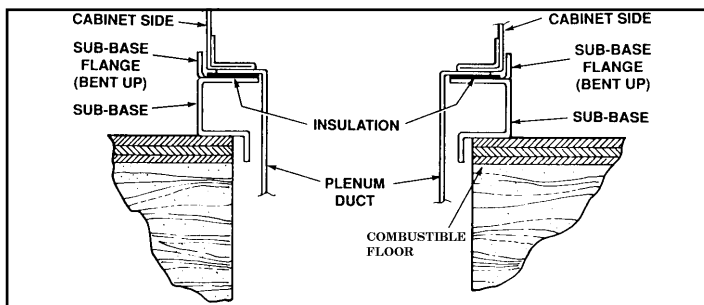


FIGURE 2

Required floor opening: (DOWNFLOW)
See Figure 2 and Table 1

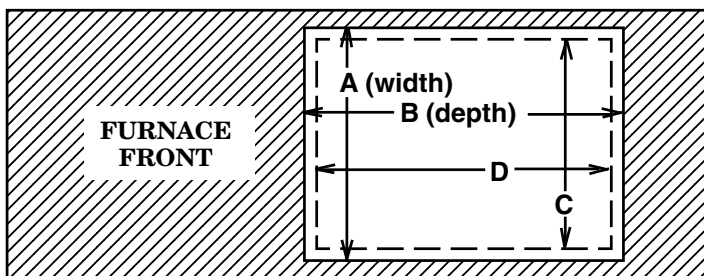


FIGURE 3

TABLE 1

CABINET WIDTH	RETURN DUCT WIDTH	FLOOR OPENING		PLENUM OPENING	
		"A"	"B"	"C"	"D"
14-1/2"	13-1/4"	13-5/8"	20-1/8"	12-5/8"	19-3/8"
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"

HORIZONTAL INSTALLATION

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% 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).

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 cased coil is secured to the furnace and both the furnace **and** the cased coil must be properly supported. 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.

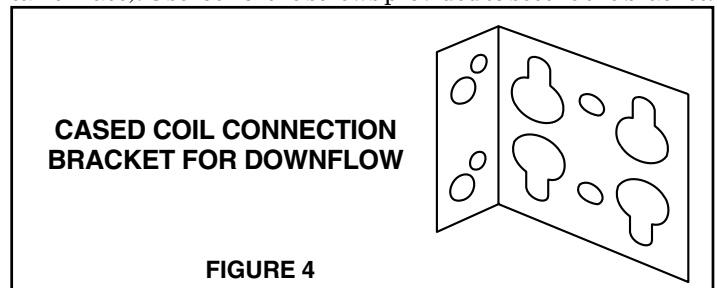


FIGURE 4

The downflow 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 Outline Drawings). Line contact is only permissible between lines formed by intersections of the top and two sides of the furnace casing and building joists, studs, or framing.

The furnace may be placed horizontally in a crawl space on a pad or other noncombustible material which will raise the unit for sufficient protection from moisture. **The furnace must be supported at both ends and the middle when installed horizontally. The furnace must also be elevated approximately 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 3/8" all-thread rods with pieces of angle iron underneath the furnace to form a hanging rack at both ends and the midpoint. The rods need to be of sufficient length to allow for proper clearances from combustible materials. The angle iron needs to be at least 32" in length to allow for access to service panels.

The upflow furnace, converted to horizontal, aligns and attaches the TXC coil to the same flanges used in vertical. The coil needs to have additional support.

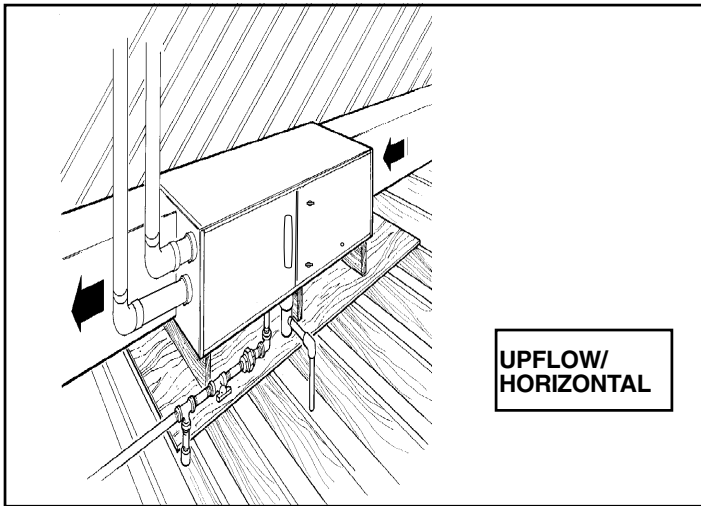


FIGURE 5

AIR FOR COMBUSTION AND VENTILATION

Adequate flow of combustion and ventilating air must not be obstructed from reaching the furnace. Air openings provided in the furnace casing must be kept free of obstructions which restrict the flow of air. Airflow restrictions affect the efficiency and safe operation of the furnace. Keep this in mind should you choose to remodel or change the area which contains your furnace. Furnaces must have a free flow of air for proper performance.

Provisions for combustion and ventilation air shall be made in accordance with "latest edition" of Section 5.3, Air for Combustion and Ventilation, of the National Fuel Gas Code, ANSI Z223.1, or Sections 7.2, 7.3 or 7.4 of CAN/CGA B149 Installation Codes, and applicable provisions of the local building codes. Special conditions created by mechanical exhausting of air and fireplaces must be considered to avoid unsatisfactory furnace operation.

Furnace locations may be in "confined space" or "unconfined space". Unconfined space is defined in Table 2 and Figure 6. These spaces may have adequate air by infiltration to provide air for combustion, ventilation, and dilution of flue gases. Buildings with tight construction (for example, weather stripping, heavily insulated, caulked, vapor barrier, etc.), may need additional air provided as described for confined space.

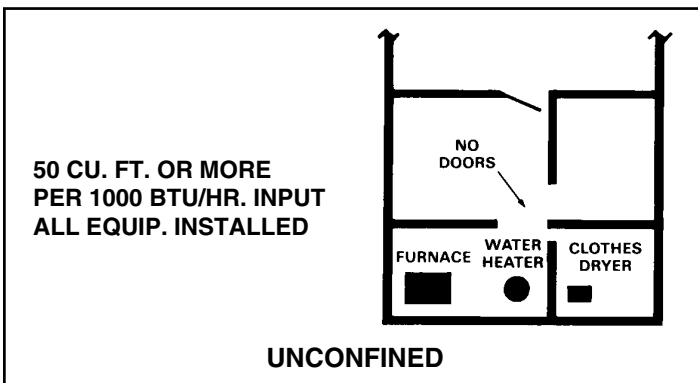


FIGURE 6

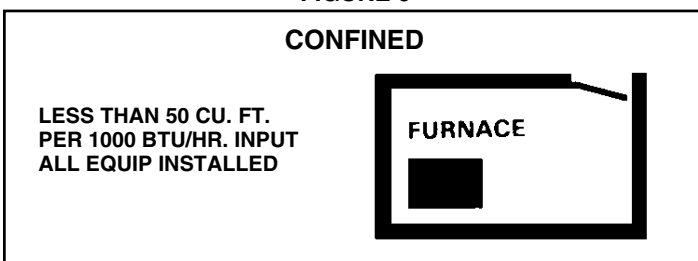


FIGURE 7

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 required.

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 required.

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

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

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

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

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
40,000	250
60,000	375
80,000	500
100,000	625
120,000	875

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

Installation Instructions

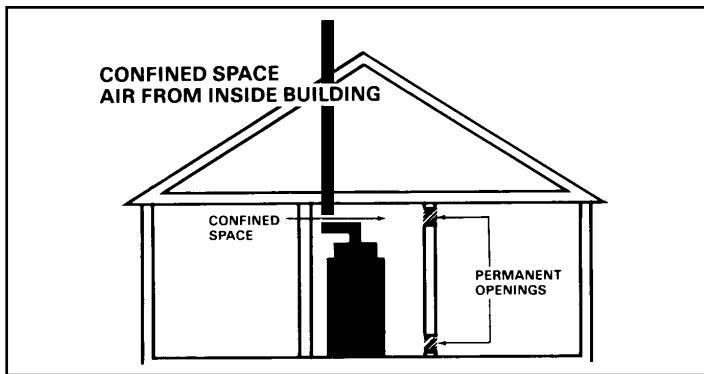


FIGURE 8

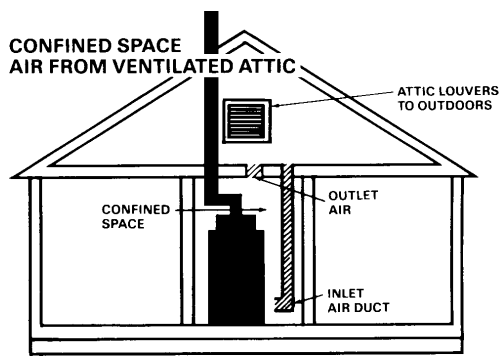
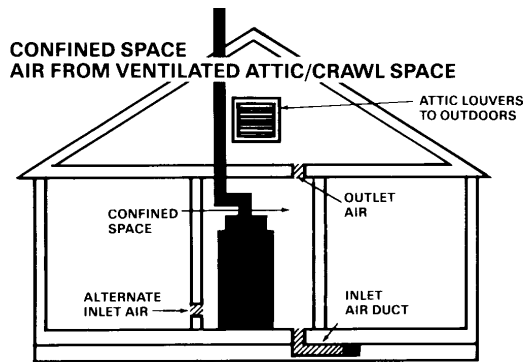
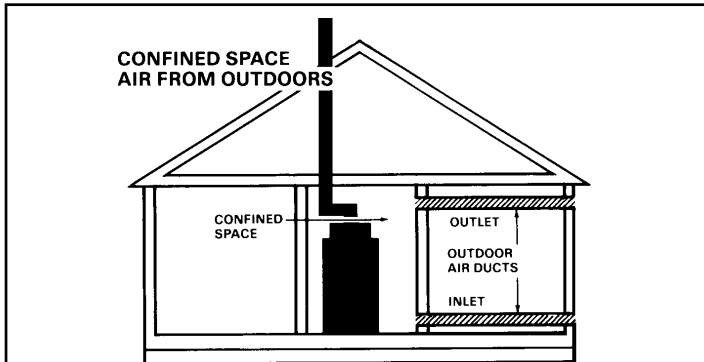


FIGURE 9

DUCT CONNECTIONS

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

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

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

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

Minimum return air "entering temperature" for the furnace is 55° F.

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.

RETURN AIR DUCT CONNECTION

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

1. Set the furnace in place.
2. For side return installations on upflow models, remove the insulation around the opening in the blower compartment.
3. The side panels on upflow furnaces include locating notches which may be used as guides for cutting an opening for return air. Refer to Figure 10 and the outline drawings on pages 4 and 5 for duct connection dimensions for various furnaces.
4. If a 3/4" flange is to be used for attaching the air inlet duct, add to cut where indicated by solid lines in Figure 10. Cut corners diagonally and bend outward to form flange.
5. If flanges are not required, and a filter frame is installed, cut along knockout guidelines.
6. Upflow furnaces: filter retainer brackets are factory supplied for bottom return. Use the filter retainer brackets on either side or on bottom if filter is to be used within the furnace cabinet.

NOTE:

On upflow 5 ton airflow models, if the airflow requirement exceeds 1800 CFM, these models will require filters on both sides; OR 1 side and the bottom; OR just the bottom.

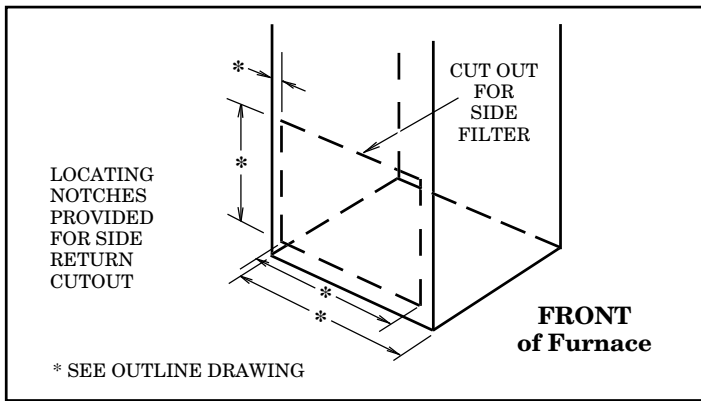


FIGURE 10

Downflow Furnaces: Brackets are factory supplied to mount filters in the return air duct work.

7. 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.

8. When replacing a furnace, old duct work should be cleaned out. Thin cloths should be placed over the registers and the furnace fan should be run for 10 minutes. Don't forget to remove the cloths before you start the furnace.

RETURN AIR FILTERS

Filters are **not** factory supplied for these furnaces. These furnaces require high velocity type air filters which may be located within the furnace blower compartment for UPFLOW furnaces in either a **BOTTOM** or **SIDE** (left side or right side) return air inlet. See Figure 11. Some filters may need to be trimmed for side or bottom filter use. Downflow furnaces must be located outside the furnace cabinet. Typical installations are shown in Figure 12. Table 5 provides information for installation of the filter retaining brackets shipped with downflow furnaces.

NOTE:

On upflow 5 ton airflow models, if the airflow requirement exceeds 1800 CFM, these models will require filters on both sides; OR 1 side and the bottom; OR just the bottom.

TABLE 4

MODELS NUMBERS	CABINET WIDTH	FILTER QTY & SIZE
CUX1B040A9241A CUX1B060A9361A CUX1B080A9421A	17-1/2"	1 - 17" X 25" X 1"
CUX1C100A9481A	21"	1 - 20" X 25" X 1"
CUX1D100A9601A# CUX1D120A9601A#	24-1/2"	1 - 24" X 25" X 1"
CDX1B040A9241A CDX1B060A9361A CDX1B080A9421A	17-1/2"	2 - 14" X 20" X 1"
CDX1C100A9481A	21"	2 - 16" X 20" X 1"
CDX1D120A9601A	24-1/2"	2 - 16" X 20" X 1"
# -NOTE - On the upflow 5 ton airflow models, if the airflow requirement exceeds 1800 CFM, these models will require filters on both sides; OR 1 side and the bottom; OR just the bottom.		

TYPICAL UPFLOW FURNACE RETURN AIR FILTER INSTALLATIONS FIGURE 11

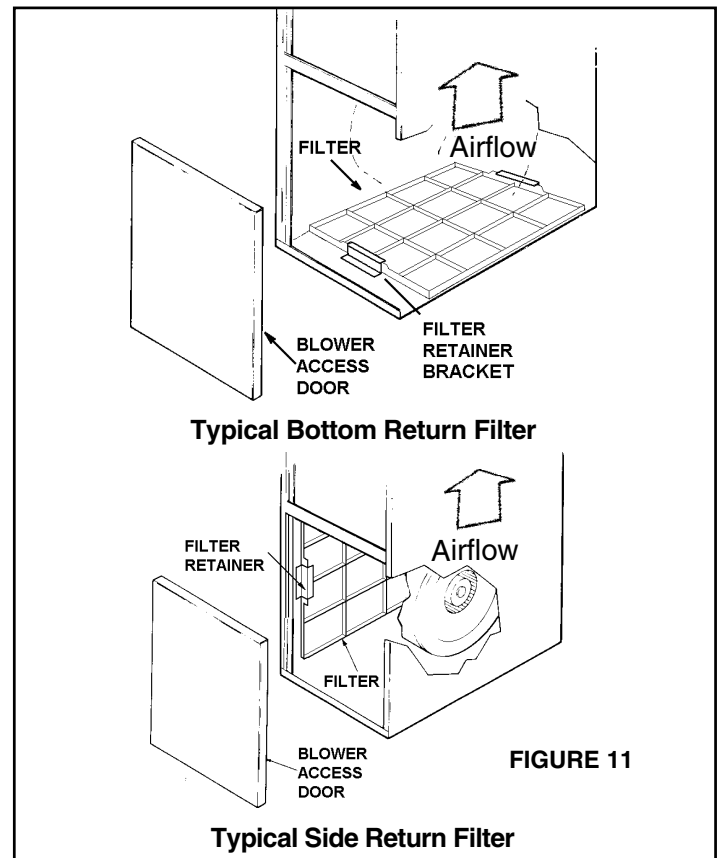


FIGURE 11

FILTER RETAINER BRACKETS FOR SIDE AIR RETURN ON UPFLOW FURNACES

If side air return is desired, it is necessary to move the 2 filter retainer brackets from the bottom of the furnace and reinstall them on the side. The following instructions should be used:

- Remove the front doors.
- Remove the filter.
- Carefully place the unit on its back.
- Using a 5/16" nut driver, remove the 4 screws holding the filter retainer brackets.
- Reinstall the filter retainer brackets on the desired side.

(See Figure 11 "Typical Side Return Filter").

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 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 11A.

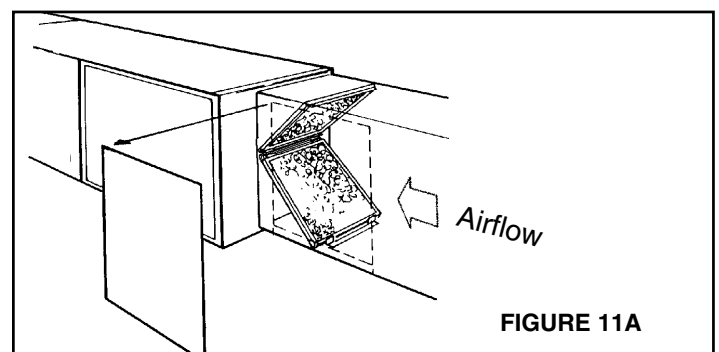


FIGURE 11A

Installation Instructions

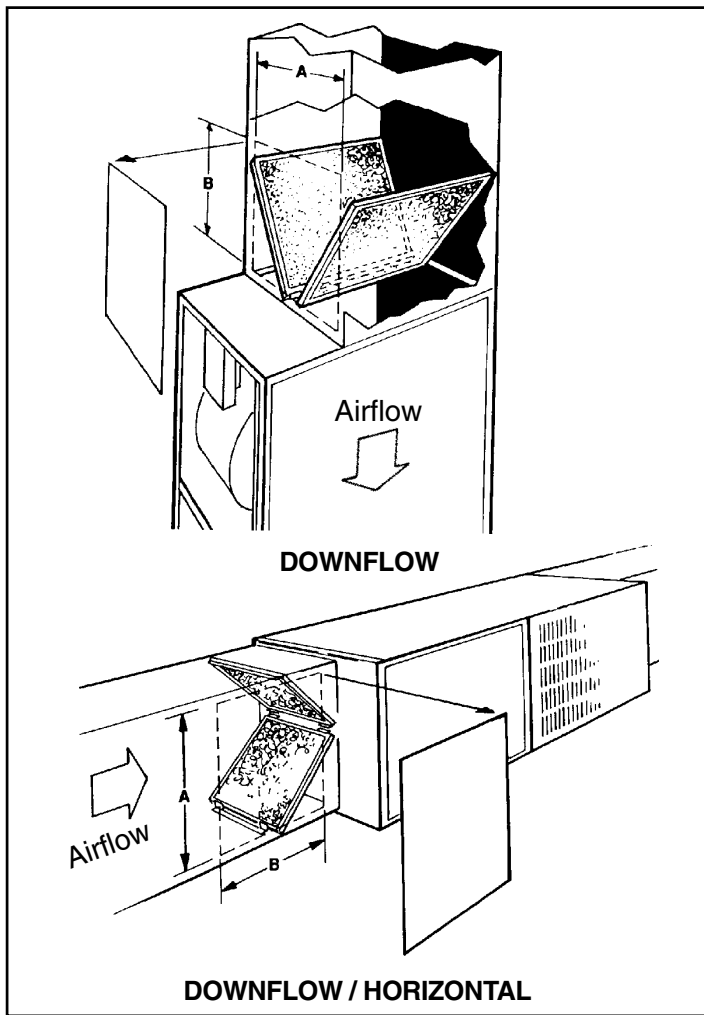


FIGURE 12

RETURN AIR FILTER FOR DOWNFLOW/HORIZONTAL

After the return air plenum has been connected to the downflow furnace in either downflow or horizontal position the return air filters may be installed in the plenum using the brackets (and screws) supplied with the furnace. See Table 5. It is recommended that BAYFLTR206 be installed in the return air plenum. See Figure 12 and Table 5 for typical installation. The BAYFLTR206 Kit includes the filter door, instructions, and the necessary hardware for installation.

To replace filters, remove the filter access door, lift the filter from the lower bracket and shift the filter to the side to free the top bracket and slide the filter out through the filter access door. Replace the filters in the same manner, making sure that the filter is secured in both top and bottom brackets. Replace the filter access door.

Use high velocity replacement filters only.

TABLE 5
LOCATING FILTER RETAINER
BRACKETS WITHIN RETURN DUCT

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.

⚠ 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 CAN/CGA B149 Installation Codes 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. 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 CAN/CGA B149 Installation Codes.
8. After it has been determined that each appliance connected to the venting system properly vents where tested as outlined above, return doors, windows, exhaust fans, fireplace dampers and any other gas-fired burning appliance to their previous conditions of use.

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

A variety of potential sources of carbon monoxide can be found in a building or dwelling such as gas-fired clothes dryers, gas cooking stoves, water heaters, furnaces and fireplaces. The U.S. Consumer Product Safety Commission recommends that users of gas-burning appliances install carbon monoxide detectors as well as fire and smoke detectors per the manufacturer's installation instructions to help alert dwelling occupants of the presence of fire, smoke or unsafe levels of carbon monoxide. These devices should be listed by Underwriters Laboratories, Inc. *Standards for Single and Multiple Station Carbon Monoxide Alarms, UL 2034* 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.

GENERAL VENTING

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**.

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.

The recommended system is assembled from 2", 2-1/2", or 3" plastic pipe and fittings (See Table 7, page 14). 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 the latest edition of ANSI Z21.47 • CAN/CGA-2.3 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.

1. Seal any unused openings in the common venting system.
2. Visually inspect the venting system for proper size and horizontal pitch and determine there is no blockage or restriction, leakage, corrosion or other deficiencies which could cause an unsafe condition.

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**.*

*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**)*

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.

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

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

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

6. After it has been determined that each appliance remaining connected to the common venting system properly vents when tested as outlined above, return door, windows, exhaust fans, fireplace dampers and any other gas-burning appliance to their previous conditions of use.

If improper venting is observed during any of the above tests, the remaining common venting system must be corrected. Correction of the remaining common vent system should be done by referring to 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. The following are general steps to be used to correct or resize a remaining vent system when a furnace which may not be common vented is removed from the system:

- a. Determine the Btu per hour input of all remaining appliances attached to the venting system.
- b. Determine the diameter, rise, and lateral of the existing venting system, as well as quantity and type of bends.
- c. 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.

PVC VENT FITTING MATERIAL

These fittings are available from your Gas Furnace Distributors.

Straight Pipe Sections, Couplings, 45° Elbows, 60° Elbows, 90° Elbows, Vent or Sanitary Tee, or other necessary fittings may be 2", 2½", 3", or 4" diameter. The allowable materials are shown in Table 7. A vent screen is optional, but recommended. The vent screen must be 3/8" open mesh weave (minimum 70% open), made of any non-corrosive material having at least 3/8" open mesh weave.

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 8 & 9 are 2", 2½", 3", and 4" size fittings 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.

Installation Instructions

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.

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:

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

TABLE 7

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

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 must be used to join the pipe and fittings. Follow instructions on the container carefully.

Procedure for Cementing Joints:

1. Cut pipe square, remove ragged edges and burrs. Chamfer end of pipe, then clean fitting socket and pipe joint area of all dirt, grease, moisture or chips.

2. After checking pipe and socket for proper fit, wipe socket and pipe with cleaner-primer. Apply a liberal coat of primer to inside surface of socket and outside of pipe.

DO NOT ALLOW PRIMER TO DRY BEFORE APPLYING CEMENT.

3. Apply a thin coat of cement evenly in the socket. Quickly apply a heavy coat of cement to the pipe end and insert pipe into fitting with a slight twisting movement until it bottoms out.

4. Hold the pipe in the fitting for 30 seconds to prevent tapered socket from pushing the pipe out of the fitting.

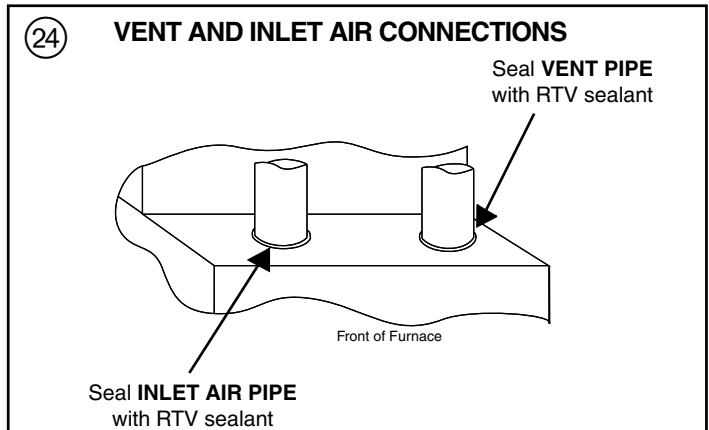
5. Wipe all excess cement from the joint with a rag. Allow 15 minutes before handling. Cure time varies according to fit, temperature and humidity.

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.



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.

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.

NOTE:

To ensure proper operation at the vent lengths indicated, the combustion air inlet and vent terminals should be in the same pressure zone. Terminating the vent and inlet in different pressure zones will change the maximum vent lengths and may cause nuisance tripping of the pressure switch(es). The amount of change can not be predicted. The selection of the inlet and outlet terminal locations are the responsibility of the designer/installer. If the installer chooses separate pressure zones for the terminals, the combustion air inlet termination must be in the higher (more positive) pressure zone.

Installation Instructions

UPFLOW / HORIZONTAL VENTING TABLE TABLE 8

MAXIMUM VENT LENGTH:								
MODEL	DIRECT VENT (2 PIPE SYSTEM) - MAXIMUM TOTAL EQUIVALENT FEET FOR VENT AND INLET AIR PIPES (See Notes)				NONDIRECT VENT (1 PIPE SYSTEM) - MAXIMUM TOTAL EQUIVALENT FEET FOR VENT PIPE ONLY (See Notes)			
	2" PIPE & FITTINGS	2-1/2" PIPE & FITTINGS	3" PIPE & FITTINGS	4" PIPE & FITTINGS	2" PIPE & FITTINGS	2-1/2" PIPE & FITTINGS	3" PIPE & FITTINGS	4" PIPE & FITTINGS
CUX1B040A2941A	60	80	100	130	50	80	80	130
CUX1B060A9361A	60	80	100	130	50	80	80	130
CUX1B080A9421A	50	80	100	130	40	80	80	130
CUX1C100A9481A	NOT ALLOWED	40	100	130	NOT ALLOWED	40	80	130
CUX1D100A9601A	NOT ALLOWED	40	100	130	NOT ALLOWED	40	80	130
CUX1D120A9601A	NOT ALLOWED	15	60	130	NOT ALLOWED	25	70	130

NOTES:

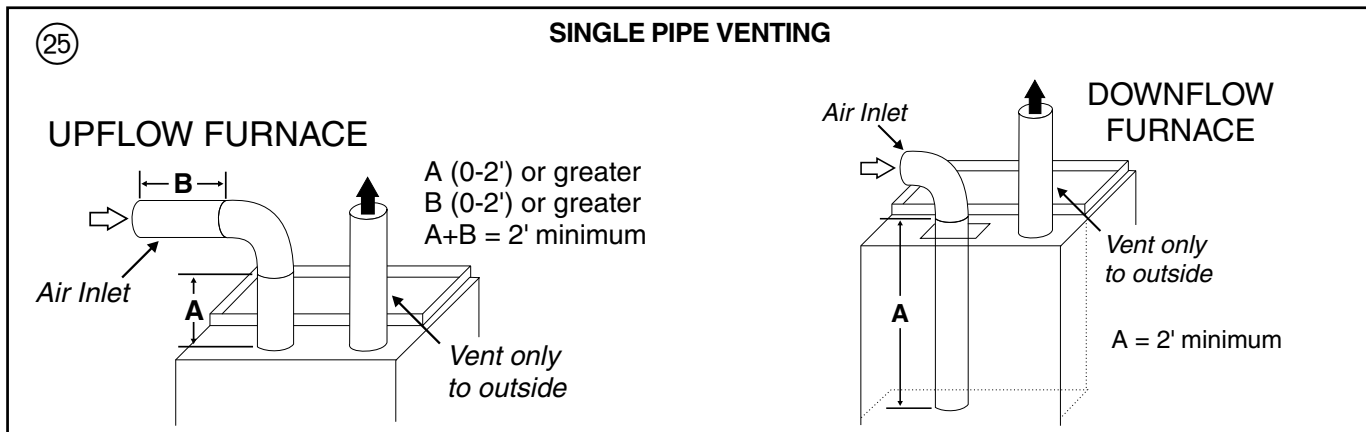
- The INLET AIR of one pipe systems require the installation of a 90° elbow (to prevent dust and debris from falling straight into the furnace) and a 2 foot horizontal or vertical straight pipe section connected before or after the elbow.
- DO NOT MIX PIPE DIAMETERS IN THE SAME LENGTH OF PIPE OUTSIDE 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 7 below for exception). The inlet pipe can be of a larger diameter, but never smaller than the vent pipe.
- 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 in two pipe systems).
- One standard radius 90° elbow is equivalent to 12' of 4" pipe; 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 SHORT/LONG radius 90° elbow is equivalent to 7½' of 2½" pipe, & 5' of 2" pipe. Two 45° elbows equal one 90° elbow.
- The termination tee or bend must be included in the total number of elbows. If the BAYVENT100 termination kit is used, the equivalent length of pipe is 5 feet. There is zero equivalent length for the BAYVENT200.
- Pipe adapters are field supplied.
- 4" pipe may be reduced to 3" for termination with BAYAIR30AVENTA or BAYVENT200 without additional length restriction.

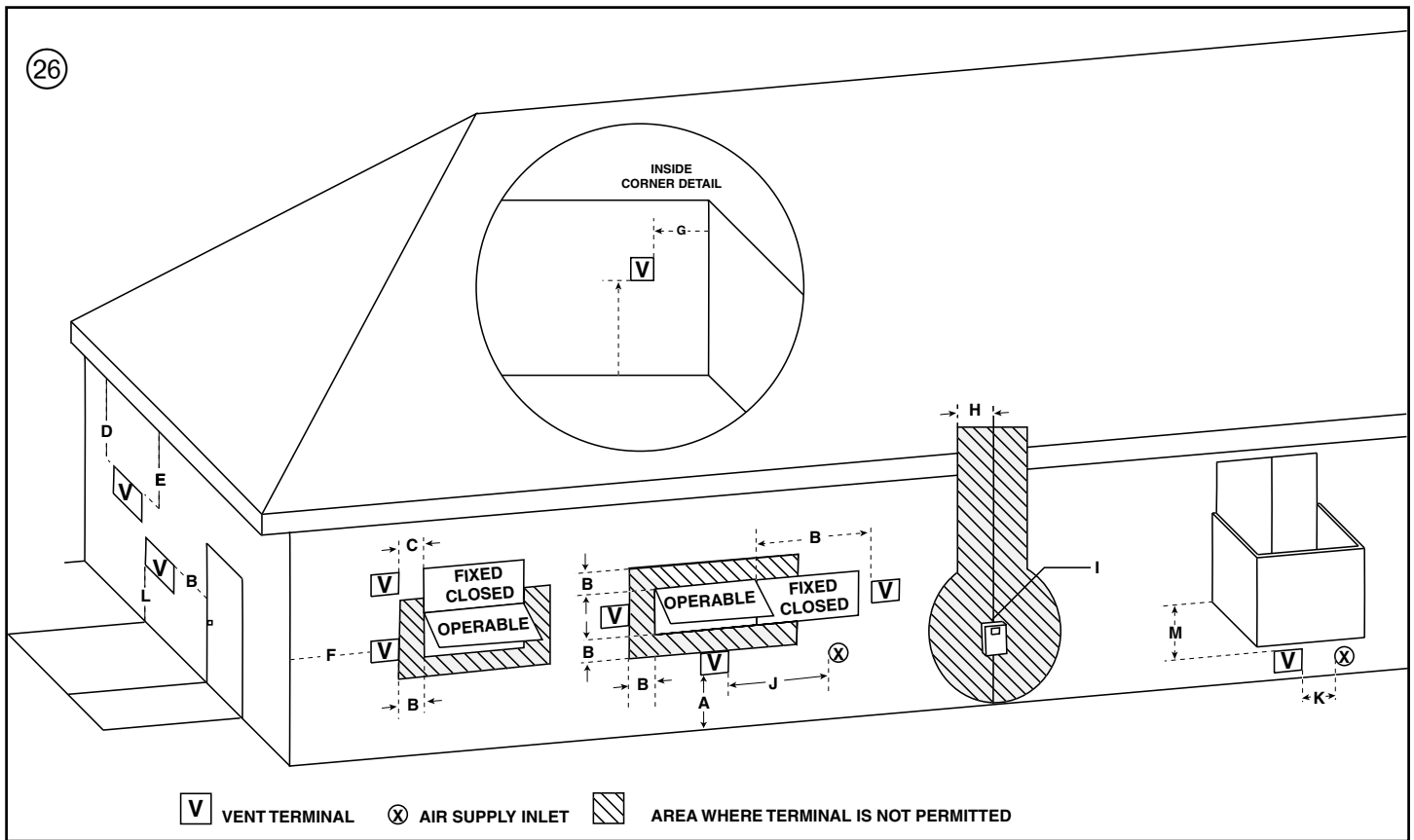
DOWNFLOW / HORIZONTAL VENTING TABLE - TABLE 9

MAXIMUM VENT LENGTH:								
MODEL	DIRECT VENT (2 PIPE SYSTEM) - MAXIMUM TOTAL EQUIVALENT FEET FOR VENT AND INLET AIR PIPES (See Notes)				NONDIRECT VENT (1 PIPE SYSTEM) - MAXIMUM TOTAL EQUIVALENT FEET FOR VENT PIPE ONLY (See Notes)			
	2" PIPE & FITTINGS	2-1/2" PIPE & FITTINGS	3" PIPE & FITTINGS	4" PIPE & FITTINGS	2" PIPE & FITTINGS	2-1/2" PIPE & FITTINGS	3" PIPE & FITTINGS	4" PIPE & FITTINGS
CDX1B040A9241A	60	80	100	130	50	80	80	130
CDX1B060A9361A	50	80	100	130	50	80	80	130
CDX1B080A9421A	45	80	100	130	40	80	80	130
CDX1C100A9481A	NOT ALLOWED	80	100	130	NOT ALLOWED	80	80	130
CDX1D120A9601A	NOT ALLOWED	15	60	130	NOT ALLOWED	25	70	130

NOTES:

- The INLET AIR of one pipe systems require the installation of a 90° elbow (to prevent dust and debris from falling straight into the furnace) and a 2 foot horizontal or vertical straight pipe section connected before or after the elbow.
- 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 7 below for exception). The inlet pipe can be of a larger diameter, but never smaller than the vent pipe.
- 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 in two pipe systems).
- One standard radius 90° elbow is equivalent to 12' of 4" pipe; 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 SHORT/LONG radius 90° elbow is equivalent to 7½' of 2½" pipe, & 5' of 2" pipe. Two 45° elbows equal one 90° elbow.
- The termination tee or bend must be included in the total number of elbows. If the BAYVENT100 termination kit is used, the equivalent length of pipe is 5 feet. There is zero equivalent length for the BAYVENT200.
- Pipe adapters are field supplied.
- 4" pipe may be reduced to 3" for termination with BAYAIR30AVENTA or BAYVENT200 without additional length restriction.





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 \leq 10,000 Btuh (3 kw), 12 inches (30 cm) for appliances $>$ 10,000 Btuh (3 kw) and \leq 100,000 Btuh (30 kw), 36 inches (91 cm) for appliances $>$ 100,000 Btuh (30 kw)	6 inches (15 cm) for appliances \leq 10,000 Btuh (3 kw), 9 inches (23 cm) for appliances $>$ 10,000 Btuh (3 kw) and \leq 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 \leq 10,000 Btuh (3 kw), 12 inches (30 cm) for appliances $>$ 10,000 Btuh (3 kw) and \leq 100,000 Btuh (30 kw), 36 inches (91 cm) for appliances $>$ 100,000 Btuh (30 kw)	6 inches (15 cm) for appliances \leq 10,000 Btuh (3 kw), 9 inches (23 cm) for appliances $>$ 10,000 Btuh (3 kw) and \leq 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:

- In accordance with the current CSA B149.1 Natural Gas and Propane Installation Code.
- 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.
- ‡ Permitted 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.

Installation Instructions

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 \leq 10,000 Btuh (3 kw), 12 inches (30 cm) for appliances $>$ 10,000 Btuh (3 kw) and \leq 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 \leq 10,000 Btuh (3 kw), 12 inches (30 cm) for appliances $>$ 10,000 Btuh (3 kw) and \leq 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) ‡	*

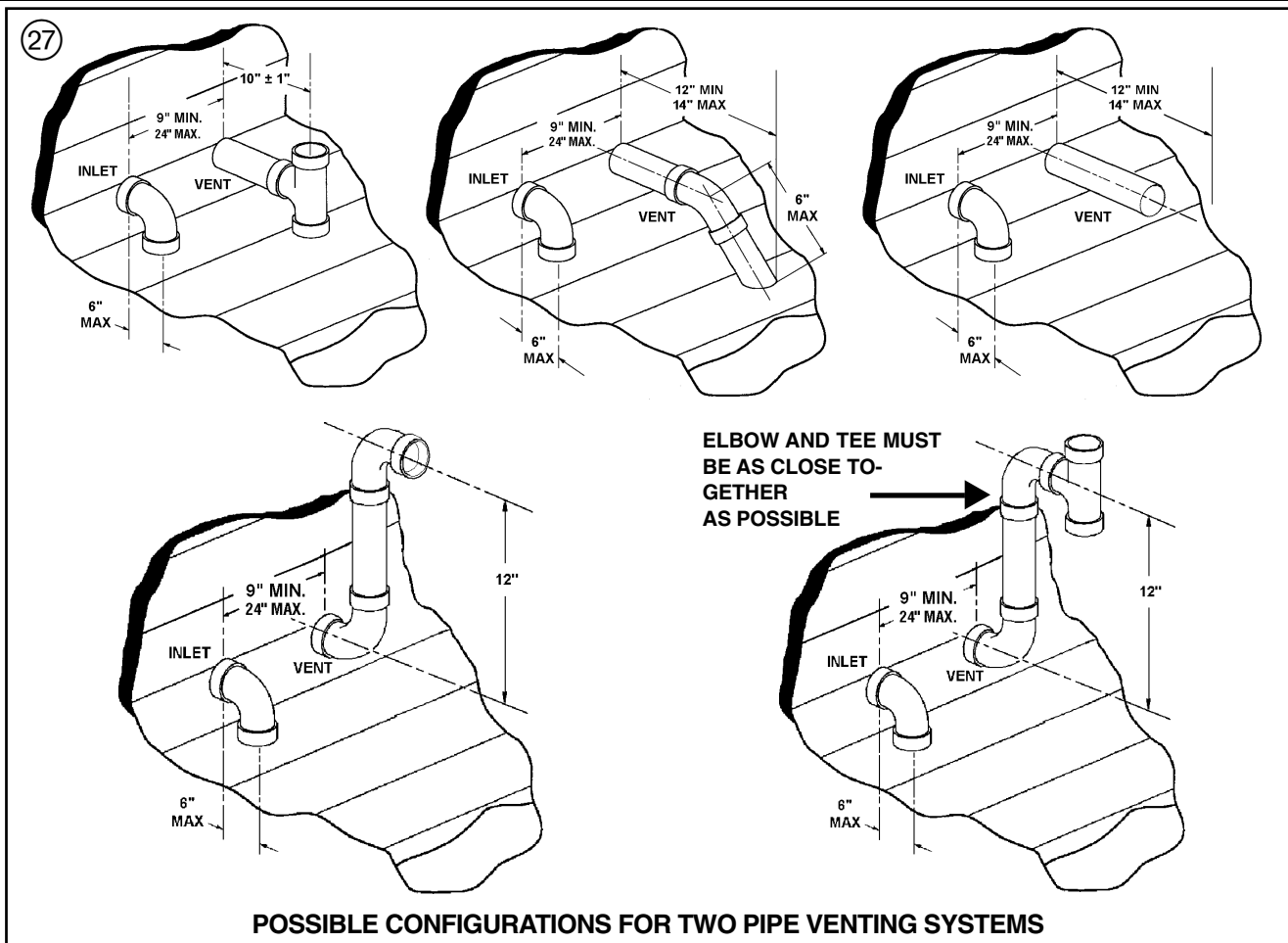
Notes:

- In accordance with the current CSA B149.1 Natural Gas and Propane Installation Code.
- 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.

‡ Permitted 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.



HORIZONTAL VENTING

NOTE:

Vent termination kit **BAYAIR30AVENTA** or **BAYVENT200*** may be used instead of the horizontal and vertical termination options shown in the following figures.

⚠ 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 it is assumed the space meets the condition of a heated space.

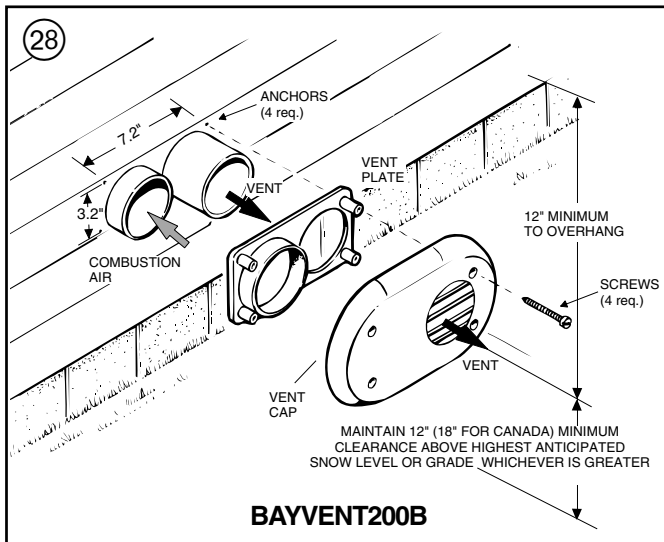
HORIZONTAL VENTING THROUGH WALL

These furnaces may be installed as direct vent (as shipped) or as nondirect 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.

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 26 for either direct or non-direct vent applications.



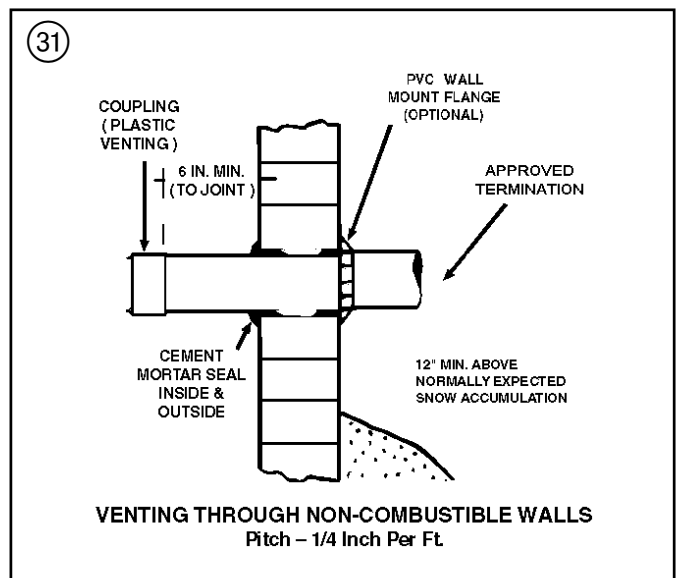
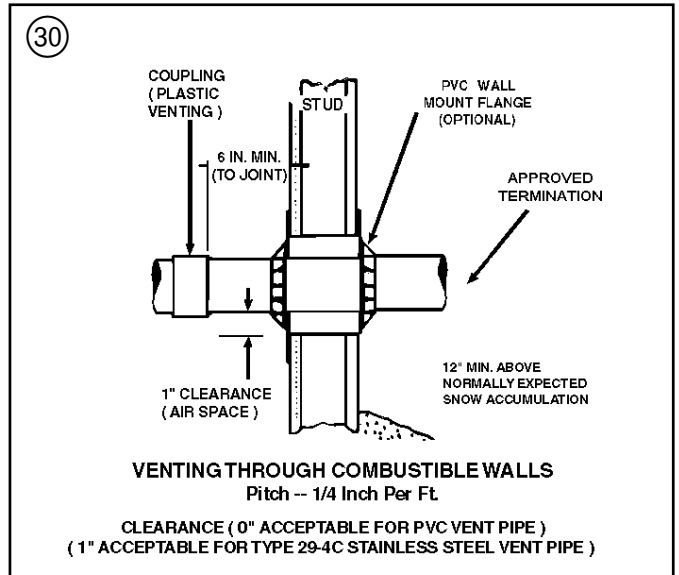
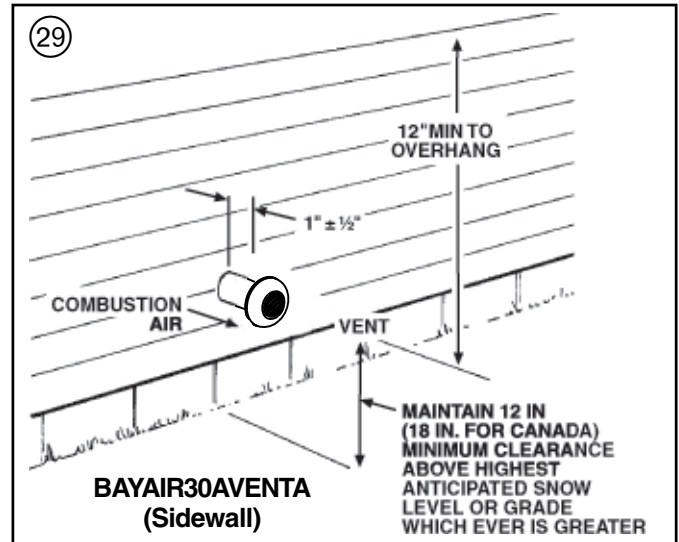
PITCH – Venting through the wall must maintain 1/4" per foot pitched upward to insure that condensate drains back to the furnace.

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 terminal, 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

COMBUSTIBLE MATERIAL WALL

A minimum clearance of 1" to combustible materials must be maintained when using single wall stainless steel venting. See Figure 30.

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.



Installation Instructions

NONCOMBUSTIBLE MATERIAL WALL

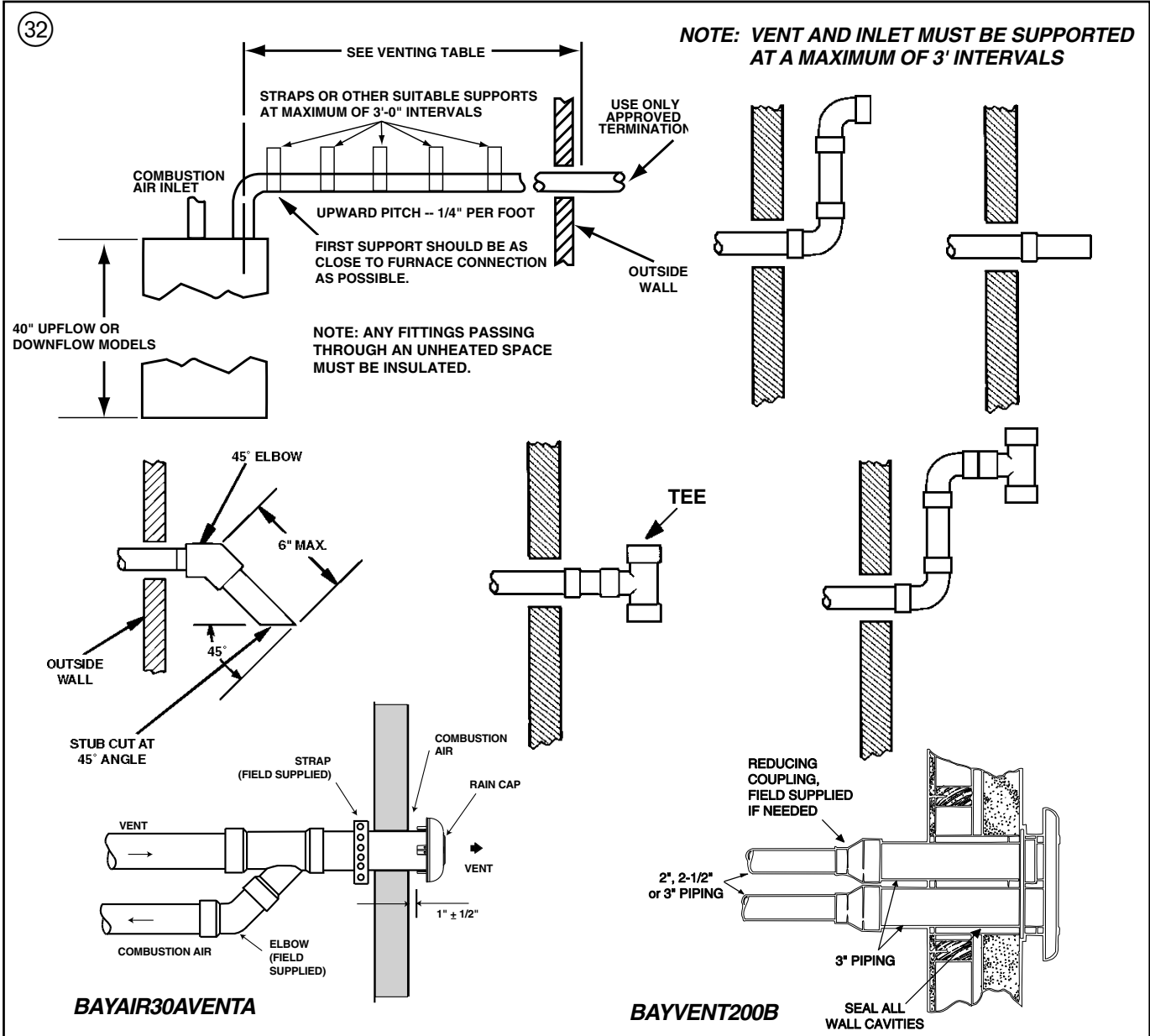
The hole through the wall must be large enough to maintain pitch of vent and properly seal.

Use cement mortar seal on inside and outside of wall.
See Figure 31.

MINIMUM CLEARANCE FROM COMBUSTIBLE MATERIALS FOR UPFLOW/HORIZONTAL AND DOWNFLOW/ HORIZONTAL FURNACES

FURNACE SURFACE	UNIT LOCATION		
	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"

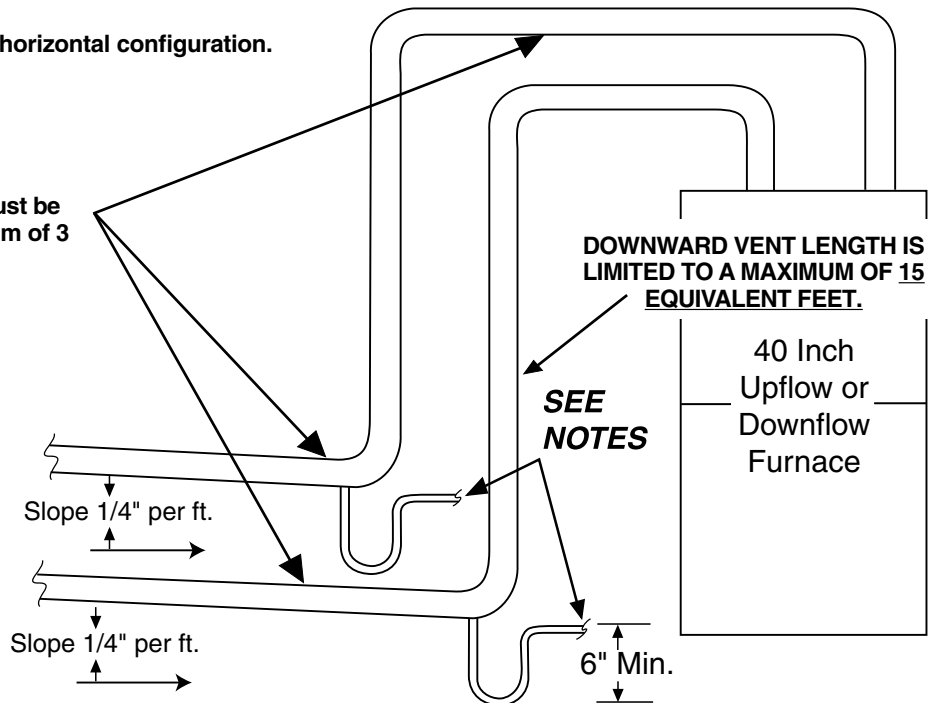
NOTE: CLEARANCE REQUIRED AT TOP OF PLENUM IS 1"



33 DOWNWARD VENTING

Furnace may be in vertical or horizontal configuration.

All horizontal pipes must be supported at a maximum of 3 foot intervals

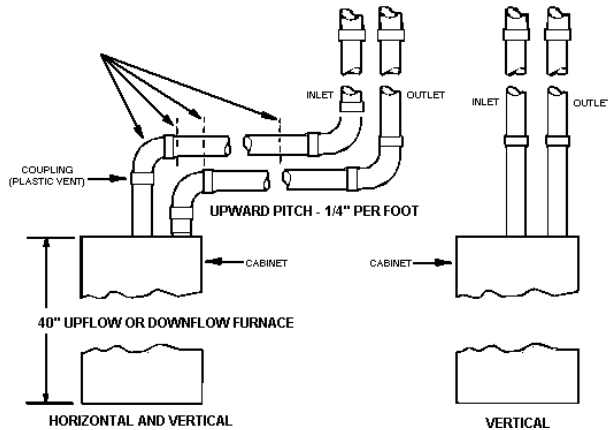


NOTES:

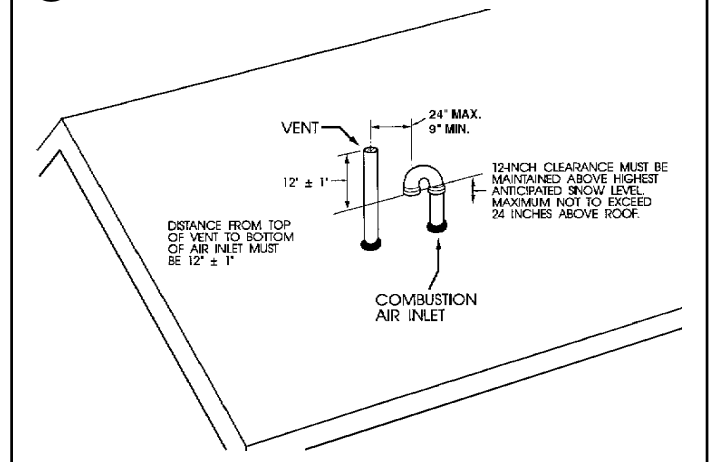
- Condensate trap for vent pipe must be a minimum of 6 inches in height.
- Condensate trap for vent and inlet pipe must be connected into a condensate drain pump; an open or vented drain; or it can be connected to the outlet hose of the furnace's condensate trap. Outdoor draining of the furnace and coil 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.
- The condensate trap should be primed at initial start up prior to heating season operation.

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



Installation Instructions

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.

VENTING ROUTED THROUGH A MASONRY CHIMNEY

VENT FITTING MATERIAL - STAINLESS STEEL

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

These fittings and fitting accessories are to be supplied locally.

DIRECTION OF STAINLESS STEEL FITTING

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

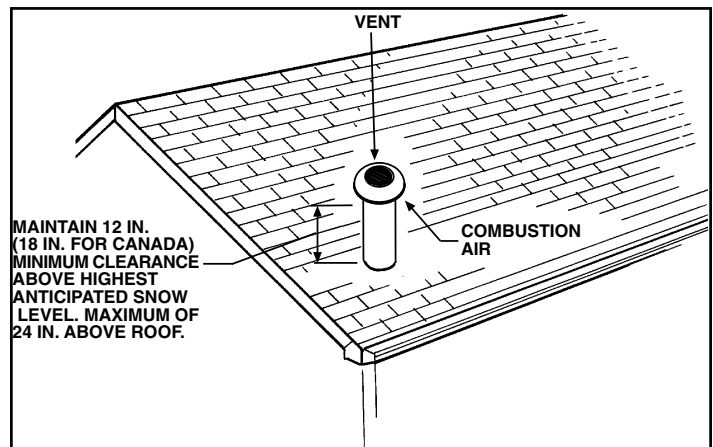
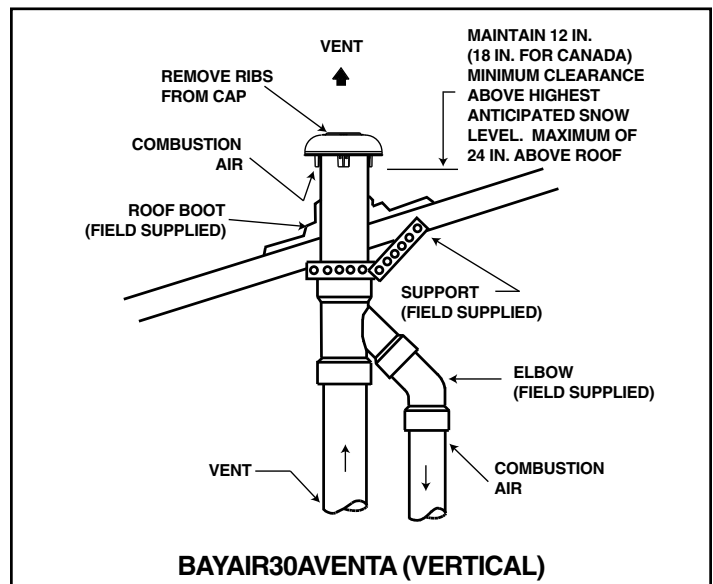
All horizontal stainless steel sections must be positioned with the seam on top.

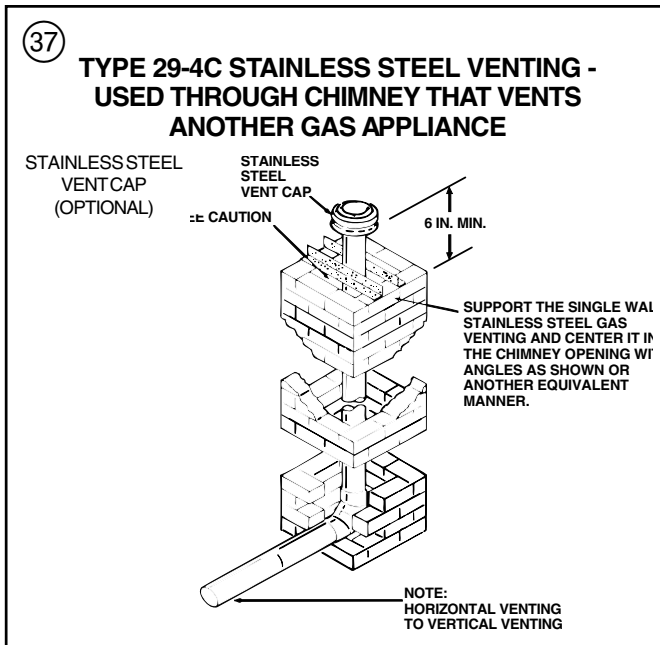
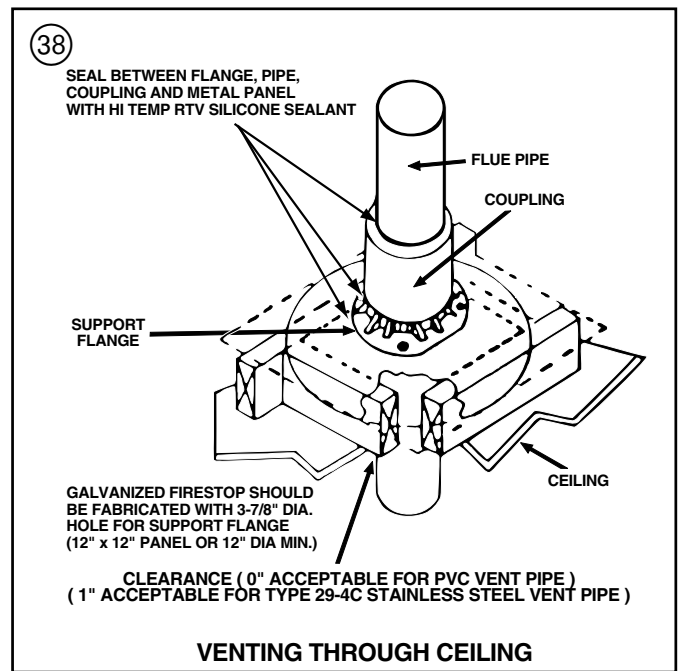
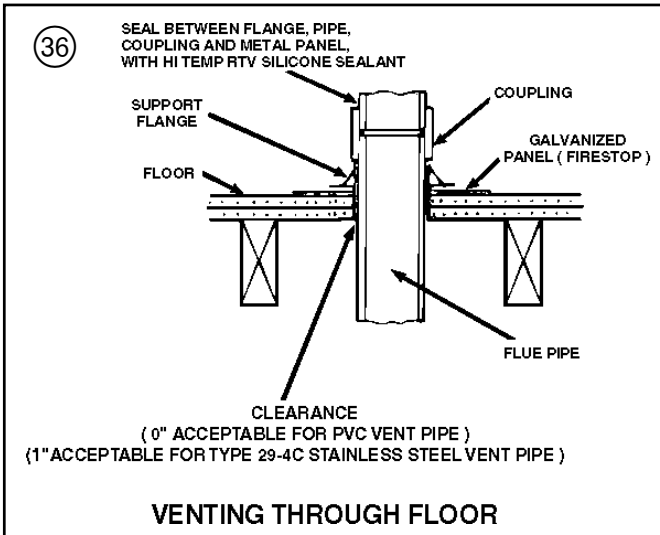
All long horizontal sections must be supported to prevent sagging.

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

NOTE:

Both venting methods shown in Figure 37 & 39 must also have the combustion air inlet installed - meeting dimension requirements of Figure 35.



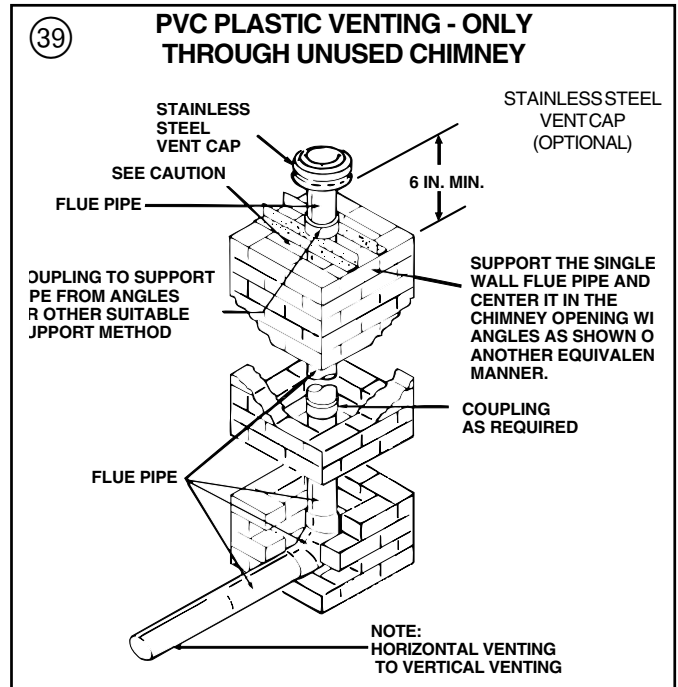


CAUTION

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.



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.

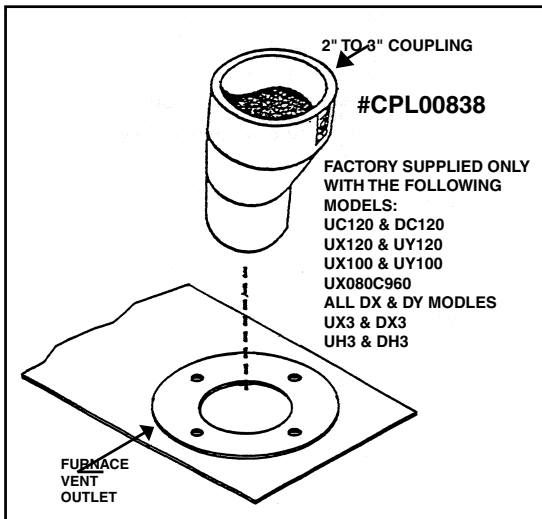
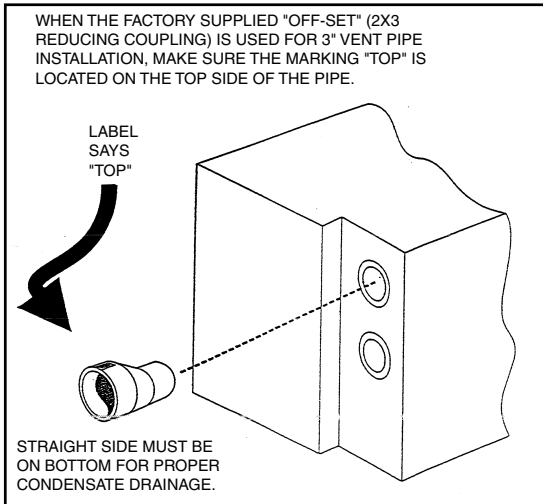
Installation Instructions

If improper venting is observed during any of the above tests, the remaining common venting system must be corrected. Correction could require rerouting or resizing the remaining vent system.

HORIZONTAL INSTALLATION (UPFLOW/HORIZONTAL OR DOWNFLOW/HORIZONTAL)

NOTE:

*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 only with the following models: *UC120 & *DC120, *UX120 & *UY120, *UX100 & *UY100, *UX808C960, and all *DX & *DY models.*



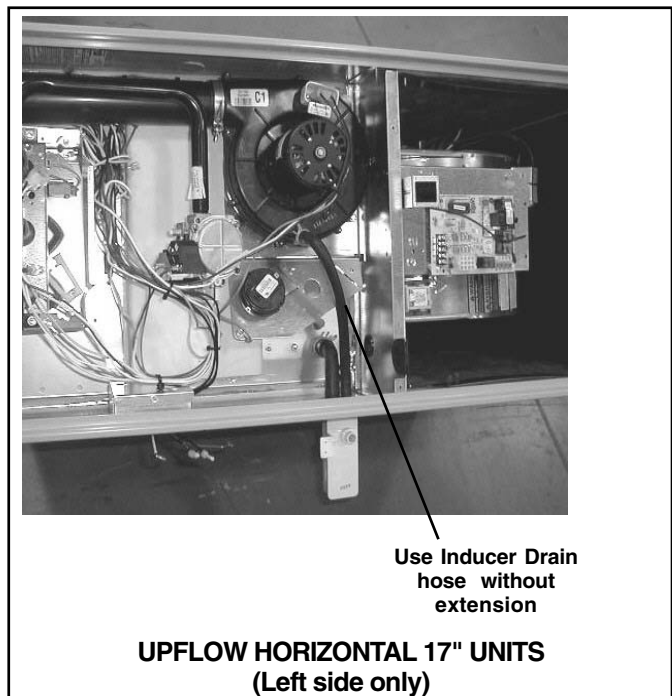
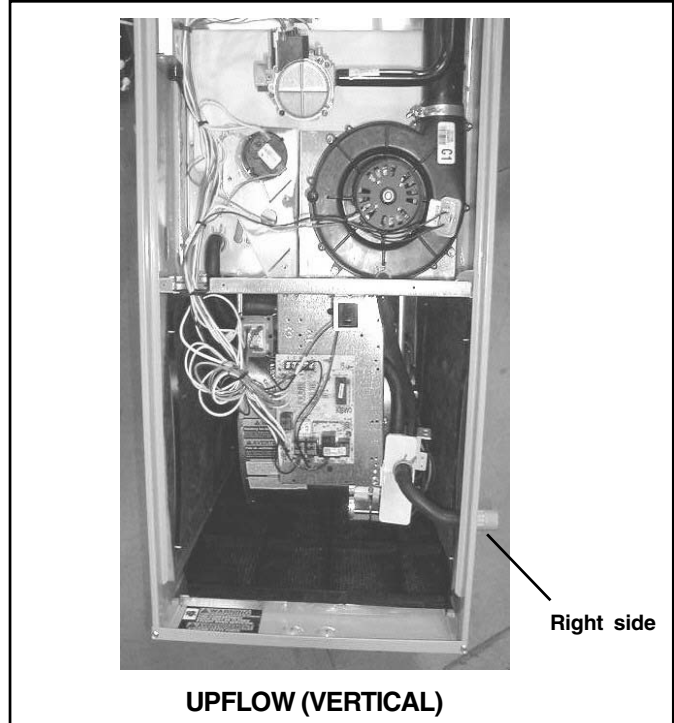
CONDENSATE DRAIN INSTRUCTIONS

⚠ CAUTION

It is recommended that a drain pan be installed under the furnace to prevent property damage, personal injury or death from leaking condensate.

VERTICAL APPLICATIONS

Upflow 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.



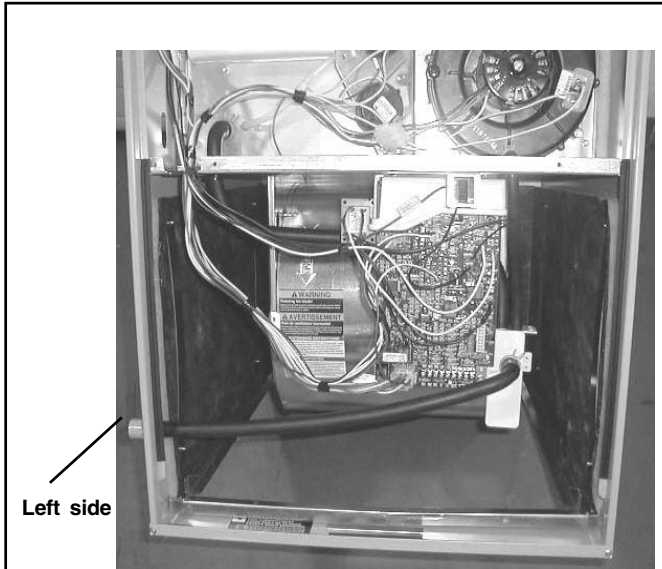
Downflow furnace - The furnace is shipped with the left side drainage setup. To change the right side drain, remove the drain lines from the trap, rotate the trap 180° so it exits to the right, reconnect the lines, and run a 1/2" CPVC pipe from the trap out through the right side knock-out. Use RTV silicone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

The 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.

HORIZONTAL APPLICATIONS

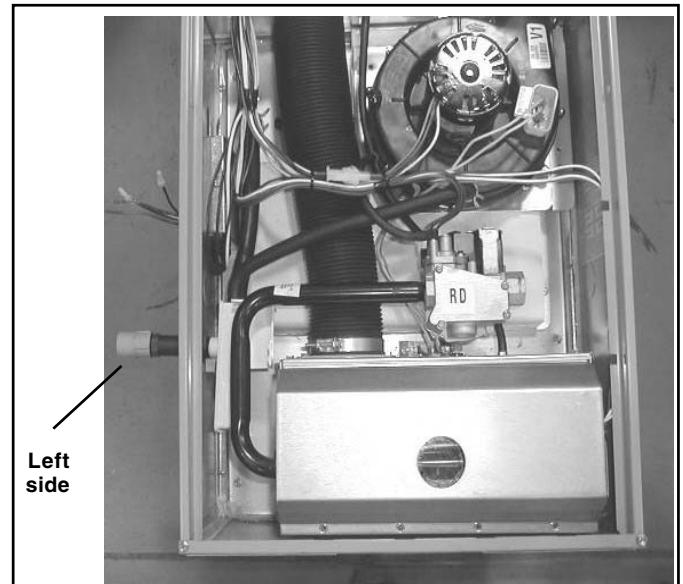
Upflow and Downflow furnaces - All horizontal applications are left side only. It is always recommended that the auxiliary drain pan be installed under a horizontally installed evaporator and/or 90% gas furnace. Connect the auxiliary drain pan to a separate drain line (no trap is needed in this line).

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. 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.



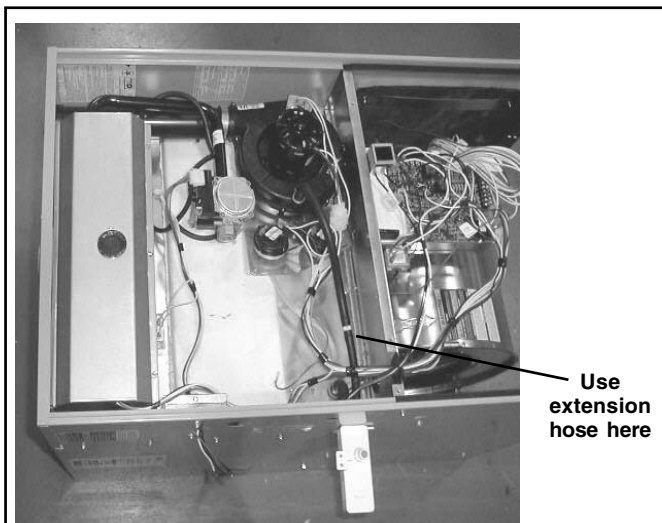
Left side

UPFLOW (VERTICAL)



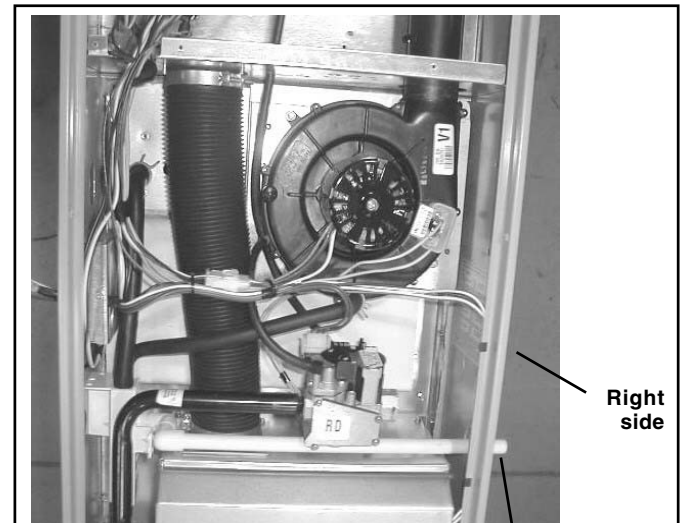
Left side

DOWNFLOW (VERTICAL)



Use extension hose here

**UPFLOW HORIZONTAL 21" & 24" UNITS
(Left side only)**

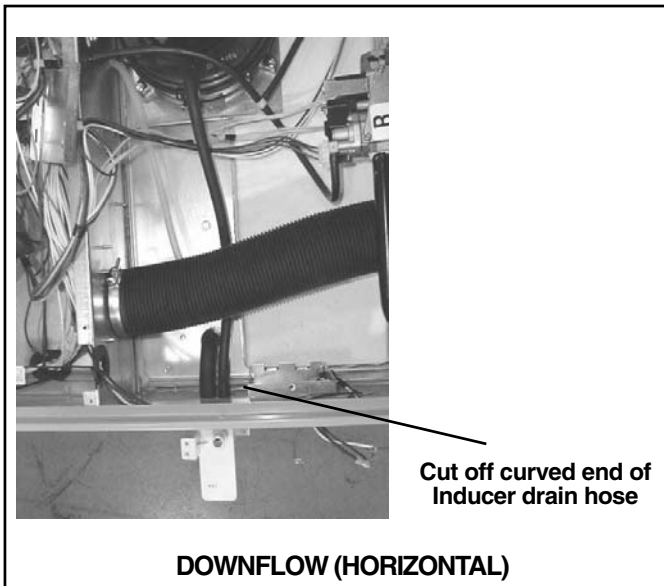


Right side

Use CPVC tubing from Trap outlet, over burner box to cabinet exit

DOWNFLOW (VERTICAL)

Installation Instructions



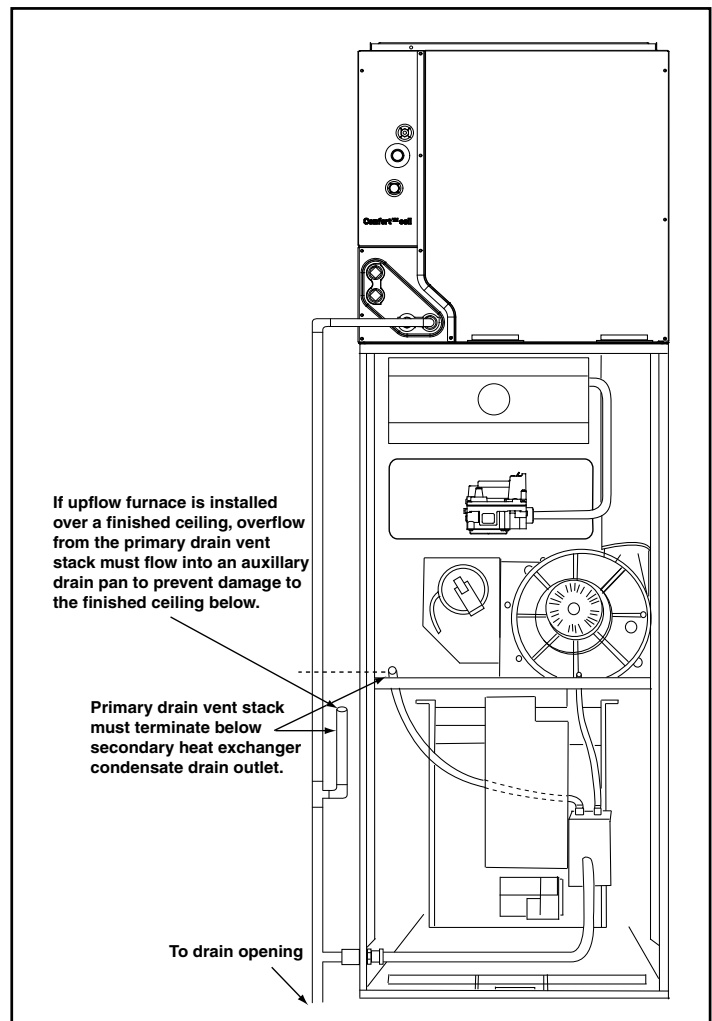
Connections must be made to an **OPEN/VENTED DRAIN**. Outdoor draining of the furnace and coil condensate is permissible if allowed by local codes. Caution should be taken to prevent drains from freezing or causing slippery conditions that could lead to personal injury. Excessive draining of condensate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

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

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

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

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 axillary drain pan in order to prevent water damage to the finished ceiling below.



ELECTRICAL CONNECTIONS

Make wiring connections to the unit as indicated on enclosed wiring diagram. As with all gas appliances using electrical power, this furnace shall be connected into a permanently live electric circuit. It is recommended that furnace be provided with a separate "circuit protection device" in the 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 CSAC 22.1 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.

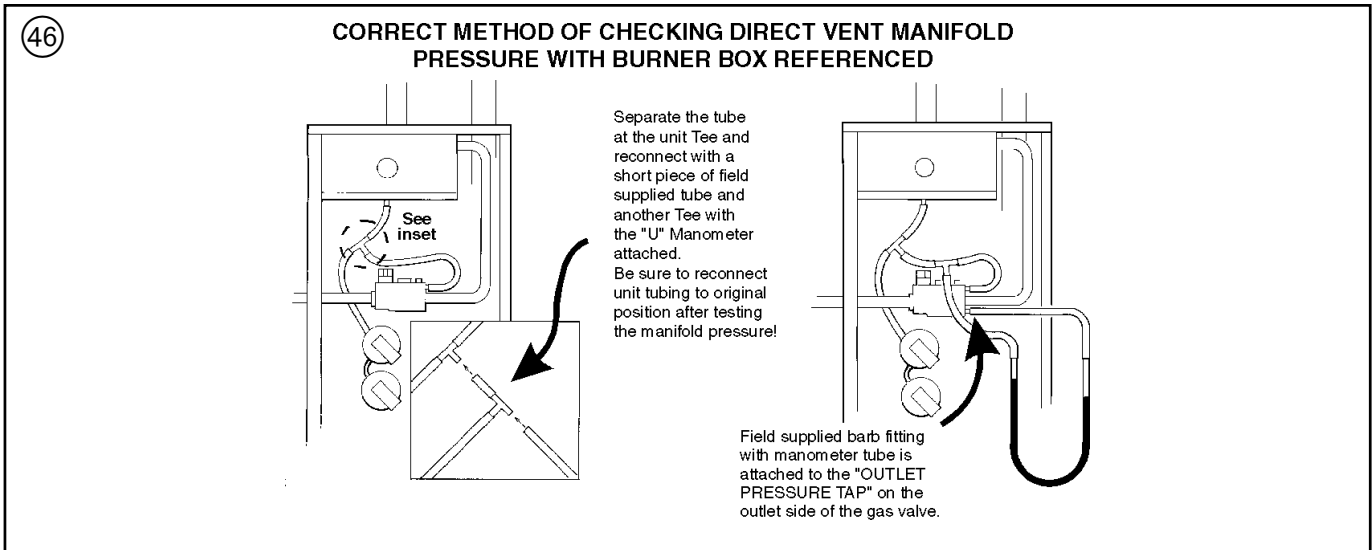
Refer to the literature and unit wiring diagram attached to furnace diagram attached to furnace.

⚠ WARNING

The cabinet must have an uninterrupted or unbroken ground according to National Electrical Code, ANSI/NFPA 70 - "latest edition" and Canadian Electrical Code, CSA C22.1 or local codes to minimize personal injury if an electrical fault should occur. A failure to follow this warning could result in an electrical shock, fire, injury, or death.

NOTE:

The manifold pressure must be referenced to the burner box. The burner box pressure tap equalizes the gas valve pressure regulator. Manifold pressure is checked by installing a tee (field supplied) in the tubing, between the tee coming from the burner box tube and the gas valve, in addition to the regular gas valve pressure tap on the outlet side of the gas valve. See Figure 46.



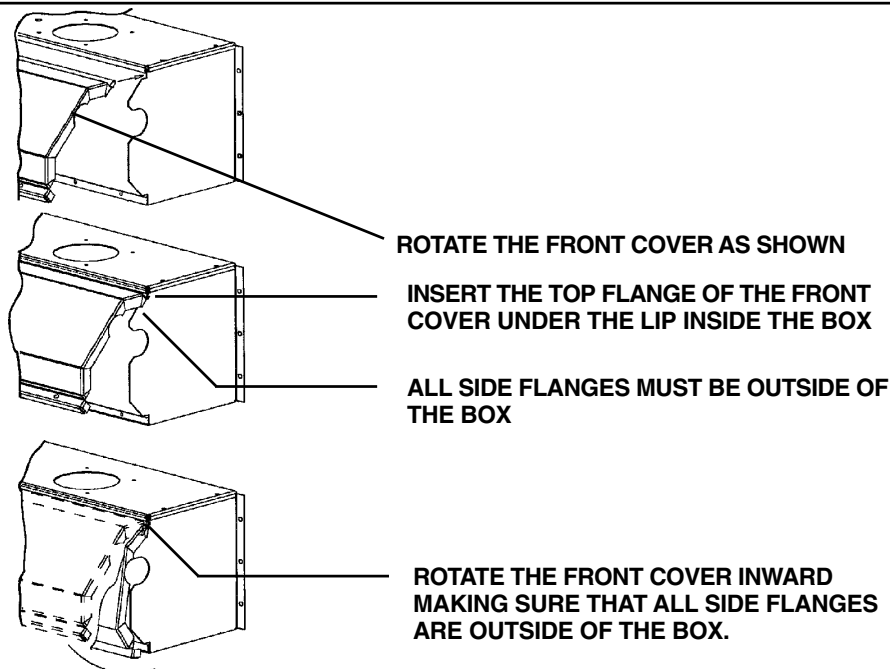
⚠ CAUTION

Replace manifold pressure tap threaded plug and leak check after checking/adjusting manifold gas pressure.

REINSTALLATION OF THE BURNER BOX COVER

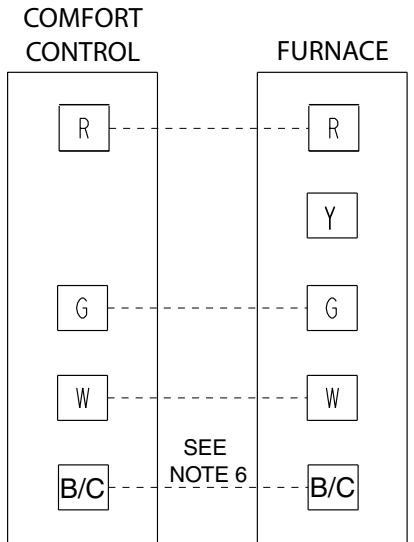
Figure 47 shows the correct way to reinstall the burner box cover if adjustment or replacement of the flame sensor, hot surface igniter, or main burner orifices have required removal of the cover.

47

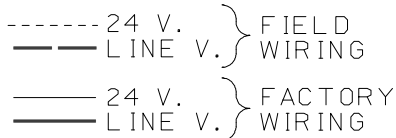


Installation Instructions

FIELD WIRING DIAGRAM FOR 1 STAGE FURNACE 1 STAGE HEATING USING A 1 STAGE HEATING COMFORT CONTROL NO COOLING

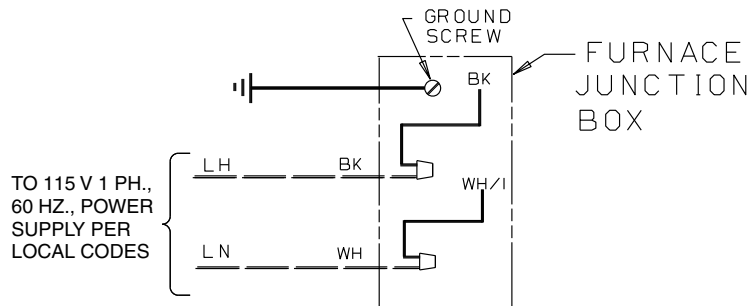


INTER-COMPONENT WIRING



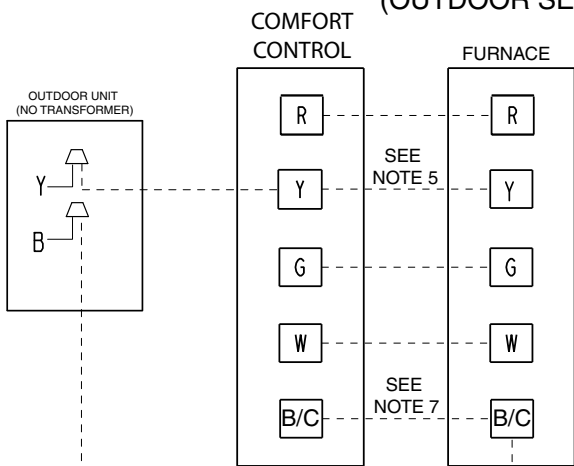
NOTES :

1. BE SURE POWER AGREES WITH EQUIPMENT NAMEPLATE(S)
2. LOW VOLTAGE(24 V. WIRING) TO BE NO. 18 A.W.G. MIN.
3. GROUNDING OF EQUIPMENT MUST COMPLY WITH LOCAL CODES.
4. SET THERMOSTAT HEAT ANTICIPATOR PER UNIT WIRING DIAGRAM.
5. IGNITION CONTROL IS POLARITY SENSITIVE. HOT LEG OF 120 VOLT POWER SUPPLY MUST BE CONNECTED TO THE BLACK LINE POWER LEAD AS INDICATED ON THE WIRING DIAGRAM OR IGNITION LOCKOUT WILL OCCUR.
6. THIS CONNECTION IS ONLY USED FOR THERMOSTATS REQUIRING CONNECTION TO THE 24 V. POWER SUPPLY. (COMMON)

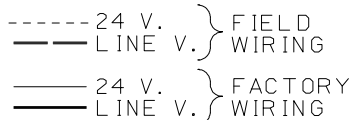


From Dwg. B340433 Rev. 2

FIELD WIRING DIAGRAM FOR 1 STAGE FURNACE 1 STAGE HEATING, 1 STAGE COOLING USING A 1 STAGE HEATING, 1 STAGE COOLING COMFORT CONTROL (OUTDOOR SECTION WITHOUT TRANSFORMER)

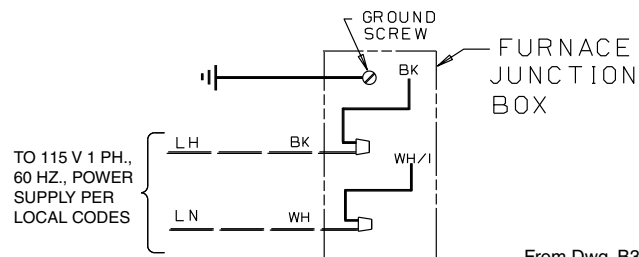


INTER-COMPONENT WIRING



NOTES :

1. BE SURE POWER AGREES WITH EQUIPMENT NAMEPLATE(S)
2. LOW VOLTAGE(24 V. WIRING) TO BE NO. 18 A.W.G. MIN.
3. GROUNDING OF EQUIPMENT MUST COMPLY WITH LOCAL CODES.
4. SET THERMOSTAT HEAT ANTICIPATOR PER UNIT WIRING DIAGRAM.
5. THE "Y" TERMINAL FROM THE THERMOSTAT MUST BE WIRED TO THE "Y" TERMINAL OF THE FURNACE CONTROL FOR PROPER BLOWER OPERATION DURING COOLING.
6. IGNITION CONTROL IS POLARITY SENSITIVE. HOT LEG OF 120 VOLT POWER SUPPLY MUST BE CONNECTED TO THE BLACK LINE POWER LEAD AS INDICATED ON THE WIRING DIAGRAM OR IGNITION LOCKOUT WILL OCCUR.
7. THIS CONNECTION IS ONLY USED FOR THERMOSTATS REQUIRING CONNECTION TO THE 24 V. POWER SUPPLY. (COMMON)



From Dwg. B340432 Rev. 2

⚠ WARNING

FIRE OR EXPLOSION HAZARD

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

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

GAS PIPING

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. See Figure 32.

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.

Refer to piping Table 8, for delivery sizes. Connect gas supply to the unit, using a ground joint union and a manual shut-off valve as shown in Figures 32 & 33. National codes require a condensation drip leg to be installed ahead of the controls as shown in Figures 32 & 33.

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).

⚠ CAUTION

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

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.

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

**TABLE 8
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

**TABLE 9
ORIFICE SIZES**

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

COMBUSTION AND INPUT CHECK

1. Make sure all gas appliances are off except the furnace.
2. Clock the gas meter with the furnace operating (determine the dial rating of the meter) for one revolution.
3. Match the "Sec" column in the gas flow (in cfh) Table 10 with the time clocked.
4. Read the "Flow" column opposite the number of seconds clocked.
5. Use the following factors if necessary:
 For 1 Cu. Ft. Dial Gas Flow CFH = Chart Flow Reading ÷ 2
 For 1/2 Cu Ft. Dial Gas Flow CFH = Chart Flow Reading ÷ 4
 For 5 Cu. Ft. Dial Gas Flow CFH = 10X Chart Flow Reading ÷ 4
6. Multiply the final figure by the heating value of the gas obtained from the utility company and compare to the nameplate rating. This must not exceed the nameplate rating.
7. Changes can be made by adjusting the manifold pressure or changing orifices (orifice change may not always be required). To adjust the manifold pressure:
 - a. Turn off all electrical power to the system.
 - b. Attach a manifold pressure gauge to the outlet pressure tap marked "OUT PRESS TAP" on White-Rodgers gas valve model 36F or boss marked "OUT P" on White-Rodgers gas valve model 36G. For the gas valve model 36F, measurement requires removal of the plug and installation of a barbed fitting. Attach flexible tubing and a manometer to the barbed fitting.

 For the gas valve model 36G, do not remove the pressure tap test screw. Using a 3/32" hex wrench, loosen the pressure tap test screw one turn and install 5/16" flexible tubing and a manometer directly onto the outlet pressure boss.
 - c. Turn on system power and energize valve.
 - d. Remove the regulator adjustment screw cap on the gas valve for manifold pressure adjustment.
 - e. Turn the adjustment nut clockwise to increase the gas flow rate, and counterclockwise to decrease the gas flow rate using a 3/32" hex wrench.
 - f. The final manifold pressure setting shall be as specified in Table 11 with an input of no more than nameplate rating and no less than 93% of the nameplate rating, unless the unit is derated for high altitude.
 - g. Replace the regulator adjustment screw cap and tighten securely.
 - h. Turn off all electrical power to the system.
 - i. Remove the manometer and flexible tubing. Remove the barbed fitting and replace the plug or tighten the pressure test screw.
 - j. Turn on electrical power to the system and energize valve.
 - k. Using a leak detection solution or soap suds, check for leaks at plug or pressure boss screw.

Installation Instructions

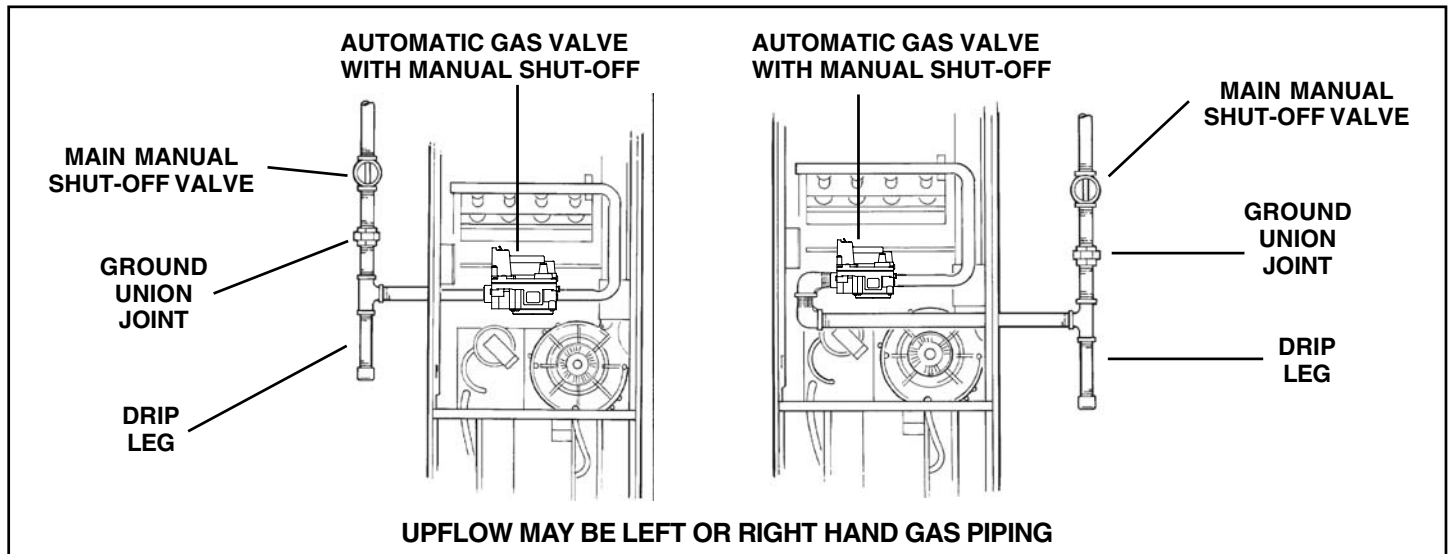


FIGURE 32

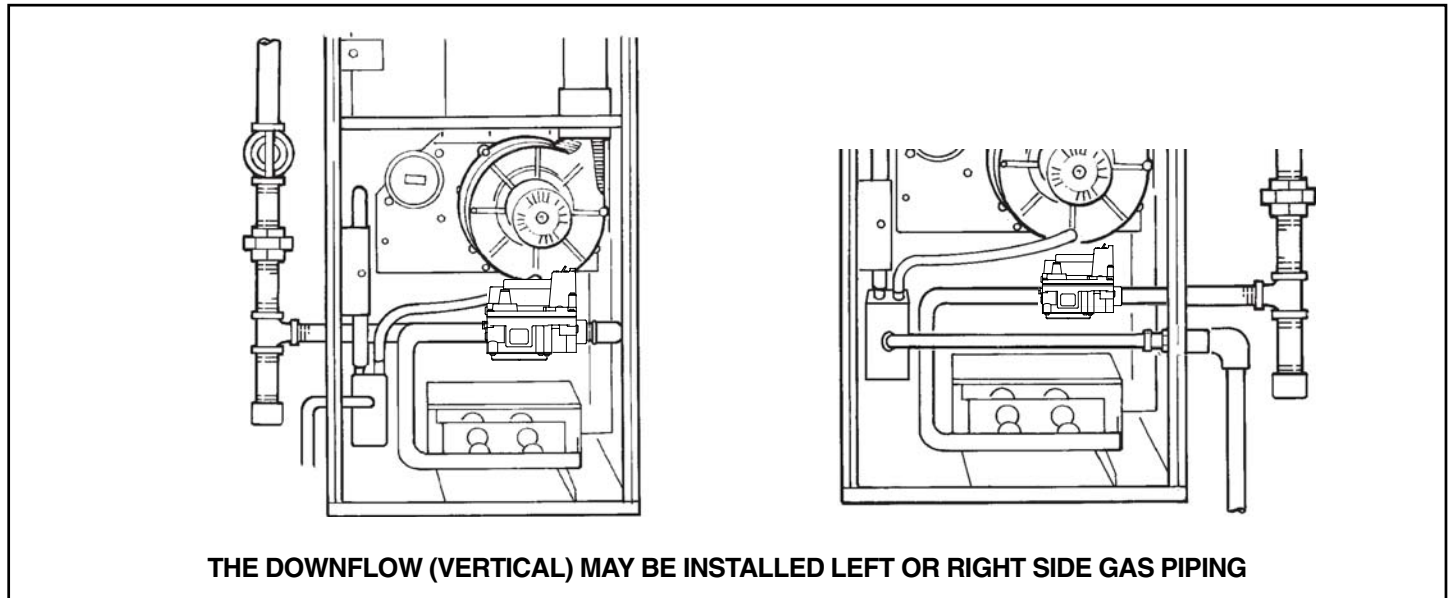


FIGURE 33

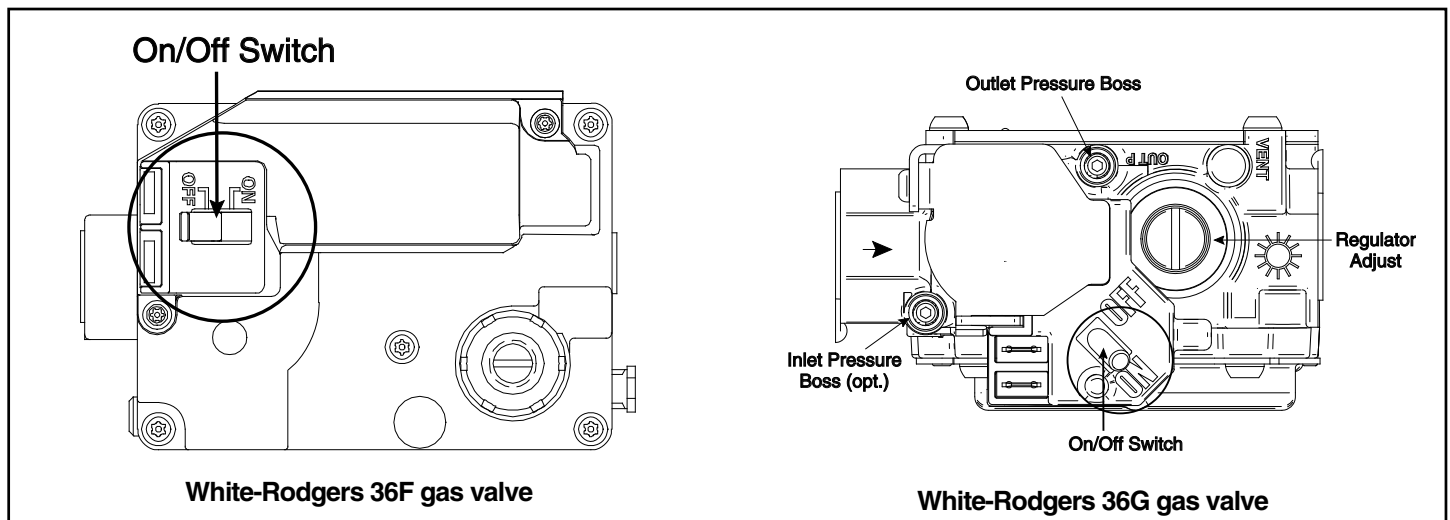


FIGURE 34

⚠ CAUTION

Replace and/or tighten all plugs removed or loosened when adjusting gas pressure. Leak check the fittings before placing the furnace into regular service. Failure to follow this warning could result in fire, explosion, or property damage.

Table 9 – page 24, lists the main burner orifices used with the furnace. If a change of orifices is required to correct the furnace input rating refer to Table 12.

HIGH ALTITUDE DERATE

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

If the installation is 2,000 ft. or above, the furnace input rate (BTUH) shall be reduced 4% for each 1,000 ft. above sea level. The furnace input rate shall be checked by clocking the gas flow rate (CFH) and multiplying by the heating value obtained from the local utility supplier for the gas being delivered at the installed altitude.

Input rate changes can be made by adjusting the manifold pressure (min 3.0 - max 3.7 in. W.C. - Natural Gas) or changing orifices (orifice change may not always be required). If the desired input rate cannot be achieved with a change in manifold pressure, then the orifices must be changed.

LP installations will require an orifice change. See Table 13 for help in selecting orifices if orifice change is required.

IMPORTANT:

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

Furnace input rate and temperature rise should be checked again after changing orifices to confirm the proper rate for the altitude.

Installations above 4,000 feet may require a pressure switch change. If required, use the BAYHALT*** Kit (High Altitude Accessory Kit) listed in PRODUCT DATA.

TABLE 10

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

Installation of this furnace at altitudes above 2,000 ft. (610m) shall be in accordance with the 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 149.1*. Installation of this furnace at altitudes above 2,000 ft. (610m) shall be made in accordance with the listed high Altitude Conversion Kit available with this furnace.

TABLE 11

FINAL MANIFOLD PRESSURE SETTINGS	
FUEL	PRESSURE
NATURAL GAS	3.5" W.C.
LP GAS	11.0" W.C.

TABLE 12

PART NUMBERS FOR REPLACEMENT ORIFICES

DRILL SIZE	PART NUMBER	DRILL SIZE	PART NUMBER
44	ORF00501	54	ORF00555
45	ORF00644	55	ORF00693
46	ORF00909	56	ORF00907
47	ORF00910	57	ORF00908
48	ORF01099	58	ORF01338
49	ORF00503	59	ORF01339
50	ORF00493		

TABLE 13

Orifice Twist Drill Size If Installed At Sea Level	ALTITUDE ABOVE SEA LEVEL and Orifice Required At Other Elevations									
	2000	3000	4000	5000	6000	7000	8000	9000	10000	
42	42	43	43	43	44	44	45	46	47	
43	44	44	44	45	45	46	47	47	48	
44	45	45	45	46	47	47	48	48	50	
45	46	47	47	47	48	48	49	49	50	
46	47	47	47	48	48	49	49	50	51	
47	48	48	49	49	49	50	50	51	52	
54	54	55	55	55	55	55	56	56	56	
55	55	55	55	56	56	56	56	56	57	
56	56	56	57	57	57	58	59	59	60	
57	58	59	59	60	60	61	62	63	63	
58	59	60	60	61	62	62	63	63	64	

From National Fuel Gas Code - Table F-4

START-UP AND ADJUSTMENT

PRELIMINARY INSPECTIONS

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.

Flip the switch on the main gas valve within the unit to the "OFF" position. Turn the external gas valve to "ON". Purge the air from the gas lines. After purging, check all gas connections for leaks with a soapy solution — **DO NOT CHECK WITH AN OPEN FLAME.** Allow 5 minutes for any gas that might have escaped to dissipate. LP Gas being heavier than air may require forced ventilation. Flip the switch on the gas valve in the unit to the "ON" position.

Installation Instructions

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.

LIGHTING INSTRUCTIONS

WARNING

DO NOT attempt to manually light the burner. Failure to follow this warning could result in property damage, personal injury, or death.

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 thermostat 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 thermostat is satisfied.

To shut off.

For complete shutdown: Flip the switch on the main gas valve to the "OFF" position (See Figure 34). Disconnect the electrical supply to the unit.

CAUTION

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

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.

SEQUENCE OF OPERATION

Thermostat call for heat

R and W thermostat contacts close signaling the control module to run its self-check routine. After the control module has verified that the pressure switch contacts are open and the limit switch(es) contacts are closed, the draft blower will be energized.

As the induced draft blower comes up to speed, the pressure switch contacts will close and the ignitor warm up period will begin. The ignitor will heat for approximately 17 seconds, then the gas valve is energized to permit gas flow to the burners. The flame sensor confirms that ignition has been achieved within the 4 second ignition trial period.

After the flame sensor confirms that ignition has been achieved, the delay to fan ON period begins timing and after approximately 45 seconds the indoor blower motor will be energized and will continue to run during the heating cycle.

When the thermostat is satisfied, R and W thermostat contacts open, the gas valve will close, the flames will extinguish, and the induced draft blower will be de-energized. The indoor blower motor will continue to run for the fan off period (Field selectable at 60, 100, 140 or 180 seconds), then will be de-energized by the control module.

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 safety of the unit, it **must be checked out on initial start up by the installer.**

To check for proper operation of the limit switches, set the thermostat to a temperature higher than the indicated temperature to bring on the gas valve.

Restrict the airflow by blocking the return air (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 paper or cardboard from the return air inlet. Refer to Service Facts for additional instructions.

NOTE TO INSTALLER

Review the following warnings with the owner. Review contents of USER'S INFORMATION MANUAL with the owner.

AIRFLOW ADJUSTMENT

Check inlet and outlet air temperatures to make sure they are within the ranges specified on the furnace rating nameplate. If the airflow needs to be increased or decreased, see the wiring diagram for information on changing the speed of the blower motor.

WARNING

Disconnect power to the unit before removing the blower door. Failure to follow this warning could result in property damage, personal injury or death.

This unit is equipped with a blower door switch which cuts power to the blower and gas valve 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.

INDOOR BLOWER TIMING

Heating: The integrated furnace control controls the indoor blower. The blower start is fixed at 45 seconds after ignition. The FAN-OFF period is field selectable by dip switches at 60, 100, 140, or 180 seconds. The factory setting is 100 seconds (See wiring diagram).

Cooling: The fan delay off period is factory set at 0 seconds. The option for 80 second delay off is field selectable (See wiring diagram).

ROOM AIR THERMOSTAT HEAT ANTICIPATOR ADJUSTMENT

Set the thermostat heat anticipator according to the current flow measured, or the settings found in the notes on the furnace wiring diagram (found in the SERVICE FACTS or inside the furnace casing).

INSTRUCTIONS TO THE OWNERS

In the event that electrical, fuel, or mechanical failures occur, the owner should immediately turn the gas supply off at the manual gas valve, located in the burner compartment. Also turn off electrical power to the furnace and contact the service agency designated by your dealer.

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.

ABNORMAL CONDITIONS

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

If pressure against induced draft blower outlet becomes excessive, the pressure switch will open and shut off the gas valve until acceptable combustion pressure is again available.

2. LOSS OF FLAME

If loss of flame occurs during a heating cycle, or flame is not present at the sensor, the flame control module will close the gas valve. The flame control module will then recycle the ignition sequence, then 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 thermostat still calls for heat.

4. GAS SUPPLY FAILURE

If loss of flame occurs during a heating cycle, the system integrated control module will recycle the ignition sequence, then if ignition is not achieved, the integrated control module will shut off the gas valve and lock out the system.

5. INDUCED DRAFT BLOWER FAILURE

If pressure is not sensed by the pressure switch, the contacts will remain open and not allow the gas valve to open, therefore the unit will not start. If failure occurs during a running cycle, the pressure switch contacts will open and the gas valve will close to shut the unit down.

6. CONDENSATE DRAIN BLOCKAGE

If the condensate drain is blocked, either by debris, improper draining, or by freezing condensate, the pressure switch will sense the accumulation of condensate in the furnace drain pan. 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 control module has shut the system down and gone into lockout, the system must be manually reset before the unit will restart. To reset, turn the system power off, then on, then off and then on again within 30 seconds. This may be done at the unit's power source or at the thermostat. *The system will not reset unless the procedure off-on-off-on is completed within 30 seconds.*

8. RESET AFTER BURNER BOX LIMIT SHUTDOWN

If the furnace shuts down, one thing that can be checked is the burner box temperature limit switch. It is located on the bottom of the burner box. The vent and combustion air inlet terminations should 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, the limit switch must be reset by a qualified servicer.**

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

WARNING

This product contains fiberglass wool insulation!

Fiberglass dust and ceramic fibers are believed by the State of California to cause cancer through inhalation. Glasswool fibers may also cause respiratory, skin, or eye irritation.

PRECAUTIONARY MEASURES

- Avoid breathing fiberglass dust.
- Use a NIOSH approved dust/mist respirator.
- Avoid contact with the skin or eyes. Wear long-sleeved, loose-fitting clothing, gloves, and eye protection.
- Wash clothes separately from other clothing: rinse washer thoroughly.
- Operations such as sawing, blowing, tear-out, and spraying may generate fiber concentrations requiring additional respiratory protection. Use the appropriate NIOSH approved respirator in these situations.

FIRST AID MEASURES

Eye Contact – Flush eyes with water to remove dust. If symptoms persist, seek medical attention.

Skin Contact – Wash affected areas gently with soap and warm water after handling.

User's Information Guide

Upflow/Horizontal and Downflow/ Horizontal, Single Stage Gas-Fired Condensing Furnaces

Contents:

Warnings & Cautions	32
General Information	32
To Start The Furnace	33-34
Proper Maintenance	35-36
The Problem Solver	37
Regular Dealer Maintenance	38
Warranties	50-51

WARNING

If the information in this manual is not followed exactly, a fire or explosion may result 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.
- **DO NOT RELY ON SMELL ALONE TO DETECT LEAKS. DUE TO VARIOUS FACTORS, YOU MAY NOT BE ABLE TO SMELL FUEL GASES.**
 - U.L. recognized fuel gas and CO detectors are recommended in all applications, and their installation should be in accordance with the manufacturer's recommendations and/or local laws, rules, regulations, or customs.
- Installation and service must be performed by a qualified installer, service agency or the gas supplier.

GENERAL INFORMATION

Understand the signal words **WARNING** and **CAUTION**. These words are safety alert words. **WARNING** indicates hazards which could result in personal injury or death. **CAUTION** is used to indicate unsafe practices which could result in minor injury or property damage.

IMPORTANT FACTS

The flow of combustion and ventilating air must not be obstructed from reaching the furnace. Air openings provided in the casing of the furnace must be kept free of obstructions which would restrict airflow, thereby affecting efficiency and safe operation of your furnace.

Also, air openings provided to the area in which the furnace is installed and the space around the furnace shall not be blocked or obstructed. Keep this in mind should you choose to remodel the area which contains your furnace. If additional insulation is added after the furnace is installed, the area around the furnace must be inspected to ensure it is free and clear of insulation. If this furnace is installed in an attic or other insulated space it must be kept free and clear of all insulating materials as some insulating materials are combustible.

Furnaces must have air for proper performance. There must be a free flow of fresh air sufficient for efficient combustion and safe ventilation of your furnace.

The combustion air for your furnace must be fresh uncontaminated air. Paints, varnishes, laundry bleaches, detergents, many household cleaners, water softening salts, adhesives, and all such products release fumes containing compounds which could lead to early heat exchanger and vent system deterioration. Do not store these type of products near your furnace.

Never store gasoline, combustible materials, or other flammable liquids or vapors near your furnace.

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

A variety of potential sources of carbon monoxide can be found in a building or dwelling such as gas-fired clothes dryers, gas cooking stoves, water heaters, furnaces and fireplaces. The U.S. Consumer Product Safety Commission recommends that users of gas-burning appliances install carbon monoxide detectors as well as fire and smoke detectors per the manufacturer's installation instructions to help alert dwelling occupants of the presence of fire, smoke or unsafe levels of carbon monoxide. These devices should be listed by Underwriters Laboratories, Inc. *Standards for Single and Multiple Station Carbon Monoxide Alarms, UL 2034* or CSA International Standard, *Residential Carbon Monoxide Alarming Devices, CSA 6.19*

WARNING

DO NOT USE THIS UNIT IF ANY PART HAS BEEN UNDER WATER. IMMEDIATELY CALL A QUALIFIED SERVICE TECHNICIAN TO INSPECT THE FURNACE AND REPLACE ANY PART OF THE CONTROL SYSTEM AND ANY GAS CONTROL WHICH HAS BEEN UNDER WATER.

NOTE:

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

⚠ WARNING

BODILY INJURY CAN RESULT FROM HIGH VOLTAGE ELECTRICAL COMPONENTS, FAST MOVING FANS, AND COMBUSTIBLE GAS. FOR PROTECTION FROM THESE INHERENT HAZARDS DURING INSTALLATION AND SERVICING, THE ELECTRICAL SUPPLY MUST BE TURNED OFF.

Installing and servicing heating equipment can be hazardous due to gas and electrical components. Only trained and qualified personnel should install, repair or service heating equipment.

Untrained personnel can perform basic maintenance functions such as cleaning and replacing filters. All other operations must be performed by trained service personnel.

To start the furnace.

Lighting instructions.

Your furnace does not use a continuously burning pilot flame. Therefore, manually lighting your furnace is not required. Your furnace is equipped with an automatic ignition system. It uses a hot surface ignition device that automatically lights the burners each time the thermostat signals the furnace to start.

⚠ WARNING

DO NOT attempt to manually light the furnace.

1. Please read all safety information in this book before operating furnace.
2. Set thermostat to lowest setting. Turn off all electric power to furnace.
3. Remove the furnace front panel to gain access to the main gas valve.
4. Turn gas cock knob clockwise or the toggle switch located on the main gas valve inside the unit to "OFF" position (see illustration on this page). If external gas cock is used, turn to "OFF" position (see illustration on next page). Allow 5 minutes for any gas within the unit to escape. LP gas being heavier than air may require forced ventilation. If you smell gas STOP! Follow the "What To Do If You Smell Gas" instructions on the front cover of this book. If you don't smell gas, go to next step.
5. Turn gas cock knob counterclockwise or the toggle switch to "ON" marker (see illustration on this page).
6. Replace the furnace front access panel.

Parts and controls of this furnace are unique. Should service or modification be required, be sure your servicer uses only factory authorized parts, kits, or accessories for this furnace.

If you experience a problem with the operation of your furnace, check the "Problem Solver" section of this manual before you call for a possibly unneeded service call.

⚠ WARNING

Improper installation, adjustment, alteration, service or maintenance can cause injury or property damage. Refer to the installation instructions provided with the furnace and this manual. For assistance or additional information consult a qualified installer, service agency or the gas supplier.

7. Turn on main electrical supply and set thermostat to desired setting. Combustion blower will start and ignition device will start to heat up. After approximately 15 seconds main gas valve will open and burners will ignite.

8. When thermostat is satisfied, main burners will extinguish.

9. If main burners fail to ignite, lower thermostat setting or disconnect electrical supply, wait 5 minutes, raise thermostat setting above indicated temperature.

10. If furnace will not light, turn "OFF" all gas and electricity to unit and call servicer or gas supplier.

For complete shutdown.

Turn gas cock knob on main gas valve to "OFF" position. Disconnect electrical supply to unit.

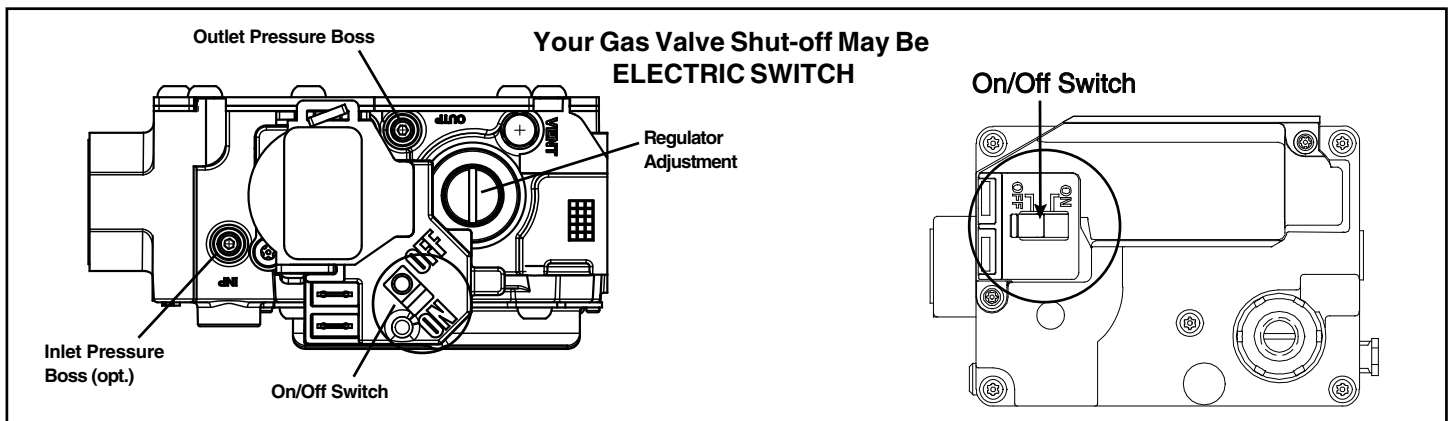
⚠ CAUTION

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

Whenever your house is to be vacant, arrange to have someone inspect your house for proper temperature. If your furnace should fail to operate, damage could result, such as frozen water pipes.

Flame Roll-out Device.

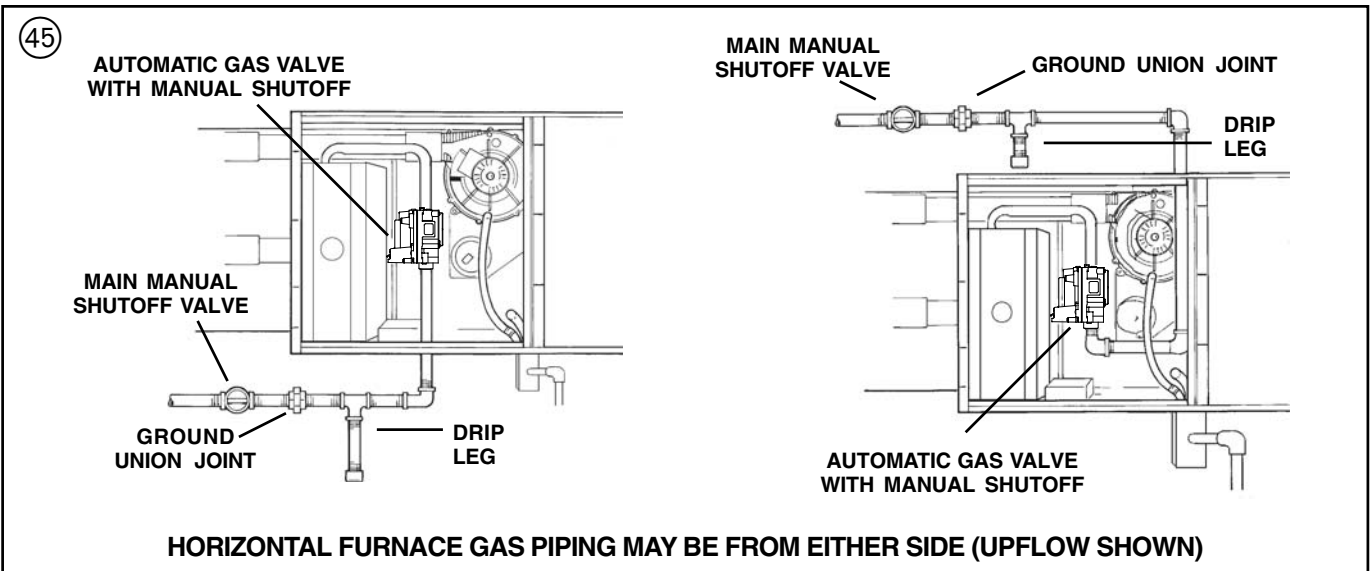
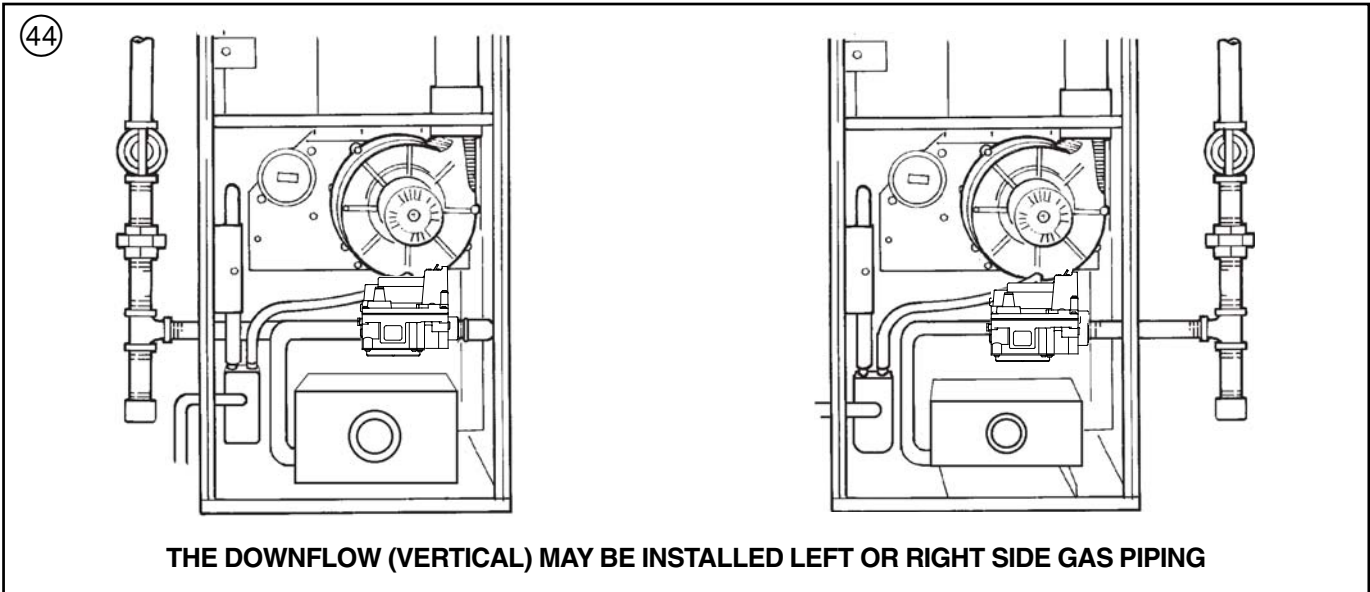
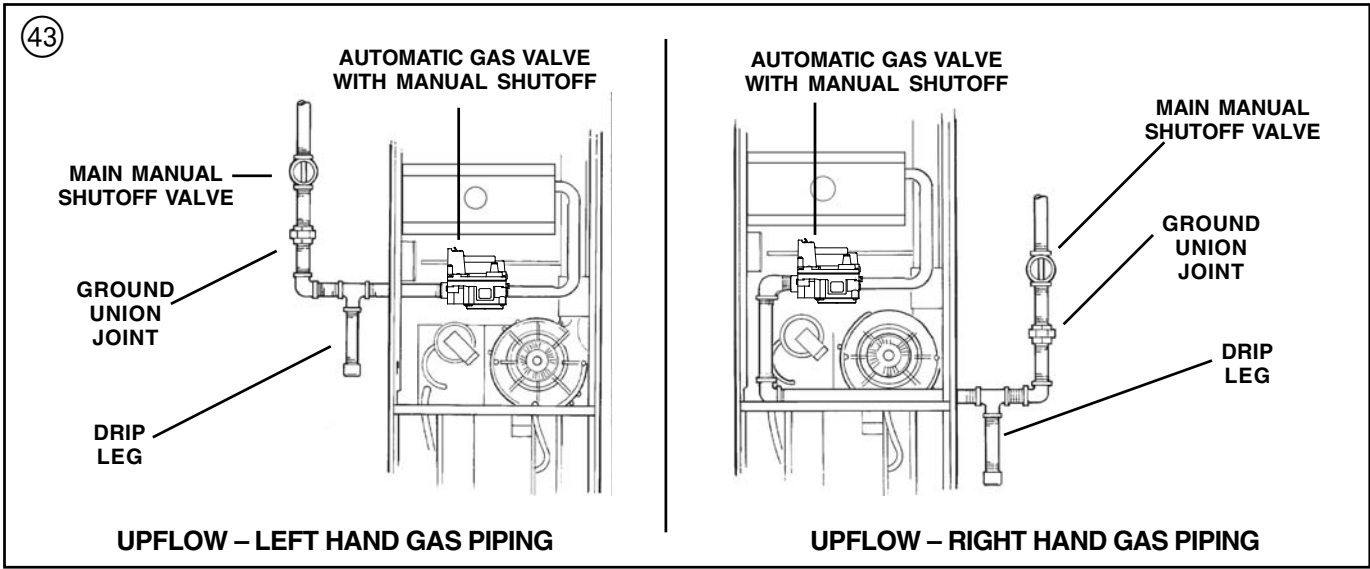
All models are equipped with a fusible link located near the burners. In case of flame roll-out, the link will open (melt) and cause the circuit to open which shuts off all flow of gas.



Owner's Information

NOTE THE LOCATION OF THE MANUAL MAIN GAS SHUT-OFF VALVE FOR YOUR FURNACE.

Have your installer or servicer show you the location if you have any questions.



Proper maintenance reduces energy use.

A clean filter saves money.

When the furnace circulates and filters the air in your home, dust and dirt particles build up on the filter. Excessive accumulation can block the airflow, forcing the unit to work harder to maintain desired temperatures.

And the harder your unit has to work, the more energy it uses. So you pay more any time your system is running with a dirty filter.

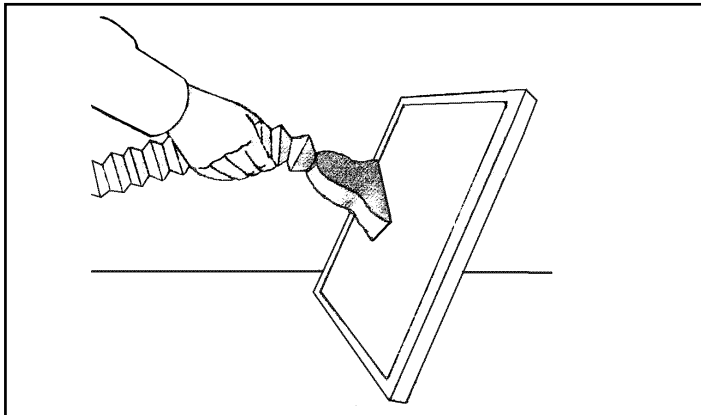
CAUTION

Never operate your unit for either heating or cooling with filters removed.

Help ensure top efficiency by cleaning the filter once a month. Clean it twice a month during seasons when the unit runs more often.

You can clean the filter with a vacuum, OR you can wash it with a household detergent.

Both methods are quick and easy, and guaranteed to improve the performance of your system.



Your filter may or may not be framed.

Replacing your filter.

When replacing your furnace filters, always use a high velocity type which are the same size as originally supplied. Filters are available from your dealer.

Where disposable filters are used, they must be a high velocity type which are the same size as originally supplied.

How to remove your filter.

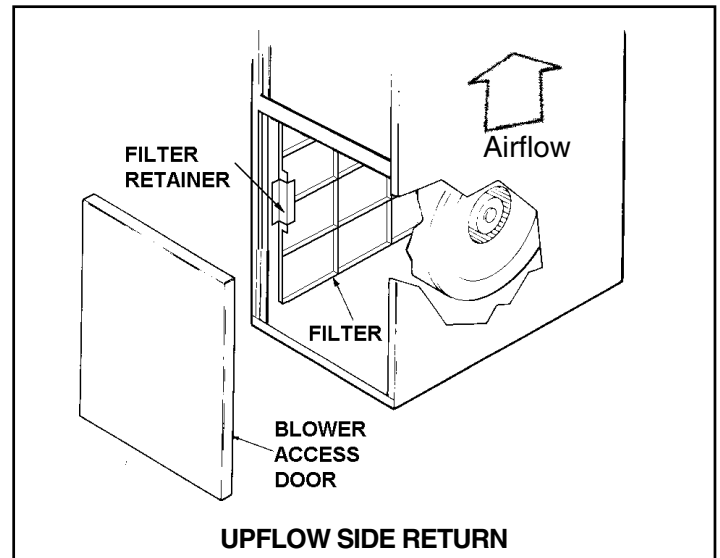
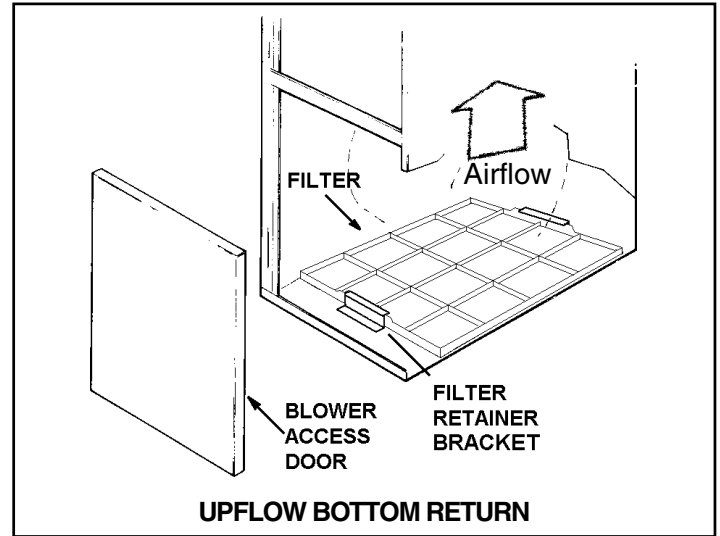
WARNING

Disconnect power to unit before removing blower door.

Upflow furnaces use a high velocity type air filter which may be located within the furnace blower compartment in either a BOTTOM or SIDE (left or right) return air inlet. The furnace may be secured with filter retaining brackets (as shown) or a filter retainer wire.

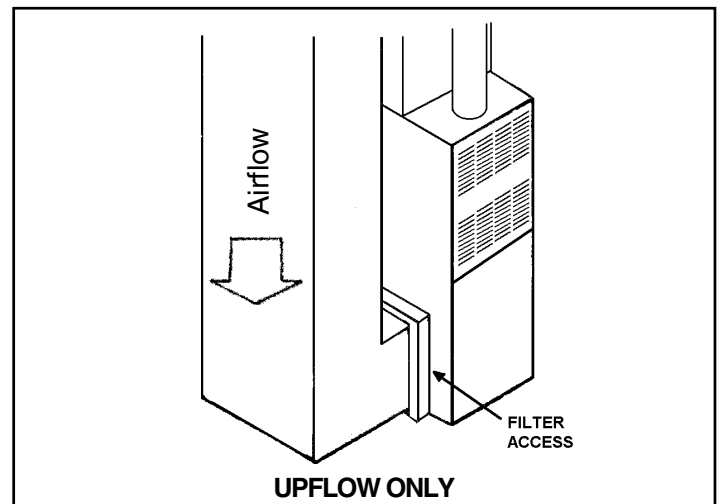
To replace filters, remove blower access door, push back to flex the filter and clear the filter retaining bracket at the front of the unit. After cleaning, replace the filter in the same manner making sure that the filter wire is secured in place in both front and back filter retaining brackets. Replace blower access door.

A bottom return air inlet as shown features a 17" x 25" x 1" filter in the 17-1/2" wide furnace cabinets; a 20" x 25" x 1" filter in the 21" wide models; and a 24" x 25" x 1" filter in the 24-1/2" wide cabinet.



For vertical UPFLOW ONLY, a left or right return air inlet as above (left side shown) requires trimming of the factory supplied filter to 17" x 25" x 1" for both the 21" and 24-1/2" wide furnaces.

Air filters may also be located outside of the furnace using a **SIDE FILTER FRAME**.



Owner's Information

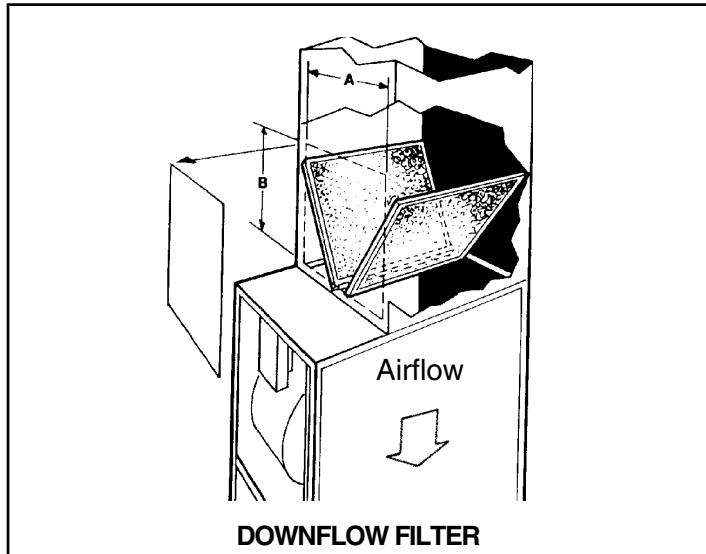
UPFLOW (Vertical) FILTER TABLES

REQUIRED FILTERS - BOTTOM	
CABINET WIDTH	FILTER QUANTITY & SIZE
17-1/2"	1 - 17" X 25" X 1"
21"	1 - 20" X 25" X 1"
24-1/2"	1 - 24" X 25" X 1"

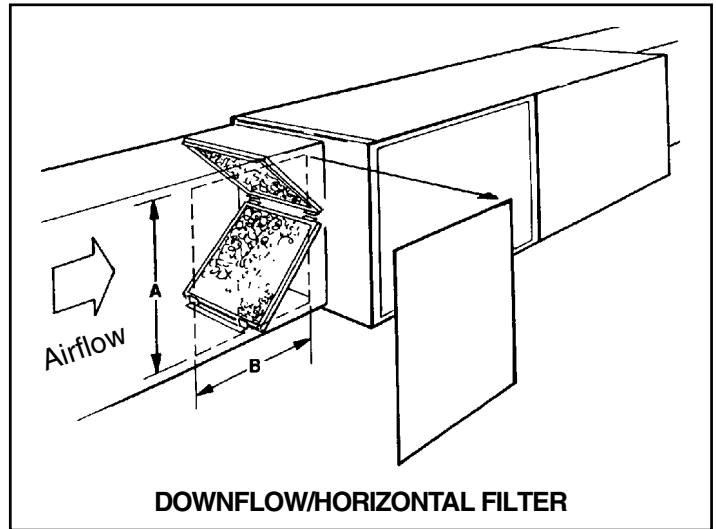
REQUIRED FILTERS - SIDE **	
CABINET WIDTH	FILTER QUANTITY & SIZE
17-1/2"	1 - 17" X 25" X 1"
21"	1 - 20" X 25" X 1"
24-1/2"	1 - 24" X 25" X 1"

** ON UPFLOW 5 TON AIRFLOW MODELS, IF THE AIRFLOW REQUIREMENT EXCEEDS 1800 CFM, THESE MODELS WILL REQUIRE FILTERS ON BOTH SIDES OR 1 SIDE AND THE BOTTOM, OR JUST THE BOTTOM

Downflow/Horizontal furnaces are factory supplied with 2 standard size permanent type air filters which may be located remote to the furnace or in the return air duct. Check with your dealer for the location of your filters.

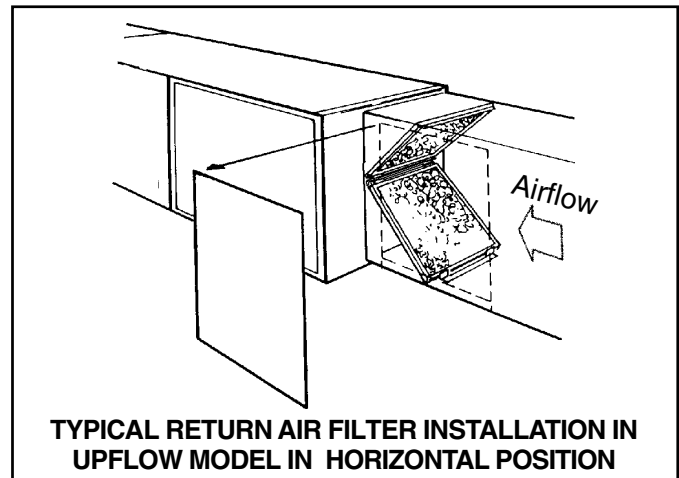


A downflow/horizontal furnace return air filter application, as shown, features two 14" x 20" x 1" filter in the 17-1/2" wide furnace cabinets; or two 16" x 20" x 1" filter in the 21" and 24-1/2" wide furnace cabinets.



DOWNFLOW (Vertical) FILTER TABLE

REQUIRED FILTERS - DOWNFLOW	
CABINET WIDTH	FILTER QUANTITY & SIZE
17-1/2"	2 - 16" X 20" X 1"
21"	2 - 16" X 20" X 1"
24-1/2"	2 - 16" X 20" X 1"



The problem solver.

A furnace is not a household appliance. It is complex and requires professional maintenance and repair.

That's why attempts at "do-it-yourself" repairs on an in-warranty unit may void the remainder of your warranty.

Other than performing the simple maintenance recommended in this manual, you should not attempt to make any adjustments to your furnace. Your dealer will be able to take care of any questions or problems you may have. A periodic inspection of your furnace should be made by a qualified service agency at the start of each heating season.

Keep your furnace looking like new for years.

Clean the enamel finish of your furnace with ordinary soap and water. For stubborn grease spots, use a household detergent. Lacquer thinner or other synthetic solvents may damage the finish.

Save time and money. Before calling for service, check the following:

Problem	Possible Trouble	Possible Remedy
No Heating - Blower Does not operate	<ol style="list-style-type: none"> 1. Thermostat set incorrectly. 2. Blown fuse or tripped circuit breaker. 3. Defective component. 4. Burner does not ignite. 5. Main gas line turned off. 6. Blower door removed or ajar. 7. Lockout 	<ol style="list-style-type: none"> 1. Adjust thermostat. See operating instructions. 2. Replace or reset protective device or call for servicer. 3. Most controls are automatic and will recycle. If your unit still does not operate call for servicer. 4. Call servicer. 5. Have gas company check. 6. Close door securely to restore power to blower and gas valve. 7. Turn power on-off-on-off twice in 30 seconds.
Insufficient Heating - Blower operates continuously	<ol style="list-style-type: none"> 1. Dirty air filters. 2. Blocked supply or return registers. 	<ol style="list-style-type: none"> 1. Clean or replace filters. 2. Make sure registers are open and No obstacles blocking off the air.
No Heat - Vent motor is running	Restricted or plugged furnace condensate drain.	<ol style="list-style-type: none"> 1. Remove drain clamps to condensate trap and drain pan outlet. 2. Flush or clean drain blockage. 3. Reinstall clamps.
Unusual Noise		Call your servicer

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

WARNING

THIS PRODUCT CONTAINS FIBERGLASS WOOL INSULATION!

Fiberglass dust and ceramic fibers are believed by the State of California to cause cancer through inhalation. Glasswool fibers may also cause respiratory, skin, or eye irritation.

PRECAUTIONARY MEASURES

- Avoid breathing fiberglass dust.
- Use a NIOSH approved dust/mist respirator.
- Avoid contact with the skin or eyes. Wear long-sleeved, loose-fitting clothing, gloves, and eye protection.
- Wash clothes separately from other clothing: rinse washer thoroughly.
- Operations such as sawing, blowing, tear-out, and spraying may generate fiber concentrations requiring additional respiratory protection. Use the appropriate NIOSH approved respirator in these situations.

FIRST AID MEASURES

- Eye Contact** – Flush eyes with water to remove dust. If symptoms persist, seek medical attention.
- Skin Contact** – Wash affected areas gently with soap and warm water after handling.

WARNING

CARBON MONOXIDE POISONING HAZARD

Failure to follow the installation and operation instructions for the venting system's operation could result in carbon monoxide poisoning or death.

Regular dealer maintenance.

Never stop the cooling system by shutting off the main power.

If the main power to your air conditioner is ever disconnected for more than three hours, turn off the thermostat. Then wait for at least three more hours after the power has been restored before turning the thermostat back on. Failure to follow this procedure could result in damage to your air conditioning system.

1. GENERAL INSPECTION — Examine the furnace installation for the following items:

- All flue product carrying areas external to the furnace (i.e. chimney, vent connector) are clear and free of obstruction.
- The vent connector is in place, slopes upward and is physically sound without holes or excessive corrosion.
- The return air duct connection(s) is physically sound, is sealed to the furnace and terminates outside the space containing the furnace.
- The physical support of the furnace should be sound without sagging, cracks, gaps, etc., around the base so as to provide a seal between the support and the base.
- There are no obvious signs of deterioration of the furnace.

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.

2. BLOWERS — The blower size and speed determine the air volume delivered by the furnace. The blower motor bearings are factory lubricated and under normal operating conditions usually do not require servicing. Annual cleaning of the blower wheel and housing is recommended for maximum air output, and this must be performed only by a qualified servicer or service agency.

⚠ WARNING

Unit is equipped with a blower door switch which cuts power to blower and gas valve causing shutdown when door is removed. Unit must not be altered to allow operation with the blower door removed. Operation with doors 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.

3. IGNITER — This unit has a special hot surface direct ignition device that automatically lights the burners. Please note that it is very fragile and should be handled with care.

⚠ CAUTION

DO NOT touch igniter. It is extremely hot.

4. BURNER — Gas burners do not normally require scheduled servicing, however, accumulation of foreign material may cause a yellowing flame or delayed ignition. Either condition indicates that a service call is required. For best operation, burners must be cleaned annually using brushes and vacuum cleaner.

Turn off gas and electric power supply. To clean burners, remove top burner bracket and lift burner from orifice.

NOTE:

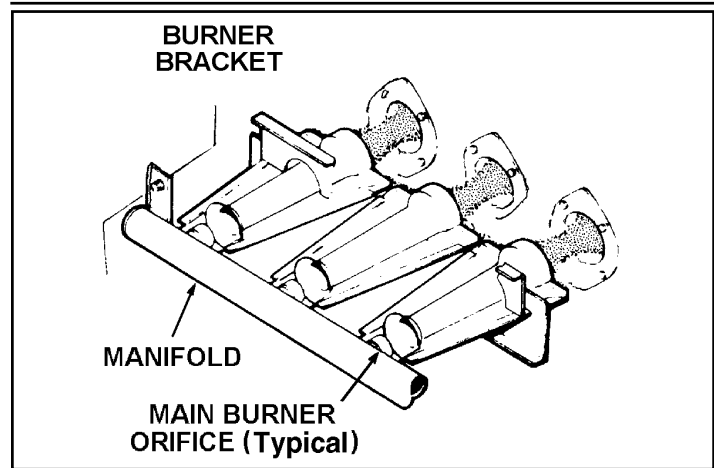
Be careful not to break igniter when removing burners.

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

NOTE:

On LP (propane) units, some light yellow tipping of the outer mantle is normal. Inner mantle should be bright blue.

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



NOTE:

On LP (propane) units, due to variations in BTU content and altitude, servicing may be required at shorter intervals.

5. HEAT EXCHANGER/FLUE PIPE — These items must be inspected for signs of corrosion, and/or deterioration at the beginning of each heating season by a qualified service technician and cleaned annually for best operation.

6. CIRCUIT PROTECTION — If blower or gas valve fail to operate, the cause could be the circuit breaker or a loose or blown fuse. Replace fuse or reset circuit breaker.

7. OPERATION — Your warm air furnace should not be operated in a corrosive atmosphere. Paint solvents, cleaning chemicals, spray propellants, and bleaches should not be used in the vicinity of the furnace during normal operation.

8. COOLING COIL CONDENSATE DRAIN — If you have a cooling coil installed with your furnace, condensate drains should be checked and cleaned periodically to assure that condensate can drain freely from coil to drain. If condensate cannot drain freely water damage could occur.

9. AIR CIRCULATION — To ensure increased comfort, the blower on this unit may be operated continuously for both heating and cooling. This will result in constantly filtered air and aid in maintaining more even temperatures by avoiding temperature stratification throughout the conditioned area. To accomplish constant air circulation, set your thermostat fan switch to "ON".

⚠ WARNING

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

In the event that electrical, fuel or mechanical failures occur, the owner should immediately turn off the gas supply at the manual gas valve located in the burner compartment and electrical power to the furnace and contact servicer.

MAINTENANCE AND SERVICE INFORMATION

⚠ WARNING DISCONNECT POWER BEFORE SERVICING

⚠ WARNING

FIRE OR EXPLOSION HAZARD

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

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

⚠ WARNING

The cabinet must have an uninterrupted or unbroken ground according to National Electrical Code, ANSI/NFPA 70 – “latest edition” and Canadian Electrical Code, CSA C22.1 or local codes to minimize personal injury if an electrical fault should occur. A failure to follow this warning could result in an electrical shock, fire, injury, or death.

⚠ CAUTION

The integrated furnace control is polarity sensitive. The hot leg of the 115 VAC power must be connected to the BLACK field lead.

⚠ WARNING

To prevent injury or death due to electrical shock or contact with moving parts, lock unit disconnect switch in the open position before servicing the unit. Failure to follow this warning could result in electrical shock, personal injury, or death.

⚠ WARNING

TO PREVENT AN EXPLOSION OR POSSIBLE INJURY, DEATH AND EQUIPMENT DAMAGE, DO NOT STORE COMBUSTIBLE MATERIALS, GASOLINE OR OTHER FLAMMABLE VAPORS OR LIQUIDS NEAR THE UNIT.

⚠ WARNING

BODILY INJURY CAN RESULT FROM HIGH VOLTAGE ELECTRICAL COMPONENTS, FAST MOVING FANS, AND COMBUSTIBLE GAS. FOR PROTECTION FROM THESE INHERENT HAZARDS DURING INSTALLATION AND SERVICING, THE ELECTRICAL SUPPLY MUST BE DISCONNECTED AND THE MAIN GAS VALVE MUST BE TURNED OFF. IF OPERATING CHECKS MUST BE PERFORMED WITH THE UNIT OPERATING, IT IS THE TECHNICIAN'S RESPONSIBILITY TO RECOGNIZE THESE HAZARDS AND PROCEED SAFELY.

⚠ 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

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 CAN/CGA B149 Installation Codes 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. 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 CAN/CGA B149 Installation Codes.
8. After it has been determined that each appliance connected to the venting system properly vents where tested as outlined above, return doors, windows, exhaust fans, fireplace dampers and any other gas-fired burning appliance to their previous conditions of use.

Service Instructions

PRODUCT SPECIFICATIONS ①

MODEL	CUX1B040A9241A	CUX1B060A9361A	CUX1B080A9421A
TYPE	Upflow	Upflow	Upflow
RATINGS ②			
Input BTUH ③	40,000	60,000	80,000
Capacity BTUH (ICS) ③	37,000	56,000	74,000
Temp. rise (Min.-Max.) °F.	30 - 60	30 - 60	35 - 65
AFUE	90.0	90.0	90.0
BLOWER DRIVE	DIRECT	DIRECT	DIRECT
Diameter - Width (In.)	9 x 7	10 x 7	10 x 8
No. Used	1	1	1
Speeds (No.)	4	4	4
CFM vs. in. w.g.	See Fan Performance Table	See Fan Performance Table	See Fan Performance Table
Motor HP	1/5	1/3	1/3
R.P.M.	1075	1075	1075
Volts / Ph / Hz	115/1/60	115/1/60	115/1/60
COMBUSTION FAN - Type	Centrifugal	Centrifugal	Centrifugal
Drive - No. Speeds	Direct - 1	Direct - 1	Direct - 1
Motor HP - RPM	1/55 - 3000	1/55 - 3000	1/25 - 3200
Volts / Ph / Hz	115/1/60	115/1/60	115/1/60
FLA	1.0	1.0	1.35
FILTER — Furnished?	No	No	No
Type Recommended	High Velocity	High Velocity	High Velocity
Hi Vel. (No.-Size-Thk.)	1 - 17x25 - 1in.	1 - 17x25 - 1in.	1 - 17x25 - 1in.
VENT — Size (in.)	2 Round	2 Round	2 Round
HEAT EXCHANGER			
Type -Fired	Aluminized Steel - Type I	Aluminized Steel - Type I	Aluminized Steel - Type I
-Unfired			
Gauge (Fired)	20	20	20
ORIFICES — Main			
Nat. Gas. Qty. — Drill Size	2 — 45	3 — 45	4 — 45
L.P. Gas Qty. — Drill Size	2 — 56	3 — 56	4 — 56
GAS VALVE	Redundant - Single Stage	Redundant - Single Stage	Redundant - Single Stage
PILOT SAFETY DEVICE			
Type	Hot Surface Ignition	Hot Surface Ignition	Hot Surface Ignition
BURNERS — Type	Multiport Inshot	Multiport Inshot	Multiport Inshot
Number	2	3	4
POWER CONN. — V / Ph / Hz ④	115/1/60	115/1/60	115/1/60
Ampacity (In Amps)	4.7	8.3	9.4
Max. Overcurrent Protection (Amps)	15	15	15
PIPE CONN. SIZE (IN.)	1/2	1/2	1/2
DIMENSIONS	H x W x D	H x W x D	H x W x D
Crated (In.)	41-3/4 x 19-1/2 x 30-1/2	41-3/4 x 19-1/2 x 30-1/2	41-3/4 x 19-1/2 x 30-1/2
WEIGHT			
Shipping (Lbs.) / Net (Lbs.)	139 / 129	150 / 140	158 / 148

① Central Furnace heating designs are certified by AGA & CSA.

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

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

③ Based on U.S. government standard tests.

④ The above wiring specifications are in accordance with National Electrical Code; however, installations must comply with local codes.

MODEL	CUX1C100A9481A	CUX1D100A9601A	CUX1D120A9601A
TYPE	Upflow	Upflow	Upflow
RATINGS ②			
Input BTUH ③	100,000	100,000	120,000
Capacity BTUH (ICS) ③	92,000	93,000	113,000
Temp. rise (Min.-Max.) °F.	35 - 65	35 - 65	40 - 70
AFUE	90.0	90.0	90.0
BLOWER DRIVE	DIRECT	DIRECT	DIRECT
Diameter - Width (In.)	10 x 10	11 x 10	11 x 10
No. Used	1	1	1
Speeds (No.)	4	4	4
CFM vs. in. w.g.	See Fan Performance Table	See Fan Performance Table	See Fan Performance Table
Motor HP	1/2	3/4	3/4
R.P.M.	1075	1100	1100
Volts / Ph / Hz	115/1/60	115/1/60	115/1/60
COMBUSTION FAN - Type	Centrifugal	Centrifugal	Centrifugal
Drive - No. Speeds	Direct - 1	Direct - 1	Direct - 1
Motor HP - RPM	1/20 - 3450	1/20 - 3450	1/20 - 3450
Volts / Ph / Hz	115/1/60	115/1/60	115/1/60
FLA	0.71	0.71	0.71
FILTER — Furnished?	No	No	No
Type Recommended	High Velocity	High Velocity	High Velocity
Hi Vel. (No.-Size-Thk.)	1 - 20x25 - 1in.	1 - 24x25 - 1in.	1 - 24x25 - 1in.
VENT — Size (in.)	2 Round	2 Round	3 Round
HEAT EXCHANGER			
Type -Fired	Aluminized Steel - Type I	Aluminized Steel - Type I	Aluminized Steel - Type I
-Unfired			
Gauge (Fired)	20	20	20
ORIFICES — Main			
Nat. Gas. Qty. — Drill Size	5 — 45	5 — 45	6 — 45
L.P. Gas Qty. — Drill Size	5 — 56	5 — 56	6 — 56
GAS VALVE	Redundant - Single Stage	Redundant - Single Stage	Redundant - Single Stage
PILOT SAFETY DEVICE			
Type	Hot Surface Ignition	Hot Surface Ignition	Hot Surface Ignition
BURNERS — Type	Multiport Inshot	Multiport Inshot	Multiport Inshot
Number	5	5	6
POWER CONN. — V / Ph / Hz ④	115/1/60	115/1/60	115/1/60
Ampacity (In Amps)	12.5	12.9	12.9
Max. Overcurrent Protection (Amps)	15	15	15
PIPE CONN. SIZE (IN.)	1/2	1/2	1/2
DIMENSIONS	H x W x D	H x W x D	H x W x D
Crated (In.)	41-3/4 x 23 x 30-1/2	41-3/4 x 26-1/2 x 30-1/2	41-3/4 x 26-1/2 x 30-1/2
WEIGHT			
Shipping (Lbs.) / Net (Lbs.)	171 / 160	197 / 185	205 / 193

PRODUCT SPECIFICATIONS ①

MODEL	CDX1B040A9241A	CDX1B060A9361A	CDX1B080A9421A
TYPE	Downflow / Horizontal	Downflow / Horizontal	Downflow / Horizontal
RATINGS ②			
Input BTUH ③	40,000	60,000	80,000
Capacity BTUH (ICS) ③	38,000	56,000	74,000
Temp. rise (Min.-Max.) °F.	30 - 60	35 - 65	40 - 70
AFUE	90.0	90.0	90.0
BLOWER DRIVE	DIRECT	DIRECT	DIRECT
Diameter - Width (In.)	10 x 7	10 x 8	11 x 8
No. Used	1	1	1
Speeds (No.)	4	4	4
CFM vs. in. w.g.	See Fan Performance Table	See Fan Performance Table	See Fan Performance Table
Motor HP	1/5	1/3	1/2
R.P.M.	1080	1075	1075
Volts / Ph / Hz	115/1/60	115/1/60	115/1/60
COMBUSTION FAN - Type	Centrifugal	Centrifugal	Centrifugal
Drive - No. Speeds	Direct - 1	Direct - 1	Direct - 1
Motor HP - RPM	1/55 - 3000	1/55 - 3000	1/25 - 3200
Volts / Ph / Hz	115/1/60	115/1/60	115/1/60
FLA	1.0	1.0	1.35
FILTER — Furnished?	No	No	No
Type Recommended	High Velocity	High Velocity	High Velocity
Hi Vel. (No.-Size-Thk.)	2 - 14x20 - 1in.	2 - 14x20 - 1in.	2 - 14x20 - 1in.
VENT — Size (in.)	2 Round	2 Round	2 Round
HEAT EXCHANGER			
Type -Fired	Aluminized Steel - Type I	Aluminized Steel - Type I	Aluminized Steel - Type I
-Unfired			
Gauge (Fired)	20	20	20
ORIFICES — Main			
Nat. Gas. Qty. — Drill Size	2 — 45	3 — 45	4 — 45
L.P. Gas Qty. — Drill Size	2 — 56	3 — 56	4 — 56
GAS VALVE	Redundant - Single Stage	Redundant - Single Stage	Redundant - Single Stage
PILOT SAFETY DEVICE			
Type	Hot Surface Ignition	Hot Surface Ignition	Hot Surface Ignition
BURNERS — Type	Multiport Inshot	Multiport Inshot	Multiport Inshot
Number	2	3	4
POWER CONN. — V / Ph / Hz ④	115/1/60	115/1/60	115/1/60
Ampacity (In Amps)	4.7	9.1	11.4
Max. Overcurrent Protection (Amps)	15	15	15
PIPE CONN. SIZE (IN.)	1/2	1/2	1/2
DIMENSIONS	H x W x D	H x W x D	H x W x D
Crated (In.)	41-3/4 x 19-1/2 x 30-1/2	41-3/4 x 19-1/2 x 30-1/2	41-3/4 x 19-1/2 x 30-1/2
WEIGHT			
Shipping (Lbs.) / Net (Lbs.)	145 / 135	155 / 145	168 / 158

① Central Furnace heating designs are certified by AGA & CSA.

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

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

③ Based on U.S. government standard tests.

④ The above wiring specifications are in accordance with National Electrical Code; however, installations must comply with local codes.

MODEL	CDX1C100A9481A	CDX1D120A9601A
TYPE	Downflow / Horizontal	Downflow / Horizontal
RATINGS ②		
Input BTUH ③	100,000	120,000
Capacity BTUH (ICS) ③	93,000	110,000
Temp. rise (Min.-Max.) °F.	35 - 65	40 - 70
AFUE	90.0	90.0
BLOWER DRIVE	DIRECT	DIRECT
Diameter - Width (In.)	11 x 10	11 x 10
No. Used	1	1
Speeds (No.)	4	4
CFM vs. in. w.g.	See Fan Performance Table	See Fan Performance Table
Motor HP	1/2	3/4
R.P.M.	1075	1075
Volts / Ph / Hz	115/1/60	115/1/60
COMBUSTION FAN - Type	Centrifugal	Centrifugal
Drive - No. Speeds	Direct - 1	Direct - 1
Motor HP - RPM	1/20 - 3450	1/20 - 3450
Volts / Ph / Hz	115/1/60	115/1/60
FLA	0.71	0.71
FILTER — Furnished?	No	No
Type Recommended	High Velocity	High Velocity
Hi Vel. (No.-Size-Thk.)	2 - 16x20 - 1in.	2 - 16x20 - 1in.
VENT — Size (in.)	2 Round	3 Round
HEAT EXCHANGER		
Type -Fired	Aluminized Steel - Type I	Aluminized Steel - Type I
-Unfired		
Gauge (Fired)	20	20
ORIFICES — Main		
Nat. Gas. Qty. — Drill Size	5 — 45	6 — 45
L.P. Gas Qty. — Drill Size	5 — 56	6 — 56
GAS VALVE	Redundant - Single Stage	Redundant - Single Stage
PILOT SAFETY DEVICE		
Type	Hot Surface Ignition	Hot Surface Ignition
BURNERS — Type	Multiport Inshot	Multiport Inshot
Number	5	6
POWER CONN. — V / Ph / Hz ④	115/1/60	115/1/60
Ampacity (In Amps)	12.5	12.9
Max. Overcurrent Protection (Amps)	15	15
PIPE CONN. SIZE (IN.)	1/2	1/2
DIMENSIONS	H x W x D	H x W x D
Crated (In.)	41-3/4 x 23 x 30-1/2	41-3/4 x 26-1/2 x 30-1/2
WEIGHT		
Shipping (Lbs.) / Net (Lbs.)	185 / 175	206 / 196

Service Instructions

FURNACE AIRFLOW (CFM) VS. EXTERNAL STATIC PRESSURE (INS. w.g.)										
MODEL	SPEED TAP	0.10	0.20	0.30	0.40	0.50	0.60	0.70	0.80	0.90
CUX1B040A9241A	4 - HIGH - Black	1043	992	930	885	812	740	647	518	457
	3 - MED.-HIGH - Blue	940	895	841	791	726	650	559	420	390
	2 - MED.-LOW - Yellow	837	798	752	705	649	560	438	305	279
	1 - LOW - Red	729	694	657	600	545	478	376	220	178
CUX1B060A9361A	4 - HIGH - Black	1394	1359	1314	1260	1196	1122	1038	945	853
	3 - MED.-HIGH - Blue	1250	1232	1202	1160	1106	1040	962	873	771
	2 - MED.-LOW - Yellow	1102	1092	1069	1034	986	925	852	766	668
	1 - LOW - Red	957	944	922	891	853	806	750	686	614
CUX1B080A9421A	4 - HIGH - Black	1748	1683	1615	1544	1470	1393	1314	1232	1147
	3 - MED.-HIGH - Blue	1375	1367	1347	1314	1268	1210	1139	1056	960
	2 - MED.-LOW - Yellow	1178	1167	1147	1119	1082	1036	982	919	847
	1 - LOW - Red	859	863	856	839	811	772	723	663	592
CUX1C100A9481A	4 - HIGH - Black	2054	1980	1906	1826	1746	1649	1551	1428	1305
	3 - MED.-HIGH - Blue	1932	1875	1818	1746	1673	1577	1481	1371	1260
	2 - MED.-LOW - Yellow	1762	1720	1677	1615	1552	1463	1373	1266	1158
	1 - LOW - Red	1558	1546	1533	1477	1421	1350	1278	1175	1071
CUX1D100A9601A	4 - HIGH - Black	2411	2358	2304	2235	2165	2083	2001	1915	1828
	3 - MED.-HIGH - Blue	2108	2083	2058	2007	1956	1893	1829	1754	1679
	2 - MED.-LOW - Yellow	1772	1759	1745	1723	1700	1657	1613	1544	1475
	1 - LOW - Red	1480	1477	1474	1458	1441	1414	1386	1327	1268
CUX1D120A9601A	4 - HIGH - Black	2454	2406	2358	2310	2261	2184	2106	2017	1928
	3 - MED.-HIGH - Blue	2105	2092	2078	2045	2012	1950	1887	1826	1765
	2 - MED.-LOW - Yellow	1747	1742	1736	1720	1703	1677	1651	1593	1535
	1 - LOW - Red	1445	1447	1449	1440	1430	1400	1369	1325	1280

CFM VS. TEMPERATURE RISE																	
MODEL	Cubic Feet Per Minute (CFM)																
	600	700	800	900	1000	1100	1200	1300	1400	1500	1600	1700	1800	1900	2000	2100	2200
CUX1B040A9241A	56	48	42	37	33												
CUX1B060A9361A				56	50	45	42	39	36								
CUX1B080A9421A						61	56	51	48	44	42						
CUX1C100A9481A								64	60	56	52	49	46	44	42		
CUX1D100A9601A								64	60	56	52	49	46	44	42	40	38
CUX1D120A9601A											63	59	56	53	50	48	46

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.

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

WARNING

This product contains fiberglass wool insulation!

Fiberglass dust and ceramic fibers are believed by the State of California to cause cancer through inhalation. Glasswool fibers may also cause respiratory, skin, or eye irritation.

FURNACE AIRFLOW (CFM) VS. EXTERNAL STATIC PRESSURE (inches w.g.)										
MODEL	SPEED TAP	0.10	0.20	0.30	0.40	0.50	0.60	0.70	0.80	0.90
CDX1B040A9241A	4 - HIGH - Black	998	965	922	870	807	735	653	561	459
	3 - MED.-HIGH - Blue	856	832	797	751	695	628	550	462	363
	2 - MED.-LOW - Yellow	753	728	694	650	596	533	460	378	286
	1 - LOW - Red	647	617	581	538	490	435	375	308	235
CDX1B060A9361A	4 - HIGH - Black	1341	1285	1223	1156	1082	1004	919	829	734
	3 - MED.-HIGH - Blue	1198	1161	1115	1060	996	923	842	751	652
	2 - MED.-LOW - Yellow	1369	1232	1108	998	901	817	747	689	645
	1 - LOW - Red	784	781	767	741	703	654	593	521	437
CDX1B080A9421A	4 - HIGH - Black	1547	1498	1445	1386	1323	1254	1180	1101	1016
	3 - MED.-HIGH - Blue	1487	1436	1382	1325	1265	1202	1137	1069	998
	2 - MED.-LOW - Yellow	1388	1348	1302	1249	1191	1126	1056	979	896
	1 - LOW - Red	1263	1234	1196	1150	1095	1032	960	879	790
CDX1C100A9481A	4 - HIGH - Black	1892	1827	1762	1688	1614	1531	1448	1354	1260
	3 - MED.-HIGH - Blue	1779	1726	1672	1605	1538	1460	1381	1291	1200
	2 - MED.-LOW - Yellow	1630	1587	1544	1485	1426	1362	1297	1208	1119
	1 - LOW - Red	1444	1416	1388	1348	1308	1246	1184	1108	1032
CDX1D120A9601A	4 - HIGH - Black	2213	2138	2062	2001	1939	1863	1786	1706	1625
	3 - MED.-HIGH - Blue	2057	2000	1943	1883	1822	1752	1681	1595	1508
	2 - MED.-LOW - Yellow	1765	1733	1700	1652	1603	1552	1500	1424	1347
	1 - LOW - Red	1468	1452	1435	1409	1382	1336	1290	1225	1159

CFM VS. TEMPERATURE RISE																			
MODEL	Cubic Feet Per Minute (CFM)																		
	600	700	800	900	1000	1100	1200	1300	1400	1500	1600	1700	1800	1900	2000	2100	2200	2300	2400
CDX1B040A9241A	56	48	42	37	34														
CDX1B060A9361A			63	56	51	46	42	39	36	34									
CDX1B080A9421A					68	61	56	52	48	45	42	40							
CDX1C100A9481A								65	60	56	53	50	47	44	42	40	38	37	35
CDX1D120A9601A										67	63	59	56	53	51	48	46	44	42

⚠ WARNING

NEVER USE AN OPEN FLAME TO TEST FOR GAS LEAKS: AN EXPLOSION COULD OCCUR, CAUSING INJURY OR DEATH.

⚠ WARNING

DO NOT USE THIS UNIT IF ANY PART HAS BEEN UNDER WATER. IMMEDIATELY CALL A QUALIFIED SERVICE TECHNICIAN TO INSPECT THE FURNACE AND REPLACE ANY PART OF THE CONTROL SYSTEM AND ANY GAS CONTROL WHICH HAS BEEN UNDER WATER.

⚠ WARNING

Should overheating occur, or the gas supply fail to shut off, shut off the gas valve to the unit before shutting off the electrical supply. Failure to follow this warning could result in property damage, personal injury, or death.

⚠ WARNING

TO PREVENT AN EXPLOSION OR POSSIBLE INJURY, DEATH AND EQUIPMENT DAMAGE, DO NOT STORE COMBUSTIBLE MATERIALS, GASOLINE OR OTHER FLAMMABLE VAPORS OR LIQUIDS NEAR THE UNIT.

PERIODIC SERVICING REQUIREMENTS

⚠ WARNING

Disconnect power to the unit before removing the blower door. Failure to follow this warning could result in personal injury from moving parts.

1. GENERAL INSPECTION — *Examine the furnace installation annually for the following items:*

- a. All flue product carrying areas external to the furnace (i.e. chimney, vent connector) are clear and free of obstruction. A vent screen in the end of the vent (flue) pipe must be inspected for blockage annually.
- b. The vent connector is in place, slopes upward and is physically sound without holes or excessive corrosion.
- c. The return air duct connection(s) is physically sound, is sealed to the furnace and terminates outside the space containing the furnace.
- d. The physical support of the furnace should be sound without sagging, cracks, gaps, etc., around the base so as to provide a seal between the support and the base.
- e. There are no obvious signs of deterioration of the furnace.

2. FILTERS — Filters should be cleaned or replaced (with high velocity filters only), monthly and more frequently during high use times of the year such as midsummer or midwinter.

3. BLOWERS — The blower size and speed determine the air volume delivered by the furnace. The blower motor bearings are factory lubricated and under normal operating conditions do not require servicing. If motor lubrication is required it should only be done by a qualified servicer. Annual cleaning of the blower wheel and housing is recommended for maximum air output, and this must be performed only by a qualified servicer or service agency.

⚠ WARNING

DO NOT touch igniter. It is extremely hot. Failure to follow this warning could result in severe burns.

4. IGNITER — This unit has a special hot surface direct ignition device that automatically lights the burners. Please note that it is very fragile and should be handled with care.

⚠ WARNING

CARBON MONOXIDE POISONING HAZARD

Failure to follow the service and/or periodic maintenance instructions for the furnace and venting system, could result in carbon monoxide poisoning or death.

5. BURNERS — Gas burners do not normally require scheduled servicing, however, accumulation of foreign material may cause a yellowing flame or delayed ignition. Either condition indicates that a service call is required. For best operation, burners should be cleaned annually by a qualified servicer.

Turn off gas and electric power supply. To clean burners, remove the top burner bracket. Lift burners from orifices.

⚠ WARNING

CARBON MONOXIDE POISONING HAZARD

Failure to follow the service and/or periodic maintenance instructions for the furnace and venting system, could result in carbon monoxide poisoning or death.

NOTE:

Be careful not to break igniter when removing burners. Clean burners with brush and/or vacuum cleaner. Reassemble parts by reversal of the above procedure.

NOTE:

On LP (propane) units, some light yellow tipping of the outer mantle is normal. Inner mantle should be bright blue.

Natural gas units should not have any yellow tipped flames. This condition indicates that a service call is required. For best operation, burners should be cleaned annually by a qualified servicer.

NOTE:

On LP (propane) units, due to variations in BTU content and altitude, servicing may be required at shorter intervals.

6. HEAT EXCHANGER/FLUE PIPE — ***These items must be inspected for signs of corrosion, and/or deterioration at the beginning of each heating season by a qualified service technician and cleaned annually for best operation. To clean flue gas passages, follow recommendations below:***

- a. Turn off gas and electric power supply.
- b. Inspect flue pipe exterior for cracks, leaks, holes or leaky joints. Some discoloration of PVC pipe is normal.
- c. Remove burner compartment door from furnace.
- d. Inspect around insulation covering flue collector box. Inspect induced draft blower connections from recuperative cell and to the flue pipe connection.
- e. Remove burners. (See 4.)
- f. Use a mirror and flashlight to inspect interior of heat exchanger, be careful not to damage the igniter, flame sensor or other components.
- g. If any corrosion is present, contact a service agency. Heat exchanger should be cleaned by a qualified service technician.
- h. After inspection is complete replace burners, and all furnace doors.
- i. Restore gas supply. Check for leaks using a soap solution. Restore electrical supply. Check unit for normal operation.

7. FURNACE CONDENSATE DRAIN TUBES — Condensate drain tubes must be checked periodically to assure that condensate can flow freely from unit to drain. If a drain problem cannot be corrected, call a qualified servicer.

8. COOLING COIL CONDENSATE DRAIN — If a cooling coil is installed with the furnace, condensate drains should be checked and cleaned periodically to assure that condensate can drain freely from coil to drain. If condensate cannot drain freely water damage could occur. (See Condensate Drain in Installer's Guide).

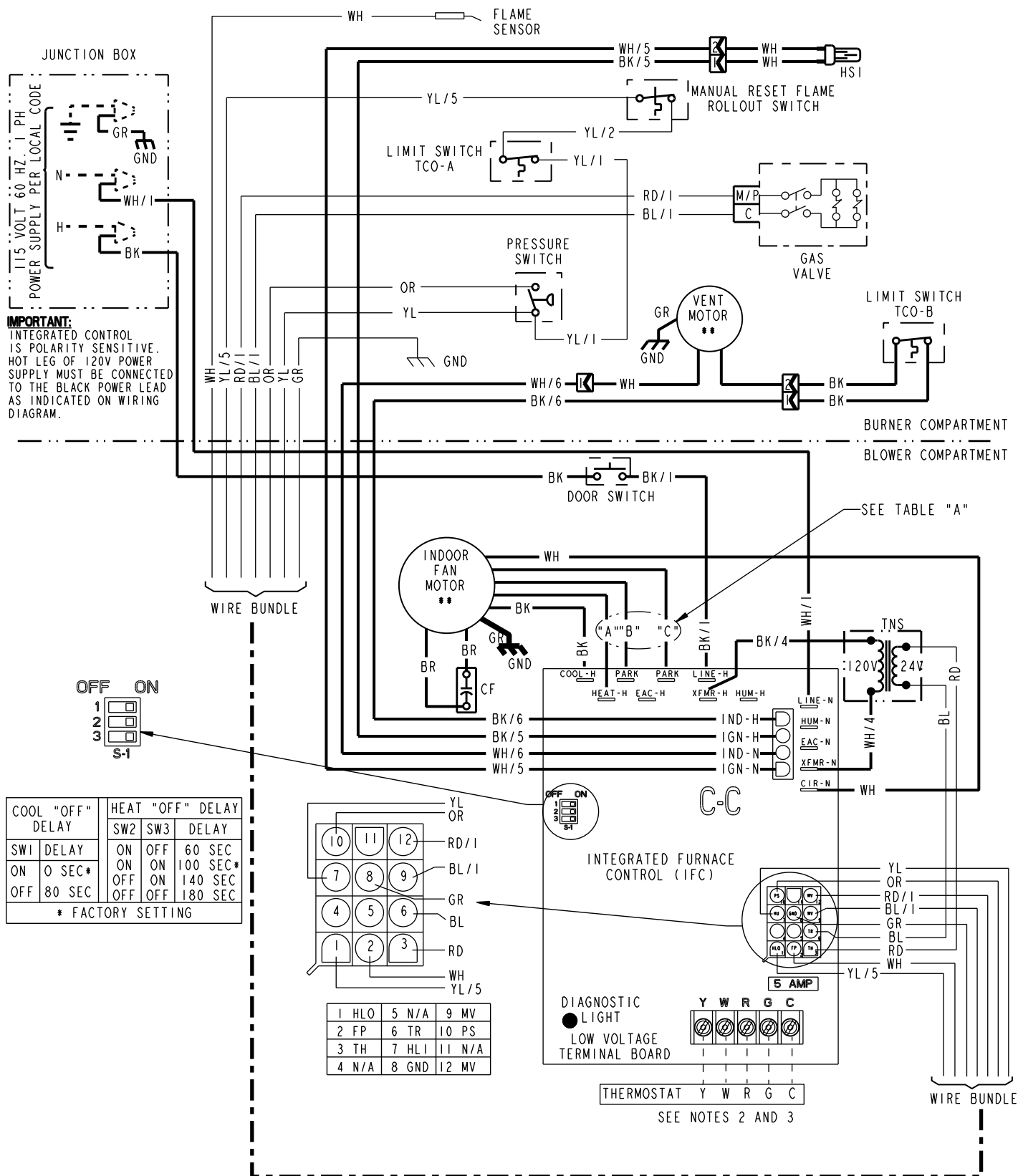
⚠ CAUTION

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

Verify proper operation after servicing.

INTEGRATED FURNACE CONTROL ERROR FLASH CODES	
Flashing Slow ---	Normal - No call for Heat
Flashing Fast ---	Normal - Call for Heat
Continuous ON ---	Replace IFC
Continuous OFF ---	Check Power
2 Flashes ---	System Lockout (Retries or Recycles exceeded)
3 Flashes ---	Draft Pressure Error - Possible problems: a) Venting problem b) Pressure switch problem c) Inducer problem
4 Flashes ---	Open Temperature Limit Circuit
5 Flashes ---	Flame sensed when no flame should be present
6 Flashes ---	115 volt AC power reversed, poor grounding or system voltage too low
7 Flashes ---	Gas valve circuit error
8 Flashes ---	Low flame sense signal

UNIT WIRING DIAGRAM



From Dwg. D342775 Rev 1

(continued on next page)

SCHEMATIC DIAGRAM

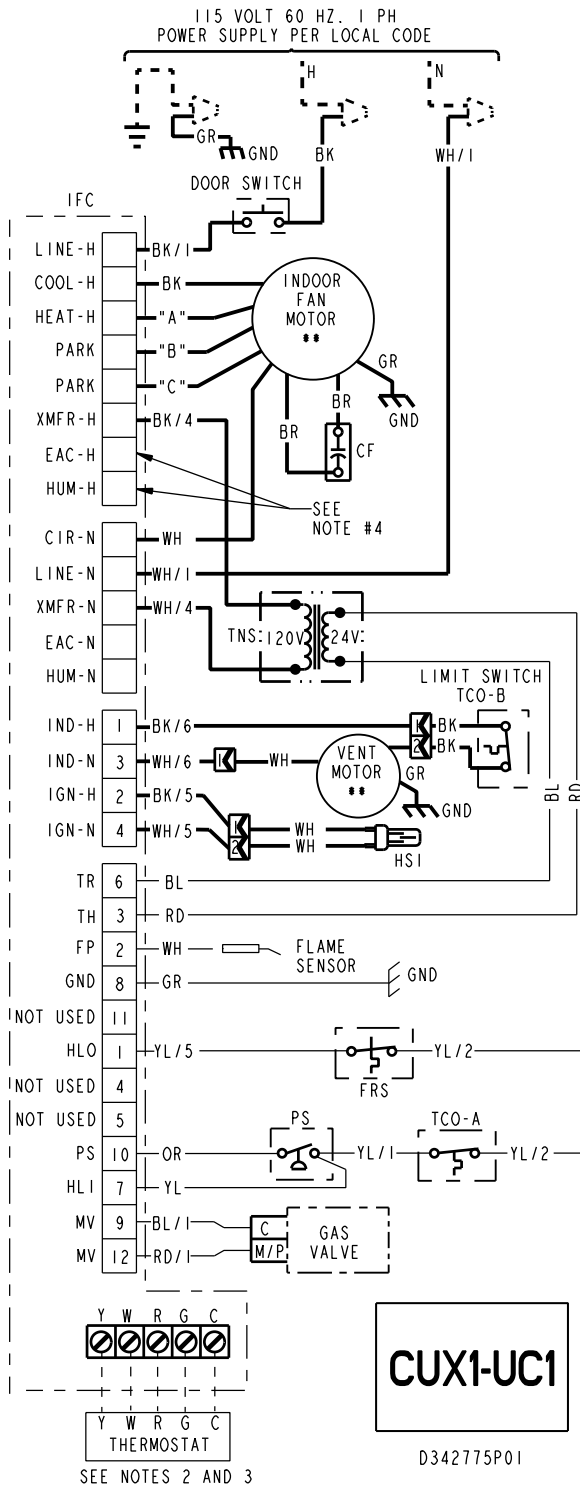


TABLE "A"
SPEED TAPS FOR I.D. FAN MOTOR

MODEL	HEAT "A"	PARK "B"	PARK "C"
CUX1B040A9241A* #UC1B040A9241A*	YL	RD	BL
CUX1B060A9361A* #UC1B060A9361A*	BL	RD	YL
CUX1B080A9421A* #UC1B080A9421A*	BL	RD	YL
CUX1C100A9481A* #UC1C100A9481A*	BL	RD	YL
CUX1D100A9601A* #UC1D100A9601A*	YL	RD	BL
CUX1D120A9601A* #UC1D120A9601A*	BL	RD	YL

RD = LOW BL = MED. HIGH
YL = MED. LOW BK = HIGH
- MAY BE "T" or "A"
* - MAY BE A THROUGH Z

WARNING
HAZARDOUS VOLTAGE:
DISCONNECT ALL ELECTRICAL POWER INCLUDING REMOTE DISCONNECTS BEFORE SERVICING.
FAILURE TO DISCONNECT POWER BEFORE SERVICING CAN CAUSE SEVERE PERSONAL INJURY OR DEATH.

CAUTION
USE COPPER CONDUCTORS ONLY!
UNIT TERMINALS ARE NOT DESIGNED TO ACCEPT OTHER TYPES OF CONDUCTORS.
FAILURE TO DO SO MAY CAUSE DAMAGE TO THE EQUIPMENT.

INTEGRATED FURNACE CONTROL
REPLACE WITH PART CNT02891 OR CNT 02183 OR EQUIVALENT
INPUT: 25 VAC, 60 HZ.
XFMR SEC. CURRENT: 450 MA.
MV OUTPUT: 1.5 A @ 24 VAC
IND OUTPUT: 2.2 FLA, 3.5 LRA @ 120 VAC
CIRC. BLOWER OUTPUT: 14.5 FLA, 26 LRA @ 120 VAC
HUMIDIFIER & AIR CLEANER
MAX. LOAD: 1.0 A @ 120 VAC
IGNITER OUTPUT: 6.0 A @ 120 VAC

DIAGNOSTIC CODES

FLASHING SLOW: NORMAL - NO CALL FOR HEAT
FLASHING FAST: NORMAL - CALL FOR HEAT
CONTINUOUS ON: REPLACE IFC
CONTINUOUS OFF: CHECK POWER
2 FLASHES: EXTERNAL LOCKOUT (RETRIES OR RECYCLES EXCEEDED)
3 FLASHES: PRESSURE SWITCH ERROR
4 FLASHES: OPEN LIMIT DEVICE
5 FLASHES: FLAME SENSED WHEN NO FLAME SHOULD BE PRESENT
6 FLASHES: 115 VAC POWER REVERSED POLARITY OR POOR GROUNDING
7 FLASHES: GAS VALVE CIRCUIT ERROR
8 FLASHES: LOW FLAME SENSE SIGNAL

	TCO THERMAL CUT OUT		LINE } FACTORY		BK BLACK		GR GREEN
	PS PRESSURE SWITCH		24 V } WIRING		WH WHITE		BR BROWN
	FRS FLAME ROLLOUT SWITCH		LINE } FIELD		YL YELLOW		RD RED
	FP FLAME SENSOR		24 V } WIRING		OR ORANGE		BL BLUE
	CHASSIS GROUND		** INTERNAL THERMAL PROTECTION		WIRE COLOR		
	HSI HOT SURFACE IGNITER		CF CAPACITOR		BK/J WIRE COLOR NUMBER ID (IF ANY)		
	DOOR SWITCH		COIL		L LINE		TH 24 VAC (HOT)
					N NEUTRAL		TR 24 VAC (COMMON)
					GND GROUND		MV MAIN GAS VALVE
					B/C COMMON		TNS TRANSFORMER
					HLO HIGH LIMIT OUTPUT		HLI HIGH LIMIT INPUT

NOTES:

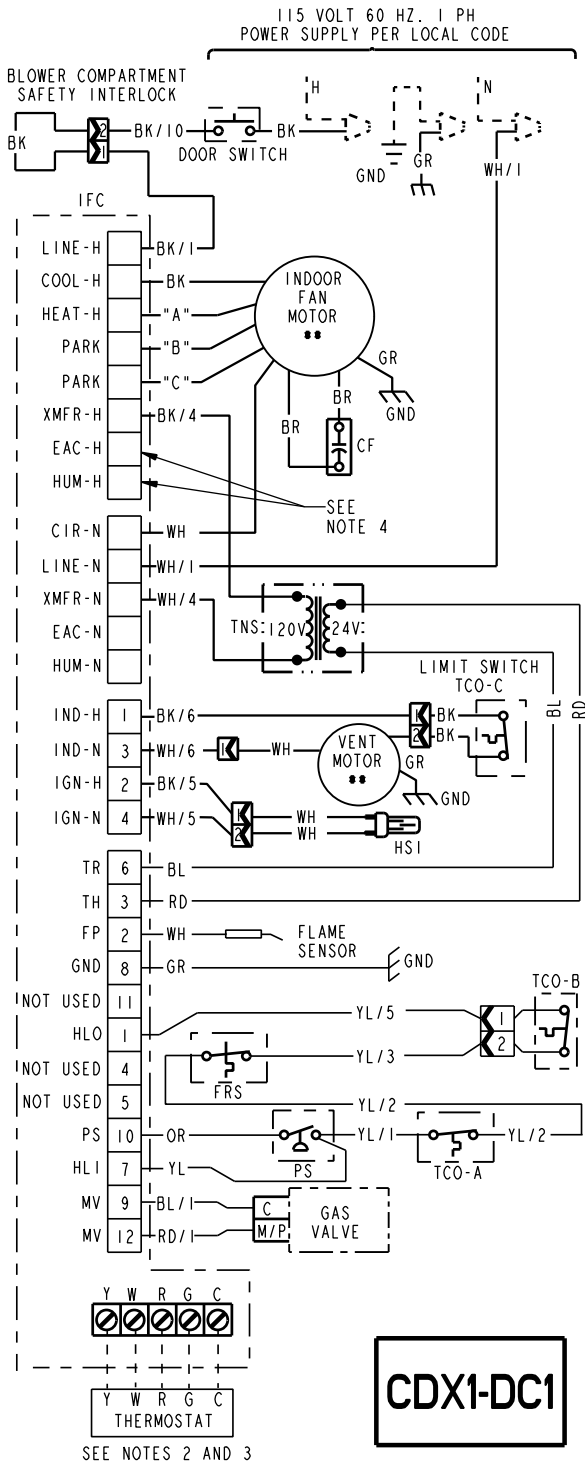
- IF ANY OF THE ORIGINAL WIRING AS SUPPLIED WITH THIS FURNACE MUST BE REPLACED, IT MUST BE WITH WIRE HAVING A TEMPERATURE RATING OF AT LEAST 105 C.
- THERMOSTAT HEAT ANTICIPATOR SETTING: .38 AMPS
- FOR PROPER OPERATION OF COOLING SPEED, "Y" TERMINAL MUST BE CONNECTED TO THE ROOM THERMOSTAT.
- THESE TERMINALS PROVIDE 120V POWER CONNECTIONS FOR ELECTRONIC AIR CLEANER (EAC) AND HUMIDIFIER (HUM). MAX. LOAD: 1.0 AMPS EACH.

CUX1-UC1

D342775P01

SEE NOTES 2 AND 3

SCHEMATIC DIAGRAM



SEE NOTES 2 AND 3

CDX1-DC1

D342798P01

WARNING

HAZARDOUS VOLTAGE:
DISCONNECT ALL ELECTRICAL POWER INCLUDING REMOTE DISCONNECTS BEFORE SERVICING.
FAILURE TO DISCONNECT POWER BEFORE SERVICING CAN CAUSE SEVERE PERSONAL INJURY OR DEATH.

CAUTION

USE COPPER CONDUCTORS ONLY!
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FAILURE TO DO SO MAY CAUSE DAMAGE TO THE EQUIPMENT.

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CDX1B080A9421A* #DC1B080A9421A*	BL	RD	YL
CDX1C100A9481A* #DC1C100A9481A*	BL	RD	YL
CDX1D120A9601A* #DC1D120A9601A*	BL	RD	YL

RD = LOW BL = MED. HIGH
YL = MED. LOW BK = HIGH
- MAY BE "T" or "A"
* - MAY BE A THROUGH Z

INTEGRATED FURNACE CONTROL

REPLACE WITH PART CNT02891 OR CNT 02183 OR EQUIVALENT
INPUT: 25 VAC, 60 HZ.
XFMR SEC. CURRENT: 450 MA.
MV OUTPUT: 1.5 A @ 24 VAC
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6 FLASHES: 115 VAC POWER REVERSED POLARITY OR POOR GROUNDING
7 FLASHES: GAS VALVE CIRCUIT ERROR
8 FLASHES: LOW FLAME SENSE SIGNAL

TCO THERMAL CUT OUT
PS PRESSURE SWITCH
FRS FLAME ROLLOUT SWITCH
FP FLAME SENSOR
CHASSIS GROUND
HSI HOT SURFACE IGNITER
DOOR SWITCH

LINE } FACTORY
24 V } WIRING
LINE } FIELD
24 V } WIRING

•• INTERNAL THERMAL PROTECTION

CF CAPACITOR
COIL

BK	BLACK	GR	GREEN
WH	WHITE	BR	BROWN
YL	YELLOW	RD	RED
OR	ORANGE	BL	BLUE

WIRE COLOR
BK/1
NUMBER ID (IF ANY)

L	LINE	TH	24 VAC (HOT)
N	NEUTRAL	TR	24 VAC (COMMON)
GND	GROUND	MV	MAIN GAS VALVE
B/C	COMMON	TNS	TRANSFORMER
HLO	HIGH LIMIT OUTPUT		
HLI	HIGH LIMIT INPUT		

NOTES:

- IF ANY OF THE ORIGINAL WIRING AS SUPPLIED WITH THIS FURNACE MUST BE REPLACED, IT MUST BE WITH WIRE HAVING A TEMPERATURE RATING OF AT LEAST 105 C.
- THERMOSTAT HEAT ANTICIPATOR SETTING: .38 AMPS
- FOR PROPER OPERATION OF COOLING SPEED, "Y" TERMINAL MUST BE CONNECTED TO THE ROOM THERMOSTAT.
- THESE TERMINALS PROVIDE 120V POWER CONNECTIONS FOR ELECTRONIC AIR CLEANER (EAC) AND HUMIDIFIER (HUM). MAX. LOAD: 1.0 AMPS EACH.



D342798P01

Limited Warranty High Efficiency Condensing Gas Furnace UH3, DH3, UX2, DX2, UH2, DH2, UX1, DX1, UX1-H, DX1-H, UX, DX, UY and DY (First letter may be preceded by an "A" or "T") (Parts Only) (or "C") **Models Less Than 20 Tons for Residential Use***

This limited warranty is extended by Trane U.S. Inc., to the original purchaser of the specified models for life, under the conditions set forth below or to any succeeding owner for a period of twenty (20) years from the date of installation, as originally affixed, for the original owner. This limited warranty applies to products purchased and retained for use within the U.S.A. and Canada.

Limited Warranty

If any part of your furnace fails because of a manufacturing defect within five (5) years from the date of original purchase, Warrantor will furnish without charge the required replacement part F.O.B. nearest Parts Distribution point. Any local transportation, related service labor, air filters, and diagnosis calls, are not included.

Limited Lifetime Warranty

The primary and secondary heat exchanger, when installed to serve a single family residence or single condominium, is warranted to the original purchaser for life, provided the installation is in the original purchaser's primary, uninterrupted residence from the date of purchase until discovery of a defect in the primary heat exchanger or secondary heat exchanger. The heat exchanger is warranted to a successor purchaser for a period of twenty (20) years from the date of original installation of the furnace, subject to proof of original purchase. Warrantor WILL AT ITS OPTION provide either a heat exchanger including secondary heat exchanger without charge F.O.B. nearest Parts Distribution point, or allow a credit in the amount of the then current wholesale price of an equivalent heat exchanger toward the purchase price of a comparable heating unit. Any local transportation, related service labor, air filters, and diagnosis calls, are not included.

This limited warranty does not cover failure of your gas furnace if it is damaged while in your possession, damage caused by unreasonable use of the gas furnace and/or damage from **failure to properly maintain** the gas furnace as set forth in the Use and Care manual (**see Proper Maintenance section**).

THE LIMITED WARRANTY AND LIABILITY SET FORTH HEREIN ARE IN LIEU OF ALL OTHER WARRANTIES AND LIABILITIES, WHETHER IN CONTRACT OR IN NEGLIGENCE, EXPRESS OR IMPLIED, IN LAW OR IN FACT, INCLUDING IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS FOR PARTICULAR USE, AND IN NO EVENT SHALL WARRANTOR BE LIABLE FOR ANY INCIDENTAL OR CONSEQUENTIAL DAMAGES.

Some states do not allow limitations on how long an implied limited warranty lasts or do not allow the exclusion or limitation of incidental or consequential damages, so the above limitation or exclusion may not apply to you. This limited warranty gives you specific legal rights, and you may also have other rights which vary from state to state.

Parts will be provided by our factory organization through an authorized service organization in your area listed in the yellow pages. If you wish further help or information concerning this limited warranty, contact:

Trane
P. O. Box 9010, Tyler, TX 75711-9010
Attention: Manager, Field Operations Excellence

Or visit our website: www.trane.com/residential

TW-1013-4707

* This limited warranty is for residential usage of this equipment and not applicable when this equipment is used for a commercial application. A commercial use is any application where the end purchaser uses the product for other than personal, family or household purposes.

The limited warranties displayed in this publication and/or on ComfortSite™ may not accurately reflect the actual limited warranty that shipped with the product.



As an **ENERGY STAR** Partner, American Standard Inc., has determined that this product meets the **ENERGY STAR** guidelines for energy efficiency.



**Limited Warranty
Induced Draft Gas Furnace
UC1, DC1, UX1, DX1, UX1-H, DX1-H, UX, DX,
UY, DY, UD-R, DD-R, UD-RV, DD-RV, UD1-H,
DD1-H, UD1, DD1, UE1, DE1, UH3, DH3, UX2,
DX2, UH2, DH2, UD2 and DD2**
Models Less Than 20 Tons for Commercial Use*

(First letter may be preceded
by an "A" or "T") (Parts Only)
(or "C")

This warranty is extended by Trane U.S. Inc., to the original purchaser and to any succeeding owner of the real property to which the Gas Furnace is originally affixed, and applies to products purchased and retained for use within the U.S.A. and Canada. There is no warranty against corrosion, erosion or deterioration.

If any part of your Gas Furnace fails because of a manufacturing defect within one year from the date of the original purchase, Warrantor will furnish without charge the required replacement part.

This limited warranty does not cover failure of your gas furnace if it is damaged while in your possession, damage caused by unreasonable use of the gas furnace and/or damage from **failure to properly maintain** the gas furnace as set forth in the Use and Care manual (**see Proper Maintenance section**).

In addition, if the steel heat exchanger fails because of a manufacturing defect within the second through twentieth year from the date of original purchase, Warrantor shall furnish without charge a replacement heat exchanger. Warrantor's obligations and liabilities under this warranty are limited to furnishing F.O.B. Warrantor factory or warehouse replacement parts for Warrantor's products covered under this warranty. No liability shall attach to Warrantor until products have been paid for and then liability shall be limited solely to the purchase price of the equipment under warranty shown to be defective.

THE WARRANTY AND LIABILITY SET FORTH HEREIN ARE IN LIEU OF ALL OTHER WARRANTIES AND LIABILITIES, WHETHER IN CONTRACT OR IN NEGLIGENCE, EXPRESS OR IMPLIED, IN LAW OR IN FACT, INCLUDING IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS FOR PARTICULAR USE, AND IN NO EVENT SHALL WARRANTOR BE LIABLE FOR ANY INCIDENTAL OR CONSEQUENTIAL DAMAGES.

Some states do not allow limitations on how long an implied warranty lasts or do not allow the exclusion or limitation of incidental or consequential damages, so the above limitation or exclusion may not apply to you. This warranty gives you specific legal rights, and you may also have other rights which vary from state to state.

Trane
P.O. Box 9010
Tyler, TX 75711-9010
Attention: Manager, Field Operations Excellence

TW-1012-4707

* This warranty is for commercial usage of said equipment and not applicable when the equipment is used for a residential application. Commercial use is any application where the end purchaser uses the product for other than personal, family or household purposes.



As an ENERGY STAR Partner, American Standard Inc., has determined that this product meets the ENERGY STAR guidelines for energy efficiency.



American Standard
Heating & Air Conditioning
6200 Troup Hwy.
Tyler, TX 75707

