INTRODUCTION

Basic Materials Needed

- Pipe and fittings to make gas connections to the furnace.
- Vertical venting materials. **See page 15, Figure 8**.
- Pipe joint compound resistant to propane.
- Electrical wiring supplies as needed. Minimum wire size is #14 gauge copper.

Basic Tools Needed

- Hand drill or properly grounded electric drill
- Expansion bit 1/2" to 1-5/8" or 1/2" and 1-1/2" blade bits
- 1/8" and 3/16" drill bit (metal)
- 6 ft. folding rule or tape measure
- Screwdriver (medium blade)
- Screwdriver (Phillips and Flat Head)
- Pliers (wire cutting)
- Hammer
- Stud Locater or small finishing nails
- Tin Snips
- 8" adjustable wrench
- 12" adjustable wrench
- 7/8" wrench
- 3/4" wrench
- 1" wrench
- Gloves and safety glasses

Helpful Installation Information

The following booklets will help you in making the installation:

ANSI/NFPA 70, or current edition "National Electrical Code". In Canada: CSA C22.1 Canadian Electrical Code.

American National Standard Z223.1 or current edition of the "National Fuel Gas Code."

Obtain from the American National Standard Institute, Inc., 1430 Broadway, New York, NY 10018. In Canada, CAN/CGA B149.

Optional Accessories

Blower Accessories 2901, 2907 - May be used on all models and mounts on top of a furnace. This blower increases circulation of warm air through the heated space. A 115V outlet adjacent to the furnace is required.

Trim Strip Kit 4701 - Provides a finished edge for sides of the wall furnace.

Free Standing Accessory 4901 - May be used with single sided models. This accessory allows the furnace to be mounted on the surface of a wall.

Vent Adapter Kit 9902 - Optional vent adapter, typically used when the furnace is vented into a properly lined chimney.

Rear Outlet Registers 6901, 6919, 6920 - May be used with single sided models when recessed into a standard 2x4 inch interior stud partition. This accessory directs some of the heated air into the room opposite the one in which the furnace is installed.

Oval B/W Vent Kit 9929 - This U.L. listed B/W vent kit contains four feet of oval, double walled vent pipe, plate spacers and base or hold-down plate that starts the venting from the top of furnace. See Vent Installation on page 15 for additional items you will need.

Plaster Ground Kit 6905 - Used for 6901 or 6919 Rear Outlet Registers.

Gas Conversion Kits - See page 18.

Thermostat - See page 20.

INSTALLING YOUR FURNACE

The following steps are needed for proper installation and safe operation of your furnace. If you have any doubts as to any requirements, obtain professional help. Remember to ALWAYS consult your local heating or plumbing inspector, building department or gas utility company regarding regulations, codes, or ordinances which apply to the installation and location of a vented wall furnace.

IMPORTANT

For satisfactory and trouble-free operation, be sure to:

1. Locate the furnace properly within the space to be heated.
2. Install the furnace in accordance with local codes or ordinances and instructions provided. In the absence of local codes or ordinances, install the furnace to conform with the current edition of the National Fuel Gas Code, NFPA 54, ANSI Z223.1/Canadian Installation Code, CAN/CGA B149.
3. Maintain minimum clearances: Floor 2½-inches, ceiling 16- inches, side wall 1-inch.
4. Provide enough combustion and ventilation air.

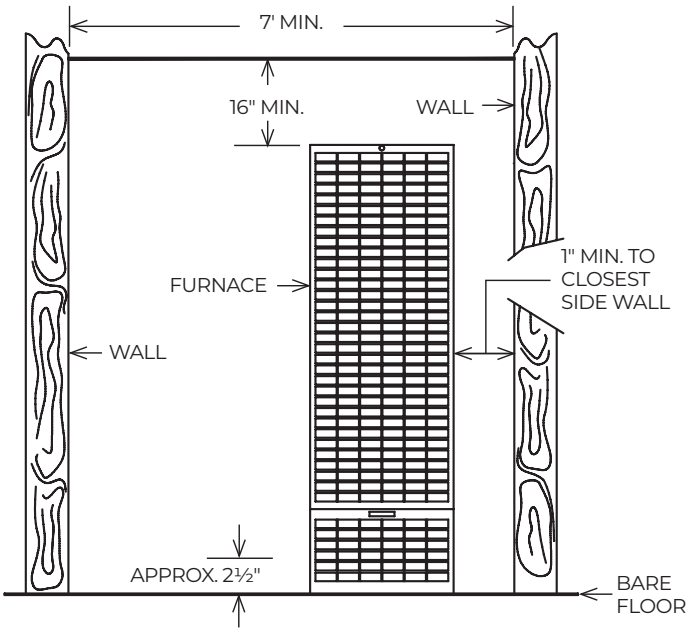
LOCATING WALL FURNACE & THERMOSTAT *(NOT INCLUDED)*

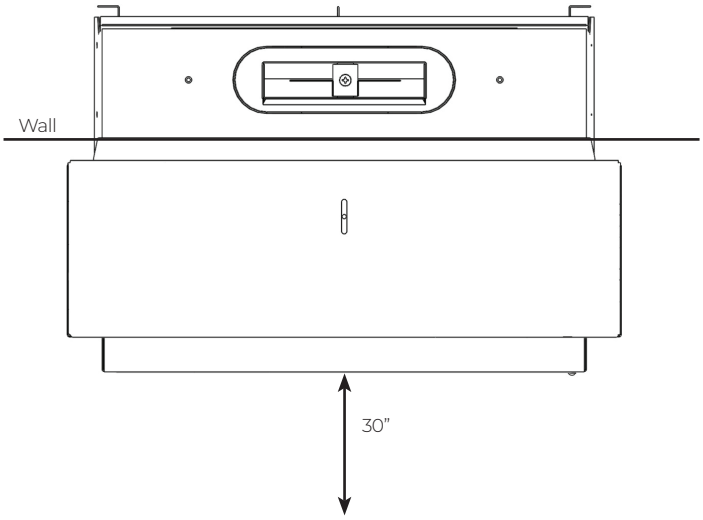
The furnace is installed between 2 x 4 inch wall studs spaced on 16-inch centers or a stud space that can be framed in to 16-inches.

Consider the following points before attempting to install the furnace:

CAUTION: Do not make cutouts in the wall or ceiling before checking in the attic for ceiling joist locations and proposed venting.

FIGURE 1 – MINIMUM SPACING





1. Locate the furnace near the center of the space to be heated for good air circulation. Do not put it behind a door or draperies. Do not install the furnace where it could be isolated by closing doors to the heated space. Do not locate the furnace where a door could swing over the front panel or where circulation could be retarded by furniture or cabinets.
2. Check the minimum spacing needs as shown in **Figure 1**.
3. The top of the furnace must be at least 16-inches from the ceiling.
4. When the furnace is properly installed with legs resting on the floor plate, it sets the dimension from the face panel to the bare floor. (Approximately 2½-inches depending on the thickness of floor plate).
5. A protective barrier (metal or wood), cut to match the width and depth of the furnace, should be used to cover over any floor coverings such as carpet or vinyl under the furnace. At no time should the dimension from the bottom of the face panel to the protective barrier be less than 1½- inches.
6. In the space to be heated, the side of the furnace may be as close as 1-inch to an intersecting wall. The recessed portion may have 0-inches clearance to combustible material.
7. Select a location that will provide adequate accessibility clearance for servicing and proper operation.
8. After picking a location, inspect the wall, floor, attic and roof areas. Make sure there are no pipes, wiring, bracing, etc., that will interfere with furnace or vent installation. If required, move them or pick a new installation location.
9. Be sure that gas piping and electrical wiring can be brought to the location. Electrical wiring is required for optional blower accessory.
10. If installing the thermostat *(not included)* on the wall, locate the thermostat approximately 5-feet above the floor on an inside wall where it will sense the average room temperature.

INSTALLING YOUR FURNACE

The thermostat *(not included)* should be sensing average room temperature; avoid the following:

HOT SPOTS:

Concealed pipes or ducts
Fireplaces
Registers
TV sets
Radios
Lamps
Direct sunlight
Kitchen

COLD SPOTS:

Concealed pipes or ducts
Stairwell - drafts
Door - drafts
Unheated rooms on other side of wall

DEAD SPOTS:

Behind doors
Corners and alcoves

After picking a location that meets the requirements, check the walls, attic and roof to make sure there are no obstructions such as pipes, electrical wiring, etc., which could interfere with the installation of the furnace or vent pipe. If required, move them or pick a new location.

> ⚠ **WARNING:** Danger of property damage, bodily injury or loss of life. Do not install the furnace in any area where oxygen is in use.

Combustion & Ventilation Air

When an existing category I heater is removed or replaced, the original venting system may no longer be sized to properly vent the attached appliances.

> ⚠ **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 natural gas and propane Installation Code, CSA 8149.1 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 spaces of the building.
4. Close fireplace dampers.
5. Turn on clothes dryers and any appliance not connected to the venting system. Turn on any exhaust fans, such as range hoods and bathroom exhausts, so they are operating at maximum speed. Do not operate a summer exhaust fan.
6. Follow the lighting instructions. Place the appliance being inspected into operation. Adjust the thermostat so appliance is operating continuously.
7. Test for spillage from draft hood equipped appliances at the draft hood relief opening after 5 minutes of main burner operation. Use the flame of a match or candle.
8. If improper venting is observed during any of the above tests, the venting system must be corrected in accordance with the National Fuel Gas Code, ANSI Z223.1/NFPA 54 and/or natural gas and propane Installation Code, CSA 8149.1
9. After it has been determined that each appliance connected to the venting system properly vents when tested as outlined above, return doors, windows, exhaust fans, fireplace dampers and any other gashed burning appliance to their previous conditions of use.

> ⚠ **WARNING:** Danger of property damage, bodily injury or loss of life. The furnace and any other fuel-burning appliances must be provided with enough fresh air for proper combustion and ventilation of flue gases. Most homes will require that outside air be supplied into the heated area.

The high cost of energy for home heating has brought about new materials and methods used to construct or remodel most current homes. The improved construction and additional insulation has reduced the heat loss and made these homes much tighter around windows and doors so that infiltrated air is minimal. This creates a problem to supply combustion and ventilation air for gas-fired or other fuel burning appliances. Any use of appliances that pull air out of the house (clothes dryers, exhaust fans, fireplaces, etc.) increases this problem and appliances could be starving for air.

The combination of a tight energy efficient home with the use of exhaust fans, fireplaces, clothes dryers, and gas appliances result in more and more air being drawn from the house until fresh air may be sucked back into the house down a furnace flue or fireplace chimney. Carbon monoxide can be the result. Carbon monoxide (CO) is a colorless, odorless gas produced when fuel is not burned completely or when the flame does not receive sufficient oxygen. Automobiles, charcoal, wood fires and improperly vented or air-starved coal, oil and gas furnaces or other appliances can produce carbon monoxide.

Do not install furnace in the same room or near a wood solid fuel burning fireplace.

BE AWARE OF THESE AIR-STARVATION SIGNALS:

1. Headaches, nausea, dizziness.
2. Excessive humidity shown by heavily frosted windows or a moist “clammy” sensation.
3. Fireplace smoke fills the room or will not draw.
4. Furnace flue backs up.

AIR REQUIREMENTS

The requirements for providing air for combustion and ventilation are listed in the National Fuel Gas Code NFPA 54/ANSI Z223.1 (in Canada: CAN/CGA B149). Most homes will require that outside air be supplied to the heated area by means of ventilation grilles or ducts connecting directly to the outside or spaces open to the outdoors such as attic or crawl space. The only exception is when the heated area meets the requirements and definitions for an unconfined space with adequate air infiltration.

All air openings and connecting ducts must comply with the following:

If the furnace is installed in an area with another gas appliance(s), the total input rating of all appliances must be considered when determining the free area requirements for combustion and ventilation air openings.

Ducts must have the same cross-sectional area as the free area of the openings to which they connect. The minimum dimension of rectangular air ducts must not be less than 3-inches in length or height.

> ⚠ **WARNING:** Danger of property damage, bodily injury or loss of life. Even when a house meets requirements for unconfined space with adequate air infiltration, it is recommended that a fresh air intake be installed to lessen the possible dangers from any future changes on the home.

LOUVERS / GRILLES AND SCREENS COVERING FREE AREA OPENINGS

If a screen is used to cover the opening(s), it must not be smaller than 1/4-inch mesh. Use the free area of a louver or grille to determine the size opening required to provide the free area specified. If the free area is not known, assume a 20% free area for wood and a 60% free area for metal louvers or grilles.

INFILTRATION AIR

If your furnace is in an open area (unconfined space), the air that leaks through the cracks around doors and windows may be enough for combustion and ventilation air. The doors should not fit tightly. The cracks around windows should not be caulked or weather stripped.

Spillage means air starvation. A fresh air duct or air intake opening must be installed to provide air directly to the furnace or other gas appliances.

If spillage exists or when the furnace is in a building of tight construction where the windows and doors are weather stripped, air for combustion and ventilation must be obtained from outdoors or space open to the outdoors.

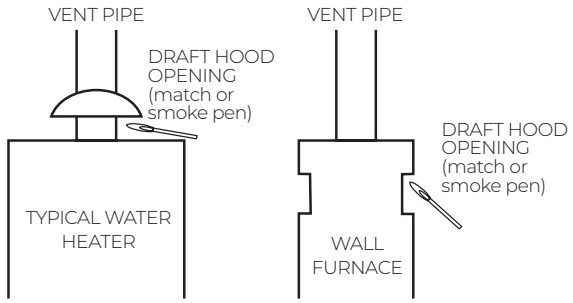
To determine if infiltration air is adequate, perform the following checks:

1. Close all doors and windows. If you have a fireplace, start a fire and wait until flames are burning vigorously.
2. Turn on all exhausting devices, i.e., kitchen and bathroom exhaust fans; water heaters (gas and electric).
3. Turn on all vented gas appliances, i.e., heating equipment (includes any room heaters), water heaters.
4. Wait ten (10) minutes for drafts to settle.
5. Check for draft hood spillage at each appliance. Hold a lit match two-inches from the draft opening. **(Figure 2)**.

   A. No Spillage If the match flame pulls toward draft hood, this indicates sufficient infiltration air. Return exhausting devices and appliances to the condition you found them.

   B. Draft Hood Spills If there is spillage at a draft hood (match goes out or flame wavers away from draft hood), check for plugged flue connectors and chimneys. Repair blockage and test again.

FIGURE 2 – DRAFT HOOD SPILLAGE



If you have a fireplace, open a window or door near the fireplace and then check for spillage. If spillage stops, do not use the fireplace without a nearby window or door open until you can supply fresh air by a permanent duct.

If you have kitchen and bathroom exhaust fans, turn them off and check for spillage. If spillage stops, do not use exhaust fans (circuit breakers for fans should be turned off) until you can supply fresh air by a permanent duct.

Provide opening(s) having a total free area of one-square-inch per 4,000 BTU/hr. of the total combined input ratings for all appliances in the area. The required free area is shown in **Figure 3**. This fresh air opening or duct must terminate at a point not more than one-foot above the floor. It must have at least one-square inch of free area for each 4,000 BTU/hr. of input of all appliances in area.

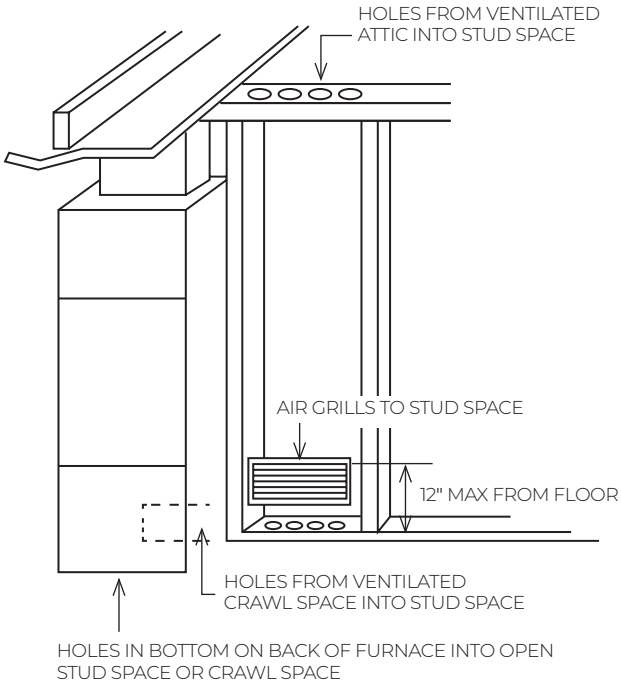
FIGURE 3 – FREE AREA

Free Area in Square Inches.
Each opening is based on one square inch per 4,000 BTU/hr

BTU/hr input	Square inches of opening	Required number of holes sill or header plates		
		1 - 1/2"	2"	3"
30,000	7.5	7	4	2
35,000	8.75	8	5	2
40,000	10.00	9	5	3
45,000	11.25	10	6	3
50,000	12.50	11	8	3
60,000	15.00	13	8	4

INSTALLING YOUR FURNACE

HOLE PLACEMENT - EXAMPLE



FURNACE LOCATED IN UNCONFINED SPACE

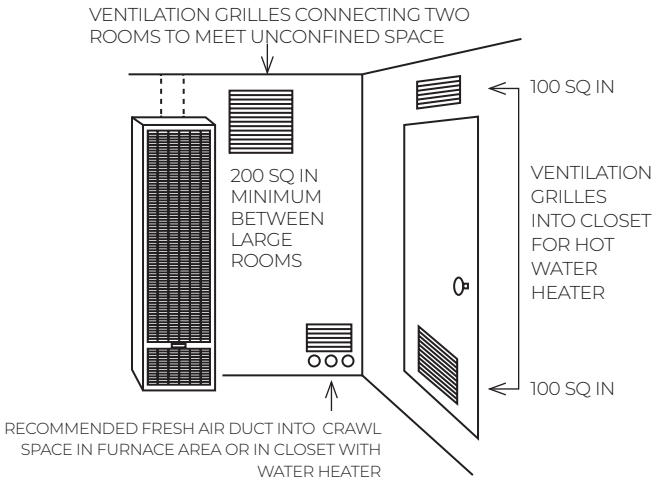
An unconfined space must have a volume of a minimum 50 cubic feet per 1,000 BTU/hr. of the total combined input of all appliances in the area. Adjoining rooms may be included only if there are no doors between the rooms or if special provisions are made such as ventilation grilles installed between connecting rooms. **Figure 4** outlines the minimum area in square feet, based on 8-foot ceiling heights for various BTU/hr. input ratings.

FIGURE 4 - MINIMUM AREA

4,000 BTU/hr. per square inch opening			
Round duct dia.	Rectangular square duct size	Max. BTU/hr input	*Uncontained space min. area in sq. ft. 8' ceiling height
4"	3" x 3"	30,000	145
4"	3" x 3"	35,000	219
4"	3" x 4"	40,000	240
4"	3" x 4"	45,000	281
4"	3" x 5"	50,000	312
4 ½"	3" x 5"	60,000	375

* Can be two or more rooms separated by ventilation gas fire.

EXAMPLES OF GRILL PLACEMENT



FURNACE LOCATED IN CONFINED SPACE

If a furnace is installed in a confined space, it must be provided with free air for proper combustion and ventilation of flue gases by one of the following methods:

A. AIR FROM INSIDE THE BUILDING

If the confined space adjoins an unconfined space, provide two permanent openings. One within 12-inches of the top and another within 12-inches of the bottom of the room directly connected to the unconfined space. Each opening must have a free area of at least 100-square inches or 1-square inch per 1,000 BTU/hr. of input for all appliances combined.

> ⚠ **WARNING:** Danger of property damage, bodily injury or death. The adjoining unconfined space must have adequate air infiltration.

B. AIR FROM OUTDOORS

If confined space does not adjoin an unconfined space, then air must be provided from outdoors or spaces open to the outdoors such as an attic or crawl spaces.

Openings for inlet or outlet air should NOT be made into an attic area if the attic is equipped with a thermostat controlled power vent.

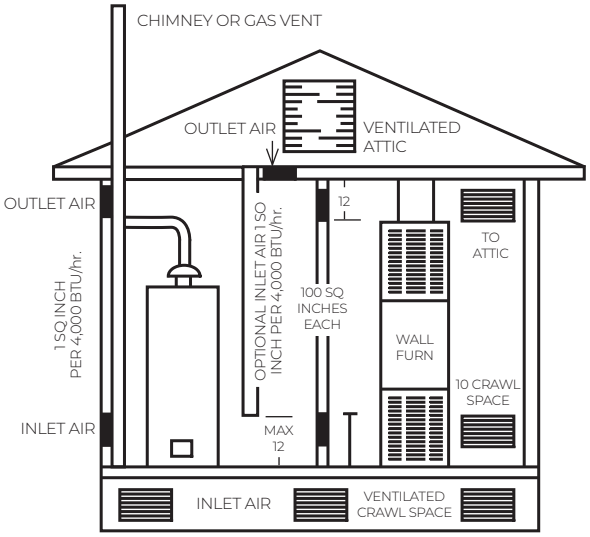
Provide two permanent openings, one within 12-inches of the top and bottom of the room connecting directly to, or by using ducts, with the outdoors or areas open to fresh air.

If the opening connects directly to, or with vertical ducts, the free area of each opening must be at least 1-square inch per 4,000 BTU/hr. of the combined input of all appliances in the area.

If horizontal ducts are used, the free area of each opening must be at least 1-square inch per 2,000 BTU/hr. of the combined input of all appliances in the area.

⚠ WARNING: Danger of illness, bodily injury or death. Draft hood spillage, with unobstructed vents, indicates that additional air must be brought into the structure from the outside. Keep a window open (minimum 2-inches near the appliance until a permanent air duct is installed.

EXAMPLES OF AIR INLETS AND OUTLETS



Recessed & Internal Wall Mount Installation

Recessed wall mount installation on single sided models: 2509621A, 2509622A, 3509621A, 3509622A.

The maximum recess depth from rear of furnace forward is 4½-inches.

Internal Wall Mount Installation - Dual Sided Models: 5009621A, 5009622A

NOTE:

1. The dual sided models should be installed only to an internal wall (between two rooms) and not an outside/ external wall.
2. The placement should be such that the wall is in-between two face panesl (ref. **Figure 9B**).

FIND THE STUDS AND CEILING JOINTS

Use a stud locater or small finishing nails. Repeatedly drive and remove a nail into the wall in the area of the stud until it is located. Then find the inside edge of the stud. Leave the nail at this location.

The other stud should be about 14½-inches from the one found. Drive finishing nails on the inside of this stud. Draw wall cutout to required size as shown in **Figure 5A, 5B**. If wall studs are not on 16-inch centers. See "CLOSE OFF STUD SPACE." **Figure 6**

CUT WALL OPENING

Cut wall opening 14⅜-inches wide and 66⅛-inches high measured from the top of the floor plate. **Figure 5A, 5B.** All corners must be square.

INSTALLATION OF REAR OUTLET REGISTER

(SINGLE SIDED MODELS ONLY)

The optional rear outlet register may be installed when the furnace is recessed into the wall. In new construction, install the rear outlet plaster ground at the same time you install the header plate. For existing construction, make the necessary cutout and install the plaster ground before you install the furnace. See instructions packed with accessory and **Figure 5A**.

Do not allow wall finish material to project into the furnace recess.

Do not install rear outlet register where grille may be blocked by a door, curtains or any other obstruction.

GAS SUPPLY OPENING

A hole must be drilled for the gas line. Decide whether the gas line will come through the floor or wall. Drill a 1½-inch hole through the floor or wall as needed. **Figure 5A, 5B**.

CAUTION: Be careful not to damage any furnace components while making any alternate hole.

FIGURE 5A - RECESSED WALL MOUNT INSTALLATION

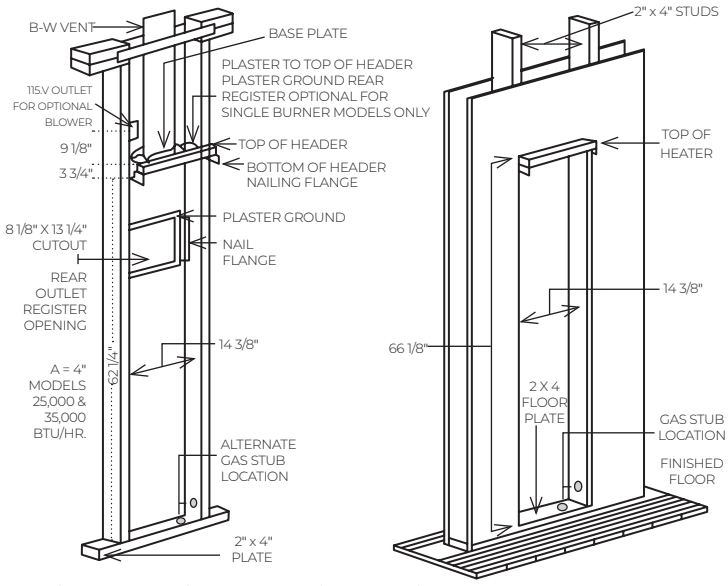
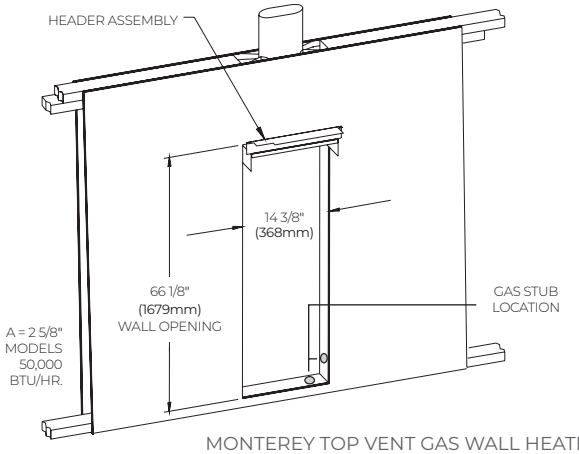


FIGURE 5B - CUT WALL OPENING

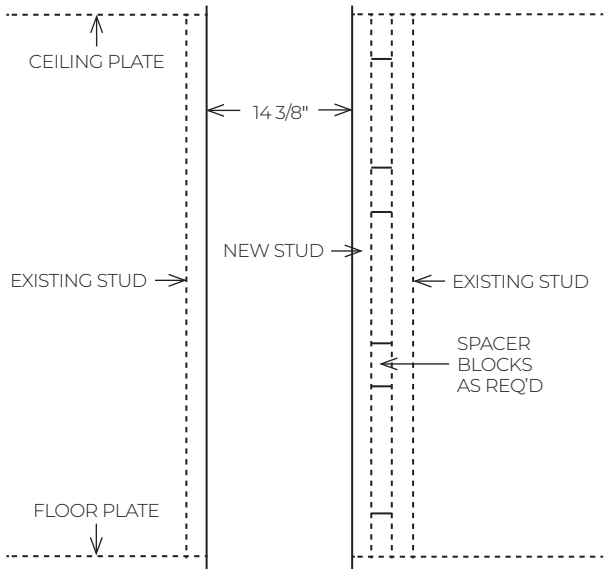


INSTALLING YOUR FURNACE

CLOSE OFF STUD SPACE *(IF REQUIRED)*

If studs are not on 16-inch centers, cut the hole for the furnace next to an existing stud and frame in the other side using a 2 x 4 and spacer blocks as required. **Figure 6**

FIGURE 6 – CLOSE OFF STUD SPACE



CEILING PLATE OPENING

Cut away the ceiling plate between the studs where the furnace is to be installed. Work from the top in the attic. If there is no access to the top, remove the wall covering between the two wall studs all the way to the ceiling. Work through this opening. Cut out the entire plate so the plate edges will be even with the inner face of the 2 x 4 studs. **Figure 7**

INSTALL VENT BASE PLATE (HOLD-DOWN PLATE)

Position base plate on top of header plate and fasten with screws. **Note: Hold down plate is not included.**

HEADER PLATE (VENT SUPPORT)

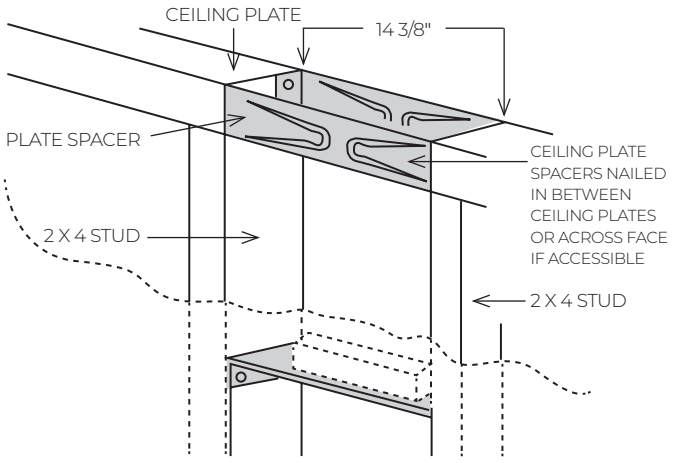
Measure upward 62¼-inches from the top of the floor plate. Place a mark on each stud at this distance. **Figure 5A, 5B**. Place the header plate between the studs with the lower edges even with marks on the studs. Make sure header plate is level.

Locate rear edge of nailing tabs at back of the header. Nail header plate to the 2 x 4 studs which will center the vent collar in the wall. **Figure 5A, 5B**

INSTALL CEILING PLATE SPACER

Nail the ceiling plate spacers either across or in between the cut out section of ceiling plate. If nailed between, ends must be bent at 90 degrees. They must be fastened along each long edge of the ceiling plate hole to hold the oval vent pipe in the center of the hole. Ceiling plate spacers preserve structural strength and position oval vent pipe in the center of the cut out opening. **Ceiling plate spacers are not included. Figure 7**

FIGURE 7 – CEILING PLATE OPENING



Surface Mount Installation

The use of the optional Free Standing Accessory No. 4901 allows single-sided furnaces to be surface mounted instead of recessed into a wall. This is ideal for remodeling existing masonry wall construction or when studding is substandard. This kit drastically cuts installation time and eliminates the expense of cutting into the walls and ceiling plates. Be sure this accessory is of the type and design required for the use with your furnace.

NOTE: After picking a location that meets the requirements, check the wall, attic, and roof to make sure there are no obstructions such as pipes, electrical wiring, etc., which could interfere with the installation of the furnace or vent pipe. If required, move them or pick a new location.

FIND THE WALL STUDS OR CEILING JOISTS

Find two studs or joists at the spot where the furnace is to be located. Use a stud locater or small finishing nails. Repeatedly drive and remove a nail into the wall or ceiling in the area of the stud or joust until you find it. Then find the its side and leave the nail there. Drive another nail just on the other side other the same stud or joist.

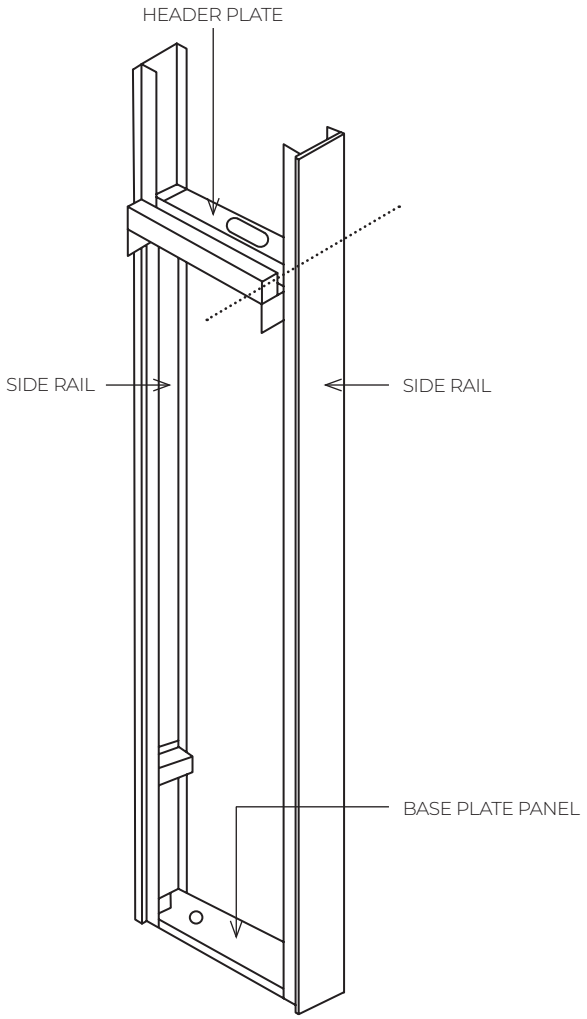
The inside of the next stud or joist should be about 14½ inches from the first one found. Drive a nail on the inside of this stud or joist.

Using the nails as a guide, draw two lines down the side of the wall from the ceiling to locate the furnace and ceiling hole cutout for venting.

FREE STANDING ACCESSORY ASSEMBLY & INSTALLATION

1. Attach the base plate panel as shown in **Figure A** to the bottom of the side rails with four (4) # 6, ⅜" screws.
2. Attach the header plate, (included with the furnace), to the side rails using four (4) #8, ⅜" screws. Flanges of the header plate go against the wall. **Figure A**
3. Install extension side rails as shown in **Figure A**, by telescoping them inside the lower side rails. Adjust the extension side rails by sliding them up or down to ceiling height. Maximum: 8 feet 9 inches, Minimum: 7 feet 9 inches.
4. If the wall has a baseboard, cut the baseboard out to fit against the side rails. Stand the side rails against the wall and fasten them to the wall securely with screws or bolts in the holes provided. Use a level to assure the enclosure is plumb. **Screws and bolts for wall fastening are not included.**
5. After positioning the enclosure, cut a 3½ X 14 inch hole in the ceiling, centered between the studs or joists as shown in **Figure B**.
6. Cut ¼ inch off each end of the ceiling spacer plate. Place the ceiling spacer plate to the back of the wall and centered in the enclosure as shown in **Figure C**.
7. Install Type B/W vent though the roof and studs or joists in accordance with the installation instructions packed with the furnace and local codes. **See Vent Installation, page 15**.
8. Set the furnace body into position. **Figure 9A** page 16. The furnace legs will rest on the bottom of the base plate panel. Utilizing the holes provided in the furnace legs, secure the furnace to the brackets attached to the bottom panel with two (2) #10, ¾" screws.
9. Install the vent enclosure panel, fastening it to the side rails with six (6) #6, ⅜" screws. Trim the bottom of the panel to fit the header plate.
10. Install gas inlet through the back wall or one of the two holes provided in the bottom base plate panel. **Figure D** Connect gas line to furnace. **See Gas supply and Piping, page 17**.
11. Install furnace face panel. **See Front Panel Installation, page 19**. NOTE: The panel recesses ¼-inch between the vertical edges of the enclosure.

FIGURE A



INSTALLING YOUR FURNACE

FIGURE B

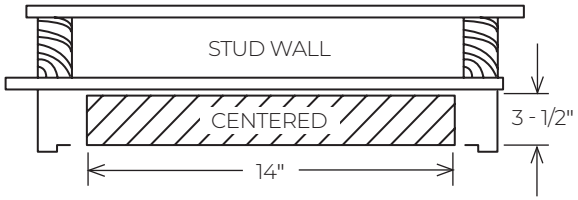


FIGURE C

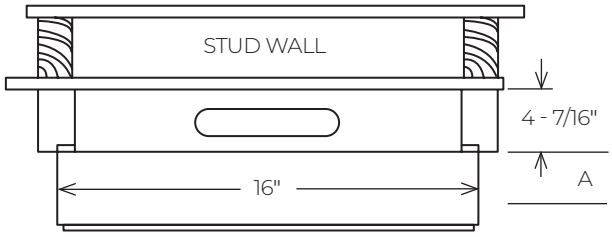
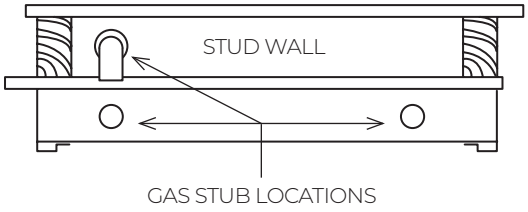
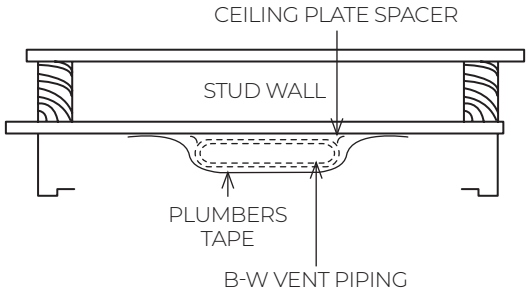
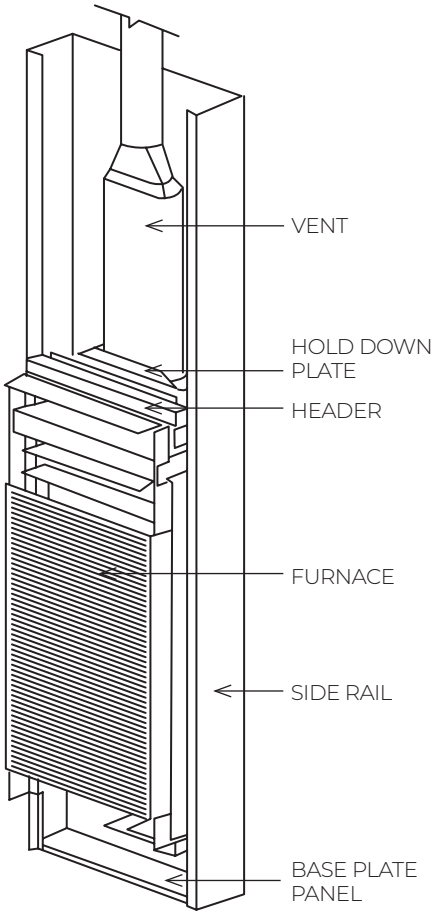


FIGURE D





VENT INSTALLED



FRONT PANEL INSTALLED

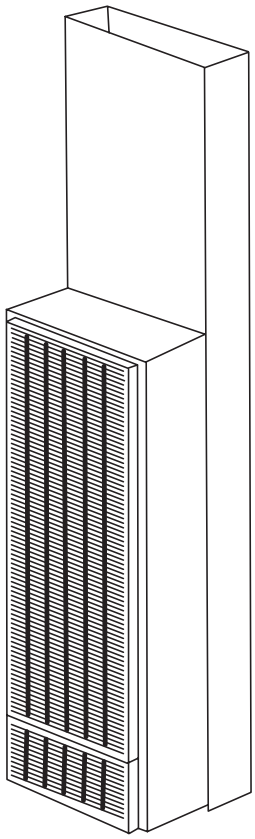
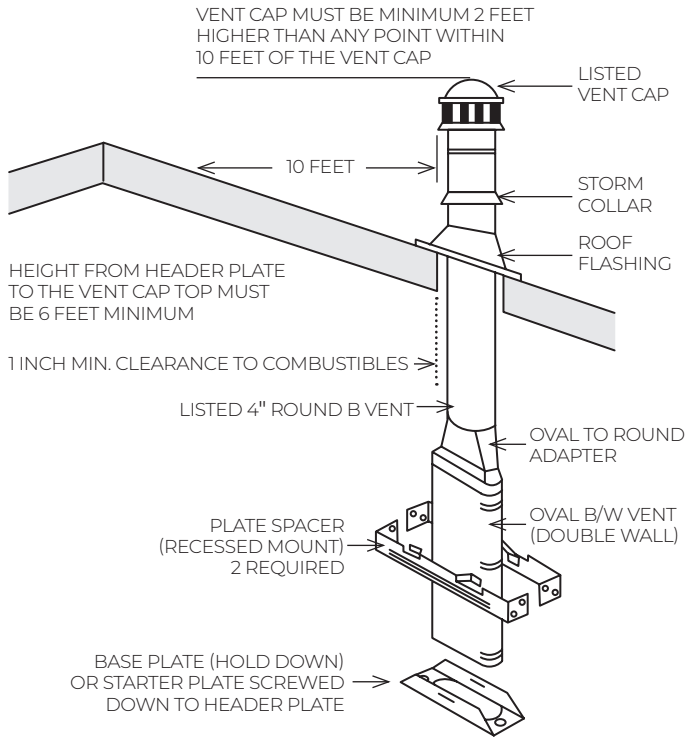
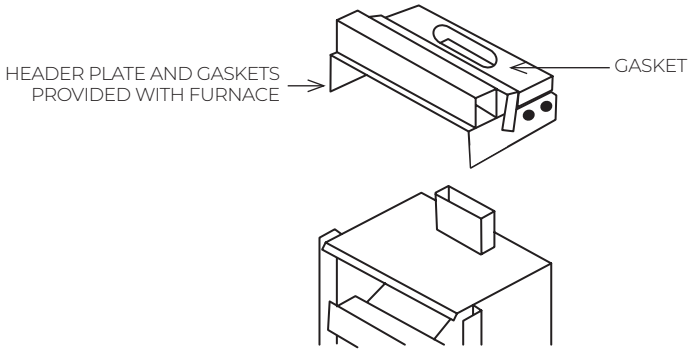


FIGURE 8 – TYPICAL VENT INSTALLATION



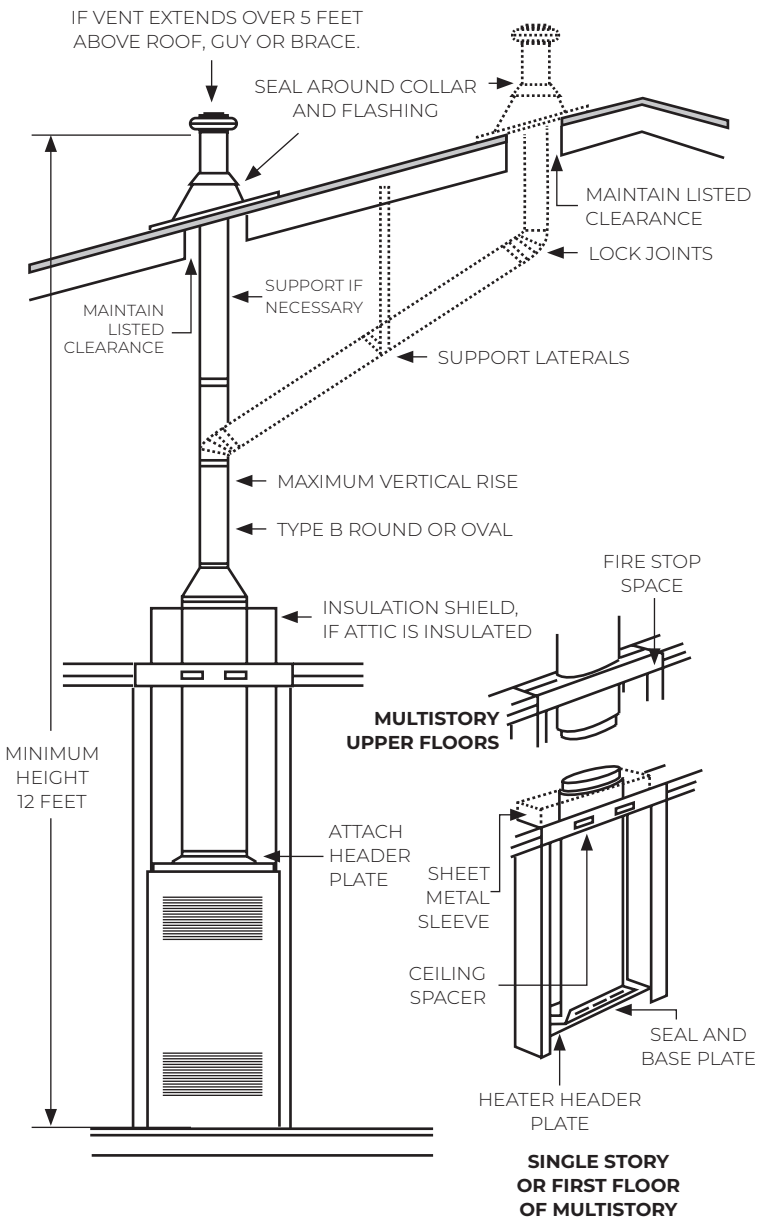
NOTE: THESE PARTS ARE SUPPLIED WITH THE FURNACE



50,000 BTU/hr. MODEL SERIES AND HEADER NOT SHOWN

FLUE COLLAR GASKET NOT REQUIRED ON 500 MODEL SERIES

FIGURE 8 – ALTERNATIVE VENTING



Vent Installation

The vent installation must comply with all local codes and ordinances. If in doubt, consult your local codes or inspector.

The furnace vent must be directed to the outdoors so that harmful combustion gases will not collect inside the building.

This furnace must not be connected to a chimney flue serving a separate solid-fuel burning appliance.

This product is design certified to ANSI Z21.86. It must be installed with a U.L. tested and listed type “B” approved vent and type “B/W” approved vent **Figure 8** Older style terra-cotta, transite pipe, clay, concrete or masonry type vent pipe cannot be used with this appliance. These types of vent pipe will not heat fast enough to establish a draft, which will result in improper venting of combustion products.

INSTALLING YOUR FURNACE

Consequently, this could cause the vent safety control system to shut down the furnace.

The area above header within the stud space MUST be kept clear of any attic insulation to allow the free circulation of air around the oval vent piping. In some areas the building code requires the use of an attic shield.

The B/W vent must extend through the ceiling and roof terminating at least 12-feet above the finished floor on which the furnace rests.

INSTALL FURNACE VENT

Attach a 4-foot length of oval, double-wall vent pipe through the plate spacers to the hold-down plate. Push the vent pipe into the hold-down plate until it is completely seated. The hold-down cleat will engage the groove in the vent pipe.

COMPLETE THE VENTING

Type B/W gas vent shall extend from the header plate of the furnace to a point above the highest ceiling plate within the stud space through which the vent passes, without any offsets or crossovers. The first vent pipe offset, (if required), may not be any closer than 2-feet from the header and needs to extend past the ceiling plate. After a type B/W gas vent passes through the highest ceiling plate within a stud space above the furnace to which it serves, the vent system may be completed with a Type B gas vent, from the **SAME** manufacturer (do not mix brands of pipe). Offsets cannot be greater than 45 degrees from vertical. Refer to The Uniform Mechanical Code.

Install the oval-to-round adapter. Complete the piping extending it through the roof. Use a 4-inch round, double-wall (Type B) vent pipe, roof flashing, storm collar and vent cap as shown. The vent cap must be at least 2-feet higher than any point that is within 10- feet of the vent cap. There must be at least a 1-inch clearance between the vent pipe and any combustible material.

CAUTION: To avoid damage to wiring, be sure to route the wires away from the path of the furnace vent.

Attaching Your Furnace

Clear the wall recess of all debris, remove any wood or plaster. Stand the furnace in front of recess, holding the furnace body at an angle. Insert flue collar into the opening in the header plate and raise furnace carefully **Figure 9A, 9B**. Swing bottom of furnace into wall recess with front edges of legs flush with 2x4 floor plate. In the holes provided, nail through the legs into studs or floor plate. **Figure 10**

Do not damage gasket glued to underside of header plate when placing furnace in wall. Avoid nailing the legs so tightly that it disturbs the inner furnace casing. Do not try to force the furnace into a smaller-than-specified recess.

If an existing gas line is preventing the installation of a Williams Furnace, a cut-out may be made using tin snips on one of the legs to clear this existing gas line. This cut-out will be on one side of the unit on the rear side of the leg and only if necessary.

FIGURE 9A – INSERT FURNACE

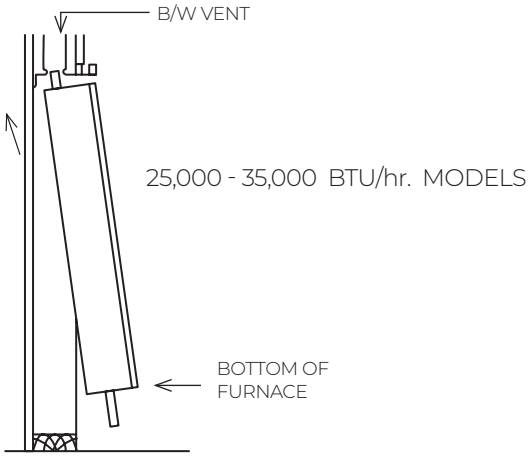


FIGURE 9B – DUAL FURNACE

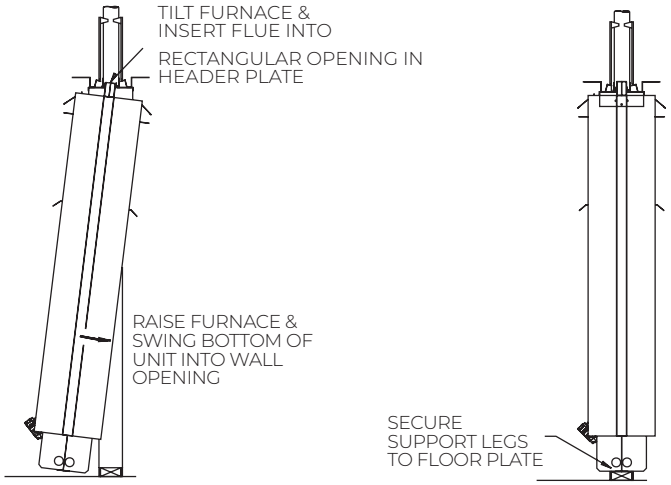
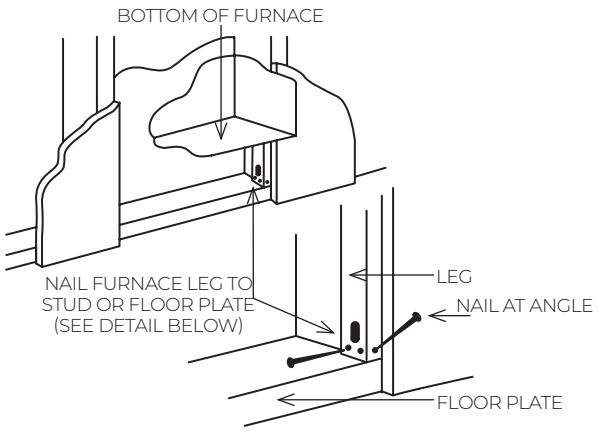


FIGURE 10 – NAIL PLACEMENT



REAR OUTLET KIT INSTALLATION *(OPTIONAL)*

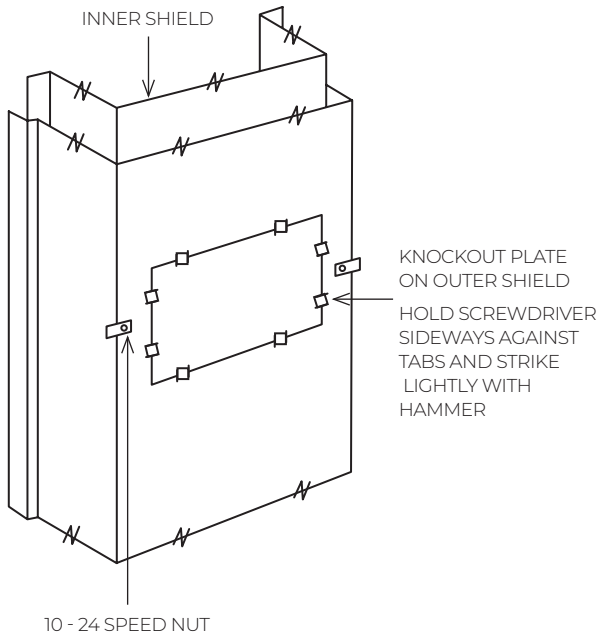
If a Rear Outlet Register Accessory is used, the following procedure must be completed before placing furnace body into wall recess. **Figure 11** Attach speed nuts to outer shield and remove knockout plates from both the outer and inner shields as follows:

1. Punch in the lower corners with a screwdriver blade.
2. Break the knockout side and bottom connecting tabs by holding a screwdriver blade sideways against the tab and striking the head of the screwdriver lightly with a hammer.
3. Swing the plate outward; bend it back and forth to break the top tabs. Use caution when handling sharp metal edges.

CAUTION: Do not install rear outlet kit where grille may be blocked by a door, curtains, or any other obstruction.

WARNING: Never shear or cut the furnace legs.

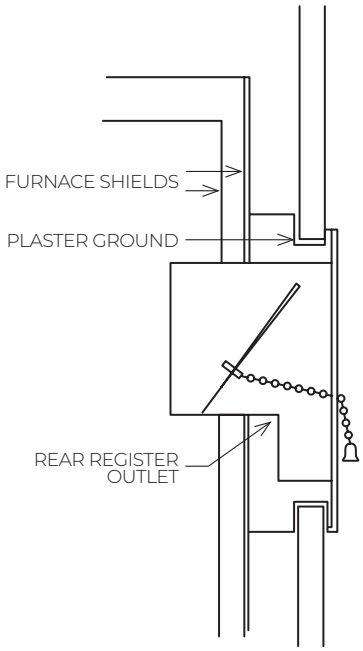
FIGURE 11 – REMOVE KNOCKOUT PLATES



Attaching Your Furnace *continued*

After furnace is in position, install rear outlet register as shown in **Figure 12**. Have damper in open position when inserting the assembly. Secure the rear outlet register to speed nuts with the machine screws furnished.

FIGURE 12 – MOUNTING REAR OUTLET REGISTER



Gas Supply and Piping

The gas control valve, in the furnace, is shipped with a seal over the gas inlet tapping. Do not remove the seal until ready to connect the piping.

WARNING: Danger of property damage, bodily injury or death. Make sure the furnace is equipped to operate o the type of gas available. Models designed as natural gas are to be used with natural gas only. Models designed for use with liquefied petroleum propane gas have orifices sized for commercially pure propane gas. They cannot be used with butane or a mixture of butane and propane.

GAS SUPPLY

For propane gas the minimum inlet gas supply pressure for the purpose of input adjustment is 11-inches water column. The maximum inlet gas supply pressure is 13-inches water column.

For natural gas, the minimum inlet gas supply pressure for the purpose of input adjustment is 5-inches water column. The maximum inlet as supply pressure is 7-inches water column.

Gas pressure and input to the burners must not exceed the rated input and pressure shown on the nameplate. The natural gas manifold pressure should be 4-inches water column. The manifold pressure should be 10-inches water column for propane gas. For operation in elevations above 2,000 feet, a burner orifice change may be required to suit the gas supplied. Check with your local gas supplier.

INSTALLING YOUR FURNACE

ORIFICE SIZES

The efficiency rating of this appliance is a product thermal efficiency rating determined under continuous operating conditions and was determined independently of any installed system. For elevations above 2,000 feet, reduce ratings 4% for each 1,000 feet above sea level.

FURNACE TECHNICAL INFORMATION						
MODEL NUMBER	GAS TYPE	INPUT RATING BTU/hr.	HEATING CAPACITY RATING BTU/hr.	MAIN BURNER ORIFICE		
				DRILL	DECIMAL	QUANTITY
2509622A	NATURAL	25,000	17,870	#43	0.089	1
2509621A	PROPANE	25,000	17,870	.057"		1
3509622A	NATURAL	35,000	23,700	#36	0.106	1
3509621A	PROPANE	35,000	23,700	.069"		1
5009622A	NATURAL	50,000	36,900	.091"		2
5009621A	PROPANE	50,000	36,900	.058"		2

GAS CONVERSION KITS	
NATURAL GAS TO PROPENE GAS	
8913	25096A SERIES WITH WILLIAMS BRAND GAS VALVE
8914	35096A SERIES WITH WILLIAMS BRAND GAS VALVE
8909	50098 SERIES WITH WILLIAMS BRAND GAS VALVE

GAS CONVERSION KITS	
PROPANE GAS TO NATURAL GAS	
8915	25096A SERIES WITH WILLIAMS BRAND GAS VALVE
8916	35096A SERIES WITH WILLIAMS BRAND GAS VALVE
8912	50098 SERIES WITH WILLIAMS BRAND GAS VALVE

GAS PIPING

The gas supply line must be of adequate size to handle the Btu/hr. requirements and length of the run for the unit being installed.

Determine the minimum pipe size from **Figure 13**, based on the length of the run from the gas meter to the unit.

All piping must comply with local codes and ordinances or with the National Fuel Gas Code (ANSI Z223.1 NFPA No. 54), whichever applies. (In Canada: CAN/C.GA B149). Refer to **FIGURE 14** for the general layout of the unit. It shows the basic fittings needed.
The following rules apply:

1. Use new, properly reamed steel or black iron pipe and fittings free of metal chips and debris that are approved by local codes. Metal chips and debris can damage the valve.
2. Do not thread pipe too far. Valve distortion or malfunction may result from excess pipe within the gas control valve. Apply a moderate amount of good quality dope to the pipe only. Leave the two end threads bare. **Figure 15**
3. Use ground joint unions.
4. Install a drip leg (sediment trap) to trap dirt and moisture before it can enter the gas valve. The nipple must be a minimum of 3-inches long.
5. Install a manual shutoff valve.
6. Provide a 1/8" NPT test gauge connection immediately before the gas supply connection to the furnace.

FIGURE 13 - PIPE CAPACITY

PIPE CAPACITY - BTU/hr. WITH FITTINGS

NATURAL GAS			
LENGTH OF PIPE FEET	PIPE SIZE		
	1/2"	3/4"	1"
20 40 60	92,000 63,000 50,000	190,000 130,000 105,000	350,000 245,000 195,000
PROPANE			
LENGTH OF PIPE FEET	PIPE SIZE		
	1/2"	3/4"	1"
20 40 60	189,000 129,000 103,000	393,000 267,000 217,000	732,000 504,000 409,000

GAS CONNECTION

If the installation is for propane gas, have the propane installer use a two stage regulator and make all the connections from the storage tank.

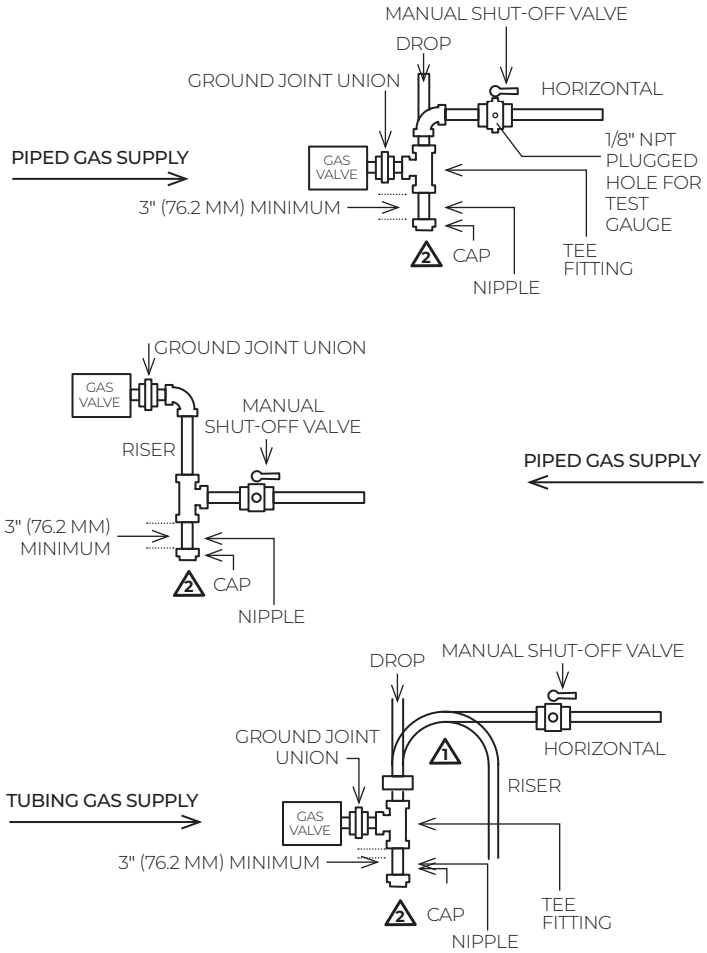
Use two pipe wrenches when making the connection to the valve to prevent turning and/or damage to the valve.

Connections between the manual shutoff valve and burner control assembly can be made with an A.G.A./C.G.A. design certified flexible connector if allowed by local codes. Drip leg and ground joint unions are still required.

Tighten all joints securely.

Test all piping for leaks. When checking gas piping to the furnace with gas pressure less than 1/2 PSI, shut off manual gas valve to the furnace. If gas piping is to be checked with the pressure at or above 1/2 PSI, the furnace and manual shutoff valve must be disconnected during testing. (SEE WARNING). Apply soap solution (or a liquid detergent) to each joint. Bubbles forming indicate a leak. Correct even the slightest leak at once.

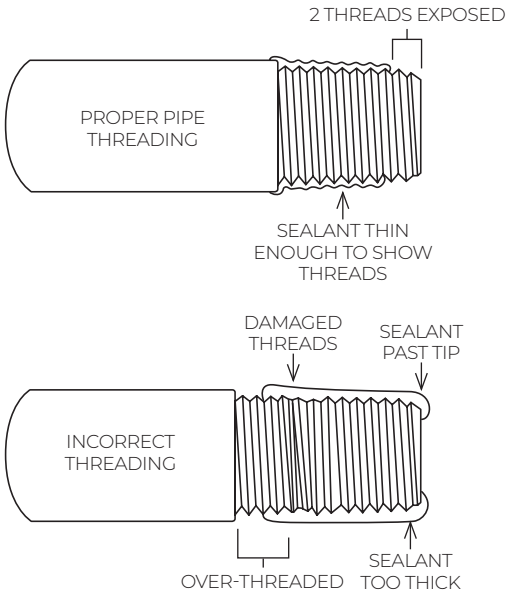
FIGURE 14 – GAS PIPING



1 **CAUTION:** All bends in metal tubing must be smooth.

2 **CAUTION:** Shut off the main gas supply before removing the end cap to prevent gas from filling the work area. Test for gas leakage when installation is complete.

FIGURE 15 – PROPER PIPING PRACTICE



WARNING: Danger of property damage, bodily injury or death. Never use a match or open flame to test for leaks. Never exceed specified pressures for testing. Higher pressures may damage the gas valve and cause over-firing which may result in component(s) failure. Never attempt start-up of unit before thoroughly ventilating the area and smelling near the floor for gas odor.

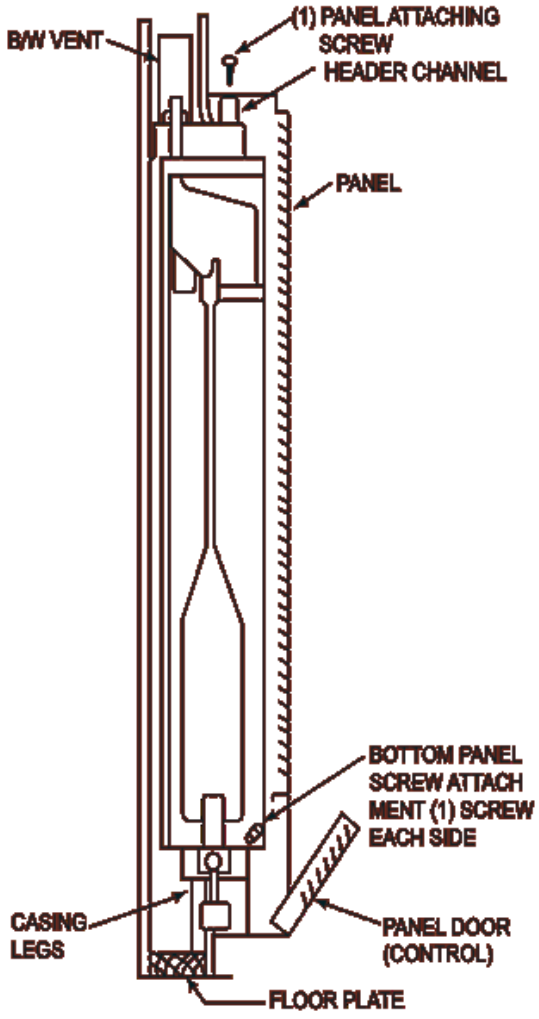
Front Panel Installation

Place the front panel top over the channel on the header plate, as shown in **Figure 16**. Press the panel tight against wall, and secure it to the header channel with the screw provided in final assembly package. Open the control door at bottom of panel and fasten the panel at each side through slots in flanges with screws provided.

Attach handle to the front panel door with the screw provided.

Install the second face panel in same manner for 500 Series models.

FIGURE 16 – PANEL PLACEMENT



INSTALLING YOUR FURNACE

Thermostat Installation

(Sold Separately)

Use Williams thermostat P322016 or any millivolt thermostat. Current to the thermostat is supplied by the pilot generator. Do not connect it to electricity. Anticipator settings are not required.

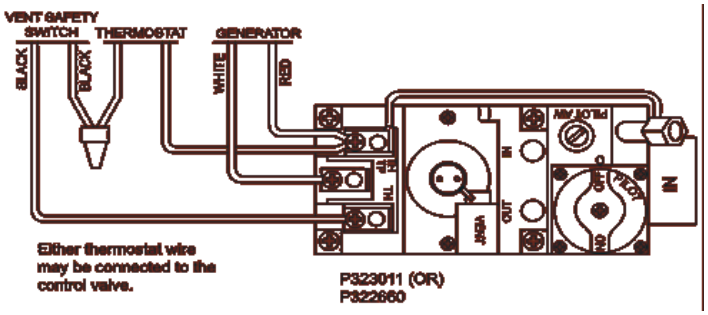
1. Use of existing wire is acceptable if it is in a satisfactory location and the wire is in good condition. When in doubt, use new wiring.
2. If a new location is chosen or if this is a new installation, thermostat wire must first be run to the location selected. All wiring must agree with local codes and ordinances. These instructions cover bringing the wire down from the attic but it may be run from a basement or crawl space using similar methods.
3. Before drilling a hole in the wall at the selected location, drive a small finish nail through the ceiling in the corner of the wall and ceiling above the thermostat location. Pull the nail out and push a small, stiff wire through the hole so it can be found in the attic. Drill a ½&inch hole through the ceiling wall plate.
4. Probe for obstructions in the partition. Then, drill a ½-inch hole through the wall at the selected location for the thermostat.
5. From the attic, feed the thermostat wire through the wall until even with the thermostat location.
6. Snag the thermostat wire through the hole and pull the wire through the hole in the wall so that 6&inches of the wire protrude.
7. Route wires to the furnace.
8. Never use nails or staples across the thermostat wires.

CAUTION: Label all wires prior to disconnection when servicing controls. Wiring errors can cause improper and dangerous operation. Verify proper operation after servicing. Refer to installation instructions packed in the thermostat carton if you have any doubt about the above procedures.

WALL-MOUNTED THERMOSTAT INSTALLATION

1. To remove the thermostat cover, squeeze both sides and lift.
2. Connect the thermostat wires to the terminal screws on the base of thermostat.
3. Push any excess wire back through hole in the wall and plug hole with insulation to prevent drafts from affecting thermostat operation.
4. Be sure to level the thermostat for best appearance. Fasten thermostat base to the wall through mounting holes with screws provided.
5. Replace the thermostat cover.
6. Do not run wire in any location where it might be damaged. Avoid splicing the thermostat wires unless the spliced wires are properly cleaned, soldered and taped.
7. Use the 18-gauge wire as supplied for a maximum length of 20-feet. If a longer length is needed, use 16-gauge wire to a maximum length of 25-feet.
8. Connect the thermostat wires to the control valve as shown in **Figure 17**.

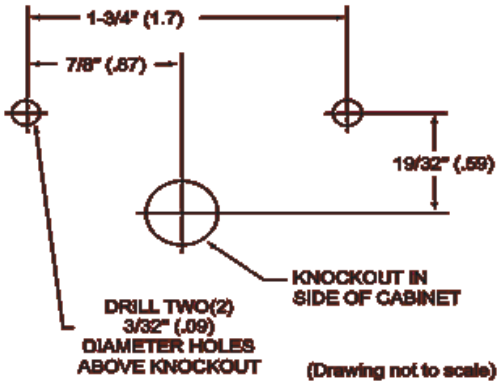
FIGURE 17 – THERMOSTAT WIRING



FACE PANEL-MOUNTED THERMOSTAT INSTALLATION

1. Before removing the face panel, disconnect the thermostat wires at the gas valve.
2. Locate the knockout on the right side of the furnace to mount the thermostat. Remove the knockout by tapping it lightly with a screwdriver **Figure 18** It will also be necessary to cut a 1/2 inch hole in the inside panel insulation for clearance to the knockout.
3. Cut the thermostat wire to 56 inches.
4. Connect the thermostat wires to terminal screws on the thermostat base.
5. Feed the thermostat wires through the knockout and route them through the metal clip to the gas valve.
6. Mount the thermostat to the side of the cabinet with screws provided.
7. Replace the thermostat cover.
8. Connect the thermostat wires to the control valve as shown in **Figure 17**.

FIGURE 18 – THERMOSTAT MOUNTING PANEL



IMPORTANT: Keep the thermostat wires away from the combustion chamber.