



80% SINGLE-STAGE MULTISPEED GAS FURNACE INSTALLATION INSTRUCTIONS

ATTENTION INSTALLATION PERSONNEL

As a professional installer, you have an obligation to know the product better than the customer. This includes all safety precautions and related items. Prior to actual installation, thoroughly familiarize yourself with this instruction manual. Pay special attention to all safety warnings. Often during installation or repair, it is possible to place yourself in a position which is more hazardous than when the unit is in operations.

Remember, it is your responsibility to install the product safely and to know it well enough to be able to instruct a customer in its safe use. Safety is a matter of common sense...a matter of thinking before acting. Most dealers have a list of specific good safety practices...follow them.

The precautions listed in this installation manual are intended as supplemental to existing practices. However, if there is a direct conflict between existing practices and the content of this manual, the precautions listed here take precedence.



These furnaces comply with requirements embodied in the American National Standard/National Standard of Canada ANSI Z21.47-CSA-2.3 Gas Fired Central Furnaces.

Whirlpool Gold® Models
WFM18, WFD18
WPIO-359E

Tradewinds Distributing Company, LLC
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Jacksonville, Florida 32258



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GAS FURNACE SAFETY PRECAUTIONS

Please adhere to the following warnings and cautions when installing, adjusting, altering, servicing or operating the furnace. To ensure proper installation and operation, thoroughly read this manual for specifics pertaining to the installation and application of this product.



Recognize this symbol as a safety precaution.



WARNING

Hazards or unsafe practices could result in property damage, product damage, severe personal injury or death.



CAUTION

Hazards or unsafe practices may result in property damage, product damage, personal injury or death.



WARNING

The manufacturer will not be responsible for any injury or property damage arising from improper service or service procedures. If you install or perform service on this unit, you assume responsibility for any personal injury or property damage which may result. Many jurisdictions require a license to install or service heating and air conditioning equipment.

 **WARNING**

To prevent personal injury or death due to improper installation, adjustment, alteration, service or maintenance, refer to this manual. For additional assistance or information, consult a qualified installer, service agency or the gas supplier.

 **WARNING**

This product contains or produces a chemical or chemicals which may cause serious illness or death and which are known to the State of California to cause cancer, birth defects or other reproductive harm.

 **WARNING**

To prevent possible property damage, personal injury or death due to electrical shock, the furnace must be located to protect the electrical components from water.

 **WARNING**

If the information in these instructions 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.

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

 **WARNING**

Heating unit should not be utilized without reasonable, routine inspection, maintenance and supervision. If the building in which any such device is located will be vacant, care should be taken that such device is routinely inspected, maintained and monitored. In the event that the building may be exposed to freezing temperatures and will be vacant, all water-bearing pipes should be drained, the building should be properly winterized and the water source closed. In the event that the building may be exposed to freezing temperatures and will be vacant, any hydronic coil units should be drained as well, and, in such case, alternative heat sources should be utilized.

 **WARNING**

Should overheating occur or the gas supply fail to shut off, turn off the manual gas shutoff valve external to the furnace before turning off the electrical supply.

 **WARNING**

Possible property damage, personal injury or death due to fire, explosion, smoke, soot, condensation, electrical shock or carbon monoxide may result from improper installation, repair, operation or maintenance of this product.

 **DANGER**



CARBON MONOXIDE POISONING HAZARD

Special Warning for Installation of Furnace or Air Handling Units in Enclosed Areas such as Garages, Utility Rooms or Parking Areas.

Carbon monoxide producing devices (such as an automobile, space heater, gas water heater, etc.) should not be operated in enclosed areas such as unventilated garages, utility rooms or parking areas because of the danger of carbon monoxide (CO) poisoning resulting from the exhaust emissions. If a furnace or air handler is installed in an enclosed area such as a garage, utility room or parking area and a carbon monoxide producing device is operated therein, there must be adequate, direct outside ventilation.

This ventilation is necessary to avoid the danger of CO poisoning which can occur if a carbon monoxide producing device continues to operate in the enclosed area. Carbon monoxide emissions can be (re)circulated throughout the structure if the furnace or air handler is operating in any mode.

CO can cause serious illness including permanent brain damage or death.

 **WARNING**

This unit must not be used as a "construction heater" during the finishing phases of construction on a new structure. This type of use may result in premature failure of the unit due to extremely low return air temperatures and exposure to corrosive or very dirty atmospheres.

WARNING

To prevent possible personal injury or death due to asphyxiation, this furnace must be Category I vented. Do not vent using Category III venting. Provisions must be made for venting combustion products outdoors through a proper venting system. The length of flue pipe could be a limiting factor in locating the furnace.

Additional Safety Considerations

- This furnace is approved for Category I venting only.
- Provisions must be made for venting combustion products outdoors through a proper venting system. The length of flue pipe could be a limiting factor in locating the furnace.

PRODUCT DESCRIPTION AND APPLICATION

Shipping Inspection

All units are securely packed in shipping containers tested according to International Safe Transit Association specifications. The carton must be checked upon arrival for external damage. If damage is found, a request for inspection by carrier's agent must be made in writing immediately.

The furnace must be carefully inspected on arrival for damage and bolts or screws which may have come loose in transit. In the event of damage, the consignee should:

1. Make a notation on the delivery receipt of any visible damage to the shipment or container.
2. Notify the carrier promptly and request an inspection.
3. With concealed damage, the carrier must be notified as soon as possible—preferably within 5 days.
4. File the claim with the following support documents within a 9-month statute of limitations.
 - Original or certified copy of the Bill of Lading, or indemnity bond.
 - Original paid freight bill or indemnity in lieu thereof.
 - Original or certified copy of the invoice, showing trade and other discounts or reductions.
 - Copy of the inspection report issued by carrier's representative at the time damage is reported to carrier.

The carrier is responsible for making prompt inspection of the damage and for a thorough investigation of each claim. The distributor or manufacturer will not accept claims from dealers for transportation damage.

Electrostatic Discharge (ESD) Precautions

NOTE: Discharge static electricity accumulated in the body before touching the unit. An electrostatic discharge can adversely affect electrical components.

Use the following steps during furnace installations and servicing to protect damage to the integrated control module. By putting the furnace, the control and the person at the same electrostatic potential, these steps will help avoid exposing the integrated control module to electrostatic discharge. This procedure is applicable to both installed and uninstalled (ungrounded) furnaces.

1. Disconnect all power to the furnace.

NOTE: Do not touch the integrated control module or any wire connected to the control prior to discharging your body's electrostatic charge to ground.
2. Firmly touch a clean, unpainted, metal surface of the furnace away from the control. Any tools held in a person's hand during grounding will be discharged also.
3. Service the integrated control module or connecting wiring after following the discharge process in Step 2.

NOTE: Do not recharge your body with static electricity by moving or shuffling your feet or touching ungrounded objects. If you touch an ungrounded object, repeat Step 2 before touching the control or wires.

4. Follow steps 1 through 3 before removing a new control from its container or installing the control on a furnace. Return any old or new controls to their containers before touching any ungrounded object.

To the Installer

Before installing this unit, please read this manual thoroughly to familiarize yourself with specific items which must be adhered to, including, but not limited to:

- Unit maximum external static pressure
- Gas pressures
- Btu input rating
- Proper electrical connections
- Circulating air temperature rise
- Minimum or maximum CFM
- Motor speed connections

NOTE: These furnaces are designed for Category I venting only.

Important Note to the Owner Regarding Product Warranty

To receive the Lifetime Heat Exchanger Limited Warranty and the 10-Year Parts Limited Warranty, online registration must be completed within 60 days of installation. Online registration is not required in California or Quebec.

Full warranty details and instructions are available at www.whirlpoolhvac.com.

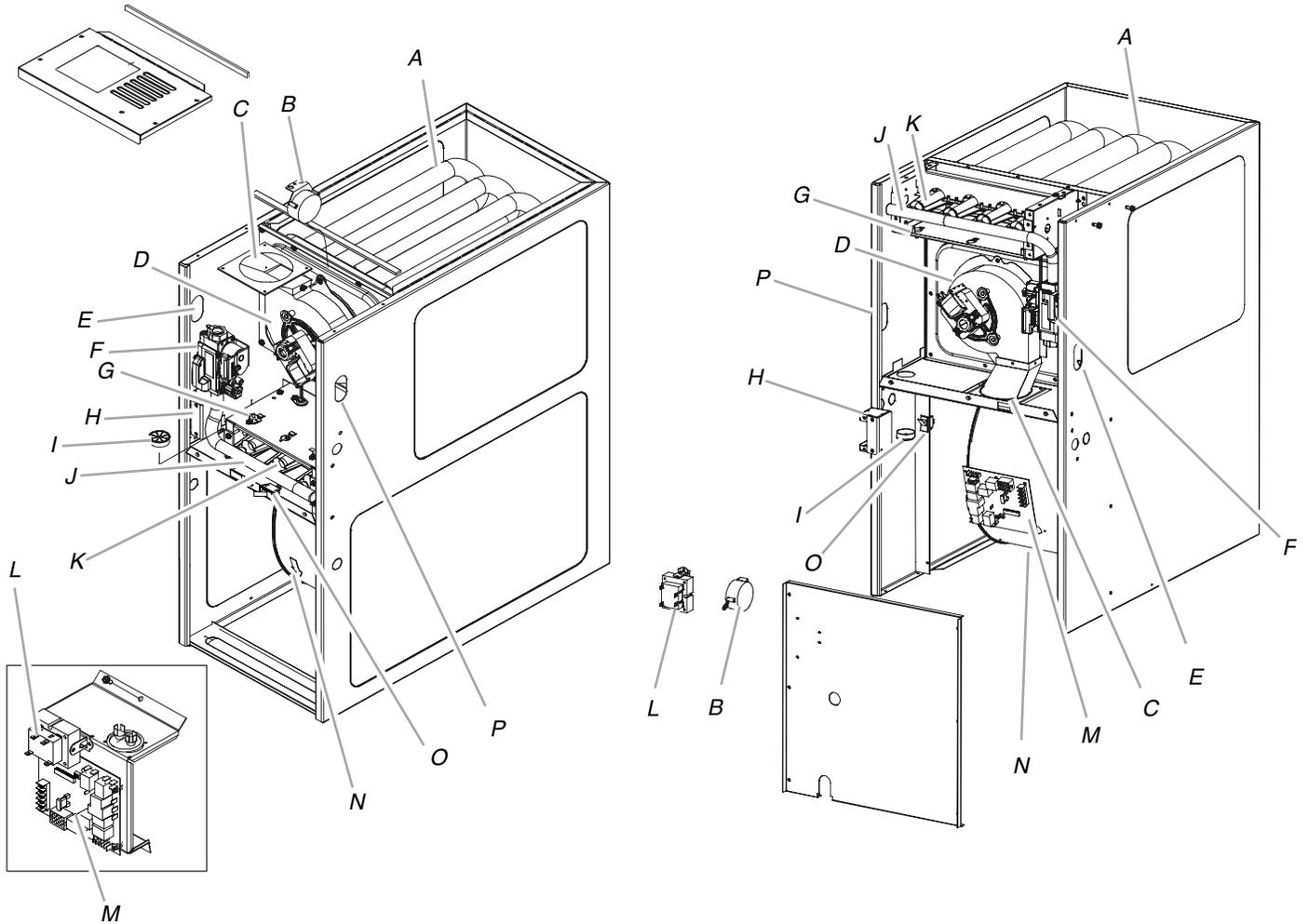
Your warranty certificate is supplied as a separate document with the unit installed by your contractor. Read the limited warranty certificate carefully to determine what is and is not covered. Keep the warranty certificate in a safe place. If you are unable to locate the warranty certificate, please contact your installing contractor, or contact customer service at 1-866-944-7575 to obtain a copy.

To register your unit, go to www.whirlpoolhvac.com. Click on the manufacturer's Comfort Commitment™ Warranty link located at the bottom center of the home page. Next, click on the Click Here to Register Your Product link located at the top center of the page, and complete the forms in the manner indicated.

WARNING

To prevent property damage, personal injury or death due to fire, do not install the furnace in a mobile home, trailer or recreational vehicle.

Component Identification



A. Tubular heat exchanger
 B. Pressure switch
 C. Flue pipe connection
 D. Induced draft blower
 E. Gas line entrance
 F. Gas control valve

G. Rollout limit switch
 H. Junction box
 I. Wiring harness grommet
 J. Gas manifold
 K. Inshot burner

L. Transformer
 M. Integrated control module
 N. Circulator blower
 O. Blower door interlock switch
 P. Gas line entrance (alternate)

Product Application

This furnace is primarily designed for residential home-heating applications.

IMPORTANT:

- This furnace is not designed or certified for use in mobile homes, trailers or recreational vehicles.
- This furnace is not designed or certified for outdoor applications.
- The furnace must be installed indoors (for example, attic space, crawl space or garage area provided the garage area is enclosed with an operating door).

This furnace can be used in the following nonindustrial commercial applications:

- | | |
|--------------------|-----------------|
| ■ Schools | ■ Nursing homes |
| ■ Office buildings | ■ Hotels/motels |
| ■ Churches | ■ Common areas |
| ■ Retail stores | ■ Office areas |

NOTE: In such applications, the furnace must be installed with the following stipulations:

- It must be installed according to the installation instructions provided and according to local and national codes.
- It must be installed indoors in a building constructed on site.
- It must be part of a ducted system and not used in a free air delivery application.
- It must not be used as a “makeup” air unit.
- All other warranty exclusions and restrictions apply.

This furnace may be used as a construction site heater only if all of the following conditions are met:

- The vent system is permanently installed according to these installation instructions.
- A room thermostat is used to control the furnace. Fixed jumpers that provide continuous heating cannot be used.
- Return air ducts are provided and sealed to the furnace.

- A return air temperature range between 60°F and 80°F (16°C and 27°C) is maintained.
- Air filters are installed in the system and maintained during construction, replaced as appropriate during construction and upon completion of construction.
- The input rate and temperature rise are set according to the furnace rating plate.
- 100% outside air is provided for combustion air requirements during construction. Temporary ducting can be used.

NOTE: Do not connect the temporary duct directly to the furnace. The duct must be sized according to the instructions in the “Combustion and Ventilation Air Requirements” section.

- The furnace heat exchanger, components, duct system, air filters and evaporator coils are thoroughly cleaned following the final construction cleanup.
- All furnace operating conditions (including ignition, input rate, temperature rise and venting) are verified according to these installation instructions.

NOTE: The Commonwealth of Massachusetts requires that the following additional requirements must also be met:

- Gas furnaces must be installed by a licensed plumber or gas fitter.
- A T-handle gas cock must be used.
- If the unit is to be installed in an attic, the passageway to and the service area around the unit must have flooring.

 WARNING
<p>To prevent property damage, personal injury or death due to fire, do not install the furnace in a mobile home, trailer or recreational vehicle.</p>

To ensure proper furnace operation, you must install, operate and maintain the furnace in accordance with these installation and operation instructions, all local building codes and ordinances. In their absence, follow the latest edition of the National Fuel Gas Code (NFPA 54/ANSI Z223.1), and/or CAN/CSA B149 Installation Codes, local plumbing or waste water codes and other applicable codes.

A copy of the National Fuel Gas Code (NFPA 54/ANSI Z223.1) can be obtained from any of the following:

American National Standards Institute
1430 Broadway
New York, NY 10018

National Fire Protection Association
1 Batterymarch Park
Quincy, MA 02269

CSA International
8501 East Pleasant Valley
Cleveland, OH 44131

A copy of the CAN/CSA B149 Installation Codes can also be obtained from:

CSA International
178 Rexdale Boulevard
Etobicoke, Ontario, Canada M9W 1R3

The rated heating capacity of the furnace should be greater than or equal to the total heat loss of the area to be heated. The total heat loss should be calculated by an approved method or in accordance with “ASHRAE Guide” or “Manual J-Load Calculations” published by the Air Conditioning Contractors of America.

In the U.S.A., this furnace must be installed in accordance with the latest edition of the ANSI Z223.1 booklet titled “National Fuel Gas Code” (NFPA 54), and the requirements or codes of the local utility or other authority having jurisdiction. In Canada, this furnace must be installed in accordance with the current CAN/CGA-B149.1 and 2 Gas Installation Codes, local plumbing or waste water codes and other applicable codes. Additional helpful publications available from the NFPA are, NFPA 90A—Installation of Air Conditioning and Ventilating System and NFPA 90B—Warm Air Heating and Air Conditioning System.

All venting shall be in accordance with PART 7, Venting of Equipment, of the National Fuel Gas Code, ANSI Z223.1, or applicable local building and/or air conditioning codes. These publications are available from:

National Fire Protection Association, Inc.
1 Batterymarch Park
Quincy, MA 02269

NOTE: Furnaces with NOx screens meet the California NOx emission standards and California seasonal efficiency standards. Annual inspections of the furnace and its vent system is strongly recommended.

LOCATION REQUIREMENTS AND CONSIDERATIONS

Your unit model type determines which installation procedures must be used. For WFM18 models, you must follow instructions for horizontal left, horizontal right or upflow installations only. These furnaces are not approved for downflow installations.

Downflow models WFD18 are not approved for horizontal or upflow installations. For these models, use only the instructions for downflow installation only.

 WARNING
<p>To prevent possible equipment damage, property damage, personal injury or death, the following bullet points must be observed when installing the unit.</p>

Follow the instructions listed below when selecting a furnace location. Refer also to the guidelines provided in “Combustion and Ventilation Air Requirements.”

- Centrally locate the furnace with respect to the proposed or existing air distribution system.
- Check that the temperature of the return air entering the furnace is between 55°F and 100°F (13°C and 38°C) when the furnace is heating.
- Provide provisions for venting combustion products outdoors through a proper venting system.

NOTE: The length of flue piping can be a limiting factor in the location of the furnace.

- Ensure that adequate combustion air is available for the furnace. Improper or insufficient combustion air can expose the building occupants to gas combustion products that could include carbon monoxide. Refer to “Combustion and Ventilation Air Requirements.”
- Set the furnace on a level floor. If the floor becomes wet or damp at times, place the furnace above the floor on a concrete base sized approximately 1½" (3.8 cm) larger than the base of the furnace.
- Ensure that the upflow or horizontal furnaces are not installed directly on carpeting, or any other combustible material.
NOTE: The only combustible material allowed is wood.
- Exposure to contaminated combustion air will result in safety and performance-related problems.
NOTE: Do not install the furnace where the combustion air is exposed to the following substances:

- Chlorinated waxes or cleaners
- Chlorine-based swimming pool chemicals
- Water softening chemicals
- Deicing salts or chemicals
- Carbon tetrachloride
- Halogen-type refrigerants
- Cleaning solutions (such as perchloroethylene)
- Printing inks
- Paint removers
- Varnishes
- Hydrochloric acid
- Cements and glues
- Antistatic fabric softeners for clothes dryers
- Masonry acid washing materials

- If the furnace is used in connection with a cooling coil unit, install the furnace upstream or in parallel to the cooling coil unit. Premature heat exchanger failure will result if the cooling coil unit is placed ahead of the furnace.
- If the furnace is installed in a residential garage, position the furnace so that the burners and ignition source are located not less than 18" (45.7 cm) above the floor. Protect the furnace from physical damage by vehicles.
- If the furnace is installed horizontally, ensure that the furnace access doors are not on the “up/top” or “down/bottom” side of the furnace. The furnace access doors must be vertical so that the burners fire horizontally into the heat exchanger.
- Do not connect the furnace to a chimney flue that serves a separate appliance designed to burn solid fuel.
- On counterflow installations, the air conditioning coil must be downstream from the furnace heat exchanger.

Counterflow Installation Over a Noncombustible Floor

- Before setting the furnace over the plenum opening, ensure that the surface around the opening is smooth and level. A tight seal should be made between the furnace base and floor by using a silicone rubber caulking compound or cement grout.

Counterflow Installation Over a Combustible Floor

- If installation over a combustible floor becomes necessary, use an accessory subbase (see Specification Sheet applicable for your model for details). A special accessory subbase must be used for upright counterflow unit installations over any combustible material, including wood. Refer to subbase instructions for installation details. Follow the instructions with the subbase for proper installation.

NOTES:

- Do not install the furnace directly on carpeting, tile or other combustible material other than wood flooring.
- The subbase will not be required if an air conditioning coil is installed between the supply air opening on the furnace and the floor.

Clearances and Accessibility

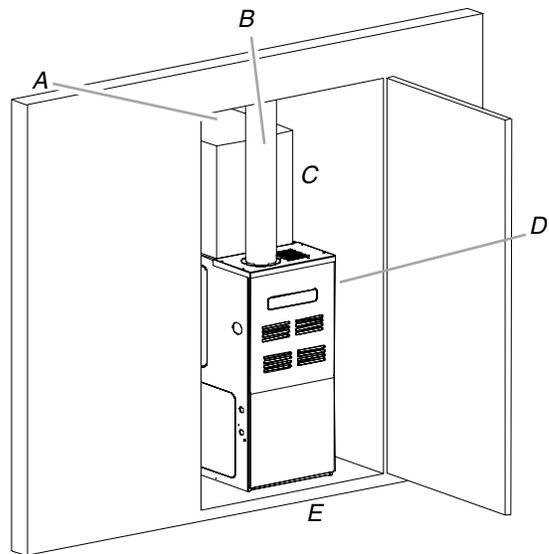
Unobstructed front clearance of 24" (61 cm) for servicing is recommended.

Clearances to Combustibles—in. (cm)

Vent Pipe

B1-Vent	Single Wall Connector	Sides	Front	Back	Top (Plenum)
1 (2.5)	6 (15.2)	1 (2.4)	3 (7.6)	0	1 (2.5)

NOTE: Top clearance for horizontal configuration is 1" (2.5 cm).



- A. Top clearance—1" (2.5 cm)
- B. Vent pipe clearance—6" (15.2 cm) for single wall connector, 1" (2.5 cm) for B-1 vent
- C. Back clearance—0"
- D. Side clearance—1" (2.5 cm)
- E. Front clearance—3" (7.6 cm)

- Adequate combustion/ventilation air must be supplied to the closet or enclosure.
- Furnace must be completely sealed to the floor or base. Combustion/ventilation air supply pipes must terminate 12" (30.5 cm) from the top of the closet or enclosure and 12" (30.5 cm) from the floor of the closet or enclosure.
NOTE: Do not remove the solid base plate for the side return.
- Return air ducts must be completely sealed to the furnace and terminate outside the enclosure surfaces.

Horizontal Installation

Line contact to framing is permitted when installed in the horizontal configuration. Line contact is defined as the portion of the cabinet that is formed by the intersection of the top and side.

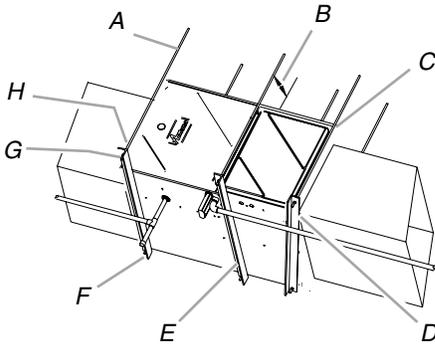
IMPORTANT: Accessibility clearance, where greater, should take precedence over minimum fire protection clearance.

- A gas-fired furnace for installation in a residential garage must be installed so that the ignition source and burners are located not less than 18" (45.7 cm) above the floor and are protected or located to prevent physical damage by vehicles.
- A gas furnace must not be installed directly on carpeting, tile, or other combustible materials other than wood flooring.

Furnace Suspension

If suspending the furnace from rafters or joists, use $\frac{3}{8}$ " threaded rod and 2" x 2" x $\frac{3}{8}$ " (5.1 cm x 5.1 cm x 1 cm) angle iron as shown in "Suspended Furnace" illustration. The length of rod will depend on the application and the clearances necessary.

Suspended Furnace



- | | |
|--|--|
| <p>A. $\frac{3}{8}$" (1 cm) diameter threaded rod (6)</p> <p>B. 8" (20.3 cm) minimum clearance between center rod and furnace cabinet to allow for circulator blower removal.</p> <p>C. Level furnace end to end, slight forward tilt with front 0° to $\frac{3}{4}$" (1.9 cm) below back.</p> | <p>D. Tilt outward to allow for door and circulator blower removal.</p> <p>E. Position as close as possible to blower deck to allow for circulator blower removal.</p> <p>F. 2" x 2" x $\frac{3}{8}$" (5.1 cm x 5.1 cm x 1 cm) angle iron (3)</p> <p>G. Support nuts</p> <p>H. Hold down nuts</p> |
|--|--|

Existing Furnace Removal

NOTE: When an existing furnace is removed from a venting system serving other appliances, the venting system may be too large to properly vent the remaining attached appliances.

The following vent testing procedure is reproduced from the American National Standard/National Standard of Canada for Gas-Fired Central Furnaces ANSI Z21.4, CSA-2.3 latest edition Section 1.23.1.

The following steps shall be followed with each appliance connected to the venting system placed in operation, while any 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 by the National Fuel Gas Code, ANSI Z223.1 or the CAN/CSA 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 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 shall operate at maximum speed. Do not operate a summer exhaust fan.
6. Follow the lighting instructions. Place the appliance being inspected in operation. Adjust thermostat so appliance shall operate continuously.
7. Test for leaking from draft hood appliances at the draft hood relief opening after 5 minutes of main burner operation. Use the flame of a match or candle.
8. After it has been determined that each appliance connected to the venting system properly vents when tested as outlined above, return doors, windows, exhaust fans, fireplace dampers and any other gas burning appliance to their previous conditions of use.
9. 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 CAN/CSA B149 Installation Codes.

NOTE: If resizing is required on any portion of the venting system, use the appropriate table in Appendix G in the latest edition of the National Fuel Gas Code ANSI Z223.1 and/or CAN/CSA B149 Installation Codes.

Thermostat Location

The thermostat should be placed approximately 5 ft (1.5 m) from the floor on a vibration-free, inside wall in an area having good air circulation.

NOTE: Do not install the thermostat where it may be influenced by any of the following:

- Drafts, or dead spots behind doors, in corners or under cabinets
- Hot or cold air from registers
- Radiant heat from the sun
- Light fixtures or other appliances
- Radiant heat from a fireplace
- Concealed hot or cold water pipes or chimneys
- Unconditioned areas behind the thermostat, such as an outside wall

Consult the instructions packaged with the thermostat for mounting instructions and further precautions.

COMBUSTION AND VENTILATION AIR REQUIREMENTS

WARNING

To avoid property damage, personal injury or death, sufficient fresh air for proper combustion and ventilation of flue gases must be supplied. Most homes require outside air be supplied into the furnace area.

Improved construction and additional insulation in buildings have reduced heat loss by reducing air infiltration and escape around doors and windows. These changes have helped in reducing heating/cooling costs but have created a problem supplying combustion and ventilation air for gas-fired and other fuel-burning appliances. Appliances that pull air out of the house (clothes dryers, exhaust fans, fireplaces, etc.) increase the problem by starving appliances for air.

House depressurization can cause back drafting or improper combustion of gas-fired appliances, thereby exposing building occupants to gas combustion products that could include carbon monoxide.

If this furnace is to be installed in the same space with other gas appliances, such as a water heater, ensure that there is an adequate supply of combustion and ventilation air for the other appliances. Refer to the latest edition of the National Fuel Gas Code NFPA 54/ANSI Z223.1 or CAN/CSA B149 Installation Codes or applicable provisions of the local building codes for determining the combustion air requirements for the appliances.

NOTE: This furnace must use indoor air for combustion. It cannot be installed as a direct vent, or sealed combustion, furnace.

Most homes will require outside air to be supplied to the furnace area by means of ventilation grilles or ducts connecting directly to the outdoors or spaces open to the outdoors such as attics or crawl spaces.

Category I Venting—Vertical Venting

WARNING

To prevent possible personal injury or death due to asphyxiation, this furnace must be Category I vented. Do not vent using Category III venting. Provisions must be made for venting combustion products outdoors through a proper venting system. The length of flue pipe could be a limiting factor in locating the furnace.

Category I Venting is venting at a nonpositive pressure. A furnace vented as Category I is considered a fan-assisted appliance. The vent system does not have to be “gas tight.”

NOTE: Single-stage gas furnaces with induced draft blowers draw products of combustion through a heat exchanger allowing, in some instances, common venting with natural draft appliances (for example, water heaters).

All installations must be vented in accordance with National Fuel Gas Code NFPA 54/ANSI Z223.1—latest edition. In Canada, the furnaces must be vented in accordance with the National Standard of Canada, CAN/CSA B149.1 and CAN/CSA B149.2—latest editions and amendments.

NOTE: The vertical height of the Category I venting system must be at least as great as the horizontal length of the venting system.

WARNING

To prevent possible personal injury or death, due to asphyxiation, common venting with other manufacturer's induced draft appliances is not allowed.

The minimum vent diameter for the Category I venting system is as shown in the Minimum Vent chart.

Minimum Vent

Model	Upflow	Counterflow
45	4" (10.2 cm)	4" (10.2 cm)
70	4" (10.2 cm)	4" (10.2 cm)
90	4" (10.2 cm)	4" (10.2 cm)
115	5" (12.7 cm)	5" (12.7 cm)
140	5" (12.7 cm)	N/A

Under some conditions, larger vents than those shown in the Minimum Vent chart may be required or allowed. When an existing furnace is removed from a venting system serving other appliances, the venting system may be too large to properly vent the remaining attached appliances.

Upflow or horizontal units are shipped with the induced draft blower discharging from the top of the furnace. (“Top” is as viewed for an upflow installation.) The induced draft blower can be rotated 90 degrees for Category I venting. For horizontal installations, a 4" (10.2 cm) single-wall pipe can be used to extend the induced draft blower outlet ½" (1.3 cm) beyond the furnace cabinet.

NOTE: This product is not designed for counterclockwise induced draft blower rotation.

Vent the furnace in accordance with the National Fuel Gas Code NFPA 54/ANSI Z223.1—latest edition. In Canada, vent the furnace in accordance with the National Standard of Canada, CAN/CSA B149.1 and CAN/CSA B149.2—latest editions and amendments.

Venting

NOTE: This furnace is not design certified to be horizontally vented.

To rotate the induced draft blower clockwise, you will need to purchase one chimney transition bottom kit (Part Number 0270F01119).

1. Disconnect electrical power from the furnace.
2. Disconnect the induced draft blower power leads, flue pipe and pressure switch tubing.
3. Remove the round cutout from the right side of the wrapper.
4. Remove and save the 4 screws that fasten the induced draft blower to the flue collector box.
5. Remove and save the 3 screws that hold the chimney assembly to the induced draft blower.
6. Remove and save the 4 screws that fasten the chimney top to the chimney bottom.
7. Remove the chimney transition bottom from the transition bottom kit.
8. Install the chimney top with the 4 screws retained from Step 6 onto the new chimney transition bottom from the transition bottom kit.
9. Install the chimney assembly with the 3 screws retained from Step 5 onto the induced draft blower.
10. Reinstall the induced draft blower rotating it 90 degrees clockwise from the original upflow configuration using the 4 screws retained in Step 4. Ensure that the gasket located between the induced draft blower and the collector box is rotated accordingly.
11. Reconnect the induced draft blower power leads.
NOTE: If the wires are not long enough, pull extra wire from the wire bundle in the blower compartment.
12. Reconnect the flue pipe and the pressure switch tubing. Ensure that all wires and the pressure switch tubing are at least 1" (2.5 cm) from the flue pipe, or any other hot surface.
13. Reconnect electrical power to the furnace.

Counterflow units are shipped with the induced draft blower discharging from the top (as viewed for a counterflow installation) of the furnace.

Vent the furnace in accordance with the National Fuel Gas Code NFPA 54/ANSI Z223.1—latest edition. In Canada, vent the furnace in accordance with the National Standard of Canada, CAN/CSA B149.1 AND CAN/CSA B149.2—latest editions and amendments.

WARNING

Never allow the products of combustion, including carbon monoxide, to enter the return ductwork or circulation air supply.

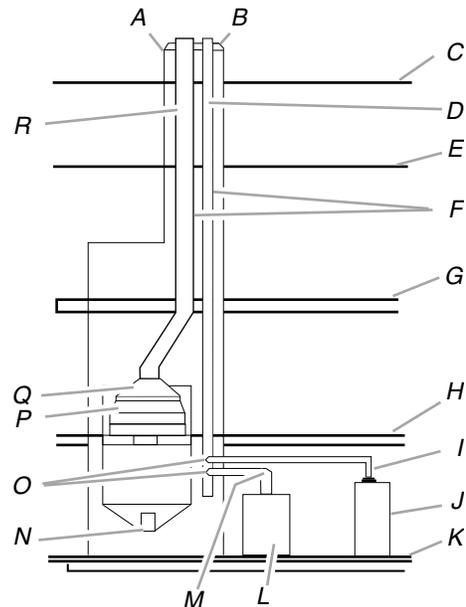
Category I Furnaces Only—Exterior Masonry Chimneys

An exterior masonry chimney is defined as a “Masonry chimney exposed to the outdoors on one or more sides below the roof line.” The ability to use a clay-lined masonry chimney depends on a parameter not associated with interior chimneys. This variable is the geographic location of the installation. Researchers have discovered that the winter design temperatures have a direct impact on the suitability of this type of venting. In most situations, the existing masonry chimneys will require a properly-sized metallic liner.

WARNING

Possibility of property damage, personal injury or death. Damaging condensation can occur inside masonry chimneys when a single fan-assisted Category I appliance (80% AFUE furnace) is vented without adequate dilution air. Do not connect an 80% furnace to a masonry chimney unless the furnace is common vented with a draft hood equipped appliance or the chimney is lined with a metal liner or Type B metal vent. All installations using masonry chimneys must be sized in accordance with the appropriate venting tables. If an 80% furnace is common vented with a draft hood equipped appliance, the potential for condensation damage may still exist with extremely cold conditions, long vent connectors, exterior chimneys or any combination of these conditions. The risk of condensation damage is best avoided by using the masonry chimney as a pathway for properly-sized metal liner or Type B metal vent.

Typical Multiple Flue Clay Tile Chimney



- | | | |
|--|------------------------------------|---|
| A. Crown | G. Second floor | M. Forced air furnace vent connector |
| B. Wash | H. First floor | N. Clean out |
| C. Roof line | I. Water heater vent connector | O. Breech |
| D. Clay tile size: 8" x 8" x 12" (24.3 cm x 24.3 cm x 30.5 cm) (each x 24" [61 cm] length) | J. Natural draft water heater | P. Damper |
| E. Attic floor | K. Basement floor | Q. Throat |
| F. 1/2" to 1" (1.3 cm to 2.5 cm) airspace | L. Fan-assisted forced air furnace | R. Clay tile size: generally 12" x 12" (30.5 cm x 30.5 cm) (24" [61 cm] length) |

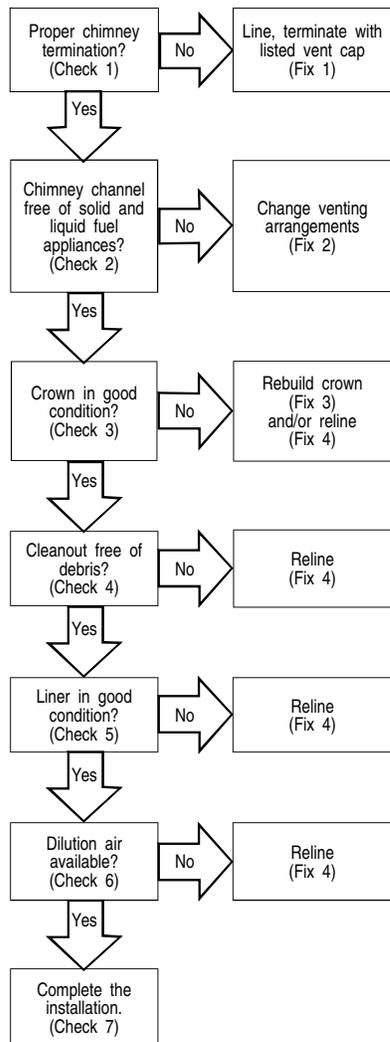
Checklist Summary

This checklist serves as a summary of the items to be checked before venting an 80+ furnace into a masonry chimney. In addition, we recommend that a qualified serviceman use this checklist to perform a yearly inspection of the furnace venting system.

This checklist is only a summary. For detailed information on each of the procedures mentioned, see the paragraph referenced with each item.

This inspection is based upon a draft topical report, "Masonry Chimney Inspection and Relining," issued by the Gas Research Institute. While not yet finalized, we believe this report represents the best information on this subject which is currently available.

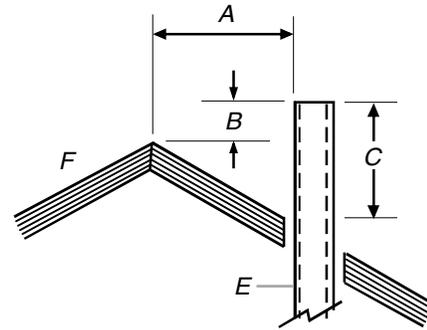
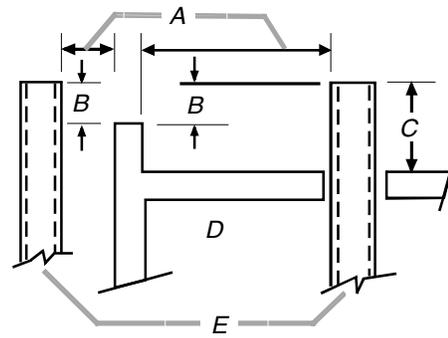
Check 1—Proper Chimney Termination



A masonry chimney used as a vent for gas-fired equipment must extend at least 3 ft (91.4 cm) above the highest point where it passes through the roof. It must extend at least 2 ft (61 cm) higher than any portion of a building within a horizontal distance of 10 ft (3 m). In addition, the chimney must terminate at least 3 ft (91.4 cm) above any forced air inlet located within 10 ft (3 m). The chimney must extend at least 5 ft (1.5 m) above the highest connected equipment draft hood outlet or flue collar.

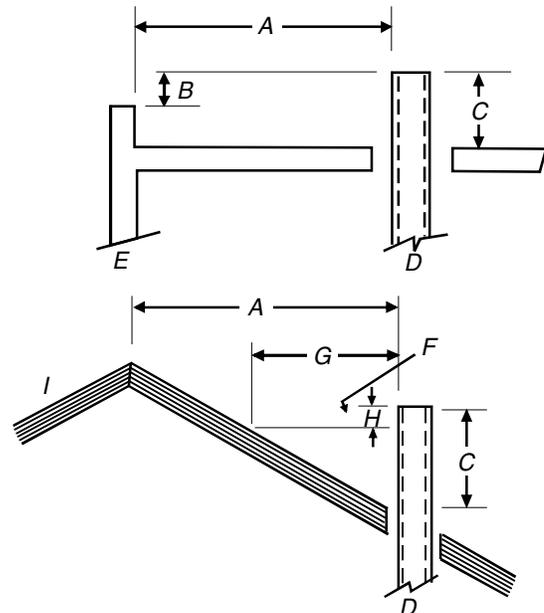
If the chimney does not meet these termination requirements, but all other requirements in the checklist can be met, it may be possible for a mason to extend the chimney. If this will not be practical, see "Fix 1—Liner Termination."

Termination 10 ft (3 m) or Less From Ridge, Wall or Parapet



- A. 10 ft (3 m) or less
- B. 2 ft (61 cm) minimum
- C. 3 ft (91.4 cm) minimum
- D. Wall or parapet
- E. Chimney(s)
- F. Ridge

Termination More Than 10 ft (3 m) From Ridge, Wall or Parapet



- A. More than 10 ft (3 m)
- B. No height above parapet required when distance from walls or parapet is more than 10 ft (3 m).
- C. 3 ft (91.4 cm) minimum
- D. Chimney
- E. Wall or parapet
- F. Height above any roof surface within 10 ft (3 m) horizontally
- G. 10 ft (3 m)
- H. 2 ft (61 cm) minimum
- I. Ridge

Check 2—Any Solid or Liquid Fuel Appliances Vented into This Chimney Channel

Solid fuel appliances include fireplaces, wood stoves, coal furnaces and incinerators.

Liquid fuel appliances include oil furnaces, oil-fired boilers and oil-fired water heaters.

Appliances which burn propane (sometimes referred to as LP [liquefied petroleum]) gas are considered gas-fired appliances.

Check 3—Chimney Crown Condition

Damage from condensate normally appears first in the crown. If any of the following trouble signs are present, the condition of the crown is not satisfactory.

- Crown leaning—“Fix 3—Rebuild the Crown”
- Bricks missing—“Fix 3—Rebuild the Crown”
- Mortar missing—“Fix 3—Rebuild the Crown”
- Tile liner cracked—“Fix 4—Relining”
- No tile liner—“Fix 4—Relining”
- Salt staining at mortar joints (white stains and mortar becomes sandy and/or erodes)—“Fix 4—Relining”

IMPORTANT: It may be necessary to follow both “Fix 3—Rebuild the Crown” and “Fix 4—Relining.”

Check 4—Debris in Cleanout

A cleanout (dropleg) must be in a location where the upper edge of the cleanout cover is at least 12" (30.5 cm) below the lower edge of the lowest chimney inlet opening.

A chimney without a cleanout could become partially blocked by debris. If no cleanout is present, the chimney must be relined (Fix 4—Relining). Remove the cleanout cover, and examine the cleanout for debris. If significant amounts of any of the following are found, reline the chimney (Fix 4—Relining).

- Fuel oil residue
- Bricks
- Mortar or sand
- Pieces of the tile liner
- Rusted pieces of the metallic liner

Check 5—Liner Condition

If a metal liner is present, it must be checked. It cannot be assumed that all existing metal liners are correctly installed and in good condition.

Remove the lowest existing vent connector and examine the inside of the elbow or tee at the base of the liner. A small amount of soot may be considered acceptable, provided the installer vacuums it away. If rusted pieces of the liner have collected here, the metal liner must be removed and replaced (Fix 4—Relining).

Next, gently tap the inside of the liner with a Phillips screwdriver. If the screwdriver perforates the liner, or if the tapping does not sound like metal hitting metal, the liner must be removed and replaced (Fix 4—Relining).

REMEMBER: All appliances must be vented inside the liner. Venting one appliance inside the liner and another appliance outside the liner is not acceptable.

Next, use a flashlight and a small mirror to look up inside the liner. B-vent must be supported so as to not come into direct contact with the chimney walls or tile liner. If it is not, it can probably be rehung so as to be acceptable. A thimble or fire stop may be helpful here.

Flexible liners should be hung straight or nearly straight. If it is spiraled in the chimney and in good condition, it should be rehung. To do this, break the top seal. Pull up and cut off the excess liner length and refit the top seal. Use caution when doing this, since the cut edges of flexible liners may be sharp.

The surfaces of the liner must be physically sound. If gaps or holes are present, the metal liner must be removed and replaced (Fix 4—Relining). Finally, confirm that the metal liner is the correct size for the appliances to be installed. Use the GAMA tables and rules.

NOTE: If a metal liner is not present, a clay tile liner must be present, or the chimney must be lined (Fix 4—Relining).

Use a flashlight and small mirror at the cleanout or vent connector to inspect the clay tile liner. If any of the following problems are present, reline (Fix 4—Relining).

- Tile sections misaligned
- Tile sections missing
- Gaps between tile sections
- Signs of condensate drainage at the cleanout or vent connectors
- Mortar protruding from between tile sections
- Use of sewer pipe or drainage pipe rather than an approved fire clay tile

Next, measure the size of the liner. It may be possible to do this from the cleanout. The liner must be at least as large as the minimum size established by the tables in National Fuel Gas Code NFPA 54/ANSI Z223.1—latest edition and in the National Standard of Canada, CAN/CSA B149.1 and CAN/CSA B149.2—latest editions and amendments. If the liner is too small or too large, then the chimney must be relined (Fix 4—Relining).

Check 6—Dilution Air

If gas-fired appliances are to be vented into a clay tile liner, a source of dilution air is required.

Dilution air cannot be obtained through the following:

- Induced draft appliances
- Natural draft appliances with vent dampers

Sufficient dilution air can ordinarily be obtained through the draft hood of a natural draft appliance only if the appliance's vent connector does not include a vent damper. If dilution air will not be available, the chimney must be relined (Fix 4—Relining).

Check 7—Complete the Installation

If checks 1 through 6 have been satisfactory, and the liner is an acceptable size as determined by the tables in National Fuel Gas Code NFPA 54/ANSI Z223.1—latest edition and in the National Standard of Canada, CAN/CSA B149.1 and CAN/CSA B149.2—latest editions and amendments, then the clay tile liner can probably be used as a vent for the gas appliances. However, the installer must keep in mind the following factors which may render the tile liner unsuitable for use as a vent:

- Extremely cold weather
- Long vent connectors
- Masonry chimneys with no air gap between the liner and the bricks—difficult to detect
- Exterior chimneys (the tables in National Fuel Gas Code NFPA 54/ANSI Z223.1—latest edition and in the National Standard of Canada, CAN/CSA B149.1 and CAN/CSA B149.2—latest editions and amendments assume interior chimneys)

If, in the judgment of the local gas utility, installer and/or local codes, one or more of the above factors is likely to present a problem, the chimney must be relined (Fix 4—Relining).

Fix 1—Liner Termination

Any cap or roof assembly used with a liner must be approved by the liner manufacturer for such use. The liner and cap/roof assembly must then terminate above the roof in accordance with the manufacturer's instructions.

In some cases, a shorter extension above the roof may be possible with a liner than would be required with a masonry chimney.

For further information on relining, see "Fix 4—Relining."

Fix 2—Change Venting Arrangements

If the masonry chimney has more than one channel, it may be possible to vent the gas appliances into one channel and vent the solid or liquid fuel appliance(s) into another channel(s). Do not vent an 80+ furnace inside of a metal liner with other appliances vented outside the liner.

Alternatively, the homeowner may agree to discontinue use of the fireplace (solid fuel appliance). If so, the tile liner must be cleaned to remove creosote buildup. The fireplace opening must then be permanently sealed.

If oil-fired appliance(s) are being replaced by gas-fired appliance(s), the tile liner must first be cleaned to remove the fuel oil residue.

If none of the above options is practical, the furnace may need to be vented vertically with a B-vent.

Under some conditions, a 90%+ furnace could be installed rather than an 80% furnace. The 90%+ furnace can be vented horizontally or vertically through PVC pipe.

Fix 3—Rebuild the Crown

If the chimney crown is damaged, a qualified mason must repair it in accordance with nationally recognized building codes or standards. One such standard which may be referenced is the Standard for Chimneys, Fireplaces, Vents, and Solid Fuel Burning Appliances, ANSI/NFPA 211.

Fix 4—Relining

Relining options include B-vent and flexible liners.

If the chimney has diagonal offsets, B-vent probably cannot be used.

If B-vent is to be used, it must be supported adequately. Supports (such as fire stops or thimbles) must be used to keep the B-vent from coming into direct contact with the tile liner or chimney walls. Direct contact would result in higher heat loss, with an increased possibility of poor venting system performance.

It is not acceptable to vent one appliance inside the B-vent and other appliances outside.

The excess space between the B-vent and the chimney walls must be covered at the top of the chimney by a weatherproof, corrosion resistant flashing. The B-vent should then be topped with a listed vent cap. The listed vent cap will, when installed according to the manufacturer's instructions, prevent problems due to rain, birds or wind effects.

A B-vent installed as described in this section is considered to be an enclosed vent system, and the sizing tables in National Fuel Gas Code NFPA 54/ANSI Z223.1—latest edition and in the National Standard of Canada, CAN/CSA B149.1 and CAN/CSA B149.2—latest editions and amendments may be used.

If a flexible liner is to be used, it must be made of the proper materials, such as:

- For most residential applications, an aluminum liner should be acceptable.
- If the combustion air supplied to the furnace will be contaminated with compounds containing chlorine or fluorine, a liner of AL 29-4C stainless steel should be used. Common sources of chlorine and fluorine compounds include indoor swimming pools and chlorine bleaches, paint strippers, adhesives, paints, varnishes, sealers, waxes (which are not yet dried) and solvents used during construction and remodeling. Various commercial and industrial processes may also be sources of chlorine/fluorine compounds.
- Heavier gauge 300 and 400 series stainless steel liners were developed for use with oil or solid-fuel appliances. They are not suitable for use with gas-fired appliances. Flexible liners specifically intended and tested for gas applications are listed in the UL "Gas and Oil Equipment Directory" (UL Standard 1777).

For sizing of flexible liners, see Note 22 and the tables in the National Fuel Gas Code NFPA 54/ANSI Z223.1—latest edition and in the National Standard of Canada, CAN/CSA B149.1 and CAN/CSA B149.2—latest editions and amendments.

To install the liner, read and follow the liner manufacturer's instructions and your local codes.

NOTES:

- Excess liner length should be pulled out of the chimney and cut off.
- Use caution when doing this, as the cut edges of flexible liners may be sharp.
- Do not spiral excess liner inside of the chimney.
- Support the liner as recommended by the liner manufacturer.

Some manufacturers of flexible liners offer an insulation sleeve designed to be added to the liner before it is installed in the chimney.

NOTE: Poured insulation, either vermiculite or other materials, is no longer recommended.

Insulation will need to be added to the flexible liner if:

- It is required by the liner manufacturer's instructions.
- The previous liner was properly sized and installed, and suffered from condensation damage.
- It is required by your local building codes.

Even if none of the 3 conditions exist which require additional liner insulation, the installer may wish to consider installing additional insulation if:

- The local climate is very cold.
- The chimney is very tall.
- The vent connectors used are very long or have a large number of elbows.
- Local experience indicates that flexible liners installed without insulation are likely to have condensation problems.

Insulation must be selected and installed in accordance with the liner manufacturer's instructions.

Finally, cap the chimney and terminate the liner in accordance with the liner manufacturer's instructions.

ELECTRICAL CONNECTIONS

 **WARNING**

HIGH VOLTAGE!

To avoid the risk of electrical shock, wiring to the unit must be polarized and grounded.



 **WARNING**

HIGH VOLTAGE!

To avoid personal injury or death due to electrical shock, disconnect electrical power before servicing or changing any electrical wiring.



 **CAUTION**

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

 **WARNING**

HIGH VOLTAGE!

To avoid the risk of injury, electrical shock or death, the furnace must be electrically grounded in accordance with local codes or in their absence, with the latest edition of the National Electric Code (NEC).



Wiring Harness

The wiring harness is an integral part of this furnace. Field alteration to comply with electrical codes should not be required. Wires are color coded for identification purposes. Refer to the wiring diagram for wire routings. If any of the original wire as supplied with the furnace must be replaced, it must be replaced with wiring material having a temperature rating of at least 105°C. Any replacement wiring must be a copper conductor.

115-Volt Line Connections

Before proceeding with electrical connections, ensure that the supply voltage, frequency and phase correspond to that specified on the unit rating plate. Power supply to the furnace must be NEC Class 1, and must comply with all applicable codes. The furnace must be electrically grounded in accordance with local codes or, in their absence, with the latest edition of The National Electric Code, ANSI NFPA 70 and/or The Canadian Electric Code CSA C22.1.

Use a separate fused-branch electrical circuit containing properly sized wire, and fuse or circuit breaker. The fuse or circuit breaker must be sized in accordance with the maximum overcurrent protection specified on the unit rating plate. An electrical disconnect must be provided at the furnace location.

Line voltage wiring must enter into the junction box provided with the furnace.

NOTE: Line polarity must be observed when making field connections.

Fossil Fuel Applications

This furnace can be used in conjunction with a heat pump in a fossil fuel application. A fossil fuel application refers to a combined gas furnace and heat pump installation which uses an outdoor temperature sensor to determine the most cost efficient means of heating (heat pump or gas furnace).

A heat pump thermostat with 2 stages of heat is required to properly use a furnace in conjunction with a heat pump. Refer to the fossil fuel kit installation instructions for additional thermostat requirements.

Strictly follow the wiring guidelines in the fossil fuel kit installation instructions. All furnace connections must be made to the furnace integrated control module and the FURNACE terminal strip on the fossil fuel control board.

Junction Box Relocation

 **WARNING**

Edges of sheet metal holes may be sharp. Use gloves as a precaution when removing hole plugs.

Line voltage connections can be made through either the right or left side panel. The furnace is shipped configured for a left side electrical connection. To make electrical connections through the opposite side of the furnace, the junction box must be relocated to the left side prior to making electrical connections. To relocate the junction box, perform the following steps.

 **WARNING**

To prevent personal injury or death due to electric shock, disconnect electrical power before installing or servicing this unit.

1. Remove both doors from the furnace.
2. Remove and save the screws securing the junction box to the right side of the furnace.
3. Models that have the junction box located in the burner compartment will need to move the junction box directly over.
4. Attach the junction box to the left side of the furnace using the screws removed in Step 2.
5. Check the location of the wiring. Confirm that it will not be damaged by heat from the burners or by the rotation of the fan. Also confirm that wiring location will not interfere with filter removal or other maintenance.

After the junction box is in the desired location, use washers to connect field-supplied conduit to the junction box in accordance with NEC and local codes. Connect hot, neutral, and ground wires as shown in the furnace wiring diagram. The wires and ground screw are located in the furnace junction box.

NOTES:

- In downflow applications, the power leads should be routed through the supplied wire tabs when rotating the junction box to the left side.
- Low voltage wires may be connected to the terminal strip.

IMPORTANT: To avoid possible equipment malfunction, route the low voltage wires to avoid interference with filter removal or other maintenance.

⚠ WARNING

HIGH VOLTAGE!

To avoid the risk of injury, electrical shock or death, the furnace must be electrically grounded in accordance with local codes or in their absence, with the latest edition of the National Electric Code (NEC).



To ensure proper unit grounding, the ground wire should run from the furnace ground screw located inside the furnace junction box all the way back to the electrical panel.

NOTE: Do not use gas piping as an electrical ground.

To confirm proper unit grounding, turn off the electrical power and perform the following check.

1. Measure the resistance between the neutral (white) connection and one of the burners.
2. Resistance should measure 10 ohms or less.

This furnace is equipped with a blower door interlock switch which interrupts the unit voltage when the blower door is opened for servicing.

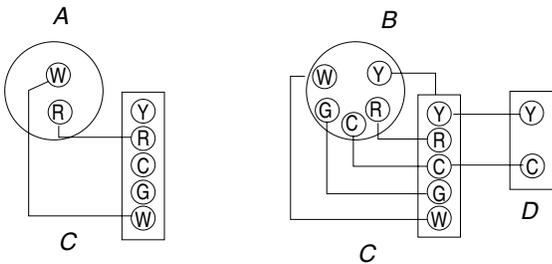
NOTE: Do not defeat this switch.

24-Volt Thermostat Wiring

NOTE: Wire routing must not interfere with circulator blower operation, filter removal or routine maintenance.

Low voltage connections can be made through either the right or left side panel. Thermostat wiring entrance holes are located in the blower compartment. See “Typical Field Wiring—24 VAC Control Circuit” for heat only and heat/cool system connections.

Typical Field Wiring—24 VAC Control Circuit



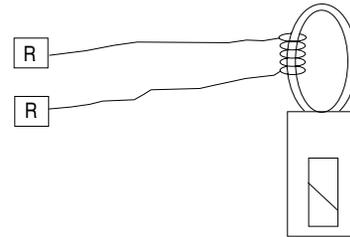
A. Heating room thermostat C. Furnace control
 B. Heating/cooling room thermostat D. Remote condensing unit

This furnace is equipped with a 40 VA transformer to facilitate use with most cooling equipment. Consult the wiring diagram, located on the blower compartment door, for further details of 115-volt and 24-volt wiring.

A single-stage thermostat with only 1 heating stage can be used to control this furnace.

Setting the Heat Anticipator

The following method should be used in measuring the amp draw of the control circuit to assure proper adjustment of the thermostat heat anticipator.



1. Wrap the “R” leg around a clip-on ammeter 10 times.
2. Energize the furnace in the heat mode.
3. Record the reading.
4. Divide this reading by 10.
5. Set the heat anticipator on the thermostat to match this reading.

Example: If the reading on the ammeter is 4, divide by 10. The anticipator setting will be 0.4 amps.

115-Volt Line Connection of Accessories— Electronic Air Cleaner and Humidifier

⚠ WARNING

HIGH VOLTAGE!

Disconnect ALL power before servicing.

Multiple power sources may be present.

Failure to do so may cause property damage, personal injury or death.



The furnace’s integrated control module is equipped with line-voltage accessory terminals for controlling power to an optional field-supplied electronic air cleaner.

The accessory load specifications are as follows:

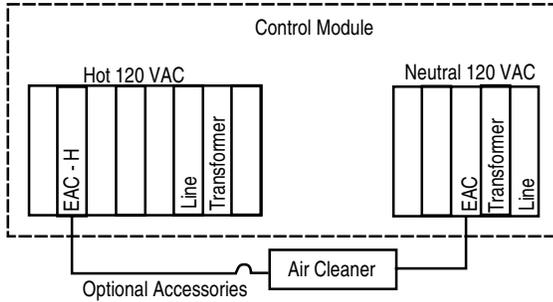
Electronic Air Cleaner—1.0 amp maximum at 120 VAC

NOTES:

- Turn off power to the furnace before installing any accessories.
- Follow the air cleaner manufacturers’ instructions for locating, mounting, grounding and controlling these accessories.
- Accessory wiring connections are to be made through the ¼” quick connect terminals provided on the furnace integrated control module.
- The electronic air cleaner hot terminal is identified as EAC-H.
- The electronic air cleaner neutral terminal is identified as NEUTRAL.
- All field wiring must conform to applicable codes.

Optional Accessories Wiring

Connections should be made as shown in the following illustration.



- If it is necessary for the installer to supply additional line voltage wiring to the inside of the furnace, the wiring must conform to all local codes, and have a minimum temperature rating of 105°C.
- All line voltage wire splices must be made inside the furnace junction box.
- The integrated control module electronic air cleaner terminals (EAC) are energized with 115 volts whenever the circulator blower is energized.

24 VAC Humidifier

The yellow wire connected to the induced draft blower pressure switch is powered anytime the pressure switch is closed and provides 24 VAC humidifier control.

1. Remove the yellow wire.
2. Connect the supplied brown jumper wire to the pressure switch terminal.
3. Reconnect the yellow wire to the “piggyback” terminal on the brown jumper.
4. Connect the 24 VAC line of the humidifier to the stripped end of the brown wire.

NOTE: Using a wire connector or a field-supplied quick connect terminal can make this connection. The wiring must conform to all local and national codes.

5. Connect the COM side of the humidifier to the B/C terminal on the furnace control board (or to the COM side of the 24 VAC transformer).

NOTE: Do not connect 115V humidifier to these terminals.

GAS SUPPLY AND PIPING

The furnace rating plate includes the approved furnace gas input rating and gas types. The furnace must be equipped to operate on the type of gas applied. This includes any conversion kits required for alternate fuels and/or high altitude.

CAUTION

To prevent unreliable operation or equipment damage, the inlet gas supply pressure must be as specified on the unit rating plate with all other household gas-fired appliances operating.

Inlet gas supply pressures must be maintained within the ranges specified in the Inlet Gas Supply Pressure chart. The supply pressure must be constant and available with all other household gas-fired appliances operating. The minimum gas supply pressure must be maintained to avoid unreliable ignition. The maximum must not be exceeded to keep the furnace from overfiring.

Inlet Gas Supply Pressure

Natural gas 5.0" W.C. minimum; 10.0" W.C. maximum

Propane gas 11.0" W.C. minimum; 13.0" W.C. maximum

NOTE: Adjusting the minimum supply pressure below the limits in the Inlet Gas Supply Pressure chart could lead to unreliable ignition. Gas input to the burners must not exceed the rated input shown on the rating plate. Overfiring of the furnace can result in premature heat exchanger failure. Gas pressures in excess of 13" W.C. can also cause permanent damage to the gas control valve.

At all altitudes, the manifold pressure must be within 0.3" W.C. of that listed in the Specification Sheet applicable to your model for the fuel used. At all altitudes and with either fuel, the air temperature rise must be within the range listed on the furnace nameplate.

Should this appliance be converted to LP gas, refer to the instructions included in the factory-authorized LP gas conversion kit.

High Altitude Derate

NOTE: The furnace will naturally derate itself with altitude. Do not attempt to increase the firing rate by changing orifices or increasing the manifold pressure. This can cause poor combustion and equipment failure.

High altitude installations may require both a pressure switch and an orifice change. These changes are necessary to compensate for the natural reduction in the density of both the gas fuel and the combustion air at higher altitude.

Contact the distributor for a tabular listing of appropriate manufacturer's kits for propane gas and/or high altitude installations. The indicated kits must be used to insure safe and proper furnace operation. All conversions must be performed by a qualified installer or service agency.

Propane Gas Conversion



WARNING

Possible property damage, personal injury or death may occur if the correct conversion kits are not installed. The appropriate kits must be applied to ensure safe and proper furnace operation. All conversions must be performed by a qualified installer or service agency.

This unit is configured for Natural gas. The appropriate manufacturer's propane gas conversion kit, must be applied for propane gas installations. See "Propane Gas and/or High Altitude Installations."

For installations above 7,000 ft (2,133.6 m), please refer to your distributor for the required kit(s).

Models Using Single-Stage Gas Control Valves

Gas	Altitude	Kit	Orifice	Manifold Pressure	Pressure Switch
Natural	0 to 7,000 ft (2,133.6 m)	None	#43	3.5" W.C.	None
Propane		LPT-00 LPT-03	#55	10.0" W.C.	None

NOTES:

- LPT-00 supports White-Rodgers single-stage valve only.
- LPT-03 supports both Honeywell and White-Rodgers single-stage valves.
- In Canada, gas furnaces are only certified to 4,500 ft (1,371.6 m).

Contact your distributor for a tabular listing of appropriate manufacturer's kits for propane gas and/or high altitude installations. The indicated kits must be used to ensure safe and proper furnace operation. All conversions must be performed by a qualified installer or service agency.

Gas Piping Connections



CAUTION

To avoid possible unsatisfactory operation or equipment damage due to underfiring of equipment, use the proper size of Natural/propane gas piping needed when running pipe from the meter/tank to the furnace.

When sizing a trunk line, be sure to include all appliances which will operate simultaneously.

The gas piping supplying the furnace must be properly sized based on the gas flow required, specific gravity of the gas and the length of the run. The gas line installation must comply with local codes, or in their absence, with the latest edition of the National Fuel Gas Code, NFPA 54/ANSI Z223.1.

Natural Gas Capacity of Pipe—Cu ft of Gas Per Hour (CFH)

Length of Pipe—ft (m)	Nominal Black Pipe Size				
	½"	¾"	1"	1¼"	1½"
10 (3)	132	278	520	1,050	1,600
20 (6.1)	92	190	350	730	1,100
30 (9.2)	73	152	285	590	980
40 (12.2)	63	130	245	500	760
50 (15.2)	56	115	215	440	670
60 (18.3)	50	105	195	400	610
70 (21.3)	46	96	180	370	560
80 (24.4)	43	90	170	350	530
90 (27.4)	40	84	160	320	490
100 (30.5)	38	79	150	305	460

Pressure 0.5 psig or less and pressure drop of 0.3" W.C.; based on 0.60 specific gravity gas

$$CFH = \frac{\text{Btu/h Furnace Input}}{\text{Heating Value of Gas (Btu/cu ft)}}$$

To connect the furnace to the building's gas piping, the installer must supply a ground joint union, drip leg, manual shutoff valve and line and fittings to connect to the gas control valve. In some cases, the installer may also need to supply a transition piece from ½" (1.3 cm) pipe to a larger pipe size.

The following stipulations apply when connecting gas piping.

- Use black iron or steel pipe and fittings for building piping.
- Use pipe joint compound (pipe dope) on male threads only.
- Always use pipe joint compound (pipe dope) that is approved for all gases.

NOTE: Do not apply compound to the first 2 threads.

- Use ground joint unions.
- Install a drip leg to trap dirt and moisture before it can enter the gas control valve.

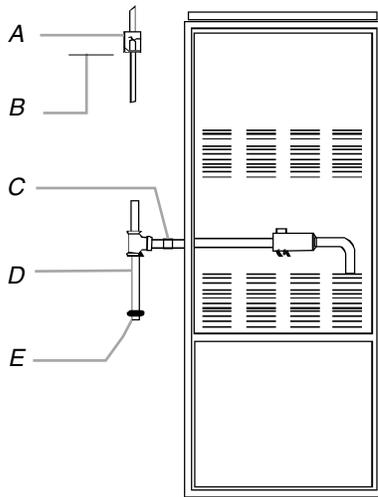
NOTE: The drip leg must be a minimum of 3" (7.6 cm) long.

- Install a ⅛" NPT pipe plug fitting, accessible for test gage connection, immediately upstream of the gas supply connection to the furnace.
- Use 2 pipe wrenches when making the connection to the gas control valve to keep it from turning.

NOTE: The orientation of the gas control valve on the manifold must be maintained as shipped from the factory.

- Install a manual shutoff valve between the gas meter and the furnace within 6 ft (1.8 m) of the furnace.
 - If a union is installed, the union must be downstream of the manual shutoff valve, between the shutoff valve and the furnace.
 - Tighten all joints securely.
 - Connect the furnace to the building piping by one of the following methods:
 1. Rigid metallic pipe and fittings.
 2. Semirigid metallic tubing and metallic fittings.
- NOTE:** Aluminum alloy tubing must not be used in exterior locations.
- Use UL Listed/CSA approved gas appliance connectors in accordance with their instructions.
 - Gas connectors must be fully in the same room as the furnace.
 - Protect gas connectors and semirigid tubing against physical and thermal damage when installed.
 - Ensure that aluminum alloy tubing and connectors are coated to protect against external corrosion when in contact with masonry, plaster, insulation or subjected to repeated wetting by liquids such as water (except rainwater), detergents or sewage.

General Furnace Layout



- A. Manual shutoff valve location
(upstream of ground joint pipe union)
- B. Height required by local codes
- C. Ground joint pipe union (upstream of gas control valve)
- D. Drip leg
- E. Reducing coupling— $\frac{1}{2}$ " x $\frac{1}{8}$ " with $\frac{1}{8}$ " pipe plug to measure line gas pressure

Upflow Installations

When the gas piping enters through the right side of the furnace, the installer must supply the following fittings (starting from the gas control valve):

- 90° elbows (2)
- Close nipple
- Straight pipe to reach the exterior of the furnace
- Ground joint union
- Drip leg
- Manual shutoff valve
- Transition piece from $\frac{1}{2}$ " to another pipe size, if needed

When the gas piping enters through the left side of the furnace, the installer must supply the following fittings (starting from the gas control valve):

- Straight pipe to reach the exterior of the furnace
- Ground joint union
- Drip leg
- Manual shutoff valve
- Transition piece from $\frac{1}{2}$ " to another pipe size, if needed

Counterflow Installations

When the gas piping enters through the left side of the furnace, the installer must supply the following fittings (starting from the gas control valve):

- Straight pipe to reach the exterior of the furnace
- Ground joint union
- Drip leg
- Manual shutoff valve
- Transition piece from $\frac{1}{2}$ " to another pipe size, if needed

When the gas piping enters through the right side of the furnace, the installer must supply the following fittings (starting from the gas control valve):

- 90° elbows (2)
- Close nipple
- Straight pipe to reach the exterior of the furnace

Gas Piping Checks

Before placing the furnace in operation, leak test the furnace and gas connections.

WARNING

To avoid the possibility of explosion or fire, never use a match or open flame to test for leaks.

Check for leaks using an approved chloride-free soap and water solution, an electronic combustible gas detector, or other approved testing methods.

WARNING

To prevent property damage or personal injury due to fire, the following instructions must be performed regarding gas connections, pressure testing, location of shutoff valve and installation of gas piping.

NOTES:

- Never exceed specified pressures for testing. Higher pressure may damage the gas control valve and cause subsequent overfiring, resulting in heat exchanger failure.
- Disconnect this unit and the shutoff valve from the gas supply piping system before pressure testing the supply piping system with pressures in excess of ½ psig (3.48 kPa).
- This unit must be isolated from the gas supply piping system by closing the manual shutoff valve before pressure testing supply piping system with test pressures equal to or less than ½ psig (3.48 kPa).

Propane Gas Tanks and Piping

WARNING

If the gas furnace is installed in a basement, and excavated area or a confined space, it is strongly recommended to contact a propane supplier to install a gas detecting warning device in case of a gas leak.

- Since propane gas is heavier than air, any leaking can settle in low areas or confined spaces.
- Propane gas odorant may fade, making the gas undetectable except with a warning device.

A gas detecting warning system is the only reliable way to detect a propane gas leak. Rust can reduce the level of odorant in propane gas. Do not rely on your sense of smell. Contact a local propane gas supplier about installing a gas detecting warning system.

NOTE: If a gas odor is detected, follow the instructions in “Gas Furnace Safety Precautions” in this manual.

All propane gas equipment must conform to the safety standards of the National Board of Fire Underwriters, NBFU Manual 58.

For satisfactory operation, propane gas pressure must be 10.0" W.C. at the furnace manifold with all gas appliances in operation.

Maintaining proper gas pressure depends on 3 main factors:

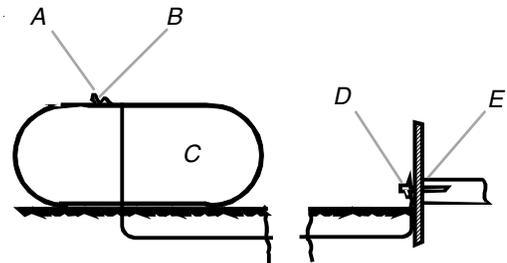
- Vaporization rate, depending on temperature of the liquid and “wetted surface” area of the container or containers.
- Proper pressure regulation. 2-stage regulation is recommended for both cost and efficiency.
- Pressure drop in the lines between the regulators, and between 2nd stage regulator and the appliance. Pipe size will depend on the length of the pipe run and the total load of all appliances.

Complete information regarding tank sizing for vaporization, recommended regulator settings, and pipe sizing is available from most regulator manufacturers and propane gas suppliers.

Since propane gas will quickly dissolve white lead and most standard commercial compounds, special pipe dope must be used. Shellac-based compounds resistant to the actions of liquefied petroleum gases, such as Gasolac®, Stalactic®, Clyde's® or John Crane® are satisfactory.

Refer to “Propane Gas Installation—Typical” for typical propane gas installations and piping.

Propane Gas Installation—Typical



A. 1st stage regulator
B. 5 to 15 psig (20 psig maximum)
C. 200 psig maximum

D. 2nd stage regulator
E. Continuous 11" W.C.

Sizing Between 1st and 2nd Stage Regulator*

Maximum propane capacities listed are based on 2 psig pressure drop at 10 psig setting. Capacities in 1,000 Btu/h.

Propane Gas Piping Chart I

Pipe or Tubing Length—ft (m)	Tubing Size, O.D. Type L					Nominal Pipe Size Schedule 40	
	3/8"	1/2"	5/8"	3/4"	7/8"	1/2"	3/4"
10 (3)	730	1,700	3,200	5,300	8,300	3,200	7,500
20 (6.1)	500	1,100	2,200	3,700	5,800	2,200	4,200
30 (9.2)	400	920	2,000	2,900	4,700	1,800	4,000
40 (12.2)	370	850	1,700	2,700	4,100	1,600	3,700
50 (15.2)	330	770	1,500	2,400	3,700	1,500	3,400
60 (18.3)	300	700	1,300	2,200	3,300	1,300	3,100
80 (24.4)	260	610	1,200	1,900	2,900	1,200	2,600
100 (30.5)	220	540	1,000	1,700	2,600	1,000	2,300
125 (38.1)	200	490	900	1,400	2,300	900	2,100
150 (45.7)	190	430	830	1,300	2,100	830	1,900
175 (53.3)	170	400	780	1,200	1,900	770	1,700
200 (61)	160	380	730	1,100	1,800	720	1,500

To convert to capacities at 15 psig settings—multiply by 1.13. To convert to capacities at 5 psig settings—multiply by 0.879.

Sizing Between 2nd Stage and Appliance Regulator*

Maximum propane capacities listed are Based on 2 psig pressure drop at 10 psig setting. Capacities in 1,000 Btu/h.

Propane Gas Piping Chart II

Pipe or Tubing Length—ft (m)	Tubing Size, O.D. Type L					Nominal Pipe Size Schedule 40					
	3/8"	1/2"	5/8"	3/4"	7/8"	1 1/8"	1/2"	3/4"	1"	1 1/4"	1 1/2"
10 (3)	39	92	199	329	501	935	275	567	1,071	2,205	3,307
20 (6.1)	26	62	131	216	346	630	189	393	732	1,496	2,299
30 (9.2)	21	50	107	181	277	500	152	315	590	1,212	1,858
40 (12.2)	19	41	90	145	233	427	129	267	504	1,039	1,559
50 (15.2)	18	37	79	131	198	376	114	237	448	913	1,417
60 (18.3)	16	35	72	121	187	340	103	217	409	834	1,275
80 (24.4)	13	29	62	104	155	289	89	185	346	724	1,066
100 (30.5)	11	26	55	90	138	255	78	162	307	630	976
125 (38.1)	10	24	48	81	122	224	69	146	275	567	866
150 (45.7)	9	21	43	72	109	202	63	132	252	511	787
200 (61)	8	19	39	66	100	187	54	112	209	439	665
250 (76.2)	8	17	36	60	93	172	48	100	185	390	590

Data in accordance with NFPA pamphlet Number 54.

CIRCULATING AIR AND FILTERS

Ductwork—Airflow

WARNING

Never allow the products of combustion, including carbon monoxide, to enter the return ductwork or circulation air supply.

- Duct systems and register sizes must be properly designed for the CFM and external static pressure rating of the furnace. Design the ductwork in accordance with the recommended methods of “Air Conditioning Contractors of America” Manual D.
- Install the duct system in accordance with Standards of the National Board of Fire Underwriters for the Installation of Air Conditioning, Warm Air Heating and Ventilating Systems. Pamphlets No. 90A and 90B.
- A closed return duct system must be used with the return duct connected to the furnace.
NOTE: Ductwork must never be attached to the back of the furnace.
- For installations requiring more than 1,800 CFM, use either 2 side returns or bottom return.
- Flexible joints may be used for supply and return connections to reduce noise transmission.
- To prevent the blower from interfering with combustion air or draft when a central return is used, a connecting duct must be installed between the unit and the utility room wall.
- Never use a room, closet or alcove as a return air chamber.

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

When the furnace is installed without a cooling unit, it is recommended that a removable access panel be provided in the outlet air duct. This opening shall be accessible when the furnace is installed and shall be of such a size that the heat exchanger can be viewed for visual light inspection or such that a sampling probe can be inserted into the airstream. The access panel must be made to prevent air leaks when the furnace is in operation.

When the furnace is heating, the temperature of the return air entering the furnace must be between 55°F and 100°F (13°C and 38°C).

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 sealed to the furnace casing and terminating outside the space containing the furnace.

Filters—Read this Section Before Installing the Return Air Ductwork

Filters must be used with this furnace. Discuss filter maintenance with the building owner. Filters are not ship with this furnace, but must be provided by the installer. Filters must comply with UL900 or CAN/ULCS111 standards. If the furnace is installed without filters, the warranty will be voided.

NOTE: An undersized opening will cause reduced airflow. The bottom return is set up as a knockout.

Upright Installations

Depending on the installation and/or customer preference, differing filter arrangements can be applied. Filters can be installed in the central return register, in a side panel external filter rack kit (upflows) or in the ductwork above a downflow furnace. As an alternative, a media air filter or electronic air cleaner can be used as the primary filter.

Circulation Air Filters

One of the most common causes of a problem in a forced air heating system is a blocked or dirty filter. Circulating air filters must be inspected monthly for dirt accumulation and replaced if necessary. Failure to maintain clean filters can cause premature heat exchanger failure.

A new home may require more frequent replacement until all construction dust and dirt is removed. Circulating air filters are to be installed in the return air duct external to the furnace cabinet.

Minimum Filter Sizes for Disposable Filters— Disposable Nominal 300 F.M. Face Velocity

Furnace Input	Filter Size (sq. in.)
45M	320
70M	483
90M	640
115M	800
140M	738

Horizontal Installations

Filters must be installed in either the central return register or in the return air ductwork.

SEQUENCE OF OPERATION—INTEGRATED IGNITION CONTROL

Refer to the timing charts for sequencing.

Power Up

The normal power up sequence is as follows:

- 115 VAC power applied to furnace.
 - Integrated control module performs internal checks.
 - Integrated control module LED will light.
 - Integrated control module monitors safety circuits continuously.
 - Furnace awaits call from thermostat.
-

Heating Mode

The normal operational sequence in heating mode is as follows:

- R and W thermostat contacts close, initiating a call for heat.
 - Integrated control module performs safety circuit checks.
 - Induced draft blower is energized for a 15-second prepurge period causing the pressure switch contacts to close.
 - Igniter warm-up begins after 15-second prepurge expires.
 - Gas control valve open at the end of the igniter warm-up period, delivering gas to the burners and establishing flame.
 - Integrated control module monitors flame presence. Gas control valve will remain open only if flame is detected.
 - Circulator blower is energized on high heat speed following a fixed 30-second blower on delay. Electronic air cleaner terminals are energized with circulator blower.
 - Furnace operates; integrated control module monitors safety circuits continuously.
 - R and W thermostat contacts open, completing the call for heat.
 - Gas control valve closes, extinguishing flame.
 - Induced draft blower is de-energized following a 15-second post-purge period.
 - The circulator blower remains at high-heat speed for the selected heat off delay period.
 - Furnace awaits next call from thermostat.
-

Cooling Mode

The normal operational sequence in cooling mode is as follows:

- R and Y thermostat contacts close, initiating a call for cool.
 - Integrated control module performs safety circuit checks.
 - Outdoor fan and compressor are energized.
 - Circulator blower is energized on cool speed following a fixed 5-second on delay. Electronic air cleaner terminals are energized with circulator blower.
 - Furnace circulator blower and outdoor cooling unit run; integrated control module monitors safety circuits continuously.
 - R and Y thermostat contacts open, completing the call for cool.
 - Outdoor fan and compressor are de-energized.
 - Circulator blower is de-energized following a fixed 45-second cool off delay period. Electronic air cleaner terminals are de-energized.
 - Furnace awaits the next call from thermostat.
-

Fan Only Mode

The normal operational sequence in fan only mode is as follows:

- R and G thermostat contacts close, initiating a call for fan.
 - Integrated control module performs safety circuit checks.
 - Circulator blower is energized on low-heat speed. Electronic air cleaner terminals are energized.
 - Circulator blower runs; integrated control module monitors safety circuits continuously.
 - R and G thermostat contacts open, completing the call for fan.
 - Circulator blower is de-energized. Electronic air cleaner terminals are de-energized.
 - Furnace awaits next call from thermostat.
-

START-UP PROCEDURE AND ADJUSTMENT

- Furnace must have a 115 VAC power supply properly connected and grounded. Proper polarity must be maintained for correct operation.
- An interlock switch prevents furnace operation if the blower door is not in place. Keep the blower access door in place except for inspection and maintenance.
- This furnace is also equipped with a self-diagnosing electronic control module. In the event a furnace component is not operating properly, the control module LED will flash on and off in a factory-programmed sequence, depending on the problem encountered. This light can be viewed through the observation window in the blower access door. See “Troubleshooting” for further explanation of the lighting codes.
- Follow the start-up and adjustment items. See “Operational Checks.”

Furnace Operation

- Purge the gas lines of air prior to start-up.
NOTE: Be sure not purge lines into an enclosed burner compartment.
- Check for leaks using an approved chloride-free soap and water solution, an electronic combustible gas detector or other approved method.
- Verify that all required kits (propane gas, high altitude, etc.) have been appropriately installed.
- An interlock switch prevents furnace operation if the blower door is not in place. Keep the blower access door in place except for inspection and maintenance.

Furnace Start-Up

1. Close the manual gas shutoff valve external to the furnace.
2. Disconnect the electrical power to the furnace.
3. Set the room thermostat to the lowest possible setting.
4. Remove the burner compartment door.

NOTE: This furnace is equipped with an ignition device which automatically lights the burner. Do not try to light the burner by hand.

5. Push the switch to the OFF position.
6. Wait 5 minutes to clear out any gas. Check for a gas odor, including near the floor.
7. If a gas odor is detected following the 5-minute waiting period, immediately leave the building and call your gas supplier or the fire department.
8. If no gas odor is detected after 5 minutes, push the switch to the ON position.
9. Replace the burner compartment door.
10. Open the manual gas shutoff valve external to the furnace.
11. Reconnect the electrical power to the furnace.
12. Set the room thermostat to the desired temperature.

NOTE: There is an approximate 30-second delay between thermostat energizing and burner firing.

Furnace Shutdown

1. Set the thermostat to the lowest setting.
2. Disconnect the electrical power to the furnace.
3. Remove the burner compartment door.
4. Push the switch to the OFF position.
5. Close the manual gas shutoff valve external to the furnace.
6. Replace the burner compartment door.

Gas Supply Pressure Measurement

CAUTION

To prevent unreliable operation or equipment damage, the inlet gas supply pressure must be as specified on the unit rating plate with all other household gas-fired appliances operating.

WARNING

HIGH VOLTAGE!

Disconnect **ALL** power before servicing.

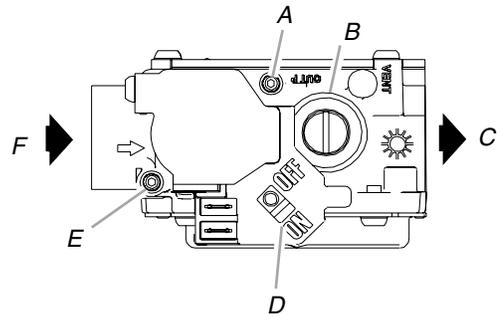
Multiple power sources may be present.

Failure to do so may cause property damage, personal injury or death.



The line pressure supplied to the gas control valve must be within the range specified in the Inlet Gas Supply Pressure chart. The supply pressure can be measured at the gas control valve inlet pressure tap or at a hose fitting installed in the gas piping drip leg. The supply pressure must be measured with the unit set to OFF. To measure inlet pressure, use the following procedure.

Gas Control Valve—White-Rodgers Model 36G22



A. Outlet pressure tap

B. Pressure regulator adjustment
(under cap screw)

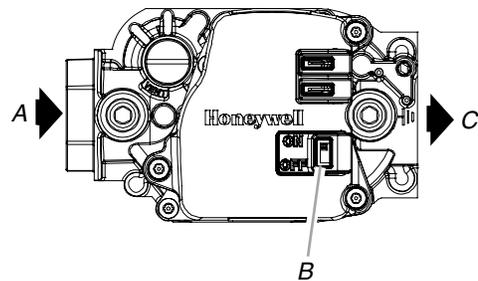
C. Outlet

D. On/Off selector switch

E. Inlet pressure tap

F. Inlet

Gas Control Valve—Honeywell Model VR8215 Single-Stage



A. Inlet

B. On/off selector switch

C. Outlet

1. Turn off the gas supply to the furnace at the manual gas shutoff valve external to the furnace.
2. Disconnect all electrical power to the system.
3. For the Honeywell VR8215 valve, remove the inlet pressure boss plug. Install an 1/8" NPT hose barb fitting into the inlet pressure tap.
4. For the White-Rodgers 36G22 valve, loosen the inlet pressure test screw (inlet pressure boss) 1 turn counterclockwise.
NOTE: Be sure to not turn the test screw more than one turn.
5. Attach a hose and manometer to the inlet pressure barb fitting (Honeywell valve) or inlet pressure boss (White-Rodgers valve).
6. Turn on the gas supply to the furnace at the manual gas shutoff valve external to the furnace.
7. Reconnect all electrical power to the system.
8. Close thermostat "R" and "W" contacts to provide a call for heat.
9. Using a leak detection solution or soap suds, check for leaks at the inlet pressure boss plug (Honeywell valve) or test screw (White-Rodgers valve).

IMPORTANT: Bubbles forming indicate a leak. Turn off the gas and repair all leaks immediately.

10. Measure the gas supply pressure with burners firing. Adjust supply pressure using the Inlet Gas Supply Pressure chart. If supply pressure reading differs from the chart, make necessary adjustments to pressure regulator, gas piping size, etc., and/or consult with the local gas utility.

Inlet Gas Supply Pressure

Natural gas 5.0" W.C. minimum; 10.0" W.C. maximum

Propane gas 11.0" W.C. minimum; 13.0" W.C. maximum

11. Disconnect all electrical power and turn off the gas supply to the system.
12. Remove the manometer hose from the hose barb fitting on the inlet pressure boss.
13. For the Honeywell VR8215 valve, remove the 1/8" NPT hose barb fitting from the inlet pressure tap. Replace the inlet pressure boss plug and seal with a high quality thread sealer.
14. For the White-Rodgers 36G22 valve, tighten the inlet pressure test screw to seal pressure port (clockwise, 7 in.-lb minimum).
15. Retest for leaks.
IMPORTANT: Bubbles forming indicate a leak. Turn off the gas and repair all leaks immediately.
16. Reconnect all electrical power and turn on gas supply to the system.
17. Turn the gas control valve switch to ON.

3. For the Honeywell VR8215 valve, remove the outlet pressure boss plug. Install an 1/8" NPT hose barb fitting into the outlet pressure tap.
4. For the White-Rodgers 36G22 valve, loosen the outlet pressure test screw (outlet pressure boss) 1 turn counterclockwise.

NOTE: Be sure to not turn the test screw more than one turn.

5. Attach a hose and manometer to the outlet pressure barb fitting (Honeywell valve) or outlet pressure boss (White-Rodgers valve).
6. Turn on electrical power and gas supply to the system.
7. Close thermostat R and W contacts to provide a call for heat.
8. Using a leak detection solution or soap suds, check for leaks at the outlet pressure boss plug (Honeywell valve) or test screw (White-Rodgers valve).

IMPORTANT: Bubbles forming indicate a leak. Turn off the gas and repair all leaks immediately.

9. Measure the gas manifold pressure with burners firing. Adjust manifold pressure using the Manifold Gas Supply Pressure chart.

Manifold Gas Supply Pressure

Natural gas 3.5" W.C.

Propane gas 10.0" W.C.

10. Remove the regulator cover screw from the outlet pressure regulator adjust and turn the screw clockwise to increase the pressure or counterclockwise to decrease pressure.
11. Replace the regulator cover screw.
12. Disconnect all electrical power and turn off the gas supply to the system.
13. Remove the manometer hose from the hose barb fitting on the outlet pressure boss.
14. For the Honeywell VR8215 valve, remove the 1/8" NPT hose barb fitting from the outlet pressure tap. Replace the outlet pressure boss plug and seal with a high-quality thread sealer.
15. For the White-Rodgers 36G22 valve, tighten the outlet pressure test screw to seal pressure port (clockwise, 7 in.-lb minimum).
16. Turn on electrical power and gas supply to the system.
17. Close thermostat "R" and "W" contacts to provide a call for heat.
18. Retest for leaks.

IMPORTANT: Bubbles forming indicate a leak. Turn off the gas and repair all leaks immediately.

Gas Manifold Pressure Measurement and Adjustment



CAUTION

To prevent unreliable operation or equipment damage, the gas manifold pressure must be as specified on the unit rating plate. Only minor adjustments should be made by adjusting the gas control valve pressure regulator.



WARNING

HIGH VOLTAGE!

Disconnect **ALL** power before servicing.

Multiple power sources may be present.

Failure to do so may cause property damage, personal injury or death.



This valve is shipped from the factory with the regulator preset (see control label).

Consult the appliance rating plate to ensure burner manifold pressure is as specified. If another outlet pressure is required, follow these steps.

1. Turn off the gas supply to furnace at the manual gas shutoff valve external to the furnace.
2. Disconnect all electrical power to the system.

Gas Input Rate Measurement—Natural Gas Only

The gas input rate to the furnace must never be greater than that specified on the unit rating plate. To measure Natural gas input using the gas meter, use the following procedure.

1. Turn off the gas supply to all other gas-burning appliances except the furnace.
2. While the furnace is operating, time and record one complete revolution of the smallest gas meter dial.

- Calculate the number of seconds per cubic foot (sec/ft³) of gas being delivered to the furnace. If the dial is a 1 cubic foot dial, divide the number of seconds recorded in Step 2 by one. If the dial is a 2 cubic foot dial, divide the number of seconds recorded in Step 2 by 2.
- Calculate the furnace input in Btu per hour (Btu/h). Input equals the sum of the installation's gas heating value and a conversion factor (hours to seconds) divided by the number of seconds per cubic foot. The measured input must not be greater than the input indicated on the unit rating plate.
 Example: Installation's gas heating (HTG) value: 1,000 Btu/ft³ (Obtained from gas supplier)
 Installation's seconds per cubic foot: 34 sec/ft³
 Conversion Factor (hours to seconds): 3,600 sec/h
 Input = (Htg. value x 3,600) ÷ seconds per cubic foot
 Input = (1,000 Btu/ft³ x 3,600 sec/h) ÷ 34 sec/ft³
 Input = 106,000 Btu/h
 This measured input must not be greater than the input indicated on the unit rating plate.
- Turn on the gas supply to all other appliances turned off in Step 1.
- Ensure that all appliances are functioning properly and that all pilot burners are lit and operating.

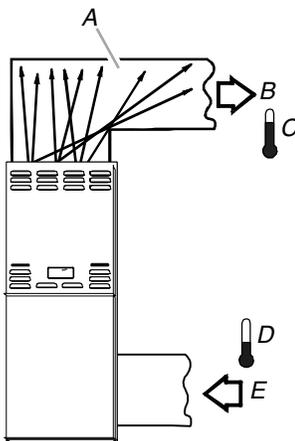
Temperature Rise

Air temperature rise is the temperature difference between the supply and return air. The proper amount of temperature rise is usually obtained when the unit is operated at the rated input with the "as shipped" blower speed. If the correct amount of temperature rise is not obtained, it may be necessary to change the blower speed.

An incorrect temperature rise can cause condensing in or overheating of the heat exchanger. Determine and adjust the temperature rise as follows. The temperature rise must be within the range specified on the rating plate or Specification Sheet applicable to your model. Please contact your distributor for the applicable Specification Sheet.

Temperature Rise Measurement

Rise = Supply air temperature - Return air temperature



A. Heat exchanger radiation "line of sight"
 B. Supply air
 C. Supply air temperature
 D. Return air temperature
 E. Return air

- Operate furnace with burners firing for approximately 15 minutes.
- Ensure that all registers are open and all duct dampers are in their final (fully or partially open) position.
- Place thermometers in the return and supply ducts as close to the furnace as possible. Thermometers must not be influenced by radiant heat from the heat exchanger.
- Subtract the return air temperature from the supply air temperature to determine the air temperature rise. Allow adequate time for thermometer readings to stabilize.
- Adjust the temperature rise by adjusting the circulator blower speed. Increase blower speed to reduce temperature rise. Decrease blower speed to increase temperature rise. Refer to "Circulator Blower Speeds" for speed changing details.

Circulator Blower Speeds

WARNING

To avoid personal injury or death due to electrical shock, turn OFF power to the furnace before changing speed taps.

This furnace is equipped with a PSC circulator blower motor. This blower provides ease in adjusting blower speeds. Refer to the Blower Performance Data chart for proper selection of heating and cooling speeds.

The cooling blower speed is shipped set on HIGH. High heat ships on MEDIUM and low heat is shipped on MEDIUM-LO. These blower speeds should be adjusted by the installer to match the installation requirements so as to provide the correct heating temperature rise and the correct cooling CFM.

To adjust the circulator blower speed, proceed as follows:

- Turn OFF power to the furnace.
- Select the heating and cooling blower speeds that match the installation requirements from the airflow table in the Product Data Book applicable to your model. Please contact your distributor for the applicable product data book.
- Relocate desired motor leads to the circulator blower heat and cool speed terminals on the integrated control module. Terminals are identified as LO HEAT, HI HEAT and COOL (hot) (on some models), or HEAT and COOL (on some models). If a heating speed and the cooling speed are the same, a jumper wire must be used between the heat and cool terminals.
- Connect all unused blower motor leads to the "PARK" terminals on the integrated control module. Any leads not connected to the "PARK" terminals must be taped.
- Turn on power to furnace.
- Verify the proper temperature rise as outlined in "Temperature Rise."

Circulator Blower Fan Timing Adjustment

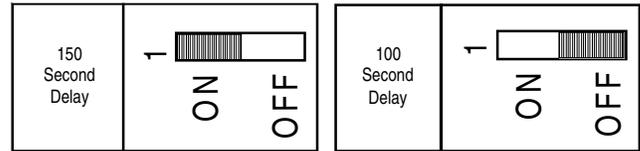
NOTE: Items in this section refer to the air circulator blower fan, not the induced draft blower. The induced draft blower timing sequence is not adjustable. The circulator blower fan timing is adjustable only on models with optional Heating Fan Off Delay adjustment pins or switches. It is not adjustable in any other circumstances.

As shipped, the circulator blower fan will remain on for 150 seconds after the gas control valve closes. When a call for cooling occurs, the circulator fan comes on and remains on for

45 seconds after the call for cooling ends. During normal heating operation, the circulator fan will come on approximately 34 seconds after the gas control valve opens.

Adjustable Switch

Switch viewed in an upflow installation.



Blower Performance Data—WFM18

CFM and Temperature Rise vs. External Static Pressure

Model—Heating Speed as Shipped	Motor Speed	Tons AC at 0.5" ESP	External Static Pressure (Inches Water Column)												
			0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8					
			CFM	Rise CFM	CFM	Rise CFM	CFM	Rise CFM	CFM	Rise CFM	CFM	Rise CFM	CFM	Rise CFM	
WFM18045S3AX (Medium)	High	3.0	1,521	22	1,466	23	1,414	24	1,373	24	1,298	26	1,243	1,164	1,075
	Med	2.5	1,160	29	1,160	29	1,132	29	1,121	30	1,082	31	1,042	997	925
	Med-Lo	2.0	961	35	955	35	948	35	932	36	913	37	882	821	803
	Low	1.5	781	43	785	42	781	43	773	43	761	44	745	716	668
WFM18070S3AX (Medium)	High	3.0	1,422	36	1,352	38	1,307	40	1,197	43	1,157	45	1,092	1,075	983
	Med	2.5	1,098	47	1,081	48	1,051	49	1,039	50	1,021	51	983	924	868
	Med-Lo	2.0	919	56	913	57	892	58	847	-	829	-	818	792	728
	Low	1.5	758	-	741	-	741	-	733	-	699	-	677	649	626
WFM18070S4BX (Medium)	High	4.0	2,134	-	2,100	25	2,042	25	1,975	26	1,883	28	1,786	1,700	1,601
	Med	3.5	1,668	31	1,663	31	1,656	31	1,645	32	1,616	32	1,549	1,492	1,391
	Med-Lo	3.0	1,419	37	1,426	36	1,426	36	1,432	36	1,419	37	1,378	1,328	1,261
	Low	2.5	1,134	46	1,145	45	1,166	44	1,171	44	1,160	45	1,144	1,111	1,071
WFM18090S4BX (Medium)	High	4.0	2,051	-	1,983	-	1,895	35	1,812	37	1,725	39	1,627	1,530	1,439
	Med	3.5	1,736	38	1,708	39	1,652	40	1,611	41	1,540	43	1,475	1,394	1,307
	Med-Lo	3.0	1,493	45	1,668	40	1,459	46	1,429	47	1,389	48	1,339	1,274	1,204
	Low	2.5	1,200	56	1,185	56	1,180	56	1,173	57	1,158	58	1,125	1,125	1,080
WFM18090S5CX (Medium)	High	5.0	2,290	-	2,229	-	2,155	-	2,047	-	1,960	-	1,837	1,712	1,584
	Med	4.0	1,852	36	1,820	37	1,777	38	1,719	39	1,641	41	1,567	1,469	1,382
	Med-Lo	3.5	1,615	41	1,592	42	1,556	43	1,516	44	1,470	45	1,405	1,346	1,235
	Low	3.0	1,290	52	1,285	52	1,265	53	1,235	54	1,214	55	1,174	1,044	904
WFM18115S5CX (Medium)	High	5.0	2,323	37	2,225	38	2,120	40	2,040	42	1,974	43	1,801	1,688	1,577
	Med	4.0	1,858	46	1,847	46	1,799	47	1,744	49	1,674	51	1,577	1,493	1,399
	Med-Lo	3.5	1,596	53	1,587	54	1,571	54	1,552	55	1,493	57	1,397	1,326	1,217
	Low	3.0	1,291	-	1,272	-	1,261	-	1,257	-	1,205	-	1,168	1,118	1,060
WFM18140S5DN (Medium)	High	5.0	2,469	42	2,389	43	2,300	45	2,223	47	2,131	49	2,027	1,902	1,786
	Med	4.0	1,575	66	1,558	67	1,545	67	1,513	69	1,500	69	1,419	1,354	1,271
	Med-Lo	3.5	1,402	-	1,380	-	1,343	-	1,319	-	1,296	-	1,245	1,183	1,106
	Low	3.0	1,200	-	1,186	-	1,161	-	1,127	-	1,082	-	1,042	995	926

Blower Performance Data—WFD18

CFM and Temperature Rise vs. External Static Pressure

Model—Heating Speed as Shipped	Motor Speed	Tons AC at 0.5" ESP	External Static Pressure (Inches Water Column)															
			0.1		0.2		0.3		0.4		0.5		0.6		0.7		0.8	
			CFM	Rise	CFM	Rise	CFM	Rise	CFM	Rise	CFM	Rise	CFM	Rise	CFM	Rise	CFM	Rise
WFD18045S3AX (Medium)	High	3.0	1,353	25	1,290	26	1,246	27	1,199	28	1,149	29	1,116	1,116	1,099			
	Med	2.5	1,183	28	1,113	30	1,098	30	1,052	32	1,039	32	1,006	1,012	969			
	Med-Lo	2.0	980	34	946	35	920	36	900	37	896	37	885	855	804			
	Low	1.5	778	43	762	44	738	45	746	45	738	45	717	696	678			
WFD18070S3AX (Medium)	High	3.0	1,290	40	1,236	42	1,194	43	1,166	44	1,176	44	1,166	1,108	1,029			
	Med	2.5	1,139	46	1,090	48	1,035	50	1,063	49	1,063	49	1,020	962	895			
	Med-Lo	2.0	962	54	927	56	925	56	941	55	909	57	877	834	779			
	Low	1.5	787	66	776	67	763	68	744	70	723	72	690	641	581			
WFD18090S4BX (Medium)	High	4.0	2,128	31	2,063	32	2,001	33	1,927	35	1,824	37	1,726	1,628	1,529			
	Med	3.5	1,840	36	1,788	37	1,745	38	1,689	39	1,625	41	1,550	1,470	1,364			
	Med-Lo	3.0	1,602	42	1,558	43	1,543	43	1,493	45	1,455	46	1,402	1,328	1,239			
	Low	2.5	1,277	52	1,252	53	1,244	54	1,229	54	1,214	55	1,179	1,141	1,079			
WFD18115S5CX (Medium)	High	5.0	2,405	35	2,361	36	2,250	38	2,161	39	2,037	42	1,937	1,808	1,689			
	Med	4.0	1,880	45	1,838	46	1,794	47	1,734	49	1,677	51	1,568	1,510	1,401			
	Med-Lo	3.5	1,659	51	1,630	51	1,587	54	1,537	55	1,492	57	1,445	1,368	1,287			
	Low	3.0	1,472	58	1,454	59	1,404	61	1,366	62	1,326	64	1,300	1,228	1,139			

NOTES:

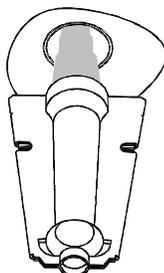
- CFM in the chart is without filter(s). Filters do not ship with this furnace, but must be provided by the installer. If the furnace requires 2 return filters, this chart assumes both filters are installed.
- All furnaces ship as high-speed cooling and medium-speed heating. Installer must adjust blower cooling and heating speeds as needed.
- For most jobs, about 375 to 400 CFM per ton when cooling is desirable.
- Installation is to be adjusted to obtain temperature rise within the range specified on the rating plate.
- This chart is for information only. For satisfactory operation, external static pressure should not exceed value shown on the rating plate.
- The chart above is for U.S. furnaces installed at 0 to 2,000 ft (609.6 m). At higher altitudes, a properly derated unit will have approximately the same temperature rise at a particular CFM, while ESP at the CFM will be lower.

OPERATIONAL CHECKS

Burner Flame

The burner flames should be inspected with the burner compartment door installed. Flames should be stable, soft and blue (dust may cause orange tips but must not be yellow). The flames must extend directly outward from the burner without curling, floating or lifting off. Flames must not impinge on the sides of the heat exchanger firing tubes.

Burner Flame



Check the burner flames for good adjustment, a stable, soft and blue flame that is not curling, floating or lifting off.

WARNING

To avoid personal injury or death due to electrical shock, do not remove any internal compartment covers or attempt any adjustment. Contact a qualified servicer at once if an abnormal flame should develop.

SAFETY CIRCUIT DESCRIPTION

General

A number of circuits are employed to ensure proper furnace operation. These circuits serve to control any potential safety hazards and serve as inputs in the monitoring and diagnosis of abnormal function. These circuits are continuously monitored during furnace operation by the integrated control module.

Integrated Control Module

The integrated control module is an electronic device which, if a potential safety concern is detected, will take the necessary precautions and provide diagnostic information through an LED.

Primary Limit Control

The primary limit control is located on the partition panel and monitors heat exchanger compartment temperatures. It is a normally closed (electrically), automatic reset, temperature-activated sensor. The limit guards against overheating as a result of insufficient conditioned air passing over the heat exchanger.

Auxiliary Limit Control

Auto reset limits are located on or near the blower. To access this auxiliary limit, disconnect the electrical power and remove the blower door. The auxiliary limit control is designed to prevent furnace operation in case of main blower failure on horizontal installations.

It may also open if the power supply is interrupted while the furnace is firing. The auxiliary limit control is suitable for both horizontal right and horizontal left installations. Regardless of airflow direction, it does not need to be relocated.

Rollout Limit Controls

The rollout limit controls are mounted on the burner/manifold assembly and monitor the burner flame. They are normally-closed (electrically), manual-reset sensors. These limits guard against burner flames not being properly drawn into the heat exchanger.

Pressure Switches

The pressure switches are normally-open (closed during operation), negative air pressure-activated switches. They monitor the airflow (combustion air and flue products) through the heat exchanger via pressure taps located on the induced draft blower and the coil front cover. These switches guard against insufficient airflow (combustion air and flue products) through the heat exchanger and/or blocked condensate drain conditions.

Flame Sensor

The flame sensor is a probe mounted on the burner/manifold assembly which uses the principle of flame rectification to determine the presence or absence of flame.

MAINTENANCE



WARNING

HIGH VOLTAGE!

To avoid personal injury or death due to electrical shock, disconnect electrical power before performing any maintenance. If you must handle the igniter, handle with care.



Touching the igniter element with bare fingers, rough handling or vibration could damage the igniter resulting in premature failure. Only a qualified servicer should ever handle the igniter.

- Heat exchanger. Check for corrosion and/or buildup within the heat exchanger passageways.
- Burners. Check for proper ignition, burner flame and flame sense.
- Drainage system. Check for blockage and/or leakage. Check hose connections at and internal to furnace.
- Wiring. Check electrical connections for tightness and/or corrosion. Check wires for damage.
- Filters

Annual Inspection

The furnace should be inspected by a qualified installer, or service agency at least once per year. This check should be performed at the beginning of the heating season. This will ensure that all furnace components are in proper working order and that the heating system functions appropriately. Pay particular attention to the following items. Repair or service as necessary.

- Flue pipe system. Check for blockage and/or leakage. Check the outside termination and the connections at and internal to the furnace.

Filters



WARNING

To avoid property damage, personal injury or death, disconnect electrical power before removing filters. Never operate unit without an air filter installed in the return air system, because dust and lint will build up on internal parts resulting in loss of efficiency, equipment damage and possible fire.

A return air filter is not supplied with this furnace; however, there must be a means of filtering all of the return air. The installer will supply filter(s) at the time of installation.

Filter Maintenance

Improper filter maintenance is the most common cause of inadequate heating or cooling performance. Filters should be cleaned (permanent) or replaced (disposable) every 2 months or as required. When replacing a filter, it must be replaced with a filter of the same type and size.

WARNING

HIGH VOLTAGE!

To prevent property damage, personal injury or death due to electrical shock, disconnect electrical power to the furnace before removing the filter or performing any other maintenance.



Become familiar with filter location and procedures for removal, cleaning and replacing them. If help is needed, contact the installer of the furnace or a qualified servicer.

Filter Removal

Depending on the installation, differing filter arrangements can be applied. Filters can be installed in either the central return register or a side panel external filter rack (upflow only). A media air filter or electronic air cleaner can be used as an alternate filter. Follow the filter sizes given in the Recommended Minimum Filter Size chart or instruction provided by the media or electronic air cleaner manufacturer to ensure proper unit performance.

To remove filters from an external filter rack in an upright upflow installation, follow the directions provided with external filter rack kit. For further details, see your distributor.

Induced Draft and Circulator Blowers

The bearings in the induced draft blower and circulator blower motors are permanently lubricated by the manufacturer. No further lubrication is required. Check motor windings for accumulation of dust which may cause overheating. Clean as necessary.

Flame Sensor (Qualified Servicer Only)

Under some conditions, the fuel or air supply can create a nearly invisible coating on the flame sensor. This coating acts as an insulator causing a drop in the flame sense signal. If the flame sense signal drops too low, the furnace will not sense flame and will lock out. The flame sensor should be carefully cleaned by a qualified servicer using emery cloth or steel wool. Following cleaning, the flame sense signal should be 1 to 6 microamps at 115 volts.

Igniter (Qualified Servicer Only)

If the igniter and the surrounding air are at about 70°F (21°C) and the igniter wires are not connected to any other electrical components, the resistance of the igniter should not exceed 75 ohms. If the resistance does exceed 75 ohms, the igniter should be replaced.

Burners

WARNING

To avoid personal injury or death due to electrical shock, do not remove any internal compartment covers or attempt any adjustment. Contact a qualified servicer at once if an abnormal flame should develop.

Visually inspect the burner flames periodically during the heating season. Turn on the furnace at the thermostat and allow several minutes for flames to stabilize, since any dislodged dust will alter the flames normal appearance. Flames should be stable, quiet, soft and blue (dust may cause orange tips but they must not be yellow). They should extend directly outward from the burners without curling, floating or lifting off. Flames must not impinge on the sides of the heat exchanger firing tubes.

Cleaning (Qualified Servicer Only)

1. Shut off electric power and gas supply to the furnace.
2. Disconnect the rollout limit wires, flame sensor wire, and disconnect the igniter plug.

CAUTION

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

3. Remove 4 screws securing the burner box top.

CAUTION

The igniter is fragile and can be easily damaged. Use extreme caution when removing the burner box cover.

4. Remove the screws securing the burners to the burner bracket.
5. Remove the burners.
6. Use a bottle brush to clean the burner insert and the inside of burner.
7. Replace the burners (opposite of removal).
8. Ensure that the burners are fully seated on the burner bracket and are properly aligned.
9. Replace the burner box top.
10. Reconnect wiring.
11. Turn on the electric power and gas supply to the furnace.
12. Check the furnace for proper operation. Refer to "Operational Checks" section to verify burner flame characteristics.

Before Leaving an Installation

- Cycle the furnace with the thermostat at least 3 times. Verify cooling and fan only operation.
 - Review the Owner's Manual with the homeowner and discuss proper furnace operation and maintenance.
 - Leave literature packet near furnace.
-

Repair and Replacement Parts

When ordering any of the listed functional parts, be sure to provide the furnace model, manufacturing and serial numbers with the order.

Although only functional parts are shown in the parts list, all sheet metal parts, doors, etc., may be ordered by description.

Parts are available from your distributor.

Functional Parts List

■ Gas Control Valve	■ Blower Motor
■ Gas Manifold	■ Blower Wheel
■ Natural Gas Orifice	■ Blower Mounting Bracket
■ Propane Gas Orifice	■ Blower Cutoff
■ Igniter Control	■ Blower Housing
■ Flame Sensor	■ Blower/Collector Box Gasket
■ Rollout Limit Switch	■ Heat Exchanger
■ Primary Limit Switch	■ Collector Box
■ Auxiliary Limit Switch	■ Coil Front Cover
■ Pressure Switch	■ Motor Mount Bracket
■ Induced Draft Blower	■ Transformer
■ Door Switch	■ Burner
■ Hot Surface Igniter	■ Pressure Switch Hose
■ Capacitor	

TROUBLESHOOTING

Electrostatic Discharge (ESD)

NOTE: Discharge static electricity accumulated in the body before touching the unit. An electrostatic discharge can adversely affect electrical components.

Use the following steps during furnace installations and servicing to avoid damage to the integrated control module. By putting the furnace, the control and the person at the same electrostatic potential, these steps will help avoid exposing the integrated control module to electrostatic discharge. This procedure is applicable to both installed and non installed (ungrounded) furnaces.

1. Disconnect all power to the furnace. Do not touch the integrated control module or any wire connected to the control prior to discharging your body's electrostatic charge to ground.
2. Firmly touch a clean, unpainted, metal surface of the furnace near the control. Any tools held in a person's hand during grounding will be discharged also.
3. Service the integrated control module or connect wiring after following the discharge process in Step 2.

NOTE: Do not recharge your body with static electricity by moving or shuffling your feet or touching ungrounded objects. Repeat Step 2 if you touch an ungrounded object.

4. Follow steps 1 through 3 before removing a new control from its container or installing the control on a furnace. Return any old or new controls to their containers before touching any ungrounded object.

Resetting from Lockout

Furnace lockout results when a furnace is unable to achieve ignition after 3 attempts during a single call for heat. It is characterized by a nonfunctioning furnace and a 1-flash diagnostic LED code from the red LED. If the furnace is in "lockout," it will (or can be) reset in any of the following ways.

1. Automatic reset. The integrated control module will automatically reset itself and attempt to resume normal operations following a 1-hour lockout period.
2. Manual power interruption. Interrupt 115-volt power to the furnace for 1 to 20 seconds.
3. Manual thermostat cycle. Lower the thermostat so that there is no longer a call for heat for 1 to 20 seconds, and then reset to previous setting.

NOTE: If the condition which originally caused the lockout still exists, the control will return to lockout. Refer to the "Diagnostic Chart."

Diagnostic Chart

WARNING

HIGH VOLTAGE!

To avoid personal injury or death due to electrical shock, disconnect electrical power before performing any service or maintenance.



LED flash code will cease if power to the control module is interrupted through the disconnect or door switch.

Symptoms of Abnormal Operation	Diagnostic/Status LED Code	Fault Description	Possible Causes	Corrective Actions	Notes and Cautions
<ul style="list-style-type: none"> ■ Furnace fails to operate. ■ Integrated control module diagnostic LED display provides no signal. 	None	<ul style="list-style-type: none"> ■ No 115-volt power to furnace, or no 24-volt power to integrated control module. ■ Blown fuse or circuit breaker. ■ Internal fault in Integrated control module. 	<ul style="list-style-type: none"> ■ Manual disconnect switch Off, door switch open or 24-volt wire improperly connected or loose. ■ Blown fuse or circuit breaker ■ Integrated control module has an internal fault. 	<ul style="list-style-type: none"> ■ Assure 115-volt power to the furnace, and 24-volt power to integrated control module ■ Check integrated control module fuse. Replace with 3A automotive fuse, if necessary. ■ Check for possible shorts in 115-volt and 24-volt circuits. Repair as necessary. ■ Replace bad integrated control module. 	<ul style="list-style-type: none"> ■ Turn off power prior to repair. ■ Replace integrated control module fuse with 3A automotive fuse. ■ Read precautions in “Electrostatic Discharge” section of manual. ■ Replace integrated control module with current replacement parts.
<ul style="list-style-type: none"> ■ Furnace fails to operate. ■ Integrated control module LED display is flashing 1 flash. 	1 flash	<ul style="list-style-type: none"> ■ Furnace lockout due to an excessive number of ignition “retries” (3 total). ■ Auxiliary limit open. 	<ul style="list-style-type: none"> ■ Failure to establish flame. No gas to burners, front cover pressure switch stuck open, bad igniter or igniter alignment, improper orifices or coated/oxidized or improperly connected flame sensor. ■ Loss of flame after establishment. Interrupted gas supply, lazy burner flames (improper gas pressure or restriction in flue and/or combustion air piping), front cover pressure switch opening, or improper induced draft blower performance. ■ Insufficient conditioned air over the heat exchanger. Blocked filters, restrictive ductwork, improper circulator blower speed or failed circulator blower. 	<ul style="list-style-type: none"> ■ Locate and correct gas interruption. ■ Replace or realign igniter. Igniter is fragile, handle gently. ■ Check flame sense signal. Sand sensor if coated and/or oxidized. ■ Check flue piping for blockage, proper length, elbows and termination. ■ Verify proper induced draft blower performance. ■ Check circulator blower speed and performance. Correct speed or replace blower if necessary. 	<ul style="list-style-type: none"> ■ Turn off power prior to repair. ■ Igniter is fragile, handle with care. ■ Sand flame sensor with emery cloth. ■ See “Combustion and Ventilation Air Requirements” and “Category I Venting—Vertical Venting” section for piping details. ■ See Product Data Bulletin for allowable rise range and proper circulator speed.

Symptoms of Abnormal Operation	Diagnostic/Staus LED Code	Fault Description	Possible Causes	Corrective Actions	Notes and Cautions
<ul style="list-style-type: none"> ■ Furnace fails to operate. ■ Integrated control module LED display is flashing 2 flashes. 	2 flashes	<ul style="list-style-type: none"> ■ Pressure switch circuit is closed. ■ Induced draft blower is not operating. 	<ul style="list-style-type: none"> ■ Induced draft blower pressure switch contacts sticking. ■ Shorts in pressure switch circuit. 	<ul style="list-style-type: none"> ■ Replace induced draft blower pressure switch. ■ Repair short. 	<ul style="list-style-type: none"> ■ Turn off power prior to repair. ■ Replace pressure switch with correct replacement part.
<ul style="list-style-type: none"> ■ Induced draft blower runs continuously with no further furnace operation. ■ Integrated control module LED display is flashing 3 flashes. 	3 flashes	<ul style="list-style-type: none"> ■ Pressure switch circuit is not closed. ■ Induced draft blower is operating. 	<ul style="list-style-type: none"> ■ Pressure switch hose blocked, pinched or connected improperly. ■ Blocked flue or weak induced draft blower. ■ Incorrect pressure switch setpoint or malfunctioning switch contacts. ■ Loose or improperly connected wiring. 	<ul style="list-style-type: none"> ■ Inspect pressure switch hose. Repair/replace, if necessary. ■ Inspect flue for blockage, proper length, elbows and termination. ■ Correct pressure switch setpoint or contact motion. ■ Tighten or correct wiring connection. 	<ul style="list-style-type: none"> ■ Turn off power prior to repair. ■ See “Combustion and Ventilation Air Requirements” and “Category I Venting—Vertical Venting” section for piping details. ■ Replace pressure switch with correct replacement part. ■ Replace induced draft blower with correct replacement part.
<ul style="list-style-type: none"> ■ Circulator blower runs continuously. No furnace operation. ■ Integrated control module LED display is flashing 4 flashes. 	4 flashes	<ul style="list-style-type: none"> ■ Primary limit or auxiliary limit circuit is open. 	<ul style="list-style-type: none"> ■ Insufficient conditioned air over the heat exchanger. Blocked filters, restrictive ductwork, improper circulator blower speed, or failed circulator blower. ■ Faulty primary limit switch. ■ Loose or improperly connected wiring. 	<ul style="list-style-type: none"> ■ Check primary limit switch. Replace if necessary. ■ Check filters and ductwork for blockage. Clean filters or remove obstruction. ■ Check circulator blower speed and performance. Correct speed or replace blower if necessary. ■ Tighten or correct wiring connection. 	<ul style="list-style-type: none"> ■ Turn off power prior to repair. ■ Replace primary limit switch with proper replacement part. ■ Replace blower with correct replacement part.
<ul style="list-style-type: none"> ■ Induced draft blower and circulator blower runs continuously. No furnace operation. ■ Integrated control module LED display is flashing 5 flashes. 	5 flashes	<ul style="list-style-type: none"> ■ Flame sensed with no call for heat. 	<ul style="list-style-type: none"> ■ Short to ground in flame sense circuit. 	<ul style="list-style-type: none"> ■ Correct short at flame sensor or in flame sensor wiring. 	<ul style="list-style-type: none"> ■ Turn off power prior to repair.

Symptoms of Abnormal Operation	Diagnostic/Staus LED Code	Fault Description	Possible Causes	Corrective Actions	Notes and Cautions
<ul style="list-style-type: none"> ■ No furnace operation. ■ Integrated control module LED display is flashing 6 flashes. 	6 flashes	<ul style="list-style-type: none"> ■ Rollout limit switch open. ■ Integrated control module fuse is blown. 	<ul style="list-style-type: none"> ■ Flame rollout. ■ Misaligned burners, blocked flue and/or air inlet pipe or failed induced draft blower. ■ Loose or improperly connected wiring. ■ Short in 24-volt AC control circuits or safety circuits. ■ Faulty rollout limit switch. 	<ul style="list-style-type: none"> ■ Check burners for proper alignment. ■ Check flue and air inlet piping for blockage, proper length, elbows and termination. Correct as necessary. ■ Check rollout limit switch. Replace if necessary. ■ Check induced draft blower for proper performance. Replace if necessary. ■ Tighten or correct wiring connection. ■ Repair short in 24-volt AC control/safety circuit(s). ■ Replace integrated control module fuse (3A). 	<ul style="list-style-type: none"> ■ Turn off power prior to repair. ■ Replace integrated control module fuse with 3A automotive fuse. ■ Replace induced draft blower with proper replacement part. ■ Replace rollout limit switch with proper replacement part. ■ See "Vent/Flue Pipe" section for piping details. ■ Read precautions in "Electrostatic Discharge" section of manual.
<ul style="list-style-type: none"> ■ Normal furnace operation. ■ Integrated control module LED display is flashing 7 flashes. 	7 flashes	<ul style="list-style-type: none"> ■ Flame sense microamp signal is low. 	<ul style="list-style-type: none"> ■ Flame sensor is coated/oxidized. ■ Flame sensor incorrectly positioned in burner flame. ■ Lazy burner flame due to improper gas pressure or combustion air. 	<ul style="list-style-type: none"> ■ Sand flame sensor if coated/oxidized. ■ Inspect for proper sensor alignment. ■ Compare current gas pressure to rating plate info. Adjust as needed. 	<ul style="list-style-type: none"> ■ Turn off power prior to repair. ■ Sand flame sensor with clean steel wool. ■ See "Vent/Flue Pipe" section for piping details. ■ See rating plate for proper gas pressure.
<ul style="list-style-type: none"> ■ Furnace not operating. ■ Integrated control module LED display is flashing 8 flashes. 	8 flashes	<ul style="list-style-type: none"> ■ Problem with igniter circuit. 	<ul style="list-style-type: none"> ■ Improperly connected igniter. ■ Faulty igniter. ■ Poor unit ground. ■ Poor burner ground. ■ Faulty integrated control module. 	<ul style="list-style-type: none"> ■ Check and correct wiring from integrated control module to igniter ■ Replace faulty igniter. ■ Check and correct furnace ground wiring ■ Replace faulty integrated control module. 	<ul style="list-style-type: none"> ■ Turn off power prior to repair. ■ Replace igniter with correct replacement part. ■ Replace control with correct replacement part. ■ Read precautions in "Electrostatic Discharge" section of manual.
<ul style="list-style-type: none"> ■ Induced draft blower runs continuously. No furnace operation. ■ Integrated control module LED display is flashing continuously. 	Continuous flashes	<ul style="list-style-type: none"> ■ Polarity of 115-volt or 24-volt AC is reversed. 	<ul style="list-style-type: none"> ■ Polarity of 115-volt AC power to furnace or integrated module is reversed. ■ Red and blue wires to transformer are reversed. ■ Poor unit ground. 	<ul style="list-style-type: none"> ■ Review wiring diagram to correct polarity. ■ Verify proper ground. Correct if necessary. ■ Reverse red and blue wires connected to transformer. 	<ul style="list-style-type: none"> ■ Turn off power prior to repair.
<ul style="list-style-type: none"> ■ LED display is steady, not flashing. 	Steady	<ul style="list-style-type: none"> ■ Normal operation 	<ul style="list-style-type: none"> ■ Normal operation 	<ul style="list-style-type: none"> ■ None 	<ul style="list-style-type: none"> ■ Normal operation

WIRING DIAGRAM—WFM18, WFD18

WARNING

HIGH VOLTAGE!

Disconnect ALL power before servicing.
Multiple power sources may be present.
Failure to do so may cause property damage, personal injury or death.

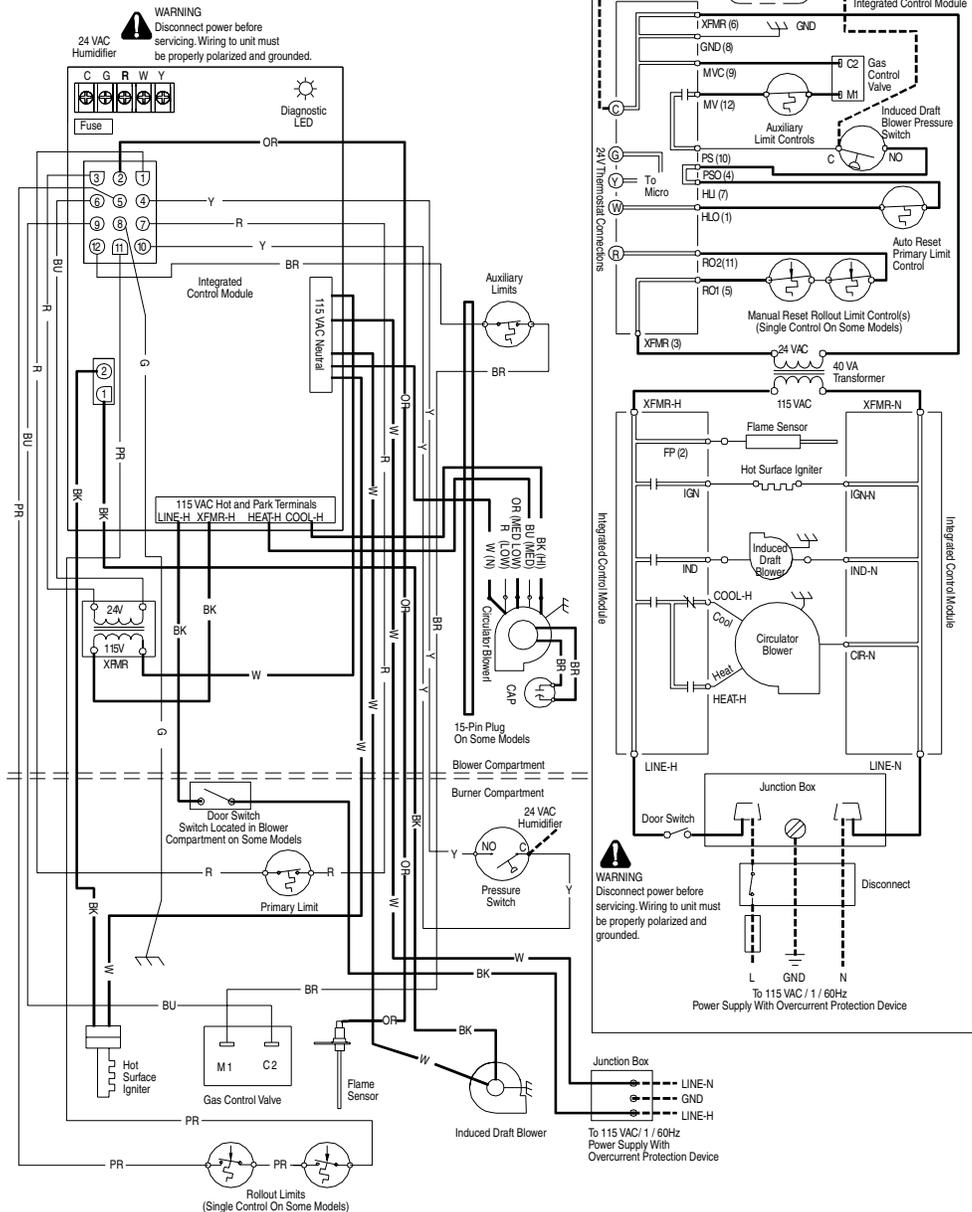


- Steady On = Normal Operation
- Off = Control Failure
- 1 Flash = System Lockout (Retries/Recycles Exceeded)
- 2 Flashes = Pressure Switch Stuck Open
- 3 Flashes = Pressure Switch Stuck Open
- 4 Flashes = Open High Limit Switch
- 5 Flashes = Flame Sensed With Gas Control Valve De-energized
- 6 Flashes = Open Rollout Switch or Open Fuse
- 7 Flashes = Low Flame Signal
- 8 Flashes = Check Igniter or Improper Ground
- Continuous Flashes = 115 VAC Polarity Reversed/Verify GND

- Equipment GND
- Field GND
- Field Splice
- Switch (Temp.)
- Igniter
- Pressure Switch
- Overcurrent Protection Device

- Low Voltage (24V)
- Low Voltage Field
- High Voltage (115V)
- High Voltage Field
- Junction
- Terminal
- Internal To Integrated Control
- Plug Connection

Color	Symbol
Gray	GY
White	W
Black	BK
Red	R
Blue	BU
Orange	OR
Yellow	Y
Green	G
Pink	PK
Azure	A
Violet	V
Brown	BR



Check codes for proper wiring and circuit protection before installation.

NOTES:

1. Set heat anticipator on room thermostat at 0.7 amps.
2. Manufacturer's specified replacement parts must be used when servicing.
3. If any of the original wire as supplied with the furnace must be replaced, it must be replaced with wiring material having a temperature rating of at least 105°C. Use copper conductors only.
4. Blower speeds should be adjusted by installer to match the installation requirements so as to provide the correct heating temperature rise and the correct cooling CFM. (See spec sheet for airflow chart.)
5. Unit must be permanently grounded and conform to NEC and local codes.

Notes

ASSISTANCE OR SERVICE

If you need further assistance, you can write to the below address with any questions or concerns:

Tradewinds Distributing Company, LLC
14610 Breakers Drive
Jacksonville, FL 32258

Please include a daytime phone number in your correspondence.

Or call toll free: 1-866-944-7575