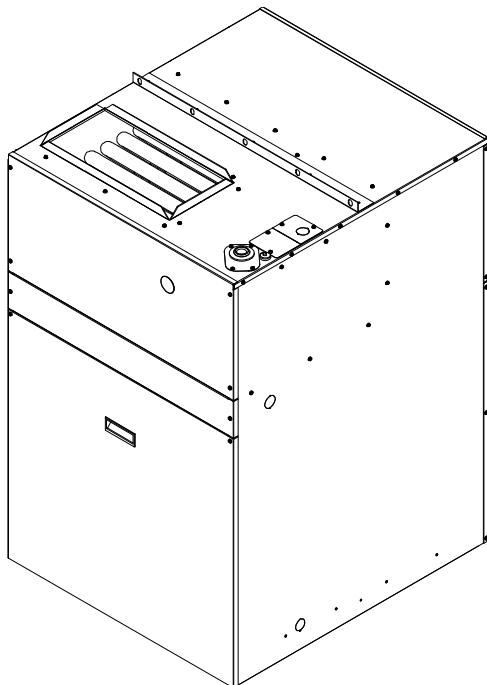


Installation, Operation, & Maintenance Manual

IOM 8401
Rev. A 09/21

FPG SERIES

Vertical Packaged Gas Heat / Electric Cooling Unit Category III Type MSP



ATTENTION:

Installer

Affix these instructions on or adjacent to the furnace.

Consumer

Read these instructions thoroughly and retain all manuals for future reference.



WARNING



FIRE OR EXPLOSION HAZARD

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

- 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.
 - Leave the building immediately.
 - 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.

COPYRIGHT

First Co. works to continuously improve its products and as a result, it reserves the right to change design and specifications without notice.

The warranty may be void unless the Startup & Performance Checklist is completed and returned to the warrantor. If the FIRST-PAK Gas Furnace unit is not installed properly, the warranty will be void, as the manufacturer cannot be held accountable for problems that stem from improper installation.

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*****WARNING TO INSTALLER, SERVICE PERSONNEL AND OWNER*****

Altering the product or replacing parts with non-authorized factory parts voids all warranty or implied warranty and may result in adverse operational performance and/or a possible hazardous safety condition to service personnel and occupants. Company employees and/or contractors are not authorized to waive this warning.

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SAFETY CONSIDERATIONS





1. **READ THE ENTIRE MANUAL BEFORE STARTING THE INSTALLATION.**
2. These instructions are intended as a general guide and do not supersede national, state, or local codes in any way.
3. Altering the product, improper installation, or the use of unauthorized factory parts voids all warranty or implied warranty and may result in adverse operation and/or performance or may result in hazardous conditions to service personnel and occupants. Company employees or contractors are not authorized to waive this warning.
4. This product should only be installed and serviced by a qualified, licensed, and factory authorized installer or service agency.
5. All “kits” and “accessories” used must be factory authorized when modifying this product. Refer and follow instructions packaged with the kits or accessories when installing.



RECOGNIZE THE FOLLOWING SAFETY NOTATIONS THROUGHOUT THIS MANUAL AND POSTED ON THE EQUIPMENT:



 **DANGER** 

Indicates an imminently hazardous situation which, if not avoided, will result in death or serious injury.



 **WARNING** 

Indicates a potentially hazardous situation or unsafe practices that could result in severe personal injury or death and/or damage to property.

 **WARNING** 

 **ELECTRIC SHOCK HAZARD** 



This warning signifies potential electrical shock hazards that could result in personal injury or death.

 **CAUTION** 



The CAUTION symbol indicates a potentially hazardous situation that may result in minor or moderate injury.



 **IMPORTANT** 

Suggests important procedure steps to insure proper installation, reliability, or operation.

 **NOTE** 

Used to highlight suggestions, which may result in enhanced installation, reliability or operation.

 **WARNING** 

 **FIRE OR EXPLOSION HAZARD** 

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

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

- Before servicing, disconnect all electrical power to furnace.
- When servicing controls, label all wires prior to disconnecting. Reconnect wires correctly.

Verify proper operation after servicing.

SAFETY CONSIDERATIONS CONTINUED

SAFETY RULES:

1. This furnace is approved for use with Natural Gas only. Refer to the **FURNACE RATING PLATE**.
2. Install this furnace ONLY in a location and position as specified in the **INSTALLATION LOCATION** section of this manual.
3. Provide adequate combustion and ventilation air to the furnace space as specified in the **COMBUSTION AIR** section of this manual.
4. Products of combustion must be discharged outdoors, refer to the **PRODUCTS OF COMBUSTION** section of this manual.
5. Never test for gas leaks with an open flame. Use a commercially available soap solution made specifically for the detection of leaks to check all connections as specified in the **GAS CONNECTION** section of this manual.
6. Always install this furnace to operate within the furnace's intended temperature rise range with a duct system which has an external static pressure within the allowable range, as specified on the unit rating plate and in the **GAS HEAT START UP** section of this manual.
7. When this furnace is installed so that the supply air duct supplies air to areas outside the space containing the furnace, the return air duct must be sealed to the furnace casing and terminate outside the space containing the furnace as specified in the **DUCT CONNECTIONS** section of this manual.

WARNING

For your safety, do not store or use any combustible materials, gasoline, and other flammable vapors and liquids in the vicinity of this or any other appliance as described in the **COMBUSTION AIR** section of this manual. The material may ignite by spontaneous combustion creating a fire hazard resulting in property damage, personal injury, or death.

8. If installed in a residential garage, this furnace must be installed as specified in the **INSTALLATION LOCATION** section of this manual.

WARNING

For your safety, do not store or use any insulating material in the vicinity of this or any other appliance as specified in the **COMBUSTION AIR** section of this manual. Such actions could result in property damage, personal injury, or death.

Inspect the furnace area after the furnace is installed and after anytime insulation has been added to the structure.

9. For proper and safe operation, the furnace needs air for combustion and ventilation. Do not block or obstruct air openings on the furnace, air openings to the area in which the furnace is installed, and the spacing around the furnace.

10. This furnace is equipped with a blocked vent shut-off system. If the furnace fails to operate, contact a qualified service agency for repair.
11. Should the gas supply fail to shut off or if overheating occurs, shut off the gas valve to the furnace before shutting off the electrical supply see **FIGURE 30 – Manual Gas Shutoff Valve** page 34.

WARNING

Do not use this furnace if any part has been under water. A flood-damaged furnace is extremely dangerous. Attempts to use the furnace can result in fire or explosion. A qualified service agency should be contacted to inspect the furnace and to replace all gas controls, control system parts, electrical parts that have been wet or the furnace is deemed necessary.

12. The user shall annually inspect the furnace installation to verify the following safety related items:
 - a. All flue-gas carrying areas external to the furnace (i.e., chimney, vent connector) are clear and free of obstructions.
 - b. The vent connector is in place and is physically sound without holes or excessive corrosion.
 - c. The return-air duct connection(s) is physically sound, is sealed to the furnace casing, and terminates outside the space containing the furnace.
 - d. The physical support of the furnace is sound without sagging, cracks, gaps, etc., around the base so as to provide a seal between the support and the base.
 - e. There are no obvious signs of deterioration of the furnace.
 - f. The burner flames are in good adjustment, refer to **FIGURE 42 - Burner Flames** page 48 illustrating proper flame appearance for comparison.

WARNING

CARBON-MONOXIDE POISONING HAZARD

Failure to follow instructions could result in severe personal injury or death due to carbon-monoxide poisoning, if combustion products infiltrate into the building.

Check that all openings in the outside wall around the vent (and air intake) pipe(s) are sealed to prevent infiltration of combustion products into the building.

Check that furnace vent (and air intake) terminal(s) are not obstructed in any way during all seasons.

WARNING

DO NOT USE FOR HEATING AND COOLING BUILDINGS OR STRUCTURE UNDER CONSTRUCTION!

SAFETY CONSIDERATIONS CONTINUED

13. The following items should be inspected annually (minimum) before each heating season by a qualified service agency:
- HEAT EXCHANGER TUBES;** make sure they are free from blockages, signs of carbon buildup or heavy corrosion.
 - GAS BURNERS;** make sure they are free of blockages, signs of carbon buildup or heavy corrosion. The burner carry-over slots should be clean and of uniform size.
 - VENT PIPE;** check for excessive corrosion or perforations.
 - VENT TERMINAL;** check that it is free from blockages and restrictions.
 - COMBUSTION AIR OPENINGS;** check that they are clean & free from debris or blockages of any kind.
 - INDOOR AIR;** the blower wheel and blower housing must be free from debris. Check that supply and return air registers, grilles, and dampers are positioned properly, filters are in place and clean.
 - INSPECT & WASH THE CONDENSER AND EVAPORATOR COILS** – do not use high pressure as damage to the finned surfaces may occur.

WARNING

Improper installation, adjustment, alteration, service, or maintenance can cause property damage, personal injury or loss of life. Refer to the user's information manual provided with this furnace. Installation and materials, service must be performed by a qualified installer, service agency or the gas supplier.

WARNING

Installation and service must be performed by a licensed professional installer (or equivalent), service agency or the gas supplier. Attempting to install or repair this unit without such background may result in product damage, personal injury or death.

WARNING

These instructions are intended as an aid to qualified, licensed service personnel for proper installation, adjustment and operation of this unit. Read these instructions thoroughly before attempting installation or operation. Failure to follow these instructions may result in improper installation, adjustment, service or maintenance possibly resulting in fire, electrical shock, property damage, personal injury or death.

WARNING

HIGH VOLTAGE!

Disconnect all power before servicing. Failure to do so may result in property damage, personal injury, or death.

CAUTION

Use care when handling compressors. Some surfaces could be hot!

CAUTION

Compressors should NOT be used to evacuate the air conditioning system. Vacuums this low can cause internal electrical arcing resulting in a damaged or failed compressor.

WARNING

The unit must be permanently grounded. Failure to do so can cause electrical shock resulting in severe personal injury or death.

WARNING

"USE COPPER SUPPLY WIRES ONLY!"

- 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 90°C.
 - This furnace must be installed so there are provisions for ventilating air.
 - Should overheating occur, or the gas supply fail to shut off, shut off the manual gas valve to the furnace before shutting off the electrical supply.
- Do not attempt to light this furnace manually. Refer to the **GAS HEAT STARTUP** section for instructions on lighting and shutting down the furnace.
- In regions where snow and ice accumulation is possible, check the outdoor grilled areas, it must be kept free from any obstructions to air flow. The flue vent must be free from snow and ice or any obstruction to assure the products of combustion are safely discharged out of doors.

MODEL NOMENCLATURE

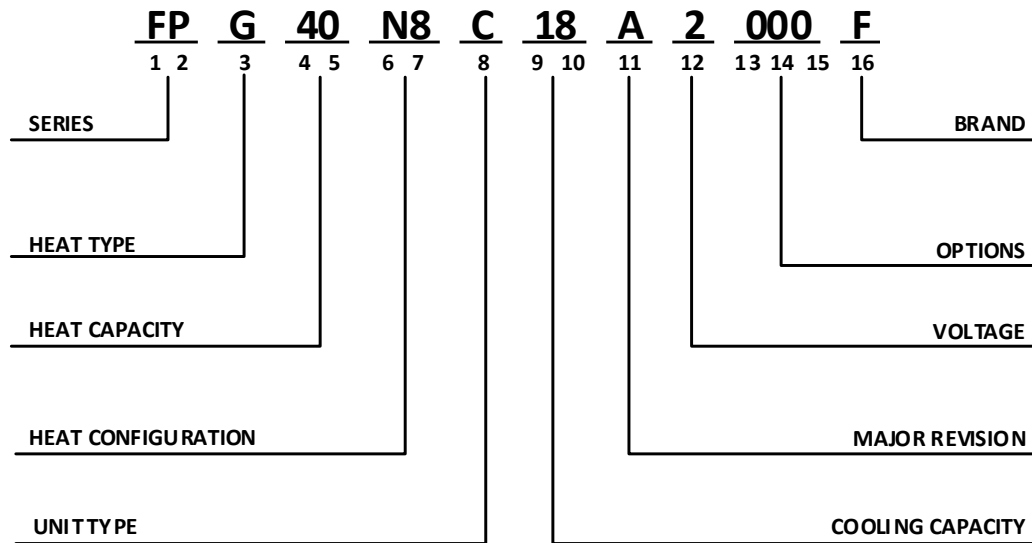


FIGURE 1 - MODEL NOMENCLATURE

MODEL NUMBER DESCRIPTION

DIGITS 1-2 – SERIES

FP – FIRST-PAK

DIGIT 2 – HEAT TYPE

G – Gas Heat

DIGITS 4-5 – HEAT CAPACITY

20 – 20,000 BTU/HR
 30 – 30,000 BTH/HR
 40 – 40,000 BTU/HR
 50 – 50,000 BTU/HR
 60 – 60,000 BTU/HR

DIGITS 6-7 – HEAT CONFIGURATION

N8 – Natural Gas Non-Condensing

DIGIT 8 – UNIT TYPE

C – Cooling Only

DIGITS 9-10 – COOLING CAPACITY

09 – 9,000 BTU/HR
 12 – 12,000 BTU/HR
 18 – 18,000 BTU/HR
 24 – 24,000 BTU/HR

DIGIT 11 – REVISION LEVEL

DIGIT 12 – VOLTAGE

2 – 208/230v 1Ph

DIGITS 13-15 – OPTIONS

000 – NONE

DIGIT 16 – BRAND

F – First Co.

GENERAL INFORMATION

CAUTION

DO NOT use these units as a source of heating or cooling during the construction process. Mechanical components and filters can become clogged with dirt and debris, which can cause damage to the system.

The manufacture does not warrant equipment subjected to abuse.

WARNING

ELECTRIC SHOCK HAZARD

Before servicing equipment, ALWAYS turn off all power to the unit. There may be more than one disconnect switch. Electrical shock can cause injury or death.

Clear surrounding area of all tools, equipment, and debris before operating this unit.

These instructions are provided for the installation of the FIRST-PAK gas furnace specifically. For any other related equipment, refer to the appropriate manufacturer's instructions.

WARNING

This furnace is certified for through-the-wall indoor installation only. This furnace is **NOT** approved for mobile homes, recreational vehicles or outdoor applications. Such use could result in property damage, personal injury, or death.

CAUTION

This furnace must never be operated under any circumstances without an air filter in place.

NOTE

Material in this shipment has been inspected at the factory and released to the transportation agency in good condition. When received, a visual inspection of all cartons should be made immediately. Any evidence of rough handling or apparent damage should be noted on the delivery receipt in the presence of the carrier's representative. If damage is found, a claim should be immediately filed against the carrier.

This furnace is designed for through-the-wall indoor installation only. Installation of this equipment, wiring, ducts, and any related components must conform to current agency codes, state laws, and local codes. Such regulations take precedence over general instructions contained in this manual.

CAUTION

Extreme caution must be taken that no internal damage will result from screws that are drilled into the cabinet.

INTRODUCTION

The FIRST-PAK cooling with combustion system model FPG Series units are self-contained, gas-fired heating with electric cooling models. The unit design has been certified by Intertek Testing Services for compliance with the latest edition of the American National Standard – ANSI Z21.47/National Standard of Canada – CAN/CGA-2.3 for direct vent central furnaces. The FPG models are certified to be in compliance with the latest edition of AHRI Standard 210/240. All models are design certified for heating operation when fired with natural gas.

These installation instructions are intended as a general guide only, for use by an experienced, qualified contractor.

CAUTION

Do not use this furnace during any phase of construction.

STORAGE

Equipment should be stored in a clean dry, conditioned area with maximum temperatures up to 120°F [48.89°C] and minimum temperatures to 32°F [0°C]. Units should be stored upright and in an indoor environment. It is recommended to leave packaging on the unit until the installation is to begin.



WARNING



Do not stack more than **FOUR** units for storage purposes. Failure to follow these instructions may result in improper installation, adjustment, service or maintenance, property damage, personal injury or death.

DO NOT operate these units during the construction process. Mechanical components and filters could become clogged with dirt and debris, which can cause damage to the system.

The manufacturer does not warrant equipment subjected to abuse.

SHIPPING & PACKAGE LIST



NOTE



Material in this shipment has been inspected at the factory and released to the transportation agency in good condition. When received, a visual inspection of all cartons should be made immediately. Any evidence of rough handling or apparent damage should be noted on the delivery receipt in the presence of the carrier's representative. If damage is found, a claim should be immediately filed against the carrier.

SHIPPING INSTRUCTIONS

FPG units must remain in the upright position throughout the shipping and handling process to maintain a proper level of oil in the compressor.



NOTE



Shrink-wrap is located around the unit for protection. Remove before installation.

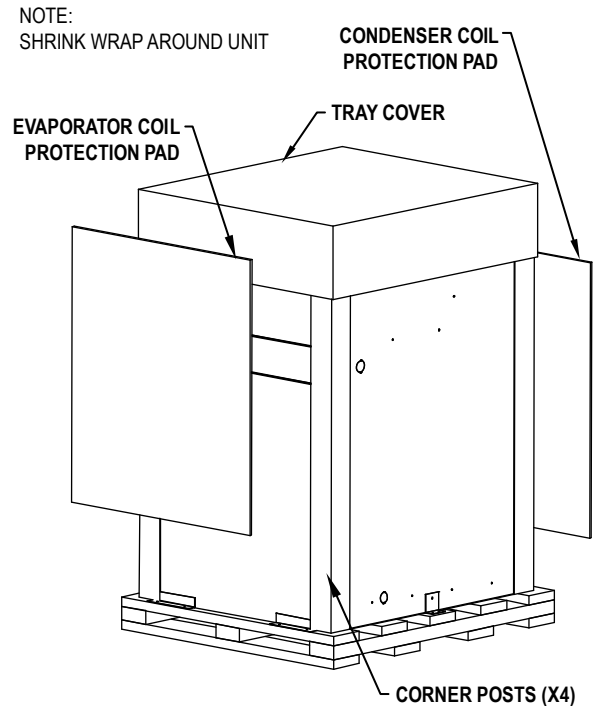


FIGURE 2 – Standard Packaging

PACKAGE LIST

The units will be shipped with the following items:

- 1- FPG (FIRST-PAK) package gas heat/dx cooling unit:
 - A- Shipping bracket
 - a. Screws
 - B- Top mounting bracket
 - a. Screws
- 2- Literature package
 - A- IOM - Installation & Operations Manual

Check the unit for shipping damage; if found, immediately contact the last carrier.

UNIT INSPECTION CHECKLIST

Complete the inspection procedures below before preparing unit for installation:

- 1) Visually inspect unit for any shipping damage. Damage must be reported immediately to the shipping company to make a claim.
- 2) Ensure that the carrier makes proper notation of any shortages or damage on all copies of the freight bill and completes a common carrier inspection report.
- 3) Verify that unit nameplates on the data label match the sales order or bill of lading (including, unit configuration, size and voltage).
- 4) Immediately before installation, remove unit front panel and verify that all electrical connections are tight and that there are no loose wires.
- 5) Check to make sure that the refrigerant piping is free from any kinks and there is no interference between unit piping and sheet metal or electrical wires.
- 6) Check that the blower spins freely within the housing and that there are no obstructions between the wheel and housing. The wheel can sometimes come loose in shipping.
- 7) Ensure that the evaporator distributor tubes are not touching one in another and that they are over the drain pan.
- 8) Check the air-coil fins for any damage during shipping.
- 9) Ensure that the shipping brackets and screws are removed from the chassis section. Refer to [FIGURE 3 - Standard Packaging with Brackets - Front View](#) & [FIGURE 4 - Standard Packaging with Brackets - Back View](#) for more information.
- 10) Inspect the gas heat section:
 - a. Check that the gas manifold is firmly in place on the burner box and secured with the provided screws (4).
 - b. Check that burners are securely in place on each gas orifice and properly aligned with each heat exchanger tube.
 - c. Check that the vent pipe is attached and secured to the draft inducer housing.
 - d. Check that wiring connections are in place on rollout switches, limit switch, pressure switch, gas valve, draft inducer, ignitor, and flame sensor.

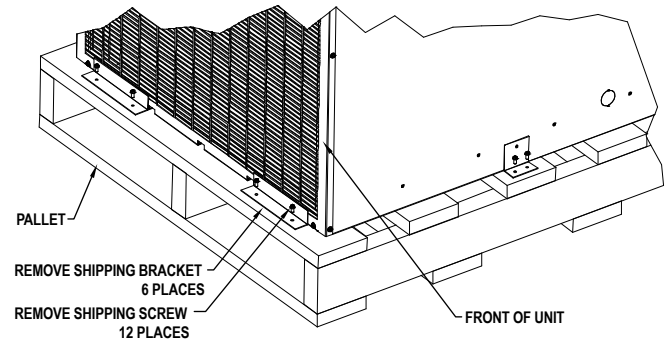


FIGURE 3 - Standard Packaging with Brackets - Front View

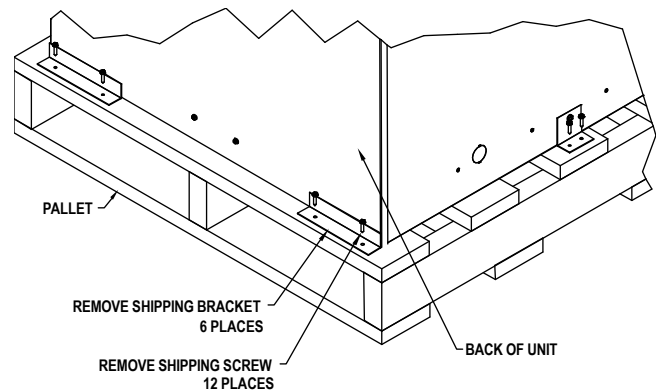


FIGURE 4 - Standard Packaging with Brackets - Back View



NOTE



Check the unit nameplate for correct voltage with the plans before installing the equipment. Also, make sure all electrical ground connections are made in accordance with local code.

UNIT DIMENSIONAL DATA

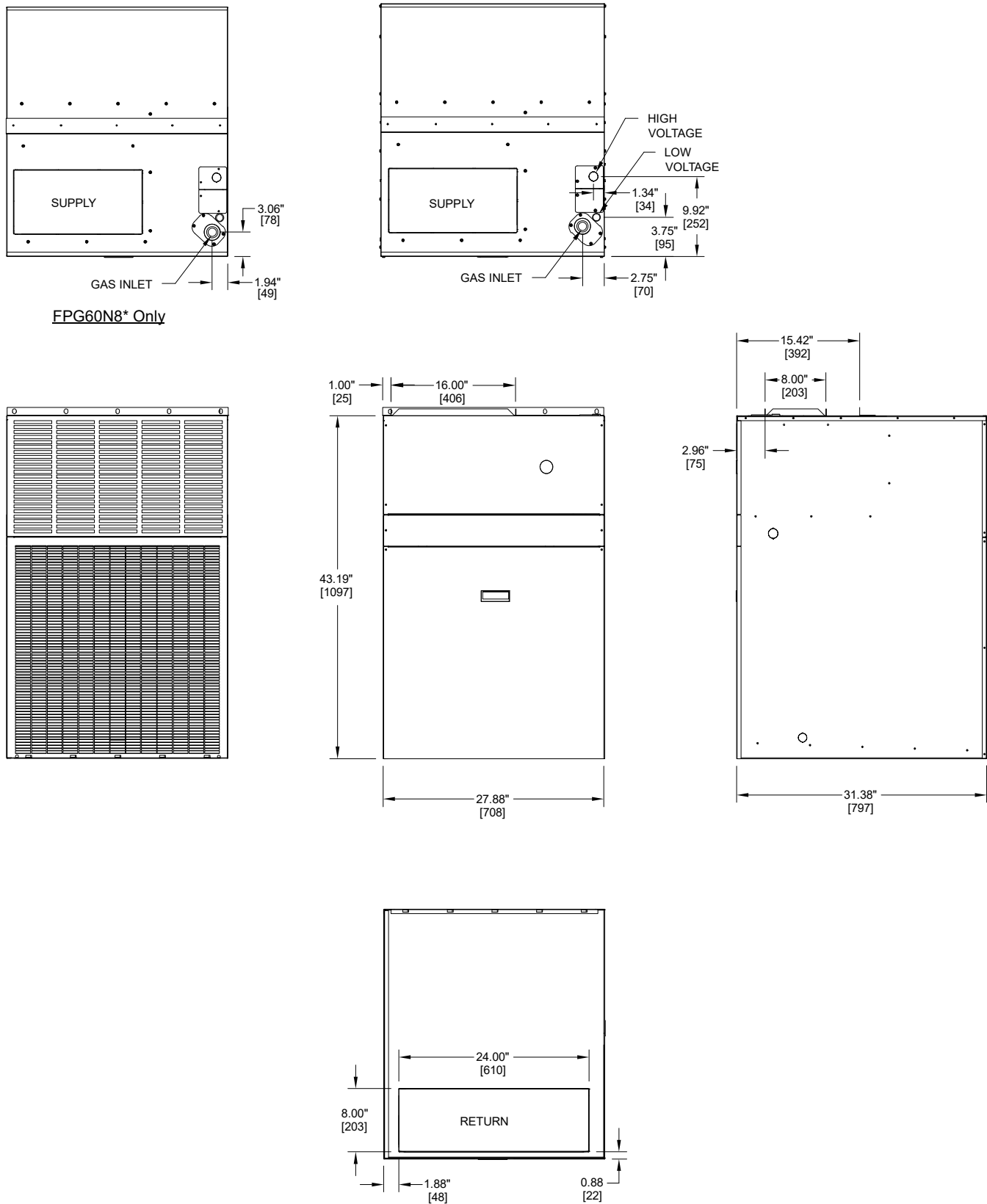


FIGURE 5 - Unit Dimensions

UNIT PHYSICAL DATA

PHYSICAL DATA								
FPG MODELS	20N8C09A	20N8C12A	30N8C12A	40N8C12A	30N8C18A	40N8C18A	50N8C18A	60N8C18A
UNIT INFORMATION								
Compressor Type (Qty)	Rotary (1)	Rotary (1)	Rotary (1)	Rotary (1)	Rotary (1)	Rotary (1)	Rotary (1)	Rotary (1)
Factory Charge (R410A) lbs. [kg]	3.7 [1.7]	3.9 [1.8]	3.9 [1.8]	3.9 [1.8]	6.4 [2.9]	6.4 [2.9]	6.4 [2.9]	6.4 [2.9]
Compressor Capacitor	40MFD/370V	40MFD/370V	40MFD/370V	40MFD/370V	35MFD/370V	35MFD/370V	35MFD/370V	35MFD/370V
Condenser Fan HP [kW]	1/5 [.15]	1/5 [.15]	1/5 [.15]	1/5 [.15]	1/3 [.25]	1/3 [.25]	1/3 [.25]	1/3 [.25]
Indoor Fan HP [kW]	1/4 [.17]	1/4 [.17]	1/4 [.17]	1/4 [.17]	1/3 [.25]	1/3 [.25]	1/2 [.37]	1/2 [.37]
Blower Size (D x W) in. [cm]	10 x 6 [25.4 x 15.24]							
Condenser Dimension (H x W) in. [cm]	26 x 23 [66.04 x 58.42]							
Evaporator Dimension (H x W) in. [cm]	24 x 22 [60.96 x 55.88]							
Filter Size (H x W) in. [cm]	24 x 24 [60.96 x 60.96]							
Input BTU/h [kW]	20000 [5.9]	20000 [5.9]	30000 [8.8]	40000 [11.7]	30000 [8.8]	40000 [11.7]	50000 [14.7]	60000 [17.6]
Output BTU/h [kW]	16200 [4.7]	16200 [4.7]	24300 [7.1]	32400 [9.5]	24300 [7.1]	32400 [9.5]	40500 [11.9]	48600 [14.2]
AFUE	81	81	81	81	81	81	81	81
No. of Burners	2	2	3	4	3	4	5	6
Orifice Size (Natural/Propane) in. [cm]	.061 [.155]							
Max. Outlet Air Temp. °F [°C]	155 [68]	155 [68]	160 [71]	160 [71]	160 [71]	160 [71]	165 [74]	165 [74]
Max. Static Pressure IWC [pa]	0.5 [125]							
Gas Piping Connection in. [cm]	1/2" [1.27]							
Operating Weight lb. [kg]	283 [129]	283 [129]	285 [130]	287 [130]	347 [158]	350 [159]	364 [165]	367 [167]
Shipping Weight lb. [kg]	303 [138]	303 [138]	305 [139]	307 [140]	367 [167]	370 [168]	384 [175]	387 [176]
Notes:								
FPT = Female Pipe Thread								

Table 1 - Physical Data

PHYSICAL DATA				
FPG MODELS	30N8C24A	40N8C24A	50N8C24A	60N8C24A
UNIT INFORMATION				
Compressor Type (Qty)	Scroll (1)	Scroll (1)	Scroll (1)	Scroll (1)
Factory Charge (R410A) lbs. [kg]	6.3 [2.9]	6.3 [2.9]	6.3 [2.9]	6.3 [2.9]
Compressor Capacitor	35MFD/370V	35MFD/370V	35MFD/370V	35MFD/370V
Condenser Fan HP [kW]	1/3 [.25]	1/3 [.25]	1/3 [.25]	1/3 [.25]
Indoor Fan HP [kW]	1/3 [.25]	1/3 [.25]	1/2 [.37]	1/2 [.37]
Blower Size (D x W) in. [cm]	10 x 6 [25.4 x 15.24]			
Condenser Dimension (H x W) in. [cm]	26 x 23 [66.04 x 58.42]			
Evaporator Dimension (H x W) in. [cm]	24 x 22 [60.96 x 55.88]			
Filter Size (H x W) in. [cm]	24 x 24 [60.96 x 60.96]			
Input BTU/h [kW]	30000 [8.8]	40000 [11.7]	50000 [14.7]	60000 [17.6]
Output BTU/h [kW]	24300 [7.1]	32400 [9.5]	40500 [11.9]	48600 [14.2]
AFUE	81	81	81	81
No. of Burners	3	4	5	6
Orifice Size (Natural/Propane) in. [cm]	.061 [.155]			
Max. Outlet Air Temp. °F [°C]	160 [71]	160 [71]	165 [74]	165 [74]
Max. Static Pressure IWC [pa]	0.5 [125]			
Gas Piping Connection in. [cm]	1/2" [1.27]			
Operating Weight lb. [kg]	347 [158]	361 [164]	364 [165]	367 [167]
Shipping Weight lb. [kg]	367 [167]	381 [173]	384 [175]	387 [176]
Notes:				
FPT = Female Pipe Thread				

Table 2 - Physical Data Continued

ELECTRICAL DATA

ELECTRICAL DATA											
MODEL NUMBER	VOLTAGE-PH-HZ	COMPRESSOR		CONDENSOR MOTOR		INDOOR MOTOR		MIN. CIRCUIT AMPACITY	MAX. CIRCUIT PROTECTION	MIN. VOLTAGE	MAX. VOLTAGE
		RLA	LRA	FLA	HP	FLA	HP				
FPG20N8C09A*	208/230-1-60	4.7	26	1.9	1/5	2.3	1/4	11	15	197	253
FPG20N8C12A*	208/230-1-60	5.5	26	1.9	1/5	2.3	1/4	12	15	197	253
FPG30N8C12A*	208/230-1-60	5.5	26	1.9	1/5	2.3	1/4	12	15	197	253
FPG40N8C12A*	208/230-1-60	5.5	26	1.9	1/5	2.3	1/4	12	15	197	253
FPG30N8C18A*	208/230-1-60	7.2	38	2.8	1/3	2.8	1/3	15	20	197	253
FPG40N8C18A*	208/230-1-60	7.2	38	2.8	1/3	2.8	1/3	15	20	197	253
FPG50N8C18A*	208/230-1-60	7.2	38	2.8	1/3	4.1	1/2	16	20	197	253
FPG60N8C18A*	208/230-1-60	7.2	38	2.8	1/3	4.1	1/2	16	20	197	253
FPG30N8C24A*	208/230-1-60	10.7	55	2.8	1/3	2.8	1/3	19	30	197	253
FPG40N8C24A*	208/230-1-60	10.7	55	2.8	1/3	2.8	1/3	19	30	197	253
FPG50N8C24A*	208/230-1-60	10.7	55	2.8	1/3	4.1	1/2	21	30	197	253
FPG60N8C24A*	208/230-1-60	10.7	55	2.8	1/3	4.1	1/2	21	30	197	253

Table 3 - Electrical Data

INSTALLATION

REQUIREMENTS

Follow manufacturer's installation instructions, as well as local and municipal building codes. In addition, the installation shall conform to the following Fire Protection Association (NFPA) Standards:

- NFPA No. 90A – Standard for Installation of Air Conditioning and Ventilation Systems
- NFPA No. 90B – Standard for Installation of Residence Type Warm Air Heating and Air Conditioning Systems.

This unit is approved for installation clearance to combustible material as stated on the unit rating plate. However, stated minimum clearances to combustibles may be inadequate for future accessibility and service needs which must be considered when planning of the installation.

INSTALLATION PRECAUTIONS



CAUTION



Always wear all appropriate personal protection Equipment when installing and servicing these units.



WARNING



Use multiple people when moving and installing these units. Failure to do so could result in injury or death.



CAUTION



Contact with metal edges and corners can result injury. Protective gloves should be worn when handling. Exercise caution when installing and servicing unit.

Observe the following precautions for typical installation:

- Always use proper tools and equipment
- No wiring or any work should be attempted without first ensuring the unit is completely disconnected from the power source and locked out. Also, verify that a proper permanent and uninterrupted, ground connection exists prior to energizing power to the unit.
- Review unit nameplate and wiring diagram for proper voltage and control configurations. This information may vary from unit to unit.

INSTALLATION CONTINUED

INSTALLATION PRECAUTIONS CONTINUED

CAUTION

When the unit is in operation components are rotating at high speeds and caution should be taken.

WARNING

When soldering and brazing, it is recommended to have a fire extinguisher readily available. When soldering and brazing close to valves or sensitive components, heat shields or wet rags are required to prevent damage to the valves or components.

NOTE

Insulation is installed in the unit to provide a barrier between varying atmospheres outside and within the unit. If insulation is damaged condensation can occur and can lead to corrosion, component failure, and possible property damage. Damaged insulation must be repaired prior to the operation of the unit. Insulation will lose its effectiveness and value when wet, torn, separated, and/or damaged.

CAUTION

When servicing this equipment, because of high pressures, make sure the reversing valve, expansion device, filter drier and other components are specifically designed for R-410A refrigerant.

ONLY USE service equipment specifically designated for use with R-410A.

WARNING

R-410A can become combustible if mixed with air at elevated temperature and/or pressure. Failure to follow this warning could result in property damage and personal injury or death.

UNIT LOCATION

This furnace is certified for through-the-wall, indoor, up-flow vertical position installation only. This appliance is not design certified for installation in mobile homes, recreational vehicles, or outdoors. A First Company approved wall sleeve must be used to install the FPG unit.

This is a direct vent appliance which uses outside air for combustion and discharges the products of combustion to the outdoors. Do not install this unit in close proximity to hot exhaust from clothes dryer vents, kitchen vents, corrosive fumes or steam vents.

Do not install directly on carpeting, tile, or other combustible material other than wood flooring. Proper distances must be maintained between the appliance vent pipe and operable windows, building openings, public walkways, electric meters, gas meters, gas regulators and gas relief equipment. Flue products must not be permitted to damage building surfaces.

The Installation must conform with local building codes or, in the absence of local codes, to the *National Fuel Gas Code*, ANSI Z223.1/NFPA 54, and/or the *Natural Gas and Propane Installation Code*, CSA B149.1

If installed in a garage, this unit must be installed so the burner(s) and the ignition source are located not less than 18" [45.72cm] above the floor. Must be located so that it is protected from physical damage by vehicles.

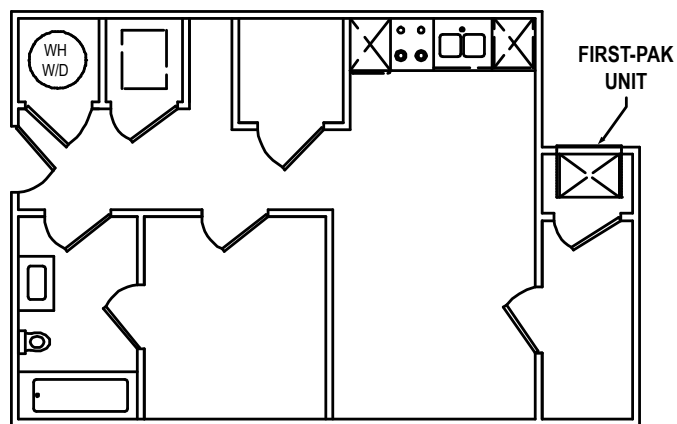


FIGURE 6 – Typical Floorplan with FIRST-PAK on Exterior Wall

INSTALLATION CONTINUED

UNIT CLEARANCE REQUIREMENTS

The unit may be installed with zero clearances to adjacent combustibles surfaces. This furnace shall not be installed directly on carpeting, tile, or other combustible material, other than wood flooring.

Service clearance must be provided for future maintenance and service. A minimum of 32" [81.28cm] open area must be left unobstructed in front of the access panels.

The grille must be kept free from any obstructions to air flow. The unit must be installed at least 4 feet [1.2192m] from electric meters, gas meters, regulators, and relief equipment. Products of combustion are discharged outside from the vent outlet located at the front grille; therefore all distances from adjacent public walkways, adjacent buildings, openable windows, and building openings must be compliant with those called for in the National Fuel Gas Code ANSI Z223.1 and/or CAN/CGA-B149 installation codes, as well as local codes.

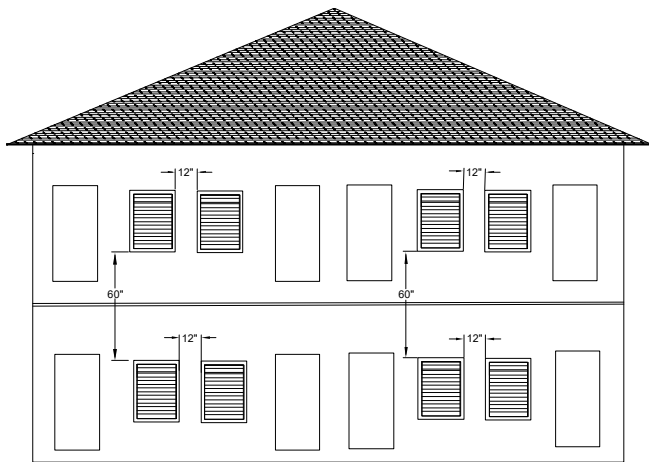


FIGURE 7 – Required Exterior Building Clearance

CLEARANCE REQUIREMENTS		
MINIMUM CLEARANCE	INCHES	CM
Horizontal distance between units	12	30
Vertical distance between units	60	152
Distance above ground level	6	15
Distance above finished floor	6	15
Distance above a garage floor	18	46

Table 4 - Clearance Requirements/Dimensions

A furnace installed in a garage must also be protected from damage by vehicles.

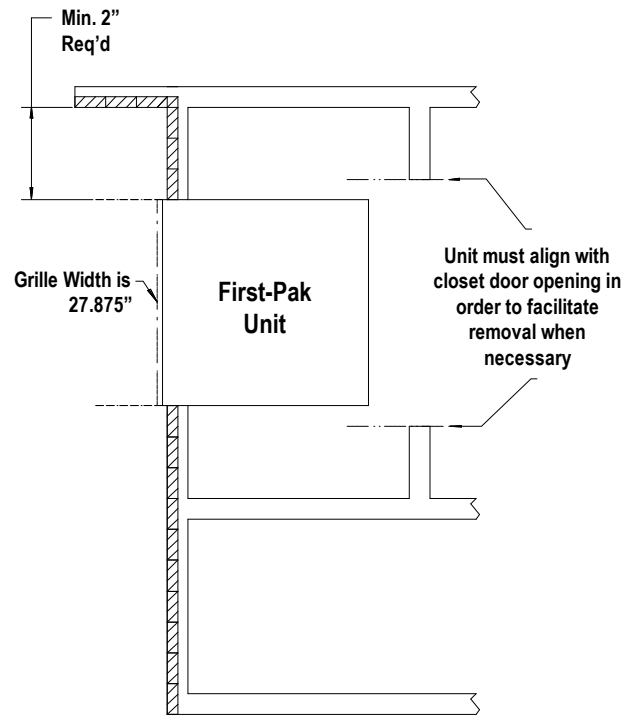


FIGURE 8 – Interior Clearance Requirements

WARNING

CARBON-MONOXIDE POISONING HAZARD

Failure to follow instructions could result in severe personal injury or death due to carbon-monoxide poisoning, if combustion products infiltrate into the building.

Check that all openings in the outside wall around the vent (and air intake) pipe(s) are sealed to prevent infiltration of combustion products into the building.

Check that furnace vent (and air intake) terminal(s) are not obstructed in any way during all seasons.

CAUTION

A masonry wall opening must be properly constructed with a lintel for wall support. Wall openings must be flashed and sealed. The unit must be level, front to back, side to side.

Refer to **VENTING** section and **CLEARANCE REQUIREMENTS** section in this manual for more information.

INSTALLATION CONTINUED

VENT CLEARANCES

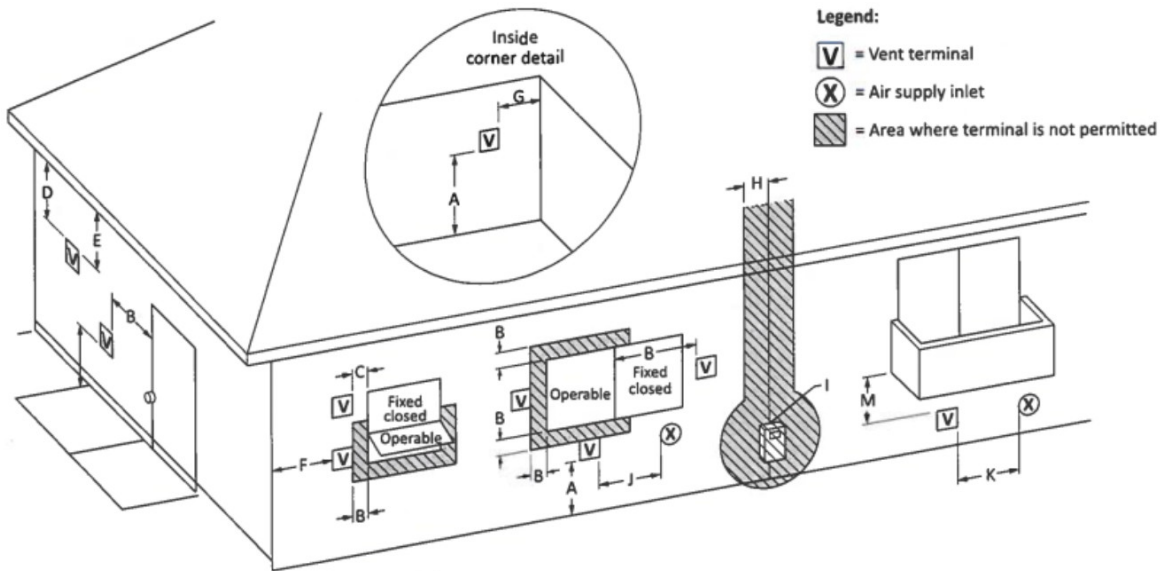


FIGURE 9 - Location of Vent Termination Clearances

VENT TERMINATION CLEARANCES			
	CLEARANCE	CANADIAN INSTALLATIONS ¹	US INSTALLATIONS ²
A =	Clearance above grade, veranda, porch, deck, or balcony (see 1.23.5-i(9)b.)	12 in (30 cm)	12 in (30 cm)
B =	Clearance to window or door that may be opened	6 in (15 cm) for appliances 10,000 Btuh (3 kW) 12 in (30cm) for appliances >10,000 Btuh(3 kW) & 100,000 Btuh (30 kW) 36 in (91 cm) for appliances >100,000 Btuh (30kW)	4 ft. (1.2 m) below or to the side of opening 1 foot (300 m) above opening
C =	Clearance to permanently closed window	*	*
D =	Vertical clearance to ventilated soffit located above the terminal within a horizontal distance of 2 ft. (61 cm) from the center line of the terminal	*	*
E =	Clearance to unventilated soffit	*	*
F =	Clearance to outside corner	*	*
G =	Clearance to inside corner	*	*
H =	Clearance to each side of center line	3 ft. (91 cm) within a height 15 ft. (4.5 m) above the meter/regulator assembly	*
I =	Clearance to service regulator vent outlet	3 ft. (91 cm)	*
J =	Clearance to nonmechanical air supply inlet to building or the combustion air inlet to any other appliance	6 in (15 cm) for appliances 10,000 Btuh (3 kW) 12 in (30cm) for appliances >10,000 Btuh (3 kW) & 100,000 Btuh (30 kW) 36 in (91 cm) for appliances >100,000 Btuh (30kW)	4 ft. (1.2 m) below or to the side of opening 1 ft. (300 m) above opening
K =	Clearance to a mechanical air supply inlet	6 ft. (1.83 m)	3 ft. (91 cm) above if within 10 ft. (3 m) horizontally
L =	Clearance above paved sidewalk or paved driveway located on public property	7 ft. (2.13 m) †	7 ft. (2.13 m)
M =	Clearance under veranda, porch, deck, or balcony	12 in (30 cm) ‡	*

NOTES:

- 1) In accordance with the current CSA B149.1, Natural Gas and Propane Installation Code.
- 2) In accordance with the current ANSI Z223.1/NFPA 54, National Fuel Gas Code.
- *Clearance in accordance with local installation codes and the requirements of the gas supplier and the manufacturer's installation instructions.
- † A vent shall not terminate directly above a sidewalk or paved driveway that is located between two single-family dwellings and serves both dwellings.
- ‡ Permitted only if veranda, porch, deck, or balcony is fully open on a minimum of two sides beneath the floor.

Table 5 – Vent Termination Clearances Dimensions


INSTALLATION CONTINUED

REMOVAL OF A UNIT FROM A COMMON VENTING SYSTEM

When an existing furnace is removed from a common venting system serving other appliances, the venting system is likely to be too large to properly vent the remaining attached appliances. The following test shall be conducted with each appliance while the other appliances connected to the common venting system are not in operation. An improperly sized venting system may cause condensation or flue gas spillage to occur.

1. Seal any unused openings in the common venting system.
2. Visually inspect the venting system for proper size and horizontal pitch and determine there is no blockage or restriction, leakage, corrosion, or other deficiencies which could cause an unsafe condition.
3. Insofar as is practical, close all building doors and windows between the space in which the appliances remaining connected to the common venting system are located and other spaces in the building. Turn on clothes dryers and any appliance not connected to the common venting system. Turn on exhaust fans, such as range hoods and bathroom exhausts, so they will operate at maximum speed. Do not operate a summer exhaust fan. Close fireplace dampers.
4. Following the lighting instructions, place the unit being inspected into operation. Adjust the thermostat so the appliance will operate continuously.
5. Test for spillage at the draft control relief opening after 5 minutes of main burner operation. Use the flame of a match or candle.
6. Follow the preceding steps for each appliance connected to the common venting system.
7. After it has been determined that each appliance remaining connected to the common venting system properly vents when tested as outlined above, return doors, windows, exhaust fans, fireplace dampers, and any other fuel burning appliance to their previous condition of use.

If improper venting is observed during any of the above tests, the common venting system must be corrected. See National Fuel Gas Code, ANSI Z223.1 (latest edition) to correct improper operation of common venting system.

	WARNING	
	ELECTRIC SHOCK HAZARD	
Disconnect all power supplies before servicing. Lock out/tag out to prevent accidental electrical shock.		

	NOTE	
There may be multiple power sources supplying the unit.		

INSTALLATION CONTINUED

WALL SLEEVE INSTALLATION

Refer to installation instruction packed with the wall sleeve to assemble and mount into the wall. Before unit installation, make sure sleeve components are not damaged; drain line is not obstructed and is leak free.

Check all seals to ensure that they are in position and undamaged. Ensure that the wall sleeve is sloped toward the exterior of the building (**FIGURE 10 - Wall Sleeve Mounting**). Securely fasten the Architectural grille to the front of the sleeve using the supplied hardware.

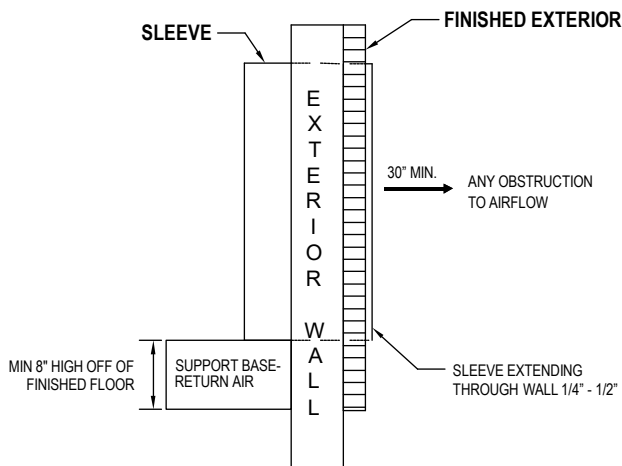


FIGURE 10 - Wall Sleeve Mounting



IMPORTANT



After sleeve installation, ensure that the gap in-between the wall and seal is insulated and is in contact with the sleeve sides.



IMPORTANT



Make sure a high grade non-hardening sealant approved for exterior use has been applied between edge of the sleeve and the structure, on the inside and outside walls, to prevent air and water from migrating inside (**FIGURE 10 - Wall Sleeve Mounting**).

REAR INSTALLATION & DIMENSIONS

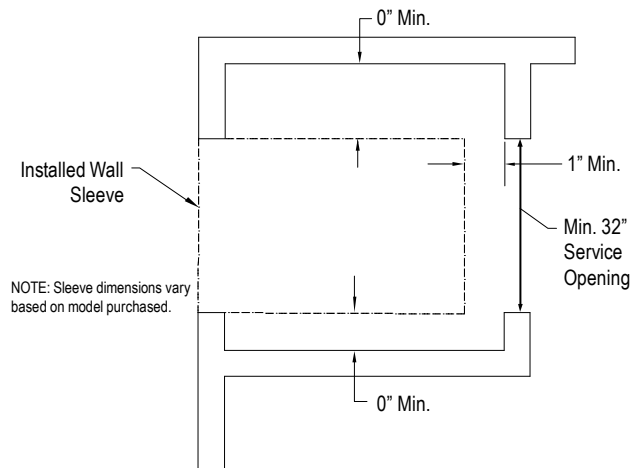


FIGURE 11 - Rear Installation Dimensions



NOTE



Sleeve dimensions vary based on model purchased.

The inside of the unit can be surrounded by a closet with minimum clearances to combustion section match to 0" clearance on the sides, 2" [5.08cm] clearance from the top, and 1" [2.54cm] from the front and the plenum. Enough clearance should be provided to install gas line and manual shutoff valve while also providing access for installing field wiring. Do not install directly on any combustible material (such as carpet, tile, etc.) other than wood flooring.

INSTALLATION CONTINUED

UNIT SUPPORT

The First Pak wall sleeve is not intended or designed to provide complete support for the First Pak unit. Additional support is required. A field constructed platform may be used for this purpose and may also be constructed to provide a means of attaching the return air duct.

PLYWOOD INSTALLATION

Support base construction should be built as below in **FIGURE 12 - Unit Support & Alignment**. It must be fabricated with plywood, framing lumber and/or any pre-approved sheet metal construction material. **FIGURE 12 - Unit Support & Alignment** is showing alignment of the platform top with the base panel of the wall sleeve.

- Minimum height of platform = 8" [20.32cm]
- Recommended platform width = 29" [73.66cm]
- Recommended platform depth = 16" [40.64cm]

Refer to **FIGURE 12 - Unit Support & Alignment**.

Things to consider prior to build the support structure:

1. Accurately measure the unit and choose a strong building material for the support structure.
2. It is recommended that for leveling purposes the unit should be well supported.
3. If additional vibration isolation material is required, non-combustible material **MUST** be used.
4. Ensure that the platform connection to FIRST-PAK Return Air Opening can fit an 8" x 24" [20.32cm x 60.96cm] duct. The FIRST-PAK unit must be aligned with return air opening on the unit base.
5. Ensure the support structure and the Wall Sleeve provide a secure, fixed, and leveled position. This allows a provision of bringing return air via ducting to the space under the unit.

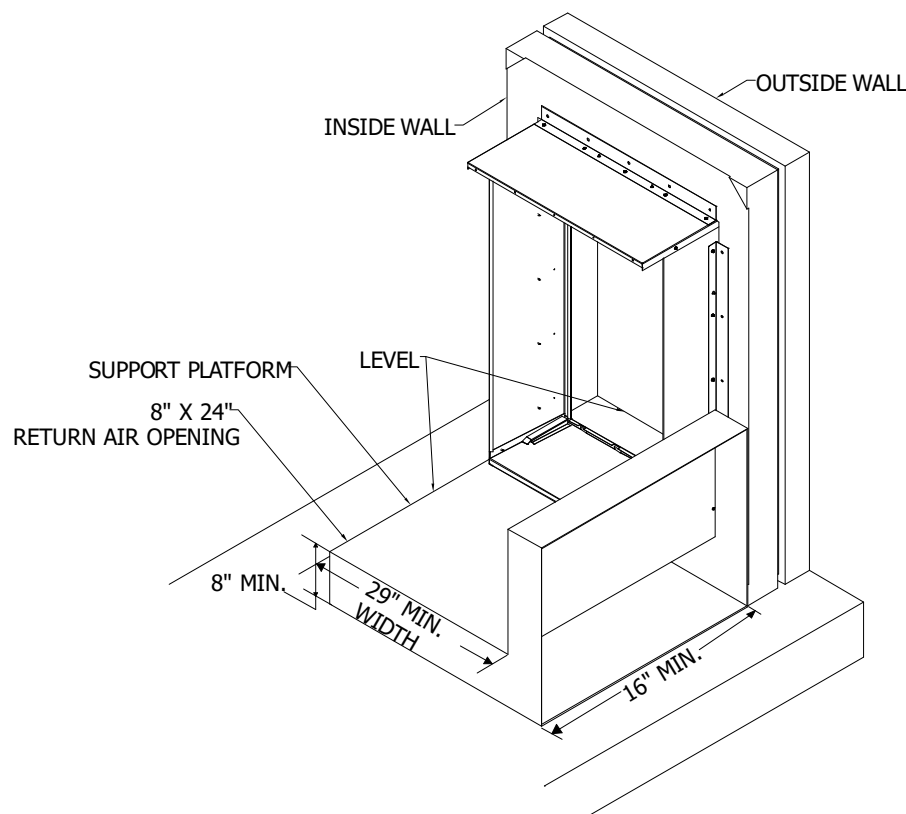


FIGURE 12 - Unit Support & Alignment



CAUTION



The sleeve is not intended as the sole support for the unit. An additional support must be provided near the return opening on the unit for adequate support. The use of vibration isolation material between the unit and the support is recommended.

INSTALLATION CONTINUED

PACKAGED UNIT INSTALLATION

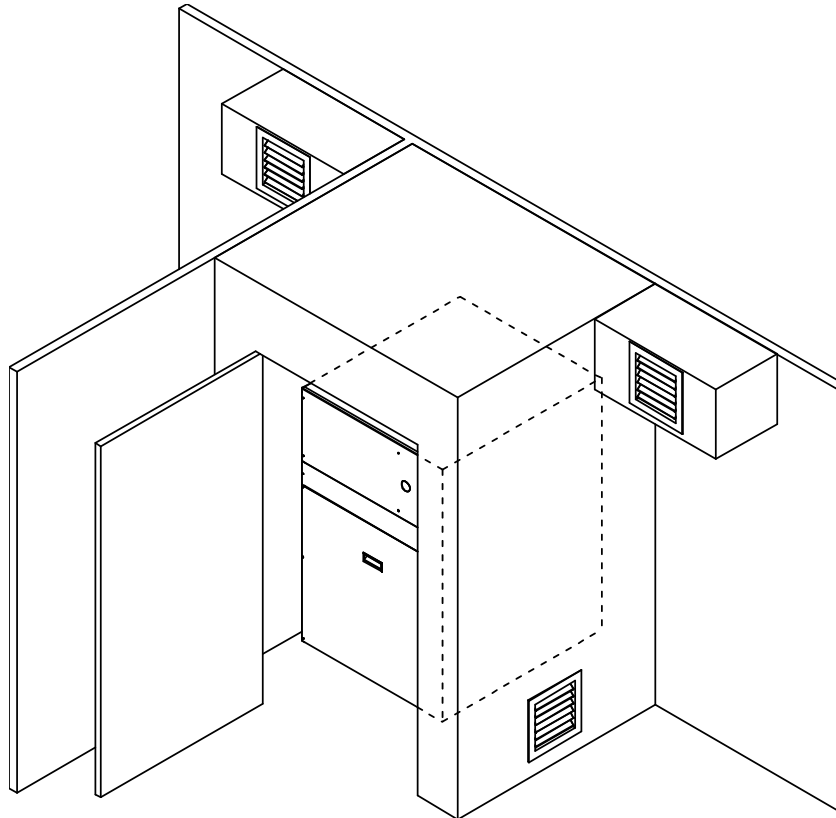


FIGURE 13 - FIRST-PAK Unit Installation



NOTE



Locate the unit in an area that provides minimum clearance to all service access panels. Consider all additional clearances needed for water connections, electrical connections, duct connections and sufficient return airflow.



IMPORTANT



These units are for indoor installation ONLY!



NOTE



Do not locate unit in areas subject to freezing temperatures or where high humidity levels could cause cabinet condensation.

Insulation is installed in indoor equipment to provide a barrier between outside air conditions surrounding the unit and the varying conditions inside the unit. If the insulating barrier is damaged, the surrounding ambient air will affect the inside surface temperature of the cabinet; this may lead to sheet metal corrosion and subsequently, component failure.



IMPORTANT



Damaged insulation must be repaired or replaced before the unit is placed back into operation. Insulation loses its insulating properties when wet, damaged, separated or torn.

The installer must adhere strictly to all local and national code requirements pertaining to the installation of this equipment including the cabinet, discharge plenum and connecting ducts. All units are designed for indoor use only, and are agency listed for installation with clearances specified in on the furnace rating plate.

INSTALLATION CONTINUED

PACKAGED UNIT INSTALLATION



NOTE



Check nameplate voltage, amperage and fuse size for proper power supply.

1. Remove the four shipping brackets holding the unit to the shipping pallet and remove unit from the shipping pallet.



NOTE



The top mounting bracket must be attached to the FIRST-PAK unit.

2. Attach the bracket to the FIRST-PAK unit and the wall sleeve using the screws supplied with the wall sleeve. Refer to [FIGURE 14](#) – below.

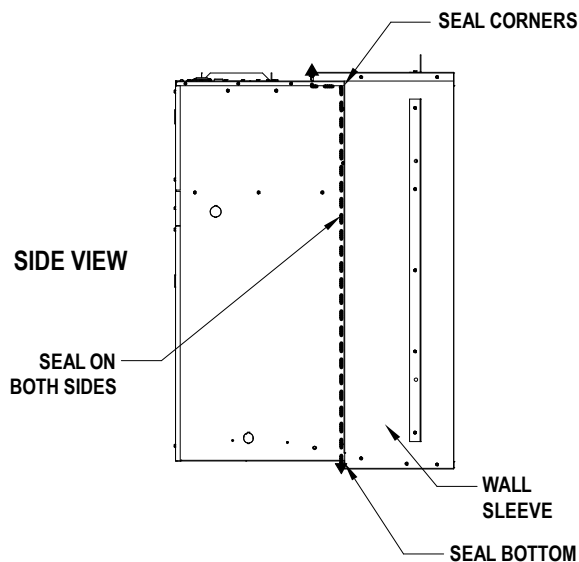


FIGURE 14 – Wall Sleeve Seal

3. Ensure that properly sized ductwork is in place to mate to the connections on the FIRST-PAK.
4. Remove front access panel and verify all electrical connections are secure and check the condenser fan to see it turns freely.



NOTE



For shipping purposes the supply flanges are shipped flat. The supply duct flanges must be bent up at a 90° angle.

5. If an air filter is to be applied to the unit remove lower front access panel to replace filter. ([FIGURE 19 – Air Filter Location](#)). Place the filter into the filter bracket.
6. Ensure that the wall sleeve is installed squarely and is secured before installing the unit.

7. Inspect the sleeve seal, which is supplied with the sleeve, to ensure that it is properly secured and aligned (see [FIGURE 14 – Wall Sleeve Seal](#)).
8. Slide the FIRST-PAK unit toward the sleeve seal until the sleeve and cabinet brackets are nested and almost making contact.
9. Center the FIRST-PAK unit in the sleeve.
10. Use screw fasteners to attach the cabinet bracket to wall sleeve.

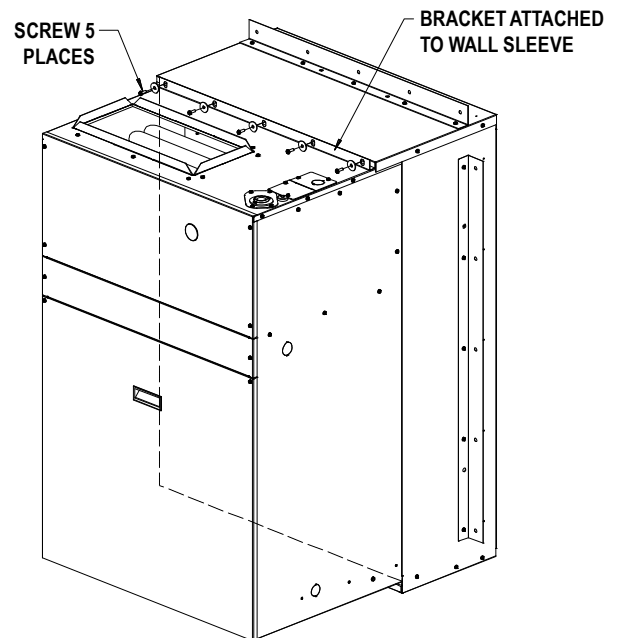


FIGURE 15 – Top Bracket Installation on Sleeve

11. Use a high-grade non-hardening sealant to close any gaps that may exist between the seal and the wall of the sleeve.
12. Check that the unit is completely settled on all four sides against the wall sleeve seals.



CAUTION



If unit is not sealed properly, water and/or outside air will infiltrate into the closet, and can cause improper unit operation and may cause damage to the unit and/or property.

INSTALLATION CONTINUED

DUCTWORK

IMPORTANT

Both supply and return air ducts must be attached to the unit.

IMPORTANT

The supply duct connection must be sized to a minimum of the same size as the unit discharge air opening.

IMPORTANT

All ductwork must be installed in accordance with National Fire Protection Assoc. Codes 90A and 90B.

DISCHARGE DUCTING

Discharge ductwork should be sized and constructed in accordance with industry best practices and standards.

Discharge (supply) air ductwork must be adequately sized to provide airflow within the specified total external static pressure (.5" W.C.). Ductwork should be adequately insulated to prevent condensation and loss of efficiency. Flexible duct connections may be used.

RETURN AIR DUCTING

Return air ductwork must be adequately sized to provide airflow within the specified total external static pressure (.5" W.C.). Ductwork should be adequately insulated to prevent loss of efficiency. Flexible duct connections may be used. When this furnace is installed so that the supply air duct supplies air to areas outside the space containing the furnace, the return air ducts must be sealed to the furnace casing and terminate outside the space containing the furnace.

WARNING

Never allow the products of combustion from the flue pipe to enter the supply or return ducts.

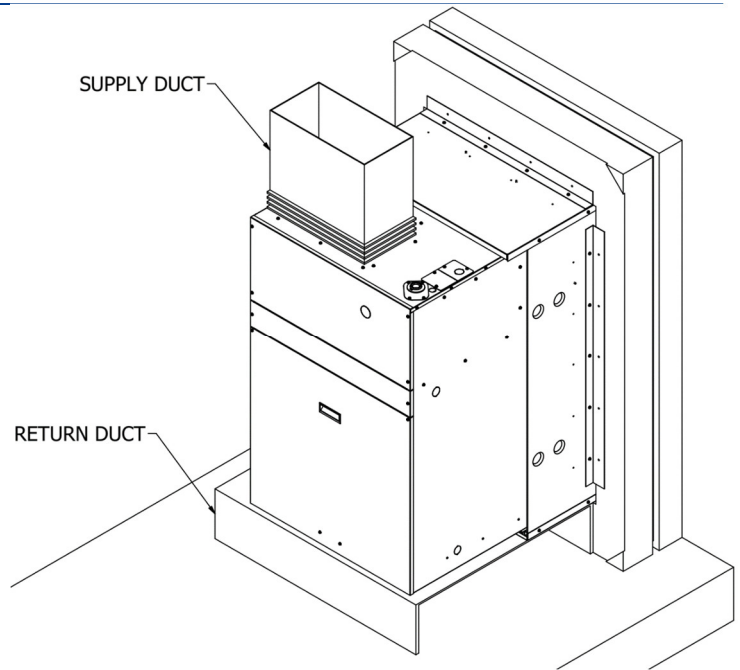


FIGURE 16 – Unit Ducting

CONDENSATE DRAINAGE

Condensate drain lines must be properly installed with adequate slope away from unit to ensure proper drainage. A minimum trap of 1.5 inches [3.81cm] must be installed to isolate the negative pressures of the drain pan from the drain line. Refer to for schematic information on the condensate drain lines.

CAUTION

On units with plastic drain pans, the drain connection must be made hand tight only.

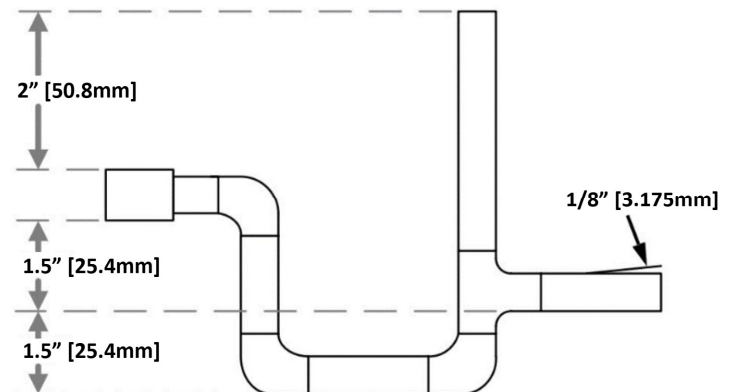


FIGURE 17 - Condensate Drain Layout

INSTALLATION CONTINUED

VENTING

The venting system exhausts the products of combustion to the outdoors. The venting system is an integral part of the furnace and must not be altered. Follow all local & National codes when selecting an installation location. Observe all clearance requirements pertaining to vent termination. Perform regularly scheduled maintenance checks to assure venting of flue products to the outdoors is unobstructed.

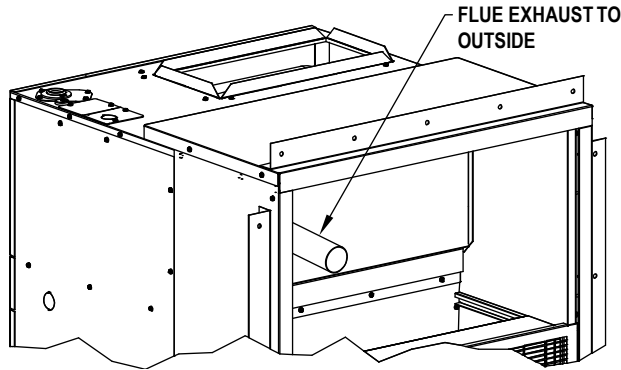


FIGURE 18 - Venting Location

NOTE
These units are direct vented.

AIR FILTER

The First Pak unit must not be operated without an air filter in place. The unit is equipped with a factory installed 1" filter rack and a disposable filter. A permanent washable filter may also be used provided it has the same or greater surface area as the original filter. As an alternative to the factory provided filter location, a filter rack may be field installed elsewhere in the return duct system. Do not use filters which are highly restrictive to air flow.

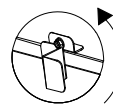
NOTE
The total external static pressure, including ducts, grilles, registers, and filters must not exceed .5" W.C.

AIR FILTER MINIMUM DIMENSIONS	
Model Series	Minimum Area
FPG**N8****	576 sq. inches [0.3716 sq. meter]

Table 6 - Air Filter Minimum Dimensions

CAUTION
Do not operate this equipment without an air filter.

1. ROTATE
- 2.



FILTER BRACKET

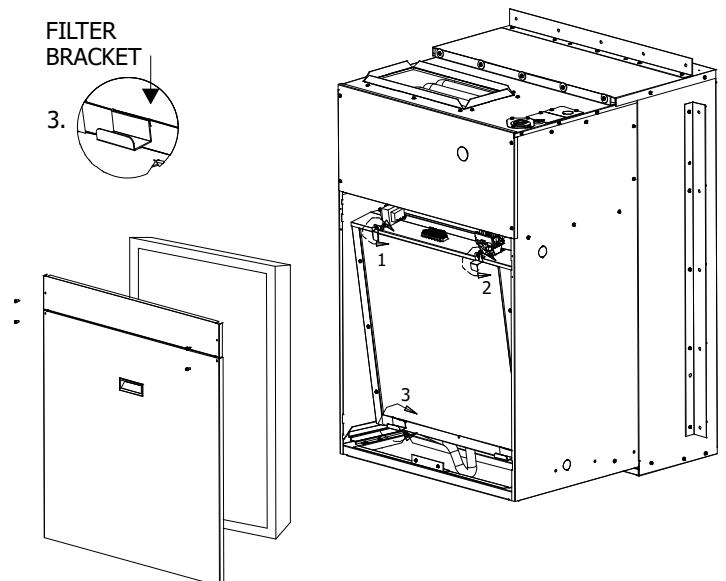
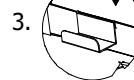


FIGURE 19 - Air Filter Location

INSTALLATION CONTINUED

COMBUSTION AIR

This is a direct vent furnace, which receives its combustion air from outside and discharges the products of combustion outside. Do not restrict air openings on the FPG unit or any other appliances. Do not store any insulating material in the vicinity of the FPG unit or any other appliances.



WARNING



Do not block any louvered sections of the furnace, inside or outside. Inadequate combustion air will cause improper combustion and lead to the production of carbon monoxide.



WARNING



The area surrounding the furnace must be kept free of all combustible materials, gasoline, insulating materials and other flammable materials.

Inspect the furnace area after the furnace is installed and after anytime insulation has been added to the structure.



CAUTION



Avoid contamination of the furnace area and the combustion air supply, exposure to the following substances may cause premature heat exchanger failure:

- Permanent wave solutions
- Chlorinated waxes and cleaners
- Chlorine based swimming pool chemicals
- Water softening chemicals
- De-icing salts or chemicals
- Carbon tetrachloride
- Halogen type refrigerants
- Cleaning solvents (such as perchloroethylene)
- Printing inks
- Paint removers
- Varnishes, etc.
- Hydrochloric acid
- Antistatic fabric softeners for clothes dryers
- Masonry acid washing materials

GAS PIPING & CONNECTION

All gas piping and connections to this furnace must be performed by a qualified installer. Installation methods and materials must comply with local building codes or, in the absence of local codes, to the *National Fuel Gas Code*, ANSI Z223.1/NFPA 54, and/or the *Natural Gas and Propane Installation Code*, CSA B149.1.

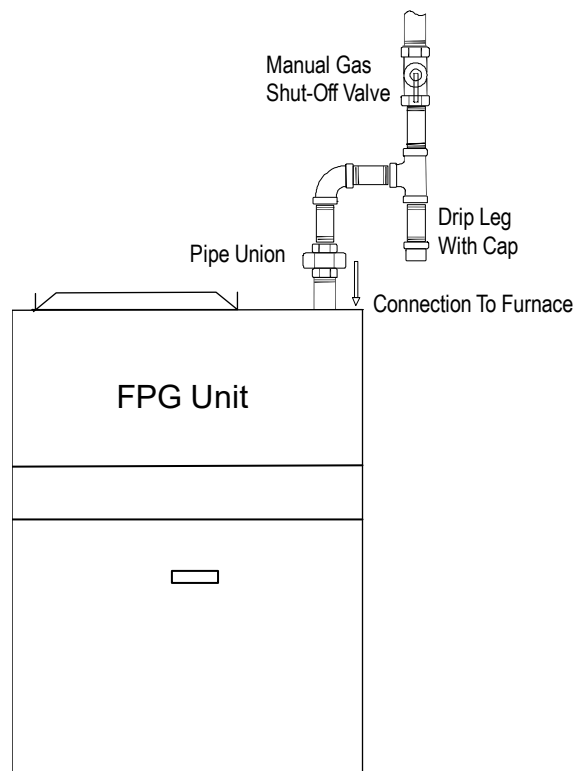


FIGURE 20 - Gas Supply Piping

Use ½" N.P.T. gas piping to make field installed connections to the furnace gas valve. A manual gas shut-off valve must be provided and installed external to the furnace casing. A ground joint union and a drip leg must also be provided. A field provided gas supply pressure 1/8" N.P.T. test port must be installed. Use a high quality approved pipe thread compound on all pipe thread joints. A flexible gas connector may be used to connect the furnace, if permitted by local codes. If a flexible connector is used, it must be a listed connector in new condition. Do not use a connector that has been previously used to service another appliance. A flexible connector must not pass through the furnace cabinet; Black steel gas piping must be used between the gas valve and a location outside the furnace cabinet to connect the flexible gas connector.

INSTALLATION CONTINUED

GAS PIPING & CONNECTION CONTINUED

When installing an FPG60, which is replacing a competitors unit, field installed gas piping may require an offset to line up the existing gas piping to the gas valve. See **FIGURE 21 - Gas Pipe FPG60**.

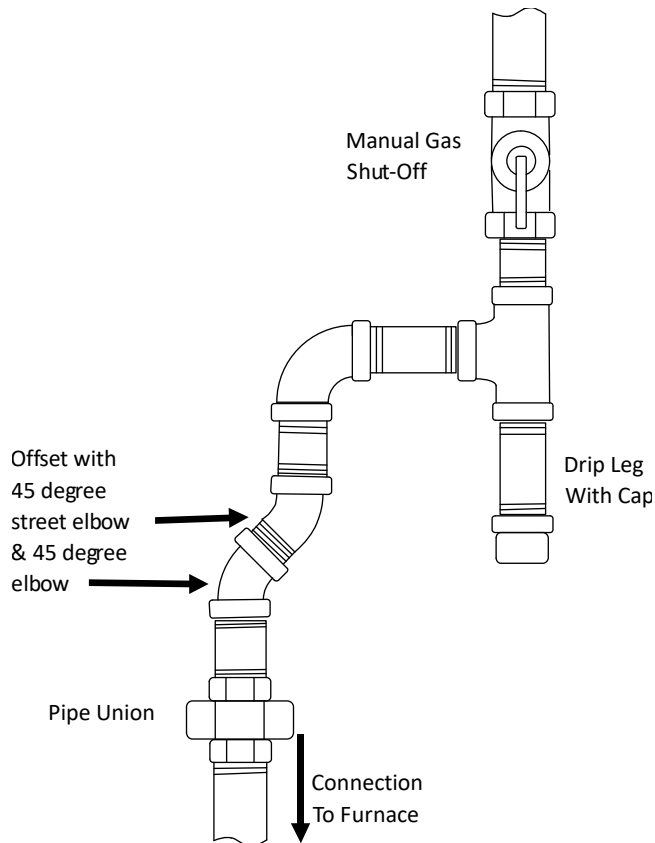


FIGURE 21 - Gas Pipe FPG60

The furnace and its external gas shut-off valve must be disconnected from the piping system before any gas line pressure test exceeding ½ PSI (14" [35.56cm] W.C.) is performed.

Do not expose the gas valve to any pressure higher than 14" [35.56cm] W.C. or gas valve failure may occur.

The gas valve is equipped with 1/8" N.P.T. pressure test ports for measuring gas supply pressure and gas manifold pressure. Refer to **FIGURE 29 – Gas Valve** on page 33 regarding locations of pressure test ports. Refer to **Table 11 - Gas Pressure Table** on page 34 for proper gas supply and manifold pressures.

LEAK TESTING

Gas piping must be thoroughly checked and proven to be leak free before placing the furnace in operation. Follow all local code requirements in place or *National Fuel Gas Code*, ANSI Z223.1/NFPA 54 requirements for leak checking.

Never test for gas leaks with an open flame. Use a commercially available soap solution made specifically for the detection of leaks.

Procedures for proper leak testing of the furnace prior to placing it into service. The furnace and its equipment shutoff valve must be disconnected from the gas supply piping system during any pressure testing of that system at pressures in excess of ½ psi (3.5 kPa).

	WARNING	
	FIRE OR EXPLOSION HAZARD	
Failure to follow the safety warnings exactly could result in serious injury, death or property damage.		
Never test for leaks with an open flame.		
Use a commercially available soap solution made specifically for the detection of leaks to check all connections. A fire or explosion may result causing property damage, personal injury or loss of life.		

WARNING

In the State of Massachusetts:

This product must be installed by a licensed Plumber or Gas Fitter. When flexible connectors are used, the maximum length shall not exceed 36" [91.44cm]. When lever-type gas shutoffs are used, they shall be T-handle type.

Gas piping must connect to the furnace through the top of the cabinet. Gas piping must be adequately supported external to the furnace cabinet. The furnace gas valve, manifold, and burner assembly are not designed or intended to support the weight of the gas line external to the furnace cabinet. The gas piping connecting the furnace must be properly aligned with the gas valve to prevent binding and distortion of the gas manifold and burner assembly.

ELECTRICAL

HIGH VOLTAGE

WARNING

ELECTRIC SHOCK HAZARD

Disconnect all power supplies before servicing. Lock out/tag out to prevent accidental electrical shock.

NOTE

There may be multiple power sources supplying the unit.

WARNING

Use copper conductors only. Install all parts and panels before operation of unit. Failure to follow these warnings can result in injury or death.

All wiring must comply with local and national code requirements. Units are provided with wiring diagrams and nameplate data to provide information required for necessary field wiring.

These units are provided with a class 2 transformer for 24VAC control circuits. Should any add-on accessory or component also have a class 2 transformer furnished, care must be taken to prevent interconnecting outputs of the two transformers by using a thermostat with isolating contacts.

WARNING

Connect ground wire to ground terminal marked "GND". Failure to do so can result in injury or death.

CAUTION

Any device that has been furnished by the factory for field installation must be wired in strict accordance with the associated wiring diagram. Failure to do so could damage components and void warranties.

208-230 VOLT OPERATION

All 208-230 Volt units are factory wired for 230 Volt operation. For 208 Volt operation, moving/changing/rewiring the line voltage tap on the 24 Volt control transformer is required. See note 5 on unit wire diagrams.

LOW VOLTAGE

THERMOSTAT

A standard 24 VAC single state heating and cooling thermostat is required to control this unit. A thermostat with a "C" common terminal is preferred. Thermostat connections and their functions are below in **FIGURE 22 - Thermostat Connections** as follows:

THERMOSTAT CONNECTIONS KEY		
Abbr.	Color	Function
Y	Yellow	Compressor Contactor
C	Brown	Transformer 24VAC Common
W	White	Call for Heating
G	Red	Evaporator Blower
R	Green	Transformer 24VAC Hot

Table 7 - Thermostat Connections Key

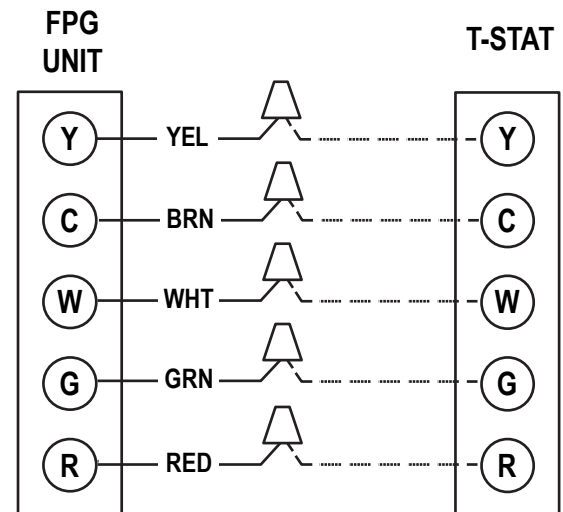


FIGURE 22 - Thermostat Connections

THERMOSTAT INSTALLATION

The Thermostat should be located on an interior wall in a larger room, away from supply duct draft. Position the thermostat back plate against the wall so that it appears level and so the thermostat wires protrude through the middle of the back plate mounting holes and drill holes with a 3/16" [5mm] bit. Install supplied anchors and secure plate to the wall. Thermostat wire must be 18 AWG wire.

CONTROLS

CONTROL BOARD

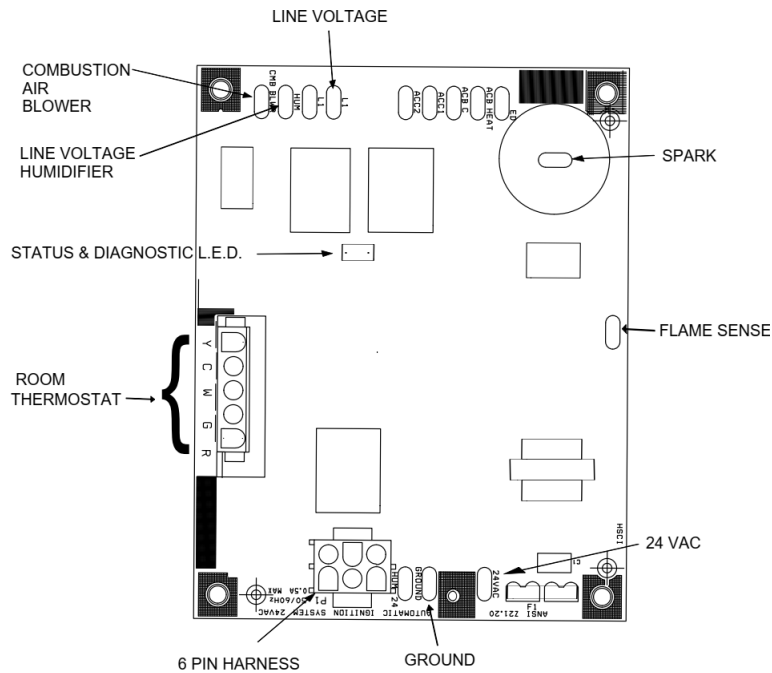


FIGURE 23 - Control Board

SIGNAL	PROBLEM	POSSIBLE CAUSE	CHECKS & CORRECTIONS
Slow Flash	No heat request from room thermostat	Stand-by mode; does not indicate fault condition	
RAPID FLASH	Room thermostat is requesting heat	Thermostat requesting heat; does not indicate condition	
CONSTANT OFF	Internal fault or No power	Main power is off or control has failed	Check circuit breaker / circuit fuse, external power switch.
CONSTANT ON	No Operation	Bad Control Board	Control Failure
2 FLASHES	Control is locked out from failed ignition or loss of flame	Control is locked out from failed ignition or loss of flame	
3 FLASHES	Unexpected pressure switch condition	Contacts are open with inducer on or closed with inducer off	
4 FLASHES	Limit switch or rollout switch is open		
5 FLASHES	Flame sensed while gas valve is off		
6 FLASHES	On-Board microprocessor conflict		

Table 8 – Control Board L.E.D. Table

COOLING OPERATION

STEADY STATE COOLING

When the unit is given a "Y" input the unit will operate in steady state cooling mode. The compressor will immediately come on after a "Y" input. After a 5s time delay the indoor fan will be energized. The system will remain in steady state operation as long as the "Y" input is provided to the unit.

The "Y" signal has priority over the both the "W" and "G" signals. If both "Y" and "W" are called, the call for cooling has priority. The heat cycle is interrupted as if the call for heat had terminated and the call for cooling proceeds as normal.

When the "Y" input is removed the control will immediately de-energize the compressor contactor. The indoor blower de-energizes after a cooling off delay period of 90s.

CONTINUOUS FAN OPERATION

When the unit is given a "G" input, without an additional "Y" or "W" call, the unit will operate in continuous fan operation mode. The fan remains energized as long as the "G" input is provided to the unit without a "Y" or "W".

CONTROLS CONTINUED

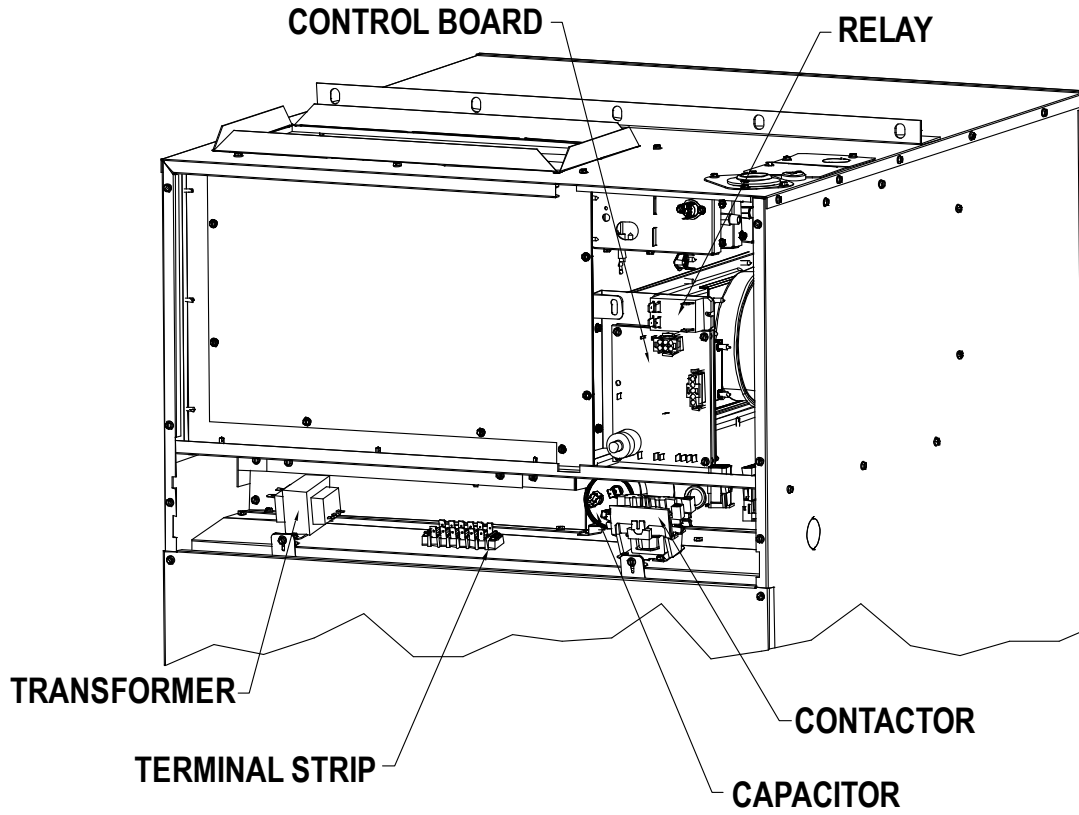


FIGURE 24 – Electrical Components

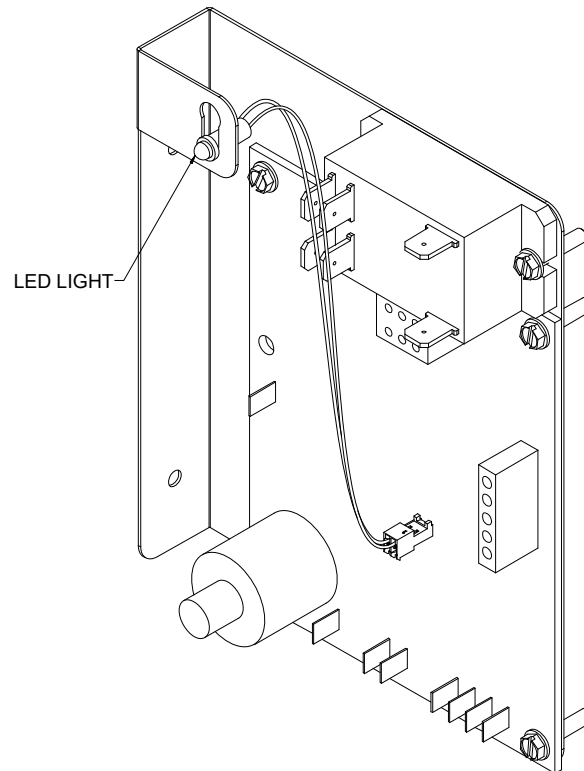


FIGURE 25 - Control Bracket Detail

CONTROLS CONTINUED

BLOWER CONTROL

FPG gas heat units are equipped with a direct drive indoor blower motor.

- FPG**N8C09A and FPG**N8C12A have a blower motor with 4 speeds:
 - Either T2 or T3 may be used for heating mode providing the speed selection allows the unit to operate within specified temperature rise range.
 - T1 is the constant fan speed.
 - T4 is used for cooling mode.
- All other models have 5 fan speeds:
 - Either T2 or T3 may be used for heating mode providing the speed selection allows the unit to operate within specified temperature rise range.
 - T1 is the constant fan speed.
 - T4 or T5 may be used for cooling mode.
 - See wiring diagram located on the unit.

Refer to [Table 9 - FPG AIRFLOW PERFORMANCE DATA](#) & [Table 10 - FPG AIRFLOW PERFORMANCE DATA CONTINUED](#) for information on the select speed changes for heat and cool mode.

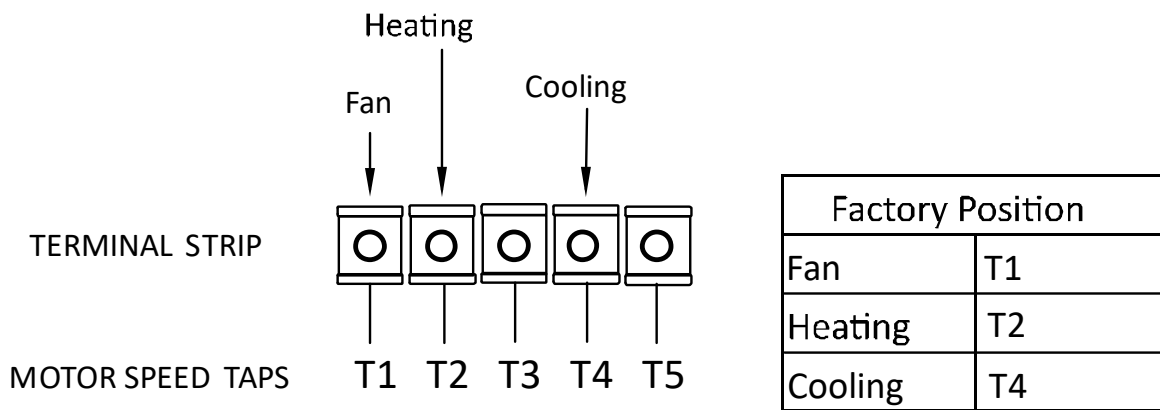


FIGURE 26 - Blower Control Tap



CAUTION



In heating mode the unit must operate within its rated temperature rise range and static range. Refer to [Tables 9 & 10 FPG AIRFLOW PERFORMANCE DATA](#) below. Failure to operate within the designed temperature rise range will cause unreliable operation and damage to the heat exchanger may occur.



NOTE



High efficiency brushless DC motors are wired with power applied at all times, see illustration above.
Low voltage thermostat demand and board algorithms will control its use.

PERFORMANCE DATA

FPG AIRFLOW PERFORMANCE DATA													
MODEL	MOTOR SPEED	MID RISE °F	RISE RANGE °F	IWC STATIC PRESSURE									
				0.1		0.2		0.3		0.4		0.5	
				SCFM	TEMP RISE °F	SCFM	TEMP RISE °F	SCFM	TEMP RISE °F	SCFM	TEMP RISE °F	SCFM	TEMP RISE °F
FPG20N8C09A*	T1	40.0	25-55	300	51	260		210		170		120	
	T2 ^H		25-55	370	41	330	45	280	53	240		190	
	T3		25-55	450	33	410	37	360	42	320	47	270	55
	T4 ^C		25-55	360	42	320	47	270		230		180	
FPG20N8C12A*	T1	40.0	25-55	300	51	260		210		170		120	
	T2 ^H		25-55	370	41	330	45	280	53	240		190	
	T3		25-55	530	28	490	30	440	34	400	37	360	42
	T4 ^C		25-55	460	33	420	36	370	41	330	46	280	53
FPG30N8C12A*	T1	45.0	30-60	410	55	370		320		290		240	
	T2 ^H		30-60	520	43	490	46	430	52	400	56	350	
	T3		30-60	620	36	590	38	540	42	500	45	460	49
	T4 ^C		30-60	460	49	420	53	370		340		290	
FPG40N8C12A*	T1	45.0	30-60	410		370		320		290		240	
	T2 ^H		30-60	620	48	590	51	540	56	500	60	460	
	T3		30-60	650	46	620	49	560	53	530	57	490	
	T4 ^C		30-60	460		420		370		340		290	
FPG30N8C18A*	T1	45.0	30-60	490	45	470	48	410	55	380	60	330	
	T2 ^H		30-60	560	40	540	42	480	47	440	51	400	57
	T3		30-60	640	35	610	37	550	41	520	43	470	48
	T4 ^C		30-60	680	33	650	34	600	38	560	40	510	44
	T5		30-60	750	30	720	31	660	34	630	36	580	39
FPG40N8C18A*	T1	45.0	30-60	530	57	510	59	450		410		370	
	T2 ^H		30-60	620	48	610	49	550	55	510	59	460	
	T3		30-60	840	36	820	36	760	39	720	41	680	44
	T4 ^C		30-60	690	44	670	44	610	49	580	52	530	57
	T5		30-60	740	40	730	41	670	45	630	48	580	51
FPG50N8C18A*	T1	50.0	35-65	650	58	610	61	560		530		480	
	T2 ^H		35-65	730	51	700	54	650	58	610	61	560	
	T3		35-65	920	41	880	42	830	45	800	47	750	50
	T4 ^C		35-65	680	55	650	58	600	62	560		510	
	T5		35-65	750	50	710	53	660	57	630	60	580	
FPG60N8C18A*	T1	50.0	35-65	580		560		490		450		410	
	T2 ^H		35-65	880	51	860	52	790	57	750	60	710	63
	T3		35-65	1090	41	1070	42	1000	45	960	47	920	49
	T4 ^C		35-65	690		670		600		560		520	
	T5		35-65	750	60	730	61	660		630		580	

NOTE:

- Airflow data shown is with a dry coil at 70°DB EAT with Standard 1" filter
- Do not operate unit outside of blower operating range
- ^C indicates default cooling tap
- ^H indicates default heating tap

Table 9 - FPG AIRFLOW PERFORMANCE DATA

PERFORMANCE DATA

FPG AIRFLOW PERFORMANCE DATA													
MODEL	MOTOR SPEED	MID RISE °F	RISE RANGE °F	IWC STATIC PRESSURE									
				0.1		0.2		0.3		0.4		0.5	
				SCFM	TEMP RISE °F	SCFM	TEMP RISE °F	SCFM	TEMP RISE °F	SCFM	TEMP RISE °F	SCFM	TEMP RISE °F
FPG30N8C24A*	T1	45.0	30-60	490	45	470	48	410	55	380	60	330	
	T2 ^H		30-60	560	40	540	42	480	47	440	51	400	57
	T3		30-60	640	35	610	37	550	41	520	43	470	48
	T4 ^C		30-60	770	29	740	30	690	33	650	34	600	37
	T5		30-60	940	24	910	25	850	26	820	27	770	29
FPG40N8C24A*	T1	45.0	30-60	530	57	510	59	450		410		370	
	T2 ^H		30-60	620	48	610	49	550	55	510	59	460	
	T3		30-60	840	36	820	36	760	39	720	41	680	44
	T4 ^C		30-60	790	38	780	39	720	42	680	44	630	47
	T5		30-60	920	32	910	33	850	35	810	37	770	39
FPG50N8C24A*	T1	50.0	35-65	650	58	610	61	560		530		480	
	T2 ^H		35-65	730	51	700	54	650	58	610	61	560	
	T3		35-65	920	41	880	42	830	45	800	47	750	50
	T4 ^C		35-65	790	47	760	49	710	53	670	56	620	60
	T5		35-65	930	40	890	42	840	45	810	46	760	50
FPG60N8C24A*	T1	50.0	35-65	650		630		560		520		480	
	T2 ^H		35-65	880	51	860	52	790	57	750	60	710	63
	T3		35-65	1090	41	1070	42	1000	45	960	47	920	49
	T4 ^C		35-65	790	57	770	59	700	64	660		620	
	T5		35-65	930	49	910	50	840	54	800	56	750	60

NOTE:

- Airflow data shown is with a dry coil at 70°DB EAT with Standard 1" filter
- Do not operate unit outside of blower operating range
- ^C indicates default cooling tap
- ^H indicates default heating tap

Table 10 - FPG AIRFLOW PERFORMANCE DATA CONTINUED

HEATING OPERATIONS

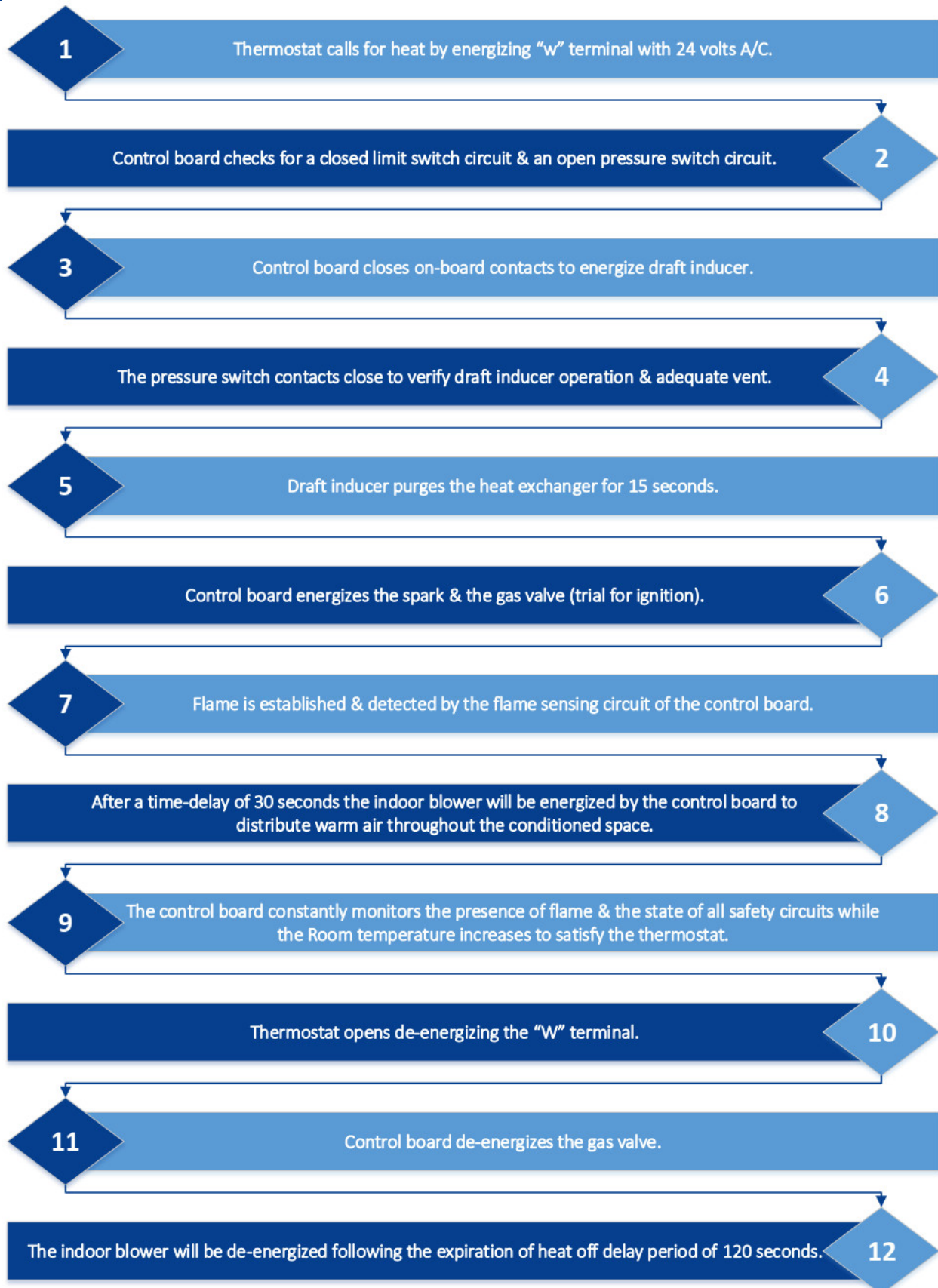


FIGURE 27 - Heating Sequence of Operations

HEATING OPERATIONS CONTINUED

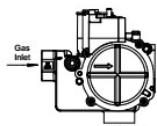
FOR YOUR SAFETY READ BEFORE OPERATING

WARNING: If you do not follow these instructions exactly, a fire or explosion may result causing property damage, personal injury or loss of life.

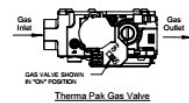
- A.** This appliance does not have a pilot. It is equipped with an ignition device which automatically lights the burner. Do not try to light the burner by hand.
- B. BEFORE OPERATING** smell ALL around the appliance area for gas. Be sure to smell next to the floor because some gas is heavier than air and will settle on the floor.
- WHAT TO DO IF YOU SMELL GAS**
- * Do not try to light any appliance.
 - * Do not touch any electric 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.
- C.** Use only your hand to push in or turn the gas control switch. Never use tools. If the gas control switch will not turn by hand, don't try to repair it, call a qualified service technician. Force or attempted repair may result in a fire or explosion.
- D.** Do not use this appliance if any part has been under water. Immediately call a qualified service technician to inspect the appliance and to replace any part of the control system and any gas control which has been under water.

OPERATING INSTRUCTIONS

1. STOP! Read the safety information above on this label.
2. Set the thermostat to lowest setting.
3. Turn off all electric power to the appliance.
4. This appliance is equipped with an ignition device which automatically lights the burner. Do not try to light the burner by hand.
5. Remove control access panel.
6. Turn the gas control switch "OFF".
7. Wait five(5) minutes to clear out any gas. Then smell for gas, including near the door. If you smell gas, STOP! Follow "B" in the safety information above on this label. If you don't smell gas, go to the next step.
8. Turn the gas control switch "ON".
9. Replace the control access panel.
10. Turn on all the electric power to the appliance.
11. Set thermostat to desired setting.
12. If the appliance will not operate, follow the instructions "To Turn Off Gas to Appliance" and call your service technician or gas supplier.



First Pak Gas Valve



Therma Pak Gas Valve

TO TURN OFF GAS TO APPLIANCE

1. Set the thermostat to lowest setting.
2. Turn off all electric power to the appliance if service is to be performed.
3. Remove control access panel.
4. Turn the gas control Switch "OFF". Do not force.
5. Replace control access panel.

LBLLGT01-A

FIGURE 28 – Lighting Instructions Label

TO LIGHT BURNERS

1. Turn off electrical power to the unit.
2. Turn the room thermostat to the lowest setting.
3. Check that the position of the gas valve switch is in the "on" position (see [FIGURE 29 – Gas Valve](#)).
4. Check that the position of the manual gas shut-off valve is in the "on" position (see [FIGURE 30 – Manual Gas Shutoff Valve](#)).
5. Turn on electrical power to the unit.
6. With the room thermostat to heat mode, set the temperature above the current room temperature.

SHUTTING DOWN BURNERS

1. Turn off electrical power to the unit.
2. Move the gas valve switch to the "off" position (see [FIGURE 30 – Manual Gas Shutoff Valve](#)).
3. Turn the manual gas shut-off valve to the "off" position.

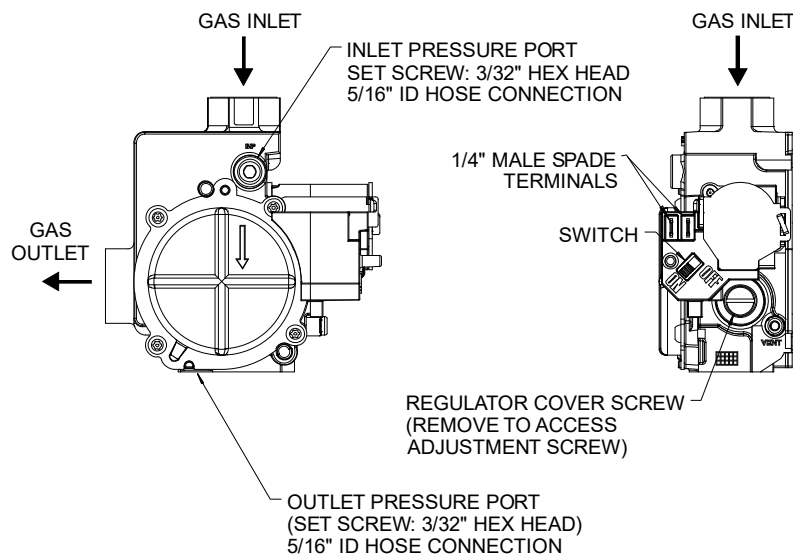


FIGURE 29 – Gas Valve



NOTE

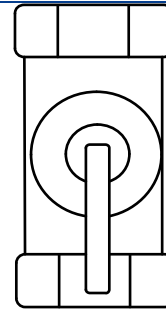


White-Rodgers kit F92-1003 is needed to measure gas pressure. The kit consists of a 3/32" Allen wrench, 5/16" I.D. tube, and a 5/16" to 1/4" hose barb connector.

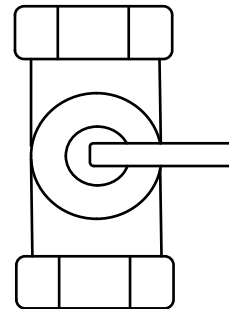
HEATING OPERATIONS CONTINUED

GAS SUPPLY PRESSURE

1. Turn "off" the gas supply to the furnace using the 1/4 turn manual gas valve.
2. Turn the pressure test screw (3/32" Hex) in the center of the inlet pressure boss not more than one turn counterclockwise.
3. Attach the 5/16" tube from the kit on the gas valve inlet pressure boss.
4. Insert the 5/16" to 1/4" hose barb connector from the kit into the 5/16" tube attached in step 3.
5. Install manometer tubing with manometer on the 1/4" hose barb connector.
6. Turn "on" the gas supply to the furnace using the 1/4 turn manual gas valve.
7. Leak check the manometer connections using soap solution made specifically for the detection of leaks. If a leak is present, shut off the manual valve and repair the leak. Proceed when no leaks are present.
8. Note the gas supply pressure measured on the manometer. With the burners not operating, the pressure should be 4.5" WC minimum and not exceed 10.5" WC maximum.
9. Set the room thermostat to call for heat.
10. Note the gas supply pressure measured on the manometer, with the burners operating the gas pressure must maintain 4.5" WC minimum and not exceed 10.5" WC maximum.
11. Terminate the call for heat at the thermostat.
12. Turn "off" the manual gas valve.
13. Remove the 5/16" tube, hose barb connector, and manometer tubing from the inlet pressure boss.
14. Turn the inlet pressure test screw (3/32" Hex) clockwise to seal pressure port. Tighten to 7 in-lb minimum.



GAS VALVE IN "ON" POSITION



GAS VALVE IN "OFF" POSITION

FIGURE 30 – Manual Gas Shutoff Valve

5. Install manometer tubing with manometer on the 1/4" hose barb connector.
6. Turn "on" the gas supply to the furnace using the 1/4 turn manual gas valve.
7. Set the room thermostat to call for heat. Check for leaks on the manometer connections using soap solution made specifically for the detection of leaks. If a leak is present, immediately shut off the manual valve and repair leak. Proceed when no leaks are present.
8. Note the gas manifold pressure measured on the manometer, with the burners operating, the gas pressure must maintain 3.2" WC minimum and not exceed 3.8 WC maximum.
9. To increase gas manifold pressure, remove the regulator cap and turn the adjustment screw clockwise. To decrease the pressure, turn the adjustment screw counter-clockwise.
10. Terminate the call for heat at the thermostat.
11. Turn "off" the manual gas valve.
12. Remove the 5/16" tube, hose barb connector, and manometer tubing from the outlet pressure boss.
13. Turn the outlet pressure test screw (3/32" Hex) clockwise to seal pressure port. Tighten to 7 in-lb minimum.
14. Turn "on" the manual gas valve.
15. Run the furnace in heat mode by setting the room thermostat to call for heat. Check for leaks using soap solution made specifically for the detection of leaks.

GAS PRESSURE TABLE

Natural Gas Pressure (inches W.C.)	Min.	Max.	Nominal
Supply Pressure	4.5	10.5	7
Manifold Pressure	3.2	3.8	3.5

Table 11 - Gas Pressure Table

GAS MANIFOLD PRESSURE

1. Turn "off" the gas supply to the furnace using the 1/4 turn manual gas valve.
2. Turn the pressure test screw (3/32" Hex) in the center of the outlet pressure boss not more than one turn counterclockwise.
3. Attach the 5/16" tube from the kit on the gas valve outlet pressure boss.
4. Insert the 5/16" to 1/4" hose barb connector from the kit into the 5/16" tube attached in step 3.

HEATING OPERATIONS CONTINUED

TEMPERATURE RISE

This gas furnace is designed to operate within a specific range of temperatures while in heating mode. The “Temperature Rise” range is shown on the rating plate. Temperature rise is defined as the temperature difference between the air entering the furnace and the air leaving the furnace. Avoid measuring supply air temperature directly above the heat exchanger as radiant heat will affect the measurement. The actual temperature rise measured must be within the range shown on the rating plate. The volume of air (CFM) moved by the indoor blower may be changed to decrease the actual temperature rise (increase indoor blower CFM) or increase the actual temperature rise (decrease the indoor blower CFM) See blower speed section in controls (FIGURE 26 - Blower Control Tap) page 29 of this manual for information on changing indoor blower speed.

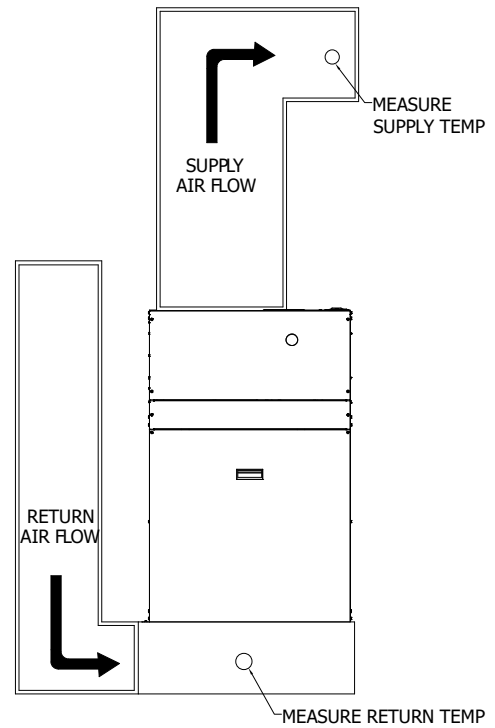


FIGURE 31 - Temperature Rise

COOLING OPERATIONS

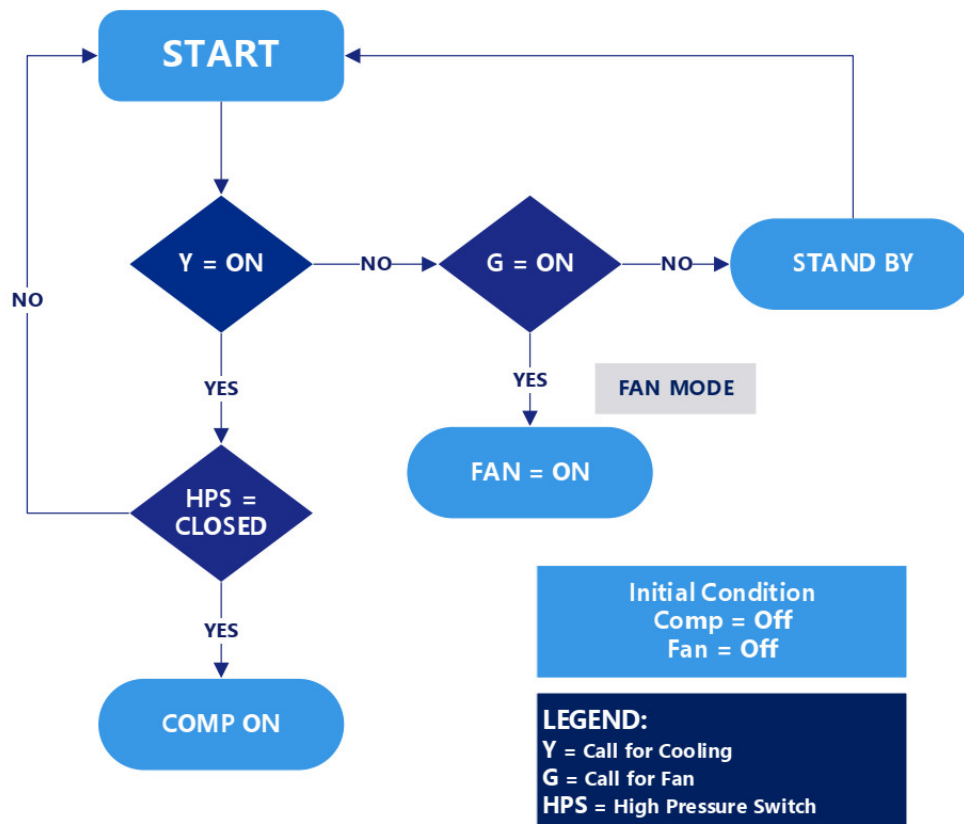


FIGURE 32 - Cooling Sequence of Operations

LOCATION OF MAJOR COMPONENTS

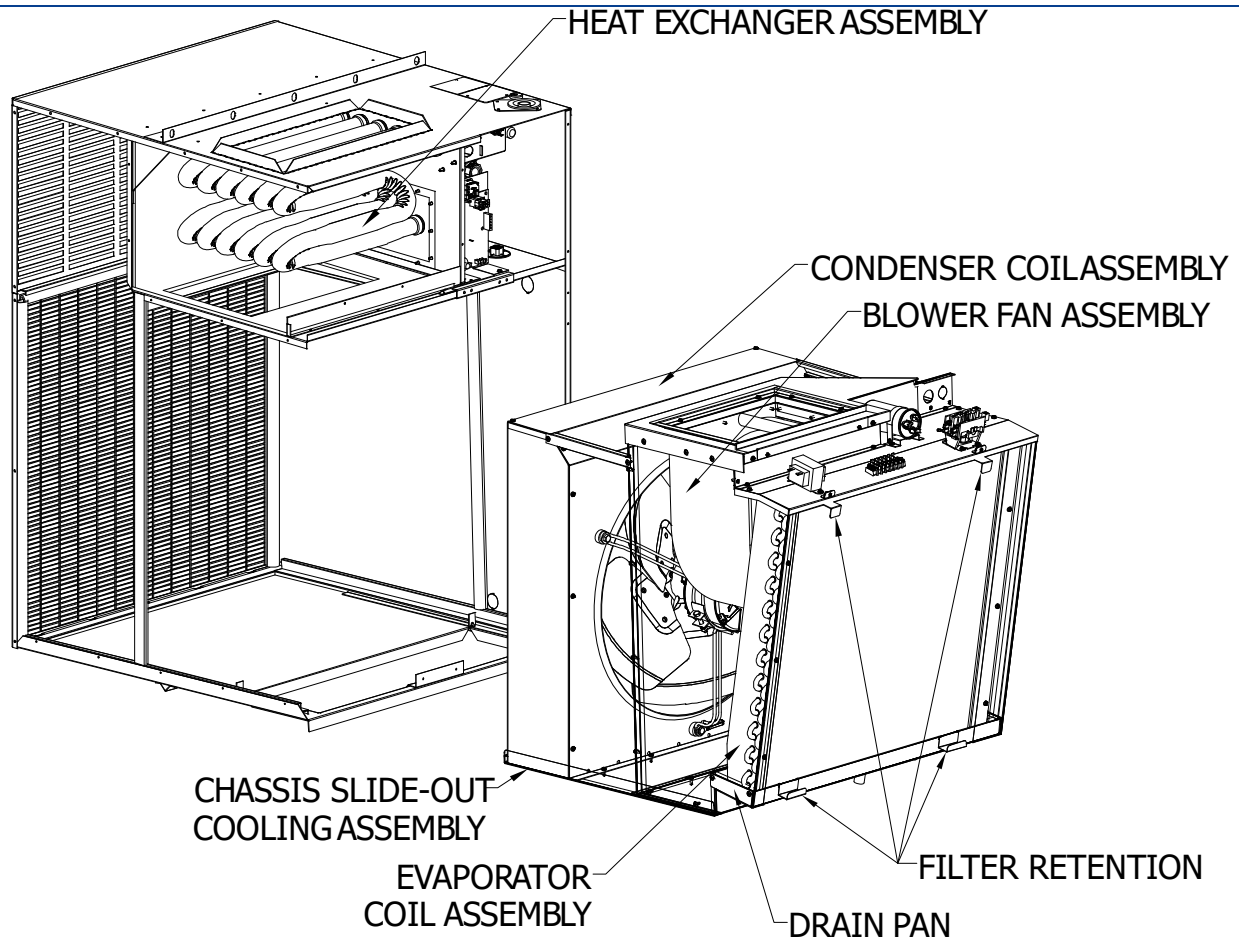


FIGURE 33 – Slide Out Chassis Assembly

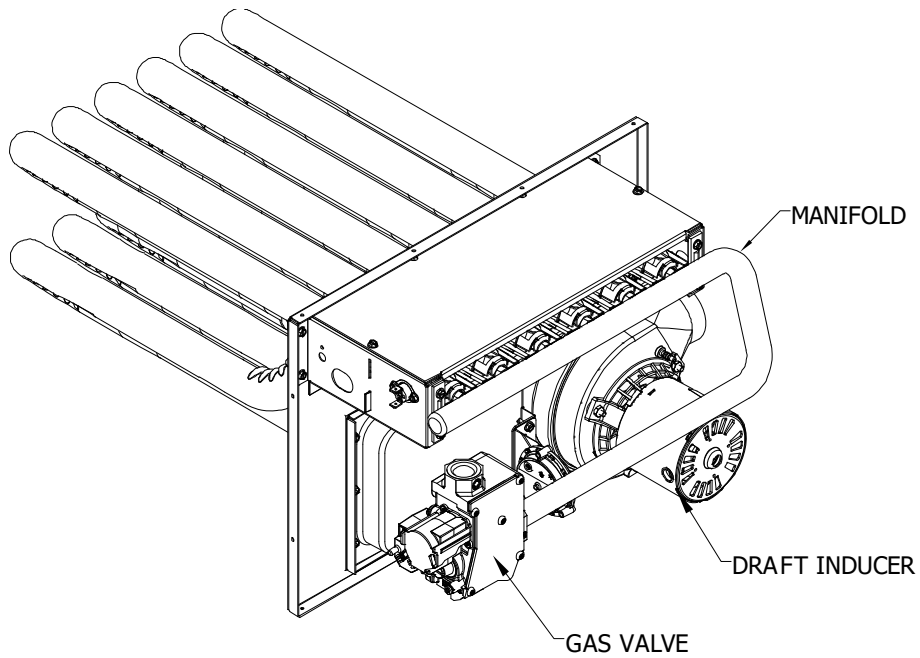


FIGURE 34 – Heating Assembly

LOCATION OF MAJOR COMPONENTS CONTINUED

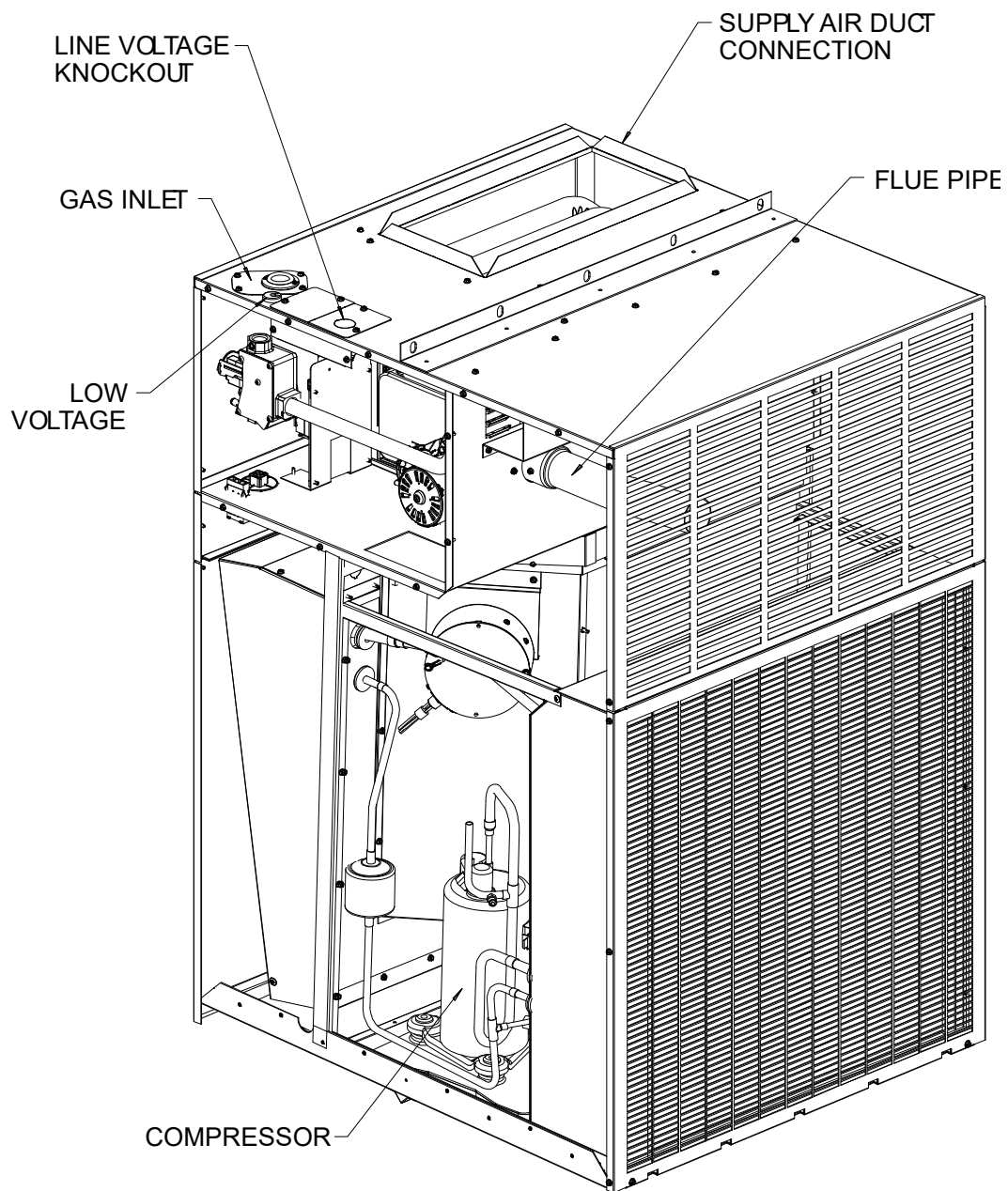
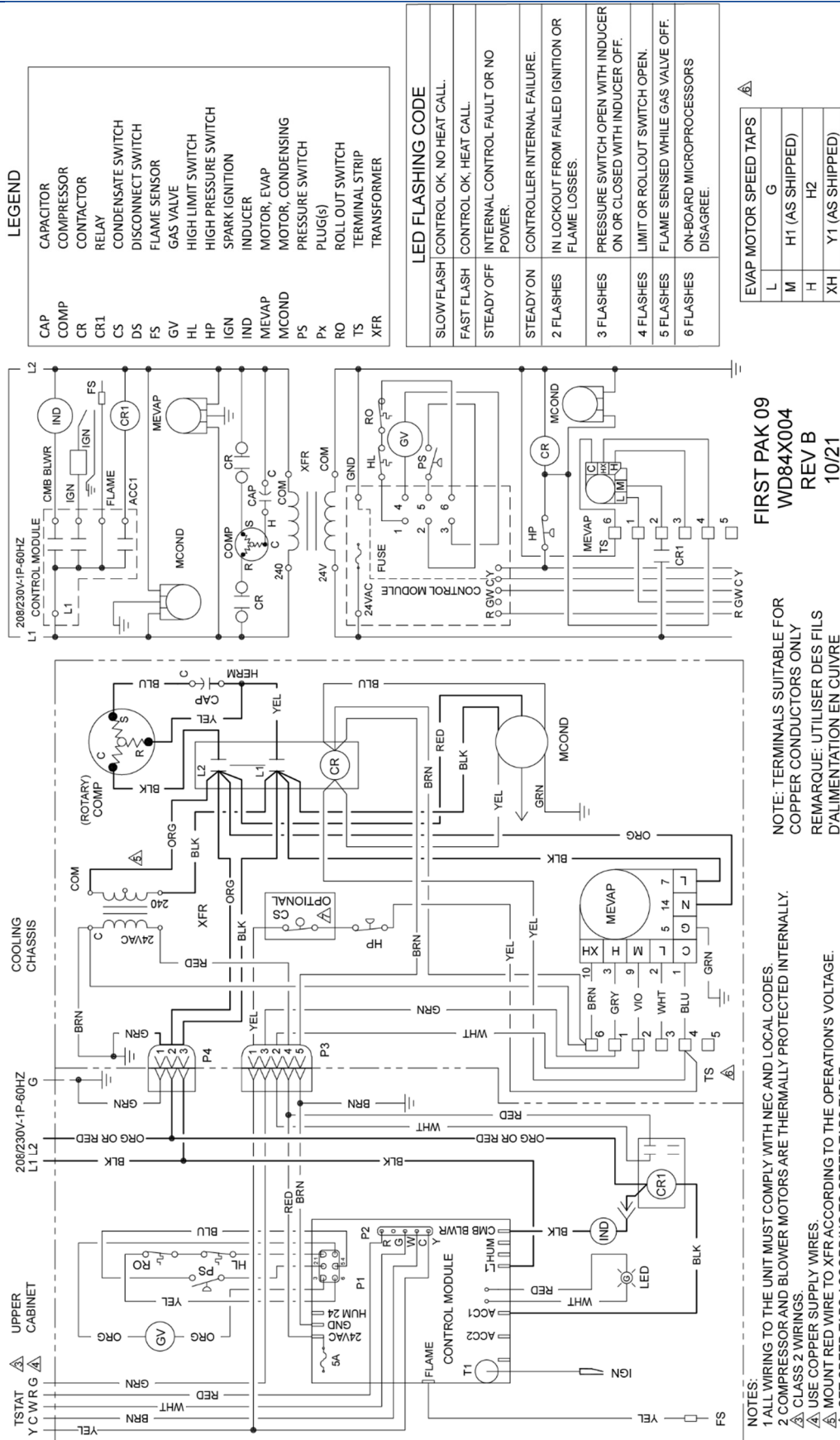


FIGURE 35 – Cabinet Components

WIRING DIAGRAMS

FPG*09-WIRING DIAGRAM (208-230V)



FIRST PAK 09
WD84X004
REV B
10/21

NOTE: TERMINALS SUITABLE FOR
COPPER CONDUCTORS ONLY
REMARQUE: UTILISER DES FILS
D'ALUMINATION EN CUIVRE

FIGURE 36 – FPG*N8C09A* Wiring Diagram

WIRING DIAGRAMS

FPG*12 WIRING DIAGRAM (208-230V)

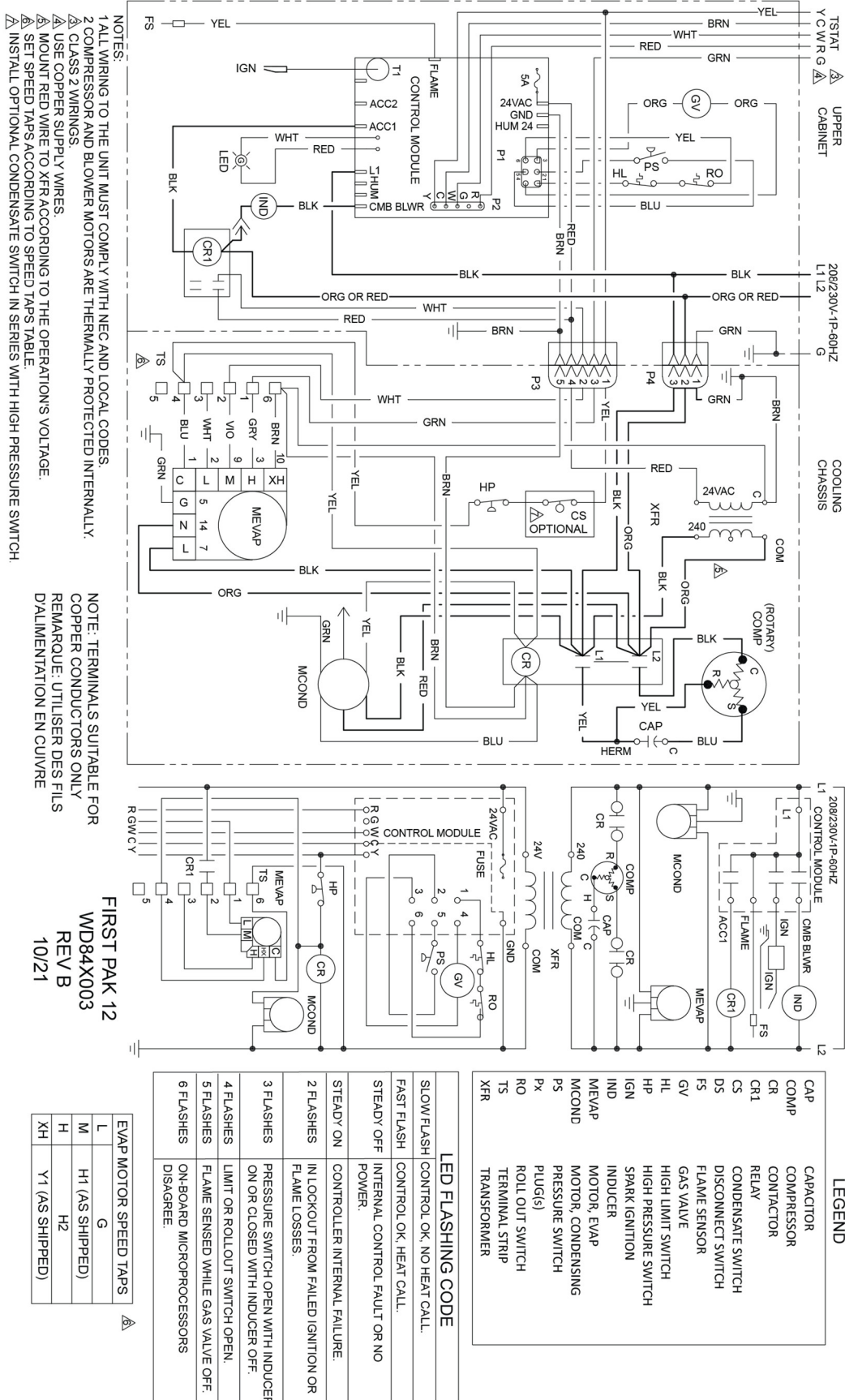


FIGURE 37 – FPG*NC12A* Wiring Diagram

WIRING DIAGRAMS

FPG*18 WIRING DIAGRAM (208-230V)

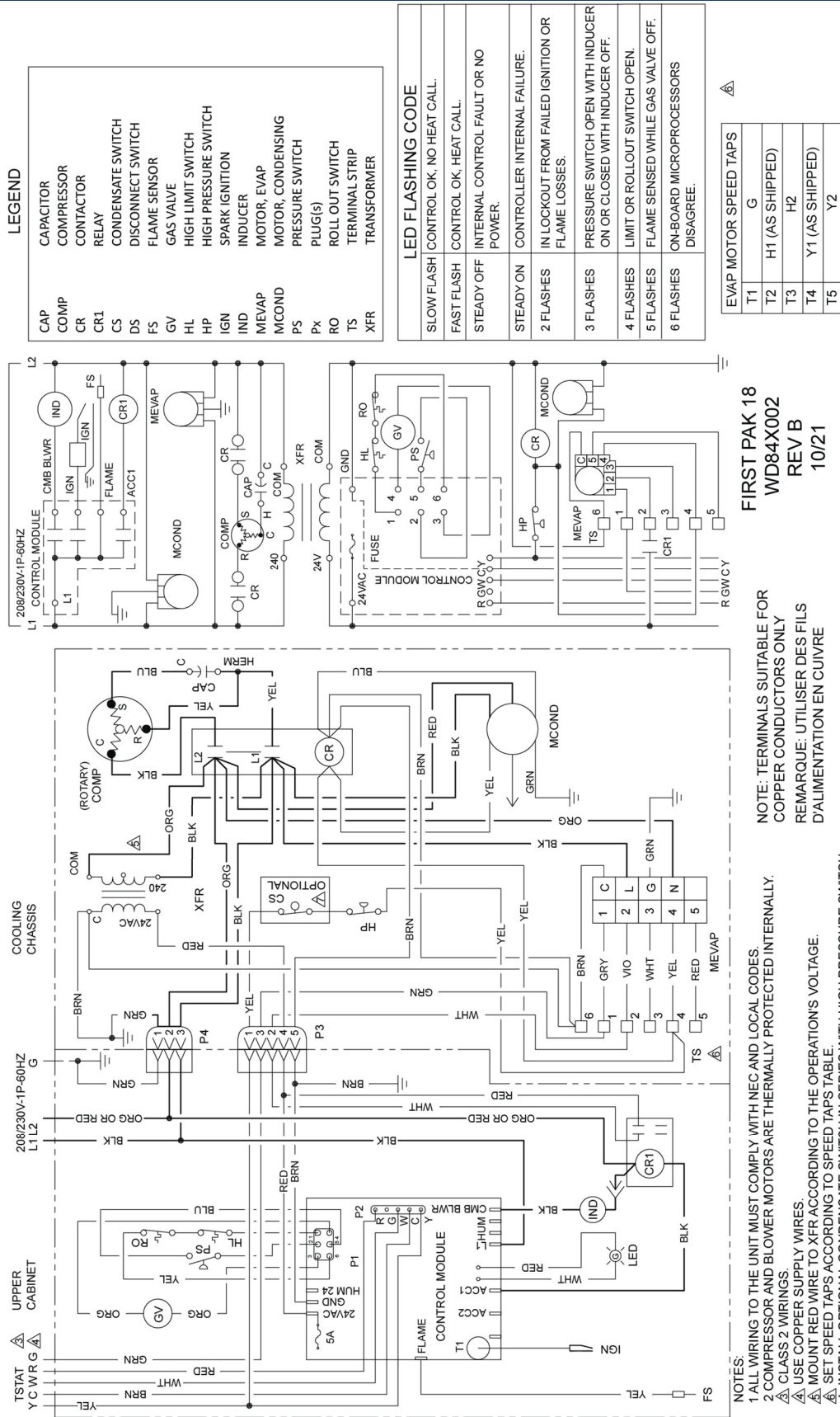
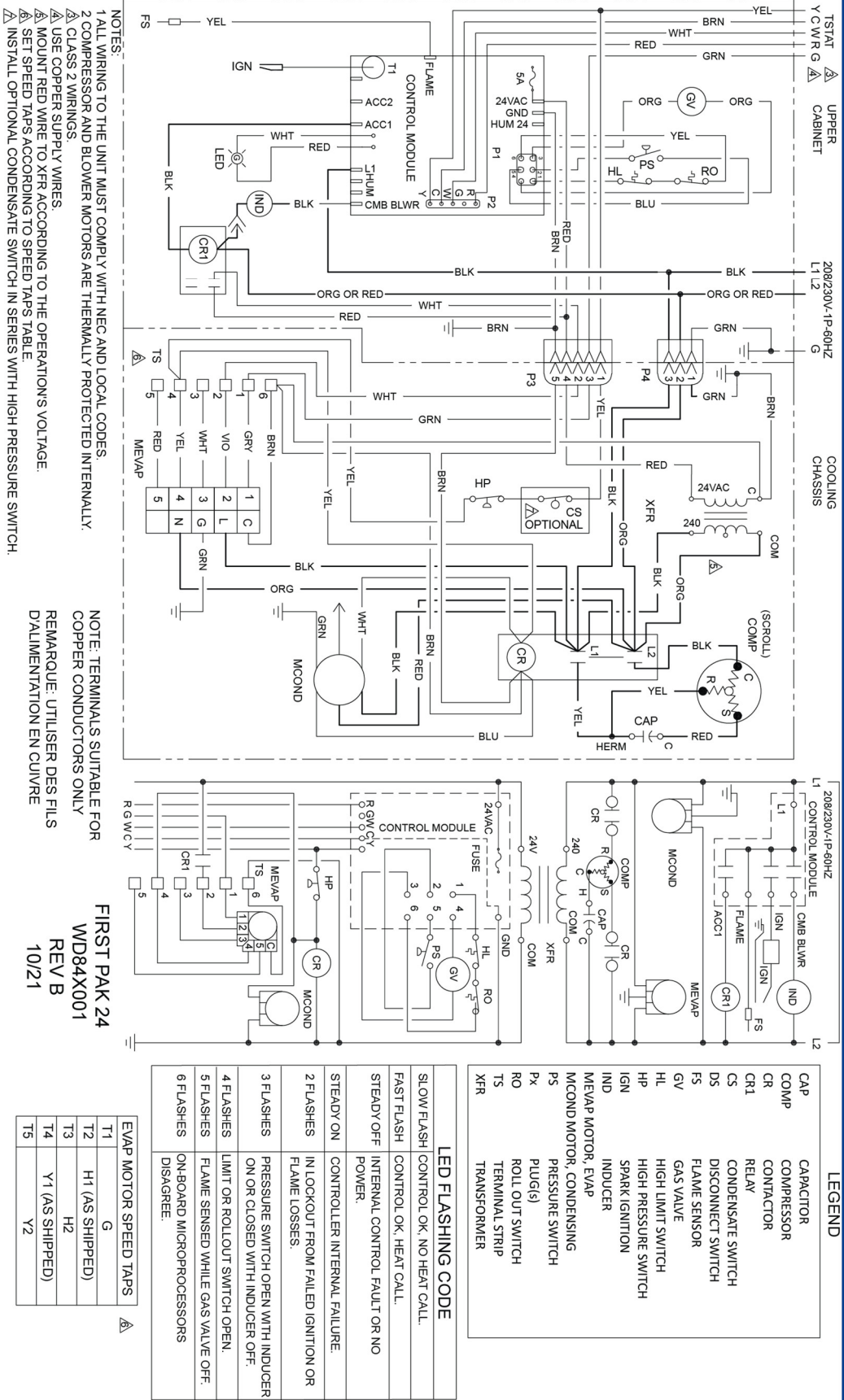


FIGURE 38 - FPG*N8C18A* Wiring Diagram

WIRING DIAGRAMS

FPG*24 WIRING DIAGRAM (208-230V)



NOTES:
 1 ALL WIRING TO THE UNIT MUST COMPLY WITH NEC AND LOCAL CODES.
 2 COMPRESSOR AND BLOWER MOTORS ARE THERMALLY PROTECTED INTERNALLY.
 3 CLASS 2 WIRINGS.
 4 USE COPPER SUPPLY WIRES.
 5 MOUNT RED WIRE TO XFR ACCORDING TO THE OPERATIONS VOLTAGE.
 6 SET SPEED TAPS ACCORDING TO SPEED TAPS TABLE.
 7 INSTALL OPTIONAL CONDENSATE SWITCH IN SERIES WITH HIGH PRESSURE SWITCH.

NOTE: TERMINALS SUITABLE FOR COPPER CONDUCTORS ONLY.
 REMARQUE: UTILISER DES FILS D'ALIMENTATION EN CUIVRE

FIRST PAK 24
 WD84X001
 REV B
 10/21

LEGEND

CAP	CAPACITOR
COMP	COMPRESSOR
CR	CONTACTOR
CR1	RELAY
CS	CONDENSATE SWITCH
DS	DISCONNECT SWITCH
FS	FLAME SENSOR
GV	GAS VALVE
HL	HIGH LIMIT SWITCH
HP	HIGH PRESSURE SWITCH
IGN	SPARK IGNITION
IND	INDUCER
MEVAP	MEVAP MOTOR, EVAP
P5	PRESSURE SWITCH
Px	PLUG(S)
RO	ROLL OUT SWITCH
TS	TERMINAL STRIP
XFR	TRANSFORMER

LED FLASHING CODE

SLOW FLASH	CONTROL OK, NO HEAT CALL.
FAST FLASH	CONTROL OK, HEAT CALL.
STEADY OFF	INTERNAL CONTROL FAULT OR NO POWER.
STEADY ON	CONTROLLER INTERNAL FAILURE.
2 FLASHES	IN LOCKOUT FROM FAILED IGNITION OR FLAME LOSSES.
3 FLASHES	PRESSURE SWITCH OPEN WITH INDUCER ON OR CLOSED WITH INDUCER OFF.
4 FLASHES	LIMIT OR ROLLOUT SWITCH OPEN.
5 FLASHES	FLAME SENSED WHILE GAS VALVE OFF.
6 FLASHES	ON-BOARD MICROPROCESSORS DISAGREE.

T1	G
T2	H1 (AS SHIPPED)
T3	H2
T4	Y1 (AS SHIPPED)
T5	Y2

FIGURE 39 - FPG*N8C24A * Wiring Diagram

CIRCUIT SCHEMATIC

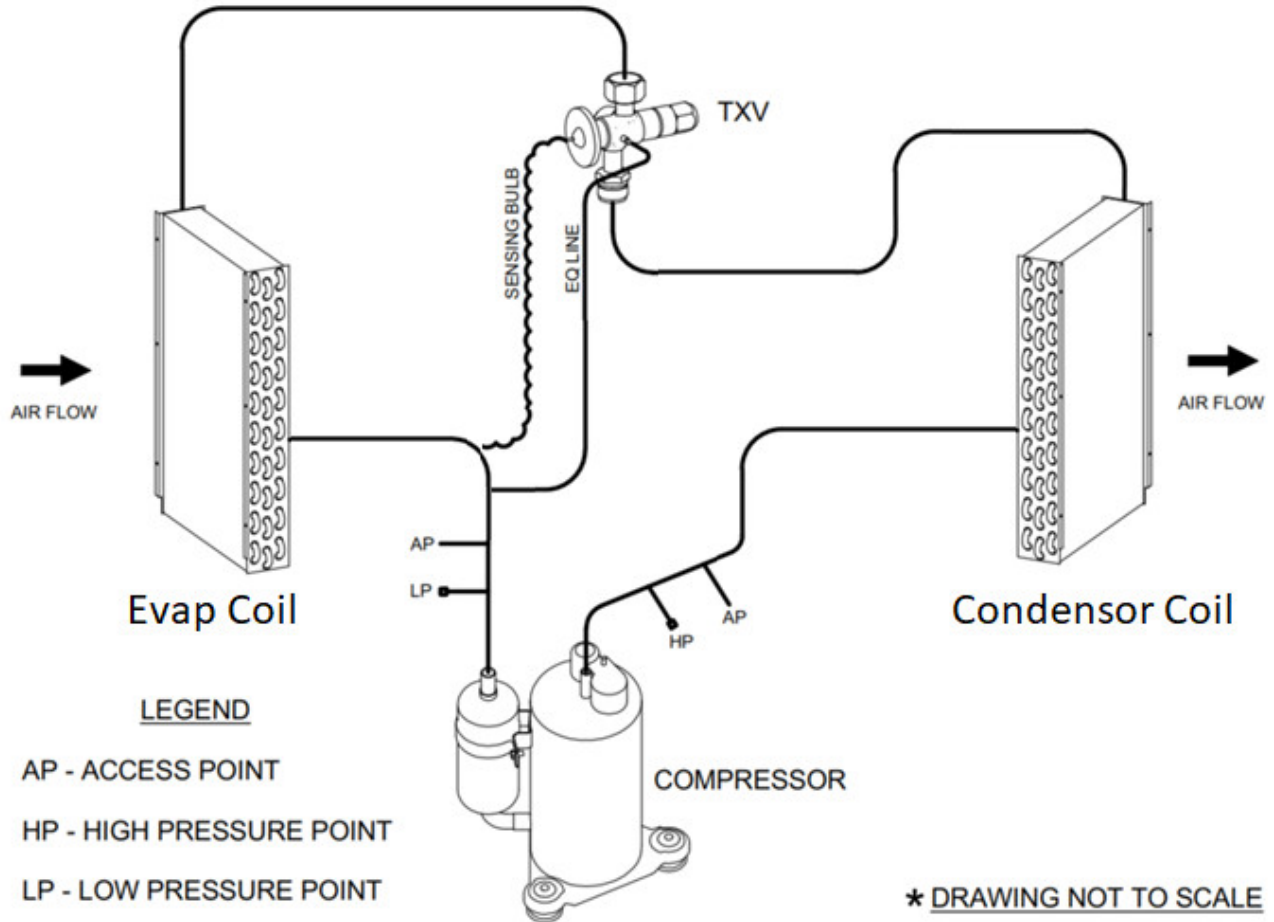


FIGURE 40 - Circuit Diagram

STARTUP INSTRUCTIONS

PRE-STARTUP CHECKS:



WARNING



Electrically ground the unit. Connect ground wire to ground lug. Failure to do so can result in injury or death.



CAUTION



Wire any field installed device such as a fan switch or thermostat furnished by the factory in strict accordance with the wiring diagram supplied with the unit. Failure to do so could result in damage to components and will void all warranties.

Before start-up, thoroughly check all the components. Optimal operation of equipment requires cleanliness. Often after installation of the equipment, additional construction activities occur. Protect the equipment from debris during these construction phases.

PRIOR TO THE STARTUP OF THE UNIT:

1. Ensure supply voltage matches nameplate data.
2. Ensure the unit is properly grounded.
3. With the power off, check blower wheel set screws for proper tightness and that the blower wheel rotates freely.
4. Ensure unit will be accessible for servicing.
5. Ensure condensate line is properly sized, run, trapped, pitched and tested.
6. Ensure all cabinet openings and wiring connections have been sealed.
7. Ensure clean filters are in place.
8. Ensure all access panels are in place and secured.
9. Make sure that all electrical connections are tight and secure.
10. Check the electrical overcurrent protection and wiring for the correct size.
11. Verify that the low voltage wiring between the thermostat and the unit matches the wiring diagram.

STARTUP INSTRUCTIONS CONTINUED

UNIT STARTUP:

1. Ensure that power is connected to the unit and the local disconnect is switched to ON position.
2. Check that there is 24V from the control transformer. The controller module LED should flash slowly.
3. Set the thermostat to the lowest position. Turn the thermostat system switch to "COOL" and the fan switch to "AUTO" position. The compressor, outdoor fan should come on within 5 seconds.

CHECKING GAS INPUT RATE:

The gas input rate of a furnace is expressed in BTU's per hour (BTUH). Upon installation and startup, the gas input rate of each FPG unit must be measured and must not exceed the input rate listed on the furnace rating plate.

To measure the natural gas input rate;

1. The FPG unit must be the only appliance consuming gas during this measurement, other gas consuming appliances must be turned OFF.
2. Set the room thermostat to call for heat. When the burners are operating, use a stopwatch and record the number of seconds it takes to complete one revolution of the .5 cu/ft., 1 cu/ft or the 2 cu/ft. dial at the gas meter.
3. The heating value may be obtained from the utility company, if unknown use the typical heating value of 1,000 BTU per cu/ft.

Refer to [Table 12 - Gas Meter Clocking Table](#) or see example calculation below.

GAS METER CLOCKING TABLE			
MODEL	SECONDS FOR ONE REVOLUTION		
	.5 CU/FT	1 CU/FT	2 CU/FT
FPG20	90	180	360
FPG30	60	120	240
FPG40	45	90	180
FPG50	36	72	144
FPG60	30	60	120

Table 12 - Gas Meter Clocking Table

Example of input rate calculation using the typical heating value of Natural Gas of 1,000 BTU cu/ft, and 90 seconds time to complete one revolution of the 1 cu/ft dial on the gas meter.

- **Heating value** = 1,000 BTU per cu/ft.
- **Convert hours to seconds** (60 minutes per hour x 60 seconds per minute) = 3600 seconds in one hour.
- **Example time for one revolution of the 1 cu/ft dial** = 90 seconds
- **Input** = Heating Value (1,000) x seconds per hour (3,600) divided by the time to consume 1 cu/ft of gas (90 secs) = 40,000 BTUH.



NOTE



In the calculation example above, If the .5 cu/ft dial was used, you must multiply the number of seconds recorded for one revolution by two before using the formula. If the 2 cu/ft dial was used, you must divide the number of seconds recorded for one revolution by two before using the formula.

STARTUP & PERFORMANCE CHECKLIST INSTRUCTIONS

The warranty may be void unless the [FIGURE 50 - Startup and Performance Checklist](#) & [FIGURE 51 - Startup and Performance Checklist](#) is completed and returned to the warrantor. If the FPG unit is not installed properly the warranty will be void as the manufacturer can't be held accountable for problems that stem from improper installation.

TROUBLESHOOTING

HEATING

PROBLEM	POSSIBLE CAUSE	CHECKS & CORRECTIONS	
NO OPERATION	Open Circuit Fuse (Electrical Panel)	Replace fuse	
	Open Circuit Breaker (Electrical Panel)	Re-set circuit breaker / fuse	
	Open Unit Power Switch (External disconnect, adjacent to unit)	Check position / electrical state of switch	
NO HEAT	Active fault locking out heat operation	Refer to LED & legend for state of unit / fault code. Correct condition & re-set power	
	Open Unit Door Switch (if applicable)	Furnace design does not permit heat operation with blower door removed	
	No power to room thermostat (24 VAC between P1 terminals 2 & 5)	Improper field wiring	
		Faulty Transformer	
		No transformer ground	
	No request from room thermostat (24 VAC between P1 terminals 2 & 3)	Improper field wiring	
		Faulty thermostat / thermostat wiring	
	No draft inducer operation	Control board relay not closing contact to draft inducer	
		Remove obstruction preventing inducer wheel from turning	
		Electrically open inducer motor winding or thermal protector - replace inducer	
	Weak Spark / No spark	Correct poor chassis to earth ground / transformer to chassis ground / control board to chassis ground	
		Correct Improper gap on spark electrode	
		Clean Insulating carbon buildup from spark electrode & determine cause of poor combustion	
		Replace spark electrode assembly for faulty - leaking insulator	
		Faulty ignition wire leaking voltage - replace ignitor & wire	
Ignition wire not connected / poorly connected to control or spark electrode			
Open limit from no indoor blower operation	Remove obstruction preventing indoor blower wheel from turning		
	Control board relay contact not energizing line voltage to blower motor - replace control		
	Speed tap not energized at low voltage terminal strip by thermostat wire, repair connection to thermostat wire or motor speed terminal		
	Over-heated blower motor with open winding or open thermal protection, correct restriction causing over-heating condition, replace motor if winding is open		
Furnace cycling on pressure switch	Correct inadequate venting, plugged inducer pressure switch port,		
Gas valve not opening	Check wiring connections to gas valve & control board (P2 terminals 3 & 4)		
	Check control board output 24 VAC to gas valve (P2 terminals 3 & 4) - control must energize gas valve and spark electrode for 4 seconds minimum at trial for ignition.		
No or inadequate flame signal	Correct low gas pressure, clean or replace flame rod		
INADEQUATE HEAT	Furnace cycling on limit switch	Restricted air flow caused by plugged filter, closed registers / grilles	
	Gas pressure too low	Correct gas supply line pressure to 4.5" - 10" range while furnace operating in heat mode	
		Correct gas manifold pressure to 3.2" to 3.8" range	

Table 13 - Gas Heat Troubleshooting Table

TROUBLESHOOTING CONTINUED

HEATING

Step 1	Thermostat calls for heat by energizing “W” terminal with 24 volts a/c
Description	The room thermostat R terminal is constantly powered with 24 volts a/c by its connection to the control board R terminal and the unit transformer. A request for heat will energize the “W” terminal of the thermostat and the control board.

Possible Causes:

1. Thermostat mode switch is not set to heat
2. Broken wire between control board & thermostat
3. Broken wire at thermostat terminal
4. Improperly connected thermostat wire (W at control is not connected to W at thermostat)
5. Defective thermostat
 - a. The control board LED will display a slow flash – no call for heat

Step 2	Control board checks for a closed limit switch circuit & an open pressure switch circuit
Description	Upon receiving a request for heat, the control board must verify a safe condition exists before attempting ignition. The high temperature limit & rollout switches must be electrically closed. The pressure switch must be electrically open.

Possible Causes:

1. Draft inducer relay on control board stuck closed keeping the draft inducer running & the pressure switch closed
 - a. The control board L.E.D. will flash 3 times
2. The high limit switch or rollout switch is electrically open. A wire or connector is broken or improperly connected
 - a. The control Board L.E.D. will flash 4 times
 - b. The room thermostat will lose power as an open limit or rollout switch breaks 24 volts a/c to the R terminal

Step 3	Control board closes on-board contacts to energize draft inducer
Description	The control board relay coil is energized & relay contacts close to power the draft inducer. The draft inducer must function to draw the gas flames into the heat exchanger tubes & expel the products of combustion outdoors.

Possible Causes:

1. No power to draft inducer due to control board inducer relay contracts failing open
 - a. The control board L.E.D. will flash 3 times
2. The draft inducer motor is powered but not operating due to an open winding or thermal protector
 - a. The control board L.E.D. will flash 3 times

Step 4	Draft inducer runs causing pressure switch contacts to close
Description	The pressure switch must prove that the draft inducer is running & that adequate negative pressure is present in the heat exchanger.

Possible Causes:

1. The draft inducer motor is running but the pressure switch is not closing due to lack of negative pressure caused by
 - a. Blocked flue
 - b. Tubing disconnected from the draft inducer or pressure switch
 - c. Tubing leaking
 - d. Blocked pressure switch port on draft inducer housing
 - i. The control board L.E.D. will flash 3 times

Step 5	Draft inducer purges the heat exchanger for 15 seconds
Description	Before trial for ignition, the draft inducer runs to purge the heat exchanger of any combustible mixture of gas & air which may be present

Possible Causes:

1. Power Failure
2. Draft Inducer Failure
3. Control Board Relay Failure

TROUBLESHOOTING CONTINUED

HEATING

Step 6	Control board energizes the spark ignitor & the gas valve (trial for ignition)
Description	During trial for ignition, the draft inducer, & gas valve are energized. After 10 seconds, the spark ignitor is de-energized & the control checks for the presence of flame. If flame is not present, the control will de-energize the gas valve.

Possible Causes:

1. Internal or external gas valve in off position
2. Inadequate ground causing no spark or poor spark
3. Inadequate gas supply to furnace
4. Manifold gas pressure too high or too low causing improper gas / air mixture
5. Improper spark electrode gap
 - a. The control board L.E.D. will display 2 flashes if locked out from failed ignition or flame loss.

Step 7	Control board senses flame within 10 seconds of trial for ignition
Description	Flame must be sensed by the control board flame rectification system to maintain gas valve operations

Possible Causes:

1. Inadequate flame
2. Inadequate control ground
3. Flame sensor dirty / coated with non-conductive buildup
4. Flame sensor insulator is cracked
 - a. The control board L.E.D. will display 2 flashes if locked out from failed ignition or flame loss.

Step 8	Control board energizes indoor blower motor after 30 seconds
Description	After 30 seconds of burner operation the control board energizes the indoor blower motor

Possible Causes:

1. Control board relay fails to energize blower
2. Indoor blower not connected to line voltage 240 volt supply
3. Indoor blower speed tap not connected to low voltage 24 volt supply
4. Indoor blower fan wheel blocked or restricted
 - a. The control board L.E.D. will display 4 flashes due to open limit switch if indoor airflow is inadequate

Step 9	Room temperature increases to satisfy the thermostat
Description	Heat cycle continues until the room thermostat temperature set point is met

Possible Causes:

1. Room thermostat request for heat interrupted ending call for heat
2. Furnace burners cycling on / off due to
 - a. Open limit switch
 - b. Restricted airflow
 - c. Dirty filter
 - i. The control board L.E.D. will display 4 flashes due to open limit switch if indoor airflow is inadequate

Step 10	Thermostat opens de-energizing the "W" terminal
Description	The room thermostat will end the request for heat & de-energize the "W" terminal of the control board

Possible Causes:

1. Room thermostat contracts staying closed not ending the request for heat
2. Thermostat wires shorted together keeping "W" terminal energized

Step 11	Control board de-energizes the gas valve
----------------	---

1. The control board L.E.D. will display 5 flashes if gas flame is detected when it is not expected. Draft inducer will continue to run.

Step 12	Control board continues to energize the indoor blower motor for 2 minutes
----------------	--

1. The control board time delay blower relay stuck closed causing blower to stay onto cool down heat exchanger runs in excess of 2 minutes

TROUBLESHOOTING CONTINUED

COOLING

PROBLEM	POSSIBLE CAUSE	CHECKS & CORRECTIONS
ENTIRE UNIT DOES NOT RUN	Power supply off	Apply power; close disconnect.
	Blown Fuse	Replace fuse or reset circuit breaker. Check for correct fuses.
	Voltage supply low	If voltage is below minimum voltage specified on unit data plate, contact power company.
	Thermostat	Set the fan to "ON", the fan should run. Set thermostat to "COOL" and lowest temperature setting, the unit should run in the cooling mode. If neither the blower nor compressor run with the thermostat set to "COOL", check that the unit is wired correctly.
BLOWER OPERATES BUT COMPRESSOR DOES NOT RUN	Thermostat	Check setting, calibration and wiring.
	Wiring	Check for loose or broken wires at compressor, capacitor or contractor.
	Safety Controls	Check control board fault LED for fault code.
	Compressor overload open	If the compressor is cool and the overload will not reset, replace the compressor.
	Compressor motor grounded	Internal wiring grounded to the compressor shell. Replace compressor. If compressor burnout, install new filter dryer.
	Compressor windings open	After compressor has cooled, check continually of compressor windings. If the windings are open, replace the compressor.
UNIT OFF ON HIGH PRESSURE CONTROL FAULT CODE 12	Discharge pressure too high	In "COOLING" mode: Lack of adequate airflow rate. Air temperature too warm. Scaled or restricted condenser coil.
	Refrigerant charge	The unit is overcharged with refrigerant. Reclaim refrigerant, evacuate and recharge with factory recommended charge.
	High pressure switch	Check for defective or improperly calibrated high-pressure switch.

Table 14 – Cooling Troubleshooting Table

MAINTENANCE & SERVICE - HEATING

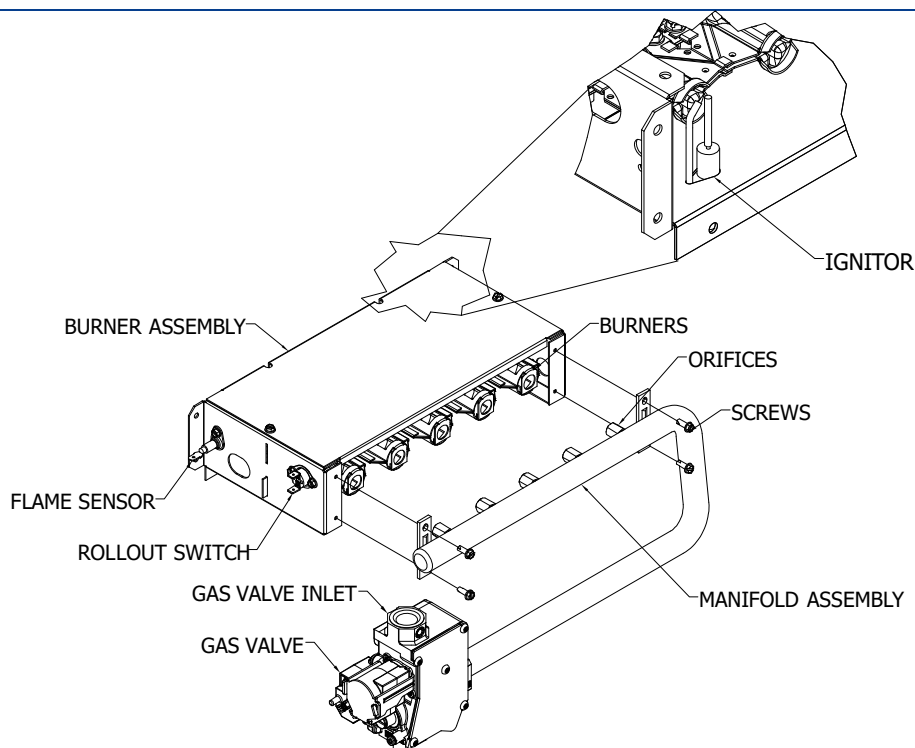


FIGURE 41 - Burner Components

MAINTENANCE & SERVICE - HEATING

AIR FILTER(S)

Furnace filters should be checked monthly and replaced as necessary. Do not operate the furnace without filters in place. The interval of filter replacement will vary with environmental factors and the size and type of filters used. It is extremely important to replace filters before they become a restriction to air flow.

Examine the furnace after installation and periodically thereafter to determine that:

1. The furnace flue is clear and free of obstructions.
2. The furnace flue is in place and is physically sound without holes or excessive corrosion.
3. The return-air duct connection(s) is physically sound, is sealed to the furnace casing, and terminates outside the space containing the furnace.
4. The physical support of the furnace is sound without sagging, cracks, or gaps.
5. There are no obvious signs of deterioration of the furnace.
6. The burner flames are proper; being drawn into the heat exchanger tubes, not lifting, blue in color, or not being distorted by fan operations (see **FIGURE 42 - Burner Flames** below).

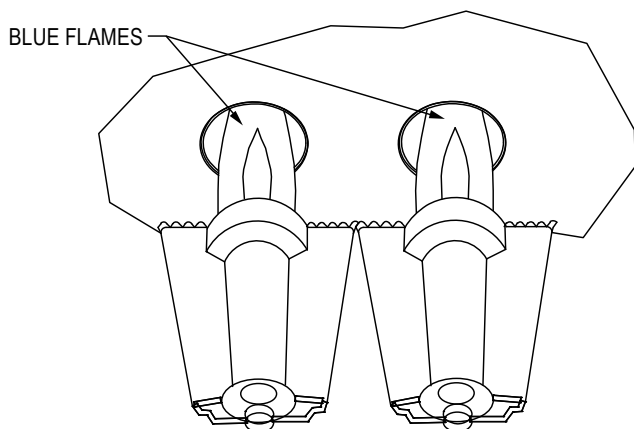


FIGURE 42 - Burner Flames

COMBUSTION AIR BLOWER

The combustion air blower creates a negative pressure condition in the gas heat exchanger and vents the products of combustion out of doors. Check the ventilation openings on the end of the combustion air blower to make sure they are not blocked and free from debris. Check for any leaks in the heat exchanger. The draft inducer motor contains permanently sealed ball bearings and requires no lubrication.

COMBUSTION AIR PROVING SWITCH

The combustion air-proving switch is a safety device which verifies operation of the combustion blower and that the products of combustion are being vented out of doors.

CONDENSATE DRAIN

Check and clean all dirt and debris from pan. Ensure drain line is free flowing and unobstructed.

FLAME ROLL OUT SWITCHES

Flame roll out switches are normally closed safety switches that assures burner flames are drawn properly into the heat exchanger tubes. In the event of improper burner flames or overheating of the burner section, the flame roll out switch opens the electrical circuit shutting off the flow of gas to the burners.

FLAME SENSOR ASSEMBLY

The flame sensor assembly consists of a conductive rod surrounded by an insulator attached to a mounting plate. The flame sensor may be cleaned as needed with steel wool. A slight coating developing on the flame sensor over time is normal and to be expected, however; the presence of heavy black carbon is an indication of improper combustion and requires immediate attention to determine the cause and to correct. Exercise care when handling to protect the insulator from damage.

GAS BURNERS

The gas burners allow combustion air to mix with the natural gas and direct the gas / air mixture to each heat exchanger tube.

GAS ORIFICES

The gas orifices are precisely sized to deliver the proper amount of natural gas to each burner. Exercise caution when handling orifices to prevent the creation of burrs.

GAS VALVE

The gas valve is an integral part of unit safety. Never use a gas valve that has been under water. The gas valve is energized by the control board to establish the flow of natural gas to the burners when heat is requested by the thermostat and all safety devices are satisfied.

HIGH TEMPERATURE LIMIT SWITCH

The high temperature limit switch is a normally closed safety that assures proper temperature within the furnace. If heating mode airflow through the furnace becomes inadequate, the high temperature limit switch will open, shutting off the flow of gas to the burners.

MAINTENANCE & SERVICE – HEATING CONTINUED

INDOOR BLOWER MOTOR

Check the openings on the end of the indoor blower motor to make sure they are not blocked and free from debris. The indoor blower motor contains permanently sealed ball bearings and requires no lubrication.

INTEGRATED CONTROL

The integrated control handles inputs from the room thermostat, spark ignition & flame sensing functions, controlling power to the gas valve, fan timing and speed functions, and monitors all safety circuits of the furnace. There are no serviceable parts in the integrated control module other than a 5 amp fuse. Do not handle the integrated control module unless necessary, before touching the integrated control module, touch the unit frame to discharge any static electricity which could damage the integrated control.

SPARK IGNITOR ASSEMBLY

The spark ignitor assembly consists of a spark electrode with insulator and a ground electrode attached to a mounting plate. Take care not to damage the insulator. The spark and ground electrodes may be cleaned as needed with steel wool.

! **WARNING** !

⚡ **ELECTRIC SHOCK, FIRE OR
EXPLOSION HAZARD** ⚡

Failure to follow safety warnings operation, serious injury, death or property damage.

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

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

PERIODIC INSPECTIONS

The following items should be inspected annually (minimum) before each heating season by a qualified service agency:

HEAT EXCHANGER TUBES

Make sure they are free from blockages, signs of carbon buildup, heavy corrosion or cracks.

GAS BURNERS

Make sure they are free of blockages, signs of carbon buildup or heavy corrosion. The burner carry-over slots should be clean and of uniform size.

VENT PIPE

Check for excessive corrosion or perforations.

COMBUSTION AIR OPENINGS

Check that they are clean & free from debris or blockages of any kind.

INDOOR AIR

The blower wheel and blower housing must be free from debris. Check that supply and return air registers, grilles, and dampers are positioned properly, filters are in place and clean.

CONDENSER AND EVAPORATOR COILS

Inspect and wash the condenser and evaporator coils – do not use high pressure as damage to the finned surfaces may occur.

HIGH ALTITUDE OPERATIONS

All FPG series units are certified for installation at altitudes of 0 - 4,500 ft.

SPECIAL NOTES FOR EXTREMELY COLD WEATHER AREAS

Periodically check the outside louvered grill for ice that may form and obstruct the flue and combustion air inlet.

MAINTENANCE & SERVICE – HEATING CONTINUED

HEATING MODULE REMOVAL

The entire gas heat section may be removed as a unit for service if required. Turn off electrical power to furnace.

- 1) Turn off electrical power to furnace.
- 2) Remove heating section access panels as seen in [FIGURE 43 – Heating Access Panel Removal](#).

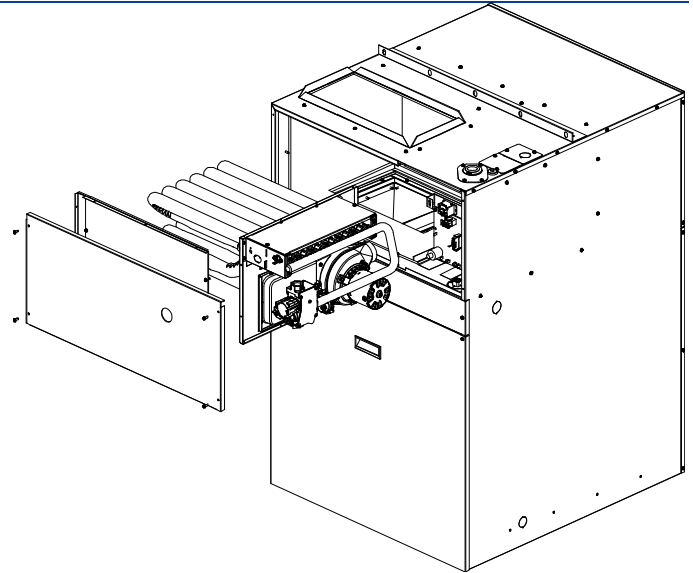


FIGURE 43 – Heating Access Panel Removal

- 3) Label and disconnect wires from gas valve, limit switch, draft inducer, pressure switch, ignitor, flame sensor.
- 4) Disconnect gas union and necessary piping to allow heat section module to slide out of cabinet as seen in [FIGURE 44 – Disconnection of Gas Union & Piping](#).

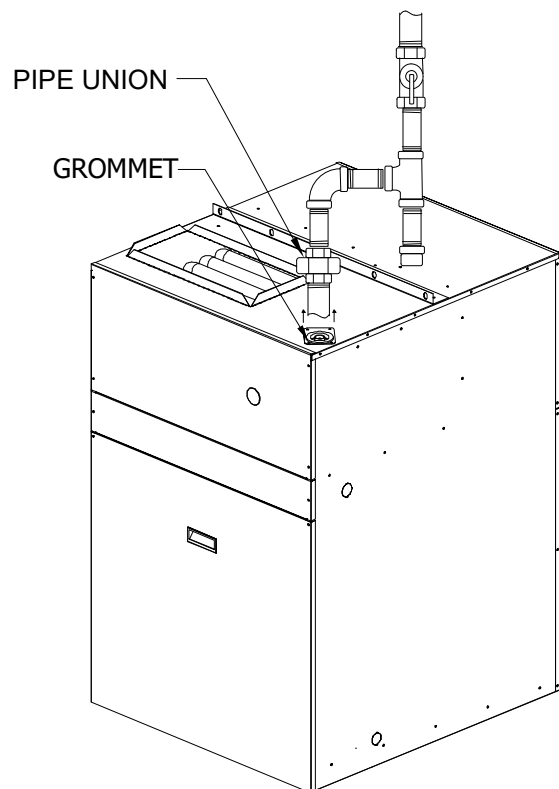


FIGURE 44 – Disconnection of Gas Union & Piping

MAINTENANCE & SERVICE – COOLING

AIR CONDITIONER MODULE REMOVAL

The air-conditioning chassis may be removed as a unit for service if required. Turn off electrical power to refrigeration chassis.

- 1) Remove screws (2) from controls cover and remove panel. See **FIGURE 45 – Removal of Control Cover**.
- 2) Remove power from unit.

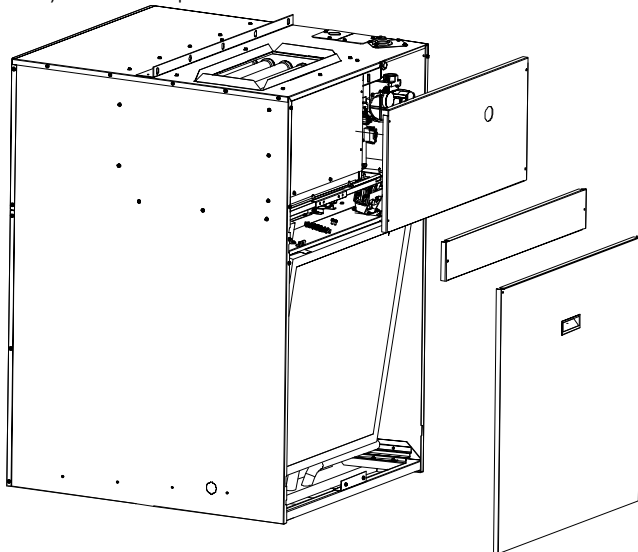


FIGURE 45 – Removal of Control Cover

- 3) Disconnect low voltage (6 pin) & line voltage (3 pin) harness connectors by pressing on the release tabs and using a downward motion (**FIGURE 47 - Line Voltage Connector (3 Pin)** & **FIGURE 48 - Low Voltage Connector (6 Pin)**).

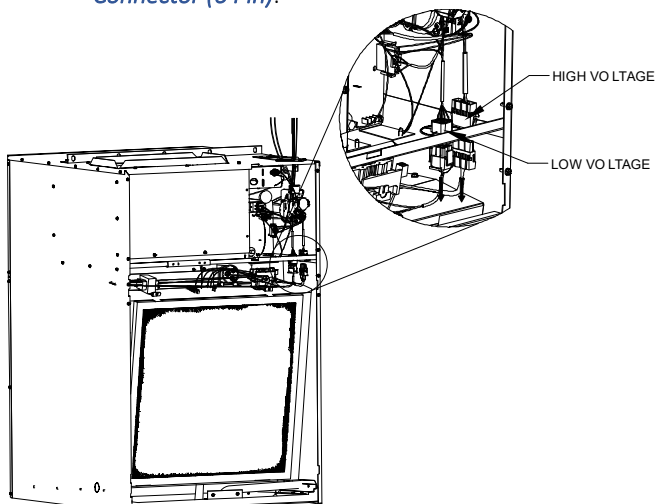


FIGURE 46 – Electrical Power Disconnection

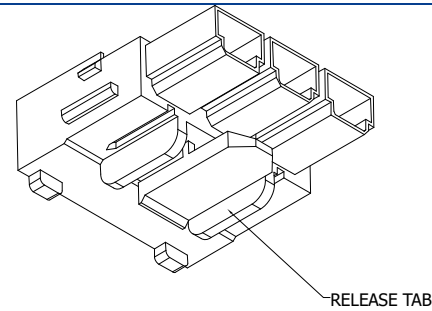


FIGURE 47 - Line Voltage Connector (3 Pin)

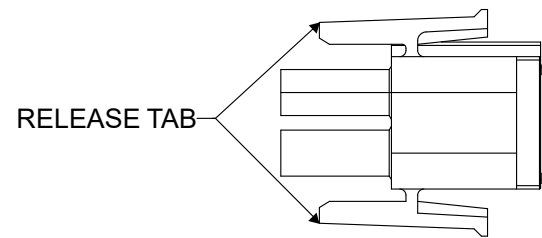


FIGURE 48 - Low Voltage Connector (6 Pin)

- 4) Slide-out refrigeration chassis **FIGURE 49 – Slide Out Chassis & Side Panel Removal**.
- 5) Side panel can be removed from the evaporator section to service the TXV.

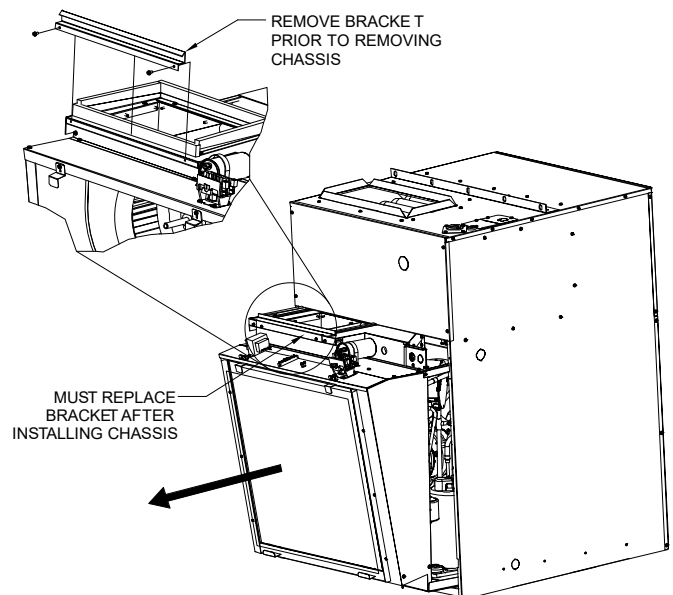


FIGURE 49 – Slide Out Chassis & Side Panel Removal



NOTE



All refrigeration components can be serviced in the chassis.

MAINTENANCE & SERVICE – COOLING CONTINUED

AIR CONDITIONER MODULE REASSEMBLY

- 1) To put-back the chassis, make sure all the refrigerant lines are in place and there are no leaks.
- 2) Slide chassis back into the unit.
- 3) Connect the electrical connection back as they previously were.

PREVENTIVE MAINTENANCE

To achieve maximum performance and service life of equipment, a formal schedule of regular maintenance should be established and followed.



WARNING



It is illegal to discharge refrigerant into the atmosphere. Use proper reclaiming methods and equipment when installing or servicing this unit. Service should be performed by a QUALIFIED service agency. The refrigerant system contained in the unit normally requires no maintenance since it is a closed, self-contained system.



CAUTION



All appropriate personal protection equipment should be worn when servicing or maintaining this unit.

Personal injury can result from sharp metal edges, moving parts, and hot or cold surfaces.

FAN

For any other refrigeration servicing, the refrigeration chassis can be removed as explained in REMOVAL OF AC Section



WARNING



ELECTRIC SHOCK HAZARD



Check motor connections to ensure they are secure and in accordance with the unit wiring diagram.

ECM motors have line voltage power applied at all times. MAKE SURE POWER IS DISCONNECTED BEFORE SERVICING.

FILTER

The air filter should be cleaned or replaced every 30 days or more frequently if severe operating conditions exist. Always replace the filter with the same type and size as originally furnished.

COIL

Clean all heat transfer surfaces and remove all dirt, dust, and contaminants that potentially impairs air flow using industry accepted practices. Care should be taken not to bend coil fin material.

CONDENSATE DRAIN PAN AND PIPE

Check and clean all dirt and debris from pan. Ensure drain line is free flowing and unobstructed.

UNIT PERFORMANCE

Record performance measurements of volts, amps, and air temperature differences. A comparison of logged data with start-up and other annual data is useful as an indicator of general equipment condition.

LABORATORY TESTING

When the unit has less than 100 operational hours and the coils have not had sufficient time to be “seasoned”, it is necessary to clean the coils with a mild surfactant such as Calgon to remove the oils left by manufacturing processes.

SUPPORT / REFERENCE MATERIAL

CALCULATION ABBREVIATIONS

BTU = British Thermal Unit

CFM = Airflow rate cubic feet per minute

EFF = Thermal Efficiency

$^{BTU}/hr$ = Rated input of furnace

Acm^2 = Cross-sectional area of test duct in cm^2

ΔT = the midpoint of the specified range
of temperature rise

W = Rated input of furnace

AV = Air velocity through filter, ft per minute

FA = Nominal filter area, in^2
= 15°F plus minimum temperature rise

TD = specified by the manufacturer

REFERENCE CALCULATION

SUPPLY DUCT SIZING

$$A = \frac{(0.1481)^{BTU/hr} (EFF)}{\Delta T}$$

$$Acm^2 = \frac{(1.811 \times W) (EFF)}{\Delta T}$$

AIRFLOW CALCULATION – TEMPERATURE RISE (using input & efficiency)

$$CFM = \frac{Btu\ input \times EFF}{1.08 \times \Delta T}$$

$$AV = \frac{CFM \times 144}{FA}$$

AIRFLOW CALCULATION (using input & efficiency)

$$CFM = \frac{BtuH\ (output)}{1.08 \times \Delta T}$$

$$BtuH\ (output) = CFM \times TD \times 1.08$$

$$TD = \frac{BtuH\ (output)}{TD \times 1.08}$$

STARTUP & PERFORMANCE CHECKLIST



FIRST-PAK

CUSTOMER _____ STARTUP DATE _____ JOB # _____
 ADDRESS _____ SERVICING COMPANY _____
 _____ TECHNICIAN _____
 MODEL # _____ SERIAL # _____ PHONE # _____

INSTALLATION CHECK LIST

- Inspect the unit for transit damage and report any damage on the carrier's freight bill.
- Check model number to insure it matches the job requirements.
- Install field accessories and unit adapter panels as required. Follow accessory and unit installation manuals.
- Verify field wiring, including the wiring to any accessories.
- Check all multi-tap transformers, to insure they are set to the proper incoming voltage.
- Prior to energizing the unit, inspect all the electrical connections.
- Power the unit. Bump the motor contractor to check rotation. Three phase motors are synchronized at the factory. If the blower fans are running backwards, de-energize power to the unit, then swap two of the three incoming electrical lines to obtain proper phasing. Re-check.
- Perform all start up procedures outline in the installation manual shipped with the unit.
- Fill in the Start Up Information as outlined below and on the following page.
- Provide owner with information packet. Explain the thermostat and unit operation.

START UP INFORMATION SHEET

ELECTRICAL

Supply Voltage L1-L2 _____ Compressor Amps _____
 Running Voltage L1-L2 _____ Blower Amps _____
 Secondary Voltage _____ Condenser Fan Amps _____
 C (black) to G (green) Volts* _____
 C (black) t W (white) Volts* _____

*With thermostat calling.

AMPERAGE – ERV MOTORS

Intake Motor: Nominal HP
 Rated Amps _____
 Running Amps _____
Exhaust Motor: Nominal HP
 Rated Amps _____
 Running Amps _____

AIRFLOW

Intake Design CFM	Exhaust Design CFM
Pressure Drop _____	Pressure Drop _____
Calculated CFM _____	Calculated CFM _____
Amb db Temp _____	Amb db Temp _____
Return Air db Temp* _____	Return Air db Temp* _____
Tempered Air db Temp* _____	Tempered Air db Temp* _____

*Measure after 15 minutes of run time

TEMPERATURES

Outdoor Air Temperature _____ DB _____ WB	Cooling Supply Air Temperature _____ DB _____ WB
Return Air Temperature _____ DB _____ WB	Heating Supply Air Temperature _____ DB _____ WB

The warranty may be void unless the Startup & Performance Checklist is completed and returned to the warrantor. If the HVAC unit is not installed properly the warranty will be void as the manufacturer can't be held accountable for problems that stem from improper installation.

FIGURE 50 - Startup and Performance Checklist (1 of 2)

STARTUP & PERFORMANCE CHECKLIST CONTINUED



FIRST-PAK

UNIT OPERATION

HEATING MODE

- 1 GAS INLET PRESSURE _____ IN. W.C.
- 2 GAS MANIFOLD PRESSURE _____ IN. W.C.
- 3 INDOOR BLOWER AMPS _____
- 4 TEMPERATURE RISE
 Supply Duct Temperature _____
 Return Duct Temperature - _____
 Temperature Rise = _____
- 5 TOTAL EXTERNAL STATIC
 Supply External Static _____
 Return External Static + _____
 Total External Static = _____
- 6 CONDENSATE LINE
 Leak Free

COOLING MODE

- 3 INDOOR BLOWER AMPS _____
- 4 TEMPERATURE DROP
 Return Duct Temperature _____
 Supply Duct Temperature - _____
 Temperature Drop = _____
- 5 TOTAL EXTERNAL STATIC (dry coil)
 Supply External Static _____
 Return External Static + _____
 Total External Static = _____
- 8 DRAIN LINE
 Leak Free
- 9 THERMOSTAT
 Adjusted & Programmed
 Explained Operation to Owner

FIGURE 51 - Startup and Performance Checklist (2 of 2)

NOTES

Manufactured by:



8273 Moberly Lane
Dallas, TX 75227

www.firstco.com

The manufacturer works to continually improve its products and as a result, it reserves the right to change design and specifications without notice.

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