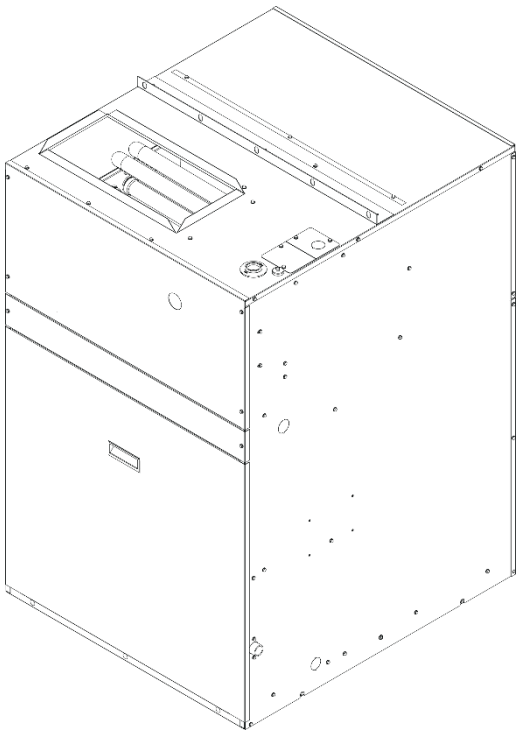
Installation, Operation, & Maintenance

IOM 8416
Rev. A 1/25

FPG SERIES
Vertical Packaged Gas Heat/ Electric Cooling Unit Category IV Type MSP Up to 96% AFUE

FIRST-PAK® GAS



ATTENTION:
Read all 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

– 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.

AHRI CERTIFIED®
www.ahridirectory.org
Unitary Small AC
AHRI Standard 210/240
Certification applies only when the complete system is listed with AHRI.

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WARNING

This appliance is not to be used by persons (including children) with reduced physical, sensory or mental capabilities, or lack of experience and knowledge, unless they have been given supervision or instruction concerning use of the appliance by a person responsible for their safety

Children should be supervised to ensure that they do not play with the appliance

Use adequate personal protection equipment when installing and performing maintenance. After switching off and locking-out an electrical disconnect, verify a safe condition with an electrical tester. Discharge a capacitor before handling any PSC motor and wiring. Use eye protection, cut resistant gloves and sleeves to protect against metal edges and screws.

Do not alter this product by using non-authorized parts. Such action voids all warranties or implied warranties and may result in adverse operation and performance and may be hazardous to service personnel and occupants. Company employees and/or contractors are not authorized to waive this warning.

TABLE OF CONTENTS

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 installer or service agency.
5. Only use First Co. approved kits and accessories 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:

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

Signifies potential electrical shock hazards that could result in personal injury or death.

CAUTION

Indicates a potentially hazardous situation that may result in minor or moderate personal 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 property damage, dangerous operation, serious injury, or death. Improper servicing could result in dangerous operation, serious injury, death, or property damage.

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

Verify proper operation after servicing

SAFETY CONSIDERATIONS CONTINUED

WARNING

FIRE OR EXPLOSION HAZARD

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

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

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

FIRE OR EXPLOSION HAZARD

FIRE OR EXPLOSION HAZARD

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.

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.

SAFETY CONSIDERATIONS CONTINUED

9. This furnace is equipped with a blocked vent shut-off system. If the furnace fails to operate, contact a qualified service agency for repair.

10. 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 26**- manual gas shut off

WARNING

FIRE OR EXPLOSION HAZARD

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 entire furnace if deemed necessary.

11. 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 are clear and free of obstructions.
b. The flue pipe is in place and physically sound without holes or other damage.
c. The return-air duct connection 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 stable and uniform, refer to **Figure 38** illustrating proper flame appearance for comparison.

WARNING

CARBON MONOXIDE POISINING 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.

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

g. **HEAT EXCHANGE TUBES**- make sure they are free from blockages, signs of carbon buildup or heavy corrosion
h. **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.
i. **FLUE PIPE:** is in place is physically sound without holes or any damage
j. **FLUE TERMINAL:** check that it is free from blockages and restrictions.
k. **COMBUSTION AIR OPENINGS:** check that they are clean & free from debris or blockages of any kind.
l. **INDOOR AIR:** the blower wheel and blower housing must be free from debris. Check that supply and return air registers, louver, and dampers are positioned properly, filters are in place and clean.
m. **INSPECT & WASH THE CONDENSER AND EVAPORATOR COILS**: do not use high pressure as damage to the finned surfaces may occur.

SAFETY CONSIDERATIONS CONTINUED

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 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 to aid qualified, licensed, service personnel in 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

ELECTRIC SHOCK HAZARD

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

CAUTION

Compressors and sealed system tubing components may be extremely hot!

CAUTION

Do not use compressors to evacuate the air conditioning system. A vacuum may cause internal electrical arcing resulting in a damaged or failed compressor.

WARNING

USE ONLY COPPER CONDUCTORS ONLY

13. 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.

n. This furnace must be installed so there are provisions for ventilating air.

o. 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.

14. Do not attempt to light this furnace manually. Refer to the GAS HEAT STARTUP section for instructions on lighting and shutting down the furnace.

15. In regions where snow and ice accumulation is possible, check the outdoor louvered 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

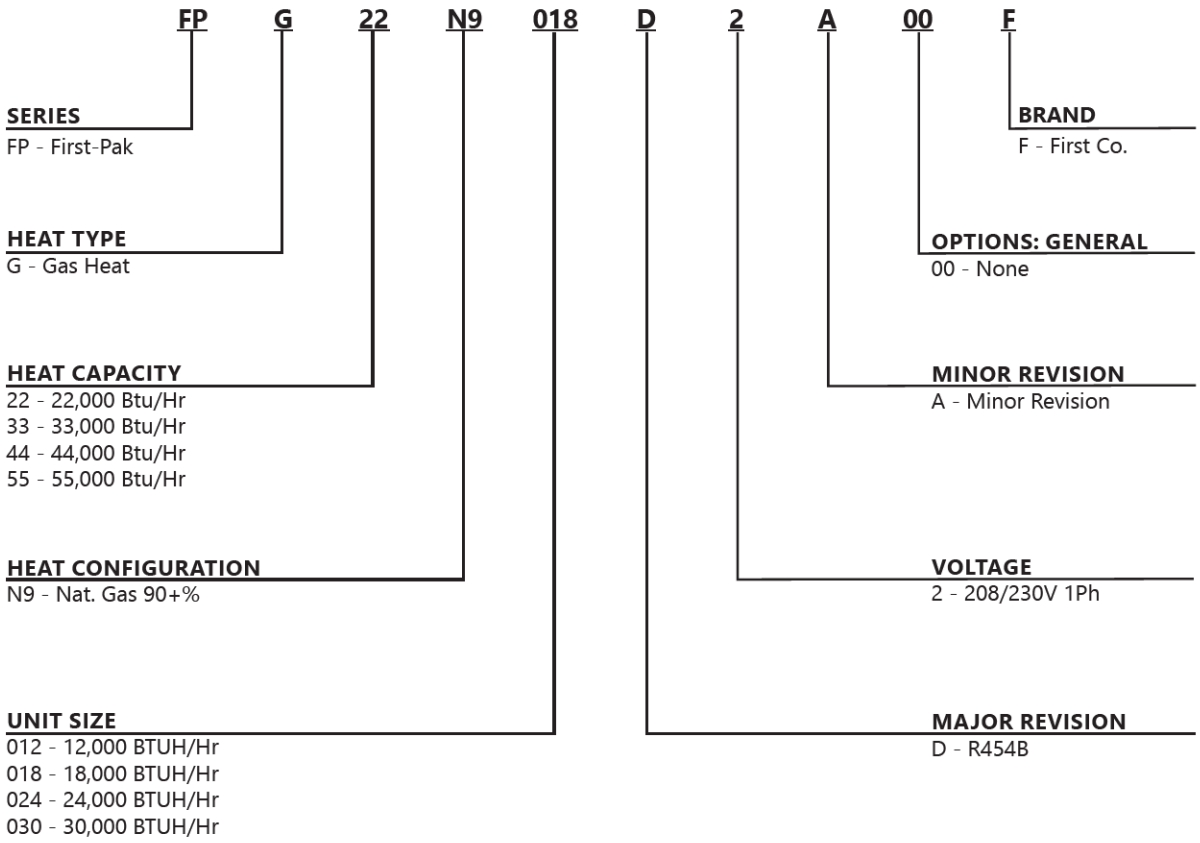


Figure 1 Model Nomenclature

GENERAL INFORMATION

IMPORTANT

DO NOT operate this unit during the construction process. Mechanical components and filters may clog with dirt and debris, which can cause damage to the system. The manufacturer 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.

WARNING

This appliance is not to be used by persons (including children) with reduced physical, sensory or mental capabilities, or lack of experience and knowledge, unless they have been given supervision or instruction.

Children should be supervised to ensure that they do not play with the appliance

Use adequate personal protection equipment when installing and performing maintenance. After switching off and locking-out an electrical disconnect, verify a safe condition with an electrical tester. Discharge a capacitor before handling any PSC motor and wiring. Use eye protection, cut resistant gloves and sleeves to protect against metal edges and screws.

WARNING

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

CAUTION

Do not operate this unit without an air filter in place

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.

WARNING

Take extreme caution that no internal damage will result if screws or holes are drilled into the cabinet

INTRODUCTION

FIRST-PAK FPG series are packaged gas heat / electric cooling units. 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 comply with the latest edition of AHRI Standard 210/240. All models are design certified for heating operation when fired with natural gas.

This unit may be installed at altitudes up to 10,000 ft. (3,048 m)

Work with extreme caution to minimize the risk of refrigerant ignition while installing and servicing a system containing a flammable refrigerant. Control the work environment as much as possible while potentially flammable vapors are present. Inform all persons on site about the risks of the nature of the work underway and the necessary safety precautions. Do not work in confined spaces. Test the work area for refrigerant in the air using an intrinsically safe A2L refrigerant leak detector before beginning work. Have a dry powder or CO2 fire extinguisher available. Use proper tools designed for A2L class refrigerants. While working near A2L refrigerants, use only non-sparking tools. Open flames and other ignition sources must not be present except during brazing. Brazing must only take place on evacuated and nitrogen purged refrigerant lines and components that are open to the atmosphere.

Consult local building codes and current editions of the National Electrical Code (NEC) NFPA 70. In Canada, refer to current editions of the Canadian electrical code CSA CEC22.1

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.

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

REFRIGERANT UNDER PRESSURE

Units are factory charged with refrigerant. Store units in a location that will minimize the potential for damage. Do not store the unit where sources of ignition are continuously present.

Do not use means to accelerate the defrosting process, or to clean the unit, other than those recommended by the manufacturer.

Be aware that refrigerants may not contain an odour.

Do not pierce or burn.

WARNING

DO NOT stack more than FOUR units when storing. Failure to follow these instructions may result in property damage, personal injury or death.

SHIPPING AND 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

Remove shrink-wrap and all packaging materials before installation. Ensure louvered areas are free from obstructions before installation.

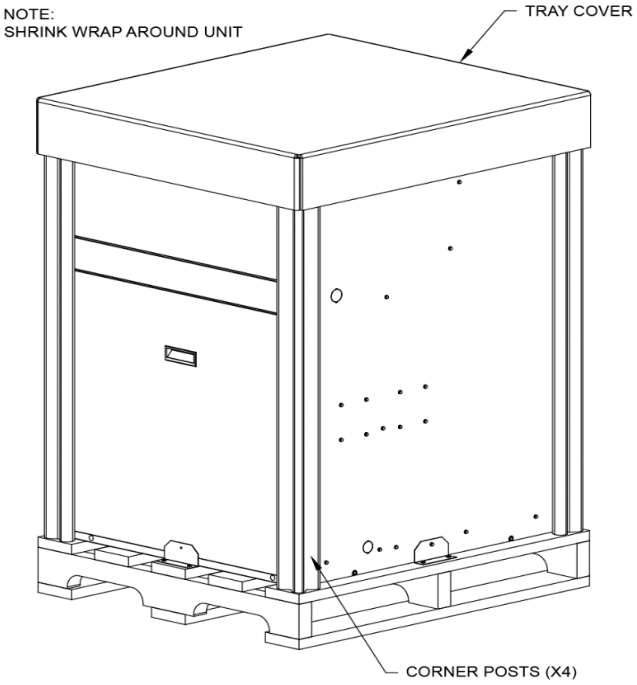


Figure 2 Standard Packaging

PACKAGE LIST

The units will be shipped with the following items:

1. FPG (FIRST-PAK) package gas heat/dx cooling unit:
   a. Shipping bracket
      i. Screws
   b. Top mounting bracket
      i. Screws
2. Literature package
   c. 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. 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.
5. Immediately before installation, remove unit front panel and verify that all electrical connections are tight .
6. 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.
7. 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.
8. Ensure that the evaporator distributor tubes are not touching one another and that they are over the drain pan.
9. Check the air-coil fins for any damage during shipping.
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.

NOTE

Verify the supply voltage requirements on the unit nameplate installing the equipment.

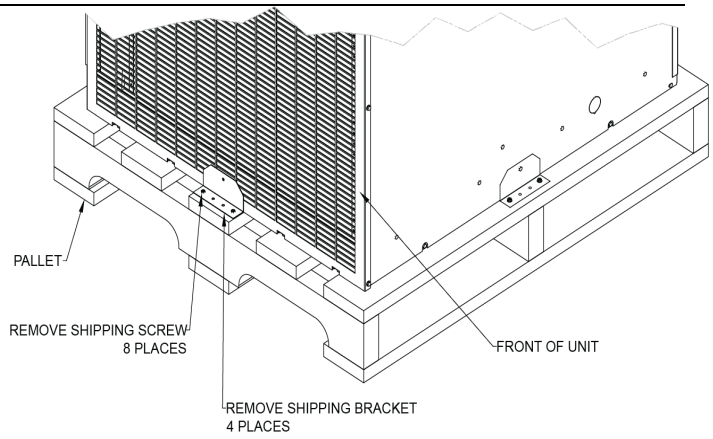


Figure 3 Standard Packaging With Bracket- Front View

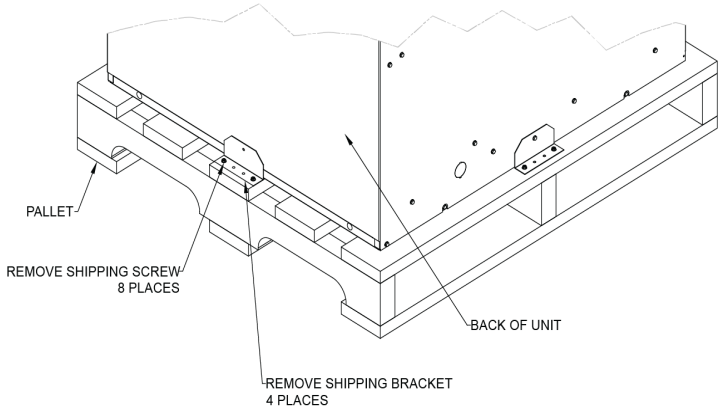


Figure 4 Standard Packaging With Brackets - Back View

UNIT DEMINSIONAL DATA

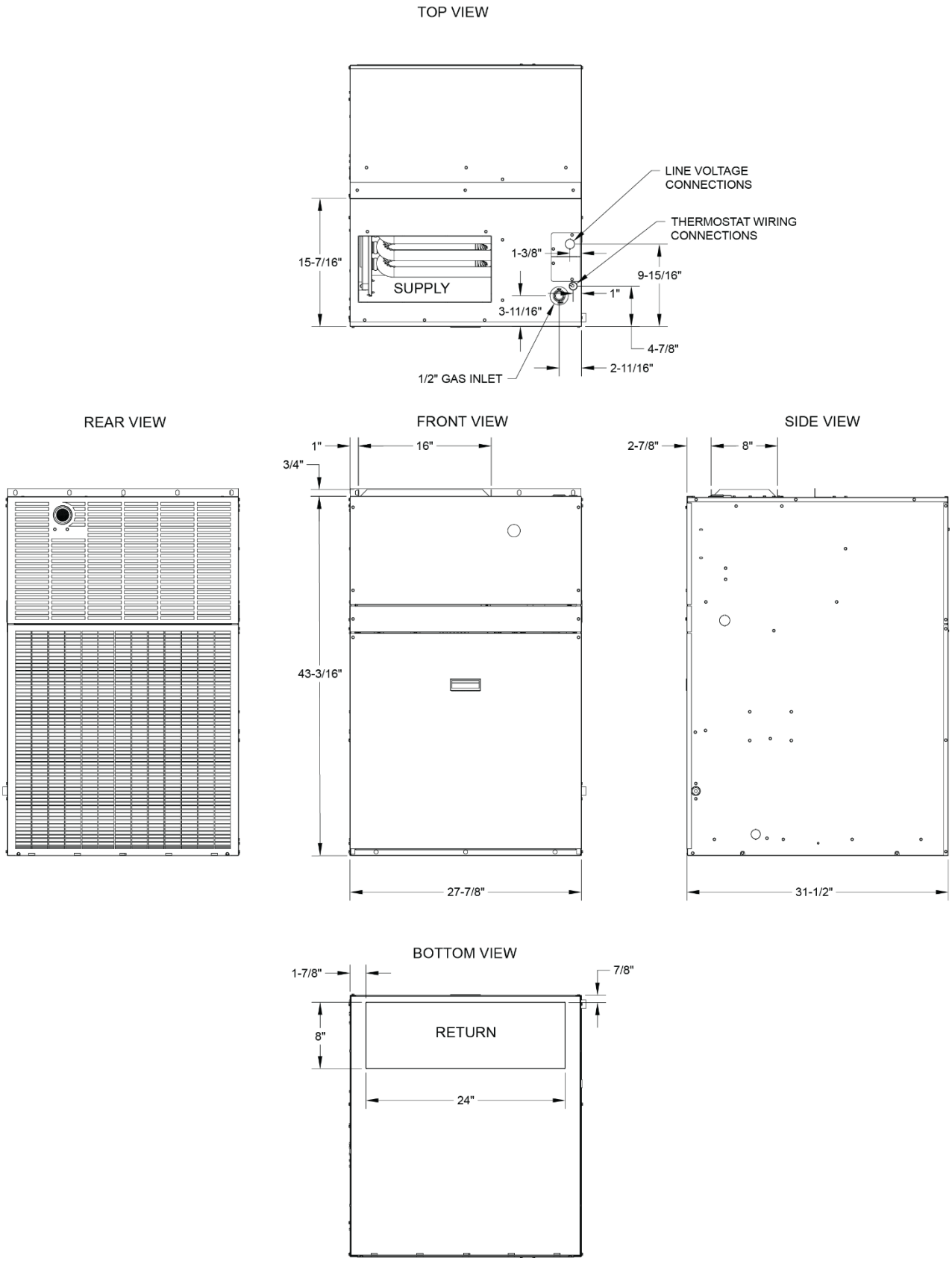


Figure 5 Unit Dimensions

UNIT PHYSICAL DATA

PHYSICAL DATA												
FPE MODELS	FPG22N90 12D	FPG33N90 12D	FPG44N90 12D	FPG22N90 18D	FPG33N90 18D	FPG44N90 18D	FPG55N90 18D	FPG33N90 24D	FPG44N90 24D	FPG55N90 24D	FPG44N90 30D	FPG55N90 30D
UNIT INFORMATION												
Compressor Qty/Type	Rotary (1)	Rotary (1)	Rotary (1)	Scroll (1)	Scroll (1)	Scroll (1)	Scroll (1)	Scroll (1)	Scroll (1)	Scroll (1)	Scroll (1)	Scroll (1)
FACTORY CHARGE (R454B) lbs. [kg]	4.8 [2.18]	4.8 [2.18]	4.8 [2.18]	4.5 [2.04]	4.5 [2.04]	4.5 [2.04]	4.5 [2.04]	4.8 [2.18]	4.8 [2.18]	4.8 [2.18]	4.8 [1.81]	4.8 [1.81]
Minimum Room Area m^2	6.6	6.6	6.6	6.2	6.2	62	62	6.6	6.6	6.6	5.5	5.5
Minimum Room Area ft^2	70.9	70.9	70.9	66.3	66.3	66.3	66.3	70.9	70.9	70.9	58.9	58.9
Minimum Air Flow CFM	130	130	130	122	122	122	122	130	130	130	108	108
Minimum Air Flow m^3/hr	221	221	221	207	207	207	207	221	221	221	183	183
Compressor Capacitor	35/370	35/370	35/370	35/370	35/370	35/370	35/370	35/370	35/370	35/370	40/370	40/370
Condenser Fan HP [Kw]	1/5 [.15]	1/5 [.15]	1/5 [.15]	1/5 [.15]	1/5 [.15]	1/5 [.15]	1/5 [.15]	1/3 [.25]	1/3 [.25]	1/3 [.25]	1/3 [.25]	1/3 [.25]
Indoor Fan Hp [kW]	1/3 [.25]	1/3 [.25]	1/3 [.25]	1/3 [.25]	1/3 [.25]	1/2 [.37]	1/2 [.37]	1/3 [.25]	1/2 [.37]	1/2 [.37]	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]	26.5 x 22.25 [67.3 x 56.5]											
Evaporator dimension (H x W) in. [cm]	23.15 x 22.25 [58.8 x 56.5]											
Filter size (H xW) im. [cm]	24 x24 [60.96 x 60.96]											
Input BTU/h [kW]	22000 [6.4]	33000 [9.7]	44000 [12.9]	22000 [6.4]	33000 [9.7]	44000 [12.9]	55000 [16.1]	33000 [9.7]	44000 [12.9]	55000 [16.1]	44000 [12.9]	55000 [16.1]
Output BTU/h [kW]	21120 [6.2]	31350 [9.2]	41360 [12.1]	21120 [6.2]	31350 [9.2]	43160 [12.1]	51150 [15]	31350 [9.2]	41360 [12.1]	51150 [15]	41360 [12.1]	51150 [15]
AFUE	96	95	94	96	95	94	93	95	94	93	94	93
No. of Burners	2	3	4	2	3	4	5	3	4	5	4	5
Orifice Size (Natural Size) in.[mm]	.0635 [1.61]	.0635 [1.61]	.0635 [1.61]	.0635 [1.61]	.0635 [1.61]	.0635 [1.61]	.0635 [1.61]	.0635 [1.61]	.0635 [1.61]	.0635 [1.61]	.0635 [1.61]	.0635 [1.61]
Max. Outlet Air Temp °F [°C]	170 [77]	160 [71]	180 [82]	170 [77]	160 [71]	180 [82]	185 [85]	160 [71]	180 [82]	185 [85]	180 [82]	185 [85]
Max. Static Pressure ICW [pa]	0.5 [125]											
GAS PIPING CONNECTION IN. [mm]	1/2 " [12.7]											
Operating Weight lb. [kg]	275 [124.7]	275 [124.7]	280 [127]	295 [133.8]	295 [133.8]	300 [136]	300 [136]	325 [147.4]	325 [147.4]	330 [149.7]	340 [154.2]	340 [154.2]
Shipping Weight lb. [kg]	302 [137]	302 [137]	307 [139.2]	322 [146]	322 [146]	327 [148.3]	327 [148.3]	352 [159.7]	352 [159.7]	357 [161.9]	367 [166.5]	367 [166.5]

TABLE 1

ELECTRICAL DATA

ELECTRICAL DATA									
		COMPRESSOR		OUTDOOR MOTOR		INDOOR MOTOR		MIN. CIRCUIT AMPACITY (MCA)	MAX. OVERCURRENT PROTECTION (MOP)
								CIRCUIT 1 (L1-L2)	CIRCUIT 1 (L1-L2)
Model Number	Voltage	RLA	LRA	FLA	HP	FLA	HP	240V	240V
FPG22N9012D2A00F	208/230-1-60	4.6	25	1.9	1/5	2.8	1/3	10	15
FPG33N9012D2A00F	208/230-1-60	4.6	25	1.9	1/5	2.8	1/3	10	15
FPG44N9012D2A00F	208/230-1-60	4.6	25	1.9	1/5	4.1	1/2	12	15
FPG22N9018D2A00F	208/230-1-60	7.2	47	1.9	1/5	2.8	1/3	14	20
FPG33N9018D2A00F	208/230-1-60	7.2	47	1.9	1/5	2.8	1/3	14	20
FPG44N9018D2A00F	208/230-1-60	7.2	47	1.9	1/5	4.1	1/2	15	20
FPG55N9018D2A00F	208/230-1-60	7.2	47	1.9	1/5	4.1	1/2	15	20
FPG33N9024D2A00F	208/230-1-60	10.2	58	2.8	1/3	2.8	1/3	18	25
FPG44N9024D2A00F	208/230-1-60	10.2	58	2.8	1/3	4.1	1/2	20	25
FPG55N9024D2A00F	208/230-1-60	10.2	58	2.8	1/3	4.1	1/2	20	25
FPG44N9030D2A00F	208/230-1-60	12.8	77	2.8	1/3	4.1	1/2	23	35
FPG55N9030D2A00F	208/230-1-60	12.8	77	2.8	1/3	4.1	1/2	23	35
TABLE									

Refer to the wiring diagrams in the EFW IOM for additional details

Wire size should be determined in accordance with National Electric Codes

Unit are rated for 208/230V, but MOP, MCA values are calculated at 208/240V

INSTALLATION

WARNING

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

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 appropriate Personal Protective Equipment (PPE) 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 in injury. Wear protective gloves 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.

WARNING

Do not touch any rotating component with any object. Damage to the equipment and personal injury can occur.

CAUTION

Only use components designed for use with R545-B refrigerant.

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 Co. 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 to 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" [45.72 cm] above the floor. The FPG unit must be located so that it is protected from physical damage by vehicles.

INSTALLATION (continued)

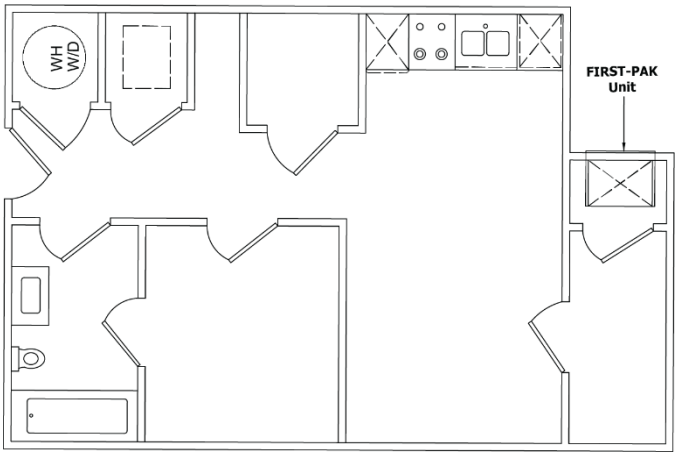


Figure 6 Typical Floorplan With First- Pak On Exterior Wall

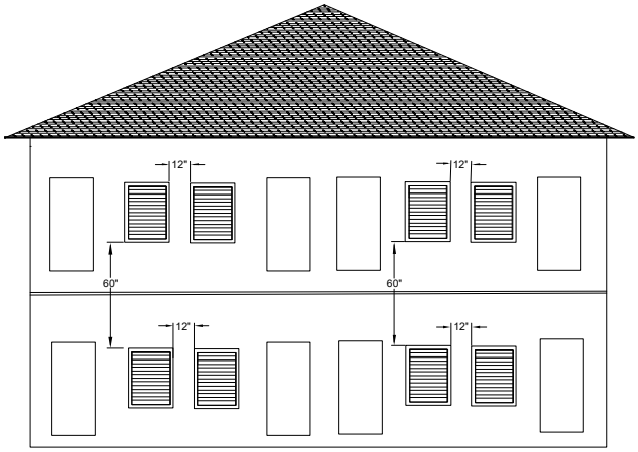


Figure 7 Required Exterior Building Clearance

CLEARANCE REQUIREMENTS		
MINIMUM CLEARANCE	IN	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 ground floor	18	46
Distance to cetner	2	5

TABLE 3

UNIT CLEARANCE REQUIREMENTS

The unit may be installed with zero clearances to adjacent combustible 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” [81.28 cm] open area must be left unobstructed in front of the access panels.

The louver must be kept free from any obstructions to air flow. The unit must be installed at least 4 feet [1.2192 m] from electric meters, gas meters, regulators, and relief equipment. Products of combustion are discharged outside from the vent outlet located at the front louver; 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

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 CLEARANCE REQUIREMENTS section in this manual for more information.

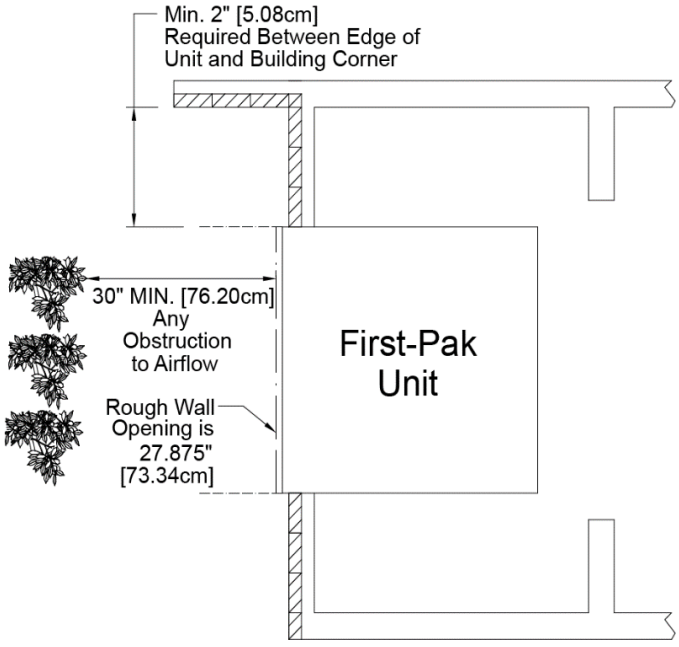


Figure 8 Clearance Requirements

INSTALLATION CONTINUED

VENT CLEARANCES

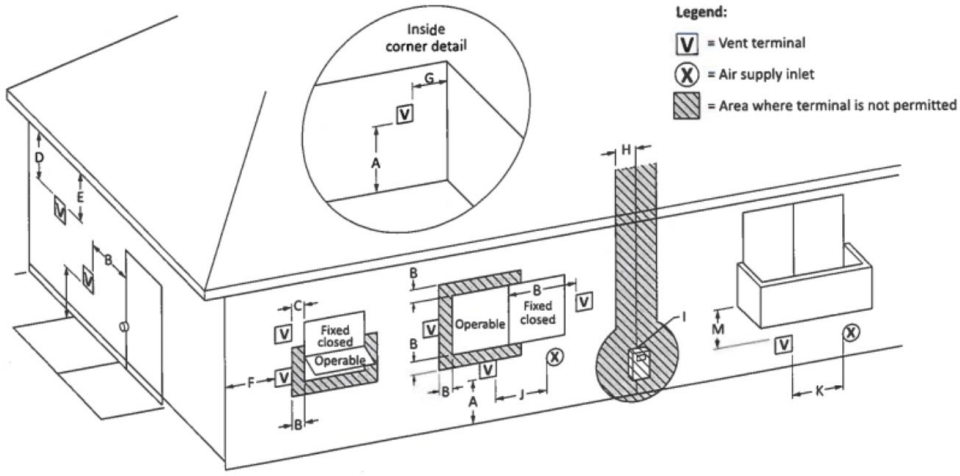


Figure 9 Location of Vent Termination Clearances

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 4

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.

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 un-damaged. Ensure that the wall sleeve is level, front to back and side to side (Figure 10 – Wall Sleeve Mounting) If an architectural louver is being used, fasten it to the sleeve using the supplied hardware.

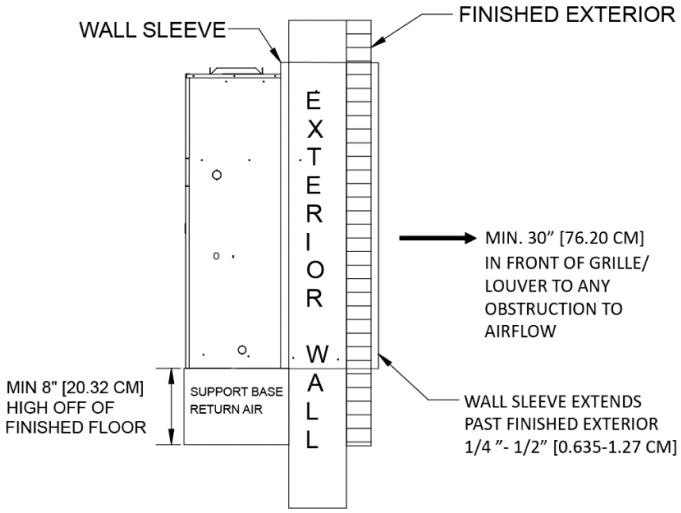


Figure 10 Wall Sleeve Mounting

IMPORTANT

Apply a high grade non-hardening sealant approved for exterior use between the sleeve and the structure, on the inside and outside walls, to prevent air and water from migrating inside (FIGURE 10 - Wall Sleeve Mounting)

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.

INSTALLATION CONTINUED

REAR INSTALLATION & DIMENSIONS

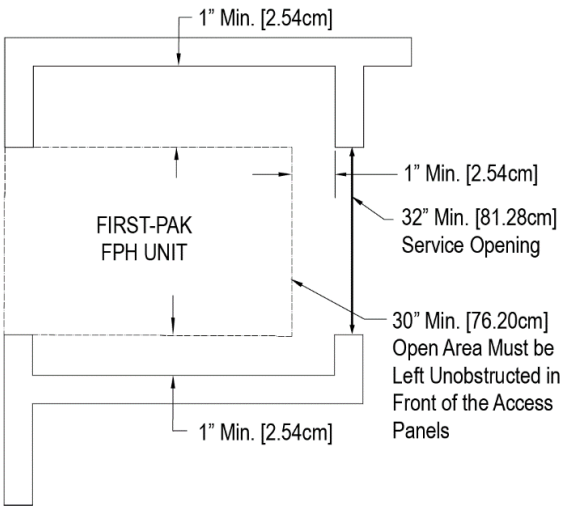


Figure 11 Rear Installation Dimensions

The FPG unit may be installed in an enclosure provided the following minimum clearances to combustibles are maintained; 1" clearance on the sides, 2" [5.08 cm] clearance from the top, and 1" [2.54 cm] from the front and the plenum. Adequate 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.

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

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

Refer to **Figure 12 – Unit Support & Alignment**

Things to consider prior to building the support structure:

1. Accurately measure the unit and choose a strong building material for the support structure.
2. If additional vibration isolation material is required, non-combustible material **MUST** be used.
3. Ensure that the platform connection to FIRST-PAK return air opening can fit an 8" x 24" [20.32 cm x 60.96 cm] duct. The FIRST-PAK unit must be aligned with return air opening on the unit base.
4. Ensure the support structure and the wall sleeve provide a secure, fixed, and leveled position.

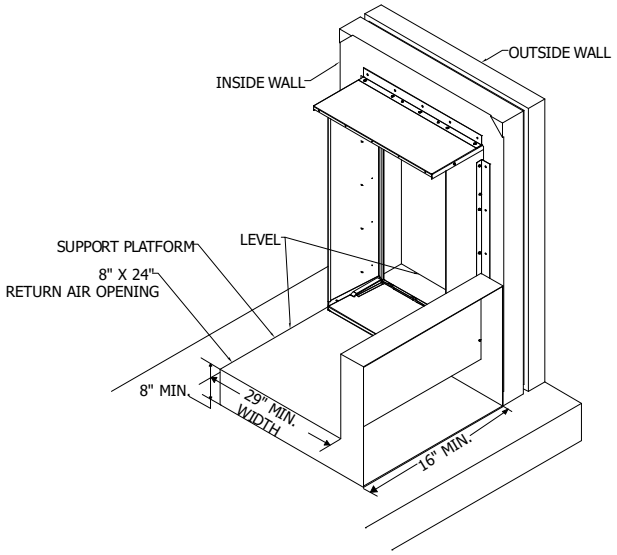


Figure 12 Unit Support & Alignment

CAUTION

The sleeve is not intended or designed to be the sole support for the unit. Additional support must be provided under the return air opening of the unit for adequate support. The use of vibration isolation material between the unit and the support is recommended.

INSTALLATION CONTINUED

NOTE

Locate the unit in an area that easily 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. Units should be mounted on the sleeve with a pitch to the outside of the building.

Insulation is used 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.

PACKAGED UNI T INSTALLATION

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 13- Wall Sleeve Seal below.

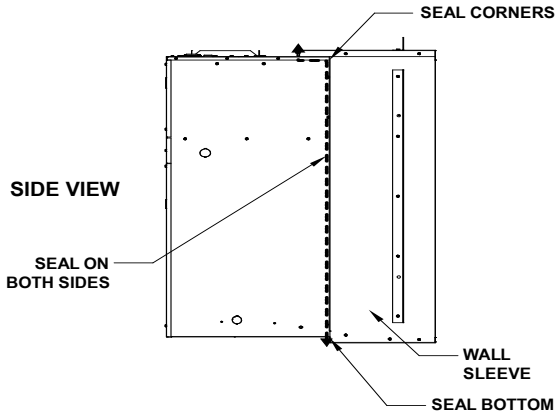


Figure 13 Wall Sleeve Seal

INSTALLATION CONTINUED

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.

IMPORTANT

Bend the supply air duct flanges up at a 90° angle before attaching duct. Leaving the flanges in the flat shipping position will cause a reduction in airflow and poor performance.

IMPORTANT

Do not restrict supply air by using a vertical duct with dimensions smaller than the supply air flanges in the bent position.

5. If an air filter is to be applied to the unit, remove lower front access panel to replace filter. 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 13- 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.
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 sealed on all four sides against the wall sleeve seals.

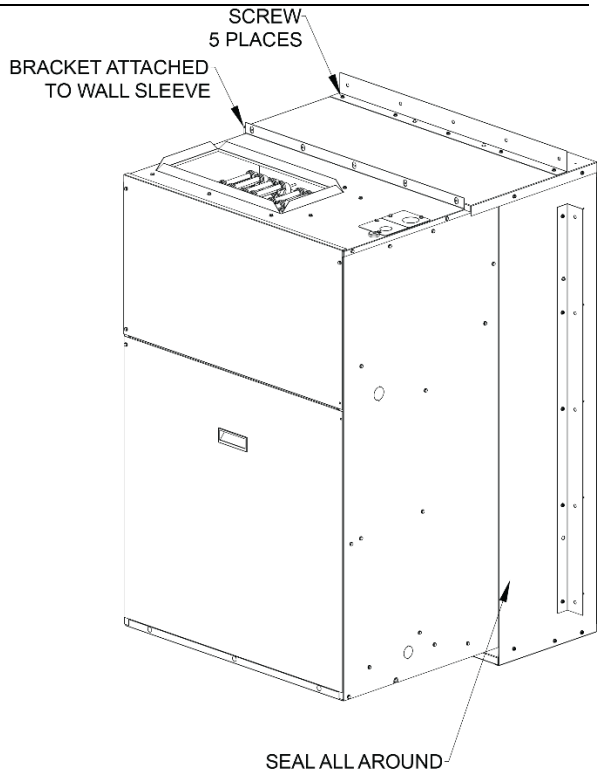


Figure 14 Top Bracket Installation on Sleeve

CAUTION

Seal exposed joints to prevent water and outside air infiltration into the closet, which can cause improper unit operation and may cause damage the unit and other property.

IMPORTANT

Supply and return air ducts must be sealed to the unit.

INSTALLATION CONTINUED

IMPORTANT

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

SUPPLY AIR DUCTING

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

Supply air ductwork must be adequately sized to provide airflow within the specified total external static pressure (0.5" 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 (0.5" 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

CARBON MONOXIDE POISONING HAZARD

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

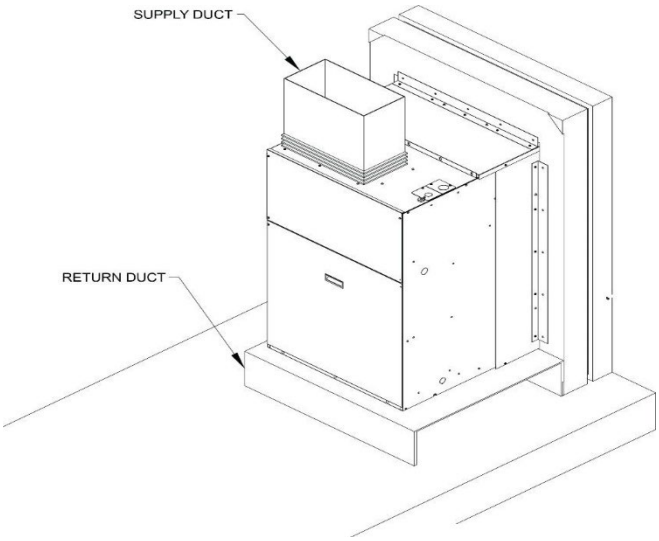


Figure 15 Unit Ducting

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 hand tight only.

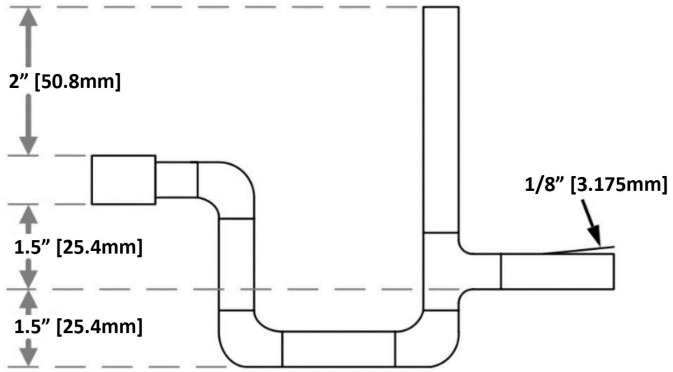


Figure 16 Condensate Drain Layout

GAS HEAT CONDENSATE DRAINAGE

In addition to air conditioning condensation, the FPG**N9 unit will produce condensation during the combustion process. The installer must make a field connection to dispose of this condensate. Condensation produced by combustion must not be routed to the unit air conditioning drain pan. Condensation produced by combustion must be disposed of in a manner compliant with all local and National Codes. A 1/2" NPT Female fitting is on the lower right side of the cabinet to make this connection. The gas heat condensate drain is internally trapped, do not double trap. The field connection should be free draining into a condensate pump or other acceptable method of disposal. A take-apart fitting is preferable for this connection to simplify future service.

VENTING PRODUCTS OF COMBUSTION

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.

INSTALLATION CONTINUED

Observe all clearance requirements pertaining to vent termination.
Perform regularly scheduled maintenance checks to assure venting of flue products to the outdoors is unobstructed.

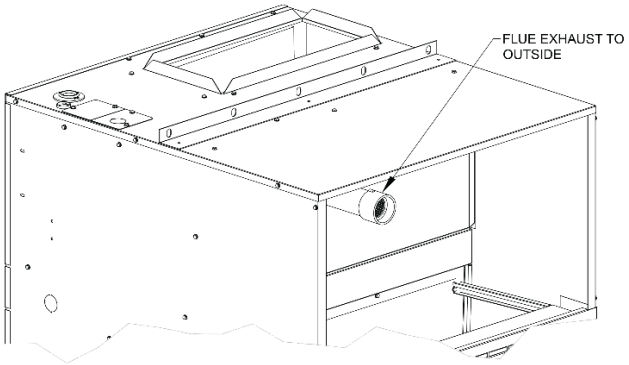


Figure 17 Venting/ Flue Location

NOTE

These units are direct vent appliances

OUTDOOR AIR SEAL

Before operation ensure that the OD air-seal is intact and there are no gaps between in the indoor and outdoor side. If there are gaps, seal as required for optimal performance.

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.

IMPORTANT

The unit is designed to operate at maximum 0.5 in.w.c external static pressure. Operation at higher E.S.P may cause equipment failure. For applications requiring higher static operation, please contact factory or the manufacture's sales representative.

AIR FILTER MINIMUM DIMENSIONS	
Model Series	Minimum Area
FPD**N9	576 sq. inches [0.3716 sq. meter]

Table 5-

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

CARBON MONOXIDE POISONING HAZARD

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

FIRE OR EXPLOSION HAZARD

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 chemical 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
- Deicing salts or chemicals
- Carbon tetrachloride
- Halogen type refrigerants
- Cleaning solvents
- Printing inks
- Paint removers
- Varnishes, etc.
- Hydrochloric acid
- Antistatic fabric softeners for clothes dryers
- Masonry acid washing materials

INSTALLATION CONTINUED

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

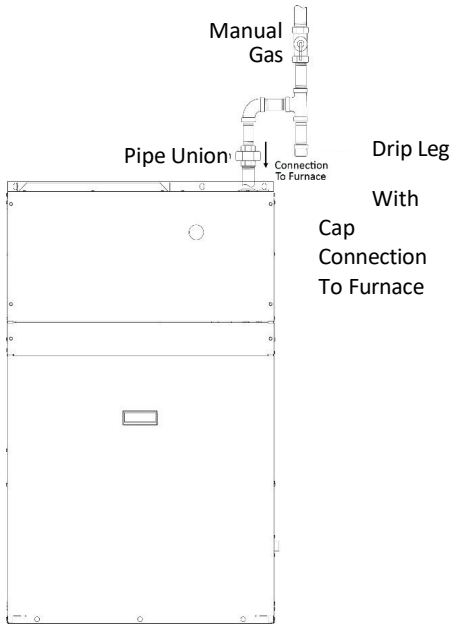


Figure 18 Gas Supply Piping

Use 1/2" 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.

IMPORTANT

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" [91.44 cm]. 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.

The furnace and its external gas shutoff valve must be disconnected from the piping system before any gas line pressure test exceeding 1/2 PSI (14" [35.56 cm] W.C.) is performed.

Do not expose the gas valve to any pressure higher than 14" [35.56 cm] 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 25 – Gas Valve regarding locations of pressure test ports. Refer to Table 11 - Gas Pressure Table 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.

Use proper procedures for leak testing 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 1/2 psi (3.5 kPa).

ELECTRICAL

HIGH VOLTAGE

WARNING

Transformers are multi voltage, It is crucial to refer to unit wiring diagram, transformers wiring diagram as well as unit voltage to ensure proper connections and operation safety

IMPORTANT

Electrical work associated with the installation of this appliance must comply with the National Electrical Code (NEC). Other local or regional electrical and building code requirements may apply.
In Canada electrical work associated with the installation of this appliance must comply with CE CSA C22

WARNING

The unit cabinet must have an uninterrupted / unbroken ground to minimize personal injury if an electrical fault should occur
. Failure to do so can cause electrical shock resulting in severe personal injury or death

ATTENTION

Electrical work associated with the installation of this appliance must comply with the National Electrical Code (NEC). Other local or regional electrical and building code requirements may apply.
In Canada electrical work associated with the installation of this appliance must comply with CSA CEC22.1

WARNING

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

WARNING

Do not bypass or eliminate safety devices

Ensure field wiring complies with local and national fire, safety, and electrical codes. Ensure voltage supply is within limits shown on unit rating plate. Contact the local power company for correction of improper voltage. Refer to the unit rating plate for recommended circuit protection device.

The unit cabinet must have an uninterrupted and unbroken ground to minimize personal injury if an electrical fault should occur. Provide ground circuit in accordance with all applicable national and local codes.

WARNING

ELECTRIC SHOCK HAZARD

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

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. Refer to Figures 32-35 Wiring Diagrams and nameplate data for necessary field wiring information.

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 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 units are factory wired for 230 volt operation. For 208 volt operation; on primary side of the transformer(line voltage), move the black wire from the 230 volt tap to the 208 volt tap.

ELECTRICAL CONTINUED

LOW VOLTAGE

THERMOSTAT

Use 18 AWG wire with color–coded insulation (35°C minimum) up to 100 ft. in length (31 m). Use 16 AWG wire if more than 100 ft. of wire is required

A standard 24 VAC single stage heating and cooling thermostat is required to control this unit. For FPG**N9030C units, a dual stage thermostat must be used in order to reach rated system performance. A thermostat with a “C” common terminal is preferred. Thermostat connections and their functions are below in

FIGURE 19- 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	Green	Evaporator Blower
R	Red	Transformer 24VAC Hot

Table 6

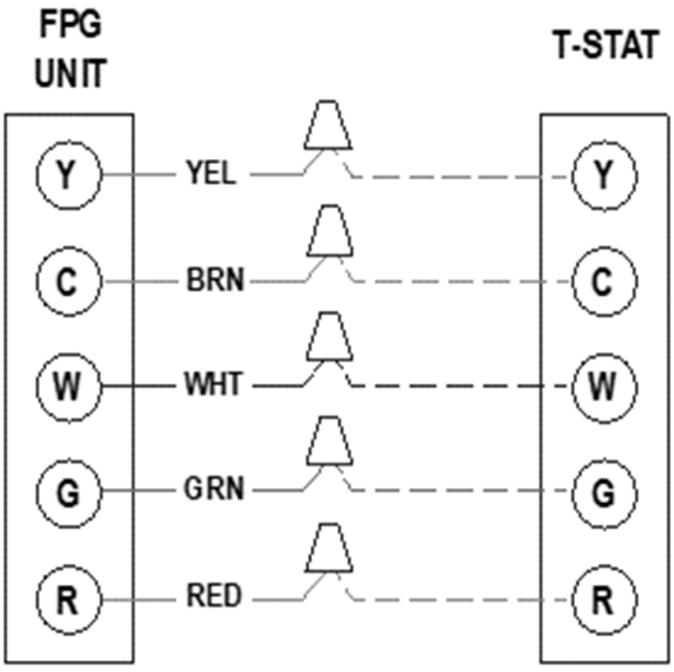


Figure 19 Thermostat Connections

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 level against the wall and the thermostat wires protrude through the middle of the back plate mounting holes and drill holes with a 3/16” [5 mm] bit. Install supplied anchors and secure plate to the wall. Thermostat wire must be 18 AWG wire.

CONTROLS

SIGNAL	PROBLEM	POSSIBLE CAUSE	CHECKS & CORREC TIONS
SLOW FLASH	Stand-by mode, awaiting call from room thermostat	Status = Stand-by mode; does not indicate fault condition	Status of stand-by mode displayed no fault indicated
RAPID FLASH	Room thermostat is requesting heat	Status = Thermostat requesting heat; does not indicate fault condition	Status of call for heat displayed, no fault indicated
CONSTANT ON	Internal fault or No power	Main power is off or control has failed	Check circuit breaker / circuit fuse, external power switch.
CONSTANT OFF	No Operation	Defective Control Board	Replace Control
2 FLASHES	Control is locked out from failed ignition or loss of flame	No gas pressure, low gas pressure, dirty, non-conductive flame rod, disconnected flame rod conductor	Check system gas pressure, check manifold gas pressure, check flame rod condition & conductor
3 FLASHES	Unexpected pressure switch condition. NOTE: There are two normally open pressure switches wired in series. Switch #1 proves adequate draft through heat exchanger. Switch #2 proves adequate condensate drainage from the collector box.	Pressure switch contacts are closed when they should be open (draft inducer not running)	Check that the two Blue wires from the control board are not shorted together
		Pressure switch contacts are open when they should be closed (draft inducer running)	Check pressure switch #1 tubing - connected to draft inducer. Check pressure switch #2 tubing - connected to collector box. Check that a Blue wire from control board is connected to each pressure switch. Check that pressure switches are connected together by a wire. Check that condensate water is not flooding the collector box. Check that flue termination is not covered with snow or other blockage. Check that flue pipe is not blocked by insects or nests.
4 FLASHES	Limit switch or rollout switch is open	Gas pressure too high, delayed ignition, restrictive air filter, blower motor providing low / no air flow	Check supply and manifold gas pressure, check that all burners are in proper position, all burners are lighting, blower motor fan wheel dirty or motor not operating or on incorrect speed, air leaking from blower compartment into combustion section
5 FLASHES	Flame sensed while gas valve is off	Cracked flame rod insulator, gas valve stuck open	Check flame rod circuit for short to ground. Check wiring between gas valve wiring and control for proper circuitry, check that gas valve closes when 24 volts is removed
6 FLASHES	On-Board microprocessor conflict	Redundant safety feature of microprocessors detecting possible internal control issue	Reset power, replace control if fault is still present

TABLE 7- CONTROL BOARD L.E.D. TABLE

CONTROLS CONTINUED

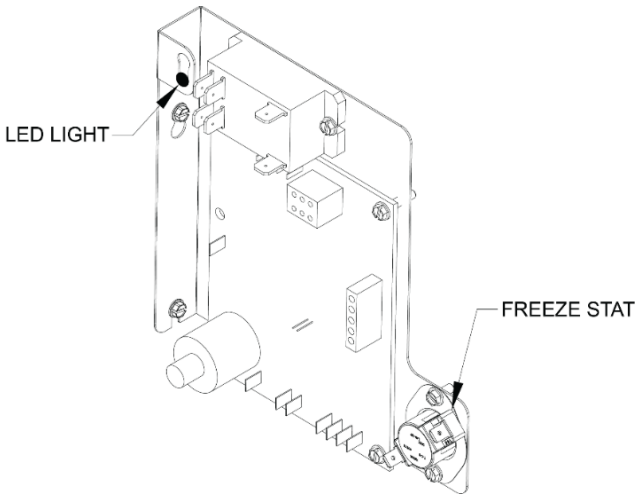


Figure 20 Control Board

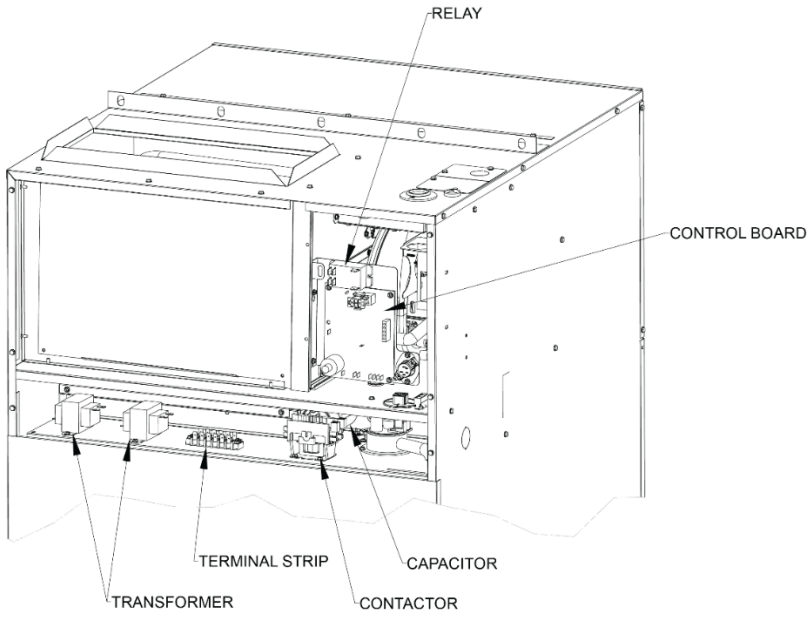


Figure 21 Electrical Component

COOLING OPERATION

When the unit is given a "Y" input the unit will operate in 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.

FREEZE PROTECTION

FIRST – PAK contains thermostatically controlled low wattage electric heaters that activate when necessary to guard against freezing condensate. Each FPGN9 unit has two non-adjustable freeze protection thermostatic controls. One thermostatic control is mounted next to the control board and controls two heaters; one applied to the collector box and one applied to the drain tube. A second thermostatic control is mounted on top of the cooling chassis and controls a heater applied to the top of the drain trap. This control also energizes the indoor blower to circulate indoor air to provide drain trap freeze protection. All field installed condensate drain lines and connections are the responsibility of the installer. The installer must protect field installed drain components subjected to freezing temperatures by adding supplemental heat and / or insulation.

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

BLOWER CONTROL

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

•All models have 5 fan speeds:
  o T2 is the constant fan speed.
  o T3 is used for freeze protection.
  o T2 may be used for heating mode providing the speed selection allows the unit to operate within specified temperature rise range.

T4 or T5 may be used for cooling mode.

See wiring diagram located on the unit.

•FPG**N9030C* units use a dual stage compressor and have 2 cooling fan speeds. T4 for low speed and T5 for high speed Refer to Table 8 - FPG AIRFLOW PERFORMANCE DATA & Table 9 - FPG AIRFLOW PERFORMANCE DATA CONTINUED for information on the select speed changes for heat and cool mode.

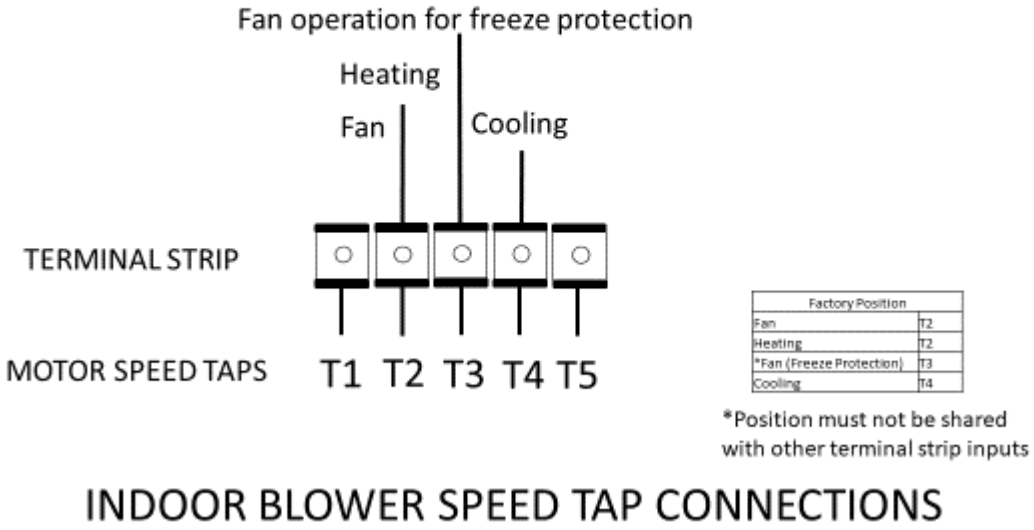


Figure 22 Blower Control Tap

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 have power applied at all times. Disconnect power before servicing. Low voltage thermostat demand and board algorithms will control its use.

PERFORMANCE DATA

IWC STATIC PRESSURE												
MODEL	MOTOR TAP	MOTOR SPEED	0.10		0.20		0.30		0.40		0.50	
			SCFM	W	SCFM	W	SCFM	W	SCFM	W	SCFM	W
FPE05E1012D*	1		405	32	365	36	326	39	290	43	259	46
	2	$H1^H$	553	63	514	67	475	70	439	74	408	77
	3	G^C	527	57	487	60	448	64	412	68	382	71
	4	Y2	602	77	562	81	523	84	488	88	457	91
FPE07E1012D*	1		405	32	365	36	326	39	290	43	259	46
	2	$H1^H$	645	92	605	95	566	99	531	103	500	106
	3	G^C	527	57	487	60	448	64	412	68	382	71
	4	Y2	602	77	562	81	523	84	488	88	457	91
FPE10E1012D*	1		405	32	365	36	326	39	290	43	259	46
	2	$H1^H$	702	115	663	118	624	122	588	126	557	129
	3	G^C	527	57	487	60	448	64	412	68	382	71
	4	Y2	602	77	562	81	523	84	488	88	457	91
FPE05E1018D*	1		467	52	420	59	375	65	327	72	292	78
	2		769	132	722	139	678	145	629	152	595	158
	3	$H1^H$	675	100	628	107	583	113	535	121	500	127
	4	G^C	724	116	677	123	632	128	584	136	549	142
	5	Y2	812	149	765	156	720	161	672	169	637	175
FPE07E1018D*	1		467	52	420	59	375	65	327	72	292	78
	2		769	132	722	139	678	145	629	152	595	158
	3	$H1^H$	812	149	765	156	720	161	672	169	637	175
	4	G^C	724	116	677	123	632	128	584	136	549	142
	5	Y2	812	149	765	156	720	161	672	169	637	175
FPE10E1018D*	1		467	52	420	59	375	65	327	72	292	78
	2		769	132	722	139	678	145	629	152	595	158
	3	$H1^H$	924	204	877	211	832	217	783	225	749	230
	4	G^C	724	116	677	123	632	128	584	136	549	142
	5	Y2	812	149	765	156	720	161	672	169	637	175
FPE05E1024D*	1		567	75	530	80	504	85	476	92	443	99
	2		783	142	746	146	720	152	692	159	658	165
	3	$H1^H$	650	96	613	101	587	107	559	114	525	120
	4	G^C	888	195	851	200	825	206	797	213	763	219
	5	Y2Y2	980	261	943	265	917	271	889	278	855	284
FPE07E1024D*	1		567	75	530	80	504	85	476	92	443	99
	2		783	142	746	146	720	152	692	159	658	165
	3	$H1^H$	827	162	790	166	764	172	736	179	702	186
	4	G^C	868	184	831	188	805	194	777	201	744	208
	5	Y2	980	261	943	265	917	271	889	278	855	284

TABLE 8

NOTE:

- Airflow data shown is with a dry coil at 70°DB EAT with Standard 1" filter.
- For models with five speed taps, T3 is for freeze protection. T2 is for heating operation. T4-t5 is for cooling operation.
- Superscript C indicates factory-set default cooling tap. Superscript H indicates factory-set default heating tap.

PERFORMANCE DATA CONTINUED

IWC STATIC PRESSURE CONTINUED												
MODEL	MOTOR TAP	MOTOR SPEED	0.10		0.20		0.30		0.40		0.50	
			SCFM	W	SCFM	W	SCFM	W	SCFM	W	SCFM	W
FPE10E1024D*	1		567	75	530	80	504	85	476	92	443	99
	2	H	783	142	746	146	720	152	692	159	658	165
	3	$H1^{H}$	888	195	851	200	825	206	797	213	763	219
	4	G^{C}	868	184	831	188	805	194	777	201	744	208
	5	Y2	980	261	943	265	917	271	889	278	855	284
FPE15E1024D*	1		567	75	530	80	504	85	476	92	443	99
	2		783	142	746	146	720	152	692	159	658	165
	3	$H1^{H}$	1198	472	1161	476	1135	482	1107	489	1074	495
	4	G^{C}	868	184	831	188	805	194	777	201	744	208
	5	Y2	980	261	943	265	917	271	889	278	855	284
FPE05E1030D*	1		694	109	657	114	631	120	603	127	569	133
	2		838	167	801	172	775	177	747	184	713	191
	3	$H1^{H}$	650	96	613	101	587	107	559	114	525	120
	4	G^{C}	962	247	925	251	899	257	871	264	837	270
	5	Y2	1103	372	1066	376	1040	382	1012	389	978	396
FPE07E1030D*	1		694	109	657	114	631	120	603	127	569	133
	2		838	167	801	172	775	177	747	184	713	191
	3	$H1^{H}$	783	142	746	146	720	152	692	159	658	165
	4	G^{C}	962	247	925	251	899	257	871	264	837	270
	5	Y2	1103	372	1066	376	1040	382	1012	389	978	396
FPE07E1018D*	1		694	109	657	114	631	120	603	127	569	133
	2		838	167	801	172	775	177	747	184	713	191
	3	$H1^{H}$	888	195	851	200	825	206	797	213	763	219
	4	G^{C}	962	247	925	251	899	257	871	264	837	270
	5	Y2	1103	372	1066	376	1040	382	1012	389	978	396
FPE15E1030D*	1		694	109	657	114	631	120	603	127	569	133
	2		838	167	801	172	775	177	747	184	713	191
	3	$H1^{H}$	1198	472	1161	476	1135	482	1107	489	1074	495
	4	G^{C}	962	247	925	251	899	257	871	264	837	270
	5	Y2	1103	372	1066	376	1040	382	1012	389	978	396

TABLE 9

NOTE:

- Airflow data shown is with a dry coil at 70°DB EAT with Standard 1" filter.
- For models with five speed taps, T3 is for freeze protection. T2 is for heating operation. T4-t5 is for cooling operation.
- Superscript C indicates factory-set default cooling tap. Superscript H indicates factory-set default heating tap.

A2L SENSING AND MITIGATION

Units charged with over 4lbs (1.81kg) of R454B refrigerant are shipped with a factory installed refrigerant leak detector attached to the evaporator coil. In the event that a refrigerant leak is detected, the controls will disable the compressor operation, and energize the evaporator fan to disperse the leaked refrigerant. The unit will operate in this mitigation state until the sensor no longer detects a refrigerant leak, for a minimum time of 5 minutes. Once the mitigation period has ended, the unit will return to its normal operation based on the current thermostat inputs. An LED status light is provided with the sensor for diagnostic purposes, the description of the LED status light signals can be found in the troubleshooting section.

Minimum Room Size and Mitigation Airflow for R454b Systems					
System Charge		Minimum Room Area		Min Mitigation Airflow	
(lb)	(kg)	(sq ft)	(sq m)	(CFM)	(cu m/hr)
4	1.81	60	5.57	108	184
5	2.27	75	6.96	135	230
6	2.72	90	8.36	162	276
7	3.17	105	9.75	189	322
8	3.63	120	11.14	216	368
9	4.08	135	12.54	243	414
10	4.54	150	13.93	271	460
11	4.99	165	15.32	298	506
12	5.44	180	16.71	325	552
13	5.90	195	18.11	352	598
14	6.35	210	19.50	379	644
15	6.80	225	20.89	406	689
16	7.26	240	22.29	433	735
17	7.71	255	23.68	460	781
18	8.16	270	25.07	487	827
19	8.62	285	26.46	514	873
20	9.07	300	27.86	541	919
21	9.52	315	29.25	568	965
22	9.98	330	30.64	595	1011
23	10.43	345	32.04	622	1057
24	10.88	360	33.43	649	1103
25	11.34	375	34.82	676	1149
26	11.79	390	36.21	703	1195
27	12.24	405	37.61	730	1241
28	12.70	420	39.00	758	1287
29	13.15	435	40.39	785	1333
30	13.61	450	41.79	812	1379

HEATING OPERATIONS

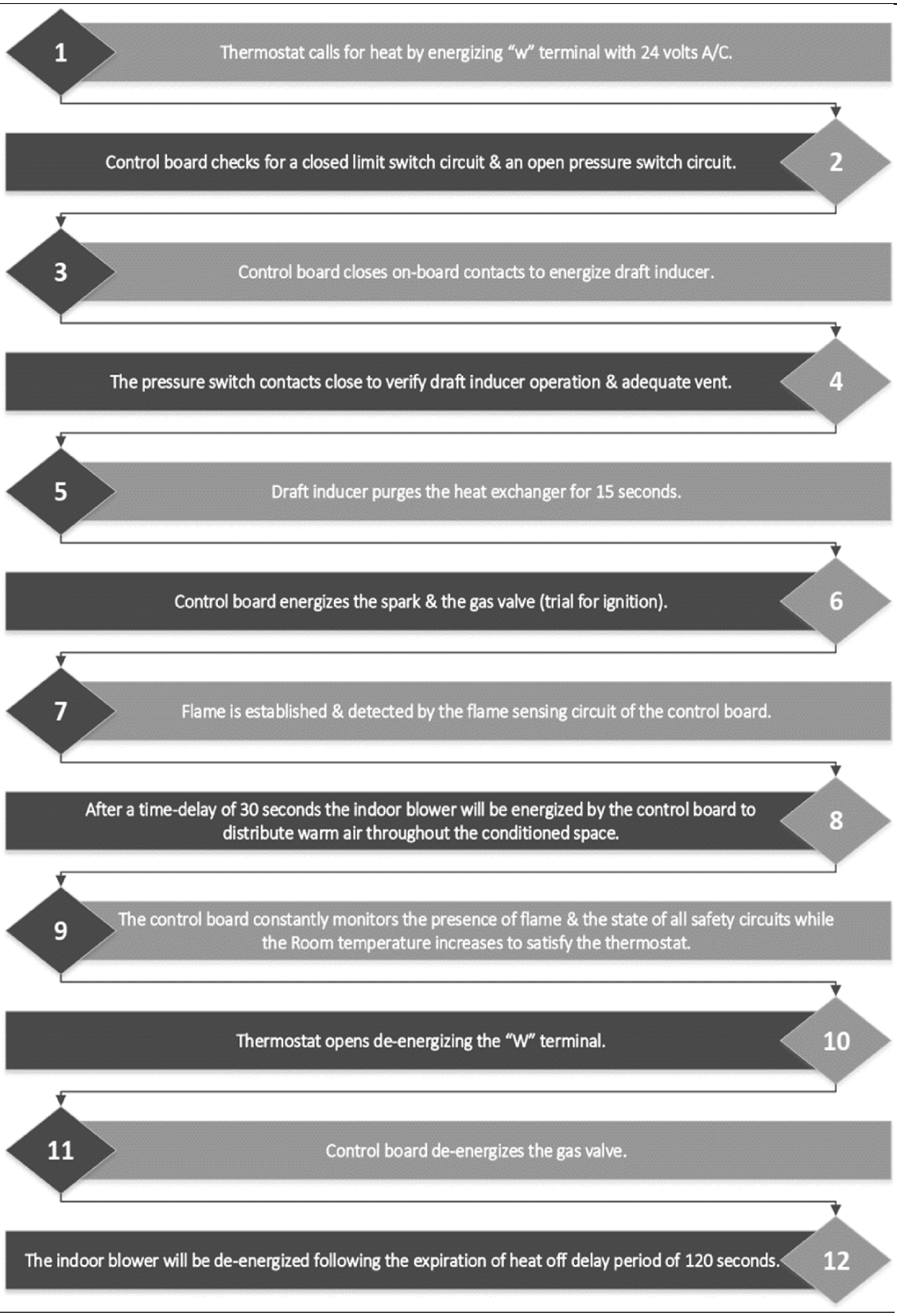


Figure 23 Heating Sequence of Operations

HEATING OPERATIONS CONTINUED

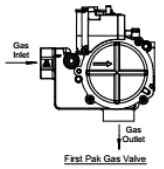
FOR YOUR SAFETY READ BEFORE OPERATING

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

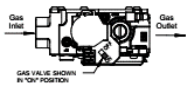
A. This appliance does not have a pilot. It is equipped with an ignition device which automatically lights the burner. Do not try to light the burner by hand.
B. BEFORE OPERATING smell ALL around the appliance area for gas. Be sure to smell next to the floor because some gas is heavier than air and will 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 24 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 25 – Gas Valve).
Check that the position of the manual gas shut-off valve is in the "on" position (see FIGURE 26 – Manual Gas Shutoff Valve).
6. Turn on electrical power to the unit.
7. 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.
Move the gas valve switch to the "off" position (see FIGURE 26 – Manual Gas Shutoff Valve).
2. Turn the manual gas shut-off valve to the "off" position.

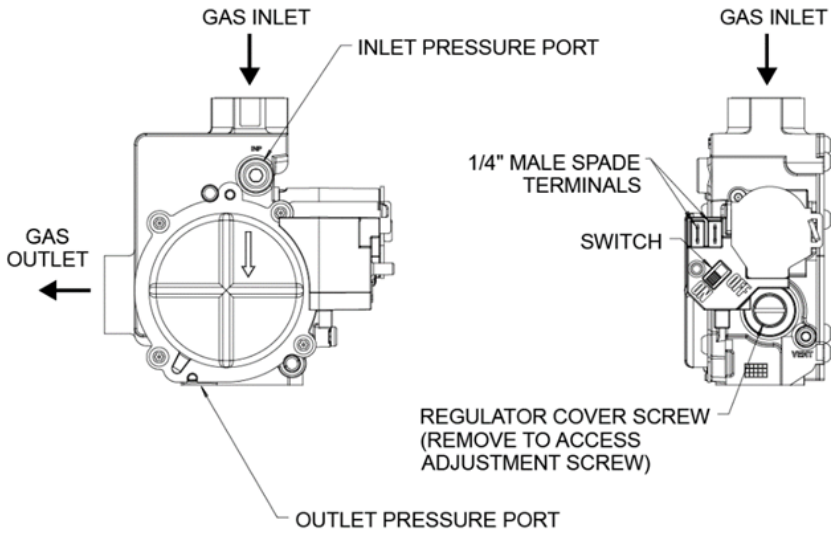


Figure 25 Gas Valve

HEATING OPERATIONS CONTINUED

GAS SUPPLY PRESSURE

1. Turn “off” the gas supply to the furnace using the manual gas valve.
2. Remove the inlet pressure port plug using a 3/16” hex wrench. (refer to Figure 28)
3. Install a 1/8”- 27 N.P.T. x 1/4” hose barb connector into the inlet pressure port.
4. Connect tubing and a manometer to the 1/4” hose barb connector.
5. Turn “on” the gas supply to the furnace using the manual gas valve.
6. 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.
7. 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.
8. Set the room thermostat to call for heat.
9. 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. NOTE: If the gas supply pressure is not within the min-max specified, contact the gas utility to correct this issue before placing this equipment in operation.
10. Terminate the call for heat at the thermostat.
11. Turn “off” the manual gas valve.
12. Remove the manometer and tubing from the 1/8”-27N.P.T. x 1/4” hose adaptor
13. Remove the 1/8”- 27 N.P.T. x 1/4” hose barb connector from the inlet pressure port and install the inlet pressure port plug removed in step 2. Check for leaks using soap solution made specifically for the detection of leaks. Do not leave the gas supply “on” until it is leak free.

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 10

GAS MANIFOLD PRESSURE

1. Turn “off” the gas supply to the furnace using the manual gas valve.
2. Remove the outlet pressure port plug using a 3/16” hex wrench. (refer to Figure 28)
3. Install a 1/8”- 27 N.P.T. x 1/4” hose barb connector into the outlet pressure port
4. Connect tubing and a manometer to the 1/4” hose barb connector.

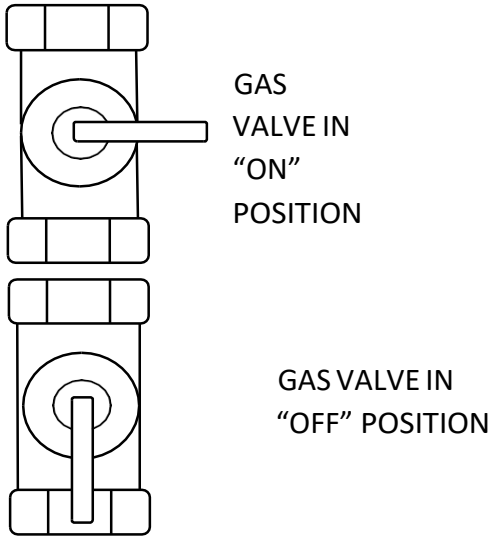


Figure 26 Manual Gas Shutoff Valve

5. Turn “on” the gas supply to the furnace using the manual gas valve.
6. 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.
7. 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.
8. 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.
9. Terminate the call for heat at the thermostat.
10. Turn “off” the manual gas valve.

HEATING OPRTATIONS CONTINUED

11. Remove the manometer and tubing from the 1/8”-27N.P.T. x 1/4” hose barb connector
12. Remove the 1/8”- 27 N.P.T. x 1/4” hose barb connector from the outlet pressure port and install the outlet pressure port plug removed in step 2.
13. Turn “on” the manual gas valve.
14. 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. Do not leave the gas supply “on” until it is leak free.

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 22 - Blower Control Tap) page 34 of this manual for information on changing indoor blower speed.

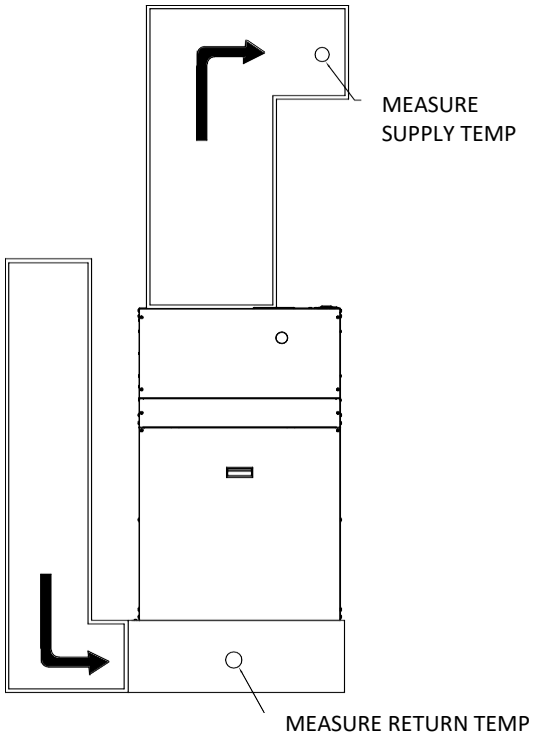


Figure 27 Temperature Rise

COOLING OPERATIONS

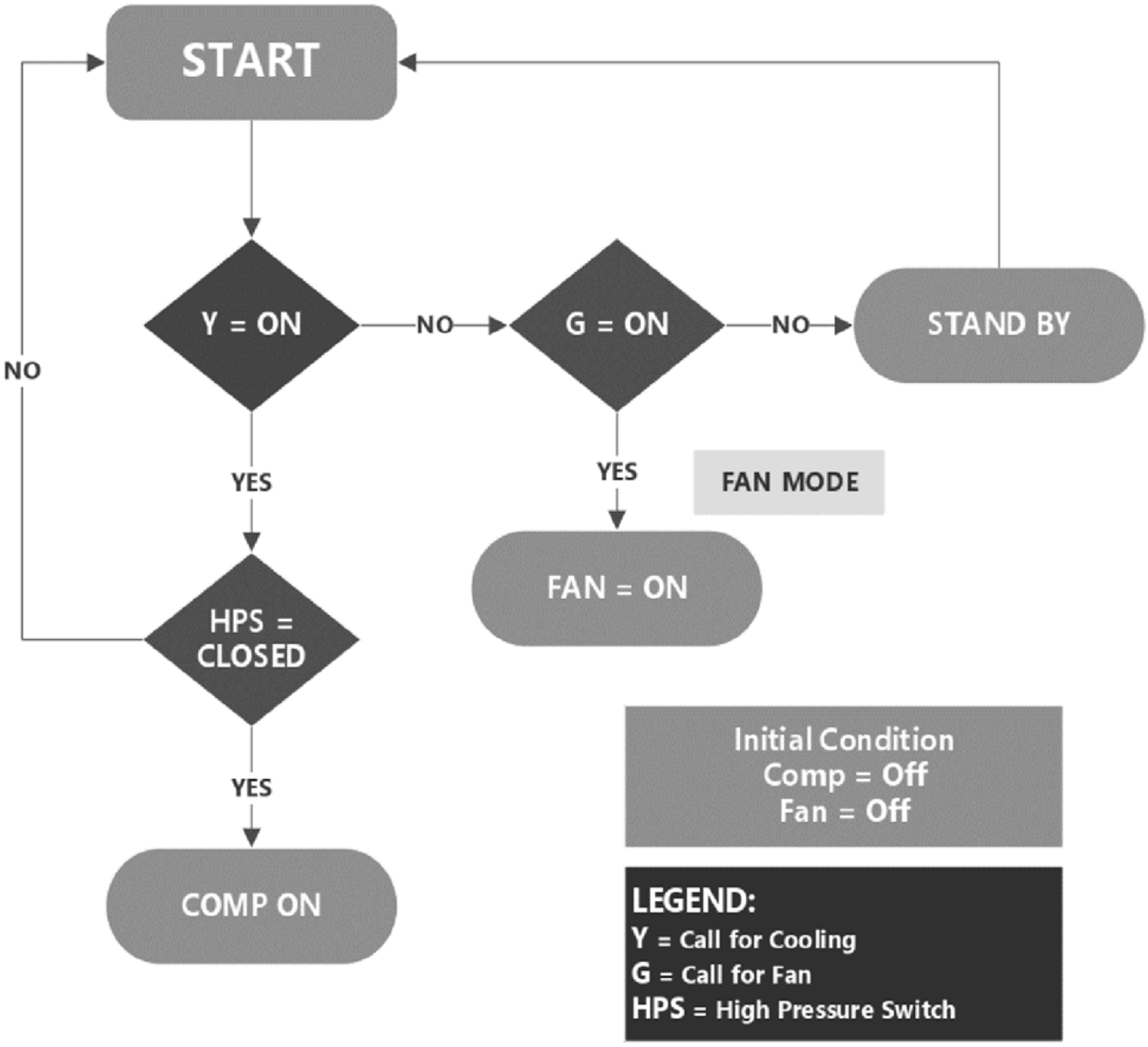


Figure 28 Cooling Sequence of Operations

LOCATION OF MAJOR COMPONENTS

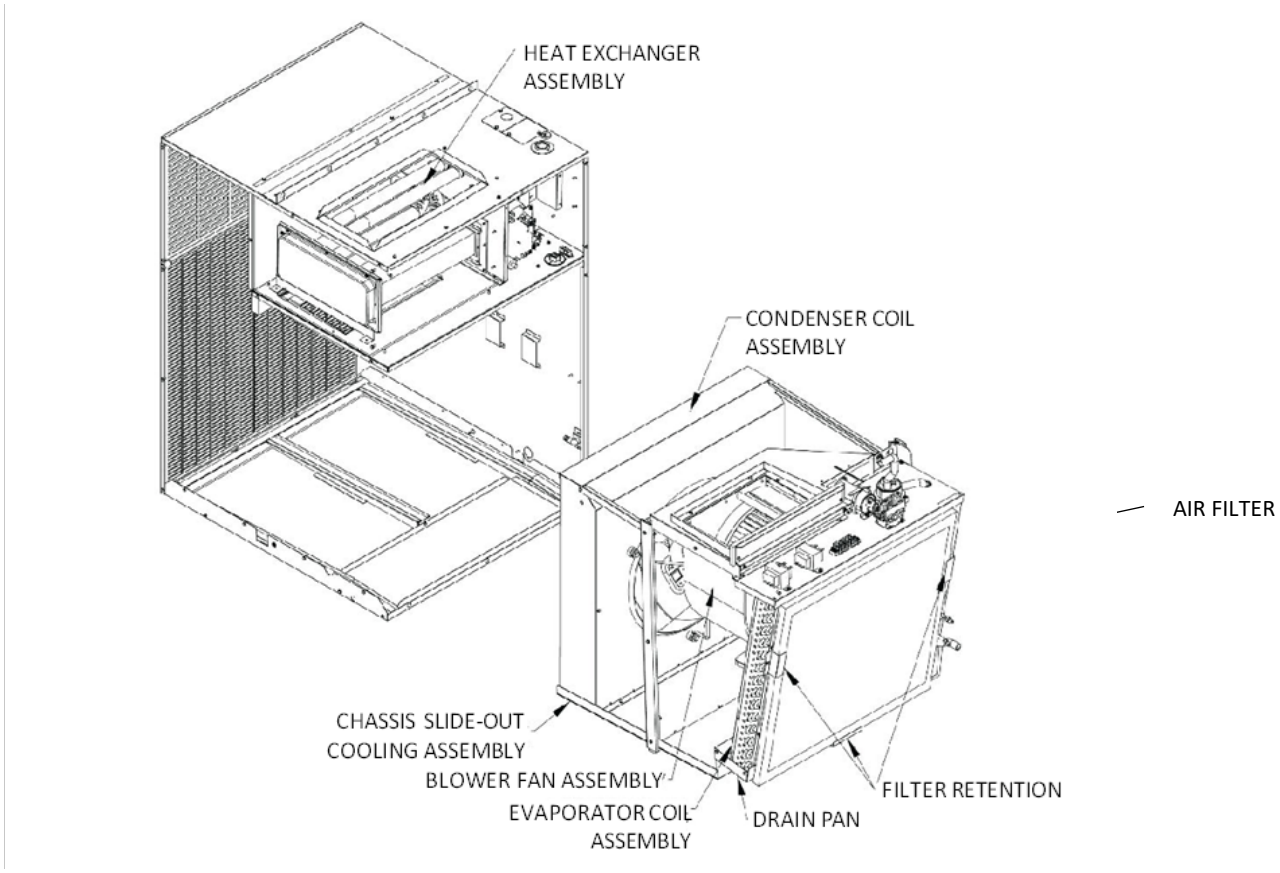


Figure 29 Slide Out Chassis

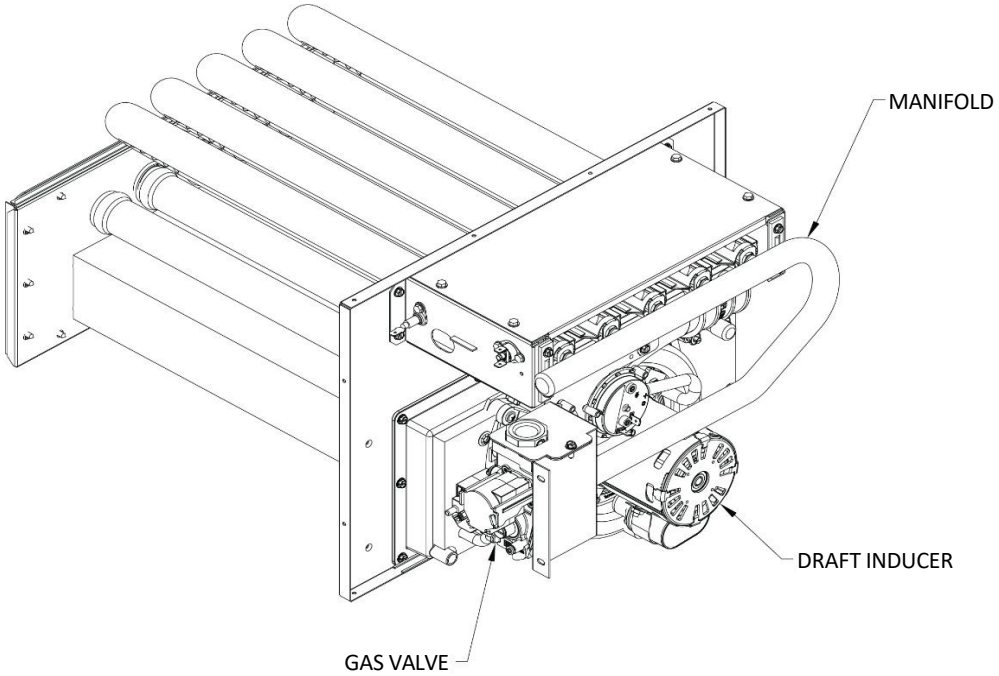


Figure 30 Heating Assembly

LOCATION OF MAJOR COMPONENTS CONTINUED

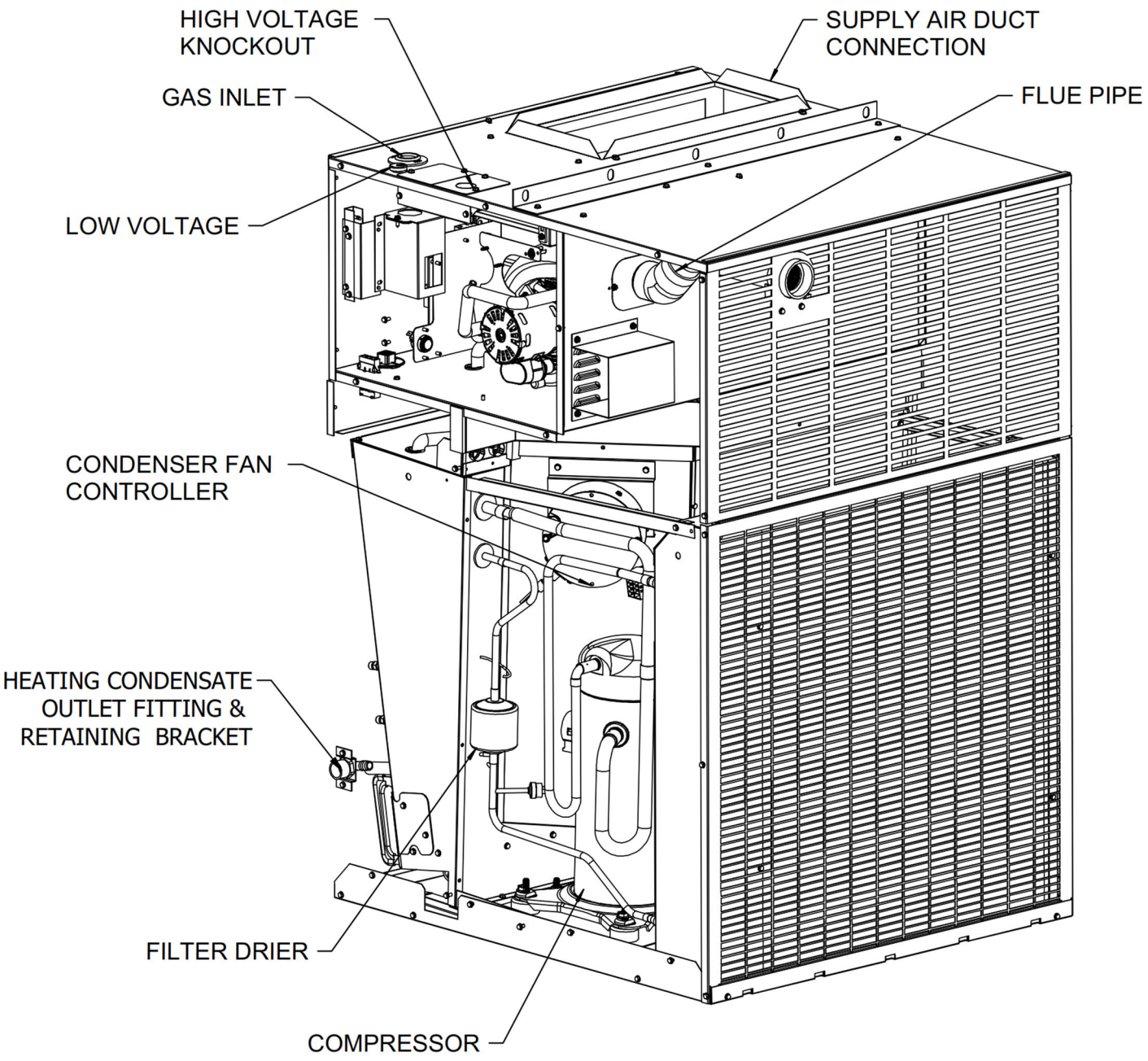
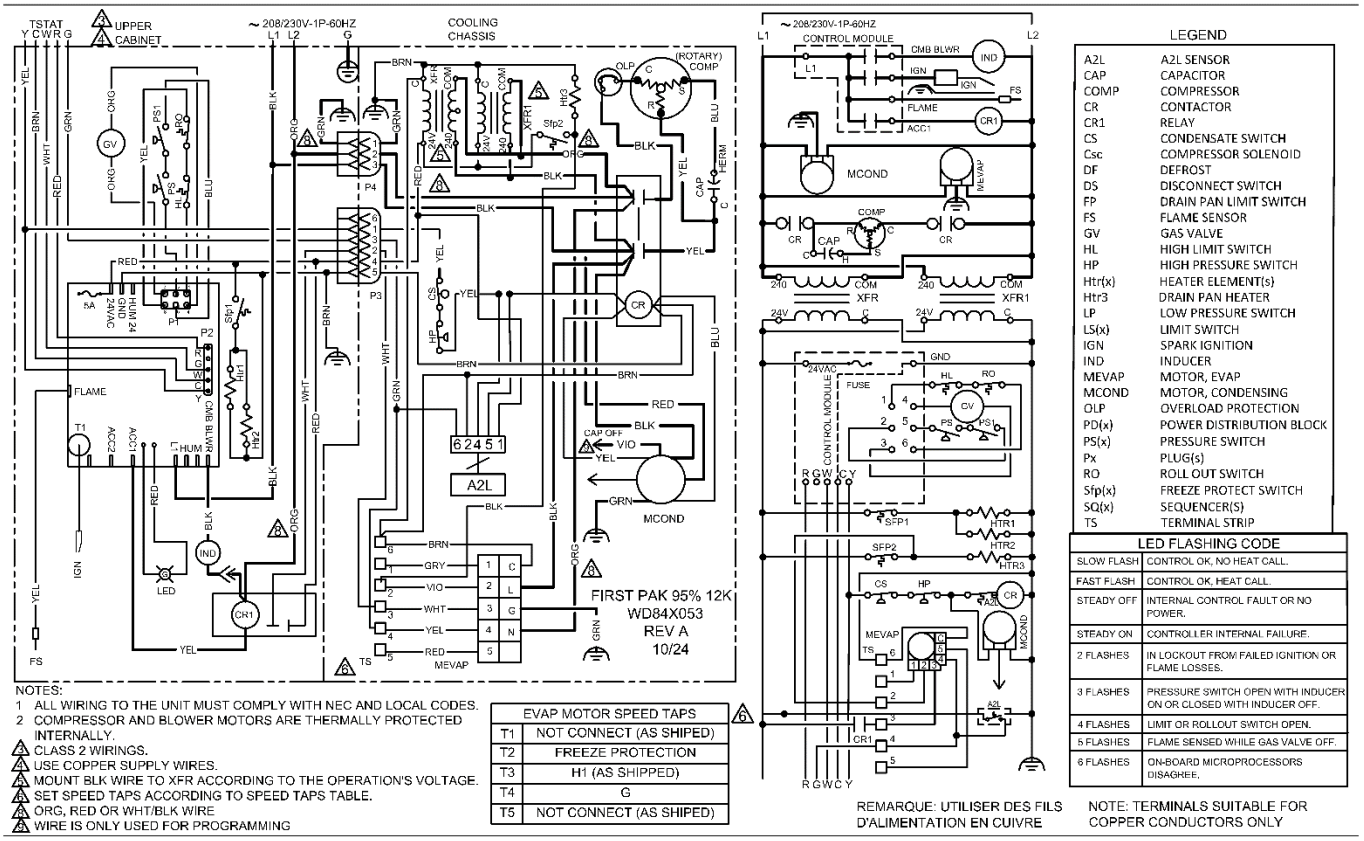


Figure 31 Cabinet Components

WIRING DIAGRAM



LEGEND

A2L	A2L SENSOR
CAP	CAPACITOR
COMP	COMPRESSOR
CR	CONTACTOR
CR1	RELAY
CS	CONDENSATE SWITCH
Csc	COMPRESSOR SOLENOID
DF	DEFROST
DS	DISCONNECT SWITCH
FP	DRAIN PAN LIMIT SWITCH
FS	FLAME SENSOR
GV	GAS VALVE
HL	HIGH LIMIT SWITCH
HP	HIGH PRESSURE SWITCH
Htr(x)	HEATER ELEMENT(s)
Htr3	DRAIN PAN HEATER
LP	LOW PRESSURE SWITCH
LS(x)	LIMIT SWITCH
IGN	SPARK IGNITION
IND	INDUCER
MEVAP	MOTOR, EVAP
MCOND	MOTOR, CONDENSING
OLP	OVERLOAD PROTECTION
PD(x)	POWER DISTRIBUTION BLOCK
PS(x)	PRESSURE SWITCH
Px	PLUG(s)
RO	ROLL OUT SWITCH
Sfp(x)	FREEZE PROTECT SWITCH
SQ(x)	SEQUENCER(S)
TS	TERMINAL STRIP

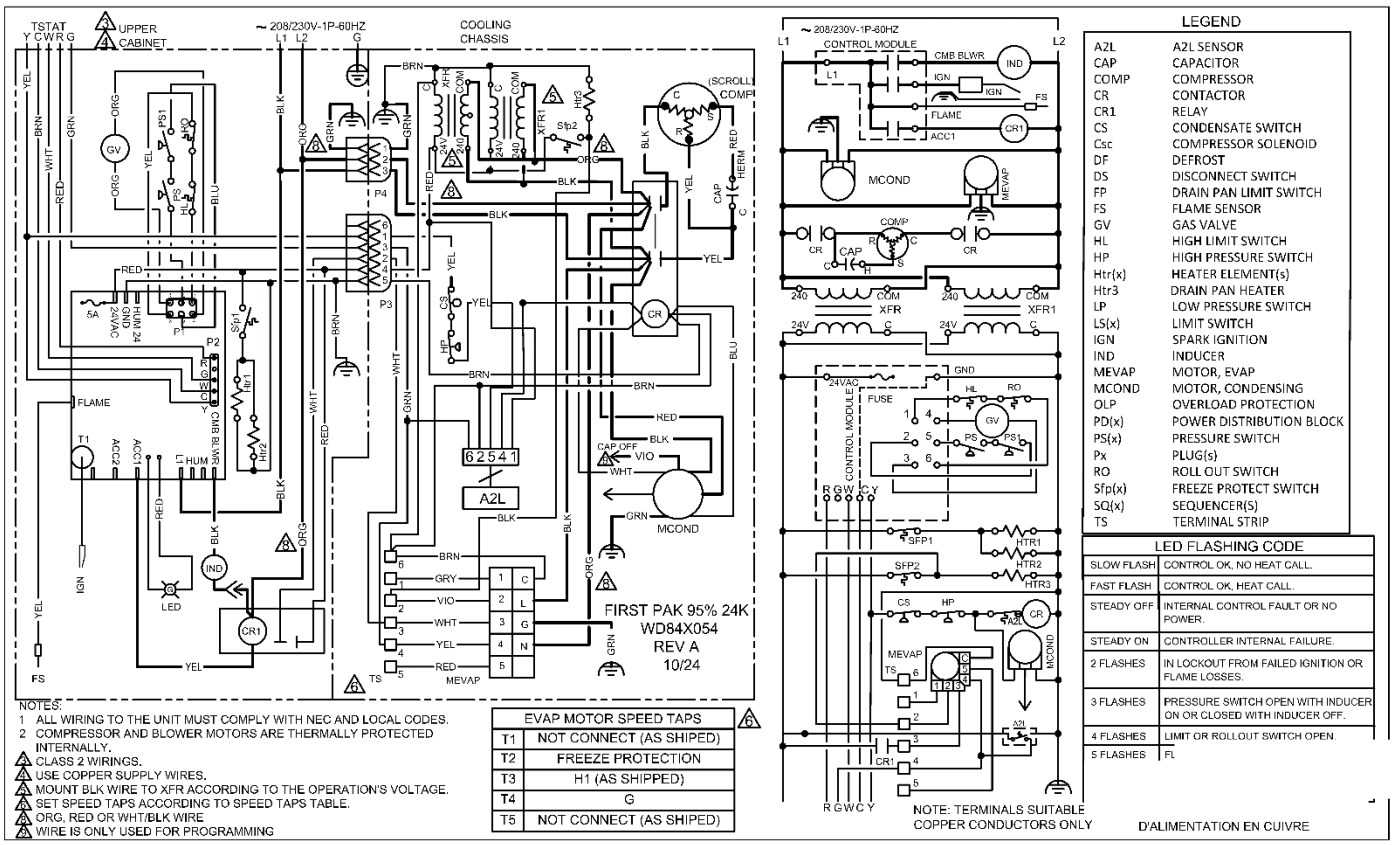
LED FLASHING CODE	
SLOW FLASH	CONTROL OK, NO HEAT CALL.
FAST FLASH	CONTROL OK, HEAT CALL.
STEADY OFF	INTERNAL CONTROL FAULT OR NO POWER.
STEADY ON	CONTROLLER INTERNAL FAILURE.
2 FLASHES	IN LOCKOUT FROM FAILED IGNITION OR FLAME LOSSES.
3 FLASHES	PRESSURE SWITCH OPEN WITH INDUCER ON OR CLOSED WITH INDUCER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

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 BLK WIRE TO XFR ACCORDING TO THE OPERATION'S VOLTAGE.
⚠6 SET SPEED TAPS ACCORDING TO SPEED TAPS TABLE.
⚠7 ORG, RED OR WHT/BLK WIRE
⚠8 WIRE IS ONLY USED FOR PROGRAMMING

EVAP MOTOR SPEED TAPS	
T1	NOT CONNECT (AS SHIPED)
T2	FREEZE PROTECTION
T3	H1 (AS SHIPPED)
T4	G
T5	NOT CONNECT (AS SHIPED)

REMARQUE: UTILISER DES FILS D'ALIMENTATION EN CUIVRE

NOTE: TERMINALS SUITABLE FOR COPPER CONDUCTORS ONLY



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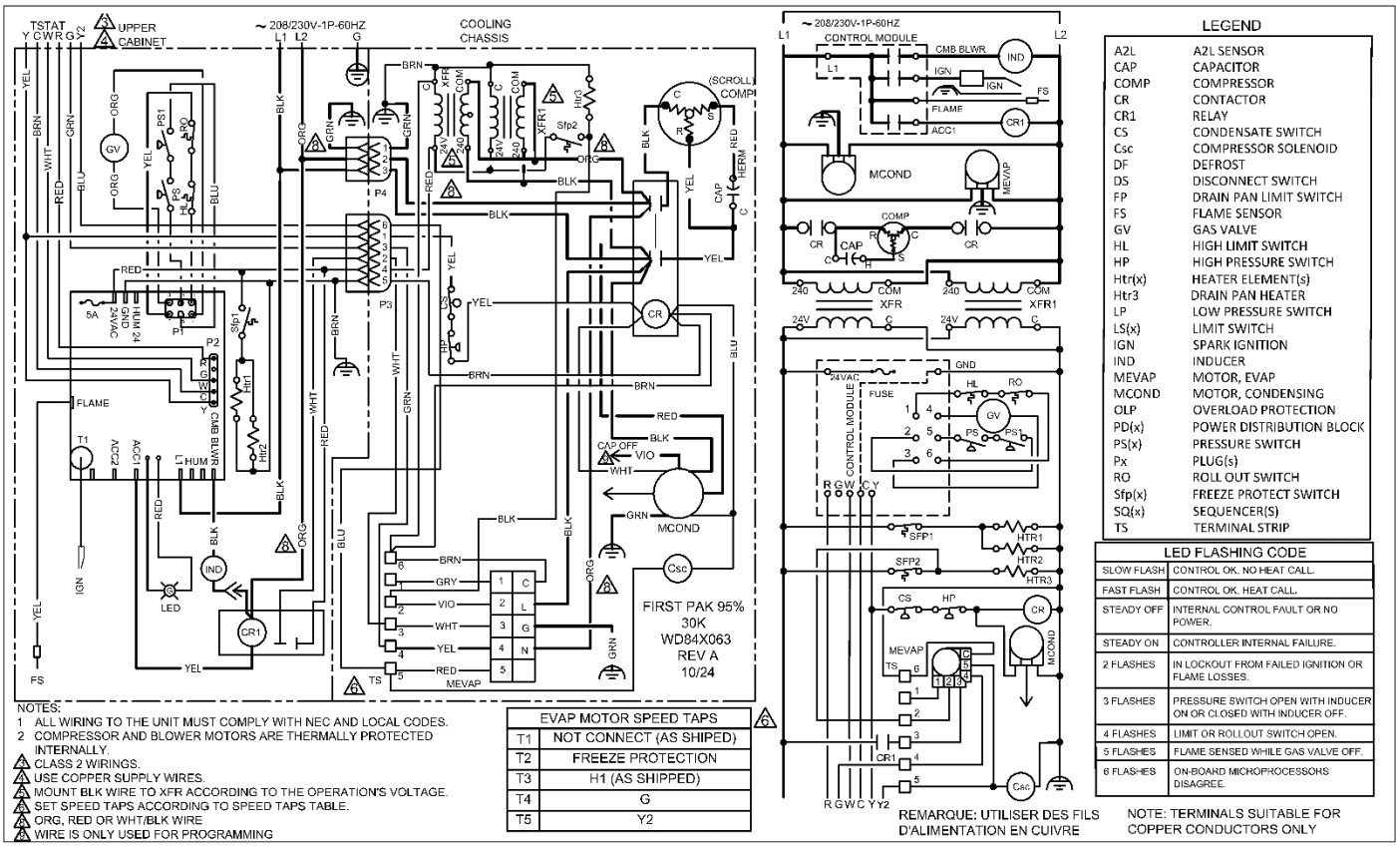
NOTE: TERMINALS SUITABLE FOR COPPER CONDUCTORS ONLY

D'ALIMENTATION EN CUIVRE

WIRING DIAGRAMS CONTINUED



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T4	G
T5	Y2

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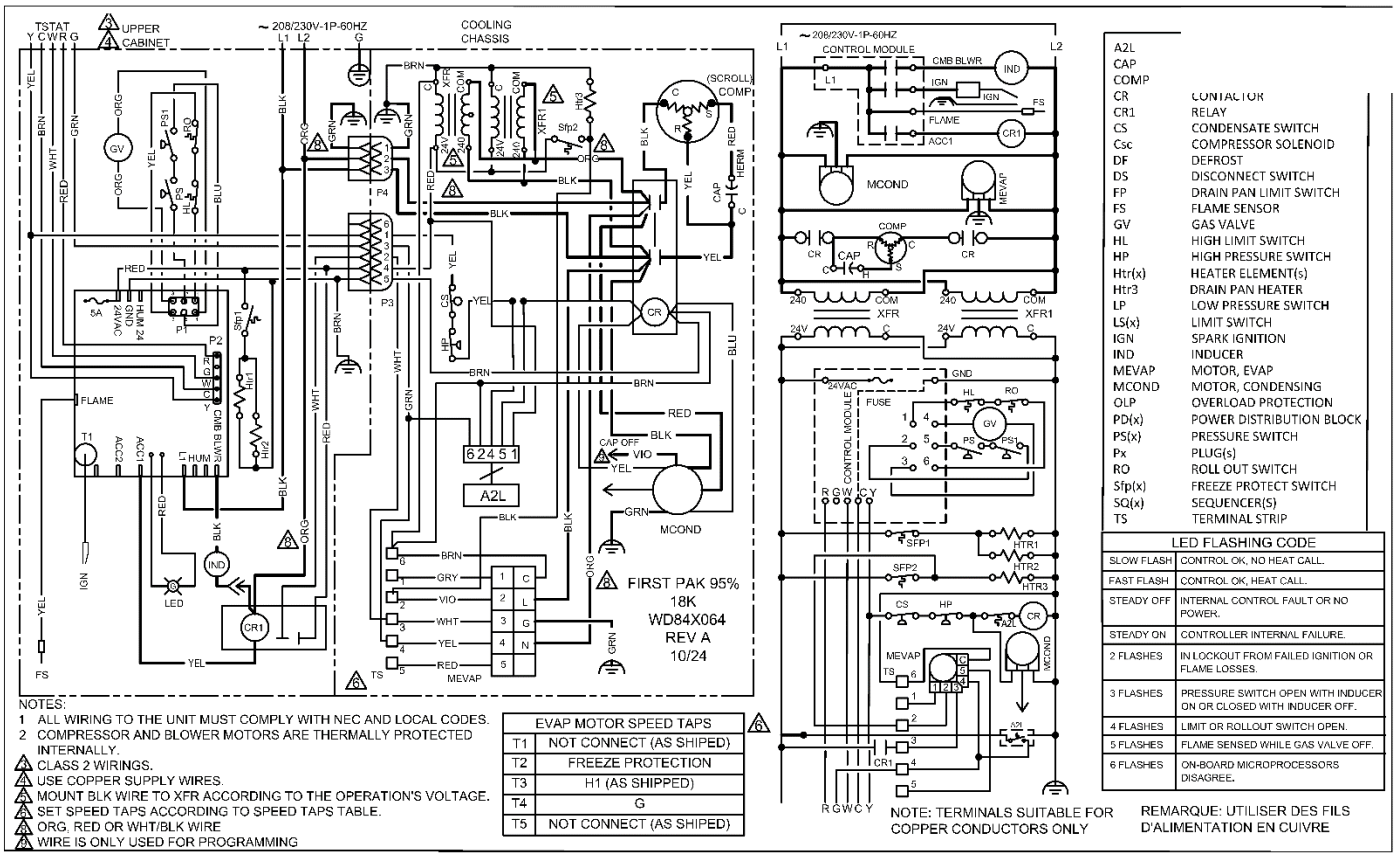

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REMARQUE: UTILISER DES FILS D'ALIMENTATION EN CUIVRE

CIRCUIT SCHEMATIC

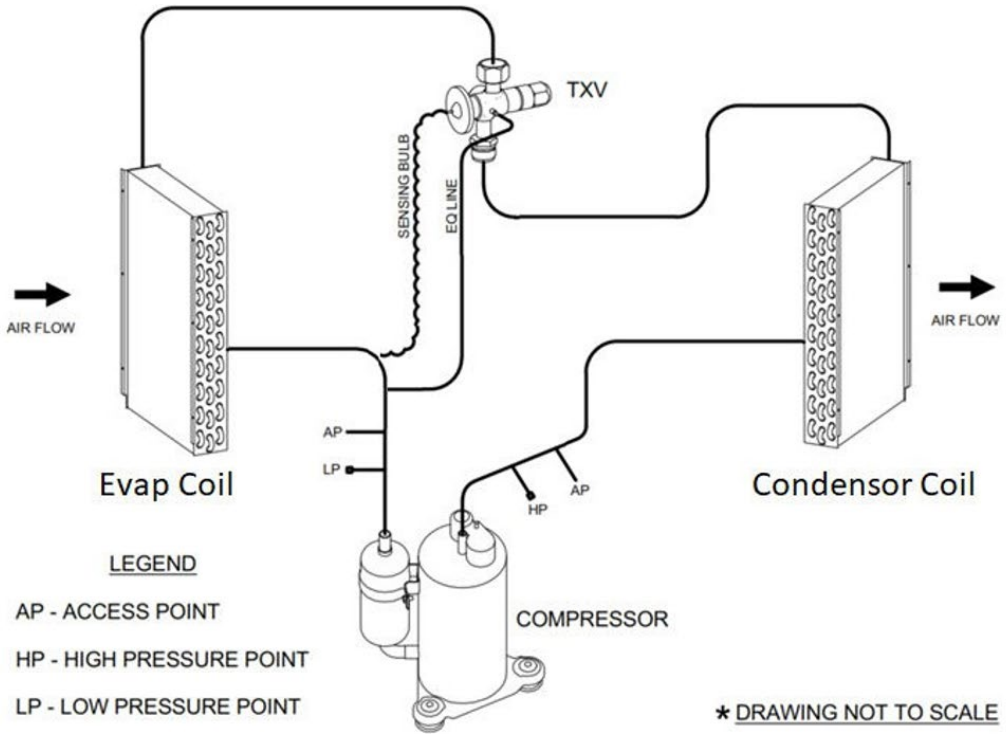

Figure 32 Circuit Diagram

STARTUP INSTRUCTIONS

PRE STARTUP CHECKS:

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 dat.
2. Ensure the unit properly grounded
3. With the power off power off, check blower wheel rotates freely
4. Ensure unit will be accessible for servicing.
5. Ensure all condensate lines are 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 connection 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.

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 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.

STARTUP INSTRUCTIONS CONTINUED

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 0.5 cu/ft., 1cu/ft., or the 2cu/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.

Gas Meter Clocking Table

GAS METER CLOCKING CHART			
MODEL	SECONDS FOR ONE REVOLUTION		
	0.5 CU/FT	1 CU/FT	2 CU/FT
FPG22	82	164	328
FPG33	55	109	218
FPG44	41	82	164
FPG55	33	65	130

TABLE 11

Example of input rate calculation using the typical heating valve 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 0.5 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 seconds recorded for one revolution by two before using the formula.

STARTUP & PERFORMANCE CHECKLIST INSTRUCTIONS

The warranty may be void unless the FIGURE 49 - Startup and Performance Checklist & FIGURE 50 – 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
	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 / louvers
	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 12- Gas Heat Troubleshooting Table

TROUBLESHOOTING CONTINUED

HEATING

Step 1	Thermostat calls for heat by energizing "W" terminal with 24 volts a/c
Expected Operation	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 of failure:

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
Expected Operation	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 of failure:

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
Expected Operation	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 of failure:

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
Expected Operation	The pressure switch must prove that the draft inducer is running & that adequate negative pressure is present in the heat exchanger.

Possible Causes of failure:

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
Expected Operation	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 of failure:

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)
Expected Operation	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 of failure:

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
Expected Operation	Flame must be sensed by the control board flame rectification system to maintain gas valve operations

Possible Causes of failure:

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
Expected Operation	After 30 seconds of burner operation the control board energizes the indoor blower motor

Possible Causes of failure:

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
Expected Operation	Heat cycle continues until the room thermostat temperature set point is met

Possible Causes of failure:

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
Expected Operation	The room thermostat will end the request for heat & de-energize the “W” terminal of the control board

Possible Causes of failure:

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

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.
REFRIGERANT SENSOR		For units over 4lbs, an active refrigerant leak will/faulty sensor will disable the compressor operation. Verify absence of refrigerant leak and replace sensor.
A2L SENSOR STATIS LIGHT	Solid Green	Sensor is in startup mode
	Blinking Green	Sensor is in normal operation
	Solid Red	Sensor has detected a leak and is in mitigation mode
	Blinking Red	Sensor fault, unit compressor will not energize and fan will be continuous

Table 13 – Cooling Troubleshooting Table

OPERATION & MAINTENANCE – HEATING

To ensure maximum performance and service life of equipment, a formal schedule of regular preventative maintenance must be established and adhered to. Failure to establish and perform preventative maintenance program can void the manufactures warranty

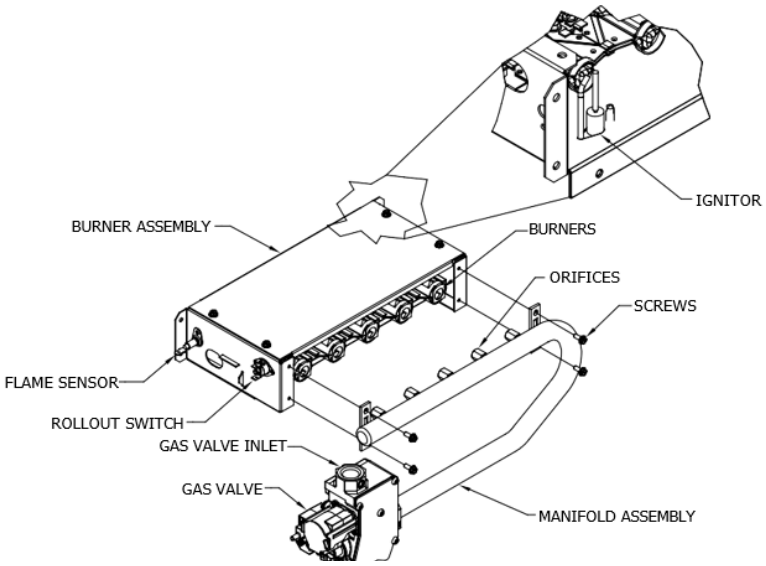

Figure 33 Burner Components

OPERATION & MAINTENANCE – 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 in place and free from obstructions.
2- The return-air duct connection(s) is physically sound, is sealed to the furnace casing, and terminates outside the space containing the furnace.
3- The physical support of the furnace is sound without sagging, cracks, or gaps.
4- There are no obvious signs of deterioration of the furnace.
5- 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 41 - Burner Flames below).

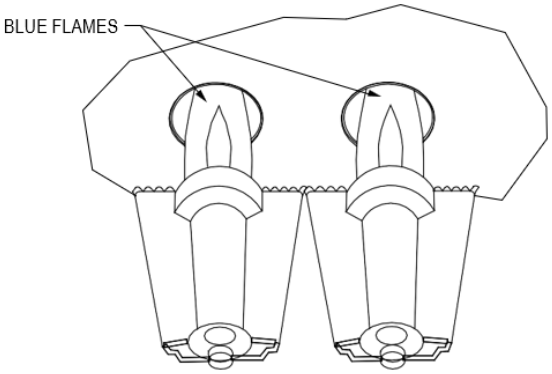

Figure 34 Burner Flames

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. The combustion air proving switch is wired in series with the drain proving switch. Check electrical and tubing connections annually.

DRAIN PROVING SWITCH

The drain proving switch verifies draining of condensation produced by the combustion process. The drain proving switch is wired in series with the combustion air proving switch. Check electrical connections annually.

FLAME ROLLOUT 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 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. Check electrical connections annually.

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 HEAT CONDENSATE DRAIN & TRAP

The heating condensate drain trap receives the water created by the combustion process. Water is carried to the trap by a drain tube which runs from the heat exchanger collector box to the drain trap located in the cooling chassis behind the evaporator coil. The trap outlet tube runs along the evaporator coil to a fitting on the right side of the cabinet where a field drain connection disposes of the water gas burners. The drain tubing and trap should be flushed annually with clear water

OPERATION & MAINTENANCE – HEATING CONTINUED

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. Check electrical connections annually.

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. Check electrical connections annually.

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.

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.

FLUE PIPE

Check that flue is in place, unobstructed, free from leaks, termination screen is in place and unobstructed.

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, louver, 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

As shipped, FPG*9* units may be installed at altitudes up to 4,500 ft.

For applications with altitudes between 4,501 – 10,000 reference IOM 8408 and KIT no. 9KHiAlt95.

SPECIAL NOTES FOR EXTREMELY COLD WEATHER AREAS

Periodically check the unit exterior louver for ice that may form and obstruct the flue and combustion air inlet.

OPERATION & MAINTENANCE – HEATING CONTINUED

HEATING MODULE REMOVAL

WARNING

Always wear eye protection.

- When fan coil is operating, some components are operating at high speeds. Do not touch rotating items with any object
.• Return and secure all electrical and service access panels in their proper place.
- Clear surrounding area of all tools, equipment and debris.
- Check the entire unit to ensure its cleanliness.

The entire gas heat section may be removed as a unit for service if required.

1. Turn off electrical power to furnace and disconnect low and high voltage field wiring at unit.
2. Remove outer and inner heating access panels and the control access panel
3. FIGURE 40 – Heating Access Panel Removal
4. Remove gas valve bracket. See FIGURE 39- Removal of Gas Valve Bracket
5. Unplug mating harness connectors for low voltage and high voltage in the control section FIGURE 46- Line Voltage Connector, FIGURE 47- Low Voltage Connector.
6. Release the low and high voltage connector housings from the cabinet.
7. Remove screws from Green and Brown Chassis ground wires.
8. Disconnect gas union and necessary piping to allow heat section module to slide out of cabinet.
9. Loosen thumb screw gear clamp connection of flue pipe in vent-drain coupling.
10. Remove drain tube connection from bottom of collector box. Gently pull & twist the drain tube away from the collector box. Slide the freeze protection heater off of the drain tube.
11. Remove the drain tube connection from the top of the drain trap by gently pulling up with a twisting motion.

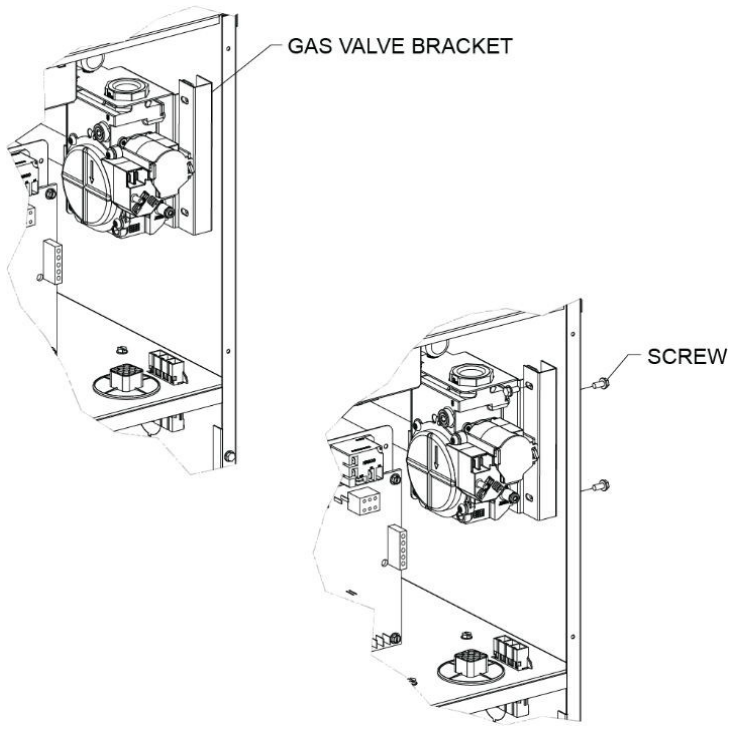

Figure 35 Removal of Gas Valve Bracket

OPERATION & MAINTENANCE – HEATING CONTINUED

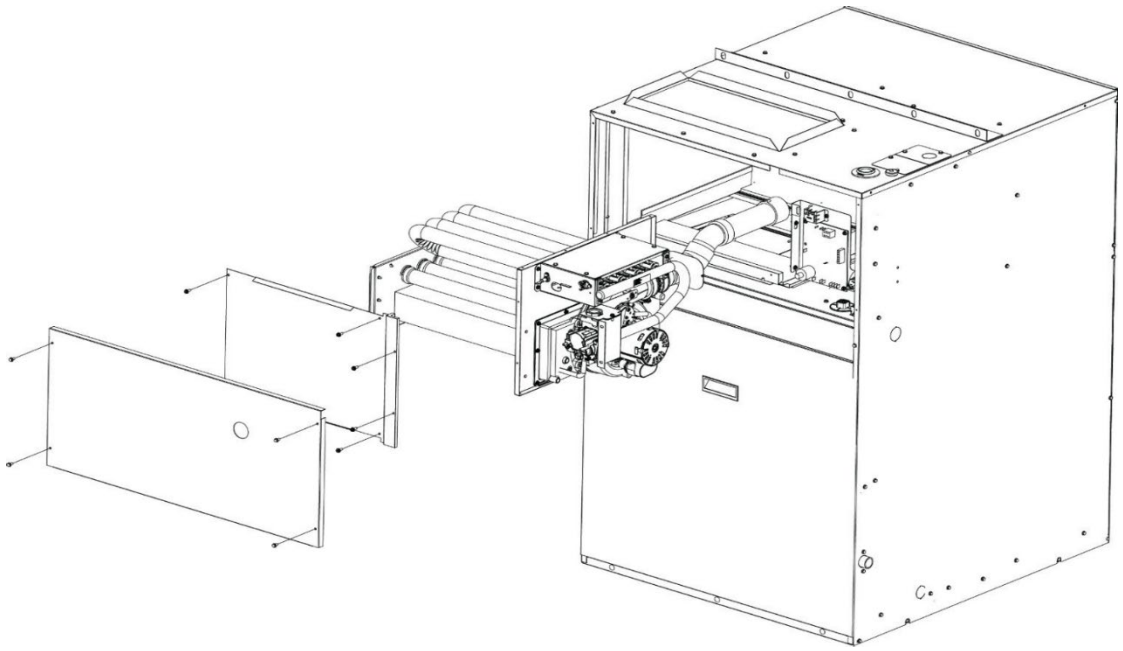

Figure 36 Heating Access Panel Removal

AIR CONDITIONING SYSTEM TROUBLE SHOOTING

Two gauge ports are provided for sealed system air conditioning access without sliding out the air conditioning chassis. This enables service personnel to quickly read low side and high side air conditioning system operating pressures during routine maintenance checks or troubleshooting. (See Figure 41)

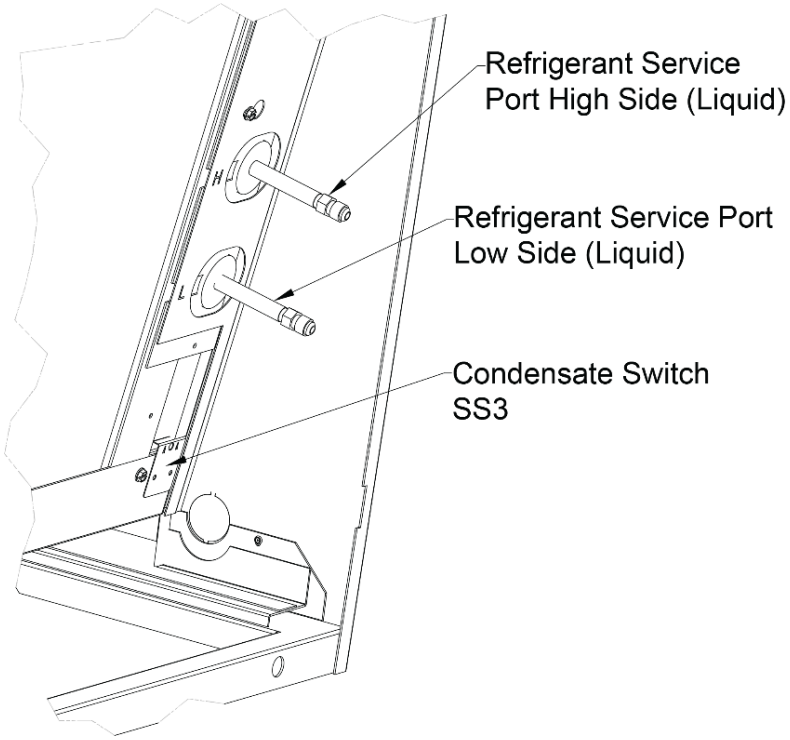

Figure 37 Refrigeration Pressure Ports

OPERATION & MAINTENANCE – COOLING CONTINUED

WARNING

IMPROPER HANDLING OF REFRIGERANTS CAN CAUSE INJURY, EXPLOSION AND DEATH

It is illegal to release refrigerant into the atmosphere. Refrigerant released into an enclosed space will displace oxygen causing unconsciousness and death.

- If an indoor refrigerant leak is suspected, thoroughly ventilate the area before beginning any work
- DO NOT purge or allow refrigerant to be released into an interior space
- Contact with liquid refrigerant can cause frostbite and blindness. Avoid skin contact with liquid refrigerant, wear goggles and gloves when working with refrigerants. Seek medical help immediately if any refrigerant contact with skin or eyes occurs
- Never burn refrigerant as highly toxic gas will be produced
- Only EPA certified technicians should handle refrigerants.
- In Canada technicians must be ODP / ODS certified to handle refrigerants
- Follow all EPA regulations

WARNING

Explosion risk, recover refrigerant only in a cylinder designed and intended for this purpose

- Do not use a damaged cylinder
- Do not apply flame or excessive heat to a refrigerant cylinder
- Do not fill a refrigerant cylinder to more than 80% of its capacity
- Do not use a refrigerant cylinder for anything other than its designed and intended purpose
- Do not use an expired refrigerant cylinder
- Use recovery equipment designed to handle the refrigerant being recovered
- Earth-ground refrigerant cylinders before using

NOTE

All air conditioning components can be serviced in the chassis

NOTE

Remove the side panel to service the TXV.

WARNING

Failure to follow this warning could result in personal injury or death. Recover all refrigerant before attempting a sealed air conditioning system repair. Recover all refrigerant before final unit disposal. Use all service ports and position all refrigerant flow–control devices open, including expansion valves and solenoid valves.

WARNING

FIRE OR EXPLOSION HAZARD

FIRE OR EXPLOSION HAZARD

Failure to following this warning could result in personal injury, death and/or property damage.

Do not attempt any sealed system repair without first recovering the entire refrigerant charge. R-454B refrigerant and oil mixture could ignite in the presence of a brazing torch flame. Completely recover the refrigerant charge using both the high and low sides of the system and purge the sealed system with nitrogen before brazing any component or tubing.

WARNING

Do not supply power to unit with the compressor terminal box cover removed

WARNING

When soldering and brazing, 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.

WARNING

Do not exceed the maximum operating pressure listed on the unit rating plate.

OPERATION & MAINTENANCE – COOLING CONTINUED

REFRIGERANT CHARGE

First-Pak units are factory charged with refrigerant. All First-Pak units use an adjustable thermostatic expansion valve (TXV) to control refrigerant flow to the evaporator coil. Do not adjust the TXV unless an evaluation of the system as described below indicates it is necessary. Superheat is increased (decrease refrigerant flow) by turning the TXV stem clockwise, turning the stem counter-clockwise will decrease superheat (increase refrigerant flow). Ideal conditions for checking refrigerant charge in cooling mode exist when the outdoor temperature is above 70°F (21° C) and indoor temperature is between 70°F (21°C) & 80°F (26.7° C).

PARTIAL REFRIGERANT CHARGE

Total refrigerant charge is listed on the unit rating plate. For partial system charging, the subcooling and superheat method can be used to make small refrigerant charge adjustments. Optionally, the entire refrigerant charge can be recovered and weighed back in per the total system charge listed on the rating plate.

To check the refrigerant charge, actual subcooling & superheat must be determined.

Allow the unit to operate in cooling mode for 15 minutes before taking readings. Attach refrigerant gauges to the suction line and liquid line access ports.

Subcooling

1. Place an accurate temperature sensor on the liquid line as close as practical to the TXV inlet. Insulate the temperature sensor from ambient to assure an accurate line temperature reading.

2. Record the liquid line temperature

3. Record the saturated temperature on your liquid line gauge that corresponds to the pressure shown on your gauge.

Actual Subcooling = saturated liquid line temperature - liquid line temperature

Superheat

1. Place an accurate temperature sensor on the suction line as close as practical to the compressor. Insulate the temperature sensor from ambient to assure an accurate line temperature reading

2. Record the suction line temperature

3. Record the saturated temperature on your suction line gauge that corresponds to the pressure shown on your gauge

Actual superheat = suction line temperature - saturated suction temperature

Compare your actual subcooling and superheat to the target subcooling and superheat.

If subcooling and superheat are both low, adjust the TXV stem clockwise 1/4 turn. Allow the system to stabilize before re-checking.

If subcooling is low and superheat is high, add a small amount of refrigerant. Allow the system to stabilize before re-checking.

If subcooling and superheat are both high, adjust the TXV stem counter-clockwise ¼ turn. Allow the system to stabilize before re-checking.

If subcooling is high and superheat is low, adjust the TXV stem 1/4 turn clockwise. Recover a small amount of refrigerant. Allow the system to stabilize before re-checking.

Cooling Capacity	12K	18K	24K	30K
Subcooling	8	8	16	10
Superheat at coil	14	7	9	8
Superheat at compressor	17	20	16	10

OPERATION & MAINTENANCE – COOLING CONTINUED

AIR CONDITIONER MODULE REMOVAL

The air-conditioning chassis may be removed as a unit for service if required. Disconnect all electrical power to the unit.

1. Remove screws (2) from controls cover and remove panel. See FIGURE 42 – Removal of Control Cover.
2. Remove power from unit.

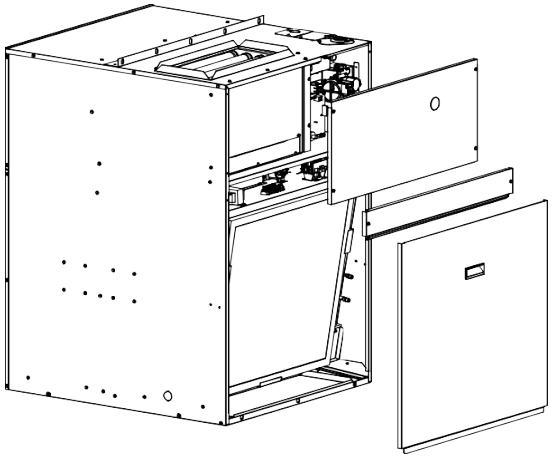

Figure 38 Removal of Control Cover

3. Disconnect low voltage (6 pin) & line voltage (3 pin) harness connectors by pressing on the release tabs and using a downward motion (FIGURE 45 - Line Voltage Connector (3 Pin) & FIGURE 46 – Low Voltage Connector (6 pin)).
4. Disconnect drain tubes from the top of heating condensate trap with long nose pliers (FIGURE 43 – Drain Tube Disconnection)
5. Disconnect the heating condensate drain from the side of the cabinet by removing screws from the bracket and separating from the field installed drain if necessary

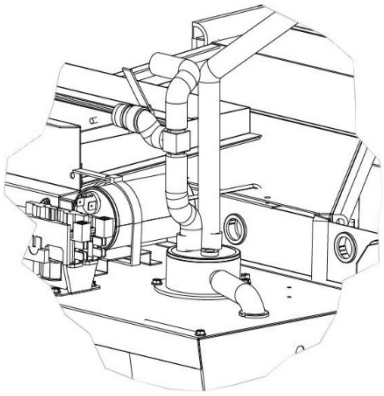

Figure 43 Drain Tube Disconnection

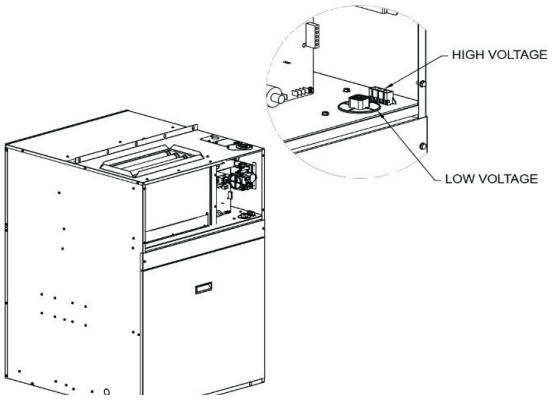

Figure 44 Electrical Power Disconnected

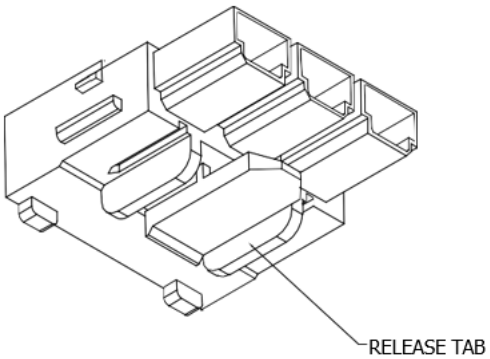

Figure 45 Line Voltage Connector (3 Pin)

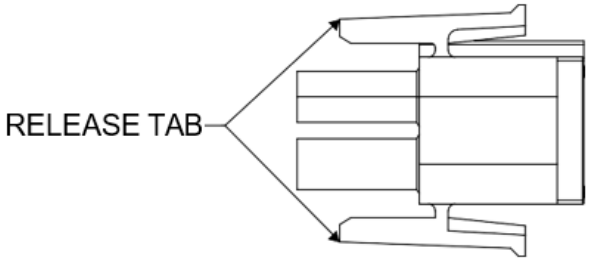

Figure 46 Low Voltage Connector (6 Pin)

OPERATION & MAINTENANCE – COOLING CONTINUED

6. Slide-out air conditioning chassis FIGURE 48 – Slide Out Chassis
7. Side panel can be removed from the evaporator section to service the TXV.

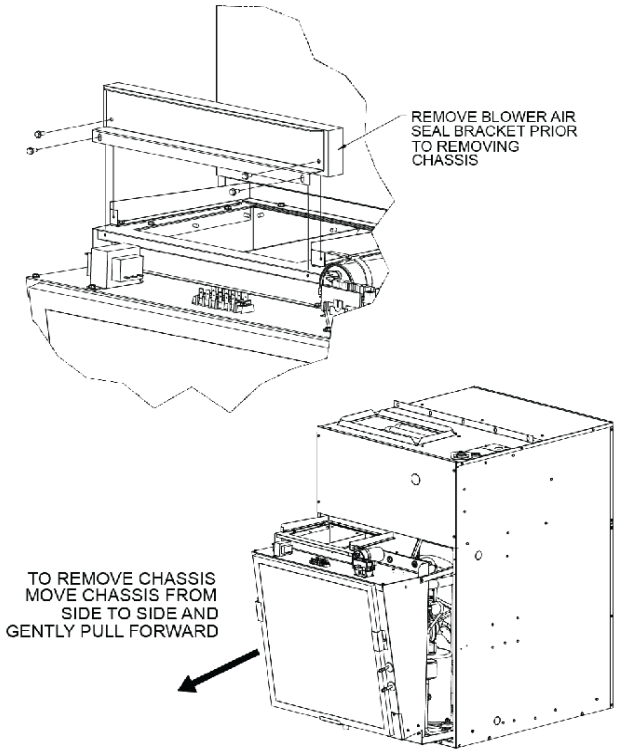

Figure 47 Slide Out Chassis

NOTE

All air conditioning components can be serviced in the chassis

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. Reconnect high & low voltage harnesses
4. Reconnect heating condensate drain tubes to trap inlet
5. Reconnect heating condensate drain to the side of the cabinet. Reconnect / repair any connections necessary external to the cabinet

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. A QUALIFIED service agency should perform this service. A sealed refrigerant system normally requires no maintenance since it is closed and self-contained.

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 the AIR CONDITIONER MODULE REMOVAL Section

OPERATION & MAINTENANCE – COOLING CONTINUED

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

WARNING

FIRE OR EXPLOSION HAZARD

FIRE OR EXPLOSION HAZARD

Failure to following this warning could result in personal injury, death and/or property damage.

Do not use flames or any potential ignition sources to leak check refrigerant tubing or components.

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 contaminates 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 mild surfactant such as Calgon to remove the oils left by manufacturing processes.

OPERATION & MAINTENANCE CONTINUED

Compressor bearing products designed for A2L refrigerants may come equipped with a factory installed refrigerant leak detection system. If the sensor is faulty, or disconnected, the appliance will not properly function.
False ceilings or drop ceilings may be used as a return air plenum if a refrigerant detection system is provided in the appliance and any external connections are also provided with a sensor immediately below the return air plenum duct joint.

QUALIFICATION OF WORKERS

Service shall only be performed by qualified technicians, certified by national training organizations or manufacturers that are accredited to teach the relevant national competency standards that may be set in legislation. Competence to properly service the appliance should be documented by a certificate.

CHECKS TO THE WORK AREA

Prior to beginning work on the appliance, safety checks are necessary to ensure that the risk of ignition of released gasses is minimized. Work shall be undertaken under a controlled procedure so as to minimize the risk of a flammable gas or vapor being present while the work is being performed.
All maintenance staff and others working in the local area shall be instructed on the nature of work being carried out. Work in confined spaces shall be avoided.

CHECKING FOR PRESENCE OF REFRIGERANT

The area shall be checked with an appropriate refrigerant detector prior to and during work, to ensure the technician is aware of potentially toxic or flammable atmospheres. Ensure that the leak detection equipment being used is suitable for use with all applicable refrigerants, i.e. non-sparking, adequately sealed or intrinsically safe.
If any hot work is to be conducted on the refrigerating equipment or any associated parts, appropriate fire extinguishing equipment shall be available to hand. Have a dry powder or CO2 fire extinguisher adjacent to the charging area.
No person carrying out work in relation to a REFRIGERATING SYSTEM which involves exposing any such a pipe work shall use any sources of ignition in manner that it may lead to the risk of fire or explosion.
All possible ignition sources, including cigarette smoking, should be kept sufficiently far away from the site of installation, repairing, removing and disposal, during which refrigerant can possibly be released to the surrounding space. Prior to work taking place, the area around the equipment is to be surveyed to make sure that there are no flammable hazards or ignition risks. “NO SMOKING” signs shall be displayed.

VENTILATED AREA

Ensure that the area is in the open or that it is adequately ventilated before breaking into the system or conducting any hot work. A degree of ventilation shall continue during the period that the work is carried out. The ventilation should safely disperse any released refrigerant and preferably expel it externally into the atmosphere.

CHECKS TO THE REFREIGERATING EQUIPMENT

Where electrical components are being changed, they shall be fit for the purpose and to the correct specification. At all times the manufacturer’s maintenance and service guidelines shall be followed. If in doubt, consult the manufacturer’s technical department for assistance.

The following checks shall be applied to installations using FLAMMANLE REFRIGERANTS:

- The actual REFRIGERANT CHARGE is in accordance with the room size within which the refrigerant containing parts are installed;
- The ventilation machinery and outlets are operating adequately and are not obstructed;
- Marking to the equipment continues to be visible and legible. Markings and signs that are illegible shall be corrected;
- Refrigerating pipe or components are installed in a position where they are unlikely to be exposed to any substance which may corrode refrigerant containing components, unless the components are constructed of materials which are inherently resistant to being corroded or are suitably protected against being so corroded.

OPERATION & MAINTENANCE CONTINUED

CHECKS TO ELECTRICAL DEVICES AND SEALED ELECTRICAL COMPONENTS

Repair and maintenance to electrical components shall include initial safety checks and component inspection procedures. If a fault exists that could compromise safety, then no electrical supply shall be connected to the circuit until it is satisfactorily dealt with. If the fault cannot be corrected immediately but it is necessary to continue operation, an adequate temporary solution shall be used. This shall be reported to the owner of the equipment so all parties are advised.
Initial Safety Checks shall include:

- That capacitors are discharged: this shall be done in a safe manner to avoid possibility of sparking;
- That no live electrical components and wiring are exposed while charging, recovering or purging the system;
- That there is continuity of earth bonding.

Sealed electrical components shall be replaced in the event of damage or malfunction.

CABLING

Check that cabling will not be subject to wear, corrosion, excessive pressure, vibration, sharp edges or any other adverse environmental effects. The check shall also take into account the effects of aging or continual vibration from sources such as compressors or fans.

DETECTION OF FLAMMABLE REFRIGERANTS

Under no circumstances shall potential sources of ignition be used in the searching for or detection of refrigerant leaks. A halide torch (or any other detector using a naked flame) shall not be used.
Electronic leak detectors may be used to detect refrigerant leaks but, in the case of FLAMMABLE REFRIGERANTS, the sensitivity may not be adequate, or may need re-calibration. (Detection equipment shall be calibrated in a refrigerant-free area.) Ensure that the detector is not a potential source of ignition and is suitable for the refrigerant used. Leak detection equipment shall be set at a percentage of the LFL of the refrigerant and shall be calibrated to the refrigerant employed, and the appropriate percentage of gas (25 % maximum) is confirmed.

Leak detection fluids (such as the bubble method or fluorescent method agents) are also suitable for use with most refrigerants but the use of detergents containing chlorine shall be avoided as the chlorine may react with the refrigerant and corrode the copper pipe-work.

If a leak is suspected, all naked flames shall be removed/extinguished. If a leakage of refrigerant is found which requires brazing, all of the refrigerant shall be recovered from the system, or isolated (by means of shut off valves) in a part of the system remote from the leak.

REMOVAL AND EVACUATION OF FLAMMABLE REFRIGERANTS

When breaking into the refrigerant circuit to make repairs – or for any other purpose – conventional procedures shall be used. However, for FLAMMABLE REFRIGERANTS it is important that best practice is followed since flammability is a consideration. The following procedure shall be adhered to:

- Remove refrigerant charge following local and national regulations
- Purge the circuit with inert gas (optional for A2L);
- Evacuate (optional for A2L)
- If using flame to open circuit, continuously flush system with an inert gas
- Open the circuit by cutting or brazing.

The refrigerant charge shall be recovered into the correct recovery cylinders if venting is not allowed by local and national codes. For appliances containing flammable refrigerants, the system shall be purged with oxygen-free nitrogen to render the appliance safe for flammable refrigerants. This process might need to be repeated several times. Compressed air or oxygen shall not be used for purging refrigerant systems.
For appliances containing flammable refrigerants, refrigerant purging shall be achieved by breaking the vacuum in the system with oxygen-free nitrogen and continuing until the working pressure is achieved, then venting to the atmosphere, and finally pulling down to a vacuum (optional for A2L). This process shall be repeated until no refrigerant is within the system (optional for A2L). When the final oxygen-free nitrogen charge is used, the system shall be vented down to atmospheric pressure to enable work to take place.
The outlet for the vacuum pump shall not be close to any potential ignition sources, and ventilation shall be available.

OPERATION & MAINTENANCE CONTINUED

CHARGING PROCEDURES

In addition to conventional charging procedures, the following requirements shall be followed.

- Ensure that contamination of different refrigerants does not occur when using charging equipment. Hoses or lines shall be as short as possible to minimize the amount of refrigerant contained in them.
- Cylinders shall be kept in an appropriate position according to the instructions.
- Ensure that the REFRIGERATING SYSTEM is earthed prior to charging the system with refrigerant.
- Label the system when charging is complete (if not already).
- Extreme care shall be taken not to overfill the REFRIGERATING SYSTEM.

Prior to recharging the system, it shall be pressure-tested with the appropriate purging gas. The system shall be leak-tested on completion of charging but prior to commissioning. A follow up leak test shall be carried out prior to leaving the site.

DECOMISSIONING

Before carrying out this procedure, it is essential that the technician is completely familiar with the equipment and all its detail. It is recommended good practice that all refrigerants are recovered safely. Prior to the task being carried out, an oil and refrigerant sample shall be taken in case analysis is required prior to re-use of recovered refrigerant. It is essential that electrical power is available before the task is commenced.

A. Become familiar with the equipment and its operation.
B. Isolate system electrically.
C. Before attempting the procedure, ensure that:
    a. mechanical handling equipment is available, if required, for handling refrigerant cylinders;
    b. all personal protective equipment is available and being used correctly;
    c. the recovery process is supervised at all times by a competent person;
    d. recovery equipment and cylinders conform to the appropriate standards.
D. Pump down refrigerant system, if possible.
E. If a vacuum is not possible, make a manifold so that refrigerant can be removed from various parts of the system.
F. Make sure that cylinder is situated on the scales before recovery takes place.
G. Start the recovery machine and operate in accordance with instructions.
H. Do not overfill cylinders (no more than 80 % volume liquid charge).
I. Do not exceed the maximum working pressure of the cylinder, even temporarily.
J. When the cylinders have been filled correctly and the process completed, make sure that the cylinders and the equipment are removed from site promptly and all isolation valves on the equipment are closed off.
K. Recovered refrigerant shall not be charged into another REFRIGERATING SYSTEM unless it has been cleaned and checked.

LABELING

Equipment Shall be labelled stating that it has been de-commissioned and emptied of refrigerant. The label shall be dated and signed. For appliances containing FLAMMABLE REFRIGERANTS, ensure that there are labels on the equipment stating that the equipment contains FLAMMABLE REFRIGERANT.

RECOVERY

When removing refrigerant from a system, either for servicing order commissioning, it is recommended good practice that all refrigerants are removed safely.
When transferring refrigerant into cylinders, ensure that only appropriate refrigerant recovery cylinders are employed. Ensure that the correct number of cylinders for holding the total system charge is available. All cylinders to be used are designated for the recovered refrigerant and labelled for that refrigerant (i.e. special cylinders for the recovery of refrigerant). Cylinders shall be complete with pressure-relief valve and associated shut-off valves in good working order. Empty recovery cylinders are evacuated and, if possible, cooled before recovery occurs.

The recovery equipment shall be in good working order with a set of instructions concerning the equipment that is at hand and shall be suitable for the recovery of the flammable refrigerant. If in doubt, the manufacturer should be consulted. In addition, a set of calibrated weighing scales shall be available and in good working order. Hoses shall be complete with leak- free disconnect couplings and in good condition

OPERATION & MAINTENANCE CONTINUED

The recovered refrigerant shall be processed according to local Legislation in the correct recovery cylinder, and the relevant waste transfer note arranged. Do not mix refrigerants in recovery units and especially not in cylinders.

If compressors or compressor oils are to be removed, ensure that they have been evacuated to an acceptable level to make certain that flammable refrigerant does not remain within the lubricant. The compressor body shall not be heated by an open flame or other ignition sources to accelerate this process. When oil is drained from a system, it shall be carried out safely

REFRIGERANT DETECTION SENSOR (RDS) INFORMATION

Refer to the appliance IOM for information regarding the minimum conditioned room requirements, and instructions for the RDS operation, installation, and wiring. Any field installed wiring connected to the RDS must be at least 18AWG and have minimum insulation thickness of 1.58mm or be protected from damage.

The RDS is not intended for service or repair. In the event of a sensor failure, the mitigation mode will engage and the sensor shall be replaced by removing the sensor and replacing it with a new sensor. Refrigerant sensors for refrigerant detection systems shall only be replaced with sensors specified by the appliance manufacturer.

DUCTING

If the appliance is connected via an air duct system to one or more rooms with A2L refrigerants is installed in a room with an area of less than the minimum as noted on the unit physical data table, or a minimum effective dispersal volume less than 18m^3(636 ft^3), the room shall be without continuously operating open flames (e.g. an operating gas appliance), or other potential ignition sources (such as an operating electric heater/ hot surface). A flame producing device may be installed in the same space if the device is provided with an effective flame arrest.

Auxiliary devices which may be a potential ignition source shall not be installed in the duct work. Potential ignition sources include hot surfaces with a temperature exceeding 430°C (806°F) and electric switching devices.

PIPING

Pipe-work including piping material, pipe routing, and installation shall include protection from physical damage in operation and service, and be in compliance with national and local codes and standards, such as AHRAE 15, ASHRAE 15.2, IAPMO uniform mechanical code, ICC International Mechanical Code, or CSA B52. All field joints shall be accessible for inspection prior to being covered or enclosed.

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

Return Air Temperature _____ DB _____ WB

Cooling Supply 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 48 Startup & Performance Checklist (1 of 2)

STARTUP & PERFORMANCE CHECKLIST

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 49 Startup & Performance Checklist (2 of 2)

NOTES

P.O. Box 270969 Dallas, TX 75227
www.firstco.com or www.ae-air.com