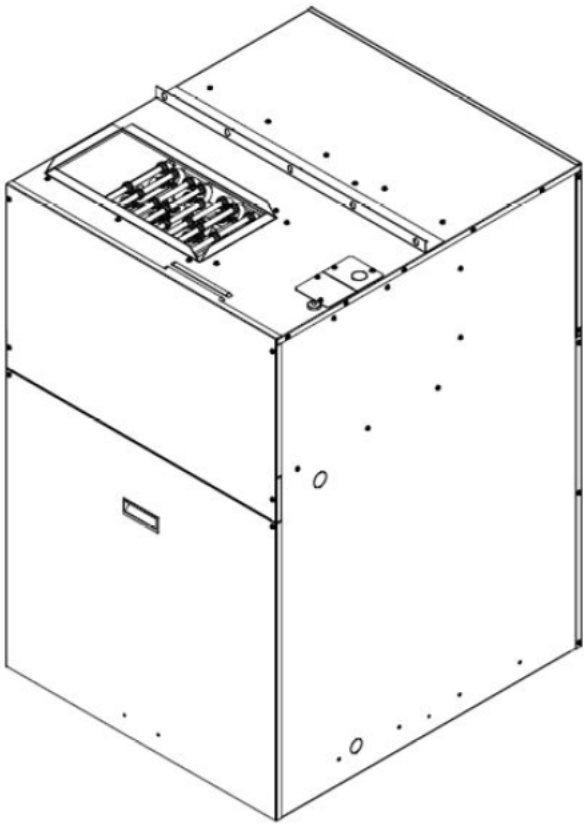
Installation, Operation, & Maintenance

IOM 8415
Rev. A 1/25

FPH SERIES
Vertical Packaged Heat Pump Unit W/ Electric Heat

FIRST-PAK® HP



ATTENTION:

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

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

COPYRIGHT

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

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

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.

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SAFETY CONSIDERATIONS

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

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

DANGER

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

WARNING

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

WARNING

ELECTRIC SHOCK HAZARD

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

CAUTION

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

IMPORTANT

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

NOTE

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

WARNING

FIRE OR EXPLOSION HAZARD

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

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

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

Verify proper operation after servicing.

SAFETY CONSIDERATIONS CONTINUED

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.

WARNING

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

WARNING

HIGH VOLTAGE!

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

CAUTION

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

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

WARNING

USE COPPER SUPPLY WIRES ONLY!

MODEL NOMENCLATURE

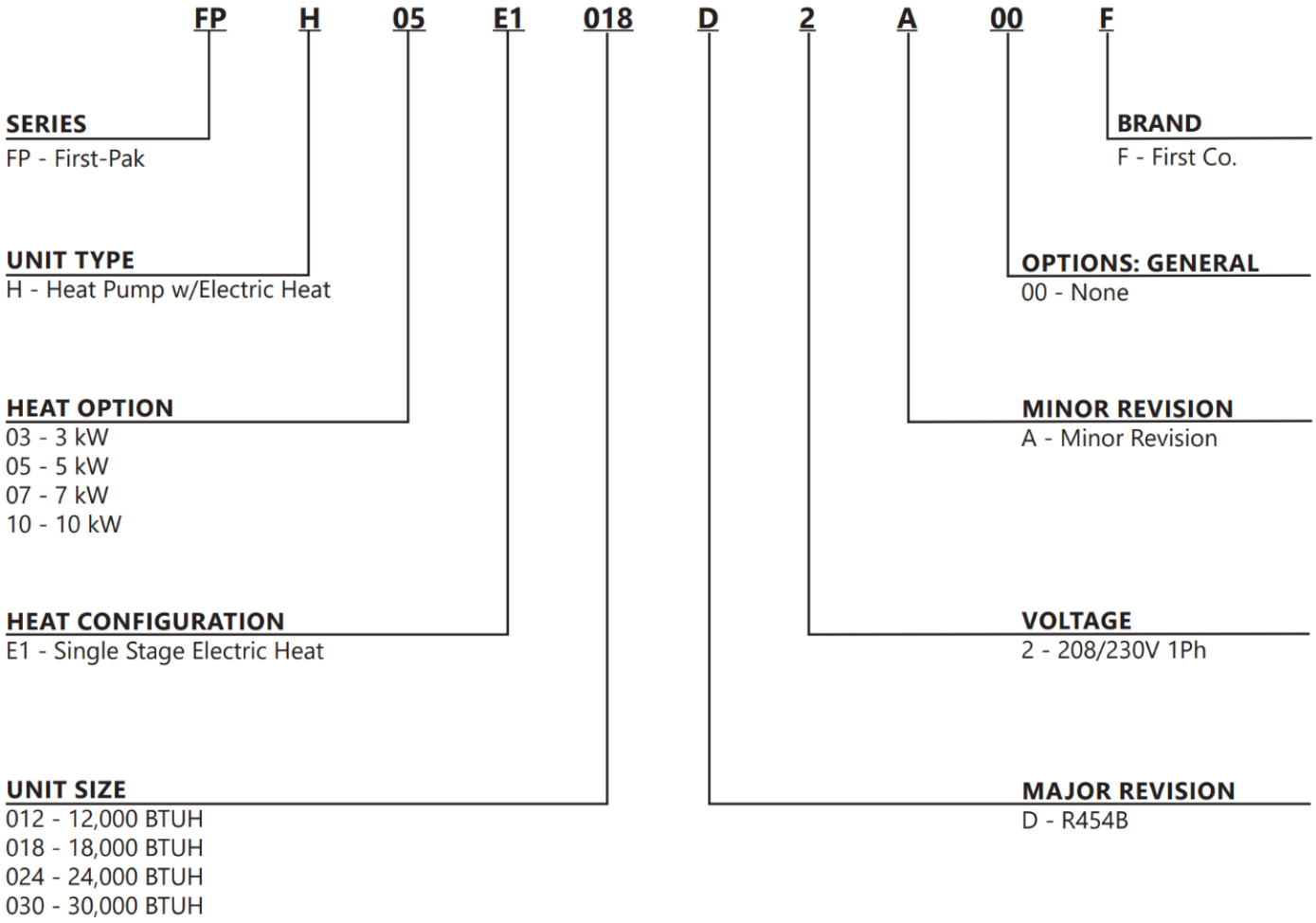


FIGURE 1 - MODEL NOMENCLATURE

UNIT DIMENSIONAL DATA

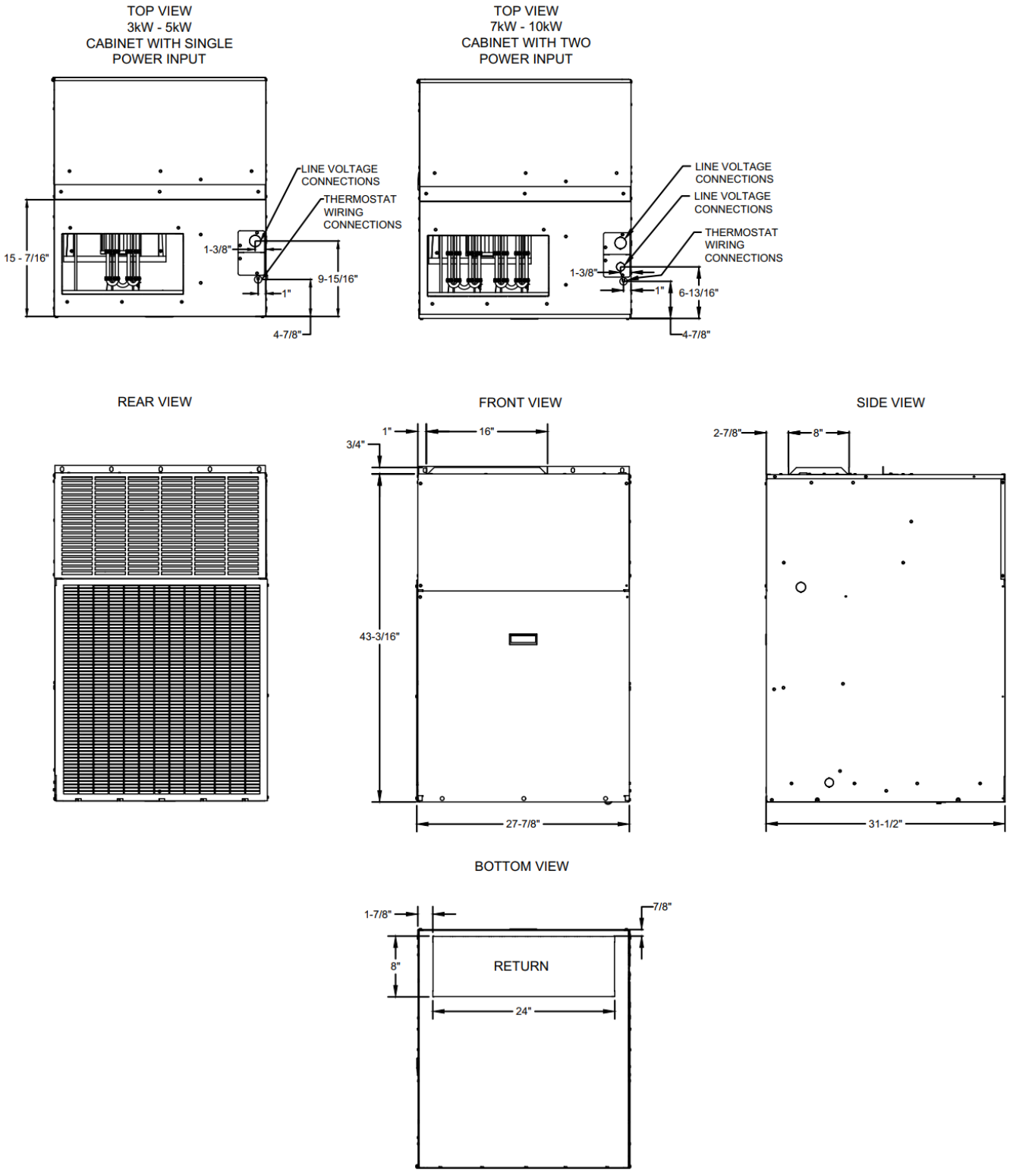


FIGURE 2 - Unit Dimensions

UNIT PHYSICAL DATA

PHYSICAL DATA							
FPH MODELS		FPH03E1012D	FPH05E1012D	FPH07E1012D	FPH05E1018D	FPH07E1018D	FPH10E1018D
UNIT INFORMATION							
Compressor Qty/Type		Rotary (1)	Rotary (1)	Rotary (1)	Scroll (1)	Scroll (1)	Scroll (1)
Factory Charge (R454B)	Lbs	4	4	4	4.375	4.375	4.375
	kg	1.81	1.81	1.81	1.98	1.98	1.98
Minimum Room Area	m^2	5.5	5.5	5.5	6	6	6
	Ft^2	58.9	58.9	58.9	64.4	64.4	64.4
Minimum Air Flow	CFM	108	108	108	118	118	118
	m^3/hr	183	183	183	201	201	201
Compressor Capacitor		35/370	35/370	35/370	35/370	35/370	35/370
Condenser Fan HP [kW]		1/5 [.15]	1/5 [.15]	1/5 [.15]	1/3 [.25]	1/3 [.25]	1/3 [.25]
Indoor Fan HP [kW]		1/4 [.17]	1/4 [.17]	1/4 [.17]	1/4 [.17]	1/3 [.25]	1/3 [.25]
Blower Size (D x W) in. [cm]		10 x 6 [25.4 x 15.24]					
Condenser Dimension (H x W) in. [cm]		26.46 x 22.25 [67.2 x 56.5]					
Evaporator Dimension (H x W) in. [cm]		23.15 x 22.25 [58.8 x 56.5]			24 x 22 [60.96 x 55.88]		
Filter Size (H x W) in. [cm]		24 x 24 [60.96 x 60.96]					
Electric Heater [kW] @240V		3	5	7(2x3.5kW)	5	7(2x3.5kW)	10(2x5kW)
Max. Static Pressure IWC [pa]		0.5 [125]					
A2L Mitigation		NO	NO	NO	YES	YES	YES
Operating Weight lb. [kg]		265 [120]	265 [120]	265 [120]	300 [136]	300 [136]	300 [136]
Shipping Weight lb. [kg]		295 [133]	295 [133]	295 [133]	330 [149]	330 [149]	330 [149]

TABLE - 1

UNIT PHYSICAL DATA (CONTINUED)

PHYSICAL DATA							
FPH MODELS		FPH05E1024D	FPH07E1024D	FPH10E1024D	FPH05E1030D	FPH07E1030D	FPH10E1030D
UNIT INFORMATION							
Compressor Qty/Type		Scroll (1)	Scroll (1)	Scroll (1)	Scroll (1)	Scroll (1)	Scroll (1)
Factory Charge (R454B)	Lbs	4	4	4	4.875	4.875	4.875
	kg	1.81	1.81	1.81	2.21	2.21	2.21
Minimum Room Area	m^2	5.5	5.5	5.5	6.7	6.7	6.7
	Ft^2	58.9	58.9	58.9	71.9	71.9	71.9
Minimum Air Flow	CFM	108	108	108	132	132	132
	m^3/hr	183	183	183	224	224	224
Compressor Capacitor		35/370	35/370	35/370	40/370	40/370	40/370
Condenser Fan HP [kW]		1/3 [.25]	1/3 [.25]	1/3 [.25]	1/3 [.25]	1/3 [.25]	1/3 [.25]
Indoor Fan HP [kW]		1/3 [.25]	1/2 [.37]	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]		26.46 x 22.25 [67.2 x 56.5]					
Evaporator Dimension (H x W) in. [cm]		24 x 22 [60.96 x 55.88]					
Filter Size (H x W) in. [cm]		24 x 24 [60.96 x 60.96]					
Electric Heater [kW] @240V		5	7(2x3.5kW)	10(2x5kW)	5	7(2x3.5kW)	10(2x5kW)
Max. Static Pressure IWC [pa]		0.5 [125]					
A2L Mitigation		NO	NO	NO	YES	YES	YES
Operating Weight lb. [kg]		305 [138]	305 [138]	305 [138]	310 [140]	310 [140]	310 [140]
Shipping Weight lb. [kg]		335 [151]	335 [151]	335 [151]	340 [153]	340 [153]	340 [153]

TABLE - 2

*Data is subject to change. Please verify most current information on www.firstco.com or www.AE-Air.com websites.

ELECTRICAL DATA

MODEL NUMBER	VOLTAGE-PH-HZ	COMPRESSOR		CONDENSER MOTOR		INDOOR MOTOR		MIN. CIRCUIT AMPACITY (MCA)				MAX. OVERCURRENT PROTECTION (MOP)				MIN. VOLTAGE	MAX. VOLTAGE
		RLA	LRA	FLA	HP	RLA	HP	CIRCUIT 1* (L1-L2)		CIRCUIT 2* (L3-L4)		CIRCUIT 1* (L1-L2)		CIRCUIT 2* (L3-L4)			
								240V	208V	240V	208V	240V	208V	240V	208V		
FPH03E1012C*	208/230-1-60	4.6	25	1.9	1/5	2.3	1/4	26	23	0	0	30	25	0	0	197	252
FPH05E1012C*	208/230-1-60	4.6	25	1.9	1/5	2.3	1/4	36	32	0	0	40	35	0	0	197	252
FPH07E1012C*	208/230-1-60	4.6	25	1.9	1/5	2.3	1/4	10	10	39	32	15	15	40	30	197	252
FPH05E1018C*	208/230-1-60	7.2	47	2.8	1/3	2.8	1/3	41	37	0	0	45	40	0	0	197	252
FPH07E1018C*	208/230-1-60	7.2	47	2.8	1/3	2.8	1/3	15	15	39	32	20	20	40	30	197	252
FPH10E1018C*	208/230-1-60	7.2	47	2.8	1/3	2.8	1/3	15	15	55	45	20	20	60	40	197	252
FPH05E1024C*	208/230-1-60	10.2	58	2.8	1/3	4.1	1/2	46	42	0	0	50	45	0	0	197	252
FPH07E1024C*	208/230-1-60	10.2	58	2.8	1/3	4.1	1/2	20	20	41	32	25	25	45	30	197	252
FPH10E1024C*	208/230-1-60	10.2	58	2.8	1/3	4.1	1/2	20	20	56	45	25	25	60	45	197	252
FPH05E1030C*	208/230-1-60	12.8	77	2.8	1/3	4.1	1/2	49	45	0	0	60	50	0	0	197	252
FPH07E1030C*	208/230-1-60	12.8	77	2.8	1/3	4.1	1/2	23	23	41	32	35	35	45	30	197	252
FPH10E1030C*	208/230-1-60	12.8	77	2.8	1/3	4.1	1/2	23	23	56	45	35	35	60	45	197	252

TABLE - 3

*. Circuit 1 and circuit 2 are separated power wires connecting to the unit. Refer to wiring diagram for details.

. Wire size should be determined in accordance with National Electrical Codes.

GENERAL INFORMATION

CAUTION

Do not operate this unit during building construction due to excessive airborne dust and debris. Do not operate this unit without an air filter in place. 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.

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

WARNING

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

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

WARNING

This heat pump is certified for through-the-wall indoor installation only. This heat pump 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

Unit Operating Range °F [°C]				
Condition	Cooling		Heating	
	Min	Max	Min	Max
Outdoor DB	60 [15.6]	115 [46.1]	5 [-15]	75 [23.8]
Indoor DB	60 [15.6]	90 [32.2]	50 [10]	80 [26.6]

Table 1 – Unit Operating Range

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

CAUTION

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

INTRODUCTION

The FIRST-PAK FPH heat pumps are self-contained packaged unit with supplemental electric heater for space constrained application. The unit design has been certified by Intertek Testing Services for compliance with the Standard of UL 60335-2-40 for Safety for Heating and Cooling Equipment. The FPH models are certified to be in compliance with the latest edition of AHRI Standard 210/240.

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

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

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.

DO NOT operate these units during the construction process. Mechanical components and filters could become clogged with dirt and debris, which can cause damage to the system and unit not function properly.
The manufacture does not warrant equipment subjected to abuse.

SHIPPING & PACKAGE LIST

NOTE

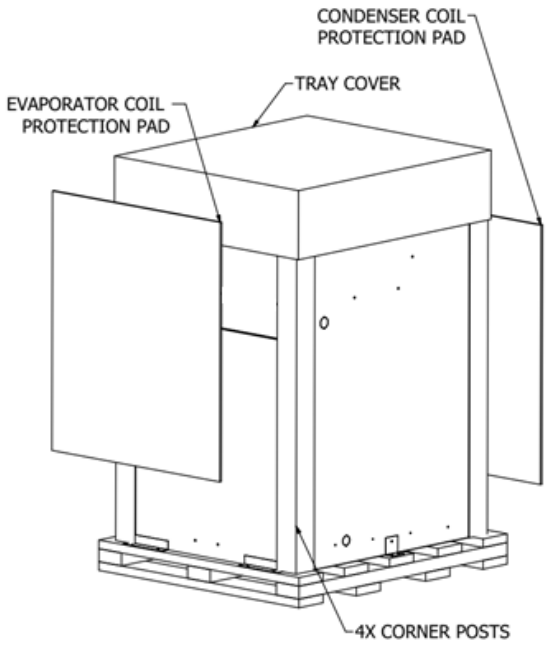
Material in this shipment has been inspected at the factory and released to the transportation agency in good condition. When received, a visual inspection of all cartons should be made immediately. Any evidence of rough handling or apparent damage should be noted on the delivery receipt in the presence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

SHIPPING INSTRUCTIONS

The FIRST-PAK FPH heat pumps 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



Standard Packaging

PACKAGE LIST

The units will be shipped with the following items:

1- FIRST-PAK FPH heat pump unit:
   - A- Shipping bracket (4)
   - B- Screws (8)
   - C- Top mounting bracket
   - D- Screws (5)
2- Literature package
   - A- IOM - Installation & Operations Manual
   - B- Warranty certificate
3- Bushing #EW1063
   - A- Screw (1)

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

UNIT INSPECTION CHECKLIST

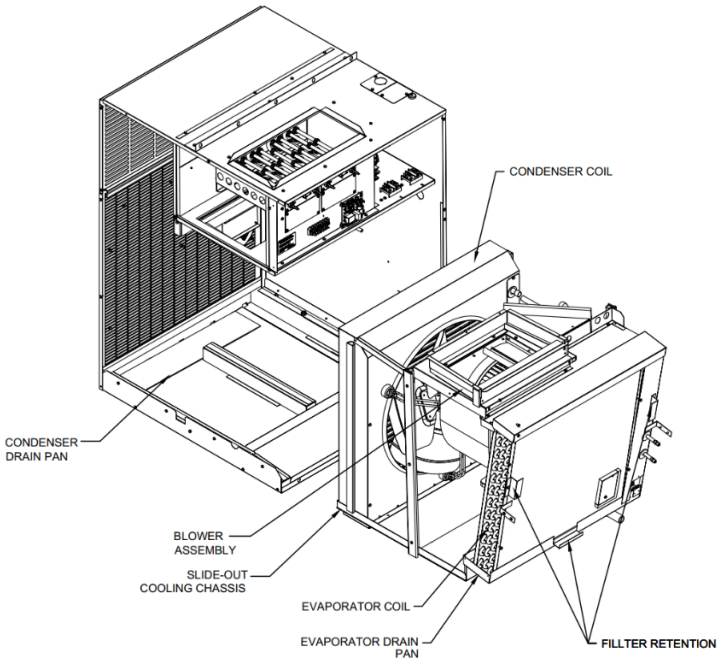


FIGURE 3 – Chassis Major Components

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 4 - Standard Packaging with Shipping Brackets - Back *View*** & **FIGURE 5 – Standard Packaging with Shipping Brackets – Front View** for more information.
5) Immediately before installation, remove unit front access panels and verify that all electrical connections are tight.
6) Check that the blower spins freely within the housing and that there are no obstructions between the wheel and housing. The wheel can sometimes come loose in shipping.
7) Inspect the electric heater section:
   a. Verify that there are no loose or damaged parts
   b. Check to make sure all wiring connections are Tight.
   c. Verify that insulation is in place and not in contact with heating elements
8) Slide out the cooling chassis, check to make sure that the refrigerant piping is free from any kinks, no visible refrigerant leak sign and there is no interference between unit piping and sheet metal or electrical wires. Refer to **FIGURE 3 – Chassis Major Components**
9) Check to make sure compressor mounting bolts and nuts are not loose.
10) Check to make sure the condenser fan blade rotates freely without hitting fan shroud.
11) Check the air-coil fins for any damage during shipping.
12) **Check the drain line is not obstructed and is leak free.**

NOTE

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

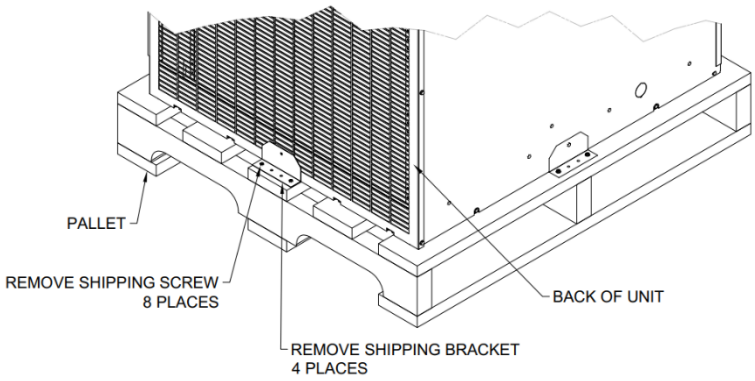


FIGURE 4 - Standard Packaging with Shipping Brackets - Back View

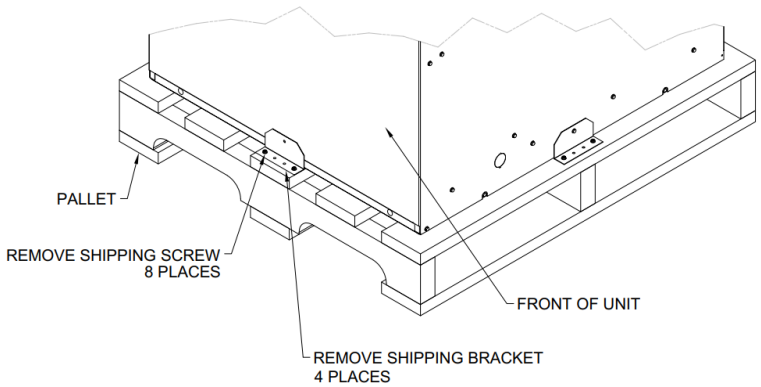


FIGURE 5 – Standard Packaging with Shipping Brackets – Front View

INSTALLATION

REQUIREMENTS

Follow manufacturer's installation instructions, as well as local and municipal building codes. In addition, the installation shall conform to the following National 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 prior to unit 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.

UNIT LOCATION

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

Do not install directly on carpeting, tile, or other combustible material other than wood flooring.

The Installation must conform with local building codes or, in the absence of local codes, to the Protection Association Standards NFPA. No. 90A and NEPA. No. 90B.

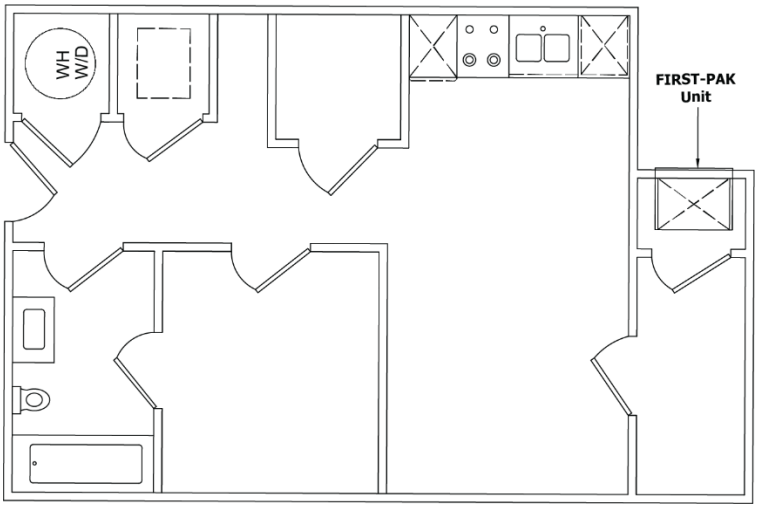


FIGURE 6 – Typical Floorplan with FIRST-PAK on Exterior Wall

INSTALLATION

UNIT CLEARANCE REQUIREMENTS

The unit may be installed with zero clearances to adjacent combustible surfaces. Please check local codes.

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

The louver side must be kept free from any obstructions to air flow. The unit must be installed at least 4 feet [1.2192m] from electric meters, gas meters, regulators, and relief equipment.

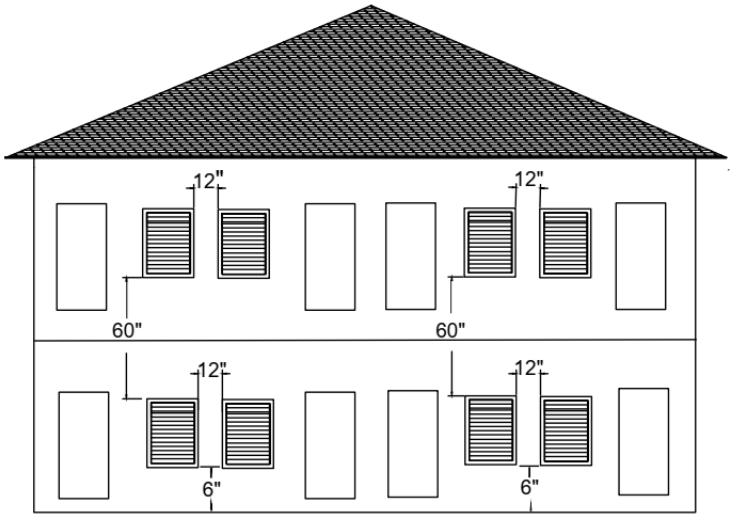


FIGURE 7 – Required Exterior Building Clearance

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 a garage floor	18	46
Distance to corner	2	5

Table 5- Exterior Clearance Requirements/Dimensions

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

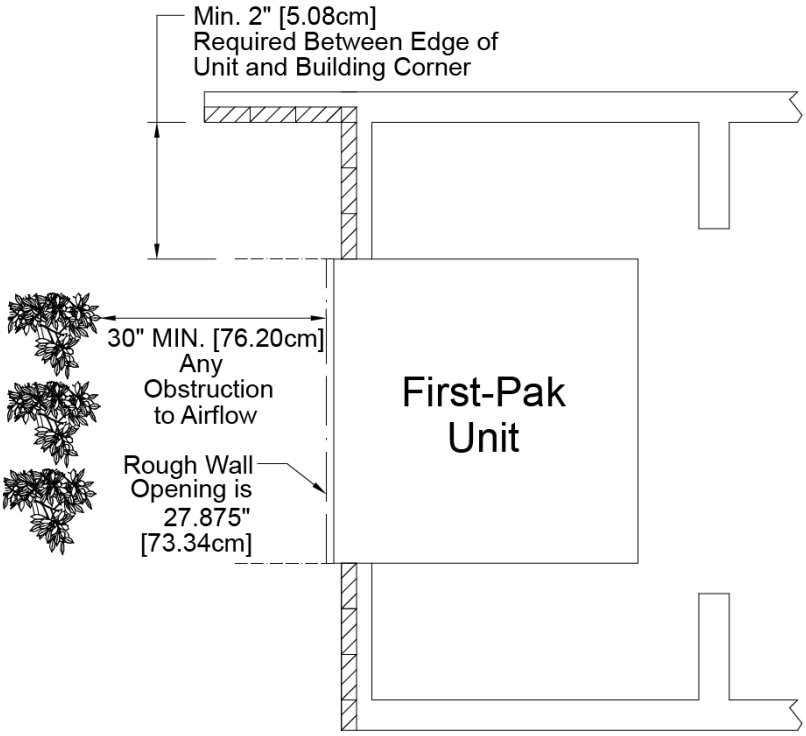


FIGURE 8 – Clearance Requirements

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.

INSTALLATION

WALL SLEEVE 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.

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.

Check all seals to ensure that they are in position and un-damaged. Ensure that the wall sleeve is pitched toward the exterior of the building

FIGURE 9 - Wall Sleeve Mounting If an Architectural louver is used to fasten it securely to the front of the sleeve using the supplied hardware.

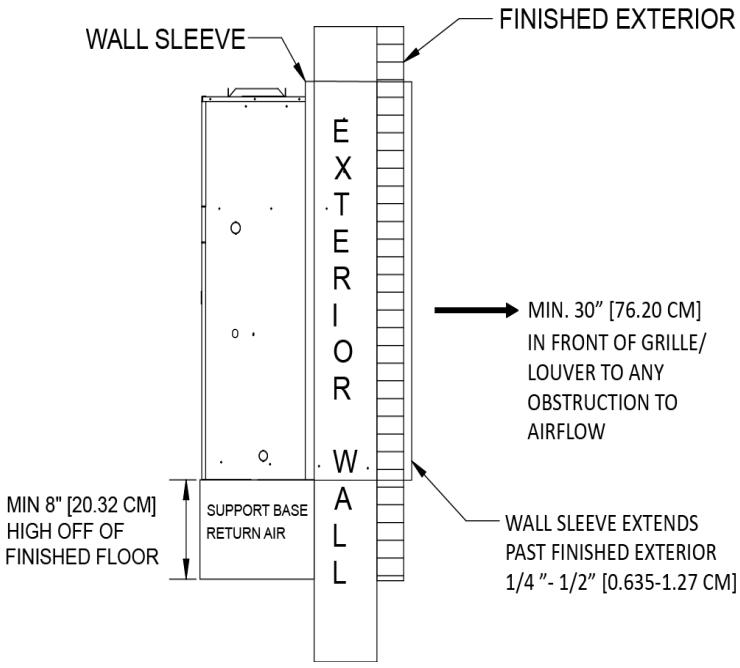


FIGURE 9 - Wall Sleeve Mounting

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 9 - Wall Sleeve Mounting)

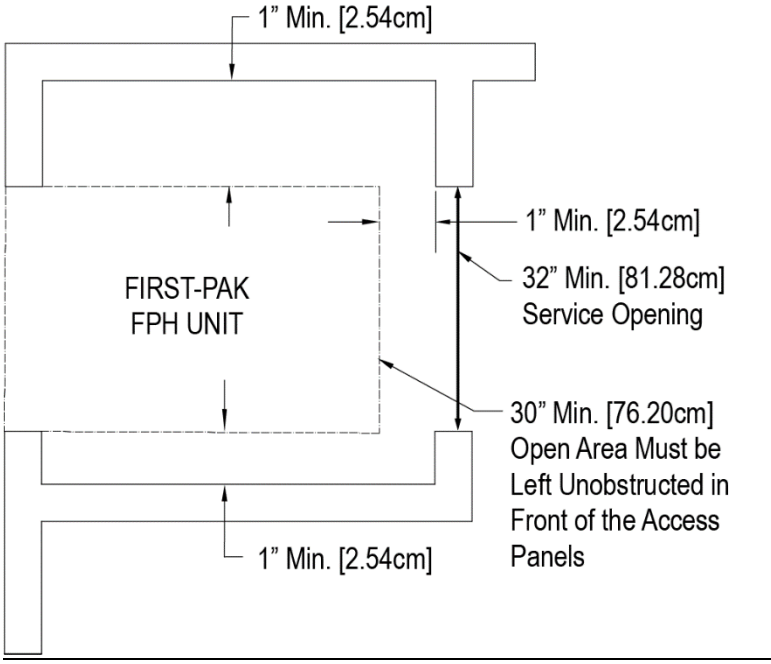


FIGURE 10 – Interior Clearance Requirements/Dimensions

The inside of the unit can be surrounded by a closet with minimum clearance to heater section match to 0" clearance on the sides, and 1" [2.54cm] from the front. Enough clearance should be provided for installing field wiring.

INSTALLATION

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

Platform construction should be built as below in **FIGURE 11 - Unit Support & Alignment.** It must be fabricated with plywood, framing lumber and/or any pre-approved sheet metal construction material. **FIGURE 11 - Unit Support & Alignment** is showing alignment of the platform top with the base panel of the wall sleeve.

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

Refer to **FIGURE 11 - Unit Support & Alignment**.

Things to consider prior to constructing the platform:

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” [20.32cm x 60.96cm] 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.

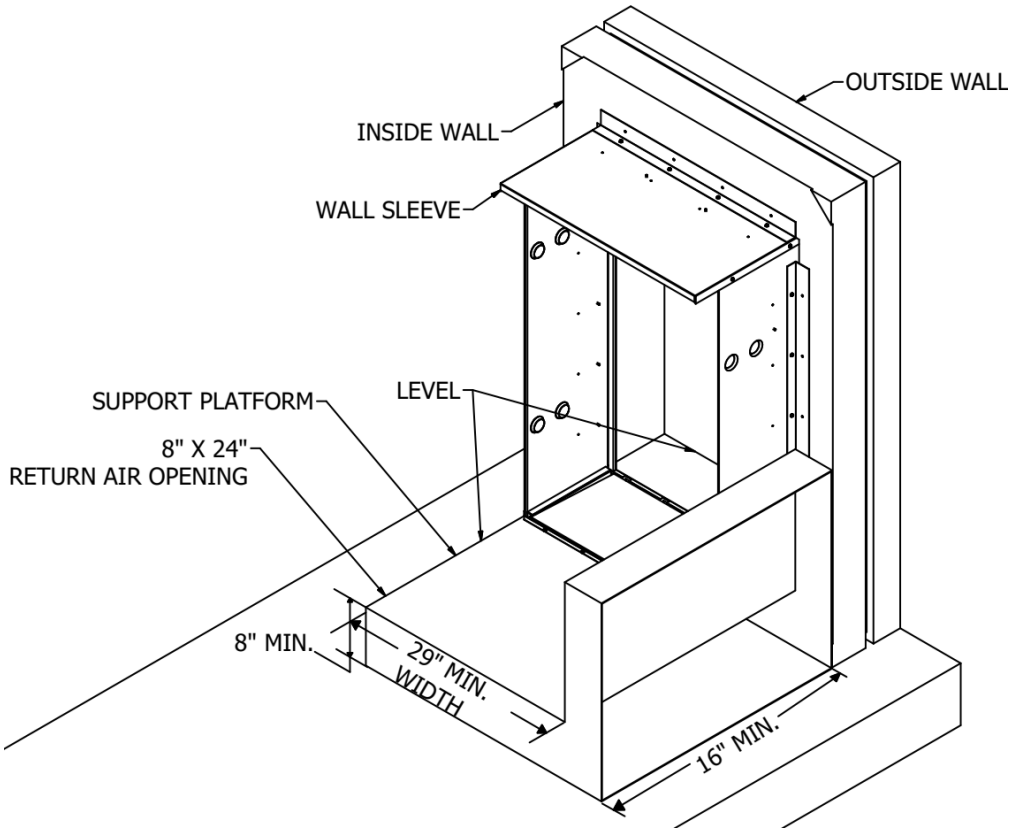


FIGURE 11 - Unit Support & Alignment

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

PACKAGED UNIT INSTALLATION

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 in the wall sleeve with a pitch to the outside of the building.

Insulation is installed on the indoor section of the unit 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 on the product rating plate.

INSTALLATION

PACKAGED UNIT INSTALLATION

NOTE

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

1. Remove the screws (8) and shipping brackets (4) 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 top mounting bracket to the unit with screws (5) provided with unit. Refer to **FIGURE 12 – Wall Sleeve Seal**

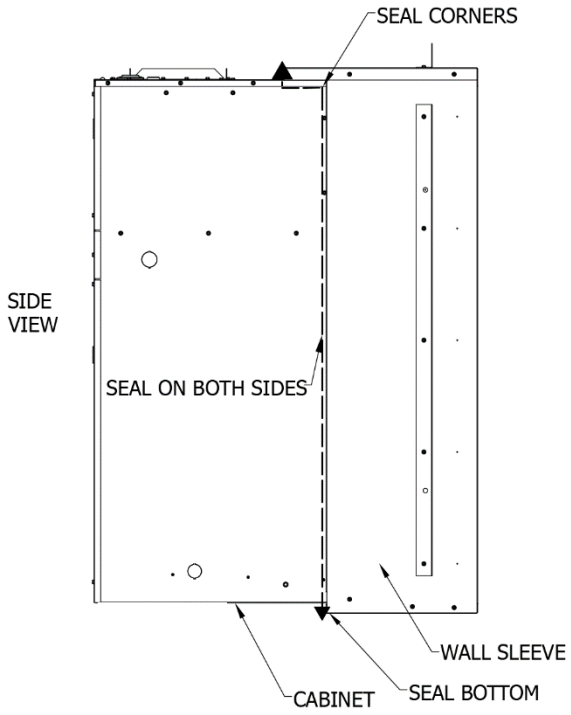


FIGURE 12 – Wall Sleeve Seal

3. Ensure that properly sized ductwork is in place to mate to the connections on the FIRST-PAK.
4. Remove filter access panel, and slide out cooling chassis - check both blowers.
5. Inspect the filter provided with the unit. **(Figure 16- Air Filter Location)** Place the filter into the filter bracket.
6. Ensure that the wall sleeve is installed squarely and is secured before installing the unit.
7. Inspect the sleeve seal, which is supplied with the sleeve, to ensure that it is properly secured and aligned refer to **FIGURE 12 – Wall Sleeve Seal**).
8. For shipping purposes, the supply air flanges are shipped flat. The discharge duct flanges must be bent up at a 90° angle.
9. Slide the FIRST-PAK unit toward the sleeve seal until the sleeve and top mounting bracket are nested and almost making contact.
10. Center the FIRST-PAK unit in the wall sleeve.
11. Use screw fasteners to attach the top mounting bracket to wall sleeve.

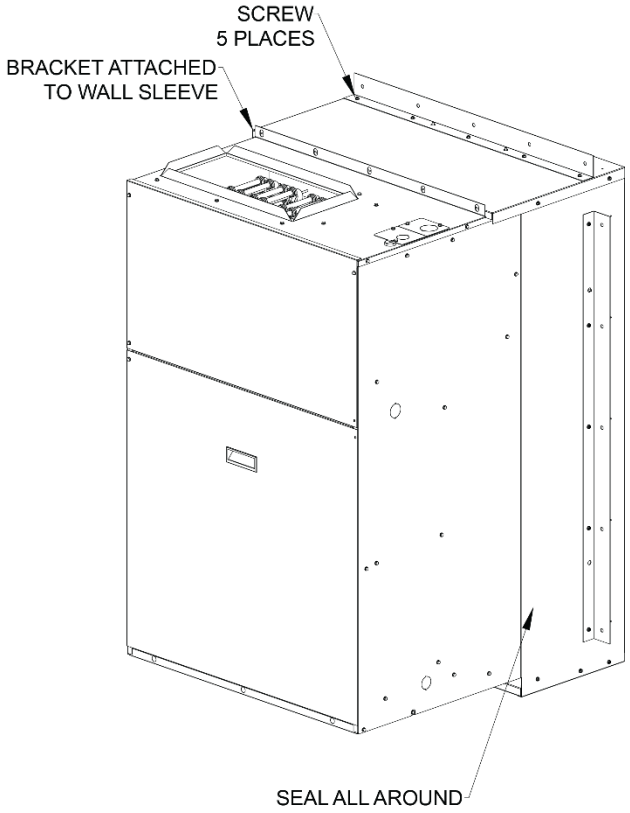


FIGURE 13 – Top Mounting Bracket Installation on Wall Sleeve

12. Use a high grade non-hardening sealant to close any gaps that may exist between the seal and the wall of the sleeve.
13. Check that the unit is contacting all four sides of the wall sleeve gaskets.

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.

INSTALLATION (CONTINUED)

DUCTWORK

IMPORTANT

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

IMPORTANT

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

IMPORTANT

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

SUPPLY DUCTWORK

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

Insufficiently sized ductwork will cause low supply airflow, which could cause low cooling performance, liquid flood back to compressor and condensate in the cabinet. In heating operation, low airflow could trigger the high-pressure switch protection and stop the compressor. If electric heater is running, low airflow could cause the heater auto-reset limit switch cycle on and off, which would reduce the longevity of heating element. Excessive airflow may result in a noisy duct system and could lower heating supply temps to an uncomfortable level. Unit external static pressure cannot be more than 0.5 in. w.c.

Ductwork should be adequately insulated to prevent condensation and to minimize heat loss within the duct system. A flexible connector is recommended for supply air connections on metal duct systems to limit noise.

RETURN AIR DUCTING

Return air ducting can be brought in through a wall louver or opening and then to the unit. The return duct should be sealed to the return air opening on the bottom of the unit and must terminate inside of the conditioned space. It is recommended to use duct material with acoustically lined insulation for sound attenuation. The return duct must be sized for a 24”x 8” [60.96cm x 20.32cm] opening and it is recommended to use sheet metal screws

RETURN AIR LOUVER OPTION

An optional return air louver configuration is available for heat pump installations where a return duct is not required. Use the blank off plate including in the kit to seal off the return air opening in the bottom of the unit, and replace the solid bottom front door panel with the supplied louvered front return panel.

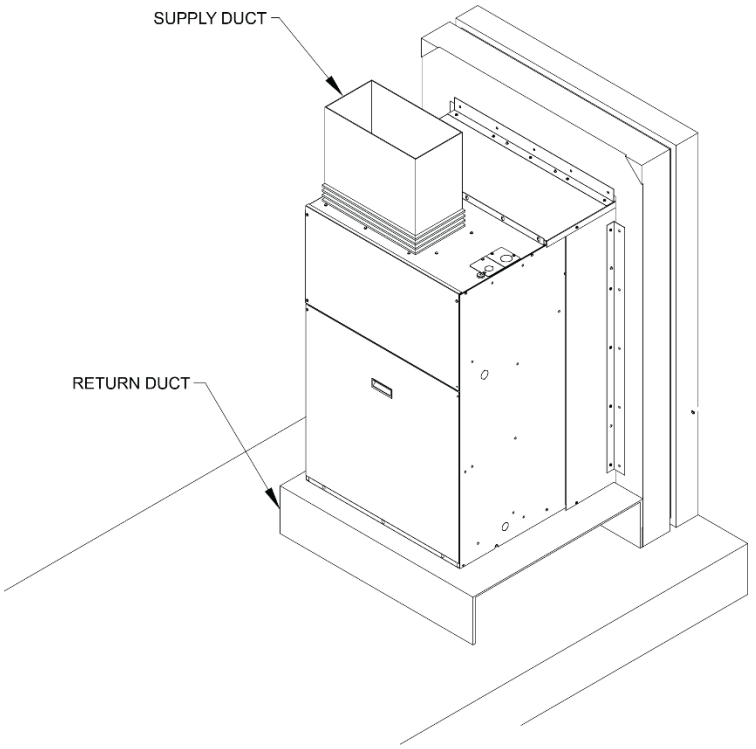


FIGURE 14 – Unit Return Ducting

INSTALLATION (CONTINUED)

CONDENSATE DRAINAGE

There are two drain pans in the FPH heat pump unit: one under evaporator coil for cooling operation and one under condenser coil for heating operation and rain drain. The drain tube from these two drain pans must be connected to the drain line to discharge condensation. 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. Drain line should be insulated to prevent condensate dropping to the ground and duct.

CAUTION

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

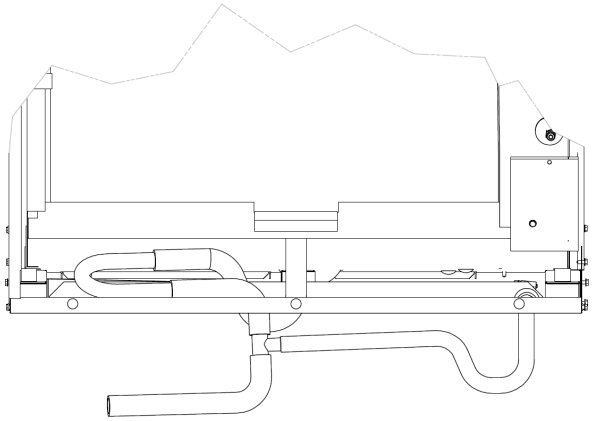
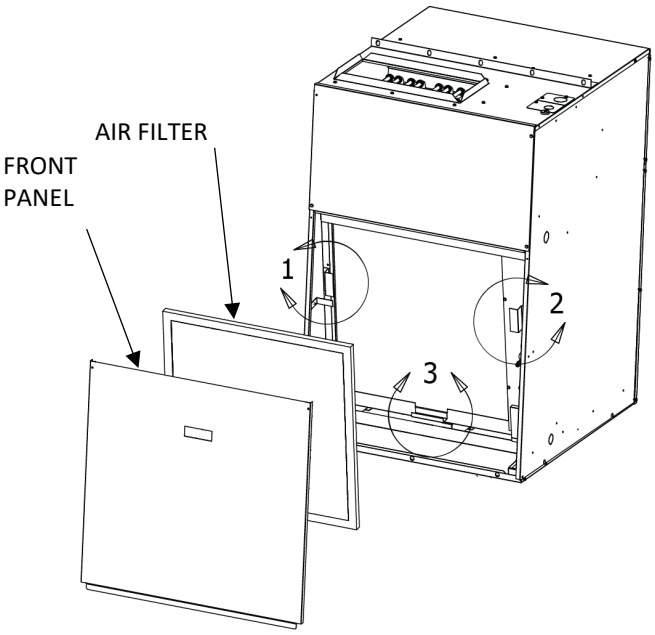


FIGURE 15 –Condensate Drain Layout

AIR FILTER

1. The heat pump unit ships with factory-installed 1" disposable MERV3/4 filter which attaches to the inlet of the evaporator coil.
2. A same size washable filter can be used to replace the existing disposable filter.
3. If a higher efficiency filter which has higher external static pressure is used, the added air pressure drop must be included in the external static pressure. The total external static pressure including duct work should not be more than 0.5 in. w.g. Airflow table should be checked to see if airflow still meets the application requirement and adjusts speed tap if needed.
4. If air filter provided with unit needs to be replaced rotate three (3) filter brackets.



FILTER EXTERNAL STATIC PRESSURE

PERFORMANCE BASED ON FACTORY-PROVIDED MERV3/4 DISPOSABLE FILTER INSTALLED IN THE UNIT. IF A HIGHER RESISTANCE FILTER IS INSTALLED IN THE UNIT, THE ADDED RESISTANCE MUST BE INCLUDED IN THE EXTERNAL STATIC PRESSURE AND MUST NOT EXCEED 0.5 IN. W.C. INCLUDING ductwork.

FACTORY FILTER SIZE (IN.) AND PRESSURE DROP (IN. W.C.)

Model	Filter Size	Supply Airflow (CFM)								
		200	300	400	500	600	700	800	900	1000
FPH**E1012C	24x24x1	0.003	0.01	0.02	0.03	0.04	---	---	---	---
FPH**E1018C	24x24x1	---	0.01	0.02	0.03	0.04	0.05	0.06	---	---
FPH**E1024C	24x24x1	---	---	0.02	0.03	0.04	0.05	0.06	0.07	---
FPH**E1030C	24x24x1	---	---	---	0.03	0.04	0.05	0.06	0.07	0.07

FIGURE 16 –Air Filter Location

FIELD WIRING

HIGH VOLTAGE

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

ELECTRIC SHOCK HAZARD

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

All wiring and components must be installed by licensed electrical technician and must comply with local and national code requirements. Units are provided with wiring diagrams and nameplate data to provide information required for necessary field wiring.

These units are provided with a class 2 transformer for 24V control circuits.

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

WARNING

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

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

Do not bypass or eliminate safety devices

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.

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

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

FIELD WIRING (CONTINUED)

CAUTION

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

UnitS with 3kW or 5kW or 7kW (12K heat pump only) electric heaters have only one power input and have a knockout hole on the top panel for field line voltage connection. Units with 7kW heater (except 12K heat pump) or 10kW heater have two power inputs and have two knockout holes for field line voltage connection.
Refer to FIGURE 17, FIGURE 18.

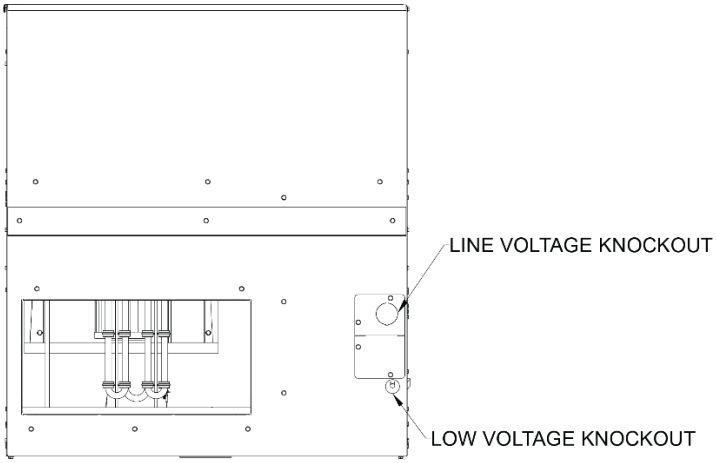


FIGURE 17 – Cabinet with Single Power Input

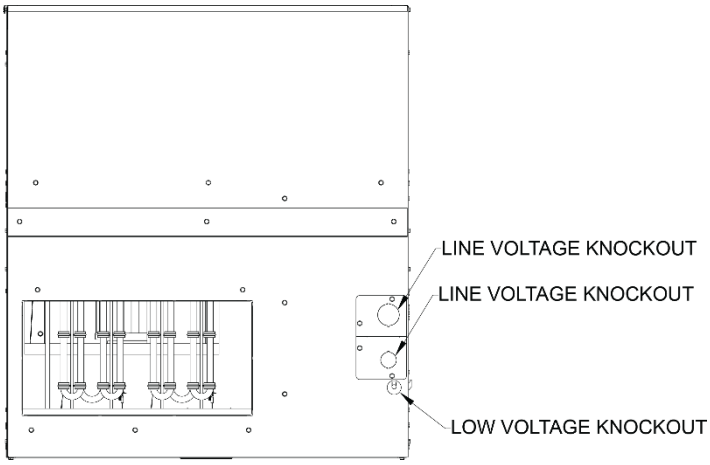


FIGURE 18 – Cabinet with Two Power Inputs

208/230 VOLT OPERATION

All 208/230 Volt units are factory wired for 230 Volt operation. For 208 Volt operation, moving/changing/rewiring the line voltage tap on the 24 Volt control transformer is required. Refer to figures 20-23, note 5 on the wiring diagram for instruction.

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

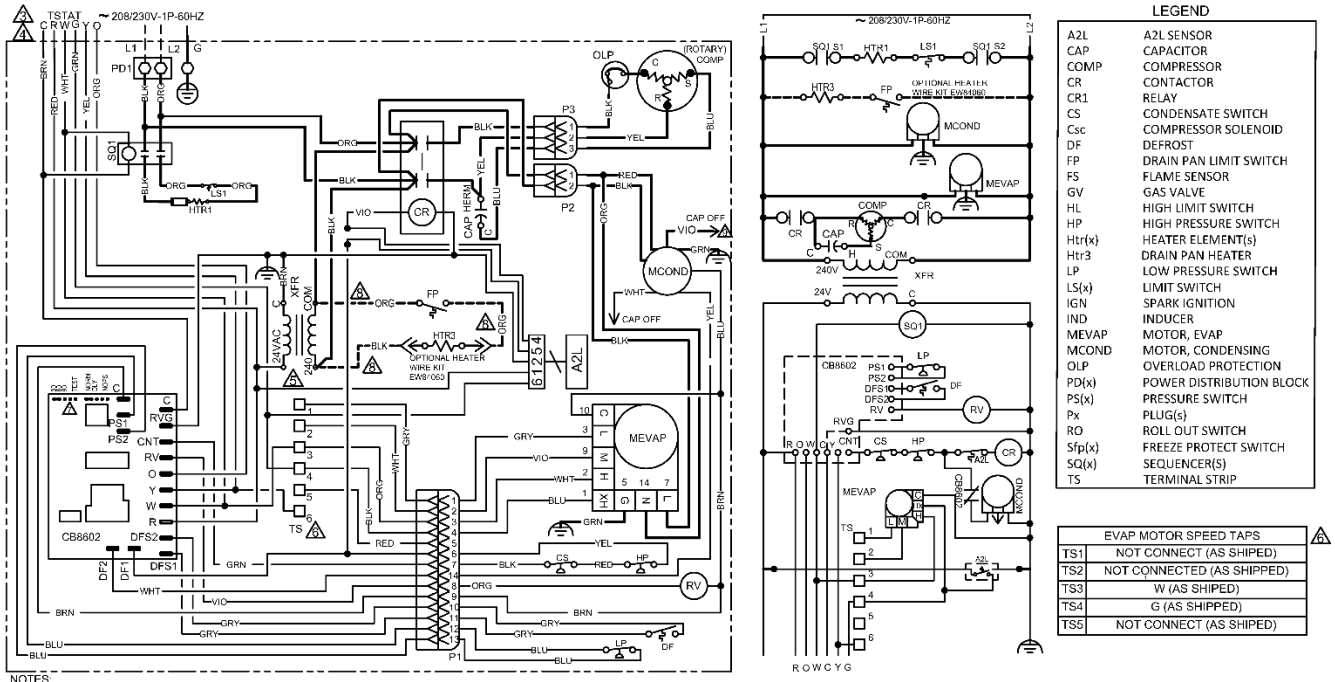
A standard 24 VAC thermostat is required to control this unit. A thermostat with a “C” common terminal is preferred. Thermostat must be capable to operate single stage cooling, single stage heat pump and single stage electric heat. Thermostat should be connected to the control wire through the LOW VOLTAGE hole on the top panel shown in FIGURE 17 and FIGURE 18. Thermostat connections and their functions are below in Table 6 – Thermostat Connections Key as follows:

THERMOSTAT CONNECTIONS KEY		
Abbr.	Color	Function
C	Brown	24VAC System Common
R	Red	Continuous 24VAC System Power
W	White	Output for Auxiliary Heat Contactor
G	Green	Evaporator Blower, Ventitation
Y	Yellow	Thermostat Call for Compressor
O	Orange	Thermostat Cooling Mode, Energize Reversing Valve

THERMOSTAT INSTALLATION

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

WIRING DIAGRAMS



LEGEND	
A2L	A2L SENSOR
CAP	CAPACITOR
COMP	COMPRESSOR
CR	CONTACTOR
CR1	RELAY
CS	CONDENSATE SWITCH
Csc	COMPRESSOR SOLENOID
DF	DEFROST
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

EVAP MOTOR SPEED TAPS	
TS1	NOT CONNECT (AS SHIPED)
TS2	NOT CONNECTED (AS SHIPPED)
TS3	W (AS SHIPED)
TS4	G (AS SHIPPED)
TS5	NOT CONNECT (AS SHIPED)

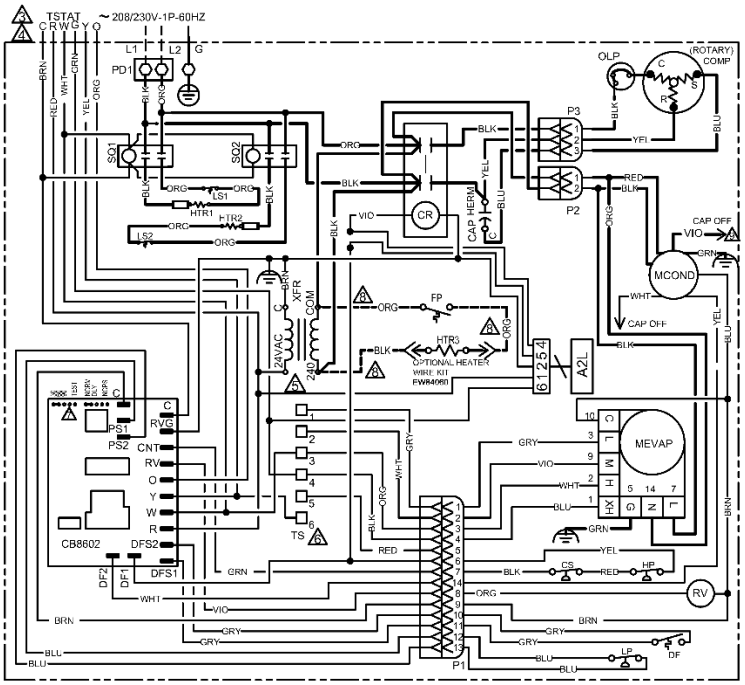
NOTES:
1. ALL WIRING TO THE UNIT MUST COMPLY WITH NEC AND LOCAL CODES.
2. COMPRESSOR AND BLOWER MOTORS ARE THERMALLY PROTECTED INTERNALLY.
3. CLASS 2 WIRINGS.
4. USE COPPER SUPPLY WIRES.
5. MOUNT BLK WIRE TO XFR ACCORDING TO THE OPERATION'S VOLTAGE.
6. SET SPEED TAPS ACCORDING TO SPEED TAPS TABLE.
7. SET JMPRS TO 60 FOR SIZE 12 & 18, SET JMPRS TO 30 FOR SIZE 24 & 30. MUST REMOVE JMPR THEN JUMP TEST FOR TEST MODE.

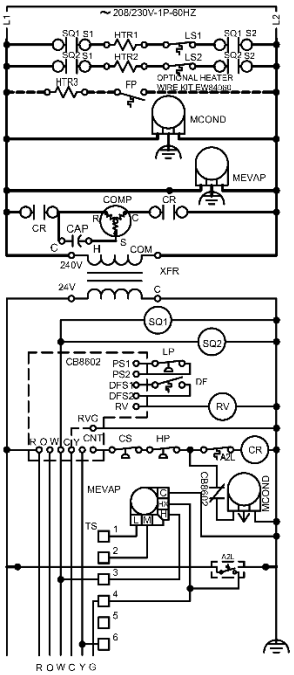
3 OPTIONAL FIELD WIRING
3 WIRE IS ONLY USED FOR PROGRAMMING

NOTE: TERMINALS SUITABLE FOR COPPER CONDUCTORS ONLY

REMARQUE: UTILISER DES FILS D'ALIMENTATION EN CUIVRE

FIRST PAK HP 12K, 1HTR, 1PS
WD84X055
REV A
10/24





LEGEND	
A2L	A2L SENSOR
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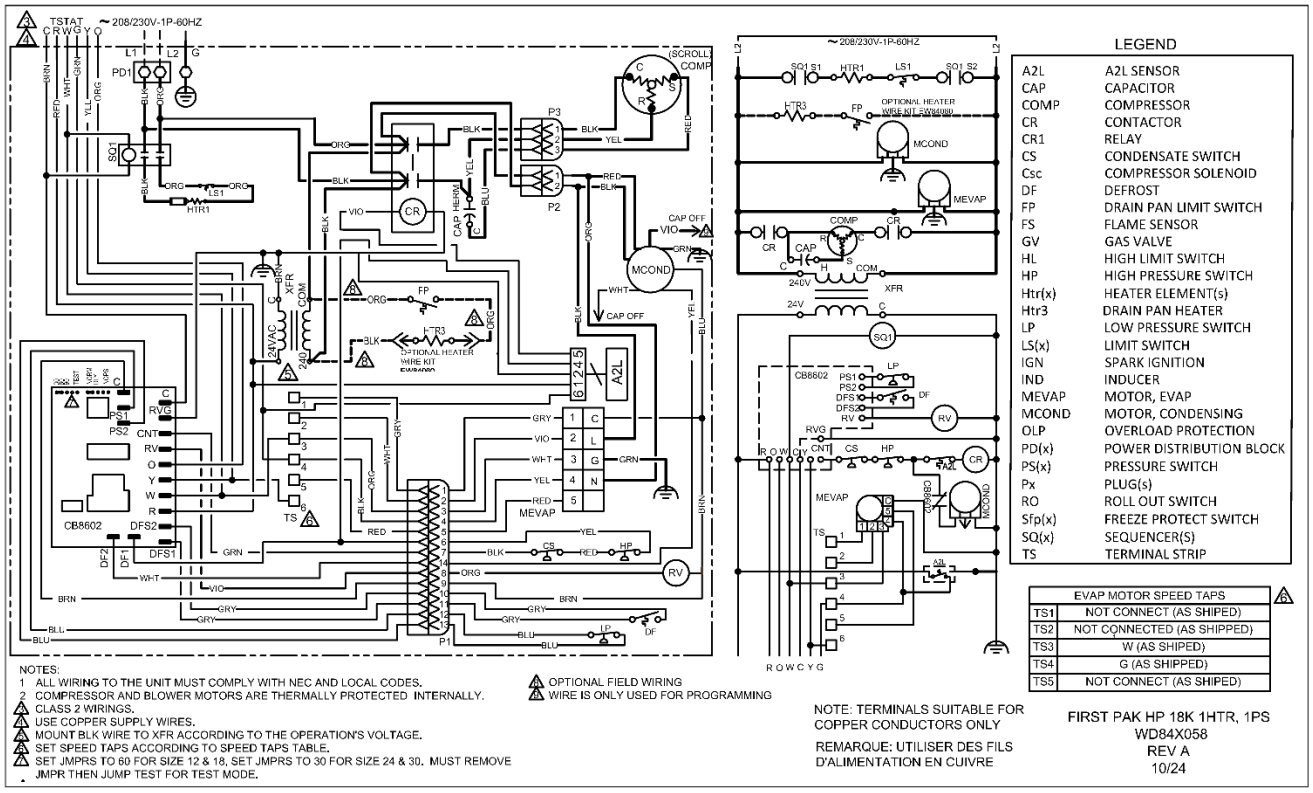
3 OPTIONAL FIELD WIRING
3 WIRE IS ONLY USED FOR PROGRAMMING

NOTE: TERMINALS SUITABLE FOR COPPER CONDUCTORS ONLY

REMARQUE: UTILISER DES FILS D'ALIMENTATION EN CUIVRE

FIRST PAK HP 12K 2HTR, 1 PS
WD84X056
REV A
10/24

WIRING DIAGRAMS



LEGEND	
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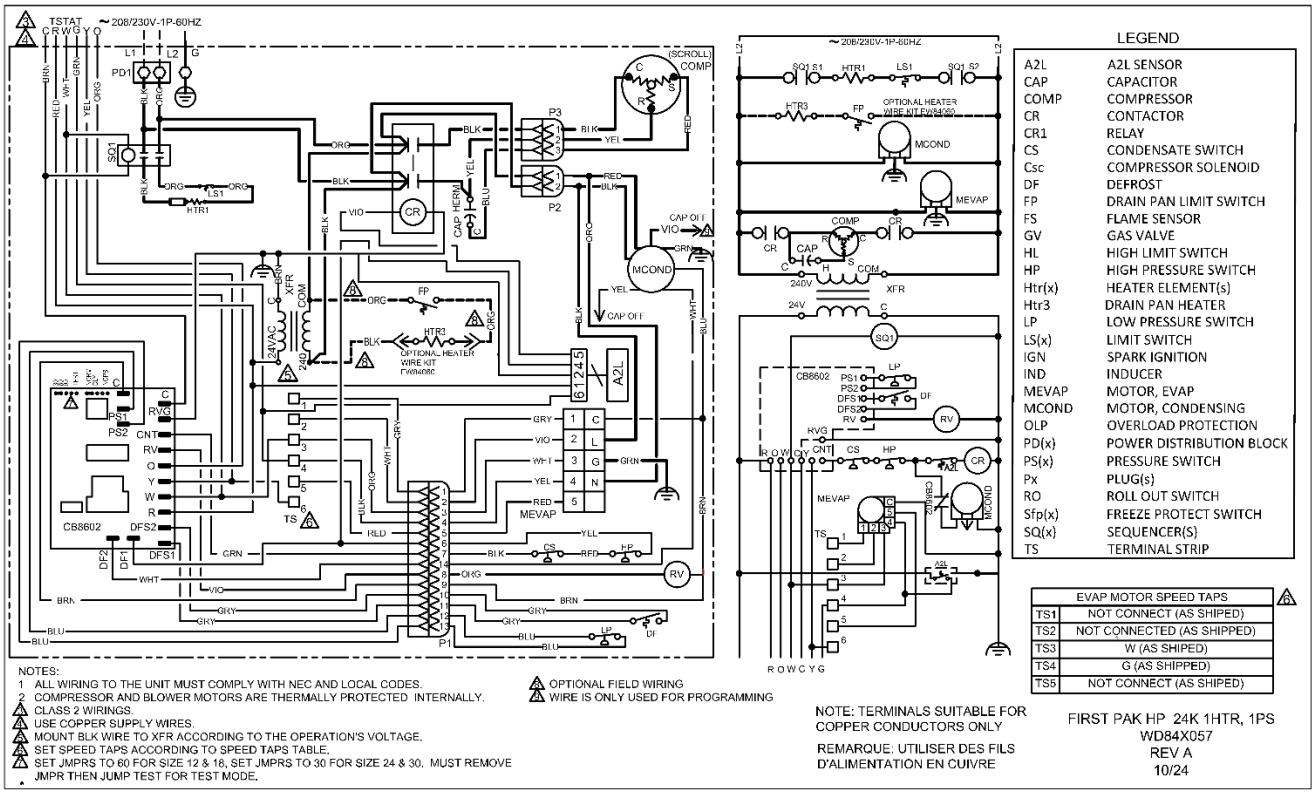
3 OPTIONAL FIELD WIRING
6 WIRE IS ONLY USED FOR PROGRAMMING

NOTE: TERMINALS SUITABLE FOR COPPER CONDUCTORS ONLY

REMARQUE: UTILISER DES FILS D'ALIMENTATION EN CUIVRE

FIRST PAK HP 18K 1HTR, 1PS
WD84X058
REV A
10/24



LEGEND	
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5. MOUNT BLK WIRE TO XFR ACCORDING TO THE OPERATION'S VOLTAGE.
6. SET SPEED TAPS ACCORDING TO SPEED TAPS TABLE.
7. SET JMPRS TO 60 FOR SIZE 12 & 18, SET JMPRS TO 30 FOR SIZE 24 & 30. MUST REMOVE JMPR THEN JUMP TEST FOR TEST MODE.

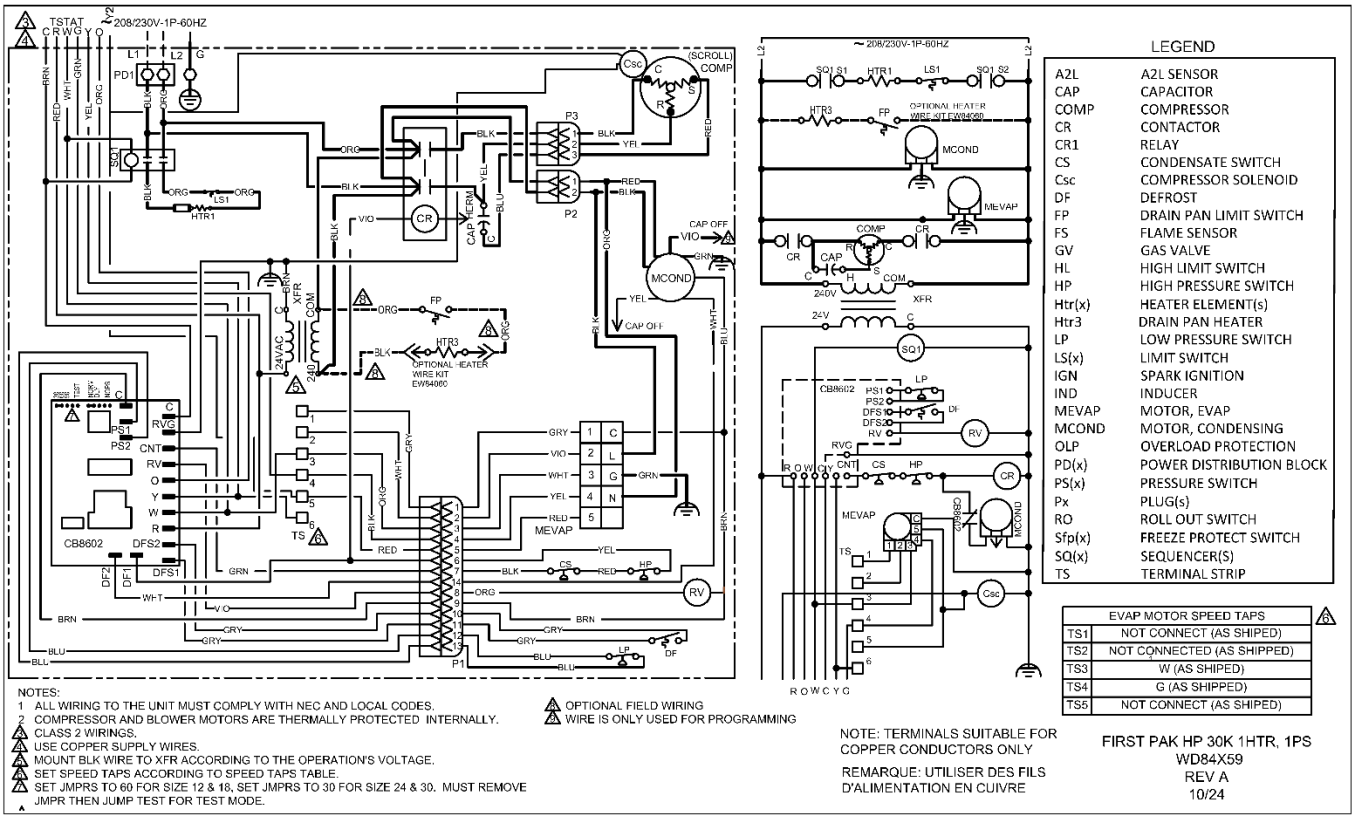
3 OPTIONAL FIELD WIRING
6 WIRE IS ONLY USED FOR PROGRAMMING

NOTE: TERMINALS SUITABLE FOR COPPER CONDUCTORS ONLY

REMARQUE: UTILISER DES FILS D'ALIMENTATION EN CUIVRE

FIRST PAK HP 24K 1HTR, 1PS
WD84X057
REV A
10/24

WIRING DIAGRAMS



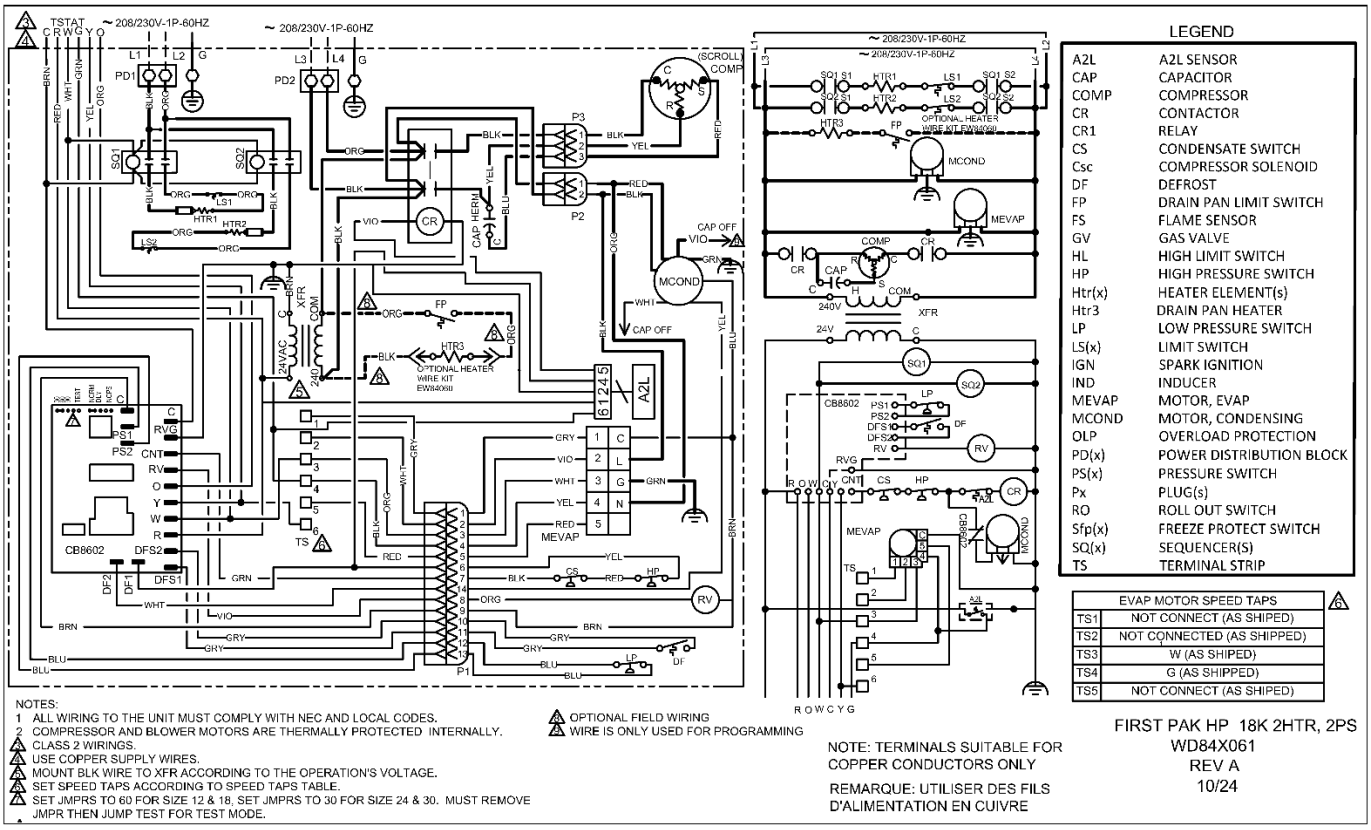
NOTES:
1. ALL WIRING TO THE UNIT MUST COMPLY WITH NEC AND LOCAL CODES.
2. COMPRESSOR AND BLOWER MOTORS ARE THERMALLY PROTECTED INTERNALLY.
3. CLASS 2 WIRINGS.
4. USE COPPER SUPPLY WIRES.
5. MOUNT BLK WIRE TO XFR ACCORDING TO THE OPERATION'S VOLTAGE.
6. SET SPEED TAPS ACCORDING TO SPEED TAPS TABLE.
7. SET JMPRS TO 60 FOR SIZE 12 & 18, SET JMPRS TO 30 FOR SIZE 24 & 30. MUST REMOVE JMPR THEN JUMP TEST FOR TEST MODE.

3 OPTIONAL FIELD WIRING
4 WIRE IS ONLY USED FOR PROGRAMMING

NOTE: TERMINALS SUITABLE FOR COPPER CONDUCTORS ONLY

REMARQUE: UTILISER DES FILS D'ALIMENTATION EN CUIVRE

FIRST PAK HP 30K 1HTR, 1PS
WD84X59
REV A
10/24



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. SET JMPRS TO 60 FOR SIZE 12 & 18, SET JMPRS TO 30 FOR SIZE 24 & 30. MUST REMOVE JMPR THEN JUMP TEST FOR TEST MODE.

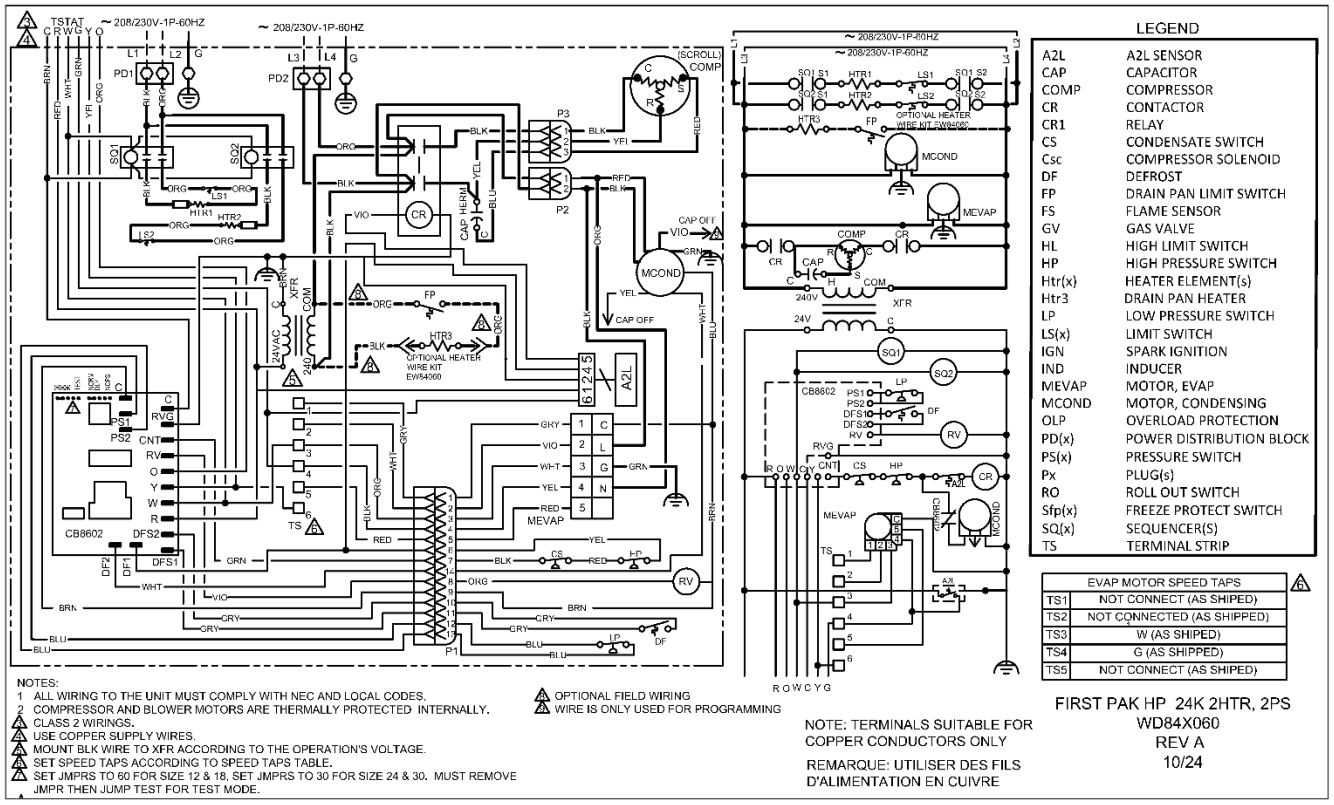
3 OPTIONAL FIELD WIRING
4 WIRE IS ONLY USED FOR PROGRAMMING

NOTE: TERMINALS SUITABLE FOR COPPER CONDUCTORS ONLY

REMARQUE: UTILISER DES FILS D'ALIMENTATION EN CUIVRE

FIRST PAK HP 18K 2HTR, 2PS
WD84X061
REV A
10/24

WIRING DIAGRAMS



LEGEND	
A2L	A2L SENSOR
CAP	CAPACITOR
COMP	COMPRESSOR
CR	CONTACTOR
CR1	RELAY
CS	CONDENSATE SWITCH
Csc	COMPRESSOR SOLENOID
DF	DEFROST
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

EVAP MOTOR SPEED TAPS	
TS1	NOT CONNECT (AS SHIPED)
TS2	NOT CONNECTED (AS SHIPPED)
TS3	W (AS SHIPED)
TS4	G (AS SHIPPED)
TS5	NOT CONNECT (AS SHIPED)

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.
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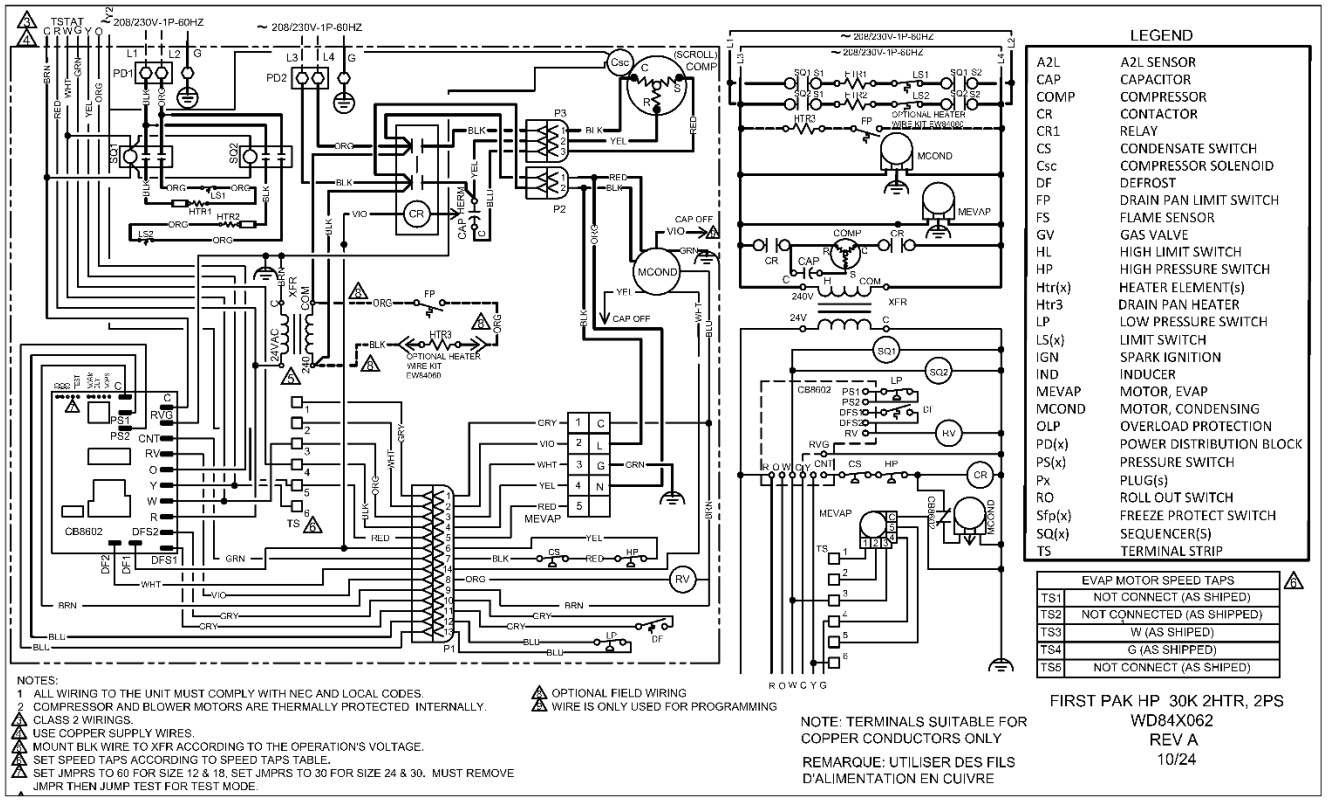
⚠ OPTIONAL FIELD WIRING
⚠ WIRE IS ONLY USED FOR PROGRAMMING

NOTE: TERMINALS SUITABLE FOR COPPER CONDUCTORS ONLY

REMARQUE: UTILISER DES FILS D'ALIMENTATION EN CUIVRE

FIRST PAK HP 24K 2HTR, 2PS
WD84X060
REV A
10/24



LEGEND	
A2L	A2L SENSOR
CAP	CAPACITOR
COMP	COMPRESSOR
CR	CONTACTOR
CR1	RELAY
CS	CONDENSATE SWITCH
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DF	DEFROST
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)
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TS5	NOT CONNECT (AS SHIPED)

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.
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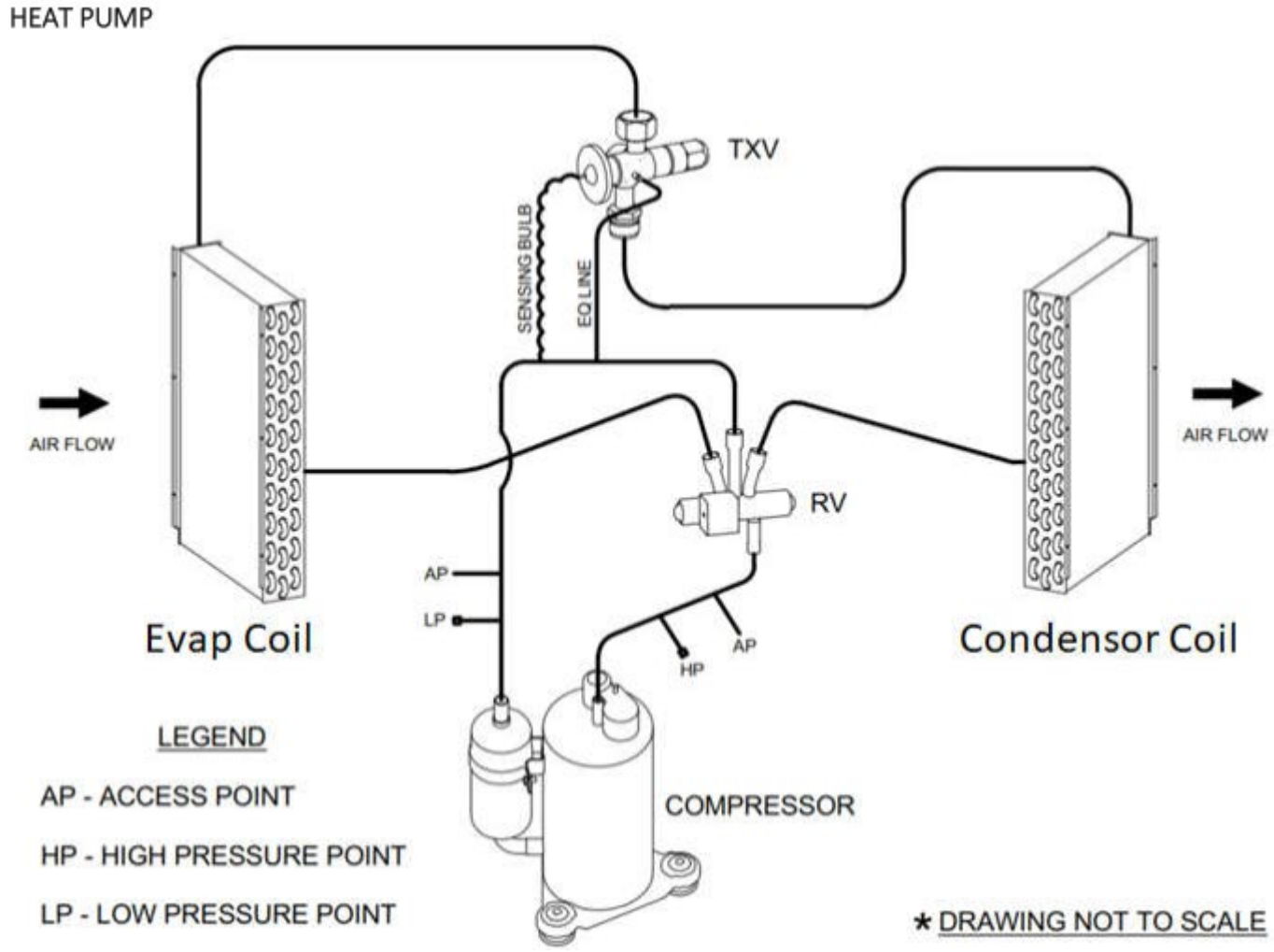
⚠ OPTIONAL FIELD WIRING
⚠ WIRE IS ONLY USED FOR PROGRAMMING

NOTE: TERMINALS SUITABLE FOR COPPER CONDUCTORS ONLY

REMARQUE: UTILISER DES FILS D'ALIMENTATION EN CUIVRE

FIRST PAK HP 30K 2HTR, 2PS
WD84X062
REV A
10/24

CIRCUIT SCHEMATIC



STARTUP INSTRUCTIONS

PRE-STARTUP CHECKS:

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.

After the installation of the unit, first check all the following items before initial start-up.

PRIOR TO THE STARTUP OF THE UNIT:

1. Ensure supply voltage matches nameplate data.
2. Ensure the power cable is connected to the unit and the ground cable is connected to the green ground screws.
3. Ensure control wire is connected to the thermostat and the wiring matches the wiring diagram.
4. Ensure unit will be accessible for servicing.
5. Ensure condensate line is properly sized, run, trapped, pitched and tested.
6. Ensure all cabinet openings and wiring connections have been sealed.
7. Ensure A clean undamaged air filter IS in place.
8. Ensure all access panels are in place and secured.
9. Make sure that all electrical connections are tight and secure.
10. Check MOP/MCA for amperage total to determine correct wire gauge.
11. For 208V supply voltage, ensure the line voltage tap on the 24V transformer has been moved to the correct terminal (see 208/230 VOLT OPERATION on page 21)
12. Make sure the supply duct and return duct have been installed properly and sealed well.
13. Ensure models with 7kw (except 12K heat pump) or 10kW electric heater should have two separate power supplies connected to the unit. Refer to Table 3.

UNIT STARTUP:

WARNING

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

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

1. Ensure that power is connected to the unit and the local disconnect is switched to ON position.
2. Turn on the power.
3. Check that there is 24V output from the control transformer.

STARTUP & PERFORMANCE CHECKLIST INSTRUCTIONS

Follow the Startup and Performance Checklist to check if the temperature and refrigerant pressure are normal, and if compressor and fans are running properly without abnormal sound. The warranty may be void unless the checklist is completed and returned to the warrantor. If the 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.

UNIT OPERATIONS

COOLING MODE

When a call for cooling is made (“Y” and “O” input is energized), the reversing valve energizes. The compressor will energize after 3 minute short cycle period. Unit will operate in cooling mode. The low pressure switch will be bypassed for the first 3 minutes after compressor is energized.

VENTILATION

When a call for fan only is made "G" input, without additional calls, the unit will operate in continuous fan operation mode. The indoor fan is energized after a .25 second delay. The indoor fan remains energized as long as the "G" input is provided to the unit.

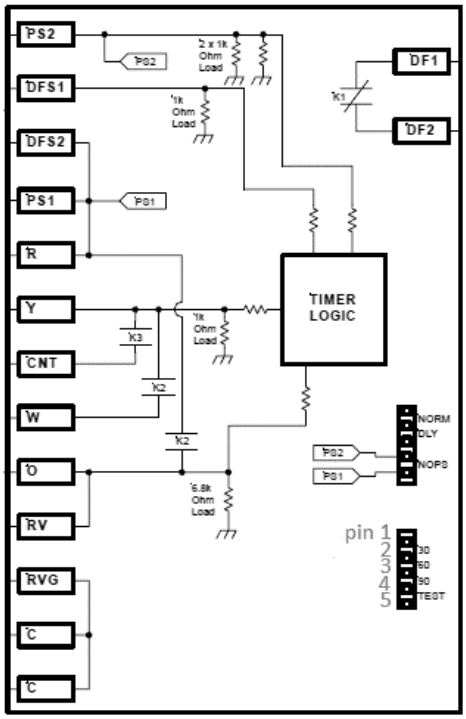
HEATING MODE

When a call for heat is made (“Y” input is energized), the blower starts operation immediately. The compressor will energize when the 3 minute short cycle period has been satisfied. The electric heat will not energize unless a “W” input is given and will energize after 1-10 second delay. The low pressure switch input will be ignored for the first 3 minutes after compressor is energized.

DEFROST OPERATION

The FIRST-PAK heat pump unit includes a time-temperature defrost board which has a movable shunt jumper for three selectable defrost interval times (30, 60, 90 minutes) and test mode for field test operation. The factory default setting is 30 minutes. The defrost cycle is controlled by the defrost sensor and accumulated compressor run time.

When the unit is in heating operation, if the defrost switch is closed and the accumulated compressor run time reaches the selected defrost interval time, the control will activate the defrost operation. During defrost the condenser fan stops running, the reversing valve is energized and electric heat is turned on. When defrost switch opens or the maximum defrost time of 10 minutes is reached, the control immediately de-energizes the electric heat and the reversing valve and energizes the condenser fan. The defrost interval timer is reset and unit goes back to normal heating operation.



DEFROST INTERVAL TIMES

Pins 1-2: 30 minutes
Pins 2-3: 60 minutes
Pins 3-4: 90 minutes
Pins 4-5: Test Mode

FIELD TEST OPERATION

The 30-60 shunt jumper in the defrost board must be removed and put on the “TEST” pins for more than 1 second; then the unit will run in the test mode. The test model operates the same as normal operations at 120 times the normal speed.

To exit test mode, the jumper must be removed from the “TEST” pins, and re-install to 30-60 position; The control automatically cancels test mode if the “TEST” pins remain jumpered more than 5 minutes.

WARNING

Failure to remove the 30-60 shunt jumper while “TEST” pin is jumped will result in board failure. Warranty will be void.

LOW PRESSURE SWITCH

The unit is installed with low pressure switch to provide protection for loss of refrigerant charge by shutting off unit if suction pressure falls below set point.

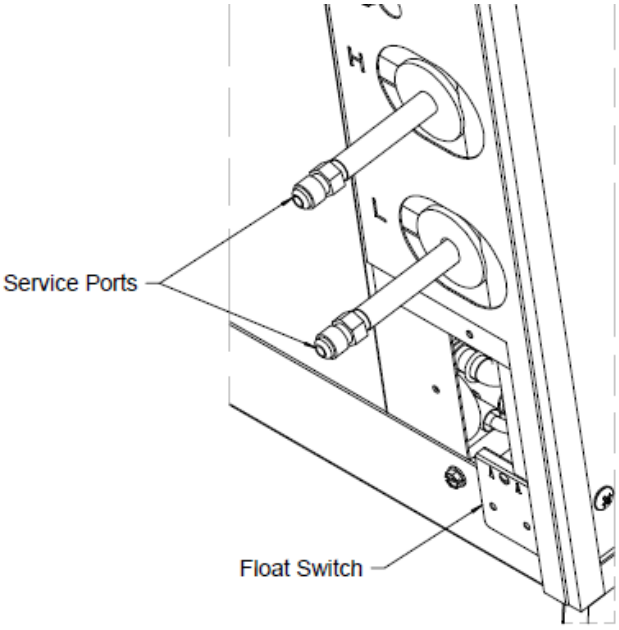
HIGH PRESSURE SWITCH

High pressure switch would shut off compressor to protect the air conditioning system from operating under extreme high discharge pressure caused by abnormal operating conditions or failure of condenser fan, dirty coil or TXV malfunction etc.

UNIT OPERATIONS

OVERFLOW PROTECTION

Condensate overflow located in the bottom of the evaporator drain pan shuts off the compressor if it senses the condensate in the drain pan rises above maximum level.



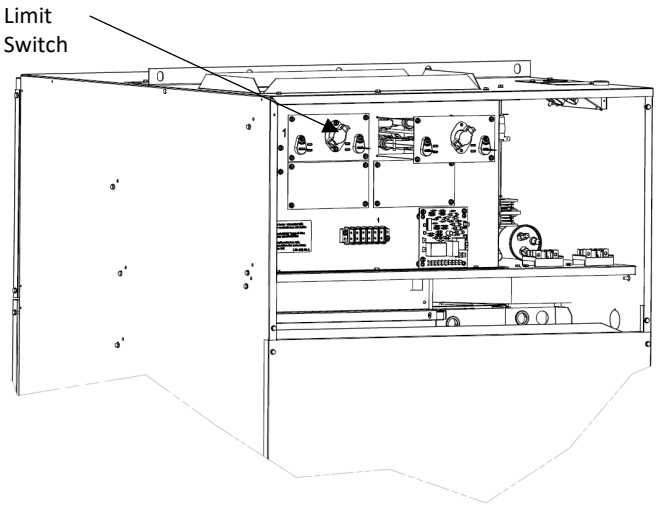


FIGURE 23 – Auto-Reset Temperature Limit Switch

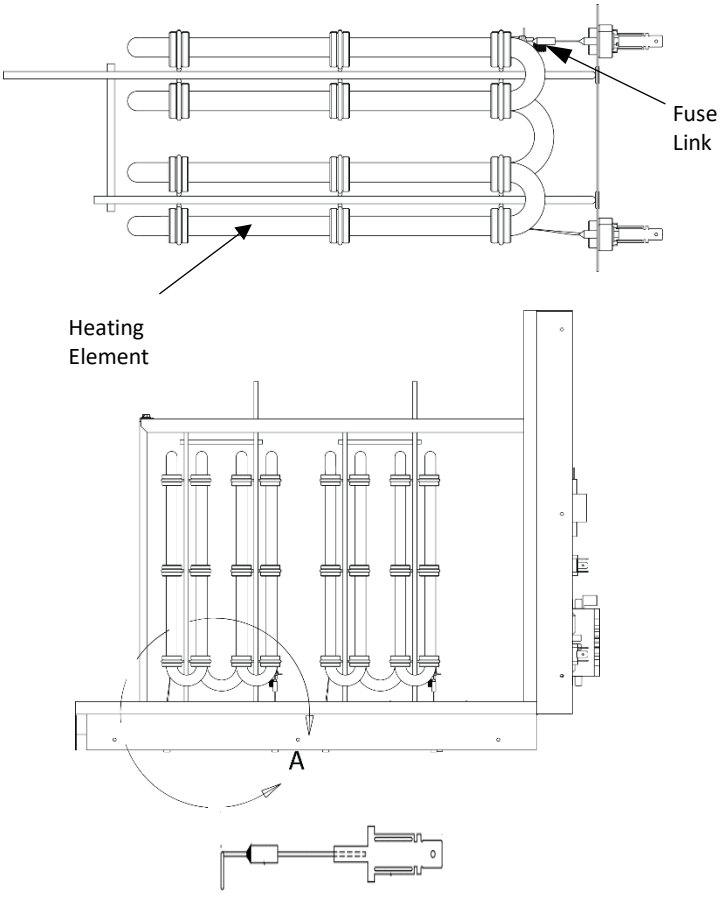


FIGURE 24 – Non-Resettable Fuse Link

HEATER OVERHEAT PROTECTION

The electric heater is equipped with auto-reset temperature limit switch (FIGURE 23) and non-resettable fuse link (FIGURE 24). If an abnormal situation such as low airflow due to dirty/clogged air filter, air leak or no airflow due to failed motor, causes the supply air temperature to rise above acceptable limit, the auto-reset limit switch will interrupt the power to the heating elements. Once the heating elements cool down, the limit switch will close and the power to the heating elements will be restored. The heater will resume operation. If the auto-reset limit switch fails to react and is permanently closed, the non-resettable fuse link will activate to cut off the power to the heating elements permanently. The heater will stop working until the fuse link is replaced by a certified technician or agency. See MAINTENANCE & SERVICE- ELECTRIC HEAT section for replacement procedure

UNIT OPERATIONS

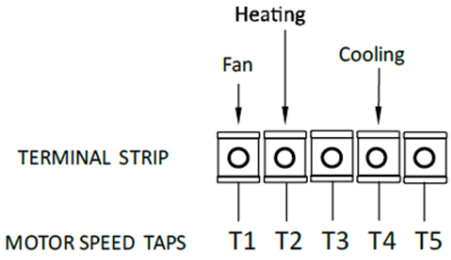
BLOWER CONTROL

WARNING

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

The FPH heat pump indoor blower fan has an ECM, direct drive, constant torque motor with multiple speed taps that can be changed in the field to meet the actual airflow and the external static pressure. Refer to FIGURES 19 to 22 WIRING DIAGRAMS and TABLES 7 & 8 BLOWER PERFORMANCE DATA

Unit performance is rated at 0.3" static. On sized 18K, 24K and 30K units, T1 and T2 are left empty from the factory. T3 is used for the heating speed tap, and T4 is used for the cooling speed tap. T5 is available for for a high fan speed tap, on the 18K and 24K, but is used for the second stage compressor fan speed on the 30K sized units. On the 12K units sizes, T1 is left empty from the factory, T2 is used for heating, T3 is used for Cooling with optional T4 connection for high fan speed.



Factory Position	
Fan	T1
Heating	T2
Cooling	T4

FIGURE 25 – Speed tap for blower control

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.

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 on page (XX)

BLOWER PERFORMANCE

BLOWER PERFORMANCE											
MODEL	Motor Tap	IWC STATIC PRESSURE									
		0.10		0.20		0.30		0.40		0.50	
		SCFM	W	SCFM	W	SCFM	W	SCFM	W	SCFM	W
FPH03E1012D*	1	403	42	369	47	341	51	307	56	275	61
	2	464	57	430	61	402	66	368	71	335	75
	3	550	81	516	85	488	90	454	95	422	99
	4	601	98	567	103	539	108	505	112	473	117
FPH05E1012D*	1	505	67	471	72	443	77	409	81	377	86
	2	464	57	430	61	402	66	368	71	335	75
	3	550	81	516	85	488	90	454	95	422	99
	4	601	98	567	103	539	108	505	112	473	117
FPH07E1012D*	1	602	99	566	104	537	108	504	112	472	117
	2	465	57	429	62	399	66	366	71	335	75
	3	551	81	515	86	486	90	453	95	421	99
		602	99	566	104	537	108	504	112	472	117
FPH05E1018D*	1	607	67	581	72	553	77	526	83	499	88
	2	657	80	631	85	603	91	576	96	549	102
	3	748	108	722	113	694	119	667	124	640	130
	4	765	114	738	119	710	125	684	130	657	136
	5	805	129	778	134	750	140	724	145	697	151
FPH07E1018D*	1	607	67	581	72	553	77	526	83	499	88
	2	657	80	631	85	603	91	576	96	549	102
	3	748	108	722	113	694	119	667	124	640	130
	4	765	114	738	119	710	125	684	130	657	136
	5	805	129	778	134	750	140	724	145	697	151
FPH10E1018D*	1	607	67	581	72	553	77	526	83	499	88
	2	828	138	801	144	773	149	746	154	720	160
	3	748	108	722	113	694	119	667	124	640	130
	4	932	188	905	193	877	198	850	203	824	209
	5	995	223	968	228	940	233	913	238	887	244

TABLE - 4

*Data is subject to change. Please verify most current information on www.firstco.com or www.AE-Air.com websites.

BLOWER PERFORMANCE (CONTINUED)

BLOWER PERFORMANCE											
MODEL	Motor Tap	IWC STATIC PRESSURE									
		0.10		0.20		0.30		0.40		0.50	
		SCFM	W	SCFM	W	SCFM	W	SCFM	W	SCFM	W
FPH05E1024D*	1	608	68	577	74	550	80	523	85	496	91
	2	655	80	623	86	597	92	570	97	543	102
	3	752	106	721	112	694	118	667	123	640	129
	4	924	171	893	177	866	183	839	188	812	194
	5	1025	225	994	232	967	237	940	243	913	248
FPH07E1024D*	1	608	68	577	74	550	80	523	85	496	91
	2	655	80	623	86	597	92	570	97	543	102
	3	752	106	721	112	694	118	667	123	640	129
	4	924	171	893	177	866	183	839	188	812	194
	5	1025	225	994	232	967	237	940	243	913	248
FPH10E1024D*	1	608	68	577	74	550	80	523	85	496	91
	2	870	147	839	153	812	159	785	165	758	170
	3	752	106	721	112	694	118	667	123	640	129
	4	924	171	893	177	866	183	839	188	812	194
	5	1025	225	994	232	967	237	940	243	913	248
FPH05E1030D*	1	684	87	653	93	626	99	599	105	572	110
	2	813	126	782	132	755	138	728	143	701	148
	3	881	152	850	158	823	164	796	169	769	174
	4	1025	225	994	232	967	237	940	243	913	248
	5	1119	288	1088	294	1061	300	1034	305	1007	311
FPH07E1030D*	1	684	87	653	93	626	99	599	105	572	110
	2	813	126	782	132	755	138	728	143	701	148
	3	881	152	850	158	823	164	796	169	769	174
	4	1025	225	994	232	967	237	940	243	913	248
	5	1119	288	1088	294	1061	300	1034	305	1007	311
FPH10E1030D*	1	684	87	653	93	626	99	599	105	572	110
	2	924	171	893	177	866	183	839	188	812	194
	3	1025	225	994	232	967	237	940	243	913	248
	4	752	106	721	112	694	118	667	123	640	129
	5	1025	225	994	232	967	237	940	243	913	248

TABLE - 5

*Data is subject to change. Please verify most current information on www.firstco.com or www.AE-Air.com websites.

OPERATION & MAINTENANCE – ELECTRIC HEAT

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 a preventative maintenance program can void the manufactures warranty.

FUSE LINK REPLACEMENT

3 kW and 5 kW heaters have one heating element. 7 kW and 10 kW heaters have two heating elements. Each heating element is connected to one fuse link. Refer to FIGURE 24. If heater is overheated and auto limit switch fails to react, the fuse link will permanently open and cut off the power to the electric heater. In this case, the fuse link must be replaced in order for the heater to work again. Following below procedures. Follow below procedures.

1) Disconnect power to the unit.
2) Remove front top panel from the unit. See FIGURE 26 – Front Top Panel Removal.
3) Disconnect wires from the heating element whose fuse link is open, remove screws from the mounting plate. Refer to FIGURE 27– Disconnect Wire
4) Take out the heating module. Refer to FIGURE 28 – Remove Heating Module
5) Replace the broken fuse link. Refer to **FIGURE 24 – Non-Resettable Fuse Link**
6) Remove the blank mounting plates to expose viewports to help locate the hole when reinserting the heating module.
7) When reinstalling the heating module, make sure the rod is inserted into the hole on the heater support panel. Reinstall heating module and screws (4).

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.

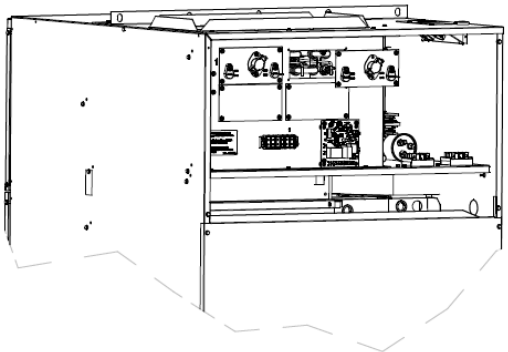


FIGURE 28 – Remove Heating Module

The electric heater is protected by auto-reset temperature limit switch and non-resettable fuse link for low airflow or no airflow caused by dirty/clogged air filter or motor failure, refer to FIGURE 23 and FIGURE 24.

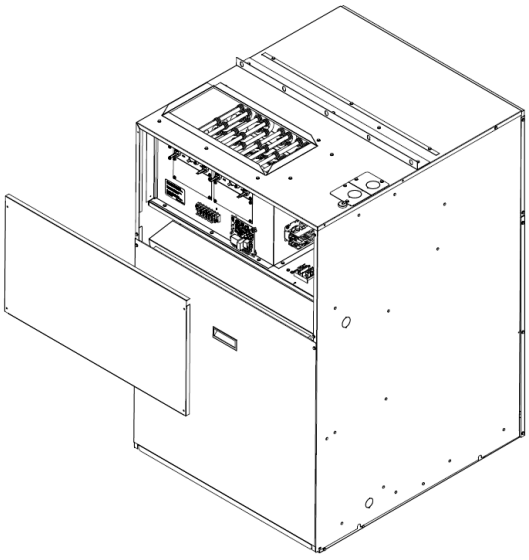


FIGURE 26 – Front Top Panel Removal

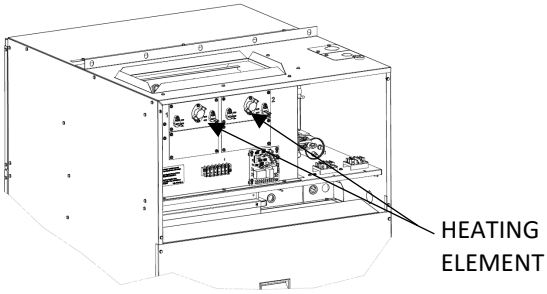


FIGURE 27 – Disconnect Wire

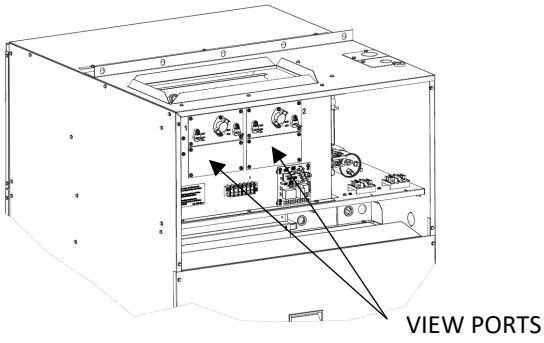


FIGURE 29 – View Ports

TROUBLESHOOTING

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 lower 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 (reversing valve energized). Set unit to "HEAT" and the highest temperature setting, the unit should run in the heating mode. If neither the blower nor compressor run in all three cases, the thermostat could be mis-wired or faulty. To ensure mis-wired or faulty thermostat verify 24 volts is available on the condenser section low voltage terminal strip between "R" and "C", "Y" and "C", and "B" and "C". If blower does not operate, verify 24 colts between terminals "G" and "C" in the air handler. Replace the thermostat if defective.
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.
	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.
	A2L Sensor Fault/Activation	For units over 4lbs, an active refrigerant leak will/faulty sensor will disable the compressor operation. Verify absence of refrigerant leak and replace sensor.
UNIT OFF ON HIGH PRESSURE CONTROL	Discharge pressure too high	In "COOLING" mode: Lack of or inadequate air flow. Entering air temperature too warm. Blower inoperative, clogged filter or restriction in ductwork. In "HEATING" mode: Lack of or inadequate airflow. Entering air temperature too cold. Blower inoperative, clogged filter or restriction in ductwork.
	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.
UNIT OFF ON LOW PRESSURE CONTROL	Suction Pressure too low	In "COOLING" mode: Lack of or inadequate air flow. Entering air temperature too cold. Blower inoperative, clogged filter or restriction in ductwork. In "HEATING" mode: Lack of or inadequate airflow. Entering air temperature too warm. Blower inoperative, clogged filter or restriction in ductwork.
	Refrigerant charge	The unit is low on refrigerant. Check for refrigerant leak, repair, evacuate and recharge with factor recommended charge.
	Low pressure switch	Check for defective or improperly calibrated low-pressure switch.
UNIT SHORT CYCLES	Unit oversized	Recalculate heating and cooling loads.
	Thermostat	Thermostat installed near a supply air register, relocate thermostat. Check heat anticipator.
	Wiring and controls	Loose connections in the wiring or a defective compressor contactor.

Table 6 - Troubleshooting Table (1 of 2)

TROUBLESHOOTING CONTINUED

PROBLEM	POSSIBLE CAUSE	CHECKS & CORRECTIONS
INSUFFICIENT COOLING OR HEATING	Unit undersized	Recalculate heating and cooling loads. If not excessive, possibly adding insulation will rectify the situation.
	Loss of conditioned air by leaks	Check for leaks in ductwork or introduction of ambient air through doors or windows.
	Airflow	Lack of adequate airflow or improper distribution of air. Replace dirty air filter.
	Refrigerant charge	Low on refrigerant charge causing inefficient operation.
	Compressor	Check for defective compressor. If discharge is too low and suction pressure is too high, compressor is not pumping properly. Replace compressor.
	Reversing valve	Defective reversing valve creating bypass of refrigerant from discharge to suction side of compressor. Discharge is too low and suction is too high. Replace reversing valve.
	Operating pressures	Compare unit operating pressures to the pressure / temperature chart for the unit.
	Refrigerant metering device	Check for possible restriction or defect. Replace if necessary.
	Moisture, non-condensable	The refrigerant system may be contaminated with moisture or non-condensable. Reclaim refrigerant, evacuate and recharge with factory recommended charge.
UNIT DOES NOT DEFROST	Loose Defrost Sensor	Ensure that the Defrost sensor is secured tightly to the return bend on the outdoor coil.
	Defrost Sensor not closed	The unit will not defrost if the defrost sensor is open.
A2L SENSOR STATUS 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 7 - Troubleshooting Table (2 of 2)

OPERATION & MAINTENANCE – HEAT PUMP SYSTEM

First-Pak units are factory charged with refrigerant. All 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 1/4” 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.

NOTE

Subcooling and superheat readings are reliable when the conditioned space is at comfortable conditions.

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

TABLE - 8

OPERATION & MAINTENANCE – HEAT PUMP SYSTEM (CONTINUED)

AIR CONDITIONING SYSTEM TROUBLESHOOTING

WARNING

FIRE OR EXPLOSION HAZARD

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

FIRE OR EXPLOSION HAZARD

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

Refrigerant service ports are located in the return air section of the unit. These ports provide easy access to high side (liquid line) and low side (suction line) system pressures for service and maintenance without removing the cooling chassis.
To access these two service ports, remove the air filter access panel.

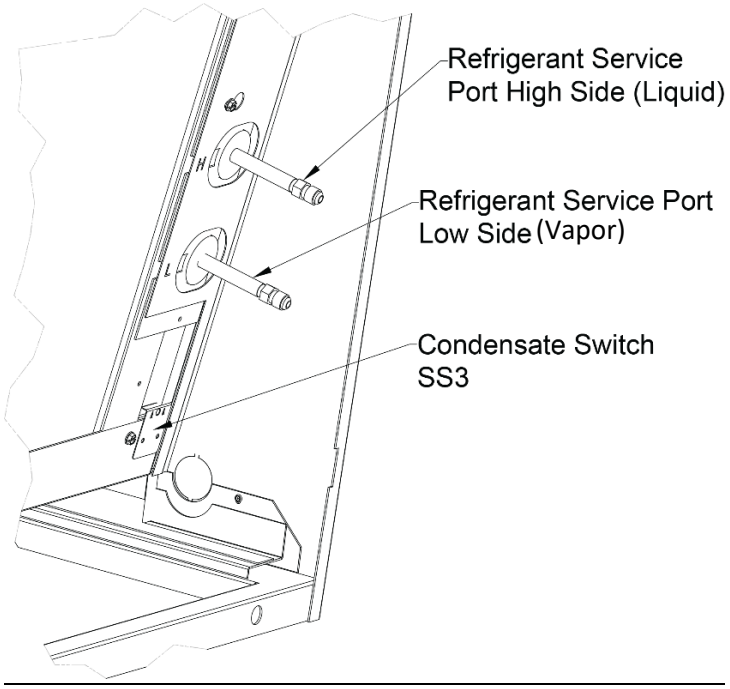


FIGURE 30 – Refrigeration Pressure Ports

COOLING CHASSIS REMOVAL

To fix a refrigerant leak or replace air conditioning components such as compressor, TXV, filter drier, etc., the cooling chassis must be removed. Follow the below procedure to remove the cooling chassis from the cabinet.

1) Turn off unit power at the external disconnect.
2) Remove screws (4) from front top panel and screws (2) from filter access panel. Remove both panels from unit. Refer to **Figure 31 – Removal of Front Panels**.

OPERATION & MAINTENANCE – HEAT PUMP SYSTEM (CONTINUED)

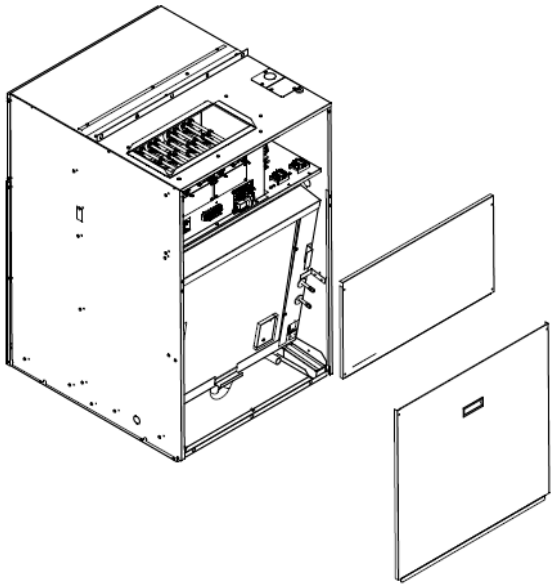


FIGURE 31 – Removal of Front Panels

3) Disconnect the low voltage connector and the two (2) high voltage connectors by pressing on the release tabs. Refer to **FIGURE 32- Electrical Power Disconnection.**

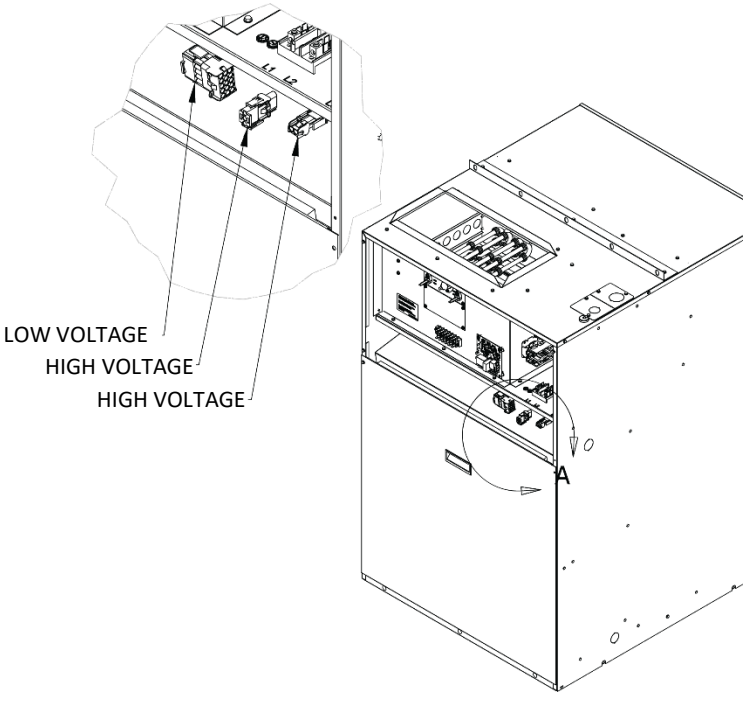
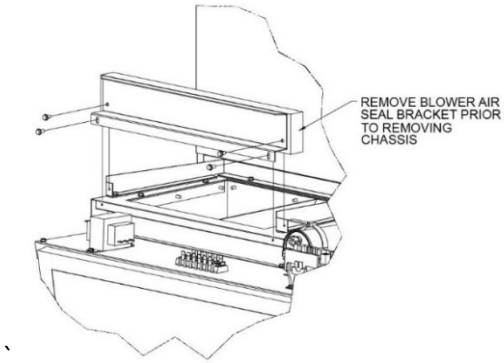


FIGURE 32 – Electrical Power Disconnection

4) Slide-out cooling chassis. **FIGURE 33–Slide Out Cooling Chassis.**



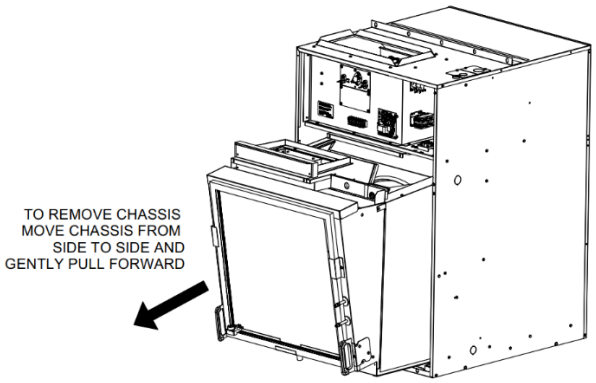


FIGURE 33 – Slide Out Cooling Chassis

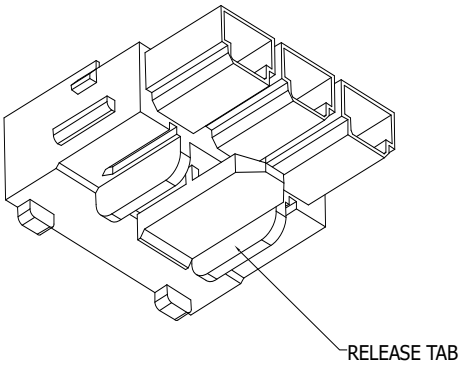


FIGURE 34- Line Voltage Connector

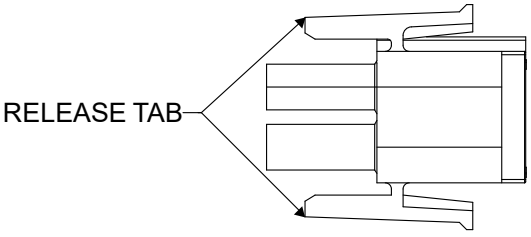


FIGURE 35- High Voltage Connector

OPERATION & MAINTENANCE – HEAT PUMP SYSTEM (CONTINUED)

WARNING

ELECTRIC SHOCK HAZARD

High efficiency brushless DC motors have power applied at all times. Disconnect power before servicing. See illustration above. Low voltage thermostat demand and board algorithms will control its use.

MAKE SURE POWER IS DISCONNECTED BEFORE SERVICING.

NOTE

All sealed system components are serviceable in the chassis

5) Evaporator and condenser coil side panels can be removed from the chassis section to access the two TXV's.

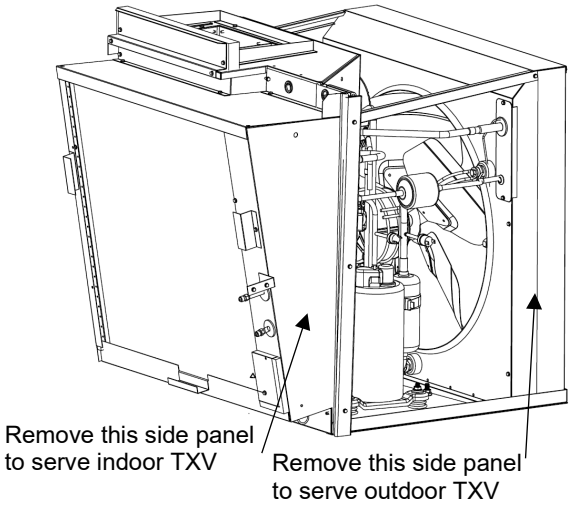


FIGURE 36- TXV Location Outside

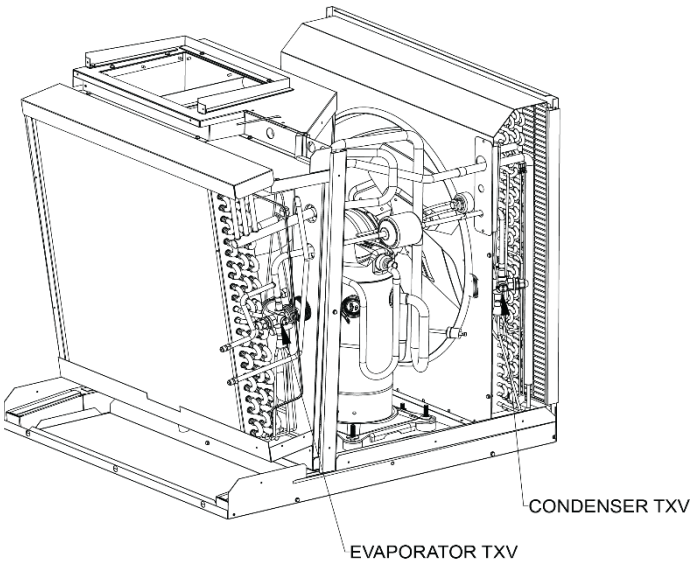


FIGURE 37- TXV Location Inside

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.

COOLING CHASSIS 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) Re-connect harnesses disconnected in step 3 of the removal process.

PREVENTIVE MAINTENANCE

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

OPERATION & MAINTENANCE – HEAT PUMP SYSTEM (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

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, 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 R-545B refrigerant tubing or components.

WARNING

WARNING FIRE, 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 exceed the maximum operating pressure listed on the unit rating plate.

WARNING

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

FAN

For any other air conditioning servicing, the refrigeration chassis can be removed as explained in the **COOLING MODULE REMOVAL** Section

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. It's recommended to clean filter at least 3 times in summer and winter season or more if needed. The air filter should be inspected every 30 days, replace or clean as needed. MERV rated filters may decrease air flow that could cause issues with the unit performance. Please contact factory for recommendations.

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. Care should not be taken to use toxic or caustic cleaning solutions. Steam cleaning is recommended.

CONDENSATE DRAIN PANS AND PIPES

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 startup and other annual data is an useful 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

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** _____ **L3-L4** _____ Compressor Amps _____

Running Voltage **L1-L2** _____ **L3-L4** _____ Blower Amps _____

Secondary Voltage _____ Condenser Fan Amps _____

C (black) to G (green) Volts* _____

C (black) to W (white) Volts* _____

*With thermostat calling.

TEMPERATURES

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

AIR CONDITIONING

Suction Pressure (Prior to Startup) _____Psig

Liquid Pressure (Prior to Startup) _____Psi

STARTUP & PERFORMANCE CHECKLIST CONTINUED

UNIT OPERATION

HEATING MODE

1 ELECTRIC HEATER AMPS _____

2 INDOOR BLOWER AMPS _____

3 TEMPERATURE RISE

Supply Air Temperature		_____
Return Air Temperature	–	_____
Temperature Rise	=	_____

4 TOTAL EXTERNAL STATIC

Supply External Static		_____
Return External Static	+	_____
Total External Static	=	_____

COOLING MODE

5 INDOOR BLOWER AMPS _____

6 TEMPERATURE DROP

Return Air Temperature		_____
Supply Air Temperature	–	_____
Temperature Drop	=	_____

7 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

10 AIR CONDITIONING

Suction Pressure _____ Psig Liquid Pressure _____Psig

Suction Temperature _____ °F Liquid Temperature _____°F

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.

NOTES

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

The manufacturer works to continually improve its products. It reserves the right to change design and specifications without notice.