

Installation, Operation, & Maintenance

IOM 4106
Rev. B 1/25

HX/HXX/HXS Series Horizontal Fan Coil Units

ATTENTION:

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



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



WARNING



Only personnel trained and qualified in the installation, adjustment, servicing, maintenance, or repair of the equipment described in this manual should perform service. The manufacturer is not responsible for any injury or property damage arising from improper service or procedures. In jurisdiction where licensing is required to service this equipment, only licensed personnel should perform the service.

Improper installation, adjustments, servicing, maintenance, or repair- or attempting to perform these tasks without proper training- may result in product damage, property damage, personal injury, or death. Service personnel assume responsibility for any injury or property damage resulting from improper procedure.

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SAFETY CONSIDERATIONS



1. READ THE ENTIRE MANUAL BEFORE STARTING THE INSTALLATION.
2. Improper installation, adjustment, alteration, service, maintenance, or use can cause explosion, fire, electrical shock, or other conditions which may cause personal injury damage.
3. Consult a qualified licensed installer, service agency, or your distributor for information assistance. The qualified licensed installer or service agency must use factory-authorized kits or accessories when servicing this product.
4. Refer to the individual instructions packaged with kits or accessories when installing.
5. Follow all safety codes.
6. Read these instructions thoroughly and follow all warnings or cautions attached to the unit. Consult local building codes and National Electrical Code (NEC) for special requirements.





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

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

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



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






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

	WARNING	
	ELECTRIC SHOCK HAZARD	
Signifies potential electrical shock hazards that could result in personal injury or death.		

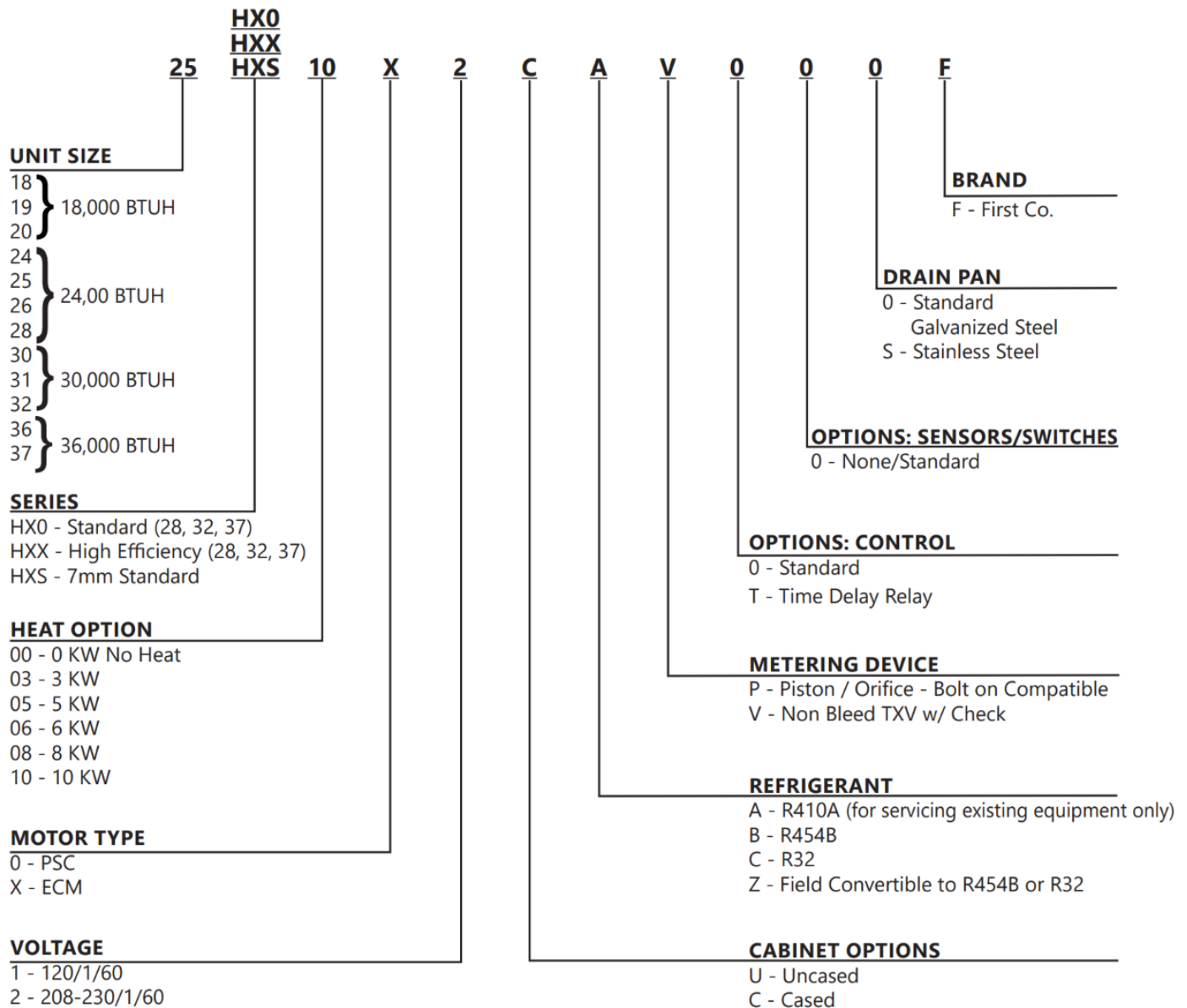
	CAUTION	
Indicates a potentially hazardous situation that may result in minor or moderate personal injury.		

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



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


	Service indicator; read technical manual
	Operator's manual; operating instructions
	Read the instructions
	Warning; flammable materials
	UN GHS flame symbol

NOMENCLATURE



SAFETY INFORMATION



 **WARNING** 

 Risk of fire. Flammable refrigerant used. To be repaired only by trained service personnel. Do not puncture refrigerant tubing.

Auxiliary devices which may be ignition sources shall not be installed in the ductwork, other than auxiliary devices listed for use with the specific appliance. See Instructions.



Dispose of refrigerant properly in accordance with federal or local regulations.

Failure to follow proper A2L refrigerant mitigation system installation instructions can result in property damage, personal injury, or death. If any fault indicators are present, please troubleshoot to prevent system malfunction.



 **WARNING** 

When a Refrigerant Leak Detection System is installed, the unit must be powered on at all times except for serving.



Installer must verify that the refrigerant sensor is properly installed and functioning or else the warranty will be voided. Failure to do so may result in fire, property damage or death.

 **WARNING** 

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.

 **WARNING** 

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



 **WARNING** 


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** 

This fan-coil must be installed in a location which is not accessible to the general public.

 **WARNING** 

 When the unit is using flammable refrigerant and is installed in a room with an area less than that outlined in section **Minimum Room Size and Mitigation Airflow**, that room shall be without continuously operating open flames or other potential ignition sources.

 **WARNING** 

 Auxiliary devices that may serve as potential ignition sources must not be installed in the ductwork. Potential ignition sources include hot surfaces exceeding 700°C and electrical switching devices.

INSTALLTION PRECAUTIONS

Installation of this fan coil should only be performed by a licensed contractor to ensure proper installation and the safety of the installer. The following are some precautions to be followed for typical installations.

- Always use proper tools and equipment.
- No wiring or other work should be attempted without first ensuring that the fan coil is completely disconnected from the power source and locked out. Always verify that a good ground connection exists prior to energizing any power sources.
- Always review the nameplate on each unit for proper voltage and control configurations. This information is determined from the components and wiring of the unit and may vary from unit to unit.
- When soldering or brazing to the unit, it is recommended to have a fire extinguisher readily available. When soldering close to metering devices or other components, heat shields or wet rags are required to prevent damage.


WARNING


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

- When the fan coil unit is in operation components are rotating at high speeds.
- Units must be installed level to ensure that the condensate water will drain toward the drain connection. An overflow drain toward the drain pan under the fan coil may be required as a backup to a clogged primary drain.
- Be sure that the drain pan is free from foreign material prior to start up.
- Check filter media installation to ensure that is installed correctly. Use the directional arrows or other information on the filter to determine the proper flow direction.
- Ensure that the air distribution system does not exceed the external static rating of the unit.

LOCATION AND CLEARANCE

Select a location that provides sufficient space for mounting and allows for ducting connections. Maintain a recommended clearance of 24 inches on all sides of the unit for service access. Units with "0" clearance to combustible materials. Always verify the specific clearance requirements on the units rating plate before installation. Refer to the dimensional data in figure 13-14 determine the space required for mounting HX/HXX/HXS units and enclosures

For installation in areas that may lead to physical damage (e.g., a garage), It is recommended to install a protective barrier to shield the unit. Ensure the unit is installed with a positive slope in the condensate line of 1/4 inch per foot to allow for proper drainage.



All joints made during installation between parts of the refrigerating system must remain accessible for maintenance purposed. Consult all applicable regulatory codes and guidelines prior to determining final clearances and completing the installation

GENERAL INFORMATION

HX/HXX/HXS units are ceiling mounted fan-coils comprised of a blower assembly, direct expansion coil and may include electric resistance heaters. The direct expansion coils are compatible with A1 as well as A2L refrigerants and the units must be fitted with an orifice or a thermostatic expansion valve (TXV) which is certified for the refrigerant which is used by the outdoor condensing unit or heat pump to which it is being connected.

If the fan-coil is to be connected to an outdoor unit which is charged with an A2L refrigerant a refrigerant sensor must be installed and properly connected to the unit.

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.

 **IMPORTANT** 

When a HX, HXX, or HXS fan-coil unit with electric heat is part of a heat pump system, also install a 942-1 heat pump kit

The manufacturer assumes no responsibility for equipment installed in violation of any code requirements.

These instructions give information relative to the installation of these fan coil units only. For other related equipment refer to the proper instructions.

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 and the material inspected in the presence of the carrier's representative. If damage is found, a claim should be filed against the carrier immediately.

FAN COIL UNIT



This unit may be installed at altitudes up to 10,000 ft. The installer must adhere strictly to all local and national code requirements pertaining to the installation of this equipment. These units are designed for installation in a horizontal position above a dropped ceiling.

 **WARNING** 

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

Free return installation (non-ducted return air): the furred down area must be completely sealed (except return air louver) to ensure that all return air is pulled from the conditioned space and not from other areas of the building structure.

When installing unit in close proximity to a room containing a shower, laundry room or other area which is prone to extreme humidity; return air must not be taken from these areas. Do not use a free return when the unit is installed in an extremely humid area of the conditioned space. Seal the return air duct to the unit and locate the return air louver(s) in a common area communicating with the supply-air duct system.

 **WARNING** 

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

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

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

FAN COIL UNIT (Continued)

WARNING

Use two or more people when moving and installing these units. Failure to do so could result in personal injury or death. Contact with metal edges and corners while applying excessive force can result in personal injury. Use gloves when handling equipment. Use caution during installation or while servicing equipment.

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.

WARNING

Unit must not be operated during building construction due to excessive airborne dust and debris. The unit must not be operated under any circumstances without an air filter in place.

WARNING

Refer to equipment rating plates for listed maximum operating pressure, do not exceed this pressure.

IMPORTANT

Electrical work associated with the installation of this appliance must comply with the National Electrical Code (NEC).

Access must be provided for servicing the unit. If this access is provided by a removable ceiling panel, ample space must be allowed for removal of the blower panels and to provide access to electrical and plumbing controls. While most fan coils are U.L. listed for installations with zero clearance to combustible materials, reference should be made to the marking on the particular unit being installed where specific information regarding clearances is provided.

AIR DISTRIBUTION DUCTS

All duct work must be installed in accordance with National Fire Protection Association Codes 90A and 90B. Ducts should be adequately insulated to prevent condensation during the cooling cycle and to minimize heat loss during the heating cycle. All return air must be filtered to prevent dirt buildup on the coil surface. If there is no ducted return, applicable installation codes may limit the unit to installation only in a single-story residence. In many cases it is acceptable to use ducting of the same size as the fan coil connections however, unique arrangements or long duct runs must be confirmed by a local professional. The manufacturer will not be responsible for misapplied equipment.

STATIC PRESSURE

These fan coil units are designed for quiet operation; however, all air conditioning equipment will transfer some amount of noise to the conditioned space. This should be taken into consideration when planning the location of the equipment.

The total external static pressure must be considered when planning installation and duct design. Refer to the rating label on your unit for more information, HX/HXS(PSC) units are recommended for use up to 0.5 in wc (125 Pa) total external static pressure. A unit operating at lower total external pressure will be more efficient and quieter vs. Operation at higher static pressure.

ELECTRICAL

WARNING

ELECTRIC SHOCK HAZARD

To avoid the risk of the fire or equipment damage, use only copper conductors.

Disconnect all power before servicing or installing this unit. Multiple power sources maybe present. The electrical power to this unit must be in the off position and all power supplies disconnected. Failure to do so may cause property damage, personal injury, or death

WARNING

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.

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 C22.1

Units are provided with wiring diagrams and nameplate data to provide information required for necessary field wiring. An enclosed terminal strip is provided on the left side of the unit (looking at the blower) for the connection of line voltage supply conductors. Refer to your unit wiring diagram.

WARNING

Any devices such as fan switches or thermostats that have been furnished by the factory for field installation must be wired in strict accordance with the wiring diagram that is supplied with the unit. Failure to do so could result in damage to components and will void all warranties.

WARNING

Transformers are multi-voltage; it is crucial to refer to unit wiring diagram as well as unit voltage to ensure proper connections and operation safety.

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

OVER CURRENT PROTECTION

HACR type breakers are recommended. Other over-current protection devices that comply with all applicable codes are acceptable.

Field installed electrical wiring supplying power to this unit and / or electric heaters must include a disconnect device at the unit.

OPERATING VOLTAGE

208/240 Volt HX, HXX, HXS fan-coil units are factory wired for a 240-volt supply. Follow the steps below to change the transformer primary wire connections at the time of installation when a 208-volt power supply is used.

FOR 208 VOLT OPERATION:

- 1) Disconnect and lockout all power supplies to the HX / HXX / HXS unit.
- 2) Disconnect the orange primary transformer wire from its connection point.
- 3) Connect the blue primary transformer wire to original connection point of the orange wire.
- 4) Cap-off the orange primary transformer wire.

THERMOSTAT WIRING

The unit provides 24 vac pig-tail wires to connect a 24-vac thermostat. This is located on the right side of the unit. (Looking at the blower) See low voltage detail on wire diagrams, Figures 1-8.

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.

Refer to the latest edition of the National Electric Code or in Canada the Canadian Electric Code when determining the correct wire size.

WIRING DIAGRAMS

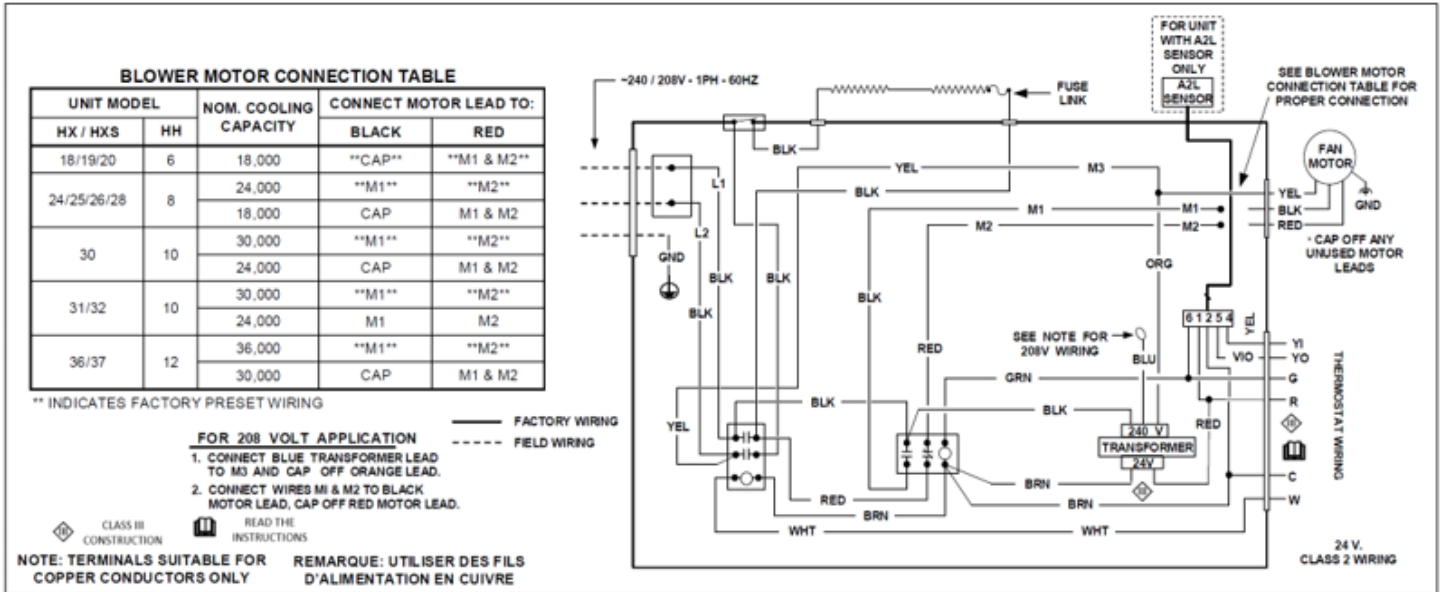


Figure 1- 208/240V 1 ELEMENT HEATER, PSC

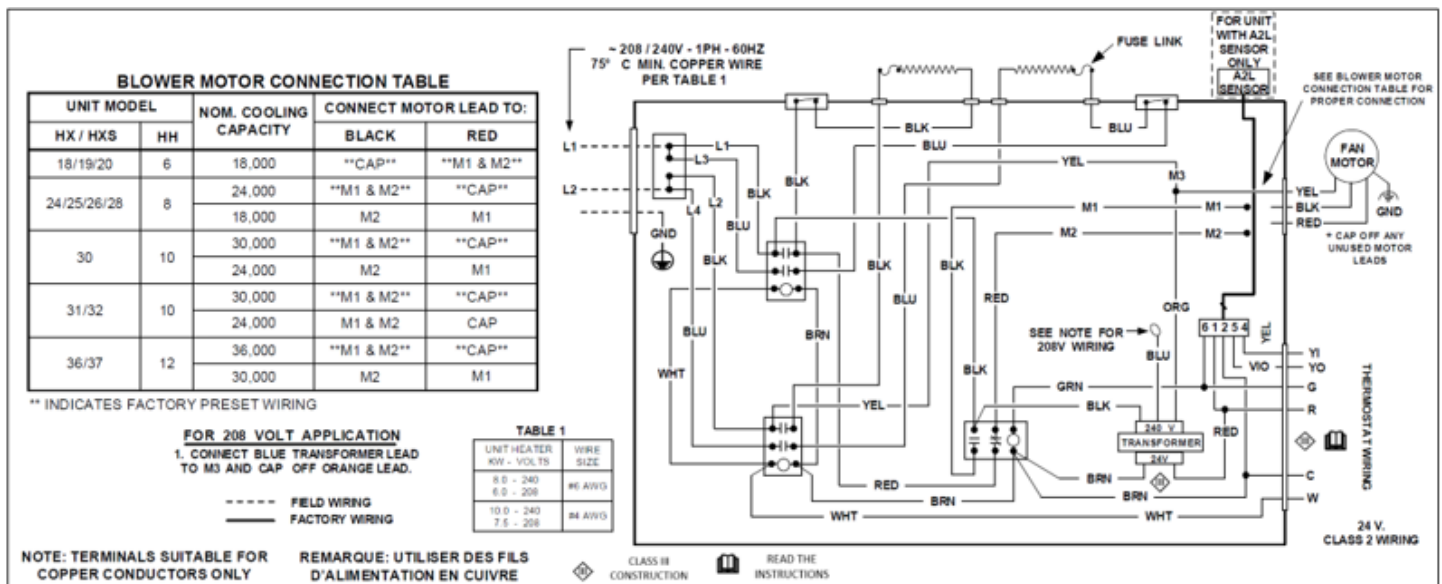


Figure 2 208/240V 2 ELEMENT HEATER, PSC

WIRING DIAGRAMS

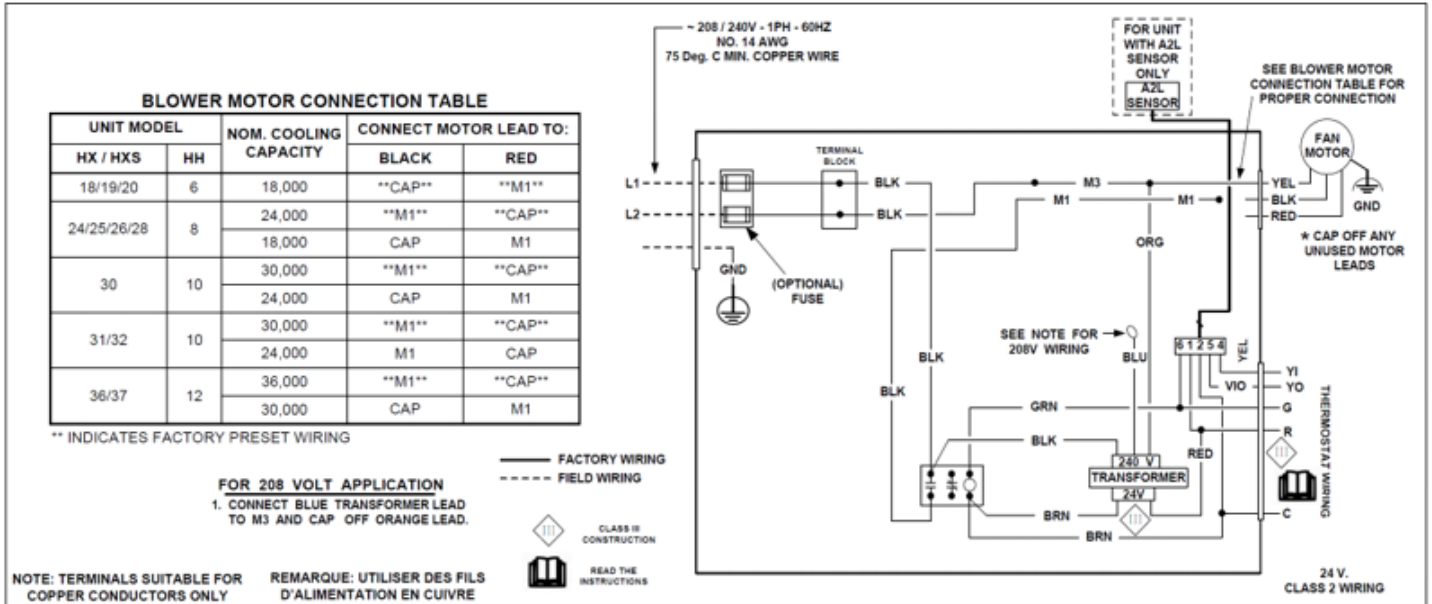


Figure 3 208/240V NO HEAT, PSC

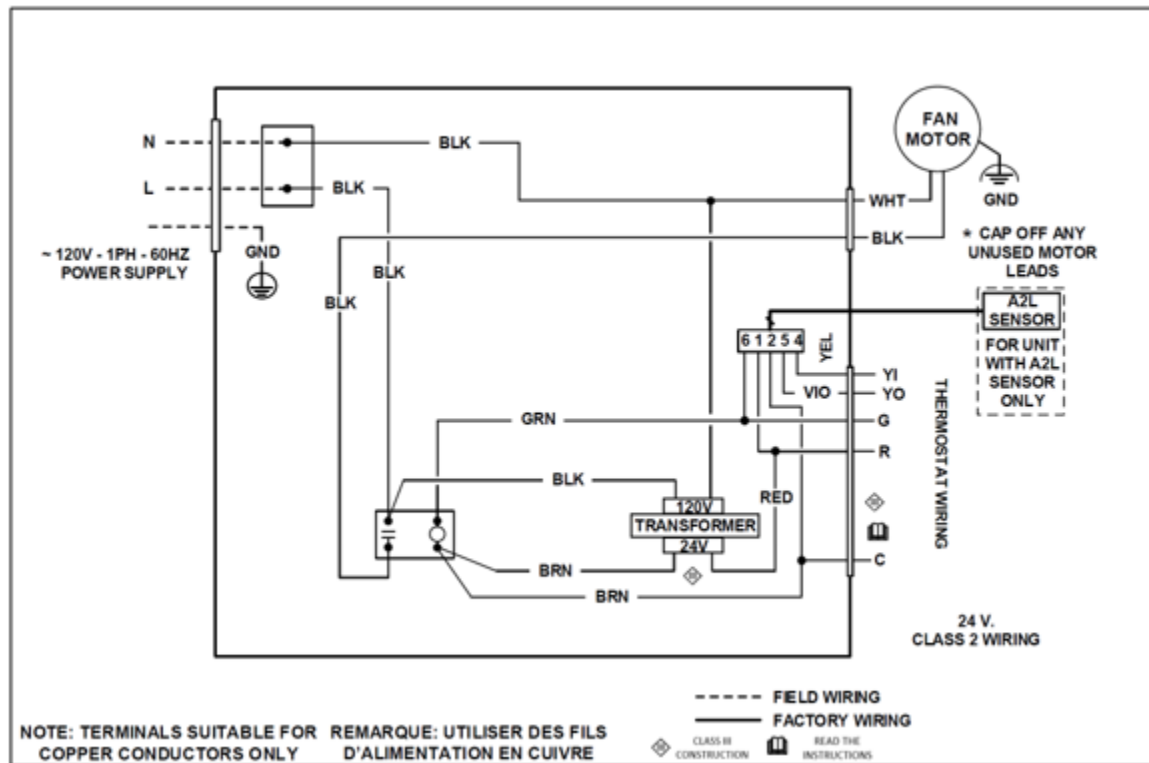


Figure 4 120V NO HEAT, PSC

WIRING DIAGRAMS

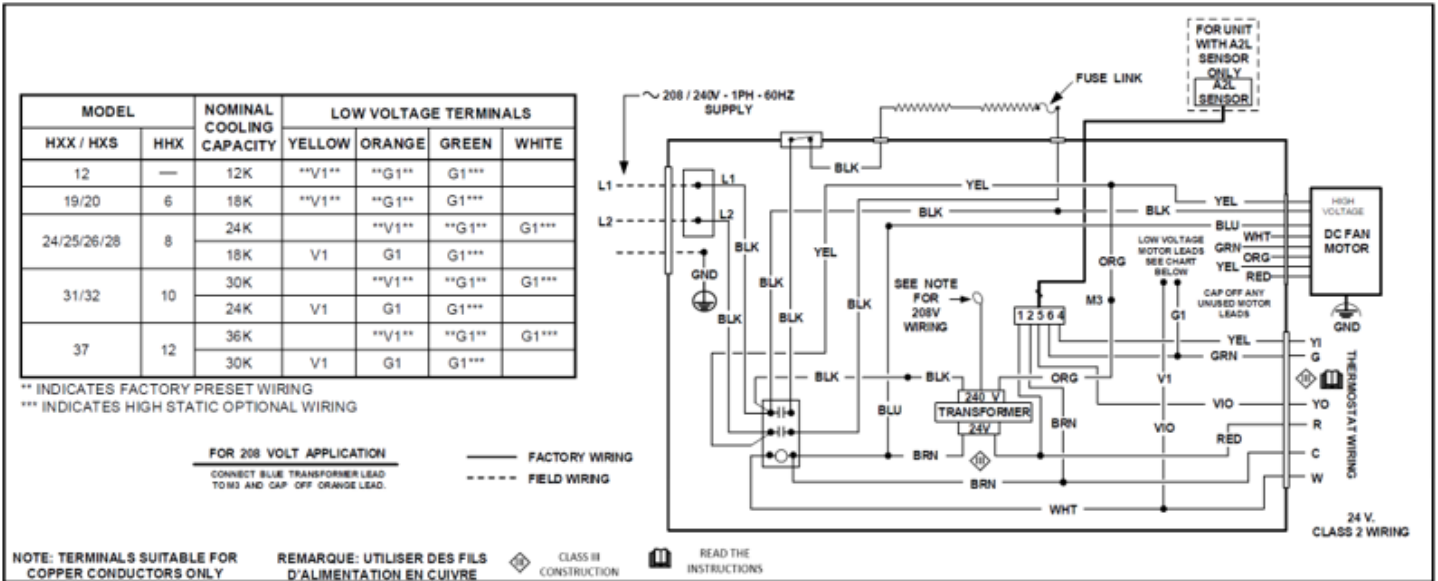


Figure 5 208/240V 1 ELEMENT HEATER, ECM

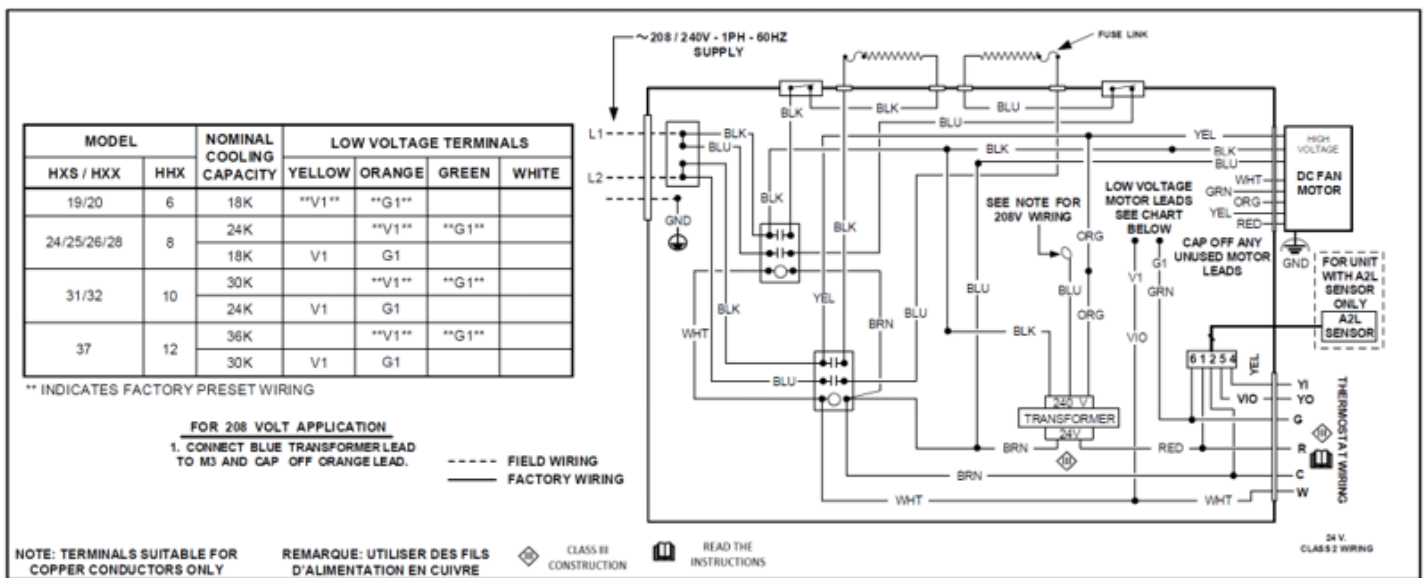


Figure 6 208/240V 2 ELEMENT HEATER, ECM

WIRING DIAGRAMS

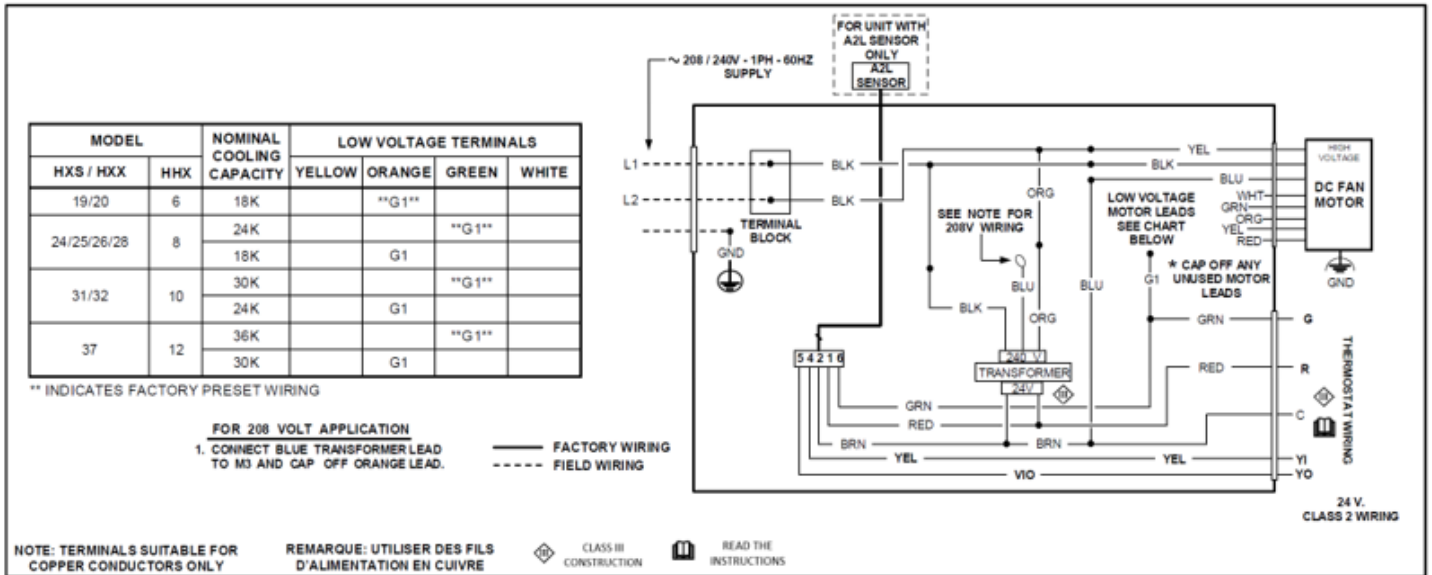


Figure 7 208/240V NO HEAT, ECM

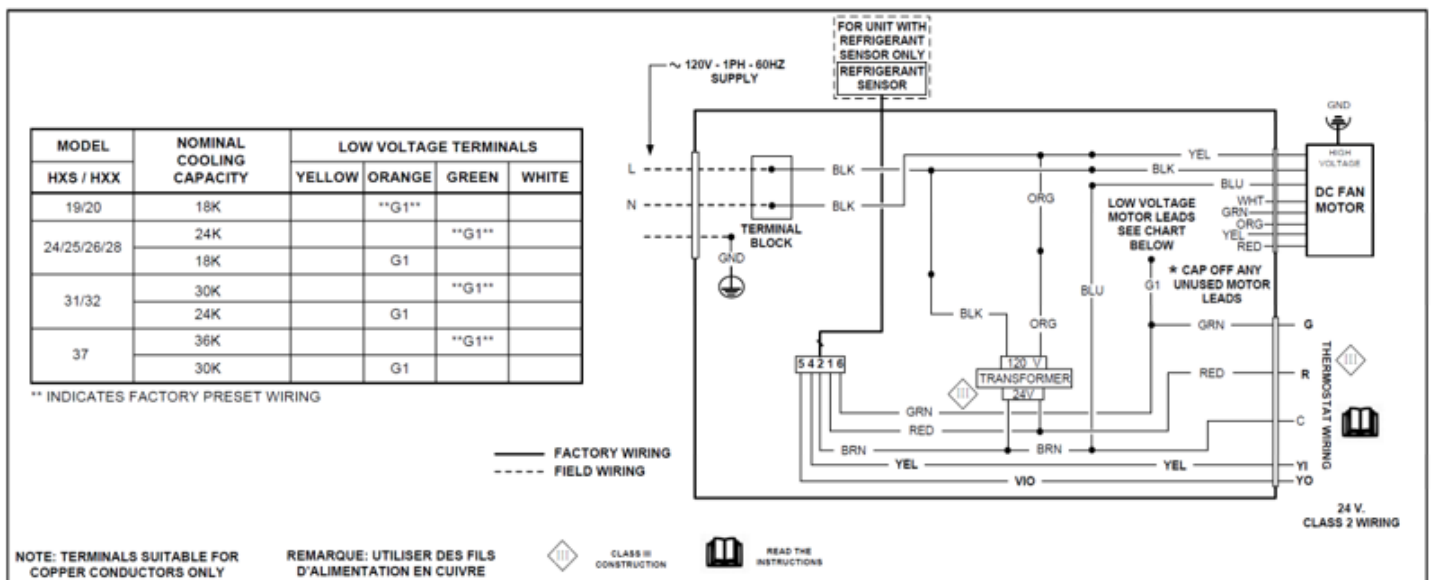


Figure 8 120V NO HEAT, ECM

MINIMUM ROOM SIZE AND MITIGATION AIRFLOW

These fan-coils are compatible with A1 as well as A2L refrigerants. However, additional critical components are required if they are used with A2L refrigerants. If not already pre-configured for A2L refrigerants from the factory a kit that is designed for a particular refrigerant must be field installed to ensure that any leakage of refrigerant is sensed and automatically mitigated.

Additionally, units charged with A2L refrigerants require a minimum room size for the application of the fan-coil as well as a minimum mitigation airflow. Both of these are determined as a function of the total refrigerant charge. The total charge is determined by the charge in the outdoor unit (see outdoor nameplate) plus the charge that was added to the system upon installation.

Minimum Room Size and Mitigation Airflow for R32 Systems					
System Charge		Minimum Room Area		Min. Mitigation Airflow	
(lb.)	(kg)	(sq ft)	(sq m)	(CFM)	(Cu m/hr.)
4	1.81	58	5.39	105	178
5	2.27	72	6.74	131	222
6	2.72	87	8.08	157	267
7	3.17	101	9.43	183	311
8	3.63	116	10.78	209	356
9	4.08	130	12.13	236	400
10	4.54	145	13.47	262	445
11	4.99	159	14.82	288	489
12	5.44	174	16.17	314	534
13	5.90	188	17.52	340	578
14	6.35	203	18.86	366	622
15	6.80	217	20.21	393	667
16	7.26	232	21.56	419	711
17	7.71	246	22.90	445	756
18	8.16	261	24.25	471	800
19	8.62	275	25.60	497	845
20	9.07	290	26.95	523	889
21	9.52	304	28.29	550	934
22	9.98	319	29.64	576	978
23	10.43	333	30.99	602	1023
24	10.88	348	32.34	628	1067
25	11.34	362	33.68	654	1112

TABLE 3

Minimum Room Size and Mitigation Airflow for R454B Systems					
System Charge		Minimum Room Area		Min. Mitigation Airflow	
(lb.)	(kg)	(sq ft)	(sq m)	(CFM)	(Cu m/hr.)
4	1.81	60	5.57	108	184
5	2.27	75	6.96	135	230
6	2.72	90	8.36	162	276
7	3.17	105	9.75	189	322
8	3.63	120	11.14	216	368
9	4.08	135	12.54	243	414
10	4.54	150	13.93	271	460
11	4.99	165	15.32	298	506
12	5.44	180	16.71	325	552
13	5.90	195	18.11	352	598
14	6.35	210	19.50	379	644
15	6.80	225	20.89	406	689
16	7.26	240	22.29	433	735
17	7.71	255	23.68	460	781
18	8.16	270	25.07	487	827
19	8.62	285	26.46	514	873
20	9.07	300	27.86	541	919
21	9.52	315	29.25	568	965
22	9.98	330	30.64	595	1011
23	10.43	345	32.04	622	1057
24	10.88	360	33.43	649	1103
25	11.34	375	34.82	676	1149

TABLE 4

For installations in locations above 800 meters the room size and mitigation airflow must be adjusted with a factor from this chart.

Altitude Correction Factor													
Altitude (m)	800	1000	1200	1400	1600	1800	2000	2200	2400	2600	2800	3000	3200
Altitude (ft)	2625	3281	3937	4593	5249	5906	6562	7218	7874	8530	9186	9843	10499
Adj Factor (AF)	1.02	1.05	1.07	1.1	1.12	1.15	1.18	1.21	1.25	1.28	1.32	1.36	1.4

TABLE 5

A2L SENSOR MOUNTING

When the unit is connected to a system using A2L refrigerants, verify that the A2L Sensor is installed and functioning properly.

1. Remove control box cover.
2. Attach A2L sensor to bracket with provided screws.
3. Attach bracket to unit. Use provided screws. Bracket is installed on the header side.
4. Remove knockout, and attach bushing in to protect sensor wire kit.
5. Connect the A2L harness from the sensor to the unit wiring kit polarized plug. Refer to the unit wiring diagram for sensor wiring. Figure 10 shows an example wiring diagram excerpt.
6. Use zip-ties (provided in kit) to tidy any long wires. Keep loose wires away from fan.

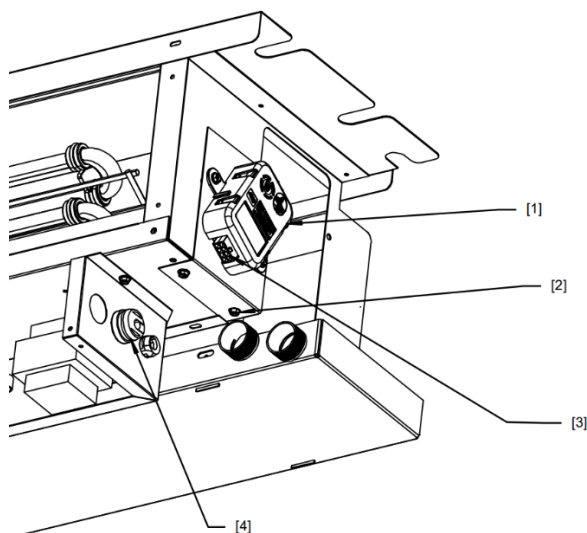


Figure 9 - Sensor Mounting Location

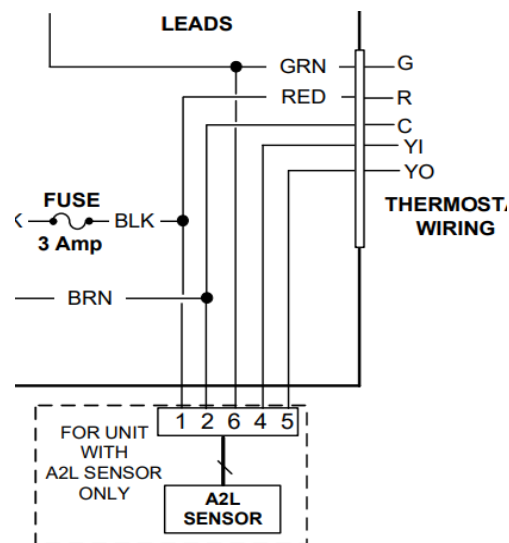


Figure 10 - Sensor Wiring

MOUNTING

The fan coil unit must be installed to ensure they are securely fixed and remain stable in position throughout their operation. The mounting structure must be capable of safely supporting the full weight of the equipment under all conditions. Use anchors that are appropriately sized and securely fastened to provide a safe and durable installation.

These units are equipped with four (4) mounting slots to facilitate secure attachment. Installers must use metal washers and nuts of the proper size, ensuring all connections are tight and stable. If mounting to wooden joists, use a minimum of 1/4-inch by 2-inch wood screws fully engaged with fender washers to secure the unit to the structure. If the mounting surface is uneven, shims must be used to achieve proper leveling, ensuring effective condensate drainage. See Figures 11 & 13.



WARNING



When connecting piping to fan coils, do not bend or reposition the coil header tubing for alignment purposes. This could cause a tubing fracture resulting in a refrigerant leak when pressure is applied to the system.

MOUNTING (Continued)



CAUTION



Extreme caution must be exercised to prevent internal damage during installation. Proper leveling and secure mounting will ensure optimal performance and prevent issues such as improper drainage or operational instability. Always consult local building codes and applicable standards during installation.

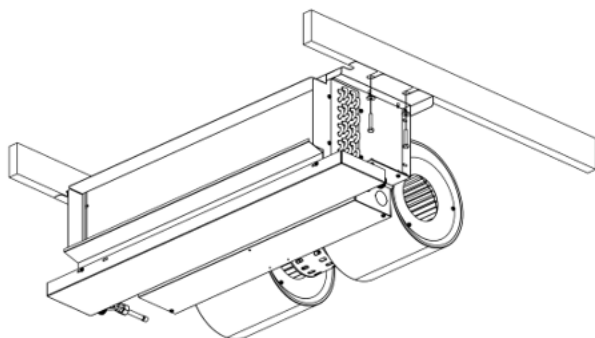


Figure 11 Structure Support with Fasteners

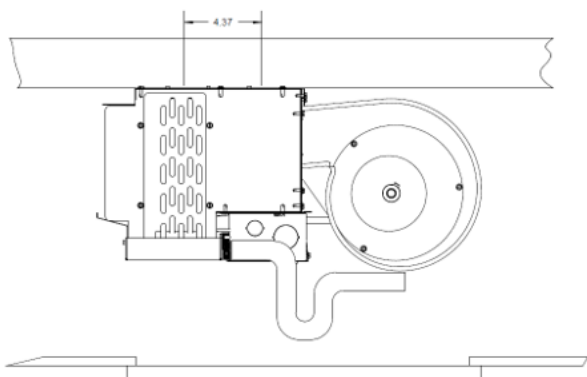


Figure 12 Structure Support Location

PHYSICAL DIMENSIONS

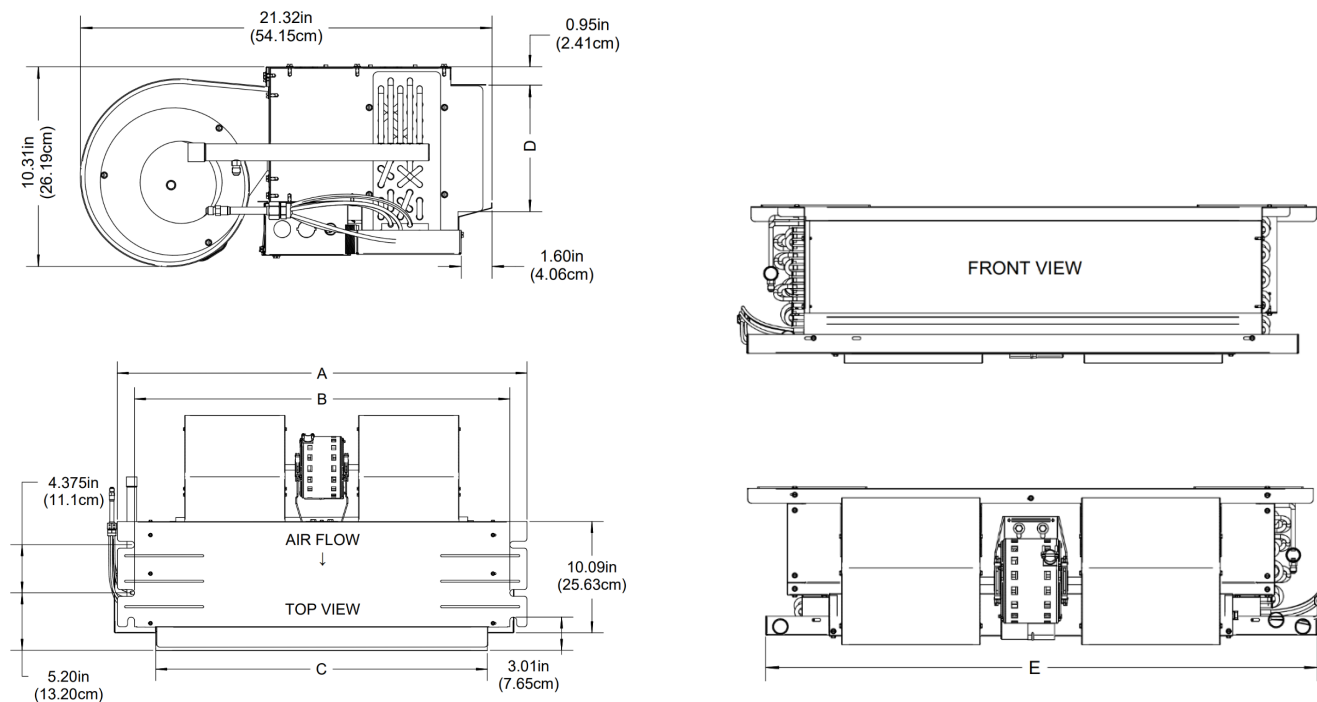


Figure 13 - PHYSICAL DIMENSIONS

PHYSICAL DIMENSIONS (CM)							
HX MODEL	HXS MODEL	HXX MODEL	A	B	C	D	E
18,19,24 HX	18,19,24 HXS	12, 19, 24 HXX	37.19" (94.46)	34.07" (86.54)	30" (76.20)	6.50" (16.50)	36.30" (92.20)
20, 25 HX	20, 25, 30 HXS	20, 25 HXX	43.19" (109.70)	40.07" (101.78)	36" (91.40)	6.50" (16.50)	42.30" (107.44)
26, 31 HX	26, 32, 36 HXS	26, 31 HXX	49.19" (124.94)	46.07" (117.02)	42" (124.50)	6.50" (16.50)	48.30" (122.68)
28, 32, 37 HX		28, 32, 37 HXX	56.19" (142.72)	53.07" (134.80)	49" (124.50)	6.50" (16.50)	55.30" (140.46)

TABLE 1

*Dimensions shown are for unit only. Room for refrigerant tubing, electrical, and drain piping must be considered along with adequate service clearance when planning the installation

ENCLOSURE DIMENSIONS

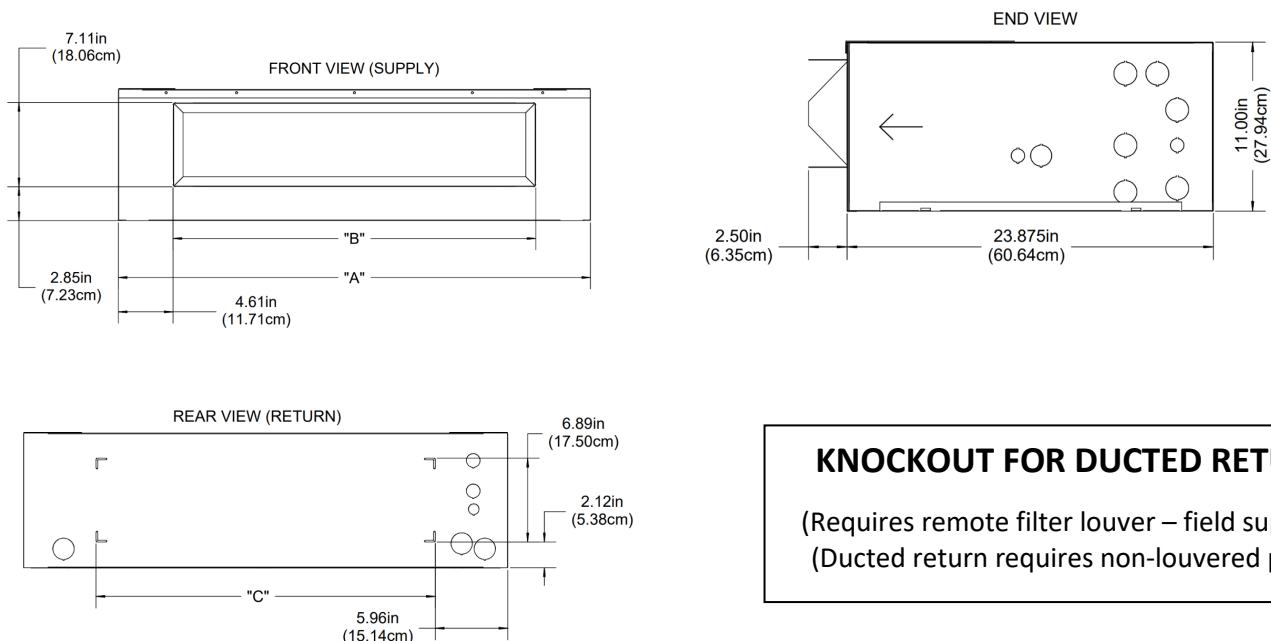


Figure 14 - ENCLOSURE DIMENSIONS

ENCLOSURE DIMENSIONS (CM)						
HX MODEL	HXS MODEL	HXX MODEL	ENCLOSURE NO.	A	B	C
18,19,24 HX	18,19,24 HXS	12, 19, 24 HXS	9EHX01	39-3/4" (101)	30-5/8" (78.8)	28" (71.1)
20, 25 HX	20, 25, 30 HXS	20, 25 HXX	9EHX02	45-3/4" (116.2)	36-5/8" (90)	34" (86.4)
26, 31 HX	26, 32, 36 HXS	26, 31 HXX	9EHX03	51-3/4" (131.4)	42-5/8" (108.3)	40" (101.6)
28, 32, 37 HX		28, 32, 37 HXX	9EHX04	28-3/4" (149.2)	50" (127)	46-3/4" (118.7)

TABLE 2

Dimensions shown are for enclosure only. Room for refrigerant tubing, electrical, and drain piping must be considered along with adequate service clearance when planning the installation.

COOLING COIL PIPING



WARNING



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

The HX, HXX, & HXS fan coil units are supplied with a direct expansion refrigerant coil. The suction and liquid refrigerant lines must be sized in accordance with the outdoor unit manufacturer's recommendations. Condensate drain lines must be installed with adequate slope away from the unit to assure positive drainage. Since the drain pan is located on the suction side of the blower, a negative pressure exists at the drain pan and a minimum trap of 1 inch (2.54cm) must be provided in the drain line to assure proper drainage.



WARNING



- Always wear eye protection.
- When fan coil is operating, some components are operating at high speeds. Personal injury can result from touching these items with any object.
- All electrical and service access panels must be returned and secured in their proper place.
- Clear surrounding area of all tools, equipment and debris.
- Check the entire unit to ensure its cleanliness.



NOTE



If a Condensate Overflow Shut-off Switch, that is designed to be installed in the drain line, is used in place of a secondary drain line, then the cut-off switch should be located in the primary drain line between the fan coil unit and the P-trap.

ELECTRIC HEATERS



HX, HXX, & HXS units are available with factory installed electric heat. Electric heaters must not be added to the HX, HXX, & HXS cabinet as a field installed item.



LEAK CHECK

After pipe installation perform a leak check to ensure that no leakage of refrigerants will occur. Use nitrogen to pressure test at a minimum of 200 psig. Pressure must not decrease within 1 hour. Care must be taken to not use any leak detectors which may cause corrosion on the copper tubing.

Evacuate the suction and liquid lines at the outdoor unit service valves to 500 microns. Isolate the vacuum pump from the piping. The vacuum must not exceed 1500 microns in 10 minutes.

REFRIGERANT CHARGING


WARNING





FIRE OR EXPLOSION HAZARD


Failure to following this warning could result in personal injury, death and/or property damage.
Do not use flames or any potential ignition sources to leak check refrigerant tubing or components.


IMPORTANT


Any metering device installed in the refrigerant circuit must be compatible with the refrigerant used.

Use adequate personal protection equipment when handling refrigerant including, but not limited to eye and hand protection. Consult the outdoor unit manufacturer's instructions for refrigerant charging and consider all pertinent factors when determining the method of charging and the amount of refrigerant required; indoor and outdoor temperatures and humidity, the factory charge amount of the outdoor unit, the length and diameter of tubing between the indoor and outdoor units, the type of metering device installed.


WARNING


IMPROPER HANDLING OF REFRIGERANTS CAN CAUSE INJURY, EXPLOSION AND DEATH

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

REFRIGERANT CHARGING (Continued)



WARNING



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



WARNING



It is illegal to discharge refrigerant into the atmosphere. Use proper reclaiming methods and equipment when installing or servicing this unit. A QUALIFIED service agency should perform this service.

Follow the outdoor unit manufacturer's instructions for adding refrigerant to a partially charged system.

PARTIAL SYSTEM CHARGING

FLAMMABLE REFRIGERANT LEAK DETECTION

Under no circumstances shall potentially 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. The following leak detection methods are deemed acceptable for all refrigerant systems. 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 too the refrigerant employed, and the appropriate percentage of gas (25 % maximum) is confirmed. Leak detection fluids 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. NOTE: Examples of leak detection fluids are bubble method, fluorescent method agents. 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 of refrigerant shall be according to removal and evacuation procedure.

REFRIGERANT CHARGING INSTRUCTIONS

When charging in cooling mode, the outdoor temperature should be 60°F or higher. To allow the pressures to stabilize, operate the system a minimum of 15 minutes between adjustments. When adjusting charge to systems with micro-channel outdoor coils, make small (1 ounce or less) adjustments as these systems are very sensitive to refrigerant charge.

TXV Charging – Follow the instructions provided in the outdoor unit instructions. Alternatively, charge to 12°F sub-cooling for AC units and 10°F sub-cooling for heat pump units. In addition, if equipped with an adjustable valve, adjust to 10°F superheat.

Fixed Orifice Charging – For A1 (R-410) & A2L (R-454B & R-32) refrigerant installation use the superheat recommended by the outdoor unit instructions. For heat pump units initially charged in the cooling mode, final adjustments to charge in the heating mode are acceptable if necessary. Some heat pump units require charging in the heating mode. In this case, refer to the outdoor instructions for recommended charging procedures. If the system is undercharged after the initial charge, add refrigerant until the sight glass is clear and recommended pressures, temperatures, sub-cooling and superheat can be obtained. If the system is overcharged after the initial charge, recover refrigerant until recommended pressures, temperatures, sub-cooling and superheat can be obtained.

ACCESSORIES

When installing a heat pump with a HX/ HXX / HXS unit equipped with electric heat, a 942-1 heat pump kit must be installed. Follow instructions included with the 942-1 or refer to Figures 15 and 16 and the instructions below for installing a 942-1 heat pump kit.

942-1 HEAT PUMP KIT (Installation Instructions)

APPLICATION

For use on model HX, HXX, & HXS fan coil units that are furnished with factory installed electric heat and are used as the indoor section of a heat pump system.

The thermostat sensor is used to prevent excessive discharge pressures should the electric heat be energized during mild weather conditions. On sensing an elevated liquid line temperature, the thermostat turns off the electric heat and keeps it off until the liquid line temperature returns to normal.

INSTALLATION

Install the thermostat sensor on the liquid line as shown in Figure 15. The exact location is not critical however the sensor must not be subjected to brazing temperatures or damage to the sensor element will occur. Wrap the foam tape insulation over the sensor element and secure with the wire tie. Clip off the push-on terminals located on the ends of the sensor wires.

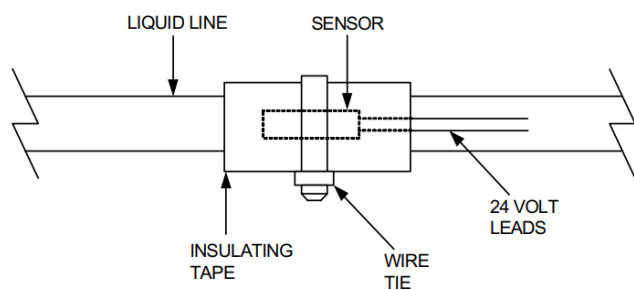


Figure 15 - Liquid Line

WIRING – 24 VOLT AC

The pigtail leads are connected between the “W” lead at the fan coil unit and the thermostat lead that energizes the supplemental electric resistance heat. The designation of this lead can vary depending on the heat pump thermostat used. Typical connections are as shown in Figure 19.

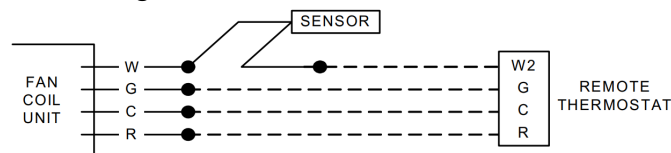


Figure 16 - Typical Connections

OPERATION AND MAINTENANCE

WARNING

FIRE OR EXPLOSION HAZARD

Failure to following this warning could result in personal injury, death and/or property damage. Do not attempt any sealed system repair without first recovering the entire refrigerant charge. 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

FIRE OR EXPLOSION HAZARD

Do not mix refrigerant with air for leak testing or other purposes.

To achieve maximum performance and service of life of each piece of equipment a formal schedule of regular maintenance should be established and maintained.

Use adequate personal protection equipment when performing maintenance. Use eye protection, cut resistant gloves and sleeves to protect against metal edges and screws.

PRE-START CHECK

- Check that supply voltage matches nameplate data.
- Ensure that the unit is properly grounded.
- With power off, check blower wheel set screws for tightness and ensure that the blower wheels rotate freely and quietly.
- Verify that refrigerant coil connections are leak free and insulated as required.

WARNING

The manufacturer does NOT WARRANT equipment subjected to abuse. Metal chips, dust, drywall tape, paint over spray, etc. can void warranties and liability for equipment failure, personal injury and property damage.

START-UP AND MAINTENANCE

WARNING

ELECTRIC SHOCK HAZARD

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

WARNING

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.

WARNING

Transformers are multi-voltage; it is crucial to refer to unit wiring diagram as well as unit voltage to ensure proper connections and operation safety.

Before start-up, all of the components should be given a thorough check. Optimal operation of this equipment requires cleanliness. Often after installation of this equipment additional construction activities occur. Care must be taken to protect the equipment from debris during these construction phases. All access panels and filters must be in place before operation of the units.

FAN

The fan should be inspected and cleaned, in conjunction with maintenance of the motor and bearings. It is important to keep the wheels clean in order to avoid imbalance and vibration.

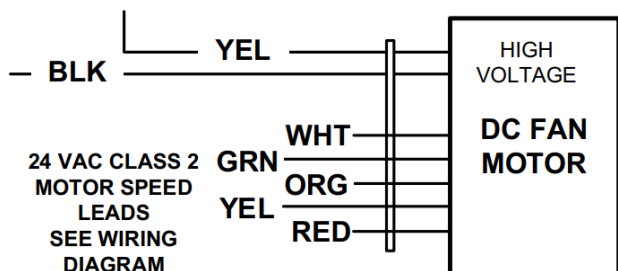
OPERATION AND MAINTENANCE (Continued)

MOTOR

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

The blower motor should be cleaned annually.

With DC motors, high voltage power is applied at all times.



BRUSHLESS DC MOTOR CONNECTIONS IF SO EQUIPPED

Figure 17 - Brushless DC Motor Connections

FILTER

The air filter should be cleaned or replaced every 30 days or more frequently if severe conditions exist.

Always replace the filter with the same type as originally furnished.

COIL

Any dust or other contaminants which accumulate on the heat transfer surfaces interferes with the airflow and impairs heat transfer. The coil must be kept clean by any of the following methods.

- Cleaning with low pressure compressed air.
- Flushing or rinsing with water (a detergent is advisable for greasy surfaces).

DRAIN PIPING

The drain should always be:

- Connected or piped to an acceptable disposal point sloped away from the unit at least 1/8" per foot.
- Checked before summer operation.
- Periodically checked during summer operation.

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)

REFRIGERANT DETECTION SENSOR (RDS) INFORMATION

For equipment utilizing A2L refrigerants, a Refrigerant Detection System (RDS) is installed on this unit to detect any A2L refrigerant leakage in the coil internal refrigerant containing components and will take action to mitigate any risk of ignition /fire.

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.

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.

OPERATION & MAINTENANCE (continued)

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 FLAMMABLE 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.

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 potentially 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.

OPERATION & MAINTENANCE (continued)

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.

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.

OPERATION & MAINTENANCE (continued)

DECOMMISSIONING

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:
 - i. mechanical handling equipment is available, if required, for handling refrigerant cylinders;
 - ii. all personal protective equipment is available and being used correctly;
 - iii. the recovery process is supervised at all times by a competent person;
 - iv. 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 or de-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.

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.

OPERATION & MAINTENANCE (continued)

Status Light Table for Refrigerant Detection System (RDS)		
Status Light	State / Condition	System Response
Green Blinking	Normal Operation	<ul style="list-style-type: none"> - The system is actively monitoring refrigerant levels. - No refrigerant detected above the activation threshold. - Outdoor unit compressor and indoor blower operate normally.
Red Continuous	Refrigerant Leak Detected	<ul style="list-style-type: none"> - Refrigerant concentration exceeds the activation threshold. - The outdoor unit compressor (Y) is turned off to prevent further circulation of refrigerant. - The indoor blower is turned on to recirculate air and mitigate the refrigerant concentration.
Red Blinking	Fault Detected	<ul style="list-style-type: none"> - A fault in the refrigerant detection system (e.g., calibration issue, end-of-life) has been detected. - The outdoor unit compressor (Y) and indoor blower mitigation mode are deactivated for safety. - System requires inspection or replacement.
No Light	System Off or Malfunction	<ul style="list-style-type: none"> - The system is not operational. - Check the power supply and all system connections.
Amber Blinking	System Initializing	<ul style="list-style-type: none"> - The system is warming up after power-up. - The outdoor unit compressor (Y) and indoor blower mitigation mode remain inactive during this phase. - Transitions to green blinking when monitoring begins.

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.

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