

# FMU5X, FMU5Z MULTIFAMILY CEILING MOUNT FAN COIL

## Installation Instructions

**NOTE:** Read the entire instruction manual before starting the installation.

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### SAFETY CONSIDERATIONS

Improper installation, adjustment, alteration, service, maintenance, or use can cause explosion, fire, electrical shock, or other conditions which may cause death, personal injury or property damage. Consult a qualified installer, service agency, or your distributor or branch for information or assistance. The qualified installer or agency must use factory-authorized kits or accessories when modifying this product. Refer to individual instructions packaged with kits or accessories when installing.

Follow all safety codes. Wear safety glasses, protective clothing, and work gloves. Use quenching cloth for brazing operations. Have a fire extinguisher available. Read these instructions thoroughly and follow all warning or cautions included in literature and attached to the unit. Consult local building codes and the current editions of the National Electrical Code (NEC) NFPA 70.

In Canada, refer to the current editions of Canadian Electrical Code CSA C22.1.

Recognize safety information. This is the safety alert symbol . When you see this symbol on the unit and in instructions or manuals, be alert to the potential for personal injury. Understand the signal words **DANGER**, **WARNING**, and **CAUTION**. These words are used with the safety alert symbol. **DANGER** identifies the most serious hazards which will result in severe personal injury or death. **WARNING** signifies hazards which could result in personal injury or death. **CAUTION** is used to identify unsafe practices, which may result in minor personal injury or product and property damage. **NOTE** is used to highlight suggestions which will result in enhanced installation, reliability, or operation.


### INTRODUCTION


FMU5X and FMU5Z Fan Coils are designed for horizontal orientation and are suitable for ceiling installations in conditioned spaces. These units are available with field -installed electric heat, and are used indoors as the fan coil for split -system heat pumps or air conditioners. FMU5X and FMU5Z models all have a factory-installed TXV and are available in 18,000 through 36,000 Btuh nominal cooling capacities. FMU5X units utilize a 3-speed PSC motor. FMU5Z units utilize a 5-speed ECM motor.

Field-installed heaters are available in 3, 5, 6, 7.5 and 10 kW sizes. The coil is equipped with sweat-type connections and is vapor-charged with dry nitrogen.

Units are designed for horizontal applications only. Local codes may limit this free-air-return type unit to installation in single-level applications.

**NOTE:** Nuisance sweating may occur if the unit is installed in a humid location with low airflow.

 **WARNING**



**PROPERTY OR PERSONAL INJURY HAZARD**

Risk of fire. Flammable refrigerant used.

To be repaired only by trained service personnel. Do not puncture refrigerant tubing.


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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 R-454B dissipation system installation instructions can result in property damage, personal injury, or death. If any fault codes are listed, please troubleshoot to prevent system malfunction.

 **WARNING**

**ELECTRICAL OPERATION HAZARD**

Failure to follow this warning could result in personal injury or death.

Before installing or servicing unit, always turn off all power to the unit. There may be more than one disconnect switch. Turn off accessory heater power if applicable. Lock out and tag switch with a suitable warning label.

**! WARNING**

**EXPLOSION HAZARD**  
 Failure to follow this warning could result in death, serious personal injury, and/or property damage.  
 Never use air or gases containing oxygen for leak testing or operating refrigerant compressors. Pressurized mixtures of air or gases containing oxygen can lead to an explosion.

**! CAUTION**

**CUT HAZARD**  
 Failure to follow this caution may result in personal injury.  
 Sheet metal parts may have sharp edges or burrs. Use care and wear appropriate protective clothing, safety glasses and gloves when handling parts.

**NOTE:** and filter maintenance.

**Refrigerant Charge and Room Area Limitations**

In UL/CSA 60335-2-40, R-454B refrigerant is classified as class A2L, which is mildly flammable. Therefore, R-454B refrigerant is suitable for systems needing additional refrigerant charge and which will limit the space of the rooms being served by the system.

Similarly, the total amount of refrigerant in the system shall be less than or equal to the allowable maximum refrigerant charge. The allowable maximum refrigerant charge depends on the space of the rooms being served by the system.

**NOTE:** The nouns in the table are explained as follows:

- Mc: the actual refrigerant charge in the system.
- A: the actual room area where the appliance is installed.
- Amin: the required minimum room area.
- Mmax: the allowable refrigerant charge in a room.
- Qmin: the minimum circulation airflow.
- Anvmin: The minimum opening area for connected rooms.

**Room Area Calculation Requirements**

**NOTE:** The space considered shall be any space which contains refrigerant-containing parts or into which refrigerant could be released. The room area (A) of the smallest, enclosed, occupied space shall be used in the determination of the refrigerant quantity limits.

For determination of room area (A) when used to calculate the refrigerant charge limit, the following shall apply. The room area (A) shall be defined as the room area enclosed by the projection to the base of the walls, partitions and doors of the space in which the appliance is installed. Spaces connected by only drop ceilings, ductwork, or similar connections shall not be considered a single space. Units mounted higher than 71" (1.8m) and spaces divided by partition walls that are no higher than 63" (1.6m) shall be considered a single space. Rooms on the same floor and connected by an open passageway between the spaces can be considered a single room when determining compliance to Amin, if the passageway complies with all of the following.

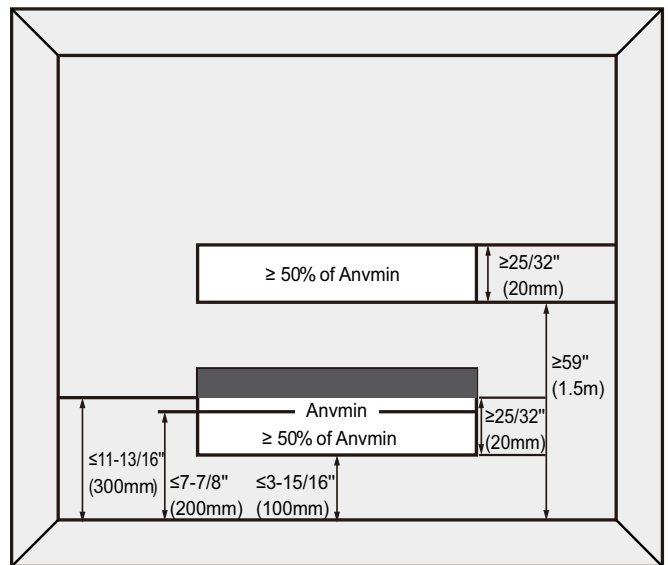
1. It is a permanent opening.
2. It extends to the floor.
3. It is intended for people to walk through.

The area of the connected rooms, on the same floor, connected by permanent opening in the walls and/or doors between occupied spaces, including gaps between the wall and the floor, can be considered a single room when determining compliance to Amin, provided all of the following conditions are met as Fig. 1.

1. Low level opening
  - a. The opening shall not be less than Anvmin in Table 1.

- b. The area of any openings above 11-3/16" (300mm) from the floor shall not be considered in determining compliance with Anvmin.
  - c. At least 50% of the opening area of Anvmin shall be below 7-7/8" (200mm) from the floor.
  - d. The bottom of the opening is not more than 100mm from the floor.
  - e. The opening is a permanent opening that cannot be closed.
  - f. For openings extending to the floor the height shall not be less than 7-7/8" (200mm) above the surface of the floor covering.
2. High level opening
    - a. The opening shall not be less than 50% of Anvmin in Table 1.
    - b. The opening is a permanent opening that cannot be closed.
    - c. The opening shall be at least 59" (1.5m) above the floor.
    - d. The height of the opening is not less than 20 mm.
  3. Room size requirement
    - a. The room into which refrigerant can leak, plus the connected adjacent room(s) shall have a total area not less than Amin. Amin shown in Table 1 or Table 3 under different conditions.
    - b. The room area in which the unit is installed shall be not less than 20% Amin. Amin is shown in Table 1 or Table 3 under different conditions.

**NOTE:** The requirement for the second opening can be met by drop ceilings, ventilation ducts, or similar arrangements that provide an airflow path between the connected rooms.



**Fig. 1 – Opening Conditions for Connected Rooms**

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For appliances serving one or more rooms with an air duct system, the room area calculation shall be determined based on the total area of the conditioned space (TA) connected by ducts taking into consideration that the circulating airflow distributed to all the rooms by the appliance integral indoor fan will mix and dilute the leaking refrigerant before entering any room.

**Table 1 – Minimum Opening Area for Connected Rooms**

A		Mc		Mmax		Anvmin	
ft <sup>2</sup>	m <sup>2</sup>	lb-oz	kg	lb-oz	kg	ft <sup>2</sup>	m <sup>2</sup>
100	11	17-3	7.8	6-10	0.3	1.3	0.14
110	12	17-3	7.8	7-5	3.3	1.2	0.13
120	13	17-3	7.8	8-0	3.6	1.1	0.12
130	14	17-3	7.8	8-10	3.9	1.0	0.11
140	16	17-3	7.8	9-5	4.2	1.0	0.11
150	17	17-3	7.8	10-0	4.5	0.9	0.10
160	18	17-3	7.8	10-10	4.8	0.8	0.09

**Table 1 – (Continued) Minimum Opening Area for Connected**

A		Mc		Mmax		Anvmin	
170	19	17-3	7.8	11-5	5.1	0.7	0.08
180	20	17-3	7.8	12-0	5.4	0.6	0.07
190	21	17-3	7.8	12-10	5.7	0.5	0.06
200	22	17-3	7.8	13-5	6.0	0.5	0.06
210	23	17-3	7.8	14-0	6.4	0.4	0.04
220	24	17-3	7.8	14-10	6.6	0.3	0.03
230	26	17-3	7.8	15-5	6.9	0.2	0.02
240	27	17-3	7.8	16-0	7.3	0.1	0.01
250	28	17-3	7.8	16-10	7.5	0.1	0.01
260	29	17-3	7.8	17-5	7.9	0.0	0.00

**The Maximum Refrigerant Charge and Minimum Room Area**

If the fan incorporated to an appliance is continuously operated or operation is initiated by a REFRIGERANT DETECTION SYSTEM with a sufficient CIRCULATION AIRFLOW rate, the maximum refrigerant charge (Mmax) and the required minimum room area (Amin) is shown in [Table 2](#) and [Table 3](#).

**Table 2 – Maximum Refrigerant Charge**

A/TA		Mmax		A/TA		Mmax	
ft <sup>2</sup>	m <sup>2</sup>	lb-oz	kg	ft <sup>2</sup>	m <sup>2</sup>	lb-oz	kg
40	4	2-10	2.6	160	18	10-10	10.6
50	6	3-5	3.3	170	19	11-5	11.3
60	7	4-0	4.0	180	20	12-0	12.0
70	8	4-10	4.6	190	21	12-10	12.6
80	9	5-5	5.3	200	22	13-5	13.3
90	10	6-0	6.0	210	23	14-0	14.0
100	11	6-10	6.6	220	24	14-10	14.6
110	12	7-5	7.3	230	26	15-5	15.3
120	13	8-0	8.0	240	27	16-0	16.0
130	14	8-10	8.6	250	28	16-10	16.6
140	16	9-5	9.3	260	29	17-5	17.3
150	17	10-0	10.0				

**Table 3 – Required Minimum Room Area**

Mc		Amin/Tamin		Mc		Amin/Tamin	
lb-oz	kg	ft <sup>2</sup>	m <sup>2</sup>	lb-oz	kg	ft <sup>2</sup>	m <sup>2</sup>
4-6	4.4	66.1	7.3	11-0	11.0	165.3	18.4
4-13	4.8	72.7	8.1	11-7	11.4	171.9	19.1
5-4	5.3	79.3	8.8	11-14	11.9	178.5	19.8
5-11	5.7	86.0	9.6	12-5	12.3	185.1	20.6
6-2	6.1	92.6	10.3	12-12	12.8	191.7	21.3
6-9	6.6	99.2	11.0	13-3	13.2	198.4	22.0
7-0	7.0	105.8	11.8	13-10	13.6	205.0	22.8
7-7	7.4	112.4	12.5	14-1	14.1	211.6	23.5
7-15	7.9	119.0	13.2	14-8	14.5	218.2	24.2
8-6	8.4	125.6	14.0	14-15	14.9	224.8	25.0
8-13	8.8	132.2	14.7	15-6	15.4	231.4	25.7
9-4	9.3	138.8	15.4	15-14	15.9	238.0	26.4
9-11	9.7	145.5	16.2	16-5	16.3	244.6	27.2
10-2	10.1	152.1	16.9	16-12	16.8	251.2	27.9
10-9	10.6	158.7	17.6	17-3	17.2	257.9	28.7

**Table 4 – Minimum Circulation Airflow**

Mc		Amin/Tamin		Mc		Amin/Tamin	
lb-oz	kg	CFM	m <sup>3</sup> /h	lb-oz	kg	CFM	m <sup>3</sup> /h
4-6	4.4	119	202.3	11-0	11.0	298	506.6
4-13	4.8	131	222.7	11-7	11.4	310	527.0
5-4	5.3	143	243.1	11-14	11.9	322	574.4
5-11	5.7	155	263.5	12-5	12.3	334	567.8
6-2	6.1	167	283.9	12-12	12.8	346	588.2
6-9	6.6	179	304.3	13-3	13.2	358	608.6
7-0	7.0	191	324.7	13-10	13.6	370	629.0
7-7	7.4	203	345.1	14-1	14.1	382	649.4
7-15	7.9	215	365.5	14-8	14.5	394	669.8
8-6	8.4	227	385.9	14-15	14.9	406	690.2
8-13	8.8	239	406.3	15-6	15.4	418	710.6
9-4	9.3	251	426.7	15-14	15.9	430	731.0
9-11	9.7	263	447.1	16-5	16.3	442	751.4
10-2	10.1	275	467.5	16-12	16.8	454	771.8
10-9	10.6	287	487.9	17-3	17.2	466	792.2

**NOTE:** The maximum refrigerant charge of [Table 2](#) or the required minimum room area of [Table 3](#) is available only if the following conditions are met: Minimum velocity of 1m/s<sup>2</sup>, which is calculated as the indoor unit airflow divided by the nominal face area of the outlet. And the grill area shall not be deducted. Minimum airflow rate must meet the corresponding values in Table1-5, which is related to the actual refrigerant charge of the system (Mc). R-454B refrigerant leakage sensor is configured.

**NOTE:** The maximum refrigerant limit described above applies to unventilated areas. If adding additional measures, such as areas with mechanical ventilation or natural ventilation, the maximum refrigerant charge can be increased or the minimum room area can be reduced. If the R-454B refrigerant leakage sensor is configured for the indoor unit, and meets the incorporated circulation airflow requirements, the maximum refrigerant charge or minimum room area can be determined according to [Table 3](#) or [Table 4](#).

**NOTE:** If the actual room area, outlet height, and refrigerant charge amount are not reflected in the above table, more severe cases need to be considered according to the data in the table.

**INSTALLATION**

**Check Equipment**

Unpack unit and move to final location. Remove from carton, avoid lifting from blower wheels, taking care not to damage unit. Inspect equipment for damage prior to installation. File claim with shipping company if shipment is damaged or incomplete. Locate rating plate on unit. It contains information needed to properly install unit. Check rating plate to be sure unit matches job specifications.

**NOTE:** Installation clearance from combustible materials is 0" (0 mm) from unit and supply-air duct.

**Mount Fan Coil**

**Fan Coil Mounting**

Mounting brackets are provided on all four corners of the casing for attachment of the fan coil to supporting structure. The supporting structure must be designed to safely support the full weight of the fan coil. Field supplied washers and bolts capable of supporting the fan coil load should be used to secure the fan coil to the supporting structure at the mounting slots.

The fan coil must be mounted level to ensure proper drainage of condensate. If the supporting structure is not level at the points of fan coil attachment, then spacers must be used to level the fan coil.

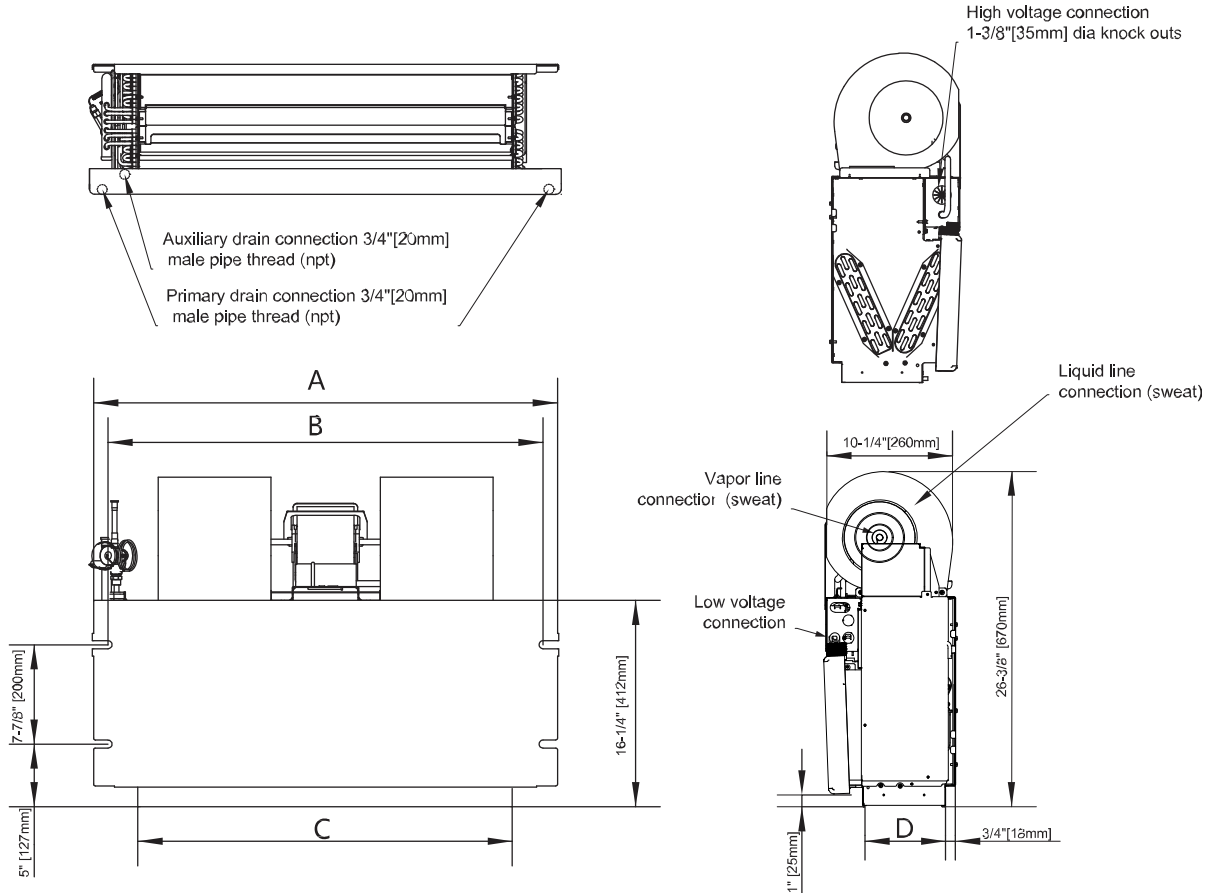
**For Conversion to Horizontal Return:**

1. Remove the back panel from the casing assembly.
2. Using the dimples on the back of the casing as a guide, pre-cut the insulation and remove to prevent damage that may occur while cutting the new return opening.
3. Cut the return opening into the sheet metal using the dimples as a guide.
4. Reinstall the back panel on to the casing.
5. Field fabricate and mount a cover panel to completely seal bottom return opening of the fan coil.

**After Mounting Unit, Install Refrigeration Tubing as Follows:**

1. Route tubing to connection points.
2. Remove plugs from liquid and vapor lines.
3. Wrap the TXV with a wet rag to prevent overheating.
4. Shield casing insulation with sheet metal in the area you will be brazing.
5. Braze connections using either silver bearing or non-silver bearing brazing material. Do not use soft solder (materials which melt below 800°F / 427°C). Consult local code requirements. Always flow nitrogen through the system refrigerant lines while brazing.

Pressurize system and leak test. Repeat procedure until leak free.



**Fig. 2 – Dimensional Drawing**

**Table 5 – Dimensional Data**

Model Size	Dimensions- inches [mm]				Unit Operating Weight lbs (kg)
	A	B	C	D	
18	37-1/4 [946]	34-11/16 [881]	30 [762]	6-1/2 [165]	6-1/2 [165]
24	37-1/4 [946]	34-11/16 [881]	30 [762]	6-1/2 [165]	6-1/2 [165]
30	49-1/4 [1251]	46-11/16 [1186]	42 [1067]	6-1/2 [165]	6-1/2 [165]
36	49-1/4 [1251]	46-11/16 [1186]	42 [1067]	6-1/2 [165]	6-1/2 [165]

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**! CAUTION**

**ENVIRONMENTAL HAZARD**  
 Failure to follow this caution may result in environmental damage.  
 Do not vent refrigerant to atmosphere. Recover during system repair or final unit disposal.

**Supply-Air Connections**

When fan coil is equipped with an electric heater, install air ducts in accordance with standards 90A and 90B of National Fire Protection Association (NFPA). Use of flexible connectors between ductwork and unit will prevent transmission of vibration. When electric heater is installed, use heat-resistant material for a flexible connector between ductwork and unit air discharge connection. Ductwork passing through unconditioned space must be insulated and covered with a vapor barrier. Local codes may limit this unit to single-level applications.

**! WARNING**

**INJURY HAZARD**  
 Failure to follow this warning could result in personal injury or death.  
 Do not, under any circumstances, connect return ductwork to any other heat-producing device such as fireplace inserts, stoves, etc. Unauthorized use of such devices may result in fire, carbon monoxide poisoning, explosion, personal injury or property damage.

Design the duct system in accordance with “ACCA” Manual “0” Design for Residential Winter and Summer Conditioning and Equipment Selection. Latest editions are available from: “ACCA” Air Conditioning Contractors of America. If duct system incorporates flexible air duct, be sure pressure drop information (straight length plus all turns) shown in “ACCA” Manual “D” is accounted for in system.

**RETURN AIR**

All return air must be filtered. Fan coil can be installed with a return-air duct, as long as airflow constraints published in the product data are met, or in a free return application. When installed as a backside ducted return, an insulated cover for the bottom casing opening must be field fabricated and installed. Refer to Fig. 2, dimension C for width of opening for ducted return. When installed as a free air return, a louvered panel must be used if the area the fan coil is installed is not sealed (see Product Data for louvered panel kit). Air filters should be located at the return air openings to the fan coil location. Refer to the Product Data sheet for a list of louvered access panel kits.

**Condensate Drain**

Condensate pan has primary and secondary drain connections to meet FHA requirements (Fig. 3). These connections have 3/4" (19 mm) male pipe threads. Tubing for all condensate drains should be a minimum of 7/8" (22 mm) OD. Drain lines from condensate pan to exterior of unit must be plastic pipe. Drain should be pitched downward at a slope of 1" per 10 feet (25 mm per 3 m). If coil is located in or above a living space where damage may result from condensate overflow, a separate 3/4" (19 mm) drain must be provided from secondary drain connection. Run this drain to a place in compliance with local installation codes where it will be noticed when unit is operational.

Condensate flow from secondary drain indicates a plugged primary drain. Install a 2" (51 mm) trap in condensate drain line as close to coil as possible. A factory approved drain trap kit is available. Make sure that the top of trap is below connection to drain pan to prevent condensate from overflowing drain pan. Prime all traps, test for leaks, and insulate in areas where sweating of the traps and drain lines could potentially cause water damage. Consult local codes for additional restrictions or precautions.

**NOTE:** Accessory UV-C lights are not approved for use with this fan coil.

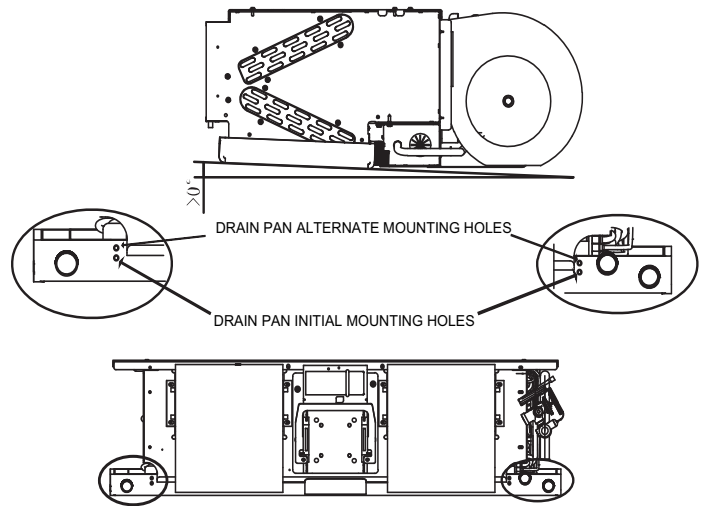


Fig. 3 – Alternate Condensate Pan Mounting Holes

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**Electrical Connections**

**! WARNING**

**ELECTRICAL OPERATION HAZARD**  
 Failure to follow this warning could result in personal injury or death.  
 Before installing or servicing the unit, always turn off all power to unit. There may be more than one disconnect switch. Turn off accessory heater power if applicable. Lock out and tag switch with a suitable warning label.

Refer to unit wiring instructions for recommended wiring procedures. Use No. 18 AWG color-coded, insulated (35°C minimum) wire to make low-voltage connections between thermostat and unit. If thermostat is located more than 100 ft. (30 m) from unit as measured along low-voltage wire, use No. 16 AWG color-coded, insulated (35°C minimum) wire.

**NOTE:** Before proceeding with electrical connections, make certain that voltage, frequency, and phase correspond to that specified on rating plate. Also, check to be sure that the service provided by utility is sufficient to handle additional load imposed by this equipment.

Refer to unit wiring label for proper field high- and low-voltage wiring. Make all electrical connections in accordance with NEC and any local codes or ordinances that might apply. Unit must have a separate branch electrical circuit.

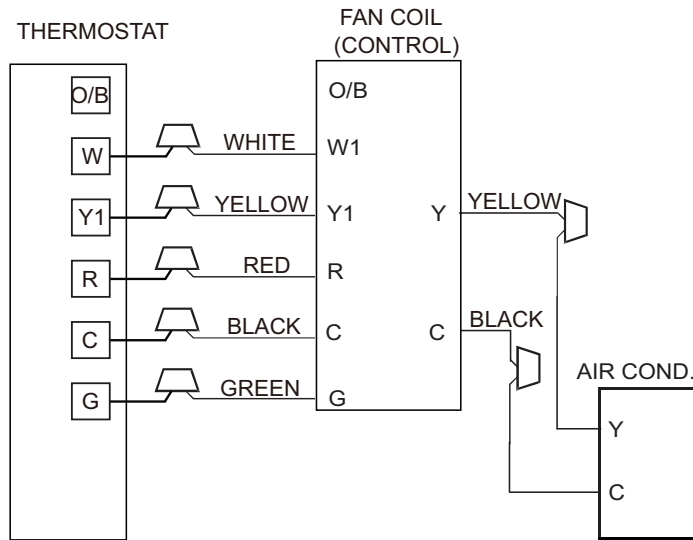
**! WARNING**

**ELECTRICAL SHOCK HAZARD**  
 Failure to follow this warning could result in personal injury or death.  
 Field wires on side of disconnect found in fan coil remain live, even when circuit breaker is off. Service and maintenance to incoming wiring cannot be performed until main disconnect switch (remote to the unit) is turned off. Lock out and tag switch with a suitable warning label.  
 Unit cabinet must have a continuous electrical path to ground in order to minimize potential for personal injury or death if an electrical fault should occur. This ground may consist of electrical wire or approved conduit when installed in accordance with existing codes. (See Item 3 below, regarding UL Listed Conduit.)

All units are shipped from factory wired for 240VAC transformer operation. For 208VAC operation, move primary lead from 240VAC terminal to 208VAC terminal.  
 See Fig. 4, and Fig. 5 for field low-voltage wiring See Fig. 2 for location of the electrical inlets. For maximum ampacity and over-current protection, see unit rating plate or product data sheet.

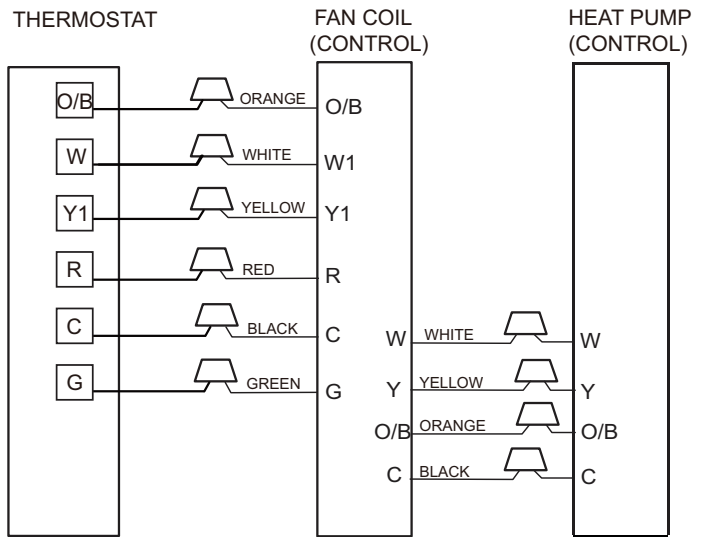
1. Provide power supply for unit being installed in accordance with unit wiring diagram and rating plate.
2. Connect line-voltage leads to the harness pigtail or the heat-kit terminal block. Use copper wire only.
3. Use UL listed conduit and conduit connector for connecting line-voltage leads to unit and obtaining proper ground. If conduit connection uses reducing washers, a separate ground wire must be used. Grounding can also be accomplished by using the ground lug provided in the control box. Power wiring may be connected to either the right or left sides or top of unit. Knockouts of 7/8" (22 mm) dia. are provided for connection of power wiring to unit. Some heater sizes may require a conduit larger than the 7/8" opening; in this situation the high-voltage connection opening should be enlarged to fit the conduit. When removing the knockouts for electrical connections, an opening in the insulation should be cut to fit the opening. The cut edge of the insulation should be reinforced with foil tape to prevent fraying. The foil facing and insulation shall not be removed beyond the knockout opening size.
4. Install plastic grommet packed with unit in hole for low-voltage wires.
5. Connect low-voltage leads to thermostat and outdoor unit. See Fig. 4, and Fig. 5 as well as the outdoor unit wiring label.

**NOTE:** For field installed electric heat, the leads from the 6-pin connector (L1 and L2) will need to be disconnected so the electric heat can plug into that connector. Refer to Fig. 6 and Fig. 7, and the electric heat installation instructions for more details.



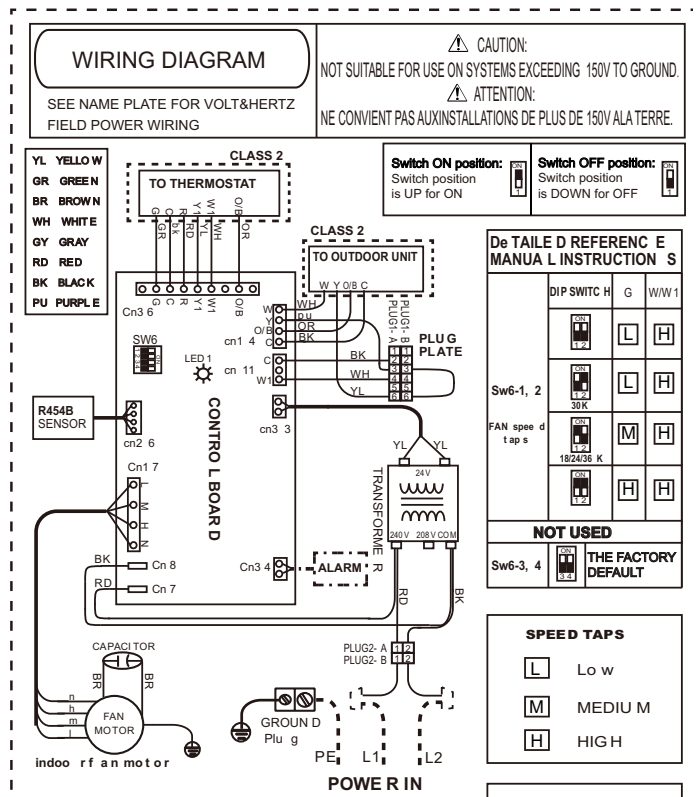
**Fig. 4 – Wiring Layout Air Conditioning Unit (Cooling and 1-Stage Heat)**

A150158A



**Fig. 5 – Wiring Layout Heat Pump Unit (Cooling and 2-Stage Heat)**

A150159A



- NOTES:**
- 1: Connect R to R, G to G, Y to Y, etc. See outdoor instruction for details.
  - 2: If some signal lines of CN36 are not used, please wrap them up separately with CAP.
- CAUTION:**
- 1: Use copper wire (75°C min) only between disconnect switch and unit.
  - 2: To be wired in accordance with NEC and local codes.
  - 3: If any of the original wires, as supplied, must be replaced. Use the same or equivalent type wires.
  - 4: If the input voltage is 208 V, please change the transformer tap by taking the red wire to 208V terminal.
  - 5: The rated operating condition of Alarm is 24 VAC/1A or 30 VDC/1A or 250 VAC/1A.

LED1 STATUS	CONTENT
Steady ON	NORMAL OPERATION
OFF	POWER SUPPLY FAILURE
Steady FLASHING	REFRIGERANT LEAK PROTECTION
3 FLASH/CYCLE	R454B REFRIGERANT SENSOR FAULT
4 FLASH/CYCLE	R454B REFRIGERANT SENSOR COMMUNICATION FAULT
8 FLASH/CYCLE	R454B REFRIGERANT SENSOR OVER SERVICE LIFE

Factory code	Date	Revision
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**Fig. 6 – Wiring Diagram - PSC**

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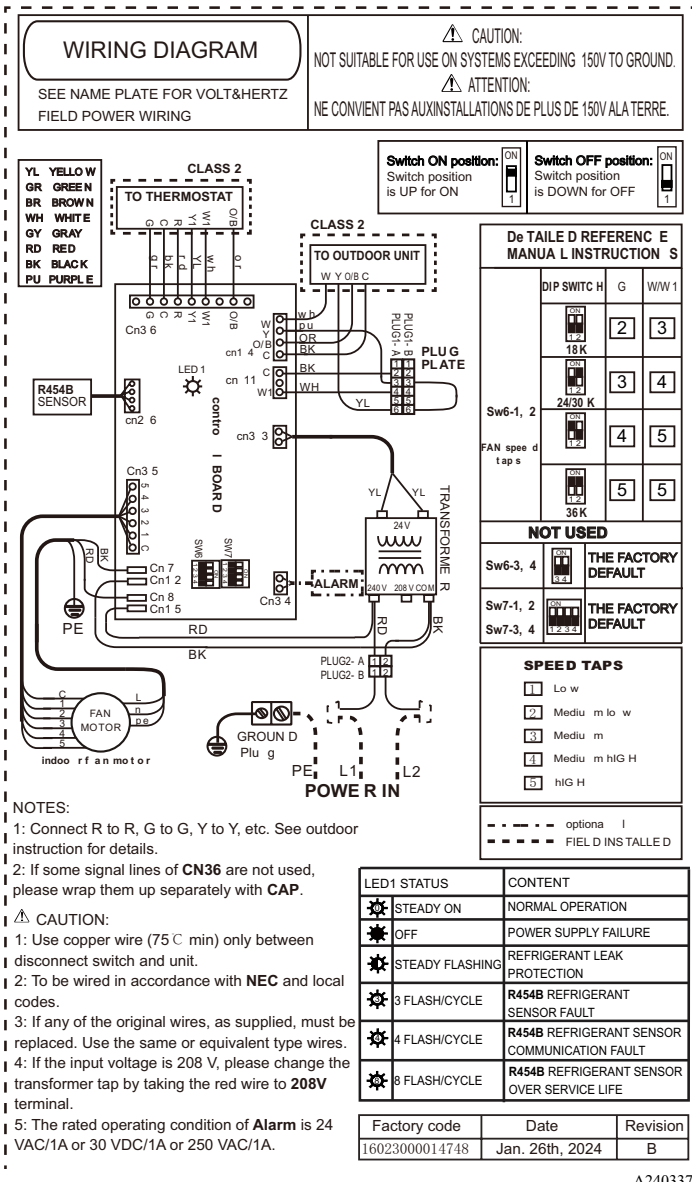


Fig. 7 – Wiring Diagram - ECM

A240337

**TXV**

**NOTE:** The TXVs are preset at the factory and do not need adjustment for reliable operation.

**! WARNING**

**PERSONAL INJURY OR PROPERTY DAMAGE**

These instructions are exclusively intended for qualified contractors and authorized installers.

Work on the refrigerant circuit with flammable refrigerant in safety group A2L may only be carried out by authorized heating contractors. These heating contractors must be trained in accordance with UL 60335-2-40, Section HH. The certificate of competence from an industry accredited body is required.

Work on electrical equipment may only be carried out by a qualified electrician.

Before initial commissioning, all safety related points must be checked by the particular certified heating contractors. The system must be commissioned by the system installer or a qualified person authorized by the installer.

For installation of the indoor unit, refer to the corresponding installation and operation manual. If an indoor unit is installed in an unventilated area, the area shall be so constructed that should any refrigerant leak, it will not stagnate so as to create a fire or explosion hazard.

The appliance shall be stored so as to prevent mechanical damage from occurring.

Do not stack combustible materials on the surface of the indoor unit.

**LEAK DISSIPATION SYSTEM**

**! WARNING**

**PERSONAL INJURY OR PROPERTY DAMAGE HAZARD**

Failure to follow proper R-454B mitigation system installation instructions can result in property damage, personal injury, or death.

If any fault codes are listed, please troubleshoot to prevent system malfunction.

The units come equipped with a factory wired R-454B leak detection and dissipation system to ensure safe operation during a leak. The system consists of a bracket, a PCB, a A2L Detection Sensor, and a drain pan clip. Failure to install this system will result in potentially hazardous conditions and improper equipment operation, and void all system warranties and liabilities.

All units are shipped with the A2L Detection Sensor located on the back side of the coil (Fig. 8).

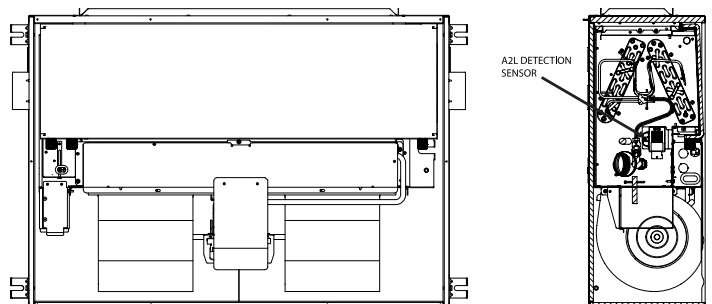



Fig. 8 – Location of Dissipation Sensor

A230605


The A2L Detection Sensor is attached to a wiring harness that connects the sensor to the control board. Refer to Fig. 4 and Fig. 5 for low voltage field connections between the control board and the thermostat. All control wires are labeled with the wire function and landing point.

### Leak Dissipation System Self-Test

Power on the unit and verify proper functioning of equipment. The green LED on the control board should be steady (Fig. 9). If flash codes are present, see Table 6.


WARNING

LEAK DETECTION SYSTEM is installed on indoor unit. Unit must be powered except for service. Continuous air circulation required for proper functioning. Unit must be powered except for service. This unit is equipped with electrically powered safety measures. To be effective, the unit must be electrically powered at all times after installation, other than when servicing.


CAUTION

The refrigerant leakage sensor can only use the factory model or the specified model indicated in the corresponding manual.

The R-454B refrigerant leakage sensor must be used to activate the refrigerant shut-off device, the alarm device, incorporated circulation airflow or other emergency controls, which shall give an electrical signal at a predetermined alarm set point in response to leaked refrigerant.

The location of leakage sensors shall be chosen in relation to the different installation scenarios. Please refer to the indoor unit installation manual for specific requirements.

The installation of the refrigerant leakage sensor shall allow access for checking, repair or replacement by an authorized person.

The refrigerant leakage sensor shall be installed so its function can be verified easily.

The refrigerant leakage sensor shall be protected to prevent tampering or unauthorized resetting of the pre-set value.

To be effective, the refrigerant leakage sensor must be electrically powered at all times after installation, other than when servicing.

If the refrigerant leakage sensor detects a refrigerant leak, the fan will be turned on to the maximum, the compressor will stop running. You should immediately leave the leak area and notify a professional for handling.

The service life of the refrigerant sensor is 15 years, and it should be replaced after the service life or if the sensor is determined to be faulty during the service life.

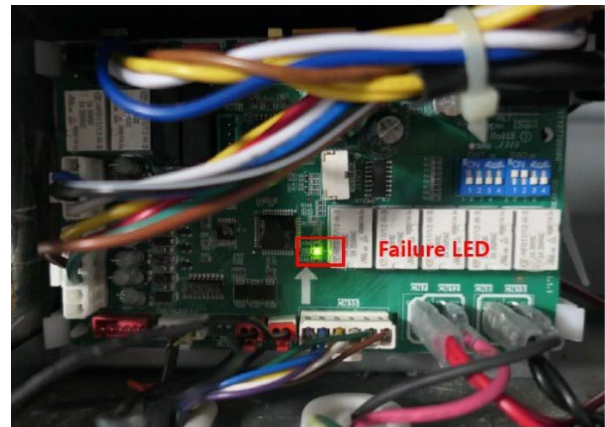


Fig. 9 – Control Board LED

A230606

Table 6 – Control Board Test Functions

LED Status	Description
Steady ON	Normal Operation
OFF	Power Supply Failure
Steady Flashing	Dissipation Mode Active
3 Flash / Cycle	A2L Sensor Error
4 Flash / Cycle	A2L Sensor Communication Error
8 Flash / Cycle	A2L Sensor Over Service Life

Ensure that the fan coil is able to meet the minimum required dissipation mode airflows. These required minimum airflow rates during Dissipation Mode are listed in Table 7. They are based on the total system refrigerant charge quantity.

Table 7 – Required Minimum Dissipation Mode Airflows, based on Total System Refrigerant Charge Quantity

Total System Charge (lb)	Minimum Required Dissipation Airflow (CFM)	Total System Charge (lb)	Minimum Required Dissipation Airflow (CFM)
5	133	16	426
6	160	17	452
7	186	18	479
8	213	19	505
9	239	20	532
10	266	21	559
11	293	22	585
12	319	23	612
13	346	24	639
14	372	25	665
15	399		

### START-UP

Refer to outdoor unit Installation Instructions for system start-up instructions and refrigerant charging method details.

### SEQUENCE OF OPERATION

The following sequence of operation is based on units installed with ECM/PSC motor and Time Delay Board (TDB). For units with ECM motor, the off-delay is programmed into the motor. Follow Table 2, ECM Motor Speed Taps & the corresponding blower off delays for each speed tap. PSC models are factory wired with TDB active. Follow Fig. 6 to disable blower off time delay. When wired in this configuration no blower off-delay will occur in any mode.

## Continuous Fan

Thermostat closes R to G. G energizes and completes circuit to indoor blower motor. When G is de-energized, there is a 90 sec blower off-delay.

## Cooling Mode

Thermostat energizes R to G, R to Y, and R to O (heat pump only). G energizes and completes indoor blower motor. Y energizes outdoor unit (O is energized for heat pump). When cooling call is satisfied, G is de-energized, there is a 90 sec blower off-delay.

## Heat Pump Heating Mode

Thermostat energizes R to G and R to Y. G energizes and completes circuit to indoor blower motor. When heating call is satisfied, G is de-energized, there is a 90 sec blower off-delay.

## Heat Pump Heating With Auxiliary Electric Heat

Thermostat energizes R to G, R to Y, and R to W1. G energizes and completes circuit to indoor blower motor. W1 energizes electric heat relay(s) which completes circuit to heater element(s). When W1 is de-energized, electric heat relay(s) open, turning off heater elements. When G is de-energized there is a 90 sec blower off-delay.

## Electric Heat Or Emergency Heat Mode

Thermostat energizes R to W1. W1 energizes electric heat relay(s) which completes circuit to heater element(s). Blower motor is energized through normally closed contacts on fan relay. When W1 is de-energized, electric heat relay(s) opens, there is no blower off-delay.

## CARE AND MAINTENANCE

For continuing high performance and to minimize possible equipment failure, it is essential that periodic maintenance be performed on this equipment. The only required maintenance that may be performed by the consumer is filter maintenance.

### WARNING

#### ELECTRICAL OPERATION HAZARD

Failure to follow this warning could result in personal injury or death. Disconnect all power to unit before servicing field wires or removing control package. The disconnect (when used) on access panel does not allow safe service to all other parts of unit. If unit does not have a disconnect, disregard the foregoing. Instead, make sure that a disconnecting means is within sight from, and is readily accessible from, the unit. Disconnect all electrical power to unit before performing any maintenance or service on it. Lock out and tag switch with a suitable warning label.

The minimum maintenance requirements for this equipment are as follows:

1. Inspect and clean or replace air filter each month or as required.
2. Inspect cooling coil, drain pan, and condensate drain each cooling season for cleanliness. Clean as necessary.
3. Inspect blower motor and wheel for cleanliness each heating and cooling season. Clean as necessary.
4. Inspect electrical connections for tightness and controls for proper operation each heating and cooling season. Service as necessary.

### CAUTION

#### CUT HAZARD

Failure to follow this caution may result in personal injury. Sheet metal parts may have sharp edges or burrs. Use care and wear appropriate protective clothing, safety glasses and gloves when handling parts.

**NOTE:** The installing technician should explain system operation to the consumer with particular emphasis on indoor fan coil operation sounds and filter maintenance.

## ELECTRICAL WIRING

Field wiring must comply with the National Electric Code (C.E.C. in Canada) and any applicable local ordinance.

### WARNING

#### ELECTROCUTION HAZARD

Disconnect all power to unit before installing or servicing. More than one disconnect switch may be required to de-energize the equipment. Hazardous voltage can cause severe personal injury or death.

### Control Wiring

**IMPORTANT:** Class 2 low voltage control wiring should not be run in conduit with main power wiring and must be separated from power wiring, unless class 1 wire of proper voltage rating is used.

Low voltage control wiring should be 18 Awg. color-coded. For lengths longer than 100 ft., 16 Awg. wire should be used.

Low voltage control connections are made to low voltage pigtailed extending from top of unit.

Connections for control wiring are made with wire nuts. Control wiring knockouts (5/8" and 7/8") are also provided on the right and left side of the unit for side connection.

See wiring diagrams attached to indoor and outdoor sections to be connected. Make sure, after installation, that separation of control wiring and power wiring has been maintained.

**Power Wiring**

It is important that proper electrical power is available for connection to the unit model being installed. See the unit nameplate wiring diagram and electrical data in the installation instructions.

If required, install a branch circuit disconnect of adequate size, located within sight of, and readily accessible to the unit.


**IMPORTANT:** After the Electric Heater is installed, units may be equipped with one two or three 30-60 amp. circuit breakers. These breaker(s) protect the internal wiring in the event of a short circuit and serve as a disconnect. Circuit breakers installed within the unit do not provide over-current protection of the supply wiring and therefore may be sized larger than the branch circuit protection.

**NOTE:** The indoor unit air switch cannot be used as a circuit breaker and cannot be operated by users. Maintenance personnel need to disconnect the main switch before operation.

Supply circuit power wiring must be 75°C minimum copper conductors only. See Electrical Data in this section for ampacity, wire size and circuit protector requirement. Supply circuit protective devices may be either fuses or "HACR" type circuit breakers.

Power wiring may be connected to either the right, left side or top. Three 7/8", 1-3/8", 1-3/4" dia. concentric knockouts are provided for connection of power wiring to unit.

Power wiring is connected to the power terminal block in unit electric cabinet.

 <b>WARNING</b>
<p><b>SHOCK HAZARD</b></p> <p>The unit must be permanently grounded. Failure to do so can result in electrical shock causing personal injury or death.</p>

Grounding may be accomplished by grounding metal conduit when installed in accordance with electrical codes to the unit cabinet.


Grounding may also be accomplished by attaching ground wire(s) to ground lug(s) provided in the unit wiring compartment.

Ground lug(s) are located close to wire entrance on left side of unit (up-flow). Lug(s) may be moved to marked locations near wire entrance on right side of unit (up-flow). If alternate location is more convenient.

Use of multiple supply circuits require grounding of each circuit to lug (s) provided in unit.

**DUCTWORK**

Field ductwork must comply with the National Fire Protection Association NFPA 90A, NFPA 90B and any applicable local ordinance.

 <b>WARNING</b>
<p><b>PERSONAL INJURY HAZARD</b></p> <p>Do not, under any circumstances, connect return ductwork to any other heat producing device such as fireplace insert, stove, etc. Unauthorized use of such devices may result in fire, carbon monoxide poisoning, explosion, personal injury or property damage.</p>

Sheet metal ductwork in unconditioned spaces must be insulated and covered with a vapor barrier. Fibrous ductwork may be used if constructed and installed in accordance with SMACNA Construction Standard on Fibrous Glass Ducts. Ductwork must comply with National Fire Protection Association as tested by UL Standard 181 for Class I Air Ducts. Check local codes for requirements on ductwork and insulation.

Duct system must be designed within the range of external static pressure the unit is designed to operate against. It is important that the system airflow be adequate. Make sure supply and return ductwork, grills, special filters, accessories, etc. are accounted for in total resistance. See airflow performance tables in this manual.


Design the duct system in accordance with "ACCA" Manual "D" Design for Residential Winter and Summer Air Conditioning and Equipment Selection. Latest editions are available from: "ACCA" Air Conditioning Contractors of America, 1513 16th Street, N.W., Washington, D.C. 20036. If duct system incorporates flexible air duct, be sure pressure drop information (straight length plus all turns) shown in "ACCA" Manual "D" is accounted for in the system.

Supply plenum is attached to the 3/4" duct flanges supplied with the unit. Attach flanges around the blower outlet.

**IMPORTANT:** If an elbow is included in the plenum close to the unit, it can not be smaller than the dimensions of the supply duct flange on the unit.

**IMPORTANT:** The front flange on the return duct if connected to the blower casing must not be screwed into the area where the power wiring is located. Drills or sharp screw points can damage insulation on wires located inside unit.

Secure the supply and return ductwork to the unit flanges, using proper fasteners for the type of duct used and tape the duct-to-unit joint as required to prevent air leaks.

 <b>WARNING</b>
<p><b>PERSONAL INJURY HAZARD</b></p> <p>If appliances connected via an air duct system to one or more rooms are installed in a room with an area less than shown in Annex A table 2-2, that room shall be without continuously operating open flames (e.g. an operating gas appliance) or other potential ignition sources (for example, an operating electric heater, hot surfaces). A flame-producing device may be installed in the same space if the device is provided with an effective flame arrest. For appliances connected via an air duct system to one or more rooms, auxiliary devices which may be a potential ignition source shall not be installed in the ductwork. Examples of such potential ignition sources are hot surfaces with a temperature exceeding 700°C and electric switching devices. For appliances connected via an air duct system to one or more rooms, only auxiliary devices approved by the appliance manufacturer or declared suitable with the refrigerant shall be installed in connecting ductwork.</p>

**Table 8 – PSC -Airflow Performance (Standard CFM)**

Model	Motor Speed	CFM Wet Coil without Filter or Electric Heat, Uncased, Bottom Return							
		External Static Pressure-Inches W.C.[kPa]							
		0[0]	0.05[.0125]	0.1[.025]	0.15[.0375]	0.2[.050]	0.25[.0625]	0.3[.075]	0.35[.0875]
18K	Low	720	696	667	639	600	545	466	386
	Med - Factory	990	945	897	845	788	727	656	531
	High	1041	991	940	882	823	763	687	574
24K	Low	720	696	667	639	600	545	466	386
	Med - Factory	990	945	897	845	788	727	656	531
	High	1041	991	940	882	823	763	687	574
Model	Motor Speed	CFM Wet Coil without Filter or Electric Heat, Uncased, Bottom Return							
		External Static Pressure-Inches W.C.[kPa]							
		0[0]	0.1[.025]	0.2[.050]	0.3[.075]	0.38[.095]	0.4[.100]	0.5[.125]	0.6[.150]
30K	Low - Factory	1177	1103	1024	934	858	843	742	626
	Med	1298	1218	1140	1058	972	957	859	737
	High	1418	1346	1272	1185	1116	1096	980	863
36K	Low	1177	1103	1024	934	858	843	742	626
	Med - Factory	1298	1218	1140	1058	972	957	859	737
	High	1418	1346	1272	1185	1116	1096	980	863

- Shaded boxes represent airflow outside the required 300-450 CFM/ton
- 1. Airflow data includes electric heat and filter.
- 2. Airflow data is with no return grill. When using a return grill on 18 & 24 sizes, decrease numbers above by approx. 10 CFM. For 30 & 36 sizes, decrease numbers above by approx. 50 CFM

**Table 9 – ECM - Airflow Performance (Standard CFM)**

Model	Motor Speed	CFM Wet Coil without Filter or Electric Heat, Uncased, Back Return							
		External Static Pressure-Inches W.C.[kPa]							
		0[0]	0.1[.025]	0.2[.050]	0.3[.075]	0.38[.095]	0.4[.100]	0.5[.125]	0.6[.150]
18K	Tap (1)	778	708	648	585	527	505	443	387
	Tap (2) - Factory	904	843	789	735	685	670	621	549
	Tap (3)	1018	963	909	861	824	815	766	694
	Tap (4)	1122	1069	1021	978	945	933	888	692
	Tap (5)	1225	1178	1128	1087	1050	1031	901	707
24K	Tap (1)	778	708	648	585	527	505	443	387
	Tap (2)	904	843	789	735	692	681	621	549
	Tap (3) - Factory	1018	963	909	861	824	815	766	694
	Tap (4)	1122	1069	1021	978	945	933	888	692
	Tap (5)	1225	1178	1128	1087	1050	1031	901	707
30K	Tap (1)	887	786	675	578	506	491	412	338
	Tap (2)	1032	948	854	763	695	678	608	538
	Tap (3) - Factory	1167	1090	1012	936	868	846	771	713
	Tap (4)	1280	1216	1148	1084	1025	1009	930	785
	Tap (5)	1390	1328	1264	1202	1156	1145	1047	785
36K	Tap (1)	887	786	675	578	506	491	412	338
	Tap (2)	1032	948	854	763	695	678	608	538
	Tap (3)	1167	1090	1012	936	868	846	771	713
	Tap (4)	1280	1216	1148	1084	1025	1009	930	785
	Tap (5) - Factory	1390	1328	1264	1202	1156	1145	1047	785

- Shaded boxes represent airflow outside the required 300-450 CFM/ton.
- 1. Airflow based upon wet coil at 230V with no electric heat and factory-approved filter. For FMA5X airflow at 208V is approximately the same as 230V because the multi-tap ECM motor is a constant torque motor. The torque doesn't drop off at the speeds in which the motor operates.
- 2. Airflow is equivalent for front or bottom return configurations.

**Table 10 – Required CFM Range for Cooling or Heat Pump Operation**

SIZE	CFM	
	Min.	Max.
18	450	675
24	600	900
30	750	1125
36	900	1350