

# INSTALLATION INSTRUCTIONS

## APARTMENT FAN COIL UNIT

### FMC4X, FMC4Z

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

FMC4X and FMC4Z 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. FMC4X and FMC4Z models all have a factory-installed TXV and are available in 18,000 through 36,000 Btuh nominal cooling capacities. FMC4X units utilize a 3-speed PSC motor. FMC4Z 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-charge 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.

#### **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 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.

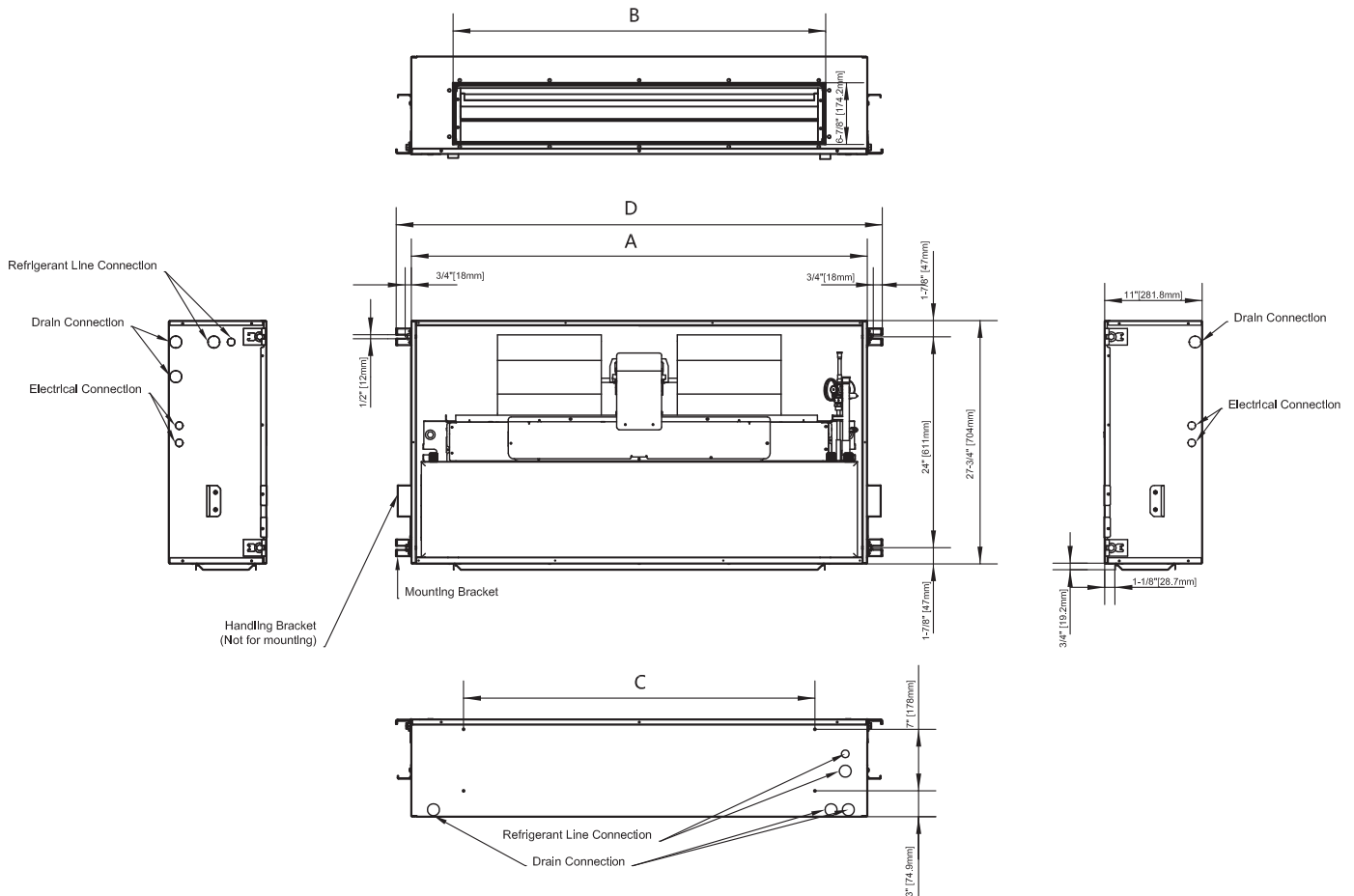
Never use air or gases containing oxygen for leak testing or operating refrigerant compressors. Pressurized mixtures of air or gases containing oxygen can lead to an explosion.

#### **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 and gloves when handling parts.



**Fig. 1 - Dimensional Drawing**

**Table 1 - Dimensional Data**

Model Size	Dimensions- inches [mm]				Unit Operating Weight lbs (kg)
	A	B	C	D	
<b>18</b>	39-3/4 [1010]	30-3/8 [771]	28 [711]	43-3/8 [1101]	115 (52)
<b>24</b>	39-3/4 [1010]	30-3/8 [771]	28 [711]	43-3/8 [1101]	115 (52)
<b>30</b>	51-3/4 [1315]	42-1/6 [1071]	40 [1016]	55-3/8 [1406]	137 (62)
<b>36</b>	51-3/4 [1315]	42-1/6 [1071]	40 [1016]	55-3/8 [1406]	137 (62)

## INSTALLATION

### Step 1 — 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.

### Step 2 — Mount 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.

#### 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 brackets.

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.

#### After mounting unit, install refrigerant 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.

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

## ⚠ 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.

### Step 3 — 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.

**NOTE:** 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 or in a free return application. When installed as a ducted return, an insulated cover for the bottom casing opening must be field fabricated. When installed as free air return, the space housing the fan coil must be fully sealed except for the the return air connection to the conditioned space. Air filters should be located at the return air openings to the fan coil location.

### Step 4 — Condensate Drain

Condensate pan has primary and secondary drain connections to meet FHA requirements. 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’ (25 mm per 3 m). Additional mounting holes are available if more slope is desired by installer. See figure 2 for drain pan alternate mounting hole locations. 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, KFAET0150ETK, 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.

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

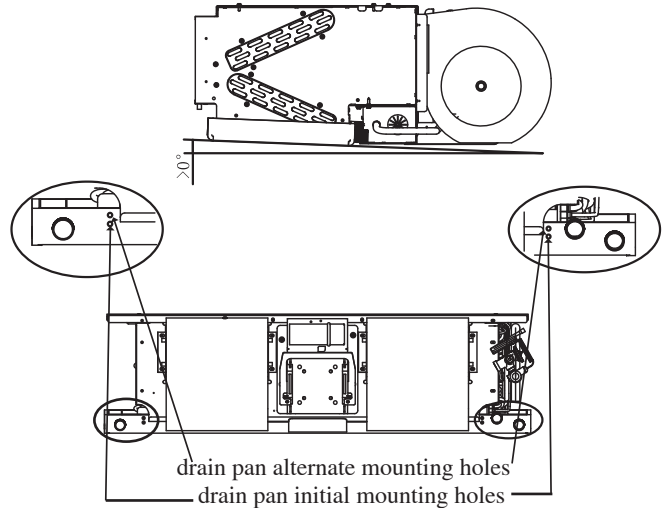


Fig. 2 Alternate condensate pan mounting holes

### Step 5 — Electrical Connections

## ⚠ 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 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. (30m) 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.

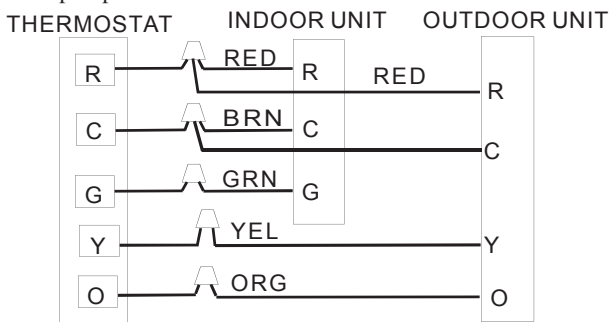
Field wires on side of disconnect found in fan coil remain live, even when circuit breaker is off. Service and maintenance to incoming wiring cannot be performed until main disconnect switch (remote to the unit) is turned off. Lock out and tag switch with a suitable warning label.

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 Step 3. below.)

**NOTE:** All units are shipped from factory wired for 240VAC transformer operation. For 208VAC operation, move primary lead from 240VAC terminal to 208VAC terminal.

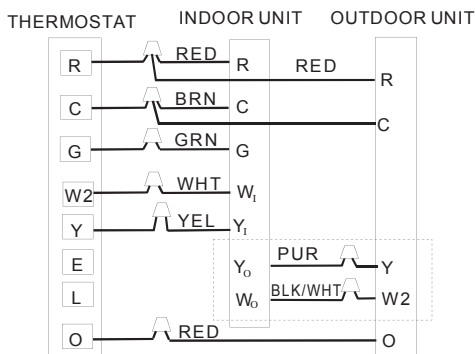
See Figs. 3 and 4 for field low-voltage wiring. See Fig. 1 for location of the electrical inlets. For maximum ampacity and over-current protection, see unit rating plate or product data sheet.

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 side of the control box.
4. Connect low-voltage leads to thermostat and outdoor unit. See Figs. 3 and 4, as well as the outdoor unit wiring label.
5. Connect per Fig. 3 when electric heat is NOT used with a heat pump.
6. Connect per Fig. 4 when electric heat is used with a heat pump.



**Fig. 3 - Wiring Layout Heat Pump Unit (Cooling and 1-Stage Heat)**

A150200



**Fig. 4 - Wiring Layout Heat Pump Unit (Cooling and 2-Stage Heat)**

A150202

## Step 6 — Select Proper Blower Speed

Before operating unit, be sure that the proper blower speed has been selected. Fan speeds are selected manually.

### To change the fan speed on model FMC4X:

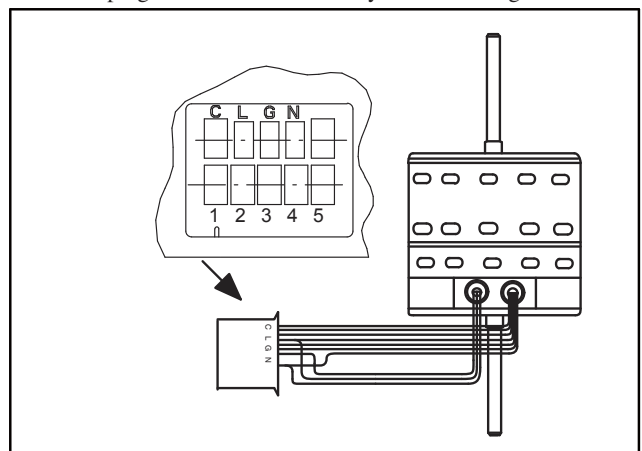
Fan Motor Speed Taps are: Black – High; Red – Medium; Blue –Low  
To select the desired fan speed for cooling operation, and anytime a “G” signal is present; connect the desired fan motor speed tap wire to Fan Relay Terminal No. 4.

To select the desired fan speed for heating operation, anytime the “G” signal is not present; connect the desired fan motor speed tap wire to Fan Relay Terminal No. 6.

Always connect the unused fan--motor wire to the dummy terminal block. When selecting the proper airflow, refer to Table 4 and 5 below to choose proper blower speeds for cooling and heating

### To change the fan speed on model FMC4Z:

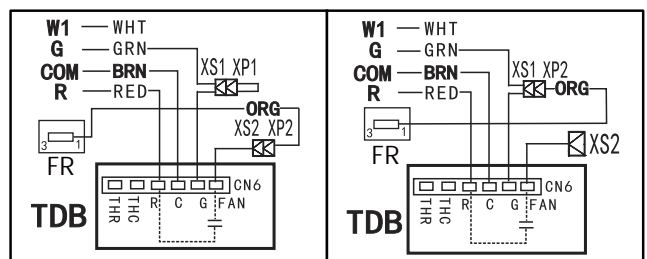
At the motor connection plug connect the green wire to the desired motor tap number indicated on the motor plug. (See Figure 5) For the electric heat fan speed selection connect the white wire to the desired motor tap number indicated on the motor plug. See Table 2 for factory default settings.



**Fig.5 - FMC4Z ECM Motor Speed Taps**

**Table 2 – FMC4Z ECM Motor Speed Taps**

Tap	Delay-off Time(s)	18	24	30	36
Tap 1	90	Default	---	---	---
Tap 2	90	---	Default	---	---
Tap 3	90	---	---	Default	---
Tap 4	90	---	---	---	Default
Tap 5	90	---	---	---	---



**Fig. 6 - Wiring Layout FMC4X PSC Motor disable time delay**

## Step 7 — TXV

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

### START-UP

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

## SEQUENCE OF OPERATION

**NOTE:** 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. 10 to disable blower off time delay. When wired in this configuration no blower off-delay will occur in any mode.

**NOTE:** The following sequence of operation is based on units installed with PSC motor and Time Delay Board (TDB).

### A. CONTINUOUS FAN

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

### B. 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 90s blower off-delay.

### C. 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 90s blower off-delay.

### D. 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 90s blower off-delay.

**NOTE:** Due to blow through coil design, simultaneous heat pump and electric heat (auxiliary) operation will not occur. When W1 is energized, Y signal will be removed from outdoor.

### E. ELECTRIC HEAT OR EMERGENCY HEAT MODE

Thermostat closes 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.

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 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.



## 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.

**Table 3 – Airflow Performance (CFM)**

**Use for Selecting Heat Pump Speed of PSC Motor (Cased, Back Return)**

Model	Motor Speed	CFM Wet Coil without Filter or Electric Heat, Cased, Back 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	L	714	679	636	585	527	461	387	306
	M	829	790	743	690	628	559	483	399
	H	876	830	776	723	662	593	517	432
24K	L	714	679	636	585	527	461	387	306
	M	829	790	743	690	628	559	483	399
	H	876	830	776	723	662	593	517	432
Model	Motor Speed	CFM Wet Coil without Filter or Electric Heat, Cased, Back Return							
		External Static Pressure-Inches W.C.[kPa]							
		0[0]	0.1[.025]	0.15[.0375]	0.2[.050]	0.3[.075]	0.4[.100]	0.5[.125]	0.6[.150]
30K	L	1191	1096	1047	997	894	787	675	560
	M	1299	1201	1151	1101	1000	897	793	687
	H	1435	1323	1268	1214	1107	1003	902	804
36K	L	1191	1096	1047	997	894	787	675	560
	M	1299	1201	1151	1101	1000	897	793	687
	H	1435	1323	1268	1214	1107	1003	902	804

**Use for Selecting Heat Pump Speed of PSC Motor (Cased, Bottom Return)**

Model	Motor Speed	CFM Wet Coil without Filter or Electric Heat, Cased, 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	L	726	689	645	593	531	464	392	315
	M	845	801	753	692	627	559	487	411
	H	887	832	773	711	644	573	498	419
24K	L	726	689	645	593	531	464	392	315
	M	845	801	753	692	627	559	487	411
	H	887	832	773	711	644	573	498	419
Model	Motor Speed	CFM Wet Coil without Filter or Electric Heat, Cased, Bottom Return							
		External Static Pressure-Inches W.C.[kPa]							
		0[0]	0.1[.025]	0.15[.0375]	0.2[.050]	0.3[.075]	0.4[.100]	0.5[.125]	0.6[.150]
30K	L	1200	1095	1042	989	880	768	655	539
	M	1305	1208	1158	1106	998	884	764	638
	H	1423	1327	1276	1224	1113	994	867	733
36K	L	1200	1095	1042	989	880	768	655	539
	M	1305	1208	1158	1106	998	884	764	638
	H	1423	1327	1276	1224	1113	994	867	733

Use for Selecting Heat Pump Speed of ECM Motor (Cased, Back Return)

Model	Motor Speed	CFM Wet Coil without Filter or Electric Heat, Cased, Back Return							
		External Static Pressure-Inches W.C.[kPa]							
		0[0]	0.1[.025]	0.15[.0375]	0.2[.050]	0.3[.075]	0.4[.100]	0.5[.125]	0.55[.1375]
18K	1	753	655	609	564	481	407	340	309
	2	913	828	787	746	666	588	513	476
	3	1044	982	945	904	810	700	575	500
	4	1153	1058	1007	953	837	711	578	503
	5	1163	1068	1017	963	847	719	580	506
24K	1	753	655	609	564	481	407	340	309
	2	913	828	787	746	666	588	513	476
	3	1044	982	945	904	810	700	575	500
	4	1153	1058	1007	953	837	711	578	503
	5	1163	1068	1017	963	847	719	580	506
30K	1	801	700	651	602	508	418	331	288
	2	1015	916	869	822	731	645	562	523
	3	1177	1107	1069	1029	943	848	745	670
	4	1327	1279	1245	1203	1098	963	795	692
	5	1493	1404	1350	1289	1150	987	798	695
36K	1	801	700	651	602	508	418	331	288
	2	1015	916	869	822	731	645	562	523
	3	1177	1107	1069	1029	943	848	745	670
	4	1327	1279	1245	1203	1098	963	795	692
	5	1493	1404	1350	1289	1150	987	798	695

**Use for Selecting Heat Pump Speed of ECM Motor (Cased, Bottom Return)**

Model	Motor Speed	CFM Wet Coil without Filter or Electric Heat, Cased, Bottom Return							
		External Static Pressure-Inches W.C.[kPa]							
		0[0]	0.1[.025]	0.15[.0375]	0.2[.050]	0.3[.075]	0.4[.100]	0.5[.125]	0.55[.1375]
18K	1	756	658	611	566	480	400	325	290
	2	946	855	810	766	675	591	506	464
	3	1035	965	926	883	788	681	561	497
	4	1208	1110	1056	999	874	736	585	504
	5	1225	1132	1079	1023	898	758	602	518
24K	1	756	658	611	566	480	400	325	290
	2	946	855	810	766	678	591	506	464
	3	1035	965	926	883	788	681	561	497
	4	1208	1110	1056	999	874	736	585	504
	5	1225	1132	1079	1023	898	758	602	518
30K	1	796	712	670	626	537	445	351	302
	2	1012	901	850	801	709	627	555	522
	3	1156	1083	1044	1002	911	811	702	616
	4	1310	1197	1150	1101	980	850	708	626
	5	1469	1328	1256	1182	1031	875	714	632
36K	1	796	712	670	626	537	445	351	302
	2	1012	901	850	801	709	627	555	522
	3	1156	1083	1044	1002	911	811	702	616
	4	1310	1197	1150	1101	980	850	708	626
	5	1469	1328	1256	1182	1031	875	714	632

■ – Shaded boxes represent airflow outside the required 300-450 cfm/ton.

**NOTES:**

1. Airflow data is without filter or electric heat accessory. Heater adds 0.05–in. static.
2. Use wet coil data for determining cooling airflow.
3. Accessory louver panel adds 0.05–in. Static.
4. When electric heater is working only, 300CFM for each ton is sufficient except 30K work with 10KW heat (≅900SCFM)

**Table 4 – Required CFM Range for Heat Pump Operation**

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