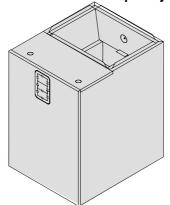
# INSTALLATION INSTRUCTIONS

# **Modular Blower** (Variable Speed)

MV08B1500B, MV12F1900B, MV16J2200B, MV20L2400B

These instructions must be read and understood completely before attempting installation.



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 the individual instructions packaged with the kits or accessories when installing.

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

In Canada refer to the current editions of the Canadian Electrical Code CSA C22.1 Recognize safety information.

This is the safety-alert symbol \( \triangle \) When you see this symbol on the unit and in instructions or manuals, be alert to the potential for personal injury. Understand these 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.

#### TABLE OF CONTENTS

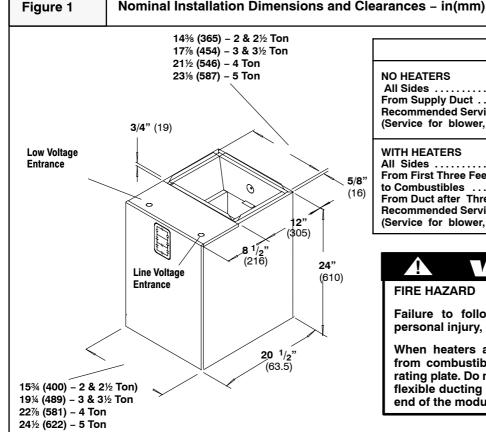
General Information/Installation
Vertical/Horizontal/Downflow Installation
Ductwork Connection 3
Filter Installation 4
Electrical Connection 4
Thermostat Field Connection 5
Wiring Connection 6
Blower Motor CFM 7
Accessories Operation
Airflow Tables10
Sequence of Operation12
Wiring Diagram
Replacement Parts

### WARNING

#### **ELECTRICAL SHOCK HAZARD**

Failure to turn off electric power could result in personal injury or death.

Before installing or servicing system, turn off main power to the system. There may be more than one disconnect switch, including accessory heater(s).



#### **CLEARANCES**

NO HEATERS All Sides	0" 0" 20"(508 mm)
WITH HEATERS All Sides	0"

From First Three Feet of Supply Duct	•
to Combustibles	1" (25mm)
From Duct after Three Feet	0" `
Recommended Service From Front	20" (508mm)
(Service for blower, heaters if installed)	, ,

#### **FIRE HAZARD**

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

When heaters are installed maintain clearances from combustible materials as specified on unit rating plate. Do not use plastic lined or combustible flexible ducting within 36" (914 mm) of the supply end of the modular unit.

### GENERAL INFORMATION

### WARNING

#### PERSONAL INJURY, AND/OR PROPERTY DAMAGE **HAZARD**

Failure to carefully read and follow this warning could result in equipment malfunction, property damage, personal injury and/or death.

The information contained in this manual is intended for use by a qualified service technician familiar with safety procedures and equipped with the proper tools and test instruments.

Installation must conform with local building codes and with the National Electrical Code NFPA70 current edition.

#### INTRODUCTION

The MV modular blower cabinet uses a 208/230V ECM variable-speed blower motor, with an electronic fan control board. The MV may be used for cooling or heat pump applications either with or without electric heat. Installations without electric heat require a NO HEAT KIT (EHIA00KN10). The cabinet can be installed in an upflow, downflow or horizontal position. Refer to Figure 3 and 4.

#### LOCATION

Select the best position which suits the installation site conditions. The location should provide adequate structural support, space in the front of the unit for service access, clearance for return air and supply duct connections, space for refrigerant piping connections and condensate drain line connections. If heaters are being installed, make sure adequate clearance is maintained from supply ductwork, See Clearances and Warning in Figure 1.

If the unit is located in an area of high humidity, nuisance sweating of casing may occur. On these installations a wrap of 2" (51mm) fiberglass insulation with a vapor barrier should be used.

#### HEATER PACKAGES

Factory approved, field installed, UL listed heater packages are available from the equipment supplier. See unit rating plate for a list of factory approved heaters (electric heat accessory models EHIA only). Heaters that are not factory approved could cause damage which would not be covered under the equipment warranty.

## 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.

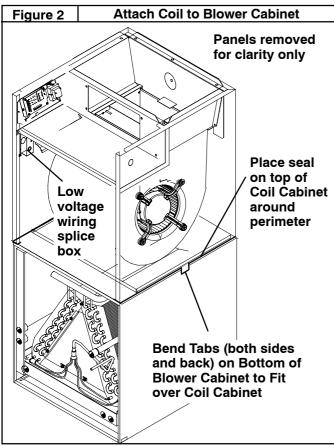
#### INSTALLATIONS

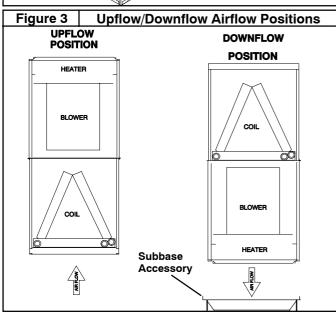
The unit is ready to install in any position without modifications. Refer to the coil instructions for information on drain pan configurations etc. Make sure coil is set up properly for desired position of blower cabinet.

Coil must be secured to blower cabinet with the three tabs that are part of the blower cabinet base. Bend the tabs out from the bottom so they fit over the coil cabinet.

Position coil cabinet in relation to the blower so they will be correct for desired application.

For upflow and horizontal applications apply foam seal strip around top of coil cabinet. For downflow application apply foam seal strip around bottom of coil cabinet. Set blower on top of coil cabinet so they are flush. Secure cabinets together using the three tabs on the bottom of the cabinet. Bend the tab out from the bottom so it fits over the coil cabinet. If no pilot holes are present, drill a hole as required for a screw.





### **DOWNFLOW INSTALLATIONS**

Refer to instructions with Subbase Accessory Kit.

# NON-DUCTED RETURN AIR CLOSET INSTALLATION

The cabinet can be installed in a closet with a false bottom to form a return air plenum, or mounted on an open platform inside the closet. Platform should be high enough to provide a free (open) area for adequate return airflow into the bottom of the cabinet. The open area can be on the front side or a combination of front and sides, providing there is clearance on the sides between cabinet and closet. **Refer to ACCA Manual D for sizing and free area recommendations.** 

**NOTE:** Local codes may limit application of systems without a ducted return to single story dwellings.

# HORIZONTAL LEFT AND RIGHT INSTALLATIONS

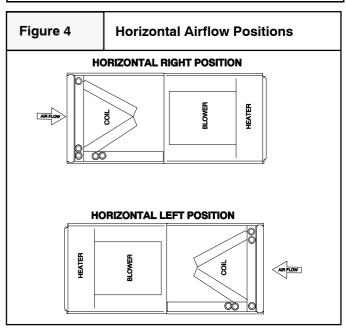
The modular blower cabinets can be installed in either downflow, horizontal left, or horizontal right applications. When a coil cabinet is applied, refer to the coil installation manual for proper drain pan and airflow requirements. They must have the drain pan repositioned for right hand airflow. Refer to coil installation manual.

## CAUTION

#### PROPERTY DAMAGE HAZARD

Failure to follow this caution may result in property damage.

A field fabricated auxiliary drain pan, with a separate drain is REQUIRED for all installations over a finished living space or in any area that may be damaged by overflow from a restricted main drain pan. In some localities, local codes require an auxiliary drain pan for ANY horizontal installation.



#### SUSPENDED CABINET INSTALLATION

- The cabinet may be supported on a frame or shelf, or it may be suspended.
- Use metal strapping or threaded rod with angle iron supports under the auxiliary drain pan to suspend cabinet. These supports MUST run parallel with the length of the cabinet. Refer to Figure 5.
- 3. Ensure that there is adequate room to remove service and access panels after installing supporting brackets.

4. Use field installed vibration isolators in auxiliary drain pan to support cabinet.

### **DUCT CONNECTIONS**

#### **SUPPLY DUCT**

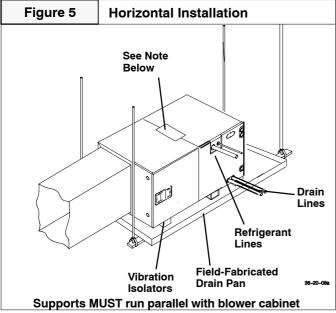
Supply duct must be attached to the outside of flange on outlet end of unit. Flexible connectors may be used if desired. Maintain clearances from supply duct to combustibles when heaters are installed. Refer to **Figure 1** and unit rating plate.

#### **RETURN DUCT**

Return duct should be attached to bottom of unit using sheet metal screws or other fasteners.

#### FILTER INSTALLATION

Filters must be field supplied. A remote filter grille or other means must be provided. Refer to ACCA Manual D for remote filter sizing.



**NOTE:** If increased structural strength is needed in the horizontal position, use field supplied connecting plates in place of the tabs on the bottom of the blower.

#### **ELECTRICAL CONNECTIONS**

The MV modular blower utilizes a variable–speed constant CFM blower motor with an electronic fan control board. The fan control board contains a low voltage protective fuse (5 AMP), and pigtail connections for thermostat hook up. The fan control also contains selection taps to modify airflow operation based upon pre–programmed airflow tables.

All electrical work MUST conform with the requirements of local codes and ordinances and the National Electrical Code NFPA 70 current edition.

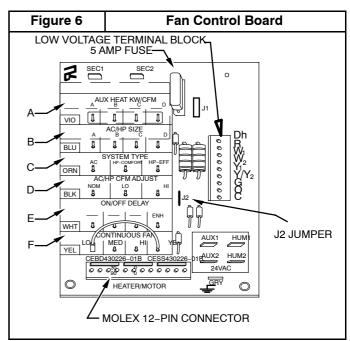
The low voltage transformer and the fan control are standard on all models and are prewired at the factory. Line voltage connections are made to the heater accessory or the lugs on the No Heat Kit.

### **A WARNING**

#### **ELECTRICAL SHOCK or UNIT DAMAGE HAZARD**

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

Turn OFF electric power at fuse box or service panel before making any electrical connections and ensure a proper ground connection is made before connecting line voltage.



#### OVERCURRENT PROTECTION

The power supply wiring to the unit **MUST** be provided with overcurrent protection. Governing codes may require this to be fuses **ONLY** or circuit breakers.

For blower cabinets without heaters, a 15 amp circuit may be used.

Before proceeding with electrical connections, make certain that supply voltage, frequency, phase, and circuit ampacity are as specified on the unit rating plate. See unit wiring label for proper field high and low voltage wiring. Make all electrical connections in accordance with the NEC and any local codes or ordinances that may apply. Use copper wire only. The unit must have a separate branch electric circuit with a field–supplied disconnect switch located within sight from and readily accessible from the unit.

**NOTE**: When a pull-out type disconnect is removed from the unit, only the Load side of the circuit is de-energized. The Line side remains live until the main (remote) disconnect is turned off.

## A WARNING

#### **ELECTRICAL SHOCK or UNIT DAMAGE HAZARD**

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

If a disconnect switch is to be mounted on unit, select a location where drill and fasteners will not contact electrical refrigeration components.

## **A WARNING**

#### **ELECTRICAL SHOCK HAZARD**

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

Turn off the main (remote) disconnect device before working on incoming (field) wiring. Incoming (field) wiring on the line side of the disconnect found in the modular blower unit remains live, even when the pull-out is removed. Service and maintenance to incoming (field) wiring cannot be performed until the main disconnect switch (remote to the unit) is turned off. MV units installed without electric heat require the use of a factory-authorized No Heat Kit (accessory part number EHIA00KN10). This kit provides the electrical connections necessary to supply the unit with 208/230V power when electric heat is not present.

For units without electric heat:

- Locate adapter and filler plates with screws inside package. If necessary, adjust plates to allow for installation of No Heat Kit required inside cabinet. Refer to Figure 7.
- 2. Secure No Heat Kit accessory with four (4) screws.
- Connect the 9-pin plug from No Heat Kit wiring into the receptacle that attaches to fan control board.
- 4. Connect ground wire to unit ground lug.
- Connect 208/230V power leads from field disconnect to terminal block assembly on No Heat Kit.

For units with electric heat, see Electric Heater Installation Instructions and blower airflow requirements.

**NOTE**: Transformer is factory–wired for 230V operation. For 208V applications the transformer must be rewired to the 208V tap. Refer to unit wiring label.

#### **GROUNDING CONNECTION**

Use a copper conductor(s) from the ground lug on the No Heat Kit or ground lugs on the electric heater to a grounded connection in the electric service panel or a properly installed grounding rod.

#### LOW VOLTAGE CONTROL CONNECTIONS

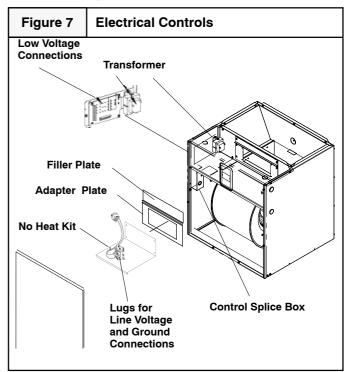
Wire low-voltage in accordance with wiring label on the blower (refer to **Figures 8 - 11**). Use 18 AWG color-coded, insulated (35°C minimum) wire to make the low-voltage connections between: thermostat, indoor equipment, and outdoor equipment. If thermostat is located more than 100 feet from the unit (as measured along the low voltage wire), use 16 AWG color-coded, insulated (35°C minimum) wire. All wiring must be NEC Class 1 and must be separated from incoming power leads. Refer to outdoor unit wiring instructions for additional wiring recommendations.

Field supplied low-voltage wiring should be field connected inside control splice box area (secure with wire nuts), and strain relief bushing or rubber grommet to seal cabinet opening.

Fan control board is circuited for single-stage heater operation. When additional heater staging is desired (using indoor wall thermostat or ODTS), remove the Jumper J2 on fan control board to enable staging.

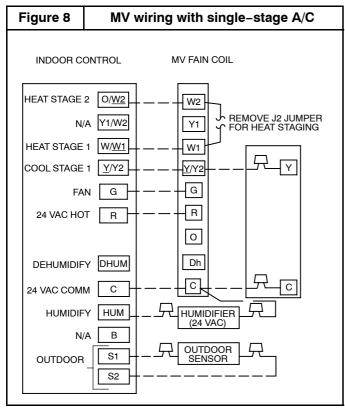
#### THERMOSTAT FIELD CONNECTIONS

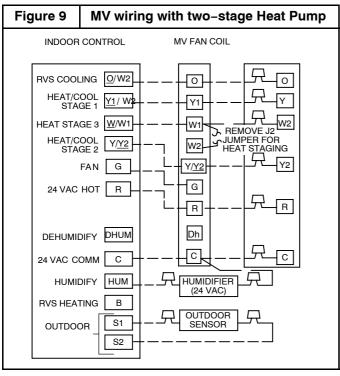
- Dh is used if additional latent capacity control is required (see Dehumidification Capability in the Accessories section for more detail). **NOTE**: the J1 jumper should already be removed from the factory.
- R R signal is 24V hot to thermostat
- W1 W1 signal controls electric heat from the thermostat
- W2 W2 signal from a two-stage thermostat or outdoor thermostat
- Y1 Connection for the low speed compressor operation
- Y/Y2 Connection for the Y signal or high speed (Y2) signal from the thermostat
- G Connection for the G (fan) signal is energized from the thermostat, 'HUM2' and AUX2' terminals are energized when G energized
- O Connection for the 'O' signal from the thermostat
- C Connection for the C terminal to the thermostat (24V common) also common to SEC1, HUM1, AUX1

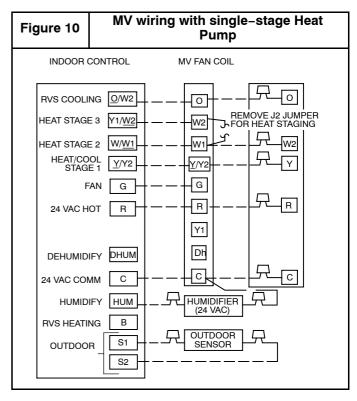


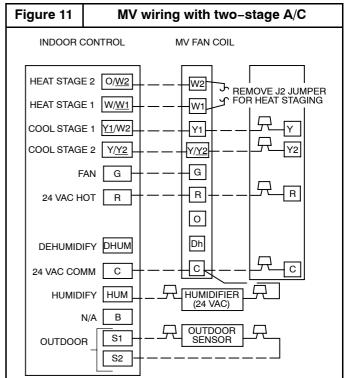
	Su	pply Circ	uit					Max Over-		Re	commend	ed	
Table 1				Supply Circuit	H.P.	Max. Branch current		St 75	ipbly M	Ground Wire			
Tubic 1	Volts	Phase	Hertz	No.	11	Amps	Circuit AMP Protection Devise (Amps)	# of Wires	Min Size	Max. Ft.(m) Length	# of Wires	Min Size	
MV08*	208 230	1	60	Single	1/2	5.0	6.3	15	2	14	118 (36)	1	14
MV12*	208 230	1	60	Single	1/2	5.0	6.3	15	2	14	118 (36)	1	14
MV16*	208 230	1	60	Single	3/4	7.3	9.1	15	2	14	82 (25)	1	14
MV20*	208 230	1	60	Single	3/4	7.3	9.1	15	2	14	82 (25)	1	14

<sup>\*</sup> Modular blower without electric heat









### **BLOWER MOTOR - CFM**

#### **FAN CONTROL BOARD CONFIGURATION**

The Fan Control Board can be configured by the installer and should be operated within its specified CFM range (refer to **Table 2**). The ECM motor uses wire selection taps (A through F) to modify operation determined from a pre-programmed airflow table (refer to **Figure 6** for wire selection and tap indentification, and **Tables 4 and 7** for airflows). Airflows are based on system size and/or mode of operation. These airflows are automatically modified as needed in response to other inputs such as the need for dehumidification, etc.

Table 2	MV Mo	dular CFM (L/s)	Range
Modular	Outdoor	CFM	L/s
Unit Size	Unit Size		
	018		
MV08	024	350 - 1200	165–566
101 0 00	030	330 - 1200	100-300
	036		
	024		
MV12	030	415 - 1400	196–661
IVI V 1Z	036	415 - 1400	190-001
	042		
	030		
MV16	036	425 - 1600	201-755
1010 10	042	423 - 1000	201-733
	048		
	036		
MV20	042	540 - 2000	255-944
101 0 20	048	340 - 2000	200-944
	060		

The Modular MV unit must be configured to operate properly with all of the system components that have been installed. To successfully configure a basic system, move the wire selection tap (as needed) to the proper pin position.

**NOTE**: The factory default setting for all selections is the first pin. It is recommended the installer review each setting (see below and refer to **Figure 6** for wire selection and tap indentification).

#### A. AUXILIARY HEAT KW/CFM (VIOLET WIRE)

Select the CFM range based on the electric heater kW size by using the Violet wire.

If no heater is installed, this step can be skipped. However, when an electric heater is applied, move the Violet wire to the proper A, B, C, D pin selection. Refer to **Table 8** for heater range selection. The heater kW ranges corresponds directly to each pin letter listed in the table.

The airflow must be greater than the minimum CFM (L/s) for electric heater application with the size system installed for safe and continuous operation. (refer to **Tables 4 and 5** for airflow).

**NOTE:** Airflow marked is the airflow which will be supplied in emergency heat mode and heating mode on air conditioners when electric heat is the primary heating source.

In heat pump heating mode when electric heaters are energized, the ECM motor will run the higher or heat pump heating airflow and electric heater airflow to ensure safe heater operation. The factory selection is the largest heater range approved.

#### **B. OUTDOOR UNIT SIZE (BLUE WIRE)**

Select the outdoor unit system size (BTU) by using the Blue wire (refer to **Table 9**).

The installer needs to properly select the outdoor unit size to ensure proper airflow delivery of the modular unit. This selection affects all operational modes (airflow) with the exception of electric heat modes.

Move the Blue wire to the proper A, B, C, D pin selection. The outdoor unit size corresponding directly to each pin letter is listed in **Table 9**.

#### C. SYSTEM TYPE - AC/HP (ORANGE WIRE)

Select the system type (AC, HP-Comfort, HP-Efficiency) by using the Orange wire.

- AC Air Conditioner selection provides approximately 350 CFM per ton for greater efficiency and humidity control with the AC/HP CFM ADJUST set to the nominal (NOM) tap. (To achieve approximately 400 CFM (189 L/s) per ton move tap to (HI) position. Refer to appropriate airflow tables for exact CFM setting.)
- HP-COMFORT Heat Pump Comfort selection provides approximately 315 CFM (149 L/s) per ton for higher than normal heating air delivery temperature. Provides approximately 350 CFM (165 L/s) per ton cooling airflow for good humidity removal with the AC/HP CFM ADJUST set to the nominal (NOM) tap.
- HP-EFF Heat Pump Efficiency selection provides same airflow for heating and cooling modes to increase overall HP efficiency; approximately 350 CFM (165 L/s) per ton with the AC/HP CFM ADJUST set to the nominal (NOM) tap.

#### D. AC/HP CFM ADJUST

Select the system AC/HP CFM Adjust by using the Black wire. This selection basically selects; Medium, Low, or High Airflow

- NOM provides airflow at rates described above, the AC/HP ADJUST select is factory set to the nominal (NOM) tap. The adjust selections HI/LO will regulate airflow supplied for all operational modes, except non–heat pump heating modes.
- HI provides 15% airflow over nominal unit size selected
- LO provides 10% airflow below nominal unit size selected.

Adjust selection options are provided to adjust airflow supplied to meet individual installation needs for such things as noise, comfort, and humidity removal.

#### E. ON/OFF DELAY

Select the ON/OFF delay by using the White wire. This selection basically selects the desired time delay profile.

**NOTE:** Delay selections are active in cooling and heat pump heating modes only. Auxiliary heating modes have a one (1) minute off delay and zero (0) on delay programmed into the ECM motor that cannot be overridden.

Choose one (1) of four (4) motor operation delays to customize and enhance system operation as follows.

Selection options are:

- 1. **0/90:** 0 (zero) second on–delay and 90 second off–delay at 100% airflow (factory setting).
- 30/90: 30 second on-delay with no airflow and 90 second off-delay at 100% airflow profile. Used when it is desirable to allow system coils time to heat-up/cool-down in conjunction with the airflow.
- 3. **0/0:** 0 (zero) second on–delay option and 0 (zero) second off–delay. Used for servicing unit or when a thermostat is utilized to perform delay functions.
- 4. ENH: Enhanced selection provides a 30 second on-delay with no airflow followed by 150 seconds at 70% airflow, and 0 (zero) second off-delay for added comfort. This profile will minimize cold blow in heat pump operation and could enhance system efficiency.

#### F. CONTINUOUS FAN

Select the desired Continuous fan speed when thermostat is set on continuous fan operation by using the Yellow jumper wire.

**NOTE:** If installed with a two-stage outdoor unit, do not select **HI** speed continuous fan. If **HI** is selected, low stage compression (low-speed cooling) will also run **HI** fan speed possibly resulting in insufficient dehumidification.

- LO speed factory setting, approximately 50% cooling mode airflow.
- MED speed move connector to MED, approximately 65% cooling mode airflow.
- HI speed move connector to HI, approximately 100% cooling mode airflow.

# G. LOW-VOLTAGE CIRCUIT (FUSING AND REFERENCE)

The low-voltage circuit is fused by a board-mounted 5-amp automotive fuse placed in series with the transformer SEC2 and the R circuit. The C circuit of the transformer is referenced to chassis ground through a printed circuit run at SEC1 connected to metal standoff marked with ground symbol.

# H. QUICK SET UP (BASIC MODULAR BLOWER CONFIGURATION)

The following basic configuration of the modular blower will provide ARI rated performance of an Air Conditioner:

- AUX HEAT KW/CFM Select the heater range for the size electric heater installed.
- OUTDOOR UNIT SIZE Select system size installed.
- SYSTEM TYPE Select system type AC.
- 4. AC/HP CFM ADJUST Select NOM.
- 5. ON/OFF DELAY Select 0/90 profile.
- CONTINUOUS FAN Select desired modular blower when thermostat is set to continuous fan.

The following basic configuration of the modular blower will provide ARI rated performance of a Heat Pump:

- AUX HEAT KW/CFM Select the heater range for the size electric heater installed.
- 2. OUTDOOR UNIT SIZE Select system size installed.
- SYSTEM TYPE Select system type HP–EFF.
- 4. AC/HP CFM ADJUST Select NOM.
- 5. ON/OFF DELAY Select 0/90 profile.
- 6. CONTINUOUS FAN Select desired fan speed when thermostat is set to continuous fan.

### **ACCESSORIES**

#### **AUXILIARY TERMINALS**

The Fan Control Board contains the following auxiliary terminals, refer to **Figure 6**.

HUM1 and AUX1 are in common with SEC1, and thermostat common.

HUM2 and AUX2 terminals are tied directly to the G terminal from thermostat, and provide a 24 VAC hot signal whenever the G terminal is energized.

# HUMIDIFIER OPERATION WITH HUMIDISTAT

A standard humidistat can be used to operate a humidifier. The HUM1 is internally connected to 24V Common (C), and HUM2 is internally connected to (G). Refer to **Figure 12** for typical Humidifier wiring layout using HUM1 (C), and HUM2 (G).

Alternately, the 24VAC signal may also be sourced from the W1 and Com (thermostat pigtail) connections when electric heaters are used as a primary heating source (refer to **Figure 13**).

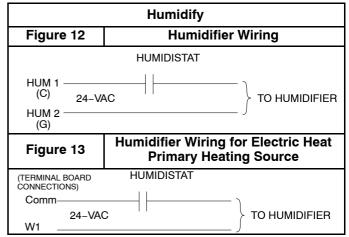
**NOTE**: When using a thermostat with built-in humidity control, the above auxiliary terminals can be ignored, and the humidifier may be sourced directly from humidity terminals located on the thermostat itself. (Refer to **Figures 8** – **11**)

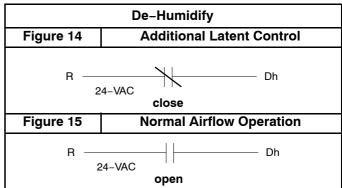
#### **DEHUMIDIFY CAPABILITY**

The J1 jumper should always be removed from the Fan Control Board for proper airflow operation.

Latent capacities for systems using the MV are better than average systems. If increased latent capacity is an application requirement, the field wiring (thermostat pigtail) connections provides a (Dh) for use with a standard humidity sensor/control (Refer to **Figure 14** for additional latent control). The MV will detect a closed contact between R and Dh (closing on a humidity rise) and reduce its airflow to approximately 80% of nominal cooling mode airflow. This reduction will increase the system latent capacity until the humidity falls to a level which causes the humidity sensor/control to open its contacts.

When the contacts open, the airflow will return to 100% of the selected cooling airflow. Refer to **Figure 15** for Normal Airflow Operation.





#### **HEATER STAGING**

The MV modular fan control board is factory set for single-stage electric heat operation. Refer to **Table 3** for available heaters.

When two-stage electric heat is desired, the J2 jumper must be removed. Refer to **Table 3-2** for two-stage compatible heaters. Removing J2 will allow second stage control by the indoor wall thermostat (if multi-stage capable), or by using an accessory ODTS (outdoor thermostat temperature switch). Refer to ODTS kit instruction for wiring information (AMF002OTA1).

When three-stage electric heat is desired, the J2 jumper must be removed. Refer to **Table 3-3** for three-stage compatible heaters. Removing J2 will allow second-stage control by the indoor wall thermostat (if multi-stage capable), and the third-stage by using an accessory ODTS. Refer to ODTS kit instruction for wiring information.

Table 3	Heat Strip Staging								
	3–1	3–2	3–3						
	Single-Stage Operation (no staging - all electric heat together)	Two-Stage Capable	Three-Stage Capable (with ODTS only)						
Single- Phase	EHIA05KB / KN EHIA07KB / KN EHIA10KB / KN EHIA15KB EHIA20KB EHIA25KB	EHIA15KB EHIA20KB EHIA25KB	EHIA25KB						
Three- Phase	EHIA10HB EHIA15HB EHIA20HB EHIA25HB	EHIA10HB EHIA15HB EHIA20HB EHIA25HB	EHIA20HB EHIA25HB						

KB is single-phase with circuit breaker

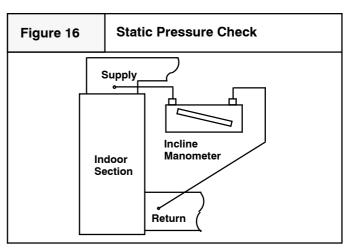
KN is single-phase with terminal block (no-breaker)

HB is three-phase with circuit breaker

#### AIR FLOW CHECK

For proper system operation, the air flow through the indoor coil should be between 350 and 450 CFM per ton of cooling capacity. The air flow through the unit can be determined by measuring the external static pressure to the unit and selecting the motor speed tap that will most closely provide the required air flow.

- Set up to measure external static pressure at the supply and return duct connections. Refer to Figure 16.
- 2. Drill holes in the ducts for pressure taps, pilot tubes, or other accurate pressure sensing devices.
- Connect these taps to a level inclined manometer or draft gauge.
- Ensure the coil and filter are clean, and all the registers are open.
- Determine the external static pressure with the blower operating.
- Refer to the Air Flow Data, **Table 4 and 6**, to find the speed setting that will most closely provide the required air flow for the system.
- Refer to Motor Speeds and Airflow in these instructions if the speed is to be changed.
- 8. Recheck the external static pressure with the new setting, and confirm speed switch selection.



#### TEMPERATURE RISE CHECK

Temperature rise is the difference between the supply and return air temperatures.

**NOTE:** The temperature rise can be adjusted by changing the heating speed tap at the fan control board. Refer to the unit's *Installation Instructions* for airflow information.

# A temperature rise greater than $60^{\circ}\text{F}$ (33.3°C) is not recommended.

- To check the temperature rise through the unit, place thermometers in the supply and return air ducts as close to the unit as possible, avoiding direct radiant heat from the heater elements.
- 2. Open ALL registers and duct dampers.
- Set thermostat Heat-Cool selector to HEAT.
- 4. Set the thermostat temperature setting as high as it will go.
- 5. Turn electric power ON.
- Operate unit AT LEAST 5 minutes, then check temperature rise.

**NOTE:** The maximum outlet air temperature for all models is  $200^{\circ}F$  (93.3°C).

- Set thermostat to normal temperature setting.
- Be sure to seal all holes in ducts if any were created during this process.

Tab	le 4		Modula	r Airflow D	Delivery (C	FM) in Coo	ling Mode	(either A/C	or HP)		
		Single-Stage	e A/C Cooling			ge Cooling			Fan Only		
Modular	Outdoor			A/C Cooling – High		A/C Cooling – Low		,			
Unit Size	Unit Size	Nominal	Dehum	Nominal	Dehum	Nominal CFM	Dehum	LOW	MED	HI	
	18	525	420		l	UFINI	<b>-</b> -	350	420	525	
	24	700	560	700	560	560	450	350	560	700	
MV08	30	875	700					440	700	875	
	36	1050	840	1050	840	840	670	525	840	1050	
	24	700	560	700	560	560	450	415	560	700	
	30	875	700	700			450	440	700	875	
MV12	36	1050	840	1050	840	840	670	525	840	1050	
	42	1225	980					615	980	1225	
	30	875	700					440	700	875	
	36	1050	840	1050	840	840	670	525	840	1050	
MV16	42	1225	980					615	980	1225	
	48	1400	1120	1400	1120	1120	900	700	1120	1400	
	36	1050	840	1050	840	840	670	540	840	1050	
	42	1225	980	1030	040	040		615	980	1225	
MV20	48	1400	1120	1400	1120	1120	900	700	1120	1400	
	60	1750	1400	1750	1400	1400	1120	875	1400	1750	
		1750								1750	
Tab	le 5		Modul	ar Airflow		-	at Pump He	eating Mod	e Only		
		Single-Stag	e HP Heating		,	ge Heating			Fan Only		
Modular	Outdoor		•	HP Heating - High HP Heating - Low				•			
Unit Size	Unit Size	Comfort	Eff	Comfort	Eff	Comfort	Eff	LOW	MED	HI	
						CFM				.==	
	18	475	525					350	380	475	
MV08	24	630	700	630	700	505	560	350	505	630	
	30	785	875					440	630	785	
	36	945	1050	945	1050	755	840	525	755	945	
	24	630	700	630	700	505	560	415	505	630	
MV12	30	785	875					440	630	785	
	36	945	1050	945	1050	755	840	525	755	945	
	42	1100	1225					615	880	1100	
	30	785	875					440	630	785	
MV16	36	945	1050	945	1050	755	840	525	755	945	
	42	1100	1225					615	880	1100	
	48	1260	1400	1260	1400	1010	1120	700	1010	1260	
	36	945	1050	945	1050	755	840	540	755	945	
MV20	42	1100	1225					615	880	1100	
IVIVEU	48	1260	1400	1260	1400	1010	1120	700	1010	1260	
1	60	1575	1750	1575	1750	1260	1400	875	1260	1575	

#### **NOTES:**

- 1. The above airflows result with the AC/HP CFM ADJUST select jumper set on NOM.
- 2. Airflow can be adjusted +15% or -10% by selecting Hi or Lo respectively for all modes except fan only.
- 3. Dry coil at 230 volts and with 10kW heater and filter installed.
- 4. Airflows shown are valid for systems with total static pressure between 0.1 and 0.7 in wc.

Tab	le 6		Modul	ar Airflow	Delivery (L	./s) in Cool	ing Mode (	either A/C	or HP)	
Madular	Outdoor	Single-Stage	e A/C Cooling	A/C Cooli		ge Cooling	ing Low		Fan Only	
Modular Unit Size	Unit Size	Nominal	Dehum	A/C Cooling - High  Nominal Dehum		A/C Cooling - Low Nominal Dehum		LOW	MED HI	
OTHE GIZE	OTILL OIZE	Homma	Donam	Homma	Donam	L/s	Donam	2011	WILD	'"
	18	248	198					165	198	248
111/00	24	330	264	330	264	264	212	165	264	330
MV08	30	413	330					208	330	413
	36	496	396	496	396	396	316	248	396	496
	24	330	264	330	264	264	212	196	264	330
MV40	30	413	330					208	330	413
MV12	36	496	396	496	396	396	316	248	396	496
	42	578	462					290	462	578
	30	413	330					208	330	413
MV4C	36	496	396	496	396	396	316	248	396	496
MV16	42	578	462					290	462	578
	48	661	529	661	529	529	425	330	529	661
	36	496	396	496	396	396	316	255	396	496
MV20	42	578	462					290	462	578
WVZU	48	661	529	661	529	529	425	330	529	661
	60	826	661	826	661	661	529	413	661	826
Tab	le 7		Modu	lar Airflow	Delivery (	L/s) in Hea	t Pump Hea	ting Mode	Only	
		0: 1 0:			Two-Stag	ge Heating	•			
Modular	Outdoor	Single-Stag	e HP Heating	HP Heati	ng – High	HP Heat	ing – Low		Fan Only	
Unit Size	Unit Size	Comfort	Eff	Comfort	Eff	Comfort	Eff	LOW	MED	HI
			•		•	L/s			•	•
	18	224	248					165	179	224
MV08	24	297	330	297	330	238	264	165	238	297
IVIVOO	30	370	413					208	297	370
	36	446	496	446	496	356	396	248	356	446
	24	297	330	297	330	238	264	196	238	297
MV12	30	370	413					208	297	370
IVI V 12	36	446	496	446	496	356	396	248	356	446
	42	519	578					290	415	519
	30	370	413					208	297	370
MV16	36	446	496	446	496	356	396	248	356	446
	42	519	578					290	415	519
	48	595	661	595	661	477	529	330	477	595
	36	446	496	446	496	356	396	255	356	446
MV20	42	519	578					290	415	519

#### NOTES:

MV20

- 1. The above airflows result with the AC/HP CFM ADJUST select jumper set on NOM.
- 2. Airflow can be adjusted +15% or -10% by selecting Hi or Lo respectively for all modes except fan only.

3. Dry coil at 230 volts and with 10kW heater and filter installed.

4. Airflows shown are valid for systems with total static pressure between 25 and 174 Pa.

Table 8	Airflow Adjust Table										
MODEL#		AUX HEAT RANGE (KW/CFM)									
VIOLET											
Wire	Α	В	С	D							
Selection											
MV08	15kw		10kw	5 thru 7.5kw							
MV12		15 thru 20kw	10kw	5 thru 7.5kw							
MV16		25kw		5 thru 20kw							
MV20			25kw	5 thru 20kw							

Table 9	Outdoor Unit Size										
MODEL#	OU	OUTDOOR UNIT SIZE (BTU)									
BLUE Wire Selection	Α	A B C D									
MV08	036	030	024	018							
MV12	042	036	030	024							
MV16	048	042	036	030							
MV20	060	060 048 042									

### **SEQUENCE OF OPERATION**

MV modular blower will supply airflow in a range which is more than twice the range of a standard modular blower. Each modular blower size is designed to provide nominal cooling capacities at 50 °F evaporator temperature and the required airflow in order to match with any of four (4) different air conditioner or heat pump outdoor unit sizes. **Table 2** outline the CFM range for the different MV modular blowers.

The blower motor is a true variable speed motor designed to deliver constant CFM. Constant CFM is valid for systems with total external static pressure between 0.1 and 0.7 inches water column (25 and 174 Pa).

#### A., CONTINUOUS FAN

- Thermostat closes circuit R to G.
- Blower runs at continuous fan airflow.

#### **B. COOLING MODE - SINGLE STAGE**

 If indoor temperature is above temperature set point and humidity is below humidity set point, thermostat closes circuits R to G, R to Y/Y2 and R to O.

NOTE: For single stage systems, do not use the Y1 terminal.

Modular blower delivers single stage cooling airflow.

#### C. COOLING MODE - TWO STAGE

- First stage (low) cooling: Thermostat closes circuits to R to G, R to O, and R to Y1.
- Modular blower delivers low stage cooling airflow.
- Second stage (high) cooling: Thermostat closes circuits to R to G, R to O, R to Y1 and R to Y/Y2.
- Modular blower delivers high stage cooling airflow.

#### D. ELECTRIC HEAT HEATING MODE

- Thermostat closes circuit R to W/W1, or W2.
- Modular blower delivers the selected electric heat airflow.

#### E. HEAT PUMP HEATING MODE - SINGLE STAGE

Thermostat closes circuits R to G and R to Y/Y2.

NOTE: For single stage systems, do not use the Y1 terminal.

Modular blower delivers single stage heat pump heating airflow.

#### F. HEAT PUMP HEATING MODE - TWO STAGE

- First stage (low) heating: Thermostat closes circuits R to G and R to Y1.
- Modular blower delivers low stage heating airflow.
- Second stage (high) heating: Thermostat closes R to G, R to Y1 and R to Y/Y2.
- Modular blower delivers high stage heating airflow.

# G. HEAT PUMP HEATING WITH AUXILIARY ELECTRIC HEAT

 Thermostat closes circuits R to G, R to Y/Y2 and/or R to Y1 with R to W/W1 or W2 (and R to O in the case of defrost).

If the thermostat calls for electric heat when the heat pump is operating in heating or defrost, the motor will modify the airflow if necessary. The motor will provide an airflow which is safe for the operation of the electric heat. That airflow is the greater of the heat pump heating airflow and the electric heat only airflow.

## **CAUTION**

#### **ELECTRICAL SHOCK or UNIT DAMAGE HAZARD**

Failure to carefully read and follow this CAUTION warning could result in equipment malfunction, property damage, personal injury and/or death.

Disconnect power to unit before removing or replacing connectors or servicing motor. Wait at least five (5) minutes after disconnecting power before opening motor.

#### CARE AND MAINTENANCE

The system should be regularly inspected by a qualified service technician. Consult the servicing dealer for recommended frequency. Between visits, the only consumer service recommended or required is air filter maintenance and condensate drain operation.

#### **AIR FILTER**

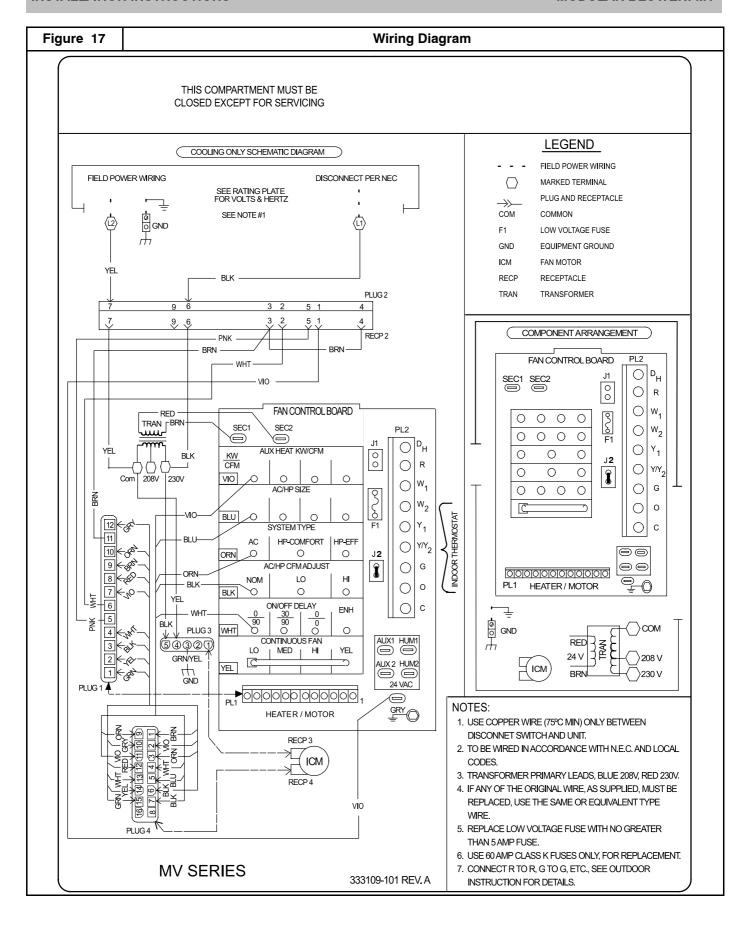
Inspect air filters at least monthly and replace or clean as required. Disposable type filters should be replaced. Reusable type filters may be cleaned by soaking in mild detergent and rinsing with cold water. The frequency of cleaning depends upon the hours of operation and the local atmospheric conditions. Install filters with the arrows on the side pointing in the direction of air flow. Clean filters keep unit efficiency high.

#### **LUBRICATION**

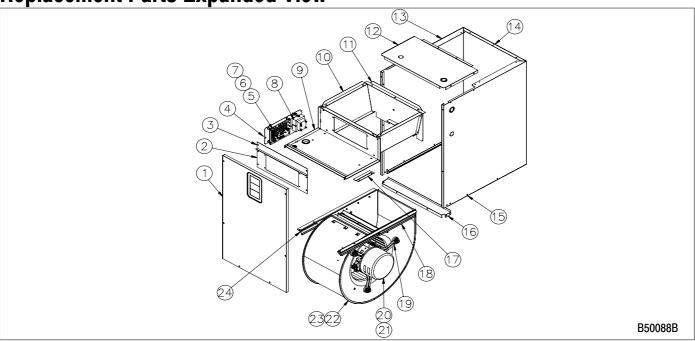
The bearings of the blower motor are permanently lubricated.

#### **CONDENSATE DRAINS**

During the cooling season check the condensate drain lines to be sure that condensate is flowing from the primary drain but not from the secondary drain. If condensate ever flows from the secondary drain, the unit should be promptly shut off and the condensate pan and drains cleaned to insure a free flowing primary drain.



**Replacement Parts Expanded View** 



## **Replacement Parts**

KEY NO.	PART NUMBER	DESCRIPTION	MV08B1500B2	MV12F1900B2	MV16J2200B2	MV20L2400B2	OLD PART#
1	B6000813	BLOWER DOOR ASS'Y	1	-	-	-	1176308
	B6000814		_	1	-	-	1176309
	B6000815		_	-	1	-	1176310
	B6000816		-	-	-	1	1176311
2	B60029	PLATE HEATER ADAPTER	-	1	1	1	1084606
3	B60048	PLATE HEATER FILLER	-	-	1	1	1084608
4	B60026	BRACKET CTL MTG	1	1	1	1	1176334
5	R99G009	FAN CONTROL BOARD MV	1	1	1	1	1175186
6	B60032	WIRE HARNESS (PRINCIPAL)	1	1	1	1	1089053
7	B60031	WIRE HARNESS (LOW VOLTAGE)	1	1	1	1	1089054
8	L01F012	TRANSFORMER 208/230-24v, 40VA	1	1	1	1	1082611
9	B60057	FRONT BLOWER DECK	1	-	-	-	1176322
	B60058	1	-	1	-	-	1176323
	B60059	1	-	-	1	-	1176324
	B60060	1	-	-	-	1	1176325
10	B60022	SIDE BLOWER DECK	2	-	-	-	1176326
	B60038	1	-	2	-	-	1176327
	B60041		-	-	2	-	1176328
	B60044		-	-	-	2	1176329
11	B60023	REAR BLOWER DECK	1	-	-	-	1176318
	B60039		-	1	-	-	1176319
	B60042		_	-	1	-	1176320
	B60045		-	-	-	1	1176321
12	B6000701	PANEL TOP ASS'Y	1	-	-	-	1176330
	B6000702		-	1	-	-	1176331
	B6000703		_	-	1	-	1176332
	B6000704		-	Ē	_	1	1176333
13	B60019	L.H. SIDE WRAPPER	1	1	1	1	1176316

KEY NO.	PART NUMBER	DESCRIPTION	MV08B1500B2	MV12F1900B2	MV16J2200B2	MV20L2400B2	OLD PART#
14	B6001801	BACK WRAPPER	1	-	-	-	1176312
	B6001802		-	1	-	-	1176313
	B6001803		-	-	1	-	1176314
	B6001804		-	-	-	1	1176315
15	B60020	R.H. SIDE WRAPPER	1	1	1	1	1176317
16	B6003601	BRACE, BOTTOM FRONT	1	-	-	-	1069603
	B6003602		-	1	-	-	1069604
	B6003603		-	-	1	-	1069605
	B6003604		-	-	-	1	1087670
17	B6005601	DECK BLOWER RAILS RIGHT	1	1	1	1	NA
	B6005602	DECK BLOWER RAILS LEFT	1	1	1	1	NA
18	B6006101	BLOWER RAILS R.H.	1	1	1	1	1085521
19	B0188802	MOTOR MOUNT ASS'Y (BAND AND LEGS)	1	1	1	1	NA
20	L06H016	BLOWER, MOTOR (NO CONTROL MODULE) 1/2HP - ECM	1	1	-	-	1172828
	L06I011	3/4HP - ECM	-	-	1	1	1172829
21	L06Z009	MOTOR, CONTROL MODULE 1/2HP - ECM	1	-	-	-	1176288
	L06Z010	1/2HP - ECM	-	1	-	-	1176289
	L06Z011	3/4HP - ECM	-	-	1	-	1176290
	L06Z012	3/4HP - ECM	-	-	-	1	1176291
22	Z01I027	BLOWER HOUSING WITH WHEEL DD10-7	1	-	-	1	1176353
	Z01I028	DD10-8	-	1	-	-	1176354
	Z01I029	DD10-9	-	-	1	1	1176355
23	Z01L011	BLOWER WHEEL DD10x7x1/2 CW CV	1	-	-	-	600586
	Z01L012	DD10x8x1/2 CW CV	-	1	-	-	600587
	Z01L013	DD10x9x1/2 CW CV	-	-	1	1	96839
24	B6006102	BLOWER RAILS L.H.	1	1	1	1	1085504

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