SunTherm™ HEATING PRODUCTS

INSTALLATION MANUAL

Intertek 9700771

Multi-Position 28" Deep Modular Air Handler With or Without Electric Heating
MODELS: MMVT Series

LIST OF SECTIONS

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SECTION 1: GENERAL

The following list includes important facts and information regarding the air handler models covered in this manual.

1. Air handler is rated for 120V at 60Hz (no heat models) or 120V (blower motor) and 208/240 VAC at 60 Hertz (electric heaters).
2. Air handler size varies by model.
3. Air handler is designed for A/C or heat pump operation.
4. Air handler is designed for upflow, downflow and horizontal applications.
5. Air handler must not be operated with the access panels removed.
6. Air handler is listed by ETL in the United States and Canada
7. This air handler is for use at elevations of 10,000 ft (3,048m) or less.
8. This air handler is not to be used by persons (including children) with reduced physical, sensory or mental capabilities, or lack of experience and knowledge, unless they have been given supervision or instruction concerning use of this air handler by a person responsible for their safety. Children must not be allowed to play with this air handler.

SAVE THIS MANUAL FOR FUTURE REFERENCE

MM Series Multi-Position Air Handlers

This is a safety alert symbol. When this symbol is seen on labels or in manuals, be alert to the potential for personal injury. Understand and pay particular attention to the signal words **DANGER, WARNING, or CAUTION.**

DANGER: Indicates an imminently hazardous situation, which if not avoided, **will result in death or serious injury.**
WARNING: Indicates a potentially hazardous situation, which if not avoided, **could result in death or serious injury.**
CAUTION: Indicates a potentially hazardous situation, which if not avoided, **may result in minor or moderate injury.** It is also used to alert against unsafe practices and hazards involving property damage.

⚠ WARNING

Improper installation may create a condition where the operation of the product could cause personal injury or property damage.

Improper installation, adjustment, alteration, service or maintenance can cause injury or property damage. Refer to this manual for assistance; or for additional information consult a qualified contractor, installer, or service agency.

⚠ WARNING

FIRE OR ELECTRICAL HAZARD
Failure to follow the safety warnings exactly could result in serious injury, death, or property damage.
A fire or electrical hazard may result causing property damage, personal injury or loss of life.

⚠ CAUTION

This product must be installed in strict compliance with the installation instructions and any applicable local, state, and national codes including, but not limited to, building, electrical, and mechanical codes.

⚠ IMPORTANT

The Clean Air Act of 1990 bans the international venting of refrigerant (CFC's and HFC's) as of July 1, 1992. Approved methods of reclaiming must be followed. Fines and/or incarceration may be levied for non-compliance.

Safety Requirements

This air handler should be installed in accordance with all national and local building/safety codes and requirements, local plumbing or waste-water codes, and other applicable codes. In the absence of local codes, install in accordance with the following codes.

- Standard for the Installation of Air Conditioning and Ventilating Systems (NFPA 90A)
- Standard for the Installation of Warm Air heating and Air Conditioning Systems (NFPA 90B)
- National Electrical Code (NFPA 70)
- Canadian Electrical Code, Part I (CSA C22.2) or ANSI/NFPA No. 70
- All local codes (State, City, and Township)

NOTE: All applicable codes take precedence over any recommendation made in these instructions. SunTherm assumes no responsibility for units installed in violation of any code or regulation.

1. Refer to the unit rating plate for the air handler model number, and then see the dimensions page of this instruction for return air plenum dimensions in Figures 1 and Tables 3. The plenum must be installed according to the above listed codes or the instructions in this manual.
2. Refer to the dimensions page of this instruction and the duct connector and combustible floor base dimensions shown in Figure 5 for the proper duct connector or combustible floor base for downflow applications. The duct connector and combustible floor base must be installed according to the instructions in this manual.
3. These models are not ETL listed or approved for installation into a Manufactured (Mobile) Home.
4. Provide clearances from combustible materials as listed under **Clearances to Combustibles.**
5. Provide clearances for servicing ensuring service access is allowed for the control box, electric heating elements, and the blower.
6. Check the rating plate and the power supply to be sure the electrical characteristics match.
7. Failure to carefully read and follow all instructions in this manual can result in malfunction of the air handler, death, personal injury, and/or property damage.
8. The air handler must be installed so the electrical components are protected from water.
9. Installing and servicing heating/cooling equipment can be hazardous due to electrical components.
11. Only trained and qualified personnel should install repair or service heating/cooling equipment. Untrained service personnel can perform basic maintenance functions such as cleaning of exterior surfaces and replacing the air filters. Observe all precautions in the manuals and on the attached labels when working on this air handler.
12. These instructions cover minimum requirements and conform to existing national standards and safety codes.

In some instances, these instructions exceed certain local codes and ordinances, especially those who have not kept up with changing home and/ or HUD construction practices. These instructions are to be followed and are the minimum requirement for a safe installation.

13. The size of the air handler should be based on an acceptable heat loss calculation for the structure. ACCA, Manual J or other approved methods may be used.
14. Check the blower motor circuit power supply to be sure it is a nominal 120 VAC, 1–Phase power supply. **DO NOT CONNECT THE BLOWER MOTOR CIRCUIT OF THIS AIR HANDLER TO A POWER SUPPLY WITH A VOLTAGE ABOVE 132 VOLTS**.
15. Check the electric heater power supply to be sure it is a nominal 208/240 VAC 1–Phase power supply. **DO NOT CONNECT THE ELECTRIC HEATER CIRCUIT OF THIS AIR HANDLER TO A VOLTAGE ABOVE 264 VOLTS**.
16. Ground connections must be securely fastened to the control box and ground wires must be secure.

⚠ WARNING

Always shut off electricity at the disconnect switch or turn off the circuit breakers in the main electrical panel before performing any service on this air handler.

GENERAL INFORMATION

This multi-position modular air handler provides the flexibility for installation in any upflow, downflow, or horizontal application. The versatile models may be used with or without electric heat. The direct-drive variable speed ECM and 5-speed constant torque motors provide a selection of air-flow volume to match any application. The air handler can be positioned for bottom air return in the upflow position, top air return in the downflow position, or air return through the end of the air handler in the horizontal position.

Inspection

As soon as the air handler is received, it should be inspected for possible damage during transit. If damage is evident, the extent of the damage should be noted on the carrier's freight bill. A separate request for inspection by the carrier's agent should be made in writing. Before installing the air handler, check the cabinet for screws or bolts which may have loosened in transit. There are no shipping or spacer brackets which need to be removed before startup.

See local distributor for more information. Mortex Products, Inc assumes no liability for freight damage.

Also check to be sure all accessories such as heater kits, and coils are available. Installation of these accessories should be accomplished before the air handler is set in place or the connecting of the wiring, electric heat, ducts or piping.

Models	**MMVT24A,36A**	**MMVT36B,48B**	**MMVT48C,60C, 60D**	**MMVT60D**
Available Electric Heat kW	5,10	5,10,15	5,10,15,20	5,10,15,20
Blower Size (D x W)	10 x 6	10 x 8	12 x 9 T	12 x 9 R
Unit Voltage	120V (Blower Motor and Transformer Only) and 208/240V (Electric Heaters Only), 60 HZ, 1 PH			
Motor Type	Constant Torque			
Max. External SP (Duct), In. W.C.	0.50			
Thermostat Circuit	24 VAC, 60 Hz, 40VA			

Table 1: Air Handler Model Specifications

UNIT NOMENCLATURE					
MM	**VT**	**36A**	**00**	**A**	**28**
I	**II**	**III**	**IV**	**V**	**VI**
I	**Series** MM = Multi-position Modular H/P Air Handler (30″Tall)				
II	**Motor Type** VT = Constant Torque Motor				
III	**Unit Size (Cabinet Size)** 24A = (14 1/4″W x 28″ D x 30″ H) 36A = (14 1/4″W x 28″ D x 30″ H) 36B = (17 1/2″W x 28″ D x 30″ H) 48B = (17 1/2″W x 28″ D x 30″ H) 48C = (21″W x 28″ D x 30″ H) 60C = (21″W x 28″ D x 30″ H) 60D = (24 1/2″W x 28″ D x 30″ H)				
IV	**Heating Configuration** 00 = Cooling or Heat Pump Only				
V	**Motor Voltage Selection** A = 120 Volt				
VI	**Option Code** 28 = (28″Deep Cabinet)				

Table 2: Model Number Nomenclature

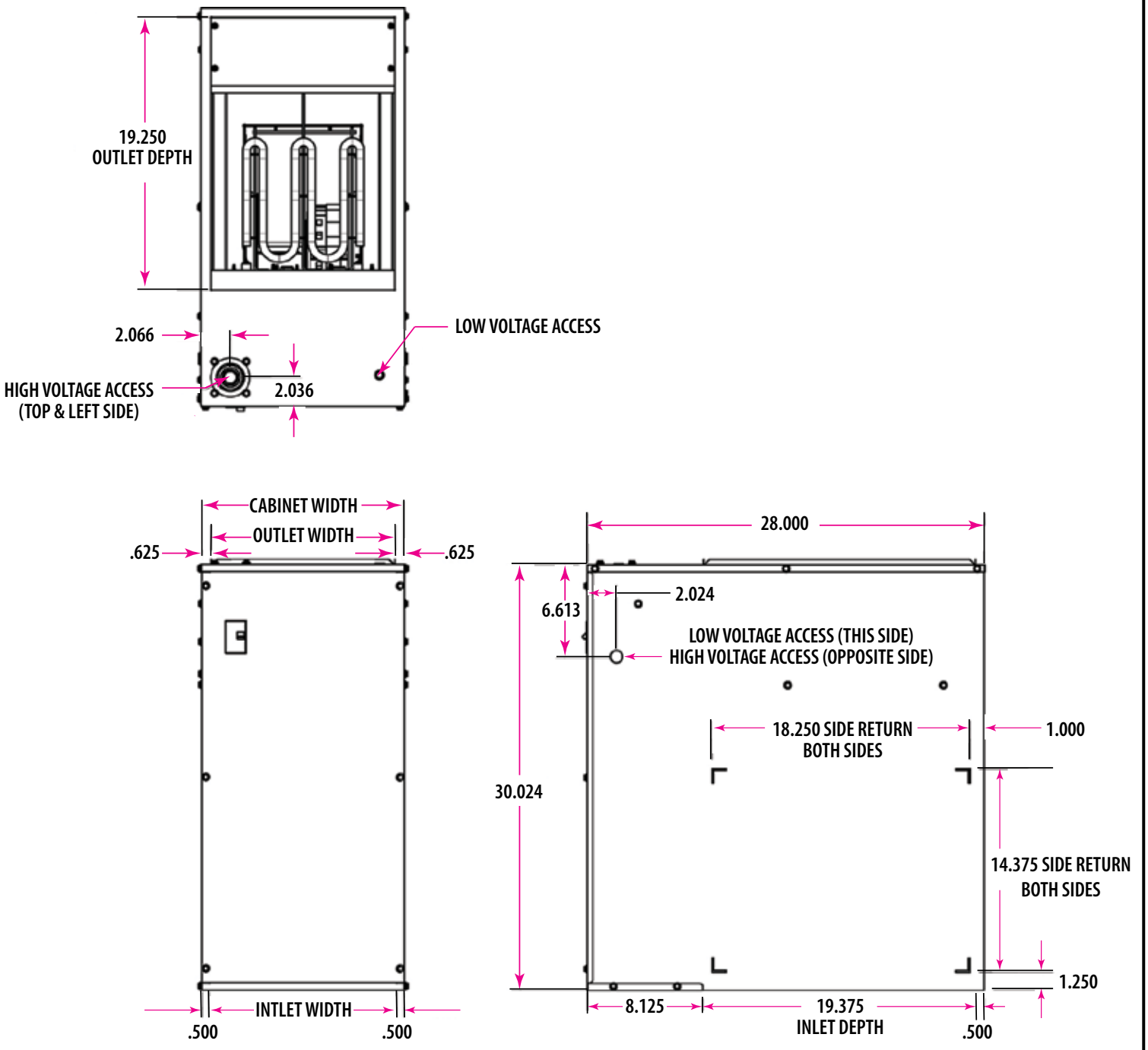

Figure 1: Dimensional Data - MS Series - DX Cooling With Or Without Electric Heat

Model	CABINET WIDTH	INLET WIDTH	OUTLET WIDTH
MMVT24A, 36A	14.25″	13.25″	13.00″
MMVT36B, 48B	17.50″	16.50″	16.25″
MMVT48C, 60C	21.00″	20.00″	19.75″
MMVT60D	24.50″	23.50″	23.25″

Table 3: Air Handler Dimensional Data for Figure 1

SECTION 3: LOCATION, CLEARANCES AND RETURN AIR REQUIREMENTS

LOCATION

Access for servicing is an important factor in the location of any air handler. Provide a minimum of 30 inches in front of the air handler for access to the control box, heating elements, blower, and air filters. This access may be provided by a closet door or by locating the air handler so that a wall or partition is not less than 30 inches from the front access panel. As the location is usually predetermined, check with owner's or dealer's installation plans. If a location has not been decided, consider the following in choosing a suitable location.

1. Select a location with adequate structural support, space for service access, clearance for return and supply duct connections.
2. Normal operating sound levels may be objectionable if the air handler is placed directly over or under some rooms such as bedrooms, study, etc.
3. It is best to locate the air handler so that supply air ducts are about the same length and the return air ducts are about the same length to provide even air distribution of supply and return air to and from the living spaces.
4. Locate air handler where electrical supply wiring can be easily routed to the main electrical panel and where electrical wiring will not be damaged.
5. Locate air handler where thermostat wiring can be easily routed to the thermostat and where the wiring will not be damaged.
6. Locate air handler where refrigerant lines can be easily routed from the indoor coil to the outdoor unit.
7. Locate the air handler where condensate lines can be easily routed to an available drain or outside. Be sure to route condensate drain piping so as not to obstruct access to the air filter.
8. If a cooling coil is installed in a draw-through configuration, a negative pressure is created in the condensate drain system. To assure proper condensate drainage and to prevent condensate from being drawn into the blower, it is recommended that a trap be installed in the primary (main) and secondary (overflow) drain lines connected to the coil. If the secondary drain is not used, it must be capped.
9. The draw-through design with a cooling coil installed can also cause exterior surface of cabinet to sweat when air handler is installed in a non-conditioned space such as an attic or garage. The installer must provide protection such as full-size auxiliary drain pan under all air handlers installed in a non-conditioned space to prevent damage from condensation runoff. Some states, cities and counties require additional insulation to be installed on the exterior casing of the air handler to prevent sweating. Refer to the state, city, county or local code for insulation requirement to be sure the installation is in compliance. In the absence of a local code, it is recommended that air handlers installed in non-conditioned spaces be insulated on the exterior of the entire cabinet including the front access panel with one (1) inch thick fiberglass that has a vapor barrier on the outside.

CLEARANCES

This air handler is approved for zero (0) inches clearance to combustible material on any part of the air handler exterior casing. Refer to Table 4 and Figures 2 and 3 for clearance to combustibles and for service access clearances.

MODEL	TOP (in)	BACK (in)	SIDES (in)	FRONT OF FURNACE		DUCT (in)
				ALCOVE (in)	CLOSET (in)	
ELECTRIC	0	0	0	30	6	1

Table 4: Clearances to Combustibles

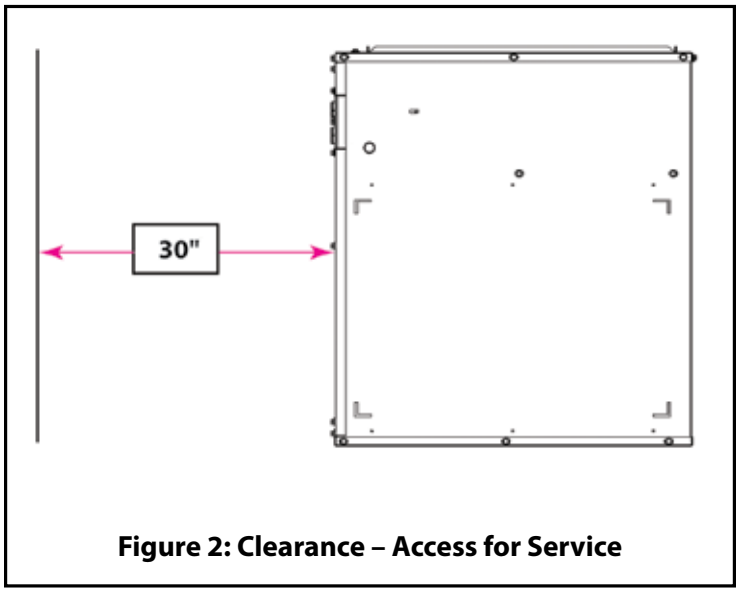

Figure 2: Clearance – Access for Service

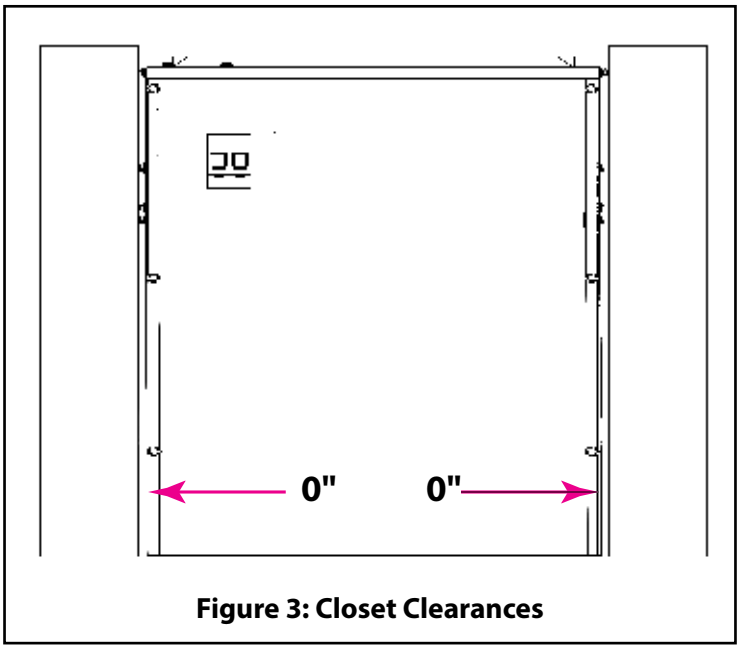

Figure 3: Closet Clearances

RETURN AIR REQUIREMENTS

Provisions shall be made to permit the air in all rooms in the living space to return to the air handler. Failure to comply may cause a reduction in the amount of return air available to the blower, causing reduced airflow resulting in improper heating of the living space. The reduced airflow may cause the air handler to cycle on the electric heater's over-temperature limit causing premature heating element failure.

The return air opening can be located in the floor, on a closet front door, or in a side wall above the air handler cabinet. If the opening for the return air is located in the floor, side walls, or closet door anywhere below the air handler cabinet, a 6-inch minimum clearance between the air handler and the wall or door must be provided on the side where the return is located to provide for proper airflow. The 6-inch minimum clearance is not required if there is a return grille installed above the air handler casing providing the grille has a sufficient return air opening.

For the air handler to work properly, a closet or alcove must have a certain total free area opening for the return air.

MMVT24A Air Handlers
- Minimum 200 in free area opening
- Use Return Grille or Coil Cabinet

MMVT36A, 36B Air Handlers
- Minimum 250 in^2 free area opening
- Use Return Grille, A/C Coil Cabinet, or any return grille with a minimum 250 in^2 free area opening.

MMVT48B, 48C, 60C Air Handlers
- Minimum 390 in^2 free area opening
- Use Return Grille, or A/C Coil Cabinet, or any return grille with a minimum 390 in^2 free area opening.

MMVT60D Air Handlers
- Minimum 430 in^2 free area opening
- Use Return Grille, or A/C Coil Cabinet, or any return grille with a minimum 430 in^2 free area opening.

SECTION 4: AIR HANDLER ORIENTATION, SUPPLY AIR DUCT, AND RETURN AIR FILTERS

The air handler is shipped from the factory configured to be installed in an upflow or horizontal right-to-left air-flow position. Horizontal right-to-left means when facing the front of the air handler and when it is laid on its side, the supply air opening is on the left and the return opening is on the right. This air handler is field convertible to a horizontal left-to-right air-flow position.

UPFLOW APPLICATIONS

In an upflow installation the discharge outlet is at the top. Care should be taken to ensure air handler is level to permit proper condensate drainage. Normal upflow installation will be in a closet or basement. If installed in a closet, the closet should have a platform framed in that measures at least 12 inches in height with an opening cut in the top of the platform for the return air to enter the bottom of the air handler. A filter frame and filter can be used that covers the opening and is sealed to prevent air by-passing the filter. A filter grille can be used that is located as described in **RETURN AIR REQUIREMENTS.**

The minimum filter size is shown as follows:

Standard Throw Away Air Filter @ 300 ft/min or Less
800 CFM = 20 x 20 x 1
1000 CFM = 20 x 25 x 1
1200 CFM = 20 x 30 x 1
1400 CFM = 25 x 30 x 1
1600 CFM = 25 x 30 x 1
1800 CFM = 30 x 30 x 1
2000 CFM = 30 x 40 x 1 or two 30 x 20 x 1
2400 CFM = 30 x 40 x 1 or two 30 x 20 x 1

Pleated Air Filter @ 500 ft/min or Less
800 CFM = 16 x 16 x 1
1000 CFM = 18 x 20 x 1
1400 CFM = 20 x 20 x 1
1200 CFM = 20 x 20 x 1
1600 CFM = 20 x 25 x 1
1800 CFM = 20 x 30 x 1 or two 20 x 15 x 1
2000 CFM = 20 x 30 x 1 or two 20 x 15 x 1
2400 CFM = 25 x 30 x 1 or two 14 x 30 x 1

Another option is to use a SunTherm Air Filter Base Accessory Kit which can be used on the return air end of the air handler when configured in the upflow position (See Figure 6). The filter base is placed over the return plenum in the floor and sealed to the plenum using sealant or caulking material and/or tape. The air handler is placed on top of the return filter base and the return opening sealed to prevent leaks.

FILTER BASE ASSEMBLY KIT – FIELD INSTALLED
86ET0004–A (Extra Small) 14.25" Wide Cabinet 14" x 25" Filter
86ET0005–B (Small) 17.50" Wide Cabinet 16" x 25" Filter
86ET0006–C (Medium) 21.00" Wide Cabinet 20" x 25" Filter
86ET0007–D (Large) 24.50" Wide Cabinet 24" x 25" Filter

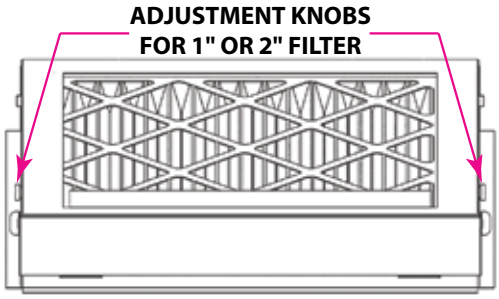

Figure 4: Air Filter Base Accessory for 1" or 2" Air Filters

Notes for Air Filter Base Accessory
- The filter size adjustment knobs are located on both sides of the base.
- Make sure the flow arrow on the air filter is pointing towards the coil.
- The Air Filter Base Accessory can also be used on the return air end of the air handler when configured in the downflow position in place of a wall, door or ceiling mounted return filter grille.

After the air handler has been secured to the return platform, connect the supply air outlet to a plenum to the top of the air handler and secure it with screws. Use a non-tape sealant such as mastic or an aerosol sealant to seal duct leakage. If the air handler is installed in a basement, run the supply and return duct work in accordance with local codes. Use a non-tape sealant such as mastic or an aerosol sealant to seal duct leakage.

HORIZONTAL APPLICATIONS

Horizontal applications will normally be used in an attic or crawl space. This type of installation requires supply air plenum or duct to be connected to the supply collar and a return air plenum or duct be attached to the air handler inlet collar. The supply ducts will be connected to the supply air plenum and routed through the attic to a register in each room. Use a non-tape sealant such as mastic or an aerosol sealant to prevent leaks in the ducts and the plenum.

NOTE: The same return air filtration requirements apply to horizontal applications as upflow applications. Refer to the upflow orientation section for return air filter requirements on this page. The opposite end of the return air duct is attached to a return filter grille housing. The filter grille is usually located in a wall, just below the ceiling or the ceiling in a hallway. Use a non-tape sealant such as mastic or an aerosol sealant to prevent leaks in the ducts and the plenum.

The MM Series air handlers are shipped to be installed without modifications for right-to-left or left-to-right supply air discharge applications.

DOWNFLOW APPLICATIONS

The MMVT air handler may be installed in the downflow configuration by simply installing it with the supply air discharge pointing downward.

COMBUSTIBLE FLOOR BASE FOR DOWNFLOW APPLICATIONS

It is required that the installer provide a combustible floor base similar what is shown in Figure 9 that is field supplied (accessory not available from air handler manufacturer) and installed on any combustible flooring where the air handler is installed in downflow applications. The overall dimensions of the combustible floor base must be the same as the air handler footprint shown in Figures 1-3 (dimensions A & C) and the opening on the floor and supply duct must be the same size as the supply opening in the air handler as shown in Figures 1-3 (dimensions D & E) to allow for proper airflow through the air handler.

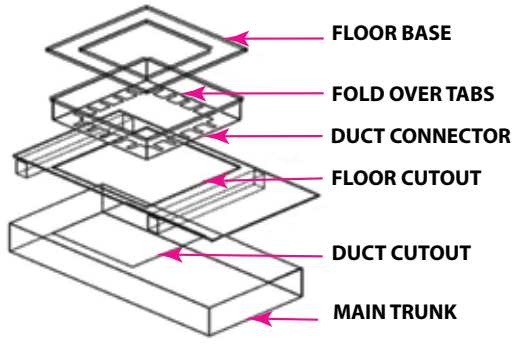

Figure 5: Combustible Floor Base Installation

SECTION 5: INSTALLING THE AIR HANDLER

Prior to installing the air handler, make sure the holes are cut into the floor for the refrigerant tubing, the drain line, the electrical wiring, the thermostat wiring and the outdoor unit control wiring.

1. Remove the top shipping cover and corner posts.
2. Remove the bottom shipping cover.
3. Remove the blower and control box access panel.
4. Remove the coil compartment access panel.
5. Place the air handler into position using one of the following choices:
   (a) If the Combustible Floor Base is used, slide the air handler onto the combustible floor base until the air handler touching the flanges on the back of the floor base.
   (b) If the Combustible Floor Base is not used, slide the air handler over the duct opening until the opening in the air handler lines up with the duct opening in the floor.
6. Secure the air handler by one of the two choices:
   (a) If the Combustible Floor Base is used, secure the air handler to the floor by drilling two holes through the air handler cabinet base and the floor base at the right and left front inside corners of the cabinet. Use two screws to secure the air handler to the floor.
   (b) If the Combustible Floor Base is not used, secure the air handler to the floor by drilling two holes through the air handler base at the left and right front inside corners of the cabinet. Use two screws to secure the air handler to the floor.
7. Use calking, sealers, and/or tape to seal between the combustible floor base and the opening on the air handler or between the opening on the air handler and the duct in the floor.
8. Connect the electrical supply wires and the thermostat control wires in the control box.
9. Connect the refrigerant lines to the coil.
10. Re-install the coil compartment access panel and secure with the screws that were removed in step 3.
11. Re-install the blower and control box access panel and secure with the screws that were removed in step 2.
12. Turn the power on to the air handler by following the procedure in the Users Information Manual.
13. Set the thermostat to the desired temperature.

SECTION 6: LINE VOLTAGE WIRING

The unit internal wiring is complete except for the power supply and the thermostat wires. See wiring diagram and/or Tables 5 & 6 for wire size, fuse/circuit breaker size, and ground wire sizes. The use of cable connectors on incoming power supply wires to relieve any strain on wiring is recommended. Follow the steps below to connect the power supply wires.

A 120V power supply will need to be connected to the power terminal block. For models with factory or field installed electric heaters, a separate 208/240VAC power supply must be connected to the line side of the electric heater circuit breakers. If the air handler has been installed prior to installing the electric heaters or if an older air handler is being replaced, the existing 208/240VAC supply power wires must be checked to make sure they are properly sized to handle the current load for the heaters. Refer to Tables 5 & 6 for correct wire size. If the supply power wire size is incorrect, new wires will need to be installed.

Follow the steps below to connect the power supply wires.

1. Remove the blower/control box access panel.
2. Remove the control box cover.
3. Remove the appropriate slug from the knockout on the left side or top of the air handler cabinet that will accommodate all of the power supply wires and install a strain relief bushing in the hole.
4. Strip 1/2" of the insulation on the end of each wire.
5. Insert the wires through the strain relief bushing.

120VAC Power Supply Wiring

1. Insert the BLACK 120VAC power wire into the L1 screw terminal on the 120VAC power terminal block and tighten the set screw on the wire.
2. Insert the WHITE 120 VAC neutral wire into the N screw terminal on the 120VAC power terminal block and tighten the set screw on the wire.
3. Insert the GREEN ground wire from the 120VAC power supply cable into the ground lug and tighten the set screw on the wire.
4. If there is no electric heat, tighten the screws on the strain relief bushing until the power supply wires are securely held by the bushing.

NOTE: A 120VAC service disconnect must be installed within sight of the air-handler to allow the 120VAC power to be disconnected from the air-handler during servicing.

Electric Heater Power Supply Wiring - Single Circuit Line Voltage Wiring Connections

1. Insert the BLACK wire into the L1 screw terminal on the first circuit breaker from the top and tighten the set screw on the wire.
2. Insert the WHITE or RED wire into the L2 screw terminal on the first circuit breaker down from the top and tighten the set screw on the wire.
3. If a single circuit is being used for a 5 kW, 10kW, 15kW or 20kW model, install a BLACK jumper wire from the L1 terminal on circuit breaker #1 to the L1 terminal on circuit breaker #2 and a WHITE or RED jumper wire from the L2 terminal on circuit breaker #1 to the L2 terminal on circuit breaker #2. Refer to Figures 6 and 9 for circuit breaker locations.
4. Insert the GREEN ground wires for both into the ground lugs and tighten the set screws on the wires.
5. Tighten the screws on the strain relief bushing until the power supply wires are securely held by the bushing.

NOTE: The 100 amp 4-Pole Jumper Bar Assembly part number 68BAE001 can be used in place of the jumper wires.

Electric Heater Power Supply Wiring - Dual Circuit Line Voltage Wiring Connections for 15kW or 20kW Models

1. Follow steps 1-2 in **Single Circuit Line Voltage Wiring Connections** above for Circuit #1.
2. Insert the BLACK wire from the second power supply into the L1 screw terminal on the second circuit breaker down from the top and tighten the set screw to clamp down on the wire.
3. Insert the WHITE or RED wire from the second power supply into the L2 screw terminal on the second circuit breaker down from the top and tighten the set screw to clamp down on the wire.
4. Insert the GREEN ground wires for both circuits into the ground lugs and tighten the set screws.
5. Tighten the screws on the strain relief bushing until the power supply wires are securely held by the bushing.

NOTE: The electric heater in the air handler is equipped with either one or two circuit breakers. These circuit breakers protect the wiring inside of the air handler in the event of a short circuit. Additionally, these breakers provide a means of disconnecting the power to the electric heaters in the air handler, but do not disconnect the 120VAC power supply to the air handler. The circuit breakers in the air handler are not meant to protect the branch circuit wiring between the air handler and the home's circuit breaker panel. General wire and breaker sizes are shown in Tables 5 & 6. If sheathed cable is used, refer to NEC National Electrical Code (NFPA 70) or the Canadian Electrical Code, Part I (CSA C22.1) and local codes for additional requirements concerning supply circuit wiring. Electrical data can be found in Tables 5 & 6.

IMPORTANT - All installation on field wiring must be rated at 60ºC or higher. Please refer to the wiring diagrams on the air handler or the tables in this manual for more information. The 15kW and 20kW models may be connected to a single or dual branch circuit.

IMPORTANT - Refer to the NEC National Electrical Code (NFPA 70) or the Canadian Electrical Code, Part I (CSA C22.1) and local codes for wiring material requirement.

	MMVT24A, 36A	MMVT36B, 48B	MMVT48C, 60C	MMVT60D
Indoor Blower Motor Type	CONSTANT TORQUE	CONSTANT TORQUE	CONSTANT TORQUE	CONSTANT TORQUE
Indoor Blower Amps @ 120 VAC	4.79	6.12	7.48	7.26
Minimum Circuit Ampacity – 120 VAC Circuit	5.99	7.65	9.35	9.08
Minimum Wire Size (90°C) – 120 VAC Circuit	#18	#18	#18	#18
Ground Wire Size	*	*	*	*
Maximum Overcurrent Production Amps – 120 VAC Circuit	15	15	15	15

Table 5: Electrical Data – 120 Volt Blower Motor and Transformer Circuit Only

+ Refer to the National Electrical Code Table 250-95 for Non-Sheathed Conductor Ground Wire.

* Ground conductor must be the same size and temperature rating as the other conductors listed in Table 5.

Electric Heater Circuit Only	Single Branch Circuit				Dual Branch Circuit			
Circuit Number	N/A				1		2	
5 kw Heater Amps - 208/240 VAC	18.0/20.8				N/A		N/A	
10 kW Heater Amps - 208/240 VAC	36.1/41.7				N/A		N/A	
15 kW Heater Amps - 208/240 VAC	54.1/62.5				36.1/41.7		18.0/20.8	
20 kW Heater Amps - 208/240 VAC	72.2/83.4				36.1/41.7		36.1/41.7	
Heater - kW	5	10	15	20	15		20	
Circuit Number	N/A	N/A	N/A	N/A	1 (10kW)	2 (5kW)	1 (10kW)	2 (10kW)
Minimum Circuit Ampacity – 208/240 VAC Circuit	26.00	52.13	78.13	104.25	52.13	26.00	52.13	52.13
Minimum Wire Size (90°C)	#12	#6	#4	#3	#6	#12	#6	#6
Minimum Wire Size (75°C)	#10	#6	#4	#2	#6	#10	#6	#6
Minimum Wire Size (60°C)	#10	#4	#3	#1	#4	#10	#4	#4
Ground Wire Size	*	*	*	*	*	*	*	*
Maximum Overcurrent Protection Amps – 208/240 VAC Circuit	30	60	80	110	60	30	60	60

Table 6: Electrical Data: 208/240 Volt Electric Heater Circuit Only

15kW and 20kW models may have a dual or single power supply. Single power supply requires a jumper bar or a jumper wire.

+ Refer to the National Electrical Code Table 250-95 for Non-Sheathed Conductor Ground Wire.

* Ground conductor must be the same size and temperature rating as the other conductors listed in Table 6.

	ELECTRIC HEATER HEATING CAPACITIES						
		5 kW	10 kW	15kW		20kW	
	BRANCH CIRCUIT	1	1	1	2	1	2
240 VAC	BTU/HR	17,033	34,067	34,067	17,033	34,067	34,067
	kW	4.99	10.00	10.00	4.99	10.00	10.00
230 VAC	BTU/HR	15,876	33,686	33,686	15,876	33,686	33,686
	kW	4.65	9.78	9.78	4.65	9.78	9.78
220 VAC	BTU/HR	14,736	30,222	30,222	14,736	30,222	30,222
	kW	4.32	8.86	8.86	4.32	8.86	8.86
TOTAL HEATING CAPACITY @ 240 VAC	BTU/HR	17,033	34,067	51,149		68,134	
	kW	4.99	10.00	14.99		20.00	

Table 7: Electric Heater Heating Capacities

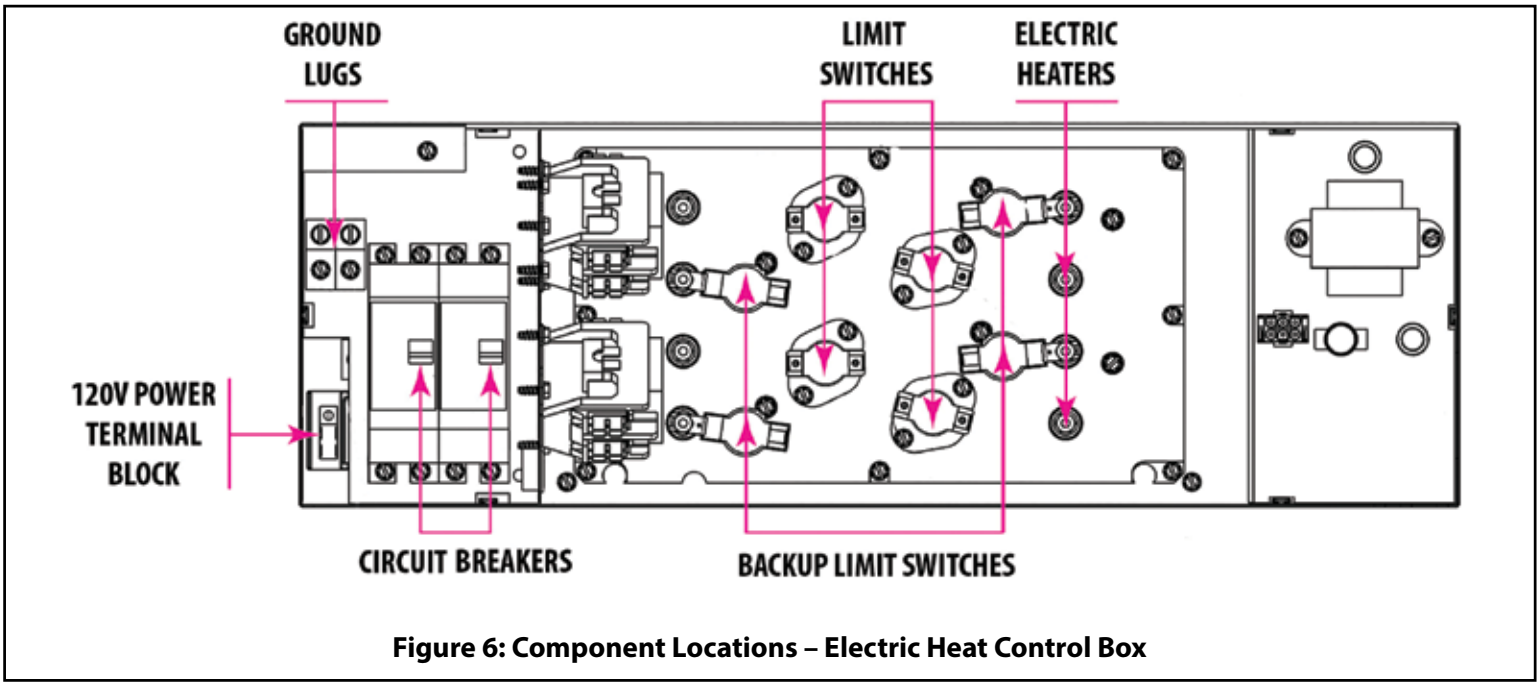

Figure 6: Component Locations – Electric Heat Control Box

NOTE: Casing or cabinet must be permanently grounded in accordance with the National Electrical Code or other applicable codes.

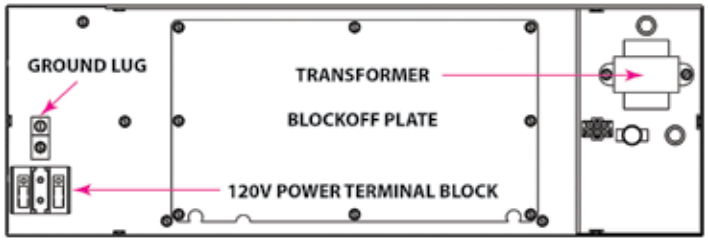

Figure 7: Component Locations – No Heat Control Box

⚠ WARNING

For personal safety be sure to turn the electrical power "OFF" at the main electrical panel and at the air handler control box circuit breakers before attempting any service or maintenance operations.

Homeowners should never attempt to perform any maintenance which requires opening the air handler control box cover.

⚠ WARNING

This air handler is not equipped with a shield that covers the line voltage electrical supply wires and the circuit breaker connections. Take precautions to prevent accidental electrical shock. Be sure to turn the electrical power "OFF" at the main electrical panel and at the air handler control box circuit breakers before removing the front panel. Refer to Figure 17 for the circuit breaker location on the front panel.

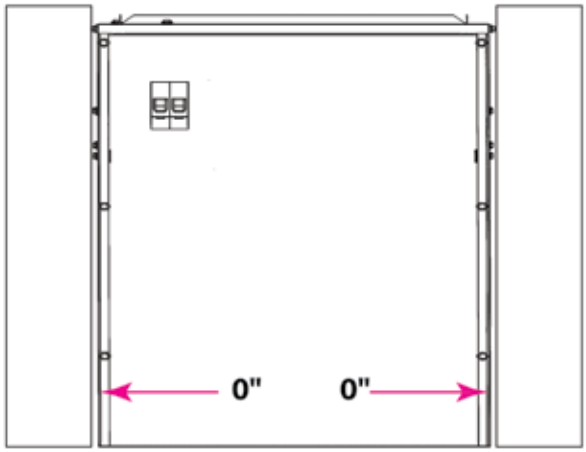

Figure 8: Circuit Breaker Location on Front Panel

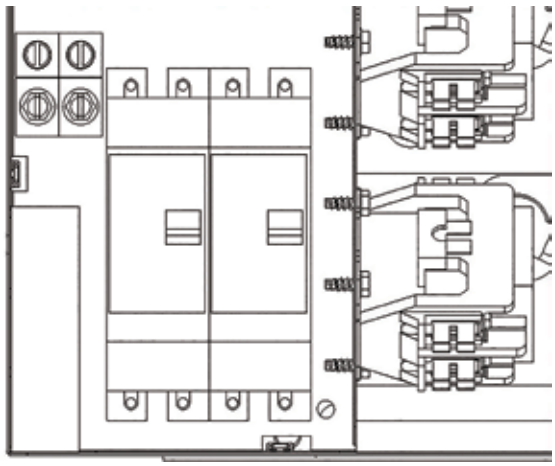

Figure 9: Control Box Circuit Breaker Location

SECTION 7: FIELD INSTALLED ELECTRIC HEATER KITS

The field installed electric heat accessories are used on cooling or heat pump models that were not purchased with electric heat from the factory. Each air handler model is approved for use with the field installed accessory electric heat kit.

INSTALLING THE HEATERS

1. Follow the instructions in the **USERS INFORMATION MANUAL** to properly shut down the air handler.
2. Remove the block off plate shown in Figure 7 and discard. Retain the screws, they will be used to secure the electric heater mount plate.
3. Insert electric heater kit assembly into the opening where the block off plate was removed. Secure the mounting plate with the screws that were removed from the block off plate.Insert electric heater kit assembly into the opening where the block offplate was removed. Secure the mounting plate with the screws that were removed from the block off plate.
4. Connect the six-pin male plug on the electric heater assembly to the six-pin female plug mounted on the side of the low voltage control box divider panel.
5. Remove the wiring diagram from the kit, remove the paper that covers the adhesive back and place the electric heat wiring diagram over the wiring diagram located on the blower housing.
6. Follow the instructions in the **USERS INFORMATION MANUAL** to properly start up the air handler.

Models Equipped With Circuit Breakers						
Model No	**Cabinet Size**	**Voltage**	**Phase**	**Hertz**	**Heater kW**	**Motor**
BAXHK05C	Extra Small (A)	208/240	1	60	5	C.T.
BAXHK10C	Extra Small (A)	208/240	1	60	10	C.T.
BAXHK15C	Extra Small (A)	208/240	1	60	15	C.T.
BBXHK05C	Small (B)	208/240	1	60	5	C.T.
BBXHK10C	Small (B)	208/240	1	60	10	C.T.
BBXHK15C	Small (B)	208/240	1	60	15	C.T.
BBXHK20C	Small (B)	208/240	1	60	20	C.T.
BCXHK05C	Medium (C)	208/240	1	60	5	C.T.
BCXHK10C	Medium (C)	208/240	1	60	10	C.T.
BCXHK15C	Medium (C)	208/240	1	60	15	C.T.
BCXHK20C	Medium (C)	208/240	1	60	20	C.T.
BDXHK05C	Large (D)	208/240	1	60	5	C.T.
BDXHK10C	Large (D)	208/240	1	60	10	C.T.
BDXHK15C	Large (D)	208/240	1	60	15	C.T.
BDXHK20C	Large (D)	208/240	1	60	20	C.T.

Table 12: Electric Heater Kit Model Numbers

NOTE: All models have factory installed circuit breakers and electric heater kits have field installed circuit breakers. The models configured as follows:

Extra-Small Cabinet (A) – MMVT24A, 36A
Small Cabinet (B) – MMVT36B, 48B
Medium Cabinet (C) – MMVT48C, 60C
Large Cabinet (D) – MMVT60D

POWER SUPPLY CONNECTIONS

For models with factory or field installed electric heaters, a 208/240VAC power supply must be connected to the line side of the electric heater circuit breakers. If the air handler has been installed prior to installing the electric heaters or if an older air handler is being replaced, the existing 208/240VAC supply power wires must be checked to make sure they are properly sized to handle the current load for the heaters. Refer to Tables 5 & 6 for correct wire size. If the supply power wire size is incorrect, new wires will need to be installed.

LOW VOLTAGE CONNECTIONS

If the air handler was previously installed, nothing will need to change on the low voltage wiring. If this is a new installation referto **SECTION 8** of these instructions.

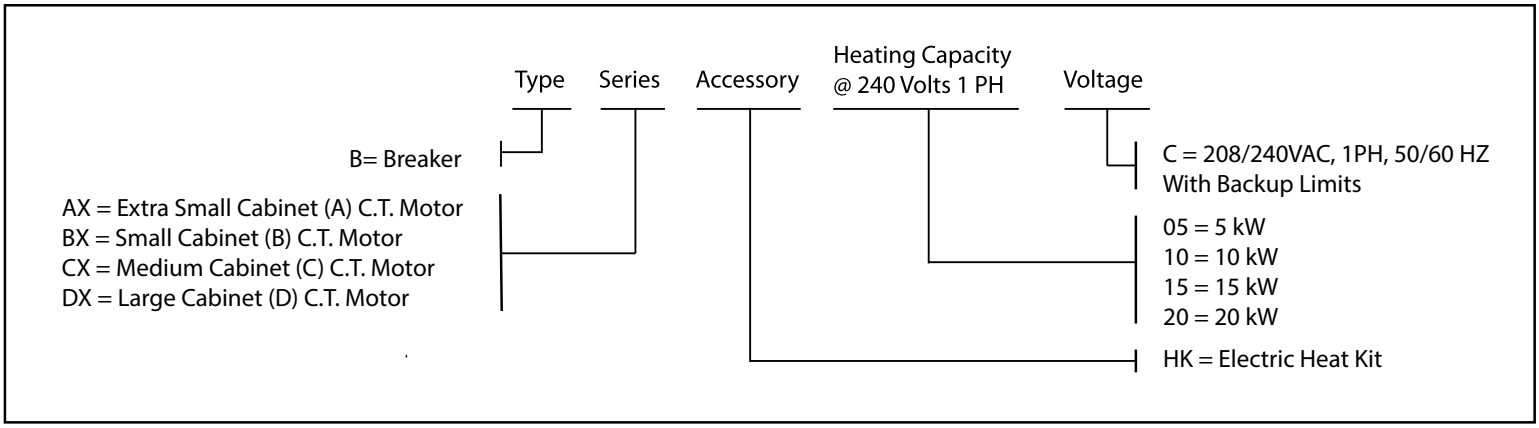

Table 9: Accessory Electric Heater Kit Model Number Nomenclature

⚠ CAUTION

To prevent damage, carefully insert the electric heating assembly through the rectangular opening in the front of the discharge opening so the heat element support rod is seated into the hole on the back side of the discharge opening.

⚠ CAUTION

After installing the electric heater, a one-inch clearance must be maintained on all sides of the supply air duct and/ or plenum for a minimum of 36 inches from the air handler discharge opening.

SECTION 8: THERMOSTAT WIRING AND CONNECTIONS

Thermostat Wiring

Thermostat wires connect through the side of air handler and should be no smaller than 22 gauge. Refer to Table 14 for recommended wire gauge, lengths and maximum current for each wire gauge. Thermostat wires can enter through the right side or top of the air handler casing. When bringing wiring through the top or side of the air handler casing, cable connectors must be installed to hold wiring in place and to relieve any strain on the wiring.

Max. Thermostat Wire Length	Thermostat Wire Gauge	Thermostat Wire Maximum Current
0 - 100 Feet	22	3.0 Amps
0 - 125 Feet	20	3.0 amps
0 - 250 Feet	18	3.0 amps

Table 10: Low Voltage Wire Gauge and Max Lengths

The use of an 8 conductor cable from the thermostat to the air handler is recommended. The thermostat wire colors and the typical heating/cooling connections are listed in Table 15. The thermostat wire colors and the typical heat pump connections are listed in Table 12.

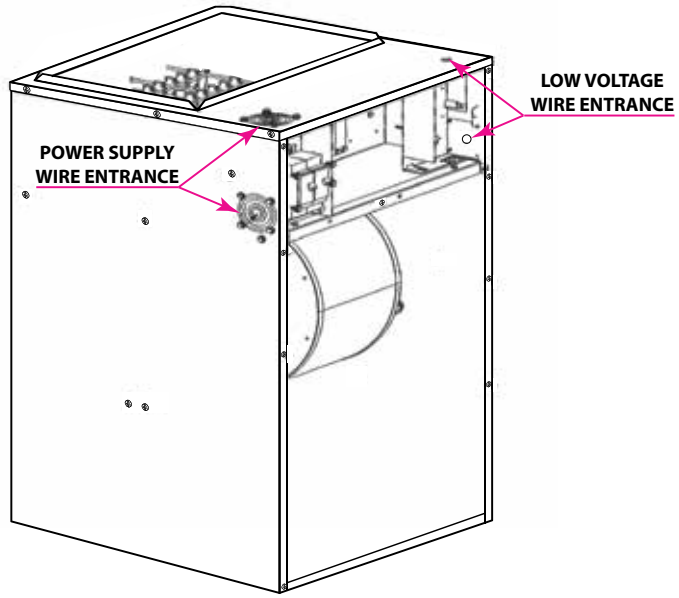

Figure 10: Cabinet Wiring Entrances

Thermostat Installation

The thermostat should be located on an inside wall in an open area to more closely regulate average room air, preferably where there is air movement back to air handler. Locating height of thermostat is important. If possible, the thermostat should be located in a hallway upstream from the air handler return airflow, not within 3 feet of from any windows and 52 to 66 inches above the floor. Do not place the thermostat within three feet of any of the air-distribution supply air registers.

Maintenance, operating and/ or programming instructions are in the envelope accompanying the thermostat. Give the envelope to the homeowner.

⚠ CAUTION

Do not locate thermostat within 3 feet of any of the following items:

1. **Air distribution supply air registers**
2. **Lights or heat lamps**
3. **Aquariums**
4. **Televisions, stereo, amplifiers, surround sound systems**
5. **Stoves or any cooking appliance**
6. **Refrigerator**
7. **Washer and/or dryer**
8. **Water heater tank**
9. **Sink or near any hot water**
10. **Within 15 feet of any electric space heater**
11. **Within two feet of any sunlight**

Air Handler and Outdoor Unit With Separate Transformers

If the air-hander and the outdoor unit have separate transformers, it is important to use a thermostat with isolated heating and cooling terminals "RC" and "RH" to prevent interconnection of separate Class II 24VAC control systems. These thermostats have an "RC" terminal for cooling and an "RH" terminal for heating. Connect the outdoor unit RED wire from the "R" terminal on the outdoor unit to the "RC" terminal on the thermostat and the RED air handler pigtail wire to the "RH" terminal on the thermostat. Remove the jumper between the "RH" and "RC" terminals if one exists. If the air handler and outdoor unit using separate transformers are both connected to the thermostat single "R" terminal, or if the jumper between "RH" and "RC" is not removed, a transformer burnout can occur or either the air handler or outdoor unit control system could go into lockout mode. If an air handler and outdoor unit with separate transformers are being installed and the thermostat does not have "RC" and "RH" terminals, a new thermostat with "RC" and "RH" terminals must be purchased and installed.

IMPORTANT: Cycle the air handler and outdoor unit separately to make sure both operate correctly.

Thermostat Heat Anticipator

Some thermostats have a heat anticipator setting that must be set to the settings shown below in order to function correctly. If the heat anticipator setting is too low, the system will short cycle. If the heat anticipator setting is too high, the system will run long heat cycles thus causing the temperature to overrun the temperature setting. This will cause the homeowner or user to feel too warm by the time the blower completes its cycle and too cold by the time the system cycles on again. The heat anticipator should be set to 0.4 for all heating kW's.

The thermostat may be a "self-setting" type in which no heat anticipator will be found on the thermostat, eliminating the need for field adjustment.

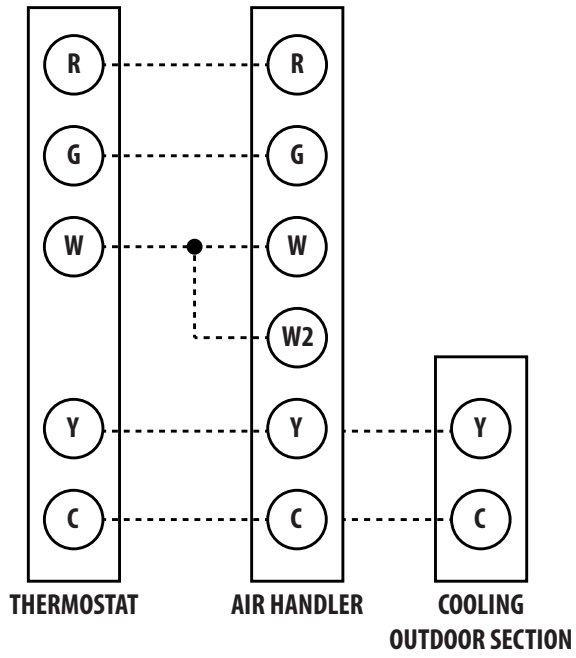

Figure 11: Typical Low Voltage Connections - Single-Stage Heat and Single-Stage Cooling

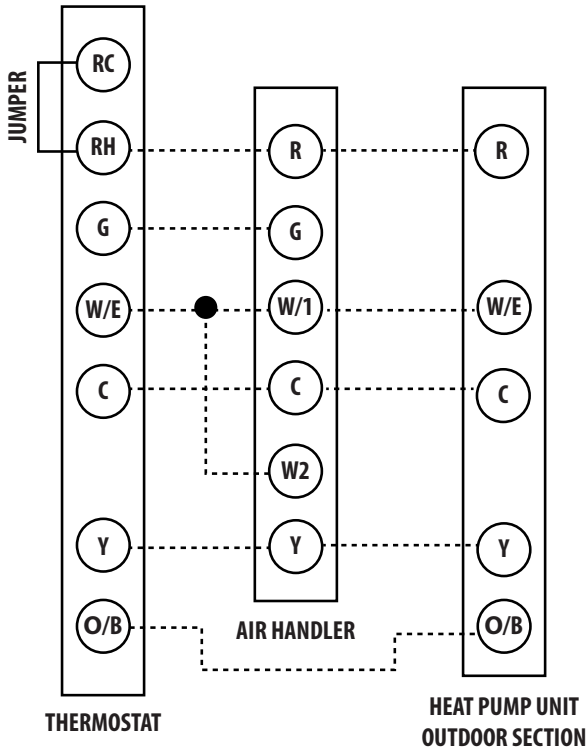

Figure 12: Typical Low Voltage Connections - Single-Stage Heat and Single-Stage Heat Pump

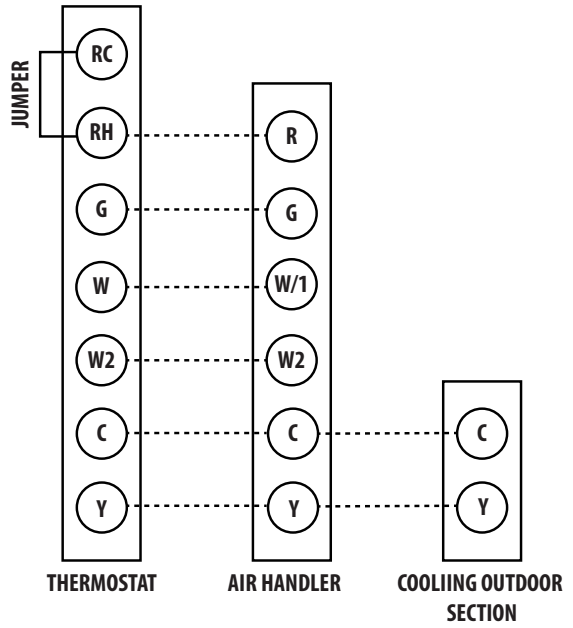

Figure 13: Typical Low Voltage Connections - Two-Stage Heat and Single-Stage Cooling

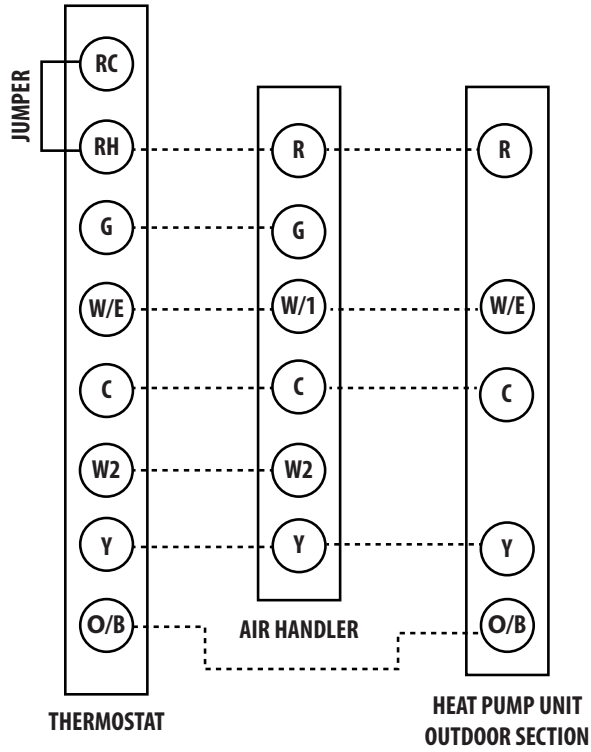

Figure 14: Typical Low Voltage Connections - Two-Stage Heat and Single-Stage Heat Pump

DESCRIPTION	LETTER CODE	THERMOSTAT AND AIR HANDLER TERMINAL BLOCK CONNECTION	OUTDOOR UNIT CONNECTIONS
24 VAC	R	R	N/A
1st Stage Heat	W1	W or W1	N/A
2nd Stage Heat	W2	W2	N/A
Indoor Fan	G	G	N/A
Cooling	Y	Y	Y
24 VAC Common	C	C	C

Table 11: Typical Heat / Cool Thermostat Wire Colors and Low Voltage Connections

Note: If a single-stage heat thermostat is used with an air handler with two-stage heat, install a jumper between W1 and W2 on the low voltage terminal block or connect the W1 and W2 pigtail wires together with the WHITE thermostat wire.

DESCRIPTION	LETTER CODE	THERMOSTAT AND AIR HANDLER TERMINAL BLOCK CONNECTION	OUTDOOR UNIT CONNECTIONS
24 VAC	R	R	R
1st Stage Electric Heat	W1	E (Thermostat) W1 (Air Handler)	See Outdoor Unit Instructions
2nd Stage Electric Heat	W2	W2	N/A
Indoor Fan	G	G	N/A
Cooling	Y	Y/Y1	Y/Y1
Heat Pump Reversing Valve (Most Brands)	O	O	See Outdoor Unit Instructions
Heat Pump Reversing Valve (Some Brands)	B	B	See Outdoor Unit Instructions
24 VAC Common	C	C	C

Table 12: Typical Heat Pump Thermostat Wire Colors and Low Voltage Connections

Typical Heating/Cooling Thermostat Wiring Connections

1. Remove blower / control box access panel.
2. Remove the control box cover.
3. Insert the wire cables from the thermostat and outdoor unit through the 9/16" diameter hole located in the top or side of the air handler and into the control box. Place the thermostat wire cable next to the air handler low voltage terminal block (LVTB) or low voltage pigtails. Secure the thermostat and outdoor unit wire cables in the 9/16" diameter hole with a strain relief to prevent wire connections from being pulled apart.
4. Strip 1/2" of the insulation on the end of each wire.
5. Connect the RED (24 VAC) supply thermostat wire to the "R" terminal on the LVTB or to the RED air handler pigtail wire and secure with a wire nut.
6. Connect the WHITE (first stage heating) thermostat wire to the "W1" terminal on the LVTB or to the WHITE air handler pigtail wire and secure with a wire nut.
7. Connect the GREEN wire from the thermostat "G" terminal thermostat wire to the "G" terminal on the LVTB or to the GREEN air handler pigtail wire and secure with a wire nut.
8. Connect the YELLOW wire from the thermostat "Y" terminal to the wire from the outdoor unit compressor contactor coil with a wire nut.
9. Connect the BROWN 24 VAC common wire from the thermostat "C" terminal to the "C" terminal on the LVTB or to the air handler 24 VAC common pigtail wire (GRAY for ECM motor, BLUE for constant torque motor) with a wire nut. Also connect the 24 VAC common wire from the outdoor unit compressor contactor coil to the "C" terminal on the LVTB or to the thermostat and outdoor unit 24 VAC common wires with a wire nut.
10. For 15kW and 20kW models, connect the BLUE wire from the thermostat "W2" terminal (2nd stage heat) to the "W2" terminal on the LVTB or to the BROWN air handler pigtail wire and secure with a wire nut. 20kW air handler, place a jumper between the "W1" and W2" terminals on the LVTB or connect the BROWN and the WHITE air handler pigtail wires to the WHITE wire from the thermostat "W" terminal with a wire nut.

Typical Heat Pump - Heating/Cooling Thermostat Wiring Connections

1. Remove the blower / control box access panel.
2. Remove the control box cover.
3. Insert the wire cables from the thermostat and outdoor unit through the 9/16" diameter hole located on the top or side of the air handler and into the control box. Place the thermostat and outdoor unit wire cables next to the air handler low voltage terminal block (LVTB) or low voltage pigtails. Secure the thermostat and outdoor unit wire cable with a strain relief in the 9/16" diameter hole to prevent wire connections from being pulled apart.
4. Strip 1/2" of the insulation on the end of each wire.
5. Connect the RED (24 VAC) wire from the thermostat "R" terminal to the "R" terminal on the LVTB or to the RED air handler pigtail wire and with the wire from the "R" terminal or pigtail on the outdoor unit. Fasten the three wires together securely with a wire nut.
6. Connect the WHITE (emergency heat) wire from the thermostat "E" terminal to the "W1" terminal on the air handler LVTB or to the WHITE air handler pigtail wire with a wire nut. If applicable, also connect the wire from the outdoor control board that calls for supplemental heat during the defrost cycle to the "W1" terminal on the air handler LVTB or to the WHITE air handler pigtail wire. Refer to the outdoor unit installation instructions for additional information.
7. Connect the GREEN wire from the thermostat "G" terminal to the "G" terminal on the LVTB or to the GREEN air handler pigtail wire and securely fasten the two wires together with a wire nut.
8. Connect the YELLOW wire from the thermostat "Y" terminal to the wire from the outdoor unit "Y" terminal or pigtail with a wire nut.
9. Connect the BROWN 24 VAC common wire from the thermostat "C" terminal to the "C" terminal on the LVTB or to the air handler 24 VAC common air handler pigtail wire (GRAY for ECM motor, BLUE for constant torque motor) with a wire nut. Also connect the 24 VAC common wire from the outdoor unit "C" terminal or pigtail to the "C" terminal on the LVTB or to the thermostat and outdoor unit 24 VAC common wires with a wire nut.
10. Connect the ORANGE wire from the thermostat "O" or "B" terminal with the wire from the outdoor unit "O" or "B" terminal or pigtail with a wire nut. Refer to the outdoor unit installation instructions for additional information.
11. For 15kW and 20kW models, connect the BLACK wire from the thermostat "W2" terminal (2nd stage heat) to the "W2" terminal on the LVTB or to the BROWN air handler pigtail wire and secure with a wire nut.

NOTE: If single-stage heat thermostat is used with a 15kW or 20kW air handler, place a jumper between the "W1" and "W2" terminals on the LVTB or connect the BROWN and the WHITE air handler pigtail wires to the WHITE wire from the thermostat "W" terminal with a wire nut.

SECTION 9: BLOWER PERFORMANCE

Model Number	Nominal Tons	Motor HP	Volts	Motor Code	Blower Size	Speed Tap	CFM @ 0.10" ESP	CFM @ 0.20" ESP	CFM @ 0.30" ESP	CFM @ 0.40" ESP	CFM @ 0.50" ESP	CFM @ 0.60" ESP
MMVT24A MMVT36A	2-3	1/2	120	VL1 or VL2	10 x 6	5	1436	1382	1312	1269	1202	1202
						4	1128	1092	1047	1021	979	948
						3	1015	982	935	902	864	832
						2	951	902	868	821	788	761
						1	--	627	590	545	506	440
MMVT36B MMVT48B	3-4	3/4	120	VM1 or VM2	10 x 8	5	1727	1667	1577	1504	1410	1361
						4	1718	1629	1530	1472	1399	1311
						3	1575	1530	1503	1465	1376	1274
						2	1285	1248	1222	1179	1147	1110
						1	1051	1012	962	927	885	844
MMVT48C MMVT60C	4-5	3/4	120	VN1 or VN2	12 x 9 T	5	2045	2024	1980	1919	1896	1857
						4	1924	1860	1809	1783	1756	1697
						3	1783	1756	1686	1646	1600	1571
						2	1515	1457	1427	1370	1314	1281
						1	1361	1314	1257	1207	1170	1122
MMVT60D	5	3/4	120	VP1 or VP2	12 x 9 R	5	2244	2211	2143	2094	2037	1985
						4	2084	2028	1972	1923	1858	1832
						3	1883	1816	1758	1714	1647	1612
						2	1697	1637	1578	1534	1463	1411
						1	1570	1493	1441	1402	1329	1285

Table 13: Blower Performance - Constant Torque Motor – With Coil - Without Air Filter

Notes: 1) Minimum CFM for Electric Heat: 5 - 10kW = 650 CFM; 15kW = 1000 CFM; 20 kW = 1400 CFM

2) CFM and ESP in the table assumes a typical indoor coil has been installed on the air handler.

SECTION 10: MOTOR SPEED SELECTION AND AIR HANDLER STARTUP

Notice: Refer to the blower performance tables in Section 10 of this manual when selecting the motor speed for a specific application.

⚠ WARNING

To avoid personal injury or property damage, make certain that the motor leads cannot come into contact with non-insulated metal components of the air handler.

Selecting the Constant Torque Motor Speed

The constant torque motor operates on 208/240 VAC and the motor speed taps are controlled by 24 VAC. The speed taps can be changed by moving the BLACK and RED wires to different terminals on the motor terminal block (terminals 1 – 5). Table 14 shows the constant torque motor lead connection labeling and the connection definitions.

Terminal	Connection
C	Speed Tap Common - 24 VAC Common
L	Supply Voltage -120VAC
G	Ground Connection
N	Supply Voltage - Neutral
1	Low Speed Tap - 24 VAC Input
2	Medium-Low Speed Tap - 24 VAC Input
3	Medium Speed Tap - 24 VAC Input
4	Medium-High Speed Tap - 24 VAC Input
5	High Speed Tap - 24 VAC Input

Table 14: Constant Torque Motor Terminal Connections

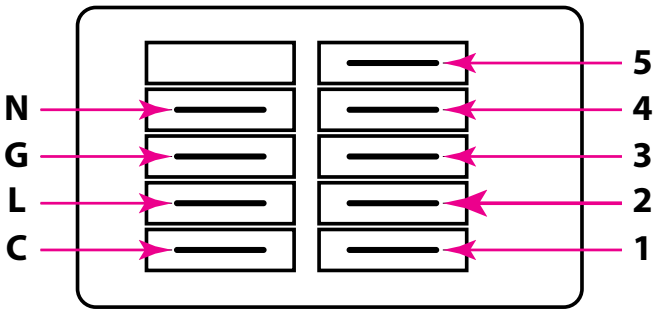

Figure 15: Constant Torque Motor Terminals

Changing Motor Speeds – Constant Torque Motor

1. Turn off all electrical supply circuits to the air handler at the main electrical panel.
2. Switch the air handler circuit breaker(s) to "OFF".
3. Remove the blower access panel.
4. Move the BLACK and RED wires connected to terminals 1-5 on the motor terminal block (See Figure15) to the desired speed taps. See Table 14 for the speed tap descriptions.
5. Reinstall the blower access panel.
6. Turn the air handler circuit breakers to "ON".
7. Turn on all electrical supply circuits to the air handler at the main electrical panel.
8. Set the thermostat to the desired operating mode and temperature.

SECTION 11: FINAL SYSTEM CHECKOUT

1. Refer to appropriate wiring diagram and recheck all wiring connections. Ensure that all wiring connections are secure.
2. Check blower motor connectors to make sure they are not damaged or loose.
3. If the control box cover was removed; reinstall control box cover.
4. Switch circuit breaker(s) to "ON" position.
5. Switch the air handler circuit breakers in the main electrical panel to the ON position.
6. Set the blower selector switch on the thermostat to the ON position and check all of the duct connections for air leaks. Seal any air leaks found.
7. Set the blower selector switch on the thermostat to the AUTO position.
8. Set the thermostat above the room temperature to check for proper operation of the electric heaters.
9. Set the thermostat to the desired temperature.

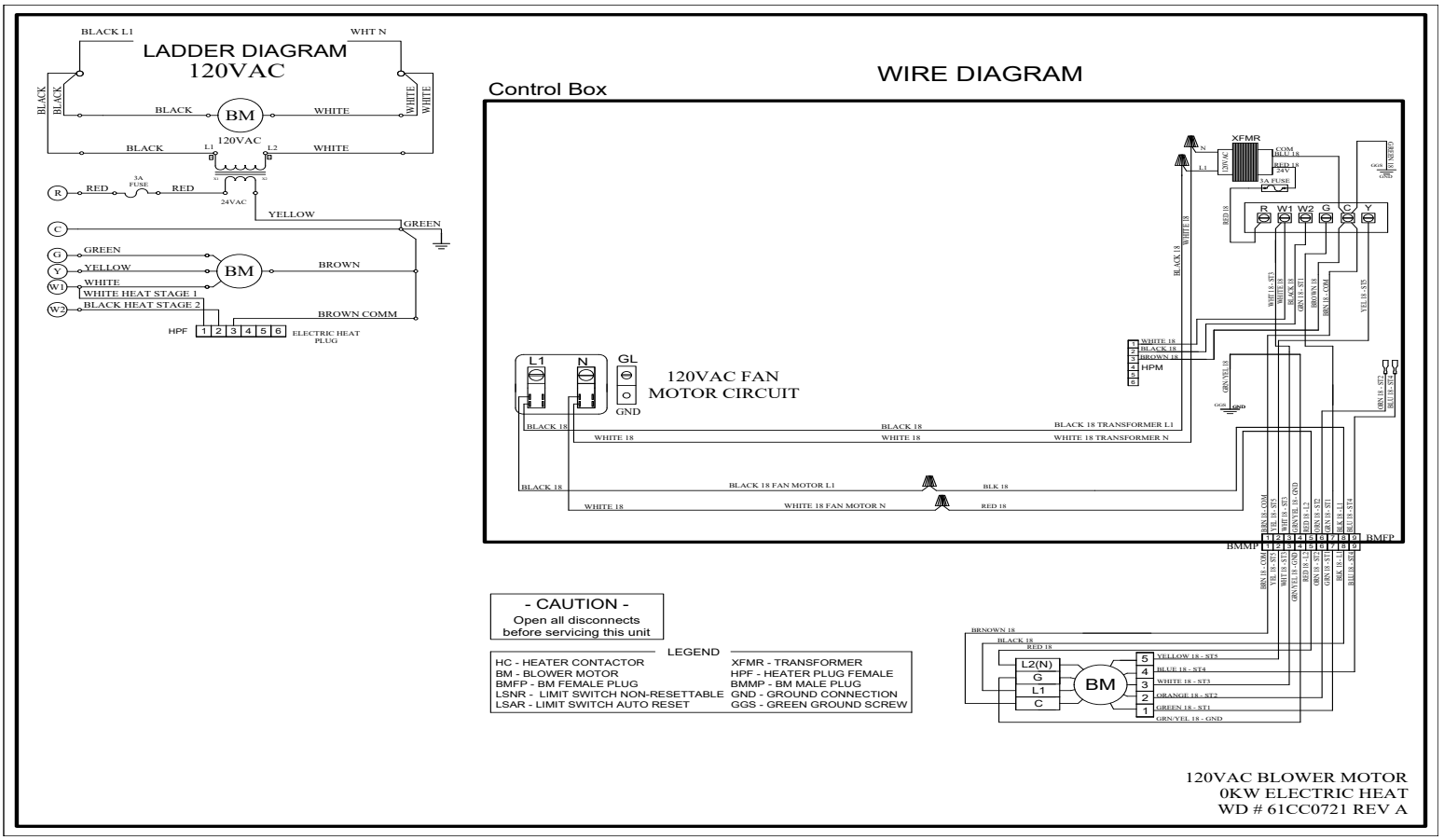

Figure 16: Wiring Diagram – 120V Blower Motor and Transformer Circuit

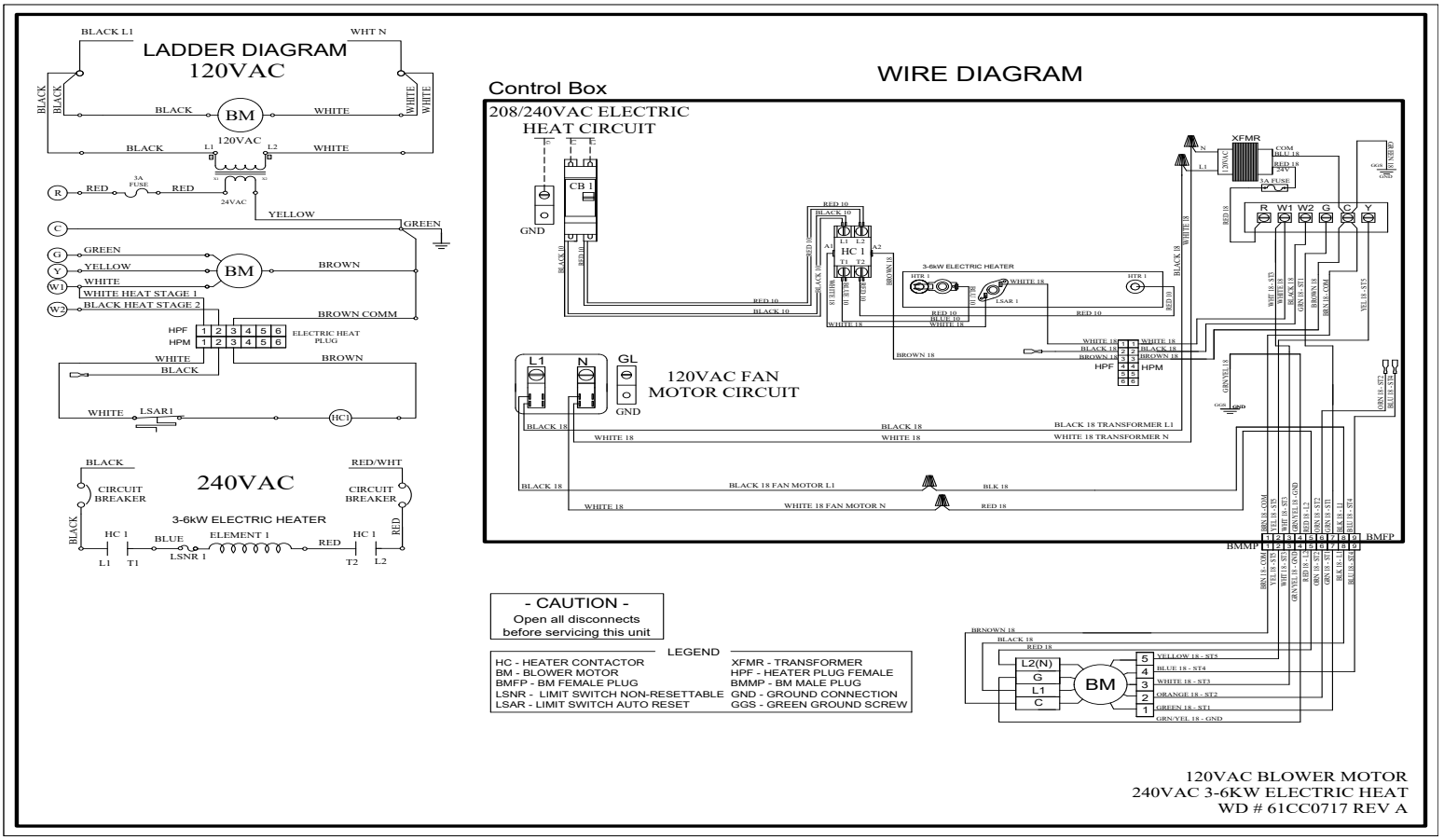

Figure 17: Wiring Diagram – 208/240V Electric Heater Circuit – 5kW

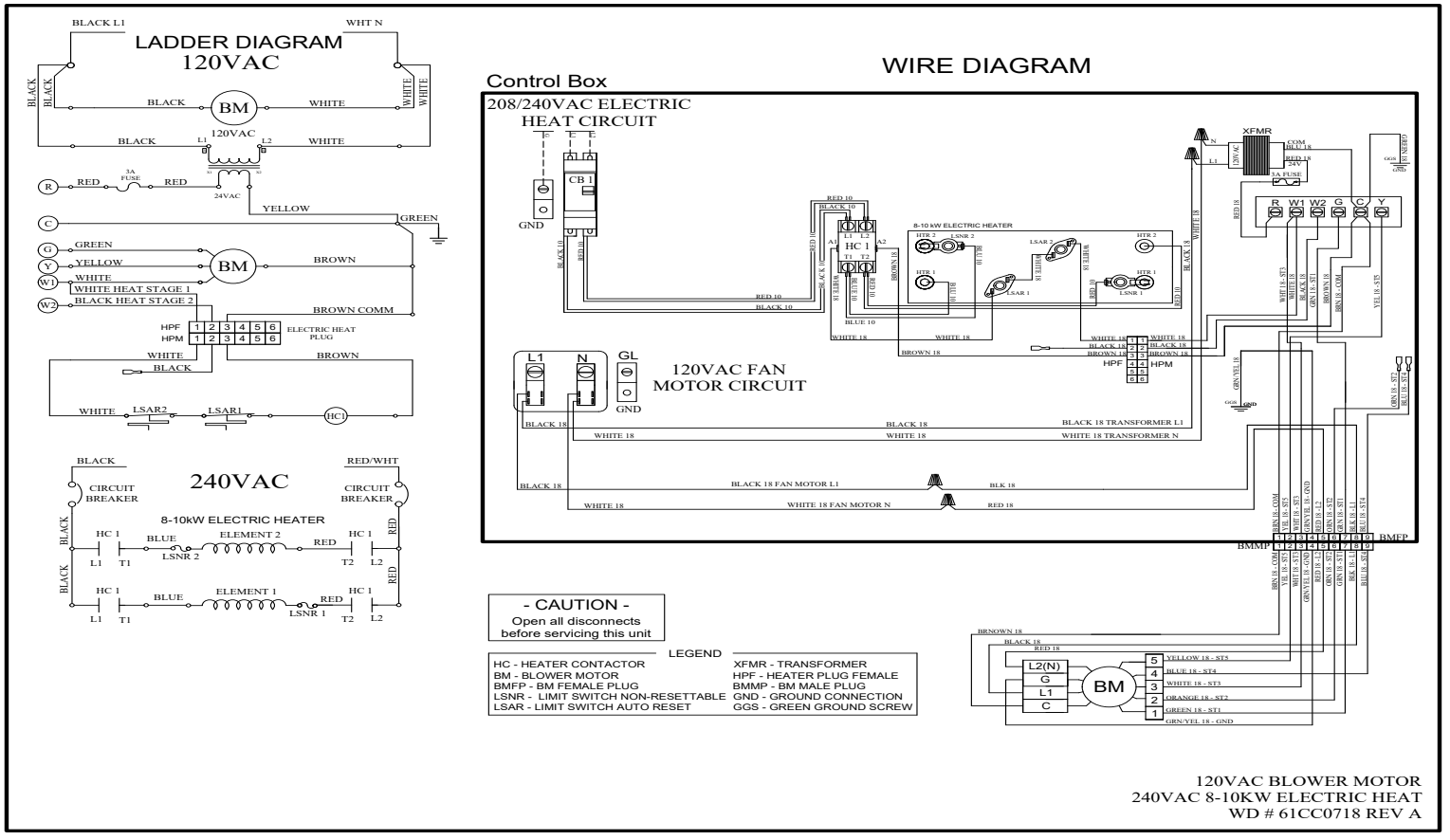

Figure 18: Wiring Diagram – 208/240V Electric Heater Circuit – 10kW

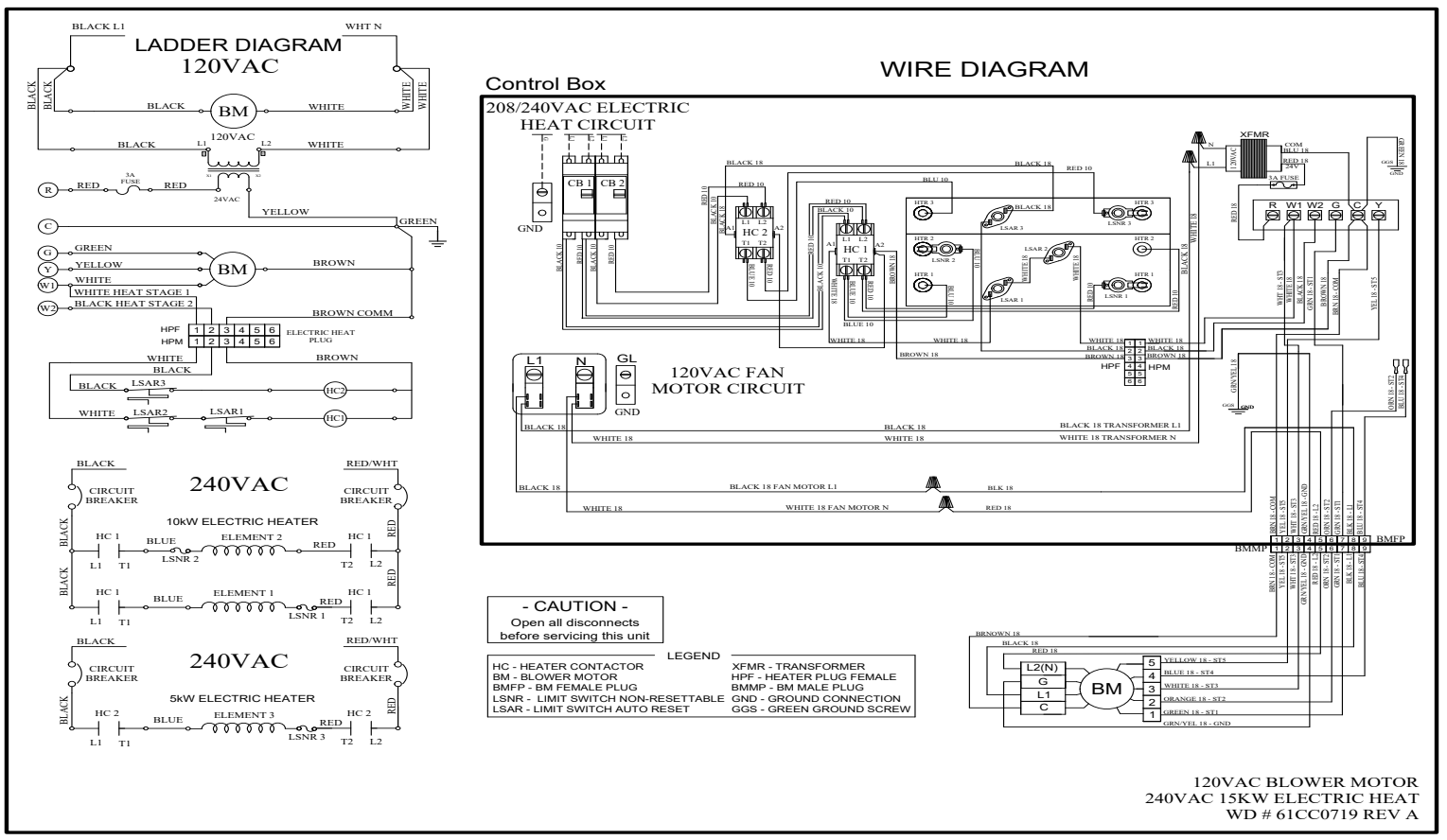

Figure 19: Wiring Diagram – 208/240V Electric Heater Circuit – 15kW

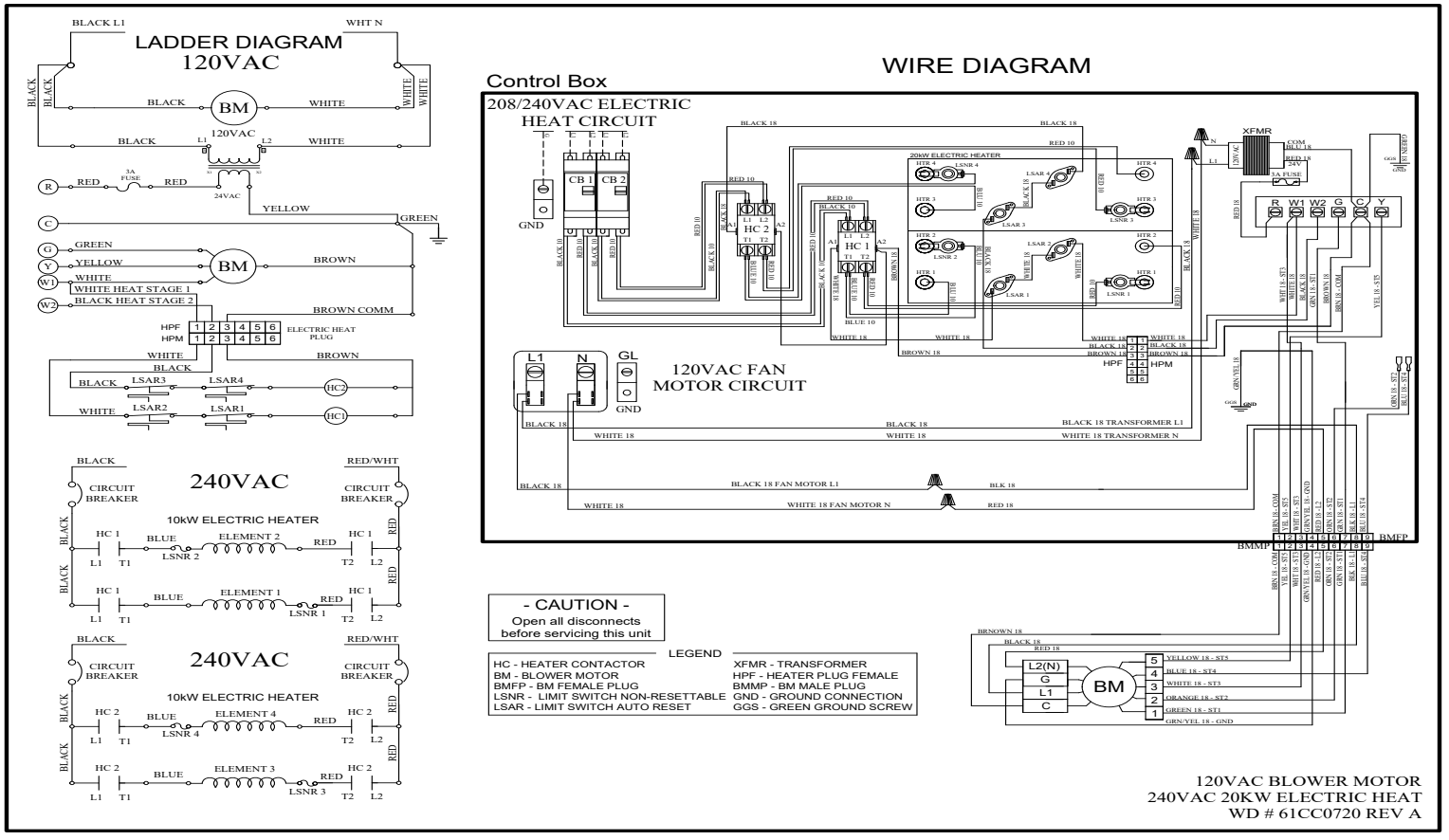

Figure 20: Wiring Diagram – 208/240V Electric Heater Circuit – 20kW

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