SunTherm™ HEATING PRODUCTS

INSTALLATION MANUAL

Intertek 9700771

Multi-Position DX and Chilled Water Cooling With Hot Water Heating
Models: MSVT Series With Single-Stage Cooling/Heat Pump Airflow
MSVE Series with Single and 2-Stage Cooling/Heat Pump Air-Flow

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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 208/240 VAC at 60 Hertz.
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 appliance is not to be used by persons (including children) with reduced physical, sensory or mental capabilities, or lack of experience and knowledge, unless they have been given supervision or instruction concerning use of this appliance by a person responsible for their safety. Children must not be allowed to play with this appliance.

SAVE THIS MANUAL FOR FUTURE REFERENCE

MS Series Multi-Position Air Handler

This is a safety alert symbol. When you see this symbol 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 air handler 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 intentional 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 air handlers installed in violation of any code or regulation.

1. Refer to the air handler rating plate for the air handler model number and then refer to Figure 1 for return air plenum dimensions that apply to that model number. The plenum must be installed according to the above listed codes or the instructions in this manual.
2. These models are not ETL listed or approved for installation into a Manufactured (Mobile) Home.
3. Provide clearances from combustible materials as listed under Clearances to Combustibles.
4. Provide adequate clearances for service access to the control box, indoor coil, hot water coil and blower.
5. 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.
6. The air handler must be installed so the electrical components are protected from water.
7. Installing and servicing heating/cooling equipment can be hazardous due to electrical components.
8. Only trained and qualified personnel should install repair or service heating/cooling equipment. Untrained service . Untrained service personnel should only 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 servicing this air handler. These instructions cover minimum requirements and conform to existing national standards and safety codes.
9. In some cases, these instructions exceed certain local codes and ordinances, especially those who have not kept up with changing home and/or HUD construction practices.
10. These instructions are to be followed and are the minimum requirement for a safe installation.
11. The capacity of the air handler should be based on an acceptable heat loss calculation for the structure such as ACCA Manual J or other approved methods.

12. Confirm the power supply meets the electrical characteristics listed on the air handler rating plate. All models must be connected to a nominal 115 VAC, 1 Phase, 60-Hertz power supply. **DO NOT CONNECT THIS AIR HANDLER TO A 50 HZ POWER SUPPLY OR A VOLTAGE ABOVE 140 VOLTS.**
13. The field ground wire MUST BE securely fastened to the ground lug terminal in the air handler control box.

⚠ WARNING

Hot water from a boiler used to satisfy heating requirements can be heated to temperatures of 180°F. Parts containing hot water can scald very quickly. Use extreme caution when servicing or performing maintenance on any parts containing hot water.

⚠ WARNING

ALWAYS SHUT OFF ELECTRICITY AT THE DISCONNECT SWITCH OR TURN OFF THE CIRCUIT BREAKERS IN THE MAIN ELECTRICAL ENTRANCE BEFORE PREFORMING ANY SERVICE ON THE AIR HANDLER.

GENERAL INFORMATION

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

NOTE: Refer to the instructions in this manual for instructions on the proper conversion from the as shipped right-to-left horizontal configuration to the left-to-right horizontal configuration.

Available Blower Motors

1. Variable Speed ECM
2. 5-Speed Constant Torque

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.

Check to be sure all accessories that are required for the installation are available. Installation of these accessories should be completed before the air handler is set in place and connected to wiring, ductwork, and piping.

Cooling Only & Cooling With Hydronic Heat				
Models	**MS**18,24**	**MS**25,30,36**	**MSVE**37,42,48,60**	**MSVT37,42,48,60; MSVE72**
Hort Water Coil (Rows)	2,3	2,3,4	2,3,4	2,3,4
Blower Size-Heat (D x W)	10 X 7 (MSVE) 10 X 8 (MSVT)	10 X 7 (MSVE) 10 X 8 (MSVT)	12 X 9	12 X 10
Unit Voltage	115V, 60 HZ, 1 PH			
Max. External SP (Duct), In. W.C.	0.60			
Thermostat Circuit	24 VAC, 60 Hz, 40VA			

Table 1: Hydronic Air Handler Model Specifications

MODEL NUMBER NOMENCLATURE						
MS	**VT**	**36**	**15**	**B**	**862T**	**AA**
I	**II**	**III**	**IV**	**V**	**VI**	**VII**
I	**Series** MS = Multi-Position Single-Piece					
II	**Motor Type** VT = Variable Constant Torque VE = Variable Speed ECM					
III	**Unit Size (Capacity in MBTUH)** 12 through 24 - Small Cabinet 25 through 36 - Medium Cabinet 37 through 72 - Large Cabinet OS = No Cooling Small Cabinet OM = No Cooling Medium Cabinet OL = No Cooling Large Cabinet					
IV	**Heating Configuration** 00 = Cooling Only 2P = 2 Row Hot Water Coil With Pump 3P = 3 Row Hot Water Coil With Pump 4P = 4 Row Hot Water Coil With Pump 2N = 2 Row Hot Water Coil No Pump 3N = 3 Row Hot Water Coil No Pump 4N = 4 Row Hot Water Coil No Pump					
V	**Air Handler Voltage** A = 115 Volts					
VI	**SUMMIT Indoor Coil Configuration** 862T = DX Coil Geometry And Metering Device 8K2N = CW Coil Geometry, No Metering Device					
VII	**Option Code** AA = Standard Factory Options					

Table 2: Hydronic Air Handler Model Number Nomenclature

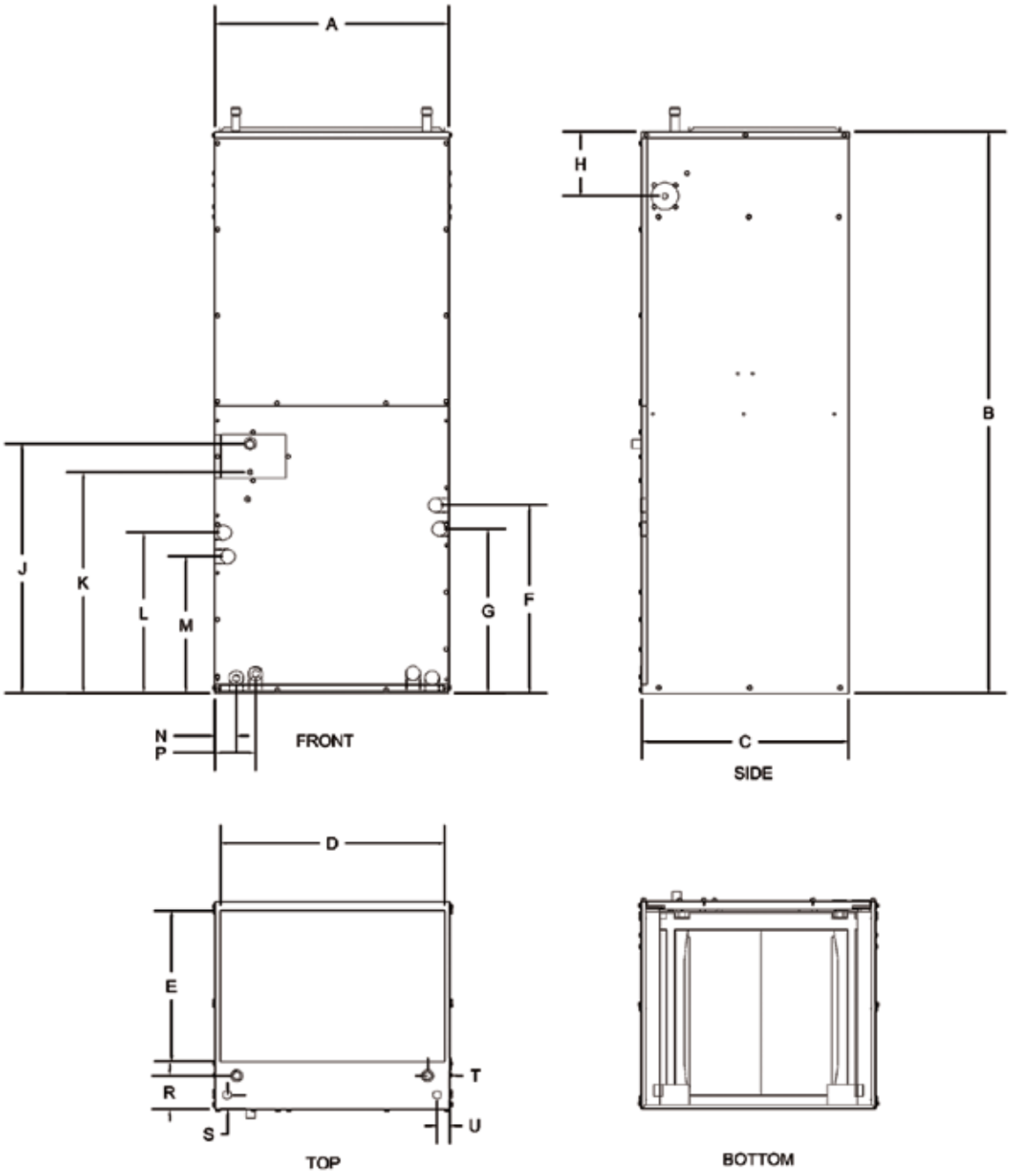

Figure 1: Air Handler Dimensions

DIMENSIONAL DATA MULTI-POSITION AIR HANDLER HYDRONIC HEAT																	
Model	**A**	**B**	**C**	**D**	**E**	**F**	**G**	**H**	**J**	**K**	**L**	**M**	**N**	**P**	**R**	**S**	**T**
MS**18, 24	17.50	43.00	21.00	15.63	12.50	13.50	11.00	6.75	16.75	14.00	11.00	10.75	2.00	1.50	5.00	16.10	20.20
MS**25, 30, 36	21.00	48.00	21.00	19.00	12.50	14.50	13.00	6.75	20.00	17.00	12.75	10.30	2.30	4.35	5.00	19.90	20.80
MS**37, 42, 48, 60, 72	24.50	58.88	21.75	22.25	14.25	19.75	17.25	6.75	26.00	23.00	16.75	14.35	2.30	4.35	4.50	23.50	20.70

Table 3: Air Handler Dimensional Data

SECTION 3: LOCATION, CLEARANCES AND RETURN AIR REQUIREMENTS

LOCATION

Access for servicing is an important factor in the location of any appliance. Provide a minimum of 30 inches in front of the air handler for access to the control box, indoor coil, water pump, 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. The location for the air handler is usually predetermined. Check with the owner or user for installation plans. If 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. If possible, locate the air handler so ducts are about the same length to achieve 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 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 the outside or an available drain. Route condensate drain piping so it does not obstruct access to the air filter or access panels.
8. When the indoor coil is installed in a draw-through application such is the case with this air handler, it will create a negative pressure situation in the condensate drain system. To prevent condensate from being drawn into the air handlers and blower, it is recommended to trap the primary (main) and secondary (overflow) drain line. Refer to CONDENSATE DRAIN SYSTEM and Figure 7 in these instructions. If the secondary drain is not used, it must be capped.
9. The exterior surface of cabinet will sweat when an 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 for all air handlers installed in a non conditioned space to prevent damage from condensation runoff. It is recommended that air handlers installed in non conditioned spaces be insulated on the exterior of the entire county or local codes for insulation requirement to assure the installation complies with all codes.

CLEARANCES

This air handler is approved for 0 inches of clearance to combustible material to any part of the air handler exterior cabinet. Refer to Figure 2 and 3 and Table 4 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)	
HYDRONIC	0	0	0	30	6	1

Table 4: Clearances to Combustibles and Service Access

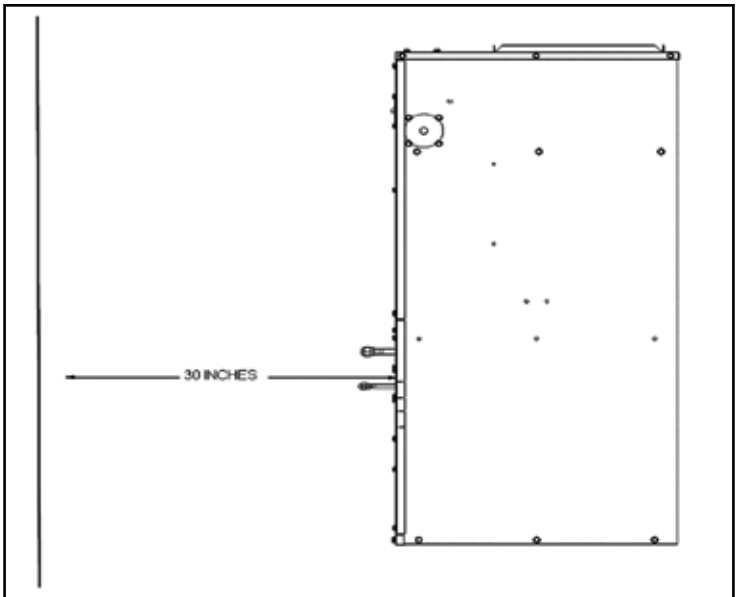

Figure 2: Clearance – Access for Service

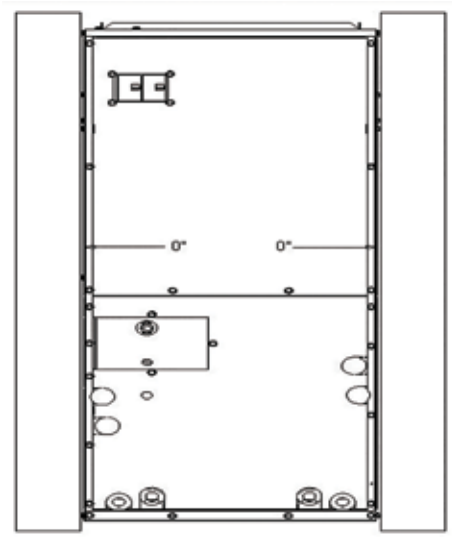

Figure 3: Closet Clearances

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

For A/C and HP Air Handlers 1/3 HP Blower Motor On MSVE, MSVT18 & 24
- Minimum 200 in© free area opening
- Use Return Grille or Coil Cabinet

For A/C and HP Air Handlers 1/2 HP Blower Motors On MSVE, MSVT25, 30, & 36
- 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.

For A/C and HP Air Handlers with Hydronic Heat use 1.0 HP Blower Motor On MSVE/MSVT 37, 42, 48, & 60
- 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.

For A/C and HP Air Handlers use 1.0 HP Blower Motor On MSVE72
- Minimum 430 in^2 free area opening.
- Use return grille, or indoor coil cabinet, or any return grille with a minimum 430 in^2 free area opening.

Provisions must be made to permit air in the rooms and living spaces 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 air flow and improper cooling and heating of the living space.

Return Air Filters
A return air filter is necessary to prevent dust, lint, and other contaminants from accumulating on the indoor coil and interior surfaces of the air handler. Return air filter options include a return air filter grille that attaches to a wall, door, or ceiling or a filter frame that attach directly to the return opening of the air handler.

Recommended Return Air Filter Grille Size - Bottom Return Only
800 CFM – 20 X 20 Grille – 324 in^2
1000 CFM – 20 X 25 Grille - 414 in^2
1200 CFM – 25 X 25 Grille - 414 in^2
1400 CFM – 25 X 30 Grille - 644 in^2
1600 CFM – 25 X 30 Grille - 644 in^2
1800 CFM – 30 X 30 Grille - 784 in^2
2000 CFM – 30 X 35 Grille - 924 in^2
2400 CFM – 30 X 40 Grille - 1064 in^2

Air Filter Base Accessory
The SunTherm Air Filter Base Accessory is available as an alternative to a return air filter frame. The Air Filter Base Accessory can be used on the return air end of the air handler when configured in upflow position. The air filter base accessory is placed over the return plenum in the floor or closet platform opening and sealed to the plenum or platform using sealant, caulking material, and/or tape. The air handler is placed on top of the air filter base and sealed around its perimeter to prevent air leaks.

NOTE: Filter size adjustment knobs are located on both sides of the frame. Make sure the flow arrow on the air filter is pointing towards the air handler.

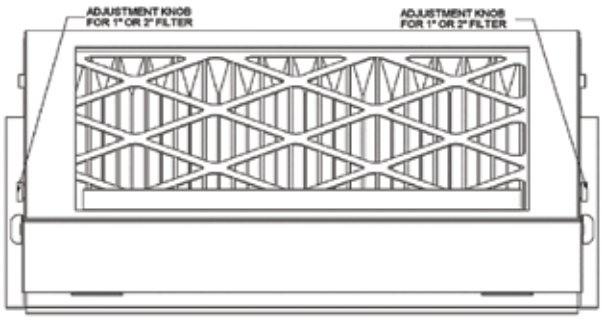

Figure 4: Air Filter Base Accessory for 1" or 2" Air Filters.

FILTER BASE ASSEMBLY KIT – FIELD INSTALLED
86ET0002 – 16"X 20" X 2" Small Cabinet
86ET0001 – 20" X 20" X 2" Medium Cabinet
86ET0003 – 20" X 24" X 2" Large Cabinet

Miniumum Air Filter Size
The minimum filter size vs. CFM of airflow is shown below

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
1200 CFM = 20 x 20 x 1
1400 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

SECTION 4: AIR HANDLER ORIENTATION AND SUPPLY AIR DUCT INSTALLATION

The air handler is shipped from the factory configured to be installed in the upflow or horizontal right-to-left air-flow position. Horizontal right-to-left means that when facing the front of the air handler and the air handler is laid on its side, the supply air opening is on the left and the return opening is on the right. The air handler can be field converted to the horizontal left-to-right air-flow position using the procedure below.

For field conversion to left-to-right horizontal applications:
1. Remove the air handler access panels.
2. Remove the indoor coil.
3. Move the condensate drain pan to the right side.
4. Reinstall the indoor coil.
5. Connect the condensate drains and refrigerant lines.
6. Reinstall air handler access panels.

UPFLOW APPLICATIONS
For upflow installations, the discharge air outlet is at the top of

the air handler. The air handler must be installed level to permit proper condensate drainage.

Typical upflow installations will be in a closet or basement. If installed in a closet, the closet should have a platform at least 12 inches in height framed in with an opening centered in the closet that matches the return air opening on the bottom of the air handler or an air filter frame if one is installed. The return air opening can be located in the floor, on a closet door, or in a side wall next to the air handler cabinet or a return duct can be attached directly to the platform next to the air handler. If the return air opening is located in the closet door or side wall above the platform, the front of the platform must be left open and a minimum of 6 inches of clearance between the front of the platform and the closet door must be provided to allow adequate air-flow from the return air opening into the cavity below the platform. The 6 inches of clearance is not required if the return opening is installed completely below the platform allowing the return air to enter directly into the cavity below the platform or if the return duct is connected directly to the platform beside the air handler.

Joints between the air handler, air filter frame, and platform must be sealed to prevent air leakage. A return air filter grille may be used instead of a filter frame.

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

HORIZONTAL APPLICATIONS

Horizontal applications will normally be used in an attic or crawl space. This type of installation requires the supply air plenum or duct to be connected to the supply duct flanges and a return air plenum or duct be attached to the air handler return air inlet. The supply ducts will be connected to the supply air plenum and routed through the attic to a register in each room. 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.

SECTION 5: AIR HANDLER INSTALLATION

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.
6. Connect the electrical supply wires to the line voltage terminal block and connect the thermostat cable wires to the low voltage terminal block or low voltage pigtails. Re-install the coil compartment access panel.
7. Connect the refrigerant lines to the coil.
8. Re-install the blower and control box access panel.
9. Turn the power on to the air handler by following the procedure in the Users Information Manual.
10. Set the thermostat to the desired operating mode and temperature.

SECTION 6: HYDRONIC HEATING / COOLING AND REFRIGERANT PIPING

DX Refrigerant Piping:

Air handlers with DX type evaporator coils require liquid and suction piping sized in accordance with outdoor unit manufacturer's instructions. The evaporator coils have sweat copper connections. Refrigerant lines should be soldered with silver solder or high temperature brazing alloy. The suction line must be insulated to avoid condensate from forming and dropping off. Armaflex (or equivalent) with 3/8" (1 cm) minimum wall thickness is recommended. In severe conditions such as hot or high humidity areas, 1/2" (1.3 cm) minimum wall thickness may be required. If the outdoor unit is installed above the indoor coil, oil traps are required at equal intervals along suction line as shown in Figure 5. Horizontal suction lines should slope downward 1 inch for every 20 feet toward outdoor unit. Flow dry nitrogen through refrigerant lines during soldering operation to prevent oxidation of the interior of the copper tubes.

- Install 1 oil trap for a height difference of 15 ft to 25 ft (4.6 m to 7.6 m) between indoor and outdoor units.
- Install 2 oil traps for a height difference of 26 ft to 50 ft (7.9 m to 15.2 m) between indoor and outdoor units.
- Install 3 oil traps for a height difference of 51 ft to 100 ft (15.5 m to 30.5 m) between indoor and outdoor units.
- Install 4 oil traps for a height difference of 101 ft to 150 ft (30.8 m to 45.7 m) between indoor and outdoor units.

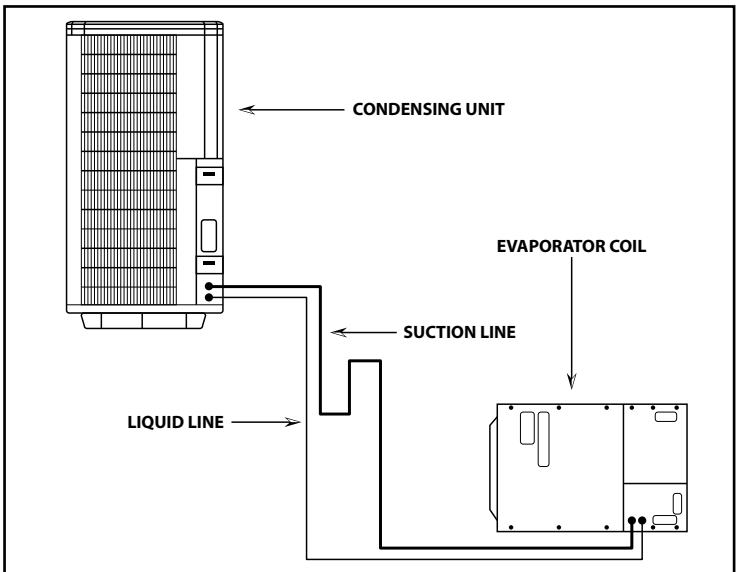

Figure 5: Evaporator Below Outdoor Unit Piping

Thermal Expansion Valves (TXV)

Introduction

SunTherm air handlers can have a factory installed thermal expansion valve (TXV) or a TXV may be field installed. The factory and field installed TXV's for this air handler have an internal check valve making them compatible for both heat pump and cooling only applications. The TXV has an external pressure equalizer, non-adjustable superheat, and has a bleed rate of 15%.

A hard start capacitor on the outdoor unit is normally not required when a 15% bleed TXV is used, but may be necessary if compressor starting issues are encountered.

Field Installed TXV Kit Information

R72DB0053HX: R-410A, 1.5 – 2.5 Ton, 15% Bleed, Inlet: Male Rotolock, Outlet: Female Swivel Nut

R72DB0054HX: R-410A, 3.0 – 5.0 Ton, 15% Bleed, Inlet: Male Rotolock, Outlet: Female Swivel Nut

⚠ WARNING

Coil is pressurized with nitrogen from the factory. Relieve pressure before installing TXV by depressing the Shrader valve on the coil manifold.

Field Installed TXV Instructions

The TXV assembly is to be installed between the flowrator distributor and the existing liquid line attached to the flowrator distributor as shown in Figure 6.

1. After the coil pressure has been relieved, turn the female swivel nut counter-clockwise to remove.
2. Remove the piston from the flowrator distributor fitting using a small diameter wire or paper clip. **(ALWAYS REMOVE PISTON FROM DISTRIBUTOR BODY WHEN TXV IS INSTALLED)**.
3. Attach the TXV by connecting the female swivel nut on TXV outlet to the flowrator distributor (aligning Teflon seal first) and torque swivel nut to 10-30 ft. lbs.
4. Attach liquid line with female swivel nut to male rotolock fitting on TXV inlet (Aligning Teflon seal first) and torque swivel nut to 10-30 ft. lbs.
5. Remove the cap from the male Schrader valve port on the coil manifold. Attach equalizer tube with 1/4" female flare nut that includes a valve depressor to the male Schrader valve port. Torque the flare nut to 10-30 ft. lb.

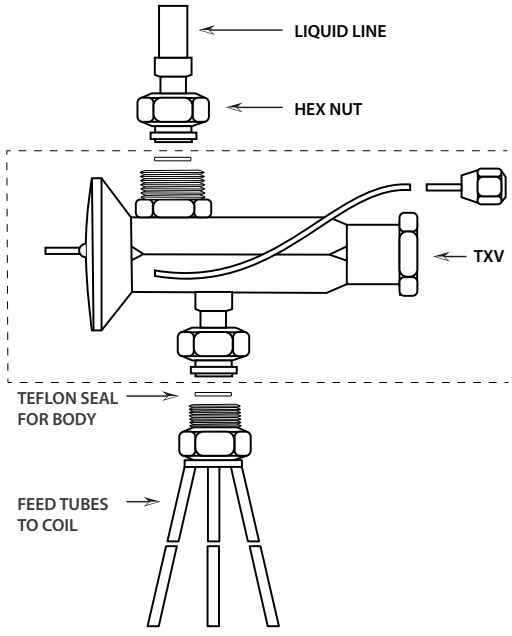

Figure 6: Typical TXV Connections

Field and Factory Installed TXV Instructions – Sensing Bulb, Leak Check, Evacuation

1. Install the TXV bulb on the suction line just outside the air handler cabinet using the two bulb clamps furnished with kit.
2. The bulb should be installed on the upper portion of a horizontal section of the suction line between 10:00 o'clock and 2:00 o'clock as shown in Figure 7.
3. If the bulb must be installed on a vertical run, the bulb should be located at least 6 inches from any bend, and on the tubing side opposite the plane of the bend. On vertical bulb installations, the bulb should be positioned with the bulb capillary tube at the top.
4. The bulb must be insulated using thermal insulation to protect it from the effect of the surrounding ambient temperature.
5. After completing the installation of the TXV (including equalizer tube), leak check the coil and evacuate the coil through the liquid and suction line valves on the outdoor unit.

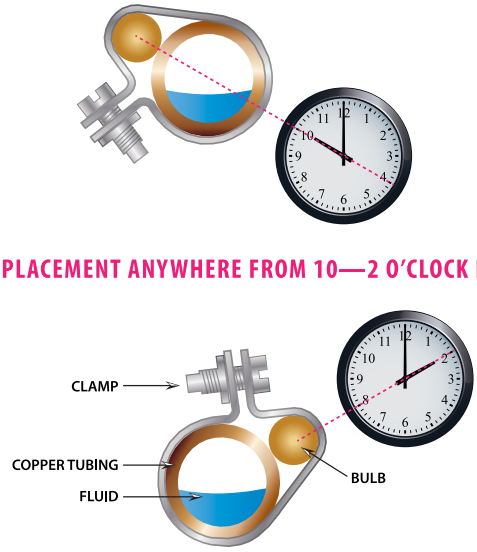

Figure 7: TXV Sensing Bulb Placement

CONDENSATE DRAIN PIPING

The air handler indoor coil drain pan has two ¾" NPT female primary and two secondary connections (left or right hand). The horizontal pan has two ¾" NPT female, one primary and one secondary. Condensate piping from each fitting must have a 2" minimum trap (See Figure 8) and the piping must be routed to provide enough slope for adequate drainage to a visible area. Do not pipe these two fittings together into a common drain. If a secondary drain is not installed, the secondary drain connection must be capped.

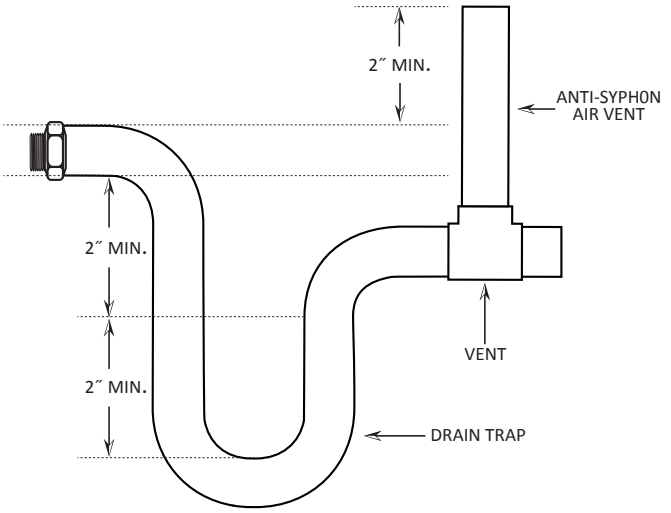

Figure 8: Typical Condensate Trap

CHILLED AND HOT WATER PIPING

All water pipes must be supported independent of coils to prevent vibration and stress on coil headers. Swing joints or flexible fittings must be provided to absorb expansion and contraction strains. Rigid piping reduces the effectiveness of vibration isolators. Coil water pipes must be adequately vented in order to prevent air binding. Air handlers are provided with manual air vents mounted through the manifold panel.

Chilled Water Piping

Supply and return chilled water piping to the coil should be ¾" ID up to 42,000 BTU/Hr, 1" on air handlers greater than 42,000 BTU/Hr. Water piping must always be connected so that the entering water is on the leaving air side of the coil.

Hot Water Piping

If a residential water heater is used for space heating water, do not exceed a distance of 70 feet between the air handler and the water heater. The water heater should be the quick recovery type. Air handler and water heater must be located indoors and not subject to freezing temperatures.

Total hot water piping should not exceed 140 feet. All hot water piping to the coil should be copper and ¾" ID and 7/8" OD. CPVC or PEX piping may be used in applications where the water temperature does not exceed 150°F. It is recommended that a water isolation valve and a union be placed in the water lines to and from the coil that is near the coil for serviceability, repair or replacement of the coil.

A thermal expansion tank is recommended on any closed loop system to relieve thermal expansion due to pressure increase. **NOTE:** Refer to **SECTION 9: FILLING HEATING SYSTEM WITH WATER AND SYSTEM STARTUP** for instructions on filling the system with water, purging the air from the system, and checking for leaks once the air handler installation has been completed.

"Massachusetts requires an electronically controlled pump timer that activates the pump every 6 hours for 60 seconds and limits the distance between the water heater and air handler to 50 feet max."

Chilled Water Piping:

Supply and return chilled water piping to the coil should be ¾" ID up to 42,000 BTU/Hr, 1" on air handlers greater than 42,000 BTU/Hr. Water piping must always be connected so that the entering water is on the leaving air side of the coil.

⚠ WARNING

Air handler must be located so that if any connections should leak, water will not cause damage to the adjacent area. When such locations can't be avoided, a suitable drain pan should be installed under the air handler, not over 1½" deep, with minimum length and width at least 2" greater than the air handler dimensions and connected to an adequate drain. Under no circumstances is the manufacturer to be held liable for any water damage in connection with this air handler.

⚠ WARNING

When system requires water at temperatures higher than required for other uses, a means such as a mixing valve shall be installed to temper the water for those uses in order to reduce the potential for a scald hazard.

⚠ WARNING

For personal safety, 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 any of the air handler access panels.

MODEL NO.	CFM	TOTAL	SENS	LATENT	LDB	LWB	GPM	WPDS FT.	APD IN-WC
CW018A8K3	600	26,650	17,680	8,970	52.7	48.5	3.0	1.6	0.021
CW024A8K3	800	32,350	22,190	10,160	54.3	54.0	3.5	2.1	0.036
CW036A8K3	1200	41,540	30,430	11,110	56.5	56.1	4.0	3.3	0.049
CW048A8K3	1600	51,940	38,600	13,340	57.6	56.8	5.5	5.5	0.132
CW060A8K3	2000	63,750	47,340	16,410	58.0	57.0	7.0	8.4	0.195
CW072A8K3	2400	78,711	57,242	21,469	58.0	56.8	9.0	9.3	0.280

Table 5: Chilled Water "A" Coil Cooling Capacity 80/67°F EAT 45°F EWT

MODEL NO.	CFM	120° EWT 20°F Δt 65°F EDB					140° EWT 20°F Δt 65°F EDB				
		BTUH	LAT	GPM	APD IN-WC	WPD FT	BTUH	LAT	GPM	APD IN-WC	WPD FT
CW018A8K3	600	26,650	17,680	8,970	52.7	48.5	3.0	1.6	0.021	0.06	1.36
CW024A8K3	800	32,350	22,190	10,160	54.3	54.0	3.5	2.1	0.036	0.09	2.03
CW036A8K3	1200	41,540	30,430	11,110	56.5	56.1	4.0	3.3	0.049	0.16	3.94
CW048A8K3	1600	51,940	38,600	13,340	57.6	56.8	5.5	5.5	0.132	0.11	7.40
CW060A8K3	2000	63,750	47,340	16,410	58.0	57.0	7.0	8.4	0.195	0.16	9.83
CW072A8K3	2400	78,711	57,242	21,469	58.0	56.8	9.0	9.3	0.280	0.22	12.31

Table 6: Heating Capacity for Water "A" Coil @ 120°F and 140°F

MODEL NO.	CFM	160° EWT 20°F Δt 65°F EDB					180° EWT 20°F Δt 65°F EDB				
		BTUH	LAT	GPM	APD IN-WC	WPD FT	BTUH	LAT	GPM	APD IN-WC	WPD FT
CW018A8K3	600	55,080	1496	56	006	205	67,556	1608	69	006	288
CW024A8K3	800	70,700	1465	72	009	309	86,916,	1652	89	009	332
CW036A8K3	1200	101,327	1429	103	016	468	124,762	1609	128	016	644
CW048A8K3	1600	139,501	1454	142	011	1091	179,219	1637	176	011	1485
CW060A8K3	2000	167,902	1424	171	016	1453	206,377	1601	212	016	1988
CW072A8K3	2400	194,543	1397	198	022	1827	239,408	1570	246	022	2320

Table 7: Heating Capacity for Water "A" Coil @ Coil 160°F and 180°F

MODEL	CFM	GPM	BTUH	LAT ° F	LWT ° F	APD IWC	WPD FT	ROWS	FPI
MS**18	500	2.7	26,290	116.5	160	0.07	1.2	2	10
	600	3.0	29,630	113.5		0.09	1.5		
	700	3.4	32,690	111.1		0.12	1.8		
	500	4.0	39,000	137.0		0.10	1.2	3	
	600	4.6	44,500	133.4		0.14	1.5		
	700	5.1	49,600	130.3		0.18	1.8		
	500	4.9	47,500	152.6		0.13	2.1	4	
	600	5.6	54,740	149.1		0.18	2.7		
	700	6.3	61,510	146		0.23	3.3		
MS**24	600	3.0	29,630	113.5		0.09	1.5	2	
	800	3.6	35,510	108.9		0.15	2.1		
	900	3.9	38,140	107.1		0.19	2.4		
	600	4.6	44,500	133.4		0.14	1.5	3	
	800	5.6	54,300	127.6		0.23	2.2		
	900	6.0	58,700	125.7		0.28	2.5		
	600	5.6	54,740	149.1		0.18	2.7	4	
	800	7.0	67,890	143.3		0.29	4.0		
	900	7.6	73,928	140.7		0.35	4.6		

Table 8: Hot Water Slab Coil Heating Capacity-Boiler Loop (No Pump) - 65°F EAT 180°F EWT 20°F Δt / Small Cabinet 1.5 & 2.0 Ton

MODEL	CFM	GPM	BTUH	LAT ° F	LWT ° F	APD IWC	WPD FT	ROWS	FPI
M S **2 5	600	3 .4	33, 080	118. 8	160	0. 07	1 .8	2	10
	800	4 .1	40, 000	114. 1		0. 11	1 .1		
	900	4 .4	43, 120	112. 2		0. 13	1 .2		
	600	4 .7	45, 530	138. 0		0. 10	1 .5	3	
	800	5 .7	56, 060	132. 6		0. 16	2 .2		
	900	6 .2	60, 880	130. 4		0. 20	2 .6		
	600	5 .6	54, 160	148. 2		0. 15	3 .1	4	
	800	6 .9	67, 160	142. 4		0. 24	4 .4		
	900	7 .5	73, 140	139. 9		0. 29	4 .9		
M S **3 0	900	4 .4	42, 780	111. 8		0. 14	1 .2	2	
	1000	4 .7	45, 680	110. 1		0. 16	1 .4		
	1200	5 .2	51, 010	107. 2		0. 23	1 .7		
	900	6 .2	60, 500	130. 0		0. 21	2 .5	3	
	1000	6 .7	65, 020	128. 0		0. 25	2 .9		
	1200	7 .5	73, 410	124. 4		0. 34	3 .7		
	900	7 .5	73, 140	139. 9		0. 29	4 .9	4	
	1000	8 .1	78, 830	137. 7		0. 34	5 .2		
	1200	9 .2	89, 455	133. 7		0. 46	5 .7		
M S **3 6	1000	4 .7	45, 680	110. 1		0. 16	1 .4	2	
	1200	5 .2	51, 010	107. 2		0. 23	1 .7		
	1400	5 .7	55, 830	104. 8		0. 29	2 .1		
	1000	6 .7	65, 020	128. 0		0. 25	2 .9	3	
	1200	7 .5	73, 410	124. 4		0. 34	3 .7		
	1400	8 .3	81, 080	121. 4		0. 44	1 .4		
	1000	8 .1	78, 830	137. 7		0. 34	5 .2	4	
	1200	9 .2	89, 455	133. 7		0. 46	5 .7		
	1400	10. 2	99, 230	130. 4		0. 60	6 .6		

Table 9: Hot Water Slab Coil Capacity - Boiler Loop (No Pump) - 65°F EAT 180°F EWT 20°F Δt / Med. Cabinet 2.0, 2.5, 3.0 Ton

MODEL	CFM	GPM	BTUH	LAT ° F	LAT ° F	APD IWC	WPD FT	ROWS	FPI
MS**37	1000	5.4	52,500	116.4	160	0.09	1.6	2	10
	1200	6.1	59,100	113.4		0.12	2.0		
	1400	6.7	65,130	110.9		0.15	2.4		
	1000	7.5	72,930	135.2		0.13	3.1	3	
	1200	8.5	83,040	131.8		0.18	1.1		
	1400	9.5	92,390	128.9		0.23	1.4		
	1000	8.8	85,910	147.2		0.17	1.3	4	
	1200	10.1	98,890	144.0		0.23	1.7		
	1400	11.4	111,020	141.1		0.31	2.1		
MS**42	1200	6.1	59,100	113.4		0.12	2.0	2	
	1400	6.7	65,130	110.9		0.15	2.4		
	1600	7.3	70,690	108.7		0.19	2.8		
	1200	8.5	83,040	131.8		0.18	1.1	3	
	1400	9.5	92,390	128.9		0.23	1.4		
	1600	10.4	101,100	126.3		0.29	1.6		
	1200	10.1	98,890	144.0		0.23	1.7	4	
	1400	11.4	111,020	141.1		0.31	2.1		
	1600	12.6	122,430	138.6		0.39	2.5		
MS**48	1400	6.7	65,130	110.9		0.15	2.4	2	
	1600	7.3	70,690	108.7		0.19	2.8		
	1800	7.8	75,860	106.9		0.24	3.2		
	1400	9.5	92,390	128.9		0.23	1.4	3	
	1600	10.4	101,100	126.3		0.29	1.6		
	1800	11.2	109,250	124.0		0.36	1.9		
	1400	11.4	111,020	141.1		0.31	2.1	4	
	1600	12.6	122,430	138.6		0.39	2.5		
	1800	13.7	133,200	136.2		0.47	3.0		
MS**60	1800	7.8	75,860	106.9		0.24	3.4	2	
	2000	8.3	80,690	105.2		0.28	3.9		
	2100	8.5	83,000	104.4		0.31	4.2		
	1800	9.5	92,390	128.9		0.36	5.2	3	
	2000	12.0	116,930	121.9		0.43	8.4		
	2100	12.4	120,600	120.0		0.46	8.9		
	1800	13.7	133,200	136.2		0.47	11.0	4	
	2000	14.7	143,400	134.1		0.57	12.7		
	2100	15.4	147,245	132.0		0.46	13.9		
MS**72	2000	8.3	80,690	101.5		0.45	2.2	2	
	2200	8.6	83,400	99.9		0.53	2.4		
	2400	9.0	87,300	98.6		0.61	2.6		
	2000	12.0	116,930	117.1		0.67	5.2	3	
	2200	12.3	119,560	115.1		0.79	5.8		
	2400	12.9	125,700	113.3		0.92	6.3		
	2000	14.7	143,400	128.9		0.89	9.0	4	
	2200	15.1	147,400	126.8		1.05	9.5		
	2400	16.0	155,600	124.8		1.72	10.2		

Table 10: Hot Water Slab Coil Capacity – Boiler Loop (No Pump) 65°F EAT 180°F EWT 20°F Δt / Large Cabinet 3.0, 3.5, 4.0, 5.0, 6.0 Ton

MODEL	CFM	GPM	BTUH 120°F	BTUH 130°F	BTUH 140°F	BTUH 150°F	BTUH 160°	APD IWC	ROWS	FPI
MS**18	500	4	13,600	16,200	18,840	21,510	24,200	0.07	2	10
	600	4	14,890	17,760	20,660	23,600	26,570	0.09		
	700	4	15,990	19,090	22,230	25,410	28,620	0.12		
	500	4	18,160	21,580	25,000	28,500	32,000	0.10	3	
	600	4	20,170	24,000	27,840	31,700	35,600	0.14		
	700	4	21,900	26,000	30,280	34,500	38,800	0.18		
	500	4	21,870	25,930	30,015	34,110	38,225	0.13	4	
	600	4	24,620	29,215	33,820	38,460	43,115	0.18		
	700	4	27,050	32,108	37,195	42,305	47,440	0.23		
MS**24	600	4	14,890	17,760	20,660	23,600	26,570	0.09	2	
	800	4	16,960	20,250	23,600	26,990	30,420	0.15		
	900	4	17,810	21,280	24,810	28,390	32,010	0.19		
	600	4	20,170	24,000	27,840	31,700	35,600	0.14	3	
	800	4	23,400	27,900	34,300	34,160	41,600	0.23		
	900	4	24,800	29,500	34,300	39,160	44,000	0.28		
	600	4	24,620	29,215	33,820	38,460	43,115	0.18	4	
	800	4	29,210	34,680	40,190	45,725	51,295	0.29		
	900	4	31,140	36,990	42,845	48,800	54,755	0.35		

Table 11: Hot Water Slab Coil Capacity - Factory Pump - 65°F EAT @ Stated EWT / Small Cabinet 1.5 and 2.0 Ton

MODEL	CFM	GPM	BTUH 120°F	BTUH 130°F	BTUH 140°F	BTUH 150°F	BTUH 160°	APD IWC	ROWS	FPI
MS**25	600	4	16,210	16,320	22,460	25,630	28,820	0.07	2	10
	800	4	18,620	22,220	25,860	29,540	33,260	0.11		
	900	4	19,620	23,420	27,270	31,170	35,110	0.13		
	600	4	21,010	25,000	29,030	33,090	37,190	0.10	3	
	800	4	24,490	29,180	33,930	38,720	43,560	0.16		
	900	4	25,940	30,920	35,960	41,060	46,210	0.20		
	600	4	24,840	29,415	34,005	38,605	43,200	0.15	4	
	800	4	29,770	35,270	40,785	46,315	51,860	0.24		
	900	4	31,895	37,790	43,710	49,645	55,595	0.29		
MS**30	900	4	19,620	23,420	27,270	31,170	35,110	0.13	2	
	1000	4	20,510	24,500	28,540	32,630	36,770	0.16		
	1200	4	22,050	26,350	30,720	35,150	39,630	0.22		
	900	4	25,940	30,920	35,960	41,060	46,210	0.20	3	
	1000	4	27,230	32,470	37,780	43,160	48,580	0.24		
	1200	4	29,440	35,140	40,910	46,760	52,670	0.33		
	900	4	31,895	37,790	43,710	49,645	55,595	0.29	4	
	1000	4	33,836	40,100	46,385	52,685	59,010	0.34		
	1200	4	37,260	44,165	51,104	58,065	65,045	0.46		
MS**36	1000	4	20,510	24,500	28,540	32,630	36,770	0.16	2	
	1200	4	22,050	26,350	30,720	35,150	39,630	0.22		
	1400	4	23,340	27,910	32,550	37,260	42,040	0.29		
	1000	4	27,230	32,470	37,780	43,160	48,580	0.24	3	
	1200	4	29,440	35,140	40,910	46,760	52,670	0.33		
	1400	4	31,270	37,350	43,510	49,750	56,070	0.43		
	1000	4	33,836	40,100	46,385	52,685	59,010	0.34	4	
	1200	4	37,260	44,165	51,104	58,065	65,045	0.46		
	1400	4	40,195	47,660	55,150	62,670	70,220	0.60		

Table 12: Hot Water Slab Coil Capacity – Factory Pump - 65°F EAT @ Stated EWT / Med. Cabinet 2.0, 2.5, 3.0 Ton

MODEL	CFM	GPM	BTUH120°F	BTUH130°F	BTUH140°F	BTUH150°F	BTUH160°F	APD IWC	ROWS	FPI
MS**37	1000	7	26,320	31,350	36,430	41,570	46,740	0.09	2	10
	1200	7	28,770	34,300	39,900	45,550	51,260	0.12		
	1400	7	30,880	36,840	42,880	48,980	55,140	0.15		
	1000	7	34,230	40,720	47,280	53,890	60,550	0.13	3	
	1200	7	37,800	45,010	52,290	59,640	67,050	0.18		
	1400	7	40,860	48,690	56,600	64,590	72,660	0.23		
	1000	7	39,630	47,090	54,620	62,190	69,810	0.17	4	
	1200	7	44,170	52,530	60,960	69,460	78,020	0.23		
	1400	7	48,080	57,220	66,440	75,750	85,130	0.31		
MS**42	1200	7	28,770	34,300	39,900	45,550	51,260	0.12	2	
	1400	7	30,880	36,840	42,880	48,980	55,140	0.15		
	1600	7	32,720	39,050	45,470	51,970	58,540	0.19		
	1200	7	37,800	45,010	52,290	59,640	67,050	0.18	3	
	1400	7	40,860	48,690	56,600	64,590	72,660	0.23		
	1600	7	43,530	51,890	60,360	68,910	77,550	0.29		
	1200	7	44 ,170	52,530	60,960	69,460	78,020	0.23	4	
	1400	7	48,080	57,220	66,440	75,750	85,130	0.31		
	1600	7	51,490	61,310	71,230	81,250	91,340	0.39		
MS**48	1400	7	30,880	36,840	42,880	48,980	55,140	0.15	2	
	1600	7	32,720	39,050	45,470	51,970	58,540	0.19		
	1800	7	34,340	41,010	47,770	54,620	61,550	0.24		
	1400	7	40,860	48,690	56,600	64,590	72,660	0.23	3	
	1600	7	43,530	51,890	60,360	68,910	77,550	0.29		
	1800	7	45,870	54,710	63,670	72,720	81,870	0.36		
	1400	7	48,080	57,220	66,440	75,750	85,130	0.31	4	
	1600	7	51,490	61,310	71,230	81,250	91,340	0.39		
	1800	7	54,490	64,910	75,450	86,090	96,820	0.47		
MS**60	1800	7	34,340	41,010	47,770	54,620	61,550	0.24	2	
	2000	7	35,780	42,750	49,820	56,990	64,240	0.28		
	2100	7	36,450	43,550	50,770	58,080	65,480	0.31		
	1800	7	45,870	54,710	63,670	72,720	81,870	0.36	3	
	2000	7	47,960	57,220	66,610	76,110	85,710	0.43		
	2100	7	48,920	58,380	67,970	77,670	87,480	0.46		
	1800	7	54,490	64,910	75,450	86,090	96,820	0.47	4	
	2000	7	57,160	68,120	79,200	90,400	101,710	0.57		
	2100	7	58,380	69,590	80,930	92,390	103,750	0.62		
M S**72	2000	7	35,780	42,750	49,820	56,990	64,240	0.45	2	
	2200	7	36,700	43,800	50,900	58,000	65,200	0.53		
	2400	7	38,000	45,300	52,600	60,000	67,500	0.67		
	2000	7	47,960	57,220	66,610	76,110	85,710	0.67	3	
	2200	7	49,500	58,900	68,300	77,900	87,500	0.79		
	2400	7	51,300	61,000	70,800	80,700	90,700	0.92		
	2000	7	57,160	68,120	79,200	90,400	101,710	0.89	4	
	2200	7	59,200	70,400	81,600	92,900	104,400	1.05		
	2400	7	61,500	73,000	84,800	96,500	108,400	1.22		

Table 13: Hot Water Slab Coil Capacity - Factory Pump - 65°F EAT @ Stated EWT / Large Cabinet 3.0, 3.5, 4.0, 5.0, 6.0 Ton

SECTION 7: LINE VOLTAGE WIRING

Power Supply Wiring

The factory air handler internal wiring is complete except for the power supply and the thermostat wires. See Tables 14 and 15 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 required. Follow the steps in the next column to connect the power supply wires.

Single Circuit Line Voltage Wiring Connections

1. Remove the blower and control box access panel.
2. Remove the control box cover.
3. Install the cable connectors on the 7/8" diameter holes on the right side of the control box.
4. Strip ½" of the insulation on the end of each wire.
5. Insert the wires through the holes in the cabinet and through the cable connectors.
6. Insert the black wire into the L1 screw terminal on the terminal block and tighten the set screw to clamp down on the wire.
7. Insert the white wire into the N screw terminal on the terminal block and tighten the set screw to clamp down on the wire.
8. Insert the green wire into the ground lug and tighten the setscrew.

NOTE: 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. Air handler electrical data can be found in Tables 14 and 15.

IMPORTANT - All field wiring must be rated for 60ºC or higher. Refer to the wiring diagrams on the air handler or at the back of this manual for more information.

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 requirements

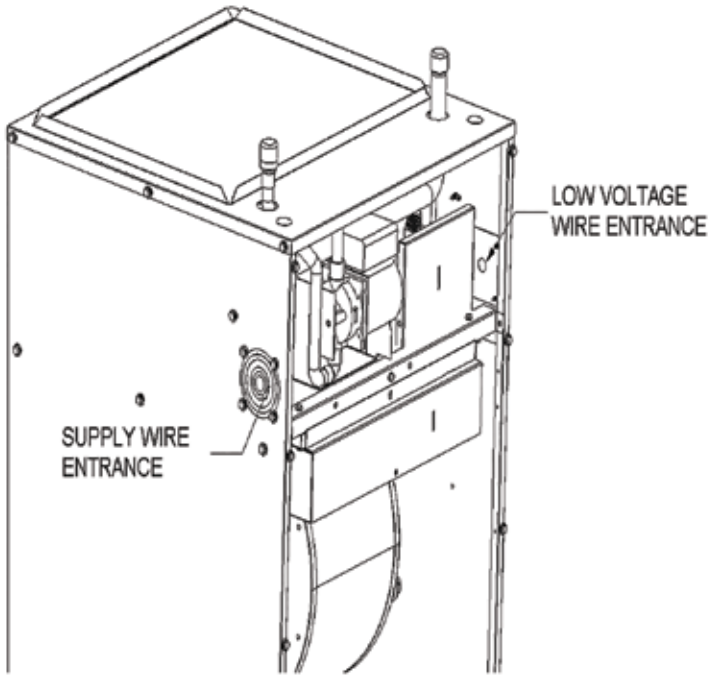

Figure 9: Hydronic Air Handler Control Box Wiring Connection Locations

AIR HANDLER MODELS				
	MSVE 18, 24	MSVT 18, 24	MSVE 25, 30, 36	MSVT 25, 30, 36
Indoor Blower Type	ECM	Constant Torque	ECM	Constant Torque
Indoor Blower Amps	1.80	2.67	2.31	4.38
Minimum Circuit Ampacity	2.25	3.34	2.89	5.48
Minimum Wire Size (90°C)	#14	#14	#14	#14
Minimum Wire Size (75°C)	#14	#14	#14	#14
Minimum Wire Size (60°C)	#14	#14	#14	#14
Ground Wire Size	*	*	*	*
Maximum Overcurrent Protection Amps	15	15	15	15

Table 14: Wiring Requirements – 115 VAC Hydronic 18-36 kBTU Models - Single Branch Circuit

+ 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 13.

AIR HANDLER MODELS			
	MSVE 37,42,48,60	MSVT 37, 42, 48, 60	MSVE 72
Indoor Blower Type	ECM	Constant Torque	ECM
Indoor Blower Amps	6.31	7.41	8.48
Minimum Circuit Ampacity	7.89	9.26	10.6
Minimum Wire Size (90°C)	#14	#14	#14
Minimum Wire Size (75°C)	#14	#14	#14
Minimum Wire Size (60°C)	#14	#14	#14
Ground Wire Size	*	*	*
Maximum Overcurrent Protection Amps	15	15	15

Table 15: Wiring Requirements – 115 VAC Hydronic 37-72kBTU Models - Single Branch Circuit

+ 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 14.

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

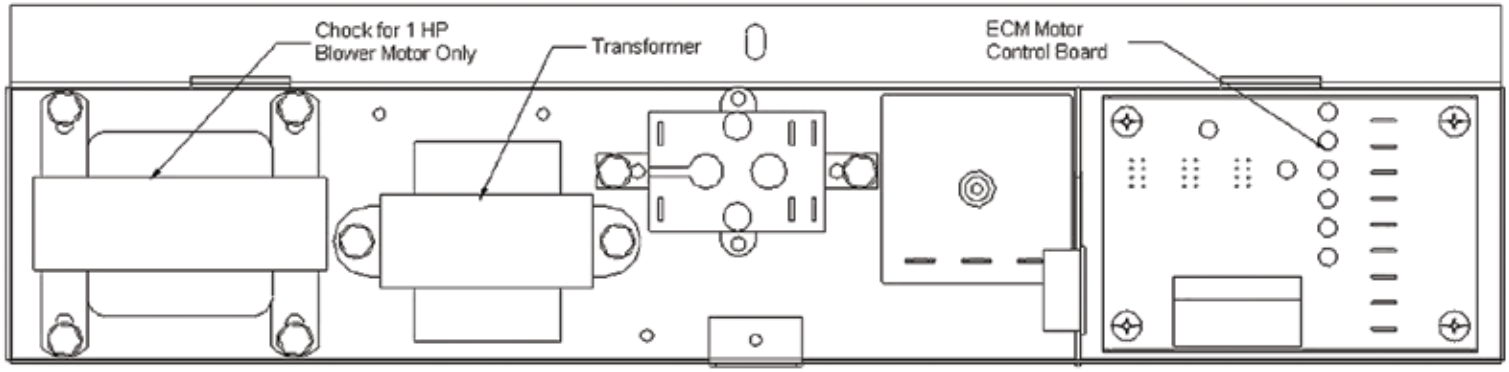

Figure 10: Component Locations – Hydronic Heat Control Box No Pump

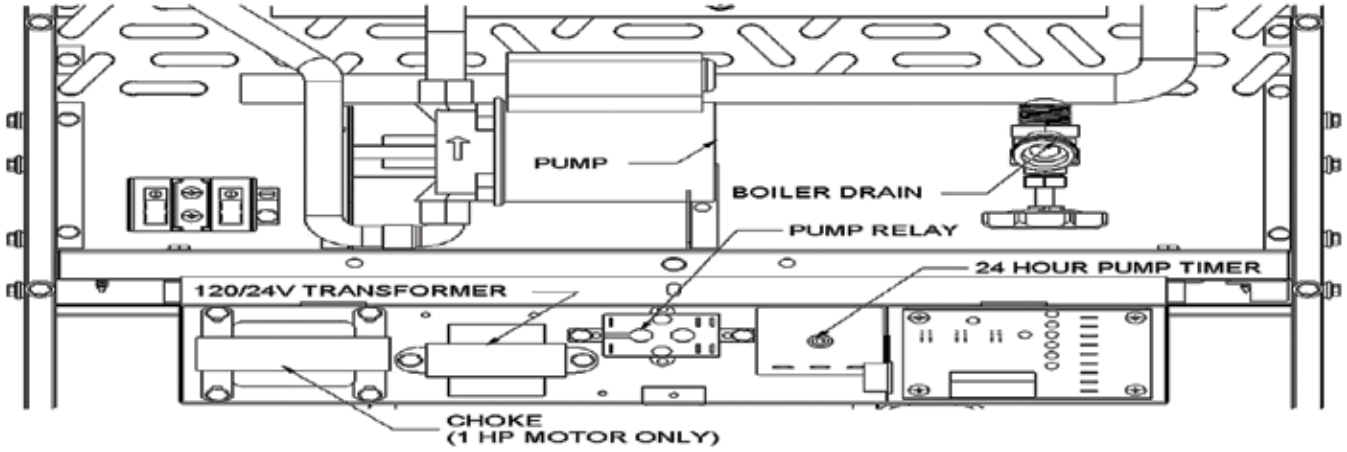

Figure 11: Component Locations – Hydronic Heat Control Box With Pump

SECTION 8: THERMOSTAT WIRING AND CONNECTIONS

Thermostat Wiring

Thermostat wires connect through side of air handler and should be no smaller than 22 gauge. Refer to Table 15 for recommended wire gauge, lengths and maximum current for each wire gauge.

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 16: Low Voltage Wire Gauge and Maximum Lengths

Thermostat wires can enter through the side or top of the air handler. When bringing wiring through the top or side of the air handler, cable connectors must be installed to hold wiring in place and to relieve any strain on the wiring.

The thermostat wire colors and the typical heating/cooling connections are listed in Table 17. The thermostat wire colors and the typical heat pump connections are listed in Table 18.

Thermostat Installation

The thermostat heat anticipator must be set at 0.4 amps if the thermostat has a manual heat anticipator adjustment. This setting should be checked at the time of installation.

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

The thermostat should be located on an inside wall in an open area or hallway to more closely sense average room air, preferably where there is air movement back to air handler. The thermostat should not be located within 3 feet of from any windows and should be 52 to 66 inches above the floor. Do not place the thermostat within 3 feet of any supply air register.

Maintenance, operating, and/or programming instructions are in the envelope shipped with the thermostat. The envelope should be given to the homeowner or user after the installation is complete.

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 contacts "RC" and "RH" to prevent interconnection of Class II 24 Volt Systems. Most modern thermostats have separate heating and cooling contacts for use with homes that have an air handler and outdoor unit that are completely separate and each have a 24 VAC transformer for system control. These thermostats have a "RC" terminal for cooling and a "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. If the air handler and outdoor unit using separate transformers are both connected to the thermostat "R" terminal, 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 the "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.

Separate Heating and Outdoor Units With Separate Thermostats

If the home has a central heating and cooling system, but the hydronic heat and DX cooling are controlled by separate thermostats, the use of a thermostat interlock switch is required in order to prevent heating and cooling from operating at the same time.

⚠ CAUTION

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

1. **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. **Clothes washer or dryer**
8. **Hot water tank**
9. **Sink or near any hot water**
10. **Within 15 feet of any electric space heater**
11. **Within 2 feet of any direct sunlight**

⚠ CAUTION

When using separate heating and cooling thermostats, a thermostat interlock system must be provided to prevent simultaneous operation of the hydronic heat and cooling. Simultaneous operation can result in equipment overheating, equipment damage, and wasted energy.

DO NOT connect the YELLOW wire to the thermostat unless an outdoor unit is installed.

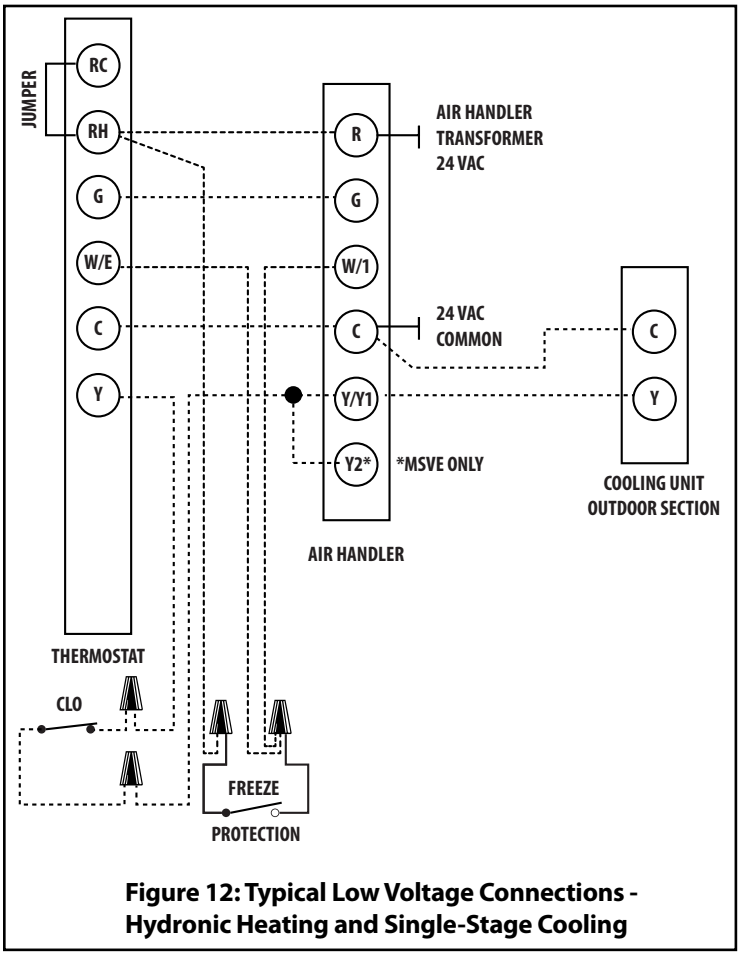

Figure 12: Typical Low Voltage Connections - Hydronic Heating and Single-Stage Cooling

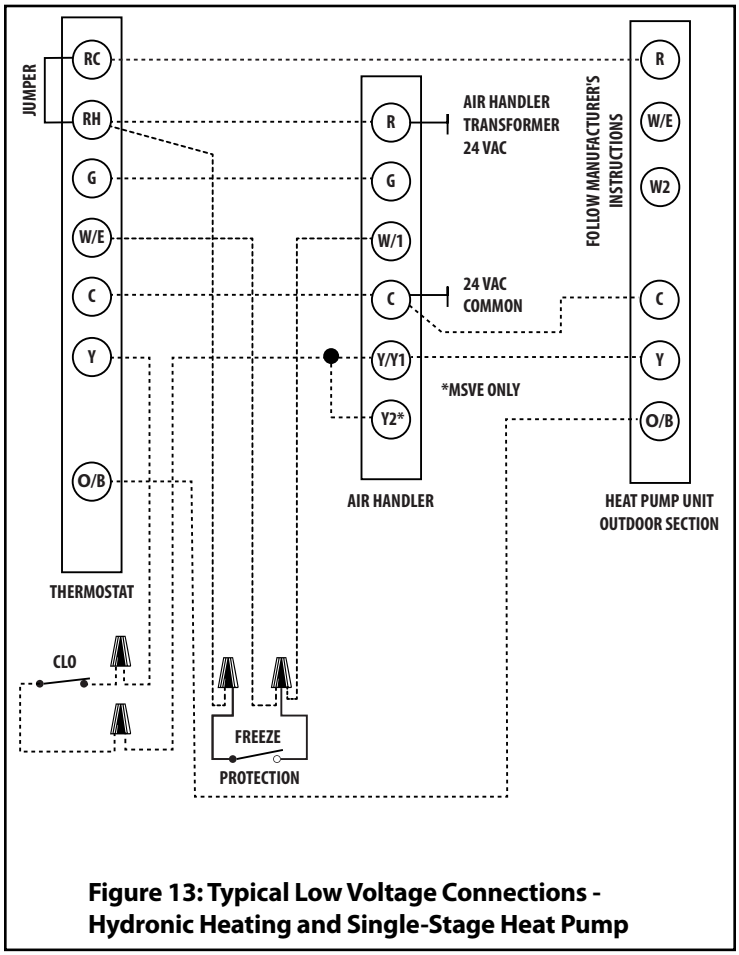

Figure 13: Typical Low Voltage Connections - Hydronic Heating and Single-Stage Heat Pump

WIRE COLOR	DESCRIPTION	LETTER CODE	AIR HANDLER PIG TAIL WIRE CONNECTION	THERMOSTAT CONNECTION	OUTDOOR UNIT CONNECTION
RED	24 VAC	R	RED	R	N/A
WHITE	Heat	W	WHITE	W	N/A
GREEN	Indoor Fan	G	GREEN	G	N/A
YELLOW	Cooling / Opt. 1st Stage Cooling	Y /Y1	YELLOW	Y /Y1	Y /Y1
BLUE	Optional 2nd Stage Cooling	Y2	BLUE	Y2	Y2
BROWN	24 VAC Common	C	BROWN	C	C

Table 17: Typical Heat / Cool Thermostat Wire Color Colors and Low Voltage Connections

WIRE COLOR	DESCRIPTION	LETTER CODE	AIR HANDLER PIG TAIL WIRE CONNECTION	THERMOSTAT CONNECTION	OUTDOOR UNIT CONNECTION
RED	24 VAC	R	RED	R	R
WHITE	Heat	W	WHITE	E (Thermostat) W (Air Handler)	See Outdoor Unit Instructions
GREEN	Indoor Fan	G	GREEN	G	N/A
YELLOW	Cooling / Opt. 1st Stage Cooling	Y /Y1	YELLOW	Y /Y1	Y /Y1
BLUE	Optional 2nd Stage Cooling	Y2	BLUE	Y2	Y2
BROWN	24 VAC Common	C	BROWN	C	C
ORANGE	Heat Pump Reversing Valve Solenoid (Most Outdoor Unit Brands)	O	N/A	O	O See Outdoor Unit Instructions
ORANGE	Heat Pump Reversing Valve Solenoid (Some Outdoor Unit Brands)	B	N/A	B	B See Outdoor Unit Instructions

Table 18: 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 low voltage wire cables from the thermostat and outdoor unit through the 9/16" diameter hole located in the top or right side of the air handler and into the control box. Place the ends of these cables next to the air handler low voltage terminal block (LVTB) or air handler low voltage pigtails. Secure these cables in the 9/16" diameter hole with a strain relief to prevent wire connections from being pulled apart.
4. Strip ½" of the insulation on the end of each thermostat cable wire.
5. Connect the RED (24 VAC) wire from the thermostat cable to the "R" screw terminal on the LVTB or to the RED air handler pigtail with a wire nut.
6. Connect the WHITE wire from the thermostat cable to the "W" screw terminal on the LVTB or to the WHITE air handler pigtail with a wire nut.
7. Connect the GREEN (indoor fan) wire from the thermostat cable to the "G" screw terminal on the LVTB or to the GREEN air handler pigtail with a wire nut.
8. For MSVT models (constant torque motor), connect the two YELLOW (cooling) wires from the thermostat and outdoor unit cables to the "Y" screw terminal on the LVTB or to the YELLOW air handler pigtail.
9. For MSVE models (ECM motor), connect the YELLOW wire from the thermostat to both the YELLOW "Y1" and BLUE "Y2" air handler pigtails with a wire nut for single-stage cooling applications to assure full nominal airflow. For 2-stage cooling applications, connect the wire from the thermostat "Y1" terminal to the YELLOW "Y1" air handler pigtail and connect the wire from the thermostat "Y2" terminal to the BLUE "Y2" air handler pigtail.
10. Connect the two BROWN (24 VAC common) wires from the thermostat and outdoor unit cables to the "C" screw terminal on the LVTB or to the BROWN air handler pigtail with a wirenut.

Typical Heat Pump Thermostat Wiring Connections

1. Remove the blower / control box access panel.
2. Remove the control box cover.
3. Insert the low voltage 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 ends of these low voltage cables next to the air handler low voltage terminal block (LVTB) or low voltage pigtails. Secure these cables in the 9/16" diameter hole with a strain relief to prevent wire connections from being pulled apart.
4. Strip ½" of the insulation on the end of each thermostat wire.
5. Connect the RED (24 VAC) wire from the thermostat cable to the "R" screw terminal on the LVTB or to the RED air handler pigtail with a wire nut.
6. Connect the WHITE (emergency heat) wire from the thermostat's "E" terminal to the "W" screw terminal on the air handler LVTB or to the WHITE air handler pigtail. If applicable, also connect the wire from the outdoor control board that calls for supplemental heat during the defrost cycle to the "W" terminal on the air handler LVTB or to the WHITE air handler pigtail. Refer to the outdoor unit installation instructions for additional information.
7. Connect the WHITE (emergency heat) wire from the thermostat's "E" terminal to the "W" screw terminal on the air handler LVTB or to the WHITE air handler pigtail. If applicable, also connect the wire from the outdoor control board or pigtail that calls for supplemental heat during the defrost cycle to the "W" terminal on the air handler LVTB or to the WHITE air handler pigtail. Refer to the outdoor unit installation instructions for additional information.
8. Connect the GREEN wire from the thermostat "G" terminal to the "G" screw terminal on the LVTB or to the GREEN air handler pigtail with a wire nut.
9. For MSVT models (constant torque motor), connect the YELLOW wire from the thermostat "Y" terminal and the YELLOW wire from the outdoor unit "Y" terminal or pigtail to the "Y" screw terminal on the LVTB or to the YELLOW air handler pigtail with a wire nut.
10. For MSVE models (ECM motor), connect the YELLOW wire from the thermostat to both the YELLOW "Y1" and BLUE "Y2" air handler pigtails with a wire nut for single-stage cooling applications to assure full nominal airflow. For 2-stage cooling applications, connect the wire from the thermostat "Y1" terminal to the YELLOW "Y1" air handler pigtail and connect the wire from the thermostat "Y2" terminal to the BLUE "Y2" air handler pigtail.
11. Connect the BROWN (24 VAC common) wire from the thermostat "C" terminal and the wire from the outdoor unit "C" terminal or 24 VAC common pigtail to the "C" screw terminal on the LVTB or to the BROWN air handler pigtail with a wire nut.
12. Connect the ORANGE (reversing valve solenoid) wire from the thermostat with the ORANGE or BLUE wire from the "O" or "B" terminal on the outdoor unit with a wire nut. Refer to the outdoor unit installation instructions for additional information

Thermostat Heat Anticipator

Some thermostats have a heat anticipator that must be set to 0.4 in order to function correctly. If the heat anticipator setting is too low the air handler will short cycle. If the heat anticipator setting is too high the air handler will run long cycles thus causing the temperature to overrun the temperature setting. This will cause the homeowner to feel hot by the time the blower completes its cycle; then cold, by the time the air handler cycles on again.

Model Number	Motor HP	Volts 1 Ph. 50/60 Hz.	Motor Code	Blower Wheel	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
MSVT18 MSVT24 Hydronic Heat	0.50	115	VJ1	10 X 8	1	710	626	552	436	429	376
					2	848	788	732	646	552	537
					3	908	844	789	747	678	570
					4	1076	1020	972	899	808	667
					5	1187	1111	1040	962	842	691
MSVT24 Hydronic Heat	0.75	115	VK1	10 X 8	1	911	839	788	717	695	590
					2	1030	909	909	842	766	761
					3	1080	1023	976	920	849	780
					4	1158	1104	1038	985	917	861
					5	1254	1203	1146	1093	1035	973
MSVT30 Hydronic Heat	0.75	115	VK1	10 X 8	1	1018	973	935	902	858	808
					2	1065	1022	989	958	923	880
					3	1154	1118	1082	1051	1020	984
					4	1269	1231	1191	1166	1135	1111
					5	1358	1326	1294	1270	1237	1210
MSVT36 Hydronic Heat	0.75	115	VK1	10 X 8	1	1158	1121	1086	1053	1024	994
					2	1267	1236	1199	1166	1140	1105
					3	1358	1327	1290	1260	1236	1204
					4	1608	1545	1483	1414	1332	1255
					5	1643	1589	1512	1431	1351	1279
MSVT37 Hydronic Heat	1.00	115	VX1	12 X 10	1	1240	1202	1145	1088	1027	975
					2	1344	1307	1254	1202	1161	1096
					3	1409	1369	1324	1278	1237	1175
					4	1504	1453	1414	1373	1312	1273
					5	1589	1558	1504	1462	1409	1373
MSVT42 Hydronic Heat	1.00	115	VX1	12 X 10	1	1445	1395	1354	1306	1251	1215
					2	1522	1479	1440	1391	1344	1296
					3	1603	1571	1518	1484	1431	1381
					4	1692	1650	1615	1575	1530	1484
					5	1805	1758	1722	1681	1638	1595
MSVT48 Hydronic Heat	1.00	115	VX1	12 X 10	1	1592	1560	1511	1473	1430	1376
					2	1691	1658	1627	1576	1540	1494
					3	1789	1750	1717	1677	1631	1592
					4	1888	1847	1817	1771	1739	1695
					5	2162	2091	2031	1950	1880	1796
MSVT60 Hydronic Heat	1.00	115	VX1	12 X 10	1	1564	1523	1482	1421	1381	1336
					2	1653	1607	1564	1511	1477	1435
					3	1734	1701	1653	1618	1572	1523
					4	1895	1849	1818	1773	1730	1683
					5	2151	2085	2015	1939	1870	1776

Table 19: MSVT Blower Performance Chart – Hydronic Heat Models - Constant Torque Motors With Hot Water Coil - Without Air Filter

Model Number	Nominal Tons	Motor HP	Volts 1 Ph. 50/60 Hz	Motor Code	Blower Wheel	Jumper	CFM @ 0.10"	CFM @ 0.20"	CFM @ 0.30"	CFM @ 0.40"	CFM @ 0.50"
MSVE18,24 Hydronic Heat	1.5 & 2.0	0.33	115	VG	10X7	A	884	884	884	880	880
						B	799	792	789	789	789
						C	691	691	691	691	690
						D	589	589	589	589	584
MSVE25,30,36 Hydronic Heat	1.5 Thru 3.0	0.50	115	VH	10 X 7	A	1294	1255	1200	1137	1058
						B	1131	1104	1075	1082	1023
						C	974	942	909	853	831
						D	808	769	736	702	657
MSVE37,42,48,60 Hydronic Heat	3.0 Thru 5.0	1.00	115	VI	12 X 9	A	2001	1994	1994	1987	1972
						B	1820	1820	1820	1804	1796
						C	1587	1599	1604	1604	1604
						D	1385	1385	1385	1385	1385
MSVE72 Hydronic Heat	6.0	1.00	115	VW	12 X 10	A	2132	2119	2091	2077	2063
						B	1921	1901	1901	1886	1886
						C	1724	1724	1724	1724	1707
						D	1508	1508	1508	1488	1488

Table 20: MSVE Blower Performance Chart – Hydronic Heat Models - ECM Motors (Y1+Y2, W) With Hot Water Coil - Without Air Filter

Table 20 Notes: 1) For single-stage cooling/heat pump systems, connect the wire from the "Y" thermostat terminal to both the "Y1" and "Y2" air handler low voltage pigtails to assure full nominal airflow.
2) "Y1" CFM (1st stage cooling/heat pump heating) is approximately 70% of the values shown in Table 20.
3) Continuous fan CFM is approximately 50% of the values shown in Table 20

SECTION 10: BLOWER MOTOR SPEED SELECTION

Notice: The factory motor speed tap settings are appropriate for most applications. Refer to the blower performance tables in Section 9 of this manual before changing the motor speeds from the factory settings.

Motor Speed Change - ECM Motor

1. Turn off the circuit breaker to the air handler at the main electrical panel and move the local air handler disconnect switch to the "OFF" position.
2. Remove the blower / control box access panel and remove the control box cover.
3. Changing the heating mode blower motor speed is accomplished by moving the "HEAT" jumper pins to one of the following settings.
   A = High Speed, B = Medium High Speed, C = Medium Speed, and D = Low Speed.
4. Changing the cooling mode blower motor speed is accomplished by moving the "COOL" jumper pins to one of the following settings.
   A = High Speed, B = Medium High Speed, C = Medium Speed, and D = Low Speed.
5. The **ADJUST** pin can be used to either increase or decrease the blower air-flow by 10% - 12% and will affect both the heating and cooling air-flows by the same percentage. Placing the jumper in normal setting will result in no increase or decrease in air-flow. The + setting will increase the air-flow by 10% -12%. The – setting will decrease the air-flow by 10% - 12%.
6. The **PROFILES** jumper pins are used for blower motor ON and OFF delays. See Climate Profiles in the back of the **SERVICE AND MAINTENANCE MANUAL** for this air handler to determine the proper setting for the climate in your area.
7. Reinstall the control box cover and blower / control box access panel.
8. Turn on the circuit breaker to the air handler at the main electrical panel and move the local air handler disconnect switch to the **"ON"** position.
9. Set the thermostat to the desired mode and temperature.

Control Board Flash Code

The ECM control board has a CFM flash code when the air handler is operation to indicate the current CFM.

- Flashes once per 100 CFM.
- To determine the selected CFM, count the number of flashes between pauses and multiply by 100.
- The flash sequence is followed by a 10 second OFF period signifying the end of the flash code and the flash sequence then starts over.

Note: Since blower external static pressure will be reduced when the blower access panel is removed, blower RPM will be lower than normal to maintain the selected CFM.

⚠ 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.

⚠ CAUTION

The test setting on the ADJUST jumper pins must not be used except for trouble shooting to determine if the blower operates.

1. Common C1
2. W/W1
3. Common C2
4. Delay Tap Select
5. Cool Tap Select
6. Y1
7. Adjust Tap Select
8. Output –
9. Reversing Valve (Heat Pump Only)
10. Humidistat (BK)
11. Heat Tap Select
12. 24 VAC (R)
13. 2nd Stage Heat (EM/W2)
14. 2nd Stage Cool (Y/Y2)
15. Fan (G)
16. Output +

Table 21: ECM Motor Control Connector Terminals

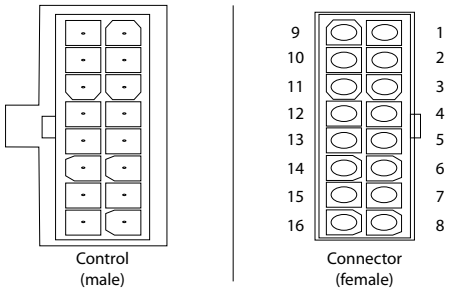

Figure 14: ECM Motor Control Plug Pin Positions

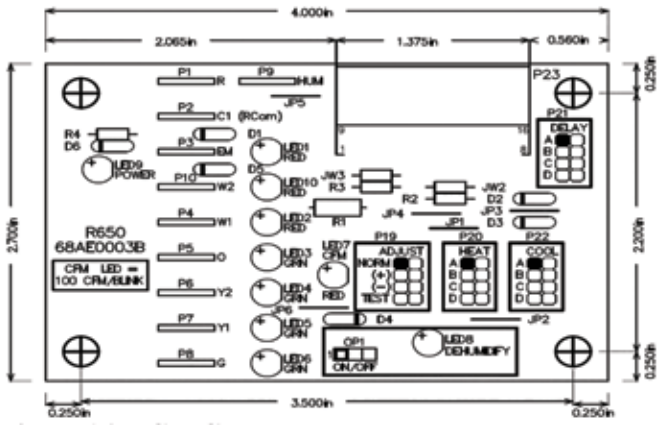

Figure 15: ECM Control Board Layout

Example of the flash code:
The air handler is operating at 1400 CFM. The flash sequence will be 14 one-second flashes, 0.1 seconds apart, followed by a 10 second pause before the flash sequence starts over.

Dehumidification Mode
The ECM control board has a jumper pin (OP1) to enable or disable the de-humidification mode. If the OP1 jumper is set to the ON position, humidification mode is enabled and a 24 VAC signal from a dehumidification capable thermostat or humidistat must be present at the HUM terminal on the ECM control board when the humidity is below the humidity set point.

Important: The humidistat contacts must open when humidity is above the set point which will remove 24 VAC from the HUM terminal and reduce the air-flow by 30%.

The dehumidify LED on the control board will be lit when the motor is running at the reduced "dehumidify" air-flow.

If the dehumidification mode is not desired by the homeowner, the OP1 jumper pin must be placed in the OFF position to disable dehumidification.

Motor Speed Change – Constant Torque Motor
1. Turn off the circuit breaker to the air handler at the main electrical panel and move the local air handler disconnect switch to the "OFF" position.
2. Remove the blower / control box access panel.
3. Locate the BLACK and RED wires connected to two of the 1–5 speed tap terminals on the motor terminal block (see Figure16).
4. The BLACK wire is for HIGH speed and the RED wire is for LOW speed. Connect the BLACK and RED wires to the desired speed taps.
5. Reinstall the blower / control box access panel.
6. Turn on the circuit breaker to the air handler at the main electrical panel and move the local air handler disconnect switch to the "ON" position.
7. Set the thermostat to the desired mode and temperature.

TERMINAL	CONNECTION
C	Speed Tap Common - 24 VAC Common
L	Supply Voltage - 115 VAC
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 22: Constant Torque Motor Terminal Connections

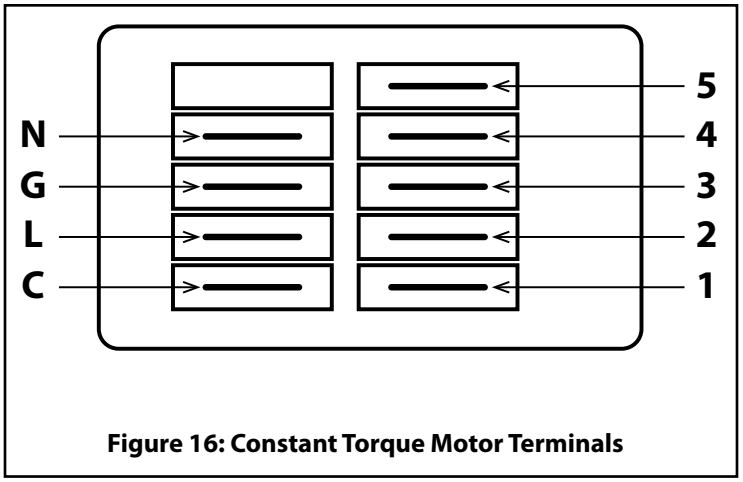

Figure 16: Constant Torque Motor Terminals

SECTION 11: FILLING HEATING SYSTEM WITH WATER AND SYSTEM STARTUP

Filling Hydronic Heating System With Water and Purging Air From System

1. Fill and pressurize the water heater and water coil.
2. Check for water leaks and seal any leaks that are found.
3. Turn the water heater on and set water temperature at 130°F for now.
4. Vent air from the water tank by opening a hot water spigot or faucet.
5. Vent and flush the supply and return water lines by attaching a hose to the volume purge valve and running purge water to a safe location. Run approximately 5 gallons of water at a high flow rate to purge.
6. Switch the air handler power disconnect switch to the "ON" position.
7. Switch the air handler circuit breakers in the main electrical panel to the ON position.
8. Set the thermostat HEAT/COOL switch to the HEAT position and adjust the set point above the room temperature to call for heat. The fan and pump should start simultaneously. The water coil should be warm after a few minutes of operation.
9. The air handler is rated for water temperatures of 130°-180°F. Set water heater temperature at design temperature and take proper safeguards for water usage at supply points per local codes and safety considerations.
   NOTE: If CPVC or PEX hot water tubing is used, do not set the water temperature above 150°F.
10. Set thermostat HEAT/COOL switch to the OFF position.

Cooling System Startup
1. Set the thermostat FAN Switch to the ON position to enable the continuous fan mode.
2. Check for air leaks at all duct connections and seal any leaks that are found.
3. Set the thermostat FAN switch to the AUTO position.
4. Set the thermostat HEAT/COOL switch to the COOL position and adjust the set point below the room temperature to enable the cooling mode.
5. Check for proper cooling operation per the outdoor unit installation and operating manual.
6. Set the thermostat to the desired operating mode and adjust the temperature for comfort conditions.

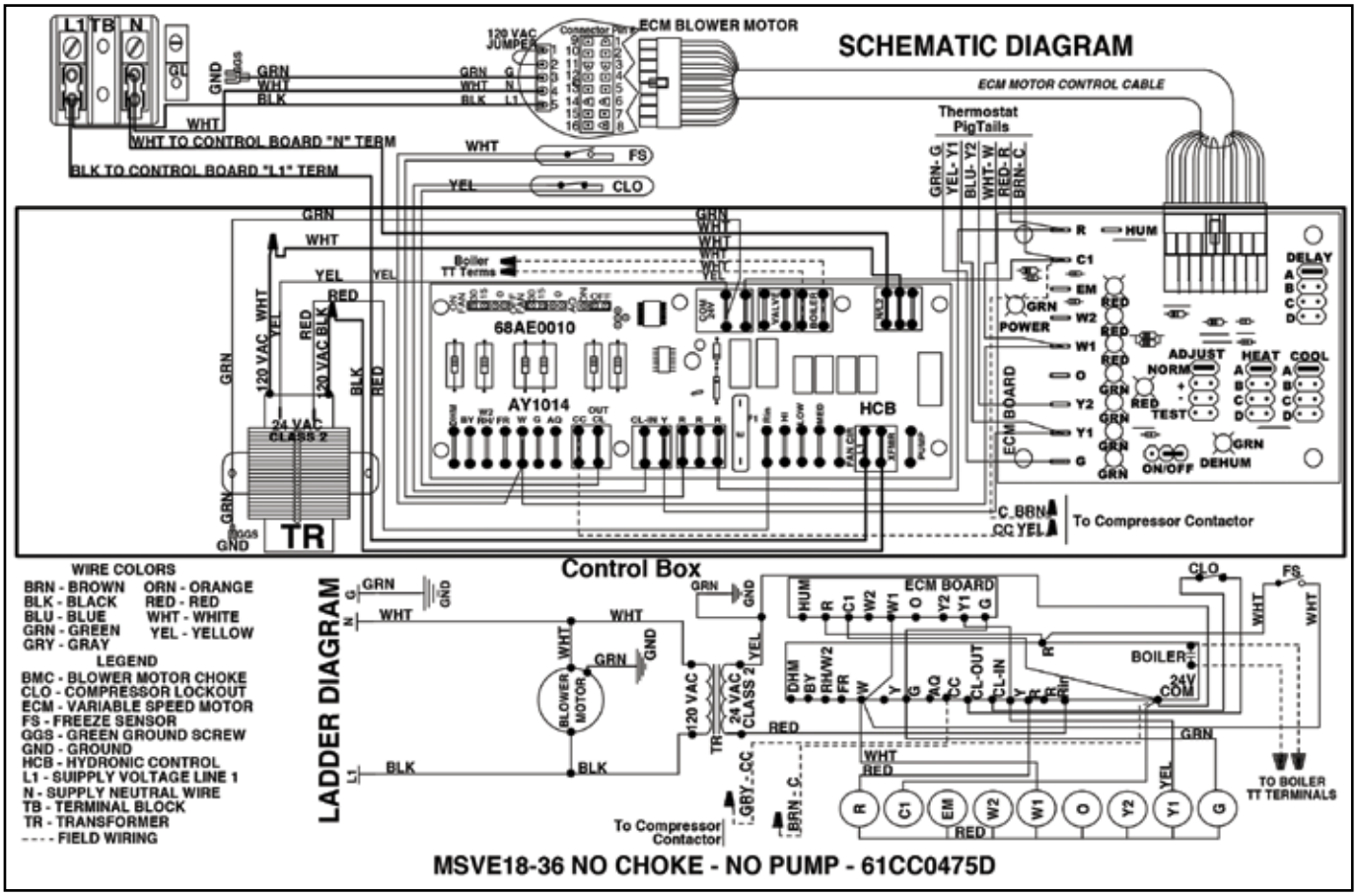

Figure 17: MSVE 18- 36 / ECM – No Choke – No Pump

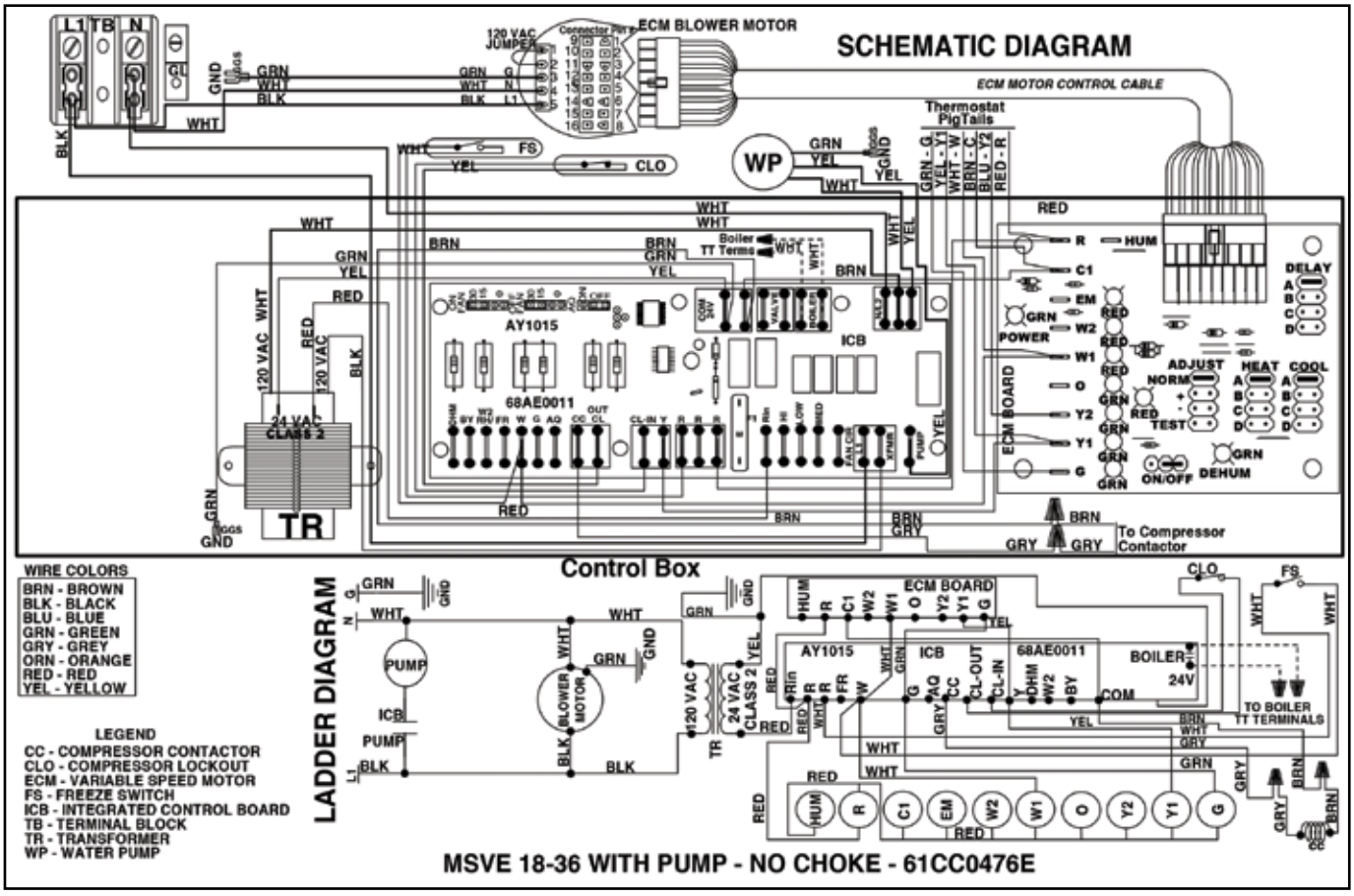

Figure 18: MSVE 18 - 36 / ECM 2.3 – With Pump – No Choke

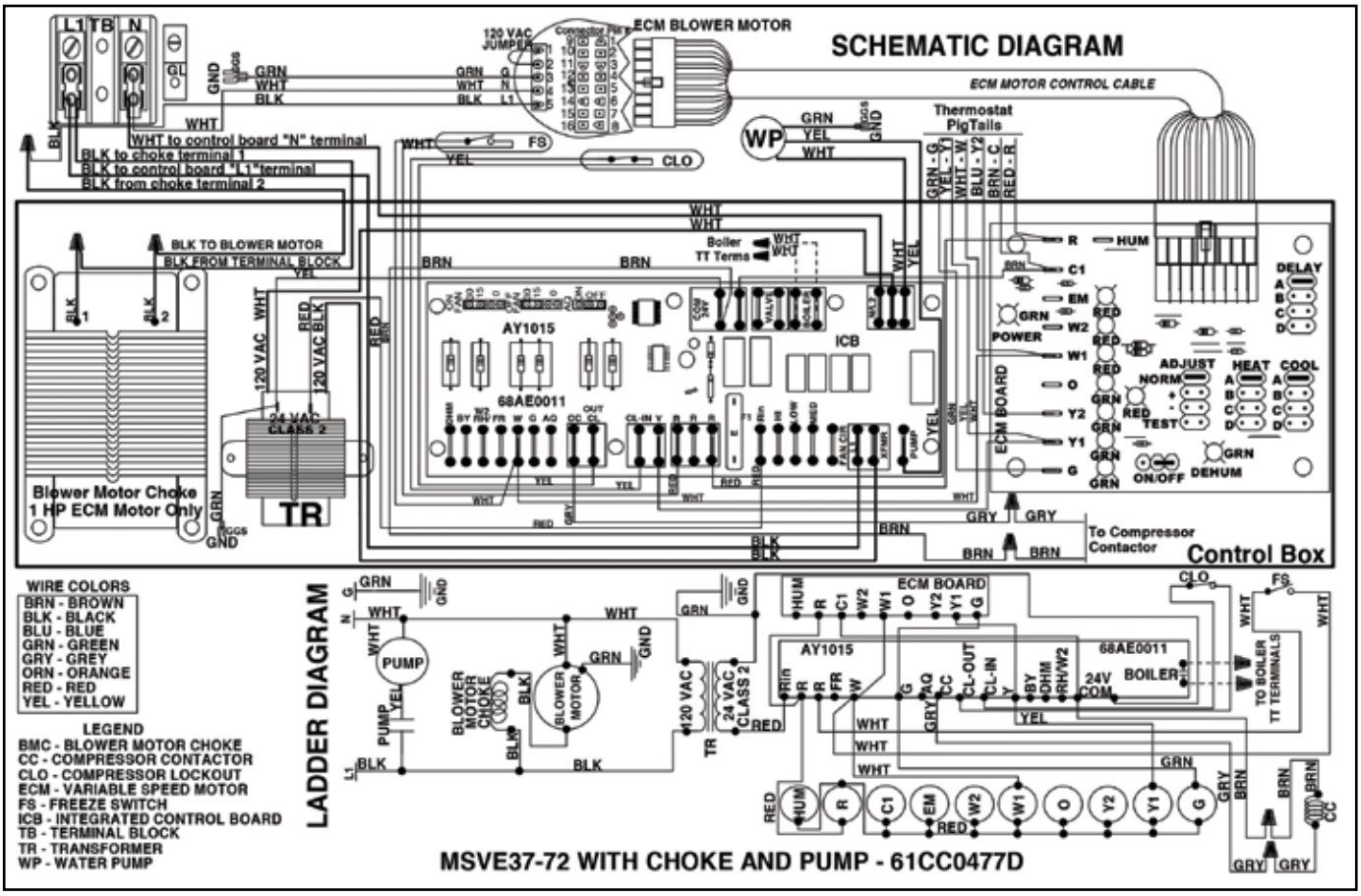

Figure 19: MSVE 37 -72 / ECM – With Choke and Pump

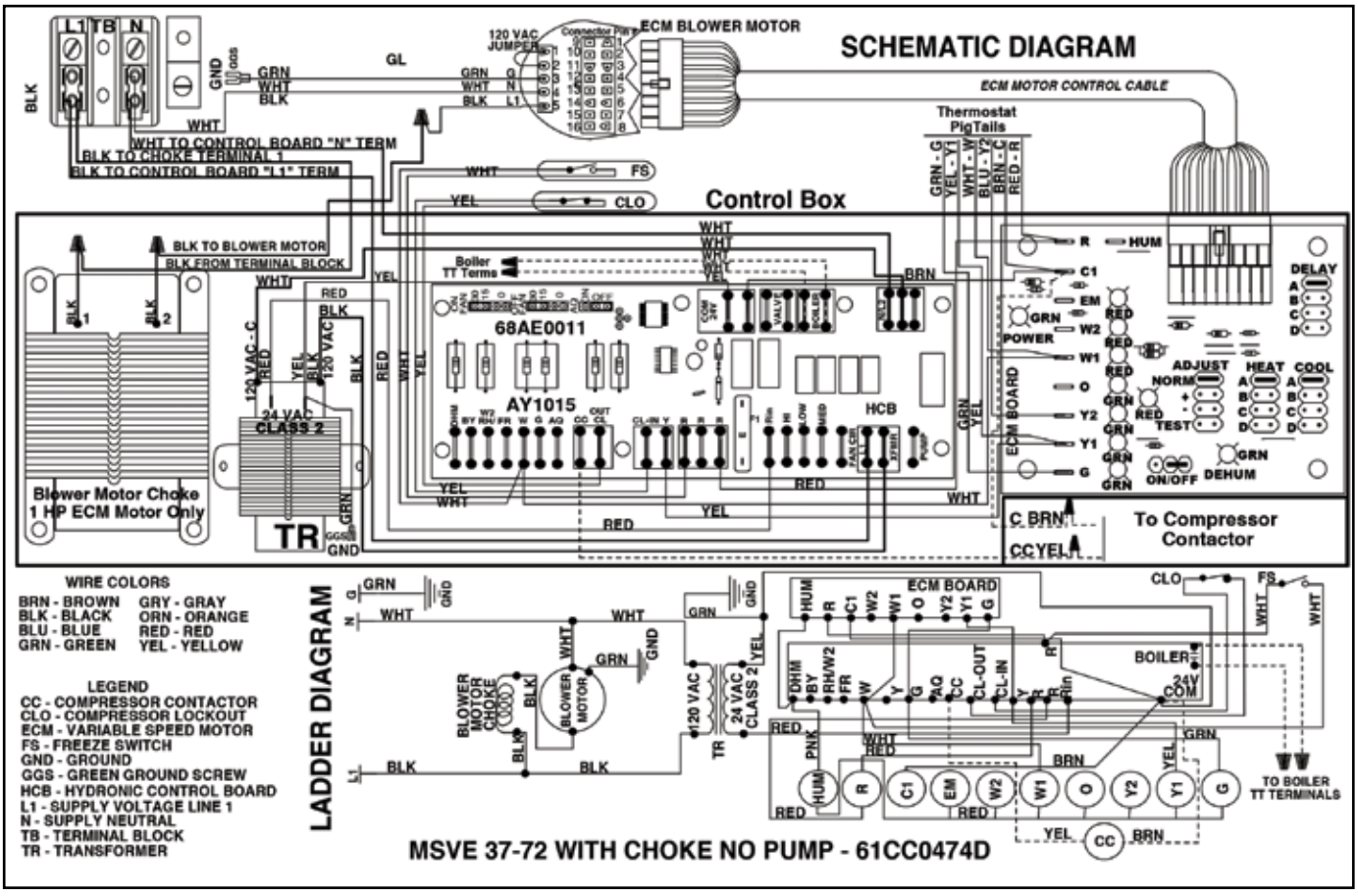

Figure 20: MSVE 37 - 72 / ECM – With Choke - No Pump

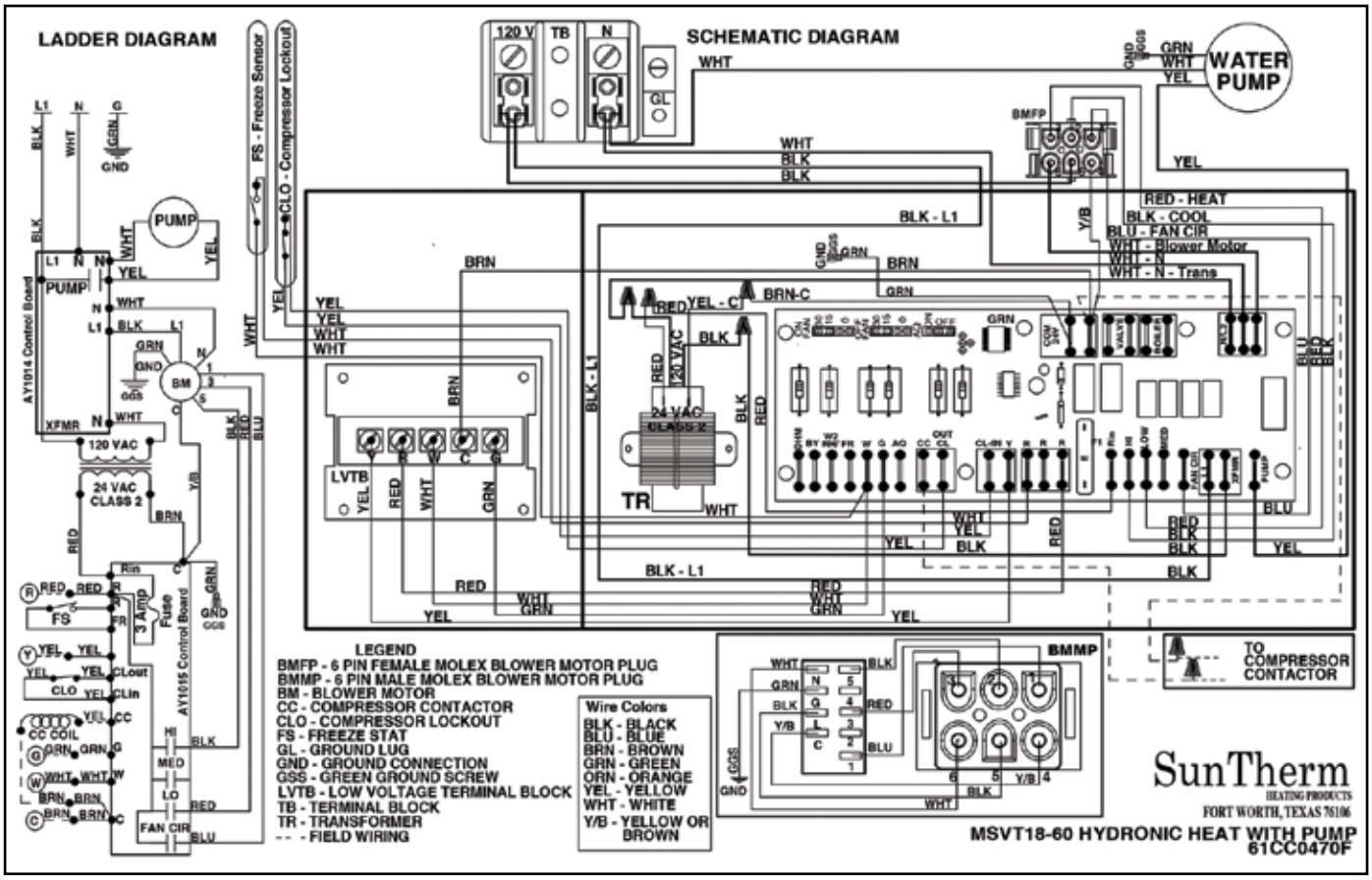

Figure 21: MSVT 18 – 36 / Constant Torque Motor – With Pump - No Choke

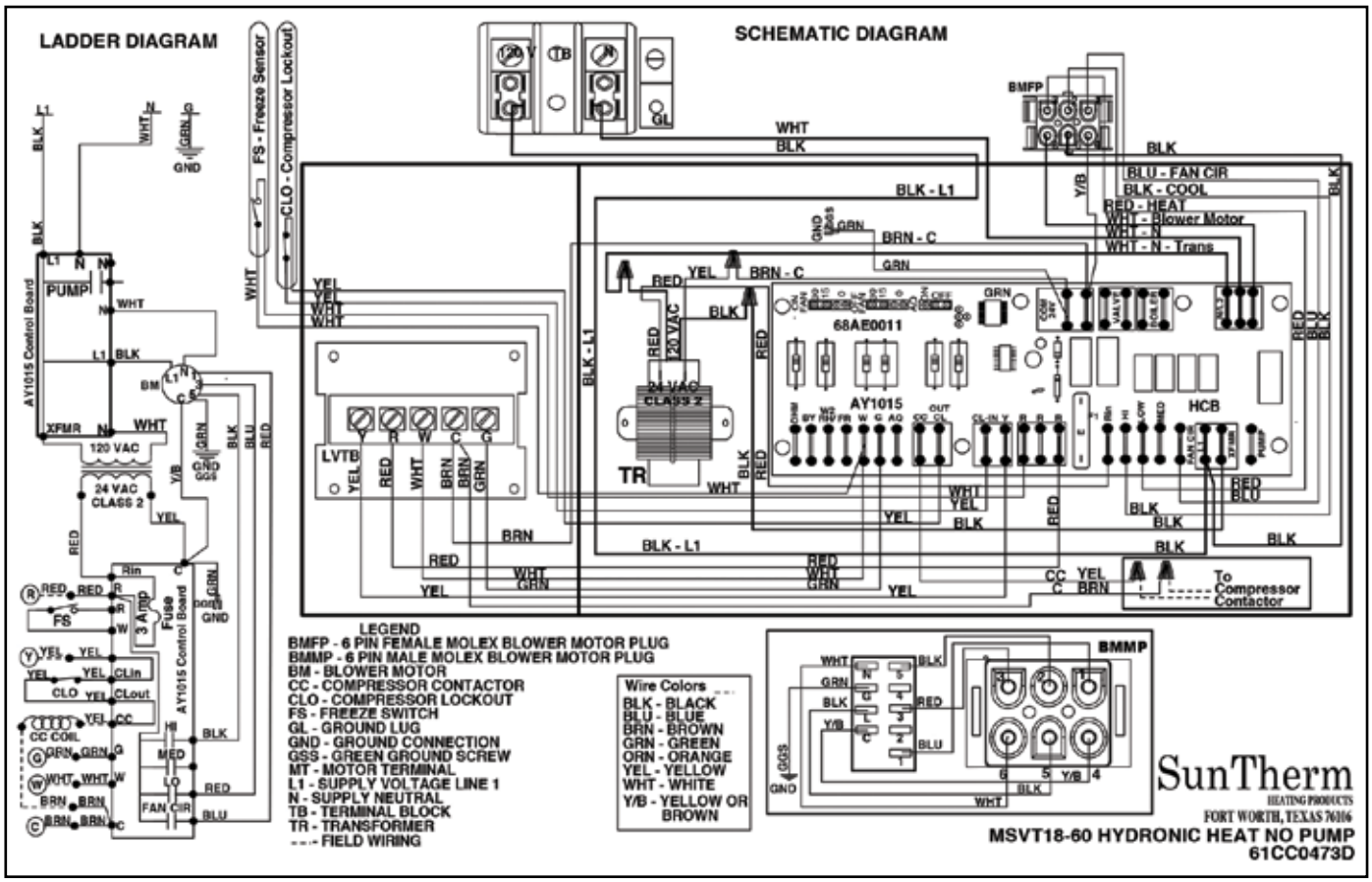

Figure 22: MSVT 18 – 36 / Constant Torque Motor – No Pump

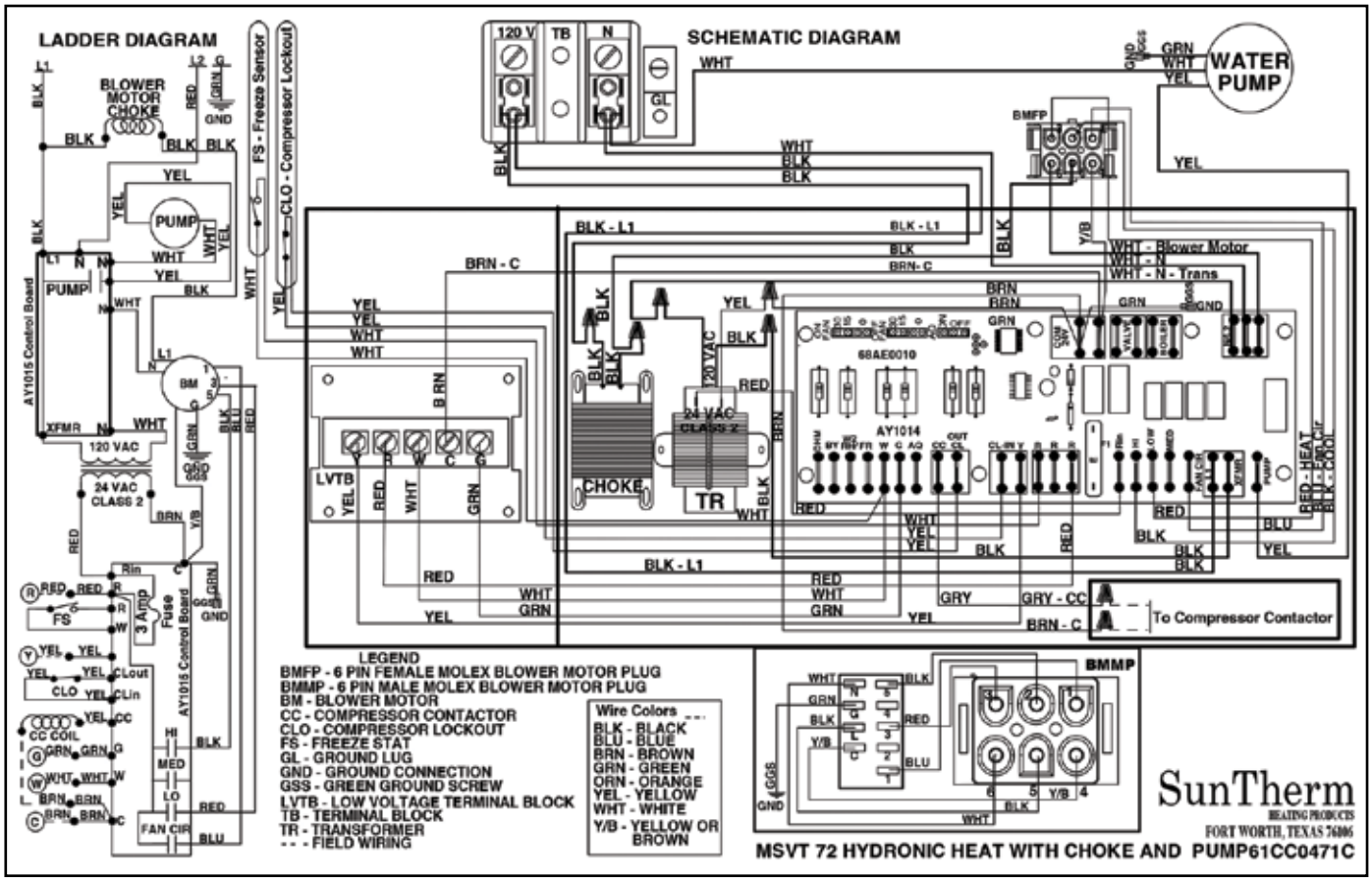

Figure 23: MSVT 37 - 60 Constant Torque Motor – With Choke and Pump

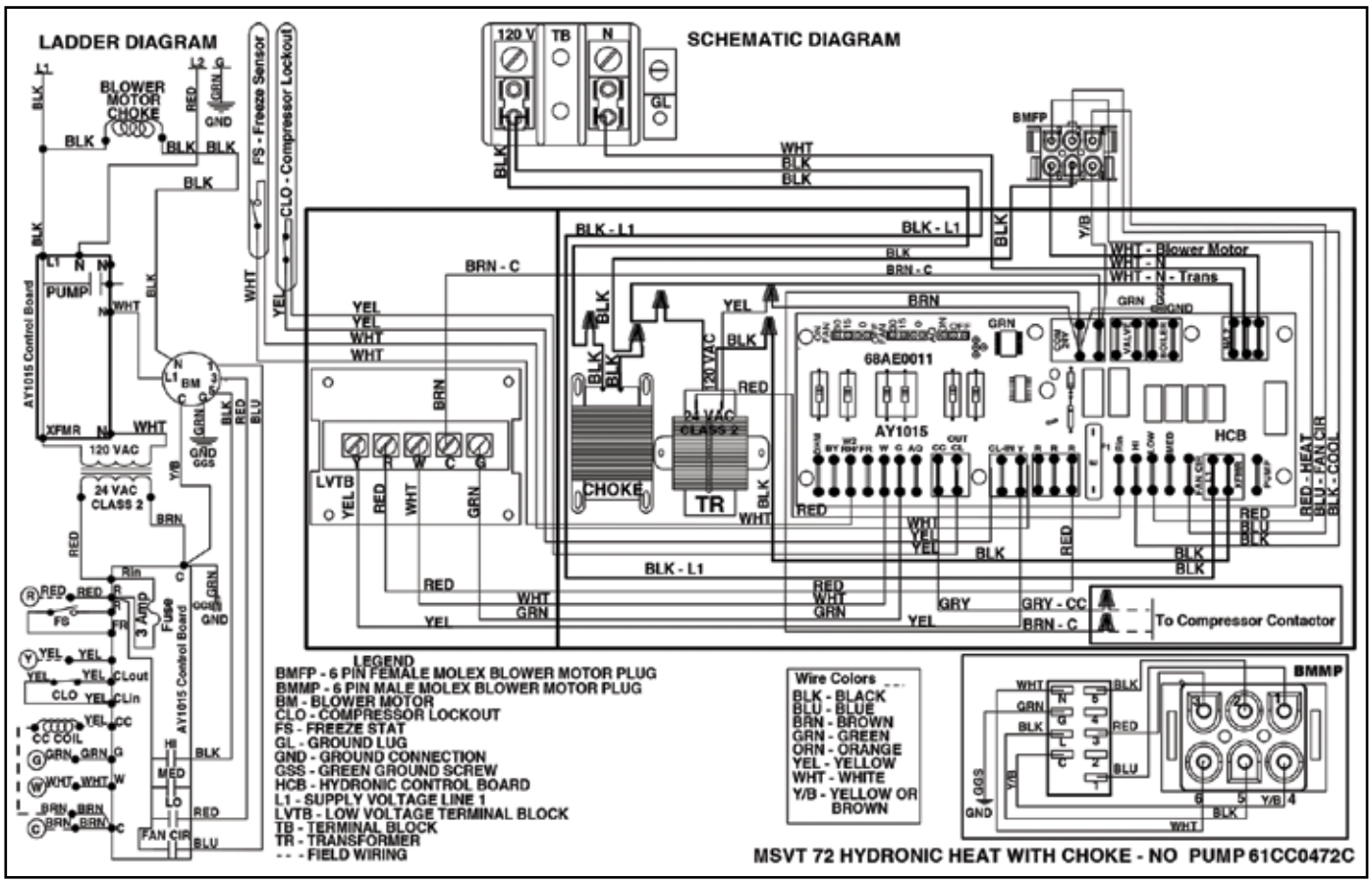

Figure 24: MSVT 37 - 60 Constant Torque Motor – With Choke - No Pump