Eubank®
An ACS Brand

Heat Pump Product Manual
Vertical Wall-Mount Heat Pumps

Installation & Operation Manual
1.5 - 4 Ton Vertical Wall-Mount Heat Pumps

MODELS:

EAA1020H • EAA1024H • EAA1030H
EAA1036H EAA1042H • EAA1048H

AHRI CERTIFIED® www.ahridirectory.org Single Package Vertical HP AHRI Standard 390

CE

ETL Listed c us Intertek

Designed, Engineered & Assembled In the USA

This manual may include information for options and features which may not be included on the unit being installed. Refer to the unit data label or Model Identification to determine which features and options this unit is equipped with.

INSTALLER:	Affix the instructions on the inside of the building adjacent to the thermostat.
END USER:	Retain this manual for future reference.

Manufactured By:

Eubank, An AirX Climate Solutions Brand

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The most current version of this manual can be found at www.EubankWallMount.com.

Eubank Wall Mount Heat Pump I&O Manual 06/2022 Rev.5

How To Use This Manual

This manual is intended to be a comprehensive guide to the installation of the Eubank® EAA family of vertical packaged heat pumps. It contains installation, troubleshooting, maintenance, warranty, and application information. The information contained in this manual is to be used by the installer as a guide only. This manual does not supersede or circumvent any applicable national or local codes. For information on the efficiency, cooling and heating performance, please refer to the Product Data Sheets. The most current version of all literature can be found on our website at www.Eubank.com.

If you are installing the heat pump unit, first read Chapter 1 and scan the entire manual before beginning the installation as described in Chapter 2. Chapter 1 contains general, descriptive information and provides an overview which can speed up the installation process and simplify troubleshooting.

If a malfunction occurs, follow this troubleshooting sequence:

1. Make sure you understand how the heat pump unit works (Chapters 1 & 3).
2. Identify and correct installation errors (Chapter 2).
3. Refer to the troubleshooting information in Chapter 4.
4. Identify defective part(s). (Chapter 5).

If you are still unable to correct the problem, contact the Factory at 1-800-841-7854 for additional assistance.

Please read the following "Important Safety Precautions" before beginning any work. Failure to follow these rules may result in death, serious bodily harm, property damage and damage to the equipment.

Important Safety Precautions

1. USE CARE when LIFTING or TRANSPORTING equipment.
2. TRANSPORT the UNIT UPRIGHT. Laying it down on its side may cause oil to leave the compressor and breakage or damage to other components.
3. TURN ELECTRICAL POWER OFF AT THE breaker or fuse box BEFORE installing or working on the equipment. LINE VOLTAGES ARE HAZARDOUS or LETHAL.
4. OBSERVE and COMPLY with ALL applicable PLUMBING, ELECTRICAL, and BUILDING CODES and ordinances.
5. SERVICE may be performed ONLY by QUALIFIED and EXPERIENCED PERSONS.
   * **Wear safety goggles when servicing the refrigeration circuit**
   * **Beware of hot surfaces on refrigerant circuit components**
   * **Beware of sharp edges on sheet metal components**
   * **Use care when recovering or adding refrigerant**
6. **Use COMMON SENSE - BE SAFETY-CONSCIOUS**

This is the safety alert symbol ⚠. When you see this symbol on the unit and in the instruction manuals be alert to the potential for personal injury. Understand the signal word DANGER, WARNING, CAUTION and IMPORTANT. These words are used to identify levels of the seriousness of the hazard.

⚠ DANGER	**Failure to comply will result in death or severe personal injury and/or property damage.**
⚠ WARNING	**Failure to comply could result in death or severe personal injury and/or property damage.**
⚠ CAUTION	**Failure to comply could result in minor personal injury and/or property damage.**
IMPORTANT	**Used to point out helpful suggestions that will result in improved installation, reliability or operation.**

SPECIFICATIONS SUBJECT TO CHANGE WITHOUT NOTICE.

⚠ WARNING

- **If the information in these instructions are not followed exactly, a fire may result causing property damage, personal injury or loss of life.**
- **Read all instructions carefully prior to beginning the installation. Do not begin installation if you do not understand any of the instructions.**
- **Improper installation, adjustment, alteration, service or maintenance can cause property damage, personal injury or loss of life.**
- **Installation and service must be performed by a qualified installer or service agency in accordance with these instructions and in compliance with all codes and requirements of authorities having jurisdiction.**

INSTALLER: Affix the instructions on the inside of the building adjacent to the thermostat.
END USER: Retain these instructions for future reference.

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Description and Specifications

1.1 General Description

Eubank® Wall Mount Heat Pumps are high efficiency, vertical wall mounted heat pumps that provide heating, cooling and ventilation for a wide range of applications. Nominal cooling capacities range from 20,000 to 48,000 BTUH.

All models have EER's of 11.00 and feature quiet operation. Resistance heating is available in all models. Please see appendix A for the installation instructions on field installing electric heaters.

Eubank heat pumps are designed for easy installation and service. All units have built-in side mounting flanges and are shipped with a bottom support bracket. The unit has been factory charged. Service ports have been provided for field service, if required. All internal wiring is complete.

Eubank EAA heat pump models are available in a wide variety of styles and configurations to meet the various ventilation and cooling requirements. For school classrooms, models are available to comply with the ASHRAE 62-1999 standard, "Ventilation for Acceptable Indoor Air Quality." Where cooling is required during cool or cold weather, e.g., telecommunication shelters, a factory-installed economizer can be used. To insure proper operation and optimum performance, all outside air ventilation packages and the economizer are non-removable, factory installed and tested. Instructions for the EAA models with the GreenWheel® ERV are included in this manual.

All Eubank heat pumps are tested and certified for efficiency and capacity in accordance with the ANSI/AHRI (Air-Conditioning, Heating and Refrigeration Institute) Standard 390-2017 (Single Package Vertical Units). All EAA models meet or exceed the efficiency requirements of ANSI/ASHRAE/IESNA 90.1.2016. All heat pump models are listed by ETL and tested to UL standard 1995, 4th Edition. Eubank heat pumps are commercial units and are not intended for use in residential applications.

1.2 Serial Number Date Code

20 = 2020	01 = January	05 = May	09 = September
21 = 2021	02 = February	06 = June	10= October
22 = 2022	03= March	07 = July	11 = November
23 = 2023	04 = April	08 = August	12 = December

1.3 Model Identification

Example	**E**	**A**	**A**	**1**	**0**	**3**	**6**	**H**	**A**	**0**	**5**	**0**	**C**	**+**	**+**	**+**	**+**	**1**	**E**	**A**	**+**	**A**	**1**	**1**	**+**	**+**	**+**	**+**	**+**	**+**
Position	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30

1	Unit Designation/Family	**E** = Eubank Wall Mount **S** = Stock Unit
2	Energy Efficiency Ratio (EER)	**A** = 11
3	Refrigerant Type	**A** = R-410a
4	Compressor Type/Quantity	**1** = Single
5 **6** **7**	Unit Capacity/Nominal Cooling (BTUH)	**020** = 20,000 **024** = 24,000 **030** = 30,000 **036** = 36,000 **042** = 42,000 **048** = 48,000
8	System Type	**H** = Heat Pump
9	Power Supply (Volts-Phase-Hz)	**A** = 208/230-1-60 **C** = 208/230-3-60 **D** = 460-3-60
10 **11** **12**	Heat Designation @ Rated Voltage	**000** = No Heat **040** = 4KW **050** = 5KW **060** = 6KW **080** = 8KW **090** = 9KW **100** = 10KW **120** = 12KW **150** = 15KW
13	Ventilation Configuration	**N** = Barometric Damper w/15% OSA **Y** = Manual Damper w/No Pressure Relief **Z** = Manual Damper w/Pressure Relief **D** = Motorized Damper w/Pressure Relief **C** = Economizer **H** = GreenWheel® **+** = None **$** = Special
14	Dehumidification	**G** = Hot Gas Reheat **R** = Electric Reheat **T** = Electric Reheat w/Humidity Control **G** = Hot Gas Reheat **+** = None **$** = Special
15	Controls	**A** = Power Fail Alarm w/Additional Lockouts **C** = 24V EMS Relay Kit **D** = 24V EMS Relay Kit w/Factory Installed T-Stat **E** = Factory Installed T-Stat **+** = None **$** = Special
16	Operating Condition	**A** = Evaporator Freeze Sensor (EFS) **C** = EFS w/Hot Gas Bypass **D** = Desert Duty **E** = Extreme Duty **F** = Desert Duty w/Hard Start **G** = Desert Duty w/EFS **H** = Desert Duty w/Hard Start & EFS **J** = Extreme Duty w/Hard Start **K** = Extreme Duty w/EFS **M** = Extreme Duty w/Hard Start & EFS **N** = Hard Start **P** = Hard Start w/Low Ambient & CCH **Q** = Hard Start w/Low Ambient & Fan Cycle Control (FCC) **R** = Crank Case Heater (CCH) **T** = Hard Start w/EFS **U** = Hard Start w/Hot Gas Bypass **V** = Hard Start w/Low Ambient & CCH & EFS **W** = Low Ambient w/CCH **X** = Hot Gas Bypass **Y** = Low Ambient w/CCH & FCC **Z** = Low Ambient w/CCH & EFS **1** = Low Ambient w/FCC **2** = Low Ambient w/FCC & EFS **3** = CCH w/Hot Gas Bypass **+** = None **$** = Special

17	Indoor Air Quality Features	**D** = Dry Bulb Sensor **E** = Dry Bulb Sensor w/Dirty Filter **G** = Dirty Filter Sensor **+** = None **$** = Special
18	Air Flow	**1** = Top Supply/Bottom Return **$** = Special
19	Compressor Location	**C** = Center - All 6 ton units and above **D** = Left Hand - All $3\frac{1}{2}$ to 5 ton units **E** = Right Hand - All $1\frac{1}{2}$ to 3 ton units
20	Filter Option	**A** = 2” Pleated (MERV 8, AC/HP-C) **C** = 2” Charcoal **D** = MERV 11 High Filtration Package **E** = MERV 13 High Filtration Package **F** = Filter Access Through Return Air Grille **W** = Aluminum Washable **+** = None **$** = Special
21	Corrosion Protection	**A** = Condenser Coil Only **C** = Evaporator Coil Only **D** = Both Coils Condenser & Evaporator **E** = All Coils Cond/Evap/Reheat **F** = Coat All **G** = Coastal Package & Evaporator Coil **K** = Coastal Package **+** = None **$** = Special
22 **23**	Engineering Revision Level	**A1**
24	Cabinet Color	**1** = Beige (Standard Eubank) **2** = Gray **3** = Carlsbad Canyon **4** = White **5** = Stainless Steel Exterior **6** = Dark Bronze **7** = .050 Aluminum Stucco **8** = Mesa Tan **9** = Pebble Gray **A** = Stainless Steel - Unit **$** = Custom Color (Powder Coat)
25	Sound Attenuation	**2** = Compressor Blanket **+** = None
26	Security Option	**A** = Lockable Access Plate/Tamper Proof **C** = Tamper Proof Screws **D** = Lockable Access Plate w/Tamper Proof **+** = None **$** = Special
27	Fastener/Drain Pan Option	**A** = Stainless Steel Fasteners **C** = Stainless Steel Drain Pan **D** = Stainless Steel Fasteners & Drain Pan **+** = None **$** = Special
28	Unused	**+** = None **$** = Special
29	Unused	**+** = None **$** = Special
30	Special Variation	**+** = None **$** = Special Configuration Not Covered by Model Nomenclature

Note: Not all options are available with all configurations. Contact your Eubank sales representative for configuration details and feature compatibility.

1.4 Air Flow, Weights and Filter Sizes.

MODEL	External Static Pressure (WET COIL)					
	0.10	0.20	0.25	0.30	0.40	0.50
EAA1020H/1024H	860	810	740	670		
EAA1030H	1100	1000	960	920	810	
EAA1036H	1310	1220	1185	1150	1060	
EAA1042H		1650	1585	1520	1450	1360
EAA1048H		1900	1830	1760	1700	1620
EAA1060H		1900	1830	1760	1700	1620
Air flow ratings of 208-230v. Units are at 230v. Air flow ratings of 480 v. units are at 460 volts. Operation of units at a different voltage from the rating point will affect air flow. **Note:** Follow local codes and standards when designing duct runs to deliver the required airflow. Minimize noise and excessive pressure drops caused by duct aspect ratio changes, bends, dampers and outlet grilles in duct runs.						

Table 1. Air Flow (Cubic Feet per Minute)

Model	Weight	Base	w/Economizer	w/3 Phase	w/Economizer & 3 Phase
EAA1020H/EAA1024H	**Pounds (Kilograms)**	337 (153)	357 (162)	356 (161)	376 (171)
EAA1030H/EAA1036H	**Pounds (Kilograms)**	397 (180)	419 (190)	416 (189)	438 (199)
EAA1042H	**Pounds (Kilograms)**	453 (205)	476 (216)	491 (223)	514 (233)

Table 2. Installed Weight (lbs (Kg)

Model	FILTER TYPE	INCHES	MILLIMETERS	PART NUMBER	FILTERS PER UNIT	MERV RATING
EAA1020H/EAA1024H	Return Air Filter	30 x 16 x 2	762 x 406 x 51	80138	1	8
EAA1030H/EAA1036H	Return Air Filter	36½ x 22 x 2	927 x 559 x 51	80162	1	8
EAA1042H	Return Air Filter	36½ x 22 x 2	927 x 559 x 51	80162	1	8

Table 3. Filter Size (inches)

1.5 General Operation

Refrigerant Cycle

Eubank heat pumps use R-410A refrigerant in a conventional vapor-compression refrigeration cycle to transfer heat. In the cooling mode, a double blower assembly blows indoor air across the evaporator (indoor coil). Liquid refrigerant passing through the evaporator is boiled into gas by heat removed from the air. The warmed refrigerant gas enters the compressor where its temperature and pressure are increased. The hot refrigerant gas condenses to liquid as heat is transferred to outdoor air blown across the condenser (outdoor coil) by the condenser fan. Liquid refrigerant is metered into the evaporator through a metering device to repeat the cycle. In the heating mode, the process is reversed.

Heating Mode

During heating mode a special reversing valve reverses the flow of refrigerant through the system exchanging the roles of the condenser and evaporator. Now the outdoor coil becomes the evaporator and the indoor coil becomes the condenser. The refrigerant then flows through the outdoor coil, picks up heat and becomes vaporized. The vapor then enters the compressor where it is compressed to a higher pressure and temperature. Next it is pumped to the indoor coil where the heat will be released into the room. The compressed refrigerant vapor will condense to its liquid state as it gives up heat. Finally, liquid flows through a metering device into the evaporator where the cycle will be repeated.

Optional electric strip heat is available for all models. Please see Appendix A for instructions on field installation of electric heat.

Ventilation Options

Standard - Ventilation Configuration N: Manual damper capable of up to 15% of rated airflow of outside air; field adjustable, no pressure relief.

Optional - Ventilation Configuration Y: Manual damper capable of 0 to 450 cfm (maximum of 40% of rated airflow) of outside air; field adjustable, no pressure relief.

Optional - Ventilation Configuration Z: Manual damper capable of 0 to 450 cfm (maximum of 40% of rated airflow) of outside air; field adjustable, includes pressure relief.

Optional - Ventilation Configuration D: Motorized, two position damper (open and closed) capable of 0 to 450 cfm (maximum of 40% of rated airflow) of outside air; includes pressure relief. A 24-volt actuated motor controls the damper from an external input such as: a time clock, CO2 sensor, energy management system or manual switch.

Optional - Ventilation Configuration C: The economizer is a regulated damper system with controls. The damper regulates the circulation of outside air into the enclosure (when the outdoor air conditions are suitable) to reduce the need for mechanical cooling, save energy, and extend compressor life.

Depending upon the options selected, the damper responds to the enthalpy of the outdoor air. On a call for cooling from a space thermostat, it operates as follows:

When the enthalpy of the outdoor air is below the set point, the outdoor air damper is proportionally open (and return air damper is proportionally closed) to maintain between 50°F and 56°F (10°C to 13°C) at the mixed/discharge air sensor. Integral pressure relief allows the indoor air to exit the shelter through the air conditioner.

When the enthalpy of the outdoor air is above the set point, the outdoor air damper closes to its minimum position. A call for cooling from the space thermostat brings on mechanical cooling.

Optional - Ventilation Configuration H: <u>GreenWheel® ERV</u>
The GreenWheel® ERV is a total energy (both sensible and latent) wheel that reduces both construction and operating cost while ventilating the classroom to ASHRAE 62-1999 requirements. The use of the GreenWheel ERV reduces the energy load of the outside air. Exhausting stale, inside air keeps indoor pollutants and harmful gases to a minimum. The GreenWheel ERV has been tested and certified according to ARI Standard 1060.

<u>How It Works</u>
During the summer, cool dry air from the classroom is exhausted through the GreenWheel® ERV to the outside. As the air passes through the rotating wheel, the desiccant becomes cooler and drier. Simultaneously, hot humid air is being pulled across the rotating wheel. The cool, dry desiccant absorbs moisture and heat from the incoming air. The cooler, drier air is mixed with the return air from the classroom and distributed throughout the room.

In the winter, warm moist air is exhausted through the GreenWheel® ERV to the outside. As the air passes through the rotating wheel, the desiccant becomes warmer and absorbs moisture. Simultaneously, cold dry air is being pulled across the rotating wheel. The cold, dry air absorbs heat and moisture from the desiccant. The warmed air is mixed with the return air from the classroom and distributed throughout the room.

Quality Components

The GreenWheel® module consists of a desiccant wheel, two blowers and the drive motor and belt. The two blowers simultaneously pull fresh air from outside and exhaust air from the classroom through the rotating wheel. Two variable speed blowers ensure that up to 450 CFM of outside air can be brought into the room and the indoor air is properly exhausted. Variable speed blowers permit that the desired quantity of outside air is delivered into the room. Optional independent exhaust air blower control allows positive pressurization of the classroom, i.e., more outside air can be introduced through the GreenWheel® ERV than is exhausted.

Hot Gas Reheat (HGR) Dehumidification Mode (Special Option "G")

When the HGR is in the dehumidification mode, the hot gas reheat (HGR) coil is energized. The cooled, dehumidified air exits the evaporator coil and is blown through the HGR coil. This coil is sized to the sensible capacity of the unit. The heat in the HGR coil is transferred to the air stream. The use of the HGR coil allows the indoor humidity of the classroom to be maintained at or below a certain set humidity set point without over cooling the classroom. These units can not add humidity to the classroom.

The operation of the HGR coil is controlled by a humidity controller. If the humidity rises above the set point on the controller and the temperature in the classroom is satisfied, both mechanical cooling and the HGR coil operate to temper the air and lower the humidity. If the temperature in the classroom rises above or falls below the set point of thermostat and the unit is operating in the dehumidification mode, the need for cooling or heating will override the call for dehumidification and the HGR coil is disengaged until the thermostat is satisfied. This assures the classroom temperature is maintained as first priority and humidity control is second.

The humidity controller or BAS control is required for proper operation of the HGR coil.

1.6 Standard Controls- PC Board

Description of Operation

The PC board controls the operation of the indoor blower, the compressor and the reversing valve while providing high pressure, loss of charge protection with an integral defrost function. Upon a call for mechanical cooling or heating, the controller will energize the compressor when a 24 VAC signal is applied to the "Y" terminal provided that all time delays and fault conditions are satisfied. It will energize the indoor blower when a 24 VAC signal is applied to the "G" terminal. The reversing valve will be energized when a 24 VAC signal is applied to the "O" terminal. Electric heat (EH) will be energized when a 24 VAC signal is applied to the "W2" terminal. The control will monitor the status of the loss of charge switch and the high pressure switch. If either of these inputs recognize a fault, the compressor will turn off and the anti-short cycle delay will be initiated. If any of these faults occur twice within a one hour period, the control will lock the compressor out until the power is reset manually. Note: 24 VAC power must be continuously applied to "R" and "C".

The board will also monitor the defrost sensor. If the defrost sensor senses a temperature of 32°F while in the heat mode, it will initiate a pin selectable 30, 60, or 90 minute delay period. (Factory set at 60 minutes). If the sensor is still calling for defrost at the end of this delay period, it will de-energize the outdoor fan and energize the reversing valve through the RV terminals. The defrost cycle will terminate on time or temperature. It will have a maximum defrost run time of 10 minutes, however, if the defrost sensor registers a temperature of 50°F or higher before the 10 minute maximum run time, the defrost cycle will terminate. The EH terminals will also be energized during a defrost cycle if the EHDD (Electric Heat During Defrost) jumper is in the "Yes" position.

The board also provides the ability to vary the speed of the indoor blower motor (electronically commutated motors excepted) and to select the number of seconds the blower will run after the compressor has turned off (Post Purge). The user can select whether the compressor and electric heat operate simultaneously (the S-Circuit) and if electric heat operates during the defrost mode (EHDD). The board can control the operation of a two position motorized damper to provide fresh air for ventilation (DRO/DRC). In conjunction with an optional temperature sensor, the board will modulate the speed of the outdoor fan motor to allow cooling during low ambient temperatures.

LED's indicate power, operating status and high pressure or loss or charge lockout.

Functions

Lockout Protection
If either of the fault conditions (LPS or HPS) occurs twice within one hour, the control board will enter into and indicate the lockout mode. In the lockout mode, the compressor is turned off. If there is a call for indoor air flow "G", the blower remains energized, the alarm output is energized and the red LED will blink to indicate which fault has occurred. When the lockout condition is cleared, the unit will reset if the thermostat is turned "Off" and back to "On" or when the power to the heat pump is reset. With the control board, the user can select either normally closed or normally open remote alarm dry contacts by moving a wire on the control board. The heat pump is factory wired to be normally open.

Delay on Break
The board has an integral three minute delay on break (anti-short cycle) timer. This timer initiates every time the compressor turns off to prevent a short cycle condition.

Loss of Charge (LPS) By-Pass Timer
The control includes a fixed, three minute Loss of Charge Switch (LPS) bypass timer. If the Loss of Charge Switch is open on initial power up or while the compressor is running, the control will ignore the fault for three minutes. If the fault still exists after three minutes, the control will de-energize the compressor, register a loss of charge fault, and initiate the three minute anti-short cycle timer.

User Selectable Settings
The control board has three potentiometers (pots) that allow the user to select settings to optimize the installation. See *Figure 1* for location of the pots.

Delay on Make
The control has a pot settable 0.03 to10 minute delay on make timer that initiates upon initial power up only. The factory set time is three minutes.

Post Purge Potentiometer
The board includes a pot settable 10-90 second post purge timer. When the signal at the "G" terminal is removed, the indoor blower will remain energized for the amount of time selected by the pot. The pot is factory set at ninety seconds.

Indoor Blower Motor Speed Control Potentiometer
The control has a speed control potentiometer for the indoor fan blower. The user can vary the speed of the fan using this potentiometer from approximately 40% to 100% of rated air flow. Caution should be used when slowing the speed of the indoor blower; sufficient air flow is critical to the proper operation of the heat pump.

The control board has four operational modes that can be defined by the installer. These modes are selected with jumpers. See *Figure 1* for location of the jumpers. To change the factory setting, **gently** pull the jumper and slide it onto the desired setting.

Damper Relay (Damper Relay Open-DRO /Damper Relay Closed-DRC)

The board has a two position, motorized fresh air damper (ventilation option “B”) from the “G” input when this option is selected. It is pin selectable using a jumper to select “Yes” to enable it. When “Yes” is selected, the control will energize the Damper Relay Open terminal when “G” is calling for the damper to open. When the “G” signal is not present, the control will energize the Damper Relay Closed terminal to close the damper. When “No” is selected, this feature is disabled. The factory setting for the damper relay option is “No”.

Defrost Mode

The board has an integral defrost cycle that will be initiated by the Defrost Sensor (DS). If the defrost sensor registers a temperature of 32°F while in the heat mode, it will initiate a pin selectable 30, 60, or 90 minute delay. The factory setting is 60 minutes. If the sensor is still calling for defrost at the end of this delay, it will de-energize the outdoor fan, energize the reversing valve through the RV terminals, and keep the compressor energized. The defrost cycle will terminate on time or temperature. It will have a maximum defrost run time of 10 minutes, however, if the defrost sensor registers a temperature of 50°F or higher before the 10 minute maximum run time, the defrost cycle will terminate. If “Yes” has been selected for Electric Heat During Defrost (EHDD) and “No” selected for the S-Circuit, the electric heat (EH) output will be energized during a defrost cycle to supply heat while the coil defrosts.

Electric Heat During Defrost (EHDD)

The board provides the option of running the electric heat (EH) during a defrost cycle. There are two options for the EHDD, “Yes” and “No”. If “Yes” is selected, the board will energize the EH terminals during a defrost cycle. If “No” is selected, the EH terminals will not be energized during a defrost cycle. The factory setting for EHDD is “No”. If the S-circuit is in the “Yes” position, the EHDD function will be disabled.

S-Circuit

The S-Circuit prevents the compressor and electric heat from operating simultaneously. The S-Circuit is pin selectable using a jumper to select “Yes” to enable this feature or “No” to disable it. When “Yes” is selected, the control will not allow the compressor to run when there is a call for electric heat at the W2 input. It will turn the compressor off until the call for W2 is satisfied. The factory setting for the S-Circuit is “No”.

Test Mode

A jumper selectable test mode can be used by technicians for trouble shooting purposes. The test mode reduces the delay on make and anti-short cycle timers to ten seconds, and the LPS bypass becomes two minutes.

Internal Head Pressure Control (Requires optional coil sensor)

The control has an internal, fixed set point head pressure control designed to maintain a constant head pressure under low ambient conditions. It will monitor a coil sensor that is inserted into the condenser fan coil and modulate the speed of the fan motor accordingly to maintain a constant coil temperature in turn stabilizing the head pressure. The fixed set point that the control will maintain is 100°F. The motor will have a minimum operating speed of 20%-30% of the full speed. It will also incorporate a fixed hard start time of one second during which the condenser fan motor will turn on full speed for one second at start up.

High Pressure Switch (HPS)

The high pressure switch is mounted on the compressor liquid line. The HPS terminals are on the high pressure switch input. This input monitors the status of the high pressure switch and determines when this fault condition is present. If the HPS is open on the initial “Y” call, the control board will not allow the compressor to operate. If the HPS opens while the compressor is running, the control board will turn the compressor off, register the first HPS fault, and initiate the 3 minute anti-short cycle timer. If two HPS faults occur within a one hour period, the control will enter a HPS lockout condition and energize the alarm contacts. The RED status LED will blink once to indicate this condition. The lockout condition will only be reset by manually cycling power to the control to prevent destructive short cycling. To reset the switch, turn primary power off, then back on or turn thermostat system switch off, then back on.

The high pressure switch opens at 650 psig and closes at 450 psig.

Loss of Charge Switch (LPS)

The loss of charge switch is mounted on the compressor’s liquid line. The LPS terminals are the loss of charge switch input. This input will be used to monitor the status of the loss of charge switch and determine when a LPS fault is recognized. There is 3 minute loss of charge switch bypass timer. If the LPS is open on the initial “Y” call or while the compressor is running, the control will ignore the status of the LPS and not recognize a fault for 3 minutes. If the LPS is still open after 3 minutes, the control will de-energize the compressor, register the first LPS fault, and initiate the 3 minute anti-short cycle timer. If two LPS faults occur within a one hour period, the control will enter a LPS lockout condition and energize the alarm contacts. The RED status LED will blink twice to indicate this condition. The lockout condition will only be reset by manually cycling power to the control. To reset the switch, turn primary power off, then back on or turn thermostat system switch off, then back on.

The loss of charge switch opens at 40 psig and closes at 60 psig.

Status LED Blink Codes

There are two LEDs on the board. The green LED is used as a power indicator. The red LED is used to indicate the two fault lockout conditions. During a HPS lockout, the red LED blinks once. During a LPS lockout, the red LED blinks twice.

Color	Type	Status	Description
Green	Power	Constant On	24 VAC power has been applied
Green	Status	Constant On	Normal Operation
Red	Status	1 Blink	High pressure switch has opened twice
Red	Status	2 Blinks	Loss of charge switch has opened twice
Red	Status	3 Blinks	Freeze Condition
Red	Status	4 Blinks	Faulty or disconnected defrost sensor

Led Color Type Status Description

Board Inputs

R and C. The R and C terminals are the input power terminals for the control. They will accept any voltage between 19-32 VAC.

Y The “Y” terminal is the compressor input from the thermostat. Given that all time delay and fault conditions are satisfied, the control will energize the compressor contactor through the “CC” terminals when there is a 24 VAC signal present at the “Y” terminal.

W2 The "W2" terminal is the electric heat input from the thermostat. When the control receives a call for "W2" from the thermostat, it will energize the EH terminal. When the S-Circuit is selected by placing the jumper in the Yes position, the control will not allow the compressor to run simultaneously with electric heat. The default setting for the S-Circuit is "No". If "Yes" is selected for the S-circuit, the EH output will not energize during defrost.

O The "O" terminal is the reversing valve input from the thermostat. When there is a 24 VAC signal present at the "O" terminal, the control will energize the reversing valve through the "RV" terminals. The control will also energize the "RV" terminals in heat mode during a defrost cycle.

G The "G" terminal is the indoor blower input from the thermostat. When there is a 24 VAC signal present at the "G" terminal, the control will energize the indoor blower. When the signal at the "G" terminal is removed, the fan will remain energized for the pot settable 10-90 second post purge period. When the damper relay option is selected by placing the jumper in the "Yes" position, the control will energize the DRO terminal with every "G" call to open the damper. When the "G" call is not present, the control will energize the DRC terminal to close the damper. The default setting for the damper relay option is "No".

HPS High Pressure switch terminals are the high pressure switch input.

LPS Loss of Charge switch terminals are the loss of charge switch input.

DS The DS terminals are the defrost sensor input.

CS The CS terminals are the coil sensor (optional) input. This input will monitor the condenser coil temperature to allow the head pressure control to modulate the speed of the fan and maintain a constant head pressure.

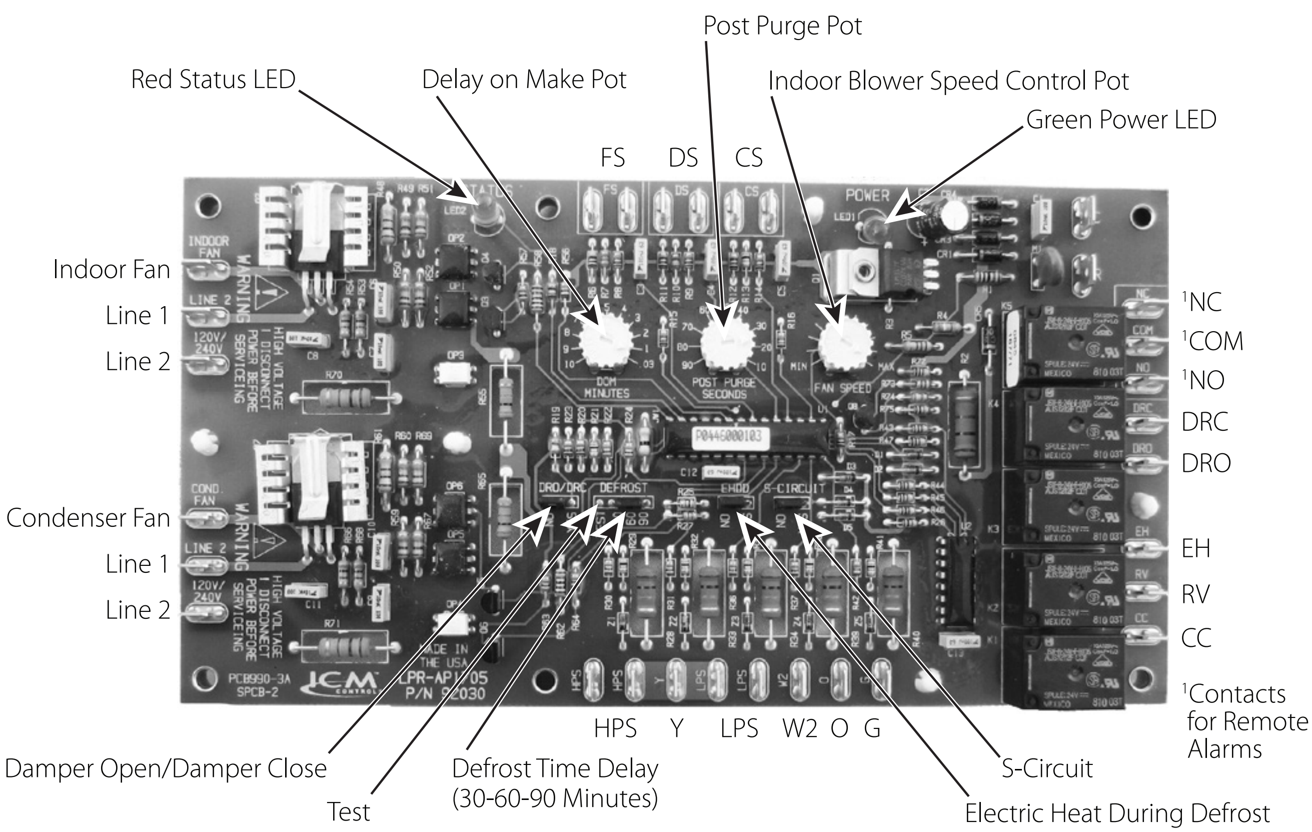


Figure 1 - PC Control Board

1.7 Options

Low Ambient Control

The low ambient control permits mechanical cooling when outdoor ambient temperatures are low. The control uses a reverse-acting high pressure switch to cycle the condenser fan motor according to liquid refrigerant pressure conditions. Switch closure and fan operation occurs when the pressure reaches 400 PSIG. The switch opens again when the refrigerant pressure falls to 245 PSIG. Therefore, the outdoor fan always starts after the compressor, **and it will cycle frequently during normal operation at low outdoor conditions.**

Hard Start Kit

Used on single phase equipment to give the compressor higher starting torque under low voltage conditions. Field installed only. (Not generally recommended for use on scroll compressor.)

Adjustable Outdoor Thermostat

Will not allow electric resistance heat to be energized unless the outdoor temperature is below the desired set point. Field or factory installed. Available on all Eubank units. P/N 93934

Single Point Feed

When multiple internal disconnects are used, single point feed permits only one field power supply to heat pump. Field installed only. Available on all Eubank H/P units.

Energy Management System (EMS)

Relay to control the heat pump. Available in 24, 120 or 240 VAC. Field or factory installed.

Electric Reheat for Dehumidification

Control provides simultaneous operation of compressor when in cooling mode and the electric elements to provide dehumidification without over cooling the room. The electric element (kW) must be properly sized for each model for proper operation. Factory installed. Available on all EAA units. Consult factory for details.

Hot Gas Reheat (HGR)

Eubank® heat pumps equipped with the Hot Gas Reheat (HGR) allow the indoor humidity of the controlled environment to be maintained at or below a certain humidity set point. These units do not have the ability to add humidity to the classroom.

Dehumidification is achieved by operating mechanical cooling in conjunction with a hot gas reheat coil. The coil is sized approximately to the sensible capacity of the total tonnage of the machine.

Speed Control for GreenWheel® ERV Exhaust Blower

For separate control of the exhaust blower. When used, the standard speed controller operates the intake blower and the optional second controller the exhaust blower. Individual blower control allows positive pressurization of the classroom. Can be factory or field installed.

1.8 Economizer Operation and Components

Damper Actuator

The damper actuator is a motor that modulates the position of the damper blade. It is controlled by the enthalpy controller and powered by the 24 VAC control transformer. It is capable of driving a full 90 degrees within 90 seconds. The assembly has a spring return to close the damper during power outage.

Controls

The economizer is controlled by an enthalpy sensor or optional dry bulb sensor.

Economizer Changeover Control

The enthalpy sensor responds to the total heat content of the outdoor air to provide changeover to outside air for free cooling. The change point is adjustable from 63°F @ 50% RH (full clockwise) to 73°F @ 50% RH (full counterclockwise). Refer to Figure 3.

Once the enthalpy sensor has selected outside air, the mixed air sensor will limit the air temperature delivered to the space by modulating the damper blade to "mix in" a quantity of inside air to provide a constant 50° to 63°F. (Adjustable minimum potentiometer is optional.)

The sensor modulates the position of the outside air damper in response to input from the enthalpy and mixed air sensors. The controller is designed to maintain the supply air temperature between 50º to 56ºF by mixing warm indoor air with cooler outdoor air.

On a call for cooling from the wall-mounted thermostat, if outdoor conditions are suitable, the sensor will open the damper and admit outside air (i.e., economizer cooling). If the outdoor ambient is too hot or humid, the sensor will place the actuator in the closed or minimum open position and activate mechanical cooling. The compressor is locked out during the economizer cooling mode.

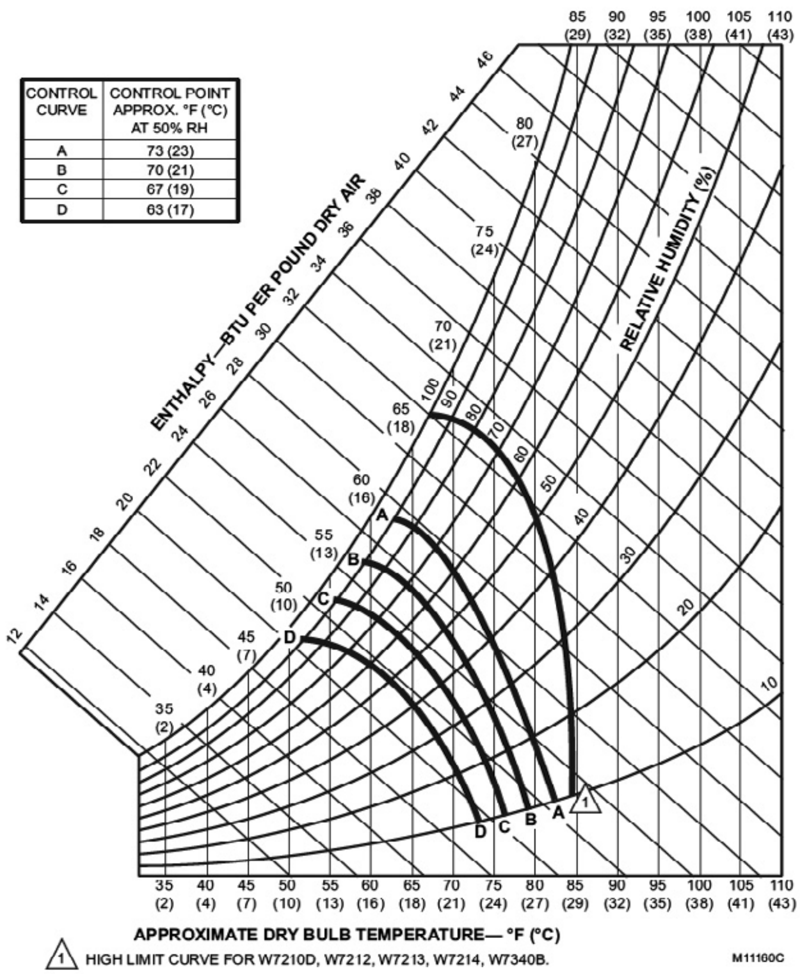


Figure 2 - Enthalpy Sensor Temperature Control Points

Mixed Air Sensor

The mixed air sensor is a thermistor mounted on a bracket adjacent to the right side of the blower assembly. The thermistor senses the air temperature entering the structure, and provides a signal to the economizer controller for modulating the position of the damper. Nominal resistance of the sensor at 77°F is 3000 ohms.

> ⚠ **WARNING**
>
> **Failure to observe and follow Warnings and Cautions and these Instructions could result in death, bodily injury or property damage. Read this manual and follow its instructions and adhere to all Cautions and Warnings in the manual and on the Eubank unit.**

2.1 Equipment Inspection

Concealed Damage

Inspect all cartons and packages upon receipt for damage in transit. Remove cartons and check for concealed damage. Important: Keep the unit upright at all times. Remove access panels and examine component parts. (Note: The bottom bracket is stored in the condenser air compartment. Remove them before replacing the side screen). Inspect refrigerant circuit for fractures or breaks. The presence of refrigerant oil usually indicates a rupture. If damage is apparent, immediately file a claim with the freight carrier.

Units that have been turned on their sides or tops may have concealed damage to compressor motor mounts, to the oil system or to other components. If the unit is not upright, immediately file a claim for concealed damages and follow these steps:

1. Set unit upright and allow to stand for 24 hours with primary power turned on.
2. Attempt to start the compressor after 24 hours.
3. If the compressor will not start, makes excessive noise, or will not operate, return the unit to the freight carrier.

General

1. Inspect unit for completeness. Check for missing parts (e.g. hardware). Refer to the installation kit information in section 2.3.
2. Remove access panels and check for loose wires. Tighten screw connections.
3. Complete and mail the warranty registration card.

2.2 Installation Requirements

You must consider all of the following when choosing the installation site:

1. **Noise.** Install the unit so that the least amount of noise will be transmitted to inhabited spaces.
2. **Condensate Drainage.** Condensate produced during operation must be discharged to a suitable drain.
3. **Defrost Drainage.** Ice build up sometime occurs during the heating cycle while in heat pump operation. The automatic reversal (defrost control) of the heat pump cycle causes the ice to melt so that the heat pump may operate efficiently. Please keep this in mind while locating unit.
4. **Placement.**
   A) Place the unit in a shaded area, if possible.
   B) Install it above ground for protection against flooding.
   C) The unit exhausts air. Be sure that the airflow is not impeded by shrubbery or other obstructions.
   D) When installing multiple units, please note the recommended clearances noted in Table 4.

5. **Airflow Requirements:**
Note the minimum CFM requirements (section 2.4). Keep duct lengths as short as possible. Do not obstruct airflow through the unit.

Applications using duct work should be designed and installed in accordance with all applicable safety codes and standards. Eubank® strongly recommends referring to the current edition of the National Fire Protection Association Standards 90A and 90B before designing and installing duct work. The duct system must be engineered to insure sufficient air flow through the unit to prevent over-heating of the heater element. This includes proper supply duct sizing, sufficient quantity of supply registers, and adequate return and filter areas. Duct work must be of correct material and must be properly insulated. Duct work must be constructed of galvanized steel with a minimum thickness of .019". Duct work must be firmly attached, secured, and sealed to prevent air leakage. See section 2.4 for additional duct work requirements.

6. **Clearances:**
When facing the unit from the outside, the minimum clearances are found below. Note the minimum clearances required for proper operation and service (Tables 4a & 4b below).

MODEL	Min. Clearance From the Front	Min. Clearance Around Sides (Single Unit)	Min. Clearance Between Sides (Two Units)	Min. Space Above Unit
1020H/1024H	42 inches	30 inches	18 inches	24 inches
1030H/1036H	42 inches	30 inches	18 inches	24 inches
1042H/1048H	42 inches	30 inches	30 inches	24 inches

Table 4 - Minimum Clearances

7. **Codes:**
Make sure your installation conforms to all applicable electrical, plumbing, building, and municipal codes. Some codes may limit installation to single story structures.

8. **Electrical Supply:**
The power supply must have the appropriate voltage, phase, and ampacity for the model selected. Voltage must be maintained above minimum specified values listed below. Refer to the unit data plate for ampacity requirements.

Electrical Rating Designations*	A	C	D
Nominal Voltage	208/230	208/230	460
Phase	1	3	3
Minimum Voltage	197	197	414
Maximum Voltage	253	253	506
* Letters refer to model number code designations. Refer to page 5.			

Table 5 - Voltage Limitations

2.3 Installation Materials

Installation Kits

Eubank EAA Heat Pumps have built-in mounting flanges that function as side brackets. All models require and are shipped with a bottom mounting bracket. On units with the "N" ventilation option, there is a fresh air hood factory installed behind the lower front panel.

Standard Kit Components

1. One 12 Ga. “L”-shaped bottom bracket

Accessories:

The package may include other factory-supplied items (optional) listed on this and the following page:

PART # DESCRIPTION

50107 Digital thermostat. 2 stage heat, 2 stage cool. 7 day programmable. Fan switch: Auto & On. Auto-change over. Status LED’s. Backlit display. Programmable fan. Non-volatile program memory. Title 24 compliant - no batteries needed.

50252 Digital thermostat. 2 stage heat, 2 stage cool. Non-programmable. Fan switch: Auto & On. Manual or auto changeover system switch: Cool-Off-Heat-Emergency Heat. Status LED’s. °F or °C. Permanent retention of settings on power loss. Field adjustable temperature calibration. Adjustable maximum setpoint for heating and minimum adjustable set points for cooling. Adjustable temperature differential. Keypad lockout.

50248 Digital, 7 day, 2 occupied & 2 unoccupied periods for each day of the week programmable thermostat. Three stage heat/Three stage cool. Manual or auto changeover. Fan: Auto & On. Ten year retention of programming settings and 48 hour clock and day settings on power loss. Adjustable max. setpoint for heating and min. adjustable setpoints for cooling. Adjustable temperature differential. Keypad lockout. Status LED. °F or °C selectable. Optional remote sensors for outdoor air, supply air and humidity. Title 24 compliant.

50254 Humidity Controller is a wall mounted remote control used when the reheat dehumidification option is chosen on the Heat Pump. The humidity controller controls the heat pump system when cooling or heating requirements are satisfied, and the need exists to dehumidify the conditioned space. When cooling or heating is required the thermostat controls the heat pump system operation.

50092 Thermostat Guard. For use with the 50107 and the 50252.

Grilles:

Description	Size	Eubank P/N
For the EAA1020H/1024H		
Double Deflection, Aluminum Supply Grille	20” x 8“ (509mm x 203mm)	80674
Aluminum Return Grille	20” x 12” (509mm x 305mm)	80677
Return Filter Grille	20” x 12” (509mm x 305mm)	80671
For the EAA1030H/1036H		
Double Deflection, Aluminum Supply Grille	28” x 8“ (711mm x 203mm)	80675
Aluminum Return Grille	28” x 14” (711mm x 356mm)	80678
Return Filter Grille*	28” x 14” (711mm x 356mm	80672
For the EAA1042H/1048H		
Double Deflection, Aluminum Supply Grille	30” x 10“ (762mm x 254mm)	80676
Aluminum Return Grille	30” x 16” (762mm x 406mm)	80679
Return Filter Grille	30” x 16” (762mm x 406mm)	80673
Note: Return filter grilles should be used when the 2” (51mm) filter in the EAA unit is not accessible from the exterior of the building. Filter used in the return filter grille is a 1” (25mm) thick filter. The return filter grille is not recommended for use with the EAA II heat pumps with economizers.		

Additional Items Needed:

Additional hardware and miscellaneous supplies (not furnished by Eubank®) are needed for installation. For example, the list below contains approximate quantities of items typically needed for mounting a unit on a wood frame wall structure with standard full length mounting bracket or flanges. Concrete or fiberglass structures have different requirements.

(10) **3/8" mounting bolts** or lag screws for side brackets and anchors, if required for side brackets.
(20) **3/8" washers**
(10) **3/8" hex nuts**
(6) **3/8" x 2-1/2" lag screws** for bottom bracket

- **Silicone Sealer** to seal around cracks and openings
- **7-conductor low voltage multi-colored wire cable** (i.e. thermostat wire)
- **Appropriate electrical supplies** such as **conduit, electrical boxes, fittings, wire connectors,** etc.
- **High voltage wire**, sized to handle the MCA (minimum circuit ampacity) listed on the data plate.
- **Over-Current Protection Device** sized in accordance with the MFS (maximum fuse size) listed on the unit data plate.

Duct materials usually are also needed in addition to the mounting hardware. To save time, design the duct work before mounting the unit.

2.4 Porting and Duct Work

⚠ WARNING

FIRE HAZARD

Improper adjustment, alteration, service, maintenance or installation could cause serious injury, death and/or property damage.

Installation or repairs made by unqualified persons could result in hazards to you and others. Installation MUST conform with local codes or, in the absence of local codes, with codes of all governmental authorities have jurisdiction.

The information contained in this manual is intended for use by a qualified service agency that is experienced in such work, is familiar with all precautions and safety procedures required in such work, and is equipped with the proper tools and test instruments.

General Information

Note: The following instructions are for general guidance only. Due to the wide variety of installation possibilities, specific instructions will not be given. When in doubt, follow standard and accepted installation practices, or contact Eubank® for additional assistance.

Wall Openings

Measure the dimensions of the supply and return openings on the heat pump unit.

⚠ WARNING

Cut the supply opening in the exterior wall for the supply and return. **IMPORTANT: All units must have one inch clearance on all four sides of the supply outlet duct flange on the unit. The one inch clearance must extend on all sides of the supply duct for the first three feet from the unit.** The duct must be constructed of galvanized steel with a minimum thickness of .019".

Minimum Airflow Requirements

⚠ WARNING

The duct system must be engineered to assure sufficient air flow through the Heat Pump, even under adverse conditions such as dirty filters, etc. Proper engineering will insure longevity and maximum performance from the Heat Pump unit.

Ducting

Extensions should be cut flush with the inside wall for applications without duct work.

Applications using duct work should be designed and installed in accordance with all applicable safety codes and standards. Eubank® strongly recommends referring to the current edition of the National Fire Protection Association Standards 90A and 90B before designing and installing duct work. The duct system must be engineered to insure sufficient air flow through the unit to prevent over-heating of the heater element. This includes proper supply duct sizing, sufficient quantity of supply registers, adequate return and filter area. Ductwork must be of correct material and must be properly insulated. Ductwork must be constructed of galvanized steel with a minimum thickness of .019". Ductwork must be firmly attached, secured and sealed to prevent air leakage. Do not use duct liner on inside of supply duct within four feet of the unit.

Galvanized metal duct extensions should be used to simplify connections to duct work and grilles. Use fabric boots to prevent the transmission of vibration through the duct system. The fabric must be U.L. rated (UL-181) to a minimum of 197°F.

2.5 Fresh Air Hood

The fresh air hood is located on the inside, behind the slots on the bottom front panel. To access the hood, remove the screws that hold the front panel. The air flow can be adjusted from no (0%) fresh air to approximately 15% of rated air flow of fresh air, in 5% increments. The hood is shipped from the factory in the closed position (no fresh air). To provide fresh air, remove the two screws on either side of the hood and reposition as desired.

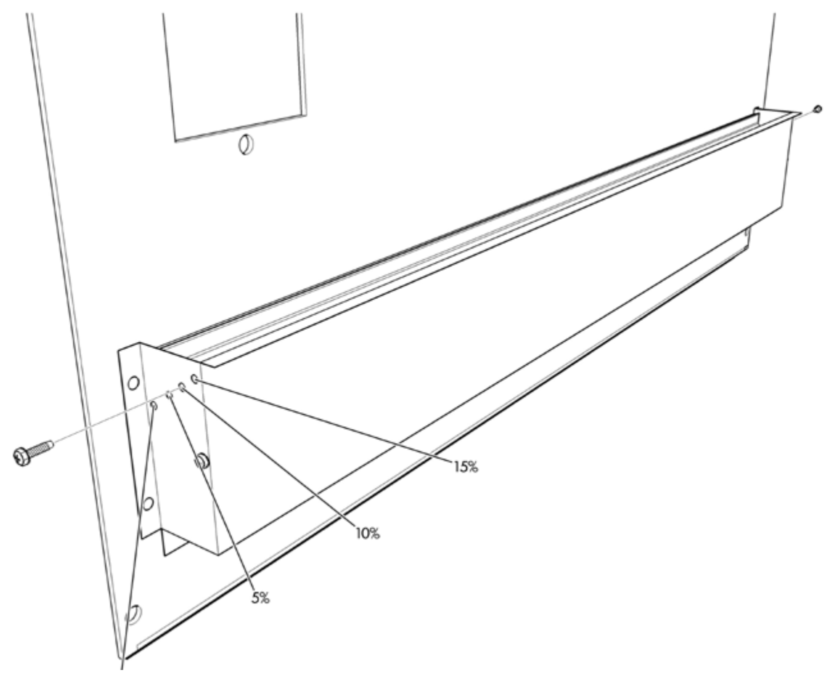


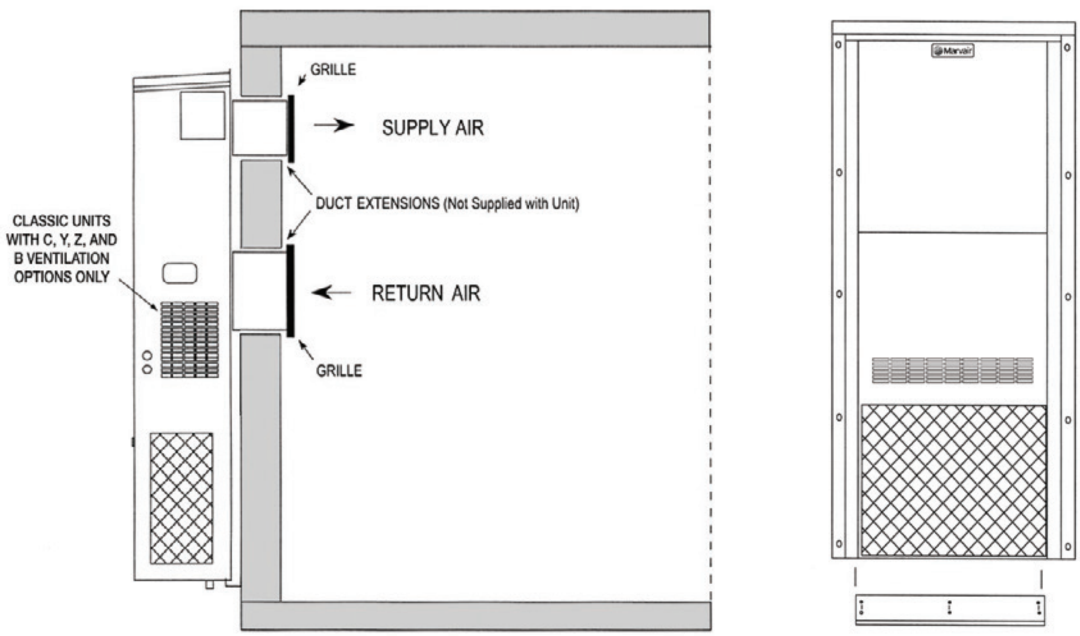
Figure 3 - Fresh Air Hood Damper Adjustment

2.6 Bottom Bracket Installation

1. Remove and discard the 4 x 4 shipping boards attached to the base of the unit.

2. All heat pump models have built-in mounting flanges. See Figure 6.
3. Refer to Figure 6. Attach the bottom support bracket to the wall using appropriate 3/8" diameter hardware.

   For example, on wooden structures, use 3/8 x 2-1/2 inch all-thread lag screws. The screws must penetrate the center of the wall stud. Drill a pilot hole in the stud to prevent it from splitting.



For units with electric heat, a 1” clearance around the duct extensions is required. The duct extensions must be made of galvanized steel with a minimum thickness of .019” as per the NFPA standards 90A & 90B.

Figure 4 - Heat Pump Wall Mounting Detail

2.7 Mounting the Unit

1. For wiring into the back of unit, locate the lower of the two knock-outs on the wall side of the Heat Pump. Drill a one inch hole in the building wall to match this opening. Allow sufficient clearance to run 3/4" conduit through the hole and to the unit.
2. Apply a bead of silicone sealer on the wall side of the mounting brackets on the Heat Pump. Circle the mounting holes with the silicone bead.
3. **Using an appropriate and safe lifting device**, set the Heat Pump on the bottom support bracket mounted on the wall. You must stabilize the unit on the bracket with the lifting device or by some other means - the bracket alone is not sufficient.
4. Make sure that the duct flanges are properly aligned with the wall opening. Adjust as necessary.
5. Note the holes in each side bracket. Using the holes for guides, drill holes through the wall with a 3/8 inch drill bit. Insert the 3/8" bolts or lag screws through the brackets. Tighten the bolts to secure the unit.
6. Apply a bead of silicone where the top flange and side brackets contact to the structure wall.
7. Fasten the top flange to the wall using #10 x 1/2 inch sheet metal screws.
8. On the inside of the structure, wall sleeves must be installed in the supply and return air openings. The sleeves should be trimmed to fit flush with the inside wall. For units with electric heat, a one inch clearance is required around the duct extensions. The duct extensions must be constructed of galvanized steel with a minimum thickness of .019” as per the NFPA standards 90A & 90B.

9. Check the fit of each sleeve to its mating flange for possible air leaks. Apply silicone sealer to close any gaps. Install the air return and supply grilles.
10. To minimize sound transmission, a latex based, insulating foam seal may be applied between the duct extensions and the frame for the wall openings. NOTE: DO NOT USE THE FOAM ON ANY UNITS WITH ELECTRIC RESISTANT HEATERS.

2.8 Electrical Connections

⚠ WARNING - ELECTRICAL SHOCK HAZARD
Failure to follow safety warnings exactly could result in serious injury, death, and/or property damage. **Turn off electrical power at fuse box or service panel BEFORE making any electrical connections and ensure a proper ground connection is made before connecting line voltage.**

All electrical work must meet the requirements of local codes and ordinances. Work should be done only by qualified persons.

⚠ CAUTION
This Eubank Heat Pump may incorporate an internal crankcase heater for compressor protection. **The crankcase heater must be energized for at least 24 hours prior to starting the compressor.**

<u>High Voltage Wiring</u>

The power supply should have the proper voltage, phase, and ampacity for the selected model.

1. Refer to the electrical data on the data sticker on the unit for field wiring requirements of the unit. Size the incoming power supply lines and the fuse(s) or HACR breaker(s) according to requirements described in the National Electric Code. Run the power conductors through the knockouts on the side or back of the unit. Use appropriate conduit and strain reliefs.

⚠ CAUTION
Note: Power supply service must be within allowable range (+10% - 5%) of rated voltage stamped on the unit rating plate. To operate nominal 230/208V unit at 208V, change the transformer line tap from 240V to 208V following the instruction on wiring label in unit.

2. Connect the wires to the input side of the internal breaker (L1 & L2 for single-phase units; L1, L2, & L3 for three phase models).

⚠ CAUTION
CAUTION! This system contains components that require phasing for correct rotation. Failure to observe rotation and correct on start-up will cause damage not covered by the Eubank® Warranty.

3. Scroll compressors, like several other types of compressors, will only compress in one rotational direction. The direction of rotation is not an issue with single-phase compressors since they will

always start and run in the proper direction. However, three phase compressors will rotate in either direction depending upon phasing of power. Since there is a 50-50 chance of connecting power in such a way as to cause rotation in the reverse direction, it is imperative to confirm that the compressor is rotating in the proper direction at the initial field start-up of the system. Verification of proper rotation is made by observing that the suction pressure drops and the discharge pressure rises when the compressor is energized. An alternate method of verification for self contained system with small critical refrigerant charges, where the installation of gauges may be objectionable, can be made by monitoring the temperature of the refrigerant lines at the compressor. The temperature should rise on the discharge line while the suction line temperature decreases. Reverse rotation also results in a substantially reduced current draw when compared to tabulated values.

There is no negative impact on durability caused by operating three phase compressors in the reversed direction for a short duration of time, usually defined as less than one hour. However, after several minutes of operation the compressor's internal protector will trip. The compressor will then cycle on the protector until the phasing is corrected. Reverse operation for longer than one hour may have a negative impact on the bearings.

To change the rotation, turn off power to the unit and reverse L1 & L2 at the disconnect.

4. Install the ground wire on the ground lug.
5. Units designed to operate on 460v. have a step down transformer for 230v. motors.

Low Voltage Wiring

1. Pull the low voltage wiring from the Heat Pump to the thermostat / sub-base assembly. Use 18 gauge, with at least 7-conductors, Class 2 thermostat wire.
2. Mount the sub-base on a level plane. Connect the thermostat wire to the unit terminal board and the thermostat as shown in Figure 7.
3. If applicable, attach the thermostat assembly to the sub-base. Check the stage two heat anticipator setting. For units with electric heat and thermostats with an adjustable heat anticipator, energize the electric heat and measure the current on the lead attached to the W2 terminal. Adjust/set the heat anticipator per the instructions provided with the thermostat.

Terminals 8 & 10 on the Eubank with economizer can be connected to a normally closed smoke alarm or fire stat to cause equipment shutdown when the circuit is opened. (Remove factory jumper).

⚠ CAUTION
The internal transformer is not designed to power other external devices.

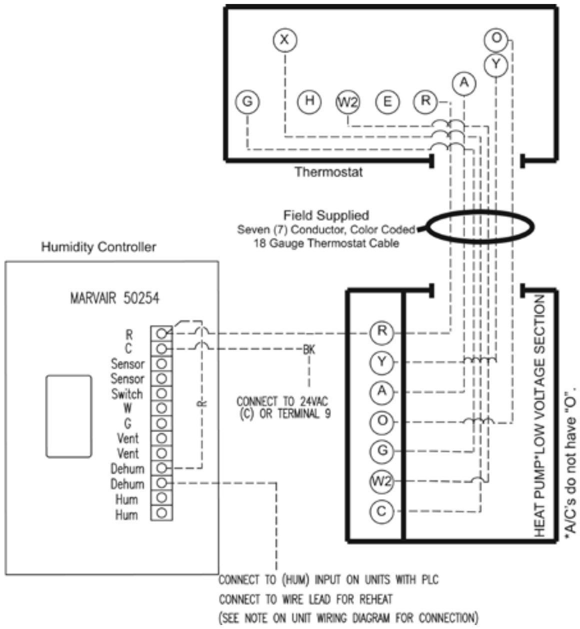
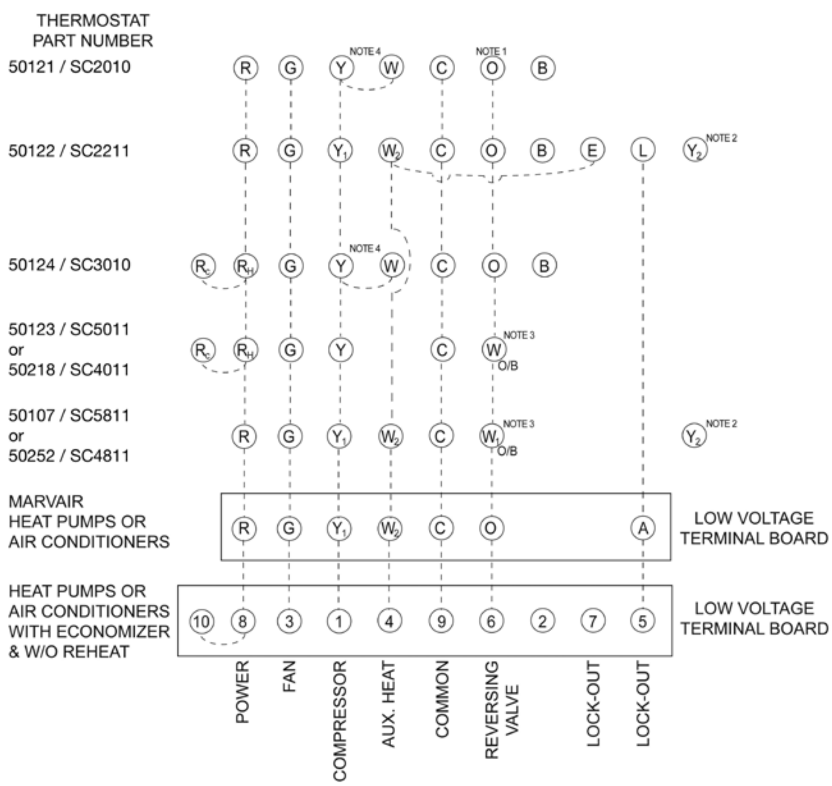


Figure 5a - Humidity Control Wiring Detail - Heat Pumps



NOTES:
1. Reversing valve on heat pumps only.
2. For units with 2-stage compressors, connect lead from the compressor monitor and diagnostic module, e.g., Copeland's Comfort Alert, to Y_2
3. For air conditioners with strip heat, connect W/O/B to terminal W or 4.
4. Jumper for heat pump only, omit with air conditioners.

A. Terminals 5 & 7 are normally open dry contacts and close to indicate lockout.
B. Terminals 6 & 7 are normally closed dry contacts and open to indicate lockout.
C. If the thermostat has RC & RH terminals, install a jumper wire between RC & RH.
D. IMPORTANT. The instructions are generic wiring instructions and may not be applicable for air conditioners with various options. Always refer to the wiring diagram in the air conditioner for the proper method to wire your unit.

Figure 5b - Thermostat Connection Diagram

Important: If your heat pump unit has a crankcase heater be sure that the crankcase heater has been energized for at least 24 hours prior to start-up of the unit. Double check all electrical connections before applying power. Various thermostats can be used to control the heat pump. The thermostat may have a fan switch with an Automatic and On positions, a system switch with Heat, Cool, and Off positions, and an emergency heat position with lights. The spec sheets have detailed description of the various Eubank® thermostats. Since other thermostats or remote control systems may be used, the following procedures should be viewed as guidelines for standard thermostats with system and fan switches.

3.1 Check-out of Cooling Cycle

Procedure:

1. Set the fan switch to "Auto" and the system switch to "Off".
2. Move the cooling set point temperature on the wall thermostat to a point higher than the room temperature. Move the heating set point temperature to a temperature that is lower than the room temperature.
3. Set the thermostats system switch to "Cool" or "Auto" position. Nothing should operate at this time.
4. Set the time delay in the control box to three minutes. Note that time delay is an option on some Eubank units and may not be on your heat pump.
5. Remove the cover plate from the thermostat. Slowly lower the thermostat cooling set point temperature. Once the indoor fan turns on, allow approximately three minutes for the compressor and outdoor fan to start.

For units equipped with the low ambient control, note that the outdoor fan may not come on immediately, because it is cycled by refrigerant pressures. Some units have a time delay module which prevents the compressor from restarting immediately after interruption of power. See section 1.5 for details on the operation of the low ambient control and the time delay.

If the unit fails to operate, refer to the troubleshooting information in Chapter 4.

Heat Pump unit with Economizer

1. Set the fan switch to "Auto" and the system switch to "Off".
2. Set the cooling set point temperature on the wall thermostat to a point higher than the room temperature. Set the heating set point temperature to a temperature that is lower than room temperature.
3. Set the thermostat system switch in the "Auto" or "Cool" position. Nothing should operate at this time.
4. Set the time delay in the **Heat Pump with Economizer** control box to 3 minutes. Check the enthalpy changeover setting of the H205A or dry bulb sensor, and reset it if needed. See section 1.7.
5. Slowly lower the thermostat’s cooling set point temperature. The indoor fan should operate.

Once the indoor fan comes on, allow approximately three minutes for the compressor to start. Note that the outdoor fan may not come on immediately because it is cycled by refrigerant pressures

Note: To check the system operation under different ambient conditions, the air temperature and enthalpy sensors must be "tricked". When outdoor ambient conditions are higher than the control setting, a component aerosol cooler may be sprayed directly into the enthalpy sensor to simulate low enthalpy conditions, causing the economizer damper to open.

Alternately, when outdoor conditions are lower than the set point, a source of heat such as a hair dryer can be directed on the air temperature sensor to simulate warmer conditions, which will bring on mechanical cooling and start the compressor.

If the unit fails to operate, refer to the troubleshooting information in Chapter 4.

3.2 Check-Out of Heating Cycle

Procedure:

1. Place the thermostat system switch to "Auto" or "Heat" and the fan to "Auto".
2. Raise the heating set point temperature to a setting which is higher than the room temperature. The fan and compressor should cycle on after time delay (standard on Eubank heat pumps with an economizer and optional on all other Eubank units) has cycled.
3. Move the system switch to the "Off" position. All functions should stop.

The Blower Timed Delay Relay (BTR) keeps the blower running for 90 seconds after the unit shuts off.

Note: The damper blade should remain closed during the heating cycle (unless the minimum position potentiometer has been set for constant ventilation).

3.3 Discharge Air Temperature Adjustment of Modulating

Hot Gas Reheat (HGR) Valve

Units with Hot Gas Reheat may use a valve, a PC board and temperature sensor to maintain a constant discharge temperature during reheat operation. The discharge air temperature can be adjusted by the use of a potentiometer located on the PC board. The board is located in the control box of the unit. A Digital VOM is required to adjust the potentiometer.

⚠ WARNING - ELECTRICAL SHOCK HAZARD
The setting of the discharge air temperature requires that power be applied to the unit and the unit operating. Use extreme caution when working in the control box.

1. Make sure the two sensor wires are connected to the TEMP SENSOR terminals on the board. See Figure 8.

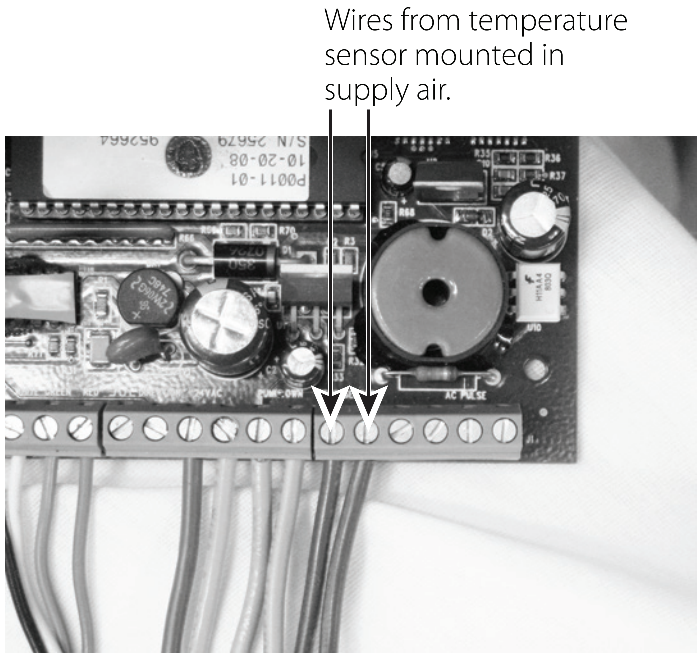


Figure 6 - Temperature Sensor Wires

2. Turn the unit on and the Hot Gas Reheat is operating.
3. Set the digital VOM for DC milliamp voltage. The milliamp voltage shown on the meter's display corresponds to the desired air temperature (ºF). Insert the probes of the meter into the negative (black) and positive (red) set point test terminals on the board. Carefully, and in small increments, turn the blue knob on the potentiometer until the volt meter displays the desired milliamp voltage (temperature). Eubank recommends 70ºF and no lower than 68ºF and no higher than 78ºF. Allow the refrigerant system to stabilize for at least five minutes and adjust the temperature as desired.

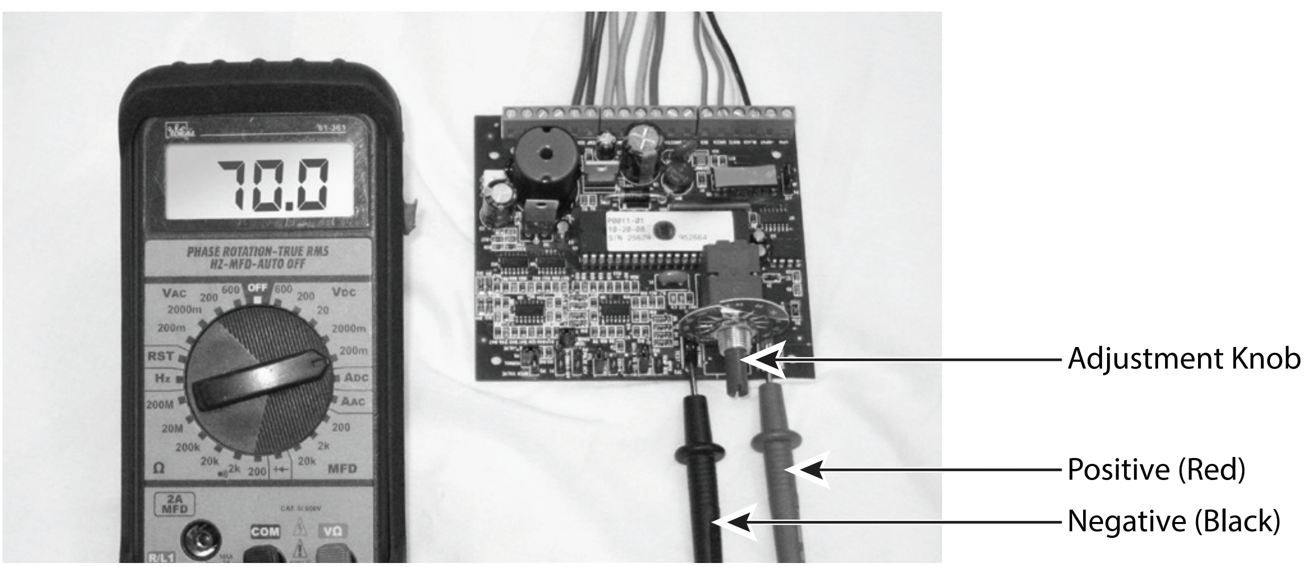


Figure 7 - Desired Temperature Set Point

3.4 Ventilation System Set-Up:

Manual Fresh Air System (Configuration N). This is the standard ventilation system in Eubank heat pumps. Fresh air ventilation by means of a damper can provide up to 15% of rated air flow of outside air. The damper has four positions corresponding to 0, 5, 10 and 15% of rated air flow of outside air.

The damper only opens when the indoor fan is operating. Position the screw on the side of the damper hood for the desired air flow.

Manual Damper - 0 to 450 cfm of Outside Air, No Pressure Relief (Configuration Y).
The amount of fresh air is determined by the position of the collar on the rod (*Figure 3*). To determine the desired quantity of fresh air:

a. With the indoor blower on, measure the quantity of supply air being discharged into the room with a balometer.

b. Now measure the quantity of the return air from the room. Subtract the return air from the supply air. The difference is the amount of fresh air.

c. Loosen the set screw that holds the collar onto the rod connected to the damper. Move the collar and tighten the set screw.

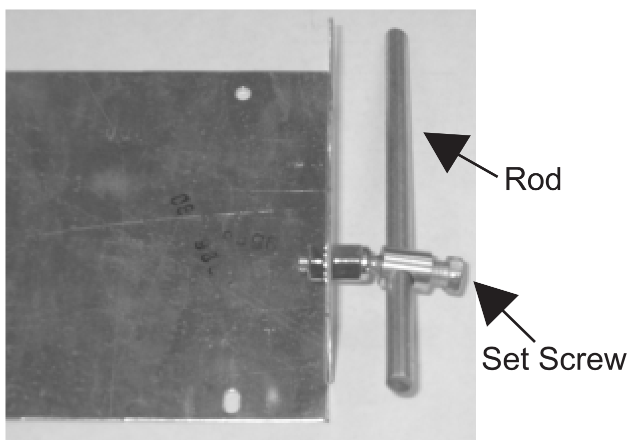


Figure 8 - Damper Adjustment

d. Repeat steps a, b and c until the desired amount of fresh air is being introduced into the room.

Important Note: Since Configuration Y does not have internal pressure relief, the fresh air must have a passage to the outside. If a passage is not available, the desired quantity of fresh air cannot be introduced into the room.

Motorized Damper - 0 to 450 cfm of Outside Air and Pressure Relief (Configuration B) and the Manual Damper with Pressure Relief (Configuration Z). The settings of the damper require a balometer and a thermometer for measuring internal and external temperatures.

a. Measure the total supply air with a balometer. If the supply air is controlled by a manual fan speed controller, make certain that the air flow is in accordance with Table 1, Air Flow (CFM) at Various Static Pressures. This CFM is referred to as "C" in the illustration and equation below.

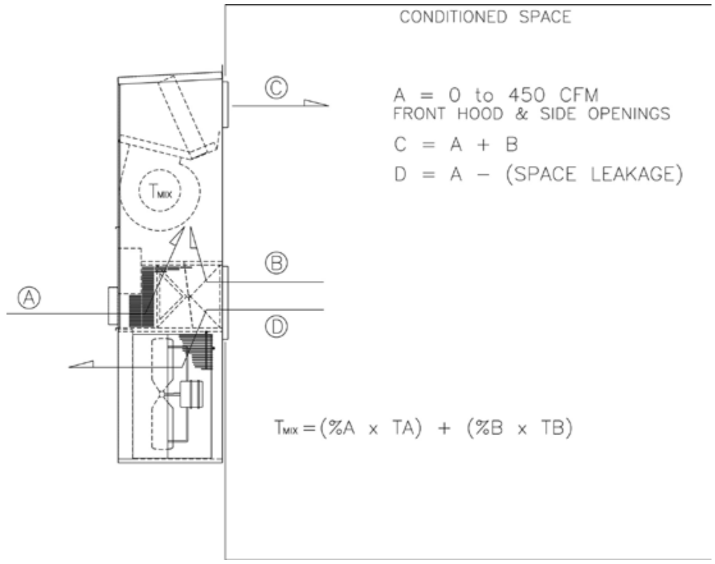


Figure 9 - Damper Air Path

b. "A" is the quantity of outside air expressed as a percentage of "C". For example, if the supply air is 1,220 CFM and 300 CFM of outside air is required, "A" is 25% (300 CFM/1,220 CFM).

   Measure the temperature of the outside air.

   Multiply the temperature by "A".

c. "B" is the quantity of return air expressed as a percentage of "C". "A" and "B" must equal 100%.

   Measure the temperature of the indoor return air.

   Multiply the temperature of the indoor air by "B".

d. Calculate what the Tmix should be with the desired quantity of outside air.

   Measure the actual temperature of Tmix at the inlet to the supply air blower or at the inlet of the supply air blower.

   Adjust the damper blade until the measured value of the Tmix equals the calculated or desired value of Tmix.

The motorized damper, Configuration B, can be controlled by an optional relay that allows additional external control with a choice of 24, 120 or 240V coils to regulate fresh air ventilation in response to a control located remote from the Eubank heat pump.

GreenWheel® ERV (Configuration H). Setting the correct air flow for the GreenWheel ERV requires a balometer and a screwdriver.

a. Using best industry standards and practices, measure the fresh air that is being brought into the classroom. For units with one speed controller (std.), adjust the speed of the intake and exhaust blowers by inserting a slotted screw driver into the opening on the controller. The speed controller is located on the lower right side of the GreenWheel ERV assembly. Access to the speed controller is through the return air grille. Measure the intake air again and adjust the speed of the blowers. Repeat as necessary to meet the fresh air requirements.

b. For units with the optional variable fan speed controller for the GreenWheel® ERV exhaust blower, first measure the air being introduced into the classroom using best industry standards and practices. Adjust the speed of the intake air GreenWheel ERV blower until the required outside air is being brought into the classroom.

c. Now measure the exhaust air from the classroom. Adjust the speed of the exhaust air GreenWheel ERV blower until the required air is being exhausted from the classroom. The exhaust air controller is located on the lower left side of the GreenWheel ERV assembly. Access to the exhaust air controller is through the return air grille. It is usual practice to pressurize the classroom by exhausting slightly less air than is being brought into the classroom.

Evaporator Variable Fan Speed Controller (Optional)

Indoor evaporator fan controller is accessed through the return air opening. The controller is located on the GreenWheel ERV assembly on the air separation box in a 2” x 4” “J” box.

Note: Sufficient airflow is required for proper operation of the unit.

Troubleshooting

4.1 Overview

A comprehensive understanding of the operation of the Eubank® Heat Pump is a prerequisite to troubleshooting. Please read the Chapter 1 for basic information about the unit.

Eubank Heat Pumps are thoroughly tested before they are shipped from the factory. However, it is possible that a defect may escape undetected, or damage may have occurred during transportation. However, the great majority of problems result from installation errors.

If you experience difficulties with the Heat Pump, please review the installation steps in Chapter 2.

Much time can be saved by taking a thoughtful and orderly approach to troubleshooting. Start with a visual check - are there loose wires, crimped tubing, missing parts, etc? Begin deeper analysis only after making this initial inspection.

The troubleshooting information in this manual is basic. The troubleshooting section contains problem / solution charts for general problems, followed by a compressor section.

Not every problem can be anticipated. If you discover a problem that is not covered in this manual, we would be very grateful if you would bring it to the attention of our service department for incorporation in future revisions.

As always, please exercise caution and good judgement when servicing your Heat Pump. Use only safe and proven service techniques. Use refrigeration goggles when servicing the refrigeration circuit.

The refrigerant circuit has hot surfaces, and the electrical voltages inside of the unit may be hazardous or lethal. SERVICE MAY BE PERFORMED ONLY BY QUALIFIED AND EXPERIENCED PERSONS.

⚠ WARNING
The refrigerant circuit has hot surfaces, and the electrical voltages inside of the unit may be hazardous or lethal. SERVICE MAY BE PERFORMED ONLY BY QUALIFIED AND EXPERIENCED PERSONS.

4.2 Failure Symptoms Guide

PROBLEM/SYMPTOM	LIKELY CAUSE(S)	CORRECTION
A. Unit does not run. **NOTE**: An internal anti-short-cycle timer will prevent the unit from starting for .2 to 8 minutes following start-up.	1. Power supply problem. 2. Tripped internal disconnect. 3. Shut off by external thermostat or thermostat is defective. 4. Unit off on high pressure or loss of charge. 5. Internal component or connection failure.	1. Check power supply for adequate phase and voltage. Check wiring to unit and external breakers or fuses. 2. Check circuit protection devices for continuity. 3. Check operation of wall-mounted thermostat. 4. Reset lockout. See section 1.4. 5. Check for loose wiring. Check components for failure.
B. Unit runs for long periods or continuously; cooling is insufficient.	1. Unit undersized for job. 2. Low refrigerant. 3. Component failure. 4. Dirty filter or reduced airflow.	1. Add additional units for greater capacity. 2. Check for proper charge and possible refrigerant leak. 3. Check internal components, especially compressor for proper operation. 4. Check air filter(s). Check blower operation. Remove airflow restriction.
C. Unit cycles on high pressure or loss of charge.	1. Loss or restriction of airflow. 2. Restriction in refrigerant circuit. 3. Refrigerant overcharge (following field service) 4. Defective high pressure control or loss of charge switch.	1. Check blower assembly for proper operation. Look for airflow restrictions, e.g., the air filter. Check blower motor and condenser fan. Indoor blower fan speed control set too low. 2. Check for blockage or restriction, especially filter drier and capillary tube assembly. 3. Evacuate and recharge to factory specifications. 4. Check limit cutout pressures. Control is set to actuate at approximately 40 PSIG (loss of charge) and 610 PSIG (high pressure).
D. Unit blows fuses or trips circuit breaker.	1. Inadequate circuit ampacity. 2. Short, loose, or improper connection in field wiring. 3. Internal short circuit. Loose or improper connection(s) in unit. 4. Excessively high or low supply voltage or phase loss (3ø only).	1. Note electrical requirements in Chapter 2 and correct as necessary. 2. Check field wiring for errors. 3. Check wiring in unit. See wiring and schematic diagrams. Test components (especially the compressor) for shorts. 4. Note voltage range limitations specific to the compressor troubleshooting section.

PROBLEM/SYMPTOM	LIKELY CAUSE(S)	CORRECTION
E. Water on floor near unit.	1. Obstruction in condensate line. 2. Obstruction or leak in condensate pan. 3. Unit is not level.	1. Check for clog or restriction. 2. Check pan for leak or blockage. 3. Level unit.
F. No space heating or reduced heating (units equipped with resistance elements)	1. Defective heating element(s). 2. Thermal limit open. 3. Defective heater contactor. 4. Thermostat set too low. 5. Compressor fault.	1. Check resistance element(s) for continuity. 2. Check continuity across thermal limit switch. 3. Check relay for proper operation. Replace if defective. 4. Adjust thermostat. 5. Reset the lock out relay at the thermostat.

4.3 Compressor Troubleshooting

Obtain the heat pump's model number and serial number, the compressor's model number and contact Eubank for compressor specifications.

It is important to rule out other component failures before condemning the compressor.

The following electrical tests will aid diagnosis on single phase units:

1. **Start-Up Voltage:** Measure the voltage at the compressor contactor during start-up. The voltage must exceed the minimum shown in Table 8, section 2.2, or compressor failure is likely. A low voltage condition must be corrected.

2. **Running Amperage:** Connect a clip-on type ammeter to the (common) lead to the compressor. Turn on the supply voltage and energize the unit. The compressor will initially draw high amperage; it should soon drop to the RLA value or less. If the amperage stays high, check the motor winding resistances.

   NOTE: Feel the top of the compressor to see if it has overheated. If it is hot, the internal overload may be open. You may have to wait several hours for it to reset.

3. **High Voltage/Insulation Test:** Test internal leakage with a megohmeter. Attach one lead to the compressor case on a bare metal tube and to each compressor terminal to test the motor windings. A short circuit at a high voltages indicates a motor defect. Do not do this test under vacuum.

4. On single phase models, check the capacitor by substitution.

4.4 Electric Heat Controls

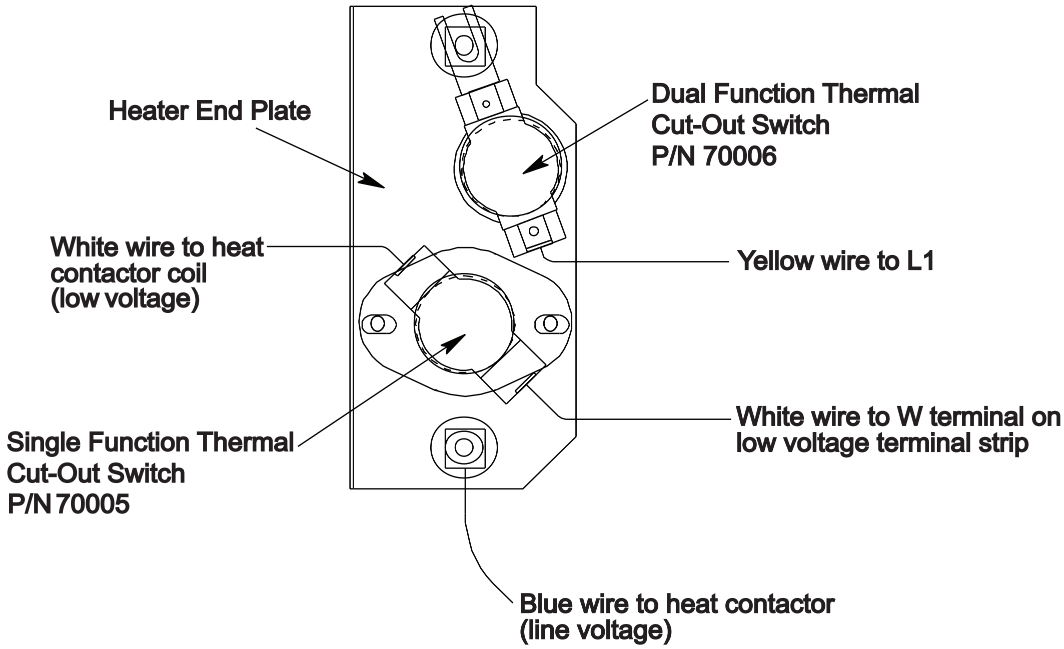


Figure 10 - Typical Configuration for Single Element Heater

The electric heater assembly can have up to three individual heating elements. Each individual heating element is protected against overheating by its own dual function thermal cut-out switch. Additionally, a separate single function thermal cut-out switch protects the entire heater assembly.

The dual function thermal cut-out switch (P/N 70006) is composed of two independent line voltage snap-disc temperature switches mounted in a single enclosure. One of these switches is an automatic reset device which cycles off at approximately 145°F and back on at approximately 115°F. Should this switch fail to open, the second switch will open the circuit if the temperature continues to increase. This second switch does not reset. If it opens (breaks the line voltage circuit to the heater assembly) the switch will have to be replaced by qualified service personnel after the source of the overheat problem is resolved.

In addition to the thermal cut-out switch described above, there is a single function thermal cut-out switch (P/N 70005) mounted on the heater frame. This switch controls the 24V AC control current to the heater contactor(s) which powers all the heating elements. This single function thermal cut-out switch operates totally independent of the dual thermal cut-out switch described above. If the single function switch senses an overheat situation, it opens the control circuit and turns off all of the installed heating elements via the heater contactor(s). Because this switch controls the heater contactor(s), only one switch is required to disconnect power from the contactor(s), regardless of the number of heater elements. This single function switch is also non-resettable, and must be replaced by qualified service personnel after the source of the overheat problem is resolved. This switch would typically open if both elements of the dual thermal cut-out switches failed.

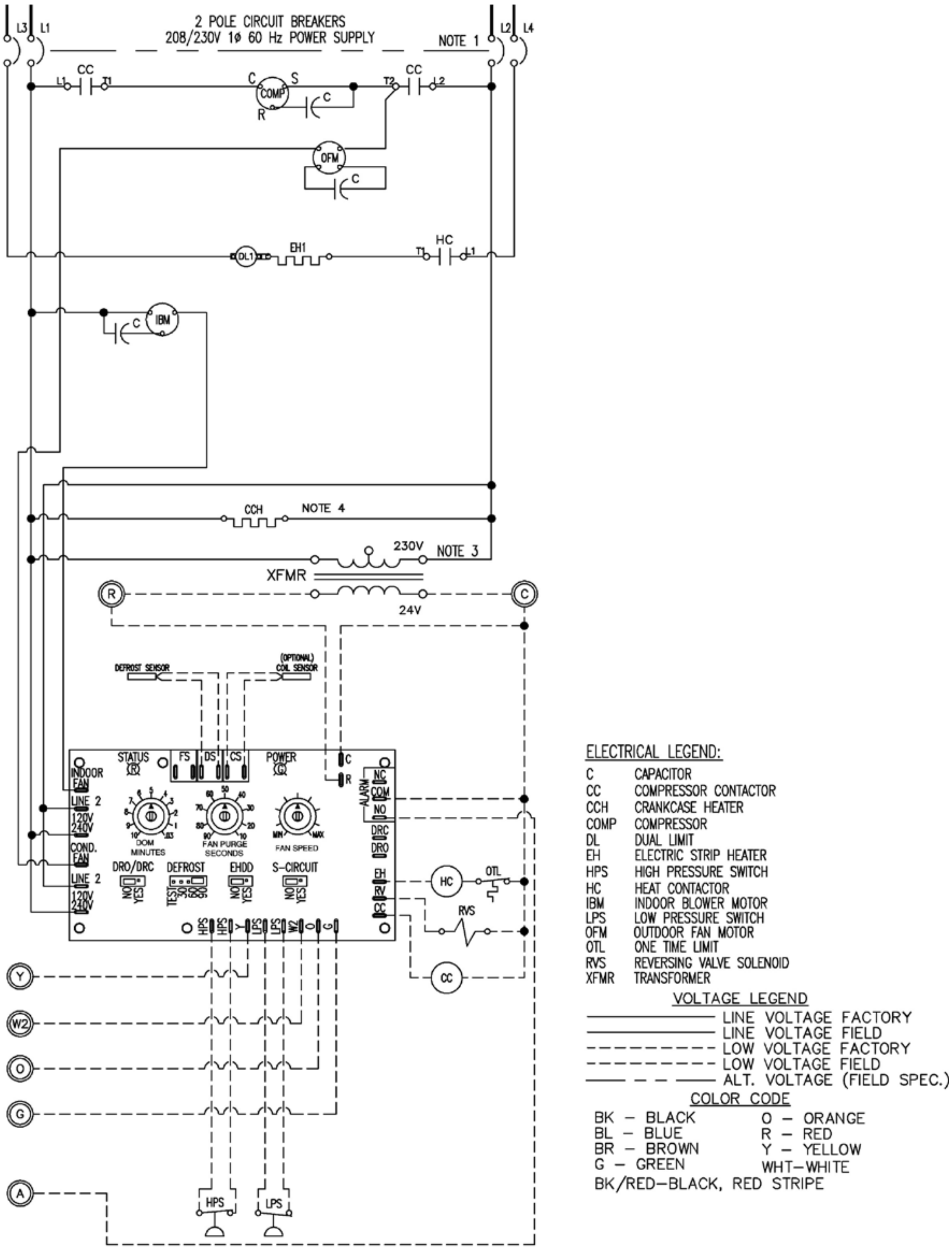
5.1 Electrical Schematics

The compressor and condenser fan are energized with a contactor controlled by a 24 VAC pilot signal.

The condenser (outside fan) motor is energized by the same contactor. However, the motor is cycled on and off by the low ambient control (see low ambient control 1.5). ***Note:*** Only on heat pumps equipped with an economizer.

The compressor incorporates an internal PTC crankcase heater that functions as long as primary power is available. The heater drives liquid refrigerant from the crankcase and prevents loss of lubrication caused be oil dilution. Power must be applied to the unit for 24 hours before starting the compressor. ***Note:*** Heat pumps with scroll compressors generally do not require crankcase heaters.

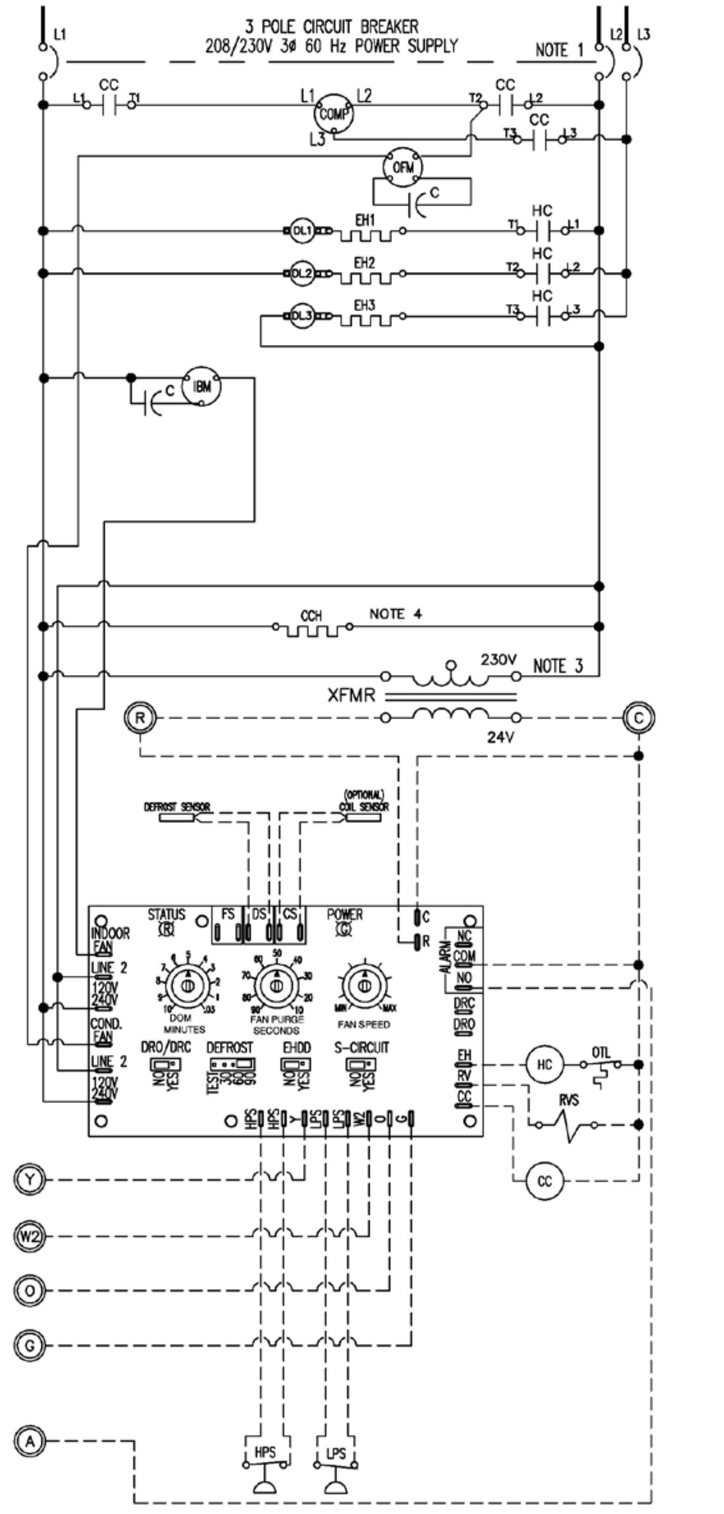
The indoor evaporator fan motor is cycled by the blower timed delay relay. See Figure 9. Due to the large number of variations and options available for the Eubank heat pumps, it is not practical to include every possible wiring schematic in this manual. The following schematics are typical. Included in each heat pump is the electrical schematic for that unit. Always refer to the schematic in the unit when installing or servicing the heat pump.



GENERAL NOTES:

1. 208/230 VOLT 1ø 60 Hz POWER SUPPLY. SEE DATA PLATE FOR AMPACITY AND FUSE SIZE. OPTIONAL CKT BKR SHOWN.
2. SPEED TAP – SEE MOTOR NAMEPLATE FOR WIRE COLORS.
3. TRANSFORMER IS FACTORY WIRED FOR 230 VOLT OPERATION. FOR LOWER VOLTAGES, INTERCHANGE ORANGE AND RED LEADS. INSULATE UNUSED LEADS.
4. CCH MAY NOT BE REQUIRED ON ALL MODELS
5. PTCR IS NOT REQUIRED ON ALL COMPRESSORS.
6. THE (STATUS LED) WILL BLINK ONE TIME AFTER THE HPS (HIGH PRESSURE SWITCH) HAS OPENED TWICE AND THE UNIT WILL LOCKOUT.
7. THE (STATUS LED) WILL BLINK TWICE AFTER THE LPS (LOW PRESSURE SWITCH) HAS OPENED TWICE AND THE UNIT WILL LOCKOUT. THE LOCKOUT CIRCUIT CONTACTS ARE LOCATED ON THE PRINTED CIRCUIT BOARD.
8. THE (STATUS LED) WILL BLINK FOUR TIMES TO INDICATE A DEFROST OR COIL SENSOR FAULT AND THE UNIT WILL CONTINUE TO OPERATE.

Figure 11a - Typical 1ø Electrical Schematic Diagram
Heat Pump (Models EAA) with Manual Outside Air Damper



ELECTRICAL LEGEND:

C	CAPACITOR
CC	COMPRESSOR CONTACTOR
CCH	CRANKCASE HEATER
COMP	COMPRESSOR
DL	DUAL LIMIT
EH	ELECTRIC STRIP HEATER
HPS	HIGH PRESSURE SWITCH
HC	HEAT CONTACTOR
IBM	INDOOR BLOWER MOTOR
LPS	LOW PRESSURE SWITCH
OFM	OUTDOOR FAN MOTOR
OTL	ONE TIME LIMIT
RVS	REVERSING VALVE SOLENOID
XFMR	TRANSFORMER

VOLTAGE LEGEND

LINE VOLTAGE FACTORY
LINE VOLTAGE FIELD
LOW VOLTAGE FACTORY
LOW VOLTAGE FIELD
ALT. VOLTAGE (FIELD SPEC.)

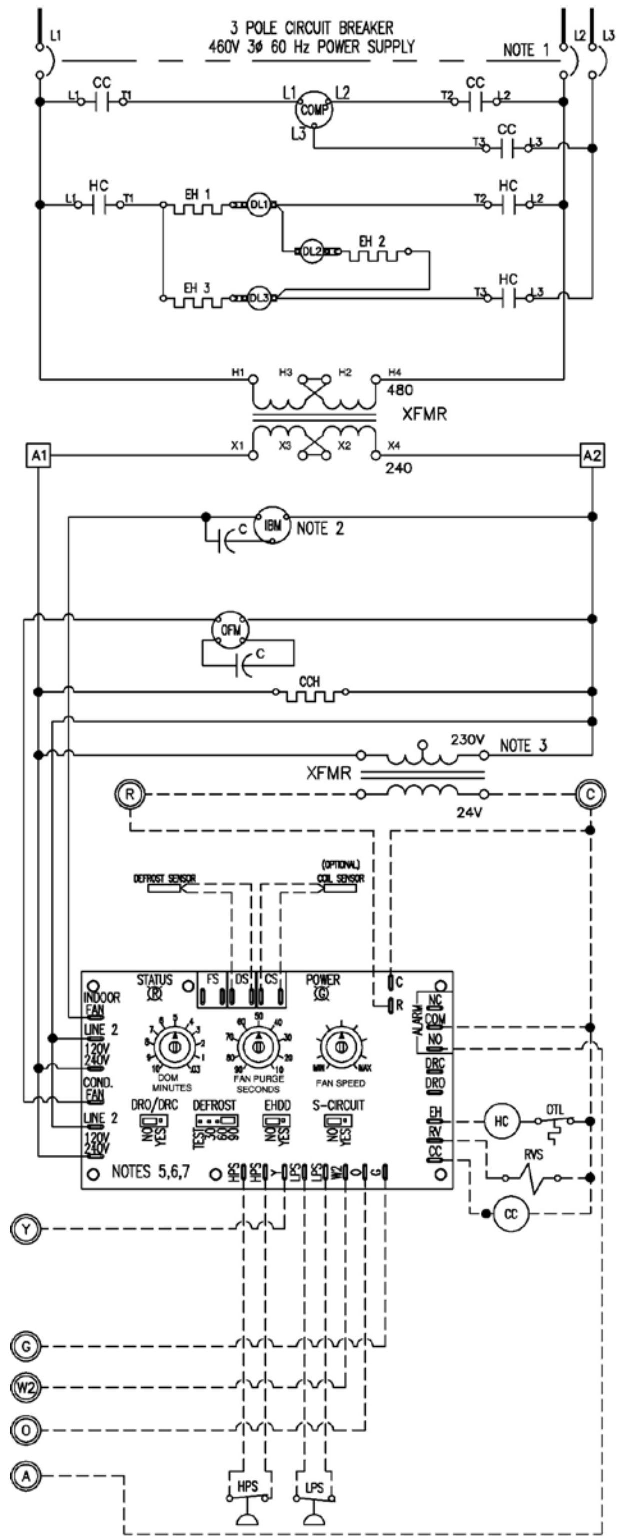
COLOR CODE

BK – BLACK	O – ORANGE
BL – BLUE	R – RED
BR – BROWN	Y – YELLOW
G – GREEN	WHT–WHITE

BK/RED–BLACK, RED STRIPE

GENERAL NOTES:
1. 208/230 VOLT 3ø 60 Hz POWER SUPPLY. SEE DATA PLATE FOR AMPACITY AND FUSE SIZE. OPTIONAL CKT BKR SHOWN.
2. FACTORY PROGRAMMED ECM MOTOR.
3. TRANSFORMER IS FACTORY WIRED FOR 230 VOLT OPERATION. FOR LOWER VOLTAGES, INTERCHANGE ORANGE AND RED LEADS. INSULATE UNUSED LEADS.
4. CCH MAY NOT BE REQUIRED ON ALL MODELS
5. PTCR IS NOT REQUIRED ON ALL COMPRESSORS.
6. THE (STATUS LED) WILL BLINK ONE TIME AFTER THE HPS (HIGH PRESSURE SWITCH) HAS OPENED TWICE AND THE UNIT WILL LOCKOUT.
7. THE (STATUS LED) WILL BLINK TWICE AFTER THE LPS (LOW PRESSURE SWITCH) HAS OPENED TWICE AND THE UNIT WILL LOCKOUT. THE LOCKOUT CIRCUIT CONTACTS ARE LOCATED ON THE PRINTED CIRCUIT BOARD.
8. THE (STATUS LED) WILL BLINK FOUR TIMES TO INDICATE A DEFROST OR COIL SENSOR FAULT AND THE UNIT WILL CONTINUE TO OPERATE.

Figure 11b - Typical 208/230v. 3ø Electrical Schematic Diagram Heat Pump (Models EAA)



ELECTRICAL LEGEND:

C	CAPACITOR
CC	COMRESSOR CONTACTOR
CCH	CRANKCASE HEATER
COMP	COMPRESSOR
DL	DUAL LIMIT
EH	ELECTRIC HEAT
HC	HEAT CONTACTOR
HPS	HIGH PRESSURE SWITCH
IBM	INDOOR BLOWER MOTOR
LPS	LOW PRESSURE SWITCH
OFM	OUTDOOR FAN MOTOR
OTL	ONE TIME LIMIT
RVS	REVERSING VALVE SOLENOID
XFMR	TRANSFORMER

VOLTAGE LEGEND

- LINE VOLTAGE FACTORY
- LINE VOLTAGE FIELD
- LOW VOLTAGE FACTORY
- LOW VOLTAGE FIELD
- ALT. VOLTAGE (FIELD SPEC.)

COLOR CODE

BK – BLACK	O – ORANGE
BL – BLUE	R – RED
BR – BROWN	Y – YELLOW
G – GREEN	WHT–WHITE

BK/RED–BLACK, RED STRIPE

GENERAL NOTES:

1. 460 VOLT 3ø 60 Hz POWER SUPPLY. SEE DATA PLATE FOR AMPACITY AND FUSE SIZE. OPTIONAL CKT BKR SHOWN.
2. SPEED TAP – SEE MOTOR NAMEPLATE FOR WIRE COLORS.
3. TRANSFORMER IS FACTORY WIRED FOR 230 VOLT OPERATION. FOR LOWER VOLTAGES, INTERCHANGE ORANGE AND RED LEADS. INSULATE UNUSED LEADS.
4. CRANKCASE MAY NOT BE REQUIRED ON ALL COMPRESSORS.
5. THE (STATUS LED) WILL BLINK ONE TIME AFTER THE HPS (HIGH PRESSURE SWITCH) HAS OPENED TWICE AND THE UNIT WILL LOCKOUT.
6. THE (STATUS LED) WILL BLINK TWICE AFTER THE LPS (LOW PRESSURE SWITCH) HAS OPENED TWICE AND THE UNIT WILL LOCKOUT. THE LOCKOUT CIRCUIT CONTACTS ARE LOCATED ON THE PRINTED CIRCUIT BOARD.
7. THE (STATUS LED) WILL BLINK FOUR TIMES TO INDICATE A DEFROST OR COIL SENSOR FAULT AND THE UNIT WILL CONTINUE TO OPERATE.

Figure 11c, Typical 460v. 3ø Electrical Schematic Diagram
Heat Pumps, Models EAA, with the PC Control Board

6.1 Scheduled Maintenance

Eubank, Inc. strongly recommends that the heat pump be serviced a minimum of twice a year – once prior to the heating season and once prior to the cooling season. At this time the filters, evaporator coil, condenser coil, the cabinet, and condensate drains should be serviced as described below. Also at this time, the heat pump should be operated in the cooling and heating cycles as described in Chapter 3, Start-Up. In addition to this seasonal check-out, the unit should be maintained as follows:

Air Filter
Replace the air filter whenever it is visibly dirty. Never operate the heat pump without the filters in place.

Indoor Coil
If the coil becomes clogged or dirty, it may be cleaned by careful vacuuming or with a commercial evaporator cleaning spray. DO NOT use a solvent containing bleach, acetone, or flammable substances. Turn power OFF before cleaning. Be careful not to wet any of the electrical components. Be sure the unit has dried before restarting. Use a fin comb of the correct spacing to straighten mashed or bent fins.

Outdoor Coil
Periodically inspect the outdoor coil and the cabinet air reliefs for dirt or obstructions. Remove foreign objects such as leaves, paper, etc.

If the coil is dirty, it may be washed off with a commercial solvent intended for this purpose. TURN OFF POWER BEFORE CLEANING! Be sure that all electrical components are thoroughly dry before restoring power.

Cabinet
The cabinet may be cleaned with a sponge and warm, soapy water or a mild detergent. Do not use bleach, abrasive chemicals or harmful solvents.

Drains
Regularly check the primary and secondary condensate drains. The secondary drain has a stand pipe. An obstruction will force water to dump into the middle of the unit and drain out the sides of the Eubank Heat Pump, causing discoloration of the side panels. If discoloration is noted, service the drains.

If a commercial drain solvent is used, flush out the drain pan and system with plenty of fresh water to prevent corrosion.

Lubrication
Oiling of the condenser fan motor or the evaporator blower motor is not recommended.

7.1 Marvair, Inc. Limited Product Warranty

Marvair Inc., warrants its products to be free from defects in materials and workmanship under normal use to the original purchaser for the period of time in the table below. If any part of your product fails within 12 months from start-up, or 18 months from shipment from the factory, whichever comes first, Marvair, Inc. will furnish without charge, EXW Cordele, Georgia, the required replacement part. The owner must provide proof of the date of the original start-up. The contractor's invoice, the certificate of occupancy, or similar documents are examples of acceptable proof of the date of the original start-up.

Marvair, ICE, Eubank Products
90 Days[1] w/Flat Rate Labor[2] *(See Marvair, ICE, Eubank Flat Rate Labor Guidelines)*
1 Year Parts[2,3]
5 Years Compressor[2]

[1]If any part of your Marvair, Inc. unit fails within 90 days of the commencement of the warranty, Marvair, Inc. will furnish without charge, EX Works, Cordele, Georgia, the required replacement part and pay for the labor to replace the part in accordance with the Marvair, Inc. Flat Rate Labor Guidelines.

[2]All OTR (over the road) applications that are moved from one location to another: Factory Warranty applies only up to the point of initial start-up and test at all OEM manufacturing locations or subsequent facility. Once it goes into OTR service, the warranty expires immediately for compressor and sealed system components. This OTR exemption does not apply to relocatable classrooms, construction or office trailers.

[3]All warranty replacement parts shall be shipped Ground only. Expedited shipping is available upon request for additional cost.

The responsibility of the equipment owner includes:

1. To operate the equipment in accordance with the manufacturer's instructions.
2. To provide easy accessibility for servicing.
3. To check and reset any circuit breaker(s) and/or disconnect(s) prior to calling for service.
4. To keep the unit clean and free of dirt and containment and replace filters as required.
5. To keep the outdoor coil clean and free of leaves, paper, or other debris.
6. To pay the charges incurred when any of the above have not been done.
7. To pay for repair or replacement of any material or part other than those within the Marvair unit or controller.

Marvair, Inc., will not be responsible for labor after 90 days, transportation costs, delays or failures to complete repairs caused by events beyond our control (labor hours incurred due to required site-specific training, time waiting to gain access, or extended drive time for remote sites). This warranty does not cover:

1. Any transportation, related service labor, diagnosis calls, filter, driers, refrigerant, or any other material charges.
2. Damages caused by shipping, accident, abuse, negligence, misuse, fire, flood, or Acts of God.
3. Damages caused by operating or staging the unit in a corrosive environment.
4. Damages caused by improper application of the product.
5. Damages caused by failing to perform proper routine maintenance.
6. Expenses incurred for erecting, disconnecting or dismantling the product or installing the replacement part(s).
7. Products not installed or operated according to the included instructions, local codes, and good trade practices.
8. Products moved from the original installation site.
9. Products lost or stolen
10. Consequential damages or incidental expenses including losses to persons, property or business.
11. Modifications to original unit after it leaves the factory, such as breaking into any part of the sealed systems unless authorized in advance in writing by Marvair, Inc..
12. Damages as a result of operating as a construction site cooler / dehumidifier.

When labor (first 90 days only) is required, it must be performed during normal working hours (8:00 AM - 5:00 PM) Monday - Friday and must be performed by Marvair, Inc., personnel or a designated Service Representative.

The owner of the product may ship the allegedly defective or malfunctioning product or part to Marvair, Inc.,, at such owner's expense, and Marvair, Inc., will diagnose the defect and, if the defect is covered under this warranty, Marvair, Inc., will honor its warranty and furnish the required replacement part. All costs for shipment and risk of loss during shipment of the product to Marvair, Inc., and back to the owner shall be the responsibility and liability of the owner. Upon written request by an owner, Marvair, Inc., may arrange for remote diagnosis of the allegedly defective or malfunctioning product or part but all costs for transportation, lodging and related expenses with regard to such diagnostic services shall be the responsibility and liability of the owner.

An owner requesting performance under this Warranty shall provide reasonable access to the allegedly defective or malfunctioning product or part to Marvair, Inc., and its authorized agents and employees.

THIS WARRANTY CONSTITUTES THE EXCLUSIVE REMEDY OF ANY PURCHASER OF A MARVAIR HEAT PUMP OR AIR CONDITIONER AND IS IN LIEU OF ALL OTHER WARRANTIES, EXPRESSED OR IMPLIED, INCLUDING, WITHOUT LIMITATION, ANY IMPLIED WARRANTY OF MERCHANTABILITY OR FITNESS FOR USE, TO THE FULLEST EXTENT PERMITTED BY LAW. IN NO EVENT SHALL ANY IMPLIED WARRANTY OF MERCHANTABILITY OR FITNESS FOR USE EXCEED THE TERMS OF THE APPLICABLE WARRANTY STATED ABOVE AND MARVAIR SHALL HAVE NO OTHER OBLIGATION OR LIABILITY. IN NO EVENT SHALL MARVAIR BE LIABLE FOR INCIDENTAL OR CONSEQUENTIAL DAMAGES OR MONETARY DAMAGES.

THIS WARRANTY GIVES YOU SPECIFIC LEGAL RIGHTS, AND YOU MAY ALSO HAVE OTHER RIGHTS WHICH VARY FROM STATE-TO-STATE. Some states do not allow limitations or exclusions, so the above limitations and exclusions may not apply to you.

04/30/2020 Rev. 9

APPENDIX A: Installation Instructions for Field Installed Electric Heat

⚠ WARNING
FIRE HAZARD

Improper adjustment, alteration, service, maintenance or installation could cause serious injury, death and/or property damage.

Installation or repairs made by unqualified persons could result in hazards to you and others. Installation MUST conform with local codes or, in the absence of local codes, with codes of all governmental authorities have jurisdiction.

The information contained in this manual is intended for use by a qualified service agency that is experienced in such work, is familiar with all precautions and safety procedures required in such work, and is equipped with the proper tools and test instruments.

Duct Work

General Information

Note: The following instructions are for general guidance only. Due to the wide variety of installation possibilities, specific instructions will not be given. When in doubt, follow standard and accepted installation practices, or contact Eubank for additional assistance.

Wall Openings

Measure the dimensions of the supply and return ports on the unit.

Cut the openings in the exterior wall for the supply and return. **IMPORTANT: All units with electric heat must have 1" (25.4 mm) clearance on all four sides of the supply outlet duct flange on the unit. The 1" (25.4 mm) clearance must extend on all sides of the supply duct for the first 3 feet (1 meter) from the unit.**

IMPORTANT: Eubank requires a minimum of 1" (25.4 mm) from the surface of any supply ducts to combustible material for the first 3 feet (1 meter) of the duct.

Ducting

Extensions should be cut flush with the inside wall for applications without duct work.

Applications using duct work should be designed and installed in accordance with all applicable safety codes and standards. Eubank strongly recommends referring to the current edition of the National Fire Protection Association Standards 90A and 90B before designing and installing duct work. The duct system must be engineered to insure sufficient air flow through the unit to prevent over-heating of the heater element. This includes proper supply duct sizing, sufficient quantity of supply registers, adequate return and filter area. Ductwork must be of correct material and must be properly insulated. Duct work must be constructed of galvanized steel with a minimum thickness of .019 inches for the first 3 feet (1 meter). Ductwork must be firmly attached, secured and sealed to prevent air leakage. Do not use duct liner on inside of supply duct within 4 feet (122 cm) of the unit. Galvanized metal duct extensions should be used to simplify connections to duct work and grilles. Use fabric boots to prevent the transmission of vibration through the duct system. The fabric must be U.L. rated to a minimum of 197°F (92°C).

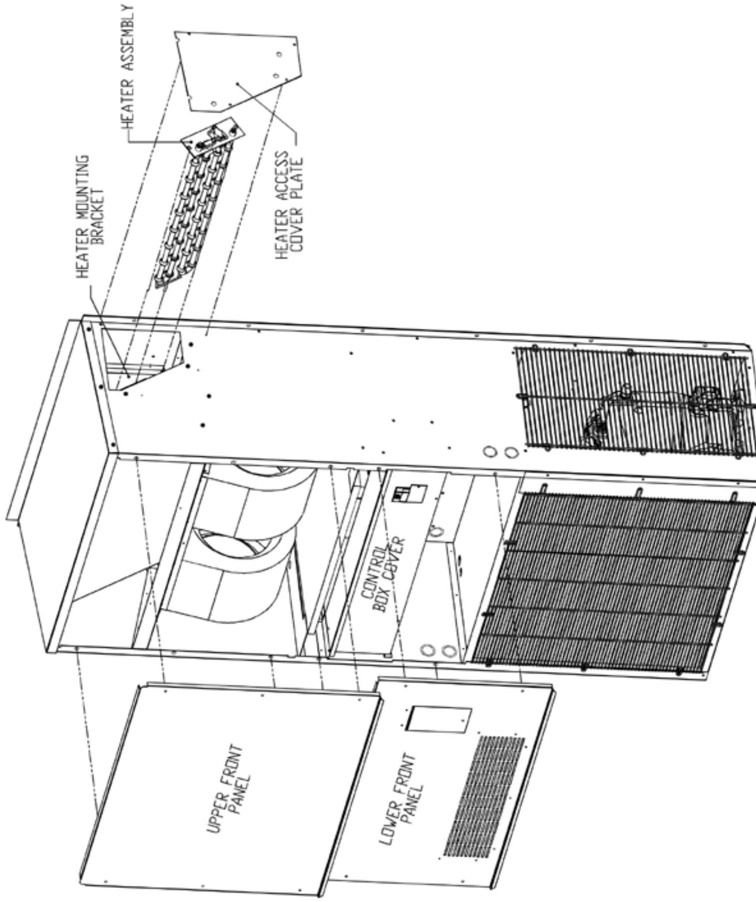
⚠ WARNING
ELECTRICAL SHOCK HAZARD

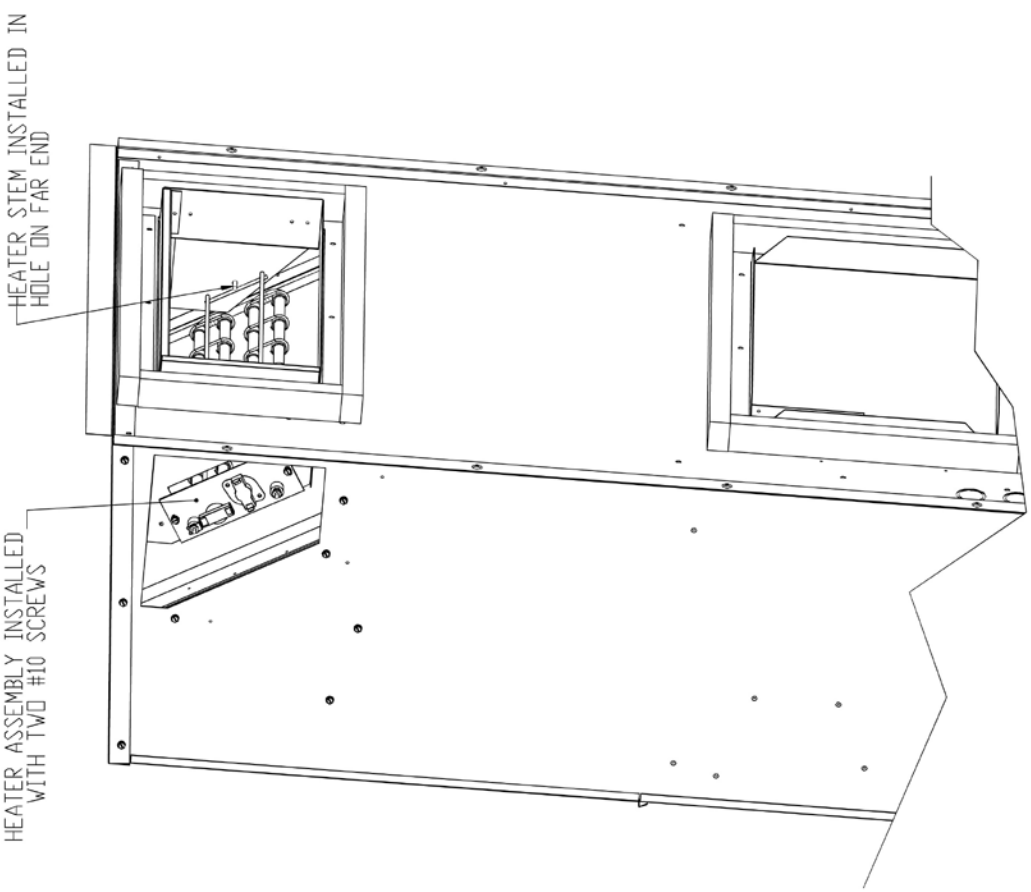
Failure to follow safety warnings exactly could result in serious injury, death, and/or property damage.

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

Heater installation (see drawings and wiring diagram)

1. Remove top front panel.
2. Remove bottom front panel.
3. Remove the control box cover.
4. Remove the heater access cover plate on the upper right side of the unit by removing the three screws. Cut insulation on two sides and fold down out of way.
5. Slide new heater assembly into place by lining up stem with hole on far end. Make sure stem of new heater assembly is inserted into correct hole. The hole nearest to the indoor coil is for three element heaters and the farthest away from indoor coil is for all other heaters.
6. Install the two No. 10 screws in the heater assembly plate.
7. Install wire harness in hole provided in drain pan and then through filter bracket and then into control box.
8. Wire the heater as shown in the wiring diagram provided with the heater kit (the insulated terminal ends are to be connected at the heater).
9. Install pop tie in appropriate hole in back panel to secure wire.
10. Install closed cell strip around wires where they pass through the drain pan.
11. Reinstall the heater access cover.
12. Mount the heat contactor inside the control box where the mounting holes are provided for the heat contactor.
13. Make the wiring connections inside the control box as shown in the wiring diagram provided with the heater kit. Bundle loose wires with wire ties.
14. With a permanent marker, place an (X) in the space provided next to the heater kit rating of the installed heater on the unit data label.
15. Place the wiring diagram provided with the heater kit inside the zip lock bag which is affixed to the back side of the control box cover.
16. Replace the control box cover, the bottom front cover and the top front panel.


HEATER ASSEMBLY
HEATER MOUNTING BRACKET
HEATER ACCESS COVER PLATE
CONTROL BOX COVER
UPPER FRONT PANEL
LOWER FRONT PANEL


HEATER STEM INSTALLED IN HOLE ON FAR END
HEATER ASSEMBLY INSTALLED WITH TWO #10 SCREWS

APPENDIX B: Heat Pump Start-Up - Commissioning Checklist

Please complete the information on this form and email to MarvairCustServ@airxcs.com.

Date: _____/_____/_______

A. Owner & Location

Equipment Owner: ______________________________

Address: ______________________________

City: ______________________________

State:_______, Zip:____________

B. Installing Contractor

Company: ______________________________ Installer: ______________________________

Address: ______________________________

City: ______________________________

State:_______, Zip:____________

C. Equipment Information

Unit Model No.: ______________________________

Unit Serial No.: ______________________________

Compressor Model No.: ______________________________

Compressor Serial No.: ______________________________

D. Pre-Start Up

Is there shipping damage? .... ❒Yes ❒No

If so, describe? ______________________________

____

Will this damage prevent starting the unit? .... ❒Yes ❒No

Incoming Power

- ✓ Has Power been connected? .... ❒Yes ❒No
- ✓ Has the ground wire been connected? .... ❒Yes ❒No
- ✓ Has the circuit protection been sized and installed properly? .... ❒Yes ❒No

Controls

- ✓ Has the thermostat / control been connected and verified? .... ❒Yes ❒No
- ✓ Are all wiring terminals (including main power supply) tight? .... ❒Yes ❒No
- ✓ If unit has a crankcase heater, has it been energized for 24 hours? .... ❒Yes ❒No
- ✓ Has the correct voltage been selected on the control transformer (24vac)?.......... ❒Yes ❒No

Condensate

- ✓ Has primary drain tube been properly place thru the opening in the bottom of the unit?. ❒Yes ❒No
- ✓ Has water been placed in drain pan to confirm proper drainage? .... ❒Yes ❒No
- ✓ Is the correct filter(s) in place and clean? .... ❒Yes ❒No

Refrigerant Piping

- ✓ Is there any evidence of refrigerant leaks (oil leaks, etc.)? .... ❒Yes ❒No

If leaks are found, report them to Marvair Warranty Service Dept.

E. Check Incoming Power at Terminal Block and verify Proper Voltage and Balance BEFORE STARTING UNIT.

❒ 208/230V 1 Phase 60 Hz. ❒ 208/230V 3 Phase 60 Hz. ❒ 460V 3 Phase 60 Hz.

❒ 380V 3 Phase 50Hz. ❒ 575 3 Phase 60 Hz. ❒ Other____________

Single Phase Units

✓ Measured Line to Line Volts L1&L2 = _______V.

✓ Is incoming voltage between Min and Max voltage listed on unit Data Label? .... ❒Yes ❒No

An incoming voltage that is Not between the Minimum and Maximum listed on the unit Data Label Must be addressed and corrected before placing the unit into full time operation. Improper voltage can cause the compressor to overheat and cause premature failure.

Three Phase Units

✓ Measured Line to Line Volts L1&L2 _______V., L1&L3 ________V., L2&L3 ______V.

✓ Is incoming voltage between Min and Max voltage listed on unit Data Label? .... ❒Yes ❒No

An incoming voltage that is Not between the Minimum and Maximum listed on the unit Data Label Must be addressed and corrected before placing the unit into full time operation. Improper voltage can cause the compressor to overheat and cause premature failure.

✓ Measured Line to Line Balance

✓ Is incoming voltage properly balanced? (use formula below to calculate balance) .... ❒Yes ❒No

Average Voltage = (L1&L2 + L1&L3 + L2&L3)/3 = _______________V.

Deviation Difference = Average Voltage - Maximum Deviation = ______________V.

Voltage Imbalance = (Deviation Difference x 100)/ Average Voltage = ___________%

A Voltage Imbalance greater than 2% with the unit running must be addressed and corrected. Excess Line to Line Voltage Imbalance can cause the compressor to overheat and cause premature failure.

Example:

$$\text{Voltage Imbalance} = \frac{(\text{Average Voltage} - \text{Maximum Deviation}) \times 100}{\text{Average Voltage}}$$

Measured Voltages:

L1 & L2 = 241 Volts

L1 & L3 = 243 Volts

L2 & L3 = 235 Volts

719 / 3 = 239.7 Volts (Average Voltage)

239.7 (Average Voltage) – 235 (Maximum Deviation) = 4.7 (Deviation Difference)

(4.7 x 100)/239.7 = 1.95% Voltage Imbalance (*Less than 2% is acceptable*)

F. Cooling Mode (Mechanical Cooling)

Close the Compressor (Cooling) circuit breaker. Power will be applied to the thermostat / control device. Setup / Configure the control for the desired settings. Adjust the cooling setpoint so there is No demand for cooling. The unit will not be running.

Cooling Start

If using a standard thermostat, Set the Control to ON, Mode to Cooling, Fan to Auto (other controls, set appropriately for cooling mode). *Note: The reversing valve (Marvair Heat Pumps) is energized for "Cooling". The "O" signal from the thermostat is Required.*

Adjust the cooling setpoint to approximately four degrees below the current indoor temperature. After the initial start-up delay (.3 to 5 minutes), the unit will sequence on, start cooling.

- ✓ Is the indoor blower motor (IBM) On? (if IBM fails to come on, Check Phase Monitor) ❒Yes ❒No
- ✓ Is the Compressor On? (if Compressor fails to come on, Check Phase Monitor) .... ❒Yes ❒No
- ✓ Is the Condenser Fan (CFM) On? (Ambient conditions may be delay CFM) .... ❒Yes ❒No
- ✓ Is incoming power properly Phased? (YES! If “Green LED” on Phase Monitor is On.).. ❒Yes ❒No

If incoming power is Not properly phased, “Red LED on Phase Monitor will be on; swap any two incoming power wires, either at the distribution panel or at the incoming power terminal block. Never rewire power wiring internal to the control box.

RECHECK Incoming Power and Voltage Balance in Cooling Mode.

- ✓ Measured Line to Line Volts L1&L2 _______V., L1&L3 ________V., L2&L3 ______V.
- ✓ Is incoming voltage between Min and Max voltage listed on unit Data Label? .... ❒Yes ❒No

An incoming voltage that is Not between the Minimum and Maximum listed on the unit Data Label Must be addressed and corrected before starting unit. Improper voltage can cause the compressor to overheat and cause premature failure.

- ✓ Measured Line to Line Balance
- ✓ Is incoming voltage properly balanced? (use formula below to calculate balance) .... ❒Yes ❒No

Average Voltage = (L1&L2 + L1&L3 + L2&L3)/3 = _______________V.
Deviation Difference = Average Voltage - Maximum Deviation = ______________V.
Voltage Imbalance = (Deviation Difference x 100)/ Average Voltage = ___________%
A Voltage Imbalance greater than 2% with the unit running Must be addressed and corrected. Excess Line to Line Voltage Imbalance can cause the compressor to overheat and cause premature failure.

Example:

$$\text{Voltage Imbalance} = \frac{(\text{Average Voltage} - \text{Maximum Deviation}) \times 100}{\text{Average Voltage}}$$

Measured Voltages:
L1 & L2 = 241 Volts
L1 & L3 = 243 Volts
L2 & L3 = 235 Volts
719 / 3 = 239.7 Volts (Average Voltage)
239.7 (Average Voltage) – 235 (Maximum Deviation) = 4.7 (Deviation Difference)
(4.7 x 100)/239.7 = 1.95% Voltage Imbalance (*Less than 2% is acceptable*)

Cooling (Check and Record Readings)

After about 10 minutes of operating in the cooling mode, check and record the following data points.

Inside Temperature (IAT)	______ºF
Outside Temperature (OAT)	______ºF
Entering Condenser Air Temperature (Should be same temp as OAT)	______ºF
Leaving Condenser Air Temperature (Acceptable Range 15º - 20º above OAT)	______ºF
Return Air Temperature (RAT) db (Should be same temp as IAT)	______ºF
Return Air Temperature (RAT) wb (used to calculate RH% of Return Air)	______ºF
Supply Air Temperature (SAT) db (Acceptable Range 15º - 20º below RAT)	______ºF
Return Air Temperature (SAT) wb (used to calculate RH% of Supply Air)	______ºF
Compressor Amps (L1)	______ºF
Compressor Amps (L2)	______ºF
Compressor Amps (L3)	______ºF

Cooling Stop

Adjust the cooling setpoint to approximately two degrees above the current indoor temperature. The unit will sequence off, stop cooling.

✓ Did the Compressor stop? .... ❒Yes ❒No
✓ Did the Condenser Fan (CFM) stop? .... ❒Yes ❒No
✓ Did the indoor blower motor (IBM) Stop? .... ❒Yes ❒No

G. Electric Reheat Mode

NOTE: If the HVAC system you are testing is not configured with Dehumidification Option, Skip this section of the Start-up / Commissioning Checklist.

✓ Has the Humidistat Control been installed & wired to the Dehumidification input? .... ❒Yes ❒No
✓ Has the Humidistat Control been properly setup for dehumidification? .... ❒Yes ❒No

Adjust the cooling setpoint so there is No demand for cooling. Adjust the Humidity setpoint so there is No demand for dehumidification. The unit will not be running.

Electric Reheat Start

Adjust the Humidity setpoint to approximately ten percent below the current indoor Humidity (Humidistat display should indicate current RH%). After the short delay, the unit will sequence on, start dehumidifying.

✓ Is the indoor blower motor (IBM) On? .... ❒Yes ❒No
✓ Is the Compressor On? .... ❒Yes ❒No
✓ Is the Condenser Fan (CFM) On? (Ambient conditions may delay CFM) .... ❒Yes ❒No
✓ Is the Heater On? (Clamp an AmpProbe on one leg of the heater contactor to verify) .... ❒Yes ❒No

Electric Reheat Lock-Out

While the system is still operating in "Dehumidification Mode". Activate Mechanical Cooling. Do Not change the Humidity Setpoint on the Humidistat. Simply adjust the cooling setpoint to approximately four degrees below the current indoor temperature. After the short delay, the unit will sequence on, start cooling. Notice: system did not turn off. The Only change that occurred is "Heater turned off".

✓ Is the indoor blower motor (IBM) On? .... ❒Yes ❒No
✓ Is the Compressor On? .... ❒Yes ❒No
✓ Is the Condenser Fan (CFM) On? .... ❒Yes ❒No
✓ Is the Heater Off? (Clamp an AmpProbe on one leg of the heater contactor to verify) ... ❒Yes ❒No

Electric Reheat Re-Start

While the system is still operating in "Cooling Mode" from the previous test. Re-Start Dehumidification.

Do Not change the Humidity Setpoint on the Humidistat. Simply adjust the cooling setpoint to approximately four degrees above the current indoor temperature. After the short delay, the unit will sequence on, start dehumidification. Notice: system did not turn off. The Only change **that occurred** is "Heater turned on".

- ✓ Is the indoor blower motor (IBM) On?.. ❒Yes ❒No
- ✓ Is the Compressor On?.. ❒Yes ❒No
- ✓ Is the Condenser Fan (CFM) On?.. ❒Yes ❒No
- ✓ Is the Heater On? (Clamp an AmpProbe on one leg of the heater contactor to verify).... ❒Yes ❒No

Electric Reheat Stop

Adjust the Humidity setpoint to approximately five percent above the current indoor Humidity (Humidistat display should indicate current RH%). After the short delay, the unit will sequence off.

- ✓ Did the Compressor Stop? .... ❒Yes ❒No
- ✓ Did the Condenser Fan (CFM) Stop? .... ❒Yes ❒No
- ✓ Did the indoor blower motor (IBM) Stop? .... ❒Yes ❒No
- ✓ Is the Heater Off? (Clamp an AmpProbe on one leg of the heater contactor to verify) ... ❒Yes ❒No

H. Cooling Mode (Economizer Cooling)

NOTE: If the HVAC system you are testing is Not configured with Economizer Cooling Option, Skip this section of the Start-up / Commissioning Checklist.

- ✓ Has the Economizer Control Board been properly wired to the Control?....................... ❒Yes ❒No
- ✓ Has the Economizer Control Board Ambient selections been properly setup? .... ❒Yes ❒No
- ✓ Has the Economizer Control Board Minimum Opening selection been properly setup?. ❒Yes ❒No
- ✓ Are ambient conditions suitable for Economizer Cooling? (If not, skip this section)...... ❒Yes ❒No

Economizer Cooling Start

If using a standard thermostat, Set the Control to ON, Mode to Cooling, Fan to Auto (other controls, set appropriately for cooling mode).

Adjust the cooling setpoint to approximately two degrees below the current indoor temperature. After the initial start-up delay (.3 to 5 minutes), the unit will sequence on, start cooling. The damper will modulate to maintain 55ºF mixed air temperature, thru the supply.

- ✓ Is the indoor blower motor (IBM) On?.. ❒Yes ❒No
- ✓ Is the Compressor Off? (Compressor Should be Off!) .... ❒Yes ❒No
- ✓ Is the Condenser Fan (CFM) Off? (CFM Should be Off!) .... ❒Yes ❒No
- ✓ Is the Economizer Damper Open?
  (Damper Should be modulating, to control supply air temp.) .... ❒Yes ❒No

Economizer Cooling (Check and Record Readings)

After about 10 minutes of operating in the cooling mode, check and record the following data points.

All unit panels MUST be in place for proper operation and testing.

Inside Temperature (IAT)	________ ºF
Outside Temperature (OAT)	________ ºF
Return Air Temperature (RAT) db (Should be same temp as IAT)	________ ºF
Return Air Temperature (RAT) wb (used to calculate RH% of Return Air)	________ ºF
Supply Air Temperature (SAT) db (Acceptable Range 55ºF (+/- 3ºF)	________ ºF
Return Air Temperature (SAT) wb (used to calculate RH% of Supply Air)	________ ºF

Economizer Cooling Stop

Adjust the cooling setpoint to approximately two degrees above the current indoor temperature. The unit will sequence off.

- ✓ Is the Economizer Damper Closed?.. ❒Yes ❒No
- ✓ Is the indoor blower motor (IBM) Off? .... ❒Yes ❒No

I. Heating Mode (Mechanical Heating Heat Pump)

Close the Compressor (Cooling) circuit breaker. Close the Heating (Heat) circuit breaker. Power will be applied to the thermostat / control device. Setup / Configure the control for the desired settings. Adjust the heating setpoint so there is No demand for heating or cooling. The unit will not be running.

Heating Start (Mechanical Heating Heat Pump)

If using a standard thermostat, Set the Control to ON, Mode to Heat, Fan to Auto (other controls, set appropriately for heating mode). *Note: The reversing valve (Marvair Heat Pumps) is de-energized for "Cooling". The "O" signal from the thermostat is Not Required.*

Adjust the heating setpoint to approximately two degrees above the current indoor temperature. After the initial start-up delay (.3 to 5 minutes), the unit will sequence on, start heating.

- ✓ Is the indoor blower motor (IBM) On?.. ❒Yes ❒No
- ✓ Is the Compressor On?... ❒Yes ❒No
- ✓ Is the Condenser Fan (CFM) On? (Ambient conditions may be delay CFM)................. ❒Yes ❒No
- ✓ Is the Heater Off? (Clamp an AmpProbe on one leg of the heater contactor to verify) ... ❒Yes ❒No

Heating (Mechanical Heating Heat Pump) (Check and Record Readings)

After about 10 minutes of operating in the heating mode, check and record the following data points.

Inside Temperature (IAT)	______ ºF
Outside Temperature (OAT)	______ ºF
Entering Condenser Air Temperature (Should be same temp as OAT)	______ ºF
Leaving Condenser Air Temperature (Acceptable Range 15º - 20º below OAT)	______ ºF
Return Air Temperature (RAT) db (Should be same temp as IAT)	______ ºF
Return Air Temperature (RAT) wb (used to calculate RH% of Return Air)	______ ºF
Supply Air Temperature (SAT) db (Acceptable Range 15º - 20º above RAT)	______ ºF
Return Air Temperature (SAT) wb (used to calculate RH% of Supply Air)	______ ºF
Compressor Amps (L1)	______ ºF
Compressor Amps (L2)	______ ºF
Compressor Amps (L3)	______ ºF

Auxiliary Heat (ODT)

While the system is operating in "Mechanical Heating Mode". Activate Auxiliary Heat (ODT).

* Your unit may be configured with an outdoor thermostat configured as "Auxiliary Heat" or "Mechanical Heat Lockout", or No outdoor thermostat. *

Do Not change the temperature setpoint on the thermostat / control. Simply adjust the ODT setpoint to approximately four degrees below the current outdoor temperature. After the short delay, the unit will activate Auxiliary Heat, start heating with Both Mechanical heat and Electric heat. Notice: system did not turn off. The Only change that occurred is "Electric Heat" turned On. *Note: The "S" Circuit (Marvair Heat Pump control board) must be set to "No", to allow Auxiliary Heat.*

- ✓ Is the indoor blower motor (IBM) On?.. ❒Yes ❒No
- ✓ Is the Compressor On?... ❒Yes ❒No
- ✓ Is the Condenser Fan (CFM) On?.. ❒Yes ❒No
- ✓ Is the Heater On? (Clamp an AmpProbe on one leg of the heater contactor to verify).... ❒Yes ❒No

Mechanical Heat Lockout ODT (Electric Heat ONLY

While the system is operating in "Mechanical Heating Mode". Activate Mechanical Heat Lockout (ODT).

* Your unit may be configured with an outdoor thermostat configured as "Auxiliary Heat", "Mechanical Heat Lockout", or No outdoor thermostat. *

Do Not change the temperature setpoint on the thermostat / control. Simply adjust the ODT setpoint to approximately four degrees below the current outdoor temperature. After the short delay, the unit will activate Mechanical Heat Lockout, start heating with Only Electric heat. Notice: system did not turn off. "Mechanical Heat" turned Off and "Electric Heat" turned On. *Note: The "S" Circuit (Marvair Heat Pump control board) must be set to "Yes", to allow Mechanical Heat Lockout.*

- ✓ Is the indoor blower motor (IBM) On?.. ❒Yes ❒No
- ✓ Is the Compressor Off?.. ❒Yes ❒No
- ✓ Is the Condenser Fan (CFM) Off?.. ❒Yes ❒No
- ✓ Is the Heater On? (Clamp an AmpProbe on one leg of the heater contactor to verify).... ❒Yes ❒No

Heating (Check and Record Readings)

After about 10 minutes of operating in the heating mode, check and record the following data points.

Inside Temperature (IAT)	______ºF
Outside Temperature (OAT)	______ºF
Return Air Temperature (RAT) db (Should be same temp as IAT)	______ºF
Return Air Temperature (RAT) wb (used to calculate RH% of Return Air)	______ºF
Supply Air Temperature (SAT) db (Acceptable Range 15º - 20º below RAT)	______ºF
Return Air Temperature (SAT) wb (used to calculate RH% of Supply Air)	______ºF
Heater Contactor Amps (HCAL1)	______ºF
Heater Contactor Amps (HCAL2)	______ºF
Heater Contactor Amps (HCAL3)	______ºF
Heater Circuit Volts (L1&L2)	______ºF
Heater Circuit Volts (L1&L3)	______ºF
Heater Circuit Volts (L2&L3)	______ºF

- ✓ Calculate Heater kW

Single Phase Units

Heater kW = (HCAL1*L1&L2)/1000 = ________________kW.

Example: $\frac{\text{HCAL1 * L1\&L2}}{1000}$

Measured Voltage: L1&L2 = 241 Volts

Measured Amperage: L1 = 20.7 Amps

4988.7 / 1000 = 4.99kW (5kW)

Three Phase Units

Heater kW = (HCAL1*L1&L2) + (HCAL2*L1&L3) + (HCAL3*L2&L3)/1000 = ___________kW.

Example: $\dfrac{(HCAL1*L1\&L2) + (HCAL2*L1\&L3) + (HCAL3*L2\&L3)}{1000}$

Measured Voltage: L1&L2 = 241 Volts
Measured Amperage: L1 = 8.28 Amps
1995.48

Measured Voltage: L1&L3 = 243 Volts
Measured Amperage: L1 = 8.22 Amps
1997.46

Measured Voltage: L1&L2 = 235 Volts
Measured Amperage: L1 = 8.57 Amps
2013.95

6006.89 / 1000 = 6.01kW (6kW)

Outdoor Thermostat Set Point ODT

Adjust the ODT setpoint to the temperature appropriate for your application (either "Auxiliary Heat" or "Mechanical Heat Lockout"). If you need assistance selecting the proper temperature contact tour HVAC system designer responsible for the application. After adjusting the ODT for your application, the HVAC system will go back to Mechanical Cooling. *Note: The range of the Outdoor Thermostat is 0ºF to 50ºF.*

- ✓ Is the indoor blower motor (IBM) On?.. ❒Yes ❒No
- ✓ Is the Compressor On?.. ❒Yes ❒No
- ✓ Is the Condenser Fan (CFM) On? (Ambient conditions may be delay CFM)................. ❒Yes ❒No
- ✓ Is the Heater Off? (Clamp an AmpProbe on one leg of the heater contactor to verify) ... ❒Yes ❒No

Heating Mode Stop (Mechanical Heating Heat Pump)

Adjust the heating setpoint to approximately two degrees below the current indoor temperature. The unit will sequence off, stop heating.

- ✓ Did the Compressor stop?... ❒Yes ❒No
- ✓ Did the Condenser Fan (CFM) stop?.. ❒Yes ❒No
- ✓ Did the indoor blower motor (IBM) Stop? .... ❒Yes ❒No

** If you see readings that are out of the normal range or features that seem to be operating incorrectly. **
Please provide a description of the issue in the Notes section below and if you need help, call:
Marvair Technical and Warranty Support: (888) 726-2734

This number is manned M-F, 8:00am to 5:00pm eastern.
Technical support calls will be returned M-F, 5:00pm to 8:00pm eastern.
Only Emergency Dispatch calls will be returned M-F, 8:00pm to 8:00am Eastern (and weekends & holidays).

Notes: