



Scholar III™
Heat Pump & Air Conditioner
(CSI 15740)

INSTALLATION AND START-UP

Model VAISA
2, 2.5, 3, 3.5 & 4 Tons

WARNING

SAFETY REQUIREMENTS

- 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.
- Follow all safety codes.



Scholar III™



MODEL NO.: _____

SERIAL NO.: _____

DATE OF START-UP: _____

Manufactured By:

Marvair Division of the AIRXCEL® Commercial Group

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

How To Use This Manual

This manual is intended to be a guide to the Marvair® Scholar III™ line of vertical packaged heat pumps and air conditioners. This manual covers the installation and start-up of the Scholar III heat pumps and air conditioners, models VAISA, with two stage compressors. 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.

If you are installing the Scholar III™ heat pump or air conditioner, first read the entire manual and Appendices for any of the options and accessories before beginning the installation. The Appendices describe the installation of the base stand, the plenum, trim strips, wall brackets and outdoor louvers.

If a malfunction occurs, follow this troubleshooting sequence:

1. Make sure you understand how the Scholar III™ unit works.
2. Identify and correct installation errors.
3. 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, resulting in DAMAGE upon START-UP.
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 & 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 reclaiming or adding refrigerant
6. Use COMMON SENSE - BE SAFETY CONSCIOUS

This is the safety alert symbol . When you see this symbol on the air conditioning unit and in the instruction manuals be alert to the potential for personal injury. Understand the signal word DANGER, WARNING and CAUTION. 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 info that will result in improved installation, reliability or operation.

Specifications subject to change without notice.

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SECTION 15700

HEATING, VENTILATING AND AIR CONDITIONING EQUIPMENT

INSTALLATION AND START-UP INSTRUCTIONS

FOR SCHOLAR III™ HEAT PUMP AND AIR CONDITIONER MODEL VAI (15740)

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SECTION 15700

HEATING, VENTILATING AND AIR CONDITIONING EQUIPMENT

1.01 TOOLS/FIELD FURNISHED SUPPLIES

WARNING

TO AVOID PERSONAL INJURY, ADEQUATE PROTECTIVE CLOTHING MUST BE WORN AND PRECAUTIONS IN HANDLING AND INSTALLING THIS EQUIPMENT MUST BE PRACTICED AT ALL TIMES.

- Power Drill/Driver & Extension
- T25 TORX Bits
- 5/16 hex bit
- Needle Nose Pliers
- Wire Stripper/Cutter
- Spirit Level
- Tape Measure
- Screwdriver with Slotted Bit
- Caulk Gun
- Sealant Caulk (tube)
- Wire Nuts for Power and Control Wiring Gauges
- Supplies to Install PVC Condensate Drain
- Floor Fasteners for Cabinet (4 required for 1/2" pass through holes) - Appropriate Drivers for Floor Fasteners
- Supplies to Install Wet Heat Coil (Steam or Hot Water) (if appropriate)
- 25 Ft. of Polyurethane Foam Strips, 1" Wide x 1/2" Thick, Adhesive Backing, for Scholar III/Wall Interface.

1.02 INSPECTION/UNPACKING/HANDLING

- A. The Scholar III™ heat pumps and air conditioners are shipped to the job site on 4x4 wood base framing, and enclosed in shrink wrap.

Freeblow and ducted plenums are shipped on wooden skids and enclosed in shrink wrap.

Outdoor louvers/collar assemblies, louvers and collars are shipped in corrugated containers.

Base stands are shipped on a wooden skid and are enclosed in shrink wrap.

Trim pieces are enclosed in corrugated carton and strapped to a wooden skid.

- B. **Immediately upon delivery to the jobsite, each Scholar III™ heat pump or air conditioner and the appropriate additional accessories should be inspected for visible and concealed damage. All damage must be reported to the freight carrier within 15 days, on the freight carrier's form.**

The Scholar III™ heat pump or air conditioner and additional accessories should be stored inside and not exposed to outdoor weather conditions. Do not remove equipment from packing until it is ready to be installed.

 WARNING

DO NOT STACK THE UNIT OR ANY ACCESSORIES ON TOP OF ONE ANOTHER. THE UNITS SHOULD ALWAYS REMAIN IN THE UPRIGHT POSITION WHEN BEING SHIPPED, STORED, HANDLED OR INSTALLED.

DO NOT STORE THE UNIT OR ACCESSORIES IN OUTDOOR WEATHER CONDITIONS.

 WARNING

THE SCHOLAR III UNIT WEIGHS IN EXCESS OF 1,000 LBS. WHEN MOVING THE UNIT, SUFFICIENT MANPOWER AND MECHANICAL EQUIPMENT MUST BE USED TO PREVENT DAMAGE TO THE UNIT AND INJURY TO PEOPLE. TO FACILITATE MOVING THE SCHOLAR III UNIT, IT MAY BE NECESSARY TO LAY THE UNIT ON ITS SIDE ON DOLLIES. IF THIS IS REQUIRED, USE TWO DOLLIES AND PLACE THE UNIT ON ITS RIGHT SIDE (WHEN FACING THE SCHOLAR II UNIT). THE UNIT SHOULD NOT REMAIN IN THIS POSITION ANY LONGER THAN REQUIRED FOR THE ACTUAL MOVING PROCESS. IF THE SCHOLAR III UNIT HAS BEEN PLACED ON ITS SIDE, DO NOT ATTEMPT TO START THE UNIT UNTIL THE UNIT HAS BEEN UPRIGHT FOR AT LEAST 24 HOURS.

- C. Note the unit identification label is located on the right side cabinet panel at the lower front corner. The identification label has the model and serial number on it and the type of refrigerant and amount of refrigerant charge.

IMPORTANT

WHEN THE HEAT PUMP OR AIR CONDITIONER IS INSTALLED, MODEL NUMBER AND SERIAL NUMBERS ARE TO BE RECORDED ON THE COVER OF THIS MANUAL AND MAINTAINED IN A LOCATION FOR IMMEDIATE ACCESS, WHEN REQUESTING FURTHER INFORMATION CONCERNING THIS EQUIPMENT.

Serial Number Date Code

A = January	E = May	J = September	D = 2014	H = 2018	M = 2022
B = February	F = June	K = October	E = 2015	J = 2019	N = 2023
C = March	G = July	L = November	F = 2016	K = 2020	P = 2024
D = April	H = August	M = December	G = 2017	L = 2021	R = 2025

For the Scholar III™ heat pump or air conditioner system, the identification numbering system is shown below. The model identification number is located as shown in Figure 1.

VAI	S	A	..	..	.	...	.	. III	...
Vertical Air Indoor Source	2-Stage Compressor	Refrigerant R-410A	Nominal Cooling 24 = 24,000 BTUH 30 = 29,000 BTUH 36 = 35,000 BTUH 40 = 40,500 BTUH 48 = 48,000 BTUH	System Type HP = Heat Pump AC = Air Conditioner	Power Supply A = 208/230V, 1,60Hz C = 208/230V, 3,60Hz D = 460V, 3,60Hz	Heat - kW 000 - No Heat 050 = 5 kW 075 = 7.5 kW 100 = 10 kW 150 = 15 kW 099 = 99 (Hot Water)	Configuration N = Manual Damper (std) H = GreenWheel® ERV Q = GreenCube® ERV B = Motorized Damper J = Power Vent with Motorized Damper	Configuration III = Scholar III	Cabinet Color 100 = Beige 200 = Gray
								Special Options G = Hot Gas Reheat/Dehumidification	

Figure 1. General External Component Identification and Access to Scholar III™ Heat Pump or Air Conditioner



1.03 STANDARD CONTROLS

A. Programmable Logic Controller (PLC) Microprocessor

Scholar III™ heat pumps and air conditioners use a factory installed PLC microprocessor to control the operation, the safety switches and function options. LED's show operational status and provide assistance with diagnosis if troubleshooting is ever required. Various control functions are field selectable. The PLC is also capable of communicating to PLC's in other Scholar units to allow run time leveling and does not require additional equipment installed in the Scholar III unit. The PLC microprocessor provides improved reliability because of the reduction of components, the components utilized are more durable and the control box wiring has been simplified. Pertinent statistical data about the life of the refrigeration system can be accessed through the PLC.

The PLC microprocessor provides for the following control and operation functions:

- **Anti-Short Cycle Timer** - Prevents the compressor from destructive short cycling due to momentary power interruptions. One of three time intervals can be field selected.
- **Defrost Timer (heat pumps only)** - Adjustable defrost control that is based upon both time and temperature. The time interval is adjustable from 30 to 90 minutes in one minute increments.
- **BAS Control Relay** - Provides 24 VAC coil to control operation from Building Automation System (BAS). Note - an additional BAS control relay can be added when 120 or 240 VAC coils are required.

B. High and Low Refrigerant Pressure and Loss of Charge Switches

These switches render the compressor and outdoor fan motor inoperative whenever the limits of the pressure switches are exceeded. In the event of high pressure, the Scholar III™ heat pump or air conditioner will turn off and lockout.

The low pressure (A/C) and loss of charge (HP) switch is bypassed for 8-1/2 minutes during each start-up. The system will lockout if the low pressure switch opens three times within one hour or if it does not reset within 8-1/2 minutes of the Scholar III™ heat pump or air conditioner start-up.

The high and low pressure and loss of charge switches are resettable at the wall thermostat or by turning power off and then on to the Scholar III™ heat pump or air conditioner. A fault LED located on the PLC indicates that a lockout has occurred and whether it is due to high or low refrigerant pressure.

C. Heat Related Controls

The **outdoor thermostat (heat pump only)**, factory set at 40°F, determines the temperature at which the supplemental electric heat (or wet heat) turns on to heat the classroom. The temperature set point can be adjusted in the field for local conditions. When the outdoor thermostat activates wet heat, the compressor simultaneously turns off.

The **electric heat control (heat pump only)** allows the user to select whether the electric heat operates simultaneously with the compressor. The units are wired at the factory for simultaneous operation. For non-simultaneous operation, a wire is moved from one terminal to another in the control box.

The **electric heat during defrost (heat pump only)** allows the user to select whether electric heat operates when the heat pump enters into the defrost mode. The units are wired at the factory to prevent the electric heaters from operating during the defrost mode. For operation during defrost, a wire is moved from one terminal to another in the control box. NOTE: for operation of the electric heat during defrost, the electric heat control must be configured to allow simultaneous operation of the electric heat and the compressor.

- D. **The motorized fresh air damper with PowerVent and GreenWheel® ERV** ventilation options are equipped with a **fresh air fan speed control**. The fresh air fan speed control controls both the ventilation intake and exhaust blowers together, automatically balancing the intake and exhaust cfm up to 450 cfm. An optional fan speed control allows independent operation of the intake and exhaust air blowers.

IMPORTANT

MINIMUM AIR FLOW IS REQUIRED FOR PROPER OPERATION.

1.04A THERMOSTATS AND SUB-BASES

- A. Thermostats for Air Conditioners and Heat Pumps with two stages heating.
1. **Digital, 7 day, 5-2 and 5-1-1 day programmable thermostat.** Two stage heat/Two stage cool. Manual or auto changeover. Fan: Auto & On. Permanent retention of setting on power loss. Field adjustable temperature calibration. Adjustable max. setpoint for heating and min. adjustable setpoints for cooling. Adjustable temperature differential. Keypad lockout. Status LED. °F or °C selectable. Title 24 compliant. For use with models VAIA and VAISA. Marvair P/N 50107.
 2. **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. For use with models VAIA and VAISA. Marvair P/N 50248.
 3. **Digital, non-programmable thermostat.** Two stage heat/Two stage cool. Manual or auto changeover. Fan: Auto & On. Permanent retention of setting on power loss. Field adjustable temperature calibration. Adjustable max. setpoint for heating and min. adjustable setpoints for cooling. Adjustable temperature differential. Keypad lockout. Status LED. °F or °C selectable. For use with models VAIA and VAISA. Marvair P/N 50252.
 4. **MAR7000 thermostat.** See Product Data Sheet for complete description.

5. The **direct digital control** (DDC) interfaces with the building automation system (BAS) is to be defined by the specifier, in consultation with the Marvair® sales representative. Marvair will factory install the **DDC** sent by the DDC manufacturer, and purchased by the customer.
- B. Thermostats for air conditioners or heat pumps with only one stage of heating.
1. **Digital, non-programmable thermostat.** 1 stage heat, 1 stage cool. Fan switch: Auto & On. Manual changeover system switch: Cool-Off-Heat. Low temperature protection. °F or °C selectable. Thirty minute power loss memory retention. For use with models VAIA only. Marvair P/N 50121.
 2. **Digital, seven day programmable thermostat.** 1 stage heat, 1 stage cool. Fan switch: Auto & On. Auto changeover. Keypad lockout. Non-volatile program memory. Title 24 compliant. For use with models VAIA only. Marvair P/N 50123.
 3. **Digital, non-programmable thermostat.** One stage cool/One stage heat. Manual or auto changeover. Fan mode: Auto or On. Permanent retention of settings upon power loss. Field adjustable temperature calibration. Max heat and minimum cool set points. Adjustable temperature differential. Remote sensor capable. Keypad lock out. Status LED. °F or °C selectable. For use with models VAIA only. Marvair P/N 50186.
- C. Humidity Controller.
All units with Electric reheat or Hot Gas Reheat must have a method of signaling the reheat function. If a DDC system is not being used, a Humidity Controller must be installed.
- Digital Humidity Controller. Programmable dehumidistat, humidistat and ventilation control. Time of day can be set for dehumidifier, humidifier or ventilation to run. Auto changeover for humidification or dehumidification. Permanent memory retention of set points. Humidity sensor can be field calibrated. High & low dehumidification set points. Outdoor temperature and humidity sensor included. °F or °C selectable. Marvair P/N 50254.
- D. Thermostat guards
1. Clear thermostat guard with keylock & clear plastic cover & base for 50121, 50123, 50186, 50107 & 50252 thermostats. Marvair P/N 50092.
 2. Clear thermostat guard with keylock & clear plastic cover & base for 50248 thermostat. Marvair P/N 50119.

1.04B OPTIONAL CONTROLS

- A. All units have the following control options available.
1. The **spring wound timer** is a field installed kit used to enable operation of the heat pump for up to six hours, or override the building automation system. (p/n 08557)
 2. The **hard start kit** is field installed and used on single phase power models to overcome hard starting conditions. Note: Hard start kits are generally not recommended for use on scroll compressors.
 3. The **motorized fresh air damper with PowerVent and GreenWheel® ERV** ventilation options can be equipped with an exhaust fan air speed control, which controls the ventilation exhaust blower independent of the fresh air intake blower.

1.05 LOCATION SELECTION AND PREPARATION

WARNING

THE SCHOLAR III™ HEAT PUMP AND AIR CONDITIONER MUST BE INSTALLED IN CONFORMANCE WITH ALL APPLICABLE LOCAL AND NATIONAL ELECTRICAL, PLUMBING AND BUILDING CODES.

- A. The Scholar III™ heat pump and air conditioner must be installed on an outside wall for access to outside air. The wall opening dimensions are shown in Figure 2. It must not interfere with any windows or doors to the outside. The outdoor air path must not be impeded by shrubbery or other obstructions. Do not locate the Scholar III heat pump or air conditioner where noxious fumes or gas can be drawn in from the outdoor air and introduced in the classroom.

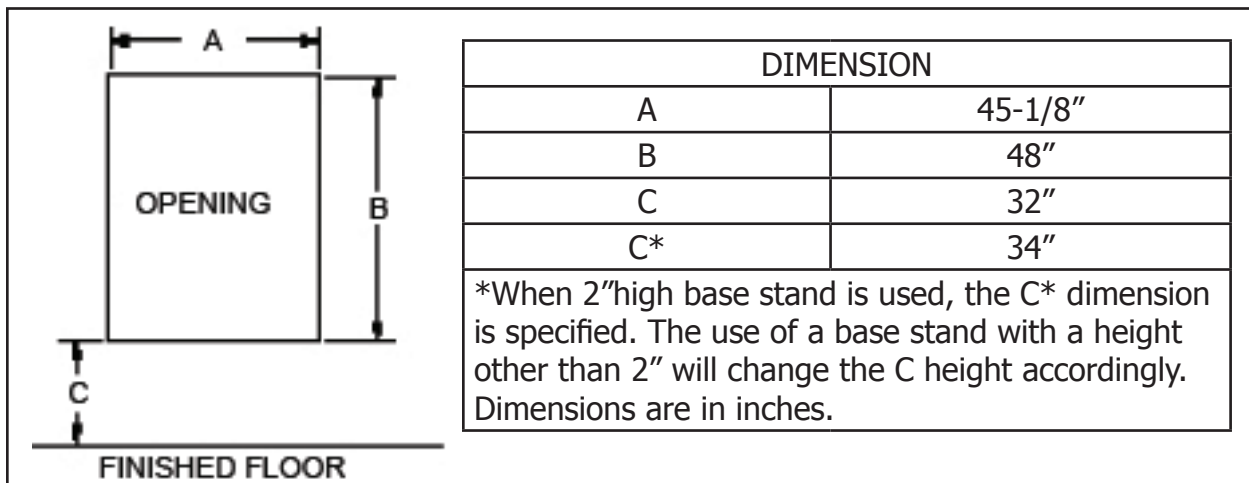
The Scholar III™ heat pump or air conditioner must be installed on a hard, level, smooth surface such as concrete, wood or tile. Do not install the unit on a carpeted surface. Do not locate the either side of the Scholar within 12" from a wall. The front doors swing open to allow access to all components. Do not put anything immovable in front of the Scholar III unit

To remove carpet from where the "footprint" of the unit will be, when installed, carefully measure, cut and remove carpet from an area based on the dimensions of the Scholar III cabinet as described in Figure 3; and allowing for any offset or standoff from the finished interior surface of the wall.

Prior to installation of the Scholar III™ heat pump or air conditioner, provisions are to be made for the following, as appropriate.

1. **Wall opening** dimensions for the Scholar III™ heat pump and air conditioner are as shown in Figure 2. The unit is designed for installation through a 14 inch thickness finished wall. For finished wall depth less than 14 inches, the unit will stand off from the interior finished wall and it will be necessary to order and install trim pieces to provide a finished, color coordinated enclosure that fits flush to the interior wall.

Figure 2. Wall Opening Dimensions for Scholar III™ Heat Pump and Air Conditioner.



1.06 POWER AND CONTROL WIRING (ROUGH-IN)

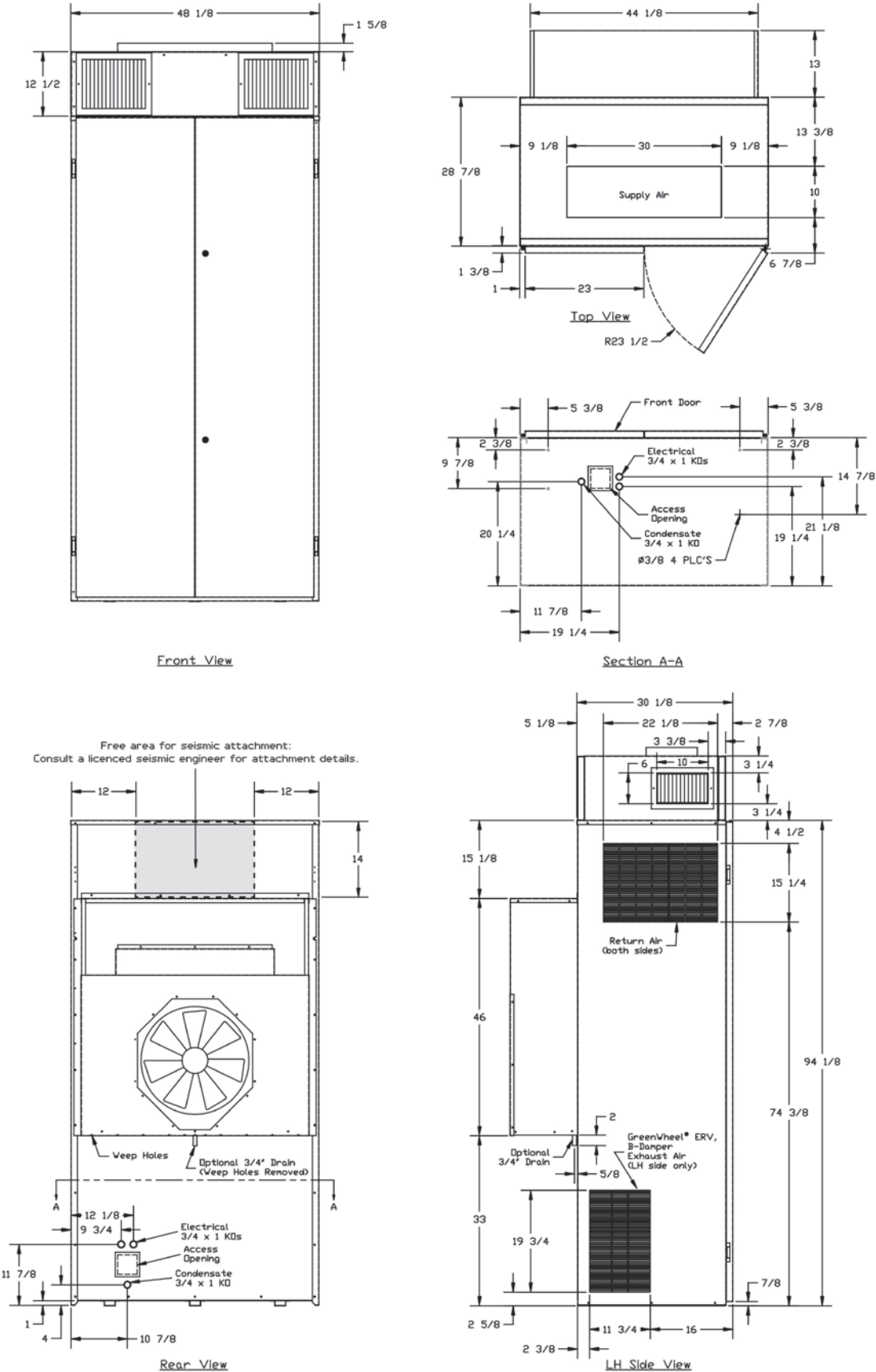
- A. **Line voltage power supply** must be sized to provide adequate power for the operation of the specific model heat pump and, if chosen, the electric heat option. Information on line power requirements, line sizing and fuse sizing is shown on data label on unit. The power leads can enter the heat pump or air conditioner either through the bottom or rear. The locations of the knockouts for power leads are shown in Figure 3. Depending on the location of the Scholar III heat pump or air conditioner relative to the outside wall, the exact rough-in location for power lines in the school room can be determined. Six feet of power line should be available inside the cabinet for routing and connecting the power lines, after the Scholar III unit is installed. If entry is from bottom, the stub-out should be no higher than 1/2" from the classroom floor to allow the unit to slide into the wall opening.

IMPORTANT

IF "S CIRCUIT" POSITION IS SELECTED ON THE ELECTRIC HEAT CONTROL (SEE ARTICLE 1.11), LOWER MINIMUM CIRCUIT AMPACITY MAY BE PERMITTED.

- B. **Low voltage wiring** can be roughed in to either the back (outside wall) or bottom (floor) of the cabinet. Six feet of low voltage wire should be available for routing and termination within the unit. If the entry is from the bottom, the stub-out should be no higher than 1/2" from the classroom floor to allow the Scholar III heat pump and air conditioner to slide into the wall opening. Reference Figure 3 as noted above, for control wiring entry points into the cabinet.

Figure 3. Scholar III™ Heat Pump and Air Conditioner Dimensional Data



1.07 CONDENSATE DRAIN LINE (ROUGH-IN)

- A. The condensate drain line can be roughed in to drain the Scholar III™ heat pump or air conditioner from either the back (outside) or the bottom (floor). The locations for the condensate stub-outs can be determined from the cabinet knockouts identified in Figure 3. The factory installed condensate connection within the cabinet is a female PVC fitting designed for a 3/4" slip connection.

CAUTION

INSPECT THE FLEXIBLE CONDENSATE DRAIN LINE INSIDE THE SCHOLAR III™ UNIT (WHEN INSTALLED) FOR POSSIBLE TUBING COLLAPSE. CORRECT AS APPROPRIATE.

1.08 WET HEAT (ROUGH-IN)

- A. **Hot water coil** connections are made by dropping supply and return lines through the knockout locations in the top of the plenums, as described in Figure 3 for the heat pump. Access to the interior cabinet is through these factory-notched locations.

1.09 PREPARATION OF THE SCHOLAR III™ HEAT PUMP AND AIR CONDITIONER

WARNING

TO AVOID PERSONAL INJURY, ADEQUATE PROTECTIVE CLOTHING MUST BE WORN AND PRECAUTIONS IN HANDLING AND INSTALLING THIS EQUIPMENT MUST BE PRACTICED AT ALL TIMES.

After the rough-in is complete, the Scholar III™ heat pump or air conditioner and accessories must be prepared for final installation prior to start-up. The following items are to be completed prior to final installation.

- A. Remove the two shipping screws that at the top and bottom of the front door.
- B. Open the front door for access to the lag bolts that hold the shipping skids in place. Unscrew the 4 lag screws. Note: access to the back right lag screw is easier through the the condensate opening in the back panel beneath the outdoor air box. Remove the shipping skids.
- C. To facilitate moving the Scholar through doors, the out door air box can be removed. To remove the outdoor air box, remove the 16 screws - 6 on each side and 4 along the top. Remember to reinstall the outdoor air box before placing the Scholar into its final position in the classroom.
- D. If the base stand accessory was chosen, install the base stand in accordance with installation instructions included with the base stand or see Appendix B at end of manual.
- E. Hot Water Plenum. The protective film on top of the Scholar III™ cabinet and on the plenum must be removed to install the plenum. Fasten the plenum to the top of the cabinet in accordance with the instructions included with the plenum or Appendix C at end of manual.
- F. Freeblow Plenum/Ducted Plenum. All Scholar III™ heat pump and air conditioners use an electronically commutated (EC) blower motor to distribute the conditioned air throughout the classroom. The EC motor automatically adjusts its speed to maintain the proper air flow over a wide variety of external static pressures in an air

distribution system. If only the freeblow plenum is used (no external duct work), the blower automatically slows down. When duct is used, the EC blower automatically speeds up to compensate for the additional static pressure. The blower automatically slows down when in the ventilation mode (compressor off) to deliver the required cfm of fresh air to the classroom. No field adjustment of the blower is required. Install plenum to top of cabinet after shipping plate has been removed from electric heater (if appropriate). Instructions are included with plenum or see Appendix C at end of manual.

The air distribution system which is field supplied and installed downstream of the specified **ducted plenum** must be engineered to assure sufficient air flow, even under adverse conditions, such as dirty filters. The information provided in Figure 1, Appendix A should be used to design the air distribution system duct size leaving the Scholar III™ heat pump or air conditioner, keeping the external static pressure to a minimum.

Applications using duct work should be designed and installed in accordance with the current edition of the National Fire Protection Association codes and standards 90A and 90B. 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. The duct work 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 ductwork 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.

- H. Install the outdoor louver/collar assembly to the outdoor side of the wall opening. The louver/collar assembly may be fastened to the air box (or air box extension) as described in the instructions for outdoor louvers/collars. The louver must be installed with the blades pointing downward on the outside and the louver and the collar must be water sealed to the outside wall surface with the appropriate caulking material. See the instructions that come with the outdoor louver for installation details or see Appendix F at the end of this manual.
- I. Weather Panels are field supplied and do not come with the Scholar III™ heat pump or air conditioner. If a weather panel covers the wall opening described in Figure 2, remove the weather panel prior to installing the unit into the wall opening.
- J. After measuring for correct locations of power/control wiring entry, condensate drain line, and the appropriate wet heat lines, remove the appropriate knock-out access ports from the cabinet. Be sure they align with the rough-in points for the noted pipes and wires. Be sure electrical, condensate and wet heat piping will not cause interference or be damaged by sliding the Scholar III heat pump or air conditioner into place.

IMPORTANT

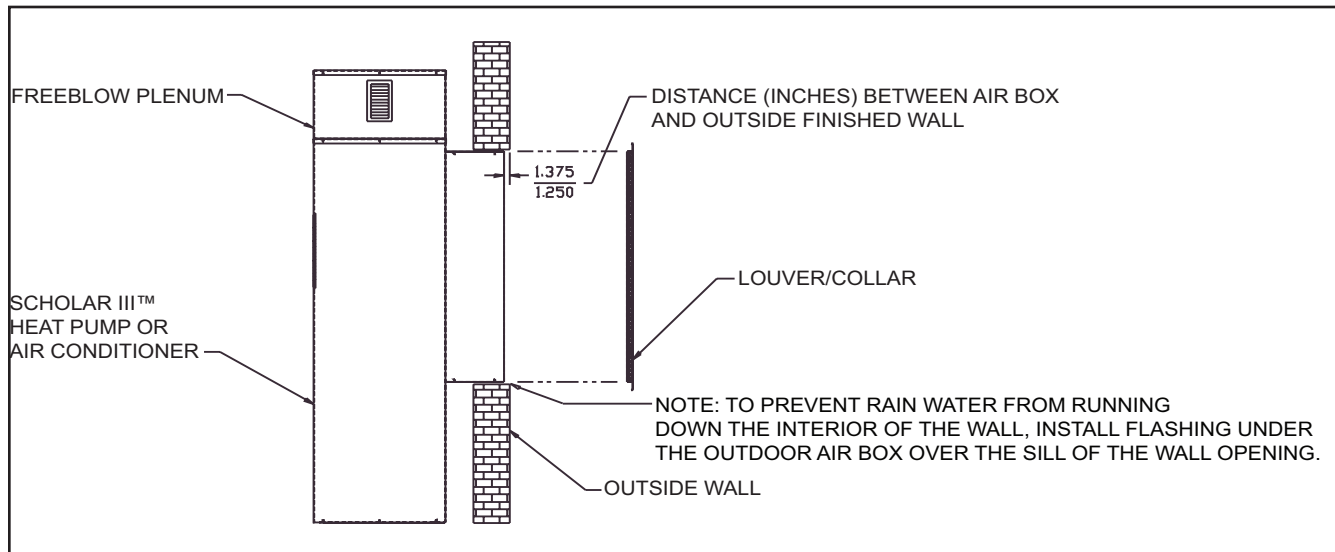
BE SURE TO SEAL THE OPEN AREAS BETWEEN LINES ENTERING THE SCHOLAR III™ CABINET AND THE KNOCKOUT OPENINGS, TO PREVENT AIR LEAKAGE.

- K. If the heat pump or air conditioner is to fit flush against the inside of the exterior wall, cut to length, strips of open cell polyurethane foam 1" wide by 1/2" thick with adhesive backing, field supplied, on one side. This may be applied to the back of the heat pump and plenum along and flush with the two vertical and top horizontal edges. These strips will provide a finished appearance to the wall/heat pump interface and provide a seal between the equipment and wall. If the heat pump or air conditioner is applied with a side against a wall (in a corner), use the same strip material on the end panel along the side vertical edge.
- L. Prior to sliding the Scholar III™ heat pump or air conditioner into the wall opening, check to be sure that the floor surface is hard, smooth and level (concrete, wood, vinyl tile or the equivalent). If the floor is carpeted, cut out an appropriate "footprint" based on the Figure 3 drawings and the location of the unit relative to the inside finished wall (flush or offset). Be sure the surface is level or provisions are made to level the unit upon installation.
- M. If the outdoor air box was removed, reinstall it prior before placing the Scholar III™ unit in its final position. Install the outdoor air box onto the back of the Scholar™ III heat pumps or air conditioners before sliding the unit into position. Apply a weather-proof sealant; i.e., silicone, onto the back of the Scholar III heat pump or air conditioner prior to installing the outdoor air box to prevent water leaks.

1.10 INSTALLATION THROUGH THE OUTSIDE WALL.

- A. Slide the Scholar III™ heat pump or air conditioner into the wall opening slowly, being careful to clear the appropriate stubouts. The heat pump or air conditioner, when installed properly, should have a clearance between the air box outside edge and the finished outside wall as shown in Figure 4. Proper fit up of the louver/collar assembly to the air box to the outside wall requires the noted recess dimension to be maintained after installing the unit.
- B. To minimize sound in the classroom, insulate all four sides of the outdoor air box that is internal to the classroom with the following:
 - Layer 1: 1/2" Rubatex
 - Layer 2: 1-1/2: Duct Board

Figure 4. Dimension Between Scholar III™ Heat Pump or Air Conditioner Air Box and Finished Outside Wall for Outdoor Louver/Collar Assembly Installatio



CAUTION

WHEN FASTENING LOUVER/COLLAR ASSEMBLY TO AIR BOX, DO NOT OVERTIGHTEN LOUVER SCREWS. OVERTIGHTENING SCREWS WILL CAUSE DAMAGE AND WARP THE LOUVER/COLLAR ASSEMBLY. TO PREVENT WATER FROM RUNNING DOWN THE INTERIOR OF THE WALL, INSTALL FLASHING UNDER THE OUTDOOR AIR BOX, OVER THE SILL OF THE WALL.

- C. Check (with a spirit level) to see that the heat pump or air conditioner is level and plumb. If it is not, take the appropriate corrective action to level and plumb the system. 1/8" thick washers with 1/2" pass through holes can be installed appropriately under the fastener holes in the base of the heat pump or air conditioner to make the system level and plumb.
- D. Secure the heat pump or air conditioner to the floor with appropriate field supplied fasteners, through the four 1/2" diameter through holes in the base.
- E. If the Scholar III™ heat pump or air conditioner is offset from the outside wall, trim strips should be installed at this time. Check instructions that come with trim strips for installation or see Appendix D at end of this manual.
- F. If appropriate, install wall brackets to the inside surface of the outside wall and to the cabinet of the Scholar III™ unit, at this time. Check instructions with wall brackets for installation or see Appendix E at end of this manual.

1.11 ELECTRICAL, CONDENSATE AND WET HEAT HOOK-UPS

WARNING

ALL ELECTRICAL, PLUMBING, AND REFRIGERATION WORK MUST MEET THE REQUIREMENTS OF LOCAL AND NATIONAL CODES AND ORDINANCES. WORK SHOULD BE DONE ONLY BY PROFESSIONALLY QUALIFIED AND TRAINED SERVICE PEOPLE.

IMPORTANT

STUBOUTS SHOULD BE LOCATED (FROM THE FLOOR OR WALL) TO BE DIRECTLY OPPOSITE THE SELECTED CABINET KNOCKOUT ON THE CABINET, AS SHOWN IN FIGURE 3. THIS IS A REQUIREMENT IF A BASE STAND IS TO BE INSTALLED AND STUBOUTS ARE COMING THROUGH THE FLOOR.

- A. 1. For line voltage wiring, the power supply must have the correct voltage, phase and ampacity for the selected Scholar III™ unit. Check the data label on each Scholar III unit to determine these values.

Be sure that the power to the line voltage wiring is off prior to hooking-up the wiring within the Scholar III™ cabinet. Remove the lower front panel for access to the disconnect. Figure 5 illustrates the disconnect location with the lower front panel removed. **Turn the disconnect to “OFF” position.**

The electrical control compartment is located behind the front door at the lower right hand corner of the unit. The electrical schematic for the heat pump or air conditioner is contained in a pocket on the inside of the middle front panel door. Figure 6 shows typical control centers for the Scholar III heat pump and air conditioner. Figures 7 and 8 show typical single and three phase wiring diagrams for the Scholar III heat pump and air conditioner.

2. Power supply service must be with the allowable voltage range stamped on the identification plate. **To operate a nominal 230/208V model on 208V, change the transformer line tap from 240V to 208V, following the instructions on the electrical schematic.**
3. Connect the main power wires coming into the cabinet to the input side of the disconnect. (L1 and L2 for single phase units and L1, L2 and L3 for three phase models.) Install the ground wire on the ground lug.

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 MARVAIR® WARRANTY.

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.

- B. 1. Low voltage wiring must be class 1.
- 2. For Scholar III™ units with a remote (wall mounted) thermostat, route the low voltage wiring from the point of entry into the cabinet, upward through the raceway adjacent to the disconnect shown in Figure 5.

Route wires into the terminal strip compartment through the openings provided. Connect wiring to the terminal strip as shown in Figure 9 for a remote, wall mounted thermostat installation.

Figure 5. Electrical Control Box, Access for Ventilation Filters and GreenWheel® ERV

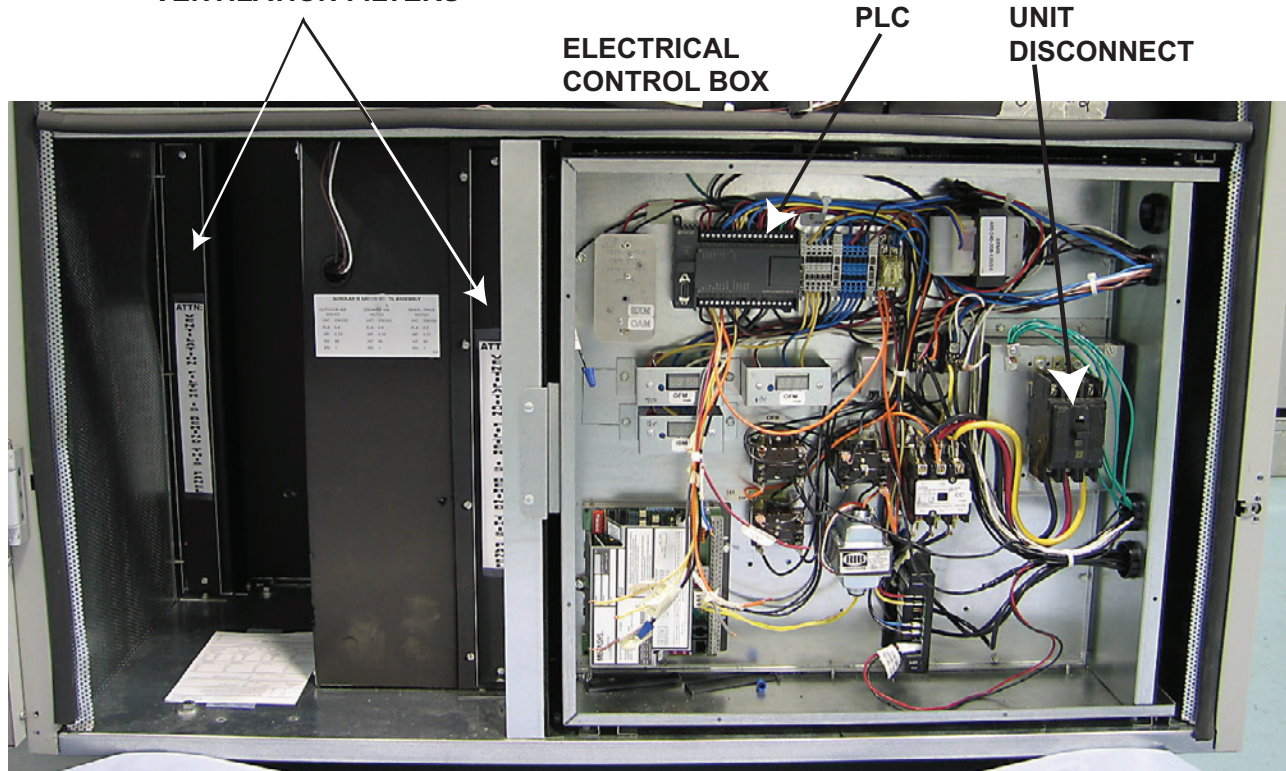
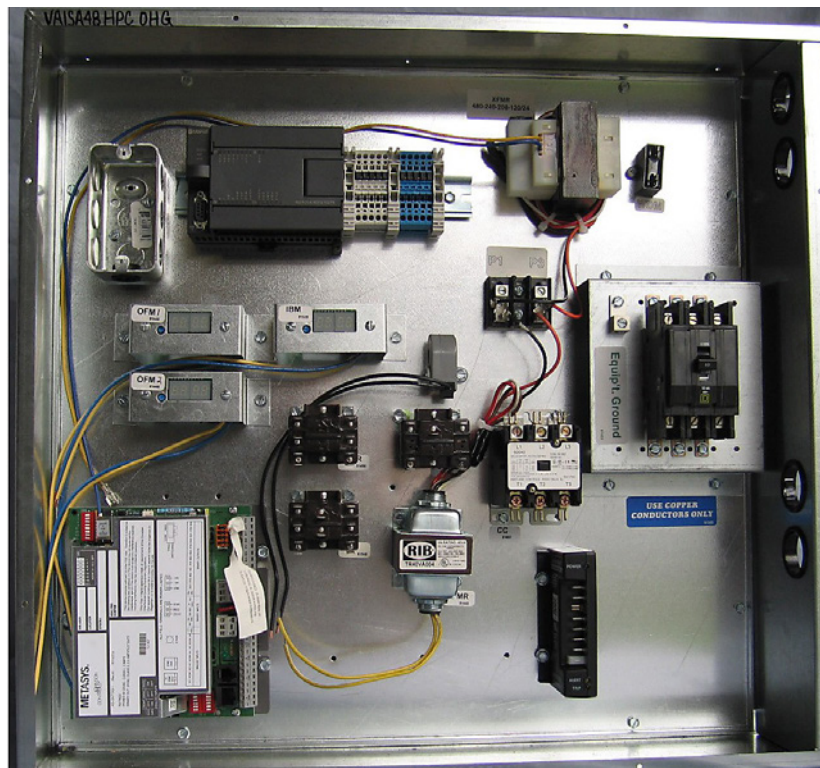
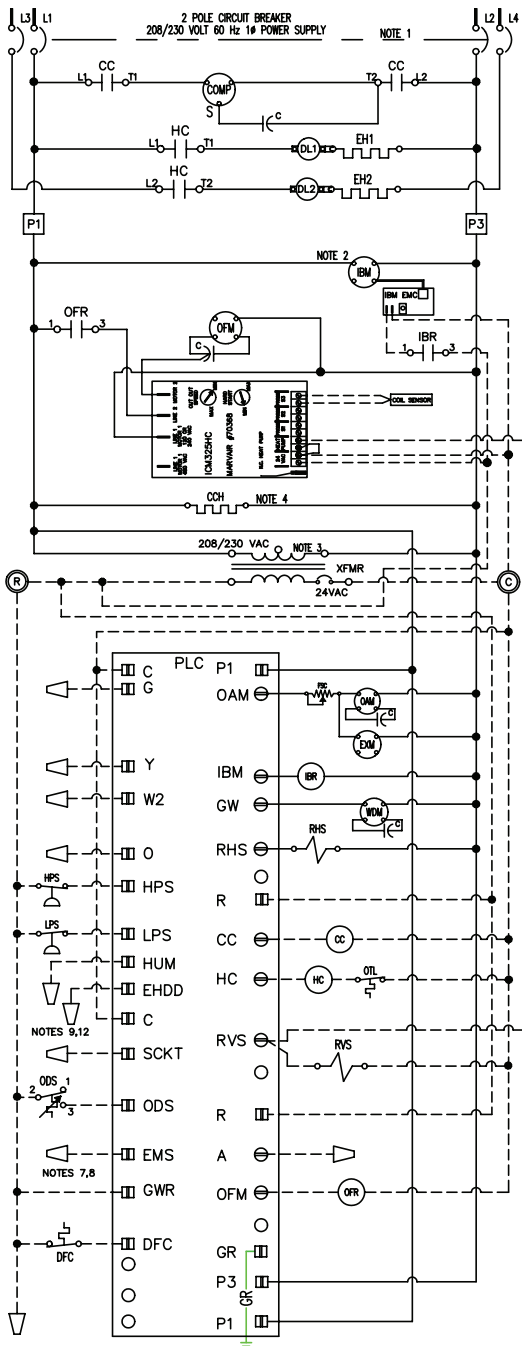


Figure 6. Typical Control Center Layout for Scholar III™



Due to the variety of options, the control center in your unit may be different from the photo. Always refer to the electrical schematic in your unit.

**Figure 7. Typical Wiring Schematic for Heat Pump
Single Phase Power**



ELECTRICAL LEGEND:

C	CAPACITOR	OAM	OUTDOOR AIR MOTOR
CC	COMPRESSOR CONTACTOR	OFM	OUTDOOR FAN MOTOR
CCH	CRANKCASE HEATER	OFR	OUTDOOR FAN RELAY
COS	CHANGE-OVER STAT	OTL	ONE TIME LIMIT
COMP	COMPRESSOR	PLC	PROGRAMMABLE LOGIC CONTROLLER
DFC	DEFROST CONTROLLER	RHS	REHEAT SOLENOID
DL	DUAL LIMIT	RVS	REVERSING VALVE SOLENOID
EH	ELECTRIC STRIP HEATER	VM	VENT MOTOR
EXM	EXHAUST MOTOR	WDM	WHEELDRIVE MOTOR
FS	FREEZE STAT	XFMR	TRANSFORMER
FSC	FAN SPEED CONTROL	Ø Ø	PLC OUTPUT TERMINAL
HPS	HIGH PRESSURE SWITCH	IO	PLC INPUT TERMINAL
IBM	INDOOR BLOWER MOTOR		
IBR	INDOOR BLOWER RELAY		
LPS	LOW PRESSURE SWITCH		

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
GY	GRAY		
BK/RED	BLACK WITH RED STRIPE		

GENERAL NOTES:

- 230 VOLT 60Hz 1Ø POWER SUPPLY. SEE DATA PLATE FOR AMPACITY AND FUSE SIZE. OPTIONAL CKT BKR SHOWN.
- FACTORY PROGRAMMED ECM MOTOR IS CONTINUOUSLY POWERED WITH HIGH VOLTAGE, CONTROL VOLTAGE IS SWITCHED.
- MULTI-TAP TRANSFORMER HAS CIRCUIT BREAKER ON SECONDARY SIDE. RESET AND CHECK CONTROL CIRCUIT IF OPEN.
- CRANKCASE HEATER NOT USED ON ALL MODELS.
- OPTIONAL PAN HEATER, 50 WATTS 240 VOLT.
- COMPRESSOR IS PROTECTED UNDER SINGLE PHASE FAILURE CONDITIONS.
- THE UNIT CONTROL SYSTEM IS FACTORY WIRED TO OPERATE UPON AN INPUT SIGNAL FROM ANY APPROPRIATE 24 VAC CONTROL THERMOSTAT OR DDC CONTROL SYSTEM. IF UNIT SHUTDOWN IS DESIRED DURING UNOCCUPIED PERIODS OF THE TEMPERATURE CONTROLLED SPACE IT MAY BE ACCOMPLISHED BY THE FOLLOWING: THE CONTROLS CONTRACTOR MUST PROVIDE A SET OF CONTACTS (24 VAC PILOT DUTY) BETWEEN WIRES MARKED EMS AND R. WHEN THE FIELD SUPPLIED CONTACTS BETWEEN EMS AND R ARE CLOSED THE SYSTEM WILL SHUT DOWN.
- THE UNIT CONTROL SYSTEM IS FACTORY WIRED TO ENERGIZE THE VENTILATION PACKAGE ANYTIME THE INDOOR FAN/BLOWER IS ENERGIZED. IF ADDITIONAL CONTROL OF THE VENTILATION PACKAGE IS DESIRED, IT MAY BE ACCOMPLISHED BY THE FOLLOWING: THE CONTROLS CONTRACTOR MUST SEPARATE THE FACTORY INSTALLED WIRENUT BETWEEN WIRES MARKED GWR & R THEN PROVIDE A SET OF CONTACTS (24 VAC PILOT DUTY) BETWEEN WIRES GWR & R. WHEN THE FIELD SUPPLIED CONTACTS BETWEEN GWR & R ARE CLOSED THE VENTILATION PACKAGE WILL OPERATE WHEN THE INDOOR FAN/BLOWER IS ENERGIZED.

- WIRES ARE MARKED FOR PROPER THERMOSTAT CONNECTIONS.

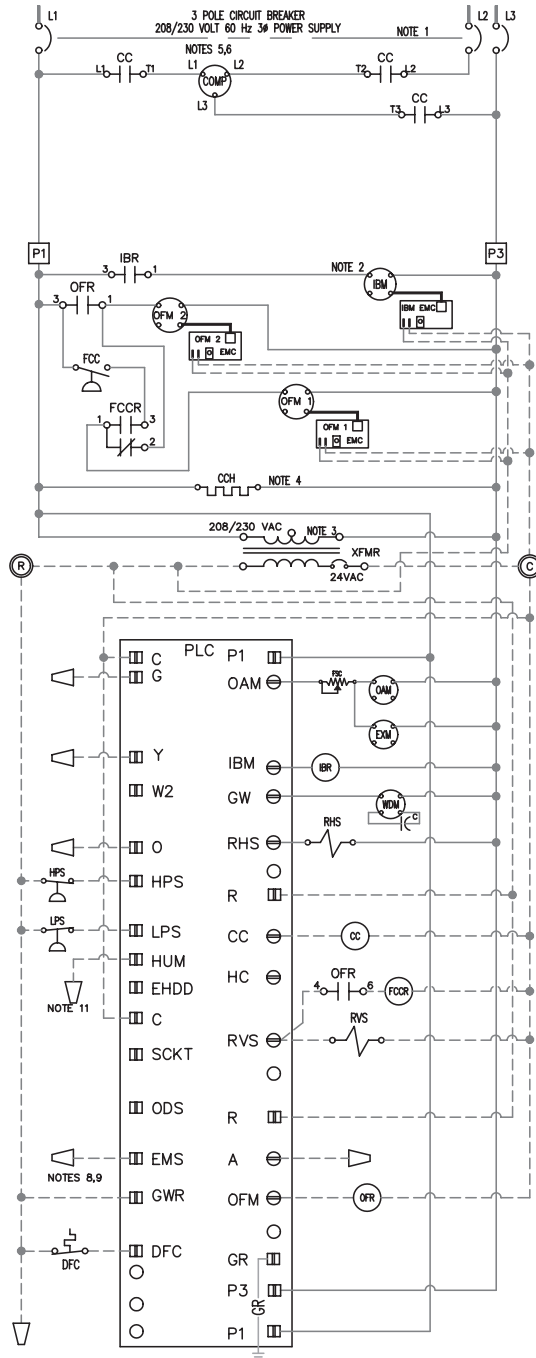
R = 24VAC A = ALARM
Y = COMPRESSOR GWR = GREEN WHEEL RELAY
G = BLOWER EMS = ENERGY MANAGEMENT SYSTEM
O = REVERSING VALVE HUM = HUMIDISTAT
C = 24VAC COMMON W2 = ELECTRIC HEAT
SCKT = AMPACITY LIMITING CIRCUIT EHDD = ELECTRIC HEAT DURING DEFROST

- USE #10 AWG WIRE FOR 10 KW ELECTRIC HEATERS.

- THE UNIT CONTROL SYSTEM IS FACTORY WIRE TO OPERATE IN NORMAL HEAT PUMP OPERATION. FOR EHDD (ELECTRIC HEAT DURING DEFROST): CONNECT WIRE MARKED EHDD TO WIRE MARKED R. FOR S-CKT (AMPACITY LIMITING CIRCUIT): CONNECT WIRE MARKED S-CKT TO WIRE MARKED R.

THIS WILL NOT ALLOW THE HEAT-PUMP AND ELECTRIC HEAT TO OPERATE SIMULTANEOUSLY. LOCATE INSIDE LOW VOLTAGE SHIELD.

**Figure 8. Typical Wiring Schematic for Heat Pump
Three Phase Power**



ELECTRICAL LEGEND:

C	CAPACITOR	OAM	OUTDOOR AIR MOTOR
CC	COMPRESSOR CONTACTOR	OFM	OUTDOOR FAN MOTOR
CCH	CRANKCASE HEATER	OFR	OUTDOOR FAN RELAY
COMP	COMPRESSOR	PLC	PROGRAMMABLE LOGIC CONTROLLER
DFC	DEFROST CONTROLLER	RVS	REVERSING VALVE SOLENOID
ECM	ELECTRONIC MOTOR CONTROL	WDM	WHEELDRIVE MOTOR
EXM	EXHAUST MOTOR	XFMR	TRANSFORMER
FCC	FAN CYCLE CONTROL	Q0	PLC OUTPUT TERMINAL
FCCR	FAN CYCLE CONTROL RELAY	I0	PLC INPUT TERMINAL
FSC	FAN SPEED CONTROL		
HPS	HIGH PRESSURE SWITCH		
IBM	INDOOR BLOWER MOTOR		
IBR	INDOOR BLOWER RELAY		
LPS	LOW PRESSURE SWITCH		

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 60Hz 3 ϕ POWER SUPPLY. SEE DATA PLATE FOR AMPACITY AND FUSE SIZE.
2. FACTORY PROGRAMMED ECM MOTOR.
3. MULTI-TAP TRANSFORMER HAS CIRCUIT BREAKER ON SECONDARY SIDE. RESET AND CHECK CONTROL CIRCUIT IF OPEN.
4. CRANKCASE HEATER MAY BE REQUIRED.
5. COMPRESSOR IS PROTECTED UNDER SINGLE PHASE FAILURE CONDITIONS.
6. CHECK LABEL FOR L1, L2 AND L3 ON LEAD END OF THE COMPRESSOR AT THE CONTACTOR. DO NOT REFERENCE MARKINGS ON THE COMPRESSOR TERMINAL COVER FOR BASIS OF WIRE TERMINATION DUE TO CORRECT PHASING REQUIREMENTS FOR 3 ϕ "SCROLL" COMPRESSOR MOTORS.
IMPORTANT NOTE TO INSTALLER: ALL 3 ϕ COMPONENTS WERE PROPERLY PHASED AT FACTORY RUN-TEST. IF ONE 3 ϕ COMPONENT ROTATES BACKWARDS, ALL SHOULD ROTATE BACKWARDS. INTERCHANGE 2 LEADS OF FIELD POWER SUPPLY TO PROPERLY PHASE ENTIRE UNIT. DO NOT INTERCHANGE LEADS ON INDIVIDUAL COMPONENTS.
7. THE UNIT CONTROL SYSTEM IS FACTORY WIRING TO OPERATE UPON AN INPUT SIGNAL FROM ANY APPROPRIATE 24 VAC CONTROL THERMOSTAT OR DDC CONTROL SYSTEM. IF UNIT SHUTDOWN IS DESIRED DURING UNOCCUPIED PERIODS OF THE TEMPERATURE CONTROLLED SPACE IT MAY BE ACCOMPLISHED BY THE FOLLOWING: THE CONTROLS CONTRACTOR MUST PROVIDE A SET OF CONTACTS (24 VAC PILOT DUTY) BETWEEN WIRES MARKED EMS AND R. WHEN THE FIELD SUPPLIED CONTACTS BETWEEN EMS AND R ARE CLOSED THE SYSTEM WILL SHUT DOWN.

8. THE UNIT CONTROL SYSTEM IS FACTORY WIRING TO ENERGIZE THE VENTILATION PACKAGE ANYTIME THE INDOOR FAN/BLOWER IS ENERGIZED. IF ADDITIONAL CONTROL OF THE VENTILATION PACKAGE IS DESIRED, IT MAY BE ACCOMPLISHED BY THE FOLLOWING: THE CONTROLS CONTRACTOR MUST SEPARATE THE FACTORY INSTALLED WIRENUT BETWEEN WIRES MARKED GWR & R THEN PROVIDE A SET OF CONTACTS (24 VAC PILOT DUTY) BETWEEN WIRES GWR & R. WHEN THE FIELD SUPPLIED CONTACTS BETWEEN GWR & R ARE CLOSED THE VENTILATION PACKAGE WILL OPERATE WHEN THE INDOOR FAN/BLOWER IS ENERGIZED.

9. WIRES ARE MARKED FOR PROPER THERMOSTAT CONNECTIONS.

R = 24VAC	A = ALARM
Y = COMPRESSOR	GWR = GREEN WHEEL RELAY
G = BLOWER	EMS = ENERGY MANAGEMENT SYSTEM
O = REVERSING VALVE	HUM = HUMIDISTAT
C = 24VAC COMMON	W2 = ELECTRIC HEAT
SKCT = AMPACITY LIMITING CIRCUIT	
Y2 = SECOND STAGE HIGH CAPACITY COOLING	

10. CONNECT TO THE YELLOW LEAD ON H600A (REHEAT SIGNAL). LOCATE INSIDE LOW VOLTAGE SHIELD.

Figure 9. Remote Wall Mounted Thermostat Wiring Detail

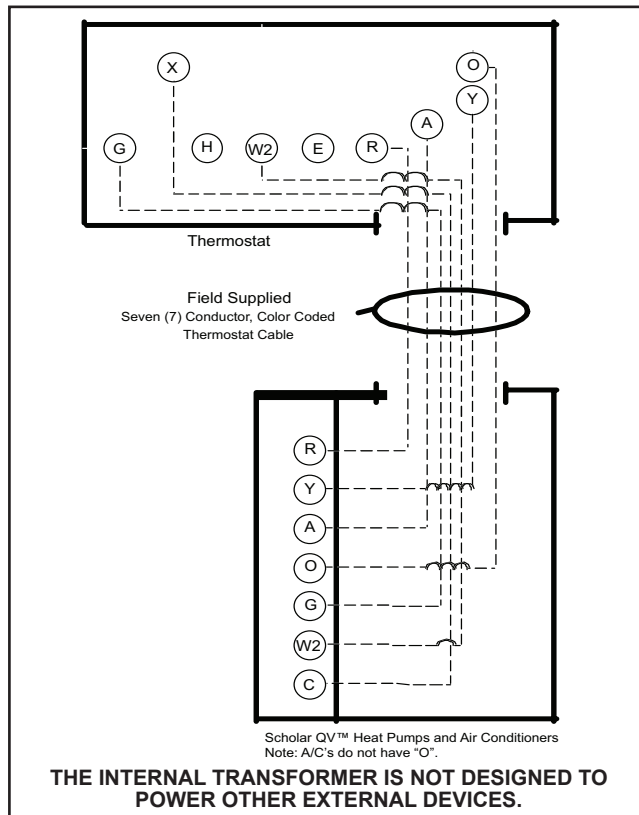
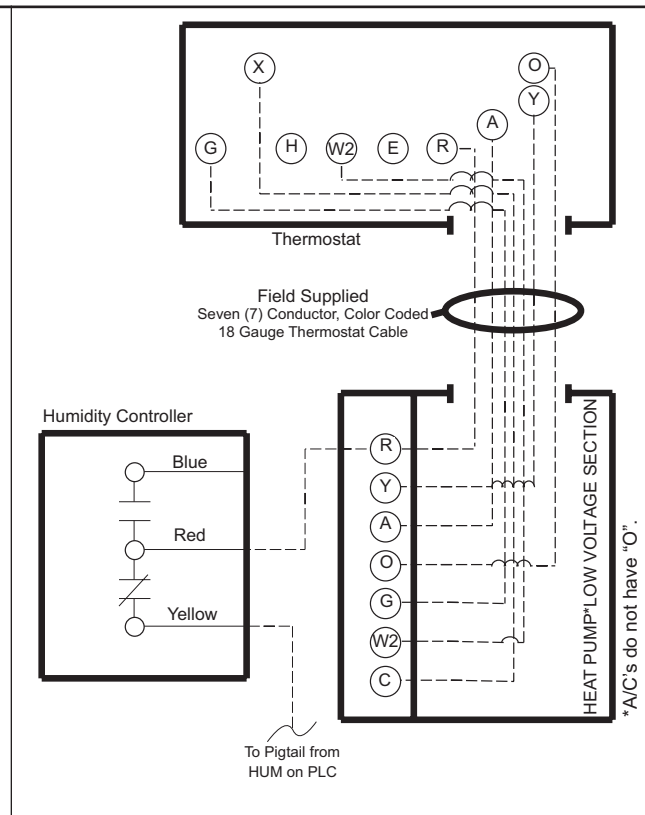


Figure 9a. Humidity Controller Wiring Detail



3. For Scholar III™ heat pump or air conditioner that interfaces with a building automation system (BAS) or energy management system (EMS), detailed instructions for the specific system being installed will be supplied separately by the manufacturer of the BAS/EMS system.

The control of the GreenWheel® ERV or Ventilation relay (VR) and the energy management relay (EMS) are 24 volt inputs to the PLC. If 120 V. of 240 inputs are required, additional relays must be installed in the factory or in the field.

The unit control system is factory wired to operate upon an input signal from any appropriate 24 VAC control thermostat or DDC control system. If unit shutdown is desired during unoccupied periods of the temperature controlled space it may be accomplished by the following: The Controls Contractor must provide a set of contacts (24 VAC pilot duty) between terminals E1 and E2. When the field supplied contacts between E1 and E2 are closed the system will shut down.

The unit control system is factory wired to energize the ventilation package anytime the Indoor Fan/Blower is energized. If additional control of the ventilation package is desired, it may be accomplished by the following: The Controls Contractor must remove the factory installed jumper between terminals V1 and V2 then provide a set of contacts (24 VAC pilot duty) between terminals V1 and V2. When the field supplied contacts between V1 and V2 are closed the ventilation package will operate when the Indoor Fan/Blower is energized.

4. For models with an internal thermostat, no internal control wiring is required.

The thermostat is preprogrammed at the factory to maintain a heating mode temperature of 64°F, and a cooling mode temperature of 82°F. To change these settings refer to the directions in installation instructions for the thermostat.

5. For units with the reheat dehumidification option, the humidity controller (p/n 50057) is remotely mounted on the wall in accordance with the same instructions for the mounting of the wall thermostat installation given in Section 1.12 of this manual. Low voltage leads from the humidity controller are brought into the terminal strip area as shown by routing through the raceway noted in Figure 8, where the “R” lead is connected to the R terminal on the terminal strip. The other lead is connected to HUM on PLC as noted on the wiring schematic of the heat pump. See Figure 9a.
- C. Condensate drain line hook-up will be from the vertically downward 3/4” female PVC slip fit port located just behind the breaker disconnect box in the lower right corner of the Scholar III™ heat pump or air conditioner. Reference Figure 5 for the location of the fitting. Because the condensate drain trap is factory installed, run the drain line directly to the roughed-in stub out. All materials for the condensate drain hook-up are field supplied.
- D. 1. **Wet heat hook-ups** are done by connecting the rough-in piping to the factory supplied coils inside the plenum.

For **hot water heating**, the plenum is equipped with a coil and a freeze protection thermostat embedded in the coil. An optional diverter valve may also be factory installed. The front and top panels of the plenums are removable, to access the coil and make piping and wiring connections. Consult hot water plenum installation instructions for installation details or see Appendix C in back of this manual.

1.12 VENTILATION SYSTEM CALIBRATION

Prior to start-up of the Scholar III™ heat pump or air conditioner, the ventilation system requires calibration to ensure the appropriate amount of fresh air is delivered to the classroom. Refer to the appropriate following ventilation system and use the instructions to calibrate the system for correct air delivery.

- A. **Manual Fresh Air System.** This ventilation module is standard with the Scholar III™ heat pump and air conditioner. Fresh air ventilation by means of a damper with pressure relief provides up to 450 cfm of outside air. The damper can be manually adjusted at installation to provide the required ventilation airflow.

The fresh air door should be set in accordance with the amount of fresh air flow required, up to a maximum of 450 CFM. Figure 10 illustrates the fresh air door settings and air flow rates.

Follow the directions in Figure 10 to ensure proper air flow rate settings. After calibrating the ventilation system, replace the lower front cabinet panel.

- B. **Two position motorized damper and PowerVent Fresh Air Systems.** The two position (open & closed) ventilation module is equipped with a motorized damper and pressure relief, and provides up to 450 cfm of outside air. The damper position can

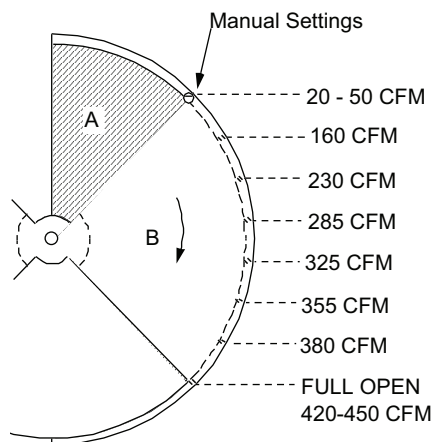
be adjusted at installation to provide the required ventilation air flow. The motorized damper operates by an external relay with a choice of 24, 120, or 240V coils, to regulate fresh air ventilation in response to a control located remotely from the heat pump or air conditioner. The two motorized damper ventilation option includes the ventilation intake air mover and a fan speed controller for the air mover.

This PowerVent ventilation module features a motorized damper, as above, plus powered exhaust ventilation to provide up to 450 cfm of outside air. The damper position can be adjusted at installation to provide the required ventilation air flow. The PowerVent option includes both a ventilation air intake air mover and an exhaust air mover. A single fan speed controller that controls both air movers is standard. An exhaust air fan speed controller is available as an option. This speed controller regulates the exhaust air motor and allows separate control of the exhaust air. Independent control allows positive pressurization of the classroom, i.e., more outside air can be brought into the classroom than what is exhausted.

The fresh air door is opened and closed by the motorized drive. Calibration, as shown in Figure 10, will ensure the required amount of air, up to a maximum of 450 CFM, is delivered to the classroom.

Follow the directions in Figure 11 to ensure the proper air flow rate setting. After calibrating the ventilation system, replace the lower front cabinet panel.

Figure 10. Manual Fresh Air System Calibration Procedure



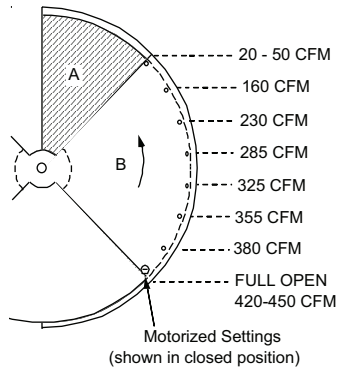
Inside the lower section, locate the circular calibration plates as noted in the drawing ("A" is fixed, "B" is movable). Remove the screw shown by the arrow from "Manual Settings."

Rotate plate B in a clockwise direction until the hole from which the screw was removed aligns with the hole adjacent to the desired air flow rate, in CFM.

Reinsert the screw into the hole in plate B and firmly drive the screw through the appropriate air flow rate hole, so plate B is securely fastened at the desired opening.

Note: Once calibrated, the manual fresh air system door remains at the set opening at all times.

Figure 11. Motorized and PowerVent System Calibration Procedure



Note: Motor drives plate B open to setting when control relay (VMR) is energized. Motor drives plate B to the closed position when control relay (VMR) is deenergized.

Operation is the same for the "Motorized" and "PowerVent" systems.

Inside the lower section, locate the circular calibration plates as noted above in the drawing ("A" is fixed, "B" is movable). Remove the screw shown by the arrow from "motorized settings."

Reinsert the screw into the hole in plate B adjacent to the desired air flow rate, in CFM, and firmly drive the screw in until it bottoms out at the screw head.

- C. GreenWheel® ERV. 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 in the control box. Measure the intake air again and adjust the speed of the blowers. Repeat as necessary to meet the fresh air requirements.
- D. GreenWheel® ERV with optional controller for exhaust air and all GreenCube ERV. First measure the air being introduced into the classroom using best industry standards and practices. Adjust the speed of the intake air blower until the required outside air is being brought into the classroom. The speed controller is located in the control box. Measure the intake air again and adjust the speed of the blower. Repeat as necessary to meet the fresh air requirement.

Now measure the exhaust air from the classroom. Adjust the speed of the exhaust air fan until the required air is being exhausted from the classroom. The exhaust air controller is in the control box. It is usual practice to pressurize the classroom by exhausting slightly less air than is being brought into the classroom.

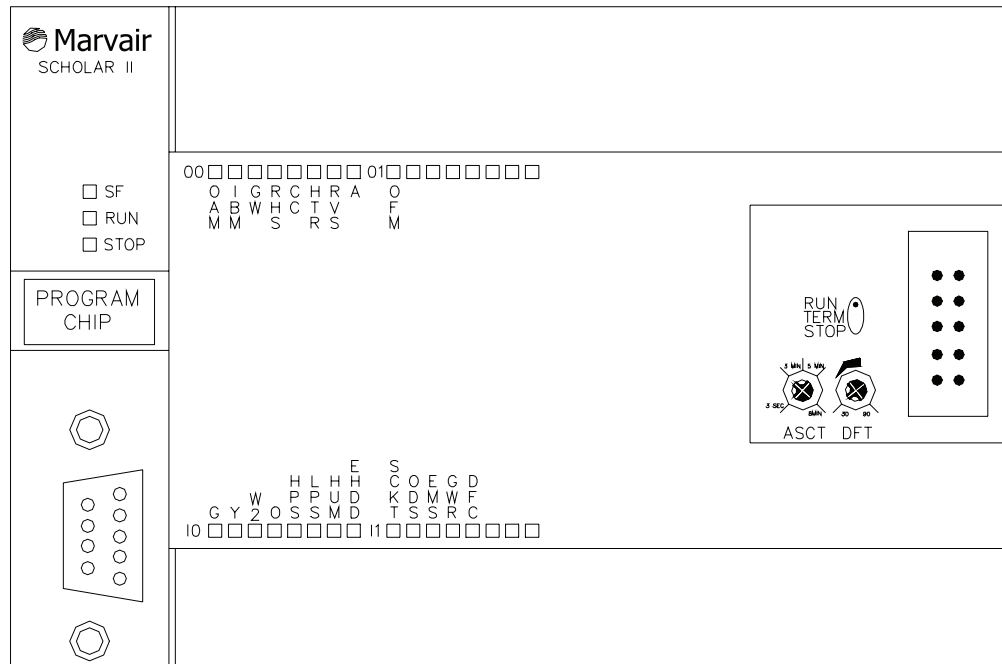
1.13 CONTROL ADJUSTMENTS

- A. **Scholar III™ Heat Pump and Air Conditioner PLC (Programmable Logic Controller) Microprocessor.** Essential to the operation of the Scholar III heat pump and air conditioner is a factory installed PLC microprocessor. The PLC controller improves reliability due to a reduction of components and simplification of the control panel wiring. The PLC is able to:
 - Provide various control functions
 - Show operational status through LED's
 - Assist in troubleshooting
 - Perform extensive self diagnosis and indicate a fault
 - Store statistical operational data
 - Be programmed remotely or with a removable program storage device

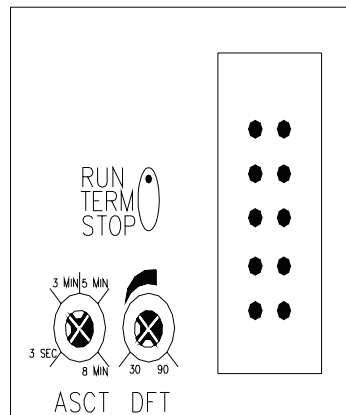
The PLC is factory wired and tested and typically no adjustments or changes are required to the PLC when the Scholar III™ heat pump or air conditioner is installed.

Location

The PLC is located in the unit control center. Open the front door and remove the cover to the control center.



On the right side of the PLC there is a small door. Behind the door is a three position micro switch and two control adjustments- an anti short cycle timer and a defrost timer. Each control can be adjusted by turning the knob with a small flat head screwdriver. The indicator on the knob is the gap between the two protrusions with the hollow centers on the knob. (See drawing below). For both control timers, turning the knob clockwise increases the time period. NOTE: Scholar III air conditioners do not have the defrost function.



The micro switch has three positions – **RUN**, **TERM** & **STOP**. The switch should be in the **RUN** position during normal operation. **Term** is for operation from a remote terminal. **Stop** is no output/non-operational.

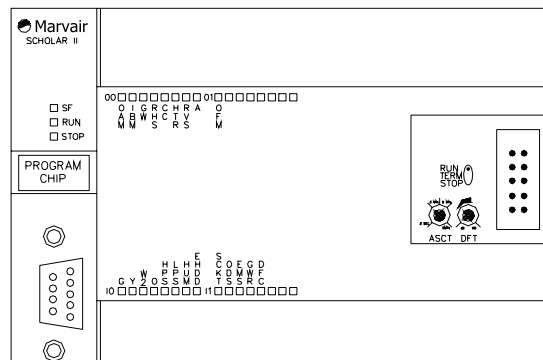
The **Anti-short Cycle Timer (ASCT)** is located to the far left of the switch. The anti-short cycle timer prevents the compressor from destructive short cycling by

allowing the compressor to restart only after a selected time interval has passed from compressor shutdown. The timer begins when the compressor turns off. The time interval is from 3 seconds to eight minutes in one minute increments. The three-second setting is used only for factory testing and should NEVER be used when installed in a classroom. Select the desired time interval by rotating the knob to the desired setting. The Marvair® factory set point is 3 minutes.

The **Defrost Timer (DFT) (heat pump function only)** is located next to the three position micro switch. The defrost control is based upon both time and temperature. The DFT initiates a defrost cycle whenever the outdoor coil temperature is 28°F or below and the selected time interval from the previous defrost cycle has been exceeded. Select the desired time interval by turning the DFT knob. When turned completely to the left (counterclockwise), the time interval between defrost cycles is 30 minutes. When turned completely to the right (clockwise), the time interval is 90 minutes. The knob allows setting the defrost time anywhere between 30 and 90 minutes, i.e., mid-way between the 30 and 90 minutes is 60 minutes. The Marvair® factory set point is 30 minutes.

PLC Inputs & Outputs

The PLC has inputs located along the bottom of the controller and outputs along the top of the controller. An input is a signal to the PLC from either the thermostat, sensors in the Scholar III™ heat pump or air conditioner, or a customer supplied input, e.g., DDC. An output is a signal from the PLC to the heat pump, air conditioner or to the thermostat.



PLC Inputs

The PLC inputs are powered only by 24 VAC. The thermostat inputs are:

- **G** - Blower signal from thermostat
- **Y** - Compressor
- **W2** - Second stage heat (heat pump function only)
- **O** - Reversing valve (energized for cooling) (heat pump function only)

The PLC has indicator LED's that show the status of all thermostat inputs and sensors. For example, if the "G" LED is on, this means that voltage is present from the "G" terminal on the thermostat.

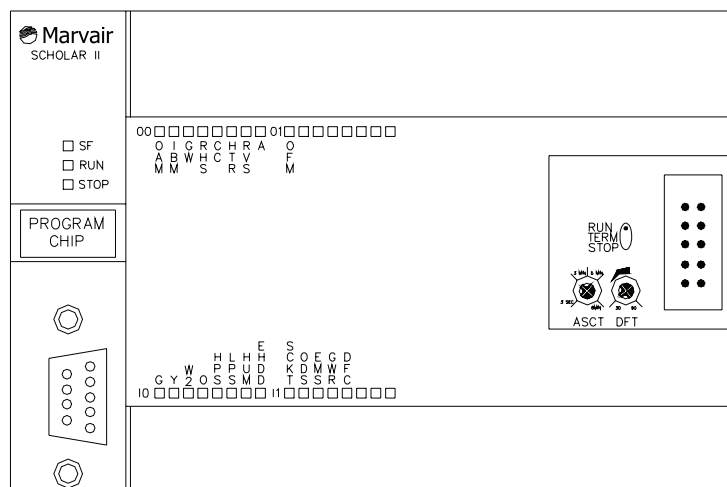
Scholar III™ heat pump and air conditioner sensor or control inputs:

- **HPS** – High Refrigerant Pressure Switch. The HPS is ON during normal

- operation. No light indicates an open switch. See lockout indicator “A” under Outputs.
- **LPS** – Low Refrigerant Pressure Switch. The LPS is ON during normal operation. No light indicates an open switch. See lockout indicator “A” under Outputs
 - **HUM** – Humidity Controller. Used when an external humidity controller operates the Scholar to control the humidity in the classroom.
 - **EHDD** – Electric Heat During Defrost. Allows the user to select whether electric heat operates when the heat pump enters into the defrost mode. The units are wired at the factory to prevent the electric heaters from operating during the defrost mode. For operation during defrost, a wire is moved from one terminal to another in the control box. NOTE: for operation of the electric heat during defrost, the electric heat control must be configured to allow simultaneous operation of the electric heat and the compressor. (heat pump only)
 - **SCKT** – “S” Circuit. Signal that indicates the electric heat and the compressor can never operate simultaneously. This function is controlled by the electric heat control toggle switch in the control center. The LED should be ON if “Y” is ON, the electric heat is on and the toggle switch is in the S circuit position. (heat pump only)
 - **ODS** – Outdoor Thermostat. Determines at what outdoor temperature (factory set at 40°F), the supplemental heat turns on. The LED should be ON if the outdoor temperature is below the ODS set point. (heat pump only)
 - **EMS** – Energy Management System. A shutdown input from an external source.
 - **GWR** – GreenWheel® ERV Relay. When this LED is lit, the GreenWheel ERV is operating.
 - **DFC** – Defrost Control Thermostat. Indicates whether the defrost thermostat is closed. The defrost cycle is based upon both time (see defrost timer) and outdoor coil temperature. (heat pump only)

PLC Outputs

An output is a signal from the PLC to the Scholar III™ heat pump or air conditioner



or thermostat. The first four outputs, from left to right, are connected to a 230 VAC supply and thus provide 230 VAC when energized. These outputs are:

- **OAM** - Outdoor Air Motor (Fresh air motor for the GreenWheel® ERV)
- **IBM** – Indoor Blower Motor Relay Note: On early models, this was IFM.
- **GW** - GreenWheel® ERV Drive Motor
- **RHS** - Reheat Solenoid

The next five outputs are 24 VAC. These outputs are:

- **CC** - Compressor Contactor
- **HTR** - Heat Contactor
- **RVS** - Reversing Valve (heat pump only)
- **A** - Lock Out Indicator. A blinking LED indicates that a pressure switch has opened. A flash rate of once per second indicates a low pressure switch lockout. A flash rate of twice per second indicates a high pressure lockout.
- **OFM** - Outdoor Fan Motor Relay

On the left side beneath the Marvair® logo are three LED's that indicate the operational status of the PLC.

- **SF** – System fault indicates an internal fault in the PLC. The fault can be found using the Microwin Programming System and an external PCI cable.
- **Run** – Normal operation. The PLC is on/operational. When the micro switch is in the RUN position, this LED should be lit.
- **Stop** – The PLC is off/non operational. When the micro switch is in the STOP position, this LED should be lit.

Operation Guide

Cooling Mode

During normal operation of the system, the thermostat calls for cooling by turning on the G, Y and O inputs to the system. This request will be indicated on the G, Y and O indicators at the bottom of the unit. If the compressor has been off for at least the amount of time interval set on the ASCT, the Compressor Contactor (CC), Indoor Blower (**IBM**), Reversing Valve (RVS) and the Outdoor Fan Motor (OFM) LED's should be on. This indicates that the controller is sending an output to turn those devices on.

Heating Mode

When the thermostat calls for first stage heating, it turns on the G and Y inputs. The indicators will come on to indicate the thermostat is calling for heat. If the compressor has been powered off for at least the time set on the ASCT, the Compressor Contactor (CC), Indoor Blower Motor (IBM) and Outdoor Fan Motor (OFM) LED's will be on. The LED's indicate that the PLC is sending an output to the devices' controls.

If the thermostat calls for second stage heating (heat pump only), the W2 indicator will be lit. If the W2 LED is on, indicating that the thermostat is calling for second stage heat and the ODS indicator is not and the outside temperature is not below the ODS set point, the second stage heat (HTR) will not come on.

If the W2 indicator is on and the ODS indicator is on then, in addition to the CC, IBM and OFM indicators, the HTR indicator will be on indicating the call for second stage heat.

If the SCKT LED is on indicating that the S Circuit function is selected, the CC and OFM indicators will be off and the HTR indicator will be on. Refer to table below.

G	Y	W2	ODS	SCKT	IBM	CC	OFM	HTR
ON	OFF	OFF	OFF	OFF	ON	OFF	OFF	OFF
ON	ON	OFF	OFF	OFF	ON	ON	ON	OFF
ON	ON	ON	OFF	OFF	ON	ON	ON	OFF
ON	ON	ON	ON	OFF	ON	ON	ON	ON
ON	ON	ON	ON	ON	ON	OFF	OFF	ON

Defrost Mode (heat pump only)

When the system has been operating in the heat pump mode for a period of time (set by the Defrost Timer), the system will examine the Defrost Control thermostat Input (DFC). If this input is on (the thermostat is closed), indicated by the LED being on, the system will go into Defrost mode. At this point the Outdoor Fan Motor relay (OFM) is de-energized and the reversing valve is energized. In this mode heat is being applied to the outdoor coil to remove any possible buildup of ice on the coil. The Defrost Control Switch (DFC) comes on at roughly 28°F and goes off at approximately 56°F. During the Defrost Cycle, the unit will continuously examine the DFC input and when it switches off OR the system has been in defrost for 10 minutes, the system will revert back to normal heating mode. By having a maximum time for the Defrost Cycle to operate, the system will not go into Defrost and remain in Defrost mode if a Defrost Switch malfunctions. If the Electric Heat During Defrost (EHDD) function has been selected, the Heat Contactor (HTR) will come on to supply supplemental heat during the Defrost Cycle.

Low Pressure Lockout

The Low Pressure Switch is designed to guard against the operation of the system in the event of a loss of refrigerant. If the Low Pressure Switch stays on for more than eight minutes, the system will turn off and a Low Pressure Lockout fault will be indicated by a slow flashing on the “A” LED. The interval for the flash is once per second.

In cold weather the pressure in the refrigerant system is low prior to operation. When the Scholar III™ unit starts in the heat pump mode during cold weather, low pressure could cause the system to lock out. To guard against nuisance lockouts, the Scholar III unit will not shut off if the Low Pressure Switch (LPS) comes on during the first eight minutes of operation and the switch has not cycled more than three times in an hour. In other words, the compressor will start and operate for eight minutes even with the LPS switch off three times before causing a lockout on low pressure.

High Pressure Switch

The system has a High Pressure Switch (HPS) that indicates a high system pressure. When this occurs, the system will run for five seconds then set a High Pressure Lockout. This lockout condition shuts the system off and flashes the “A” indicator quickly at a rate of twice per second.

Troubleshooting Chart

Troubleshooting

The PLC is a microprocessor-based system that has the ability to provide a great amount of information to aid in troubleshooting a malfunctioning system. In addition to field malfunctions such as a bad Compressor Contactor, the system performs a diagnostics on itself about 100 times per second. If any internal faults are found the system will turn itself off and indicate a failure on the System Fault (SF) indicator. The fault can be read by using the Microwin Programming System.

Most likely the faults will occur external to the PLC however. These faults should be easily diagnosed by using the indicators on the front panel.

Normal Operation

The High Pressure Switch (HPS) and Low Pressure Switch (LPS) should be on all the time. An exception will be during a low temperature start-up during which the LPS should come on within a few moments of start-up.

The chart below shows the standard inputs and what functions should be on as a result.

2. **Outdoor Thermostat (heat pump only).** Factory set at 40°F, this thermostat determines the outdoor temperature at which the supplemental electric heat or wet

	OAM	IBM	GW	RHS	CC	HTR	RVS	A	OFM
G		X							
Y					X	X If SCKT is on			X
W2		X				X			
O							X		
HPS								X If HPS is off	
LPS								X If LPS is off	
HUM		X		X	X		X		X
EHDD						X If system is in Defrost Mode			
SCKT						X If Y is on due to a call for heat			
ODS						X If calling for heat			
EMS									
GWR	X If system is calling for any function and an external control is not utilized.		X If system is calling for any function and an external control is not utilized.						
DFC		X			X		X		

X – Indicates that this function should be on.

heat turns on. This may be field adjusted to the desired temperature setting by rotating the knob on the control panel. (See Figures 5 and 6.)

3. **Electric Heat Control (heat pump only).** allows the user to select whether the electric heat operates simultaneously with the compressor. The units are wired at the factory for simultaneous operation. For non-simultaneous operation, a wire is moved from one terminal to another in the control box.
4. **Electric Heat During Defrost (heat pump only).** Allows the user to select whether electric heat operates when the heat pump enters into the defrost mode. The units are wired at the factory to prevent the electric heaters from operating during the defrost mode. For operation during defrost, a wire is moved from one terminal to another in the control box.

1.14 REMOTE THERMOSTAT INSTALLATION

- A. Locate the thermostat about five feet above the floor on an inside wall. Avoid the following:

Hot Spots

Concealed Pipes or Duct
Registers
TV Sets
Radio
Lamps
Direct Sunlight

Cold Spots

Concealed Pipe or Ducts
Stairwells - Drafts
Doors - Drafts
Unheated Rooms on Other
Side of Wall

Dead Spots

Behind Doors
Corners and Alcoves

After choosing the wall upon which to mount the thermostat, see instructions in the thermostat box for mounting the thermostat on the wall.

- B. The thermostat should be wired to the terminal strip in the Scholar III™ heat pump or air conditioner in accordance with Figure 9, and in accordance with the thermostat instructions, National Electric Code, and with local electrical codes, where they prevail.

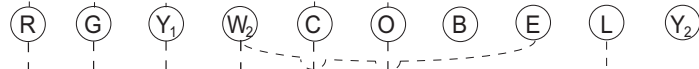
**MARVAIR®/SIMPLE COMFORT THERMOSTAT CONNECTION DIAGRAM
FOR MARVAIR CLASSIC I™, CLASSIC II™ & SCHOLAR™ HEAT PUMPS**

THERMOSTAT
PART NUMBER

50121/
SC2010-SL



50122/
SC2210-SL



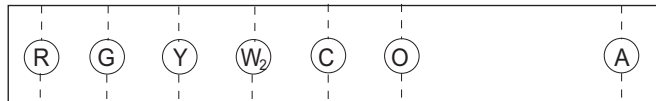
50252/
SC4811-SL



50107/
SC5811-SL

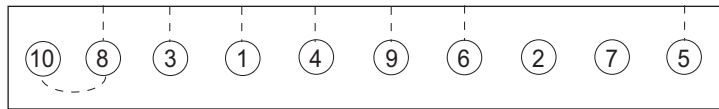


CLASSIC I &
SCHOLAR
W/O REHEAT



LOW VOLTAGE
TERMINAL BOARD

CLASSIC II
WITH
ECONOMIZER
& W/O REHEAT



LOW VOLTAGE
TERMINAL BOARD

POWER
FAN
COMPRESSOR
AUX. HEAT
COMMON
REVERSING
VALVE
LOCK-OUT
LOCK-OUT

1.15 START-UP PROCEDURE

- A. On VAISA models with two stage compressors, only the cooling mode operates in two stages. Mechanical heating (compressor) is a single stage as is the dehumidification mode.
1. Turn the disconnect in the Scholar III™ unit to “OFF” position and double check all electrical connections before applying power.
 2. Set the remote thermostat system switch to “OFF” position. The blower switch should be in “AUTO” position.
 3. Check the voltage supply to the disconnect. If voltage readings are appropriate, proceed with start-up. (See Figure 13 for acceptable voltage ranges.) If voltage readings are not appropriate, check the power leads at the disconnect and the main breaker in the mechanical room. Take appropriate corrective action to supply sufficient voltage to the Scholar III™ disconnect.

Figure 13. Voltage Limitations

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.

Example: VAI 36 HP (A) — Voltage

4. Turn the Scholar III™ heat pump disconnect to “ON” position.
5. Please refer to the thermostat instructions for configuration and start-up of units with 2-stage compressors.
 - a. Check to see that when the heat pump comes on that the air coming out the discharge grille is cooling. Let unit run for five minutes in this mode. If heat pump continues to run and provide cooling, this verifies that the indoor blower, compressor and outdoor blower are all running.
 - b. Now slowly raise the cooling set point up toward room temperature until the pump compressor and outdoor blower motor turn off. This will be audible. The indoor blower will continue to run and turn off after 90 seconds.

6a. Heating (heat pump version only) (Note: Models VAISA with two stage compressors only have one stage of heating.)

- a. Put the thermostat system switch to “HEAT” mode. Wait five minutes after testing on cooling, before testing in heating mode.
- b. Slowly raise the heating set point above room temperature until the heat pump comes on. The indoor blowers will start and the heat pump will provide warm air from the air supply grille. Let run for five minutes.
- c. Slowly lower the set point temperature until the heat pump compressor and outdoor blower turn off. The indoor blower will turn off 90 seconds later.

6b. Heating (air conditioner version only)

- a. Set the heating set point below room temperature and put the thermostat system switch on “HT.”
- b. Raise the set point slowly and the indoor blower and the electric supplemental heat will turn on at the same time.
- c. Lowering the set point slowly should turn the electric heat off. The indoor blower will turn off 90 seconds later.

7. Automatic Changeover

For an automatic changeover remote thermostat, the proper functioning of the system can be checked for cooling and heating by using the same sequence as detailed above with the thermostat system switch put in “AUTO” position.

8. Emergency Heat (heat pump version only)

This setting on a remote thermostat is to provide electric heat in the event the compressor does not function, and heat is required. In emergency heat mode, the compressor is de-energized and electric heat supplies all heating, controlled by the thermostat.

To check this out, set the heating set point below room temperature and put the thermostat system switch on “EM. HT.”

Raise the set point slowly and the indoor blower and the electric supplemental heat will turn on at the same time.

Lowering the set point slowly should turn the electric heat off. The indoor blower will turn off 90 seconds later.

APPENDIX A - RATINGS AND DATA

1.01 RATINGS / DATA

Figure 1. Air Flow, CFM vs. ESP (Wet Coil)

BASIC MODEL	AIR FLOW CFM					
	ESP (WET COIL)					
	0.10	0.15	0.20	0.30	0.40	0.50
24	920	890	860	800	—	—
36	1380	1340	1290	1200	—	—
40	1380	1340	1290	1200	—	—
48	1840	1780	1740	1600	1490	1400

CFM = Cubic Feet per Minute, Indoor Air Flow
Rated at 240 Volts

ESP = External Static Pressure in Inches of Water

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.

Figure 2. Air Filter Sizes (inches)

	Qty per unit	Size	Type	MERV ¹ Rating
Return Air Filter	2	46" x 24" x 2"	Pleated, disposable	7 ²
Fresh Air Ventilation Filter	1	12" x 20" x 1"	Fiberglass, disposable	N/A
Exhaust Air Ventilation Filter	1	12" x 20" x 1"	Fiberglass, disposable	N/A
¹ MERV = Minimum Efficiency Reporting Value				
² Standard return air filter has MERV rating of 7. Optional filters are available with MERV ratings of 8 and 13.				

Figure 3. Shipping Weight (pounds)

BASIC MODEL	24	36	40	48
VOLTAGE - 230	1020	1020	1030	1045
VOLTAGE - 460	1045	1045	1055	1070

APPENDIX B - BASE STAND INSTALLATION

1.01 TOOLS/FIELD FURNISHED SUPPLIES

WARNING

TO AVOID PERSONAL INJURY, ADEQUATE PROTECTIVE CLOTHING MUST BE WORN AND PRECAUTIONS IN HANDLING AND INSTALLING THIS EQUIPMENT MUST BE PRACTICED AT ALL TIMES.

- Power Drill/Driver and Extension
- Bit for 5/16" Hex Head Bolts (or Adjustable Wrench)
- Appropriate Bits for Boring Anchor Holes and Fastening Anchor Bolts Through 1/2" Pass Through Holes in Base Stand (4 Locations)

1.02 INSPECTION/UNPACKING/HANDLING

Base stands are shipped to the job site on wooden skids and are enclosed in shrink wrap. Do not stack the base stands.

IMPORTANT

IMMEDIATELY UPON RECEIPT, INSPECT THIS EQUIPMENT TO DETERMINE VISIBLE AND CONCEALED DAMAGE. ALL DAMAGE MUST BE REPORTED TO THE FREIGHT CARRIER WITHIN 15 DAYS, ON THE FREIGHT CARRIER'S FORM.

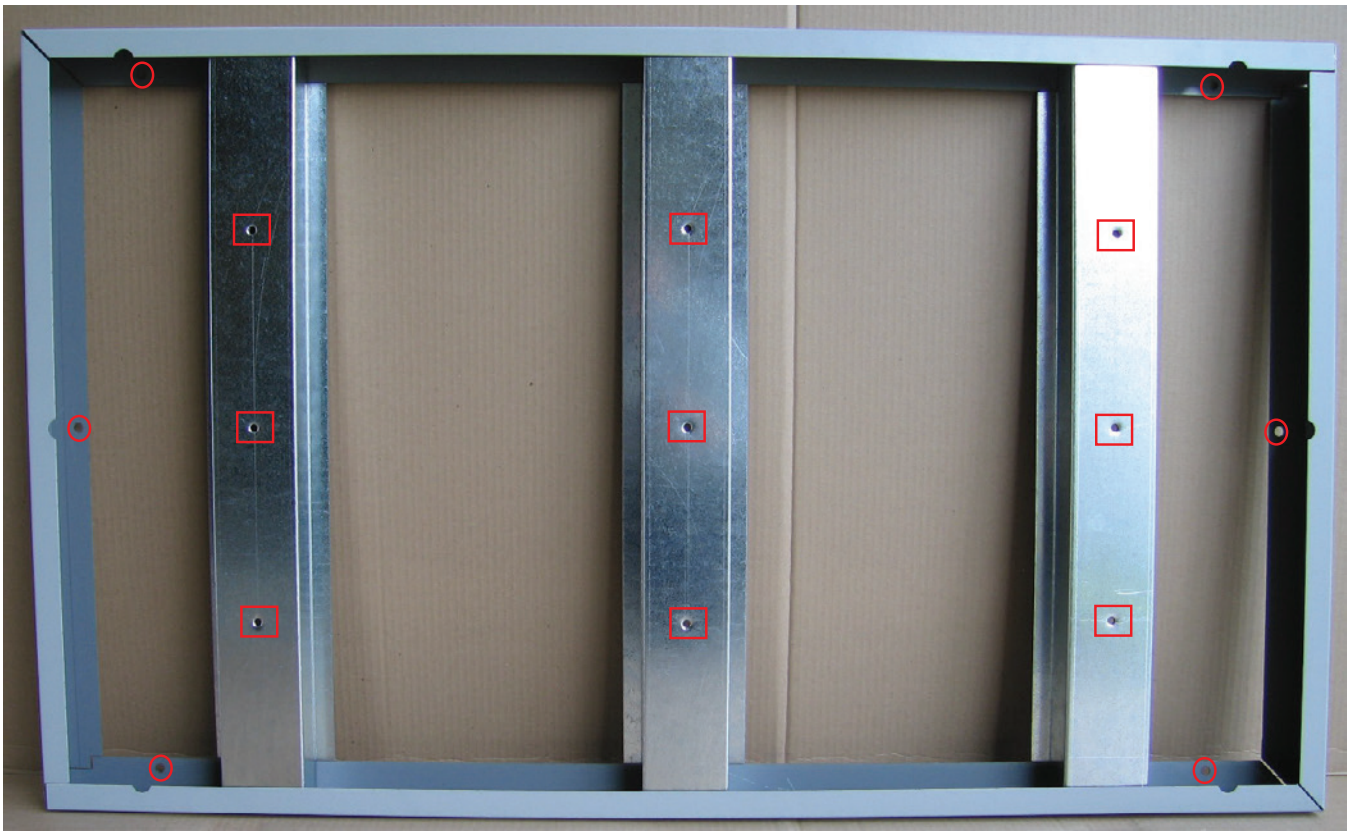
The label on the base stand identifies the part number of the base stand.

Base Stand	
<u>Height</u>	<u>Part Number</u>
2"	S/06849
4"	S/06850

Remove the shrink wrap from the base stand and dispose of the wooden skid. Retain the bag of 5/16" bolts and flat washers to fasten the cabinet to the base stand. **Do not install the Scholar III heat pump or air conditioner to the base stand at this time.**

Place the base stand (as shown in Figure 1) on the floor, measuring carefully to determine the exact location, based on where the heat pump or air conditioner is intended to be placed. It is important to be sure of base stand location when the unit is going to be located set off from the finished inside wall. The unit will be located directly on top of the base stand, and the base stand will be anchored to the floor.

Figure 1. Top View of Base Stand



○ HOLES TO SECURE BASE STAND TO FLOOR

□ HOLES TO HOLD SCHOLAR III TO BASE PAN

Also, recheck the locations of the electrical and condensate stub-outs to ensure they are located properly, relative to the cabinet knock-out openings as shown in the Installation and Start-Up Manual, Figures 3 and 4.

IMPORTANT

STUBOUTS SHOULD BE LOCATED (FROM THE FLOOR OR WALL) TO ALIGN WITH SELECTED CABINET KNOCK OUT ON THE CABINET, AS SHOWN IN FIGURE 3. THIS IS A REQUIREMENT IF A BASE STAND IS TO BE INSTALLED AND STUBOUTS ARE COMING THROUGH THE FLOOR

Lastly, remeasure to be sure that the wall opening for the Scholar III™ heat pump and air conditioner air box is located properly, taking the height of the base stand into account, before proceeding to install the base stand.

1.03 INSTALLATION

After the base stand is located on the floor, mark the floor in the locations where 1/2" through holes go through the bottom flange of the base stand. Be sure the floor is a hard, smooth surface and the base stand is level. If the floor is carpeted, cut out a base stand "footprint," so the base stand rests on the non-carpeted floor.

Anchor the base stand to the floor with the four field supplied anchors.

Now remove the lower front cabinet panel from the heat pump or air conditioner, removing the shipping skid bolts, air box support and installing the plenum (as appropriate), following the instructions provided in Appendix C.

WARNING

WHEN MOVING/RAISING THE SCHOLAR III™ CABINET, UTILIZE ADEQUATE RESOURCES TO HANDLE THE 1,100 LB. CABINET. THIS IS TO AVOID PERSONAL INJURY OR DAMAGE TO THE EQUIPMENT/FACILITIES.

With appropriate resources to lift the Scholar III™ unit, place it on the base stand while guiding the air box through the wall opening and maintaining clearance between the plenum (as appropriate) and the ceiling. The Scholar III heat pump aligns and rests on the base stand.

After the cabinet is resting on the base stand, align the four 3/8" through holes in the base with the receiving weld nut holes in the base stand. Thread the four 5/16" machine bolts with flat washers loosely into the base stand. Tighten bolts evenly to affix the cabinet firmly to base stand.

IMPORTANT

DO NOT OVERTIGHTEN MACHINE BOLTS OR CABINET BASE WILL BOW.

APPENDIX C - INSTALLATION OF THE FREEBLOW PLENUM WITH NO HEAT

1.01 TOOLS/FIELD FURNISHED SUPPLIES

WARNING

TO AVOID PERSONAL INJURY, ADEQUATE PROTECTIVE CLOTHING MUST BE WORN AND PRECAUTIONS IN HANDLING AND INSTALLING THIS EQUIPMENT MUST BE PRACTICED AT ALL TIMES.

- Power Drill/Driver and Extension
- 5/16" Nut Driver

1.02 INSPECTION/UNPACKING/HANDLING

Plenums are shipped to the job site on a wooden skid and are enclosed in shrink wrap. Do not stack plenums. Protect plenums from outside weather conditions. Part numbers for the freeblow plenum grilles are as follows:

<u>Part #</u>	<u>Description</u>
91969	Freeblow plenum side supply grille (two per plenum)
91970	Front supply grille (two per plenum)

IMPORTANT

IMMEDIATELY UPON RECEIPT, INSPECT THIS EQUIPMENT TO DETERMINE VISIBLE AND CONCEALED DAMAGE. ALL DAMAGE MUST BE REPORTED TO THE FREIGHT CARRIER WITHIN 15 DAYS, ON THE FREIGHT CARRIER'S FORM.

WARNING

THIS EQUIPMENT MUST BE INSTALLED IN CONFORMANCE WITH ALL APPLICABLE LOCAL AND NATIONAL ELECTRICAL, PLUMBING AND BUILDING CODES.

THIS EQUIPMENT SHOULD BE INSTALLED AND SERVICED ONLY BY A TRAINED PROFESSIONAL HEAT PUMP SERVICE PERSON.

WARNING

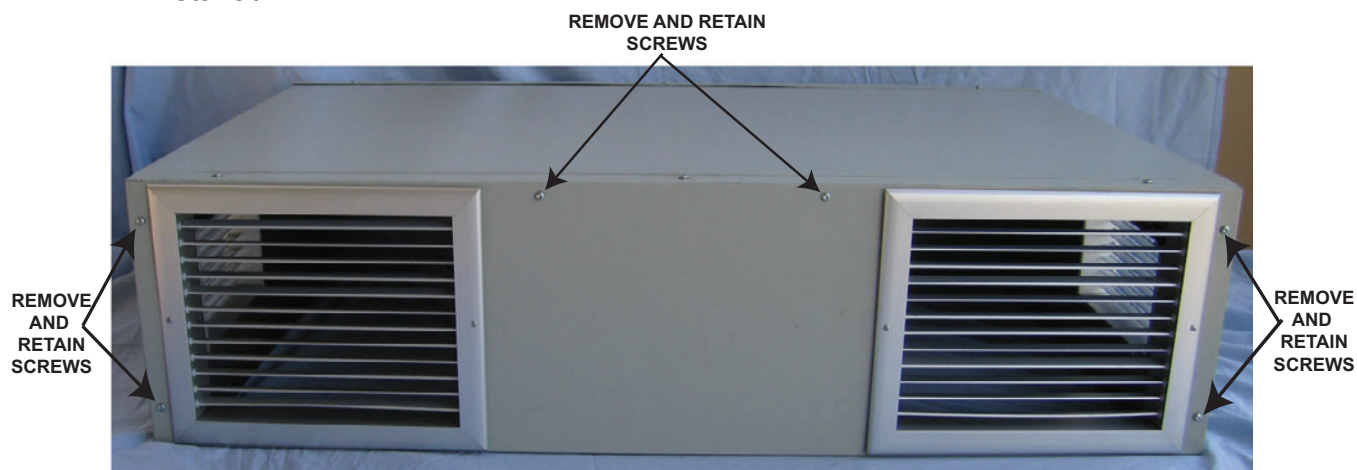
BEFORE INSTALLING, SERVICING OR MAINTAINING THIS EQUIPMENT, SWITCH THE ELECTRIC POWER TO "OFF" AT THE DISCONNECT LOCATED BEHIND THE FRONT DOOR ON THE LOWER PANEL. FAILURE TO DO THIS COULD RESULT IN PROPERTY DAMAGE, BODILY INJURY OR DEATH.

Remove the front plenum panel from the plenum. Retain the screws and panels for reinstallation after plenum has been installed.

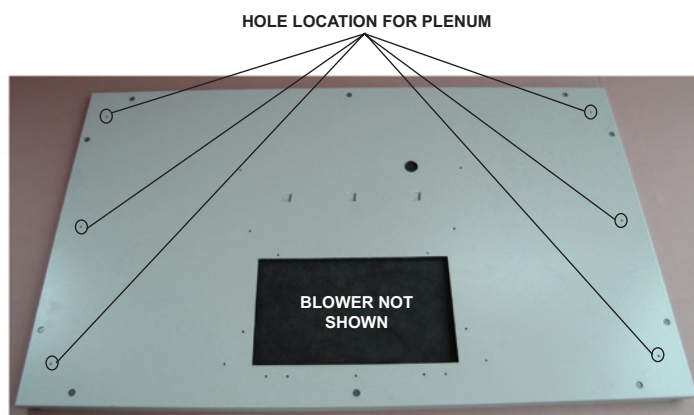
For freeblow plenum and standard height ducted plenums, the plenums should be installed onto the Scholar III™ cabinet, prior to installing the cabinet into its final location. On extended height ducted plenums, the Scholar III heat pump or air conditioner may have to be installed in its final location before the ducted plenum is fastened to the top of the cabinet.

1.03 PLENUM INSTALLATION

1. Prior to mounting the plenum on top of the Scholar II unit, remove the front panel from the plenum. Retain the screws for reinstallation after the plenum has been installed.



2. On the top panel of the Scholar III unit, locate the 6 holes that correspond with the six holes in the plenum.

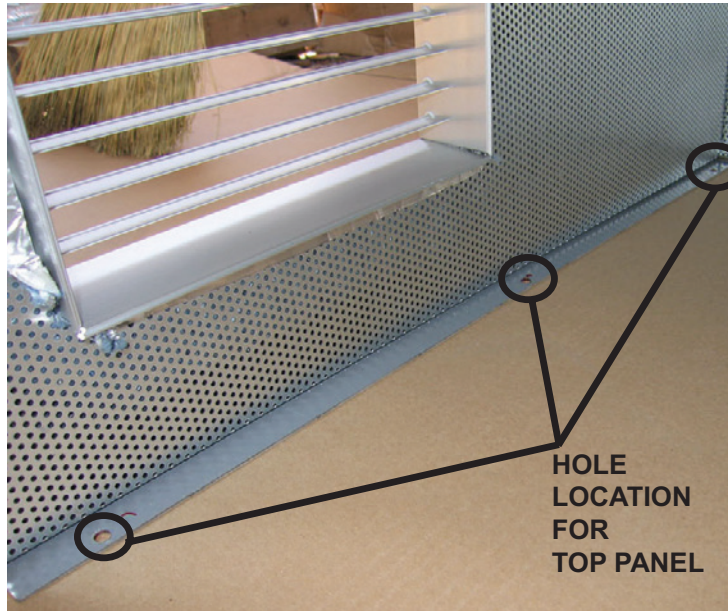


3. After the front panel has been removed, lift the plenum onto the top of the Scholar III unit.

WARNING

THE PLENUM IS HEAVY. USE CARE WHEN PLACING THE PLENUM ON TOP OF THE SCHOLAR III HEAT PUMP OR AIR CONDITIONER.

4. Locate the 6 holes on the side flanges (3 on each side) of the plenum.



5. Secure the plenum to the Scholar III unit with the six ½" hex head screws.
6. Attach the front panel top the front of the plenum with the six screws. Make sure that the two screws located between the supply grilles are at the top.
7. Adjust the vanes on the grilles to deliver the optimize air flow to the classroom.

The air distribution system which is field supplied and installed downstream of the specified **ducted plenum** must be engineered to assure sufficient air flow, even under adverse conditions, such as dirty filters. The information provided in Figure 1, Appendix A should be used to design the air distribution system duct size leaving the Scholar III™ unit, keeping the external static pressure to a minimum.

Applications using duct work should be designed and installed in accordance with the current edition of the National Fire Protection Association codes and standards 90A and 90B. 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. The duct work 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 ductwork 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.

APPENDIX D - TRIM STRIP INSTALLATION

1.01 TOOLS/FIELD FURNISHED SUPPLIES

WARNING

TO AVOID PERSONAL INJURY, ADEQUATE PROTECTIVE CLOTHING MUST BE WORN AND PRECAUTIONS IN HANDLING AND INSTALLING THIS EQUIPMENT MUST BE PRACTICED AT ALL TIMES.

- Power Drill/Driver and Extension
- Tape Measure
- Self-tapping Sheet Metal Screws, 1/2" Long (one for every foot of trim strip)
- Bit for Field Supplied Sheet Metal Screws
- Metal Saw to Cut Trim Strips to Required Lengths
- File to Debur Field Sawed/Cut Metal Edges
- Acoustical Insulation

1.02 INSPECTION/UNPACKING/HANDLING

Trim strips are ordered to fill the gap between the Scholar III™ cabinet and the finished inside surface of the wall, when the cabinet is offset from the wall.

Trim strips are 10 inches in depth and have a 1 inch 90° flange on one end to fit flush to the finished inside wall. Trim strips can be used to accommodate cabinets with up to a 9 inch offset from the wall.

Trim strips are packaged in corrugated marked on the outside with part number 03027 and strapped to a skid for shipment to the job site. They are painted to match the cabinet color. The finished painted surfaces have a protective white film on the surface to protect the surfaces from damage. Leave the film on the painted surfaces until the strips have been installed and construction work in the area is completed.

IMPORTANT

IMMEDIATELY UPON RECEIPT, INSPECT THIS EQUIPMENT TO DETERMINE VISIBLE AND CONCEALED DAMAGE. ALL DAMAGE MUST BE REPORTED TO THE FREIGHT CARRIER WITHIN 15 DAYS, ON THE FREIGHT CARRIER'S FORM.

1.03 PREPARATION OF SCHOLAR III™ HEAT PUMP AND AIR CONDITIONER FOR TRIM STRIP INSTALLATION

The Scholar III™ heat pump and air conditioner cabinet and plenum (as appropriate) must be installed, with the floor fasteners in place and the outside louver installed, to ensure the fixed location of the system prior to installation of the trim strips. Check the cabinet for vertical plumb and parallelism to the inside of the finished wall prior to installing the trim strips.

1.04 INSTALLATION OF TRIM STRIPS

Cut the trim strips to appropriate lengths to fill the gaps between the finished inside wall and the cabinet sides and top. To reduce sound transmission through the trim strips, apply acoustical insulation on the side of the strips that face the outdoor air box.

Debur all field cut or sawed metal edges.

IMPORTANT

CAREFULLY MARK, INDENT AND DRIVE SCREWS THROUGH THE TRIM STRIPS TO AVOID DAMAGING THE PAINTED SURFACES.

Field supplied screws should be self tapping zinc coated sheet metal type, 1/2" long with head color of satin aluminum, to match the cabinet finish.

APPENDIX E - OUTDOOR LOUVER/COLLAR INSTALLATION

1.01 TOOLS/FIELD FURNISHED SUPPLIES

WARNING

TO AVOID PERSONAL INJURY, ADEQUATE PROTECTIVE CLOTHING MUST BE WORN AND PRECAUTIONS IN HANDLING AND INSTALLING THIS EQUIPMENT MUST BE PRACTICED AT ALL TIMES.

- Power Drill/Driver and Extension
- T25 TORX Bits
- Sealant Caulk (tube)
- Caulking Applicator
- Ladder (as appropriate)
- Masonry Penetrating Fasteners (6 per collar)
- Scribe/punch

1.02 INSPECTION/UNPACKING/HANDLING

Louver/collar assemblies, louvers and collars are shipped to the job site in corrugated containers. Do not stack these containers. Louvers and collars are to be handled as fragile items.

IMPORTANT

IMMEDIATELY UPON RECEIPT, INSPECT THIS EQUIPMENT TO DETERMINE VISIBLE AND CONCEALED DAMAGE. ALL DAMAGE MUST BE REPORTED TO THE FREIGHT CARRIER WITHIN 15 DAYS, ON THE FREIGHT CARRIER'S FORM

- A. The following louver/collar assemblies, louvers and collars are suitable for all Scholar III™ units.

<u>Part Number</u>	<u>Description</u>
81161	Clear anodized louver/collar assembly
81162	Dark bronze louver/collar assembly

To minimize damage, remove the louver and louver parts from the corrugated container just prior to installation. Retain the bag of screws and caps for installation of the louver.

WARNING

THIS EQUIPMENT MUST BE INSTALLED IN CONFORMANCE WITH ALL APPLICABLE LOCAL AND NATIONAL ELECTRICAL, PLUMBING AND BUILDING CODES.

THIS EQUIPMENT SHOULD BE INSTALLED AND SERVICED ONLY BY A TRAINED PROFESSIONAL HVAC SERVICE PERSON.

WARNING

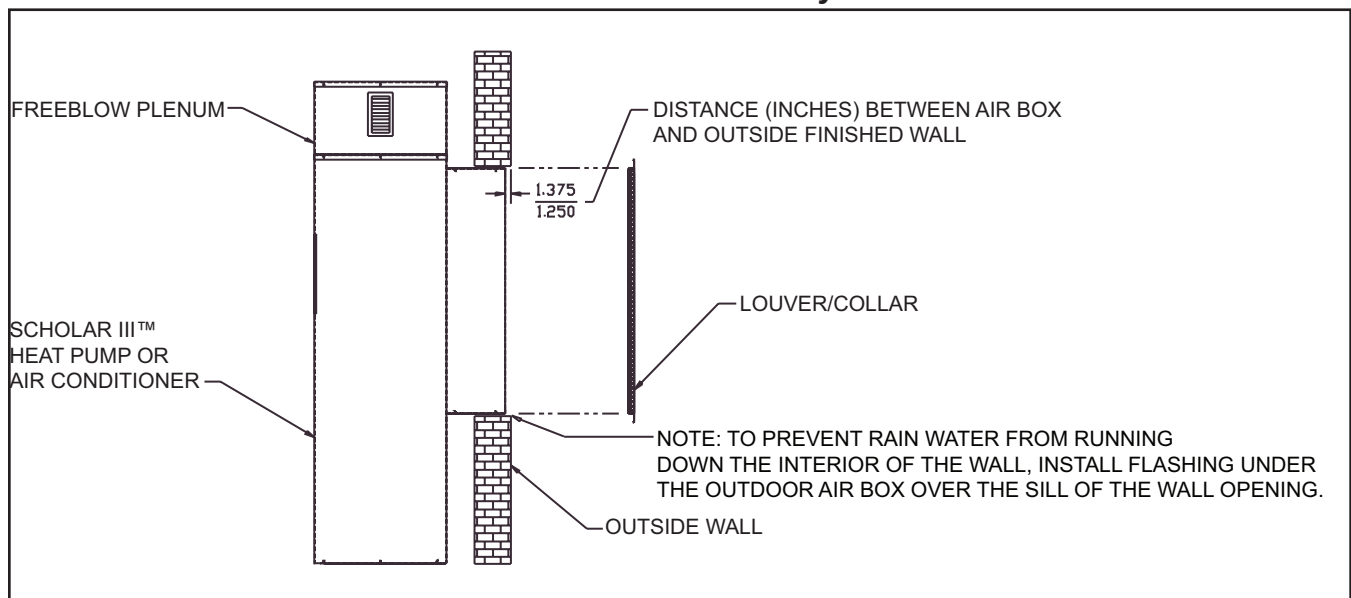
BEFORE INSTALLING, SERVICING OR MAINTAINING THIS EQUIPMENT, SWITCH THE ELECTRIC POWER TO “OFF” AT THE DISCONNECT LOCATED BEHIND THE KEY LOCKED DOOR ON THE LOWER FRONT PANEL. FAILURE TO DO THIS COULD RESULT IN PROPERTY DAMAGE, BODILY INJURY OR DEATH.

1.03 PREPARATION OF SCHOLAR III™ HEAT PUMP OR AIR CONDITIONER FOR LOUVER/COLLAR INSTALLATION

Note: Custom louvers may have installation requirements different from louvers with a collar. Follow engineer’s drawings and instructions for installation of these louvers.

The Scholar III™ heat pump or air conditioner should be installed following the instructions in this manual. After installation, the Scholar III air box should be from 1-1/4” to 1-3/8” from the outside surface of the finished wall, as shown in Figure 1.

Figure 1. Dimension between Scholar III™ Air Box and Finished Outside Wall for Outdoor Louver/Collar Assembly Installation.



CAUTION

WHEN FASTENING LOUVER/COLLAR ASSEMBLY TO AIR BOX (OR EXTENSION) DO NOT OVERTIGHTEN LOUVER SCREWS. OVERTIGHTENING SCREWS WILL CAUSE DAMAGE AND WARP THE LOUVER/COLLAR ASSEMBLY.

1.04 INSTALLATION OF LOUVER/COLLAR ASSEMBLY, LOUVER AND COLLAR

A. Louver/Collar Assembly

The preassembled louver/collar is fastened from the outside of the building in one assembly.

1. The louver/collar assembly is **fastened directly to the air box** as shown in Figure 2, with six screws supplied with the louver/collar. Prior to installing the louver, apply caulk around the perimeter flange of the outdoor air box. Be careful

not to block the weep holes on the bottom flange. To ensure proper fit up of the collar to the outside wall surface, be sure the unit is positioned as shown in Figure 1. After the six screws have been installed and appropriately tightened (do not over torque), the color coordinated screw caps are snapped into place to cover the screw fastener heads. Provide a water seal around the top & both sides edges of the collar/wall interface, by applying an even bead of sealant caulk at the collar/wall interface.

2. The louver/collar assembly is **fastened directly to the outside wall**, as shown in Figure 2.

B. Louver

The louver itself may be fastened to the air box as shown in Figure 2.

C. Collar

The collar itself may be fastened to the outside wall by following the instructions in Figure 2.

IMPORTANT

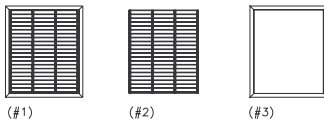
BE SURE AIR BOX IS PLACED 1-3/8" TO 1-1/2" INSET FROM OUTSIDE WALL SURFACE.

USE LOUVER/COLLAR SCREWS THAT ARE COMPATIBLE WITH THE COLOR OF THE COLLAR.

Figure 2. Installation of Louver/Collar Assembly to Air Box

NOTES:

1. The louvers come in three different configurations depending on mounting requirements: (#1) is the louver with collar, (#2) is the louvered grille without collar and (#3) is the collars. These types are shown below.



2. When the installation is designed to provide a flush finish of the louver with collar (#1), the outside air box will recess into the wall 1-1/8" from the exterior face. This is the preferred appearance and provides excellent aesthetics.

3. When the outside air box extends beyond the outside wall, then the louver (#2) is used. The collar (#3) can be selected to provide a finished trim appearance to the wall opening.

4. When the outside air box recedes into the wall more than 1-1/4" to 1-3/8", a "field supplied" air box extension must be used to join the air box and the outside louver. This prevents air bypass and noise transmission from the outside through the masonry opening.

5. Some applications may require that the louver collar be fastened to the exterior wall. Installer must drill required holes in the collar as located in Figure (1-1).

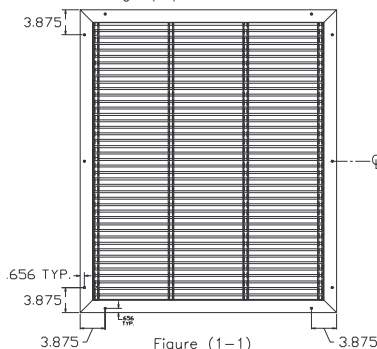
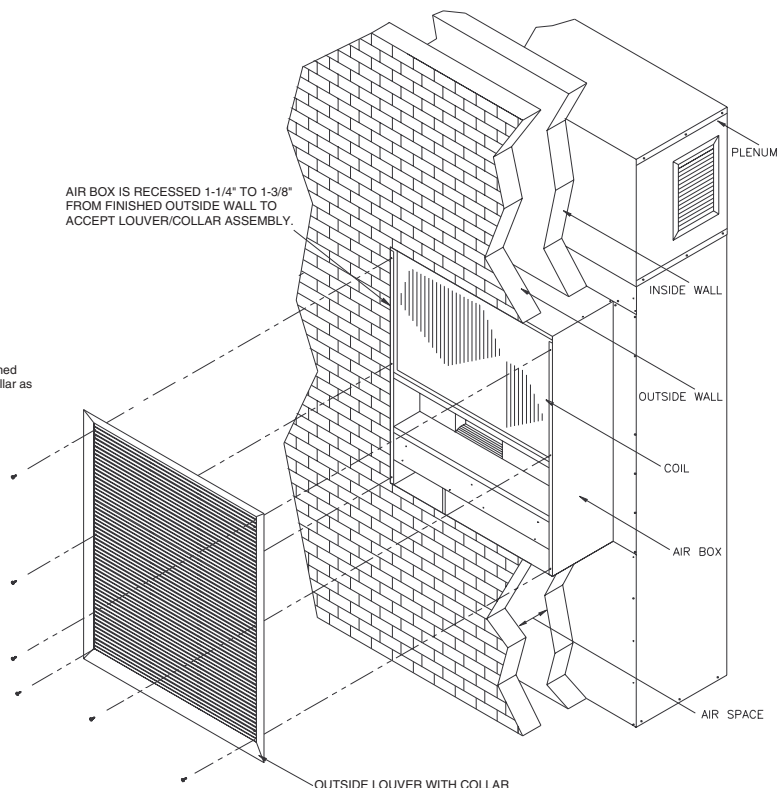


Figure (1-1)
ALT. HOLE PATTERN (1800)

AIR BOX IS RECESSED 1-1/4" TO 1-3/8" FROM FINISHED OUTSIDE WALL TO ACCEPT LOUVER/COLLAR ASSEMBLY.



APPENDIX F - INSTALLATION OF ELECTRIC HEATERS ON ALL VAIA/VAISA MODELS

1.01 TOOLS/FIELD FURNISHED SUPPLIES

WARNING

BEFORE INSTALLING, SERVICING OR MAINTAINING THIS EQUIPMENT, SWITCH THE ELECTRIC POWER TO “OFF” AT THE DISCONNECT.

FAILURE TO DO THIS COULD RESULT IN PROPERTY DAMAGE, BODILY INJURY OR DEATH.

- Power Drill/Driver and Extension
- T 5 TORX Bits
- Needle Nose Pliers
- Wire Stripper/Cutter
- Screwdriver with Slotted Bit

1.02 INSPECTION/UNPACKING/HANDLING

Electric heaters are shipped inside the GeoScholar unit in the lower left side. Use care when handing the heaters. The heaters are wrapped in brown paper for protection during transit. Remove the paper before installing the heaters. The heater's elements are fragile and can break and the support frames can bend when handled improperly. Make sure that the heater's elements are not touching the frame.

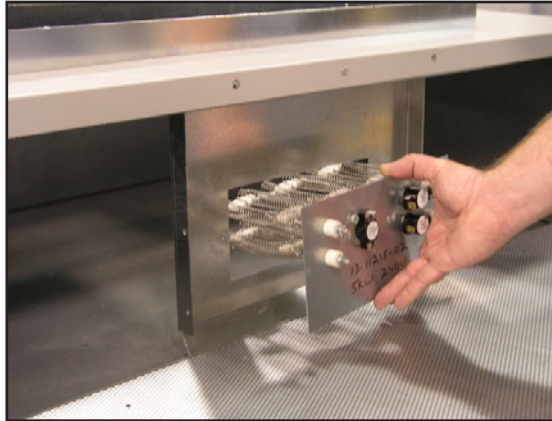
1.03 MOUNTING THE ELECTRIC HEATERS

The heaters are installed on top of the heat pump over the supply air blower's discharge. Marvair recommends that the plenum be installed prior to installing the heaters to minimize the chance of damaging the heaters when installing the plenum.

- A. Remove the front panel of the plenum. A rectangular opening with two screws holes is visible.



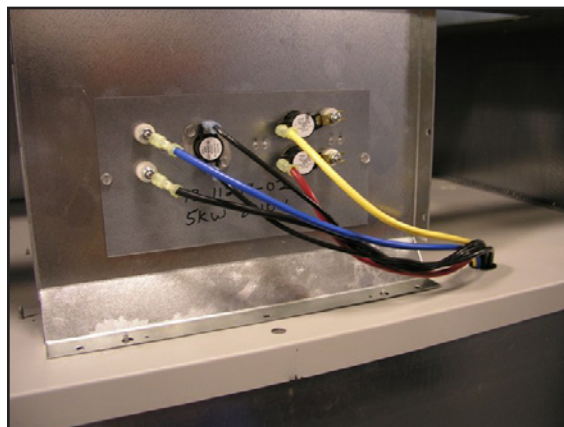
- B. Carefully slide the heater assembly into the opening. The safety switches should be at the top of the heater assembly. Make sure that the elements are not broken or bent when sliding the assembly into position.



- C. Secure the assembly with two screws.



- D. Pull the power wires from inside the heat pump, through the electrical bushing. Connect the wires as shown in the electrical diagram that is on the heat pump.



- E. Check to see that all connections are secure and replace the front cover of the plenum.



Please consult the Marvair® website at www.marvair.com for the latest product literature. Detailed dimensional data is available upon request. A complete warranty statement can be found in each product's Installation/Operation Manual, on our website or by contacting Marvair at 229-273-3636. As part of the Marvair continuous improvement program, specifications are subject to change without notice.



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