Marvair®
AIRXCEL™, Inc.

SCHOLAR V

INSTALLATION & STARTUP MANUAL

Scholar V Classroom Units: 2 to 5 Ton Cooling Capacity

Model VAIVA36 (14-42 BTUH)

with Variable Refrigerant Flow Compressors

⚠ WARNING - SAFETY REQUIREMENTS

- **If the information in these instructions is 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 V with Free Blow Plenum

Intertek NSF Designed, Engineered & Assembled In the USA

MODEL NUMBER: _____

SERIAL NUMBER: _____

DATE OF START-UP: _____

Manufactured By:

Marvair® Division of AIRXCEL™, Inc.

P.O. Box 400 • Cordele, Georgia 31010
156 Seedling Drive • Cordele, Georgia 31015
(229) 273-3636 • Fax (229) 273-5154
E-mail: marvairtech@airxcel.com • Internet: www.marvair.com

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

Marvair Scholar V VAIVA Installation & Startup Manual 12/2016 New
Part #03079

How To Use This Manual

This manual is intended to be a guide to the Marvair® Scholar V line of vertical packaged heat pumps and air conditioners. This manual covers the installation and start-up of the Scholar V heat pumps and air conditioners, models VAIVA, with variable refrigerant flow 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 V 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 V 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 SafetyPrecautions

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 Scholar 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 suggestions that will result in improved installation, reliability or operation.

Specifications subject to change without notice.

HEATING, VENTILATING AND AIR CONDITIONING EQUIPMENT

INSTALLATION AND START-UP INSTRUCTIONS

FOR SCHOLAR V HEAT PUMP AND AIR CONDITIONER MODEL VAIVA

TABLE OF CONTENTS

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 Noise 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 V 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 V 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 V 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 V 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 V 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 V UNIT). THE UNIT SHOULD NOT REMAIN IN THIS POSITION ANY LONGER THAN REQUIRED FOR THE ACTUAL MOVING PROCESS. IF THE SCHOLAR V 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
B = February	F = June	K = October	E = 2015	I = 2019
C = March	G = July	L = November	F = 2016	J = 2020
D = April	H = August	M = December	G = 2017	K = 2021

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

VAI V A • • • • • • V

- **VAI**: Vertical Air Indoor Source
- **V**: Variable Speed Compressor
- **A**: Refrigerant R-410A
- **Nominal Cooling**: 24 = 24,000 BTUH; 36 = 34,000 BTUH; 48 = 46,000 BTUH; 60 = 54,500 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
- **Special Options**: G = Hot Gas Reheat/Dehumidification
- **Configuration**: V = Scholar V

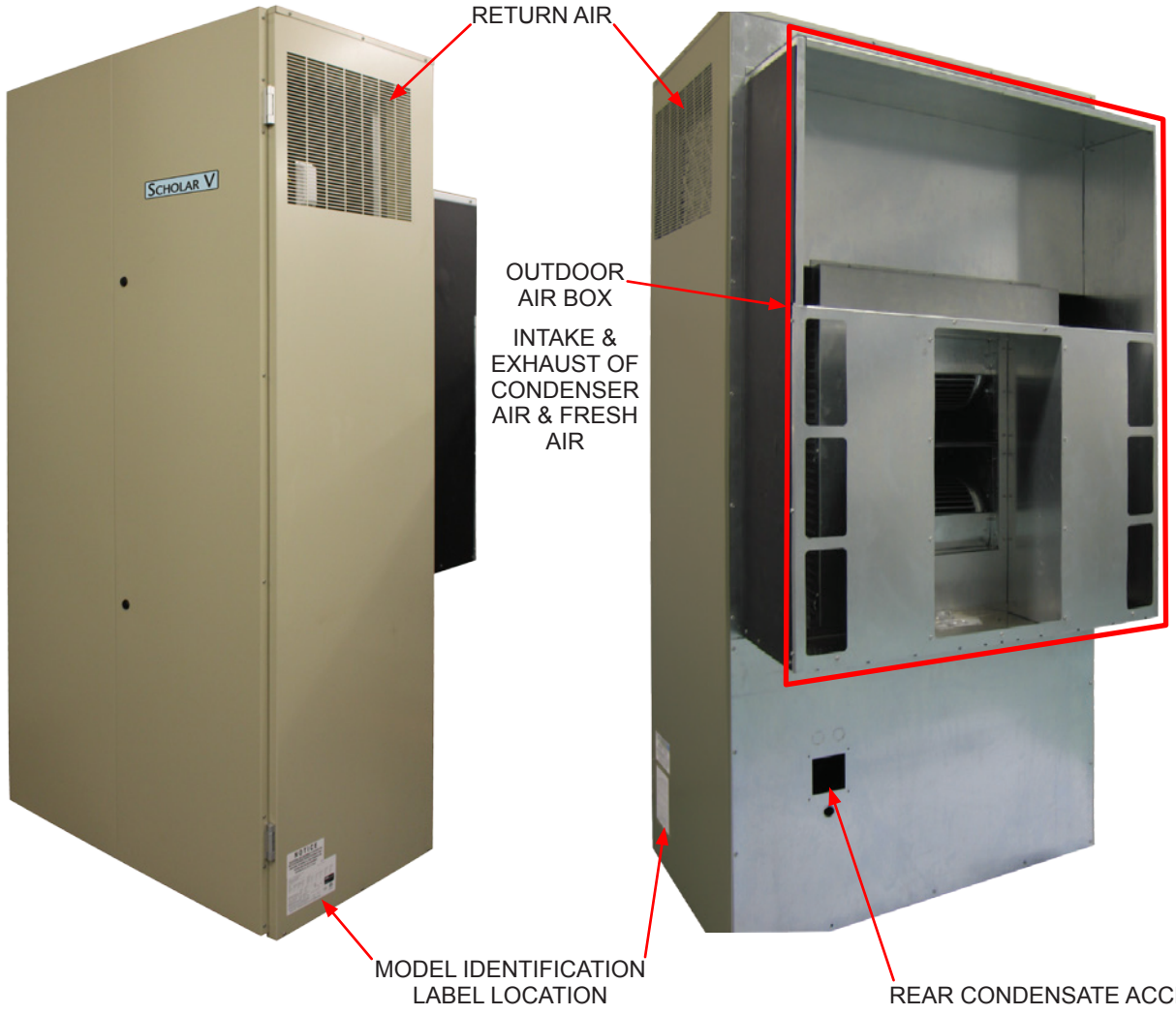


Figure 1. General External Component Identification and Access to Scholar V Heat Pump or Air Conditioner

1.03 STANDARD CONTROLS

A. 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 V 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 V 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 V 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.

B. 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 electric heat, the compressor simultaneously turns off.

The **electric heat control (heat pump only)** operates only when a preset outdoor temperature is reached. Electric heat can also operate upon request from the control setting for emergency heat.

The **electric heat during defrost (heat pump only)** is programmed to operate during defrost.

C. 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.

1.04 THERMOSTAT

The Scholar V does not use a conventional wall mounted thermostat and sub base. Instead, an internal Temperature and Relative Humidity sensor sends room condition information directly to the PLC in the unit for processing.

Figure 2. Internal Temperature/Humidity Sensor

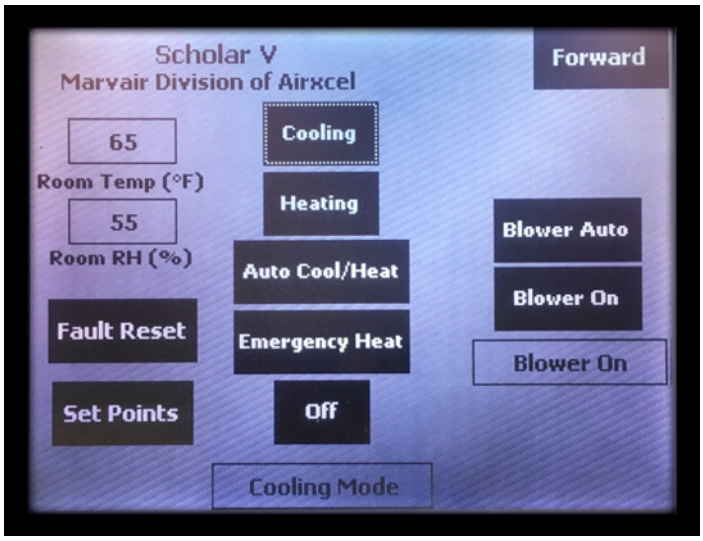
Temperature and Relative Humidity set-point adjustments are made on the HMI (Human-Machine-Interface) screen typically located on the front of the unit. The HMI contains several screens with parameters that can be changed by the end user. There are other parameters designed for use by qualified service personnel and these are accessible with a User Name and Password only.

Figure 3. HMI Touchscreen Controller

The HMI uses touch Screen Technology. All screen manipulation and set-point changes can be made just by touching the appropriate virtual buttons on the screen.

A. Main Screen

The first screen is the main screen and contains the following:



Room Temperature Read-out
Displays real time room temperature

Room Relative Humidity Read-out
Displays real time room relative humidity

Fault Reset
Press this button once to clear any faults that may have occurred

Set-Points
Press this button to go to another screen with the set points

Cooling
Press this button once to enter the cooling mode. The chosen operating mode is shown at the bottom of the screen.

Heating
Press this button once to enter the heating mode. The chosen operating mode is shown at the bottom of the screen.

AutoCool/Heat
This mode will allow automatic change-over from Cooling to Heating and vice-versa. When this mode is being used, the cooling set point is established by the end user and the heating set-point is calculated by applying a differential to the cooling set point. In this mode, the heating set-point will always be less than the cooling set/ point.

Emergency Heat
In this mode, all compressor functions are disabled and heating is provided with electric resistance heating elements.

Operating Mode Read-Out
This box shows the mode that the unit is running in.

Forward
Advances to the next screen

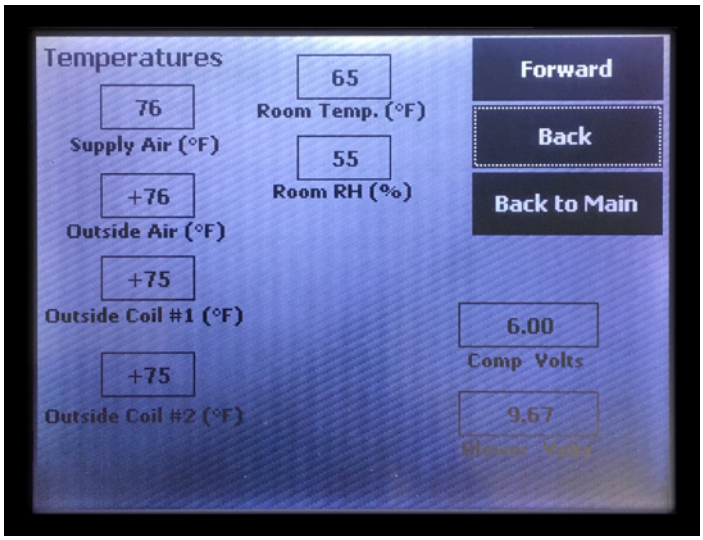
Blower Auto
Press this to run the indoor blower only when a cooling or heating function is required. The selection you make is shown in the box below.

Blower ON
Press this to run the indoor blower continually. The selection you make is shown in the box below.

Blower On/Auto Read-Out
This box shows which blower operation technique is being used.

B. Temperature Screen

The next screen is the Temperature screen and shows several important temperature values, as well as the compressor and blower control voltages



Supply Air
This is the real-time temperature of the air coming out of the unit.

Outside Air
This is the real-time temperature of the ambient outside air.

Outside Coil #1
This is the temperature read by a thermocouple buried in the feeder tubes of Outside Coil #1.

Outside Coil #2
This is the temperature read by a thermocouple buried in the feeder tubes of Outside Coil #2.

Room Temperature
This is the real-time temperature being transmitted by the temperature transmitter located in the inlet to the evaporator coil.

Room RH
This is the real time relative humidity being transmitted by the RH transmitter located in the inlet to the evaporator coil.

Forward
Press this button to go forward one screen.

Back
Press this button to go back one screen.

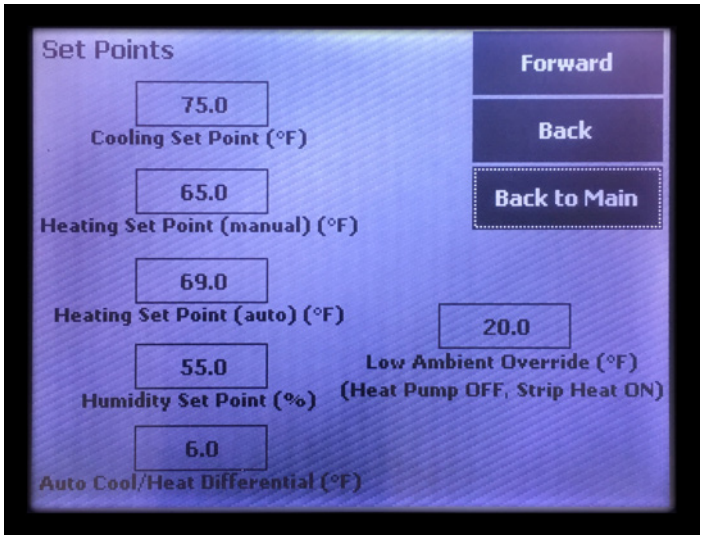
Back to Main
Press this button to go back to the main screen.

Compressor Volts
This box shows the speed control voltage being sent to the compressor.

Blower Volts
This box shows the speed control voltage being sent to the indoor blower.

C. Set-Points Screen

The Set-Points Screen is where the desired room conditions are set.



Cooling Set-Point
In the Cooling Mode or Auto Cool/Heat Mode, this is the user adjustable temperature the unit runs to try and achieve while cooling the space.

Heating Set-Point (manual)
In the Heating Mode (manual, not Auto Cool/Heat), this is the user adjustable temperature the unit runs to try to achieve while heating the space.

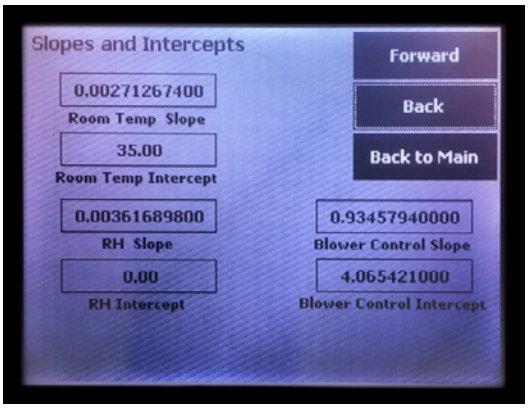
Heating Set-Point (auto)
This set point is automatically calculated and is not directly adjustable by the end user. Adjustment is made by changing the Auto Cool/Heat Differential (see below).

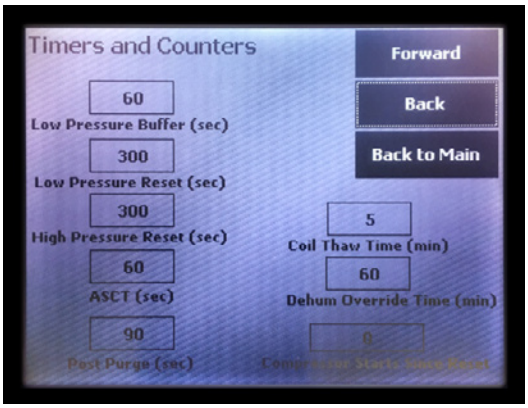
Humidity Set-Point
This is the user adjustable relative humidity the unit runs to try to achieve in the Cooling Mode or in the Dehumidification with Reheat mode. The Dehumidification with Reheat mode will automatically come on if the temperature is satisfied in cooling but the relative humidity is still high. Cooling is forced on for dehumidification with hot gas reheat to keep from overcooling the space.

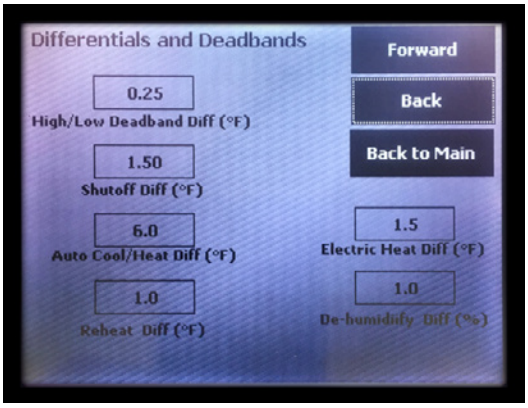
Auto Cool/Heat Differential
This number is subtracted from the Cooling Set Point to establish the Heating Set Point while the unit is in the Auto Cool/Heat Mode.

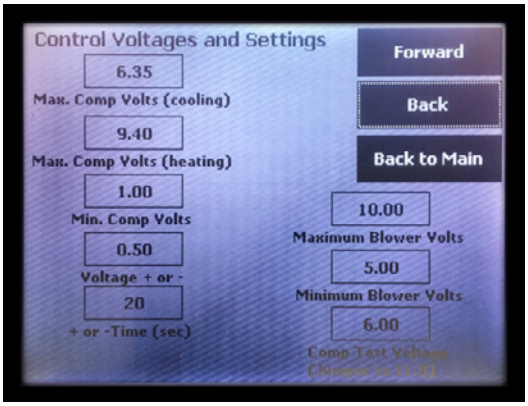
Low Ambient Override
This is the outside temperature at which heat pump heating operation is discontinued and resistance heating is used. It is Password Protected

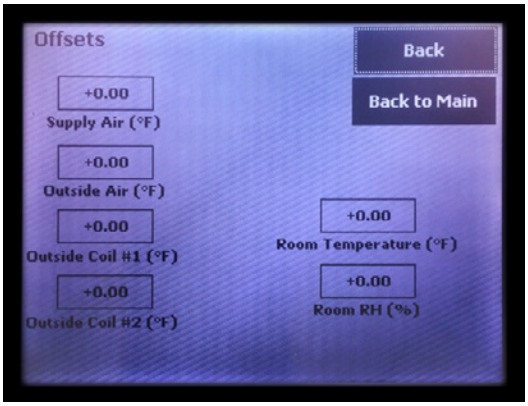
D. Other Screens
There are several other screens used for diagnostics. The screens are shown below but detailed discussion is not provided in this document.











1.05 OPTIONAL CONTROLS

A. All units have the following control options available.

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.

1.06 LOCATION SELECTION AND PREPARATION

⚠ WARNING

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

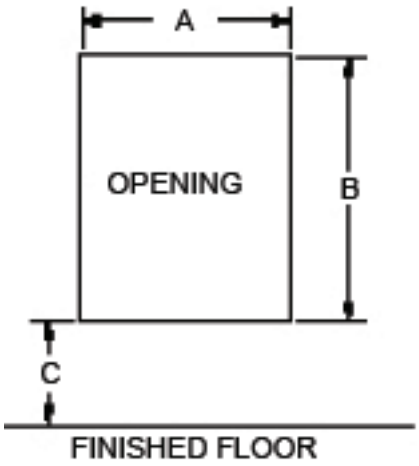
A. The Scholar V heat pump and air conditioner must be installed on an outside wall for access to outside air. The wall opening dimensions are shown in Figure 2. It must not interfere with any windows or doors to the outside. The outdoor air path must not be impeded by shrubbery or other obstructions. Do not locate the Scholar V 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 V 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 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 V 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 V cabinet as described in Figure 5; and allowing for any offset or standoff from the finished interior surface of the wall.

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

B. Wall opening dimensions for the Scholar V 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.



DIMENSION	
A	45-1/8”
B	48”
C	32”
C*	34”

When 2” high base stand is used, the C dimension is specified. The use of a base stand with a height other than 2” will change the C height accordingly. Dimensions are in inches.

Figure 4. Wall Opening Dimensions for Scholar V Heat Pump and Air Conditioner.

1.07 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 5. Depending on the location of the Scholar V 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 V 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.

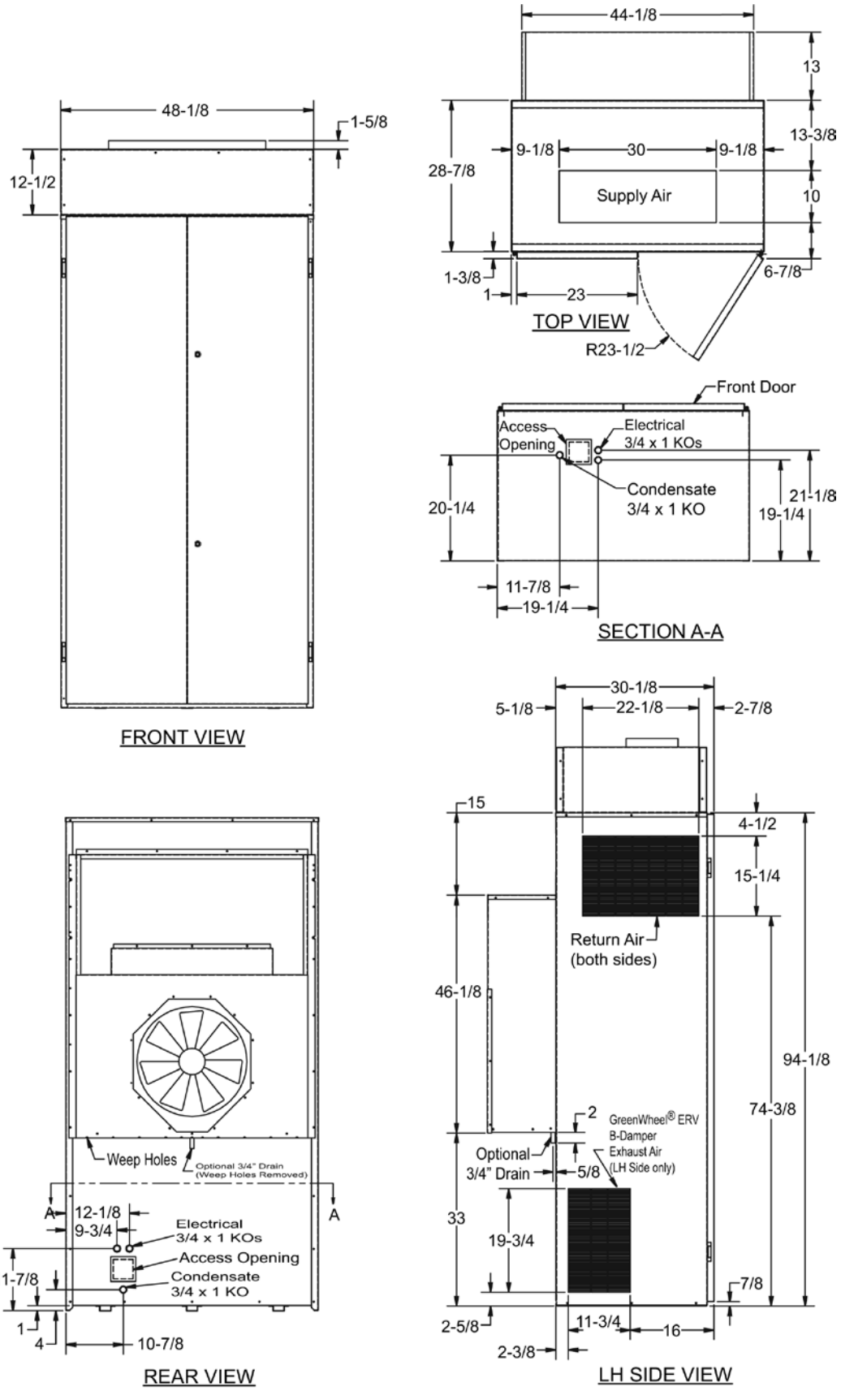


Figure 5. Scholar V Heat Pump and Air Conditioner Dimensional Data

1.08 CONDENSATE DRAIN LINE (ROUGH-IN)

A. The condensate drain line can be roughed in to drain the Scholar V 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 5. 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 V UNIT (WHEN INSTALLED) FOR POSSIBLE TUBING COLLAPSE. CORRECT AS APPROPRIATE.

1.09 PREPARATION OF THE SCHOLAR V 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 V 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 are 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 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. Freeblow Plenum/Ducted Plenum. All Scholar V heat pump and air conditioners use an electronically commutated (EC) blower motor to distribute the conditioned air throughout the classroom. Taking commands from the PLC controller, the EC motor automatically adjusts its speed to match the compressor speed. 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.

F. 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 V heat pump or air conditioner, keeping the external static pressure to a minimum.

G. 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.

H. 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.

I. 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.

J. Weather Panels are field supplied and do not come with the Scholar V heat pump or air conditioner. If a weather panel covers the wall opening described in Figure 4, remove the weather panel prior to installing the unit into the wall opening.

K. 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 V heat pump or air conditioner into place.

IMPORTANT

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

L. 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. his 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.

M. Prior to sliding the Scholar V 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 5 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.

N. If the outdoor air box was removed, reinstall it prior before placing the Scholar V unit in its final position. Install the outdoor air box onto the back of the Scholar V 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 V 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 V 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 6. 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

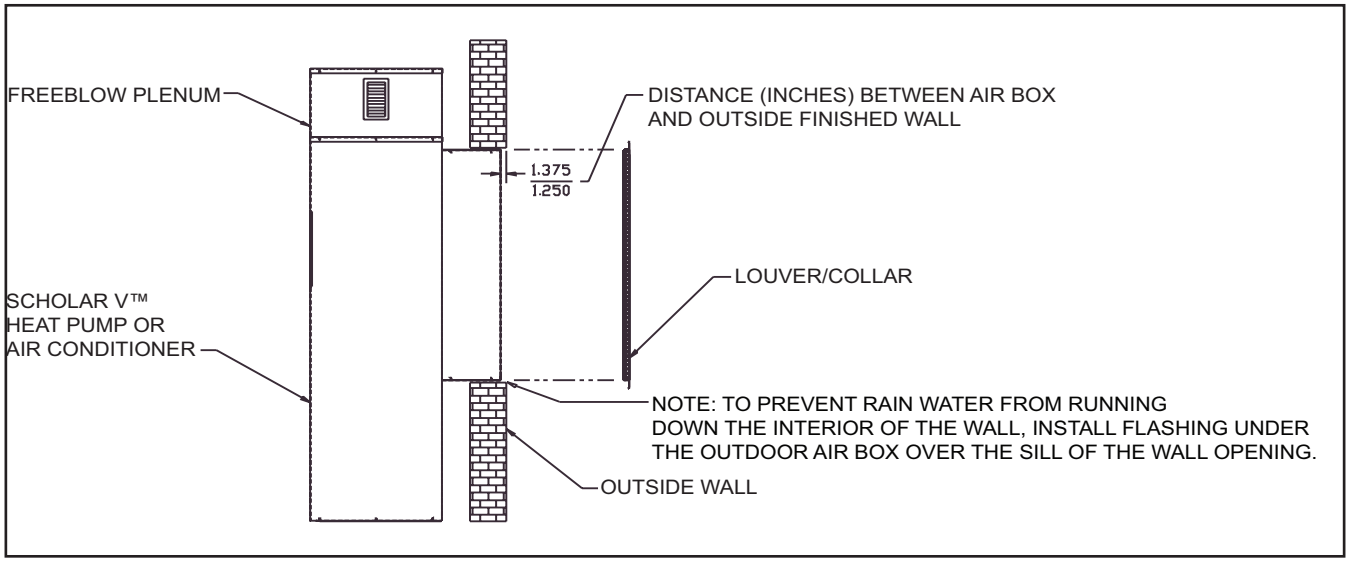


Figure 6. Dimension Between Scholar V Heat Pump or Air Conditioner Air Box and Finished Outside Wall for Outdoor Louver/Collar Assembly Installation

⚠ 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 V 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 V 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 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 V unit. Check the data label on each Scholar V 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 V cabinet. Remove the lower front panel for access to the disconnect. Figure 7 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 7 shows typical control centers for the Scholar V heat pump and air

conditioner. Figures 8 and 9 show typical single and three phase wiring diagrams for the Scholar V 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 terminal block located next to the disconnect. 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.

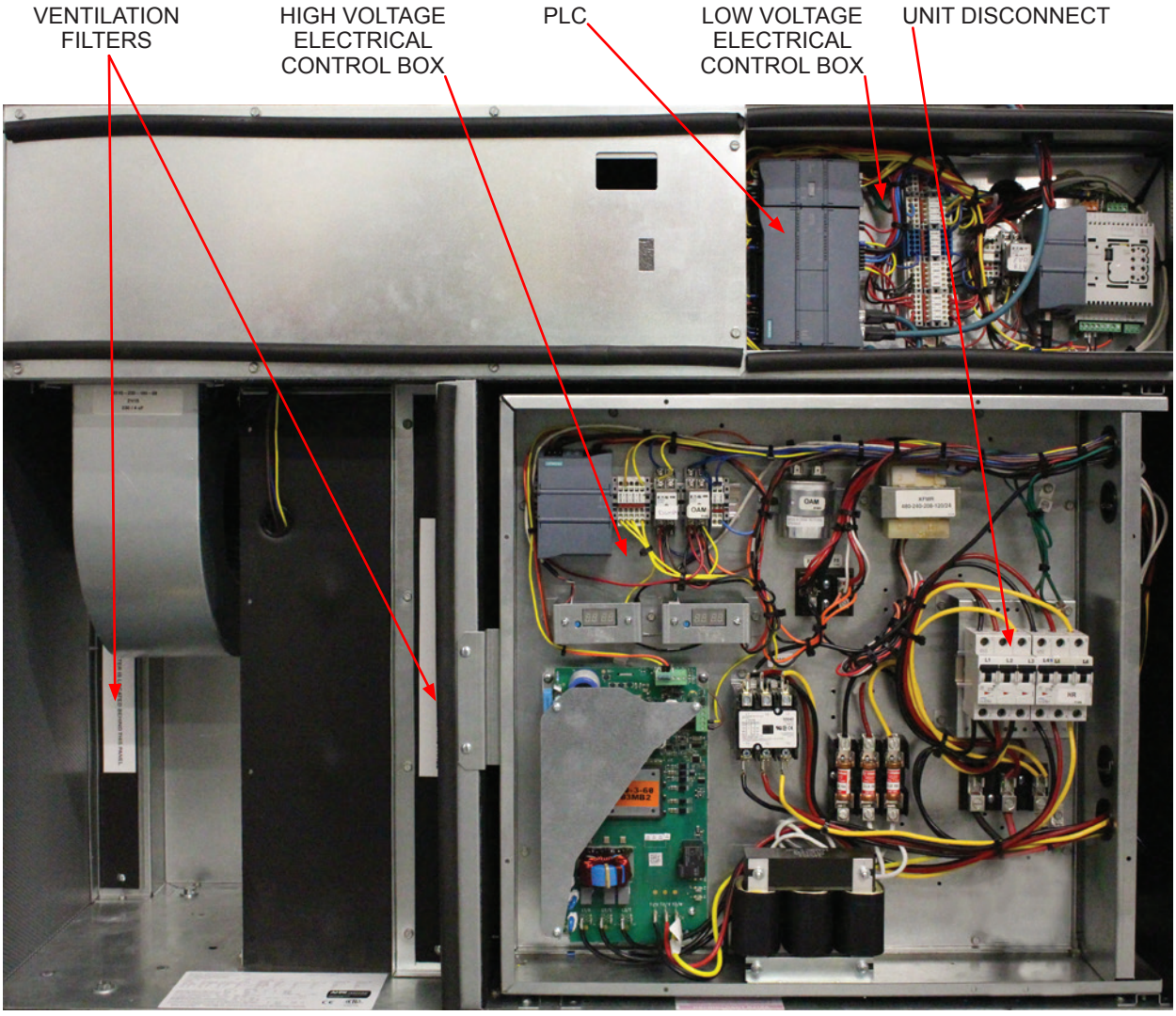


Figure 7. Electrical Control Box, Access to Ventilation Filters and GreenWheel® ERV

Note: Due to the variety of options, the control box in your unit may differ from the photo. Always refer to the electrical schematic in your unit.

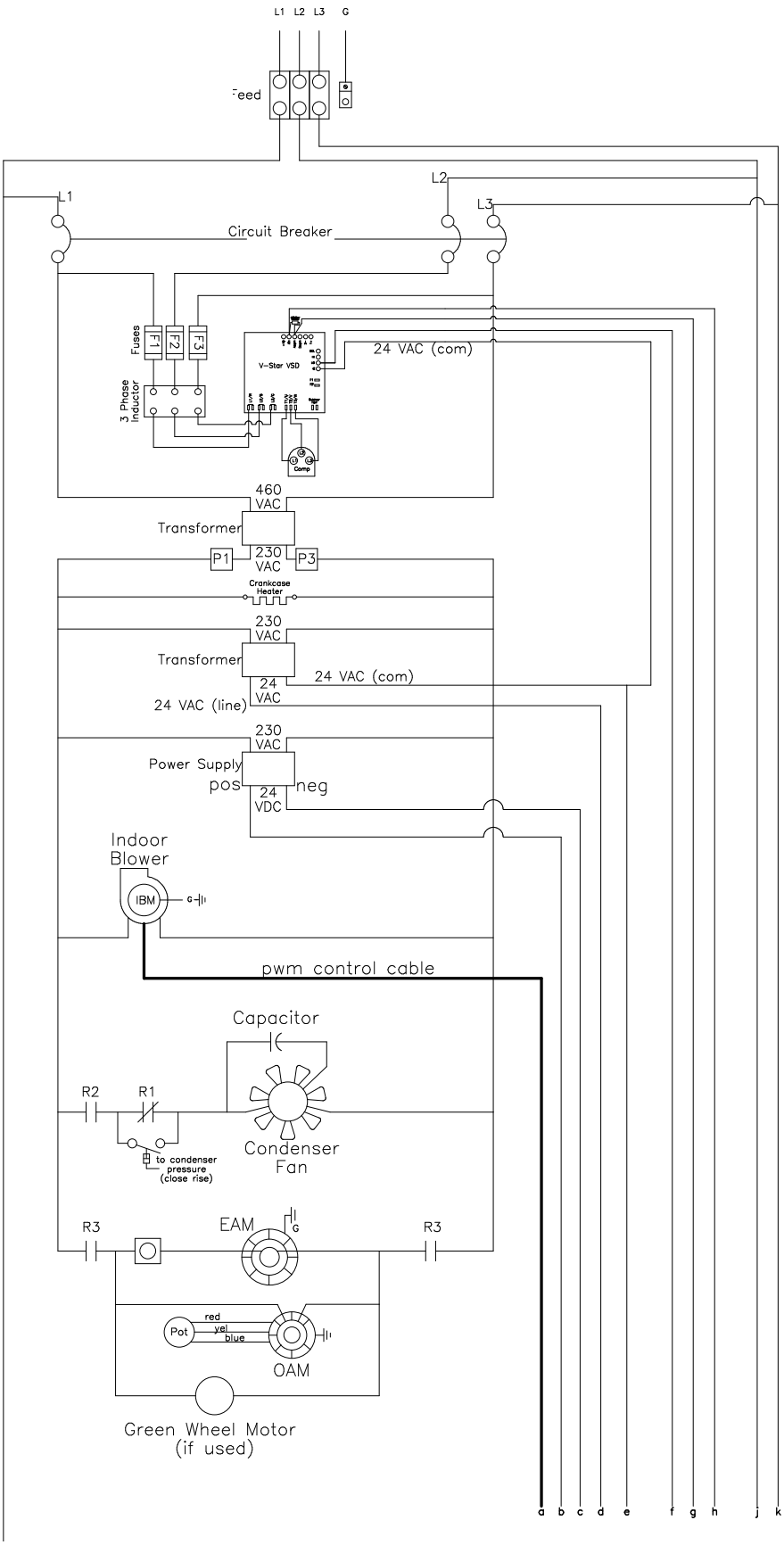


Figure 8a. Typical Wiring Schematic - Page 1 of 3

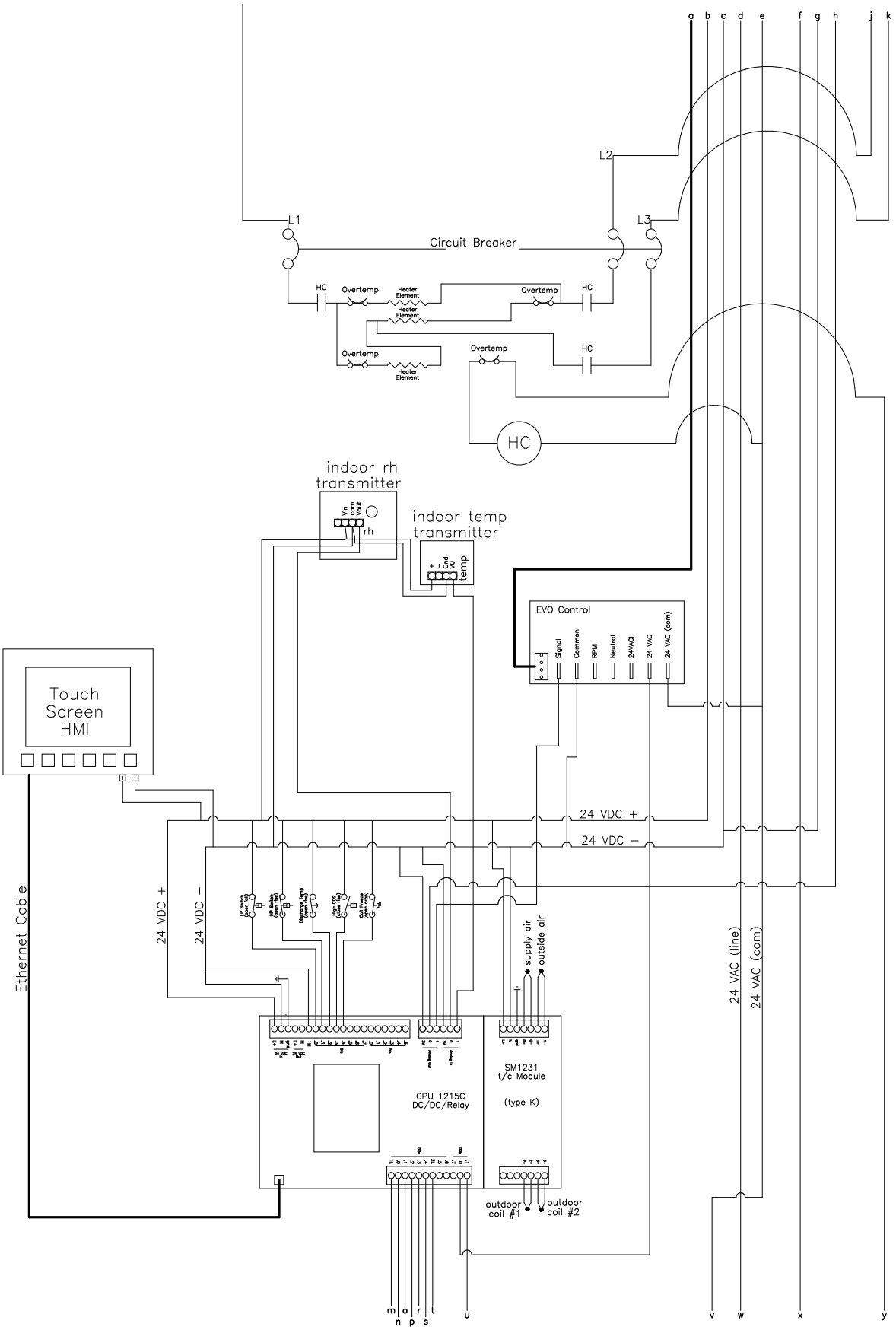


Figure 8b. Typical Wiring Schematic - Page 2 of 3

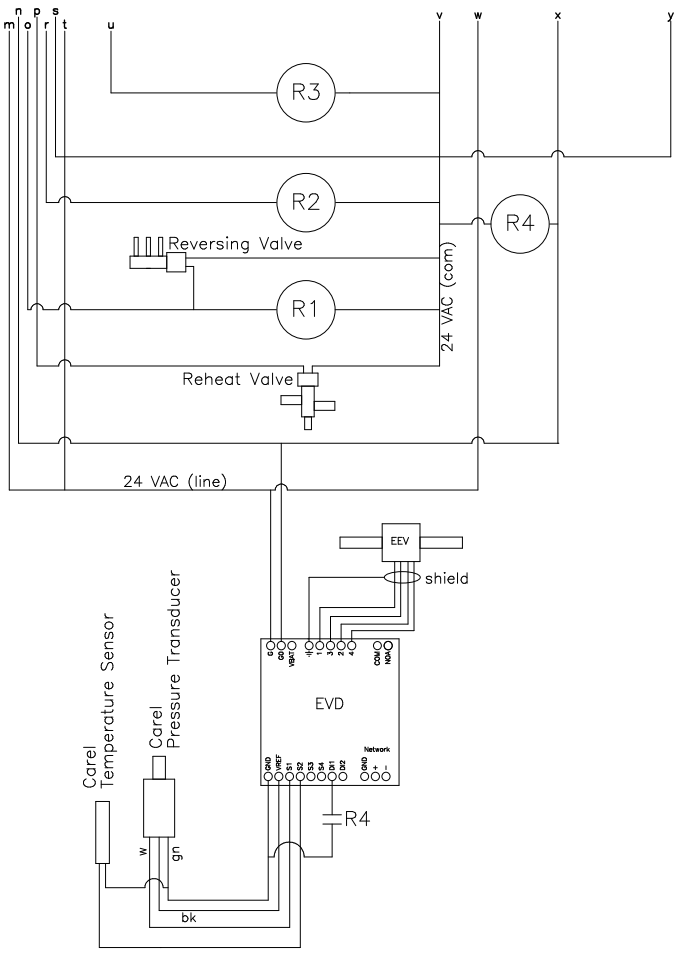


Figure 8c. Typical Wiring Schematic - Page 3 of 3

B. 1. For Scholar V 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.

2. 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.

3. For units with the reheat dehumidification option, the humidity sensor is integral to the unit and communicates with the PLC.

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 V 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 V 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 V 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.

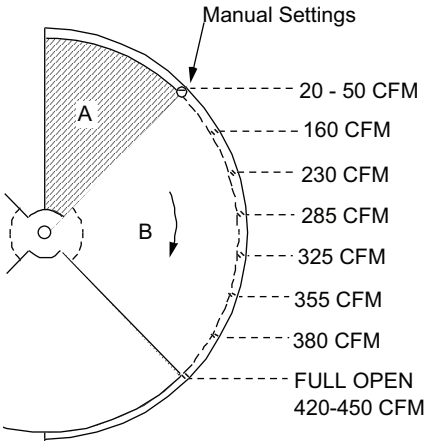
Follow the directions in Figure 10 to ensure proper air flow rate settings. After calibrating the ventilation system, replace the lower front cabinet panel.

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.



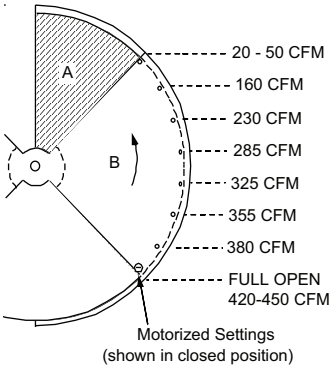
Inside the lower section, locate the circular calibration plates as noted in the drawing ("A" is fixed, "B" is movable). Remove the screw shown by the arrow from "Manual Settings."

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 10. Manual Fresh Air System Calibration Procedure



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.

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.

Figure 11. Motorized and PowerVent System Calibration Procedure

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 PROGRAMMABLE LOGIC CONTROLLER (PLC)

The control logic of the Scholar V is handled by a Siemens S7-1200 1215C Programmable Logic Controller (PLC). This device is powered by 24 volts DC and has 14 digital inputs, 10 digital outputs, two analog inputs and two analog outputs. The PLC has a model SM 1231 expansion module which provides four type K thermocouples for measuring various temperatures throughout the unit.

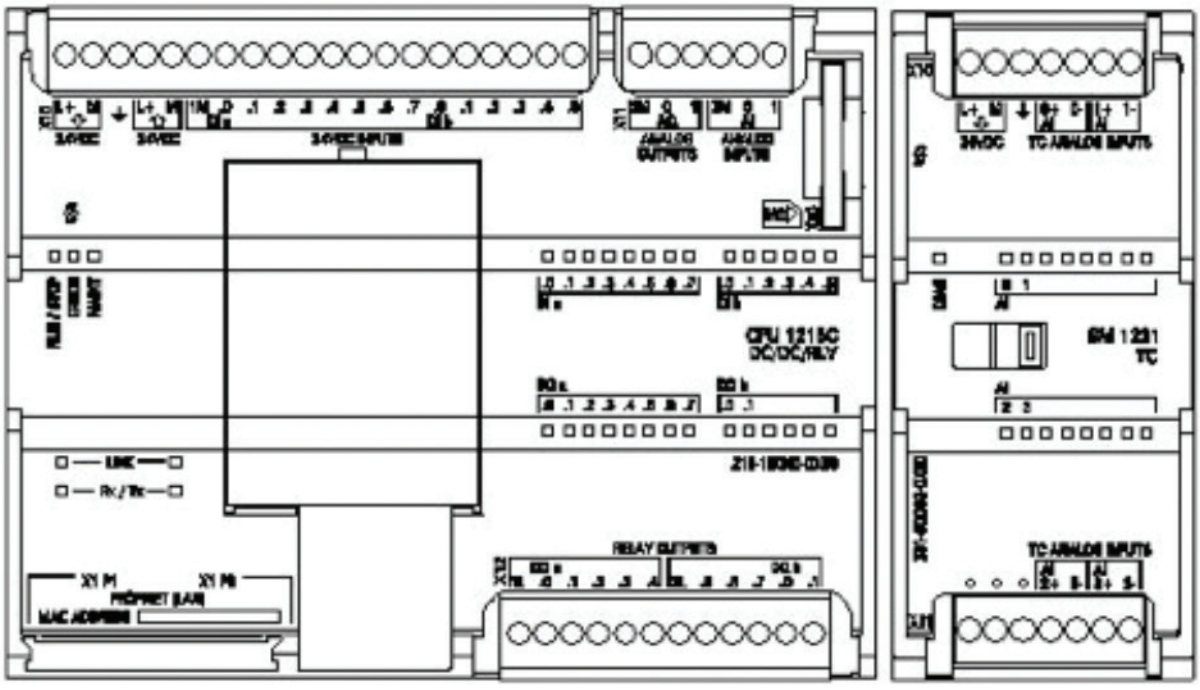


Figure 12. PLC and Thermocouple Module

A. Digital Inputs: All digital inputs are powered by 24 VDC

- DI 0.0 – *Low Refrigerant Pressure Switch:* Opens on refrigerant evaporator pressure drop
- DI 0.1 – *High Refrigerant Pressure Switch*: Opens on refrigerant condenser pressure rise
- DI 0.2 – *High Compressor Discharge Temperature:* Opens on temperature rise of the compressor discharge refrigerant line
- DI 0.3 – *CO2 Sensor*: Opens when the CO2 content of the room gets above set-point of the sensor
- DI 0.4 – *Evaporator Coil Freeze-Stat:* Opens when temperature of the evaporator coil fins falls below 28°F. This is an indication that the evaporator coil may be freezing up.

B. Digital Outputs

- DO 0.0 – Provides 24 VAC ON signal for Electronic Expansion Valve and for Variable Speed Compressor Driver Board
- DO 0.1 – *24 VAC to Reversing Valve:* Valve is energized in Cooling Mode.
- DO 0.2 – *24 VAC to Reheat Valve*: Valve is energized in the Dehumidification Mode when the supply air temperature is below the cooling set-point
- DO 0.3 – *24 VAC to Condenser Fan Head Pressure Control*
- DO 0.4 – *24 VAC to Heater Contactor*
- DO 1.0 – *24 VAC to Indoor Blower Controller*
- DO 1.1 – *24 VAC to Ventilation Control Relay*

C. Analog Inputs

- AI 0 – *0-10 VDC modulating signal from indoor Relative Humidity Transmitter:* 0 Volts = 0 %RH 10 volts = 100 %RH
- AI 1 – *2-10 VDC modulating signal from indoor Temperature Transmitter:* 2 Volts = 50°F 10 volts = 150°F

D. Analog Outputs

- AO 0 – *0 – 20 ma current signal to Variable Speed Compressor driver board:* This signal is converted to voltage with a 500 ohm resistor at the board. The voltage varies between 1 VDC and 9.4 VDC. 1 VDC drives the compressor at 1200 RPM. 9.4 VDC drives the compressor at 4800 RPM.
- AO1 – *0-20 ma current signal to EC Indoor Blower Motor control board:* This signal is converted to voltage with a 500 ohm resistor at the board. The Indoor Blower speed modulates linearly with the compressor speed. A maximum and minimum blower speed can be set to correspond linearly with the maximum and minimum compressor speeds.

E. Thermocouple Module

The Thermocouple Module has 4 channels. Type K thermocouples are used.

- Channel 0 – *Supply Air (treated air discharged from unit to the room)*
- Channel 1 – *Outdoor Air (ambient outdoor air entering condenser compartment)*
- Channel 2 – *Outdoor Coil #1: T*his thermocouple is located in the distributor tube bundle for Coil #1 and measures refrigerant temperature. It is used for defrost control.
- Channel 3 – *Outdoor Coil #2:* This thermocouple is located in the distributor tube bundle for Coil #2 and measures refrigerant temperature. It is used for defrost control.

F. Variable Speed Control Methodology

The variable speed compressor is capable of operating at speed from 1200 rpm to 3600 rpm in cooling and 4800 rpm in heating. Cooling or heating capacity is basically proportional to the compressor speed.

A control band is established by assigning a differential (+ or -) to the cooling set point or heating set point. This differential is adjustable but comes factory set at 0.25°F. For example, if the cooling setpoint is 75°F, the differential establishes a “deadband” from 74.75°F to 75.25 °F. If the heating setpoint is 65°F, the “deadband” would be 64.75 °F to 65.25 °F.

In Cooling, if the room temperature is outside of this deadband on the high side, the compressor speed (and cooling capacity) slowly ramps up. This cools the room more and lowers the room temperature. When the room temperatures enters the “deadband”, the compressor speed and capacity stop modulating and hold constant at their current values. If the room temperature falls below the “deadband” on the low side, the compressor speed and capacity slowly ramp down until the room temperature climbs and re-enters the “deadband”, at which point the compressor speed and capacity stop modulating and hold constant at their current values. The following drawing shows this process in graphical form.

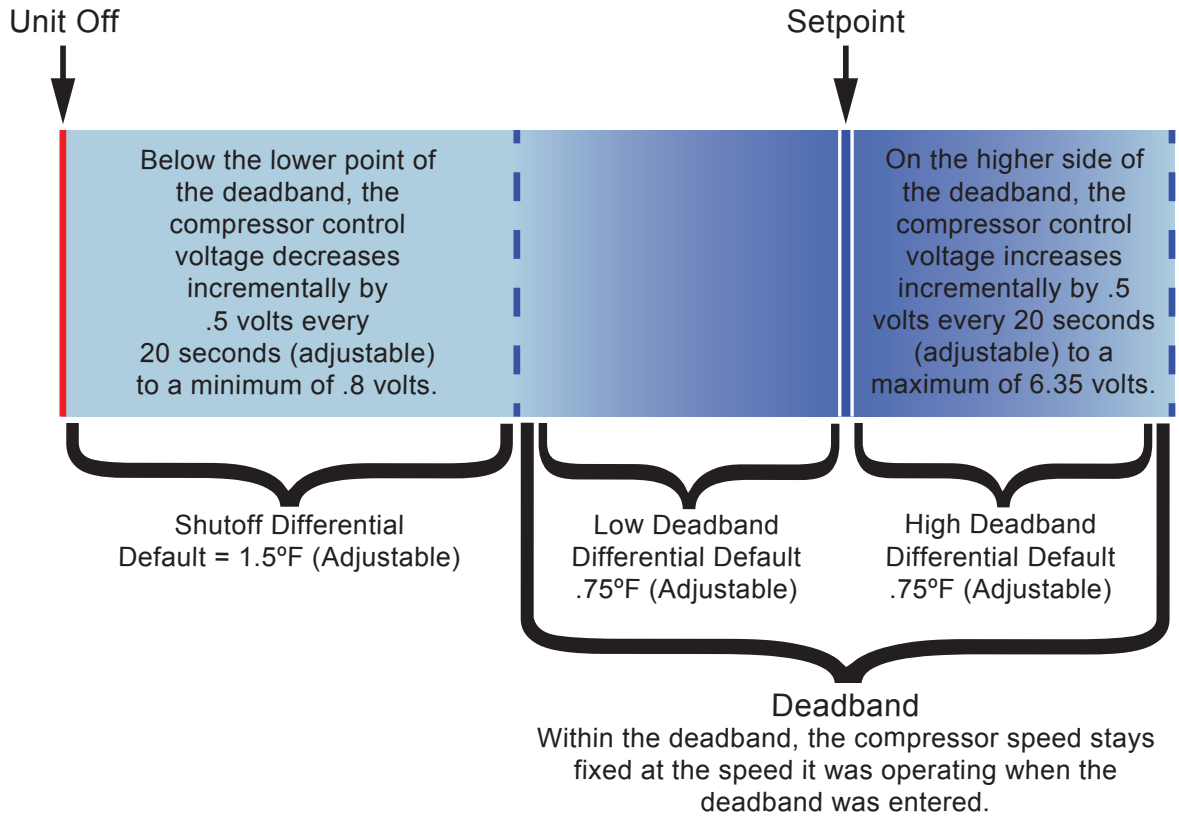


Figure 13. Scholar V Cooling Control Method

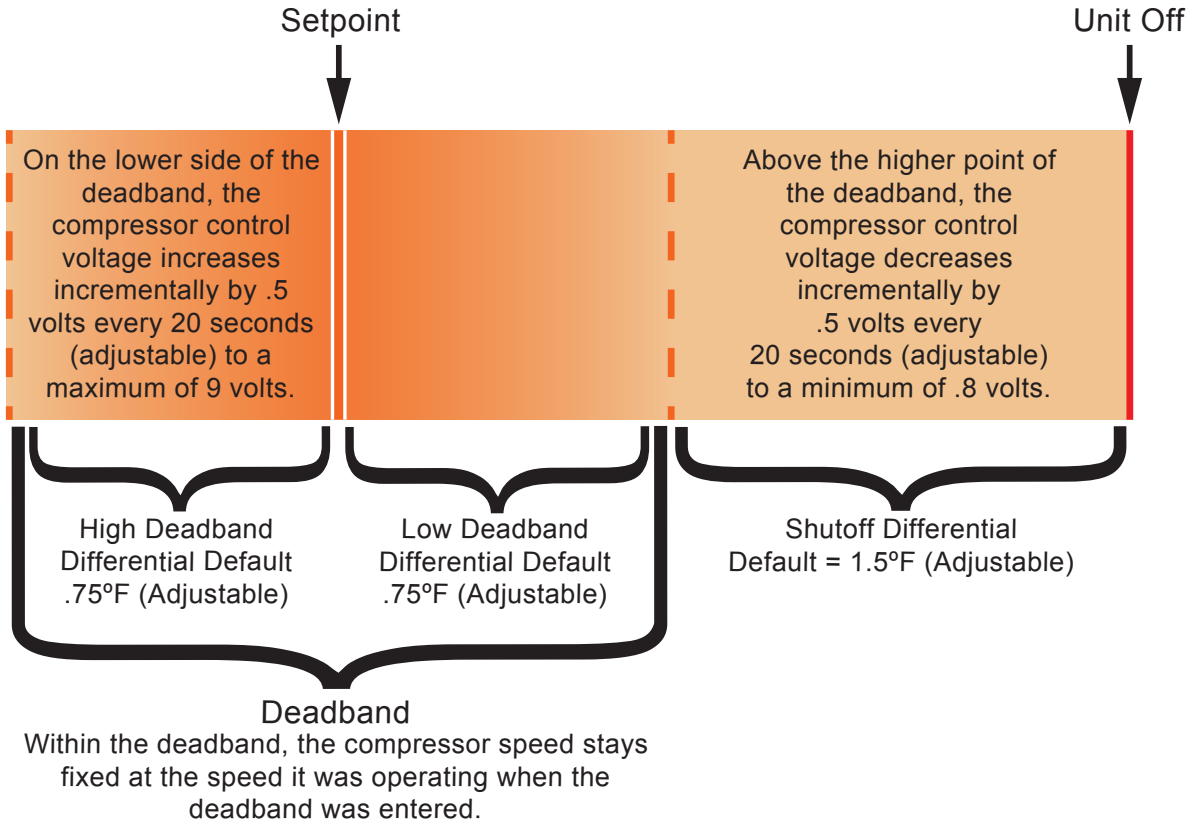


Figure 14. Scholar V Heating Control Method

1.14 REMOTE TEMPERATURE/RH TRANSMITTER LOCATION (OPTIONAL)

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

Hot Spots	Cold Spots	Dead Spots
Concealed Pipes/Ducts	Concealed Pipe/Ducts	Behind Doors
Registers	Stairwells - Drafts	Corners and Alcoves
TV Sets	Doors - Drafts	
Radios	Unheated Rooms on Other Side of Wall	
Lamps		
Direct Sunlight		

The thermostat should be wired to the terminal strip in the Scholar V heat pump or air conditioner in accordance with the following diagram, and in accordance with National Electric Code, and with local electrical codes, where they may prevail. Since the transmitters send analog signals, it is best to use shielded wire no smaller than 20 gauge.

The temperature transmitter and the relative humidity transmitter are on separate boards in a single housing.

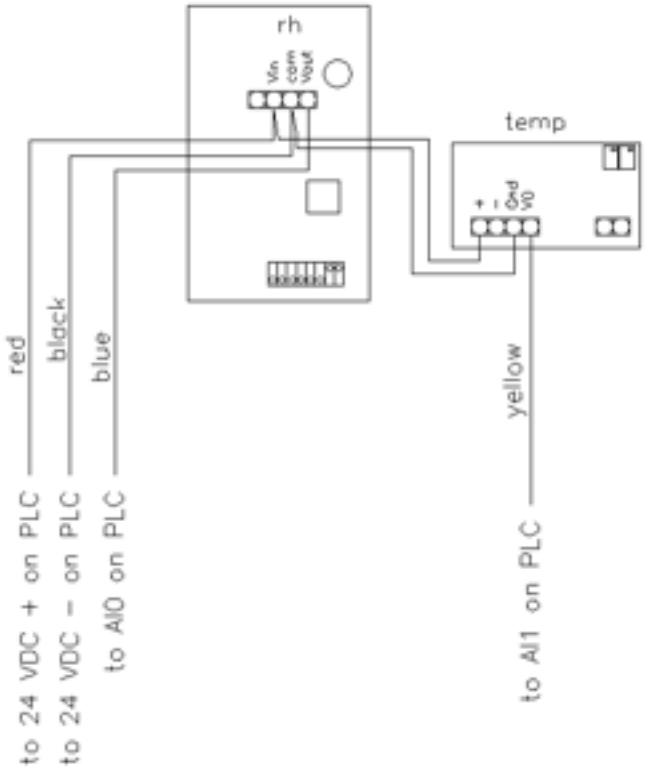


Figure 15. Temperature/Relative Humidity Connection

1.15 START-UP PROCEDURE (QUALIFIED PERSONNEL ONLY)

A. Be sure installation is complete and all high voltage and control wiring has been double checked.

B. Turn both circuit breakers to the ON position. One of the breakers operates the compressor, blower, and controls. The other breaker operates the electric heater.

C. After turning the breakers ON, check the voltage downstream of the breakers with a voltmeter. The voltage on all phases should be within the maximum and minimum specified.

D. Voltage imbalance between phases should be <= 2%. Voltage imbalance greater than this should be corrected immediately as it can cause mechanical problems and performance issues.

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			

Table 1. Maximum and Minimum Voltages

E. When the breakers are turned on, the HMI display gets powered immediately, but it takes about one minute for the front screen to be displayed properly. Wait until you see the Initial Power-Up Screen before proceeding with the Start-Up Procedure.

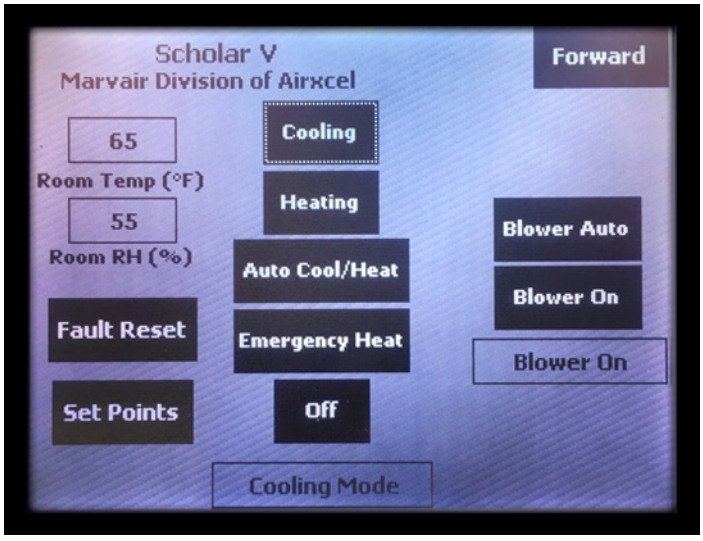


Figure 16. HMI Initial Power-Up Screen

Note: The “Cooling Mode” button may be blank on initial power-up.

F. Check *Room Temp* and *Room RH* to be sure they are reading correctly. Use a good quality hand-held Temp/RH meter for this check.

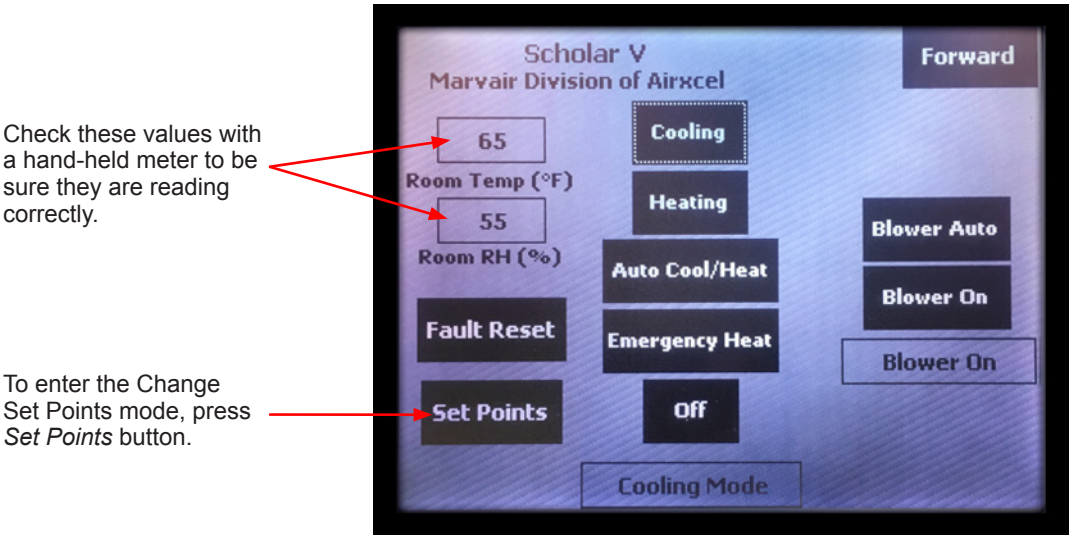


Figure 17. Room Temperature and RH Readout

G. Press *Set Points* button to change HMI screens to the *Set Points* Screen. While in the *Set Points* screen press and adjust the values shown. When a Set Point is pressed, another screen will pop up where the numbers can be changed. When done, just press the arrow key shown.

Figure 18. Set Point Selection & Adjustment Screens

H. When the Set Points have been set, go back to the Main screen. Press the desired mode you want to run. As an example, press *Cooling* to run in the cooling mode. You should see the word Cooling in the box at the bottom of the screen. This is an indicator that the cooling mode is running. Whichever mode is operating is shown in this box.

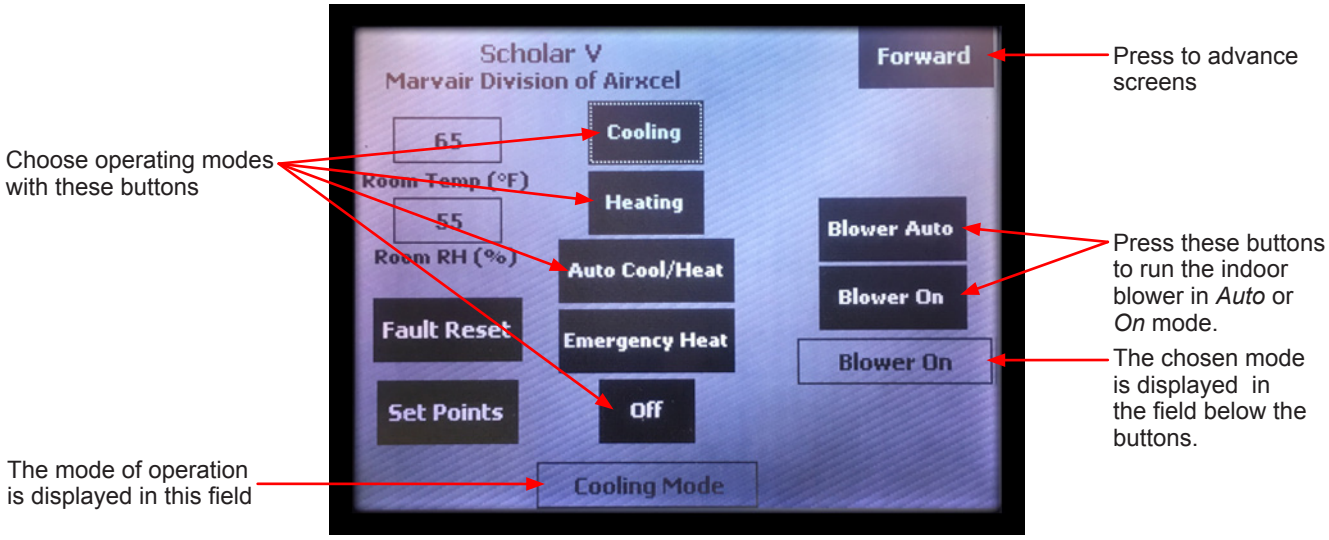


Figure 19. Mode Selection on Home Screen

I. In the Cooling Mode, the compressor should be running. It is very quiet and difficult to hear. In addition, if the room temperature is close to the Cooling Set Point, the compressor may be running at a low speed which makes it even quieter. Press the *Forward* button (see Figure 19) to advance the screens until you get to the *Temperature* screen. This screen will let you observe what compressor control voltage is being delivered to VSD (Variable Speed Drive) of the compressor.

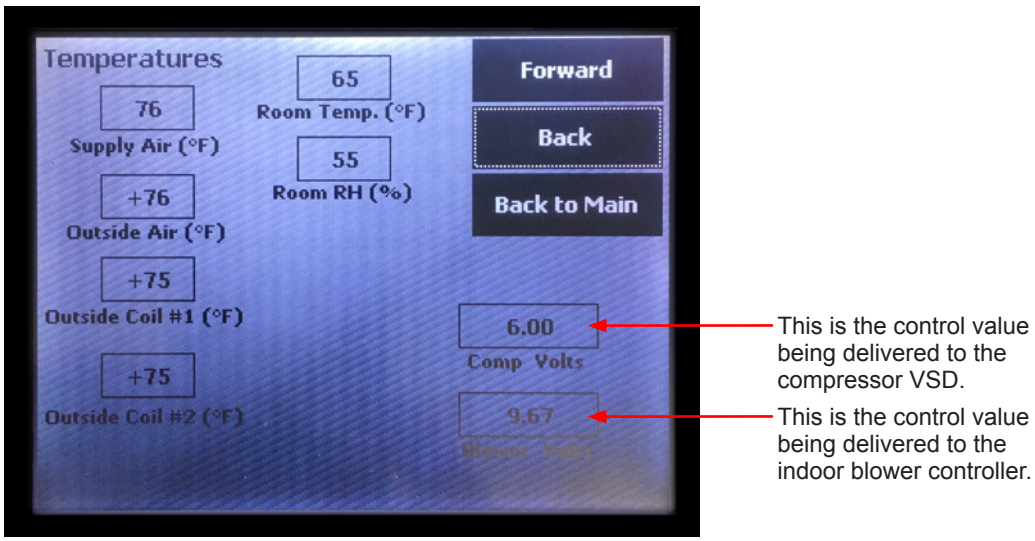


Figure 20. Compressor and Indoor Blower Control Voltages Display

J. In the Cooling Mode, the compressor control voltage runs between 1 VDC and 6.35 VDC. In the Heating Mode, the compressor control voltage runs between 1 VDC and 9.4 VDC. The blower control voltage changes to adjust according to the compressor control voltage. It is factory set to run between 5 VDC and 10 VDC. This can be changed with a password protected adjustment.

K. Heating can be tested and monitored in a similar fashion to cooling.

L. In Emergency Heating, all compressor operation is discontinued.

M. De-humidification is automatic and takes place in cooling only. If, while in the Cooling Mode, the humidity set-point hasn't been satisfied by a pre-determined time (adjustable with password) the compressor is set to run at full speed. If the compressor shuts off due to the room temperature being 1.5 °F below set point (adjustable with password) and humidity is not satisfied, maximum cooling is turned on along with hot gas reheat to keep from overcooling the room.

APPENDIX A - RATINGS AND DATA

1.01 RATINGS / DATA

AIR FLOW CFM						
BASIC MODEL	ESP (WET COIL)					
	0.10	0.15	0.20	0.30	0.40	0.50
VAIVA36	920	890	860	800	—	—
CFM = Cubic Feet per Minute, Indoor Air Flow Rated at 240 Volts			ESP = External Static Pressure in Inches of Water			

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

	Qty per unit	Size	Type	MERV[1] Rating
Return Air Filter	2	16” x 24” x 2”	Pleaded, disposable	8[1]
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				

Figure 2. Air Filter Sizes (inches)

BASIC MODEL	14-42	24-60
VOLTAGE - 230	1020	1020
VOLTAGE - 460	1045	1045

Figure 3. Shipping Weight (pounds)

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

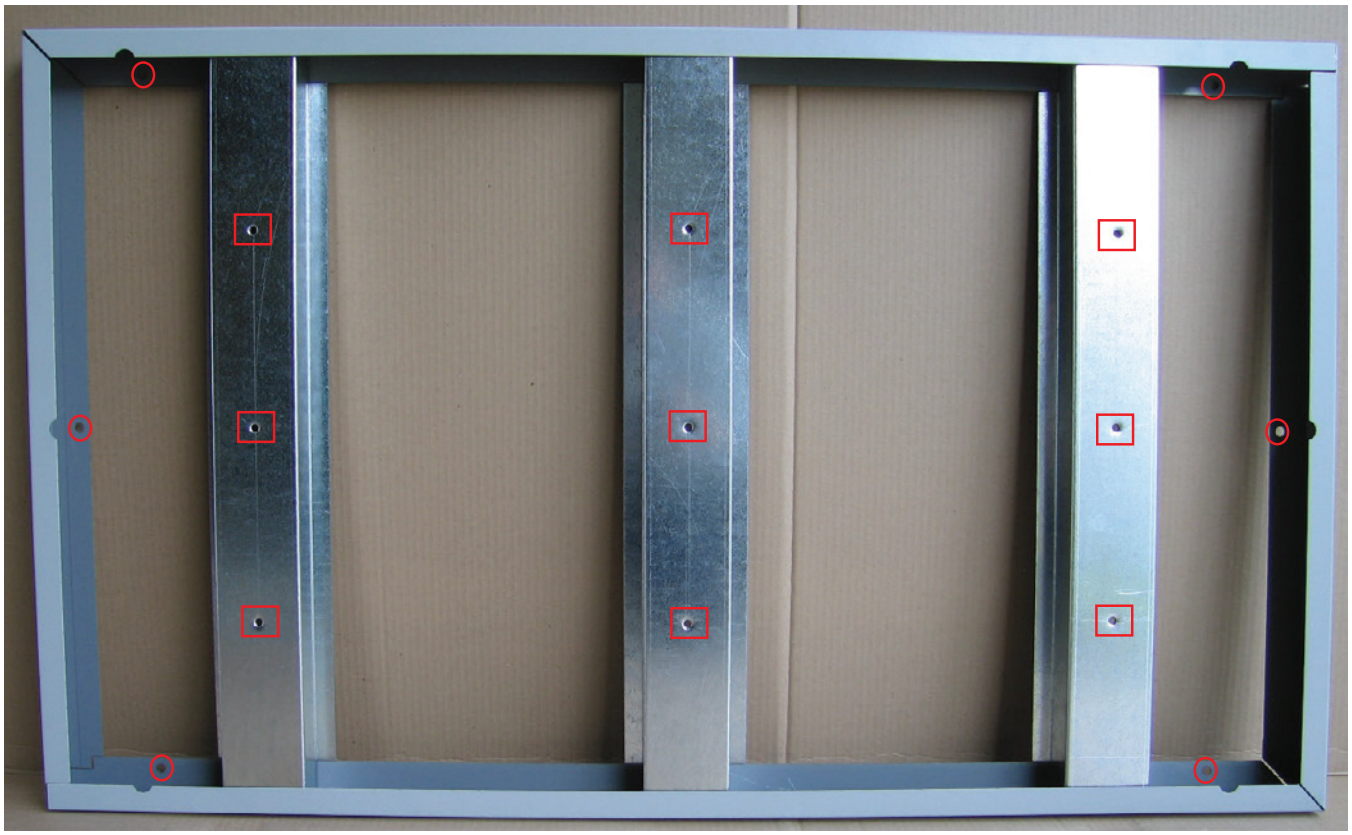
IMMEDIATELY UPON RECEIPT, INSPECT THIS EQUIPMENT TO DETERMINE VISIBLE AND CONCEALED DAMAGE. ALL DAMAGE MUST BE REPORTED TO THE FREIGHT CARRIER WITHIN 15 DAYS, ON THE FREIGHT CARRIER’S FORM.

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

Base Stand Height	Part Number
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 V 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.



HOLES TO SECURE BASE STAND TO FLOOR

HOLES TO HOLD SCHOLAR III TO BASE PAN

Figure 1. Top View of Base Stand

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, re-measure to be sure that the wall opening for the Scholar V 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 V 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 V 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 V 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:

Part #	Description
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

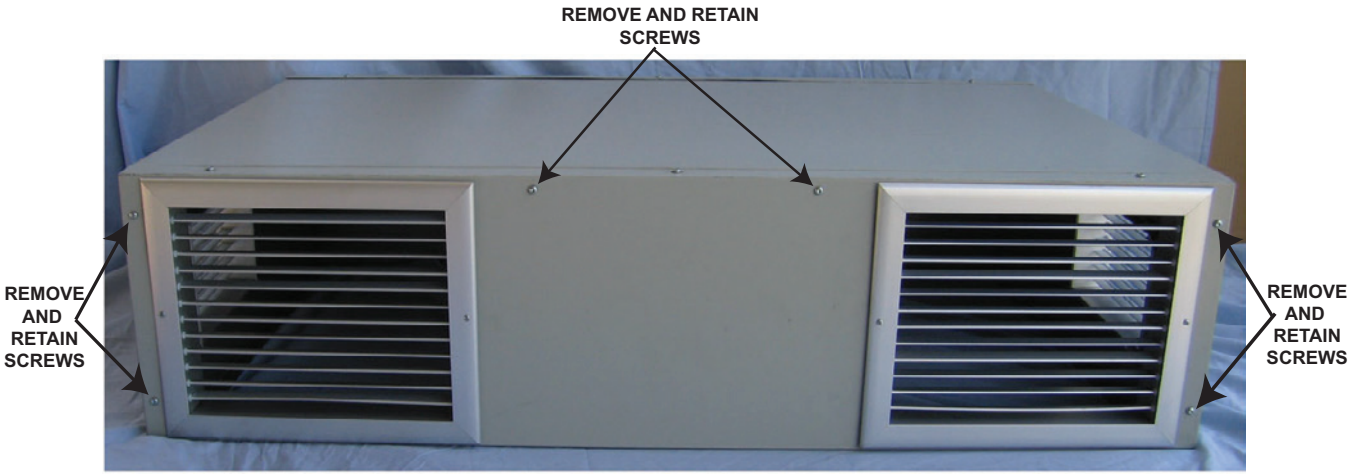
BEFORE INSTALLING, SERVICING OR MAINTAINING THIS EQUIPMENT, SWITCH THE ELECTRIC POWER TO “OFF” AT THE DISCONNECT LOCATED BEHIND THE FRONT DOOR ON THE LOWER PANEL. FAILURE TO DO THIS COULD RESULT IN PROPERTY DAMAGE, BODILY INJURY OR DEATH.

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

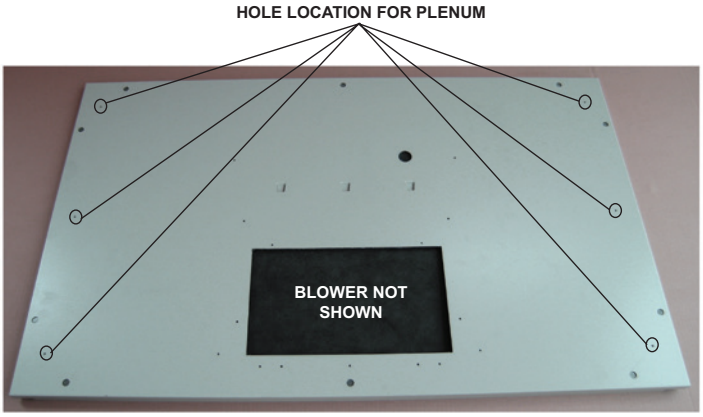
For freeblow plenum and standard height ducted plenums, the plenums should be installed onto the Scholar V cabinet, prior to installing the cabinet into its final location. On extended height ducted plenums, the Scholar V heat pump or air conditioner may have to be installed in its final location before 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 V 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 V unit, locate the 6 holes that correspond with the six holes in the plenum.

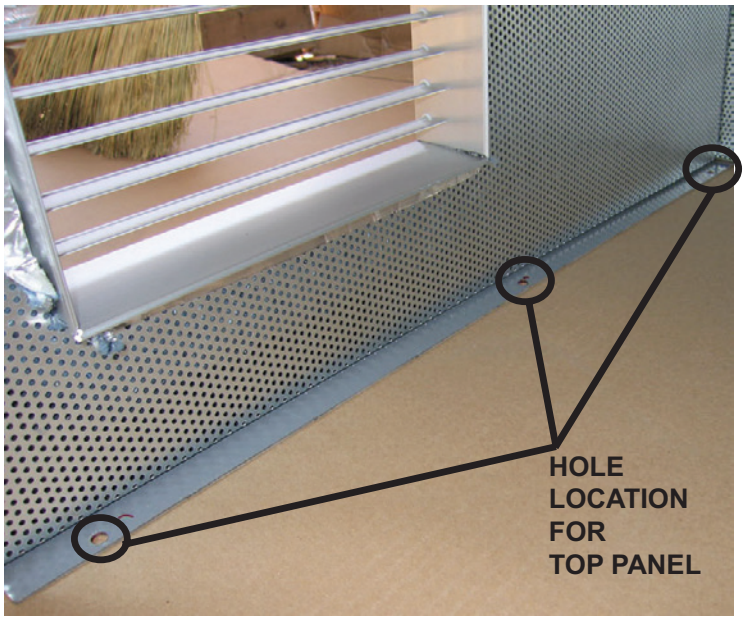


3. After the front panel has been removed, lift the plenum onto the top of the Scholar V unit.

⚠ WARNING

THE PLENUM IS HEAVY. USE CARE WHEN PLACING THE PLENUM ON TOP OF THE SCHOLAR V 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 V 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 V 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 V 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 V HEAT PUMP AND AIR CONDITIONER FOR TRIM STRIP INSTALLATION

The Scholar V 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 - WALL BRACKET 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
- Bits for Wall Anchors, Field Supplied Sheet Metal Screws
- Masonry Penetrating Wall Anchors (4)
- #10 x 1/2” Self-Tapping Sheet Metal Screws (4)
- Ladder (as appropriate)
- File for Deburring Field Cut Metal Edges

1.02 INSPECTION/UNPACKING/HANDLING

Wall brackets are shipped to the job site in a corrugated container. The wall brackets are universal and are adaptable to any model Scholar V heat pump or air conditioner. The wall brackets provide additional means of securing the Scholar V heat pump where deemed necessary by the specifier. The wall brackets can be applied to any cabinet with a position of flush with the finished inside surface of the wall. Brackets are covered with a protective film on the exposed painted surface. Leave film on surface to protect against damage. Remove film when brackets are installed and construction has been 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 V HEAT PUMP OR AIR CONDITIONER FOR WALL BRACKET INSTALLATION

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

1.04 INSTALLATION OF THE WALL BRACKETS

⚠ WARNING

FOR HEAT PUMP OR AIR CONDITIONERS WITH PLENUMS, BE SURE TO INSTALL WALL BRACKETS ON THE CABINET (VERSUS THE PLENUM) TO ENSURE MAXIMUM HOLDING STRENGTH.

A. Measure and mark on the inside surface of the wall where the two anchors for each bracket are to be placed. Bore holes in the bracket and wall appropriate to accept field supplied anchors. Be sure to put the bracket up so that the side with pilot holes is on the cabinet and the blank side is on the wall. Anchor bracket(s) to the wall.

B. Screws should be no longer than 1/2”.

APPENDIX F - 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, OF THE FREIGHT CARRIER'S FORM

The following louver/collar assemblies, louvers and collars are suitable for all Scholar V units.

Part Number	Description
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 V 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 V heat pump or air conditioner should be installed following the instructions in this manual. After installation, the Scholar V 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.

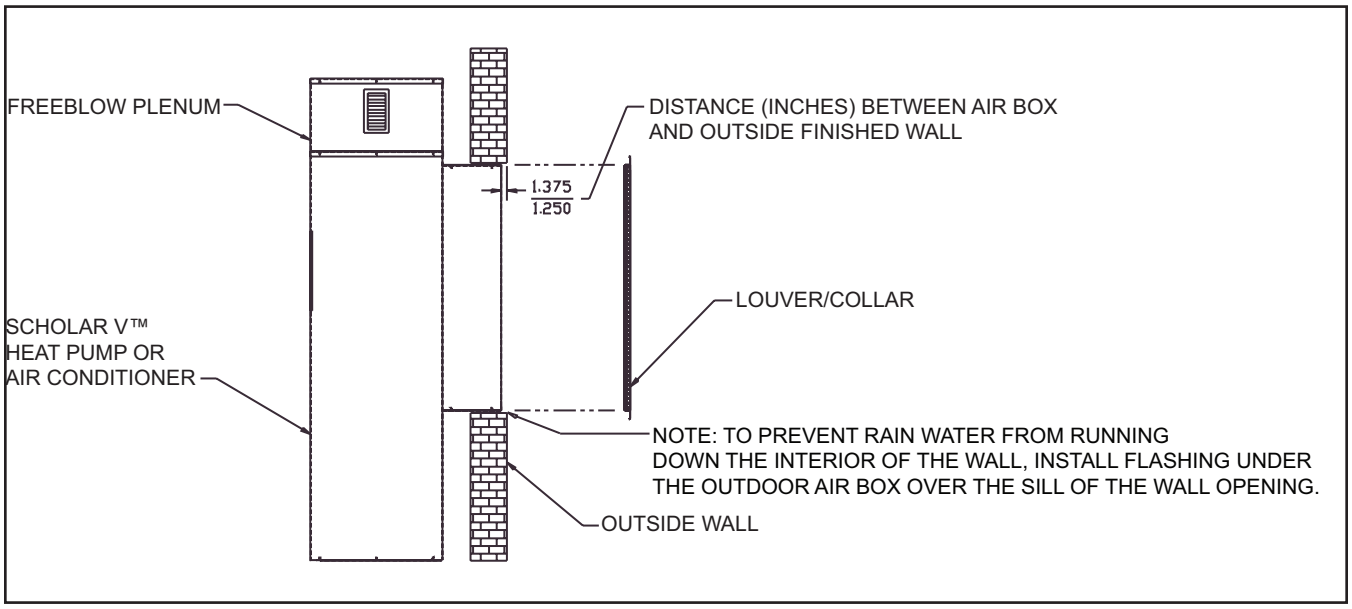


Figure 1. Dimension between Scholar V Air Box and Finished Outside Wall for Outdoor Louver/Collar Assembly Installation.

⚠ 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.

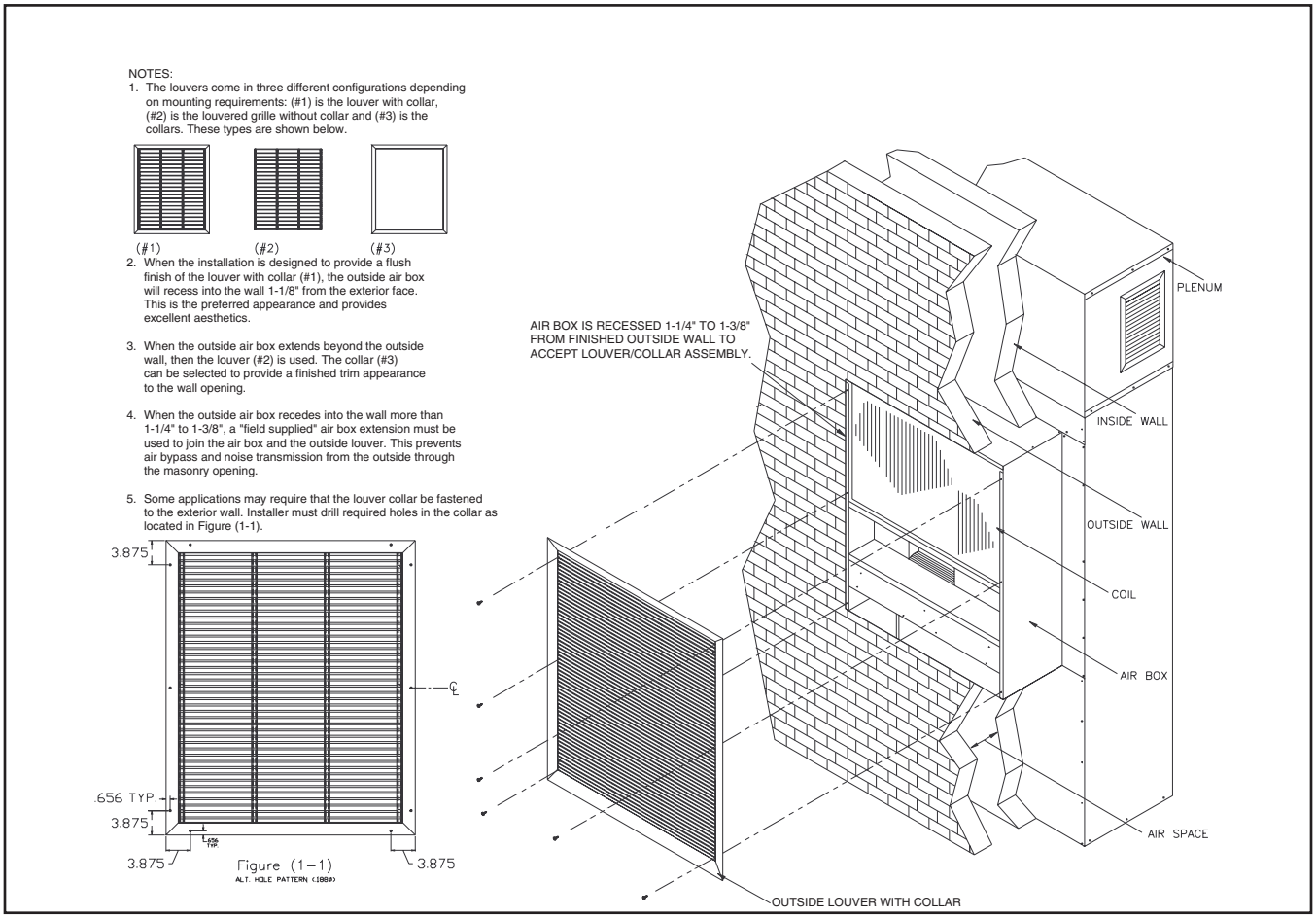


Figure 2. Installation of Louver/Collar Assembly to Air Box

APPENDIX G - INSTALLATION OF ELECTRIC HEATERS ON ALL VAIVA 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
- T5 TORX Bits
- Needle Nose Pliers
- Wire Stripper/Cutter
- Screwdriver with Slotted Bit

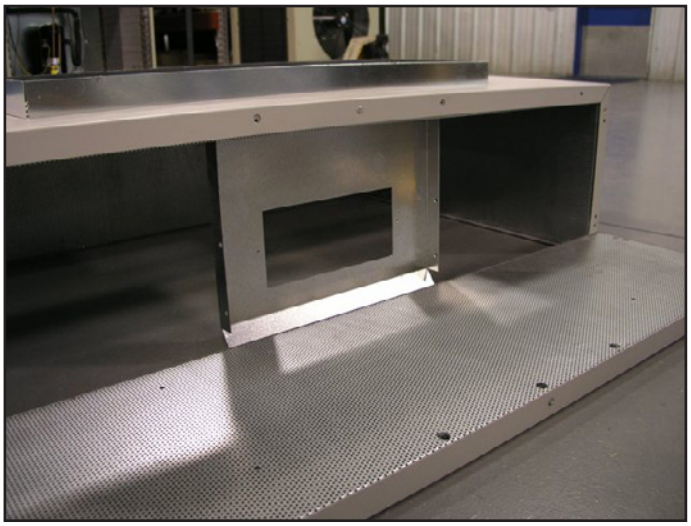
1.02 INSPECTION/UNPACKING/HANDLING

Electric heaters are shipped inside the Scholar V 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.

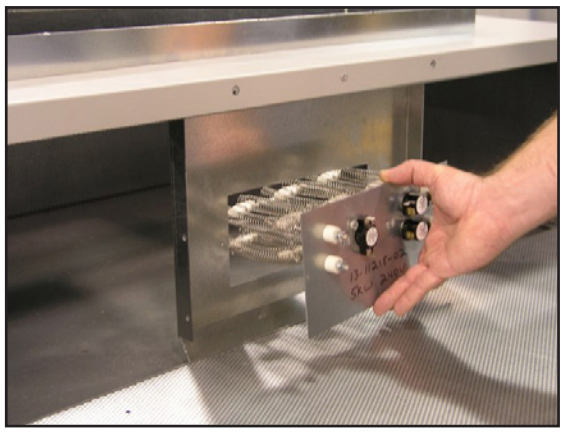
1.03 MOUNTING THE ELECTRIC HEATERS

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.

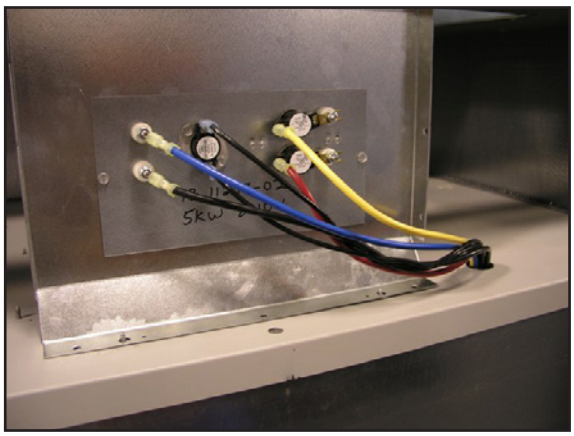


B. Carefully slide the heater assembly into the opening. The safety switches should be at the top of the heater assembly. Make sure that the elements are not broken or bent when sliding the assembly into position.



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.

NOTES

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.

Marvair® AIRXCEL™, Inc.
P.O. Box 400 • Cordele, GA 31010
156 Seedling Drive • Cordele, GA 31015
Ph: 229-273-3636 • Fax: 229-273-5154
Email: marvair@airxcel.com • Internet: www.marvair.com

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