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.

MODEL NO.:______________________ SERIAL NO.:__________________

DATE OF START-UP:______________

P.O. Box 400 • Cordele, GA 31010
156 Seedling Drive • Cordele, GA 31015
(229) 273-3636 • Fax: (229) 273-5154
Email: marvair@airxcel.com
Internet: www.marvair.com
How To Use This Manual

This manual is intended to be a guide to the Marvair® GeoScholar line of vertical packaged heat pumps. It contains installation, troubleshooting, maintenance, warranty, and application information. The information contained in this manual is to be used by the installer as a guide only. This manual does not supersede or circumvent any applicable national or local codes.

If you are installing the GeoScholar heat pump, 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, outdoor louvers and the sound reduction panel.

If a malfunction occurs, follow this troubleshooting sequence:
1. Make sure you understand how the GeoScholar 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. Definitions identifying hazard labels are shown below.

| 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 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

Specifications subject to change without notice.

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# SECTION 15700
HEATING, VENTILATING AND AIR CONDITIONING EQUIPMENT
INSTALLATION AND START-UP INSTRUCTIONS
FOR GEOSCHOLAR HEAT PUMP (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
- 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 (Hot Water) (if appropriate)
- 25 Ft. of Polyurethane Foam Strips, 1" Wide x 1/2" Thick, Adhesive Backing, for GeoScholar /Wall Interface.

1.02 INSPECTION/UNPACKING/HANDLING

A. The GeoScholar heat pumps 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.

The sound reduction panel (models VWCA & VWCSA only) is shipped in a wooden crate after being shrink wrapped.
B. Immediately upon delivery to the jobsite, each GeoScholar heat pump 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 GeoScholar heat pump 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.

---

**CAUTION**

**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.**

**IF IT IS NECESSARY TO TILT THE GEOSCHOLAR HEAT PUMP WHILE MOVING IT DURING INSTALLATION, BE SURE THE TOP END IS ALWAYS ABOVE THE BOTTOM BY AT LEAST 30 INCHES. THE UNIT SHOULD NOT BE ALLOWED TO REMAIN IN THE TILTED POSITION ANY LONGER THAN REQUIRED FOR THE ACTUAL MOVING PROCESS.**

---

C. Note the unit identification label is located on left 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 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**

<table>
<thead>
<tr>
<th>Letter</th>
<th>Month</th>
<th>Letter</th>
<th>Date Code</th>
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</thead>
<tbody>
<tr>
<td>A</td>
<td>January</td>
<td>G</td>
<td>L = 2000</td>
</tr>
<tr>
<td>B</td>
<td>February</td>
<td>H</td>
<td>M = 2001</td>
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<td>C</td>
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<tr>
<td>F</td>
<td>June</td>
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<td>S = 2005</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>A = 2011</td>
</tr>
</tbody>
</table>
For the GeoScholar heat pump system, the identification numbering system is shown below. The model identification number is located as shown in Figure 1. Models with an “S” indicate a 2-stage compressor. Installation is identical for the heat pumps regardless of the type of compressor. However, a 2-stage cooling thermostat must be used with all 2-stage compressor units.

**Figure 1. General External Component Identification and Access to GeoScholar QV Series Heat Pump**
1.03 CONTROLS

1.03A. STANDARD CONTROLS

1. Programmable Logic Controller (PLC) Microprocessor

GeoScholar heat pumps 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 GeoScholar units to allow run time leveling and does not require additional equipment installed in the GeoScholar 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.

- **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.

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

These switches render the compressor and pump inoperative whenever the limits of the pressure switches are exceeded. In the event of high pressure, the GeoScholar heat pump will turn off and lockout.

The low pressure (A/C) and loss of charge (HP) switch render the compressor and pump inoperative whenever the limit of the switch is exceeded after one minute.

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 GeoScholar heat pump. A fault LED located on the PLC indicates that a lockout has occurred and whether it is due to high or low refrigerant pressure.

3. The indoor blower fan speed control (VWCA models only) provides adjustable air volume from the indoor blower.

4. 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.
5. **Fresh water/anti-freeze solution switch.** This two position selector switch must be set based upon the liquid used for the heat source. If the system is using fresh water, select fresh water. If the system is using an antifreeze solution, e.g. glycol, select anti-freeze solution. Brine or salt solutions should NOT be used due to corrosion of the heat exchanger.

6. **Freeze Stat.** A thermostat clamped to the outlet water line of the water coil senses the temperature of the water. If the sensor detects water temperature of 37°F or lower and the compressor and pump are on, the compressor is turned off, but the pump will continue to run. If the compressor and pump are off when a temperature of 37ºF is detected, the pump will be turned on. The freeze stat is disabled (not operable) if the antifreeze solution position is selected in “F” above.

1.03B OPTIONAL CONTROLS

1. All units have the following control options available.

   A. 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)

   B. 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.

**IMPORTANT**

**MINIMUM AIR FLOW IS REQUIRED FOR PROPER OPERATION.**

1.04 CONTROLLERS

1.04A **THERMOSTATS & SUB-BASES**

1. GeoScholar™ heat pumps with one stage of heat. All units with 2-stage compressors require a two stage cool thermostat.


2. Thermostat guards.

   A. **Clear thermostat guard with keylock & clear plastic cover & base** (p/n 50092). For use with 50121, 50123, 50186, 50107 & 50252 thermostats.
   
   B. **Clear thermostat guard with keylock & clear plastic cover & base** (p/n 50119). For use with 50248 thermostat.

1.04B HUMIDITY CONTROLLERS

1. Humidity Controller

   A. **Digital humidity controller**, (p/n 50254). To be used with units with hot gas or electric reheat. 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.

1.04C ENERGY MANAGEMENT SYSTEMS

1. **MAR5000 Energy Management System** provides a number of functions while remaining extremely cost sensitive. For a complete description of the operation and features of the MAR5000 EMS, please see the MAR5000 Product Data Sheet. The MAR5000 features:

   • Temperature control.
   • Dynamic recovery time.
   • Run time limitation of heat pump to minimize energy costs.
   • Humidity measurement and direct control of the dehumidification function.
   • Seven relays for interfacing with the HVAC system or external devices.
   • Ventilation control.
   • One dry contact set of inputs enables data feed from any dry contact output device, e.g., a door switch.
   • Support for peak load shedding.
   • A precise time clock that will keep accurate time for lengthy power outages (at least 2 1/2 weeks).
   • Intelligent occupancy and departure anticipation.

   Options include:
   - Unoccupied continuous fan shutoff.

2. 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.
1.05 OPTIONS

1.05A TWO STAGE COMPRESSOR

1. Models with a “S” in the 5th letter of the model number have a 2-stage compressor. A two stage compressor is able to maintain more precise temperature control and humidity levels. The 2-stage operation is only operational in the cooling mode-heating and dehumidification are 1-stage.

Installation of heat pumps with a 2-stage is identical to hose with a 1-stage compressor. However, a 2-stage cooling thermostat must be used. Do not use the Mar5000 controller with a unit with a 2-stage compressor.

1.05B WATER SIDE ECONOMIZER (VWIA MODELS ONLY)

1. A water side economizer is a factory installed option that can reduce the cost of cooling the classroom. The water side economizer is a set of water coils installed in the plenum. If the loop water is sufficiently cool and cooling is required by the room thermostat, a valve opens to allow the cool water to flow into the coils. Simultaneously, the indoor blower turns on to pull the air across the coils and into the classroom. When either the room temperature is satisfied or the entering water rises above the set point, the economizer operation is terminated. The following schematic shows the internal water piping for the waterside economizer.

Figure 2. Water Side Economizer
1.06 LOCATION PREPARATION

**WARNING**

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

A. The GeoScholar heat pump must be installed on an outside wall for access to outside air when the GeoScholar unit is providing fresh air for ventilation. The wall opening dimensions are shown in Figure 3. 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 GeoScholar heat pump where noxious fumes or gas can be drawn in from the outdoor air and introduced in the classroom.

The GeoScholar heat pump must be installed on a hard, level, smooth surface such as concrete, wood or tile. Do not install the unit on a carpeted surface.

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 GeoScholar cabinet as described in Figures 4 and 5; and allowing for any offset or standoff from the finished interior surface of the wall.

Prior to installation of the GeoScholar heat pump, provisions are to be made for the following, as appropriate.

1. **Wall opening** dimensions for the GeoScholar heat pump are as shown in Figure 3. 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 3. Wall Opening Dimensions for GeoScholar Heat Pump*

<table>
<thead>
<tr>
<th>MODEL</th>
<th>All Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>36.75</td>
</tr>
<tr>
<td>B</td>
<td>8.00</td>
</tr>
<tr>
<td>C</td>
<td>32.00</td>
</tr>
<tr>
<td>C*</td>
<td>36.00</td>
</tr>
</tbody>
</table>

*When 4” high base stand is used, the C* dimension is specified. Dimensions are in inches.*

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 either through the bottom or rear. The locations of the knockouts for power leads are shown in Figures 4 - 6. Depending on the location of the GeoScholar heat pump 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 GeoScholar 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.

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 GeoScholar heat pump to slide into the wall opening. Reference Figures 4 -6 as noted above, for control wiring entry points into the cabinet.
Figure 4. GeoScholar Heat Pump Models VWCA24/30/36

Dimensional Data

NOTE: ACTUAL LOCATION OF WATER INLET AND OUTLET WILL VARY WITH SPECIFIC GEOSCHOLAR UNIT.
NOTE: ACTUAL LOCATION OF WATER INLET AND OUTLET WILL VARY WITH SPECIFIC GEO SCHOLAR UNIT.
Figure 6. GeoScholar Heat Pump Model VWIA24-60
Dimensional Data
1.08 CONDENSATE DRAIN LINE (ROUGH-IN)

A. The condensate drain line can be roughed in to drain the GeoScholar heat pump 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 Figures 4/5/6. 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 GEOSCHOLAR UNIT (WHEN INSTALLED) FOR POSSIBLE TUBING COLLAPSE. CORRECT AS APPROPRIATE.

TO PREVENT CONDENSATE OR RAIN WATER FROM RUNNING DOWN THE INTERIOR OF THE WALL, INSTALL FLASHING UNDER THE OUTDOOR AIR BOX OVER THE SILL OF THE WALL OPENING.

THE SECONDARY CONDENSATE LINE ON THE VWCA24, 30 & 36 IS TERMINATED IN THE BOTTOM OF THE UNIT. THIS LINE MUST BE EITHER ROUTED OUT OF THE GEOSCHOLAR UNIT TO A SUITABLE LOCATION OR TEEED INTO THE PRIMARY CONDENSATE LINE. FAILURE TO ROUTE THE CONDENSATE OUT OF THE UNIT, COULD RESULT IN EXTENSIVE WATER DAMAGE.

THE SECONDARY CONDENSATE LINE IN THE VWCA40, 48 & 60 UNITS SHOULD BE RUN THROUGH THE OUTDOOR AIR BOX AND THROUGH THE EXTERNAL LOUVER. ROUTE THE CONDENSATE DRAIN AWAY FROM THE GEOSCHOLAR UNIT WITH SUFFICIENT DOWNWARD SLOPE TO INSURE ADEQUATE DRAINAGE.

THE VWIA DOES NOT HAVE A SECONDARY DRAIN.

1.09 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 Figures 4 and 5 for the heat pump. Access to the interior cabinet is through these factory-notched locations.

1.10 PREPARATION OF THE GEOSCHOLAR HEAT PUMP

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 GeoScholar heat pump 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 lower front panel of the GeoScholar heat pump for access to the shipping skids. Unscrew the four hold-down lag bolts from the inside of the unit. The four lag bolts on all the the VWIA models and the VWCA24-30-36 can be accessed from the front of the unit. On the VWCA40-48-60, the front two lag bolts can be accessed from the front of the unit. The back two lag bolts can be accessed through the condensate opening in the rear of the unit. Remove the cover plates to access the bolts.

Remove the shipping skids from under the GeoScholar heat pump.

B. 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.

C. Hot Water Plenum. The protective film on top of the GeoScholar 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.

D. Electric Heaters. On the 2, 2½, 3 and 3½ ton VWCA units, electric heaters are shipped attached to the top of the unit. Remove the metal shipping plate from the electric heat assembly mounted on top of the cabinet. Remove protective shipping plate over electric heater and check for damage before connecting power to the unit. Reference the tag affixed to the shipping plate on top of the cabinet for directions.

On 4 & 5 ton VWCA units and all VWIA units, the electric heaters are shipped inside the heat pump in the lower compartment. Please see Appendix I for installation instructions for electric heaters for all VWIA units.

E. Freeblow Plenum/Ducted Plenum. 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 GeoScholar heat pump, 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.


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

I. If the heat pump 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 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.

J. Prior to sliding the GeoScholar heat pump 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 or 4 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.

K. On 4 & 5 ton VWCA units and all VWIA units, the outdoor air box must be field
WHEN FASTENING LOUVER/COLLAR ASSEMBLY TO AIR BOX, DO NOT OVERTIGHTEN LOUVER SCREWS. OVERTIGHTENING SCREWS WILL CAUSE DAMAGE AND WARP THE LOUVER/COLLAR ASSEMBLY.

C. Check (with a spirit level) to see that the heat pump is level and plumb. If it is not, take the appropriate corrective action to level and plumb the system. 1/8” thick washers

NOTE: To prevent condensate OR RAIN WATER from running down the interior of the wall, install flashing under the outdoor AIR BOX over the sill of the wall opening.
with 1/2” pass through holes can be installed appropriately under the fastener holes in
the base of the heat pump to make the system level and plumb.

D. Secure the heat pump to the floor with appropriate field supplied fasteners, through the
four 1/2” diameter through holes in the base.

E. If the GeoScholar heat pump 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 GeoScholar unit, at this time. Check instructions with wall brackets for
installation or see Appendix E at end of this manual.

1.12 ELECTRICAL, CONDENSATE, WATER AND WET HEAT HOOK-UPS

WARNING

ALL ELECTRICAL AND PLUMBING FITTING 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
FIGURES 3/4/5. 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 GeoScholar unit. Check the data label on each
GeoScholar 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 GeoScholar cabinet. Remove the lower front panel for access
to the disconnect on the VWCA models. On the VWIA models, the disconnect is
located behind the right door. Figures 8a and 8b illustrate the disconnect location
with the lower front panel removed. **Turn the disconnect to “OFF” position.**

Remove the middle front panel for access to the control center. On the VWIA
models, the control center is located behind the right door. The electrical
schematic for the heat pump is contained in a pocket on the inside of the middle
front panel door. Figure 9 shows typical control centers for the GeoScholar heat
pump. Figures 10a and 10b show typical single and three phase wiring diagrams
for the GeoScholar heat pump.

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.

**IMPORTANT**

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 GeoScholar 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 8.

Route wires into the terminal strip compartment through the openings provided. Connect wiring to the terminal strip as shown in Figure 10 for a remote, wall mounted thermostat installation.
Figure 8a. Front View of Models VWCA 24/30/36 with Front Doors Open.

Figure 8b. Front View of Models VWCA 40/48/60 with Front Doors Open.
Figure 9. Typical Control Center Layout for Models VWCA 24/30/36

Note: This is a typical control box layout. The actual control box will vary with unit configurations and options. Please refer to the wiring diagram in your unit.
Figure 10a. Typical Wiring Schematic for Heat Pump Model VWCA, Single Phase Power

General Notes:
1. Use 20/250 volt with 14 power supply. See data label for amperage and fuse size. Optional cut box shown.
2. Speed tap is wired to each contact for wire colors.
3. Millivolt transformer is factory wired for 230 volt operation. For 240 volt, interconnect orange and red leads. Insulate unused leads. Secondary has circuit breaker, react and check control circuit if open.
4. Crankcase heater is not used on all models.
5. Switch to antifreeze if glycol solution is used.
6. Connect to the yellow lead on indoor (solenoid) locate inside low voltage shield.
7. The unit control system is factory wired to operate upon an input signal from any appropriate 24 vac control, thermostat or bcc control system. If unit shutdown is desired during unoccupied periods of the temperature controlled space it may be accomplished by the following: The controls contain a set of contacts at 1.2.3 when the field supplied contacts between 1 & 2 are closed the system will shutdown.
8. 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 contain a set of contacts between terminals V1 & V2. When a set of contacts 24 vac pilot (0v) between terminals V1 & V2 when the field supplied contacts between V1 & V2 and the ventilation package will operate when the indoor fan/blower is energized.

Voltage Legend

- Line Voltage Factory
- Low Voltage Factory
- Low Voltage Field
- Alt. Voltage (Field Spec.)

Color Code
- BK = Black
- BL = Blue
- BR = Brown
- G = Green
- Y = Yellow
- GR = Green
- WHT = White
- BK/RED = Black, Red Stripe
Figure 10b. Typical Wiring Schematic for Heat Pump Model VWCA, Three Phase Power
3. For GeoScholar heat pump 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 9, where the “R” lead is connected to the R terminal on the terminal strip. The other lead is connected to IO.6 on PLC as noted on the wiring schematic of the heat pump. See Figure 14a.

6. Some units with Hot Gas Bypass may use a modulating reheat valve. Please see below for the procedure for adjusting the valve.

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

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**WARNING**

**ELECTRICAL SHOCK HAZARD**

THE SETTING OF THE DISCHARGE AIR TEMPERATURE REQUIRES THAT LINE POWER BE APPLIED TO THE UNIT AND THE UNIT OPERATING. WHILE THE PC BOARD USES LOW VOLTAGE, IT IS NEAR HIGH VOLTAGE DEVICES AND WIRING. USE EXTREME CAUTION WHEN WORKING IN THE CONTROL BOX.

1. Make sure the two sensor wires are connected to the TEMP SENSOR terminals on the board. See Figure 12 below.

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**Figure 12. Supply air temperature sensor wiring connection**
2. Turn the unit on and the Hot Gas Reheat is operating.

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

![Adjustment Knob](image)

**Figure 13. Setting desired air temperature using a digital VOM**

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 GeoScholar heat pump. Reference Figure 8 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. The secondary drain line for the VWCA is located in the outdoor air box of the GeoScholar unit. This drain line must be routed to the outside between the blades in the outdoor louver. In the event that the primary drain does not function, the condensate will flow out of the unit and should be visible on the exterior of the school. Models VWIA do not have secondary drain.

D. 1. **Wet heat hook-ups** are done by connecting the rough-in piping to the factory supplied coils inside the plenum.

   a. 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.

E. Water Hook Up. The water inlet and outlet lines must be connected to the inlet and outlet fittings in the GeoScholar unit. Since there are various configurations of the water lines and pumps, please consult the factory or refer to installation specific instructions. In all cases the freeze thermostat sensor must be secured to the water out line. The sensor must accurately sense the water temperature. Secure the sensor to the line with metal clamps or wire ties. Insulate the sensor with insulation. Metal pipe must be used for at least the first six inches from the bronze elbow or fitting. In order to accurately sense water temperature, the sensor is located behind the electrical box. Gently extend the capillary tube and attach the sensor to the water line. Water inlet and outlet lines must be of adequate size for the required flow rate.

F. Fresh water/ anti-freeze selector switch. The switch is located in the control box. Select either fresh water or anti-freeze depending on the source water type use for the installation.

1.13 VENTILATION SYSTEM CALIBRATION

Prior to start-up of the GeoScholar heat pump, 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 GeoScholar heat pump. 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 14 illustrates the fresh air door settings and air flow rates.

Follow the directions in Figure 14 to ensure proper air flow rate settings. After calibrating the ventilation system, replace the lower front cabinet panel.

B. Motorized and PowerVent Fresh Air Systems. This motorized 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.

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.
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 15, will ensure the required amount of air, up to a maximum of 450 CFM, is delivered to the classroom.

Follow the directions in Figure 15 to ensure the proper air flow rate setting. After calibrating the ventilation system, replace the lower front cabinet panel.

**Figure 14. 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.

**Figure 15. Motorized and PowerVent 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.
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.

For units with the optional variable fan speed controller for the exhaust blower on the GreenWheel® 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.

Now measure the exhaust air from the classroom. Adjust the speed of the exhaust air blower 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.

1.14 CONTROL ADJUSTMENTS

A. GeoScholar Heat Pump PLC (Programmable Logic Controller) Microprocessor. Essential to the operation of the GeoScholar heat pump is a factory installed PLC microprocessor. Since July of 2001, all GeoScholar heat pumps have incorporated the PLC. 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 GeoScholar heat pump is installed.

Location

The PLC is located in the unit control center. The control center is accessed by removing the middle cabinet panel on VWCA units and behind the right side door on VWIA units. After removing the middle cabinet panel, 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 potentiometers. The left potentiometer, labeled “O”, is for setting the anti-short cycle timer for the compressor. The right pot is not used on the GeoScholar heat pump. The indicator on the knob is the gap between the two protrusions with the hollow centers on the knob. (See drawing below).
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 (O)** 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 10 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.

**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 GeoScholar heat pump, or a customer supplied input, e.g., DDC. An output is a signal from the PLC to the heat pump.
PLC Inputs

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

- **I0.0** - Blower signal from thermostat
- **I0.1** - Compressor
- **I0.2** - Second stage heat (heat pump function only)
- **I0.3** - 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 “I0.0” LED is on, this means that voltage is present from the “G” terminal on the thermostat.

*GeoScholar heat pump sensor or control inputs:*

- **I0.4** – High Refrigerant Pressure Switch. The IO.4 is ON during normal operation. No light indicates an open switch. See lockout indicator “Q0.7” under Outputs.
- **I0.5** – Low Refrigerant Pressure Switch. The IO.5 is ON during normal operation. No light indicates an open switch. See lockout indicator “Q0.7” under Outputs
- **I0.6** – Humidity Controller. Used when an external humidity controller operates the GeoScholar to control the humidity in the classroom.
- **I0.7** – FreezeStat. When input is present (light in ON), system anti-freeze has been selected. When no input (light is OFF), fresh water has been selected.
- **I1.2** – Energy Management System. A shutdown input from an external source.
- **I1.3** – GreenWheel® ERV Relay. When this LED is lit, the GreenWheel ERV is operating.

PLC Outputs

An output is a signal from the PLC to the GeoScholar heat pump or thermostat. Outputs Q0.0, Q0.1, Q0.2 and Q0.3 are connected to a 230 VAC supply and thus provide 230 VAC when energized. These outputs are:

- **Q0.0** - Outdoor Air Motor (Fresh air motor for the GreenWheel® ERV)
- **Q0.1** – Indoor Blower Motor Relay
- **Q0.2** - GreenWheel® ERV Drive Motor
- **Q0.3** - Reheat Solenoid

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

- **Q0.4** - Compressor Contactor
HVAC Equipment

• **Q0.5** - Heat Contactor
• **Q0.6** - Reversing Valve (heat pump only)
• **Q0.7** - Lock Out Indicator. A LED indicates that a pressure switch has opened. A continually ON indicates a low pressure switch lockout. A flash rate of twice per second indicates a high pressure lockout.
• **Q1.0** - Pump Relay

On the left side 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 I0.0, I0.1 and I0.3 inputs to the system. This request will be indicated on the I0.0, I0.1 and I0.3 indicators at the bottom of the unit. If the compressor has been off for at least the amount of time interval set on the Anti-Short Cycle Timer (0), the Compressor Contactor (Q1.0), Indoor Blower (Q0.1), Reversing Valve (Q0.6) and the Pump (Q0.4) 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 I0.0 and I0.1 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 anti-short cycle timer, the Compressor Contactor (Q0.4), Indoor Blower Motor (Q0.1) and Outdoor Fan Motor (Q1.0) 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 I0.2 indicator will be lit. If the LED is on this indicates that the thermostat is calling for second stage heat.

If the I0.2 indicator is on, in addition to the Q0.4, Q0.1 and Q1.0 indicators, the Q0.5 indicator will be on indicating the call for second stage heat.
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 one minute, the system will turn off and a Low Pressure Lockout fault will be indicated by a solid on the “Q0.7” LED.

In cold weather the pressure in the refrigerant system is low prior to operation. When the GeoScholar unit operates in the heat pump mode during cold weather, low pressure could cause the system to lock out. To guard against nuisance lockouts, the GeoScholar unit will not shut off until after one minute if the Low Pressure Switch (I0.5) comes on.

High Pressure Switch
The system has a High Pressure Switch (I0.4) that indicates a high system pressure. When this occurs, the system will shut down and set a High Pressure Lockout. This lockout condition shuts the system off and flashes the Q0.7 indicator quickly at a rate of twice per second.

Troubleshooting
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.

1. Indoor Blower Speed Control (VWCA models only). The indoor blower speed control is located within the middle cabinet panel of GeoScholar heat pump. Factory setting for the indoor blower speed is full speed. If a lower speed setting is required, the blower motor speed control may be adjusted with a slotted screwdriver rotating the speed control as shown in Figure 16. Reference unit label for minimum required air flow settings for specific unit model.

Figure 16. Indoor Blower Speed Control Adjustment Instructions
1.15 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 GeoScholar heat pump in accordance with Figure 11, and in accordance with the thermostat instructions, National Electric Code, and with local electrical codes, where they prevail.

MARVAIR® SIMPLE COMPORT THERMOSTAT CONNECTION DIAGRAM
FROM MARVAIR HEAT PUMPS
2.0 START-UP PROCEDURE

A. This start-up procedure applies to GeoScholar models equipped with a remote (wall mounted) thermostat and electric supplemental heat.

1. Turn the disconnect in the GeoScholar 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 15 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 GeoScholar disconnect.

4. Turn the GeoScholar heat pump disconnect to “ON” position.

IMPORTANT
ON UNITS WITH CRANKCASE HEATERS, POWER MUST BE APPLIED TO UNIT FOR 24 HOURS BEFORE STARTING THE COMPRESSOR.

5. Cooling

a. At the remote thermostat, move the cooling set point several degrees above room temperature. Move the “heating” set point several degrees below room temperature.

b. Put the thermostat system switch in “COOL” mode.

c. Move the blower switch on the remote thermostat from “AUTO” to “ON” position. The indoor blower should come on, as evidenced by sound and air blowing out of the air supply grille.

d. Move the blower switch on the remote thermostat from “ON” to “AUTO” and the indoor blower will stop 90 seconds later.

e. Move the system switch on the remote thermostat from “OFF” to “COOL.” Slowly lower the cooling set point to just below room temperature and bring on cooling. Check to see that when the heat pump comes on that the air

---

**Figure 15. Voltage Limitations**

<table>
<thead>
<tr>
<th>Electrical Rating Designations*</th>
<th>A</th>
<th>C</th>
<th>D</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nominal Voltage</td>
<td>208/230</td>
<td>208/230</td>
<td>460</td>
</tr>
<tr>
<td>Phase</td>
<td>1</td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td>Minimum Voltage</td>
<td>197</td>
<td>197</td>
<td>414</td>
</tr>
<tr>
<td>Maximum Voltage</td>
<td>253</td>
<td>253</td>
<td>506</td>
</tr>
</tbody>
</table>

* Letters refer to model number code designations.

Example: VWIA 36 HP A Voltage
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.

f. 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.

6. **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.

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**

   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.

9. After the initial start has been finished, please complete the Equipment Test, Check and Start Form in Appendix J.
APPENDIX A - RATINGS AND DATA

1.01 RATINGS / DATA

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

<table>
<thead>
<tr>
<th>AIR FLOW (CFM)</th>
<th>ESP (WET COIL)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>0.10</td>
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<tr>
<td>BASIC MODEL</td>
<td></td>
</tr>
<tr>
<td>24</td>
<td>920</td>
</tr>
<tr>
<td>30</td>
<td>1150</td>
</tr>
<tr>
<td>36</td>
<td>1380</td>
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</tr>
<tr>
<td>48</td>
<td>1840</td>
</tr>
<tr>
<td>60</td>
<td>2250</td>
</tr>
</tbody>
</table>

CFM = Cubic Feet per Minute, Indoor Air Flow
ESP = External Static Pressure in Inches of Water
Rated at 240 Volts

**Figure 2. Model VWCA Air Filter Sizes (inches)**

<table>
<thead>
<tr>
<th>MODEL</th>
<th>RETURN AIR FILTER*</th>
<th>FRESH AIR FILTER</th>
<th>EXHAUST FILTER**</th>
</tr>
</thead>
<tbody>
<tr>
<td>24/30/36</td>
<td>2 - 16&quot; x 16&quot; x 1&quot;</td>
<td>11&quot; x 22&quot; x 1&quot;</td>
<td>12&quot; x 20&quot; x 1&quot;</td>
</tr>
<tr>
<td>40/48/60</td>
<td>2 - 20&quot; x 15&quot; x 1&quot;</td>
<td>11&quot; x 22&quot; x 1&quot;</td>
<td>12&quot; x 20&quot; x 1&quot;</td>
</tr>
</tbody>
</table>

*Two (2) return air filters are required for each unit.
**With GreenWheel™ ventilation system.
Optional 2" Filter

**Figure 3. Model VWCA Shipping Weight (pounds)**

<table>
<thead>
<tr>
<th>BASIC MODEL</th>
<th>VWCA24</th>
<th>VWCA30</th>
<th>VWCA36</th>
<th>VWCA40</th>
<th>VWCA48</th>
<th>VWCA60</th>
</tr>
</thead>
<tbody>
<tr>
<td>VOLTAGE - 230</td>
<td>450</td>
<td>540</td>
<td>550</td>
<td>565</td>
<td>935</td>
<td>960</td>
</tr>
<tr>
<td>VOLTAGE - 460</td>
<td>475</td>
<td>565</td>
<td>575</td>
<td>590</td>
<td>960</td>
<td>985</td>
</tr>
</tbody>
</table>

**Figure 4. Model VWIA Air Flow, CFM vs. ESP (Wet Coil)**

<table>
<thead>
<tr>
<th>AIR FLOW (CFM)</th>
<th>24</th>
<th>30</th>
<th>36</th>
<th>40</th>
<th>48</th>
<th>60</th>
</tr>
</thead>
<tbody>
<tr>
<td>BASIC MODEL</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>24</td>
<td>800</td>
<td>1000</td>
<td>1200</td>
<td>1300</td>
<td>1550</td>
<td>1650</td>
</tr>
</tbody>
</table>

*Nominal air flow up to .50 IWG.

**Figure 5. Model VWIA Air Filter Sizes (inches)**

<table>
<thead>
<tr>
<th>MODEL</th>
<th>RETURN AIR FILTER*</th>
<th>FRESH AIR FILTER</th>
<th>EXHAUST FILTER**</th>
</tr>
</thead>
<tbody>
<tr>
<td>ALL VWIA</td>
<td>16&quot; x 24&quot; x 2&quot;</td>
<td>12&quot; x 20&quot; x 1&quot;</td>
<td>12&quot; x 20&quot; x 1&quot;</td>
</tr>
</tbody>
</table>

*Two (2) return air filters are required for each unit. Optional 4" pleated filter.
**With GreenWheel® ventilation system.

**Figure 6. Model VWIA Shipping Weight (pounds)**

<table>
<thead>
<tr>
<th>BASIC MODEL</th>
<th>24</th>
<th>30</th>
<th>6</th>
<th>40</th>
<th>48</th>
<th>60</th>
</tr>
</thead>
<tbody>
<tr>
<td>VOLTAGE - 230</td>
<td>1020</td>
<td>1020</td>
<td>1020</td>
<td>1030</td>
<td>1045</td>
<td>1060</td>
</tr>
<tr>
<td>VOLTAGE - 460</td>
<td>1045</td>
<td>1045</td>
<td>1045</td>
<td>1055</td>
<td>1070</td>
<td>1085</td>
</tr>
</tbody>
</table>

**Figure 7. Water Flow and Pressure Drop**

<table>
<thead>
<tr>
<th>MODEL</th>
<th>WATER FLOW (GPM)</th>
<th>PRESSURE DROP (PSI)</th>
<th>MODEL</th>
<th>WATER FLOW (GPM)</th>
<th>PRESSURE DROP (PSI)</th>
</tr>
</thead>
<tbody>
<tr>
<td>VWCA24HP</td>
<td>6.0</td>
<td>5.8</td>
<td>VWIA24HP</td>
<td>6.0</td>
<td>5.8</td>
</tr>
<tr>
<td>VWCA30HP</td>
<td>7.5</td>
<td>6.3</td>
<td>VWIA30HP</td>
<td>7.5</td>
<td>3.4</td>
</tr>
<tr>
<td>VWCA36HP</td>
<td>9.0</td>
<td>4.4</td>
<td>VWIA36HP</td>
<td>7.8</td>
<td>3.8</td>
</tr>
<tr>
<td>VWCA40HP</td>
<td>10.5</td>
<td>6.1</td>
<td>VWIA40HP</td>
<td>10.5</td>
<td>6.1</td>
</tr>
<tr>
<td>VWCA48HP</td>
<td>12.0</td>
<td>6.7</td>
<td>VWIA48HP</td>
<td>12.0</td>
<td>6.7</td>
</tr>
<tr>
<td>VWCA60HP</td>
<td>15.0</td>
<td>4.6</td>
<td>VWIA60HP</td>
<td>15.0</td>
<td>4.6</td>
</tr>
<tr>
<td>VWCSA36HP</td>
<td>9.0</td>
<td>4.4</td>
<td>VWISA36HP</td>
<td>9.0</td>
<td>4.4</td>
</tr>
<tr>
<td>VWCSA40HP</td>
<td>10.5</td>
<td>6.1</td>
<td>VWISA40HP</td>
<td>10.5</td>
<td>6.1</td>
</tr>
<tr>
<td>VWCSA48HP</td>
<td>12.0</td>
<td>6.7</td>
<td>VWISA48HP</td>
<td>12.0</td>
<td>6.7</td>
</tr>
<tr>
<td>VWCSA60HP</td>
<td>15.0</td>
<td>4.6</td>
<td>VWISA60HP</td>
<td>15.0</td>
<td>4.6</td>
</tr>
</tbody>
</table>
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. The part number on the base stand must be matched with the correct GeoScholar cabinet size prior to installing the base stand. The model numbers are located on the lower left side cabinet panel.

<table>
<thead>
<tr>
<th>Base Stand Part #</th>
<th>Height</th>
<th>GeoScholar Cabinet Models</th>
</tr>
</thead>
<tbody>
<tr>
<td>S/02093</td>
<td>4&quot;</td>
<td>Models VWCA 24/30/36</td>
</tr>
<tr>
<td>S/02791</td>
<td>4&quot;</td>
<td>Models VWCA 40/48/60</td>
</tr>
<tr>
<td>S/02554</td>
<td>6&quot;</td>
<td>Models VWCA 24/30/36</td>
</tr>
<tr>
<td>S/04244</td>
<td>6&quot;</td>
<td>Models VWCA 40/48/60</td>
</tr>
<tr>
<td>S/06849</td>
<td>4&quot;</td>
<td>All VWIA Models</td>
</tr>
</tbody>
</table>

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 GeoScholar heat pump to the base stand at this time.

Place the base stand (as shown in Figure 1a or 1c) on the floor, measuring carefully to determine the exact location, based on where the heat pump 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 1a. Top View of Base Stand Part Number S/02093
(For VWCA 24/30/36)

Figure 1b. Top View of Base Stand Part Number S/02791
(For VWCA 40/48/60)
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 4 and 5.

**IMPORTANT**

**STUBOUTS SHOULD BE LOCATED (FROM THE FLOOR OR WALL) TO ALIGN WITH SELECTED CABINET KNOCK OUT ON THE CABINET, AS SHOWN IN FIGURES 3 & 4. 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 GeoScholar heat pump 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, removing the shipping skid bolts, and installing the plenum (as appropriate), following the instructions provided in Appendix C.

---

**CAUTION**

WHEN MOVING/RAISING THE GEOSCHOLAR CABINET, UTILIZE ADEQUATE RESOURCES TO HANDLE THE 300 TO 1,100 LB. CABINET. THIS IS TO AVOID PERSONAL INJURY OR DAMAGE TO THE EQUIPMENT/FACILITIES.

---

With appropriate resources to lift the GeoScholar 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 GeoScholar heat pump aligns and rests on the base stand as shown in Figures 1a/1b/1c.

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.
Figure 2a. GeoScholar Models VWCA24/30/36 Placed on Base Stand.

Fasten 5/16” bolt and washer through base pan to weld nut located on base extension.
Figure 2b. GeoScholar Models VWCA40/48/60 Placed on Base Stand.

- Plenum
- GeoScholar Cabinet
- Base Stand
- Arrow Points Forward

Fasten 5/16" bolt and washer through base pan to weld nut located on base extension.
### 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
- Needle Nose Pliers
- Wire Stripper/Cutter
- Screwdriver with Slotted Bit
- Wire Nuts for Power/Control Wiring
- Supplies for Piping Connections to Hot Water Coils (as appropriate)

### 1.02 INSPECTION/UNPACKING/HANDLING

Plenums, with and without wet heat coils installed, 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. When freeblow plenums are ordered with grilles, the grilles are shipped separately in corrugated containers. Part numbers for the freeblow plenum grilles are as follows:

<table>
<thead>
<tr>
<th>Part #</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>80705</td>
<td>8&quot; x 4&quot; double deflection freeblow plenum side grille</td>
</tr>
<tr>
<td>80676</td>
<td>Supply grille for VWCA24/30/36/40</td>
</tr>
<tr>
<td>81085</td>
<td>Supply grille for VWCA48/60</td>
</tr>
</tbody>
</table>

**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 part number on the plenum label must be matched to the GeoScholar model, as designated by the identification label on the lower left cabinet panel of the GeoScholar unit.

A. **Freeblow and Ducted Plenums to be used with electric resistance heat or no heat** have part numbers and model numbers, and are installed on the GeoScholar models/designated as follows:
1. For models VWCA 24/30/36.

<table>
<thead>
<tr>
<th>Part #</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>S/03212</td>
<td>Plenum (16” high)</td>
</tr>
<tr>
<td></td>
<td>Plenum (17 to 40” high) is special order</td>
</tr>
</tbody>
</table>

2. For models VWCA 40/48/60.

<table>
<thead>
<tr>
<th>Part #</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>S/03247</td>
<td>Plenum (18” high)</td>
</tr>
<tr>
<td></td>
<td>Plenum (19 to 40” high) is special order</td>
</tr>
</tbody>
</table>

B. **Freeblow and ducted plenums equipped with a wet heat coil** have the following part numbers and go with the designated models.

1. For models VWCA 24/30/36.

<table>
<thead>
<tr>
<th>Part #</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>S/03214</td>
<td>Hot water plenum (18” high)</td>
</tr>
<tr>
<td></td>
<td>Hot water plenums greater than 18” tall are special order.</td>
</tr>
</tbody>
</table>

2. For models VWCA 40/48/60.

<table>
<thead>
<tr>
<th>Part #</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>S/03249</td>
<td>Hot water plenum (18” high)</td>
</tr>
<tr>
<td></td>
<td>Hot water plenums greater than 18” tall are special order.</td>
</tr>
</tbody>
</table>

Remove the shrink wrap from the plenum and dispose of the wooden skid. Retain the bag of sheet metal screws to fasten the plenum to the top of the cabinet.

---

**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 KEY LOCKED DOOR ON THE LOWER FRONT PANEL. FAILURE TO DO THIS COULD RESULT IN PROPERTY DAMAGE, BODILY INJURY OR DEATH.
Remove the front plenum panel and the top 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 GeoScholar cabinet, prior to installing the cabinet into its final location. On extended height ducted plenums, the GeoScholar heat pump may have to be installed in its final location before the ducted plenum is fastened to the top of the cabinet.

**IMPORTANT**

**IF THE PLENUM TO BE INSTALLED IS EQUIPPED WITH A HOT WATER COIL, THE KNOCKOUT LOCATED IN THE TOP OF THE GEOSCHOLAR HEAT PUMP CABINET WILL HAVE TO BE REMOVED SO WIRES FROM THE FREEZE THERMOSTAT (AND BYPASS VALVE ON HOT WATER COIL) CAN BE RUN DOWN TO THE CONTROL CENTER WHEN PLENUM IS INSTALLED.**

### 1.03 PLENUM INSTALLATION

After the plenum has been unpackaged, it must be put into the final configuration required - either a freeblow plenum or a ducted plenum.

**A.** If a **freeblow plenum** is required, the blank off plate on the front of the plenum panel should be removed. Also remove the ducted flange from the inside top of the plenum. See Figure 1. Dispose of the ducted flange. Place the blank off plate on top of the plenum (where the duct flange was mounted) and fasten it with the retained screws. With a sharp knife, cut and remove the insulation from the perimeter of the plenum opening in the front, to receive the supply grille. If a side grille(s) is to be installed, remove the cover plate(s) from the side of the plenum, as shown in Figure 1, and cut insulation from the perimeter of the appropriate plenum side opening. If only one side grille is to be installed, be sure to locate it properly on the plenum. Install the supply and side grilles, as appropriate, with the retained screws.

**B.** If a **ducted plenum** is required, leave the blank off plate and cover plates for side grille in place, on the plenum as received. With a sharp knife, cut and remove the insulation from the perimeter of the duct flange opening on top of the plenum. Remove the duct flange from inside the plenum and reattach it to the top of the plenum. Swap the front and back panels of the plenum. This should put the blank off plate facing the exterior wall and not visible from the classroom.
C. Carefully raise the plenum into its location atop the GeoScholar cabinet as shown in Figure 2. Align the through holes (three on each side of the plenum base) with the matching holes in the top of the cabinet. Using screws supplied with the plenum, fasten the plenum to the cabinet, adjusting the alignment of the plenum with the cabinet as necessary before final torquing the screw fasteners.

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 GeoScholar 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.
1.04 ELECTRICAL/PIPING HOOK-UP

If the freeblow or ducted plenum (without the wet heat coil) is installed as noted in Article 1.03, there is no further electrical or piping hook-up required. If, however, a wet heat coil was ordered with the plenum, follow these instructions to complete the installation.

A. Electrical Hook-up

1. The **hot water coil** has a 24-volt freeze protection thermostat located on the coil. It may also have a diverter valve to activate the water flow through the coil. The leads from the freeze protection thermostat and the diverter valve are run down the knockout hole noted in Figure 2, and to the control center. The leads are then connected to the terminals in the control center as denoted on the wire leads.
B. Piping Hook-up

1. For the **hot water coil**, the supply and return connections to the coil are shown in Figure 2. An optional diverter valve may also be factory installed. All other controls for the hot water system are external to the coiled plenum. All materials (piping and controls) are field supplied. Prior to making piping connections to the stub-outs shown in Figure 2, the plenum top panel should be reinstalled and fastened in place. Access to the connection locations is through the opening on the front of the plenum. After water piping connections are completed, leak check the system, and check the proper operation of the bypass valve after turning the electrical disconnect back to “ON” position.

2. After turning the disconnect to “OFF” position, replace appropriate plenum and cabinet panels after rechecking and tightening all new electrical connections and checking wiring for appropriate protection from sharp edges and clearance from moving parts, etc.
APPENDIX D - INSTALLATION OF THE FREEBLOW PLENUM WITH NO HEAT FOR ALL VWIA UNITS

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:

<table>
<thead>
<tr>
<th>Part #</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>91969</td>
<td>Freeblow plenum side supply grille (two per plenum)</td>
</tr>
<tr>
<td>91970</td>
<td>Front supply grille (two per plenum)</td>
</tr>
</tbody>
</table>

⚠️ 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 GeoScholar cabinet, prior to installing the cabinet into its final location. On extended height ducted plenums, the GeoScholar heat pump 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 GeoScholar 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 GeoScholar 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 GeoScholar unit.

**WARNING**

THE PLENUM IS HEAVY. USE CARE WHEN PLACING THE PLENUM ON TOP OF THE GEOSCHOLAR HEAT PUMP.

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

5. Secure the plenum to the GeoScholar 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 GeoScholar 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 E - 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 GeoScholar 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 GEOSCHOLAR HEAT PUMP FOR TRIM STRIP INSTALLATION

The GeoScholar heat pump 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.

Trim strips are to be installed as shown in Figure 1. 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. LEAVE PROTECTIVE FILM IN PLACE UNTIL INSTALLATION IS COMPLETE AND CONSTRUCTION WORK HAS BEEN COMPLETED.

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.

Figure 1. Installation of Trim Strips to GeoScholar Heat Pump
APPENDIX F - 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 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 marked on the outside with part number MB/03901. The wall brackets are universal and are adaptable to any model GeoScholar heat pump. The wall brackets provide additional means of securing the GeoScholar 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 GEOSCHOLAR HEAT PUMP FOR WALL BRACKET INSTALLATION

The GeoScholar heat pump 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

CAUTION

FOR HEAT PUMP 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. See Figure 1. Anchor bracket(s) to the wall.

B. Install sturdy self-tapping sheet metal screws into two bracket pilot holes and into cabinet as shown in Figure 1. Screws should be no longer than 1/2”.

Figure 1. Installation of Wall Brackets (One on Each Side of Unit)
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.

The part number on the louver/collar package should be matched to the GeoScholar model, as designated by the identification label on the lower left cabinet panel of the GeoScholar heat pump.

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.

**IMPORTANT**

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 GEOSCHOLAR HEAT PUMP 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 GeoScholar heat pump should be installed following the instructions in this manual. After installation, the GeoScholar air box should be from 1-3/8” to 1-1/2” from the outside surface of the finished wall, as shown in Figure 1.

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

NOTE: To prevent condensate OR RAIN WATER from running down the interior of the wall, install flashing under the outdoor AIR BOX over the sill of the wall opening.

IMPORTANT

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 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. 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.

B. Louver

The louver itself may be fastened to the air box.

C. Collar

The collar itself may be fastened to the outside wall.

---

**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.

---

D. Secondary Drain Line - **IMPORTANT**

To Prevent Condensate OR RAIN WATER From Running Down the interior of the wall, install flashing under the outdoor AIR BOX over the sill of the wall opening.

The secondary condensate line on the VWCA24, 30 & 36 is terminated in the bottom of the unit. This line must be either routed out of the GeoScholar unit to a suitable location or teed into the primary condensate line. Failure to route the condensate out of the unit, could result in extensive water damage.

The secondary condensate line in the VWCA40, 48 & 60 units should be run through the outdoor air box and through the external louver. Route the condensate drain away from the GeoScholar unit with sufficient downward slope to insure adequate drainage.

VWIA models do not have secondary drain.
APPENDIX H - SOUND REDUCTION PANEL (Models VWCA only)

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

1.02 INSPECTION/UNPACKING/HANDLING

The sound reduction panel components are shipped to the job site in a wooden crate, after being enclosed in shrink wrap. Do not stack the sound reduction panels and do not expose them to outdoor weather conditions. Sound reduction panel components with painted finish surfaces are coated with a protective white plastic film for protection. Leave the film on until the installation is completed and construction work in the area is finished. Sound reduction panel components are to be considered as fragile, and handled accordingly.

![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 part number of the sound reduction panel must be matched to the proper GeoScholar model number. GeoScholar model numbers are found in the lower front corner of the left side cabinet panel.

<table>
<thead>
<tr>
<th>Sound Reduction Panel Part Number</th>
<th>GeoScholar Cabinet Models</th>
</tr>
</thead>
<tbody>
<tr>
<td>S/04263</td>
<td>Models VWCA 24/30/36</td>
</tr>
<tr>
<td>S/04195</td>
<td>Models VWCA 40/48/60</td>
</tr>
</tbody>
</table>

For the best installation results, the GeoScholar unit should be installed, into the wall opening and secured to the floor, prior to installing the sound reduction panel.

Remove all sound reduction panel parts from the wooden container and identify them referencing Figure 1. Retain the bag of screws for use in assembling and installing the sound panel components.
1.03 INSTALLATION

IMPORTANT

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.
A. Assemble the 3 support braces to the left and right side panels with #10 sheet metal screws provided (6 screw per brace).

B. The Sound Panel can be assembled with the hinges on left or right side of framework. With the basic framework complete determine which side of the frame will need to be hinged.

C. Assemble the bottom half of the lift off hinge (quantity 4) to the appropriate side of the framework with the metal post up on the hinge. Assemble the top half of the lift off hinge to the front doors (quantity 2 per door) with hole in the hinge facing down. Use the #10-32 x ¼” long screws provided for assembling both bottom and top hinge parts.

D. Press J nuts on the opposite side of framework from hinges.

E. Place framework, without doors attached against cabinet 6” from the bottom of the cabinet, and flush with the sides of the cabinet. Place a mark (4 each side) on the cabinet through the mounting holes in the framework. Remove framework from cabinet and drill 1/8” diameter holes at the marked locations on the cabinet. Reattach framework using #10 x ½” long sheet metal screws provided.

F. Slide the quick opening captive screws (quantity 4) through the holes in the front doors and push retaining clip onto backside of captive screws.

G. Attach doors (lower first) to framework by slipping hinge on door over the hinge post on framework. Close doors and tighten captive screws to framework.

**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.
APPENDIX I - INSTALLATION OF ELECTRIC HEATERS ON ALL VWIA/VWISA 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
- T25 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. 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.
GeoScholar Water Source Heat Pump
Equipment Check, Test and Start Form

Installation Data

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<th>Information</th>
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<td>City or Town</td>
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<tr>
<td>State</td>
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Who is Performing CTS

- General Contractor

Equipment Type (check all that apply)

- Closed Loop
- Open Loop
- Geothermal
- Other (specify)

Essential Items Check

A. Voltage Check

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<th>°F Cooling</th>
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B. Yes No

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<td>Water System Freeze Protection</td>
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<td>Filters Clean</td>
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Note: “NO” answer below requires notice to installer by memorandum (attached copy).

Other Conditions Found

Please include any suggestions or comments

Printed Name_____________ Signature _______________ Date________

GeoScholar Check Test and Start Form  Page ___ of ___
<table>
<thead>
<tr>
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<th>Model #</th>
<th>Serial #</th>
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