GeoScholar III™ Heat Pumps
2 to 5 Tons
Models VWIA24-30-36-40-48-60 (1-Stage Compressor) and VWISA36-40-48-60 (2-Stage Compressor)

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General Description

The GeoScholar III heat pumps are self-contained HVAC systems designed to provide heating, cooling, and outside fresh air for school classrooms. The units are typically installed against an exterior wall and an opening in the wall provides fresh aie for ventilation. If fresh air is not required, the GeoScholar III can be installed anywhere in the classroom. The vertical configuration minimizes the floor space occupied by the HVAC unit. This unique design makes it ideal for both new schools and for renovation of existing classrooms.

A full range of ventilation options – from the GreenWheel® ERV to a mechanical damper - are offered to meet any climate or budget. A wide selection of architectural louvers provides the designer with unlimited styles and configurations to complement the exterior of the school. (For a complete description of the architectural louvers, please refer to the Marvair brochure entitled, "Architectural Extruded Aluminum Louvers".) Marvair offers a full range of thermostats to meet virtually every requirement. The unit can be controlled by a wall mounted thermostat, an internal thermostat or interfaced with a energy management system.

GeoScholar III without Free Blow Plenum

GeoScholar III heat pumps are available in cooling capacities from 2 to 5 tons with 1-stage compressor and 3 to 5 tons with the 2-stage compressor. All sizes are available for operation on 208/230 V. 1Ø or 3Ø and 460 V. electrical supply. All models comply with UL standard 1995, 2nd edition.

GeoScholar III Advantages

Since its introduction in 1991, Scholar GeoScholar heat pumps have been the undisputed leader in interior, self-contained classroom HVAC systems. Students in tens of thousands of classrooms across the USA have benefited from the environment provided by Scholar and GeoScholar heat pumps.

The GeoScholar III builds on this history with unique design innovations and features.

- **Quiet Operation for better learning.** The GeoScholar III minimizes sound levels in the classroom; in many non-ducted applications sound levels of 45 dbA and less can be expected. Specially designed interior panels convert sound to heat energy, resulting in the sound being absorbed. A low vibration, scroll compressor insures quiet operation as well as energy efficiency. The indoor air mover utilizes a revolutionary electronically commutated motor (ECM). This motor consumes a minimum of power with whisper quiet operation. The ECM automatically adjusts its speed to maintain the proper air flow at various external static pressures. Throughout this Data Sheet features, options and components that minimize sound levels are designated by Quiet Marv. 
- **High efficiency means lower operating costs.**
  - The latest in scroll compressor technology,
  - Ultra efficient indoor air movers,
  - Twin indoor coils with generous heat transfer surface,
  - Coaxial, tube-in-tube compact heat exchanger with superior anti-fouling characteristics. Convoluted cupronickel inner tube increases heat transfer surface yet still permits full flow of both water and refrigerant around its entire periphery.
- **Designed for the future with R-410A refrigerant.** GeoScholar III heat pumps utilize R-410A, a non-ozone depleting refrigerant, with a synthetic lubricant. Since R-410A can release heat more efficiently than R-22, compressors with R-410A have less risk of burnout due to over heating. The synthetic lubricant and R-410A mix and circulate more efficiently to lubricate the compressor, reducing wear and extending its life. Finally, by selecting a heat pump that uses R-410A, you will avoid the risk associated with purchasing a product that is destined to become obsolete.
- **Humidity Control.** The control of humidity is essential for a positive learning environment. GeoScholar III heat pumps actively control humidity with both standard controls and several optional accessories for schools where control of humidity is an everyday concern. The electronically commutated motor optimizes moisture removal by automatically controlling the air flow across the indoor coil. Raw outdoor air for ventilation is not brought directly into the classroom. Ventilation air first passes through the indoor coil to temper the air and remove moisture. It then is mixed with classroom air before being introduced into the classroom.
- **Optional 2-Stage Compressor.** The VWISA models of GeoScholar III heat pumps are available with a two stage compressor with a first stage capacity of 65% of the total capacity. The two stage compressor provides better comfort and improved energy efficiency compared to many older, single stage compressors. See page 4 for a complete description of the operation and performance of the two stage compressor units. 
- **GreenWheel® ERV.** The optional GreenWheel® ERV is a total energy wheel, i.e., during the summer it removes both moisture **and** heat from the incoming air stream. With a outdoor wet bulb of 74°F and a indoor dry bulb of 72°F and 450 cfm of outside air, the GreenWheel ERV will remove 8 pints per hour of moisture from the incoming fresh air stream. See page 7 for a complete description of the performance and operation of the Marvair GreenWheel ERV.

  For optimum control of the humidity, the GreenWheel® ERV should be used in conjunction with Hot Gas Reheat. This complete, factory assembled optional coil and controls economically maintains the temperature and humidity in the classroom. See page 5 for a complete description of the performance and operation of the Hot Gas Reheat Coil.

Ease of Installation

GeoScholar III heat pumps are installed in the classroom against an exterior wall. The outdoor air box slides into an opening in the exterior wall. The outdoor air box provides for the ingress and egress of the intake and exhaust for the ventilation air. The bottom of the outdoor air box is 33” from the base of the unit, enabling it to clear the sills of windows. For existing schools this greatly facilitates installation since expensive structural changes to exterior walls are not required. By having the fresh air intake three feet above grade, stagnant, moisture laden air is not introduced into the classroom.

GeoScholar III heat pumps can be installed as a free blow or ducted system. Free blow and ducted plenums are built to match the color and appearance of GeoScholar III units.

GeoScholar III units are available with a full range of accessories for customizing the installation including, base stands, decorative trim panels, and outdoor louvers.

The outdoor air box is designed to be quickly removed and reinstalled in the field. With the box removed, GeoScholar III heat pumps will slide comfortably through a three foot wide door.

Rugged Cabinet Construction

The exterior cabinet is constructed of 16 gage galvanized steel with a mark and scratch resistant polyester finish. Grey is the standard cabinet color, but other colors are available.

The hinged doors permit easy access to the filters and components for service and maintenance.

The drain pans under each indoor coil are sloped to ensure condensate does not sit in pan.

Service and Maintenance

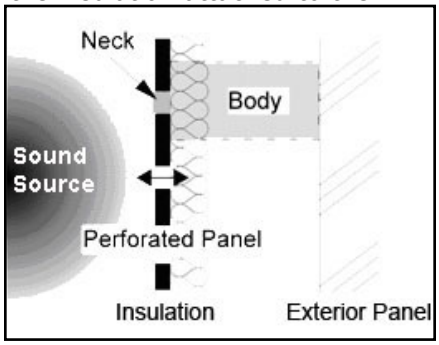
All service and maintenance is performed from the front or side of the unit – no need to slide the unit away from the wall. The heavy duty hinged front panels open 180° to facilitate access to parts, air filters and controls. The indoor coils are easily accessible for cleaning.

Quiet and High Efficiency

The GeoScholar III was designed from the onset for unsurpassed quiet operation and high efficiency. With the proper installation, sound levels of 45 dBA or less in a free blow can be obtained. With duct, sound levels can be greatly reduced. In addition, many of the same components that enable the GeoScholar III to have such quiet operation, contribute to its high efficiency.

a. Cabinet Construction

All exterior cabinet panels are double wall construction with a perforated interior panel and the finished exterior panel. Between the two sheet metal panels is a 1-1/4" thick, acoustical and thermal insulation. The perforation pattern and the insulation are designed to optimize the reduction of sound. The absorption mechanism of these panels is a combination of the perforated panels and insulation acting together as an array of Helmholtz Resonators. The columns of air in each perforation correspond to the "neck" of the Resonator and the layer of air at the back side of the panel including insulation correspond to the "body" of the Resonator. As sound passes through a perforation, it causes the air of the "neck" to vibrate. When the vibrations meet the resistance of the panel material surrounding the perforation or the resistance of the insulation attached to the back of the perforated panel, the resistance causes the sound to convert to heat energy, the heat is absorbed by the insulation & sound levels are reduced.



b. Scroll Compressor and R-410A Refrigerant

The heart of every heat pump is the compressor and the GeoScholar III utilizes a scroll compressor specifically designed to use R-410A refrigerant. The heavy duty scroll compressor is quieter and operates with less damaging vibration than older compressors that operate on R-22. Since R-410A can absorb and release heat more efficiently than R-22, compressors with R-410A run cooler than R-22 systems, reducing the risk of burnout due to overheating.

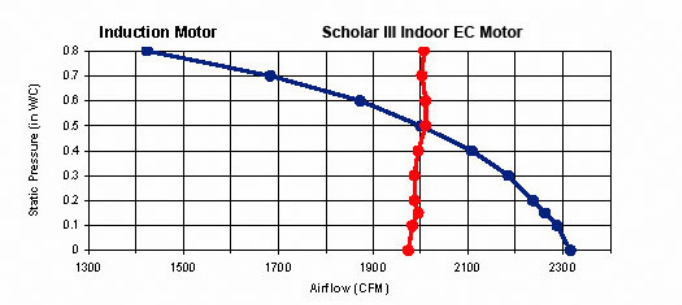
c. Electronically Commutated (EC) Indoor Motor

The GeoScholar III heat pump uses an Electronically Commutated (EC) motor for the indoor air mover and provides a number of advantages over conventional induction motors.

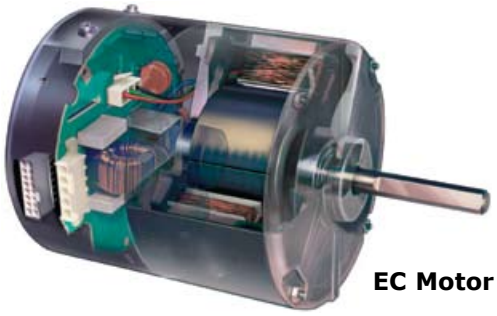
- Constant air flow. The EC motor automatically adjusts its speed to maintain proper air flow over a wide variety of external static pressures in an air distribution system. Benefits of constant air flow include improved air distribution throughout the static pressure range, improved indoor air quality with the use of high efficiency air filters and low speed constant fan operation which not only saves money but lessens temperature stratification.
- Quiet. The three phase motor construction results in a very low torque ripple and the rotor construction effectively eliminates noise transmission through the shaft. Unlike a conventional induction motor that repeatedly cycles on & off, the EC motor is programmed to slowly ramp up to speed, eliminating the abrupt sound at start–up.
- Ultra-high efficiency. On constant fan speed, the motor consumes 60-80 watts compared to 400 watts for an induction motor.

Quiet and High Efficiency (cont'd)

- Reliable. The motor's control is fully encapsulated to prevent harmful moisture from damaging the sensitive electronics.



The unregulated airflow output of an induction motor decreases as the static pressure of the system increases. In contrast, the indoor motor in the GeoScholar III remains constant over the same range of static pressure.

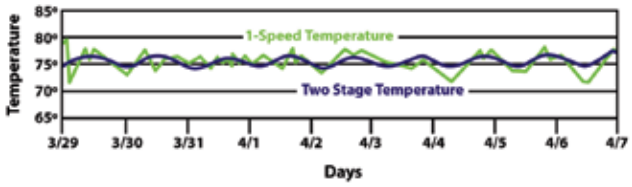


EC Motor

d. Two Stage Compressor

As an option, selected models of the GeoScholar III heat pump are available with a two stage compressor. The two stage compressor offers better comfort and improved overall energy efficiency. The second stage is only functional in the cooling mode. Heating and dehumidification are single stage.

- Better Comfort. The two stage compressor is able to maintain more precise temperature and relative humidity levels. During mild days, the first stage can satisfy the load, minimizing temperature fluctuations providing steady, even comfort.



- Energy Efficiency. The GeoScholar III heat pump with the two stage high efficiency compressor can provide significant energy savings compared to older, less efficient systems.
- Hot gas reheat for humidity control.

The outside air requirements of classrooms require a special emphasis on control of humidity. The GeoScholar III with hot gas reheat and the two speed compressor provide a comprehensive, yet affordable solution. It is a complete factory assembled unit designed to provide dehumidification of fresh air and room air. See page 5 for a complete description of Hot Gas Reheat for dehumidification.

e. Water side economizer. A water side economizer is an option that can reduce the cost of cooling the classroom. The water side economizer is a set of water coils factory installed in the plenum. The GeoScholar unit has an internal adjustable thermostat which monitors the loop water's temperature. If the water inlet temperature is less than the thermostat set point and cooling is required, the thermostat energizes a 3-way diverting valve. The 3-way valve allows water to flow to the economizer coilsfor cooling. Mechanical (compressor) operation is disabled when cooling with the economizer. If the water inlet temperature rises above the thermostat's set point, the thermostat de-energizes the 3-way valve.

GeoScholar III Heat Pump Waterside Economizer Performance Data

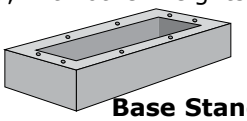
Model Numbers	Waterside				Indoor Air System		Cooling Capacity (80° DB / 67° WB EAT)	
	EWT[1] (°F)	DT[2]	Flow (GPM)	Pressure Drop (Ft-H2O)	Air Flow (CFM)	Pressure Drop (In-H2O)	Total (Btu/Hr)	Sensible (Btu/Hr)
VWIA24	42	8	5.7	1.2	800	0.05	23,079	17,797
	45	8	4.8	0.8			19,086	16,123
	42	10	4.4	0.7			18,097	15,287
	45	10	3.7	0.6			15,169	12,813
VWIA30	42	8	6.5	1.6	1000	0.08	26,419	20,741
	45	8	5.5	1.1			21,795	18,787
	42	10	4.5	0.8			20,549	17,861
	45	10	3.8	0.6			17,224	14,971
VWIA36	42	8	7.3	2.0	1200	0.10	29,508	23,478
	45	8	6.0	1.3			24,258	21,226
	42	10	4.6	0.8			23,001	20,436
	45	10	3.9	0.6			19,279	17,129
VWIA40	42	8	7.6	2.2	1300	0.12	30,868	24,772
	45	8	6.3	1.5			25,522	22,458
	42	10	4.8	0.9			24,240	21,634
	45	10	4.1	0.7			20,318	18,133
VWIA48	42	8	8.5	2.7	1550	0.16	34,327	27,954
	45	8	7.1	1.9			28,387	25,354
	42	10	5.4	1.1			27,033	24,430
	45	10	4.6	0.8			22,660	21,841
VWIA60	42	8	8.9	2.9	1650	0.17	35,615	29,150
	45	8	7.3	2.0			29,432	26,440
	42	10	5.6	1.2			27,935	25,401
	45	10	4.7	0.8			23,553	22,769

[1]EWT=Entering Water Temperature
[2]DT=Temperature Difference (ºF) between inlet and out water.
Air side pressure drop is for the Waterside Economizer coil (wet).
The plenum for the Waterside Economizer is 15" high. It is factory installed in the plenum of the GeoScholar heat pump.

Field Installed Accessories

Trim Piece. The trim piece provides a color coordinated panel between the cabinet and the wall. Built in the same color as the cabinet and in various widths. Trim pieces provide a finished appearance and cover any space between the back of the cabinet and the wall.

Base Stand. A 2” or 4” (standard, with other heights available) high base is the same dimension as the GeoScholar III™ cabinet and raises the cabinet off the floor for custodial purposes. The base stand is available in several colors to match the color of the GeoScholar III unit.



Base Stand

1ø or 3ø Single Point Power Entry. Dual circuit units connect to a single power entry.

Louver and Collar Options

See the brochure, *Architectural Extruded Aluminum Louvers*, for complete description of the various styles and configurations of louvers.

Louver/Collar Assembly. Aluminum louver and collar, preassembled at the factory to cover outside wall opening. The louver with 2" collar assembly is to be used when the louver is flush with the outside wall and is the preferred method of filling and sealing the outside wall. Standard colors are dark bronze or clear anodized. Exterior louver includes 1/2” x 1/2” bird screen. Note: Louvers are available in a variety of styles to meet architectural needs and various colors for aesthetic considerations. Contact your Marvair® representative for custom louvers.

Louver Collar. Aluminum louver collar to enclose the louver and provide finished appearance over wall opening. Fits flush with outer wall surface. Available in dark bronze or clear anodized. Normally used when wall depth is less than 14" and louver is not flush with the outside wall.

Louver. Aluminum louver for covering the outside wall opening. Available in dark bronze or clear anodized. Used with collar when louver is not flush with the outside wall. Exterior louver includes 1/2” x 1/2” bird screen.

Air Distribution Options

Freeblow Air Distribution is provided with the freeblow plenum. The front grille has individually adjustable vertical louvers that provide a full range of airflow direction. Two side supply grilles with vertical louvers enhance the air flow in the classroom. All grilles have a clear brushed aluminum finish to be used with GeoScholar III™ units. The plenum is 12-1/2” high.

Supply Grilles. The frame and blades are 6063 extruded aluminum alloy with a 2000-R1 satin anodized finish. To eliminate corrosion and vibration, the frame is separated from the blade with injection molded bushings. All blades are air foil in design, individually adjustable and spaced 3/4” on center. A specially engineered channel on the outside of the frame holds an extruded flexible vinyl bulb gasket that produces a positive air seal at the mounting surface.

Ducted Air Distribution is provided with the ducted plenum. The plenum is 12-1/2” high. Duct can be easily installed to the flanged rectangular opening on the top. The table on page 10 shows the cfm for the various units.

Plenum Extenders. In order to provide a finished appearance, plenum extenders may be ordered. The plenum extender rests on top of the either the free blow or ducted plenum and may be ordered in various heights in 1” increments.

Dehumidification

Reheat Dehumidification. GeoScholar III heat pumps with hot gas reheat are complete factory assembled units designed to provide dehumidification of fresh air and room air. Hot gas reheat can be used with the single stage or two stage compressor and the GreenWheel® ERV or motorized damper ventilation options. Hot gas reheat is controlled by an external humidity controller or BAS control. For optimum performance, hot gas reheat should be used in conjunction with the GreenWheel® ERV. When used with the motorized damper, hot gas reheat alone may not maintain satisfactory control of the humidity in the classroom over all outdoor conditions.

Operation. If the humidity rises above the set point on the humidity controller and the temperature in the classroom is satisfied, both mechanical cooling and the HGR coil operate to temper the air and lower the humidity. If the temperature in the classroom rises above (or falls below) the set point of the thermostat and the unit is operating in the dehumidification mode, the call for cooling (or heating) will override the call for dehumidification and the coil is disengaged until the thermostat is satisfied. This assures the environment temperature is maintained as first priority and humidity control is second. Note: GeoScholar III™ units with the hot gas reheat coil require a humidity controller for proper operation. (See Optional Controls.)

Ventilation Options

Manual Fresh Air Damper with Pressure Relief (Standard). Ventilation Configuration "N". Manually adjustable to a fixed position up to 40% outside air, with a maximum of 450 cfm. Includes fresh air filter and exhaust air filters, fresh air intake blower, fan speed controller and pressure relief.

Motorized Fresh Air Damper with Pressure Relief (Optional). Ventilation Configuration "B". A 24 volt actuated, two position (open & closed) motor motor allows fresh air to enter, as a function of an external input; e.g., time clock, CO2 sensor, energy management system, or manual switch. Includes fresh air and exhaust air filters, a ventilation intake blower and a fan speed controller for the blower. Pressure relief is standard.

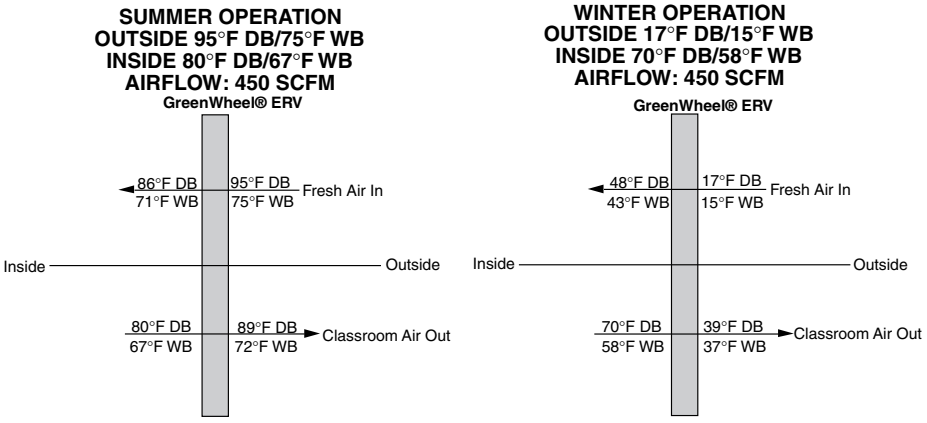
Power Vent with Motorized Damper (Optional). Ventilation Configuration "J". A 24 volt actuated, two position (open & closed) motor motor allows fresh air to enter, as a function of an external input; e.g., time clock, CO2 sensor, energy management system, or manual switch. Includes fresh air filter and exhaust air filters, a ventilation intake blower, a fan speed controller for the intake blower, a ventilation exhaust blower and pressure relief. An optional fan speed controller for the exhaust air blower may be ordered. Vents up to 40% of classroom air, with a maximum of 450 cfm, to assure fresh air circulation.

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

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

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

Quality Components - The GreenWheel® ERV cassette consists of the wheel, two blowers and the drive motor and belt. The two blowers simultaneously pull fresh air from outside and exhaust air from the classroom through the rotating wheel. The air streams are separated by an insulated partition so that the incoming fresh air is not mixed with the exhaust air. Two variable speed blowers ensure that up to 450 CFM of outside air can be brought into the room and the indoor air is properly exhausted. Variable speed blowers permit that the desired quantity of outside air is delivered into the room. Optional independent exhaust air blower control allows positive pressurization of the classroom, i.e., more outside air can be introduced through the GreenWheel ERV than is exhausted.



GreenWheel® Energy Recovery Ventilator Performance

SCFM* of Outside Air	95° DB/73° WB Outside 80° DB/67° WB Inside Energy Conserved, BTUH			95° DB/80° WB Outside 80° DB/67° WB Inside Energy Conserved, BTUH		
	Sensible	Latent	Total	Sensible	Latent	Total
225	2,900	1,100	4,000	2,900	6,400	9,300
250	3,100	1,200	4,300	3,100	6,900	10,000
325	3,700	1,400	5,100	3,700	8,100	11,800
400	4,200	1,500	5,700	4,200	9,100	13,300
450	4,500	1,600	6,100	4,500	9,700	14,200

SCFM* of Outside Air	90° DB/74° WB Outside 75° DB/64° WB Inside Energy Conserved, BTUH			80° DB/70° WB Outside 75° DB/64° WB Inside Energy Conserved, BTUH			60° DB/54° WB Outside 70° DB/58° WB Inside Energy Conserved, BTUH		
	Sensible	Latent	Total	Sensible	Latent	Total	Sensible	Latent	Total
225	2800	3600	6400	900	2800	2700	1900	200	2100
250	3000	3800	6800	1000	3000	4000	2000	200	2200
325	3600	4500	8100	1200	3500	4700	2400	200	2600
400	4100	4900	9000	1400	3800	5200	2700	300	3000
450	4300	5200	9500	1400	4000	5400	2900	300	3200

SCFM* of Outside Air	40° DB/36° WB Outside 70° DB/58° WB Inside Energy Conserved, BTUH			20° DB/18° WB Outside 70° DB/58° WB Inside Energy Conserved, BTUH			0° DB/7° WB Outside 70° DB/58° WB Inside Energy Conserved, BTUH		
	Sensible	Latent	Total	Sensible	Latent	Total	Sensible	Latent	Total
225	5600	3300	8900	9300	4900	14200	13000	5700	18700
250	6000	3600	9600	10000	5300	15300	14000	6100	14100
325	7200	4200	11400	12000	6200	18200	16700	7100	23800
400	8100	4600	12700	13500	6800	20300	18900	7900	26800
450	8600	4800	13400	14400	7100	21500	20100	8200	28300

*SCFM = Standard Cubic Feet per Minute

For performance of the GreenWheel® ERV at conditions other than those shown, please contact your Marvair® representative or the factory.

Optional Ventilation Controls and Grilles

Demand Control Ventilation. A field or factory installed carbon dioxide sensor controls the ventilation damper and only opens the damper when CO_2 levels exceed a specified level. Demand control ventilation saves energy and utility costs by ventilating the classroom based upon occupancy. Note: Not available on the manual fresh air damper ("B") configuration.

Exhaust Air Controller. The motorized fresh air damper with PowerVent (option J) and GreenWheel® ERV (option H) ventilation options are equipped with an exhaust air fan speed control which controls the ventilation exhaust blower independent of the fresh air intake blower. An optional independent exhaust air blower control allows positive pressurization of the classroom; i.e., more outside air can be introduced through the GreenWheel® ERV than is exhausted.

Ventilation Backdraft Damper. A factory installed flapper type damper that prevents outside air from entering the GeoScholar III unit when it is not operating. The damper opens whenever the ventilation fan is on and automatically shuts when the ventilation fan turns off. The damper should be used in areas where outside air infiltration is a concern. Can be used on all ventilation packages.

Side Return Air Grilles. Aluminum grille replaces stamped slots on left and right side of the unit.

GreenWheel® ERV Exhaust Air Grille. Aluminum grille replaces slots in cabinet.

Thermostats

Digital Thermostat (p/n 50121) **-** 1 stage heat, 1 stage cool. Non-programmable. Fan switch: Auto & On. Manual changeover system switch: Cool-Off-Heat. Low temperature protection. °F or °C selectable.

Digital Thermostat (p/n 50123) **-** 1 stage heat, 1 stage cool. 7 day programmable. Fan switch: Auto & On. Auto-changeover. Keypad lockout. Non-volatile program memory. Title 24 compliant - no batteries needed.

Digital Thermostat (p/n 50186) Digital, non-programmable thermostat. One stage cool/One stage heat. Manual or auto changeover. Fan mode: Auto or On. Permanent retention of settings upon power loss. Field adjustable temperature calibration. Max heat and minimum cool set points. Adjustable temperature differential. Remote sensor capable. Keypad lock out. Status LED. °F or °C selectable.

Thermostat Guard (p/n 50092) Clear thermostat guard with key lock and clear plastic cover and base For use with 50121, 50123, 50186, 50107 & 50252 thermostats.

Thermostat Guard (p/n 50119) Clear, thermostat guard with key lock and clear plastic cover for use with 50248 thermostat.

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

Internal Electronic Programmable Heat Pump Thermostat (p/n S/02792) (factory installed) with automatic changeover, has two stages of heating and one stage of cooling and a fan switch. System mode switch has OFF, COOL, AUTO, HEAT, and EM.HT. settings. Fan mode switch has OFF and AUTO settings. This thermostat may be used with systems that have no heat, electric resistance, a hot water coil or a steam coil.

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.

Standard Controls

High Pressure and Loss of Charge (HP) or Low Pressure (A/C) Switches with lockout relay.

PLC Controller. The PLC is a factory installed microprocessor. LED indicator lights show operational status and provide assistance with diagnosis if troubleshooting is ever required. The controller can perform extensive self diagnosis to assess the operational status and indicate a fault when detected. The controller can be programmed remotely or with a removable program storage device. Pertinent statistical data regarding the history of the refrigerant system is also stored.

The controller in the GeoScholar III™ heat pumps improves reliability due to a reduction of components and simplification of control panel wiring and can control a Building Automation System (BAS) and various ventilation operations.

Anti-short Cycle Timer: Prevents the compressor's motor windings and starting controls from destructive overheating. The time interval is adjustable from three to eight minutes.

BAS Control Relay (24V only): Provides a 24 VAC coil to control operation from a Building Automation System. Note: An additional BAS control relay can be added when 120 or 240 VAC coils are required.

Electric Heat Control. Controls operation of electric heat and allows either simultaneous or non-simultaneous operation of electric heat and the compressor.

Ventilation Control. 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 controls both the ventilation intake and exhaust blowers together, automatically balancing the intake exhaust cfm up to 450 cfm.

Optional Controls

Spring Wound Timer. Used to enable operation of the heat pump or override building automation system. Field installed.

Humidity Controller. Wall mounted type humidity controller controls operation of the hot gas reheat coil for dehumidification. Adjustable dehumidification range. Required for GeoScholar III™ heat pumps with hot gas reheat.

Other

Condensate Pans and Freeze Protection. To prevent freezing of water in the condensate lines, this kit should be installed in locales subject to freezing temperatures.

Anti-microbial light. A germicidal UV light destroys toxic bacteria, viruses and mold on the indoor air coil. A field or factory installed option.

Model Identification

VWI — Vertical Water Indoor Source

S — 2-Stage Compressor

A — Refrigerant: R-410A

• — Nominal Cooling
24 = 24,000 BTUH
30 = 28,000 BTUH
36 = 34,600 BTUH
40 = 40,000 BTUH
48 = 48,000 BTUH
60 = 59,000 BTUH

HP — System Type: HP = Heat Pump

• — Power Supply
A = 208/230V,1,60Hz
C = 208/230V,3,60Hz
D = 460V,3,60Hz

• — Heat – kW
000 - No Heat
050 = 5 kW
075 = 7.5 kW
100 = 10 kW
150 = 15 kW

• — Configuration
N = Manual Damper (std)
H = GreenWheel® ERV
B = Motorized Damper
J = Power Vent with Motorized Damper

• — Special Options
G = Hot Gas Reheat/Dehumidification

III — Configuration: III = GeoScholar III

GEOSCHOLAR III HEAT PUMPS WITH 1-STAGE COMPRESSOR PERFORMANCE

Summary Performance

Based upon ISO Std. 13256-1-98.
Cooling: 80°F DB/67°F WB Indoor Air, 77°F Entering Water Temperature
Heating: 70°F DB Entering Air, 55°F Entering Water

MODEL	VWIA24HP	VWIA30HP	VWIA36HP	VWIA40HP	VWIA48HP	VWIA60HP
ARI Capacity, Cooling (Btu/Hr)	24,000	28,000	34,600	40,000	48,000	59,000
ARI Efficiency, Cooling (EER)	14.40	16.80	16.40	17.00	15.30	15.20
ARI Capacity, Heating (Btu/Hr)	17,000	22,000	25,600	29,000	34,000	47,500
ARI Efficiency, Heating (COP)	3.20	3.50	3.30	3.70	3.30	3.50
ARI Indoor Air Flow (CFM)	900	975	1200	1200	1450	1550
ARI Outdoor Water Flow (GPM)	6.0	7.0	7.8	9.0	9.5	13.0

GEOSCHOLAR III HEAT PUMPS WITH 1-STAGE COMPRESSOR ELEC. CHARACTERISTICS

Electrical Characteristics - Ventilation System Motors - Heat Pumps with 1-Stage Compressor

		EXHAUST AIR MOTOR (EXM)				INTAKE AIR MOTOR (IAM)				WHEEL DRIVE MOTOR			
CONFIGURATION	OPTION	VOLTS	HZ/PH	FLA	HP	VOLTS	HZ/PH	FLA	HP	VOLTS	HZ/PH	FLA	HP
Motorized Damper	**B**	n/a	n/a	n/a	n/a	230	60/1	1.0	0.17	n/a	n/a	n/a	n/a
Manual Damper (std)	**N**	n/a	n/a	n/a	n/a	230	60/1	1.0	0.17	n/a	n/a	n/a	n/a
PowerVent with Motorized Damper	**J**	230	60/1	0.4	0.12	230	60/1	1.0	0.17	n/a	n/a	n/a	n/a
GreenWheel® ERV	**H**	230	60/1	0.4	0.12	230	60/1	1.0	0.17	230	60/1	0.2	0.01

n/a = Not Applicable FLA = Full Load Amps Watts = Power Consumption Hz/Ph = Hertz (Frequency)/Number of Phases

Electrical Characteristics - Compressor, Fan & Blower Motors - Heat Pumps with 1-Stage Compressor

	COMPRESSOR					INDOOR FAN MOTOR					GREENWHEEL® ERV		
BASIC MODEL	VOLTS	HZ/PH	RLA	LRA	MCC	VOLTS	HZ/PH	RPM	FLA	HP	VOLTS	HZ/PH	RLA
VWIA24HPA	208/230	60/1	13.4	60.0	21.0	208/230	60/1	1050	2.8	1/3	208/230	60/1	1.0
VWIA30HPA	208/230	60/1	12.8	64.0	20.0	208/230	60/1	1050	2.8	1/3	208/230	60/1	1.0
VWIS36HPA	208/230	60/1	14.1	77.0	22.0	208/230	60/1	1050	2.8	1/3	208/230	60/1	1.0
VWIA40HPA	208/230	60/1	17.9	112.0	28.0	208/230	60/1	1050	4.3	1/2	208/230	60/1	1.0
VWIA48HPA	208/230	60/1	19.8	117.0	31.0	208/230	60/1	1050	4.3	1/2	208/230	60/1	1.0
VWIA60HPA	208/230	60/1	26.4	134.0	41.2	208/230	60/1	1050	4.3	1/2	208/230	60/1	1.0
VWIA24HPC	208/230	60/3	7.7	55.0	12.1	208/230	60/1	1050	2.8	1/3	208/230	60/1	1.0
VWIA30HPC	208/230	60/3	8.3	61.0	13.0	208/230	60/1	1050	2.8	1/3	208/230	60/1	1.0
VWIS36HPC	208/230	60/3	9.0	88.0	14.0	208/230	60/1	1050	2.8	1/3	208/230	60/1	1.0
VWIA40HPC	208/230	60/3	13.2	88.0	20.6	208/230	60/1	1050	4.3	1/2	208/230	60/1	1.0
VWIA48HPC	208/230	60/3	13.1	83.1	20.5	208/230	60/1	1050	4.3	1/2	208/230	60/1	1.0
VWIA60HPC	208/230	60/3	15.9	111.0	24.9	208/230	60/1	1050	4.3	1/2	208/230	60/1	1.0
VWIA24HPD	460	60/3	4.0	22.4	6.2	208/230	60/1	1050	2.8	1/3	208/230	60/1	1.0
VWIA30HPD	460	60/3	5.1	28.0	8.0	208/230	60/1	1050	2.8	1/3	208/230	60/1	1.0
VWIA36HPD	460	60/3	5.6	38.0	8.8	208/230	60/1	1050	2.8	1/3	208/230	60/1	1.0
VWIA40HPD	460	60/3	6.0	44.0	9.3	208/230	60/1	1050	4.3	1/2	208/230	60/1	1.0
VWIA48HPD	460	60/3	6.1	41.0	9.5	208/230	60/1	1050	4.3	1/2	208/230	60/1	1.0
VWIA60HPD	460	60/3	7.7	52.0	12.1	208/230	60/1	1050	4.3	1/2	208/230	60/1	1.0

GEOSCHOLAR III HEAT PUMPS WITH 2-STAGE COMPRESSOR PERFORMANCE

2-STAGE PERFORMANCE INFORMATION TO BE PROVIDED AT A LATER DATE.

Electric Heat Table - Heat Pumps

	HEATER KW			
OUTPUT	5	7.5	10	15
240 VOLT (BTUH)	16,380	24,500	32,670	49,150
208 VOLT (BTUH)	12,290	18,420	24,570	36,860
480 VOLT (BTUH)	17,070	25,600	34,130	51,200

Electric heaters are field installed.

Air Flow, CFM* - Heat Pumps

BASIC MODEL	24	30	36	40	48	60
AIR FLOW (CFM)	800	1000	1200	1300	1550	1650

*Nominal air flow up to .50 IWG.
All ratings are at 230v. for 208-230v. units and 460v. for 460v. units. Operation of units at a voltage different from the rating point will affect performance and air flow.

Shipping Weight (pounds)

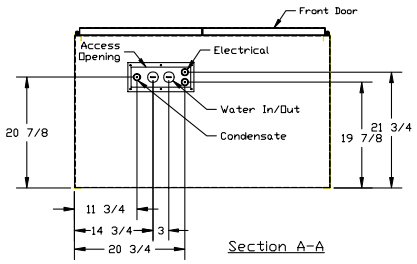
BASIC MODEL	24	30	36	40	48	60
VOLTAGE - 230	1020	1020	1020	1030	1045	1060
VOLTAGE - 460	1045	1045	1045	1055	1070	1085

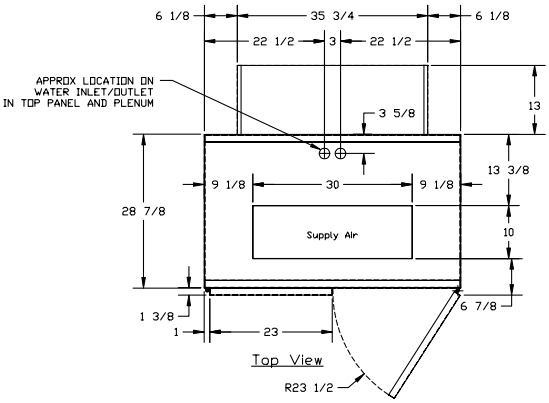
Air Filter Sizes (inches)

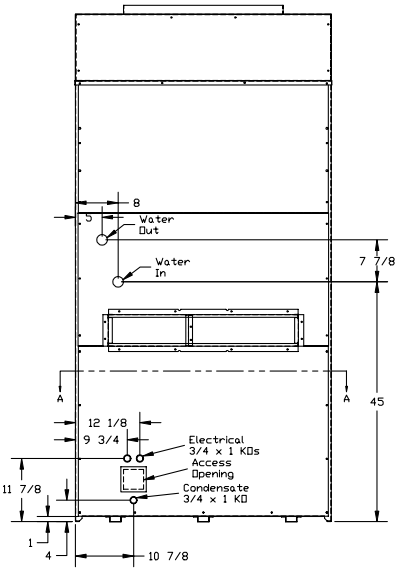
MODEL	RETURN AIR FILTER*	FRESH AIR FILTER	EXHAUST FILTER**
ALL VWIA & VWISA	16” x 24” x 2”	12” x 20” x 1”	12” x 20” x 1”
*Two (2) return air filters are required for each unit. Optional 4” pleated filter. **With GreenWheel® ventilation system.			

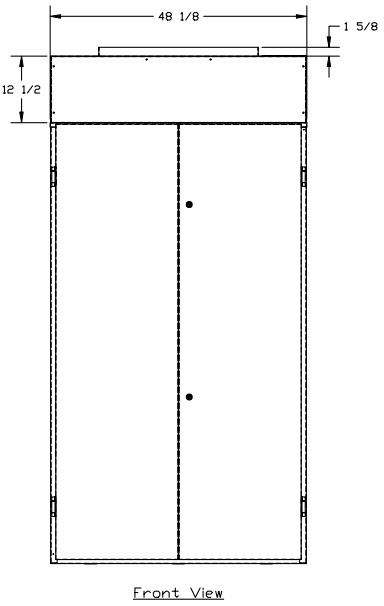
Dimensional Data (in inches)

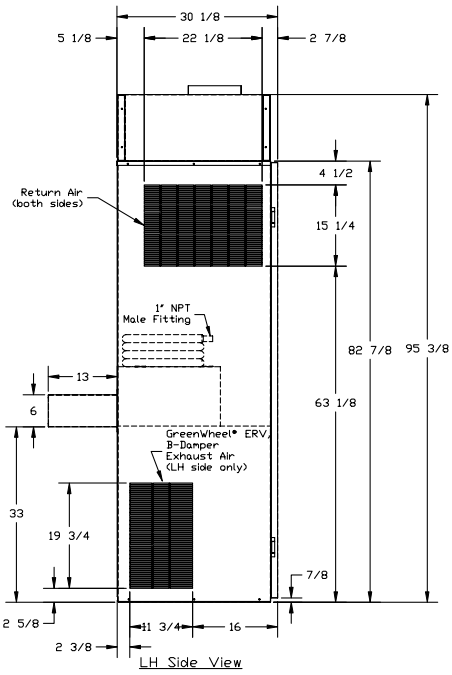
GeoScholar Heat Pump Model VWIA24-60



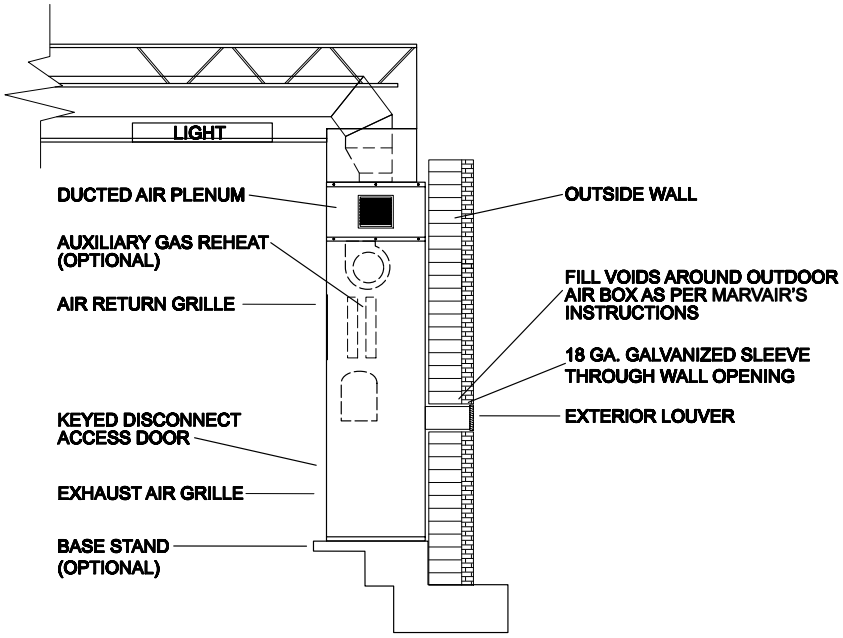




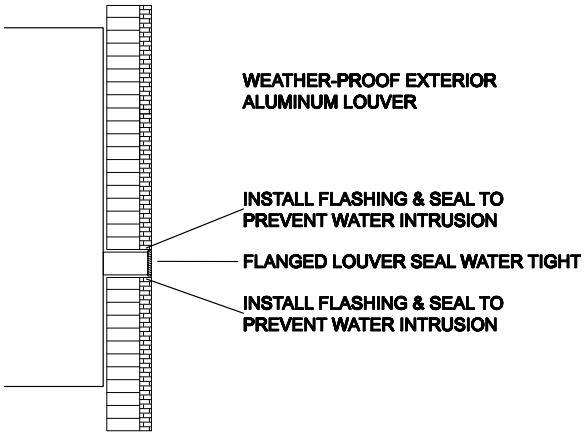




Typical Installation Detail



WALL MOUNTED LOUVER DETAIL



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

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