OMEGA VSHP SERIES

Installation and Operation Manual (IOM)

VERTICAL STACKED
WATER SOURCE HEAT PUMPS

MODEL: VSHP SE / VSHP HE

DEV. G

DOCUMENT RELEASE: OMEGA-VSHP.G-IOM-2103

Supersedes document OMEGA-VSHP.F-IOM-2005

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IMPORTANT

READ THE FOLLOWING MANUAL PRIOR TO INSTALLATION, OPERATION and SERVICING THIS UNIT.

1. GENERAL INFORMATION & WARNINGS

SAFETY SYMBOLS – Warnings, Cautions & Notices

There are three advisory symbols used in this document to alert the reader:

Warning: Indicates a potentially dangerous situation which could result in death or serious injury.

Caution: Indicates a possible hazardous situation which can result in possible injuries or damage to unit and/or environmental pollution, or to alert against practices that are unsafe.

Note: Identifies important information to the technician to complete the installation correctly.

Responsible Refrigerant Practices

All technicians who handle refrigerants must be certified in accordance with local codes for reclaiming, recovering, recycling and handling of refrigerants. Technicians must follow all applicable local and federal laws.

Correct field wiring and grounding is required, failure to adhere and follow code could result in death of serious injury. **ALL FIELD WIRING MUST BE PERFORMED ONLY BY A QUALIFIED ELECTRICIAN**. All wiring must be in accordance of with the manufacturer's specifications.

Wiring that is improperly installed and/or grounded could result in FIRE, ELECTROCUTION, and other serious hazards. Manufacturer is not responsible for damage/ equipment or site issues resulting from the improper connections of the unit or the use of improper controls.

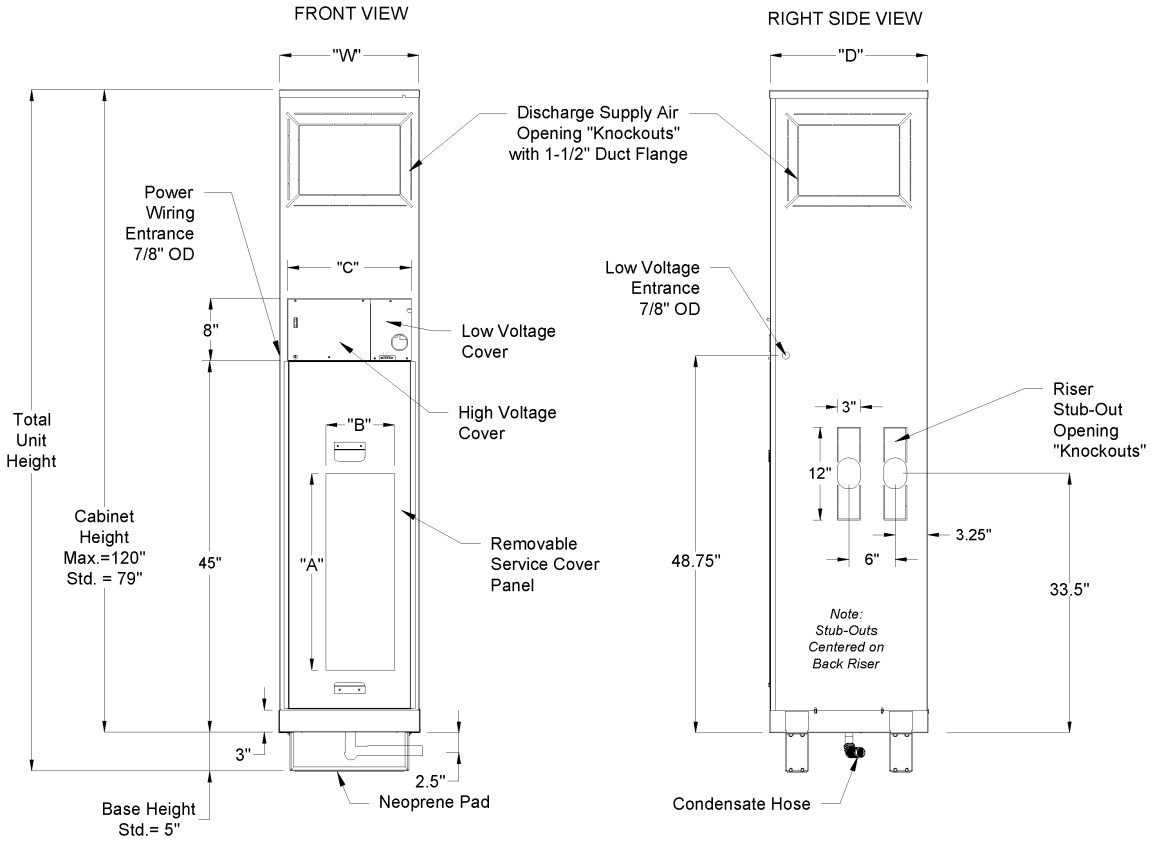
Personal Protective Equipment (PPE) is mandatory. Technicians installing or servicing this unit must use all PPE including but not limited to: hard hats, safety glasses, cut resistant sleeves and gloves, electrical PPE, and fall protection.

Disclaimer

All units are certified and built in accordance to applicable government and industry standards. Any customer modifications performed without the express written approval from the manufacturer are strictly prohibited and will void all warranties expressed or implied.

Modifications to the unit may result in hazardous or unexpected operation of the unit. Modifications to the unit may result in a potentially hazardous situation resulting in equipment damage, property damage, injury or death.

2. CABINET DIMENSIONS



VSHP Cabinet Dimensions (Silver & Gold Series)

Model	Cabinet Size	Dimensions (in)			VSHP Supply Discharge Opening (W X H) inches	
		"W"	"D"	"C"	Horizontal	Top
VSHP 020G	X	16	17.5	14	14 x 8	12 x 12
VSHP 030G					14 x 8	12 x 12
VSHP 040G					14 x 10	12 x 12
VSHP 050G	Y	18	20.5	16	16 x 12	14 x 12
VSHP 060G					16 x 12	14 x 12
VSHP 080G	Z	22	24.5	20	18 x 14	14 x 14
VSHP 100G					18 x 16	16 x 14
VSHP 120G					18 x 16	16 x 16

Notes:

- Temporary riser supports provided (Contractor to remove and install permanent riser clamps fastening risers to the building structure).
- Return air opening is on the front of the unit.
- Discharge opening sizes are customer configurable. Published sizes shown are maximum factory default sizes. Customer to verify discharge opening sizes match design requirements for proper airflow and select appropriate discharge openings at time of order.
- Unit includes hose kits and manual shut off valves.
- Optional risers are furnished with type L, M copper. Available 3 inch deep swage connections on same size piping.
- Contractor to provide couplings where the piping is not swaged or for joining dissimilar piping sizes.

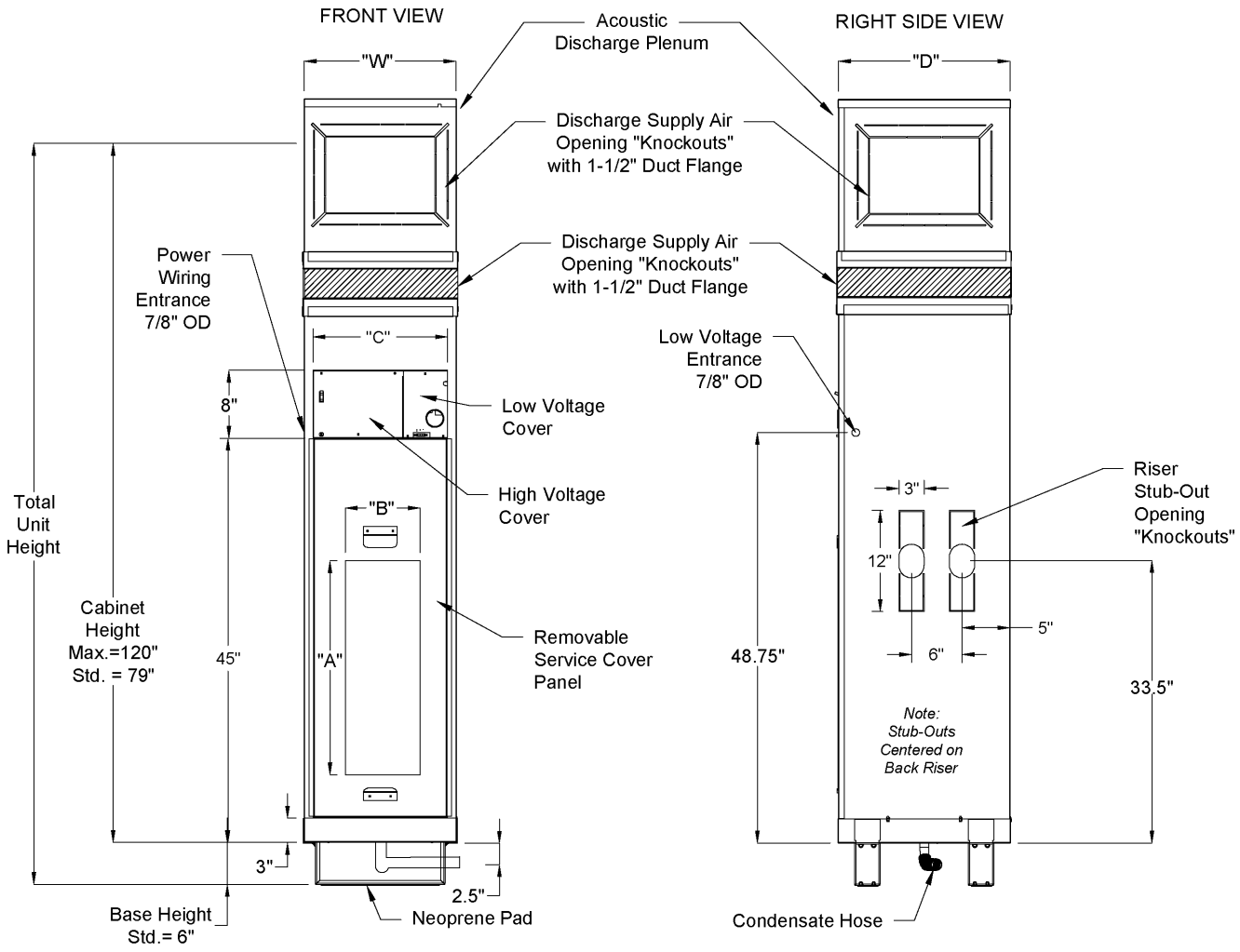


Figure 2 Gold Series w/ Acoustic Plenum Dimensional Drawing

1. Supply, return and condensate risers. Type ‘M’ or ‘L’ copper.
2. Field “knockout” supply air openings (Front/Back/Side/Top) with 1-1/2” duct flange.
3. Electrical box with advanced microprocessor.
4. (Optional) 1.5-inch perimeter flange
5. Removable Blower / Fan assembly
6. Heat pump chassis (VSHY chassis shown)
7. Chassis service cover panel.
8. 1-inch MERV 10 pleated air filter.
9. Return air (R/A) panel available in acoustic or perimeter (Acoustic shown).

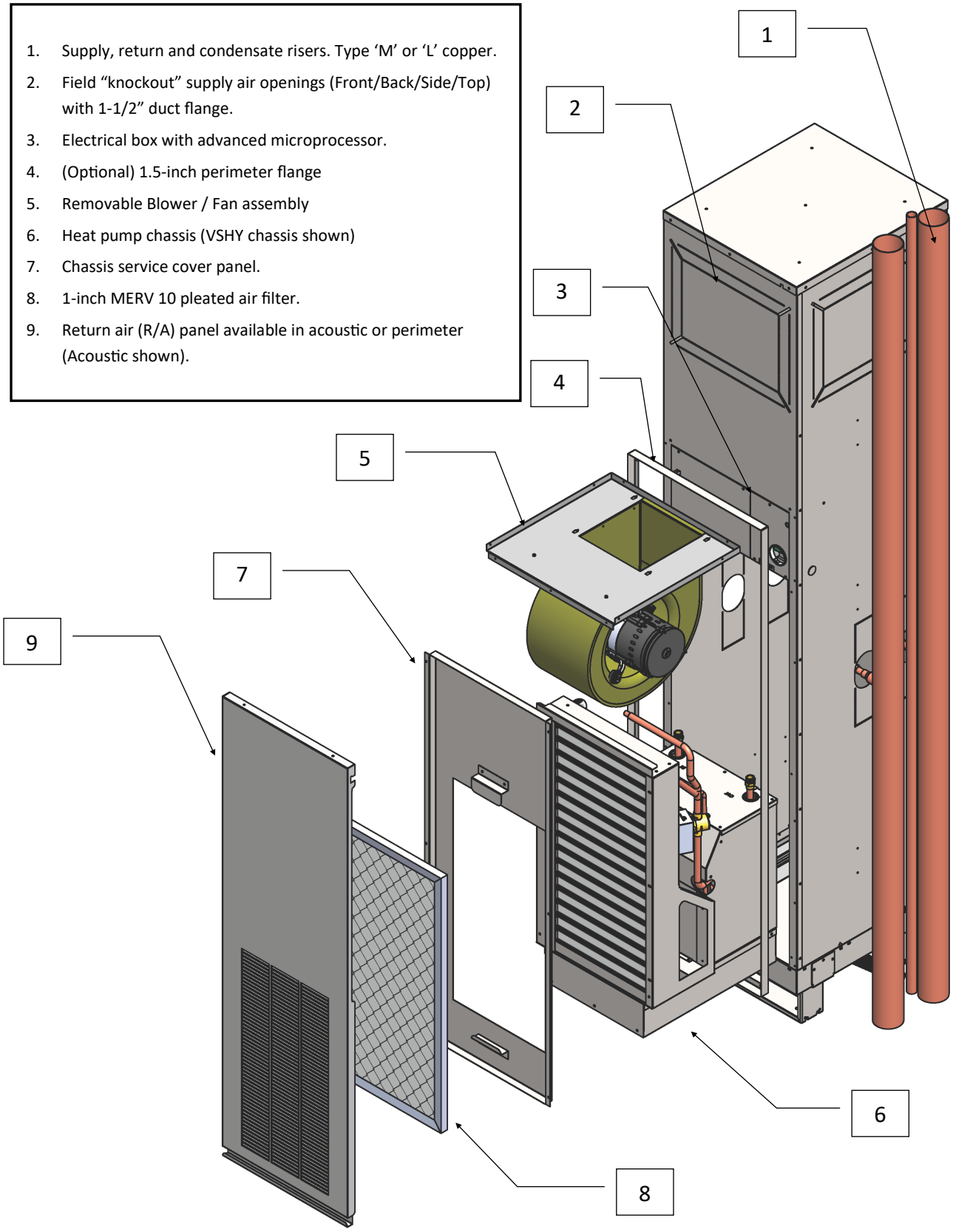


Figure 3 VSHP Assembly View (Silver Series Cabinet)

3. GENERAL UNIT INFORMATION

BLOWER & MOTOR

The unit comes with a blower and motor assembly that is mounted to a blower deck inside the unit cabinet, located above the chassis behind the electrical box. Removal of the blower/motor assembly is done through the chassis compartment opening.

UNIT NAMEPLATES

The nameplate contains information about the unit including model and serial numbers, electrical data and refrigerant charge information. The cabinet nameplate is located on the surface of the cabinet and the chassis nameplate is located on the chassis. Collecting the information on the nameplate will be useful when contacting your local customer service representative or when ordering parts. **Size wiring and circuit breakers to nameplate rating identified on the unit.**

CONTROLS

The unit comes with a factory supplied transformer. See wiring diagram for field wiring a thermostat to the electrical box low voltage terminals. High voltage connection is made on the left side of the cabinet and low voltage connections enter through the right side of the cabinet.

MICROPROCESSOR CONTROLLER

Unit comes with a microprocessor controller that monitors the entire function of the unit. The microprocessor board comes with an integral terminal strip for wiring thermostat cable.

REFRIGERANT CONNECTIONS

Low and high pressure side refrigeration service ports re located inside the compressor enclosure. Slide out chassis and remove sheet metal enclosure to access fittings.

CABINET– SILVER SERIES

The standard Silver series cabinet is a fully factory assembled one piece cabinet. See Figure 1. Use flexible duct connections for connecting cabinet to supply ducts to prevent vibration and noise transmission into occupant space. Discharge openings should be sized to meet site design conditions. Factory default sizes shown are maximum allowable size.

CABINET– OPTIONAL GOLD SERIES

The optional Gold series cabinet comes in two sections for isolating fan cabinet from ductwork. See Figure 2. The upper section discharge plenum is lined with 1” thick insulation on all inside surfaces. Plenum is secured to cabinet with shipping brackets. Once discharge plenum is fastened to the underside of the concrete slab shipping brackets must be removed. See Figure 4 for comparison of Silver and Gold series cabinet install. Factory installed flexible connection joins the upper and lower sections. “S” and “D” cleats are used to join upper and lower plenums to the metal portion of the flex connection. The plenum comes with factory pre-punched knockouts on all sides. Discharge openings should be sized to meet site design conditions. Factory default sizes shown are maximum allowable size.

RETURN AIR PANEL—ACOUSTIC & PERIMETER

The **Acoustic Return Air Panel** is insulated with 1/2” thick, acoustic insulation and removable without tools to allow access to the filter, service disconnect switch, all electrical controls and chassis. The panel is removed by swinging out and lifting it off the support pegs. The panel should be flush mounted to the drywall as per installation guidelines.

The **Perimeter Return Air Panel** door is a hinged door panel mounted in the drywall opening and fastened to the wall studs.

Cabinet base height and maximum baseboard height dimensions can be determined by referencing the Return Air Panel Installation sections. Use appropriate example based on Return Air Panel type ordered.

THERMOSTAT

Unless ordered otherwise, unit comes with a factory provided 24-inch long, 6-wire thermostat cable whip prewired to the control board terminal blocks. A minimum 4-wire thermostat cable is required for use with basic thermostats that do not require a ‘Common’ wire.

4. INSPECTION & STORAGE

INSPECTION OF UNIT

Prior to the installation of the unit perform the following checks:

- Visually inspect the packaging, cabinet and chassis for signs of shipping damage prior to signing the bill of lading. Check that the units match the sales order by referring to the cabinet labels, and chassis nameplate information.
- Inspect the riser ends and stub-outs for any sign of damage.
- Verify breaker and power supply meet electrical nameplate requirements of the unit.
- Check that the nameplate of the units matches the floor plan layout.

When construction is not complete including concrete core drilling, drywalling, plastering, painting or any work that would contaminate the storage space all necessary precautions are to be taken to prevent the cabinet and

chassis from becoming contaminated. Particulate infiltration (i.e. drywall dust) into cabinet and chassis coil could result in equipment damage. Fumes could result in premature corrosion (formicary corrosion) of the chassis air-coil resulting in refrigeration system leaks.

STORAGE

Both cabinet and chassis units are designed for indoor use only. Care must be taken to protect the unit from environmental damage. Store the chassis in an environment with a temperature above (32°F). To prevent contamination the units should be stored indoors. For temporary outdoor storage ensure:

- Units should be placed in an area that will not be exposed to any moisture. Units should be placed on a dry and raised surface. Do not stack units.
- Cover the units with a waterproof tarp.
- Failure to keep the units dry could result in the interior insulation becoming wet and cause the growth of mold which is known to cause odors and serious indoor air quality problems and health issues.
- Chassis units must be stored in the upright position to keep oil in the compressor.
- Riser ends should be capped if being stored on site to prevent contamination from foreign objects and debris.

Wet insulation can cause the growth of mold. Any sign of mold growth in the interior insulation should be removed, cabinet interior disinfected with anti-microbial cleaner and replaced prior to operating the unit.

Do not store cabinets on their side when chassis units are inside. Chassis units should always be stored and transported in the upright position otherwise damage to chassis may occur.

The refrigeration system of these units contains POE oil. PVC/CPVC piping is prone to failure when in contact with POE oil. PVC/CPVC piping should not be used for water supply, return or condensate risers with any heat pump products as this may result in failure of the system and serious property damage.

<u>Do not rest or lean the unit on the risers.</u> Do not use the risers or stub-outs to pick up the unit. Only designated lift points should be used when moving or lifting cabinets. Do not drop the risers.

5. CABINET & RISER INSTALLATION

Risers are designed to have slight adjustments for riser system expansion and aligning the stub-outs in the cabinet opening. When installing risers, do not let riser stubs bottom out in the riser swage.

Risers are designed to allow for 1-1/2 inches of movement due expansion and contraction. If the total calculated riser expansion exceeds ±1 -1/2 inches the field must provide expansion compensators.

Riser stub-outs should be located as centrally as possible in the cabinet opening. Do not allow stub-outs to rest or contact the sheet metal opening.

Do not allow the risers to bottom out when installing into the swage.

FOR SHIPPED LOOSE RISER SHUT-OFF VALVES

Visually inspect riser stub-outs and shut-off valves for debris or damage.

Follow industry standard soldering practices when soldering shut-off valves to riser stub-outs.

Ensure riser stub-out surface is cleaned of any residue, soot or oils. Failure to adequately clean soldering surfaces can result in water leaks, property damage and physical injury.

When soldering shut-off valves to riser stub outs, adequately protect cabinet, insulation and any other equipment from exposure to flames and heat.

CABINET INSTALL

1) When cabinets are shipped with risers attached, place cabinets in a horizontal position on the floor (do not rest cabinet on the risers).

2) If required, install any field or factory supplied riser extensions to the unit mounted risers.

3) Raise the entire cabinet slowly upright while at the same time lowering the risers through the floor cut-out

opening. Align the risers to the matching swaged section of the riser on the floor below.

4) Swaged sections are approximately 3 inches deep. Risers should be inserted at a depth of approximately 2 inches into the 3 inch deep swage. Confirm risers penetrate at a minimum of 1 inch into the swage. Do not allow the riser tailpiece to bottom out fully into the 3 inch deep swage. This will allow for floor to floor variations, otherwise riser overlap may not be sufficient on upper floors. See Figure 6.

5) Align and center riser positions in the pipe chase and level cabinet as necessary.

6) Secure the cabinet to the floor. Cabinet base comes with factory mounted neoprene pads.

7) Center the riser stub-outs in the cabinet openings to allow for riser expansion and prevent contact with cabinet sheet metal. Prevent riser stub-outs from contacting sheet metal pass through otherwise damage to stub-outs may occur, resulting in serious water damage. See Figures 7 & 8.

8) Secure risers to building structure as per engineering design specifications. Do not allow the risers to be supported by the cabinets. Field supplied riser compensators are required if the temperature range of the system exceeds the expansion and contraction limit.

9) Using industry accepted soldering and brazing standards and materials to solder or braze the riser joints.

10) Connect supply ducts and discharge grilles.

11) Connect to optional Fresh Outside Air Duct (Snorkel) when connecting to remote ERV.

RISER LOOP

Do not connect chassis to the water circulating system when flushing is being conducted to prevent debris and fouling of the water side components of the chassis (i.e. auto balancing valve, auto shut-off valve, coaxial coil).

Do not flush and clean riser system with chassis units connected. Do not allow the flushing and cleansing solutions to flow in the chassis water coil. Damage to water components may occur.

Do not let untreated, standing and/or stagnant water sit inside chassis. Connect chassis water connections by opening isolation valves only when riser system is treated and flowing.

Servicing

To enable system flushing, servicing and balancing of supply and return risers the following field supplied components are required: shut-off valves, drain tees and drain valves, and flow measuring devices. Refer to the job site engineering design specifications and building drawings for more detailed information.

Flushing & Cleaning

Once the riser system is complete the riser system must be cleaned and flushed, refilled and chemically treated with industry accepted inhibitors. Untreated riser loop water will result in premature wear and potential failure of system components due to water coil leaks inside chassis. Filters must be installed in riser loop system and checked, cleaned as per regular maintenance schedule.

Supply and return pipes must be interconnected, at a minimum in the top and bottom units of each riser, with factory supplied hoses to properly flush system and ensure adequate elimination of foreign material and cleaning of riser system.

1) Use only clean water to fill water circulation system. Fill the water circulating system at the municipal water makeup connection with all air vents opened.

2) After air vents have been sequentially closed and riser system is primed begin water circulation of the system to purge remaining trapped air bubbles.

3) Shut off the circulating pump and open all the drains and vents to completely drain the system.

4) The riser system should be cleaned after the initial flush and flushed a second time to adequately rinse the riser system of cleaning solution.

5) Riser system is then re-filled with clean city water and chemically treated to inhibit corrosion, oxidization and fouling of the riser loop system. Do not use untreated water to run heat pump chassis units.

Chassis installation is permitted once the riser system is thoroughly flushed, cleaned, and commissioned by the riser treatment company and contractor.

RISER SYSTEM LOOP TEMPERATURE

Correct riser system loop temperature settings are important for optimal unit operation. Temperatures outside of the recommended range will affect overall unit operating performance (capacity and efficiency), long term reliability and sound performance.

Cooling Season

In cooling mode recommended riser loop temperatures should be maintained between 85°F to 90°F. Higher riser loop temperatures reduce unit cooling capacity and efficiency and may increase sound levels. Lower riser loop

temperatures will increase unit operating efficiency.

Operation of riser loop temperatures above 110°F EWT is not permitted. If loop temperatures are close to maximum permissible levels, riser loop can experience water temperature spikes above recommended during peak demand loads. Refer to 'Unit Operation Limits".

Heating Season

In heating mode riser loop temperatures must be maintained within 55°F to 90°F for standard range operation. For Low Temperature Water (LTW) operation, riser loop temperature are permitted down to 45°F with water only risers systems. In Geothermal Range operation the system loop must contain an appropriate glycol mixture to protect the system from freezing the water circuit. For Geothermal operation units must come with factory Geothermal Range option. Do not operate riser system below 20°F EWT due to reduced heating capacity and efficiency. See Table 2.

Operating Limits

Air Limits	Cooling		Heating
	DB	WB	DB
Std. Entering Air Temperature (EAT)	75°F	63°F	68°F
Min. Entering Air Temperature (EAT)	65°F	55°F	50°F
Max. Entering Air Temperature (EAT)	85°F	71°F	80°F

Fluid Limits	Standard Range		Low Temp Water Range		Geothermal Range	
	Cooling	Heating	Cooling	Heating	Cooling	Heating
Std. Entering Fluid Temperature (EFT)	85°F	70°F	85°F	55°F	85°F	60°F
Min. Entering Fluid Temperature (EFT)	50°F	55°F	50°F	45°F	30°F	20°F
Max. Entering Fluid Temperature (EFT)	110°F	90°F	110°F	90°F	110°F	90°F

CFM Limits	
Min. CFM/Ton	300
Design CFM/Ton	400
Max. CFM/Ton	450

Fluid GPM Limits	
Min. GPM/Ton	1.5
Design GPM/Ton	3
Max. GPM/Ton	4

Table 2: Unit Operation Limits

Design limits can not be combined. Combining maximum or minimum limits is not allowed. This could exceed the operation and design limits of the unit.

For example: It is not allowed to combine maximum entering air temperature (EAT) limits with maximum entering fluid temperature (EFT) limits.

6. CHASSIS INSTALLATION

Do not apply plumbers putty, pipe dope or sealing tape to NPSM water fittings.

Always use a back-up wrench when tightening hoses or fittings. Damage to copper pipes and solder joints could result in serious equipment and property damage.

Check hoses and fittings for any visible damage or debris.

INSTALLATION OF FITTINGS AND HOSES

Upon removal of service cover panel check cabinet interior for construction debris and dust. Clean out all dust and debris.

Close riser shut-off valves and disconnect factory hoses from riser supply or return shut off valves.

Units with NPSM Riser and Chassis Fittings

Connect the supplied hoses to the Male-NPSM riser shut-off valves. Do not apply pipe dope or pipe sealant to NPSM fittings. **Always use a back-up wrench**. **Finger tighten hose and tighten with back-up wrench approximately 1/6 turn. DO NOT OVERTIGHTEN**.

Units with NPT Riser and Chassis Fittings

Connect the supplied male-male (NPT/ NPSM) couplings to the Female-NPT supply and return riser shut-off valves.

Do not apply pipe dope to the NPSM fittings, as these are flare style fittings.

Connect the supplied hoses to the riser shut-off valves. **Always use a back-up wrench**. **DO NOT OVERTIGHTEN**.

CHASSIS INSTALL

1. Remove chassis packaging, leaving cardboard shipping cover on the air coil cover in place. Check chassis nameplate to verify chassis model matches cabinet model for compatibility.

2. Align chassis with front of the cabinet and tilt chassis so that the back aligns with the cabinet rails.

3. Slide chassis into cabinet partially. Check to ensure wiring harnesses are not being pinched. Adjust the chassis to ensure it is resting approximately centered in the rails.

4. Connect the hoses by hand to the chassis supply and return connections. Hand tighten, then using a back-up wrench tighten fittings as necessary. Ensure that the hose supply and return connections are not reversed and matched to correct risers. Water IN and water OUT is stamped on the chassis sheet metal enclosure.

5. If riser loop system has been commissioned and operational open the riser shut-off valves. Check for any signs of water leaks at all water connection points.

6. Connect the chassis electrical plugs to the quick connect mating plugs in the cabinet electrical box.

7. Slide the chassis into the cabinet. Check to ensure wiring harnesses and hoses are not being pinched. Do not push against the air coil surface.

8. Ensure hoses are not pressed against unit cabinet.

9. Remove cardboard shipping cover from the air coil.

10. Install the service cover panel and visually check foam gasket around service cover panel perimeter is not damaged and providing an adequate seal.

11. Insert filter into service cover panel.

12. Install Return Air Panel into the closet drywall opening if not already done and secure with screws.

7. UNIT START-UP

Ensure the building loop system has been cleaned, flushed, chemically treated and commissioned by the water treatment company. Verify that the main system strainers or mechanical filtration system has been installed and commissioned. The chassis should be at room temperature (68°F) prior to start up.

Once the installation of the cabinet and chassis units is complete the riser shut-off valves can be opened. The riser loop system should be filled and all trapped air should be bled from the system prior to unit start-up. Water flow failure will cause the unit to trip on the safety devices. Repeated water flow failures can cause equipment damage.

CHECKLIST

Before energizing the unit ensure all steps are verified in the following checklist:

___High voltage power supply is correct and in accordance with unit nameplate ratings.

___Unit is electrically grounded and circuit protection is the correct size.

___Low voltage control wiring is per unit wiring diagram.

___Riser loop system is clean, filled, and vented of air.

___Chassis unit high and low pressure caps are firmly secure and in place.

___Chassis matches the cabinet model number.

___Protective cardboard coil cover is removed and unit service cover panel and a clean air filter are in place.

___There is a proper seal between chassis service cover panel and unit cabinet.

___Riser shut-off valves are in the OPEN position.

___Riser loop water is circulating through all units and at design conditions.

___Unit condensate drain hose is securely attached to drain pan and condensate riser.

___Indoor unit blower spins freely.

___All ductwork is complete.

___All cutting, sanding, drywalling, patching work is complete.

___Thermostat is in the OFF position.

INITIAL UNIT START-UP

1. Close disconnect switch.
2. Set thermostat to a high setting (above current room temperature), set system to COOL with fan on AUTO. The compressor should not run.
3. Lower the thermostat temperature setting until the fan and compressor energize. Verify the following results:

- Leaving water temperature (LWT) in the heat exchanger water coil is warmer than the entering water temperature (EWT) by approximately 9°F—12°F.
- Blower is running smoothly.
- Compressor and blower amps are within nameplate data.
- Suction line is cool and no frosting is forming in the refrigeration circuit.

4. Set thermostat to the OFF position. Unit compressor and fan should stop running.
5. Allow the system to equalize for approximately 5 minutes.
6. Set thermostat to the lowest setting and switch to the HEAT position.
7. Adjust thermostat temperature higher until the fan and compressor energize. The following should occur:

- Warm air will flow from the supply register.
- Leaving water temperature (LWT) in the heat exchanger water coil is cooler than the entering water temperature (EWT) by approximately 5°F—9°F.
- Blower and compressor operation is smooth and no frost development is visible in the refrigeration circuit.

8. Set the thermostat to the desired temperature.
9. Check for any water leaks at the hose connections.

8. CONTROLS

MICROPROCESSOR CONTROLLER

DIP Switch Settings

Controller DIP switch contains 6 switches for setting up thermostat, Fan, and system settings. Microprocessor DIP settings are factory set. Make changes if warranted by site conditions. Below are the 6 settings:

DIP	DESCRIPTION	OFF	ON
1	Tstat Type	Heat/Cool Tstat	HeatPump Tstat
2	HP Type	Hybrid HP	Std Heat Pump
3	FlowType	Variable Flow	Constant Flow
4	Coax Valve	Coax Valve NO	Coax Valve NC
5	Reversing Valve (RV)/ HeatCoil	HeatCoil Valve NO	Heat Coil Valve NC
		RV Energized to Heat	RV Energized to Cool
6	FanMode	Fan Manual	Fan Auto

NO = Normally Open and NC = Normall Closed

Table 3: DIP Switch Settings

Heat Pump Thermostat

When using Heat Pump Thermostat (recommended setting) set DIP #1 to the “ON” position. See table below for connecting thermostat to unit terminal blocks:

Table 4: Heat Pump Thermostat Connections

DIP 1 (ON) = HeatPump Thermostat

TERMINAL BLOCK	WIRE	DESCRIPTION
TB1 #4	R	24VAC – Line (R)
TB1 #3	G1	Fan Speed 1 - Low Speed
TB1 #2	G2	Fan Speed 2 - Medium Speed
TB1 #1	G3	Fan Speed 3 - High Speed
TB2 #3	Y	Call for Compressor
TB2 #2	O/B	Call for Reversing Valve
TB2 #1	C	Common (Optional)

When setting thermostat to HEAT PUMP mode check the following:

“G” Terminal Close (24V) = call for fan

“Y” Terminal Closed (24V) = call for compressor

Heating Mode: “O/B” Terminal Open (0V) = Reversing Valve De-Energized

Cooling Mode: “O/B” Terminal Closed (24V) = Reversing Valve Energized

Heat/Cool Thermostat - Requires Power to G (Fan)

Ensure thermostat provides 24V power to G (fan) terminal during call for heating or cooling. When using HEAT/COOL thermostat set DIP #1 set to the “OFF” position. See table below for connecting thermostat to unit terminal blocks:

Table 5: Heat/Cool Thermostat Connections

DIP 1 (OFF) = HEAT/COOL Thermostat

TERMINAL BLOCK	WIRE	DESCRIPTION
TB1-4	R	24VAC – Line – (R)
TB1-3	G1	Fan Speed 1 - Low Speed
TB1-2	G2	Fan Speed 2 - Medium Speed
TB1-1	G3	Fan Speed 3 - High Speed
TB2-3	Y	Call for Cooling
TB2-2	O/B	Call for Heating
TB2-1	C	Common (Optional)

Fan Control with EC Motors (ECM)

PULSE WIDTH MODULATED (PWM) signal is utilized to control motor speed between 0 and 100% of full speed. The controller has been programmed to use 3 pre-programmed speeds for Low, Medium and High. With optional Whisper Mode when there is a no request for cooling or heating, unit will operate in ‘Whisper Mode’ for ultra low fan speed air circulation.

Thermostat Cable

Units come with a 24 inch long standard 6-wire thermostat cable pigtail factory wired to the control board terminal blocks. A minimum 4-wire thermostat cable is required for single fan speed thermostats where common wire is not required.

Ensure thermostat provides 24V power to G (fan) terminal during call for heating or cooling.

Fan Speed Set by Thermostat

Wire thermostat wire to required fan speed terminal and set DIP Switch #6 on the board to (ON) Auto. Fan speed will be determined by wiring to the G1,G2, or G3 terminals:

G1 Signal = LOW fan speed enabled.

G2 Signal = MEDIUM fan speed enabled.

G3 Signal = HIGH fan speed enabled.

Manual Fan Speed Control - 3-Speed Selector Switch

Enable the unit mounted 3-speed selector switch by setting DIP Switch #6 to OFF (Manual). Run fan wire from thermostat to any of the G1, G2, G3 terminals. Fan speed will be determined by the position of the unit mounted 3-speed fan selector switch:

L = LOW fan speed

M = MEDIUM fan speed

H = HIGH fan speed

(not available with Whisper Mode)

Optional Whisper Mode - Fan Speed Set by Thermostat

With optional Whisper Mode DIP Switch #6 is set to (ON) Auto. During a call for heating or cooling, fan speed will be determined by the thermostat fan wiring to the G2 or G3 terminals:

G1 Signal = Whisper Mode Only

G2 Signal = MEDIUM fan speed enabled.

G3 Signal = HIGH fan speed enabled.

SEQUENCE OF OPERATION

Call for Heating and Cooling

When a compressor request is made, the optional motorized auto shut-off control valve will open. The compressor contactor will then be energized so long as none of the following fault conditions are present:

- High-Pressure Alarm
- Low-Pressure Alarm
- Condensate Over Flow Alarm
- Compressor Anti-Short Cycle 7 min. timer has not expired
- Entering Water Temperature is greater than 115°F
- Leaving Water Temperature greater than 127°F

When call for compressor request is terminated, the optional motorized auto shut-off control valve and the blower fan will remain open for an additional 3 minutes.

Low-Pressure Bypass

During a call for compressor, the low-pressure switch is bypassed for the first 2 minutes of compressor operation to prevent nuisance low-pressure start-ups.

Timers and Interlocks

Microprocessor board utilizes a number of timers and interlocks in the control sequence of the unit.

Anti-Short Cycle Timer

The compressor anti-short cycle timer of 7 minutes starts every time a call for compressor is terminated to prevent compressor over cycling.

Fan-On Timer

The Fan-On timer of 3 minutes starts anytime there is a call for fan request.

Fan-Off Timer

The Fan-Off timer of 3 minutes starts anytime a call for compressor is terminated to ensure fan runs for a period of 3 minutes after the compressor turns off.

Valve Open Timer

The valve open timer of 1 minutes starts anytime a fan and compressor request are made to develop flow in the water coil.

Valve Closed Timer

The valve closed timer of 1 minutes starts anytime a call for compressor is terminated to allow for flushing of the water coil.

Random Wait Time on Unit Power Up

Microprocessor controller uses a random wait time during unit start up between 1-30 seconds.

9. TROUBLESHOOTING

Refer to the ‘Troubleshooting Guide’ for identifying common issues and possible resolutions. The microprocessor control board has a number of LED lights for simple identification of common alarms and faults. Refer to ’LED Code Table Guide’.

TEST MODE

A Test mode feature can be enabled in order to perform diagnostic testing of the unit.

To enable test mode temporarily jumper “DI1” pins on the microprocessor board. The unit will operate in test mode.

Unit status and diagnostics temperature (Supply Air, Entering Water, Leaving Water and Suction Temperature) readings can be easily accessed using the Web Browser based tool as described in the following ‘Web Browser Access’ section.

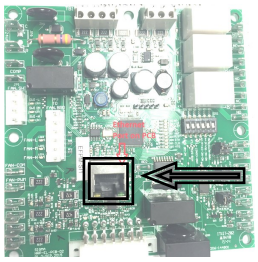
WEB BROWSER ACCESS

The Omega controller features a webpage configuration and troubleshooting tool. The imbedded webpage is accessed by connecting to the control board, no internet connection required. There are two ways to connect: using a mini-wireless router or directly to a laptop. Wireless router is the preferred method for fewer configuration steps and works with Tablets or smartphones.

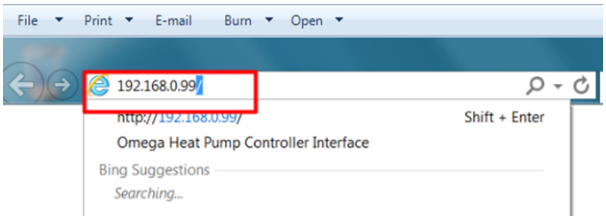
Wireless Router Method

1. To connect to the controller you will need the following: Ethernet cable, Laptop/Tablet, and wireless router (e.g. TP Link TL-WR802N, shown below). Configure routers as per manufacturer instructions. Setup as Access point with Static IP (leave IP address blank).

2. Remove electrical box access panel and connect router via ethernet cable directly into surface mounted ethernet port (RJ45) on control board.



3. Connect tablet, laptop or phone to WIFI router. Turn off mobile data. Once connected open up your internet browser (i.e. Internet Explorer, Google Chrome) and type in the following address **192.168.0.99**

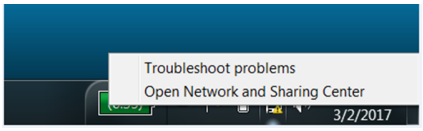


Direct to Laptop Method

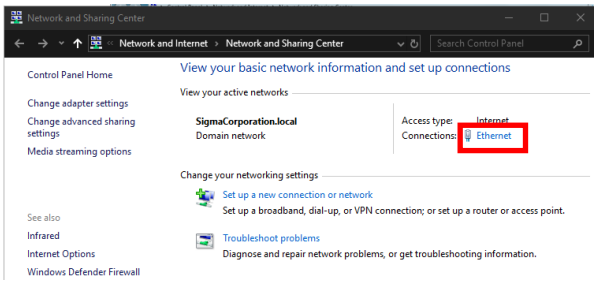
1. To connect to the controller with a laptop you will need the following: Ethernet cable & Laptop.

2. Remove electrical box access panel and connect ethernet cable directly into surface mounted ethernet port (RJ45) on control board.

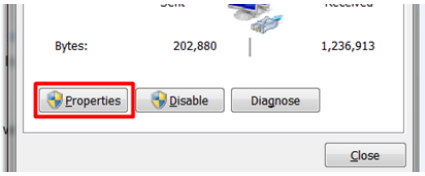
3. On laptop access “Network and Sharing Center“ though the “Network & Internet Settings” icon located in the bottom right taskbar.

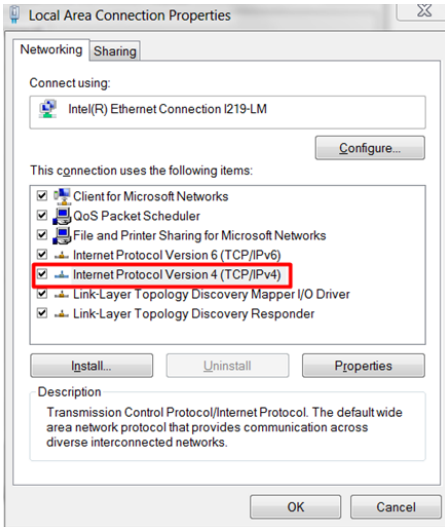


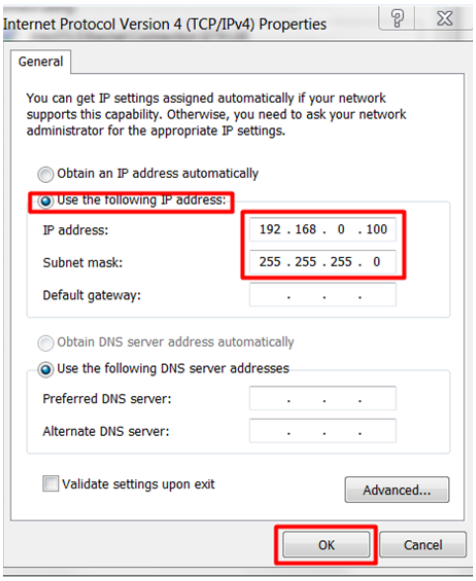
4. In the Network & Sharing Center click on “Ethernet” / “Local Area Connection” as indicated below.



5. Local Area Connection Status will open, click on Properties, then click on “Internet Protocol Version 4 (TCP/IPv4)”, and click on Properties for IPv4.

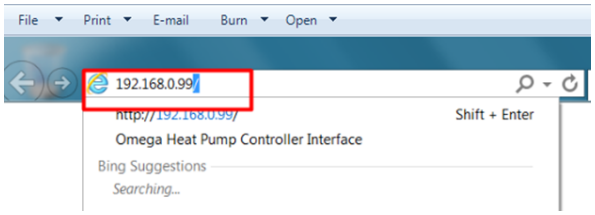






6. With Internet Protocol Version 4 (TCP/IPv4) window open click on “Use the Following IP Address” and change the IP address to 192.168.0.100 and Subnet mask to 255.255.255.0, as shown below. Then click “OK”.

7. Open up your internet browser (i.e. Internet Explorer, Google Chrome) and type in the following address **192.168.0.99**.



8. The following home page will load for the controller software. Below is a screen shot of the interface (version 5.4.1 software is shown).

9. An event log feature called ‘Log Dump’ allows for recording unit operation information during faults or at start -up as a troubleshooting aid. For example in the figure below the first line item indicates “Y” terminal was energized (Y=1) when the Cooling (CLG=1) and tripped on Low Pressure fault (LP=0).

Captured unit controller details include: ‘Y’ ,’O/B’, ‘CPR’ =compressor, ‘RV’= reversing valve, ‘HTG’ = heating, ‘CLG’ = cooling, LP = low pressure, ‘HP’ = high pressure, Fan, Condensate, LPALM = low-pressure alarm, HPALM = high-pressure alarm.

Omega Heat Pump Controller Interface — Software V5.4.0

Settings | LogDump | CSVDump

DIP SWITCHES/GEO JUMPER :

Stat Type	HP Type	Flow Type	Cx Valve	HC-RV Valve	FanMode	GeoJumper
OFF	OFF	OFF	OFF	OFF	ON	CLOSE
H/C Tstat	Hyb HP	Var Flo	NO CxVlv	NO HCVlv	Auto/TstatInp	STDTemp

STATUS LEDS :

HP	LP	WLDT	CO	RST	WLST	STA	CLG	HTG
○	○	○	○	○	○	○	○	●

THERMOSTAT INPUTS/ FAN SWITCH INPUTS :

G1(Fan1)	G2(Fan2)	G3(Fan3)	Y(Cpr/Clg)	O/B (Rv/Htg)		SWLO(Fan1)	SWMD(Fan2)	SWHI(Fan3)
CLS	CLS	OPN	CLS	CLS		OPN	OPN	OPN

FAN OUTPUTS :

FanSpdL	FanSpdM	FanSpdH	FanPWM(%)		Cpr	FvCx Vlv	Rv/Hc Vlv
OFF	ON	OFF	66		OFF	ON	OFF

CHASSIS INPUTS:

HPS	LPS	COS	LvgAir	ReFrgSuction	WaterLoopSupply	WaterLoopDischarge
CLS	CLS	1	73.6	68.2	69.7	69.8

GENERAL I/O :

AI1(A/D)	AI2(A/D)	DI1	DI2	DO_ALARM	DO1	DO2
1023.0	381.0	CLS	OPN	NRM/OPN	OFF	OFF

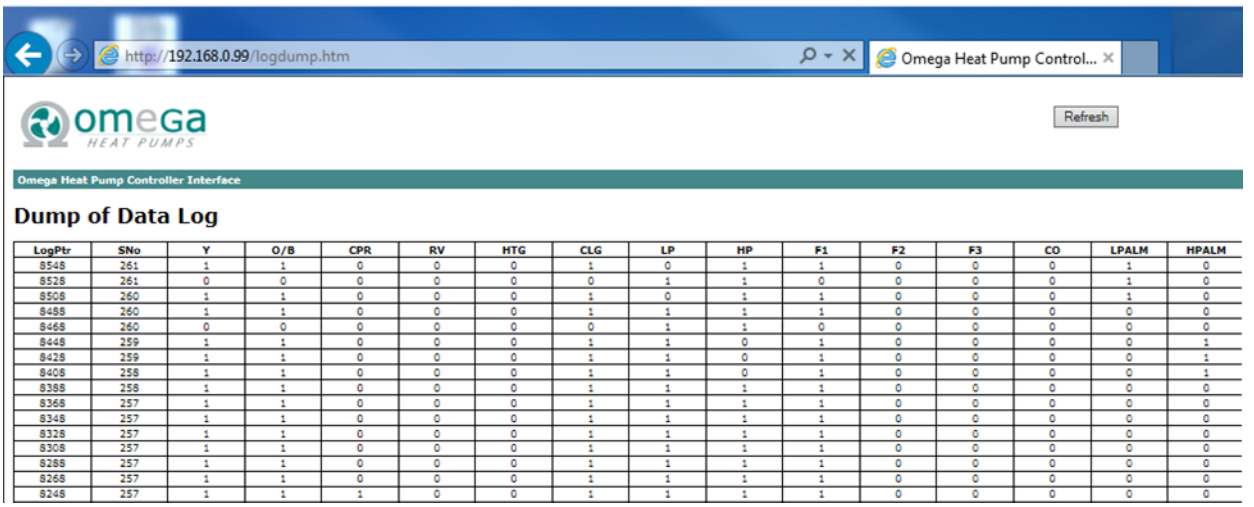
COMPRESSOR CALL LOGIC:

	CPR Relay	CPR Call	ARTimer Exp	HP Alarm	HP OK2Run	LP Alarm	LP OK2Run	COS Alarm	COS OK2Run	WLST Safe	WLDT Safe	FanRequest	Fan On Timer	Vlv Opn Timer
Value:	OFF	FALSE	Expired	NRM	NO	NRM	NO	NRM	NO	ALM	ALM	TRUE	Expired	0/10
Special Mode:	-													

CONTROLLER STATES :

	HPS : Alarm on OPEN	LPS : ALARM on OPEN > 5 sec	COS : ALARM on OPEN (COS over 500 for 5 sec)
Raw Input	CLS	CLS	1
Timing	-	0/5	0/5
Safety Value	NRM	NRM	NRM
State	0	0	0
Time Delay	-	0/20	-
ASCD Delay	Expired	Expired	Expired
LockOut Value	0	0	0
RunTimer(Sec)	0	0	-

NOTE:Compressor permissible enable if HPState=1,6 or 8 and LPState=1,5,8,9,12,or 13 and COSState=3 and 5



LogPtr	SNo	Y	O/B	CPR	RV	HTG	CLG	LP	HP	F1	F2	F3	CO	LPALM	HPALM
8548	261	1	1	0	0	0	1	0	1	1	0	0	0	1	0
8528	261	0	0	0	0	0	0	1	1	0	0	0	0	1	0
8508	260	1	1	0	0	0	1	0	1	1	0	0	0	1	0
8488	260	1	1	0	0	0	1	1	1	1	0	0	0	0	0
8468	260	0	0	0	0	0	0	1	1	0	0	0	0	0	0
8448	259	1	1	0	0	0	1	1	0	1	0	0	0	0	1
8428	259	1	1	0	0	0	1	1	0	1	0	0	0	0	1
8408	258	1	1	0	0	0	1	1	0	1	0	0	0	0	1
8388	258	1	1	0	0	0	1	1	1	1	0	0	0	0	0
8368	257	1	1	0	0	0	1	1	1	1	0	0	0	0	0
8348	257	1	1	0	0	0	1	1	1	1	0	0	0	0	0
8328	257	1	1	0	0	0	1	1	1	1	0	0	0	0	0
8308	257	1	1	0	0	0	1	1	1	1	0	0	0	0	0
8288	257	1	1	0	0	0	1	1	1	1	0	0	0	0	0
8268	257	1	1	0	0	0	1	1	1	1	0	0	0	0	0
8248	257	1	1	1	0	0	1	1	1	1	0	0	0	0	0

10. MAINTENANCE GUIDE

Proper unit maintenance will result in optimal unit performance and prevent potentially costly repairs or property damage. Turn unit disconnect switch to off and turn unit off at circuit breaker/fuse panel before starting maintenance procedure.

Do not operate unit without filters or during any temporary construction that could clog the air filter or air coil.

Do not use any cleaning solutions that contain acids on the air-refrigerant coil or any refrigerant components.

30 DAY MAINTENANCE

1. Visually inspect filter monthly for dirt and clogging. Replace as required with a quality filter.
2. Vacuum dust from unit air grilles and surrounding coil area with soft bristle brush attachment as required.
3. Every month visually inspect unit for any signs of water leaks, or water damage around floor or surrounding drywall.

3 MONTH MAINTENANCE

1. Inspect condensate drain every 3 months for signs of stagnant water, microbial growth, and mineral buildup. Clean drain pan with an appropriate cleaning solution as required to prevent condensate hose blockages and microbial growth.
2. Check valves and hoses for signs of leaks, cracking or deterioration.

6 MONTH MAINTENANCE

1. Check condensate flow to ensure adequate drainage and test for signs of impending blockages.
2. Check that condensate alarm is operating correctly. Alarm trips whenever water level rises above sensor threshold and locks unit operation.
3. Visually inspect the air coil for signs of dirt accumulation. Use a mild detergent or coil-cleaning agent. DO NOT use any cleaning solutions that contain an acid, including acetic acid (vinegar). Damage to the air coil may occur resulting in possible refrigerant leaks.

ANNUAL MAINTENANCE

1. Perform an annual maintenance inspection of the fan and blower motor assembly. All units come with permanently lubricated fan motors. DO NOT oil or lubricate fan motors. Clean up any dirt or debris that may have accumulated.
2. Visually inspect the electrical box annually for signs of component damage due to overheating or poor electrical contact.
3. Completely clean the interior of the cabinet. Vacuum any dust or debris.

REPLACEMENT FILTERS & REFRIGERANT CHARGE

Disposable 1-inch thick replacement filters, sizes listed below and can be obtained from any HVAC parts supplier.

Factory also provides optional 2-inch filter rack for use with 2-inch MERV 13 filters.

Factory provided 1-inch filters are MERV 10. Pleated filters rated between MERV 8 to MERV 11 are preferable as they will provide optimal filtration. Higher rated 1-inch filters (MERV 12, 13+) may reduce airflow and affect unit heating and cooling performance. Verify that the unit can produce the desired airflow before installing high efficiency filters. More frequent filter changes will be required. Factory recommends optional 2-inch filter rack when using MERV 13 filters.

Table 6a: Filter Sizes

Model	Cabinet Size	Standard 1-inch Filter Size	Optional 2-inch Filter Size
VSHP 020G	X	14 x 25 x 1	14 x 25 x 2
VSHP 030G			
VSHP 040G			
VSHP 050G	Y	16 x 30 x 1	16 x 30 x 2
VSHP 060G			
VSHP 080G	Z	20 x 30 x 1	20 x 30 x 2
VSHP 100G			
VSHP 120G			

Table 7: Troubleshooting Guide

Problem	Mode	Possible Cause(s)	Correction Method
No response to any thermostat setting	Heating/Cooling	Main power off	Check unit disconnect switch/ circuit breaker/ fuses
	Heating/Cooling	Defective control transformer	Confirm thermostat is wired correctly before replacing
	Heating/Cooling	Broken or loose connection	Check for loose thermostat connections. Repair and/or tighten as required.
	Heating/Cooling	Defective thermostat	Check and replace
Unit short cycles	Heating/Cooling	Thermostat improperly located	Relocate thermostat away from supply registers
Only blower runs, but not compressor	Heating/Cooling	Defective compressor overload	Check and replace if required (if external)
	Heating/Cooling	Defective compressor contactor	Check and replace if required
	Heating/Cooling	Supply voltage too low	Correct incoming supply voltage setting at Transformer
	Heating/Cooling	Defective compressor capacitor	Check and replace if required
	Heating/Cooling	Defective compressor windings	Check and replace if required
	Heating/Cooling	Limit switches open	Check for faulty pressure switches. Switches are normally closed. Replace if switches are open when unit is shutdown.
	Heating/Cooling	Clogged Drain Pan / Condensate hose / Faulty Sensor	Condensate switch detects overflow condition in drain pan, check for obstruction. If no water, check switch, replace if required.
Insufficient capacity	Heating/Cooling	Dirty filter	Check and replace
	Heating/Cooling	Blower RPM too low	Set to blower to higher fan speed
	Heating/Cooling	Loss of conditioned air due to ductwork leaks	Check for duct leaks and repair
	Heating/Cooling	Low on refrigerant charge	Possible leak in system. Check for leaks at piping joints and coil. Repair if possible, and recharge to unit nameplate charge rating.
	Heating/Cooling	Defective reversing valve	Check and replace
	Heating/Cooling	Thermostat improperly located	Relocate thermostat
	Heating/Cooling	Inadequate water flow	Increase GPM
	Cooling	Entering Water Temperature too hot	Adjust EWT Loop temperature lower
	Heating/Cooling	Entering Water Temperature too cold	Adjust EWT Loop temperature higher
High Pressure Fault	Cooling	Inadequate GPM	If auto shut-off valve is installed, check that control valve actuator opens during call for Heating. Set valve to manual mode and remove power connections from actuator and re-test. If manual mode re-test confirms proper water flow, actuator is likely faulty.
	Cooling	Water too hot	Reduce water loop temperature
	Heating	Inadequate air flow	Check blower. Typical airflow should be 400 cfm/Ton across air coil. Check for dirty or obstructed air coil.
	Heating	Dirty filter	Clean/replace
	Heating/Cooling	Overcharged with refrigerant	Decrease charge/Confirm charge matches nameplate.
	Heating/Cooling	Defective pressure switch	Check connections. Jumper terminals and check that it is not a control board issue. Replace if switch remains open.
Low Pressure Fault	Heating/Cooling	Undercharged	Possible leak in system. Check for leaks at piping joints and coil. Repair if possible, and recharge to unit nameplate charge rating.
	Cooling	Faulty thermal expansion valve (TXV) operation	Flooding of refrigerant caused by the TX valve not opening/closing correctly. Check TX valve bulb has not come loose.
	Cooling	Inadequate air flow	Check blower. Typical airflow should be 400 cfm/Ton across air coil. Check for dirty or obstructed air coil
	Cooling	Dirty filter	Check and replace
	Heating	Inadequate GPM	Check GPM to unit. If auto-flow reg. valve installed check GPM matches rating of auto-flow reg. valve.
	Heating	Inadequate GPM	If auto shut-off valve is installed, check that control valve actuator opens during call for Heating. Set valve to manual mode and remove power connections from actuator and re-test. If manual mode re-test confirms proper water flow, actuator is likely faulty.
	Heating	Inadequate GPM	Inadequate water flow from riser loop system. Units are nominally rated for 3GPM/Ton. Check water flow from riser system and confirm capability to provide required GPM to unit.
Water Loop Discharge Temp Alarm	Cooling	Inadequate GPM/Too High Riser Loop Temperature	Leaving water temperature from water coil exceeds acceptable operating temperature (127°F). Check for clogged or faulty water components, or too low GPM riser supply or too high entering water temperature.
Water Loop Supply Temp Alarm	Heating/Cooling	Too High Riser Loop Temperature	Entering water temperature to water coil exceeds acceptable operating temperature (115°F). Lower riser water loop temperature.
Condensate Overflow Alarm	Cooling	Clogged Drain Pan / Condensate hose	Condensate switch detects overflow condition in cabinet drain pan. Check connections. Check for plugged, obstructed or pinched condensate hose.
Refrigerant Suction Alarm	Heating/Cooling	Suction Temperature sensor defective.	Check connections. Check sensor is not shorted or stuck in open circuit. Check for resistance, if reading Zero or Infinity replace sensor.
	Heating/Cooling	Suction Temperature below threshold	Suction temperature is below 50°F in cooling and 70°F in heating. Refer to possible causes under "Low Pressure Fault".

Table 8: Microprocessor LED Code Guide

LED table applicable to version 5.4.1 software

LED	Description	LED Code	Alarm Description
HP	High Pressure	Red = Solid	High pressure alarm. Hard Lock-Out. 3 Trips
		Red = Blinking	High pressure alarm. Soft Lock-Out
LP	Low Pressure	Red = Solid	Low pressure alarm. Hard Lock-Out. 3 Trips
		Red = Blinking	Low pressure alarm. Soft Lock-Out
WLDT	Water Loop Discharge Temp	Red = Solid	Water loop discharge temperature too hot. Non-latching alarm
		Red = Blinking	Sensor open/missing or close/shorted. Non-latching alarm, replace sensor
CO	Condensate Overflow	Red = Solid	Condensate overflow alarm. Hard Lock-Out. 2 Trips
		Red = Blinking	Condensate overflow alarm. Soft Lock-Out
RST	Refrigerant Suction Temp	Red = Blinking	Sensor open/missing or close/shorted. Non-latching alarm. Replace sensor
WLST	Water Loop Supply Temp	Red = Solid	Water loop supply temperature too hot. Non-Latching fault
		Red = Blinking	Sensor open/missing or close/shorted. Non-latching alarm, replace sensor
STA	PCB Status	Green = Blinking	PCB is operational
CLG	Cooling	Green = Solid	Cooling call from thermostat input
HTG	Heating	Green = Solid	Heating call from thermostat input

LP Alarm LED	***HP Alarm LED***	***COS Alarm LED***
LP SoftLock = 0, Off	HP SoftLock = 0, Off	COS SoftLock = 0, Off
LP SoftLock = 1 , Blink 1 every 1 Sec	HP SoftLock = 1 , Blink 1 every 1 Sec	COS SoftLock = 1 , Blink 2 every 1 Sec
LP SoftLock = 2 , Blink 2 every 1 Sec	HP SoftLock = 2 , Blink 2 every 1 Sec	COS SoftLock = 2 , Solid = HARD LOCK
LP SoftLock = 3 , Solid = HARD LOCK	HP SoftLock = 3 , Solid = HARD LOCK	

Silver series is the Omega standard product built as free standing design. The optional Gold series cabinet includes a factory built-in canvas flex duct collar between the base chassis/blower section and upper discharge plenum. The Gold series upper plenum and base cabinet are secured with shipping brackets to be removed in the field. The upper discharge plenum is field mounted to the ceiling structure creating a non-rigid, acoustically isolated connection between the discharge plenum and the cabinet compressor and blower base section.

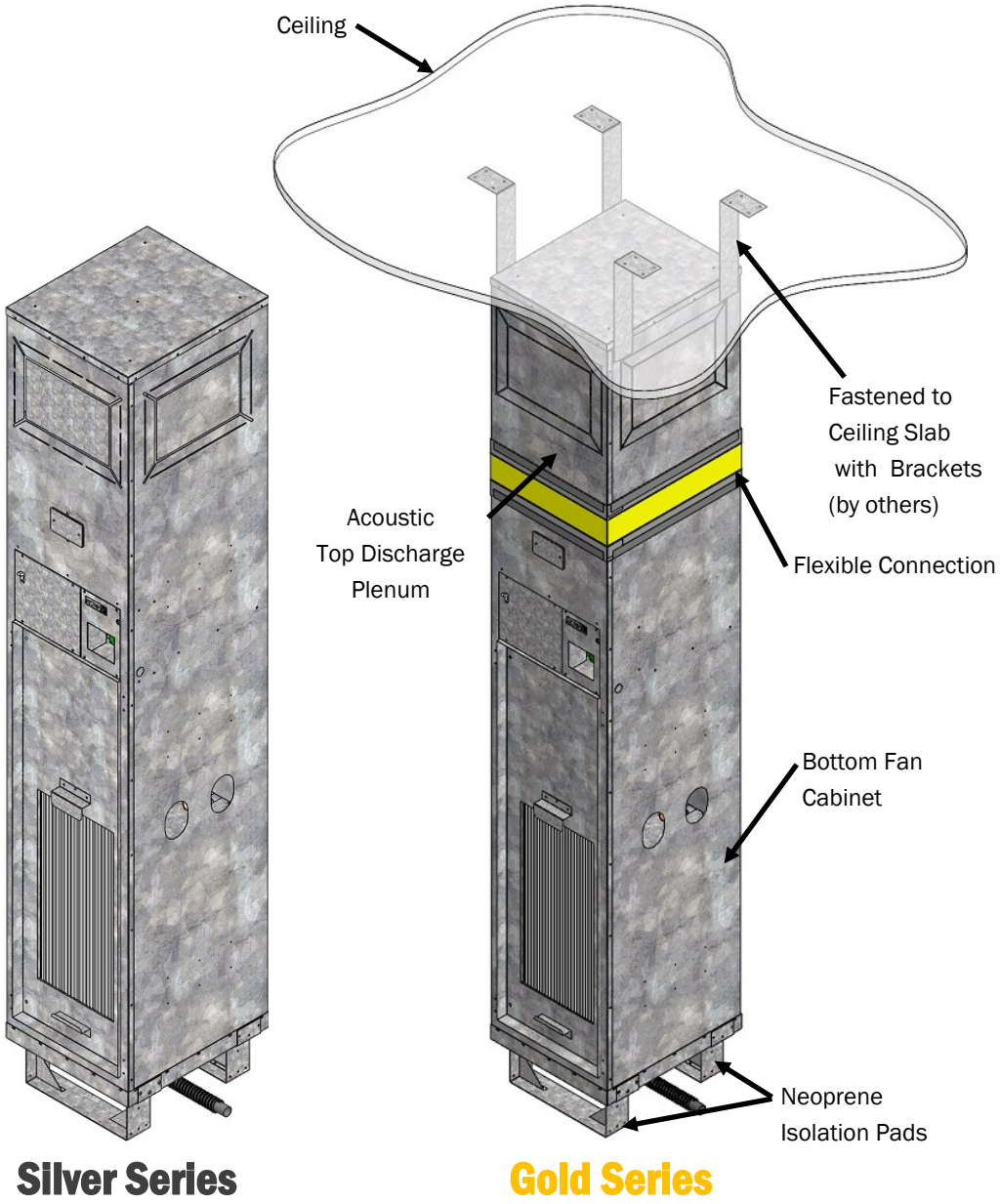


Figure 4 Silver and Gold Series Cabinets

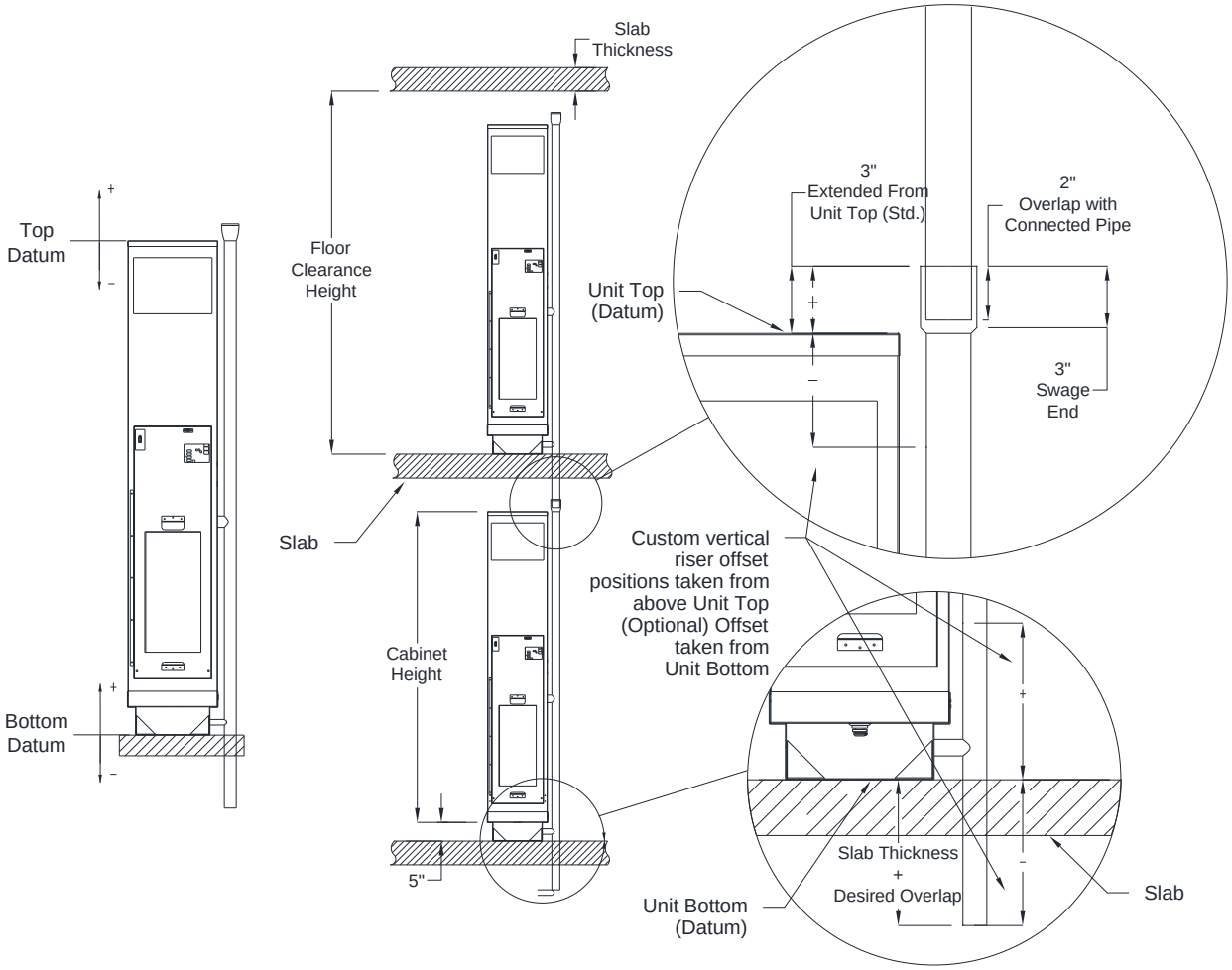


Figure 6 Riser Length Reference Measurements

Notes:

- Risers are positioned relative to cabinet using a standard “Top” Datum reference (optional “Base” Datum). Top Datum Offset indicates where the top of riser will be located relative to top of cabinet. A Base Datum indicates where bottom of riser will be located relative to base of cabinet.
- Upon request Omega will provide 3 inch deep swage on risers of same pipe size (optional for all risers) for connection to units on the floor below.
- Risers should insert 2 inches into the 3 inch deep swage connection (minimum 1 inch insertion is required)
- Riser Length = Floor Clearance Height + Slab Thickness + 2 inch (overlap) (Rounded up to 120” or 144”).
- Omega supplies two standard riser lengths, 120” (10’) and 144” (12’), to be field cut on-site.
- Omega does not supply extension tailpieces or transition riser pieces for joining dissimilar piping sizes. Items are field provided.
- Risers available in Type L and Type M/DWV copper.
- Condensate riser comes standard with 3/8 inch thick closed cell insulation to prevent condensation.
- Optional insulation on supply and return risers is available.

CAUTION

Center riser stub-outs in cabinet riser openings. Do not let stub-outs rest on or contact sheet metal cabinet, otherwise can result in water leaks and property damage.

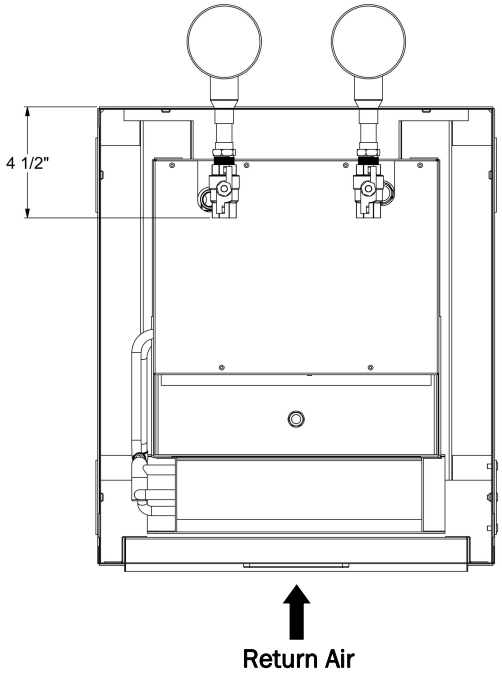
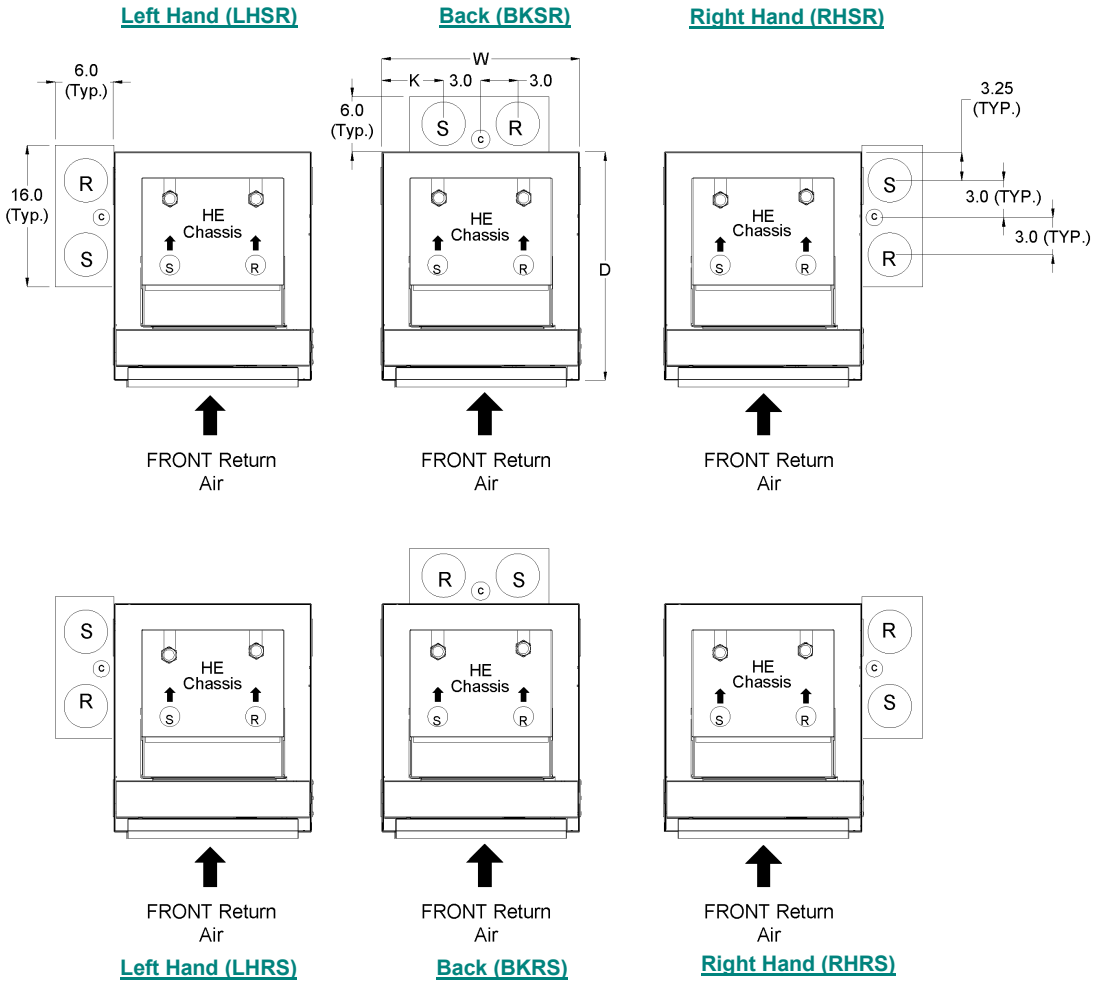


Figure 8 Riser Stub Distance from Cabinet Wall



S = Supply Riser
C = Condensate Riser
R = Return Riser

Note:

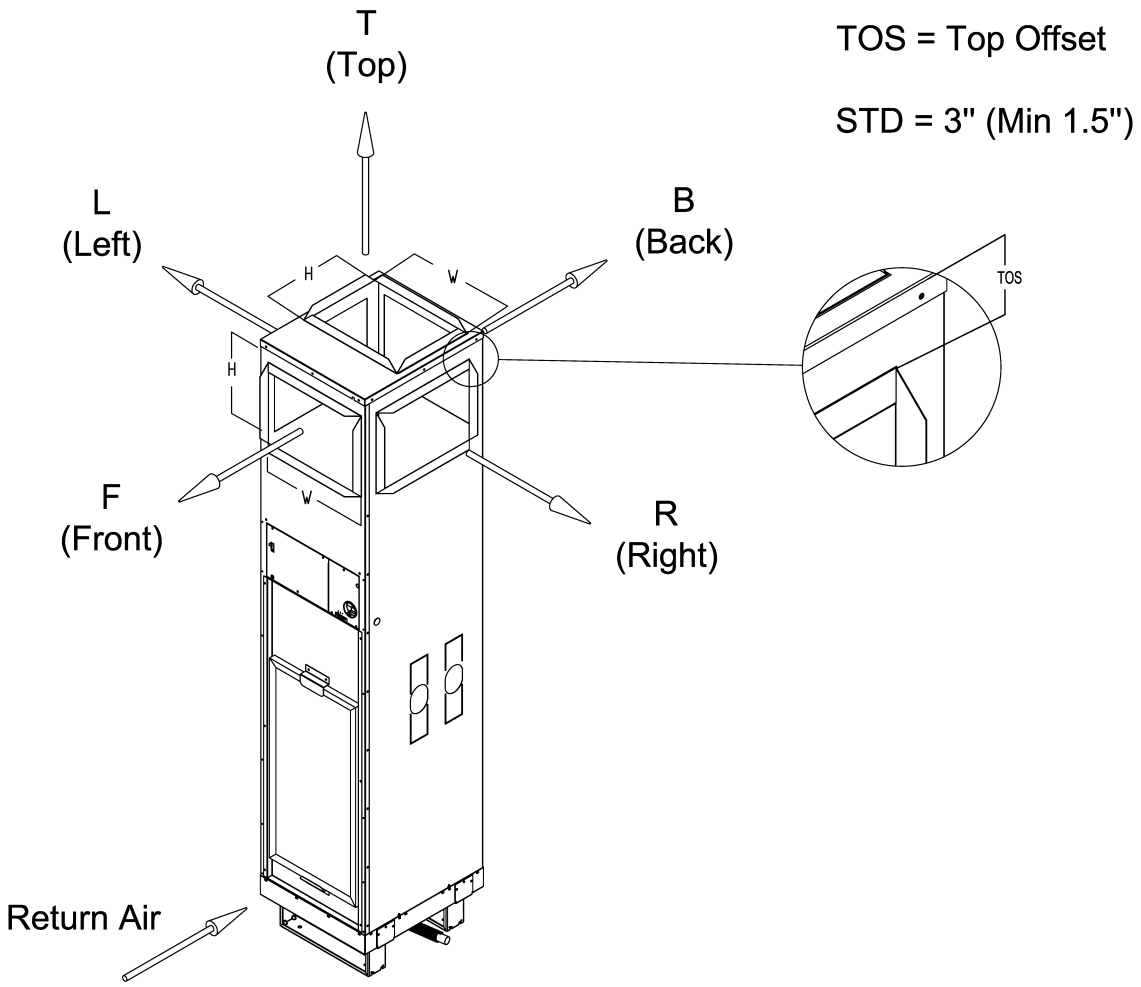
Units do not come with a riser chase or riser sleeve. Depiction shown indicates typical coring openings.

Hose Kit Sizes

Model	Hose Kit	
	Size (in)	Length (in)
VSHP 020G	1/2	24
VSHP 030G	1/2	24
VSHP 040G	1/2	24
VSHP 050G	1/2	24
VSHP 060G	1/2	24
VSHP 080G	3/4	30
VSHP 100G	3/4	30
VSHP 120G	3/4	30

Unit Size	Cabinet Size	W	D	"K" (in)
020, 030, 040	X	16	17.5	5
050, 060	Y	18	20.5	6
080, 100, 120	Z	22	24.5	8

Units comes with standard "*Knockout"* style discharge openings on top and all sides for field configuration. This allows for custom discharge configurations based on site requirements. Discharge opening sizes are configurable to meet site design conditions.



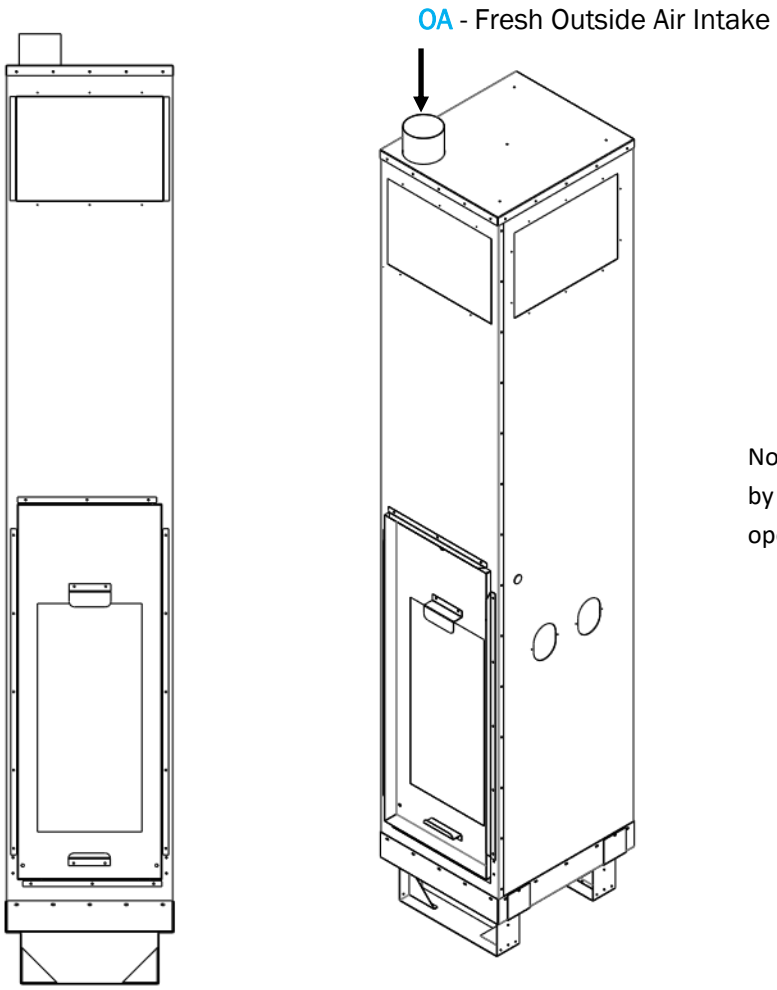
Supply Air Opening Sizes

Model	VSHP Supply Discharge Opening (W X H) inches							
	020	030	040	050	060	080	100	120
Horizontal	14 x 8	14 x 8	14 x 10	16 x 12	16 x 12	18 x 14	18 x 16	18 x 16
Top	12 x 12	12 x 12	12 x 12	14 x 12	14 x 12	14 x 14	16 x 14	16 x 16

Notes:

- Discharge opening sizes are customer configurable. Published sizes shown are maximum factory default sizes. Customer to verify discharge opening sizes match design requirements for proper airflow and select appropriate discharge openings at time of order.
- Unit comes standard with field "knockout" style discharge openings on all sides. Discharge flanges are 1-1/2 inches.
- Line of Site Baffles (LOSB) are available where two or more horizontal discharge (Front, Left, Right and/or Back) openings are specified.
- All handing's determined by facing return air opening
- Top Discharge is centered left and right, and offset 2 inches from the back.

Optional built-in Fresh Air Duct is suited for applications where the Energy Recovery Ventilator (ERV) unit is remote mounted. The factory installed fresh air intake accepts fresh air connection from a remote mounted ERV. Factory recommends Whisper Mode constant FAN-ON air circulation option with Fresh Air Duct option.



Note: Handing is referenced by facing the unit return air opening (front).

Figure 11 Optional Fresh Outside Air Duct

CAUTION

The introduction of cold conditioned outside air from a remote energy recovery ventilation device into the heat pump cabinet can result in potential freezing and bursting of mechanical components. All necessary precautions should be taken to temper Outside Air sufficiently above freezing point before entering the unit.

Top discharge for VSHP cabinet with fresh air duct is available in two orientations: Horizontal and Vertical. With in each orientation, Omega offers (4) different configuration option for fresh air duct location. Line of sight baffle is not available with Fresh Outside Air Intake option.

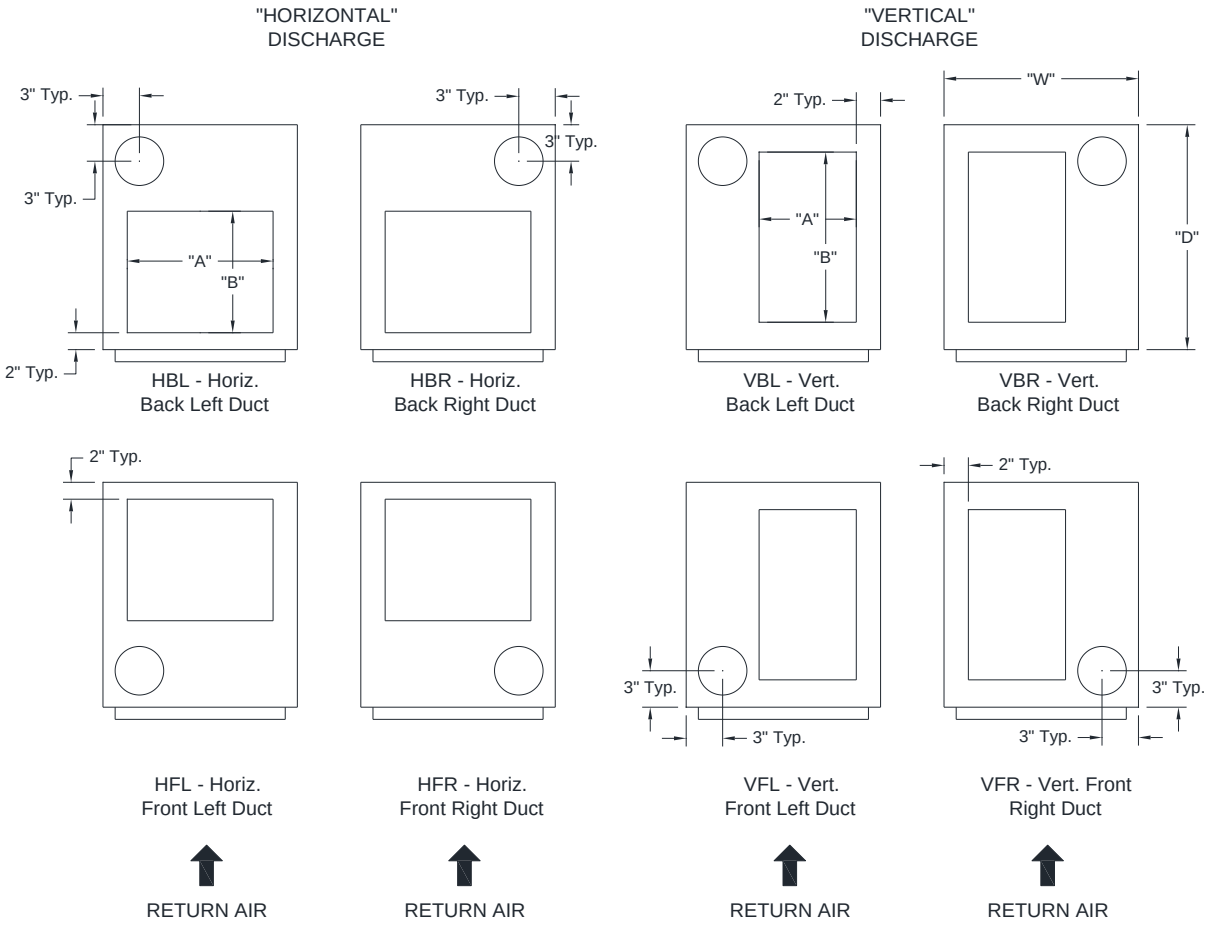


Figure 12 Top Supply Air Opening Configurations with Fresh Air Duct

Table 12 Supply Air Opening Sizes w/ Fresh Air Duct

Model	Cabinet Size	Dimensions (in)		Top Supply Opening w/ Fresh Air Duct (A x B) inches	
		"W"	"D"	"Horizontal"	"Vertical"
VSHP 020G	X	16	17.5	12 x 8	8 x 12
VSHP 030G				12 x 8	8 x 12
VSHP 040G				12 x 8	8 x 12
VSHP 050G	Y	18	20.5	14 x 12	10 x 16
VSHP 060G				14 x 12	10 x 16
VSHP 080G	Z	22	24.5	14 x 14	14 x 14
VSHP 100G				16 x 14	14 x 18
VSHP 120G				16 x 16	14 x 18

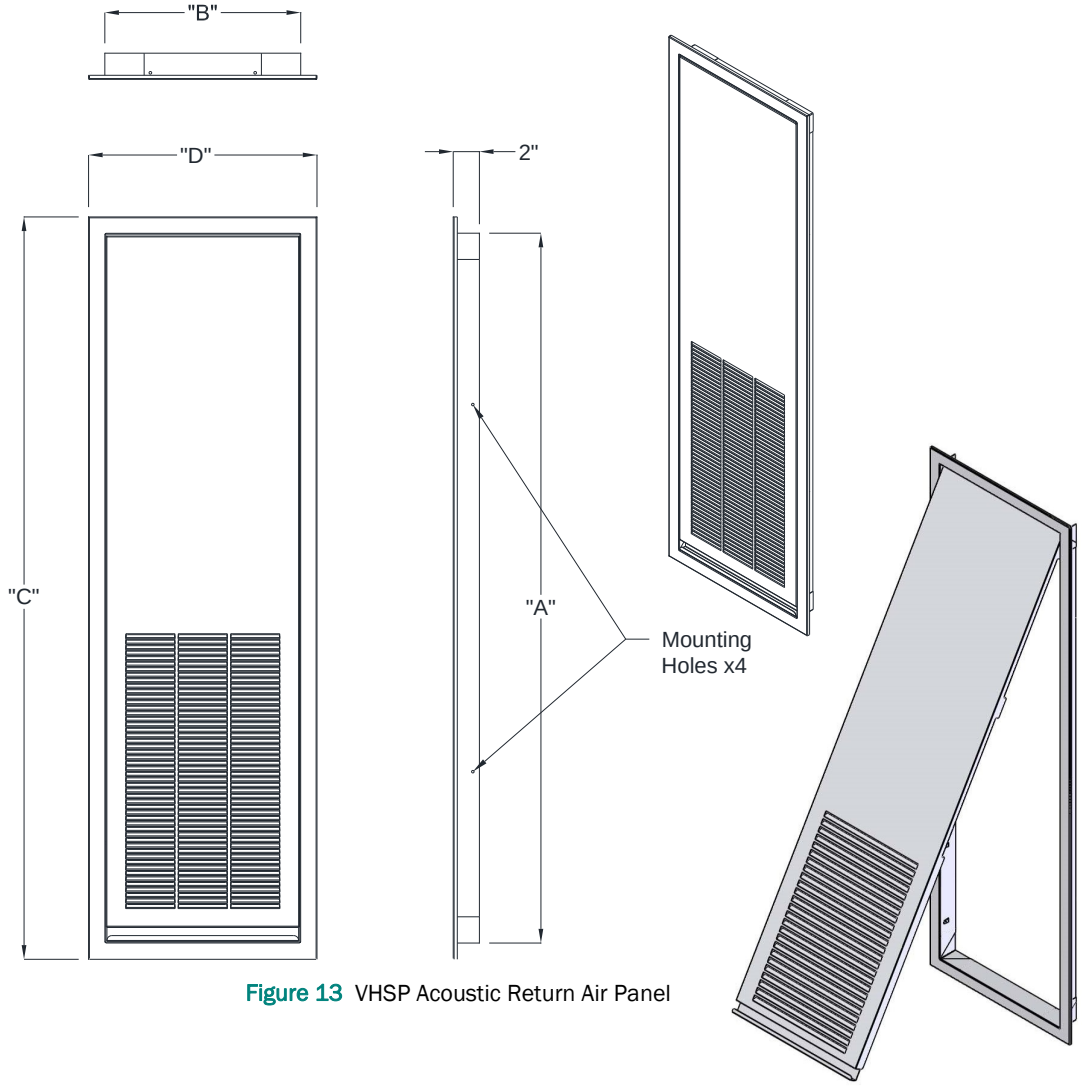


Figure 13 VHSP Acoustic Return Air Panel

Table 13 Acoustic Panel Sizes

Model	Cabinet Size	Acoustic RA Panel Dimensions (inches)			
		A	B	C	D
VSHP 020	X	54	15 1/4	56 1/2	17 5/8
VSHP 030					
VSHP 040					
VSHP 050	Y	54	17 1/4	56 1/2	19 5/8
VSHP 060					
VSHP 080	Z	54	21 1/4	56 1/2	23 5/8
VSHP 100					
VSHP 120					

Note: Apply acoustic Insulation to the internal surface of closet for enhanced sound attenuation.

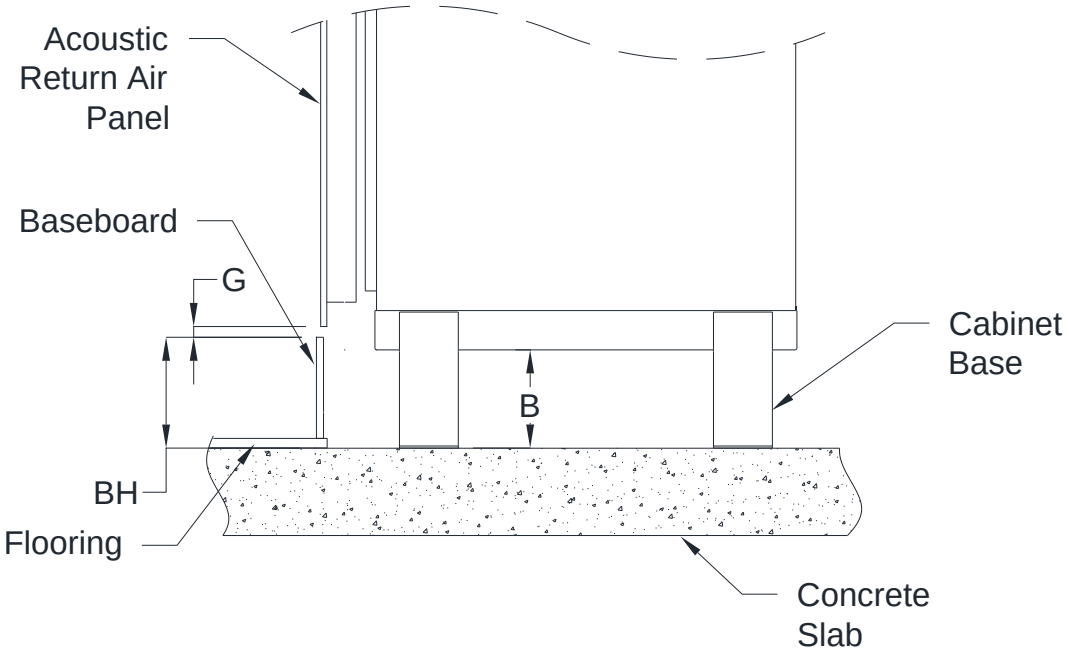


Figure 14 Acoustic Panel Cabinet Base Height Diagram

Acoustic Panel Cabinet Base Height Calculation

BH = Baseboard Height + Finish Floor Height*
G = Gap (min 0.5") between baseboard and panel.
B = Cabinet Base Height
(Min 5", increases in 1" increments)

B = BH + G - 1.5"

Note: *Include flooring thickness, underlayment, and any concrete leveling as part of calculation.

Example:
If using a 5" baseboard, with 1" Finished Flooring height, and 0.5" gap:
B = (5" + 1") + (0.5") - 1.5"
B = 5"
Therefore a 5" Cabinet Base is required.

Example: Baseboard to Base Height Table

Baseboard Height*	Cabinet Base Height
Up to 5"	5"
>5" to 6"	6"
>6" to 7"	7"
>7" to 8"	8"

*Includes 1" Total Flooring
*Using gap G= 0.5" (from top of baseboard to return panel flange)

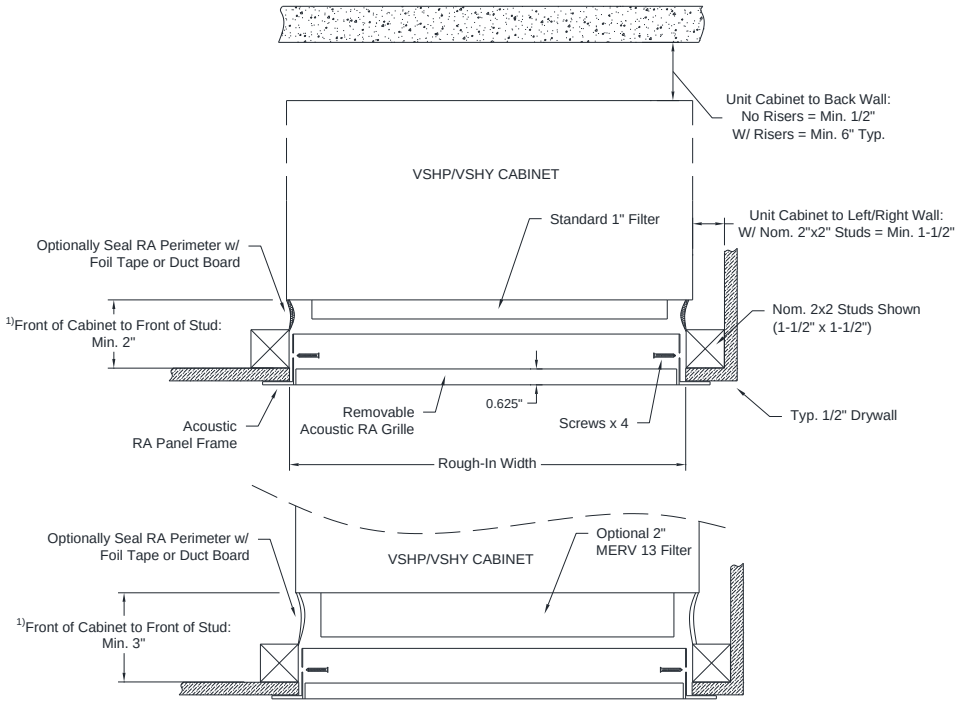


Figure 15 Acoustic Panel Furring Detail—Typ. 2x2 Framing Plan View

Notes:

1)Provide 2" from framing stud to cabinet. With optional 2-inch MERV 13 filter provide 3" from front of stud or min 1-1/2" from back of stud to cabinet. With optional flange, provide gap min. 1/2" from stud to flange.
2) Return air panel should be centered in front of the unit return air opening.
3) With rear/side risers, allow for min. 6" typical clearance at the rear/side of the units.
4) For additional sound attenuation insulate the closet cavity with plenum rated acoustical insulation.

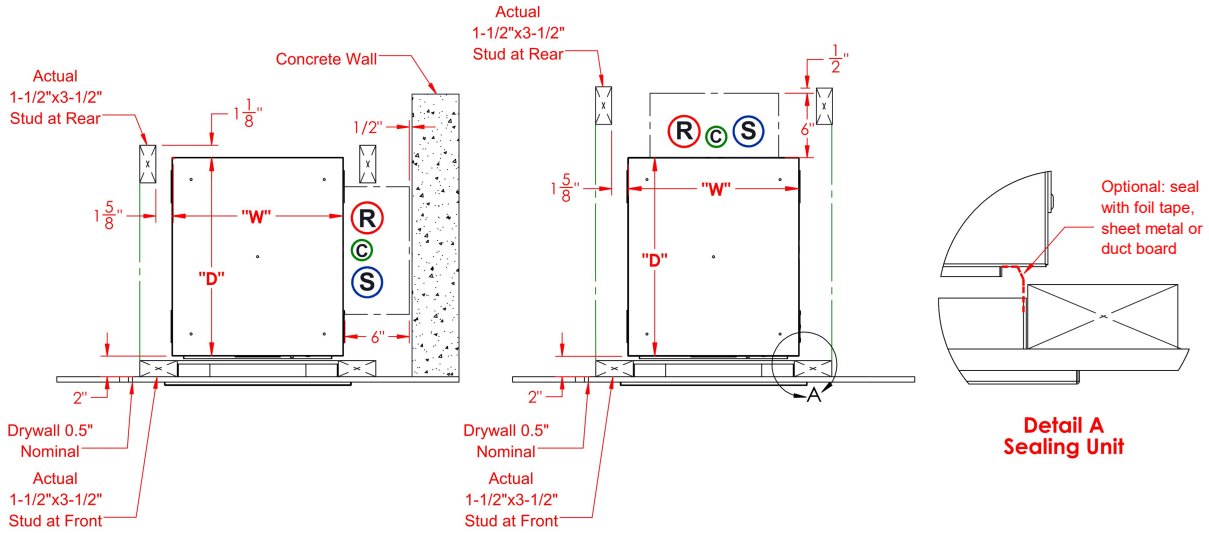


Figure 16 Acoustic Panel — Typ. 2x4 Framing Plan View

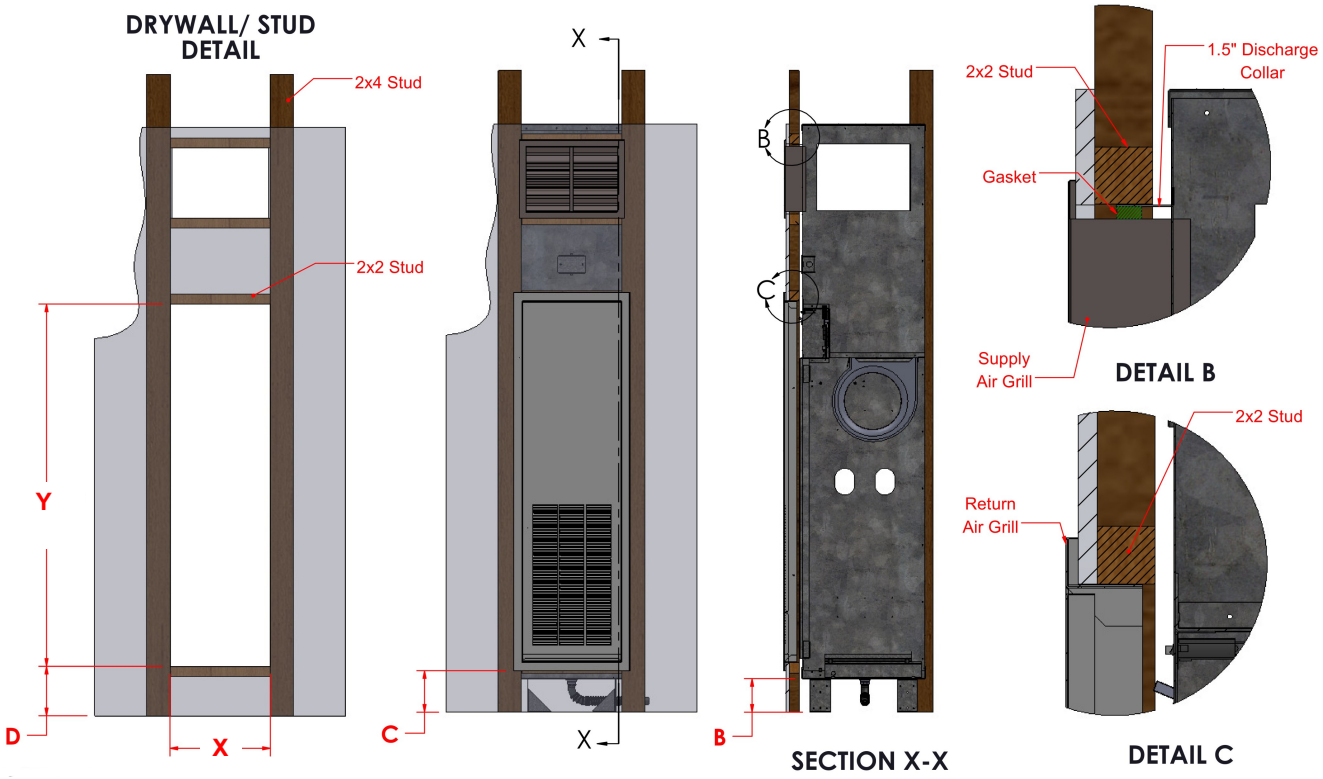


Figure 17 Acoustic Panel Furring Drawing—Front & Side View

B = Cabinet Base Height (Min 5", increases in 1" increments)
C = Flange Height Above Floor (B + 1.25")
D = Rough-In Height Above Floor (B + 2.5")

Table 14 Acoustic Panel Rough-In Dimensions

Model	Cabinet Size	Cabinet Dimensions (in)		Rough-In (in)	
		W	D	"X"	"Y"
VSHP 020G	X	16	17 1/2	15 3/4	54 1/2
VSHP 030G					
VSHP 040G					
VSHP 050G	Y	18	20 1/2	17 3/4	54 1/2
VSHP 060G					
VSHP 080G	Z	22	24 1/2	21 3/4	54 1/2
VSHP 100G					
VSHP 120G					

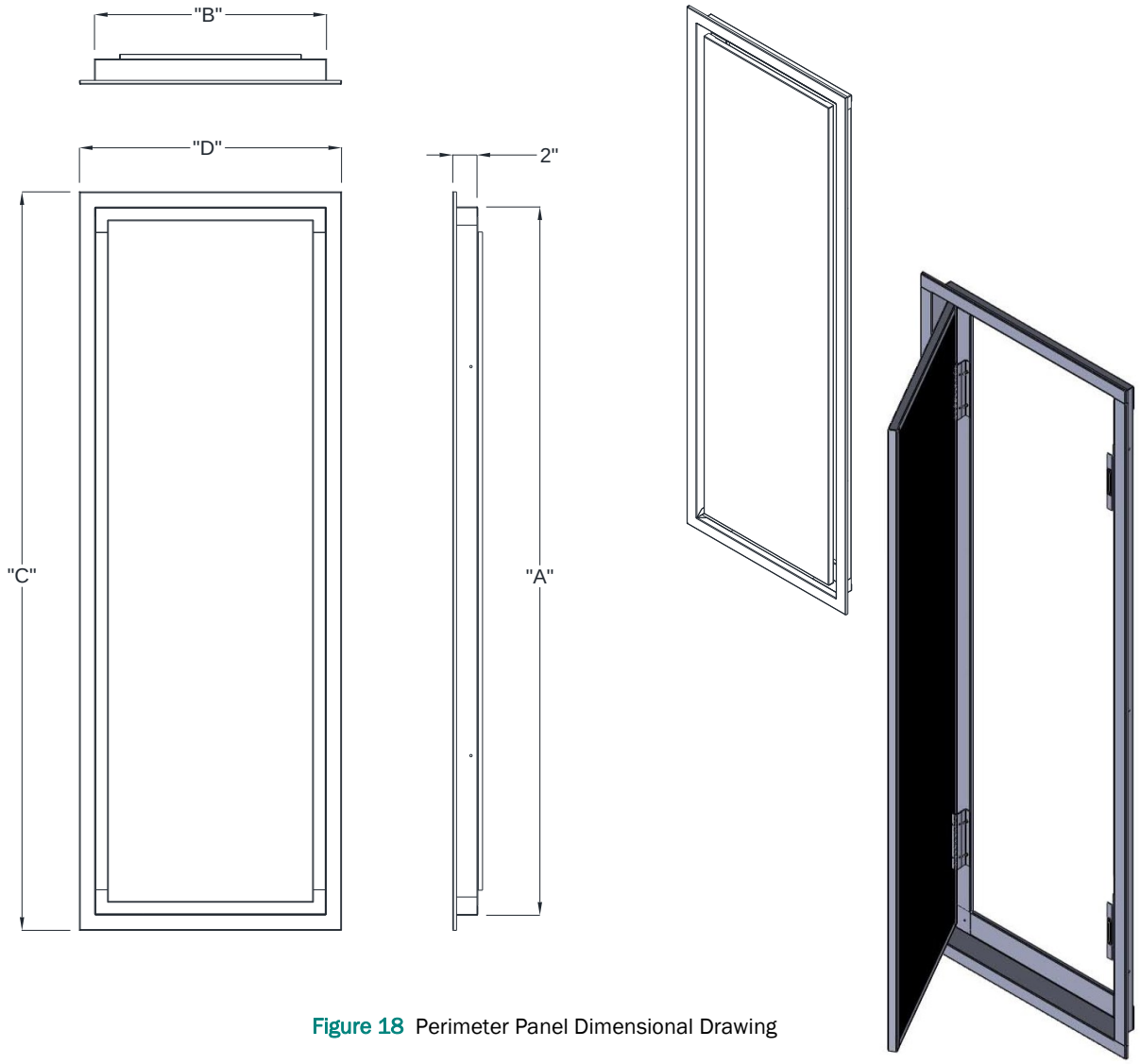


Figure 18 Perimeter Panel Dimensional Drawing

Table 15 Perimeter Panel Sizes

Model	Cabinet Size	Perimeter RA Panel Dimensions (inches)			
		A	B	C	D
VSHP 020	X	58 1/4	19 1/8	60 3/4	21 5/8
VSHP 030					
VSHP 040					
VSHP 050	Y	58 1/4	21 1/8	60 3/4	23 5/8
VSHP 060					
VSHP 080	Z	58 1/4	25 1/8	60 3/4	27 5/8
VSHP 100					
VSHP 120					

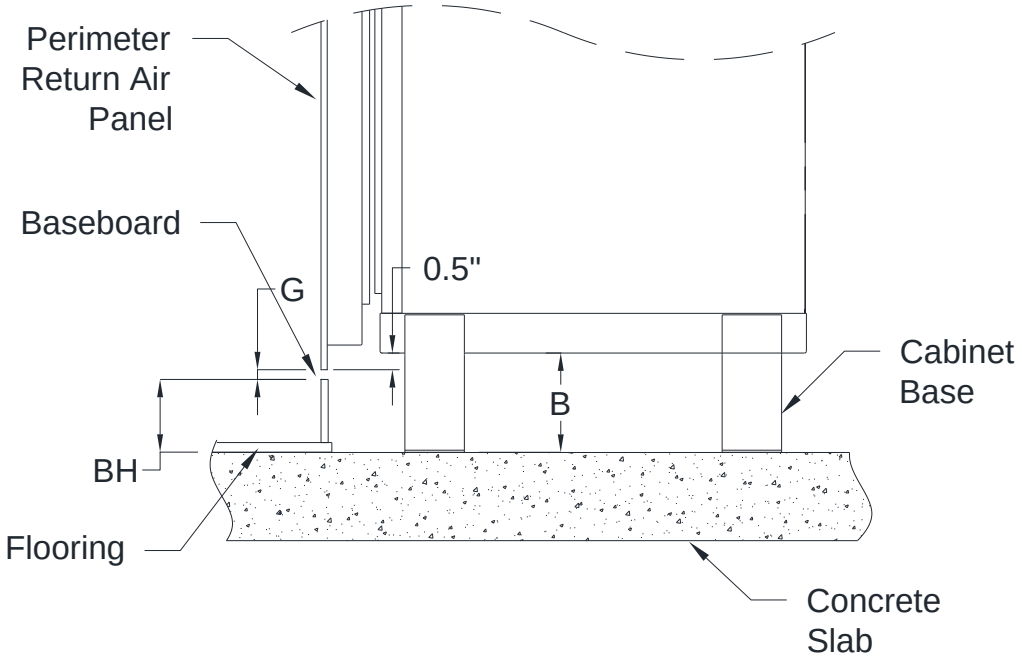


Figure 19 Perimeter Panel Cabinet Base Height Diagram

Perimeter Panel Cabinet Base Height Calculation

BH = Baseboard Height + Finish Floor Height*
G = Gap (min 0.5")
B = Cabinet Base Height
(Min 5", increases in 1" increments)

B = BH + G + 0.5"

Note: *Include flooring thickness, underlayment, and any concrete leveling as part of calculation.

Example:
If using a 5" baseboard, with 1" Finished Flooring height, and 0.5" gap:
B = (5" + 1") + (0.5") + 0.5"
B = 7"
Therefore a 7" Cabinet Base is required.

Example: Baseboard to Base Height Table

Baseboard Height*	Cabinet Base Height
Up to 3"	5"
>3" to 4"	6"
>4" to 5"	7"
>5" to 6"	8"

*Includes 1" Total Flooring
*Using gap G= 0.5" (from top of baseboard to return panel flange)

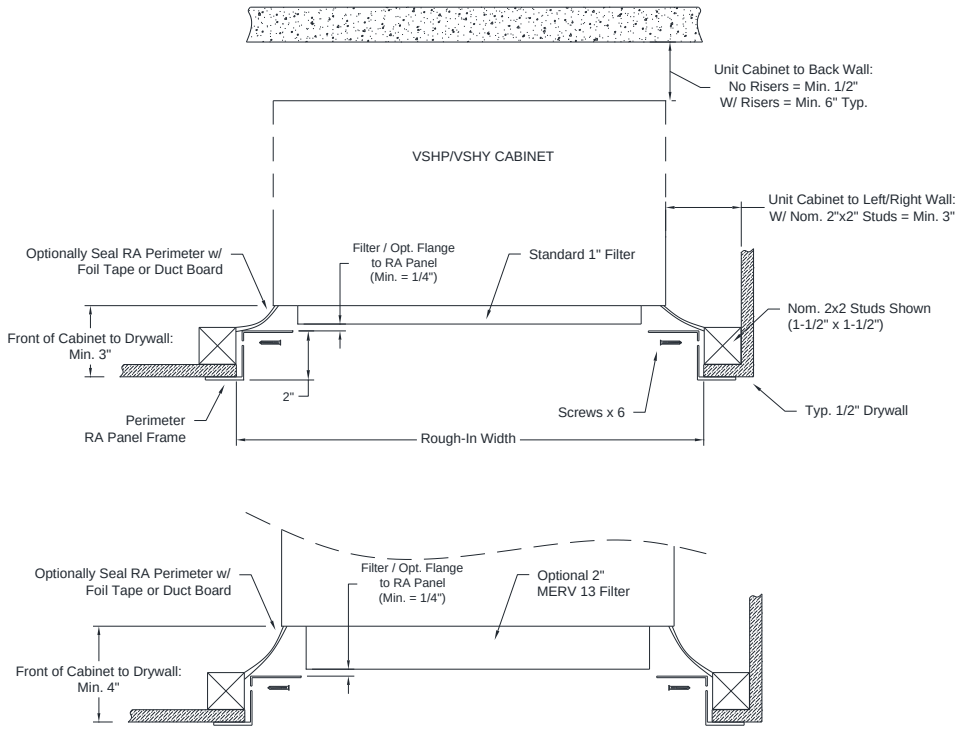


Figure 20 Perimeter Panel Furring Detail—Typ. 2x2 Framing Plan View

Notes:

1)Provide gap of 3" from framing finished drywall to cabinet. With optional 2-inch MERV 13 filter provide 4" from finished drywall to cabinet. With optional flange, provide gap min. 1/4" from RA Panel to flange.
2) Return air panel should be centered in front of the unit return air opening.
3) With rear/side risers, allow for min. 6" typical clearance at the rear/side of the units.
4) For additional sound attenuation insulate the closet cavity with plenum rated acoustical insulation.

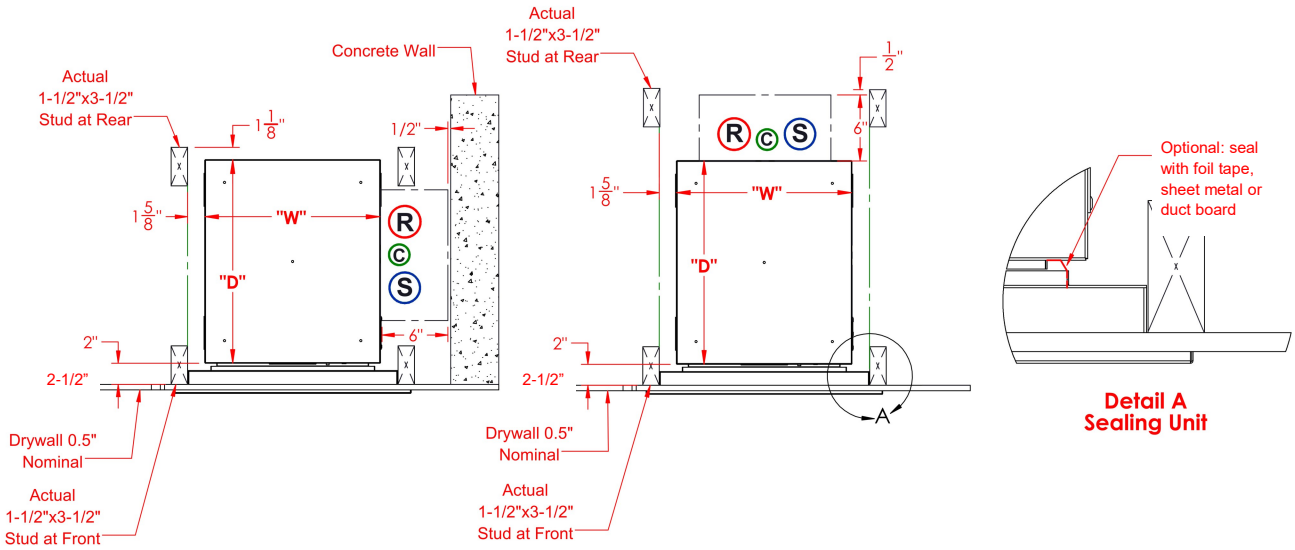


Figure 21 Perimeter Panel — Typ. 2x4 Framing Plan View

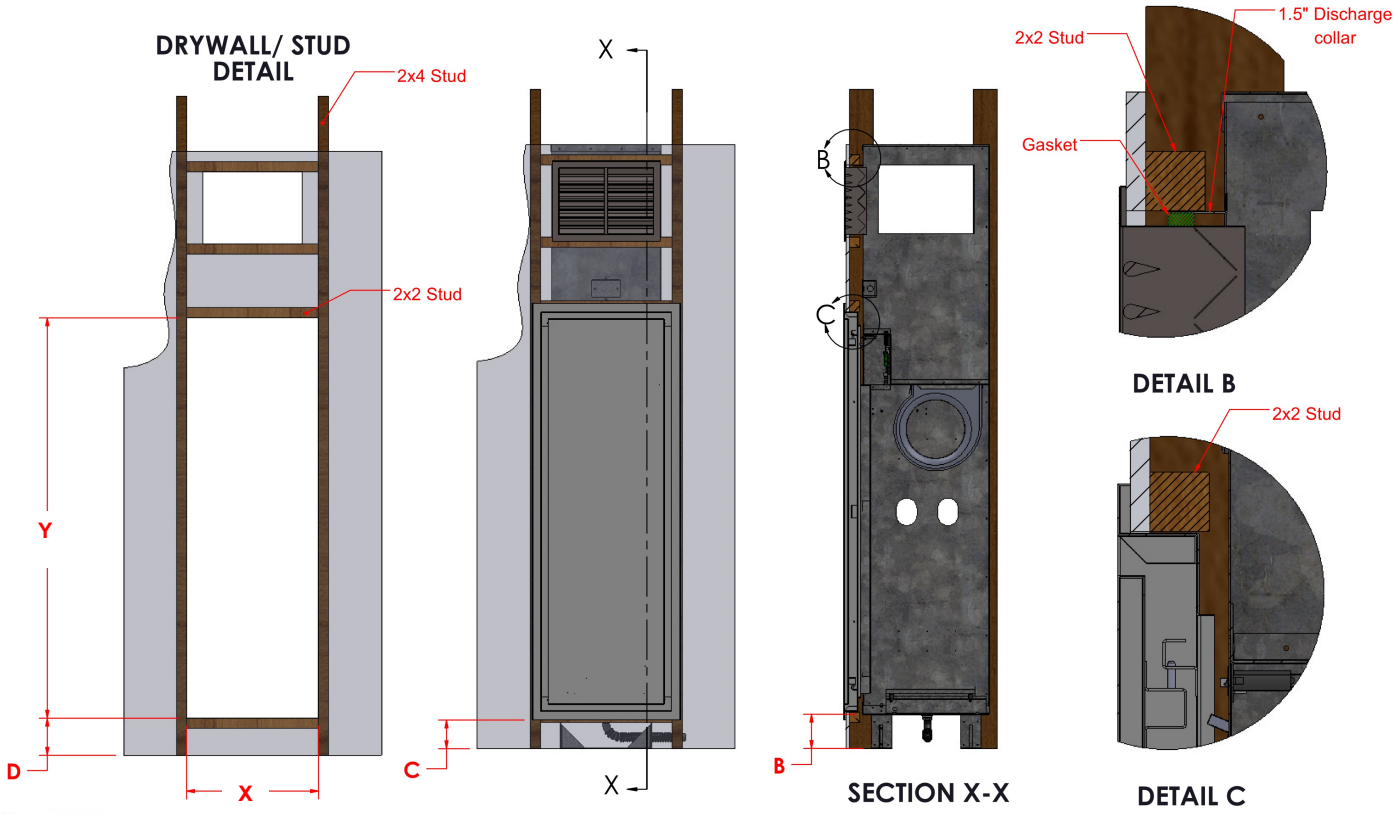


Figure 22 Perimeter Panel Furring Drawing– Front & Side View

B = Cabinet Base Height (Min 5", increases in 1" increments)
C = Flange Height Above Floor (B - 0.5")
D = Rough-In Height Above Floor (B + 0.625")

Table 16 Perimeter Panel Rough-In Dimensions

Model	Cabinet Size	Cabinet Dimensions (in)		Rough-In (in)	
		W	D	"X"	"Y"
VSHP 020G	X	16	17 1/2	19 1/2	58 3/4
VSHP 030G					
VSHP 040G					
VSHP 050G	Y	18	20 1/2	21 1/2	58 3/4
VSHP 060G					
VSHP 080G	Z	22	24 1/2	25 1/2	58 3/4
VSHP 100G					
VSHP 120G					

Figure 23 VHSP Electrical Schematic—PSC Fan Motor

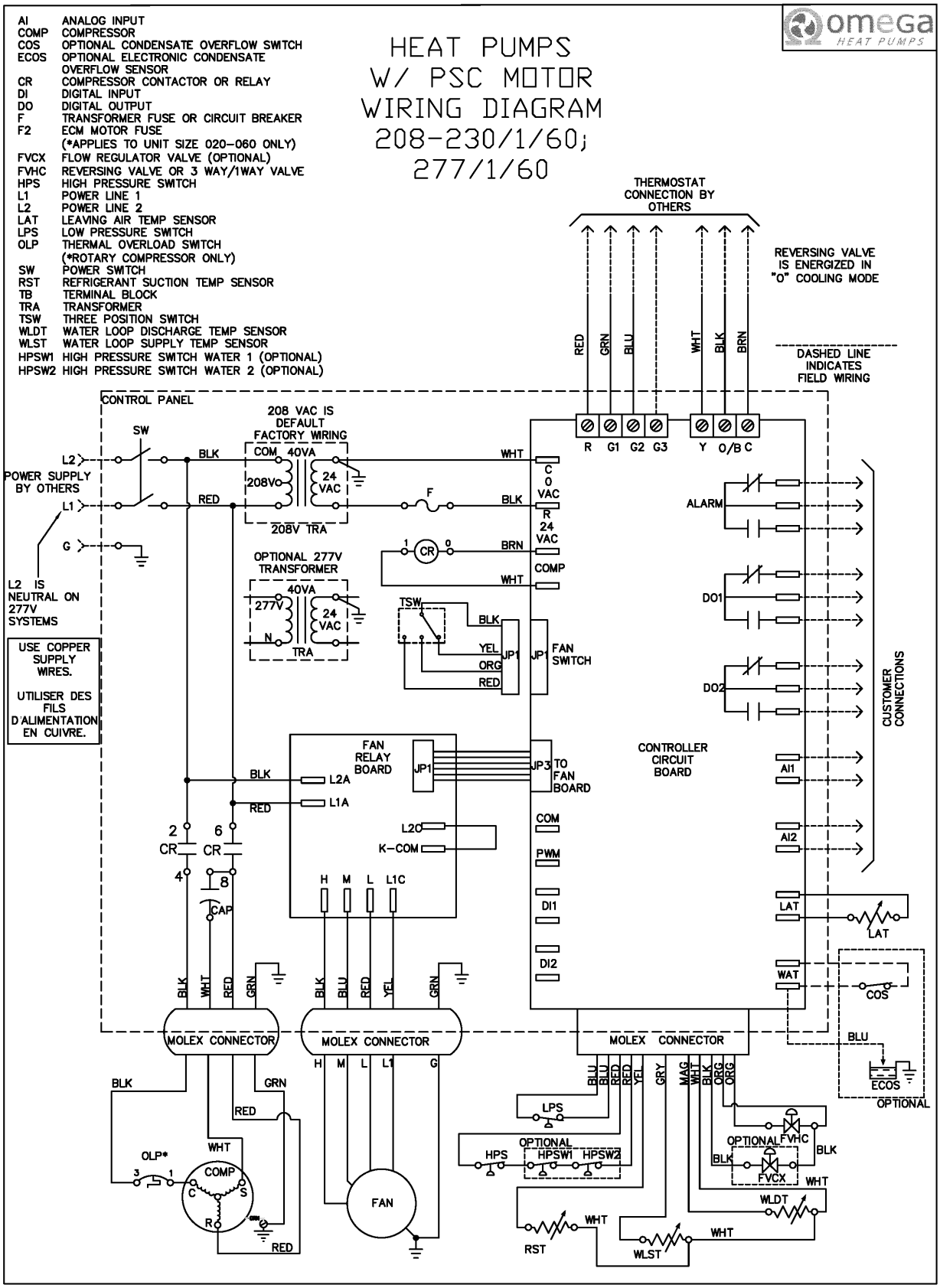
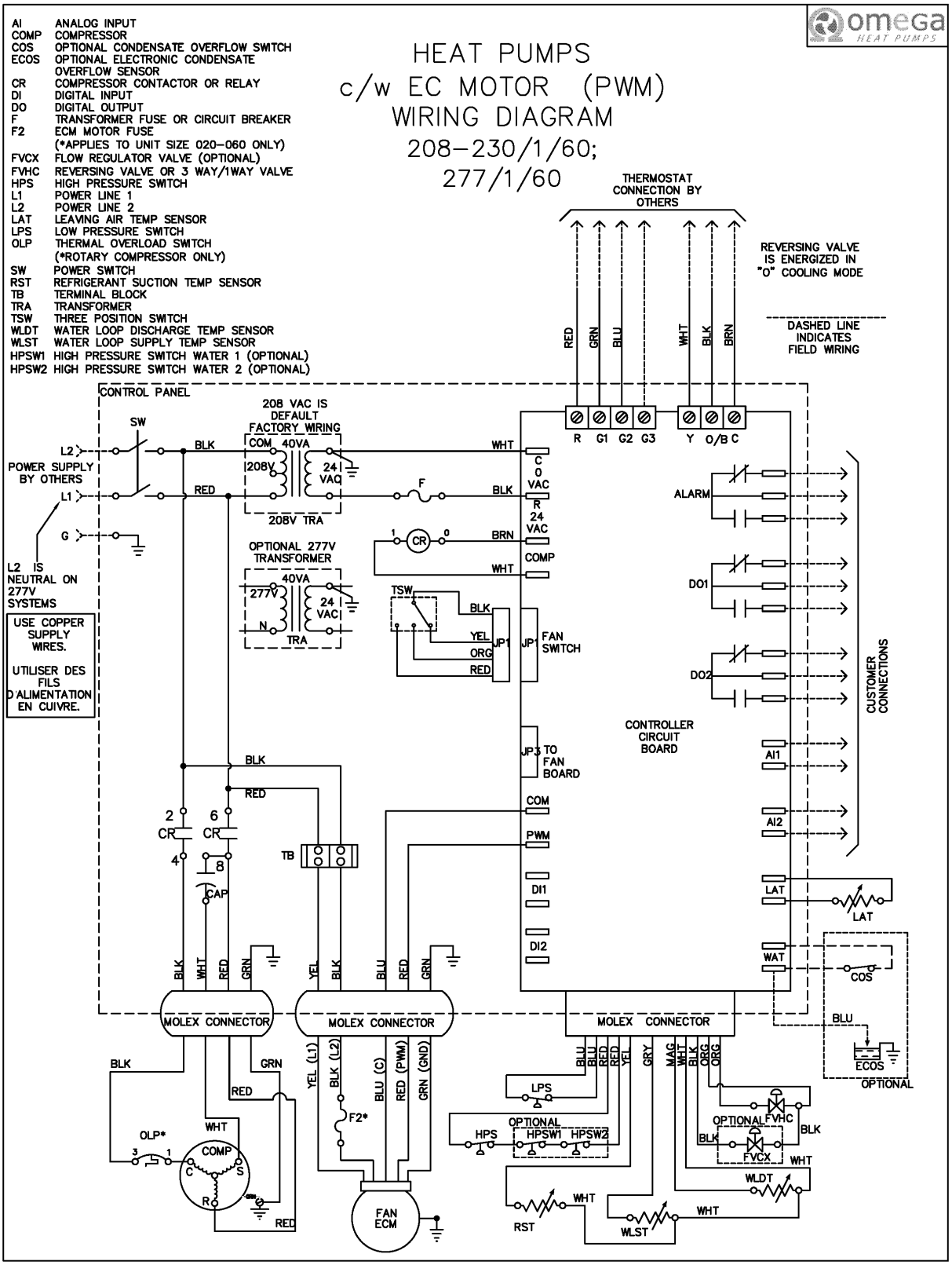


Figure 24 VHSP Electrical Schematic—ECM Fan



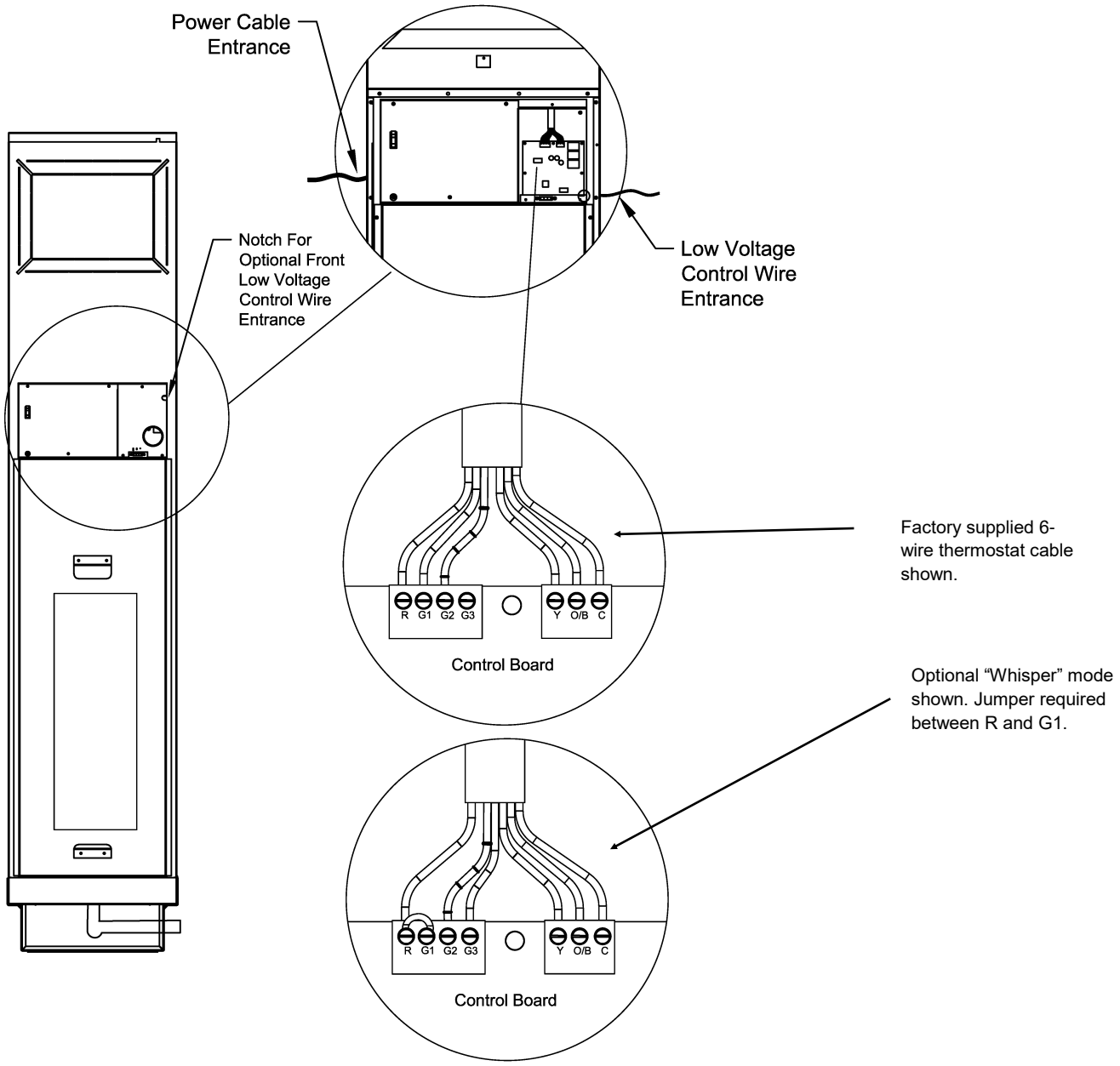


Figure 25 Thermostat Wiring Detail

Note: Factory supplied 6-wire 24 inch thermostat cable coiled up in low-voltage compartment of electrical box for field wiring to thermostat. Single speed thermostat thermostats require minimum 4-wire low voltage control wire harness when 'Common' is not required by thermostat.

Heat Pump Thermostat:
R = 24VAC
G1 = Fan Speed 1
G2 = Fan Speed 2
G3 = Fan Speed 3
Y = Compressor On
O/B = Reversing Valve
C = Common

Heat/Cool Thermostat:
R = 24VAC
G1 = Fan Speed 1
G2 = Fan Speed 2
G3 = Fan Speed 3
Y = Cooling
O/B = Heating
C = Common

Thermostat with Whisper Mode:
R = 24VAC
G1 = Whisper Mode (Cont. Fan On)
G2 = Fan Speed 2
G3 = Fan Speed 3
Y = Compressor On
O/B = Reversing Valve
C = Common

Table 17 PSC Fan Data

Model	Min. SCFM	Rated SCFM	Speed	External Static Pressure (in w.g.)						
				0	0.1	0.2	0.3	0.4	0.5	0.6
				SCFM	SCFM	SCFM	SCFM	SCFM	SCFM	SCFM
020	150	200	LOW	285	230	210	195	160	-	-
			MED	320	270	250	225	200	160	-
			HIGH	430	355	340	315	280	240	185
030	210	350	LOW	275	235	220	-	-	-	-
			MED	310	275	250	230	-	-	-
			HIGH	405	370	350	315	280	235	-
040	270	460	LOW	340	300	275	-	-	-	-
			MED	410	370	350	338	315	-	-
			HIGH	600	550	520	500	380	310	-
050	370	530	LOW	560	510	475	450	-	-	-
			MED	645	585	550	505	460	415	-
			HIGH	765	715	670	630	585	530	455
060	410	630	LOW	560	510	475	450	-	-	-
			MED	645	585	550	505	460	415	-
			HIGH	765	715	670	630	585	530	455
080	270	820	LOW	785	735	700	655	615	570	-
			MED	855	790	750	710	670	615	-
			HIGH	895	840	790	745	710	645	600
100	640	1010	LOW	895	855	790	745	670	-	-
			MED	1045	970	925	855	785	710	-
			HIGH	1155	1075	1010	935	845	775	670
120	740	1200	LOW	1155	1080	1015	950	875	790	-
			MED	1170	1095	1025	970	890	800	-
			HIGH	1225	1150	1080	1000	935	850	760

Note: All airflow ratings are taken at lowest voltage rating of dual rating (ie. 208 volt).
Airflow ratings include resistance of dry coil, Return Air panel and clean MERV10 air filters.
Contact customer service for external static pressure requirements exceeding 0.5” w.g.

Table 18 ECM Fan Data

Model	EC Motor Speed	External Static Pressure Option	Min. SCFM	Rated SCFM	External Static Pressure (in w.g.)												
					0	0.05	0.1	0.15	0.2	0.25	0.3	0.35	0.4	0.45	0.5	0.55	0.6
					SCFM	SCFM	SCFM	SCFM	SCFM	SCFM	SCFM	SCFM	SCFM	SCFM	SCFM	SCFM	SCFM
020	WHISPER* MODE	N/A	N/A	N/A	210	195	180	160	145	130	115	100	75	55	-	-	-
	LOW	LOW ESP	150	200	250	240	225	210	200	185	150	-	-	-	-	-	-
	MED				-	-	255	240	225	215	200	190	175	165	150	-	-
	MED	HIGH ESP			-	-	255	240	225	215	200	190	175	165	150	-	-
	HIGH				-	-	-	-	260	240	230	220	210	195	185	175	165
030	WHISPER* MODE	N/A	N/A	N/A	225	210	195	175	160	145	130	115	100	85	70	-	-
	LOW	LOW ESP	220	350	315	305	295	285	275	265	250	240	225	-	-	-	-
	MED				350	340	335	325	315	305	295	285	275	265	255	245	235
	MED	HIGH ESP			350	340	335	325	315	305	295	285	275	265	255	245	235
	HIGH				-	-	365	355	350	340	330	320	310	305	295	285	275
040	WHISPER* MODE	N/A	N/A	N/A	250	230	225	205	180	160	145	125	110	90	75	-	-
	LOW	LOW ESP	300	460	410	400	390	380	370	365	350	340	330	325	310	300	-
	MED				460	450	445	440	430	425	415	405	395	385	375	365	355
	MED	HIGH ESP			460	450	445	440	430	425	415	405	395	385	375	365	355
	HIGH				-	-	-	-	470	465	455	445	435	430	420	410	400
050	WHISPER* MODE	N/A	N/A	N/A	450	430	410	390	370	350	320	300	270	250	220	-	-
	LOW	LOW ESP	375	530	520	510	490	470	450	430	410	390	375	-	-	-	-
	MED				-	-	550	540	520	505	485	470	450	430	410	390	375
	MED	HIGH ESP			-	-	550	540	520	505	485	470	450	430	410	390	375
	HIGH				-	-	-	-	-	-	555	540	525	510	490	475	460
060	WHISPER* MODE	N/A	N/A	N/A	450	430	410	390	370	350	320	300	270	250	220	-	-
	LOW	LOW ESP	450	630	580	565	550	540	520	505	485	470	450	-	-	-	-
	MED				640	620	610	595	580	565	555	540	525	510	490	475	460
	MED	HIGH ESP			640	620	610	595	580	565	555	540	525	510	490	475	460
	HIGH				-	-	675	670	655	650	640	620	610	595	580	565	550
080	WHISPER* MODE	N/A	N/A	N/A	620	580	560	520	480	440	410	380	340	300	260	-	-
	LOW	LOW ESP	600	820	800	760	740	720	695	660	640	620	-	-	-	-	-
	MED				880	860	840	820	800	780	750	720	700	670	650	625	600
	MED	HIGH ESP			880	860	840	820	800	780	750	720	700	670	650	625	600
	HIGH				-	-	-	-	895	880	860	820	805	795	780	770	760
100	WHISPER* MODE	N/A	N/A	N/A	620	580	560	520	480	440	410	380	340	300	260	-	-
	LOW	LOW ESP	750	1010	960	940	920	890	860	840	820	800	775	750	-	-	-
	MED				1080	1060	1040	1010	990	970	950	930	900	880	860	840	820
	MED	HIGH ESP			1080	1060	1040	1010	990	970	950	930	900	880	860	840	820
	HIGH				-	-	-	-	1110	1090	1070	1060	1040	1020	990	980	960
120	WHISPER* MODE	N/A	N/A	N/A	620	580	560	520	480	440	410	380	340	300	260	-	-
	LOW	LOW ESP	900	1200	1120	1100	1090	1070	1050	1025	1010	990	970	940	920	-	-
	MED				1230	1200	1185	1170	1150	1130	1110	1095	1080	1055	1040	1020	1000
	MED	HIGH ESP			1230	1200	1185	1170	1150	1130	1110	1095	1080	1055	1040	1020	1000
	HIGH				1320	1290	1275	1260	1240	1225	1205	1190	1175	1160	1140	1120	1100

Note: All airflow ratings are taken at lowest voltage rating of dual rating (ie. 208 volt).
Airflow ratings include resistance of dry coil, Return Air panel and clean MERV10 air filters.
*Optional “Whisper” mode is Fan On, Compressor Off mode for constant fresh air circulation. Low Fan Speed is not available in Whisper mode.

VSHP UNIT START-UP SHEET

INSTALLATION INFORMATION

Job Name_____

City_____Province/State_____Postal/ZIP Code_____

OMEGA Unit Model #_____

OMEGA Unit Serial #_____

Unit Tag#_____

Technician_____Company_____

Heating

Riser Fluid Loop Temperature:

Entering Water Temperature (EWT):_____F

Leaving Water Temperature (LWT): _____F

ΔT = EWT - LWT = _____°F

Water Flow Rate (GPM):_____

(units with optional balancing valve see nameplate for GPM rating)

Air Temperature (Measure the difference in temperature across air coil) for measuring sensible capacity:

ΔT = LAT - EAT

Sensible Capacity (Btuh) = ΔT x CFM x 1.08

Entering Air Temperature (EAT):_____F

Leaving Air Temperature (LAT): _____F

ΔT = _____°F

Sensible Capacity (Btuh) = _____

Fan Speed Used: Low Med High

Compressor Amp: _____

Fan Amp: _____

Run Time For Test: _____

Cooling

Riser Fluid Loop Temperature:

Entering Water Temperature (EWT):_____F

Leaving Water Temperature (LWT): _____F

ΔT = LWT - EWT = _____°F

Water Flow Rate (GPM):_____

(units with optional balancing valve see nameplate for GPM rating)

Air Temperature (Measure the difference in temperature across air coil) for measuring sensible capacity:

ΔT = EAT - LAT

Sensible Capacity (Btuh) = ΔT x CFM x 1.08

Entering Air Temperature (EAT):_____F

Leaving Air Temperature (LAT): _____F

ΔT = _____°F

Sensible Capacity (Btuh) = _____

Fan Speed Used: Low Med High

Compressor Amp: _____

Fan Amp: _____

Run Time For Test: _____