

# Project:

Model: VSHY

Vertical Stack Hybrid Heat Pump

High Efficiency Chassis

**R-454B**

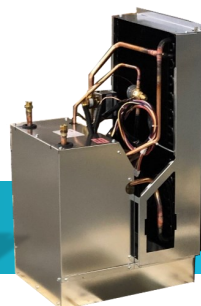
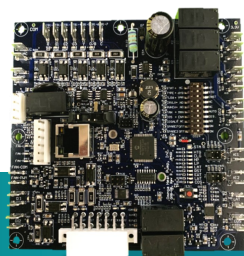
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Date:

Revision: 0

OMEGA Job #:

## SUBMITTAL SET





**SUMMARY PAGE**

- ☐ Vertical Stack Hybrid Heat Pump
- ☐ R-454B / UL-60335-2-40
- ☐ Unit Mounted Non-Fused Disconnect Switch
- ☐ ECM Fan with Forward Curved DWDI Blower
- ☐ High Efficiency DX Cooling Chassis with Hydronic Heating Coil
- ☐ Standard Basic Microprocessor Control Board
- ☐ Dual 2-Way Motorized Zone Valves - Standard Close-Off Pressure 40 PSI

**OPTIONAL**

- ☐ Deluxe Control Board, or Deluxe Control Board with SmartOne®
- ☐ “Whisper” Mode for Constant Low CFM Air Circulation
- ☐ Line of Sight Baffle
- ☐ Fresh Air Snorkel
- ☐ Autoflow Balancing Valve
- ☐ Y-Strainer #20 Mesh
- ☐ Coated DX Evaporator Coil
- ☐ Cupro-Nickel Coaxial Heat Exchanger
- ☐ Risers (Type M, L)
- ☐ Hose Kits
- ☐ MERV 13 pleated 2-inch Filter
- ☐ Return Air Panel Type
  - ☐ Acoustic - with Baffle
  - ☐ Perimeter
  - ☐ Perimeter with ADA thermostat mounting



## HIGH-EFFICIENCY HYBRID CHASSIS

### VSHY - HIGH EFFICIENCY PERFORMANCE TABLE—ISO WATER LOOP CONDITIONS

Unit Model	Refrig.	Air Flow (CFM)	Heating (105F EWT)				<sup>2</sup> Cooling (86F EWT)		
			Water Flow (GPM)	*WPD (FT)	LWT (°F)	<sup>1</sup> Capacity (BTUH)	<sup>3</sup> Capacity (BTUH)	EER	Water Flow (GPM)
VSHY 020	R-454B	200	1.5	2.9	96.1	6,700	5,800	12.2	1.5
VSHY 030	R-454B	340	2.25	5.8	95.6	10,500	9,200	12.5	2.4
VSHY 040	R-454B	400	3.0	5.0	96.3	12,900	12,200	13.5	3.0
VSHY 050	R-454B	550	3.5	5.5	95.8	16,000	15,000	15.0	3.7
VSHY 060	R-454B	630	4.5	8.8	96.7	18,600	18,100	14.5	4.4
VSHY 080	R-454B	870	6.0	6.3	97.1	23,700	23,300	14.5	6.0
VSHY 100	R-454B	1100	7.5	7.4	97.5	28,000	29,500	14.5	7.5
VSHY 120	R-454B	1200	9.0	10.6	97.9	31,800	35,900	13.0	9.0

<sup>1</sup> Based on 70F EAT. Heating performance does not include fan motor heat.

<sup>2</sup> Nominal capacity performance based on ARI/ISO 13256-1 Water Loop conditions at 86F EWT Cooling.

<sup>3</sup> Cooling performance shown is for 80.6F DB and 66.2F WB entering air.

### VSHY - ELECTRICAL DATA (ECM)

Model	Supply Voltage	Compressor			Blower		Total Unit FLA	MCA	MaxFuse/Circuit Breaker
		Qty	RLA	LRA	HP	FLA			
VSHY 020	208-230/1/60	1 @	3.0	15.0	1/4	1.0	4.0	4.8	15
VSHY 030	208-230/1/60	1 @	3.7	22.0	1/4	1.1	4.8	5.7	15
VSHY 040	208-230/1/60	1 @	4.7	26.0	1/4	1.2	5.9	7.1	15
VSHY 050	208-230/1/60	1 @	5.5	26.0	1/3	2.1	7.6	9.0	15
VSHY 060	208-230/1/60	1 @	7.0	38.0	1/3	2.6	9.6	11.4	15
VSHY 080	208-230/1/60	1 @	10.9	62.9	1/2	2.4	13.3	16.0	25
VSHY 100	208-230/1/60	1 @	13.5	72.5	1/2	3.4	16.9	20.3	30
VSHY 120	208-230/1/60	1 @	15.4	83.9	1/2	3.4	18.8	22.7	35

SCCR RATING: 5kA RMS, SYMMETRICAL, 300V MAX

### VSHY - PHYSICAL DATA

Model Series	VSHY 020	VSHY 030	VSHY 040	VSHY 050	VSHY 060	VSHY 080	VSHY 100	VSHY 120
Nominal Cooling (Ton)	0.5	0.75	1.0	1.25	1.50	2.0	2.5	3.0
Compressor-Type	High Efficiency Rotary					High Efficiency Scroll		
Water Coil-Type	High Efficiency Co-Axial							
Hose Size (in)	1/2"					3/4"		
Water Connections	1/2" NPSM					3/4" NPSM		
Drain Connection Size	7/8" ID (Standard)							
Standard 1" Filter MERV8	1-14x25x1			1-16x30x1		1-20x30x1		
Optional 2" Filter MERV13	1-14x25x2			1-16x30x2		1-20x30x2		
VSHY Chassis Weight (lb)	68	72	77	105	110	150	165	175
VSHY Cabinet Weight (lb)	175	175	175	178	178	243	243	243

**VSHY - ECM FAN DATA**

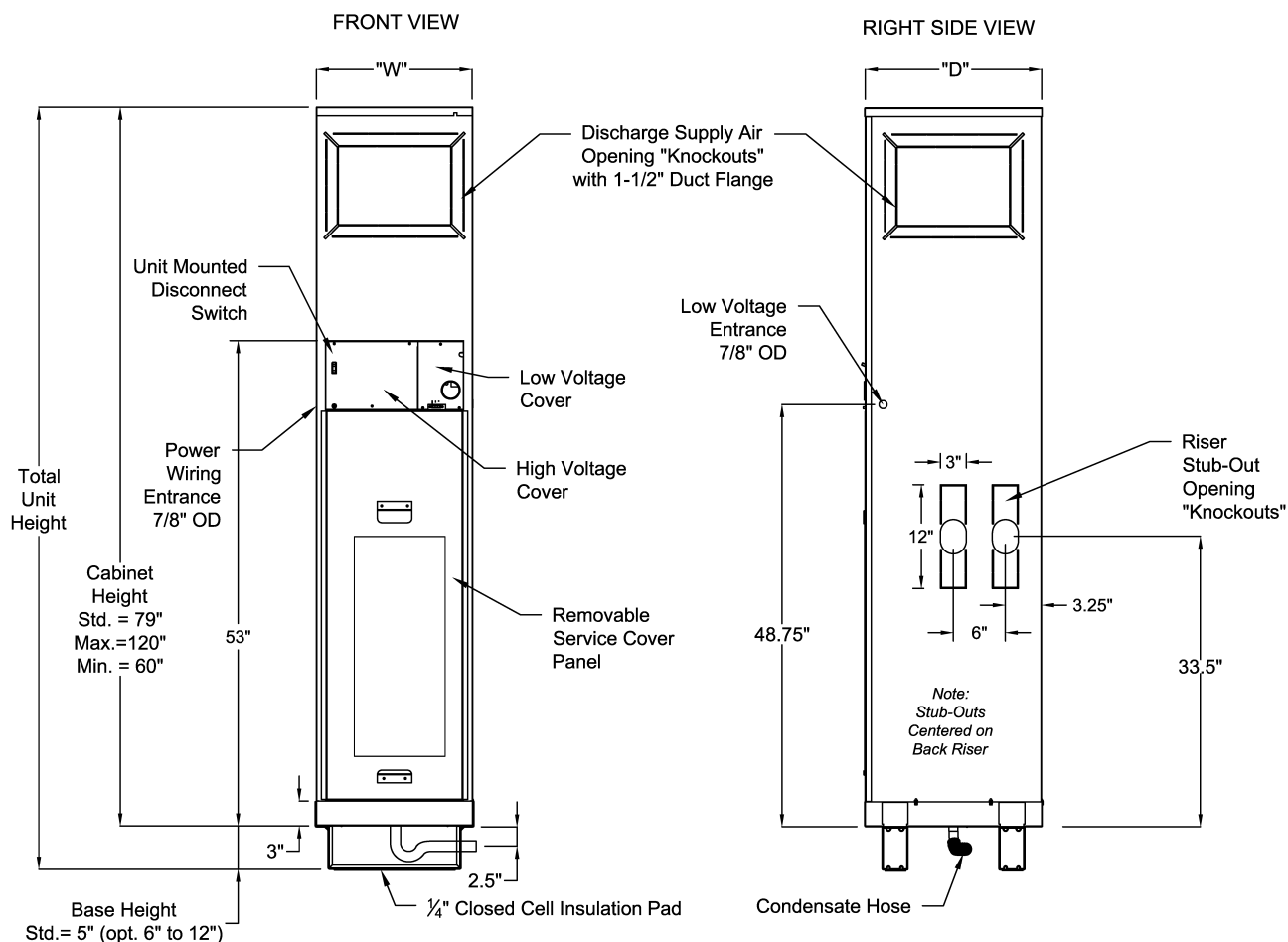
Model	EC Motor Speed	Min. SCFM	Rated SCFM	External Static Pressure (in w.g.)												
				0	0.05	0.1	0.15	0.2	0.25	0.3	0.35	0.4	0.45	0.5	0.55	0.6
				SCFM	SCFM	SCFM	SCFM	SCFM	SCFM	SCFM	SCFM	SCFM	SCFM	SCFM	SCFM	SCFM
020	WHISPER* MODE	N/A	N/A	110	100	95	85	75	70	60	55	40	30	-	-	-
	LOW	150	200	240	230	215	200	190	175	145	-	-	-	-	-	-
	MED			-	-	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	170	160	145	130	120	110	100	85	75	65	55	-	-
	LOW	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
	HIGH			-	-	365	355	350	340	330	320	310	305	295	285	275
040	WHISPER* MODE	N/A	N/A	190	175	170	155	135	120	110	95	85	70	75	-	-
	LOW	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
	HIGH			-	-	-	-	470	465	455	445	435	430	420	410	400
050	WHISPER* MODE	N/A	N/A	340	325	310	295	280	265	240	225	205	190	165	-	-
	LOW	375	530	520	510	490	470	450	430	410	390	375	-	-	-	-
	MED			-	-	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	340	325	310	295	280	265	240	225	205	190	165	-	-
	LOW	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
	HIGH			-	-	675	670	655	650	640	620	610	595	580	565	550
080	WHISPER* MODE	N/A	N/A	465	435	420	390	360	330	310	285	255	225	195	-	-
	LOW	600	820	800	760	740	720	695	660	640	620	-	-	-	-	-
	MED			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	465	435	420	390	360	330	310	285	255	225	195	-	-
	LOW	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
	HIGH			-	-	-	-	1110	1090	1070	1060	1040	1020	990	980	960
120	WHISPER* MODE	N/A	N/A	465	435	420	390	360	330	310	285	255	225	195	-	-
	LOW	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
	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.

Due to a policy of continuous improvement, data is subject to change without notice.

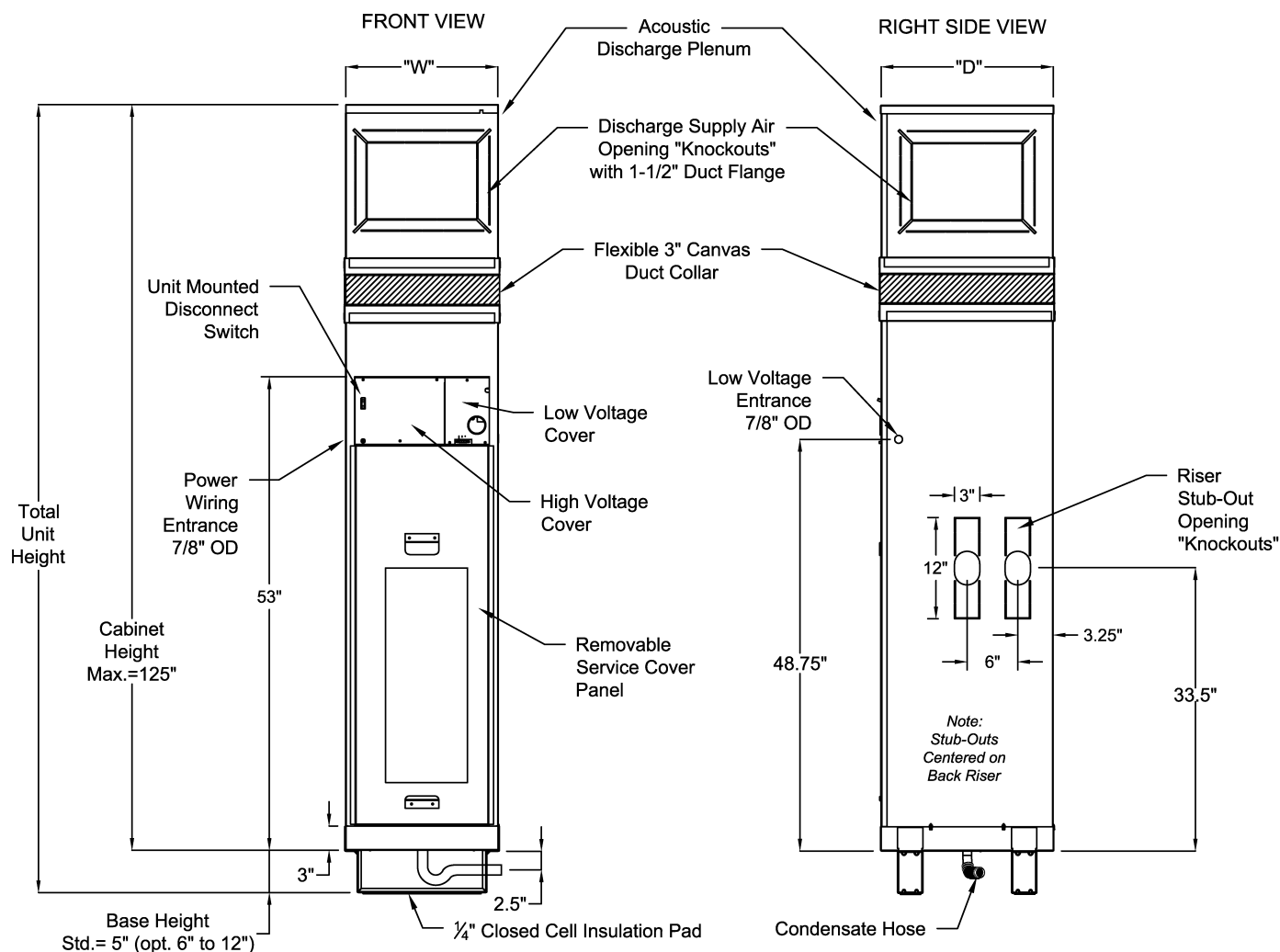
**VSHY - CABINET DIMENSIONS –STANDARD SILVER SERIES CABINET**

**VSHY - CABINET DIMENSIONS & SUPPLY DISCHARGE OPENING SIZES**

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

**Note:** 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.

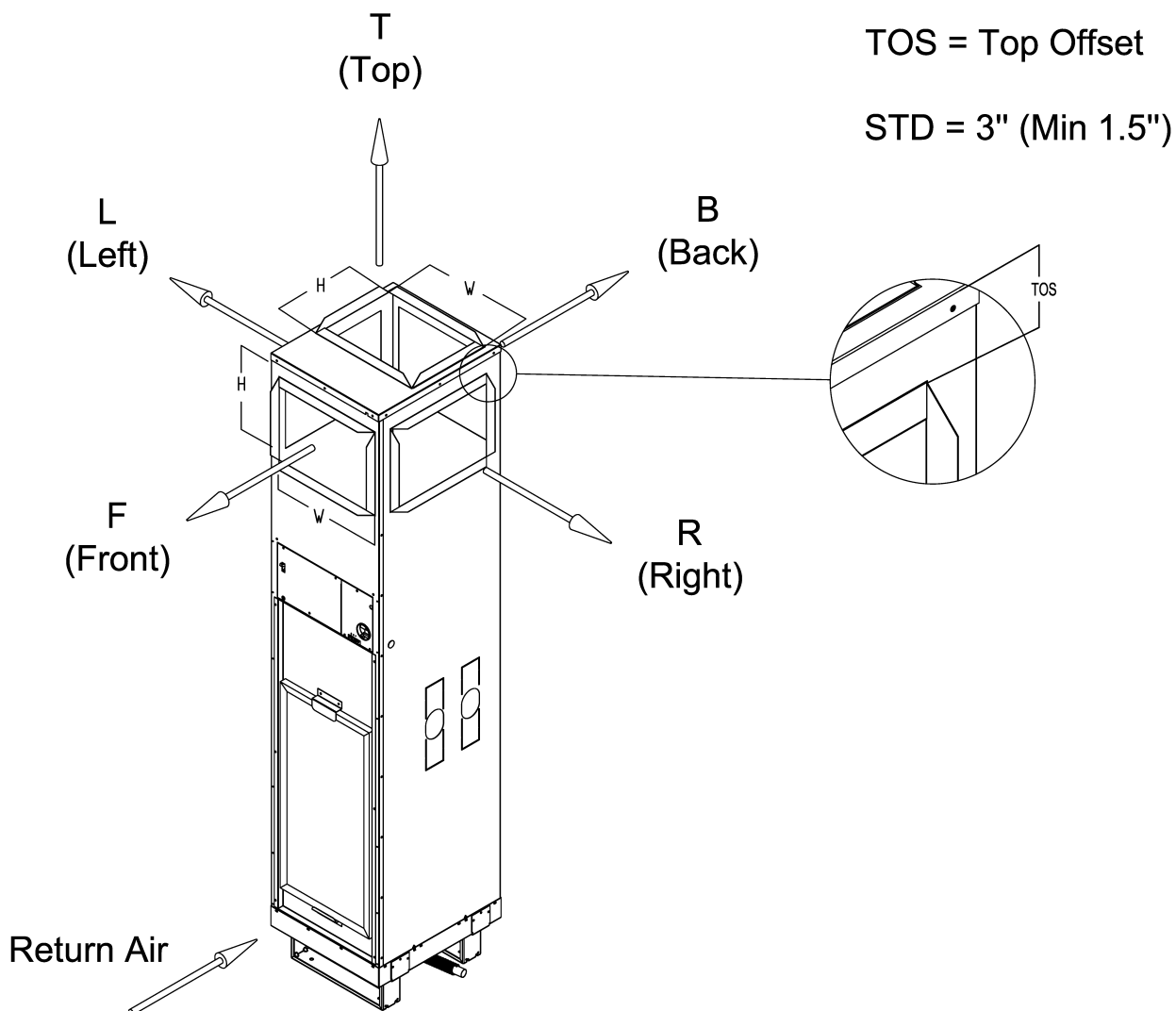
Lower riser knockout can be used to match previous generation fan cabinet riser stub-out locations.

Addition of unit mounted supply discharges will increase NC sound data above published levels.

**VSHY - CABINET DIMENSIONS –OPTIONAL GOLD SERIES CABINET**

**VSHY - CABINET DIMENSIONS & MINIMUM CABINET HEIGHTS (SILVER & GOLD SERIES)**

Model	Cabinet Size	Dimensions (in)			Minimum Cabinet Height (in)	
		"W"	"D"	"C"	Silver Series*	Gold Series
VSHY 020	X	16	17.5	14	60 / 72	80
VSHY 030						
VSHY 040						
VSHY 050	Y	18	20.5	16	60 / 74	82
VSHY 060						
VSHY 080	Z	22	24.5	20	60 / 74	86
VSHY 100						
VSHY 120						

\* Short Cabinet - 60in without horizontal (side) discharges

**VSHY - STANDARD DISCHARGE OPENING KNOCKOUTS**


Supply Air Opening Sizes

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

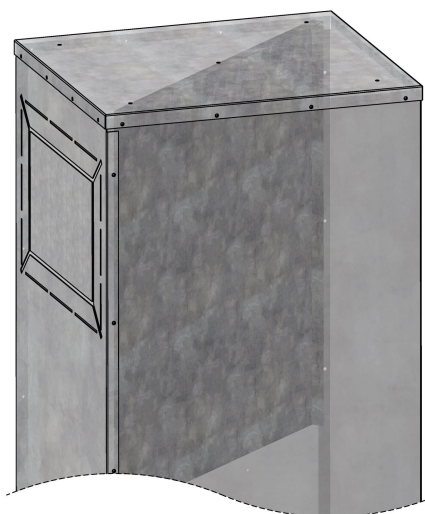
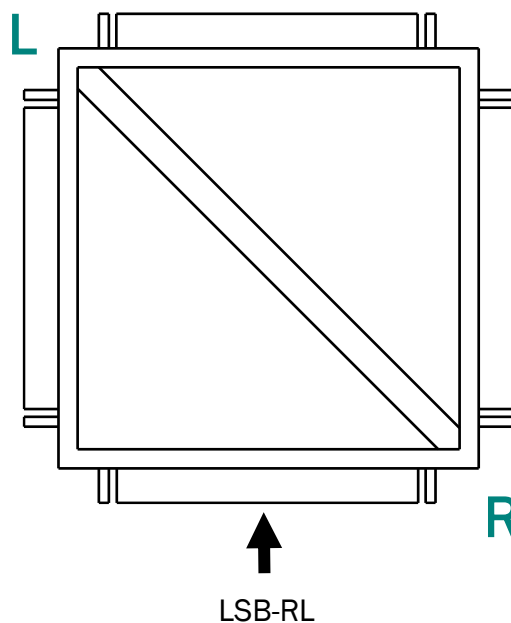
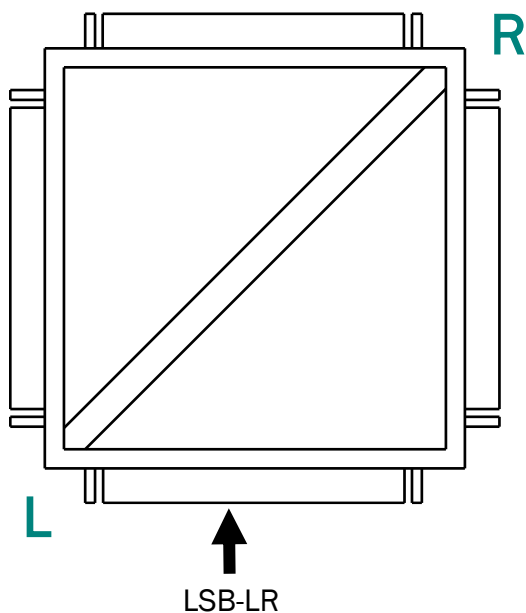
**Notes:**

- 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.
- Recommend adding supply baffles when installing unit mounted discharges. Contact factory for information.

### VSHY - OPTIONAL LINE OF SIGHT BAFFLE

Optional Line of Sight Baffles (LOSB) are supplied inside discharge plenum. The LOSB provides occupant privacy between adjacent rooms. Two configurations (LSB-LR or LSB-RL) of LOSB are available based on the unit discharge arrangement. LOSB is not available with optional Fresh Outside Air Duct intake.

TOP VIEW

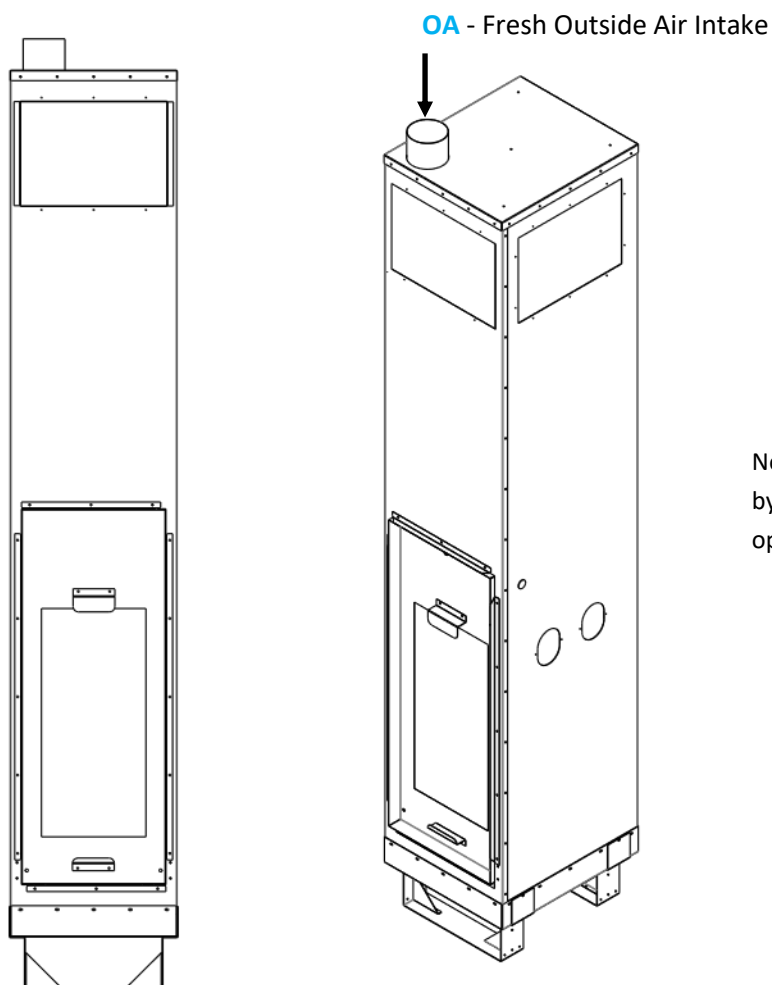


Line of Sight Baffle Configurations



### VSHY - OPTIONAL FRESH OUTSIDE AIR INTAKE

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.



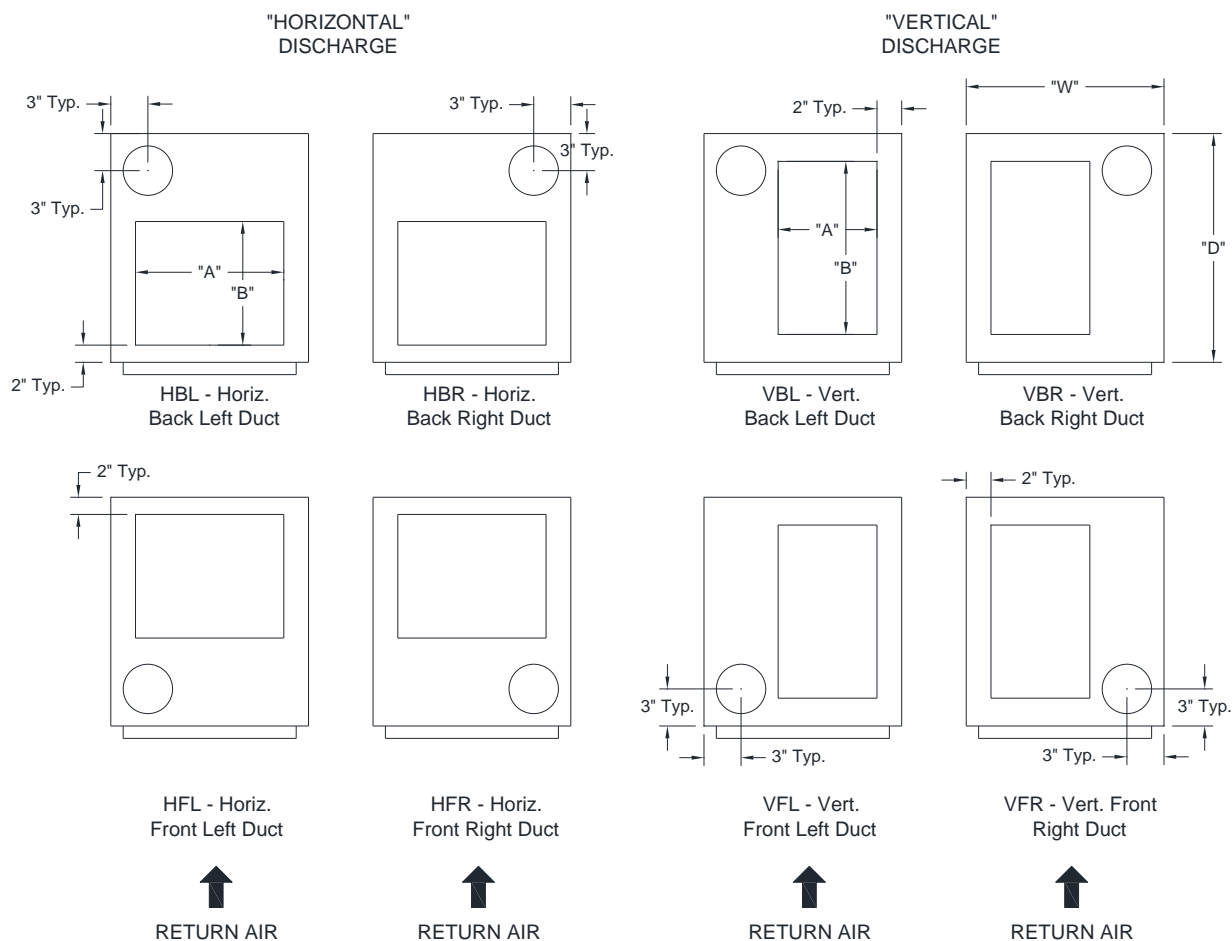
Note: Handling is referenced by facing the unit return air opening (front).



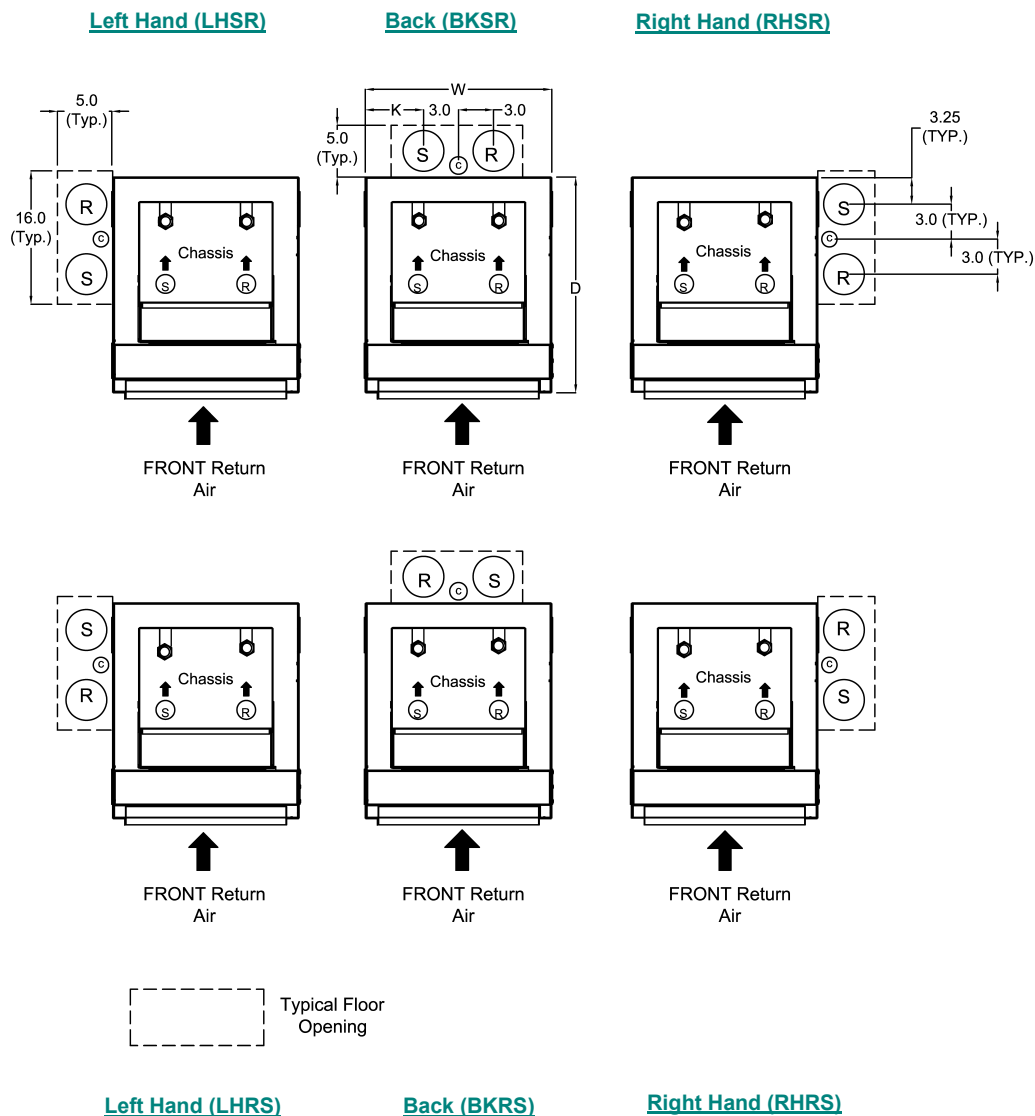
The introduction of cold conditioned outside air from a remote energy recovery ventilation device into the heat pump cabinet can result in potential freezing and bursting of mechanical components. All necessary precautions should be taken to temper Outside Air sufficiently above freezing point before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

### VSHY - OPTIONAL FRESH OUTSIDE AIR INTAKE—TOP DISCHARGE OPENINGS

Top discharge for VSHY 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.



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

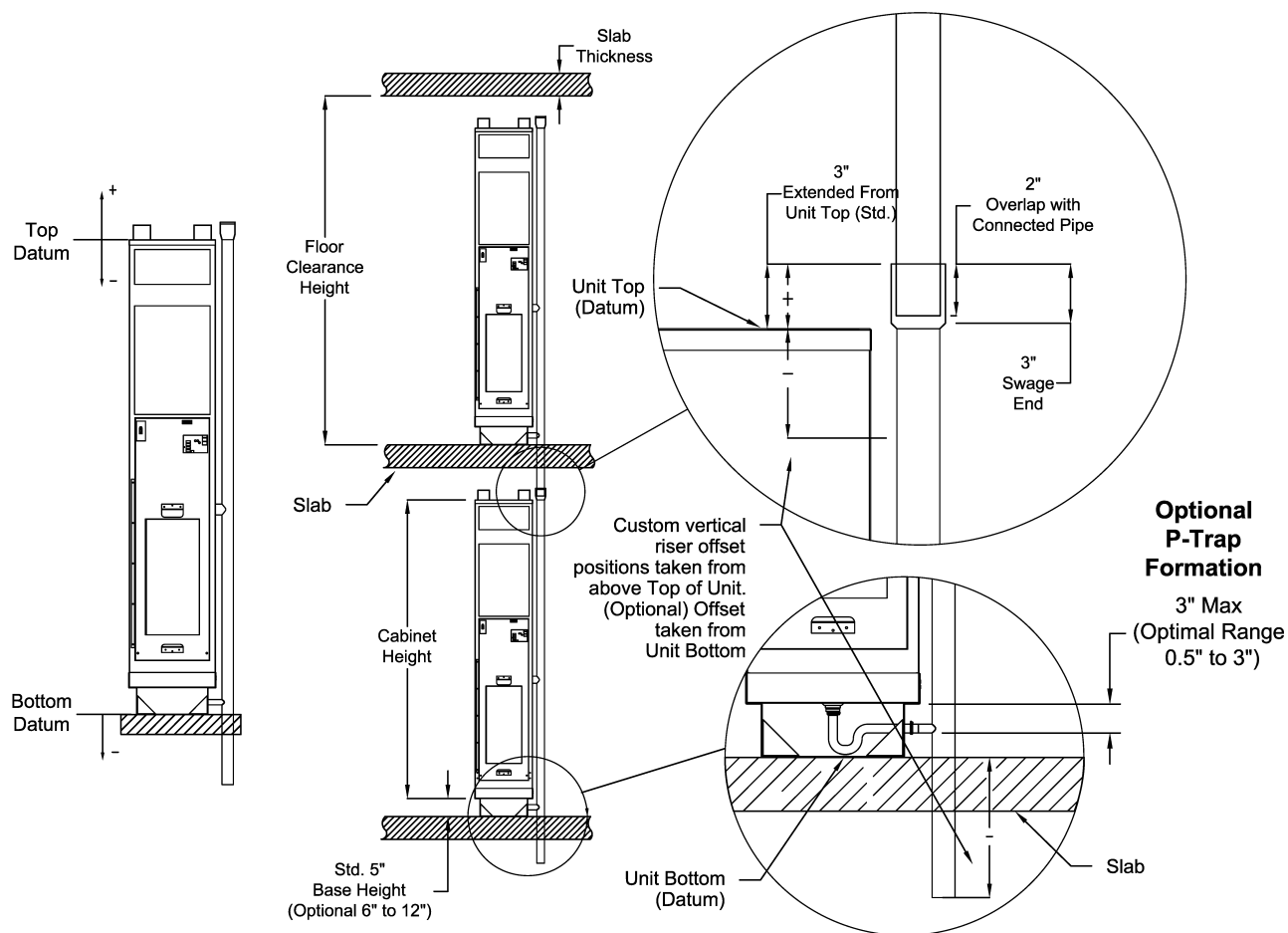
**VSHY - RISER HANDING CONVENTIONS**


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

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

**Note:**

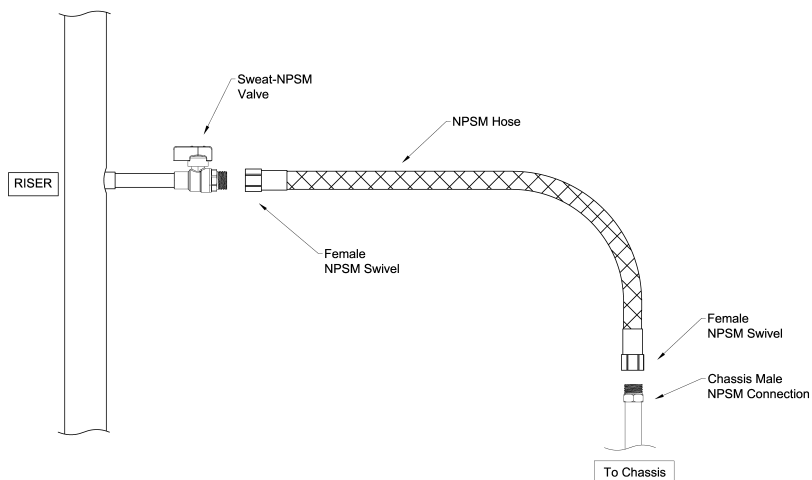
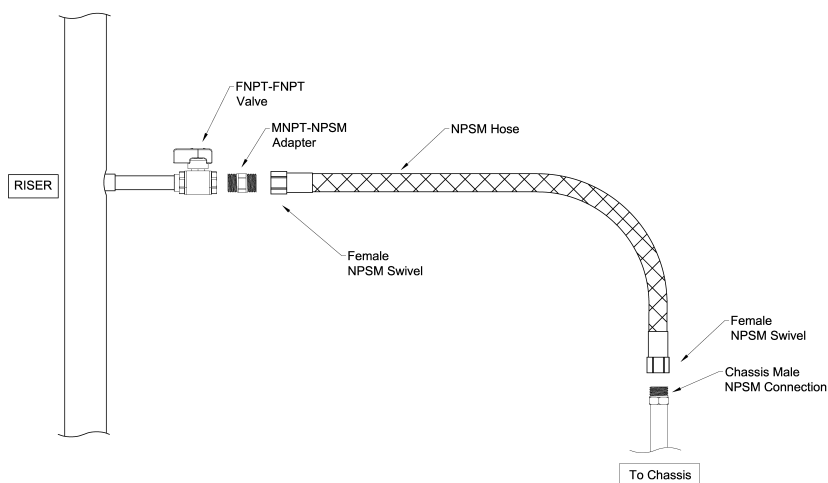
- Units do not come with a riser chase or riser sleeve. Depiction shown indicates typical coring openings.
- Supply & Return risers shown are 3-inch. Condensate riser shown is 1.25-inch.

**VSHY - RISER INSTALL DETAIL**

**Notes:**

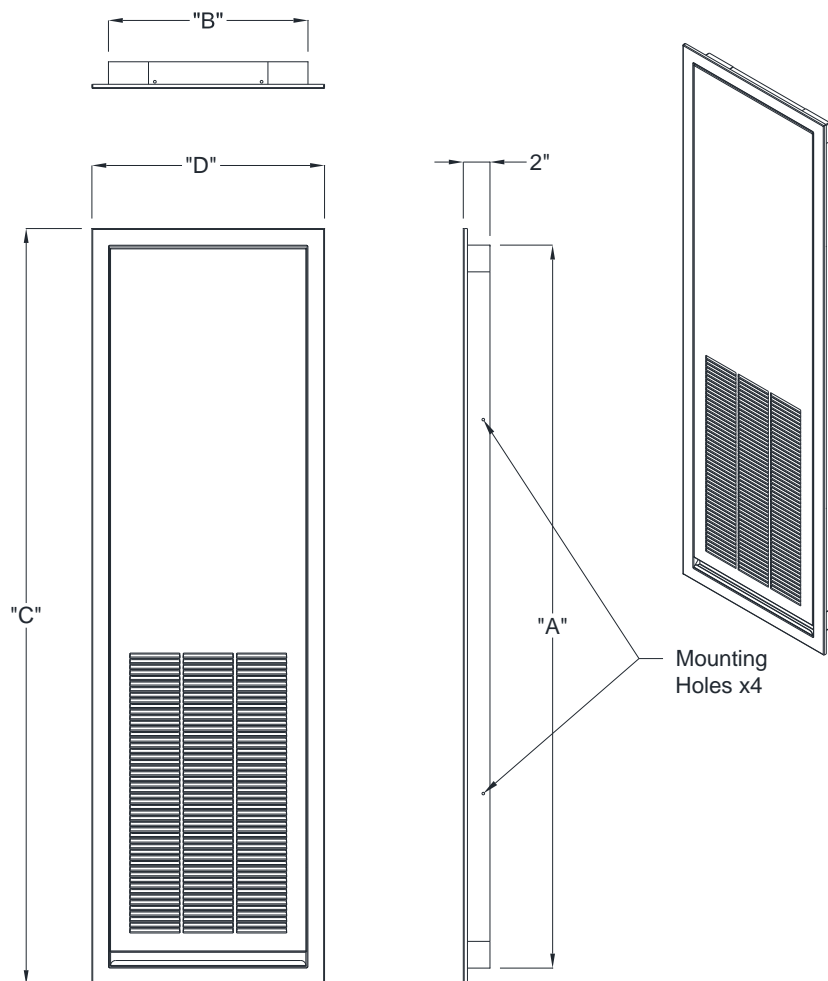
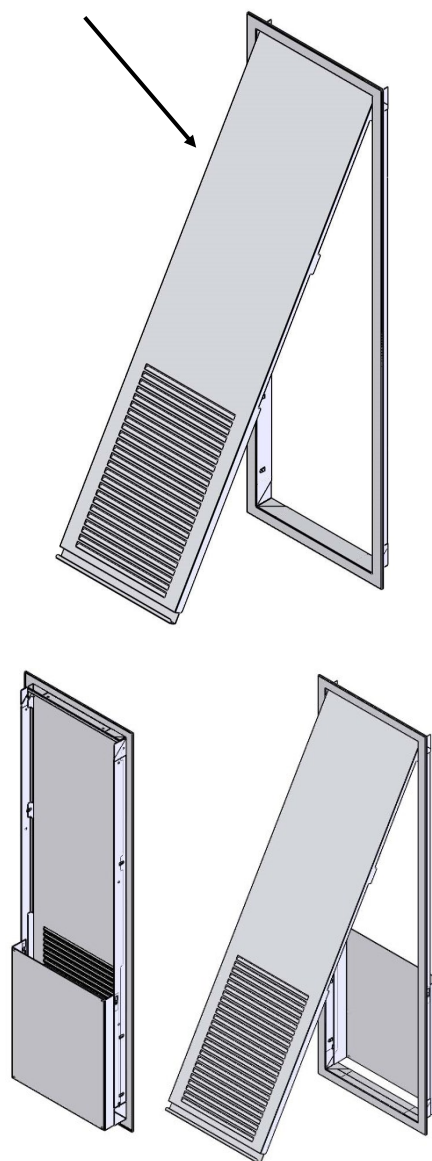
- Risers are positioned relative to cabinet using a standard "Top" Datum reference (optional "Base" Datum). Top Datum Offset indicates where the top of riser will be located relative to top of cabinet. A Base Datum indicates where bottom of riser will be located below the base of cabinet.
- Upon request 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').
- Supply extension tailpieces or reducers for joining dissimilar piping sizes are optional.
- Risers available in Type L and Type M copper.
- Condensate riser comes with optional 3/8-inch thick closed cell insulation to prevent condensation.
- Optional insulation on supply and return risers is available for 3/8-inch and 1/2-inch closed cell insulation.

**VSHY - HOSE KIT DETAILS**

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

**STANDARD VALVE - SWEAT CONNECTED NPSM**

**OPTIONAL FPT VALVE - FPT to FPT**

**Isolation Valve Notes:**

- Standard NPSM sweat connected isolation valves are for Factory or Field Supplied Copper Risers.
- Optional Female NPT valves are for Field Supplied Risers only. Includes MNPT-MNPSM hose adaptors with hose kit.

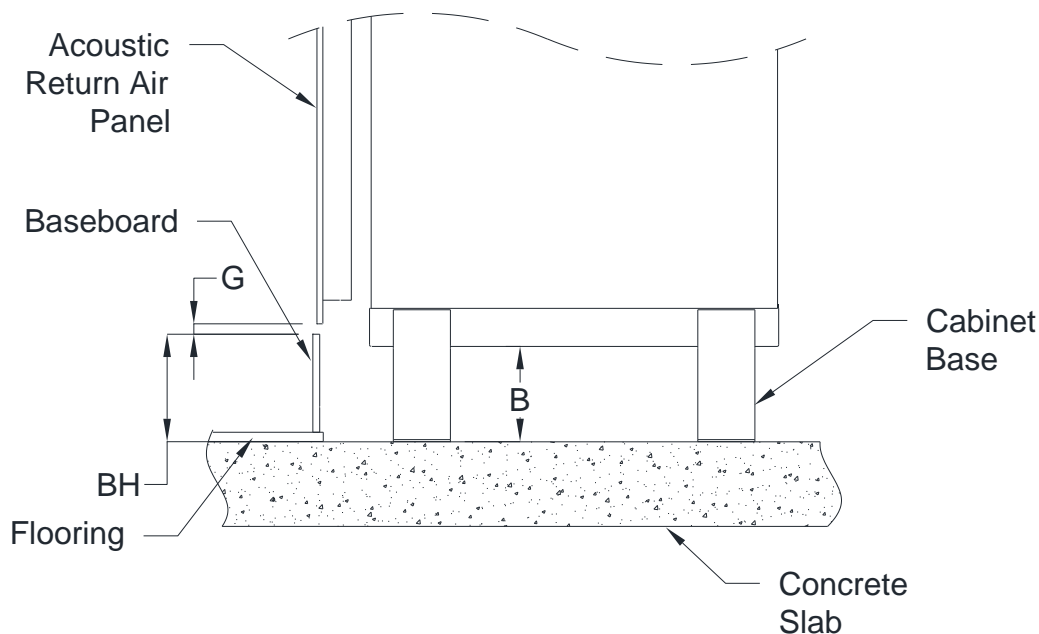
**VSHY - ACOUSTIC RETURN AIR PANEL**

 Removable Door  
 Panel


Acoustic Panel Sizes

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

☐ Field Installed Baffle<sup>1</sup>
**Notes:**

- 1) Backside of RA Panel is insulated with 1/2 inch insulation.
- 2) Return air panel supplied in standard powder coat 'appliance white' finish.

**VSHY - ACOUSTIC BASEBOARD HEIGHT CALCULATION**


Acoustic Panel Cabinet Base Height Calculation

**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:*

$$B = (5" + 1") + (0.5") - 1.5"$$

$$B = 5"$$

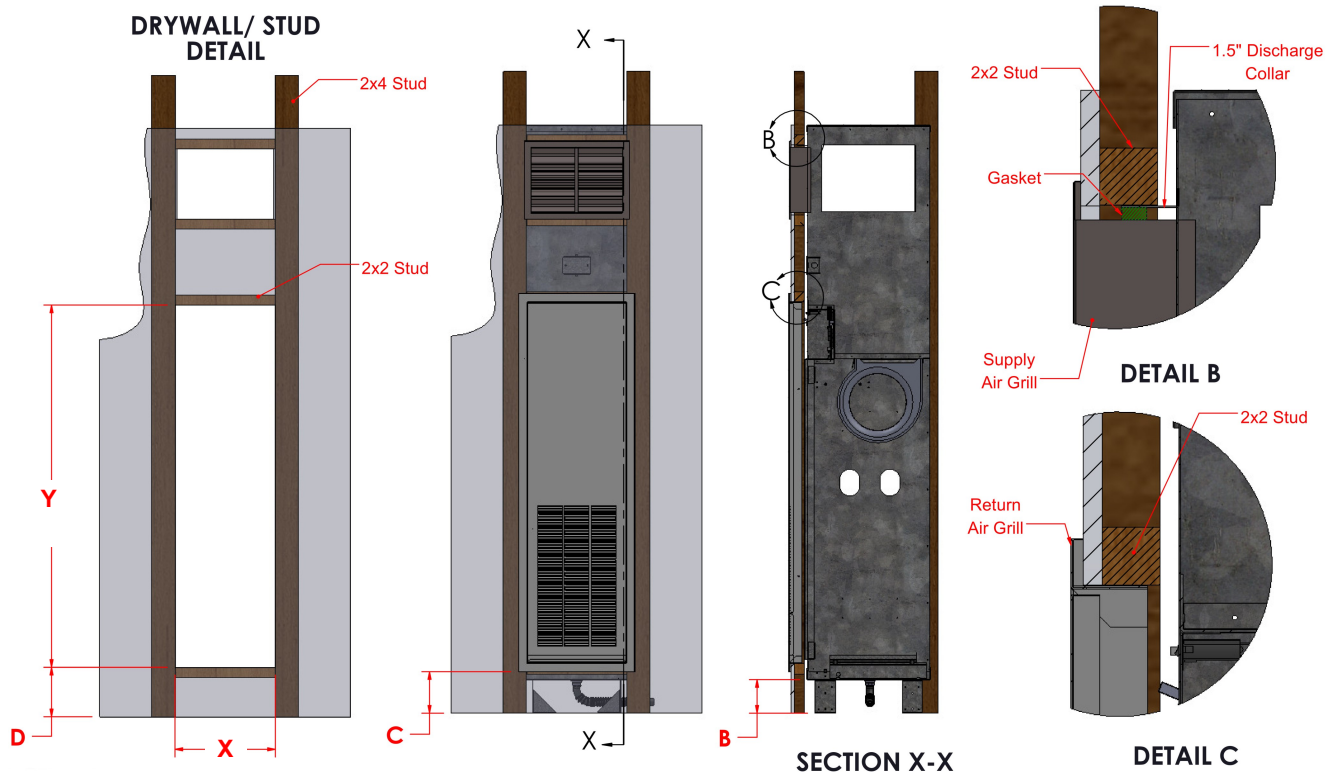
*Therefore a 5" Cabinet Base is required.*

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)

**VSHY - ACOUSTIC RETURN AIR PANEL ROUGH-IN FURRING DETAILS**


**B** = Cabinet Base Height (Min 5", increases in 1" increments)

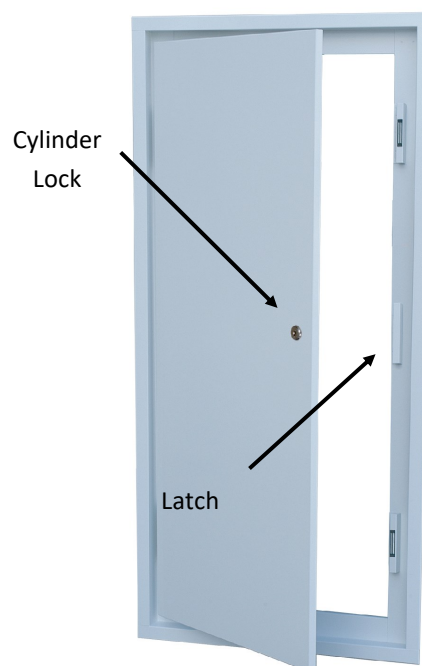
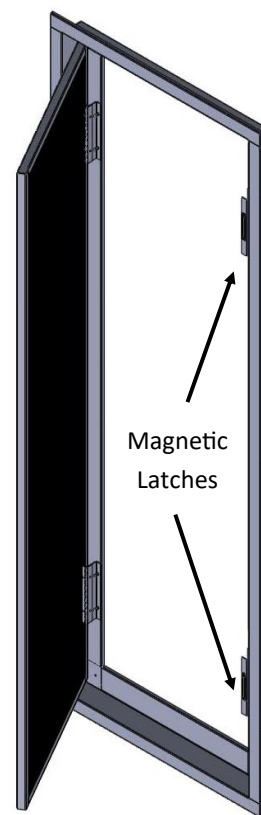
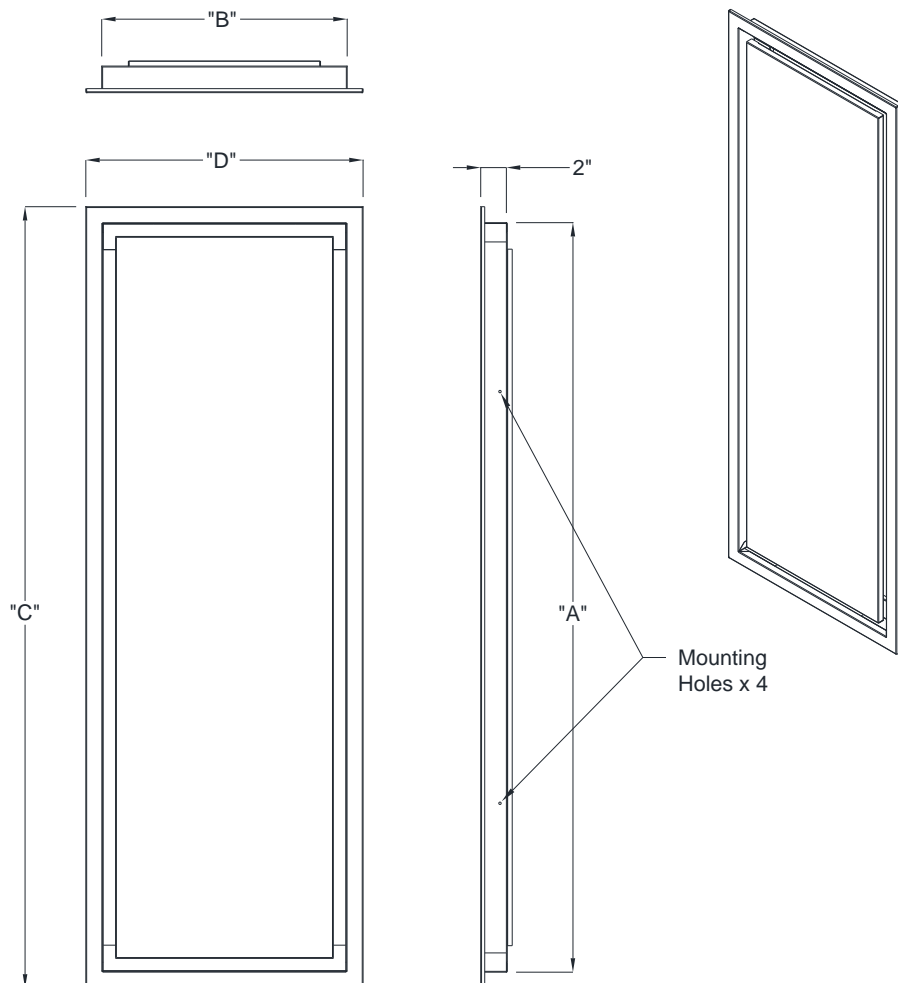
**C** = Flange Height Above Floor (**B** + 1.25")

**D** = Rough-In Height Above Floor (**B** + 2.5")

Acoustic Panel Rough-In Dimensions

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



**VSHY - PERIMETER RETURN AIR PANEL**


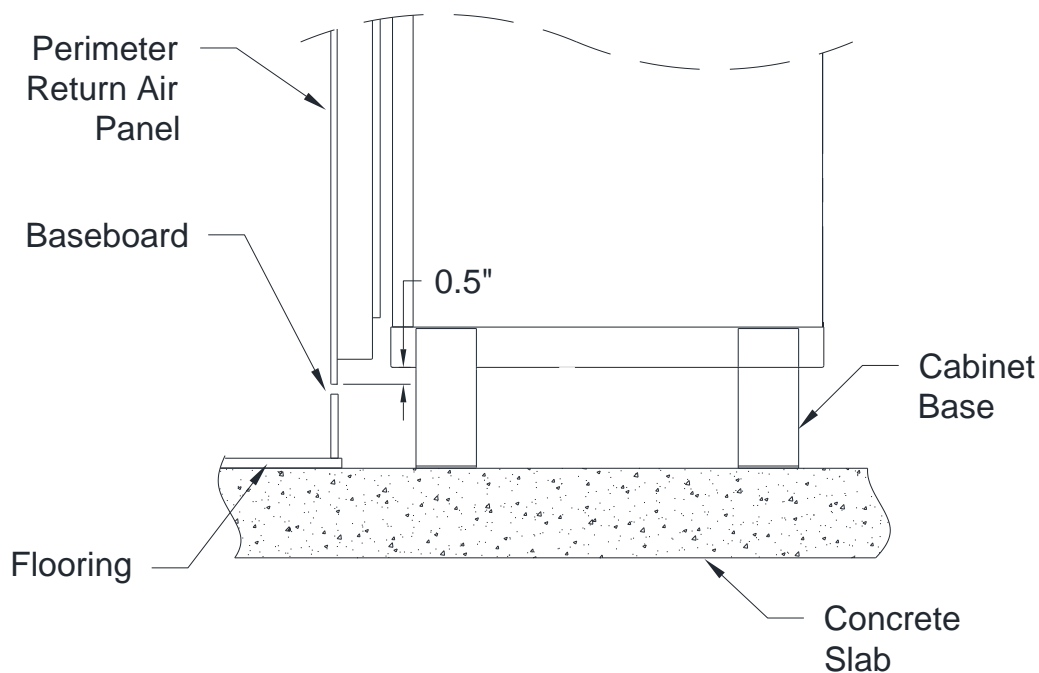
Perimeter Panel Sizes

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

**Notes:**

Backside of RA Panel is insulated with 1/2 inch insulation.  
 Return air panel supplied in standard powder coat 'white' finish.

☐ Optional Perimeter Locking

**VSHY - PERIMETER RETURN AIR PANEL - FURRING DETAILS**


Perimeter Panel Cabinet Base Height Calculation

**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:*

$$B = (5" + 1") + (0.5") + 0.5"$$

$$B = 7"$$

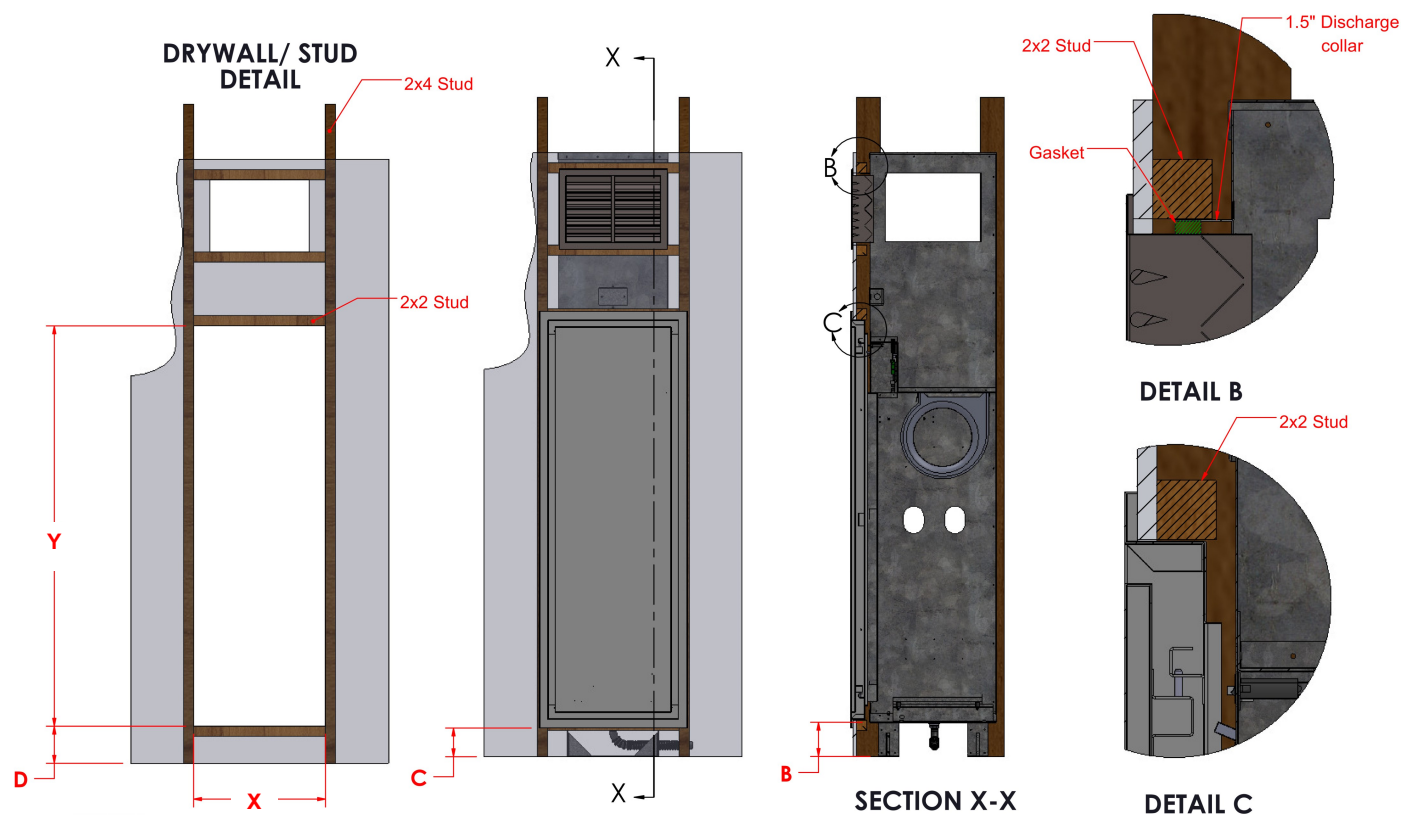
*Therefore a 7" Cabinet Base is required.*

**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)

**VSHY - PERIMETER RETURN AIR PANEL FURRING DETAILS**


**B** = Cabinet Base Height (Min 5", increases in 1" increments)

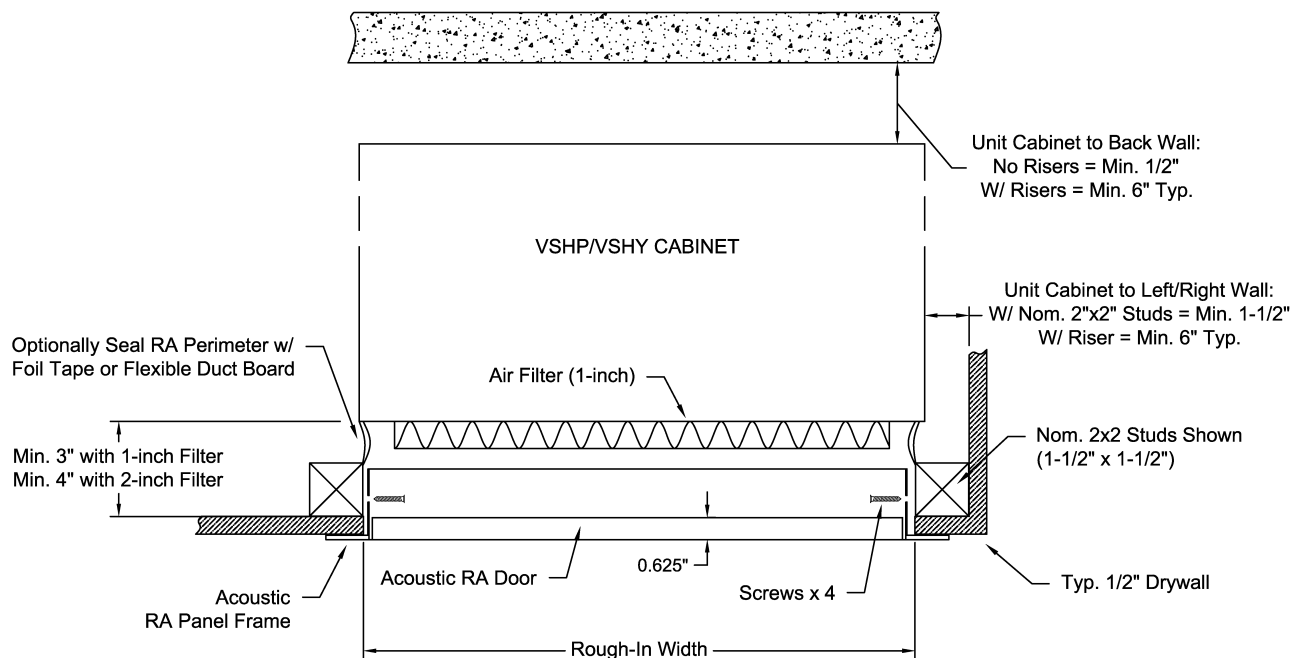
**C** = Panel Flange Height from Base of Cabinet ( **B** - 5" )

**D** = Rough-In Height from Base of Cabinet ( **B** + 0.625" )

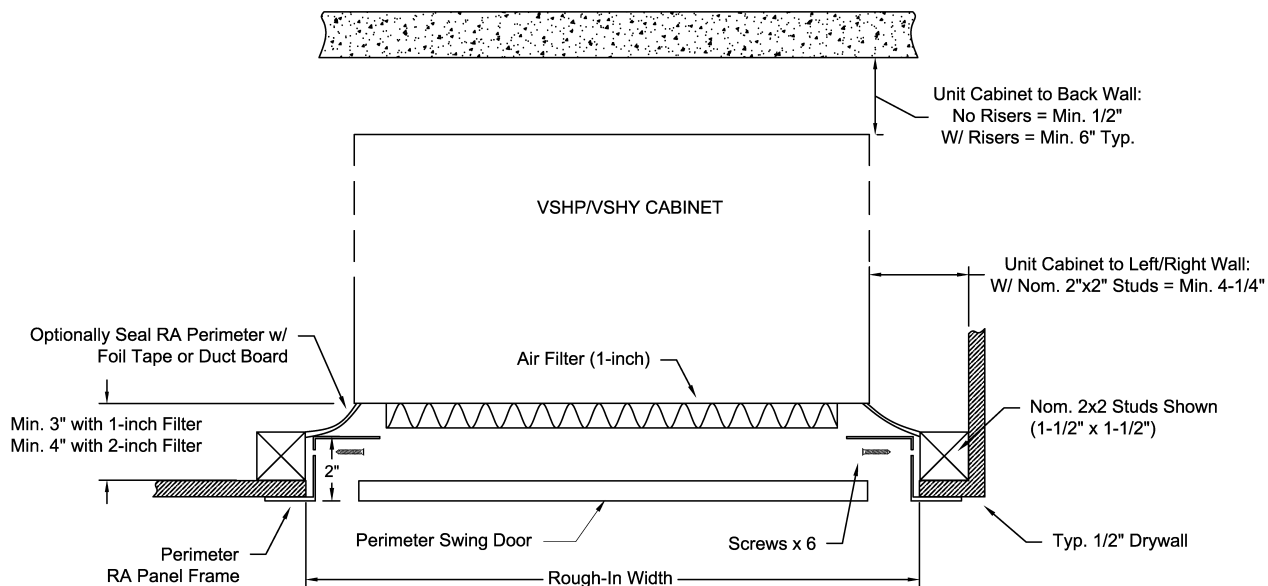
Perimeter Panel Rough-In Dimensions

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

**VSHY - RETURN AIR PANEL CLOSET FURRING DETAILS**



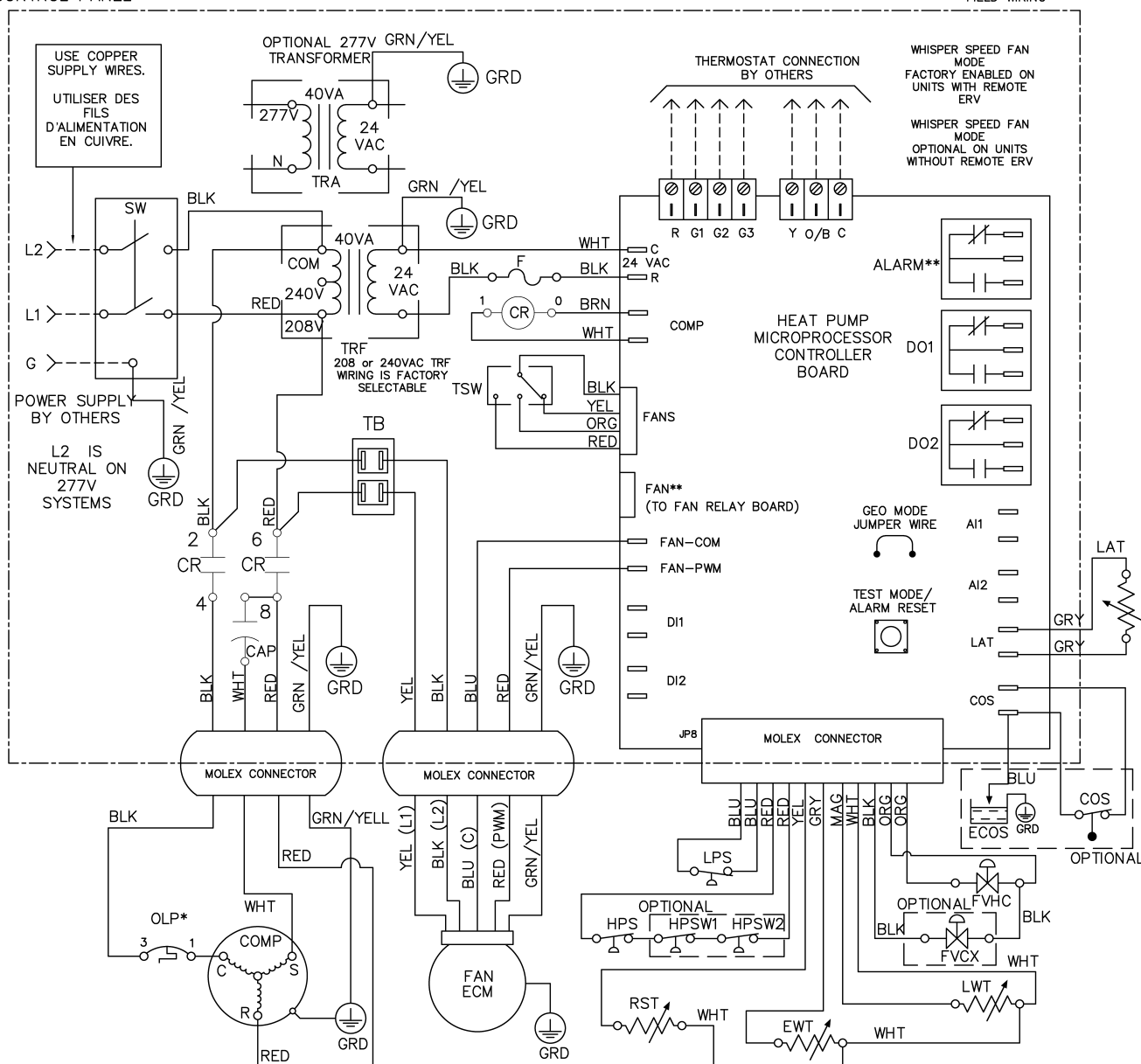
**Acoustic Panel Furring Detail—Typ. 2x2 Framing Plan View**

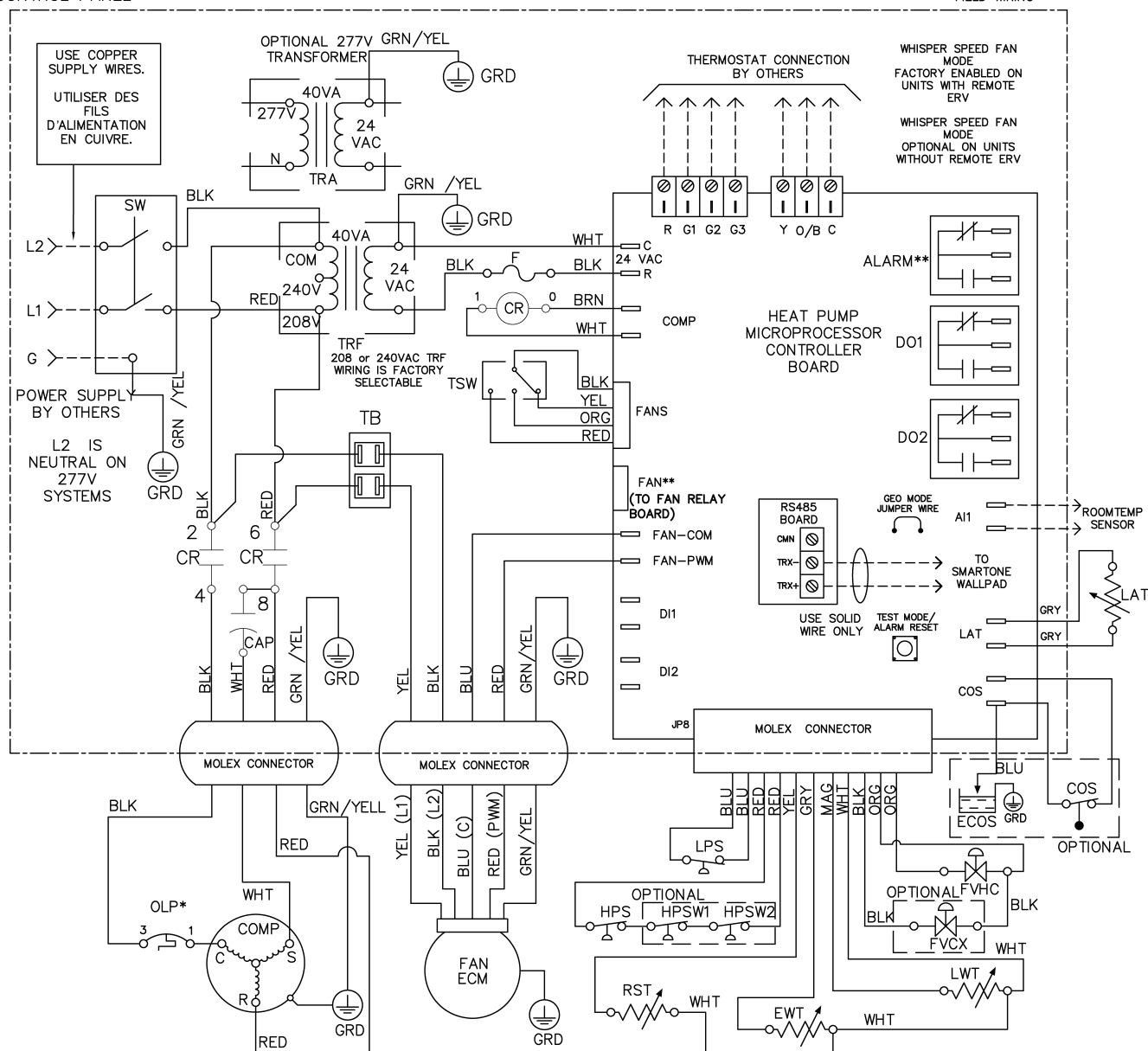


**Perimeter Panel Furring Detail—Typ. 2x2 Framing Plan View**

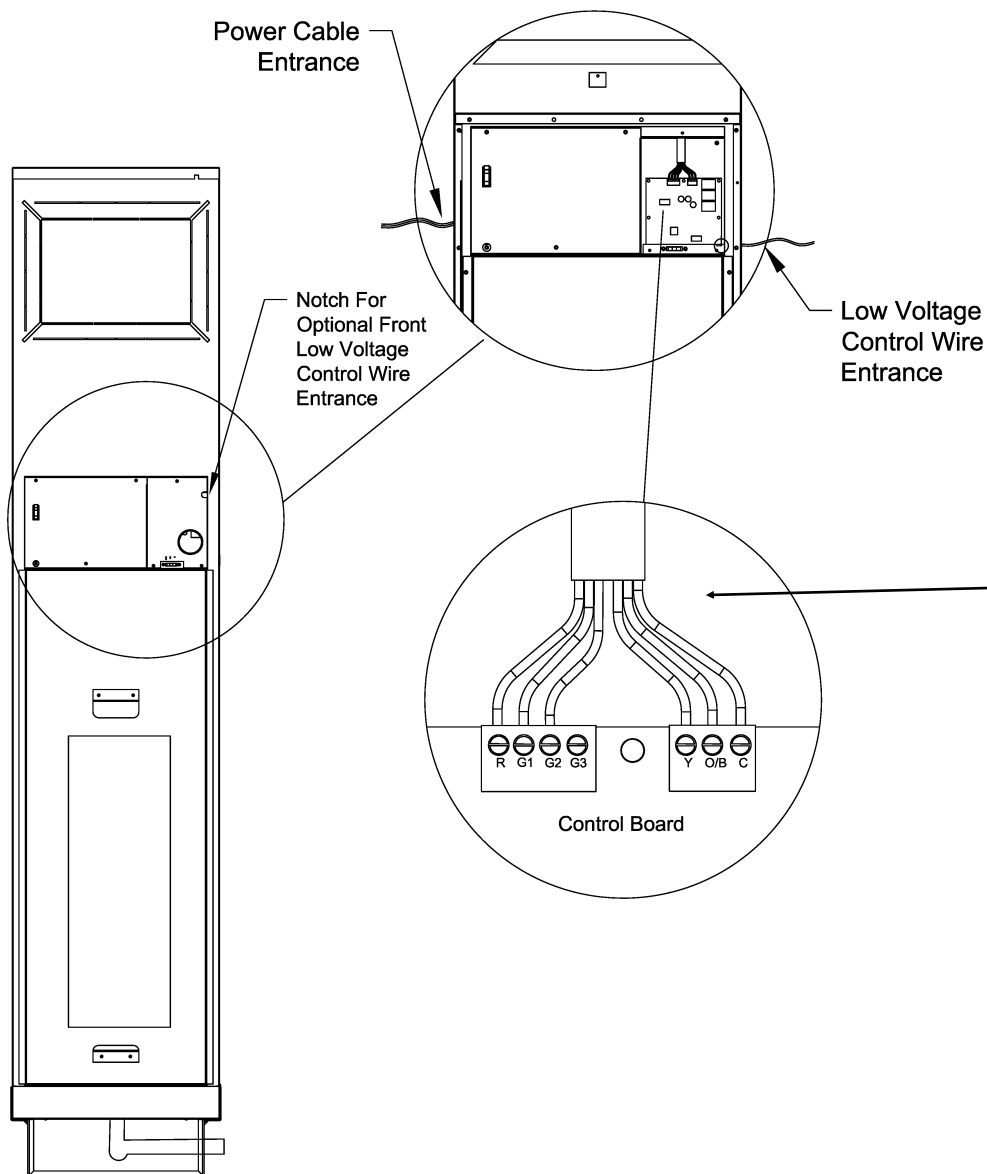
**Notes:**

- Return air panel should be centered in front of the unit return air opening.
- With rear/side risers, allow for min. 6" typical clearance at the rear/side of the units.
- For additional sound attenuation insulate the closet cavity with acoustical insulation.
- Acoustic Sound Baffle not shown with Acoustic Panel





**VSHY - ELECTRICAL CONTROL WIRING**



**Heat Pump Thermostat:**

**R** = 24VAC  
**G1** = Low Fan Speed  
**G2** = Med Fan Speed  
**G3** = High Fan Speed  
**Y** = Heating  
**O/B** = Cooling (Compressor)  
**C** = Common (Optional)

**Heat/Cool Thermostat:**

**R** = 24VAC  
**G1** = Low Fan Speed  
**G2** = Med Fan Speed  
**G3** = High Fan Speed  
**Y** = Cooling (Compressor)  
**O/B** = Heating (W)  
**C** = Common (Optional)

## **VSHY - CONTROLS**

### **Fan Control with EC Motors (ECM)**

Pulse Width Modulated (PWM) signal is utilized to control fan motor speeds 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.

### **Optional Whisper Mode**

When optional Whisper mode is enabled and there is no call for heating or cooling, the unit will run the fan at an ultra low speed to circulate the fresh air being introduced into the optional unit snorkel.

### **Thermostat Connection**

A minimum 4-wire thermostat cable is required for basic single fan speed thermostats where common wire is not required. A 5-wire cable is recommended for most modern thermostats.

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:

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. 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

## **SEQUENCE OF OPERATION**

### **Hard Lock-Out**

In the event the board has entered a Hard Lock-Out state control board must be reset by pressing the TEST button on the control board.

### **Call Cooling**

When a call for compressor (cooling) request is made, the motorized auto shut-off control valves will divert water flow through coaxial coil. 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
- Fan-On timer
- Compressor Anti-Short Cycle 7 min. timer has not expired
- Refrigerant Suction Temperature (RST) Alarm
- Entering Water Temperature exceeds threshold
- Leaving Water Temperature exceeds threshold

### **Call for Heating**

When a call for heating request is made, the motorized auto shut-off control valves will divert water flow through the hydronic hot water heating coil. When call for heating request is terminated, the motorized auto shut-off control valve will close and the blower fan will remain open until the fan off timer expires.

### **Low-Pressure Bypass**

During a call for compressor (cooling), the low-pressure switch is bypassed for the first 3 minutes of compressor operation to prevent nuisance low-pressure start-ups.

### **RST - Refrigerant Suction Alarm**

Refrigerant suction temperature sensor is set to 32°F. If the temperature drops below 32°F unit will alarm and stop compressor operation.

### **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.

### **Random Wait Time on Unit Power Up**

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



## **VSHY - Mechanical Specification**

### **1 GENERAL**

Vertical stacked Hybrid Heat pump units shall be Omega VSHY Series. Units shall provide scheduled capacities at the ampacity and voltage shown on the drawings. Specified airflow shall be at the scheduled external static pressure and shall include the effects of a wet coil and clean filter.

Each unit shall be factory tested and ship factory-charged with R-454B refrigerant. All units from 3/4 to 3 Tons shall be tested and certified to ASHRAE/ANSI/AHRI/ ISO 13256-1, UL60335-2-40, and ETL listed for United States and Canada. Each unit shall have factory affixed label showing ASHRAE/ANSI/AHRI/ISO and ETL logos. Cabinets and refrigeration chassis shall be factory wired and pre-piped.

### **2 CABINET**

**2.1** The vertical stacked hybrid heat pump units shall be **Omega VSHY Series**. Units shall provide scheduled capacities at the ampacity and voltage specified.

**2.2** The cabinet shall be 20-gauge galvanized steel with riveted internal components for rigidity. Cabinet shall have internal surfaces insulated with 1 inch thick, 3.5 lbs. high-density, mold resistant, thermal and acoustic insulation. Insulation shall meet NFPA 90, UL-181, and ASTM-C1071 standards and insulation shall have a flame spread of less than 25, and a smoke developed classification of less than 50 per ASTM E-84 and UL 723.

**2.3** Physical dimensions of each unit shall be accommodated within furring / ceiling-slab spaces provided as shown on the architectural drawings

**2.4 (Optional GOLD Series)** The cabinet shall be sectionalized using a factory installed canvas duct collar for acoustic and installation purposes. The lower section shall include the risers, blower and fan motor assembly, all controls, and removable refrigeration chassis. The upper section shall be an acoustic discharge plenum lined with 1 inch thick, 3.5 lbs. high-density, mold resistant, thermal and acoustic insulation. Final cabinet height shall be coordinated with the installing contractor and architect. The discharge plenum shall be designed to be fastened to the underside of the concrete slab with field cut "Knockout" discharge openings. Rigid connections will not be accepted. A factory supplied flexible canvas connection shall be provided between the upper and lower sections. Heat pump manufacturer shall factory attach flexible connection to the plenum section.

**2.5** Provide a minimum 5" (optional 6" to 12") high stand factory installed to the bottom of the sheet metal cabinet to elevate the unit 5" above the floor.

**2.6** A removable inner chassis service panel allowing service access to the fan and compressor compartment shall be provided with each unit.

**2.7** The drain pan shall be minimum 18-gauge stainless steel or **(Optional)** galvanized. The drain pan shall have optional condensate overflow switch. The drain pan outlet shall be readily accessible for cleaning with a 7/8 inch OD copper drain connection. Unit shall be provided with a flexible p-trap condensate hose for connection to the condensate riser. Drain pan shall be removable to allow for access and inspection of p-trap and drain connection to riser.

**2.8** Factory installed supply and return risers shall be (Type L) (Type M) copper, with (factory) (field) mounted shut-off ball valves on each supply and return riser. Valves shall be brass and rated for 400

psig. A (Type L) (Type M) condensate riser shall be (factory) (field) installed. Risers sizes shall be installed according to building plans.

**2.9** Risers shall have a (field) (factory) provided 3-inch deep swage. Transition pieces & expansion joints shall be field supplied.

**2.10** Unit cabinet shall come with supply discharge opening "knockouts". An optional noise attenuating insulated privacy air baffle (LOSB) shall be provided, if available, for horizontal supply discharge openings. All cabinet discharge openings shall include 1-1/2 inch dry-wall flange around the full opening perimeter.

**2.11** Supply ducts shall not be rigidly attached to the cabinet and shall be acoustically isolated from cabinet using flexible canvas connections. Contractor shall install flex connection on all discharge openings. There shall be no rigid connection to supply-air discharge grilles or supply ducts except on Gold Series units designed with split casing.

**2.11** Each unit shall have an (Acoustic) (Perimeter) return air panel. The panels shall be insulated with 1/2 inch thick, lined fiberglass insulation. The panel shall be easily removable without tools to allow access to the filter, chassis compartment and service disconnect switch.

**2.12** A field installed Return Air Baffle shall be provided with each Acoustic RA Panel for enhanced sound attenuation. Installing contractor shall ensure there are adequate clearances when framing closet opening. Return Air Baffle is shipped loose and field installed.

**2.13 (Optional)** Provide optional line of site baffles (LOSB) on all units with multiple horizontal unit outlets.

**2.14 (Optional)** Unit shall have an optional Fresh Outside Air Duct intake located at the top of the unit for introducing fresh outside air into the unit.

**2.15 (Optional)** Each unit shall be (field) (factory) supplied with double deflection supply grilles as shown on the plans. (Field) (Factory) provide opposed blade balancing dampers on units with multiple outlets as indicated on the plans.

**2.16 (Optional)** Unit shall have an optional 2-inch filter rack with MERV 13 rated pleated filter.

**2.17 (Optional)** Perimeter Return Air Panels shall have provision for a unit mounted thermostat to meet ADA requirements. Thermostat cable shall use a moxex plug connector.

**2.18** The drain pan shall come standard with an electronic condensate overflow switch to stop compressor operation if water is detected.

### **3 FAN & BLOWER**

**3.1** Each unit shall include a factory mounted forward curved, double inlet double width centrifugal direct drive fan and motor assembly with internal overload protection. The blower fan assembly shall be positioned horizontally from a sheet metal blower deck. Single inlet fans are not accepted.

**3.2** Units shall be supplied with an ECM fan motor as standard. Fan motors speeds shall be field selectable by wiring thermostat to required fan speed terminals.

### **4 REFRIGERATION CHASSIS**

**4.1.** Provide high temperature and pressure rated water hoses for connection of the risers to the chassis. The hoses supplied shall be constructed with an inner core of rubber, a stainless-steel metal braid, and rubber outer covering. Fittings shall be brass construction. Hoses shall carry a pressure rating of 600 psig.

## **VSHY - Mechanical Specification (CONT'D)**

**4.2.** The compressor chassis shall be mounted and vibrationally isolated on 12-gauge slide rails using a double isolated base. Compressor shall have an acoustical enclosure ensuring compressor noise is isolated from air stream. Provide plug type electrical connections for chassis control and power connections allowing for easy removal of the chassis from the front of the cabinet.

**4.3** The refrigeration circuit shall have two service valves, for measuring high and low refrigerant pressure, in the chassis compartment enclosure. The refrigerant circuit shall contain a thermal expansion valve (TXV) refrigerant metering device, high and low safety pressure switches, a suction line freeze sensor, entering and leaving water temperature sensors.

**4.4** Chassis shall employ dual 2-way valves mounted in the chassis compartment to minimize water pressure drop across water circuit. Water flow shall be directed through either the coaxial condenser coil during a call for cooling, or through hydronic heating coil during a call for heating. During a no demand situation, controls valves can be closed to reduce pumping power requirements. Units with 3-way valves are not accepted. By-pass units shall be set in the field using the DIP switch setting on the control board.

**4.5** The hydronic heating coil shall be integral to the refrigeration coil. Units with separate heating and cooling coils are not accepted. Integrated hybrid coil shall minimize air pressure drop and maintain efficient fan performance. The Air side coils shall have copper tubes mechanically bonded to aluminum fins. Coils shall be sized to meet scheduled performance for cooling and heating.

**4.6** Compressor shall be hermetically sealed type with internal thermal overload protection. Compressor shall be mounted on rubber vibration isolators.

**4.7** Water side condenser heat exchanger shall be coaxial type with steel outer tube and copper inner tube. Condenser shall be rated at 500 psig water side and 650 psig refrigerant side.

**4.8 (Optional)** The chassis shall employ optional autoflow balancing valve mounted in the chassis compartment to maintain specified unit water flow rate over 2-80 psig differential water pressure. Auto flow balancing valve shall be field serviceable.

**4.9 (Optional)** The chassis shall employ optional y-strainer with #20 mesh screen mounted in the chassis compartment to filter any debris and shall be field serviceable.

**4.10 (Optional)** Air coil shall be epoxy coated to aid in the prevention of premature corrosion (formicary, environmental) with minimum 1000 hour salt spray ASTM B117 protection.

**4.14 (Optional)** Optional cupro-nickel coaxial coil shall be provided in lieu of standard copper coaxial for protection from loop water corrosion and fouling and with use in open loop systems.

microprocessor controller. Sensor parameters and timers shall be field adjustable to meet site conditions. Controller shall have the following safety switches and sensors:

- Low Pressure Safety Switch
- High Pressure Safety Switch
- Condensate Overflow Switch
- **(Optional)** Entering Water Temperature sensor
- **(Optional)** Leaving Water Temperature sensor
- Suction line "freeze-stat" temperature sensor
- **(Optional)** Supply Air Temperature sensor
- Compressor Anti-Short Cycle timer
- Water Valve Open and Closed timer
- Low-pressure bypass timer
- Random wait time on unit power up
- Fan-On and Fan-Off timer

**5.3** Standard Basic control board shall have High Pressure, Low Pressure, Suction Line (Refrigerant Suction Temperature) sensor alarming capability. Motor speeds can be field programmed when necessary to meet site specific conditions.

**5.4 (Optional)** Deluxe Microprocessor controller shall have embedded webpage diagnostic capability for status updates, quick servicing and troubleshooting on site. Controller shall have data logging with stored alarm states, supply and leaving water temperature, suction line temperature, and supply air temperature readings. Access to controller status and data log shall be available through a smart phone device, tablet or laptop.

**5.5** Microprocessor controller shall have 'future proof' feature to accept software updates. Microprocessor board shall be capable of being field updated with newer software patches or custom software as needed.

**5.6** Thermostats shall be remote mounted. Thermostats can be either Heat/Cool or Heat Pump type. Thermostat shall provide 24V signal to G (fan) terminal during a call for cooling or heating.

**5.7** Unit shall provide 3 fan speeds. Fan speeds are field selectable for Low, Medium or High fan speed.

**5.8** ECM speed settings are field configurable using to meet site CFM and static requirements.

**5.9 (Optional)** Fan operation shall have a low fan speed "whisper mode" for air circulation when there is no call for compressor to circulate Outdoor Fresh Air.

**5.10 (Optional)** SmartOne® compatible RS-485 communication add-on board and remote temperature sensor shall be provide for integration with SmartOne® building systems.

## **5 CONTROLS**

**5.1** Each unit shall be factory wired with all necessary controls. Each unit shall come standard with a microprocessor controller mounted in the electrical box. Electrical box shall contain compressor and fan motor contactor, 24 volt control power transformer, terminal block for low voltage field wiring connection, and terminal block for main power electrical connection, unit mounted service disconnect switch.

**5.2** The operating and safety controls shall be monitored by the

## **6 TESTING & WARRANTY**

**6.1** Each chassis unit shall be factory tested using a multi-step computer controlled testing equipment to prevent operator error during factory testing.

**6.2** Warranty shall be for parts, 1 year not to exceed 18 months from date of shipment. **(Optional)** Provide 5-year compressor replacement parts warranty only.

**VSHP - Mechanical Specification (CONT'D)****7 EXECUTION**

**7.1** Units shall be installed neat and level on neoprene vibration isolation pads, supplied by heat pump manufacturer, and secured to floor.

**7.2** Flush the system per manufacturer instructions before connecting chassis. Contractor shall join supply and return riser flexible hoses together, at the top/bottom on every riser and at the farthest point from the pump for flushing purposes.

**7.3** Installing contractor shall install risers and install riser transition piece connections where riser sizes change.

**7.4** The hoses shall be installed in the field by the contractor. The flare fittings on the hoses shall be connected according to industry standard (Finger tighten then tighten with wrench while always using back-up wrench).

**7.5** Flush the system per manufacturer instructions before connecting chassis. The riser system shall be flushed, cleaned and commissioned before connecting chassis units to the riser system.

**7.6** Contractor shall provide duct and grille canvas connections on all single piece units.

**7.7** Start-up of units shall be supervised by trained representatives of the equipment manufacturer.