

# Project:

## Model: VSHY

### Vertical Stack Hybrid Heating & Cooling

DEV. G

Date:

Revision:

OMEGA Job #:

# SUBMITTAL SET

Presented By:

**SUMMARY PAGE**

- Vertical Stack Hybrid Cooling and Heating Unit with High Efficiency Chassis
- Unit Mounted Non-Fused Disconnect Switch
- Integrated Hybrid DX Cooling and Hydronic Heating Air Coil.
- Forward Curved DWDI Blowers w/ ECM
- Advanced Microprocessor Control Board

**VSHY - PERFORMANCE TABLE—WATER LOOP CONDITIONS**

Unit Model	Refrig.	Air Flow (CFM)	Heating (105F EWT)				Cooling (86F EWT)				
			Water Flow (GPM)	*WPD (FT)	LWT (°F)	<sup>1</sup> Capacity (BTUH)	<sup>3</sup> Capacity (BTUH)	Watt	EER	Water Flow (GPM)	<sup>4</sup> WPD (FT)
VSHY 020	R-410A	200	1.5	2.8	96.1	6,700	5,800	475	12.2	1.5	3.3
VSHY 030	R-410A	350	2.25	5.8	95.6	10,500	8,900	710	12.5	2.6	11.0
VSHY 040	R-410A	460	3.0	5.0	96.3	12,900	11,600	845	13.7	3.5	11.1
VSHY 050	R-410A	530	3.5	5.5	95.8	16,000	15,100	975	15.5	4.0	14.3
VSHY 060	R-410A	630	4.5	8.8	96.7	18,600	17,900	1235	14.5	5.1	20.2
VSHY 080	R-410A	820	6.0	6.3	97.1	23,600	22,000	1655	13.3	6.7	10.2
VSHY 100	R-410A	1010	7.5	7.4	97.5	28,000	26,400	2030	13.0	7.9	14.2
VSHY 120	R-410A	1200	9.0	10.6	97.9	31,800	36,000	2810	12.8	9.0	18.4

\* Water pressure drop (WPD) through Hydronic coil only. Does not include PD system piping, valves or hoses.

<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.

<sup>4</sup> Water pressure drop (WPD) through Coaxial Condenser coil. Does not include PD system piping, valves or hoses.

Data based on ECM fan.

**VSHY - ELECTRICAL DATA (ECM)**

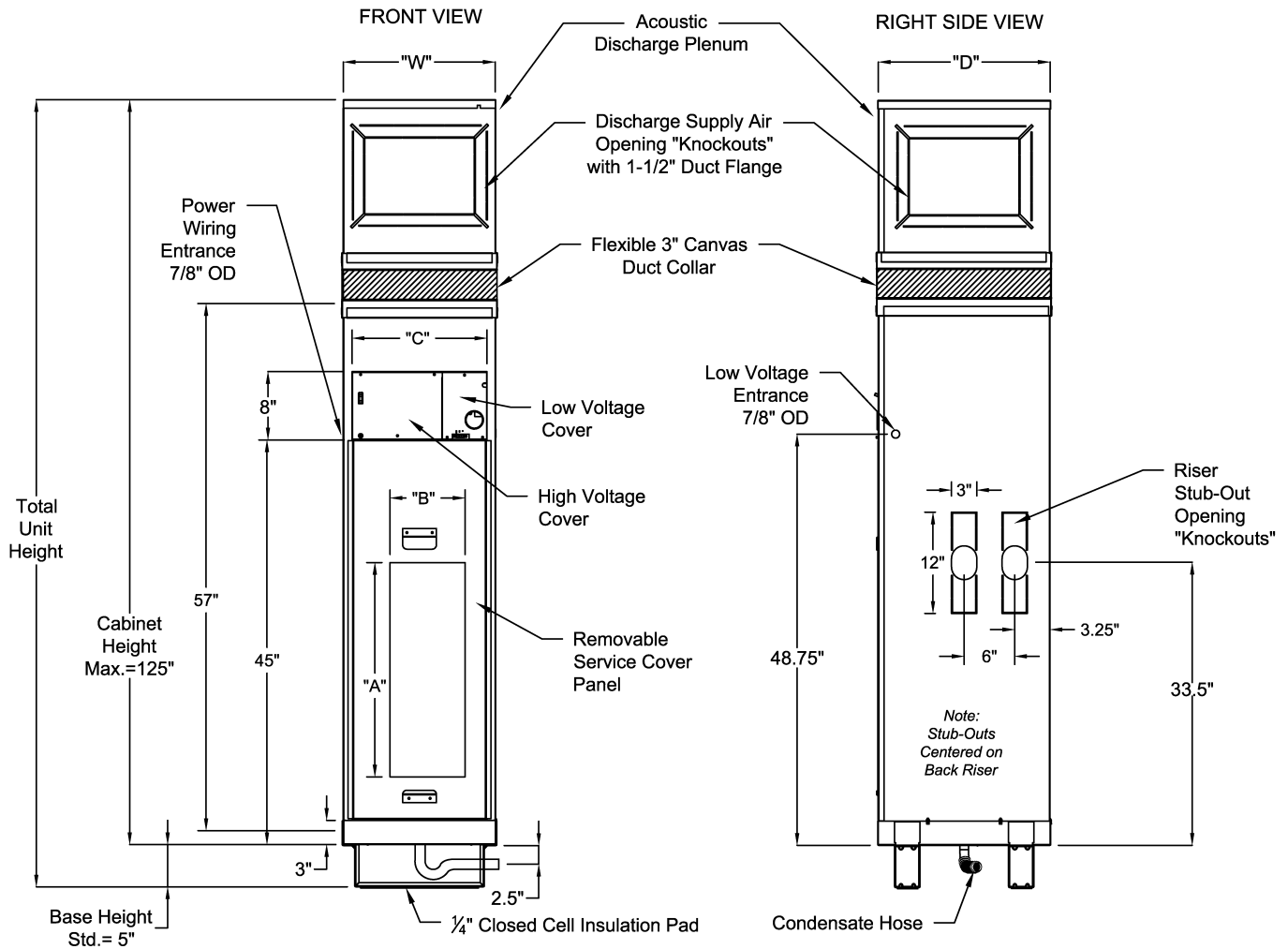
Model	Supply Voltage	Compressor			Blower		Total Unit FLA	MCA	MaxFuse/Circuit Breaker
		Qty	RLA	LRA	HP	FLA			
VSHY 020	208-230/1/60	1	@ 3.0	15.0	1/4	1.0	4.0	4.8	15
VSHY 030	208-230/1/60	1	@ 3.7	22.0	1/4	1.1	4.8	5.7	15
VSHY 040	208-230/1/60	1	@ 4.7	26.0	1/4	1.2	5.9	7.1	15
VSHY 050	208-230/1/60	1	@ 5.5	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	4.2	15.1	17.8	25
VSHY 100	208-230/1/60	1	@ 13.5	72.5	1/2	4.2	17.7	21.1	30
VSHY 120	208-230/1/60	1	@ 15.4	83.9	1/2	4.2	19.6	23.5	35

**VSHY - 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
WHISPER* MODE	N/A				N/A	N/A	225	210	195	175	160	145	130	115	100	85	70
030	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
	WHISPER* MODE				N/A	N/A	N/A	250	230	225	205	180	160	145	125	110	90
040	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
	WHISPER* MODE				N/A	N/A	N/A	450	430	410	390	370	350	320	300	270	250
050	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
	WHISPER* MODE				N/A	N/A	N/A	450	430	410	390	370	350	320	300	270	250
060	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
	WHISPER* MODE				N/A	N/A	N/A	620	580	560	520	480	440	410	380	340	300
080	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
	WHISPER* MODE				N/A	N/A	N/A	620	580	560	520	480	440	410	380	340	300
100	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
	WHISPER* MODE				N/A	N/A	N/A	620	580	560	520	480	440	410	380	340	300
120	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
	WHISPER* MODE				N/A	N/A	N/A	620	580	560	520	480	440	410	380	340	300

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.

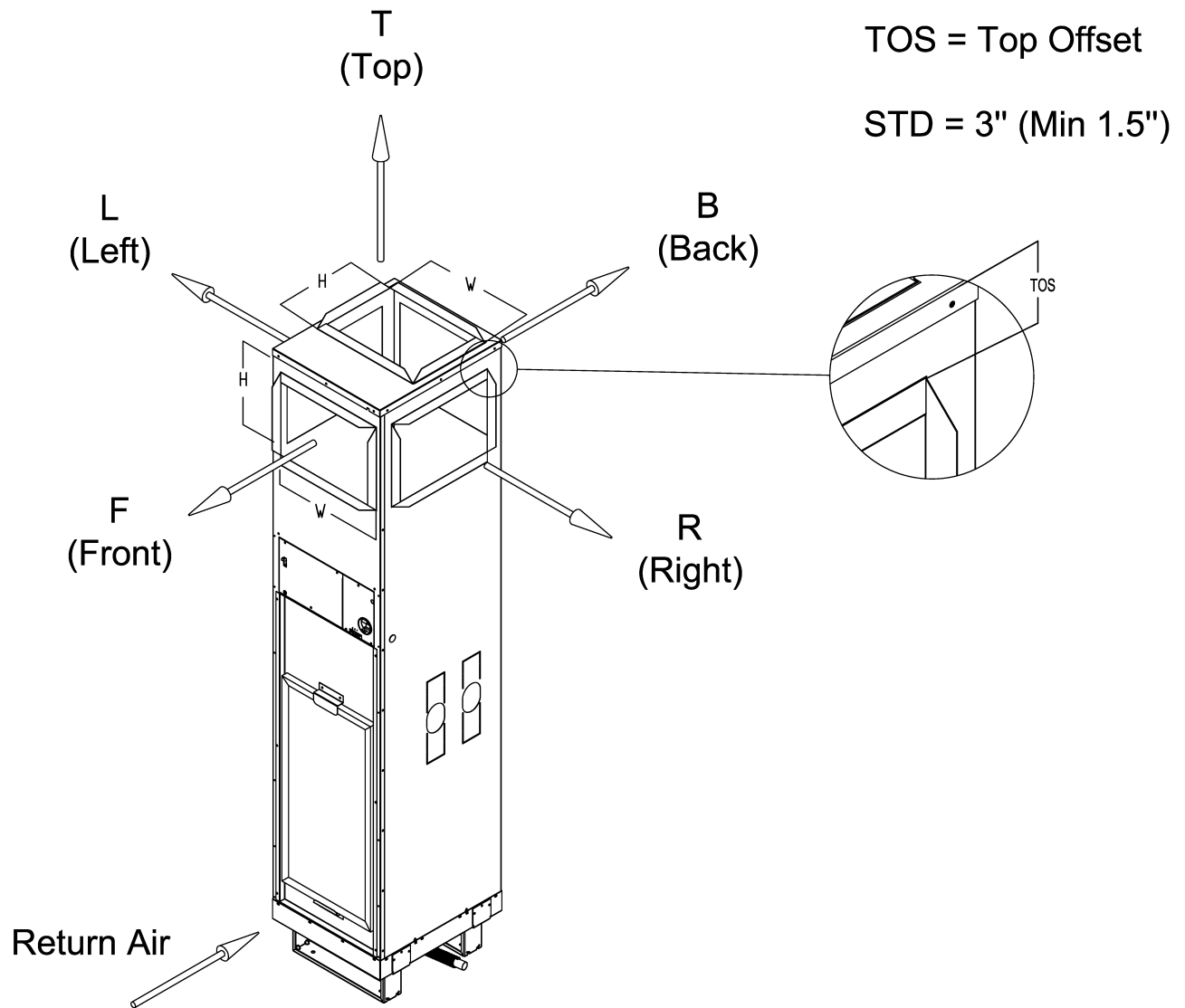


**VSHY - CABINET DIMENSIONS –OPTIONAL GOLD SERIES CABINET**

**VSHP - 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						

\* 60in without horizontal (side) discharges

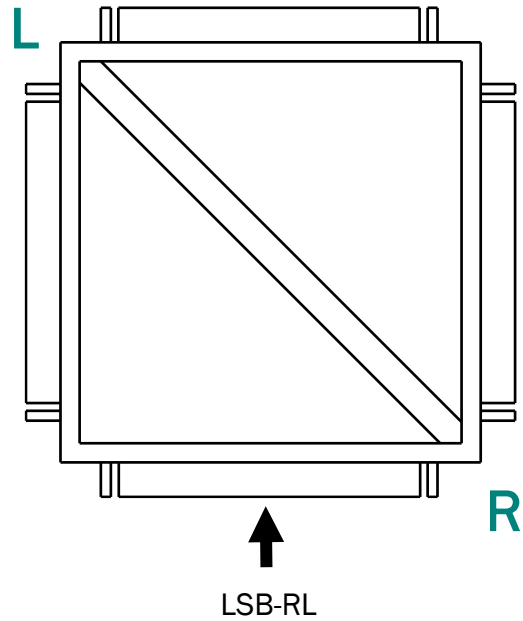
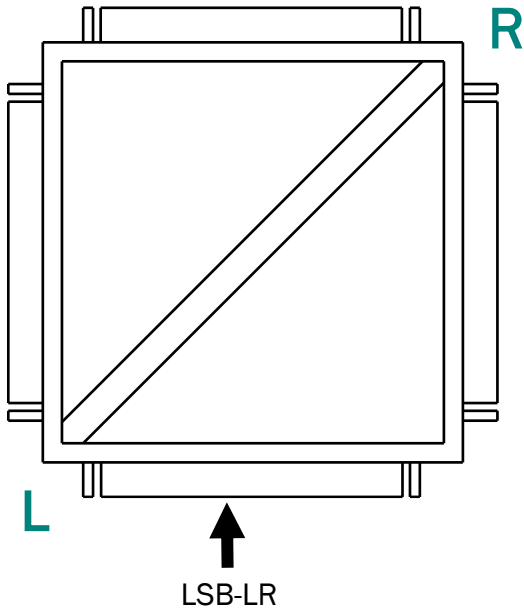
**VSHY - STANDARD DISCHARGE OPENING KNOCKOUTS**



### VSHY - OPTIONAL LINE OF SIGHT BAFFLE

Optional Line of Sight Baffles (LOSBS) 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

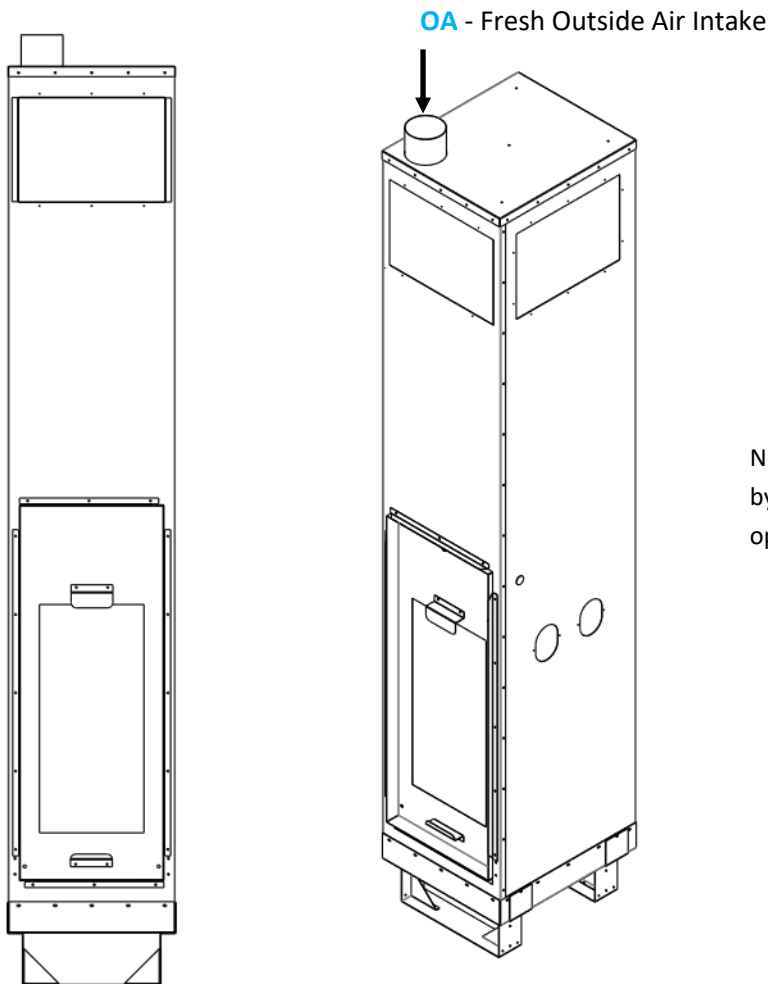


Line of Sight Baffle Configurations



**VSHY - OPTIONAL FRESH OUTSIDE AIR INTAKE**

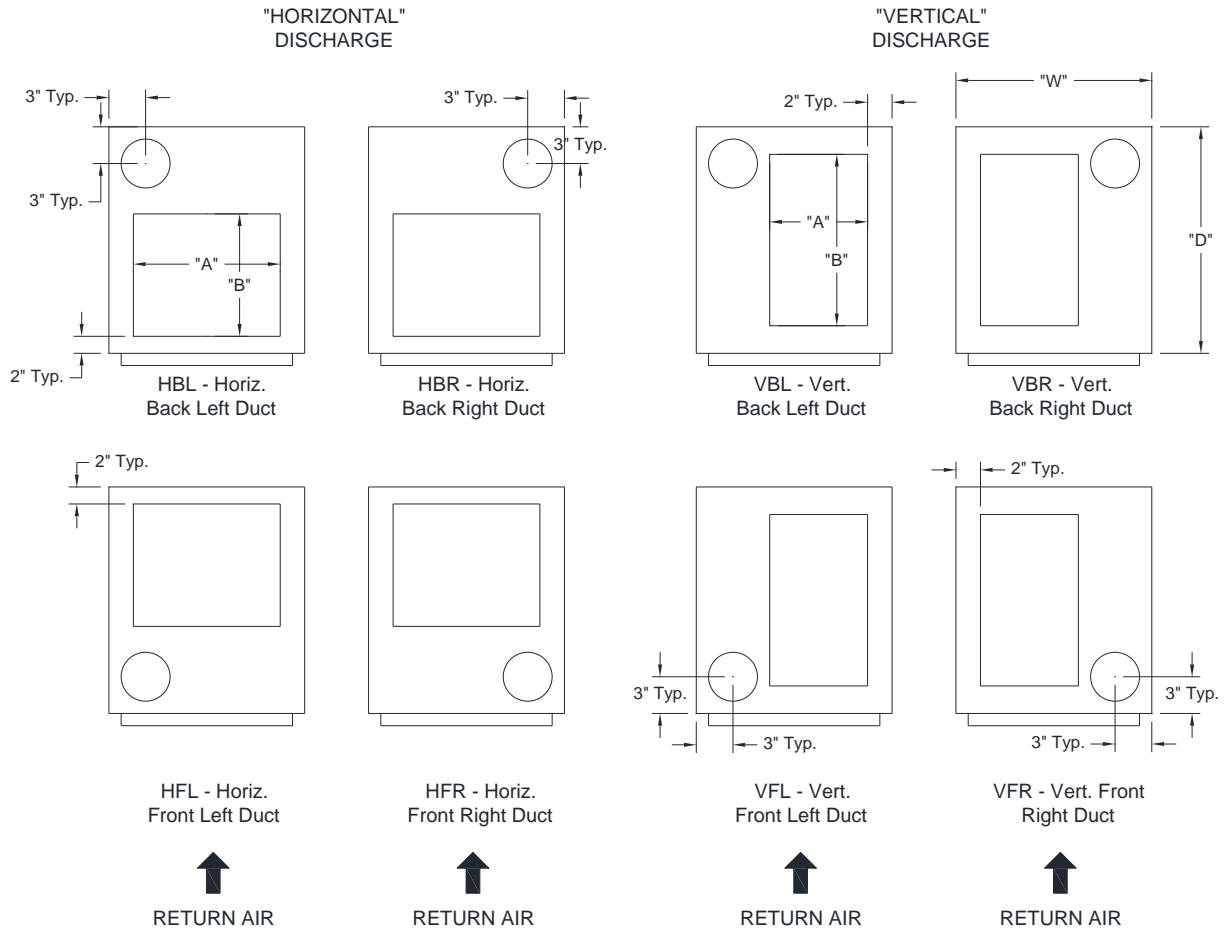
Optional built-in Fresh Air Duct is suited for applications where the Energy Recovery Ventilator (ERV) unit is remote mounted. The factory installed fresh air intake accepts fresh air connection from a remote mounted ERV. Factory recommends Whisper Mode constant FAN-ON air circulation option with Fresh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



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

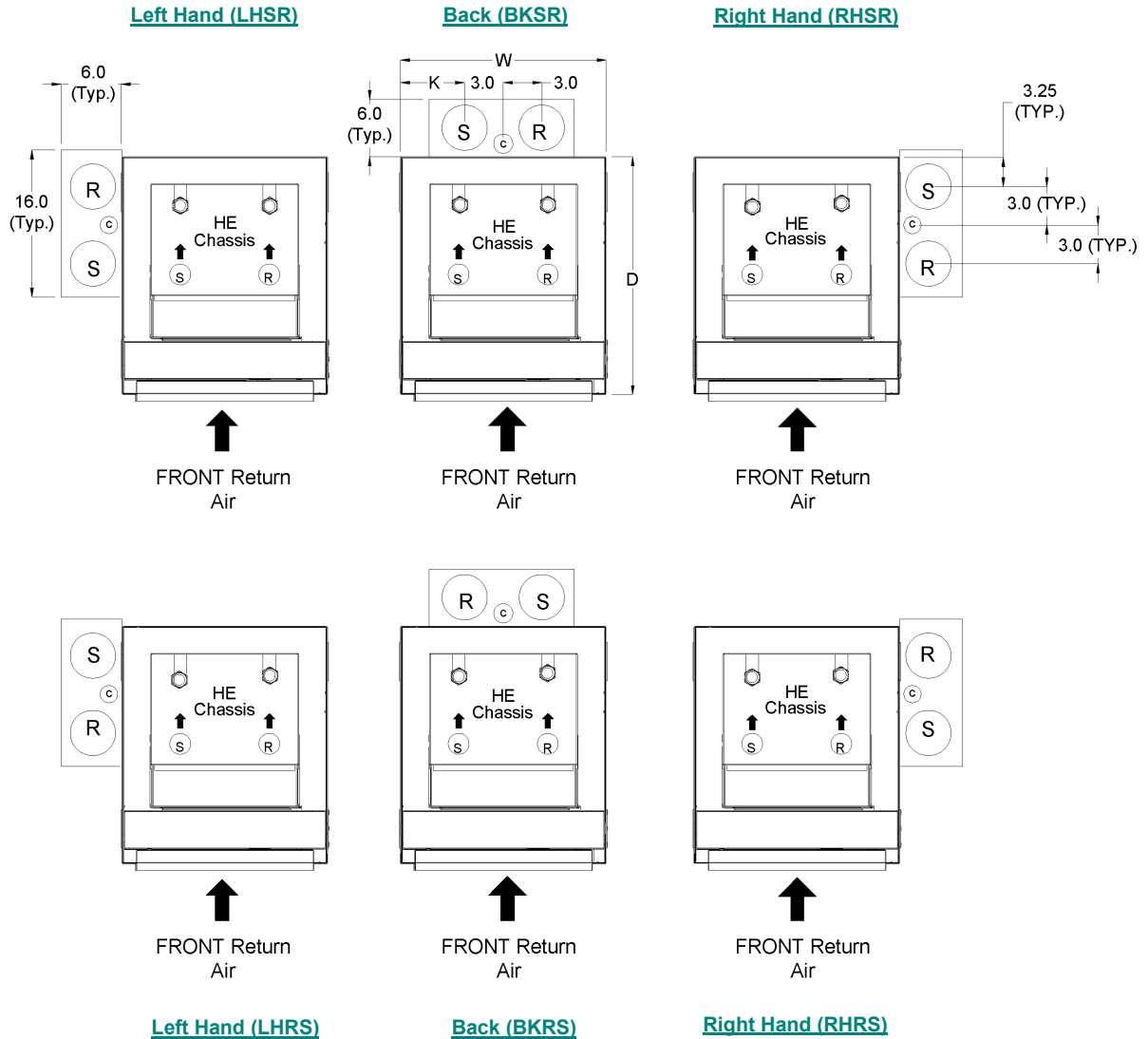


The introduction of cold conditioned outside air from a remote energy recovery ventilation device into the heat pump cabinet can result in potential freezing and bursting of mechanical components. All necessary precautions should be taken to temper Outside Air sufficiently above freezing point before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

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


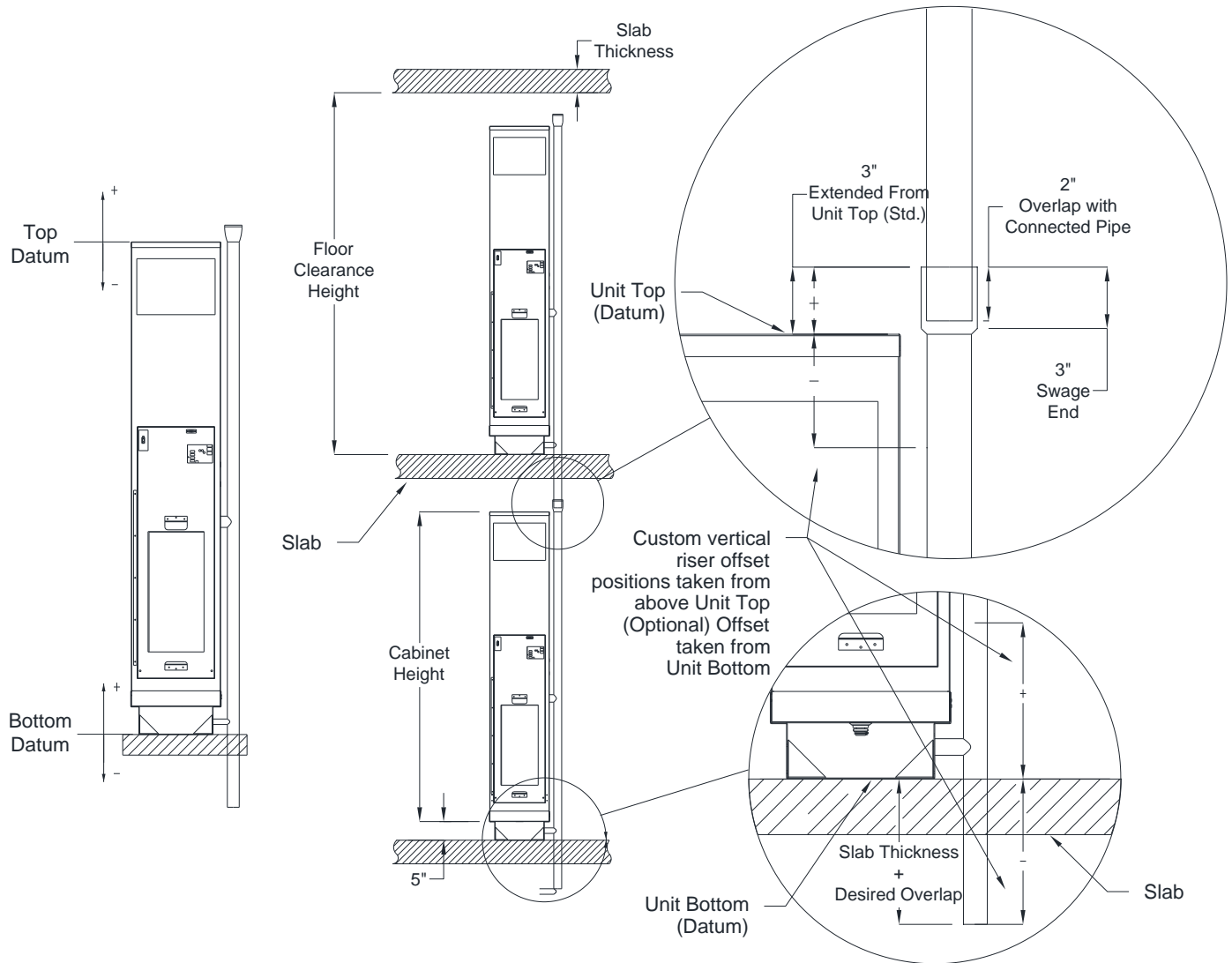
Supply Air Opening Sizes w/ Fresh Air Duct

Model	Cabinet Size	Dimensions (in)		Top Supply Opening w/ Fresh Air Duct (A x B) inches	
		"W"	"D"	"Horizontal"	"Vertical"
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

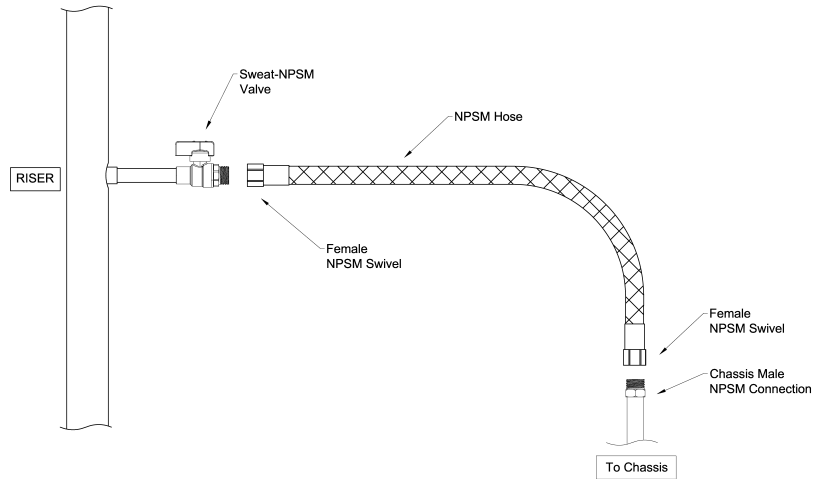
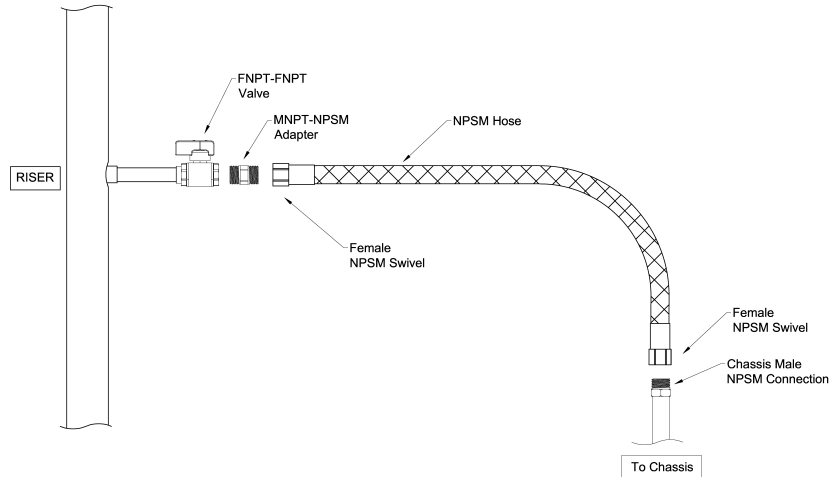
**VSHY - RISER HANDING CONVENTIONS**


**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

**VSHY - TYPICAL RISER INSTALL DETAIL**

**Notes:**

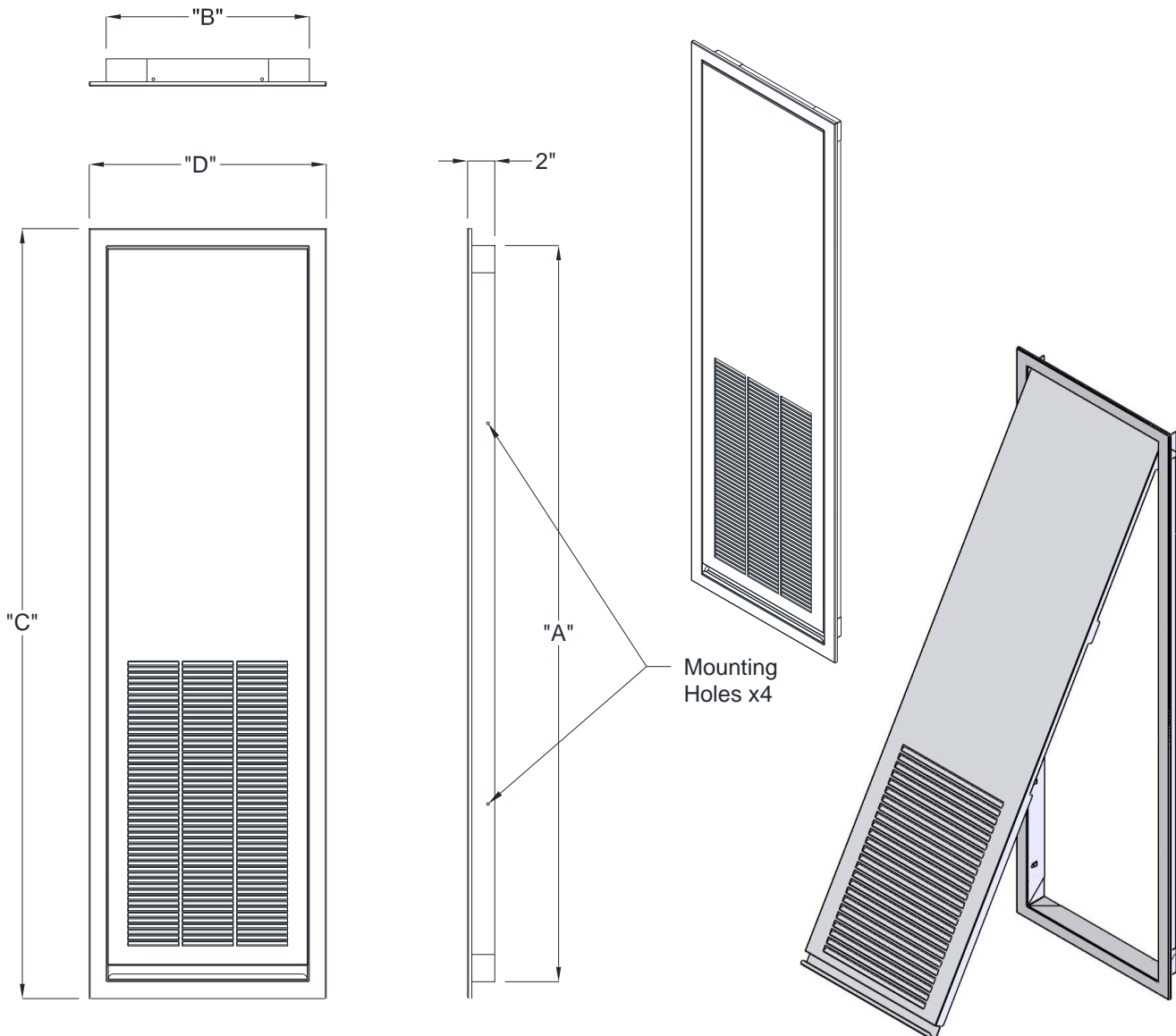
- Risers are positioned relative to cabinet using a standard “Top” Datum reference (optional “Base” Datum). Top Datum Offset indicates where the top of riser will be located relative to top of cabinet. A Base Datum indicates where bottom of riser will be located relative to base of cabinet.
- Upon request 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.
- 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 come with optional 3/8-inch thick closed cell insulation to prevent condensation.
- Optional 3/8-inch insulation on supply and return risers is also available.

**VSHY - HOSE KIT DETAILS**
**STANDARD VALVE - SWEAT CONNECTED NPSM**

**OPTIONAL FPT VALVE - FPT to FPT**

**VSHY - HOSE SIZES**

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

**Isolation Valve Notes:**

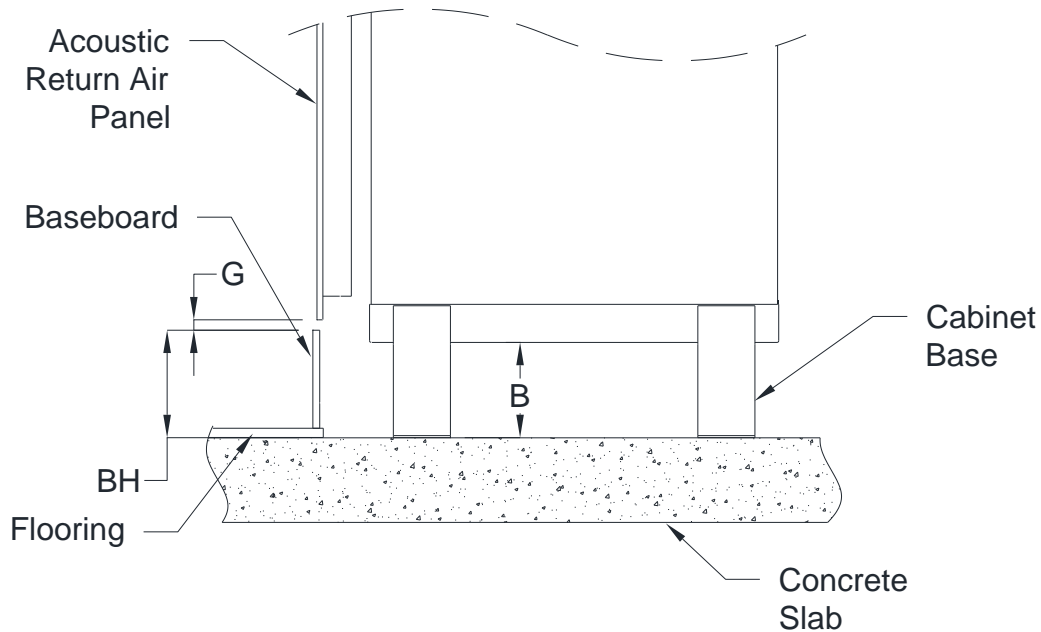
- Standard NPSM sweat connected isolation valves are for Factory or Field Supplied Copper Risers.
- Optional Female NPT valves are for Field Supplied Risers only. Includes MNPT-MNPSM hose adaptors with hose kit.

**VSHY - ACOUSTIC RETURN AIR PANEL**


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					

**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.
- 3) Optional Baffle is available for field mounting inside Acoustic RA panel.

**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:

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

$$B = 5"$$

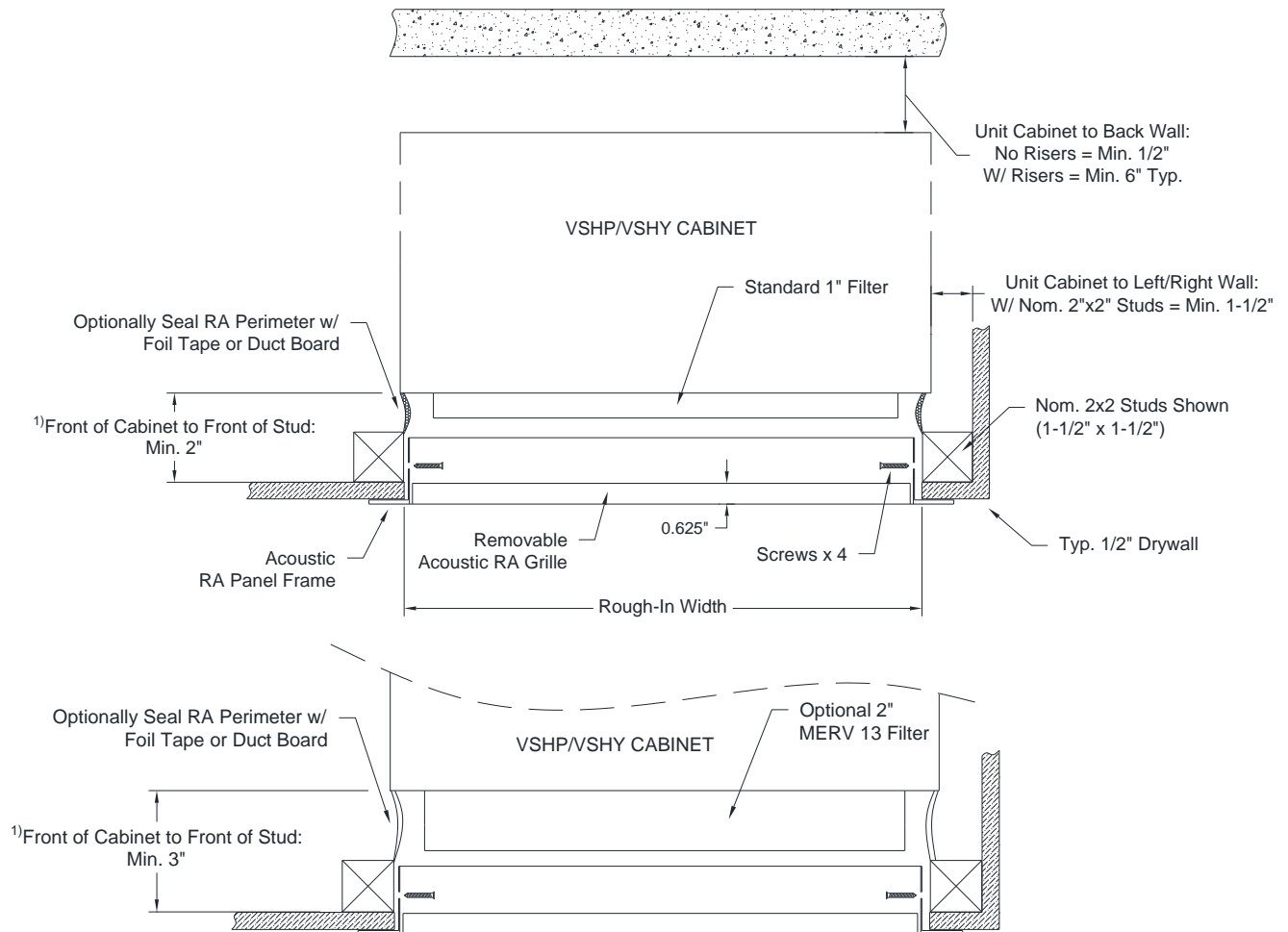
Therefore a 5" Cabinet Base is required.

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)

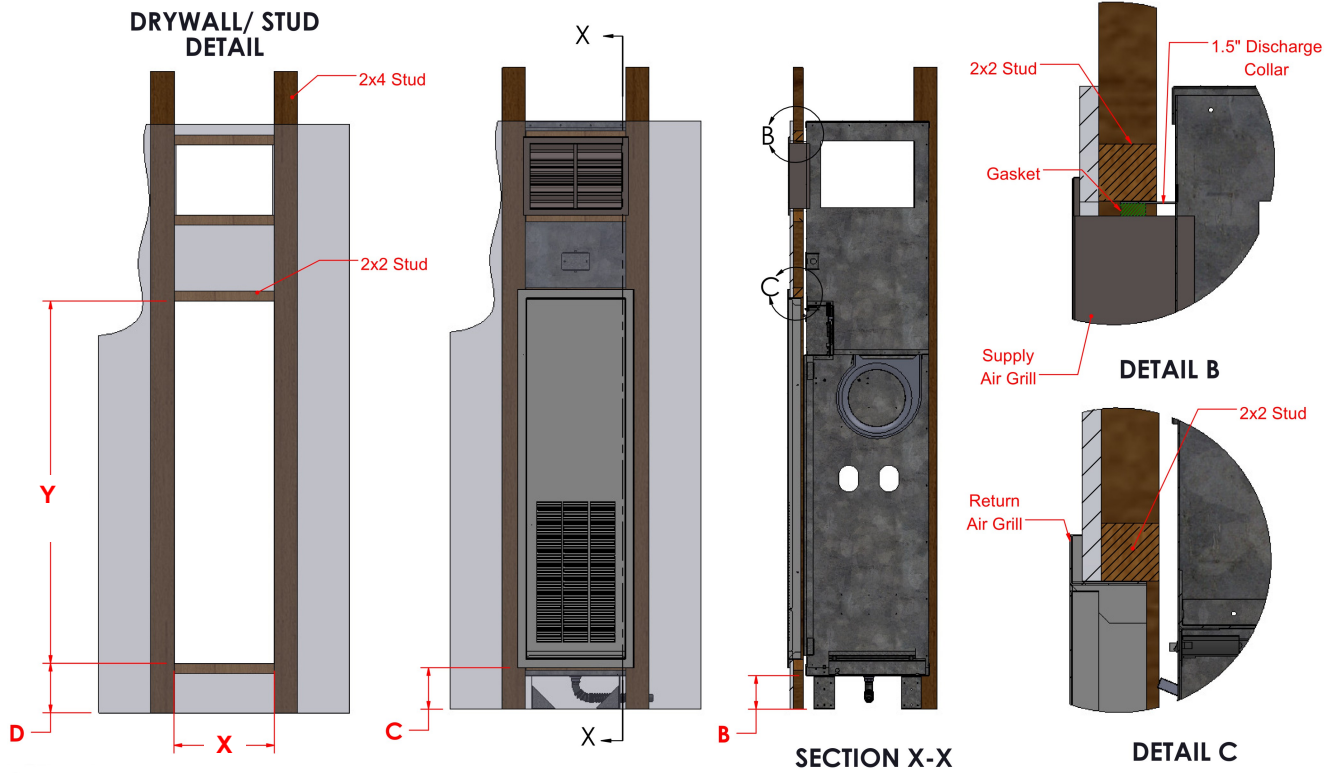
**VSHY - ACOUSTIC RETURN AIR PANEL - FURRING DETAILS**


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.
- 5) With optional Baffle, allow for an additional 2-inch of clearance between stud and front of cabinet.

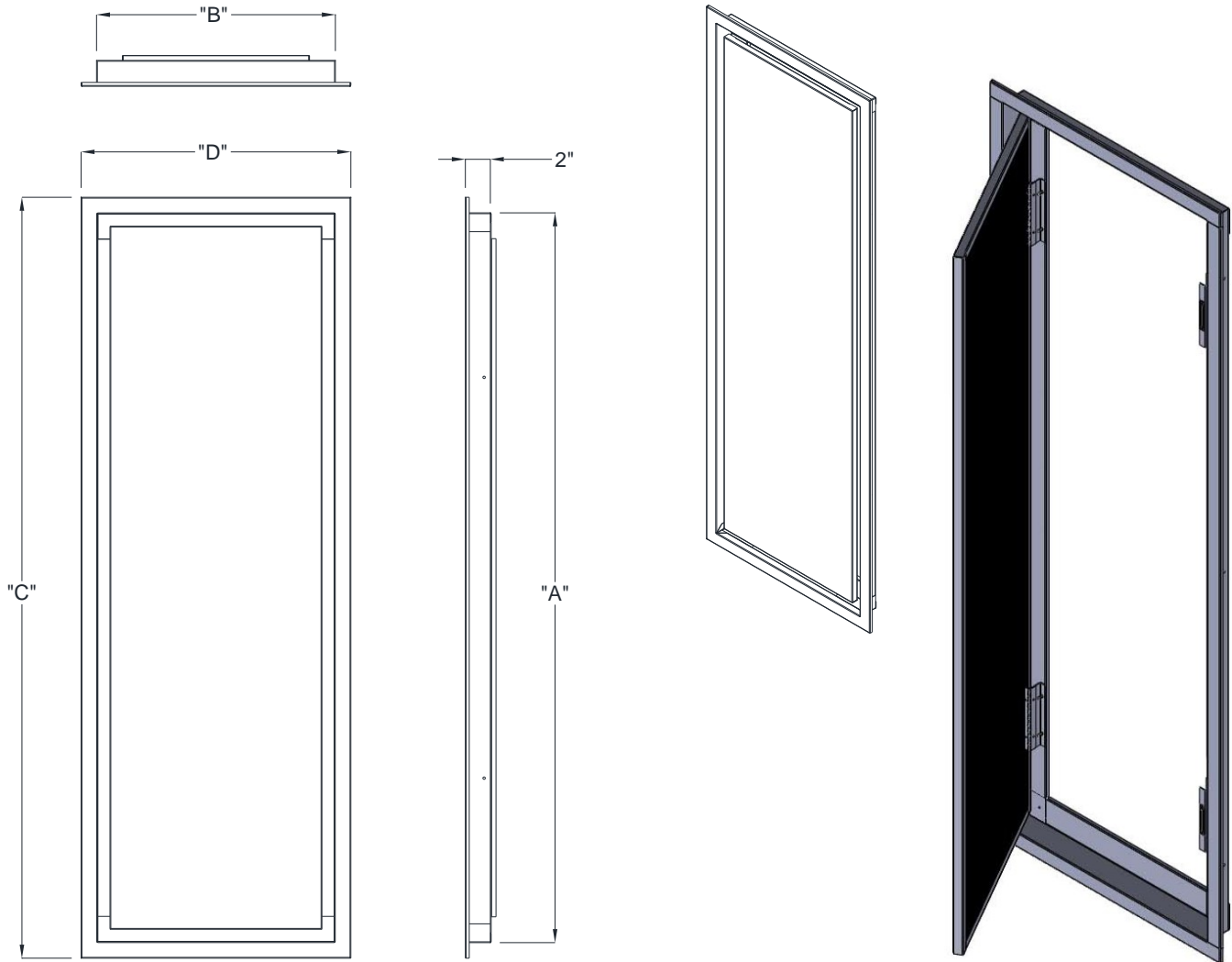


**VSHY - ACOUSTIC RETURN AIR PANEL FURRING DETAILS**


- B** = Cabinet Base Height (Min 5", increases in 1" increments)  
**C** = Panel Flange Height from Base of Cabinet (  $B + 1.25"$  )  
**D** = Rough-In Height from Base of Cabinet (  $B + 2.5"$  )

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					

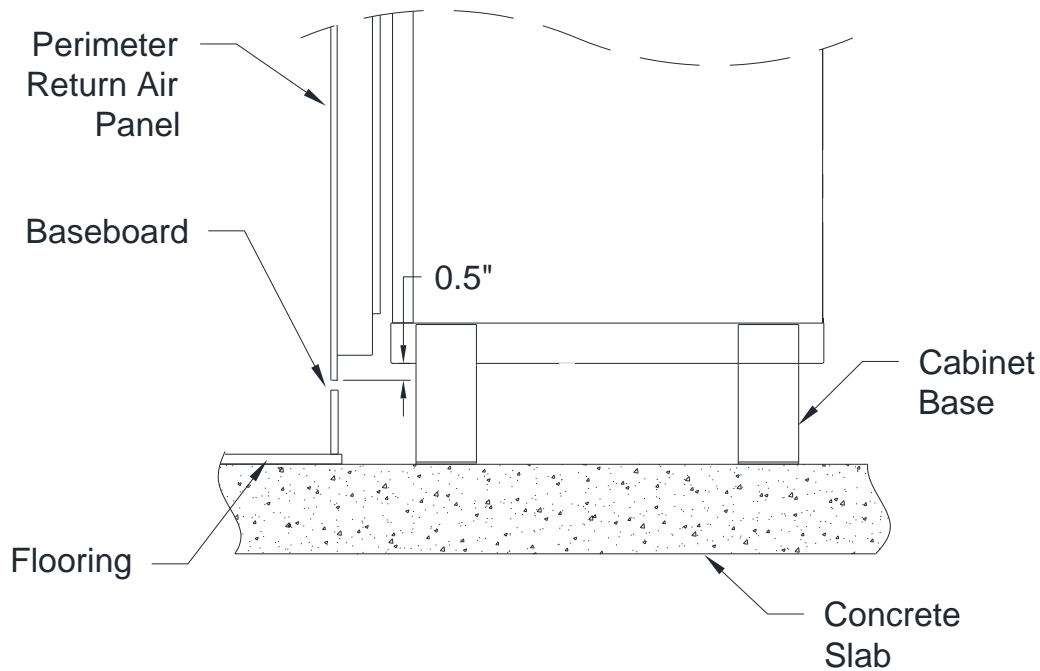
**VSHY - PERIMETER RETURN AIR PANEL**


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 'appliance white' finish.

**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:*

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

$$B = 7''$$

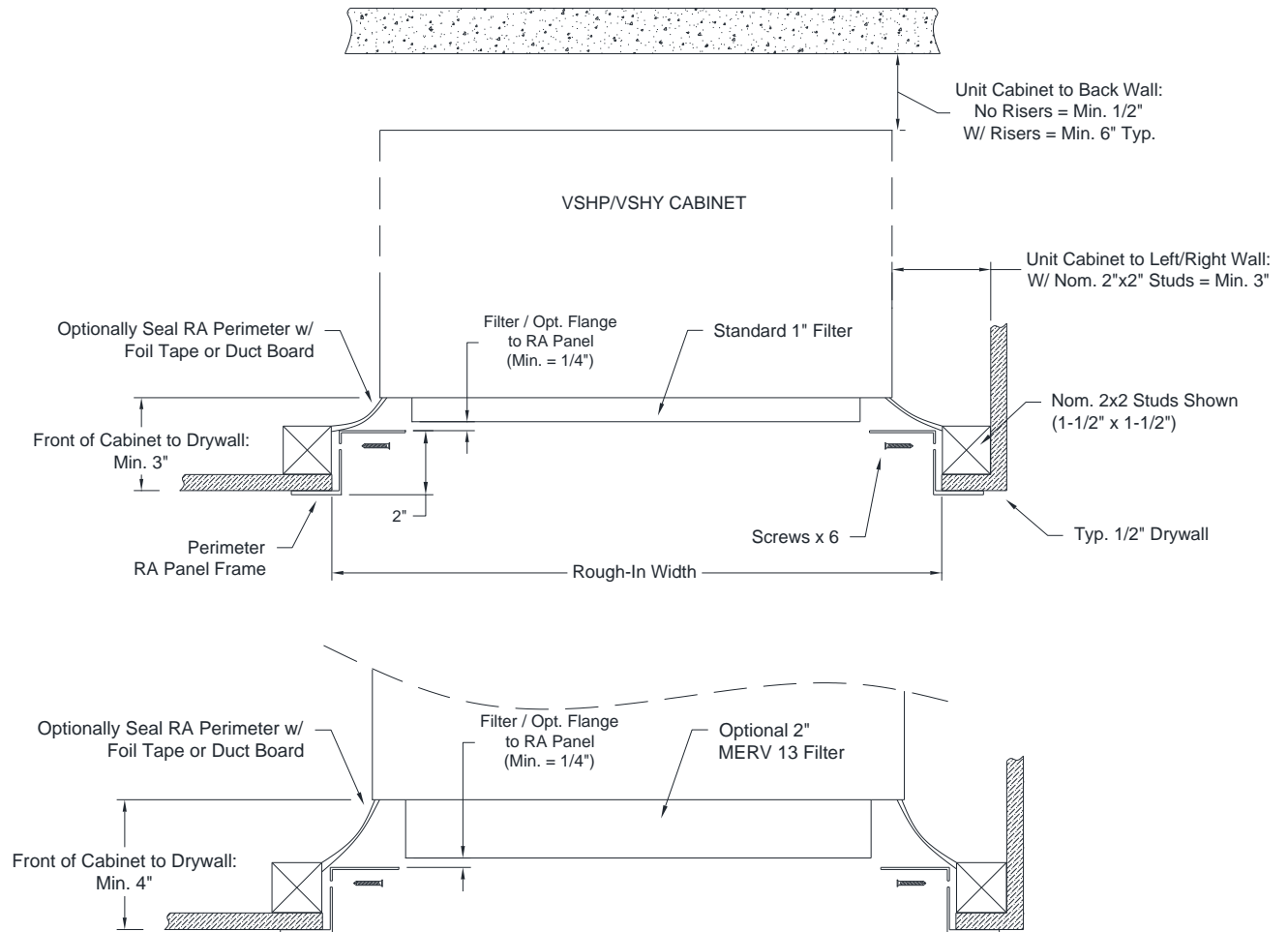
*Therefore a 7" Cabinet Base is required.*

**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

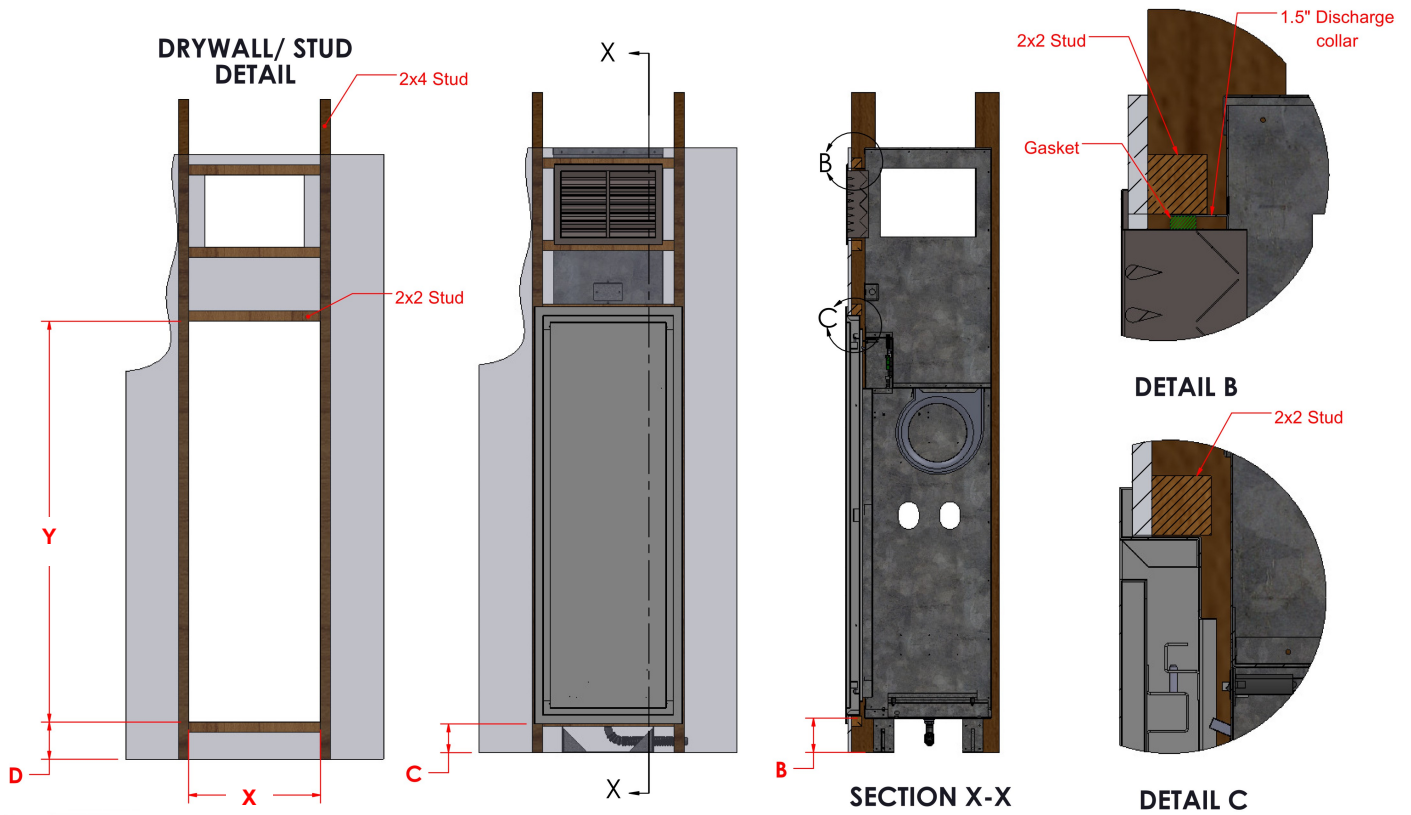
\*Using gap G= 0.5" (from top of baseboard to return panel flange)

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


Perimeter Panel Furring Drawing—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.

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


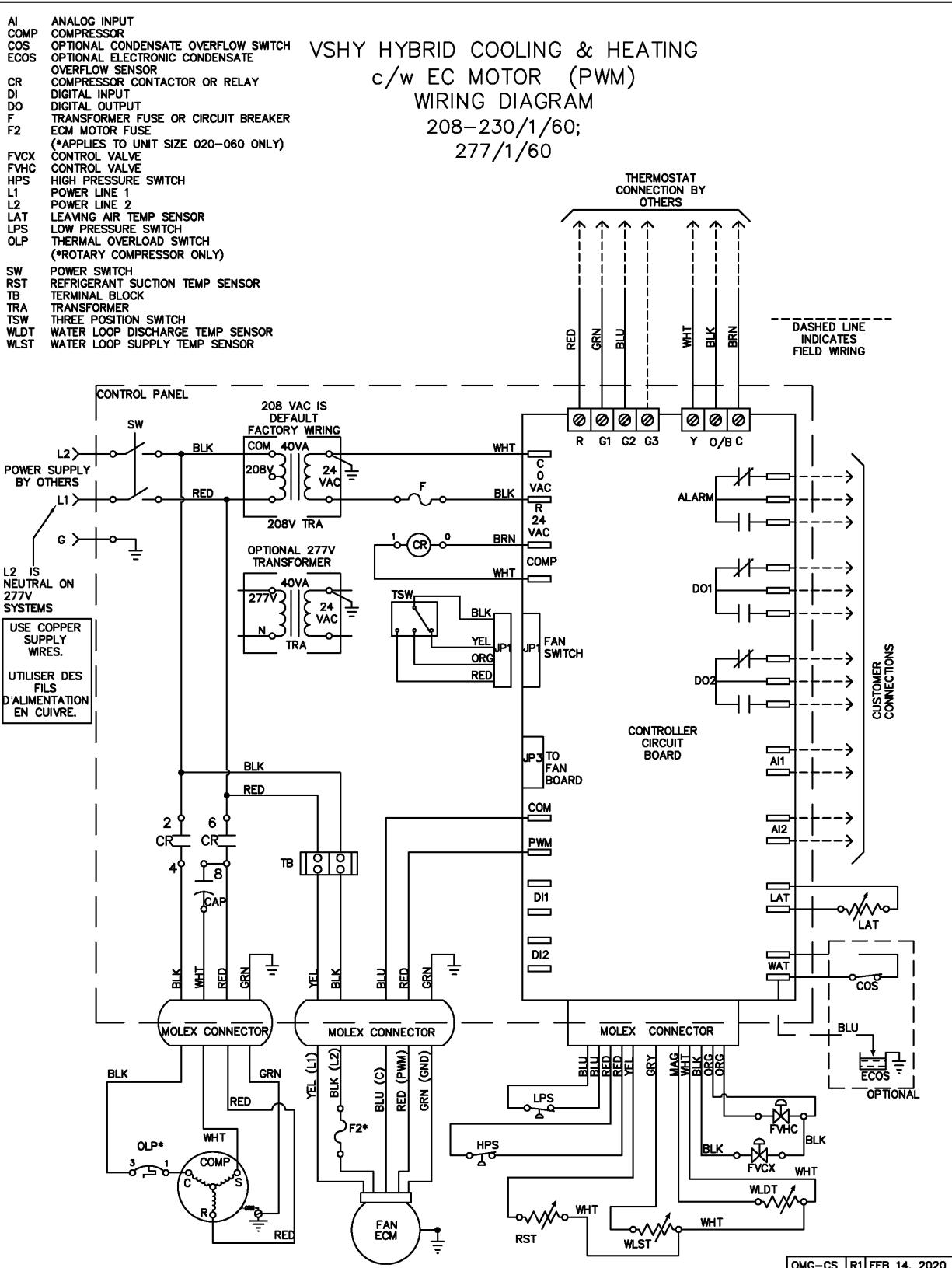
**B** = Cabinet Base Height (Min 5", increases in 1" increments)

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

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

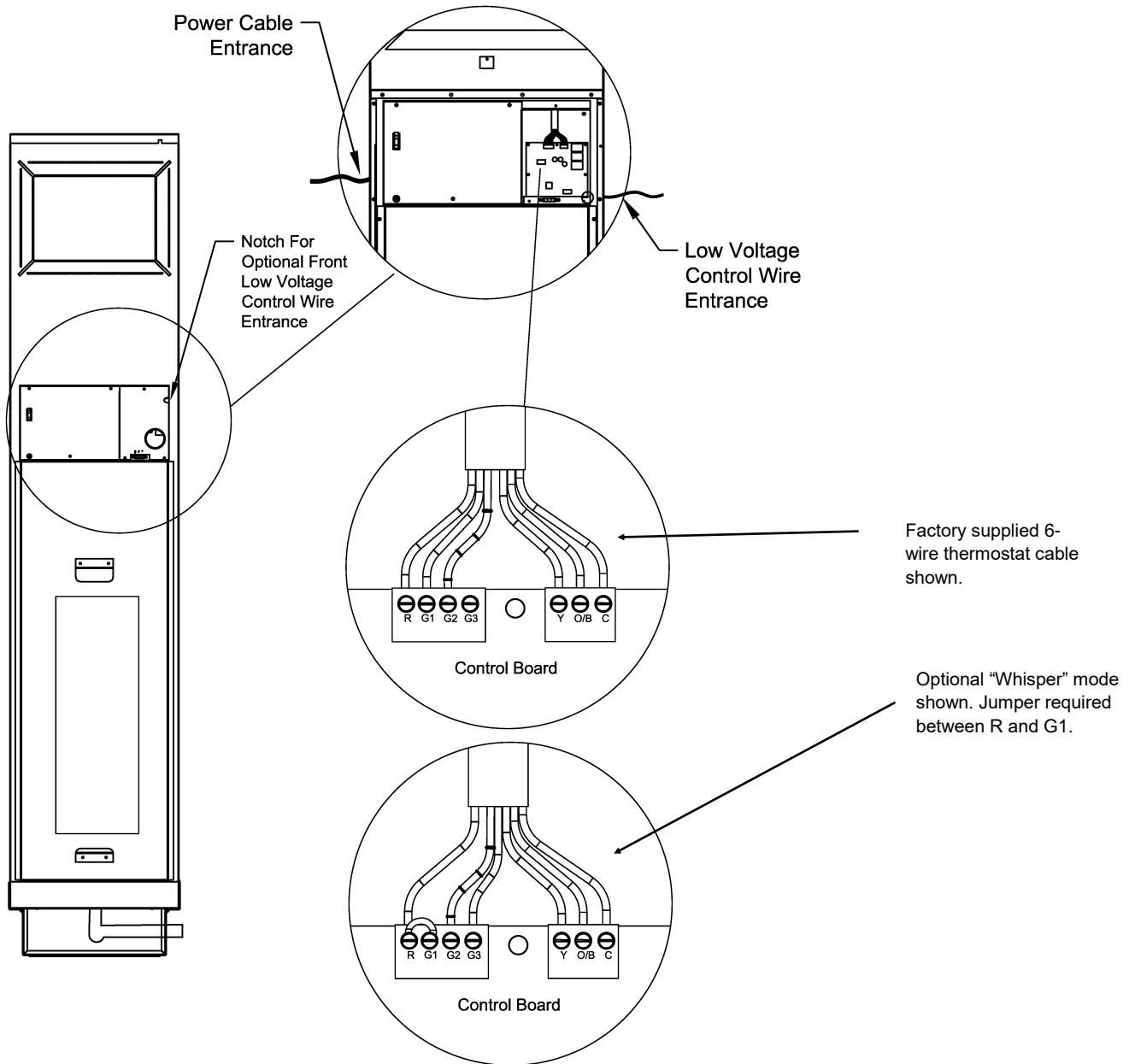
## Perimeter Panel Rough-In Dimensions

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 - ELECTRICAL SCHEMATIC (ECM)**


\*With Optional "Whisper" mode: GRN and BLU wires are factory wired to G2 and G3 terminals. R and G1 have jumper.

**VSHY - ELECTRICAL CONTROL WIRING**



**Thermostat Connection Detail:**

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

**Thermostat with Whisper Mode:**

R = 24VAC  
 G1 = Whisper Mode (Continuous Fan On)  
 G2 = Med Fan Speed  
 G3 = High Fan Speed  
 Y = Compressor On (Cooling)  
 O/B = Heating  
 C = Common (Optional)

## VSHY - UNIT CONTROLS (ECM)

### 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, and 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 wire thermostat to required fan speed terminal. DIP Switch #6 on the board is set to (ON) Auto. During a call for heating or cooling, fan speed will be determined by the 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

Demand call for Heating or Cooling are initiated at the thermostat.

### 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
- Compressor Anti-Short Cycle 7 min. timer has not expired
- Entering Water Temperature exceeds threshold.
- Leaving Water Temperature exceeds threshold.

When call for compressor (cooling) request is terminated, a motorized auto shut-off control valve will close and the blower fan will remain open until the fan off timer expires.

### 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.

### 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 SPECIFICATIONS

### 1 GENERAL

Install Vertical Stacked Hybrid Omega VSHY Series as indicated on the plans and capacities listed in the schedule and specifications.

Each unit shall be factory tested and ship factory-charged with R-410A refrigerant. All units from 1/2 to 3 Tons shall be tested and certified by ASHRAE/ANSI/AHRI/ ISO 13256-1 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 units shall be **Omega VSHY Series**. Units shall provide scheduled capacities at the ampacity and voltage specified. Specified airflow shall be at the scheduled external static pressure and shall include the effects of a wet coil and clean filter.

**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, mould 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.

The unit shall be a single cabinet construction. Contractor shall be responsible for isolating the supply duct and supply grille from the cabinet.

**(Optional GOLD Series)** The cabinet shall be sectionalized 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, mould 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.

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

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

**2.5** Provide a minimum 5" (optional 6", 7" and 8") 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 16-gauge stainless steel. The drain pan shall come an 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.

**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 M/DWV) 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 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 for adjacent room privacy. All cabinet discharge openings shall include 1-1/2 inch drywall 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.

**2.12** 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.

**2.11 (Optional)** A Baffle shall be provided with each Acoustic RA Panels for enhanced sound attenuation. Baffle contains 1/2" thick sound insulation. Installing contractor shall provide additional clearances when framing closet opening.

**2.11 (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.

**2.12** 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.

**2.13** Provide each unit with 1-inch thick MERV 8 pleated filters.

**2.14 (Optional)** Provide each unit with 2-inch thick MERV 13 pleated filters.

**2.15 (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.

### 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 a 3-speed ECM fan motor. Fan motors speeds shall be field selectable using unit mounted 3-speed fan switch or by wiring thermostat to required fan speed terminals.

### 4 REFRIGERATION CHASSIS

**4.1.** Chassis shall be rated up to 400psig working pressure for the water side circuit. 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.

**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.

**4.4** Chassis shall employ two 2-way valves installed 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 automatically close to reduce pumping power requirements. Units with 3-way valves are not accepted.

**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 hybrid air coil shall be Epoxy coated to aid in the prevention of premature formicary corrosion. The polymer coating shall meet minimum 1000 hours of Salt Spray ASTM B117 protection and NSF-51 certified for food splash zone applications.

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

- Low Pressure Safety Switch
- High Pressure Safety Switch
- **(Optional)** Condensate Overflow Switch
- Entering Water Temperature sensor

- Leaving Water Temperature sensor
- Suction line freeze-stat temperature sensor
- 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** 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.

**5.4** 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.

**5.5** Thermostats shall be remote mounted. Unit will come with a standard 24-inch thermostat whip factory wired to the controller board terminals. Thermostats can be either Heat/Cool or Heat Pump type. Thermostat shall provide 24V signal to G (fan) terminal during a call for cooling.

**5.6** ECM fan speed % torque settings are field configurable using the imbedded Web based interface to meet site static requirements.

**5.7** ECM speed settings are field configurable using the embedded webpage interface to meet site CFM and static requirements.

**5.8 (Optional)** Units shall come with a SmartOne compatible RS-485 communication add-on board and remote temperature sensor.

## 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.

## 7 EXECUTION

**7.1** Units shall be installed neat and level on 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 in each cabinet 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 (Optional):** Contractor shall make provisions for connecting fresh air duct to the optional fresh outside air duct intake located at the top of the unit cabinet.

**7.6 (Add for Gold Units)** Discharge plenum shall be fastened to the underside of the concrete slab for noise attenuation using appropriate industry accepted mounting practices.

**7.7** 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.

**7.8** Contractor shall provide duct and grille canvas connections on all single piece (Silver Series) units.

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