zehnder
always the best climate

Vertical Stack Water Source Heat Pump

Catalog

Zehnder – everything you need to create a comfortable, healthy and energy-efficient indoor climate

Heating, cooling, fresh and clean air: at Zehnder, you will find everything you need to create a comfortable, healthy and energy-efficient indoor climate. Zehnder's wide and clearly structured portfolio can offer the right product for any project, be it private, public or commercial, new build or refurbishment. And where service is also concerned, you'll find that Zehnder is "always around you."

Heating

At Zehnder, Heating doesn't just come in the form of designer radiators. We offer solutions in all shapes and sizes, from radiant ceiling panels to heat pumps with integrated ventilation devices.

- Designer radiators
- Compact energy station with integrated heat pump
- Heating and cooling ceiling systems
- Comfortable indoor ventilation with heat recovery

Zehnder Designer Radiators

Cooling

Zehnder also offers sophisticated solutions for indoor Cooling. These range from cooling ceiling systems to comfortable indoor ventilation with a supply of pre-cooled fresh air.

- Heating and cooling ceiling systems
- Compact energy station with heat pump and brine pipe
- Comfortable indoor ventilation with geothermal heat exchanger for fresh air pre-cooling

Zehnder Heating and Cooling Ceiling Systems

Fresh Air

Fresh Air – a product range with a long tradition at Zehnder. Zehnder Comfosystems provides products and solutions for comfortable indoor ventilation with heat recovery for houses and apartments, for new builds and for renovation projects.

- Comfortable indoor ventilation
- Compact energy station with integrated ventilation device

Zehnder Comfosystems

Clean Air

Zehnder Clean Air Solutions provide Clean Air in buildings particularly prone to dust. In residential applications, the comfortable indoor ventilation provided by Zehnder Comfosystems filters external pollutants out of the air.

- Comfortable indoor ventilation with integrated fresh-air filter
- Compact energy station with integrated fresh-air filter
- Systems for clean air

Zehnder Clean Air Solutions


KAFKA
HARTMUT BINDER · JAN PARIK
MAHNERT-LUEG

Certified efficiencies for water loop, ground water and ground loop applications

The perfect room climate is today, more than ever, a question of economic energy use and active climate control. The solution for efficient and energy-saving heating and cooling is the Zehnder Rittling Vertical Stack Water Source Heat Pump.

Simple to install and virtually unheard, the Zehnder Rittling Vertical Stack Water Source Heat Pump provides the quietest solution to the commercial marketplace. All seven sizes exceed ASHRAE standard 90.1 energy efficiency requirements using environmentally friendly R-410A refrigerant.

As well as the reliably high product quality associated with all Zehnder Rittling products, the Zehnder Rittling Vertical Stack Water Source Heat Pump offers a number of advantages: the heavy duty construction and custom applications capability provided by the Zehnder Rittling engineering team maximizes flexibility of selection and minimizes cost of installation specifically for single and multi-floor applications. Zehnder Rittling Heat Pumps were the first to market with drop-down service legs as well as wheels on the bottom of the chassis and inside the cabinet that make removal of the chassis during service and testing a thing of the past.

In addition to this, Zehnder Rittling experts are able to help with complex specification plans through our competent sales team who can visit the site if requested.

Effective technology creates the perfect indoor climate

The broad range of options associated with the Zehnder Rittling Vertical Stack Water Source Heat Pumps provide the needed flexibility to fit a wide range of applications. These units are often positioned in the corner of a room but can just as easily be set along a perimeter wall or as part of a partition wall separating two rooms. These units are typically stand-alone ductless systems that can be placed in a multitude of arrangements by taking into account the aesthetics and space requirements of the room.

Advantages
The simplest and most effective solutions are always those that come from nature; this is the case for the Zehnder Rittling Vertical Stack Water Source Heat Pump. Our design takes advantage of the moderate temperature the earth provides to boost the efficiency of the energy draw and reduce the operational costs of heating and cooling systems.

Zehnder Rittling Vertical Stack Water Source Heat Pumps are the direct result of years of research and extensive testing in our state-of-the-art design lab by our dedicated team of engineers. As a result, the Heat Pump design lends itself equally to new and retrofit applications.

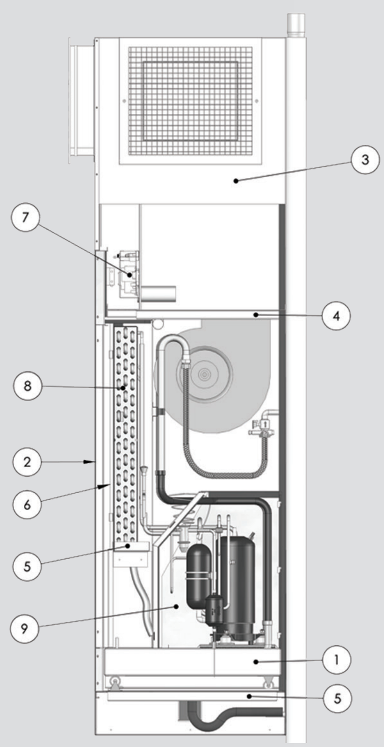
Promoting healthy indoor air quality
Zehnder Rittling Vertical Stack Water Source Heat Pumps incorporate coated aluminum air coils to expedite condensate drainage. Additionally, the standard stainless steel drain pan with microprocessor based condensate overflow protection inhibits microbial growth and minimizes maintenance.

The perfect indoor climate: comfortable, yet unobtrusive
Aesthetics and efficiency are our primary concerns. The Zehnder Rittling Vertical Stack Water Source Heat Pump operates in the background only noticeable by the perfect indoor climate - the architectural design of the room remains in the forefront not the heating and cooling system.

Features

1. Chassis

- Seven available sizes named for their nominal capacities
  - 09: 9,000 BTU/hr
  - 12: 12,000 BTU/hr
  - 15: 15,000 BTU/hr
  - 18: 18,000 BTU/hr
  - 24: 24,000 BTU/hr
  - 30: 30,000 BTU/hr
  - 36: 36,000 BTU/hr
- Exceeds ASHRAE 90.1 efficiency requirements using environmentally friendly R-410A refrigerant.
- Front service ports for refrigerant system maintenance.
- 208-230V/60/1 compressor.
- TXV metering device.
- Appliance wheels, drop down service legs and electrical quick connects for system maintenance.
- Insulated water/refrigeration piping for low temperature applications.
- Sound attenuation package including dual compressor isolation.



2. Return air panel

- 18-gauge construction with 16-gauge and 14-gauge options.
- Removable perimeter bypass (Allen lock), hinged perimeter bypass (key lock or Allen lock) and removable louvered (Allen lock).
- Ivory epoxy powder coating is standard.

3. Cabinet

- 20-gauge galvanized steel construction.
- Two sizes available.
  - Small: 18" x 18" x 88" for sizes 09,12, 15 and 18
  - Large: 24" x 24" x 88" for sizes 24, 30 and 36
- 1/2" thick, 2 lb. density matt-faced fiberglass insulation.
- Pre-configured riser knockouts: left, right and rear.

Â Pre-configured supply air knockouts: left, right, rear, front and top.

4. Removable blower/motor assembly

- 208-230V/60/1 permanent split capacitor type motor.
- Easily removable assembly with motor quick connect.

5. Stainless steel drain pan

- Factory installed P-trap.
- Externally insulated using closed cell foam.
- Positively sloped in two directions to ensure proper drainage and maximize protection against microbial growth.

6. Air filter

Â Washable nylon type.

7. Controls

- Standard unit mounted microprocessor control with system troubleshooting codes and dip switches.
- 24V, 50VA transformer with resettable fuse.
- Low/high pressure switches.
- Air side and water side freeze protection sensors.
- Electronic condensate overflow protection.

8. Air coil

- Multi-louvered, lanced aluminum fins.
- Rifled copper tube construction.
- Hydrophilic coating.

9. Compressor

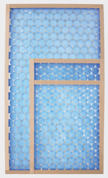
- Rotary type or scroll type, dependent upon size.
- Wrapped in an insulation blanket for noise attenuation.

Options and accessory equipment

Factory assembled

Chassis
- Available in 277V/60/1.

Air filter



- 1" disposable spun glass media filter.

Disconnect switch
- 20 amp DPST: sizes 09-18.
- 30 amp DPST: sizes 24-36.
- Pre-wired and factory installed.

Autoflow valves
- 1/2" 1.5 GPM through 3.0 GPM: sizes 09-12.
- 3/4" 2.0 GPM through 10.5 GPM: sizes 15-36.

Hose kits
- 1/2": sizes 09-12.
- 3/4": sizes 15-36.
- Designed for water source heat pump applications.
- Kevlar® reinforced EPDM core with ANSI 302-304 stainless steel outer braid.

Zone valves
- 24V normally closed, 2-way.
- Factory installed on water supply side of chassis.
- Factory quick-connect plug; factory-wired and controlled by Zehnder Rittling's microprocessor (PCB).

Cabinet
- Standalone (VHNA), Master (VHNM) or Slave (VHNS) models available.
- 1/2" thick foil-faced fiberglass or closed cell insulation.
- Sight and sound baffles.
- Contact the factory for other cabinet heights.

Blower motors
- Available in 277V/60/1.
- 208-230V/60/1 and 277V/60/1 high static motors to handle up to 0.6" of external static pressure.
- Electronically commutated motors (ECM) are high efficiency, programmable brushless DC motors that utilize a permanent magnetic rotor and built-in inverter.

Controls
- LonWorks or BACnet network communication interface.
- Customer supplied DDC controls.

Risers
- Diameters from 3/4" – 2-1/2" with 3" swaged connections.
- 104"-115" standard lengths.
- Type L or M copper.
- Uninsulated or insulated with 1/2" or 3/4" closed-cell foam.
- Ship loose risers available upon request.
- Contact the factory for:
  - Type K copper
  - 3" diameter
  - Lengths up to 120"

Field assembled

Return door panels
- Standard perimeter bypass Allen lock; removable.
- Optional perimeter bypass Allen lock or key lock: hinged.
- Optional louvered Allen lock, removable.
- 6 standard colors.
- Custom colors available upon request with customer-supplied paint chip.
- Contact factory for ADA options.

Wall mounted thermostats

Three types to choose from:
- Communicating thermostat with remote control.
  - Timed power on/off.
  - Fan speed settings.
  - °F or°C readout.
  - Troubleshooting failure code(s).
  - Pre-wired quick connection.
- Digital programmable.
  - Large display, programmable 5-1-1.
  - Pre-wired quick connection.
- Non-programmable.
  - Large display digital thermostat.
  - Pre-wired quick connection.

Discharge grille(s)
- Single deflection, double deflection or double deflection with opposed blade damper.
- Aluminum construction.
- Color matched to return air panel.

Riser extensions
- Diameters from 3/4" – 2-1/2" with 3" swaged connections.
- Up to 24" length.
- Type L or M copper.
- Uninsulated or insulated with 1/2" or 3/4" closed-cell foam.

Exploded installation view
Stand Alone unit

Features not shown:

Cabinet
- 18" x 24" x 88" or 24" x 24" x 88"
- 20-gauge galvanized steel

Stainless steel drain pan
- Factory-installed P-trap
- Positively sloped in two directions

Risers
- Standard diameters: 3/4" to 2-1/2"
- Standard lengths: 104" – 115"
- Standard type L or M
- Insulated or uninsulated

Compressor
- Rotary or scroll-type
- Wrapped in insulation blanket

Air coil
- Multi-louvered, lanced aluminum fins
- Rifled copper tube construction
- Hydrophilic coating

Nomenclature
VS series, complete unit

1, 2, 3	4	5, 6	7	8	9	10	11	12	13, 14	15	16	17	18	19	20	21	22	23	24	25, 26
VHN	M	09	A	A	X	S	1	X	DB	1	D	A	X	A	1	1	A	A	-	AA

Unit type
VHN = Vertical Stack Water Source Heat Pump complete

Model
M = Master
S = Slave
A = Stand Alone

Nominal capacity	
09 = 9,000 BTU/Hr	24 = 24,000 BTU/Hr
12 = 12,000 BTU/Hr	30 = 30,000 BTU/Hr
15 = 15,000 BTU/Hr	36 = 36,000 BTU/Hr
18 = 18,000 BTU/Hr	

Voltage	
A = 208-230V/60/1	B = 277V/60/1

Blower/motor options	
A = Standard/PSC	C = Standard/ECM
B = High static/PSC	D = High static/ECM

Options	
X = None (standard)	S = With sight and sound baffle

Controls
S = Microprocessor controls
C = Microprocessor and customer supplied DDC controls
L = Microprocessor and Lon Network Communication
B = Microprocessor and BACnet network communication
N = Microprocessor and N2 network communication

Thermostat
1 = No thermostat
2 = Non-programmable thermostat
3 = Programmable thermostat
4 = Communicating thermostat

Power termination	
X = No disconnect	1 = Disconnect switch

Supply air/risers		
NA = None/back	DA = Front, right/back	DQ = front, top/right
NB = None/right	DB = Front, left/back	DR = Back, top/right
NC = None/left	DC = Left, right/back	DS = Left, top/right
SA = Front/back	DD = Front, top/back	TA = Front, left, right/back
SB = Right/back	DE = Front, left/right	TB = Front, top, right/back
SC = Left/back	DF = Back, left/right	TC = Front, top, left/back
SD = Top/back	DG = Front, back/right	TD = Top, left, right/back
SE = Left/right	DH = Left, top/back	TE = Front, back, left/right
SF = Front/right	DJ = Back, right/left	TF = Front, back, top/right
SG = Back/right	DK = Front, right/left	TG = Front, top, left/right
SH = Top/right	DL = Front, back/left	TH = Top, back, left/right
SJ = Right/left	DM = Right, top/back	TJ = Front, back,right/left
SK = Back/left	DN = Front, top/left	TK = Front, back, top/left
SL = Front/left	DO = Back, top/left	TL = Front, top, right/left
SM = Top/left	DP = Right, top/left	TM = Top, back, right/left

Special option codes
AA = Standard

Placeholder

Revision level
A = Rev. 1

Supply air size
X = None
A = 10" x 8" (09-18)
B = 12" x 10" (24-36)
C = 14" x 12" (09-18)
D = 16" x 14" (24-36)

Cabinet
1 = 88"
3 = Custom

Air filter
1 = Washable
2 = 1" throwaway

Hose kit (3')
X = None
A = 1/2"
B = 3/4"

Y strainer
X = None
A = 1/2" Y strainer (09, 12)

Zone valve
X = None
A = 1/2" 24VAC zone valve (09, 12)
B = 3/4" 24VAC zone valve (15-36)

Flow regulator
X = None
A = 1/2", 1.5 GPM (09, 12)
B = 1/2", 2.0 GPM (09, 12)
C = 1/2", 2.5 GPM (09, 12)
D = 1/2", 3.0 GPM (09, 12)
E = 3/4", 2.0 GPM (15, 18)
F = 3/4", 2.5 GPM (15, 18)
G = 3/4", 3.0 GPM (15-24)
H = 3/4", 3.5 GPM (24, 30)
I = 3/4", 4.0 GPM (24, 30)
J = 3/4", 5.0 GPM (24-36)
K = 3/4", 6.0 GPM (24-36)
L = 3/4", 7.0 GPM (30, 36)
M = 3/4", 8.0 GPM (30, 36)
N = 3/4", 9.0 GPM (36)
O = 3/4", 10.5 GPM (36)

Heat exchanger
1 = Copper coax with air coil

Nomenclature
VS series, cabinetry

1, 2, 3	4	5, 6	7	8	9	10	11	12, 13	14	15	16	17	18
VHC	M	09	A	A	X	S	X	DB	1	A	A	–	AA

Unit type
VHC = Vertical Stack Water Source Heat Pump cabinetry

Model
M = Master
S = Slave
A = Stand Alone

Nominal capacity
09 = 9,000 BTU/Hr
12 = 12,000 BTU/Hr
15 = 15,000 BTU/Hr
18 = 18,000 BTU/Hr
24 = 24,000 BTU/Hr
30 = 30,000 BTU/Hr
36 = 36,000 BTU/Hr

Voltage
A = 208-230V/60/1
B = 277V/60/1

Blower/motor options
A = Standard/PSC
B = High static/PSC
C = Standard/ECM
D = High static/ECM

Options
X = None (standard)
S = With sight and sound baffle

Controls
S = Microprocessor controls
C = Microprocessor and customer supplied DDC controls
L = Microprocessor and Lon Network Communication
B = Microprocessor and BACnet network communication
N = Microprocessor and N2 network communication

Power termination
X = No disconnect
1 = Disconnect switch

Special option codes
AA = Standard

Placeholder

Revision level
A = Rev. 1

Supply air size
X = None
A = 10" x 8" (09-18)
B = 12" x 10" (09, 12, 24-36)
C = 14" x 12" (15, 18)
D = 16" x 14" (24-36)

Cabinet
1 = 88"
3 = Custom

Supply air/risers		
NA = None/back	DA = Front, right/back	TA = Front, left, right/back
NB = None/right	DB = Front, left/back	TB = Front, top, right/back
NC = None/left	DC = Left, right/back	TC = Front, top, left/back
SA = Front/back	DD = Front, top/back	TD = Top, left, right/back
SB = Right/back	DE = Front, left/right	TE = Front, back, left/right
SC = Left/back	DF = Back, left/right	TF = Front, back, top/right
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SE = Left/right	DH = Left, top/back	TH = Top, back, left/right
SF = Front/right	DJ = Back, right/left	TJ = Front, back,right/left
SG = Back/right	DK = Front, right/left	TK = Front, back, top/left
SH = Top/right	DL = Front, back/left	TL = Front, top, right/left
SJ = Right/left	DM = Right, top/back	TM = Top, back, right/left
SK = Back/left	DN = Front, top/left	
SL = Front/left	DO = Back, top/left	
SM = Top/left	DP = Right, top/left	
	DQ = front, top/right	
	DR = Back, top/right	
	DS = Left, top/right	

Nomenclature
VS series, chassis

1, 2, 3, 4	5, 6	7	8	9	10	11	12	13	14	15	16, 17
VHCH	09	A	1	D	A	X	A	1	A	–	AA

Unit type
VHCH = Vertical Stack Water Source Heat Pump chassis

Nominal capacity
09 = 9,000 BTU/Hr
12 = 12,000 BTU/Hr
15 = 15,000 BTU/Hr
18 = 18,000 BTU/Hr
24 = 24,000 BTU/Hr
30 = 30,000 BTU/Hr
36 = 36,000 BTU/Hr

Voltage
A = 208-230V/60/1
B = 277V/60/1

Heat exhanger
1 = Copper coax with air coil

Flow regulator
X = None
A = 1/2", 1.5 GPM (1, 2)
B = 1/2", 2.0 GPM (1, 2)
C = 1/2", 2.5 GPM (1, 2)
D = 1/2", 3.0 GPM (1, 2)
E = 3/4", 2.0 GPM (3, 4)
F = 3/4", 2.5 GPM (3, 4)
G = 3/4", 3.0 GPM (3, 4, 5)
H = 3/4", 3.5 GPM (5, 6)
I = 3/4", 4.0 GPM (5, 6)
J = 3/4", 5.0 GPM (5, 6, 7)
K = 3/4", 6.0 GPM (5, 6, 7)
L = 3/4", 7.0 GPM (6, 7)
M = 3/4", 8.0 GPM (6, 7)
N = 3/4", 9.0 GPM (7)
O = 3/4", 10.5 GPM (7)

Special option codes
AA = Standard

Placeholder

Revision level
A = Rev. 1

Air filter
1 = Washable
2 = 1" throwaway

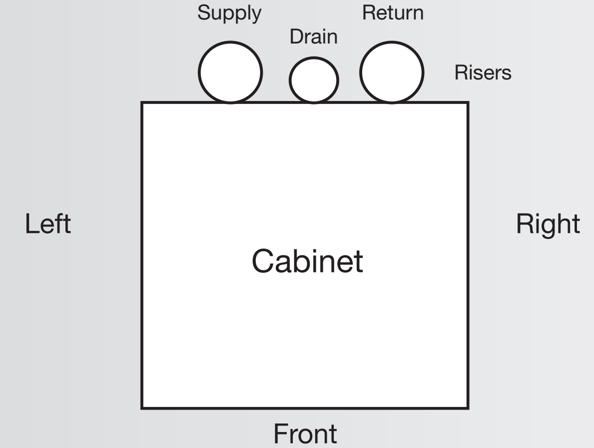
Hose kit (3')
X = None
A = 1/2"
B = 3/4"

Y strainer
X = None
A = 1/2" Y strainer (09, 12)
B = 3/4" Y straner (15-36)

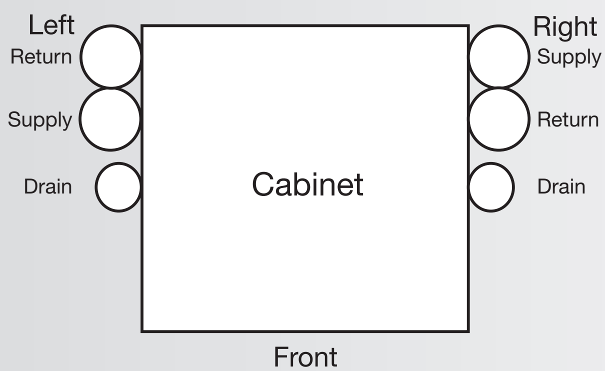
Zone valve
X = None
A = 1/2" 24VAC zone valve (09, 12)
B = 3/4" 24VAC zone valve (15-36)

Unit air flow arrangements

Back



Side (Left and Right)



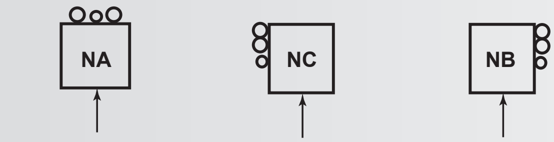
Supply air to room

Return air from room

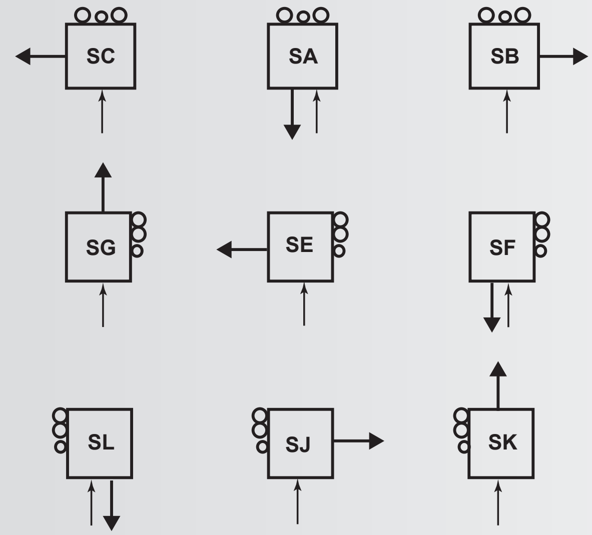
Notes:

- Supply air grilles can be on any side except the riser side.
- Return air location also denotes the control location and service access, which is always considered the front.
- Single discharge opening is not recommended for sizes 24, 30 and 36. Triple discharge openings are not recommended for sizes 09 and 12.
- Refer to Riser Slot Arrangements on page 46 for actual layout dimensions.

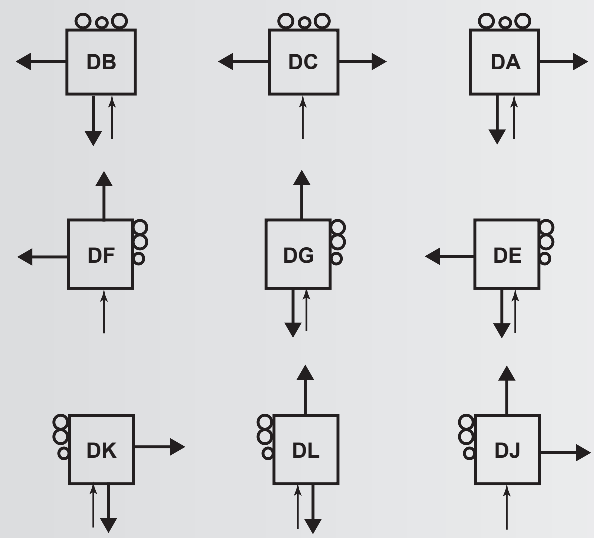
No Supply Openings



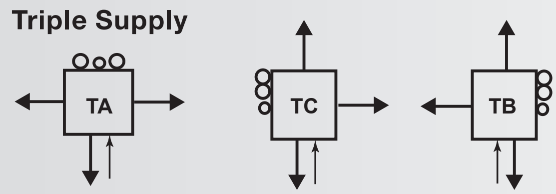
Single Supply



Double Supply



Triple Supply



General data

Size	09	12	15	18	24	30	36
Cooling capacity (BTU/hr)	9200	12000	16500	18500	22500	30000	34000
Heating capacity (BTU/hr)	12500	16000	21500	23500	29500	37000	41000
Compressor (1 each)	Rotary	Rotary	Rotary	Rotary	Rotary	Rotary	Scroll
Factory refrigerant charge R-410A (oz)	27.5	31.7	45.8	47.0	52.9	70.7	60.0
Fan data							
Speeds	2	2	2	2	2	2	2
Blower wheel size (D x W) (in.) standard/high static	7.1 x 6.7	7.1 x 6.7	7.1 x 6.7	7.1 x 6.7	9.2 x 10.0	9.2 x 10.0	9.2 x 10.0
Air flow (CFM @ 0.0" of static pressure)	360	420	540	630	820	1080	1220
Water/condensate side data							
Water connection size (female NPT, in.)	1/2	1/2	3/4	3/4	3/4	3/4	3/4
Condensate connection size (in.)	3/4	3/4	3/4	3/4	3/4	3/4	3/4
Air coil data							
Total face area (ft.)	1.48	1.48	1.81	1.81	1.72	1.72	1.72
Tube size (in.)	3/8	3/8	3/8	3/8	3/8	3/8	3/8
Fin spacing (FPI)	14	14	14	14	12	12	12
Number of rows	2	3	4	4	3	4	4
Cabinet data							
Depth (in.)	18	18	18	18	24	24	24
Height (in.)	88	88	88	88	88	88	88
Width (in.)	18	18	18	18	24	24	24
Filter standards - washable filter (in.)	14-1/4 x 18-1/2	14-1/4 x 18-1/2	14-1/4 x 22-1/2	14-1/4 x 22-1/2	19 x 28-3/4	19 x 28-3/4	19 x 28-3/4
Cabinet weight (lb.)	120	120	120	120	170	170	170
Chassis weight (lb.)	99	105	119	122	187	198	225

Notes:
- Air flow at high speed and operation at lower voltage (208V) of dual voltage ratings.

Standard ratings

English (IP) units

Water loop heat pump

Size	Total cooling at 86 °F		Total heating at 68 °F	
	Capacity (BTU/hr)	EER (BTU/W)	Capacity (BTU/hr)	COP
09	9200	13.5	12500	4.7
12	12000	13.0	16000	4.6
15	16500	13.0	21100	4.5
18	18500	13.0	23500	4.5
24	22500	13.0	29500	4.7
30	30000	12.7	37000	4.5
36	34000	13.0	41000	4.5

Water loop heat pump

Size	Total cooling at 86 °F		Total heating at 68 °F	
	Capacity (BTU/hr)	EER (BTU/W)	Capacity (BTU/hr)	COP
09	9600	14.5	12300	4.8
12	12500	15.5	17000	5.5
15	16800	14.5	21700	4.8
18	18100	13.8	25100	4.8
24	20500	13.8	29400	5.0
30	32200	14.9	38900	5.1
36	34700	14.1	41100	4.9

- EC fan motor

Ground water heat pump

Size	Total cooling at 59 °F		Total heating at 50 °F	
	Capacity (BTU/hr)	EER (BTU/W)	Capacity (BTU/hr)	COP
09	11200	21.0	10500	4.1
12	14800	21.0	13500	4.0
15	19500	20.0	18500	3.9
18	20500	19.5	19500	3.9
24	26800	20.0	24500	4.2
30	35000	19.0	32000	4.0
36	38000	19.0	35000	4.0

Ground loop heat pump

Size	Total cooling at 77 °F		Total heating at 32 °F	
	Capacity (BTU/hr)	EER (BTU/W)	Capacity (BTU/hr)	COP
09	9700	15.6	8100	3.4
12	13200	15.5	10000	3.3
15	18000	15.0	15000	3.2
18	19000	14.8	16800	3.2
24	24000	15.0	19000	3.3
30	32000	14.5	25000	3.3
36	36000	15.0	27000	3.2

Notes:
- Cooling capacity based upon 80.6 °F DB, 66.2 °F WB entering air temperature.
- Heating capacity based upon 68 °F DB, 59 °F WB entering air temperature.
- All ratings based upon air flow at high speed and operation at lower voltage (208V) of dual voltage ratings.
- PSC fan motor

Standard ratings

Metric (SI) units

Water loop heat pump

Size	Total cooling at 30 °C		Total heating at 20 °C	
	Capacity (W)	EER (BTU/W)	Capacity (W)	COP
09	2696	4.0	3663	4.7
12	3429	3.8	4689	4.6
15	1836	3.8	6301	4.5
18	5275	3.8	6887	4.5
24	6594	3.8	8646	4.7
30	8353	3.7	10844	4.5
36	9584	3.8	12016	4.5

Water loop heat pump

Size	Total cooling at 86 °F		Total heating at 68 °F	
	Capacity (BTU/hr)	EER (BTU/W)	Capacity (BTU/hr)	COP
09	2813	4.2	3604	4.8
12	3663	4.5	4982	5.5
15	4923	4.2	6359	4.8
18	5304	4.0	7355	4.8
24	6007	4.0	8615	5.0
30	9436	4.4	11399	5.1
36	10168	4.1	12044	4.9

- EC fan motor

Ground water heat pump

Size	Total cooling at 15 °C		Total heating at 10 °C	
	Capacity (W)	EER (BTU/W)	Capacity (W)	COP
09	3282	6.2	3077	4.1
12	4337	6.2	3956	4.0
15	5715	5.9	5422	3.9
18	6008	5.7	5715	3.9
24	7854	5.9	7180	4.2
30	10257	5.6	9378	4.0
36	11137	5.6	10257	4.0

Ground loop heat pump

Size	Total cooling at 25 °C		Total heating at 0 °C	
	Capacity (W)	EER (BTU/W)	Capacity (W)	COP
09	2843	4.6	2374	3.4
12	3868	4.5	2931	3.3
15	5275	4.4	4396	3.2
18	5568	4.3	4924	3.2
24	7034	4.4	5568	3.3
30	9378	4.2	7327	3.3
36	10550	4.4	7913	3.2

Notes:
- Cooling capacity based upon 27 °C DB, 19 °C WB entering air temperature.
- Heating capacity based upon 20 °C DB, 15 °C WB entering air temperature.
- All ratings based upon air flow at high speed and operation at lower voltage (208V) of dual voltage ratings.
- PSC fan motor

Standard ratings

VS series octave band sound power level

dB re 1pW

Size	Unit test operation mode	With single supply double deflection grille with standard perimeter bypass Allen lock, removable						
		125	250	500	1000	2000	4000	8000
09	Fan only: low speed	52.3	50.5	46.0	41.1	33.6	32.1	31.0
	Fan only: high speed	52.9	51.0	47.4	41.5	33.9	32.8	31.1
	Cooling: low speed	53.5	51.5	47.6	41.7	34.4	32.9	31.1
	Cooling: high speed	56.5	54.3	50.1	44.3	37.9	36.3	31.8
	Heating: low speed	53.9	51.0	48.4	42.4	34.9	33.2	33.1
	Heating: high speed	56.2	53.8	50.2	44.2	37.5	36.3	32.8
12	Fan only: low speed	54.8	52.3	40.1	43.3	37.5	36.5	32.7
	Fan only: high speed	54.4	52.1	37.6	43.4	36.9	38.6	32.2
	Cooling: low speed	56.0	53.3	49.6	43.9	38.3	36.6	32.8
	Cooling: high speed	58.0	55.4	41.7	46.2	40.9	39.2	34.2
	Heating: low speed	60.9	54.2	49.9	44.2	37.6	36.4	33.8
	Heating: high speed	60.7	56.2	51.7	45.8	39.6	38.6	34.4
15	Fan only: low speed	58.9	57.8	54.0	51.5	45.0	43.7	38.4
	Fan only: high speed	59.2	59.1	54.3	52.6	45.2	44.7	41.3
	Cooling: low speed	60.1	58.8	55.6	52.1	45.8	44.5	38.6
	Cooling: high speed	62.8	62.4	58.2	55.4	49.1	48.1	41.8
	Heating: low speed	61.3	59.3	56.4	52.3	45.4	44.1	39.1
	Heating: high speed	63.8	62.3	58.1	55.2	48.4	47.7	41.7
18	Fan only: low speed	62.0	60.9	55.9	54.9	48.3	47.4	42.1
	Fan only: high speed	61.6	60.9	55.4	53.6	47.8	47.0	44.2
	Cooling: low speed	63.3	61.9	57.4	55.5	49.1	48.2	42.3
	Cooling: high speed	65.1	64.1	59.4	57.5	51.3	50.5	44.8
	Heating: low speed	63.8	61.9	57.9	55.1	48.3	47.1	42.0
	Heating: high speed	65.1	63.9	59.4	57.5	50.3	49.2	43.7
24	Fan only: low speed	60.7	58.6	54.1	48.3	42.3	38.4	35.7
	Fan only: high speed	59.6	58.7	54.8	49.2	43.1	39.2	36.9
	Cooling: low speed	61.9	59.6	55.7	48.9	43.1	39.2	35.9
	Cooling: high speed	63.1	62.0	58.9	52.0	47.1	43.0	37.5
	Heating: low speed	63.7	60.8	57.9	51.1	44.8	40.5	38.4
	Heating: high speed	65.7	63.2	59.4	52.3	48.7	44.1	39.6
30	Fan only: low speed	67.4	63.7	58.8	54.3	49.9	45.7	41.3
	Fan only: high speed	65.2	64.2	58.7	55.8	50.4	46.9	44.0
	Cooling: low speed	68.6	64.8	60.2	54.8	50.7	46.6	41.5
	Cooling: high speed	68.8	67.4	63.0	58.5	54.2	50.3	44.5
	Heating: low speed	69.7	65.7	61.2	56.1	51.9	47.8	41.9
	Heating: high speed	68.7	67.7	63.2	58.6	54.4	50.3	44.8
36	Fan only: low speed	70.2	68.0	62.1	59.1	56.6	50.1	45.1
	Fan only: high speed	70.3	68.1	63.2	65.3	56.6	50.3	46.8
	Cooling: low speed	71.4	68.6	62.1	59.4	56.7	50.4	45.2
	Cooling: high speed	71.5	69.8	64.0	65.4	56.2	52.1	47.0
	Heating: low speed	69.9	68.3	63.0	60.1	58.5	51.3	45.8
	Heating: high speed	70.5	69.6	64.0	60.9	58.8	53.0	47.7

Notes:

- All performance is sound power level in dB referenced to one picoWatt.
- Data is based on sound measurements made in a reverberant room on representative units from each cabinet size in accordance with AHRI Standard 350-08.

Electrical data

Standard PSC motors

Size	Voltage code	Rated voltage (V/Hz/Ph)	Voltage min./max.	Compressor		Power (W)	FLA	Total unit FLA	Min. circuit Amps	Max. fuse/ HACR size
				RLA	LRA					
09	A	208-230/60/1	197/254	4.7	20.0	37	0.44	5.1	6.3	15
	B	277/60/1	250/293	3.3	18.8	40	0.40	3.7	4.5	15
12	A	208-230/60/1	197/254	6.3	27.0	46	0.44	6.7	8.3	15
	B	277/60/1	250/293	4.6	20.0	50	0.40	5.0	6.2	15
15	A	208-230/60/1	197/254	9.9	42.0	87	1.30	11.2	13.7	25
	B	277/60/1	250/293	7.1	43.0	100	1.30	8.4	10.2	20
18	A	208-230/60/1	197/254	9.9	42.0	111	1.30	11.2	13.7	25
	B	277/60/1	250/293	9.0	54.0	125	1.30	10.3	12.6	20
24	A	208-230/60/1	197/254	10.8	46.0	304	2.10	12.9	15.6	25
	B	277/60/1	250/293	9.0	54.0	300	1.70	10.7	13.0	25
30	A	208-230/60/1	197/254	13.1	65.9	368	2.10	15.2	18.5	30
	B	277/60/1	250/293	12.2	72.0	340	1.70	13.9	17.0	30
36	A	208-230/60/1	197/254	18.6	79.0	442	2.10	20.7	25.4	40
	B	277/60/1	250/293	13.5	72.0	360	1.70	15.2	18.6	40

Standard EC motors

Size	Voltage code	Rated voltage (V/Hz/Ph)	Voltage min./ max.	Compressor		FLA	Total unit FLA	Min. circuit Amps	Max. fuse/ HACR size
				RLA	LRA				
09	A	208-230/60/1	197/254	4.7	20.0	2.9/2.6	7.6/7.3	8.8/8.5	15
	B	277/60/1	250/293	3.3	18.8	2.5	5.8	6.6	15
12	A	208-230/60/1	197/254	6.3	27.0	2.9/2.6	9.2/8.9	10.8/10.5	20
	B	277/60/1	250/293	4.6	20.0	2.5	7.1	8.3	15
15	A	208-230/60/1	197/254	9.9	42.0	2.9/2.6	12.8/12.5	15.3/15.0	25
	B	277/60/1	250/293	7.1	43.0	2.5	9.6	11.4	20
18	A	208-230/60/1	197/254	9.9	42.0	2.9/2.6	12.8/12.5	15.3/15.0	25
	B	277/60/1	250/293	9.0	54.0	2.5	11.5	13.8	25
24	A	208-230/60/1	197/254	10.8	46.0	2.9/2.6	13.7/13.4	16.4/16.1	25
	B	277/60/1	250/293	10.9	60.0	2.5	13.4	16.1	25
30	A	208-230/60/1	197/254	13.1	65.9	2.9/2.6	16.0/15.7	19.3/19.0	30
	B	277/60/1	250/293	12.2	72.0	2.5	14.7	17.8	30
36	A	208-230/60/1	197/254	18.6	79.0	2.9/2.6	21.5/21.2	26.2/25.9	50
	B	277/60/1	250/293	16.0	87.0	2.5	18.5	22.5	40

Notes: *(applies to both of the above tables)*

- Maximum circuit ampacity (MCA) = 1.25 x (FLA motor 1 + FLA motor 2 + FLA electric heat)
- Maximum overcurrent protection (MOP) = (2.25 x FLA motor 1) + FLA motor 2 + FLA electric heat
- If the calculated MOP is within 10% of the next smaller available fuse size, that fuse size shall be used. If not, the next larger fuse size above the calulated MOP must be used.
- If the selected MOP is smaller than the MCA, the selected MOP must be increased to the next larger available fuse size above the MCA.
- If the MOP is less than 15, it shall be rounded up to 15 amps. This is the minimum fuse or circuit breaker permitted by code.
- EC motor nameplate amperage indicates the motor hardware peak amperage while the motor full load amperage (FLA) is limited by the motor's factory programmed operating range, programmed specifically for each unit size. The programmed operating range is generally only a portion of the motor hardware full potential resulting in the motor FLA being lower than the nameplate FLA. Motor FLA will be reflected on the Fan Coil serial tag and should be used when sizing building electrical requirements.

Electrical data

High static PSC motors

Size	Voltage code	Rated voltage (V/Hz/Ph)	Voltage min./max.	Compressor		Power (W)	FLA	Total unit FLA	Min. circuit Amps	Max. fuse/ HACR size
				RLA	LRA					
9	A	208-230/60/1	197/254	4.7	20.0	79	1.3	6.0	7.2	15
	B	277/60/1	250/293	3.3	18.8	80	1.3	4.6	5.4	15
12	A	208-230/60/1	197/254	6.3	27.0	102	1.3	7.6	9.2	15
	B	277/60/1	250/293	4.6	20.0	120	1.3	5.9	7.1	15
15	A	208-230/60/1	197/254	9.9	42.0	155	3.2	13.1	15.6	25
	B	277/60/1	250/293	7.1	43.0	170	2.9	10.0	11.8	20
18	A	208-230/60/1	197/254	9.9	42.0	199	3.2	13.1	15.6	25
	B	277/60/1	250/293	9.0	54.0	210	2.9	11.9	14.2	25
24	A	208-230/60/1	197/254	10.8	46.0	450	3.4	14.2	16.9	30
	B	277/60/1	250/293	10.9	60.0	450	2.9	13.8	16.5	25
30	A	208-230/60/1	197/254	13.1	65.9	560	3.4	16.5	19.8	30
	B	277/60/1	250/293	12.2	72.0	560	2.9	15.1	18.2	30
36	A	208-230/60/1	197/254	18.6	79.0	650	3.4	22.0	26.7	50
	B	277/60/1	250/293	16.0	87.0	650	2.9	18.9	22.9	40

High static EC motors

Size	Voltage code	Rated voltage (V/Hz/Ph)	Voltage min./ max.	Compressor		FLA	Total unit FLA	Min. circuit Amps	Max. fuse/ HACR size
				RLA	LRA				
9	A	208-230/60/1	197/254	4.7	20.0	2.9/2.6	7.6/7.3	8.8/8.5	15
	B	277/60/1	250/293	3.3	18.8	2.5	5.8	6.6	15
12	A	208-230/60/1	197/254	6.3	27.0	2.9/2.6	9.2/8.9	10.8/10.5	20
	B	277/60/1	250/293	4.6	20.0	2.5	7.1	8.3	15
15	A	208-230/60/1	197/254	9.9	42.0	8.1/7.3	18.0/17.2	20.5/19.7	30
	B	277/60/1	250/293	7.1	43.0	5.5	12.6	14.4	20
18	A	208-230/60/1	197/254	9.9	42.0	8.1/7.3	18.0/17.2	20.5/19.7	30
	B	277/60/1	250/293	9.0	54.0	5.5	14.5	16.8	25
24	A	208-230/60/1	197/254	10.8	46.0	8.1/7.3	18.9/18.1	21.6/20.8	30
	B	277/60/1	250/293	10.9	60.0	5.5	16.4	19.1	30
30	A	208-230/60/1	197/254	13.1	65.9	8.1/7.3	21.2/20.4	24.5/23.7	40
	B	277/60/1	250/293	12.2	72.0	5.5	17.7	20.8	30
36	A	208-230/60/1	197/254	18.6	79.0	8.1/7.3	26.7/25.9	31.4/30.6	50
	B	277/60/1	250/293	16.0	87.0	5.5	21.5	25.5	40

Notes: *(applies to both of the above tables)*

- Maximum circuit ampacity (MCA) =
  1.25 x (FLA motor 1 + FLA motor 2 + FLA electric heat)
- Maximum overcurrent protection (MOP) =
  (2.25 x FLA motor 1) + FLA motor 2 + FLA electric heat
- If the calculated MOP is within 10% of the next smaller available fuse size, that fuse size shall be used. If not, the next larger fuse size above the calulated MOP must be used.
- If the selected MOP is smaller than the MCA, the selected MOP must be increased to the next larger available fuse size above the MCA.
- If the MOP is less than 15, it shall be rounded up to 15 amps. This is the minimum fuse or circuit breaker permitted by code.
- EC motor nameplate amperage indicates the motor hardware peak amperage while the motor full load amperage (FLA) is limited by the motor's factory programmed operating range, programmed specifically for each unit size. The programmed operating range is generally only a portion of the motor hardware full potential resulting in the motor FLA being lower than the nameplate FLA. Motor FLA will be reflected on the Fan Coil serial tag and should be used when sizing building electrical requirements.

Standard 24VAC sequence of operation

Random start delay

When the unit is first powered "on" the control microprocessor will generate a random number to determine the start delay of the compressor operation (3-5 minutes). This delay is used to prevent multiple units from cycling "on" at the same time. The purpose is to prevent a large power load on the building electrical system after a power outage. After the number, or delay time, is generated the microprocessor will use it to determine the minimum amount of time delay before the compressor is cycled "on" after a demand is received from the thermostat.

Anti-short cycling delay

After the random start delay is generated the microprocessor will use it to determine the minimum amount of delay before the compressor is cycled "on" after a demand is received from the thermostat. This allows the refrigerant system to equalize in pressure and prevents short-cycling of the compressor.

Minimum compressor runtime

The minimum compressor runtime of each cycle, heating or cooling, is 90 seconds. Once the compressor is energized it will not de-energize until the minimum runtime is satisfied, even if the thermostat input is removed.

Cooling 1st stage (Y1, O)

When the microprocessor receives (Y1, O) at the 24VAC thermostat input connection, the unit will proceed with the cooling 1st stage sequence. The microprocessor must receive these signals for 2 continuous seconds before it recognizes the inputs as valid. Once the input signals are determined to be valid the reversing valve will energize/de-energize after 5 seconds. The microprocessor will then verify that the anti-short cycling delay has been satisfied. Once the anti-short cycling delay has been satisfied the compressor will cycle "on." The blower will cycle "on" in low speed 15 seconds after the compressor is cycled "on."

Cooling 2nd stage (Y1, Y2, O)

When the microprocessor receives (Y1, Y2, O) at the 24VAC thermostat input connection, the unit will proceed with the cooling 2nd stage sequence. The microprocessor must receive these signals for 2 continuous seconds before it recognizes the inputs as valid. Once the input signals are determined to be valid the reversing valve will energize/de-energize after 5 seconds. The microprocessor will then verify that the anti-short cycling delay has been satisfied. Once the anti-short cycling delay has been satisfied the compressor will cycle "on." The blower will cycle "on" in high speed 15 seconds after the compressor is cycled "on."

Heating 1st stage (Y1)

When the microprocessor receives (Y1) at the 24VAC thermostat input connection, the unit will proceed with the cooling 1st stage sequence. The microprocessor must receive these signals for 2 continuous seconds before it recognizes the inputs as valid. Once the input signals are determined to be valid the reversing valve will enertize/de-energize after 5 seconds. The microprocessor will then verify that the anti-short cycling delay has been satisfied. Once the anti-short cycling delay has been satisfied the compressor will cycle "on." The blower will cycle "on" in low speed 15 seconds after the compressor is cycled "on."

Heating 2nd stage (Y1, Y2)

When the microprocessor receives (Y1, Y2) at the 24VAC thermostat input connection the unit will proceed with the heating 2nd stage sequence. The microprocessor must receive these signals for 2 continuous seconds before it recognizes the inputs as valid. Once the input signals are determined to be valid the reversing valve will energize/de-energize after 5 seconds. The microprocessor will then verify that the anti-short cycling delay has been satisfied. Once the anti-short cycling delay has been satisfied the compressor will cycle "on." The blower will cycle "on" in high speed 15 seconds after the compressor is cycled "on."

Fan only mode (G)

The fan only mode can only be used with a 24VAC thermostat and will energize the low speed blower when a (G) input has been received at the 24VAC thermostat input connection. When the input is removed the blower will de-energize immediately.

24 volt thermostats

Non-programmable and programmable thermostats use a control algorithm that uses both time and temperature difference from the setting to determine when to turn on stage 1 fan speed (low) and stage 2 fan speed (high). This logic therefore controls the room temperature to plus or minus 1 degree from set point.

System piping arrangements

Shown to the right are some of the common piping layouts for the Zehnder Rittling Vertical Stack Water Source Heat Pumps. Regardless of the system selected, optimum performance can only be achieved through adjustment of the water flow at each individual unit.

Direct return

This system is the most common piping arrangement referred to as "Direct Return." This is the most cost effective method of piping to install since the water is supplied and returned to a riser column at the same place, at the bottom or top of the building. However, this type of system requires more effort to individually balance water flow to the units. The risers are normally capped at the ends opposite the main supply and return piping and may require a field installed flush and vent loop.

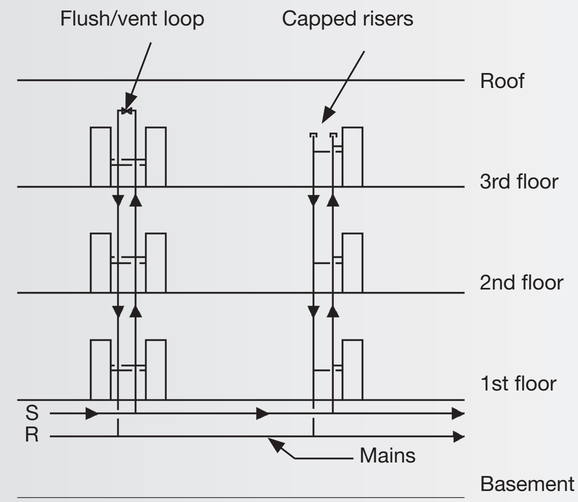
Reverse return with individual return

This system is a "Reverse Return" system, which is commonly used to minimize individual unit water flow balancing and is often referred to as "self balancing." This riser arrangement has a natural affinity to balance the flow to each unit in the riser column. However, individual unit balancing may still be required. This piping system has an individual return for each riser column.

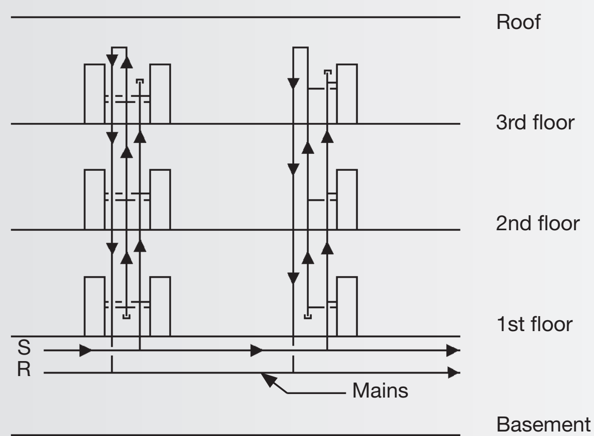
Reverse return with common return

This system is a "Reverse Return" with a common reverse return riser installed separately from the individual unit riser columns. This riser arrangement allows for more flexibility in individual unit riser sizing but has the same general characteristics as the "reverse return" system described above. It may also be a better fit for the particular structural and architectural requirements of the building.

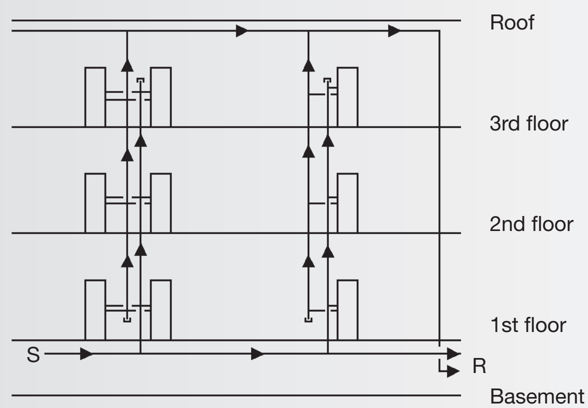
Direct return



Reverse return with individual return



Reverse return with common return



Riser material, sizing, installation and expansion

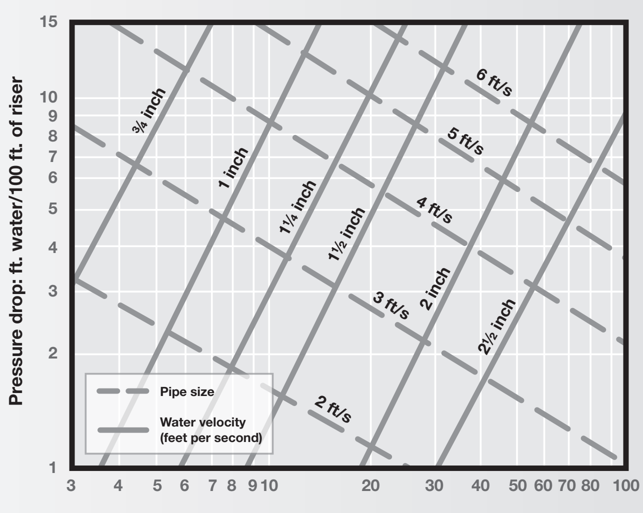
Some of the factors affecting riser application and sizing are noise, tube erosion and economics. Since each Vertical Stack Water Source Heat Pump unit may be supplied with factory installed risers, the riser material, diameter, length and insulation thickness must be determined for each unit based on its positioning within the building.

The Friction Loss for Risers Table displays riser tube diameter sizes as a function of flow (GPM), friction loss and water velocity. For maximum riser velocity on pressure drop per 100 feet, refer to ASHRAE 2005 Fundamentals 36.6 Figure 5 for riser sizing. Generally, riser copper type, size, length and insulation thickness are determined by the location of the heat pump unit in the building. Water and condensate risers are available in type M or Type L copper, varying diameters from 3/4" to 2 1/2", and with either 1/2" or 3/4" thick closed cell foam insulation. All factory supplied risers and riser extensions are insulated for the full length of the riser, eliminating the need for field insulation. Any concerns regarding excessive expansion and between-the-floor fireproofing have not been addressed in the Zehnder Rittling design and any additional materials to accommodate these concerns are to be field supplied and installed using proper building practices and local building codes.

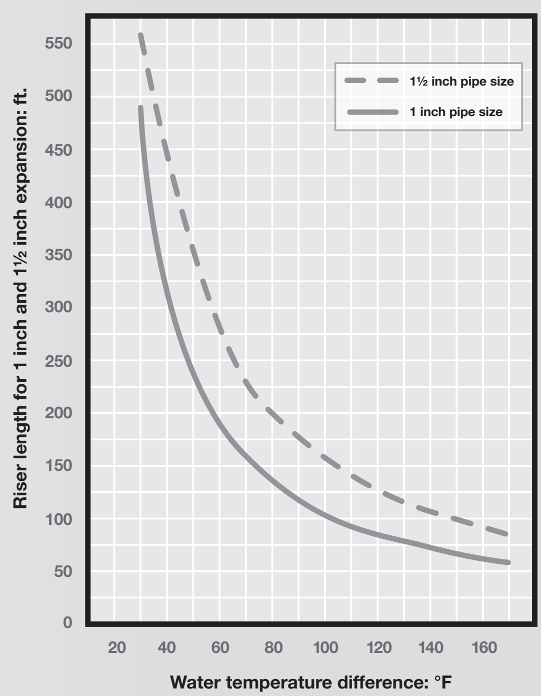
Riser sizing is generally based on the water flow requirements of each unit and the units on higher and lower floors that tie into the same riser column depending on the piping system chosen. Water piping is often designed at approximately 4-5 ft/s for system economy, consistent with minimizing riser erosion and noise. Keeping this in mind, risers can be reduced in size as the water flow decreases from floor to floor. For low-rise buildings, riser sizes can be of a single diameter. The reduced material handling on site will often offset extra costs associated with larger risers.

Generally, in medium to high-rise buildings, allowances must be made for pipe expansion. Vertical Stack Water Source Heat Pump units are furnished with integral copper expansion loops that allow up to 1" of riser expansion and contraction. Additional expansion compensation must be made in the riser system in the field where movement is expected to exceed factory allowances. The table showing allowable riser lengths between system expansion loops displays expansion characteristics of risers compared to water temperature differential. Assuming a hot water temperature of 150 °F and 45 °F chilled water, the temperature difference of 105 °F indicates 95 feet of riser will expand or contract 1". To eliminate stress, a riser system must be anchored to the building structure at least once. Technical information on pipe expansion, contraction and anchoring can be found in the ASHRAE HVAC Systems and Equipment Handbook and various other technical publications. Riser expansion and anchoring is the responsibility of the design engineer and installing contractor.

Friction loss for risers



Allowable riser lengths between system expansion loops

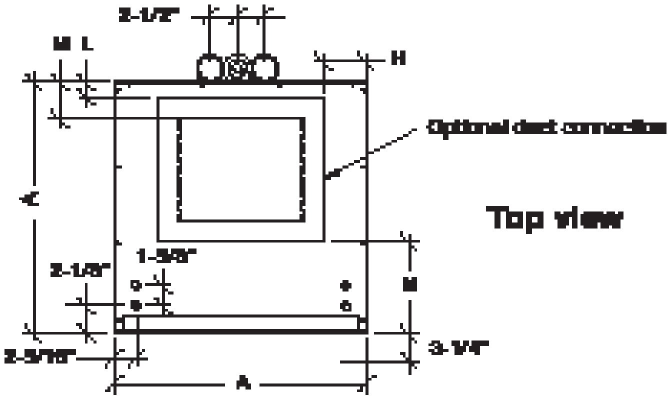


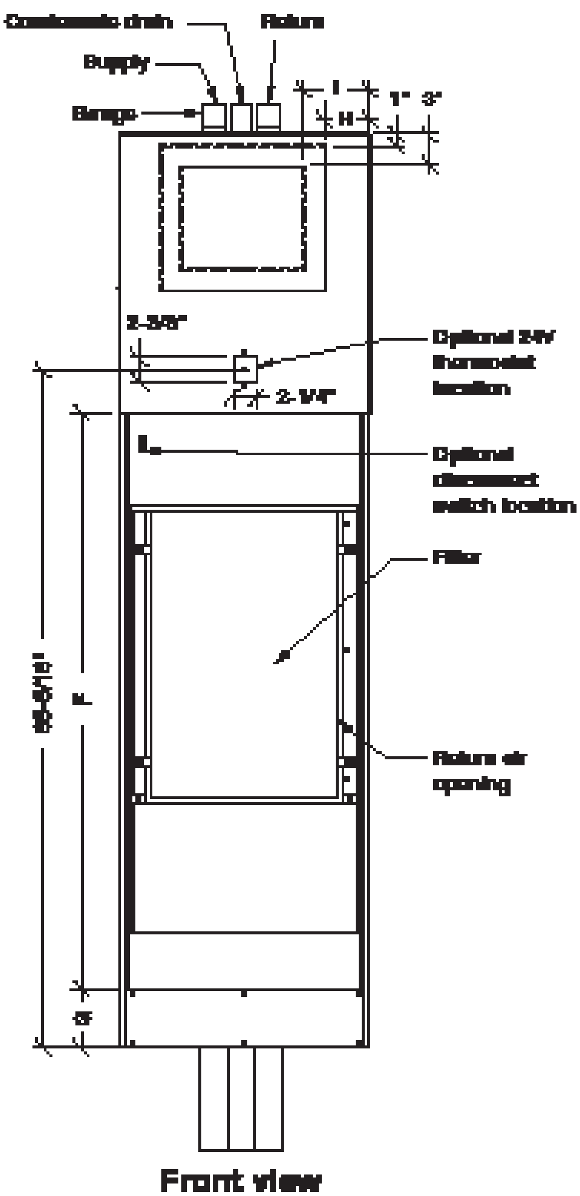
Dimensions and data: Stand alone unit (VHNA)

Dimensional data

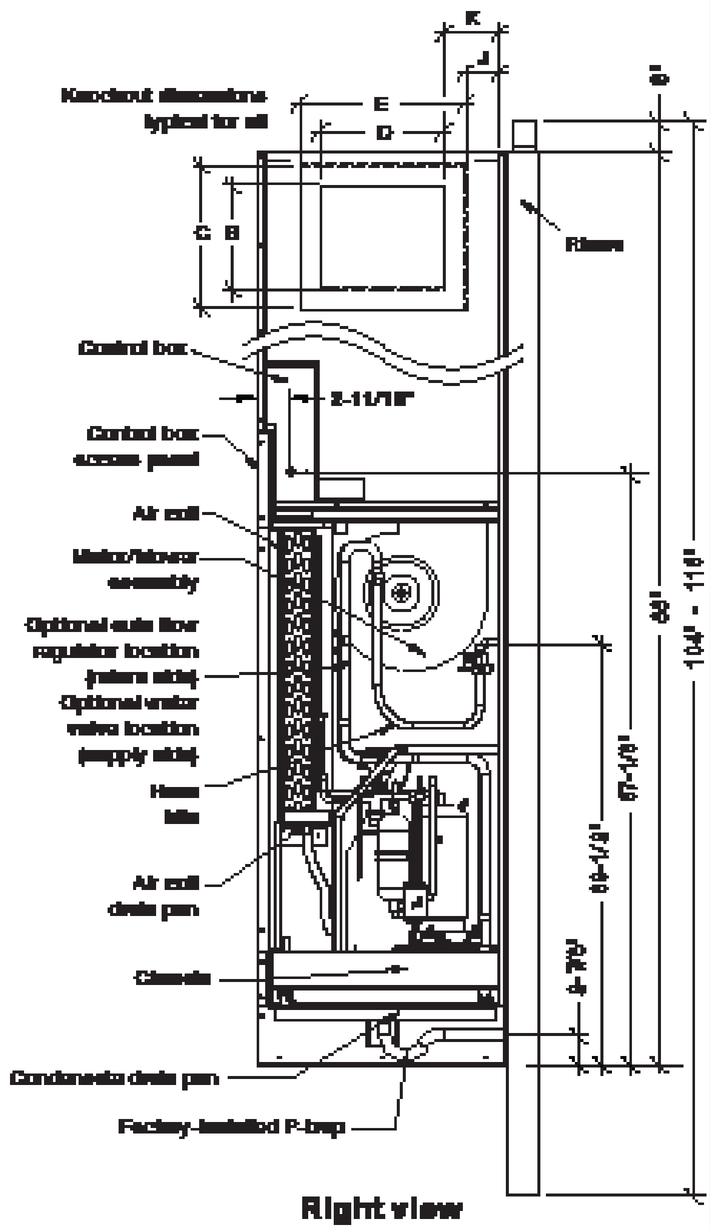
Unit dimensions: 88" height

Dimension	Models 09-18	Models 24-36
A	18"	24-1/4"
B	8"	10"
C	12"	14"
D	10"	12"
E	14"	16"
F	54-11/16"	55-1/2"
G	5-9/16"	5-5/8"
H	2-1/16"	4-1/8"
I	4-1/16"	6-1/8"
J	1-15/16"	4-1/16"
K	3-5/16"	6-1/16"
L	1-1/4"	1-7/16"
M	3-1/4"	3-7/16"
N	4-3/4"	8-13/16"

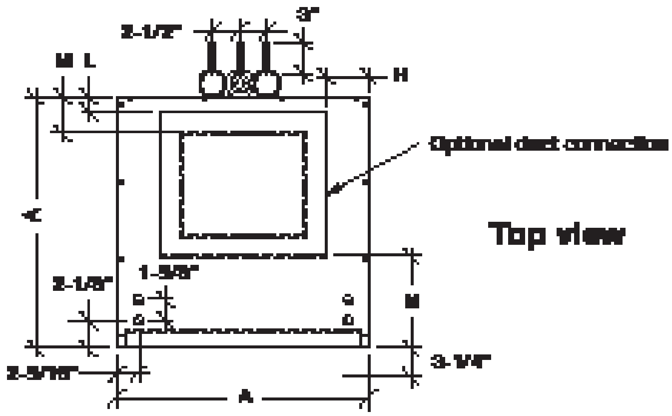




* Supply grille rough-in dimensions



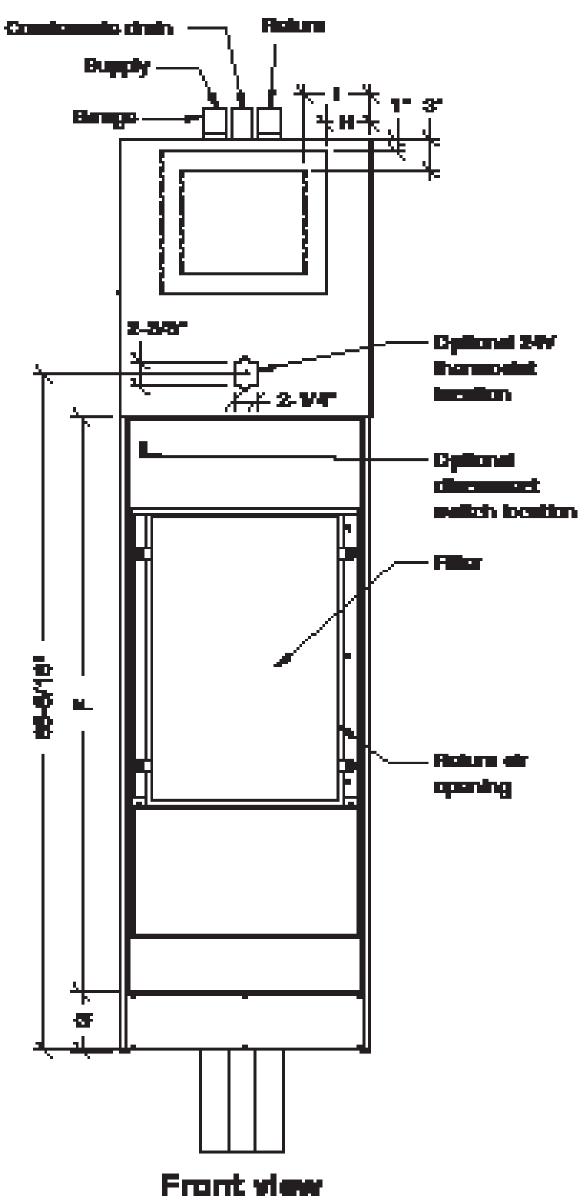
Dimensions and data: Master (VHNM)



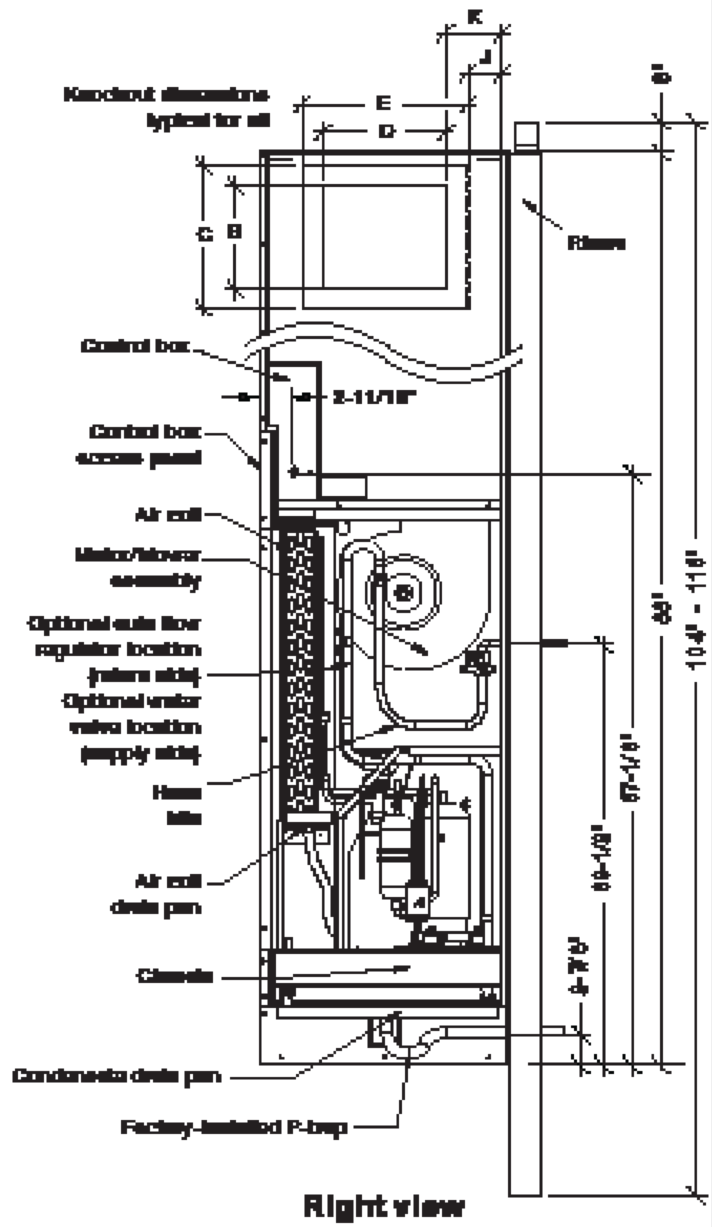
Dimensional data

Unit dimensions: 88" height

Dimension	Models 09-18	Models 24-36
A	18"	24-1/4"
B	8"	10"
C	12"	14"
D	10"	12"
E	14"	16"
F	54-11/16"	55-1/2"
G	5-9/16"	5-5/8"
H	2-1/16"	4-1/8"
I	4-1/16"	6-1/8"
J	1-15/16"	4-1/16"
K	3-5/16"	6-1/16"
L	1-1/4"	1-7/16"
M	3-1/4"	3-7/16"
N	4-3/4"	8-13/16"



* Supply grille rough-in dimensions

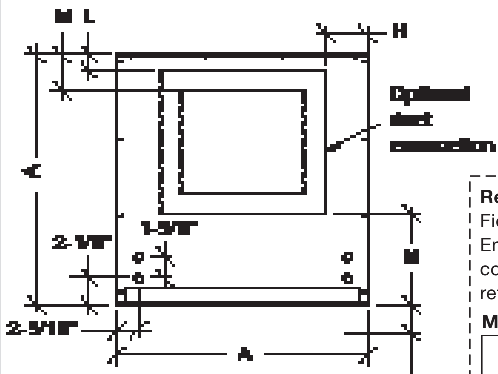


Dimensions and data: Slave (VHNS)

Dimensional data

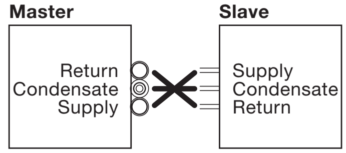
Unit dimensions: 88" height

Dimension	Models 09-18	Models 24-36
A	18"	24-1/4"
B	8"	10"
C	12"	14"
D	10"	12"
E	14"	16"
F	54-11/16"	55-1/2"
G	5-9/16"	5-5/8"
H	2-1/16"	4-1/8"
I	4-1/16"	6-1/8"
J	1-15/16"	4-1/16"
K	3-5/16"	6-1/16"
L	1-1/4"	1-7/16"
M	3-1/4"	3-7/16"
N	4-3/4"	8-13/16"

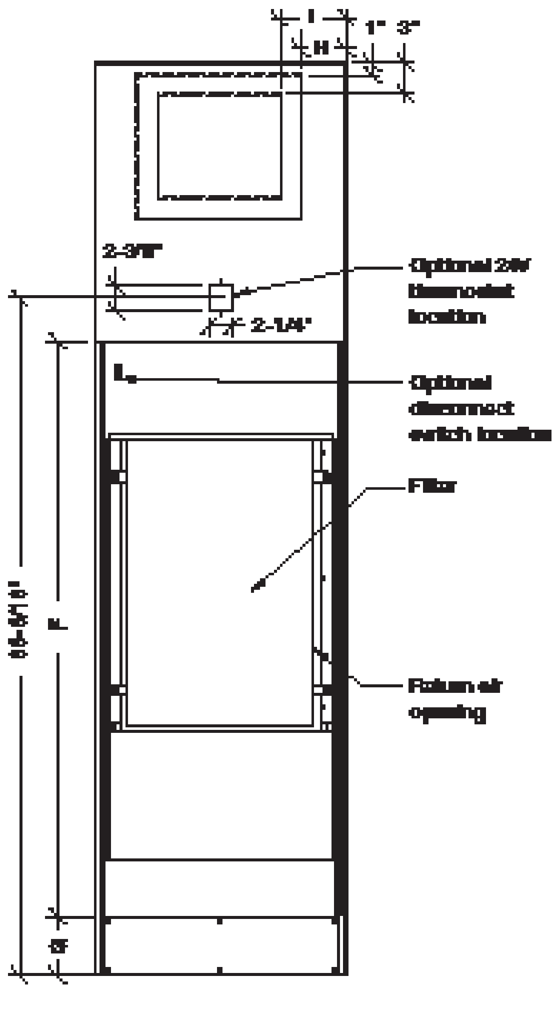


Top view

Reference only:
Field piping to master by others. Ensure master and slave are connected supply-to-supply and return-to-return

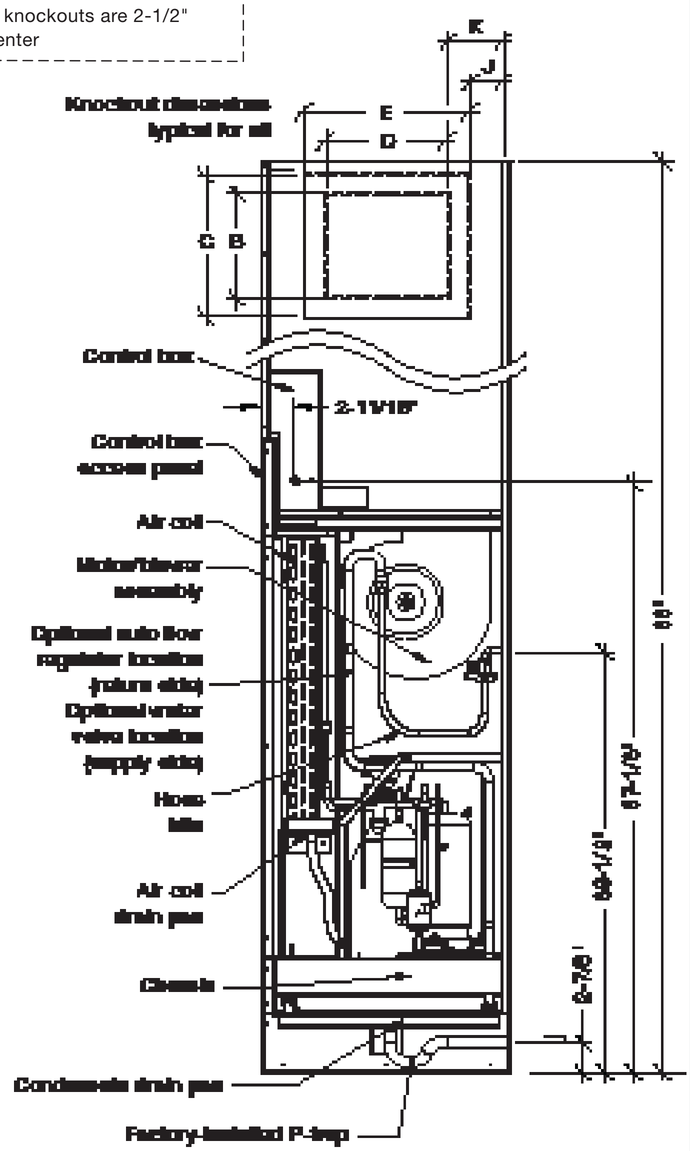


Note: Riser knockouts are 2-1/2" center to center



Front view

* Supply grille rough-in dimensions

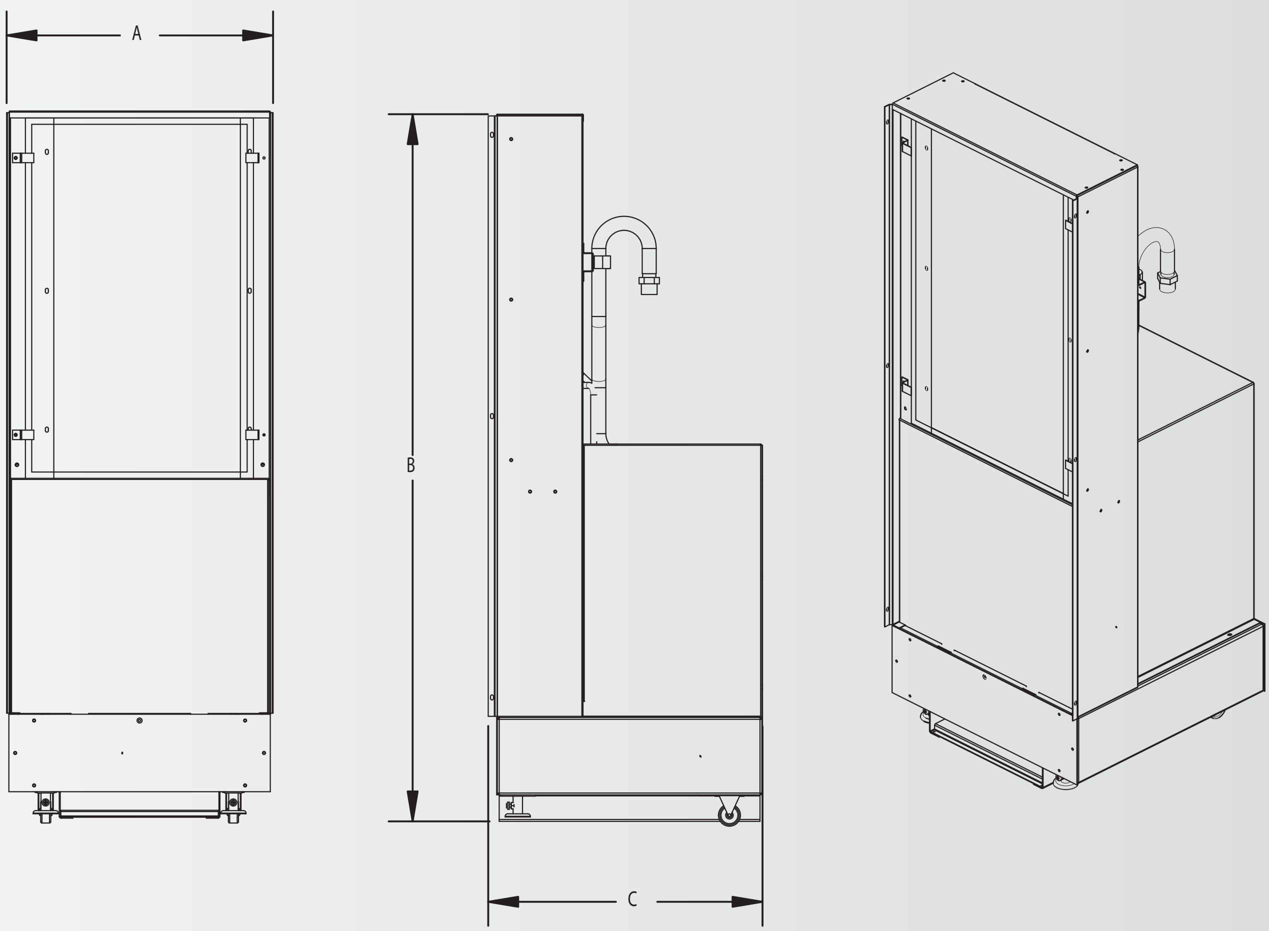


Right view

Dimensions and data: Chassis

Dimensional data

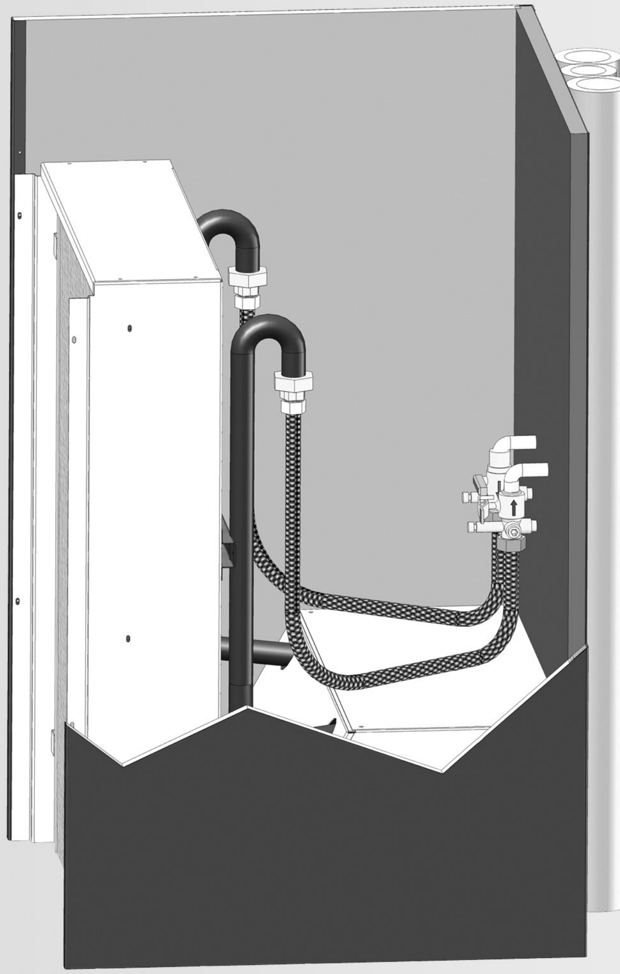
Unit size	A	B	C
Small unit 09-12	16-1/32"	37"	16-3/32"
Small unit 15-18		44"	
Large unit 24-36	22-1/32"	46"	23"



Hose kit

Specifications:

- Designed for VS series applications.
- Temperature range of 35 °F (2 °C) to 180 °F (82 °C).
- Maximum working pressure of 400 psig (2756 kPa).
- Fire rated materials per ASTM E 84-00 (NFPA 255, ANSI/UL 723 and UBC 8-1).
- Kevlar® reinforced EPDM core with ANSI 302-304 stainless steel outer braid.
- Swivel connector(s) with NPSH at both ends. EPDM gasket, shipped inside connection.
- Two ball valves supplied with each hose kit



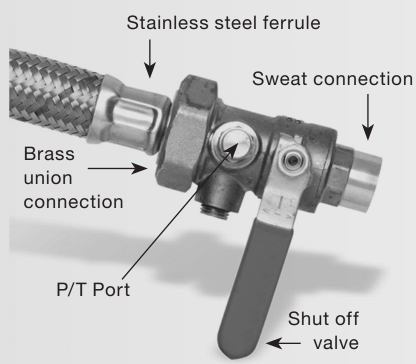
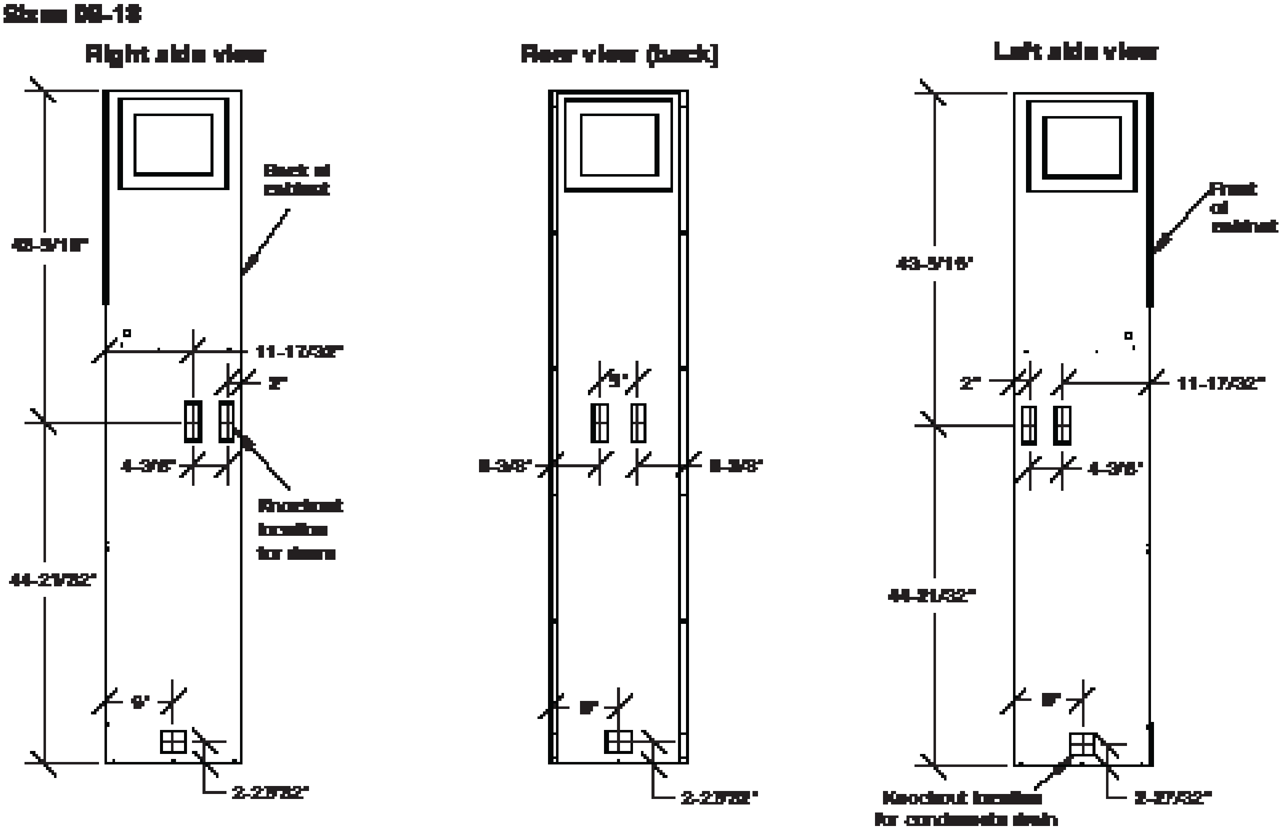


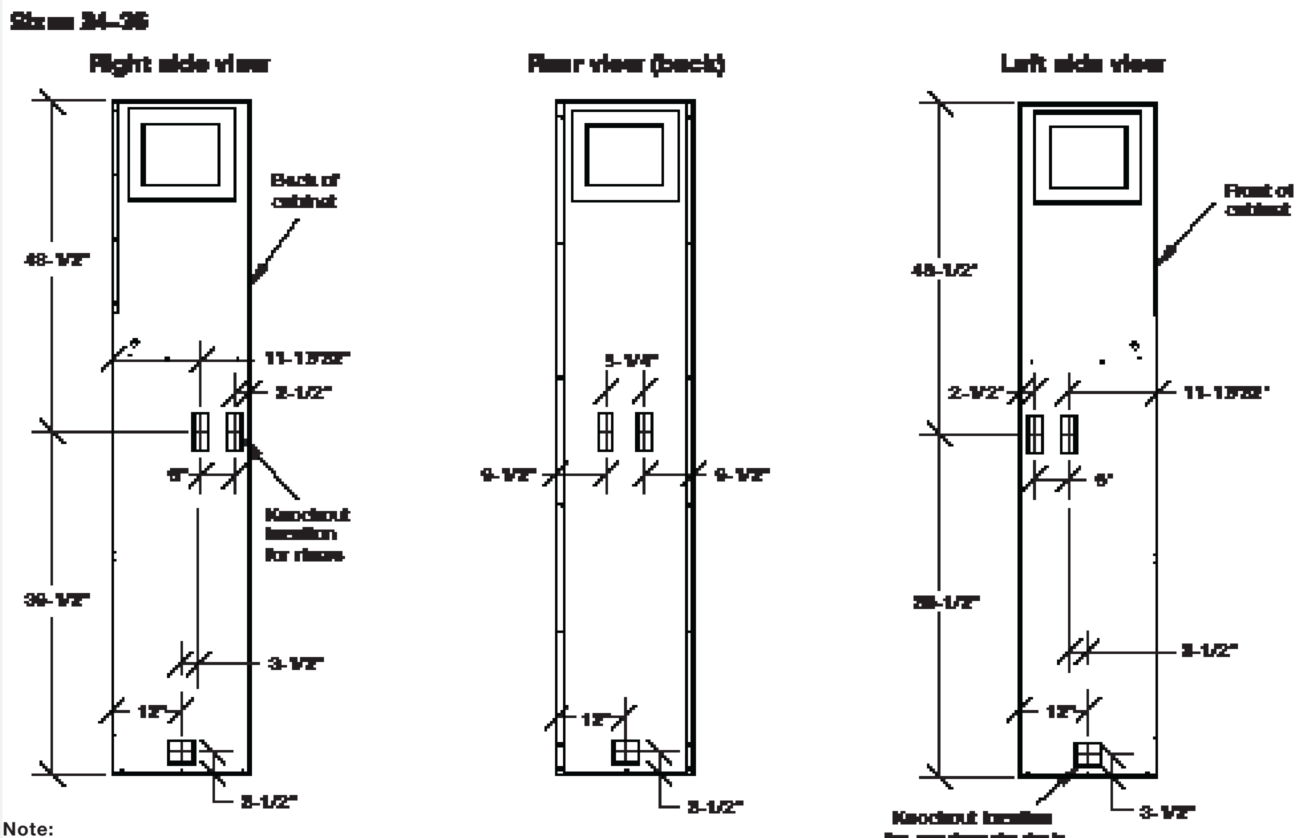
Table 9: Physical data

Unit sizes	Inside diameter inch (mm)	Length feet (cm)	Working pressure psig (kPa)	Minimum burst pressure psig (kPa)	Minimum bend radius inch (mm)
09, 12	1/2 (10.7)	3 (91)	400 (2756)	1600 (11024)	2-5/8 (66.7)
15, 18, 24, 30, 36	3/4 (19.1)	3 (91)	400 (2756	1600 (11024)	4-1/2 (114.3)

Notice: Do not allow hoses to rest against sharp edges or structural building components. Compressor vibration may cause hose failure and vibration transmission through the hoses to the structure, causing noise complaints.

Riser slot arrangements

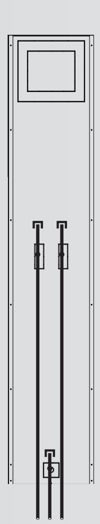




Note:

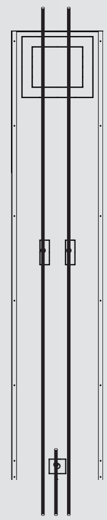
- Standard riser slots are 5"H x 2"W. Custom riser slots are available upon request up to a maximum height of 8" (+1.5" in either direction). The installer is responsible to ensure all air gaps are properly sealed in the custom 12"H slot, along with all other air penetrations regarding installation, electrical covers and air-block plates.
- Right and left are determined by facing front of cabinet.

Riser configurations



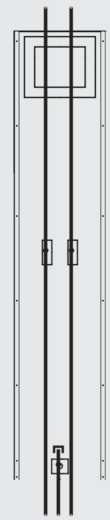
All risers capped at cabinet run-outs

- System piping is bottom supply and return.



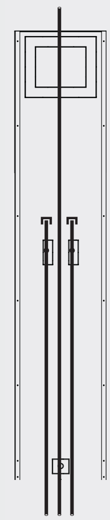
All risers open at top

- Bottom supply and return piping for supplying water to other units.
- Bottom supply and return piping for drain vent to roof, flushing crossover.
- Top supply and return piping.



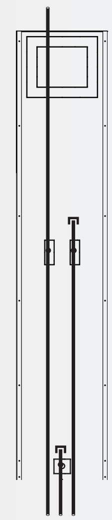
Supply and return open, drain capped at cabinet run-out

- Bottom supply and return piping with open top for venting or flushing crossover.
- Top supply and return.



Capped supply and return, drain open at top

- Bottom supply and return piping with open drain riser for venting to roof or picking up drain from other equipment above.



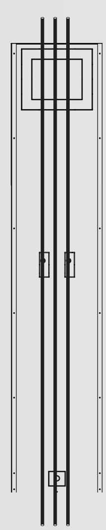
Supply or return open at top, others capped at cabinet run-out

- Bottom supply and top return piping.
- Top supply and bottom return piping.

Symbols

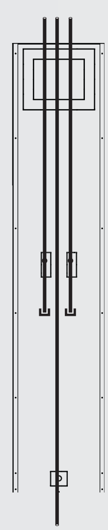
Riser piping is left open from factory


Riser piping is capped from factory



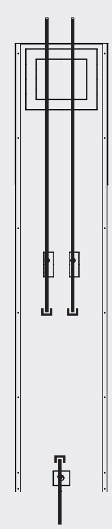
All riser through slab at bottom

- Bottom supply and return.
- Top supply and return feeding other equipment above.



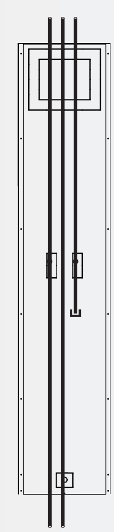
Supply and return capped at cabinet run-out, drain through slab

- Top supply and return
- Supply & return mains above these units on “between-floors” main piping.



All risers capped at cabinet run-out, drain through slab

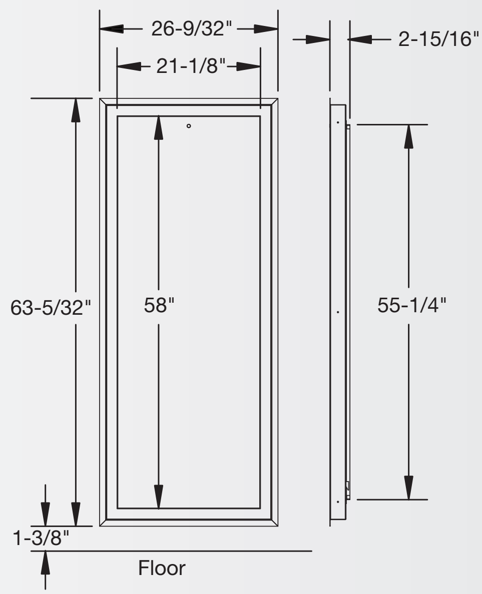
- Isolated unit top supply and return from adjacent riser with separate drain.
- Check riser venting.



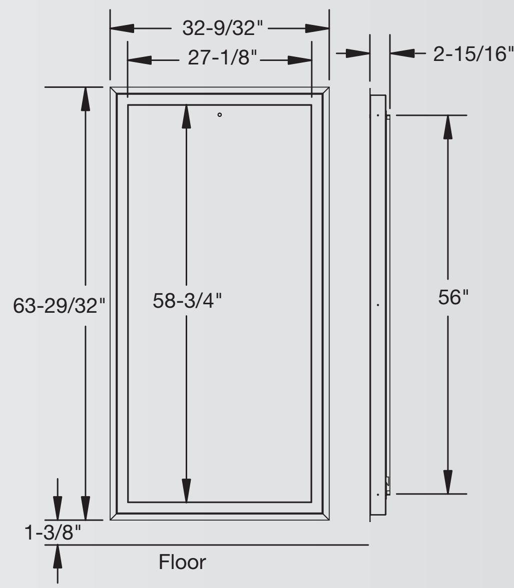
Supply or return capped at cabinet run-out, other risers extend through slab

- Bottom supply, top return piping.
- Bottom return, top supply piping.

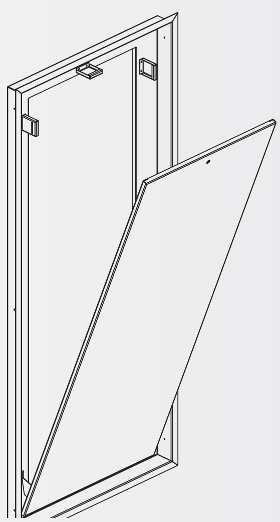
Standard removable perimeter return air panel

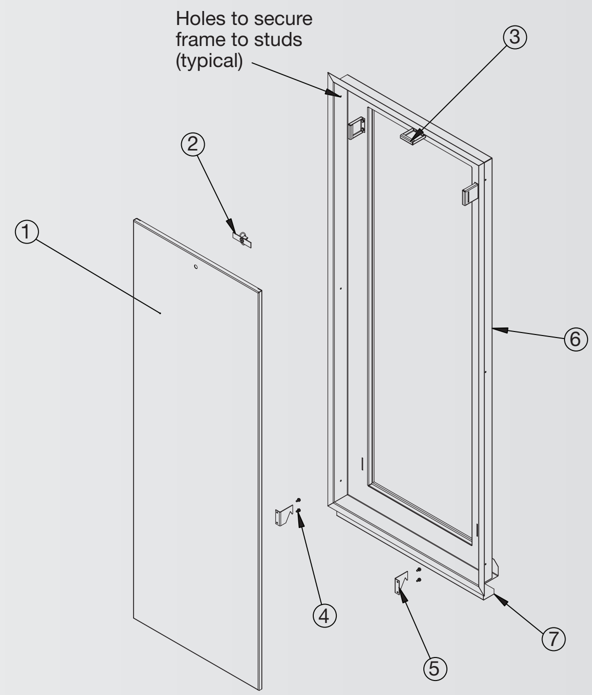


Available for sizes 09-18



Available for sizes 24-36



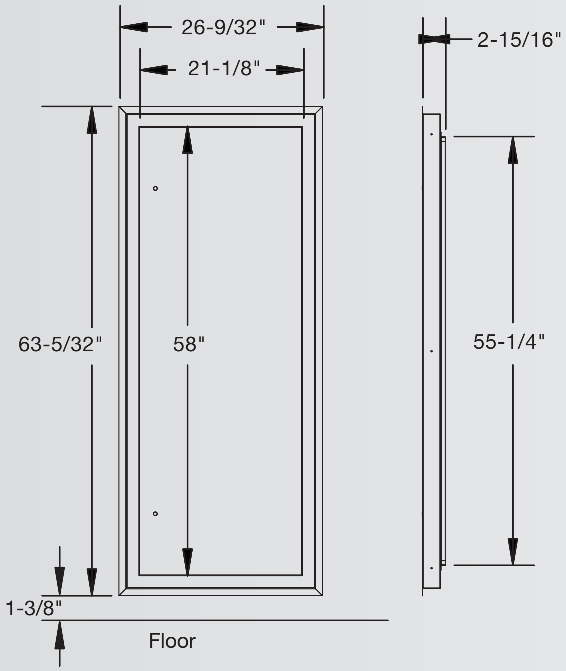


Allen lock, removable

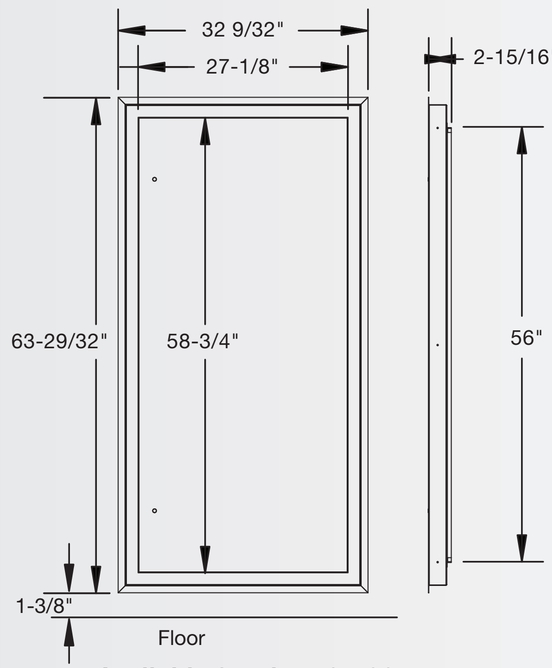
Item Number	Description	Quantity
1	Return panel	1
2	Quarter turn fastener	1
3	Door stop	3
4	Screw	10
5	Pivot angle	2
6	Frame	1
7	Frame support	1

Notes:
- Seal between the frame and cabinet with a weather serial gasket (provided with cabinet) to avoid air from being pulled in from the wall cavity.
- Do not attach frame to cabinet.
- Frame support shipped with cabinet.
- Door assemblies shipped separately.

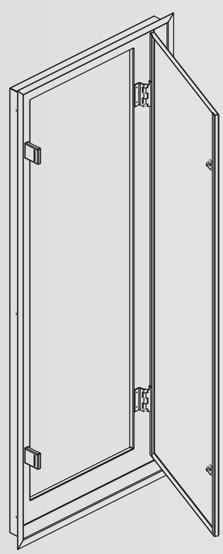
Optional hinged perimeter return air panel

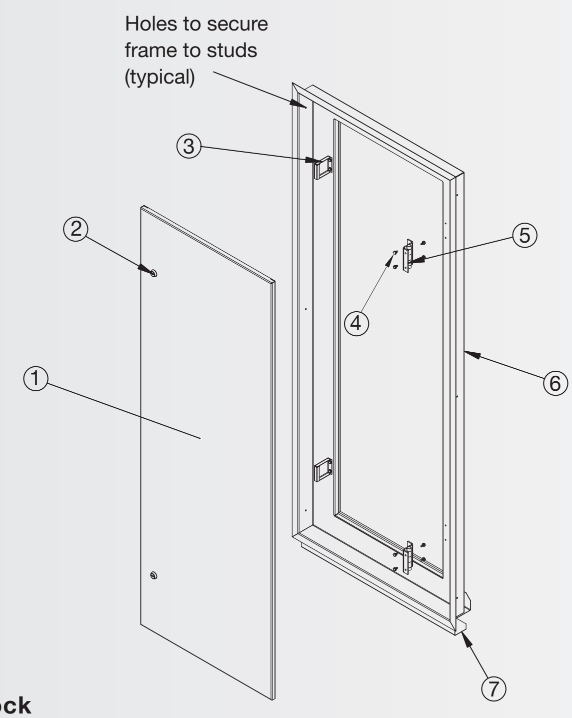


Available for sizes 09-18



Available for sizes 24-36





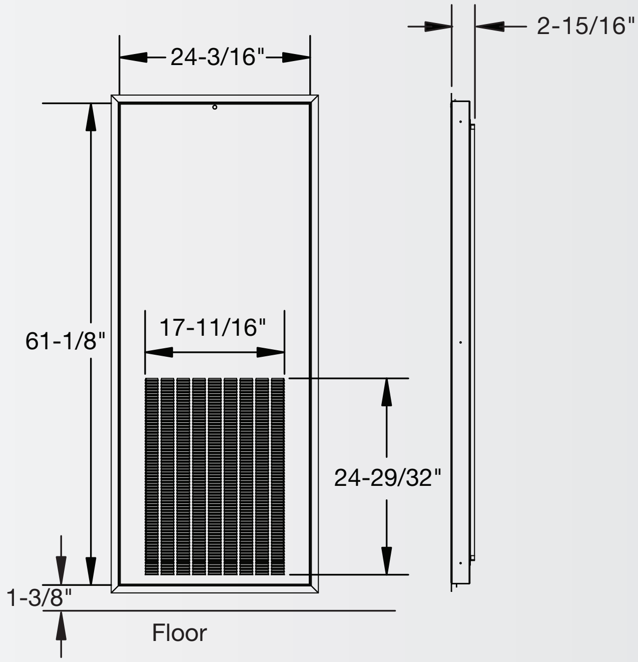
Key lock or Allen lock

Item number	Description	Quantity
1	Return panel	1
2	Quarter turn fastener or key lock	2
3	Door stop	2
4	Screw	12
5	Hinge	2
6	Frame	1
7	Frame support	1

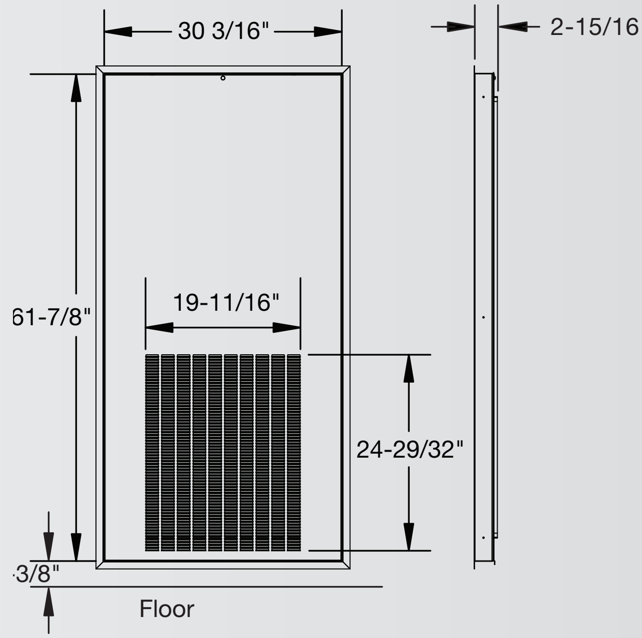
Notes:

- Seal between the frame and cabinet with a weather serial gasket (provided with cabinet) to avoid air from being pulled in from the wall cavity.
- Do not attach frame to cabinet.
- Frame support shipped with cabinet.
- Door assemblies shipped separately.

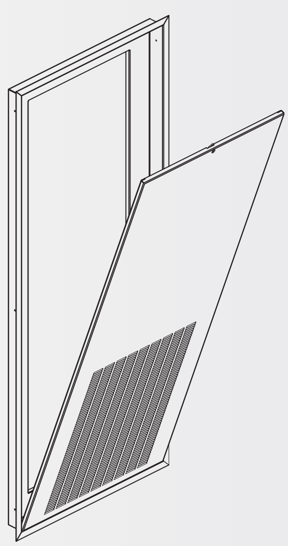
Optional removable louvered return air panel

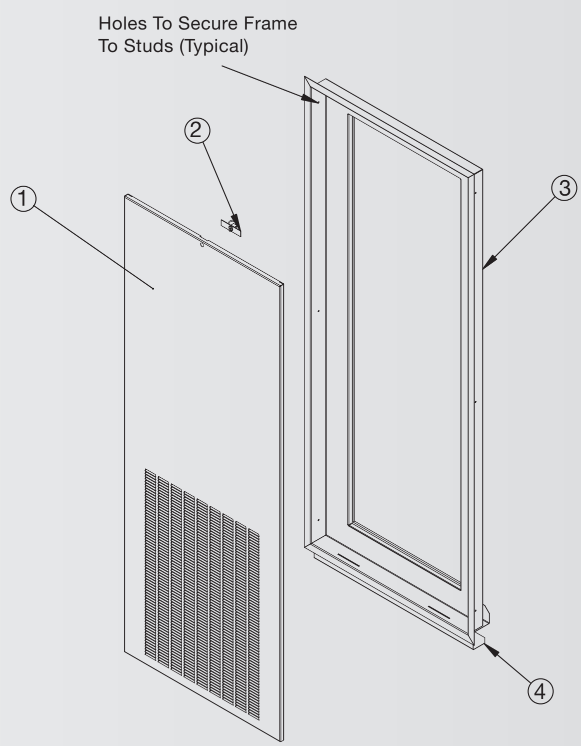


Available for sizes 09-18



Available for sizes 24-36



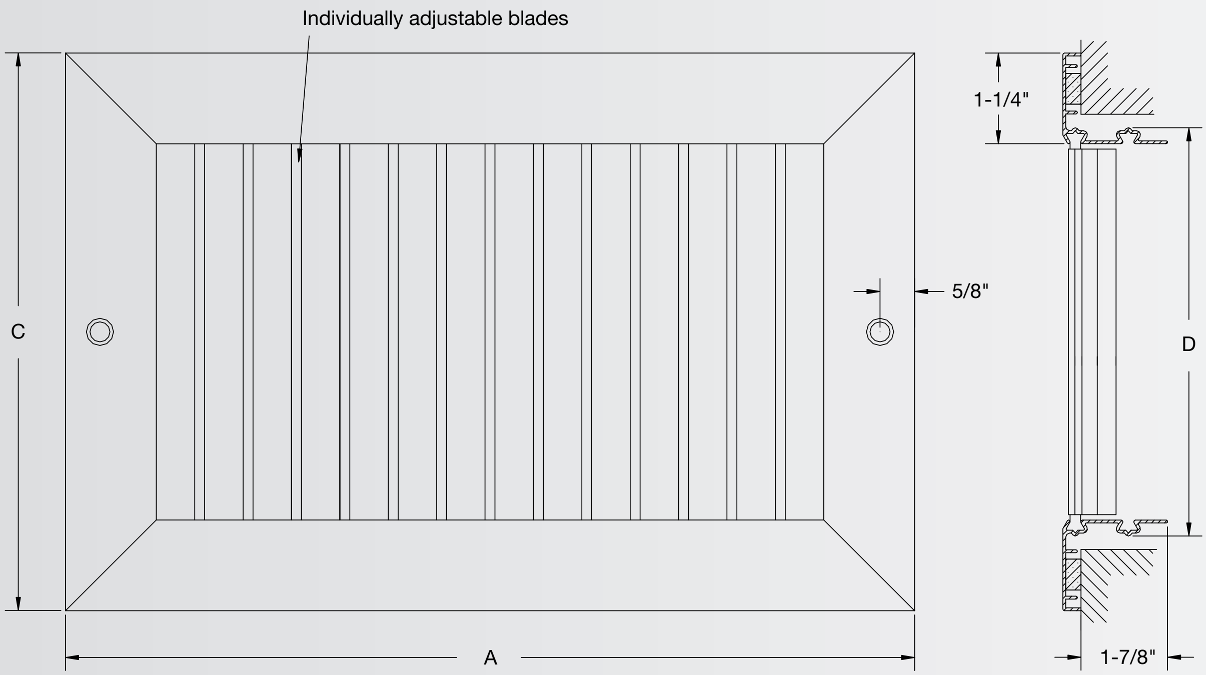


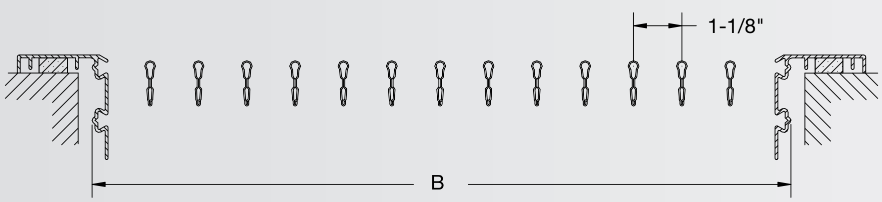
Notes:
- Seal between the frame and cabinet with a weather serial gasket (provided with cabinet) to avoid air from being pulled in from the wall cavity.
- Do not attach frame to cabinet.
- Frame support shipped with cabinet.
- Door assemblies shipped separately.

Allen lock, removable

Item number	Description	Quantity
1	Return panel	1
2	Quarter turn fastener	1
3	Frame	1
4	Frame support	1

Aluminum discharge grille
Single deflection





Dimensional data

Grille size	A	B	C	D
16" x 14"	17-11/16"	15-11/16"	15-11/16"	13-11/16"
14" x 12"	15-11/16"	13-11/16"	13-11/16"	11-11/16"
12" x 10"	13-11/16"	11-11/16"	11-11/16"	9-11/16"
10" x 8"	11-11/16"	9-11/16"	9-11/16"	7-11/16"

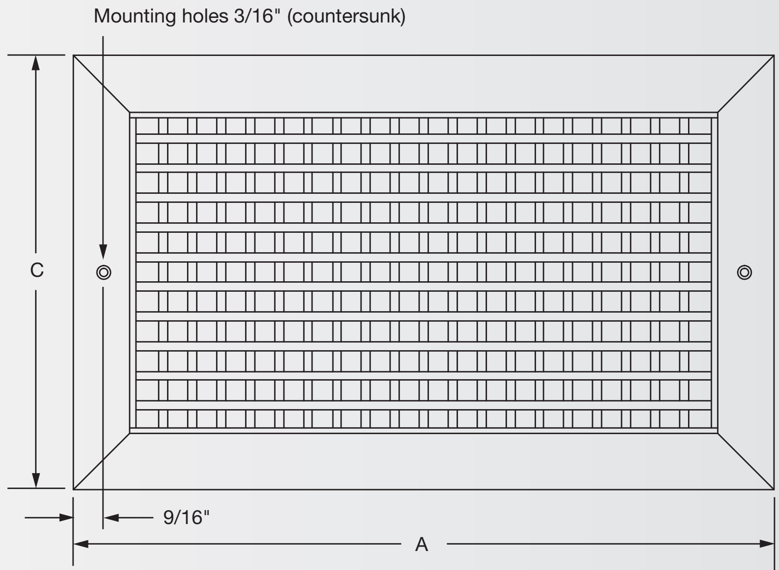
Supply grille arrangements

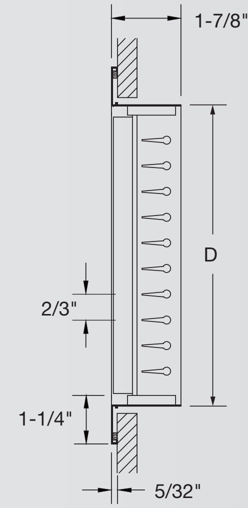
Unit Size	Single discharge	Double discharge	Triple discharge
09	14" x 12"	10" x 8"	10" x 8"
12	14" x 12"	10" x 8"	10" x 8"
15	14" x 12"	10" x 8"	10" x 8"
18	14" x 12"	10" x 8"	10" x 8"
24	16" x 14"	12" x 10"	12" x 10"
30	16" x 14"	12" x 10"	12" x 10"
36	16" x 14"	12" x 10"	12" x 10"

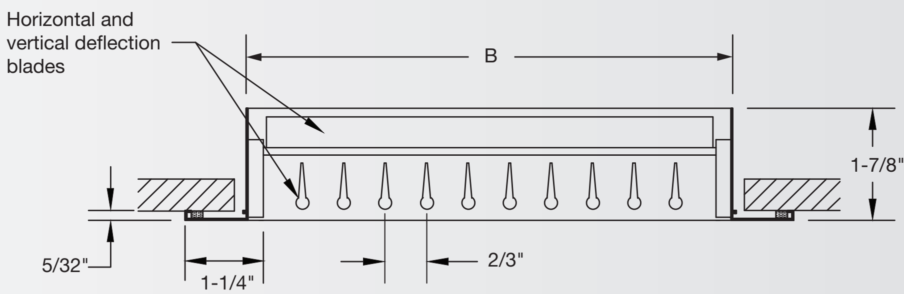
Notes
- Dimensions are in inches
- All dimensions are +/- 1/4
- Discharge grilles are shipped loose for field installation
- Construction is roll formed aluminum frame and blades
- Standard finish is powder coated and will be the same color as the return grille
- Mounting hardware included

All listed dimensions are approximate and are subject to change without notice.

Aluminum discharge grille
Double deflection







Dimensional data

Grille size	A	B	C	D
16" x 14"	17-11/16"	15-11/16"	15-11/16"	13-11/16"
14" x 12"	15-11/16"	13-11/16"	13-11/16"	11-11/16"
12" x 10"	13-11/16"	11-11/16"	11-11/16"	9-11/16"
10" x 8"	11-11/16"	9-11/16"	9-11/16"	7-11/16"

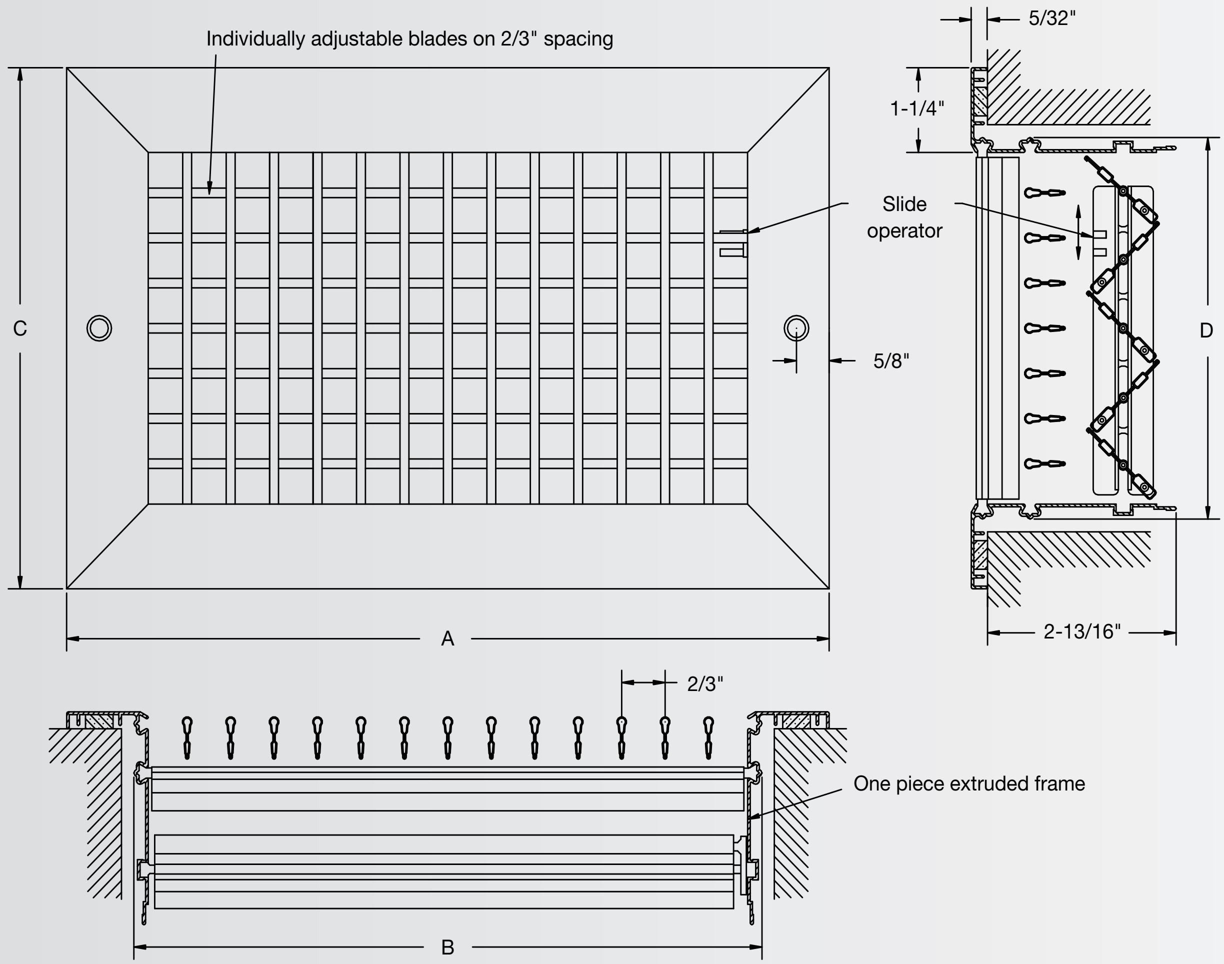
Supply grille arrangements

Unit Size	Single discharge	Double discharge	Triple discharge
09	14" x 12"	10" x 8"	10" x 8"
12	14" x 12"	10" x 8"	10" x 8"
15	14" x 12"	10" x 8"	10" x 8"
18	14" x 12"	10" x 8"	10" x 8"
24	16" x 14"	12" x 10"	12" x 10"
30	16" x 14"	12" x 10"	12" x 10"
36	16" x 14"	12" x 10"	12" x 10"

Notes
- Dimensions are in inches
- All dimensions are +/- 1/4
- Discharge grilles are shipped loose for field installation
- Construction is roll formed aluminum frame and blades
- Standard finish is powder coated and will be the same color as the return grille
- Mounting hardware included

All listed dimensions are approximate and are subject to change without notice.

Aluminum discharge grille
Double deflection with opposed blade damper



Dimensional data

Grille size	A	B	C	D
16" x 14"	17-11/16"	15-11/16"	15-11/16"	13-11/16"
14" x 12"	15-11/16"	13-11/16"	13-11/16"	11-11/16"
12" x 10"	13-11/16"	11-11/16"	11-11/16"	9-11/16"
10" x 8"	11-11/16"	9-11/16"	9-11/16"	7-11/16"

Supply grille arrangements

Unit Size	Single discharge	Double discharge	Triple discharge
09	14" x 12"	10" x 8"	10" x 8"
12	14" x 12"	10" x 8"	10" x 8"
15	14" x 12"	10" x 8"	10" x 8"
18	14" x 12"	10" x 8"	10" x 8"
24	16" x 14"	12" x 10"	12" x 10"
30	16" x 14"	12" x 10"	12" x 10"
36	16" x 14"	12" x 10"	12" x 10"

Notes
- All dimensions are in inches
- All dimensions are ± 1/4
- Discharge grilles are shipped loose for field installation
- Vertical blades in the front, horizontal blades in the back, both individually adjustable and on 2/3" spacing
- Opposed blade damper with slide operator
- Aluminum roll formed blade with semi-airfoil design
- Pressure fit nylon pivot pins (rattle-free and non-loosening)
- Aluminum extruded frame with mechanically locked corners
- Countersunk screw holes
- Standard finish is powder coated and will be the same color as the return grille
- Mounting hardware included

All listed dimensions are approximate and are subject to change without notice.

Mechanical specifications
Models VHNA, VHNM and VHNS

General
Furnish and install Vertical Stack Water Source Heat Pumps where indicated on the plans and in the specifications, with required mounting components and accessories. All units shall be capable of meeting or exceeding the scheduled capacities for cooling, heating and air delivery. Units shall be ETL certified for the United States and Canada in compliance with UL/ANSI Standard 1995 and CSA C22.2 No. 236-05, and be tested.

Construction
All unit cabinet panels shall be fabricated of 20-gauge galvanized steel panels. All cabinet panels shall be insulated with ½" thick 2 lb density matt-faced fiberglass [½" thick foil faced fiberglass with scrim and taped edges to prevent any fibers from reaching the airstream] [½" thick elastomeric closed cell foam insulation]. Insulation shall conform to NFPA 90A for fire, smoke and melting, and comply with a 25/50 Flame Spread and Smoke Developed Index per ASTM E-84 or UL 723. Additionally, insulation shall comply with Antimicrobial Performance Rating of 0, no observed growth, per ASTM G-21.

All unit panels shall have knockouts for supply air openings and riser slots to facilitate the field conversion of riser location and supply air grille location.

- Option: Supply air opening knockouts shall be factory sealed and left in place during shipping and staging at the job site.

The removable perimeter bypass with Allen lock [hinged perimeter bypass with Allen lock] [hinged perimeter bypass with key lock] [removable perimeter bypass with Allen lock] [removable louvered with Allen lock] front access panel shall be fabricated of not less than 18-gauge [16-gauge] [14-gauge] cold rolled steel.

The front panel mounts within a frame that is flush with the wall. A front panel that protrudes from the wall is not acceptable.

- Option: Provide an architectural grade double deflection [single deflection] [double deflection opposed blade damper] aluminum discharge grille.

Painted finish
All front return panels, mounting frames and supply air grilles shall be finished with a standard ivory epoxy powder coat paint. Optional colors can be selected from the Zehnder Rittling Color Chart. Liquid coat paint shall not be acceptable. Custom colors are also available with the submission of a color chip for color match.

- Option: For units with multiple outlets, include a sheet metal baffle, insulated on 2 sides, inside the discharge plenum to break the sight lines between the two discharge outlets and to attenuate room noise that could be transmitted through the openings.

Power
Units shall not exceed scheduled power consumption.

Fan and motor
Unit fan shall be dynamically balanced, forward curved, DWDI centrifugal type constructed of galvanized steel for corrosion resistance. Motors shall be 208-230V/60Hz/1Ph [277V/60Hz/1Ph] permanent split-capacitor [electronically commutated high-efficiency, programmable brushless DC], totally enclosed, tap wound for 2-speed, permanently lubricated sleeve bearing, type with automatic reset integral thermal overload protection and resiliently mounted. High static motors are available for ducted applications. Shaded pole motors are not acceptable. Single speed motors are not acceptable. Prior to shipping, all motors shall be assembled, factory tested and installed in the unit

The fan/motor assembly shall be constructed of 18-gauge galvannealed steel and installed in a z-channel mounting frame for ease of sliding fan/motor deck in and out through the front panel. Each fan/motor assembly shall be fastened by no more than 2 screws. The motor shall have a quick connect to allow service and removal without the need for tools.

Chassis
The chassis consists of a compressor, complete refrigeration and water piping circuits, copper coaxial heat exchanger and incorporates a coated hydrophilic aluminum air coil for enhanced condensate drainage. A rotary or scroll compressor utilizes R-410A refrigerant. All units are equipped with two drop down service legs to support the chassis when testing or servicing is required. All units feature wheels on the

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bottom of the chassis that allow for easy installation and removal during installation or servicing. Front facing refrigerant test ports are accessible without removing the chassis.

Drain pan

Primary condensate drain pans shall be single wall, 20-gauge stainless steel for superior corrosion resistance. Drain pans shall be of one piece construction and be positively sloped in 2 directions for condensate removal. An easily removable rubber p-trap shall be furnished, factory piped to the condensate drain riser, held in place by 2 compression clamps. A condensate level sensor is provided to eliminate power to unit if drain pan becomes clogged.

The primary drain pan shall be externally insulated with elastomeric closed cell foam insulation. The insulation shall carry no more than a 25/50 Flame Spread and Smoke Developed Rating per ASTM E-84 and UL 723 and an Antimicrobial Performance Rating of 0, no observed growth, per ASTM G-21. Internally sprayed insulation will not be acceptable.

Coils

The air coil shall optimize rows to meet the specified capacity. Coils shall have 3/8" OD seamless copper tubes and shall be mechanically expanded to provide an efficient, permanent bond between the tube and aluminum fin. Minimum copper tube thickness shall be 0.012".

Fins shall have high efficiency aluminum surface optimized for heat transfer, air pressure drop and carryover. Minimum fin thickness shall be 0.0045". Lanced fins shall not be acceptable.

All coils shall be tested at 300 PSIG with helium and rated for a maximum 600 PSIG working pressure.

Coil casing shall be fabricated from galvanized steel [stainless steel].

Filters

All units shall be furnished with a washable nylon type filter [1" nominal glass fiber throwaway] filter. Filters are held in place by four (4) filter clips and shall be tight fitting to prevent air bypass.

Electrical

Units shall be furnished with single point power connection. All electrical terminations to be made in terminal strip. The factory mounted terminal wiring strip consists of a multiple position screw terminal block to facilitate wiring terminations for the electric control valve and thermostat. The control box shall contain a 50VA transformer, 24V secondary voltage with 2A low voltage circuit breaker, 2-pole compressor contactor and microprocessor controller.

The reversing valve, fan motor and unit safety controls wiring shall be connected to the microprocessor for unit operation and monitoring. The units shall be name-plated for use with time delay fuses or HACR circuit breakers.

The unit controls shall be 24V and provide heating or cooling as required by the remote thermostat. The microprocessor can accept either a standard 24V digital, non-programmable thermostat [digital, programmable thermostat] [digitally communicating thermostat with IR remote control operation]

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Models VHNA, VHNM and VHNS

designed to control up to two independently energized fan speeds. Thermostat will be provided with wiring harness complete with quick connect and pre-wired to terminal blocks.

- Option: Provide a service disconnect switch to isolate power from the unit during maintenance.

Primary internal wiring and testing shall be conducted at the factory. All units shall be shipped with wiring diagrams.

Hose kits

- Option: Provide a standard factory assembled and mounted ½” [3/4”] 2-way, on/off, 24V normally closed zone valve. Control valve shall be wired to terminal blocks through quick connect to allow service and replacement of valves. Maximum entering water temperature on the control valve shall be 200°F, and maximum operating pressure shall be 300 PSIG.
- Option: Piping packages shall include stainless steel braided hoses to allow for thermal expansion within the unit cabinet. The hose shall be EPDM inner lined and Kevlar® reinforced, with stainless steel FNPT swivels and/or fittings. The hoses shall be rated for a maximum 450 PSIG working pressure at 250°F, and shall conform to NFPA 90A and carry no more than a 25/50 Flame Spread and Smoke Developed Rating, per ASTM E-84 and UL 723.
- Option: Provide a y-strainer with pressure-temperature ports (P/T) on supply line.
- Option: Provide a fixed flow control device with pressure-temperature ports (P/T) on return line.

Piping packages shall be completely factory assembled including interconnecting pipe and factory tested for leaks.

Risers

Furnish chilled and hot water supply and return risers mounted to the unit. Risers shall be Type-M seamless copper tube and include 3" deep swaged connections at the top for connection to the unit above. Slip couplings are not acceptable.

- Option: Provide Type-L copper risers that meet or exceed the requirements stated above.

Risers shall be insulated with ½" closed cell foam insulation covering the entire riser. Insulation shall conform to NFPA 90A and carry no more than a 25/50 Flame Spread and Smoke Developed Rating, per ASTM E-84 and UL 723.

- Option: Provide ¾" closed cell foam insulation that meets or exceeds the requirements stated above.
- Option: Risers to be provided without insulation.

Condensate drain risers shall be Type-M seamless copper tube and meet the requirements stated above.

- Option: Risers shall be factory fabricated, bundled, and tagged separate from the heat pump units, allowing for shipment and installation of risers prior to the heat pumps.

Warranty

Zehnder Rittling, manufacturer of Zehnder Rittling product line, guarantees its products to be free from defects in material and workmanship for a period of one year from date of shipment from our Buffalo, New York factory.

Should there be any defects in the good(s), the purchaser should promptly notify Zehnder Rittling. Upon receipt of written consent from Zehnder Rittling, the purchaser shall return the defective good(s) to the factory for inspection with freight prepaid. If inspection shows the goods to be defective, Zehnder Rittling will at its discretion repair or replace the said item(s).

Defects arising from damage due to shipment, improper installation, negligence or misuse by others are not covered by this warranty.

This warranty is extended only to the original purchaser from Zehnder Rittling.

Extended warranties may be available, please contact the factory for warranty options and pricing: 716-827-6510.

IMPORTANT: Approved submittal documentation, specific to each project, supersedes the general guidelines contained within this document.

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