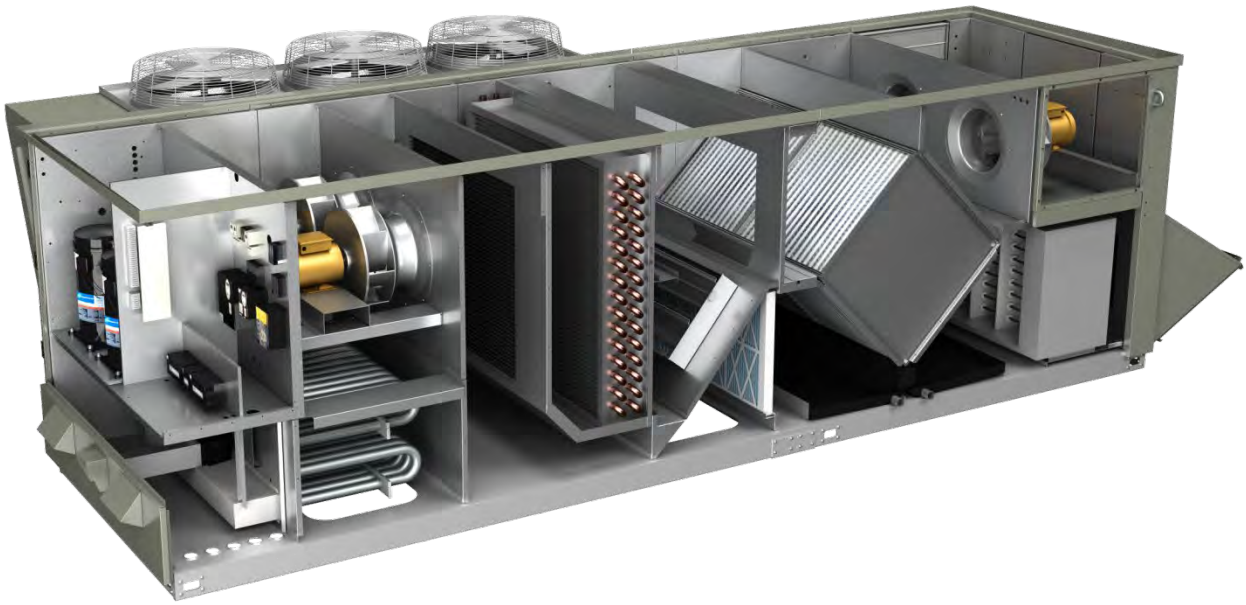
MECHANICAL
INSTALLATION
OPERATION
& MAINTENANCE

valent®



VPR Series
VPRC/P Series
VPRE Series
VPRX Series

Valent VPR Series IOM 10-26-20
Part Number 472916

Contents

Special Design Requests

VPR, VPRC/P, VPRE, and VPRX units are occasionally built with special features requested by the customer. This manual only covers standard options and does not include any Special Design Requests

Model Number Guide

OPTION & DESCRIPTION					
MODEL		PRODUCT TYPE			
	VPR	HIGH-PERCENTAGE OUTDOOR AIR PACKAGED ROOFTOP			
	VPRE	HIGH-PERCENTAGE OUTDOOR AIR PACKAGED ROOFTOP WITH ENTHALPY WHEEL			
	VPRP	HIGH-PERCENTAGE OUTDOOR AIR PACKAGED ROOFTOP WITH FLAT-PLATE HEAT EXCHANGER			
	VPRX	HIGH-PERCENTAGE OUTDOOR AIR PACKAGED ROOFTOP WITH POWERED EXHAUST			
	VPRC	HIGH-PERCENTAGE OUTDOOR AIR PACKAGED ROOFTOP WITH SENSIBLE AND LATENT FLAT-PLATE HEAT EXCHANGER			
CABINET		CABINET SIZE			
	V	VXX SERIES			
	1	1XX SERIES			
	2	2XX SERIES			
	3	3XX SERIES			
DESIGN		DESIGN			
	1	SIDE CONDENSING CABINET PLATFORM		PACKAGED	
	5	TOP CONDENSING CABINET PLATFORM		PACKAGED	
SERIES		PRODUCT SERIES			
	0	SERIES 0	PACKAGED		
	2	REVISION 2	PACKAGED		
NOMINAL COOLING CAPACITY		CAPACITY			
	##	4-5-6-7-8-10-13-16-18-20-25-30-35-40-50-60-70 TONS			
	CW	N/A (CHILLED WATER COOLING)			
COOLING TYPE & REFRIGERATION		TYPE	CONDENSING	COIL DEPTH	HGRH
	B	DX	AIR COOLED	6 ROWS	NONE
	C	DX	AIR COOLED	6 ROWS	HIGH CAPACITY
	E	DX	AIR COOLED	4 ROWS	NONE
	F	DX	AIR COOLED	4 ROWS	HIGH CAPACITY
	G	HEAT PUMP	WATER COOLED	4 ROWS	NONE
	H	HEAT PUMP	WATER COOLED	4 ROWS	HIGH CAPACITY
	I	HEAT PUMP	AIR COOLED	4 ROWS	NONE
	J	HEAT PUMP	AIR COOLED	4 ROWS	HIGH CAPACITY
	U	CHILLED WATER	NONE	6 ROWS, SMALL	NONE
	V	CHILLED WATER	NONE	6 ROWS, MEDIUM	NONE
	W	CHILLED WATER	NONE	6 ROWS, LARGE	NONE
	X	CHILLED WATER	NONE	4 ROWS, SMALL	NONE
	Y	CHILLED WATER	NONE	4 ROWS, MEDIUM	NONE
	Z	CHILLED WATER	NONE	4 ROWS, LARGE	NONE
HEATING SIZE & TYPE		TYPE	CAPACITIES		
	###I	INDIRECT GAS	75-100-150-200-250-300-350-400-500-600-700-800-1000-1200 [MBH]		
	##J	TEMPERATOR[2]	100-150-200-250-300-350-400-500-600-700-800 [MBH]		
	##E	ELECTRIC	10-15-20-25-30-35-40-45-50-60-70-80-90-100-125-150-175-200 [KW]		
	WSHP	WATER-SOURCE HEAT PUMP			
	HW	HOT WATER			
ELECTRICAL		VOLTAGE			
	A	208/3/60			
	B	230/3/60			
	C	460/3/60			
	D	575/3/60			
DUCT CONNECTIONS		SA CONNECTION	RA CONNECTION		
	0	BOTTOM	NONE		
	1	BOTTOM	BOTTOM		
	2	BOTTOM	HORIZONTAL		
	3	HORIZONTAL	NONE		
	4	HORIZONTAL	BOTTOM		
	5	HORIZONTAL	HORIZONTAL		
	6	TOP	NONE		
	7	TOP	BOTTOM		
	8	TOP	HORIZONTAL		
REFRIGERATION		REFRIGERANT	COMPRESSORS	CONDENSER	EFFICIENCY
	X	NONE	NONE	PACKAGED	STANDARD
	A	R-410A	STANDARD	PACKAGED	STANDARD
	D	R-410A	DIGITAL SCROLL CIRCUIT B	PACKAGED	STANDARD
	E	R-410A	DIGITAL SCROLL CIRCUIT B	SPLIT	STANDARD
	F	R-410A	STANDARD	PACKAGED	HIGH EFFICIENCY
	G	R-410A	DIGITAL SCROLL CIRCUIT B	PACKAGED	HIGH EFFICIENCY
	H	R-410A	DIGITAL SCROLL CIRCUIT B	SPLIT	HIGH EFFICIENCY
	I	R-410A	INVERTER SCROLL CIRCUIT B	PACKAGED	STANDARD
	K	R-410A	INVERTER SCROLL CIRCUIT B	PACKAGED	HIGH EFFICIENCY

continued next page …

OPTION & DESCRIPTION		
ENERGY RECOVERY		ENERGY RECOVERY
	X	NONE
	A	FULL-SIZE COMPOSITE (AIRXCHANGE) ENTHALPY WHEEL
	C	FLAT-PLATE HEAT EXCHANGER WITH BYPASS
	D	FLAT-PLATE HEAT EXCHANGER WITHOUT BYPASS
	E	FULL-SIZE ALUMINUM (SEMCO) ENTHALPY WHEEL

Safety

WARNING:

Improper installation, adjustment, service, maintenance, or alteration can cause property damage, personal injury, or loss of life. Installation, startup, and service must be performed by a qualified installer, service agency, or gas supplier.

The customer must provide proper equipment and fully-trained installers to follow local safety requirements when receiving, installing, or servicing equipment. Consult all local building, electrical, occupational safety, and gas codes.

Lock out all power supplies before servicing the unit to prevent accidental startup. All fan blades should be secured to prevent wind rotation. Remove any restrictive device before restoring power.

The Clean Air Act of 1990 bans the intentional venting of refrigerant (CFC and HCFC) as of July 1, 1992. Approved methods of recovery, recycling, or reclaiming refrigerant must be followed. Fines and/or incarceration may be levied for non-compliance.

Lifting Procedure

Lifting Guidelines

- Crane lift only. (110, 210, 310, 350, 352)
- Preparation of curb and roof openings should be completed prior to lifting unit to the roof.
- Lifting lugs consist of integral U-bolts located at the top of the unit.
- Unit must be lifted using all lifting lugs on the exterior of the unit.
- Cables or chains should be at least double the length of the unit to prevent stress on the structure.
- Spreader bars are required for lifting the unit to prevent damage to the cabinet.
- Do not use belt-type slings.
- Chain angle at point of lug connection must never exceed 20 degrees from vertical in any direction.
- Always test-lift the unit to check for proper balance and rigging before hoisting to desired location.
- Do not twist the unit while it is being lifted.

WARNING:

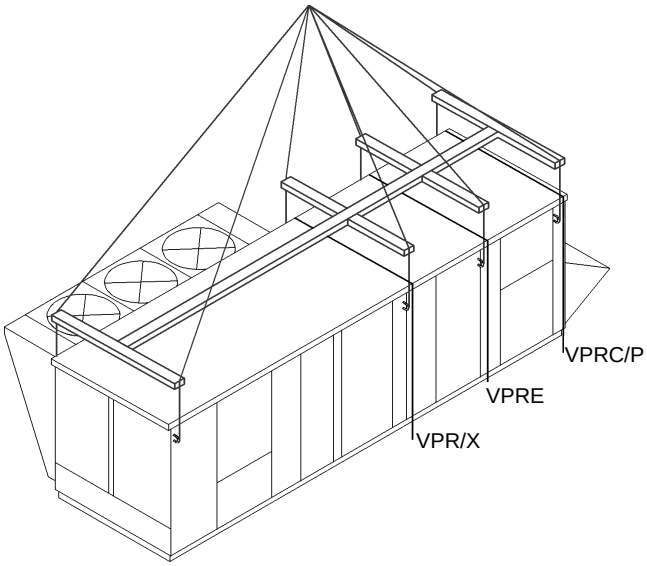
Failure to follow proper instructions could result in property damage, serious injury, or death. Never lift units in windy conditions.

Lifting Lug Quantities

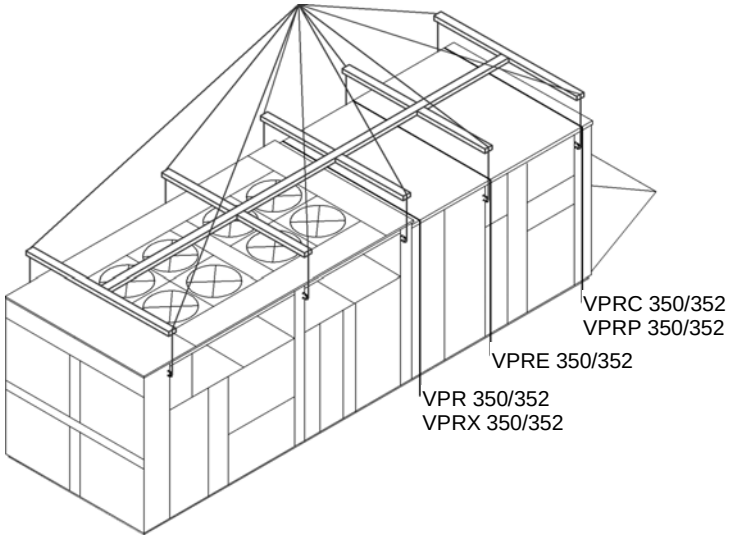
Casing	VPR	VPRX	VPRE	VPRC/P
V10	4	N/A	N/A	N/A
110	4	4	6	8
210	4	4	6	8
310	4	4	6	8
350	6	6	8	10
352	6	6	8	10

⚠ WARNING

- **CRANE LIFT ONLY**
- **USE ALL PROVIDED LIFTING LUGS**
  (UNITS MAY HAVE FEWER LIFTING LUGS THAN SHOWN BELOW)
- **USE SPREADER BAR TO PREVENT DAMAGE TO UNIT**
- **CHAIN ANGLE AT POINT OF LUG MUST NEVER EXCEED 20° FROM VERTICAL**
- **TEST LIFT UNIT TO CHECK FOR PROPER BALANCE AND RIGGING**
- **NEVER LIFT IN WINDY CONDITIONS**



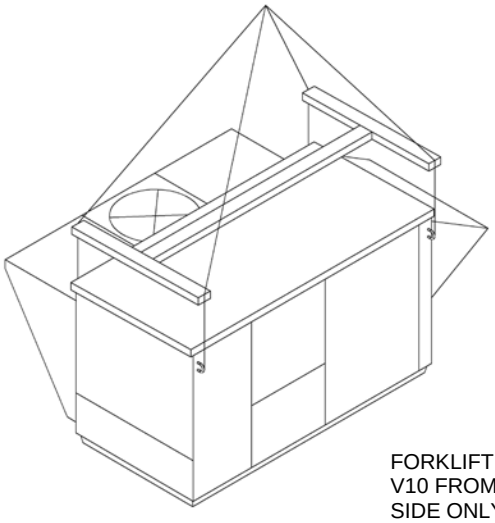
110/210/310 Rigging



350/352 Rigging

⚠ WARNING

- **IF USING CRANE LIFT:**
  - **USE ALL PROVIDED LIFTING LUGS**
    (UNITS MAY HAVE FEWER LIFTING LUGS THAN SHOWN BELOW)
  - **USE SPREADER BAR TO PREVENT DAMAGE TO UNIT**
  - **CHAIN ANGLE AT POINT OF LUG MUST NEVER EXCEED 20° FROM VERTICAL**
  - **TEST LIFT UNIT TO CHECK FOR PROPER BALANCE AND RIGGING**
  - **NEVER LIFT IN WINDY CONDITIONS**
- **IF USING FORK LIFT (V10 ONLY):**
  - **USE FORKS WITH 48" LENGTH AND ENSURE FORKS EXTEND TO BACK OF UNIT**
  - **DO NOT FORKLIFT 110, 210, 310, 350, OR 352 CASINGS**



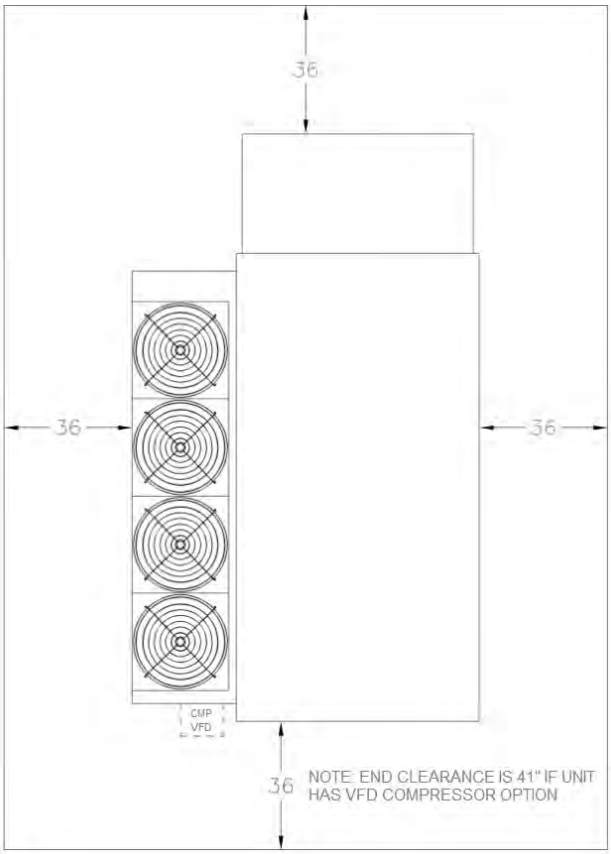
FORKLIFT VPR-V10 FROM THIS SIDE ONLY

V10 Rigging

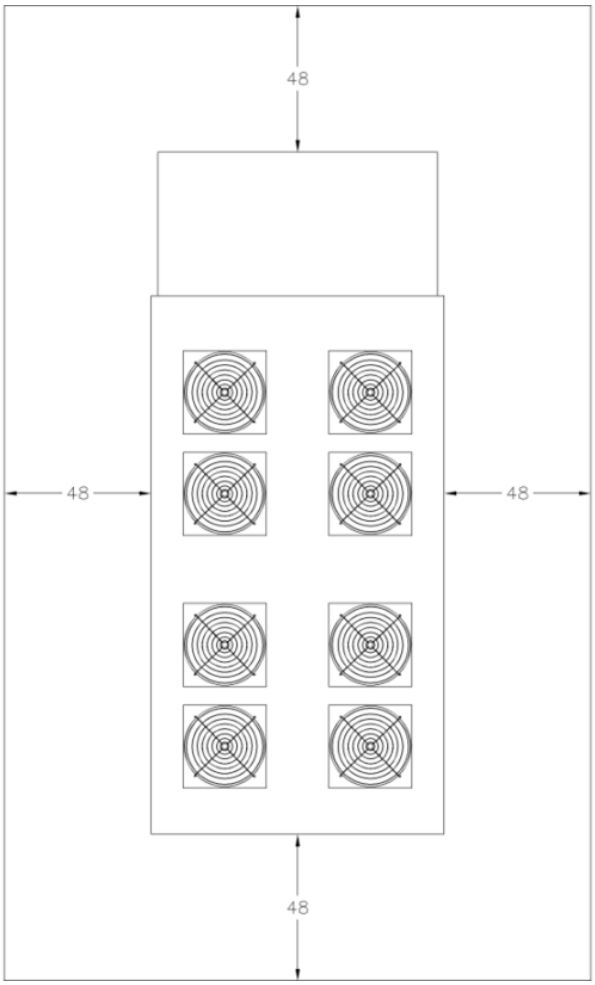
Clearances

The minimum allowable clearances around each unit are as follows. Failure to abide by these minimum clearances may prevent serviceability or affect unit performance.

V10/110/210/310 casings – 36" away from all sides of the unit



350/352 casing – 48" away from all sides of the unit



Energy Recovery Clearances

VPRE Energy recovery sections require additional clearance to service the heat wheel.

VPRE Casing	Energy Recovery Section Clearance (in.)
110	36
210	52
310	60
350/352	85

Installation

Receiving and Inspection

Visually inspect the unit before unloading and note any damage in writing on the delivery receipt. If the unit is damaged during shipping, the customer should immediately file a claim with the shipping company and notify the manufacturer. Photograph the damage if possible.

Verify that all pieces listed on the bill of lading have been received.

Storage

Any unit stored outdoors prior to installation should be covered. Do not store other equipment on top of or inside the unit.

Long Term Storage

Every month:

- Rotate all shafts, blowers, and energy wheels several times by hand

Every three months:

- Rotate all shafts, blowers, and energy wheels several times by hand
- Lightly grease all bearings. Use the grease recommended by the bearing or motor manufacturer. Do not over grease and do not mix different types of grease. Rotate shafts by hand again.
- Thoroughly inspect cabinet, both inside and outside. Check for corrosion, scratches or dirt build-up. If dirt or debris is found inside the unit, locate the source and correct it. If scratches or corrosion are found, clean the area and coat it with an appropriate sealant.

Every six months:

- Rotate all shafts, blowers, and energy wheels several times by hand
- Thoroughly inspect cabinet, both inside and outside. Check for corrosion, scratches or dirt build-up. If dirt or debris is found inside the unit, locate the source and correct it. If scratches or corrosion are found, clean the area and coat it with an appropriate sealant.
- Purge all bearings. See electric motor and pillow block manufacturer's recommendations.

Temporary Use

This equipment must not be used as:

- Temporary heating or cooling
- Construction heating

The units should not be operated until construction is complete and the units have properly undergone the pre-startup and startup routines.

IMPORTANT:

The bottom of the unit must be field-insulated if outdoor air can contact the bottom of the unit. To avoid leakage, do not drill or punch holes in the floor of the unit.

Hanging Installation

DO NOT permanently suspend the unit from the lifting lugs. If the unit is to be hung, additional supports are required under the unit. Hang the unit from the supports, making sure the unit is level. Failure to keep the unit level will result in operational problems.

Pad Installation

- Check to make sure the pad is level. Failure to provide a level surface will result in operational problems.
- Check for correct orientation of the unit.
- Lift unit into place per the lifting instructions in this manual.
- Secure the unit to the pad in accordance with all applicable building codes.
- Tighten door handles.

Curb Installation

IMPORTANT:

Gasket material must be applied to all surfaces of the curb which contact the unit to create proper seal between the unit and the curb.

- Ensure that the roof curb is level. Failure to level the curb will result in operational problems.
- Lift unit into place per the lifting instructions in this manual.
- Ensure a neoprene gasket is installed on the top flange of the perimeter and cross members of the curb.

- Check for correct orientation of the unit on the curb.
- Check the seal between the roof curb and the unit. Apply additional caulking as required. Failure to provide an adequate seal can result in air and water leakage into the building.
- Secure the unit to the curb in accordance with all applicable building codes.
- The V10 casing has the option of screwing the base to the curb. All hardware provided by others.
- Tighten door handles.

Specifications

Factory-supplied roof curbs shall be constructed of 16 gauge G-90 galvanized steel and fully assembled at the factory. A 1.5" wood nailer shall be provided around the entire perimeter of the curb. Curb shall be fully insulated through 1.5" fiberglass insulation. Cross-member supports shall be provided for connecting ductwork prior to the unit being set on the roof.

Duct Connections to Curb

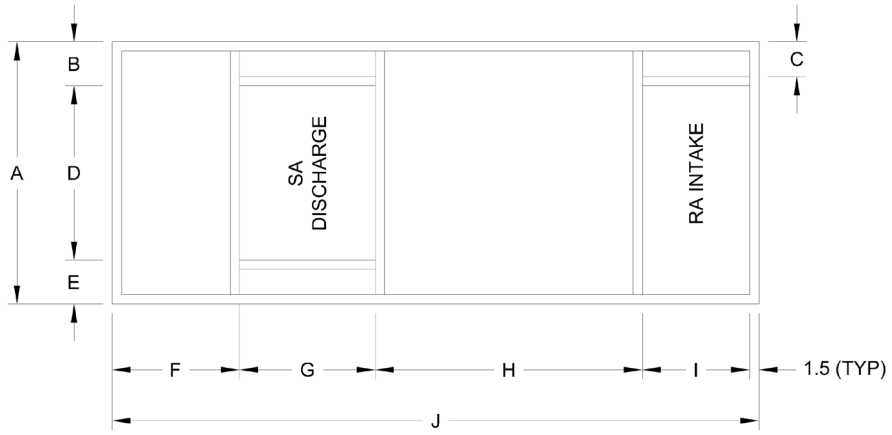
When the supply air discharge opening and/or the return air intake opening are located on the bottom of a VPR, VPRC/P, VPRE, or VPRX series unit, the ductwork should be connected to the curb directly. The actual opening sizes in the floor of the unit are not specified as they are slightly undersized from the duct dimensions shown on the following curb drawings.

Curb & Ductwork Dimensions

VPR, VPRX Series

The VPR and VPRX series share a common curb layout, which is shown in the following diagram. Note that the two cross members, *Dimension B*, are only provided on the 110-size casing. The supply air ductwork on 210 and 310 casings is mounted directly to the exterior rail of the curb.

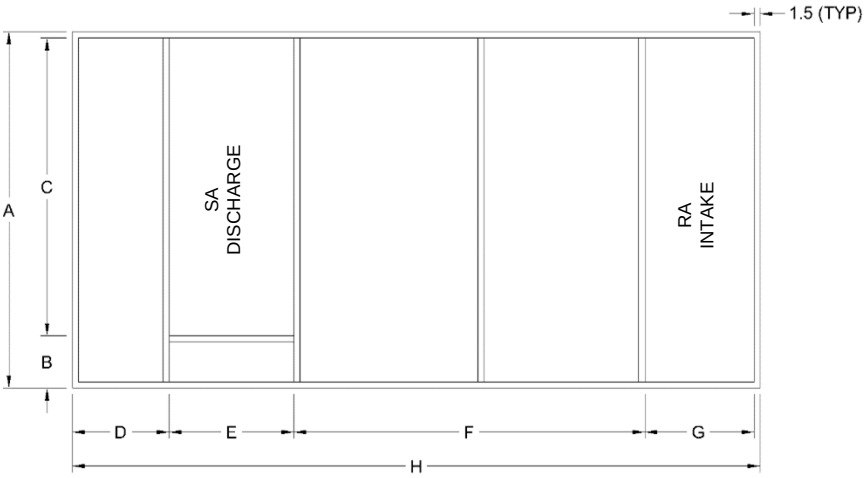
V10/110/210/310 Casing



Casing	A	B	C	D	E	F	G	H	I	J
V10	39.25	8.25	8.25	29.5	1.5	12.0	16.5	31.75	9.5	71.25
110	42.5	7.13	1.5	28.25	7.13	20.63	22	43.25	17.38	104.75
210	54.75	1.5	1.5	51.75	1.5	23.75	22	43.13	24.38	114.75
310	61.5	1.5	1.5	58.5	1.5	20.75	26	50.5	26	124.75

Dimensions in inches

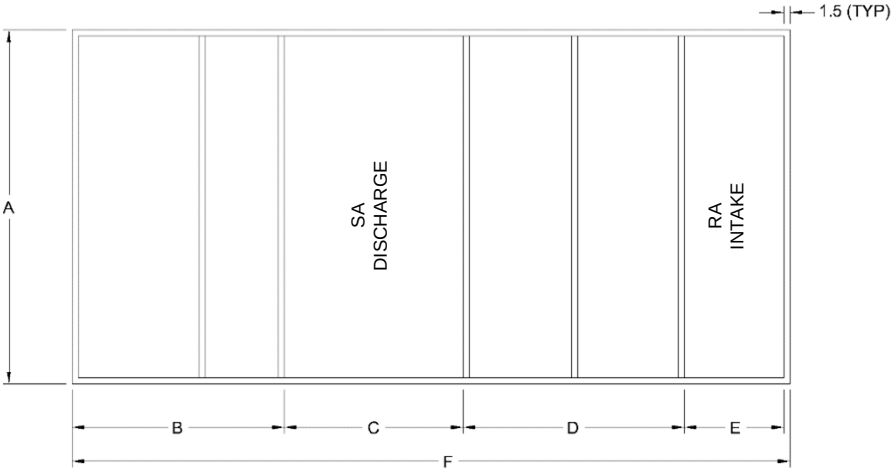
350 Casing



Casing	A	B	C	D	E	F	G	H
350	86.5	12.75	72.25	23.5	30.25	85.25	26.5	167

Dimensions in inches

352 Casing



Casing	A	B	C	D	E	F
352	86.5	52	43.75	54	24.5	175.75

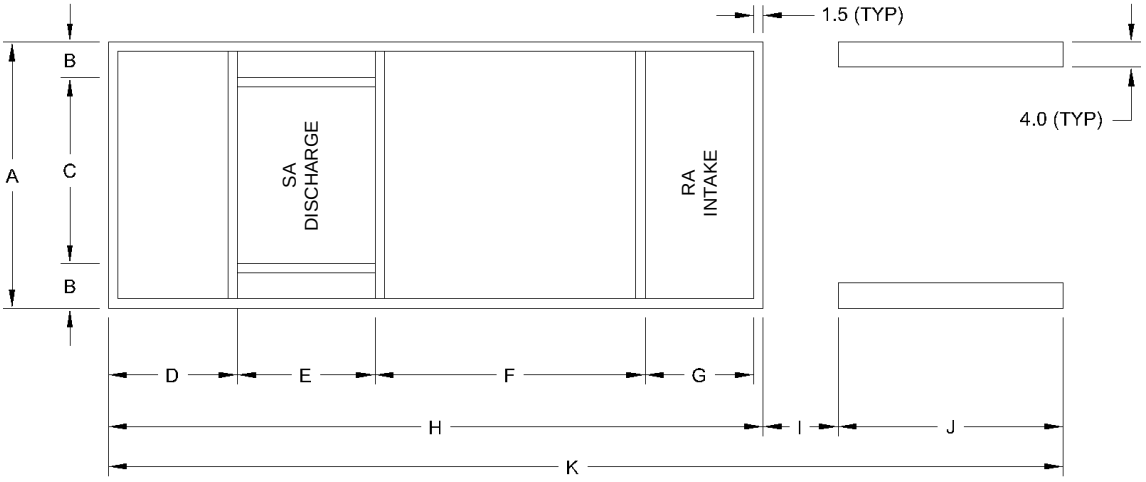
Dimensions in inches

VPRE Series

The VPRE series is constructed with a cross member in the base that requires one of the following when curb mounted:

- Partial-perimeter curb plus secondary support rails (standard factory offering)
- Partial-perimeter curb plus equipment support
- Single curb with 6" x 6" notch(es) to accommodate cross members in 1 to 2 locations depending on unit configuration
- VPRE-350 one-piece curb does not include a 6"x6" notch

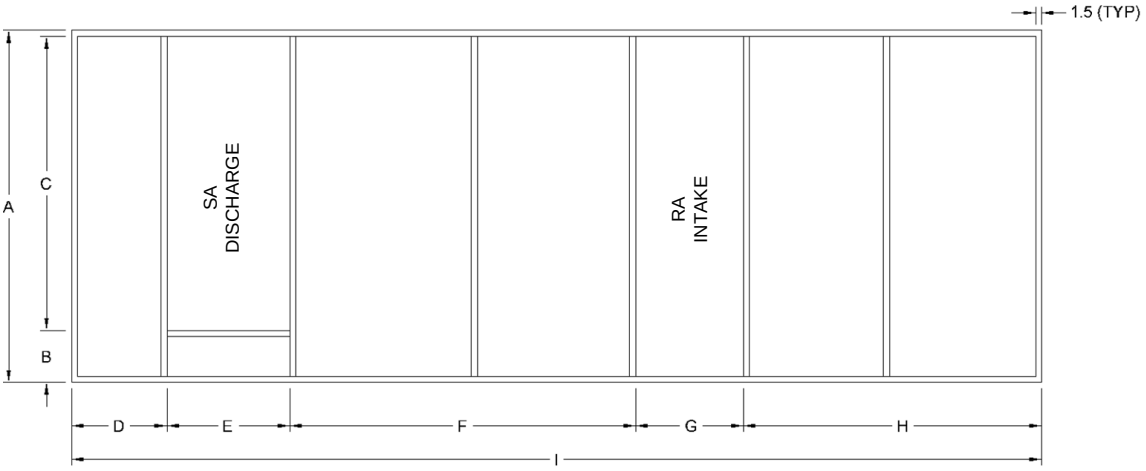
110/210/310 Casing



Casing	A	B	C	D	E	F	G	H	I		J	K	
									Bottom RA	Side RA		Bottom RA	Side RA
110	42.5	7.13	28.25	20.63	22	43.25	17.38	104.75	12	39	36	152.75	179.75
210	54.75	1.5	51.75	23.75	22	43.13	24.38	114.75	12	39	36	162.75	189.75
310	61.5	1.5	58.5	20.75	26	50.5	26	124.75	12	39	36	172.75	199.75

Dimensions in inches

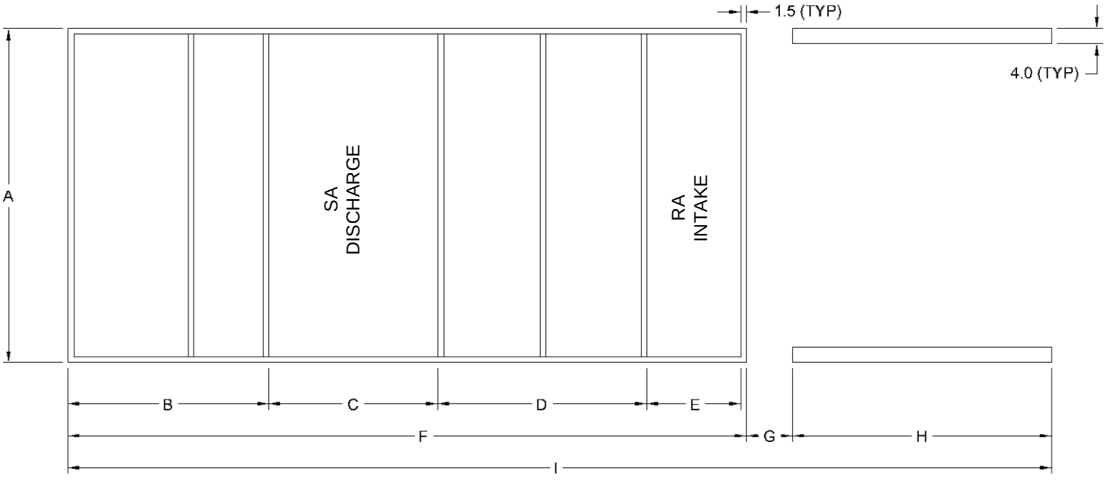
350 Casing



Casing	A	B	C	D	E	F	G	H	I
350	86.5	12.75	72.25	23.5	30.25	85.25	26.5	73.5	239

Dimensions in inches

352 Casing



Casing	A	B	C	D	E	F	G	H		I	
								Bottom RA	Side RA	Bottom RA	Side RA
352	86.5	52	43.75	54	24.5	175.75	12	67	110	254.75	297.75

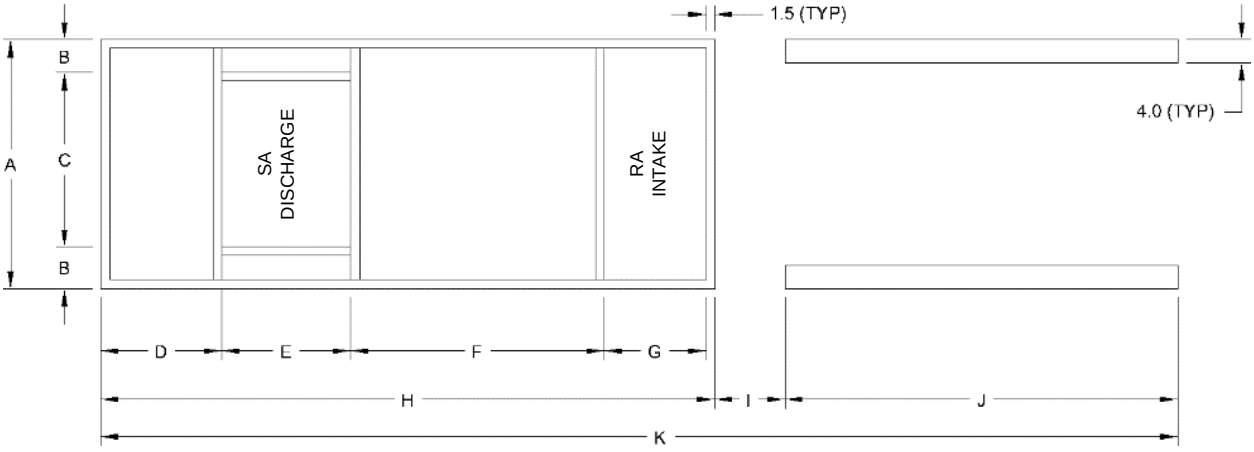
Dimensions in inches

VPRC/P Series

The VPRC/P series is constructed with a cross member in the base that requires one of the following when curb mounted:

- Partial-perimeter curb plus secondary support rails (standard factory offering)
- Partial-perimeter curb plus equipment support
- Single curb with 6" x 6" notch(es) to accommodate cross members in 1 to 2 locations depending on unit configuration
- VPRC/P-350 one-piece curb does not include a 6"x6" notch

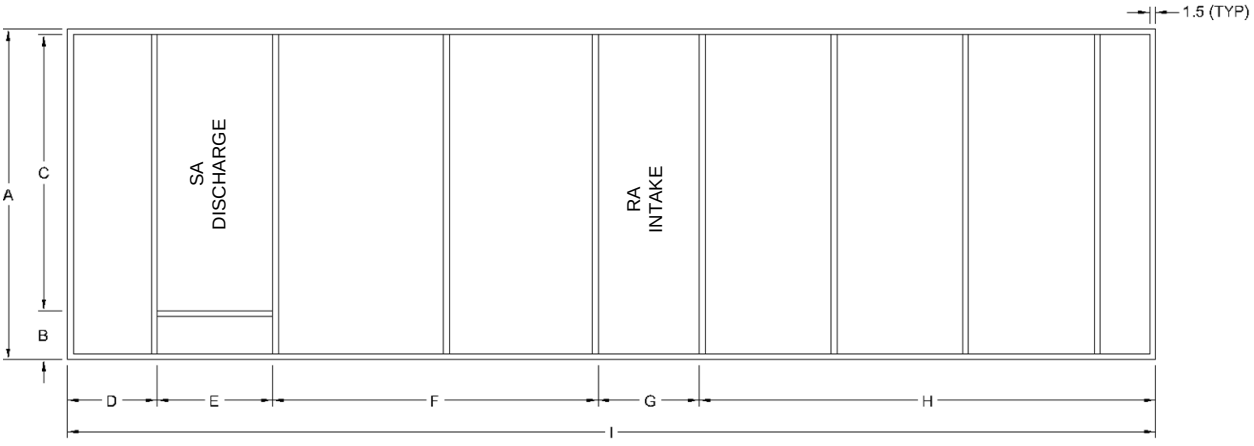
110/210/310 Casing



Casing	A	B	C	D	E	F	G	H	I		J	K	
									Bottom RA	Side RA		Bottom RA	Side RA
110	42.5	7.13	28.25	20.63	22	43.25	17.38	104.75	12	39	67	183.75	210.75
210	54.75	1.5	51.75	23.75	22	43.13	24.38	114.75	12	39	67	193.75	220.75
310	61.5	1.5	58.5	20.75	26	50.5	26	124.75	22	49	67	213.75	240.75

Dimensions in inches

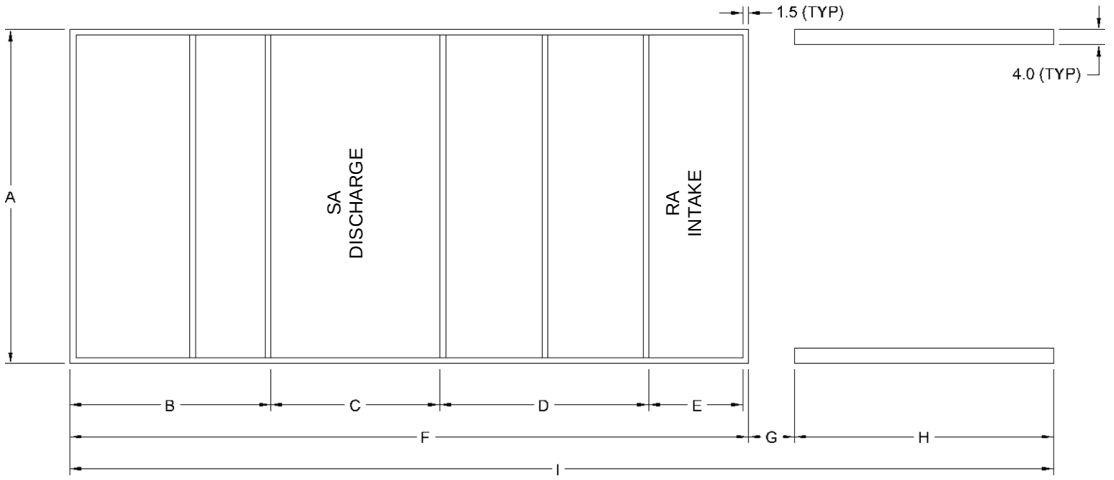
350 Casing



Casing	A	B	C	D	E	F	G	H	I
350	86.5	12.75	72.25	23.5	30.25	85.25	26.5	119.5	285

Dimensions in inches

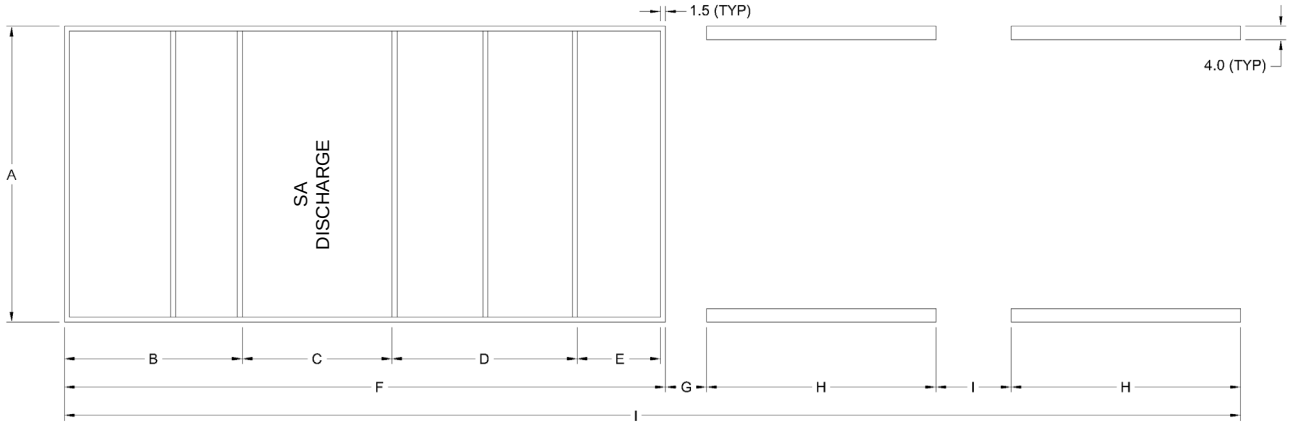
352 Bottom Return Casing



Casing	A	B	C	D	E	F	G	H	I
352 Bottom Return	86.5	52	43.75	54	24.5	175.75	12	110	297.75

Dimensions in inches

352 Side Return Casing



Casing	A	B	C	D	E	F	G	H	I	J
352 Side Return	86.5	52	43.75	54	24.5	175.75	12	67	22	343.75

Dimensions in inches

Outdoor Air Hood Assembly

Please refer to the Outdoor Air Hood Assembly Instructions, part number 476059, for information about assembling the outdoor air hood that is shipped with the unit.

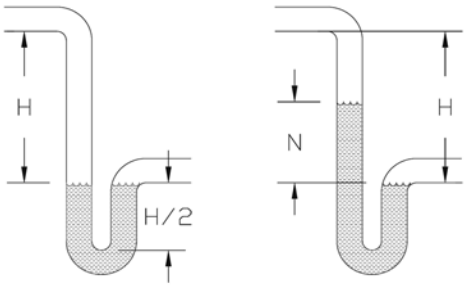
Duct & Drain Connections

Condensate Drain Connection

All condensate drain connections must be properly trapped and primed before operating the unit. Failure to properly trap a drain will result in flooding the drain pan and potential water damage to the unit or building.

Slope the piping from the trap downward in direction of flow. The trap must be primed before startup by filling the U portion of the trap with water. Drains that are not properly trapped and primed will not operate correctly. Each drain connection must be individually trapped.

Drains that are inactive will dry out and air will be drawn through the drain, preventing water flow. Inactive drains should be plugged or connected to a shutoff valve. On outdoor units that operate during freezing weather, install a heat trace around trap piping. Refer to the following figure to determine the correct trap height.



N=Negative Fan Pressure (InWc)

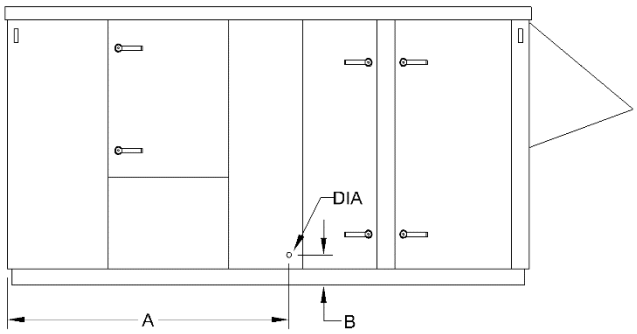
H=N+[1InWc (minimum)]

Drain Sizes and Locations

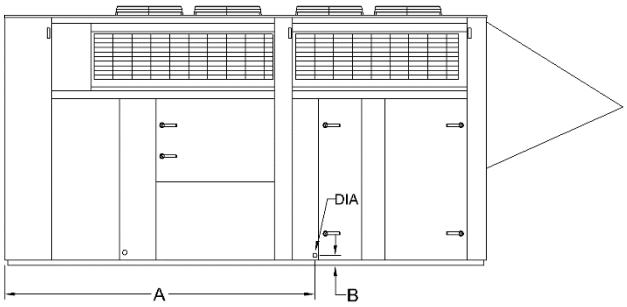
Drains are located on the access side of all units and dimensioned as shown in the following drawings.

Cooling Section Drain (VPR Models)

V10/110/210/310 Casing

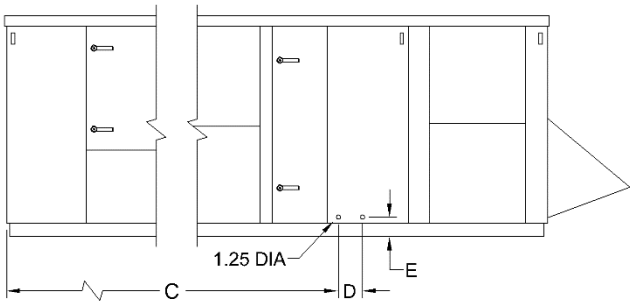


350/352 Casing



Casing Size	A (in)	B (in)	Diameter (in)
V10	44	10	1.0
110	58	7	1.0
210	65	7	1.0
310	75	7	1.0
350	106	4	1.0
352	119	4	1.0

Heat Exchanger Drain (VPRC/P Models)



Casing Size	C (in) Return Connection		D (in)	E (in)
	Bottom	Side		
110	133.25	160.25	5.8	5.6
210	142.75	169.75	7	5.6
310	167	194	7	5.6
350	210	X	7	3.75
352	225	269.5	7	3.75

Duct Connections

The contractor is responsible for providing transitions to accommodate difference in sizing between the unit and the building ducts. Duct connections to collar-type openings can be made with S-cleats or overlapping joints. Apply caulk around each duct connection. Failure to seal duct connections can cause air leakage and system performance problems.

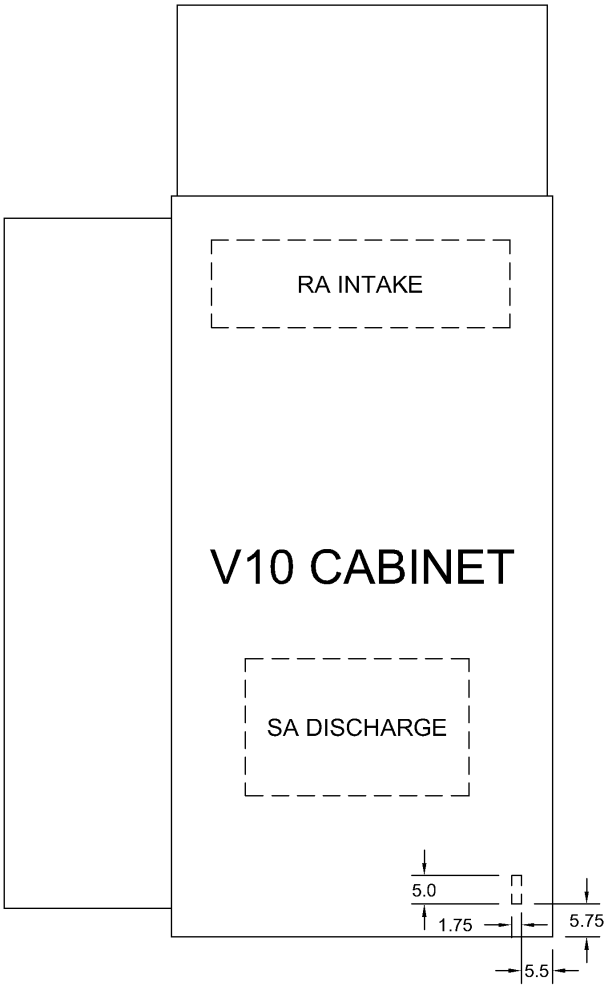
A straight duct for a distance of three to six duct diameters from the unit discharge should be used to develop a full dynamic head. Branching and turning closer to the discharge causes system effect losses.

IMPORTANT:
When an air duct which carries supply air or warm air passes through a combustible roof, a clearance of one inch must be maintained between the outside perimeter of ductwork and any combustible materials, per NFPA Standard 90A.

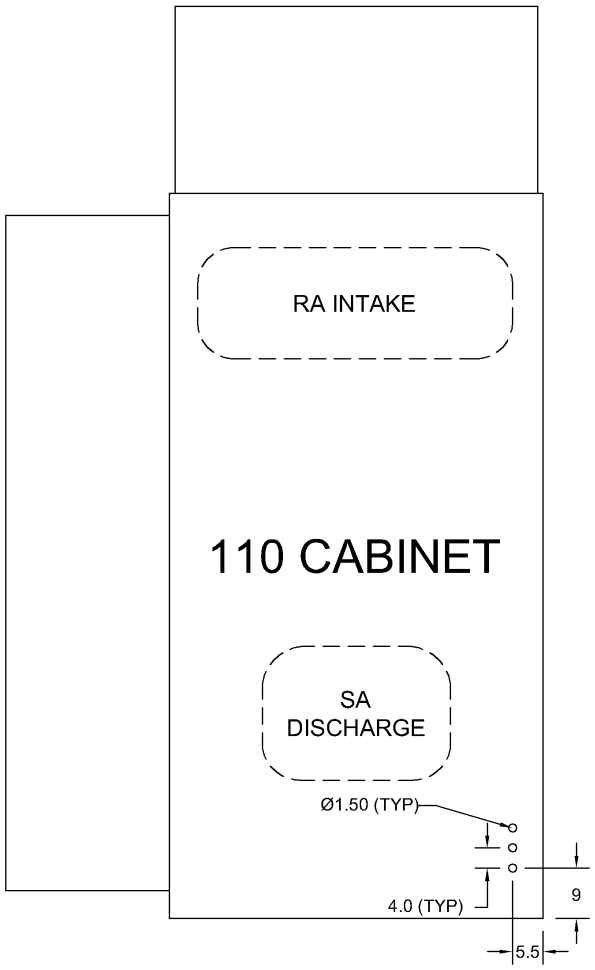
Pre-Punched Openings

A number of pre-punched holes are provided on the cabinet for electrical, gas, and water connections for each unit

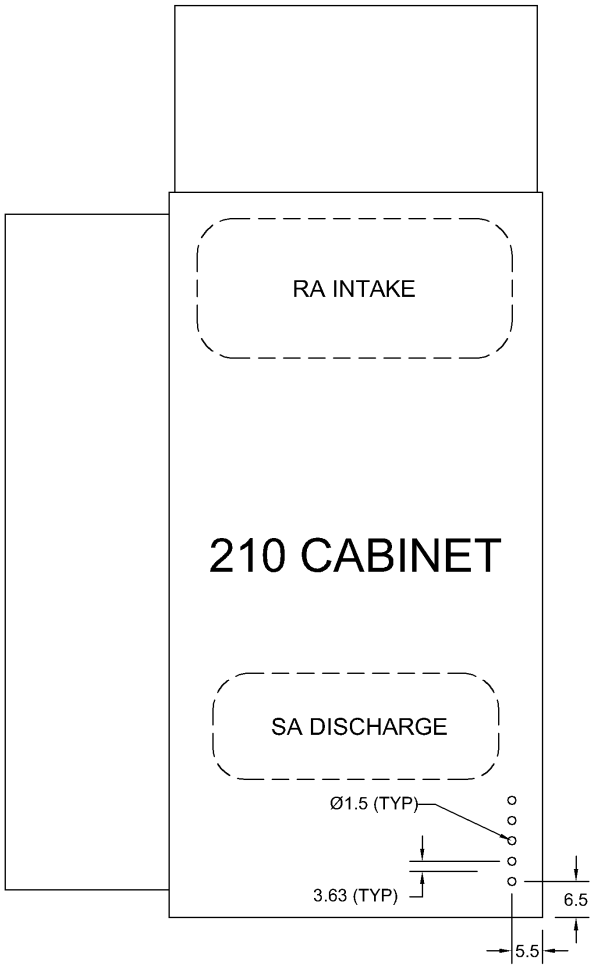
V10 Cabinet



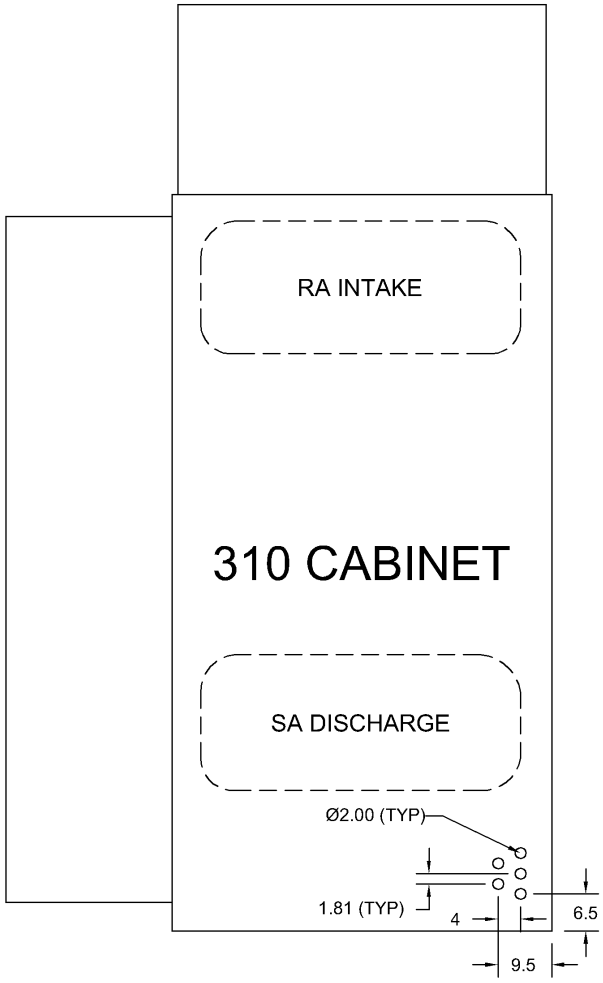
110 Cabinet



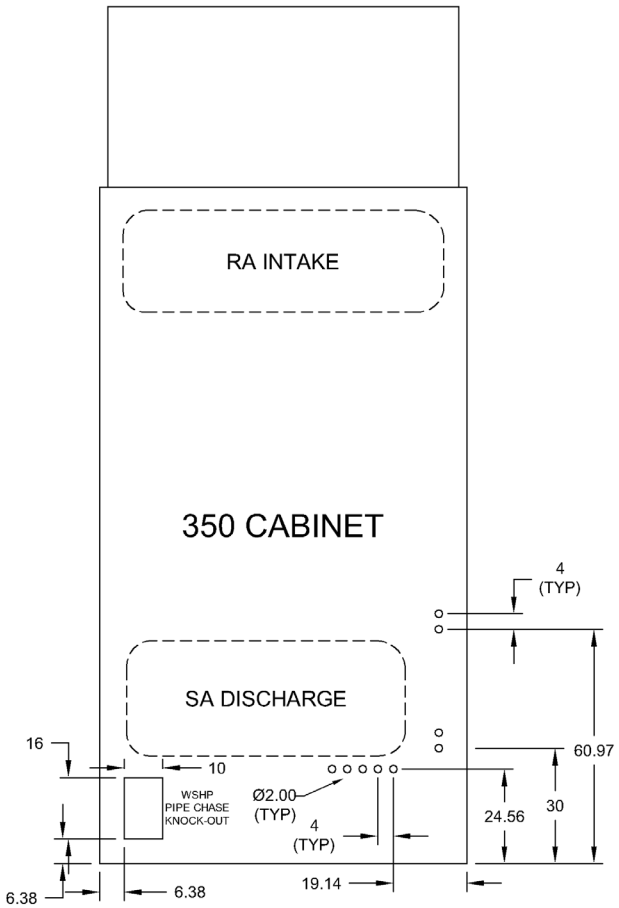
210 Cabinet



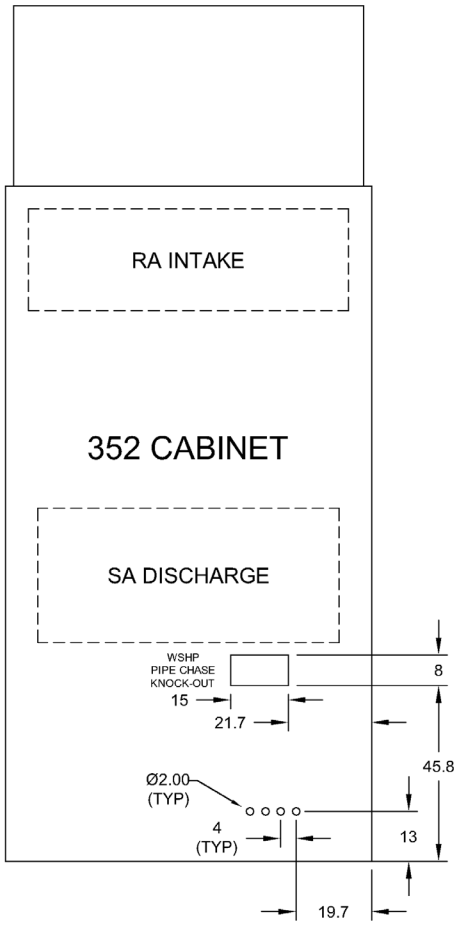
310 Cabinet



350 Cabinet



352 Cabinet



Electrical Connections

All electrical connections should be made in accordance with local building codes. Wiring may be drawn through the base of the unit using the pre-punched openings.

Gas Connections

WARNING: Fuel gas poses a danger of explosion which can cause personal injury, product damage, or property damage. Do not use matches, candles, flame, of other sources of ignition to check for leaks.

WARNING:

Gas-fired equipment is designed to provide safe, controlled combustion. The installer must ensure that the correct amount of supply combustion air and a properly operating vent system is provided. If the installation does not permit the burner to receive the proper supply of combustion air, complete combustion may not occur and carbon monoxide may be produced.

WARNING:

Carbon monoxide is a lethal, colorless, odorless gas.

Gas pipe must be sized and installed in accordance with applicable codes and by qualified personnel. Authorities having jurisdiction should be consulted before installing and connecting gas lines.

Gas furnaces are designed for gas pressure of 5-13.5 InWc for natural gas (6″ minimum on single 500 and 600 MBH furnaces) and 11-13.5 InWc for LP. If the gas pressure at the job location is greater than 13.5 InWc, an additional regulator is required to reduce pressure.

Connection Sizes

All gas furnace sections require one or two gas connections (usually ¾″ NPT) based on the total heating capacity as shown in the following chart:

Flue Venting

Refer to the Heatco IOM in the Valent Cut Sheets for information on proper furnace ventilation.

Exterior Gas Connections

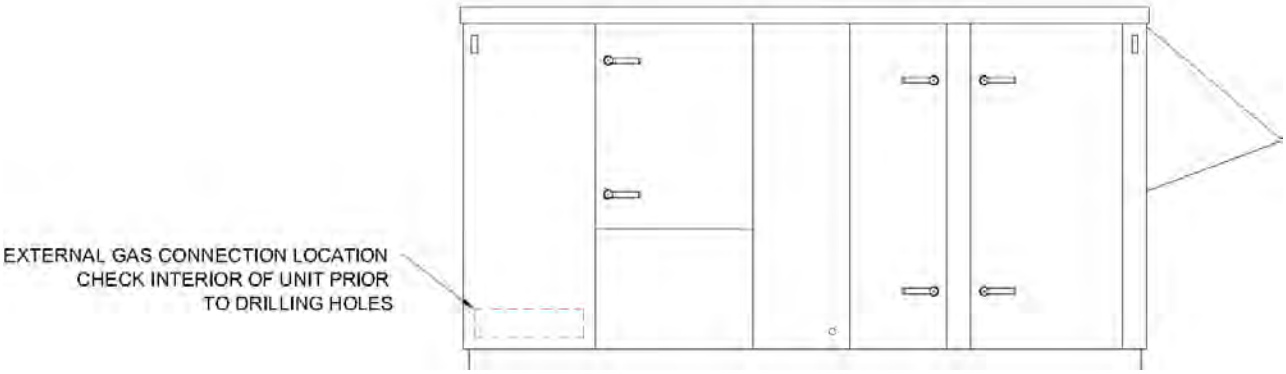
Refer to the following graphics for possible locations to run gas connections through the exterior of the cabinet.

IMPORTANT:

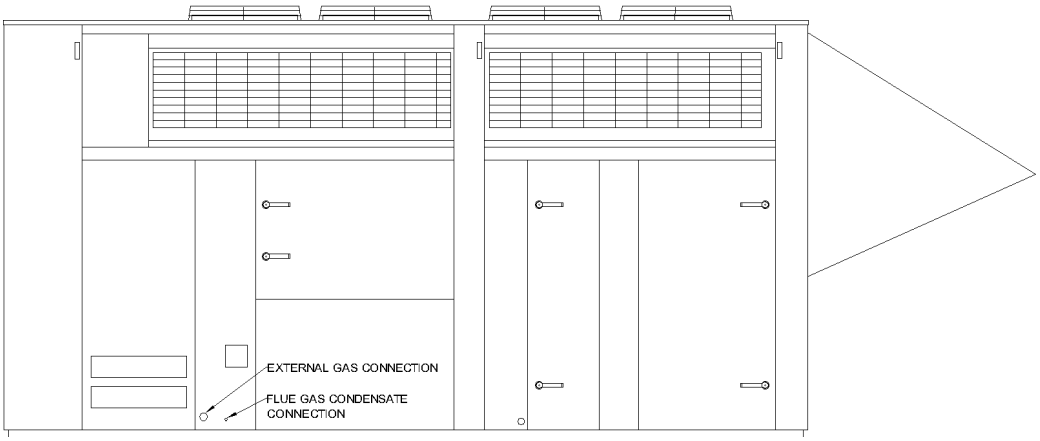
Check inside the cabinet before drilling to avoid damaging interior equipment.

Total Heating Capacity Input in MBH	Gas Connections 3/4" NPT unless noted
75	1
100	1
150	1
200	1
250	1
300	1
350	1
400	1
500	1 @ 1" NPT
600	1 @ 1" NPT
800	2 for 310 casing 1 @ 2" NPT for 352 casing
1000	1 @ 2" NPT
1200	1 @ 2" NPT

V10/110/210/310 Casing



352 Casing

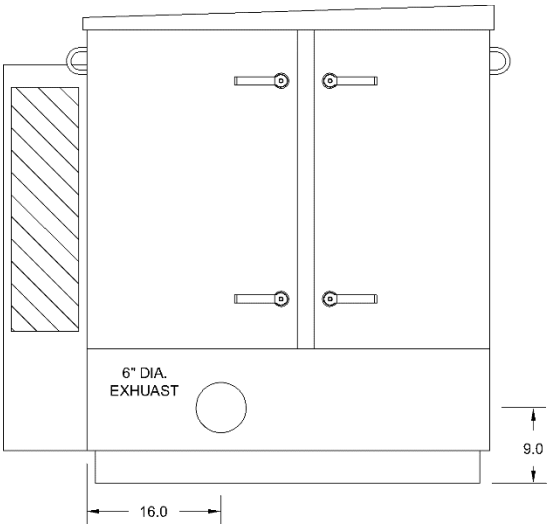


Refrigeration and Gas Connections – Indoor Unit

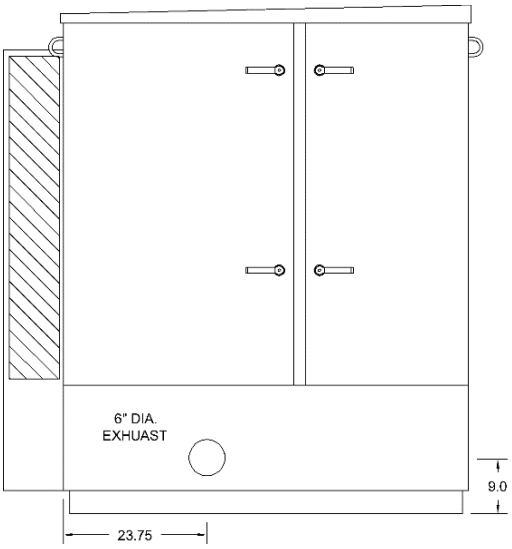
The following graphics show suggested field refrigerant piping penetrations as well as furnace flue duct connections when equipped with IG heat.
Hatched area represents general location of refrigerant piping penetrations.

WARNING:
Gas heaters pull combustion air from the surrounding space. Ensure the mechanical room has ample combustion air supply and is not at an overly negative pressure relative to outdoors.

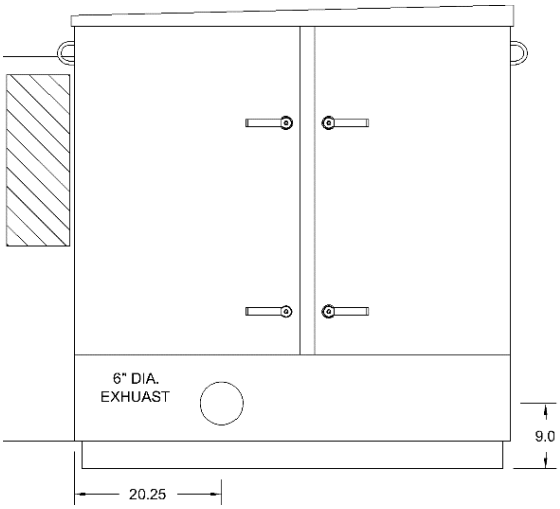
110 – All Furnaces



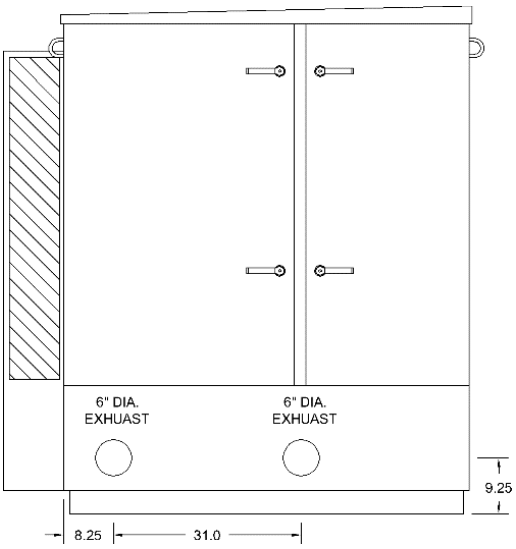
310 – 400 MBH Furnace



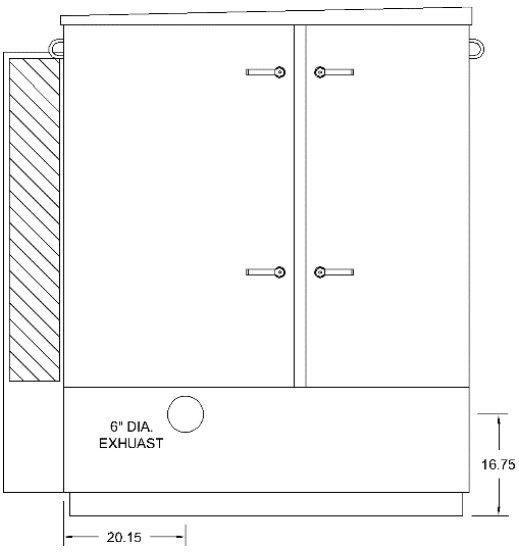
210 – All Furnaces



310 – 700-800 MBH Furnaces



310 – 500-600 MBH Furnaces



Pressure Testing the System

- When test pressures exceed 14 InWc, the heater must be disconnected from the supply gas piping.
- When test pressures are 14 InWc or less, the heater must be isolated from the supply gas piping by closing its individual manual shutoff valve.
- The gas pressure to the unit should be checked to make sure that the gas pressure does not fall out-side of the maximum and minimum allowable gas pressures listed on the unit nameplate.
- For your safety, if you smell gas:
  - Open windows
  - Don't touch electrical switches
  - Extinguish any open flame
  - Vacate the area
  - Immediately call your gas supplier

IMPORTANT:
Check both the supply lines and factory piping for leaks. Apply a soap and water solution to all piping and watch for bubbling. Some soaps used for leak detection are corrosive to some metals. Carefully rinse to remove soap and clean the pipe after leak test is completed.

Chilled Water Coil Freeze Protection

Chilled water coils must be protected against freezing when the ambient temperature is less than 40°F. Either a suitable antifreeze solution (glycol) can be used in the coil or the coil can be drained. Vent and drain connections are provided for coil drainage. The coil must be completely drained using air or nitrogen pressure to blow any remaining water from the coil. Failure to properly protect the coil from freezing may result in damage to coil and property.

A freeze stat is provided on chilled water coils to prevent the unit from operating during freezing conditions. This is not a failsafe method of freeze protection, and the coil must still be protected by one of the above means. To prevent nuisance trips on chilled water coils with glycol, the freeze stat setpoint must be lowered to the freezing point of the water/glycol mix.

Refrigeration Charge

Upon startup, refrigeration charge should be verified on each circuit by checking superheat and subcooling. Superheat should be measured at the suction line port nearest the compressor. Subcooling should be measured at the liquid line port nearest the TXV. All compressors on the circuit should be on at 100% when checking superheat and subcooling. Readings should fall within the ranges outlined on the following table.

	Cooling mode 0% reheat	Cooling mode 100% reheat	Heating mode (heat pumps only)
Subcooling	10-15°F	2-10°F	10-20°F
Superheat	10-20°F	10-30°F	10-20°F

Record superheat and subcooling readings on the startup form. If readings do not fall within the desired ranges, charge or TXV adjustments may need to be made. Refer to the Refrigeration section of Troubleshooting for adjustment guidelines.

Water Source Heat Pump

Each refrigeration circuit on ventilators with the water source heat pump refrigeration option includes a coaxial water-to-refrigerant heat exchanger. In addition, a two- or three-way valve with modulating actuator is provided with each circuit for refrigerant pressure control.

Fluid Piping Recommendations

- Install a drain valve in the supply and return lines to facilitate system flushing.
- Install shutoff valves and unions in the supply and return lines for system disconnect.
- Install strainers at the inlet to each circuit.
- Install balancing valves on the outlet of each circuit. DO NOT use a single balancing valve to regulate two circuits piped in parallel.
- Insulate all fluid lines running through unconditioned areas if fluid temperature is below expected ambient dewpoint conditions.
- Provide heat trace, unit heater, or antifreeze if minimum expected ambient temperature is below 30°F.

Fluid Line Sizes

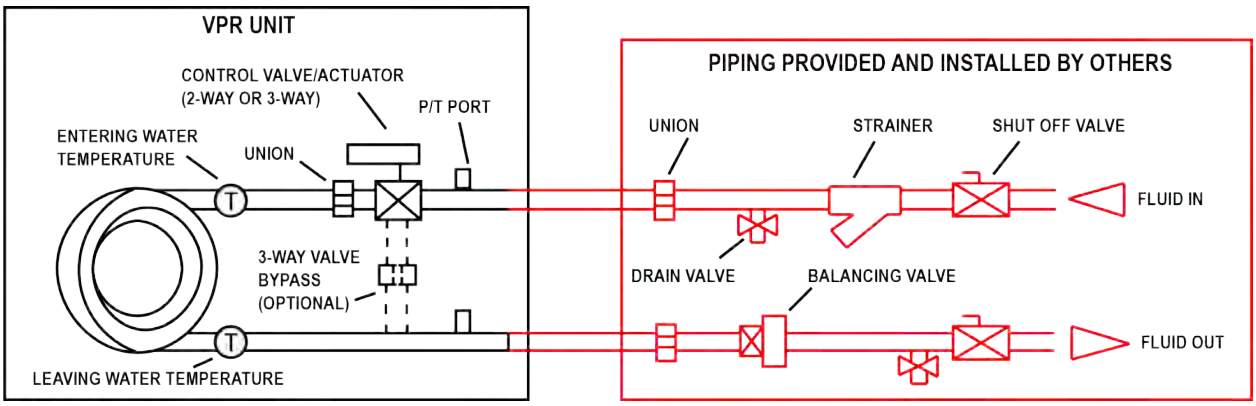
The following water piping line sizes are for both entering and leaving water connections. Fluid connections are copper sweat-type. Strainers, manual shutoff valves, and unions shall be provided by others.

Casing	Tonnage	Circuit A (in)	Circuit B (in)
110	5	1.0	N/A
	8	1.0	N/A
	10	1.25	N/A
210	10	1.0	1.0
	13	1.0	1.0
	16	1.0	1.0
	18	1.0	1.25
	20	1.25	1.25
	25	1.25	1.25
310	25	1.25	1.25
	30	1.25	1.50
	35	1.50	2.00
	40	2.00	2.00
350	30	1.50	1.50
	40	2.00	2.00
	50	2.00	2.00
	60	2.00	2.00

Fluid Piping Connections

Each circuit of the heat pump requires one supply and one return fluid connection. Fluid connections are copper sweat. Strainers, manual shutoff valves, and unions shall be provided and installed by others. Fluid pipe/COAX freeze protection shall be provided and installed by others. Each circuit of the heat pump requires 3 GPM/ton cooling capacity. GPM can be confirmed using fluid pressure drop through COAX and water valve.

Typical Piping Diagram



Fluid Flow Rates

To help verify proper water flow, P/T ports are factory-installed on WSHP water lines. Each circuit of the heat pump requires 3 GPM per ton of nominal cooling capacity. The Pressure Drop Chart shows the target flow rates and resulting pressure drops across both the coaxial coil and the factory-installed modulating valve. Measure the pressure drop from Fluid In to Fluid Out via the P/T ports. The valve should be 100% open when measuring pressure drop. If the pressure drop is below the required value, adjust the water balance valves to increase the water flow so that the required pressure drop is attained across the P/T ports.

ΔP = PIn – POut

ΔP – Pressure drop (psid)
PIn – Pressure at inlet P/T port (psi)
POut – Pressure at outlet P/T port (psi)

Pressure Drop Chart

Casing	Nom. Tons	Circuit A		Circuit B	
		Flow [GPM]	Pres. Drop [psi]	Flow [GPM]	Pres. Drop [psi]
V10	N/A	N/A	N/A	N/A	N/A
110	5	15	9.25	N/A	N/A
	8	24	12.4	N/A	N/A
	10	30	11.7	N/A	N/A
210	10	15	9.25	15	9.25
	13	15	9.25	24	12.4
	16	24	12.4	24	12.4
	18	24	12.4	30	11.7
	20	30	11.7	30	11.7
	25	30	11.7	45	13.6
310	25	37.5	13.9	37.5	13.9
	30	37.5	13.9	52.5	9.9
	35	45	12.3	60	9.8
	40	60	9.8	60	9.8
350	30	45	12.3	45	12.3
	40	60	9.8	60	9.8
	50	75	13.9	75	13.9
	60	90	13.9	90	13.9

Chart indicates values for 60°F water.

Water Mixtures (not 100% water)

If the fluid is a water/antifreeze mixture, the freeze point of the fluid in the controller needs to be lowered to the freezing point of the mixture. Refer to the Controls IOM for more information.

The Pressure Drop Chart will need a correction factor based on the antifreeze mixture, as shown in the following table. All pressure values in the Pressure Drop Chart should be increased by the following multipliers for accuracy.

Pressure Drop Correction Factors							
Glycol %	10%	15%	20%	25%	30%	35%	40%
Multiplier	1.08	1.11	1.16	1.21	1.27	1.33	1.40

Coaxial Coil Freeze Protection

The installation of a heat trace system on the coaxial coil and all fluid piping outside of a conditioned space (including inside the ventilator) is recommended if the minimum expected ambient temperature is below 30°F and glycol is not used. Any heat trace system shall be provided by others and installed in the field.

Glycol Protection Requirements

Heat pump loop fluid must be freeze protected according to the following equation to avoid coax freeze up:

$t_{protect} = t_{EFT} - 13°$ where

$t_{protect}$ = minimum temperature at which the glycol mixture freezes

t_{EFT} = the lowest expected entering fluid temperature in heating mode

Example:

If minimum entering fluid temperature equals 45°F, the system must be protected to (45°F - 13°F) = 32°F.

IMPORTANT:

The microprocessor included with each ventilator is defaulted to a minimum entering fluid temperature of 45°F, suitable for loops without glycol. When glycol is present, the following setpoint change is required to operate below 45°F:

Refer to the Controls IOM for more information.

Valve Operation and Control

Each independent refrigerant circuit includes a two- or three-way water valve with modulating actuator on the inlet of the coaxial heat exchanger. When operating, the factory-installed microprocessor will modulate the valve to regulate fluid flow through the coaxial heat exchanger and maintain refrigerant head pressures.

Compressor Off / Water Valve Off Position

IMPORTANT:

When one or more compressors are not enabled, the fluid valve will de-energize and fail to the off position. If the water piping and coaxial coil are equipped with heat trace or the fluid contains glycol, the valve may be set to a position by modifying setpoints at the controller.

Refer to the Controls IOM for more information.

WSHP Operating Conditions & Limitations

- Heat pumps require 3 GPM/ton per circuit. Quantity 2 fluid connections per circuit.
- Fluid must be freeze protected to 13°F below the entering fluid temperature (see prior example under Glycol Protection Requirements).
- Fluid temperature range: heating mode 30°F–80°F, cooling mode 50°F–90°F.
- To run Cooling mode, the following must be true:
    - Supply air temperature above minimum low supply temp limit (35°F)
    - Outside air temperature above the cooling ambient lockout (55°F adj.)
- To run Heating mode, the following must be true:
    - Supply air temperature below maximum high supply temp limit (120°F)
    - Outside air temperature below the heating ambient lockout (80°F adj.)
- For more information, please refer to the Controls IOM

Air Source Heat Pump

IMPORTANT:
Air source heat pumps are equipped with a defrost cycle to remove ice from the outdoor coil. During defrost cycles, melt water may drip from the bottom of the refrigeration section under the outdoor coil. In cold climates (temperatures below 32°F), proper drainage/heat trace must be installed under the outdoor coil to prevent the buildup of ice on the roof.

IMPORTANT:
Melt water from snow accumulation on the unit roof can be sucked up into condenser fans, resulting in ice formation on fan blades under certain conditions. Remove snow accumulation from the unit roof and refrigeration section roof after snow storms.

ASHP Operating Conditions & Limitations

- To run Cooling mode, the following must be true:
    - Supply air temperature above minimum low supply temp limit (35°F)
    - Outside air temperature above the cooling ambient lockout (55°F adj.)
- To run Heating mode, the following must be true:
    - Supply air temperature below maximum high supply temp limit (120°F)
    - Outside air temperature above ASHP low ambient lockout (17°F adj.)
- For more information, please refer to the Controls IOM

VFD Compressor Option

If the VFD compressor option is included, the compressor VFD is mounted in an external enclosure on the end of the condensing section. Condensing section internal components are accessible via the access panel on the right side of the condenser coil or the access panel on the opposite end of the condensing section.

Envelope Control

The unit controller tracks the operating point of the VFD compressor within the operating envelope at all times. If the operating point is out of the envelope, the controller will take action to bring it back in. If unsuccessful, the controller will shut down the compressor. DO NOT operate the compressor VFD in hand mode because the envelope control safeties will not be in place. Refer to the controls IOM for more information on envelope control.

Electronic Expansion Valve

An electronic expansion valve is provided on the VFD compressor circuit to ensure tight superheat control throughout the compressor modulation band. The EXV acts as a liquid line solenoid valve when the compressor is off to prevent refrigerant migration.

Crankcase Heat (V10 Only)

The VFD compressor will be heated by the compressor stator. To ensure optimal performance and reliability, do not disable stator heat.

Oil Return Management

The compressor VFD has an oil return purge cycle such that if the compressor has been operating below 1800 RPM for over 2 hours, the VFD will accelerate the compressor to 3600 RPM for 90 seconds to ensure sufficient lubrication.

DO NOT disable the oil return management function.

DO NOT operate the compressor VFD in hand mode because the oil return management will not be operational.

IMPORTANT:
Line voltage wiring should be drawn and landed to the unit in accordance with all local and national electrical codes.

IMPORTANT:
All wiring to the unit should be drawn through one of the pre-punched holes in the bottom of the floor pan immediately underneath the control center or through a field-cut hole in the side of the unit casing.

Hot & Chilled Water Valve Actuators

The 24VAC actuator is provided and installed by others. Wire the valve with the provided 0-10V control signal and power by proper 24VAC transformer. Refer to notes on the right side of page 4 of the Electrical Schematics.

Field-Mounted Sensors

All field mounted sensors are designed to be connected to the terminal strip located in the upper left corner of the control panel. All sensors and end devices for the product have been factory wired with the exception of the following items:

Sensor Description	Mounting Location
Supply Air Temperature Sensor	Supply air ductwork downstream of ventilator
Space Temperature Sensor	Wall mounted in the space
Space Relative Humidity Sensor	Wall mounted in the space
+++	Unit mounted with sampling tube run into the space
Space Static Pressure Probe	Space mounted, connected to sampling tube from Space Static Pressure Sensor
Duct Static Pressure Sensor	Duct mounted downstream of ventilator
Space CO_2 Sensor	Wall mounted in the space
Outdoor Air Temp/Humidity Sensor (Indoor Units Only)	Intake of outdoor air ductwork upstream of all shutoff dampers; protect from rain and snow

- Not all field-mounted sensors are listed. Special control sequences are required for many field-mounted sensors.
- Do NOT run sensor wiring in the same conduit as high or low voltage AC wiring. Inaccurate signal levels are possible when AC power wiring is present in the same conduit as the sensor wires

Supply Air Temperature Sensor

A supply air temperature sensor is required on all VPR, VPRC/P, VPRE, and VPRX units and ships loose with approximately 20 feet of wiring for mounting in the supply air ductwork downstream of the unit. Wiring is two-conductor, 22 AWG, twisted, shielded, and stranded communication cable. A minimum 5 feet of duct run is recommended for installation of the supply air temperature sensor. If mounted too close to the discharge of the ventilator, the sensor may provide a false reading to the microprocessor controller when in heating mode.

Space Temperature and Humidity Sensors

When a VPR, VPRC/P, VPRE, or VPRX ventilator is equipped with space temperature and humidity reset, both a wall-mounted temperature sensor and a wall-mounted humidity sensor ship loose with the unit. Both sensors should be mounted in the space served by the ventilator at a height of approximately 5 feet from the floor. Two individual sensors are provided to prevent interference but the individual enclosures may be installed on a wall immediately next to one another.

Wiring between the ventilator and the temperature sensor should be through a field-supplied, four-conductor, 22 AWG, twisted, shielded, and stranded communication cable. Terminations should be made per the following chart.

Space Temperature Sensor	Terminal Strip TB3
SP1	TB3-13
SP2	TB3-14
SN	TB3-4
SN	TB3-5
Shield	TB3-G
*V+	TB2-HA
*GND	TB2-G0A

*For the optional digital display space temperature sensor, two additional wires will need to be run to power the sensor off the Valent unit.

Wiring between the ventilator and the space humidity sensor should be through a field-supplied, three-conductor, 22 AWG, twisted, shielded, and stranded communication cable. Terminations should be made per the following chart.

Space Humidity Sensor	Terminal Strip TB3
SIG	6
–	7
+	HB

IMPORTANT:
Do not use a single, multi-conductor cable to wire both the space temperature and humidity sensors. Use separate communication cables for each sensor.

Space Static Pressure Sensor

A space static pressure sensor is provided with all VPR, VPRC/P, VPRE, and VPRX ventilators which include a building static pressure modulation controls sequence. The sensor is designed to be mounted inside an enclosed space (e.g., control panel) and includes two pressure taps: one for the ambient reference, the other for sampling from the space. In addition to the static pressure sensor, a sampling probe is included with the ventilator for installation in the space.

Wiring between the ventilator and the space static pressure sensor should be through a field-supplied, three-conductor, 22 AWG, twisted, shielded, and stranded communication cable. Terminations should be made per the following chart.

Space Static Pressure Sensor	Terminal Strip TB2
SIG	30
–	31
+	32

Duct Static Pressure Sensor

A duct static pressure sensor is provided with all VPR, VPRC/P, VPRE, and VPRX ventilators that include a modulation controls sequence based on duct static pressure. The sensor is built into a NEMA 4 casing and designed for mounting on the exterior of the supply air ductwork downstream of the ventilator.

Wiring between the ventilator and the duct static pressure sensor should be through a field-supplied, three-conductor, 22 AWG, twisted, shielded, and stranded communication cable. Terminations should be made per the following chart.

Duct Static Pressure Sensor	Terminal Strip TB2
SIG	39
–	38
+	37

Space CO_2 Sensor

A space-mounted CO_2 sensor is provided with all VPR, VPRC/P, VPRE, and VPRX ventilators that include a modulation controls sequence based on CO_2. The sensor should be mounted in the space served by the ventilator at a height of approximately 5 feet from the floor.

Wiring between the ventilator and the space CO_2 sensor should be through a field-supplied, three-conductor, 22 AWG, twisted, shielded, and stranded communication cable. Terminations should be made per the following chart.

CO_2 Sensor	Terminal Strip TB3
OUT1	33
GO	34
G+	35

Outdoor Air Temperature/Humidity Sensor

On indoor units, the outdoor air temperature/ humidity sensor ships loose with the unit. The sensor should be mounted at the intake of the outdoor air ductwork, upstream of all shutoff dampers (exposed to outdoor air at all times). If mounted on the exterior of the building, the sensor needs to be protected from rain, snow, and radiant heat from the sun. A sensor protection hood, if needed, shall be provided and installed by others. Wiring between the ventilator and the outdoor air temperature sensor terminals should be through a field-supplied, two-conductor, 22 AWG, twisted, shielded, and stranded communication cable. Terminations should be made per the following chart.

OA Temperature Sensor	Terminal Strip TB3
TMP	504
TMP	505

Wiring between the ventilator and the outdoor air humidity sensor terminals should be through a field-supplied, three-conductor, 22 AWG, twisted, shielded, and stranded communication cable. Terminations should be made per the following chart.

OA Humidity Sensor	Terminal Strip TB3
SIG 0	8
COM –	7
SUP +	HB

IMPORTANT:
Do not use a single, multi-conductor cable to wire both the outdoor air temperature and humidity terminals. Use separate communication cables for each sensor function.

Maintenance

Access Doors

When working on the unit, use the tie-back rods to fasten the door open for convenience and safety. Tie-back rods are located on these doors:

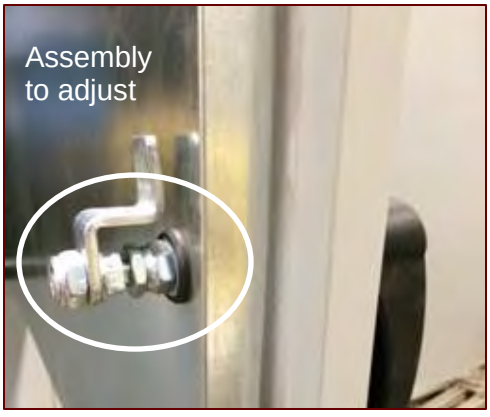
- Exterior door in front of the compressors
- Exterior door in front of the electrical panel
- Interior door at the electrical panel

Find the tie-back rod on the lower inside door lip. Pull up on the inner end. Swing the rod toward the unit and insert the end of the rod into the hole in the sheet metal, as shown below.

Replace the tie-back rod into the door lip before closing the door.

Checking the seals on access doors:
To prevent air or water leaks around access doors, the door handles can be adjusted to tighten the door seal. To test if the door is properly sealed, close the access door on a dollar bill with the end of the bill protruding from the unit, then tug on the bill. If the bill is taut and doesn't slip when pulling on it, then the door handles are adequately tight.

If the bill can easily slide out of the seal, then the door handles are not tight enough. To tighten the door handles, adjust the nuts on the latch assembly, as shown in the following photo, and move the latch closer to the door.



Cooling Coil

Coils need to be periodically cleaned to operate at design efficiency. Soiled fins reduce the capacity of the coil, demand more fan energy, and provide an environment for odor and bacteria to grow and to be spread throughout the conditioned zone.

High pressure water can be used to clean coils. Spray in the direction opposite the airflow to push dirt out the front of the coil.

Test the spray pressure on a small area on a corner of the coil to see how well the fins withstand the high pressure. Foaming chemical sprays and washes are available and should be used instead of high-pressure water on more fragile fins or when high fin density does not allow high-pressure water cleaning.

Drain Pan

Clean the condensate drain pans regularly. Algaecide tablets or similar products can be used to prevent any algae growth in the drain pans. Remove any foreign objects that may obstruct drainage.

Check the drain trap for any sediment that may have accumulated in the bottom of the trap and could prevent drainage.

Winterize the drain trap each year before the drain piping or drain pan is exposed to freezing air. Return the trap to operating position before the cooling season starts.

Dampers

Inspect the dampers periodically. Check that all linkages are operating smoothly and that the damper blade seals are in good condition. Clean the damper rod bushings.

Interior and Exterior

Clean the inside of the unit regularly with a disinfectant to prevent the buildup of dirt and the growth of microorganisms that can negatively affect the indoor air quality. Clean all metal surfaces including walls, racks, partitions, floors, and heat transfer surfaces.

Clean the exterior casing occasionally to prevent buildup of foreign material that can cause corrosion. The required frequency of cleaning depends on the location of the unit. If the paint is damaged, remove any corrosion and repaint the surface.

Check the condition of gaskets around doors.

Blower

When the unit is operating, a routine maintenance schedule should be carried out and include the following:

- Tighten the fan's wheel, bolts, and set screws.
- Clean dirt from the wheel to prevent imbalance and possible damage.
- Tighten motor mounting bolts and blower/motor assembly support bolts.
- Check rubber isolators (if applicable) for deterioration.

Blower Motor Lubrication

The ball bearings in the blower motor have been lubricated at the factory. Motors that cannot be regreased are factory lubricated for the normal life of the bearings.

For motors that can be regreased, lubrication is recommended at the following intervals. New motors that have been stored for a year or more should also be relubricated.

Lubrication Intervals		
Frame Size NEMA (IEC)	Rated Speed (RPM)	
	1,200	1,800
Marathon – 56 (80)	5,000 hours	N/A
Baldor – Up to 210 incl. (132)	18,000 hours	12,000 hours
Baldor – Over 210 to 280 incl. (180)	15,000 hours	9,500 hours

For information about bearing lubrication, refer to the motor manufacturer's documentation. Blower motors are pregreased, normally with Polyrex EM (Exxon Mobil).

Motors can be regreased while stopped (at less than 176°F) or running.

1. Clean the grease fitting.
2. If the motor has a purge plug, remove it.
3. Slowly apply grease to the fitting. Refer to the following table for the recommended amount of grease to add. Too much grease or injecting grease too quickly can cause premature bearing failure. Take a minute or more to apply the grease.
4. Operate the motor for 20 minutes, then reinstall the purge plug if it was previously removed.

IMPORTANT:
Keep grease clean. Mixing dissimilar greases is not recommended.

Amount of Grease to Add			
Frame Size NEMA (IEC)	By Weight ounces (grams)	By Volume	
		Inches^3	Teaspoons
Marathon – 56 (80)	0.14 (4.0)	0.25	0.8
Baldor – Up to 210 incl. (132)	0.30 (8.4)	0.6	2
Baldor – Over 210 to 280 incl. (180)	0.61 (17.4)	1.2	3.9

Furnace

Consult the manufacturer's manual for information about furnace maintenance.

Energy Recovery Wheel (VPRE Series)

Each VPRE-series ventilator includes an integral total enthalpy wheel for energy recovery. The energy recovery media (wheel) is built into a cassette that can be slid out of the ventilator without tools. The energy wheel is accessed through a hinged door with quarter-turn handles and latches. For a full description of maintenance procedures, refer to the following documents included in the Valent component cut sheets.

- AirXchange Series 36 Thru Series 86 IOM
- SEMCO Energy Recovery Wheel IOM

VPRE Casing	Heat Wheel Model (AirXchange/SEMCO)
110	ERC-3628C / UWCH-3609
210	ERC-5262C / UWCH-5209
310	ERC-5874C / UWCH-5809
350/352	ERC-81146C / UWCH-7409

Flat Plate Heat Exchanger (VPRP Series)

An all-aluminum, cross-flow air-to-air heat exchanger is provided with each VPRP-series ventilator for sensible-only energy recovery.

- Heat exchanger may be cleaned with hot water (180°F) or a mild detergent that does not damage the aluminum surface.
- Water pressure of 22 to 55 psig is recommended for the aluminum plate.
- Do not force sharp objects against the heat transfer surface or the plates may be damaged, causing leakage between the supply and exhaust airstreams.
- Inspect and clean the flat plate heat exchanger at least once per year.

Underneath each side of the heat exchanger is a drain pan and drain to remove moisture buildup.

VPRP Casing	Heat Exchanger Model
110	30A-900
210	30A-1200
310	50B-1200
350/352	50C-1650

Enthalpy Plate (VPRC Series)

An enthalpic cross-flow air-to-air heat exchanger is provided with each VPRC-series ventilator for both sensible and latent energy recovery.

- Heat exchanger may be cleaned with hot water (180°F) or a mild detergent that does not damage the enthalpic surface. Refer to the manufacturer's cleaning instructions.
- To avoid damage, do not use a high-pressure water source (pressure washer) to clean the enthalpy plate.

Underneath each side of the heat exchanger is a drain pan and drain to remove moisture buildup.

VPRC with Bypass Casing	Heat Exchanger Model
110	Module B
210	Module B, Module E
310	Module C, Module F
350/352	Module G

Filters

Inspect the filters quarterly. Pressure drop readings can be used to determine when a filter should be replaced. Pre-filters should be replaced according to the following chart or as required by system design.

All filter sections can be accessed by a door. Filters can be removed by sliding them out of the rack. Some filters are secured to the frame using a clip. Aluminum filters can be removed and cleaned using high-pressure water.

Filter Media Type

Filter Media	Quantity		
	Outdoor Air	Exhaust Air	Supply Air
2" Aluminum	X	X	
2" MERV 8	X	X	X
4" MERV 8			X
4" MERV 11			X
4" MERV 14			X

Filter Resistance

Filter Size	Final Resistance
2"	1.0" W.G.
4"	1.0" W.G.
2" + 4"	1.25" W.G.

Filter Media Sizes and Quantities-

Casing	Quantity		
	Outdoor Air	Exhaust Air	Supply Air
V10	(4) 16x20	N/A	N/A
110	(4) 20x20	(2) 20x20	(4) 20x20
210	(6) 16x25	(3) 16x25	(6) 16x25
310	(6) 20x24	(4) 16x25	(9) 20x24
350 (30, 40 tons)	(9) 20x24 + (3) 20x20	(6) 20x24 + (2) 20x20	*6-row DX coil:* (6) 20x24 + (2) 20x20 *4-row DX coil:* (9) 20x24 + (3) 20x20
350 (50, 60 tons)	(9) 20x24 + (3) 20x20	(6) 20x24 + (2) 20x20	(9) 20x24 + (3) 20x20
352 (30, 40 tons)	(9) 20x24 + (3) 20x20	(6) 20x24 + (2) 20x20	*6-row DX coil:* (4) 20x24 + (4) 20x20 *4-row DX coil:* (6) 20x24 + (6) 20x20
352 (50, 60, 70 tons)	(9) 20x24 + (3) 20x20	(6) 20x24 + (2) 20x20	(6) 20x24 + (6) 20x20

Compressor Staging

Cooling Mode – The Digital Scroll compressor (Circuit B) will engage to maintain cooling demand. If more cooling is needed than the Digital Scroll compressor can provide, the Standard Scroll compressor (Circuit A) will engage and the Digital Scroll compressor (Circuit B) will modulate to maintain the desired supply air temperature.

Dehumidification Mode – For units equipped with a hot gas reheat coil, the Standard Scroll compressor (Circuit A) will run to lower the DX coil temperature to the DX coil setpoint and modulate the hot gas reheat (HGRH) valve to maintain the supply air temperature. If more capacity is needed to decrease the DX coil temperature to the setpoint, the Digital Scroll compressor (Circuit B) will engage to meet the setpoint. The hot gas reheat valve will continue to modulate as needed to maintain the supply air temperature.

For more information, see the Controls IOM.

Sensor Trip and Reset Values

Sensor/Cutout	Trip	Reset
Low Limit (Freezestat)	35°F	46°F
Furnace High Limit	194°F	164°F
Furnace Aux High Limit	160°F	120°F
Electric Heat High Limit	125°F	90°F
Low Pressure (Air Cooled)	75 ±5psig	95 ±7psig
Low Pressure (Heat Pump)	25 ±5psig	50 ±5psig
High Pressure (Refrigeration)	610 ±25psig	Manual
Condenser Fan Cycling Switch	450 ±15psig	350 ±10psig

Troubleshooting

Motor

Motor Symptom	Probable Cause	Action
Motor doesn't start	Blown fuse or open circuit breaker	Replace fuse or reset circuit breaker
	Overload trips	Check and reset overload
	Improper line connections	Check connections on diagram supplied with motor
	Open circuit in winding or starting switch; humming sound from motor when switch is closed	Replace motor
	Improper current supply	Check that power supply agrees with motor specifications listed on nameplate
	Mechanical failure	Determine that motor turns freely; if not, replace motor
	Motor overload	Reduce load
	Power source (3-phase) may have one phase open	Check line for open phase
Motor doesn't come up to speed	Motor under-designed for the application	Replace with larger motor
	Voltage too low at motor terminals	Check across AC line and correct if possible
	Line wiring to motor too small	Install larger wiring
	60-Hz motor connected to 50-Hz line supply	Replace unit with 50-Hz motor
	Motor wired for wrong voltage	Check wiring
Motor takes too long to accelerate to speed	Excessive load	Consult the factory
	Loose connection(s)	Check connection and tighten where necessary
Motor rotates in wrong direction	Improperly wired to AC line; wrong sequence of phases	Check wiring diagram on motor nameplate and correct; reverse any two motor leads at line connection
Motor vibrates excessively	Motor mounting bolts are loose	Tighten mounting bolts
	Impeller is unbalanced	Replace impeller
Motor overheats	Motor overloaded	Replace with larger motor
	Motor fan may be clogged with dirt, preventing proper ventilation	Remove fan cover and clean; replace fan cover
	Motor (3-phase) may have one phase open	Check that all connections are tight
	Line voltage too high	Check across AC line. Consult power company; step-down transformer may be required.
	Line voltage too low	Check across AC line. Consult power company; step-up transformer may be required.

Blower

Blower Symptom	Probable Cause	Action
Excessive noise	Impeller hitting inlet ring	Check that impeller is centered on inlet ring
		Check for damage on inlet ring; replace inlet ring
		Check for crooked or damaged impeller; replace impeller
		Check if shaft is loose in bearing; replace motor
		Check if impeller is loose on shaft; tighten impeller set screw
	Defective bearing	Replace motor
	Shaft seal squeals	Replace motor
	Impeller	Check if impeller is loose on shaft; tighten impeller
		Defective impeller: DO NOT RUN. Contact the unit manufacturer.
		Check if impeller is unbalanced; replace impeller
		Check if impeller is worn because abrasive or corrosive material is moving through flow passages
	Housing	Check for foreign material in housing
		Check if block-off or other part is loose (rattling during operation)
	Electrical	Confirm that lead-in cable is secure
		Check for AC hum in motor or relay
		Check for starting relay chatter
		Check if 3-phase motor is wired for single phase
	High air velocity	Check if duct work is too small for application
		Check if fan selection is too large for application
		Check if registers or grilles are too small for application
		Check if heating or cooling coil has insufficient face area for application
	Obstruction in high-velocity gas stream (rattle or pure-tone whistles)	Check damper sizing
		Check register sizing
		Check grille sizing
		Check for sharp elbows
		Check for sudden expansion or contraction in ductwork
		Check turning vanes
	Pulsation or surge	Check if restricted system causes fan to operate at a poor point of rating
		Check if fan is too large for application
		Check if ducts vibrate at same frequency as fan pulsations
	Gas velocity through cracks or holes, or past obstructions	Check for leaks in duct work
		Check the fins on coils
Insufficient airflow	Fan	Check if the fan is running backwards
		Check if the impeller is not centered in inlet collars
		Check if the fan speed is too slow
	Duct system	Check if the actual system is more restrictive (there is more resistance to flow) than expected
		Check if the dampers are closed
		Check if the registers are closed
		Check for leaks in supply duct
	Filters	Check if filter is dirty or clogged
	Coils	Check if coil is dirty or clogged
	Recirculation	Check for internal cabinet leaks in the bulkhead that separates the fan outlet (pressure zone) from fan inlets (suction zone)
	Obstructed fan inlets	Elbows, cabinet walls, or other obstructions are restricting air flow. Inlet obstructions cause more restrictive systems but do not cause increased negative pressure readings near the fan inlet(s). Fan speed may be increased to counteract the effect of restricted fan inlet(s).

Blower Symptom	Probable Cause	Action
Excessive airflow	System	Check for oversized duct work
		Check if access door is open
		Check if registers or grilles are not installed
		Check if filters are not in place
	Fan	Check if backward-inclined impeller is installed backward; HP will be high
		Check if fan speed is too fast; reduce fan speed
	System, fan, or interpretation of measurements	The static pressure measured in a “loose” or oversized system will be less than the static pressure in a “tight” or undersized system for the same airflow rate.
		In most systems, pressure measurements are indicators of how the installation is operating. These measurements are the result of airflow and are useful indicators in defining system characteristics.
High airflow, low static pressure	System	System has less resistance to flow than expected. Fan speed may be reduced to obtain the desired flow rate. This will reduce HP (operating cost).
	Air density	Pressures will be less with high-temperature gasses or at high altitude
	Fan	Check if backward-inclined impeller is installed backward; HP will be high
		Check if the fan speed is too high
Low airflow, low static pressure	System	Check if the fan inlet or outlet conditions are not the same as tested
Low airflow, high static pressure	System	Check for obstruction in system

Refrigeration

Refrigeration Symptom	Probable Cause	Action
High superheat and low subcooling	Undercharged	Add refrigerant to the system in small increments (0.5-1 lb.)
Low superheat and high subcooling	Overcharged	Remove refrigerant from the system in small increments (0.5-1 lb.)
Normal superheat and low subcooling	Undercharged	Add refrigerant to the system in small increments (0.5-1 lb.)
Normal superheat and high subcooling	Overcharged	Remove refrigerant from the system in small increments (0.5-1 lb.)
High superheat and normal subcooling	Over restricted	Loosen TXV adjustment screw by 1 or 2 turns
Low superheat and normal subcooling	Under restricted	Tighten TXV adjustment screw by 1 or 2 turns
High superheat and high subcooling	Over restricted	Loosen TXV adjustment screw by 1 or 2 turns
Low superheat and low subcooling	Under restricted	Tighten TXV adjustment screw by 1 or 2 turns

Controls

Controls Symptom	Probable Cause	Description
Fan output does not operate	Shutdown input	Must be closed contact at the controller for the unit to run. For input location at the controller please see the unit wiring schematics. If the contact is open, the unit will be in shutdown mode and the fan will not run. The unit will reset when the contact is closed. The BMS can also command a shutdown.
	Unoccupied mode	The supply fan is normally on in the occupied mode and off during the unoccupied mode. Verify the occupancy.
	Damper failure	Outdoor Air Damper is generally commanded open before supply fan start. See Troubleshooting for outdoor air damper, below.
	Fan status	A fan shutdown alarm will be generated if fan status is not confirmed within one minute after commanding the supply fan to run. This alarm must be manually reset from the handheld LCD before normal fan operation is enabled. Check the fan status input at the controller. Also check the variable frequency drive VFD11 and any motor overloads tagged OL11.
	Low limit alarm	The supply fan is controlled off whenever the supply air temperature is less than the low limit (35°F, adjustable) for 5 minutes. This alarm must be manually reset from the handheld LCD before normal fan operation is enabled.
	Duct static high limit	The supply fan is controlled off whenever the duct static pressure exceeds the duct static high limit setpoint (2.5 InWc, adjustable). This alarm must be manually reset from the handheld LCD before normal fan operation is enabled.
Compressor output does not energize	Ambient lockout	Compressors are allowed to operate whenever the outdoor air temperature is greater than the outdoor air lockout temperature (55°F, adjustable).
	Coil temperature lockout	When running in cooling or dehumidification, compressor staging will be limited as the cooling coil temperature approaches 46°F. Compressors are not allowed to operate when the cooling coil is below 42°F. This does not apply to heat pumps in heating mode.
	Unoccupied mode	Compressors are normally controlled off during unoccupied mode. Compressor operation is enabled when space temperature or dewpoint conditions exceed unoccupied setpoints.
	Inter-stage delays	Compressors are subject to inter-stage delays that prevent concurrent starting of multiple compressors.
	Low pressure cutout	Compressors are prevented from operating when a low pressure cutout alarm is present on that circuit. A low pressure alarm must be manually reset from the handheld LCD if it has tripped three times in one hour.
	High pressure cutout	Compressors are prevented from operating when a high pressure cutout alarm is present on that circuit. A high pressure alarm must be manually reset by pressing the button on the cutout device (in the compressor section of the unit).
Outdoor air damper does not open	Occupancy	The outdoor air damper is controlled closed during the unoccupied mode. On units with return air, the return air damper is controlled open (recirculation) in the unoccupied mode. Verify the occupancy mode.
	Morning warmup and cooldown	On units equipped with this feature and return air dampers, the outdoor air damper may close and the return air damper may open for up to 30 minutes upon entering occupied operation. Check the Morning Warmup setpoints at the handheld LCD.
	Energy recovery wheel failure	On units equipped with return air dampers, energy recovery wheels, and energy recovery rotation sensors, the outdoor air damper may close and the return air damper may open to raise (heating) or lower (cooling) discharge temperature. This only occurs if heating/cooling capacity is insufficient and the energy recovery wheel rotation sensor does not detect motion.
	End switch failure	When the outdoor air damper is commanded open, the controller waits for the end switch of the damper actuator(s) to confirm that there is an airflow path. If end switch closure is not confirmed, a damper switch (end switch) alarm is generated. It must be manually reset from the handheld LCD. Check the damper actuators are properly configured. Set Mode dial 1 for 2-10. If actuator is equipped, set outdoor air damper AUX = 0.25 and return air damper AUX = 0.75.

Controls Symptom	Probable Cause	Description
Dehumidification not enabled	Space relative humidity sensor/value	Occupied dehumidification is enabled when the space relative humidity or outdoor dewpoint temperature is greater than setpoint. If the space relative humidity sensor is not connected or operating properly, dehumidification will be determined by the outdoor air dewpoint. The space relative humidity reading may be sent by the BMS.
	Outdoor air dewpoint setpoint	Occupied dehumidification is enabled when the space relative humidity or outdoor dewpoint temperature is greater than setpoint. The outdoor dewpoint is calculated from the outdoor air temperature and relative humidity. If either the outdoor air temperature or relative humidity sensor is not connected or operating properly, dehumidification may not operate. The outdoor air temperature and relative humidity may be sent by the BMS.
	Space dewpoint dehumidification cutout	Dehumidification of the space is disabled when the space dewpoint falls below this threshold. Check the space temperature and relative humidity sensors for proper operation. Space temperature and relative humidity reading may be sent by the BMS.
	Unoccupied space dewpoint setpoint	Unoccupied dehumidification is enabled when the space humidity is greater than setpoint. Check the space relative humidity sensors. The space relative humidity reading may be sent by the BMS.
Gas furnace does not operate	Electric heat inter-stage delay	For units with both gas and electric heat (Temperator option), the electric heat is the first stage of heat, followed by gas heat.
	High limit output	Both gas and electric heaters are equipped with high temperature limit switches, both manual and automatic reset. Check schematics for locations and operation type.
Occupied/unoccupied control not operating properly	The occupancy mode of the controller is determined by three sources: hardwired occupancy input, local (internal schedule), or network (BMS) schedule/command.	
	Local (internal) schedule	Unit default is 24/7 occupied by internal schedule, which is edited using the occupancy schedule menu of the handheld LCD. Be sure to set the controller time and date.
	Hardwired occupancy input	See controls IOM to configure occupancy mode in order to allow hardwired input to determine occupancy. See unit wiring schematics for input wiring information.
	Controller time and date	The local time and date must be set for the local schedule to correctly determine the occupancy mode. Use the handheld LCD to set the time and date for the unit location. See controls IOM for more information.
	Network (BMS) schedule/command	See Controls IOM for information on configuring BMS occupancy commands.
Compressor does not cycle off	Coil temperature setpoint not satisfied	In the dehumidification mode the compressors cycle to maintain the DX coil temperature setpoint. At least one compressor will remain on while dehumidification is active.
	Supply air temperature setpoint not satisfied	During the normal control sequence (dehumidification not enabled) the compressors cycle to maintain the supply air temperature setpoint. The compressor(s) will remain on until the supply air setpoint is satisfied.

Cleaning Instructions for Enthalpy Plate

Maintenance Instruction 120314A

CORE Energy Recovery Ventilator Maintenance Instructions

The following document outlines the proper care instructions for a CORE energy recovery core.

It is important to wash the core at least once per year, using tap water and mild detergent such as Dawn®, Palmolive® or equivalent dish soap.

1) Obtain access to a source of regular tap water. Do not use a high pressure water source (pressure washer).
2) Remove the core from the system if possible to facilitate access to all core faces, otherwise wash in place. Ensure adequate drainage is available for waste water.
3) If the core is heavily soiled, prepare a solution of less than 1:100 parts water to dish soap. Otherwise, clean water is sufficient.
4) Orient the plates vertically for drainage and pour solution (or clean water) through the core, both Supply and Exhaust paths, ensuring exposure of all layers.
5) Rinse with clean tap water until no more bubbles appear in the exiting water.
6) Allow the core to dry (with plates still oriented vertically) until there is no more water dripping out, then return to service.*
    - For systems without a drain pan, drain water thoroughly and allow to dry 2-3 hours before returning to service.

While cleaning other adjacent components in the HVAC system, it is possible for the core to come in contact with harsher detergents. The following is a list of coil cleaners and all-purpose cleaners that have been tested with the CORE ERV, and what the recommendation is for exposure. Generally, contact with any coil cleaning product is not recommended, and specifically hydroxide based cleaners should be avoided. If contact does occur, the core should be rinsed immediately as it may void the warranty.

Cleaner	Recommendation
Viper Expanding Foam	**OK**
CalSpray–nu-Brite	**Avoid Contact**
CalSpray–evap foam	**OK**
HD CalClean 1:40	**OK**
HD CalClean 1:5	**Avoid Contact**
Fantastik w/ Bleach	**Avoid Contact**
Fantastik Original	**Avoid Contact**

1455 East Georgia Street, Vancouver, B.C. Canada V5L 2A8
604.488.1122 info@core.life core.life

Innovative HVAC solutions for today's engineering challenges.

VALENT LIMITED WARRANTY & DISCLAIMER POLICY

(Please read the Valent terms and conditions
of sale Section 9 for additional details, conditions and exclusions.)

PRODUCT WARRANTY

Valent warrants that at the time of delivery and for a period of twelve (12) months from the initial startup or eighteen (18) months from the date of shipment, whichever is less, its products will be free from defects in materials and manufacture, provided that the products have been installed properly, maintained and operated under normal conditions and serviced in accordance with Valent's instructions, and are operating within capacities and ratings set forth in design specifications. Labor or consumable parts are not included in this limited standard product warranty. Consumable parts include, but are not limited to, refrigerant, belts and filters.

START-UP LABOR LIMITED WARRANTY

While labor is not included in the Valent standard product warranty, Valent offers a limited labor warranty, for a period beginning on the start-up date and continuing for sixty (60) days, with the completion and documentation of a qualified start-up. The limited labor warranty will not be available if the product warranty has expired.

Start-up services may be available as an option on other Valent products. These services must be performed by a Valent Certified Technician. Startup services include verifying proper operation of the unit, including proper refrigerant charge and repair of minor refrigerant leaks outside the coil. At the completion of start-up, an approved start-up record must be submitted to the Valent service department for processing. Once the start-up record is received, the (60) day limited labor warranty, from date of start-up, will be activated. Labor associated with the diagnosis, validation and repair of warranty parts failures will be covered outside of the start-up, at a negotiated labor rate.

CONSIDERATIONS REGARDING PARTS-SUPPLIED-BY-OTHERS

Valent may supply equipment at a customer's request which has components, like controls, sensors, drives, which are engineered, provided, programmed or configured by other non-Valent parties. Valent does not provide a warranty for these parts or components. These components can be mounted in the factory or at the jobsite. In these instances, Valent's support is limited to verification of basic functionality of the components and not the overall operation or integration of the equipment within the overall building HVAC system. As stated in the Valent Terms & Conditions – *No warranty herein extended shall apply to repair or correction of conditions arising from improper or incorrectly connected air duct, piping, wiring, power supply, blown fuses, freezing, improper Product control when programmed by non-Seller controls, or personnel, or by anyone other than Seller employee or its representative*. In these situations, Valent will assist in the diagnosis of issues and provide support to the customer provided the customer issues a purchase order to cover Valent's expenses in doing so.

Appendix A: Rating Conditions

AHRI Rating Conditions

Basic Model Number (Number Unique to the Basic Model)	Airflow (SCFM)	Capacity (BTU/hr)	EER^ (Btu/W-h)	IEER^ (Btu/W-h)	SEER^^ (Btu/W-h)
4-ROW AC (PACKAGED AND SPLIT)					
DIGITAL SCROLL COMPRESSORS					
VPR*-110-05	1600	68000	11.3	13.2	-
VPR*-110-08	1750	76000	11.2	13.3	-
VPR*-210-10	3000	130000	11.8	13.7	-
VPR*-210-13	3500	149000	11.5	13.1	-
VPR*-210-16	4000	166000	11.6	13.1	-
VPR*-210-18	4000	185000	11.2	13.2	-
VPR*-210-20	5250	242000	10.2	12.0	-
VPR*-310-25	7000	270000	10.6	14.7	-
VPR*-310-30	7500	328000	10.5	15.0	-
VPR*-310-35	7500	354000	10.0	14.3	-
VPR*-352-30	9000	353000	10.7	15.3	-
VPR*-352-40	10500	429000	10.5	15.7	-
VPR*-352-50	10500	530000	10.1	15.0	-
VFD COMPRESSORS					
VPR*-V10-04	1200	42000	-	-	18
VPR*-V10-05	1600	54500	-	-	17.9
VPR*-V10-06	1800	65000	11.4	20.4	-
VPR*-V10-07	2100	75000	11.3	19.8	-
VPR*-110-05	1750	65000	11.3	18.3	-
VPR*-110-08	1750	78000	11.2	18.3	-
VPR*-210-10	3000	126000	11.6	16.7	-
VPR*-210-13	3500	143000	12.1	16.8	-
VPR*-210-16	4000	167000	11.5	14.9	-

^ Rated in accordance to AHRI 340/360

^^ Rated in accordance to AHRI 210/240

ISO 13256-1 Rating Conditions

Basic Model Number (Number Unique to the Basic Model)	Airflow (SCFM)	Capacity (BTU/hr)	EER (Btu/W-h)	COP
WSHP				
VPR*-110-05	2000	62000	13.8	4.7
VPR*-110-08	2500	82000	13.4	4.4
VPR*-110-10	3000	115000	13.9	4.6
VPR*-210-10	3500	121000	13.5	4.4

Index

Valent Dedicated Outdoor Air Systems
60 28th Avenue North
Minneapolis, MN 55411

For service inquiries, please contact:
Valent Technical Support
(800)789-8550
support@doas.com