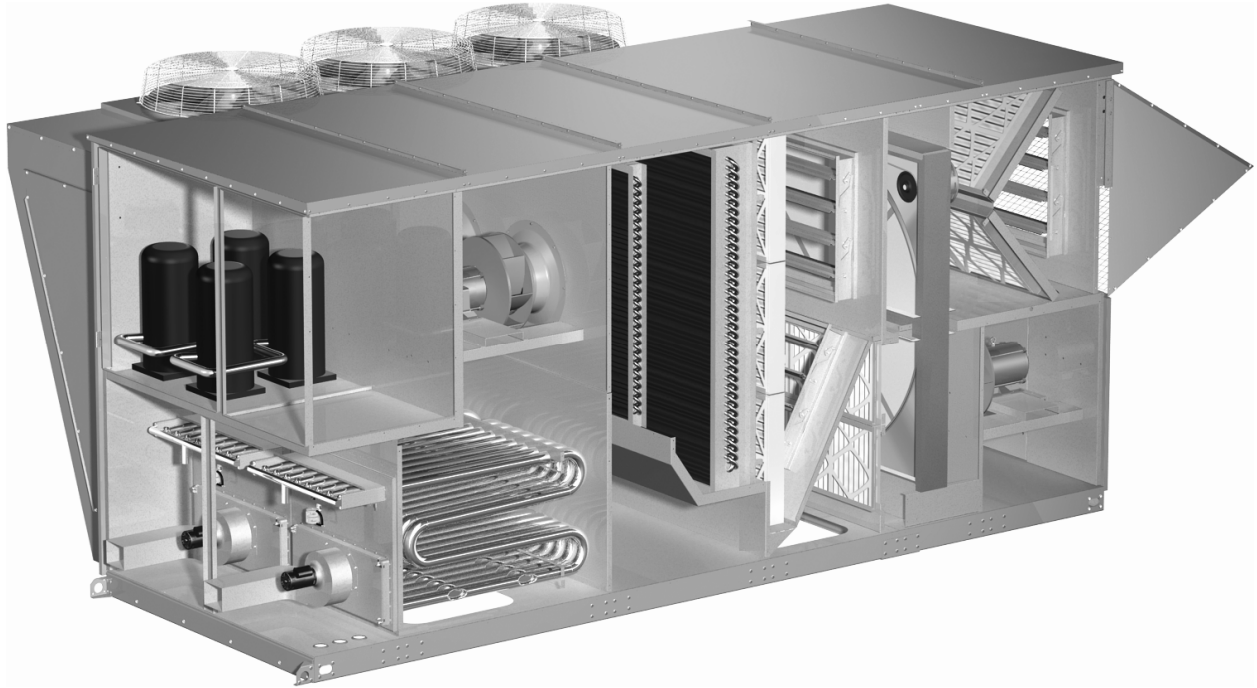


Installation, Operation, and Maintenance Manual



VPR Series
VPRX Series
VPRE Series
VPRP Series

Version July 2011
Part Number 472916

Table of Contents

Safety	3
Special Design Requests	3
Model Number Guide	4
Warranty Documentation	5
Installation Overview	6
Clearances	6
Lifting Procedure	7
Installation	8
Pad Installation	8
Curb Installation.....	9
Duct & Drain Connections	12
Condensate Drain Connection	12
Duct Connections	12
Electrical, Gas, and Water Connections	13
Pre-punched Connection Drawing.....	13
Gas Connections	14
Water Source Heat Pump Connections.....	15
Wiring	16
Maintenance	19
Troubleshooting	21
Start-up Documentation	27
Job Information.....	27
Pre-startup Checklist	28
Air-cooled Direct Expansion Startup Form	30
Water Source Heat Pump Startup Form.....	32
Outside Air Hood Assembly Instructions	34

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.

Special Design Requests

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

Model Number Guide

FIELD		OPTION & DESCRIPTION				
VPR	A	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			
2	B	CABINET	CABINET SIZE			
			1 1XX SERIES			
			2 2XX SERIES			
			3 3XX SERIES			
			4 4XX SERIES			
1	C	DESIGN	CABINET TYPE			
			1 SIDE CONDENSING CABINET PLATFORM			
0	D	SERIES	5 TOP CONDENSING CABINET PLATFORM			
			PRODUCT SERIES			
25	E	NOMINAL COOLING CAPACITY	CAPACITY			
			5 5 TONS			
			8 8 TONS			
			10 10 TONS			
			13 13 TONS			
			16 16 TONS			
			18 18 TONS			
			20 20 TONS			
			25 25 TONS			
			30 30 TONS			
			35 35 TONS			
			40 40 TONS			
			50 50 TONS			
			60 60 TONS			
			70 70 TONS			
			80 80 TONS			
			A	F	COOLING TYPE & REFRIGERATION	TEMPERATOR HEAT ¹
						A DX AIR COOLED 6 ROWS STANDARD
						B DX AIR COOLED 6 ROWS NONE
						C DX AIR COOLED 6 ROWS HIGH PERFORMANCE
D DX AIR COOLED 4 ROWS STANDARD						
E DX AIR COOLED 4 ROWS NONE						
F DX AIR COOLED 4 ROWS HIGH PERFORMANCE						
G HEAT PUMP WATER COOLED 4 ROWS NONE						
H HEAT PUMP WATER COOLED 4 ROWS HIGH PERFORMANCE						
I HEAT PUMP AIR COOLED 4 ROWS NONE						
J HEAT PUMP AIR COOLED 4 ROWS HIGH PERFORMANCE						
40J	G	HEATING SIZE & TYPE	TYPE			
			10I INDIRECT GAS 100 MBH			
			15I INDIRECT GAS 150 MBH			
			20I INDIRECT GAS 200 MBH			
			25I INDIRECT GAS 250 MBH			
			30I INDIRECT GAS 300 MBH			
			35I INDIRECT GAS 350 MBH			
			40I INDIRECT GAS 400 MBH			
			50I INDIRECT GAS 500 MBH			
			60I INDIRECT GAS 600 MBH			
			70I INDIRECT GAS 700 MBH			
			80I INDIRECT GAS 800 MBH			
			90I INDIRECT GAS 900 MBH			
			100I INDIRECT GAS 1000 MBH			
			110I INDIRECT GAS 1100 MBH			
			10J TEMPERATOR ² 100 MBH			
			15J TEMPERATOR ² 150 MBH			
			20J TEMPERATOR ² 200 MBH			
			25J TEMPERATOR ² 250 MBH			
			30J TEMPERATOR ² 300 MBH			
			35J TEMPERATOR ² 350 MBH			
			40J TEMPERATOR ² 400 MBH			
			50J TEMPERATOR ² 500 MBH			
			60J TEMPERATOR ² 600 MBH			
			70J TEMPERATOR ² 700 MBH			
			80J TEMPERATOR ² 800 MBH			
			10E ELECTRIC 10 KW			
			15E ELECTRIC 15 KW			
			20E ELECTRIC 20 KW			
			25E ELECTRIC 25 KW			
			30E ELECTRIC 30 KW			
			35E ELECTRIC 35 KW			
			40E ELECTRIC 40 KW			
			45E ELECTRIC 45 KW			
50E ELECTRIC 50 KW						
60E ELECTRIC 60 KW						
70E ELECTRIC 70 KW						
80E ELECTRIC 80 KW						
90E ELECTRIC 90 KW						
100E ELECTRIC 100 KW						
125E ELECTRIC 125 KW						
WSHP WATER-SOURCE HEAT PUMP						
HW HOT WATER						
XXE ELECTRIC ³						
A	H	ELECTRICAL	VOLTAGE			
			A 208/3/60			
			B 230/3/60			
			C 460/3/60			
			D 575/3/60			
1	I	DUCT CONNECTIONS	SA CONNECTION			
			0 BOTTOM			
			1 BOTTOM			
			2 BOTTOM			
			3 SIDE			
			4 SIDE			
A	J	REFRIGERATION	RA CONNECTION			
			X NONE			
			A R-410A STANDARD			
			B R-22 STANDARD			
X	K	ENERGY RECOVERY	C R-410A DIGITAL SCROLL			
			ENERGY RECOVERY			
			X NONE			
			A FULL-SIZE ENTHALPY WHEEL			
B PARTIAL ENTHALPY WHEEL						
C FLAT-PLATE HEAT EXCHANGER						

¹ Temperator heat optional.

² Heating capacities shown are for gas only. Electric heater sized by nominal cooling capacity.

³ Electric heater sized by nominal cooling capacity.

Warranty Documentation

Manufacturer warrants to the original purchaser that the manufacturer's equipment will be free from defects in material and workmanship if installed, maintained and operated under normal conditions of service in accordance with the instructions of the manufacturer for the following periods:

- Overall unit - for a period of one year from the date of original installation but, in no event, for longer than eighteen months from the date of shipment from its factory
- Compressors - for a period of five years from the date of original installation but, in no event, for longer than 66 months from the date of shipment from its factory

Manufacturer will repair or replace, F.O.B. factory, without charge, any part it has manufactured or supplied which upon examination at its factory shall prove to have been defective. This warranty may not be assigned or transferred. No allegedly defective part or component may be returned to the manufacturer without its prior written authorization.

WARRANTY DOES NOT INCLUDE LABOR CHARGES INCURRED IN THE REMOVAL, REPLACEMENT OR ADJUSTMENT OF DEFECTIVE PARTS OR COMPONENTS, NOR TRANSPORTATION CHARGES INCURRED IN RETURNING ALLEGEDLY DEFECTIVE PARTS OR COMPONENTS TO THE LOCATION OF THE EQUIPMENT. No warranty herein extended shall apply to correction of conditions arising from improper or incorrectly connected air duct, piping, wiring, power supply, blown fuses, freezing, or any other condition resulting from improper installation, operation, or maintenance by anyone other than the manufacturer's employee or its representative. The foregoing warranty shall not apply if damage results from any contingency beyond the manufacturer's control, not to equipment installed outside of the boundaries of the Continental U.S.A., Canada, or Alaska unless specifically noted in writing by the manufacturer, nor to equipment which has been tampered with or altered or upon which, or any component of which, any serial number has been altered, defaced or removed.

The manufacturer shall not be liable to the original Purchaser of any third person for any consequential, secondary, or incidental damages due to or resulting from the design, construction, installation, servicing, or operation of the warranted equipment or for any other cause whatsoever. THE WARRANTIES HEREIN SET FORTH ARE IN LIEU OF ALL OTHER WARRANTIES, EXPRESS OR IMPLIED, AND ALL OTHER OBLIGATIONS OR LIABILITIES ON THE PART OF THE MANUFACTURER.

The manufacturer neither assumes nor authorizes any person to assume for it any other obligation or liability in connection with warranted equipment or any part thereof. THE MANUFACTURER HEREBY EXCLUDES THE IMPLIED WARRANTY OF MERCHANTABILITY. THE MANUFACTURER HEREBY EXCLUDES THE IMPLIED WARRANTY OF FITNESS FOR ANY PARTICULAR PURPOSE FROM ANY SALE MADE TO THE PURCHASER.

Installation Overview

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

Temporary Use

This equipment must not be used as:

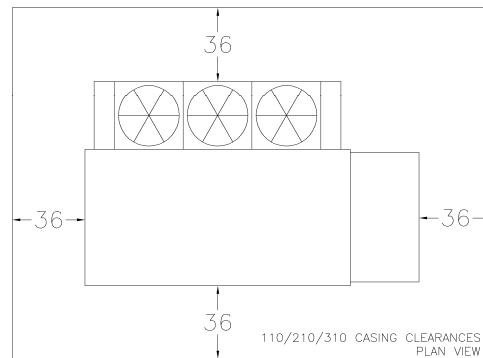
- Temporary heating or cooling
- Construction heating

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

Clearances

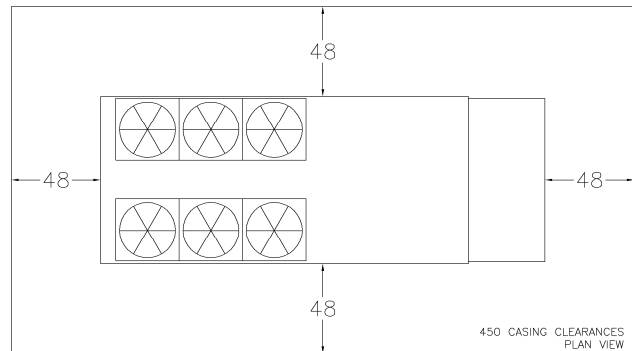
110/210/310 Casing

All VPR, VPRX, VPRE, and VPRP models in the 110, 210, and 310 cabinet require a minimum of 36" clearance around the farthest projected edge as seen from the plan view.



450 Casing

The VPR-450 and VPRX-450 model requires a minimum of 48 inches of clearance around the furthest projected edge as seen from the plan view.



Lifting Procedure

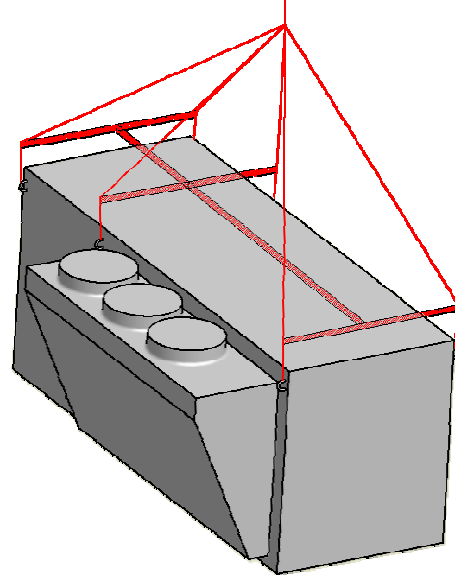


WARNING:

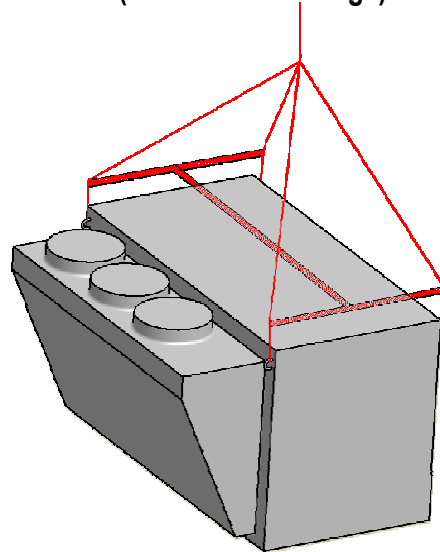
Failure to follow proper instructions could result in property damage, serious injury, or death. Never lift units in windy conditions.

- Crane lift only.
- 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 by all lifting lugs on the exterior of the unit. Lifting lug quantities shown below for the 110, 210, and 310 cabinets:

VPR Series	4 lifting lugs
VPRX Series	4 lifting lugs
VPRE Series	6 lifting lugs
VPRP Series	8 lifting lugs
- 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.



VPRE Lifting Schematic
(110/210/310 casings)



VPR, VPRX Lifting Schematic
(110/210/310 casings)

Installation

IMPORTANT

The bottom of the unit must be field-insulated if outside air can contact the bottom of the unit. Do not drill or punch holes in the floor of the unit. Leaking may occur if unit floor is punctured.

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

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.

Installation Guidelines

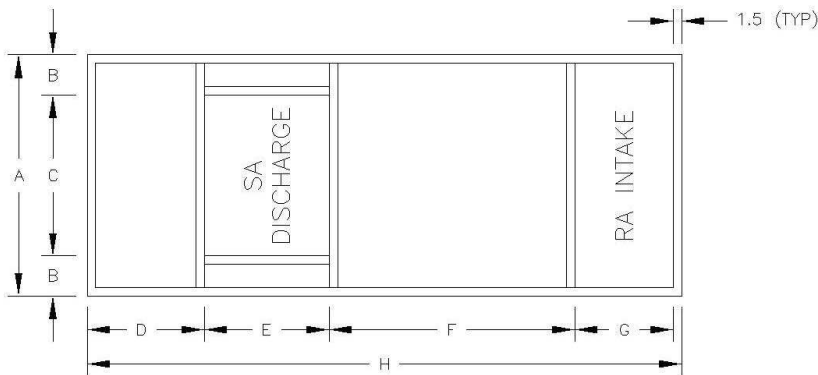
- Ensure that the roof curb is level. Failure to level the curb will result in operational problems.
- Lift unit into place per the lifting instructions in this manual
- Ensure a neoprene gasket is installed on top flange of the perimeter and cross members of the curb
- Check for correct orientation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

Curb & Ductwork Dimensions

VPR, VPRX Series

The VPR and VPRX series share a common curb layout dimensioned below. Note that the two cross member dimensions by "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.

VPR, VPRX CURB DIMENSIONS



Unit	A	B	C	D	E	F	G	H
110	42.5	7.125	28.25	20.625	22	43.25	17.375	104.75
210	54.75	1.5	51.75	23.75	22	43.125	24.375	114.75
310	61.5	1.5	58.5	28.5	26	50.5	26	124.75

All dimensions shown in inches.

Specifications

Factory-supplied roof curbs shall be constructed of 16 gage 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

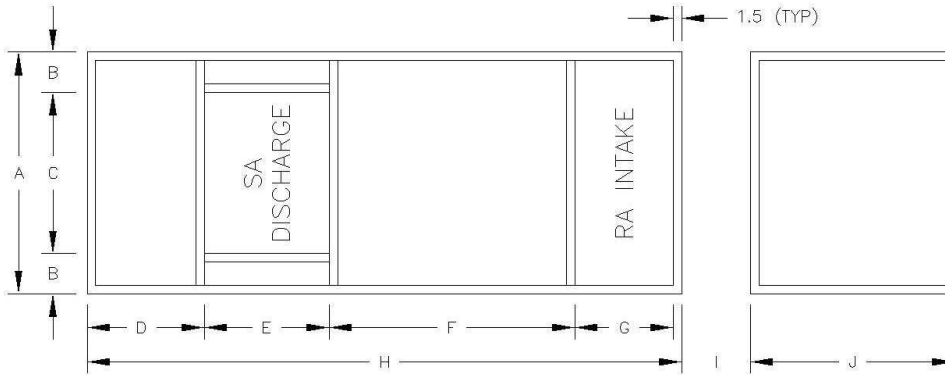
When the supply air discharge opening and/or the return air intake opening are located on the bottom of a VPR, VPRX, VPRE, or VPRP series unit, the ductwork should be connected to the curb directly. The actual opening sizes in the floor of the unit are not specified as they are slightly undersized from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

VPRE Series

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

- Partial-perimeter curb plus secondary partial-perimeter curb (standard factory offering)
- Partial-perimeter curb plus equipment support
- Single curb with 6" x 6" notch to accommodate cross member (see "Notched Roof Curbs" section)

VPRE CURB DIMENSIONS



Unit	A	B	C	D	E	F	G	H	I	J
110	42.5	7.125	28.25	20.625	22	43.25	17.375	104.75	12.0	36.0
210	54.75	1.5	51.75	23.75	22	43.125	24.375	114.75	12.0	36.0
310	61.5	1.5	58.5	28.5	26	50.5	26	124.75	12.0	36.0

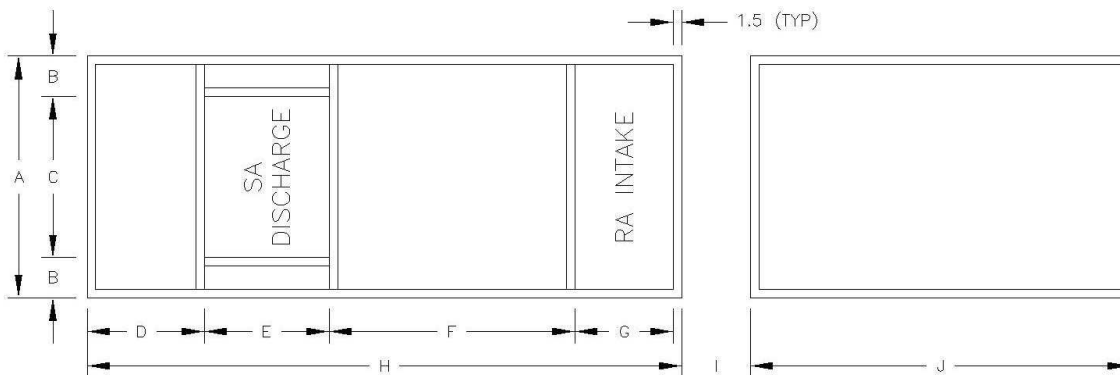
All dimensions shown in inches.

VPRP Series

The VPRP series is constructed with a cross-member in the base that facilitates the need for one of the following when curb mounted:

- Partial-perimeter curb plus secondary partial-perimeter curb (standard factory offering)
- Partial-perimeter curb plus equipment support
- Single curb with 6" x 6" notch to accommodate cross member

VPRP CURB DIMENSIONS



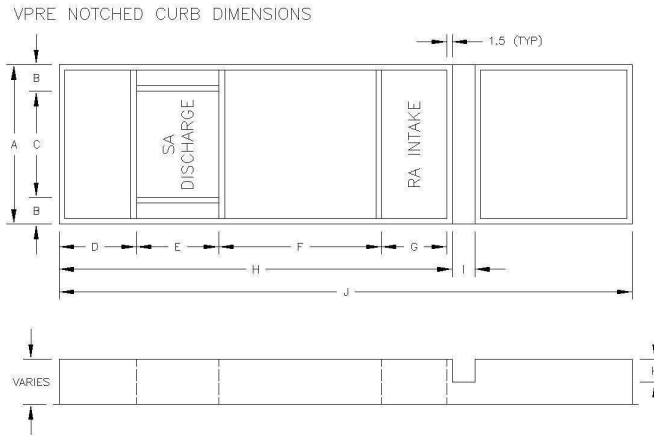
Unit	A	B	C	D	E	F	G	H	I	J
110	42.5	7.125	28.25	20.625	22.0	43.25	17.375	104.75	12.0	67.0
210	54.75	1.5	51.75	23.75	22.0	43.125	24.375	114.75	12.0	67.0
310	61.5	1.5	58.5	28.5	26.0	50.5	26	124.75	12.0	87.0

All dimensions shown in inches.

Third-party Notched Roof Curbs

A notched roof curb may be used to support the VPRE and VPRP series if sourced from a third party. The dimensions below should be used for the construction of a notched roof curb.

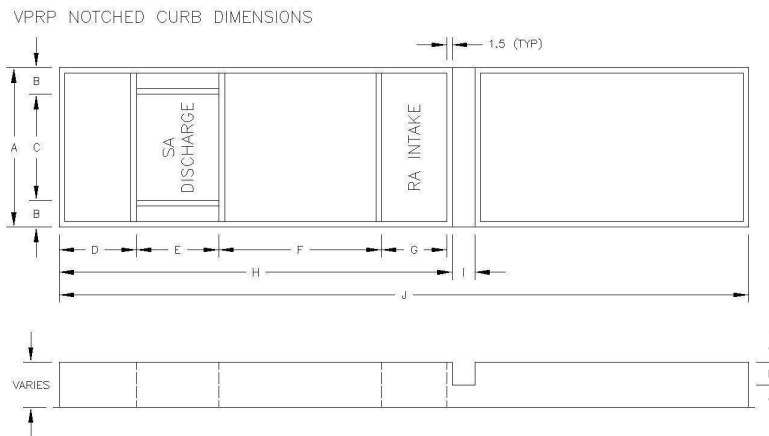
VPRE Third-party Notched Curb



Unit	A	B	C	D	E	F	G	H	I	J	K
110	42.5	7.125	28.25	20.625	22.0	43.25	17.375	104.75	6.0	152.75	6.0
210	54.75	1.5	51.75	23.75	22.0	43.125	24.375	114.75	6.0	162.75	6.0
310	61.5	1.5	58.5	28.5	26.0	50.5	26	124.75	6.0	172.75	6.0

All dimensions shown in inches.

VPRP Third-party Notched Curb



Unit	A	B	C	D	E	F	G	H	I	J	K
110	42.5	7.125	28.25	20.625	22.0	43.25	17.375	104.75	6.0	183.75	6.0
210	54.75	1.5	51.75	23.75	22.0	43.125	24.375	114.75	6.0	193.75	6.0
310	61.5	1.5	58.5	28.5	26.0	50.5	26	124.75	6.0	223.75	6.0

All dimensions shown in inches.

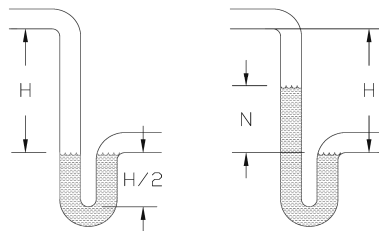
Duct & Drain Connections

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. A 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.

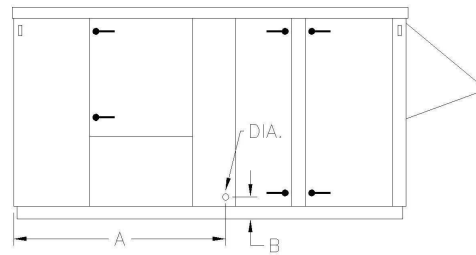


N=Negative Fan Pressure (inches w.c.)
 H=N+[1" w.c. (minimum)]

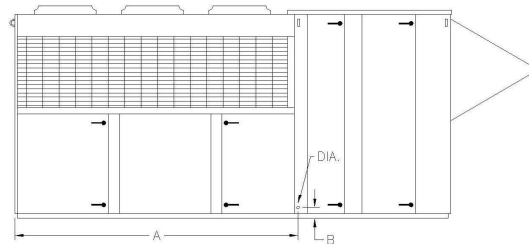
Drain Sizes and Locations

Drain locations are located on the access-side of all units and dimensioned as shown in the drawings below.

110/210/310 Casing



450 Casing



Casing Size (VPR/VPRE/VPRP/VPRX)	A [in]	B [in]	Diameter [in]
110	58	7	1.25
210	65	7	1.25
310	75	7	1.25
450	129	7	1.625

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.

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.

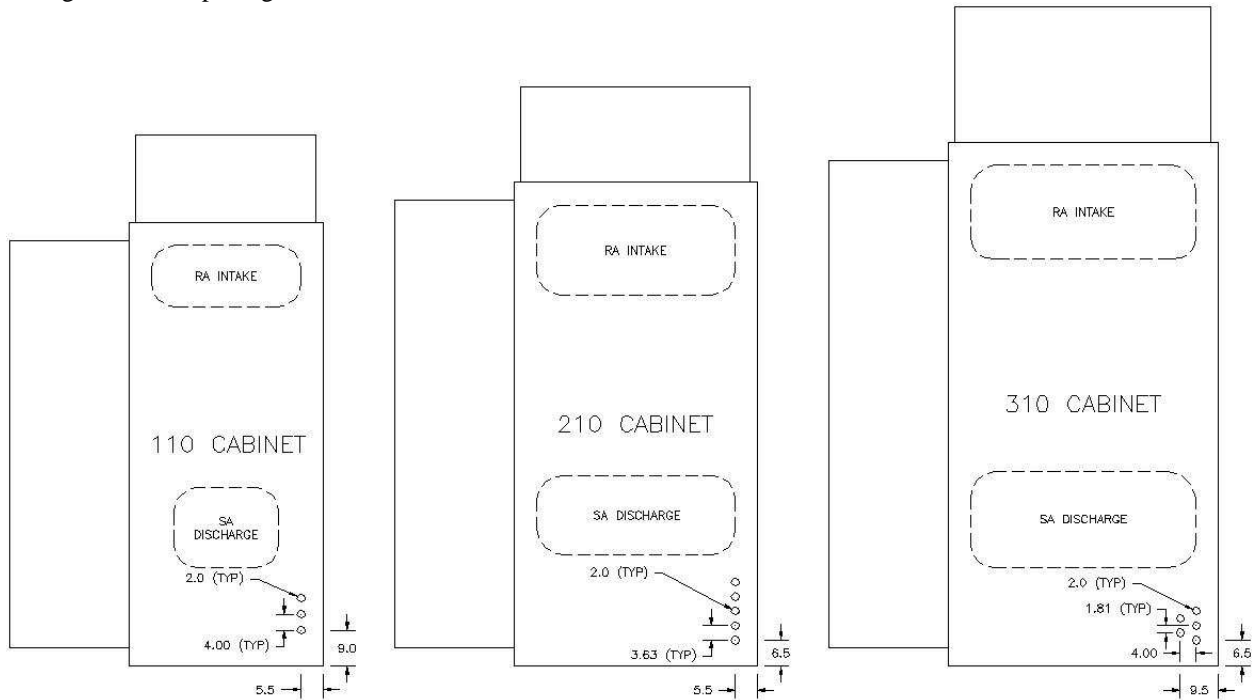
Electrical, Gas, and Water Connections

Pre-punched Connection Drawing

A number of pre-punched holes are provided on the 110, 210, and 310 cabinet for electrical, gas, and water connections for each unit. The illustration below shows the quantity, size, and location of each through the base opening.

Electrical Connections

All electrical connections should be made in accordance with local building codes. Wiring may be drawn through the base of the unit as shown in the pre-punched connection location drawing.



Gas Connections



WARNING:

Natural gas poses a danger of explosion which can cause personal injury, product damage, or property damage. Do not use matches, candles, flame, or 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.

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

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.

NOTE: VPR, VPRE, VPRP and VPRX series units use furnaces from two manufacturers. Verify which furnace is in the unit and consult the appropriate manual in the Component Cutsheets document.

Gas pipe must be sized and installed in accordance with applicable codes and by qualified personnel. If the supply gas pressure exceeds the rating of the pressure regulator that is built into the heater manifold by 2 psig or more, the contractor must install an auxiliary high-pressure regulator in the incoming gas line.

Gas furnaces are designed for gas pressure between 6-14 in.wg. If the gas pressure at the job location is greater or less than these values, please contact the factory.

Connection Sizes

All gas furnace sections require one, two, or three 3/4" NPT gas connections based on the total heating capacity as shown in the following chart:

Total Heating Capacity (Input)	3/4" NPT Gas Connections
100	1
150	1
200	1
250	1
350	1
400	1
500	2
600	2
700	2
800	2
900	3
1000	3
1100	3

Pressure testing the system

- When test pressures exceed 0.5 psig, the heater must be disconnected from the supply gas piping.
- When test pressures are 0.5 psig 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 outside of the maximum and minimum allowable gas pressures listed on the unit nameplate.

Water Source Heat Pump Connections

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

Piping to each coaxial coil shall be performed in accordance to local building codes.

Line Sizes

The following water piping line sizes are for both entering and leaving water connections.

Casing	Tonnage	Circuit A [in]	Circuit B [in]
110	5	1.0	N/A
	8	1.0	N/A
	10	1.0	N/A
210	10	1.0	1.0
	13	1.0	1.0
	16	1.0	1.0
	18	1.0	1.0
	20	1.0	1.0
	25	1.0	1.25

Wiring

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 (see sticker on side of unit for hole placement).

Field-mounted Sensor Overview

All sensors and end devices for the product have been factory wired with the exception of the following items:

Description	Part Number	Mounting Location	Primary Sequence		Secondary Sequence		
			Discharge Air Control	Discharge Air Control with Space Temperature and Humidity Reset	VAV	Demand Control	Building Pressurization Control
Supply air temperature sensor	471557	Supply air ductwork downstream of ventilator (3 duct diameters or past the first 90 degree turn)	X	X			
Space temperature sensor	470639	Wall-mounted in space		X			
Space relative humidity sensor	470639	Wall-mounted in space		X			
Space static pressure sensor	471852	Unit mounted with sampling tube run into space					X
Space static pressure probe	471866	Space mounted, connected to sampling tube from space static pressure sensor					X
Duct static pressure sensor	471853	Duct mounted downstream of unit			X		
Space CO ₂ sensor	471854	Wall-mounted in space				X	

All field mounted sensors are designed to be connected to the terminal strip located in the upper left hand corner of the control panel.

Supply Air Temperature Sensor

A supply air temperature sensor is required on all VPR, VPRE, VPRP and VPRX units and ships loose with approximately 20 feet of wiring for mounting in the supply air ductwork downstream of the unit. 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, VPRE, VPRP 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, two-conductor, 22 AWG, twisted, shielded, and stranded communication cable. Terminations should be made per the chart below.

Space Temperature Sensor	Terminal Strip TB3
SN	4
SN	5
SP1	13
SP2	14
Shield	G

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 chart below.

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, VPRE, VPRP and VPRX ventilators which include a building static pressure secondary controls sequence. 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 chart below.

Duct Static Pressure Sensor	Terminal Strip TB3
Sig	30
-	31
+	32

Duct Static Pressure Sensor

A duct static pressure sensor is provided with all VPR, VPRE, VPRP and VPRX ventilators that include a variable air volume (VAV) secondary sequence based on duct static pressure. 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 chart below.

Duct Static Pressure Sensor	Terminal Strip TB3
Sig	30
-	31
+	32

Space CO₂ Sensor

A space-mounted CO₂ sensor is provided with all VPR, VPRE, VPRP and VPRX ventilators that include a demand-control secondary sequence. 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 CO₂ sensor should be through a field-supplied, three-conductor, 22 AWG, twisted, shielded, and stranded communication cable. Terminations should be made per the chart below.

CO₂ Sensor	Terminal Strip TB3
OutI	33
G0	34
G+	35

Maintenance

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.

Flat Plate Heat Exchanger

The heat exchanger requires minimal maintenance in clear air streams. Small amounts of dust present in either side of the heat exchanger will not affect the performance of the unit. If appreciable amounts of dirt accumulate, the heat exchanger may be cleaned with hot water (180°F) or a detergent that does not damage the aluminum surface. Spray evenly across the transfer surface. Water pressure of 22 to 55 psig

is recommended. Do not force sharp objects against the heat transfer surface or damage to the plates may occur, causing leakage between the supply and exhaust airstreams.

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:

- Lubricate bearings and motor
- Tighten the fan's wheel, housing, bolts, and set screws
- Clean dirt from the wheel and housing to prevent imbalance and possible damage
- Check isolation bases (if applicable) for freedom of movement.
- Tighten bolts
- Check rubber isolators (if applicable) for deterioration

Filters

Change the filters regularly. Pressure drop readings can be used to determine when a filter should be replaced. Pre-filters should be replaced according to the pressure drop change out guidelines from the filter manufacturer 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 Sizes and Quantities

Casing Size	Filter Size [in x in]	Quantity		
		OA	EA	SA
110	20 x 20	4	2	4
210	16 x 25	6	3	6
310	20 x 24	6	-	9
310	16 x 25	-	4	-
450 (50-60 tons)	20 x 24	-	-	12
450 (70-80 tons)	20 x 24	-	-	16

Filter Media Type

Filter Media	Quantity		
	OA	EA	SA
2" Aluminum	X	X	
2" MERV 8	X	X	X
4" MERV 8			X
4" MERV 11			X
4" MERV 14			X

Variable Frequency Drives

Factory-supplied VFD's are manufactured by Telemecanique, a division of Schneider Electric. Replacement VFD's can consist of the identical factory-supplied model or the alternative model number shown in the table below.

Voltage	HP	Amperage Rating	Factory Supplied	Alternative Replacement
208/3/60 230/3/60	1	4.6	ATV21H075M3X	ATV31H075M3X
	2	7.5	ATV21HU15M3X	ATV31HU15M3X
	3	10.6	ATV21HU22M3X	ATV31HU22M3X
	4	13.7	ATV21HU30M3X	ATV31HU30M3X
	5	17.5	ATV21HU40M3X	ATV31HU40M3X
	7.5	24.2	ATV21HU55M3X	ATV31HU55M3X
	10	32	ATV21HU75M3X	ATV31HU75M3X
	15	46.2	ATV21HD11M3X	ATV31HD11M3X
	20	61	ATV21HD15M3X	ATV31HD15M3X
	25	74.8	ATV21HD18M3X	N/A
460/3/60	1	2.2	ATV21H075N4	ATV31H075N4
	2	3.7	ATV21HU15N4	ATV31HU15N4
	3	5.1	ATV21HU22N4	ATV31HU22N4
	4	7.2	ATV21HU30N4	ATV31HU30N4
	5	9.1	ATV21HU40N4	ATV31HU40N4
	7.5	12	ATV21HU55N4	ATV31HU55N4
	10	16	ATV21HU75N4	ATV31HU75N4
	15	22.5	ATV21HD11N4	ATV31HD11N4
	20	30.5	ATV21HD15N4	ATV31HD15N4
	25	37	ATV21HD18N4	N/A
	30	43.5	ATV21HD22N4	N/A
	40	58.5	ATV21HD30N4	N/A
	50	79	ATV21HD37N4	N/A
575/3/60	1	2.4	ATV31H075S6X	N/A
	1.5	4.2	ATV31HU15S6X	N/A
	2	4.2	ATV31HU15S6X	N/A
	3	5.6	ATV31HU22S6X	N/A
	5	9.3	ATV31HU40S6X	N/A
	7.5	14.1	ATV31HU55S6X	N/A
	10	18.5	ATV31HU75S6X	N/A
	15	24.4	ATV31HD11S6X	N/A
	20	31.8	ATV31HD15S6X	N/A
	25	27	ATV61HD22Y	N/A
	30	32	ATV61HD30Y	N/A
	40	41	ATV61HD37Y	N/A
	50	52	ATV61HD45Y	N/A

Troubleshooting

Motor

Symptom	Probable Cause	Solution
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	Check inside motor to determine if switch is closed; check for loose connections
	Improper current supply	Check that power supply agrees with motor specifications listed on nameplate
	Mechanical failure	Determine that motor and drive turn freely; check bearings and lubrication
	Short-circuited stator	Blown fuses; motor must be rewound
	Poor stator coil connection	Remove end bells and locate with a test lamp
	Defective rotor	Look for broken bars or end rings; replace rotor
	Motor overload	Reduce load or replace unit with larger motor
	Power source (3-phase) may have one phase open	Check line for open phase
	Defective capacitor	Replace capacitor

	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
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
	Broken rotor bars	Look for broken bars or end rings; replace rotor
	60-cycle motor connected to 50-cycle line supply	Replace unit with 50-cycle motor
Motor takes too long to accelerate to speed	Excessive load	Replace with a larger motor
	Loose connection(s)	Check connection and tighten where necessary
Motor rotates in wrong directions	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
	Rigid-type coupling used to connect motor to driven equipment	Replace coupling with a proper coupling

Symptom	Probable Cause	Solution
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
	Partially shorted stator coil	Motor must be rewound
	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.
	Rotor rubs stator bore	Check motor bearings and replace
	Worn bearings	Replace bearings and seals

Blower

Symptom	Probable Cause	Solution
Excessive noise Excessive noise (cont.)	Impeller hitting inlet ring	Impeller not centered in inlet ring
		Inlet ring is damaged
		Crooked or damaged impeller
		Shaft is loose in bearing
		Impeller is loose on shaft
	Impeller hitting cutoff	Bearing is loose in bearing support
		Cutoff is not secure in housing
		Cutoff is damaged
	Bearing	Cutoff is improperly positioned
		Defective bearing
		Needs lubrication
		Loose on bearing support
		Loose on shaft
		Seals are misaligned
		Foreign material inside bearing
	Shaft seal squeals	Worn bearing
		Fretting corrosion between inner race and shaft
	Impeller	Needs lubrication
		Misaligned
		Loose on shaft
		Defective impeller: DO NOT RUN. Contact the fan manufacturer.
		Unbalanced
	Housing	Coating is loose
		Worn because abrasive or corrosive material is moving through flow passages
	Electrical	Foreign material in housing
		Cutoff or other part is loose (rattling during operation)
		Lead-in cable is not secure
		AC hum in motor or relay
	High air velocity	Starting relay chatter
		Noisy motor bearing
		Single phasing a 3-phase motor
		Duct work is too small for application
		Fan selection is too small for application
	Obstruction in high-velocity gas stream (rattle or pure-tone whistles)	Registers or grilles are too small for application
		Heating or cooling coil has insufficient face area for application
		Dampers
		Registers
		Grilles
		Sharp elbows
		Sudden expansion in ductwork
Sudden contraction in ductwork		
Pulsation or surge	Turning vanes	
	Restricted system causes fan to operate at a poor point of rating	
	Fan is too large for application	
Gas velocity through cracks or holes, or past obstructions	Ducts vibrate at same frequency as fan pulsations	
	Leaks in duct work	
		Fins on coils

Insufficient airflow	Fan	Fan running backwards
		Cutoff missing or improperly installed
		Impeller not centered in inlet collars
		Fan speed too slow
	Duct system	Actual system is more restrictive (there is more resistance to flow) than expected
		Dampers are closed
		Registers are closed
		Leaks in supply duct
	Filters	Insulating duct liner is loose
	Coils	Dirty or clogged
Recirculation	Internal cabinet leaks in the bulkhead that separates the fan outlet (pressure zone) from fan inlets (suction zone)	
	Leaks around fan outlet at the connection through the cabinet bulkhead	
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).	
Insufficient airflow (cont.)	Lack of straight duct at fan outlet	Fans that are normally used in duct systems are tested with a length of straight duct at the fan outlet. If there is no straight duct at the fan outlet, performance will decrease. If it is not practical to install a straight section of duct at the fan outlet, the fan speed may be increased to overcome this pressure loss.
	Obstructions in high-velocity air stream	Obstruction near the fan outlet
		Sharp elbows near the fan outlet
Excessive Airflow	System	Improperly designed turning vanes
		Projections, dampers, or other obstructions in system where air velocity is high
		Oversized duct work
		Access door is open
		Registers or grilles are not installed
	Fan	Dampers are set to bypass coils
		Filters are not in place
	System, fan, or interpretation of measurements	Backward inclined impeller installed backwards (HP will be high)
		Fan speed is too fast
		The velocity pressure at any point of measurement is a function of the velocity of the air or gas and its density.
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.		
High airflow, low static pressure	System	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.
		Field static pressure measurements rarely correspond with laboratory static pressure measurements unless the fan inlet and fan outlet conditions of the installation are the same as the inlet and outlet conditions in the laboratory.
	Gas density	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).
Low airflow, low static pressure	Fan	Pressures will be less with high-temperature gasses or at high altitude
		Backward inclined impeller installed backwards; HP will be high
Low airflow, high static pressure	System	Fan speed is too high
		Fan inlet or outlet conditions are not the same as tested
		Obstruction in system
Low airflow, high static pressure	System	Dirty filters
		Dirty coil
		System is too restricted

Controls

Symptom	Probable Cause	Solution
Fan output does not operate	Shutdown input	The unit shutdown (run/stop) input must be closed before unit operation is enabled.
	Unoccupied mode	The supply fan is normally on in the occupied mode and off during the unoccupied mode. Verify the occupancy mode as a part of fan control troubleshooting.
	Fan status	A fan shutdown alarm will be generated fan status is not confirmed within 30 seconds after commanding the supply fan to run. Such an alarm must be manually reset before normal fan operation is enabled.
	Low limit alarm	The supply fan is controlled off whenever the supply air temperature is less than the low limit (35 F). Such an alarm must be manually reset 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. The fan remains off for 15 minutes before it is automatically started by the controller.
Compressor output does not energize	Ambient lockout	Compressors are allowed to operate whenever the outside air temperature is greater than the outside air lockout temperature (55°F, 58°F, 61°F, 61°F for compressors 1, 2, 3, and 4, respectively). Lockout temperatures are adjustable.
	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 multiple compressors from being started concurrently.
	Low pressure cutout	Compressors are prevented from operating when a low pressure cutout alarm is present on that circuit. Low pressure alarms are automatically reset when the low pressure condition is corrected.
	High pressure cutout	Compressors are prevented from operating when a high pressure cutout alarm is present on that circuit. High pressure alarms must be manually reset by pressing the red button on the cutout device (in the compressor section of the unit).
	Heating mode, delay timer	Upon initial power up the controller defaults in the heating mode. A five-minute delay is required before the controller is allowed to change between heat/cool modes.
Compressor 1 does not cycle off	Ambient lock-in	Compressor 1 is controlled On continuously when the outside air temperature exceeds the outside air lock-in temperature (75°F, adjustable).
	Coil temperature setpoint not satisfied	In the dehumidification mode the compressors cycle to maintain the evaporator coil temperature setpoint (50°F, typical). The compressor(s) will remain on until the coil setpoint is satisfied.
	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.
Compressor 2 does not cycle off	Space dewpoint lock	Compressor 2 is controlled On continuously whenever the space dewpoint temperature exceeds the space dewpoint setpoint temperature (58°F, adjustable). Compressor 2 remains locked on until the space dewpoint drops below 52°F, adjustable.

Symptom	Probable Cause	Solution
Outdoor air damper does not open	Occupancy	The outdoor air damper is controlled closed during the unoccupied mode. When a return air damper is present, the return air damper is controlled open (recirculation) in the unoccupied mode.
	Normal recirculation control sequence	The normal startup control sequence for units equipped with outside and return air dampers allows the supply fan and heat/cool capacities to operate prior to opening the outside air damper. The unit starts in recirculation mode for 30 seconds to allow time for heat/cool capacities to operate.
	Damper shutdown	When the outside air damper is commanded open, the control sequence allows time for the end switch of the damper actuator(s) to confirm that at least one damper is open. If after 1 minute, 50 seconds the end switch closure is not confirmed, a shutdown alarm is generated. The shutdown alarm must be manually reset.
Dehumidification not enabled	Space relative humidity sensor/value	Daytime dehumidification is enabled when the space relative humidity or outside dewpoint temperature is greater than setpoint. If the space relative humidity sensor is not connected or operating properly, dehumidification may not operate properly.
	Outside air dewpoint setpoint	Daytime dehumidification is enabled when the space relative humidity or outside dewpoint temperature is greater than setpoint. The outside dewpoint is calculated from the outside air temperature and relative humidity. If either the outside air temperature or relative humidity sensor is not connected or operating properly, dehumidification may not operate properly.
Dehumidification not enabled (cont.)	Unoccupied space dewpoint setpoint	Night dehumidification is enabled when the space dewpoint is greater than setpoint (59°F, adjustable). Night dehumidification is disabled when the space dewpoint is less than 53°F (adjustable). The space dewpoint is calculated from the space temperature and relative humidity. If either the space temperature or relative humidity sensor is not connected or operating properly, night dehumidification may not operate properly.
Unit remains in heating mode, does not switch to cooling	Heat mode, delay timer	At startup the unit defaults to the heating mode. A five-minute delay is required prior to switching to the cooling mode.
	Force heating mode	The unit is forced into the heating mode when the outside air temperature is less than 45°F (adjustable).
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. In order for gas heat operation to be enabled, the electric heat must be at 100% capacity for five minutes.
Occupied/unoccupied control no operating properly	Occupancy input	The occupancy mode of the controller is determined from three potential sources: hardwired input, local schedule, or network command. The occupancy of the controller can be determined based on a hardwired (digital) input. If the local hardwired input is used to determine the occupancy, the OCC HARDWIRED field must be set to True (use the operator interface or PC-based tool). In all other cases, set the OCC HARDWIRED value to False.
	Internal time schedule	The occupancy mode of the controller is determined from three potential sources: hardwired input, local schedule, network command. The local schedule is compared to the time and date of the controller to determine the occupancy of the controller. Even if occupancy is to be determined based on the local schedule or network command, the occupancy input (jumper) must be installed.
	Controller date/time	The local time and date must be set for the local schedule to correctly determine the occupancy mode. These values are normally set at the factory and stored in the controller for several months with battery backup.
	Network schedule/command	The occupancy mode of the controller is determined from three potential sources: hardwired input, local schedule, network command. Even if occupancy is to be determined based on the local schedule or network command, the occupancy input (jumper) must be installed.

Start-up Documentation

Instructions

Complete the following forms during the startup process and return to Valent in one of three methods shown below.

US Mail

Valent Startup Forms
60 28th Avenue North
Minneapolis, MN 55411

E-mail

Subject: Valent Startup Forms
services@unisoncomfort.com

Fax

ATTN: Valent Startup Forms
(612) 877-4851

Job Information

Jobsite

Project Name: _____

Jobsite Address: _____

City: _____ State: _____ Zip: _____

Start-up Contractor

Company Name: _____

Address: _____

City: _____ State: _____ Zip: _____

Phone: _____

Start-up Technician

Name (print): _____

Phone: _____ e-mail: _____

Unit Information

Sales Order: _____ Tag/Mark: _____

Model Number: _____ Serial #: _____

Pre-startup Checklist

Standard Unit Features

The items below should be checked on all Valent units prior to startup.

Exterior and Interior Inspection

- Unit is inspected for rigging or shipping damage.
- Report any damage to the manufacturer.
 - Unit is installed correctly, is level, and all doors are operable.
 - Unit is secured to curb or mounting supports.
 - Doors operate smoothly and gaskets are in place.
 - All shipping blocks, tie downs, and bolts are removed.
 - Condensate drain is piped and trapped.
 - Condensate drains are primed.
 - External ductwork is completed and correctly installed.
 - Outside air intake hood is installed bird screen is in place, and opening is unobstructed.
 - Interior of unit is free of debris.
 - Copper tubing is secured and not rubbing.
 - Filters are installed correctly.

Controls and Electrical

- The main disconnect is off.
- All field-mounted sensors and instruments are installed and wired.
- Unit controls are off.
- Electrical service matches unit voltage.
- Electrical field wiring is complete.
- All electrical connections are tightened.
- Compressor and motor breakers or fuses are open (disabled).
- Main power is wired to the disconnect.
- Discharge air sensor is installed per the “Wiring” instructions of IOM.
- Space temperature and humidity sensors are installed per the “Wiring” instructions of this IOM.

Fans and Motors

- Fan inlets and outlets are unobstructed.
- Fasteners, setscrews, and locking collars on the fan are secure.
- Fasteners on the motor and base are secure.
- Fan wheel rotates freely by hand and no parts are rubbing.
- Electrical connections are properly secured.
- Housing and ductwork, if accessible, are cleared of obstructions and foreign material that may damage the fan wheel.

Optional Unit Features

The items below should be checked as they apply to the specific unit being started up.

Compressors

- Compressor shipping brackets removed.
- Crankcase heaters must be energized for a minimum of 12 hours before startup.

IG Furnace

- Gas piping is complete and gas lines are purged.
- Gas venting is in place.

Water Source Heat Pump

- All water/fluid connections are piped with field supplied strainer, shutoff valves and pressure/temperature ports.
- Water/fluid loop is filled with required glycol/water mix.
- Water/fluid loop pumps and VFD's are operational, enabled, and ready to supply fluid to unit such that opening the unit shutoff valves will result in flow at the required GPM.
- Water/fluid flow to each circuit has been measured and matches unit design (3 gpm/ton).
- Water/fluid entering water temperature has been measured and matches design.
- Strainers checked for blockage and cleaned if necessary.

Air-cooled Direct Expansion Startup Form

Prior to starting the unit, ensure that all applicable items in the “Pre-startup Checklist” have been verified and/or completed. Note that compressor crankcase heaters must be energized for a minimum of 12 hours prior to operating unit.

Voltage Verification

Unit Voltage: _____ Line Voltage: _____

L1 – L2: _____ L2 – L3: _____ L3 – L1: _____

Electrical

Component	Nameplate Amps	Running Amps			Rotation Direction
		L1	L2	L3	
Supply Fan #1					
Supply Fan #2					
Supply Fan #3					
Exhaust Fan #1					
Exhaust Fan #2					
Exhaust Fan #3					
Condensing Fan #1					
Condensing Fan #2					
Condensing Fan #3					
Condensing Fan #4					
Condensing Fan #5					
Condensing Fan #6					
Compressor A1 Crankcase Amps = _____					
Compressor A2 Crankcase Amps = _____					
Compressor B1 Crankcase Amps = _____					
Compressor B2 Crankcase Amps = _____					
Energy Recovery Wheel					

Cooling

Parameter	Test Point C1	Test Point C2	Test Point C3	Test Point C4
Circuit A	100%	100%	25%	0%
Circuit B	0%	0%	0%	100%
Hot Gas Reheat	0%	100%	0%	0%
Outdoor Air Temp [°F]				
Evaporator Coil Leaving Air Temp [°F]				
Discharge Air Temp [°F]				
Fluid Flow Rate [gpm]				
Entering Fluid Temp [°F]				
Leaving Fluid Temp [°F]				
Subcooling [°F] Normal = 5-20 °F				
Superheat [°F] Normal = 8-20 °F				
Head Pressure [psi] Normal = 250 -500 psi				
Suction Pressure [psi] Normal = 96-155 psi				

*Only applies to units with Digital Scroll™ compressors.

Heating - IG Furnace

Nominal Heating Capacity [MBH]: _____ Gas Type: _____

F1 Capacity [MBH]: _____ F2 Capacity [MBH]: _____ F3 Capacity [MBH]: _____

Verify pilot spark

Parameter	Low Fire 25%	High Fire 100%
OA Temp. [°F]		
Discharge Air Temp. [°F]		
Manifold Pressure [in.wg] Normal = 0.4-1.0 in.wg at 25%, 3.5-10.0 in.wg at 100%		
Flue Stack Temperature [°F]		

Heating - Electric

Nameplate Amps: _____ Running Amps (L1/L2/L3): _____

Parameter		Observed Value
OA Temp. [°F]		
Low (25%)	Discharge Air Temp. [°F]	
High (100%)	Discharge Air Temp. [°F]	

CAUTION

Do not allow supply temperature to exceed 110F. If supply temperature approaches 110F during startup, turn off heater and record 110F in the "LAT" field.

Water Source Heat Pump Startup Form

Prior to starting the unit, ensure that all applicable items in the “Pre-startup Checklist” have been verified and/or completed. Note that compressor crankcase heaters must be energized for a minimum of 12 hours prior to operating unit.

Voltage Verification

Unit Voltage: _____ Line Voltage: _____

L1 – L2: _____ L2 – L3: _____ L3 – L1: _____

Electrical

Component	Nameplate Amps	Running Amps			Rotation Direction
		L1	L2	L3	
Supply Fan #1					
Supply Fan #2					
Supply Fan #3					
Exhaust Fan #1					
Exhaust Fan #2					
Exhaust Fan #3					
Compressor A1 Crankcase Amps = _____					
Compressor A2 Crankcase Amps = _____					
Compressor B1 Crankcase Amps = _____					
Compressor B2 Crankcase Amps = _____					
Energy Recovery Wheel					

Fluid Verification

Fluid Type: _____ Glycol Concentration: _____

Cooling Mode

Parameter	Test Point C1	Test Point C2	Test Point C3	Test Point C4
Circuit A	100%	100%	25%	0%
Circuit B	0%	0%	0%	100%
Hot Gas Reheat	0%	100%	0%	0%
Outdoor Air Temp [°F]				
Evaporator Coil Leaving Air Temp [°F]				
Discharge Air Temp [°F]				
Fluid Flow Rate [gpm]				
Entering Fluid Temp [°F]				
Leaving Fluid Temp [°F]				
Subcooling [°F] Normal = 5-20 °F				
Superheat [°F] Normal = 8-20 °F				
Head Pressure [psi] Normal = 250 -500 psi				
Suction Pressure [psi] Normal = 96-155 psi				

Heating Mode

Parameter	Test Point H1	Test Point H2	Test Point H3
Circuit A	100%	25%	0%
Circuit B	0%	0%	100%
Outdoor Air Temp [°F]			
Evaporator Coil Leaving Air Temp [°F]			
Discharge Air Temp [°F]			
Fluid Flow Rate [gpm]			
Entering Fluid Temp [°F]			
Leaving Fluid Temp [°F]			
Subcooling [°F] Normal = 5-20 °F			
Superheat [°F] Normal = 8-20 °F			
Head Pressure [psi] Normal = 250 -500 psi			
Suction Pressure [psi] Normal = 96-155 psi			

Note: Unit may not run at 100% heating mode in ambient temps over 70 °F. Modulate digital compressor back as necessary to keep unit running.

CAUTION

Do not allow supply temperature to exceed 110F. If supply temperature approaches 110F during startup, turn off heater and record 110F in the "LAT" field.

Outside Air Hood Assembly Instructions

Outside Air Hood Assembly Instructions

OUTSIDE AIR HOOD OPTIONS.....Option 1) Bird Screen Mesh Weatherhood
Option 2) Aluminum Filter Weatherhood

Option 1) Bird Screen Mesh: Bill of Materials

#	Item Description	Qty	Part numbers	
			110	210
1	Weatherhood	1	1316	4086
2	Bottom S-Flashing	1	1228	4297
3	Side Panel	2	1317/1318	4087/4088
4	Flashing Strip	2	1319	4128
5	Bird Screen	1	n/a	n/a

Step 1: Completely detach the weatherhood from the unit & remove all contents for assembly

Step 2: Attach both side panels.

A. The side panel with the odd part number always goes on the right, the panel with the even part number always goes on the left.

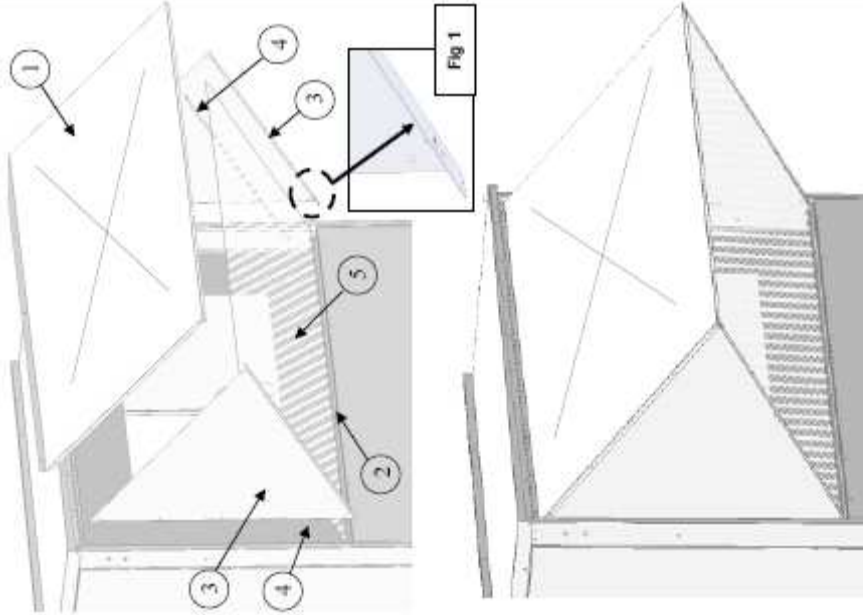
B. Position each side panel with its flange facing in. (See Fig 1)

Step 3: Attach the bottom S-flashing facing outward for the screen to rest on.

Step 4: Install the mesh bird screen from the top so that it rests on side flanges and bottom S-flashing.

Step 5: Insert the flashing strips inside of the hood on the backside of the mesh bird screen. Then, fasten the flashing strips down from the front.

Step 6: Re-install the weatherhood. First, screw in the top. Then, screw in both of the sides.



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Part# 47024-04

Option 2) Aluminum Filters- 110 Cabinet:

Bill of Materials

#	Item Description	Qty.	Part #
1	Weatherhood	1	1316
2A	Side Panel	1	1317
2B	Side Panel	1	1318
3	Filter Rail	2	1352
4	End Plate	2	1353
5	20x25 Alum Filter	2	N/A

- Step 1:** Completely detach the weatherhood from the unit.
- Step 2:** Attach both side panels.
 A. Side panel 1317 goes on the right, and side panel 1318 goes on the left.
 B. Position each side panel with its flange facing in.
- Step 3:** Re-install the weatherhood. Screw in place the top first. Then, screw both of the weatherhood flanges to the side panels.
- Step 4:** Bend filter rail end tabs 90 degrees. (See Fig 2)
- Step 5:** Fasten the top filter rail to both sides of the weatherhood.
- Step 6:** Fasten the bottom filter rail to both side panels.
- Step 7:** Slide in all filters. Make sure their correct side faces out. (To place the filters correctly, look for the direction of airflow arrow located on the side of the filter).
- Step 8:** Fasten all end plates to secure the filters.

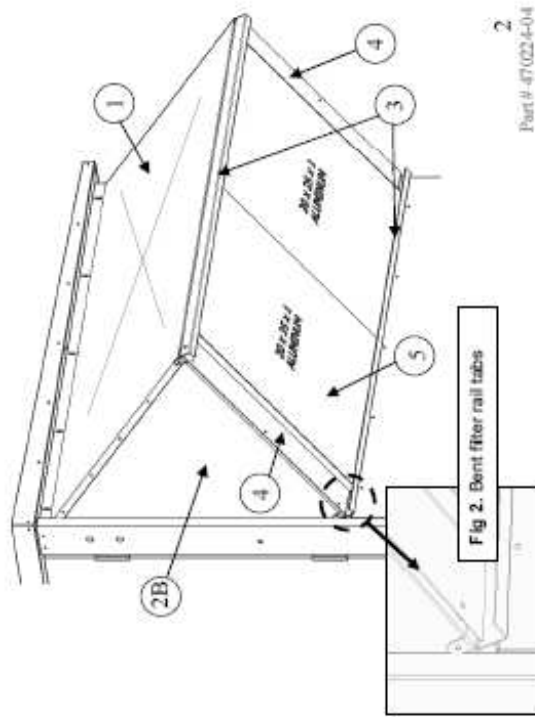
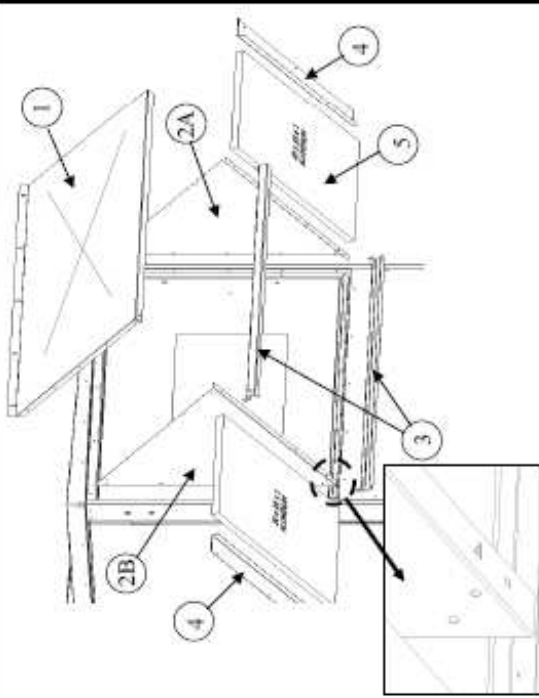


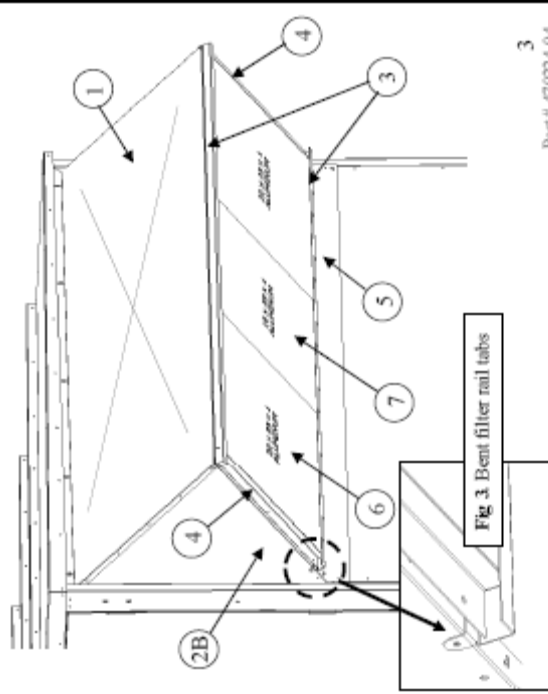
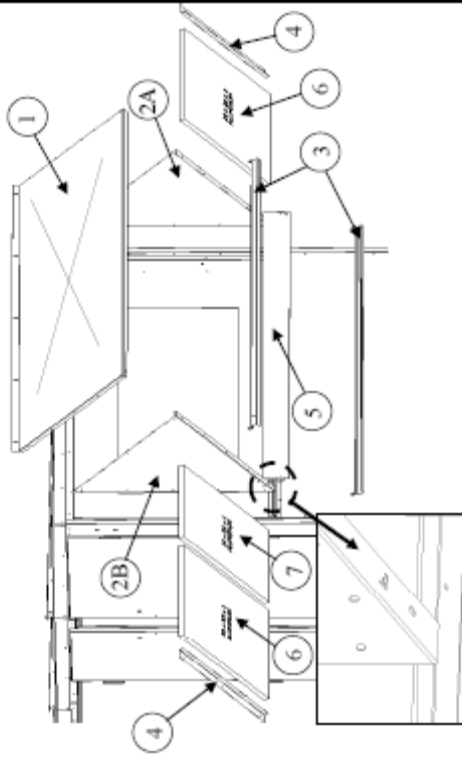
Fig 2. Bent filter rail tabs

Option 2 Aluminum Filters- 210 Cabinet

Bill of Materials

#	Item Description	Qty.	Part #
1	Weatherhood	1	4086
2A	Side Panel	1	4087
2B	Side Panel	1	4088
3	Filter Rail	2	4429
4	End Plate	2	4430
5	Bottom Plate	1	4431
6	20x25 Alum Filter	2	N/A
7	16x25 Alum Filter	1	N/A

- Step 1:** Completely detach the weatherhood from the unit.
- Step 2:** Attach both side panels.
A. Side panel 4087 goes on the right, and side panel 4088 goes on the left.
B. Position each side panel with its flange facing in.
- Step 3:** Re-install the weatherhood. Screw in place the top first. Then, screw both of the weatherhood flanges to the side panels.
- Step 4:** Bend all filter rail end tabs 90 degrees. (See Fig 3)
- Step 5:** Fasten the top filter rail to both sides of the weatherhood.
- Step 6:** Fasten the bottom plate. First, Back out all of the unit's panel screws. Then, place the bottom plate into position and refasten.
- Step 7:** Fasten the bottom filter rail to both side panels.
- Step 8:** Slide in all filters. Make sure their correct side faces out. *(To place the filters correctly, look for the direction of airflow arrow located on the side of the filter).*
- Step 9:** Fasten all end plates to secure the filters.



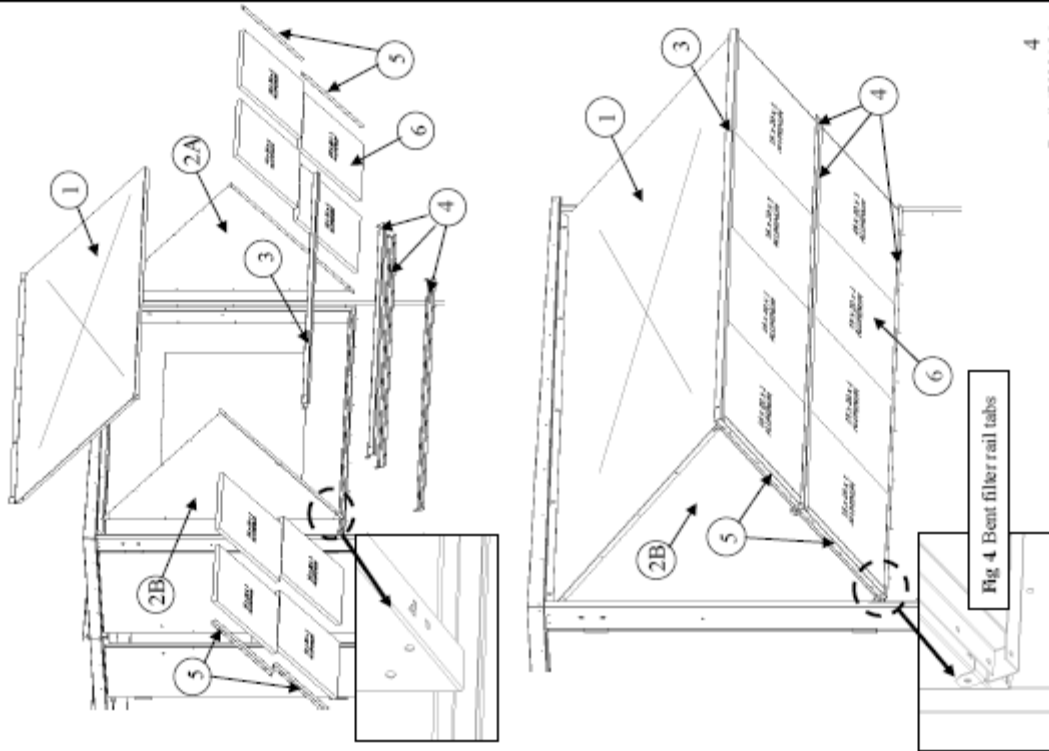
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Option 2) Aluminum Filters- 310 Cabinet

Bill of Materials

#	Item Description	Qty.	Part #
1	Weatherhood	1	8086
2A	Side Panel	2	8087
2B	Side Panel	1	8088
3	Top Filter Rail	1	8436
4	Filter Rail	3	8424
5	End Plate	4	8425
6	16x20 Alum Filter	8	N/A

- Step 1:** Completely detach the weatherhood from the unit.
- Step 2:** Attach both side panels.
A. Side panel 8087 goes on the right, and side panel 8088 goes on the left.
B. Position each side panel with its flange facing in.
- Step 3:** Re-install the weatherhood. Screw in place the top first. Then, screw both of the weatherhood flanges to the side panels.
- Step 4:** Bend all filter rail end tabs 90 degrees. (See Fig 4)
- Step 5:** Fasten the top filter rail to both sides of the weatherhood.
- Step 6:** Fasten the middle filter rails. Use the filters to get the correct spacing when fastening the middle rails.
- Step 7:** Fasten the bottom filter rail to both side panels.
- Step 8:** Slide in all filters. Make sure their correct side faces out. (To place the filters correctly, look for the direction of airflow arrow located on the side of the filter).
- Step 9:** Fasten all end plates to secure the filters.



Valent® is a business of Unison™ Comfort Technologies

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