MECHANICAL INSTALLATION OPERATION & MAINTENANCE

valent
AIR MANAGEMENT SYSTEMS

VRC Series

IOM-M2-0916
Part Number 478603

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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

VRC 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

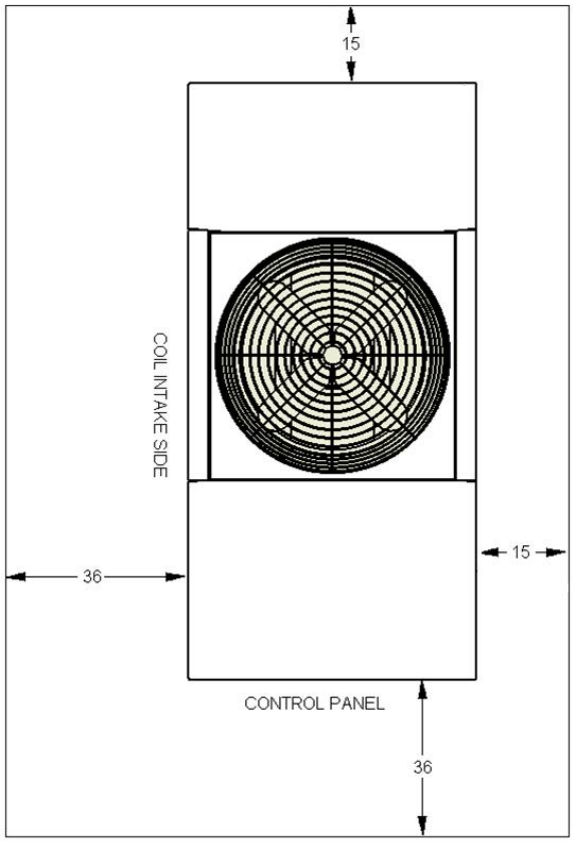
OPTION & DESCRIPTION			
MODEL	**PRODUCT TYPE**		
	VRC	REMOTE MOUNTED CONDENSER	
CABINET PAIRING	**CABINET PAIRING**		
	110	110 SERIES	
	210	210 SERIES	
	310	310 SERIES	
	350	350 SERIES	
CAPACITY	**CAPACITY**		
	5	5 TONS	
	8	8 TONS	
	10	10 TONS	
	13	13 TONS	
	16	16 TONS	
	18	18 TONS	
	20	20 TONS	
	25	25 TONS	
	30	30 TONS	
	35	35 TONS	
	40	40 TONS	
COOLING TYPE & REFRIGERATION	**TYPE**		
	A	AIR COOLED	STANDARD CAPACITY
	B	AIR COOLED	HIGH CAPACITY
ELECTRICAL	**VOLTAGE**		
	A	208/3/60	
	B	230/3/60	
	C	460/3/60	
	D	575/3/60	

Clearances

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

VRC-110/210/310 Casings

- 36″clearance from coil intake side and control panel sides of unit.
- 15″ clearance from all other sides.



Lifting Procedure

Lifting Guidelines

- Pad and equipment supports 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.

Lifting Lug Quantities

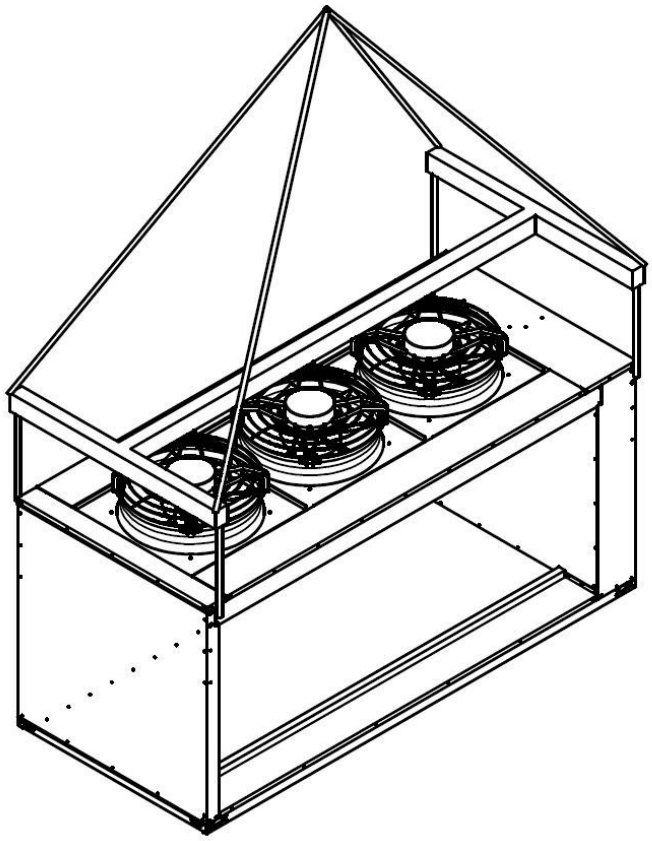
Casing	# Lugs
110	4
210	4
310	4

- 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.

⚠ WARNING

- **USE ALL PROVIDED LIFTING LUGS**
- **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**



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.

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.

Sound Insulation

If the ventilator (indoor) unit is to be installed above or adjacent to a sound-critical area such as an office, precautions should be taken to sound insulate mechanical room walls, floor, or ceiling to minimize unit noise transmission.

Pad Installation

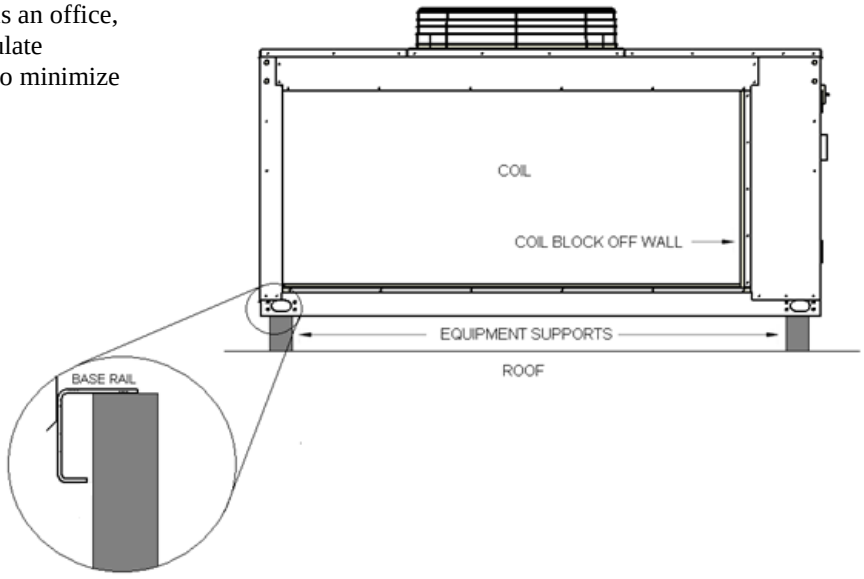
- Check to make sure the pad is level.
- Lift unit into place per the Lifting Procedure on page 4.
- Secure the unit to the pad in accordance with all applicable building codes.

Refer to the following Minimum Pad Dimensions.

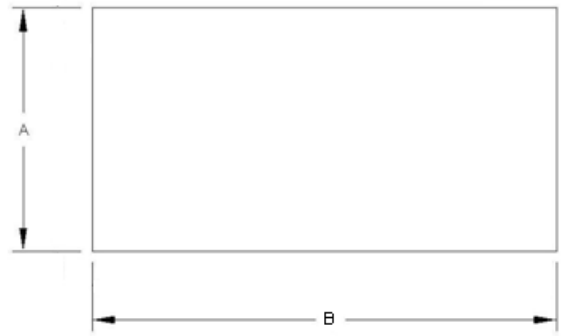
Equipment Support Installation

- Ensure that equipment supports are level. Space supports as shown in the drawing below.
- Lift unit into place per the Lifting Procedure on page 4.
- Place unit on supports such that one support is under each end of the unit (see drawing below).
- Secure the unit to the supports in accordance with all applicable building codes.

Refer to the following Equipment Support Dimensions.



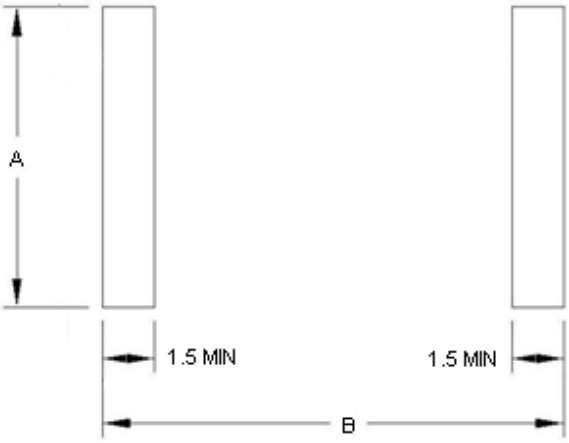
Minimum Pad Dimensions



Unit	A	B
110	37.75	80.25
210	49.75	110.25
310	66.50	117.00

Dimensions in inches.

Equipment Support Dimensions

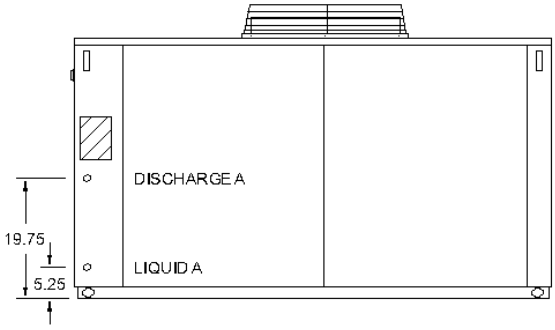


Unit	A	B
110	32.75	75.25
210	44.75	105.25
310	61.50	112

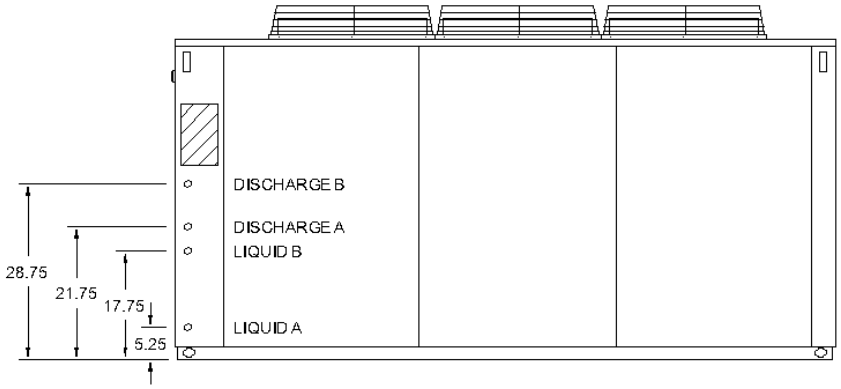
Dimensions in inches.

Electrical and Refrigeration Connections

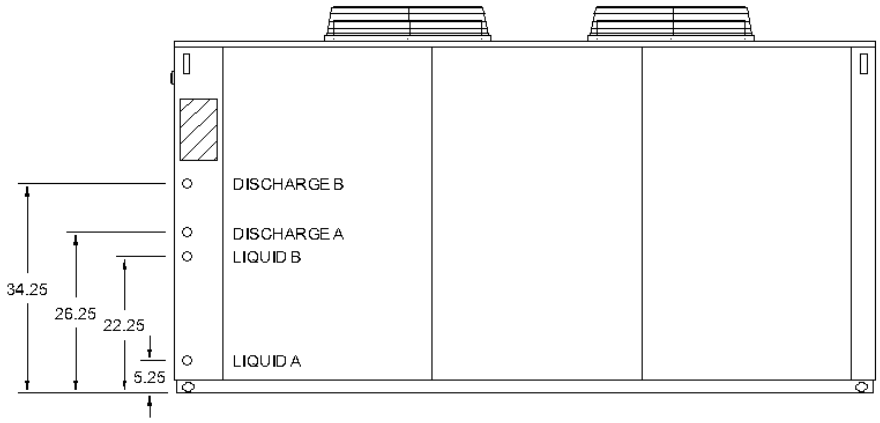
The following diagrams show piping locations as well as suggested field penetration locations for high-voltage and low-voltage electrical connections. Refer to the Recommended Line Sizes table on page 11 for suggested piping diameters. Hatched area represents suggested location of field electrical penetrations.



VRC-110



VRC-210



VRC-310

Electrical Connections

Wiring Hole Locations

Drill location labels are provided on the right side of the controls cabinet for power and control wiring connections. All electrical connections should be made in accordance with local building codes.

Power Wiring

All remote condensers are provided with a factory-mounted disconnect. The condenser requires its own power point connection. No high voltage power wires are required between the ventilator unit and condenser.

Control Wiring

Depending on the head pressure control option provided, 2-5 control wires may need to be connected between the ventilator unit and condenser. Refer to the table below for required field wiring. All control wiring is low voltage (24 volts or less). Fan modulation signal wiring (0-10 VDC) between units should be through a field-supplied, 2-conductor, 20 AWG, shielded and stranded cable. Fan start/stop relay wiring should be through a field-supplied, multi-conductor, 20 AWG cable. Modulation signal wire must be separate from start/stop wire. All control wiring is terminated at the terminal strip in each unit.

Field Control Wiring Requirements

All units require 3-phase power wiring in addition to the following control wiring.

VPR/VRC Case	AHPC 1.0			AHPC 2.0		
	Shielded Conductors	Unshielded Conductors	Total Conductors	Shielded Conductors	Unshielded Conductors	Total Conductors
110	2	2	4	2	0	2
210	2	3	5	2	0	2
310	2	3	5	2	0	2

Refrigeration Connections

Both the condenser and ventilator unit are shipped with a 20-psi nitrogen holding charge. Relieve pressure before cutting or unsweating connection stubs.

Filter drier, sight glass, liquid line solenoid, and receiver are factory installed and do not need to be field provided. Use ACR refrigeration copper pipe only for interconnecting pipe.

Interconnecting refrigerant lines should be sized according to the Recommended Line Sizes table on page 11 unless the application dictates different line sizes due to pressure drop or refrigerant velocity. Consult the factory before changing line sizes.

Maximum vertical rise between the ventilator unit and condenser is 60′, with 100′ maximum, one way, total equivalent line length. Equivalent line length is equal to the straight pipe line length plus the straight pipe equivalent of all the elbows and fittings. Consult the factory for larger vertical or line runs.

Piping should be installed according to accepted practices and codes (consult ASHRAE handbook). Valent is not responsible for interconnecting piping.

Piping/Charging Procedure

- Relieve the 20-psi nitrogen holding charge from both the ventilator unit and the condenser. Relieve pressure from the Schrader port nearest each connection. If no pressure is present, check for leaks in the system.
- Run interconnecting pipe between the systems. Discharge line horizontal piping runs should be pitched in the direction of flow (1/2″ for every 10′ of horizontal pipe). Clean and deburr all cut pipe before connecting.
- Braze connections on each unit under nitrogen purge to prevent the formation of copper oxide. Wrap a wet cloth around the connection stubs near the wall to protect the wall grommets.
- If the condenser is over 20′ above the ventilator unit, an oil drip leg must be field installed at the bottom of the first vertical rise in the discharge line. If the discharge pipe contains multiple vertical rises and horizontal sections, a drip leg must be installed at the bottom of any rise over 10′. Pipe the oil drip legs as shown in the Refrigeration Piping Schematic on page 12.
- Insulate the discharge line for safety (due to high pipe temperatures). Insulate the liquid line if it is to run through high-temperature areas (over 10°F above outside air temperature).
- Use nitrogen to pressure check the system to 450 psi. System should hold pressure for one hour with no significant pressure drop. Record pressure check (psi) on the Condenser Startup Form on page 16.
- Evacuate the system to 500 microns or less. Record evacuation microns on the Condenser Startup Form on page 16.
- Charge system to the following superheat and subcooling with hot gas reheat at 0%. Use the Charging Guidelines on page 11 for guidance.
    - Superheat: 10°F–20°F
    - Subcooling: 10°F–15°F

  Superheat should be measured at the suction line port nearest to the compressor. Subcooling should be measured at the liquid line port nearest to the TXV. Refer to the Approximate Charge Chart on page 11 for base charge and approximate refrigerant addition per length of interconnecting pipe.

  Record the final charge on the Condenser Startup Form on page 16. Record superheat and subcooling values on the ventilator unit start up form (VPR IOM PN#472916, Air-Cooled DX Startup Form).
- Additional oil may need to be added to the system based on interconnecting pipe length. On compressors with an oil sight glass, the oil level should settle between 20% and 80% full in the sight glass after 15 minutes of steady-state operation.

  Oil should be fairly clear with minimal bubbles during steady-state operation. Foggy oil indicates the presence of liquid refrigerant and a possible over-charge situation. If oil is low in the sight glass, add oil to the system though the compressor sump port or suction line port. Use POE oil only. Record added oil amount on the Condenser Startup Form on page 16.
- Use ventilator unit refrigeration start up form to complete refrigeration start up (VPR IOM PN#472916, Air-Cooled DX Startup Form). Record all values requested.

Charging Guidelines

Each circuit should be charged with the compressor(s) at 100% and as much DX/condenser load (highest ambient) as possible. Hot gas reheat should be at 0% during initial charging. Let the system run for at least 10 minutes between each adjustment before rechecking. Refer to the following table for adjustments.

Base Charge Measurement	Adjustment
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

Recommended Line Sizes

All line lengths are equivalent line lengths and must account for fitting pressure drop.

Casing	Tonnage	Circuit	Nominal Capacity (BTU/hr)	Discharge Line Size (inches)		Liquid Line Size (inches)
				0 – 40 ft *	40 – 100 ft	0 – 100 ft *
110	5	A	67,700	5/8	5/8	1/2
	8	A	99,691	5/8	7/8	1/2
	10	A	128,662	7/8	7/8	5/8
210	10	A	64,877	5/8	5/8	1/2
		B	68,382	5/8	5/8	1/2
	13	A	63,413	5/8	5/8	1/2
		B	98,057	5/8	7/8	1/2
	16	A	100,505	5/8	7/8	1/2
		B	99,547	5/8	7/8	1/2
	18	A	100,336	5/8	7/8	1/2
		B	130,206	7/8	7/8	5/8
	20	A	130,937	7/8	7/8	5/8
		B	132,322	7/8	7/8	5/8
	25	A	133,719	7/8	7/8	5/8
		B	171,374	7/8	7/8	7/8
310	25	A	157,576	7/8	7/8	5/8
		B	157,673	7/8	7/8	5/8
	30	A	152,579	7/8	7/8	5/8
		B	228,142	7/8	1 1/8	7/8
	35	A	199,312	7/8	7/8	7/8
		B	230,993	7/8	1 1/8	7/8
	40	A	252,507	7/8	1 1/8	7/8
		B	259,060	7/8	1 1/8	7/8

* Line size in this column = stub connection size on the VPR and VRC units.

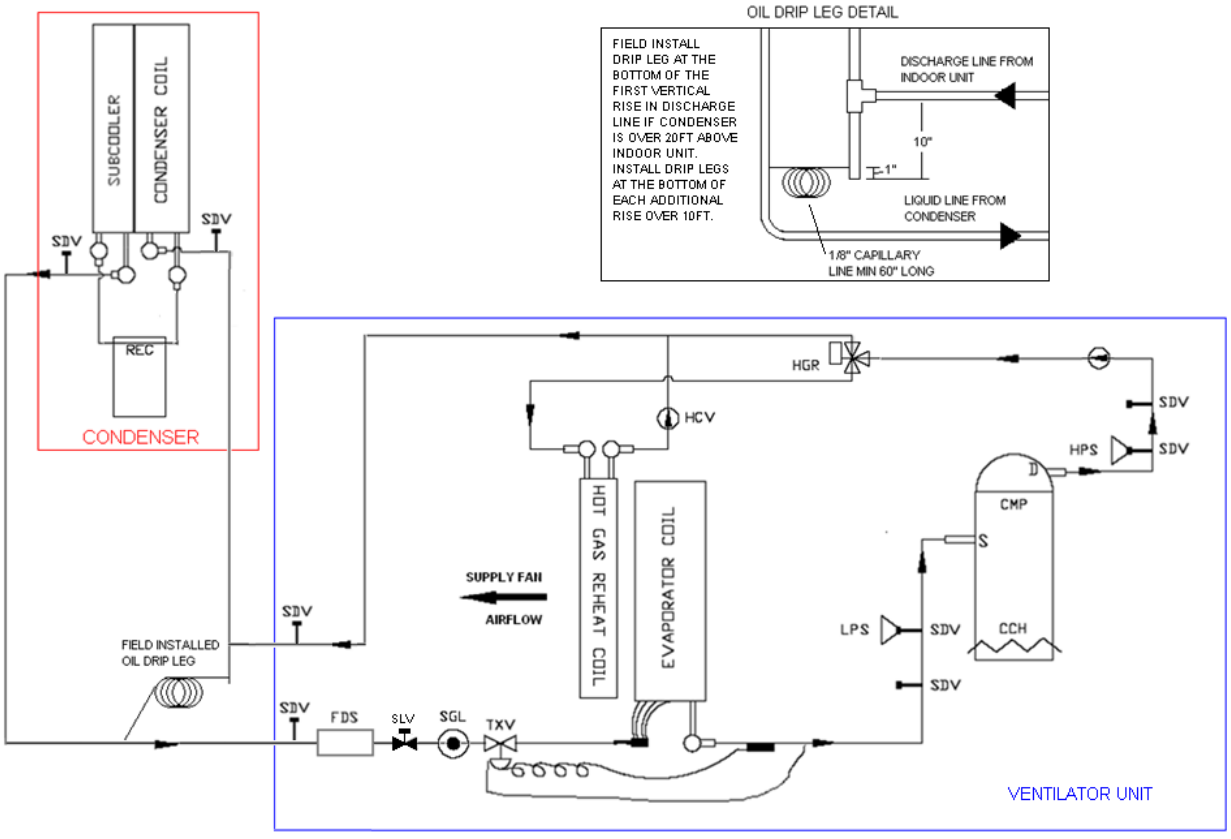
Approximate Charge Chart

For reference only. Proper charge should be checked using superheat and subcooling. Refer to the Piping/Charging Procedure on page 10.

Casing	Tonnage	Dehumidification Coils		High Airflow Coils		Refrigerant Add / ft of Line*	
		Circuit A (lbs)	Circuit B (lbs)	Circuit A (lbs)	Circuit B (lbs)	Circuit A (oz)	Circuit B (oz)
110	5	10.7		12.5		1.0	
	8	15.6		17.9		1.1	
	10	20.2		N/A		1.8	
210	10	9.8	8.0	13.6	11.8	1.0	1.0
	13	11.0	12.9	13.6	15.8	1.0	1.1
	16	16.4	13.5	18.1	15.0	1.1	1.1
	18	16.2	17.0	20.4	20.9	1.1	1.8
	20	20.3	16.1	19.7	15.4	1.8	1.8
	25	18.9	20.8	N/A	N/A	1.8	3.4
310	25	24.1	19.8	25.0	20.5	1.8	1.8
	30	23.0	27.2	25.2	25.4	1.8	3.4
	35	29.9	26.6	26.9	24.7	3.4	3.4
	40	32.6	25.6	N/A	N/A	3.4	3.4

*ft of line = The one-way line distance between the two units or the length of the liquid line alone. Use actual line length, not equivalent line length for charge calculations.

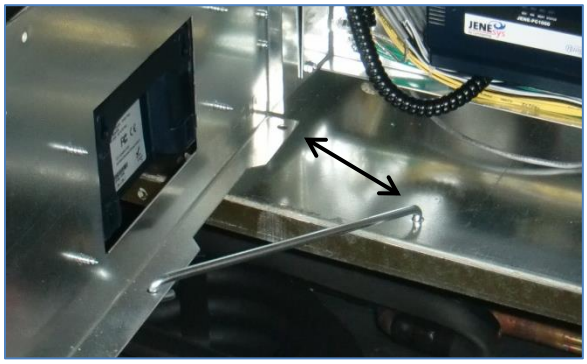
Refrigeration Piping Schematic



Maintenance

Access Doors

When working on the unit, use the tie-back rod to fasten the door open for convenience and safety. 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.



Condenser Coil

Coils need to be periodically cleaned to operate at design efficiency. Soiled fins reduce the capacity of the coil and demand more fan energy.

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.

Exterior

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.

Condenser Fans

Check condenser fan blades for cracks, dirt buildup, or other damage. Clean fans blades if necessary to prevent imbalance.

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
	Propeller is unbalanced	Replace propeller
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.

Startup Documentation

Instructions

Complete a single startup form for each unit and return along with the ventilator unit start up form (VPR IOM PN#472916, Air-Cooled DX Startup Form) to Valent via:

US Mail

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

E-mail

Subject: Valent Startup Forms
OAPservices@unisoncomfort.com

Fax

ATTN: Valent Startup Forms
(612) 877-4851

Job Information

Jobsite

Project Name: _____

Jobsite Address: _____

City: _____ State: _____ Zip: _____

Startup Contractor

Company Name: _____

Address: _____

City: _____ State: _____ Zip: _____

Phone: _____

Startup Technician

Name (print): _____

Phone: _____ e-mail: _____

Unit Information

Sales Order: _____ Tag/Mark: _____

Model Number: _____ Serial #: _____

Pre-Startup Checklist

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.
- ☐ Interior of unit is free of debris.
- ☐ Copper tubing is secured and not rubbing.

Controls and Electrical

- ☐ The main disconnect is off.
- ☐ Electrical service matches unit voltage.
- ☐ Field power and control wiring is complete.
- ☐ All electrical connections are tightened.
- ☐ Main power is wired to the disconnect.

Refrigeration Piping

- ☐ Discharge and liquid lines are pipes and brazed between ventilator unit and condenser.
- ☐ Oil drip leg and capillary bleed line is installed at the bottom of the first vertical rise on the discharge line and all additional rises over 10ft.
- ☐ System has been pressure checked to 450psi with nitrogen for 1 hr.
- ☐ System has been evacuated to less than 500 microns before charging.

Condenser Startup Form

Prior to starting the unit, ensure that all applicable items in the Pre-Startup Checklist have been completed and verified. Compressor crankcase heaters must be energized for a minimum of 12 hours prior to operating unit. The condenser startup form should be completed in conjunction with the ventilator unit startup form (VPR IOM PN#472916, Air-Cooled DX Startup Form). Refrigeration system check values should be recorded on the ventilator unit startup form.

Electrical

Unit Voltage: _____ Line Voltage: _____

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

Parameter	Circuit A	Circuit B (if applicable)
Pressure Check (PSI)		
Evacuation (Microns)		
Final Charge (lbs)		
POE Oil Added (oz)		

Note: Be sure to record the final charge on the charge sticker on the inside of the control panel doors in both units.

Component	Nameplate Amps	Running Amps			Rotation Direction
		L1	L2	L3	
Condensing Fan #1					
Condensing Fan #2					
Condensing Fan #3					
Condensing Fan #4					

Innovative HVAC solutions for today's engineering challenges.

UNISON COMFORT TECHNOLOGIES LIMITED WARRANTY & DISCLAIMER POLICY

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

PRODUCT WARRANTY

Unison 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 Unison'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 Unison standard product warranty, Unison 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 are included on all Innovent compressorized products, and may be available as an option on other Unison products. These services must be performed by a Unison 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 Unison 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

Unison 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-Unison parties. Unison 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, Unison'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 Unison 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, Unison will assist in the diagnosis of issues and provide support to the customer provided the customer issues a purchase order to cover Unison's expenses in doing so.

Extended Limited Warranty Certificate

This certificate verifies that _____ has purchased a Limited Extended Warranty policy from Unison Comfort Technologies for the following unit(s):

Unit Brand: Choose Trademark

Unit Model or Tag#: _____

Unit Serial #: _____

The Extended Limited Warranty coverage for this unit is as follows:

Unit/Component Options	**Coverage Purchased**	**Length of Warranty Extension (1,3,5, 10 or 15 years)**	**Parts Only Or Parts & Labor**
DX Unit			
Chilled Water Unit			
Heat Pump Unit			
Unit Casing Only			
Components			
Coil(s)			
Energy Recovery Wheel(s)			
Fan motor(s)			
Furnace Heat Exchanger(s)			
Air-to-air Heat Exchanger(s)			
DDC Controller(s)			
VFD(s)			
Compressor(s)			

All Unison warranties begin at start-up or 6 months after the date of shipment from the Unison factory, whichever occurs first. The ship date for the units noted above is _____. Please refer to the Unison Comfort Technologies terms and conditions of sales for additional details, conditions and exclusions.

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