ENVIRO-TEC VSCS-Series
Vertical Stacked Water Source Heat Pumps
Mechanical Specifications

GENERAL

All VSCS-series models ship as factory-charged packages, complete with R-410A refrigerant. All units from ¾ to 3 tons shall be tested and certified by AHRI / ISO 13256-1 and ETL listed for United States and Canada. AHRI / ISO and ETL labels shall be applied prior to leaving the factory. All units are test operated at the factory. Both cabinets and refrigeration chassis are completely factory wired and pre-piped.

CABINET / RISER ASSEMBLY

The self-supporting cabinet assembly is constructed of heavy gauge corrosion-resistant coated steel (minimum 20-gauge thickness for exterior panels). The entire cabinet interior is insulated with 1/2" thick, high-density thermal and acoustic insulation. Insulation shall meet NFPA 90, UL-181, and ASTM-C1071 standards, and have a flame spread of less than 25 and a smoke developed classification of less than 50 per ASTM E-84 and UL 723. A removable inner service panel seals the fan and compressor compartment during operation.

The cabinet base section contains a 14 gauge galvanized steel drain pan, with integral guide rails for the slide-in heat-pump chassis. The drain pan outlet is readily accessible for cleaning (removal of inner service panel required). The drain pan outlet, incorporating a P-trap, is factory connected to the condensate riser.

Full-length supply, return, and condensate risers are factory assembled onto the cabinet. Maximum factory installed riser length is 120 inches. When the slab-to-slab dimension for a given floor is in excess of 118 inches, separate riser extension pieces can be factory provided to reach the required total riser length (riser extensions are field installed). The top of all risers and riser extensions is internally expanded (3" depth) to allow connection of each subsequent riser section without the use of couplings. Type ‘M’ copper for risers is standard.

- Optional Type ‘L’ copper risers.

Riser placement may be on any of three sides of the cabinet (right, left, or back). Risers are internally piped into the cabinet assembly, including ball shut-off valves, and threaded hose connection stubs. The condensate drain riser is insulated with 3/8” wall thickness closed-cell foam insulation.

- Optional protective risers cover to prevent riser damage during shipping, handling and installation.

The removable fan and motor assembly is suspended horizontally from an 18-gauge blower mounting deck, which creates an insulated discharge plenum in the upper section of the cabinet. Up to 3 supply air openings are provided. A noise attenuating insulated air baffle is provided for each supply air opening. All cabinet openings are provided with drywall flanges around the full opening perimeter.

- Optional surface-mount connection box. Allows mounting of the space thermostat directly above the unit's return air panel. Electrical connection to the thermostat is by a plug-in Molex connector. The connection box is insulated where it projects into the upper plenum section of the unit, to prevent discharge air temperature from affecting the thermostat reading.

REFRIGERATION CHASSIS

Each removable heat-pump chassis assembly includes an air-to-refrigerant coil, a water-to-refrigerant coil, a primary condensate collection pan, and features a high efficiency rotary or scroll compressor. The chassis base is fabricated from heavy gauge galvanized steel (14 Ga). A metal enclosure isolates the compressor from the moving air stream in the lower fan compartment. The compressor enclosure is insulated with ½ inch thick, 2- pound density insulation. Insulation shall meet NFPA 90, UL-181, and ASTM-C1071 standards, and have a flame spread of less than 25 and a smoke developed classification of less than 50 per ASTM E-84 and UL 723.

Electrical connection between the cabinet and the chassis is by locking quick-connect plugs (separate high voltage and low voltage plugs).

Rotary and scroll compressors are mounted on rubber vibration isolators. Compressor motors are provided with internal overload protection. Each refrigeration circuit is thoroughly evacuated, and fully charged with R-410A refrigerant before shipment. An external high-pressure switch and a low-suction temperature switch are included in each compressor control circuit. The sealed refrigeration circuit

includes an adjustable bi-flow thermal expansion valve, with external equalizer. Service gauge ports are provided for field diagnosis and service.
The 4-way reversing valve is a pilot operated, sliding piston type with a replaceable magnetic solenoid coil.

Refrigerant-to-air heat transfer coils are constructed of internally enhanced copper tubes; mechanically bonded to enhanced aluminum plate fins. The coaxial refrigerant-to water heat exchangers feature a convoluted inner tube design for high heat transfer efficiency. Standard models feature a copper inner tube surrounded by a steel outer tube, and carry a 400-psig waterside working pressure rating. Units shall be capable of operation with an entering fluid temperature range of 20°F to 110°F.

- Optional automatic water flow regulator, factory installed as an integral part of the refrigeration chassis. The automatic flow control valve shall be selected for the nominal rated flow rate, and provides constant flow over a 2-80 psi differential pressure range.

- Optional water control valve. A factory installed 2-way motorized valve is wired in parallel with the compressor control circuit, to shut-off water flow to the unit when the compressor is off. This feature can significantly reduce power consumption in variable speed, or staged, pumping applications. The valve is rated for a 60 psi operating pressure differential. The actuator is of a slow-closing design, to eliminate hydraulic shock.

INDOOR FAN

Forward curved, double inlet and double width, direct-drive centrifugal blowers are used for air movement. Large diameter blower wheels are employed to provide required airflow performance at minimum noise levels. Fan motors are PSC types, and feature permanently lubricated bearings and internal thermal overload protection. The fan motors are attached to the blower housings by means of an integral 'flex-mount' system, with additional vibration isolation provided by rubber mounting grommets. A manual selector switch is accessible through the hinged return air panel, allowing switching between the two available fan speeds (Hi – Low).

- Optional Hi-Static motor and blower assembly, for applications with extended ductwork layout.

ELECTRICAL/CONTROLS

All units are completely factory wired with all necessary operating controls.

- Optional non-fused electrical disconnect for service convenience and maintenance.

- Optional non-fused electrical disconnect with fusing added to the internal line voltage switch circuit for service convenience and maintenance.

Standard unit control consists of a 24-volt electromechanical relay package. The cabinet mounted electrical box contains a 50VA Class II transformer for field connection. The reversing valve solenoid coil shall be energized in cooling mode only.

- Optional condensate overflow switch.

Unit shall have a microprocessor-based control system with the following:

a. Unit shall operate with conventional thermostat designs and have a low voltage terminal strip for easy hook-up.
b. Unit shall incorporate a lockout circuit which provides reset capability at the space thermostat, base unit, or by interrupting service power, should any of the following standard safety devices trip and shut off the compressor.
c. Loss-of-charge/Low-pressure switch
d. High-pressure switch
e. Control board shall monitor each refrigerant safety switch independently.
f. Low water temperature protection
g. Condensate overflow protection
h. Low voltage (brown-out) protection
i. Anti-short cycle timer (ASCT)
j. Random start
k. Should the high-pressure or low-pressure safeties open three times within two hours of operation (1 hour for low-pressure safety), then lockout requiring manual reset will occur.
l. Should the low water temperature or condensate overflow safeties trip 3 times sequentially, then lockout requiring manual reset will occur.
m. The low-pressure switch shall not be monitored during the initial 30 seconds of a cooling system's operation to prevent nuisance trips.
n. Unit shall have capability to defeat time delays for servicing.
o. Unit control board shall have on-board diagnostics and fault code display.
p. Control board shall retain last 5 fault codes in non volatile memory which will not be lost in the event of a power loss.

q. Unit shall have an automated sequence used after installation that quickly tests cooling and heating modes.

The unit's thermostat wire leads will terminate in a 6-pin Molex plug for direct surface mount thermostat application. The control leads are spliced to field supplied cable for remote thermostat applications.

ACOUSTIC RETURN AIR PANEL

The flush-mounted return air panel is designed to minimize line-of-sight noise transmission. The panel assembly is fabricated from heavy gauge steel. An insulated, hinged center section allows convenient user access to the unit control panel and filter.

The perimeter frame of the panel is mounted to the drywall/framing opening at the front of the cabinet. The heat-pump chassis is fully accessible and removable through the hinged door section. The panel is supplied pre-primed, ready for painting.

SUPPLY AIR GRILLES

Supply air grilles shall be supplied for each free discharge outlet directly from the cabinet (non-ducted outlets). All unit mounted supply grilles will be supplied as double deflection type. Grilles for unequal airflow applications shall be provided with integral opposed blade dampers. Grilles will be supplied in standard 'Appliance White' painted finish.

FILTERS

All units are supplied with a 1-inch thick throwaway filter. Filters are accessible through the hinged return air panel, without removing the inner service panel.

UNIT TAGGING

Each unit shall be individually tagged with factory and customer supplied information. Units can be tagged with specific room number, riser number, or any other special requirement of the project.

FIELD INSTALLED ACCESSORIES

The following options are available field installation:

- Hoses: high-pressure flexible hoses, with quick-sealing swivel couplings, provide supply and return water connections to the chassis. Hose material is fire-rated (UL-94 VO) thermoplastic inner tube, reinforced by a stainless steel wire outer braid. The hose assemblies are rated for a minimum 350 psig working pressure.

- Electronic Thermostats
  - Programmable (7-day), 1 Ht / 1 Cl, back-lit display. The thermostat shall be supplied with an occupancy sensing cover (or be capable of being retrofitted on site for future occupancy sensing).
  - Non-programmable, 1 Ht / 1 Cl, back-lit display. The thermostat shall be supplied with an occupancy sensing cover (or be capable of being retrofitted on site for future occupancy sensing).