



**HydroTech**<sup>™</sup>  
**R-410A** Water Source Heat Pump

16+  
EER

**WSV6 SERIES**  
**WATER SOURCE HEAT PUMP**

Vertical - R-410A  
7.5 thru 10 Tons



# WSV6 Series WATER SOURCE HEAT PUMP

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The Hydro-Tech includes many standard features found only in higher priced products, plus a number of unique features, including:

- **2-speed blower operation in the summer:** The Hydro-Tech removes more moisture from the air by operating on a lower speed for up to 10 minutes before quietly switching to a higher speed. An even higher speed is also available for high static applications. (Size 120 or 10 ton does not have this ability)
- **Optional Vacated Premises Control (VPC) kit with reset feature:** Ensures that the unit will operate a minimum of one or two hours per day during extended periods of unoccupancy. This option also includes an automatic reset feature. If a fault occurs, the system will shut down, but then automatically reset every 24 hours. If the same fault exists each day, the unit will lockout on the fourth day and have to be manually reset.
- **Superior insulation:** Fully insulated with 1" Fiberglass Insulation with FSK which is a flame retardant, vapor barrier facing. Will also help achieve quality efficiency, and control condensation.
- **Removable discharge flange:** Provides additional installation clearance.
- **Filter rack:** Standard Filter rack can hold 1" or 2" filters. Optional 4" filter rack available for special order.
- **State-of-the-art Digital Control Module (see p. 2)**



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## Additional Standard Features

- 100% Factory Tested!
- R-410A Refrigerant - All units operate with environmentally friendly R-410A refrigerant.
- Stainless Steel Condensate Pan- Sloped for positive drainage
- High and Low pressure Service Ports
- Refrigerant Filter-drier
- Panel-mounted FPT Water Connections - No back-up wrench needed.
- Removable Panels for Service
- 75 VA Transformer
- 1" Throwaway Filter
- Disconnect switch and phase monitor

## Optional Features

- Cupronickel Coaxial Heat Exchanger
- Vacated Premises Control
- E-Coated Air Coil Corrosion Protection
- Evaporator Temperature Sensor

## DEFINITIONS

### Abbreviations and Definitions

CFM	= air flow, cubic feet per minute	EER	= Energy Efficient Ratio
EWT	= entering water temperature, Fahrenheit	COP	= Coefficient of Performance= Btu/h output/Btu/h input
GPM	= water flow in gallons per minute	EER	= Energy efficiency ratio = Btu/h output/Watt input
WPD	= water pressure drop, psi and feet of water	LWT	= leaving water temperature, °F
EAT	= entering air temperature, Fahrenheit (dry bulb/wet bulb)	LAT	= leaving air temperature, °F
HC	= air heating capacity, MBtu/h	TH	= total heating capacity, MBtu/h
TC	= total cooling capacity, MBtu/h	LC	= latent cooling capacity, MBtu/h
HR	= total heat of rejection, MBtu/h	S/T	= sensible to total cooling ratio
HE	= total heat of extraction, MBtu/h		

# WSV6 Series WATER SOURCE HEAT PUMP

## DIGITAL CONTROL MODULE

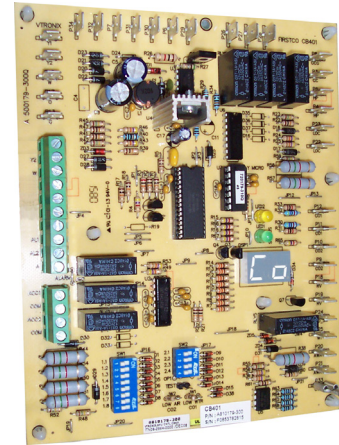
Controls unit operation and monitors all safety controls. (Patent Pending)

### Standard Features

- Digital Diagnostic Display - A two-digit display indicates either the current operational mode or a fault code
- 24V Status LED - Green light indicates 24V power to the control module
- VPC (Vacated Premises Control) - Allows the unit to operate for either 1 or 2 hours per day (total) during extended periods of unoccupancy (requires optional kit).
- Nuisance Trip Protection - Unit will attempt to start up to three times with a fault signal. If the fault continues, the unit locks out.
- Condensate Overflow Lockout
- High and Low Pressure Controls
- Water Coil Low Temperature Protection
- Over / Under Voltage Protection
- Random Re-start Timer
- Anti-short Cycle Timer
- Test Mode With LED Indicator - Speeds up control timers for service personnel
- Alarm Relay - Activated if the unit locks out
- Conformal Coating (both sides) for humidity and condensation protection

### Dip Switches (field selectable settings):

- 5 Second Compressor Delay - Blower starts before the compressor, which helps attenuate compressor start up sound.
- 45 Second Blower-off Delay - Increases cooling efficiency.
- Continuous Dehumidification Mode - Selects continuous low speed fan operation for increased humidity removal.
- VPC Switch - Selects either one or two hour daily operation (requires optional kit)
- Lower Water and Air Coil Temperature Cutout Options - Optional 10 degree F. cutouts for applications where water temperature is below 50 degrees F. (requires antifreeze solution).
- Two Accessory Relays - The relays can cycle with either the fan or compressor. In addition, relay number one can be configured for use with slow opening water valves (60 second pre-compressor initialization) and relay number 2 can be configured for a 30 second post fan delay.



Electronic Control Module

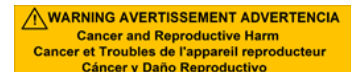


DESCRIPTION OF OPERATION	LED Readout
NORMAL MODE	Off (Green Light)
COOL MODE (NON-FUNCTIONAL)	Off (Green Light)
TEST MODE (only visible momentarily)	Off (Yellow Light)
STANDBY	Off
FAN ONLY (if active)	F5
LOCAL TX & D receive	G5
HEAT IS SENSE (if active)	H1
ACCESSORY RELAY 1	A1
ACCESSORY RELAY 2	A2
VACATED PREMISES CONTROL	V1
LOCKOUT	L1 & Code #
OVER / UNDER VOLTAGE SHUTDOWN	U1 & Code #
TEMPERATURE SENSOR ERROR	E1 & Code #
TEST MODE - NO FAULT	CODE 11
TEST MODE - HP FAULT	CODE 12
TEST MODE - LP FAULT	CODE 13
TEST MODE - COIL FAULT	CODE 14
TEST MODE - COOL FAULT	CODE 15
TEST MODE - COND. OVER LOW FAULT	CODE 16
TEST MODE - OVERVOLTAGE SHUTDOWN	CODE 17
TEST MODE - SWAPPED COIL THERMISTORS	CODE 18
TEST MODE - TEMPERATURE SENSOR ERROR	CODE 19

Sight Glass on Door



Optional Vacated Premises Selector Switch (Kit# 9WS01)



# WSV6 Series WATER SOURCE HEAT PUMP

PERFORMANCE DATA - CERTIFIED AT ARI/ISO 13256-1 CONDITIONS										
MODEL	NOM. CFM	GPM	WATER LOOP (entering Water Temperature)				GROUND WATER (entering Water Temperature)			
			86° Deg. F		68° Deg. F		59° Deg. F		50° Deg. F	
			COOLING	EER	HEATING	COP	COOLING	EER	HEATING	COP
WSV6090	2680	25	93,000	16.1	92,000	4.75	101,000	22.00	73,000	4.1
WSV6120	3680	29	120,000	15.5	140,000	4.60	133,000	21.0	110,000	4.0

NOTE: **Certified at ARI/ISO 13256-1**  
 Tabulated performance data is at noted entering water temperature and entering air conditions of 80.6 degree DB / 66.2 degree WB at ARI / ISO 13256-1 rated 208V CFM.

NOTE:  
 Requires extended range temperature package

ELECTRICAL DATA							
MODEL NUMBER	VOLTAGE	COMPRESSOR		BLOWER		MIN. CIRCUIT AMPACITY	MAX. CIRCUIT PROTECTION
		RLA	LRA	FLA	HP		
WSV6090*E	208/230V-1-60	25.0	164	4.2	1.5	35.2	60
WSV6090*F	460V-3-60	12.8	100	1.9	1.5	17.9	30
WSV6090*M	208/230V-1-60	25.0	164	4.8	2.0 <sup>1</sup>	36.1	60
WSV6090*N	460V-3-60	12.8	100	2.3	2.0 <sup>1</sup>	18.3	30
WSV6120*E	208/230V-1-60	28.2	240	10.2	3.0	45.5	70
WSV6120*F	460V-3-60	14.7	130	4.8	3.0	40.1	60
WSV6120*M	208/230V-1-60	28.2	240	13.6	5.0 <sup>1</sup>	48.9	70
WSV6120*N	460V-3-60	14.7	130	6.3	5.0 <sup>1</sup>	41.6	60

<sup>1</sup> High Static Motor



WSV6 BLOWER DATA														FACTORY BLOWER SETTINGS				
MODEL NUMBER	FAN SPEED	MOTOR TERMINAL NO.	CFM vs EXTERNAL STATIC PRESSURE (inches of water)												CLG		HTG	
			0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9	1.0	1.1	1.2	1-10 MINS	10+ MINS		
WSV6090 1.5hp	HIGH STATIC	X1 + X2	---	---	---	---	---	---	---	---	2755	2670	2515	---	---		X	X
	MED.	X2	---	---	---	2900	2850	2800	2755	2705	---	---	---	---				
	LOW	X1	---	2555	2300	1980	---	---	---	---	---	---	---	---	X			
MODEL NUMBER	FAN SPEED	MOTOR TERMINAL NO.	CFM vs EXTERNAL STATIC PRESSURE (inches of water)												CLG		HTG	
			0.3	0.4	0.5	0.6	0.7	0.8	0.9	1.0	1.1	1.2	1.3	1.4	1-10 MINS	10+ MINS		
WSV6090 High Static 2.0hp	HIGH STATIC	X1-X2	---	---	---	---	---	---	---	---	3225	3185	3140	3085	3025	X	X	
	MED.	X2	---	---	---	2965	2845	2745	2655	2585	---	---	---	---				
	LOW	X1	2820	2535	2200	---	---	---	---	---	---	---	---	---	X			

WSV6120 BLOWER DATA - BELT DRIVE											
AIRFLOW (SCFM)	DESCRIPTION	ESP (in. wg)									
		0.2	0.4	0.6	0.8	1.0	1.2	1.4	1.6	1.8	2.0
3000	RPM	561	624	684	743	800	855	909	960	1010	1058
	BHP	0.7	0.8	0.9	1.0	1.2	1.3	1.5	1.6	1.8	2.0
	URNS OPEN (±0.5)	5.0	3.5	3.0	4.0	2.0	4.0	2.5	1.0	3.5	2.0
3500	RPM	623	676	729	781	832	883	933	982	1031	1079
	BHP	0.9	1.0	1.2	1.4	1.5	1.7	1.8	2.0	2.2	2.3
	URNS OPEN (±0.5)	4	3.5	2.0	2.5	1.0	3.5	2.0	4.0	2.5	1.5
4000	RPM	673	727	778	828	876	922	966	1007	1047	1085
	BHP	1.3	1.5	1.6	1.8	2.0	2.1	2.3	2.5	2.7	2.9
	URNS OPEN (±0.5)	3.5	2.0	2.5	1.5	3.5	2.0	1.0	3.5	2.0	1.0
4500	RPM	732	784	833	881	926	969	1010	1049	1087	1121
	BHP	1.8	1.9	2.1	2.3	2.5	2.7	3.0	3.2	3.4	3.6
	URNS OPEN (±0.5)	1.5	2.5	1.0	3.5	2.0	1.0	3.5	2.0	1.0	0.0
STANDARD MOTOR - 3 HP							OPTIONAL HIGH STATIC MOTOR - 5 HP				

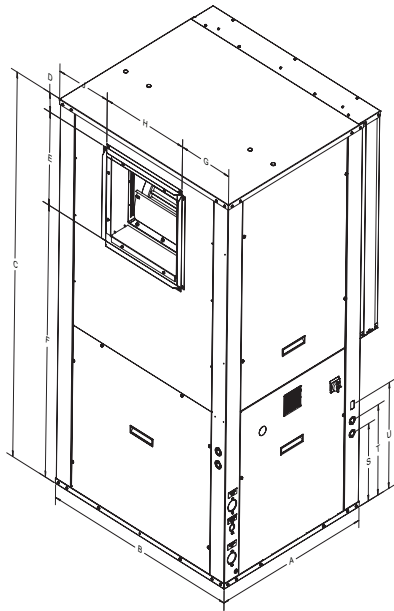
--- NOTE: not recommended

NOTE:  
 Airflow data shown is with a dry coil at 70°DB EAT with Standard 1" filter

For superior dehumidification in the summer, all models operate at a slightly lower speed for a maximum of ten minutes before shifting to a higher speed. An optional "High" speed is available for higher static applications.

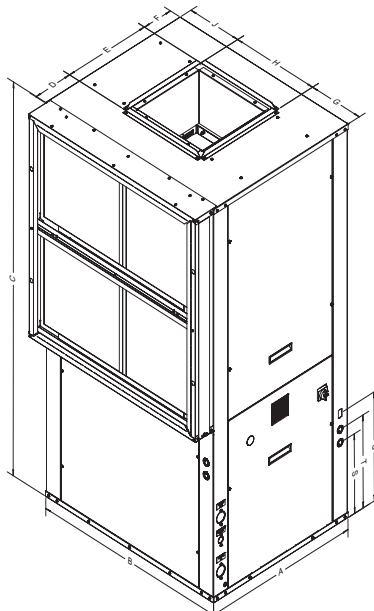


# WSV6 Series WATER SOURCE HEAT PUMP



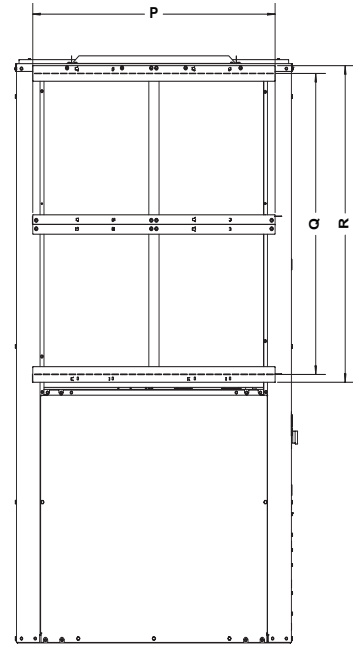
Side Discharge Shown

RIGHT HAND UNIT



Top Discharge Shown

LEFT HAND UNIT

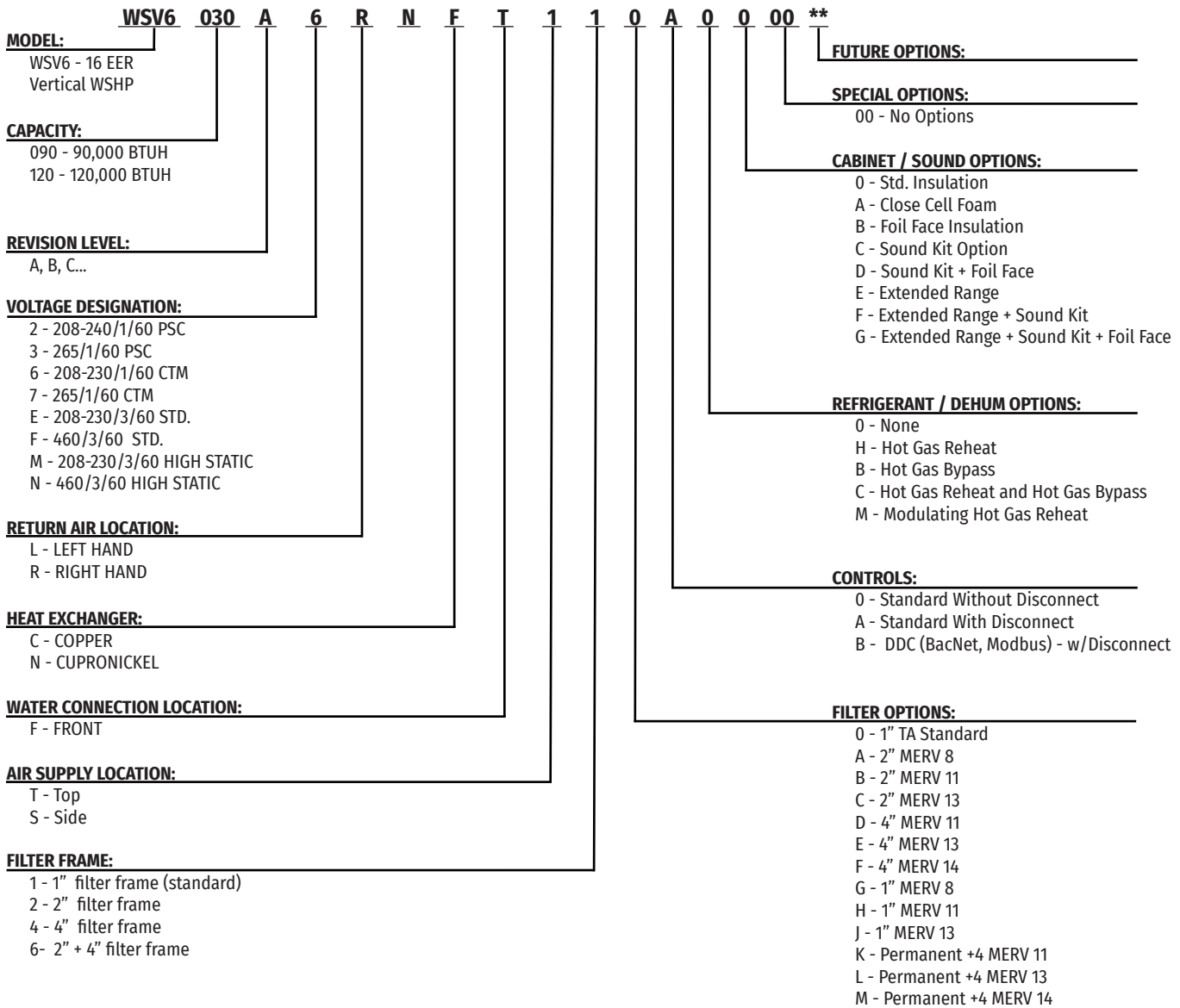


SIDE VIEW

DIMENSIONS																								
MODEL NUMBER	A	B	C	D	E	F	G	H	J	K	M	N	P	Q	R	S	T	U	V	W	Condenser Water Connections	Condensate Connections	Nom. Filter Size	Ship WT.
	Width	Depth	Height	Duct			Duct		Water In	Condensate Drain	Water Out	R/A Duct Flange Width	R/A Duct Flange Height	Filter Rack Height										
WSV6090 (Top)	32.0	40.0	74.1	8.1	18.0	6.2	11.2	18.0	11.2	5.1	10.9	15.2	39.9	39.7	41.8	15.0	17.5	20.5	20.0	32.3	3/4" FPT	11/2" FPT	20 x 20 x 1 qty 4	750
WSV6090 (Side)	32.0	40.0	74.1	3.9	18.0	52.4	11.2	18.0	11.2	5.1	10.9	15.2	39.9	39.7	41.8	15.0	17.5	20.5	20.0	32.3	3/4" FPT	11/2" FPT	20 x 20 x 1 qty 4	750
WSV6120 (Top Only)	32.0	48.0	74.1	6.5	20.8	4.9	13.9	20.8	13.6	4.8	10.8	16.3	47.8	39.8	41.8	14.9	17.4	28.9	19.9	32.3	3/4" FPT	11/2" FPT	20 x 24 x 1 qty 4	850

# WSV6 Series WATER SOURCE HEAT PUMP

## MODEL NOMENCLATURE



In keeping with its policy of continuous progress and product improvement, Applied Environmental Air reserves the right to make changes without notice. Maintenance for all Applied Environmental Air products is available under "Product Maintenance" at [www.ae-air.com](http://www.ae-air.com).

# WSV6 Series WATER SOURCE HEAT PUMP

## WSV690-WSV6-120 SPECIFICATION GUIDE

### GENERAL

Equipment shall be completely assembled, piped, internally wired, fully charged with R410A refrigerant and factory tested. Filters, thermostat field interfaces, and all safety controls shall be factory installed. Units shall be capable of operating over entering fluid temperature ranges of 50° - 110° in cooling mode and 50° - 90° in heating mode in standard configuration. The extended range option allows extends unit operating range to 20° -120° in cooling mode and 20° - 90° in heating mode.

All equipment will be tested and certified in accordance with (AHRI/ISO 13256-1) and comply with safety standards UL-1995 and CAN/CSA-C22./2. The units shall have AHRI/ISO and ETL labels.

### UNIT CONSTRUCTION

#### *Configurations*

Vertical units shall be configurable in the following arrangements, left return/top supply, left return/side supply, right return/top supply, right return/side supply. For side discharge configurations, the supply side connection will be on the opposite side of the unit tube-fin heat exchanger.

For all systems, water connections and electrical connections shall be accessible from the front service access panel.

### CABINET CONSTRUCTION

Units shall be built with a corner post and base design using a minimum of 18 gauge galvanized steel on any weight bearing component. Corner posts and panels shall be designed to allow for large service access to all internal components. Structural integrity of the cabinets shall remain unaffected by the removal of any or all of the access panels.

Air handling section interior surfaces shall be lined with 1" thick foil faced insulation. The insulation will be placed such that there is no exposed section of the fiberglass fibers into the airstream. Units without minimum of 1" thick of air handling section insulation shall not be accepted.

The condensing section interior surfaces shall be lined with ½" of micromat fiberglass insulation on the condensing section access panel and 1" thick micromat insulation on the condensing section base pan, mid pan, and all lower access panels. Units without 1" thick of insulation on the bottom panel and access panels shall not be accepted.

### SERVICE CONNECTIONS

Water connections shall be assessable from the front of the unit. Water connections shall be made through factory installed brass FPT fittings which will be flush to the water post. The water fittings shall be rigidly attached to the corner posts to forgo the use of a backup wrench when connecting the supply water. Units without rigidly attached water connections shall not be accepted.

### SUPPLY AIR CONNECTIONS

Vertical systems shall have 1" integral supply duct collars to allow for connection of the supply duct. All duct collars will be installed on the unit from the factory.

### FILTER RACK

Vertical systems will come standard with a 2" filter frame and be factory installed. The filter frame shall enclose the filter on all four sides to prevent air bypass around the filter. The filter frame shall provide tool less access to the filters for replacement. The filter rack shall have integrated duct flanges for duct-ed applications. An option 4" filter frame may also be configured. Units without 4 sided filter frames and tool-less filter access shall not be accepted.



# WSV6 Series WATER SOURCE HEAT PUMP

## WSV690-WSV6-120 SPECIFICATION GUIDE

### DRAIN PAN

All units shall use a stainless steel drain pan to increase corrosion resistance. The drain pan will be internally sloped, with the drain port located near the front of the unit. The unit will come standard with an electronic condensate overflow sensor that will be attached to the edge of the drain pan. Units without corrosion resistant drain pans, internally sloped drain pans and electronic condensate overflow sensors shall not be accepted.

Refrigeration Circuit

### GENERAL

All systems shall use R410A refrigerant. All units shall have factory charged refrigeration circuits each with its own compressor, reversing valve, bi-flow TXV, coaxial heat exchanger and fin-tube refrigerant to air heat exchanger. Each circuit will also have its own independent safeties such as a high pressure switch, low pressure switch and heat exchanger freeze sensors. The circuits will each have a high-side and low-side Schrader to allow for service access to the refrigeration systems. All service Schrader ports shall be accessible from the front of the unit.

Compressor

All systems shall use a high efficiency scroll compressor. The scroll compressor shall be attached to a 12 gauge doubly isolated compressor mounting plate to dampen vibration through the system. Units that do not have double isolated compressor mounting plates shall not be accepted.

For additional sound attenuation an optional sound package is available which offers a compressor blanket.

### COAXIAL HEAT EXCHANGER

The systems shall use one high efficiency coaxial heat exchanger. The coaxial heat exchanger shall be designed for working refrigerant pressures up to 600psi and working water pressures up to 400psi. The heat exchanger will be coated in an epoxy resin to protect against corrosion.

Optional curpronickel coaxial heat exchangers are offered to provide additional corrosion resistance in certain hard water and open loop applications.

### REVERSING VALVE

A system reversing valve (4-way valve) is included with all heat pump systems. The valve is piped to be energized in cooling mode to provide heat if a valve failure were to occur. Once the valve is energized in cooling mode, it will remain energized as long as the O call is provided to the unit control board.

Thermostatic Expansion Valve

Each independent refrigeration circuit will have its own balanced port, externally equalized bi-flow thermostatic expansion valve. The thermostatic expansion valve will have sweat connections on the inlet/ outlets and feature a screw on equalizer port connection.

### EVAPORATOR-COIL

Internally finned, 3/8-inch copper tubes mechanically bonded to a configured aluminum plate fin shall be standard. Coils shall be leak tested at the factory to ensure the pressure integrity. The coil shall be leak tested to 450 psig and pressure tested to 650 psig. The tubes are to be completely evacuated of air and correctly charged with proper volume of refrigerant prior to shipment. The refrigerant coil distributor assembly shall be of orifice style with round copper distributor tubes. The tubes shall be sized consistently with the capacity of the coil. Suction header shall be fabricated from rounded copper pipe.

# WSV6 Series WATER SOURCE HEAT PUMP

## WSV690-WSV6-120 SPECIFICATION GUIDE

### FAN BLOWER

System shall include either a forward curve direct drive fan with ECM motor or a belt driven forward curve fan with premium duty motor. The standard fan blower assemblies are designed to supply a nominal 400 CFM/ton at maximum of 1.5" of external static. Ratings for the fan blowers are done with a dry coil and with a standard 1" Merv 5 filter.

Optional high static motors are available to provide additional static range up to 2" of external static pressure at nominal 400 CFM/ton.

### REFRIGERANT OPTIONS

#### *HGR ON/OFF with part load*

Units may be configured with an optional hot gas reheat to provide for additional space dehumidification. The HGRH circuit adds an additional reheat coil in the air stream, integral 3 way valve, 2 way solenoid valve, and check valve. For systems with multiple refrigeration circuits, only the primary circuit will have the HGRH circuit.

The reheat coil circuit will be controlled via the H terminal, which must be wired to an external humidistat to provide dehumidification call to enable hot gas reheat mode. The HGRH circuit will provide two stages of dehumidification based on cooling demand. In full load, the 3-way valve will bypass all refrigerant flow into the reheat coil. In part load, the 3 way valve will divert refrigerant flow into both the coaxial heat exchanger and reheat coil to reduce the amount of heat added back into the air stream. When the call for dehumidification is removed, both the 3-way valve and 2 way solenoid valve will close to divert all refrigerant flow through the coaxial coil.

Systems that do not offer hot gas reheat with part load shall not be accepted.

Electrical and Controls

### GENERAL

All units shall have a control box mounted in the condensing section compartment which shall house all necessary electrical components for unit operation. This control box will serve as the location for wiring of the high voltage and low voltage circuits for unit operation.

The unit will be controlled via 24V low voltage terminals, which shall connect to an external thermostat or controller logic and which will control the heating and cooling provided by the unit.

The electrical control box will contain the following components.

1. Compressor Contactors
2. Blower motor contactors
3. Control Board
4. Low Voltage Wiring Connections
5. High Voltage terminal block
6. 24V Transformer for low voltage control
7. Phase monitor
8. High Voltage Disconnect Switch
9. Ground Connection

Units without internal phase monitors and high voltage disconnect switch shall not be accepted.

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