



# WSV6

Water Source Heat Pump

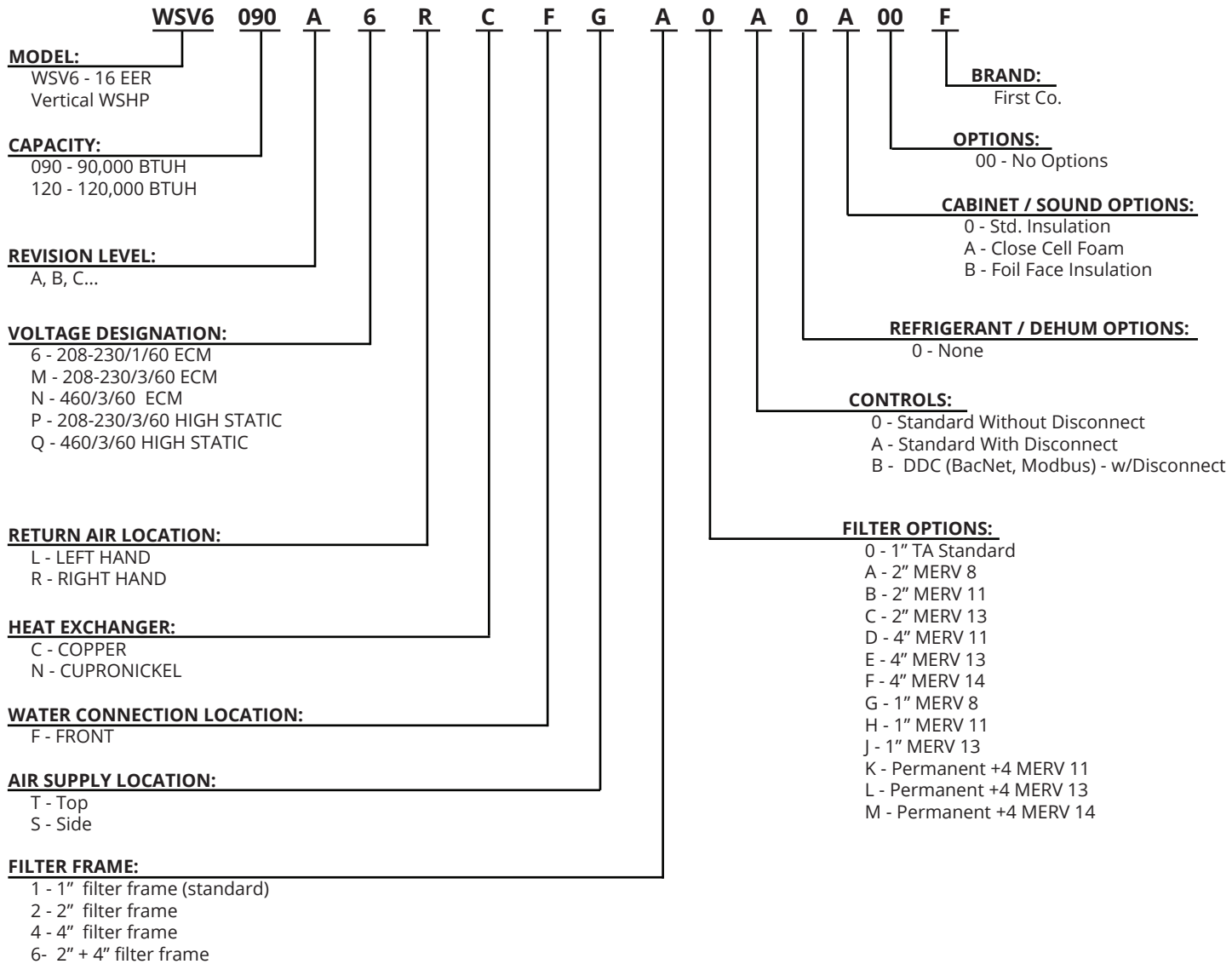
**HydroTech**™

Vertical

7.5 thru 10 Tons



# NOMENCLATURE



# WSV6

## WATER SOURCE HEAT PUMP

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

- **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:** Air handling section lined with 1" fiberglass insulation with FSK which is a flame retardant, vapor barrier. Condensing section lined with 1" fiberglass insulation on access panels, mid panel. Improves 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 with 2" or 4" filters. Optional 6" filter rack available with 2" and 4" filters.
- **State-of-the-art Digital Control Module**



## ADDITIONAL STANDARD FEATURES

- 100% Factory Tested!
- 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"-2" field convertible filter rack with 1" throwaway Filter
- Disconnect switch and phase monitor
- Water coil freeze sensor
- Air coil freeze sensor
- Condensate overflow sensor

## OPTIONAL FEATURES

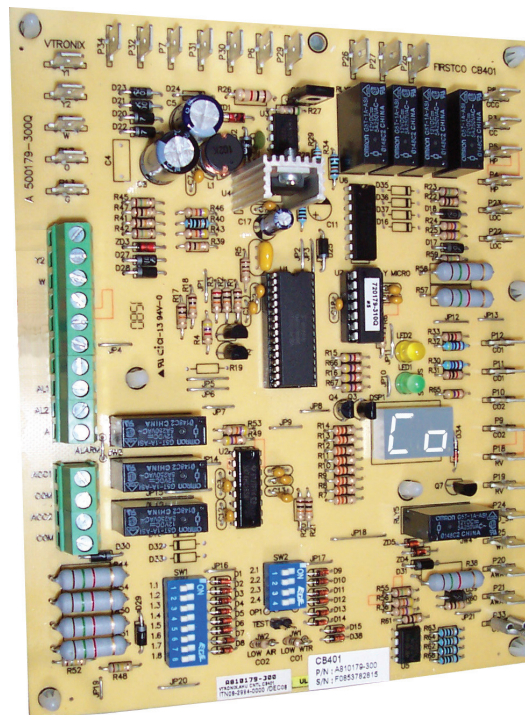
- Cupronickel Coaxial Heat Exchanger
  - Vacated Premises Control
  - E-Coated Air Coil Corrosion Protection
  - Evaporator Temperature Sensor
-

## 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



Electronic Control Module





DESCRIPTION OF OPERATION	LED Readout
NORMAL MODE	ON (Green Light)
CONTROLLER NON-FUNCTIONAL	OFF (Green Light)
TEST MODE (pins shorted momentarily)	ON (Yellow Light)
STANDBY	St
FAN ONLY (G active)	Fo
COOL (Y1 & O active)	Co
HEAT 1st Stage (Y1 active)	H1
ACCESSORY RELAY 1	A1
ACCESSORY RELAY 2	A2
VACATED PREMISES CONTROL	Vp
FAULTY RETRY	rE & CODE #
LOCKOUT	Lo & Code #
OVER / UNDER VOLTAGE SHUTDOWN	Ou & Code #
TEMPERATURE SENSOR ERROR	SE & CODE #
TEST MODE - NO FAULT	CODE 11
TEST MODE - HP FAULT	CODE 12
TEST MODE - LP FAULT	CODE 13
TEST MODE - CO1 FAULT	CODE 14
TEST MODE - CO2 FAULT	CODE 15
TEST MODE - COND. OVERFLOW FAULT	CODE 16
TEST MODE - OVER/UNDER SHUTDOWN	CODE 17
TEST MODE - SWAPPED CO1/CO2 THERMISTORS	CODE 18
TEST MODE - TEMPERATURE SENSOR ERROR	CODE 19

LBL02



Sight Glass on Door

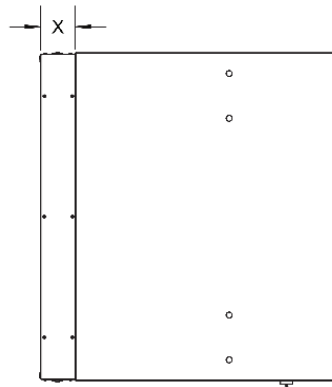
Optional Vacated Premises Selector Switch

## DIP SWITCHES (FIELD SELECTABLE SETTINGS):

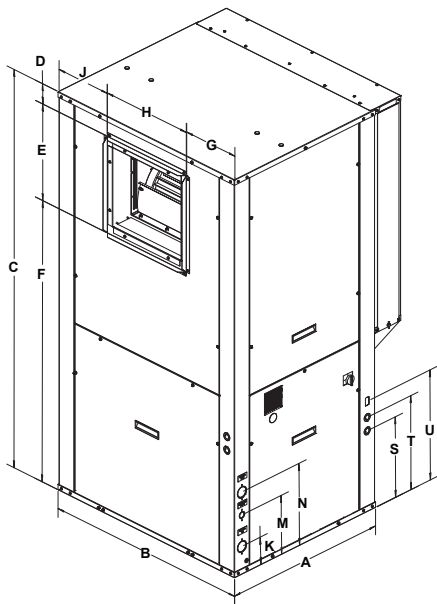
- 5 Second Compressor Delay - Blower starts before the compressor, which helps attenuate compressor start up sound.
- 45 Second Blower-off Delay - Increases cooling efficiency.
- Dehumidification Mode - Selects continuous low speed fan operation for increased humidity removal.
- VPC Switch - Selects either one or two hour daily operation (requires optional kit)
- Lower Water and Air Coil Temperature Cutout Options - Optional 10 °F. Cutouts for applications where water temperature is below 50 °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.



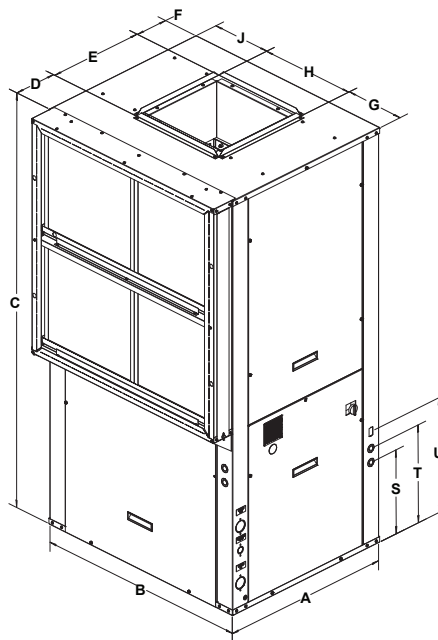
# DIMENSIONS



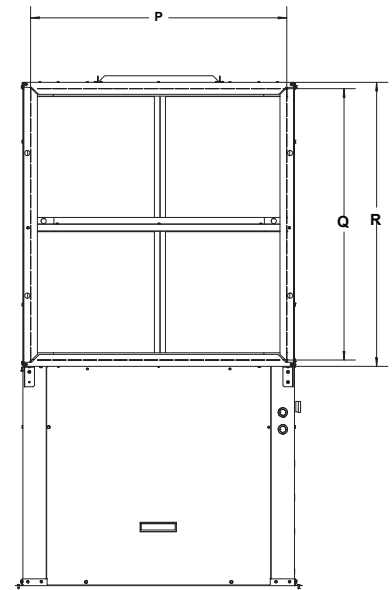
Side Discharge  
Left Hand Unit



Straight Discharge  
Right Hand Unit



Top Discharge  
Right Hand Unit



Side View (coil side)  
Left Hand

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	1-1/2" FPT	3/4" 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	1-1/2" FPT	3/4" 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	1-1/2" FPT	3/4" FPT	20 x 24 x 1 qty 4	850

# PERFORMANCE DATA

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

Tabulated performance data is at noted entering water temperature and entering air conditions of 80.6 degree DB / 66.2 degree WB at 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*	208/230V-3-60	25.0	164	4.2	1.5	35.2	60
	460V-3-60	12.8	100	1.9	1.5	17.9	30
	208/230V-3-60	25.0	164	4.8	2.0	36.1	60
	460V-3-60	12.8	100	2.3	2.0	18.3	30
WSV6120*	208/230V-3-60	28.2	240	10.2	3.0	45.5	70
	460V-3-60	14.7	130	4.8	3.0	40.1	60
	208/230V-1-60	28.2	240	13.6	5.0	48.9	70
	460V-3-60	14.7	130	6.3	5.0	41.6	60

Data is subject to change. Please verify current information on [www.firstco.com](http://www.firstco.com).



# BLOWER DATA

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

WSV6120 - 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)	4.0	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:**

Air flow data shown is with a dry coil at 70°DB EAT with Standard 1" filter

Data is subject to change. Please verify current information on [www.firstco.com](http://www.firstco.com).

# SPECIFICATION GUIDE

## GENERAL

Equipment is completely assembled, piped, internally wired, fully charged with R454B 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 extends unit operating range to 20°- 120° in cooling mode and 20° - 90° in heating mode.

## UNIT CONSTRUCTION

### CONFIGURATIONS

Vertical units are 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 is on the opposite side of the unit finned tube heat exchanger.

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

### CABINET CONSTRUCTION

Units are 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 are designed to allow for service access to all internal components. Structural integrity of the cabinets is unaffected by the removal of any or all of the access panels.

Air handling section interior surfaces are lined with 1" thick foil faced insulation.

The condensing section interior surfaces are lined with 1" of fiberglass insulation on the condensing section access panel, base pan, mid pan, and all lower access panels.

### SERVICE CONNECTIONS

Water connections are accessible from the front of the unit. Water connections shall be made through factory installed brass FPT fittings which will be flush to the water panel. The water fittings shall be rigidly attached to the corner posts to forgo the use of a backup wrench when connecting the supply water.

### SUPPLY AIR CONNECTIONS

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

### FILTER RACK

Vertical systems come standard with a 2" filter frame factory installed. The filter frame encloses the filter on all four sides to prevent air bypass around the filter. The filter frame provides tool-less access to the filters for replacement. The filter rack has integrated duct flanges for ducted applications. An option 4" filter frame may also be configured.

### DRAIN PAN

All units use a stainless steel drain pan to increase corrosion resistance. The drain pan will be internally two-way sloped, with the drain port located near the front of the unit. The unit comes standard with an electronic condensate overflow sensor attached to the edge of the drain pan.

## REFRIGERATION CIRCUIT

### GENERAL

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

### COMPRESSOR

All systems use a high efficiency scroll compressor. The scroll compressor is attached to a 12 gauge double-isolated compressor mounting plate to dampen vibration throughout the system.

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

### COAXIAL HEAT EXCHANGER

The systems use one high efficiency coaxial heat exchanger. The coaxial heat exchanger is designed for working refrigerant pressures up to 600psi and working water pressures up to 400psi. The heat exchanger is 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.

# SPECIFICATION GUIDE

## Continued

### 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 has its own balanced port, externally equalized bi-flow thermostatic expansion valve. The thermostatic expansion valve has sweat connections on the inlet/outlet and feature a screw on equalizer port connection.

### EVAPORATOR COIL

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

### FAN BLOWER

System includes 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

### HGRH ON/OFF

Units may be configured with an optional hot gas reheat to provide for additional space dehumidification during the cooling mode. The HGRH circuit adds an additional reheat coil in the air stream, reheat 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 DH terminal, which must be wired to an external humdistat to provide dehumidification call to enable hot gas reheat mode. During this mode, the reheat valve diverts some hot refrigerant to the reheat coil while the rest of hot refrigerant flow into the coaxial heat exchanger. 2-phase refrigerant from reheat coil and liquid refrigerant from the coaxial heat exchanger rejoin before entering the evaporator. When the call for dehumidification is removed, the reheat solenoid valve will close to divert all refrigerant flow through the coaxial coil.

## ELECTRICAL AND CONTROLS

### GENERAL

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

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

The electrical control box contains 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

# SPECIFICATION GUIDE

## *Continued*

### **WATER SOURCE CONTROL MODULE**

All units will come standard with a WSCM electromechanical module that will control unit operation and contain safety features to protect the compressors, coaxial heat exchangers and fin-tube heat exchangers. The board will contain the following features:

1. Two-stage cooling and two-stage heating control modes for optimal temperature and
2. Anti-short cycle protection
3. Random Start
4. High and Low Pressure Safeties
5. Water Coil Freeze Protection
6. Air-coil Freeze protection
7. Over/under voltage protection
8. Fault Retry
9. Lockout with soft and hard reset
10. Condensate overflow sensor
11. Diagnostic LED display
12. Test Mode
13. Alarm Relay
14. Accessory Relays
15. Option Delays



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