



# WSV6 Series

Water Source Heat Pump Vertical 3/4 thru 6 Tons 16+ EER

# Installation, Operation, &

# Maintenance

IOM8001 Rev. D04/22



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### NOMENCLATURE

#### WSV6 PRODUCT NOMENCLATURE



# SAFETY CONSIDERATIONS:

#### 1. READ THE ENTIRE MANUAL BEFORE STARTING THE INSTALLATION.

- 2. These instructions are intended as a general guide and do not supersede national, state, or local codes in any way.
- 3. Altering the product, improper installation, or the use of unauthorized factory parts voids all warranty or implied warranty and may result in adverse operation and/or performance <u>or</u> may result in hazardous conditions to service personnel and occupants. Company employees or contractors are not authorized to waive this warning.
- 4. This product should only be installed and serviced by a qualified, licensed, and factory authorized installer or service agency.
- 5. All "kits" and "accessories" used must be factory authorized when modifying this product. Refer and follow instructions packaged with the kits or accessories when installing.

#### RECOGNIZE THE FOLLOWING SAFETY NOTATIONS THROUGHOUT THIS MANUAL AND POSTED ON THE EQUIPMENT:

$\wedge$	This warning siginifies general hazards which could result in personal injury or death.
	This warning siginifies electrical shock hazards which could result in injury or death.
	Caution is used to identify unsafe practices which could result in injury or death.
$\bigtriangleup$	Note is used to highlight suggestions which may result in enhanced installation, reliability, or operation.

### **GENERAL**



DO NOT use these units as a source of heating or cooling during the construction process. Mechanical components and filters become clogged with dirt and debris, which can cause damage to the system.

The manufacture does not warrant equipment subjected to abuse. Construction debris can void warranties and liability for equipment failure, personal injury, and property damage.



Before servicing equipment, ALWAYS turn off all power to the unit. There may be more than one disconnect switch. Electrical shock can cause injury or death.

Clear surrounding area of all tools, equipment, and debris before operating this unit.

Unit must never be operated under any circumstances without an air filter in place.

These instructions are given for the installation of the WSV6 Water source heat pump specifically. For any other related equipment, refer to the appropriate manufacturer's instructions.



Material in this shipment has been inspected at the factory and released to the transportation agency in good condition. When received, a visual inspection of all cartons should be made immediately. Any evidence of rough handling or apparent damage should be noted on the delivery receipt in the presence of the carrier's representative. If damage is found, a claim should be immediately filed against the carrier.

These models are designed for indoor installation only. Installation of this equipment, wiring, ducts, and any related components must conform to current agency codes, state laws, and local codes. Such regulations take precedence over general instructions contained in this manual.



Extreme caution must be taken that no internal damage will result from screws that are drilled into the cabinet.

# **INSTALLATION PRECAUTIONS**



Use two or more people when moving and installing these units. Failure to do so could result in injury or death. Contact with metal edges and corners can result injury. Protective gloves should be worn when handling. Exercise caution when installing and servicing unit.



Observe the following precautions for typical installation:

- Always use proper tools and equipment
- No wiring or any work should be attempted without first ensuring the unit is completely disconnected from the power source and locked out. Also, verify that a proper permanent and uninterrupted, ground connection exists prior to energizing power to the unit.
- Review unit nameplate and wiring diagram for proper voltage and control configurations. This information may vary from unit to unit.





When unit is in operation components are rotating at high speeds and caution should be taken.



# **INSTALLATION PRECAUTIONS CONT.**



When soldering and brazing, it is recommended to have a fire extinguisher readily available. When soldering and brazing close to valves or sensitive components, heat shields or wet rags are required to prevent damage to the valves or components.



Insulation is installed in the unit to provide a barrier between varying atmospheres outside and within the unit. If insulation is damaged condensation can occur and can lead to corrosion, component failure, and possible property damage. Damaged insulation must be repaired prior to the operation of the unit. Insulation will lose its effectiveness and value when wet, torn, separated, and/or damaged.

ALWAYS WEAR ALL APPROPRIATE PERSONAL PROTECTION EQUIPMENT WHEN INSTALLING AND SERVICING THESE UNITS.



When servicing this equipment, because of high pressures, make sure the reversing valve, expansion device, filter drier and other components are specifically designed for R-410A refrigerant.

ONLY USE service equipment specifically designated for use with R-410A.



R-410A can become combustible if mixed with air at elevated temperature and/or pressure. Failure to follow this warning could result in property damage and personal injury or death.

# TECHNICAL DATA:

PERFORMANCE DA	ΔTA
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			PERFORMANCE DATA - CERTIFIED AT AHRI/ISO 13256 - 1 CONDITIONS								PERFORMANCE DATA - AT STANDARD OPERATING CONDITIONS			
	NOM.		WATER	LOOP ( Tempe	entering Wa rature)	ter	GROUNI	O WATER Tempei	(entering W rature)	ater	STAN	DARD (eı Tempei	ntering Wate rature)	r
MODEL	FCM	GPM	86 Deg	;.F	68 Deg	g.F	59 De	g.F	50 Deg	ς.F	85 De	g.F	70 Deg.F	
			COOLING	EER	HEATING	СОР	COOLING	EER	HEATING	COP	COOLING	EER	HEATING	СОР
WSV6009	330	3.0	9,200	16.0	10,800	4.80	10,800	24.00	8,400	3.8	9,300	15.90	11,000	4.70
WSV6012	450	3.0	11,500	16.0	13,200	4.70	13,200	24.00	10,500	3.8	11,500	15.80	13,300	4.60
WSV6018	600	4.5	17,800	16.0	22,600	4.60	20,800	24.00	18,400	4.0	17,600	16.20	23,000	4.50
WSV6024	800	6.0	22,600	16.0	25,000	4.90	25,400	24.00	22,000	4.1	23,000	16.30	25,000	4.80
WSV6030	870	8.5	30,000	16.0	33,000	4.70	34,000	23.00	29,000	4.0	30,500	16.00	33,500	4.50
WSV6036	1150	9.0	36,000	16.0	41,000	4.90	42,500	24.00	35,500	4.1	38,000	16.50	41,500	4.80
WSV6042	1250	10.7	42,000	16.0	45,000	5.00	46,500	24.00	39,000	4.2	42,500	16.20	46,000	4.90
WSV6048	1475	12.0	48,000	16.0	57,000	5.00	55,500	24.00	43,500	4.0	50,000	16.40	59,000	4.90
WSV6060	1640	15.0	60,000	16.0	68,000	4.80	65,000	23.00	53,500	4.1	59,000	15.90	69,000	4.70
WSV6072	1890	18.0	72,000	16.0	78,000	4.50	77,500	22.50	66,500	4.0	71,500	15.90	79,000	4.40

#### ELECTRICAL DATA

ELECTRICAL DATA							
MODEL	VOLTAGE	COMPR	ESSOR	BLO	WER	MIN. CIRCUIT	MAX. CIRCUIT
NUMBER	VOLTAGE	RLA	LRA	FLA	HP	AMPACITY	PROTECTION
WSV6009	208/230V-1-60	3.7	22.0	2.3	1/4	9	15
WSV6012	208/230V-1-60	4.7	25.0	2.3	1/4	10	15
WSV6018	208/230V-1-60	10.0	56.3	2.8	1/3	15	20
WSV6024	208/230V-1-60	10.9	62.9	4.1	1/2	17	25
WSV6030	208/230V-1-60	15.4	82.6	4.1	1/2	24	35
WSV6036	208/230V-1-60	15.4	83.9	4.1	1/2	24	35
WSV6042	208/230V-1-60	19.2	123.4	4.1	3/4	29	45
WSV6048	208/230V-1-60	19.6	130.0	7.6	1	34	50
WSV6060	208/230V-1-60	27.1	144.2	7.6	1	42	60
WSV6072	208/230V-1-60	34.3	178.0	7.6	1	52	70

#### **BLOWER DATA**

BLOWER DATA								FA	ACTORY BL SETTING	.OWER GS					
MODEL	MODEL FAN MOTOR CFM vs. STATIC PRESSURE (in. w.g.)								COOLING		HEATING				
NUMBER	SPEED	TERMINAL NO.	0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9	1.0	1 - 10 MIN	10+ MIN	
	HIGH	WHT	380	360	330	300	270	-	-	-	-	-			
WSV6009	MEDIUM	VIO	360	330	300	260	230	-	-	-	-	-		x	x
	LOW	GRY	310	270	230	200	180	-	-	-	-	-	х		
	HIGH	WHT	520	500	480	440	410	-	-	-	-	-			
WSV6012	MEDIUM	VIO	460	440	410	380	360	-	-	-	-	-		x	x
	LOW	GRY	430	400	360	350	330	-	-	-	-	-	х		
	HIGH STATIC	4	-	-	770	740	690	660	-	-	-	-			
WSV6018	HIGH	3	600	580	530	500	460	-	-	-	-	-		x	х
	LOW	2	540	510	460	430	370	-	-	-	-	-	х		
	HIGH STATIC	4	-	-	980	950	900	880	-	-	-	-			
WSV6024	HIGH	3	760	740	710	650	610	-	-	-	-	-		x	x
	LOW	2	630	600	550	510	480	-	-	-	-	-	х		
	HIGH STATIC	4	-	-	980	930	900	870	-	-	-	-			
WSV6030	HIGH	3	940	900	870	830	790	-	-	-	-	-		х	х
	LOW	2	600	550	500	450	410	-	-	-	-	-	х		
	HIGH STATIC	4	-	-	1,320	1,290	1,270	1,240	-	-	-	-			
WSV6036	HIGH	3	1,130	1,090	1,060	1,030	1,000	-	-	-	-	-		x	x
	LOW	2	990	950	910	880	850	-	-	-	-	-	х		
	HIGH STATIC	4	-	-	1,370	1,340	1,320	1,290	-	-	-	-			
WSV6042	HIGH	3	1,330	1,300	1,270	1,240	1,220	-	-	-	-	-		х	х
	LOW	2	1,030	1,000	960	920	890	-	-	-	-	-	х		
	HIGH STATIC	4	-	-	1,620	1,580	1,560	1,520	-	-	-	-			
WSV6048	HIGH	3	1,550	1,530	1,510	1,480	1,450	-	-	-	-	-		х	х
	LOW	2	1,370	1,350	1,330	1,290	1,260	-	-	-	-	-	х		
	HIGH STATIC	4	-	-	2,130	2,080	2,060	2,030	-	-	-	-			
WSV6060	HIGH	3	1,900	1,860	1,820	1,780	1,740	-	-	-	-	-		x	x
	LOW	2	1,710	1,670	1,620	1,580	1,540	-	-	-	-	-	х		
	HIGH STATIC	4	-	-	2,080	2,060	2,010	1,990	1,950	1,960	1,880	1,830			
WSV6072	HIGH	3	2,010	1,980	1,950	1,910	1,860	1,830	1,790	1,740	1,710	-		x	x
	LOW	2	1,860	1,830	1,780	1,740	1,700	1,670	1,620	1,590	1,530	-	х		

# PHYSICAL DATA:

DIMENSIONS								
MODEL NUMBER	Width	Depth	Height	Ship WT.				
WSV6009	21.50	21.50	36.25	164				
WSV6012	21.50	21.50	36.25	166				
WSV6018	21.50	21.50	36.25	195				
WSV6024	21.50	21.50	36.25	208				
WSV6030	21.50	21.50	39.25	221				
WSV6036	21.50	26.00	43.25	254				
WSV6042	26.00	26.00	43.25	295				
WSV6048	26.00	26.00	43.25	315				
WSV6060	26.00	26.00	51.25	360				
WSV6072	26.00	26.00	51.25	365				





# MOUNTING DETAILS

It is important to ensure the unit is securely mounted and that the mounting structure is sufficient to support the operating weight of the equipment. Place and size all anchors to ensure a safe and durable installation.



Locate the unit to provide all minimum clearances as specified and that allows for adequate serviceability of the unit including filter access and panel removal. Consider proper clearances needed for water connections, electrical connections, duct connections, and sufficient return airflow.

These units are for indoor installation ONLY (\*\*Units <u>should always</u> be mounted on a <u>solid surface</u> and not just a frame)







MOUNT ON HIGH PLATFORM

HANGING FROM CEILING

**ISOLATION PAD** 

#### FIGURE 1. MOUNTING EXAMPLES

Do not locate unit in areas subject to freezing temperatures or where high humidity levels could cause cabinet condensation. WSV6 units are available in right and left hand configurations. Units should be mounted level with a proper drain pan pitch toward the condensate drain. 3/8"-1/2" vibration isolation pads should be used to minimize vibration transmission.

## WATER & ELECTRICAL CONNECTIONS



DIMENSIONS						
MODEL NUMBER	Condenser Water Connections	Condensate Connections				
WSV6009	3/4" F.P.T.	3/4" F.P.T.				
WSV6012	3/4" F.P.T.	3/4" F.P.T.				
WSV6018	3/4" F.P.T.	3/4" F.P.T.				
WSV6024	3/4" F.P.T.	3/4" F.P.T.				
WSV6030	3/4" F.P.T.	3/4" F.P.T.				
WSV6036	3/4" F.P.T.	3/4" F.P.T.				
WSV6042	1" F.P.T.	3/4" F.P.T.				
WSV6048	1-1/8" F.P.T.	3/4" F.P.T.				
WSV6060	1-1/8" F.P.T.	3/4" F.P.T.				
WSV6072	1-1/8" F.P.T.	3/4" F.P.T.				



Water Flow Pressure Drop Table								
	Flow Rate (GPM)	1.0	2.0	3.0	4.0	5.0	6.0	7.0
W2V0009	Pressure Drop (PSI)	0.2	0.9	1.9	3.0	4.5	6.3	8.2
	Flow Rate (GPM)	2.0	3.0	4.0	5.0	6.0	7.0	8.0
W3V0012	Pressure Drop (PSI)	1.0	2.0	3.3	4.8	6.6	8.7	10.9
	Flow Rate (GPM)	2.0	3.0	4.0	5.0	6.0	7.0	8.0
0030018	Pressure Drop (PSI)	1.0	2.0	3.3	4.8	6.6	8.7	10.9
WSV6024	Flow Rate (GPM)	5.0	6.0	7.0	8.0	9.0	10.0	11.0
VV3V6024	Pressure Drop (PSI)	1.4	2.0	2.6	3.3	4.1	5.0	6.0
	Flow Rate (GPM)	6.0	7.0	8.0	9.0	10.0	11.0	12.0
WSV6030	Pressure Drop (PSI)	2.3	3.0	3.9	4.8	5.8	6.9	8.0
WEVEO26	Flow Rate (GPM)	6.0	8.0	10.0	12.0	14.0	16.0	18.0
VVSV6036	Pressure Drop (PSI)	1.1	1.9	2.8	4.0	5.2	6.7	8.2
	Flow Rate (GPM)	7.0	9.0	11.0	13.0	15.0	17.0	19.0
W3V0042	Pressure Drop (PSI)	1.4	2.1	3.0	4.1	5.2	6.6	8.0
W/SV/6049	Flow Rate (GPM)	12.0	14.0	16.0	18.0	20.0		
W3V0048	Pressure Drop (PSI)	2.6	3.5	4.7	5.9	7.4		
	Flow Rate (GPM)	12.0	14.0	16.0	18.0	20.0	22.0	24.0
VV3V0000	Pressure Drop (PSI)	2.6	3.3	4.2	5.1	6.2	7.3	8.5
\ <u>\\</u> {\\ <u>\</u> {\\ <u>\</u> {\\ <u>\</u> {\\ <u>\</u> {\\ <u>\</u> }	Flow Rate (GPM)	12.0	14.0	16.0	18.0	20.0	22.0	24.0
VV3V0U/2	Pressure Drop (PSI)	2.6	3.3	4.2	5.1	6.2	7.3	8.5

### **DUCT CONNECTIONS**



SUPPLY DUCT CONNECTIONS						
MODEL	Α	В				
NUMBER	Duct	Duct				
WSV6009	7.75	12.75				
WSV6012	7.75	12.75				
WSV6018	13.75	16.25				
WSV6024	13.75	16.25				
WSV6030	13.75	16.25				
WSV6036	15.75	16.25				
WSV6042	17.75	17.75				
WSV6048	17.75	17.75				
WSV6060	19.00	19.00				
WSV6072	19.00	19.00				

All duct work must be installed in accordance with National Fire Protection Assoc. Codes 90A and 90B. Supply and Return ducts must be sized properly as to not exceed static pressure capabilities (See Blower Data Table Pg.9) Ducts should be adequately insulated to prevent condensation and to minimize heat loss. A flexible connector is recommended for supply air connections on metal duct systems.

### **APPLICATION:**

To ensure optimum cooling and heating performance, the cooling tower and boiler loop temperature should be maintained between 55-75 deg. F in the heating mode and 60-95 deg. F in the cooling mode. Heat is rejected from the heat pump's refrigerant into the water loop in the cooling mode, and heat is absorbed from the water loop into the refrigerant in the heating mode.

A cooling tower and/or boiler may be required to maintain proper water temperature within the water loop. In an open cooling tower, chemical water treatment is mandatory to ensure water is free of corrosive materials.

Failure to maintain proper water loop temperatures could result in equipment failure and property damage, and void warranties.

When a secondary heat exchanger is used (i.e. plate to plate; closed loop system) it is imperative that all air is purged from the system to prevent condenser fouling.



THE ENTIRE WATER LOOP MUST BE COMPLETELY CLEANED AND FLUSHED OF ALL DEBRIS PRIOR TO FINAL CONNECTIONS AND UNIT OPERATION. Valves should be adjusted to supply proper water flow rated for the unit. Nominal flow rate is 3 GPM per 12,000 BTUH of cooling. Failure to do so will VOID ALL FACTORY WARRANTY.

### <u>PIPING</u>

#### **Piping Notes:**

- 1. Flush all field piping prior to connection to clear all debris.
- 2. Open all valves (mid-way for hand valves, manually open motorized valves) prior to soldering and brazing. Use proper heat shields to protect valve bodies.
- 3. When soldering or brazing to the unit, it is recommended to have a fire extinguisher readily available.
- 4. Use proper soldering and brazing techniques to protect valve bodies and unit components.
- 5. Avoid rapid quenching of soldered joints to prevent weakening.
- 6. Make provisions for expansion and contraction of piping systems to provide movement with temperature changes. Failure to do so will result in damage and failure of piping, fittings, and valves throughout the system.
- 7. DO NOT insulate the heads or motorized portion of control valves. Excessive heat build-up can cause damage and affect proper operation of the system.
- 8. Consider electrical routing when installing field piping.
- 9. Observe all regulations and codes governing installation of piping.
- 10. When all connections are complete, pressure test the system, and repair any leaks or faulty joints. HYDRONIC SYSTEMS ARE NOT DESIGNED TO HOLD PRESSURIZED AIR AND SHOULD ONLY BE TESTED WITH WATER. Failure to observe this note could damage the system.

#### **Piping Installation:**



All piping must be adequately sized to meet the designed water flow as specified for the specific application, and must adhere to all applicable codes. Piping connections on the equipment are not necessarily indicative of the proper supply and return line sizes. Refer to the project drawings and specifications for sizing.



### PIPING (Cont.)



When connecting piping to fan coil units, do not bend or reposition the coil header tubing for alignment purposes. This could cause a tubing fracture and result in a water leak and will void warranty.

Condensate drain lines must be properly installed with adequate slope away from unit to assure proper drainage. A minimum trap of 1.5 inches must be installed to isolate the negative pressures of the drain pan from the drain line.



Check the condensate overflow sensor for proper operation and adjust if necessary. Final field adjustment ensures proper operation to avoid property damage.





On units with plastic drain pans the drain connection must be made hand tight only.

Chilled water piping must be properly insulated to prevent condensation and potential property damage. It is also recommended that all piping be insulated to prevent freezing in unconditioned spaces.



Do not bend or kink supply lines or hoses. Adhere to minimum bend radii to prevent piping damage and potential restrictions in water flow.

Hose Diameter	Minimum Bend Radii
1/2" [12.7mm]	2-1/2" [6.4cm]
3/4" [ 19.1mm]	4" [10.2cm]
1" [25.4mm]	5-1/2" [14cm]
1-1/4" [31.8mm]	6-3/4" [17.1cm]

### PIPING (Cont.)



For all applications, 50 deg. F minimum entering water temperature and rated water flow is required to prevent freezing. Antifreeze solution is required for any application with entering water below 50 deg. F

These units are designed to operate with the entering liquid temperature between 50 and 100 deg. F. With the extended range option, the heat pump model can operate with entering liquid temperatures between 30-100 deg. F. below 50 deg. F. Antifreeze solution must be used to prevent freezing. Frozen coils water coils are not covered under warranty.



When anti-freeze is used in the loop, insure that it is compatible with the Teflon tape that is applied.

Cooling Tower / Boiler and Geo Thermal applications should have sufficient antifreeze solution when required to protect against freezing.

#### Well Water Application:

When a well is used for supplying water, a cupronickel heat exchanger is required and the well pump must operate only when the heat pump operates. A 24V contactor can be wired to the ACC1 terminal on the control module which can be selected to energize prior to or at compressor startup.

Closed loop and pond applications require specialized design knowledge. No attempt at these installations should be made unless the licensed installer as received specific training.

Potential Failure Mode	Water Chemistry	Conner	Cu-Ni	
rotentiar ranare mode	Parameter	copper	culti	
	pH Level	7-9	7-9	
	Hardness (Calcium or	< 250 ppm	< 250 nom	
	Magnesium Carbonate)	< 350 ppm	< 350 ppm	
	Langelier Saturation	-0.5 to 0	-0.5 to 0	
	Index (LSI)	-0.5 (0 0	-0.5 (0 0	
	Ryznar Stability Index (RSI)	6.2 - 6.8	6.2 - 6.8	
	Hydrogen Sulfide	< 0.5 ppm*	< 0.5 ppm*	
Corrosion and Scaling	Sulfates	< 125 ppm	< 125 ppm	
Corrosion and Scaling	Chlorine	< 0.5 ppm	< 0.5 ppm	
	Chlorides	< 20 ppm	< 150 ppm	
	Carbon Dioxide	< 5 ppm	< 5 ppm	
	Ammonia	< 2 ppm	< 2 ppm	
	Ammonia Chloride, Nitrate, Hydroxide, Sulfate,	< 0.5 ppm	< 0.5 ppm	
	Total Dissolved Solids (TDS)	< 1000 ppm	< 1500 ppm	
Iron Fouling	Iron, Iron Bacteria	< 0.2 ppm	< 0.2 ppm	
non rouning	Iron Oxide	< 1 ppm	< 1 ppm	
	Suspended Solids	< 10 ppm, < 600 micron	< 10 ppm, < 600 micron	
Erosion	Suspended Solids	or 30 mesh filter size	or 30 mesh filter size	
	Design Water Velocity	3 GPM/TON	3 GPM/TON	

# **CONTROLS**

Standard Safety controls included with the WSV6:

- High Pressure switch on the refrigerant discharge line
- Low pressure switch on the refrigerant suction line
- Water coil low temp cutout on the heat exchanger
- Condensate overflow protection in the drain pan
- Anti-short cycle timer for compressor protection
- Random start 5-80 second start upon power up

Control Notes:

The low pressure switch input is bypassed for the initial 120 seconds of a compressor run cycle to prevent nuisance lockouts.

Should an over/under voltage condition be detected, the module will initiate shutdown. This feature is self-resetting when the voltage comes back into operational range of 18.5-31VAC.

The module has a set of contacts for remote fault indication. Contacts can provide a 24VAC output or converted to a dry contact.

Test mode can be entered by momentarily jumping test pins. This will enter the unit into a 10 minute test period in which all time delays are sped up by 15X. While in the test mode the LED display will display the last fault code.

While in the fault retry mode the LED display the retry and fault code.

The unit will initiate the anti-short cycle timer and try to restart after delays. If 3 consecutive faults occur the control will go into lockout mode. The last fault causing the lockout will be stored. The lockout and fault code will be displayed. The compressor relay will be turned off and the alarm relay activated.

Lockout mode can be soft reset by turning the thermostat to the off position and the back to heat or cool. Or a hard reset via the power disconnect.

# CONTROLS (Cont.)

CONTROLLER OPERATING CODES				
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	Ау			
FAULT 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			

STANBY FAN ONLY COOL HEAT 1ST STAGE ACCESSORY RELAY 1 ACCESSORY **RELAY 2** VAC PREM. CONTROL FAULT RETRY LOCKOUT OVER/UNDER VOLT SHUTDOWN TEMP. SENSOR ERROR CODE 11 CODE 12

TABLE 1. OPERATING CODES



FIGURE 5. LED DISPLAY



### <u>Thermostat</u>

A standard 24 VAC Heat Pump thermostat is required that will operate the reversing valve in the cooling mode. Thermostat connections and their functions are as follows:

- C Transformer 24VAC Common
- O Reversing Valve (energized in cooling)
- Y Compressor Contactor
- R Transformer 24VAC Hot
- G Evaporator Blower







Digital Control Module



FIGURE 7. HP Thermostat

Thermostat Installation - The Thermostat should be located on an interior wall in a larger room, away from supply duct draft. DO NOT locate the thermostat may in certain cases need to be sealed to prevent erroneous temperature may in certain cases need to be sealed to prevent erroneous temperature measurement. Position the thermostat back plate against the wall so that it appears level and so the thermostat wires protrude through the middle of the back plate mounting holes and drill holes with a 3/16" (5mm) bit. Install supplied anchors and secure plate to the wall. Thermostat wire must be 18 AWG wire.

# **ELECTRICAL**



Disconnect all power supplies before servicing. Lock out/tag out to prevent accidental electrical shock. NOTE: There may be multiple power sources supplying the unit.





Use copper conductors only. Install all parts and panels before operation of unit. Failure to follow these warnings can result in injury or death.

All wiring must comply with local and national code requirements. Units are provided with wiring diagrams and nameplate data to provide information required for necessary field wiring.

These units are provided with a class 2 transformer for 24 volt control circuits. Should any add-on accessory or component also have a class 2 transformer furnished, care must be taken to prevent interconnecting outputs of the two transformers by using a thermostat with isolating contacts.



Connect ground wire to ground terminal marked "GND". Failure to do so can result in injury or death.

Any device that has been furnished by the factory for field installation must be wired in strict accordance with the associated wiring diagram. Failure to do so could damage components and void warranties.

### WIRING DIAGRAM











## PRE-START UP CHECK LIST



Before Start-up, all components should be checked thoroughly. The system should be completely cleaned of all construction dirt and debris. Coils should be cleaned using an industry acceptable cleaning method.

#### Prior to starting the unit:

- 1. Ensure supply voltage matches nameplate data.
- 2. Ensure unit is properly grounded.
- 3. WITH POWER OFF, check blower wheel set screws for proper tightness and that the blower wheel rotates freely.
- 4. Ensure unit is properly and securely installed.
- 5. Ensure proper slope for condensate drainage.
- 6. Ensure accessibility for future servicing.
- 7. Ensure condensate line is properly sized, attached, trapped, pitched, and tested.



- 8. Ensure all cabinet openings and wiring connections are tight and sealed.
- 9. Ensure a clean filter is installed.
- 10. Ensure all access panels and cover plates are properly installed and secured.
- 11. Ensure that all air has been vented from the water coil.
- 12. Check that the water coil, valves, and piping are leak checked, and insulated as required.
- 13. Ensure all components have been installed and wired in strict accordance with the documents provided.
- 14. Ensure electrical overcurrent protection and wiring are correct size.
- Verify all dip switches are set to the off position for standard unit operation. (Dip switch 1, position 2 is set to on only if DC motor is installed. (See figure 11)
- 16. All water piping is complete and connections are leak free.



FIGURE 11. Dip Switch

- 17. Check condensate overflow sensor for proper operation and position.
- 18. Unit is securely mounted and properly isolated for vibration.

#### UNIT START UP:

- 1. Set thermostat to highest setting, and the system switch to COOL, and the fan switch to AUTO. Reversing valve should energize, compressor and fan should run after 5 minute time delay.
- 2. Reduce thermostat setting to 5 degrees below room temperature. Verify cooling mode and PROPER ROTATION OF COMPRESSOR.
- 3. Turn thermostat system switch to OFF. Unit should shut down and reversing valve should de-energize.
- 4. AFTER 5 MINUTES (allow pressures to equalize) Set thermostat to lowest setting and set system switch to HEAT. Increase setting to 5 degrees above room temperature.
- 5. Heat pump should energize.
- 6. Set thermostat to desired room temperature and set system switch to appropriate seasonal setting or AUTO.
- 7. Re-Check system for any leaks or abnormal vibrations.
- 8. Verify proper water flow rate and adjust if necessary. Nominal 3 GPM per 12,000 BTHU.
- 9. Instruct the owner on proper operation of the unit and thermostat and provide them with relative documentation.

#### **BLOWER SPEED:**

#### PSC Motors:

Units come from the factory set to deliver rated airflow at unit designed static pressure. The heat pump has a built in dehumidification function that runs the lower fan speed for 10 minutes, the increases to the nominal CFM output until the thermostat is satisfied. All units have field adjustable motors. Refer to blower data (Pg. 9) for system adjustments from normal.

#### DC Motors:

No fan speed relays are used. Three motor leads connect directly to the control board. See wiring diagrams for speed tap selections.

#### CONNECTIONS FOR PERMANENT MAGNET MOTORS IF SO EQUIPPED



High efficiency brushless DC motors are wired with power applied at all times (G.E. X13 for example), see illustration above. Low voltage thermostat demand and board algorithms will control its use.

## **STARTUP LOG**

Todays Date: \_\_\_\_



Start up log & Unit Check

Start up Date:		
Customer:	HydroTech Model:	
Address:	Serial Number:	
Servicing Company:	(1 letter) – (2 numbers) – (1 letter) – (6 numbers) Technician:	
Problem Summary:		
Corrective Actions Taken:		
Visual Inspection:		
Air Filter Condition Evap	orator Coil Condition Blower Wheel	
Signs of sweating on plenum / cabinet	of condensate outside pan Condensate Drain Clear	
Accessories Installed: Hard Start Kit Type	/ Brand: Compressor Cover	
Vacated Premises Switch		
Control Module Switch Positions Dip Switch #1 Con	trol Module Switch Positions Dip Switch #2	
off/on off	/ on	
Switch #1	Switch #1	
Switch #2	Switch #2	
	Switch #4	
Switch #5		
Switch #6	init in Lock Out?:	
Switch #7 Switch #8 <u>Fau</u>	It Code Displayed in Test Mode:	
Unit Operation: Primary Voltage to the Heat Pump:	Transformer Secondary Voltage: Unit Grounded?	
Low Side PSIG: Vapor Line Temp: Saturated T	<pre>'emp: [Vapor Line Temp – Saturated Temp = Superheat] *</pre>	
High Side PSIG: Saturated Temp: Liquid Lin	e Temp: [Saturated Temp – Liquid Line Temp = Sub Cooling] *	
Duct System Static Pressure:		
Supply Static Pressure: Total External Static Pressure:		
Evaporator Coil Temperatures:		
Evaporator Coll EAT Dry Bulb: Evaporator C	Delta:	
Evaporator Coil EAT Wet Bulb: Evaporator	Coll LAT Wet Bulb: Delta:	
Heat Exchanger Temperatures:		
Cond Entering Water Temp: Cond Leavin	g water 1 emp: Cond Temp Rise:	

# TROUBLESHOOTING:

PROBLEM	POSSIBLE CAUSE	CHECKS AND CORRECTIONS
ENTIRE UNIT DOES NOT RUN	Power supply off	Apply power, close disconnect
	Blown Fuse	Replace fuse or reset circuit breaker. Check for correct fuses.
	Voltage supply low	If voltage is below minimum voltage specified on unit dataplate, contact local power company. (Fault Code - Ou & 17)
	Thermostat	Set the fan to "ON", the fan should run. Set thermostat to "COOL" and lowest temperature setting, the unit should run in the cooling mode (reversing valve energized). Set unit to "HEAT" and the highest temperature setting, the unit should run in the heating mode. If neither the blower or compressor run in all three cases, the thermostat could be miswired or faulty. To ensure miswired or faulty thermostat verify 24 volts is available on the condenser section low voltage terminal strip between "R" and "C", "Y" and "C", and "C" and "C". The lower does not operate, verify 24 volts between terminals "G" and "C" in the air handler. Replace the thermostat if defective.
BLOWER OPERATES BUT COMPRESSOR DOES NOT RUN	Thermostat	Check setting, calibration and wiring
	Wiring	Check for loose or broken wires at compressor, capacitor or contactor.
	Safety Controls	Check control board fault LED for fault code.
	Compressor overload open	If the compressor is cool and the overload will not reset, replace the compressor.
	Compressor motor grounded	Internal wiring grounded to the compressor shell. Replace compressor. If compressor burnout, install new filter dryer.
	Compressor windings open	After compressor has cooled, check continuity of compressor windings. If the windings are open, replace the compressor.
UNIT OFF ON HIGH PRESSURE CONTROL FAULT CODE 12	Discharge pressure too high	In "Cooling" mode: Lack of or inadequate water flow. Entering water temperature too warm. Scaled or restricted water to refrigerant heat exchanger. In "HEATING" mode: Lack of or inadequate airflow. Blower inoperative, clogged filter or restrictions in ductwork.
	Refrigerant charge	The unit is overcharged with refrigerant. Reclaim refrigerant, evacuate and recharge with factory recommended charge.
	High pressure switch	Check for defective or improperly calibrated high pressure switch.
UNIT OFF ON LOW PRESSURE CONTROL FAULT CODE 13	Suction pressure too low	In "Cooling" mode: Lack of or inadequate airflow. Entering air temperature too cold. Blower inoperative, clogged filter or restriction in ductwork. In "HEATING" mode: Lack of or inadequate water flow. Entering water temperature too cold. Scaled or restricted water to refrigerant heat exchanger.
	Refrigerant charge	The unit is low on refrigerant. Check for refrigerant leak, repair, evacuate and recharge with factory recommended charge.
	Low pressure switch	Check for defective or improperly calibrated low pressure switch.
UNIT SHORT	Unit oversized	Recalculate heating and cooling loads.
CYCLES	Thermostat	Thermostat installed near a supply air register, relocate thermostat. Check heat anticipator.
	Wiring and controls	Loose connections in the wiring or a defective compressor contactor.
INSUFFICIENT COOLING OR	Unit undersized	Recalculate heating and cooling loads. If not excessive, possibly adding insulation will rectify the situation.
HEATING	Loss of conditioned air by leaks	Check for leaks in ductwork or introduction of ambient air through doors or windows.
	Airflow	Lack of adequate airflow or improper distribution of air. Replace dirty air filter.
	Refrigerant charge	Low on refrigerant charge causing inefficient operation.
	Compressor	Check for defective compressor. If discharge is too low and suction pressure is too high, compressor is not pumping properly. Replace compressor.
	Reversing valve	Defective reversing valve creating bypass of refrigerant from discharge to suction side of compressor. Discharge is too low and suction pressure is too high. Replace reversing valve.
	Operating pressures	Compare unit operating pressures to the pressure / temperature chart for the unit.
	Refrigerant metering device	Check for possible restriction or defect. Replace if necessary.
	Moisture, non-condensables	The refrigerant system may be contaminated with moisture or non-condensables. Reclaim refrigerant, evacuate and recharge with factory recommended charge. Replace filter dryer.

# PREVENTIVE MAINTENANCE:

To achieve maximum performance and service life of equipment, a formal schedule of regular maintenance should be established and adhered to.



ALL APPROPRIATE PERSONAL PROTECTION EQUIPMENT SHOULD BE WORN WHEN SERVICING OR MAINTAINING THIS UNIT.

Personal injury can result from sharp metal edges, moving parts, and hot or cold surfaces.

#### Fan:

The fan should be inspected and cleaned annually in conjunction with maintenance of the motor and bearings. It is important to keep the fan section and motor clean and free from obstruction to prevent imbalance, vibration, and improper operation.

#### Motor:



Check motor connections to ensure they are secure and in accordance with the unit wiring diagram.

ECM motors have line voltage power applied at all times. MAKE SURE POWER IS DISCONNECTED BEFORE SERVICING.

#### Filter:

The air filter should be cleaned or replaced every 30 days or more frequently if severe operating conditions exist. Always replace the filter with the same type and size as originally furnished.

#### Coil:

Clean all heat transfer surfaces and remove all dirt, dust, and contaminates that potentially impairs air flow using industry accepted practices. Care should be taken not to bend coil fin material.



#### Condensate drain pan and pipe:

Check and clean all dirt and debris from pan. Ensure drain line is free flowing and unobstructed.

#### Maintenance Updates:

Contact Factory for current Maintenance Program Information.





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