Premium EW Reversible Chiller - 60Hz

Water-to-Water Heat Pump

30 Ton

Installation Information

Water Piping Connections

Electrical Connections

Microprocessor Control

Startup Procedures

Preventive Maintenance

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General Installation Information (cont.) Safety Considerations

Installing and servicing air conditioning and heating equipment can be hazardous due to system pressure and electrical components. Only trained and qualified service personnel should install, repair or service heating and air conditioning equipment. When working on heating and air conditioning equipment, observe precautions in the literature, tags and labels attached to the unit and other safety precautions that may apply.

Follow all safety codes. Wear safety glasses and work gloves. Use quenching cloth for brazing operations. Have fire extinguisher available for all brazing operations.

Note: Before installing, check voltage of unit(s) to ensure proper voltage.



WARNING: Before performing service or maintenance operations on the system, turn off main power switches to the unit. Electrical shock could cause serious personal injury.

Application

Units are not intended for heating domestic (potable water) by direct coupling. If used for this type of application, a secondary heat exchanger must be used.

Moving and Storage

Move units in the normal "Up" orientation as indicated by the labels on the unit packaging. When the equipment is received, all items should be carefully checked against the bill of lading to ensure that all crates and cartons have been received in good condition. Examine units for shipping damage, removing unit packaging if necessary to properly inspect unit. Units in question should also be internally inspected. If any damage is observed, the carrier should make the proper notation on delivery receipt acknowledging the damage. Units are to be stored in a location that provides adequate protection from dirt, debris and moisture.



WARNING: To avoid equipment damage, do not leave the system filled in a building without heat during cold weather, unless adequate freeze protection levels of anti-freeze are used. Heat exchangers do not fully drain and will freeze unless protected, causing permanent damage.

Unit Location

Provide sufficient room to make water and electrical connections. If the unit is located in a confined space, provisions must be made for unit servicing. Locate the unit in an indoor area that allows easy removal of the access panels and has enough space for service personnel to perform maintenance or repair. These units are not approved for outdoor installation and, therefore, must be installed inside the structure being conditioned. Do not locate units in areas subject to freezing conditions.



WARNING: Do not store or install units in corrosive environments or in locations subject to temperature or humidity extremes (e.g. attics, garages, rooftops, etc.). Corrosive conditions and high temperature or humidity can significantly reduce performance, reliability, and service life.



WARNING: To avoid equpment damage and possible voiding of warranty, be sure that properly sized strainers are installed upstream of both brazed plate heat exchangers to protect them against particles in the fluid.

General Installation Information (cont.) Mounting Units

Remove the unit from the wooden shipping skids (see Figures 1 and 2). Units should be mounted level on a solid floor. The floor must be capable of supporting the operating weight of the unit (see page 22). Units should be located away from sound-critical areas. Adequate, vibration isolators should be field installed to reduce vibration transmission.





CAUTION: A minimum of 24" clearance should be allowed for service access.

Unpacking the Unit

EW360: Remove the stretch wrap and protective cardboard from the unit. Remove the compressor shipping brackets located at the base of each compressor. To do so, lift up the bottom of the compressor sound jacket and remove the two bolts that hold the bracket and shims (see Figure 3a). Discard the brackets and shims.

EW540: Remove the stretch wrap and protective cardboard from the unit. Remove the compressor shipping brackts located at the base of each compressor. To do so, lift up the bottom of the compressor sound jacket and remove the two bolts that hold the angle brackets that the compressor base sits on (see Figure 3b). The angle brackets can then be discarded. The hold down shipping bolts should then be removed and discarded.





Compressor Shipping Bracket (one on each side of both compressors)

Figure 3b: Removing Shipping Bolts



Remove shipping

related hardware

Water Quality

General

Reversible chiller systems may be successfully applied in a wide range of commercial and industrial applications. It is the responsibility of the system designer and installing contractor to ensure that acceptable water quality is present and that all applicable codes have been met in these installations.

Water Treatment

Do not use untreated or improperly treated water. Equipment damage may occur. The use of improperly treated or untreated water in this equipment may result in scaling, erosion, corrosion, algae or slime. The services of a qualified water treatment specialist should be engaged to determine what treatment, if any, is required. The product warranty specifically excludes liability for corrosion, erosion or deterioration of equipment.

The heat exchangers in the units are 316 stainless steel plates with copper brazing. The water piping in the heat exchanger is steel. There may be other materials in the building's piping system that the designer may need to take into consideration when deciding the parameters of the water quality.

If an antifreeze or water treatment solution is to be used, the designer should confirm it does not have a detrimental effect on the materials in the system.

Contaminated Water

In applications where the water quality cannot be held to prescribed limits, the use of a secondary or intermediate heat exchanger is recommended to separate the unit from the contaminated water.

The following table outlines the water quality guidelines for unit heat exchangers. If these conditions are exceeded, a secondary heat exchanger is required. Failure to supply a secondary heat exchanger where needed will result in a warranty exclusion for primary heat exchanger corrosion or failure.

рН	Acidity / Alkalinity	6.0 - 8.5; Minimize steel <7, No open tanks <8						
Scaling	Calcium and Magnesium Carbonate	(Total Hardness) Less than 350 ppm						
	Hydrogen Sulfide	Less than 0.5 ppm (rotten egg smell appears at 0.5 ppm)						
	Sulfates	Less than 125 ppm for CuproNickel						
	Chlorine	Less than 0.5 ppm						
	Chloridae	Less than 125 ppm for CuproNickel, Less than 20 ppm for Copper; at						
	Chiorides	50°F (10°C)						
	Carbon Dioxide	Less than 75 ppm						
Corrosion	Ammonia	Less than 0.5 ppm						
	Ammonia Chloride	Less than 0.5 ppm						
	Ammonia Nitrate	Less than 0.5 ppm						
	Ammonia Hydroxide	Less than 0.5 ppm						
	Ammonia Sulfate	Less than 0.5 ppm						
	Total Dissolved Solids (TDS)	Less than 1000 ppm						
Iron Fouling	Iron Fe ²⁺ (Ferrous) (Bacterial Iron potential)	Less than 0.2 ppm (Ferrous). If $Fe^2 > 0.2$ ppm with pH 6 - 8, $O_2 < 5$ ppm, check for Iron Bacteria						
	Iron Fouling	Less than 0.5 ppm of Oxygen. Above this level deposition will occur.						
Erosion	Suspended Solids	Less than 10 PPM and less than 6 fps filtered for a max of 800 micron size.						

Water Quality Guidelines

Water Quality (cont.)

Strainers

These units must have properly sized strainers upstream of both brazed plate heat exchangers to protect them against

and cause degraded performance, reduced operating life and failed compressors. Improper installation of the unit (which includes not having proper strainers to protect the heat exchangers) can also result in voiding the warranty.

Field supplied strainers with 20-40 mesh (530-1060 microns) are recommended, with 30 mesh (800 microns) being the optimum choice. The strainers selected should have a mesh open area of at least 6 square inches (39 square centimeters) for each unit being serviced by the strainer. Using strainers with a smaller amount of open area will result in the need for more frequent cleaning.

Strainers should be selected on the basis of acceptable pressure drop, and not on pipe diameter. The strainers selected should have a pressure drop at the nominal flow rate of the units (at 90 GPM (5.7 LPS) for the EW360, and 135 GPM (8.5 LPS) for the EW540) low enough to be within the pumping capacity of the pump being used.

Field Connected Water Piping

General

System piping should be kept as simple as possible to minimize the pressure drop, but hand valves should be field installed to facilitate unit servicing. The piping installation should provide service personnel with the ability to measure and/or monitor water temperatures and pressures.

Source and load fluid connections are provided with 2-inch [50.8mm] Victaulic grooved nipples (see Figure 4). Each nipple will also have a PT port installed for test and balance purposes. It will be the installing contractor's responsibility to adequately support incoming piping to avoid damage to the unit's piping or heat exchangers. The water lines should be routed so as not to interfere with access to the unit. It is recommended that adequate measures are taken to minimize the transmission of vibration through the piping connections.

Note: Units are factory run-tested using propylene glycol. Prior to connecting piping to unit, thoroughly flush heat exchangers.

Figure 4: Water Connections

Brazed Plate (EW360 shown) Heat Exchanger 2" Victaulic Grooved Nipples Optional Connection Kit CKV160FL (Includes four of each)







CAUTION: Remove the plastic protective caps in the ends of each of the four water pipes on the heat exchangers prior to piping connection. Failure to remove the caps will result in serious damage and could void the warranty.

Field Connected Water Piping (cont.)

Before final connection to the unit, the supply and return hose kits must be connected to each other, bypassing the unit, and the system flushed to remove dirt, piping chips and other foreign material. Normally, a combination balancing and close-off (ball) valve is installed at the return, and a rated gate or ball valve is installed at the supply. The return valve can be adjusted to obtain the proper water flow. The valves allow the unit to be removed for servicing.

The proper water flow must be delivered to each unit whenever the unit heats or cools. The proper flow rate cannot be accurately set without measuring the water pressure drop through the refrigerant-to-water heat exchanger. A 3 GPM flow rate per ton [0.054 LPS per kW] of cooling capacity (2.25 GPM per ton [0.0404 LPS per kW] minimum) is required.

Note: The placement and connection of the water circulating pump(s) must be taken into consideration prior to designing the final water piping systems.

Closed Loop Tower/Boiler Systems

The water loop is usually maintained between 60°F [15.5°C] and 90°F [32.2°C] for proper heating and cooling operation. This is accomplished with a cooling tower and a boiler.

To reject excess heat from the condenser water loop, the use of a closed-circuit evaporative cooler or an open type cooling tower with a secondary heat exchanger between the tower and the condenser water loop is recommended. If an open type cooling tower is used without a secondary heat exchanger, continuous chemical treatment and filtering of the water must be performed to ensure the water is free from damaging materials.



CAUTION: Water piping exposed to outside temperature may be subject to freezing.

Open Loop Well Water Systems

Installation of an open loop system is not recommended without using a secondary heat exchanger unless water quality guidelines are met.

Earth Coupled Systems

All supply and return water piping should be insulated to prevent excess condensation from forming on the water lines. Ensure pumping system is capable of providing adequate flow rate at the system pressure drop, 3.0 GPM per ton [0.054 LPS per kW] (source side) is recommended.

Heating with High Source Temperatures

Heating water with a water to water unit using high source temperatures can lead to operating conditions that fall outside of the system operating range. The condition occurs when the loop (source) temperature exceeds 70°F [21.1°C] with a full flow of 3 GPM per ton [0.054 LPS per kW]. Under this scenario, the evaporating temperature can fall outside of the compressor's operating window.

To allow the system to operate correctly, the company recommends restricting the source side flow when the evaporating temperature exceeds 55°F [12.7°C]. One way of accomplishing this is to use a flow-restricting valve on the source loop circuit that is controlled by the evaporating temperature. Locate the sensing device on the refrigerant inlet of the evaporator. In dual circuit systems, the company recommends monitoring both circuits and controlling off the sensor that reads the highest temperature.

As an alternative to the evaporating temperature, the suction line temperature can be monitored with the same control capability. In this control, temperature should be a maximum of 65°F [18.3°C].

Electrical Data

Madal	Rated	Voltage		Comp	ressor		Total Unit	Min Circ	Max	Max HACR	
Model	Voltage	Min/Max	Qty	МСС	RLA	LRA	FLA	Amp	Fuse	Breaker	
	208-230/60/3	197/253	2	82.7	52.9	425.0	105.8	119.0	150	150	
EW360	460/60/3	414/506	2	37.0	23.7	187.0	47.4	53.3	70	70	
	575/60/3	518/633	2	36.4	23.3	148.0	46.6	52.4	70	70	
EW640	460/60/3	414/506	2 67.0 42.9 2		250.0	85.8	96.5	125	125		
EVV340	575/60/3	518/633	2	50.0	32.0	198.0	64.0	72.0	100	100	

Notes: Ratings per each compressor. All fuses RK-5.

Figure 6: Control Box



*User interface mounted here on units without enclosure. On units with enclosure, user interface is mounted externally.

Wiring Schematic

Figure 7: Wiring Schematic (left side) 460/3 shown



Special Note: Details on the FX10 control can be found in *AFGFX10 Application Manual*

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Wiring Schematic - continued

Figure 7 - continued: Wiring Schematic (right side)



Field Wiring & Control Setup

Figure 8a & 8b - High Voltage Connections





Figure 9 - Low Voltage Connections





1. Acc Output 1 is cycled with the lead compressor 2. Acc Output 2 is cycled with the lag compressor

Figure 10 - Wiring Schematic



LINE VOLTAGE

High Voltage Connections

Connect power wiring as shown in Figure 8a and 8b.

208 Volt Operation

For 208V operation, select 208V on transformer switch as shown in Figure 8b. (EW360 only)

LOW VOLTAGE OPERATION

Thermostat/Controller (Aquastat)

A two-stage 24 VAC thermostat or liquid controller (field supplied) must be used to turn the reversible chiller on or off, and to switch it from cooling to heating if necessary. Multiple chillers in the same bank must be controlled from one thermostat/controller (must be isolation relays for multiple unit applications).

Low Voltage Connections

Connect low voltage thermostat wiring as shown in Figure 9. Connections shown are for typical thermostat. Actual connections may vary with specific device used.

- **Note:** If a separate transformer is used to supply a Y1, Y2, or B signal to the unit controls, isolation relays must be used.
- **Note:** Accessory 1 and 2 are selectable as normally open or normally closed using the unit display.
- **CAUTION:** Use only copper conductors for field installed wiring. Terminals in the unit are not designed for other types of conductors.



WARNING: All wiring must comply with local and state codes. Disconnect the power supply before beginning to wire to prevent electrical shock or equipment damage.

Source Flow Switch (SFS)

Unit is factory shipped with no connections on Flow Switch pins J10-45 (entering). If flow proving switch is required, hook up as shown in Fig. 10 and Note 7. Otherwise wire should be connected to 24VAC or unit will not operate.

Load Flow Switch (LFS)

Unit is factory shipped with no connections on Flow Switch pins J9-56 (leaving). If flow proving switch is required, hook up as shown in Fig. 10 and Note 6. Otherwise wire should be connected to TB2 - pin 2 or unit will not operate.

ATTENTION: Flow Switches must be installed or jumpered before unit will operate!

Field Wiring & Control Setup (cont.)

Accessory Relay Setup

Accessory relays 1 and 2 are set to "close" upon Y1 compressor call (compressor is delayed 90 sec. after Y1) but can be set to "open" with Y1.

To change ACC1 or ACC2: (ACC1 shown)

◊ On FX10 control using up and down keys, scroll to "MAINT" menu (maint password "5667")

- \diamond Using up and down keys, scroll to "ACC 1" hit "ENTER" and "ACC 1" begins flashing
- ◊ Using up and down keys, select "ON" for actuation with Y1 Call or "OFF" for deactivation with Y1

Lead /Lag Selection

Compressor Lead/Lag Selection is factory set to "ON" but can be set to "OFF".

To change Lead/Lag On/Off:

On FX10 control using up and down keys, scroll to "MAINT" menu (maint password "5667")

- ◊ Using up and down keys, scroll to "LEAD/LAG SELECT" hit "ENTER" and "LEAD/LAG SELECT" begins flashing
- \diamond Using up and down keys, select "ON" for activation or " OFF" for deactivation

Lead/Lag Time - Runtime in Hours

Compressor Lead/Lag Time is factory set "100" hours but can be set from 1 to 100 hours.

To change Lead/Lag Time:

◊ On FX10 control using up and down keys, scroll to "MAINT" menu (maint password "5667")

◊ Using up and down keys, scroll to "LEAD/LAG TIME" hit "ENTER" and "LEAD/LAG TIME begins flashing

◊ Using up and down keys, select 1 - 100 HOURS.

°F or °C - Unit of Measure

Degrees Fahrenheit is factory set, however degrees Celsius can be selected using the following procedure:

To Change Unit of Measure:

◊ On FX10 control using up and down keys, scroll to "SETTINGS"

◊ Using up and down keys, scroll to "UNIT OF MEASURE" hit "ENTER" and "UNIT OF MEASURE" begins flashing
 ◊ Using up and down keys, select "F" for degrees Fahrenheit or "C" for degrees Celsius.

Other Field Options

Other field selectable options are available as shown in the maintenance menu on page 16 of the FX10 control using a similar procedure as shown in the above examples. These would include thermostat enabling, and emergency shutdown. See page 16 for details.

DDC Operation & Connection

Consult AGFX10 Manual for application details.

Control Features

Anti Short Cycle High Pressure Protection Low Pressure Protection Water Coil Freeze Protection Random Start Display for diagnostics Reset Lockout at disconnect Intelligent reset for field installed flow switches 2 Accessory outputs Optional DDC control add-on Compressor Lead/Lag Compressor Current Switches

Field Selectable Options

Freeze Protection Select (DI-4)

The freeze protection selection inputs allow the user to adjust the freeze protection temperature set points. For the source heating freeze protection these set points are (AI-3 and AI-4). For the load cooling freeze protection these set points are (AI-5 and AI-6). When the jumper is installed on DI-5 the heating freeze protection temperature set point is factory set for 30°F. When the jumper is installed on DI-6 the heating freeze protection temperature set point is factory set for 30°F. When you remove the jumpers DI-5 the heating freeze protection temperature set point will be 15°F. When you remove the jumper on DI-6 the heating freeze protection temperature set point will be 15°F.

Accessory Outputs (DO-7 and DO-8)

Accessory Output 1 will be energized 30 seconds prior to the lead compressor output being energized. Accessory Output 2 will be energized 30 seconds prior to the lag compressor output being energized. When the corresponding compressor output is turned off the accessory output will be deactivated immediately. These outputs must be selectable for normally open or normally closed operation by use of the facility management system, Service/Commissioning Tool, or the user interface.

Control and Safety Features

Emergency Shutdown

The emergency shutdown mode can be activated by a command from a facility management system or a closed contact on DI-2. The default state for the emergency shutdown data point is off. When the emergency shutdown mode is activated, all outputs will be turned off immediately and will remain off until the emergency shutdown mode is de-activated. The first time the compressor starts after the emergency shutdown mode has been de-activated, there will be a random start delay present.

Lockout Mode

Lockout mode can be activated by any of the following fault signals: refrigerant system high pressure, refrigerant system low pressure, heating freeze protection, cooling freeze protection, and compressor current sensor. When any valid fault signal remains continuously active for the length of its recognition delay, the controller will go into fault retry mode, which will turn off the compressor. After the Compressor short cycle delay, the compressor will attempt to operate once again. If three consecutive faults are recognized during a single heating or cooling demand, the unit will go into lockout mode, turning off the compressor and enabling the alarm output until the controller is reset. The fault count will automatically reset when the heating or cooling command becomes satisfied. If a fault occurs on a dual compressor unit, the other compressor will continue to operate based on the heating or cooling demand. The lockout condition can be reset by powering down the controller, by a command from the facility management system, or by holding both the enter and escape keys on the optional user interface.

Control Features (cont.)

Heating Freeze Protection (AI-3 through AI-6)

There are 2 freeze protection temperature sensors which monitor the refrigerant temperature entering the evaporator on both compressor circuits in each mode. If the temperature drops below the freeze protection trip point for the recognition delay period (30 seconds), the condition will be recognized as a fault. The source heating freeze protection 1 trip point will be factory set for 30°F and will be field selectable for 15°F by removing a jumper wire see the field selectable options section above. The freeze protection fault condition will be bypassed 2 minutes at normal compressor startup to allow the refrigeration circuit to stabilize. If a freeze protection fault occurs in one circuit the other circuit will continue to operate based on the heating or cooling demand.

Compressor Current Switch (AI-3 EXP and AI-4 EXP)

The compressor current switch is designed to insure that the compressor is on when the compressor output is energized. This switch is normally open and closes when current is flowing to the compressor. If the compressor fails to start the switch will open. The switch must be open for a continuous 5 seconds for a fault to occur. After 3 faults in 60 minutes the control will put the unit into an alarm state.

Flow Proving Switch (DI-1 and DI-10)

The load and source flow-proving switches are a field installed option. These switches shall be normally open flow switches that will close when the water flow through the heat exchangers reach an acceptable level. The flow-proving switches must be closed 15 seconds prior to enabling either compressor output (DO-2 and DO-4). If the load flow-proving switch opens at any time both compressor outputs (DO-2 and DO-4) must be disabled immediately.

High Pressure (DI-11 and DI-12)

The high-pressure switches shall be a normally closed (NC) switch that monitors the systems compressor discharge refrigerant pressures. There shall be an individual high pressure switch for each circuit. The input will not be monitored until the compressor output for a given circuit (DO-2 or DO-4) is enabled. If the input senses the highpressure switch is open during the period that the compressor output is enabled, it must shut down the compressor immediately and count the fault. The compressor minimum on time does not apply if the high-pressure switch trips. The compressor will not restart until the short cycle time delay has been satisfied. If the high-pressure fault occurs in one circuit the other compressor will continue to operate based on the heating or cooling demand.

Low Pressure (DI-3 and DI-6)

The low-pressure switches shall be a normally closed (NC) switch that monitors the systems compressor suction line refrigerant pressure. The input shall be checked 15 seconds before compressor start up to insure the pressure switch is closed and then ignored for the first 2 minutes after the compressor output (DO-2 or DO-4) is enabled. If the switch is open continuously for (30) seconds the compressor output for that circuit will be disabled. The compressor will not restart until the short cycle time delay has been satisfied. If a low-pressure fault occurs in one circuit the other compressor will continue to operate based on the heating or cooling demand.

Alarm Output (DO-6)

The alarm output will be enabled when either stage 1 or stage 2 is in the lockout mode and will be disabled when the lockout is reset. When the lockout occurs in the stage 1 circuit the stage 1 alarm output (DO-1) will also enable. The same is true for the stage 2 alarm output (DO-9).

Sequence of Operation

Power Fail Restart

When the controller is first powered up, the outputs will be disabled for a random start delay time (See Section 4.2). The delay is provided to prevent simultaneous starting of multiple heat pumps. Once the timer expires, the controller will operate in the occupied mode until it is commanded to another mode by a facility management system or a remote thermostat. A restart status variable is available for indication of this occurrence.

Random Start Delay

This delay will be used after every power failure, as well as the first time the compressor(s) is started after the control exits the emergency shutdown mode. The default time period for the start delay will be random between 1 and 120 seconds.

Compressor Fixed On Delay Time

The Compressor Fixed On Delay Time will ensure that the compressor output is not enabled for (30) seconds after the control receives a call to start the compressor.

Compressor Minimum On Delay

The compressor minimum on delay will ensure that the compressor output(s) are enabled for a minimum of (2) minute each time the compressor output is enabled. This will apply in every instance except in the event the high-pressure switch is tripped or emergency shutdown, then the compressor output will be disabled immediately.

Compressor Short Cycle Delay Time

The compressor short cycle time delay will ensure that the compressor output will not be enabled for a minimum of (4) minutes after it is disabled. This allows for the system refrigerant pressures to equalize after the compressor is disabled.

Compressor Stage Lead Lag

The factory setup software, a facility management system, Service/Commissioning Tool, or a user interface can be used to select compressor lead lag option for the compressors. The factory setup software, a facility management system, Service/Commissioning Tool, or a user interface must also be used to select the number of run time hours the compressors will lead before being switched, the factory default will be 24 hours. The two compressors will still be staged depending on load when the lead lag option is enabled.

Heating Cycle

During the heating cycle, the reversing valves will be positioned for heating operation. The thermostat or aquastat will command the reversing valves "On" or "Off" based on a call for heating. If the compressor short cycle time delay has been satisfied, compressor 1 will turn on after accessory outputs 1 and 2 have been enabled, the low pressure switches has been verified, and the fixed compressor start delay timer has been satisfied. When heating is no longer required, the compressor output is turned off immediately after the compressor minimum on delay has been satisfied. After the compressor output is turned off, it will remain off for the time specified in the compressor short cycle time delay. If the dual compressor option is selected, the compressors will be sequenced to maintain the heating set point. As the temperature drops below the heating set point and begins to operate in the heating proportional band, the first stage compressor will be activated. If the first stage compressor is not able to satisfy the heating demand, the second stage compressor will be activated by the thermostat or aquastat. The controller is allowed to operate the heat pump in the heating mode regardless of the outdoor air temperature.

Cooling Cycle

During the cooling cycle, the reversing valves will be positioned for cooling operation. The thermostat or aquastat will command the reversing valves "On" or "Off" based on a call for cooling. If the compressor short cycle time delay has been satisfied, compressor 1 will turn on after accessory outputs 1 and 2 have been enabled, the low pressure switches has been verified, and the fixed compressor start delay timer has been satisfied. When cooling is no longer required, the compressor will be turned off immediately after the compressor minimum on delay has been satisfied. After the compressor output is turned off, it will remain off for the time specified in the compressor short cycle time delay. If the dual compressor option is selected, the compressors will be sequenced to maintain the cooling set point. As the temperature drops below the cooling set point and begins to operate in the cooling proportional band, the first stage compressor will be activated. If the first stage compressor is not able to satisfy the cooling demand, the second stage compressor will be activated by the thermostat or aquastat. The controller is allowed to operate the heat pump in the cooling mode regardless of the outdoor air temperature.

Inputs and Outputs Configuration

DUAL STAGE WW			
Input Name	Input	Output Name	Output
Entering Load Water Temperature	AI 1	Circuit 1 Alarm	DO1
Leaving Load Water Temperature 1	AI 2	1st Stage Comp	DO2
Source Heating Freeze Protection 1	AI 3	1st Stage Reversing Valve	DO3
Source Heating Freeze Protection 2	AI 4	2nd Stage Comp	DO4
Load Cooling Freeze Protection 1	AI 5	2nd Stage Reversing Valve	DO5
Load Cooling Freeze Protection 2	AI 6	Alarm	DO6
		Accessory Output 1	DO7
Load Flow Proving Switch	DI 1	Accessory Output 2	DO8
Emergency Shutdown	DI 2	Circuit 2 Alarm	D09
Stage 2 Low Pressure	DI 3		
Source Htg Frz Pro Select - 30°F	DI 4	Future	PWM1
Load Htg Frz Pro Select - 30°F	DI 5	Future	PWM2
Stage 1 Low Pressure	DI 6		
Thermostat Y1	DI 7		
Thermostat Y2	DI 8		
Thermostat B	DI 9		
Source Flow Proving Switch	D10		
Stage 1 High Pressure	DI11		
Stage 2 High Pressure	DI12		
XP10 Expansion Card			
Input Name	Input	Output Name	Output
Entering Source Water Temperature	AI 1	Unused	DO 1
Leaving Source Water Temperature 1	AI 2	Unused	DO 2
Current Switch 1	AI 3	Unused	DO 3
Current Switch 2	AI 4	Unused	DO 4

Networking Protocol

The Johnson FX10 Board is specifically designed for commercial heat pumps and provides control of the entire unit as well as input ports for Open N2, Lontalk and BACnet communications protocols as well as an input port for a user interface. For more information on the specifics of each protocol refer to the application guide AGFX10.

Unit Display and Interface

The Unit Display allows the user to view entering and leaving water temperatures, freeze protection temperature readings, inputs and outputs, and allows the user enable and disable certain control functions through the various menus. The interface also displays all faults on the LCD once the unit has locked out to aid in diagnostics.

There are 10 LED indicator lights that indicate the following:

- O Power
- 🖄 Alarm
- 1. Compressor 1
- 2. Compressor 2
- 3. Unused
- 4. Reversing Valve 1
- 5. Reversing Valve 2
- 6. Unused
- 7. Unused
- 8. Unused

Menu Navigation

Return Key

- 1. Use the left and right directional keys to scroll through the menus on the Home screen.
- 2. When the menu you would like to enter is displayed on the LCD press the return key and a cursor will appear in the lower left corner of the LCD.
- 3. Use the left and right directional keys to put the cursor on the menu you would like to enter and press the return key again to open the menu.
- 4. If you would like to return to the Home screen press the escape key. You may have to press the escape key more than once to return to the Home screen.
- 5. The display will return to the home screen after two minutes without any key presses.

Menus and Menu Contents

Info – Application Information

- WFI
- Dual Stage
- Reversible Chiller
- Version X.X

Temp - System Temperatures (All points are read only.)

- Entering Load Water Temp entering the Load heat exchanger
- · Leaving Load Water Temp leaving the Load heat exchanger
- Entering Source Water Temp entering the Source heat exchanger
- Leaving Source Water Temp leaving the Source heat exchanger
- Src Frz 1 Temp reading of the Source Freeze Protection 1 Sensor
- Src Frz 2 Temp reading of the Source Freeze Protection 2 Sensor
- LD Frz 1 Temp reading of the Load Freeze Protection 1 Sensor
- LD Frz 2 Temp reading of the Load Freeze Protection 2 Sensor
- Src Frz Setpt Source side freeze protection set point
- LD Frz Setpt Load side freeze protection set point



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Unit Display and Interface (cont.)

Menu and Menu Contents (cont.)

Stat - Digital Input Status (All points are read only.)

- **Unit Status** •
 - ◊ Auto
 - ◊ Off
- Y1 Input– 1st Stage Compressor Call ٠ ♦ ON ♦ OFF
- Y2 Input– 2nd Stage Compressor Call 0 ON ◊ OFF
- B Input– Reversing Valve Call
 - 0 ON
 - ♦ OFF
- Emerg Shutdown Emergency Shutdown ٠ ◊ ON
 - ◊ OFF
- Current Sens 1 Compressor 1 Current Sensor ♦ ON
 - ◊ OFF
- Current Sens 2 Compressor 2 Current Sensor ♦ ON
 - ◊ OFF

Outputs - Status of the control outputs (All points are read only.) ٠

- Comp 1 Status Compressor 1
- ♦ ON
- ◊ OFF • Comp 2 Status – Compressor 2 ♦ ON
 - ◊ OFF
- RV 1 Status Reversing Valve 1 0 ON
 - ♦ OFF
- RV 2 Status Reversing Valve 2
 - 0 ON
 - ◊ OFF
- Alarm Status Unit Alarm 0 ON ♦ OFF
- Acc 1 Status ◊ ON
 - ◊ OFF
- Acc 2 Status
 - ♦ ON
 - ♦ OFF
- Stg 1 Status Compressor Circuit 1 Status ◊ Alarm
 - ◊ Normal Stg 2 Status – Compressor Circuit 2 Status
 - ◊ Alarm
 - ◊ Normal

٠

Unit Display and Interface (cont.)

Menu and Menu Contents (cont.)

Settings – Unit Display/Interface Settings

- Unit Of Measure
 - ◊ F (default)
 - ♦ C

Maint – Configurable Parameters (Password Protected = 5667)

Y1, Y2, B, and Emerg Shutdown must be set to Auto for normal unit operation (default).

- Y1 Input
 - ◊ Auto Normal Operation
 ◊ ON Apply Y1 call to control
 ◊ OFF Remove Y1 Call
- Y2 Input
 - ◊ Auto Normal Operation
 ◊ ON Apply Y2 call to control
 ◊ OFF Remove Y2 Call
- B Input
 - ◊ Auto Normal Operation
 ◊ ON Apply B Call
 ◊ OFF Remove B Call
- Emerg Shutdown (Emergency Shutdown)
 Auto Normal Operation
 ON Enable emergency shutdown
 OFF Disable Emergency Shutdown
- Acc 1 Sel Accessory Output 1 Selection
 On Comp Output will be cycled on with the compressor
 Off Comp Output will be cycled off with the compressor
- Acc 2 Sel Accessory Output 2 Selection
 On Comp Output will be cycled on with the compressor
 Off Comp Output will be cycled off with the compressor
- Lead/Lag Select Enable or Disable Compressor Lead/Lag
 ◊ ON Compressor Lead/Lag Enabled
 ◊ OFF Compressor Lead/Lag Disabled
- Lead/Lag Time Hours of run time for Lead/Lag
 ◊ Selectable from 1 100 hours of compressor run time

Alarm

Displays unit alarms until the unit has been reset (Unit alarms can be reset by holding both the Escape (ESC) key and Return (←) key for five seconds or by power cycling the unit.)

Unit Display and Interface (cont.)

Menu and Menu Contents (cont.)

Unit Alarms

Unit alarms are shown on the display once the unit has locked out.

Load Flow – Load flow switch is not closed

• The load flow switch must be closed prior to either compressor starting and must remain closed for the entire run time of the compressor(s).

Low Pressure 1 – Compressor Circuit 1 Low Pressure switch

• The low pressure switch is checked before compressor start up and is monitored during compressor operation.

Src FP 1 Temp Low – Source Freeze Protection Sensor 1

• The source freeze protection sensor on compressor circuit 1 has reached its set point.

Src FP 1 Sensor Bad

• The sensor for Source freeze protection on compressor circuit 1 is unreliable or is not reading.

LD FP 1 Temp Low – Load Freeze Protection Sensor 1

• The load freeze protection sensor on compressor circuit 1 has reached its set point.

LD FP 1 Sensor Bad

• The sensor for Load freeze protection on compressor circuit 1 is unreliable or is not reading.

Source Flow – Source Flow switch is not closed

• The source flow switch must be closed prior to either compressor starting and must remain closed for the entire runtime of the compressor(s).

High Pressure 1 – Compressor Circuit 1 High Pressure Switch

 If high pressure switch 1 opens at any time during compressor 1 run time the compressor will be shut down immediately.

Low Pressure 2 - Compressor Circuit 2 Low Pressure Switch

• The low pressure switch is checked before compressor start up and is monitored during compressor operation.

Src FP 2 Temp Low - Source Freeze Protection Sensor 2

• The source freeze protection sensor on compressor circuit 2 has reached its set point.

Src FP 2 Sensor Bad

The sensor for Source freeze protection on compressor circuit 2 is unreliable or is not reading.

LD FP 2 Temp Low - Load Freeze Protection Sensor 2

• The load freeze protection sensor on compressor circuit 2 has reached its set point.

LD FP 2 Sensor Bad

• The sensor for Load freeze protection on compressor circuit 2 is unreliable or is not reading.

High Pressure 2 - Compressor Circuit 2 High Pressure Switch

If high pressure switch 2 opens at any time during compressor 2 run time the compressor will be shut down
immediately.

Comp Start Failure – Compressor Start Failure

If either compressor fails to start when the contactor pulls in the compressor current switch will
cause that compressor to be locked out after 2 retries. The other compressor will continue to operate normally in
this condition.

Physical Data

Madal	Configuration	C	Refrigerant	Total V	Veight	Corner Weights						
wodei	Configuration	Compressor	Charge*	Shipping	Installed	Front Left	Rear Left	Front Right	Rear Right			
	with	Corroll (0)	13.0	1305	1227	305	303	310	309			
EW360 /	enclosure		[5.9]	[592]	[557]	[138]	[137]	[141]	[140]			
EKW090	without	Soroll (2)	13.0	1143	1065	264	263	270	268			
	enclosure	3010ll (2)	[5.9]	[518]	[483]	[120]	[119]	[122]	[122]			
	with	Soroll (2)	21.25	1920	1842	349	595	664	312			
EW540 /	enclosure	301011 (2)	[9.6]	[871]	[836]	[158]	[270]	[301]	[142]			
EKW130	without	Soroll (2)	21.25	1808	1730	321	567	636	284			
	enclosure	301011 (2)	[9.6]	[820]	[785]	[146]	[257]	[288]	[129]			

Notes: Weights shown in Pounds, [kg]. * Refrigerant per circuit in Pounds, [kg] Add 64 pounds [29 kg] for fluid weight when full (EW360). Add100 lbs [50kg] for fluid weight when full (EW540).

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Rating Point Data

ARI/ASHRAE/ISO 13256-2

English (IP) Units

				Wat	er Loop I	leat Pump)	Grou	nd Water	r Heat Pun	ιp	Ground Loop Heat Pump							
		Load	Source	Coo	ling	Heati	ng	Coo	ling	Heatii	ng		Cooling			Heating			
Model	Capacity	Flow (gpm)	Flow (gpm)	Load 53.6°F Source 86°F		Load 104°F Source 68°F		Load 53.6°F Source 59°F		Load 104°F Source 50°F		Source	Load !	53.6°F	Source	Load 104°F			
				Capacity Btuh	EER Btuh/W	Capacity Btuh	СОР	Capacity Btuh	EER Btuh/W	Capacity Btuh	СОР	°F	Capacity Btuh	EER Btuh/W	°F	Capacity Btuh	СОР		
E14/200	Full	86.0	86.0	335,000	13.6	452,600	4.1	-	-	-	-	77	351,000	15.4	32	296,500	3.0		
EVV360	Part	86.0	86.0	175,000	14.4	237,600	4.4	-	-	-	-	68	191,500	18.7	41	170,000	3.3		
EWEAD	Full	135.0	135.0	533,400	13.8	691,200	4.1	-	-	-	-	77	558,500	15.6	32	485,800	3.1		
EVV540	Part	135.0	135.0	277,300	14.5	359,400	4.3	-	-	-	-	68	302,800	18.6	41	282,600	3.5		

Notes: All ratings based upon lower Voltage operation of dual voltage rated units. Load coil also called "Indoor" and Source coil also called "Outdoor". "-" not rated.

Metric (SI) Units

				Wat	er Loop I	Heat Pump)	Grour	nd Water	r Heat Pum	ıp	Ground Loop Heat Pump							
		Load	Source	Cool	ling	Heatir	ng	Cool	ing	Heati	ng		Cooling			Heating			
Model	Capacity	Flow (lps)	Flow (lps)	Iquid Flow Load 12° (lps) Source 30		Load 40°C Source 20°C		Load Source	Load 12°C Source 15°C		Load 40°C Source 10°C		Load	12°C	Source	Load 4	0°C		
				Capacity Watts	EER (W/W)	Capacity Watts	СОР	Capacity Watts	EER (W/W)	Capacity Watts	СОР	°C	Capacity Watts	EER (W/W)	°C	Capacity Watts	СОР		
EW/260	Full	5.43	5.43	98,183	4.0	132,649	4.1	-	-	-	-	25	102,872	4.5	0	86,899	3.0		
EVV300	Part	5.43	5.43	51,290	4.2	69,637	4.4	-	-	-	-	20	56,125	5.5	5	49,824	3.3		
EWEAD	Full	8.52	8.52	156,331	4.0	202,579	4.1	-	-	-	-	25	163,687	4.6	0	142,380	3.1		
EVV340	Part	8.52	8.52	81,272	4.2	105,334	4.3	-	-	-	-	20	88,746	5.5	5	82,825	3.5		

Notes: All ratings based upon lower Voltage operation of dual voltage rated units. Load coil also called "Indoor" and Source coil also called "Outdoor". "-" not rated.

ARI 550 CHILLER RATINGS

English (IP) Units

		Load	Source	Cooling						
Model	Capacity	Liquid Flow	Liquid Flow	Leaving Load 44°F Ent Source 85 °F						
		(gpm)	(gpm)	Capacity Btuh	EER Btuh/W					
EW260	Full	69.0	86.0	345,000	14.0					
EW300	Part	69.0	86.0	179,400	14.8					
EW640	Full	108.0	135.0	540,000	14.3					
EVV340	Part	108.0	135.0	280,800	15.0					

Notes: All ratings based upon lower Voltage operation of dual voltage rated units. Load coil also called "Indoor" and Source coil also called "Outdoor".

Metric (SI) Units

		Load	Source	Cool	ing			
Model	Capacity	Liquid Flow	Liquid Flow	Leaving Load 12°C Ent Source 30°C				
		(lps)	(lps)	Capacity Watts	EER (W/W)			
EW260	Full	4.35	5.43	101,114	4.1			
EW300	Part	4.35	5.43	52,579	4.3			
EW640	Full	6.81	8.52	158,265	4.2			
EVV340	Part	6.81	8.52	82,298	4.4			

Notes: All ratings based upon lower Voltage operation of dual voltage rated units. Load coil also called "Indoor" and Source coil also called "Outdoor".

Reference Calculations

Heating Calculations:	Cooling Calculations:
LWT = EWT - $\frac{\text{HE}}{\text{GPM} \times 500^*}$	LWT = EWT + $\frac{\text{HR}}{\text{GPM x 500}^*}$

Note: * When using water. Use 485 for 15% methanol/water or Environol solution.

Legends and Notes

Abbreviations and Definitions

ELT = entering load fluid temperature to heat pump PSI LLT = leaving load fluid temperature from heat pump FT HD = pressure drop in feet of head LGPM = load flow in gallons per minute KW LWPD = load heat exchanger water pressure drop HR EST = entering source fluid temperature to heat pump TC LST = leaving source fluid temperature from heat pump COP HC SGPM = source flow in gallons per minute SWPD = source heat exchanger water pressure drop ΗE

Performance Data Notes

Performance data on pages 25 - 32 is based on using a 15% methanol solution which is comparable to water in performance. The use of alternative antifreeze solution can alter performance due to viscosity and heat transfer coefficient changes. (Discharge pressures can run higher and suction pressures lower.) If running at operating conditions where the potential for freeze-ups exist, freeze protection is recommended through the use of antifreeze in addition to the freeze protection supplied with the FX10 Control.

= pressure drop in pounds per square in

= coefficient of performance (HC/KW x 3

= heat rejected in MBTUH

= heating capacity in MBTUH

= heat of extraction in MBTUH

= total cooling capacity in MBTUH

= kilowatt

Operational Limits

Performance data tables indicate the approved operational range. Operation of the unit outside the range of temperatures and flow rates listed will result in performance problems and possible failure.

Rev: 12/22/04 B

Capacity Data EW360

Heating - Full Load

							S	Source 6	8 GPM				Source 90 GPM							
ELT	EST	Flow	Pres	s Drop			Heat	ting			Pres	s Drop			Heat	ing			Pres	s Drop
F°	F°	GPM	PSI	FT HD	LLT	HC	ĸw	HE	СОР	LST	PSI	FT HD	LLT	HC	ĸw	HE	СОР	LST	PSI	FT HD
	30	68	5.6	12.9	69.1	301.4	18.8	237.2	4.7	22.8	5.8	13.4	69.2	303.4	18.4	240.7	4.8	24.5	9.8	22.6
		90	9.5	21.9	67.1	311.9	18.8	247.7	4.9	22.5	5.8	13.4	67.2	313.8	18.5	250.8	5.0	24.3	9.8	22.6
	40	68	5.6	12.9	70.5	346.1	19.5	279.4	5.2	31.5	5.7	13.2	70.6	348.0	19.1	282.8	5.3	33.5	9.7	22.4
		90	9.5	21.9	68.2	357.6	19.7	290.4	5.3	31.2	5.7	13.2	68.2	359.0	19.2	293.4	5.5	33.3	9.7	22.4
60	50	68	5.6	12.9	71.8	390.7	20.2	321.6	5.7	40.2	5.6	12.9	71.9	392.5	19.8	324.9	5.8	42.6	9.6	22.2
		90	9.5	21.9	69.2	403.2	20.5	333.2	5.8	39.9	5.6	12.9	69.3	404.2	20.0	335.9	5.9	42.3	9.6	22.2
	60	68	5.6	12.9	73.0	429.8	21.0	358.1	6.0	49.1	5.6	12.9	73.1	431.7	20.5	361.8	6.2	51.7	9.5	21.9
		90	9.5	21.9	70.1	441.6	21.2	369.2	6.1	48.8	5.6	12.9	70.1	442.5	20.7	371.9	6.3	51.5	9.5	21.9
	70	68	5.6	12.9	74.2	468.8	21.7	394.6	6.3	58.0	5.5	12.7	74.3	470.8	21.2	398.6	6.5	60.9	9.4	21.7
	10	90	9.5	21.9	71.0	479.9	21.9	405.2	6.4	57.7	5.5	12.7	71.0	480.8	21.4	407.9	6.6	60.7	9.4	21.7
	30	68	5.5	12.7	89.0	297.2	22.9	219.1	3.8	23.4	5.8	13.4	89.0	298.0	22.8	220.3	3.8	25.0	9.8	22.6
		90	9.2	21.3	86.9	299.5	23.0	220.9	3.8	23.3	5.8	13.4	86.9	302.0	23.0	223.5	3.8	24.9	9.8	22.6
	40	68	5.5	12.7	90.2	337.9	23.9	256.5	4.2	32.2	5.7	13.2	90.3	340.1	23.5	259.8	4.2	34.0	9.7	22.4
		90	9.2	21.3	87.9	345.5	24.0	263.6	4.2	32.0	5.7	13.2	88.1	351.8	23.7	271.0	4.4	33.8	9.7	22.4
80	50	68	5.5	12.7	91.5	378.6	24.8	293.9	4.5	41.1	5.6	12.9	91.6	382.1	24.2	299.4	4.6	43.1	9.6	22.2
		90	9.2	21.3	89.0	391.4	25.0	306.2	4.6	40.7	5.6	12.9	89.2	401.6	24.3	318.6	4.8	42.7	9.6	22.2
	60	68	5.5	12.7	92.8	420.7	25.6	333.5	4.8	49.9	5.6	12.9	92.8	423.6	24.7	339.4	5.0	52.2	9.5	21.9
		90	9.2	21.3	89.9	433.8	25.7	346.0	4.9	49.5	5.6	12.9	90.1	440.5	25.1	355.0	5.2	51.9	9.5	21.9
	70	68	5.5	12.7	94.0	462.8	26.3	373.1	5.2	58.7	5.5	12.7	94.1	465.1	25.1	379.3	5.4	61.3	9.4	21.7
		90	9.2	21.3	90.9	476.2	26.5	385.8	5.3	58.3	5.5	12.7	91.0	479.4	25.8	391.5	5.5	61.0	9.4	21.7
	30	68	5.4	12.5	108.6	283.3	29.2	183.6	2.8	24.4	5.8	13.4	108.6	284.6	28.7	186.8	2.9	25.7	9.8	22.6
		90	9.0	20.8	106.6	289.3	29.3	189.2	2.9	24.3	5.8	13.4	106.7	290.5	28.8	192.4	3.0	25.6	9.8	22.6
	40	68	5.4	12.5	109.8	322.9	29.9	220.8	3.2	33.3	5.7	13.2	109.8	324.8	29.3	224.8	3.2	34.8	9.7	22.4
		90	9.0	20.8	107.6	331.7	30.0	229.3	3.2	33.0	5.7	13.2	107.6	332.9	29.4	232.6	3.3	34.7	9.7	22.4
100	50	68	5.4	12.5	111.0	362.4	30.6	258.0	3.5	42.2	5.6	12.9	111.1	364.9	29.9	262.8	3.6	44.0	9.6	22.2
		90	9.0	20.8	108.6	374.1	30.7	269.3	3.6	41.8	5.6	12.9	108.6	375.3	30.0	272.9	3.7	43.7	9.6	22.2
	60	68	5.4	12.5	112.2	403.4	31.3	296.6	3.8	51.0	5.6	12.9	112.3	406.5	30.5	302.4	3.9	53.1	9.5	21.9
		90	9.0	20.8	109.5	415.5	31.4	308.4	3.9	50.7	5.6	12.9	109.6	418.0	30.6	313.5	4.0	52.8	9.5	21.9
	70	68	5.4	12.5	113.5	444.3	32.0	335.2	4.1	59.8	5.5	12.7	113.6	448.0	31.1	342.0	4.2	62.2	9.4	21.7
		90	9.0	20.8	110.5	456.8	32.1	347.4	4.2	59.5	5.5	12.7	110.6	460.6	31.2	354.1	4.3	61.9	9.4	21.7
	30	68	5.3	12.2	128.5	279.3	36.5	154.8	2.2	25.3	5.8	13.4	128.6	283.6	35.6	162.3	2.3	26.3	9.8	22.6
		90	8.9	20.6	126.4	279.9	36.7	154.8	2.2	25.3	5.8	13.4	126.5	284.6	35.8	162.5	2.3	26.3	9.8	22.6
	40	68	5.3	12.2	129.6	315.0	37.1	188.5	2.5	34.3	5.7	13.2	129.7	318.3	36.2	194.8	2.6	35.5	9.7	22.4
		90	8.9	20.6	127.3	319.0	37.2	192.0	2.5	34.2	5.7	13.2	127.4	322.8	36.3	198.8	2.6	35.4	9.7	22.4
120	50	68	5.3	12.2	130.6	350.7	37.7	222.2	2.7	43.3	5.6	12.9	130.7	353.0	36.8	227.3	2.8	44.8	9.6	22.2
		90	8.9	20.6	128.2	358.0	37.7	229.2	2.8	43.0	5.6	12.9	128.3	361.0	36.9	235.1	2.9	44.6	9.6	22.2
	60	68	5.3	12.2	131.7	385.2	38.3	254.6	2.9	52.3	5.6	12.9	131.8	389.5	37.3	262.0	3.1	54.0	9.5	21.9
		90	8.9	20.6	129.0	392.6	38.4	261.7	3.0	52.1	5.6	12.9	129.1	397.7	37.5	269.9	3.1	53.8	9.5	21.9
1	70	68	5.3	12.2	132.7	419.6	38.9	287.0	3.2	61.3	5.5	12.7	132.9	426.0	37.9	296.8	3.3	63.2	9.4	21.7
		90	8.9	20.6	129.8	427.1	39.0	294.1	3.2	61.1	5.5	12.7	130.0	434.4	38.0	304.6	3.3	63.0	9.4	21.7

Notes: All capacities in kBtuh. All temperatures in °F. Interpolation is permissable, extrapolation is not. All performance data is based upon the lower voltage of dual voltage rated units. Performance data tables indicate the approved operational range. Operation of the unit outside the range of temperatures and flow rates listed will result in performance problems and possible failure.

Heating - Part Load

			Load Flo	w			s	ource 6	8 GPM				Source 90 GPM								
ELT	EST	Flow	Pres	s Drop			Heat	ting			Pres	s Drop			Heati	ing			Pres	s Drop	
F°	F°	GPM	PSI	FT HD	LLT	HC	ĸw	HE	COP	LST	PSI	FT HD	LLT	НС	ĸw	HE	СОР	LST	PSI	FT HD	
	20	68	5.6	12.9	64.6	150.7	9.0	119.9	4.9	26.4	5.0	11.6	64.6	151.7	8.8	121.6	5.0	27.2	8.6	19.9	
		90	9.5	21.9	63.6	156.0	9.0	125.1	5.1	26.2	5.0	11.6	63.6	156.9	8.9	126.7	5.2	27.1	8.6	19.9	
	40	68	5.6	12.9	65.3	176.0	9.4	144.0	5.5	35.6	4.9	11.3	65.4	176.9	9.2	145.7	5.7	36.7	8.5	19.6	
		90	9.5	21.9	64.2	181.8	9.4	149.6	5.6	35.5	4.9	11.3	64.2	182.5	9.2	151.0	5.8	36.5	8.5	19.6	
60	50	68	5.6	12.9	66.1	201.2	9.7	168.1	6.1	44.9	4.8	11.1	66.1	202.1	9.5	169.7	6.2	46.1	8.4	19.4	
		90	9.5	21.9	64.8	207.6	9.9	174.0	6.2	44.7	4.8	11.1	64.8	208.2	9.6	175.4	6.4	46.0	8.4	19.4	
	60	68	5.6	12.9	66.8	224.8	10.1	190.4	6.5	54.2	4.8	11.0	66.8	225.8	9.8	192.3	6.7	55.6	8.3	19.2	
		90	9.5	21.9	65.3	231.0	10.2	196.3	6.7	54.0	4.8	11.0	65.3	231.5	9.9	197.6	6.8	55.5	8.3	19.2	
	70	68	5.6	12.9	67.5	248.5	10.4	212.8	7.0	63.5	4.7	10.9	67.6	249.5	10.2	214.9	7.2	65.1	8.2	18.9	
		90	9.5	21.9	65.8	254.3	10.5	218.5	7.1	63.4	4.7	10.9	65.8	254.8	10.3	219.9	7.3	65.0	8.2	18.9	
	30	68	5.5	12.7	84.5	148.6	11.0		4.0	26.6	5.0	11.6	84.5	149.0	10.9	111./	4.0	27.4	8.6	19.9	
		90	9.2	21.3	83.4	149.8	11.1	112.0	4.0	26.6	5.0	11.6	83.5	151.0	11.0	113.3	4.0	27.4	8.6	19.9	
	40	68	5.5	12.7	85.2	1/1.8	11.5	132.7	4.4	36.0	4.9	11.3	85.2	172.9	11.3	134.4	4.5	36.9	8.5	19.6	
		90	9.2	21.3	84.0	1/5./	11.5	136.4	4.5	35.9	4.9	11.3	84.1	178.9	11.4	140.1	4.6	30.8	8.5	19.6	
80	50	00	5.5	12.7	85.9	195.0	11.9	154.3	4.0	45.3	4.0	11.1	00.0	190.0		107.1	5.0	40.4	0.4	19.4	
		90	9.2	21.3	96.7	201.0	12.0	179.2	4.9	40.1	4.0	11.1	96.7	200.0	11.7	107.0	5.2	40.Z	0.4	19.4	
	60	00	0.0	21.2	95.2	220.1	12.5	10.5	5.5	54.0	4.0	11.1	95.2	221.0	12.0	190.4	5.5	55.7	0.5	19.2	
		- 90 - 68	9.2	12.7	87.4	245.3	12.4	202.2	5.7	63.9	4.0	10.0	87.5	230.5	12.0	205.3	6.0	65.3	8.2	19.2	
	70	90	0.0	21.3	85.8	240.0	12.0	202.2	5.8	63.7	4.7	10.0	85.8	240.0	12.1	200.0	6.0	65 1	8.2	18.0	
		50 68	5.4	12.5	104.3	141 7	14.0	93.8	3.0	27.2	50	11.5	104.3	142.3	13.8	95.4	3.0	27.8	8.6	19.9	
	30	90	9.0	20.8	103.3	144 7	14.1	96.6	3.0	27.1	5.0	11.6	103.3	145.3	13.8	98.1	3.1	27.8	8.6	19.9	
		68	5.4	12.5	105.0	164.1	14.4	115.1	3.4	36.5	4.9	11.3	105.0	165.1	14.1	117.1	3.4	37.3	8.5	19.6	
	40	90	9.0	20.8	103.9	168.7	14.4	119.5	3.4	36.4	4.9	11.3	103.9	169.3	14.1	121.1	3.5	37.2	8.5	19.6	
		68	5.4	12.5	105.7	186.6	14.7	136.5	3.7	45.9	4.8	11.1	105.7	187.9	14.4	138.9	3.8	46.8	8.4	19.4	
100	50	90	9.0	20.8	104.4	192.7	14.7	142.4	3.8	45.7	4.8	11.1	104.4	193.3	14.4	144.1	3.9	46.7	8.4	19.4	
		68	5.4	12.5	106.4	211.1	15.0	159.8	4.1	55.2	4.8	11.1	106.4	212.7	14.6	162.7	4.3	56.3	8.3	19.2	
	60	90	9.0	20.8	105.0	217.4	15.1	166.0	4.2	55.0	4.8	11.1	105.0	218.7	14.7	168.6	4.4	56.1	8.3	19.2	
	70	68	5.4	12.5	107.1	235.5	15.3	183.1	4.5	64.4	4.7	10.9	107.2	237.4	14.9	186.6	4.7	65.7	8.2	18.9	
	10	90	9.0	20.8	105.5	242.1	15.4	189.6	4.6	64.3	4.7	10.9	105.6	244.1	15.0	193.0	4.8	65.6	8.2	18.9	
	30	68	5.3	12.2	124.2	139.6	17.5	79.9	2.3	27.6	5.0	11.6	124.3	141.8	17.1	83.6	2.4	28.1	8.6	19.9	
	30	90	8.9	20.6	123.2	140.0	17.6	79.9	2.3	27.6	5.0	11.6	123.3	142.3	17.2	83.7	2.4	28.1	8.6	19.9	
	40	68	5.3	12.2	124.9	160.1	17.8	99.4	2.6	37.0	4.9	11.3	124.9	161.8	17.4	102.5	2.7	37.7	8.5	19.6	
	40	90	8.9	20.6	123.7	162.2	17.9	101.2	2.7	36.9	4.9	11.3	123.8	164.1	17.4	104.6	2.8	37.6	8.5	19.6	
120	50	68	5.3	12.2	125.5	180.6	18.1	118.9	2.9	46.4	4.8	11.1	125.5	181.8	17.7	121.4	3.0	47.2	8.4	19.4	
1 120		90	8.9	20.6	124.2	184.4	18.1	122.6	3.0	46.3	4.8	11.1	124.3	185.9	17.7	125.5	3.1	47.1	8.4	19.4	
	60	68	5.3	12.2	126.1	201.5	18.4	138.8	3.2	55.8	4.8	11.0	126.2	203.8	17.9	142.6	3.3	56.7	8.3	19.2	
		90	8.9	20.6	124.7	205.4	18.4	142.5	3.3	55.7	4.8	11.0	124.8	208.1	18.0	146.7	3.4	56.6	8.3	19.2	
	70	68	5.3	12.2	126.7	222.4	18.7	158.7	3.5	65.2	4.7	10.9	126.8	225.8	18.2	163.8	3.6	66.2	8.2	18.9	
		90	8.9	20.6	125.2	226.4	18.7	162.5	3.5	65.1	4.7	10.9	125.3	230.2	18.3	167.9	3.7	66.2	8.2	18.9	

Notes: All capacities in kBtuh. All temperatures in °F. Interpolation is permissable, extrapolation is not. All performance data is based upon the lower voltage of dual voltage rated units. Performance data tables indicate the approved operational range. Operation of the unit outside the range of temperatures and flow rates listed will result in performance problems and possible failure.

Cooling - Full Load

		L	oad Flo	w				Source (68 GPM							Source 9	0 GPM			
ELT F°	EST	Flow	Pres	s Drop			He	ating			Pres	s Drop			Hea	iting			Pres	s Drop
^{F*}	F.	GPM	PSI	FT HD	LLT	TC	KW	HR	EER	LST	PSI	FT HD	LLT	тс	ĸw	HR	EER	LST	PSI	FT HD
	50	68	5.5	12.7	21.9	267.0	16.3	322.5	16.4	59.8	5.4	12.5	21.9	267.8	16.0	322.5	16.7	57.4	9.2	21.3
	50	90	9.4	21.7	23.7	274.8	16.5	331.0	16.7	60.0	5.4	12.5	23.7	276.7	16.2	331.8	17.1	57.6	9.2	21.3
30	70	68	5.5	12.7	22.4	249.0	20.0	317.3	12.5	79.6	5.3	12.2	22.4	250.6	19.8	318.2	12.7	77.3	9.1	21.0
	10	90	9.4	21.7	24.1	258.7	20.3	328.0	12.7	79.9	5.3	12.2	24.1	257.8	19.9	325.7	13.0	77.5	9.1	21.0
	90	68	5.5	12.7	23.3	219.9	24.4	303.1	9.0	99.2	5.2	12.0	23.3	221.4	24.1	303.5	9.2	97.0	9.0	20.8
	50	90	9.4	21.7	24.8	225.8	24.6	309.7	9.2	99.4	5.2	12.0	24.8	227.5	24.2	310.1	9.4	97.1	9.0	20.8
	50	68	5.4	12.5	39.1	358.7	17.7	419.0	20.3	62.7	5.4	12.5	39.1	359.8	17.4	419.1	20.7	59.6	9.2	21.3
		90	9.2	21.3	41.5	372.5	17.9	433.5	20.8	63.1	5.4	12.5	41.5	372.6	17.5	432.2	21.3	59.9	9.2	21.3
50	70	68	5.4	12.5	39.8	337.7	21.5	411.1	15.7	82.5	5.3	12.2	39.8	334.8	20.9	406.1	16.0	79.3	9.1	21.0
		90	9.2	21.3	42.1	344.3	21.7	418.4	15.9	82.7	5.3	12.2	42.1	344.8	21.0	416.5	16.4	79.5	9.1	21.0
	90	68	5.4	12.5	40.5	311.9	26.3	401.7	11.9	102.2	5.2	12.0	40.5	312.0	26.0	400.7	12.0	99.2	9.0	20.8
		90	9.2	21.3	42.6	321.4	26.0	410.1	12.4	102.4	5.2	12.0	42.6	322.4	25.4	409.1	12.7	99.4	9.0	20.8
	50	68	5.3	12.2	56.6	442.0	19.3	507.9	22.9	65.4	5.4	12.5	56.9	431.5	18.7	495.5	23.0	61.4	9.2	21.3
		90	9.1	21.0	59.8	446.3	19.5	512.7	22.9	65.5	5.4	12.5	60.0	434.4	18.9	498.9	23.0	61.4	9.2	21.3
70	70	68	5.3	12.2	56.5	444.1	23.2	523.2	19.2	85.9	5.3	12.2	56.9	433.7	22.5	510.5	19.3	81.7	9.1	21.0
		90	9.1	21.0	59.7	448.5	23.4	528.5	19.2	86.0	5.3	12.2	60.0	436.6	22.7	514.2	19.2	81.8	9.1	21.0
	90	68	5.3	12.2	57.4	416.2	27.7	510.7	15.0	105.5	5.2	12.0	56.9	430.7	27.1	523.3	15.9	102.0	9.0	20.8
		90	9.1	21.0	60.4	420.4	28.0	515.8	15.0	105.6	5.2	12.0	60.1	432.5	27.4	526.1	15.8	102.1	9.0	20.8
	50	68	5.2	12.0	75.7	472.5	20.1	541.2	23.5	66.4	5.4	12.5	76.1	458.0	19.4	524.3	23.6	62.0	9.2	21.3
		90	9.0	20.8	79.2	473.2	20.2	542.0	23.5	66.4	5.4	12.5	79.5	459.0	19.5	525.5	23.6	62.0	9.2	21.3
90	70	68	5.2	12.0	75.0	493.3	24.5	576.9	20.1	87.5	5.3	12.2	75.5	478.2	23.6	558.8	20.2	82.8	9.1	21.0
		90	9.0	20.8	78.7	494.0	24.5	577.7	20.1	87.5	5.3	12.2	79.0	478.9	23.7	559.7	20.2	82.8	9.1	21.0
	90	68	5.2	12.0	75.0	495.9	29.4	596.1	16.9	108.1	5.2	12.0	75.4	480.8	28.5	578.2	16.9	103.2	9.0	20.8
		90	9.0	20.8	78.6	499.1	29.5	599.8	16.9	108.2	5.2	12.0	78.9	484.0	28.7	581.8	16.9	103.3	9.0	20.8

Notes: All capacities in kBtuh. All temperatures in °F. Interpolation is permissable, extrapolation is not. All performance data is based upon the lower voltage of dual voltage rated units. Performance data tables indicate the approved operational range. Operation of the unit outside the range of temperatures and flow rates listed will result in performance problems and possible failure. Rev: 12/22/04 B

Cooling - Part Load

		L	oad Flo	w	Source 68 GPM								Source 90 GPM							
ELT	EST	Flow	Pres	s Drop			He	ating			Pres	s Drop			Hea	ting			Pres	s Drop
Г	F	GPM	PSI	FT HD	LLT	тс	KW	HR	EER	LST	PSI	FT HD	LLT	тс	KW	HR	EER	LST	PSI	FT HD
	50	68	5.5	12.7	25.8	138.8	8.0	166.3	17.3	55.0	5.4	12.5	25.8	139.3	7.9	166.3	17.6	53.8	9.2	21.3
		90	9.4	21.7	26.7	142.9	8.1	170.6	17.6	55.2	5.4	12.5	26.7	143.9	8.0	171.1	18.0	53.9	9.2	21.3
30	70	68	5.5	12.7	26.1	129.5	9.9	163.2	13.1	74.9	5.3	12.2	26.0	130.3	9.8	163.7	13.3	73.8	9.1	21.0
		90	9.4	21.7	26.9	134.5	10.0	168.8	13.4	75.1	5.3	12.2	26.9	134.1	9.8	167.6	13.6	73.8	9.1	21.0
	90	68	5.5	12.7	26.5	114.3	12.0	155.5	9.5	94.7	5.2	12.0	26.5	115.1	11.9	155.7	9.7	93.6	9.0	20.8
		90	9.4	21.7	27.3	117.4	12.1	158.9	9.7	94.8	5.2	12.0	27.3	118.3	12.0	159.1	9.9	93.6	9.0	20.8
	50	68	5.4	12.5	44.3	186.5	8.7	216.3	21.4	56.6	5.4	12.5	44.3	187.1	8.6	216.4	21.8	55.0	9.2	21.3
		90	9.2	21.3	45.6	193.7	8.8	223.8	21.9	56.8	5.4	12.5	45.6	193.8	8.6	223.2	22.5	55.1	9.2	21.3
50	70	68	5.4	12.5	44.7	175.6	10.6	211.9	16.5	76.4	5.3	12.2	44.7	174.1	10.3	209.3	16.9	74.8	9.1	21.0
		90	9.2	21.3	45.9	179.0	10.7	215.6	16.7	76.5	5.3	12.2	45.9	179.3	10.4	214.7	17.3	74.9	9.1	21.0
	90	68	5.4	12.5	45.1	162.2	13.0	206.5	12.5	96.3	5.2	12.0	45.1	162.2	12.8	206.1	12.6	94.7	9.0	20.8
		90	9.2	21.3	46.2	167.1	12.8	211.0	13.0	96.4	5.2	12.0	46.2	167.6	12.6	210.5	13.4	94.8	9.0	20.8
	50	68	5.3	12.2	63.0	229.8	9.5	262.4	24.1	58.0	5.4	12.5	63.2	224.4	9.3	256.0	24.2	55.9	9.2	21.3
		90	9.1	21.0	64.7	232.1	9.6	264.9	24.1	58.0	5.4	12.5	64.8	225.9	9.3	257.8	24.2	55.9	9.2	21.3
70	70	68	5.3	12.2	63.0	230.9	11.5	270.0	20.2	78.2	5.3	12.2	63.2	225.5	11.1	263.5	20.3	76.0	9.1	21.0
		90	9.1	21.0	64.7	233.2	11.6	272.7	20.2	78.3	5.3	12.2	64.8	227.0	11.2	265.4	20.2	76.1	9.1	21.0
	90	68	5.3	12.2	63.4	216.4	13.7	263.1	15.8	98.0	5.2	12.0	63.2	224.0	13.4	269.7	16.7	96.2	9.0	20.8
		90	9.1	21.0	65.0	218.6	13.8	265.8	15.8	98.1	5.2	12.0	64.8	224.9	13.5	271.1	16.6	96.2	9.0	20.8
	50	68	5.2	12.0	82.6	245.7	10.0	279.7	24.7	58.5	5.4	12.5	82.8	238.2	9.6	270.9	24.8	56.2	9.2	21.3
		90	9.0	20.8	84.4	246.1	10.0	280.1	24.7	58.5	5.4	12.5	84.5	238.7	9.6	271.5	24.8	56.2	9.2	21.3
90	70	68	5.2	12.0	82.2	256.5	12.1	297.8	21.2	79.0	5.3	12.2	82.5	248.6	11.7	288.5	21.3	76.6	9.1	21.0
		90	9.0	20.8	84.1	256.9	12.1	298.2	21.2	79.0	5.3	12.2	84.3	249.0	11.7	288.9	21.3	76.6	9.1	21.0
	90	68	5.2	12.0	82.2	257.9	14.5	307.4	17.8	99.3	5.2	12.0	82.4	250.0	14.1	298.1	17.7	96.8	9.0	20.8
		90	9.0	20.8	84.1	259.5	14.6	309.3	17.8	99.4	5.2	12.0	84.2	251.7	14.2	300.0	17.8	96.9	9.0	20.8

Notes: All capacities in kBtuh. All temperatures in °F. Interpolation is permissable, extrapolation is not. All performance data is based upon the lower voltage of dual voltage rated units. Performance data tables indicate the approved operational range. Operation of the unit outside the range of temperatures and flow rates listed will result in performance problems and possible failure.

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Heating - Full Load

	For		LW	/PD		S	OURCE	108 GPN	1		SV	VPD		S	JURCE	135 GPM			SV	NPD
ELI	ESI	LGPIN	PSI	FT HD	LLT	HC	KW	HE	COP	LST	PSI	FT HD	LLT	HC	KW	HE	COP	LST	PSI	FT HD
	20	108	3.1	7.2	69.4	491.4	29.0	392.4	5.0	22.5	3.4	7.9	69.5	495.0	28.3	398.4	5.1	23.9	5.0	11.5
	30	135	4.6	10.7	67.7	503.3	29.1	403.9	5.1	22.3	3.4	7.9	67.8	507.9	28.5	410.7	5.2	23.7	5.0	11.5
	10	108	3.1	7.2	70.6	557.0	30.2	453.9	5.4	31.3	3.3	7.6	70.7	561.1	29.5	460.4	5.6	33.0	4.9	11.2
	40	135	4.6	10.7	68.7	570.6	30.4	466.9	5.5	31.1	3.3	7.6	68.8	575.8	29.7	474.4	5.7	32.8	4.9	11.2
	50	108	3.1	7.2	71.8	617.4	31.5	510.1	5.8	40.3	3.2	7.4	71.9	622.0	30.7	517.3	5.9	42.1	4.8	11.0
60	50	135	4.6	10.7	69.7	632.5	31.6	524.6	5.9	40.0	3.2	7.4	69.7	638.3	30.9	532.8	6.1	41.9	4.8	11.0
	60	108	3.1	7.2	72.8	672.6	32.7	561.1	6.0	49.3	3.1	7.2	72.9	677.6	31.9	568.8	6.2	51.3	4.6	10.7
	00	135	4.6	10.7	70.5	689.0	32.9	576.9	6.1	49.0	3.1	7.2	70.6	695.3	32.1	585.7	6.3	51.1	4.6	10.7
	70	108	3.1	7.2	73.8	722.7	33.9	607.0	6.2	58.4	3.0	6.9	73.9	728.0	33.1	615.1	6.4	60.6	4.5	10.3
	10	135	4.6	10.7	71.3	740.3	34.1	624.0	6.4	58.1	3.0	6.9	71.4	747.0	33.3	633.3	6.6	60.3	4.5	10.3
		108	2.9	6.7	89.1	476.5	35.8	354.5	3.9	23.2	3.4	7.9	89.2	480.0	34.9	360.9	4.0	24.5	5.0	11.5
	30	135	4.4	10.1	87.5	488.1	35.9	365.5	4.0	23.0	3.4	7.9	87.5	492.6	35.1	372.6	4.1	24.3	5.0	11.5
	10	108	2.9	6.7	90.4	544.1	37.0	417.9	4.3	32.0	3.3	7.6	90.5	548.1	36.1	424.9	4.4	33.5	4.9	11.2
	40	135	4.4	10.1	88.5	557.3	37.2	430.5	4.4	31.8	3.3	7.6	88.6	562.4	36.4	438.4	4.5	33.3	4.9	11.2
20	50	108	2.9	6.7	91.6	605.5	38.2	475.1	4.6	40.9	3.2	7.4	91.6	610.0	37.3	482.7	4.8	42.6	4.8	11.0
δυ	50	135	4.4	10.1	89.5	620.3	38.4	489.2	4.7	40.7	3.2	7.4	89.6	626.0	37.6	497.8	4.9	42.4	4.8	11.0
	60	108	2.9	6.7	92.6	660.7	39.4	526.1	4.9	50.0	3.1	7.2	92.7	665.6	38.5	534.2	5.1	51.8	4.6	10.7
	00	135	4.4	10.1	90.3	676.8	39.6	541.5	5.0	49.7	3.1	7.2	90.4	683.0	38.8	550.7	5.2	51.6	4.6	10.7
	70	108	2.9	6.7	93.6	709.8	40.7	571.0	5.1	59.1	3.0	6.9	93.7	715.0	39.7	579.5	5.3	61.1	4.5	10.3
	10	135	4.4	10.1	91.1	727.0	40.9	587.6	5.2	58.8	3.0	6.9	91.2	733.7	40.0	597.3	5.4	60.9	4.5	10.3
	30	108	2.7	6.2	108.8	461.1	45.1	307.3	3.0	24.1	3.4	7.9	108.9	464.5	44.0	314.4	3.1	25.2	5.0	11.5
	30	135	4.1	9.5	107.2	472.3	45.3	317.7	3.1	23.9	3.4	7.9	107.3	476.6	44.3	325.5	3.2	25.0	5.0	11.5
	10	108	2.7	6.2	110.0	525.4	46.1	368.1	3.3	33.0	3.3	7.6	110.1	529.3	45.0	375.8	3.4	34.3	4.9	11.2
	40	135	4.1	9.5	108.2	538.2	46.3	380.1	3.4	32.7	3.3	7.6	108.3	543.1	45.3	388.5	3.5	34.1	4.9	11.2
100	50	108	2.7	6.2	111.2	584.1	47.0	423.6	3.6	41.9	3.2	7.4	111.2	588.4	45.9	431.8	3.8	43.4	4.8	11.0
100	50	135	4.1	9.5	109.1	598.3	47.3	437.0	3.7	41.7	3.2	7.4	109.2	603.8	46.2	446.1	3.8	43.2	4.8	11.0
	60	108	2.7	6.2	112.2	637.3	48.1	473.3	3.9	51.0	3.1	7.2	112.3	642.0	46.9	482.0	4.0	52.6	4.6	10.7
	00	135	4.1	9.5	110.0	652.8	48.3	488.0	4.0	50.7	3.1	7.2	110.1	658.8	47.2	497.6	4.1	52.4	4.6	10.7
		108	2.7	6.2	113.1	684.9	49.0	517.8	4.1	60.1	3.0	6.9	113.2	690.0	47.8	526.9	4.2	62.0	4.5	10.3
	10	135	4.1	9.5	110.7	701.6	49.2	533.7	4.2	59.8	3.0	6.9	110.8	708.0	48.1	543.8	4.3	61.7	4.5	10.3
	30	108	2.5	5.8	128.4	441.5	56.6	248.6	2.3	25.3	3.4	7.9	128.5	444.8	55.2	256.5	2.4	26.1	5.0	11.5
	30	135	3.8	8.9	126.9	452.3	56.8	258.3	2.3	25.1	3.4	7.9	127.0	456.4	55.6	266.8	2.4	25.9	5.0	11.5
	10	108	2.5	5.8	129.5	496.3	57.2	301.3	2.5	34.2	3.3	7.6	129.5	500.0	55.8	309.6	2.6	35.3	4.9	11.2
	40	135	3.8	8.9	127.8	508.4	57.5	312.4	2.6	34.0	3.3	7.6	127.8	513.1	56.2	321.3	2.7	35.1	4.9	11.2
120	50	108	2.5	5.8	130.5	548.5	57.8	351.4	2.8	43.3	3.2	7.4	130.5	552.6	56.4	360.2	2.9	44.5	4.8	11.0
120	50	135	3.8	8.9	128.6	561.9	58.1	363.7	2.8	43.1	3.2	7.4	128.7	567.1	56.8	373.3	2.9	44.3	4.8	11.0
	60	108	2.5	5.8	131.4	598.2	58.4	398.9	3.0	52.4	3.1	7.2	131.5	602.6	57.0	408.1	3.1	53.8	4.6	10.7
	60	135	3.8	8.9	129.4	612.8	58.7	412.5	3.1	52.1	3.1	7.2	129.4	618.4	57.4	422.5	3.2	53.5	4.6	10.7
		108	2.5	5.8	132.3	645.2	59.0	443.9	3.2	61.5	3.0	6.9	132.4	650.0	57.6	453.5	3.3	63.1	4.5	10.3
	1 /0	135	3.8	8.9	130.1	661.0	59.3	458.6	3.3	61.2	3.0	6.9	130.2	667.0	58.0	469.1	3.4	62.8	4.5	10.3

Notes: All capacities in kBtuh. All temperatures in °F. Interpolation is permissable, extrapolation is not. All performance data is based upon the lower voltage of dual voltage rated units. Performance data tables indicate the approved operational range. Operation of the unit outside the range of temperatures and flow rates listed will result in performance problems and possible failure.

Heating - Part Load

	FOT		LW	/PD		S	OURCE	108 GPN	1		SV	VPD		S	DURCE	135 GPM			SV	VPD
ELI	ESI	LGPM	PSI	FT HD	LLT	HC	KW	HE	COP	LST	PSI	FT HD	LLT	HC	KW	HE	COP	LST	PSI	FT HD
	00	108	3.1	7.2	64.8	253.2	13.9	205.7	5.3	26.1	3.4	7.9	64.9	255.1	13.6	208.7	5.5	26.8	5.0	11.5
	30	135	4.6	10.7	64.0	259.4	14.0	211.6	5.4	26.0	3.4	7.9	64.0	261.7	13.7	215.1	5.6	26.7	5.0	11.5
		108	3.1	7.2	65.5	287.0	14.5	237.5	5.8	35.5	3.3	7.6	65.5	289.1	14.2	240.8	6.0	36.3	4.9	11.2
	40	135	4.6	10.7	64.5	294.0	14.6	244.2	5.9	35.3	3.3	7.6	64.5	296.7	14.3	248.0	6.1	36.2	4.9	11.2
		108	3.1	7.2	66.1	318.2	15.1	266.6	6.2	44.9	3.2	7.4	66.1	320.5	14.7	270.2	6.4	45.9	4.8	11.0
60	50	135	4.6	10.7	65.0	325.9	15.2	274.1	6.3	44.8	3.2	7.4	65.0	328.9	14.8	278.3	6.5	45.8	4.8	11.0
		108	3.1	7.2	66.6	346.6	15.7	293.1	6.5	54.4	3.1	7.2	66.7	349.2	15.3	296.9	6.7	55.5	4.6	10.7
	60	135	4.6	10.7	65.4	355.0	15.8	301.2	6.6	54.2	3.1	7.2	65.5	358.3	15.4	305.7	6.8	55.3	4.6	10.7
		108	3.1	7.2	67.1	372.4	16.3	316.8	6.7	64.0	3.0	6.9	67.2	375.1	15.9	320.9	6.9	65.1	4.5	10.3
	70	135	4.6	10.7	65.8	381.5	16.4	325.6	6.8	63.8	3.0	6.9	65.9	385.0	16.0	330.3	7.0	65.0	4.5	10.3
	00	108	2.9	6.7	84.7	245.5	17.2	187.0	4.2	26.4	3.4	7.9	84.7	247.3	16.8	190.2	4.3	27.1	5.0	11.5
	30	135	4.4	10.1	83.8	251.5	17.3	192.6	4.3	26.3	3.4	7.9	83.9	253.8	16.9	196.2	4.4	27.0	5.0	11.5
	40	108	2.9	6.7	85.4	280.4	17.8	219.8	4.6	35.8	3.3	7.6	85.4	282.4	17.3	223.3	4.8	36.6	4.9	11.2
	40	135	4.4	10.1	84.4	287.2	17.8	226.3	4.7	35.7	3.3	7.6	84.4	289.8	17.5	230.3	4.9	36.5	4.9	11.2
00	50	108	2.9	6.7	86.0	312.0	18.3	249.4	5.0	45.2	3.2	7.4	86.0	314.3	17.9	253.2	5.1	46.1	4.8	11.0
80	50	135	4.4	10.1	84.9	319.6	18.4	256.7	5.1	45.1	3.2	7.4	84.9	322.6	18.0	261.0	5.2	46.0	4.8	11.0
		108	2.9	6.7	86.5	340.5	18.9	275.9	5.3	54.7	3.1	7.2	86.5	343.0	18.5	279.9	5.4	55.7	4.6	10.7
	60	135	4.4	10.1	85.3	348.8	19.0	283.8	5.4	54.6	3.1	7.2	85.4	352.0	18.6	288.4	5.5	55.6	4.6	10.7
	70	108	2.9	6.7	87.0	365.7	19.5	299.1	5.5	64.3	3.0	6.9	87.0	368.4	19.1	303.4	5.7	65.4	4.5	10.3
	10	135	4.4	10.1	85.7	374.6	19.6	307.7	5.6	64.1	3.0	6.9	85.8	378.1	19.2	312.6	5.8	65.2	4.5	10.3
	20	108	2.7	6.2	104.5	237.6	21.6	163.8	3.2	26.9	3.4	7.9	104.6	239.4	21.1	167.3	3.3	27.4	5.0	11.5
	30	135	4.1	9.5	103.7	243.4	21.8	169.2	3.3	26.8	3.4	7.9	103.8	245.6	21.3	173.0	3.4	27.4	5.0	11.5
	40	108	2.7	6.2	105.2	270.7	22.1	195.2	3.6	36.3	3.3	7.6	105.2	272.7	21.6	199.0	3.7	37.0	4.9	11.2
	40	135	4.1	9.5	104.2	277.3	22.2	201.4	3.7	36.2	3.3	7.6	104.3	279.9	21.8	205.6	3.8	36.9	4.9	11.2
100	50	108	2.7	6.2	105.7	301.0	22.6	223.9	3.9	45.7	3.2	7.4	105.8	303.2	22.0	228.0	4.0	46.5	4.8	11.0
100	50	135	4.1	9.5	104.7	308.3	22.7	230.9	4.0	45.6	3.2	7.4	104.8	311.1	22.2	235.4	4.1	46.4	4.8	11.0
	60	108	2.7	6.2	106.3	328.4	23.1	249.7	4.2	55.2	3.1	7.2	106.3	330.8	22.5	254.0	4.3	56.1	4.6	10.7
	00	135	4.1	9.5	105.1	336.4	23.2	257.3	4.3	55.1	3.1	7.2	105.2	339.5	22.7	262.1	4.4	56.0	4.6	10.7
	70	108	2.7	6.2	106.7	352.9	23.5	272.7	4.4	64.8	3.0	6.9	106.8	355.6	22.9	277.3	4.5	65.8	4.5	10.3
	10	135	4.1	9.5	105.5	361.5	23.6	280.9	4.5	64.6	3.0	6.9	105.6	364.9	23.1	286.0	4.6	65.6	4.5	10.3
	30	108	2.5	5.8	124.3	227.5	27.2	134.9	2.5	27.4	3.4	7.9	124.4	229.2	26.5	138.8	2.5	27.9	5.0	11.5
	50	135	3.8	8.9	123.6	233.1	27.3	139.9	2.5	27.3	3.4	7.9	123.6	235.2	26.7	144.1	2.6	27.8	5.0	11.5
	10	108	2.5	5.8	124.9	255.8	27.4	162.1	2.7	36.9	3.3	7.6	124.9	257.6	26.8	166.2	2.8	37.5	4.9	11.2
	40	135	3.8	8.9	124.0	262.0	27.6	167.9	2.8	36.8	3.3	7.6	124.0	264.4	27.0	172.3	2.9	37.4	4.9	11.2
120	50	108	2.5	5.8	125.4	282.7	27.7	188.0	3.0	46.4	3.2	7.4	125.4	284.8	27.1	192.4	3.1	47.1	4.8	11.0
1 20		135	3.8	8.9	124.4	289.6	27.9	194.4	3.0	46.3	3.2	7.4	124.5	292.2	27.3	199.2	3.1	47.0	4.8	11.0
	60	108	2.5	5.8	125.9	308.2	28.0	212.6	3.2	55.9	3.1	7.2	125.9	310.5	27.4	217.1	3.3	56.7	4.6	10.7
		135	3.8	8.9	124.8	315.8	28.2	219.6	3.3	55.8	3.1	7.2	124.9	318.6	27.6	224.6	3.4	56.6	4.6	10.7
	70	108	2.5	5.8	126.3	332.5	28.3	235.8	3.4	65.5	3.0	6.9	126.4	334.9	27.7	240.6	3.5	66.3	4.5	10.3
		135	3.8	8.9	125.2	340.6	28.5	243.4	3.5	65.4	3.0	6.9	125.2	343.7	27.8	248.7	3.6	66.2	4.5	10.3

Notes: All capacities in kBtuh. All temperatures in °F. Interpolation is permissable, extrapolation is not. All performance data is based upon the lower voltage of dual voltage rated units. Performance data tables indicate the approved operational range. Operation of the unit outside the range of temperatures and flow rates listed will result in performance problems and possible failure.

Cooling - Full Load

	LOT		LW	/PD		S	OURCE	108 GPN	1		SV	VPD		S	OURCE	135 GPN	1		SV	VPD
ELI	E31	LGPIVI	PSI	FT HD	LLT	TC	KW	HR	EER	LST	PSI	FT HD	LLT	TC	KW	HR	EER	LST	PSI	FT HD
	50	108	3.4	7.9	22.0	418.1	25.3	504.3	16.5	59.6	3.2	7.4	22.0	421.2	24.7	505.4	17.1	57.7	4.7	11.0
	50	135	5.0	11.5	23.5	428.3	25.4	515.0	16.9	59.8	3.2	7.4	23.4	432.2	24.8	516.8	17.4	57.9	4.7	11.0
20	70	108	3.4	7.9	22.8	377.2	31.3	484.1	12.0	79.2	3.0	6.9	22.7	380.0	30.6	484.4	12.4	77.4	4.5	10.3
30	10	135	5.0	11.5	24.1	386.4	31.5	493.9	12.3	79.4	3.0	6.9	24.0	389.9	30.7	494.7	12.7	77.6	4.5	10.3
	00	108	3.4	7.9	23.7	328.6	37.7	457.3	8.7	98.7	2.8	6.4	23.7	331.0	36.9	456.7	9.0	97.0	4.2	9.8
	90	135	5.0	11.5	24.9	336.6	37.9	466.0	8.9	98.9	2.8	6.4	24.8	339.7	37.0	465.9	9.2	97.1	4.2	9.8
	50	108	3.2	7.4	39.0	577.8	27.8	672.6	20.8	62.8	3.2	7.4	38.9	582.1	27.1	674.7	21.4	60.3	4.7	11.0
	50	135	4.7	11.0	41.0	591.9	27.9	687.2	21.2	63.1	3.2	7.4	40.9	597.3	27.2	690.3	21.9	60.5	4.7	11.0
50	70	108	3.2	7.4	39.9	531.1	33.9	646.8	15.7	82.3	3.0	6.9	39.8	535.0	33.1	648.1	16.1	79.9	4.5	10.3
50	10	135	4.7	11.0	41.7	544.0	34.1	660.4	15.9	82.6	3.0	6.9	41.6	549.0	33.3	662.5	16.5	80.1	4.5	10.3
	00	108	3.2	7.4	40.9	478.5	40.4	616.5	11.8	101.8	2.8	6.4	40.8	482.0	39.5	616.8	12.2	99.4	4.2	9.8
	90	135	4.7	11.0	42.5	490.1	40.7	628.9	12.1	102.0	2.8	6.4	42.4	494.6	39.7	629.9	12.5	99.6	4.2	9.8
	50	108	3.0	6.9	56.1	725.5	30.2	828.6	24.0	65.8	3.2	7.4	56.0	730.9	29.5	831.6	24.8	62.7	4.7	11.0
	50	135	4.5	10.3	58.6	743.2	30.4	846.8	24.5	66.2	3.2	7.4	58.5	750.0	29.6	851.1	25.3	63.0	4.7	11.0
70	70	108	3.0	6.9	57.0	680.0	36.5	804.6	18.6	85.4	3.0	6.9	56.9	685.0	35.7	806.7	19.2	82.3	4.5	10.3
70	10	135	4.5	10.3	59.4	696.5	36.7	821.8	19.0	85.7	3.0	6.9	59.3	702.9	35.8	825.1	19.6	82.6	4.5	10.3
	00	108	3.0	6.9	58.1	621.4	42.7	767.1	14.6	104.6	2.8	6.4	58.0	626.0	41.7	768.3	15.0	101.7	4.2	9.8
	90	135	4.5	10.3	60.3	636.5	42.9	783.0	14.8	104.9	2.8	6.4	60.2	642.4	41.9	785.2	15.3	102.0	4.2	9.8
	50	108	2.8	6.4	73.6	861.2	32.5	972.2	26.5	68.6	3.2	7.4	73.4	867.6	31.8	976.0	27.3	64.9	4.7	11.0
	50	135	4.2	9.8	76.5	882.2	32.7	993.8	27.0	69.0	3.2	7.4	76.4	890.3	31.9	999.1	27.9	65.3	4.7	11.0
00	70	108	2.8	6.4	74.4	819.0	39.1	952.4	20.9	88.2	3.0	6.9	74.2	825.0	38.2	955.3	21.6	84.6	4.5	10.3
90	10	135	4.2	9.8	77.2	838.9	39.3	973.1	21.3	88.6	3.0	6.9	77.1	846.6	38.3	977.4	22.1	84.9	4.5	10.3
	00	108	2.8	6.4	75.5	757.4	45.1	911.1	16.8	107.4	2.8	6.4	75.4	763.0	44.0	913.1	17.3	103.9	4.2	9.8
	90	135	4.2	9.8	78.2	775.9	45.3	930.4	17.1	107.8	2.8	6.4	78.0	783.0	44.2	933.7	17.7	104.3	4.2	9.8

Notes: All capacities in kBtuh. All temperatures in °F. Interpolation is permissable, extrapolation is not. All performance data is based upon the lower voltage of dual voltage rated units. Performance data tables indicate the approved operational range. Operation of the unit outside the range of temperatures and flow rates listed will result in performance problems and possible failure.

Cooling - Part Load

ELT	LOT		LW	/PD		S	OURCE	108 GPN	1		SV	VPD		S	OURCE	135 GPN	1		SV	VPD
CLI	E91	LGPIN	PSI	FT HD	LLT	TC	KW	HR	EER	LST	PSI	FT HD	LLT	TC	KW	HR	EER	LST	PSI	FT HD
	50	108	3.4	7.9	25.8	217.4	12.5	259.9	17.4	55.0	3.2	7.4	25.8	219.0	12.2	260.5	18.0	54.0	4.7	11.0
30	50	135	5.0	11.5	26.6	222.7	12.5	265.5	17.8	55.1	3.2	7.4	26.6	224.8	12.2	266.4	18.4	54.1	4.7	11.0
20	70	108	3.4	7.9	26.3	196.2	15.4	248.9	12.7	74.8	3.0	6.9	26.2	197.6	15.1	249.1	13.1	73.8	4.5	10.3
30	70	135	5.0	11.5	26.9	200.9	15.5	253.9	12.9	74.8	3.0	6.9	26.9	202.8	15.1	254.4	13.4	73.9	4.5	10.3
	00	108	3.4	7.9	26.7	170.9	18.6	234.3	9.2	94.5	2.8	6.4	26.7	172.1	18.2	234.1	9.5	93.6	4.2	9.8
	90	135	5.0	11.5	27.3	175.0	18.7	238.8	9.4	94.6	2.8	6.4	27.3	176.6	18.2	238.8	9.7	93.6	4.2	9.8
	50	108	3.2	7.4	44.3	300.5	13.7	347.2	21.9	56.6	3.2	7.4	44.2	302.7	13.4	348.3	22.6	55.3	4.7	11.0
	50	135	4.7	11.0	45.3	307.8	13.8	354.8	22.3	56.8	3.2	7.4	45.3	310.6	13.4	356.4	23.1	55.4	4.7	11.0
50	70	108	3.2	7.4	44.7	276.2	16.7	333.2	16.5	76.4	3.0	6.9	44.7	278.2	16.3	333.9	17.0	75.1	4.5	10.3
50	70	135	4.7	11.0	45.7	282.9	16.8	340.3	16.8	76.5	3.0	6.9	45.6	285.5	16.4	341.4	17.4	75.2	4.5	10.3
	00	108	3.2	7.4	45.3	248.8	19.9	316.8	12.5	96.0	2.8	6.4	45.2	250.6	19.5	317.1	12.9	94.8	4.2	9.8
	90	135	4.7	11.0	46.1	254.9	20.0	323.3	12.7	96.2	2.8	6.4	46.1	257.2	19.5	323.9	13.2	94.9	4.2	9.8
	50	108	3.0	6.9	62.8	377.3	14.9	428.1	25.3	58.2	3.2	7.4	62.7	380.1	14.5	429.7	26.1	56.6	4.7	11.0
	50	135	4.5	10.3	64.1	386.5	15.0	437.6	25.8	58.4	3.2	7.4	64.0	390.0	14.6	439.8	26.7	56.7	4.7	11.0
70	70	108	3.0	6.9	63.2	353.6	18.0	415.0	19.6	77.9	3.0	6.9	63.2	356.2	17.6	416.2	20.3	76.4	4.5	10.3
70	70	135	4.5	10.3	64.5	362.2	18.1	424.0	20.0	78.1	3.0	6.9	64.4	365.5	17.7	425.7	20.7	76.5	4.5	10.3
	00	108	3.0	6.9	63.8	323.1	21.1	395.0	15.4	97.5	2.8	6.4	63.8	325.5	20.6	395.7	15.8	96.0	4.2	9.8
	90	135	4.5	10.3	64.9	331.0	21.2	403.2	15.6	97.7	2.8	6.4	64.9	334.0	20.6	404.4	16.2	96.2	4.2	9.8
	50	108	2.8	6.4	81.5	447.8	16.0	502.6	27.9	59.6	3.2	7.4	81.4	451.2	15.7	504.6	28.8	57.7	4.7	11.0
	50	135	4.2	9.8	83.0	458.8	16.1	513.8	28.5	59.8	3.2	7.4	82.9	463.0	15.7	516.6	29.4	57.9	4.7	11.0
00	70	108	2.8	6.4	81.9	425.9	19.3	491.7	22.1	79.4	3.0	6.9	81.8	429.0	18.8	493.3	22.8	77.5	4.5	10.3
90	10	135	4.2	9.8	83.3	436.2	19.4	502.4	22.5	79.6	3.0	6.9	83.3	440.2	18.9	504.7	23.3	77.7	4.5	10.3
	00	108	2.8	6.4	82.5	393.9	22.2	469.6	17.7	99.0	2.8	6.4	82.4	396.8	21.7	470.8	18.3	97.2	4.2	9.8
	90	135	4.2	9.8	83.8	403.4	22.3	479.6	18.1	99.2	2.8	6.4	83.8	407.1	21.8	481.4	18.7	97.4	4.2	9.8

Notes: All capacities in kBtuh. All temperatures in °F. Interpolation is permissable, extrapolation is not. All performance data is based upon the lower voltage of dual voltage rated units. Performance data tables indicate the approved operational range. Operation of the unit outside the range of temperatures and flow rates listed will result in performance problems and possible failure.

Unit Startup

Verify the following:

- · High voltage is correct and matches nameplate
- Fuses, breakers and wire size are correct
- · Low voltage wiring is complete
- Piping is complete and the water system has been cleaned and flushed
- Air is purged from closed loop system
- · Isolation valves are open and water control valves or loop pumps are wired
- · Service/access panels are in place
- Transformer has been switched to lower voltage tap if needed (208/230 volt units only)
- Unit controls are in "off" position
- · Flow switches are installed and ready or wires are jumpered
- · Freeze points have been set in control



WARNING: Verify ALL water controls are open and allow water flow PRIOR to engaging the compressor. Failure to do so can result in freezing the heat exchanger or water lines causing permanent damage to the unit.

Startup Steps

- · Set thermostat control above cooling set point.
- · Set thermostat control in cooling mode.
- Slowly reduce the control setting until both the compressor and water control valve/loop pumps are activated. Verify that the compressor is on and that the water flow rate is correct by measuring pressure drop through the heat exchanger and comparing to the Performance Data Tables (pages 25 - 32). Check for correct rotation of scroll compressors. Switch any two power leads at the L1, L2, and L3 line voltage termination block if incorrect.
- Perform a cooling capacity test by multiplying GPM x ∆T x 485 (antifreeze/water). Use 500 for 100% water. Check capacity against catalog data at same conditions.
- Set control to "OFF" position.
- · Leave unit "OFF" for approximately five (5) minutes to allow pressure to equalize.
- Adjust control below heating set point.
- Set control in "HEAT" position mode.
- Slowly increase the control setting until both compressor and water control valve/loop pumps are activated. The
 reversing valve should be heard changing over.
- Perform a heating capacity test by multiplying GPM x ∆T x 485 (antifreeze/water). Use 500 for 100% water. Check capacity against catalog data at same conditions.
- · Check for vibrations, noise and water leaks.
- · Set system to maintain desired set point.
- Instruct the owner/operator of correct control and system operation.

Troubleshooting

Should a major problem develop, refer to the following information for possible causes and corrective steps.

If compressor won't run:

- 1. The fuse may be open or the circuit breaker is tripped. Check electrical circuits and motor windings for shorts or grounds. Investigate for possible overloading. Replace fuse or reset circuit breakers after fault is corrected.
- 2. Supply voltage may be too low. Check it with a volt meter.
- 3. Control system may be faulty. Check control for correct wiring of thermostat or aquastat and check the 24 volt transformer for proper voltage.
- 4. Wires may be loose or broken. Replace or tighten.
- 5. The low pressure switch may have tripped due to one or more of the following:
 - a. Heating
 - 1) Plugged heat exchanger on source side
 - 2) Water flow source side -(Low)
 - 3) Water too cold source side
 - 4) Low refrigerant
 - b. Cooling
 - 1) Plugged heat exchanger on load side
 - 2) Water flow load side (Low)
 - 3) Water too cold load side
 - 4) Low refrigerant
- 5. The high pressure switch may have tripped due to one or more of the following:
 - a. Heating
 - 1) Plugged heat exchanger on load side
 - 2) Low water flow load side
 - 3) Water too warm load side
 - b. Cooling
 - 1) Plugged heat exchanger on source side
 - 2) Low water flow on source side
 - 3) Water too warm source side
- 7. The compressor overload protection may be open. Disconnect power. Remove S1 & S2 wires from the compressor protection module. Measure the resistance between the S1 & S2 wires. If the resistance measures > 2750 ohms, then the internal compressor resistance has tripped the compressor protection module. The compressor protection module will reset after a 30 minute delay and the resistance measures < 2250 ohms. Cycling the power off for a minimum of 3 seconds will manually reset the compressor module. The internal compressor resistance measure < 2250 ohms for the compressor module to reset.</p>
- 8. The internal winding of the compressor motor may be grounded to the compressor shell. If so, replace the compressor.
- 9. The compressor winding may be open or shorted. Disconnect power. Check continuity with ohm meter. If the winding is open, replace the compressor.

If sufficient cooling or heating is not obtained:

- 1. Check control for improper location or setting.
- 2. Check for restriction in water flow.
- 3. Check refrigerant subcooling and superheat for proper refrigerant charge and expansion valve operation.
- 4. The reversing valve may be defective and creating a bypass of refrigerant. If the unit will not heat, check the reversing valve coil.

If the unit operation is noisy:

- 1. Check compressor for loosened mounting bolts. Make sure compressor is floating free on its isolator mounts. Check for tubing contact with the compressor or other surfaces. Readjust it by bending slightly.
- 2. Check screws on all panels.
- 3. Check for chattering or humming in the contactor or relays due to low voltage or a defective holding coil. Replace the component.
- 4. Check for proper installation of vibration absorbing material under the unit.
- 5. Check for abnormally high discharge pressures.
- 6. Compressor rotation incorrect

Preventive Maintenance

Unit Heat Exchanger Maintenance

- 1. Keep all air out of the water or antifreeze solution.
- 2. Keep the system under pressure at all times. Closed loop systems must have positive static pressure or air vents may draw air into the system.

Notes: If the installation is in an area with a known high mineral content in the water, it is best to establish with the owner a periodic maintenance schedu for checking the water-to-refrigerant heat exchanger on a regular basis. Should periodic cleaning be necessary, use standard cleaning procedures. Generally, the more water flowing through the unit, the less chance there is for scaling. Low GPM flow rates produce higher temperatures through the heat exchanger. To avoid excessive pressure drop and the possibility of metal erosion, do not exceed GPM flow rate as shown on the specification sheets for each unit.

Replacement Procedures

When contacting the company for service or replacement parts, refer to the model number and serial number of the unit а□

In-Warranty Material Return

Material may not be returned except by permission of authorized warranty personnel. Contact your local distributor for warranty return authorization and assistance.

Service Parts List

	Dout Decemination		EW360		EW540			
	Part Description	208-230/60/3	460/60/3	575/60/3	460/60/3	575/60/3		
or	Compressor	34P576-03	34P576-04	34P576-05	34P577-04	34P577-05		
SS	Crankcase Heater	19P535B01	19P535B02	19P535B03	19P535-04	19P535-05		
pre	Compressor Sound Jacket		92P515-01		92P5	17-01		
Ē	Discharge Rotalock Adapter		33P603-01		33P6	03-02		
ŭ	Suction Rotalock Adapter		33P604-01		33P6	04-02		
on ts	Thermal Expansion Valve		33P573-01		33P5	72-01		
atio	Filter Dryer		36P500B06		36P50	00B06		
oor	Reversing Valve with Coil		33P546-04		33P6	07-01		
n fri	Brazed Plate Heat Exchanger		62P550-01		62P5	51-01		
နူဂ္ဂ	Heat Exchanger Support Bracket		47C698-01		47C7	13-01		
7.5	High Pressure Switch		35P506B02		35P50)6B02		
sor	Low Pressure Switch		35P506B01		35P50	06B01		
afet	Water Temperature Sensor		12P529-01		12P5	29-01		
ω̈́ω	Freeze Protection Sensor		12P529-01		12P5	29-01		
	Compressor Contactor	13P537B05	13P53	37B04	13P53	37B05		
	Transformer	15P501B01	15P505B01	15P506B01	15P505B01	15P506B01		
ca	Power In Terminal Block		12P524A01		12P52	24A01		
ctri	Connection Block - Small		12P503-06		12P5	03-06		
Ē	Connection Block - Low Voltage		12P520-01		12P5	20-01		
-	Grounding Lug		12P004A		12P0	004A		
	Phase Guard Monitor		19P541A04		19P54	41A04		
	FX10 Main Board - no communications		17X51606-09		17X51	606-09		
	FX10 Main Board & N2 Open Com Card		17X51606-10		17X51	606-10		
ē	FX10 Main Board & Lonworks Com Card		17X51606-12		17X51	606-12		
onti	FX10 Main Board & BACnet Com Card		17X51606-11		17X51	606-11		
ပိ	FX10 Expansion Board		17P516-07		17P5	16-07		
	Display		19P563-01		19P5	63-01		
	FX10 Display Interface Board		17P516-11		17P5	16-11		
	Side Access Panel		40C752-01		40C7	58-01		
lre	Front Upper Access Panel		40C750-01		40C7	57-01		
nsc	Lower Front Access Panel		40C751-01		40C7	56-01		
ы Ц	Top Panel		42C356-01		42C3	57-01		
ш	Rear Left Panel		40C754-01		40C7	60.01		
	Rear Right Panel		40C753-01		40C7	59-01		



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Product: Type: Size:

Document Type: Part Number: Release Date: Supercedes: Premium EW Reversible Chiller 30, 50 Ton

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