

SPECIFICATION CATALOG

TruClimate 100

30 to 150 kW

Commercial Reversible Chiller - 50 Hz

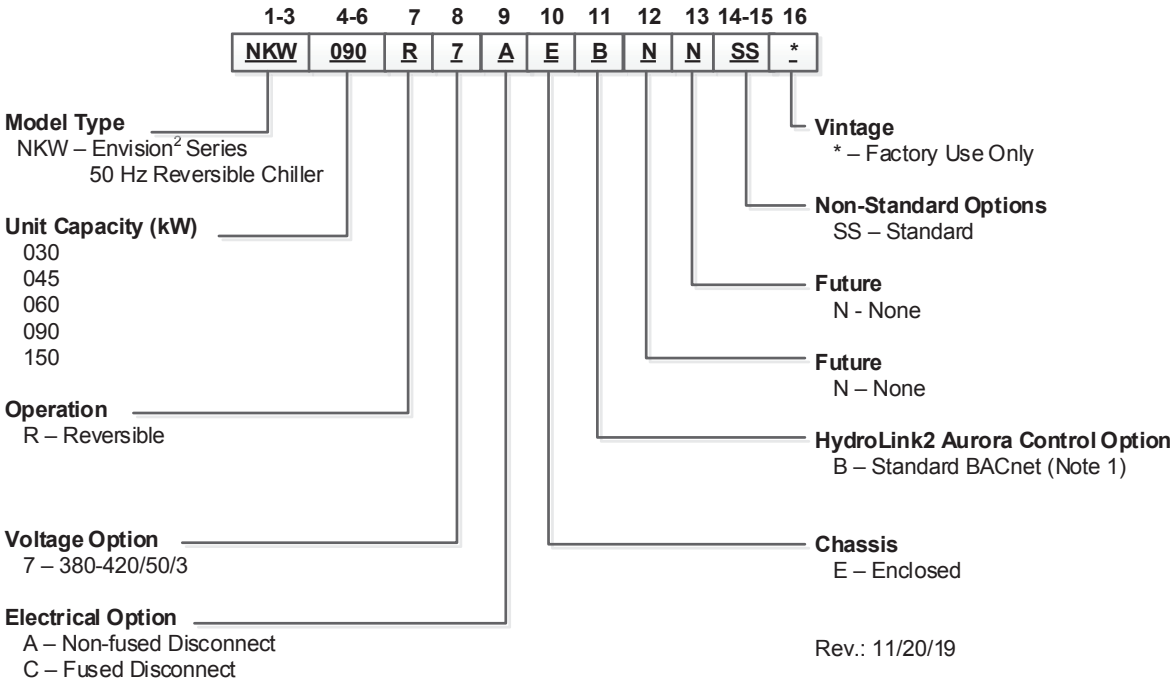


WaterFurnace®
Commercial Solutions

Table of Contents

Nomenclature 4
HydroLink2 Supervisory Control Box Nomenclature 5
AHRI Data. 6
Energy Labelling. 6
The TruClimate 100 10-50 Ton Series 7
Inside the Cabinet. 10
HydroLink2 Supervisory Control 13
HydroLink2 Aurora Controls. 15
Using the HydroLink2 Aurora Color Touch Tablet 22
Application Notes. 47
Water Quality 48
Selection Process 49
Typical Piping 49
Dimensional Data 51
Vibration Isolators 54
Physical Data 55
Electrical Data 56
Antifreeze Correction 57
Reference Calculations 58
Legend and Notes 58
Pressure Drop 59
Performance Data. 61
Wiring Schematics 71
Engineering Guide Specifications 76
Revision Guide. 81

Model Nomenclature



Notes:
1. Standard controls option includes BACnet and standalone control.

Reversible Chiller Availability

Voltage	Chiller				
	030	045	060	090	150
380-420/50/3	•	•	•	•	•

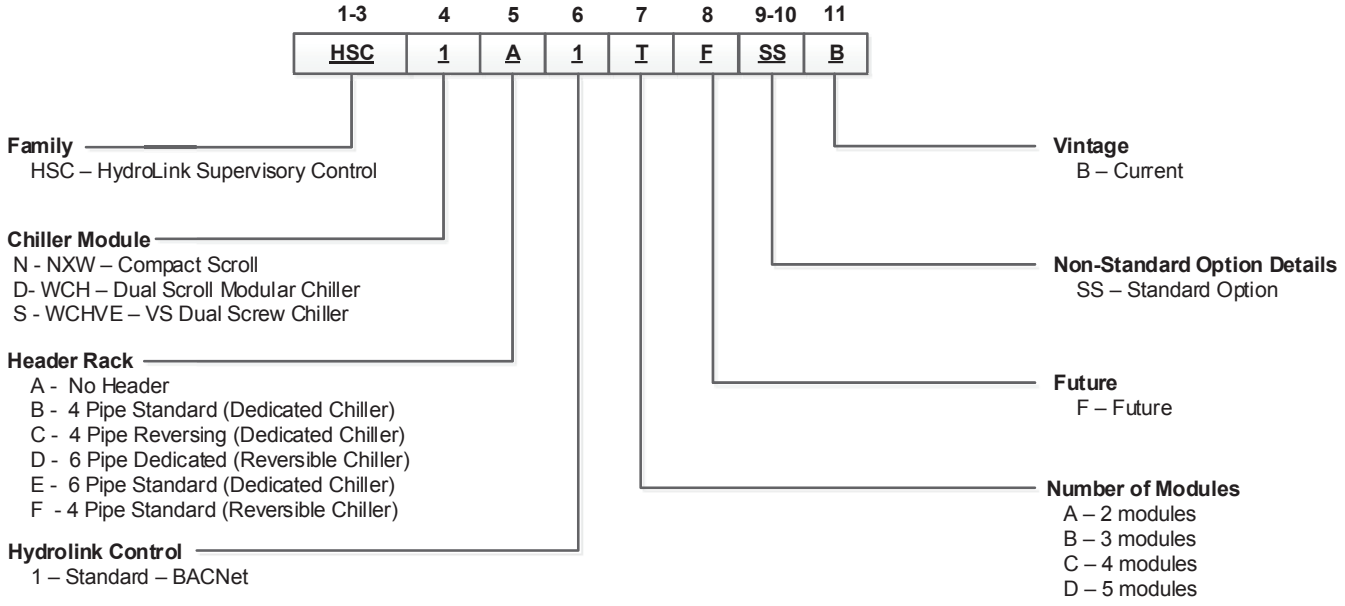
Legend: 10/7/14

NA = Not Available

• = Voltage available in this size

All TruClimate 100 10-50 Ton 50Hz product is safety tested to CE standards and performance tested in accordance with standard EN 14511-2.

HydroLink2 Supervisory Control Box Nomenclature



EN 14511-2 2011 Ratings

TruClimate 100 10-50 Ton Heat Pump
Heating Performance Data
EN 14511-2 2011

Model	B0/W35			W10/W35			B0/W45			B5/W35			W10/W45		
	Capacity Output kW	COP	Power Input kW	Capacity Output kW	COP	Power Input kW	Capacity Output kW	COP	Power Input kW	Capacity Output kW	COP	Power Input kW	Capacity Output kW	COP	Power Input kW
030	29.3	3.50	8.4	40.8	4.70	8.6	28.3	2.90	9.9	34.3	4.00	8.5	39.1	3.90	10.0
045	42.6	3.70	11.4	57.3	4.90	11.8	41.3	3.20	13.1	48.9	4.20	11.6	55.4	4.10	13.5
060	54.0	3.70	14.7	73.9	4.70	15.6	52.2	3.00	17.2	62.6	4.10	15.2	71.7	4.00	18.1
090	83.4	3.80	22.1	107.3	4.70	23.1	80.6	3.20	25.5	93.3	4.10	22.6	103.1	3.90	26.4
150	118.8	3.60	32.9	179.0	4.80	37.1	107.4	2.90	37.4	145.5	4.20	35.0	162.8	4.00	40.8

All ratings based upon 380-400V operation 10/7/14
All ratings based on new heat pump with clean heat exchangers

Cooling Performance Data
EN 14511-2 2011

Model	W30/B0			W30/W12			W30/W23		
	Capacity Output kW	EER (W/W)	Power Input kW	Capacity Output kW	EER (W/W)	Power Input kW	Capacity Output kW	EER (W/W)	Power Input kW
030	19.2	2.60	7.40	34.8	4.40	7.90	48.4	5.80	8.30
045	28.2	2.70	10.4	48.8	4.40	11.2	66.5	5.50	12.0
060	39.3	2.90	13.7	62.5	4.20	14.9	82.0	5.10	16.0
090	58.4	2.80	20.6	91.1	4.10	22.3	118.7	5.00	23.8
150	98.7	2.90	33.9	152.7	4.20	36.4	198.1	5.10	38.7

All ratings based upon 380-400V operation 10/7/14
All ratings based on new heat pump with clean heat exchangers

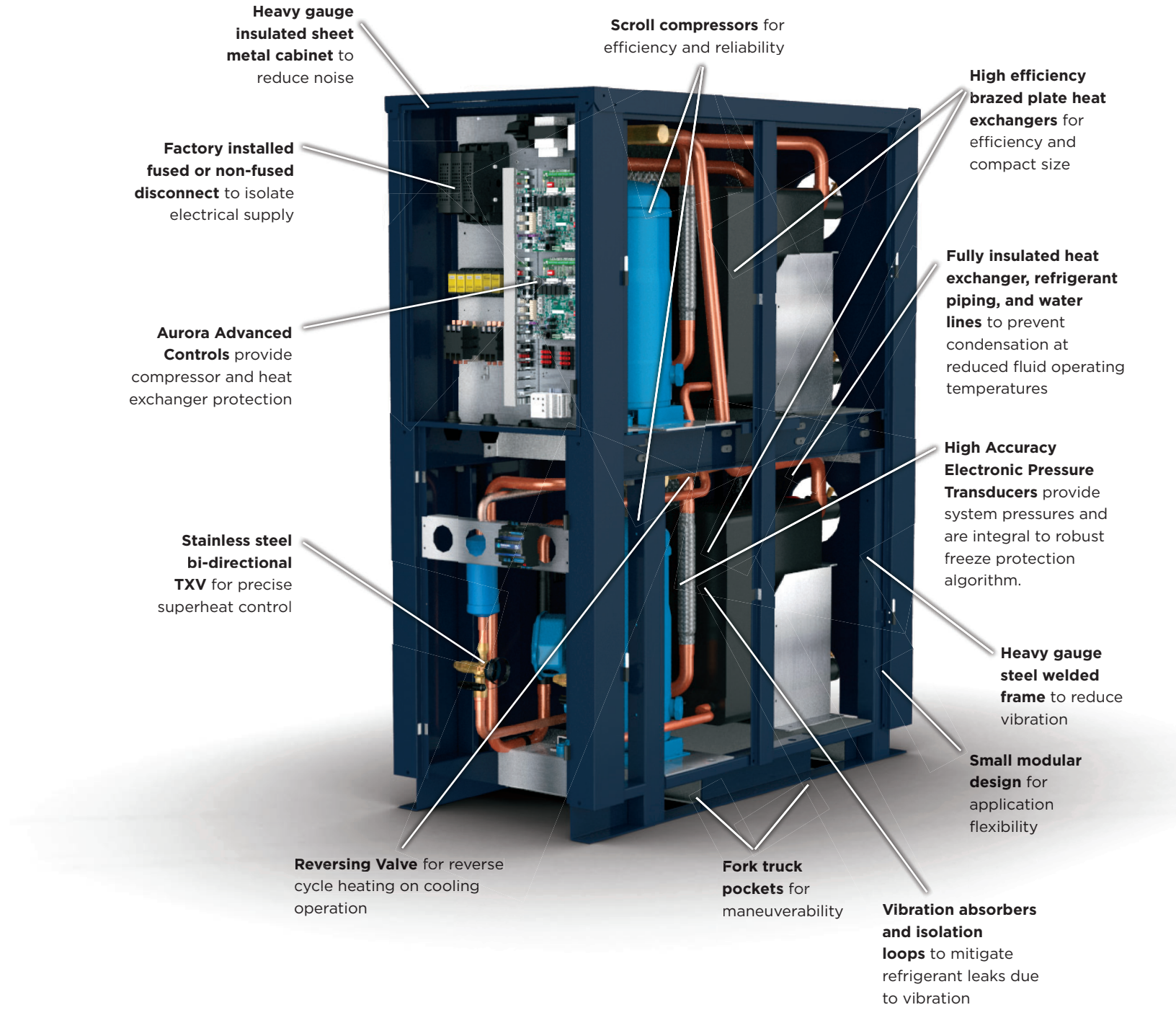
Energy Labelling

Supplier		WaterFurnace International, Inc.					
Model		NKW030		NKW045		NKW060	
Model hot water heater		-		-		-	
Temperature application	°C	35	55	35	55	35	55
Declared load profile for water heating		-		-		-	
Seasonal space heating energy efficiency class, average climate		A++	A+	A++	A+	A++	A+
Water heating energy efficiency class, average climate		-		-		-	
Rated heat output (Pdesignh), average climate	kW	29		43		54	
Annual energy consumption space heating, average climate	kWh	16,186	19,872	22,059	26,531	29,951	29,610
Annual energy consumption water heating, average climate	kWh	-		-		-	
Seasonal space heating energy efficiency, average climate	%	142	110	152	122	158	122
Water heating energy efficiency, average climate	%	-		-		-	
Sound power level LWA indoors	dB	62		64		64	
Rated heat output (Pdesignh), cold climate	kW	29		43		54	
Rated heat output (Pdesignh), warm climate	kW	29		43		54	
Sound power level LWA outdoors dB	dB	-		-		-	

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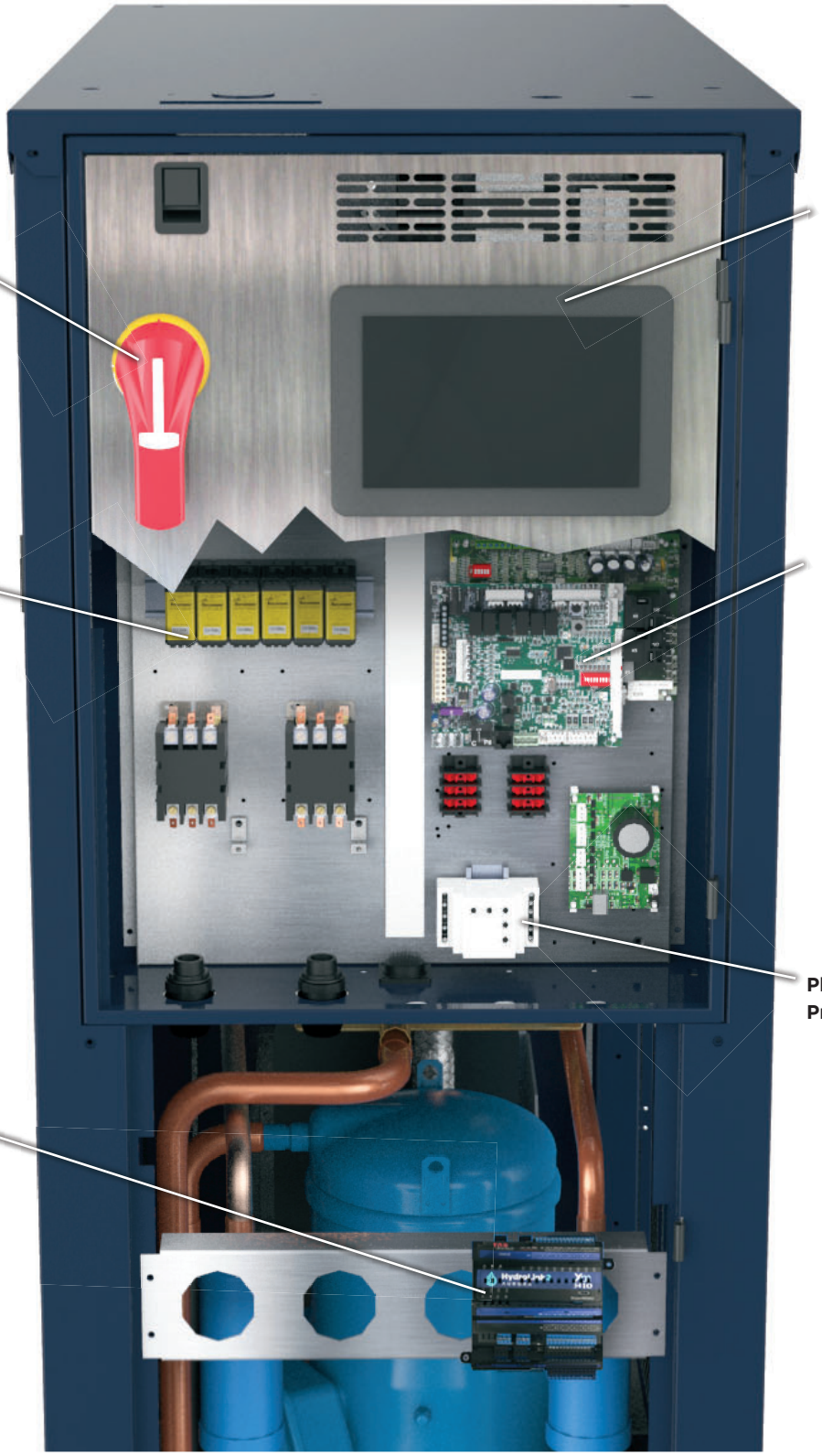
The TruClimate 100 10-50 Ton Series

Reversible Features



The TruClimate 100 10-50 Ton Series

Control System Features



Factory installed fused or non-fused disconnect to isolate electrical supply

Internal class J/CC fusing for protection of electrical components

HydroLink2 Controller provides system level staging user interface for diagnostics and setup

Color touchscreen tablet displays information from HydroLink2 Aurora Controls System providing configuration, operational and service information.

Aurora Advanced Controls to manage each refrigerant circuit

Phase Guard Protection Module

The TruClimate 100 10-50 Ton Series cont.

The TruClimate 100 Series with premium efficiency is now available with HydroLink2 Aurora controls platform which provides numerous factory installed options to provide better service, diagnostic, and monitoring ability. New features include refrigerant, energy, and performance monitoring all through the Human Machine Interface (HMI) or through DDC protocols such as BACnet. HMI images are viewed through a 10" touchscreen tablet located on the control panel door to enable the technician easy access to detailed information about the chiller without removing a service panel or using any tools. Additional options are available to display HMI screens to other tablets or computers located elsewhere on the job site. Additional features and improvements are listed below:

Chillers Highlights

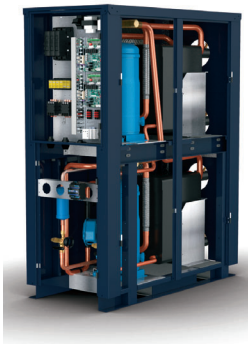
- Capacities ranging from 30 to 150 kW output
- Oversized brazed plate heat exchangers offer high efficiency with industry low waterside pressure drop
- True-dual brazed plate heat exchangers provide better part load efficiencies compared to two single-circuit evaporators
- Compressor suction/discharge tubes come with braided stainless steel vibration absorbers to dampen compressor vibration on system piping
- Heavy gauge, galvanized steel enclosure with hinged access panels that can easily be removed for ease of service
- Fork pockets and lifting points in the frame enable maneuverability for installation and shipment
- Factory installed pressure/temperature port externally accessible for improved serviceability
- Finger-touch safe power fuses provide circuit protection
- Primary fusing to control transformer to protect low voltage components from spikes in current fault
- Rugged plug assembly wiring harness provides a solid yet serviceable connection for control wiring to the control panel.
- Factory installed high accuracy sensors measure system pressures and temperatures
- Superheat/subcooling, compressor run time, and entering/leaving water temperatures are displayed thru the 3D high definition images of the color touch HMI.
- Set point control via factory installed leaving/entering water temperatures or remote temperature option
- Phase guard monitor provides phase reversal, phase imbalance, and loss of phase protection

Wide array of standard factory installed options including:

- Factory mounted, internally wired, rotary-style, non-fused disconnect
- HydroLink2 Aurora controls with BACnet or non-communicating options.

Inside the Unit

Cabinet



All unit frames are constructed of heavy gauge steel channel and painted with a corrosion resistant black, polyester, powder coat paint. Sheet metal cabinets are constructed of heavy gauge galvanized sheet steel painted with white, polyester, powder coat paint rated at more than a 1,000 hours salt spray rating. The frame includes fork truck access pockets in two dimensions and lifting points for easy maneuvering during installation and servicing.

Compressors

Reversible chillers use high efficiency R-410A, hermetically sealed, scroll compressors that are mounted on rubber grommets for vibration isolation. Scroll compressors provide high efficiency while providing greater tolerance to liquid refrigerant entering the suction port.

Vibration Absorbers



Vibration absorbers are factory installed on every compressor suction and discharge tube to dampen the vibrations introduced by compressor on the refrigerant piping. These absorbers are constructed from corrugated copper tubing wrapped with stainless steel wire braid to provide strength and flexibility.

Electrical Box



Unit controls feature quick connect wiring harnesses for easy servicing. Separate knockouts for low voltage, and two for power on two sides allow easy access to the control box. A large transformer assures adequate control's power for accessories. Flexible HydroLink2/Aurora microprocessor control is included, featuring several innovations. See Controls section for more information.

Water Connections

All water line connections are Victaulic grooved nipples for ease of installation with optional connection kits. Factory installed thermistors are used on all water lines and can be viewed through the microprocessor interface tool. Pressure ports are also added at the factory for easy service access.

Thermostatic Expansion Valve



All reversible chillers utilize balanced port, bi-directional, thermostatic expansion valves (TXV) for refrigerant metering. These valves have stainless steel capillary tube and bulb for improved robustness over conventional copper sensing capillary lines. The valve consists of a laser-welded power-head, forged brass valve body and diaphragm optimized for R-410A applications. This valve design allows precise refrigerant flow in a wide range of entering water variation geothermal systems.

Water-to-Refrigerant Heat Exchanger



Large oversized stainless steel interlaced copper-brazed plate water-to-refrigerant heat exchangers provide unparalleled efficiency. The heat exchangers have common water circuits with isolated refrigerant circuits so that in part load operation, the full mass of the heat exchanger is utilized. All heat exchangers are pressure rated to 2.4MPa water side and 4.4MPa refrigerant side. All heat exchangers, water lines, and suction lines are insulated to prevent condensation during low temperature inlet water operation.

Strainers



All reversible chillers shall have a field-installed strainer either Y-type or basket type. Strainers should be made of a suitable body such as brass with 316 stainless steel screens with a minimum of 30 mesh.

WARNING: Warranty is void if strainers are not used on the entering side of the load and source.

Service Connections and Serviceability



Two Schrader service ports are provided for each circuit on every unit. The suction side and discharge side ports are for field charging and servicing access. All valves are 7/16" SAE connections.

Inside the Unit

Potable Water Condensers (Potable Water Option Only)

Potable Water brazed plate condensers are used in the Potable Water option. This type of condensers ensure safe and efficient heating of building service water. All connections between the Potable Water condensers and the building are established with copper piping. The potable water brazed plate heat exchangers are pressure rated to 2.4MPa water side and 4.4MPa refrigerant side.



Flow Switch

A flow switch or equivalent must be installed on the evaporator for each unit to be installed. If the unit is to operate as both modes (heating/cooling), a flow switch is needed on both heat exchangers.

Differential Pressure Switch

A differential pressure switch can be used in place of a flow switch. The differential switch must be capable of pressure range as indicated in the pressure drop tables.

4-Way Reversing Valve

Envision units feature a reliable all-brass pilot operated refrigerant reversing valve. The reversing valve operation is limited to change of mode by the control to enhance reliability.



Vibration Isolation

Units do not ship standard with vibration isolation hardware, however, non-standard options are selectable for the unit. Non-standard options include:

- Rubber Isolators - Heavy-duty durometer rubber grommets for reduced sound transmitted through the floor via the frame.
- Spring Isolators - For increased sound attenuation, heavy-duty isolation springs can reduce sound levels by 3 dBA.



Standard Grommets
99S502-01 (120-360)
99S502-02 (600)



Heavy Duty Mounting Springs Optional
IS-325-01 (NKW030-090)
IS-750-01 (NKW150)

Control Panel

Reversible chiller control panel features a heavy-duty, hinged service door with a convenient 10" touchscreen display for ease of service and installation. The keyed service door features a optional factory mounted disconnect switch. The left interior of the control panel features high voltage components such as the electrical disconnect, fuses, and compressor contactors. The right interior of the panel features the HydroLink2 Aurora Controls, control transformer, and 24 VAC terminal strip for control wiring. The control panel was designed with the technician in mind to provide convenient, clear wiring with plenty of working space.

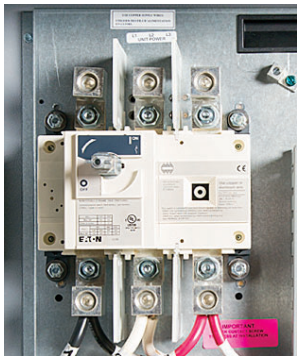


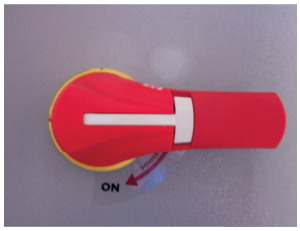


Electrical Disconnect

A factory mounted, internally wired, disconnect is available to provide electrical isolation from high voltage supply at the heat pump. Separate circuit protection must be field installed in the power wiring and must comply with National Electric Code (NEC) and/or local codes. Disconnect features include:

- Non-fused, rotary disconnect with "on/off" position
- Door interlocked, external pistol handle keeps door closed when disconnect is "on"
- "Lockout/Tagout" feature to keep the unit "off" during service
- Complies with NEC Article 440-14





Inside the Unit cont.

Short Circuit Current Rating

An optional factory mounted, fused disconnect provides the same benefits as the non-fused version yet increases the short circuit current rating, SCCR to comply with buildings with a high available fault current. Adding the fused disconnect option ensures the equipment will comply with NEC Article 409. Separate circuit protection must be field installed in the power wiring and must comply with National Electric Code (NEC) and/or local codes. Disconnect features include:

- Increases SCCR to 100 kA
- Door interlocked, external pistol handle keeps door closed when disconnect is “on”
- “Lockout/Tagout” feature to keep the unit “off” during service
- Complies with NEC Article 440-14
- Complies with NEC Article 409 for Short Circuit Current Rating

Phase Guard

Factory mounted phase guard device is available to protect the compressor against loss of phase, reverse rotation, or phase imbalance.

Compressor Protection Module

Model size 150 come with external compressor protection module that provides additional motor protection such as reverse phase detection and a pre-wire thermistor. All other models have internal overload protection without reverse phase detection.

Fuses



Reversible chillers come with non-indicating CUBEFuse which is a finger-safe, time-delay, power fuse with a small footprint, Class J rating, and have high fault interrupting rating. CUBEFuse includes dual-element fuse construction that can withstand inrush current yet still allow low let-through currents during a fault condition.

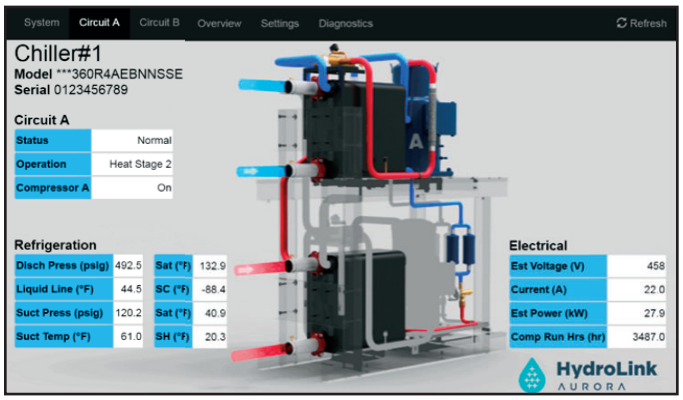
HydroLink2 Supervisory Control

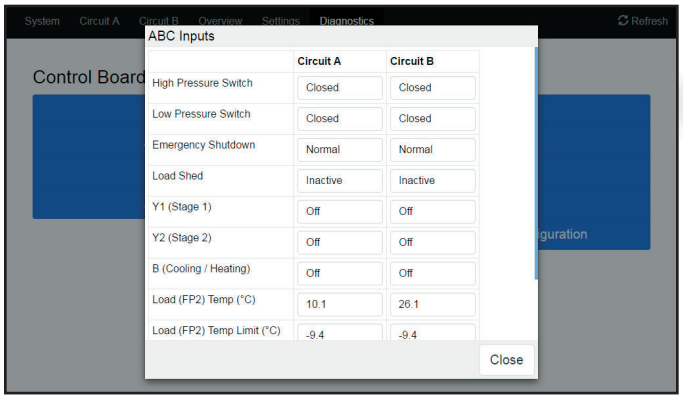
The HydroLink2 Supervisory Control is a Niagara AX based control, designed to consolidate all Chiller mechanical room chillers and hydronic components into one supervisory control. By consolidating all components into one control complete plant room management can be obtained to insure proper operation and easier servicing with a turn-ley solution. It features a Niagara AX based control with its own I/O and a 10" color touchscreen tablet as a user interface. Turn-key custom programming of the Supervisory Control will be provided based upon your specific requirements for the whole chiller mechanical room to manage not only the chillers but also the pumps and other hydronics specialties. The many benefits of the HydroLink2 Supervisory control are:

- Control is based upon the powerful and flexible Niagara AX software platform.
- Customized supervisory control programming to meet your specific site specifications.
- Allows the engineer to specify graphics required for ease in monitoring and troubleshooting.
- Improves the integration of mechanical room components such as variable speed pumps and other hydronic specialties of the plant room into the site BAS.
- Guaranteed compatibility of the Supervisory Controller with the Unit Controllers.
- The sophistication of the Niagara based control allows better equipment support and servicing.
- Customer benefits from our experience in providing custom Supervisory Controllers.
- Enables tight integration to peripheral devices such as pump and valve controllers for reliable sequencing especially for vital processes such as liquid flow etc...
- Improved system visibility from the BAS.

The HydroLink2 Supervisory Control is the perfect match to manage your complete chiller mechanical room.

Machine Interface - 10" ColorTouch Tablet



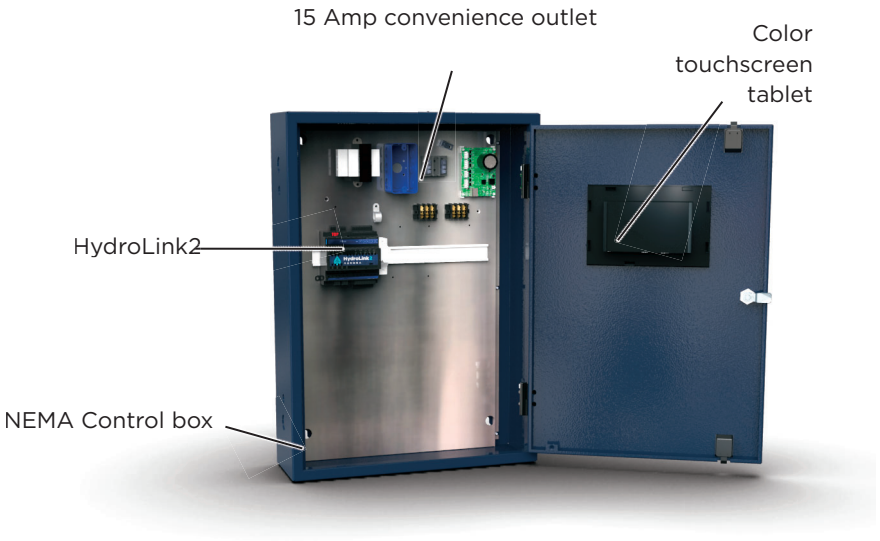




HydroLink2 Supervisory Control

HydroLink2 Supervisory Control cont.

- HydroLink2 Control uses powerful NIAGARA AX software Platform.
- HydroLink2 Control with standard I/O 34 and up to two optional I/O 34 modules can be added for flexibility.
- Internal power supply and 120V convenience outlet (15 Amp)
- Over 2 sq. ft. [0.19 m^2 of control mounting area for custom controls such as relays, or other controllers.
- Provides for a custom programmed turnkey solution.





HydroLink2 Supervisory Control



HydroLink2 Aurora Controls

Overview

The HydroLink2 Aurora Control is the ultimate chiller control system that accurately controls fluid temperatures while providing technical information about the system in a simple, readable format thru a large 10" touchscreen tablet. The backbone of the system is the dedicated HVAC input/output control boards known as the Aurora control system. The Aurora Controls communicate using the ModBus protocols and quickly pass information from sensors up to the HydroLink2 controller. The HydroLink2 controller is a powerful controller that does compressor staging and then communicates over the network via BACnet or thru the NiagaraAX platform.

This system is the best combination of a proven, robust safety coupled with a flexible yet powerful system level controller. High end, graphic browser images are hosted on the HydroLink2 controller and displayed on the factory mounted touchscreen tablet. Each chiller is equipped with a small Wi-Fi router or a hardwire Ethernet connection that offers additional connectivity options to display chiller information without tapping in the BAS network.

There are several factory installed components so that each chiller has built-in refrigeration, energy, and performance monitoring capabilities.

HydroLink2 Control

The HydroLink2 Control is a NiagaraAX control that functions as a master control communicating to ABC "A" for compressor A and to ABC "B" for compressor B via Modbus protocol. The HydroLink2 controls all higher functions as a master control managing lead/lag, user interface and other functions of each ABC/AXB combination by communicating via Modbus. The HydroLink2 also manages all BAS and 10" color touchscreen tablet communications.

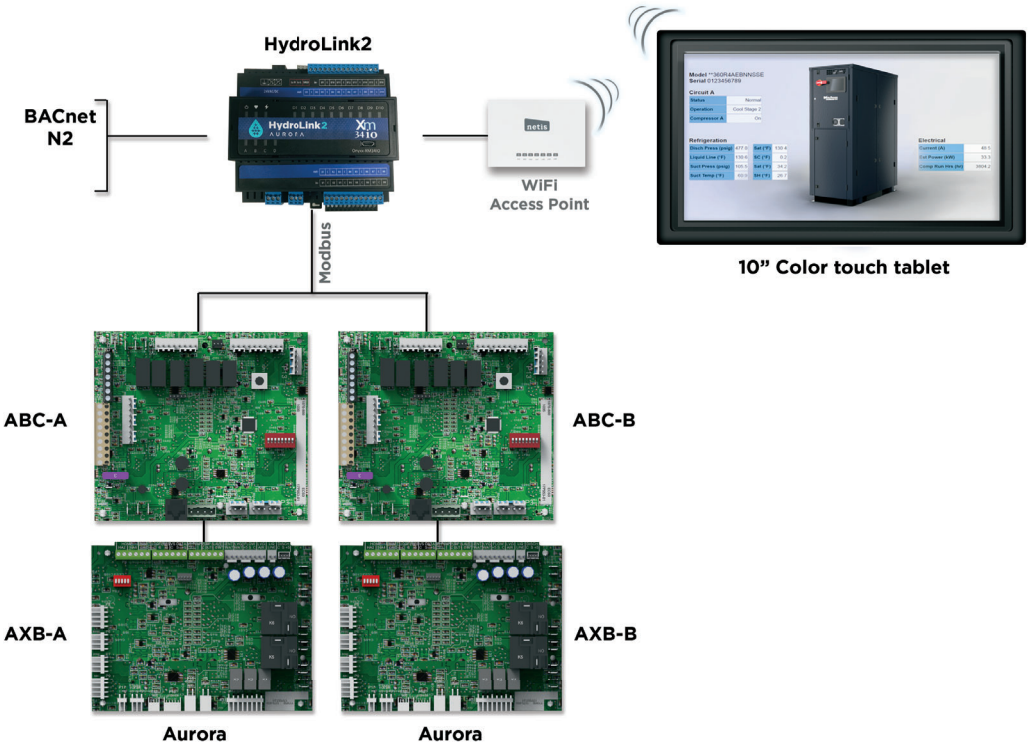
Aurora 'Base' Control (ABC)

The Base Control functions as a microprocessor compressor monitoring device and handles all compressor timings, and control. One board is dedicated to each compressor and is labeled for circuit A and B.

Aurora Expansion Board (AXB)

The AXB functions as an I/O expander for the ABC Most of the Circuit A I/O is for the compressor circuit however some additional sensors also function with the Source heat exchanger. The B Circuit AXB in turn handles circuit B compressor plus some I/O dedicated to the Load heat exchanger.

NOTE: Refer to the Aurora Base Control Application and Troubleshooting Guide and the Instruction Guide: Aurora Interface and Diagnostics (AID) Tool for additional information.



HydroLink2 Aurora Controls cont.

Field Selectable Options via Hardware

DIP Switch (SW1) – Test/Configuration Button (See SW1 Operation Table)

Test Mode

The control is placed in the test mode by holding the push button switch SW1 for 2 - 5 seconds. In test mode most of the control timings will be shortened by a factor of sixteen (16). LED3 (green) will flash at 1 second on and 1 second off. Additionally, when entering test mode LED1 (red) will flash the last lockout one time. Test mode will automatically time out after 30 minutes. Test mode can be exited by pressing and holding the SW1 button for 2 to 5 seconds or by cycling the power. NOTE: Test mode will automatically be exited after 30 minutes.

Reset Configuration Mode

The control is placed in reset configuration mode by holding the push button switch SW1 for 50 to 60 seconds. This will reset all configuration settings and the EEPROM back to the factory default settings. LED3 (green) will turn off when entering reset configuration mode. Once LED3 (green) turns off, release SW1 and the control will reset.

DIP Switch (SW2)

SW2-1 FP1 Selection – Low water coil temperature limit setting for freeze detection. On = 30°F [-1.1 °C]; Off = 15°F [-9.4°C]. On is default.
SW2-2 FP2 Selection – On = 30°F [-1.1 °C]; Off = N/A. On is default.
SW2-3 RV – O/B - Reversing Valve Position. Normally cooling "B" or normally heating "O" On = O; Off = B. B is default.
SW2-4 and 2-5 Access Relay Operation (P2). On and Off is default.
SW2-6 CC Operation – selection of single or dual capacity compressor. On = Single Stage; Off = Dual Capacity. On is default.

Access Relay Operation	SW2-4	SW2-5
Not Used	ON	ON
Cycle with Compressor	OFF	OFF
Water Valve Slow Opening	ON	OFF
(Reserved)	OFF	ON

SW2-7 Lockout and Alarm Outputs (P2) – selection of a continuous or pulsed output for both the LO and ALM Outputs. On = Continuous; Off = Pulsed. On is default.
SW2-8 Future Use. On is default.

Alarm Jumper Clip Selection

From the factory, ALM is connected to 24 VAC via JW2. By cutting JW2, ALM becomes a dry contact connected to ALG.

Software Features

Safety Features

The following safety features are provided to protect the compressor, heat exchangers, wiring and other components from damage caused by operation outside of design conditions.

Fuse – a 5 amp automotive type plug-in fuse and each ABC provides protection against a low Voltage short circuit or overload conditions.

Lead/Lag Operation - The lead/lag circuit will switch between circuit A and B at every start up to even run time between circuits. Therefore Stage 1 can energize Circuit A or B depending upon the state of the lead/lag circuit.

Anti-Short Cycle Protection – 5 minute anti-short cycle protection for the compressor.

Compressor Minimum On Time - 5 minute minimum on-time protection for the compressor to insure oil circulation for each compressor cycle.

Random Start – 5 to 80 second random start upon power up and return from load shed or emergency shutdown.

Fault Retry – in the fault condition, the control will stage off the outputs and then “try again” to satisfy the compressor input call. Once the input calls are satisfied, the control will continue on as if no fault occurred. If 3 consecutive faults occur without satisfying the compressor input call, then the control will go to lockout mode.

Lockout – when locked out, the Alarm output (ALM) and Lockout output (L) will be turned on. The fault type identification display LED1 (Red) shall flash the fault code. Lockout may also be reset by turning power off for at least 30 seconds or through HMI or BACnet.

High Pressure – The E2 fault is recognized when the Normally Closed High Pressure Switch, P4-9/10 opens, no matter how momentarily. The High Pressure Switch is electrically in series with the Compressor Contactor and serves as a hardwired limit switch if an overpressure condition should occur.

Low Pressure OR Loss of Charge - The E6 fault is recognized when the Normally Closed Low Pressure Switch, P4-7/8 is continuously open for 30 seconds. Closure of the LPS any time during the 30 second recognition time restarts the 30 second continuous open requirement.

In a Loss of Charge, the E3 fault is recognized when the Normally Closed Low Pressure Switch, P4-7/8 is open prior to the compressor starting.

HydroLink2 Aurora Controls cont.

Freeze Detection - Refrigerant (Source – E5 or Load HX E4) – Freeze detection can be triggered by either a 30 sec. recognition of the FP1 (Source HX) or FP2 (Load HX) temperature OR a 30 sec recognition of saturation temperature (using Suction pressure) below setpoint of 30 degrees. For the FP sensors, set points shall be either 30°F [-1.1 °C] or 15°F [-9.4°C] for the refrigerant temperature (can also be adjusted between these points). When the thermistor temperature drops below the selected set point, the control shall begin counting down the 30 seconds delay. If the thermistor value rises above the selected set point, then the count should reset. The resistance value must remain below the selected set point for the entire length of the appropriate delay to be recognized as a fault.

For the Saturation Temperature, the suction pressure sensor is monitored and when the resulting saturation temperature is below 30°F [-1.1°C] for 30 continuous seconds a fault is triggered in a similar fashion. There is no indication which condition has triggered the fault other than sensor readings at the time of the event.

Water Temp Fault EST/ELT – HX fluid (Source or Load HX) – An E26 alarm can be triggered by a 30 sec. recognition of the EST (Source or Load HX) temperature below specified limit. An E27 alarm can be triggered by a 30 sec. recognition of the EST (Source or Load HX) temperature above specified limit. It is recommended that the Alarms be set 1-2 degrees off of the Fault set points so that the Alarm will trigger first prior to generating the faults or Lockouts.

Water Temp Fault LST/LLT – HX fluid (Source or Load HX) – An E28 alarm can be triggered by a 30 sec. recognition of the EST (Source or Load HX) temperature below specified limit. An E29 alarm can be triggered by a 30 sec. recognition of the EST (Source or Load HX) temperature above specified limit. It is recommended that the Alarms be set 1-2 degrees off of the Fault set points so that the Alarm will trigger first prior to generating the faults or Lockouts.

		Source HX	Load HX
Entering Temp	Low Fault	E26	E26
	High Fault	E27	E27
Leaving Temp	Low Fault	E28	E28
	High Fault	E29	E29

Over/Under Voltage Shutdown - An over/under voltage condition exists when the control voltage is outside the range of 18 VAC to 30 VAC. If the over/under voltage shutdown lasts for 15 minutes, the lockout and alarm relay will be energized. Over/under voltage shutdown is self-resetting in that if the voltage comes back within range of 18 VAC to 30 VAC for at least 0.5 seconds, then normal operation is restored.

Operation Description

Power Up - The unit will not operate until all the inputs and safety controls are checked for normal conditions. The unit has a 5 to 80 second random start delay at power up. Then the compressor has a 5 minute anti-short cycle delay after the random start delay.

Standby - In standby mode, Y1, Y2, W, DH, and G are not active. Input O/B may be active. The compressor will be off.

Heating Operation

This product generally utilizes a "B" reverse cycle selection of the O/B reversing valve operation. In all heating operations, the reversing valve directly tracks the B input. Thus, anytime the B input is present, the reversing valve will be energized for heating mode. This means a failure of the reversing valve will still allow cooling mode operation. The lead/lag circuit will switch between circuit A and B at every start up to even run time between circuits. Therefore Stage 1 can energize Circuit A or B depending upon the state of the lead/lag circuit.

Dual Compressor Heating, 1st Stage (Stage 1, B)
The stage 1 compressor will be staged to full capacity 20 seconds after Y1 input is received at ABC A.

Dual Compressor Heating, 2nd Stage (Stage 1, Stage 2, B)
The stage 2 compressor will be engaged to full capacity 30 seconds after Y2 input is received at the ABC A board.

Cooling Operation

This product generally utilizes a "B" reverse cycle selection of the O/B reversing valve operation. In all cooling operations, the reversing valve inversely tracks the B input. Thus, anytime the B input is NOT present, the reversing valve will be de-energized for cooling mode. This means a failure of the reversing valve will still allow cooling mode operation. The lead/lag circuit will switch between circuit A and B at every start up to even run time between circuits. Therefore Stage 1 can energize Circuit A or B depending upon the state of the lead/lag circuit.

Dual Compressor Heating, 1st Stage (Stage 1, B) - The stage 1 compressor will be staged to full capacity 20 seconds after Y1 input is received at the ABC A board.

Dual Compressor Heating, 2nd Stage (Stage 1, Stage 2, B) - The stage 2 compressor will be engaged to full capacity 30 seconds after Y2 input is received at the ABC A board.

HydroLink2 Aurora Controls cont.

Other Modes of Operation

Load Shed - The LS input or communicated signal disables all outputs with the exception of the blower output. When the LS input has been cleared, the anti-short cycle timer and random start timer will be initiated. Input must be tied to common to activate. These feature can be applied to Circuit A or B individually.

Aurora 'Base' Control LED Displays - Although the HydroLink2 Aurora comes with a 10" color touch tablet, the ABC does have LED's for reading basic status and fault codes. These three LEDs display the status, configuration, and fault codes for the control. These can also be read in plain English via the HydroLink2 Touch Display.

Status LED (LED3, Green)
Description of Operation Fault LED, Green Normal Mode
ON Control is functional
OFF Control is Non-Functional
Slow Flash is Test Mode
Fast Flash Dehumidification Mode
Flash Code 2 (Future Use)
Flash Code 3 (Future Use)
Flash Code 4 Load Shed
Flash Code 5 ESD
Flash Code 6 (Future Use)
Flash Code 7 (Future Use)

Configuration LED (LED2, Yellow)
Description of Operation Configuration LED, Yellow
Not used.

Fast Flash Fault LED (LED1, Red) Red Fault LED
See Fault Table for flash codes.

HydroLink2 Aurora in BAS Applications

The HydroLink2 Aurora is designed to allow chillers to be integrated into Building Automation Systems (BAS) with ease. The HydroLink2 Aurora is an integrated solution and communicates directly with the Aurora Heat Pump Controls and allows access/control of a variety of internal Aurora heat pump operations such as sensors, relay operation, faults and other information. In turn, the HydroLink2 then converts internal Aurora Modbus protocol to BACnet MS/TP and communicates to the BAS system. This provides the great benefit of complete control integration and a myriad of information available to the BAS from the heat pump control. Plus it also allows individual unit configuration such as freeze protection setting directly over the BAS without the need for access to the actual heat pump. The HydroLink2 Aurora is programmed using the powerful NiagaraAX language.. This will allow for a BAS to integrate and communicate to the heat pump through BACnet MSTP. The HydroLink2 Aurora includes a configurable wireless 10" color touch tablet. There are an extensive number of points that the HydoLink2 Aurora has available over the network for integration into the BAS. Control programmers need to carefully determine which points they want to add into the BAS database. Consult your factory representative for more information on BAS integration.

HydroLink2 Aurora Controls cont.

HydroLink2 Aurora Features

- Built-in surge transient protection circuitry
- Operating range of -20° to 140°F [-28.9°C to 60°C]; 10 to 95% relative humidity, non-condensing
- BACnet MS/TP
- Status of all unit operating conditions and fault lockouts
- Visual color high definition display for status of power, network communication, processor operation, and faults etc.
- Provides gateway into Aurora heat pump controls for unsurpassed control flexibility
- Network point for commanding unit into load shed
- Network point for commanding unit into emergency shutdown
- Network points for freeze protection settings
- Heating and cooling control from a remotely located sensor
- FCC, UL and CE listed. BTL Certification

Advanced Features

- AID Tool for Aurora ABC configuration and troubleshooting.
- The display includes full color high definition graphics display for easier diagnostics.
- Built-in 802.11g wi-fi router for wireless connectivity.
- The built in Aurora AXB expansion board and provides added user I/O.
- Refrigeration Monitoring – provides Suction and discharge pressure, Suction, liquid line temps and superheat and subcooling.
- Energy Monitoring – provides real-time power measurement (Watt) of compressor
- Performance Monitoring – provides entering and leaving loop water temperatures, loop flow rate as well as heat of extraction or rejection rate into the loop. (requires optional field mounted flow meters.

HydroLink2 Aurora Touch Interface

Utilizing a wireless 10” color touch-screen interface, the HydroLink2 provides a technician the ability to configure and diagnose equipment at the unit. The technician will have full access to equipment status, parameter values, temperature, as well as access to alarms history. With website-like navigation, the HydroLink2 Aurora Touch Interface is easy to use and provides important insight into the system so your building can operate as efficiently as possible



10” Color touch tablet

Available BAS Points

Nearly every internal input and output used in the control and monitoring of the system is available as a point on the BAS system. BACnet points list boasts nearly 100 points available to the BAS system. Please consult the appropriate points list for your specific network.

Compressor Proving Sensors – Are installed on each compressor from the factory.

Fault, Configuration, and Status Codes – The codes can be visible to the BAS if desired Fault LED (LED1, Red) Red Fault LED

HydroLink2 Aurora Controls cont.

Fault, Configuration and Status Codes

Red Fault LED	Fault Code		LED Flash Code *	Lockout	Reset/ Remove	Fault Condition Summary
ABC & AXB Basic Faults	-	Normal - No Faults	Off			
	1	Fault-Input	1	No	Auto	Tstat input error. Autoreset upon condition removal.
	2	Fault-High Pressure	2	Yes	Hard or Soft	HP switch has tripped (>600 psi) [4.1 MPa]
	3	Fault-Low Pressure	3	Yes	Hard or Soft	Low Pressure Switch has tripped (<40 psi [0.28 MPa] for 30 continous sec.)
	4	Fault-Freeze Detection FP2	4	Yes	Hard or Soft	Freeze protection sensor or low Sat temp has tripped (<15˚F [-9.4°C] or 30˚F [-1.1°C] for 30 continuous sec.)
	5	Fault-Freeze Detection FP1	5	Yes	Hard or Soft	Freeze protection sensor or low Sat temp has tripped (<15˚F [-9.4°C] or 30˚F [-1.1°C] for 30 continuous sec.)
	6	Fault-Loss of Charge	6	Yes	Hard or Soft	Low Pressure Switch open prior to compressor start (UPC Only)
	7	Fault-Condensate Overflow	7	Yes	Hard or Soft	Condensate switch has shown continuity for 30 continuous sec.
	8	Fault-Over/Under Voltage	8	No**	Auto	Instantaneous Voltage is out of range. **Controls shut down until resolved.
	9	Not Used	9	Yes	Hard or Soft	Not used
	10	Fault-Compressor Monitor	10	Yes	Hard or Soft	Open Crkt, Run, Start or welded cont
	11	Not Used	11	Yes	Hard or Soft	Not used
ABC & AXB Advanced Faults	12	Not Used	12	-	-	Not Used
	13	Non-CriticAXBSnsrErr	13	No	Auto	Any Other Sensor Err
	14	CriticAXBSnsrErr	14	Yes	Hard or Soft	Sensor Err for EEV or HW
	15	Alarm-HotWtr	15	No	Auto	HW over limit or logic lockout. HW pump deactivated.
	16	Fault-VarSpdPump	16	No	Auto	Alert is read from PWM feedback.
	17	Not Used	17	No	Auto	Not used
	18	Non-CritComErr	18	No	Auto	Any non-critical com error
	19	Fault-CritComErr	19	No	Auto	Any critical com error. Auto reset upon condition removal
	20	ABC Com Loss	20	Yes	Auto	HydroLink2ABC communication loss (UPC or HydroLink2 Only)
	21	Alarm - Low Loop Pressure	21	No	Auto	Loop pressure is below 3 psi for more than 3 minutes
	2	Not Used	2	-	-	Not used
	23	Not Used	23	No	Auto	Not used
	24	Not Used	24	No	Auto	Not used
	25	Not Used	25	-	-	Not used
	26	Ent Source/Load Low Limit	26	Yes	Auto	Entering Source/Load Low Water Temperature Limit
	27	Ent Source/Load High Limit	27	Yes	Auto	Entering Source/Load High Water Temperature Limit
	28	Lvg Source/Load Low Limit	28	Yes	Auto	Leaving Source/Load Low Water Temperature Limit
	29	Lvg Source/Load High Limit	29	Yes	Auto	Leaving Source/Load High Water Temperature Limit
	31	Src Flow Switch	31	Yes	Auto	Source Flow Switch Fault
	32	Ld Flow Switch	32	Yes	Auto	Load Flow Switch Fault

HydroLink2 Aurora Controls cont.

Other User Defined Field I/O

Field Temp 1 and 2 - Can display the temperature of a field supplied 10k Ohm NTC thermistor connected to AXB A or B P1-LVG Air.

Field Temp 3 - Can display the temperature of a field supplied 10k Ohm NTC thermistor connected to AXB A P17-HWT.

Field Press 1 and 2 - Can display the pressure of a field supplied pressure transducer connected to AXB A P3-Loop Pres. Consult technical support for more details.
Both Circuit A and Circuit B are shown on screen.

Field DI 1 and 2 - Can display the logic (Off/On) of the Field DI 1 and 2 input on the AXB A and B pin P4 – Smart Grid. Consult technical support for application details.

Flow Switch Inputs (HA1-Source, HA2-Load) - All flow switch inputs will be checked 5 seconds prior to either compressor starting. If the flow switches are not closed the compressor(s) will not start. While the compressor(s) is operating if either flow switch opens for 5 continuous seconds the compressor(s) will be immediately shut down until flow returns. If flow does not return within 60 seconds the controller will issue an E-31 fault code for Source Flow or an E-32 fault code for Load Flow. If at any time the flow returns for 15 continuous seconds the flow fault will automatically reset and the controls will be allowed to resume normal operation**.**

Field Amps 1 and 2 - Can display the current draw using a field installed current transducer on the AXB A and B pin P10 – Fan. Consult technical support for application details.

VS Pump % (Source/Load) - Can display the PWM output (0-100%) of the optional field installed source and load VS Pump. Outputs are connected to AXB A and B P2-VS Pmp. Consult technical support for application details.

Field AO 1 and 2 - Can display the output (0-10V) of the optional field installed analog output device. Outputs are connect to AXB A and B P11-ANA. Consult technical support for application details.

Field Relay 1 and 2 – This shows the state of the Field Relay 1 and 2 on AXB A and B (labeled DH). When Field Relay is “ON” the Field Relay 1 and 2 will be engaged. The output is wired to AXB A and B P11 – DH.

Field Relay 3 and 4 – This shows the state of the Field Relay 3 and 4 on AXB A and B (labeled DIV). When Field Relay is “ON” the Field Relay 1 and 2 will be engaged. The output is wired to AXB A and B P11 – DIV.

Field Relay 5 and 6 – This shows the state of the Field Relay 5 and 6 on AXB A and B (labeled K5). When Field Relay is “ON” the Field Relay 1 and 2 will be engaged. The output is wired directly to top of relay on AXB A and B K5

Field Relay 7 and 8 – This shows the state of the Field Relay 7 and 8 on AXB A and B (labeled K6). When Field Relay is “ON” the Field Relay 1 and 2 will be engaged. The output is wired directly to top of relay on AXB A and B K6

ACC2 (A and B) - This shows the state of the ACC 2 relay on the two AXB’s. When ACC 2 is “ON” the ACC 2 relay will be engaged.

Access Relay Operation	SW1-4	SW1-4
Not Used	ON	ON
Cycle with CC	OFF	ON
Cycle with CC2	ON	OFF
Cycle with DH from ABC Board	OFF	OFF

Using the HydroLink2 Aurora Color Touch Tablet



Color Touch Tablet

The Color Touch Tablet utilizes a touch-screen interface and HydroLink2 Aurora provides technicians with the ability to configure and diagnose equipment at the unit. Technicians have full access to equipment status, parameter values, temperature, and humidity sensing as well as access to alarm and trend history. With website-like navigation, the HydroLink2 Aurora Touch Interface is easy to use and provides important insight into the system so your building can operate as efficiently as possible.

Using the HydroLink2 Aurora Color Touch Tablet cont.

System Screen

Displays chiller status, operation, compressor status, source/load fluid temperatures, and control method. This screen gives an overview of the chiller with ability to change the mode and set point condition directly from this screen.



- Indicates a variable that can be changed via a single tap on the text box area.

Status – "Normal" for normal operation or "Lockout" indicating the unit has locked out due to a fault. The "Fault" causing the "Lockout" reason will be prominently displayed.

Operation – Displays the current operating condition of the unit such as "standby" or "cooling stage 2"

Compressor – Denotes the specific compressor that is operating. "A" for the top compressor circuit and "B" for the bottom. If both are active, "A + B" will be displayed.

Mode – Since this product is a reversible chiller, this displays whether it is "Heating" or "Cooling". In "Heating Mode" the source is the evaporator and load is the Condenser, and in "Cooling Mode" it is reversed.

Method – Displays the control method current selected to operate the system. The three options include, Setpoint Control using selectable onboard sensors and a PID loop, Aquastat mode using external (field supplied) 24V temperature sensor and 24VAC commands directly to the unit, Network Mode with operation commands directly thru BACnet communication. See Temperature Control Method Section for more detail.

Input – The selected temperature sensor for the control method.

Setpoint – The selected setpoint the unit is trying to maintain.

Control Temp – The current temperature of the control sensor.

Source Fluid:

Leaving (°F) – The leaving source temperature in °F or °C.
Entering (°F) – The entering source temperature in °F or °C.
Flow – The source fluid flow in GPM or l/s
HE/HR – The source heat of extraction (heating mode) or rejection (cooling mode) in MBtuh or kW.

Load Fluid:

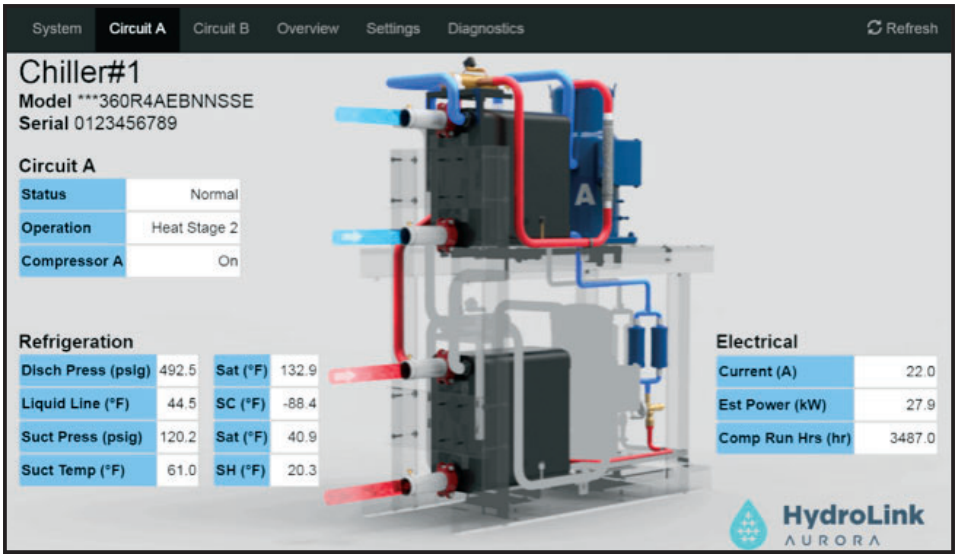
Leaving (°F) – The leaving load temperature in °F or °C.
Entering (°F) – The entering load temperature in °F or °C.
Flow – The load fluid flow in GPM or l/s
Capacity – The Load Capacity in MBtuh or kW.

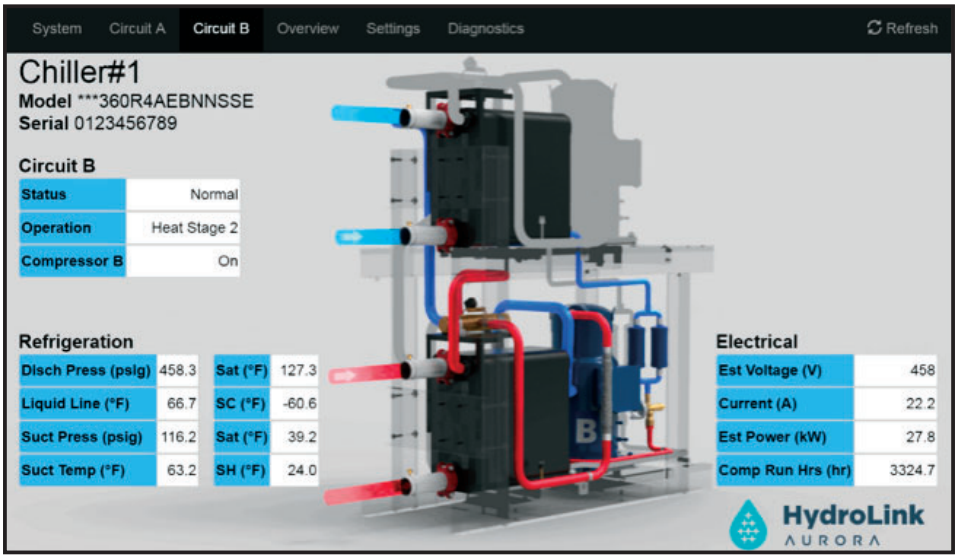
NOTE: N/A – Is displayed in the "Flow", "HE/HR", and "Capacity" dialogue boxes when an optional field installed flow meter is not connected to the HydroLink2 Aurora. Compatible flow meters must be used for accurate flow measurement. Consult your factory representative for more information on this option.

Using the HydroLink2 Aurora Color Touch Tablet cont.

Circuit A/Circuit B Screens

As the title suggests, these screen display information regarding the compressor circuit of interest. From this screen, refrigerant pressure and temperature values are displayed along with superheat, subcooling, and refrigerant saturation values. Compressor amperage, run hours, and estimated power are also displayed here. For information on “Est Power (kW)” please see “Diagnostics” section later in this manual.

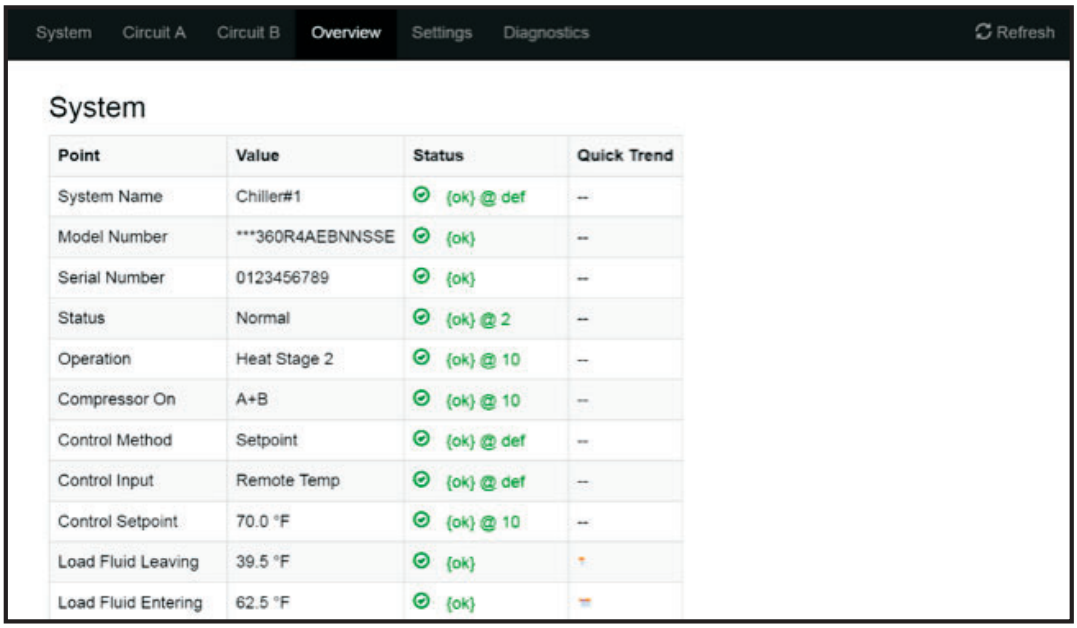




Using the HydroLink2 Aurora Color Touch Tablet cont.

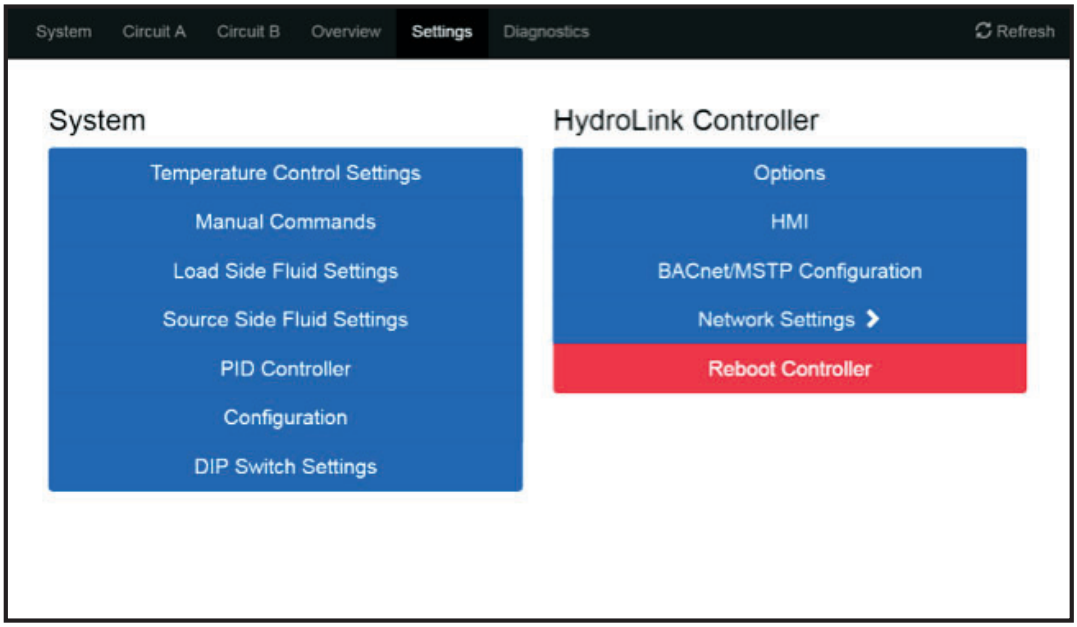
Overview Screen

The overview screen provides a binary snapshot of all system variables available to the HydroLink2 Aurora Control system. This screen is arguably the most powerful of all the screens and provides the technician with the value and status for every point in the system. As an added bonus, the "Quick Trend" column displays on current readings for various systems points so that the technician can have access to data readings without changing screens.



Settings Screen

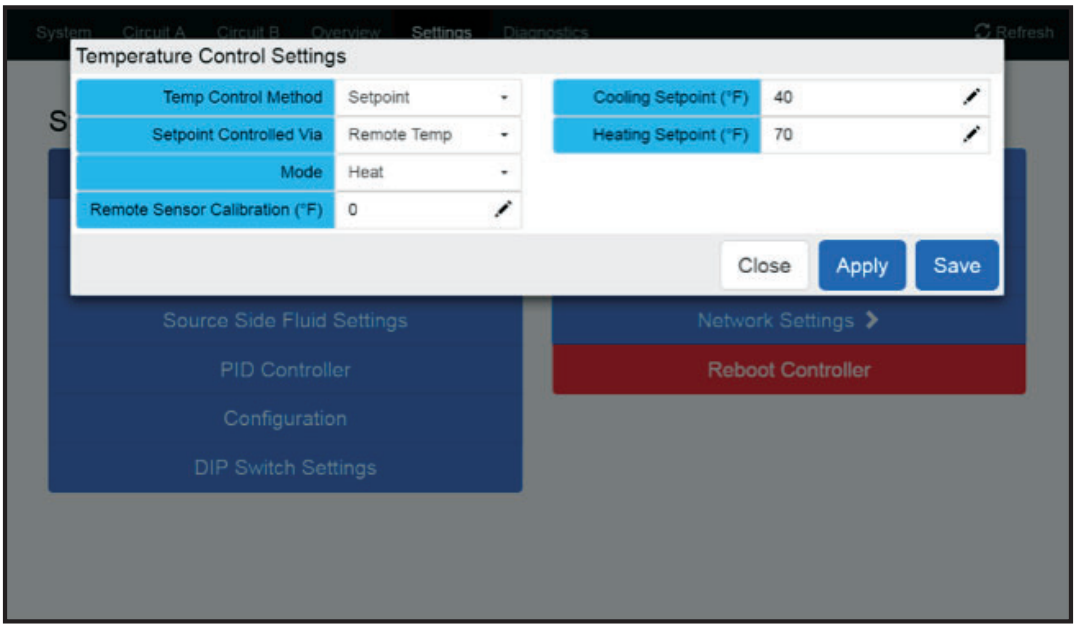
All temperature, network, or DIPswitch settings for the system or HydroLink2 controller can be accessed or changed thru the "Settings" screen. The method of temperature control, mode of operation, and manual operation all take place in this screen.



Using the HydroLink2 Aurora Color Touch Tablet cont.

Temperature Control Settings Screen

The unit will operate with 3 different control methods. The three options include, Setpoint Control using selectable onboard sensors and a PID loop, Aquastat mode using external (field supplied) 24V temperature sensor and 24VAC commands directly to the unit, Network Mode with operation commands directly thru BACnet communication. These are selectable in the Temperature control Settings Window.



Setpoint Control Method

In Setpoint control the unit will maintain setpoint based upon the internal (and modifiable) PID algorithm. In this mode several sensors can be selected and used for sensing. The entering load temperature (ELT), or leaving load temperature (LLT) are onboard sensors that can be selected for this use. The remote sensor, a 10k NTC thermistor that is hooked up to P17-HW inputs (bare wire provided) on the AXB-B board, allows for an external sensor application. The last option is the Network Sensor that can be selected and communicated thru BACnet and used as the controlling sensor. The network sensor also relies on the internal PID algorithm as the other 3. The compressors will have lead/lag capability in this method.

AquaStat Control Method

In Aquastat control the unit will operate based upon 24VAC control signals into the Y1 (stage 1), Y2 (stage 2), and B (heating) P1 inputs on ABC-A using an external to the unit aquastat temperature sensing and setpoint control system. The compressors will have lead/lag capability.

Network Control Method

In Network Control the unit will operate based upon communicated Y1 (stage 1), Y2 (stage 2), and B (heating) points thru the BACnet system. See BACnet Points lists for specifics. The compressors will have lead/lag capability.

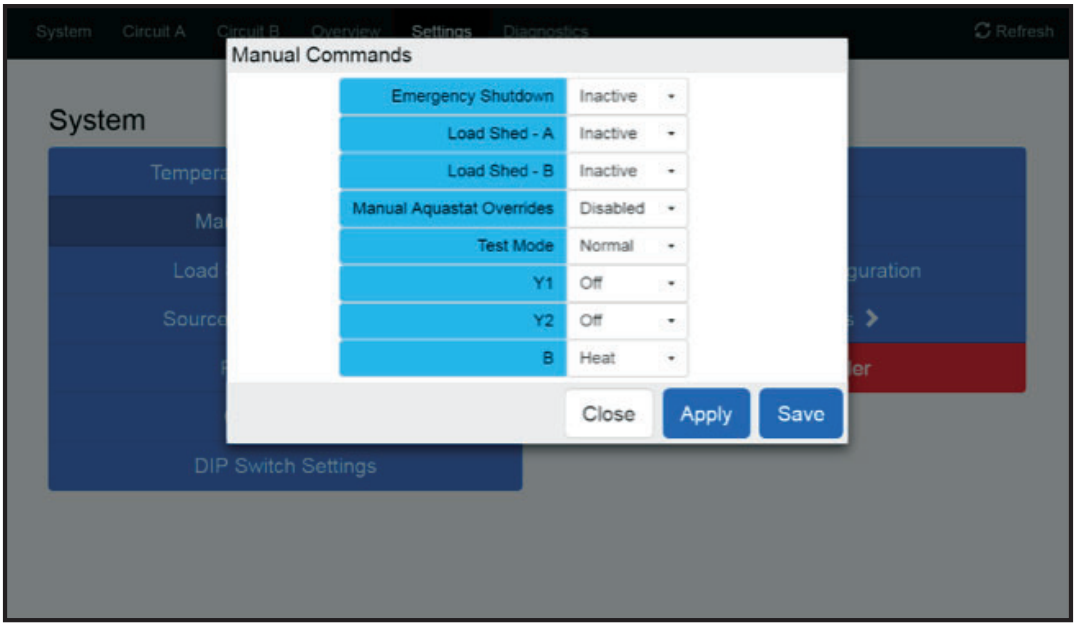
The following are only available for selection in Setpoint Mode.

- **Mode –** Allows the selection of heating, cooling, and auto. Remote Sensor Calibration.
- **Remote Sensor Calibration –** Allows the remote sensor to be 'calibrated' using an offset temperature. Enter -1 to lower the reading to match a reference measurement and 1 to raise the reading by a degree.
- **Heating and Cooling Setpoint –** These are the setpoints respectively for heating and cooling. Only one can be selected at a time.

Using the HydroLink2 Aurora Color Touch Tablet cont.

Manual Commands Screen

HydroLink2 Aurora allows several manuals commands that can either be 'network communicated' or in some cases even hardwired to the boards using a daisy chained grounding signal.



Emergency Shutdown – This command, either hard-wired as a grounded signal to P2 on either ABC-A or ABC-B or network communicated (Emerg Shutdown), will immediately (5 sec) shutdown all compressor and any other outputs. This screen shows whether it is active or not.

Load Shed A – This command, either hard wired as a grounded signal to P2 on ABC-A for Compressor A or network communicated (Load Shed A), will immediately shutdown (5 sec) the appropriate compressor operation all other outputs are unaffected. This screen shows whether it is active or not.

Load Shed B – This command, either hard wired as a grounded signal to P2 on ABC-B for Compressor B or network communicated (Load Shed B), will immediately shutdown (5 sec) the appropriate compressor operation all other outputs are unaffected. This screen shows whether it is active or not.

Manual Aquastat Override – When enabled allows manual operation of the unit using the following direct commands.

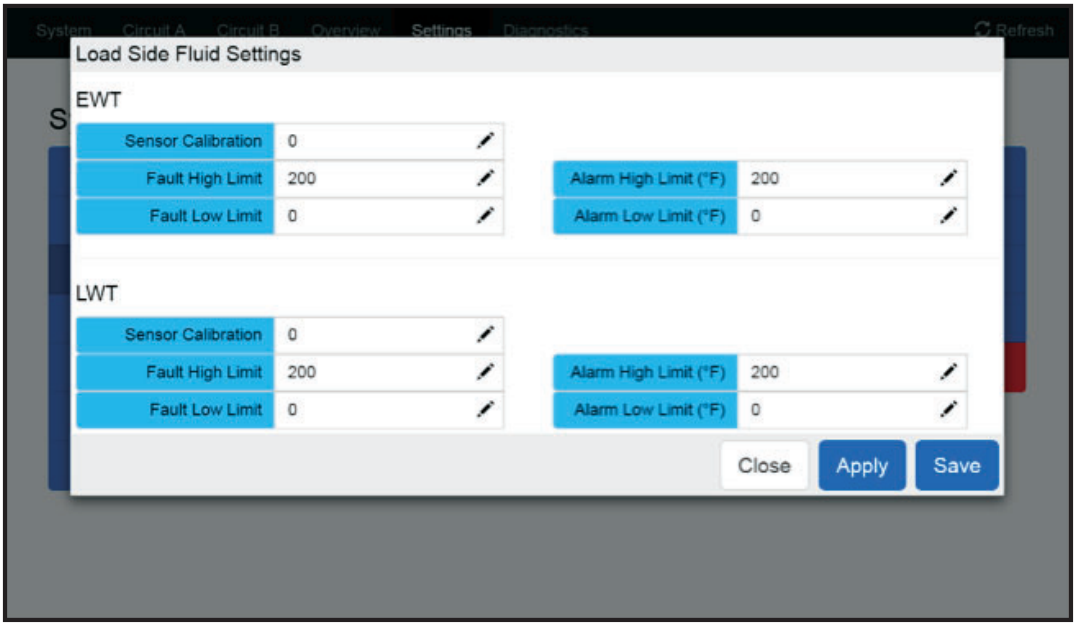
Test Mode – This network communicated command only will speed up all timings by 16 times to aid in troubleshooting. If Active this display will show Active and the ABC Board's Green LED will also fast flash when Test Mode is active. If Test Mode is inactive this will show 'normal'.

Circuit A, Circuit B and B (Heating) Commands – These commands allow manual operation of the unit. If activated (ON), Circuit A will engage the A compressor. Circuit B and B (Heating) work similarly. This is a handy way to manually turn on the compressor stages and check reversing valve operation.

Using the HydroLink2 Aurora Color Touch Tablet cont.

Load Side Fluid Settings Screen

Load Side Fluid Settings window allows calibration and Load Side Fluid Fault and Alarm settings.



ELT - Sensor Calibration – This allows adjustment up or down of the ELT sensor for better calibration. Enter -1 (minus 1) to lower the reading to match a reference measurement and 1 to raise the reading by a degree.

ELT - Fault High Limit and Low Limit – These boundaries can be user set. When the ELT temperature is above the high limit or below the low limit for 1 sec. a fault code (E26 for low limit and E27 for high limit) network point is generated. After 3x of unsuccessful operation the unit is locked out on an E26 for low limit or E27 for high limit.

ELT – Alarm High Limit and Alarm Low Limit – These boundaries can be the user set and serve as a first level warning. When the ELT temperature is above the high alarm limit or below the low alarm limit for 1 sec. a warning screen and Network point is generated. It is recommended that the Alarms be set 1-2 degrees off of the Fault set points so that the Alarm will trigger first prior to generating the faults or Lockouts.

LLT - Sensor Calibration – This allows adjustment up or down of the LLT sensor for better calibration. Enter -1 (minus 1) to lower the reading to match a reference measurement and 1 to raise the reading by a degree.

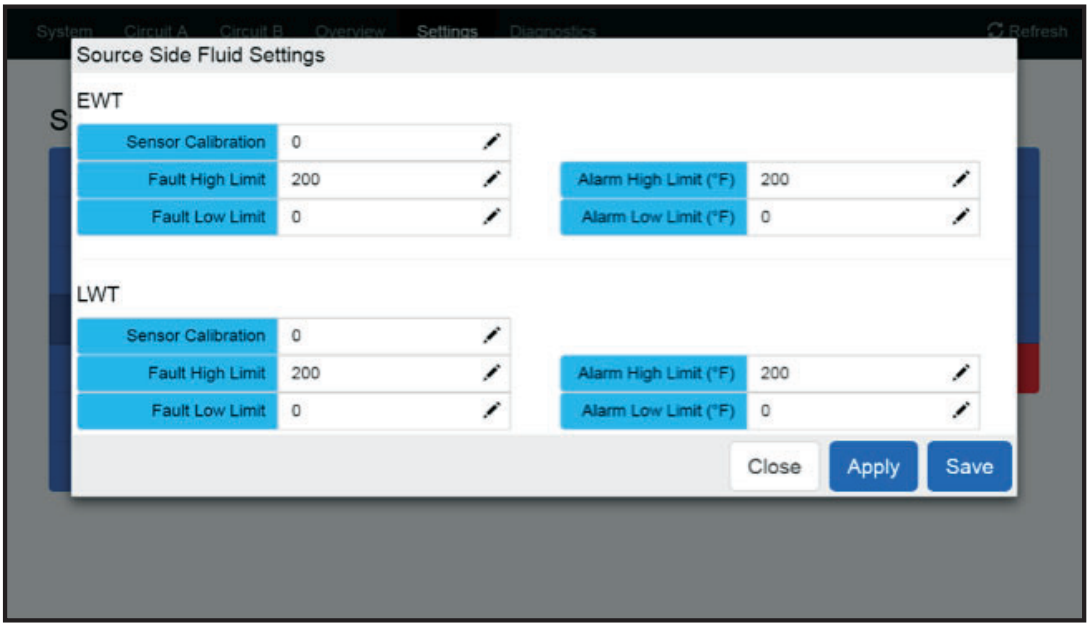
LLT - Fault High Limit and Low Limit – These boundaries can be user set. When the LLT temperature is above the high limit or below the low limit for 1 sec. a fault code (E28 for low limit and E29 for high limit) network point is generated. After 3x of unsuccessful operation the unit is locked out on an E28 for low limit or E29 for high limit.

LLT – Alarm High Limit and Alarm Low Limit – These boundaries can be the user set and serve as a first level warning. When the LLT temperature is above the high alarm limit or below the low alarm limit for 1 sec. a warning screen and Network point is generated. It is recommended that the Alarms be set 1-2 degrees off of the Fault set points so that the Alarm will trigger first prior to generating the faults or Lockouts.

Using the HydroLink2 Aurora Color Touch Tablet cont.

Source Side Fluid Settings Screen

Source Side Fluid Settings window allows calibration and Source Side Fluid Fault and Alarm settings.



EST - Sensor Calibration – This allows adjustment up or down of the EST sensor for better calibration. Enter -1 (minus 1) to lower the reading to match a reference measurement and 1 to raise the reading by a degree.

EST - Fault High Limit and Low Limit – These boundaries can be user set. When the EST temperature is above the high limit or below the low limit for 1 sec. a fault code (E26 for low limit and E27 for high limit) network point is generated. After 3x of unsuccessful operation the unit is locked out on an E26 for low limit or E27 for high limit.

EST – Alarm High Limit and Alarm Low Limit – These boundaries can be the user set and serve as a first level warning. When the EST temperature is above the high alarm limit or below the low alarm limit for 1 sec. a warning screen and Network point is generated. *It is recommended that the Alarms be set 1-2 degrees off of the Fault set points so that the Alarm will trigger first prior to generating the faults or Lockouts.*

LST - Sensor Calibration – This allows adjustment up or down of the LST sensor for better calibration. Enter -1 to lower the reading to match a reference measurement and 1 to raise the reading by a degree.

LST - Fault High Limit and Low Limit – These boundaries can be user set. When the LST temperature is above the high limit or below the low limit for 1 sec. a fault code (E28 for low limit and E29 for high limit) network point is generated. After 3x of unsuccessful operation the unit is locked out on an E28 for low limit or E29 for high limit.

LST – Alarm High Limit and Alarm Low Limit – These boundaries can be the user set and serve as a first level warning. When the LST temperature is above the high alarm limit or below the low alarm limit for 1 sec. a warning screen and Network point is generated. *It is recommended that the Alarms be set 1-2 degrees off of the Fault set points so that the Alarm will trigger first prior to generating the faults or Lockouts.*

		Source HX	Load HX
Entering Temp	Low Fault	E26	E26
	High Fault	E27	E27
Leaving Temp	Low Fault	E28	E28
	High Fault	E29	E29

NOTE: In the cooling mode, Freeze protection also includes the E5 Freeze protection fault that is based upon both the suction temperature and the saturated suction pressure setpoints when cooling. These are not user adjustable, have retry and can lockout the unit on an E5 Fault code. Note: In the heating mode, Freeze protection also includes the E4 Freeze protection fault that is based upon both the suction temperature and the saturated suction pressure setpoints. These are not user adjustable, have retry and can lockout the unit on an E4 Fault code.

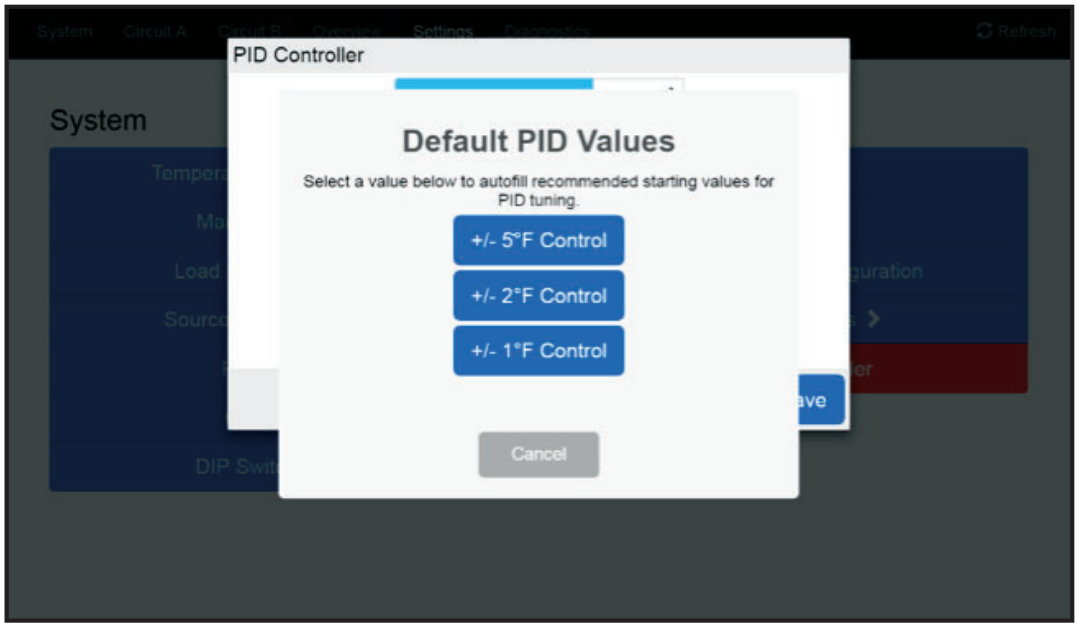
Using the HydroLink2 Aurora Color Touch Tablet cont.

PID Controller Screen

The setpoint control method utilizes an internal PID (proportional integral derivative) algorithms. The PID is commonly used as a control feedback loop to maintain a temperature setpoint. Three control accuracy defaults have been setup. Simply select the temperature control accuracy desired. Please consult our technical support if further PID fine tuning is desired.

	Control Accuracy		
	± 5˚F [± 3˚C]	± 2˚F [± 1˚C]	± 1˚F [± 0.5˚C]
Proportional Constant	8	20	40
Integral Constant	0.07	0.1	0.2
Derivative Constant	0	0	0
Execute Time	15	15	15
Cooling Differential	2.5	1	0.5
Heating Differential	2.5	1	0.5

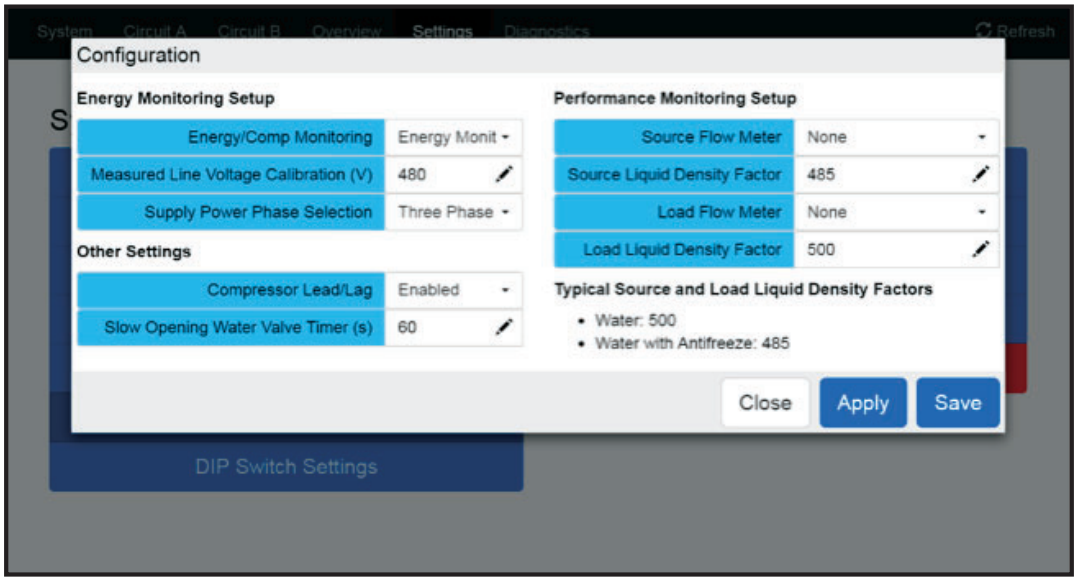




Using the HydroLink2 Aurora Color Touch Tablet cont.

Configuration Screen

The configuration window allows setup of the energy and performance monitoring as well as other settings such as lead/lag and water valve timing.



Energy Monitoring

Energy Compressor Monitoring – In Comp Monitoring the current transducers are only used for compressor locked rotor start timing or welded contact fault monitoring of the compressor contactor producing an E10 fault. In Energy monitoring adds power measurement to Comp monitoring and displays operating power of each compressor in Watts.

Measured Line Voltage Calibration – The HydroLink2 Aurora monitors the line Voltage of the unit after the control transformer. Upon installation, it is required that the supply Voltage be measured with the unit operating with one stage compressor. Enter this measured Voltage value into this cell. The control will track the line Voltage as it fluctuates using this calibration factor.

Supply Power Phase Selection – the selection of the unit supply power for use in unit power calculation.

Performance Monitoring

Source Flow Meter – An optional field installed flow meter for the source fluid is available to measure fluid flow of the unit. The meter has an accuracy of ±3%. The flow meter is required to calculate HE/HR. Use this to select the appropriate flow meter model.

Source Liquid Density – Select the appropriate liquid density factor of the source fluid. Typically 500 [4.2] is used for pure water and 485 [4.1] is used for antifreezes solutions. 500 [4.2] is the default

Load Flow Meter – An optional field installed flow meter for the load fluid is available to measure fluid flow of the unit. The meter has an accuracy of ±3%. The flow meter is required to calculate unit capacity at the load. Use this to select the appropriate flow meter model.

Load Liquid Density – Select the appropriate liquid density factor of the load fluid. Typically 500 [4.2] is used for pure water and 485 [4.1] is used for antifreezes solutions. 500 [4.2] is the default.

Other Settings

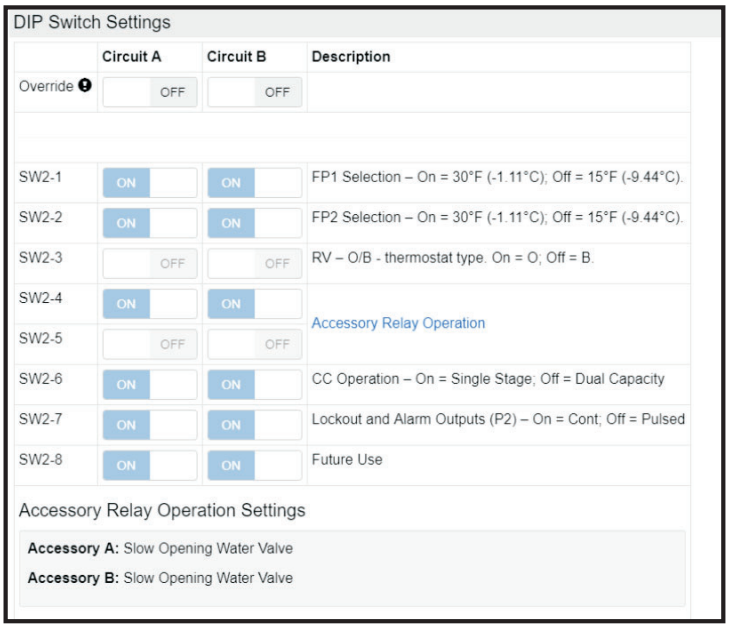
Compressor Lead/Lag – here you can enable or disable the compressor lead/lag algorithm. Lead/Lag is based upon simple alternation.

Slow Opening Water Valve Timer – This number represents the time it takes the water valve to open and establish 100% water flow and the delay on engaging the compressor. 60 sec is the default.

Using the HydroLink2 Aurora Color Touch Tablet cont.

Dip Switch Settings Screen

Each compressor has on its ABC board an 8 pin DIP allowing custom configurations of the operation. Both Circuit A and Circuit B are shown on screen.



Override - The DIP switch's physical selection can be electronically overridden by selecting Override and then changing the DIP switch position electronically. This is convenient in large multi-unit installations where SW2-1 Freeze protection has been inadvertently left in Water position at installation and needs to be switched to antifreeze. Thru this entry or BAS network the unit can be switched to Antifreeze without the need to physically go to the unit and flip the DIP switch. When overridden, the Yellow LED2 on the ABC will slowly flash indicating the physical position of the DIP has been overridden.

SW2-1 FP1 Selection – Source temperature limit setting for freeze detection. On = 30°F [-1.1°C] Water; Off = 15°F [-9.4°C] Antifreeze. Default is On=30°F [-1.1°C] Water.

SW2-2 FP2 Selection – Load temperature limit setting for freeze detection. On = 30°F [-1.1°C] Water; Off = 15°F [-9.4°C] Antifreeze. Default is On=30°F [-1.1°C] Water.

SW2-3 RV – O/B - thermostat type. Heat pump thermostats with "O" output in cooling or "B" output in Heating can be selected. On = O; Off = B. Default is Off=B.

Access Relay Operation	SW2-4	SW2-5
Not Used	ON	ON
Cycle with Compressor	OFF	OFF
Water Valve Slow Opening	ON	OFF
(Reserved)	OFF	ON

SW2-4 Access Relay Operation (P2) and 2-5 Default is OFF/OFF Cycle with Compressor.
Cycle with Blower - The accessory relay will cycle with the blower output. Not used.
Cycle with Compressor - The accessory relay will cycle with the compressor output.
Water Valve Slow Opening - The accessory relay will cycle and delay both the blower and compressor output for 90 seconds.

SW2-6 CC Operation – selection of single or dual capacity compressor. On = Single Stage; Off = Dual Capacity. *Default is On=Single Stage.*

SW2-7 Lockout and Alarm Outputs (P2) – selection of a continuous or pulsed output for both the LO and ALM Outputs. On = Continuous; Off = Pulsed. *Default is On=Continuous.*

SW2-8 Future Use – *Default is On=Normal.*

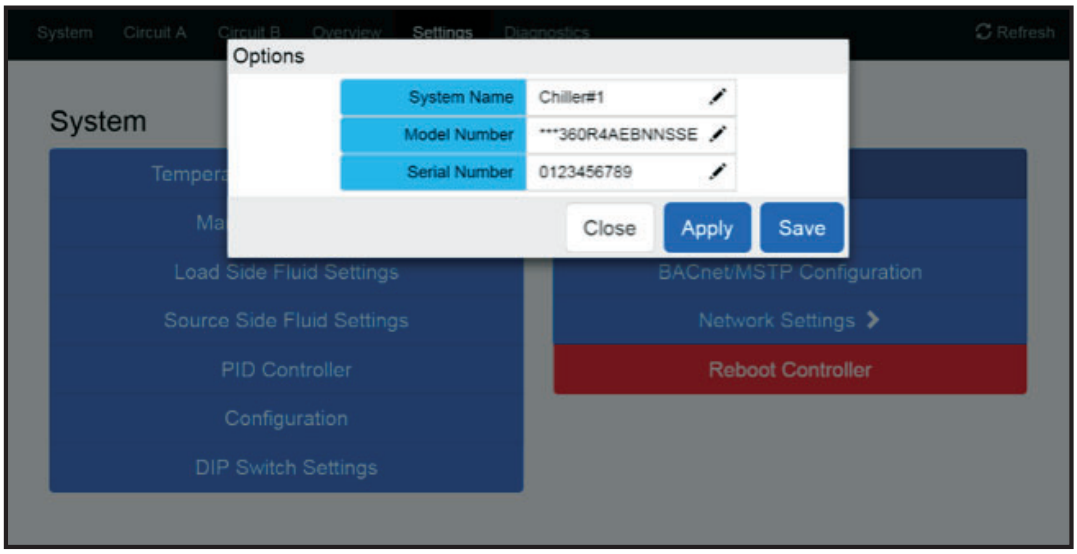
Using the HydroLink2 Aurora Color Touch Tablet cont.

System Name Options Screen

System Name - Each unit can have a custom alphanumeric name to better identify it in the BAS or local wifi displays. For example a name such as Mech Rm 2 – Chiller #1 could be entered.

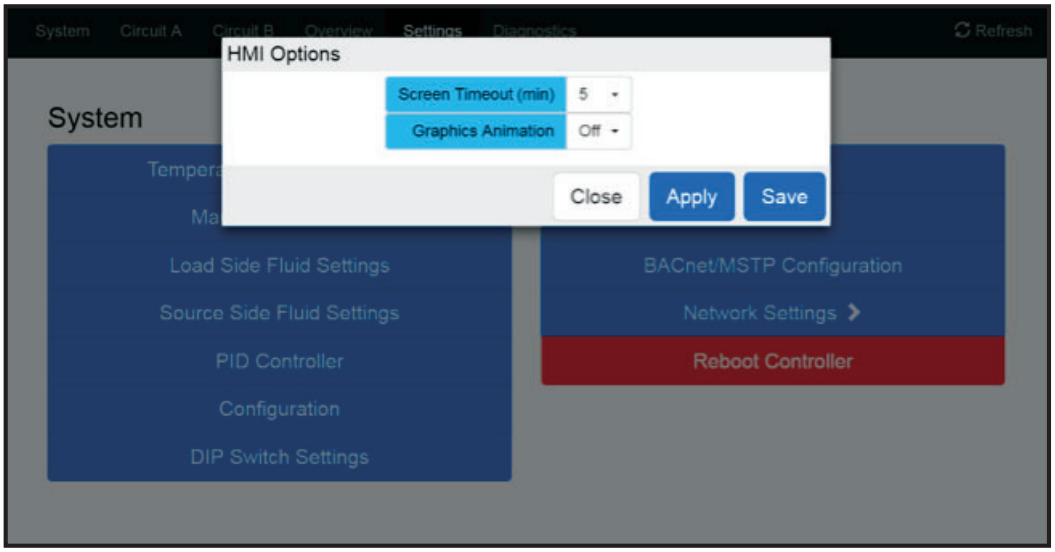
Model Number – The Model number of the unit. This field is entered at the factory and should never need to be changed except in an extreme case in which all controls have been field replaced. Otherwise replacing any one control the other controls should retain both the model and serial number.

Serial Number – The serial number of the unit. This field is entered at the factory and should never need to be changed except in an extreme case in which all controls have been field replaced. Otherwise replacing any one control the other controls should retain both the model and serial number.



Screen Options Screen

Screen Timeout – Typical Screen Timeout of the color touch display. Select desired time after use for screen to sleep.
Graphics Animation – The Graphics animation can be turned off in lower speed/performance environments. This will not effect the operation of the control or unit.



Using the HydroLink2 Aurora Color Touch Tablet cont.

BACnet/MSTP Configuration

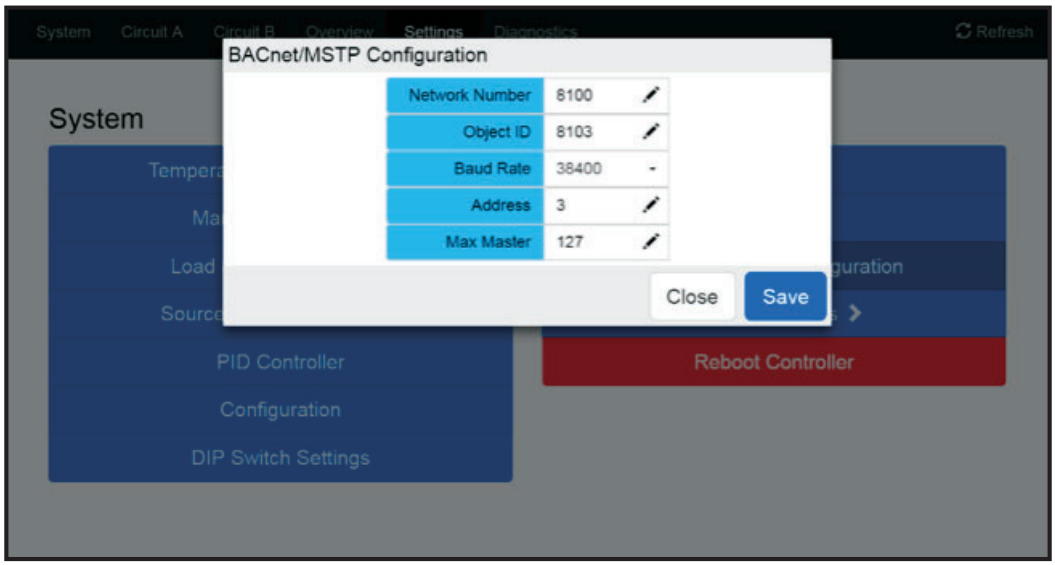
Network Number – The network number can be assigned from 8100 thru 8199. BACnet only allows a maximum of 99 id's per trunk.

Object ID - The object ID can be assigned from 8100 thru 8199. BACnet only allows a limited number of object ID's.

Baud Rate – Selectable from several speeds.

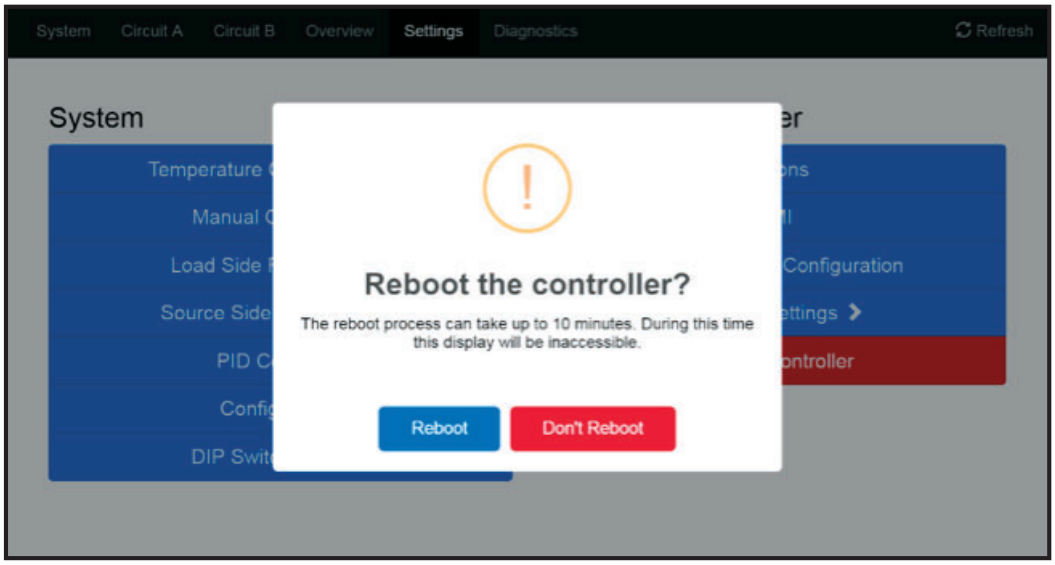
Address – Unique MAC Address

Max Master – Highest network number available.



Reboot Screen

Reboot The Controller – The reboot process can take up to 10 minutes and should not be interrupted.



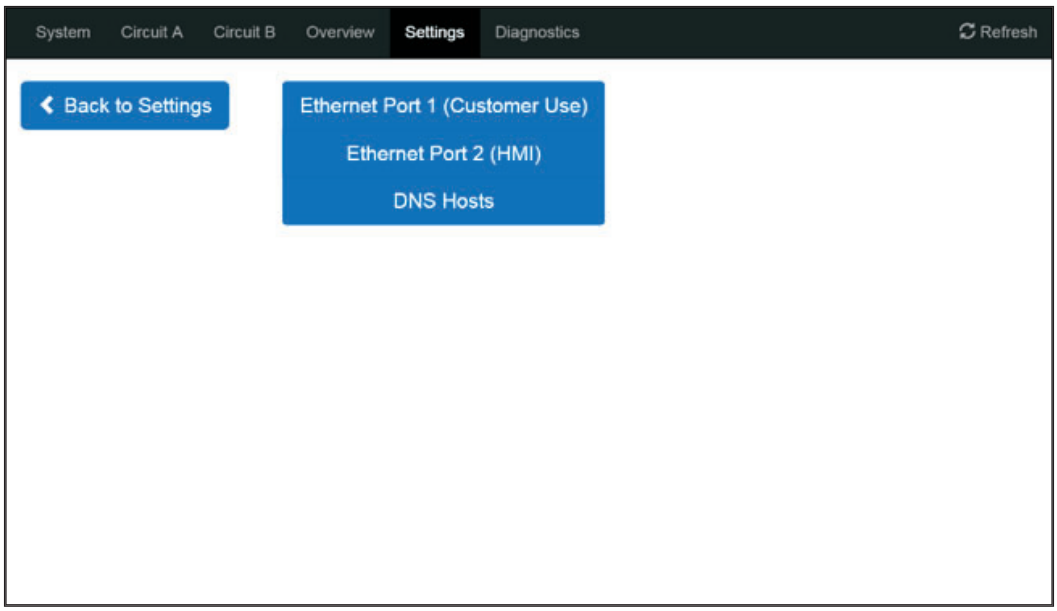
Using the HydroLink2 Aurora Color Touch Tablet cont.

Network Settings

Ethernet Port 1 (Customer Use) – This port is not used from the factory and can be setup for field use to connect such as connecting to another local area network router.

Ethernet Port 2 (HMI) – This port is configured in the factory to communicate via Wi-Fi router to the 10" [254mm] touch-screen tablet which displays HMI screens.

DNS Hosts – These values can be used if the field implementation requires the use of local Domain Name Service Hosts.



Using the HydroLink2 Aurora Color Touch Tablet cont.

Ethernet Port 1 & 2

WARNING: Changing Ethernet Port 2 (en1) settings may cause the touchscreen tablet to stop functioning correctly.

Addressing Mode – This setting is dependent upon the setup of the field implementation network. Static IP addressing is used to assign an unchanging IP address. Dynamic IP addressing should be used if the field implemented network will assign an IP address using DHCP (Dynamic Host Configuration Protocol).

IP Address – (Static Addressing Mode Only) The IP Address assigned to the HydroLink2 server.

Subnet Mask – (Static Addressing Mode Only) The subnet to which the the HydroLink2 server is assigned. (NOTE: Subnet Mask 1 and 2 must be different.

Default Gateway – The IP address of the Default Gateway. Used if the field implementation network requires a Default Gateway to which network traffic should be routed.



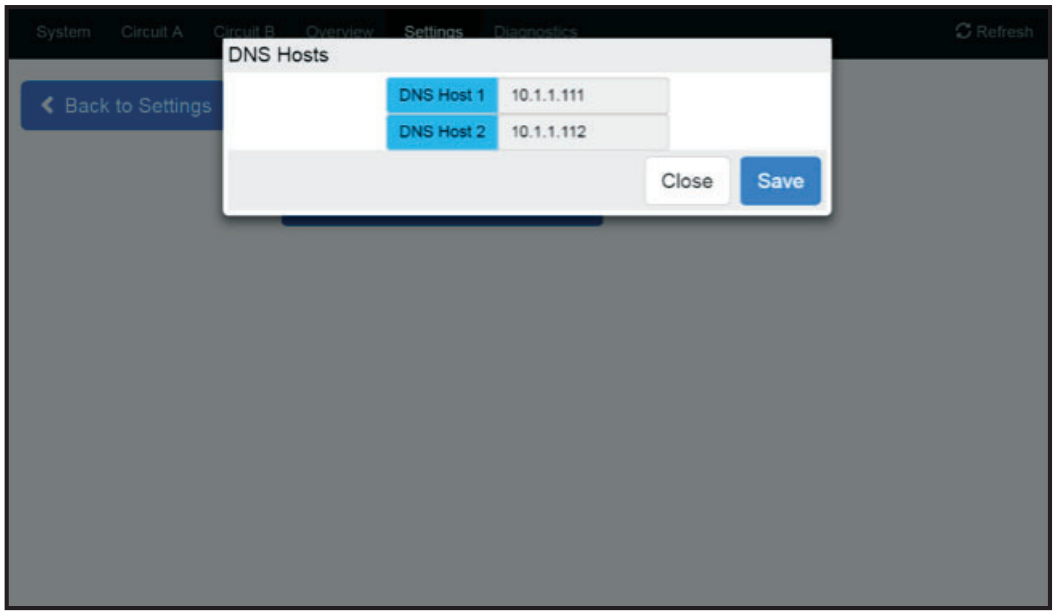


Using the HydroLink2 Aurora Color Touch Tablet cont.

DNS Hosts

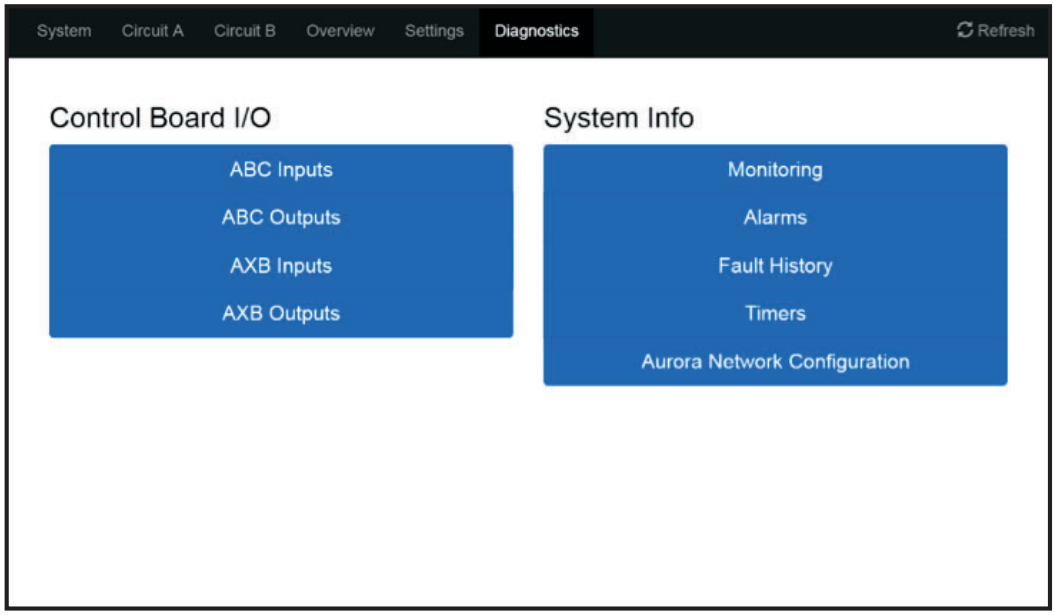
DNS Host 1 – The IP Address of DNS Host 1.

DNS Host 2 – The IP Address of DNS Host 2.



Diagnostic Screens

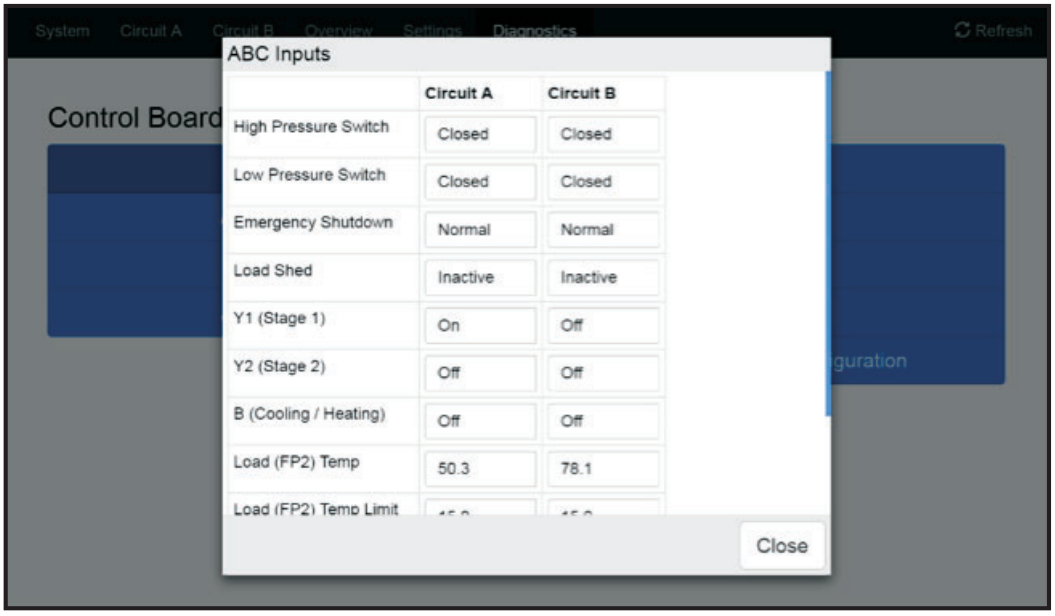
As the name suggests, the "Diagnostic" screen is summarized screen to make servicing of the chiller easier. This is the location where most of the detailed information and settings lie of the Aurora System.



Using the HydroLink2 Aurora Color Touch Tablet cont.

ABC Inputs Screen

Both Circuit A and Circuit B are shown on screen.



High Pressure Switch – The HP switch displays the position of the High pressure switch on the compressor discharge. Closed is the normal operation position, and open is a fault.

Low Pressure Switch – The LP switch displays the position of the low pressure switch on the compressor suction line. Closed is the normal operation position, and open is a fault.

Emergency Shutdown – Normal is displayed when NO grounded signal or Emergency Shutdown (ES) command is present. Active is displayed when an ES grounded signal or ES command is present. All

Load Shed Shutdown – Normal is displayed when NO grounded signal or load Shed (LS) command is present. Active is displayed when an LS grounded signal or LS command is present. Either Compressor A be B can be deactivated.

Y1 (Stage 1) – Y1 will be active when first stage compressor call is engaged either Comp A or B depending upon lead/lag selection.

Y2 (Stage 2) – Y2 will be active when second stage compressor call is engaged either Comp A or B depending upon lead/lag selection.

B (Cooling/Heating) – The "B" signal will be present when heating the load. Circuit A and B should always be the same.

Load (FP2) Temp – This displays the actual temperature of the FP2 Sensor.

Load (FP2) Temp Limit – This displays the actual limit of the FP2 Sensor. This is a user editable cell. Generally there is a 30 second recognition when FP2 is below this limit before a fault (E5) is recognized.

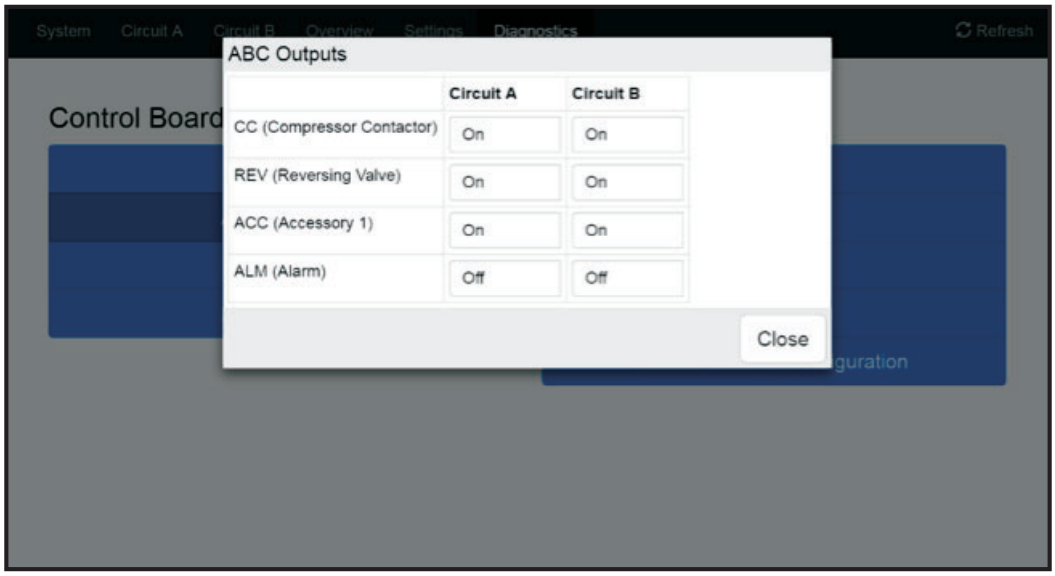
Source (FP1) Temp – This displays the actual temperature of the FP1 Sensor.

Source (FP1) Temp Limit – This displays the actual limit of the FP1 Sensor. This is a user editable cell. Generally there is a 30 second recognition when FP1 is below this limit before a fault (E5) is recognized.

Using the HydroLink2 Aurora Color Touch Tablet cont.

ABC Outputs Screen

Both Circuit A and Circuit B are shown on screen.



CC (Compressor Contactor) – This shows the state of the CC relay on the two ABC's. When CC is "ON" the compressor power contactor should be engaged.

REV (Reversing Valve) – This shows the state of the RV relay on the two ABC's. When RV is "ON" the unit should be in heating mode.

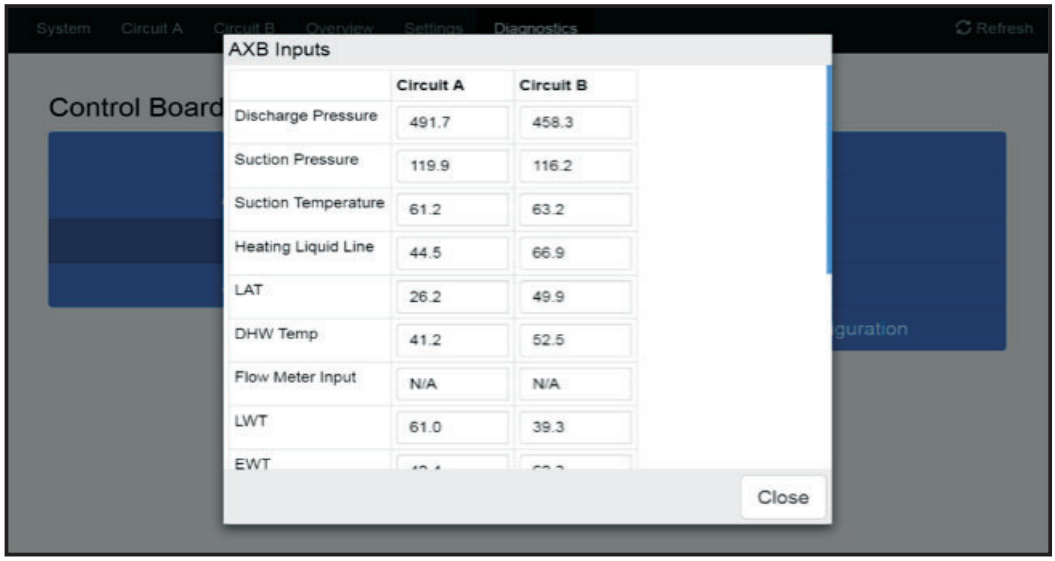
ACC (A and B) – This shows the state of the ACC relay on the two ABC's. When ACC is "ON" the ACC relay will be engaged.

ALM (Alarm) – This shows the state of the ALM relay on the two ABC's. When ALM is "ON" the ALM relay will be engaged. Note there is a DIP option to have this output pulse the lockout code. For instance an E3 would cause this relay to close for 0.5 sec three times then remain off for 2 sec. and continue repeating.

Access Relay Operation	SW2-4	SW2-5
Not Used	ON	ON
Cycle with Compressor	OFF	OFF
Water Valve Slow Opening	ON	OFF
(Reserved)	OFF	ON

Using the HydroLink2 Aurora Color Touch Tablet cont.

AXB Inputs Screen



Both Circuit A and Circuit B are shown on screen.
Discharge Pressure - Displays the value of the discharge pressure transducers.
Suction Pressure - Displays the value of the suction pressure transducers.
Suction Temperature - Displays the temperature of the suction line near the compressors.
Heating Liquid Line - Displays the temperature of the liquid line on the condenser side of the expansion device. In the heating mode it is the sensor labeled Htg LL and in Cooling it is FP1. This will switch sensor readings automatically between modes.
Field Temp 1 and 2 - Displays the temperature of a field supplied 10k Ohm NTC thermistor connected to AXB A or B P1-LVG Air.
Field Temp 3 - Displays the temperature of a field supplied 10k Ohm NTC thermistor connected to AXB A P17-HWT.
External Temperature Sensor - Displays the temperature of a field supplied 10k Ohm NTC thermistor connected to AXB B P17-HWT.

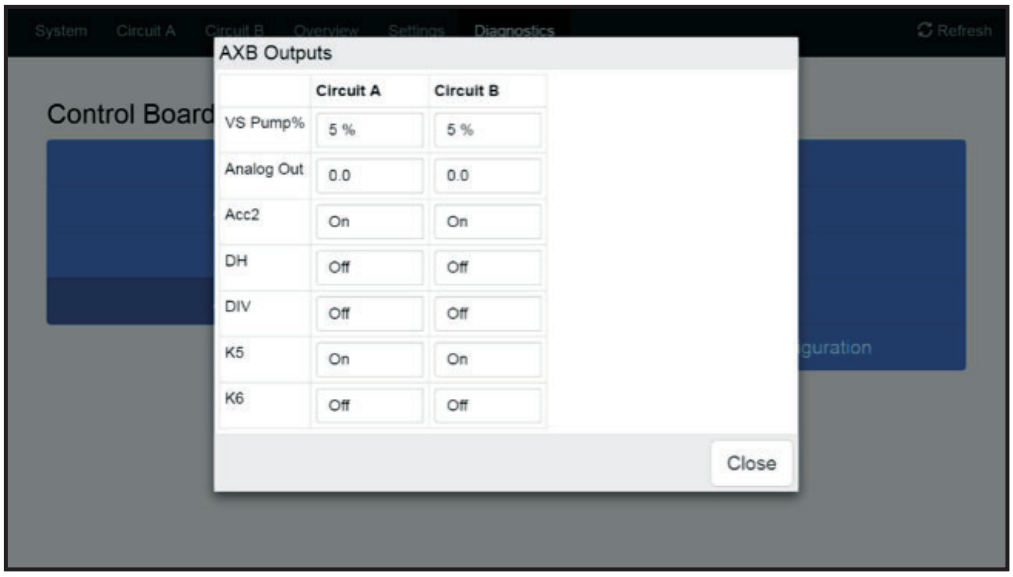
Both Circuit A and Circuit B are shown on screen. Here the Circ A represents Source fluid and B represents Load fluid sensors.
Flow Meter Input - Displays the Optional field installed flow meter. Circuit A is Source Flow and Circuit B is Load Flow. NA is displayed if the flow meter is not installed or configured. Flow Meter is wired to AXB A or B P1-Flow.
Leaving Water Temp (LWT) - Displays the temperature of the source and load leaving water temperatures on the AXB A and B pin P1 – Lvg Wtr.
Entering Water Temp (EWT) - Displays the temperature of the source and load entering water temperatures on the AXB A and B pin P1 – Ent Wtr.
Entering Water Temp (EWT) - Displays the temperature of the source and load entering water temperatures on the AXB A and B pin P1 – Ent Wtr.
Field Press 1 and 2 - Displays the pressure of a field supplied pressure transducer connected to AXB A P3-Loop Pres. Consult technical support for more details.

Both Circuit A and Circuit B are shown on screen.
Field DI 1 and 2 - Displays the logic (Off/On) of the Field DI 1 and 2 input on the AXB A and B pin P4 – Smart Grid. Consult technical support for application details.
Field DI 3 and 4 - Displays the logic (Off/On) of the Field DI 3 and 4 input on the AXB A and B pin P4 – HA1. Consult technical support for application details.
Field DI 5 and 6 - Displays the logic (Off/On) of the Field DI 5 and 6 input on the AXB A and B pin P4 – HA2. Consult technical support for application details.
Field Amps 1 and 2 - Displays the current draw using a field installed current transducer on the AXB A and B pin P10 – Fan. Consult technical support for application details.

Using the HydroLink2 Aurora Color Touch Tablet cont.

AXB Outputs Screen

Both Circuit A and Circuit B are shown on screen.



VS Pump % (Source/Load) - Displays the PWM output (0-100%) of the optional field installed source and load VS Pump. Outputs are connect to AXB A and B P2-VS Pmp. Consult technical support for application details.

Field AO 1 and 2 - Displays the output (0-10V) of the optional field installed analog output device. Outputs are connect to AXB A and B P11-ANA. Consult technical support for application details.

ACC2 (A and B) This shows the state of the ACC 2 relay on the two AXB's. When ACC 2 is "ON" the ACC 2 relay will be engaged.

Field Relay 1 and 2 – This shows the state of the Field Relay 1 and 2 on AXB A and B (labeled DH). When Field Relay is "ON" the

Access Relay Operation	SW1-4	SW1-5
Not Used	ON	ON
Cycle with CC or Variable Speed 1-12	OFF	OFF
Cycle with CC2 or Variable Speed 7-12	ON	OFF
Cycles with DH from ABC Board	OFF	ON

Field Relay 1 and 2 will be engaged. The output is wired to AXB A and B P11 – DH.

Field Relay 3 and 4 – This shows the state of the Field Relay 3 and 4 on AXB A and B (labeled DIV). When Field Relay is "ON" the Field Relay 1 and 2 will be engaged. The output is wired to AXB A and B P11 – DIV.

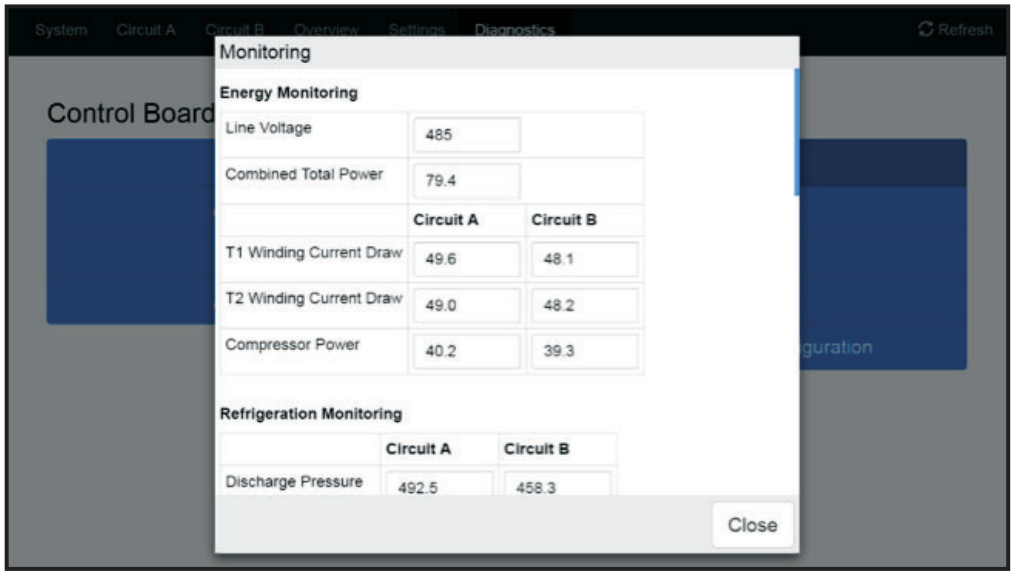
Field Relay 5 and 6 – This shows the state of the Field Relay 5 and 6 on AXB A and B (labeled K5). When Field Relay is "ON" the Field Relay 1 and 2 will be engaged. The output is wired directly to top of relay on AXB A and B K5

Field Relay 7 and 8 – This shows the state of the Field Relay 7 and 8 on AXB A and B (labeled K6). When Field Relay is "ON" the Field Relay 1 and 2 will be engaged. The output is wired directly to top of relay on AXB A and B K6

Using the HydroLink2 Aurora Color Touch Tablet cont.

Monitoring Screen

Both Circuit A and Circuit B are shown on screen where applicable.



Energy Monitoring

Line Voltage – Displays the calibrated Line Voltage as monitored by the Aurora Control after the transformer.

Combined Total Power – Displays the combined power of compressors as monitored by the Aurora Control. The power factor is estimated and current and Voltage measured for the calculation.

T1 Winding Current (A + B) – Displays the T1 Line Compressor Current measured using the current transducer connected at AXB A or B P5-Comp1.

T2 Winding Current (A + B) – Displays the T2 Line Compressor Current measured using the current transducer connected at AXB A or B P5-Comp2.

Compressor Power (A + B) – Displays the total power of each compressor as monitored by the Aurora Control. The power factor is estimated, and current is corrected for three phase applications and Voltage is measured for input into the calculation.

Refrigeration Monitoring

Discharge Pressure (A + B) – Displays the refrigerant discharge pressure of circuit A and B. The Pressure transducer is connected to the AXB A and B P14-Disch.

Suction Pressure (A + B) – Displays the refrigerant suction pressure of circuit A and B. The Pressure transducer is connected to the AXB A and B P12-Scp.

Suction Temp (A + B) – Displays the suction temperature of circuit A and B. The thermistor is connected to the AXB A and B P18-Sct.

Heating Liquid Line (A + B) - Displays the temperature of the liquid line on the condenser side of the expansion device. In the heating mode it is the sensor labeled Htg LL.

Cooling Liquid Line (A + B) - Displays the temperature of the liquid line on the condenser side of the expansion device. In the Cooling it is FP1.

Saturated Evaporator (A + B) – this value is calculated from the suction pressure and used in the superheat calculation.

Saturated Condenser (A + B) – this value is calculated from the discharge pressure and used in the subcooling calculation.

Superheat (A + B) – This value is calculated by subtracting the saturated evaporator temperature from the actual suction temperature. The result is superheat at the compressor inlet.

Subcooling (A + B) – This value is calculated by subtracting the liquid line temperature from saturated condenser temperature. The result is subcooling after the condenser.

Using the HydroLink2 Aurora Color Touch Tablet cont.

Performance Monitoring

Both Circuit A and Circuit B are shown on screen.

Entering Source Temp (EST) - Displays the temperature of the source entering water temperatures on the AXB A pin P1 – Ent Wtr.

Leaving Source Temp (LST) - Displays the temperature of the source leaving water temperatures on the AXB A pin P1 – Lvg Wtr.

Source Water Flow - Displays the Optional field installed flow meter. NA is displayed if the flow meter is not installed or configured. Flow Meter is wired to AXB A P1-Flow.

Source Liquid Density – Displays the liquid density factor selected of the source fluid. Typically 500 [4.2] is used for pure water and 485 [4.1] is used for antifreezes solutions.

Field Press 1 - Displays the pressure of a field supplied pressure transducer connected to AXB A P3-Loop Pres. Consult technical support for more details.

Entering Load Temp (ELT) - Displays the temperature of the load entering water temperatures on the AXB B pin P1 – Ent Wtr.

Leaving Load Temp (LLT) - Displays the temperature of the load leaving water temperatures on the AXB B pin P1 – Lvg Wtr.

Load Water Flow - Displays the optional field installed flow meter. NA is displayed if the flow meter is not installed or configured. Flow Meter is wired to AXB B P1-Flow.

Load Liquid Density – Displays the liquid density factor selected of the load fluid. Typically 500 [4.2] is used for pure water and 485 4.1] is used for antifreezes solutions.

Field Press 2 - Displays the pressure of a field supplied pressure transducer connected to AXB B P3-Loop Pres. Consult technical support for more details.

Heat of Extraction/Rejection – The source heat of extraction (heating mode) or rejection (cooling mode) in MBtuh or kW.

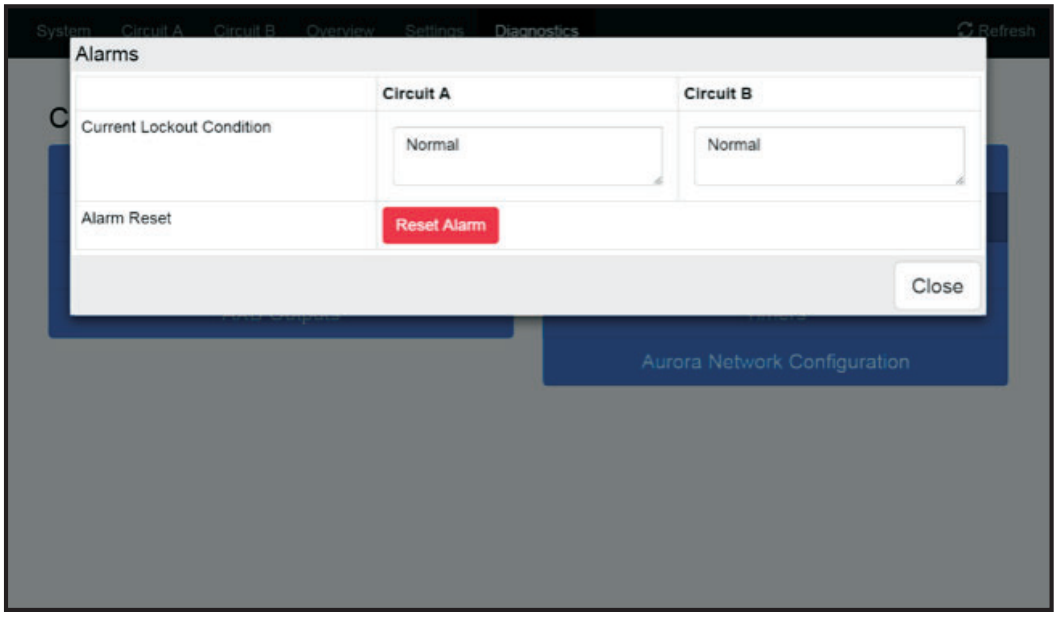
Total Capacity – The Load Capacity of both circuits in MBtuh or kW.

NOTE: N/A – Is displayed in the “Flow”, “HE/HR”, and “Capacity” dialogue boxes when an optional field installed flow meter is not connected to the HydroLink2 Aurora. Compatible flow meters must be used

Using the HydroLink2 Aurora Color Touch Tablet cont.

Alarms Screen

Both Circuit A and Circuit B are shown on screen where applicable.



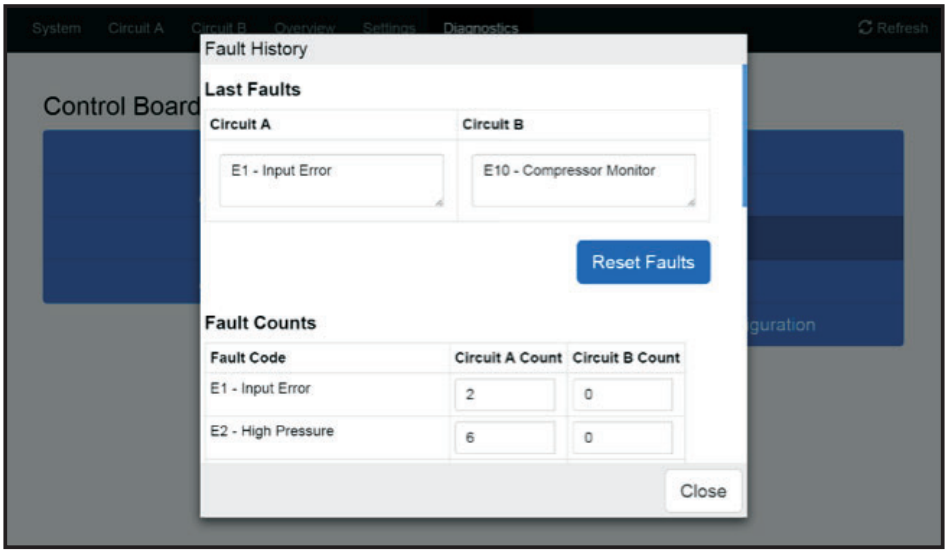
Current Lockouts – Displays the current lockout condition.

Alarm Reset – button allows resetting of the alarm.

NOTE: For a comprehensive list of Alarms/Fault Codes, please reference the "Faults, Configuration and Status Codes" Table located on page 21 of this manual.

Using the HydroLink2 Aurora Color Touch Tablet cont.

Fault history Screen



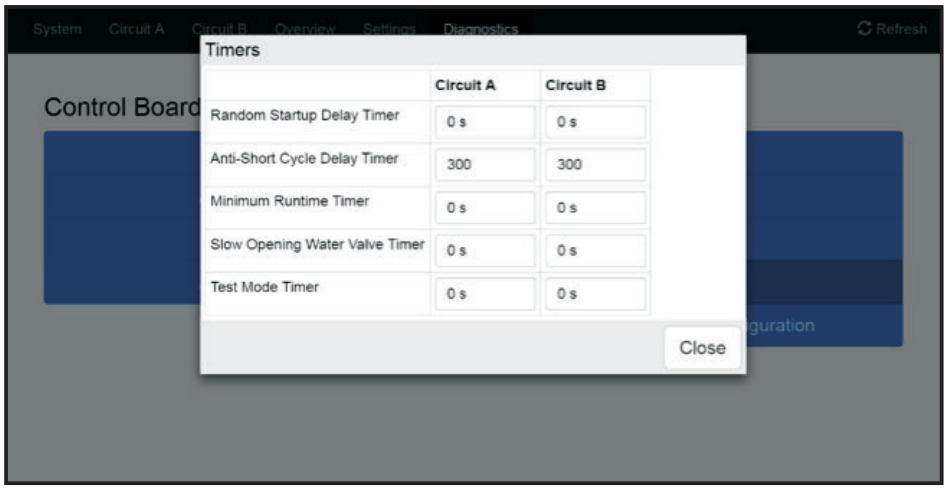
Last Faults – Displays the last fault seen by the Circuit A or Circuit B ABC controller.

Fault Counts – Displays the number of Faults of all types by either circuit.

Reset Faults button – Pushing this button clears the fault history.

Timers Screen

These timers will all count down to zero showing the reason for any compressor delay.



Random Startup Delay Timer (A + B) – After a building power up, his 0-90 sec. random startup delay prevents all units from simultaneously starting.

Anti-Short Cycle Delay Timer (A + B) – Prior to starting this 300 sec. anti-short cycle delay prevents all units from restarting immediately and prevents short cycling of the compressor.

Minimum Runtime Timer (A + B) – Once operating this timer insures a minimum 120 sec. operation of the compressor.

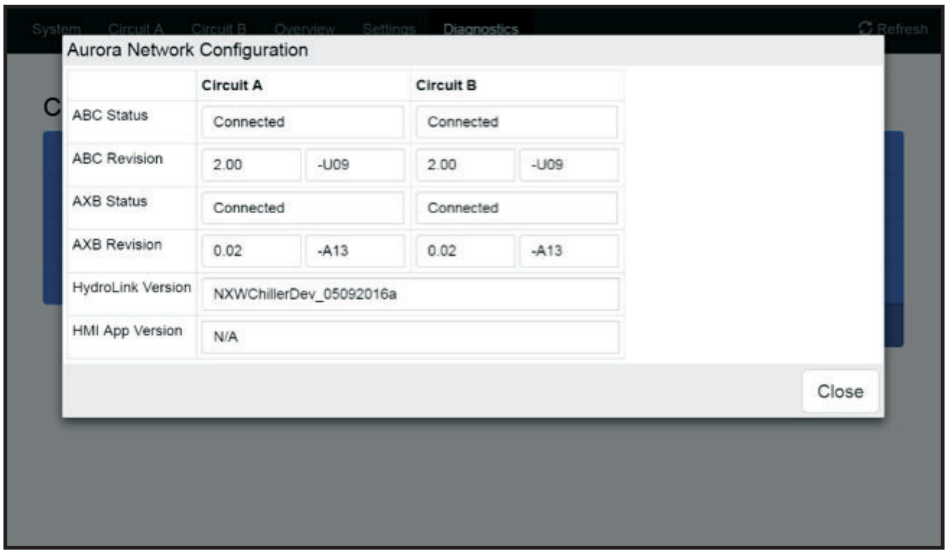
Slow Opening Water Valve (A + B) – This 90 sec. timer prevents the compressor from turning on prior to the water valves complete opening with insufficient water flow.

Test mode Timer (A + B) – Once Test mode is engaged this timer prevents the technician from forgetting to return the unit to normal operation by automatically ending the test mode operation after 1800 sec.

Using the HydroLink2 Aurora Color Touch Tablet cont.

Aurora Network Configuration Screen

This screen shows the proper communication status and software revision of each communicating board. The HydroLink2 Aurora controller software and App version is also shown.



Application Data

1.0. Minimum Fluid Volume

A. Water-to-water heat pumps require a minimum amount of source and load side fluid volume to ensure accurate and stable temperatures during system operation. For normal air conditioning type applications, it is recommended to use at least 7.5 Liter per kW output.
B. Applications that require more precise temperature control or low loading will occur the minimum fluid volume shall be no less than 10.7 Liter per kW output. Installation of a buffer tank that will properly mix the fluid is recommended.

1.1. Water-to-Water Heat Pump Sizing

A. Heat pumps should be adequately sized for optimal system efficiency and run time. Oversizing by more than 15% can diminish performance resulting in higher power consumption, short cycling of compressors, and unstable conditioning temperatures.
B. In applications where the minimum load is significantly less than the design condition, it is better to install 2 smaller heat pumps for load matching rather than a single large heat pump.

1.2. Heat Pump Piping

A. Multiple heat pumps can be installed in series or parallel configurations. The preferred system design is to pipe the equipment in parallel due to its simplicity and flexibility. In parallel systems, the heat pump equipment can vary in size as long as flow rate and system volume are accounted for.
B. Piping equipment in series is not desired; however, it can be done if proper guidelines are followed. Always observe proper temperature and flow rate requirements for each unit. Sometimes this method is desired to achieve larger temperature differences.

1.3. Strainers

A. All brazed-plate heat exchangers shall have a strainer within 2.4 meters of the water/brine inlet. It is highly recommended to use a minimum of 60 mesh in order to provide maximum filtration. In any case, the strainers should never have a mesh size less than 20.
B. Failure to install proper stainers and perform regular service can result in serious damage to the unit, 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.
C. 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; low enough to be within the pumping capacity of the pump being used.

1.4. Flow Sensing Devices

A. A flow switch or equivalent must be installed on the evaporator for each unit to be installed. If the unit is to operate as both modes (heating/cooling), a flow switch is needed on both heat exchangers.
B. A differential pressure switch can be used in place of a flow switch. The differential switch must be capable of pressure range as indicated in the pressure drop tables.

1.5. Water Quality

A. **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.

B. **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.

C. **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.



WARNING: Must have intermediate heat exchanger when used in pool applications.

Application Data cont.

1.6. Insulation

A. Heat pumps are built with factory installed insulation on any surface that may be subject to temperatures below the room dew point.

Surface Condensation Chart

Room Ambient Condition	Surface Temperature		
	10°C	20°C	-18°C
Normal (Max 85°F, 70% RH)	12.7mm	19.1mm	25.4mm
Mild (Max 80°F, 50% RH)	3.2mm	6.4mm	12.7mm
Severe (Max 90°F, 80% RH)	19.1mm	25.4mm	50.8mm

1.7. Brine Applications

A. Applications where the leaving fluid temperature goes below 4.4°C a suitable brine solution must be used. Failure to do so can cause immediate damage to the system. The brine must be approved for use with heat exchangers. Automotive antifreeze solutions are not suitable for use in brazed plate heat exchangers.

B. The freeze detection must be adjusted appropriately for brine applications. The brine solution concentration should be at least -9.4°C below the lowest leaving fluid temperature.

Water Quality Guidelines

Material		316 Stainless Steel
pH	Acidity/Alkalinity	7 - 9
Scaling	Calcium and Magnesium Carbonate	(Total Hardness) less than 350 ppm
Corrosion	Hydrogen Sulfide	Less than 1 ppm
	Sulfates	Less than 200 ppm
	Chlorine	Less than 0.5 ppm
	Chlorides	Less than 300 ppm
	Carbon Dioxide	10 - 50 ppm
	Ammonia	Less than 20 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)	1000 - 1500 ppm
	LSI Index	+0.5 to -0.5
Iron Fouling (Biological Growth)	Iron, FE^{2}+ (Ferrous) Bacterial Iron Potential	< 0.2 ppm
	Iron Oxide	Less than 1 ppm, above this level deposition will occur
Erosion	Suspended Solids	Less than 10 ppm and filtered for max. of 600 micron size
	Threshold Velocity (Fresh Water)	< 1.8 m/sec

NOTES: Grains = ppm divided by 17
mg/L is equivalent to ppm

10/07/14

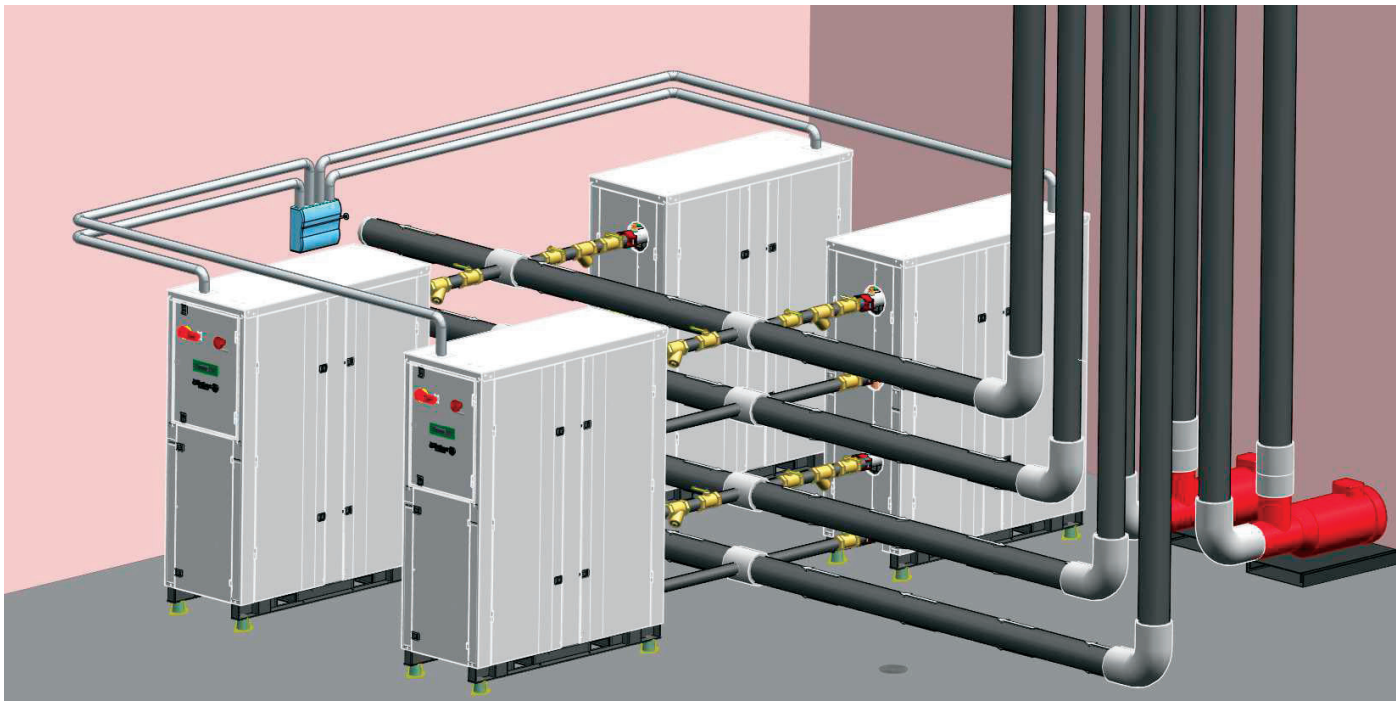
Selection Process

To achieve optimal performance, proper selection of each heat pump is essential. The easiest and most accurate method to size and select heat pump equipment is to use WaterFurnace's WeDoGeo selection program. Specific design information such as temperatures, voltages, and flow requirements are entered directly into the program so that the correct heat pump is chosen. The heat pump schedule and submittal data is all generated within WeDoGeo.

Notes before selections:

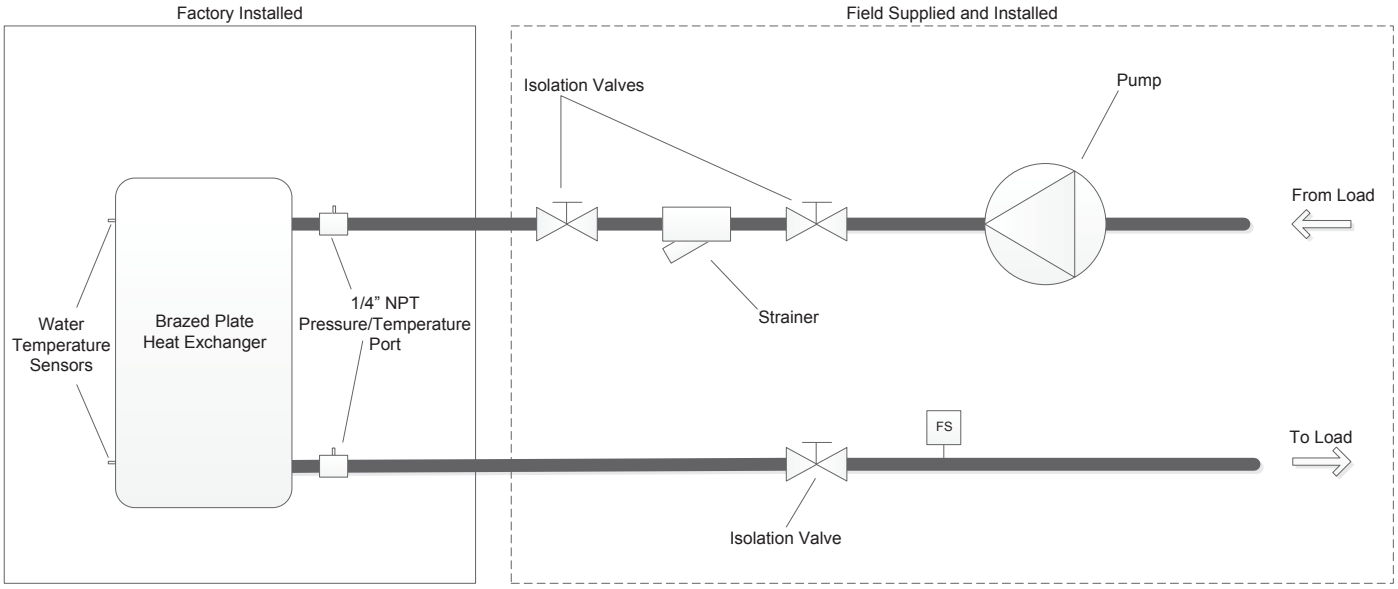
- For applications using water, the leaving water temperature must stay above 4.4°C.
- If leaving water temperature below 4.4°C is desired, the design must include a suitable brine solution.
- Water/Brine flow rates must meet the minimum and maximum criteria as established in the engineering data.
- Water quality must comply with data presented in engineering documentation.
- Contact factory for applications requiring load temperatures below 0°C

Typical Piping



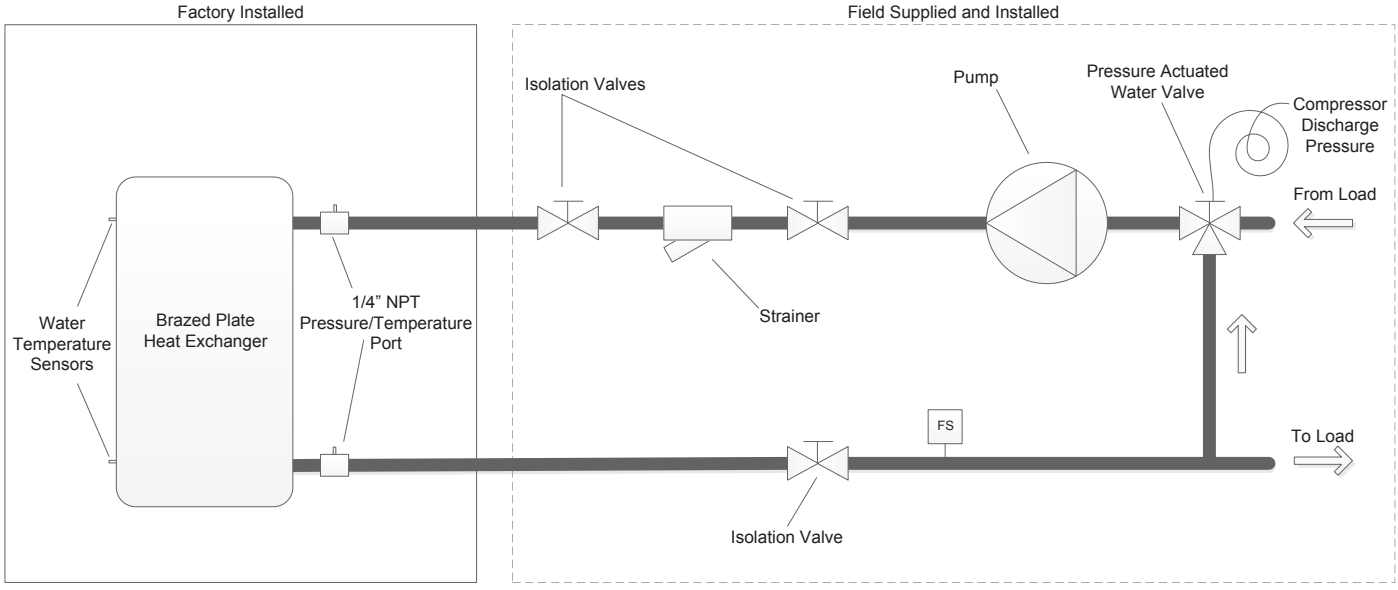
Typical Piping, cont.

Standard Piping



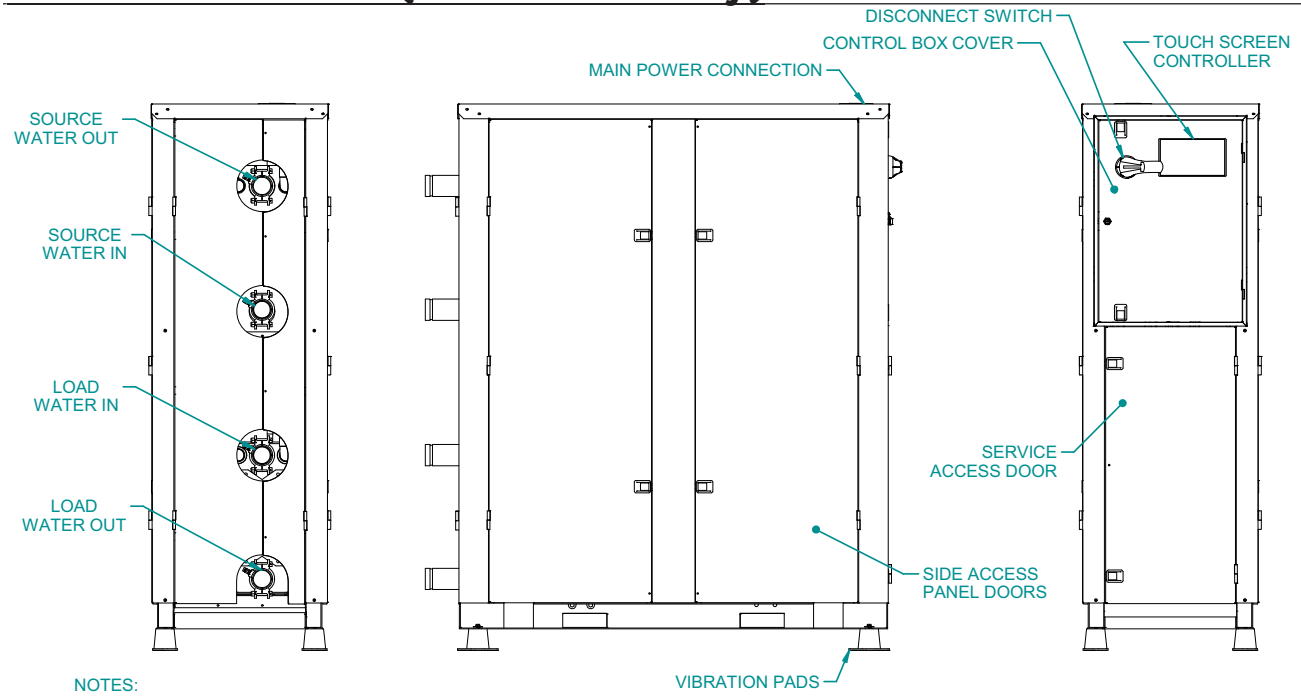
Note: System piping should have drain ports to enable flushing and cleaning of heat exchangers. On systems utilizing pumps with VFDs, an automatic flow control valve must be installed.

Pressure Regulated Piping



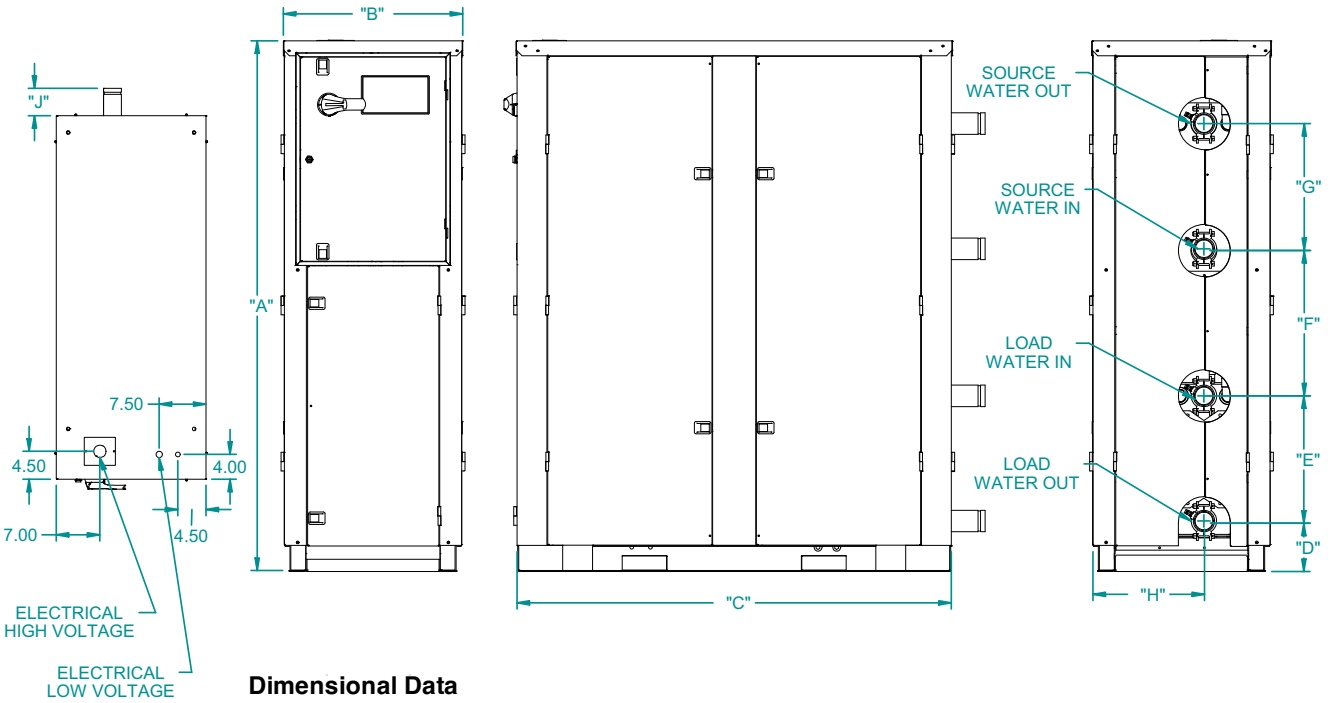
Note: System piping should have drain ports to enable flushing and cleaning of heat exchangers. On systems utilizing pumps with VFDs, an automatic flow control valve must be installed.

Dimensional Data (Reversible only)



NOTES:

1. DO NOT SCALE DRAWING.
2. RECOMMENDED TO HAVE 24" CLEARANCE ON ALL SIDES.



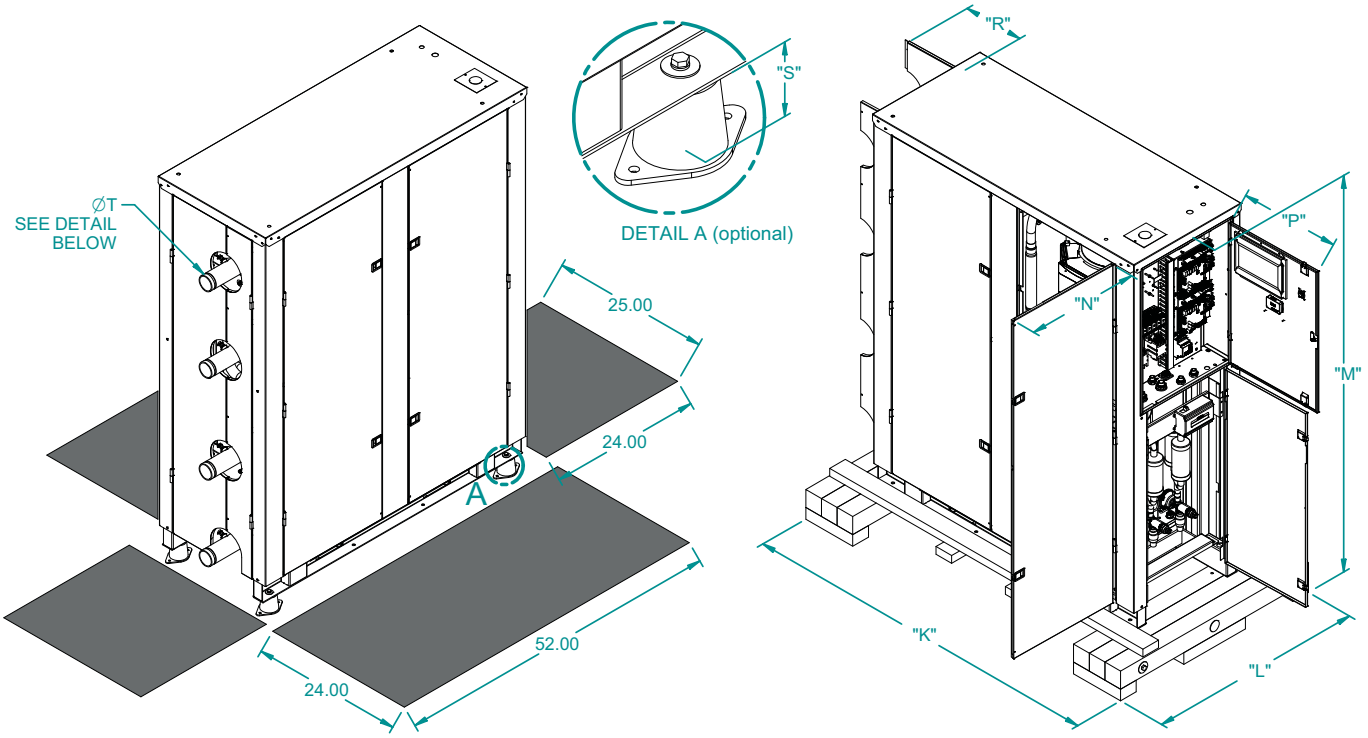
Dimensional Data

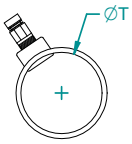
Dimensional Data for unit with enclosure

Model	A	B	C	D	E	F	G	H	J
120-180	57.3 [1455]	24.1 [612]	42.5 [1080]	5.0 [127]	17.0 [432]	8.8 [224]	17.0 [432]	11.9 [302]	5.8 [147]
240-360	64.2 [1631]	24.1 [612]	50.5 [1283]	6.9 [175]	17.0 [432]	13.9 [353]	17.0 [432]	12.1 [307]	4.8 [122]
600	71.1 [1806]	24.1 [610]	58.5 [1486]	6.5 [165]	17.0 [432]	19.5 [495]	17.0 [432]	15.0 [381]	4.4 [112]

All dimensions in inches, [mm]

Dimensional Data (Reversible only) cont.





Dimensional Data

Dimensional Data for unit with enclosure

Model	K	L	M	N	P	R	S	*T
120-180	57.0 [1448]	42.0 [1067]	63.1 [1603]	15.9 [404]	19.5 [495]	9.7 [246]	1.3 [33]	2.0 [51]
240-360	65.0 [1651]	42.0 [1067]	69.9 [1775]	19.9 [505]	19.5 [495]	9.7 [246]	1.8 [46]	2.0 [51]
600	70.0 [1778]	42.0 [1067]	76.8 [1951]	22.0 [559]	19.5 [495]	12.7 [323]	1.8 [46]	2.5 [64]

All dimensions in inches, [mm]

*T - Units shipped with groove pipe connection

Vibration Isolators

Mounting Units

Remove the unit from the wooden shipping skids (see physical dimensions). Units do not ship standard with vibration isolation hardware, however, non-standard options are selectable for the unit.
Non-standard options include:

- Rubber Isolators - Heavy-duty durometer rubber grommets for reduced sound transmitted through the floor via the frame.
- Spring Isolators - For increased sound attenuation, heavy-duty isolation springs can reduce sound levels by 3 dBA.

Rubber Isolators

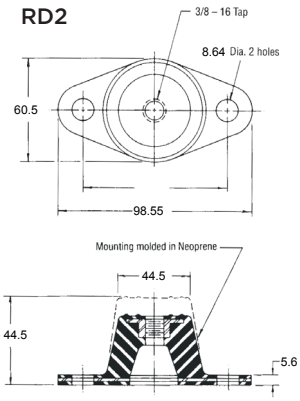
Part Number	Type	Color Code	Max Load, kg	Deflection, mm	Qty
99S502-01	RD2	Green	172	12.7	4

• Compatible with 030-045

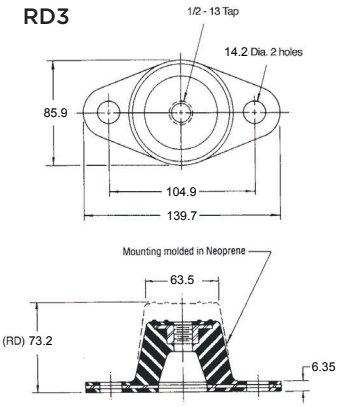
Part Number	Type	Color Code	Max Load, kg	Deflection, mm	Qty
99S502-02	RD3	Green	340	12.7	4

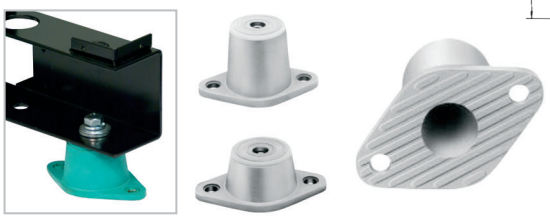
• Compatible with 060-150

RD2



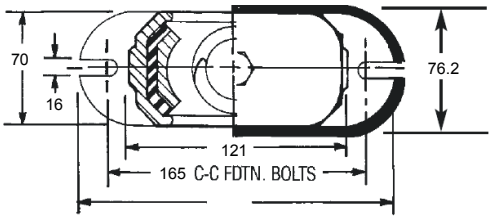
RD3

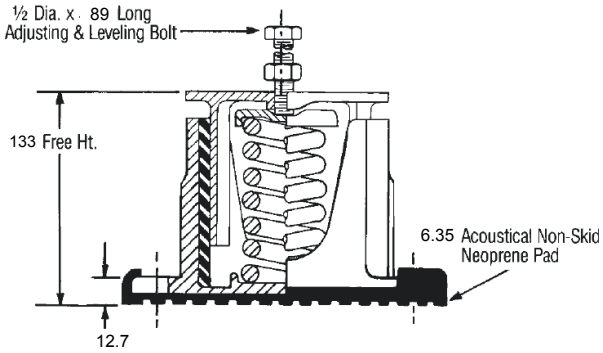


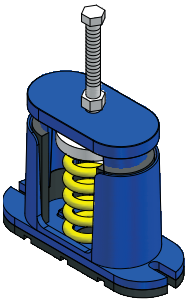


Spring Isolators

Number	Compatible With	Spring Color	Rated Capacity	Rated Deflection	Isolator Constant	Adjustment Bolt [in x mm]	Qty
IS-340-01	030-045	Red	147 kg	31 mm	4.72 kg/mm	1/2 x 89	4
IS-900-01	090-130	DK Green	340 kg	27 mm	12.65 kg/mm	1/2 x 89	4









Physical Data

Model	Compressor	Refrigerant Charge*	Total Weight	
			Shipping	Installed
030	Scroll (2)	5.3	720	710
		[2.4]	[327]	[323]
045	Scroll (2)	7.8	838	844
		[3.5]	[381]	[384]
060	Scroll (2)	10.5	1130	1152
		[4.8]	[514]	[524]
090	Scroll (2)	17.9	1320	1388
		[8.1]	[600]	[631]
150	Scroll (2)	27.3	1748	1850
		[12.4]	[795]	[841]

Weights shown in Pounds, [kg] 1/30/2014

* Refrigerant per circuit in Pounds, [kg]
Add 32 lbs [15 kg] for fluid weight when full. (120)
Add 48 lbs [22 kg] for fluid weight when full. (180)
Add 64 lbs [29 kg] for fluid weight when full. (240)
Add 110 lbs [50 kg] for fluid weight when full. (360)
Add 144 lbs [65 kg] for fluid weight when full. (600)

NOTE: See page 16 for minimum fluid volume guidelines.

Electrical Data

Chiller (30-150kW) Electrical Table

Model	Rated Voltage	Voltage Min/Max	Compressor[1]			Total Unit FLA	Min Circ Amp	Min Fuse/ HACR	Max Fuse/ HACR[2]
			MCC	RLA	LRA				
030	380-420/50/3	340/440	19.0	12.2	87.0	24.4	27.5	30.0	35
045	380-420/50/3	340/440	19.0	12.2	110.0	24.4	27.5	30.0	35
060	380-420/50/3	340/440	27.0	19.2	140.0	38.4	43.2	45.0	60
090	380-420/50/3	340/440	38.6	24.7	197.0	49.4	55.6	60.0	80
150	380-420/50/3	340/440	62.0	39.7	260.0	79.4	89.3	100.0	125

HACR circuit breaker in USA only 10/7/14

[1] - MCC, RLA, & LRA rating per compressor. Breaker & FLA sized for both compressors.

[2] - Equipment supplied with Class J fuses per minimum fuse size.

Compressor Protection Module

An electronic protection module is provided with compressors utilized in model size 150. This module will protect against phase reversal and phase loss at start-up. Protection is active for 5 seconds after the first second of compressor operation. In the event that either phase sequencing or phase loss has occurred the following blink sequence will display on the module.

In case of phase reverse error:



In case of phase loss error:



Antifreeze Correction

Catalog performance can be corrected for antifreeze use. Please use the following table and note the example given.

Antifreeze Type	Antifreeze % by wt	Heating		Cooling		Pressure Drop
		Load	Source	Load	Source	
EWT - °F [°C]		**90 [32.2]**	**30 [-1.1]**	**50 [10]**	**90 [32.2]**	**30 [-1.1]**
Water	0	1.000	1.000	1.000	1.000	1.000
Ethylene Glycol	10	0.991	0.973	0.975	0.991	1.075
	20	0.979	0.943	0.946	0.979	1.163
	30	0.965	0.917	0.920	0.965	1.225
	40	0.955	0.890	0.895	0.955	1.324
	50	0.943	0.865	0.870	0.943	1.419
Propylene Glycol	10	0.981	0.958	0.959	0.981	1.130
	20	0.969	0.913	0.919	0.969	1.270
	30	0.950	0.854	0.866	0.950	1.433
	40	0.937	0.813	0.829	0.937	1.614
	50	0.922	0.770	0.789	0.922	1.816
Ethanol	10	0.991	0.927	0.941	0.991	1.242
	20	0.972	0.887	0.901	0.972	1.343
	30	0.947	0.856	0.866	0.947	1.383
	40	0.930	0.815	0.826	0.930	1.523
	50	0.911	0.779	0.791	0.911	1.639
Methanol	10	0.986	0.957	0.961	0.986	1.127
	20	0.970	0.924	0.928	0.970	1.197
	30	0.951	0.895	0.897	0.951	1.235
	40	0.936	0.863	0.865	0.936	1.323
	50	0.920	0.833	0.835	0.920	1.399

WARNING: Gray area represents antifreeze concentrations greater than 35% by weight and should be avoided due to the extreme performance penalty they represent.

Reference Calculations

Heating Calculations:	Cooling Calculations:
$LWT = EWT - \frac{HE}{L/S \times 4.2^*}$	$LWT = EWT + \frac{HR}{L/S \times 4.2^*}$

NOTE: * When using water. Use 4.1 for 15% methanol/water or Environol solution.

Legend

ABBREVIATIONS AND DEFINITIONS:

COP = coefficient of performance
EER = cooling energy efficiency (TC/kW)
ELT = entering load fluid temperature
EST = entering source fluid temperature to heat pump
FLA = full load amps
FtHd = pressure drop in feet of head
gpm = US gallon per minute
HC = heating capacity in kW
HE = heat of extraction in kW
HR = heat rejected in kW
kPa = kilopascal
kW = kilowatt
L/s = liters per second
LLT = leaving load fluid temperature from heat pump
LRA = locked rotor amps (starting current)
LST = leaving source fluid temperature from heat pump
LWPD= load heat exchanger water pressure drop
MCC = maximum continuous current
PD = pressure drop
psi = pressure drop in pounds per square inch
P/T = Pressure/Temperature
RLA = run load amps
TC = total cooling capacity in kW
W = Watt

CONVERSIONS:

x°F = (*x* - 32)/1.8°C
1 bar = 100 kPa
1 gpm = 0.0631 L/s
1 US Gallon = 3.785412 L
1 Btu/h = 0.29037 W

Notes to Performance Data Tables

The following notes apply to all performance data tables:

- Three flow rates are shown for each unit. The lowest flow rate shown is used for geothermal open loop/well water systems with a minimum of 10°C EST. The middle flow rate shown is the minimum geothermal closed loop flow rate. The highest flow rate shown is optimum for geothermal closed loop systems and the suggested flow rate for boiler/tower applications.
- Water temperatures below 4.4°C assumes 15% antifreeze solution.
- Interpolation between ELT, EST, and GPM data is permissible.
- Operation in the gray areas is not recommended.

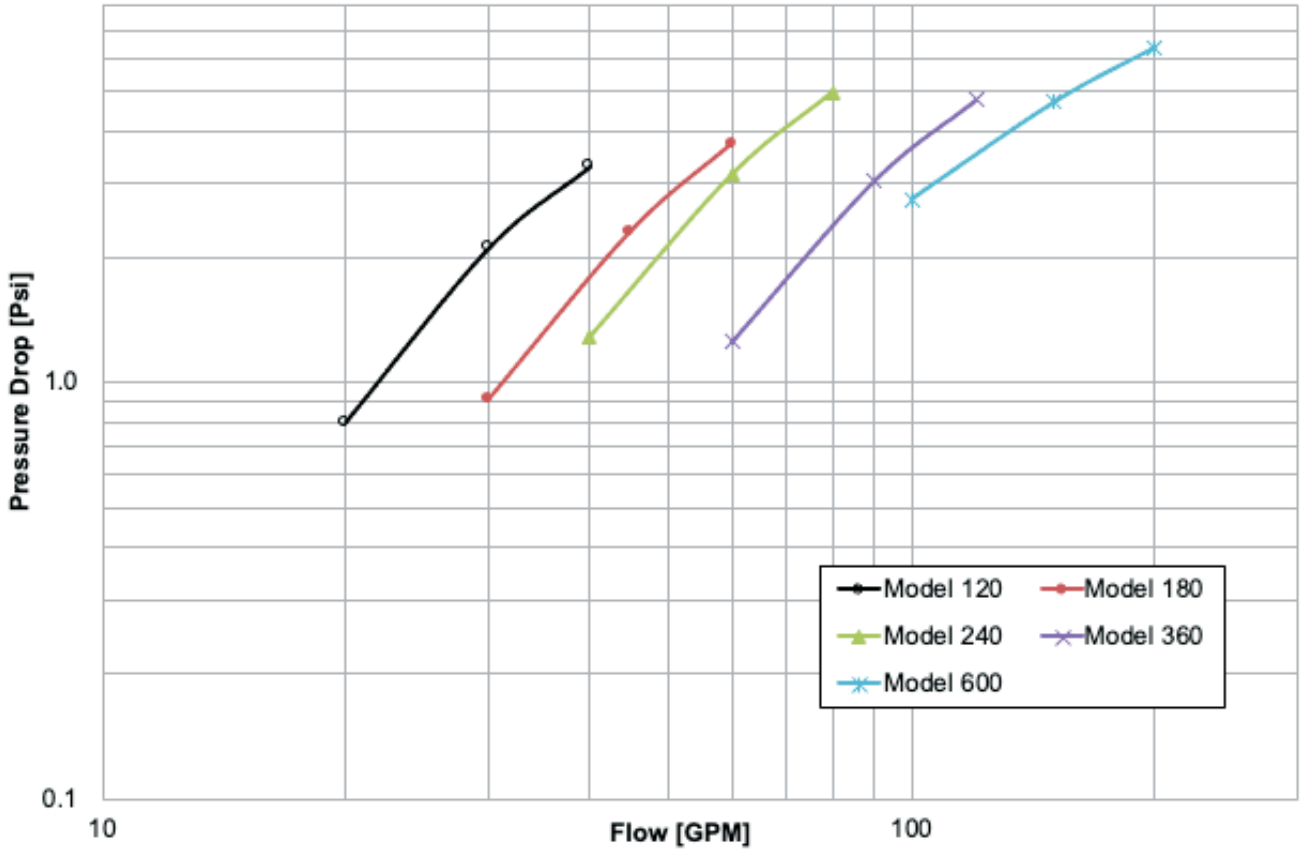
Pressure Drop

Model	L/s	Pressure Drop (kPa)				
		0°C	10°C	20°C	30°C	45°C
030	1.3	5.5	4.8	4.1	4.1	3.4
	1.9	14.5	13.1	12.4	11.7	10.3
	2.5	22.8	21.4	20.0	19.3	17.2
045	1.9	6.3	5.5	5.1	4.9	4.0
	2.8	15.9	14.8	13.8	13.4	12.4
	3.8	25.7	24.1	23.0	22.1	20.1
060	2.5	8.9	8.2	7.9	7.5	6.6
	3.8	21.7	20.7	20.0	19.3	17.9
	5.1	34.3	32.6	31.4	30.6	28.6
090	3.8	8.6	7.9	7.4	6.9	6.1
	5.7	21.0	20.0	19.3	18.6	16.5
	7.6	32.9	31.4	30.3	29.6	27.2
150	6.3	19.0	17.6	16.5	15.4	14.0
	9.5	32.4	31.0	30.3	27.8	26.8
	12.6	43.9	42.5	41.8	39.3	38.3

10/7/14

Pressure Drop cont.

Reversible Chiller
Water Pressure Drop vs. Flow at 30˚F



Note: Pressure drop is the same for load and source heat exchangers at 30°F [-1.1°C] fluid temperature.

030 Performance Data

030 - Heating Capacity Data

Source		ELT	Load Flow - 1.3 L/s						Load Flow - 1.9 L/s						Load Flow - 2.5 L/s					
EST ºC	Flow L/s	ºC	LLT ºC	HC kW	Power kW	HE kW	COP	LST ºC	LLT ºC	HC kW	Power kW	HE kW	COP	LST ºC	LLT ºC	HC kW	Power kW	HE kW	COP	LST ºC
0	1.9	15	20.7	31.3	5.9	25.4	5.3	-3.2	18.9	31.5	5.8	25.7	5.5	-3.2	18.0	31.6	5.6	26.0	5.7	-3.3
		25	30.5	29.9	8.0	21.9	3.7	-2.7	28.8	30.1	7.8	22.4	3.9	-2.8	27.9	30.3	7.5	22.8	4.0	-2.9
		40	45.2	28.6	10.1	18.5	2.8	-2.3	43.6	28.8	9.8	19.0	2.9	-2.4	42.8	29.1	9.5	19.6	3.1	-2.5
		50	55.0	27.2	12.2	15.0	2.2	-1.9	53.4	27.5	11.8	15.7	2.3	-2.0	52.7	27.8	11.4	16.4	2.4	-2.1
	2.5	15	20.9	32.5	6.0	26.5	5.4	-2.5	19.1	32.6	5.8	26.8	5.6	-2.6	18.1	32.7	5.6	27.1	5.8	-2.6
		25	30.6	30.8	8.0	22.8	3.8	-2.2	28.9	31.1	7.8	23.3	4.0	-2.2	28.0	31.3	7.5	23.7	4.1	-2.3
		40	45.4	29.2	10.1	19.1	2.9	-1.8	43.7	29.5	9.8	19.7	3.0	-1.9	42.8	29.9	9.5	20.4	3.2	-1.9
		50	55.1	27.6	12.2	15.4	2.3	-1.5	53.5	28.0	11.8	16.2	2.4	-1.5	52.7	28.4	11.4	17.0	2.5	-1.6
10	1.3	15	22.3	39.6	6.3	33.3	6.3	3.9	20.0	39.9	6.1	33.8	6.6	3.8	18.8	40.1	5.8	34.3	6.9	3.7
		25	31.9	37.7	8.4	29.4	4.5	4.6	29.8	38.1	8.1	30.0	4.7	4.5	28.7	38.4	7.7	30.6	5.0	4.4
		40	46.6	35.9	10.4	25.4	3.4	5.3	44.5	36.2	10.0	26.2	3.6	5.2	43.5	36.6	9.7	27.0	3.8	5.1
		50	56.2	34.0	12.5	21.5	2.7	6.1	54.3	34.4	12.0	22.4	2.9	5.9	53.3	34.9	11.6	23.3	3.0	5.7
	1.9	15	22.6	41.4	6.4	35.1	6.5	5.6	20.2	41.7	6.1	35.6	6.8	5.5	19.0	42.0	5.9	36.1	7.1	5.5
		25	32.2	39.2	8.4	30.8	4.7	6.1	30.0	39.6	8.1	31.5	4.9	6.1	28.8	40.0	7.8	32.2	5.1	6.0
		40	46.8	37.0	10.4	26.6	3.5	6.7	44.7	37.5	10.1	27.4	3.7	6.6	43.6	38.0	9.7	28.3	3.9	6.5
		50	56.4	34.8	12.5	22.3	2.8	7.2	54.4	35.4	12.0	23.3	2.9	7.1	53.4	36.0	11.6	24.4	3.1	6.9
	2.5	15	22.9	43.3	6.4	36.8	6.7	6.5	20.5	43.6	6.2	37.4	7.0	6.4	19.2	44.0	6.0	38.0	7.4	6.4
		25	32.5	40.7	8.5	32.2	4.8	6.9	30.2	41.2	8.1	33.0	5.1	6.9	29.0	41.7	7.8	33.8	5.3	6.8
		40	47.0	38.1	10.5	27.7	3.6	7.4	44.9	38.7	10.1	28.7	3.8	7.3	43.7	39.4	9.7	29.7	4.1	7.2
		50	56.5	35.6	12.5	23.1	2.8	7.8	54.6	36.3	12.0	24.3	3.0	7.7	53.5	37.0	11.6	25.5	3.2	7.6
20	1.3	15	24.0	49.0	6.7	42.3	7.3	12.2	21.2	49.4	6.4	43.0	7.7	12.1	19.7	49.8	6.1	43.7	8.1	12.0
		25	33.5	46.4	8.7	37.7	5.3	13.1	30.9	46.9	8.4	38.5	5.6	12.9	29.5	47.4	8.0	39.4	5.9	12.8
		40	48.0	43.8	10.8	33.1	4.1	13.9	45.6	44.4	10.3	34.1	4.3	13.8	44.3	44.9	9.8	35.1	4.6	13.6
		50	57.5	41.2	12.8	28.4	3.2	14.8	55.2	41.8	12.2	29.6	3.4	14.6	54.0	42.5	11.7	30.8	3.6	14.4
	1.9	15	24.4	51.5	6.8	44.7	7.6	14.4	21.5	52.0	6.5	45.5	8.0	14.3	20.0	52.5	6.2	46.3	8.4	14.2
		25	33.9	48.5	8.8	39.7	5.5	15.0	31.2	49.1	8.4	40.7	5.8	14.9	29.7	49.7	8.1	41.6	6.2	14.8
		40	48.3	45.4	10.8	34.7	4.2	15.7	45.8	46.2	10.3	35.8	4.5	15.5	44.5	46.9	9.9	37.0	4.7	15.4
		50	57.8	42.4	12.8	29.6	3.3	16.3	55.4	43.2	12.2	31.0	3.5	16.1	54.2	44.1	11.7	32.4	3.8	15.9
	2.5	15	24.9	54.0	6.9	47.1	7.8	15.5	21.8	54.6	6.6	48.0	8.2	15.4	20.3	55.2	6.3	48.8	8.7	15.3
		25	34.3	50.6	8.9	41.7	5.7	16.0	31.4	51.3	8.5	42.8	6.0	15.9	30.0	52.0	8.1	43.9	6.4	15.8
		40	48.6	47.1	10.8	36.3	4.3	16.5	46.0	48.0	10.4	37.6	4.6	16.4	44.7	48.8	9.9	38.9	4.9	16.3
		50	58.0	43.6	12.8	30.8	3.4	17.1	55.6	44.6	12.2	32.4	3.6	16.9	54.3	45.7	11.7	34.0	3.9	16.8
30	1.3	15	25.7	58.5	7.1	51.4	8.2	20.6	22.4	59.0	6.8	52.2	8.7	20.4	20.7	59.5	6.4	53.1	9.2	20.3
		25	35.1	55.1	9.1	46.0	6.1	21.6	32.0	55.7	8.7	47.1	6.4	21.4	30.4	56.4	8.2	48.1	6.9	21.2
		40	Operation not recommended.																	
		50																		
	1.9	15	26.3	61.6	7.2	54.4	8.5	23.2	22.8	62.3	6.9	55.4	9.0	23.1	21.0	62.9	6.6	56.4	9.6	22.9
		25	35.6	57.8	9.2	48.6	6.3	23.9	32.3	58.6	8.8	49.8	6.7	23.8	30.7	59.4	8.3	51.1	7.1	23.6
		40	Operation not recommended.																	
		50																		
	2.5	15	26.9	64.8	7.4	57.4	8.8	24.5	23.2	65.6	7.0	58.6	9.3	24.4	21.3	66.4	6.7	59.7	9.9	24.3
		25	36.1	60.4	9.3	51.1	6.5	25.1	32.7	61.4	8.8	52.6	6.9	25.0	30.9	62.4	8.4	54.0	7.4	24.9
		40	Operation not recommended.																	
		50																		

Note: Operation in shaded areas require special attention to ensure adequate water temperature and flow rates are maintained. Operation outside the limits could result in lockout.

10/7/14

030 Performance Data cont.

030 - Cooling Capacity Data

Source		ELT	Load Flow - 1.3 L/s						Load Flow - 1.9 L/s						Load Flow - 2.5 L/s					
EST ºC	Flow L/s	ºC	LLT ºC	TC kW	Power kW	HR kW	EER	LST ºC	LLT ºC	TC kW	Power kW	HR kW	EER	LST ºC	LLT ºC	TC kW	Power kW	HR kW	EER	LST ºC
10	1.3	10	3.7	34.3	5.3	39.6	22.2	17.3	5.5	36.1	5.6	41.7	22.2	17.6	6.4	37.9	5.8	43.7	22.2	18.0
		20	11.7	45.4	5.7	51.1	27.0	19.4	14.3	45.7	5.9	51.7	26.3	19.5	15.6	46.1	6.2	52.2	25.5	19.6
		30	19.7	56.4	6.2	62.6	31.2	21.5	23.1	55.3	6.3	61.7	29.8	21.3	24.8	54.3	6.5	60.8	28.6	21.1
	1.9	10	3.7	34.4	5.3	39.7	22.1	15.0	5.4	36.3	5.4	41.7	23.0	15.2	6.4	38.2	5.5	43.7	23.8	15.5
		20	12.1	43.2	5.6	48.8	26.1	16.1	14.4	44.9	5.7	50.6	26.8	16.3	15.6	46.5	5.8	52.3	27.5	16.6
		30	20.5	52.0	6.0	57.9	29.8	17.3	23.3	53.4	6.0	59.4	30.3	17.4	24.8	54.8	6.1	60.9	30.9	17.6
	2.5	10	3.7	34.5	5.4	39.8	22.0	13.8	5.4	36.5	5.2	41.8	23.8	14.0	6.3	38.6	5.1	43.7	25.8	14.2
		20	12.5	41.0	5.5	46.5	25.2	14.4	14.5	44.0	5.5	49.4	27.5	14.7	15.5	47.0	5.4	52.4	29.8	15.0
		30	21.3	47.5	5.7	53.2	28.3	15.1	23.6	51.4	5.7	57.1	30.9	15.4	24.7	55.4	5.6	61.0	33.5	15.8
20	1.3	10	4.2	31.7	6.6	38.2	16.5	27.0	5.9	33.1	6.9	40.0	16.3	27.3	6.7	34.6	7.3	41.9	16.2	27.7
		20	12.1	43.4	7.1	50.5	20.9	29.2	14.5	43.5	7.4	50.9	20.1	29.3	15.8	43.7	7.7	51.4	19.3	29.4
		30	19.9	55.1	7.6	62.7	24.7	31.5	23.2	54.0	7.9	61.8	23.4	31.3	25.0	52.8	8.1	60.9	22.2	31.2
	1.9	10	4.2	31.5	6.7	38.2	16.1	24.8	5.8	33.3	6.7	40.0	16.9	25.0	6.7	35.1	6.8	41.8	17.7	25.2
		20	12.4	41.3	7.0	48.4	20.0	26.1	14.6	43.4	7.1	50.5	20.8	26.3	15.7	45.4	7.2	52.6	21.6	26.6
		30	20.6	51.1	7.4	58.5	23.5	27.3	23.3	53.4	7.5	60.9	24.3	27.6	24.7	55.7	7.6	63.3	25.1	27.9
	2.5	10	4.2	31.4	6.8	38.2	15.8	23.6	5.8	33.5	6.5	40.0	17.6	23.8	6.6	35.6	6.2	41.8	19.5	24.0
		20	12.8	39.2	7.0	46.2	19.1	24.4	14.6	43.2	6.8	50.0	21.6	24.8	15.5	47.1	6.6	53.8	24.3	25.1
		30	21.4	47.1	7.2	54.3	22.2	25.2	23.4	52.9	7.1	60.0	25.3	25.7	24.4	58.7	7.0	65.7	28.5	26.3
30	1.3	10	4.7	29.0	8.1	37.2	12.2	36.8	6.1	31.3	7.8	39.0	13.7	37.1	6.8	33.5	7.4	40.9	15.5	37.5
		20	12.7	39.7	8.6	48.3	15.7	38.8	14.8	41.9	8.2	50.1	17.4	39.2	15.8	44.1	7.8	51.9	19.3	39.5
		30	Operation not recommended.																	
	1.9	10	4.7	28.7	8.2	36.9	12.0	34.6	6.2	30.0	8.4	38.4	12.3	34.8	7.0	31.3	8.5	39.9	12.5	35.0
		20	12.9	38.6	8.5	47.1	15.4	35.9	15.0	39.8	8.7	48.6	15.6	36.1	16.1	41.1	8.9	50.0	15.7	36.3
		30	Operation not recommended.																	
	2.5	10	4.8	28.3	8.2	36.6	11.8	33.5	6.2	30.3	8.0	38.3	13.0	33.7	6.9	32.3	7.8	40.1	14.2	33.8
		20	13.1	37.5	8.5	45.9	15.1	34.4	14.9	41.1	8.3	49.4	16.8	34.7	15.7	44.7	8.2	52.9	18.6	35.0
		30	Operation not recommended.																	
45	1.3	10	5.4	25.0	10.1	35.2	8.4	51.4	6.7	26.5	10.2	36.6	8.9	51.7	7.3	27.9	10.2	38.1	9.3	52.0
		20	13.6	35.2	10.6	45.8	11.3	53.4	15.4	37.0	10.7	47.7	11.8	53.7	16.3	38.9	10.8	49.7	12.3	54.1
		30	Operation not recommended.																	
	1.9	10	5.4	25.2	9.9	35.0	8.7	49.4	6.7	26.6	9.9	36.5	9.1	49.6	7.3	28.0	10.0	38.0	9.6	49.8
		20	13.5	35.5	10.3	45.7	11.8	50.7	15.3	37.3	10.4	47.6	12.3	51.0	16.3	39.1	10.4	49.5	12.8	51.2
		30	Operation not recommended.																	
	2.5	10	5.4	25.3	9.6	34.9	9.0	48.3	6.7	26.7	9.7	36.4	9.4	48.5	7.3	28.1	9.7	37.8	9.8	48.6
		20	13.5	35.7	9.9	45.7	12.3	49.3	15.3	37.5	10.0	47.5	12.8	49.5	16.3	39.2	10.1	49.3	13.3	49.7
		30	Operation not recommended.																	

10/7/14

Note: Operation in shaded areas require special attention to ensure adequate water temperature and flow rates are maintained. Operation outside the limits could result in lockout.

045 Performance Data

045 - Heating Capacity Data

Source		ELT	Load Flow - 1.9 L/s						Load Flow - 2.8 L/s						Load Flow - 3.8 L/s					
EST ºC	Flow L/s	ºC	LLT ºC	HC kW	Power kW	HE kW	COP	LST ºC	LLT ºC	HC kW	Power kW	HE kW	COP	LST ºC	LLT ºC	HC kW	Power kW	HE kW	COP	LST ºC
0	2.8	15	20.6	44.9	8.3	36.6	5.4	-3.1	18.9	45.3	8.1	37.2	5.6	-3.2	17.9	45.7	7.9	37.8	5.8	-3.2
		25	30.4	43.2	10.8	32.4	4.0	-2.8	28.7	43.7	10.5	33.2	4.2	-2.8	27.8	44.1	10.2	33.9	4.3	-2.9
		40	45.2	41.4	13.2	28.2	3.1	-2.4	43.6	42.0	12.9	29.1	3.3	-2.5	42.7	42.5	12.5	30.0	3.4	-2.6
		50	55.0	39.7	15.7	24.0	2.5	-2.0	53.4	40.3	15.3	25.0	2.6	-2.1	52.6	40.9	14.8	26.1	2.8	-2.2
	3.8	15	20.8	46.4	8.4	38.0	5.5	-2.4	19.0	46.8	8.2	38.7	5.7	-2.4	18.0	47.2	7.9	39.3	5.9	-2.5
		25	30.6	44.4	10.8	33.6	4.1	-2.1	28.8	44.9	10.5	34.4	4.3	-2.2	27.8	45.4	10.2	35.2	4.4	-2.2
		40	45.3	42.4	13.3	29.1	3.2	-1.8	43.7	43.0	12.9	30.1	3.3	-1.9	42.7	43.6	12.6	31.0	3.5	-1.9
		50	55.1	40.4	15.7	24.7	2.6	-1.5	53.5	41.1	15.3	25.8	2.7	-1.6	52.6	41.8	14.9	26.9	2.8	-1.7
10	1.9	15	21.9	55.3	8.8	46.5	6.3	4.2	19.7	55.8	8.5	47.2	6.5	4.1	18.5	56.3	8.3	48.0	6.8	4.0
		25	31.6	52.9	11.3	41.7	4.7	4.8	29.6	53.5	10.9	42.6	4.9	4.7	28.4	54.1	10.6	43.5	5.1	4.6
		40	46.3	50.6	13.7	36.9	3.7	5.4	44.4	51.2	13.3	37.9	3.8	5.2	43.3	51.9	12.9	39.0	4.0	5.1
		50	56.0	48.2	16.2	32.1	3.0	6.0	54.2	49.0	15.7	33.3	3.1	5.8	53.1	49.7	15.2	34.5	3.3	5.7
	2.8	15	22.2	57.7	8.9	48.7	6.5	5.9	19.9	58.2	8.6	49.5	6.7	5.8	18.7	58.7	8.4	50.3	7.0	5.7
		25	31.9	55.1	11.4	43.7	4.8	6.3	29.7	55.7	11.0	44.6	5.0	6.2	28.5	56.2	10.7	45.6	5.3	6.1
		40	46.6	52.5	13.9	38.6	3.8	6.7	44.5	53.2	13.4	39.7	4.0	6.6	43.4	53.8	13.0	40.8	4.1	6.5
		50	56.3	49.9	16.3	33.5	3.1	7.1	54.3	50.7	15.8	34.8	3.2	7.0	53.2	51.4	15.3	36.1	3.4	6.9
	3.8	15	22.5	60.0	9.0	51.0	6.7	6.8	20.1	60.5	8.7	51.8	6.9	6.8	18.8	61.0	8.4	52.6	7.2	6.7
		25	32.2	57.2	11.5	45.7	5.0	7.1	29.9	57.8	11.1	46.7	5.2	7.1	28.7	58.4	10.8	47.6	5.4	7.0
		40	46.8	54.3	14.0	40.4	3.9	7.5	44.7	55.1	13.5	41.5	4.1	7.4	43.5	55.8	13.1	42.7	4.3	7.3
		50	56.5	51.5	16.5	35.0	3.1	7.8	54.5	52.3	16.0	36.4	3.3	7.7	53.3	53.2	15.4	37.7	3.4	7.6
20	1.9	15	23.4	67.1	9.4	57.8	7.2	12.8	20.8	67.7	9.0	58.7	7.5	12.6	19.3	68.4	8.7	59.6	7.8	12.5
		25	33.0	63.9	11.8	52.1	5.4	13.5	30.5	64.6	11.4	53.2	5.7	13.3	29.1	65.3	11.0	54.3	5.9	13.2
		40	47.6	60.8	14.3	46.5	4.3	14.2	45.2	61.5	13.8	47.8	4.5	14.0	43.9	62.3	13.3	49.0	4.7	13.9
		50	57.2	57.6	16.7	40.9	3.4	14.9	55.0	58.5	16.2	42.3	3.6	14.7	53.7	59.3	15.6	43.7	3.8	14.5
	2.8	15	23.8	70.4	9.5	60.9	7.4	14.8	21.0	71.0	9.2	61.8	7.7	14.7	19.5	71.6	8.8	62.8	8.1	14.7
		25	33.4	66.9	12.0	54.9	5.6	15.3	30.8	67.7	11.6	56.1	5.8	15.2	29.3	68.4	11.2	57.2	6.1	15.1
		40	48.0	63.5	14.5	49.0	4.4	15.8	45.5	64.3	14.0	50.4	4.6	15.7	44.1	65.2	13.5	51.7	4.8	15.6
		50	57.5	60.1	17.0	43.1	3.5	16.3	55.2	61.0	16.4	44.6	3.7	16.2	53.9	62.0	15.8	46.2	3.9	16.1
	3.8	15	24.2	73.6	9.7	64.0	7.6	16.0	21.3	74.2	9.3	64.9	8.0	15.9	19.7	74.8	9.0	65.9	8.4	15.9
		25	33.8	69.9	12.2	57.8	5.7	16.4	31.0	70.7	11.7	58.9	6.0	16.3	29.5	71.4	11.3	60.1	6.3	16.2
		40	48.3	66.3	14.7	51.6	4.5	16.8	45.7	67.1	14.2	53.0	4.7	16.7	44.3	68.0	13.7	54.3	5.0	16.6
		50	57.8	62.6	17.2	45.4	3.6	17.2	55.4	63.6	16.6	47.0	3.8	17.1	54.0	64.6	16.0	48.6	4.0	17.0
30	1.9	15	24.9	78.9	9.9	69.0	8.0	21.4	21.8	79.7	9.5	70.2	8.4	21.2	20.0	80.4	9.1	71.3	8.8	21.1
		25	34.4	74.9	12.3	62.6	6.1	22.2	31.4	75.8	11.9	63.9	6.4	22.0	29.8	76.6	11.4	65.2	6.7	21.8
		40	Operation not recommended.																	
		50																		
	2.8	15	25.4	83.1	10.1	73.0	8.2	23.8	22.1	83.8	9.7	74.1	8.6	23.7	20.3	84.5	9.3	75.2	9.1	23.6
		25	34.9	78.8	12.6	66.2	6.3	24.4	31.8	79.7	12.1	67.5	6.6	24.3	30.0	80.5	11.6	68.9	6.9	24.1
		40	Operation not recommended.																	
		50																		
	3.8	15	25.9	87.2	10.3	76.9	8.5	25.2	22.5	87.9	9.9	78.0	8.9	25.1	20.6	88.6	9.5	79.2	9.4	25.0
		25	35.4	82.7	12.9	69.8	6.4	25.6	32.1	83.6	12.4	71.2	6.8	25.5	30.3	84.4	11.8	72.6	7.1	25.5
		40	Operation not recommended.																	
		50																		

Note: Operation in shaded areas require special attention to ensure adequate water temperature and flow rates are maintained. Operation outside the limits could result in lockout.

10/7/14

045 Performance Data cont.

045 - Cooling Capacity Data

Source		ELT ºC	Load Flow - 1.9 L/s						Load Flow - 2.8 L/s						Load Flow - 3.8 L/s					
EST ºC	Flow L/s		LLT ºC	TC kW	Power kW	HR kW	EER	LST ºC	LLT ºC	TC kW	Power kW	HR kW	EER	LST ºC	LLT ºC	TC kW	Power kW	HR kW	EER	LST ºC
10	1.9	10	3.9	49.0	7.7	56.7	21.7	17.1	5.7	51.1	7.8	58.9	22.5	17.4	6.7	53.2	7.8	61.0	23.2	17.6
		20	12.0	63.6	8.3	71.9	26.1	19.0	14.4	66.2	8.4	74.5	27.0	19.3	15.7	68.8	8.4	77.2	28.0	19.7
		30	20.2	78.1	8.9	87.0	30.0	20.9	23.1	81.3	8.9	90.2	31.0	21.3	24.7	84.5	9.0	93.5	32.1	21.7
	2.8	10	3.8	49.9	7.6	57.5	22.4	14.9	5.6	52.0	7.6	59.7	23.3	15.1	6.6	54.2	7.7	61.9	24.1	15.3
		20	11.9	64.5	8.0	72.5	27.4	16.2	14.4	65.9	8.1	74.0	27.8	16.3	15.8	67.3	8.1	75.5	28.3	16.4
		30	20.1	79.2	8.5	87.6	31.8	17.5	23.2	79.8	8.5	88.4	31.9	17.5	25.0	80.5	8.6	89.1	32.0	17.6
	3.8	10	3.6	50.7	7.5	58.2	23.2	13.6	5.5	53.0	7.5	60.5	24.1	13.8	6.5	55.2	7.5	62.7	25.0	13.9
		20	11.8	65.5	7.8	73.2	28.7	14.6	14.4	65.7	7.8	73.5	28.7	14.6	15.9	65.8	7.9	73.7	28.6	14.6
		30	19.9	80.2	8.1	88.3	33.9	15.5	23.3	78.3	8.1	86.5	32.9	15.4	25.2	76.5	8.2	84.7	31.8	15.3
20	1.9	10	4.3	45.5	9.2	54.7	16.8	26.9	6.0	47.3	9.3	56.6	17.4	27.1	6.9	49.1	9.3	58.4	17.9	27.3
		20	12.2	62.2	10.0	72.2	21.1	29.0	14.6	63.4	10.1	73.6	21.4	29.2	15.9	64.7	10.2	74.9	21.6	29.4
		30	20.1	78.8	10.9	89.7	24.8	31.2	23.2	79.6	11.0	90.5	24.7	31.3	25.0	80.3	11.1	91.4	24.7	31.5
	2.8	10	4.2	46.3	9.0	55.3	17.5	24.7	5.9	48.1	9.1	57.2	18.1	24.9	6.9	50.0	9.1	59.1	18.7	25.0
		20	12.1	63.2	9.7	73.0	22.2	26.2	14.5	64.6	9.8	74.4	22.5	26.3	15.9	65.9	9.9	75.7	22.8	26.4
		30	19.9	80.2	10.4	90.6	26.2	27.7	23.1	81.0	10.5	91.5	26.3	27.8	24.9	81.8	10.6	92.3	26.3	27.9
	3.8	10	4.1	47.1	8.8	55.9	18.2	23.5	5.8	49.0	8.9	57.9	18.8	23.6	6.8	50.9	8.9	59.8	19.5	23.7
		20	11.9	64.3	9.4	73.8	23.3	24.6	14.4	65.7	9.5	75.2	23.7	24.7	15.8	67.0	9.5	76.5	24.1	24.8
		30	19.8	81.6	10.0	91.6	27.8	25.7	23.0	82.4	10.0	92.4	28.0	25.8	24.8	83.2	10.1	93.3	28.2	25.8
30	1.9	10	4.8	41.2	11.5	52.7	12.2	36.6	6.4	42.8	11.6	54.5	12.6	36.8	7.2	44.5	11.7	56.2	13.0	37.0
		20	13.0	56.1	12.4	68.5	15.5	38.6	15.1	58.0	12.5	70.5	15.8	38.8	16.2	59.9	12.6	72.5	16.2	39.1
		30	Operation not recommended.																	
	2.8	10	4.8	41.6	11.3	52.9	12.6	34.5	6.3	43.3	11.4	54.7	13.0	34.6	7.2	45.0	11.4	56.5	13.5	34.8
		20	12.9	56.9	12.0	68.9	16.1	35.9	15.0	58.8	12.1	71.0	16.6	36.0	16.2	60.8	12.2	73.0	17.0	36.2
		30	Operation not recommended.																	
	3.8	10	4.7	42.0	11.0	53.1	13.0	33.3	6.3	43.8	11.1	54.9	13.5	33.4	7.1	45.6	11.1	56.7	14.0	33.6
		20	12.8	57.7	11.7	69.4	16.9	34.3	14.9	59.7	11.7	71.4	17.4	34.5	16.1	61.7	11.8	73.5	17.9	34.6
		30	Operation not recommended.																	
45	1.9	10	5.4	36.8	13.8	50.7	9.1	51.3	6.7	38.4	13.9	52.3	9.4	51.6	7.5	40.0	14.0	54.0	9.7	51.8
		20	13.7	50.0	14.7	64.8	11.6	53.1	15.5	52.6	14.9	67.4	12.1	53.5	16.5	55.1	15.0	70.1	12.5	53.8
		30	Operation not recommended.																	
	2.8	10	5.4	36.9	13.5	50.4	9.3	49.3	6.7	38.5	13.6	52.1	9.6	49.4	7.5	40.1	13.7	53.8	10.0	49.6
		20	13.7	50.5	14.3	64.9	12.1	50.5	15.5	53.1	14.4	67.6	12.6	50.7	16.5	55.7	14.6	70.3	13.1	51.0
		30	Operation not recommended.																	
	3.8	10	5.4	37.0	13.2	50.2	9.5	48.1	6.7	38.6	13.3	51.9	9.9	48.3	7.5	40.3	13.4	53.6	10.3	48.4
		20	13.6	51.1	13.9	65.0	12.5	49.1	15.4	53.7	14.0	67.7	13.1	49.2	16.5	56.3	14.1	70.4	13.7	49.4
		30	Operation not recommended.																	

Note: Operation in shaded areas require special attention to ensure adequate water temperature and flow rates are maintained. Operation outside the limits could result in lockout.

10/7/2014

060 Performance Data

060 - Heating Capacity Data

Source		ELT ºC	Load Flow - 2.5 L/s						Load Flow - 3.8 L/s						Load Flow - 5.1 L/s					
EST ºC	Flow L/s		LLT ºC	HC kW	Power kW	HE kW	COP	LST ºC	LLT ºC	HC kW	Power kW	HE kW	COP	LST ºC	LLT ºC	HC kW	Power kW	HE kW	COP	LST ºC
0	3.8	15	20.5	57.4	9.9	47.5	5.8	-3.0	18.6	57.5	9.7	47.8	5.9	-3.0	17.7	57.6	9.5	48.2	6.1	-3.0
		25	30.2	54.3	13.2	41.0	4.1	-2.6	28.4	54.8	13.2	41.6	4.1	-2.6	27.6	55.3	13.2	42.1	4.2	-2.6
		40	44.9	51.2	16.6	34.6	3.1	-2.2	43.3	52.1	16.8	35.3	3.1	-2.2	42.5	53.0	17.0	36.0	3.1	-2.3
		50	54.6	48.0	19.9	28.1	2.4	-1.8	53.1	49.3	20.4	29.0	2.4	-1.8	52.4	50.6	20.8	29.8	2.4	-1.9
	5.1	15	20.7	60.1	9.9	50.3	6.1	-2.3	18.8	60.2	9.7	50.5	6.2	-2.4	17.8	60.3	9.6	50.8	6.3	-2.4
		25	30.3	55.6	12.9	42.7	4.3	-2.0	28.6	56.7	12.9	43.8	4.4	-2.0	27.7	57.7	13.0	44.8	4.4	-2.1
		40	44.9	51.2	15.9	35.2	3.2	-1.6	43.3	53.1	16.2	37.0	3.3	-1.7	42.6	55.1	16.4	38.8	3.4	-1.8
		50	54.4	46.7	19.0	27.7	2.5	-1.3	53.1	49.6	19.4	30.2	2.6	-1.4	52.5	52.5	19.8	32.7	2.7	-1.5
10	2.5	15	21.8	70.9	11.1	59.9	6.4	4.3	19.5	71.2	10.7	60.5	6.6	4.2	18.3	71.5	10.4	61.2	6.9	4.2
		25	31.5	68.4	14.9	53.6	4.6	4.9	29.3	69.0	14.8	54.2	4.7	4.8	28.2	69.6	14.7	54.9	4.7	4.8
		40	46.3	66.0	18.6	47.3	3.5	5.5	44.2	66.8	18.8	48.0	3.6	5.4	43.2	67.6	18.9	48.7	3.6	5.4
		50	56.0	63.5	22.4	41.0	2.8	6.1	54.0	64.6	22.8	41.7	2.8	6.0	53.1	65.6	23.2	42.4	2.8	6.0
	3.8	15	22.1	74.2	11.2	63.0	6.6	6.1	19.7	74.6	10.8	63.7	6.9	6.0	18.5	75.0	10.5	64.4	7.1	6.0
		25	31.7	70.4	14.5	55.9	4.8	6.5	29.5	71.4	14.5	57.0	4.9	6.4	28.4	72.4	14.4	58.1	5.0	6.4
		40	46.3	66.6	17.9	48.7	3.7	6.9	44.3	68.3	18.1	50.2	3.8	6.9	43.3	69.9	18.2	51.7	3.8	6.8
		50	56.0	62.9	21.3	41.6	3.0	7.4	54.1	65.1	21.7	43.5	3.0	7.3	53.1	67.4	22.0	45.3	3.1	7.2
	5.1	15	22.4	77.5	11.3	66.2	6.9	6.9	19.9	77.9	11.0	67.0	7.1	6.9	18.7	78.4	10.7	67.7	7.3	6.8
		25	31.9	72.4	14.2	58.2	5.1	7.3	29.6	73.8	14.1	59.7	5.2	7.2	28.5	75.3	14.1	61.2	5.3	7.1
		40	46.4	67.3	17.2	50.1	3.9	7.7	44.4	69.8	17.3	52.4	4.0	7.6	43.4	72.2	17.5	54.7	4.1	7.4
		50	55.9	62.2	20.1	42.1	3.1	8.0	54.1	65.7	20.5	45.2	3.2	7.9	53.2	69.1	20.9	48.2	3.3	7.7
20	2.5	15	23.3	87.1	12.2	74.9	7.1	12.9	20.5	87.6	11.8	75.8	7.4	12.8	19.1	88.1	11.4	76.7	7.7	12.7
		25	33.0	83.9	16.1	67.8	5.2	13.5	30.3	85.1	16.0	69.1	5.3	13.4	29.0	86.3	15.8	70.5	5.5	13.3
		40	47.7	80.8	20.1	60.7	4.0	14.2	45.2	82.6	20.1	62.4	4.1	14.1	43.9	84.4	20.2	64.2	4.2	13.9
		50	57.4	77.6	24.0	53.6	3.2	14.9	55.0	80.1	24.3	55.8	3.3	14.7	53.9	82.6	24.6	57.9	3.3	14.5
	3.8	15	23.7	91.0	12.4	78.5	7.3	15.1	20.7	91.6	12.0	79.6	7.6	15.0	19.3	92.3	11.6	80.7	8.0	14.9
		25	33.2	86.5	15.8	70.7	5.5	15.6	30.5	88.1	15.7	72.4	5.6	15.5	29.2	89.6	15.5	74.1	5.8	15.4
		40	47.8	82.1	19.2	62.9	4.3	16.1	45.3	84.5	19.3	65.2	4.4	15.9	44.1	86.8	19.4	67.4	4.5	15.8
		50	57.4	77.7	22.6	55.1	3.4	16.6	55.1	80.9	23.0	57.9	3.5	16.4	53.9	84.1	23.3	60.8	3.6	16.2
	5.1	15	24.0	94.8	12.7	82.1	7.5	16.2	21.0	95.6	12.2	83.4	7.8	16.1	19.5	96.5	11.8	84.7	8.2	16.0
		25	33.5	89.1	15.5	73.6	5.7	16.6	30.7	91.0	15.4	75.6	5.9	16.5	29.3	92.9	15.2	77.7	6.1	16.4
		40	47.9	83.4	18.4	65.1	4.5	17.0	45.4	86.4	18.5	67.9	4.7	16.8	44.2	89.3	18.6	70.7	4.8	16.7
		50	57.4	77.8	21.2	56.5	3.7	17.4	55.1	81.7	21.6	60.1	3.8	17.2	54.0	85.7	22.0	63.7	3.9	17.0
30	2.5	15	24.8	103.4	13.3	90.0	7.8	21.4	21.5	104.0	12.9	91.2	8.1	21.3	19.9	104.7	12.4	92.3	8.5	21.2
		25	34.5	99.5	17.4	82.1	5.7	22.2	31.3	101.2	17.2	84.0	5.9	22.0	29.8	102.9	16.9	86.0	6.1	21.8
		40	Operation not recommended.																	
		50																		
	3.8	15	25.3	107.7	13.7	94.1	7.9	24.1	21.8	108.7	13.2	95.5	8.3	24.0	20.1	109.6	12.6	97.0	8.7	23.9
		25	34.8	102.7	17.1	85.5	6.0	24.6	31.6	104.7	16.9	87.8	6.2	24.5	30.0	106.7	16.6	90.1	6.4	24.4
		40	Operation not recommended.																	
		50																		
	5.1	15	25.7	112.1	14.1	98.1	8.0	25.4	22.1	113.3	13.5	99.9	8.4	25.3	20.3	114.6	12.9	101.7	8.9	25.3
		25	35.1	105.9	16.8	89.0	6.3	25.8	31.8	108.2	16.6	91.6	6.5	25.7	30.2	110.5	16.3	94.2	6.8	25.6
		40	Operation not recommended.																	
		50																		

Note: Operation in shaded areas require special attention to ensure adequate water temperature and flow rates are maintained. Operation outside the limits could result in lockout.

10/7/14

060 Performance Data cont.

060 - Cooling Capacity Data

Source		ELT ºC	Load Flow - 2.5 L/s						Load Flow - 3.8 L/s						Load Flow - 5.1 L/s					
EST ºC	Flow L/s		LLT ºC	TC kW	Power kW	HR kW	EER	LST ºC	LLT ºC	TC kW	Power kW	HR kW	EER	LST ºC	LLT ºC	TC kW	Power kW	HR kW	EER	LST ºC
10	2.5	10	3.7	65.8	9.9	75.7	22.8	17.2	5.7	69.3	10.0	79.3	23.6	17.6	6.6	72.8	10.2	82.9	24.4	17.9
		20	12.2	81.7	10.8	92.5	25.9	18.8	14.7	83.9	10.9	94.8	26.2	19.0	16.0	86.0	11.0	97.0	26.6	19.2
		30	20.7	97.7	11.7	109.3	28.5	20.4	23.8	98.4	11.8	110.2	28.5	20.5	25.4	99.2	11.9	111.1	28.4	20.6
	3.8	10	3.7	65.8	9.7	75.5	23.2	14.7	5.7	69.2	9.8	79.0	24.0	15.0	6.6	72.6	10.0	82.6	24.8	15.2
		20	12.4	79.7	10.4	90.1	26.0	15.6	14.9	81.7	10.6	92.3	26.3	15.8	16.1	83.7	10.7	94.4	26.6	15.9
		30	21.1	93.5	11.2	104.7	28.5	16.6	24.1	94.2	11.3	105.5	28.3	16.6	25.6	94.8	11.5	106.3	28.2	16.7
	5.1	10	3.7	65.8	9.5	75.3	23.7	13.5	5.7	69.1	9.7	78.8	24.4	13.7	6.6	72.4	9.8	82.2	25.1	13.8
		20	12.6	77.6	10.1	87.7	26.2	14.1	15.0	79.5	10.3	89.8	26.4	14.2	16.2	81.4	10.4	91.8	26.7	14.3
		30	21.5	89.4	10.8	100.1	28.4	14.7	24.4	89.9	10.9	100.8	28.2	14.7	25.8	90.4	11.0	101.4	28.0	14.7
20	2.5	10	4.3	59.8	12.5	72.3	16.3	26.9	6.1	62.8	12.6	75.5	17.0	27.2	6.9	65.8	12.8	78.6	17.6	27.5
		20	12.7	77.0	13.5	90.5	19.4	28.6	15.0	79.3	13.7	93.0	19.8	28.9	16.2	81.7	13.9	95.6	20.1	29.1
		30	21.0	94.2	14.5	108.7	22.1	30.4	24.0	95.8	14.8	110.6	22.2	30.5	25.4	97.5	15.0	112.5	22.2	30.7
	3.8	10	4.3	59.8	12.2	72.1	16.7	24.5	6.1	62.8	12.4	75.2	17.3	24.7	6.9	65.7	12.5	78.3	17.9	24.9
		20	12.8	75.8	13.1	88.9	19.8	25.6	15.1	78.1	13.3	91.4	20.1	25.7	16.2	80.4	13.5	93.8	20.4	25.9
		30	21.3	91.8	14.0	105.8	22.5	26.6	24.1	93.4	14.2	107.6	22.5	26.7	25.6	95.0	14.4	109.4	22.5	26.9
	5.1	10	4.3	59.9	12.0	71.8	17.1	23.4	6.1	62.8	12.1	74.9	17.7	23.5	6.9	65.6	12.3	77.9	18.3	23.6
		20	12.9	74.7	12.7	87.3	20.1	24.1	15.2	76.9	12.9	89.7	20.4	24.2	16.3	79.1	13.0	92.1	20.7	24.3
		30	21.5	89.4	13.4	102.8	22.8	24.8	24.3	91.0	13.6	104.6	22.8	24.9	25.7	92.5	13.8	106.3	22.9	25.0
30	2.5	10	4.9	53.8	15.2	69.0	12.1	36.6	6.5	56.4	15.3	71.6	12.6	36.8	7.2	58.9	15.4	74.3	13.0	37.1
		20	13.1	72.3	16.3	88.5	15.2	38.4	15.3	74.8	16.5	91.3	15.5	38.7	16.4	77.4	16.7	94.1	15.8	39.0
		30																		
	3.8	10	4.9	53.9	14.8	68.6	12.4	34.3	6.5	56.4	14.9	71.3	12.9	34.5	7.2	58.9	15.1	74.0	13.4	34.6
		20	13.1	72.0	15.7	87.7	15.6	35.5	15.3	74.5	16.0	90.5	15.9	35.7	16.4	77.1	16.2	93.2	16.2	35.8
		30																		
	5.1	10	4.9	53.9	14.4	68.3	12.8	33.2	6.5	56.4	14.6	70.9	13.2	33.3	7.3	58.9	14.7	73.6	13.7	33.4
		20	13.2	71.7	15.2	86.9	16.1	34.1	15.3	74.2	15.4	89.7	16.4	34.2	16.4	76.7	15.7	92.4	16.7	34.3
		30																		
45	2.5	10	5.4	47.8	17.8	65.6	9.2	51.2	6.9	49.9	17.9	67.8	9.5	51.5	7.6	52.0	18.1	70.0	9.8	51.7
		20	13.6	67.5	19.0	86.5	12.1	53.2	15.6	70.3	19.3	89.6	12.4	53.5	16.6	73.1	19.6	92.6	12.7	53.8
		30																		
	3.8	10	5.4	47.9	17.3	65.2	9.4	49.1	6.9	50.0	17.5	67.4	9.8	49.2	7.6	52.1	17.6	69.7	10.1	49.4
		20	13.5	68.1	18.4	86.5	12.6	50.4	15.6	70.9	18.7	89.6	13.0	50.6	16.6	73.7	18.9	92.7	13.3	50.8
		30																		
	5.1	10	5.4	47.9	16.9	64.8	9.7	48.0	6.9	50.0	17.0	67.0	10.0	48.1	7.6	52.2	17.1	69.3	10.4	48.2
		20	13.4	68.8	17.8	86.6	13.2	49.0	15.5	71.6	18.0	89.6	13.6	49.2	16.5	74.4	18.3	92.7	13.9	49.3
		30																		

Note: Operation in shaded areas require special attention to ensure adequate water temperature and flow rates are maintained. Operation outside the limits could result in lockout.

10/7/14

090 Performance Data

090 - Heating Capacity Data

Source		ELT	Load Flow - 3.8 L/s						Load Flow - 5.7 L/s						Load Flow - 7.6 L/s					
EST ºC	Flow L/s	ºC	LLT ºC	HC kW	Power kW	HE kW	COP	LST ºC	LLT ºC	HC kW	Power kW	HE kW	COP	LST ºC	LLT ºC	HC kW	Power kW	HE kW	COP	LST ºC
0	5.7	15	20.6	89.0	15.8	73.2	5.6	-3.1	18.7	89.3	15.5	73.8	5.8	-3.1	17.8	89.6	15.1	74.4	5.9	-3.1
		25	30.4	85.4	20.6	64.8	4.1	-2.7	28.6	85.8	20.2	65.6	4.2	-2.7	27.7	86.1	19.7	66.4	4.4	-2.8
		40	45.1	81.8	25.5	56.3	3.2	-2.4	43.4	82.2	24.9	57.3	3.3	-2.4	42.6	82.7	24.4	58.3	3.4	-2.4
		50	54.9	78.2	30.3	47.9	2.6	-2.0	53.3	78.7	29.6	49.1	2.7	-2.0	52.5	79.2	29.0	50.2	2.7	-2.1
	7.6	15	20.8	92.2	15.9	76.3	5.8	-2.4	18.9	92.6	15.6	77.0	5.9	-2.4	17.9	92.9	15.3	77.6	6.1	-2.4
		25	30.5	88.1	20.8	67.4	4.2	-2.1	28.7	88.6	20.3	68.3	4.4	-2.1	27.8	89.0	19.9	69.1	4.5	-2.2
		40	45.3	84.1	25.6	58.5	3.3	-1.8	43.5	84.6	25.0	59.6	3.4	-1.9	42.7	85.1	24.4	60.6	3.5	-1.9
		50	55.0	80.0	30.4	49.6	2.6	-1.6	53.4	80.6	29.7	50.9	2.7	-1.6	52.5	81.2	29.0	52.1	2.8	-1.6
10	3.8	15	22.0	111.2	17.1	94.1	6.5	4.1	19.6	110.6	16.7	93.9	6.6	4.1	18.4	110.0	16.3	93.7	6.8	4.1
		25	31.6	104.7	21.9	82.8	4.8	4.8	29.4	104.6	21.4	83.2	4.9	4.8	28.3	104.6	20.8	83.7	5.0	4.8
		40	46.2	98.2	26.8	71.4	3.7	5.5	44.1	98.7	26.1	72.6	3.8	5.5	43.1	99.1	25.4	73.7	3.9	5.4
		50	55.7	91.7	31.6	60.1	2.9	6.2	53.9	92.7	30.8	61.9	3.0	6.1	52.9	93.7	30.0	63.7	3.1	6.0
	5.7	15	22.1	114.1	17.2	96.9	6.6	6.0	19.7	113.4	16.8	96.6	6.7	6.0	18.5	112.8	16.4	96.4	6.9	6.0
		25	31.7	107.3	22.1	85.2	4.9	6.4	29.5	107.2	21.5	85.7	5.0	6.4	28.4	107.2	21.0	86.3	5.1	6.4
		40	46.3	100.5	26.9	73.6	3.7	6.9	44.2	101.0	26.2	74.8	3.9	6.9	43.2	101.6	25.5	76.1	4.0	6.8
		50	55.9	93.6	31.8	61.9	2.9	7.4	54.0	94.8	30.9	63.9	3.1	7.3	53.0	96.0	30.1	66.0	3.2	7.2
	7.6	15	22.3	117.0	17.4	99.6	6.7	6.9	19.9	116.3	17.0	99.4	6.9	6.9	18.6	115.6	16.5	99.1	7.0	6.9
		25	31.9	109.9	22.2	87.7	4.9	7.3	29.6	109.9	21.6	88.2	5.1	7.2	28.4	109.9	21.1	88.8	5.2	7.2
		40	46.4	102.7	27.0	75.7	3.8	7.6	44.3	103.4	26.3	77.1	3.9	7.6	43.3	104.1	25.6	78.5	4.1	7.5
		50	56.0	95.6	31.9	63.7	3.0	8.0	54.1	97.0	31.0	66.0	3.1	7.9	53.1	98.4	30.2	68.2	3.3	7.9
20	3.8	15	23.6	136.6	18.5	118.1	7.4	12.6	20.6	135.2	18.0	117.2	7.5	12.7	19.2	133.8	17.6	116.2	7.6	12.7
		25	32.9	126.7	23.3	103.4	5.4	13.5	30.3	126.3	22.7	103.6	5.6	13.5	28.9	125.9	22.1	103.8	5.7	13.5
		40	47.3	116.8	28.2	88.7	4.1	14.4	44.9	117.4	27.4	90.1	4.3	14.4	43.7	118.0	26.6	91.5	4.4	14.3
		50	56.7	106.9	33.0	73.9	3.2	15.4	54.5	108.6	32.0	76.5	3.4	15.2	53.5	110.2	31.1	79.1	3.5	15.0
	5.7	15	23.7	139.2	18.6	120.5	7.5	15.0	20.7	137.6	18.2	119.5	7.6	15.0	19.3	136.1	17.7	118.4	7.7	15.1
		25	33.1	129.1	23.5	105.7	5.5	15.6	30.4	128.7	22.8	105.9	5.6	15.6	29.0	128.3	22.2	106.2	5.8	15.6
		40	47.5	119.1	28.3	90.8	4.2	16.2	45.0	119.9	27.5	92.3	4.4	16.1	43.8	120.6	26.7	93.9	4.5	16.1
		50	56.8	109.1	33.2	75.9	3.3	16.8	54.6	111.0	32.2	78.8	3.4	16.7	53.5	112.9	31.2	81.7	3.6	16.6
	7.6	15	23.9	141.7	18.8	123.0	7.5	16.1	20.8	140.0	18.3	121.8	7.7	16.2	19.3	138.3	17.8	120.5	7.8	16.2
		25	33.2	131.6	23.6	107.9	5.6	16.6	30.5	131.2	23.0	108.2	5.7	16.6	29.1	130.8	22.3	108.5	5.9	16.6
		40	47.6	121.4	28.5	92.9	4.3	17.1	45.1	122.3	27.7	94.6	4.4	17.0	43.9	123.2	26.8	96.4	4.6	17.0
		50	57.0	111.2	33.4	77.8	3.3	17.6	54.7	113.4	32.4	81.1	3.5	17.5	53.6	115.7	31.4	84.3	3.7	17.4
30	3.8	15	25.2	162.0	19.9	142.1	8.1	21.1	21.7	159.8	19.4	140.4	8.2	21.2	19.9	157.5	18.8	138.7	8.4	21.3
		25	34.3	148.8	24.7	124.0	6.0	22.2	31.2	148.0	24.0	124.0	6.2	22.2	29.6	147.2	23.3	124.0	6.3	22.2
		40	Operation not recommended.																	
		50																		
	5.7	15	25.3	164.3	20.1	144.2	8.2	24.0	21.8	161.8	19.5	142.3	8.3	24.1	20.0	159.3	19.0	140.3	8.4	24.1
		25	34.5	151.0	24.9	126.1	6.1	24.7	31.3	150.2	24.2	126.1	6.2	24.7	29.7	149.4	23.4	126.0	6.4	24.7
		40	Operation not recommended.																	
		50																		
	7.6	15	25.4	166.5	20.2	146.3	8.2	25.4	21.8	163.8	19.6	144.1	8.3	25.5	20.0	161.0	19.1	142.0	8.4	25.6
		25	34.6	153.3	25.1	128.2	6.1	26.0	31.4	152.5	24.3	128.1	6.3	26.0	29.8	151.7	23.6	128.1	6.4	26.0
		40	Operation not recommended.																	
		50																		

10/7/14

Note: Operation in shaded areas require special attention to ensure adequate water temperature and flow rates are maintained. Operation outside the limits could result in lockout.

090 Performance Data cont.

090 - Cooling Capacity Data

Source		ELT	Load Flow - 3.8 L/s						Load Flow - 5.7 L/s						Load Flow - 7.6 L/s					
EST ºC	Flow L/s	ºC	LLT ºC	TC kW	Power kW	HR kW	EER	LST ºC	LLT ºC	TC kW	Power kW	HR kW	EER	LST ºC	LLT ºC	TC kW	Power kW	HR kW	EER	LST ºC
10	3.8	10	4.1	94.0	15.3	109.2	21.0	16.8	5.9	98.7	15.6	114.2	21.7	17.2	6.8	103.4	15.8	119.2	22.3	17.5
		20	12.4	121.7	16.8	138.5	24.7	18.7	14.8	124.9	17.1	142.0	25.0	18.9	16.0	128.2	17.3	145.5	25.3	19.1
		30	20.6	149.4	18.3	167.7	27.8	20.5	23.7	151.2	18.6	169.8	27.8	20.6	25.2	153.0	18.8	171.8	27.8	20.8
	5.7	10	4.1	93.6	15.0	108.5	21.3	14.5	5.9	98.3	15.2	113.6	22.0	14.7	6.8	103.1	15.5	118.6	22.7	15.0
		20	12.6	117.6	16.3	133.8	24.7	15.6	15.0	120.8	16.5	137.2	25.1	15.7	16.1	124.0	16.6	140.7	25.4	15.9
		30	21.1	141.5	17.6	159.1	27.5	16.6	24.0	143.3	17.7	160.9	27.7	16.7	25.5	145.0	17.8	162.8	27.8	16.8
	7.6	10	4.2	93.1	14.7	107.8	21.7	13.4	5.9	98.0	14.9	112.9	22.4	13.5	6.8	102.8	15.2	118.0	23.1	13.7
		20	12.9	113.4	15.7	129.1	24.6	14.0	15.1	116.7	15.8	132.5	25.1	14.2	16.2	119.9	16.0	135.9	25.6	14.3
		30	21.6	133.7	16.8	150.5	27.2	14.7	24.3	135.3	16.8	152.1	27.5	14.8	25.7	137.0	16.7	153.7	27.9	14.8
20	3.8	10	4.6	86.3	18.9	105.2	15.6	26.6	6.2	90.6	19.2	109.8	16.1	26.9	7.0	94.9	19.4	114.3	16.7	27.2
		20	12.9	113.7	20.6	134.3	18.9	28.4	15.1	117.5	20.9	138.4	19.2	28.7	16.2	121.3	21.1	142.5	19.6	28.9
		30	21.2	141.2	22.2	163.4	21.7	30.2	24.0	144.5	22.5	167.0	21.9	30.5	25.4	147.8	22.8	170.6	22.1	30.7
	5.7	10	4.6	86.0	18.5	104.5	15.8	24.4	6.2	90.3	18.8	109.1	16.4	24.6	7.0	94.7	19.0	113.7	17.0	24.7
		20	13.0	111.2	20.0	131.1	19.0	25.5	15.2	114.8	20.2	135.0	19.4	25.6	16.3	118.5	20.4	138.9	19.8	25.8
		30	21.5	136.4	21.4	157.7	21.8	26.6	24.2	139.3	21.6	160.9	22.0	26.7	25.5	142.2	21.8	164.0	22.3	26.9
	7.6	10	4.6	85.7	18.2	103.8	16.1	23.3	6.2	90.1	18.4	108.4	16.7	23.4	7.0	94.5	18.6	113.1	17.3	23.5
		20	13.2	108.6	19.4	128.0	19.1	24.0	15.3	112.1	19.5	131.6	19.6	24.1	16.4	115.6	19.7	135.2	20.0	24.2
		30	21.8	131.5	20.6	152.1	21.8	24.8	24.4	134.1	20.7	154.8	22.1	24.8	25.7	136.7	20.8	157.4	22.5	24.9
30	3.8	10	5.1	78.6	22.6	101.1	11.9	36.3	6.6	82.5	22.8	105.3	12.4	36.6	7.3	86.4	23.0	109.5	12.8	36.9
		20	13.4	105.8	24.3	130.1	14.8	38.2	15.4	110.1	24.6	134.8	15.3	38.4	16.4	114.5	25.0	139.4	15.7	38.7
		30	Operation not recommended.																	
	5.7	10	5.1	78.4	22.1	100.5	12.1	34.2	6.6	82.3	22.3	104.6	12.6	34.4	7.3	86.3	22.5	108.8	13.1	34.5
		20	13.4	104.8	23.7	128.4	15.1	35.4	15.5	108.8	23.9	132.7	15.5	35.5	16.5	112.9	24.2	137.0	15.9	35.7
		30	Operation not recommended.																	
	7.6	10	5.1	78.2	21.6	99.8	12.3	33.1	6.6	82.2	21.8	104.0	12.8	33.3	7.3	86.1	22.0	108.1	13.3	33.4
		20	13.5	103.8	23.0	126.8	15.4	34.0	15.5	107.5	23.2	130.7	15.8	34.1	16.5	111.2	23.4	134.6	16.2	34.2
		30	Operation not recommended.																	
45	3.8	10	5.6	70.8	26.2	97.1	9.2	51.1	6.9	74.4	26.4	100.8	9.6	51.3	7.6	78.0	26.6	104.6	10.0	51.6
		20	13.9	97.8	28.1	125.9	11.9	52.9	15.7	102.7	28.4	131.2	12.3	53.2	16.6	107.6	28.8	136.4	12.8	53.5
		30	Operation not recommended.																	
	5.7	10	5.6	70.8	25.7	96.4	9.4	49.0	6.9	74.3	25.8	100.2	9.8	49.2	7.6	77.9	26.0	103.9	10.2	49.3
		20	13.8	98.4	27.4	125.7	12.3	50.3	15.7	102.8	27.7	130.5	12.7	50.5	16.6	107.3	27.9	135.2	13.1	50.6
		30	Operation not recommended.																	
	7.6	10	5.6	70.7	25.1	95.8	9.6	48.0	6.9	74.2	25.3	99.5	10.0	48.1	7.6	77.8	25.4	103.2	10.4	48.2
		20	13.8	99.0	26.6	125.6	12.7	48.9	15.7	102.9	26.9	129.8	13.1	49.1	16.7	106.9	27.1	134.0	13.5	49.2
		30	Operation not recommended.																	

10/7/14

Note: Operation in shaded areas require special attention to ensure adequate water temperature and flow rates are maintained. Operation outside the limits could result in lockout.

150 Performance Data

150 - Heating Capacity Data

Source		ELT	Load Flow - 6.3 L/s						Load Flow - 9.5 L/s						Load Flow - 12.6 L/s					
EST ºC	Flow L/s	ºC	LLT ºC	HC kW	Power kW	HE kW	COP	LST ºC	LLT ºC	HC kW	Power kW	HE kW	COP	LST ºC	LLT ºC	HC kW	Power kW	HE kW	COP	LST ºC
0	9.5	15	20.2	137.4	25.1	112.4	5.5	-2.8	18.5	138.3	24.1	114.1	5.7	-2.9	17.6	139.1	23.2	115.9	6.0	-2.9
		25	29.9	128.9	32.0	96.9	4.0	-2.4	28.2	128.0	30.7	97.4	4.2	-2.4	27.4	127.2	29.4	97.8	4.3	-2.5
		40	44.6	120.4	38.9	81.5	3.1	-2.0	43.0	117.8	37.2	80.6	3.2	-2.0	42.2	115.2	35.6	79.7	3.2	-2.0
		50	54.2	111.9	45.9	66.0	2.4	-1.7	52.7	107.6	43.8	63.8	2.5	-1.6	52.0	103.3	41.7	61.6	2.5	-1.5
	12.6	15	20.5	144.5	25.9	118.6	5.6	-2.2	18.7	145.8	25.0	120.9	5.8	-2.3	17.8	147.2	24.1	123.1	6.1	-2.3
		25	30.1	134.6	32.7	102.0	4.1	-1.9	28.3	133.3	31.3	102.0	4.3	-1.9	27.5	131.9	29.9	102.0	4.4	-1.9
		40	44.7	124.8	39.4	85.4	3.2	-1.6	43.0	120.7	37.6	83.2	3.2	-1.6	42.2	116.6	35.7	80.9	3.3	-1.5
		50	54.3	115.0	46.2	68.8	2.5	-1.3	52.7	108.2	43.9	64.3	2.5	-1.2	51.9	101.4	41.5	59.8	2.4	-1.1
10	6.3	15	21.2	163.0	27.5	135.5	5.9	4.9	19.2	167.2	26.9	140.3	6.2	4.7	18.2	171.4	26.3	145.1	6.5	4.5
		25	30.9	156.1	34.6	121.6	4.5	5.4	29.0	158.9	33.5	125.4	4.7	5.3	28.1	161.7	32.5	129.2	5.0	5.1
		40	45.6	149.3	41.7	107.6	3.6	5.9	43.8	150.7	40.2	110.5	3.8	5.8	42.9	152.0	38.6	113.4	3.9	5.7
		50	55.4	142.5	48.8	93.7	2.9	6.5	53.6	142.4	46.8	95.6	3.0	6.4	52.7	142.3	44.8	97.5	3.2	6.3
	9.5	15	21.4	170.5	28.4	142.1	6.0	6.4	19.5	180.6	28.3	152.3	6.4	6.2	18.6	190.7	28.2	162.4	6.8	5.9
		25	31.1	162.5	35.4	127.1	4.6	6.8	29.2	168.8	34.6	134.2	4.9	6.6	28.3	175.1	33.7	141.3	5.2	6.5
		40	45.8	154.4	42.4	112.0	3.6	7.2	43.9	157.0	40.8	116.1	3.8	7.1	43.0	159.5	39.2	120.2	4.1	7.0
		50	55.5	146.4	49.4	97.0	3.0	7.6	53.6	145.1	47.1	98.1	3.1	7.5	52.7	143.9	44.8	99.1	3.2	7.5
	12.6	15	21.7	178.1	29.4	148.7	6.1	7.2	19.9	194.0	29.8	164.3	6.5	6.9	19.0	209.9	30.1	179.8	7.0	6.6
		25	31.4	168.8	36.3	132.6	4.7	7.5	29.5	178.6	35.6	143.0	5.0	7.3	28.6	188.4	35.0	153.5	5.4	7.1
		40	46.0	159.5	43.1	116.4	3.7	7.8	44.1	163.2	41.5	121.8	3.9	7.7	43.2	166.9	39.9	127.1	4.2	7.6
		50	55.7	150.3	50.0	100.2	3.0	8.1	53.7	147.9	47.4	100.5	3.1	8.1	52.7	145.4	44.7	100.7	3.3	8.1
20	6.3	15	22.4	195.6	30.7	164.8	6.4	13.8	20.1	203.7	30.5	173.2	6.7	13.5	19.0	211.8	30.3	181.5	7.0	13.1
		25	32.1	189.1	37.8	151.2	5.0	14.3	29.9	195.0	37.0	158.1	5.3	14.0	28.8	201.0	36.1	164.9	5.6	13.8
		40	46.9	182.6	44.9	137.7	4.1	14.8	44.7	186.4	43.4	143.0	4.3	14.6	43.6	190.2	41.9	148.3	4.5	14.4
		50	56.7	176.1	52.1	124.1	3.4	15.3	54.5	177.8	49.9	127.9	3.6	15.2	53.4	179.4	47.7	131.7	3.8	15.0
	9.5	15	22.7	203.6	31.8	171.8	6.4	15.7	20.6	222.9	32.5	190.4	6.9	15.2	19.6	242.2	33.2	209.0	7.3	14.8
		25	32.4	196.0	38.9	157.2	5.0	16.1	30.3	209.5	38.5	171.0	5.4	15.7	29.2	223.0	38.1	184.9	5.9	15.4
		40	47.1	188.4	45.9	142.6	4.1	16.4	44.9	196.1	44.4	151.7	4.4	16.2	43.8	203.7	42.9	160.8	4.7	16.0
		50	56.8	180.9	53.0	127.9	3.4	16.8	54.6	182.7	50.4	132.3	3.6	16.7	53.5	184.5	47.8	136.7	3.9	16.6
	12.6	15	23.0	211.7	32.9	178.9	6.4	16.6	21.1	242.2	34.5	207.7	7.0	16.1	20.2	272.7	36.2	236.5	7.5	15.5
		25	32.7	203.0	39.9	163.1	5.1	16.9	30.6	224.0	40.0	184.0	5.6	16.5	29.6	245.0	40.1	204.9	6.1	16.1
		40	47.3	194.3	46.9	147.4	4.1	17.2	45.2	205.8	45.4	160.3	4.5	17.0	44.1	217.2	44.0	173.3	4.9	16.7
		50	57.0	185.6	53.9	131.7	3.4	17.5	54.7	187.5	50.9	136.7	3.7	17.4	53.6	189.5	47.9	141.6	4.0	17.3
30	6.3	15	23.6	228.1	34.0	194.1	6.7	22.7	21.0	240.1	34.1	206.0	7.0	22.2	19.8	252.2	34.3	217.9	7.4	21.8
		25	33.4	222.0	41.1	180.9	5.4	23.2	30.8	231.1	40.4	190.7	5.7	22.8	29.5	240.2	39.7	200.5	6.0	22.4
		40	48.2	215.9	48.2	167.7	4.5	23.7	45.6	222.1	46.7	175.4	4.8	23.4	44.3	228.3	45.2	183.2	5.1	23.1
		50	Operation not recommended.																	
	9.5	15	23.9	236.7	35.2	201.6	6.7	24.9	21.6	265.3	36.7	228.6	7.2	24.3	20.6	293.8	38.3	255.6	7.7	23.6
		25	33.7	229.6	42.3	187.3	5.4	25.3	31.3	250.2	42.4	207.9	5.9	24.8	30.1	270.9	42.5	228.4	6.4	24.3
		40	48.4	222.5	49.4	173.1	4.5	25.7	45.9	235.2	48.0	187.2	4.9	25.3	44.7	247.9	46.6	201.3	5.3	25.0
		50	Operation not recommended.																	
	12.6	15	24.3	245.3	36.4	209.0	6.7	26.1	22.3	290.4	39.3	251.1	7.4	25.3	21.3	335.4	42.3	293.2	7.9	24.5
		25	34.0	237.2	43.5	193.7	5.5	26.3	31.8	269.3	44.3	225.0	6.1	25.7	30.7	301.5	45.2	256.3	6.7	25.2
		40	48.7	229.0	50.6	178.5	4.5	26.6	46.2	248.3	49.4	198.9	5.0	26.2	45.1	267.5	48.1	219.4	5.6	25.9
		50	Operation not recommended.																	

Note: Operation in shaded areas require special attention to ensure adequate water temperature and flow rates are maintained. Operation outside the limits could result in lockout.

10/7/14

150 Performance Data cont.

150 - Cooling Capacity Data

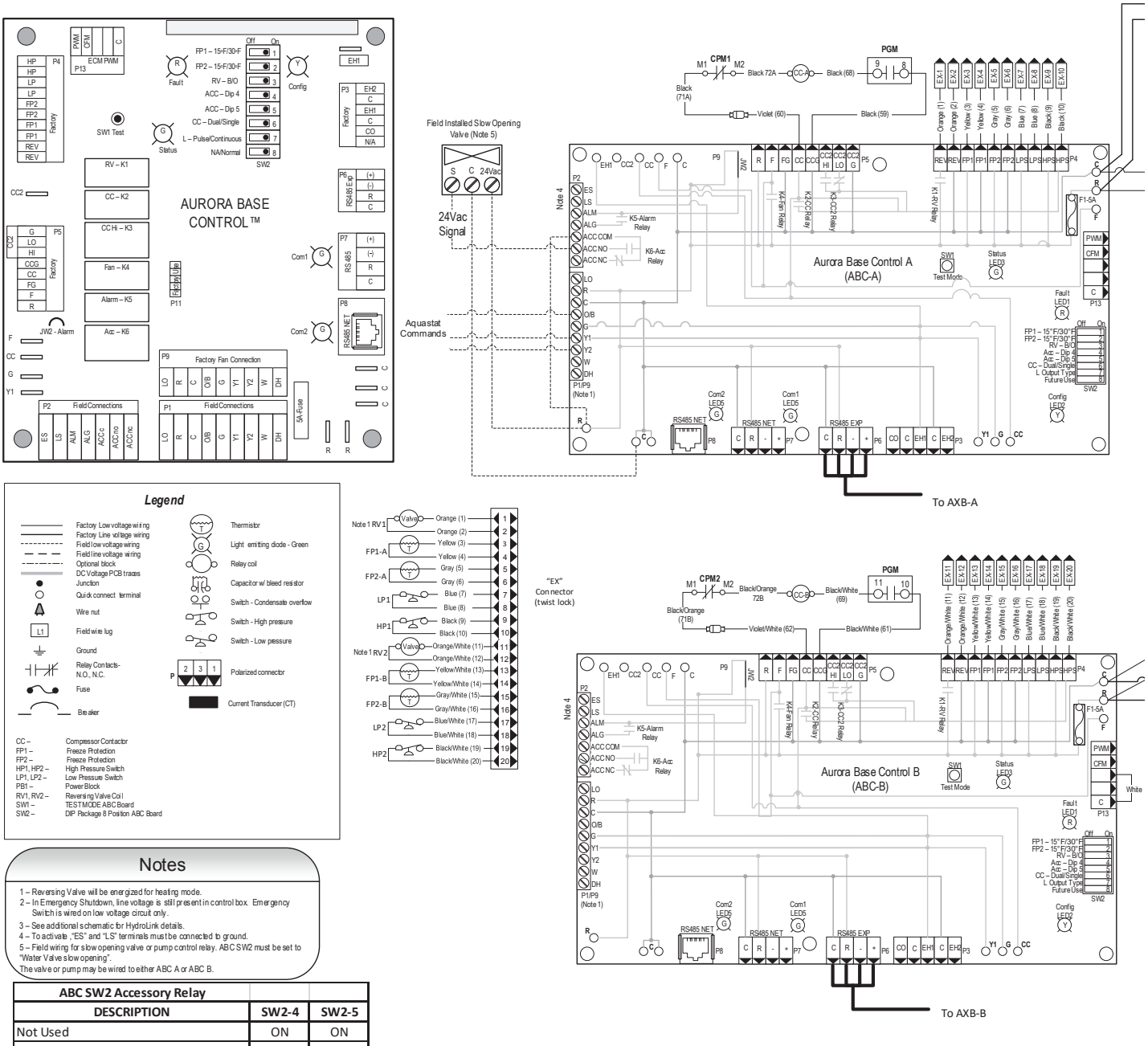
Source		ELT	Load Flow - 6.3 L/s						Load Flow - 9.5 L/s						Load Flow - 12.6 L/s					
EST ºC	Flow L/s	ºC	LLT ºC	TC kW	Power kW	HR kW	EER	LST ºC	LLT ºC	TC kW	Power kW	HR kW	EER	LST ºC	LLT ºC	TC kW	Power kW	HR kW	EER	LST ºC
10	6.3	10	4.3	151.6	24.76	176.3	20.9	16.7	5.8	166.3	25.8	192.1	22.0	17.3	6.6	181.0	26.8	207.9	23.0	17.9
		20	12.6	194.9	27.54	222.4	24.2	18.4	14.8	205.9	28.6	234.5	24.6	18.9	15.9	217.0	29.6	246.5	25.0	19.3
		30	21.0	238.2	30.31	268.5	26.8	20.1	23.8	245.5	31.3	276.9	26.7	20.5	25.2	252.9	32.4	285.2	26.7	20.8
	9.5	10	4.3	151.1	24.12	175.3	21.4	14.4	5.9	165.3	25.38	190.7	22.2	14.8	6.6	179.5	26.6	206.1	23.0	15.2
		20	12.8	189.4	26.27	215.7	24.6	15.4	15.0	198.1	27.5	225.6	24.6	15.7	16.1	206.8	28.7	235.4	24.6	15.9
		30	21.4	227.7	28.43	256.2	27.3	16.4	24.2	230.9	29.6	260.4	26.6	16.5	25.6	234.0	30.8	264.7	26.0	16.6
	12.6	10	4.3	150.7	23.49	174.2	21.9	13.3	5.9	164.4	25.0	189.3	22.5	13.6	6.6	178.0	26.4	204.4	23.0	13.9
		20	13.0	184.0	25.01	209.0	25.1	13.9	15.2	190.3	26.4	216.7	24.6	14.1	16.3	196.5	27.8	224.3	24.1	14.2
		30	21.8	217.3	26.54	243.8	27.9	14.6	24.6	216.2	27.8	244.0	26.5	14.6	25.9	215.1	29.1	244.2	25.2	14.6
20	6.3	10	4.8	138.5	31.00	169.5	15.2	26.4	6.2	150.4	31.9	182.2	16.1	26.9	6.9	162.2	32.8	195.0	16.9	27.4
		20	13.2	180.1	33.71	213.8	18.2	28.1	15.2	190.9	34.7	225.6	18.8	28.5	16.2	201.7	35.7	237.4	19.3	29.0
		30	21.6	221.7	36.41	258.1	20.8	29.8	24.2	231.4	37.5	268.9	21.0	30.2	25.4	241.1	38.7	279.8	21.3	30.6
	9.5	10	4.8	138.3	30.05	168.4	15.7	24.2	6.2	150.0	31.0	181.1	16.5	24.5	6.9	161.7	32.0	193.7	17.2	24.9
		20	13.3	177.2	32.18	209.3	18.8	25.2	15.3	186.8	33.3	220.0	19.2	25.5	16.3	196.4	34.3	230.7	19.5	25.8
		30	21.8	216.0	34.30	250.3	21.5	26.3	24.4	223.5	35.5	259.0	21.5	26.5	25.6	231.1	36.7	267.7	21.5	26.7
	12.6	10	4.8	138.2	29.10	167.3	16.2	23.2	6.2	149.7	30.2	179.9	16.9	23.4	7.0	161.2	31.2	192.4	17.6	23.6
		20	13.4	174.3	30.65	204.9	19.4	23.9	15.4	182.7	31.8	214.5	19.6	24.1	16.4	191.1	33.0	224.0	19.8	24.2
		30	22.1	210.3	32.20	242.5	22.3	24.6	24.6	215.7	33.4	249.1	22.0	24.7	25.8	221.0	34.7	255.7	21.8	24.8
30	6.3	10	5.3	125.4	37.24	162.6	11.5	36.1	6.6	134.4	38.0	172.4	12.1	36.5	7.3	143.4	38.8	182.2	12.6	36.9
		20	13.8	165.3	39.87	205.1	14.1	37.8	15.6	175.8	40.9	216.7	14.7	38.2	16.5	186.4	41.9	228.3	15.2	38.6
		30	Operation not recommended.																	
	9.5	10	5.3	125.6	35.98	161.5	11.9	34.0	6.6	134.7	36.7	171.4	12.5	34.3	7.3	143.9	37.4	181.3	13.1	34.5
		20	13.8	164.9	38.08	203.0	14.8	35.1	15.6	175.5	39.0	214.5	15.3	35.4	16.5	186.0	40.0	226.0	15.9	35.7
		30	Operation not recommended.																	
	12.6	10	5.2	125.7	34.71	160.4	12.4	33.0	6.6	135.1	35.4	170.4	13.0	33.2	7.3	144.4	36.0	180.4	13.7	33.4
		20	13.8	164.5	36.28	200.8	15.5	33.8	15.6	175.1	37.2	212.3	16.1	34.0	16.5	185.7	38.1	223.8	16.6	34.2
		30	Operation not recommended.																	
45	6.3	10	5.8	112.3	43.48	155.8	8.8	50.9	7.0	118.4	44.1	162.5	9.2	51.1	7.6	124.6	44.8	169.3	9.5	51.4
		20	14.3	150.5	46.04	196.5	11.2	52.4	16.0	160.8	47.0	207.8	11.7	52.9	16.8	171.1	48.0	219.1	12.2	53.3
		30	Operation not recommended.																	
	9.5	10	5.7	112.8	41.91	154.6	9.2	48.9	7.0	119.4	42.35	161.8	9.6	49.1	7.6	126.1	42.8	168.9	10.1	49.2
		20	14.2	152.6	43.98	196.6	11.8	49.9	15.9	164.1	44.8	208.9	12.5	50.2	16.7	175.6	45.7	221.3	13.1	50.5
		30	Operation not recommended.																	
	12.6	10	5.7	113.2	40.33	153.5	9.6	47.9	7.0	120.4	40.6	161.0	10.1	48.0	7.6	127.6	40.8	168.4	10.7	48.2
		20	14.2	154.8	41.92	196.7	12.6	48.7	15.8	167.5	42.6	210.1	13.4	49.0	16.6	180.2	43.3	223.5	14.2	49.2
		30	Operation not recommended.																	

10/7/14

Note: Operation in shaded areas require special attention to ensure adequate water temperature and flow rates are maintained. Operation outside the limits could result in lockout.

Wiring Schematics

Reversible Chiller HydroLink2 Aurora 120-600

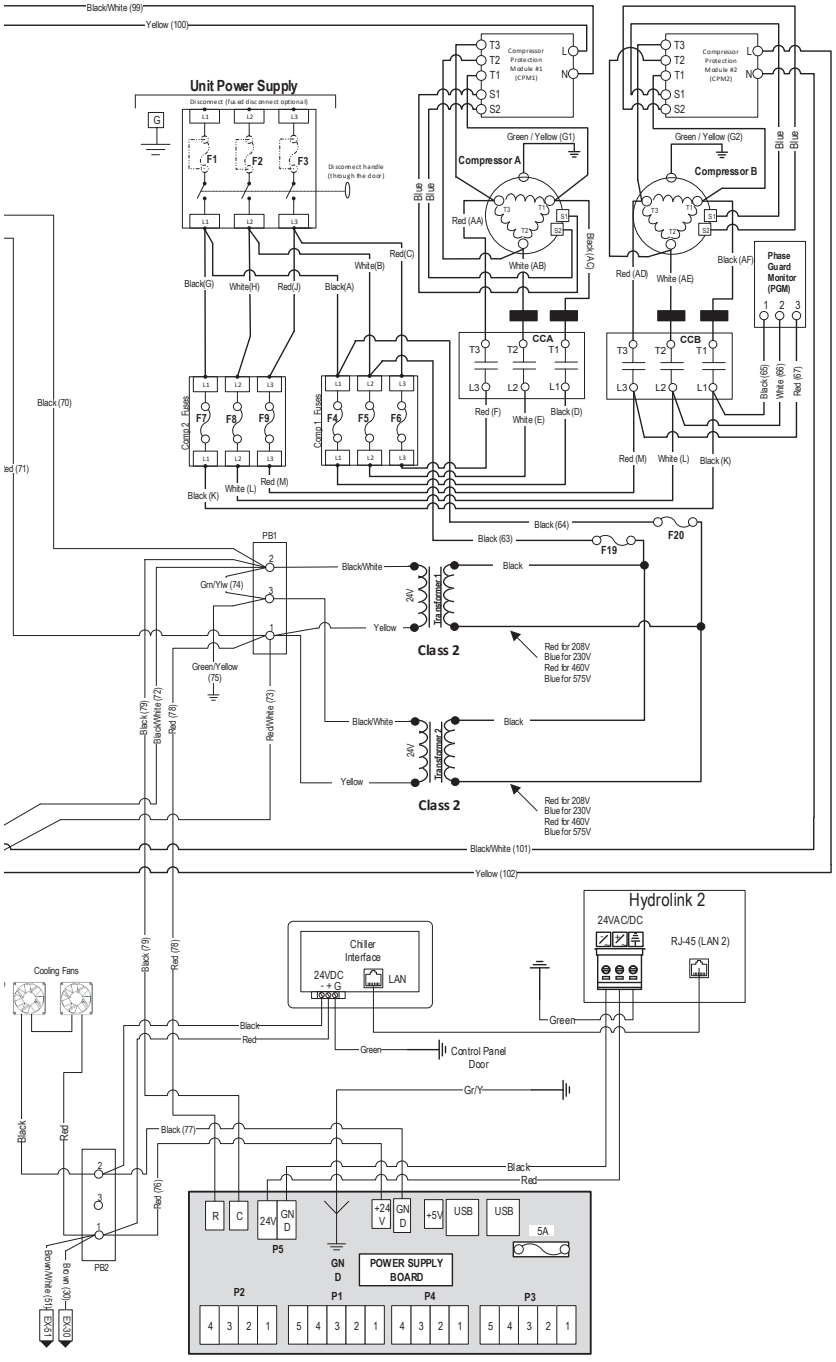


ABC SW2 Accessory Relay		
DESCRIPTION	SW2-4	SW2-5
Not Used	ON	ON
Cycle with Compressor	OFF	OFF
Water Valve Slow Opening	ON	OFF
Not Used	OFF	ON

97P897-42

Wiring Schematics cont.

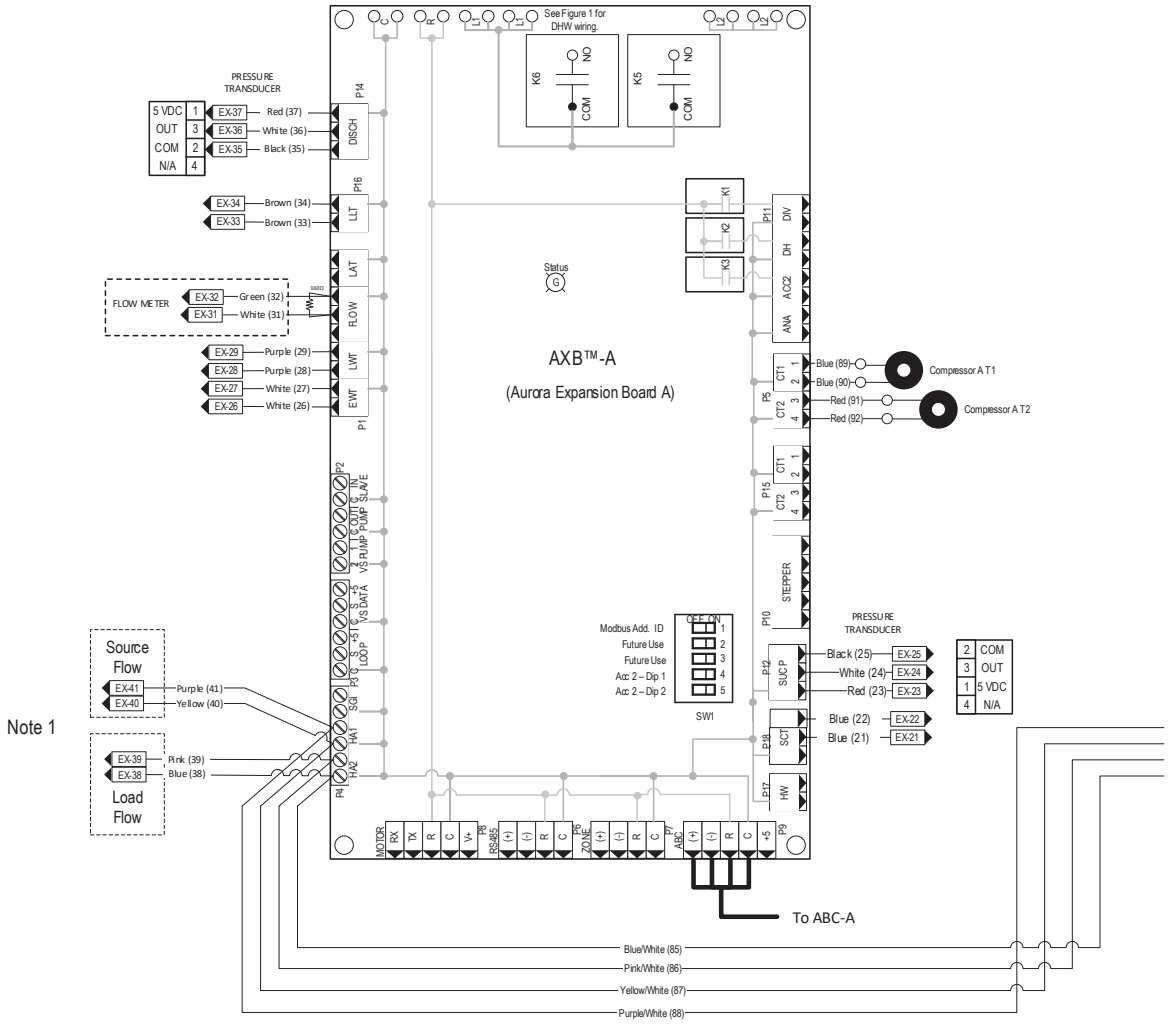
Reversible Chiller HydroLink2 Aurora 120-600

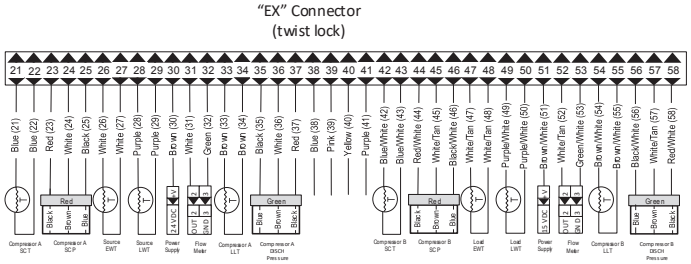


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Wiring Schematics cont.

Reversible Chiller HydroLink2 Aurora 600 Series

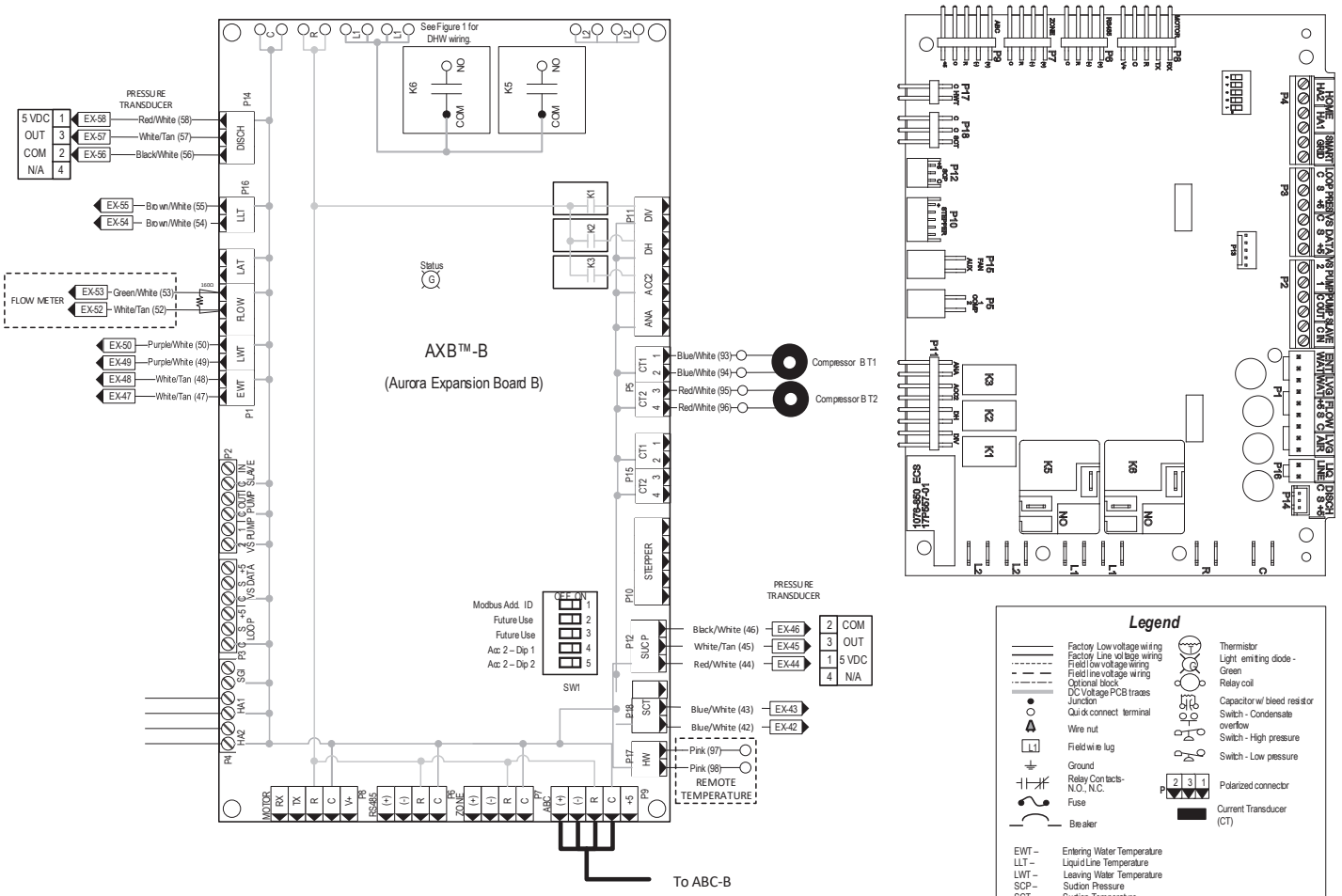




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Wiring Schematics cont.

Reversible Chiller HydroLink2 Aurora 600 Series



Notes

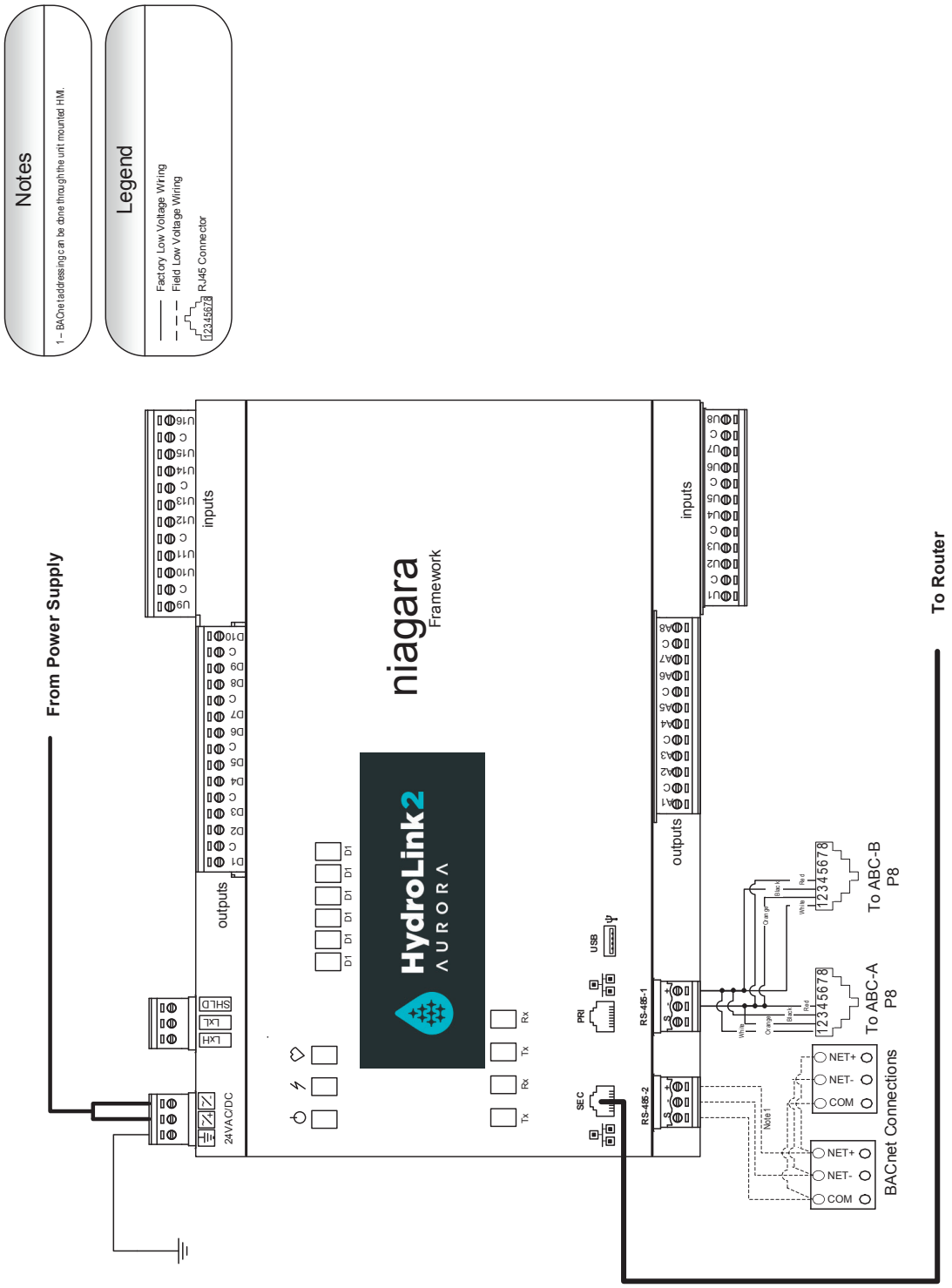
1 - A field installed flow switch is required for the load and source side and must be connected to AXB HA1 and HA2 for the unit to operate. HA1- Source and HA2 – Load.

AXB Accessory 2 DIP Settings		
SW1-4	**SW1-5**	**DESCRIPTION**
ON	ON	Not Used
OFF	ON	Cycles with CC (Normal)
ON	OFF	Not Used
OFF	OFF	Not Used

97P897-14A

Wiring Schematics cont.

HydroLink2 Aurora Control



Engineering Guide Specifications

PART 1 - GENERAL

SUMMARY
The liquid source, water-to-water heat pump shall be a single packaged, reverse-cycle heating/cooling unit. Each unit shall contain microprocessor control for two hermetically sealed, scroll compressors with brazed plate heat exchangers and thermostatic expansion valves.

PERFORMANCE REQUIREMENTS
Fluid Temperature Performance:
Heat Pump shall be capable of continuous operation over the entire range of entering source-fluid temperature of -1°C – 43°C in cooling mode and -1°C – 32°C in heating mode.

Heat Pump shall be capable of continuous operation over the entire range of entering load conditions as indicated in the engineering performance tables.

SUBMITTALS
Product submittal data shall contain manufacturer's specifications for heat pumps showing dimensions, weights, capacities, performance ratings, electrical characteristics, gauges and finishes of materials and installation instructions.

Submit internal electrical wiring diagrams
Submit Control Diagrams and Specifications

QUALITY ASSURANCE
Liquid source, water-water heat pumps shall be tested, rated, and certified in accordance with the following standards.

- ASHRAE 15 for safety code for mechanical refrigeration.
- ASHRAE 147 for refrigerant leaks, recovery, and handling and storage requirements.
- ASHRAE 90.1 – minimum Energy Efficiency compliance for water-to-water heat pumps.
- Comply with NFPA 70 or National Electric Code (N.E.C)
- Comply with UL 1995 and be nationally recognized with ETL
- Tested in accordance with EN14511 13256-2

Each unit shall be run tested at the factory using water. Quality control system shall automatically perform via computer: triple leak check, pressure tests, evacuate and accurately charge system, perform detailed heating and cooling mode tests, and quality cross check all operational and test conditions to pass/fail criteria. Units tested without water flow are not acceptable.

WARRANTY
Standard Warranty: The units shall be warranted by the manufacturer against defects in materials and workmanship for a period of 12 months from startup or 18 months from shipment.

Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace components of chillers that fails in materials or workmanship within specified warranty period.

Extended warranties include, but are not limited to, the following:
- Complete heat pump including refrigerant and oil charge.
- Complete compressor and drive assembly.
- Parts only.

PART 2 - PRODUCTS

WATER TO WATER HEAT PUMP EQUIPMENT
Heat pump equipment shall be factory assembled with two refrigerant circuits consisting of scroll compressors, brazed-plate heat exchangers for the evaporator and condenser, microprocessor controls, and safety devices such as refrigerant pressure switches. Units must be field installed with a minimum of a differential waterside pressure switch or flow proving switch on the outlet of the load and source piping.

Frame & Enclosure
Frame shall be constructed of 10 gauge welded steel with forklift pockets in the bottom channel and threaded weld nuts for lifting points in the top of the frame.

Enclosure shall be factory installed and constructed of heavy-gauge G60 galvanized steel coated with polyester powder coat paint. Paint shall be rated for 1,000 hour of salt spray using ASTM B117. Panels, other than control service door, shall be lined with 50.8mm inch thick, glass fiber glass insulation with an foil face, washable backing.

Compressor:
1. Hermetically sealed, scroll compressors with factory charged POE or PVE oil.
2. Suction gas cooled motors operate at 3500 rpm protected by internal overload device. Model sizes 150 protected by external compressor protection module.
3. Brazed connections to system piping utilizing braided stainless steel vibration absorbers on all suction and discharge piping to mitigate vibration.
4. Compressors can be operated separately to provide staged capacity for lighter load conditions.
5. Factory mounted with rubber isolation grommets.
6. Acoustically insulated sound blankets are factory installed around the compressor to reduce sound emanating from the compressor.

Engineering Guide Specifications cont.

Heat Exchangers:

1. The water to refrigerant heat exchangers shall be dual circuit, copper-brazed 316 stainless steel channel plates, capable of withstanding 650 psig working pressure on the refrigerant side and 450 psig on the water side. Refrigerant circuits are separate with a common water supply. This provides optimal part load efficiency compared to using two single circuit heat exchangers. Heat exchangers are designed to work as an evaporator and condenser.
2. Heat exchangers are covered with 3/4" closed-cell insulation on sizes 120-240 and 1" closed-cell insulation on sizes 360-600.
3. Water line connections attached to the heat exchangers are groove type are factory installed with groove coupling and steel pipe nipple. Pipe nipple is insulated and comes with 1/4" NPT pressure/ temperature port.

Refrigerant Components:

1. Unit shall utilize R-410A refrigerant type. All system components shall be rated to appropriate UL standards to handle maximum system pressure.
2. Factory charged, sealed system contains optimal refrigerant quantity.
3. Each refrigerant circuit shall utilize a thermostatic expansion valve (TXV) with stainless steel sensing bulb and laser welded diaphragm. TXV will control adequate superheat over the stated operating range as indicated in submittal data.
4. Bidirectional, liquid line filter driers are to be factory installed to provide additional system cleanliness.
5. Factory installed service ports for high and low pressure readings.
6. Optional factory installed pressure gauges mounted below control panel aid in field diagnostics and reduces need for technician applied gauges.

Control Panel

1. Factory installed, wired, and functionally tested at factory before shipment.
2. Single-point power connection to non-fused, or fused rotary-type disconnect in control panel.
3. Factory installed, DIN mounted CUBEFuse with Class J rating wired for protection of each compressor.
4. Low voltage, emergency stop button factory wired and mounted to control panel service door.
5. Factory mounted class 2, control power transformer provides nominal 24 VAC low voltage power supply. Primary to transformer is protected by Class CC fuses.
6. High pressure cut out set at 600 PSIG with manual reset.
7. Low pressure cut out set at 40 PSIG with manual reset.
8. Unit shall have phase loss/reversal for compressor protection.

Controls:

1. The unit shall be controlled using a HydroLink2/Aurora microprocessor which sequences all functions and modes of operations.
2. Units shall be capable to communicate thru standard DDC protocols such as BACnet (MS/TP)
3. Standalone, non-communicating units are also available that will operate with thermostat, mechanical, or electronic signals. Setpoint or Aquastat mode is capable of controlling to leaving/entering load temperature.
4. The control system shall have the following hardware features:
   - Setpoint, aquastat or network control methods with adjustable PID parameters.
   - 3D color graphics for easier diagnostics
   - 10" color touch WiFi tablet user interface
   - 802.11g WiFi router for local wireless access.
   - BACnet (MSTP)
   - 8 Field defined user relay outputs (N.O.)
   - 2 Field defined analog outputs (0-10V)
   - 6 Field defined digital inputs (0-24VAC)
   - 2 Field defined pressure sensor (0-5V)
   - 2 Field defined current transducer inputs (0-100A)
5. The control system shall have the following functional programming features:
   - Compressor lead/lag control
   - Random start at power up
   - 5 minute Anti-short cycle compressor protection
   - 5 minute minimum compressor run time to ensure oil circulation
   - High and low pressure cutouts
   - Loss of charge protection
   - Slow opening water valve timing
   - Selectable Water coil freeze detection – Refrigerant Temp and Suction Saturation Temp
   - Selectable Water coil freeze detection – Internal HX Fluid Temp Sensing
   - Selectable Water coil freeze alarm –
   - Over/under voltage protection
   - Remote DIP switch override
   - Load shed
   - Emergency shutdown
   - Diagnostic LED's
   - Test mode push button switch
   - Fault Retry with fault history
   - Source and load entering and leaving fluid temperatures
   - Alarm output with optional E code pulsing
   - 4 Accessory output relays with N.O. and N.C.
   - Modbus communication
   - Energy monitoring of current and power for each compressor
   - Refrigerant monitoring of pressures and temperatures including superheat and subcooling
   - Performance Monitoring including capacity and heat of extraction/rejection (optional with field installed flow meters)
   - Nearly 100 BACnet points available.

Engineering Guide Specifications cont.

Accessories:

1. Additional Items Not Listed Previously:
   - Compressor sound blankets to reduce sound power level of unit.
   - Flow switch to monitor the units presence of flow.
2. Flow Proving Switch
   - A flow proving switch shall be available utilizing high reliability flow sensing technology.
3. Water Connection Adaptor
   - Accessory adaptors shall be available to connect the Victaulic type fitting to a 2 in. [50.8 mm] IPT and to a 2 in. [50.8 mm] bolted flange. Accessory adaptors shall also be available to connect the Victaulic type fitting to a 2 in. MPT through a braided stainless steel flexible hose with a 400 psi burst rating and a 2 in. pipe union.
4. Differential Pressure Switch
5. Strainers
   - A strainer connection kit shall be available and includes a 2 in. [50.8 mm] Y-strainer with self-aligning screen and 1 in. [25.4 mm] blow-off port to reduce debris that will enter the heat exchanger. Strainers should be made of a brass body with a 316 stainless steel screen. Connection kit shall also include two 2 in. [50.8 mm] wrought copper tees with integral pressure/temperature port.
6. Vibration Isolators
   - Heavy duty mounting springs shall be available for corner mounting and 3 dBA noise reduction. Springs shall be field adjustable and load rated for application.

Heat Exchangers:

1. The water to refrigerant heat exchangers shall be dual circuit, copper-brazed 316 stainless steel channel plates, capable of withstanding 4.5MPa psig working pressure on the refrigerant side and 3.1MPa psig on the water side. Refrigerant circuits are separate with a common water supply. This provides optimal part load efficiency compared to using two single circuit heat exchangers. Heat exchangers are designed to work as an evaporator and condenser.
2. Heat exchangers are covered with 19mm closed-cell insulation on sizes 030-060 and 25mm closed-cell insulation on sizes 090-150.
3. Water line connections attached to the heat exchangers are groove type are factory installed with groove coupling and steel pipe nipple. Pipe nipple is insulated and comes with 1/4" NPT pressure/temperature port.

Refrigerant Components:

1. Unit shall utilize R-410A refrigerant type. All system components shall be rated to appropriate UL standards to handle maximum system pressure.
2. Factory charged, sealed system contains optimal refrigerant quantity.
3. Each refrigerant circuit shall utilize a thermostatic expansion valve (TXV) with stainless steel sensing bulb and laser welded diaphragm. TXV will control adequate superheat over the stated operating range as indicated in submittal data.
4. Bidirectional, liquid line filter driers are to be factory installed to provide additional system cleanliness.
5. Factory installed service ports for high and low pressure readings.
6. Optional factory installed pressure gauges mounted below control panel aid in field diagnostics and reduces need for technician applied gauges.

Control Panel

1. Factory installed, wired, and functionally tested at factory before shipment.
2. Single-point power connection to non-fused, or fused rotary-type disconnect in control panel.
3. Factory installed, DIN mounted CUBEFuse with Class J rating wired for protection of each compressor.
4. Low voltage, emergency stop button factory wired and mounted to control panel service door.
5. Factory mounted class 2, control power transformer provides nominal 24 VAC low voltage power supply. Primary to transformer is protected by Class CC fuses.
6. High pressure cut out set at 4.1MPa with manual reset.
7. Low pressure cut out set at 275kPa with manual reset.
8. Unit shall have phase loss/reversal for compressor protection.

Controls:

1. The unit shall be controlled using a microprocessor which sequences all functions and modes of operations.
2. Units shall be capable to communicate thru standard DDC protocols such as N2, Lon, and BACnet (MS/TP @ 19,200 Baud Rate).
3. Standalone, non-communicating units are also available that will operate with thermostat, mechanical, or electronic signals. Temperature set mode is capable of controlling to leaving/entering load temperature.
4. The control system shall have the following features:
   - Anti-short cycle time delay of 5 minutes on compressor operation.
   - Random start on power up mode
   - Low voltage protection
   - High voltage protection
   - Unit shut down on high or low refrigerant pressures
   - Unit shut down for freeze detection
   - Source and Load heat exchanger freeze detection setpoint selectable for water or antifreeze
   - Automatic intelligent reset
5. A 4 x 20 digit backlit LCD to display the following:
   - Entering and leaving water temperatures
   - High pressure, low pressure, low voltage, high

Engineering Guide Specifications cont.

voltage, freeze detection setpoint, and control status
- The low pressure shall not be monitored for the first 120 seconds after a compressor start command to prevent nuisance safety trips
- Remote fault indication on the thermostat
- An accessory relay output tied to each compressor selectable for normally open or normally closed

6. Control Inputs:
   - Start/Stop
   - Lead/Lag
   - Freeze detection set point for load/source
   - Water temperature set point
   - Control Outputs:
   - Status: Cooling/Heating/On/Off
   - Load Side Supply and Return Temperatures
   - Source Side Supply and Return Temperatures
   - Evaporator Entering Refrigerant Temperatures
   - Condenser Leaving Refrigerant Temperatures

Accessories:

1. Additional Items Not Listed Previously:
   - Compressor sound blankets to reduce sound power level of unit.
   - Flow switch to monitor the units presence of flow.
2. Flow Proving Switch
   - A flow proving switch shall be available utilizing high reliability flow sensing technology.

PART 3 - EXECUTION

CHILLER INSTALLATION

Install chillers on support structure indicated.

Equipment Mounting: Install chiller on concrete bases using elastomeric pads. Comply with requirements for vibration isolation devices specified in Division 23 Section "Vibration and Seismic Controls for HVAC Piping and Equipment."

- Minimum Deflection: 12mm.
- Install dowel rods to connect concrete base to concrete floor. Unless otherwise indicated, install dowel rods on 450mm centers around the full perimeter of concrete base.
- For supported equipment, install epoxy-coated anchor bolts that extend through concrete base and anchor into structural concrete floor.
- Place and secure anchorage devices. Use setting drawings, templates, diagrams, instructions, and directions furnished with items to be embedded.
- Install anchor bolts to elevations required for proper attachment to supported equipment.

Equipment Mounting: Install chiller using elastomeric pads. Comply with requirements for vibration isolation devices specified in Division 23 Section "Vibration and Seismic Controls for HVAC Piping and Equipment."

Equipment Mounting: Install chiller on concrete bases. Comply with requirements for concrete base specified by contractor.

- Install dowel rods to connect concrete base to concrete floor. Unless otherwise indicated, install dowel rods on 450mm centers around the full perimeter of concrete base.
- For supported equipment, install epoxy-coated anchor bolts that extend through concrete base and anchor into structural concrete floor.
- Place and secure anchorage devices. Use setting drawings, templates, diagrams, instructions, and directions furnished with items to be embedded.
- Install anchor bolts to elevations required for proper attachment to supported equipment.

Maintain manufacturer's recommended clearances for service and maintenance.

Charge chiller with refrigerant and fill with oil if not factory installed.

Install separate devices furnished by manufacturer and not factory installed.

CONNECTIONS

Comply with requirements for piping specified in Division 23 Section "Hydronic Piping." Drawings indicate general arrangement of piping, fittings, and specialties.

Install piping adjacent to chiller to allow service and maintenance.

Evaporator Fluid Connections: Connect to evaporator inlet with shutoff valve, strainer, flexible connector, thermometer, and plugged tee with pressure gage. Connect to evaporator outlet with shutoff valve, balancing valve, flexible connector, flow switch, thermometer, plugged tee with shutoff valve and pressure gage, flow meter, and drain connection with valve. Make connections to chiller with a flange.

Condenser Fluid Connections: Connect to condenser inlet with shutoff valve, strainer, flexible connector, thermometer, and plugged tee with pressure gage. Connect to condenser outlet with shutoff valve, balancing valve, flexible connector, flow switch, thermometer, plugged tee with shutoff valve and pressure gage, flow meter, and drain connection with valve. Make connections to chiller with a flange.

Connect each chiller drain connection with a union and drain pipe, and extend pipe, full size of connection, to floor drain. Provide a shutoff valve at each connection.

Engineering Guide Specifications cont.

STARTUP SERVICE

Engage a factory-authorized service representative to perform startup service.

- Complete installation and startup checks according to manufacturer's written instructions.
- Verify that refrigerant charge is sufficient and chiller has been leak tested.
- Verify that pumps are installed and functional.
- Verify that thermometers and gages are installed.
- Operate chiller for run-in period.
- Check bearing lubrication and oil levels.
- For chillers installed indoors, verify that refrigerant pressure relief device is vented outdoors.
- Verify proper motor rotation.
- Verify static deflection of vibration isolators, including deflection during chiller startup and shutdown.
- Verify and record performance of fluid flow and low-temperature interlocks for evaporator and condenser.
- Verify and record performance of chiller protection devices.
- Test and adjust controls and safeties. Replace damaged or malfunctioning controls and equipment.

Inspect field-assembled components, equipment installation, and piping and electrical connections for proper assembly, installation, and connection.

Prepare test and inspection startup reports.

Revision Guide

Pages:	Description:	Date:	By:
11, 53	Updated vibration isolation content	02 June 2023	MA
10-11, 53	Adjusted pressure rating values for heat exchangers, updated dimensional data for double wall chiller	Feb 03 2022	MA
Cover	Naming Update	10 Feb 2022	JM
Misc.	Updated nomenclature, updated paint schematic	14 Jan 2020	MA
Misc.	Updated to HydroLink2, updated product renders	20 Feb 2019	MA
All	Removed FX10 Control Option, added HydroLink Aurora Controls	25 Aug 2016	MA
4	Inserted Updated MCS/KIWA Logo	14 Oct 2015	MA
All	First Published	6 Nov 2014	MA



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Product:	**TruClimate 100**
Type:	Reversible Chiller - 50 Hz
Size:	30-150 kW
Document:	Specification Catalog

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