WC Series Modular Scroll Chiller
20-80 Ton
60Hz

Installation Information
Water Piping Connections
Electrical Data
Microprocessor Control
Startup Procedures
Preventive Maintenance
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General Installation Information

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

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

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

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

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

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

Units are setup to be side picked using a fork lift. Some units include pick bars allowing for picking from the end with required fork lengths. Note unit labels and markings for safe picking points. Do not pick the unit up from points not specified and keep the unit level during transport and handling. Using improper equipment handling methods can result in damage and/or void the warranty.

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

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

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

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

**WCHDM040*3AABS1B4GCN00NSSS**

<table>
<thead>
<tr>
<th>W</th>
<th>CH</th>
<th>D</th>
<th>M</th>
<th>040</th>
<th>-</th>
<th>2</th>
<th>A</th>
<th>B</th>
<th>S</th>
<th>1</th>
<th>B</th>
<th>4GC</th>
<th>N</th>
<th>0</th>
<th>0</th>
<th>N</th>
<th>SSS</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>2-3</td>
<td></td>
<td>4</td>
<td></td>
<td>5</td>
<td>6-8</td>
<td></td>
<td>9</td>
<td>10</td>
<td>11</td>
<td>12</td>
<td>13</td>
</tr>
</tbody>
</table>

- **Brand**: W - WaterFurnace  
- **Model Type**: CH - Heat Recovery Chiller, CR - Reversible Chiller  
- **Compressor Type**: D - Dual Scroll  
- **Cabinet Configuration**: M - Modular  
- **Unit Capacity (Nominal Tons)**: 020, 030, 040, 050, 060, 070, 080  
- **Vintage**: * - Current Revision  
- **Voltage**: 3 - 208-230/60/3, 4 - 460/60/3, 5 - 575/60/3  
- **Electrical Option**: N - Breaker w/ no Disconnect, A - Breaker W/ Thru-the-Door Disconnect  
- **Control Option**: A - Standalone, B - BACnet, C - LonWorks  
- **Sound Kit Option**: B - Sound Kit  
- **Cabinet Option**: S - Standard  
- **Non-Standard Options**: SSS - None  
- **Future Option**: N - Not Applicable  
- **Water Control Option**: 1 - Standard No Isolation, 2 - Standard w/ Isolation supplied with 2-½” flange connection, 4 - 4 Pipe Standard  
- **4 Pipe Reversing**: 4GM, 6GM  
- **6 Pipe Standard**: 4GX, 6GX  
- **6 Pipe Dedicated**: 4GW, 6GW  
- **Provisions for 4/6 Pipe**: 1FP  
- **Water Coil Option**: B - Brazed-Plate  
- **Refrigeration Option**: 1 - Standard TXV, 3 - EEV

### Notes:
1. “CH” models are non-reversible and are from 20-80 ton. “CR” models are reversible and available from 20-50 ton.  
2. See electrical availability table for detailed offering by voltage.  
3. Standard no isolation and standard w/ isolation supplied with 2-½” flange connection.  
   - All 4 pipe and 6 pipe options with grooved connection standard, flange conversion available.  
   - Provisions for 4/6 pipe has all necessary wiring and equipment for 4 or 6 pipe water options for instances when the removable pipe rack was sold separate from the unit.

### Voltage Availability

<table>
<thead>
<tr>
<th>Voltage</th>
<th>Dual Scroll Models</th>
<th>2.5&quot;</th>
<th>4&quot;</th>
<th>6&quot;</th>
</tr>
</thead>
<tbody>
<tr>
<td>208-230/60/3</td>
<td>**</td>
<td>**</td>
<td>**</td>
<td>**</td>
</tr>
<tr>
<td>460/60/3</td>
<td>**</td>
<td>**</td>
<td>**</td>
<td>**</td>
</tr>
<tr>
<td>575/60/3</td>
<td>**</td>
<td>**</td>
<td>**</td>
<td>**</td>
</tr>
</tbody>
</table>

- * - “CH” only models  
- ** - “CH” & “CR” models available
The Modular Scroll Chiller Series Features

**Features**

- **Dual scroll compressors** for efficiency and reliability
- **Heavy gauge insulated sheet metal cabinet** to reduce noise
- **Small modular design** for application flexibility
- **Stainless steel bi-directional TXV** for precise superheat control
- **Heavy gauge steel welded frame** to reduce vibration
- **Optional electronic expansion valve** for improved performance across the operating range
- **Fork truck pockets** for maneuverability
- **Fully insulated heat exchanger, refrigerant piping, and water lines** to prevent condensation at reduced fluid operating temperatures
- **High efficiency brazed plate heat exchangers** for efficiency and compact size
- **Control box** is removable from the front to provide access in case of service part replacement
- **Low voltage panel** is hinged to provide access to refrigerant service ports
The Modular Scroll Chiller Series Features cont.

Optional Header Rack

- **4” or 6” Pipe**
  - Victaulic or Flange
- **Alignment channels**
  - for easy separation of unit and pipe rack
- **Exclusive 8-mode operation of header**
  - including simultaneous hot and cold setpoints
- **Modulating 3-way valve**
- **300 PSI rated**
- **Integrated isolation valves**
  - (motorized on unit)
- **2-1/2” Inlet/Outlet**
- **HydroLink NiagaraAX based control**
- **Integrated isolation valves**
  - (manual on unit outlets)
- **Field proven communicating Aurora compressor management control (ABC and AXB)**
The True 'Modular' Concept

Most modular chillers can be ganged together but once in place cannot be easily serviced or removed. WaterFurnace modular scroll units feature several industry firsts to provide a true modular chiller!

1. Modular chiller unit can be removed from the bank and replaced with a new unit using strategically placed fork truck pockets.

2. Majority of servicing can be accomplished from front (control box) of unit. Zero service clearance on side. Top panels are removable with unit in place.

3. Chiller section can be separated from the pipe rack for service or replacement with pipe rack remaining plumbed and intact due to the isolation valves at the pipe rack.

4. Hinged low voltage control box allows easy service access to refrigerant circuit such as TXV, switches and transducers.

5. Removable control box for servicing the compressor through the control box side while keeping the piping all in place.
**Header Rack Configuration Availability**

<table>
<thead>
<tr>
<th>Description</th>
<th>Nomen Digit</th>
<th>Pipe Diameter</th>
<th>Unit Capacity</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>020</td>
</tr>
<tr>
<td>Standard No Isolation</td>
<td>1FS</td>
<td>2-1/2&quot;</td>
<td>**</td>
</tr>
<tr>
<td>Standard w/ Isolation</td>
<td>1FV</td>
<td>2-1/2&quot;</td>
<td>**</td>
</tr>
<tr>
<td>4 Pipe Standard</td>
<td>4GC 6&quot;</td>
<td>**</td>
<td>**</td>
</tr>
<tr>
<td>4 Pipe Reversing</td>
<td>4GM 4&quot;</td>
<td>*</td>
<td>*</td>
</tr>
<tr>
<td></td>
<td>6GM 6&quot;</td>
<td>*</td>
<td>*</td>
</tr>
<tr>
<td>6 Pipe Standard</td>
<td>4GC 4&quot;</td>
<td>***</td>
<td>***</td>
</tr>
<tr>
<td></td>
<td>6GC 6&quot;</td>
<td>***</td>
<td>***</td>
</tr>
<tr>
<td>6 Pipe Dedicated</td>
<td>4GW 4&quot;</td>
<td>***</td>
<td>***</td>
</tr>
<tr>
<td></td>
<td>6GW 6&quot;</td>
<td>***</td>
<td>***</td>
</tr>
<tr>
<td>Provisions for 4/6 Pipe</td>
<td>1FP 2-1/2&quot;</td>
<td>**</td>
<td>**</td>
</tr>
</tbody>
</table>

- ** - Only available with “CH” models
- ** - Available with “CH” & “CR” models
- *** - Only available with “CR” models

**Operating Limits**

<table>
<thead>
<tr>
<th>Fluid Limit</th>
<th>Condenser</th>
<th>Evaporator</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>°F</td>
<td>°C</td>
</tr>
<tr>
<td>Min Entering Water</td>
<td>40</td>
<td>4.4</td>
</tr>
<tr>
<td>Min Entering Brine</td>
<td>50</td>
<td>10.0</td>
</tr>
<tr>
<td>Min Leaving Brine</td>
<td>60</td>
<td>15.6</td>
</tr>
<tr>
<td>Min Leaving Water</td>
<td>60</td>
<td>15.6</td>
</tr>
<tr>
<td>Max Entering Water/Brine</td>
<td>123</td>
<td>50.6</td>
</tr>
<tr>
<td>Max Leaving Water/Brine</td>
<td>130</td>
<td>54.4</td>
</tr>
<tr>
<td>Min Differential Temperature</td>
<td>7</td>
<td>3.9</td>
</tr>
<tr>
<td>Max Differential Temperature</td>
<td>30</td>
<td>16.7</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Flow Rate Limit</th>
<th>Condensed</th>
<th>Evaporated</th>
</tr>
</thead>
<tbody>
<tr>
<td>Minimum flow rate</td>
<td>1</td>
<td>3.8</td>
</tr>
<tr>
<td>Maximum flow rate</td>
<td>4.5</td>
<td>17.0</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Ambient Temperature</th>
<th>°F</th>
<th>°C</th>
</tr>
</thead>
<tbody>
<tr>
<td>Minimum Ambient</td>
<td>55</td>
<td>12.8</td>
</tr>
<tr>
<td>Maximum Ambient</td>
<td>115</td>
<td>46.1</td>
</tr>
</tbody>
</table>

**Bypass Nomenclature (Accessory)**

- **Model**
  - B – Bypass Header
  - T – Temperature Header

- **Pipe Diameter**
  - 4 – 4"
  - 6 – 6"

- **Configuration**
  - L – Left
  - R – Right
  - S – Supply
  - B – Return

**Future Option**
- N – None
- P – Diff. Pressure Sensor

**Revision**
- * – Current Revision

**Connection Type**
- G – Groove

**Pipe Loop Connection**
- H – Hot
- C – Cold
- S – Source

**NOTES:**
1. Left/Right configuration applies to bypass header only.
2. Supply/Return configuration applies to temperature header only

Rev. 10/10/17
Dimensional Data: Modular Units (No Header Rack)

- **53.5 TYP**
- **55.50 with Isolation Valve**
- **19.1**
- **73.3**
- **46.5**
- **9.2**
- **24.6**
- **7.0**
- **11.4**
- **2" Trade Size Knock Out**

**Source Out**
- ANSI B16.5
- Class 150
- 2.5" Flange

**Load In**
- ANSI B16.5
- Class 150
- 2.5" Flange

**Source In**
- ANSI B16.5
- Class 150
- 2.5" Flange

**Load Out**
- ANSI B16.5
- Class 150
- 2.5" Flange

**24.6 TYP**

**9.2 TYP**

**9.7 TYP**

**23.3 TYP**
Dimensional Data: Modular Units (With Header Rack)

4" or 6" Pipe
Victaulic Groove Standard
flange conversion available

Dual Scroll with Pipe
### Dimensional Data: Modular Units (With Header Rack)

#### Connection Identifier

<table>
<thead>
<tr>
<th>Configuration</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
</tr>
</thead>
<tbody>
<tr>
<td>4 Pipe Source (Hot) Inlet</td>
<td>Source (Hot) Outlet</td>
<td>Chilled (Load) Inlet</td>
<td>Chilled (Load) Outlet</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4 Pipe Reversing Source Inlet</td>
<td>Source Outlet</td>
<td>Load Inlet</td>
<td>Load Outlet</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>6 Pipe Dedicated Source Hot Inlet</td>
<td>Hot Outlet</td>
<td>Chilled Inlet</td>
<td>Chilled Outlet</td>
<td>Source Inlet</td>
<td>Source Outlet</td>
<td></td>
</tr>
<tr>
<td>6 Pipe Standard Source Inlet</td>
<td>Source Outlet</td>
<td>Chilled Inlet</td>
<td>Chilled Outlet</td>
<td>Hot Inlet</td>
<td>Hot Outlet</td>
<td></td>
</tr>
</tbody>
</table>

Note: 4" or 6" Pipe Victaulic Groove Standard flange conversion available.
Dimensional Data: Modular Units (With Header Rack)

4" or 6" Pipe Victaulic Groove Standard flange conversion available

Dimensions:
- 20.5 TYP
- 56.5 TYP
- 47.0 TYP
- 28.4 TYP
- 6.1 TYP
- 18.5 TYP
- 13.0 TYP
- 33.0 TYP
- 34.0 TYP
Dimensional Data: Service Clearance

- 30" REQUIRED SERVICE CLEARANCE
- 24" RECOMMENDED SERVICE CLEARANCE
- 18" RECOMMENDED
- 18" RECOMMENDED
- 8.5 TYP
Dimensional Data: Bank Units

NOTES:
1. FOR BYPASS OR TEMPERATURE HEADER, APPLIES TO EITHER LEFT OR RIGHT INLET/OUTLET (RIGHT SHOWN)
2. UNLESS OTHERWISE SPECIFIED, ALL WIRING OF BYPASS AND/OR TEMPERATURE HEADERS WILL RETURN TO UNIT 1
3. UNLESS OTHERWISE SPECIFIED, UNITS WILL BE LABELED AND ASSUMED TO BE INSTALLED AS SHOWN IN THIS DRAWING.
Dimensional Data: Bank Units cont.

NOTES:
1. FOR BYPASS OR TEMPERATURE HEADER, APPLIES TO EITHER LEFT OR RIGHT INLET/OUTLET (RIGHT SHOWN)
2. UNLESS OTHERWISE SPECIFIED, ALL WIRING OF BYPASS AND/OR TEMPERATURE HEADERS WILL RETURN TO UNIT 1
3. UNLESS OTHERWISE SPECIFIED, UNITS WILL BE LABELED AND ASSUMED TO BE INSTALLED AS SHOWN IN THIS DRAWING.
Dimensional Data: Bank Units cont.

UNIT 1    UNIT 2    UNIT 3    UNIT 4

LEFT       .       .       .       .       .

UNIT 1

TOP VIEW

NOTES:
1. FOR BYPASS OR TEMPERATURE HEADER. APPLIES TO EITHER LEFT OR RIGHT INLET/OUTLET (RIGHT SHOWN).
2. UNLESS OTHERWISE SPECIFIED, ALL WIRING OF BYPASS AND/OR TEMPERATURE HEADERS WILL RETURN TO UNIT 1.
3. UNLESS OTHERWISE SPECIFIED, UNITS WILL BE LABELED AND ASSUMED TO BE INSTALLED AS SHOWN IN THIS DRAWING.
Dimensional Data: Bank Units cont.

NOTES:
1. FOR BYPASS OR TEMPERATURE HEADER. APPLIES TO EITHER LEFT OR RIGHT INLET/OUTLET (RIGHT SHOWN)
2. UNLESS OTHERWISE SPECIFIED, ALL WIRING OF BYPASS AND/OR TEMPERATURE HEADERS WILL RETURN TO UNIT 1
3. UNLESS OTHERWISE SPECIFIED, UNITS WILL BE LABELED AND ASSUMED TO BE INSTALLED AS SHOWN IN THIS DRAWING.
Dimensional Data: Temperature Header (Accessory)
Dimensional Data - Bypass (Temp + Valve)

**Label**
- Loop Identifier and Inlet/Outlet.
- Designates by bypass assembly per bypass nomenclature.
- Optional pressure transducer.

**Diagram**
- Right Bypass Assy
- Left Bypass Assembly

**Measurements**
- 8.5
- 6.0
- 3.0
- 16.5
Modular Unit Pipe Rack Removal

1. Remove side access panel (1) from both sides of pipe rack.

2. Remove (2) bolts in locations shown on both sides of pipe rack (8 bolts total)
Modular Unit Pipe Rack Removal

3. Remove (4) bolts from (4 flanges), on the chiller side (16 bolts total). Note that butterfly isolation valves will stay with the pipe rack.

4. Disconnect electrical connectors on each side of pipe rack (electrical connectors per pipe rack).

5. Pull pipe rack straight out from chiller. Pipe rack should be free from chiller, and separated as shown. Note that C channel connecting chiller and pipe rack will stay connected to the chiller, and aids in re-alignment during reinstallation of the pipe rack.

6. Re-assemble in reverse order, noting that any damaged insulation should be repaired to prevent condensation on pipes.
Transportation and Rigging

FORKLIFT POCKET LOCATIONS
Transportation and Rigging cont.
Water Quality

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 gallons/ton.
B. Applications that require more precise temperature control or low loading will occur the minimum fluid volume shall be no less than 10 gallons/ton. 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 8 ft 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 strainers 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 recommended. 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.](image-url)
Water Quality cont.

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

1.7. Brine Applications
A. Applications where the leaving fluid temperature goes below 40°F 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 15°F below the lowest leaving fluid temperature.

Surface Condensation Chart

<table>
<thead>
<tr>
<th>Room Ambient Condition</th>
<th>Surface Temperature</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>50°F</td>
</tr>
<tr>
<td>Normal (Max 85°F, 70% RH)</td>
<td>1/2”</td>
</tr>
<tr>
<td>Mild (Max 80°F, 50% RH)</td>
<td>1/8”</td>
</tr>
<tr>
<td>Severe (Max 90°F, 80% RH)</td>
<td>3/4”</td>
</tr>
</tbody>
</table>

Water Quality Guidelines

<table>
<thead>
<tr>
<th>Material</th>
<th>Acidity/Alkalinity</th>
<th>Copper</th>
<th>90/10 Cupronickel</th>
<th>316 Stainless Steel</th>
</tr>
</thead>
<tbody>
<tr>
<td>pH</td>
<td>Clarity</td>
<td>7 - 9</td>
<td>7 - 9</td>
<td>7 - 9</td>
</tr>
<tr>
<td>Scaling</td>
<td>Calcium and</td>
<td>(Total Hardness)</td>
<td>(Total Hardness)</td>
<td>(Total Hardness)</td>
</tr>
<tr>
<td>Magnesium Carbonate</td>
<td>less than 350 ppm</td>
<td>less than 350 ppm</td>
<td>less than 350 ppm</td>
<td></td>
</tr>
<tr>
<td>Hydrogen Sulfide</td>
<td>Less than 0.5 ppm</td>
<td>10 - 50 ppm</td>
<td>Less than 1 ppm</td>
<td></td>
</tr>
<tr>
<td>(rotten egg smell appears at 0.5 ppm)</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>Sulfates</td>
<td>Less than 125 ppm</td>
<td>Less than 125 ppm</td>
<td>Less than 200 ppm</td>
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<tr>
<td>Chlorine</td>
<td>Less than 0.5 ppm</td>
<td>Less than 0.5 ppm</td>
<td>Less than 0.5 ppm</td>
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</tr>
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<td>Chlorides</td>
<td>Less than 20 ppm</td>
<td>Less than 20 ppm</td>
<td>Less than 20 ppm</td>
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<tr>
<td>Carbon Dioxide</td>
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<td>Less than 50 ppm</td>
<td>Less than 50 ppm</td>
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<tr>
<td>Ammonia</td>
<td>Less than 2 ppm</td>
<td>Less than 2 ppm</td>
<td>Less than 2 ppm</td>
<td></td>
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<tr>
<td>Ammonia Chloride</td>
<td>Less than 0.5 ppm</td>
<td>Less than 0.5 ppm</td>
<td>Less than 0.5 ppm</td>
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<tr>
<td>Ammonia Nitrate</td>
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<td>Less than 0.5 ppm</td>
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<tr>
<td>Ammonia Hydroxide</td>
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<td>Less than 0.5 ppm</td>
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<tr>
<td>Ammonia Sulfate</td>
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<td>Less than 0.5 ppm</td>
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<tr>
<td>Total Dissolved Solids (TDS)</td>
<td>Less than 1000 ppm</td>
<td>1000 - 1500 ppm</td>
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<td>LSI Index</td>
<td>&lt;0.5 to -0.5</td>
<td>&lt;0.5 to -0.5</td>
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<tr>
<td>Iron Fouling (Biological Growth)</td>
<td>Iron, Fe⁺⁺ (Ferrous)</td>
<td>&lt; 0.2 ppm</td>
<td>&lt; 0.2 ppm</td>
<td>&lt; 0.2 ppm</td>
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<td>Bacterial Iron Potential</td>
<td>Less than 1 ppm, above this level deposition will occur</td>
<td>Less than 1 ppm, above this level deposition will occur</td>
<td>Less than 1 ppm, above this level deposition will occur</td>
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<tr>
<td>Iron Oxide</td>
<td>Less than 1 ppm, above this level deposition will occur</td>
<td>Less than 1 ppm, above this level deposition will occur</td>
<td>Less than 1 ppm, above this level deposition will occur</td>
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<tr>
<td>Suspended Solids</td>
<td>Less than 10 ppm and filtered for max. of 600 micron size</td>
<td>Less than 10 ppm and filtered for max. of 600 micron size</td>
<td>Less than 10 ppm and filtered for max. of 600 micron size</td>
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<tr>
<td>Threshold Velocity</td>
<td>&lt; 6 ft/sec</td>
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<td>&lt; 6 ft/sec</td>
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NOTES: Grains = ppm divided by 17

mg/L is equivalent to ppm

2/22/12
## Electrical Data

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<tr>
<th>Model</th>
<th>Rated Voltage</th>
<th>Voltage Min/Max</th>
<th>Compressor*</th>
<th>Total Unit FLA</th>
<th>Min Circ Amp</th>
<th>Max Fuse/HACR</th>
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<td>MCC</td>
<td>RLA</td>
<td>LRA</td>
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<td>020</td>
<td>208-230/60/3</td>
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<td>61.0</td>
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<td>267.0</td>
<td>78.2</td>
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<td>460/60/3</td>
<td>414/506</td>
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<td>17.3</td>
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<td>517/633</td>
<td>24.0</td>
<td>15.4</td>
<td>103.0</td>
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<td>030</td>
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<td>414/506</td>
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<td>517/633</td>
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<td>485.0</td>
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<td>320.0</td>
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<td>414/506</td>
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<td>235.0</td>
<td>79.9</td>
</tr>
<tr>
<td></td>
<td>575/60/3</td>
<td>517/633</td>
<td>60.0</td>
<td>38.5</td>
<td>235.0</td>
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<td>070</td>
<td>208-230/60/3</td>
<td>187/253</td>
<td>80.2</td>
<td>51.2</td>
<td>280.0</td>
<td>102.6</td>
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<td>517/633</td>
<td>70.0</td>
<td>44.9</td>
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<td>208-230/60/3</td>
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<td>90.0</td>
<td>57.7</td>
<td>413.0</td>
<td>115.4</td>
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<tr>
<td></td>
<td>460/60/3</td>
<td>414/506</td>
<td>70.0</td>
<td>44.9</td>
<td>327.0</td>
<td>89.7</td>
</tr>
</tbody>
</table>

HACR circuit breaker in USA only

* - HP, MCC, RLA, & LRA rating per compressor. Breaker & FLA sized for both compressors.

10/7/16
Electrical Connections

**Individual -**
Each module will have a single high volt feed from the building

**Single Point -**
There will be a single high volt connection from the building. Wiring will need to be ran from the single point disconnect to each module in the field.

---

**Individual Electrical Connections**

- 30” REQUIRED SERVICE CLEARANCE
- 24” RECOMMENDED SERVICE CLEARANCE
- 18” RECOMMENDED

**Single Point Electrical Connections**

- 30” REQUIRED SERVICE CLEARANCE
- 24” RECOMMENDED SERVICE CLEARANCE
- 18” RECOMMENDED
Water Connections

Water Piping must be installed in accordance with application codes and per necessary standards. Supply and return connections should be connected per units’ directions. Strainers are required on supply to machine per engineer specification to prevent heat exchanger fouling from occurring.

Before start-up can occur, water must be CLEAN and proper procedures and care should be implemented in order to ensure and maintain a clean system. Water should be treated and clean per necessary standards before start-up is scheduled. Each water header is equipped standard with a temperature well sensor for supply and return water temperatures of the units’ performance. Also included is a flow switch located on the exit side of the heat exchanger to ensure flow through the heat exchangers, which is integrated into the controls and is adjusted in pre-shipping testing procedures.

Furthermore, it is recommended to provide water isolation valves for proper isolation and maintenance of the unit, pumps, and strainers.

Temperature headers
Temperature headers will need to be installed between the building and chiller connections

Bypass Headers
Bypass headers will need to be installed between the chiller outlet and the building connection with the temperature sensors on the building side of the bypass.

Temperature header installed between building and chiller connections

Bypass location determined by building outlet connection

(Left Side Outlet) (Right Side Outlet)
HydroLink Aurora Chiller Controls

Overview
The HydroLink 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 field proven Aurora compressor management control system. The Aurora Controls communicate using the ModBus protocols and quickly pass information from sensors up to the HydroLink controller. The HydroLink controller in turn is a powerful controller that does compressor staging and then communicates over the network via BACnet, LonWorks, or thru the NiagaraAX platform.

This system is the best combination of a proven, robust compressor management control coupled with a flexible yet powerful system level controller. High end, graphic browser images are hosted on the HydroLink 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.

HydroLink Control
The HydroLink 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 HydroLink 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 HydroLink 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.
HydroLink Aurora Chiller 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 On is default.

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

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 3 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 Y input call. Once the thermostat input calls are satisfied, the control will continue on as if no fault occurred. If 3 consecutive faults occur without satisfying the thermostat Y 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, BACnet, or Lon.

**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 E3 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.
HydroLink Aurora Chiller 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.

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 4 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.
HydroLink Aurora Chiller Controls cont.

Other Modes of Operation

**Emergency Shutdown** - Four (4) seconds after a valid ES input or communicated signal, P2-7 is present, all control outputs will be turned off and remain off until the emergency shutdown input is no longer present. The first time that the compressor is started after the control exits the emergency shutdown mode, there will be an anti-short cycle delay followed by a random start delay. Input must be tied to common to activate.

**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 HydroLink 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 Hydrolink Touch Display.

**Status LED (LED3, Green)**
- Description of Operation Fault LED, Green Normal Mode
- ON Control is Non-functional
- OFF Test Mode Slow Flash Lockout Active
- 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.

Hydrolink Aurora in BAS Applications

The HydroLink Aurora is designed to allow chillers to be integrated into Building Automation Systems (BAS) with ease. The HydroLink 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 HydroLink then converts internal Aurora Modbus protocol to BACnet MS/TP or LON protocols 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 HydroLink Aurora is programmed using the powerful NiagaraAX language. This will allow for a BAS to integrate and communicate to the heat pump thru a choice of 2 different communication protocols. The HydroLink Aurora includes a configurable wireless 10” color touch tablet. There are an extensive number of points that the HydroLink 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.
HydroLink Aurora Chiller Controls cont.

HydroLink 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
• LonWorks TP/FT-10 (Requires optional LON plug-in communication card)
• 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
• Wireless Local laptop browser connection for field service
• 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.

HydroLink Aurora Touch Interface
Utilizing a wireless 10" color touch-screen interface, the HydroLink provides a technician the ability to configure and diagnose equipment at the unit or wirelessly from any laptop or tablet for added accessibility and simpler troubleshooting. The technician will 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 HydroLink Aurora Touch Interface is easy to use and provides important insight into the system so your building can operate as efficiently as possible

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
## HydroLink Aurora Chiller Controls cont.

### Fault, Configuration and Status Codes

<table>
<thead>
<tr>
<th>Red Fault LED</th>
<th>Fault Code</th>
<th>LED Flash Code *</th>
<th>Lockout</th>
<th>Reset/Remove</th>
<th>Fault Condition Summary</th>
</tr>
</thead>
<tbody>
<tr>
<td>-</td>
<td>Normal - No Faults</td>
<td>Off</td>
<td></td>
<td>Auto</td>
<td>Tstat input error. Autoreset upon condition removal.</td>
</tr>
<tr>
<td>1</td>
<td>Fault-Input</td>
<td>1</td>
<td>No</td>
<td>Auto</td>
<td>HP switch has tripped (&gt;600 psi) [4.1 MPa]</td>
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<tr>
<td>2</td>
<td>Fault-High Pressure</td>
<td>2</td>
<td>Yes</td>
<td>Hard or Soft</td>
<td>Low Pressure Switch has tripped (&lt;40 psi [0.28 MPa] for 30 continous sec.)</td>
</tr>
<tr>
<td>3</td>
<td>Fault-Low Pressure</td>
<td>3</td>
<td>Yes</td>
<td>Hard or Soft</td>
<td>Low Pressure Switch open prior to compressor start (UPC Only)</td>
</tr>
<tr>
<td>4</td>
<td>Fault-Freeze Detection FP2</td>
<td>4</td>
<td>Yes</td>
<td>Hard or Soft</td>
<td>Freeze protection sensor or low Sat temp has tripped (&lt;15°F [-9.4°C] or 30°F [-1.1°C] for 30 continuous sec.)</td>
</tr>
<tr>
<td>5</td>
<td>Fault-Freeze Detection FP1</td>
<td>5</td>
<td>Yes</td>
<td>Hard or Soft</td>
<td>Freeze protection sensor or low Sat temp has tripped (&lt;15°F [-9.4°C] or 30°F [-1.1°C] for 30 continuous sec.)</td>
</tr>
<tr>
<td>6</td>
<td>Fault-Loss of Charge</td>
<td>6</td>
<td>Yes</td>
<td>Hard or Soft</td>
<td>Instantaneous Voltage is out of range. **Controls shut down until resolved.</td>
</tr>
<tr>
<td>7</td>
<td>Fault-Condensate Overflow</td>
<td>7</td>
<td>Yes</td>
<td>Hard or Soft</td>
<td>Not used</td>
</tr>
<tr>
<td>8</td>
<td>Fault-Over/Under Voltage</td>
<td>8</td>
<td>No**</td>
<td>Auto</td>
<td>Not used</td>
</tr>
<tr>
<td>9</td>
<td>Not Used</td>
<td>9</td>
<td>Yes</td>
<td>Hard or Soft</td>
<td>Not used</td>
</tr>
<tr>
<td>10</td>
<td>Fault-Compressor Monitor</td>
<td>10</td>
<td>Yes</td>
<td>Hard or Soft</td>
<td>Not used</td>
</tr>
<tr>
<td>11</td>
<td>Not Used</td>
<td>11</td>
<td>Yes</td>
<td>Hard or Soft</td>
<td>Not used</td>
</tr>
<tr>
<td>12</td>
<td>Not Used</td>
<td>12</td>
<td>-</td>
<td>-</td>
<td>Not Used</td>
</tr>
<tr>
<td>13</td>
<td>Non-CriticAXBSnsrErr</td>
<td>13</td>
<td>No</td>
<td>Auto</td>
<td>Any Other Sensor Err</td>
</tr>
<tr>
<td>14</td>
<td>CriticAXBSnsrErr</td>
<td>14</td>
<td>Yes</td>
<td>Hard or Soft</td>
<td>Sensor Err for EEV or HW</td>
</tr>
<tr>
<td>15</td>
<td>Alarm-HotWtr</td>
<td>15</td>
<td>No</td>
<td>Auto</td>
<td>HW over limit or logic lockout. HW pump deactivated.</td>
</tr>
<tr>
<td>16</td>
<td>Fault-VarSpdPump</td>
<td>16</td>
<td>No</td>
<td>Auto</td>
<td>Alert is read from PWM feedback.</td>
</tr>
<tr>
<td>17</td>
<td>Not Used</td>
<td>17</td>
<td>No</td>
<td>Auto</td>
<td>Not used</td>
</tr>
<tr>
<td>18</td>
<td>Non-CritComErr</td>
<td>18</td>
<td>No</td>
<td>Auto</td>
<td>Any non-critical com error</td>
</tr>
<tr>
<td>19</td>
<td>Fault-CritComErr</td>
<td>19</td>
<td>No</td>
<td>Auto</td>
<td>Any critical com error. Auto reset upon condition removal</td>
</tr>
<tr>
<td>20</td>
<td>ABC Com Loss</td>
<td>20</td>
<td>Yes</td>
<td>Auto</td>
<td>HydroLinkABC communication loss (UPC or HydroLink Only)</td>
</tr>
<tr>
<td>21</td>
<td>Alarm - Low Loop Pressure</td>
<td>21</td>
<td>No</td>
<td>Auto</td>
<td>Loop pressure is below 3 psi for more than 3 minutes</td>
</tr>
<tr>
<td>22</td>
<td>Not Used</td>
<td>22</td>
<td>-</td>
<td>-</td>
<td>Not used</td>
</tr>
<tr>
<td>23</td>
<td>Not Used</td>
<td>23</td>
<td>No</td>
<td>Auto</td>
<td>Not used</td>
</tr>
<tr>
<td>24</td>
<td>Not Used</td>
<td>24</td>
<td>No</td>
<td>Auto</td>
<td>Not used</td>
</tr>
<tr>
<td>25</td>
<td>Not Used</td>
<td>25</td>
<td>-</td>
<td>-</td>
<td>Not used</td>
</tr>
<tr>
<td>26</td>
<td>Ent Source/Load Low Limit</td>
<td>26</td>
<td>Yes</td>
<td>Auto</td>
<td>Entering Source/Load Low Water Temperature Limit</td>
</tr>
<tr>
<td>27</td>
<td>Ent Source/Load High Limit</td>
<td>27</td>
<td>Yes</td>
<td>Auto</td>
<td>Entering Source/Load High Water Temperature Limit</td>
</tr>
<tr>
<td>28</td>
<td>Lvg Source/Load Low Limit</td>
<td>28</td>
<td>Yes</td>
<td>Auto</td>
<td>Leaving Source/Load Low Water Temperature Limit</td>
</tr>
<tr>
<td>29</td>
<td>Lvg Source/Load High Limit</td>
<td>29</td>
<td>Yes</td>
<td>Auto</td>
<td>Leaving Source/Load High Water Temperature Limit</td>
</tr>
<tr>
<td>31</td>
<td>Src Flow Switch</td>
<td>31</td>
<td>Yes</td>
<td>Auto</td>
<td>Source Flow Switch Fault</td>
</tr>
<tr>
<td>32</td>
<td>Ld Flow Switch</td>
<td>32</td>
<td>Yes</td>
<td>Auto</td>
<td>Load Flow Switch Fault</td>
</tr>
</tbody>
</table>
HydroLink Aurora Chiller 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.

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.

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 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.

<table>
<thead>
<tr>
<th>Access Relay Operation</th>
<th>SW1-4</th>
<th>SW1-4</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cycle with Fan</td>
<td>ON</td>
<td>ON</td>
</tr>
<tr>
<td>Cycle with CC</td>
<td>OFF</td>
<td>ON</td>
</tr>
<tr>
<td>Cycle with CC2</td>
<td>ON</td>
<td>OFF</td>
</tr>
<tr>
<td>Cycle with DH from ABC Board</td>
<td>OFF</td>
<td>OFF</td>
</tr>
</tbody>
</table>
Controls and BAS Integration

Operation and Connection
With a DDC device the chiller may be controlled by a building management system. The DDC device can work over several different communication protocols (BACnet MSTP is standard). DDC devices can be customized to relay an array of refrigeration, electrical and water information about the chiller. The User Management interface supports multiple users which allows you to assign different levels of accessibility to different users.

Default (Adjustable) Parameters:
- Mac Address - 42
- Protocol - BACnet MSTP
- Baud Rate - 38400

Individual Chillers

Stand Alone
Unit is controlled by aquastat mode or remote setpoint through the tablet HMI.

BACnet
The BAS will land a single shielded twisted pair cable (22 gauge) to the RS 485 card on the HydroLink Aurora. Daisy-chain if more devices are in series.

Lon Works
The BAS will land a wire pair to the Lon card on the HydroLink Aurora

Remote Access
An Ethernet cable will need to be ran to the chiller with 1 static IP for remote accessibility.

Master Panel Connections
If a master panel is present, then the BAS will only connect to the master panel and will need to run a single shielded twisted pair cable (22 gauge) to the RS 485 card on the HydroLink Aurora on one of the chillers. Daisy-chain to each additional chiller.

BACnet
The BAS will land a single shielded twisted pair cable (22 gauge) to the RS 485 card on the HydroLink Aurora. Daisy-chain if more devices are in series.

Lon Works
The BAS will land a wire pair to the Lon card on the HydroLink Aurora

Remote Access
An Ethernet cable will need to be ran to the chiller with 1 static IP for remote accessibility.
Using the HydroLink Aurora Color Touch Tablet

Color Touch Tablet
The Color Touch Tablet utilizes a touch-screen interface and HydroLink Aurora provides technicians with the ability to configure and diagnose equipment at the unit or wirelessly from any laptop or tablet for added accessibility and simpler troubleshooting. Technicians have full access to equipment status, parameter values, temperature, and humidity sensing as well as access to alarm history. With website-like navigation, the HydroLink 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 HydroLink 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 left compressor circuit and “B” for the right compressor. If both are active, “A + B” will be displayed.

**Mode** – Since this product might be 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/LON 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 HydroLink Aurora. Compatible flow meters must be used for accurate flow measurement. Consult your factory representative for more information on this option.
Using the HydroLink 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 HydroLink Aurora Color Touch Tablet cont.

Overview Screen
The overview screen provides a binary snapshot of all system variables available to the HydroLink 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.

![Overview Screen Image]

Settings Screen
All temperature, network, or DIPswitch settings for the system or HydroLink 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.

**NOTE:** Header Rack setting information is detailed in Header Rack Interface section.

![Settings Screen Image]
Using the HydroLink 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/LON 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 or Lon 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 or Lon 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 HydroLink Aurora Color Touch Tablet cont.

Manual Commands Screen
HydroLink 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 HydroLink 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 (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.

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 HydroLink 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 (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.

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.

<table>
<thead>
<tr>
<th>Entering Temp</th>
<th>Source HX</th>
<th>Load HX</th>
</tr>
</thead>
<tbody>
<tr>
<td>Low Fault</td>
<td>E26</td>
<td>E26</td>
</tr>
<tr>
<td>High Fault</td>
<td>E27</td>
<td>E27</td>
</tr>
</tbody>
</table>

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 HydroLink 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.

<table>
<thead>
<tr>
<th>Control Accuracy</th>
<th>± 5˚F</th>
<th>± 2˚F</th>
<th>± 1˚F</th>
</tr>
</thead>
<tbody>
<tr>
<td>(± 3˚C)</td>
<td>8</td>
<td>20</td>
<td>40</td>
</tr>
<tr>
<td>(± 1˚C)</td>
<td>0.07</td>
<td>0.1</td>
<td>0.2</td>
</tr>
<tr>
<td>(± 0.5˚C)</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Proportional Constant</td>
<td>82 0 4</td>
<td>0.07</td>
<td>0</td>
</tr>
<tr>
<td>Integral Constant</td>
<td>15</td>
<td>15</td>
<td>15</td>
</tr>
<tr>
<td>Cooling Differential</td>
<td>2.5</td>
<td>1</td>
<td>0.5</td>
</tr>
<tr>
<td>Heating Differential</td>
<td>2.5</td>
<td>1</td>
<td>0.5</td>
</tr>
</tbody>
</table>

![PID Controller Screen](image)

![Default PID Values](image)
Using the HydroLink 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 HydroLink 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 33%. 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 33%. 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 HydroLink 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.


**SW2-3 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.

<table>
<thead>
<tr>
<th>Access Relay Operation</th>
<th>SW2-4</th>
<th>SW2-5</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cycle with Blower</td>
<td>ON</td>
<td>ON</td>
</tr>
<tr>
<td>Cycle with Compressor</td>
<td>OFF</td>
<td>OFF</td>
</tr>
<tr>
<td>Water Valve Slow Opening</td>
<td>ON</td>
<td>OFF</td>
</tr>
<tr>
<td>(Reserved)</td>
<td>OFF</td>
<td>ON</td>
</tr>
</tbody>
</table>

**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 HydroLink 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 HydroLink 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 HydroLink Aurora Color Touch Tablet cont.

Network Settings
Not Intended for field use. Please consult a factory representative if changes to the Network Settings are required.

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 HydroLink 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 or 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 HydroLink 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.

<table>
<thead>
<tr>
<th>Access Relay Operation</th>
<th>SW2-4</th>
<th>SW2-5</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cycle with Blower</td>
<td>ON</td>
<td>ON</td>
</tr>
<tr>
<td>Cycle with Compressor</td>
<td>OFF</td>
<td>OFF</td>
</tr>
<tr>
<td>Water Valve Slow Opening</td>
<td>ON</td>
<td>OFF</td>
</tr>
<tr>
<td><em>(Reserved)</em></td>
<td>OFF</td>
<td>ON</td>
</tr>
</tbody>
</table>
Using the HydroLink Aurora Color Touch Tablet cont.

**AXB Inputs Screen**

![AXB Inputs Screen Image]

Both Circuit A and Circuit B are shown on screen. Here the Circ A represents Source fluid and B represents Load fluid sensors.

**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.

**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 HydroLink 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 PII-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 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 directly to top of relay on AXB A and B K5

- **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 K6

<table>
<thead>
<tr>
<th>Access Relay Operation</th>
<th>SW1-4</th>
<th>SW1-5</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cycle with Fan</td>
<td>ON</td>
<td>ON</td>
</tr>
<tr>
<td>Cycle with CC or Variable Speed 1-12</td>
<td>OFF</td>
<td>OFF</td>
</tr>
<tr>
<td>Cycle with CC2 or Variable Speed 7-12</td>
<td>ON</td>
<td>OFF</td>
</tr>
<tr>
<td>Cycles with DH from ABC Board</td>
<td>OFF</td>
<td>ON</td>
</tr>
</tbody>
</table>
Using the HydroLink 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 HydroLink 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 HydroLink Aurora. Compatible flow meters must be used.
Using the HydroLink 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 HydroLink 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 HydroLink Aurora Color Touch Tablet cont.

**Aurora Network Configuration Screen**

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

Header rack systems have an additional Header Rack option available in the top bar selections and an additional Header Rack Settings option in the Settings Menu.

Under the Header Rack Settings Option the Header Rack Type is selected.
Header Rack Interface cont.

If the No Header option is selected for the Header Rack Type, when the Header Rack screen is activated a display indicating the system is not configured for a header rack will be displayed.

If the No Header or 4 Pipe Standard option is selected for the Header Rack Type, the options and option menus on the Settings page will not be changed, and the operation of the chiller will not be impacted.
Header Rack Interface cont.

If the 4 Pipe Standard option is selected for the Header Rack Type, when the Header Rack screen is activated the water temperatures and a representation of the current header rack operation will be displayed. If the chiller is not currently operating the display will be similar to the following:

<table>
<thead>
<tr>
<th>Bypass / Temp Header</th>
<th>Global Temp</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hot Lvg (°F)</td>
<td>77.4</td>
</tr>
<tr>
<td>Cold Lvg (°F)</td>
<td>47.9</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Chiller</th>
<th>Inlet Temp</th>
<th>Outlet Temp</th>
</tr>
</thead>
<tbody>
<tr>
<td>Source HX (°F)</td>
<td>70.0</td>
<td>120.0</td>
</tr>
<tr>
<td>Load HX (°F)</td>
<td>60.0</td>
<td>50.0</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Control Points</th>
<th>Setpoint</th>
<th>Temp</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cooling (°F)</td>
<td>45.0</td>
<td>HX Out</td>
</tr>
<tr>
<td>Heating (°F)</td>
<td>125.0</td>
<td>HX Out</td>
</tr>
</tbody>
</table>

If the chiller is operating in the cooling mode the display will be similar to the following:
Header Rack Interface cont.

If the chiller is operating in the heating mode the display will be similar to the following:

If the 4 Pipe Reversing option is selected for the Header Rack Type, the Header Rack Settings options are expanded to include the Temperature Control Method.
Header Rack Interface cont.

If the Aquastat temperature control method is selected there will be no other options available.

If the Setpoint temperature control method is selected there will also be an Operating Mode selection option available.
Header Rack Interface cont.

When configured as a 4 Pipe Reversing header rack there will be 5 operating mode option selections available.

When configured as a 4 Pipe Reversing, 6 Pipe Standard, or 6 Pipe Dedicated header rack, the options available under the Temperature Control Settings will be modified to provide cooling and heating operation settings.
**Header Rack Interface cont.**

For header rack cooling operation the controlling temperature is selected from the outlet temperature from the heat exchanger of the chiller, the header rack cold water out temperature measured by the header rack controller, the header rack cold water in temperature measured by the header rack controller, and a network supplied temperature value.

For header rack heating operation the controlling temperature is selected from the outlet temperature from the heat exchanger of the chiller, the header rack hot water out temperature measured by the header rack controller, the header rack hot water in temperature measured by the header rack controller, and a network supplied temperature value.
Header Rack Interface cont.

If the system is configured for Aquastat control when the Temperature Control Settings option is selected, the only option available will be the Temperature Control Method. Control temperatures, setpoints, and delta T values will not be available.

When configured as a 4 Pipe Reversing, 6 Pipe Standard, or Dedicated header rack there will be additional items under the Manual Commands option to control the header rack valves manually.
Header Rack Interface cont.

When configured as a 4 Pipe Reversing, 6 Pipe Standard, or 6 Pipe Dedicated header rack, the options available under the PID Controller option will be modified to provide cooling and heating operation settings.

If the 4 Pipe Reversing option is selected for the Header Rack Type, when the Header Rack screen is activated the water temperatures and a representation of the current header rack operation will be displayed. If the system is configured for setpoint control and the chiller is not currently operating the display will be similar to the following:
Header Rack Interface cont.

When configured for Setpoint Control as a 4 Pipe Reversing, 6 Pipe Standard, or 6 Pipe Dedicated header rack, the operating mode and setpoint selection values will be available from the main Header Rack screen by selecting the Selected Header Mode.

If the 4 Pipe Reversing option is selected for the Header Rack Type, and the system is configured for setpoint control, when the system is operating in the cooling mode the display will be similar to the following if the Source In Valve detail view is selected:
Header Rack Interface cont.

If the 4 Pipe Reversing option is selected for the Header Rack Type, the system is configured for setpoint control and configured for the Full Building mode, when the system is operating the display will be similar to the following:

If the 4 Pipe Reversing option is selected for the Header Rack Type and the Full Building mode is selected, the valve detail views are very similar to the cooling mode views.
Header Rack Interface cont.

If the 4 Pipe Reversing option is selected for the Header Rack Type, when the Header Rack screen is activated the water temperatures and a representation of the current header rack operation will be displayed. If the system is configured for Aquastat control and the chiller is currently active in cooling the display will be similar to the following:

If the 6 Pipe Standard option is selected for the Header Rack Type, the Header Rack Settings options are expanded to include the Operating Mode. Aquastat control is not an option for the 6 Pipe Standard header rack configuration.
Header Rack Interface cont.

When configured as a 6 Pipe Standard header rack there will be 8 operating mode option selections available.

When configured as a 6 Pipe Standard or Dedicated Source header rack there will be an additional menu item on the Settings menu for Header Rack Valve Settings.
Header Rack Interface cont.

Under the Header Rack Valve Settings the limits for the bypass valves are set as well as the operational parameters for the control valves.

If the 6 Pipe Standard option is selected for the Header Rack Type, when the system is operating in the cooling mode the display will be similar to the following if the Source In Valve detail view is selected:

If the 6 Pipe Standard option is selected for the Header Rack Type, when the Header Rack screen is activated the water temperatures and a representation of the current header rack operation will be displayed.

If the 6 Pipe Standard option is selected for the Header Rack Type, when the system is operating in the cooling mode the display will be similar to the following if the Source In Valve detail view is selected:
Header Rack Interface cont.

If the 6 Pipe Standard option is selected for the Header Rack Type, when the system is operating in the full building mode the display will be similar to the following if the Source In Valve detail view is selected:

If the 6 Pipe Standard option is selected for the Header Rack Type, when the system is configured for the Auto Full Building mode and operating in the Primary Cooling mode the display will be similar to the following if the Source In Valve detail view is selected:
Header Rack Interface cont.

If the 6 Pipe Standard option is selected for the Header Rack Type, when the system is configured for the Auto Full Building mode and operating in the Primary Heating mode the display will be similar to the following if the Load Out Valve detail view is selected:

![Header Rack Interface Diagram](image)

Header Rack Interface cont.

If the 6 Pipe Standard option is selected for the Header Rack Type, when the system is configured for the Primary Cooling mode and operating in the Primary Cooling mode the display will be similar to the following if the Source In Valve detail view is selected:

![Header Rack Interface Diagram](image)
Header Rack Interface cont.

If the 6 Pipe Dedicated option is selected for the Header Rack Type, the Header Rack Settings options are expanded to include the Temperature Control Method.

If the Aquastat temperature control method is selected there will be no other options available.
Header Rack Interface cont.

If the Setpoint temperature control method is selected there will also be an Operating Mode selection option available with four operating mode options.

If the 6 Pipe Dedicated option is selected for the Header Rack Type, when the Header Rack screen is activated the water temperatures and a representation of the current header rack operation will be displayed. If the system is configured for setpoint control and the chiller is operating in the cooling mode the display will be similar to the following if the Load Out Valve detail view is selected.
Header Rack Interface cont.

The display will be similar to the following if the Load In Valve detail view is selected:

If the header rack control system is under supervisory or network control, the header rack display screens will display the “Under Supervisory Control” message in the upper right hand corner to warn users that supervisory control will likely override any settings made locally using the interface.
Wiring Schematics
Wiring Schematics cont.

Diagram with various components labeled such as transformers, circuit breakers, and pressure switches. Legend for symbols used in the diagram is included at the bottom right.

Notes:
1. Optional thru the door switch
2. See second page for hydrolink details
3. CLASS 2 Transformer
4. EEV option only.

Legend:
- Factory Low Voltage
- Pressure Transmitter
- Terminal Block
- Pressure Switch
- Refrigeration Circuit Breaker
- Water Service Valve
- Condenser Motor
- Compressor Motor
- Phase Guard Monitor
- Transformer

Page 1
Wiring Schematics cont.

Legend

1. Bypass valves are available with bypass option only in a single unit configuration. When multiple units are installed in tandem, the bypass valves are wired through the supervisory controller.
2. If the pipe rack is configured as "6 pipe dedicated", the source valves are eliminated and the unit is equipped only with load valves.
3. The unit is equipped with IO34 only for options that require controlling source, load and bypass valves.
4. BACnet addressing can be done through the unit mounted HMI.
5. If no IO34 is present, the hydrolink is powered directly from the power supply board (PSB).
6. SW2-3 MUST BE SET TO "OFF". This ensures that freeze protection is active.

NOTES:
Wiring Schematics cont.

CONTROL BOARDS PHYSICAL LAYOUT
Pressure Drop - Modular

![Modular Pressure Drop Graph at 50 °F]

Pressure Drop - Header Rack

![Header Rack Pressure Drop Graph at 50°F]
## Compressor Resistance

<table>
<thead>
<tr>
<th>Model</th>
<th>208-230</th>
<th>460</th>
<th>575</th>
</tr>
</thead>
<tbody>
<tr>
<td>030</td>
<td>0.200</td>
<td>0.830</td>
<td>1.320</td>
</tr>
<tr>
<td>040</td>
<td>0.156</td>
<td>0.616</td>
<td>0.944</td>
</tr>
<tr>
<td>050</td>
<td>0.130</td>
<td>0.520</td>
<td>0.820</td>
</tr>
<tr>
<td>060</td>
<td></td>
<td>0.418</td>
<td></td>
</tr>
<tr>
<td>070</td>
<td>NA</td>
<td>NA</td>
<td></td>
</tr>
<tr>
<td>080</td>
<td>0.231</td>
<td>NA</td>
<td></td>
</tr>
</tbody>
</table>

NA - Not available at time of publishing  

10/7/16
**Start-Up Data Collection**

Data Collection is to be schedule and implemented by a qualified representative.

### Prior to Powering Up Machine

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Measurement</th>
</tr>
</thead>
<tbody>
<tr>
<td>Suction Temperature</td>
<td>Discharge Pressure</td>
</tr>
<tr>
<td>Super Heat</td>
<td>Hx1 Gas Pressure</td>
</tr>
<tr>
<td>Subcooling</td>
<td>Hx1 Sat</td>
</tr>
<tr>
<td>Capacity</td>
<td>Hx2 Gas Pressure</td>
</tr>
<tr>
<td>Return Water from Geo Field</td>
<td>Hx2 Sat</td>
</tr>
<tr>
<td>Hx2 Gas Temperature</td>
<td>Supply Water to Building</td>
</tr>
<tr>
<td>Hx2 Liquid Temperature</td>
<td>Hx1 Gas Temperature</td>
</tr>
<tr>
<td>Return water to Geo Field</td>
<td>Hx1 Liquid Temperature</td>
</tr>
<tr>
<td>Return Water to Building</td>
<td></td>
</tr>
</tbody>
</table>

**Notes**

After Machine has been Running for 4 Minutes

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Measurement</th>
</tr>
</thead>
<tbody>
<tr>
<td>Suction Temperature</td>
<td>Discharge Pressure</td>
</tr>
<tr>
<td>Super Heat</td>
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</tr>
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<td>Hx2 Gas Temperature</td>
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</tr>
<tr>
<td>Hx2 Liquid Temperature</td>
<td>Hx1 Gas Temperature</td>
</tr>
<tr>
<td>Return water to Geo Field</td>
<td>Hx1 Liquid Temperature</td>
</tr>
<tr>
<td>Return Water to Building</td>
<td></td>
</tr>
</tbody>
</table>

**Notes**

After Machine has been Running for 60 Minutes

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Measurement</th>
</tr>
</thead>
<tbody>
<tr>
<td>Suction Temperature</td>
<td>Discharge Pressure</td>
</tr>
<tr>
<td>Super Heat</td>
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</tr>
<tr>
<td>Subcooling</td>
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</tr>
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<td>Hx2 Sat</td>
</tr>
<tr>
<td>Hx2 Gas Temperature</td>
<td>Supply Water to Building</td>
</tr>
<tr>
<td>Hx2 Liquid Temperature</td>
<td>Hx1 Gas Temperature</td>
</tr>
<tr>
<td>Return water to Geo Field</td>
<td>Hx1 Liquid Temperature</td>
</tr>
<tr>
<td>Return Water to Building</td>
<td></td>
</tr>
</tbody>
</table>

**Notes**
Scroll Refrigeration Cycle Analysis

Unit Amp Draw
Line Voltage
Subcooling
Superheat

Note: Do not attach refrigerant gauges unless a problem is suspected!
Reference Calculations

### Heating Calculations:

\[ \text{LWT} = \text{EWT} - \frac{\text{HE}}{\text{GPM} \times 500^*} \]

### Cooling Calculations:

\[ \text{LWT} = \text{EWT} + \frac{\text{HR}}{\text{GPM} \times 500^*} \]

*NOTE:* * When using water.

## Legend

### Abbreviations and Definitions

- **HWR** = Hot Water Return
- **HWS** = Hot Water Supply
- **CWR** = Cold Water Return
- **CWS** = Cold Water Supply
- **HVR** = Heat Recovery Return
- **HVS** = Heat Recovery Supply
- **HVP** = High Voltage Panel
- **LVP** = Low Voltage Panel
- **TC** = Total Cooling Capacity in MBTUH
- **MBTUH** = Thousands of British Thermal Units per hour
- **LWT** = Leaving Water Temperature
- **EWT** = Entering Water Temperature
- **EER** = Energy Efficiency Ratio (TC/kW)
- **COP** = Coefficient of Performance (HC/kW \times 3.413)
- **PSI** = Pressure drop in pounds per square inch
- **HC** = Heating Capacity in MBTUH
- **HE** = Heat of Extraction in MBTUH
- **kW** = kilowatt
- **ft hd** = pressure drop in feet of head
- **HR** = Heat of Rejection

## Unit Startup

**Verify the following:**

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

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

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

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

Quarterly Checks
- Compressor oil levels
- Test and check all manual safeties
- Check strainers for debris
- Check water flow rates and pressure drops across evaporators and condensers
- Verify graphical data and trending
- Properly document all data

Annual Checks
- Remove and clean all waterside strainers
- Back washing of heat exchangers
- Perform leak tests on all refrigerant circuits
- Check all water flanged connections for wear or leaks
- Implement oil analysis if deemed necessary
- Verify all electrical connections
- Check and update all graphical interface items along with main controller
- Check and test all safeties both mechanical and software
- Verify sensor accuracy
- Do a system check to get overall overview
- Properly document all data

Replacement Procedures
When contacting the company for service or replacement parts, refer to the model number and serial number of the unit as stamped on the serial plate attached to the unit. If replacement parts are required, mention the date of installation of the unit and the date of failure, along with an explanation of the malfunctions and a description of the replacement parts required.

In-Warranty Material Return
Material may not be returned except by permission of authorized warranty personnel. Contact your local distributor for warranty return authorization and assistance.
WC Commercial Scroll Chiller Troubleshooting Form

Company Name: _________________________________ Company Phone No: _________________________________
Technician Name: ______________________________ Date: _________________________________
Model No: ______________________________ Serial No: _________________________________
Owner’s Name: ______________________________ Owner’s Phone No: _________________________________
Installation Address: ______________________________ Open or Closed Loop: _________________________________
Installation Date: _________________________________

Check One
☑ Start up/Check-out for new installation ☐ Troubleshooting Problem: _________________________________

1. FLOW RATE IN GPM (SOURCE/LOAD SIDE HEAT EXCHANGER)
   - Water In Pressure: a.______ PSI  a.______ PSI
   - Water Out Pressure: b.______ PSI b.______ PSI
   - Pressure Drop = a - b c.______ PSI c.______ PSI
   - Convert Pressure Drop to Flow Rate (refer to Pressure Drop table) d.______ GPM d.______ GPM

2. TEMPERATURE RISE OR DROP ACROSS SOURCE SIDE HEAT EXCHANGER
   - COOLING | HEATING
   - Water In Temperature: e.______ °F e.______ °F
   - Water Out Temperature: f.______ °F f.______ °F
   - Temperature Difference: g.______ °F g.______ °F

3. TEMPERATURE RISE OR DROP ACROSS LOAD SIDE HEAT EXCHANGER
   - COOLING | HEATING
   - Water In Temperature: h.______ °F h.______ °F
   - Water Out Temperature: i.______ °F i.______ °F
   - Temperature Difference: j.______ °F j.______ °F

4. HEAT OF REJECTION (HR) / HEAT OF EXTRACTION (HE) CALCULATION
   - HR or HE = Flow Rate x Temperature Difference x Brine Factor*
   - d. (above) x g. (above) x 485 for Methanol or Environol, 500 for water*
   - Heat of Extraction (Heating Mode) = _______ btu/hr
   - Heat of Rejection (Cooling Mode) = _______ btu/hr
   - Compare results to Capacity Data Tables
   - Note: Steps 5 through 8 need only be completed if a problem is suspected

5. WATTS
   - COOLING | HEATING | HYDRONIC
   - Volts: m.______ VOLTS m.______ VOLTS m.______ VOLTS
   - Total Amps (Comp. + Fan): n.______ AMPS n.______ AMPS n.______ AMPS
   - Watts = m. x n. x 0.85 o.______ WATTS o.______ WATTS o.______ WATTS

6. CAPACITY
   - Cooling Capacity = HR. - (o. x 3.413) p.______ btu/hr
   - Heating Capacity= HE. + (o. x 3.413) p.______ btu/hr

7. EFFICIENCY
   - Cooling EER = p. / o. q.______ EER
   - Heating COP = p. / (o. x 3.413) q.______ COP

8. SUPERHEAT (S.H.) / SUBCOOLING (S.C.)
   - COOLING | HEATING | HYDRONIC
   - Suction Pressure: r.______ PSI r.______ PSI r.______ PSI
   - Suction Saturation Temperature: s.______ °F s.______ °F s.______ °F
   - Suction Line Temperature: t.______ °F t.______ °F t.______ °F
   - Superheat = t. - s. u.______ °F u.______ °F u.______ °F
   - Head Pressure: v.______ PSI v.______ PSI v.______ PSI
   - High Pressure Saturation Temp.: w.______ °F w.______ °F w.______ °F
   - Liquid Line Temperature*: x.______ °F x.______ °F x.______ °F
   - Subcooling = w. - x. y.______ °F y.______ °F y.______ °F

* Note: Liquid line is between the source heat exchanger and the expansion valve in the cooling mode;
between the load heat exchanger and the expansion valve in the heating mode.
## Chiller Start-up Report

### PRELIMINARY CHECKS

<table>
<thead>
<tr>
<th>INSPECTION ITEM</th>
<th>RESULT</th>
<th>INITIALS</th>
</tr>
</thead>
<tbody>
<tr>
<td>INSPECT UNIT FOR SHIPPING OR INSTALLATION DAMAGE</td>
<td>□ OK</td>
<td>□ NG</td>
</tr>
<tr>
<td>VERIFY UNIT IS LEVEL</td>
<td>□ OK</td>
<td>□ NG</td>
</tr>
<tr>
<td>INSPECT WATER PIPING FOR PROPER INSTALLATION, AND THAT PIPING IS INSULATED ADEQUATELY</td>
<td>□ OK</td>
<td>□ NG</td>
</tr>
<tr>
<td>INSPECT INSIDE OF UNIT FOR POSSIBLE REFRIGERANT, OIL, OR WATER LEAKS</td>
<td>□ OK</td>
<td>□ NG</td>
</tr>
<tr>
<td>VERIFY MOISTURE INDICATOR (IF PRESENT) IS GREEN (INDICATING NO MOISTURE IN SYSTEM)</td>
<td>□ OK</td>
<td>□ NG</td>
</tr>
<tr>
<td>VERIFY ALL REFRIGERANT VALVES ARE OPEN</td>
<td>□ OK</td>
<td>□ NG</td>
</tr>
<tr>
<td>VERIFY ELECTRICAL PANELS ARE FREE OF FOREIGN MATERIALS AND ALL WIRING IS TIGHT AND SECURE</td>
<td>□ OK</td>
<td>□ NG</td>
</tr>
<tr>
<td>L1-L2 VOLTAGE</td>
<td>(V)</td>
<td></td>
</tr>
<tr>
<td>L1-L3 VOLTAGE</td>
<td>(V)</td>
<td></td>
</tr>
<tr>
<td>L2-L3 VOLTAGE</td>
<td>(V)</td>
<td></td>
</tr>
<tr>
<td>L1 TO GROUND VOLTAGE</td>
<td>(V)</td>
<td></td>
</tr>
<tr>
<td>VERIFY COMPRESSOR ROTATION BY BUMPING COMPRESSOR AND VERIFYING NO ALARM WITHIN 5 SEC.</td>
<td>□ OK</td>
<td>□ NG</td>
</tr>
<tr>
<td>VERIFY ETHERNET CABLE W/INTERNET CONNECTION HAS BEEN RUN TO UNIT (IF APPLICABLE)</td>
<td>□ OK</td>
<td>□ NG</td>
</tr>
<tr>
<td>VERIFY MS/TP COMMUNICATION WIRES HAVE BEEN RUN FROM BAS TO UNIT (IF APPLICABLE)</td>
<td>□ OK</td>
<td>□ NG</td>
</tr>
<tr>
<td>VERIFY MS/TS COMMUNICATION WIRES HAVE BEEN RUN BETWEEN UNITS (IF APPLICABLE)</td>
<td>□ OK</td>
<td>□ NG</td>
</tr>
<tr>
<td>EVAPORATOR (LOAD) FLOW RATE</td>
<td>(GPM)</td>
<td></td>
</tr>
<tr>
<td>CONDENSER (SOURCE) FLOW RATE</td>
<td>(GPM)</td>
<td></td>
</tr>
</tbody>
</table>
Chiller Start-up Report cont.

### PRELIMINARY CHECKS CONT.

<table>
<thead>
<tr>
<th>INSPECTION ITEM</th>
<th>RESULT</th>
<th>INITIALS</th>
</tr>
</thead>
<tbody>
<tr>
<td>GEO FLOW RATE (GPM)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>EVAPORATOR (LOAD) PRESSURE DROP (PSI)</td>
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</tr>
<tr>
<td>CONDENSER (SOURCE) PRESSURE DROP (PSI)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>GEO PRESSURE DROP (PSI)</td>
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</tr>
<tr>
<td>EVAPORATOR (LOAD) SIDE ANTIFREEZE CONCENTRATION % / TYPE</td>
<td></td>
<td></td>
</tr>
<tr>
<td>CONDENSER (SOURCE) SIDE ANTIFREEZE CONCENTRATION % / TYPE</td>
<td></td>
<td></td>
</tr>
<tr>
<td>GEO SIDE ANTIFREEZE CONCENTRATION % / TYPE</td>
<td></td>
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</tr>
<tr>
<td>APPROVAL OF ANTIFREEZE CONCENTRATION TO ADJUST FREEZE PROTECTION AND SET POINT SETTINGS</td>
<td></td>
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</tr>
<tr>
<td>ADJUST LOW SAT SETTINGS BASED ON TABLE BELOW (˚F)</td>
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</table>
Chiller Start-up Report cont.

<table>
<thead>
<tr>
<th>CONTROLS CHECKS</th>
</tr>
</thead>
<tbody>
<tr>
<td>INSPECTION ITEM</td>
</tr>
<tr>
<td>POWER ON INTERFACE AND ENSURE ALL PAGES AND DATA IS READING NORMALLY</td>
</tr>
<tr>
<td>VERIFY USER MANAGEMENT IS SETUP PROPERLY (ENHANCED CONTROLS ONLY)</td>
</tr>
<tr>
<td>VERIFY WATER TEMPERATURES CLOSELY MATCH REFRIGERANT SAT. TEMPERATURES</td>
</tr>
<tr>
<td>VERIFY COMPRESSOR AND UNIT SETTINGS ARE CORRECT (SEE SHEET BELOW)</td>
</tr>
<tr>
<td>COMPUTER STATIC IP ADDRESS (IF APPLICABLE) (FACTORY: 10.1.7.49)</td>
</tr>
<tr>
<td>VERIFY DDC IS COMMUNICATING WITH UNIT PROPERLY</td>
</tr>
<tr>
<td>VERIFY REMOTE ACCESS WORKS PROPERLY (IF APPLICABLE)</td>
</tr>
</tbody>
</table>

**Notes:**

COMPUTER STATIC IP ADDRESS (IF APPLICABLE) (FACTORY: 10.1.7.49)
### Chiller Start-up Report cont.

#### RUN CHECKS

<table>
<thead>
<tr>
<th>INSPECTION ITEM</th>
<th>RESULT</th>
<th>INITIALS</th>
</tr>
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<tbody>
<tr>
<td>VERIFY COMPRESSOR OIL LEVEL</td>
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<td></td>
</tr>
<tr>
<td>MODE</td>
<td>(°F)</td>
<td></td>
</tr>
<tr>
<td>ENTERING HOT WATER TEMP</td>
<td>(°F)</td>
<td></td>
</tr>
<tr>
<td>LEAVING HOT WATER TEMP</td>
<td>(°F)</td>
<td></td>
</tr>
<tr>
<td>ENTERING COLD WATER TEMP</td>
<td>(°F)</td>
<td></td>
</tr>
<tr>
<td>LEAVING COLD WATER TEMP</td>
<td>(°F)</td>
<td></td>
</tr>
<tr>
<td>COMPRESSOR 1 CAPACITY</td>
<td>(%)</td>
<td></td>
</tr>
<tr>
<td>COMPRESSOR AMPERAGE</td>
<td>(A)</td>
<td></td>
</tr>
<tr>
<td>SUCTION SAT</td>
<td>(°F)</td>
<td></td>
</tr>
<tr>
<td>DISCHARGE SAT</td>
<td>(°F)</td>
<td></td>
</tr>
<tr>
<td>COMPRESSOR 2 CAPACITY</td>
<td>(%)</td>
<td></td>
</tr>
<tr>
<td>COMPRESSOR AMPERAGE</td>
<td>(A)</td>
<td></td>
</tr>
<tr>
<td>SUCTION SAT</td>
<td>(°F)</td>
<td></td>
</tr>
<tr>
<td>DISCHARGE SAT</td>
<td>(°F)</td>
<td></td>
</tr>
<tr>
<td>SUBCOOLING ON ALL CIRCUITS BETWEEN 4°F-15°F</td>
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<td></td>
</tr>
<tr>
<td>SUPERHEAT ON ALL CIRCUITS BETWEEN 7°F-19°F</td>
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## Revision Guide

<table>
<thead>
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<th>Description:</th>
<th>Date:</th>
<th>By:</th>
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<tbody>
<tr>
<td>9, 19</td>
<td>Added Bypass Nomenclature, Updated Temperature Header Dimensional Data</td>
<td>12 Dec 2017</td>
<td>MA</td>
</tr>
<tr>
<td>All</td>
<td>Document Creation</td>
<td>7 July 2017</td>
<td>MA</td>
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