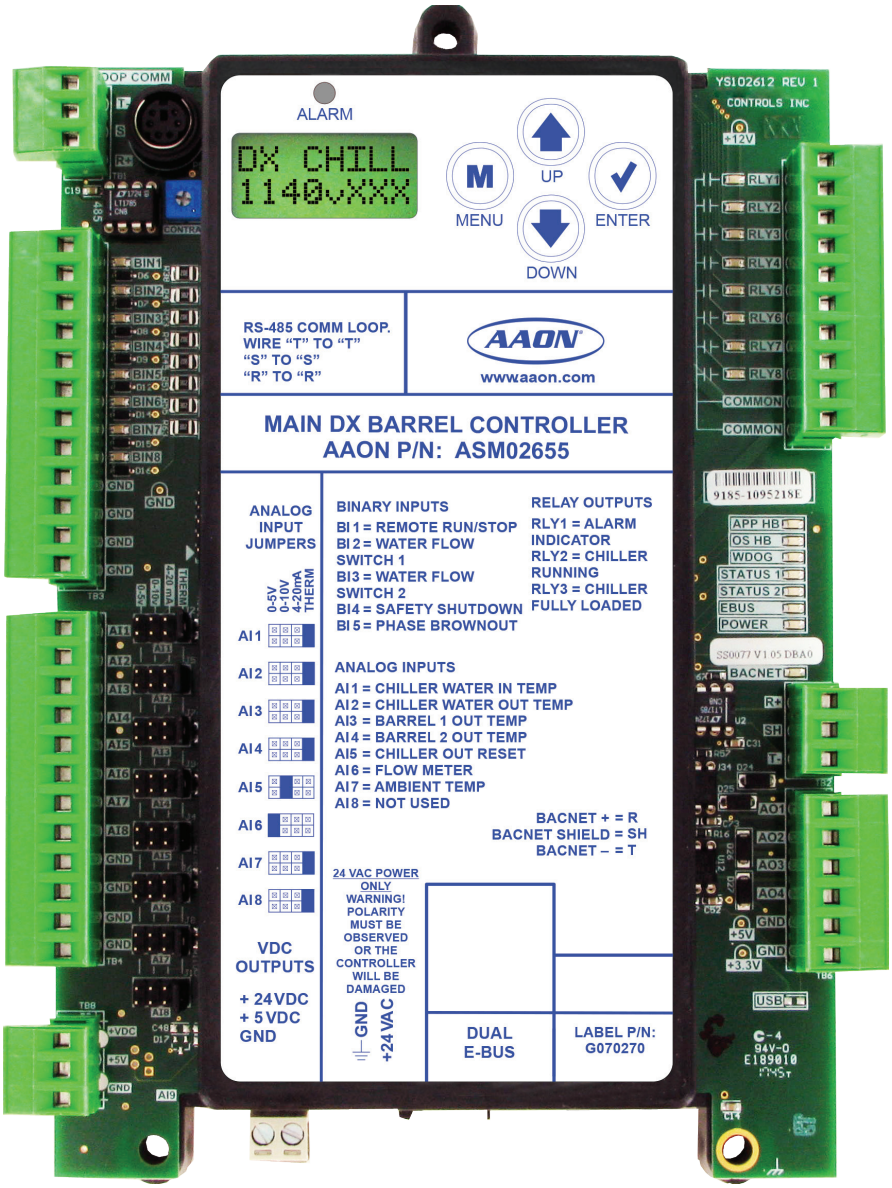
# Main DX Barrel Chiller Controller Technical Guide



| MAIN DX BARREL CHILLER CONTROLLER REVISION LOG | |
|---|---|
| **REVISION AND DATE** | **CHANGE** |
| Rev. 01A, November 5, 2020 | added Lead/Lag sequence, Added Pump Runtime screens, Chiller Pumping Module: removed Heat Exchanger Water Side Outlet Temperature Sensor Failure Alarm def., removed HE GLOUT NO SENSE alarm and HE GLOUT history alarm |
| Rev. B, November 17, 2021 | Updated format. Updated Glycol screen information |

| MAIN DX BARREL CHILLER CONTROLLER PARTS REFERENCE | |
|---|---|
| **PART DESCRIPTION** | **PART NUMBER** |
| Main DX Barrel Chiller Controller | ASM02655 |
| Chiller Refrigerant Module | ASM02654 |
| Vestibule Module | ASM02650 |
| Chiller Pumping Module | ASM02448 |
| Evaporative Condenser Module | ASM02318 |
| E-BUS Horizontal Outdoor Air Temp and RH Sensor | ASM01836 |
| Touchscreen Controller PPC | V99840 |
| Prism 2 Software | ASM02533 |
| CommLink 5 | ASM01874 |
| IP Module Kit | ASM01902 |
| USB Link 2 | ASM02244 |
| EBC E-BUS Cable Assembly E-BUS Power & Comm 1.5 ft., 3 ft., 10 ft., 25 ft., 50 ft., 75 ft., 100 ft., 150 ft., 250 ft., and 1000 ft. Spool | G029440 (1.5 ft.), G012870 (3 ft.), G029460 (10 ft.), G045270 (25 ft.), G029510 (50 ft.), G029530 (75 ft.), G029450 (100 ft.), G029470 (150 ft.), V36590 (250 ft.), G018870 (SPOOL) |
| E-BUS Adapter Hub with 1.5 ft. E-BUS cable | ASM01635 |
| E-BUS Adapter Board | ASM01878 |

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**All manuals are also available for download from www.aaon.com/controlsmanuals.**

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AAON P/N: G070300, Rev. B

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## Control System Features and Applications

The Main DX Barrel Chiller Controller provides control of the chilled water for a DX Barrel Chiller.

The Main DX Barrel Chiller Controller has an on-board BACnet port for connection to a BACnet MS/TP BAS network. There are also two E-BUS expansion ports which allow for the connection of the Chiller Refrigerant Module, Chiller Pumping Module, Evaporative Condenser Module, and Vestibule Module via E-BUS cables.

In addition, the controller and its associated modules contain a 2 x 8 LCD character display with four buttons that allow for status and alarm display and BACnet configuration.

## Important Wiring Considerations

### General

Correct wiring of the Main DX Barrel Chiller Controller and its modules is the most important factor in the overall success of the controller installation process. The Main DX Barrel Chiller Controller and modules are installed and wired at the AAON factory. Some of the following information may not apply to this specific installation if it was pre-wired at the factory.

### Wiring

The Main DX Barrel Chiller Controller and associated modules must be connected to an 18-30 VAC power source of the proper size for the calculated VA load requirements. All transformer sizing should be based on the VA rating listed in **Table 1 and Table 2, this page**.

Please carefully read and apply the following information when wiring the Main DX Barrel Chiller Controller and its associated modules.

1. All wiring is to be in accordance with local and national electrical codes and specifications.
2. All 24 VAC wiring must be connected so that all ground wires remain common. Failure to follow this procedure can result in damage to the controller and connected devices.
3. Minimum wire size for 24 VAC wiring should be 18 gauge.
4. Minimum wire size for all sensors should be 24 gauge. Some sensors require two-conductor wire and some require three-or four-conductor wire.
5. Minimum wire size for 24 VAC thermostat wiring should be 22 gauge.
6. Be sure that all wiring connections are properly inserted and tightened into the terminal blocks. Do not allow wire strands to stick out and touch adjoining terminals which could potentially cause a short circuit.
7. When communication wiring is to be used to interconnect Main DX Barrel Chiller Controllers together or to connect to other communication devices, all wiring must be plenum-rated, minimum 18-gauge, two-conductor, twisted-pair with shield. AAON can supply communication wire that meets this specification and is color coded for the network or local loop. Please consult your AAON distributor for information. If desired, Belden #82760 or equivalent wire may also be used.
8. Before applying power to the Main DX Barrel Chiller Controller and its associated modules, be sure to recheck all wiring connections and terminations thoroughly.

| Control Device | Voltage | VA Load | Operating Temperature | Humidity (Non-Condensing) |
|---|---|---|---|---|
| **Main DX Barrel Chiller Controller** | 18-30 VAC (25%/-15%), Class 2 | 15 | 10°F to 150°F -12ºC to 66ºC | 0-95% RH |
| **Chiller Refrigerant Module** | **Inputs** | | Resistive Inputs require 10KΩ Type III Thermistor | |
| | | | 24 VAC Inputs provide 4.7kΩ Load | |
| **Chiller Pumping Module** | **Outputs** | | Relay Outputs: 1 amp maximum per output. | |

**Table 1: Main DX Barrel Chiller Controller, Chiller Refrigerant Module, and Chiller Pumping Module Electrical and Environmental Requirements**

| Control Device | Voltage | VA Load | Operating Temperature | Humidity (Non-Condensing) |
|---|---|---|---|---|
| **Evaporative Condenser Module** **Vestibule Module** | 18-30 VAC (25%/-15%), Class 2 | 18 | 10°F to 150°F -12ºC to 66ºC | 0-95% RH |
| | **Inputs** | | Resistive Inputs require 10KΩ Type III Thermistor | |
| | | | 24 VAC Inputs provide 4.7kΩ Load | |
| | **Outputs** | | Relay Outputs: 1 amp maximum per output. | |

**Table 2: Evaporative Condenser Module and Vestibule Module Electrical and Environmental Requirements**

**WARNING:** Observe Polarity. All boards must be wired with GND-to-GND and 24 VAC-to-24 VAC. Failure to observe polarity will result in damage to one or more of the boards. Expansion modules must be wired in such a way that the expansion modules and the controller are always powered together. Loss of power to the expansion module will cause the controller to become inoperative until power is restored to the expansion module.

## Input/Output Maps

See **Table 3, this page**, for the Main DX Barrel Chiller Controller Inputs/Outputs and **Table 4, this page**, for the Chiller Refrigerant Module Inputs/Outputs.

| MAIN DX BARREL CHILLER CONTROLLER | |
|---|---|
| **Analog Inputs** | |
| **1** | Chiller Water In Temperature (AI1) |
| **2** | Chiller Water Out Temperature (AI2) |
| **3** | Barrel 1 Out Temperature (AI3) |
| **4** | Barrel 2 Out Temperature (AI4) |
| **5** | Chiller Out Reset (AI5) |
| **6** | Flow Meter (AI6) |
| **7** | Ambient Temperature (AI7) |
| **8** | Not Used (AI8) |
| **BInary Inputs** | |
| **1** | Remote Run/Stop (BI1) |
| **2** | Water Flow Switch 1 (BI2) |
| **3** | Water Flow Switch 2 (BI3) |
| **4** | Safety Shutdown (BI4) |
| **5** | Phase Brownout (BI5) |
| **Relay Outputs (24 VAC)** | |
| **1** | Alarm Indicator (RLY1) |
| **2** | Chiller Running (RLY2) |
| **3** | Chiller Fully Loaded (RLY3) |
| **Communication Terminals** | |
| **WATTCOMM** | Communication Terminal Block |
| **BACNET MS/TP** | Communication Terminals Block |
| **DUAL E-BUS** | Two E-BUS Ports |
| **Additional Inputs** | |

**NOTE:** The following E-BUS sensor could be connected to the Main DX Barrel Chiller Controller via E-BUS port or E-BUS adapter:

1. E-BUS Horizontal Outdoor Air Temperature and RH Sensor

**Table 3: Main DX Barrel Chiller Controller Inputs and Outputs**

| CHILLER REFRIGERANT MODULE | |
|---|---|
| **Analog Inputs** | |
| **1** | Suction Line Pressure (0-5VDC) (AI1) |
| **2** | Discharge Line Pressure (0-5VDC) (AI2) |
| **3** | Suction Line Temperature Sensor (AI3) |
| **4** | Discharge Line Temperature Sensor (AI4) |
| **5** | Liquid Line Pressure (0-5VDC) (AI5) |
| **6** | Liquid Line Temperature Sensor (AI6) |
| **7** | Compressor 1 Amps (AI7) |
| **8** | Compressor 2 Amps (AI8) |
| **Binary Inputs** | |
| **1** | Compressor 1 Status (BI1) |
| **2** | Compressor 2 Status (BI2) |
| **3** | Compressor 1 VFD Fault (BI3) |
| **4** | Circuit Disable (BI4) |
| **5** | Condenser Fan Fault (BI5) |
| **Analog Outputs (0-5 VDC)** | |
| **1** | Compressor 1 VFD (AO1) |
| **2** | Condenser Fan VFD (AO2) |
| **3** | Expansion Valve (AO3) |
| **Relay Outputs (24 VAC)** | |
| **1** | Compressor 1 Enable (RLY1) |
| **2** | Compressor 2 Enable (RLY2) |
| **3** | Condenser Fan Enable (RLY3) |
| **Communication Terminals** | |
| **DUAL E-BUS** | Two E-BUS Ports |

**Table 4: Chiller Refrigerant Module Inputs and Outputs**

## Vestibule Module and Chiller Pumping Module I/O Maps

| VESTIBULE MODULE | |
|---|---|
| **Analog Inputs** | |
| **1** | Not Used (AI1) |
| **2** | Not Used (AI2) |
| **3** | Not Used (AI3) |
| **4** | Not Used (AI4) |
| **5** | Vestibule Temperature Sensor (AI5) |
| **6** | Outdoor Air Temperature Sensor (0-5VDC) (AI6) |
| **7** | Not Used (AI7) |
| **Binary Inputs** | |
| **1** | Chiller Running Status (BI1) |
| **2** | Refrigerant Leak Detector (BI2) |
| **3** | Coil Pump WFS (BI3) |
| **4** | Not Used (BI4) |
| **Relay Outputs (24 VAC)** | |
| **1** | Vent Fan Enable (RLY1) |
| **2** | Coil Pump / Fan Enable (RLY2) |
| **3** | Heat Enable (RLY3) |
| **4** | Alarm (RLY4) |
| **Communication Terminals** | |
| **DUAL E-BUS** | One E-BUS Port |

**Table 5: Vestibule Module Inputs and Outputs**

| CHILLER PUMPING MODULE | |
|---|---|
| **Analog Inputs - 10K @ 77ºF Type III Thermistors** | |
| **1** | Waterside Economizer Primary Mixing Valve Outlet Temperature Sensor (AI1) (Valve Outlet Mixed Temperature) |
| **2** | Heat Exchanger Water Side Outlet Temperature Sensor (AI2) |
| **3** | Heat Exchanger Glycol Side Inlet Temperature Sensor (AI3) |
| **4** | Heat Exchanger Glycol Side Outlet Temperature Sensor (AI4) |
| **5** | Chiller Pump Building Pump Suction Pressure (AI5) |
| **6** | Chiller Pump Building Pump Discharge Pressure (AI6) |
| **Binary Inputs** | |
| **1** | Waterside Economizer VFD Fault (BI1) |
| **2-3** | Not Used (BI2) (BI3) |
| **4** | Chiller Pump VFD 1 Fault (BI4) |
| **5** | Chiller Pump VFD 2 Fault (BI5) |
| **6** | Glycol Feeder Low (BI6) |
| **Analog Outputs** | |
| **1** | Waterside Economizer VFD Speed (AO1) |
| **2** | Waterside Economizer Primary 3-Way Mixing Valve Actuator (AO2) |
| **3** | Waterside Economizer Secondary 3-Way Mixing Valve Actuator (AO3) |
| **4** | Chiller Pump VFD (AO4) |
| **5** | Bypass Valve (AO5) |
| **Relay Outputs (24 VAC)** | |
| **1** | Waterside Economizer Fan Enable (RLY1) |
| **2** | Waterside Economizer Glycol Circuit Pump (RLY2) |
| **3** | Chiller Pump Primary A Pump 1 (RLY3) |
| **4** | Chiller Pump Primary A Pump 2 (RLY4) |
| **5** | Chiller Pump Secondary Pump 1 (RLY5) |
| **6** | Chiller Pump Secondary Pump 2 (RLY6) |
| **7** | Chiller Pump Primary B Pump 1 (RLY7) |
| **8** | Chiller Pump Primary B Pump 2 (RLY8) |
| **Communication Terminals** | |
| **DUAL E-BUS** | Two E-BUS Ports |

**Table 6: Chiller Pumping Module Inputs and Outputs**

| EVAPORATIVE CONDENSER MODULE | |
|---|---|
| **Analog Inputs** | |
| **1** | Condenser Pump 1 Amps (SP) |
| **2** | Condenser Pump 2 Amps (HP) |
| **3** | Sump Temperature Sensor 1 (TEMP1) |
| **4** | Sump Temperature Sensor 2 (TEMP2) |
| **5** | Sump Temperature Sensor 3 (TEMP3) |
| **6** | Low Sump (Dry Contact) (TEMP4) |
| **Binary Inputs** | |
| **1** | Pump 1 Pressure Switch (BI1) |
| **2** | Pump 2 Pressure Switch (BI2) |
| **3** | Condenser Pump 1 VFD Fault (BI3) |
| **4** | Condenser Pump 2 VFD Fault (BI4) |
| **Analog Outputs** | |
| **1** | Pump 1 VFD Speed (AO1) |
| **2** | Pump 2 VFD Speed (AO2) |
| **Relay Outputs (24 VAC)** | |
| **1** | Condenser Pump 1 Run (RLY1) |
| **2** | Condenser Pump 2 Run (RLY2) |
| **3** | Sump Heater Enable (RLY3) |
| **4** | Drain Valve / Disable Make-Up Water (RLY4) |
| **Communication Terminals** | |
| **DUAL E-BUS** | 2 E-BUS Ports |

**Table 7: Evaporative Condenser Module Inputs and Outputs**

## Main DX Barrel Chiller Controller Input Wiring

The Main DX Barrel Chiller Controller provides control of the Chilled Water for one or two DX Barrel Chillers. The controller is designed with eight analog inputs, four analog outputs, eight binary inputs, and eight relay outputs.

The controller has an on-board BACnet port for connection to a BACnet MS/TP network. There are also two E-BUS expansion ports which allow the connection of communicating sensors and E-BUS modules via E-BUS cable assemblies.

The controller contains a 2 x 8 LCD character display and four buttons that allow for status and alarm display as well as BACnet configuration. See **Figure 1, this page**, below for input wiring.

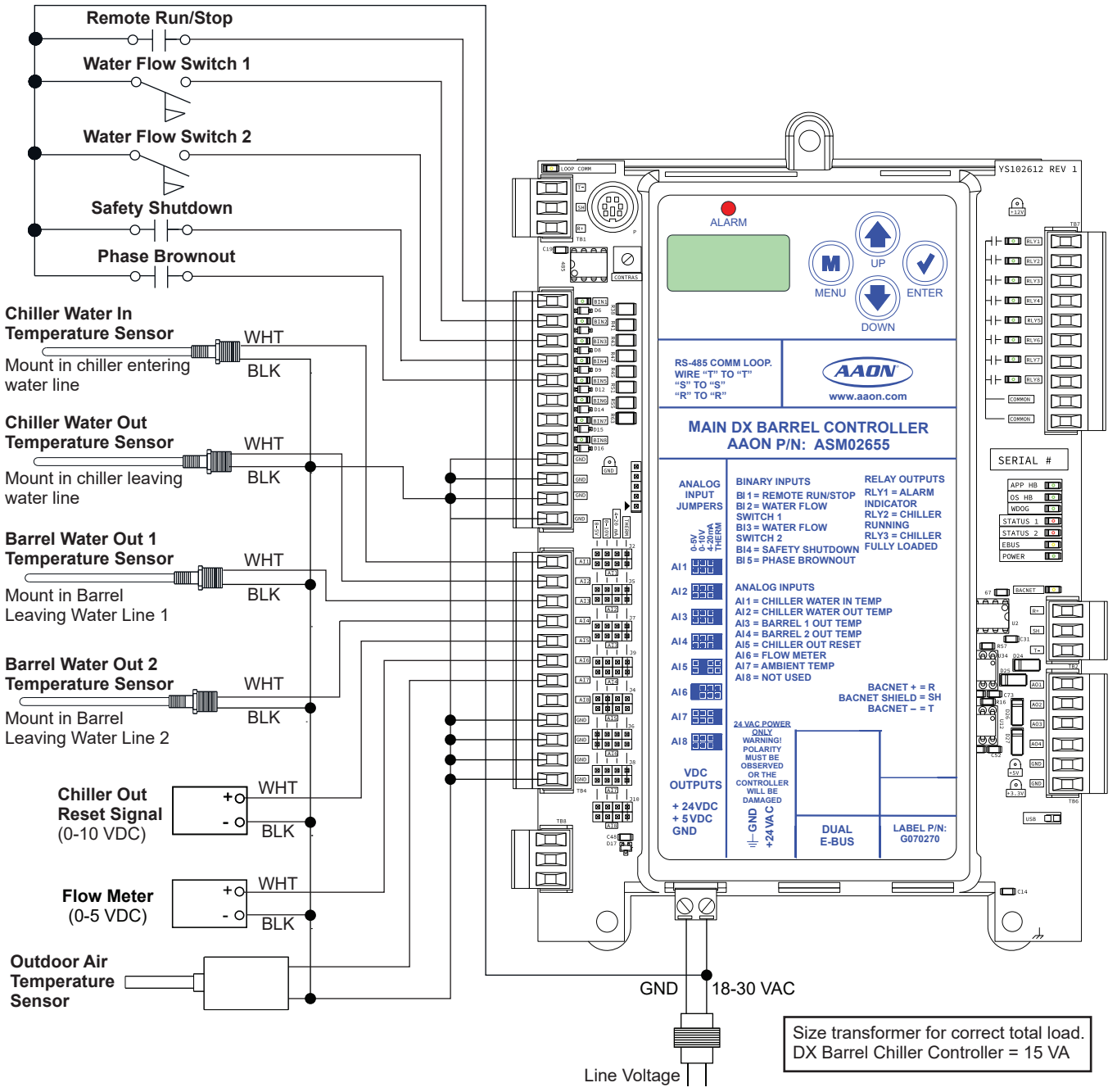



**Figure 1: Main DX Barrel Chiller Controller Input Wiring**

The Main DX Barrel Chiller Controller has two E-BUS expansion ports which allow for the connection of the Chiller Refrigerant Module, the Chiller Pumping Module, the Evaporative Condenser Module, and the Vestibule Module via E-BUS cables.

The Main DX Barrel Chiller Controller must be connected to an 18-30 VAC power source. Please see **Table 1, page 10**, for correct VA requirements to use when sizing the transformer(s) used for powering the controller and its associated modules. See **Figure 2, this page**, for output wiring.

**NOTE:** When wiring the Main DX Barrel Chiller Controller, its contacts must be wired as wet contacts (connected to 24 VAC).

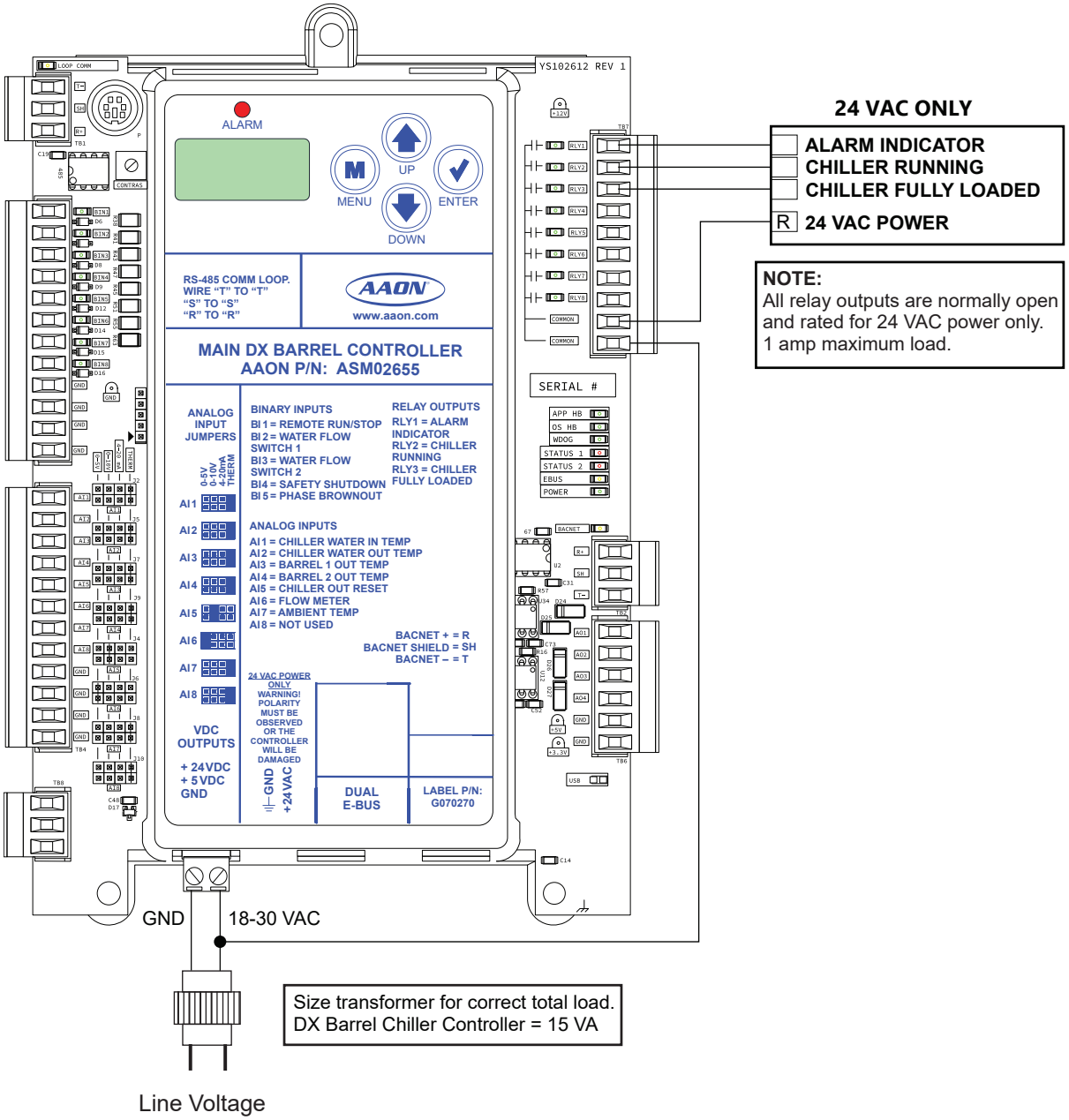



**Figure 2: Main DX Barrel Chiller Controller Output Wiring**

## Chiller Refrigerant Module Input Wiring

The Chiller Refrigerant Module provides control of the compressors and condenser fans on a DX Barrel Chiller. Up to six refrigerant modules can be used, one per circuit.

The module is designed with eight analog inputs, five analog outputs, ten binary inputs, and eight relay outputs.

The module has two E-BUS expansion ports which allow the connection of communicating sensors and E-BUS modules via modular cable assemblies.

The module contains a 2 x 8 LCD character display and four buttons that allow for status and alarm display.

The Chiller Refrigerant Module must be connected to an 18-30 VAC power source. When wiring the refrigerant module, its relay outputs must be wired as wet contacts (connected to 24 VAC). See **Figure 3, this page**, for input wiring and **Figure 4, page 17**, for output wiring.

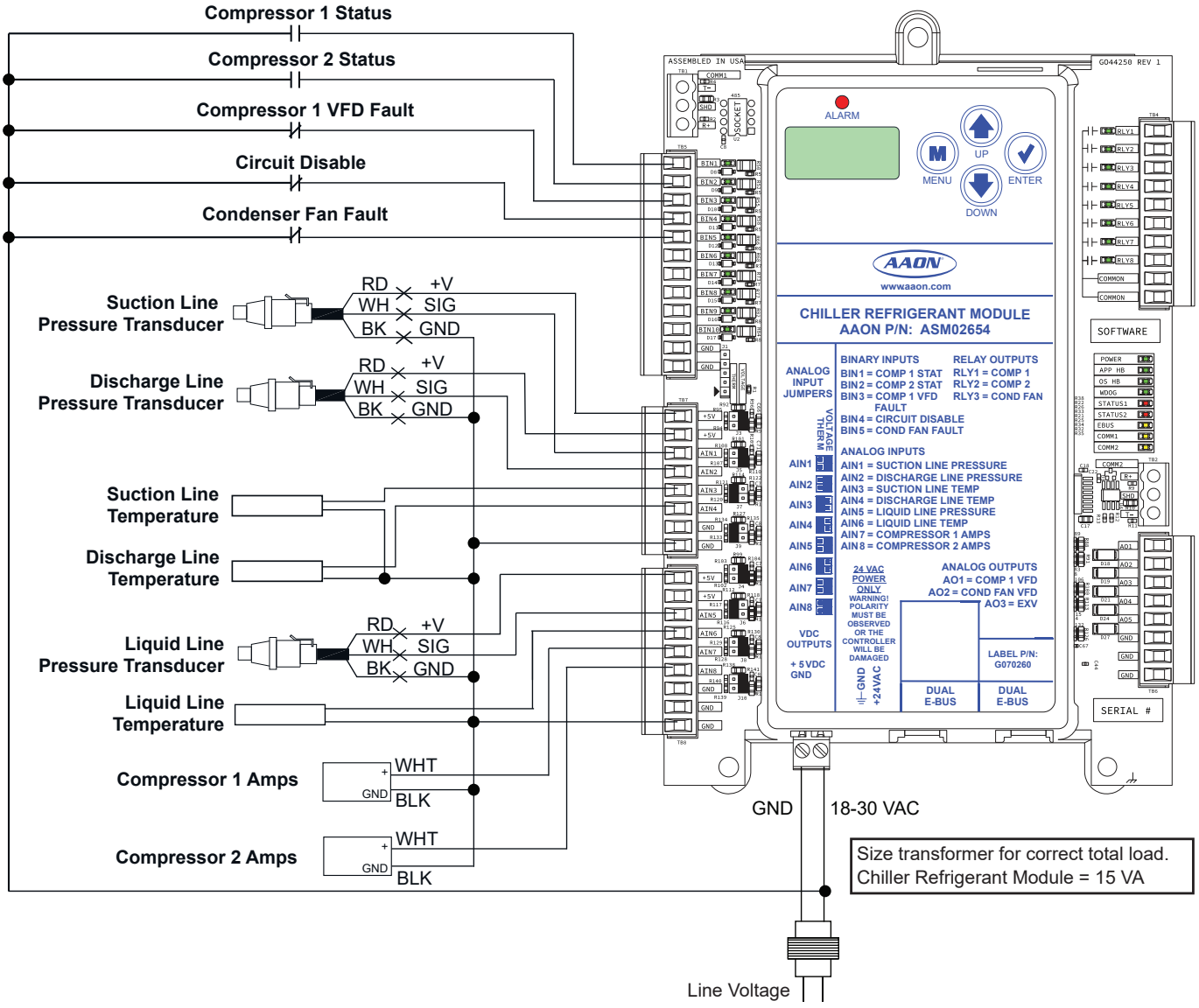



**Figure 3: Chiller Refrigerant Module Input Wiring**

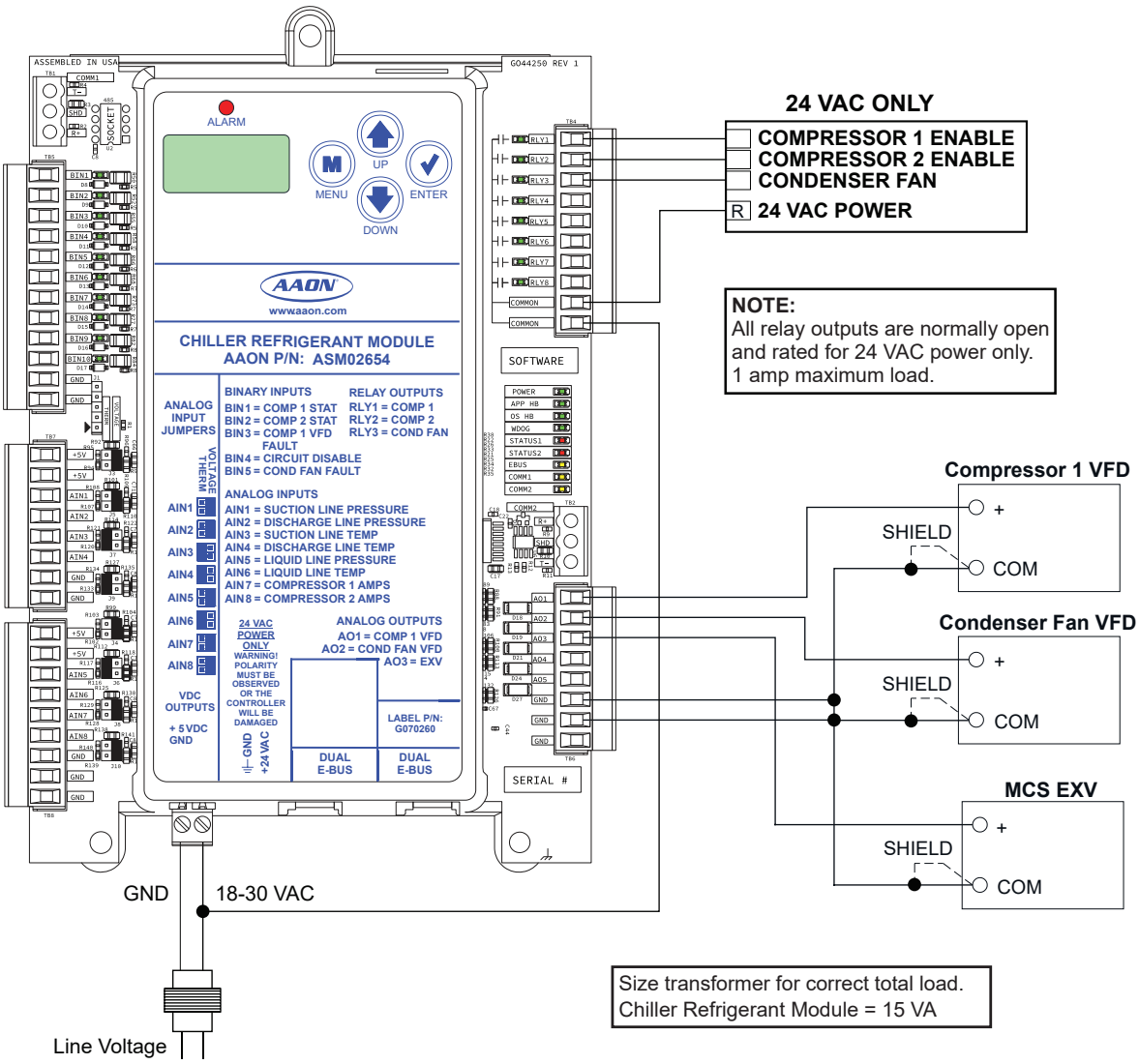



**Figure 4: Chiller Refrigerant Module Output Wiring**

## Chiller Pumping Module Input Wiring

The Chiller Pumping Module modulates and stages the compressors to satisfy the Main DX Barrel Chiller Controller's leaving water temperature.

The module is designed with eight analog inputs, five analog outputs, ten binary inputs, and eight relay outputs.

The module has two E-BUS expansion ports which allow the connection of communicating sensors and E-BUS modules via modular cable assemblies.

The module contains a 2 x 8 LCD character display and 4 buttons that allow for status and alarm display.

The Chiller Pumping Module must be connected to an 18-30 VAC power source. When wiring the module, its relay outputs must be wired as wet contacts (connected to 24 VAC).

See **Figure 5, this page**, for input wiring and **Figure 6, page 19**, for output wiring.

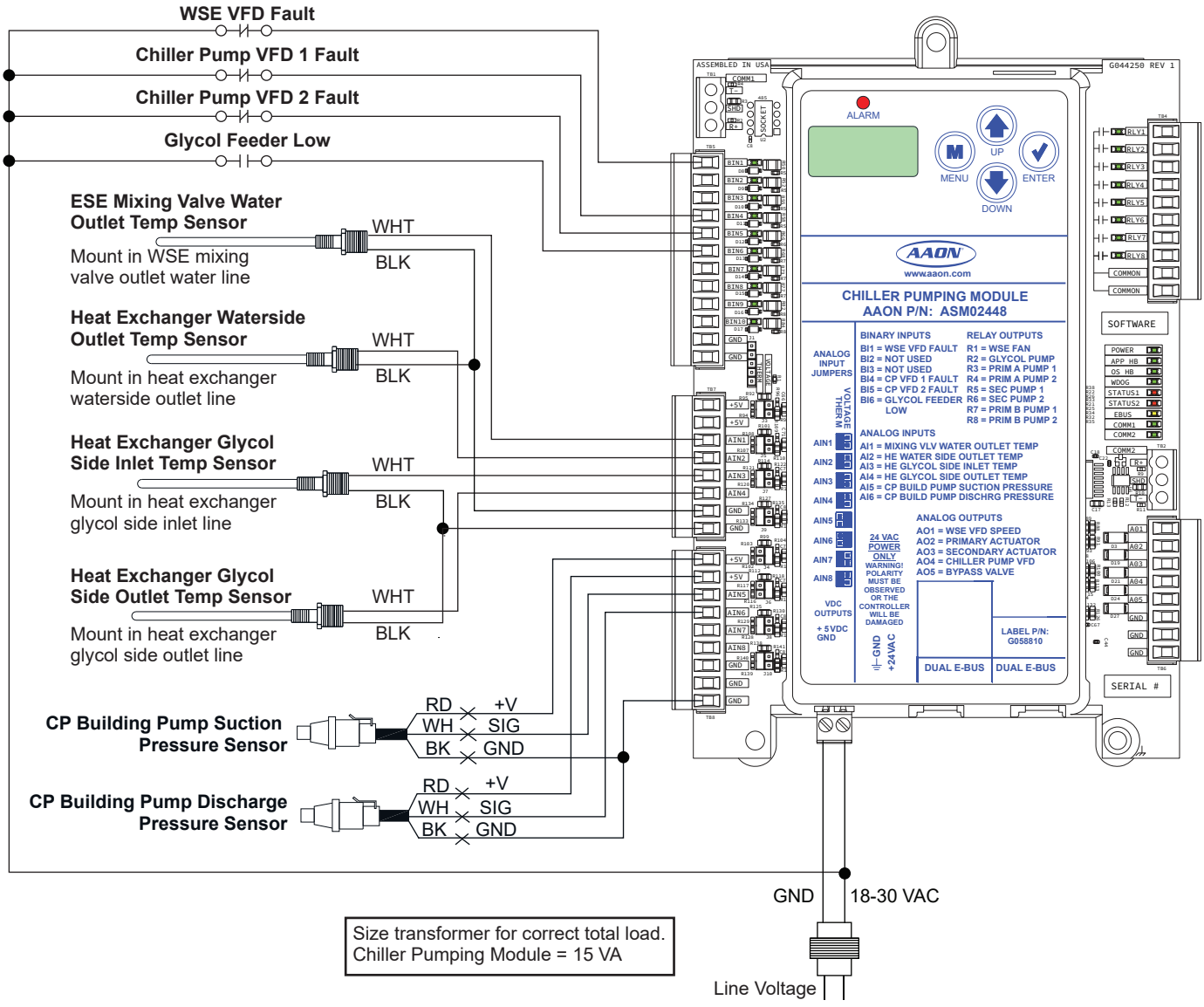



**Figure 5: Chiller Pumping Module Input Wiring**

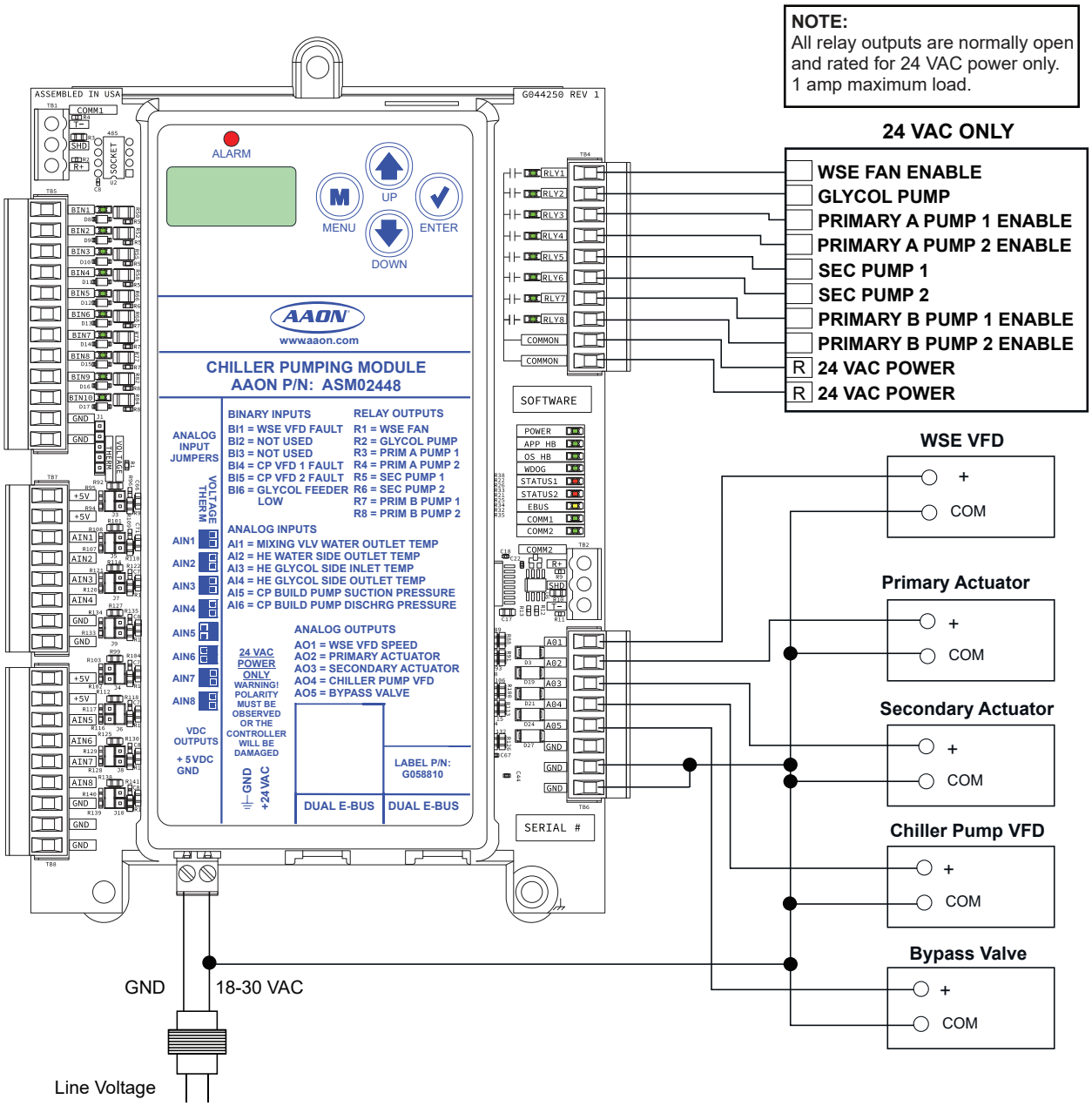



**Figure 6: Chiller Pumping Module Output Wiring**

## Evaporative Condenser Module Input Wiring

The Evaporative Condenser Module controls the Evaporative Condenser of the Chiller to help control the head pressure. The module is designed for R410-A refrigerant.

The module is connected to the Main DX Barrel Chiller Controller. Only one Evaporative Condenser Module can be connected.

The module provides a 2 x 8 LCD character display and four buttons that allow for status of system operation, system setpoints, system configurations, sensors, and alarms, and to change the module's address, if necessary.

See **Figure 7, this page**, for input wiring and **Figure 8, page 21,** for output wiring.

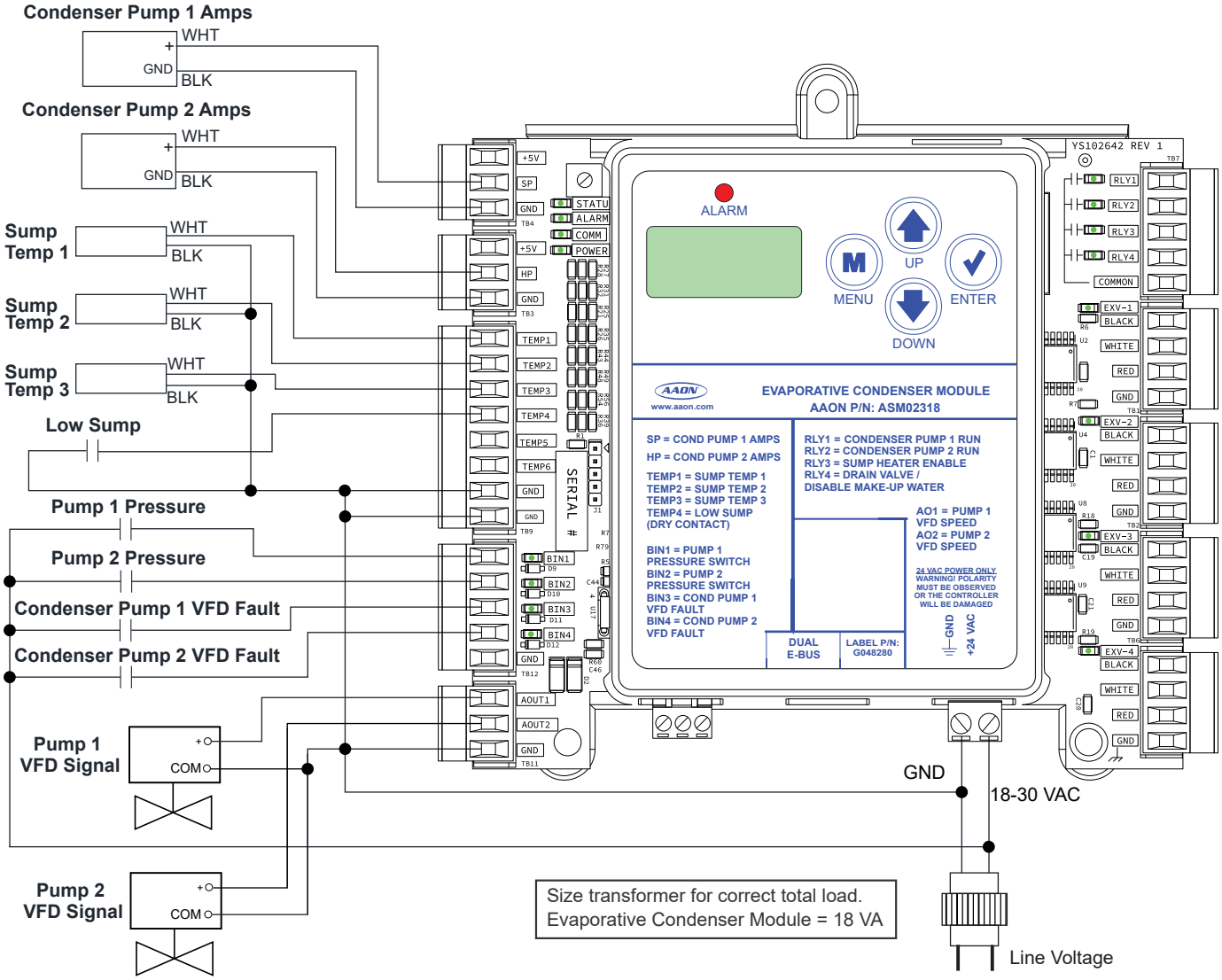



**Figure 7: Evaporative Condenser Module Input Wiring**

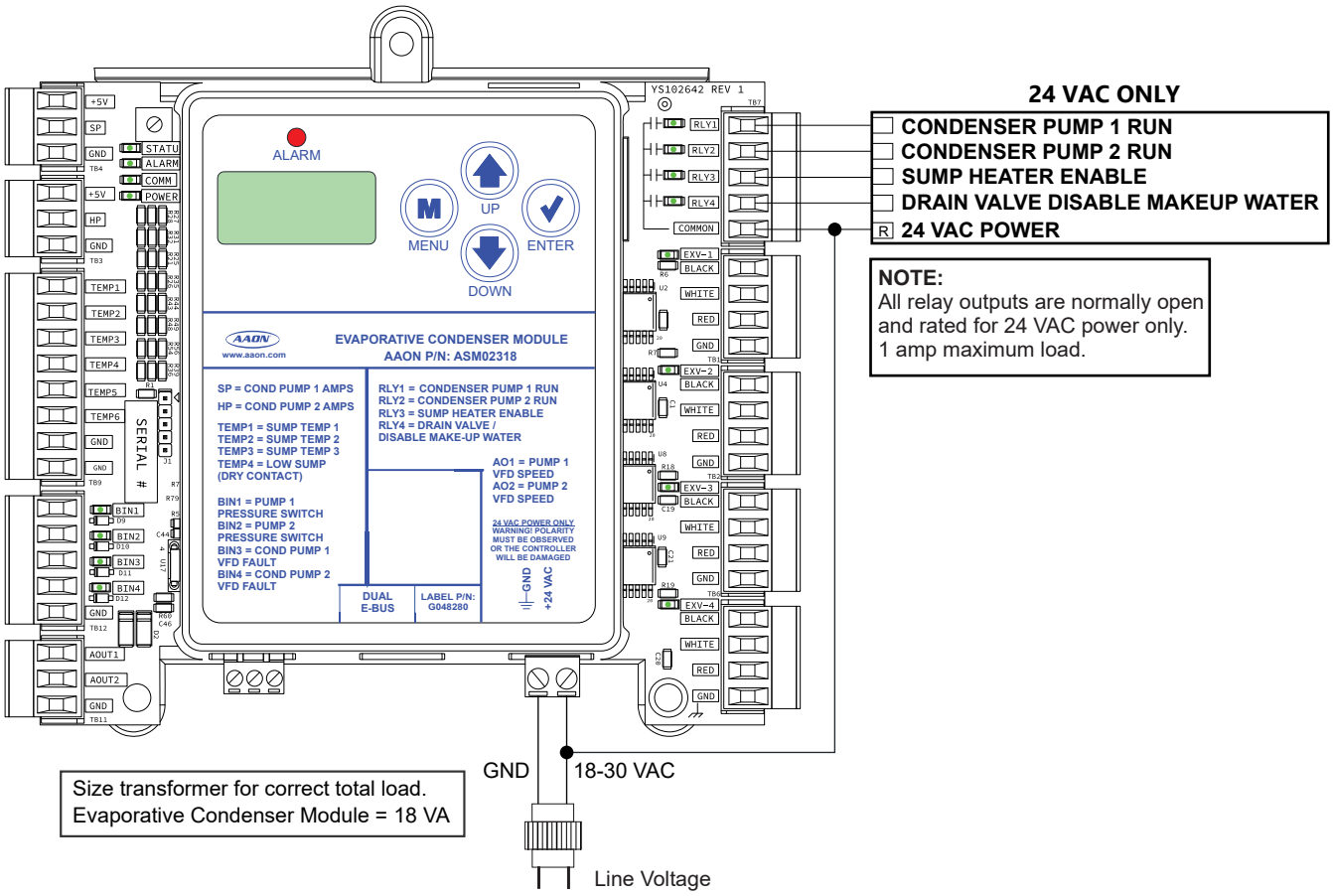



**Figure 8: Evaporative Condenser Module Output Wiring**

## Vestibule Module Input Wiring

The Vestibule Module can be used to control the heating, cooling, and venting of the vestibule it is mounted in. It monitors the heating, cooling, and venting operation to manage the conditions of a single vestibule.

The Vestibule Module can be used in stand-alone mode or communicating with the Main DX Barrel Chiller Controller. Up to two Vestibule Modules can be connected, depending on the size of the system.

The module has two E-BUS expansion ports which allow the connection of communicating sensors and E-BUS modules via modular cable assemblies.

The module contains a 2 x 8 LCD character display and four buttons that allow for status and alarm display.

See **Figure 9, this page**, for input wiring and **Figure 10, page 23**, for output wiring.

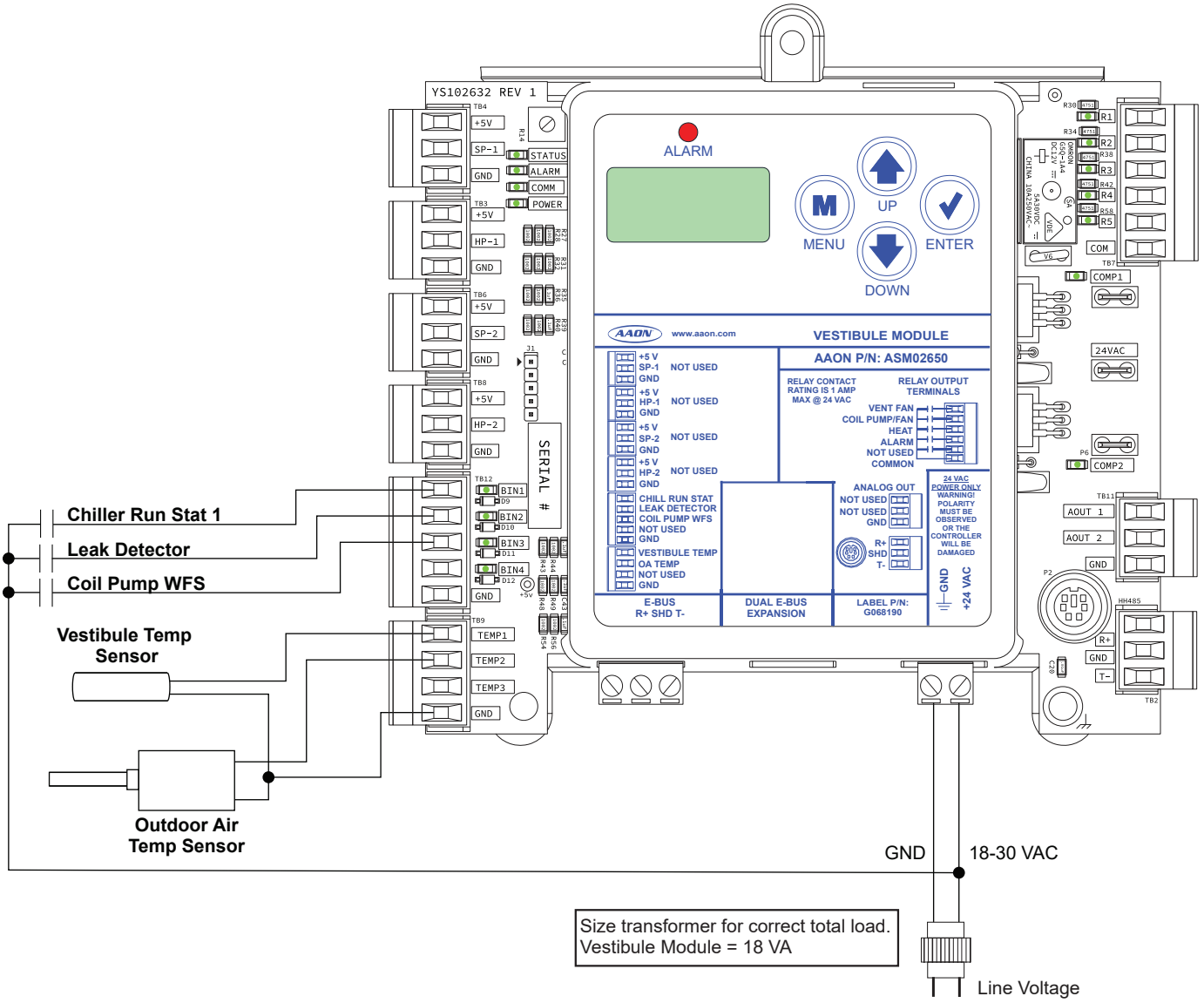



**Figure 9: Vestibule Module Input Wiring**

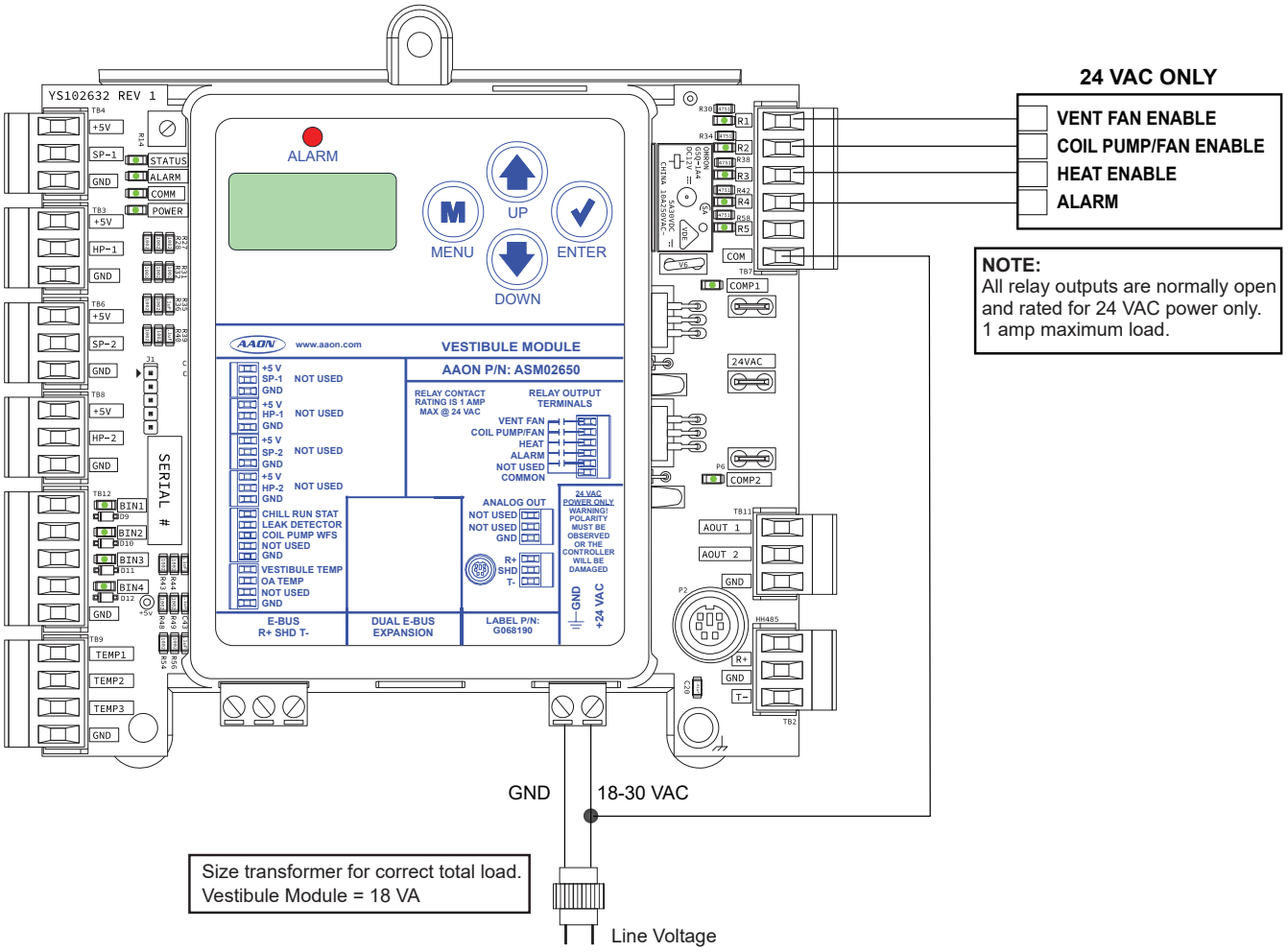



**Figure 10: Vestibule Module Output Wiring**

## Main DX Barrel Chiller Controller - Overview

### DX Barrel Chiller Operation

The Main DX Barrel Chiller Controller directly operates the following components to provide chilled water:

- Mode control
- Mechanical chilling oversight
- Glycol feeder level monitor
- External control interface (e.g. a building management system)
- Safety checks

Chilling operation involves operations outside the main chiller controller; however, the controller maintains operational management of these components, including:

- Mechanical chilling
- Water circuit pumping
- Economizing

### Chiller Mode of Operation

There are two operational modes for the chiller system:

- Off Mode
- Chiller (Run) Mode

The sequence is based primarily on "normal" operation, with extensions to operation where exceptional conditions are present (safeties).

### Controlling the Operator Modes

The two operator modes are commanded by a combination of four mode control factors:

- Remote Unit Enable/Disable Input
- Internal Schedule
- Run/Stop override via BACnet
- Run/Stop override via the User Interface

#### Remote Unit Enable/Disable Input

This input is a master override to disable the unit.

When this input is inactive, the chiller will not run regardless of the other three control factors.

When this input is active, the chiller will operate according to the condition of the other three factors. Since the schedule defaults to always active, and the overrides default to always inactive, activating this input will by default activate the chiller.

#### Internal Schedule

The chiller controls have an internal schedule which may be used to automate chiller operations on a timed basis. This schedule defaults to always on and, in combination with the Remote Unit Enable/Disable input, can affect the electrical binary remote control of the chiller.

**NOTE:** Regardless of the internal schedule commands, the Remote Unit Enable/Disable Input must be active for the chiller to run. The schedule has no effect on operations otherwise. The internal schedule can be overridden by either of the Run/Stop Override settings.

#### Run/Stop Override via BACnet and Run/Stop Override via User Interface

These two override operations, issued from two possible sources, affect the same single internal conditional variable, meaning an override issued by BACnet can be canceled via the user interface and an override condition issued by the user interface can be canceled or altered via BACnet.

**NOTE:** Regardless of the override conditions, the Remote Unit Enable/Disable Input MUST be active for the chiller to run. These override conditions have no meaning if the input is not active.

There are three Run/Stop Override value settings:

**0 = Automatic Operation:** Operation will be based on an internal schedule.

**1 = Chiller Run:** Chiller will operate in the Running Mode.

**2 = Chiller Off:** Chiller will operate in the Off Mode.

## Off Mode

If the Remote Enable/Disable is disabled, the internal schedule (if used) has transitioned to the Unoccupied Mode, or if an override is indicating stop, the chiller will enter the Off Mode. In Off Mode, everything that was running will shut down.

**NOTE:** If there are multiple circuits, each circuit will pump down separately, yet simultaneously, and terminate independently.

Once the compressors have shut down, the condenser fans will shut down, the Waterside Economizer (if present) will shut down, and the circuit pumping (if present) will shut down.

## Chiller Run Mode

### Condenser Operation

When chilling operation starts there will be a 30 second delay while all inputs stabilize and all modules initialize.

The Chiller Pumping Module (if present) will be commanded to begin operation.

If the barrel does not have an evaporative condenser or the evaporative condenser is locked out, the condenser fan will be used for heat rejection.

If the barrel does have an evaporative condenser and if the ambient temperature is at or above the Ambient First Stage Enable Setpoint, the evaporative condenser will be used as the first stage of heat rejection followed by the condenser fan. If the ambient temperature is below the Ambient First Stage Enable Setpoint, the condenser fan will be used as the first stage of heat rejection followed by the evaporative condenser.

### Waterside Economizer Operation (runs on the Chiller Pumping Module)

If Waterside Economizer is present and the ambient temperature is below the entering water temperature by the adjustable Waterside Economizer enable deadband (default: 5°F), the Waterside Economizer will be enabled to operate.

If Waterside Economizer is present and the ambient temperature is greater than the entering water temperature minus half the Waterside Economizer deadband (default: -2.5°F), the Waterside Economizer will be disabled.

If Waterside Economizer is not present, is not active, or has reached its maximum, and the Leaving Water Temperature is above the Leaving Water Temperature Setpoint by the Mechanical Chilling Enable deadband, then Mechanical Chilling will be enabled. The controller will send a signal to the Chiller Pumping Module that mechanical chilling is active and the Waterside Economizer (if active) will be locked at maximum.

## Mechanical Chilling Overview

The Main DX Barrel Chiller Controller, in combination with one or more Chiller Refrigeration Modules, manages all mechanical chilling operation. The operation of the mechanical chilling is broken into different pieces that work together to accomplish the chilling.

- Leaving water temperature control
- Barrel control
- Staging operation
- Circuit control
  - This operation runs on the Refrigeration Modules; however, controller notifies the refrigeration modules of evaporative condenser availability and transfers evaporative condenser commands to the Evaporative Condenser Module.

### Leaving Water Temperature Control

The controller will generate an offset based on a PI loop on the leaving water temperature error. This offset will be limited from zero to the barrel out target temperature reset limit (default: 5°F). The barrel out target temperature is the difference between the Leaving Water Temperature Setpoint and this offset.

### Staging Operation

A barrel may have one, two, or three refrigeration circuits, each with one or two compressors. The main chiller controller provides staging time control and sequencing while the refrigeration module manages minimum run times, off times, and other limiting parameters of individual compressors on circuits through indication of availability.

### Barrel Control

Chillers have three possible barrel arrangements:

- Single Barrel with Single Primary Water Circuit.
- Dual Barrels with Single Primary Water Circuit.
- Dual Barrels with Independent Primary Water Circuits.

Barrel operation varies slightly with each arrangement. The staging control will stage compressors up and down on each barrel independently, with the exceptions noted below:

#### Single Barrel with Single Primary Water Circuit

The compressor and circuit operation will stage to modulate the barrel out temperature to the Barrel Out Temperature Setpoint.

The Chiller Pumping Module will deactivate pumping operations when the last compressor is deactivated.

#### Dual Barrels with Single Primary Water Circuit

The compressor and circuit operation will stage each barrel independently as its own barrel.

When a stage up condition is determined, the barrel with the warmest output temperature will stage up first.

When a stage down condition is determined, the barrel with the coldest output temperature will stage down first if it has a stage to deactivate; otherwise, the warmer barrel will stage down if it has a stage to deactivate.

If both barrels have only one compressor active, and one barrel has a variable compressor active, the compressor on the other barrel will deactivate. If the barrel does not have a variable compressor active, the compressor on the lag barrel will deactivate.

If only one barrel has an active compressor, and chiller pumping is present but Waterside Economizer is not, the Chiller Pumping Module will shut down.

#### Dual Barrels with Independent Primary Water Circuits

The compressor and circuit operation will stage each barrel independently as its own barrel.

Staging is similar to that of Dual Barrels with Single Primary Water Circuit, except that the second barrel will not be activated until the first barrel has reached a certain capacity.

### Circuit Control

The controller will notify the refrigeration modules that condenser control is available if there is no evaporative condenser, if the evaporative condenser is locked out, or if the ambient temperature is below the evaporative condenser lockout temperature.

If the barrel configuration is for dual barrel and there is a Pump 1 Failure, then evaporative condensing will not be available for the first circuit on each barrel. If there is a Pump 2 Failure, then evaporative condensing will not be available for the last circuit on each barrel.

## Safety Checks

Safeties represent operating conditions which may override or otherwise affect normal operation.

### Water Flow Switch Input

The water flow switch controls when mechanical chilling may operate. Mechanical chilling cannot be started until the water flow switch is active for a minimum of 30 seconds.

When water flow is present, if the water flow switch is inactive for more than 30 seconds, an emergency shut down of running compressors on all refrigeration modules for the barrel will occur (no pump down). An alarm will activate indicating water flow failure. Once the switch is reactivated, mechanical chilling may restart as needed.

### Phase Brownout Input and Emergency Shutdown Input

These are direct safety inputs and must be active for the chiller to operate and for pumping operations (when circuit pumping is configured).

If either of the phase brownout or safety shutdown signals go inactive, a phase brownout alarm or emergency shutdown alarm will be generated. All chiller operations and any running compressors on all refrigeration modules will be shut down immediately. If the Chiller Pumping Module is present, pumping will deactivate and any freeze protection operation will stop. If the Evaporative Condenser Module is present, all pumping and water heating operations will stop. Once reactivated, the alarm will clear and the chiller may restart operations from the beginning as if just powered up.

**NOTE:** Activation of either of these shutdowns will not affect the state of the evaporative condenser drain valve. The drain valve can be commanded open/closed via BACnet during this shutdown condition.

### Refrigerant Leak Detection

If a vestibule controller is present and gives indication of a leak detection, a refrigerant leak detection alarm will generate. All running compressors on all refrigeration modules for the barrel associated with the vestibule will be shut down.

### Freeze Protection

If the barrel out temperature drops below the barrel out freeze protection limit, a freeze protection failure alarm will be generated. All active compressors on all refrigeration modules for the barrel associated with the vestibule will shut down immediately.

If the Chiller Pumping Module is present, the pumping action will be activated for the barrel to keep water flowing through the barrel and warm it from the building.

The freeze protection operation will be terminated when the barrel out temperature is 5°F above the freeze protection limit.

### Glycol Feeder Low Input

If the glycol feeder low input is activated, an alarm will be generated indicating the glycol feeder is low.

### Non-Critical Sensor Failure

If a non-critical sensor fails, an alarm will be generated to indicate the failure and normal operations will continue.

### Critical Sensor Failure

If a critical sensor fails, an alarm will be generated to indicate the failure. If there is an alternative sensor that can serve as a backup, that sensor will be used in place of the failed sensor. If there is no backup sensor available, an additional alarm will be generated indicating that normal operations cannot continue. All operations associated with the failed sensor will then be shut down and locked out, including all chilling operations.

## Chiller Refrigeration Module - Operation

### Chiller Refrigeration Module Operation

The refrigeration module controls the following components to maintain a target Barrel Out Water Temperature:

- One compressor or two compressors in tandem
- A condenser consisting of a directly controlled variable speed fan and an indirectly controlled evaporative condenser spray pump (optional)
- An electronic expansion valve

### Mode Control

The controller commands the refrigerant module into one of two possible operating modes: Off Mode and Chiller Run Mode.

#### Off Mode

In Off Mode, the system is not running and will remain off for at least the adjustable minimum compressor off time.

#### Chiller Run Mode

In Chiller Run Mode, the compressor indicated to run by the main chiller controller will be activated, the condenser operations for the circuit will be activated, and the electronic expansion valve operations for the circuit will be activated.

##### Circuit Pump-Down

Circuit pump-down is initiated when a compressor/refrigeration circuit is running and is commanded not to run. During pump-down, the electronic expansion valves will be set to the pump-down position (factory-adjustable only) and stay there for the duration of the pump-down. Any active compressors will continue to operate until the suction pressure reaches the low suction pressure limit or 30 seconds have elapsed.

### Compressor Operation

There are four possible configurations for the compressors on the circuit:

- Single fixed compressor
- Single variable compressor
- Two fixed compressors in tandem
- Variable compressor plus fixed compressor in tandem

#### Compressor Modulation

If the first (only) compressor is a variable compressor, the compressor will modulate to regulate to the Barrel Out Water Temperature provided by the main chiller controller while staying within the compressor protection envelope.

#### Compressor Shutdown

Prior to shutting down the last compressor on a circuit, a circuit pump-down operation will be performed.

### Condenser Operation

The condenser has two modes of operation:

- Condenser Off
- Condenser Condensing

If there is no evaporative condenser, then for each active circuit,the condenser fan will activate and start at minimum speed. The fan will modulate to maintain the Head Pressure Setpoint.

If there is an evaporative condenser, the controller will determine whether the evaporative condenser or the condenser fan will act as first stage of heat rejection based on the ambient temperature relative to the Ambient First Stage Enable Setpoint. If one type of condenser control is operating as first stage, but a change of ambient temperature dictates that the other type of condenser operation should now be the first stage, then the controller can disable the first type of control and enable the other type.

If the condenser fan is first stage and has modulated to 100%, but the head pressure still exceeds the Head Pressure Setpoint deadband (and if the evaporative condenser is available), the evaporative spray pump will be activated and will work in conjunction with the condenser fan to achieve the Head Pressure Setpoint. If the fan is at minimum and the head pressure drops below the Head Pressure Setpoint deadband, the evaporative spray pump will deactivate while the fan is allowed to modulate.

If evaporative condensing is acting as first stage and the head pressure exceeds the Head Pressure Setpoint deadband, the evaporative spray pump will activate. If the spray pump has been activated for more than 30 seconds, the fan will be activated at minimum speed and will then modulate to maintain the Head Pressure Setpoint. If the head pressure drops below the Head Pressure Setpoint deadband, the fan will deactivate. If the head pressure remains below the Head Pressure Setpoint deadband for more than 30 seconds, the evaporative spray pump will deactivate.

### Electronic Expansion Valve Operation

The refrigeration module commands the electronic expansion valve to a predetermined starting position. A startup delay will hold the electronic expansion valve in the starting position for a set time.

The module will use a PID control loop to command the modulation of the electronic expansion valve position to regulate the superheat to the Superheat Setpoint. If pump-down operations are implemented, the electronic expansion valve will be set to the pump-down position and will remain there until commanded to close.

## Safety Checks

### Emergency Shutdown

In Emergency Shutdown, a pump-down operation will not be performed on the circuit. All compressors will be deactivated and the electronic expansion valve will close.

### Alarms

Alarms generally provide notification of an abnormal condition in the circuit and may cause an override or alter certain operations. There are three types of alarms:

- Warnings
- Faults
- Lockouts

### Warnings

Warnings are alarms that may alter operating limits in circuit operation in an attempt to overcome the warning condition without stopping any current operations. Warnings may progress into faults, but otherwise will recover without intervention.

### Faults

Faults are alarms that result in forcibly shutting down compressors in an attempt to overcome the fault condition. Faults may progress into lockouts, but otherwise will recover without intervention.

### Lockouts

Lockouts are alarms that result in termination of all operation for the circuit. Operation cannot resume without servicing.

# Vestibule Module - Operation and Safeties

## Vestibule Module Operation

Vestibule Module operation includes the following:

- Heating
- Cooling
- Venting

### Heating Operation

If heating control is configured, when the vestibule temperature drops below the Heating Enable Setpoint deadband, heating will be activated. Alternately, when the vestibule temperature rises above the Heating Enable Setpoint deadband, heating will be deactivated.

### Cooling Operation

If cooling control is configured and is not locked out, when the vestibule temperature rises above the Cooling Enable Setpoint deadband and the chiller is active, the coil pump and coil fan output will be activated to begin cooling. Alternately, when the vestibule temperature drops below the Cooling Enable Setpoint deadband or the chiller becomes inactive, the coil pump and coil fan output will be deactivated to stop cooling.

### Venting Operation

If cooling operation is not active, and the vestibule temperature rises above the Cooling Enable Setpoint deadband and the ambient temperature (if available) is below the vestibule temperature by 0.5°F, the vent fan output will be activated.

If cooling operation is active or when the vestibule temperature drops below the Cooling Enable Setpoint deadband or the ambient temperature (if available) rises above the vestibule temperature by 0.5°F, the vent fan output will be deactivated.

### Chiller Run Status

The chiller running status is determined by either the chiller running input (if configured), or from a chiller running status indication from the controller.

## Vestibule Safeties

### Refrigerant Leak Detection

If the module detects a refrigerant leak, the heat output, coil pump, and coil fan output will deactivate. The vent fan output will activate, and the Vestibule Module will be locked in safety mode.

### Coil Pump Water Flow Switch

If the coil pump water switch input is configured, if the water flow switch does not activate within 15 seconds, or if, once activated, the water flow input deactivates for more than five seconds, an alarm will activate indicating cooling coil pump failure. The cooling coil output will be disabled and this lockout condition will be maintained until power is cycled or a clear signal is given via E-BUS.

## Chiller Pumping Module Operation

The chiller pumping module operates the following three optional components:

- Waterside Economizer Operation
- Plate Heat Exchanger Operation
- Water Circuit Pumping Operation

## Waterside Economizer Operation

The Chiller Pumping Module Waterside Economizer operation consists of two modes that are commanded by controller: Off Mode and Economizing Mode.

### Off Mode

If Mechanical Chilling is not active and the unit leaves Waterside Economizer operation, the Waterside Economizer fan will de-energize and the mixing valve will close. If the chiller has a plate heat exchanger in a Waterside Economizer isolation configuration, the glycol side pump will de-energize and the secondary mixing valve will close and freeze protection operations will remain active.

If Mechanical Chilling is active (meaning the mixing valve is full open and the fan output is active at 100%) and the unit leaves Waterside Economizer operation, the primary mixing valve will close at a slowed programmable rate (default: one minute) and the Waterside Economizer fan will de-energize. If the chiller has a plate heat exchanger in a Waterside Economizer isolation configuration, the glycol side pump will de-energize and the secondary mixing valve will close at normal speed and freeze protection operations will remain active.

### Economizing Operation

The controller will communicate to the Chiller Pumping Module when conditions are favorable for Waterside Economizer operation. The Waterside Economizer has two variable stages of chilling: Mixing Valve Stage and Fan Stage.

When the economizer and mechanical chilling are simultaneously active, the two stages of the economizer operate at maximum (except as may be overridden by the plate heat exchanger freeze protection operation).

#### Mixing Valve Stage

As the first stage of chilling, the primary mixing valve will modulate to regulate the output water temperature. If the chiller has a plate heat exchanger in a Waterside Economizer isolation configuration, the primary mixing valve will be maintained full open during economizing, the secondary mixing valve will modulate, and the glycol side pump will activate.

If the chiller has a plate heat exchanger in a primary loop isolation configuration, the primary mixing valve will modulate to regulate the output water temperature from the plate exchanger.

#### Fan Stage

As the second stage of chilling, the fan will be activated and modulate to regulate the output water temperature. There is a hysteresis in the fan start/stop operation to avoid fan cycling.

### Economizing Mode

Economizing Mode operation varies based on whether or not mechanical chilling is active.

#### Economizing While Mechanical Chilling is Not Active

The economizer operates one or both stages of its chilling to regulate the output water temperature: mixing valve or fan.

**Mixing Valve Control:** If the fan output is active and operating above the minimum fan speed during water mixing valve control, the mixing valve will be set to maximum.

If the fan output is not active, a PID control loop will be used to control the mixing valve to maintain the Chiller Leaving Water Temperature Setpoint. However, if the chiller has a plate heat exchanger, the mixing valve will be controlled to maintain the heat exchanger outlet temperature to the Chiller Leaving Water Temperature Setpoint.

**Fan Control:** If the water mixing valve reaches 100%, the fan relay will activate. The fan VFD speed will be held at the Minimum Speed Setpoint for the fan startup delay period (default 0 seconds). The fan will then modulate, using a PID control loop, to control the Chiller Leaving Water Temperature to the Chiller Leaving Water Temperature Setpoint.

If the fan speed reaches 100%, mechanical chilling can be used to maintain the Chiller Leaving Water Temperature Setpoint.

If the water mixing valve output modulates below the minimum mixing valve position with fan on setpoint, the fan will be de-energized

#### Economizing While Mechanical Chilling is Active

If mechanical chilling activates during economizer operation to supplement economizer cooling, the economizer mixing valve and fan will operate at 100% unless limited by freeze protection.

If the economizer enables while mechanical cooling is active, the fan VFD output will be set to the Minimum Speed Setpoint and will be held there until the configurable fan startup delay has been met (default 0 seconds). The fan relay will then be energized and the speed will be set to 100%.

If the chiller has a plate heat exchanger in a waterside economizer isolation configuration, the glycol side pump will be activated and the secondary mixing valve will be opened to full open (full open may be limited by freeze protection). The primary water mixing valve will be driven full open at a slowed rate (default 30 minutes).

## Plate Heat Exchanger Operation

The plate heat exchanger has no direct operation, it is a passive device. However, it does run safety checks and can override operations on the Waterside Economizer or the water circuit pumping to help protect it from freezing.

The plate heat exchanger operation utilizes the following input points from the Chiller Pumping Module:

- HE Water Side Outlet Temperature
- HE Glycol Side Inlet Temperature
- HE Glycol Side Outlet Temperature

### Safety Checks

There are two possible installation configurations for the plate heat exchanger and each has differing effects on the specific safety operations. They are as follows:

**Water Side Economizer Isolation:** The plate heat exchanger isolates only the Waterside Economizer.

**Primary Loop Isolation:** The plate heat exchanger isolates the primary loop, including up to two chiller barrels, and if present, the Waterside Economizer.

#### Water Side Economizer Isolation Freeze Protection

While the chiller is in Off Mode, if any of the three exchanger temperature sensors drop below 35°F the following events will happen:

- The mixing valve will fully open.
- The primary and secondary pumps will be activated.

The pumping operations will continue until both glycol side sensors are at or above 36°F and the water outlet sensor is at or above 40°F.

While the chiller is in Chilling Mode, if the Glycol Side Inlet Temperature drops below 35°F, the secondary mixing valve will modulate more closed as necessary to keep the inlet temperature at or above 35°F. This modulation should not open the valve more than is demanded by the primary temperature modulation.

#### Primary Loop Isolation Freeze Protection

While the chiller is in Off Mode, if any of the three exchanger temperature sensors drop below 35°F, the following events will happen.

- The secondary pumping will be activated
- The primary pumping will remain inactive.

Pumping operations will continue until both glycol side sensors are at or above 36°F and the water outlet sensor is at or above 40°F.

While the chiller is in chilling mode, if the glycol side inlet temperature drops below 35°F and the mechanical chilling is active, all mechanical chilling (emergency shutdown action) will be deactivated and locked out. An alarm will be generated to indicate mechanical chilling lockout due to freeze protection.

While the chiller is in chilling mode, if the glycol side inlet temperature drops below 35°F and the mechanical chilling is not active, the primary mixing valve will modulate more closed as necessary to keep the inlet temperature at or above 35°F. This modulation should not open the valve more than is demanded by the current temperature modulation.

## Water Circuit Pumping Operation

The water circuit pumping operation provides all pump operations for chilled water in the chiller and optionally in the building, except for the glycol circuit pump which is managed by the water side economizer.

### Pumping Operation

The Water Circuit Pumping has two base modes of operation: Off Mode and Pumping Mode.

The pumping action operates in one of four modes:

- **Primary Only Fixed Speed Pumping -** Pumping activates a fixed speed pump only.
- **Primary Only Variable Speed Pumping -** Pumping activates a variable speed pump and modulates the pump speed to control building differential pressure.
- **Primary and Secondary Pumping -** Pumping activates a fixed speed primary pump and a variable speed secondary pump. It modulates the secondary pump speed to control building differential pressure.
- **Dual Primary and Secondary -** Based on a command from the chiller controller, pumping activates one or two fixed speed primary pumps and a variable speed secondary pump. It modulates the secondary pump speed to control building differential pressure.

For any pump, which has a redundant pump, only one of the two pumps will operate at any given time. Changeover may occur in one of three ways:

- Changeover on failure.
- Lead/Lag balancing changeover only at pump startup, the pump with lowest run time will activate.
- Demand based Lead/Lag balancing, pump changeover can occur while system is running based on direct command or maximum runtime differential. This changeover requires proper setup of pump VFDs to have matched ramp up and ramp down profiles so the lag pump can spin up while the lead pump spins down. These profiles must be relatively short so emergency pump shutdown operations can work properly. Demand based Lead/Lag balancing automatically includes pump startup balancing, the pump with the lowest run time will activate on a startup.

### Lead/Lag Operation and Backup Pump

If Lead/Lag Operation is configured, a Lead/Lag calculation is performed every seven days at which point the module will switch to the pump with the least amount of run time. This pump changeover can occur while running or upon start-up. This feature can be disabled by setting the changeover time to 0 hours. There is no “direct command” to force the pump changeover. If the lead pump is locked out, then the lag pump will come on.

If Lead/Lag Operation is not configured and the lead pump is locked out, the backup pumps will come on using the same sequence as the lead pump.

### Off Mode

In Off Mode, all pumps will turn off.

### Pumping Mode

If variable speed pumping is used, the appropriate primary pump will activate and begin operation at the Pump Starting Setpoint.

Chillers with dual primaries might only activate one pump. The other pump can activate at any future point in operation, and either pump can deactivate at any point in chiller operation without the chiller going to Off Mode.

If the chiller has a secondary pump, the module will wait for the primary circuit to prove water flow The proving is only required for one circuit when there are dual primaries. The appropriate secondary pump will then activate.

If there is a variable speed pump, the VFD speed output will modulate using a PID control loop to regulate the building pressure differential to the Building Pressure Differential Setpoint.

If the VFD speed is at minimum and the building pressure differential is still above setpoint, the bypass valve will modulate open to regulate the building pressure differential. The VFD speed will not modulate until the bypass valve modulates closed.

## Trend Logs

### DX Barrel Chiller Trend Logs

There are instances in the trend logs where a "#" is used in place of a value. These are references to the different barrels, circuits, and compressors that may be present on the system. For example, B1C1Flt would indicate a fault on Barrel 1, Circuit 1. See **Tables 8-16, pages 34 through 36,** for alarm bit string definitions.

| Item Description | Log Abbreviation (Unit) |
|---|---|
| **Date** | Date (Day Month) |
| **Time** | Time (24 Hr.) |
| **Mode of Operation** | Mode (Enumerated)* |
| **HVAC Mode** | HVAC (Enumerated)* |
| **Leaving Water Temp** | LvgH2O (ºF) |
| **Leaving Water Setpoint** | Lvg SP (ºF) |
| **Entering Water Temp** | EntrH2O (ºF) |
| **Barrel 1 Water Temp** | Brl1H2O (ºF) |
| **Barrel 2 Water Temp** | Brl2H2O (ºF) |
| **Barrel Water Setpoint** | Brl SP (ºF) |
| **Outdoor Air Temp** | OAT (ºF) |
| **Proof of Water Flow 1** | POWF 1 |
| **Proof of Water Flow 2** | PWF 2 |
| **H20 Flow Rate** | H2ORate (GPM) |
| **Alarm Group 1** | AlmGrp1 (Bit String) |
| **Alarm Group 2** | AlmGrp2 (Bit String) |
| **Alarm Group 3** | AlmGrp3 (Bit String) |
| **Alarm Group 4** | AlmGrp4 (Bit String) |
| **Alarm Group 5** | AlmGrp5 (Bit String) |
| **Barrel # Circuit # Compressor # Percentage** | B#C#C# (%) |
| **Barrel # Circuit # Compressor # Amps** | B#C#C#A (amps) |
| **Barrel # Circuit # Suction Pressure** | B#C#SP (psi) |
| **Barrel # Circuit # Saturated Suction Temp** | B#C#SST (ºF) |
| **Barrel # Circuit # Suction Line Temp** | B#C#SLT (ºF) |
| **Barrel # Circuit # Electronic Expansion Valve Position** | B#C#EXV (%) |
| **Barrel # Circuit # Suction SuperHeat** | B#C#SSH (ºF) |
| **Barrel # Circuit # Condenser Position** | B#C#Cnd (%) |
| **Barrel # Circuit # Discharge Pressure** | B#C#DP (psi) |

| Item Description | Log Abbreviation (Unit) |
|---|---|
| **Barrel # Circuit # Saturated Discharge Temp** | B#C#SDT (ºF) |
| **Barrel # Circuit # Discharge Line Temp** | B#C#DLT (ºF) |
| **Barrel # Circuit # Saturated Liquid Temp** | B#C#SLT (ºF) |
| **Barrel # Circuit # Liquid Line Temp** | B#C#LLT (ºF) |
| **Barrel # Circuit # Subcool** | B#C#SC (ºF) |
| **Barrel # Circuit # Fault** | B#C#Flt |
| **Barrel # Circuit # Warning** | B#C#Wrn |
| **Barrel # Circuit # Lockout** | B#C#Lkt |
| **Sump Temp #** | SmpTmp# (ºF) |
| **Sump Heater** | SmpHtr |
| **Low Sump Level** | LoSpLvl |
| **Condenser Pump #** | CndPmp # |
| **Condenser Pump # Current** | Pmp#Amp (amps) |
| **Condenser Pump # VFD Signal** | Pmp#VFD |
| **Condenser Pump # VFD Fault** | VFD#Flt |
| **Condenser Pump # Pressure** | Pmp#Pres |
| **Evaporative Condenser Alarms** | EvapAlm (Bit String) |
| **Relay Status of the CPM Module** | CPMRlys (Bit String) |
| **Building Pump Suction Pressure** | PumpSP (psi) |
| **Building Pump Discharge Pressure** | PumpDP (psi) |
| **Building Pump Differential Pressure** | PumpDfP (psi) |
| **Building Pump VFD Signal** | Pump VFD (%) |
| **Primary 3-Way Valve** | PriVlv (%) |
| **Secondary 3-Way Valve** | SecVlv (%) |
| **HE Waterside Outlet** | HEWOUT (ºF) |
| **HE Glycol Side Inlet** | HEGlin (ºF) |
| **Primary Outlet Temp** | PriOut (ºF) |
| **HE Glycol Side Outlet** | HEGlOut (ºF) |
| **Fan Speed** | Waterside Economizer Fan (%) |
| **Condenser Fan Position Alarms** | CPMAlms (Bit String) |

**Table 8: Trend Log Descriptions**

| ALARM GROUP 1 | | |
|---|---|---|
| Bit | Value | Description |
| 0 | 1 | Sensor Failure |
| 1 | 2 | Entering Water Sensor |
| 2 | 4 | Leaving Water Sensor |
| 3 | 8 | Barrel #1 Out Sensor |
| 4 | 16 | Barrel #2 Out Sensor |
| 5 | 32 | Outdoor Air Sensor |

**Table 9: Alarm Group 1 Bit String**

| ALARM GROUP 2 | | |
|---|---|---|
| Bit | Value | Description |
| 0 | 1 | Mechanical Failure |
| 1 | 2 | #1 Water Proving Failure |
| 2 | 4 | #2 Water Proving Failure |
| 3 | 8 | Emergency Contact |
| 4 | 16 | Phase Loss |
| 5 | 32 | High Speed Recovery |

**Table 10: Alarm Group 2 Bit String**

| ALARM GROUP 3 | | |
|---|---|---|
| Bit | Value | Description |
| 0 | 1 | Failure Modes |
| 1 | 2 | Bad Leaving Water Temp |
| 2 | 4 | Low Leaving Water Cutoff |

**Table 11: Alarm Group 3 Bit String**

| ALARM GROUP 4 | | |
|---|---|---|
| Bit | Value | Description |
| 0 | 1 | Expansion Boards |
| 1 | 2 | RSM Module B1:C1 |
| 2 | 4 | RSM Module B2:C1 |
| 3 | 8 | RSM Module B1:C2 |
| 4 | 16 | RSM Module B2:C2 |
| 5 | 32 | RSM Module B1:C3 |
| 6 | 64 | CPM Module |
| 7 | 128 | Evap Module |
| 8 | 256 | Vestibule Module #1 |
| 9 | 512 | Vestibule Module #2 |

**Table 12: Alarm Group 4 Bit String**

| ALARM GROUP 5 | | |
|---|---|---|
| Bit | Value | Description |
| 0 | 1 | Module Alarms |
| 1 | 2 | RSM Module B1:C1 |
| 2 | 4 | RSM Module B2:C1 |
| 3 | 8 | RSM Module B1:C2 |
| 4 | 16 | RSM Module B2:C2 |
| 5 | 32 | RSM Module B1:C3 |
| 6 | 64 | CPM Module |
| 7 | 128 | Evap Module |
| 8 | 256 | Vestibule Module #1 |
| 9 | 512 | Vestibule Module #2 |

**Table 13: Alarm Group 5 Bit String**

| CPM MODULE ALARMS | | |
|---|---|---|
| Bit | Value | Description |
| 0 | 1 | Waterside Economizer Not Operating |
| 1 | 2 | Freeze Protection Running |
| 2 | 4 | Primary Mixing Valve Outlet Temp Sensor Failure |
| 3 | 8 | Primary Mixing Valve Feed Temp Sensor Failure |
| 4 | 16 | Heat Exchanger Secondary Side Inlet Temp Sensor Failure |
| 5 | 32 | Heat Exchanger Secondary Side Outlet Temp Sensor Failure |
| 6 | 64 | VFD Fault |
| 7 | 128 | Primary A Pump 1 Lockout |
| 8 | 256 | Primary A Pump 2 Lockout |
| 9 | 512 | Secondary Pump 1 Lockout |
| 10 | 1024 | Secondary Pump 2 Lockout |
| 11 | 2048 | Primary B Pump 1 Lockout |
| 12 | 4096 | Primary B Pump 2 Lockout |
| 13 | 8192 | Building Maximum Pressure Exceeded |
| 14 | 16384 | Pumping System Locked-Out |
| 15 | 32768 | Glycol Feeder Low |

**Table 14: CPM Module Alarms Bit String**

## Trend Log Alarm Bit Strings

| EVAPORATIVE CONDENSER ALARMS | | |
|---|---|---|
| **Bit** | **Value** | **Description** |
| 0 | 1 | Sump Heater Status (1: Cannot Run) |
| 1 | 2 | Low Sump Level |
| 2 | 4 | No Pump 1 Pressure Signal |
| 3 | 8 | No Pump 2 Pressure Signal |
| 4 | 16 | Pump 1 VFD Fault |
| 5 | 32 | Pump 2 VFD Fault |
| 6 | 64 | Sump Temp 1 Not Detected |
| 7 | 128 | Sump Temp 2 Not Detected |
| 8 | 256 | Sump Temp 3 Not Detected |
| 9 | 512 | Evaporative Condenser Lockout 1 |
| 10 | 1024 | Evaporative Condenser Lockout 2 |
| 11 | 2048 | Low Sump Temp 1 |
| 12 | 4096 | Pump 1 Low Current |
| 13 | 8192 | Pump 1 High Current |
| 14 | 16384 | Pump 2 Low Current |
| 15 | 32768 | Pump 2 High Current |

**Table 15: Evaporative Condenser Alarms Bit String**

| CPM RELAYS | | |
|---|---|---|
| **Bit** | **Value** | **Description** |
| 0 | 1 | CP Primary A Pump 1 Running |
| 1 | 2 | CP Primary A Pump 2 Running |
| 2 | 4 | CP Secondary Pump 1 Running |
| 3 | 8 | CP Secondary Pump 2 Running |
| 4 | 16 | CP Primary B Pump 1 Running |
| 5 | 32 | CP Primary B Pump 2 Running |

**Table 16: CPM Relays Bit String**

## Trend Log Bit String Decoding

Bit string values allow the manipulation of binary data in useful ways. For instance, a single trend log item may need to represent multiple simultaneous true conditions. An example would be a trend log item indicating what binary inputs are currently active, what relays are currently active, or what alarms are currently active. A single bit string value can be decoded to determine which multiple conditions might be simultaneously true. This section is not intended to be a full explanation of how bit strings work, but to explain how to decode the trend log items that are indicated as being bit string values.

### Determine Active Binary Inputs When a Trend Item Was Recorded

| Binary Inputs | Bit String Values |
|---|---|
| 0 | No Binary Inputs Active |
| 1 | Fan Proving |
| 2 | Dirty Filter |
| 4 | Hood On/Off |
| 8 | Remote Occupied |
| 16 | Remote Cooling |
| 32 | Remote Heating |
| 64 | Remote Dehumidification |
| 128 | Emergency Shutdown |

**Example 1**

1. If the trend log bit string value is 22 for Binary Inputs, first identify the highest value shown above that can be subtracted from 22. In this example, that would be 16 (Remote Cooling). The Remote Cooling binary input is currently active.
2. From the remainder of 6 (22 - 16 = 6), subtract the next highest possible number. That would be 4 (Hood On/Off). The Hood On/Off binary input is currently active.
3. From the remainder of 2 (6 – 4 = 2), subtract the next highest possible number which is 2 (Dirty Filter). The Dirty Filter binary input is also currently active.
4. There is no remainder (2 – 2 = 0), so there are no more inputs that are active.

With this example, from one value of 22 the formula above determined that three binary inputs were active when that trend item was recorded.

## Alarms and Faults

### Waterside Economizer VFD Fault

If the VFD is indicating a fault, an alarm will generate and operations will continue as if the VFD were operational.

### Waterside Economizer Primary Outlet (Leaving Water) Temperature Sensor Failure

If the Waterside Economizer Primary Outlet (Leaving Water) Temperature Sensor fails, an alarm will indicate the sensor failure. If the Chiller Leaving Water Temperature is available, it will be used as the outlet temperature.

If the Chiller Leaving Water Temperature is not available, the Waterside Economizer will be forced to the Off Mode condition. An additional alarm will indicate the Waterside Economizer is not operating.

If the chiller has a plate heat exchanger in a primary loop isolation configuration, the outlet temperature will continue to be used.

### Suction Pressure Sensor Failure

If the Suction Pressure Sensor fails, an alarm will indicate the sensor failure. Operation will continue with an assumed suction pressure of 0 psig.

### Discharge Pressure Sensor Failure

If the Discharge Pressure Sensor fails, an alarm will indicate the sensor failure. All pumps will shut down and the chiller will be forced to off mode. All pumping operations will be locked out.

## Main DX Barrel Chiller Controller LEDs

The Main DX Barrel Chiller Controller is equipped with LEDs that can be used to verify operation and perform troubleshooting. There are LEDs for communication, operation modes, and diagnostic codes. See **Figure 11, page 39**, for the LED locations. The LEDs associated with these inputs and outputs shows what is active without using a voltmeter. The LEDs and their uses are as follows:

### Operation LEDs

**POWER:** This green LED will light up to indicate that 24 VAC power has been applied to the controller.

**APP HB:** This green LED will light up and blink continuously to indicate the application software is working properly.

**OS HB:** This green LED will light up and blink continuously to indicate the operating system is working properly.

**WDOG:** This green LED will light up and stay lit to indicate the operating system is working properly.

### Diagnostic LEDs

**ALARM:** This red LED is a diagnostic blink code LED. It will light up and stay lit when there is an alarm present. The type of alarm will display on the LCD display.

**STATUS 1:** This red LED is a diagnostic blink code LED. Under normal operation, it should not be blinking. If the LED is blinking non-stop along with Status 2 LED, the controller is resetting factory defaults or there is an output Force Mode active.

**STATUS 2:** This red LED is a diagnostic blink code LED. If the software is running, this LED should blink at a rate of one blink every 10 seconds. If the LED is blinking non-stop along with Status 1 LED, the controller is resetting factory defaults or there is an output Force Mode active.

### Communication LEDs

**EBUS:** This yellow LED will blink to signal E-BUS communications.

**BACNET:** This yellow LED will light up and blink continuously to indicate BACnet communications.

### Relay LEDs

**RLY1 - RLY3:** These green LEDs will light up when the relay is enabled and will stay lit as long as it is active.

### Binary Input LEDs

**BI1:** This green LED will light up when the Remote Run/Stop contact is closed.

**BI2:** This green LED will light up when the Water Flow Switch 1 is open.

**BI3:** This green LED will light up when the Water Flow Switch 2 is open.

**BI4:** This green LED will light up when the Safety Shutdown contact is closed.

**BI5:** This green LED will light up when the Phase Brownout contact is closed.

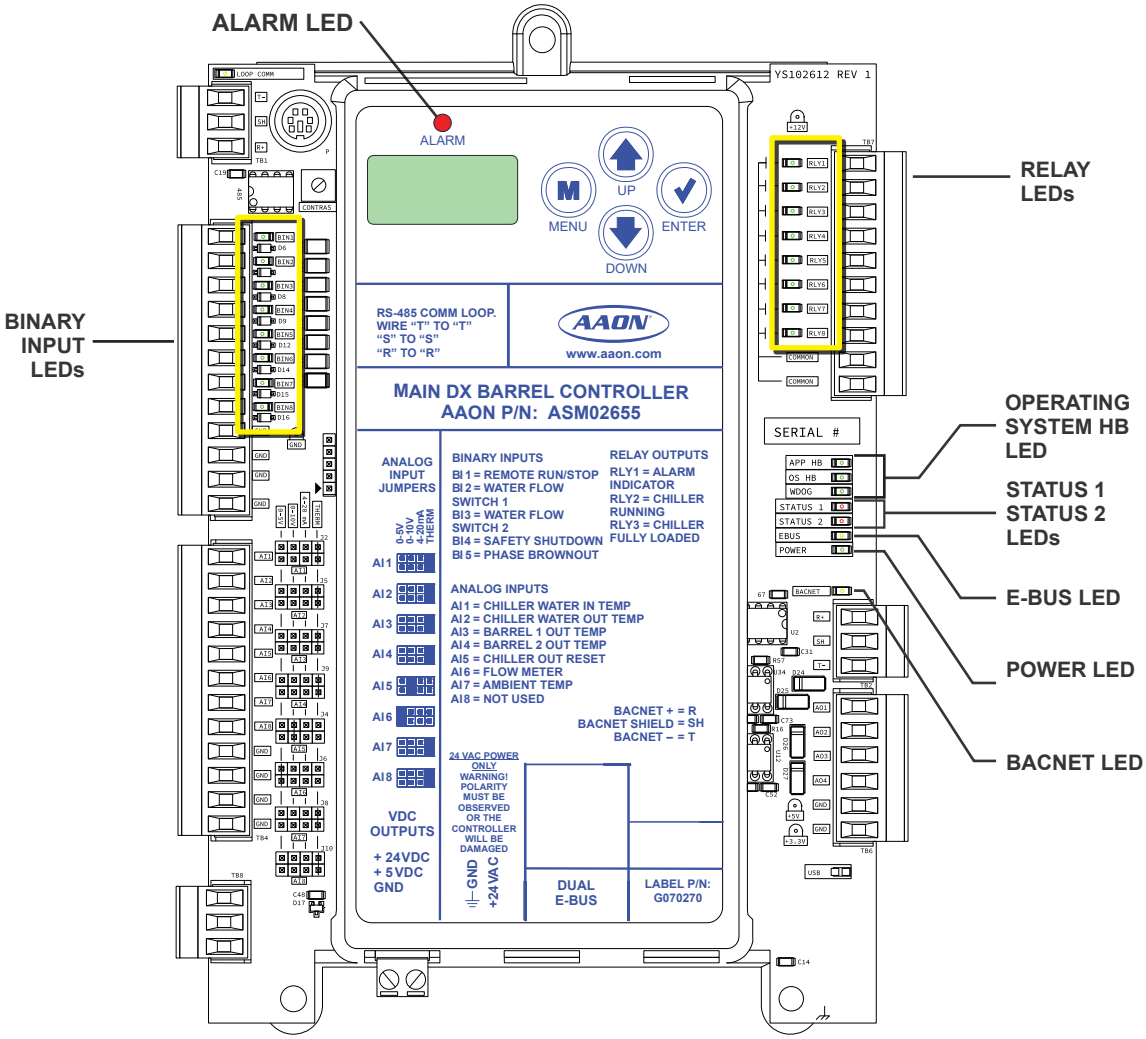



Figure 11: Main DX Barrel Chiller Controller LED Locations

## Refrigerant Module LEDs

The Chiller Refrigerant Module is equipped with LEDs that can be used to verify operation and perform troubleshooting. There are LEDs for communication, operation modes, and diagnostic codes. See **Figure 12, page 41**. The LEDs associated with these inputs and outputs show what is active without using a voltmeter. The LEDs and their uses are as follows:

### Operation LEDs

**POWER:** This green LED will light up to indicate that 24 VAC power has been applied to the controller.

**WDOG:** This green LED is not currently used.

### Diagnostic LEDs

**ALARM:** This red LED is a diagnostic blink code LED. It will light up and blink when there is an alarm present. The type of alarm will display on the LCD display.

**STATUS 1:** This red LED is a diagnostic blink code LED. If the LED is blinking at a rate of 1 blink every 10 seconds, the module is in the Off mode. If the LED is blinking two blinks every 10 seconds, the module is in the Cool Mode.

**STATUS 2:** This red LED is not used.

### Communication LED

**EBUS:** This yellow LED will blink to signal E-BUS communications.

**COMM1:** This yellow LED is not used.

**COMM2:** This yellow LED is not used.

### Relay LEDs

**RLY1 - RLY3:** These green LEDs will light up when the relays are enabled and will stay lit as long as they are active.

### Refrigerant Module Binary Input LEDs

**BI1:** This green LED indicates Compressor 1 Status and will light up when Compressor 1 is running.

**BI2:** This green LED indicates Compressor 2 Status and will light up when Compressor 2 is running.

**BI3:** This green LED will be lit when the Compressor 1 VFD Fault contact indicates normal operating status. If the LED turns off then there is a VFD Fault Condition.

**BI4:** This green LED will light up when the Circuit Disable Switch is in the enabled state. When the circuit is disabled, the LED will be off.

**BI5:** This green LED will light up when the Condenser Fan Fault contact is closed. There can be multiple Condenser fan fault signals wired in series, so if one of the condenser fans are in fault, the LED will be off.

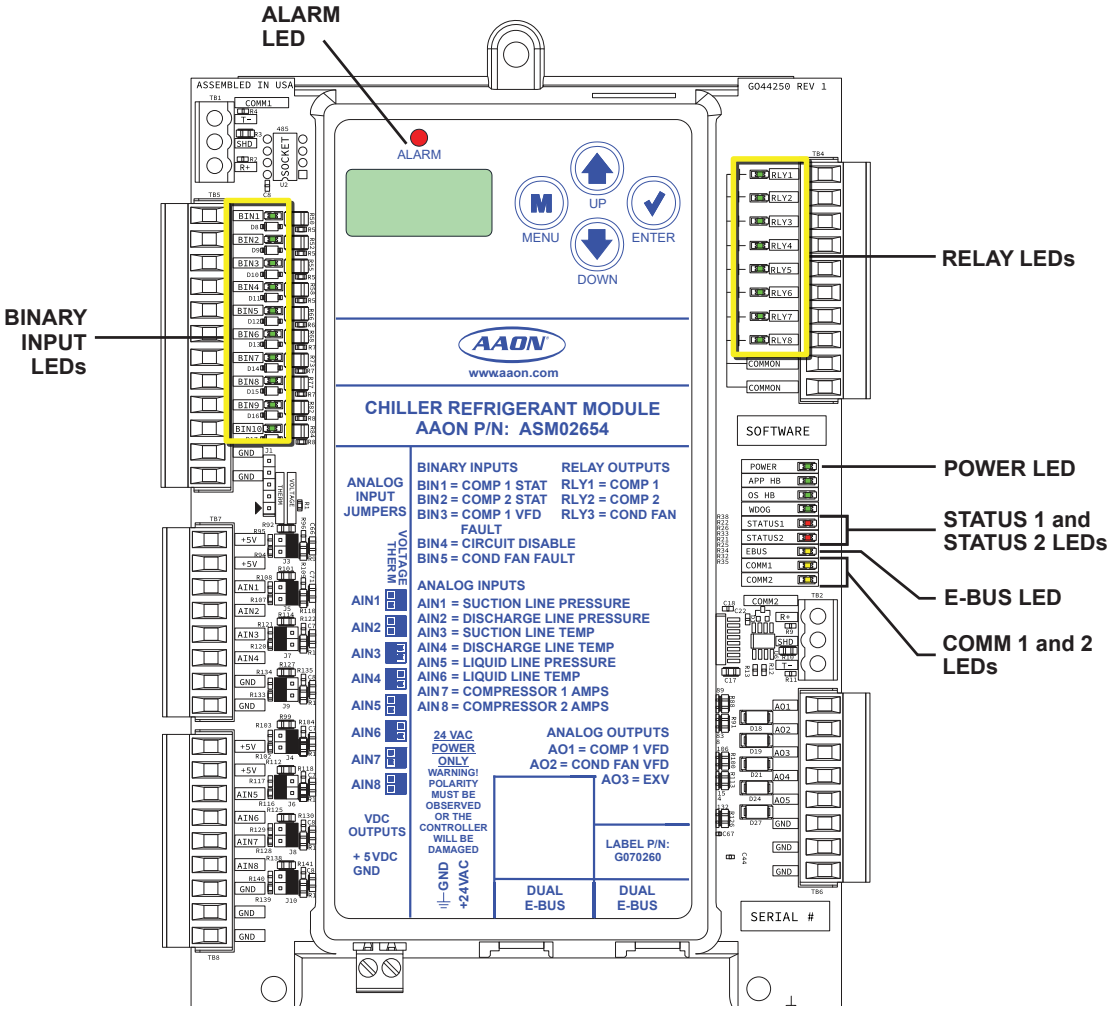



Figure 12: Refrigerant Module LED Locations

## Chiller Pumping Module LEDs

The Chiller Pumping Module is equipped with LEDs that can be used to verify operation and perform troubleshooting. See **Figure 13, page 43**. The LEDs associated with these inputs and outputs show what is active without using a voltmeter. The LEDs and their uses are as follows:

### Operation LEDs

**POWER:** This green LED will light up to indicate that 24 VAC power has been applied to the controller.

**APP HB:** This green LED will light up and blink according to what mode the controller is in. See **Table 17, this page**.

| No. of Blinks | APP HB LED |
|---|---|
| 1 | Off Mode |
| 2 | Economizer Mode |
| 3 | Freeze Mode |

**Table 17: APP HB LED Blink Codes**

**OS HB:** This green LED will light up and blink continuously to indicate the operating system is working properly.

**WDOG:** This green LED will light up and stay lit to indicate the operating system is working properly.

### Diagnostic LEDs

**ALARM:** This red LED is a diagnostic blink code LED. It will light up and blink the number of alarms present when there is an alarm(s) present. The type of alarm will display on the LCD display.

**STATUS 1:** This red LED is not used.

**STATUS 2:** This red LED is not used.

### Communication LED

**EBUS:** This yellow LED will blink to signal E-BUS communications.

**COMM1:** This yellow LED will turn on when the economizer is unable to operate due to a sensor fault.

**COMM2:** This yellow LED will turn on to signal economizer maxed out.

### Relay LEDs

**RLY1 - RLY8:** These green LEDs will light up when the relay is enabled and will stay lit as long as it is active.

### Binary Input LEDs

**BI1:** This green LED will be lit when the Waterside Economizer VFD contact indicates normal operating status. If the LED turns off then there is a VFD Fault condition.

**BI4:** This green LED will be lit when the Chiller Pump VFD Fault Switch 1 contact indicates normal operating status. If the LED turns off then there is a VFD Fault condition.

**BI5:** This green LED will be lit when the Chiller Pump VFD Fault Switch 2 contact indicates normal operating status. If the LED turns off then there is a VFD Fault condition.

**BI6:** The Glycol Feeder Low input will normally be off, and will light up green to indicate the Glycol Feeder Low alarm is active.

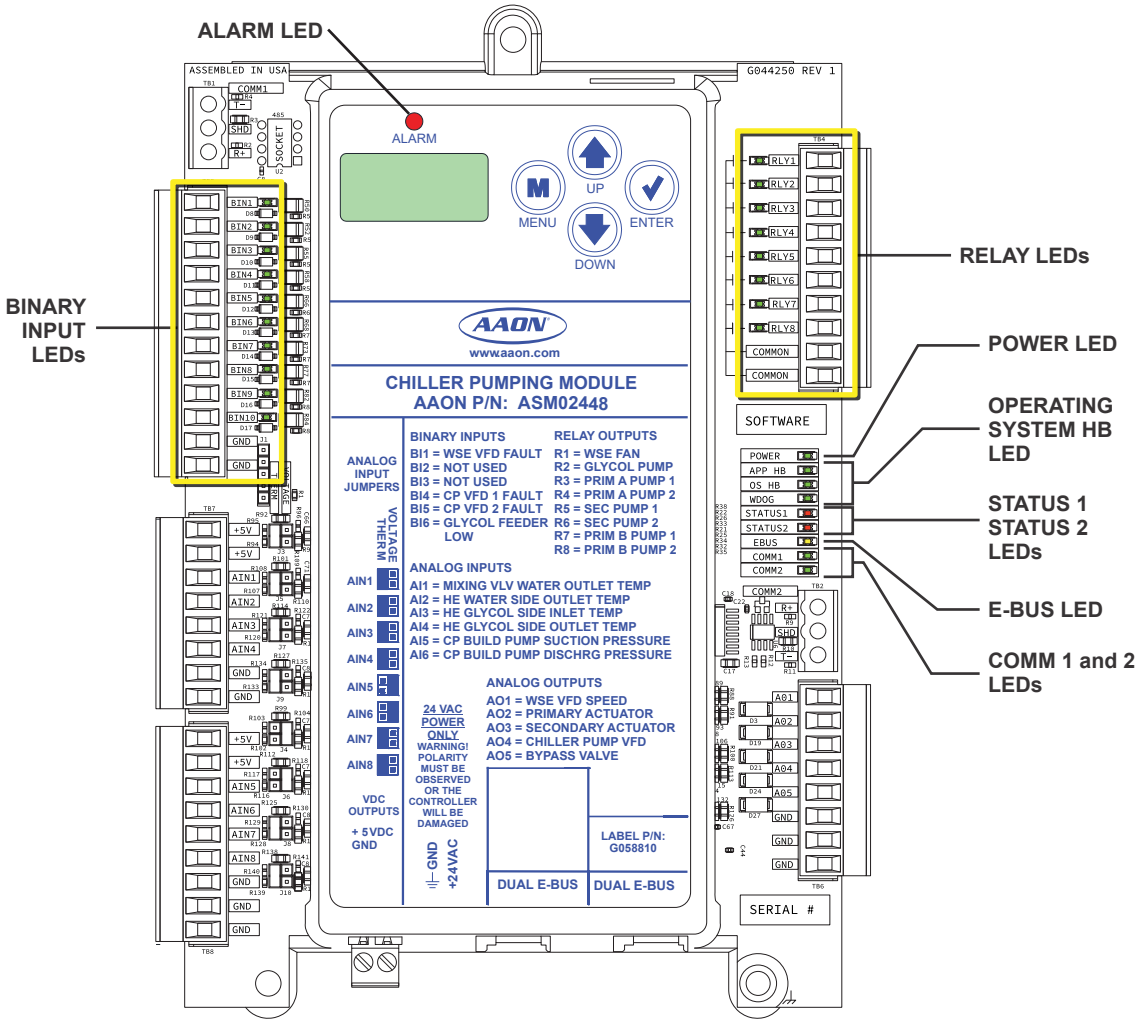



Figure 13: Chiller Pumping Module LED Locations

## Evaporative Condenser Module LED Diagnostics and Locations

### Evaporative Condenser Module LEDs

The Evaporative Condenser Module is equipped with LEDs that can be used to verify operation and perform troubleshooting. See **Figure 14, this page**, for the LED locations. The LEDs associated with these inputs and outputs show what is active without using a voltmeter. The LEDs and their uses are as follows:

#### Diagnostic LEDs

**STATUS:** If the software is running, this LED should blink at a rate of one blink per second.

**ALARM (on board):**This red LED will light up and stay lit when there is an alarm present. The type of alarm will display on the LCD display. The ALARM LED also blinks when the expansion valve is initializing at startup.

**ALARM (above LCD display):** This red LED will light up and stay lit when there is an alarm present. The type of alarm will display on the LCD display. The ALARM LED also blinks when the expansion valve is initializing at startup.

**COMM:** Every time the module receives a valid E-BUS request from the Main DX Barrel Chiller Controller, this LED will blink on and then off, signifying that it received a valid request and responded.

**POWER:** This LED will light up to indicate that 24 VAC power has been applied to the module.

#### Binary Input LEDs

**BI1:** This green LED will light up when the Condenser Pump 1 Pressure switch contact is closed.

**BI2:** This green LED will light up when the Condenser Pump 2 Pressure switch contact is closed.

**BI3:** This green LED will light up when the Condenser Pump 1 VFD Fault contact is closed.

**BI4:** This green LED will light up when the Condenser Pump 2 VFD Fault contact is closed.

#### Relay LEDs

**RLY1 - RLY4:** These green LEDs will light up when the relays are enabled and will stay lit as long as they are active.

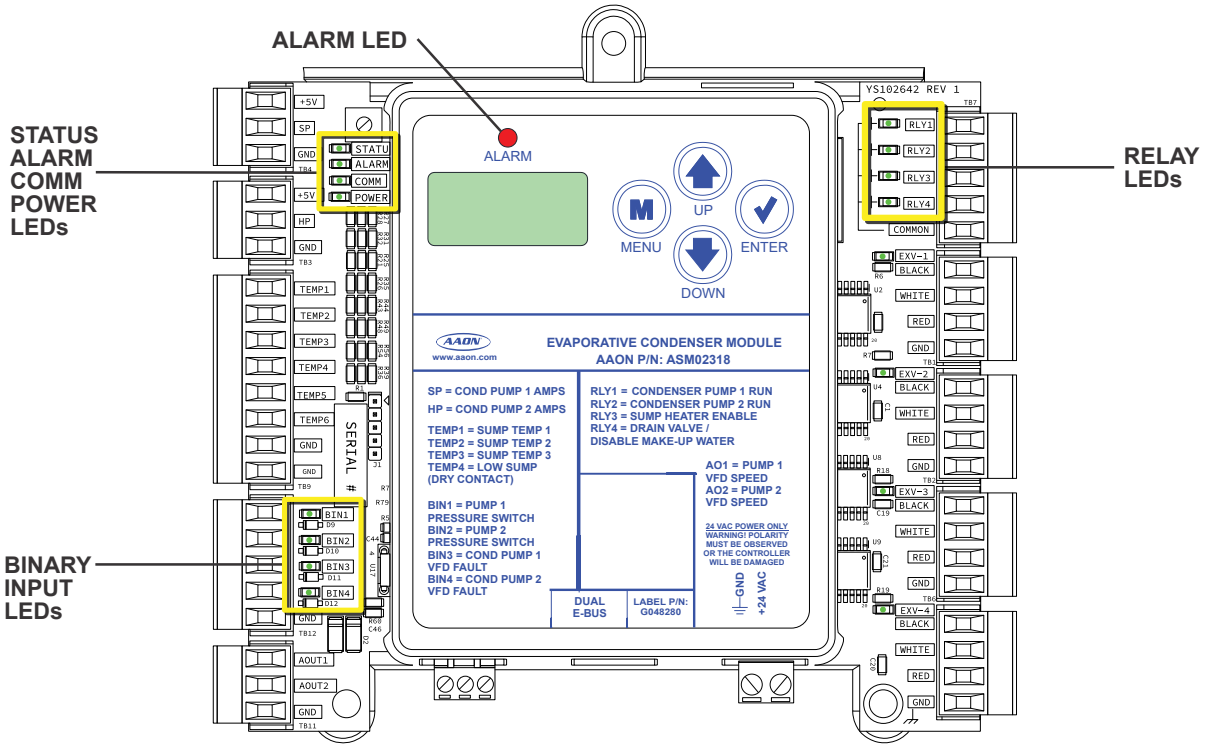



**Figure 14: Evaporative Condenser Module LEDs**

## Vestibule Module LEDs

The Vestibule Module is equipped with LEDs that can be used to verify operation and perform troubleshooting. See **Figure 15, this page**. The LEDs associated with these inputs and outputs show what is active without using a voltmeter. The LEDs and their uses are as follows:

### Diagnostic LEDs

**STATUS:** If the software is running, this LED should blink at a rate of one blink per second.

**ALARM (on board):** If the module does not receive communications for more than one minute, this LED will light up and the relays will turn off.

**ALARM (above LCD display):** This red LED will light up and stay lit when there is an alarm present. The type of alarm will display on the LCD display.

**COMM:** Every time the module receives a valid E-BUS request from the Main DX Barrel Chiller Controller, this LED will blink on and then off, signifying that it received a valid request and responded.

**POWER:** This LED will light up to indicate that 24 VAC power has been applied to the controller.

### Binary Input LEDs

**BI1:** This green LED will light up when Chiller Run Status contact is closed.

**BI2:** This green LED will light up when Leak Detector contact is closed.

**BI3:** This green LED will light up when the Coil Pump Water Flow Switch is closed.

### Relay LEDs

**RLY1 - RLY4:** These green LEDs will light up when the relays are enabled and will stay lit as long as they are active.

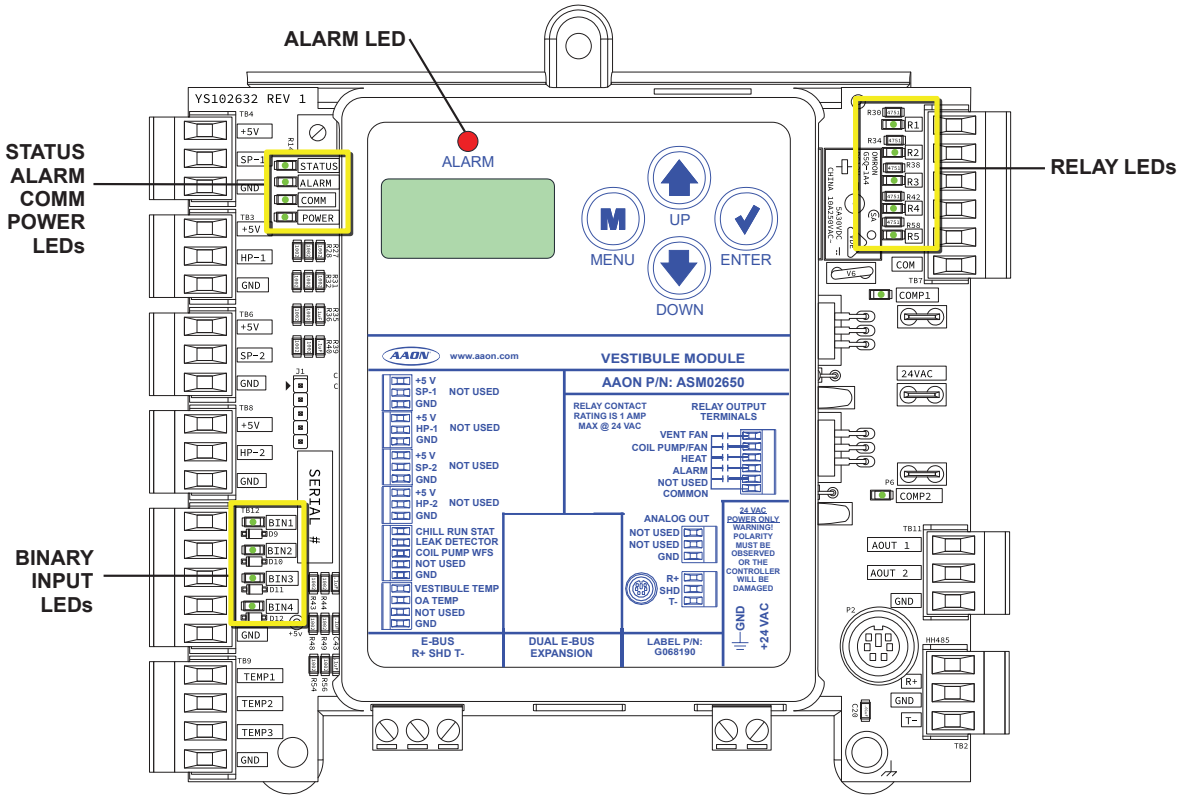



**Figure 15: Vestibule Module LEDs**

## Thermistor Sensor Testing

### Temperature/Resistance for Thermistor Sensors

The following sensor voltage and resistance table is provided to aid in checking sensors that appear to be operating incorrectly. Many system operating problems can be traced to incorrect sensor wiring. Be sure all sensors are wired per the wiring diagrams in this manual.

If the sensors still do not appear to be operating or reading correctly, check voltage and/or resistance to confirm that the sensor is operating correctly per the tables. Please follow the notes and instructions that appear after the chart when checking sensors.

#### Thermistor Sensor Testing Instructions

Use the resistance column to check the thermistor sensor while disconnected from the controllers (not powered).

Use the voltage column to check sensors while connected to powered controllers. Read voltage with meter set on DC volts. Place the "-" (minus) lead on GND terminal and the "+" (plus) lead on the sensor input terminal being investigated.

| Temperature and Resistance – Voltage for Type III 10 K ohm Thermistor Sensors | | | | | | | |
|---|---|---|---|---|---|---|---|
| Temp (ºF) | Temp (ºC) | Resistance (Ohms) | Voltage @ Input (VDC) | Temp (ºF) | Temp (ºC) | Resistance (Ohms) | Voltage @ Input (VDC) |
| **-10** | -23.3 | 93333 | 4.51 | **72** | 22.2 | 11136 | 2.635 |
| **-5** | -20.6 | 80531 | 4.45 | **73** | 22.8 | 10878 | 2.605 |
| **0** | -17.8 | 69822 | 4.37 | **74** | 23.3 | 10625 | 2.576 |
| **5** | -15 | 60552 | 4.29 | **75** | 23.9 | 10398 | 2.549 |
| **10** | -12.2 | 52500 | 4.2 | **76** | 24.4 | 10158 | 2.52 |
| **15** | -9.4 | 45902 | 4.1 | **77** | 25 | 10000 | 2.5 |
| **20** | -6.6 | 40147 | 4.002 | **78** | 25.6 | 9711 | 2.464 |
| **25** | -3.9 | 35165 | 3.891 | **80** | 26.7 | 9302 | 2.41 |
| **30** | -1.1 | 30805 | 3.773 | **82** | 27.8 | 8893 | 2.354 |
| **35** | 1.7 | 27140 | 3.651 | **84** | 28.9 | 8514 | 2.3 |
| **40** | 4 4.4 | 23874 | 3.522 | **86** | 30 | 8153 | 2.246 |
| **45** | 7.2 | 21094 | 3.39 | **88** | 31.1 | 7805 | 2.192 |
| **50** | 10 | 18655 | 3.252 | **90** | 32.2 | 7472 | 2.139 |
| **52** | 11.1 | 17799 | 3.199 | **95** | 35 | 6716 | 2.009 |
| **54** | 12.2 | 16956 | 3.143 | **100** | 37.8 | 6047 | 1.884 |
| **56** | 13.3 | 16164 | 3.087 | **105** | 40.6 | 5453 | 1.765 |
| **58** | 14.4 | 15385 | 3.029 | **110** | 43.3 | 4923 | 1.65 |
| **60** | 15.6 | 14681 | 2.972 | **115** | 46.1 | 4449 | 1.54 |
| **62** | 16.7 | 14014 | 2.916 | **120** | 48.9 | 4030 | 1.436 |
| **64** | 17.8 | 13382 | 2.861 | **125** | 51.7 | 3656 | 1.339 |
| **66** | 18.9 | 12758 | 2.802 | **130** | 54.4 | 3317 | 1.246 |
| **68** | 20 | 12191 | 2.746 | **135** | 57.2 | 3015 | 1.159 |
| **69** | 20.6 | 11906 | 2.717 | **140** | 60 | 2743 | 1.077 |
| **70** | 21.1 | 11652 | 2.691 | **145** | 62.7 | 2502 | 1.001 |
| **71** | 21.7 | 11379 | 2.661 | **150** | 65.6 | 2288 | 0.931 |

**NOTE:** If the voltage is above 4.88 VDC, the sensor or wiring is open. If the voltage is less than 0.05 VDC, the sensor or wiring is shorted.

**Table 18: Temperature and Resistance for Type III 10K ohm Thermistor Sensors**

## 0 - 250 PSI Suction Pressure Transducer Testing for R410-A Refrigerant

The Evaporator Coil Temperature is calculated by converting the Suction Pressure to Temperature. The Suction Pressure is obtained by using the 0 - 250 PSI Suction Pressure Transducer, which is connected into the suction line of the compressor.

Use the voltage column to check the Suction Pressure Transducer while connected to the refrigeration module(s). The Main DX Barrel Chiller Controller and the refrigeration module(s) must be powered for this test. Read voltage with a meter set on DC volts. Place the positive lead from the meter on the +5V terminal located on the module(s) terminal block. Place the negative lead from the meter on the ground (GND) terminal located adjacent to the +5V terminal on the module(s) terminal block. Use a refrigerant gauge set and/or an accurate electronic thermometer to measure the temperature or suction line pressure near where the Suction Pressure Transducer is connected to the suction line. Measure the voltage at the +5V and GND terminals and compare it to the appropriate chart depending on the refrigerant in use. If the temperature/voltage or pressure/voltage readings do not align closely with the chart, the Suction Pressure Transducer is probably defective and will need to be replaced.

| 0-250 PSI Suction Pressure Transducer Coil Pressure, Temperature, and Voltage Chart for R410-A Refrigerant | | | | | | | |
|---|---|---|---|---|---|---|---|
| Temeprature ºF | Temperature ºC | Pressure PSI | Signal DC Volts | Temperature ºF | Temperature ºC | Pressure PSI | Signal DC Volts |
| **21.19** | -6.01 | 80.94 | 1.8 | **56.76** | 13.76 | 161.88 | 3.1 |
| **24.49** | -4.17 | 87.16 | 1.9 | **59.03** | 15.02 | 168.10 | 3.2 |
| **27.80** | -2.33 | 93.39 | 2.0 | **61.17** | 16.21 | 174.32 | 3.3 |
| **30.99** | -0.56 | 99.62 | 2.1 | **63.19** | 17.33 | 180.55 | 3.4 |
| **33.89** | 1.05 | 105.84 | 2.2 | **65.21** | 18.45 | 186.78 | 3.5 |
| **36.80** | 2.67 | 112.07 | 2.3 | **67.23** | 19.57 | 193.00 | 3.6 |
| **39.71** | 4.28 | 118.29 | 2.4 | **69.24** | 20.69 | 199.23 | 3.7 |
| **42.30** | 5.72 | 124.52 | 2.5 | **71.15** | 21.75 | 205.46 | 3.8 |
| **44.85** | 7.14 | 130.75 | 2.6 | **72.95** | 22.75 | 211.68 | 3.9 |
| **47.39** | 8.55 | 136.97 | 2.7 | **74.76** | 23.76 | 217.91 | 4.0 |
| **49.94** | 9.97 | 143.2 | 2.8 | **76.57** | 24.76 | 224.14 | 4.1 |
| **52.23** | 11.24 | 149.42 | 2.9 | **78.37** | 25.76 | 230.36 | 4.2 |
| **54.50** | 12.50 | 155.65 | 3.0 | **80.18** | 26.77 | 236.59 | 4.3 |

**Table 19: 0-250 PSI Suction Pressure Transducer Coil Pressure, Temperature, and Voltage Chart for R410-A Refrigerant**

## Discharge Pressure Sensor Testing 0-667 PSI

The Discharge Pressure is obtained by using the Discharge Pressure Sensor, which is connected into the discharge line of the compressor.

Use the voltage column to check the Discharge Pressure Sensor while connected to the refrigeration module(s). The module must be powered for this test. Read voltage with a meter set on DC volts. Place the positive lead from the meter on the +5V input terminal located on the module. Place the negative lead from the meter on the ground terminal located adjacent to the +5V terminal on the module. Use a refrigerant gauge set to measure the suction line pressure near where the Discharge Pressure Sensor is connected to the discharge line. Measure the voltage at the terminals +5V and GND terminals and compare it to the appropriate chart depending on the refrigerant in use. If the pressure/voltage readings do not align closely with the chart, the Discharge Pressure Sensor is probably defective and will need to be replaced.

| Discharge Pressure Transducer Pressure – Voltage Chart for R410-A Refrigerant 0-667 PSI | | | |
|---|---|---|---|
| **Pressure PSI** | **Signal DC Volts** | **Pressure PSI** | **Signal DC Volts** |
| **20** | 0.62 | **360** | 2.66 |
| **40** | 0.74 | **380** | 2.78 |
| **60** | 0.86 | **400** | 2.9 |
| **80** | 0.98 | **420** | 3.02 |
| **100** | 1.1 | **440** | 3.14 |
| **120** | 1.22 | **460** | 3.26 |
| **140** | 1.34 | **480** | 3.38 |
| **160** | 1.46 | **500** | 3.5 |
| **180** | 1.58 | **520** | 3.62 |
| **200** | 1.7 | **540** | 3.74 |
| **220** | 1.82 | **560** | 3.86 |
| **240** | 1.94 | **580** | 3.98 |
| **260** | 2.026 | **600** | 4.1 |
| **280** | 2.18 | **620** | 4.22 |
| **300** | 2.3 | **640** | 4.34 |
| **320** | 2.42 | **660** | 4.46 |
| **340** | 2.54 | | |

**Table 20: Discharge Pressure and Voltage Chart for Discharge Pressure Sensors**

## LCD Display Screen and Navigation Keys

The LCD display screens and buttons show status and alarms, and enable force modes. **See Figure 16, this page,** and refer to **Table 21 and Table 22, this page,** for key functions.

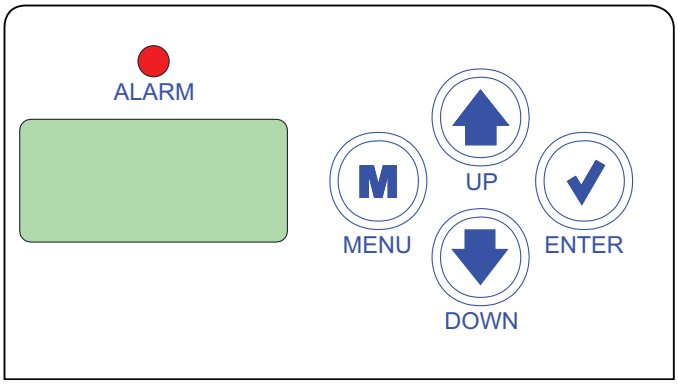



**Figure 16: LCD Display Screen and Navigation Keys**

| Navigation Key | Key Function |
|---|---|
| MENU  | Use the MENU key to move through screens within Main Menu categories and return to the Main Menu while at other screens. |
| UP  | Use this key to adjust setpoints and change configurations. |
| DOWN  | Use this key to adjust setpoints and change configurations. |
| ENTER  | Use the ENTER key to navigate through the Main Menu Screen categories. |

**Table 21: Navigation Key Functions**

| Editing Key | Key Function |
|---|---|
| **UP or DOWN**  | Use the UP or DOWN key to enter Edit Mode on a user-adjustable screen. Edit Mode is indicated by the underscore appearing on the screen.<br><br>**NOTE:** Entering Edit Mode will also adjust the value up one (UP key) or down one (DOWN key). |
| **ENTER**  | Use the ENTER key to move through the digits in the screen when editing a numeric value. An extended press of the ENTER key saves edits no matter the location of the editing cursor within the digits.<br><br>Press the ENTER key to save a non-numeric value such as Hi Speed Network. |
| **MENU**  | The MENU key cancels editing when in Edit Mode. The screen being edited will return to its original value and the underscore will disappear.<br><br>A second press of the MENU key returns the view to the Main Menu. |

**Table 22: Editing Key Functions**

## Main Screens Map

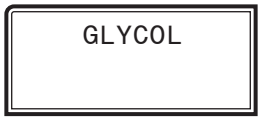
### Main DX Barrel Chiller Controller Main Screens Map

Refer to the following map when navigating through the Main DX Barrel Chiller Controller Screens. The first screen is an initialization screen. To scroll through the rest of the screens, press the **<MENU>** button.


Press (M) to go to the Settings screen.


Press (✓) to scroll through Settings screens.

Press (M) to go to the GLYCOL screen.




Press (✓) to scroll through GLYCOL screens.

Press (M) to go to the Status screen.


Press (✓) to scroll through the Status screens.

Press (M) to go to the Alarms screen.

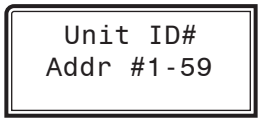

Press (✓) to scroll through the Alarms.

If there are no alarms, the screen will say “No Alarms”.

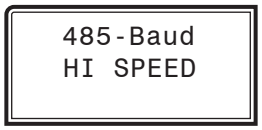
Press (M) to go to the first Main Menu screen.

## Settings Screens

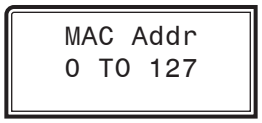
Refer to the following map when navigating through the Settings Screens. From the Settings Screen, press **<ENTER>** to scroll through the screens.

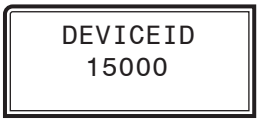

**UNIT ADDRESS**
Unit address. Valid range is 1-59. Default is 1.



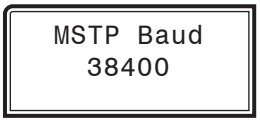

**485 BAUD RATE**
HI SPEED or LO SPEED. Default is HI SPEED.




**BACnet CURRENT MAC ADDRESS**
Valid range is 0-127. Default is 0.
The **<ENTER>** key moves the cursor between the digital fields. Once the cursor is under a field, use the **<UP>** and **<DOWN>** arrow keys to select a number between 0 and 9.




**BACnet CURRENT DEVICE ID**
A Device ID of up to seven digits can be entered.
The **<ENTER>** key moves the cursor between the digital fields. Once the cursor is under a field, use the **<UP>** and **<DOWN>** arrow keys to select a number between 0 and 9.

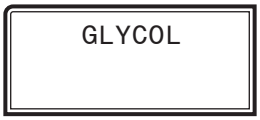


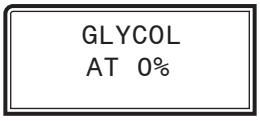

**BACnet CURRENT BAUD RATE**
The options are 9600, 19200, 38400, 57600, 76800.
Default is 38400.

## Glycol Screens

From the Glycol Screen, press **<ENTER>** to scroll through the screens.

**CAUTION:** These screens are protected. The Glycol percentage can only be changed with guidance from AAON Controls Engineering. This is to prevent someone from changing the percentage of glycol while someone is running water through the loop. This could cause the system to freeze and cause mechanical damage to the Chiller.



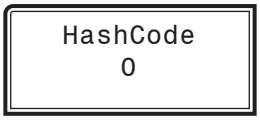




**GLYCOL AT %**

Use this screen to see the current glycol level. Any changes made to this screen are not saved until validated by a HashCode From AAON Controls Engineering.


**KEY CODE**

Submit this code to AAON Controls Engineering. This code will not change until a HashCode has been entered.

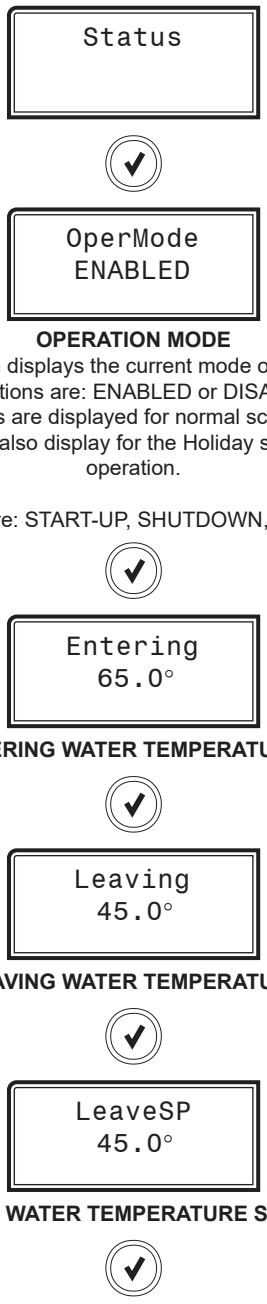


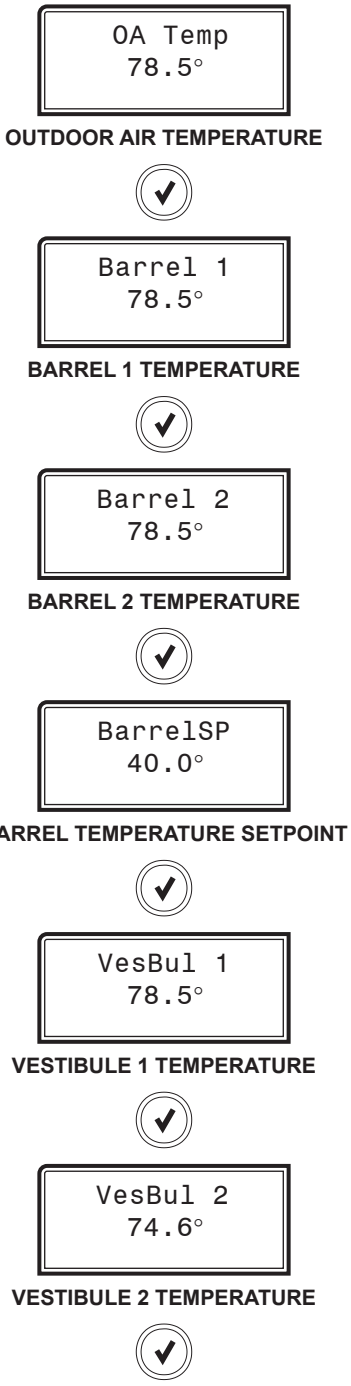

**HASHCODE**

Input the code you receive from AAON Controls Engineering to finalize any changes to your glycol percentage. The changed percentage will only be saved once a valid Hashcode has been entered.

## Status Screens

Refer to the following map when navigating through the Status Screens. From the Status Screen, press **<ENTER>** to scroll through the screens.



## Alarms

### Alarm Screens

If there are no Alarms, the Alarm Screen will display "No Alarms." If there are alarms present, the screen will display, "Alarms." Press **<ENTER>** to scroll through the alarms or let the alarms automatically scroll on the screen.


**ALARMS**
This will be displayed if there are active alarms.


**NO ALARMS**
This will be shown if there are no current alarms.

| Alarm | Description |
|---|---|
| **Inlet SENSOR:** | The Chiller Water Inlet Temperature Sensor has failed. |
| **Outlet SENSOR:** | The Chiller Water Outlet Temperature Sensor has failed. |
| **Barrel 1 SENSOR:** | Barrel 1 Temperature Sensor has failed. |
| **Barrel 2 SENSOR:** | Barrel 2 Temperature Sensor has failed. |
| **OAT SENSOR:** | The Outdoor Air Temperature Sensor has failed. |
| **WtrFlow1 ALARM:** | Water Flow Switch 1 has been disabled. |
| **WtrFlow2 ALARM:** | Water Flow Switch 2 has been disabled. |
| **EMG SHUTDOWN:** | An emergency shutdown has occurred. |
| **PHASE LOSS:** | A phase loss has occurred. |
| **CWOutlet TOO HIGH:** | The Chiller Water Outlet Temperature has risen above the Chiller Water Inlet Temperature by 4ºF for the Bad Water Out Temp Failure Delay time period. |
| **CWOutlet CUTOFF:** | The Chiller Water Outlet Temperature has dropped below the Chiller Water Temperature Cutoff Setpoint. |
| **REFRIG 1 MISSING:** | Refrig. Module 1 is not communicating. |
| **REFRIG 2 MISSING:** | Refrig. Module 2 is not communicating. |
| **REFRIG 3 MISSING:** | Refrig. Module 3 is not communicating. |
| **REFRIG 4 MISSING:** | Refrig. Module 4 is not communicating. |
| **REFRIG 5 MISSING:** | Refrig. Module 5 is not communicating. |
| **REFRIG 6 MISSING:** | Refrig. Module 6 is not communicating. |
| **EVAP Mod MISSING:** | The Evaporative Condenser Module is not communicating. |
| **CPM Mod MISSING:** | The Chiller Pumping Module is not communicating. |
| **VST1 Mod MISSING:** | Vestibule 1 Module is not communicating. |
| **VST2 Mod MISSING:** | Vestibule 2 Module is not communicating. |
| **REFRIG 1 ALARMS:** | Refrigeration Module 1 has an alarm(s). |
| **REFRIG 2 ALARMS:** | Refrigeration Module 2 has an alarm(s). |
| **REFRIG 3 ALARMS:** | Refrigeration Module 3 has an alarm(s) |
| **REFRIG 4 ALARMS:** | Refrigeration Module 4 has an alarm(s). |
| **REFRIG 5 ALARMS:** | Refrigeration Module 5 has an alarm(s). |
| **REFRIG 6 ALARMS:** | Refrigeration Module 6 has an alarm(s). |
| **EVAP Mod ALARMS:** | The Evaporative Condenser Module has an alarm(s). |
| **CPM Mod ALARMS:** | The Chiller Pumping Module has an alarm(s). |
| **VST1 Mod ALARMS:** | Vestibule 1 Module has an alarm(s). |
| **VST2 Mod ALARMS:** | Vestibule 2 Module has an alarm(s). |
| **UNKNOWN ALARM:** | There is an unknown alarm. |

**Table 23: Main DX Barrel Chiller Controller Alarms**

## Main Screens Map

Refer to the following map when navigating through the Refrigerant Module Main Screens. To scroll through the screens, press the **<MENU>** button.

RSM
1149vXXX

Press ✓ to scroll through the RSM screens.

Press **M** to go to the STATUS MENU screen..

STATUS
MENU

Press ✓ to scroll through the STATUS MENU screens.

Press **M** to go to the SENSOR MENU screen.

SENSOR
MENU

Press ✓ to scroll through the SENSOR MENU screens.

Press **M** to go to the SETPOINT STATUS screen.

SETPOINT
STATUS

Press ✓ to scroll through the SETPOINT STATUS screens.

Press **M** to go to the ALARMS WARNINGS screen.

ALARM
WARNINGS

Press ✓ to scroll through the ALARM WARNINGS screens.

Press **M** to go to the ALARM FAULTS screen.

ALARM
FAULTS

Press ✓ to scroll through ALARM FAULTS screens.

Press **M** to go to the ALARM LOCKOUTS screen.

ALARM
LOCKOUTS

Press ✓ to scroll through ALARM LOCKOUTS screens.

Press **M** to go to the FORCE MENU screen.

FORCE
MENU

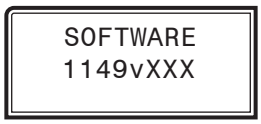
Press ✓ to scroll through the FORCE MENU screens.

## Refrigerant Module Screens

Refer to the following map when navigating through the Refrigerant Module Screens. Press **<ENTER>** to scroll through the screens.



**E-BUS COMMUNICATION DIAGNOSTICS**
This screen shows the number of COMM packets received.

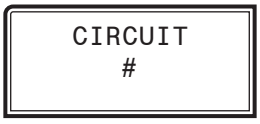



**SOFTWARE VERSION**


**CURRENT BOARD ADDRESS**
Configure the address according to which board address this module represents—1, 2, 3, 4, 5, 6

Number in parentheses is E-BUS address.
Module 1 is 160, Module 2 is 161, Module 3 is 162,
Module 4 is 163, Module 5 is 164, Module 6 is 165

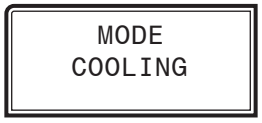

**NUMBER OF BARRELS (1-2)**



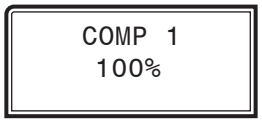

**NUMBER OF CIRCUITS (1-2)**

## Status Menu Screens

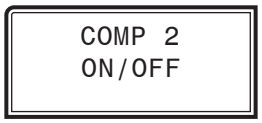
Refer to the following map when navigating through the Status Screens. From the STATUS MENU Screen, press **<ENTER>** to scroll through the screens.

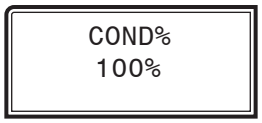

**OPERATING MODE STATUS**
COOLING or OFF.



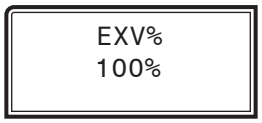

**COMPRESSOR 1 STATUS**
**%**



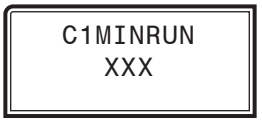

**COMPRESSOR 2 STATUS**
ON/OFF



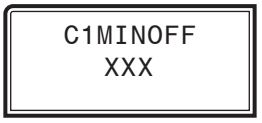

**CONDENSER STATUS**
100%




**EXPANSION VALVE STATUS**

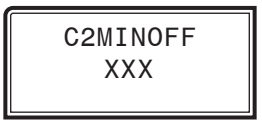



**COMPRESSOR 1 MINIMUM RUN TIME**
(in seconds)




**COMPRESSOR 1 MINIMUM OFF TIME**
(in seconds)

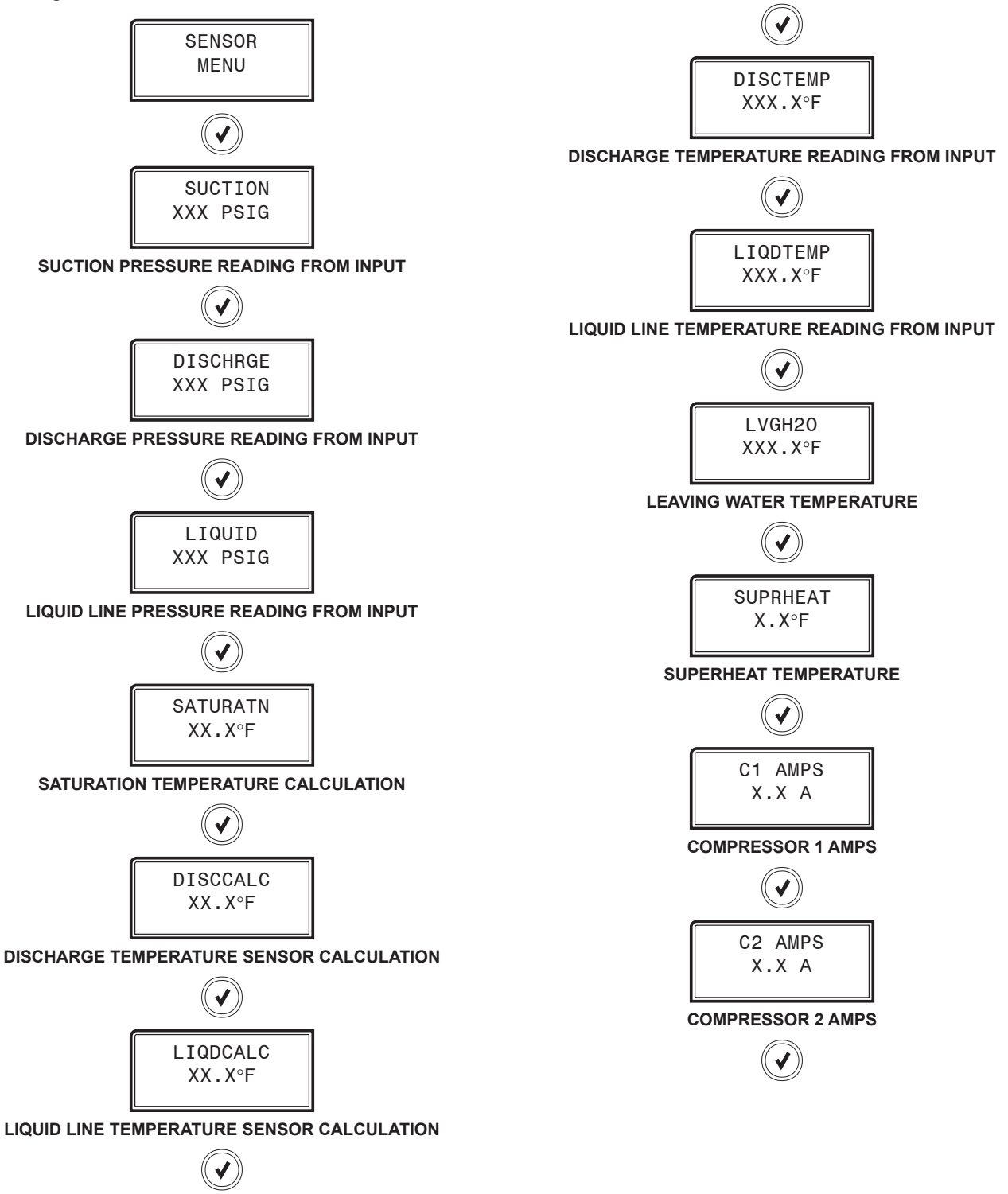

**COMPRESSOR 2 MINIMUM RUN TIME**
(in seconds)




**COMPRESSOR 2 MINIMUM OFF TIME**
(in seconds)

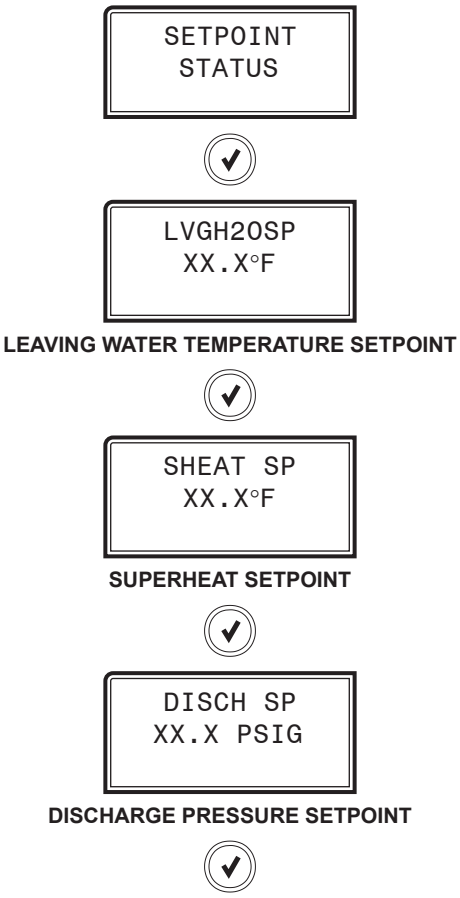
## Sensor Menu Screens

Refer to the following map when navigating through the Sensor Screens. From the SENSOR MENU Screen, press **<ENTER>** to scroll through the screens.



## Setpoint Status Screens

Refer to the following map when navigating through the Screens. From the SETPOINT STATUS Screen, press **<ENTER>** to scroll through the screens.



## Alarm Screens

### Alarm Warning Screens

If an alarm is present, the ALARM LED above the LCD display will light up red and blink. The Alarms will display and scroll automatically from the ALARMS screen when alarms are present.

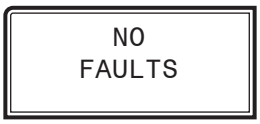

**WARNING!**
This will be displayed if there are active warnings.


**NO WARNINGS**
This will be shown if there are no current warnings.

| Alarm | Description |
|---|---|
| **LOW SUCT PRESSURE:** | Low Suction Pressure |
| **LOW SUCT NO START:** | Low Suction Pressure Startup |
| **HIGH DISCHPSI:** | High Discharge Pressure |
| **DISCHPSI NODETECT:** | Cannot detect Discharge Pressure |
| **DLTSENSR NODETECT:** | Cannot detect Discharge Line Temperature Sensor |
| **HIGH SUPRHEAT:** | High Superheat |
| **FANFAULT INPUT:** | Condenser Fan Fault Input |
| **CONDENSR OVERAMPS:** | Condenser Over Current |
| **LQUIDPSI NODETECT:** | Cannot detect Liquid Line Pressure |
| **LLTSENSR NODETECT:** | Cannot detect Liquid Line Temperature Sensor |
| **HIGH DISCHPSI:** | High Discharge Pressure Level 2 |

**Table 24: RSM Alarms**

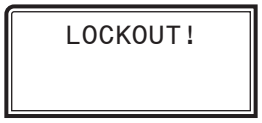

**FAULTS!**
This will be displayed if there are active faults.



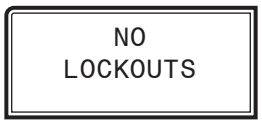

**NO FAULTS**
This will be shown if there are no current faults.

| Fault | Description |
|---|---|
| **LOW SUCT PRESSURE:** | Low Suction Pressure |
| **UNSAFE SUCT PSI:** | Unsafe Suction Pressure |
| **HIGH PSI TRIP:** | High Discharge Pressure Trip |
| **C1 NO START:** | Compressor 1 not running |
| **C2 NO START:** | Compressor 2 not running |
| **EVAPTEMP NODETECT:** | Cannot detect Suction Line Temperature Sensor |
| **LOW SUPRHEAT:** | Low Superheat |
| **HIGH DISCTEMP:** | High Discharge Temperature |
| **HIGH DISCTEMP:** | High Discharge Temperature Compressor 2 |
| **C1 FALSE ACTIVE:** | Compressor 1 False Active |
| **C2 FALSE ACTIVE:** | Compressor 2 False Active |
| **SUCT PSI NODETECT:** | Cannot detect Suction Pressure Temperature Sensor |
| **EMERGNCY SHUTDOWN:** | Emergency Shutdown |
| **COMM TIMEOUT:** | Modbus Slave Communication Time Out |
| **HIGH SUPRHEAT:** | High Superheat |
| **HIGH SAT TEMP** | High Saturation Temperature |
| **C1 OVER CURRENT:** | Compressor 1 Over Current |
| **C2 OVER CURRENT:** | Compressor 2 Over Current |
| **C1 LOW CURRENT:** | Compressor 1 Under Current |
| **C2 LOW CURRENT:** | Compressor 2 Under Current |
| **COMP VFD INPUT:** | Compressor 1 VFD fault |

**Table 25: RSM Faults**




**LOCKOUT!**
This will be displayed if there are active lockouts.



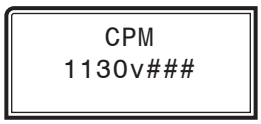

**NO LOCKOUTS**
This will be shown if there are no current lockouts.

| Lockout | Description |
|---|---|
| **SUCT PSI LOCKOUT:** | Suction Pressure System Lockout |
| **LOW DISC LOCKOUT:** | Low Discharge Pressure Lockout |
| **C1 >AMPS LOCKOUT:** | Compressor 1 Over Current Lockout |
| **C2 >AMPS LOCKOUT:** | Compressor 2 Over Current Lockout |
| **HIGH DLT LOCKOUT:** | High Discharge Temperature Lockout |
| **HIDISPSI LOCKOUT:** | High Discharge Pressure System Lockout |
| **LO SUPHT LOCKOUT:** | Low Superheat System Lockout |
| **HI SUPHT LOCKOUT:** | High Superheat System Lockout |
| **HIGH SAT LOCKOUT:** | High Saturation Temperature System Lockout |
| **C1 <AMPS LOCKOUT:** | Compressor 1 Under Current Lockout |
| **C2 <AMPS LOCKOUT:** | Compressor 2 Under Current Lockout |

**Table 26: RSM Lockouts**

## Main Screens Map

Refer to the following map when navigating through the Chiller Pumping Module Main Screens. To scroll through the screens, press the **<MENU>** button.

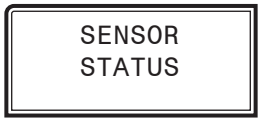



Press ✓ to scroll through the CPM screens.

Press **M** to go to the SYSTEM STATUS screen..


Press ✓ to scroll through the SYSTEM STATUS screens.

Press **M** to go to the SENSOR STATUS screen.




Press ✓ to scroll through the SENSOR STATUS screens.

Press **M** to go to the ALARMS screen.


Press ✓ to scroll through the ALARMS screens.

Press **M** to go to the ALARMS HISTORY screen.


Press ✓ to scroll through the ALARMS HISTORY screens.

Press **M** to go to the ALARM SETPOINT STATUS screen.

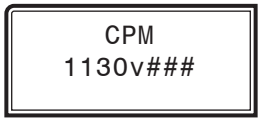

Press ✓ to scroll through the SETPOINT STATUS screens.

Press **M** to go to the PUMP RUNTIME screen.


Press ✓ to scroll through the PUMP RUNTIME screens.

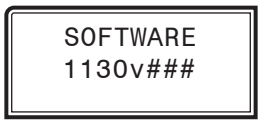
## Module Screens

Refer to the following map when navigating through the Chiller Pumping Module Screens. From the Waterside Economizer Main Screen, press **<ENTER>** to scroll through the screens.

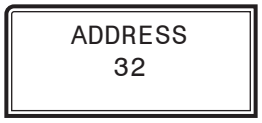




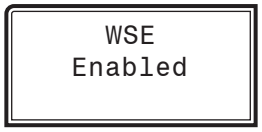
**E-BUS COMMUNICATION DIAGNOSTICS**
Number of COMM packets received. This value will count up to 65535 and rollover to 0.



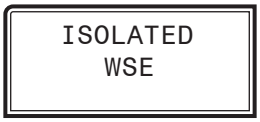

**SOFTWARE AND SOFTWARE VERSION**



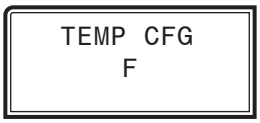

**CURRENT EBUS ADDRESS**



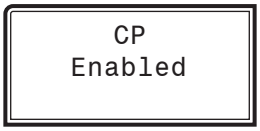

**WATERSIDE ECONOMIZER OPERATION STATUS**
Enabled or Disabled



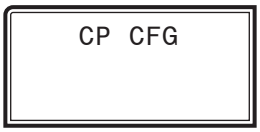

**ISOLATED GLYCOL LOOP**
NO, WSE, or PRIM/SEC
It will display WSE if the economizer is isolated. It will display PRIM/SEC if the primary and secondary pumping circuits are isolated.




**FAHRENHEIT or CELSIUS**
This screen will be present if the Waterside Economizer is enabled.



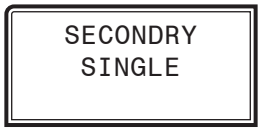

**CHILLER PUMP OPERATION STATUS**
Enabled or Disabled.



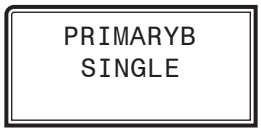

**CHILLER PUMP CONFIGURATION**
This screen will be present only if the Chiller Pump is enabled.
PRIM FIXED: Primary only with fixed speed pump
PRIM VAR: Primary only with variable speed pump
PRIM+SEC: Primary and secondary pumps
A+B+SEC: Primary A + Primary B + Secondary Pumps


**PRIMARY A PUMP CONFIGURATION**
This screen will be present only if the Chiller Pump is enabled.
SINGLE: Only one Primary A pump
DUAL: Has backup pump

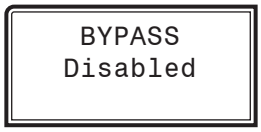
## Module Screens



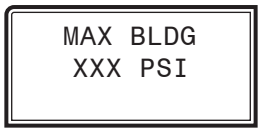

**SECONDARY PUMP CONFIGURATION**
This screen will be present only if the Chiller Pump is enabled and configured to have a secondary pump.
SINGLE: Only one Secondary Pump
DUAL: Has backup pump




**PRIMARY B PUMP CONFIGURATION**
This screen will be present only if the Chiller Pump is enabled.
SINGLE: Only one Primary B Pump
DUAL: Has backup pump

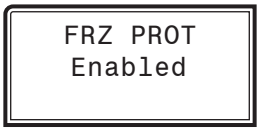



**BYPASS VALVE OPERATION STATUS**
Enabled or Disabled.




**MAXIMUM BUILDING PUMP PRESSURE**
This screen will be present only if the Chiller Pump is enabled and the configuration is not a primary fixed speed pump. It indicates the maximum building pressure allowed out of the building pump before failing.

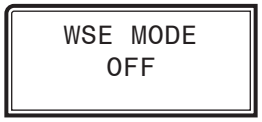

**TARGET DIFFERENTIAL PRESSURE**
This screen will be present only if the Chiller Pump is enabled and the configuration is not a primary fixed speed pump. It indicates the target differential pressure for the variable speed pump control.




**FREEZE PROTECTION STATUS**
This screen will be present only if both the Waterside Economizer and Chiller Pump are enabled. It indicates whether the pumps will be enabled to self operation when the Waterside Economizer goes into freeze protection.

## System Status Screens

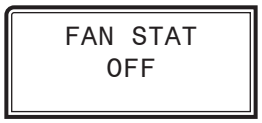
Refer to the following map when navigating through the System Status Screens. From the SYSTEM STATUS screen, press **<ENTER>** to scroll through the screens.

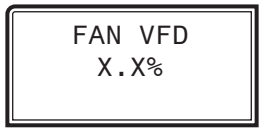

**CURRENT OPERATING MODE**
OFF or ECONO


**PRIMARY 3-WAY VALVE POSITION**
This screen will only be present if Waterside Economizer is enabled.

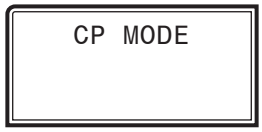

**SECONDARY 3-WAY VALVE POSITION**
This screen will only be present if Waterside Economizer is enabled and is configured to have an isolated (glycol) loop.



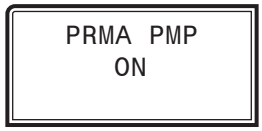

**FAN OPERATING STATUS**
This screen will only be present if Waterside Economizer is enabled.




**CURRENT FAN VFD DRIVE LEVEL**
This screen will only be present if Waterside Economizer is enabled.

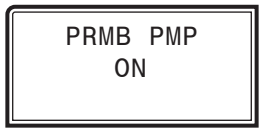



**CURRENT CHILLER RUN COMMAND**
This screen will be present only if the Chiller Pump is enabled.
OFF = No Pump command is currently active.
PRIM A = Primary A is commanded to run
PRIM B = Primary B is commanded to run
PRIM A+B = Both A & B are commanded to run.
A+B+SEC = Primary A + Primary B + Secondary Pumps



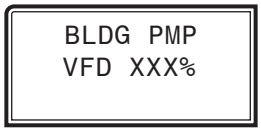

**PRIMARY A PUMP CURRENT RUN STATUS**
This screen will be present only if the Chiller Pump is enabled.
Will display OFF or PUMPING.


**SECONDARY PUMP CURRENT RUN STATUS**
This screen will be present only if the Chiller Pump is enabled and configured to have a secondary pump.
Will display OFF or PUMPING.




**PRIMARY B PUMP CURRENT RUN STATUS**
This screen will be present only if the Chiller Pump is enabled and configured for Primary A + Primary B + Secondary.
Will display OFF or PUMPING.

## System Status Screens



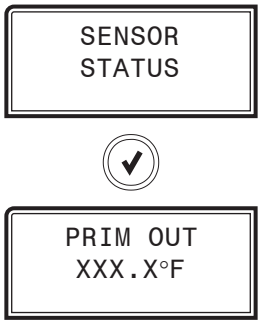

**BUILDING PUMP VFD CURRENT DRIVE STATUS**
This screen will be present only if the Chiller Pump is enabled and configured as Primary Only with Fixed Speed Pump.
Will display OFF or PUMPING


**BYPASS VALVE POSITION**
This screen will be present only if the Bypass Valve is enabled and configured.
Will display OFF or PUMPING.


**CALCULATED DIFFERENTIAL BUILDING PRESSURE**
This screen is only present if Chiller Pump is enabled and not configured for Primary Only with Fixed Speed Pump. .
Will display OFF or PUMPING.

## Sensor Status Screens

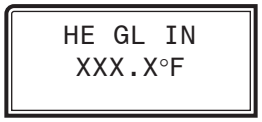
Refer to the following map when navigating through the Sensor Status Screens. From the SENSOR STATUS screen, press **<ENTER>** to scroll through the screens.




**PRIMARY MIXING VALVE OUTLET TEMPERATURE**
This screen is only present if Waterside Economizer is enabled.


**HEAT EXCHANGER WATER SIDE OUT TEMPERATURE**
This screen is only present if Waterside Economizer is enabled.

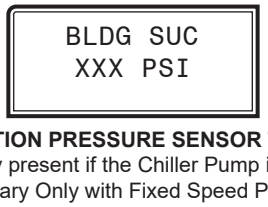

**HEAT EXCHANGER GLYCOL SIDE OUTLET TEMPERATURE**
This screen is only present if Waterside Economizer is enabled and the module is configured for isolated operation. It shows the Heat Exchanger Glycol Side Outlet Temperature (F/C).




**HEAT EXCHANGER GLYCOL SIDE INLET TEMPERATURE**
This screen is only present if Waterside Economizer is enabled and the module is configured for isolated operation. It shows the Heat Exchanger Glycol Side Inlet Temperature (F/C).


**PRIMARY A FLOW SWITCH INPUT STATUS**
This screen is only present if the Chiller Pump is enabled. Will display “FLOWING” or “NO FLOW”.

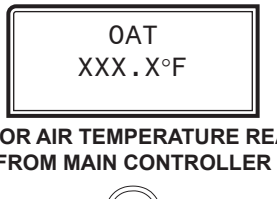

**PRIMARY B FLOW SWITCH INPUT STATUS**
This screen is only present if the Chiller Pump is enabled. Will display “FLOWING” or “NO FLOW”.



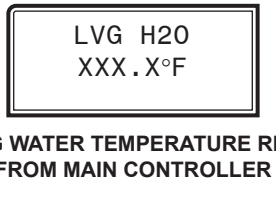

**BUILDING SUCTION PRESSURE SENSOR TEMPERATURE**
This screen is only present if the Chiller Pump is enabled and not configured for Primary Only with Fixed Speed Pumps. It shows the Building Suction Pressure Sensor temperature reading.




**BUILDING DISCHARGE PRESSURE SENSOR TEMPERATURE**
This screen is only present if the Chiller Pump is enabled and not configured for Primary Only with Fixed Speed Pumps. It shows the Building Suction Pressure Sensor temperature reading.




**OUTDOOR AIR TEMPERATURE READING FROM MAIN CONTROLLER**




**LEAVING WATER TEMPERATURE READING FROM MAIN CONTROLLER**

## Alarms Screens

### Alarms Screen

If an alarm is present, the ALARM LED above the LCD display will light up red and blink. The Alarms will display and scroll automatically from the ALARMS screen when alarms are present.

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**ACTIVE ALARMS!**
This will be displayed if there are active alarms.


**NO ALARMS**
This will be shown if there are no current alarms.

| Alarm | Description |
|---|---|
| **WSE NOT OPERATE:** | The Waterside Economizer is not operating. |
| **IN FRZ PROTECT:** | In Freeze Protection Mode. |
| **PRIM OUT NO SENSE:** | The primary mixing valve outlet temperature sensor has failed. |
| **HE WTOUT NO SENSE:** | The heat exchanger water out temperature sensor has failed. |
| **HE GL IN NO SENSE:** | The heat exchanger glycol inlet temperature sensor has failed. |
| **FAN VFD FAULT:** | Fan VFD Fault detected. |
| **SUC SNSR FAULT:** | The building suction pressure sensor's reading is out of range. |
| **DIS SNSR FAULT:** | The building discharge pressure sensor's reading is out of range. |
| **PMP1 VFD FAULT:** | First VFD pump fault detected. |
| **PMP2 VFD FAULT:** | Second VFD pump fault detected. |
| **PAP1 LOCKOUT:** | Primary A Pump 1 locked out. |
| **PAP2 LOCKOUT:** | Primary A Pump 2 locked out. |
| **SEC1 LOCKOUT:** | Secondary Pump 1 locked out. |
| **SEC2 LOCKOUT:** | Secondary Pump 2 locked out. |
| **PBP1 LOCKOUT:** | Primary B Pump 1 locked out. |
| **PBP2 LOCKOUT:** | Primary B Pump 2 locked out. |
| **CP SYSTM LOCKOUT:** | Chiller pumping system is locked out. |
| **COMM FAULT:** | Communications have failed. |
| **SUC SNSR FAIL:** | The building suction pressure sensor has failed. |
| **DIS SNSR FAIL:** | The building discharge pressure sensor has failed. |
| **DIFF PRS FAULT:** | The building differential pressure is out of range. |
| **SUC INIT FAIL:** | The building suction pressure sensor initialization has failed. |
| **DIS INIT FAIL:** | The building discharge pressure sensor initialization has failed. |
| **GLYCFEED LOW:** | The glycol level in the glycol feeder is low |

**Table 27: Chiller Pumping Module Alarms**

## Alarms History Screen

The ALARMS HISTORY screen will display the last occurrence of the given alarm in minutes if the last occurrence was 60 minutes or less, hours if the last occurrence was 72 hours or less, days if the last occurrence was 30 days or less and 0 if the last occurrence was over 30 days or the alarm has not been triggered since power up. Alarm histories are only kept as long as the unit is powered; they clear on loss of power.


This screen will only display if there are alarms that have occurred in the past 30 days.

**WSE NOOP ## MIN/HR/DAY:** This screen is only present if the Waterside Economizer is enabled. Time since last occurrence of Waterside Economizer is Not Operating Alarm.

**FRZ PROT ## MIN/HR/DAY:** This screen is only present if the Waterside Economizer is enabled. Time since last occurrence of Freeze Protection Mode Alarm.

**PRIM OUT ## MIN/HR/DAY:** This screen is only present if the Waterside Economizer is enabled. Time since last occurrence of Primary Mixing Valve Outlet Temperature Sensor Failure detection.

**HE WTOUT ## MIN/HR/DAY:** This screen is only present if Waterside Economizer is enabled. Time since last occurrence of Heat Exchanger Waterside Out Temperature Sensor Failure detection.

**HE GL IN ## MIN/HR/DAY:** This screen is only present if Waterside Economizer is enabled. Time since last occurrence of Heat Exchanger Glycol Side Inlet Sensor Failure detection.

**FAN VFD ## MIN/HR/DAY:** This screen is only present if Waterside Economizer is enabled. Minutes since last occurrence of a Fan VFD fault.

**PMP1 VFD ## MIN/HR/DAY:** This screen is only present if the Chiller Pump is enabled. Time since last occurrence of a VFD Pump 1 fault.

**PMP2 VFD ## MIN/HR/DAY:** This screen is only present if the Chiller Pump is enabled and not configured for Primary Only with Fixed Speed Pump. Time since last occurrence of a VFD Pump 2 fault.

**PAP1 LCK ## MIN/HR/DAY:** This screen is only present if the Chiller Pump is enabled. Time since last occurrence of a Primary A, Pump 1 Lockout.

**PAP2 LCK ## MIN/HR/DAY:** This screen is only present if the Chiller Pump is enabled and primary A is configured for backup. Time since last occurrence of a Primary A, Pump 2 Lockout.

**SEC1 LCK ## MIN/HR/DAY:** This screen is only present if the Chiller Pump is enabled and configured for a secondary. Time since last occurrence of a Secondary Pump 1 Lockout.

**SEC2 LCK ## MIN/HR/DAY:** This screen is only present if the Chiller Pump is enabled, configured for a secondary and the secondary is configured for backup. Time since last occurrence of a Secondary Pump 2 Lockout.

**PBP1 LCK ## MIN/HR/DAY:** This screen is only present if the Chiller Pump is enabled and is configured for Primary A + Primary B + Secondary. Time since last occurrence of a Primary B, Pump 1 Lockout.

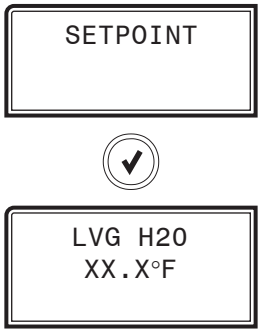
**PBP2 LCK ## MIN/HR/DAY:** This screen is only present if the Chiller Pump is enabled, is configured for Primary A + Primary B + Secondary and Primary B is configured for backup. Time since occurrence of a Primary B, Pump 2 Lockout.

**The Chiller Pump LOCK ## MIN/HR/DAY:** This screen is only present if the Chiller Pump is enabled. Time since last occurrence of a Chiller Pumping System Lockout.

**COMM FLT ## MIN/HR/DAY:** Time since last occurrence of a communications fault.

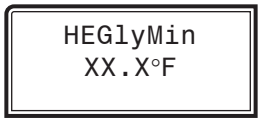
## Setpoint Status Screens

Refer to the following map when navigating through the Screens. From the SETPOINT STATUS screen, press **<ENTER>** to scroll through the screens.



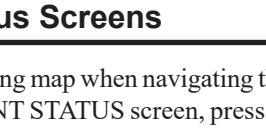

**LEAVING WATER TEMPERATURE TARGET SETPOINT**
This screen is only present if the Waterside Economizer is enabled.
Range is 0.0 to 70.0°F


**FREEZE PROTECT SETPOINT**
**FOR WATERSIDE ECONOMIZER AND HEAT EXCHANGER**
This screen is only present if the Waterside Economizer is enabled.
Range is 0.0 to 50.0°F



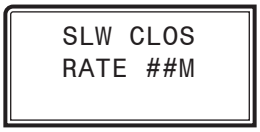

**HEAT EXCHANGER GLYCOL SIDE MINIMUM INLET TEMPERATURE SETPOINT**
This screen is only present if the Waterside Economizer is enabled and the module is configured for isolated operation.
Range is 32.0 to 50.0°F


**FAN STAGE UP DELAY SETPOINT**
This screen is only present if the Waterside Economizer is enabled.
Range is 0 to 30 seconds



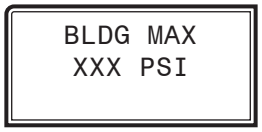

**FAN VFD MINIMUM OPERATING SPEED IN PERCENT**
This screen is only present if the Waterside Economizer is enabled.
Range is 10 to 50%


**PRIMARY MIXING VALVE SLOW OPENING RATE USED IN BRINGING WATERSIDE ECONOMIZER ON-LINE WITH COMPRESSORS RUNNING**
This screen is only present if the Waterside Economizer is enabled.
Range is 1 to 30 minutes




**PRIMARY MIXING VALVE SLOW CLOSING RATE USED IN DISABLING WATERSIDE ECONOMIZER WHILE COMPRESSORS ARE RUNNING**
This screen is only present if the Waterside Economizer is enabled.
Range is 1 to 30 minutes


**TARGET DIFFERENTIAL BUILDING PRESSURE**
This screen is only present if the Chiller Pump is enabled and not configured for Primary Only with Fixed Speed Pumps.
Range is 0 to 100 psi.




**MAXIMUM BUILDING PRESSURE**

This screen is only present if the Chiller Pump is enabled and not configured for Primary Only with Fixed Speed Pumps. It sets the maximum allowed building pressure from 0 to 200 psi.

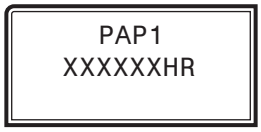

**PROOF OF FLOW START**

This screen is only present if the Chiller Pump is enabled and is configured for Primary Only with Fixed Speed Pumps.
It sets how many seconds the pump will run before it is considered a failed start.
Range is 0 to 300 seconds.

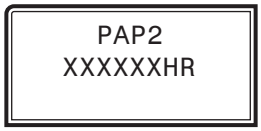
## Pump Runtime Screens

### Pump Runtime Screens

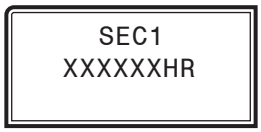
Refer to the following map when navigating through the Screens. From the PUMP RUNTIME screen, press **<ENTER>** to scroll through the screens.

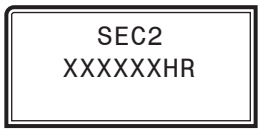

**PRIMARY A PUMP 1 RUN TIME**
Total accumulative runtime in hours.



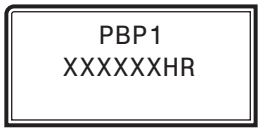

**PRIMARY A PUMP 2 RUN TIME**
Total accumulative runtime in hours.



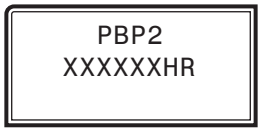

**SECONDARY PUMP 1 RUN TIME**
Total accumulative runtime in hours.




**SECONDARY PUMP 2 RUN TIME**
Total accumulative runtime in hours.



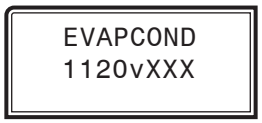

**PRIMARY B PUMP 1 RUN TIME**
Total accumulative runtime in hours.




**PRIMARY B PUMP 2 RUN TIME**
Total accumulative runtime in hours.

## Main Screens Map

Refer to the following map when navigating through the LCD Main Screens. To scroll through the screens, press the **<MENU>** button.

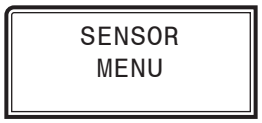



Press ✓ to scroll through the EVAPCOND screens.

Press **M** to go to the STATUS MENU screen..


Press ✓ to scroll through the STATUS MENU screens.

Press **M** to go to the SENSOR MENU screen.




Press ✓ to scroll through the SENSOR MENU screens.

Press **M** to go to the ALARMS screen.

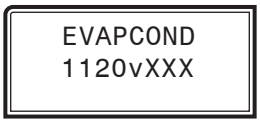

Press ✓ to scroll through the ALARMS screens.

Press **M** to go to the SETPOINT STATUS screen.


Press ✓ to scroll through the SETPOINT STATUS screens.

## Module Screens

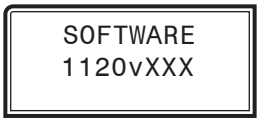
Refer to the following map when navigating through the Evaporative Condenser Screens. From the EVAP COND Screen, press **<ENTER>** to scroll through the screens.




✓

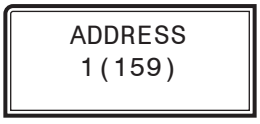

**E-BUS COMMUNICATION DIAGNOSTICS**
Number of COMM packets received.

✓




**CURRENT SOFTWARE VERSION**

✓

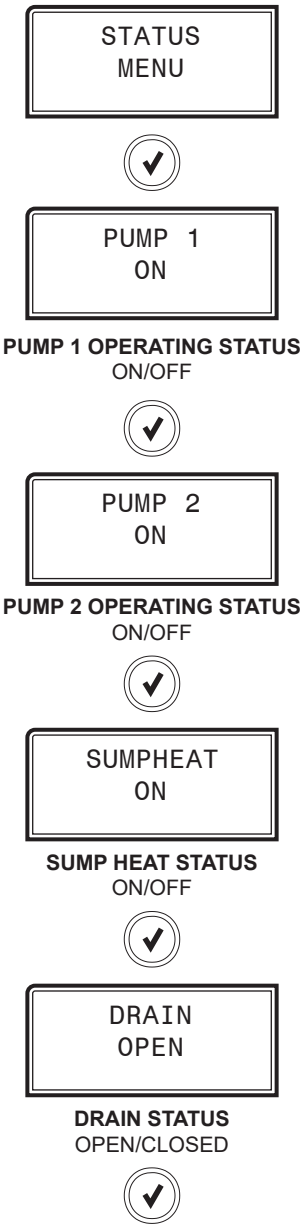



**CURRENT BOARD ADDRESS**

✓

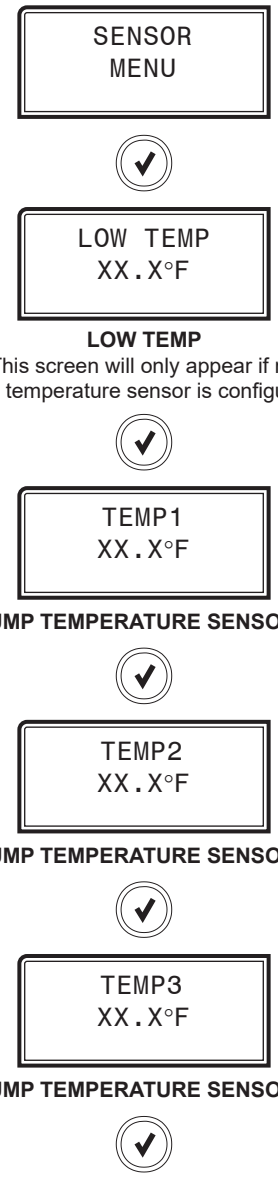
## Status Menu Screens

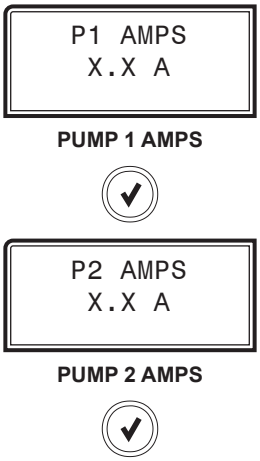
Refer to the following map when navigating through the Status Screens. From the SYSTEM MENU Screen, press **<ENTER>** to scroll through the screens.



## Sensor Menu Screens

Refer to the following map when navigating through the Sensor Screens. From the SENSOR MENU Screen, press **<ENTER>** to scroll through the screens.



## Alarms Screen

If an alarm is present, the ALARM LED above the LCD display will light up red and blink. The Alarms will display and scroll automatically from the ALARMS screen when alarms are present.


**ACTIVE ALARMS!**
This will be displayed if there are active alarms.

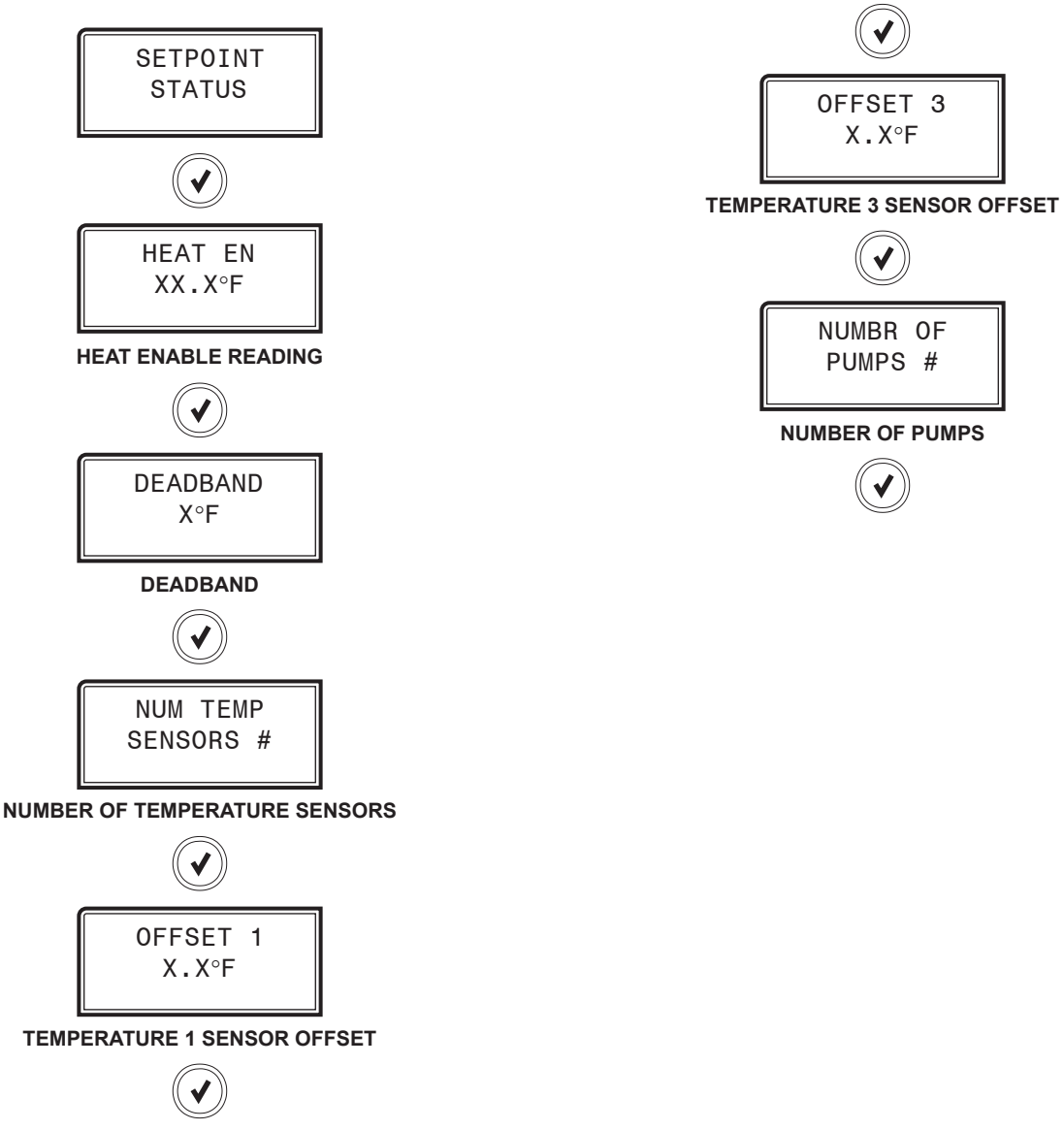

**NO ALARMS**
This will be shown if there are no current alarms.

| Alarm | Description |
|---|---|
| **EBUS COMM NODETECT:** | E-BUS communications not detected. |
| **SUMP HTR BLOCKED:** | Sump Heater blockage detected. |
| **LOW SUMP LEVEL!:** | Low Sump Level detected. |
| **NO PUMP1 PRESSURE:** | Pump 1 no pressure detected. |
| **NO PUMP2 PRESSURE:** | Pump 2 no pressure detected. |
| **PUMP1VFD FAULT!:** | Pump 1 VFD Fault |
| **PUMP2VFD FAULT!:** | Pump 2 VFD Fault |
| **TEMP1 NODETECT:** | Sump 1 Temperature Sensor not detected. |
| **TEMP2 NODETECT:** | Sump 2 Temperature Sensor not detected. |
| **TEMP3 NODETECT:** | Sump 3 Temperature Sensor not detected. |
| **CONDSR 1 LOCKOUT:** | Condenser 1 has a lockout condition. |
| **CONDSR 2 LOCKOUT:** | Condenser 2 has a lockout condition. |
| **LOW SUMP TEMP:** | Low Sump Temperature detected. |
| **PUMP1 LO LOCKOUT:** | Pump 1 Low Amperage lockout. |
| **PUMP1 HI LOCKOUT:** | Pump 1 High Amperage lockout. |
| **PUMP2 LO LOCKOUT:** | Pump 2 Low Amperage lockout. |
| **PUMP2 HI LOCKOUT:** | Pump 2 High Amperage lockout. |

**Table 28: Evaporative Condenser Alarms**

## Setpoint Status Screens

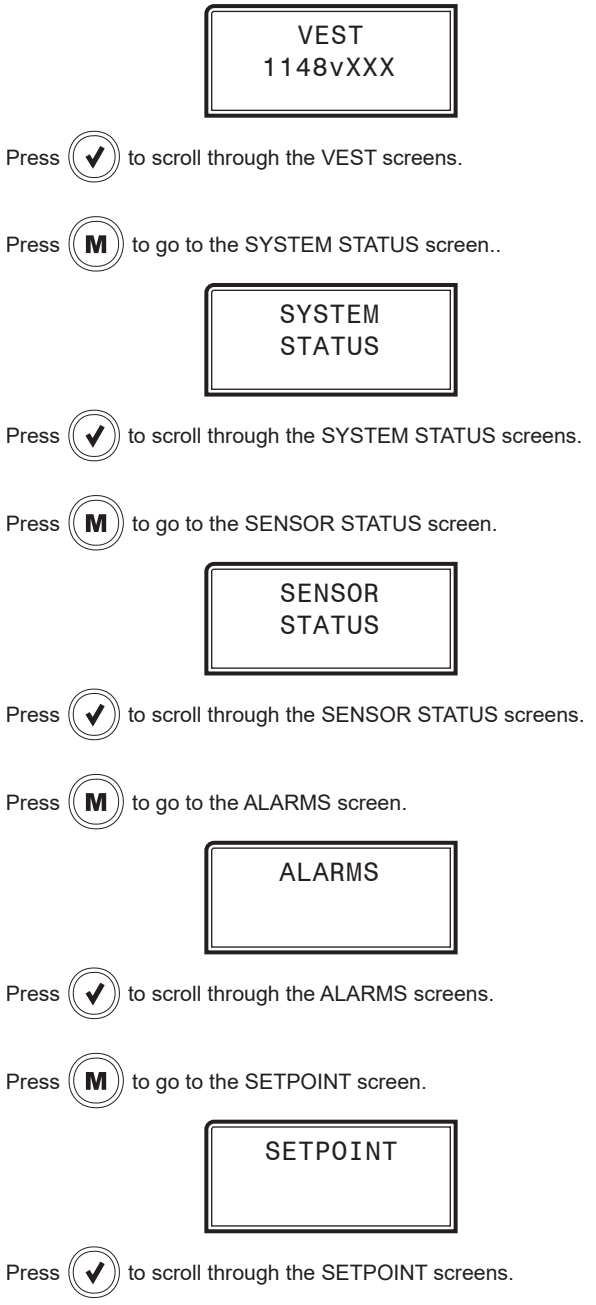
Refer to the following map when navigating through the Setpoint Status Screens. From the SETPOINT STATUS Screen, press **<ENTER>** to scroll through the screens.



## Main Screens Map and Module Screens

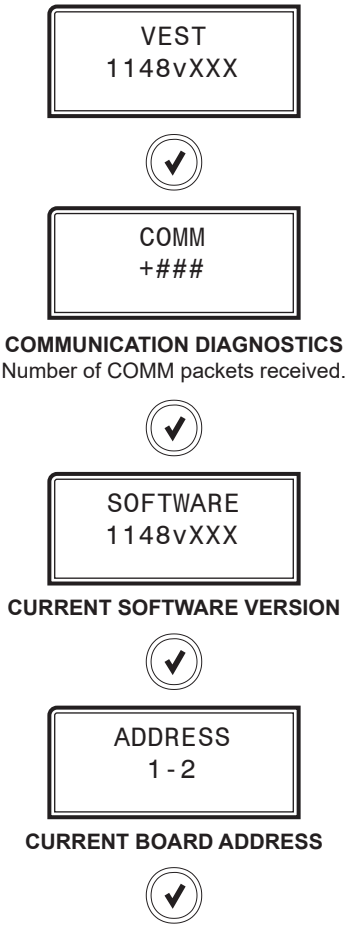
### Vestibule Main Screens Map

Refer to the following map when navigating through the Vestibule LCD Main Screens. To scroll through the screens, press the **<MENU>** button.



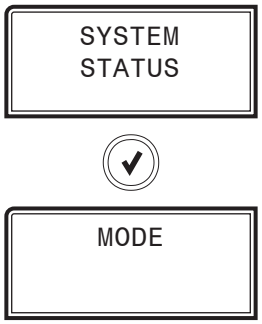

### Vestibule Module Screens

Refer to the following map when navigating through the Vestibule Module Screens. From the VEST Screen, press **<ENTER>** to scroll through the screens.



## System Status Screens

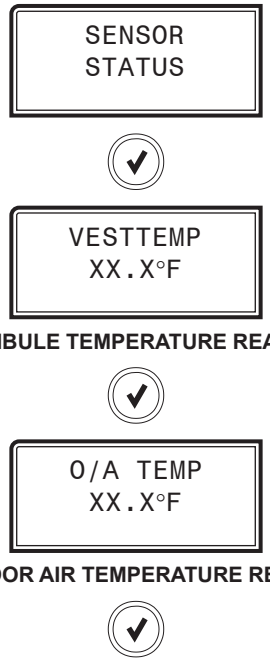
Refer to the following map when navigating through the SYSTEM STATUS Screens. From the SYSTEM STATUS Screen, press **<ENTER>** to scroll through the screens.




**OPERATION MODE**
COOL, HEAT, OFF

## Sensor Status Screens

Refer to the following map when navigating through the SYSTEM STATUS Screens. From the SYSTEM STATUS Screen, press **<ENTER>** to scroll through the screens.




**VESTIBULE TEMPERATURE READING**




**OUTDOOR AIR TEMPERATURE READING**

## Alarms Screen

If an alarm is present, the ALARM LED above the LCD display will light up red and blink. The Alarms will display and scroll automatically from the ALARMS screen when alarms are present.


**ACTIVE ALARMS!**
This will be displayed if there are active alarms.

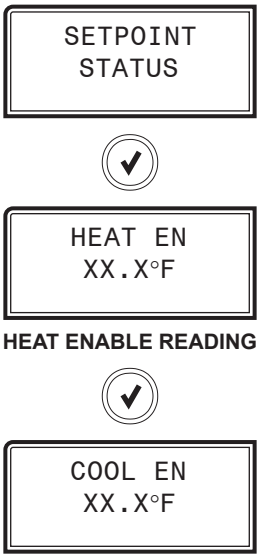

**NO ALARMS**
This will be shown if there are no current alarms.

| Alarm | Description |
|---|---|
| **VestTemp FAIL:** | Vestibule Temperature Sensor not detected. |
| **Out Temp FAIL:** | Outdoor Air Temperature Sensor not detected. |
| **WFS LOSS:** | Water Flow Switch open. |
| **LeakDetc FAIL:** | Leak Detector Sensor closed. |

**Table 29: Vestibule Module Alarms**

## Setpoint Status Screens

Refer to the following map when navigating through the Setpoint Status Screens. From the SETPOINT STATUS Screen, press **<ENTER>** to scroll through the screens.

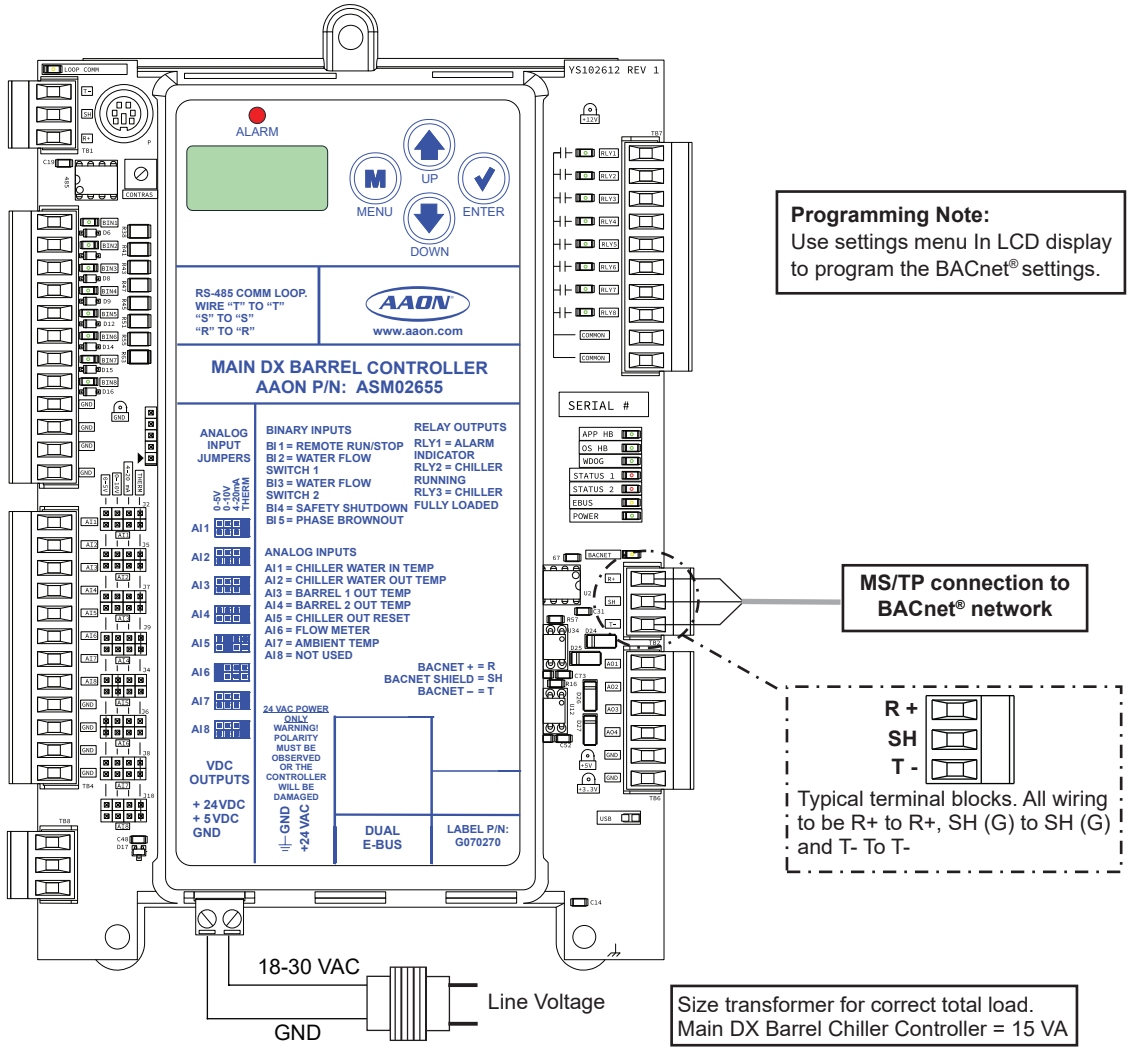



**HEAT ENABLE READING**




**OUTDOOR AIR TEMPERATURE READING**

## MS/TP Connection




**Wiring Notes:**

1. All wiring to be in accordance with local and national electrical codes and specifications.
2. All communication wiring to be 18-gauge minimum, two-conductor, twisted-pair with shield. Use Belden #82760 or equivalent.

**Figure 17: BACnet Connection to MS/TP Network**

| BACnet Analog Inputs | | |
|---|---|---|
| Point Type | Number | BACnet Point Name |
| AI | 1 | Application Version |
| AI | 2 | Entering Water Temperature |
| AI | 3 | Leaving Water Temperature |
| AI | 4 | Leaving Water Setpoint |
| AI | 5 | Barrel #1 Leaving Water Temperature |
| AI | 6 | Barrel #2 Leaving Water Temperature |
| AI | 7 | Barrel Leaving Water Setpoint |
| AI | 8 | Outdoor Air Temperature |
| AI | 9 | Flow Rate |
| AI | 10 | Vestibule #1 Temperature |
| AI | 11 | Vestibule #2 Temperature |
| AI | 20 | Building Pump Suction Pressure |
| AI | 21 | Building Pump Discharge Pressure |
| AI | 22 | Building Pump Differential Pressure |
| AI | 23 | Building Pump VFD Signal |
| AI | 24 | Building Pump Bypass Valve Position |
| AI | 30 | Waterside Economizer Primary 3-Way Valve |
| AI | 31 | Waterside Economizer Secondary 3-Way Valve |
| AI | 32 | Waterside Economizer Heat Exchanger Waterside Outlet |
| AI | 33 | Waterside Economizer Heat Exchanger Glycol Side Outlet |
| AI | 34 | Waterside Economizer Heat Exchanger Glycol Side Inlet |
| AI | 35 | Waterside Economizer Primary Valve Outlet Temperature |
| AI | 36 | Waterside Economizer Fan Speed |
| AI | 40 | EVAP Sump Temperature #1 |
| AI | 41 | EVAP Sump Temperature #2 |
| AI | 42 | EVAP Sump Temperature #3 |
| AI | 43 | EVAP Pump #1 Amps |
| AI | 44 | EVAP Pump #2 Amps |
| AI | 45 | EVAP Pump #1 VFD Signal |
| AI | 46 | EVAP Pump #2 VFD Signal |
| AI | 50 | Superheat Setpoint |
| AI | 51 | Head Pressure Setpoint |
| AI | 60 | B1:C1 Suction Pressure |
| AI | 61 | B1:C1 Discharge Pressure |
| AI | 62 | B1:C1 Liquid Line Pressure |
| AI | 63 | B1:C1 Calculated Saturation Temp |

**Table 30: BACnet Analog Inputs**

| BACnet Analog Inputs | | |
|---|---|---|
| Point Type | Number | BACnet Point Name |
| AI | 64 | B1:C1 Calculated Discharge Temp |
| AI | 65 | B1:C1 Calculated Liquid Line Temp |
| AI | 66 | B1:C1 Suction Line Temp |
| AI | 67 | B1:C1 Discharge Line Temp |
| AI | 68 | B1:C1 Liquid Line Temp |
| AI | 69 | B1:C1 Superheat Temp |
| AI | 70 | B1:C1 Discharge Superheat Temp |
| AI | 71 | B1:C1 Sub-cooling Temp |
| AI | 72 | B1:C1 Compressor A1 Percentage |
| AI | 73 | B1:C1 Compressor A2 Percentage |
| AI | 74 | B1:C1 Condenser Percentage |
| AI | 75 | B1:C1 Electronic Expansion Valve Position |
| AI | 76 | B1:C1 Compressor 1 Current |
| AI | 77 | B1:C1 Compressor 2 Current |
| AI | 90 | B2:C1 Suction Pressure |
| AI | 91 | B2:C1 Discharge Pressure |
| AI | 92 | B2:C1 Liquid Line Pressure |
| AI | 93 | B2:C1 Calculated Saturation Temp |
| AI | 94 | B2:C1 Calculated Discharge Temp |
| AI | 95 | B2:C1 Calculated Liquid Line Temp |
| AI | 96 | B2:C1 Suction Line Temp |
| AI | 97 | B2:C1 Discharge Line Temp |
| AI | 98 | B2:C1 Liquid Line Temp |
| AI | 99 | B2:C1 Superheat Temp |
| AI | 100 | B2:C1 Discharge Superheat Temp |
| AI | 101 | B2:C1 Sub-cooling Temp |
| AI | 102 | B2:C1 Compressor A1 Percentage |
| AI | 103 | B2:C1 Compressor A2 Percentage |
| AI | 104 | B2:C1 Condenser Percentage |
| AI | 105 | B2:C1 Electronic Expansion Valve Position |
| AI | 106 | B2:C1 Compressor 1 Current |
| AI | 107 | B2:C1 Compressor 2 Current |
| AI | 120 | B1:C2 Suction Pressure |
| AI | 121 | B1:C2 Discharge Pressure |
| AI | 122 | B1:C2 Liquid Line Pressure |
| AI | 123 | B1:C2 Calculated Saturation Temp |
| AI | 124 | B1:C2 Calculated Discharge Temp |
| AI | 125 | B1:C2 Calculated Liquid Line Temp |
| AI | 126 | B1:C2 Suction Line Temp |
| AI | 127 | B1:C2 Discharge Line Temp |

**Table 21: BACnet Analog Inputs (continued)**

## BACnet Analog Inputs

| BACnet Analog Inputs | | |
|---|---|---|
| Point Type | Number | BACnet Point Name |
| AI | 128 | B1:C2 Liquid Line Temp |
| AI | 129 | B1:C2 Superheat Temp |
| AI | 130 | B1:C2 Discharge Superheat Temp |
| AI | 131 | B1:C2 Sub-cooling Temp |
| AI | 132 | B1:C2 Compressor A1 Percentage |
| AI | 133 | B1:C2 Compressor A2 Percentage |
| AI | 134 | B1:C2 Condenser Percentage |
| AI | 135 | B1:C2 Electronic Expansion Valve Position |
| AI | 136 | B1:C2 Compressor 1 Current |
| AI | 137 | B1:C2 Compressor 2 Current |
| AI | 150 | B2:C2 Suction Pressure |
| AI | 151 | B2:C2 Discharge Pressure |
| AI | 152 | B2:C2 Liquid Line Pressure |
| AI | 153 | B2:C2 Calculated Saturation Temp |
| AI | 154 | B2:C2 Calculated Discharge Temp |
| AI | 155 | B2:C2 Calculated Liquid Line Temp |
| AI | 156 | B2:C2 Suction Line Temp |
| AI | 157 | B2:C2 Discharge Line Temp |
| AI | 158 | B2:C2 Liquid Line Temp |
| AI | 159 | B2:C2 Superheat Temp |
| AI | 160 | B2:C2 Discharge Superheat Temp |
| AI | 161 | B2:C2 Sub-cooling Temp |
| AI | 162 | B2:C2 Compressor A1 Percentage |
| AI | 163 | B2:C2 Compressor A2 Percentage |
| AI | 164 | B2:C2 Condenser Percentage |
| AI | 165 | B2:C2 Electronic Expansion Valve Position |
| AI | 166 | B2:C2 Compressor 1 Current |
| AI | 167 | B2:C2 Compressor 2 Current |
| AI | 190 | B1:C3 Suction Pressure |
| AI | 191 | B1:C3 Discharge Pressure |
| AI | 192 | B1:C3 Liquid Line Pressure |
| AI | 193 | B1:C3 Calculated Saturation Temp |
| AI | 194 | B1:C3 Calculated Discharge Temp |
| AI | 195 | B1:C3 Calculated Liquid Line Temp |
| AI | 196 | B1:C3 Suction Line Temp |
| AI | 197 | B1:C3 Discharge Line Temp |
| AI | 198 | B1:C3 Liquid Line Temp |
| AI | 199 | B1:C3 Superheat Temp |
| AI | 200 | B1:C3 Discharge Superheat Temp |
| AI | 201 | B1:C3 Sub-cooling Temp |

**Table 21: BACnet Analog Inputs (continued)**

| BACnet Analog Inputs | | |
|---|---|---|
| Point Type | Number | BACnet Point Name |
| AI | 202 | B1:C3 Compressor A1 Percentage |
| AI | 203 | B1:C3 Compressor A2 Percentage |
| AI | 204 | B1:C3 Condenser Percentage |
| AI | 205 | B1:C3 Electronic Expansion Valve Position |
| AI | 206 | B1:C3 Compressor 1 Current |
| AI | 207 | B1:C3 Compressor 2 Current |
| AI | 220 | B2:C3 Suction Pressure |
| AI | 221 | B2:C3 Discharge Pressure |
| AI | 222 | B2:C3 Liquid Line Pressure |
| AI | 223 | B2:C3 Calculated Saturation Temp |
| AI | 224 | B2:C3 Calculated Discharge Temp |
| AI | 225 | B2:C3 Calculated Liquid Line Temp |
| AI | 226 | B2:C3 Suction Line Temp |
| AI | 227 | B2:C3 Discharge Line Temp |
| AI | 228 | B2:C3 Liquid Line Temp |
| AI | 229 | B2:C3 Superheat Temp |
| AI | 230 | B2:C3 Discharge Superheat Temp |
| AI | 231 | B2:C3 Sub-cooling Temp |
| AI | 232 | B2:C3 Compressor A1 Percentage |
| AI | 233 | B2:C3 Compressor A2 Percentage |
| AI | 234 | B2:C3 Condenser Percentage |
| AI | 235 | B2:C3 Electronic Expansion Valve Position |
| AI | 236 | B2:C3 Compressor 1 Current |
| AI | 237 | B2:C3 Compressor 2 Current |

**Table 21: BACnet Analog Inputs (continued)**

| BACnet Analog Values | | | |
|---|---|---|---|
| **BACnet Point Type** | **Number** | **Limit Range** | **BACnet Point Name** |
| **AV** | 1 | 35° - 60° | Leaving Water Maximum Reset Limit |
| **AV** | 2 | 35° - 60° | Leaving Water Minimum Reset Limit |
| **AV** | 3 | 1° - 10° | Maximum Barrel Setpoint Offset |
| **AV** | 4 | 1° - 20° | Compressor Stage Window Above |
| **AV** | 5 | 1° - 20° | Compressor Stage Window Below |
| **AV** | 6 | 25° - 45° | Low Chilled Water Out Cutoff Temp |
| **AV** | 7 | -30° - 40° | Ambient Air Lockout Temperature |
| **AV** | 8 | 1° - 20° | Superheat Setpoint |
| **AV** | 9 | 150 psi – 475 psi | Head Pressure Setpoint |
| **AV** | 10 | 0 psi – 200 psi | Discharge Pressure Deadband Above |
| **AV** | 11 | 0 psi – 200 psi | Discharge Pressure Deadband Below |
| **AV** | 12 | 0 - 15,000 Ft | Altitude Above Sea Level |
| **AV** | 20 | 38° - 80° | EVAP Sump Heat Enable Setpoint |
| **AV** | 21 | 1° - 10° | EVAP Sump Heat Enable Deadband |
| **AV** | 22 | 0 Amps – 100 Amps | EVAP Maximum Amps |
| **AV** | 23 | 35° - 110° | EVAP Ambient First Stage Enable |
| **AV** | 24 | -30° - 40° | EVAP Ambient Condenser Lockout |
| **AV** | 30 | 1° - 10° | Waterside Economizer Enable Deadband |
| **AV** | 31 | 0° - 50° | Waterside Economizer Freeze Protection Setpoint |
| **AV** | 32 | 0° - 50° | Waterside Economizer Heat Exchange Inlet Setpoint |
| **AV** | 33 | 0 Sec – 30 Sec | Waterside Economizer Fan Staging Delay |
| **AV** | 34 | 0 Sec – 120 Sec | Waterside Economizer Startup Delay |
| **AV** | 35 | 0% - 50% | Waterside Economizer Minimum VFD Speed |
| **AV** | 36 | 0% - 95% | Waterside Economizer Minimum Mixing Valve w/Fan On |
| **AV** | 37 | 1 Min – 30 Min | Waterside Economizer Primary 3-Way Valve Slow Start |
| **AV** | 38 | 1 Min – 30 Min | Waterside Economizer Primary 3-Way Valve Slow Stop |
| **AV** | 39 | 0% - 100% | Waterside Economizer Primary Valve Maximum Position |
| **AV** | 40 | 0 = Log 1 = Reset | CPM Reset Alarm History { 1 = Reset } |
| **AV** | 41 | 10 psi - 200 psi | CPM Maximum Building Pressure |
| **AV** | 42 | 0 psi - 100 psi | CPM Building Differential Pr. Target |
| **AV** | 43 | 0 psi - 100 psi | CPM Minimum Suction Pressure |
| **AV** | 44 | 0% - 100% | CPM Pump VFD Initial Starting Position |
| **AV** | 45 | 0% - 100% | CPM Pump VFD Minimum Position |
| **AV** | 50 | 30° - 90° | Vestibule 1 Cooling Setpoint |
| **AV** | 51 | 30° - 90° | Vestibule 1 Heating Setpoint |
| **AV** | 52 | 0.1° - 20° | Vestibule 1 Setpoint Deadband |
| **AV** | 53 | 30° - 90° | Vestibule 2 Cooling Setpoint |
| **AV** | 54 | 30° - 90° | Vestibule 2 Heating Setpoint |
| **AV** | 55 | 0.1° - 20° | Vestibule 2 Setpoint Deadband |

**Table 31: BACnet Analog Values**

## BACnet Analog Values

| BACnet Analog Values | | | |
|---|---|---|---|
| **BACnet Point Type** | **Number** | **Limit Range** | **BACnet Point Name** |
| **AV** | 60 | -100° - 100° | Inlet Water Sensor Calibration Offset |
| **AV** | 61 | -100° - 100° | Outlet Water Sensor Calibration Offset |
| **AV** | 62 | -100° - 100° | Outdoor Air Sensor Calibration Offset |
| **AV** | 63 | -100° - 100° | Barrel 1 Temp Sensor Calibration Offset |
| **AV** | 64 | -100° - 100° | Barrel 2 Temp Sensor Calibration Offset |
| **AV** | 65 | -100° - 100° | Vestibule 1 Sensor Calibration Offset |
| **AV** | 66 | -100° - 100° | Vestibule 2 Sensor Calibration Offset |
| **AV** | 70 | 1 Sec – 60 Sec | Compressor Modulation Rate |
| **AV** | 71 | 5 Sec - 600 Sec | High Outlet Water Temp Failure Time |
| **AV** | 80 | 0 = Run 1 = Reset | Reset Unit Lockout { 1 = Reset } |
| **AV** | 81 | 0 – 2 = Auto/Run/Off | Auto/Run/Off Command |
| **AV** | 82 | 0 = Off 1 = On | Enable/Disable EVAP Drain Valve |
| **AV** | 83 | 0 = Off 1 = On | Enable/Disable Main Relay #4 |
| **AV** | 84 | 0 = Off 1 = On | Enable/Disable Main Relay #5 |
| **AV** | 85 | 0 = Off 1 = On | Enable/Disable Main Relay #6 |
| **AV** | 86 | 0 = Off 1 = On | Enable/Disable Main Relay #7 |
| **AV** | 87 | 0 = Off 1 = On | Enable/Disable Main Relay #8 |
| **AV** | 88 | 0, 100 | Set Analog Output #1 Voltage |
| **AV** | 89 | 0, 100 | Set Analog Output #2 Voltage |
| **AV** | 90 | 0, 100 | Set Analog Output #3 Voltage |
| **AV** | 91 | 0, 100 | Set Analog Output #4 Voltage |

**Table 22: BACnet Analog Values (continued)**

| BACnet Binary Inputs | | | |
|---|---|---|---|
| **BACnet Point Type** | **Number** | **BACnet Description** | **Value Type** |
| **BI** | 1 | Run/Stop Input Command | Status |
| **BI** | 2 | Proof of Water Flow #1 | Status |
| **BI** | 3 | Proof of Water Flow #2 | Status |
| **BI** | 4 | Emergency Shutdown | Status |
| **BI** | 5 | Phase Loss | Status |
| **BI** | 6 | Barrel #1 Disable Command | Status |
| **BI** | 7 | Barrel #2 Disable Command | Status |
| **BI** | 8 | Chiller Running On/Off Status | Status |
| **BI** | 9 | Chiller Fully Loaded Status | Status |
| **BI** | 10 | Waterside Economizer Fan Run Status | Status |
| **BI** | 11 | Waterside Economizer at Maximum Capacity | Status |
| **BI** | 12 | Waterside Economizer Secondary Pump Status | Status |
| **BI** | 13 | Waterside Economizer Alarm Not Operating | Alarm |
| **BI** | 14 | Waterside Economizer Alarm Freeze Protection | Alarm |
| **BI** | 15 | Waterside Economizer Alarm Primary Outlet Sensor | Alarm |
| **BI** | 16 | Waterside Economizer Alarm HE Waterside Outlet Sensor | Alarm |
| **BI** | 17 | Waterside Economizer Alarm HE Glycol Inlet Sensor | Alarm |
| **BI** | 18 | Waterside Economizer Alarm HE Glycol Outlet Sensor | Alarm |
| **BI** | 19 | Waterside Economizer Alarm VFD Fault | Alarm |
| **BI** | 20 | Chiller Pumping Module Water Flow Proving | Status |
| **BI** | 21 | Chiller Pumping Module Primary A Pump 1 Status | Status |
| **BI** | 22 | Chiller Pumping Module Primary A Pump 2 Status | Status |
| **BI** | 23 | Chiller Pumping Module Secondary Pump 1 Status | Status |
| **BI** | 24 | Chiller Pumping Module Secondary Pump 2 Status | Status |
| **BI** | 25 | Chiller Pumping Module Primary B Pump 1 Status | Status |
| **BI** | 26 | Chiller Pumping Module Primary B Pump 2 Status | Status |
| **BI** | 27 | Chiller Pumping Module Alarm Primary Pump A1 Locked Out | Alarm |
| **BI** | 28 | Chiller Pumping Module Alarm Primary Pump A2 Locked Out | Alarm |
| **BI** | 29 | Chiller Pumping Module Alarm Secondary Pump 1 Locked Out | Alarm |
| **BI** | 30 | Chiller Pumping Module Alarm Secondary Pump 2 Locked Out | Alarm |
| **BI** | 31 | Chiller Pumping Module Alarm Primary Pump B1 Locked Out | Alarm |
| **BI** | 32 | Chiller Pumping Module Alarm Primary Pump B2 Locked Out | Alarm |
| **BI** | 33 | Chiller Pumping Module Alarm Maximum Pressure Exceeded | Alarm |
| **BI** | 34 | Chiller Pumping Module Alarm Pumps Locked Out | Alarm |
| **BI** | 35 | Chiller Pumping Module Alarm Glycol Feeder Low | Alarm |
| **BI** | 40 | Evaporator Low Sump Input Status | Status |
| **BI** | 41 | Evaporator Pump 1 Pressure Status | Status |
| **BI** | 42 | Evaporator Pump 1 VFD Fault Status | Status |
| **BI** | 43 | Evaporator Pump 2 Pressure Status | Status |
| **BI** | 44 | Evaporator Pump 2 VFD Fault Status | Status |
| **BI** | 45 | Evaporator Condenser Pump 1 | Status |

**Table 32: BACnet Binary Inputs**

## BACnet Binary Inputs

| BACnet Binary Inputs | | | |
|---|---|---|---|
| **BACnet Point Type** | **Number** | **BACnet Description** | **Value Type** |
| **BI** | 46 | Evaporator Condenser Pump 2 | Status |
| **BI** | 47 | Evaporator Sump Heater | Status |
| **BI** | 48 | Evaporator Drain Valve | Status |
| **BI** | 49 | Evaporator Alarm Low Sump Level | Alarm |
| **BI** | 50 | Evaporator Alarm No Pump 1 Pressure Signal | Alarm |
| **BI** | 51 | Evaporator Alarm No Pump 2 Pressure Signal | Alarm |
| **BI** | 52 | Evaporator Alarm Pump 1 VFD Fault | Alarm |
| **BI** | 53 | Evaporator Alarm Pump 2 VFD Fault | Alarm |
| **BI** | 54 | Evaporator Alarm Missing Sump Temperature Sensor #1 | Alarm |
| **BI** | 55 | Evaporator Alarm Missing Sump Temperature Sensor #2 | Alarm |
| **BI** | 56 | Evaporator Alarm Missing Sump Temperature Sensor #3 | Alarm |
| **BI** | 57 | Evaporator Alarm Condenser 1 Lockout | Alarm |
| **BI** | 58 | Evaporator Alarm Condenser 2 Lockout | Alarm |
| **BI** | 59 | Evaporator Alarm Low Sump Temperature | Alarm |
| **BI** | 60 | Evaporator Alarm Pump 1 Low Current | Alarm |
| **BI** | 61 | Evaporator Alarm Pump 1 High Current | Alarm |
| **BI** | 62 | Evaporator Alarm Pump 2 Low Current | Alarm |
| **BI** | 63 | Evaporator Alarm Pump 2 High Current | Alarm |
| **BI** | 70 | B1:C1 Module Enabled | Status |
| **BI** | 71 | B1:C1 Compressor #1 Status | Status |
| **BI** | 72 | B1:C1 Compressor #2 Status | Status |
| **BI** | 73 | B2:C1 Module Enabled | Status |
| **BI** | 74 | B2:C1 Compressor #1 Status | Status |
| **BI** | 75 | B2:C1 Compressor #2 Status | Status |
| **BI** | 76 | B1:C2 Module Enabled | Status |
| **BI** | 77 | B1:C2 Compressor #1 Status | Status |
| **BI** | 78 | B1:C2 Compressor #2 Status | Status |
| **BI** | 79 | B2:C2 Module Enabled | Status |
| **BI** | 80 | B2:C2 Compressor #1 Status | Status |
| **BI** | 81 | B2:C2 Compressor #2 Status | Status |
| **BI** | 82 | B1:C3 Module Enabled | Status |
| **BI** | 83 | B1:C3 Compressor #1 Status | Status |
| **BI** | 84 | B1:C3 Compressor #2 Status | Status |
| **BI** | 85 | B2:C3 Module Enabled | Status |
| **BI** | 86 | B2:C3 Compressor #1 Status | Status |
| **BI** | 87 | B2:C3 Compressor #2 Status | Status |
| **BI** | 90 | B1:C1 Fault Low Suction | Fault |
| **BI** | 91 | B1:C1 Fault Unsafe Suction | Fault |
| **BI** | 92 | B1:C1 Fault Trip High Discharge Pressure | Fault |
| **BI** | 93 | B1:C1 Fault Compressor 1 Not Running | Fault |
| **BI** | 94 | B1:C1 Fault Compressor 2 Not Running | Fault |

**Table 23: BACnet Binary Inputs (continued)**

| BACnet Binary Inputs | | | |
|---|---|---|---|
| **BACnet Point Type** | **Number** | **BACnet Description** | **Value Type** |
| **BI** | 95 | B1:C1 Fault No Suction Line Temperature Sensor | Fault |
| **BI** | 96 | B1:C1 Fault Low Superheat | Fault |
| **BI** | 97 | B1:C1 Fault High Discharge Temperature | Fault |
| **BI** | 98 | B1:C1 Fault High Discharge psi Trip | Fault |
| **BI** | 99 | B1:C1 Fault Compressor 1 False Active | Fault |
| **BI** | 100 | B1:C1 Fault Compressor 2 False Active | Fault |
| **BI** | 101 | B1:C1 Fault No Suction Pressure Sensor | Fault |
| **BI** | 102 | B1:C1 Fault Emergency Shutdown | Fault |
| **BI** | 103 | B1:C1 Fault Modbus Slave Timeout | Fault |
| **BI** | 104 | B1:C1 Fault High Superheat | Fault |
| **BI** | 105 | B1:C1 Fault High Saturation Temperature | Fault |
| **BI** | 106 | B1:C1 Fault Compressor 1 Over Current | Fault |
| **BI** | 107 | B1:C1 Fault Compressor 2 Over Current | Fault |
| **BI** | 108 | B1:C1 Fault Compressor 1 Under Current | Fault |
| **BI** | 109 | B1:C1 Fault Compressor 2 Under Current | Fault |
| **BI** | 110 | B1:C1 Warning Low Suction Pressure | Warning |
| **BI** | 111 | B1:C1 Warning Low Suction Pressure Startup | Warning |
| **BI** | 112 | B1:C1 Warning High Discharge Pressure | Warning |
| **BI** | 113 | B1:C1 Warning No Discharge Pressure Sensor | Warning |
| **BI** | 114 | B1:C1 Warning No Discharge Temperature Sensor | Warning |
| **BI** | 115 | B1:C1 Warning High Superheat | Warning |
| **BI** | 116 | B1:C1 Warning Condenser Fault | Warning |
| **BI** | 117 | B1:C1 Warning No Liquid Line Pressure Sensor | Warning |
| **BI** | 118 | B1:C1 Warning No Liquid Line Temperature Sensor | Warning |
| **BI** | 119 | B1:C1 Warning High Discharge Pressure 2 | Warning |
| **BI** | 120 | B1:C1 Lockout Suction Pressure | Lockout |
| **BI** | 121 | B1:C1 Lockout Low Discharge Pressure | Lockout |
| **BI** | 122 | B1:C1 Lockout Compressor 1 Over Current | Lockout |
| **BI** | 123 | B1:C1 Lockout Compressor 2 Over Current | Lockout |
| **BI** | 124 | B1:C1 Lockout High Discharge Temperature | Lockout |
| **BI** | 125 | B1:C1 Lockout High Discharge Pressure | Lockout |
| **BI** | 126 | B1:C1 Lockout Low Superheat | Lockout |
| **BI** | 127 | B1:C1 Lockout High Superheat | Lockout |
| **BI** | 128 | B1:C1 Lockout High Saturation Temperature | Lockout |
| **BI** | 129 | B1:C1 Lockout Compressor 1 Under Current | Lockout |
| **BI** | 130 | B1:C1 Lockout Compressor 2 Under Current | Lockout |
| **BI** | 131 | B2:C1 Fault Low Suction | Fault |
| **BI** | 132 | B2:C1 Fault Unsafe Suction | Fault |
| **BI** | 133 | B2:C1 Fault Trip High Discharge Pressure | Fault |
| **BI** | 134 | B2:C1 Fault Compressor 1 Not Running | Fault |
| **BI** | 135 | B2:C1 Fault Compressor 2 Not Running | Fault |

**Table 23: BACnet Binary Inputs (continued)**

## BACnet Binary Inputs

| BACnet Binary Inputs | | | |
|---|---|---|---|
| **BACnet Point Type** | **Number** | **BACnet Description** | **Value Type** |
| **BI** | 136 | B2:C1 Fault No Suction Line Temperature Sensor | Fault |
| **BI** | 137 | B2:C1 Fault Low Superheat | Fault |
| **BI** | 138 | B2:C1 Fault High Discharge Temperature | Fault |
| **BI** | 139 | B2:C1 Fault High Discharge psi Trip | Fault |
| **BI** | 140 | B2:C1 Fault Compressor 1 False Active | Fault |
| **BI** | 141 | B2:C1 Fault Compressor 2 False Active | Fault |
| **BI** | 142 | B2:C1 Fault No Suction Pressure Sensor | Fault |
| **BI** | 143 | B2:C1 Fault Emergency Shutdown | Fault |
| **BI** | 144 | B2:C1 Fault Modbus Slave Timeout | Fault |
| **BI** | 145 | B2:C1 Fault High Superheat | Fault |
| **BI** | 146 | B2:C1 Fault High Saturation Temperature | Fault |
| **BI** | 147 | B2:C1 Fault Compressor 1 Over Current | Fault |
| **BI** | 148 | B2:C1 Fault Compressor 2 Over Current | Fault |
| **BI** | 149 | B2:C1 Fault Compressor 1 Under Current | Fault |
| **BI** | 150 | B2:C1 Fault Compressor 2 Under Current | Fault |
| **BI** | 151 | B2:C1 Warning Low Suction Pressure | Warning |
| **BI** | 152 | B2:C1 Warning Low Suction Pressure Startup | Warning |
| **BI** | 153 | B2:C1 Warning High Discharge Pressure | Warning |
| **BI** | 154 | B2:C1 Warning No Discharge Pressure Sensor | Warning |
| **BI** | 155 | B2:C1 Warning No Discharge Temperature Sensor | Warning |
| **BI** | 156 | B2:C1 Warning High Superheat | Warning |
| **BI** | 157 | B2:C1 Warning Condenser Fault | Warning |
| **BI** | 158 | B2:C1 Warning No Liquid Line Pressure Sensor | Warning |
| **BI** | 159 | B2:C1 Warning No Liquid Line Temperature Sensor | Warning |
| **BI** | 160 | B2:C1 Warning High Discharge Pressure 2 | Warning |
| **BI** | 161 | B2:C1 Lockout Suction Pressure | Lockout |
| **BI** | 162 | B2:C1 Lockout Low Discharge Pressure | Lockout |
| **BI** | 163 | B2:C1 Lockout Compressor 1 Over Current | Lockout |
| **BI** | 164 | B2:C1 Lockout Compressor 2 Over Current | Lockout |
| **BI** | 165 | B2:C1 Lockout High Discharge Temperature | Lockout |
| **BI** | 166 | B2:C1 Lockout High Discharge Pressure | Lockout |
| **BI** | 167 | B2:C1 Lockout Low Superheat | Lockout |
| **BI** | 168 | B2:C1 Lockout High Superheat | Lockout |
| **BI** | 169 | B2:C1 Lockout High Saturation Temperature | Lockout |
| **BI** | 170 | B2:C1 Lockout Compressor 1 Under Current | Lockout |
| **BI** | 171 | B2:C1 Lockout Compressor 2 Under Current | Lockout |
| **BI** | 172 | B1:C2 Fault Low Suction | Fault |
| **BI** | 173 | B1:C2 Fault Unsafe Suction | Fault |
| **BI** | 174 | B1:C2 Fault Trip High Discharge Pressure | Fault |
| **BI** | 175 | B1:C2 Fault Compressor 1 Not Running | Fault |

**Table 23: BACnet Binary Inputs (continued)**

| BACnet Binary Inputs | | | |
|---|---|---|---|
| **BACnet Point Type** | **Number** | **BACnet Description** | **Value Type** |
| **BI** | 176 | B1:C2 Fault Compressor 2 Not Running | Fault |
| **BI** | 177 | B1:C2 Fault No Suction Line Temperature Sensor | Fault |
| **BI** | 178 | B1:C2 Fault Low Superheat | Fault |
| **BI** | 179 | B1:C2 Fault High Discharge Temperature | Fault |
| **BI** | 180 | B1:C2 Fault High Discharge psi Trip | Fault |
| **BI** | 181 | B1:C2 Fault Compressor 1 False Active | Fault |
| **BI** | 182 | B1:C2 Fault Compressor 2 False Active | Fault |
| **BI** | 183 | B1:C2 Fault No Suction Pressure Sensor | Fault |
| **BI** | 184 | B1:C2 Fault Emergency Shutdown | Fault |
| **BI** | 185 | B1:C2 Fault Modbus Slave Timeout | Fault |
| **BI** | 186 | B1:C2 Fault High Superheat | Fault |
| **BI** | 187 | B1:C2 Fault High Saturation Temperature | Fault |
| **BI** | 188 | B1:C2 Fault Compressor 1 Over Current | Fault |
| **BI** | 189 | B1:C2 Fault Compressor 2 Over Current | Fault |
| **BI** | 190 | B1:C2 Fault Compressor 1 Under Current | Fault |
| **BI** | 191 | B1:C2 Fault Compressor 2 Under Current | Fault |
| **BI** | 192 | B1:C2 Warning Low Suction Pressure | Warning |
| **BI** | 193 | B1:C2 Warning Low Suction Pressure Startup | Warning |
| **BI** | 194 | B1:C2 Warning High Discharge Pressure | Warning |
| **BI** | 195 | B1:C2 Warning No Discharge Pressure Sensor | Warning |
| **BI** | 196 | B1:C2 Warning No Discharge Temperature Sensor | Warning |
| **BI** | 197 | B1:C2 Warning High Superheat | Warning |
| **BI** | 198 | B1:C2 Warning Condenser Fault | Warning |
| **BI** | 199 | B1:C2 Warning No Liquid Line Pressure Sensor | Warning |
| **BI** | 200 | B1:C2 Warning No Liquid Line Temperature Sensor | Warning |
| **BI** | 201 | B1:C2 Warning High Discharge Pressure 2 | Warning |
| **BI** | 202 | B1:C2 Lockout Suction Pressure | Lockout |
| **BI** | 203 | B1:C2 Lockout Low Discharge Pressure | Lockout |
| **BI** | 204 | B1:C2 Lockout Compressor 1 Over Current | Lockout |
| **BI** | 205 | B1:C2 Lockout Compressor 2 Over Current | Lockout |
| **BI** | 206 | B1:C2 Lockout High Discharge Temperature | Lockout |
| **BI** | 207 | B1:C2 Lockout High Discharge Pressure | Lockout |
| **BI** | 208 | B1:C2 Lockout Low Superheat | Lockout |
| **BI** | 209 | B1:C2 Lockout High Superheat | Lockout |
| **BI** | 210 | B1:C2 Lockout High Saturation Temperature | Lockout |
| **BI** | 211 | B1:C2 Lockout Compressor 1 Under Current | Lockout |
| **BI** | 212 | B2:C3 Lockout Compressor 2 Under Current | Lockout |
| **BI** | 213 | B2:C2 Fault Low Suction | Fault |
| **BI** | 214 | B2:C2 Fault Unsafe Suction | Fault |
| **BI** | 215 | B2:C2 Fault Trip High Discharge Pressure | Fault |

**Table 23: BACnet Binary Inputs (continued)**

## BACnet Binary Inputs

| BACnet Binary Inputs | | | |
|---|---|---|---|
| **BACnet Point Type** | **Number** | **BACnet Description** | **Value Type** |
| **BI** | 216 | B2:C2 Fault Compressor 1 Not Running | Fault |
| **BI** | 217 | B2:C2 Fault Compressor 2 Not Running | Fault |
| **BI** | 218 | B2:C2 Fault No Suction Line Temperature Sensor | Fault |
| **BI** | 219 | B2:C2 Fault Low Superheat | Fault |
| **BI** | 220 | B2:C2 Fault High Discharge Temperature | Fault |
| **BI** | 221 | B2:C2 Fault High Discharge psi Trip | Fault |
| **BI** | 222 | B2:C2 Fault Compressor 1 False Active | Fault |
| **BI** | 223 | B2:C2 Fault Compressor 2 False Active | Fault |
| **BI** | 224 | B2:C2 Fault No Suction Pressure Sensor | Fault |
| **BI** | 225 | B2:C2 Fault Emergency Shutdown | Fault |
| **BI** | 226 | B2:C2 Fault Modbus Slave Timeout | Fault |
| **BI** | 227 | B2:C2 Fault High Superheat | Fault |
| **BI** | 228 | B2:C2 Fault High Saturation Temperature | Fault |
| **BI** | 229 | B2:C2 Fault Compressor 1 Over Current | Fault |
| **BI** | 230 | B2:C2 Fault Compressor 2 Over Current | Fault |
| **BI** | 231 | B2:C2 Fault Compressor 1 Under Current | Fault |
| **BI** | 232 | B2:C2 Fault Compressor 2 Under Current | Fault |
| **BI** | 233 | B2:C2 Warning Low Suction Pressure | Warning |
| **BI** | 234 | B2:C2 Warning Low Suction Pressure Startup | Warning |
| **BI** | 235 | B2:C2 Warning High Discharge Pressure | Warning |
| **BI** | 236 | B2:C2 Warning No Discharge Pressure Sensor | Warning |
| **BI** | 237 | B2:C2 Warning No Discharge Temperature Sensor | Warning |
| **BI** | 238 | B2:C2 Warning High Superheat | Warning |
| **BI** | 239 | B2:C2 Warning Condenser Fault | Warning |
| **BI** | 240 | B2:C2 Warning No Liquid Line Pressure Sensor | Warning |
| **BI** | 241 | B2:C2 Warning No Liquid Line Temperature Sensor | Warning |
| **BI** | 242 | B2:C2 Warning High Discharge Pressure 2 | Warning |
| **BI** | 243 | B2:C2 Lockout Suction Pressure | Lockout |
| **BI** | 244 | B2:C2 Lockout Low Discharge Pressure | Lockout |
| **BI** | 245 | B2:C2 Lockout Compressor 1 Over Current | Lockout |
| **BI** | 246 | B2:C2 Lockout Compressor 2 Over Current | Lockout |
| **BI** | 247 | B2:C2 Lockout High Discharge Temperature | Lockout |
| **BI** | 248 | B2:C2 Lockout High Discharge Pressure | Lockout |
| **BI** | 249 | B2:C2 Lockout Low Superheat | Lockout |
| **BI** | 250 | B2:C2 Lockout High Superheat | Lockout |
| **BI** | 251 | B2:C2 Lockout High Saturation Temperature | Lockout |
| **BI** | 252 | B2:C2 Lockout Compressor 1 Under Current | Lockout |
| **BI** | 253 | B2:C3 Lockout Compressor 2 Under Current | Lockout |
| **BI** | 254 | B1:C3 Fault Low Suction | Fault |
| **BI** | 255 | B1:C3 Fault Unsafe Suction | Fault |

**Table 23: BACnet Binary Inputs (continued)**

| BACnet Binary Inputs | | | |
|---|---|---|---|
| **BACnet Point Type** | **Number** | **BACnet Description** | **Value Type** |
| **BI** | 256 | B1:C3 Fault Trip High Discharge Pressure | Fault |
| **BI** | 257 | B1:C3 Fault Compressor 1 Not Running | Fault |
| **BI** | 258 | B1:C3 Fault Compressor 2 Not Running | Fault |
| **BI** | 259 | B1:C3 Fault No Suction Line Temperature Sensor | Fault |
| **BI** | 260 | B1:C3 Fault Low Superheat | Fault |
| **BI** | 261 | B1:C3 Fault High Discharge Temperature | Fault |
| **BI** | 262 | B1:C3 Fault High Discharge psi Trip | Fault |
| **BI** | 263 | B1:C3 Fault Compressor 1 False Active | Fault |
| **BI** | 264 | B1:C3 Fault Compressor 2 False Active | Fault |
| **BI** | 265 | B1:C3 Fault No Suction Pressure Sensor | Fault |
| **BI** | 266 | B1:C3 Fault Emergency Shutdown | Fault |
| **BI** | 267 | B1:C3 Fault Modbus Slave Timeout | Fault |
| **BI** | 268 | B1:C3 Fault High Superheat | Fault |
| **BI** | 269 | B1:C3 Fault High Saturation Temperature | Fault |
| **BI** | 270 | B1:C3 Fault Compressor 1 Over Current | Fault |
| **BI** | 271 | B1:C3 Fault Compressor 2 Over Current | Fault |
| **BI** | 272 | B1:C3 Fault Compressor 1 Under Current | Fault |
| **BI** | 273 | B1:C3 Fault Compressor 2 Under Current | Fault |
| **BI** | 274 | B1:C3 Warning Low Suction Pressure | Warning |
| **BI** | 275 | B1:C3 Warning Low Suction Pressure Startup | Warning |
| **BI** | 276 | B1:C3 Warning High Discharge Pressure | Warning |
| **BI** | 277 | B1:C3 Warning No Discharge Pressure Sensor | Warning |
| **BI** | 278 | B1:C3 Warning No Discharge Temperature Sensor | Warning |
| **BI** | 279 | B1:C3 Warning High Superheat | Warning |
| **BI** | 280 | B1:C3 Warning Condenser Fault | Warning |
| **BI** | 281 | B1:C3 Warning No Liquid Line Pressure Sensor | Warning |
| **BI** | 282 | B1:C3 Warning No Liquid Line Temperature Sensor | Warning |
| **BI** | 283 | B1:C3 Warning High Discharge Pressure 2 | Warning |
| **BI** | 284 | B1:C3 Lockout Suction Pressure | Lockout |
| **BI** | 285 | B1:C3 Lockout Low Discharge Pressure | Lockout |
| **BI** | 286 | B1:C3 Lockout Compressor 1 Over Current | Lockout |
| **BI** | 287 | B1:C3 Lockout Compressor 2 Over Current | Lockout |
| **BI** | 288 | B1:C3 Lockout High Discharge Temperature | Lockout |
| **BI** | 289 | B1:C3 Lockout High Discharge Pressure | Lockout |
| **BI** | 290 | B1:C3 Lockout Low Superheat | Lockout |
| **BI** | 291 | B1:C3 Lockout High Superheat | Lockout |
| **BI** | 292 | B1:C3 Lockout High Saturation Temperature | Lockout |
| **BI** | 293 | B1:C3 Lockout Compressor 1 Under Current | Lockout |
| **BI** | 294 | B1:C3 Lockout Compressor 2 Under Current | Lockout |
| **BI** | 295 | B2:C3 Fault Low Suction | Fault |

**Table 23: BACnet Binary Inputs (continued)**

## BACnet Binary Inputs

| BACnet Binary Inputs | | | |
|---|---|---|---|
| **BACnet Point Type** | **Number** | **BACnet Description** | **Value Type** |
| **BI** | 296 | B2:C3 Fault Unsafe Suction | Fault |
| **BI** | 297 | B2:C3 Fault Trip High Discharge Pressure | Fault |
| **BI** | 298 | B2:C3 Fault Compressor 1 Not Running | Fault |
| **BI** | 299 | B2:C3 Fault Compressor 2 Not Running | Fault |
| **BI** | 300 | B2:C3 Fault No Suction Line Temperature Sensor | Fault |
| **BI** | 301 | B2:C3 Fault Low Superheat | Fault |
| **BI** | 302 | B2:C3 Fault High Discharge Temperature | Fault |
| **BI** | 303 | B2:C3 Fault High Discharge psi Trip | Fault |
| **BI** | 304 | B2:C3 Fault Compressor 1 False Active | Fault |
| **BI** | 305 | B2:C3 Fault Compressor 2 False Active | Fault |
| **BI** | 306 | B2:C3 Fault No Suction Pressure Sensor | Fault |
| **BI** | 307 | B2:C3 Fault Emergency Shutdown | Fault |
| **BI** | 308 | B2:C3 Fault Modbus Slave Timeout | Fault |
| **BI** | 309 | B2:C3 Fault High Superheat | Fault |
| **BI** | 310 | B2:C3 Fault High Saturation Temperature | Fault |
| **BI** | 311 | B2:C3 Fault Compressor 1 Over Current | Fault |
| **BI** | 312 | B2:C3 Fault Compressor 2 Over Current | Fault |
| **BI** | 313 | B2:C3 Fault Compressor 1 Under Current | Fault |
| **BI** | 314 | B2:C3 Fault Compressor 2 Under Current | Fault |
| **BI** | 315 | B2:C3 Warning Low Suction Pressure | Warning |
| **BI** | 316 | B2:C3 Warning Low Suction Pressure Startup | Warning |
| **BI** | 317 | B2:C3 Warning High Discharge Pressure | Warning |
| **BI** | 318 | B2:C3 Warning No Discharge Pressure Sensor | Warning |
| **BI** | 319 | B2:C3 Warning No Discharge Temperature Sensor | Warning |
| **BI** | 320 | B2:C3 Warning High Superheat | Warning |
| **BI** | 321 | B2:C3 Warning Condenser Fault | Warning |
| **BI** | 322 | B2:C3 Warning No Liquid Line Pressure Sensor | Warning |
| **BI** | 323 | B2:C3 Warning No Liquid Line Temperature Sensor | Warning |
| **BI** | 324 | B2:C3 Warning High Discharge Pressure 2 | Warning |
| **BI** | 325 | B2:C3 Lockout Suction Pressure | Lockout |
| **BI** | 326 | B2:C3 Lockout Low Discharge Pressure | Lockout |
| **BI** | 327 | B2:C3 Lockout Compressor 1 Over Current | Lockout |
| **BI** | 328 | B2:C3 Lockout Compressor 2 Over Current | Lockout |
| **BI** | 329 | B2:C3 Lockout High Discharge Temperature | Lockout |
| **BI** | 330 | B2:C3 Lockout High Discharge Pressure | Lockout |
| **BI** | 331 | B2:C3 Lockout Low Superheat | Lockout |
| **BI** | 332 | B2:C3 Lockout High Superheat | Lockout |
| **BI** | 333 | B2:C3 Lockout High Saturation Temperature | Lockout |
| **BI** | 334 | B2:C3 Lockout Compressor 1 Under Current | Lockout |
| **BI** | 335 | B2:C3 Lockout Compressor 2 Under Current | Lockout |

**Table 23: BACnet Binary Inputs (continued)**

| BACnet Multi-State Input | | | |
|---|---|---|---|
| **BACnet Point #** | **BACnet Point Name** | **BACnet Description** | **Limits** |
| **MI: 1** | Operating Status | Current Unit Mode | 1 = OFF_MODE<br>2 = RUN MODE<br>3 = Holiday OFF MODE<br>4 = Holiday RUN MODE<br>5 = Startup Delay<br>6 = Emergency Shutdown<br>7 = High Leaving Water |

**Table 33: BACnet Parameter Multi-State Input**

## Overview

### Features

The main operator interface to the Main DX Barrel Chiller Controller is a panel PC with a 15 in. touchscreen. It provides a direct, graphic-enhanced, menu-driven link to allow the administrative level end user to view status points, change setpoints and configurations, and view alarms and reset alarm lockouts on the DX Barrel Chiller system.

Directly below the touchscreen is a rocker switch panel with switches to shut down the unit and/or each compressor.

The touchscreen provides the following useful functions:

- Utilizes a graphical touchscreen menu system with easy-to-understand menu options
- Easy setup and operation without the need for specialized training
- Provides protection from unauthorized users through passcode authorization
- Comes equipped with real-time clock backup power supply for short power losses
- Contains a USB port for software updates

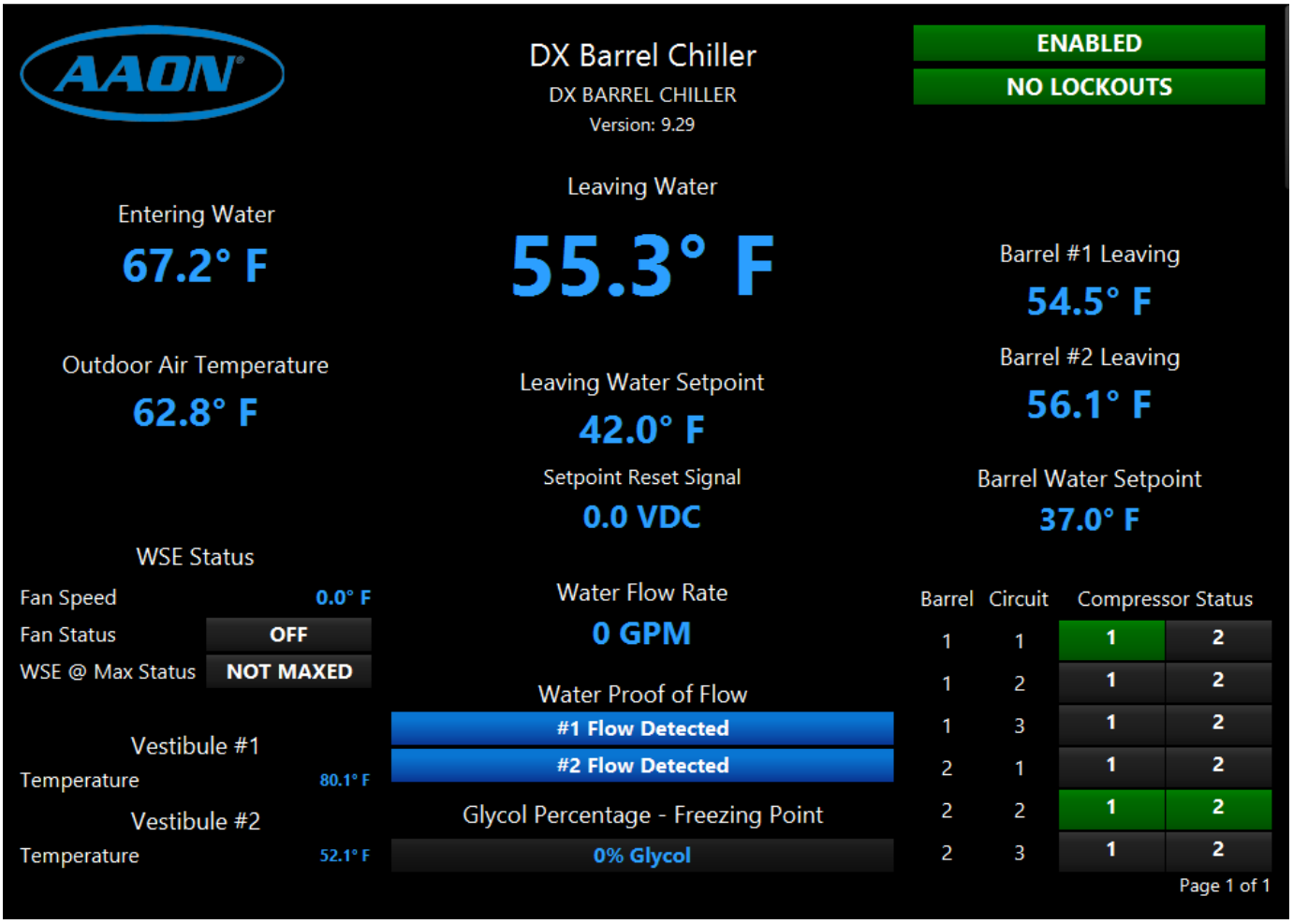



**Figure 18: Panel PC with Touchscreen Interface**

## Start Screen

Once the Chiller Touchscreen program has been successfully installed, the program will run continuously on the panel PC. The Start Screen is the first screen displayed on startup. See **Figure 19, this page**.

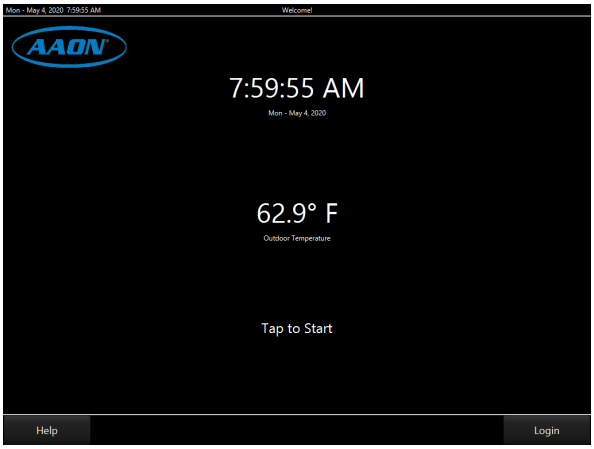



**Figure 19: Start Screen**

The Start Screen displays the current time, day of the week, month, day, and year. The **<Help>** button (lower left) and the **<Login/Log Out>** button (lower right) are displayed on this screen and every screen in the program. The **<Help>** button opens the Help Screen which contains the Controls Technical Support phone number and other information. See **Figure 20, this page**. Select **<Exit Help>** to exit the screen.

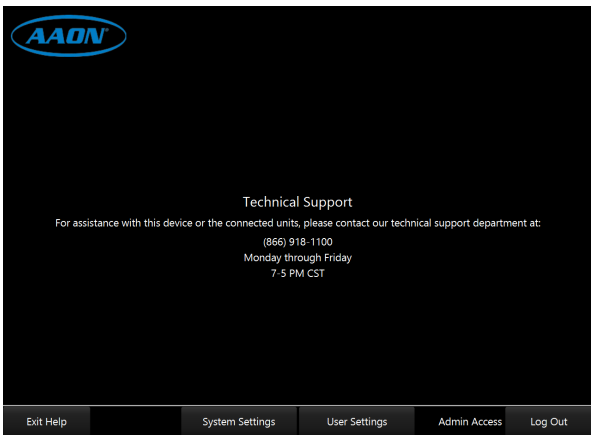



**Figure 20: Help Screen**

## System Overview Screen (View Only)

Tap the Start Screen to access the System Overview Screen (view only). The View Only status screen only shows alarms and component status.

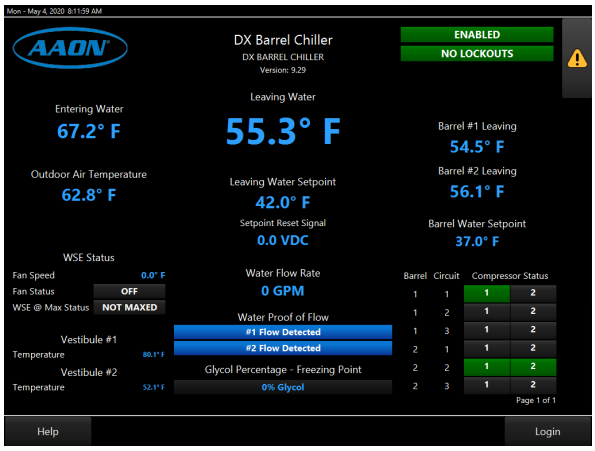



**Figure 21: System Overview Screen (View Only)**

## Logging In - Administrator Access

At the bottom of the System Overview Screen, touch the **<Login>** button to access the Login Screen. See **Figure 22, this page**. Touch the User Name field and use the pop-up keyboard to enter a username and touch **<Submit>**. Touch the passcode field and use the pop-up keyboard to enter a passcode and touch **<Submit>**. Then, at the Login Screen, touch **<Submit>** again.

**WARNING:** The touchscreen program does not time-out. Remember to logout when finished to secure the system.

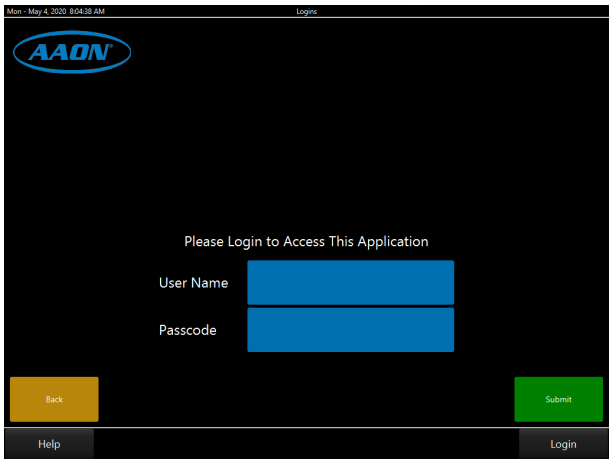



**Figure 22: Login Screen**

## System Overview Screen (Full Access)

The Administrator account has full access to the *System Overview Screen*. See **Figure 23, this page**.

The System Overview Screen displays the current operating status, inputs, and outputs. Schedules, view alarms and reset lockouts, and access and change setpoints and configurations can also be accessed from this screen using the icons located on the vertical toolbar at the right of the screen: **<Alarms>**, **<Details>**, **<Schedules>**, **<Setpoints>**, and **<Configuration>**.

The bottom of the screen holds additional functions: **<Help>**, **<System Settings>**, **<User Settings>**, **<Admin Access>**, and **<Logout>**.

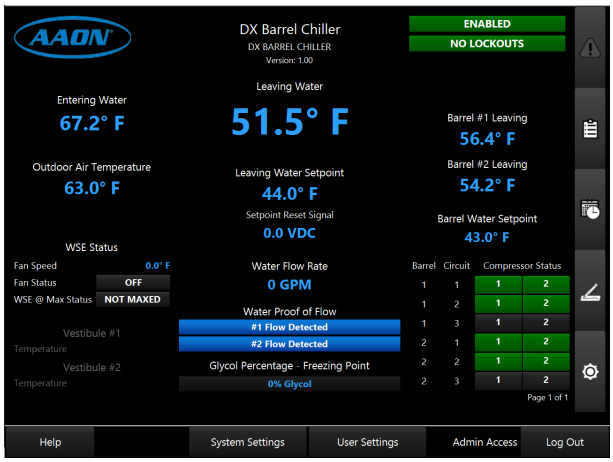



**Figure 23: System Overview Screen (Full Access)**

## Changing the Administrator Passcode

At the bottom of the *System Overview Screen*, touch **<User Settings>**. The *Manage Users Screen* will appear. See **Figure 25, this page**. Touch the Administrator username and passcode entry on the screen to highlight it and then touch **<Change Passcode>**.

**WARNING:** Change the Administrator passcode as soon as possible to secure the system and record the password before touching **<Change Passcode>**. Logout of the touchscreen when tasks are completed in order to secure the system.

The *New Passcode Screen* will appear. See **Figure 24, this page**. Enter the new passcode in the passcode field and then again in the Confirm field or choose **<Generate Random Passcode>**. Please pay attention to the passcode requirements listed on the screen.

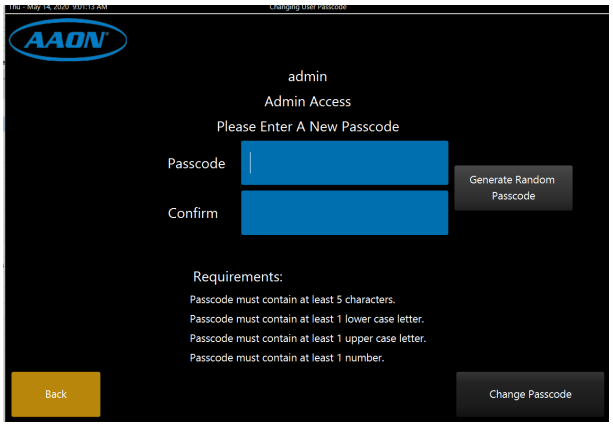



**Figure 24: New Passcode Screen**

If the passcodes don't match or don't meet the requirements, a message will appear explaining what is wrong with the passcode—for example, the passcodes do not match or the passcode requires one lower case letter.

If the passcode change is successful, the *Manage Users Screen* is displayed and the last date changed will update the date and time you changed the passcode. See **Figure 25, this page**.

Touch **<Exit User Settings>** at the bottom of the display to return to the *System Overview Screen*.

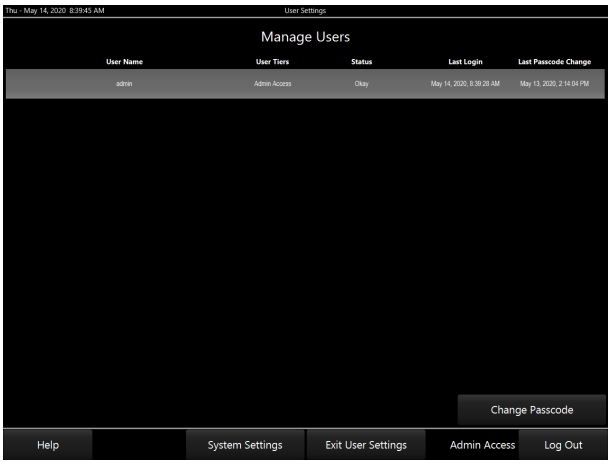



**Figure 25: Manage Users Screen**

## Icons and Button Functions

### Navigation

There are several ways to navigate the touchscreen program. One is to use a finger to swipe up and down or left and right to move from screen to screen. Another is to touch the named buttons on the screen. See **Table 34, this page**, for a list of Navigation buttons and their functions.

| Button | Function |
|---|---|
| **No Button** | Use a finger to swipe the screen up or down or left to right to move from screen to screen. |
| Back | Touch the **<Back>** button to exit the screen without saving changes and returns to the previous screen. |
| > | The **>** symbol located on the left-hand side toolbar of a screen means a swipe right returns to the previous screen until the main screen is reached. |

**Table 34: Navigation Buttons**

### Configuration Buttons

See **Table 35, this page**, for a list of configuration buttons and their functions.

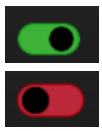
| Button | Function |
|---|---|
| Submit | The **<Submit>** button is used throughout the program to save a setting or value. This includes **<Submit Changes>** and **<Submit Search>**. The program verifies the input and returns to the previous screen. |
| Save | Touch the **<Save>** button to save changes and return to the previous screen. |
|  | Touch the **<Toggle>** button to turn it on and off. Green is On/Yes and red is Off/No. |
|  | Touch the **<Radio>** button to turn it on and off. Green is On/Yes and gray is Off/No. The radio button is grouped with other radio buttons so that only one radio button can be chosen On/Yes in the group. |

**Table 35: Configuration Buttons**

### Administrative Access Icons

System settings and screens are easily accessible by simply touching one of the five icons found on the right side of the *System Overview Screen*. The subscreens contain data entry boxes with accessible number keyboards for data entry and screen maneuvering buttons such as <**Back>**, **<Submit>**, and **<Done>**.

There are five main administrative access icons. See **Table 36, this page**, for a list of these icons and their functions.

| Icon | Function |
|---|---|
|  | When bright yellow, the **<Alarms>** icon opens the Alarms Screen and displays active alarms. When greyed out, no active alarms are present. |
|  | The **<Details>** icon opens the Details Screens for Chiller Pump Status, Waterside Economizer Status, Evap Status, Vestibule(s) Status, and RSM Module(s) Status. There are four pages of details. |
|  | The **<Schedules>** icon opens the Schedules Screen & Holidays Screen. These screens are for setting the schedule for the controller, schedule overrides, and holidays. |
|  | The **<Setpoints>** icon opens the Setpoint Screens for Temperatures, Staging Delays & Timing Intervals, Vestibules, and Sensor Calibration. |
|  | The **<Configuration>** icon opens the System Configuration Screens for the Main DX Barrel Chiller Controller, RSM Modules, Waterside Economizer Settings, Building Pump Settings, and Evaporator Condenser Module. |

**Table 36: Administrative Icons**

## System Settings

At the bottom of the *System Overview Screen*, touch **<System Settings>**. The System Settings Screen will appear. See F**igure 26, this page**.

**WARNING:** **<Exit Program>** is to be used only for extreme circumstances to completely close the program such as when the program needs to be restarted.

### System Settings Buttons and Functions

Refer to **Table 37, this page**, for a description of the System Settings buttons and functions.

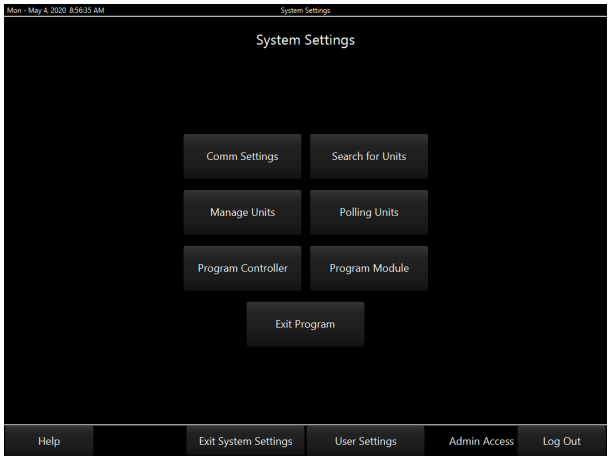



**Figure 26: System Settings Screen**

| BUTTON | SYSTEM SETTINGS |
|---|---|
| Comm Settings | The **<Comm Settings>** function is for setting up communication to the Main DX Barrel Chiller Controller. This communication can be through a serial connection on the local loop or through an ethernet connection using a CommLink 5. Verify communication has been established by performing a search for units. |
| Search for Units | Once communication has been established, the **<Search for Units>** function is used to search for unit controllers on the loop or loops. |
| Manage Units | The **<Manage Units>** function is used to change names and/or descriptions of loops and units if desired. |
| Polling Units | The **<Polling Units>** function shows the unit controllers in queue and the parameter blocks. It also allows Administrators to disable polling. |
| Program Controller | The **<Program Controller>** function allows software updates in a unit controller using the USB port on the touchscreen. |
| Program Module | The **<Program Module>** function allows software updates in a module using the USB port on the touchscreen. |
| Exit Program | The **<Exit Program>** function will completely close the software application from the touchscreen. This should only be performed when told to do so by a Controls Support Technician. |

**Table 37: System Settings Functions and Buttons**

## Details Screens

To the right of the administrator access level *System Overview Screen*, touch the **<Details>** icon. The first *Details Screen* will appear. There are four details screens, specified by a page number at the bottom of each screen. Slide the screen up and down to access each page. Touch the **>** symbol on the left to return to the *System Overview Screen*.


**Figure 27: Chiller Pump Status and Waterside Economizer Status Details screen**

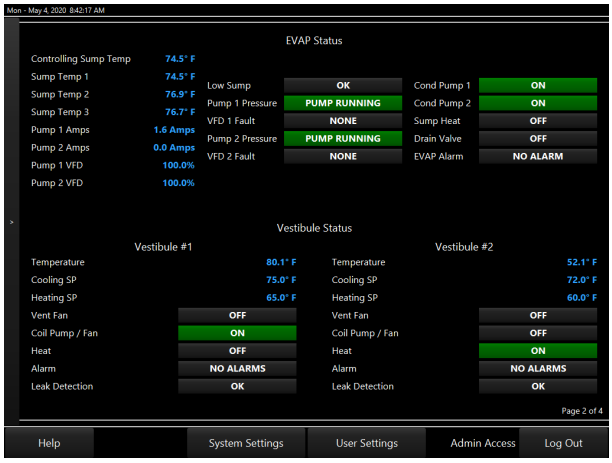



**Figure 28: Evaporator Condenser Status and Vestibule Status Details Screen**

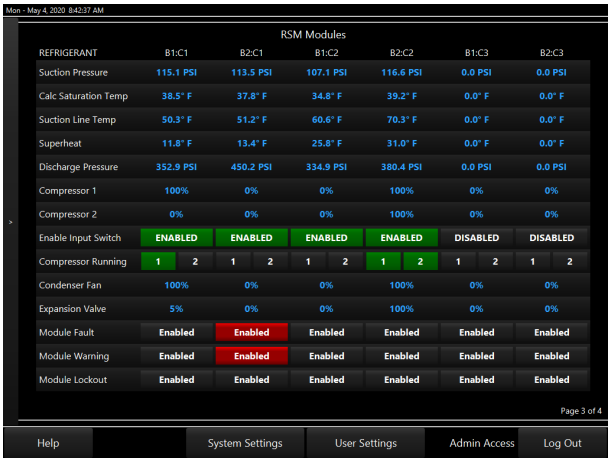



**Figure 29: RSM Status Details Screen**

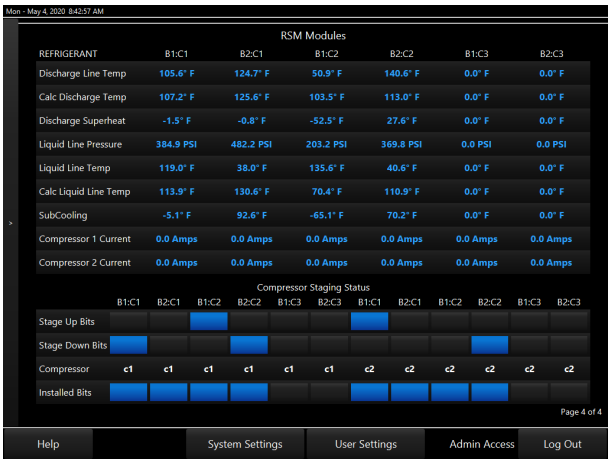



**Figure 30: RSM Status and Compressor Staging Status Details Screen**

## Setting Schedules

To the right of the administrator access level *System Overview Screen*, touch the **<Schedules>** icon. The *Scheduling Screen* will appear. See **Figure 31, this page**.

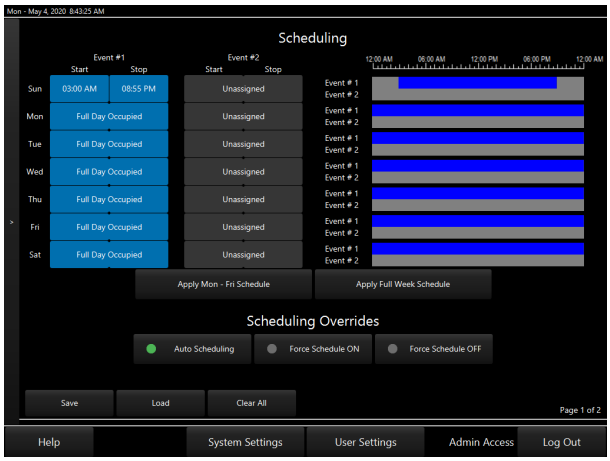



**Figure 31: Scheduling Screen**

The controller has two event start and stop times per day and two event start and stop times for holidays. The holiday start and stop times will override the standard operating hours.

Set schedules by individual days or by touching **<Apply Mon - Fri Schedule>** or **<Apply Full Week Schedule>**. Touching any of the fields or these selections displays the *Time Selection Screen*. See **Figure 32, this page**. Touch the **<Set Time>** button in the middle of the screen.

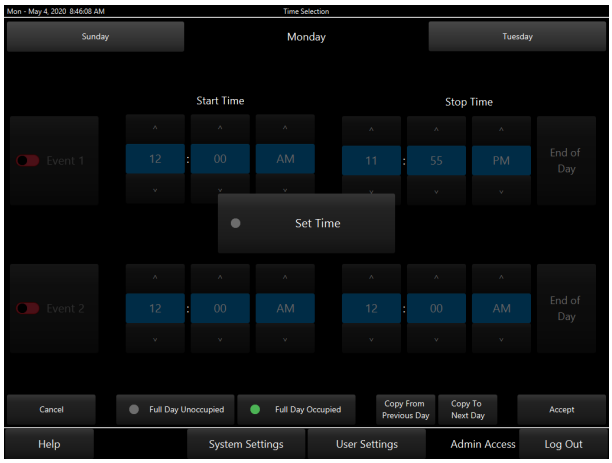



**Figure 32: Time Selection Screen**

Touching **<Full Day Occupied>** or **<Full Day Unoccupied>** which will automatically set the times. Toggle each event on in order to set the time.

It is also possible to copy a schedule from a previous day and/or copy a schedule to the next day. When finished, touch **<Accept>**.

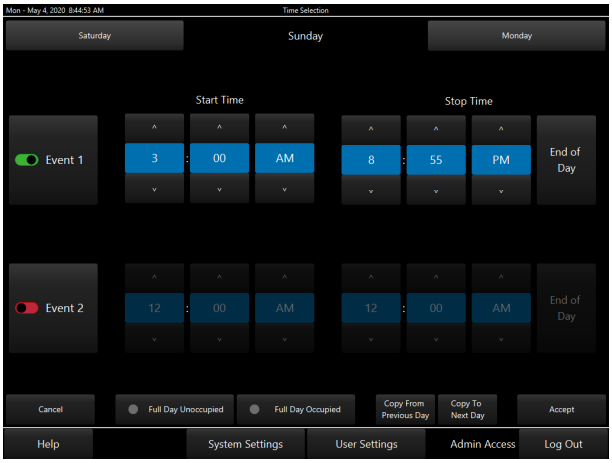



**Figure 33: Set Time Screen - Individual Day**

### Scheduling Overrides

From the *Scheduling Screen*, it is possible to override the schedule mode of operations. See **Figure 31, this page**.

This screen has the Auto Scheduling, Force Schedule ON or Force Schedule OFF options.

A scheduled force override will remain in effect until canceled. To cancel an override, select the Auto Scheduling option.

## Setting Holidays

While at the *Scheduling Screen*, see **Figure 31, page 100**, swipe up to access the *Holidays Screen*. See **Figure 34, this page.**

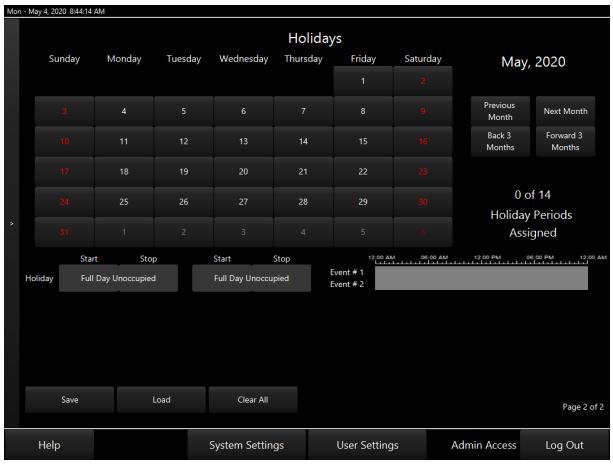



**Figure 34: Holidays Screen**

This screen allows selection of 14 holiday periods. It is possible to schedule the holiday time schedule by touching **<Full Day Occupied>** or **<Full Day Unoccupied>** which will display the *Holiday Set Time Screen*. See **Figure 35, this page**.

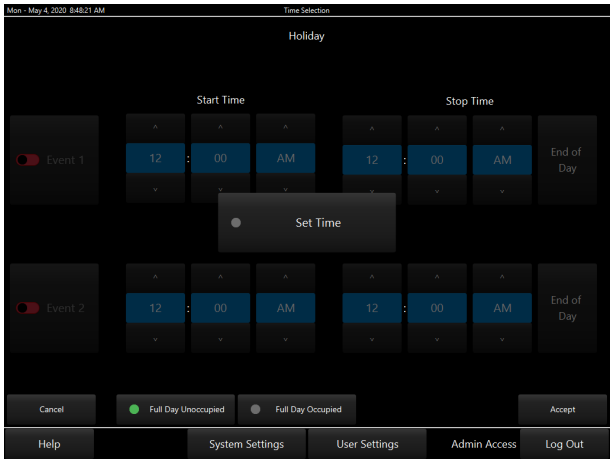



**Figure 35: Holiday Set Time Screen**

In the *Holidays Screen*, touch a date in the month to highlight it green and tag it as a holiday. Days selected as holidays are indicated with a green background and white text.

There are 14 holiday periods available for each year. These holiday periods can span a single day to months.

Holiday periods override the standard operating hours to accommodate holidays or other special events.

It is not possible to program holidays for the next year, and holidays do not automatically adjust for the new year. It is necessary to access this screen after the new year and accommodate holidays that float, such as Memorial Day.

## Saving and Restoring Schedules and Holidays

While at the *Scheduling Screen*, touch **<Save>** to save the controller's schedule. Touch **<Load>** to restore a previously saved schedule or to copy or transfer a schedule from another controller. Touch **<Clear>** to completely erase the schedule appearing in the window.

**WARNING:** **<Clear>** will clear ALL entered stop/start times, so use with caution.

While at the Holidays Screen, touch **<Save>** to save the Holidays. Touch **<Load>** to restore previously saved Holidays or to copy or transfer Holidays from another controller's schedule. Touch **<Clear All>** to completely erase the holidays appearing in the window.

Saving all schedules and/or holidays from the controller to a computer for use in restoring the schedules and/or holidays for copying to another specific controller will save time in configuring the controller and reentering schedules and/or holidays for another controller.

Saving holidays will also make it easier to enter the holidays for the next calendar year when it arrives.

## Setpoint Screens

To the right of the administrator access level *System Overview Screen*, touch the **<Setpoints>** icon. The *Temperatures Setpoints Screen* will appear. See **Figure 36, this page**. There is one setpoint screen for each of the following categories: Temperatures, Staging Delays, Vestibules, and Sensor Calibration. See **Figures 36-39, this page**. Touch the buttons at the right of the *Temperatures Setpoint Screen* to access the categories. Touch the **>** symbol on the left to return to the *Temperatures Setpoint Screen*.

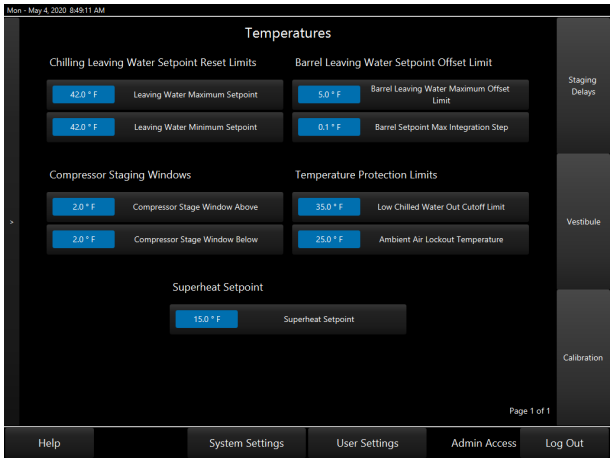



**Figure 36: Temperatures Setpoints Screen**

To change a setpoint, touch the blue data field next to the setpoint. The *Keypad Data Entry Screen* will appear. See **Figure 45, page 104**. Each setpoint has its own data entry screen containing the name of the setpoint, a brief description of the setpoint, and the valid range for the setpoint.

Enter a new value that is within the allowable range. Select **<Submit>** to have the system accept the new value. If an entered setpoint is not in the valid range, it will remain as is and will not change. Touch **<Back>** to return to the previous screen without saving the entry.

The *Vestibules Setpoints Screen* also contains configuration setpoints. Use the toggle key next to each configuration setpoint to turn the configuration on or off.

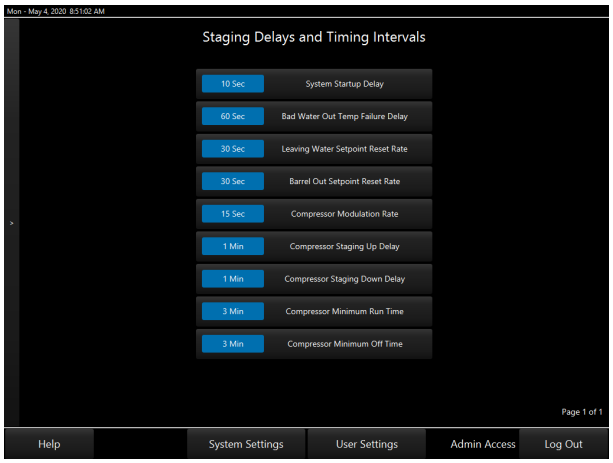



**Figure 37: Staging Delays and Timing Intervals Setpoints Screen**

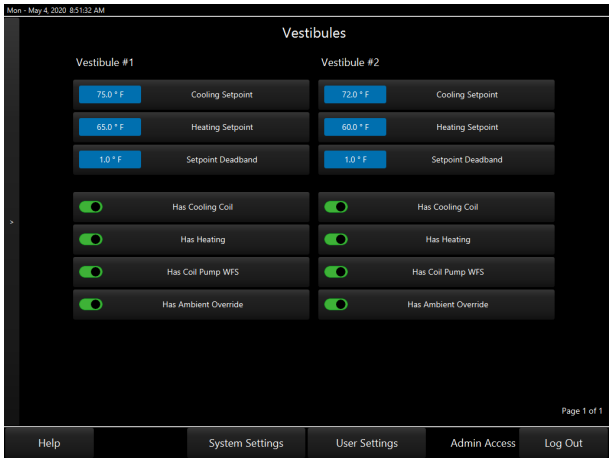



**Figure 38: Vestibules Setpoints Screen**

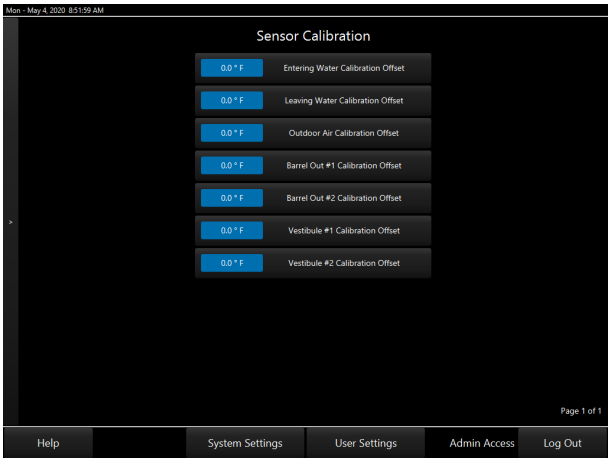



**Figure 39: Sensor Calibration Setpoints Screen**

## Configuration Settings Screens

To the right of the administrator access level *System Overview Screen*, touch the **<Configuration>** icon. The *System Configuration Main Screen* will appear. See **Figure 40, this page**. Touch the buttons to the right of the *System Configuration Main Screen* to access the categories. Touch the **>** symbol on the left or slide the screen to the left to return to the *System Configuration Main Screen*.

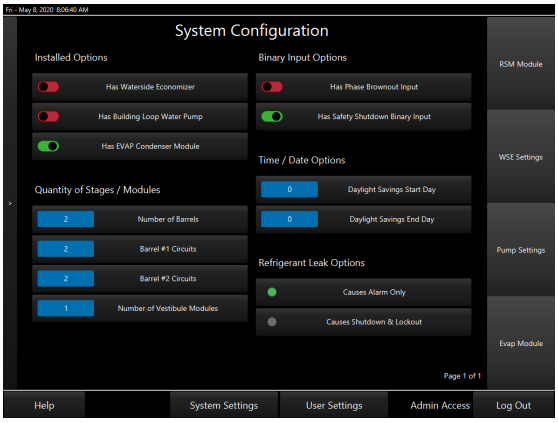
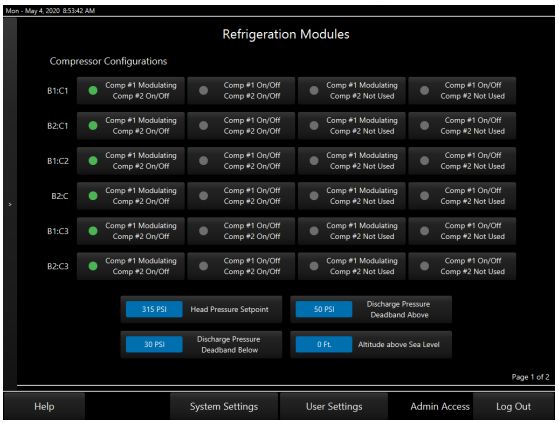



**Figure 40: System Configuration Main Page**



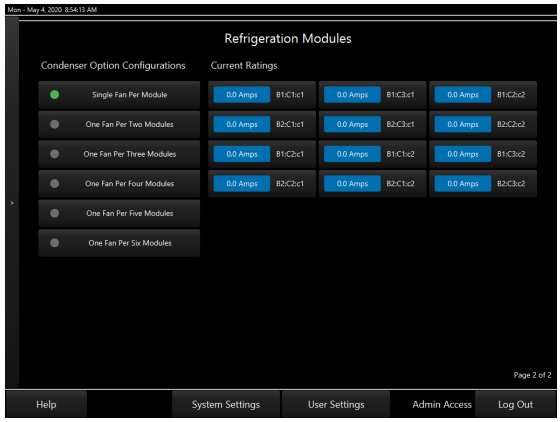




**Figure 41: Refrigeration Modules Screens**

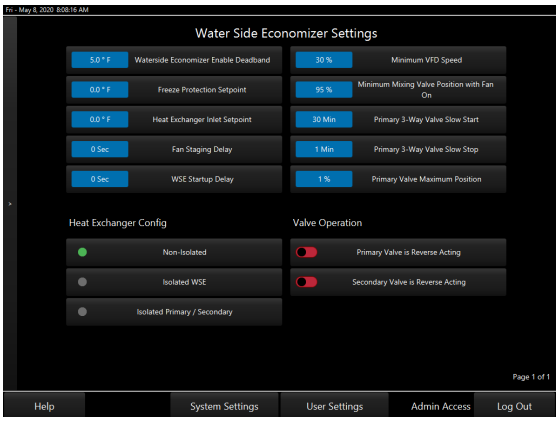



**Figure 42: Waterside Economizer Settings Screen**

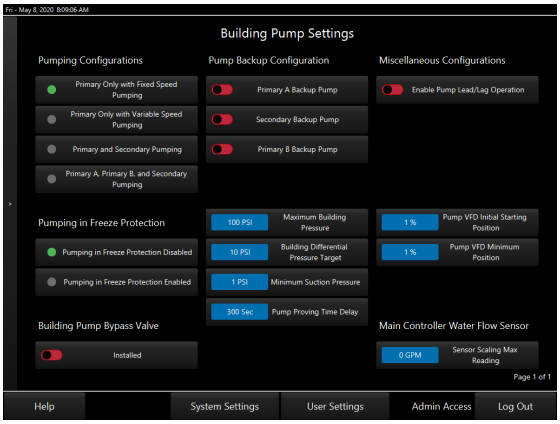



**Figure 43: Boiler Pump Settings Screen**

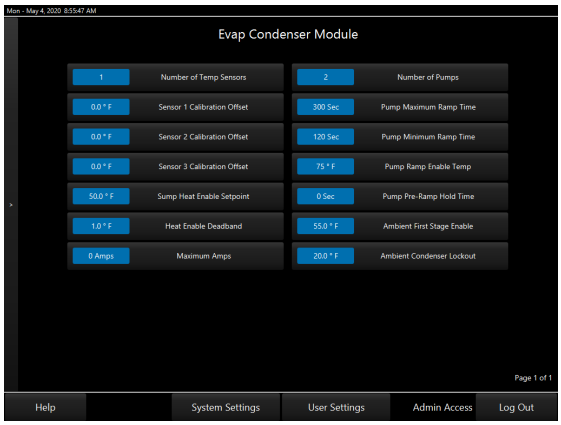



**Figure 44: Evaporative Condenser Module**

## Changing Configuration and Setpoint Values

To change a value for a configuration or setpoint, touch the blue data field next to the setpoint. The *Keypad Data Entry Screen* will appear. See **Figure 45, this page**. Each editable configuration or setpoint has its own data entry screen containing the name of the configuration or setpoint, a brief description of the configuration or setpoint, and the valid range for the configuration or setpoint.

Enter a new value that is within the allowable range in the blue data entry field above the keypad.

Touch **<Submit>** to have the system accept the new value. If an entered setpoint is not in the valid range, it will remain as is and will not change. Touch **<Back>** to return to the previous screen without saving the entry.

The *Configuration Settings Screens* also utilize radio buttons and toggle keys. Use the radio button next to a configuration to turn the configuration on or off—grey is off; green is on.

Use the toggle key next to each configuration setpoint to turn the configuration on or off—red is off; green is on.

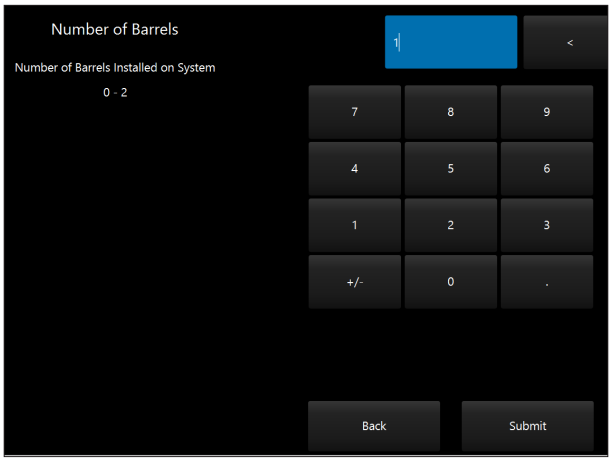



**Figure 45: Keypad Data Entry Screen**

## Viewing Alarm Status

To access the *Alarms Log*, from the *System Overview Screen*, touch the **<Alarms>** icon. This icon will be a dull grey when no active alarms exist and will be a bright yellow when active alarms exist.

There are two views for the Alarms Log: View Only and Administrative Access.

The View Only shows the alarm category, alarm description, and number of active alarms at the bottom center of the screen.

The Administrative Access shows the alarm category, alarm description, number of active alarms at the bottom center of the screen and has buttons at the bottom to allow the administrator to reset lockouts. Touch one of the **<Reset Lockout>** buttons at the bottom of the screen to immediately reset an alarm once it has cleared. See **Figure 46, this page**.

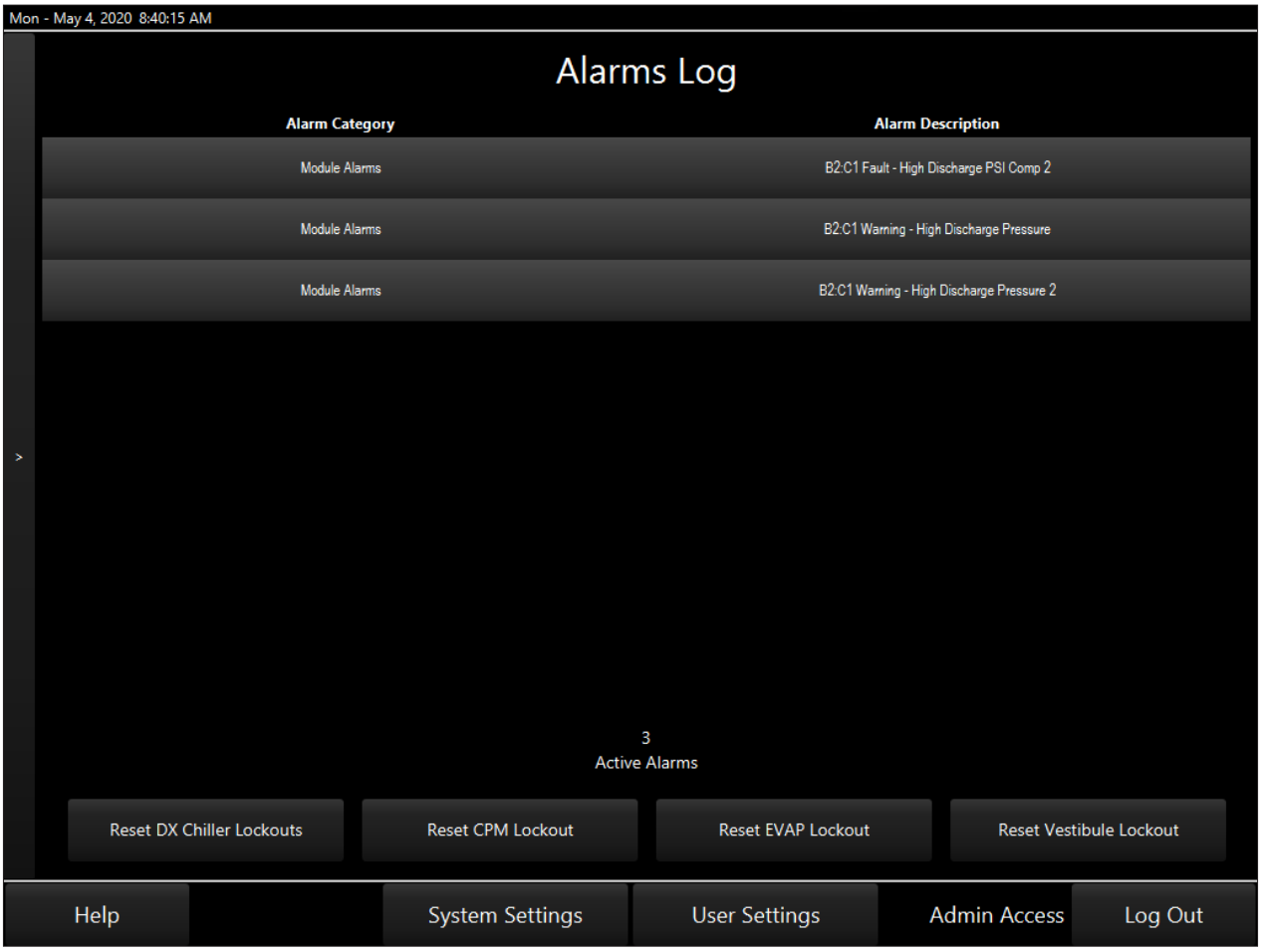



**Figure 46: Alarms Logs Screen - Administrative Access**

## Touch Screen Troubleshooting

### Updating the Touch Screen

1. Download the latest software obtained from an AAON representative. The software file is named ChillerJFX-x.x.x.zip, where x.x.x stands for the version number.
2. Extract the contents of the compressed file to the chiller folder located on the panel PC's hard drive.
3. Confirm to replace the old versions of ChillerJFX.jar and Version.txt with the new files.

### Communication Lost - No Comm

- Verify that the main controller is powered on and is firmly connected to the touchscreen with the communications cable.
- Verify that the CommLink 5 is powered on and connected to your touchscreen with the ethernet cable.

### Sync Clock

In the event of the main controller being powered down for a week or longer, it will lose its time and date. Once power is cycled to the main controller, the touchscreen will display the correct time and date.

## Unit Run/Stop and Compressor Disable

There can be up to seven switches located below the touchscreen that can be used to disable the compressors or force the unit to run. See **Figure 47, this page**.

The switches labeled Circuit A, B, C, D, E, and F allow for a direct disabling of each Compressor—1, 2, 3, 4, 5, and 6. These switches might be used to troubleshoot a problem with a given compressor and it needs to be disabled.

The Unit Run/Stop Switch is a local run switch used to force the unit to run even though the Main DX Barrel Chiller Controller is not commanding the unit to run. This might be used in a local test situation where an operator needs to force the chiller into operation for diagnostic reasons.

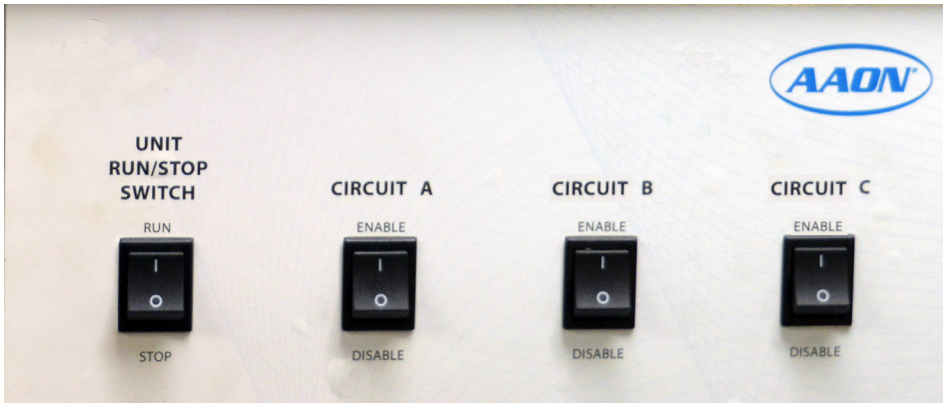



**Figure 47: Chiller Rocker Switch Panel (Three Circuit Switches Shown)**

## General

Prism 2 is a complete Windows®-based graphical interface controls and management program that allows interaction with digital controls. The program provides standard, easy-to-understand status, setpoint, and configuration screens for the main DX Barrel Chiller Controller and other controllers in the system.

Prism 2 allows access to trend logs and alarm conditions. The program can be configured for direct on-site installation or TCP/IP Internet connection.

**NOTE:** This appendix gives a brief overview of the Prism 2 software. For more information, refer to the *Prism 2 Technical Guide*, the *CommLink 5 Technical Guide*, the *IP Module Technical Guide*, the *USB-Link 2 Technical Guide*, and/or the *MiniLink PD 5 Technical Guide*. All can be found on the AAON website at www.aaon.com/controlsmanuals.

## Feature Summary

Prism 2 provides a broad set of features:

- Easy to use
- On-site or TCP/IP communications
- User programmable description for every piece of equipment and user-defined custom screens
- Automatic retrieval of trend logs and export capability to spreadsheet and database programs
- Alarm Logs maintained on disk
- Alarm E-mail/texting capability when using a CommLink
- Encrypted History Logs

## System Requirements

Prism 2 requires a computer that meets or exceeds the following requirements:

### Operating System

Microsoft Windows® 10

**NOTE:** Prism 2 is not intended for a server/client environment nor for any version of Windows Server.

### Minimum Hardware

- CommLink 5 or USB Link 2 for direct, on-site connection
- IP Module for remote connection
- Prism is NOT supported in a server environment. It does not support client/server systems. Prism is a LAPTOP/DESKTOP ONLY system.

**WARNING:** Older operating systems, while they still might be capable of running Prism 2, are not recommended due to security updates being obsoleted by Microsoft®. AAON does not support troubleshooting of any version of Windows® operating the Prism program. Some new models of laptops running the latest release of Windows® 10 have also experienced issues running Prism, and AAON cannot troubleshoot customer computer issues.

## Software License

Prism 2 does not require any license agreement and may be freely copied and distributed.

## Support Information

AAON Controls provides Prism 2 installation and configuration support. Call (866) 918-1100 for free, direct telephone support or (816) 505-1100 to talk to a Controls Support Representative. Support for all telephone services is available Monday through Friday, 7:00 AM to 5:00 PM, CMT.

**NOTE:** AAON Controls Support cannot troubleshoot internal PC and/or Windows®-based operating system problems.

**NOTE:** AAON Controls Support cannot troubleshoot firewalls, routers, and/or problems on a customer's internal or external network. An IT professional may need to be consulted.

## Controller Status Screen

After successful Prism 2 installation and job-site setup, the system will be able to access the *DX Barrel Chiller Main Controller Status Screen*. See **Figure 48, this page**.

This screen displays current operating status and inputs and outputs, this screen allows a user to set schedules, force modes, run BACnet commands, view alarms, chart modules, and access and change setpoints and configurations.

**NOTE:** Only the Administrator and top level users can access and change setpoints and schedules.

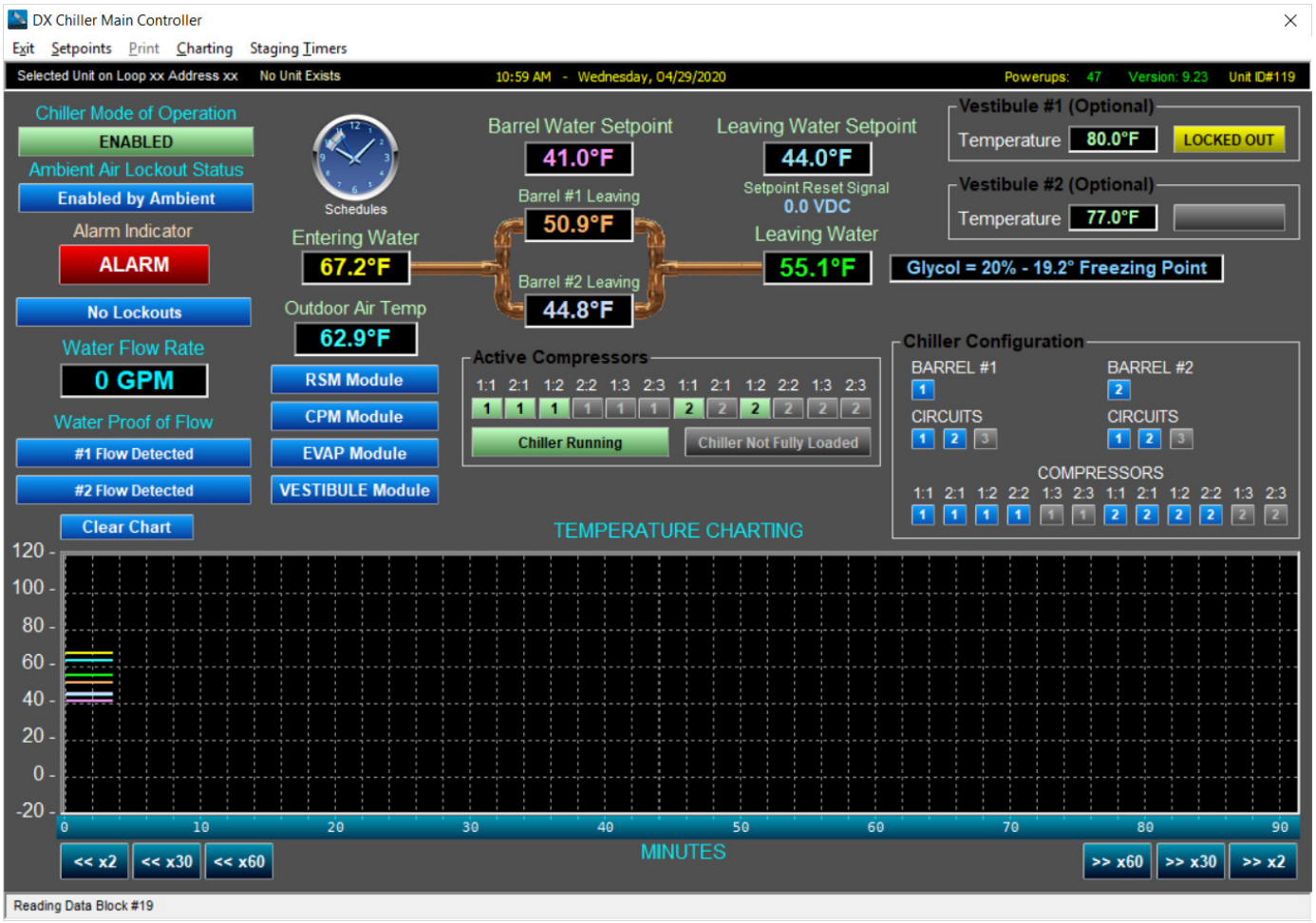



**Figure 48: Prism 2 - DX Chiller Main Controller Status Screen**

## Controller Setpoint Screens

Setpoints are accessed by clicking on **<Setpoints>** at the top left of the *DX Barrel Chiller Main Controller Status Screen* (**Figure 48, page 108**). The *Temperature Setpoints Screen* will display. See **Figure 49, this page**.

At the bottom of any Setpoints Screen, there is access to all other Setpoint Screens by clicking the icons: Temperatures, Staging Delays, Vestibule, Calibration, Configuration, RSM Module, Waterside Economizer Settings, Pump Settings, and Evap Module. See **Figure 49, this page**.

The figures that follow show the rest of the screens available under Setpoints.

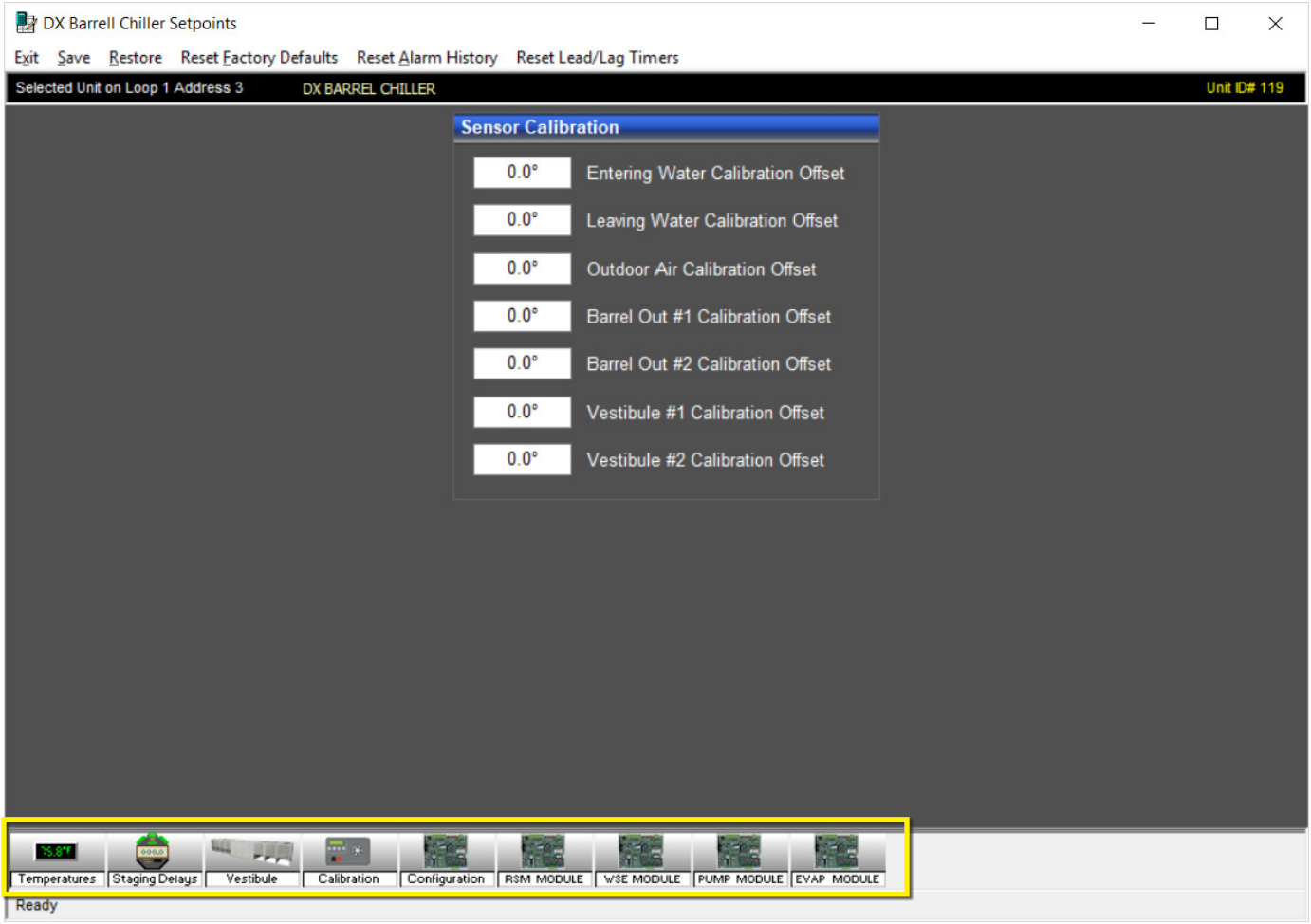



**Figure 49: Prism 2 - Controller Setpoint Screens**

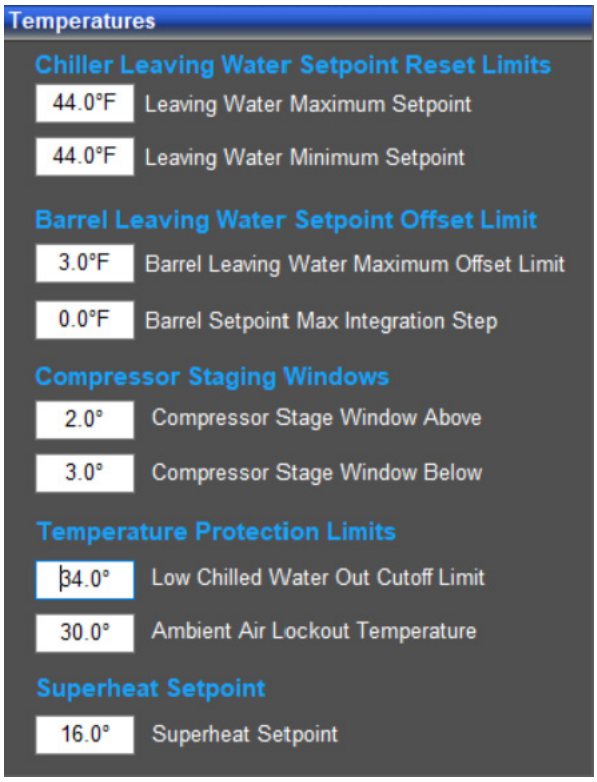



**Figure 50: Prism 2 - Setpoints - Temperatures**


**Figure 51: Prism 2 - Setpoints - Staging Delays & Timing Intervals**

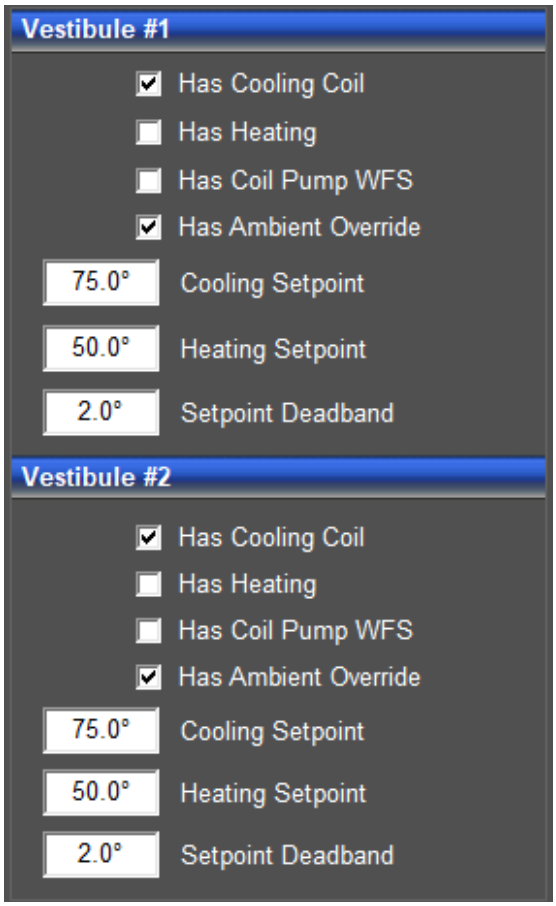



**Figure 52: Prism 2 - Setpoints - Vestibules #1 and #2**

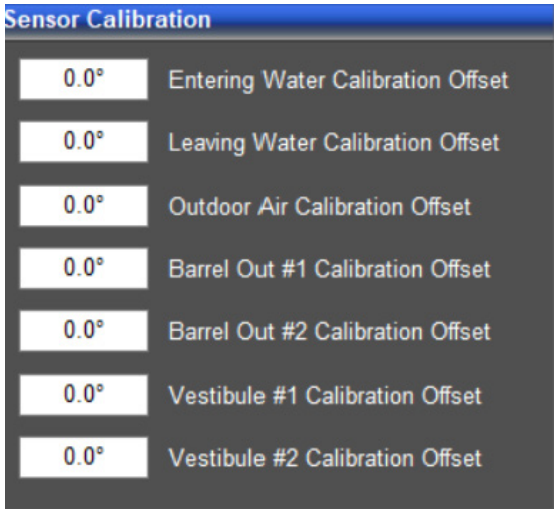



**Figure 53: Prism 2 - Setpoints - Sensor Calibration**

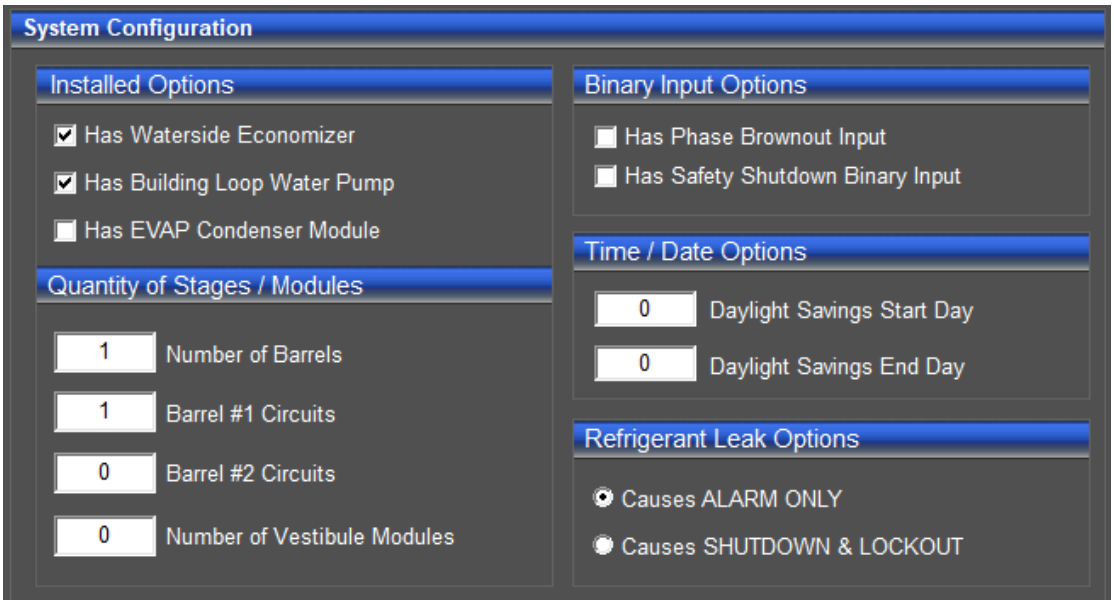



**Figure 54: Prism 2 - Setpoints - System Configuration**

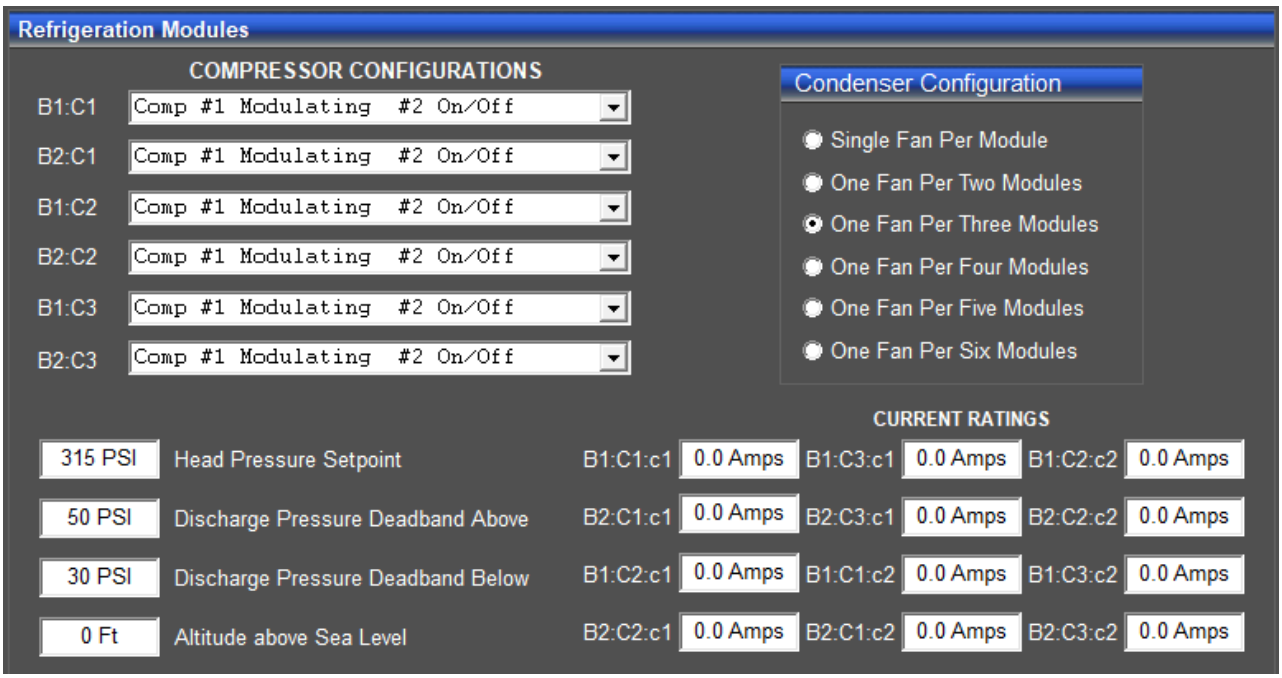



**Figure 55: Prism 2 - Setpoints - Refrigeration Modules**

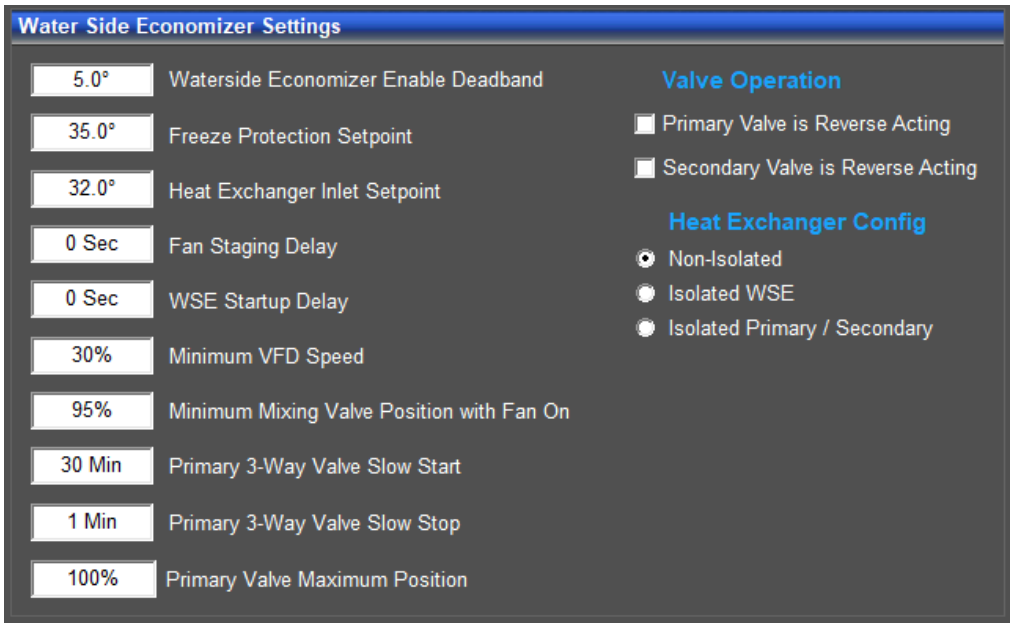



**Figure 56: Prism 2 - Setpoints - Waterside Economizer Settings**

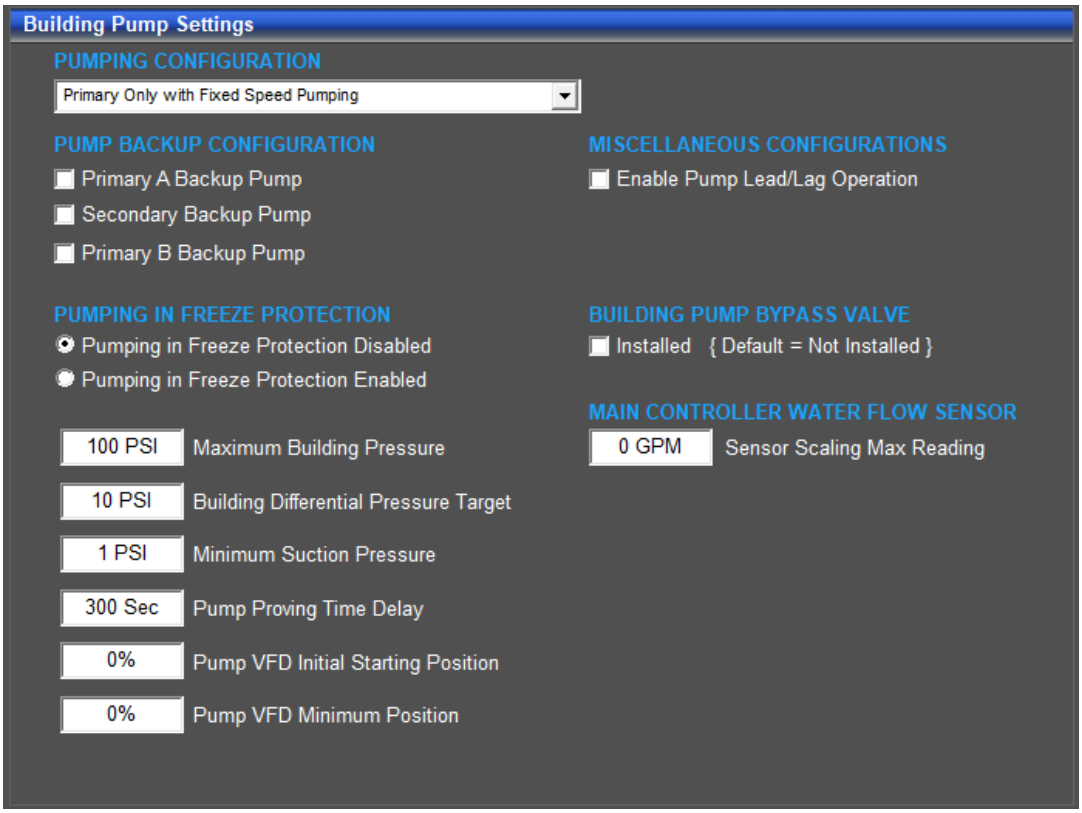



**Figure 57: Prism 2 - Setpoints - Building Pump Settings**

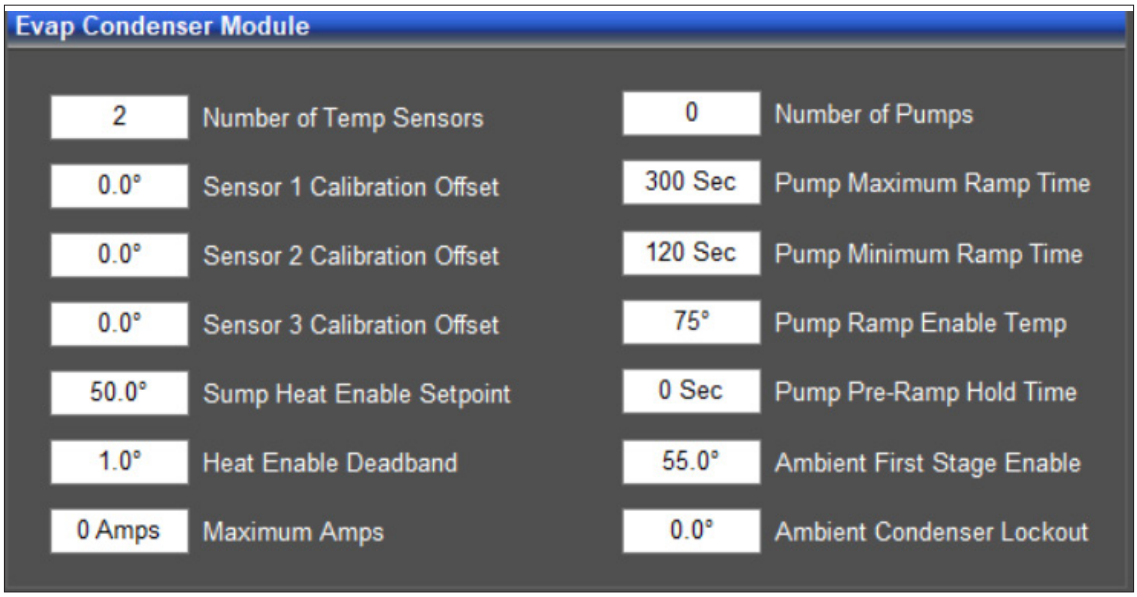



**Figure 58: Prism 2 - Setpoints - Evap Condenser Module**

## Setpoint Help and Changing Setpoints

Positioning the cursor over the top of a setpoint box will cause a help window will pop up indicating how that setpoint is used by the controller.

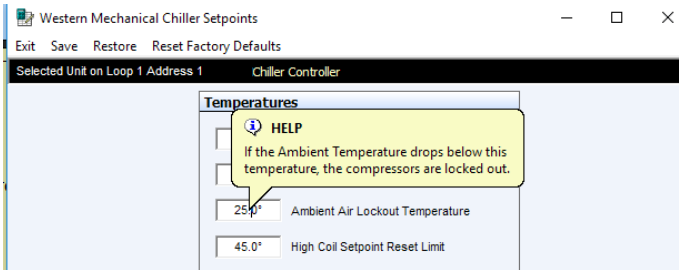



**Figure 59: Prism 2 - Setpoints - Help Window**

If the setpoint entered is too high, too low, or the user doesn't have Level 3 access, Prism 2 will not accept a new setpoint value and will restore the previous value in that field.

Press **<Enter>** to have Prism 2 save the value.

## Saving and Restoring Setpoints

The **<Save>** and **<Restore>** functions at the top of every setpoint screen save and copy over ALL of the setpoints for a controller, not only those on a single setpoint screen.

Saving all setpoints from the controller to a computer for use in restoring the setpoints or for copying to another specific controller will save time in configuring a controller and reentering setpoints for another controller.

### Restore Factory Defaults

To restore factory configuration and setpoint defaults for the main DX Barrel Chiller Controller, select **<Restore Factory Defaults>** at the top of any setpoint screen. A confirmation window will appear. See **Figure 60, this page**.

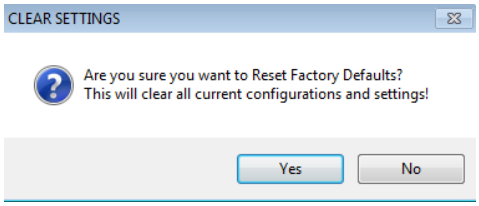



**Figure 60: Prism 2 - Clear Settings Confirmation Window**

Select **<Yes>** to clear all configuration and settings and restore factory defaults. Select **<No>** to cancel this operation.

**WARNING:** AAON does not assume any responsibility or liability due to misuse or misunderstanding of this feature. Restore Factory Defaults wipes out ALL current configuration and setpoints for a single controller.

## Charting

At the top of the *DX Barrel Main Chiller Controller Status Screen* (**Figure 61, this page**) is the option **<Charting>**.

Select **<Charting>** to display a chart for the DX Barrel Chiller #1 or #2. See **Figure 62, this page**, for an example. The options available are to clear the graph, chart the colors, or save the graph.

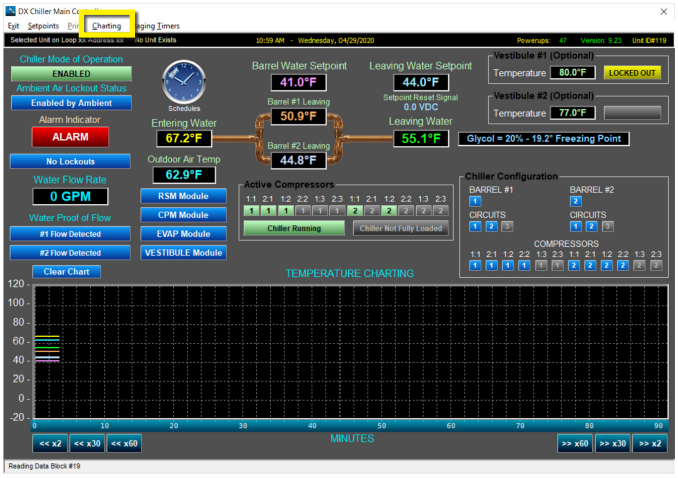



**Figure 61: Prism 2 - Charting Selection**

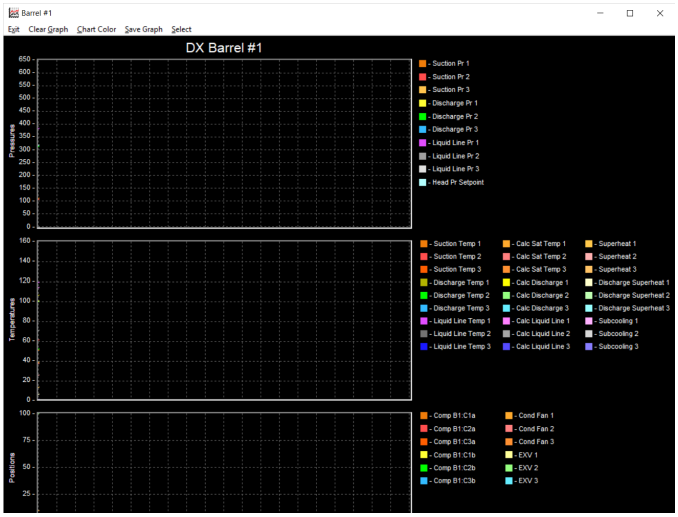



**Figure 62: Prism 2 - DX Barrel Chiller Chart**

## Schedules and Holidays

Selecting the **<Schedules>** icon, found on the *DX Barrel Main Controller Status Screen* (**Figure 63, this page**), displays the *Schedules Screen*. See **Figure 64, this page**.

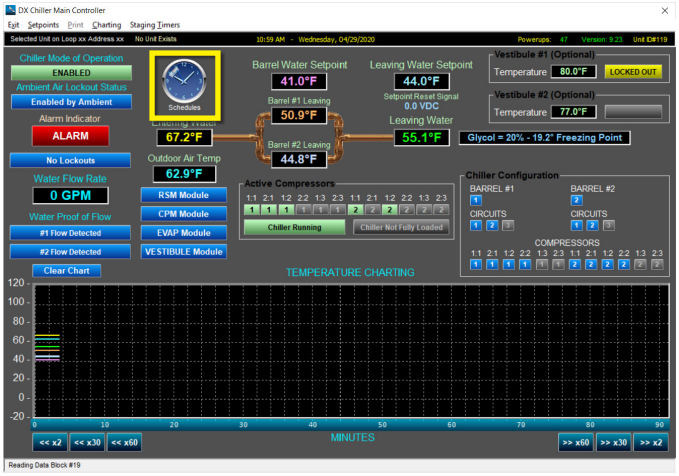



**Figure 63: Prism 2 - Charting Selection**

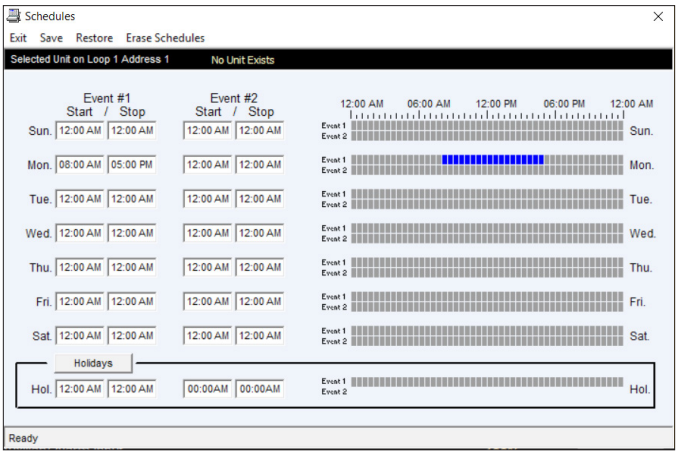



**Figure 64: Prism 2 - Schedules Screen**

The controller has two event start and stop times per day and two event start and stop times for holidays. The holiday start and stop times will override the standard operating hours.

To schedule holidays, press the **<Holidays>** button. The *Holiday Schedule Screen* will appear. See **Figure 65, this page**.

Click on the date to highlight it and tag it as a holiday. Days selected as holidays are indicated with a green background and white text.

There are 14 holiday periods available for each year. These holiday periods can span a single day to months.

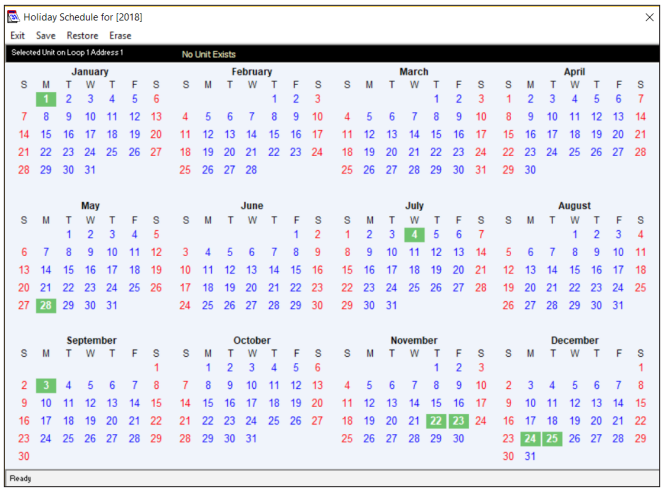



**Figure 65: Prism 2 - Yearly Holiday Schedule Screen**

Holiday periods override the standard operating hours to accommodate holidays or other special events.

It is not possible to program holidays for the next year, and holidays do not automatically adjust for the new year. It is necessary to access this screen after the new year and accommodate holidays that float, such as Memorial Day.

## Saving and Restoring Schedules and Holidays

While at the *Schedules Screen*, select **<Save>** to save the schedule. Select **<Restore>** to restore a previously saved schedule. Select **<Erase Schedules>** to completely erase the schedule appearing in the window.

**WARNING:** **<Erase Schedules>** will clear ALL entered stop/start times, so use with caution.

While at the *Holiday Schedule Screen*, select **<Save>** to save the Holidays. Select **<Restore>** to restore previously saved Holidays. Select **<Erase>** to completely erase the holidays appearing in the window.

Saving all schedules from the controller to a computer for use in restoring the schedules or for copying to another specific controller will save time in configuring the controller and reentering schedules for another controller.

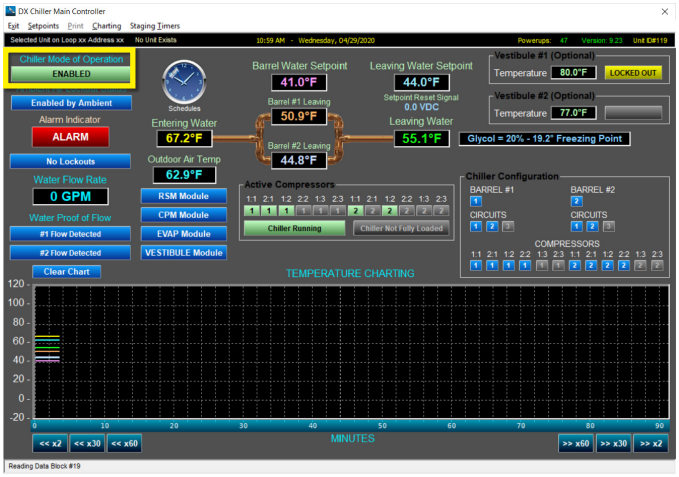
# Schedule Override and Viewing Alarms

## Schedule Override

Override the schedule mode of operations by clicking on the button under Chiller Mode of Operation, located on the controller's status screen. See **Figure 66, this page**. The *Overrides Dialog Box* will appear.

The options are: Auto Scheduling, Force Schedule ON, and Force Schedule OFF.

A scheduled force override will remain in effect until canceled. To cancel an override, select the Auto Scheduling option.



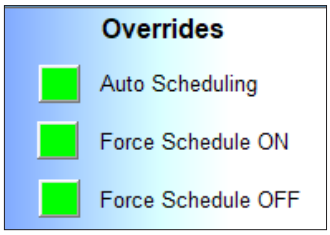




**Figure 66: Prism 2 - Mode Status and Override**

## Viewing Alarm Status

The *Unit Alarm Screen* is accessed from the controller's status screen by clicking the **<ALARM>** button. This button will be a dull red and display **<No Alarms>** when there are no alarms present or will be bright red and display **<ALARM>** if active alarms exist.

Click the **<ALARM>** button when bright red or the **<No Alarms>** button when dull red. The *Chiller Alarm Status Screen* will appear. See **Figure 67, this page**.

For the system to poll for alarms, the **<Enabled>** box associated with each alarm category must be selected. Select **<Alarm Polling Enabled>** in the Job Sites Window in order for Prism 2 to actively poll for alarms. Refer to the *Prism 2 Technical Guide* for more information.

The gray **<OK>** button next to each alarm category will change to a bright red **<ALARM>** button if an alarm exists within that category.

When an alarm(s) exists within a category, the individual **<OK>** button(s) within that category will change to a dull red **<Alarm>** or **<Show Alarm>** button (module alarms only) when an alarm(s) exists.

When **<Show Alarm>** is selected, one of four Module Alarm Screens will appear. See **Figures 68-71, pages 113-114**. Alarms can be reset in these screens.

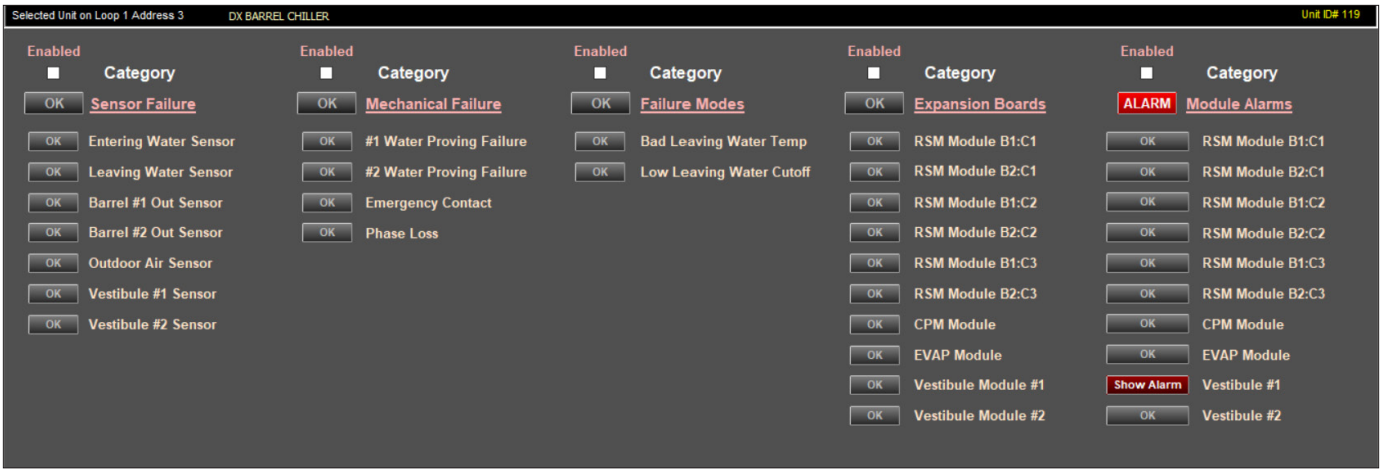



**Figure 67: Prism 2 - Alarms Screen**

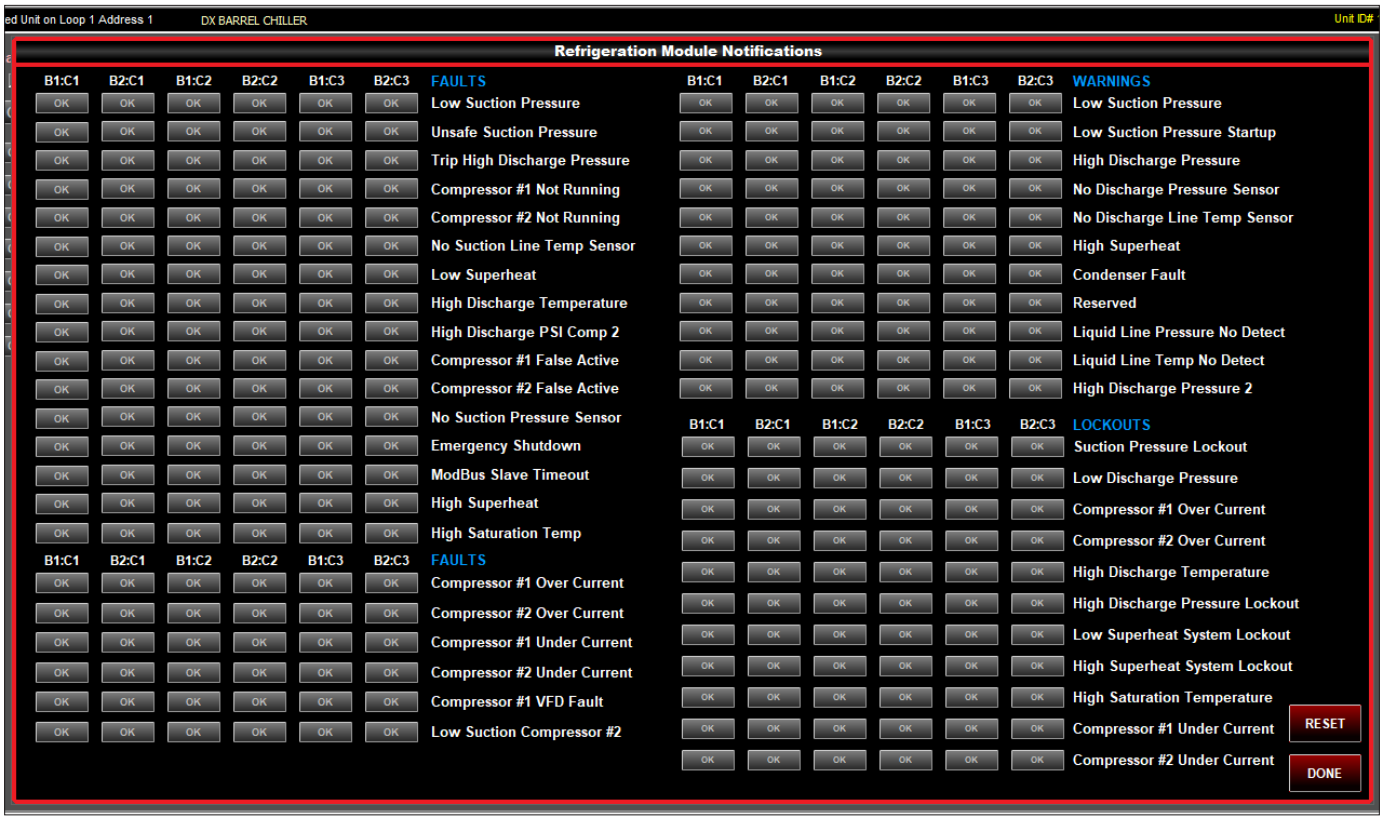



**Figure 68: Prism 2 - Refrigeration Module Alarms and Reset Screen**

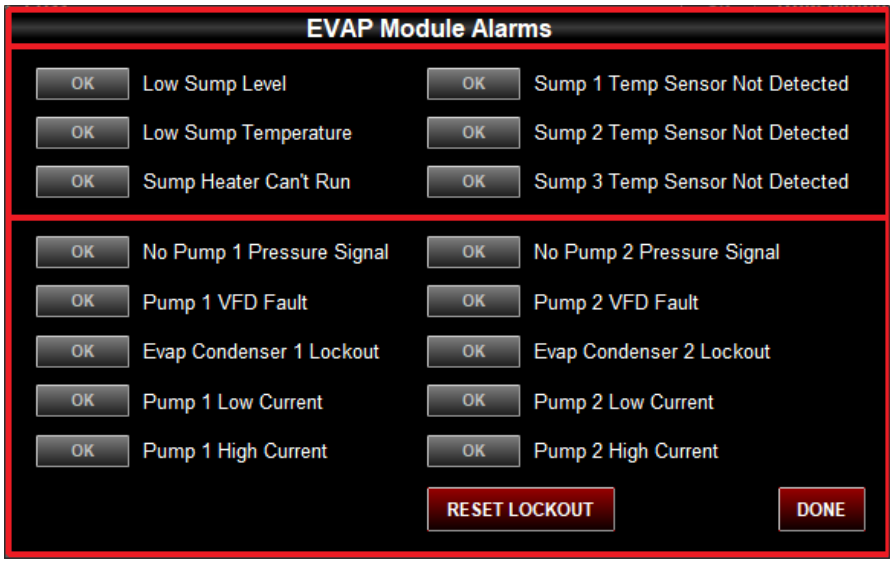



**Figure 69: Prism 2 - EVAP Module Alarms and Reset Screen**

## CPM and Vestibule Alarms and Reset Screens

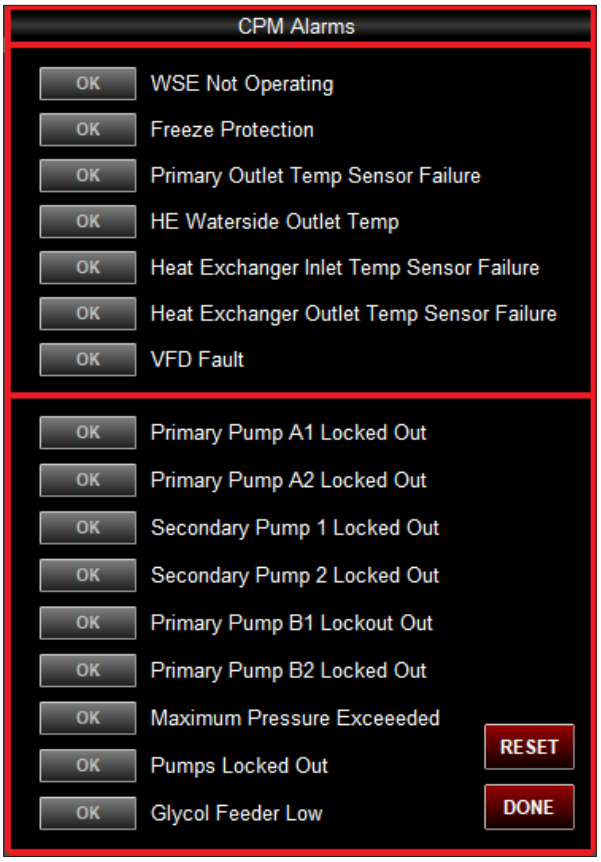



**Figure 70: Prism 2 - CPM Alarms and Reset Screen**

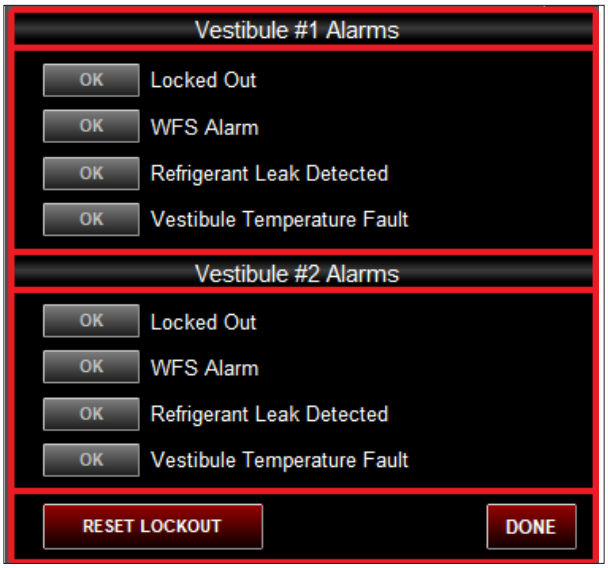



**Figure 71: Prism 2 - Vestibule Alarms and Reset Screen**

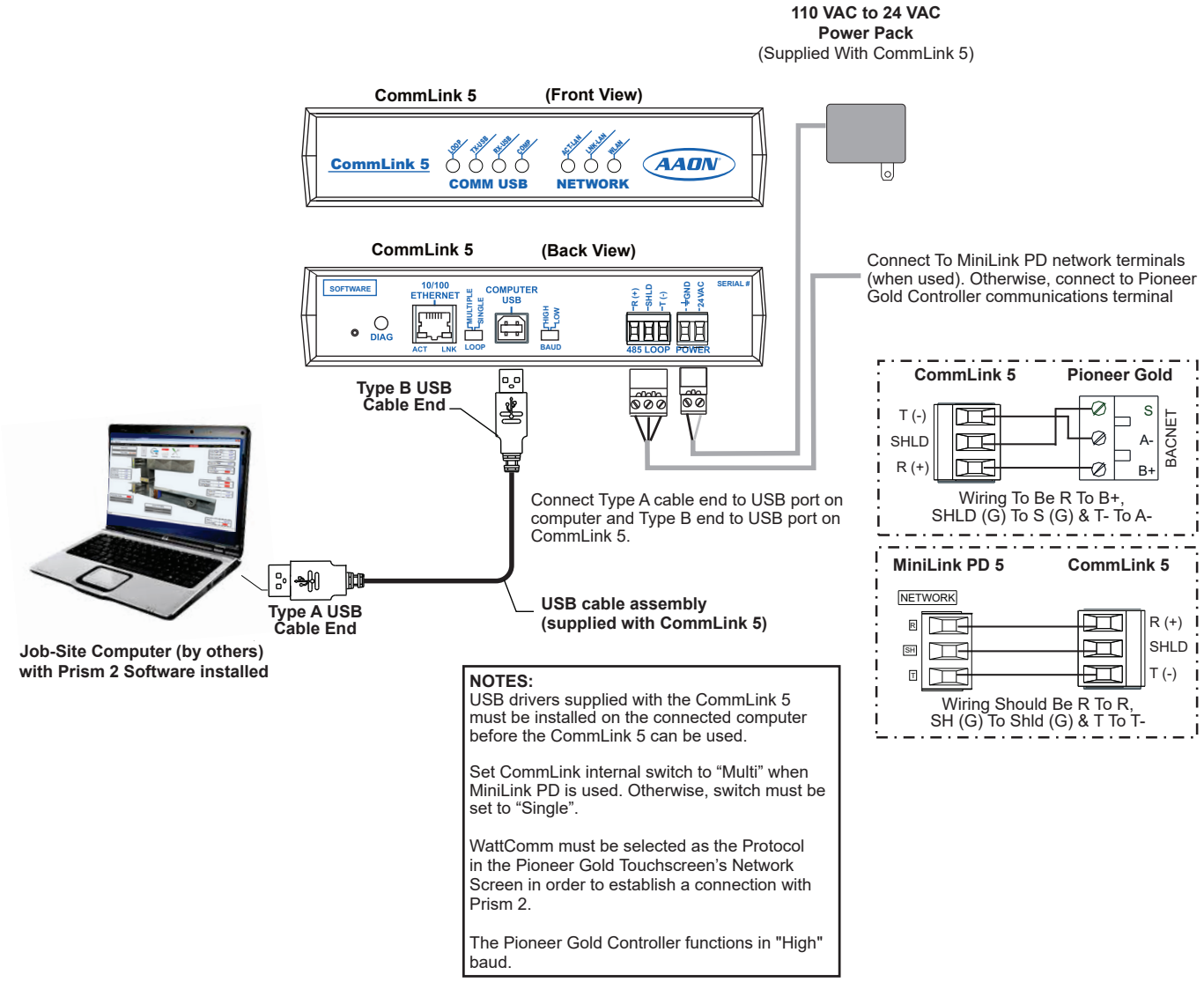



**Figure 72: Prism 2 - CommLink 5 Connection**

## IP Module Connection

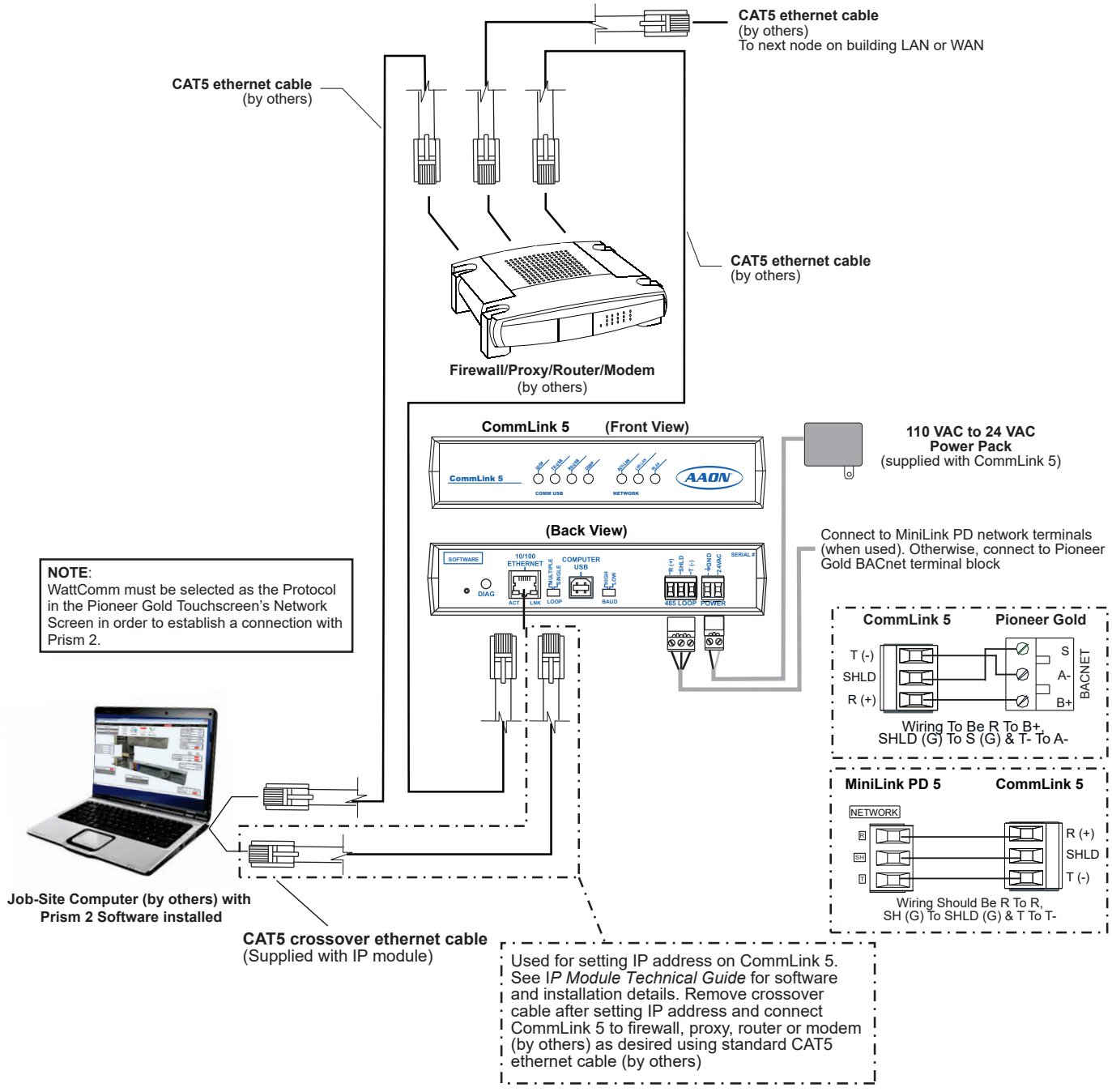



**Figure 73: Prism 2 - IP Module Connection**

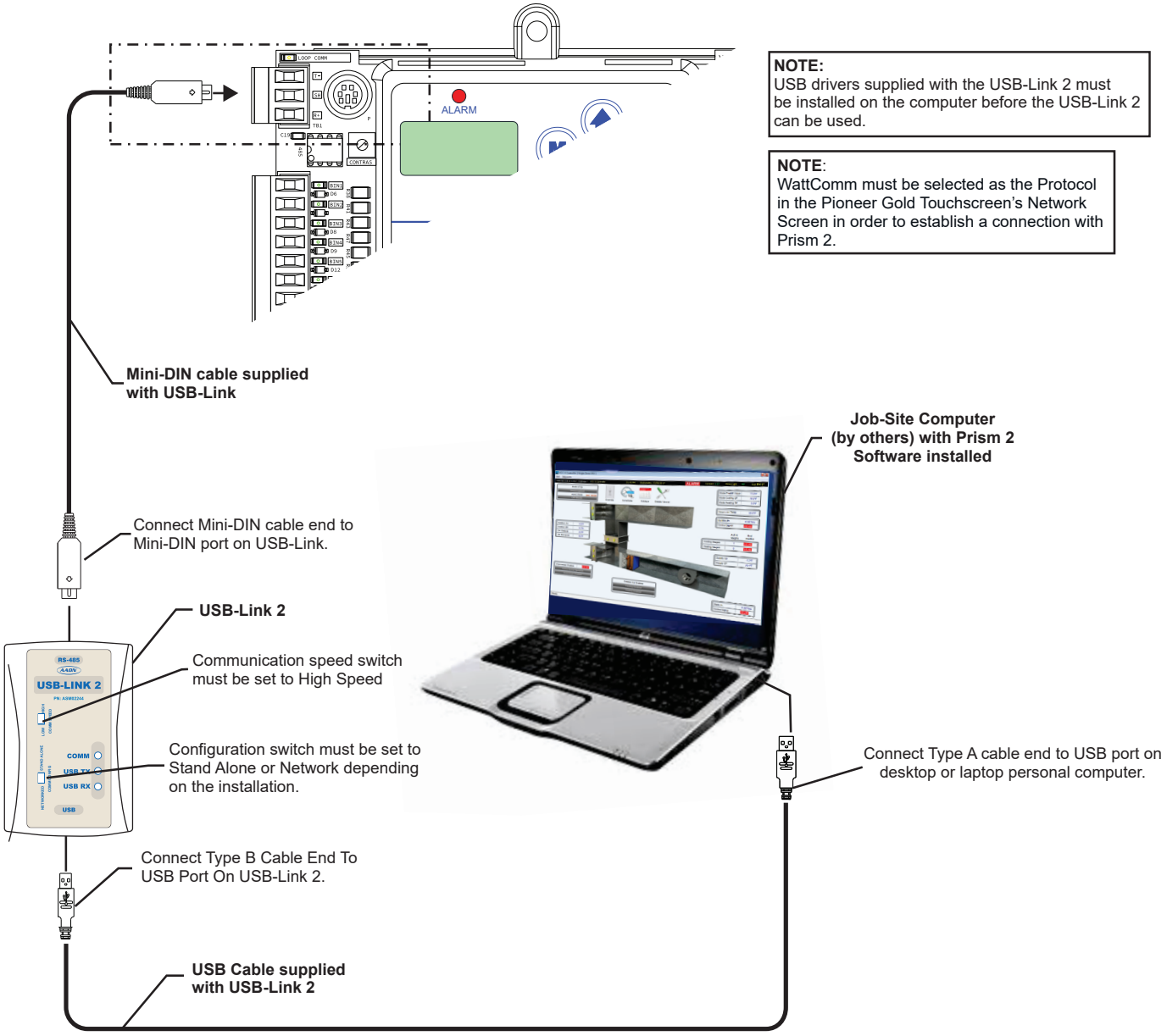



**Figure 74: Prism 2 - USB-Link 2 Connection**

# Main DX Barrel Chiller Controller Technical Guide

## G070300 · Rev. B · 211117

**AAON Controls Support: 866-918-1100**
**Monday through Friday, 7:00 AM to 5:00 PM**
**Central Standard Time**

**Controls Support website:**
**www.aaon.com/controlstechsupport**

**AAON Factory Technical Support: 918-382-6450**
**techsupport@aaon.com**

**NOTE:** Before calling Technical Support, please have the model and serial number of the unit available.

**PARTS:** For replacement parts, please contact your local AAON Representative.

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