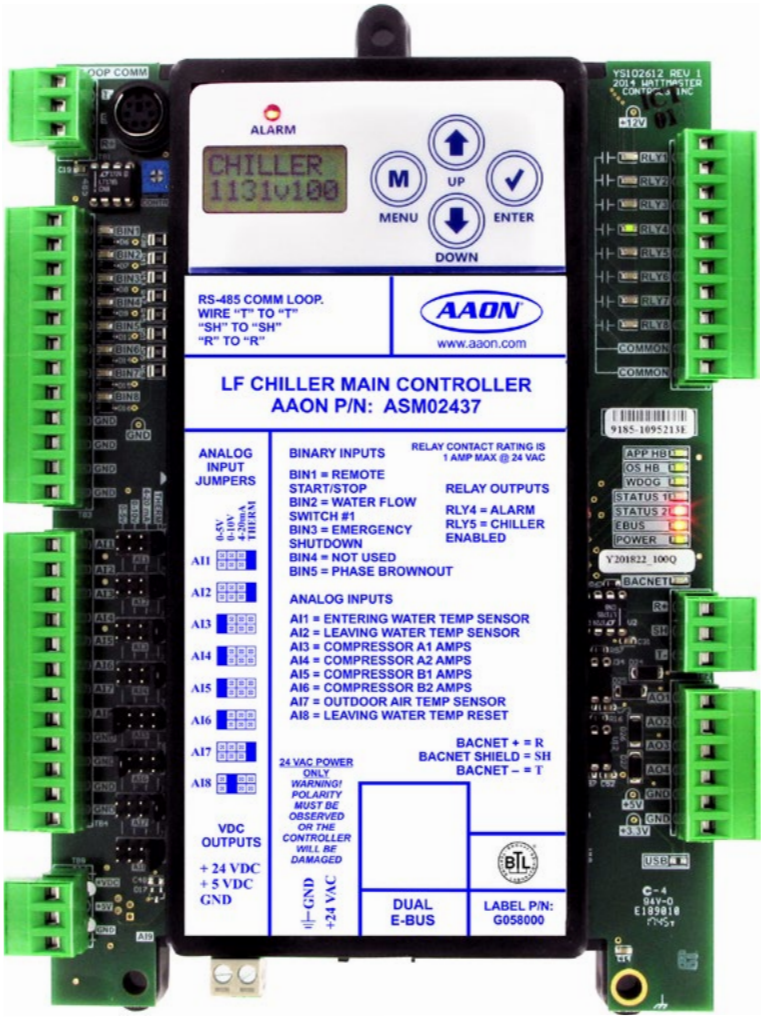
LF Chiller Controller Technical Guide

LF Chiller Controller Code: DT005683-001/SS1131 v. 1.00 and later



LF CHILLER CONTROLLER TECHNICAL GUIDE	
REVISION & DATE	**CHANGE**
Rev. 01C, June 26, 2020	Removed WSE Outlet Temperature from needed sensors for WSE operation, p.14
Rev. 01C, June 26, 2020	Removed WSE Mixing Valve Water Feed Temp Sensor from Chiller Pumping Module illustration, p.24.
Rev. 01D, November 6, 2020	Change in Lead/Lag sequence, p. 15
Rev. 01D, November 6, 2020	Updated most of the Chiller Pumping Module LCD screens due to new software, p. 48-56
Rev. 01D, November 6, 2020	Removed SEC OUT NO SENSE alarm & SEC OUT ## DAY history alarm from Chiller pumping module, p.53-54

⚠ WARNING

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IMPROPER INSTALLATION, ADJUSTMENT, ALTERATION, SERVICE, OR MAINTENANCE CAN CAUSE PROPERTY DAMAGE, PERSONAL INJURY, OR LOSS OF LIFE. INSTALLATION AND SERVICE MUST BE PERFORMED BY A TRAINED, QUALIFIED INSTALLER. A COPY OF THIS MANUAL SHOULD BE KEPT WITH THE UNIT AT ALL TIMES.

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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.

LF CHILLER CONTROL SYSTEM	
PART DESCRIPTION	**AAON P/N**
LF Chiller Main Controller	ASM02437
Chiller Refrigerant System Module	ASM02438
Chiller Pumping Module	ASM02448
E-BUS Horizontal Outdoor Air Temp & RH Sensor	ASM01836
Prism 2 Software	N/A
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 Foot 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. EBC Cable	ASM01635
E-BUS Adapter Board	ASM01878

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Control System Features & Applications

LF Chiller Main Controller

The LF Chiller Main Controller is used to control 1-2 circuit DX chillers with an option for water circuit pumping and an option for water side economizer.

The LF Chiller Main Controller has an on-board BACnet® port for connection to a BACnet® MS/TP BAS network. There are also (2) E-BUS expansion ports which allow for the connection of the Chiller Refrigerant System Modules and Chiller Pumping Module via EBC E-BUS cables.

In addition, the LF Chiller Main Controller and its associated modules contain a 2 x 8 LCD character display with 4 buttons that allow for status and alarm display and BACnet® configuration for the Main Controller.

Chiller Pumping Module

The Chiller Pumping Module (CPM) offers two distinct optional services to a chiller system—water circuit pumping and water side economizer. Each of these two services can be independently enabled or disabled.

Water Circuit Pumping

The Chiller Pumping (CP) functionality is to provide operational control of all water circuit pumping, including primary only, primary/secondary and dual primary/secondary systems. The CP provides for water circulation through the chiller exchanger and is also capable of managing building water pressure differential if supplying building water. The CP operational sequence does not make the decision about when to run the water pumps, it is commanded by the main chiller controller. If the CP operation is enabled and the WSE operation is enabled, freeze protection can override the currently commanded operation.

Waterside Economizer

The Waterside Economizer (WSE) functionality is to provide cooling when the outside air temperature is able to provide cooling. The WSE provides cooling by means of a set of outdoor coils with fans. When cooling is to be provided, water or a water/glycol mix is pumped through the coils to cool the water. The temperature of the cooled water is managed by a 3-way mixing valve and variable speed fans. In the case of a water system with an isolated glycol outside coil system, an additional 3-way mixing valve on the isolated (secondary) side is used in combination with the fans to cool a water/glycol mix feeding a heat exchanger which then cools the main loop water. Each loop, as well as the fans, operate independently, but interlocks in their sequences ensure that fans and the associated 3-way valve do not compete in their temperature control operations. The WSE operational sequence does not make the decision about when to provide WSE cooling, it is commanded by the Main Chiller Controller. If the WSE operation is enabled, freeze protection can override the currently commanded operation.

Manual Overview

This guide will lead you through each section of the *LF Chiller Controller Technical Guide*. Below is a quick overview of each section of this manual.

Section 1: Sequence of Operations - Page 7—This section contains the sequence of operations for the LF Chiller Controller and its modules.

Section 2: Wiring - Page 16—This section contains the inputs, outputs, and wiring for the controller and modules.

Section 3: Troubleshooting - Page 26—This section contains sensor testing charts and controller LED diagnostics.

Appendices A, B ,C: LCD Display Screens - Page 37— These appendices describe the controller and module LCD screens.

Appendix D: BACnet® Configuration - Page 57—This section lists BACnet® parameters, definitions, and ranges, if applicable.

Appendix E: PRISM 2 User Interface - Page 65—This section gives a brief overview of the Prism 2 user interface of the LF Chiller Control System.

Chiller Mode of Operation

There are 2 operational modes for the Chiller system:

1. Off Mode
2. 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 4 mode control factors:

1. Remote Unit Enable/Disable Input
2. Internal Schedule
3. Run/Stop override via BACnet®
4. 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 3 control factors.

When this input is active, the chiller will operate according to the condition of the other 3 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.

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 (UI)

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 UI and an override condition issued by the UI 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 3 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.

LF Chiller Main Controller Operation Modes

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 Water Side Economizer (if present) will shut down, and the circuit pumping (if present) will shut down.

Chiller Run Mode

The objective of the running mode is to generate cold water using Mechanical Cooling and Water Side Economizer Cooling if available. The economizer operation is commanded active or inactive by the LF Main Chiller.

If the Chiller Pumping Module is present and pumping operation is configured, the Chiller Module will activate pumping operations. The Chiller will not operate unless the Water Flow Switch is closed to provide 24 VAC to the Water Flow Switch binary input on the LF Chiller Main Controller.

If the Water Side Economizer is present and the ambient temperature is below the Entering Water Temperature by the adjustable Water Side Economizer Enable Deadband (defaulted to 5°F), the LF Chiller Main Controller will signal the Chiller Pumping Module to begin Water Side Economizer operation (see Water Side Economizer sequence for details).

If the Water Side Economizer is present and the ambient temperature is at or above the Entering Water Temperature, the LF Chiller Main Controller will signal the Chiller Pumping Module to disable Water Side Economizer operation.

If the Water Side 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 Cooling Enable Deadband (adj.), then Mechanical Cooling will be enabled. The LF Chiller Main Controller will send a signal to the Chiller Pumping Module that mechanical cooling is active and the Water Side Economizer (if active) will be locked at maximum.

Mechanical Cooling may be locked out by the Ambient Compressor Lockout or by Water Proof of Flow failure.

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Alarms and Safeties

Each of these sub-sequences is run collectively to evaluate various inputs and internal conditions for status and alarming/faulting purposes.

Chiller Entering Water Temperature (EWT)

If the EWT sensor has failed (measurement outside the accepted normal operating range for the given sensor), an EWT Sensor Failure alarm will be generated.

The EWT is used in the reverse flow safety which is not operated if this sensor fails (see Chiller Leaving Water Temperature Input below).

Chiller Leaving Water Temperature (LWT)

The LWT is the target for the chiller operations and is used in controlling the operation of the chiller.

If the LWT sensor has failed (measurement outside the accepted normal operating range for the given sensor), the chiller will be shut down and locked out, an LWT sensor failure alarm will generate, and all chiller running operations will be locked out (the Chiller Pumping Module may have independent freeze protection operations that may continue to run). A power cycle or specific command sent via BACnet® is required to restore operations, at which point operations will start as if the unit had just been powered up.

If the water drops below the Leaving Water Freeze Limit (default 35°F, adjustable based on glycol %), the chiller will be shut down and locked out, a freeze protection alarm will be generated, and all chiller running operations will be locked out (the Chiller Pumping Module may have independent freeze protection operations that may continue to run). A power cycle or specific command sent via BACnet® is required to restore operations, at which point operations will start as if the unit had just been powered up.

If the EWT is below the LWT by a difference of 4°F or more for a duration of 1 minute, the chiller will be shut down and locked out, a reverse flow alarm will be generated, and all chiller running operations are locked out (the Chiller Pumping Module may have independent freeze protection operations that may continue to run). A power cycle or specific command sent via BACnet® is required to restore operations, at which point operations will start as if the unit had just been powered up.

Compressor Current Sensor Inputs (1-4)

There are 4 compressor current inputs, one associated with each compressor. Each input is only monitored and acted upon if the associated compressor is configured and active.

The compressor current will be measured and shared with the refrigeration module controlling that compressor.

The compressor safeties operate in the individual refrigeration modules, based on the current measurement information provided by the main controller.

For each individual compressor, if the current is less than 20% of the Running Load Amps (RLA) for the given compressor for more than 30 seconds or if the current is more than 120% of the RLA for 10 seconds, the given compressor will shut down, an alarm will generate, and a 5 minute recovery delay will occur before a lock out will be issued. Following the recovery delay (no lockout), the failure alarm will be cleared and the compressor can be restarted if still called for. If (3) shutdowns occur in a 2-hour window, the compressor will be locked out and an alarm will be generated to indicate a lockout has occurred. The lockout can only be cleared by cycling power to the module or via a clearing command issued through BACnet®. **NOTE:** RLA is configurable in the controller for each compressor.

Ambient Temperature Input

The ambient temperature sensor is used in determining when to operate the water side economizer if present and may be used by the water side economizer for freeze protection operations.

If ambient temperature sensor is determined to have failed (measurement outside the accepted normal operating range for the given sensor), an ambient temperature sensor failure alarm will be generated. If the water side economizer is present, its operation will be disabled.

Water Flow Switch Input

The water flow switch controls when mechanical cooling may operate. Mechanical cooling 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 10 seconds, an emergency shut down of running compressors will occur (no pump down). Once the switch is reactivated, mechanical cooling may restart as needed.

Main Chiller Alarms and Safeties

Emergency Shutdown Input

This is a direct safety input and must be active for the chiller to operate and for pumping operations (when circuit pumping is configured).

NOTE: Freeze protection operations in the Chiller Pumping Module may continue to operate even if the emergency shutdown input is deactivated.

If the emergency shutdown input is deactivated for a period of 2 seconds, all chiller operations and any running compressors (without a pump down) will be shut down immediately, all EXVs will be closed immediately, and an emergency shutdown alarm will be generated. Once reactivated, the alarm will clear and the chiller may restart operations from the beginning as if just powered up.

Phase Brownout Input

This is a direct safety input and must be active for the chiller to operate and for pumping operations (when circuit pumping is configured).

NOTE: Freeze protection operations in the Chiller Pumping Module may continue to operate even if the emergency shutdown input is deactivated.

If the phase brownout input is deactivated for a period of 2 seconds, all chiller operations and any running compressors (without a pump down) will be shut down immediately, all EXVs will be closed immediately, and a phase brownout alarm will be generated. Once reactivated, the alarm will clear and the chiller may restart operations from the beginning as if just powered up.

Sequences

There are 4 main sequences for the Chiller system:

1. Mechanical Cooling Sequence
2. Water Side Economizer Sequence
3. Water Circuit Pumping Sequence
4. Inputs and Safeties Sequence

Mechanical Cooling Sequence

Compressor/Module Configurations Supported

COMPRESSORS/ CIRCUIT	CIRCUIT 1 COMPRESSOR(S) RSM 1	CIRCUIT 2 COMPRESSOR(S) RSM 2
1	Fixed	
1	Variable Capacity	
1	Fixed	Fixed
1	Variable Capacity	Fixed
1	Variable Capacity	Variable Capacity
2 (Tandem)	Fixed/Fixed	Fixed/Fixed
2 (Tandem)	Variable Capacity/ Fixed	Fixed/Fixed
2 (Tandem)	Variable Capacity/ Fixed	Variable Capacity/ Fixed

Table 1: Compressor/Module Configurations

If the Leaving Water temperature is above the Leaving Water Temperature Setpoint by the Compressor Stage Window Above Setpoint, compressors will be staged/modulated to achieve the Leaving Water Temperature Setpoint.

If a compressor is enabled and is not locked out, the compressor will be started. The water flow switch will be evaluated before allowing Mechanical Cooling to run. If the water flow switch input is lost, then all compressors will shut off immediately regardless of the minimum run time, with no pump down.

On chillers with multiple compressors, if the Leaving Water Temperature remains above setpoint for the Stage Up Delay, the next compressor can stage up. A variable capacity compressor must be at 100% for the Stage Up Delay for the next compressor to stage up.

To stage down fixed compressors, the Leaving Water Temperature must be below setpoint by the Compressor Stage Window Below Setpoint for the Stage Down Delay. With variable capacity and fixed compressors, the variable capacity compressor must be at minimum capacity for the Stage Down Delay to stage down a fixed compressor. To stage off the variable capacity compressor it must be a minimum capacity for the Stage Down Delay.

Refrigeration Alarm Descriptions

Alarm Warnings Descriptions

Low Suction Pressure Warning

Low suction pressure will be ignored for the first minute of initial compressor operation. If the suction pressure is below the glycol-adjusted setpoint (default 105 psi) for 20 seconds, the digital compressor will modulate down 1% per second. The warning will clear once the suction pressure rises above setpoint.

Low Suction Pressure – Startup Warning

The suction pressure must be above 40 psig for the compressor on the circuit to start. A warning will generate if the circuit is off and suction pressure is below 40 psig.

High Discharge Pressure – Level 1 Warning

If the discharge pressure rises above 525 psig, the condenser fan will be forced to 100%.

High Discharge Pressure – Level 2 Warning

If the discharge pressure rises above 550 psig, the compressor will modulate down 1% per second and the 2nd tandem compressor will be shut down until the discharge pressure drops below 425 psig.

Discharge Pressure Not Detected Warning

If the discharge pressure sensor is not detected and a compressor is running, the Copeland Digital Scroll will be forced to 50% based on Copeland requirements.

High Superheat Warning

If a compressor is active and the superheat is above 25 degrees for two minutes or longer, an alarm will be generated.

Condenser Fault Binary Input Warning

If the connection to the condenser binary input is lost, an alarm will be generated.

Discharge Line Temp Sensor Not Detected Warning

If the discharge line temperature analog input sensor is not detected by the module, the Condenser fan will be forced to 100%.

Liquid Pressure Sensor Not Detected

If the liquid pressure sensor is not detected and a compressor is running, an alarm will be generated.

Liquid Line Temperature Sensor Not Detected

If the liquid line temperature sensor is not detected, an alarm will be generated.

Alarm Faults Description

Low Suction Pressure Fault

Low suction pressure will be ignored for the first minute of initial compressor operation. If the suction pressure is below the glycol-adjusted setpoint (default 105 psi) for 1 minute, the compressor(s) will turn off. After 5 minutes have passed, if the suction pressure measures above the glycol-adjusted restart setpoint (default 115 psi), the fault will clear.

Unsafe Suction Pressure Fault

Unsafe suction pressure detection will be ignored for the first 30 seconds of initial compressor operation. If the suction pressure is below the glycol-adjusted setpoint (default 50 psi) for 5 seconds, the compressor(s) will be turned off. After 5 minutes have passed, if the suction pressure measures above the glycol-adjusted restart setpoint (default 115 psi), the fault will clear.

High Discharge Pressure Fault

For a single compressor circuit, if the discharge pressure rises above 600 psig, the compressor will turn off. After five minutes have passed, if the discharge pressure drops below 475 psig, the compressor will turn back on.

Compressor 2 High Discharge Pressure Fault

For a tandem compressor circuit, if the discharge pressure rises above 550 psig, the second compressor will turn off. After the minimum off time and stage up delays have been met, the compressor will retry.

Compressor 1 or Compressor 2 Not Running Fault

If the compressor has been activated for at least 45 seconds, but the binary input signal to the module is not active, the Compressor signal will turn off. After five minutes the fault will clear and the compressor will retry.

Low Superheat Fault

Low superheat detection will be ignored for the first 2 minutes of initial compressor operation. If superheat is below four degrees for two minutes, the compressor signal will turn off. After five minutes the fault will clear and the compressor will retry.

High Discharge Line Temperature Fault

The discharge line temperature sensor is installed for digital scroll compressors only. If the discharge line temperature is above 225 degrees for 30 seconds, the compressor will fail. If the discharge line temperature is below 150 degrees and five minutes have passed, the compressor will retry.

Refrigeration Alarm Descriptions

Communications Loss Fault

If E-BUS communications are lost for at least 15 seconds, the compressor(s) will turn off. When communication is reestablished, the fault will clear.

Compressor 1 False Active Warning

If the compressor is not activated, but the binary input signal to the module is active for at least 45 seconds, the condenser fan will be forced to 100%.

Compressor 2 False Active Warning

If the compressor is not activated, but the running verification signal to the module is active for at least 45 seconds, the condenser fan will be forced to 100%. For fixed on/off compressors, the running verification is a binary input signal to the module.

High Superheat Fault

If a compressor is active and the superheat is above 40 degrees for 1 minute or longer, the compressor(s) will turn off. After five minutes have passed, the compressor(s) will retry.

Suction Line Temperature Sensor Not Detected

The circuit is disabled until the sensor is detected.

Suction Pressure Sensor Not Detected

The circuit is disabled until the sensor is detected.

High Saturation Temperature Fault

If the compressor is at 100% and the saturation temperature is above 55 degrees for 5 minutes, both compressors will fail.

Compressor 1 or Compressor 2 Overcurrent Fault

If the current is more than 120% of the Running Load Amps (RLA) for 10 seconds, the compressor will shut down.

Compressor 1 or Compressor 2 Undercurrent Fault

If the current is less than 20% of the RLA for 30 seconds, the compressor will shut down.

Alarm Lockouts Description

Low/Unsafe Suction Pressure Lockout

If a low suction pressure fault or unsafe suction pressure fault occurs three times in a two-hour time period, the circuit will be disabled and locked out until the module is reset.

Low Discharge Pressure Lockout

If the discharge pressure is below 200 psig for 2 minutes, the circuit will be disabled and locked out until the module is reset.

High Discharge Pressure Lockout

If a high discharge pressure fault occurs three times in a two-hour time period, the circuit will be disabled and locked out until the module is reset.

Low Superheat Lockout

If a low superheat fault occurs three times in a two-hour time period, the circuit will be disabled and locked out until the module is reset.

High Superheat Lockout

If a high superheat fault occurs three times in a two-hour time period, the circuit will be disabled and locked out until the module is reset.

High Discharge Line Temperature Lockout

If a high discharge line temperature fault occurs three times in a two-hour time period, the circuit will be disabled and locked out until the module is reset.

Compressor 1 Overcurrent

If a compressor overcurrent fault occurs three times in a two-hour time period, the compressor will be disabled and locked out until the module is reset.

Compressor 2 Overcurrent

If a compressor overcurrent fault occurs three times in a two-hour time period, the compressor will be disabled and locked out until the module is reset.

High Saturation Temperature

If a high saturation temperature fault occurs three times in a two-hour time period, the circuit will be disabled and locked out until the module is reset.

Compressor 1 Undercurrent

If a compressor under current fault occurs three times in a two-hour time period, the compressor will be disabled and locked out until the module is reset.

Compressor 2 Undercurrent

If a compressor undercurrent fault occurs three times in a two-hour time period, the compressor will be disabled and locked out until the module is reset.

Water Side Economizer Sequence

Water Side Economizer (WSE) Operation

Power Up Delay

Once power is applied to the unit, the control algorithm will not start until 30 seconds has expired. **NOTE:** 100% valve position equals max valve position that can be less than full open.

Cooling Mode

If the ambient temperature is below the entering water temperature by the WSE Enable Offset (adj.), then the WSE will be used as the primary source of cooling. Once in WSE operation, the WSE 3-way valve will modulate to maintain the Leaving Water Temperature setpoint.

If the valve reaches 100% and the Leaving Water Temperature Out (LWTO) is still above setpoint, then the WSE VFD fans will begin to modulate in conjunction with the 3-way valve to achieve setpoint. If both the 3-way valve and the WSE VFD fans reach 100% and the LWTO is still above setpoint, then Compressor Cooling will be enabled while the 3-way valve and fans stay at 100%.

If Compressor Cooling is active and the ambient temperature drops below the entering water temperature by the WSE Enable Offset Setpoint (adj.), the WSE will be enabled. The WSE will be enabled at a slow rate to avoid negatively impacting the barrel operation.

If the WSE and Compressor Cooling are active and the ambient temperature rises above a value calculated to be the entering water temperature minus ½ of the WSE Enable Offset, then WSE will be disabled. The 3-way valve will close and the WSE fans will de-energize.

Controlling Sensor

The following sensor is needed:

WSE Valve Outlet Mixed Temperature

Measures the temperature of the water after the 3-way mixing valve.

Alarms & Faults

WSE VFD Fault

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

Freeze Protection

If the WSE Valve Outlet Mixed Temperature drops below the freeze protection temperature setpoint, an alarm will indicate the WSE is in freeze protection operation. The WSE Fans will be disabled and the 3-way mixing valve will open to pass 100% water to the WSE coils.

Additionally, if the water circuit pumping is enabled, it will be forced active to circulate water through the WSE. This action for the water circuit pumping operation is configurable and can be disabled.

If the WSE Valve Outlet Mixed Temperature rises 5°F above the freeze protection temperature setpoint, the freeze protection alarm will clear.

WSE Valve Outlet Mixed Temperature Sensor Failure

An alarm will indicate the sensor failure.

Chiller Pumping (CP) Sequence

The pumping section of an LF Chiller is capable of managing the pumping in a primary only chilled water circuit arrangement. The pumping operation has two basic modes of operation:

1. Off Mode
2. Pumping Mode

Off Mode

In Off Mode, all pumps will turn off.

Pumping Mode

There are two conditions that will cause the unit to run in pumping mode. While in the off mode, if WSE is configured and CP operation in freeze protection is configured, and if a system lockout is not present, then if WSE freeze protection or heat exchanger freeze protection become active, the CP will run in pumping mode – even if the chiller is not running. Otherwise, the unit will enter pumping mode whenever the chiller is in run mode.

During pumping mode, there are two distinct sequences that are run based on pump configuration. Each sequence has additional handling for backup and lead/lag operations:

1. Primary Circuit Only with Fixed Speed Pumping
2. Primary Circuit Only with Variable Speed Pumping

Primary Circuit Only with Fixed Speed Pumping

If Primary A Pump 1 is enabled and after 30 seconds, POWF is made, the pump will continue to run. If POWF is not made, the pump will turn off. The Pump will be locked out, and a Pump Lockout Alarm will occur.

If the POWF Switch deactivates for more than 30 seconds, the pump will shut down, The Pump will be locked out, and a Pump Lockout Alarm will occur.

Primary Circuit Only with Variable Speed Pumping

If Primary A Pump 1 with VFD at minimum speed is enabled and after 60 seconds the (1) the building pressure differential reaches a value greater than 1 psi and (2) POWF is made, the pump will continue to run and the VFD will modulate to maintain the differential pressure setpoint. However, if either of these conditions are not met, the pump will turn off.

If the POWF Switch deactivates for more than 30 seconds or a VFD fault occurs, the pump will shut down, The Pump will be locked out, and a Pump Lockout Alarm will occur.

Lead Lag Operation & Backup Pump

If Lead Lag Operation is configured, a Lead/Lag calculation is performed every 7 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.

Freeze Protection

If the Automatic Pump in Freeze Protection is enabled and the WSE section goes into freeze protection, the pumping mode will be forced active. The freeze protection operation cannot override a system lockout, which will keep any pumps from running.

Alarms & Faults

Discharge Sensor Fail

If the analog input for the pressure sensor measures above 4.5vdc or below 0.5vdc, then the sensor is considered to have failed.

Discharge Sensor Fault

This fault occurs if the discharge pressure is above the maximum discharge pressure setpoint for more than 5 seconds.

Discharge Initial Startup Fail

This fault occurs if the discharge pressure does not change by 1 psi in the first 30 seconds of running.

Suction Sensor Fail

If the analog input for the pressure sensor measures above 4.5vdc or below 0.5vdc, then the sensor is considered to have failed.

Suction Sensor Fault

This fault occurs if the suction pressure is below the minimum suction pressure setpoint.

Differential Pressure Fault

This fault occurs if the differential pressure is less than 0 psi for 30 seconds when the pump is active.

Pump Lockout

This lockout will occur (1) if POWF does not occur or is lost for 30 seconds, (2) if a VFD Fault occurs, (3) if a Discharge or Suction Pressure Sensor Fails or Fault occurs, or (4) if a Differential Pressure Fault occurs.

Chiller Pumping System Lockout

If all pumps are in a lockout condition, then the pumping system will lockout. Pumping cannot operate and the off mode is effectively enforced regardless of the current chiller command. (**NOTE:** A system lockout can only be cleared by a power cycle or module fault reset).

LF Chiller Main Controller & Refrigerant Module Input/Output Maps

Input/Output Maps

See **Table 2** for the LF Chiller Main Controller Inputs/Outputs and **Table 3** for the Refrigerant System Module Inputs/Outputs.

LF CHILLER MAIN CONTROLLER	
Analog Inputs	
1	Entering Water Temperature Sensor (AI1)
2	Leaving Water Temperature Sensor (AI2)
3	Compressor A1 Amps (AI3)
4	Compressor A2 Amps (AI4)
5	Compressor B1 Amps (AI5)
6	Compressor B2 Amps (AI6)
7	Outside Air Temperature Sensor (AI7)
8	Leaving Water Temperature Reset (AI8)
Binary Inputs	
1	Remote Start/Stop (BIN1)
2	Water Flow Switch 1 (BIN2)
3	Emergency Shutdown (BIN3)
4	Not Used (BIN4)
5	Phase Brownout (BIN5)
6	Not Used (BIN6)
7	Not Used (BIN7)
8	Not Used (BIN8)
Binary Outputs (24 VAC)	
1	Not Used (RLY1)
2	Not Used (RLY2)
3	Not Used (RLY3)
4	Alarm (RLY4)
5	Chiller Enabled (RLY5)
6	Not Used (RLY6)
7	Not Used (RLY7)
8	Not Used (RLY8)
Communication Terminals	
BACNET	Communication Terminal Block
RS-485 COMM	Prism User Interface Terminal Block
DUAL E-BUS	2 EBC E-BUS Ports

Table 2: LF Chiller Main Controller Inputs & Outputs

REFRIGERATION SYSTEM MODULE	
Analog Inputs	
1	Suction Pressure Sensor (SP-1)
2	Discharge Line Pressure Sensor (HP-1)
3	Liquid Line Pressure Sensor (SP-2)
4	Not Used
Binary Inputs	
1	Compressor 1 Status (BIN1)
2	Compressor 2 Status (BIN2)
3	Condenser Fault (BIN3)
4	Circuit Disable (BIN4)
Temperature Inputs	
1	Suction Line Temperature (TEMP1)
2	Discharge Line Temperature 2 (TEMP2)
3	Liquid Line Temperature 3 (TEMP3)
Binary Outputs	
1	Compressor 1 Enable (RLY1)
2	Compressor 2 Enable (RLY2)
3	Condenser Enable (RLY3)
4	Not Used (RLY4)
5	Not Used (RLY5)
Analog Outputs	
1	Condenser (AOUT1)
2	Expansion Valve (AOUT2)
Additional Inputs	
DUAL E-BUS	2 EBC E-BUS Ports
E-BUS	R+ SH T- Communication Terminal Block

Table 3: Chiller Refrigerant Module Inputs & Outputs

Input/Output Maps

See **Table 4** for the Chiller Pumping Module Inputs/Outputs.

CHILLER PUMPING MODULE	
Analog Inputs - 10K @ 77 Deg F Type 3 Thermistors	
1	Mixing Valve Water Outlet Temperature Sensor (AIN1)
2	Mixing Valve Water Feed Temperature Sensor (AIN2)
3	Heat Exchanger Secondary Inlet Temperature Sensor (AIN3)
4	Heat Exchanger Secondary Outlet Temperature Sensor (AIN4)
Binary Inputs	
1	WSE VFD Fault (BIN1)
4	Chiller Pump VFD 1 Fault (BIN4)
5	Chiller Pump VFD 2 Fault (BIN5)
Analog Outputs	
1	WSE VFD Speed (AO1)
2	Primary 3-Way Mixing Valve Actuator (AO2)
3	Secondary 3-Way Mixing Valve Actuator (AO3)
4	Chiller Pump VFD (AO4)
Binary Outputs (24 VAC)	
1	WSE Fan Enable (RLY1)
2	Glycol Pump (RLY2)
3	Primary A Pump 1 (RLY3)
4	Primary A Pump 2 (RLY4)
5	Secondary Pump 1 (RLY5)
6	Secondary Pump 2 (RLY6)
7	Primary B Pump 1 (RLY7)
8	Primary B Pump 2 (RLY8)
Communication Terminals	
E-BUS	(2) Dual E-BUS Ports

Table 4: Chiller Pumping Module Inputs & Outputs

LF Chiller Main Controller Input Wiring

LF Chiller Main Controller Input Wiring

The LF Chiller Main Controller is used to control 1-2 circuit DX chillers with an option for water circuit pumping and an option for water side economizer.

The Controller is designed with 8 analog inputs, 4 analog outputs, 8 binary inputs, and 8 relay outputs.

The Controller has an on-board BACnet® port for connection to a BACnet® MS/TP network. There are also 2 E-BUS Expansion Ports which allow the connection of communicating sensors and future E-BUS Modules via modular cable assemblies.

The Controller contains a 2 x 8 LCD character display and 4 buttons that allow for status and alarm display as well as BACnet® configuration.

See **Figure 1** below for input wiring.

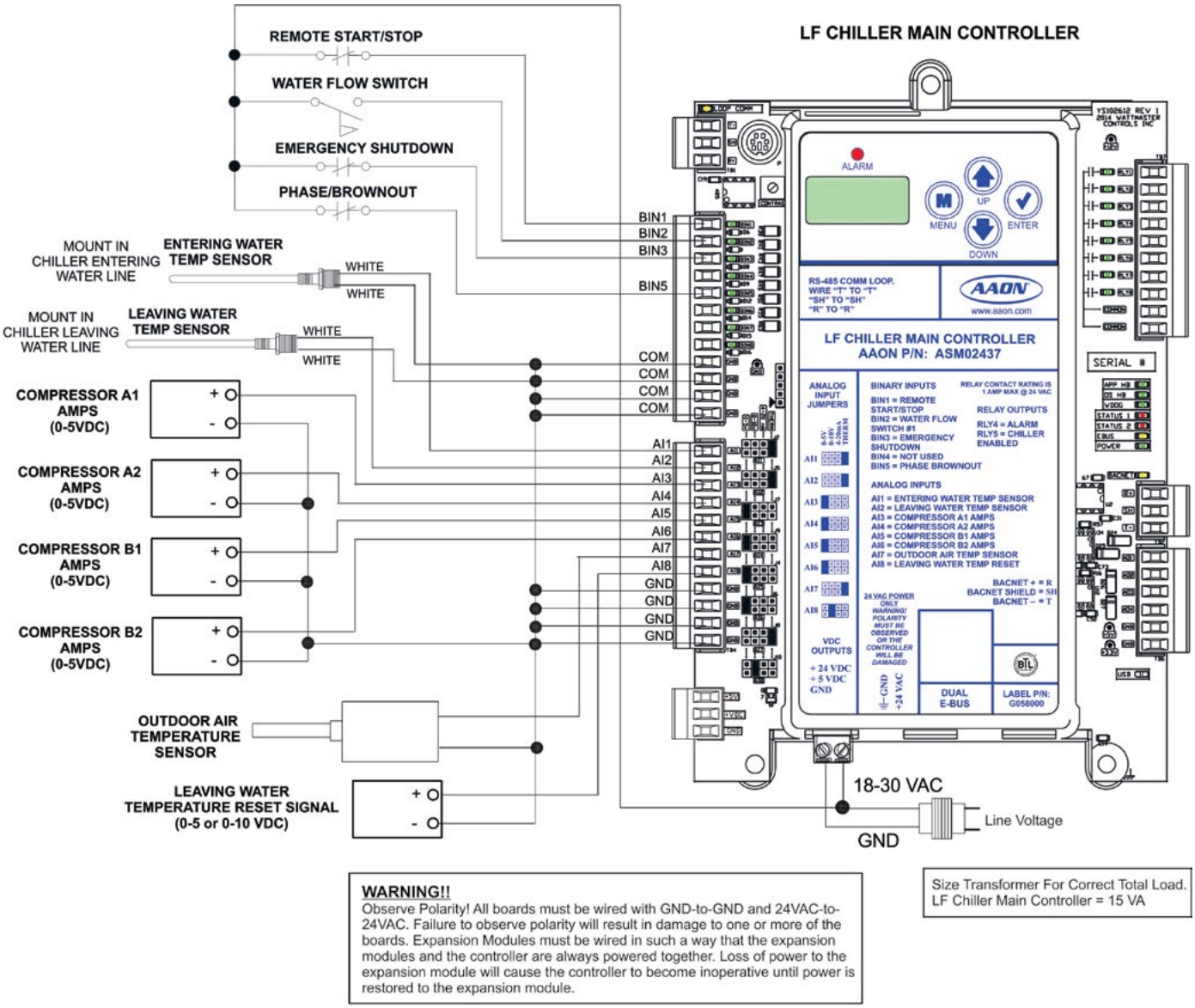


Figure 1: LF Chiller Main Controller Input Wiring

LF Chiller Main Controller Output Wiring

The LF Chiller Controller has (2) E-BUS Expansion Ports which allow for the connection of the Chiller Refrigerant Modules and the Chiller Pumping Module via EBC E-BUS Cables.

The LF Chiller Controller must be connected to an 18-30 VAC power source. Please see **Table 9, page 36** for correct VA requirements to use when sizing the transformer(s) used for powering the Controller and its associated modules.

Also, please note that when wiring the LF Chiller Controller, its contacts must be wired as wet contacts (connected to 24 VAC).

See **Figure 2** below for output wiring.

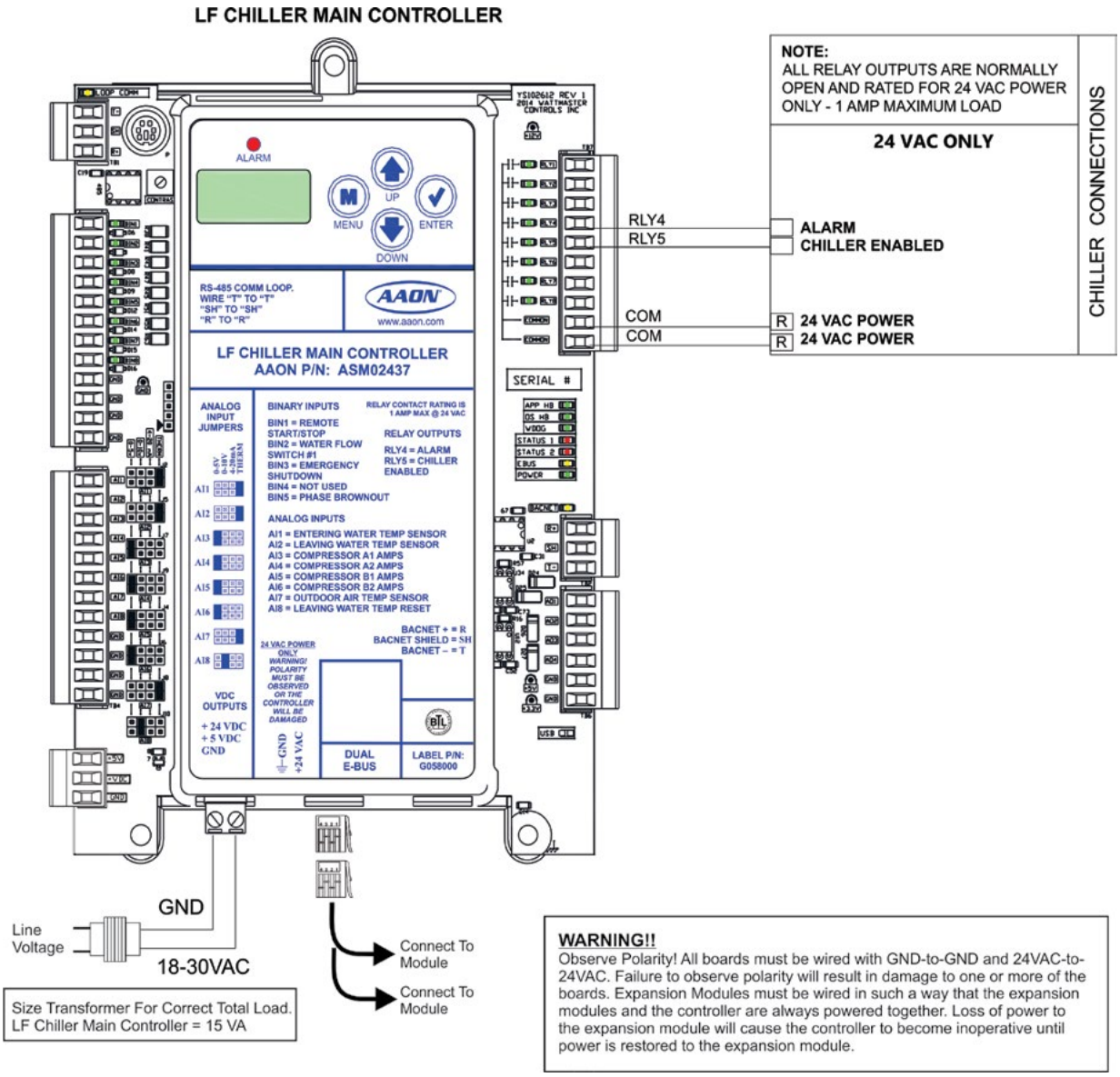


Figure 2: LF Chiller Main Controller Output Wiring

Chiller Refrigerant A Module Input Wiring

Chiller Refrigerant A Module Input Wiring

The Chiller Refrigerant A Module provides control of the compressors and condenser fans on an LF Chiller.

The Chiller Refrigerant A Module provides 3 analog inputs, 4 binary inputs, 5 relays, and 2 analog outputs.

The Module has a Dual E-BUS Expansion Port which allows the connection of communicating sensors and future 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 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** below for input wiring.

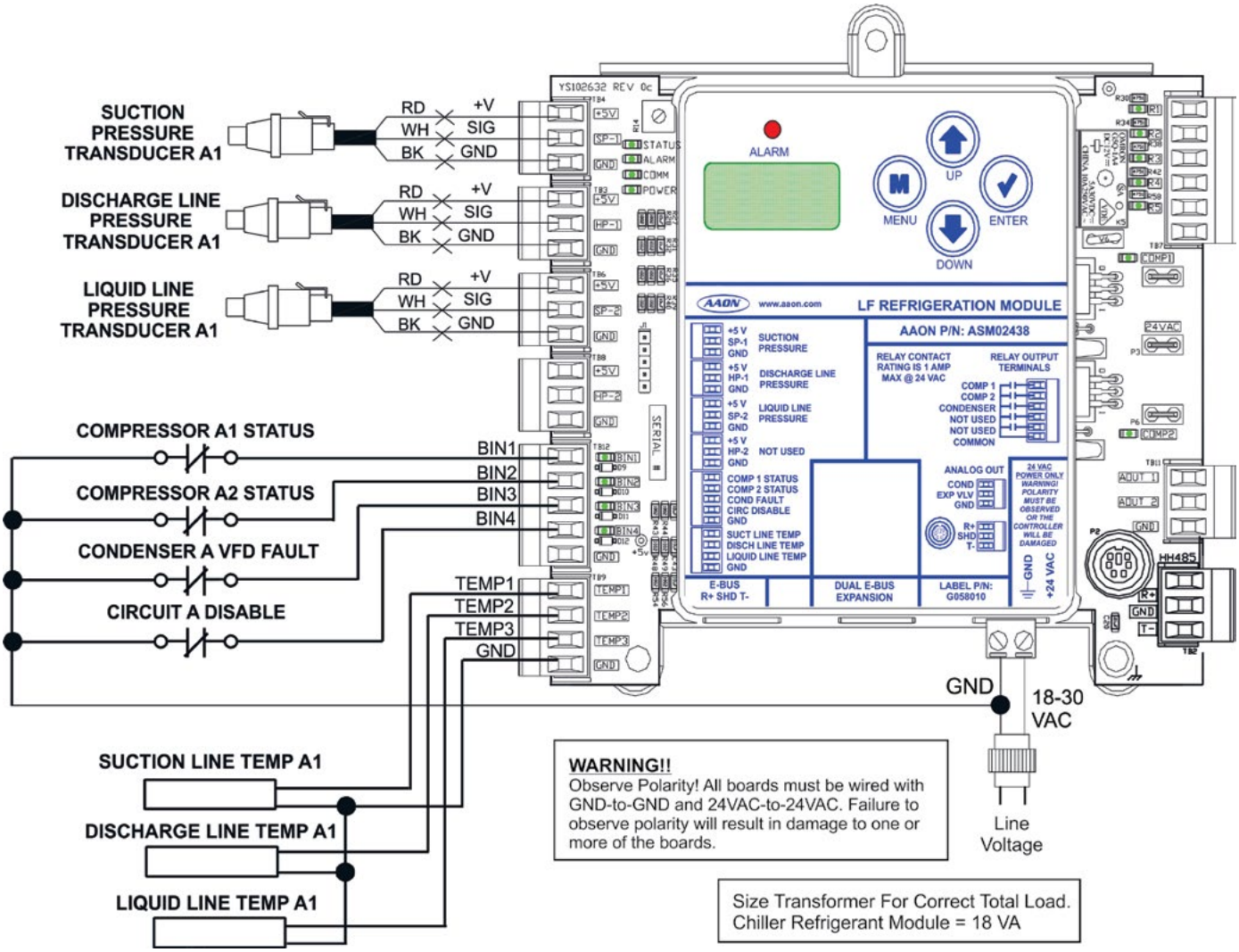


Figure 3: Chiller Refrigerant A Module Input Wiring

Chiller Refrigerant A Module Output Wiring

See **Figure 4** below for output wiring.

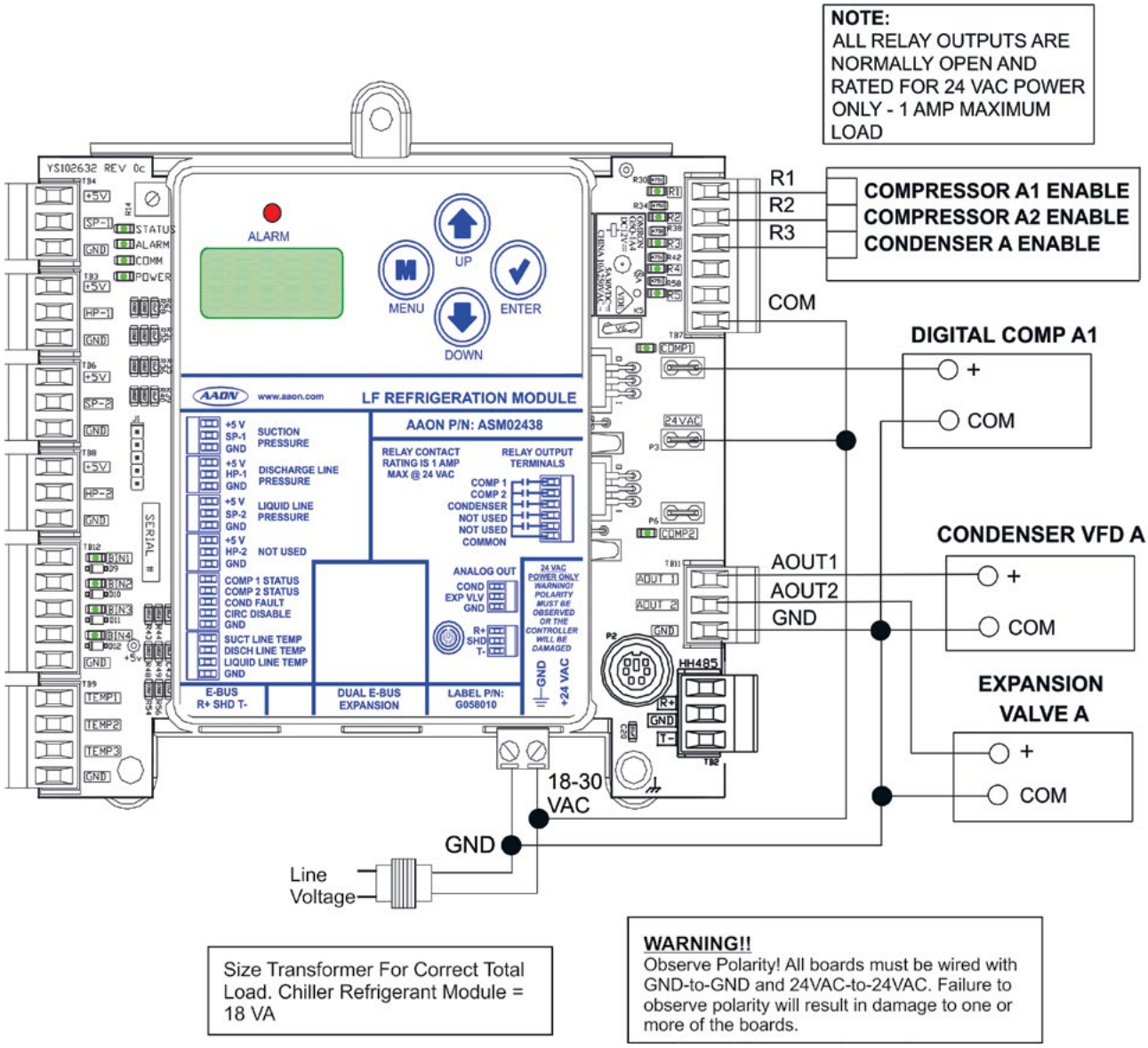


Figure 4: Chiller Refrigerant A Module Output Wiring

Chiller Refrigerant B Module Input Wiring

Chiller Refrigerant B Module Input Wiring

The Chiller Refrigerant B Module provides control of the compressors and condenser fans on an LF Chiller.

The Chiller Refrigerant B Module provides 3 analog inputs, 4 binary inputs, 5 relays, and 2 analog outputs.

The Module has a Dual E-BUS Expansion Port which allows the connection of communicating sensors and future 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 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 5** below for input wiring.

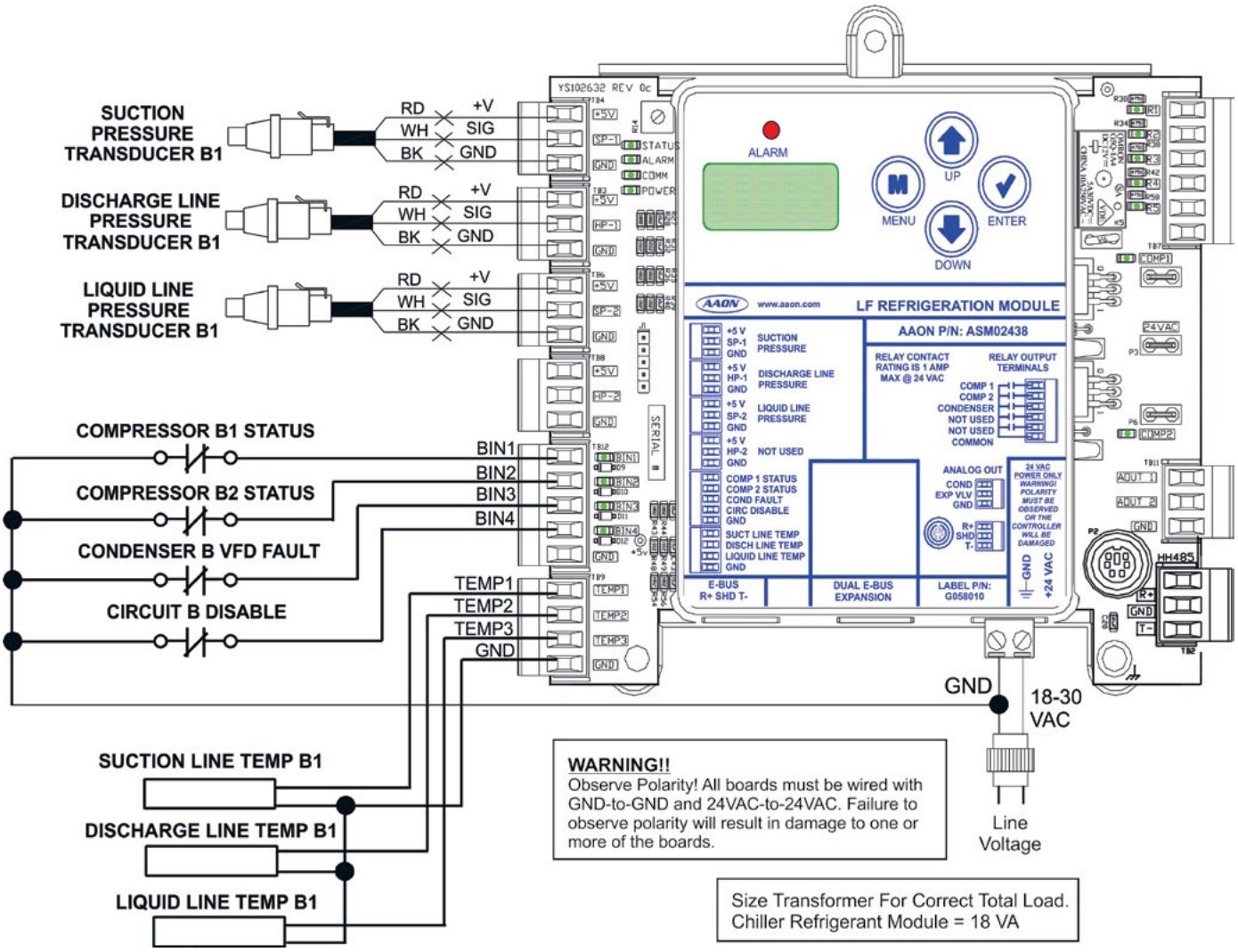


Figure 5: Chiller Refrigerant B Module Input Wiring

Chiller Refrigerant B Module Output Wiring

See **Figure 6** below for output wiring.

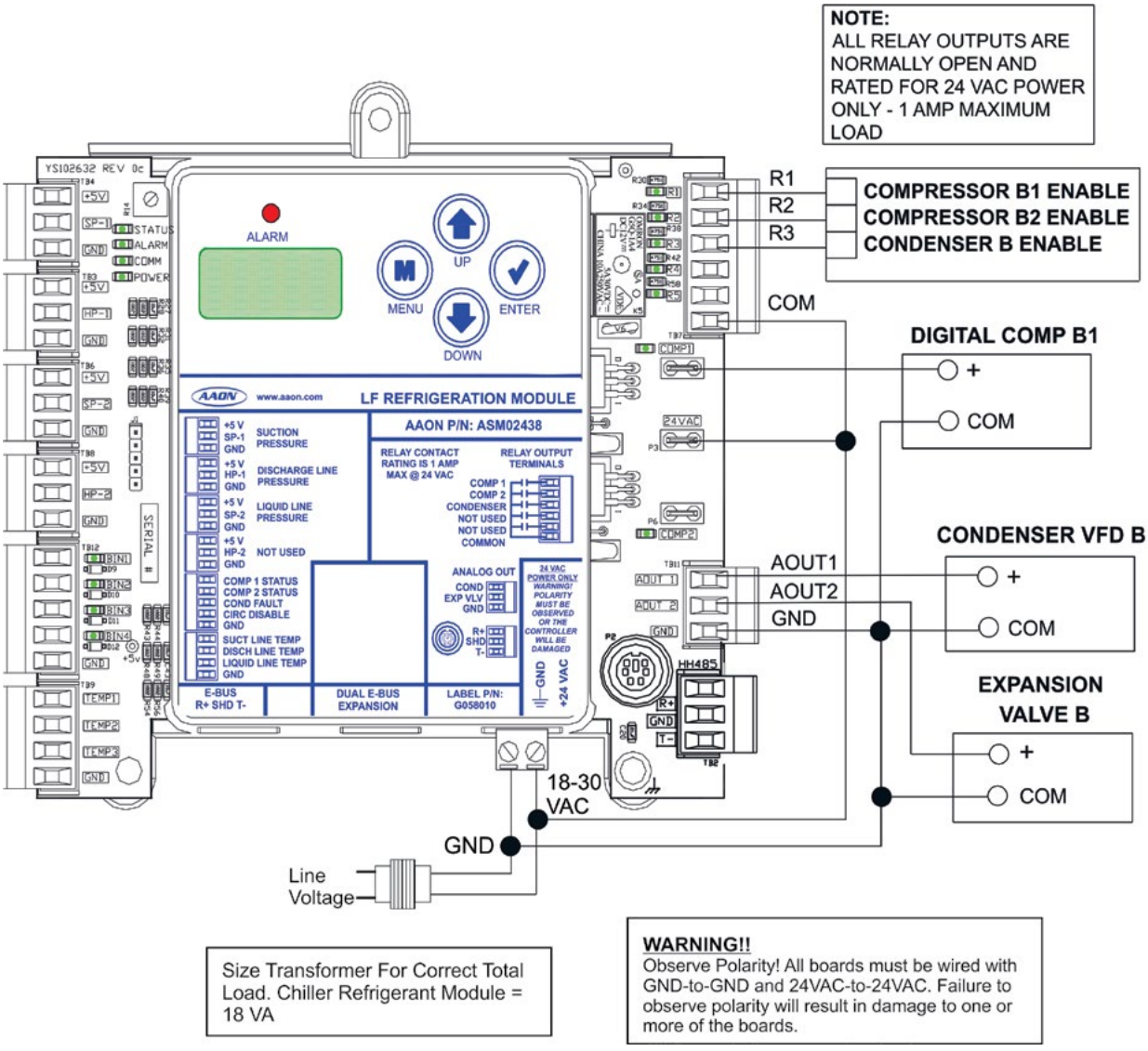


Figure 6: Chiller Refrigerant B Module Output Wiring

Chiller Pumping Module Input Wiring

Chiller Pumping Module Input Wiring

The Chiller Pumping Module offers two distinct optional services to a chiller system—water circuit pumping and water side economizer. Each of these two services can be independently enabled or disabled.

The Chiller Pumping Module is connected to the LF Chiller Main Controller. Only (1) module can be connected.

The Chiller Pumping Module provides a 2 x 8 LCD character display and 4 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** below for input wiring.

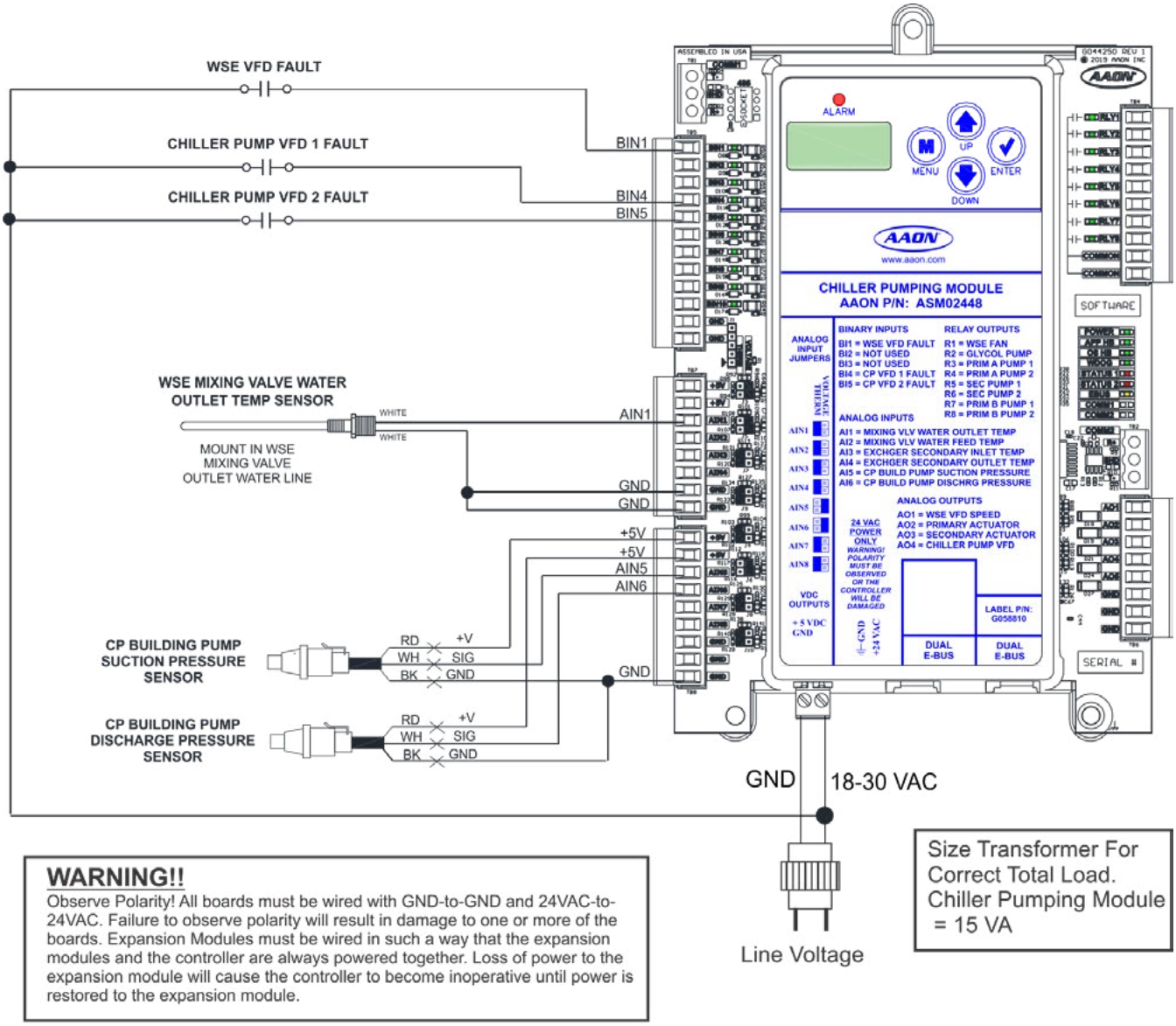


Figure 7: Chiller Pumping Module Input Wiring

Chiller Pumping Module Output Wiring

See **Figure 8** below for output wiring.

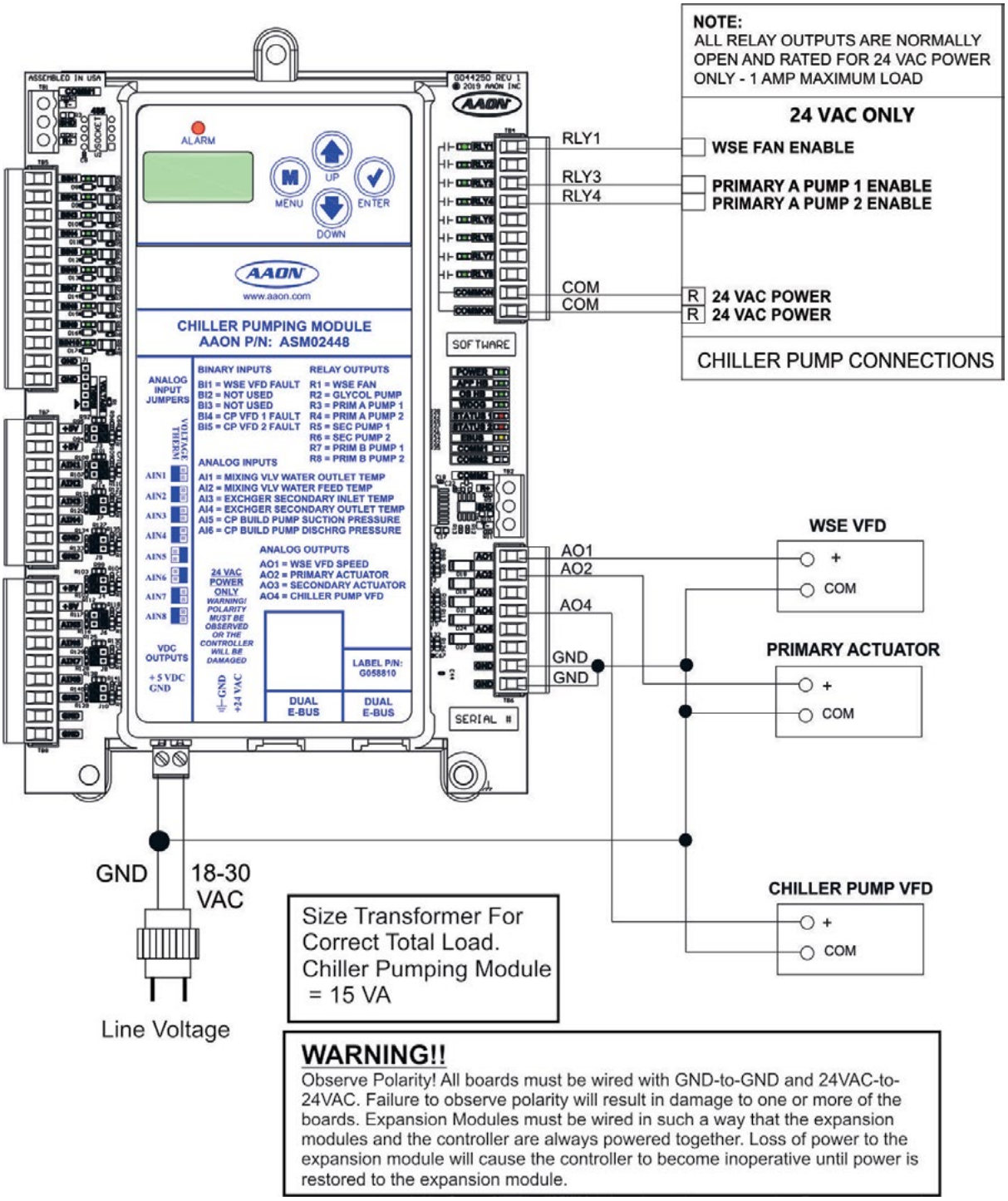


Figure 8: Chiller Pumping Module Output Wiring

LF Chiller Main Controller LED Diagnostics

LF Chiller Main Controller LEDs

The LF Chiller Main Controller is equipped with LEDs that can be used to verify operation and perform troubleshooting. See **Figure 9, page 27** for the LED locations. The LEDs associated with these inputs and outputs allow you to see what is active without using a voltmeter. The LEDs and their uses are as follows:

Operation LEDs - Factory Troubleshooting

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 1 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

RLY4, RLY5 - These green LEDs will light up when the relays are enabled and will stay lit as long as they are active.

Binary Input LEDs

BIN1 - This green LED will light up when the Remote Start/Stop contact is closed.

BIN2 - This green LED will light up when the Water Flow Switch 1 is closed.

BIN3 - This green LED will light up when the Emergency Shutdown contact is closed.

BIN5 - This green LED will light up when the Phase Brownout contact is closed.

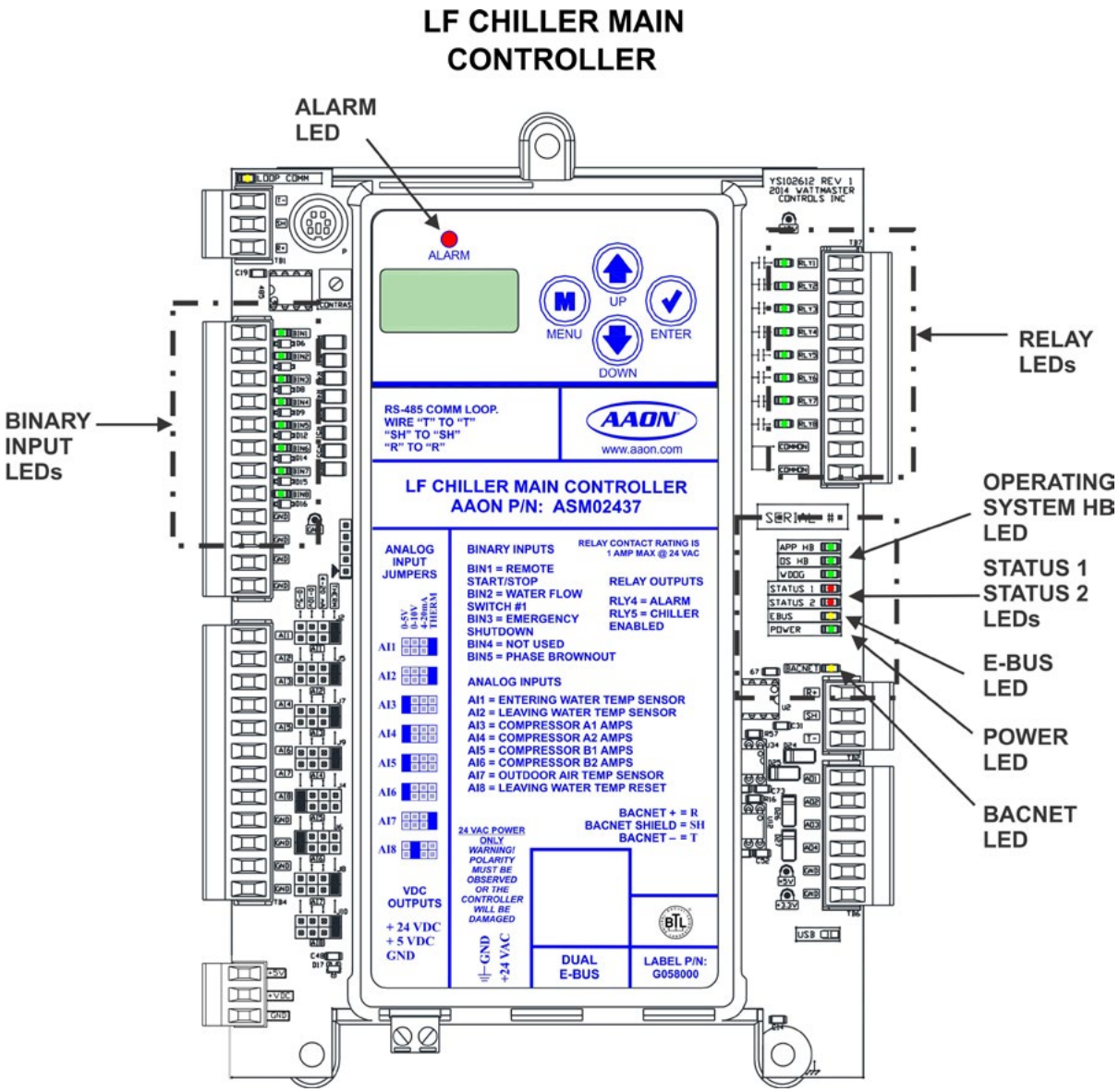


Figure 9: LF Chiller Main Controller LED Locations

Refrigerant A & B Module LED Diagnostics

Refrigerant A & B Module LEDs

The Chiller Refrigerant A & B Modules are equipped with LEDs that can be used to verify operation and perform troubleshooting. See **Figure 10, page 29** for the LED locations. The LEDs associated with these inputs and outputs allow you to see 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 1 blink per second.

ALARM (on board) - If the module does not receive communications for more than 1 minute, this LED will light up, the relays will turn off, and the Analog Outputs will go to 0 VDC.

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 VCCX2 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.

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.

Digital Compressor LEDs

COMP1 - This green LED will light up when Digital Compressor 1 is unloading.

COMP2 - This green LED will light up when Digital Compressor 2 is unloading.

Refrigerant A Module Binary Input LEDs

BIN1 - This green LED will light up when the Compressor A1 Status Switch is closed.

BIN2 - This green LED will light up when the Compressor A2 Status Switch is closed.

BIN3 - This green LED will light up when the Condenser A VFD Fault contact is closed.

BIN4 - This green LED will light up when the Circuit A Disable Switch is closed.

Refrigerant B Module Binary Input LEDs

BIN1 - This green LED will light up when the Compressor B1 Status Switch is closed.

BIN2 - This green LED will light up when the Compressor B2 Status Switch is closed.

BIN3 - This green LED will light up when the Condenser B VFD Fault contact is closed.

BIN4 - This green LED will light up when the Circuit B Disable Switch is closed.

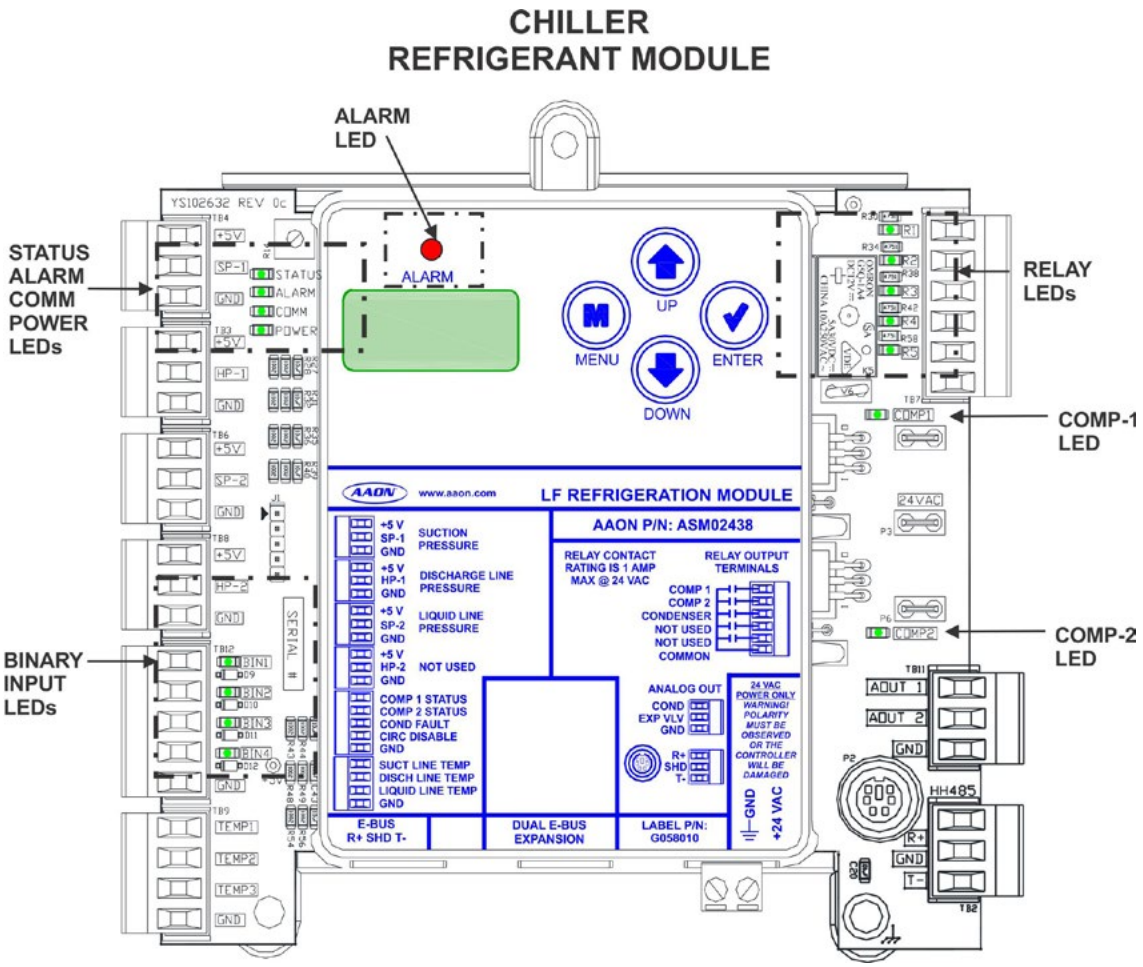


Figure 10: Refrigerant Module A & B LED Locations

Chiller Pumping Module LED Diagnostics

Chiller Pumping Module LEDs

The Chiller Pumping Module is equipped with LEDs that can be used to verify operation and perform troubleshooting. See **Figure 11, page 31** for the LED locations. The LEDs associated with these inputs and outputs allow you to see what is active without using a voltmeter. The LEDs and their uses are as follows:

Operation LEDs - Factory Troubleshooting

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 5**.

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

Table 5: 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 - When Comm1 is communicating, this yellow LED will turn on to indicate an error condition, either forced on or forced off.

COMM2 - When Comm2 is communicating, this yellow LED will turn on to signal economizer max out.

Relay LEDs

RLY1 - This green LED will light up when the relay is enabled and will stay lit as long as it is active.

Binary Input LEDs

BIN1 - This green LED will light up when the WSE VFD Fault Switch 1 is closed.

BIN4 - This green LED will light up when the Chiller Pump VFD Fault Switch A is closed.

BIN5 - This green LED will light up when the Chiller Pump VFD Fault Switch B is closed.

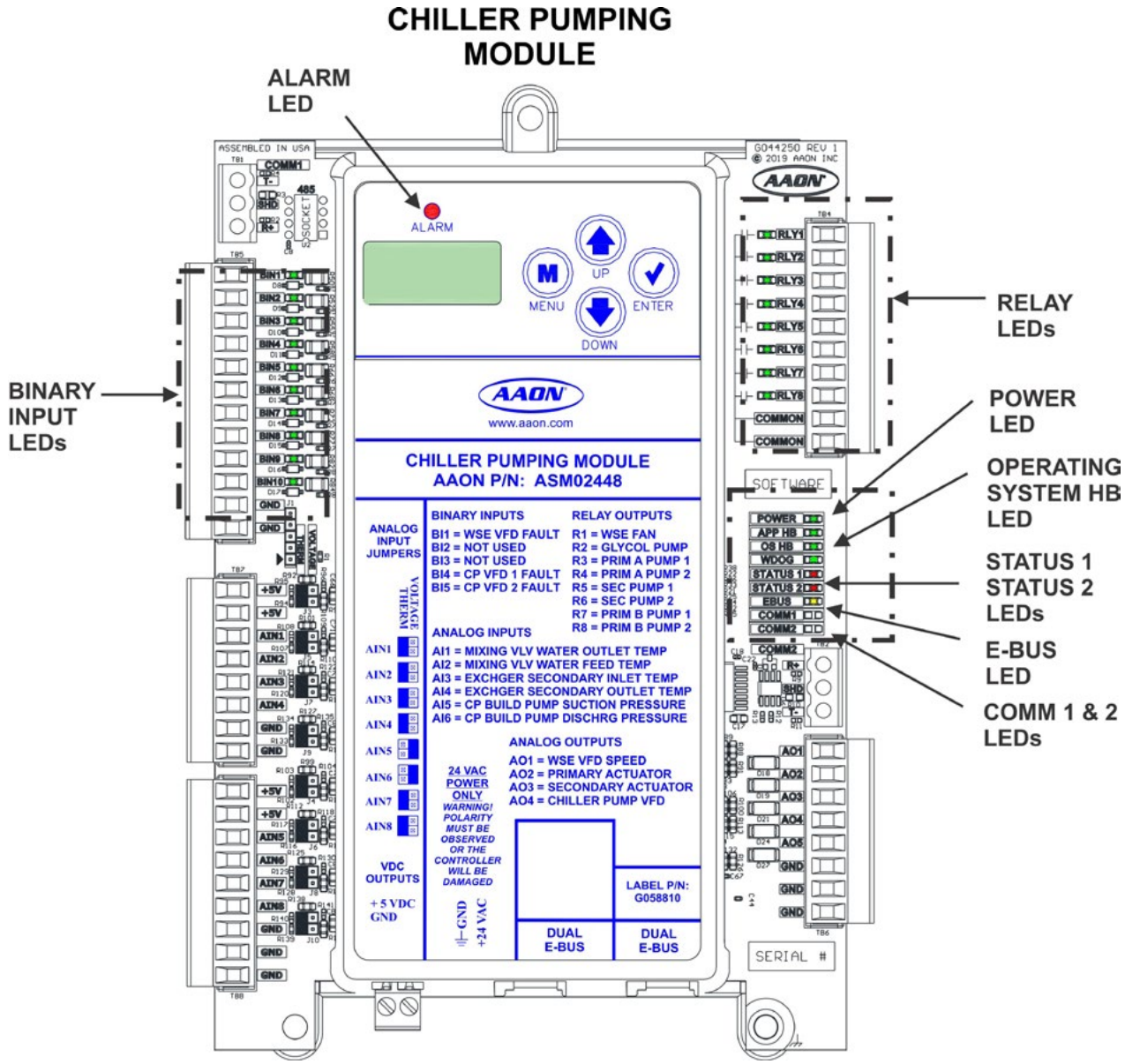


Figure 11: Chiller Pumping Module LED Locations

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.

Temperature – Resistance – Voltage for Type III 10 K Ohm Thermistor Sensors			
Temp (ºF)	Temp (ºC)	Resistance (Ohms)	Voltage @ Input (VDC)
-10	-23.33	93333	4.51
-5	-20.55	80531	4.45
0	-17.77	69822	4.37
5	-15	60552	4.29
10	-12.22	52500	4.2
15	-9.44	45902	4.1
20	-6.66	40147	4.002
25	-3.88	35165	3.891
30	-1.11	30805	3.773
35	1.66	27140	3.651
40	4.44	23874	3.522
45	7.22	21094	3.39
50	10	18655	3.252
52	11.11	17799	3.199
54	12.22	16956	3.143
56	13.33	16164	3.087
58	14.44	15385	3.029
60	15.55	14681	2.972
62	16.66	14014	2.916
64	17.77	13382	2.861
66	18.88	12758	2.802
68	20	12191	2.746
69	20.55	11906	2.717
70	21.11	11652	2.691
71	21.66	11379	2.661
72	22.22	11136	2.635
73	22.77	10878	2.605

Table 6: Temperature/Resistance for Type III 10K Ohm Thermistor Sensors

Temperature – Resistance – Voltage for Type III 10 K Ohm Thermistor Sensors			
Temp (ºF)	Temp (ºC)	Resistance (Ohms)	Voltage @ Input (VDC)
74	23.33	10625	2.576
75	23.88	10398	2.549
76	24.44	10158	2.52
77	25	10000	2.5
78	25.55	9711	2.464
80	26.66	9302	2.41
82	27.77	8893	2.354
84	28.88	8514	2.3
86	30	8153	2.246
88	31.11	7805	2.192
90	32.22	7472	2.139
95	35	6716	2.009
100	37.77	6047	1.884
105	40.55	5453	1.765
110	43.33	4923	1.65
115	46.11	4449	1.54
120	48.88	4030	1.436
125	51.66	3656	1.339
130	54.44	3317	1.246
135	57.22	3015	1.159
140	60	2743	1.077
145	62.77	2502	1.001
150	65.55	2288	0.931

Table 6, cont.: Temperature/Resistance for Type III 10K Ohm Thermistor 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.

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

0 - 250 PSI Suction Pressure Transducer Testing for R410A 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 LF Chiller Main 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 you are using. If the temperature/voltage or pressure/voltage readings do not align closely with the chart, your Suction Pressure Transducer is probably defective and will need to be replaced.

See the 0 - 250 PSI Suction Pressure Transducer, Pressure, Temperature, and Voltage Chart for R410A Refrigerant testing. The charts show a temperature range from 20°F to 80°F. For troubleshooting purposes, the DC Voltage readings are also listed with their corresponding temperatures and pressures.

0 - 250 PSI Suction Pressure Transducer Coil Pressure – Temperature – Voltage Chart for R410A Refrigerant					
Temperature °F	Pressure PSI	Signal DC Volts	Temperature °F	Pressure PSI	Signal DC Volts
21.19	80.94	1.8	59.03	168.10	3.2
24.49	87.16	1.9	61.17	174.32	3.3
27.80	93.39	2.0	63.19	180.55	3.4
30.99	99.62	2.1	65.21	186.78	3.5
33.89	105.84	2.2	67.23	193.00	3.6
36.80	112.07	2.3	69.24	199.23	3.7
39.71	118.29	2.4	71.15	205.46	3.8
42.30	124.52	2.5	72.95	211.68	3.9
44.85	130.75	2.6	74.76	217.91	4.0
47.39	136.97	2.7	76.57	224.14	4.1
49.94	143.2	2.8	78.37	230.36	4.2
52.23	149.42	2.9	80.18	236.59	4.3
54.50	155.65	3.0			
56.76	161.88	3.1			

Table 7: Coil Pressure/Voltage/Temp for 0-250 PSI Suction Pressure Transducers - R410A Refrigerant

Discharge Thermistor Temperature Sensor Testing

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 table. Please follow the notes and instructions that appear after the chart when checking sensors.

Discharge Thermistor Temperature/ Resistance			
Temp (ºF)	Temp (ºC)	Resistance (K Ohms)	Voltage @ Input (VDC)
-40	-40	2889.60	4.98
-31	-35	2087.22	4.97
-22	-30	1522.20	4.96
-13	-25	1121.44	4.95
-4	-20	834.72	4.94
5	-15	627.28	4.92
14	-10	475.74	4.89
23	-5	363.99	4.86
32	0	280.82	4.82
41	5	218.41	4.77
50	10	171.17	4.72
59	15	135.14	4.65
68	20	107.44	4.57
77	25	86.00	4.47
86	30	69.28	4.36
95	35	56.16	4.24
104	40	45.81	4.10
113	45	37.58	3.94
122	50	30.99	3.77
131	55	25.68	3.59
140	60	21.40	3.40
149	65	17.91	3.20
158	70	15.07	3.00
167	75	12.73	2.80
176	80	10.79	2.59
185	85	9.20	2.39

Table 8: Discharge Thermistor Temperature/ Resistance

Discharge Thermistor Temperature/ Resistance			
Temp (ºF)	Temp (ºC)	Resistance (K Ohms)	Voltage @ Input (VDC)
194	90	7.87	2.19
203	95	6.77	2.01
212	100	5.85	1.84
221	105	5.09	1.68
230	110	4.45	1.53
239	115	3.87	1.39
248	120	3.35	1.25
257	125	2.92	1.12
266	130	2.58	1.02
275	135	2.28	0.92
284	140	2.02	0.83
293	145	1.80	0.76
302	150	1.59	0.68
311	155	1.39	0.61
320	160	1.25	0.55
329	165	1.12	0.50
338	170	1.01	0.45
347	175	0.92	0.42
356	180	0.83	0.38

Table 8, cont.: Discharge Thermistor Temperature/ Resistance

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.

If the voltage is above 4.98 VDC, then the sensor or wiring is "open." If the voltage is less than 0.38 VDC, then the sensor or wiring is shorted.

WARNING: When using a single transformer to power more than one controller or expansion module, the correct polarity must always be maintained between the boards. Failure to observe correct polarity will result in damage to the LF Chiller Controller and its associated modules.

Please carefully read and apply the following information when wiring the LF Chiller Main 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 2-conductor wire and some require 3-or 4-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 LF Chiller Main Controllers together or to connect to other communication devices, all wiring must be plenum-rated, minimum 18-gauge, 2-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 LF Main Chiller Controller and its associated modules, be sure to recheck all wiring connections and terminations thoroughly.

Important Wiring Considerations

General

Correct wiring of the LF Chiller Main Controller and its modules is the most important factor in the overall success of the controller installation process. The LF Chiller Main Controller and Modules are factory installed and wired at the AAON® factory. Some of the following information may not apply to your installation if it was pre-wired at the factory. However, if troubleshooting of the controller is required, it is a good idea to be familiar with the system wiring.

Wiring

The LF Chiller Main 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 **Tables 9, 10 & 11**.

Control Device	Voltage	VA Load	Operating Temperature	Humidity (Non-Condensing)
Main LF Chiller Controller	18-30VAC (25%/-15%), Class 2	15	10°F to 150°F	0-95% RH
	Inputs		Resistive Inputs require 10KΩ Type 3 Thermistor	
			24VAC Inputs provide 4.7kΩ Load	
	Outputs		Relay Outputs: 1 Amp maximum per output	

Table 9: LF Chiller Main Controller Electrical and Environmental Requirements

Control Device	Voltage	VA Load	Operating Temperature	Humidity (Non-Condensing)
Chiller Pumping Module	18-30VAC (25%/-15%), Class 2	15	10°F to 150°F	0-95% RH
	Inputs		Resistive Inputs require 10KΩ Type 3 Thermistor	
			24VAC Inputs provide 4.7kΩ Load	
	Outputs		Relay Outputs: 1 Amp maximum per output	

Table 10: Chiller Pumping Module Electrical and Environmental Requirements

Control Device	Voltage	VA Load	Operating Temperature	Humidity (Non-Condensing)
Chiller Refrigerant Module	18-30VAC (25%/-15%), Class 2	18	10°F to 150°F	0-95% RH
	Inputs		Resistive Inputs require 10KΩ Type 3 Thermistor	
			24VAC Inputs provide 4.7kΩ Load	
	Outputs		Relay Outputs: 1 Amp maximum per output	

Table 11: Chiller Refrigerant Module Environmental Requirements

LCD Display Screen & Navigation Keys

The LCD display screens and buttons allow you to view status and alarms, enable force modes, and make BACnet® configuration changes. See **Figure 12, below** and refer to **Table 12** for Navigation Key functions. The keys also have editing functions. Refer to **Table 13** for Editing functions.

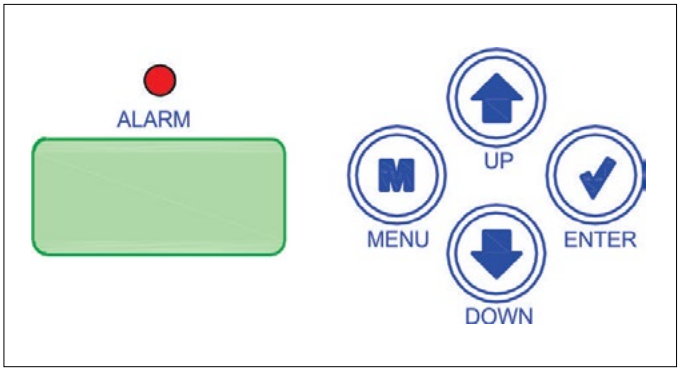


Figure 12: LCD Display and Navigation/Editing Keys

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 12: Navigation Key Functions

EDITING KEY	FUNCTION
UP or DOWN	Use the UP or DOWN key to enter editing mode on a user-adjustable screen. Edit Mode is indicated by the underscore appearing on the screen. **NOTE:** Entering Edit Mode will also adjust the value up one (UP key) or down one (DOWN key), so you may have to readjust the value.
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 your edits no matter the location of the editing cursor within the digits. 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 you were editing will return to its original value and the under-score will disappear. A second press of the MENU key will return you to the Main Menu.

Table 13: Editing Key Functions

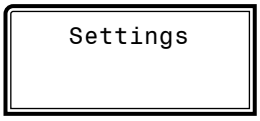
APPENDIX A - LF CHILLER MAIN CONTROLLER LCD SCREENS

Main Screen Map & Settings Screens

Main Screens Map

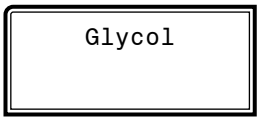
Refer to the following map when navigating through the *LF Chiller Main Controller Screens*. The first screen is an initialization screen. To scroll through the rest of the screens, press the **<MENU>** button.

Press (M) to go to the *Settings Screen*.



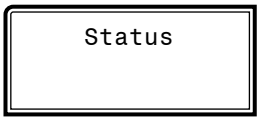
Press (✓) to scroll through the *Settings Screens.*

Press (M) to go to the *Glycol Screen*.



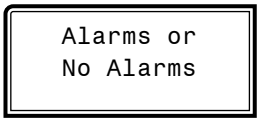
Press (✓) to scroll through the *Glycol Screens.*

Press (M) to go to the *Status Screen*.



Press (✓) to scroll through the *Status Screens*.

Press (M) to go to the *Alarms Screen*.



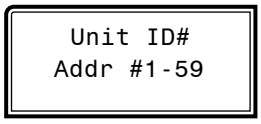
Press (✓) to scroll through the Alarms.

Press (M) to return 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.

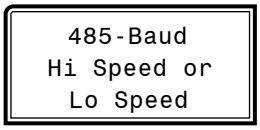
(✓)



UNIT ADDRESS

Unit address. Valid range is 1-59. Default is 1.

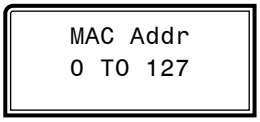
(✓)



BAUD RATE SPEED

485 baud rate speed. Valid range Hi Speed or Lo Speed. Default is Hi Speed.

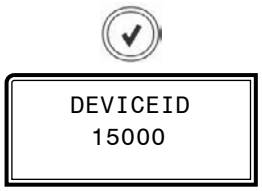
(✓)



BACnet® - CURRENT MAC ADDRESS

Valid range is 0 to 127. Default is 1.

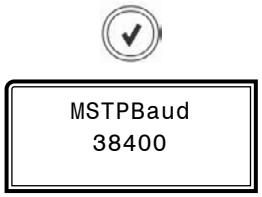
The **<ENTER>** key moves the cursor between the digit fields starting with the ones field. Once the cursor is under a field, use the **<UP>** & **<DOWN>** arrow keys to select a number between 0 and 9.



BACnet® - CURRENT DEVICE ID

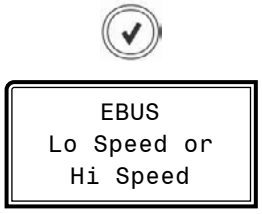
A Device ID of up to 7 digits can be entered.

The **<ENTER>** key moves the cursor between the digit fields starting with the ones field. Once the cursor is under a field, use the **<UP>** & **<DOWN>** arrow keys to select a number between 0 and 9.



BACnet® - CURRENT BAUD RATE

9600, 19200, 38400, 57600, 76800. Default is 38400.

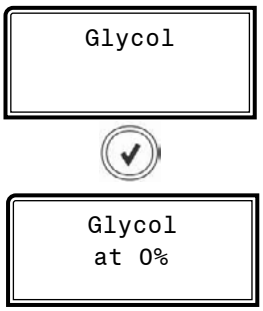


E-BUS COMMUNICATIONS

Hi Speed or Lo Speed. Default is Hi Speed.

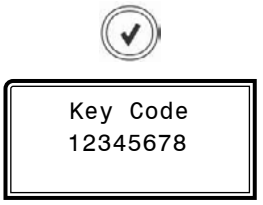
Glycol Screens

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



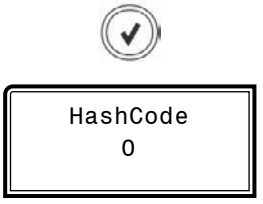
GLYCOL PERCENTAGE

Valid percentages are 0, 15, 20, 25, 30. Default is 0%.



KEY CODE

The **<ENTER>** key moves the cursor between the digit fields starting with the ones field. Once the cursor is under a field, use the **<UP>** & **<DOWN>** arrow keys to select a number between 0 and 9.



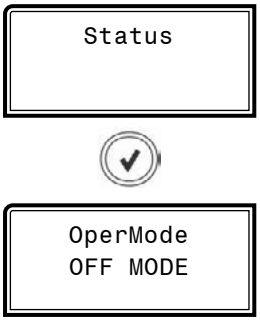
HASH CODE

The **<ENTER>** key moves the cursor between the digit fields starting with the ones field. Once the cursor is under a field, use the **<UP>** & **<DOWN>** arrow keys to select a number between 0 and 9.

Status Screens

Status Screens

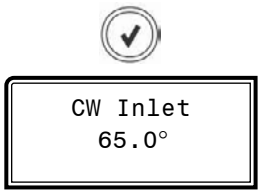
Refer to the following map when navigating through the Status Screens. From the *Status Screen*, press **<ENTER>** to scroll through the screens.



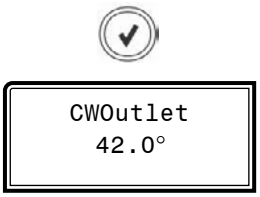
OPERATION MODE

This screen displays the current mode of operation. Options are:

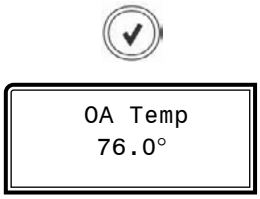
- OFF MODE
- RUN MODE
- HOL OFF
- HOL RUN
- START-UP
- SHUTDOWN
- LOCKOUT



CHILLER WATER INLET TEMPERATURE



CHILLER WATER OUTLET TEMPERATURE



OUTDOOR AIR TEMPERATURE

Alarm Screens

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

NO ALARMS

This will be shown if there are no current alarms.

ACTIVE ALARMS!

This will display if there are active alarms.

Inlet SENSOR: The chiller water inlet temperature sensor has failed.

Outlet SENSOR: The chiller water outlet temperature sensor has failed.

OAT SENSOR: The outdoor air temperature sensor has failed.

PHASE LOSS: A phase loss has occurred.

EMG SHUTDOWN: An emergency shutdown has occurred.

SEC OUT NO SENSE: The secondary heat exchanger outlet temperature sensor has failed.

H2OProof ALARM: Water flow switch 1 or 2 has been disabled.

WaterOut TOO HIGH: The chiller water outlet temperature has risen above the chiller water temperature setpoint.

WaterOut CUTOFF: The chiller water outlet temperature has risen above the chiller water temperature cutoff setpoint.

REFRIG 1 MISSING: Refrigeration Module 1 is not communicating.

REFRIG 2 MISSING: Refrigeration Module 2 is not communicating.

CPM Mod MISSING: The Chiller Pumping Module is not communicating.

REFRIG 1 ALARM: Refrigeration Module 1 has an alarm.

REFRIG 2 ALARM: Refrigeration Module 2 has an alarm.

CPM Mod ALARM: Chiller Pumping Module has an alarm.

UNKNOWN ALARM: There is an unknown alarm.

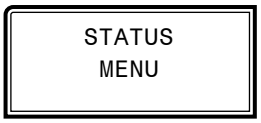
Main Screens Map

Main Screens Map

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

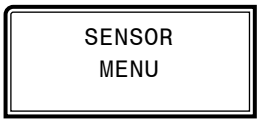
Press ✓ to scroll through the CHILLER REFRIG Screens.

Press M to go to STATUS MENU Screen.



Press ✓ to scroll through STATUS MENU Screens.

Press M to go to SENSOR MENU Screen.



Press ✓ to scroll through SENSOR MENU Screens.

Press M to return to the SETPOINT STATUS Screen.

Press ✓ to scroll through SETPOINT STATUS Screens.

Press M to go to ALARM WARNINGS Screen.

Press ✓ to scroll through ALARM WARNINGS Screens.

Press M to go to ALARM FAULTS Screen.

Press ✓ to scroll through ALARM FAULTS Screens.

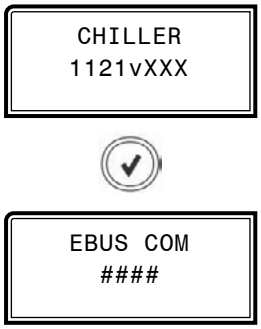
Press M to return to the ALARM LOCKOUTS Screen.

Press ✓ to scroll through ALARM LOCKOUTS Screens.

Module & Status Menu Screens

Module Screens

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



E-BUS COMMUNICATION DIAGNOSTICS

Number of COMM packets received.

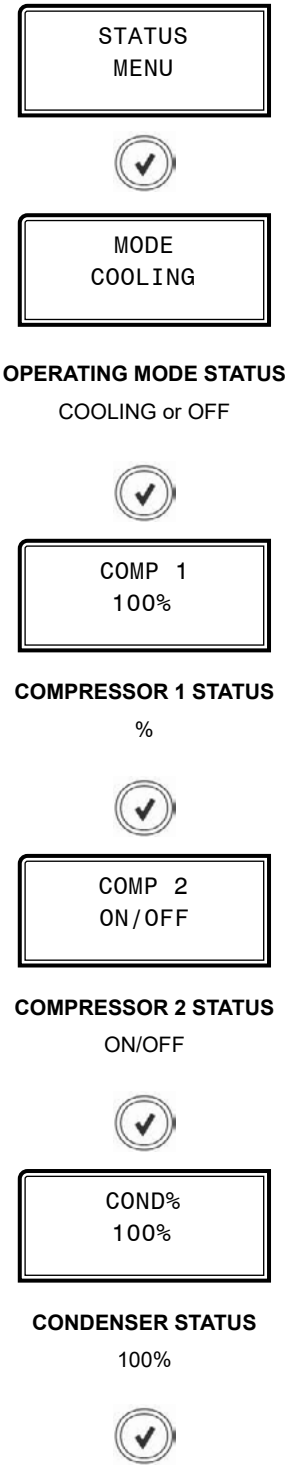
CURRENT BOARD ADDRESS

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

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

%

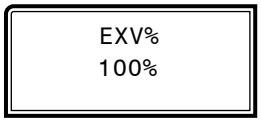
COMPRESSOR 2 STATUS

ON/OFF

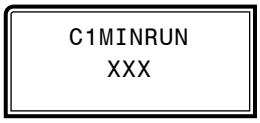
CONDENSER STATUS

100%

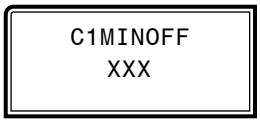
Status Menu & Sensor Menu Screens



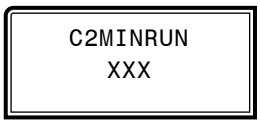
EXPANSION VALVE STATUS



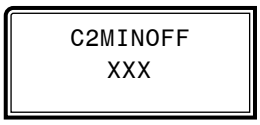
COMPRESSOR 1 MINIMUM RUN TIME IN SECONDS



COMPRESSOR 1 MINIMUM OFF TIME IN SECONDS



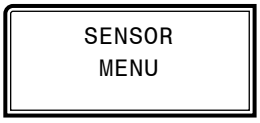
COMPRESSOR 2 MINIMUM RUN TIME IN SECONDS

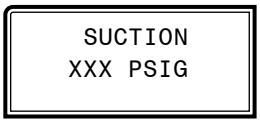


COMPRESSOR 2 MINIMUM OFF TIME IN SECONDS

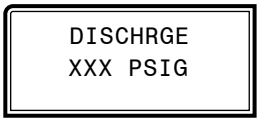
Sensor Menu Screens

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

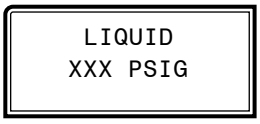




SUCTION PRESSURE READING FROM INPUT



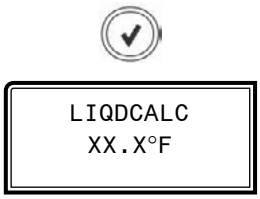
DISCHARGE PRESSURE READING FROM INPUT



LIQUID LINE PRESSURE READING FROM INPUT

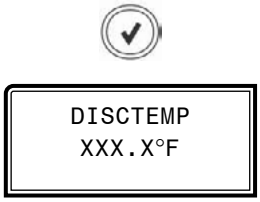
SATURATION TEMPERATURE CALCULATION

DISCHARGE TEMPERATURE SENSOR CALCULATION



LIQUID LINE TEMPERATURE SENSOR CALCULATION

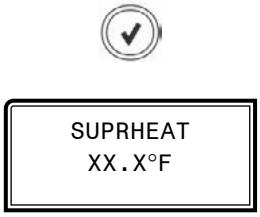
EVAPORATION TEMPERATURE READING FROM INPUT



DISCHARGE TEMPERATURE READING FROM INPUT

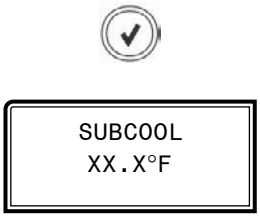
LIQUID LINE TEMPERATURE READING FROM INPUT

LEAVING WATER TEMPERATURE



SUPERHEAT TEMPERATURE

DISCHARGE SUPERHEAT TEMPERATURE

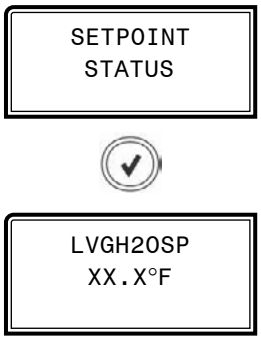


SUBCOOL TEMPERATURE

Setpoint Status & Alarm Menu Screens

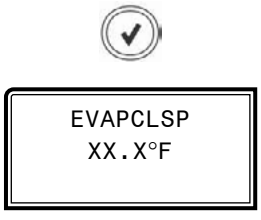
Setpoint Status Screens

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



LEAVING WATER TEMPERATURE SETPOINT

SUPERHEAT SETPOINT



SATURATION TEMPERATURE SETPOINT

Alarm 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.

NO WARNINGS

This will be shown if there are no current warnings.

WARNINGS!

This will display if there are active warnings.

LOW SUCT PRESSURE: Low Suction Pressure

LOW SUCT NO START: Low Suction Pressure Startup

HIGH DISCHPSI: High Discharge Pressure Level 1

HIGH DISCHPSI: High Discharge Pressure Level 2

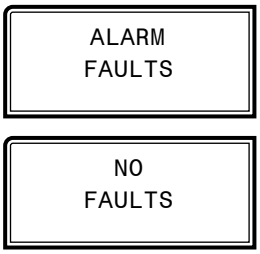
DISCHPSI NODETECT: Discharge Pressure not detected

HIGH SUPRHEAT: High Superheat

DLT NODETECT: Discharge Line Temperature Sensor not detected

CONDENSR OVERAMPS: Condenser VFD Overcurrent

Alarm Menu Screens

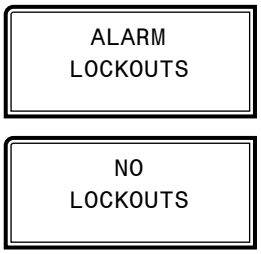


NO FAULTS

This will be shown if there are no current faults.

FAULTS!

This will display if there are active faults.



NO LOCKOUTS

This will be shown if there are no current lockouts.

LOCKOUTS!

This will display if there are active lockouts.

LOW SUCT PRESSURE: Low Suction Pressure

UNSAFE SUCT PSI: Unsafe Suction Pressure

HIGH PSI TRIP: High Discharge Pressure Trip

HIGH PSI TRIP C2: Compressor 2 Fail from High Discharge Pressure

C1 NO START: Compressor 1 not running

C2 NO START: Compressor 2 not running

LOW SUPRHEAT: Low Superheat

HIGH DISCTEMP: High Discharge Line Temperature

C1 FALSE ACTIVE: Compressor 1 False Active

C2 FALSE ACTIVE: Compressor 2 False Active

COMM TIMEOUT: Communication Loss

HIGH SUPRHEAT: High Superheat

SLT NODETECT: Cannot detect Suction Line Temperature Sensor

SUCT PSI NODETECT: Cannot detect Suction Pressure Temperature Sensor

HIGH SAT TEMP: High Saturation Temperature

C1 OVER CURRENT: Compressor 1 Overcurrent

C2 OVER CURRENT: Compressor 2 Overcurrent

C1 LOW CURRENT: Compressor 1 Undercurrent

C2 LOW CURRENT: Compressor 2 Undercurrent

SUCT PSI LOCKOUT: Low/Unsafe Suction Pressure

LOW DISC PSI L/O: Low Discharge Pressure Lockout

HIGHDISC PSI L/O: High Discharge Pressure Lockout

LOW SH LOCKOUT: Low Superheat Lockout

HIGH SH LOCKOUT: High Superheat Lockout

HIGHDISC TEMP L/O: High Discharge Line Temperature

C1 >AMPS LOCKOUT: Compressor 1 Overcurrent

C2 >AMPS LOCKOUT: Compressor 2 Overcurrent

HIGH SAT LOCKOUT: High Saturation Temperature

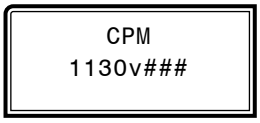
C1 <AMPS LOCKOUT: Compressor 1 Undercurrent Lockout

C2 <AMPS LOCKOUT: Compressor 2 Undercurrent Lockout

Main Screen Map & Module Screens

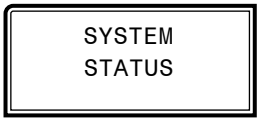
Main Screens Map

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



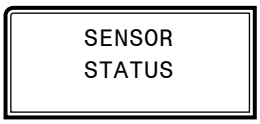
Press ✓ to scroll through the CPM Screens.

Press M to go to SYSTEM STATUS Screen.



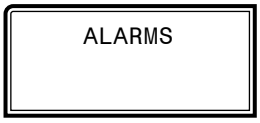
Press ✓ to scroll through SYSTEM STATUS Screens.

Press M to go to SENSOR STATUS Screen.



Press ✓ to scroll through SENSOR STATUS Screens.

Press M to go to ALARMS Screen.

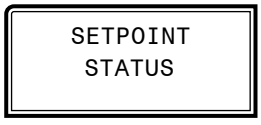


Press ✓ to scroll through the ALARMS Screens.

Press M to go to ALARMS HISTORY Screen.

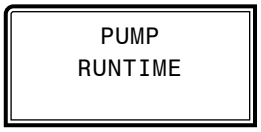
Press ✓ to scroll through the ALARMS HISTORY Screens.

Press M to go to the SETPOINT STATUS Screen.



Press ✓ to scroll through the SETPOINT STATUS Screens.

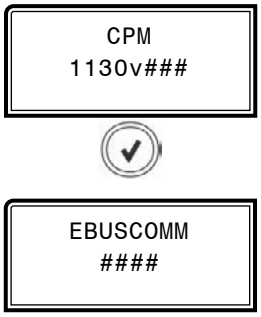
Press M to go to the PUMP RUNTIME Screen.



Press ✓ to scroll through the PUMP RUNTIME Screens.

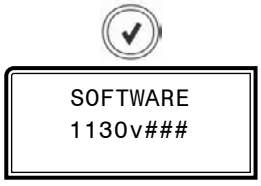
Module Screens

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



E-BUS COMMUNICATION DIAGNOSTICS

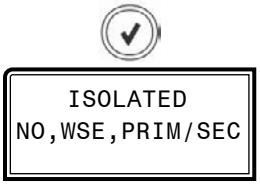
Number of COMM packets received. This value will count up to 65535 and rollover to 0.



SOFTWARE AND SOFTWARE VERSION

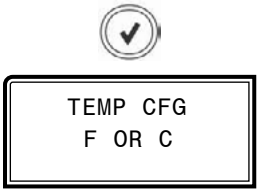
CURRENT EBUS ADDRESS

WSE OPERATION STATUS



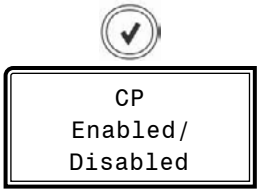
ISOLATED GLYCOL LOOP

The options are NO, WSE, or PRIM/SEC. It will display WSE if the economizer is isolated and will display PRIM/SEC if the primary and secondary pumping circuits are isolated.

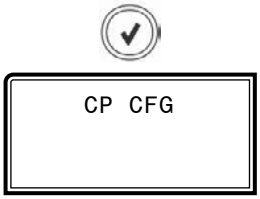


FAHRENHEIT OR CELSIUS

This screen will be present if WSE is enabled.



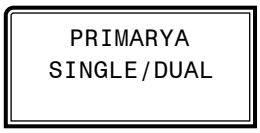
CHILLER PUMP OPERATION STATUS



CHILLER PUMP CONFIGURATION

This screen will be present only if the Chiller Pump is enabled.

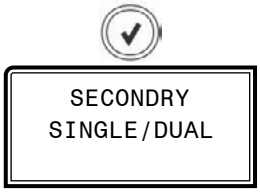
PRIM FIXED = Primary only with Fixed Speed Pump
PRIM VAR = Primary only with Variable Speed Pump
PRIM+SEC = Primary + Secondary Pumps
A+B+SEC = Primary A + Primary B + Secondary Pumps



PRIMARY A PUMP CONFIGURATION

This screen will be present only if the Chiller Pump is enabled.

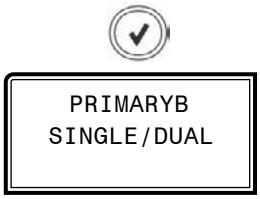
SINGLE = Only one Primary A Pump
DUAL = Has Backup Pump



SECONDARY PUMP CONFIGURATION

This screen will be present only if the Chiller Pump is enabled and configured to have a secondary pump.

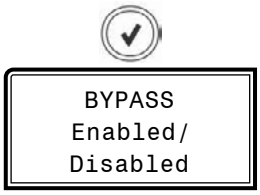
SINGLE = Only one Secondary Pump
DUAL = Has Backup Pump



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

MAXIMUM BUILDING PUMP PRESSURE

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

APPENDIX C - CHILLER PUMPING MODULE LCD SCREENS

System Status Screens

TARGET DIFFERENTIAL PRESSURE

This screen will be present only if the Chiller Pump is enabled and 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 WSE and Chiller Pump are enabled. It indicates if the pumps will be enabled to self operation when the WSE goes into freeze protection.

SECONDARY 3-WAY VALVE POSITION

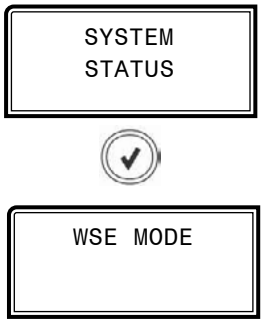
This screen will only be present if WSE is enabled and is configured to have an isolated (glycol) loop.

FAN OPERATING STATUS

This screen will only be present if WSE is enabled.

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.

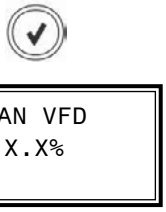


CURRENT OPERATING MODE

Possible values are
OFF or ECONO

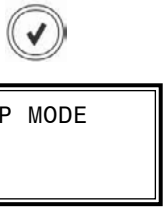
PRIMARY 3-WAY VALVE POSITION

This screen will only be present if WSE is enabled.



CURRENT FAN VFD DRIVE LEVEL

This screen will only be present if WSE is enabled.

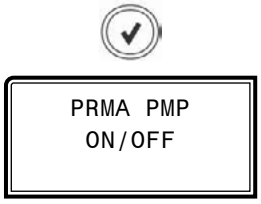


CURRENT CHILLER RUN COMMAND

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.

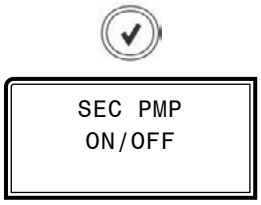
System Status & Sensor Status Screens



PRIMARY A PUMP CURRENT RUN STATUS

This screen will be present only if the Chiller Pump is enabled.

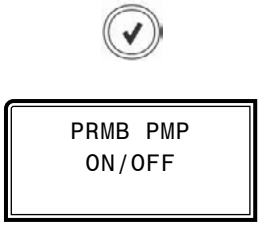
Will display OFF or PUMPING.



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

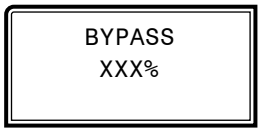
This screen will be present only if the Chiller Pump is enabled and configured for Primary A + Primary B + Secondary.

Will display OFF or PUMPING.

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.

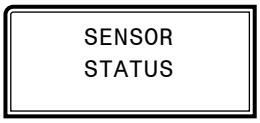
CALCULATED DIFFERENTIAL BUILDING PRESSURE

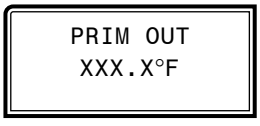
This screen is only present if CP is enabled and not configured for primary only w/fixed speed pumps.

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 WSE is enabled.

HEAT EXCHANGER WATER SIDE OUT TEMPERATURE

This screen is only present if WSE is enabled.

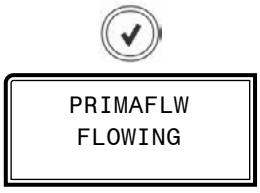
Sensor Status Screens

HEAT EXCHANGER GLYCOL SIDE OUTLET TEMPERATURE

This screen is only present if WSE is enabled and the module is configured for isolated operation. It shows the heat exchanger glycol side outlet temperature (F/C).

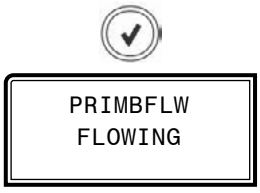
HEAT EXCHANGER GLYCOL SIDE INLET TEMPERATURE

This screen is only present if WSE 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 CP is enabled. It shows the Primary A flow switch input status as “FLOWING” or “NO FLOW”.



PRIMARY B FLOW SWITCH INPUT STATUS

This screen is only present if CP is enabled. It shows the Primary B flow switch input status as “FLOWING” or “NO FLOW”.

BUILDING SUCTION PRESSURE SENSOR TEMPERATURE

This screen is only present if CP is enabled and not configured for primary only w/fixed speed pumps. It shows the building suction pressure sensor temperature reading.

BUILDING DISCHARGE PRESSURE SENSOR TEMPERATURE

This screen is only present if CP is enabled and not configured for primary only w/fixed speed pumps. It shows the building discharge pressure sensor.

OUTDOOR AIR TEMPERATURE READING FROM MAIN CONTROLLER

LEAVING WATER TEMPERATURE READING FROM MAIN CONTROLLER

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.

NO ALARMS

This will be shown if there are no current alarms.

ACTIVE ALARMS!

This will display if there are active alarms.

WSE NOT OPERATE: The WSE 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.

Alarms History Screen

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.

The name of the alarm will appear along with how long it has been since it last occurred in number of minutes, hours, or days. 0 indicates more than 30 days or the alarm has not been triggered since power up.

WSE NOOP ## MIN/HR/DAY: This screen is only present if WSE is enabled. Time since last occurrence of WSE is not operating alarm.

FRZ PROT ## MIN/HR/DAY: This screen is only present if WSE is enabled. Time since last occurrence of freeze protection mode alarm.

PRIM OUT ## MIN/HR/DAY: This screen is only present if WSE 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 WSE is enabled. Time since last occurrence of heat exchanger water side out temperature sensor failure detection.

HE GL IN ## MIN/HR/DAY: This screen is only present if WSE 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 WSE is enabled. Minutes since last occurrence of a fan VFD fault.

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

PMP2 VFD ## MIN/HR/DAY: This screen is only present if CP is enabled and not configured for primary only w/fixed speed pump. Time since last occurrence of a VFD pump 2 fault.

PAP1 LCK ## MIN/HR/DAY: This screen is only present if CP is enabled. Time since last occurrence of a primary A, pump 1 lockout.

PAP2 LCK ## MIN/HR/DAY: This screen is only present if CP 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 CP 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 CP 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 CP is enabled and is configured for primary A + primary B + secondary. Time since last occurrence of a primary B, pump 1 lockout.

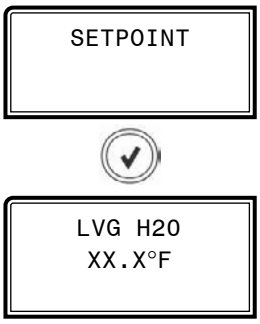
PBP2 LCK ## MIN/HR/DAY: This screen is only present if CP is enabled, is configured for primary A + primary B + secondary and primary B is configured for backup. Time since occurrence of a primary B, pump 2 lockout.

CP LOCK ## MIN/HR/DAY: This screen is only present if CP 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.

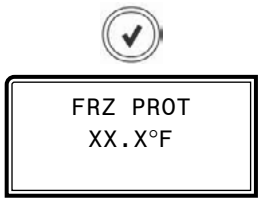
Setpoint Status Screens

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



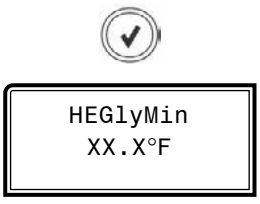
LEAVING WATER TEMPERATURE TARGET SETPOINT

This screen is only present if WSE is enabled.
Range is 0.0 to 70.0°F



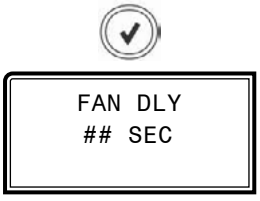
FREEZE PROTECT SETPOINT FOR WSE AND HEAT EXCHANGER

This screen is only present if WSE is enabled.
Range is 0.0 to 50.0°F



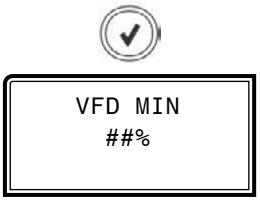
HEAT EXCHANGER GLYCOL SIDE MINIMUM INLET TEMPERATURE SETPOINT

This screen is only present if WSE is enabled and the module is configured for isolated operation. Range is 32.0 to 50.0°F



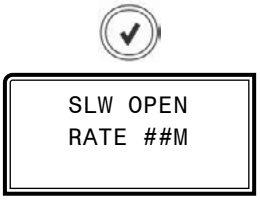
FAN STAGE UP DELAY SETPOINT

This screen is only present if WSE is enabled.
Range is 0 to 30 seconds



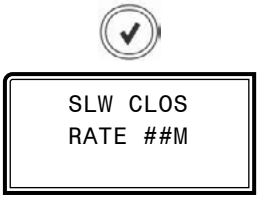
FAN VFD MINIMUM OPERATING SPEED IN PERCENT

This screen is only present if WSE is enabled.
Range is 10 to 50%



PRIMARY MIXING VALVE SLOW OPENING RATE USED IN BRINGING WSE ON-LINE WITH COMPRESSORS RUNNING

This screen is only present if WSE is enabled.
Range is 1 to 30 minutes



PRIMARY MIXING VALVE SLOW CLOSING RATE USED IN DISABLING WSE WHILE COMPRESSORS ARE RUNNING

This screen is only present if WSE is enabled.
Range is 1 to 30 minutes

TARGET DIFFERENTIAL BUILDING PRESSURE

This screen is only present if CP is enabled and not configured for primary only w/fixed speed pumps. Range is 0 to 100 PSI.

Setpoint Status Screens & Pump Runtime Screens

MAXIMUM BUILDING PRESSURE

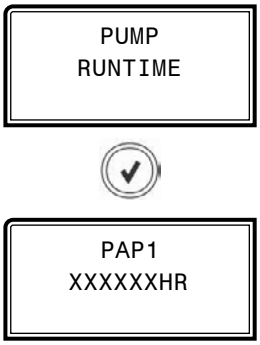
This screen is only present if CP is enabled and not configured for primary only w/fixed speed pumps. It sets the maximum allowed building pressure from 0 to 200 PSI.

PROOF OF FLOW START

This screen is only present if CP is enabled and is configured for primary only or w/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.

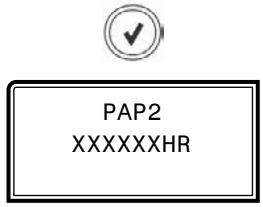
Pump Runtime Screens

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

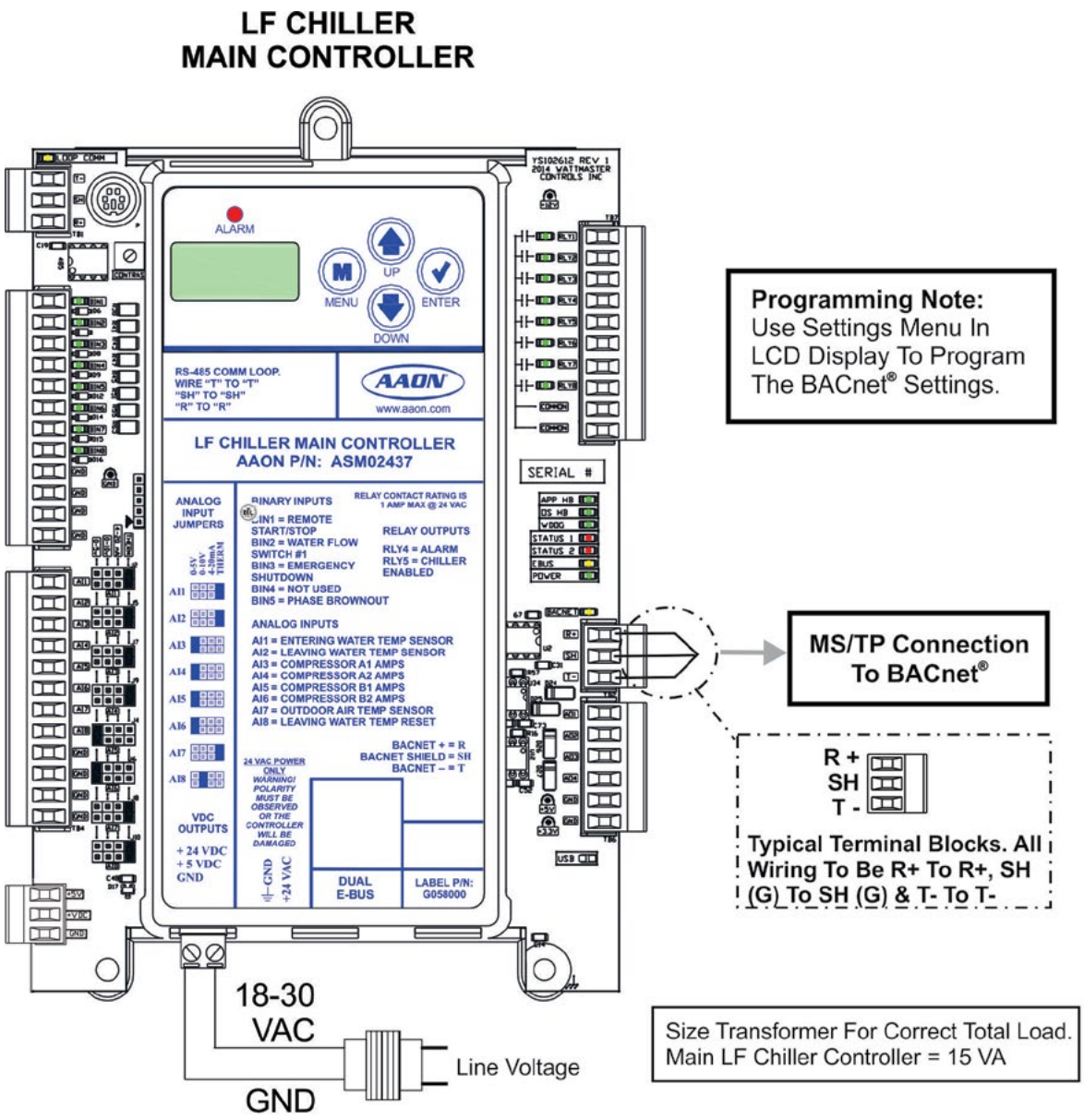
Total accumulative runtime in hours.

PRIMARY B PUMP 1 RUN TIME

Total accumulative runtime in hours.

PRIMARY B PUMP 2 RUN TIME

Total accumulative runtime in hours.



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, 2 conductor twisted pair with shield. Use Belden #82760 or equivalent.

Figure 13: BACnet® Connection to MS/TP Network

BACnet® Analog Inputs

ANALOG INPUTS		
Point Type	**Number**	**BACnet® Point Name**
AI	1	Application Version
AI	2	Entering Water Temperature
AI	3	Leaving Water Temperature
AI	4	Active Leaving Water Setpoint
AI	5	Outdoor Air Temperature
AI	6	WSE Primary Feed Temperature
AI	7	WSE Primary Outlet Temperature
AI	8	WSE Primary 3-Way Valve
AI	9	WSE VFD Speed
AI	10	Pump Discharge Pressure
AI	11	Pump Suction Pressure
AI	12	Pump Differential Pressure
AI	13	Pump VFD Speed
AI	14	Active Superheat Setpoint
AI	15	Active Head Pressure Setpoint
AI	16	Active Coil Temperature Setpoint
AI	17	A-Suction Pressure
AI	18	A-Discharge Pressure
AI	19	A-Liquid Line Pressure
AI	20	A-Calculated Saturation Temperature
AI	21	A-Calculated Discharge Temperature
AI	22	A-Calculated Liquid Line Temperature
AI	23	A-Suction Line Temperature
AI	24	A-Discharge Line Temperature
AI	25	A-Liquid Line Temperature
AI	26	A-Superheat Temperature
AI	27	A-Discharge Superheat Temperature
AI	28	A-Sub-cooling Temperature
AI	29	A-Compressor A1 Percentage
AI	30	A-Compressor A2 Percentage

Table 13: BACnet® MS/TP Parameter Analog Inputs

ANALOG INPUTS		
Point Type	**Number**	**BACnet® Point Name**
AI	31	A-Condenser Percentage
AI	32	A-EXV Position
AI	33	A-Compressor A1 Current
AI	34	A-Compressor A2 Current
AI	35	B-Suction Pressure
AI	36	B-Discharge Pressure
AI	37	B-Liquid Line Pressure
AI	38	B-Calculated Saturation Temperature
AI	39	B-Calculated Discharge Temperature
AI	40	B-Calculated Liquid Line Temperature
AI	41	B-Suction Line Temperature
AI	42	B-Discharge Line Temperature
AI	43	B-Liquid Line Temperature
AI	44	B-Superheat Temperature
AI	45	B-Discharge Superheat Temperature
AI	46	B-Sub-cooling Temperature
AI	47	B-Compressor B1 Percentage
AI	48	B-Compressor B2 Percentage
AI	49	B-Condenser Percentage
AI	50	B-EXV Position
AI	51	B-Compressor B1 Current
AI	52	B-Compressor B2 Current

Table 13, continued: BACnet® MS/TP Parameter Analog Inputs

BACnet® Analog Values

BACnet® Analog Values				
BACnet® Point Type	Number	Limit Range		BACnet® Point Name
AV	1	0	10	Leaving Water SP Max Reset Volts
AV	2	35	60	Leaving Water Max Temp Setpoint
AV	3	0	10	Leaving Water SP Min Reset Volts
AV	4	12	60	Leaving Water Min Temp Setpoint
AV	5	0	45	Low Chilled Water Out Cutoff Temp
AV	6	-20	40	Ambient Temperature Lockout
AV	7	35	60	High Coil Setpoint Reset Limit
AV	8	35	60	Low Coil Setpoint Reset Limit
AV	9	10	30	Superheat Setpoint
AV	10	1	30	Compressor Stage Above Window
AV	11	1	30	Compressor Stage Below Window
AV	12	-100	100	Entering Water Sensor Calibration
AV	13	-100	100	Leaving Water Sensor Calibration
AV	14	-100	100	Outdoor Air Sensor Calibration
AV	15	150	475	Head Pressure Setpoint
AV	16	5	600	High Outlet Water Temp Failure Time
AV	17	0	75	Waterside Economizer Enable Setpoint
AV	18	0	75	WSE Primary Outlet Setpoint
AV	19	0	75	WSE Heat Exchange Outlet Setpoint
AV	20	0	75	WSE Freeze Protection Setpoint
AV	21	0	75	WSE Heat Exchange Inlet Setpoint
AV	22	0	300	WSE Fan Staging Delay
AV	23	0	300	WSE Startup Delay
AV	24	10	50	WSE Minimum VFD Speed
AV	25	0	95	WSE Minimum Mixing Valve
AV	26	1	60	WSE Primary 3-Way Valve Slow Start
AV	27	1	60	WSE Primary 3-Way Valve Slow Stop
AV	28	0	1	WSE Reset Alarm History {1 = Reset }
AV	29	1	60	Compressor Modulation Rate
AV	30	0	1	Reset Unit Lockout {1 = Reset }
AV	31	0	2	Auto/Run/Off Command
AV	32	0	1	Enable/Disable Main Relay #6
AV	33	0	1	Enable/Disable Main Relay #7
AV	34	0	1	Enable/Disable Main Relay #8

Table 14: BACnet® MS/TP Parameter Analog Values

BACnet® Binary Inputs

BINARY INPUTS			
BACnet® Point Type	Number	BACnet® Name	Value
BI	1	Run/Stop Input Command	Status
BI	2	Proof of Water Flow	Status
BI	3	Emergency Shutdown	Status
BI	4	Phase Loss	Status
BI	5	WSE Fan Run Status	Status
BI	6	WSE at Maximum Capacity	Status
BI	7	WSE Enable Status	Status
BI	8	WSE Alarm Not Operating	Alarm
BI	9	WSE Alarm Freeze Protection	Alarm
BI	10	WSE Alarm Primary Outlet Sensor	Alarm
BI	11	WSE Alarm Primary Feed Sensor	Alarm
BI	12	WSE Alarm Heat Exchange Inlet	Alarm
BI	13	WSE Alarm Heat Exchange Outlet	Alarm
BI	14	WSE Alarm VFD Fault	Alarm
BI	15	Primary A Pump 1 Status	Status
BI	16	Primary A Pump 2 Status	Status
BI	17	Pump Water Flow Status	Status
BI	18	For Future Use	
BI	19	For Future Use	
BI	20	A-Fault Low Suction	Fault
BI	21	A-Fault Unsafe Suction	Fault
BI	22	A-Fault Trip High Discharge Pr.	Fault
BI	23	A-Fault Compressor A1 Not Running	Fault
BI	24	A-Fault Compressor A2 Not Running	Fault
BI	25	A-Fault No Suction Line Temp Sensor	Fault
BI	26	A-Fault Low Superheat	Fault
BI	27	A-Fault High Discharge Temp	Fault
BI	28	A-Fault Compressor A1 False Active	Fault
BI	29	A-Fault Compressor A2 False Active	Fault
BI	30	A-Fault No Suction Pr. Sensor	Fault
BI	31	A-Fault Emergency Shutdown	Fault
BI	32	A-Fault MODBUS Slave Timeout	Fault
BI	33	A-Fault High Superheat	Fault
BI	34	A-Fault High Saturation Temperature	Fault
BI	35	A-Fault Compressor A1 Over Current	Fault
BI	36	A-Fault Compressor A2 Over Current	Fault
BI	37	A-Fault Compressor A1 Under Current	Fault
BI	38	A-Fault Compressor A2 Under Current	Fault
BI	39	For Future Use	

Table 15: BACnet® MS/TP Parameter Binary Inputs

BINARY INPUTS			
BACnet® Point Type	Number	BACnet® Name	Value
BI	40	A-Warning Low Suction Pressure	Warning
BI	41	A-Warning Low Suction Pr. Startup	Warning
BI	42	A-Warning High Discharge Pressure 1	Warning
BI	43	A-Warning No Discharge Pr. Sensor	Warning
BI	44	A-Warning No Discharge Temp Sensor	Warning
BI	45	A-Warning High Superheat	Warning
BI	46	A-Warning Condenser Fault	Warning
BI	47	A-Warning Condenser Over Current	Warning
BI	48	A-Warning No Liquid Line Pr. Sensor	Warning
BI	49	A-Warning No Liquid Line Temp Sensor	Warning
BI	50	A-Warning High Discharge Pressure 2	Warning
BI	51	A-Lockout Suction Pressure	Lockout
BI	52	A-Lockout Low Discharge Pressure	Lockout
BI	53	A-Lockout Compressor A1 Over Current	Lockout
BI	54	A-Lockout Compressor A2 Over Current	Lockout
BI	55	A-Lockout High Discharge Temp	Lockout
BI	56	A-Lockout High Discharge Pressure	Lockout
BI	57	A-Lockout Low Superheat	Lockout
BI	58	A-Lockout High Superheat	Lockout
BI	59	A-Lockout High Saturation Temp	Lockout
BI	60	A-Lockout Compressor A1 Under Current	Lockout
BI	61	A-Lockout Compressor A2 Under Current	Lockout
BI	62	For Future Use	
BI	63	For Future Use	
BI	64	For Future Use	
BI	65	For Future Use	
BI	66	For Future Use	
BI	67	For Future Use	
BI	68	For Future Use	
BI	69	For Future Use	
BI	70	B-Fault Low Suction	Fault
BI	71	B-Fault Unsafe Suction	Fault
BI	72	B-Fault Trip High Discharge Pr.	Fault
BI	73	B-Fault Compressor B1 Not Running	Fault
BI	74	B-Fault Compressor B2 Not Running	Fault
BI	75	B-Fault No Suction Line Temp Sensor	Fault
BI	76	B-Fault Low Superheat	Fault
BI	77	B-Fault High Discharge Temp	Fault

Table 15, continued: BACnet® MS/TP Parameter Binary Inputs

BACnet® Binary Inputs

BINARY INPUTS			
BACnet® Point Type	**Number**	**BACnet® Name**	**Value**
BI	78	B-Fault Compressor B1 False Active	Fault
BI	79	B-Fault Compressor B2 False Active	Fault
BI	80	B-Fault No Suction Pr. Sensor	Fault
BI	81	B-Fault Emergency Shutdown	Fault
BI	82	B-Fault MODBUS Slave Timeout	Fault
BI	83	B-Fault High Superheat	Fault
BI	84	B-Fault High Saturation Temperature	Fault
BI	85	B-Fault Compressor B1 Over Current	Fault
BI	86	B-Fault Compressor B2 Over Current	Fault
BI	87	B-Fault Compressor B1 Under Current	Fault
BI	88	B-Fault Compressor B2 Under Current	Fault
BI	89	For Future Use	
BI	90	B-Warning Low Suction Pressure	Warning
BI	91	B-Warning Low Suction Pr. Startup	Warning
BI	92	B-Warning High Discharge Pressure 1	Warning
BI	93	B-Warning No Discharge Pr. Sensor	Warning
BI	94	B-Warning No Discharge Temp Sensor	Warning
BI	95	B-Warning High Superheat	Warning
BI	96	B-Warning Condenser Fault	Warning
BI	97	B-Warning Condenser Over Current	Warning
BI	98	B-Warning No Liquid Line Pr. Sensor	Warning
BI	99	B-Warning No Liquid Line Temp Sensor	Warning
BI	100	B-Warning High Discharge Pressure 2	Warning
BI	101	B-Lockout Suction Pressure	Lockout
BI	102	B-Lockout Low Discharge Pressure	Lockout
BI	103	B-Lockout Compressor B1 Over Current	Lockout
BI	104	B-Lockout Compressor B2 Over Current	Lockout
BI	105	B-Lockout High Discharge Temp	Lockout
BI	106	B-Lockout High Discharge Pressure	Lockout
BI	107	B-Lockout Low Superheat	Lockout
BI	108	B-Lockout High Superheat	Lockout
BI	109	B-Lockout High Saturation Temp	Lockout
BI	110	B-Lockout Compressor B1 Under Current	Lockout
BI	111	B-Lockout Compressor B2 Under Current	Lockout
BI	112	Chiller Fully Loaded	Status

Table 15, continued: BACnet® MS/TP Parameter Binary Inputs

MULTI-STATE INPUT			
BACnet® Point #	**BACnet® Point Name**	**BACnet® Description**	**Limits**
MI: 1	Operating Status	Current Unit Mode	1 = OFF_MODE 2 = RUN MODE 3 = Holiday OFF MODE 4 = Holiday RUN MODE 5 = Startup Delay 6 = Emergency Shutdown 7 = High Leaving Water

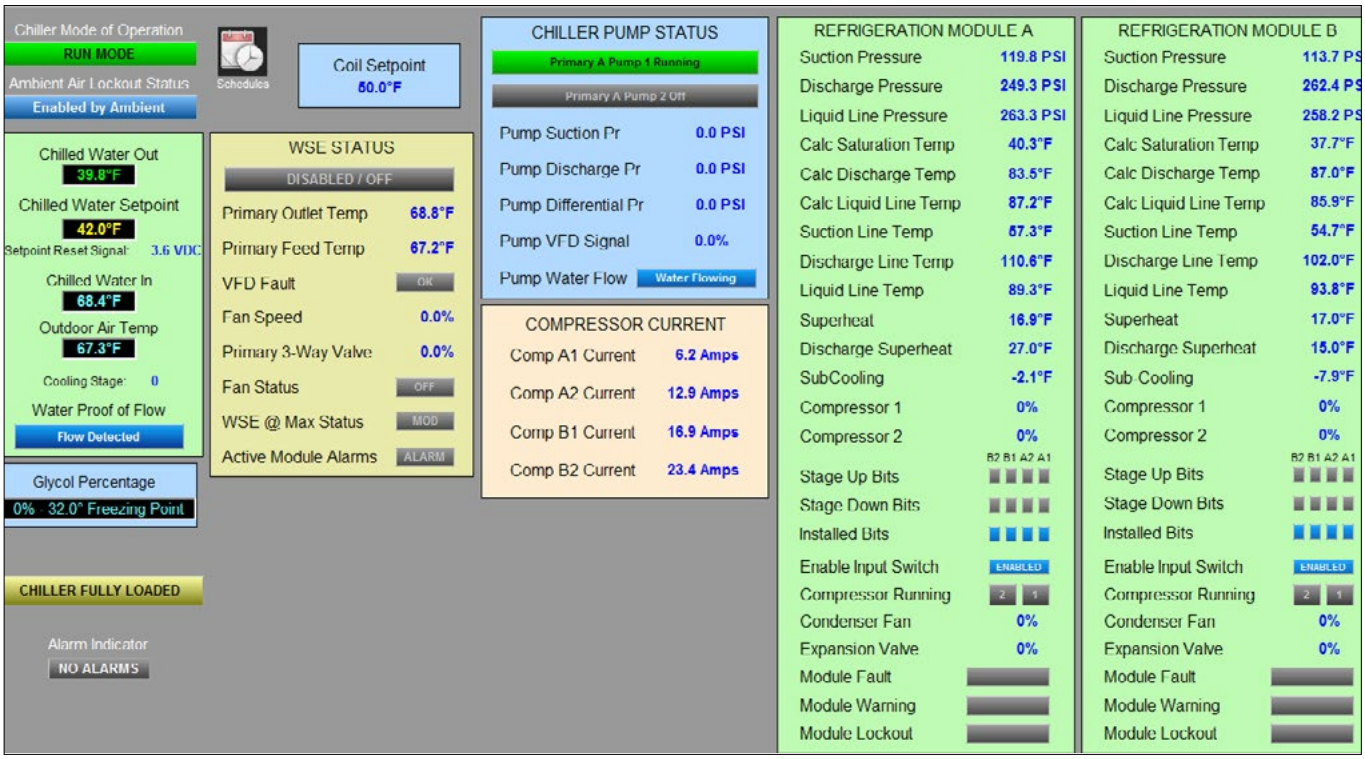
Table 16: BACnet® MS/TP Parameter Multi-State Input

NOTES

Prism2

Operator Interface Overview

Prism 2 Software: Version 4.9.0 and later
LF Chiller Main Controller Code: Version 1.0 and up



Prism 2 Requirements

PLEASE 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.

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

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

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

To use Prism 2 you must have 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

- Windows® compatible computer
- 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, are not recommended due to security updates being obsoleted by Microsoft®. We also do 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 we 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 central standard time.

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.

Prism 2 Technical Guide Overview

The *Prism 2 Technical Guide* will lead you through each step in configuring Prism 2—from entering passcodes to searching and selecting units for troubleshooting. Below is a quick overview of each step of the guide that pertains to the LF Chiller Control System.

Step 1: Installing Prism 2—This section explains how to install the Prism 2 software, initiate communications, navigate the program, and enter and edit passcodes.

Step 2: Setting Up Job Sites—This section provides instructions for setting up each job site's name, port, or IP address, CommLink type and configuration, alarm notification, and custom screen designation.

Step 3: Configuring Prism 2—This section describes how to have Prism 2 automatically restart after a power failure and broadcast time to all controllers. It also explains how to set up the main screen display picture.

Step 4: Setting Up Communications—This section explains how to establish communications via TCP/IP connection through your CommLink.

Step 5: Searching for Installed Units—This section explains how to perform a unit search per job-site.

Step 6: Selecting and Renaming Loops and Units—This section explains how to select and rename loops and units.

Step 7: Configuring Units—This section describes how to configure controller setpoints. It also explains how to configure units while off-line.

Appendices—The appendices include examples of status and setpoint screens, instructions for DEMOMODE, and a list of controllers, E-BUS modules, and other devices that can be updated using Prism 2.

Controller Status Screen

Controller Status Screen

After successful Prism 2 installation and job-site setup, you will be able to access the LF Chiller Controller Status Screen. See **Figure 14** below.

Besides displaying the current operating status and inputs and outputs, from this screen you can set schedules, force modes, run BACnet® commands, view alarms, print status reports, 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 14: LF Chiller Controller Status Screen

Controller Setpoint Screens

Setpoints are accessed by *clicking* on **<Setpoints>** at the top left of the *LF Chiller Main Controller Status Screen* (**Figure 14, page 68**). The *Temperature Setpoints Screen* will display. See **Figure 15**, below.

At the bottom of any *Setpoints Screen*, you can access all other *Setpoint Screens* by clicking the icons, **Temperatures**, **Staging Delays**, **Miscellaneous**, **Calibration, Configuration**, **RSM Module**, **WSE Module**, and **Pump Module**.

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

Figure 15: Temperatures Setpoints Screen

Controller Setpoint Screens

Figure 16: Staging Delays Setpoints Screen

Figure 17: Miscellaneous Setpoints Screen

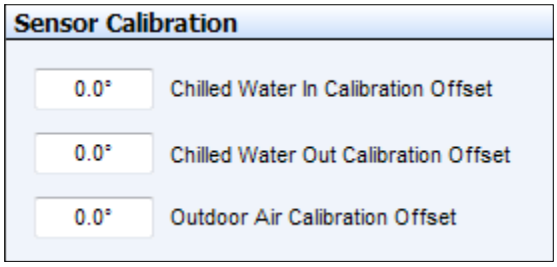


Figure 18: Calibration Setpoints Screen

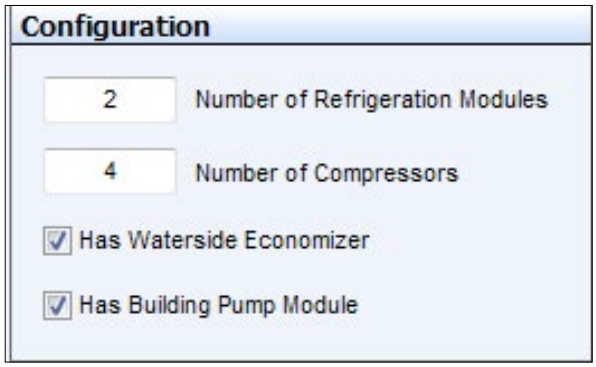


Figure 19: Configuration Setpoints Screen

Figure 20: WSE Module Setpoints Screen

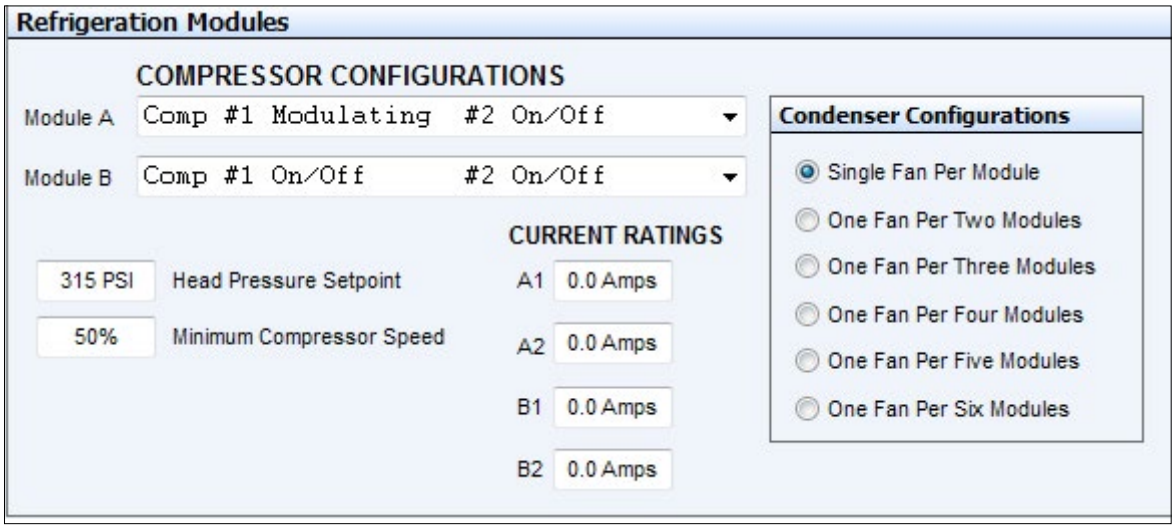


Figure 21: Refrigeration Module Configuration Screen

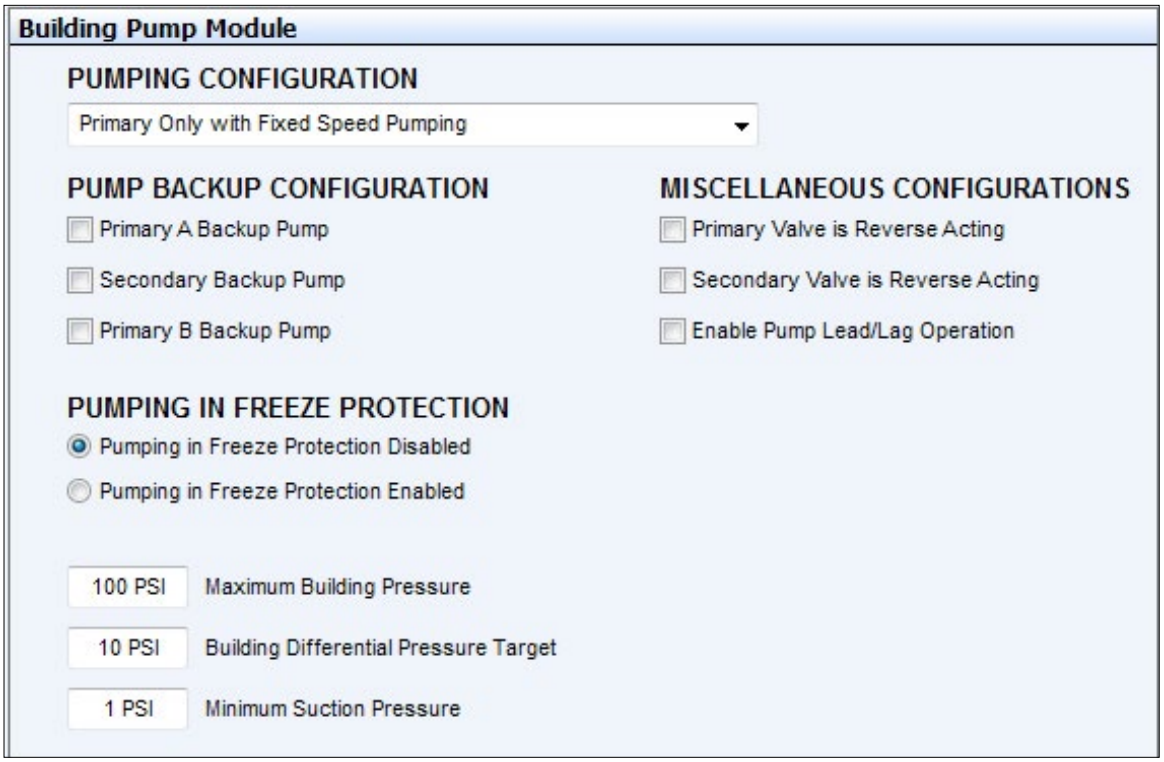
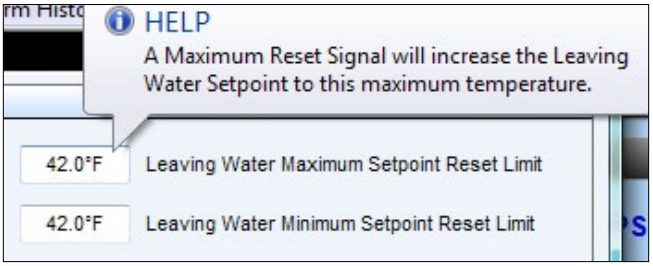


Figure 22: Pumping Module Setpoints Screen

Changing, Saving & Restoring Setpoints, Printing & Charting

Setpoint Help & Changing Setpoints

If you position the cursor over the top of a setpoint box, a *Help Window* will pop up indicating how that setpoint is used by the controller.



If you enter a setpoint that is either too high or too low or if you don't have Level 3 access, Prism 2 will not accept the new value and will restore the previous value in that field. When you enter a value, you must *press* **<Enter>** to have Prism 2 save the value.

Saving and Restoring Setpoints

At the top of each setpoint screen, you can *select* **<Save>** or **<Restore>**. These two functions save and copy over ALL of the setpoints for a controller, not only those on a single setpoint screen.

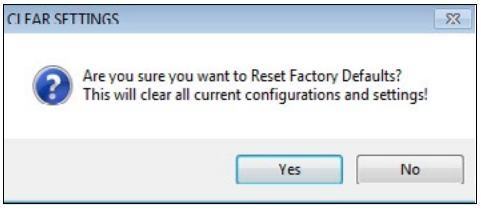
Saving all setpoints from the controller to a file on your computer for use in restoring the setpoints or for copying to another specific controller will save time in configuring your controller and save valuable time in having to reenter setpoints for another controller.

Restore Factory Defaults

To restore factory configuration and setpoint defaults for the DX Chiller Controller, *select* **<Restore Factory Defaults>** at the top of any setpoint screen.

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.

The following message will display:



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

Printing & Charting

At the top of the *LF Chiller Main Controller Status Screen* (**Figure 14, page 68**), are the options **<Print>** and **<Charting>**.

Select **<Print>** to print a status report for the Controller for the current date. See **Figure 23**, below for an example. The printers you have set up for your computer will show in the printer selection box at the bottom of the screen.

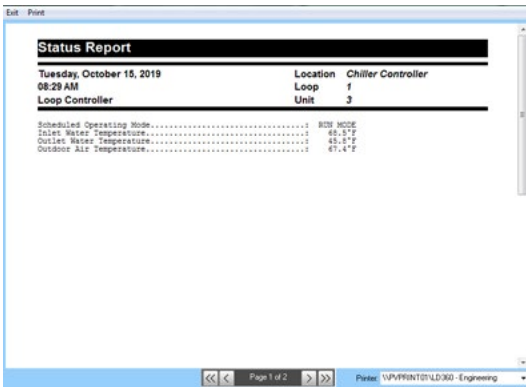


Figure 23: Status Report Screen

Select **<Charting>** to display a chart for the Main Chiller Controller or the Refrigeration Modules. See **Figure 24**, below for an example. You have the option to clear the graph, chart the colors, or save the graph.

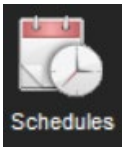
Figure 24: Refrigeration Module Chart

LF Chiller Refrigeration Timers

At the top of the *LF Chiller Main Controller Status Screen* (**Figure 14, page 68**), click **<Staging Timers>**. The *LF Chiller Refrigeration Timers Window* will display. See **Figure 25**, below.

Figure 25: Refrigeration Timers

Schedules & Holidays



When you *select* the **<Schedules>** icon found on the *LF Controller Status Screen* (**Figure 14, page 68**), the *Schedules Screen* will appear. See **Figure 26**, below.

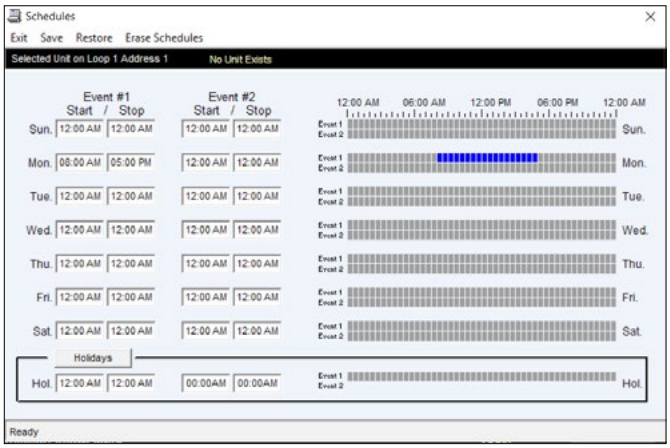


Figure 26: Schedules Screen

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.

When you enter a time in any field, you must designate AM or PM and *press* **<ENTER>**.

To schedule holidays, *press* the **<Holidays>** button. The *Holiday Schedule Screen* will appear. See **Figure 27**.

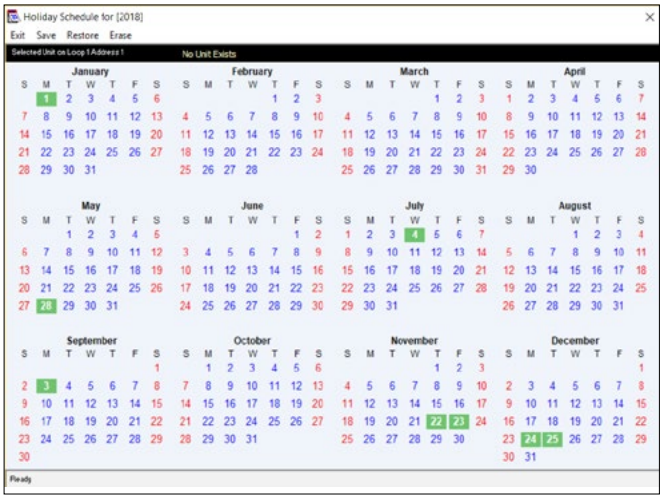


Figure 27: Yearly Holiday Schedules Screen

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 or they can span weeks or even months.

If your job-site has days during the year when you need to override the standard operating hours to accommodate holidays or other special events, you can use this window to select the holidays.

You cannot program holidays for the next year, and holidays do not automatically adjust for the new year, so you will need to access this screen after the new year and make necessary adjustments to the days that float, such as Memorial Day.

Saving and Restoring Schedules & Holidays

While at the *Schedules Screen* (**Figure 26**), *select* **<Save>** to save your 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* (**Figure 27**), *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 file on your computer for use in restoring the schedules or for copying to another specific controller will save time in configuring your controller and save valuable time in having to reenter schedules for another controller.

Schedule Override & Alarms

Schedule Override

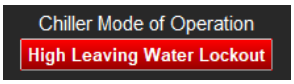


Figure 28: Overrides

You can override the schedule mode of operations by *clicking* on the button under Chiller Mode of Operation. The *Overrides Dialog Box* will appear. See **Figure 28**.

You can choose **Auto Scheduling, Force Schedule ON** or **Force Schedule OFF**.

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

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 29**.

Each individual **<ALARM>** button will be bright red if an alarm exists and will be gray if no alarm exists.

Click the blue **<Manual Lockout Reset>** button to immediately reset an alarm once it has cleared.

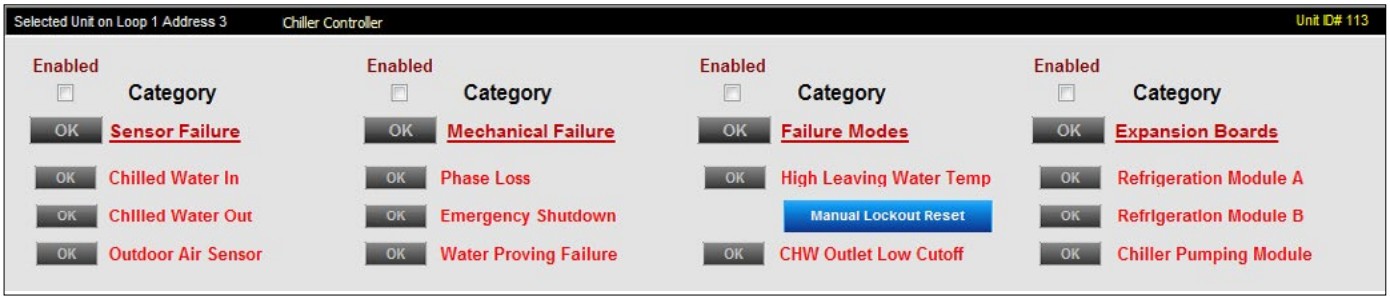


Figure 29: Unit Alarm Status Screen

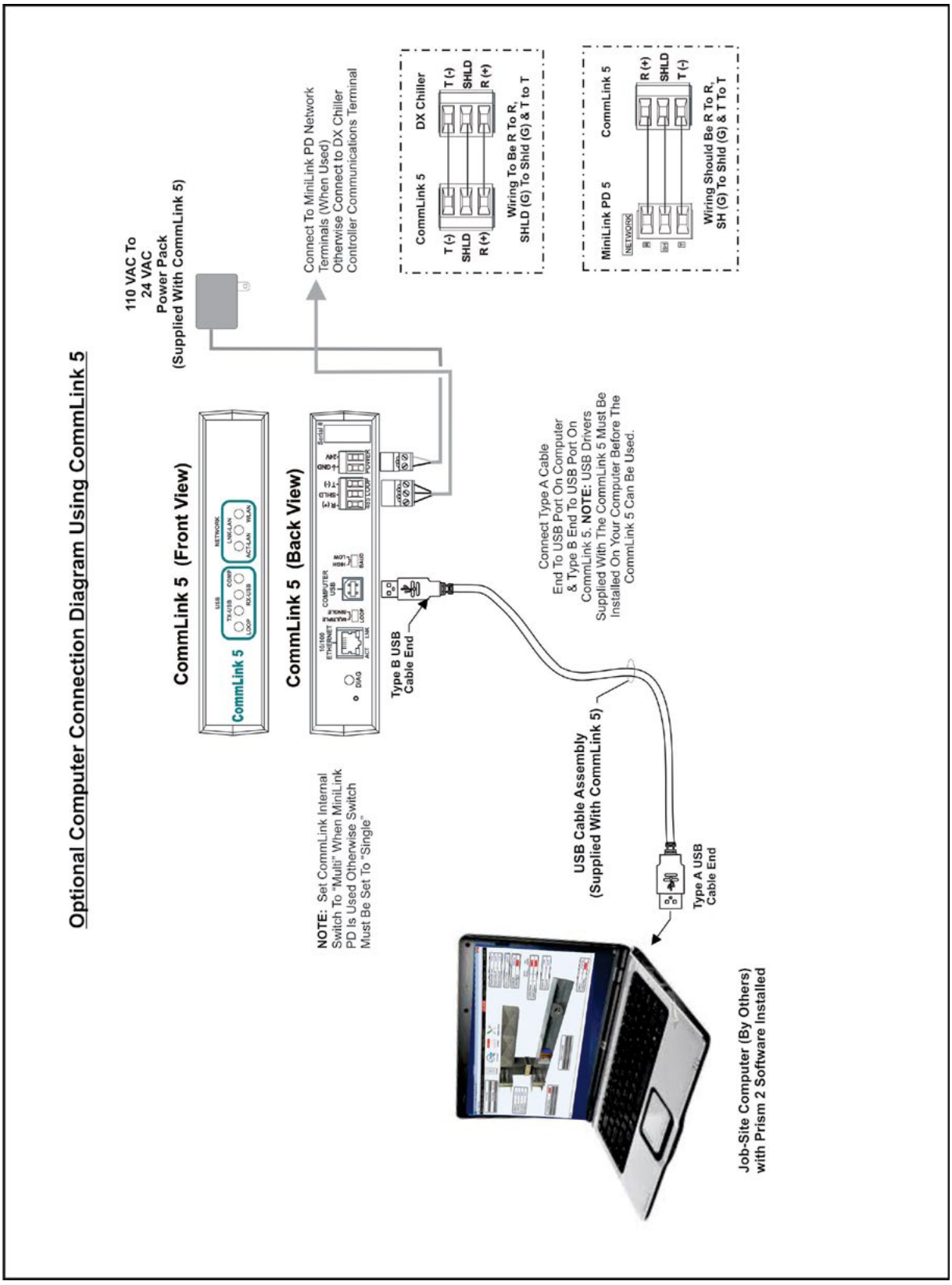


Figure 30: CommLink 5 Connection

IP Module Connection

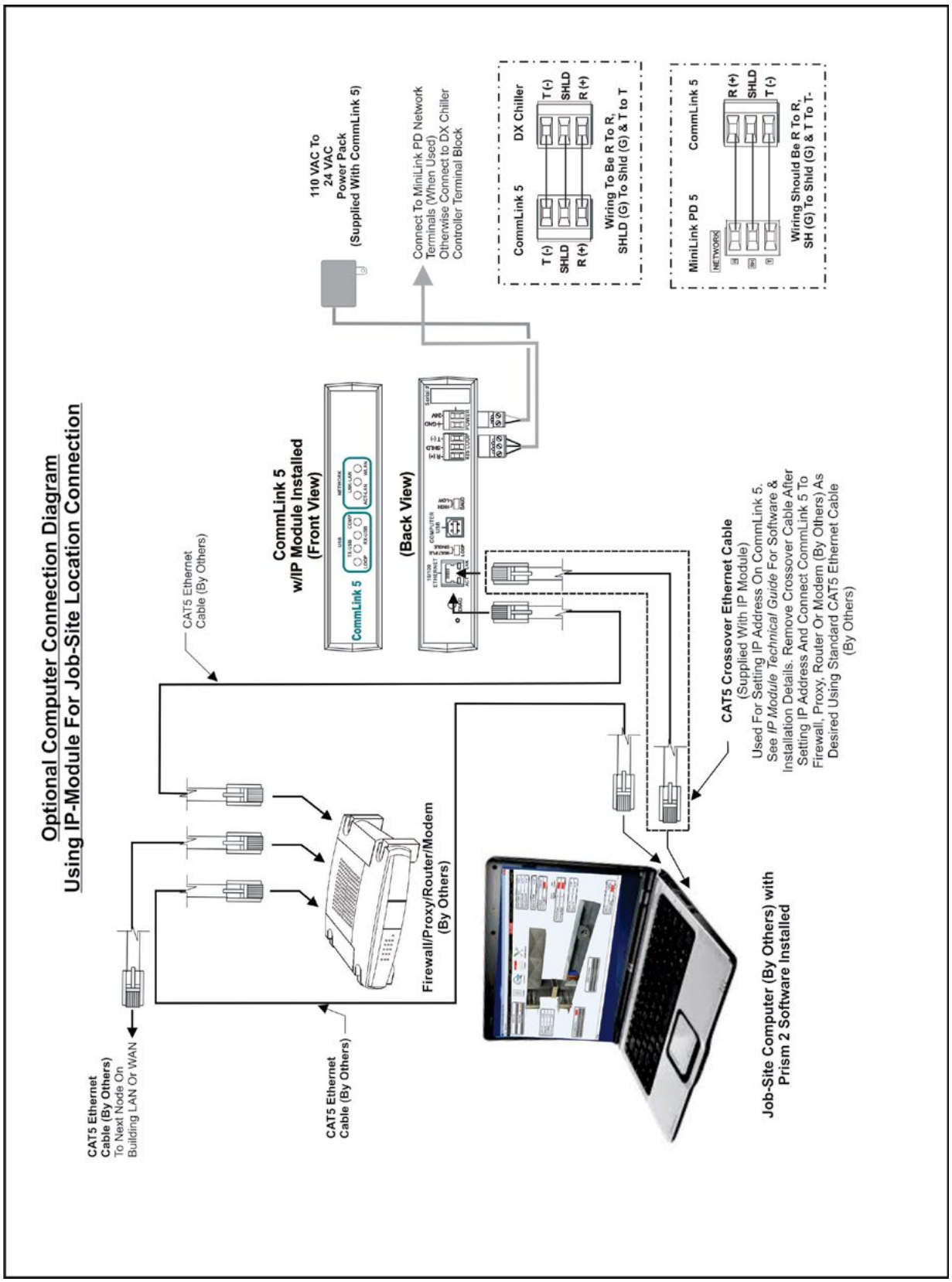


Figure 31: IP Module Connection

USB-Link 2 Connection

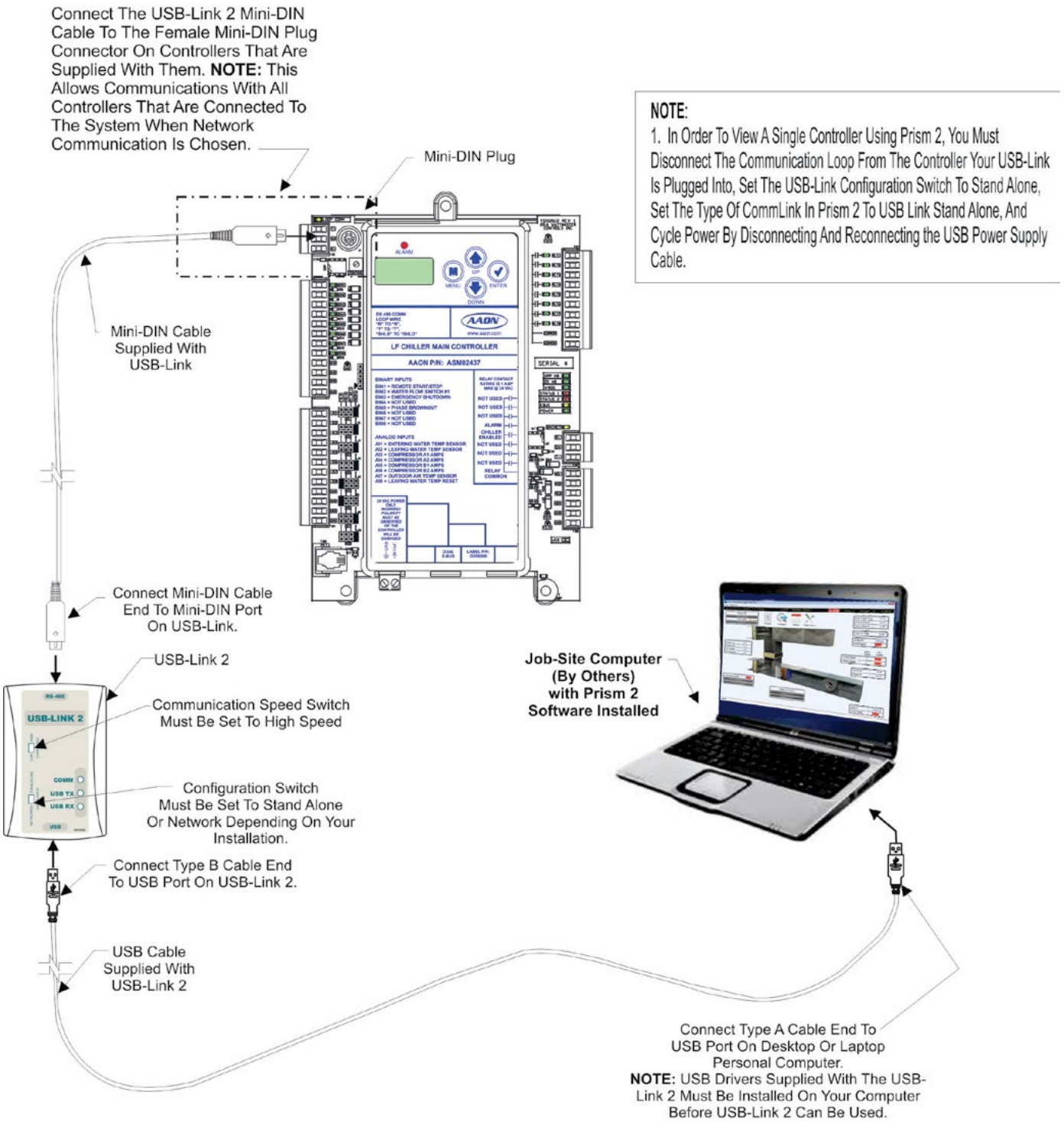


Figure 32: USB-Link 2 Connection

LF Chiller Controller Technical Guide
G059100 · Rev. 01D · 201106

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

AAON Controls Support: 866-918-1100
Monday through Friday, 7:00 AM to 5:00 PM
central standard time

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.

2425 So. Yukon Ave • Tulsa, OK • 74107-2728
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