Integration Guide

BACnet® and Modbus Integration to Ascend™ Air-Cooled Chiller Model ACR

with Symbio™ 800 Controls

⚠ SAFETY WARNING

Only qualified personnel should install and service the equipment. The installation, starting up, and servicing of heating, ventilating, and air-conditioning equipment can be hazardous and requires specific knowledge and training. Improperly installed, adjusted or altered equipment by an unqualified person could result in death or serious injury. When working on the equipment, observe all precautions in the literature and on the tags, stickers, and labels that are attached to the equipment.

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TRANE TECHNOLOGIES

Introduction

Read this manual thoroughly before operating or servicing this unit.

Warnings, Cautions, and Notices

Safety advisories appear throughout this manual as required. Your personal safety and the proper operation of this machine depend upon the strict observance of these precautions.

The three types of advisories are defined as follows:

⚠ WARNING	Indicates a potentially hazardous situation which, if not avoided, could result in death or serious injury.
⚠ CAUTION	Indicates a potentially hazardous situation which, if not avoided, could result in minor or moderate injury. It could also be used to alert against unsafe practices.
NOTICE	Indicates a situation that could result in equipment or property-damage only accidents.

Important Environmental Concerns

Scientific research has shown that certain man-made chemicals can affect the earth's naturally occurring stratospheric ozone layer when released to the atmosphere. In particular, several of the identified chemicals that may affect the ozone layer are refrigerants that contain Chlorine, Fluorine and Carbon (CFCs) and those containing Hydrogen, Chlorine, Fluorine and Carbon (HCFCs). Not all refrigerants containing these compounds have the same potential impact to the environment. Trane advocates the responsible handling of all refrigerants-including industry replacements for CFCs and HCFCs such as saturated or unsaturated HFCs and HCFCs.

Important Responsible Refrigerant Practices

Trane believes that responsible refrigerant practices are important to the environment, our customers, and the air conditioning industry. All technicians who handle refrigerants must be certified according to local rules. For the USA, the Federal Clean Air Act (Section 608) sets forth the requirements for handling, reclaiming, recovering and recycling of certain refrigerants and the equipment that is used in these service procedures. In addition, some states or municipalities may have additional requirements that must also be adhered to for responsible management of refrigerants. Know the applicable laws and follow them.

⚠ WARNING

Proper Field Wiring and Grounding Required!

Failure to follow code could result in death or serious injury.

All field wiring MUST be performed by qualified personnel. Improperly installed and grounded field wiring poses FIRE and ELECTROCUTION hazards. To avoid these hazards, you MUST follow requirements for field wiring installation and grounding as described in NEC and your local/state/national electrical codes.

⚠ WARNING

Personal Protective Equipment (PPE) Required!

Failure to wear proper PPE for the job being undertaken could result in death or serious injury.

Technicians, in order to protect themselves from potential electrical, mechanical, and chemical hazards, MUST follow precautions in this manual and on the tags, stickers, and labels, as well as the instructions below:

- **Before installing/servicing this unit, technicians MUST put on all PPE required for the work being undertaken (Examples; cut resistant gloves/sleeves, butyl gloves, safety glasses, hard hat/bump cap, fall protection, electrical PPE and arc flash clothing). ALWAYS refer to appropriate Safety Data Sheets (SDS) and OSHA guidelines for proper PPE.**
- **When working with or around hazardous chemicals, ALWAYS refer to the appropriate SDS and OSHA/GHS (Global Harmonized System of Classification and Labelling of Chemicals) guidelines for information on allowable personal exposure levels, proper respiratory protection and handling instructions.**
- **If there is a risk of energized electrical contact, arc, or flash, technicians MUST put on all PPE in accordance with OSHA, NFPA 70E, or other country-specific requirements for arc flash protection, PRIOR to servicing the unit. NEVER PERFORM ANY SWITCHING, DISCONNECTING, OR VOLTAGE TESTING WITHOUT PROPER ELECTRICAL PPE AND ARC FLASH CLOTHING. ENSURE ELECTRICAL METERS AND EQUIPMENT ARE PROPERLY RATED FOR INTENDED VOLTAGE.**

⚠ WARNING

Follow EHS Policies!

Failure to follow instructions below could result in death or serious injury.

- **All Trane personnel must follow the company's Environmental, Health and Safety (EHS) policies when performing work such as hot work, electrical, fall protection, lockout/tagout, refrigerant handling, etc. Where local regulations are more stringent than these policies, those regulations supersede these policies.**
- **Non-Trane personnel should always follow local regulations.**

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Table of Contents

Overview

Purpose

The purpose of this document is to provide instructions for integrating the Symbio™ 800 controller into Non-Trane building automation systems. This document is targeted to system integrators and controls contractors.

Symbio 800 Controller Overview

The Trane Chiller includes the Symbio 800 controller. The controller has been installed, programmed, wired, commissioned, and tested in the factory prior to shipment. While some sensors and end devices are normally wired in the field, nearly all other wiring is factory-provided. Power for the controller is provided and connected from within the chiller control panel.

The chiller and associated controller can be applied as standalone or as part of a building automation system.

Note: *For communicating applications to third-party control systems, network communication wiring must be provided by others.*

Communication Options

The Symbio™ 800 controller supports the following communication protocol options for integration to either Trane or Non-Trane control systems:

- BACnet TP
- BACnet Zigbee (Air-Fi)®
- BACnet/IP
  - Ethernet
  - Wi-Fi
- Modbus RTU
- Modbus TCP
- LonTalk

For information pertaining to the integration of the Symbio™ 800 controller using either Modbus or LonTalk communication, refer to the integration guides specific to those applications.

Units of Measure

The communicated data of the Symbio™ 800 controller will be passed in the factory-configured units of measure, either inch-pound (I-P) or the International System of Units (SI). The units of measure are selected as part of the unit order (the default selection is normally I-P). Should the units of measure need to be changed in the field, contact your local Trane representative.

The Symbio 800 controller provides a browser-based user interface for USB connection to the controller. One of the tools provided with that interface allows the user to change and customize the Data Display Units Preferences.

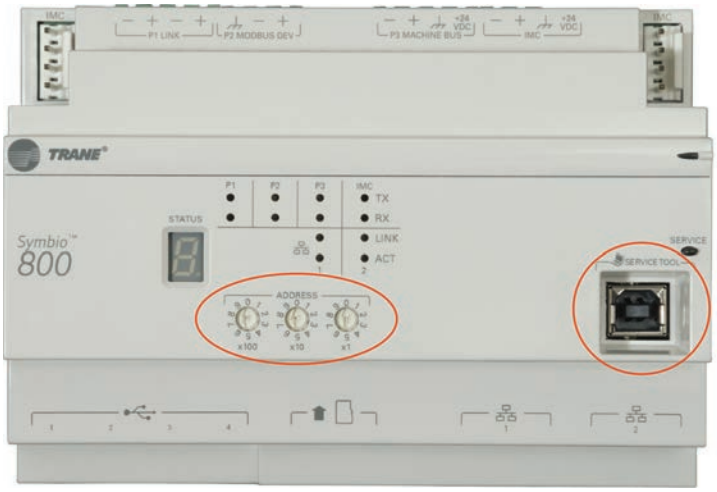
Important: *These adjustable settings are applied only to the units of measured displayed in the web interface, not the communicated interface.*

Regardless of the communicated (system) units of measure, the user may change the displayed units of measure on their smart device. These user preference units of measure are independent of the communicated units.

Communication Setup and Configuration

The Symbio™ 800 controller can be factory ordered with a specific protocol configuration and rotary address setting. If communication options were not specified, the Symbio™ 800 controller will be setup for BACnet TP communications at 76,800 bps with a rotary address setting of 000.

Figure 1. Symbio™ 800 rotary address and service tool port



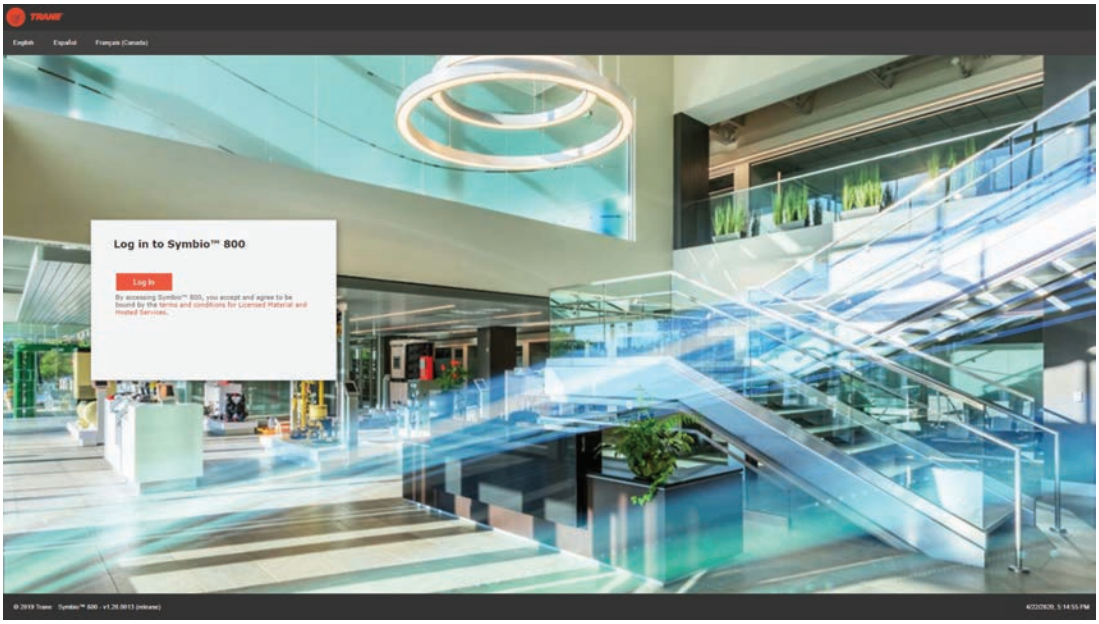
Service Tool for Symbio™ 800 Configuration

The service tool used to modify the Symbio™ 800 controller is a standard web browser. The Symbio™ 800 webpage is accessed by using a standard USB type A/B cable. Connect the USB cable between a laptop and the service tool port on the Symbio™ 800 controller (shown in Figure 1, p. 6).

Connecting to the Symbio™ 800 Web Interface

1. Connect a laptop to the Symbio™ 800 controller using a USB cable.
2. On the laptop, open a web browser to http://198.80.18.1/
3. When the Symbio™ 800 page displays, click **Log In**.

Figure 2. Symbio™ 800 log in screen



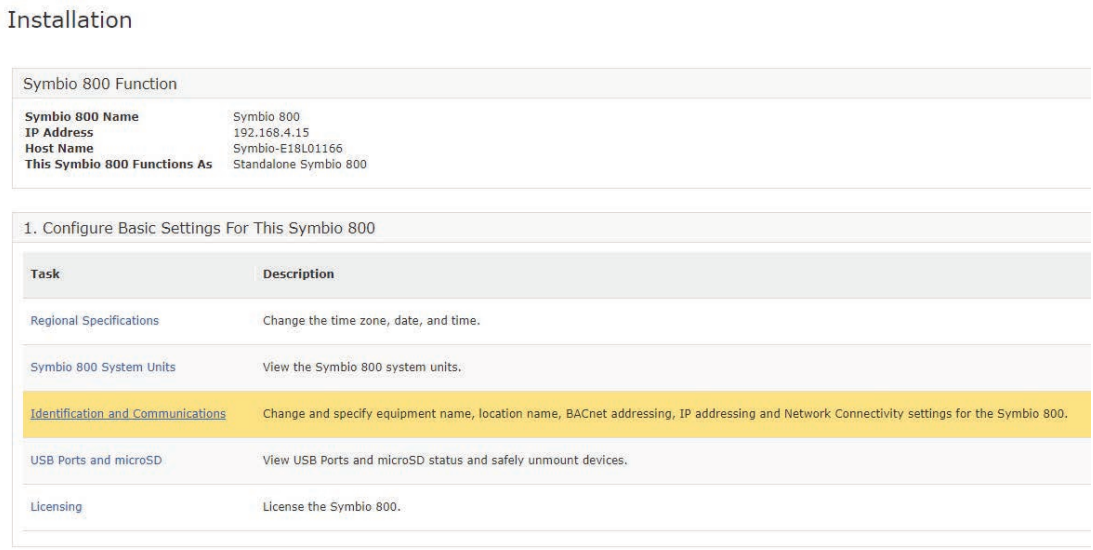
Note: *The Symbio™ 800 web interface can only be viewed using the USB connection. Ethernet port 1 and Ethernet port 2 will not allow access to the Symbio™ web server to meet IT security requirements.*

BACnet Protocol Configuration

To access the Symbio™ 800 Protocol Configuration page:

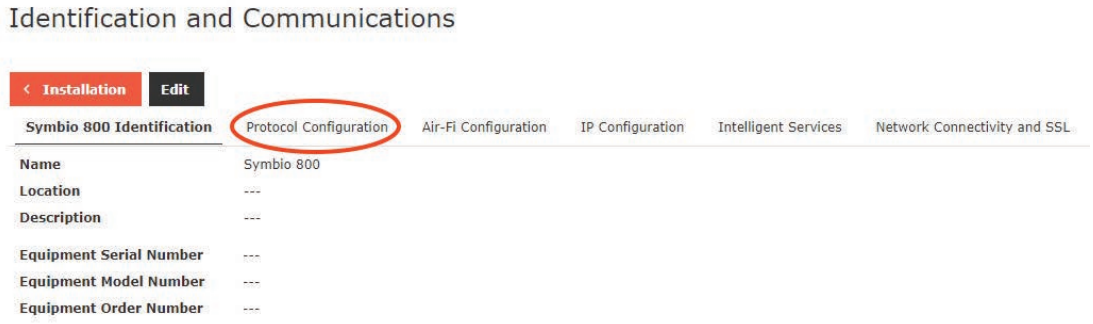
1. Connect to the Symbio™ 800 web interface.
2. On the left-hand navigation, click **Installation**.
3. Click **Identification and Communications**.

Figure 3. Identification and Communications



4. Click the **Protocol Configuration** tab.

Figure 4. Protocol Configuration



5. Click **Edit** to change the Protocol Configuration settings. See the sections below for details on editing BACnet TP, BACnet IP, and BACnet Air-Fi protocols.

BACnet TP Protocol Settings

The rotary address on the Symbio™ 800 controller sets the BACnet TP MAC address. Each BACnet TP device on the same TP link must have a unique MAC address. The valid range of BACnet TP MAC addresses for the Symbio™ 800 is: **001–127**.

Important: *The Symbio™ 800 controller will disable BACnet TP communications if the rotary address is 000!*

Changing the rotary address will immediately take affect and does NOT require a power cycle to

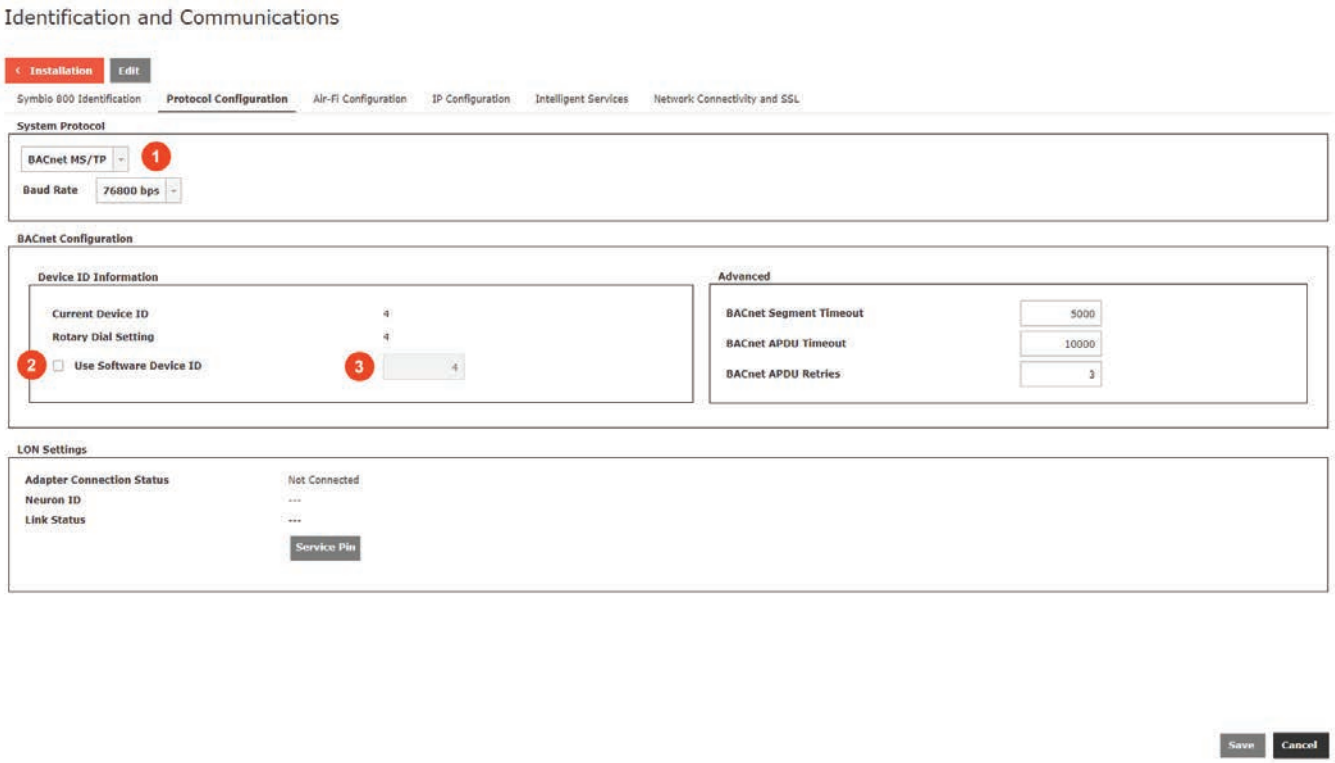
the Symbio™ 800 controller.

The rotary address also sets the BACnet Device ID which gives a range of **1-127.** All BACnet devices must have a unique BACnet Device ID. The Symbio™ 800 BACnet Device ID can also be manually changed using a web browser, the Tracer SC+ system controller, or Tracer TU.

To configure the Symbio™ 800 for BACnet TP protocol:

1. Set the System Protocol drop-down to **BACnet TP**.
2. Verify the **Baud Rate** (default is 76,800 bps). All BACnet TP devices on an TP link must communicate at the same baud rate.
3. Verify the **Current Device ID**. To change the device ID, click **Use Software Device ID** and enter the desired device ID. The valid device ID range using a software device ID is 1–4194302 as defined by the BACnet standard.

Figure 5. BACnet TP protocol settings



The BACnet TP communication wire is connected to the P1 Link. Observe wire polarity when connecting to the + and – terminals. The + terminals and the – terminals are internally connected. The second set of + and – terminals on the P1 Link are used to make it easier to wire the next BACnet TP device in the daisy chain.

Refer to the BACnet standard or BACnet® TP Wiring and Link Performance Best Practices and Troubleshooting guide BAS-SVX51–EN for detailed information on TP wiring.

BACnet/IP (Ethernet or Wi-Fi connectivity)

The Symbio™ 800 controller can communicate BACnet/IP using a standard Ethernet cable or using Wi-Fi (with the optional USB to Wi-Fi adapter).

If using BACnet/IP using a standard Ethernet cable, connect the Ethernet cable with RJ-45 connectors to Ethernet port 1 and the BACnet network. If using BACnet/IP communication using Wi-Fi, the optional USB to Wi-Fi adapter should be connected to one of the USB ports.

Note: *It is strongly recommended to only use the Ethernet 1 connection or the Wi-Fi adapter.*

Set up the IP address of the Symbio™ 800 controller before changing other BACnet/IP

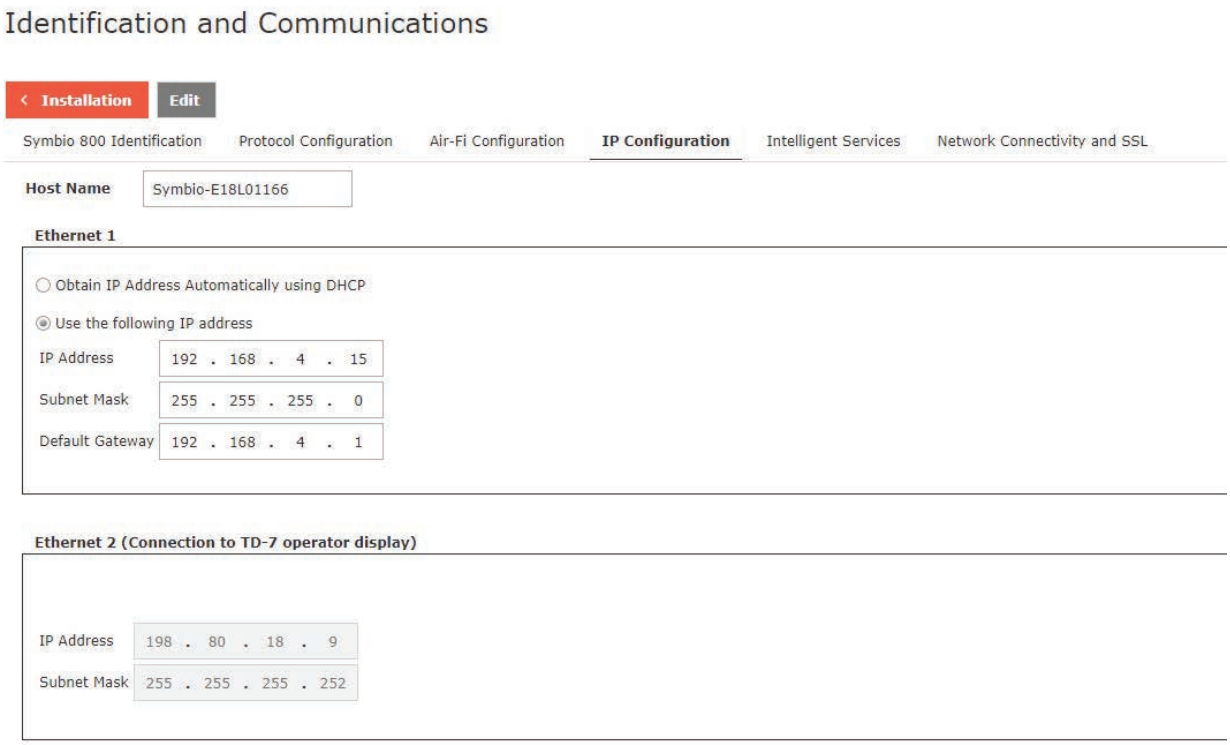
configuration parameters.

1. On the Identification and Communications page, click the **IP Configuration** tab.

Figure 6. IP Configuration tab

2. Click **Edit**.

Figure 7. Edit IP configuration

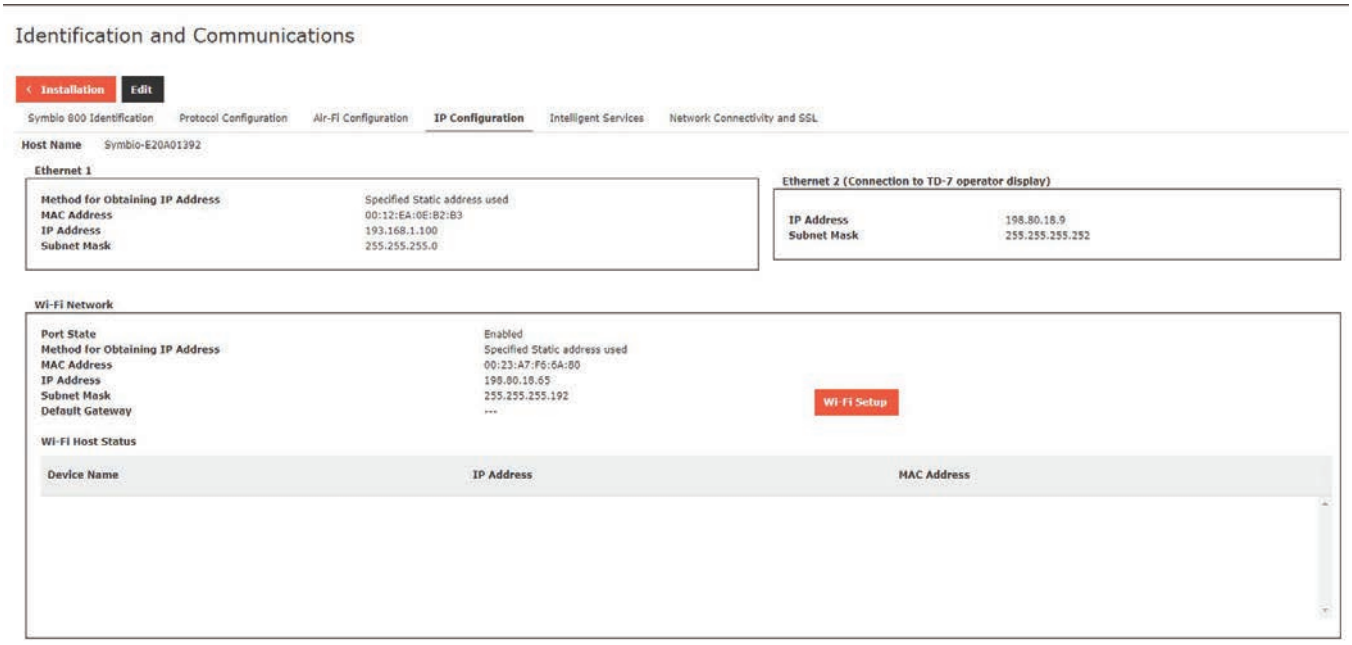


3. For BACnet/IP using Ethernet cable connection only:
   a. Setup the Ethernet 1 port to either **Obtain an IP Address Automatically using DHCP** or use a static IP address by manually entering the IP address, subnet mask, and default.
   b. Set the Preferred IP Interface to **Ethernet 1**.
   c. Setup the DNS section if using a Domain Name System server to identify the Symbio™ 800 controller by host name.
4. For BACnet/IP using the Wi-Fi connection only:
   a. Check **Enable the Wi-Fi network connection** and click **Save**.

Figure 8. Enable Wi-Fi network connection

b. Click **Wi-Fi Setup**.

Figure 9. Wi-Fi Setup



c. Click **Client Mode (Station)** to join an existing Wi-Fi access point. Click **Next**.

d. Select the Wi-Fi network or type the SSID of the hidden access point. Click **Next**.

e. Enter the security parameters for the chosen access point. Contact the local IT

administrator of the chosen access point for security parameters.

f. Click **Finish** and verify connectivity to the access point.

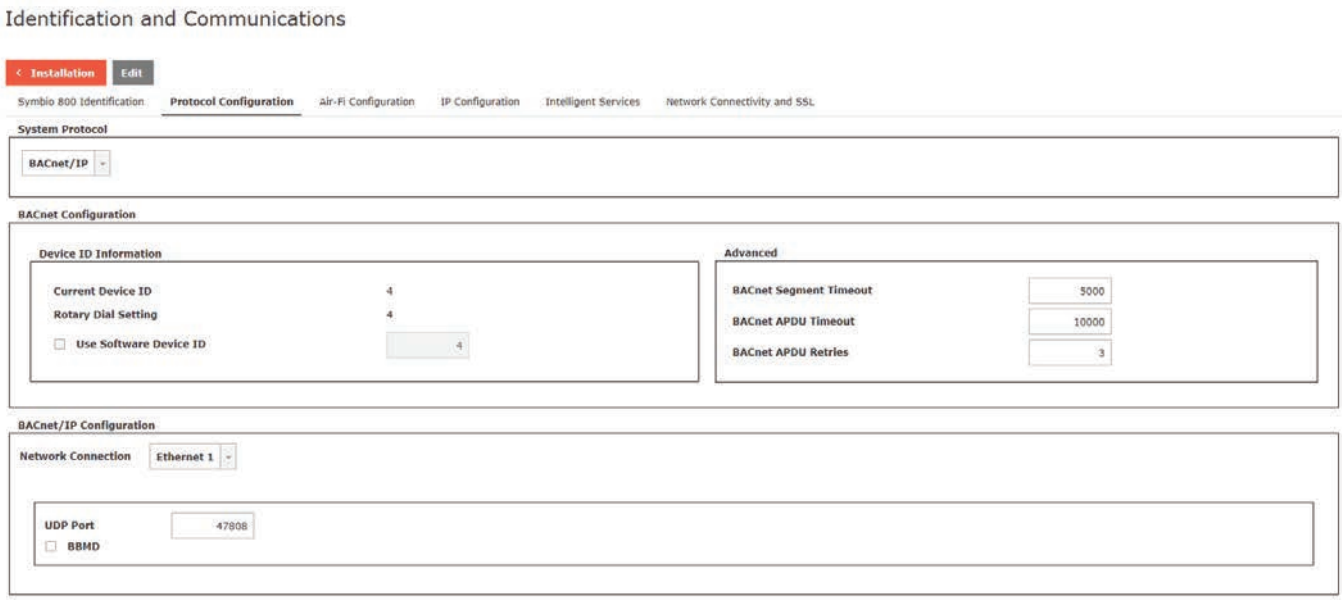
g. Set the Preferred IP Interface to **Wi-Fi Network**.

h. Setup the DNS section if using a Domain Name System server to identify the Symbio™ 800 controller by host name.

Manually Change Symbio™ 800 BACnet Device ID

The rotary address on the Symbio™ 800 controller sets the BACnet Device ID which gives a range of **1-999.** All BACnet devices must have a unique BACnet Device ID. The Symbio™ 800 BACnet Device ID can also be manually changed using a web browser or the Tracer SC+ system controller.

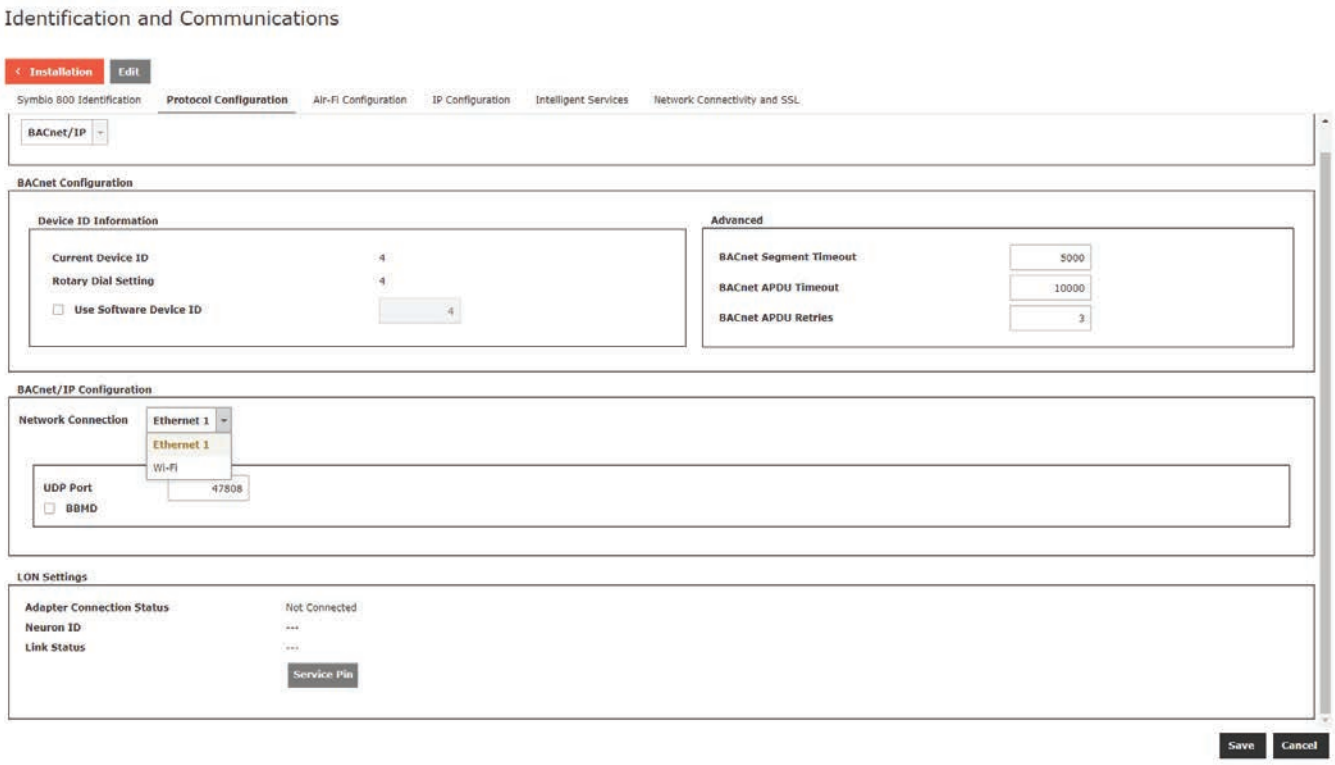
Figure 10. Protocol Configuration



1. Set the System Protocol drop down to **BACnet/IP**.
2. Verify the current Device ID. To change the Device ID, click **Use Software Device ID** and enter the desired Device ID. Most installations will not need to manually change the BACnet Device ID.

   Note: *The valid Device ID range using a software Device ID is 1 – 4194302 as defined by the BACnet standard.*
3. If using an Ethernet cable, set the Network Connection to **Ethernet 1**. If using the USB to Wi-Fi adapter, set the Network Connection to **Wi-Fi**.

Figure 11. Network Connection



4. Set the UDP Port to match the port number used by the BACnet/IP network. The default is 47808.
5. Check the BBMD checkbox only if the Symbio™ 800 controller is the only BACnet/IP device on the IP subnet.
   a. If a change to the BBMD checkbox was made, click **Save** and refresh the web browser. If BBMD functionality is enabled, the BDT setup button displays.

Figure 12. BDT setup

   b. If BBMD functionality is enabled, click **BDT Setup** to set up the BACnet Distribution Table (BDT). The IP addresses of all BBMDs in the BACnet intranetwork should be in the BDT. and all BBMDs should have the same BDT entries.

   Important: *A strong knowledge of BACnet networking is needed to properly setup BBMD and BDT functionality.*

   For additional information on BBMDs and BDTs, refer to the BACnet specification or your local Trane office.

Air-Fi® Wireless

Air-Fi Wireless – Conforms to ANSI/ASHRAE Standard 135-2016 (BACnet®/ZigBee®[1]). Air-Fi Wireless provides reliable and secure, and location-flexible communication between equipment controls, sensors, and service tools to the system controller.

Air-Fi networks will be setup by a Trane technician. Integration to a Symbio™ 800 controller setup for Air-Fi communications uses BACnet/IP communication through a Tracer SC+ system controller. Contact your local Trane office for additional information if the Symbio™ 800 controller is setup for Air-Fi Wireless.

1. *ZigBee is a registered trademark of the ZigBee Alliance.*

BACnet Points List

Object Naming Conventions

The communicated points for the Symbio™ controllers are generally named according to their function. While many of the points are read-only, others include both read and write capability. The established naming convention helps to identify the capabilities of each point. For most points, the suffix identifies the capability according to the following definition.

While there are some exceptions, the majority of the points have been defined according to these guidelines.

Suffix	Description
Status	Points with the Status suffix are defined as read-only. The status point reports the value being used by the controller.
Local	Points with the Local suffix are defined as read-only. The local point reports values associated with controller sensors, both wired and wireless. The local value may or may not be actively used by the controller, depending on the presence or absence of a communicated value (BAS). When both a local and communicated value exist, the communicated value is used.
Active	Points with the Active suffix are defined as read-only. Points designated as active are normally the result of the arbitration between a communicated value (BAS) and at least one value local to the equipment, such as a sensor or default setpoint. The active point reports the value being used by the controller.
Setpoint	Points with the Setpoint suffix are defined as either read-only or read/write. For BACnet, the binary input, analog input and multi-state input points are all read-only. These setpoints report the value currently in use by the controller. The analog value, binary value and multi-state value points are all read/write. These points are provided for use by the building automation system (BAS). When used, these points are written internally to arbitration logic. This defines the interaction with hardwired points, editable software configuration points and the relinquish default value/state. Refer to the Appendix for additional information.
Input	Points with the Input suffix are defined as read-only. These points normally reflect the status of a sensor input, either hardwired or communicating wirelessly (Air-Fi). However, the input point reflects the arbitrated result of the controller sensor input and a communicated value, if present. When both a controller sensor and communicated value exist, the controller will use and report the communicated value.
Arbitrator	Points with the "Arbitrator" suffix are to be used as read-only. The arbitrator prioritizes inputs from communicating points, hardwired points and stored defaults points. The priority array of the arbitration point displays each of the values provided, including the active status, indicating which of the input sources is being used. Refer to the Appendix for additional information.
BAS	Points with the BAS suffix are defined as read/write. These points are provided for use by the building automation system (BAS). When used, these points are written to arbitration logic. This defines the interaction with hardwired points, editable software configuration points and the relinquished default value/state. Refer to the Appendix for additional information.
Command	Points with the Command suffix are defined as read/write. These points are written to change the default behavior of the controller. Once written, these point values may be persisted.
Request	Points with the Request suffix are defined as read/write. These points are written to change the operating behavior of the controller.

Object Data Points and Diagnostic Data Points

The following tables are sorted as follows:

- Tables are listed by input/output type and sorted by object identifier. These tables provide the user with the units type for each object type.

- Tables are sorted by object name and provide a complete list of object names, types, values/ranges, and descriptions.

Note: *Not all points are available to the user. The available data points are defined during self-configuration and are dependent on the type of equipment.*

ACRB 150–300 Tons Data Points

Table 1. ACRB 150–300 tons analog inputs

Object Identifier	Object Name	Description	Units
AI-10100	Active Chilled Water Setpoint	Indicates the value of the active Chilled Water Setpoint actively being used by the chiller	Degrees Fahrenheit
AI-10101	Evaporator Entering Water Temperature	Indicates the current temperature of the water entering the evaporator	Degrees Fahrenheit
AI-10102	Evaporator Leaving Water Temperature	Indicates the current temperature of the water leaving the evaporator	Degrees Fahrenheit
AI-10103	Calculated Chiller Capacity	Indicates the capacity the chiller is currently using	Tons of Refrigeration
AI-10104	Active Demand Limit Setpoint	Indicates the demand limit setpoint value actively being used by the chiller	Percent
AI-10105	Unit Power Consumption	Indicates the measurement of the power being consumed by the Chiller	Kilowatts
AI-10106	Outdoor Air Temperature	Indicates the current temperature of the outdoor air	Degrees Fahrenheit
AI-10107	Evaporator Refrigerant Pressure Circuit 1	Indicates the current pressure of the refrigerant in the evaporator on circuit 1	Pound Force per Square Inch
AI-10108	Condenser Refrigerant Pressure Circuit 1	Indicates the current pressure of the refrigerant in the condenser on circuit 1	Pound Force per Square Inch
AI-10109	Differential Refrigerant Pressure Circuit 1	Indicates the pressure difference between the suction and discharge lines on circuit 1	Pound Force per Square Inch
AI-10110	Evaporator Saturated Refrigerant Temperature Circuit 1	Indicates the saturated_x000D_ refrigerant temperature of the evaporator on circuit 1	Degrees Fahrenheit
AI-10111	Condenser Saturated Refrigerant Temperature Circuit 1	Indicates the saturated_x000D_ refrigerant temperature of the condenser on circuit 1	Degrees Fahrenheit
AI-10112	Evaporator Refrigerant Pressure Circuit 2	Indicates the current pressure of the refrigerant in the evaporator on circuit 2	Pound Force per Square Inch
AI-10113	Condenser Refrigerant Pressure Circuit 2	Indicates the current pressure of the refrigerant in the condenser on circuit 2	Pound Force per Square Inch
AI-10114	Differential Refrigerant Pressure Circuit 2	Indicates the pressure difference between the suction and discharge lines on circuit 2	Pound Force per Square Inch
AI-10115	Evaporator Saturated Refrigerant Temperature Circuit 2	Indicates the saturated_x000D_ refrigerant temperature of the evaporator on circuit 2	Degrees Fahrenheit
AI-10116	Condenser Saturated Refrigerant Temperature Circuit 2	Indicates the saturated_x000D_ refrigerant temperature of the condenser on circuit 2	Degrees Fahrenheit
AI-10117	Refrigerant Discharge Temperature - Compressor 1A	Indicates the current temperature of the refrigerant being discharged from Compressor 1A	Degrees Fahrenheit
AI-10118	Oil Pressure - Compressor 1A	Indicates the pressure of the oil on the high pressure side of Compressor 1A	Pound Force per Square Inch
AI-10119	Refrigerant Discharge Temperature - Compressor 2A	Indicates the current temperature of the refrigerant being discharged from Compressor 2A	Degrees Fahrenheit
AI-10120	Oil Pressure - Compressor 2A	Indicates the pressure of the oil on the high pressure side of Compressor 2A	Pound Force per Square Inch
AI-10121	Air Flow Percentage Circuit 1	Indicates the approximate air flow percentage of Circuit 1	Percent
AI-10122	Air Flow Percentage Circuit 2	Indicates the approximate air flow percentage of Circuit 2	Percent
AI-10123	Starts - Compressor 1A	Indicates the number of starts of Compressor 1A	No Units
AI-10124	Run Time - Compressor 1A	Indicates the run time of Compressor 1A, in hours	Hours
AI-10125	Compressor 1A Speed Status	Indicates the % of the available speed being used by Compressor 1A	Percent
AI-10126	Motor Winding Temperature 1 Circuit 1	Indicates the first temperaure sensor of the windings on motor 1A	Degrees Fahrenheit
AI-10127	Motor Winding Temperature 2 Circuit 1	Indicates the second temperaure sensor of the windings on motor 1A	Degrees Fahrenheit
AI-10128	Drive Motor Current U RLA Compressor 1A	Indicates the measurement of Line 1 current at AFD for Compressor 1A in terms of % RLA	Percent
AI-10129	Drive Motor Current V RLA Compressor 1A	Indicates the measurement of Line 2 current at AFD for Compressor 1A in terms of % RLA	Percent
AI-10130	Drive Motor Current W RLA Compressor 1A	Indicates the measurement of Line 3 current at AFD for Compressor 1A in terms of % RLA	Percent
AI-10131	Drive Motor Average Current RLA Compressor 1A	Indicates the average current at AFD for Compressor 1A in terms of % RLA	Percent

Table 1. ACRB 150–300 tons analog inputs (continued)

Object Identifier	Object Name	Description	Units
AI-10132	Drive Motor Current U Compressor 1A	Indicates the measurement of Line 1 current at AFD for Compressor 1A in terms of Amps	Amps
AI-10133	Drive Motor Current V Compressor 1A	Indicates the measurement of Line 2 current at AFD for Compressor 1A in terms of Amps	Amps
AI-10134	Drive Motor Current W Compressor 1A	Indicates the measurement of Line 3 current at AFD for Compressor 1A in terms of Amps	Amps
AI-10135	Drive Motor Voltage UV Circuit 1	Indicates the measurement of voltage between Line 1 to 2 at the AFD for Compressor 1A	Volts
AI-10136	Drive Motor Voltage VW Circuit 1	Indicates the measurement of voltage between Line 2 to 3 at the AFD for Compressor 1A	Volts
AI-10137	Drive Motor Voltage WU Circuit 1	Indicates the measurement of voltage between Line 3 to 1 at the AFD for Compressor 1A	Volts
AI-10138	Drive Motor Average Voltage Circuit 1	Indicates the average voltage line to line at AFD for Compressor 1A	Volts
AI-10139	Drive DC Bus Voltage Circuit 1	Indicates the voltage of the DC Bus from the AFD for Compressor 1A	Volts
AI-10140	Drive Output Power Circuit 1	Indicates the power output from the AFD for Compressor 1A	Kilowatts
AI-10141	Drive Input Power Circuit 1	Indicates the power input for the AFD for Compressor 1A	Kilowatts
AI-10142	Drive Line Average Voltage Circuit 1	Indcates the average input voltage at the AFD for Compressor 1A	Volts
AI-10143	Drive Average Line Current Circuit 1	Indcates the average input current at the AFD for Compressor 1A	Amps
AI-10144	Drive Line Frequency Circuit 1	Indicates the estimated input frequency at the AFD for Compressor 1A	feet per second per second
AI-10145	AFD Frequency Circuit 1	Indicates the frequency at the stator for AFD for Compressor 1A	feet per second per second
AI-10146	AFD Transistor Temperature Circuit 1	Indicates the temperature of the transistor for the AFD for Compressor 1A	Degrees Fahrenheit
AI-10147	Drive Inverter Base Temperature Circuit 1	Indicates the temperature of the inverter base for the AFD for Compressor 1A	Degrees Fahrenheit
AI-10148	Drive Rectifier Base Temperature Circuit 1	Indicates the temperature of the rectifier base for the AFD for Compressor 1A	Degrees Fahrenheit
AI-10149	Starts - Compressor 2A	Indicates the number of starts of Compressor 2A	No Units
AI-10150	Run Time - Compressor 2A	Indicates the run time of_x000D_ Compressor 2A, in hours	Hours
AI-10151	Compressor 2A Speed Status	Indicates the % of the available speed being used by Compressor 2A	Percent
AI-10152	Motor Winding Temperature 1 Circuit 2	Indicates the first temperaure sensor of the windings on motor 2A	Degrees Fahrenheit
AI-10153	Motor Winding Temperature 2 Circuit 2	Indicates the second temperaure sensor of the windings on motor 2A	Degrees Fahrenheit
AI-10154	Drive Motor Current U RLA Compressor 2A	Indicates the measurement of Line 1 current at AFD for Compressor 2A in terms of % RLA	Percent
AI-10155	Drive Motor Current V RLA Compressor 2A	Indicates the measurement of Line 2 current at AFD for Compressor 2A in terms of % RLA	Percent
AI-10156	Drive Motor Current W RLA Compressor 2A	Indicates the measurement of Line 3 current at AFD for Compressor 2A in terms of % RLA	Percent
AI-10157	Drive Motor Average Current RLA Compressor 2A	Indicates the average current at AFD for Compressor 2A in terms of % RLA	Percent
AI-10158	Drive Motor Current U Compressor 2A	Indicates the measurement of Line 1 current at AFD for Compressor 2A in terms of Amps	Amps
AI-10159	Drive Motor Current V Compressor 2A	Indicates the measurement of V line current at AFD for Compressor 2A in terms of Amps	Amps
AI-10160	Drive Motor Current W Compressor 2A	Indicates the measurement of W line current at AFD for Compressor 2A in terms of Amps	Amps
AI-10161	Drive Motor Voltage UV Circuit 2	Indicates the measurement of voltage between Line 1 to 2 at AFD for Compressor 2A	Volts
AI-10162	Drive Motor Voltage VW Circuit 2	Indicates the measurement of voltage between Line 2 to 3 at AFD for Compressor 2A	Volts
AI-10163	Drive Motor Voltage WU Circuit 2	Indicates the measurement of voltage between Line 3 to 1 at AFD for Compressor 2A	Volts
AI-10164	Drive Motor Average Voltage Circuit 2	Indicates the average voltage line to line at AFD for Compressor 2A	Volts
AI-10165	Drive DC Bus Voltage Circuit 2	Indicates the voltage of the DC Bus from the AFD for Compressor 2A	Volts
AI-10166	Drive Output Power Circuit 2	Indicates the power output from the AFD for Compressor 2A	Kilowatts
AI-10167	Drive Input Power Circuit 2	Indicates the power input for the AFD for Compressor 2A	Kilowatts
AI-10168	Drive Line Average Voltage Circuit 2	Indicates the average input voltage at the AFD for Compressor 2A	Volts

Table 1. ACRB 150–300 tons analog inputs (continued)

Object Identifier	Object Name	Description	Units
AI-10169	Drive Average Line Current Circuit 2	Indicates the average input current at the AFD for Compressor 2A	Amps
AI-10170	Drive Line Frequency Circuit 2	Indicates the estimated input frequency at the AFD for Compressor 2A	feet per second per second
AI-10171	AFD Frequency Circuit 2	Indicates the frequency at the stator for AFD for Compressor 2A	feet per second per second
AI-10172	AFD Transistor Temperature Circuit 2	Indicates the temperature of the transidtor for the AFD for Compressor 2A	Degrees Fahrenheit
AI-10173	Drive Inverter Base Temperature Circuit 2	Indicates the temperature of the inverter base for the AFD for Compressor 2A	Degrees Fahrenheit
AI-10174	Drive Rectifier Base Temperature Circuit 2	Indicates the temperature of the rectifier base for the AFD for Compressor 2A	Degrees Fahrenheit
AI-10175	Number Of Circuits	Indicates the number of refrigeration circuits in the chiller	No Units
AI-10176	Number Of Compressors Circuit 1	Indicates the number of compressors on circuit 1 of the chiller	No Units
AI-10177	Number Of Compressors Circuit 2	Indicates the number of compressors on circuit 2 of the chiller	No Units
AI-10178	Free Cooling Capacity	Indicates the % capacity of the free cooling being used	Percent
AI-10179	Free Cooling Entering Water Temperature	Indiactes the entering water temperature of the free cooling circuit	Degrees Fahrenheit
AI-10180	Energy Consumption Lifetime	Indicates the total energy consumption of the chiller (for the lifetime of the chiller)	Kilowatts hour
AI-10181	Energy Consumption	Indicates the total energy consumption of the chiller (since last accumulation reset)	Kilowatts hour
AI-10182	Unit Source ID	Indicates the last diagnostic of the chiller Separately, individual diagnostics are reported with dedicated points, variables, registers	No Units
AI-10183	Chiller Design Capacity	Indicates the design capacity of chilller	Tons of Refrigeration
AI-10184	Active Cool/Heat Setpoint Temperature	Indicates the value of the active Chilled Water Setpoint actively being used by the chiller	Degrees Fahrenheit
AI-10185	Actual Running Capacity	Indicates the measurement of the power being consumed by the Chiller	Percent

Table 2. ACRB 150–300 tons analog values

Object Identifier	Object Name	Description	Units
AV-10100	BAS Chilled Water Setpoint	The value is normally provided by the BAS to send the Chilled Water Setpoint. The value is subject to arbitration logic in the controller, in which case it may or may not be used for control purposes	Degrees Fahrenheit
AV-10101	BAS Demand Limit Setpoint	The value is normally provided by the BAS to send the Demand Limit Setpoint. The value is subject to arbitration logic in the controller, in which case it may or may not be used for control purposes	Percent

Table 3. ACRB 150–300 tons binary inputs

Object Identifier	Object Name	Description	Object States
BI-10100	Run Enable	Indicates that chiller is available to run or is currently running	0 = Run Not Enabled 1 = Run Enabled
BI-10101	Local Setpoint Control	Indicates the which setpoint is used for control purposes, Remote (BAS) or Local	0 = Remote control 1 = Local control
BI-10102	Limit Mode Relay Status	Indicates the status of the chiller limit relay	0 = Off 1 = On
BI-10103	Chiller Running State	Indicates whether the chiller is on (currently doing either cooling) or is considered off(not currently doing cooling)	0 = Off 1 = On
BI-10104	Maximum Capacity	Indicates the status of the maximum capacity relay	0 = Off 1 = On
BI-10105	Evaporator Water Pump Command	Indicates a request from the chiller to turn on the Evaporator Water Pump	0 = Off 1 = On
BI-10106	Evaporator Water Flow Status	Indicates the flow of water through evaporator	0 = No Flow 1 = Flow
BI-10107	Manual Override Exists	Indicated a manual override is present	0 = Off 1 = On

Table 3. ACRB 150–300 tons binary inputs (continued)

Object Identifier	Object Name	Description	Object States
BI-10108	Emergency Stop	Indicates the status of the emergency stop function of the chiller	0 = Auto 1 = Emergency Stop - Manual Reset Required
BI-10109	Diagnostic Present	Indicates whether diagnostic present	0 = Normal 1 = In Alarm
BI-10110	Diagnostic Shutdown Present	Indicates chiller is shut down due to diagnostics	0 = Normal 1 = In Alarm
BI-10111	Diagnostic: Manual Reset Required	Indicates when a diagnostic exists that requires manual reset	0 = Normal 1 = In Alarm
BI-10112	Diagnostic: Local Manual Reset Required	Indicates when a diagnostic exists that requires manual reset [Local only]	0 = Normal 1 = In Alarm
BI-10113	Diagnostic Present: Information	Indicates whether diagnostic present with Information Category	0 = Normal 1 = In Alarm
BI-10114	Diagnostic Present: Advisory	Indicates whether diagnostic present with Warning Category	0 = Normal 1 = In Alarm
BI-10115	Diagnostic Present: Critical	Indicates whether diagnostic present with Critical Category	0 = Normal 1 = In Alarm
BI-10116	Diagnostic Present: Service Required	Indicates whether diagnostic present with Service Required Category	0 = Normal 1 = In Alarm
BI-10117	Compressor 1A Running Status	Indicates running state fo Compressor 1A	0 = Off 1 = Running
BI-10118	Compressor 2A Running Status	Indicates running state fo Compressor 2A	0 = Off 1 = Running
BI-10119	Free Cooling Active	Indicated the free cooling mode is active	0 = Inactive 1 = Active
BI-10120	External Auto Stop Status	Indicates the status of the externally-wired auto/stop input	0 = Stop 1 = Auto
BI-10121	Front Panel Auto Stop Status	Indicates the auto/stop status of the Front Panel	0 = Stop 1 = Auto
BI-10122	Noise Reduction Request Active	Indicates wherther Noise Reduction active	0 = Off 1 = On

Table 4. ACRB 150–300 tons binary values

Object Identifier	Object Name	Description	Object States
BV-10100	Reset Diagnostic	Normally used by the BMS to initiate a request to reset any controller diagnostics	0 = Normal 1 = Reset
BV-10101	Noise Reduction Request BAS	Normally used by the BMS to command the chiller to enter a mode of operation where the noise of the unit is reduced	0 = Normal 1 = Reduce Noise
BV-10102	Chiller Auto Stop Command BAS	Normally used by the BMS to command the chiller to start running if operating conditions are satisfied, or to stop the chiller from running.	0 = Stop 1 = Auto
BV-10103	Free Cooling Auto Stop Command BAS	Normally used the BMS to command the chiller to allow free cooling mode if conditions are satisfied, or to stop the free cooling mode from operating.	0 = Stop 1 = Auto
BV-10104	Free Cooling Compressor Lockout	Normally used by the BMS to lockout the Compressor while in free cooling mode	0 = Normal 1 = Locked Out
BV-10105	Circuit 1 Lockout BAS	Normally used by the BMS to lockout the Circuit-1 Compressor	0 = Normal 1 = Locked Out
BV-10106	Circuit 2 Lockout BAS	Normally used by the BMS to lockout the Circuit-2 Compressor	0 = Normal 1 = Locked Out
BV-10107	Energy Consumption Reset	Normally used by the BMS to reset the energy consumption accumulated total	0 = Accumulating 1 = Reset

Table 5. ACRB 150–300 tons multi-state inputs

Object Identifier	Object Name	Description	Object States
MI-10100	Running Mode	Indicates the running state of the chiller	1 = Chiller Off 2 = Chiller In Start Mode 3= Chiller In Run Mode 4= Chiller In Pre-Shutdown Mode 5 = Chiller In Service Mode
MI-10101	Operating Mode	Indicates the operating mode of the chiller	1 = Cool 2 = Heat 3= Ice Making 4= Free Cooling

Table 5. ACRB 150–300 tons multi-state inputs (continued)

MI-10102	Refrigerant Type	Indicates the chiller refrigerant type	1 = R-11 2 = R-12 3= R-22 4= R-123 5 = R-134a 6 = R-407C 7 = R-410A 8 = R-113 9 = R-114 10 = R-500 11 = R-502 12 = R-404A 13 = R-513A 14 = R-1233zd(E) 15 = R-514A 16 = R-1234ze(E)
MI-10103	Cooling Type	Indicates the cooling Type of chiller	1 = Water Cooled 2 = Air Cooled
MI-10104	Manufacture Location	Indicates the location that the chiller was manufactured	1 = Field Applied 2 = La Crosse 3= Pueblo 4= Charmes 5 = Rushville 6 = Macon 7 = Waco 8 = Lexington 9 = Forsyth 10 = Clarksville 11 = Ft. Smith 12 = Penang 13 = Colchester 14 = Curitiba 15 = Taicang 16 = Taiwan 17 = Epinal 18 = Golbey

Table 5. ACRB 150–300 tons multi-state inputs (continued)

MI-10105	Model Information [GEN2]	Indicates the model information of chiller	1 = CVHF 2 = CVGF 3= CVHS 4= RTAE 5 = RTAF 6 = RTHA 7 = RTHB 8 = RTHC 9 = RTHD 10 = RTWE 11 = CTVD 12 = CVR 13 = CVHH 14 = CDHH 15 = VMAX 16 = GVAF 17 = RTWF 18 = RTHF 19 = RTAC 20 = CVHM 21 = RTAG 22 = CGAF 23 = RTXG 24 = GVWF 25 = HDWA 26 = CMAC 27 = IPAK 28 = CXAF 29 = ACSA 30 = RTSF 31 = HSWA 32 = ACRA 33 = RTEG 34 = ACXA 35 = CMAF 36 = ACRB Large 37 = ACRB Small
MI-10106	Chiller Setpoint Source	Indicates the selected setpoint source for control purpose	1 = BAS 2 = External 3 = Front Panel

Table 6. ACRB 150–300 tons multi-state values

Object Identifier	Object Name	Description	Object States
MV-10100	BAS Chiller Mode Command	Normally used by the BMS to command the chiller Mode	1 = Cool 2 = Heat 3= Ice Making 4= Free Cooling

ACRB 350–500 Tons Data Points

Table 7. ACRB 350–500 tons analog inputs

Object Identifier	Object Name	Description	Units
AI-10100	Active Chilled Water Setpoint	Indicates the value of the active Chilled Water Setpoint actively being used by the chiller	Degrees Fahrenheit
AI-10101	Active Demand Limit Setpoint	Indicates the demand limit setpoint value actively being used by the chiller	Percent
AI-10101	Active Demand Limit Setpoint	Indicates the demand limit setpoint value actively being used by the chiller	Percent
AI-10103	Evaporator Entering Water Temperature	Indicates the current temperature of the water entering the evaporator	Degrees Fahrenheit
AI-10104	Evaporator Leaving Water Temperature	Indicates the current temperature of the water leaving the evaporator	Degrees Fahrenheit
AI-10106	Unit Power Consumption	Indicates the measurement of the power being consumed by the Chiller	Kilowatts
AI-10107	Outdoor Air Temperature	Indicates the current temperature of the outdoor air	Degrees Fahrenheit
AI-10110	Evaporator Refrigerant Pressure Circuit 1	Indicates the current pressure of the refrigerant in the evaporator on circuit 1	Pound Force per Square Inch

Table 7. ACRB 350–500 tons analog inputs (continued)

Object Identifier	Object Name	Description	Units
AI-10111	Condenser Refrigerant Pressure Circuit 1	Indicates the current pressure of the refrigerant in the condenser on circuit 1	Pound Force per Square Inch
AI-10112	Differential Refrigerant Pressure Circuit 1	Indicates the pressure difference between the suction and discharge lines on circuit 1	Pound Force per Square Inch
AI-10113	Evaporator Saturated Refrigerant Temperature Circuit 1	Indicates the saturated_x000D_ refrigerant temperature of the evaporator on circuit 1	Degrees Fahrenheit
AI-10114	Condenser Saturated Refrigerant Temperature Circuit 1	Indicates the saturated_x000D_ refrigerant temperature of the condenser on circuit 1	Degrees Fahrenheit
AI-10115	Evaporator Refrigerant Pressure Circuit 2	Indicates the current pressure of the refrigerant in the evaporator on circuit 2	Pound Force per Square Inch
AI-10116	Condenser Refrigerant Pressure Circuit 2	Indicates the current pressure of the refrigerant in the condenser on circuit 2	Pound Force per Square Inch
AI-10117	Differential Refrigerant Pressure Circuit 2	Indicates the pressure difference between the suction and discharge lines on circuit 2	Pound Force per Square Inch
AI-10118	Evaporator Saturated Refrigerant Temperature Circuit 2	Indicates the saturated_x000D_ refrigerant temperature of the evaporator on circuit 2	Degrees Fahrenheit
AI-10119	Condenser Saturated Refrigerant Temperature Circuit 2	Indicates the saturated_x000D_ refrigerant temperature of the condenser on circuit 2	Degrees Fahrenheit
AI-10120	Refrigerant Discharge Temperature - Compressor 1A	Indicates the current temperature of the refrigerant being discharged from Compressor 1A	Degrees Fahrenheit
AI-10121	High Side Oil Pressure - Compressor 1A	Indicates the pressure of the oil on the high pressure side of Compressor 1A	Pound Force per Square Inch
AI-10122	Refrigerant Discharge Temperature - Compressor 2A	Indicates the current temperature of the refrigerant being discharged from Compressor 2A	Degrees Fahrenheit
AI-10123	High Side Oil Pressure - Compressor 2A	Indicates the pressure of the oil on the high pressure side of Compressor 2A	Pound Force per Square Inch
AI-10124	Air Flow Percentage Circuit 1	Indicates the approximate air flow percentage of Circuit 1	Percent
AI-10125	Air Flow Percentage Circuit 2	Indicates the approximate air flow percentage of Circuit 2	Percent
AI-10126	Drive Motor Average Voltage Circuit 1	Indicates the average voltage line to line at AFD for Compressor 1A	Volts
AI-10127	Drive Motor Current U Circuit 1	Indicates the measurement of Line 1 current at AFD for Compressor 1A in terms of Amps	Amps
AI-10128	Drive Motor Current V Circuit 1	Indicates the measurement of Line 2 current at AFD for Compressor 1A in terms of Amps	Amps
AI-10129	Drive Motor Current W Circuit 1	Indicates the measurement of Line 3 current at AFD for Compressor 1A in terms of Amps	Amps
AI-10130	Drive Motor Current U RLA Circuit 1	Indicates the measurement of Line 1 current at AFD for Compressor 1A in terms of % RLA	Percent
AI-10131	Drive Motor Current V RLA Circuit 1	Indicates the measurement of Line 2 current at AFD for Compressor 1A in terms of % RLA	Percent
AI-10132	Drive Motor Current W RLA Circuit 1	Indicates the measurement of Line 3 current at AFD for Compressor 1A in terms of % RLA	Percent
AI-10133	Drive Motor Average Current RLA Circuit 1	Indicates the average current at AFD for Compressor 1A in terms of % RLA	Percent
AI-10134	Drive DC Bus Voltage Circuit 1	Indicates the voltage of the DC Bus from the AFD for Compressor 1A	Volts
AI-10135	Drive Output Power Circuit 1	Indicates the power output from the AFD for Compressor 1A	Kilowatts
AI-10136	AFD Transistor Temperature Circuit 1	Indicates the temperature of the transistor for the AFD for Compressor 1A	Degrees Fahrenheit
AI-10137	Motor Winding Temperature 1 Circuit 1	Indicates the first temperaure sensor of the windings on motor 1A	Degrees Fahrenheit
AI-10138	Motor Winding Temperature 2 Circuit 1	Indicates the second temperaure sensor of the windings on motor 1A	Degrees Fahrenheit
AI-10139	Drive Motor Average Voltage Circuit 2	Indicates the average voltage line to line at AFD for Compressor 2A	Volts
AI-10140	Drive Motor Current U Circuit 2	Indicates the measurement of Line 1 current at AFD for Compressor 2A in terms of Amps	Amps
AI-10141	Drive Motor Current V Circuit 2	Indicates the measurement of V line current at AFD for Compressor 2A in terms of Amps	Amps
AI-10142	Drive Motor Current W Circuit 2	Indicates the measurement of W line current at AFD for Compressor 2A in terms of Amps	Amps
AI-10143	Drive Motor Current U RLA Circuit 2	Indicates the measurement of Line 1 current at AFD for Compressor 2A in terms of % RLA	Percent
AI-10144	Drive Motor Current V RLA Circuit 2	Indicates the measurement of Line 2 current at AFD for Compressor 2A in terms of % RLA	Percent
AI-10145	Drive Motor Current W RLA Circuit 2	Indicates the measurement of Line 3 current at AFD for Compressor 2A in terms of % RLA	Percent
AI-10146	Drive Motor Average Current RLA Circuit 2	Indicates the average current at AFD for Compressor 2A in terms of % RLA	Percent
AI-10147	Drive DC Bus Voltage Circuit 2	Indicates the voltage of the DC Bus from the AFD for Compressor 2A	Volts
AI-10148	Drive Output Power Circuit 2	Indicates the power output from the AFD for Compressor 2A	Kilowatts
AI-10149	AFD Transistor Temperature Circuit 2	Indicates the temperature of the transidtor for the AFD for Compressor 2A	Degrees Fahrenheit

Table 7. ACRB 350–500 tons analog inputs (continued)

Object Identifier	Object Name	Description	Units
AI-10150	Motor Winding Temperature 1 Circuit 2	Indicates the first temperaure sensor of the windings on motor 2A	Degrees Fahrenheit
AI-10151	Motor Winding Temperature 2 Circuit 2	Indicates the second temperaure sensor of the windings on motor 2A	Degrees Fahrenheit
AI-10152	Sub Cooled Liquid Temperature Circuit 1	Indicates the sub cooled liquid temperature of circuit 1	Degrees Fahrenheit
AI-10153	Sub Cooled Liquid Temperature Circuit 2	Indicates the sub cooled liquid temperature of circuit 2	Degrees Fahrenheit
AI-10154	Evaporator Differential Water Pressure	Indicates the differential water pressure of the evaporator	Pound Force per Square Inch
AI-10155	System Chilled Water Differential Pressure	Indicates the differential water pressure of the chilled water system	Pound Force per Square Inch
AI-10158	Phase AB Voltage - Compressor 1B	Indicates the measurement of voltage in Phase AB for Compressor 1B	Volts
AI-10159	Line 1 Current - Compressor 1B	Indicates the measurement of Line 1 current for Compressor 1B in terms of Amps	Amps
AI-10160	Line 2 Current - Compressor 1B	Indicates the measurement of Line 2 current for Compressor 1B in terms of Amps	Amps
AI-10161	Line 3 Current - Compressor 1B	Indicates the measurement of Line 3 current for Compressor 1B in terms of Amps	Amps
AI-10162	Line 1 Current RLA - Compressor 1B	Indicates the measurement of Line 1 current for Compressor 1B in terms of % RLA	Percent
AI-10163	Line 2 Current RLA - Compressor 1B	Indicates the measurement of Line 2 current for Compressor 1B in terms of % RLA	Percent
AI-10164	Line 3 Current RLA - Compressor 1B	Indicates the measurement of Line 3 current for Compressor 1B in terms of % RLA	Percent
AI-10165	Phase AB Voltage - Compressor 2B	Indicates the measurement of voltage in Phase AB for Compressor 2B	Volts
AI-10166	Line 1 Current - Compressor 2B	Indicates the measurement of Line 1 current for Compressor 2B in terms of Amps	Amps
AI-10167	Line 2 Current - Compressor 2B	Indicates the measurement of Line 2 current for Compressor 2B in terms of Amps	Amps
AI-10168	Line 3 Current - Compressor 2B	Indicates the measurement of Line 3 current for Compressor 2B in terms of Amps	Amps
AI-10169	Line 1 Current RLA - Compressor 2B	Indicates the measurement of Line 1 current for Compressor 2B in terms of % RLA	Percent
AI-10170	Line 2 Current RLA - Compressor 2B	Indicates the measurement of Line 2 current for Compressor 2B in terms of % RLA	Percent
AI-10171	Line 3 Current RLA - Compressor 2B	Indicates the measurement of Line 3 current for Compressor 2B in terms of % RLA	Percent
AI-10173	Refrigerant Discharge Temperature - Compressor 1B	Indicates the current temperature of the refrigerant being discharged from Compressor 1B	Degrees Fahrenheit
AI-10174	High Side Oil Pressure - Compressor 1B	Indicates the pressure of the oil on the high pressure side of Compressor 1B	Pound Force per Square Inch
AI-10175	Refrigerant Discharge Temperature - Compressor 2B	Indicates the current temperature of the refrigerant being discharged from Compressor 2B	Degrees Fahrenheit
AI-10176	High Side Oil Pressure - Compressor 2B	Indicates the pressure of the oil on the high pressure side of Compressor 2B	Pound Force per Square Inch
AI-10177	Number of Circuits	Indicates the number of refrigeration circuits in the chiller	No Units
AI-10178	Number of Compressors Circuit 1	Indicates the number of compressors on circuit 1 of the chiller	No Units
AI-10179	Number of Compressors Circuit 2	Indicates the number of compressors on circuit 2 of the chiller	No Units
AI-10180	Actual Running Capacity	Indicates the measurement of the power being consumed by the Chiller	Percent
AI-10181	Free Cooling Capacity Status	Indicates the % capacity of the free cooling being used	Percent
AI-10182	Free Cooling Entering Water Temperature Active	Indicates the entering water temperature of the free cooling circuit	Degrees Fahrenheit
AI-10185	Evaporator Differential Water Pressure Setpoint Status	Indicates the setpoint status of the evaporator differential water pressure	Pound Force per Square Inch
AI-10186	Energy Consumption Lifetime	Indicates the total energy consumption of the chiller (for the lifetime of the chiller)	Kilowatts hour
AI-10187	Energy Consumption	Indicates the total energy consumption of the chiller (since last accumulation reset)	Kilowatts hour
AI-10188	Starts - Compressor 1A	Indicates the number of starts of Compressor 1A	No Units
AI-10189	Run Time - Compressor 1A	Indicates the run time of Compressor 1A	No Units
AI-10190	Starts - Compressor 2A	Indicates the number of starts of Compressor 2A	No Units
AI-10191	Run Time - Compressor 2A	Indicates the run time of Compressor 2A	No Units
AI-10192	Starts - Compressor 1B	Indicates the number of starts of Compressor 1B	No Units
AI-10193	Run Time - Compressor 1B	Indicates the run time of Compressor 1B	No Units
AI-10194	Starts - Compressor 2B	Indicates the number of starts of Compressor 2B	No Units

Table 7. ACRB 350–500 tons analog inputs (continued)

Object Identifier	Object Name	Description	Units
AI-10195	Run Time - Compressor 2B	Indicates the run time of Compressor 2B	No Units
AI-10196	Chiller Design Capacity	Indicates the design capacity of chilller	Tons of Refrigeration
AI-10198	Chilled Water Setpoint Status	Indicates the chilled water setpoint temperature	Degrees Fahrenheit
AI-10199	Demand Limit Setpoint Status	Indacates the % capacity of the demand limit being used	Percent
AI-10200	Unit Source ID	Indicates the last diagnostic of the chiller Separately, individual diagnostics are reported with dedicated points, variables, registers	No Units
AI-10201	Drive Input Voltage Calculated 1A	Indicates the input voltage at the AFD for Compressor 1A	Volts
AI-10202	Drive Input Voltage Calculated 2A	Indicates the input voltage at the AFD for Compressor 2A	Volts
AI-10203	Active Cool/Heat Setpoint Temperature	Indicates the value of the active Chilled Water Setpoint actively being used by the chiller	Degrees Fahrenheit
AI-10204	Phase BC Voltage - Compressor 1B	Indicates the measurement of voltage in Phase BC for Compressor 1B	Volts
AI-10205	Phase CA Voltage - Compressor 1B	Indicates the measurement of voltage in Phase CA for Compressor 1B	Volts
AI-10206	Phase BC Voltage - Compressor 2B	Indicates the measurement of voltage in Phase BC for Compressor 2B	Volts
AI-10207	Phase CA Voltage - Compressor 2B	Indicates the measurement of voltage in Phase CA for Compressor 2B	Volts
AI-10208	Average Line Current Circuit 1	Indicates the average current, reported in Circuit 1	Amps
AI-10209	Average Line Current Circuit 2	Indicates the average current, reported in Circuit 2	Amps
AI-10210	Average Line Voltage Circuit 1	Indicates the average voltage, line-to-line reported in Circuit 1	Volts
AI-10211	Average Line Voltage Circuit 2	Indicates the average voltage, line-to-line reported in Circuit 2	Volts
AI-10212	Line Current L1 Circuit 1	Indicates the current for line/leg 1 of Circuit 1	Amps
AI-10213	Line Current L2 Circuit 1	Indicates the current for line/leg 2 of Circuit 1	Amps
AI-10214	Line Current L3 Circuit 1	Indicates the current for line/leg 3 of Circuit 1	Amps
AI-10215	Line Current L1 Circuit 2	Indicates the current for line/leg 1 of Circuit 2	Amps
AI-10216	Line Current L2 Circuit 2	Indicates the current for line/leg 2 of Circuit 2	Amps
AI-10217	Line Current L3 Circuit 2	Indicates the current for line/leg 3 of Circuit 2	Amps
AI-10218	Voltage L1-L2 Circuit 1	Indicates the voltage between line/leg L1 and L2 of Circuit 1	Volts
AI-10219	Voltage L2-L3 Circuit 1	Indicates the voltage between line/leg L2 and L3 of Circuit 1	Volts
AI-10220	Voltage L1-L3 Circuit 1	Indicates the voltage between line/leg L1 and L3 of Circuit 1	Volts
AI-10221	Voltage L1-L2 Circuit 2	Indicates the voltage between line/leg L1 and L2 of Circuit 2	Volts
AI-10222	Voltage L2-L1 Circuit 2	Indicates the voltage between line/leg L2 and L3 of Circuit 2	Volts
AI-10223	Voltage L1-L3 Circuit 2	Indicates the voltage between line/leg L1 and L3 of Circuit 2	Volts
AI-10224	Total Real Power	Indicates the total real power reported	Kilowatts
AI-10225	Line Frequency Circuit 1	Indicates the estimated input frequency for Circuit 1	No Units
AI-10226	Line Frequency Circuit 2	Indicates the estimated input frequency for Circuit 2	No Units
AI-10227	Power Factor Circuit 1	Indicates the reported power factor for Circuit 1	No Units
AI-10228	Power Factor Circuit 2	Indicates the reported power factor for Circuit 2	No Units
AI-10229	Power Demand Circuit 1	Indicates the reported power demand for Circuit 1	Kilowatts
AI-10230	Power Demand Circuit 2	Indicates the reported power demand for Circuit 2	Kilowatts

Table 8. ACRB 350–500 tons analog values

AV-10100	Chilled Water Setpoint	The value is normally provided by the BAS to send the Chilled Water Setpoint. The value is subject to arbitration logic in the controller, in which case it may or may not be used for control purposes	Degrees Fahrenheit
AV-10101	Demand Limit Setpoint	The value is normally provided by the BAS to send the Demand Limit Setpoint. The value is subject to arbitration logic in the controller, in which case it may or may not be used for control purposes	Percent

Table 9. ACRB 350–500 tons binary inputs

Object Identifier	Object Name	Description	Object States
BI-10100	Run Enable	Indicates that chiller is available to run or is currently running	0 = Run Not Enabled 1 = Run Enabled
BI-10101	Local Setpoint Control	Indicates the which setpoint is used for control purposes, Remote (BAS) or Local	0 = Remote control 1 = Local control
BI-10102	Limit Mode Relay Status	Indicates the status of the chiller limit relay	0 = Off 1 = On
BI-10103	Chiller Running State	Indicates whether the chiller is on (currently doing either cooling) or is considered off(not currently doing cooling)	0 = Off 1 = On
BI-10104	Maximum Capacity	Indicates the status of the maximum capacity relay	0 = Off 1 = On
BI-10106	Manual Override Exists	Indicated a manual override is present	0 = Off 1 = On
BI-10107	Compressor 1A Status	Indicates running state fo Compressor 1A	0 = Off 1 = Running
BI-10108	Compressor 2A Status	Indicates running state fo Compressor 2A	0 = Off 1 = Running
BI-10109	Emergency Stop	Indicates the status of the emergency stop function of the chiller	0 = Auto 1 = Emergency Stop - Manual Reset Required
BI-10110	Evaporator Water Pump Request	Indicates a request from the chiller to turn on the Evaporator Water Pump	0 = Off 1 = On
BI-10111	Evaporator Water Flow Status	Indicates the flow of water through evaporator	0 = No Flow 1 = Flow
BI-10112	Compressor 1B Status	Indicates running state of Compressor 1B	0 = Off 1 = Running
BI-10113	Compressor 2B Status	Indicates running state of Compressor 2B	0 = Off 1 = Running
BI-10114	Free Cooling Active	Indicated the free cooling mode is active	0 = Inactive 1 = Active
BI-10116	Diagnostic Present	Indicates whether diagnostic present	0 = Normal 1 = In Alarm
BI-10117	Diagnostic Shutdown Present	Indicates chiller is shut down due to diagnostics	0 = Normal 1 = In Alarm
BI-10118	Diagnostic: Manual Reset Required	Indicates when a diagnostic exists that requires manual reset	0 = Normal 1 = In Alarm
BI-10119	Diagnostic: Local Manual Reset Required	Indicates when a diagnostic exists that requires manual reset [Local only]	0 = Normal 1 = In Alarm
BI-10120	Diagnostic Present: Information	Indicates whether diagnostic present with Information Category	0 = Normal 1 = In Alarm
BI-10121	Diagnostic Present: Advisory	Indicates whether diagnostic present with Warning Category	0 = Normal 1 = In Alarm
BI-10122	Diagnostic Present: Critical	Indicates whether diagnostic present with Critical Category	0 = Normal 1 = In Alarm
BI-10123	Diagnostic Present: Service Required	Indicates whether diagnostic present with Service Required Category	0 = Normal 1 = In Alarm
BI-10124	External Auto Stop Input Status	Indicates the status of the externally-wired auto/stop input	0 = Stop 1 = Auto
BI-10125	Front Panel Auto Stop	Indicates the auto/stop status of the Front Panel	0 = Stop 1 = Auto
BI-10126	Noise Reduction Request Active	Indicates wherther Noise Reduction active	0 = Off 1 = On
BI-10127	Circuit 1 Lockout Front Panel	Indicates the lockout state of Circuit 1 Compresser from Front Panel	0 = Normal 1 = Locked Out
BI-10128	Circuit 2 Lockout Front Panel	Indicates the lockout state of Circuit 2 Compresser from Front Panel	0 = Normal 1 = Locked Out
BI-10129	Circuit 1 Lockout External	Indicates the lockout state of Circuit 1 Compresser from External	0 = Normal 1 = Locked Out

Table 9. ACRB 350–500 tons binary inputs (continued)

Object Identifier	Object Name	Description	Object States
BI-10130	Circuit 2 Lockout External	Indicates the lockout state of Circuit 2 Comprosser from External	0 = Normal 1 = Locked Out
BI-10131	Circuit 1 Lockout Active	Indicates the lockout state of Circuit 1 Comprosser	0 = Normal 1 = Locked Out
BI-10132	Circuit 2 Lockout Active	Indicates the lockout state of Circuit 2 Comprosser	0 = Normal 1 = Locked Out

Table 10. ACRB 350–500 tons binary values

Object Identifier	Object Name	Description	Object States
BV-10100	Reset Diagnostic	Normally used by the BMS to initiate a request to reset any controller diagnostics	0 = Normal 1 = Reset
BV-10101	Noise Reduction Request BAS	Normally used by the BMS to command the chiller to enter a mode of operation where the noise of the unit is reduced	0 = Normal 1 = Reduce Noise
BV-10102	Circuit 1 Lockout BAS	Normally used by the BMS to lockout the Circuit-1 Compressor	0 = Normal 1 = Locked Out
BV-10103	Circuit 2 Lockout BAS	Normally used by the BMS to lockout the Circuit-2 Compressor	0 = Normal 1 = Locked Out
BV-10107	Energy Consumption Reset	Normally used by the BMS to reset the energy consumption accumulated total	0 = Accumulating 1 = Reset
BV-10108	Chiller Auto Stop Command BAS	Normally used by the BMS to command the chiller to start running if operating conditions are satisfied, or to stop the chiller from running.	0 = Stop 1 = Auto
BV-10109	Free Cooling Auto Stop Command BAS	Normally used the BMS to command the chiller to allow free cooling mode if conditions are satisfied, or to stop the free cooling mode from operating.	0 = Stop 1 = Auto
BV-10110	Free Cooling Compressor Lockout	Normally used by the BMS to lockout the Compressor while in free cooling mode	0 = Normal 1 = Locked Out

Table 11. ACRB 350–500 tons multi-state inputs

Object Identifier	Object Name	Description	Object States
MI-10100	Running Mode	Indicates the running state of the chiller	1 = Chiller Off 2 = Chiller In Start Mode 3= Chiller In Run Mode 4= Chiller In Pre-Shutdown Mode 5 = Chiller In Service Mode
MI-10101	Operating Mode	Indicates the operating mode of the chiller	1 = Cool 2 = Heat 3= Ice Making 4= Free Cooling
MI-10102	Refrigerant Type	Indicates the chiller refrigerant type	1 = R-11 2 = R-12 3= R-22 4= R-123 5 = R-134a 6 = R-407C 7 = R-410A 8 = R-113 9 = R-114 10 = R-500 11 = R-502 12 = R-404A 13 = R-513A 14 = R-1233zd(E) 15 = R-514A 16 = R-1234ze(E)
MI-10103	Cooling Type	Indicates the cooling Type of chiller	1 = Water Cooled 2 = Air Cooled

Table 11. ACRB 350–500 tons multi-state inputs (continued)

MI-10104	Manufacture Location	Indicates the location that the chiller was manufactured	1 = Field Applied 2 = La Crosse 3= Pueblo 4= Charmes 5 = Rushville 6 = Macon 7 = Waco 8 = Lexington 9 = Forsyth 10 = Clarksville 11 = Ft. Smith 12 = Penang 13 = Colchester 14 = Curitiba 15 = Taicang 16 = Taiwan 17 = Epinal 18 = Golbey
MI-10105	Model Information [GEN2]	Indicates the model information of chiller	1 = CVHF 2 = CVGF 3= CVHS 4= RTAE 5 = RTAF 6 = RTHA 7 = RTHB 8 = RTHC 9 = RTHD 10 = RTWE 11 = CTVD 12 = CVR 13 = CVHH 14 = CDHH 15 = VMAX 16 = GVAF 17 = RTWF 18 = RTHF 19 = RTAC 20 = CVHM 21 = RTAG 22 = CGAF 23 = RTXG 24 = GVWF 25 = HDWA 26 = CMAC 27 = IPAK 28 = CXAF 29 = ACSA 30 = RTSF 31 = HSWA 32 = ACRA 33 = RTEG 34 = ACXA 35 = CMAF 36 = ACRB Large 37 = ACRB Small
MI-10106	Chiller Setpoint Source	Indicates the selected setpoint source for control purpose	1 = BAS 2 = External 3 = Front Panel

Table 12. ACRB 350–500 tons multi-state values

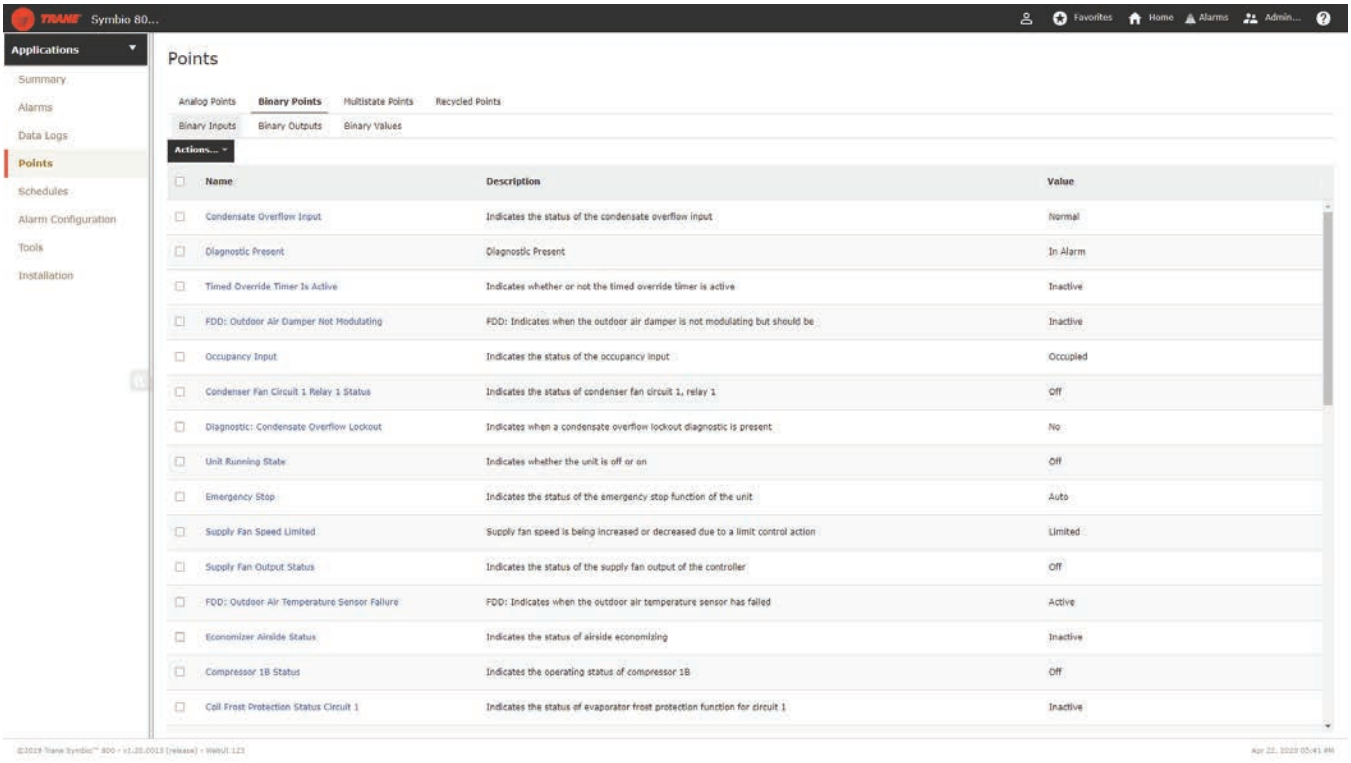
Object Identifier	Object Name	Description	Object States
MV-10100	BAS Chiller Mode Command	Normally used by the BMS to command the chiller Mode	1 = Cool 2 = Heat 3= Ice Making 4= Free Cooling

Recycled Points

The Symbio™ 800 controller ships from the factory pre-configured for the specific unit application. The points of the communicated interface (BACnet, Modbus, or LonTalk) vary based on the unit configuration. Only those points pertinent to that configuration are included in the interface.

Example: When the unit is configured for only two compressors, any points associated with compressors three and four are not be displayed on the Touch Screen interface or browser-based Web user interface. When configuration changes are made in the field, the points in the communication interface change accordingly to align with those features or user-added points.

Figure 13. Points

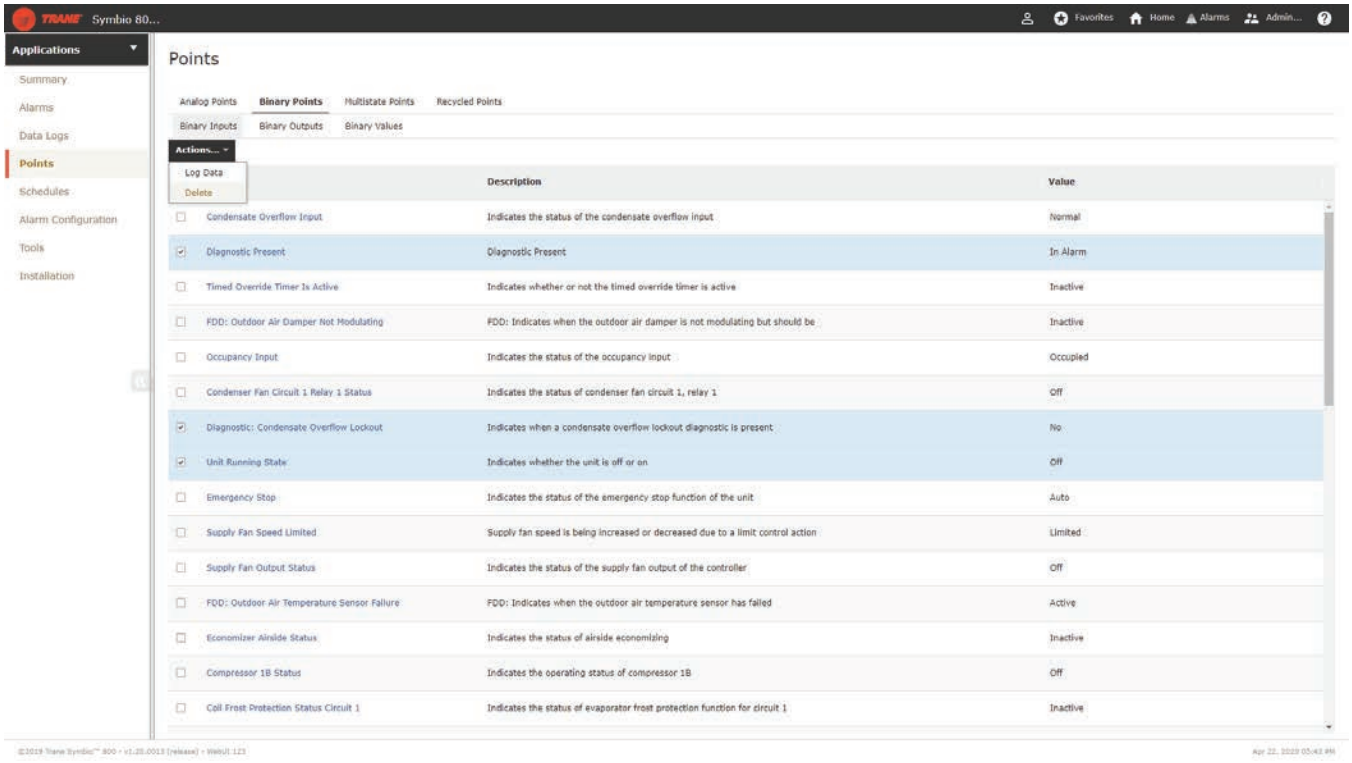


Any of the factory-provided points can be removed from the communication interface through a feature known as recycling. When the user selects and deletes a factory point, that point is moved to Recycled Points and is removed from the interface. This feature offers technicians the ability to strategically provide only those interface points desired for a specific project or installation.

To remove a point from the interface:

1. On the left-hand navigation, select **Points**.
2. Each of the points are grouped by their native type (analog, binary or multi-state), and input, output, or value. Select the appropriate group at the top of the page.
3. Select one or more points from the list and select **Actions... | Delete**.

Figure 14. Delete points

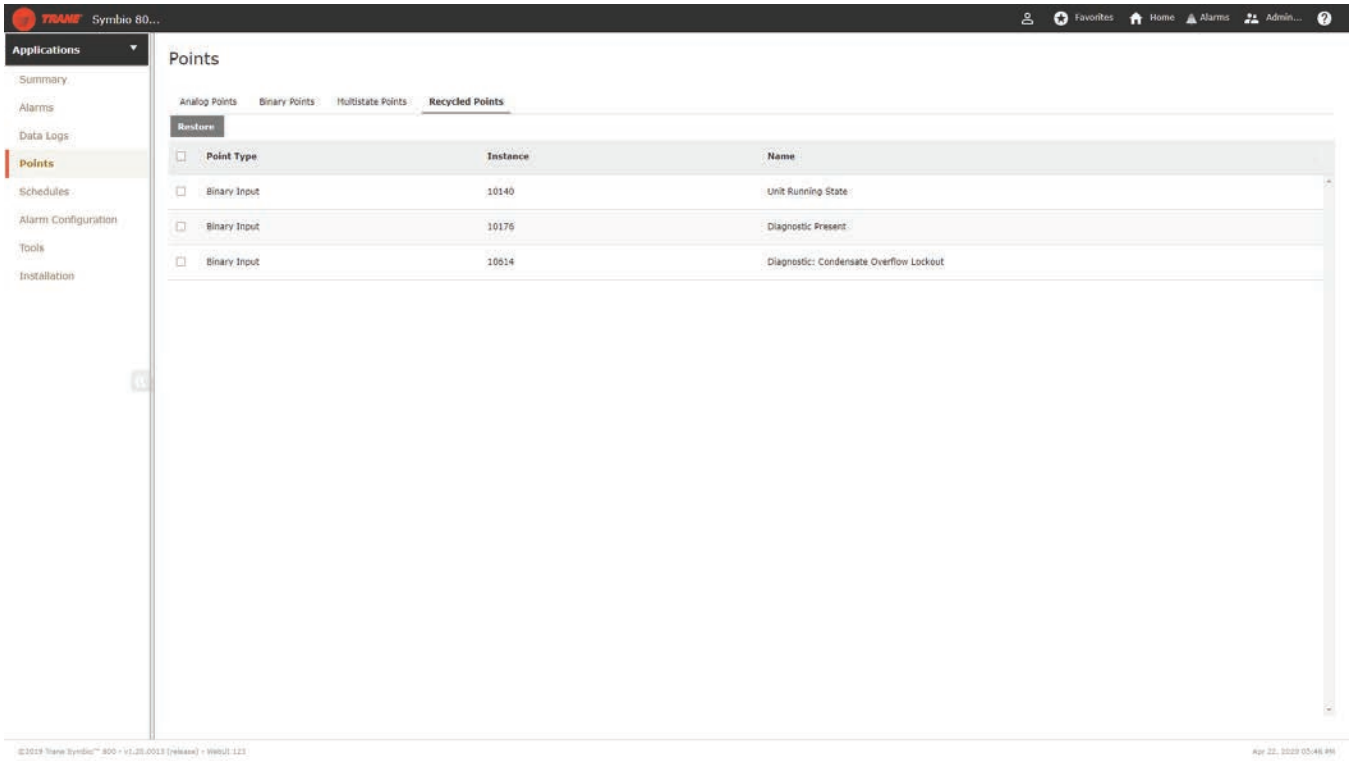


Note: *User-created points cannot be recycled. Instead, when the user selects and deletes user-created points, those points are permanently removed from the controller. Should the user decide later that one or more of the deleted user points are needed, they will need to be recreated.*

To restore recycled points:

1. Navigate to the **Recycled Points** tab on the Points page.
2. Select one or more points to be restored, then click **Restore**.
3. Once the restore process is complete, the restored points are moved back to the appropriate tab depending on point type. The recycled points also appear in the communicated interface once they are restored.

Figure 15. Recycled points tab

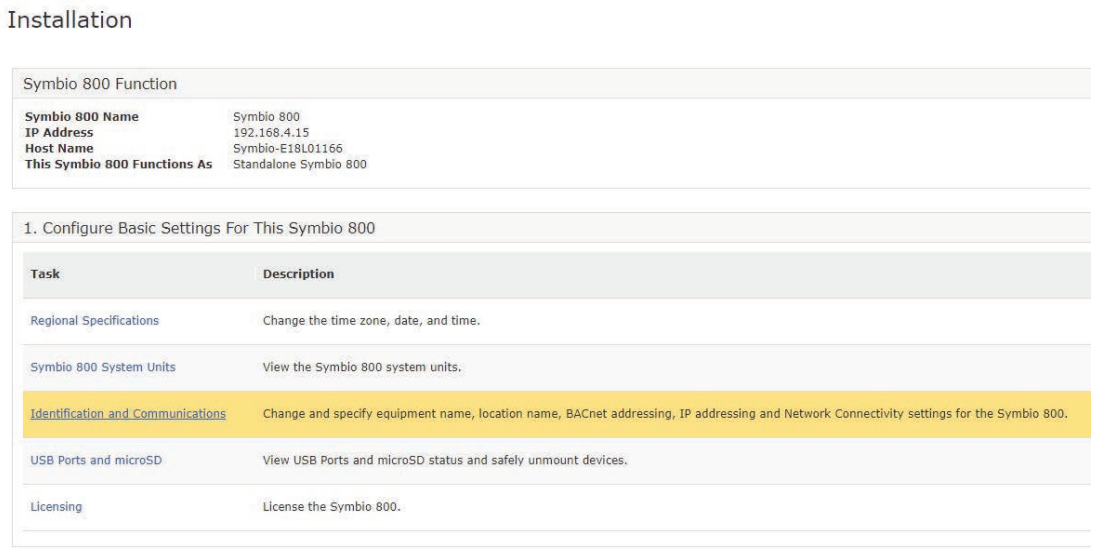


Modbus Protocol Configuration

To access the Symbio 800 Protocol Configuration page:

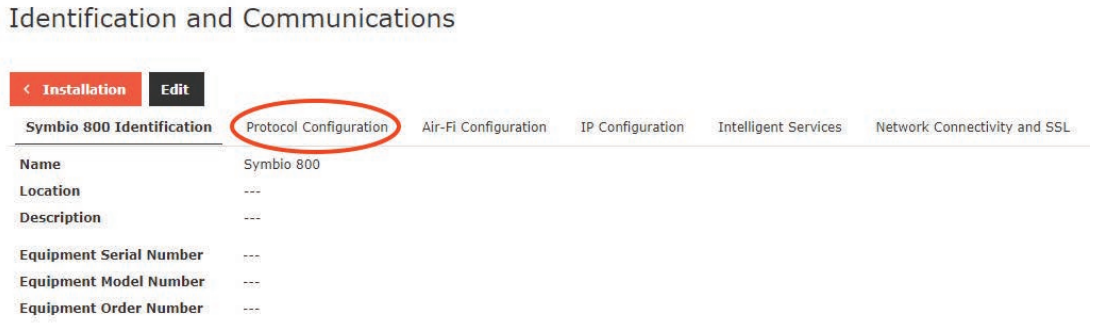
1. Connect to the Symbio 800 web interface.
2. On the left-hand navigation, click **Installation**.
3. Click **Identification and Communications**.

Figure 16. Identification and Communications



4. Click the **Protocol Configuration** tab.

Figure 17. Protocol Configuration



5. View the existing Protocol Configuration settings.

Modbus Protocol Settings

The rotary address on the Symbio 800 controller sets the Modbus address, sometimes called a device ID. Each Modbus server controller on the same Modbus RTU link must have a unique address. The valid range of Modbus RTU server addresses for the Symbio 800 is: **001 – 247**.

Important: *Symbio 800 controller will disable Modbus RTU communications if the rotary address is 000! Changing the rotary address will immediately take affect and does NOT require a power cycle to the Symbio 800 controller.*

Figure 18. Modbus protocol settings

1. Set the Communication Protocol drop down to **Modbus RTU**.
2. The rotary dial setting field shows the physical setting of the rotary dials on the Symbio 800. The address field shows the Modbus RTU address. The Modbus RTU address will match the rotary dial setting unless the Use Software address option is used. The recommendation is to change the Modbus address using the physical rotary dials on the Symbio 800 controller.
3. Verify the baud rate (default is 19200 bps), parity (default is Even), and stop bits (default is 1). All Modbus RTU devices on a link must communicate using the same communication parameters.

Modbus Wiring

The Modbus RTU communication wire is connected to the P1 Link. Observe wire polarity when connecting to the + and – terminals. The + terminals and the – terminals are internally connected. The second set of + and – terminals on the P1 Link are used to make it easier to wire the next Modbus RTU device in the daisy chain.

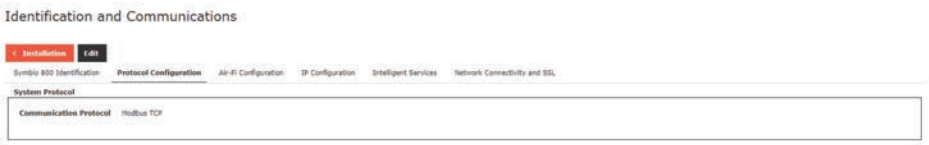
Refer to the TIA/EIA 485 standard for detailed information on Modbus RTU wiring.

Modbus TCP (Ethernet)

The Symbio 800 controller can communicate Modbus TCP using a standard Ethernet cable. Connect an Ethernet cable with RJ-45 connectors to Ethernet port 1 and the IP network. The Symbio 800 controller does not support the optional Wi-Fi module with Modbus TCP communications. The rotary address on the Symbio 800 controller is not used with Modbus TCP communications. Ethernet Port 2 is reserved for the optional TD7 display.

1. Set the System Protocol drop down to **Modbus TCP**.

Figure 19. Set system protocol

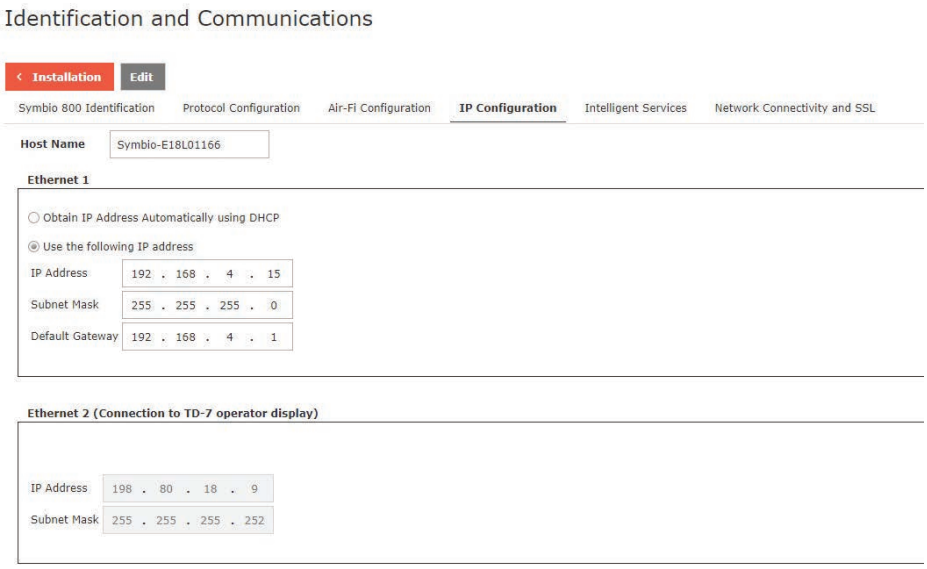


2. Click the **IP Configuration** tab to set the IP address of the Symbio 800 controller.

Figure 20. Set IP address

3. Click **Edit**.

Figure 21. Edit IP configuration



4. Setup the Ethernet 1 port to either ‘Obtain an IP addresss Automatically using DHCP’ or use a static IP address by manually entering the IP address, subnet mask, and default gateway. The IP address information is typically provided by the local IT administrator.
5. Set the Preferred IP Interface to **Ethernet 1**.
6. Set up the DNS section if using a Domain Name System server to identify the Symbio 800 controller by host name.

Modbus Points List

Object Naming Conventions

The communicated points for the Symbio™ controllers are generally named according to their function. While many of the points are read-only, others include both read and write capability. The established naming convention helps to identify the capabilities of each point. For most points, the suffix identifies the capability according to the following definition.

While there are some exceptions, the majority of the points have been defined according to these guidelines.

Suffix	Description
Status	Points with the Status suffix are defined as read-only. The status point reports the value being used by the controller.
Local	Points with the Local suffix are defined as read-only. The local point reports values associated with controller sensors, both wired and wireless. The local value may or may not be actively used by the controller, depending on the presence or absence of a communicated value (BAS). When both a local and communicated value exist, the communicated value is used.
Active	Points with the Active suffix are defined as read-only. Points designated as active are normally the result of the arbitration between a communicated value (BAS) and at least one value local to the equipment, such as a sensor or default setpoint. The active point reports the value being used by the controller.
Setpoint	Points with the Setpoint suffix are defined as either read-only or read/write. For BACnet, the binary input, analog input and multi-state input points are all read-only. These setpoints report the value currently in use by the controller. The analog value, binary value and multi-state value points are all read/write. These points are provided for use by the building automation system (BAS). When used, these points are written internally to arbitration logic. This defines the interaction with hardwired points, editable software configuration points and the relinquish default value/state. Refer to the Appendix for additional information.
Input	Points with the Input suffix are defined as read-only. These points normally reflect the status of a sensor input, either hardwired or communicating wirelessly (Air-Fi). However, the input point reflects the arbitrated result of the controller sensor input and a communicated value, if present. When both a controller sensor and communicated value exist, the controller will use and report the communicated value.
Arbitrator	Points with the "Arbitrator" suffix are to be used as read-only. The arbitrator prioritizes inputs from communicating points, hardwired points and stored defaults points. The priority array of the arbitration point displays each of the values provided, including the active status, indicating which of the input sources is being used. Refer to the Appendix for additional information.
BAS	Points with the BAS suffix are defined as read/write. These points are provided for use by the building automation system (BAS). When used, these points are written to arbitration logic. This defines the interaction with hardwired points, editable software configuration points and the relinquished default value/state. Refer to the Appendix for additional information.
Command	Points with the Command suffix are defined as read/write. These points are written to change the default behavior of the controller. Once written, these point values may be persisted.
Request	Points with the Request suffix are defined as read/write. These points are written to change the operating behavior of the controller.

Object Data Points and Diagnostic Data Points

ACRB 150–300 Tons Data Points

The following tables are sorted as follows:

- Tables are listed by input/output type and sorted by object identifier. These tables provide the user with the units type for each object type.

- Tables are sorted by object name and provide a complete list of object names, types, values/ranges, and descriptions.

Note: *Not all points are available to the user. The available data points are defined during self-configuration and are dependent on the type of equipment.*

Table 13. ACRB 150–300 tons analog inputs

Modbus Register	Data Type	Object Name	Description	Units
30011	Float	Active Chilled Water Setpoint	Indicates the value of the active Chilled Water Setpoint actively being used by the chiller	Degrees Fahrenheit
30013	Float	Evaporator Entering Water Temperature	Indicates the current temperature of the water entering the evaporator	Degrees Fahrenheit
30015	Float	Evaporator Leaving Water Temperature	Indicates the current temperature of the water leaving the evaporator	Degrees Fahrenheit
30017	Float	Calculated Chiller Capacity	Indicates the capacity the chiller is currently using	Tons of Refrigeration
30019	Float	Active Demand Limit Setpoint	Indicates the demand limit setpoint value actively being used by the chiller	Percent
30021	Float	Unit Power Consumption	Indicates the measurement of the power being consumed by the Chiller	Kilowatts
30025	Float	Outdoor Air Temperature	Indicates the current temperature of the outdoor air	Degrees Fahrenheit
30027	Float	Evaporator Refrigerant Pressure Circuit 1	Indicates the current pressure of the refrigerant in the evaporator on circuit 1	Pound Force per Square Inch
30029	Float	Condenser Refrigerant Pressure Circuit 1	Indicates the current pressure of the refrigerant in the condenser on circuit 1	Pound Force per Square Inch
30031	Float	Differential Refrigerant Pressure Circuit 1	Indicates the pressure difference between the suction and discharge lines on circuit 1	Pound Force per Square Inch
30033	Float	Evaporator Saturated Refrigerant Temperature Circuit 1	Indicates the saturated_x000D_ refrigerant temperature of the evaporator on circuit 1	Degrees Fahrenheit
30035	Float	Condenser Saturated Refrigerant Temperature Circuit 1	Indicates the saturated_x000D_ refrigerant temperature of the condenser on circuit 1	Degrees Fahrenheit
30037	Float	Evaporator Refrigerant Pressure Circuit 2	Indicates the current pressure of the refrigerant in the evaporator on circuit 2	Pound Force per Square Inch
30039	Float	Condenser Refrigerant Pressure Circuit 2	Indicates the current pressure of the refrigerant in the condenser on circuit 2	Pound Force per Square Inch
30041	Float	Differential Refrigerant Pressure Circuit 2	Indicates the pressure difference between the suction and discharge lines on circuit 2	Pound Force per Square Inch
30043	Float	Evaporator Saturated Refrigerant Temperature Circuit 2	Indicates the saturated_x000D_ refrigerant temperature of the evaporator on circuit 2	Degrees Fahrenheit
30045	Float	Condenser Saturated Refrigerant Temperature Circuit 2	Indicates the saturated_x000D_ refrigerant temperature of the condenser on circuit 2	Degrees Fahrenheit
30047	Float	Refrigerant Discharge Temperature - Compressor 1A	Indicates the current temperature of the refrigerant being discharged from Compressor 1A	Degrees Fahrenheit
30049	Float	Oil Pressure - Compressor 1A	Indicates the pressure of the oil on the high pressure side of Compressor 1A	Pound Force per Square Inch
30051	Float	Refrigerant Discharge Temperature - Compressor 2A	Indicates the current temperature of the refrigerant being discharged from Compressor 2A	Degrees Fahrenheit
30053	Float	Oil Pressure - Compressor 2A	Indicates the pressure of the oil on the high pressure side of Compressor 2A	Pound Force per Square Inch
30055	Float	Air Flow Percentage Circuit 1	Indicates the approximate air flow percentage of Circuit 1	Percent
30057	Float	Air Flow Percentage Circuit 2	Indicates the approximate air flow percentage of Circuit 2	Percent
30059	Float	Starts - Compressor 1A	Indicates the number of starts of Compressor 1A	No Units
30061	Float	Run Time - Compressor 1A	Indicates the run time of Compressor 1A, in hours	Hours
30063	Float	Compressor 1A Speed Status	Indicates the % of the available speed being used by Compressor 1A	Percent
30065	Float	Motor Winding Temperature 1 Circuit 1	Indicates the first temperaure sensor of the windings on motor 1A	Degrees Fahrenheit
30067	Float	Motor Winding Temperature 2 Circuit 1	Indicates the second temperaure sensor of the windings on motor 1A	Degrees Fahrenheit
30069	Float	Drive Motor Current U RLA Compressor 1A	Indicates the measurement of Line 1 current at AFD for Compressor 1A in terms of % RLA	Percent

Table 13. ACRB 150–300 tons analog inputs (continued)

Modbus Register	Data Type	Object Name	Description	Units
30071	Float	Drive Motor Current V RLA Compressor 1A	Indicates the measurement of Line 2 current at AFD for Compressor 1A in terms of % RLA	Percent
30073	Float	Drive Motor Current W RLA Compressor 1A	Indicates the measurement of Line 3 current at AFD for Compressor 1A in terms of % RLA	Percent
30075	Float	Drive Motor Average Current RLA Compressor 1A	Indicates the average current at AFD for Compressor 1A in terms of % RLA	Percent
30077	Float	Drive Motor Current U Compressor 1A	Indicates the measurement of Line 1 current at AFD for Compressor 1A in terms of Amps	Amps
30079	Float	Drive Motor Current V Compressor 1A	Indicates the measurement of Line 2 current at AFD for Compressor 1A in terms of Amps	Amps
30081	Float	Drive Motor Current W Compressor 1A	Indicates the measurement of Line 3 current at AFD for Compressor 1A in terms of Amps	Amps
30083	Float	Drive Motor Voltage UV Circuit 1	Indicates the measurement of voltage between Line 1 to 2 at the AFD for Compressor 1A	Volts
30085	Float	Drive Motor Voltage VW Circuit 1	Indicates the measurement of voltage between Line 2 to 3 at the AFD for Compressor 1A	Volts
30087	Float	Drive Motor Voltage WU Circuit 1	Indicates the measurement of voltage between Line 3 to 1 at the AFD for Compressor 1A	Volts
30089	Float	Drive Motor Average Voltage Circuit 1	Indicates the average voltage line to line at AFD for Compressor 1A	Volts
30091	Float	Drive DC Bus Voltage Circuit 1	Indicates the voltage of the DC Bus from the AFD for Compressor 1A	Volts
30093	Float	Drive Output Power Circuit 1	Indicates the power output from the AFD for Compressor 1A	Kilowatts
30095	Float	Drive Input Power Circuit 1	Indicates the power input for the AFD for Compressor 1A	Kilowatts
30097	Float	Drive Line Average Voltage Circuit 1	Indcates the average input voltage at the AFD for Compressor 1A	Volts
30099	Float	Drive Average Line Current Circuit 1	Indcates the average input current at the AFD for Compressor 1A	Amps
30101	Float	Drive Line Frequency Circuit 1	Indicates the estimated input frequency at the AFD for Compressor 1A	feet per second per second
30103	Float	AFD Frequency Circuit 1	Indicates the frequency at the stator for AFD for Compressor 1A	feet per second per second
30105	Float	AFD Transistor Temperature Circuit 1	Indicates the temperature of the transistor for the AFD for Compressor 1A	Degrees Fahrenheit
30107	Float	Drive Inverter Base Temperature Circuit 1	Indicates the temperature of the inverter base for the AFD for Compressor 1A	Degrees Fahrenheit
30109	Float	Drive Rectifier Base Temperature Circuit 1	Indicates the temperature of the rectifier base for the AFD for Compressor 1A	Degrees Fahrenheit
30111	Float	Starts - Compressor 2A	Indicates the number of starts of Compressor 2A	No Units
30113	Float	Run Time - Compressor 2A	Indicates the run time of_x000D_ Compressor 2A, in hours	No Units
30115	Float	Compressor 2A Speed Status	Indicates the % of the available speed being used by Compressor 2A	Percent
30117	Float	Motor Winding Temperature 1 Circuit 2	Indicates the first temperaure sensor of the windings on motor 2A	Degrees Fahrenheit
30119	Float	Motor Winding Temperature 2 Circuit 2	Indicates the second temperaure sensor of the windings on motor 2A	Degrees Fahrenheit
30121	Float	Drive Motor Current U RLA Compressor 2A	Indicates the measurement of Line 1 current at AFD for Compressor 2A in terms of % RLA	Percent
30123	Float	Drive Motor Current V RLA Compressor 2A	Indicates the measurement of Line 2 current at AFD for Compressor 2A in terms of % RLA	Percent
30125	Float	Drive Motor Current W RLA Compressor 2A	Indicates the measurement of Line 3 current at AFD for Compressor 2A in terms of % RLA	Percent
30127	Float	Drive Motor Average Current RLA Compressor 2A	Indicates the average current at AFD for Compressor 2A in terms of % RLA	Percent
30129	Float	Drive Motor Current U Compressor 2A	Indicates the measurement of Line 1 current at AFD for Compressor 2A in terms of Amps	Amps
30131	Float	Drive Motor Current V Compressor 2A	Indicates the measurement of V line current at AFD for Compressor 2A in terms of Amps	Amps
30133	Float	Drive Motor Current W Compressor 2A	Indicates the measurement of W line current at AFD for Compressor 2A in terms of Amps	Amps
30135	Float	Drive Motor Voltage UV Circuit 2	Indicates the measurement of voltage between Line 1 to 2 at AFD for Compressor 2A	Volts

Table 13. ACRB 150–300 tons analog inputs (continued)

Modbus Register	Data Type	Object Name	Description	Units
30137	Float	Drive Motor Voltage VW Circuit 2	Indicates the measurement of voltage between Line 2 to 3 at AFD for Compressor 2A	Volts
30139	Float	Drive Motor Voltage WU Circuit 2	Indicates the measurement of voltage between Line 3 to 1 at AFD for Compressor 2A	Volts
30141	Float	Drive Motor Average Voltage Circuit 2	Indicates the average voltage line to line at AFD for Compressor 2A	Volts
30143	Float	Drive DC Bus Voltage Circuit 2	Indicates the voltage of the DC Bus from the AFD for Compressor 2A	Volts
30145	Float	Drive Output Power Circuit 2	Indicates the power output from the AFD for Compressor 2A	Kilowatts
30147	Float	Drive Input Power Circuit 2	Indicates the power input for the AFD for Compressor 2A	Kilowatts
30149	Float	Drive Line Average Voltage Circuit 2	Indcates the average input voltage at the AFD for Compressor 2A	Volts
30151	Float	Drive Average Line Current Circuit 2	Indcates the average input current at the AFD for Compressor 2A	Amps
30153	Float	Drive Line Frequency Circuit 2	Indicates the estimated input frequency at the AFD for Compressor 2A	feet per second per second
30155	Float	AFD Frequency Circuit 2	Indicates the frequency at the stator for AFD for Compressor 2A	feet per second per second
30157	Float	AFD Transistor Temperature Circuit 2	Indicates the temperature of the transidtor for the AFD for Compressor 2A	Degrees Fahrenheit
30159	Float	Drive Inverter Base Temperature Circuit 2	Indicates the temperature of the inverter base for the AFD for Compressor 2A	Degrees Fahrenheit
30161	Float	Drive Rectifier Base Temperature Circuit 2	Indicates the temperature of the rectifier base for the AFD for Compressor 2A	Degrees Fahrenheit
30163	Float	Number Of Circuits	Indicates the number of refrigeration circuits in the chiller	No Units
30165	Float	Number Of Compressors Circuit 1	Indicates the number of compressors on circuit 1 of the chiller	No Units
30167	Float	Number Of Compressors Circuit 2	Indicates the number of compressors on circuit 2 of the chiller	No Units
30169	Float	Free Cooling Capacity	Indicates the % capacity of the free cooling being used	Percent
30171	Float	Free Cooling Entering Water Temperature	Indiactes the entering water temperature of the free cooling circuit	Degrees Fahrenheit
30173	Float	Energy Consumption Lifetime	Indicates the total energy consumption of the chiller (for the lifetime of the chiller)	Kilowatts hour
30175	Float	Energy Consumption	Indicates the total energy consumption of the chiller (since last accumulation reset)	Kilowatts hour
30177	Float	Unit Source ID	Indicates the last diagnostic of the chiller Separately, individual diagnostics are reported with dedicated points, variables, registers	No Units
30179	Float	Chiller Design Capacity	Indicates the design capacity of chillller	Tons of Refrigeration
30181	Float	Active Cool/Heat Setpoint Temperature	Indicates the value of the active Chilled Water Setpoint actively being used by the chiller	Degrees Fahrenheit
30183	Float	Actual Running Capacity	Indicates the measurement of the power being consumed by the Chiller	Percent

Table 14. ACRB 150–300 tons analog values

Modbus Register	Data Type	Object Name	Description	Units
40010	Float	Chilled Water Setpoint	The value is normally provided by the BAS to send the Chilled Water Setpoint. The value is subject to arbitration logic in the controller, in which case it may or may not be used for control purposes	Degrees Fahrenheit
40012	Float	Demand Limit Setpoint	The value is normally provided by the BAS to send the Demand Limit Setpoint. The value is subject to arbitration logic in the controller, in which case it may or may not be used for control purposes	Percent

Table 15. ACRB 150–300 tons binary inputs

Modbus Register	Data Type	Object Name	Description	Object States
33010	Signed Integer 16-bit	Run Enable	Indicates that chiller is available to run or is currently running	0 = Run Not Enabled 1 = Run Enabled
33011	Signed Integer 16-bit	Local Setpoint Control	Indicates the which setpoint is used for control purposes, Remote (BAS) or Local	0 = Remote control 1 = Local control
33012	Signed Integer 16-bit	Limit Mode Relay Status	Indicates the status of the chiller limit relay	0 = Off 1 = On
33013	Signed Integer 16-bit	Chiller Running State	Indicates whether the chiller is on (currently doing either cooling) or is considered off(not currently doing cooling)	0 = Off 1 = On
33014	Signed Integer 16-bit	Maximum Capacity Relay	Indicates the status of the maximum capacity relay	0 = Off 1 = On
33015	Signed Integer 16-bit	Evaporator Water Pump Command	Indicates a request from the chiller to turn on the Evaporator Water Pump	0 = Off 1 = On
33016	Signed Integer 16-bit	Evaporator Water Flow Status	Indicates the flow of water through evaporator	0 = No Flow 1 = Flow
33017	Signed Integer 16-bit	Manual Override Exists	Indicated a manual override is present	0 = Off 1 = On
33018	Signed Integer 16-bit	Emergency Stop	Indicates the status of the emergency stop function of the chiller	0 = Auto 1 = Emergency Stop - Manual Reset Required
33019	Signed Integer 16-bit	Diagnostic Present	Indicates whether diagnostic present	0 = Normal 1 = In Alarm
33020	Signed Integer 16-bit	Diagnostic Shutdown Present	Indicates chiller is shut down due to diagnostics	0 = Normal 1 = In Alarm
33021	Signed Integer 16-bit	Diagnostic: Manual Reset Required	Indicates when a diagnostic exists that requires manual reset	0 = Normal 1 = In Alarm
33022	Signed Integer 16-bit	Diagnostic: Local Manual Reset Required	Indicates when a diagnostic exists that requires manual reset [Local only]	0 = Normal 1 = In Alarm
33023	Signed Integer 16-bit	Diagnostic Present: Information	Indicates whether diagnostic present with Information Category	0 = Normal 1 = In Alarm
33024	Signed Integer 16-bit	Diagnostic Present: Warning	Indicates whether diagnostic present with Warning Category	0 = Normal 1 = In Alarm
33025	Signed Integer 16-bit	Diagnostic Present: Critical	Indicates whether diagnostic present with Critical Category	0 = Normal 1 = In Alarm
33026	Signed Integer 16-bit	Diagnostic Present: Service Required	Indicates whether diagnostic present with Service Required Category	0 = Normal 1 = In Alarm
33027	Signed Integer 16-bit	Running Status Cprsr1A	Indicates running state fo Compressor 1A	0 = Off 1 = Running
33028	Signed Integer 16-bit	Running Status Cprsr2A	Indicates running state fo Compressor 2A	0 = Off 1 = Running
33029	Signed Integer 16-bit	Free Cooling Active	Indicated the free cooling mode is active	0 = Inactive 1 = Active
33030	Signed Integer 16-bit	External Auto Stop	Indicates the status of the externally-wired auto/stop input	0 = Stop 1 = Auto
33031	Signed Integer 16-bit	Front Panel Auto/Stop	Indicates the auto/stop status of the Front Panel	0 = Stop 1 = Auto
33032	Signed Integer 16-bit	Noise Reduction Request Active	Indicates whether Noise Reduction active	0 = Off 1 = On

Table 16. ACRB 150–300 tons binary values

Modbus Register	Data Type	Object Name	Description	Object States
43010	Signed Integer 16-bit	Reset Diagnostic	Normally used by the BMS to initiate a request to reset any controller diagnostics	0 = Normal 1 = Reset
43011	Signed Integer 16-bit	Noise Reduction Request BAS	Normally used by the BMS to command the chiller to enter a mode of operation where the noise of the unit is reduced	0 = Normal 1 = Reduce Noise
43012	Signed Integer 16-bit	Chiller Auto Stop Command BAS	Normally used by the BMS to command the chiller to start running if operating conditions are satisfied, or to stop the chiller from running.	0 = Stop 1 = Auto
43013	Signed Integer 16-bit	Free Cooling Auto Stop Command BAS	Normally used the BMS to command the chiller to allow free cooling mode if conditions are satisfied, or to stop the free cooling mode from operating.	0 = Stop 1 = Auto
43014	Signed Integer 16-bit	Free Cooling Compressor Lockout	Normally used by the BMS to lockout the Compressor while in free cooling mode	0 = Normal 1 = Locked Out

Table 16. ACRB 150–300 tons binary values (continued)

Modbus Register	Data Type	Object Name	Description	Object States
43015	Signed Integer 16-bit	Circuit 1 Lockout BAS	Normally used by the BMS to lockout the Circuit-1 Compressor	0 = Normal 1 = Locked Out
43016	Signed Integer 16-bit	Circuit 2 Lockout BAS	Normally used by the BMS to lockout the Circuit-2 Compressor	0 = Normal 1 = Locked Out
43017	Signed Integer 16-bit	Energy Consumption Reset	Normally used by the BMS to reset the energy consumption accumulated total	0 = Accumulating 1 = Reset

Table 17. ACRB 150–300 tons multi-state inputs

Modbus Register	Data Type	Object Name	Description	Object States
32010	Unsigned Integer 16-bit	Running Mode	Indicates the running state of the chiller	1 = Chiller Off 2 = Chiller In Start Mode 3= Chiller In Run Mode 4= Chiller In Pre-Shutdown Mode 5 = Chiller In Service Mode
32011	Unsigned Integer 16-bit	Operating Mode	Indicates the operating mode of the chiller	1 = Cool 2 = Heat 3= Ice Making 4= Free Cooling
32012	Unsigned Integer 16-bit	Chiller Setpoint Source	Indicates the selected setpoint source for control purpose	1 = BAS 2 = External 3 = Front Panel
32013	Unsigned Integer 16-bit	Refrigerant Type	Indicates the chiller refrigerant type	1 = R-11 2 = R-12 3= R-22 4= R-123 5 = R-134a 6 = R-407C 7 = R-410A 8 = R-113 9 = R-114 10 = R-500 11 = R-502 12 = R-404A 13 = R-513A 14 = R-1233zd(E) 15 = R-514A 16 = R-1234ze(E)
32014	Unsigned Integer 16-bit	Cooling Type	Indicates the cooling Type of chiller	1 = Water Cooled 2 = Air Cooled

Table 17. ACRB 150–300 tons multi-state inputs (continued)

Modbus Register	Data Type	Object Name	Description	Object States
32015	Unsigned Integer 16-bit	Manufacture Location	Indicates the location that the chiller was manufactured	1 = Field Applied 2 = La Crosse 3= Pueblo 4= Charmes 5 = Rushville 6 = Macon 7 = Waco 8 = Lexington 9 = Forsyth 10 = Clarksville 11 = Ft. Smith 12 = Penang 13 = Colchester 14 = Curitiba 15 = Taicang 16 = Taiwan 17 = Epinal 18 = Golbey
32016	Unsigned Integer 16-bit	Model Information [GEN2]	Indicates the model information of chiller	1 = CVHF 2 = CVGF 3= CVHS 4= RTAE 5 = RTAF 6 = RTHA 7 = RTHB 8 = RTHC 9 = RTHD 10 = RTWE 11 = CTVD 12 = CVR 13 = CVHH 14 = CDHH 15 = VMAX 16 = GVAF 17 = RTWF 18 = RTHF 19 = RTAC 20 = CVHM 21 = RTAG 22 = CGAF 23 = RTXG 24 = GVWF 25 = HDWA 26 = CMAC 27 = IPAK 28 = CXAF 29 = ACSA 30 = RTSF 31 = HSWA 32 = ACRA 33 = RTEG 34 = ACXA 35 = CMAF 36 = ACRB Large 37 = ACRB Small

Table 18. ACRB 150–300 tons multi-state values

Modbus Register	Data Type	Object Name	Description	Object States
42010	Unsigned Integer 16-bit	BAS Chiller Mode Command	Normally used by the BMS to command the chiller Mode	1 = Cool 2 = Heat 3= Ice Making 4= Free Cooling

ACRB 350–500 Tons Data Points

Table 19. ACRB 350–500 tons analog inputs

Modbus Register	Data Type	Object Name	Description	Units
30010	Float	Active Chilled Water Setpoint	Indicates the value of the active Chilled Water Setpoint actively being used by the chiller	Degrees Fahrenheit
30012	Float	Active Demand Limit Setpoint	Indicates the demand limit setpoint value actively being used by the chiller	Percent
30016	Float	Evaporator Entering Water Temperature	Indicates the current temperature of the water entering the evaporator	Degrees Fahrenheit
30018	Float	Evaporator Leaving Water Temperature	Indicates the current temperature of the water leaving the evaporator	Degrees Fahrenheit
30022	Float	Unit Power Consumption	Indicates the measurement of the power being consumed by the Chiller	Kilowatts
30024	Float	Outdoor Air Temperature	Indicates the current temperature of the outdoor air	Degrees Fahrenheit
30030	Float	Evaporator Refrigerant Pressure Circuit 1	Indicates the current pressure of the refrigerant in the evaporator on circuit 1	Pound Force per Square Inch
30032	Float	Condenser Refrigerant Pressure Circuit 1	Indicates the current pressure of the refrigerant in the condenser on circuit 1	Pound Force per Square Inch
30034	Float	Differential Refrigerant Pressure Circuit 1	Indicates the pressure difference between the suction and discharge lines on circuit 1	Pound Force per Square Inch
30036	Float	Evaporator Saturated Refrigerant Temperature Circuit 1	Indicates the saturated_x000D_ refrigerant temperature of the evaporator on circuit 1	Degrees Fahrenheit
30038	Float	Condenser Saturated Refrigerant Temperature Circuit 1	Indicates the saturated_x000D_ refrigerant temperature of the condenser on circuit 1	Degrees Fahrenheit
30040	Float	Evaporator Refrigerant Pressure Circuit 2	Indicates the current pressure of the refrigerant in the evaporator on circuit 2	Pound Force per Square Inch
30042	Float	Condenser Refrigerant Pressure Circuit 2	Indicates the current pressure of the refrigerant in the condenser on circuit 2	Pound Force per Square Inch
30044	Float	Differential Refrigerant Pressure Circuit 2	Indicates the pressure difference between the suction and discharge lines on circuit 2	Pound Force per Square Inch
30046	Float	Evaporator Saturated Refrigerant Temperature Circuit 2	Indicates the saturated_x000D_ refrigerant temperature of the evaporator on circuit 2	Degrees Fahrenheit
30048	Float	Condenser Saturated Refrigerant Temperature Circuit 2	Indicates the saturated_x000D_ refrigerant temperature of the condenser on circuit 2	Degrees Fahrenheit
30050	Float	Refrigerant Discharge Temperature - Compressor 1A	Indicates the current temperature of the refrigerant being discharged from Compressor 1A	Degrees Fahrenheit
30052	Float	High Side Oil Pressure - Compressor 1A	Indicates the pressure of the oil on the high pressure side of Compressor 1A	Pound Force per Square Inch
30054	Float	Refrigerant Discharge Temperature - Compressor 2A	Indicates the current temperature of the refrigerant being discharged from Compressor 2A	Degrees Fahrenheit
30056	Float	High Side Oil Pressure - Compressor 2A	Indicates the pressure of the oil on the high pressure side of Compressor 2A	Pound Force per Square Inch
30058	Float	Air Flow Percentage Circuit 1	Indicates the approximate air flow percentage of Circuit 1	Percent
30060	Float	Air Flow Percentage Circuit 2	Indicates the approximate air flow percentage of Circuit 2	Percent
30062	Float	Drive Motor Average Voltage Circuit 1	Indicates the average voltage line to line at AFD for Compressor 1A	Volts
30064	Float	Drive Motor Current U Circuit 1	Indicates the measurement of Line 1 current at AFD for Compressor 1A in terms of Amps	Amps
30066	Float	Drive Motor Current V Circuit 1	Indicates the measurement of Line 2 current at AFD for Compressor 1A in terms of Amps	Amps
30068	Float	Drive Motor Current W Circuit 1	Indicates the measurement of Line 3 current at AFD for Compressor 1A in terms of Amps	Amps
30070	Float	Drive Motor Current U RLA Circuit 1	Indicates the measurement of Line 1 current at AFD for Compressor 1A in terms of % RLA	Percent
30072	Float	Drive Motor Current V RLA Circuit 1	Indicates the measurement of Line 2 current at AFD for Compressor 1A in terms of % RLA	Percent
30074	Float	Drive Motor Current W RLA Circuit 1	Indicates the measurement of Line 3 current at AFD for Compressor 1A in terms of % RLA	Percent
30076	Float	Drive Motor Average Current RLA Circuit 1	Indicates the average current at AFD for Compressor 1A in terms of % RLA	Percent

Table 19. ACRB 350–500 tons analog inputs (continued)

Modbus Register	Data Type	Object Name	Description	Units
30078	Float	Drive DC Bus Voltage Circuit 1	Indicates the voltage of the DC Bus from the AFD for Compressor 1A	Volts
30080	Float	Drive Output Power Circuit 1	Indicates the power output from the AFD for Compressor 1A	Kilowatts
30082	Float	AFD Transistor Temperature Circuit 1	Indicates the temperature of the transistor for the AFD for Compressor 1A	Degrees Fahrenheit
30084	Float	Motor Winding Temperature 1 Circuit 1	Indicates the first temperaure sensor of the windings on motor 1A	Degrees Fahrenheit
30086	Float	Motor Winding Temperature 2 Circuit 1	Indicates the second temperaure sensor of the windings on motor 1A	Degrees Fahrenheit
30088	Float	Drive Motor Average Voltage Circuit 2	Indicates the average voltage line to line at AFD for Compressor 2A	Volts
30090	Float	Drive Motor Current U Circuit 2	Indicates the measurement of Line 1 current at AFD for Compressor 2A in terms of Amps	Amps
30092	Float	Drive Motor Current V Circuit 2	Indicates the measurement of V line current at AFD for Compressor 2A in terms of Amps	Amps
30094	Float	Drive Motor Current W Circuit 2	Indicates the measurement of W line current at AFD for Compressor 2A in terms of Amps	Amps
30096	Float	Drive Motor Current U RLA Circuit 2	Indicates the measurement of Line 1 current at AFD for Compressor 2A in terms of % RLA	Percent
30098	Float	Drive Motor Current V RLA Circuit 2	Indicates the measurement of Line 2 current at AFD for Compressor 2A in terms of % RLA	Percent
30100	Float	Drive Motor Current W RLA Circuit 2	Indicates the measurement of Line 3 current at AFD for Compressor 2A in terms of % RLA	Percent
30102	Float	Drive Motor Average Current RLA Circuit 2	Indicates the average current at AFD for Compressor 2A in terms of % RLA	Percent
30104	Float	Drive DC Bus Voltage Circuit 2	Indicates the voltage of the DC Bus from the AFD for Compressor 2A	Volts
30106	Float	Drive Output Power Circuit 2	Indicates the power output from the AFD for Compressor 2A	Kilowatts
30108	Float	AFD Transistor Temperature Circuit 2	Indicates the temperature of the transidtor for the AFD for Compressor 2A	Degrees Fahrenheit
30110	Float	Motor Winding Temperature 1 Circuit 2	Indicates the first temperaure sensor of the windings on motor 2A	Degrees Fahrenheit
30112	Float	Motor Winding Temperature 2 Circuit 2	Indicates the second temperaure sensor of the windings on motor 2A	Degrees Fahrenheit
30114	Float	Sub Cooled Liquid Temperature Circuit 1	Indicates the sub cooled liquid temperature of circuit 1	Degrees Fahrenheit
30116	Float	Sub Cooled Liquid Temperature Circuit 2	Indicates the sub cooled liquid temperature of circuit 2	Degrees Fahrenheit
30118	Float	Evaporator Differential Water Pressure	Indicates the differential water pressure of the evaporator	Pound Force per Square Inch
30120	Float	System Chilled Water Differential Pressure	Indicates the differential water pressure of the chilled water system	Pound Force per Square Inch
30126	Float	Phase AB Voltage - Compressor 1B	Indicates the measurement of voltage in Phase AB for Compressor 1B	Volts
30128	Float	Line 1 Current - Compressor 1B	Indicates the measurement of Line 1 current for Compressor 1B in terms of Amps	Amps
30130	Float	Line 2 Current - Compressor 1B	Indicates the measurement of Line 2 current for Compressor 1B in terms of Amps	Amps
30132	Float	Line 3 Current - Compressor 1B	Indicates the measurement of Line 3 current for Compressor 1B in terms of Amps	Amps
30134	Float	Line 1 Current RLA - Compressor 1B	Indicates the measurement of Line 1 current for Compressor 1B in terms of % RLA	Percent
30136	Float	Line 2 Current RLA - Compressor 1B	Indicates the measurement of Line 2 current for Compressor 1B in terms of % RLA	Percent
30138	Float	Line 3 Current RLA - Compressor 1B	Indicates the measurement of Line 3 current for Compressor 1B in terms of % RLA	Percent
30140	Float	Phase AB Voltage - Compressor 2B	Indicates the measurement of voltage in Phase AB for Compressor 2B	Volts
30142	Float	Line 1 Current - Compressor 2B	Indicates the measurement of Line 1 current for Compressor 2B in terms of Amps	Amps
30144	Float	Line 2 Current - Compressor 2B	Indicates the measurement of Line 2 current for Compressor 2B in terms of Amps	Amps
30146	Float	Line 3 Current - Compressor 2B	Indicates the measurement of Line 3 current for Compressor 2B in terms of Amps	Amps
30148	Float	Line 1 Current RLA - Compressor 2B	Indicates the measurement of Line 1 current for Compressor 2B in terms of % RLA	Percent

Table 19. ACRB 350–500 tons analog inputs (continued)

Modbus Register	Data Type	Object Name	Description	Units
30150	Float	Line 2 Current RLA - Compressor 2B	Indicates the measurement of Line 2 current for Compressor 2B in terms of % RLA	Percent
30152	Float	Line 3 Current RLA - Compressor 2B	Indicates the measurement of Line 3 current for Compressor 2B in terms of % RLA	Percent
30156	Float	Refrigerant Discharge Temperature - Compressor 1B	Indicates the current temperature of the refrigerant being discharged from Compressor 1B	Degrees Fahrenheit
30158	Float	High Side Oil Pressure - Compressor 1B	Indicates the pressure of the oil on the high pressure side of Compressor 1B	Pound Force per Square Inch
30160	Float	Refrigerant Discharge Temperature - Compressor 2B	Indicates the current temperature of the refrigerant being discharged from Compressor 2B	Degrees Fahrenheit
30162	Float	High Side Oil Pressure - Compressor 2B	Indicates the pressure of the oil on the high pressure side of Compressor 2B	Pound Force per Square Inch
30164	Float	Number of Circuits	Indicates the number of refrigeration circuits in the chiller	No Units
30166	Float	Number of Compressors Circuit 1	Indicates the number of compressors on circuit 1 of the chiller	No Units
30168	Float	Number of Compressors Circuit 2	Indicates the number of compressors on circuit 2 of the chiller	No Units
30170	Float	Actual Running Capacity	Indicates the measurement of the power being consumed by the Chiller	Percent
30172	Float	Free Cooling Capacity Status	Indicates the % capacity of the free cooling being used	Percent
30174	Float	Free Cooling Entering Water Temperature Active	Indiactes the entering water temperature of the free cooling circuit	Degrees Fahrenheit
30180	Float	Evaporator Differential Water Pressure Setpoint Status	Indicates the setpoint status of the evaporator differential water pressure	Pound Force per Square Inch
30182	Float	Energy Consumption Lifetime	Indicates the total energy consumption of the chiller (for the lifetime of the chiller)	Kilowatts hour
30184	Float	Energy Consumption	Indicates the total energy consumption of the chiller (since last accumulation reset)	Kilowatts hour
30186	Float	Starts - Compressor 1A	Indicates the number of starts of Compressor 1A	No Units
30188	Float	Run Time - Compressor 1A	Indicates the run time of Compressor 1A	No Units
30190	Float	Starts - Compressor 2A	Indicates the number of starts of Compressor 2A	No Units
30192	Float	Run Time - Compressor 2A	Indicates the run time of Compressor 2A	No Units
30194	Float	Starts - Compressor 1B	Indicates the number of starts of Compressor 1B	No Units
30196	Float	Run Time - Compressor 1B	Indicates the run time of Compressor 1B	No Units
30198	Float	Starts - Compressor 2B	Indicates the number of starts of Compressor 2B	No Units
30200	Float	Run Time - Compressor 2B	Indicates the run time of Compressor 2B	No Units
30202	Float	Chiller Design Capacity	Indicates the design capacity of chilller	Tons of Refrigeration
30206	Float	Chilled Water Setpoint Status	Indicates the chilled water setpoint temperature	Degrees Fahrenheit
30208	Float	Demand Limit Setpoint Status	Indacates the % capacity of the demand limit being used	Percent
30210	Float	Unit Source ID	Indicates the last diagnostic of the chiller Separately, individual diagnostics are reported with dedicated points, variables, registers	No Units
30212	Float	Drive Input Voltage Calculated 1A	Indicates the input voltage at the AFD for Compressor 1A	Volts
30214	Float	Drive Input Voltage Calculated 2A	Indicates the input voltage at the AFD for Compressor 2A	Volts
30216	Float	Active Cool/Heat Setpoint Temperature	Indicates the value of the active Chilled Water Setpoint actively being used by the chiller	Degrees Fahrenheit
30218	Float	Phase BC Voltage - Compressor 1B	Indicates the measurement of voltage in Phase BC for Compressor 1B	Volts
30220	Float	Phase CA Voltage - Compressor 1B	Indicates the measurement of voltage in Phase CA for Compressor 1B	Volts
30222	Float	Phase BC Voltage - Compressor 2B	Indicates the measurement of voltage in Phase BC for Compressor 2B	Volts
30224	Float	Phase CA Voltage - Compressor 2B	Indicates the measurement of voltage in Phase CA for Compressor 2B	Volts

Table 19. ACRB 350–500 tons analog inputs (continued)

Modbus Register	Data Type	Object Name	Description	Units
30226	Float	Average Line Current Circuit 1	Indicates the average current, reported in Circuit 1	Amps
30228	Float	Average Line Current Circuit 2	Indicates the average current, reported in Circuit 2	Amps
30230	Float	Average Line Voltage Circuit 1	Indicates the average voltage, line-to-line reported in Circuit 1	Volts
30232	Float	Average Line Voltage Circuit 2	Indicates the average voltage, line-to-line reported in Circuit 2	Volts
30234	Float	Line Current L1 Circuit 1	Indicates the current for line/leg 1 of Circuit 1	Amps
30236	Float	Line Current L2 Circuit 1	Indicates the current for line/leg 2 of Circuit 1	Amps
30238	Float	Line Current L3 Circuit 1	Indicates the current for line/leg 3 of Circuit 1	Amps
30240	Float	Line Current L1 Circuit 2	Indicates the current for line/leg 1 of Circuit 2	Amps
30242	Float	Line Current L2 Circuit 2	Indicates the current for line/leg 2 of Circuit 2	Amps
30244	Float	Line Current L3 Circuit 2	Indicates the current for line/leg 3 of Circuit 2	Amps
30246	Float	Voltage L1-L2 Circuit 1	Indicates the voltage between line/leg L1 and L2 of Circuit 1	Volts
30248	Float	Voltage L2-L3 Circuit 1	Indicates the voltage between line/leg L2 and L3 of Circuit 1	Volts
30250	Float	Voltage L1-L3 Circuit 1	Indicates the voltage between line/leg L1 and L3 of Circuit 1	Volts
30252	Float	Voltage L1-L2 Circuit 2	Indicates the voltage between line/leg L1 and L2 of Circuit 2	Volts
30254	Float	Voltage L2-L1 Circuit 2	Indicates the voltage between line/leg L2 and L3 of Circuit 2	Volts
30256	Float	Voltage L1-L3 Circuit 2	Indicates the voltage between line/leg L1 and L3 of Circuit 2	Volts
30258	Float	Total Real Power	Indicates the total real power reported	Kilowatts
30260	Float	Line Frequency Circuit 1	Indicates the estimated input frequency for Circuit 1	No Units
30262	Float	Line Frequency Circuit 2	Indicates the estimated input frequency for Circuit 2	No Units
30264	Float	Power Factor Circuit 1	Indicates the reported power factor for Circuit 1	No Units
30266	Float	Power Factor Circuit 2	Indicates the reported power factor for Circuit 2	No Units
30268	Float	Power Demand Circuit 1	Indicates the reported power demand for Circuit 1	Kilowatts
30270	Float	Power Demand Circuit 2	Indicates the reported power demand for Circuit 2	Kilowatts

Table 20. ACRB 350–500 tons analog values

Modbus Register	Data Type	Object Name	Description	Units
40010	Float	Chilled Water Setpoint	The value is normally provided by the BAS to send the Chilled Water Setpoint. The value is subject to arbitration logic in the controller, in which case it may or may not be used for control purposes	Degrees Fahrenheit
40012	Float	Demand Limit Setpoint	The value is normally provided by the BAS to send the Demand Limit Setpoint. The value is subject to arbitration logic in the controller, in which case it may or may not be used for control purposes	Percent

Table 21. ACRB 350–500 tons binary inputs

Modbus Register	Data Type	Object Name	Description	Object States
33010	Signed Integer 16-bit	Run Enable	Indicates that chiller is available to run or is currently running	0 = Run Not Enabled 1 = Run Enabled
33011	Signed Integer 16-bit	Local Setpoint Control	Indicates the which setpoint is used for control purposes, Remote (BAS) or Local	0 = Remote control 1 = Local control
33012	Signed Integer 16-bit	Limit Mode Relay Status	Indicates the status of the chiller limit relay	0 = Off 1 = On
33013	Signed Integer 16-bit	Chiller Running State	Indicates whether the chiller is on (currently doing either cooling) or is considered off(not currently doing cooling)	0 = Off 1 = On

Table 21. ACRB 350–500 tons binary inputs (continued)

Modbus Register	Data Type	Object Name	Description	Object States
33014	Signed Integer 16-bit	Maximum Capacity	Indicates the status of the maximum capacity relay	0 = Off 1 = On
33016	Signed Integer 16-bit	Manual Override Exists	Indicated a manual override is present	0 = Off 1 = On
33017	Signed Integer 16-bit	Compressor 1A Status	Indicates running state fo Compressor 1A	0 = Off 1 = Running
33018	Signed Integer 16-bit	Compressor 2A Status	Indicates running state fo Compressor 2A	0 = Off 1 = Running
33019	Signed Integer 16-bit	Emergency Stop	Indicates the status of the emergency stop function of the chiller	0 = Auto 1 = Emergency Stop - Manual Reset Required
33020	Signed Integer 16-bit	Evaporator Water Pump Request	Indicates a request from the chiller to turn on the Evaporator Water Pump	0 = Off 1 = On
33021	Signed Integer 16-bit	Evaporator Water Flow Status	Indicates the flow of water through evaporator	0 = No Flow 1 = Flow
33022	Signed Integer 16-bit	Compressor 1B Status	Indicates running state of Compressor 1B	0 = Off 1 = Running
33023	Signed Integer 16-bit	Compressor 2B Status	Indicates running state of Compressor 2B	0 = Off 1 = Running
33024	Signed Integer 16-bit	Free Cooling Active	Indicated the free cooling mode is active	0 = Inactive 1 = Active
33026	Signed Integer 16-bit	Diagnostic Present	Indicates whether diagnostic present	0 = Normal 1 = In Alarm
33027	Signed Integer 16-bit	Diagnostic Shutdown Present	Indicates chiller is shut down due to diagnostics	0 = Normal 1 = In Alarm
33028	Signed Integer 16-bit	Diagnostic: Manual Reset Required	Indicates when a diagnostic exists that requires manual reset	0 = Normal 1 = In Alarm
33029	Signed Integer 16-bit	Diagnostic: Local Manual Reset Required	Indicates when a diagnostic exists that requires manual reset [Local only]	0 = Normal 1 = In Alarm
33030	Signed Integer 16-bit	Diagnostic Present: Information	Indicates whether diagnostic present with Information Category	0 = Normal 1 = In Alarm
33031	Signed Integer 16-bit	Diagnostic Present: Advisory	Indicates whether diagnostic present with Warning Category	0 = Normal 1 = In Alarm
33032	Signed Integer 16-bit	Diagnostic Present: Critical	Indicates whether diagnostic present with Critical Category	0 = Normal 1 = In Alarm
33033	Signed Integer 16-bit	Diagnostic Present: Service Required	Indicates whether diagnostic present with Service Required Category	0 = Normal 1 = In Alarm
33034	Signed Integer 16-bit	External Auto Stop Input Status	Indicates the status of the externally-wired auto/stop input	0 = Stop 1 = Auto
33035	Signed Integer 16-bit	Front Panel Auto Stop	Indicates the auto/stop status of the Front Panel	0 = Stop 1 = Auto
33036	Signed Integer 16-bit	Noise Reduction Request Active	Indicates wherther Noise Reduction active	0 = Off 1 = On
33037	Signed Integer 16-bit	Circuit 1 Lockout Front Panel	Indicates the lockout state of Circuit 1 Compresser from Front Panel	0 = Normal 1 = Locked Out
33038	Signed Integer 16-bit	Circuit 2 Lockout Front Panel	Indicates the lockout state of Circuit 2 Compresser from Front Panel	0 = Normal 1 = Locked Out
33039	Signed Integer 16-bit	Circuit 1 Lockout External	Indicates the lockout state of Circuit 1 Compresser from External	0 = Normal 1 = Locked Out
33040	Signed Integer 16-bit	Circuit 2 Lockout External	Indicates the lockout state of Circuit 2 Compresser from External	0 = Normal 1 = Locked Out
33041	Signed Integer 16-bit	Circuit 1 Lockout Active	Indicates the lockout state of Circuit 1 Compresser	0 = Normal 1 = Locked Out
33042	Signed Integer 16-bit	Circuit 2 Lockout Active	Indicates the lockout state of Circuit 2 Compresser	0 = Normal 1 = Locked Out

Table 22. ACRB 350–500 tons binary value

Modbus Register	Data Type	Object Name	Description	Object States
43010	Signed Integer 16-bit	Reset Diagnostic	Normally used by the BMS to initiate a request to reset any controller diagnostics	0 = Normal 1 = Reset
43011	Signed Integer 16-bit	Noise Reduction Request BAS	Normally used by the BMS to command the chiller to enter a mode of operation where the noise of the unit is reduced	0 = Normal 1 = Reduce Noise
43012	Signed Integer 16-bit	Circuit 1 Lockout BAS	Normally used by the BMS to lockout the Circuit-1 Compressor	0 = Normal 1 = Locked Out

Table 22. ACRB 350–500 tons binary value (continued)

Modbus Register	Data Type	Object Name	Description	Object States
43013	Signed Integer 16-bit	Circuit 2 Lockout BAS	Normally used by the BMS to lockout the Circuit-2 Compressor	0 = Normal 1 = Locked Out
43017	Signed Integer 16-bit	Energy Consumption Reset	Normally used by the BMS to reset the energy consumption accumulated total	0 = Accumulating 1 = Reset
43018	Signed Integer 16-bit	Chiller Auto Stop Command BAS	Normally used by the BMS to command the chiller to start running if operating conditions are satisfied, or to stop the chiller from running.	0 = Stop 1 = Auto
43019	Signed Integer 16-bit	Free Cooling Auto Stop Command BAS	Normally used the BMS to command the chiller to allow free cooling mode if conditions are satisfied, or to stop the free cooling mode from operating.	0 = Stop 1 = Auto
43020	Signed Integer 16-bit	Free Cooling Compressor Lockout	Normally used by the BMS to lockout the Compressor while in free cooling mode	0 = Normal 1 = Locked Out

Table 23. ACRB 350–500 tons multi-state inputs

Modbus Register	Data Type	Object Name	Description	Object States
32010	Unsigned Integer 16-bit	Running Mode	Indicates the operating mode of the chiller	1 = Cool 2 = Heat 3= Ice Making 4= Free Cooling
32011	Unsigned Integer 16-bit	Operating Mode	Indicates the chiller refrigerant type	1 = R-11 2 = R-12 3= R-22 4= R-123 5 = R-134a 6 = R-407C 7 = R-410A 8 = R-113 9 = R-114 10 = R-500 11 = R-502 12 = R-404A 13 = R-513A 14 = R-1233zd(E) 15 = R-514A 16 = R-1234ze(E)
32012	Unsigned Integer 16-bit	Refrigerant Type	Indicates the cooling Type of chiller	1 = Water Cooled 2 = Air Cooled
32013	Unsigned Integer 16-bit	Cooling Type	Indicates the location that the chiller was manufactured	1 = Field Applied 2 = La Crosse 3= Pueblo 4= Charmes 5 = Rushville 6 = Macon 7 = Waco 8 = Lexington 9 = Forsyth 10 = Clarksville 11 = Ft. Smith 12 = Penang 13 = Colchester 14 = Curitiba 15 = Taicang 16 = Taiwan 17 = Epinal 18 = Golbey

Table 23. ACRB 350–500 tons multi-state inputs (continued)

Modbus Register	Data Type	Object Name	Description	Object States
32014	Unsigned Integer 16-bit	Manufacture Location	Indicates the model information of chiller	1 = CVHF 2 = CVGF 3= CVHS 4= RTAE 5 = RTAF 6 = RTHA 7 = RTHB 8 = RTHC 9 = RTHD 10 = RTWE 11 = CTVD 12 = CVR 13 = CVHH 14 = CDHH 15 = VMAX 16 = GVAF 17 = RTWF 18 = RTHF 19 = RTAC 20 = CVHM 21 = RTAG 22 = CGAF 23 = RTXG 24 = GVWF 25 = HDWA 26 = CMAC 27 = IPAK 28 = CXAF 29 = ACSA 30 = RTSF 31 = HSWA 32 = ACRA 33 = RTEG 34 = ACXA 35 = CMAF 36 = ACRB Large 37 = ACRB Small
32015	Unsigned Integer 16-bit	Model Information [GEN2]		1 = BAS 2 = External 3 = Front Panel
32016	Unsigned Integer 16-bit	Chiller Setpoint Source	Indicates the selected setpoint source for control purpose	1 = BAS 2 = External 3 = Front Panel

Table 24. ACRB 350–500 tons multi-state values

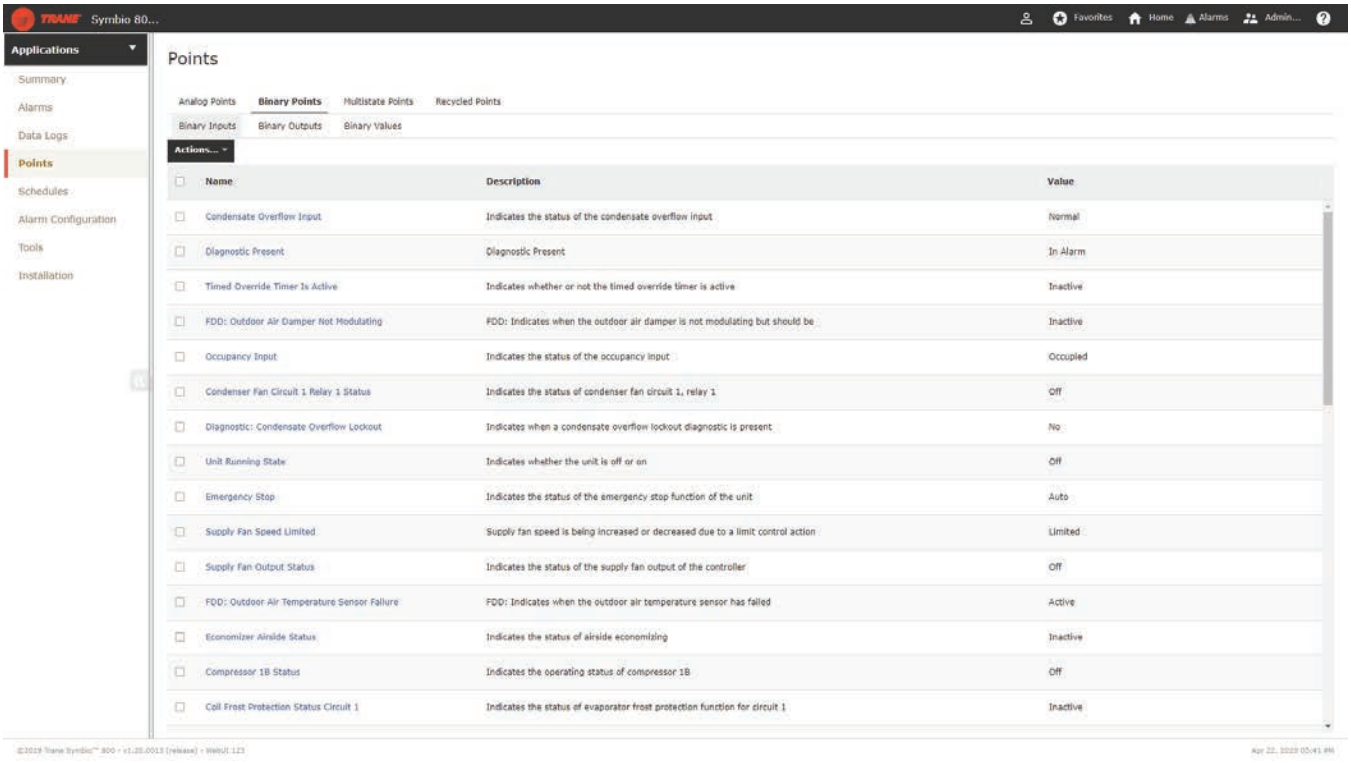
Modbus Register	Data Type	Object Name	Description	Object States
42010	Unsigned Integer 16-bit	Chiller Mode Command BAS	Normally used by the BMS to command the chiller Mode	1 = Cool 2 = Heat 3= Ice Making 4= Free Cooling

Recycled Points

The Symbio™ 800 controller ships from the factory pre-configured for the specific unit application. The points of the communicated interface (BACnet, Modbus, or LonTalk) vary based on the unit configuration. Only those points pertinent to that configuration are included in the interface.

Example: When the unit is configured for only two compressors, any points associated with compressors three and four are not be displayed on the Touch Screen interface or browser-based Web user interface. When configuration changes are made in the field, the points in the communication interface change accordingly to align with those features or user-added points.

Figure 22. Points

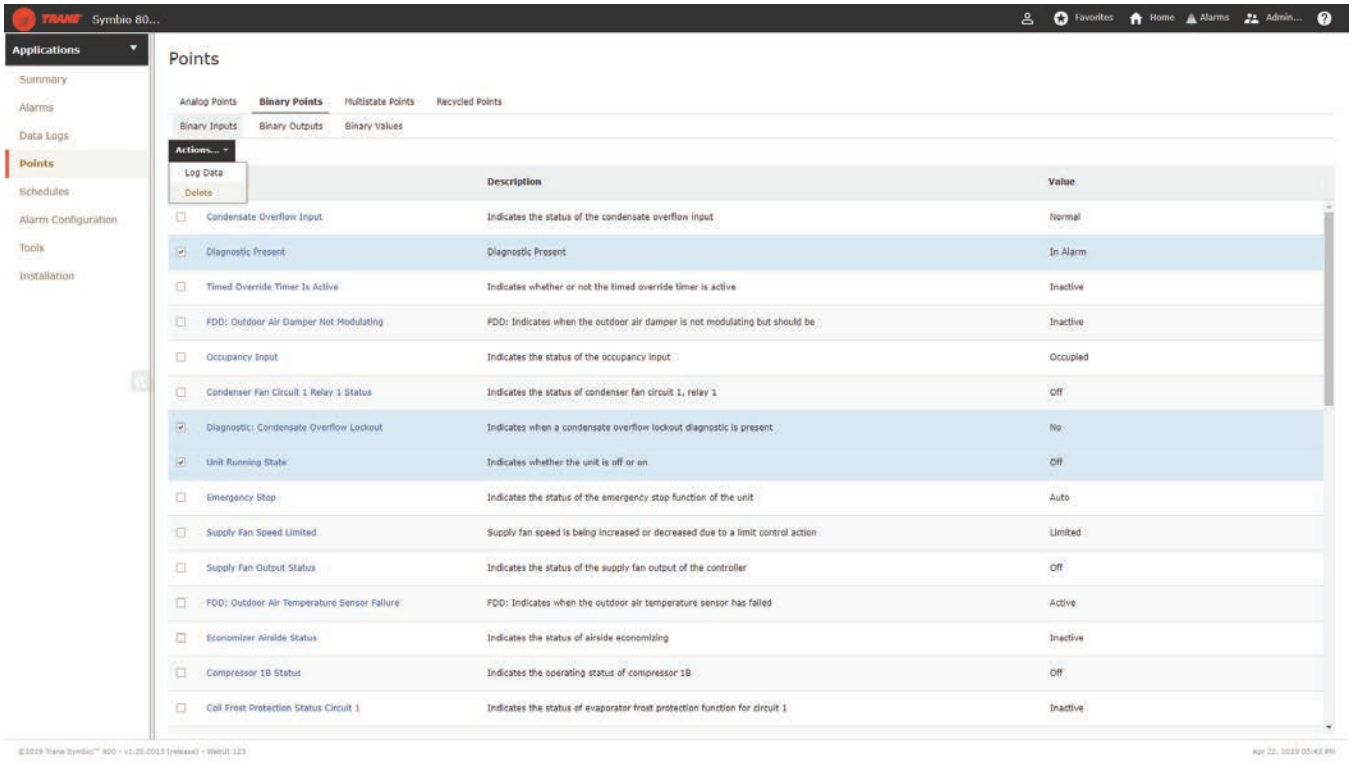


Any of the factory-provided points can be removed from the communication interface through a feature known as recycling. When the user selects and deletes a factory point, that point is moved to Recycled Points and is removed from the interface. This feature offers technicians the ability to strategically provide only those interface points desired for a specific project or installation.

To remove a point from the interface:

1. On the left-hand navigation, select **Points**.
2. Each of the points are grouped by their native type (analog, binary or multi-state), and input, output, or value. Select the appropriate group at the top of the page.
3. Select one or more points from the list and select **Actions... | Delete**.

Figure 23. Delete points

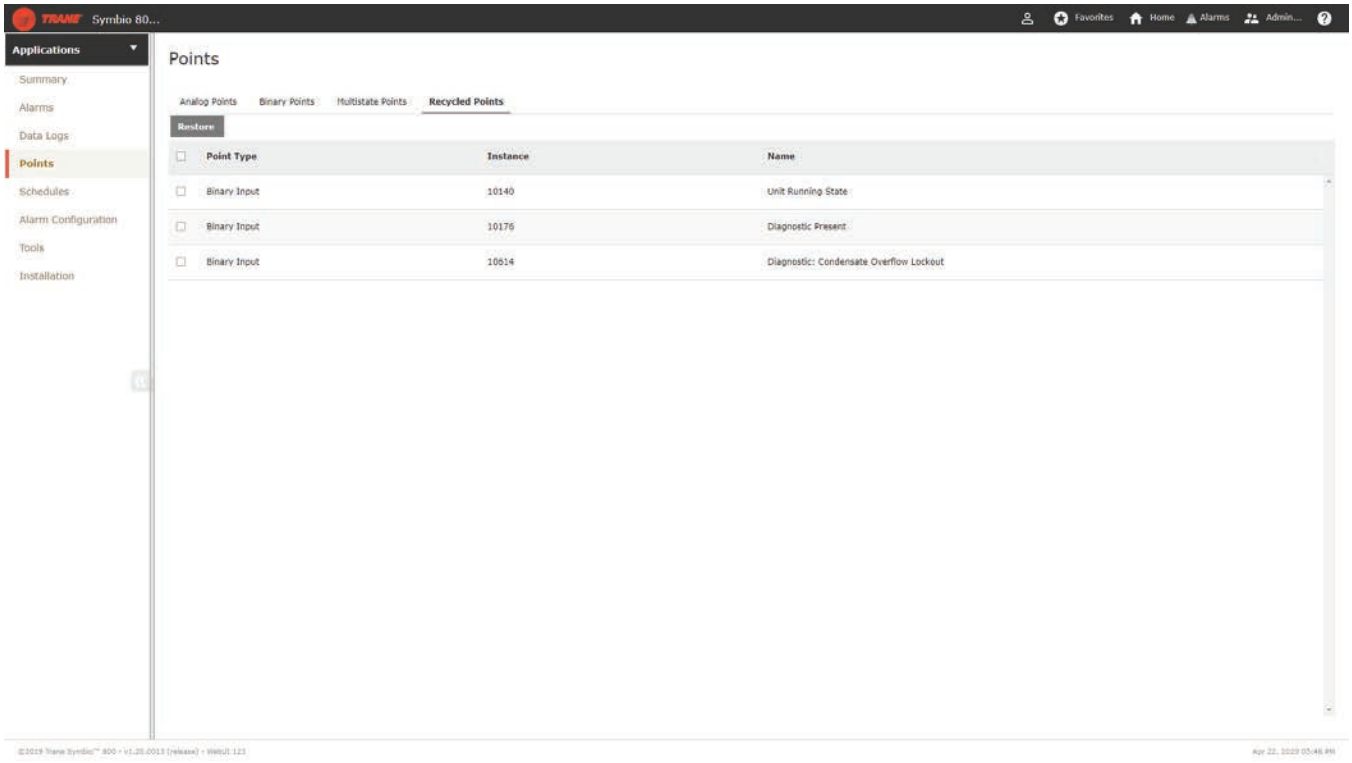


Note: *User-created points cannot be recycled. Instead, when the user selects and deletes user-created points, those points are permanently removed from the controller. Should the user decide later that one or more of the deleted user points are needed, they will need to be recreated.*

To restore recycled points:

1. Navigate to the **Recycled Points** tab on the Points page.
2. Select one or more points to be restored, then click **Restore**.
3. Once the restore process is complete, the restored points are moved back to the appropriate tab depending on point type. The recycled points also appear in the communicated interface once they are restored.

Figure 24. Recycled points tab



Appendix A. Arbitration

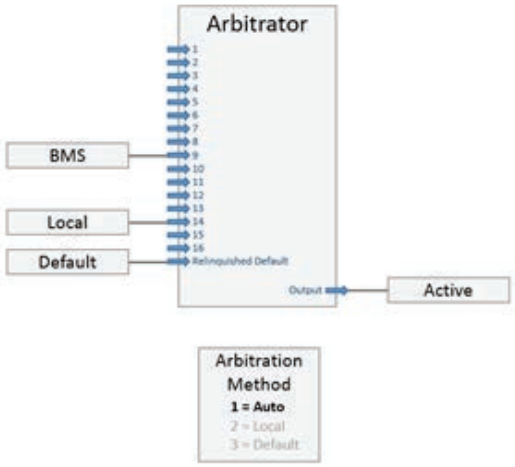
The Symbio™ 800 controller includes arbitration logic for several points. For each read/write point designated as "BAS", an associated "Arbitration" point determines the behavior of that communicated data compared to the local hardwired (or wireless) sensor and a default value.

As shown in Figure 25, p. A–1, the arbitrator considers all possible sources of the provided data, including Building Management Systems (BMS), local, and default. Each potential source is defined at a pre-determined, fixed priority. When the arbitration method is selected as full/auto, the BMS value is used instead of the local or default values.

The point designator with the arbitrator suffix includes the full priority array, allowing the user to see the value associated with all potential sources considered in the logic. The active point reflects the result of the arbitration logic.

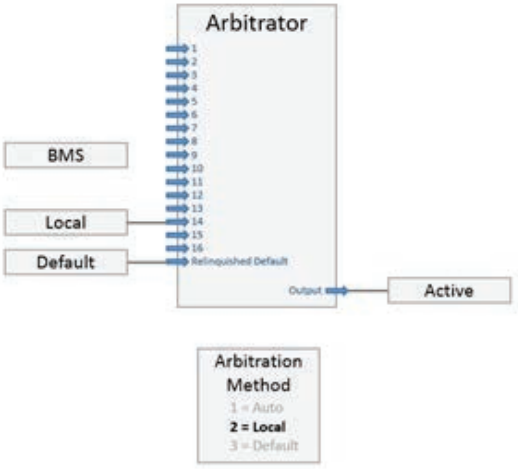
Because the arbitrated points are normally associated with sensors, the default value is invalid, meaning the value must be provided either by the BMS or the local sensor.

Figure 25. Arbitration method - full/auto



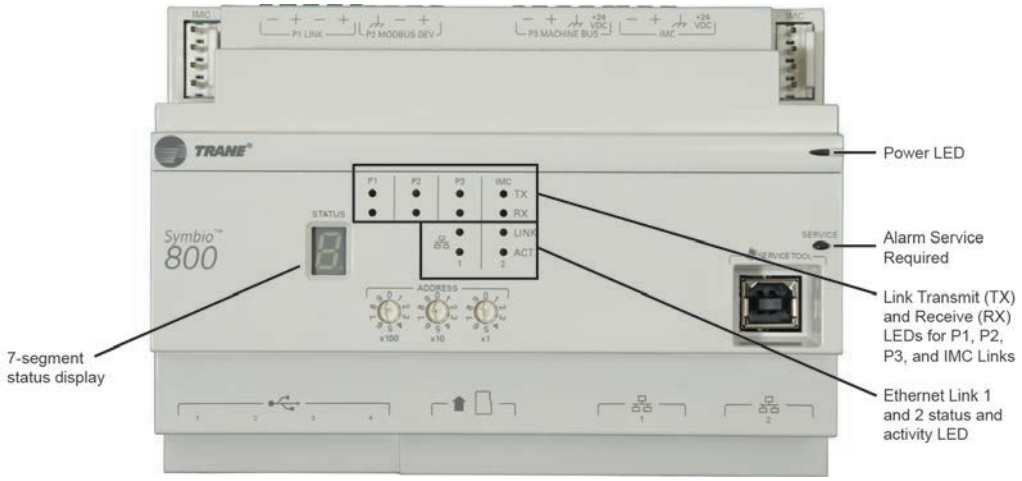
When the Arbitration Method is selected as local, the BMS value is ignored and local value is used instead. Though the arbitration logic still considers all inputs, any values sent by the BMS are effectively ignored.

Figure 26. Arbitration method - local



Appendix B. Symbio™ 800 Controller Display

Figure 27. Symbio™ 800 controller display and LEDs



7–Segment status display

Table 25. Codes for 7–segment display segment

Code	Description
U0.	Waiting for USB drives to mount
U2.	Checking signature on the .scfw file
U3.	Checking software maintenance plan
U4.	Reformatting main filesystem (clearing database)
U5.	Beginning update
U12.	Searching for .scfw files on USB drive(s)
U51.	Updating main firmware
U54.	Updating FPGA image
U55.	Updating U-boot image
U57.	Updating recovery partition

Note: *A code starting with an "F" indicates a failure, and requires Trane Service to resolve the issue.*

P1 Link — BACnet TP or Modbus RTU

- RS-485 daisy chain
- Used for connection to a primary controller

Figure 28. P2 Modbus device (factory installed Modbus server devices)

Note: *The P2 link is intended for factory devices only and should not have any other devices added this link.*

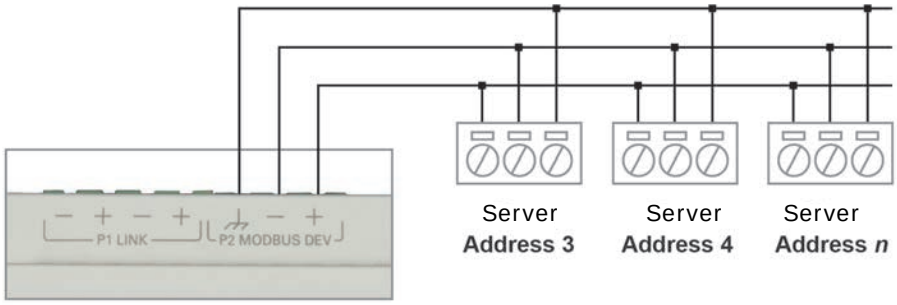


Figure 29. P3 machine bus (global bus — internal communication bus)

Note: *The P3 link is intended for factory devices only and should not have any other devices added this link.*

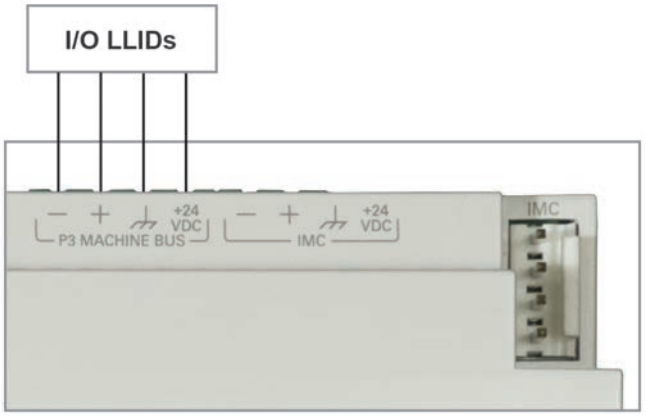
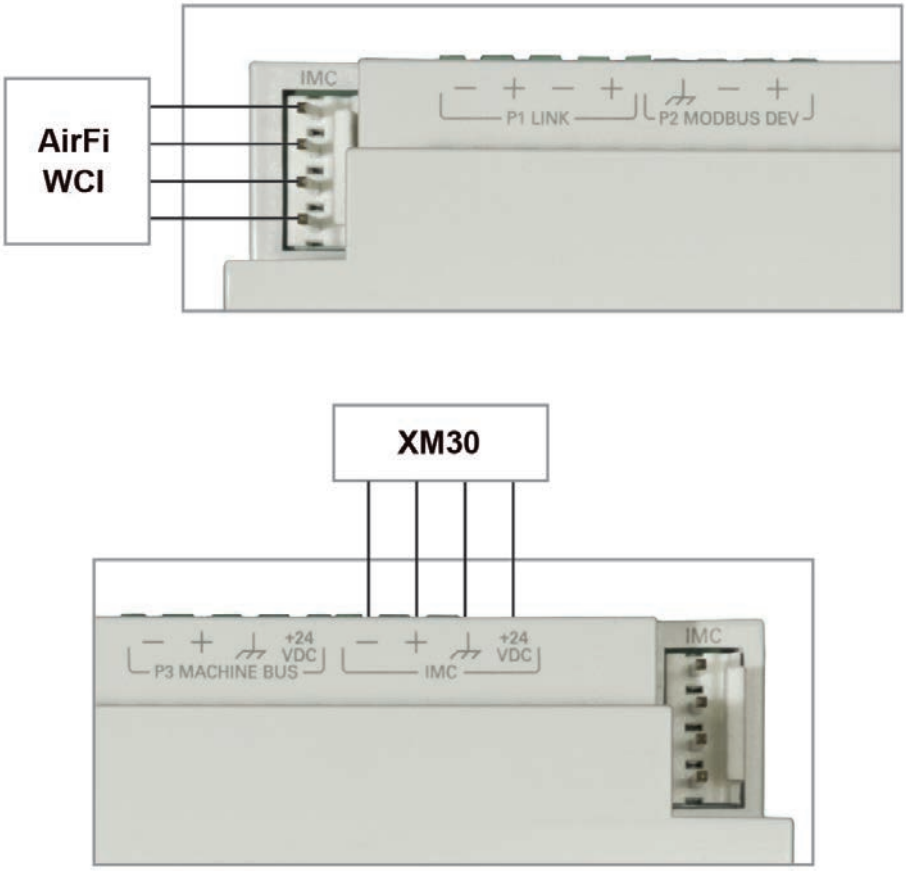
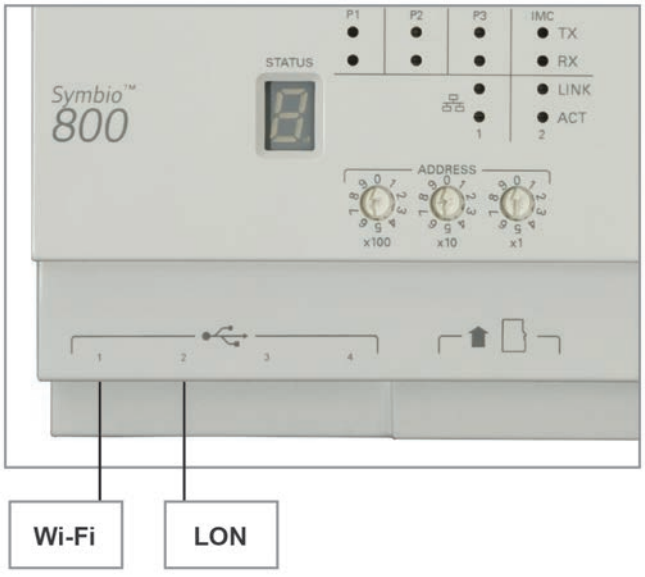


Figure 30. IMC link terminations for optional Air-Fi and expansion module (XM30)



For more information on Expansion Module wiring reference BAS-SVX46 – Expansion Module Installation Operation and Maintenance Manual.*

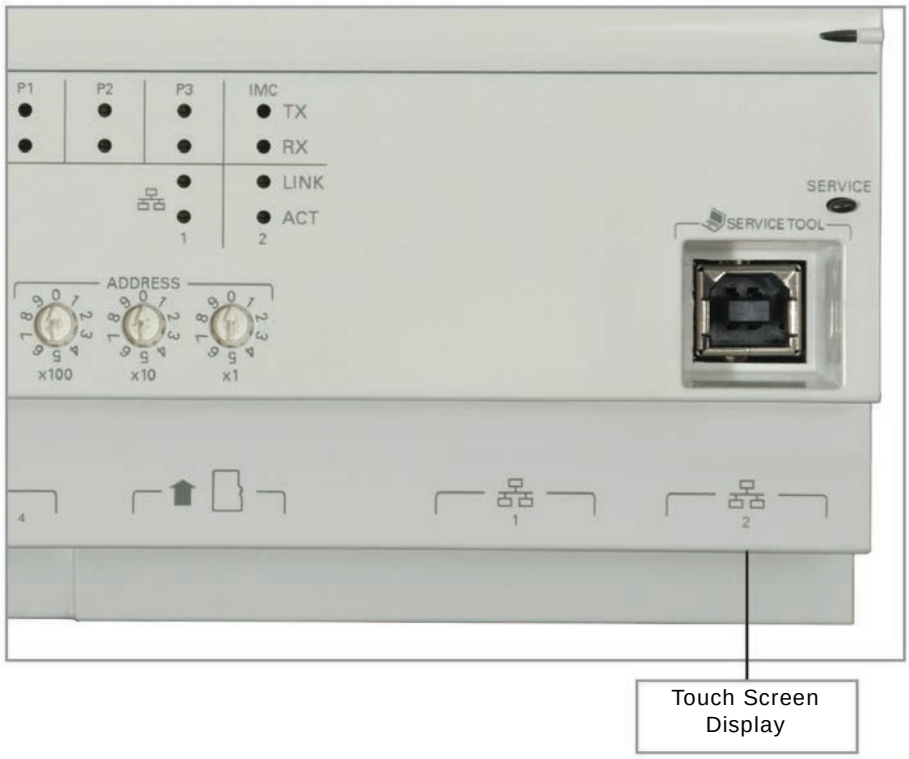
Figure 31. (4) USB connectors



The controller automatically detects devices on any of the ports (not port specific). The controller ships with all ports enabled, but they can be disabled via the Web interface.

Note: *The USB ports are not to be used for any devices that are not Trane approved, such as cellular phones.*

Figure 32. Ethernet port 2



Note: *Ethernet Port 2 is for use with the Touch Screen display only. Communication to other devices is not supported.*

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