Integration Guide

BACnet® Integration for Symbio™ 800

For use with IntelliPak® Symbio™ Rooftops

⚠ 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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Revision History

- Updated all tables in Object Data Points and Diagnostic Data Points section.
- Updated IMC link terminations for optional Air-Fi and expansion module.
- Additional running edits included.

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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 Symbio™ 800 controller has been installed, programmed, wired, 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 RTU control panel.

The RTU 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.

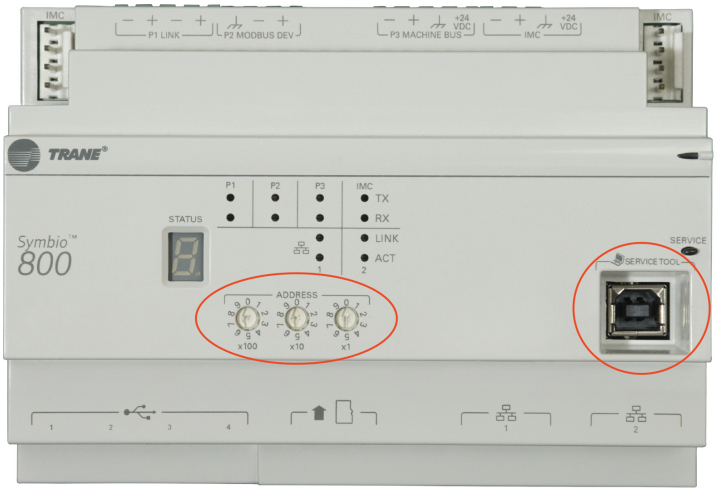
Important: *These adjustable settings are applied only to the units of measured displayed in the web interface, not the communicated interface.*

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



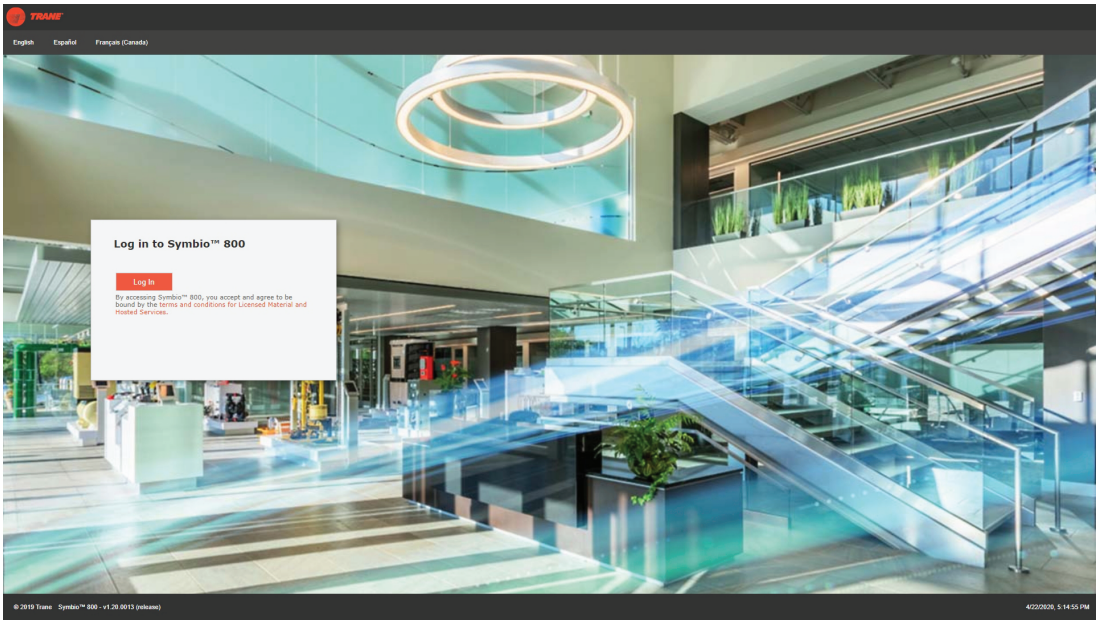
Service Tool for Symbio™ 800 Configuration

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



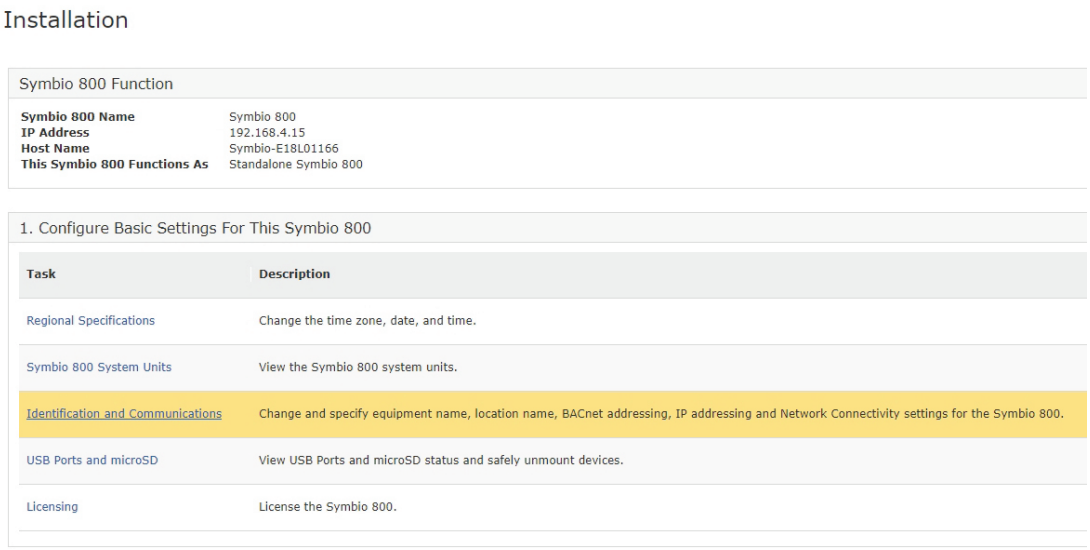
Note: *The Symbio™ 800 web interface can only be viewed using the USB connection. Ethernet port 1 and Ethernet port 2 will not allow access to the Symbio™ web server to meet IT security requirements.*

BACnet Protocol Configuration

To access the Symbio™ 800 Protocol Configuration page:

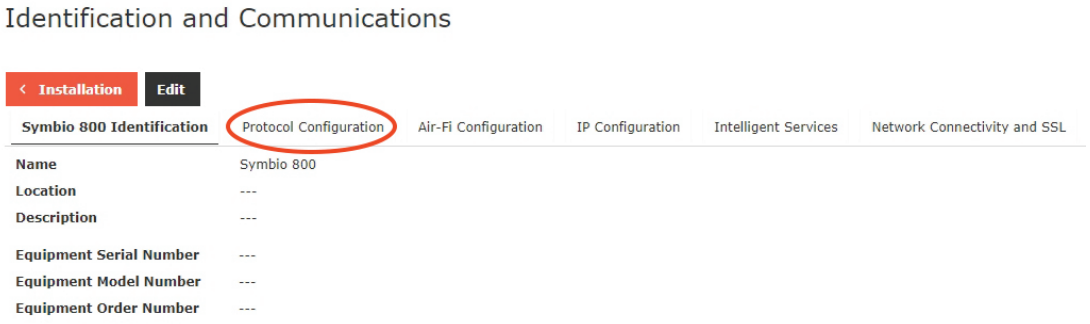
1. Connect to the Symbio™ 800 web interface.
2. On the left-hand navigation, click **Installation**.
3. Click **Identification and Communications**.

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

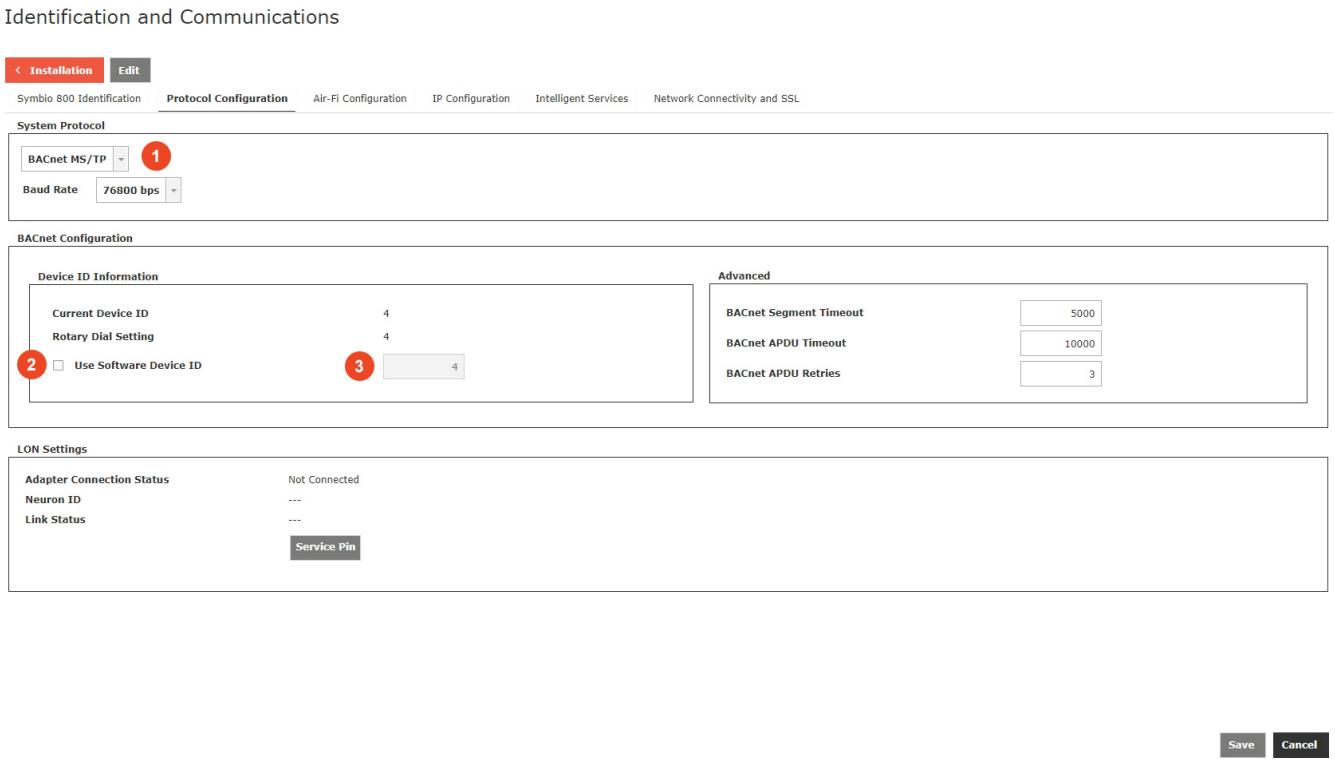
the Symbio™ 800 controller.

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

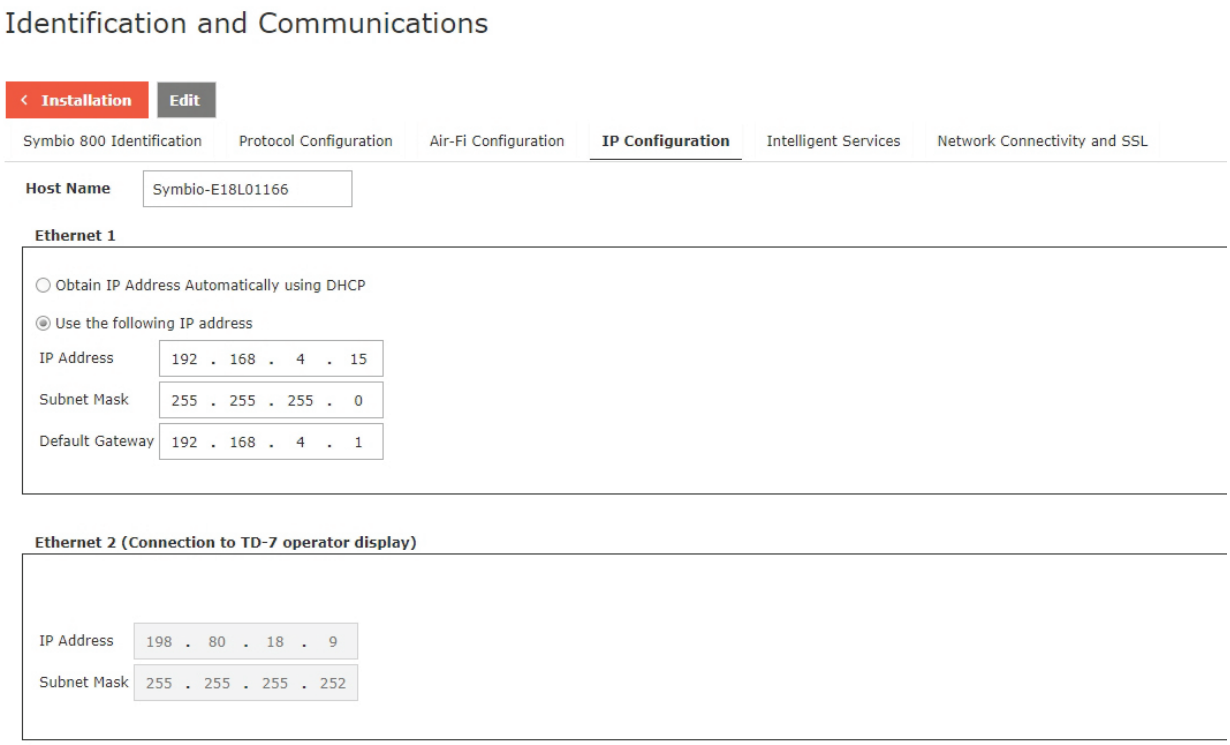
configuration parameters.

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

Figure 6. IP Configuration tab

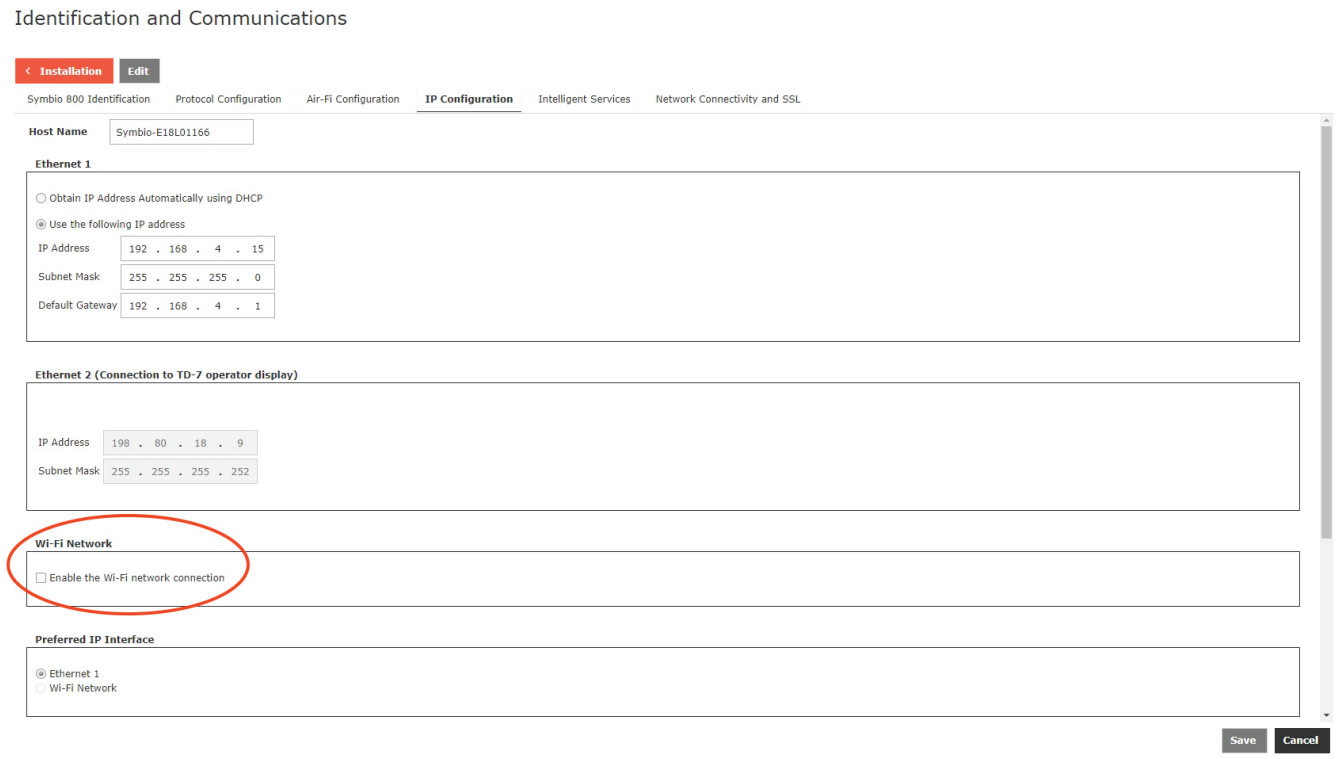
2. Click **Edit**.

Figure 7. Edit IP configuration



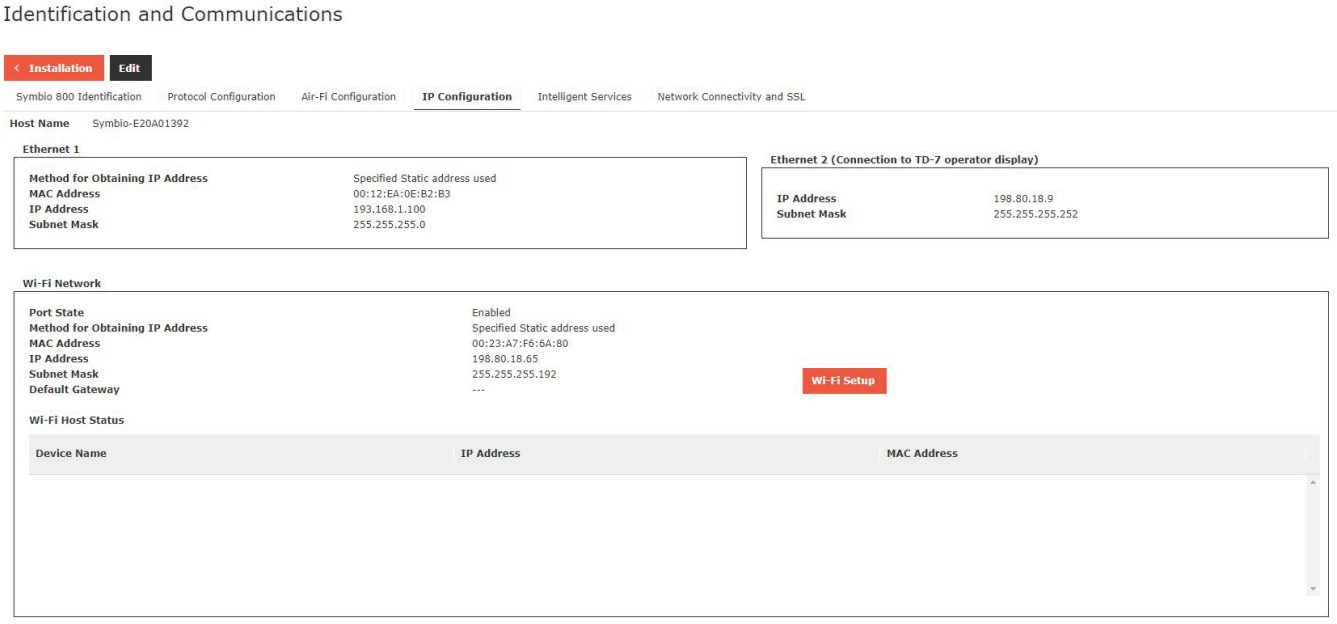
3. For BACnet IP using Ethernet cable connection only:
   a. Setup the Ethernet 1 port to either **Obtain an IP Address Automatically using DHCP** or use a static IP address by manually entering the IP address, subnet mask, and default.
   b. Set the Preferred IP Interface to **Ethernet 1**.
   c. Setup 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.

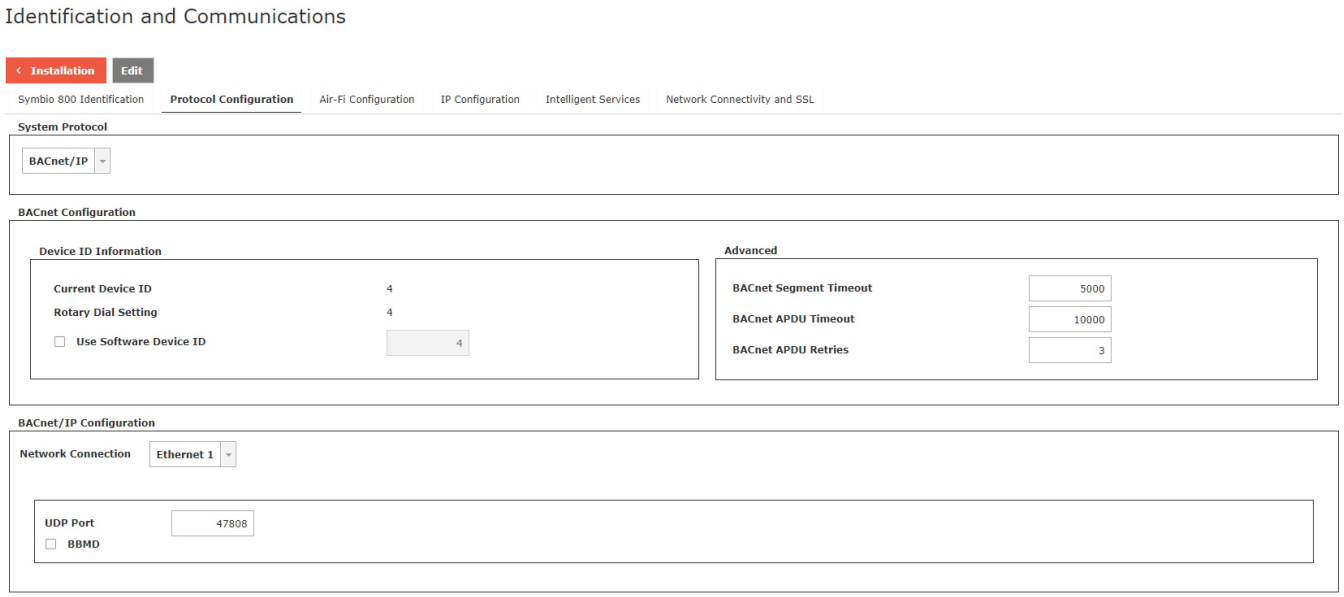
g. Set the Preferred IP Interface to **Wi-Fi Network**.

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.

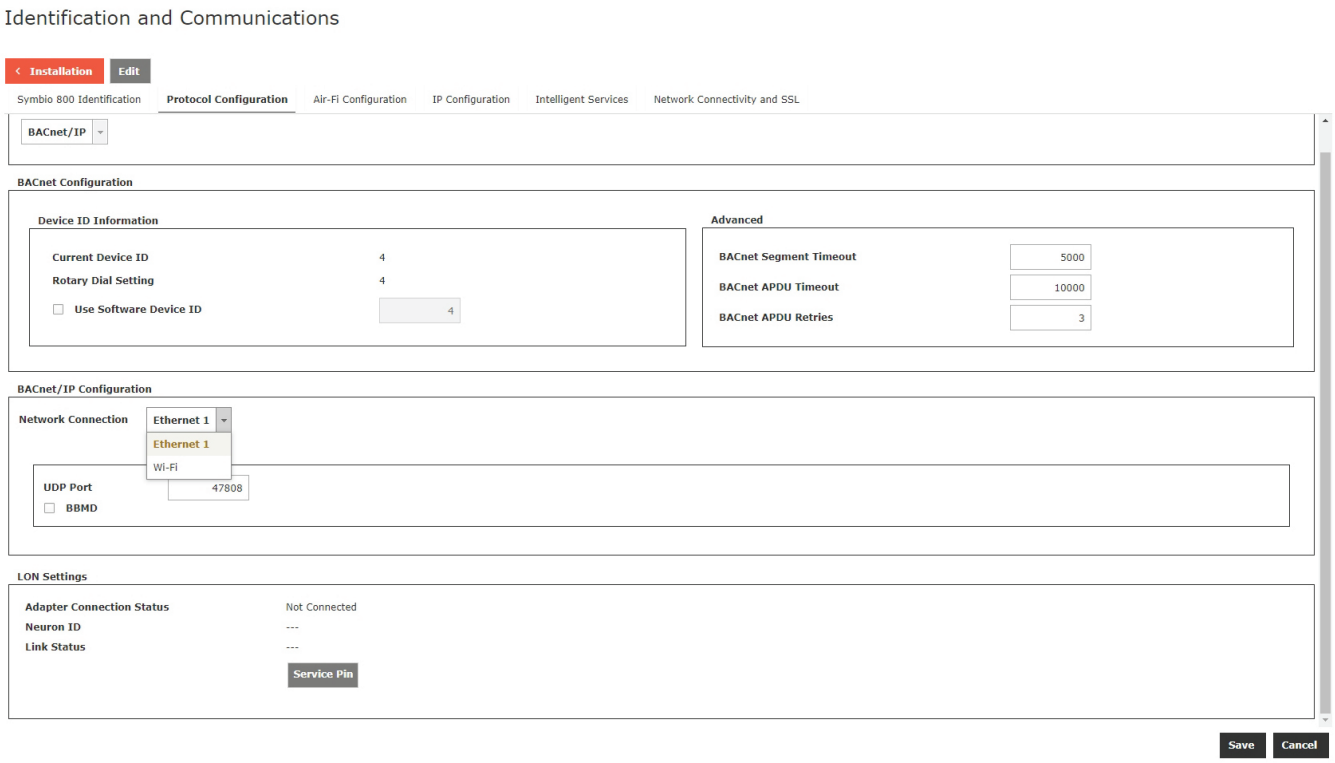
Figure 10. Protocol Configuration



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.

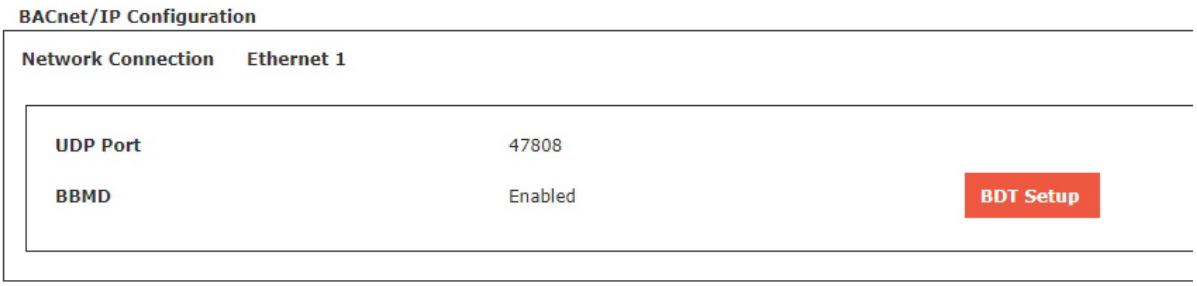
   Note: *The valid Device ID range using a software Device ID is 1 – 4194302 as defined by the BACnet standard.*
3. If using an Ethernet cable, set the Network Connection to **Ethernet 1**. If using the USB to Wi-Fi adapter, set the Network Connection to **Wi-Fi**.

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.*

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.*

Table 1. Analog input

Object Identifier	Object Name	Description	Units	VVDA[a]	CVDA[b]	VVZT[c]	CVZT[d]	When Exists
AI-10101	Cooling Capacity Status	Indicates the actual operating unit cooling capacity.	Percent	X	X	X	X	All Packaged RTU
AI-10102	Heating Capacity Primary Status	Indicates the unit (primary) heating capacity.	Percent	X	X	X	X	Heat Present
AI-10104	Outdoor Air Relative Humidity Local	Indicates the outdoor air humidity value from sensor connected to the controller.	Percent	X	X	X	X	Economizer with Reference or Comparative Enthalpy
AI-10105	Outdoor Air Flow Local	Indicates the measured outdoor air flow intake to the unit as reported by the locally-wired air flow monitoring feature.	Cubic Feet Per Minute	X	X	X	X	TRAQ Present
AI-10107	Space Static Pressure Local	Indicates the space statice pressure from a sensor connected to the controller.	Inches of Water	X	X	X	X	Space Pressure Management Present
AI-10110	Return Air Humidity Local	Indicates the return air humidity value from sensor connected to the controller.	Percent	X	X	X	X	Economizer with Reference or Comparative Enthalpy
AI-10111	Outdoor Air Damper Position	Indicates the position of the outside air damper as requested by the controller This value does not reflect position feedback from the damper actuator.	Percent	X	X	X	X	Economizer Present
AI-10112	Exhaust Damper Position	Indicates the unit exhaust damper position.	Percent	X	X	X	X	Barometric or Powered Relief
AI-10114	Outdoor Air Minimum Flow Setpoint Active	Indicates the active minimum outdoor air flow setpoint being used by the controller.	Cubic Feet Per Minute	X	X	X	X	TRAQ Present
AI-10116	Space Humidity Active	Indicates the active space relative humidity being used by the controller.	Percent	X	X	X	X	Hot Gas Reheat Present
AI-10118	Outdoor Air Temperature Active	Indicates the active outdoor air temperature currently being used by the controller.	Degrees Fahrenheit	X	X	X	X	All Packaged RTU
AI-10120	Outdoor Air Humidity Active	Indicates the active outdoor air humidity value used by the controller, considering all potential sources, local to the controller and remote.	Percent	X	X	X	X	Economizer with Reference or Comparative Enthalpy
AI-10121	Discharge Air Cooling Setpoint Active	Indicates the discharge air temperature cooling setpoint value resulting from any setpoint arbitration. The active value does NOT reflect any modifications that may be in place as part of setpoint reset. For the actual value being used, refer to the "...status".	Degrees Fahrenheit	X	X	X	X	All Packaged RTU

Table 1. Analog input (continued)

Object Identifier	Object Name	Description	Units	VVDA[a]	CVDA[b]	VVZT[c]	CVZT[d]	When Exists
AI-10122	Discharge Air Heating Setpoint Active	Indicates the discharge air temperature heating setpoint value resulting from any setpoint arbitration. The active value does NOT reflect any modifications that may be in place as part of setpoint reset. For the actual value being used, refer to the "...status".	Degrees Fahrenheit	X	X	X	X	Heat Present
AI-10123	Duct Static Pressure Setpoint Active	Indicates the duct static pressure control setpoint value resulting from any setpoint arbitration.	Inches of Water	X				Multiple-zone VAV Units
AI-10124	Discharge Air Temperature	Indicates the actual discharge air temperature being used by the controller.	Degrees Fahrenheit	X	X	X	X	All Packaged RTU
AI-10125	Mixed Air Temperature Local	Indicates the mixed air temperature value from a sensor physically connected to the controller.	Degrees Fahrenheit	X	X	X	X	All Packaged RTU
AI-10126	Return Air Temperature	Indicates the actual return air temperature being used by the controller.	Degrees Fahrenheit	X	X	X	X	Economizer with Reference or Comparative Enthalpy or Rapid Restart
AI-10128	Space Static Pressure Setpoint Active	Indicates the active space static pressure being used by the controller.	Inches of Water	X	X	X	X	Space Pressure Management Present
AI-10135	Space Dehumidification Setpoint Active	Indicates the active (occupied) space dehumidification setpoint, considering all potential sources.	Percent	X	X	X	X	Hot Gas Reheat Present
AI-10152	Exhaust Fan Speed Status	Indicates the commanded speed of the modulating exhaust fan.	Percent	X	X	X	X	Relief/Exhaust Fan Present
AI-10154	Economizer Minimum Position Setpoint Active	Indicates the economizer minimum position setpoint value resulting from any setpoint arbitration.	Percent	X	X	X	X	Economizer Present
AI-10155	Duct Static Pressure Local	Indicates the duct static pressure value from a sensor physically connected to the controller.	Inches of Water	X	X	X	X	All Packaged RTU
AI-10156	Outdoor Air Temperature Local	Indicates the outdoor air temperature value from a sensor physically connected to the controller.	Degrees Fahrenheit	X	X	X	X	All Packaged RTU
AI-10157	Dehumidification Control Status	Indicates the status of the unit dehumidification capacity.	Percent	X	X	X	X	Hot Gas Reheat Present
AI-10161	Condenser Capacity	Indicates the status of the unit condenser capacity, in percent.	Percent	X	X	X	X	All Packaged RTU
AI-10172	Reheat Capacity Status	Indicates the unit reheat capacity being requested by the controller, in percent.	Percent	X	X	X	X	Hot Gas Reheat Present
AI-10173	Supply Fan Speed Status	Indicates the commanded speed of the supply fan, in percent.	Percent	X		X		All Packaged RTU

Table 1. Analog input (continued)

Object Identifier	Object Name	Description	Units	VVDA[a]	CVDA[b]	VVZT[c]	CVZT[d]	When Exists
AI-10181	Discharge Air Temperature Local	Indicates the discharge air temperature value from a sensor physically connected to the controller.	Degrees Fahrenheit	X	X	X	X	All Packaged RTU
AI-10186	Space Temperature Active	Indicates the active space temperature being used by the controller.	Degrees Fahrenheit	X	X	X	X	All Packaged RTU
AI-10188	Space CO_2 Concentration Active	Indicates the active space CO_2 concentration being used by the controller.	Parts Per Million	X	X	X	X	TRAQ or Demand Control Ventilation
AI-10190	Space Temperature Cooling Setpoint Input	Indicates the (occupied) cooling temperature setpoint from the connected space sensor.	Degrees Fahrenheit			X	X	Zone Temperature Control Units
AI-10191	Space Temperature Heating Setpoint Input	Indicates the (occupied) heating temperature setpoint from the connected space sensor.	Degrees Fahrenheit			X	X	Heat Present and Zone Temperature Control Units
AI-10197	Heat Type	Indicates the type of heat in the unit.	No Units	X	X	X	X	All Packaged RTU
AI-10198	Cabinet Style	Indicates the cabinet style of the unit.	No Units	X	X	X	X	All Packaged RTU
AI-10199	Cool Type	Indicates the type of cooling in the unit.	No Units	X	X	X	X	All Packaged RTU
AI-10200	Preheat Type	Indicates the type of preheat in the unit.	No Units	X	X	X	X	All Packaged RTU
AI-10201	Reheat Type	Indicates the type of reheat in the unit.	No Units	X	X	X	X	All Packaged RTU
AI-10202	Supply Fan Type	Indicates the type of supply fan in the unit.	No Units	X	X	X	X	All Packaged RTU
AI-10203	Exhaust Or Return Fan Type	Indicates the type of exhaust fan or return fan in the unit.	No Units	X	X	X	X	All Packaged RTU
AI-10204	Exhaust Fan Speed Setpoint Active	Active setpoint input to exhaust/relief fan control.	Percent	X	X	X	X	Relief/Exhaust Fan Present
AI-10206	Number of Circuits	Indicates the number of refrigeration circuits in the unit.	No Units	X	X	X	X	All Packaged RTU
AI-10207	Number of Compressors Circuit 1	Indicates the number of compressors on DX circuit 1 of the unit.	No Units	X	X	X	X	All Packaged RTU
AI-10208	Number of Compressors Circuit 2	Indicates the number of compressors on DX circuit 2 of the unit.	No Units	X	X	X	X	All Packaged RTU, 40-75T
AI-10210	Return Isolation Damper Input	Indicates the requested position of the return isolation damper, when present.	Percent	X	X	X	X	Supply or Supply/ Return Dampers Present [e]
AI-10213	Space CO_2 Concentration Input	Indicates the space CO_2 concentration from a sensor connected to the controller.	Parts Per Million	X	X	X	X	TRAQ or Demand Control Ventilation
AI-10214	Space Dehumidification Unoccupied Setpoint Active	Indicates the active unoccupied space dehumidification setpoint, considering all potential sources.	Percent	X	X	X	X	Hot Gas Reheat Present
AI-10215	Space Humidity Input	Indicates the space relative humidity from a sensor connected to the controller.	Percent	X	X	X	X	Hot Gas Reheat Present
AI-10216	Space Temp Cooling Setpoint Status	Indicates the (occupied) cooling temperature setpoint from the connected space sensor module.	Degrees Fahrenheit			X	X	Zone Temperature Control Units

Table 1. Analog input (continued)

Object Identifier	Object Name	Description	Units	VVDA[a]	CVDA[b]	VVZT[c]	CVZT[d]	When Exists
AI-10217	Space Temp Heating Setpoint Status	Indicates the (occupied) heating temperature setpoint from the connected space sensor module.	Degrees Fahrenheit			X	X	Heat Present and Zone Temperature Control
AI-10218	Space Temperature Input	Indicates the space temperature from a sensor connected to the controller, either wired or wireless.	Degrees Fahrenheit	X	X	X	X	All Packaged RTU
AI-10221	Space Temperature Setpoint Active	Indicates the active space temperature setpoint being used by the controller.	Degrees Fahrenheit			X	X	Zone Temperature Control Units
AI-10222	Supply Isolation Damper Input	Indicates the requested position of the supply isolation damper, when present.	Percent	X	X	X	X	Supply or Supply/ Return Dampers Present[e]
AI-10224	Average Current	Indicates the average current, as reported by the optional power monitoring feature of the product.	Amps	X	X	X	X	Heat Present and Discharge Air Temperature Control
AI-10225	Average Voltage L-L	Indicates the average voltage, line-to-line, as reported by the optional power monitoring feature of the product.	Volts	X	X	X	X	Power Monitoring Present
AI-10226	Average Voltage L-N	Indicates the average voltage, line-to-neutral, as reported by the optional power monitoring feature of the product.	Volts	X	X	X	X	Power Monitoring Present
AI-10227	Run Time - Compressor 1A	Indicates the run time of Compressor 1A, in hours.	No Units	X	X	X	X	All Packaged RTU
AI-10228	Starts - Compressor 1A	Indicates the number of starts for Compressor 1A.	No Units	X	X	X	X	All Packaged RTU
AI-10229	Run Time - Compressor 1B	Indicates the run time of Compressor 1B, in hours.	No Units	X	X	X	X	All Packaged RTU, 20-75T
AI-10230	Starts - Compressor 1B	Indicates the number of starts for Compressor 1B.	No Units	X	X	X	X	All Packaged RTU, 20-75T
AI-10231	Run Time - Compressor 1C	Indicates the run time of Compressor 1C, in hours.	No Units	X	X	X	X	All Packaged RTU, 20-30T
AI-10232	Starts - Compressor 1C	Indicates the number of starts for Compressor 1C.	No Units	X	X	X	X	All Packaged RTU, 20-30T
AI-10233	Run Time - Compressor 2A	Indicates the run time of Compressor 2A, in hours.	No Units	X	X	X	X	All Packaged RTU, 40-75T
AI-10234	Starts - Compressor 2A	Indicates the number of starts for Compressor 2A.	No Units	X	X	X	X	All Packaged RTU, 40-75T
AI-10235	Run Time - Compressor 2B	Indicates the run time of Compressor 2B, in hours.	No Units	X	X	X	X	All Packaged RTU, 40-75T
AI-10236	Starts - Compressor 2B	Indicates the number of starts for Compressor 2B.	No Units	X	X	X	X	All Packaged RTU, 40-75T
AI-10239	Current L1	Indicates the current for line/ leg 1, as reported by the optional power monitoring feature of the product.	Amps	X	X	X	X	Power Monitoring Present
AI-10240	Current L2	Indicates the current for line/ leg 2, as reported by the optional power monitoring feature of the product.	Amps	X	X	X	X	Power Monitoring Present
AI-10241	Current L3	Indicates the current for line/ leg 3, as reported by the optional power monitoring feature of the product.	Amps	X	X	X	X	Power Monitoring Present

Table 1. Analog input (continued)

Object Identifier	Object Name	Description	Units	VVDA[a]	CVDA[b]	VVZT[c]	CVZT[d]	When Exists
AI-10242	Current Neutral	Indicates the current for neutral, as reported by the optional power monitoring feature of the product.	Amps	X	X	X	X	Power Monitoring Present
AI-10243	Discharge Air Cooling Setpoint Status	Indicates the actual discharge air temperature cooling setpoint value, including all setpoint arbitration and any reset algorithms.	Degrees Fahrenheit	X	X			Discharge Air Temperature Control
AI-10244	Discharge Air Heating Setpoint Status	Indicates the actual discharge air temperature heating setpoint value, including all setpoint arbitration and any reset algorithms.	Degrees Fahrenheit	X	X			Heat Present and Discharge Air Temperature Control
AI-10245	Discharge Air Reheat Setpoint Status	Indicates the actual discharge air temperature reheat setpoint value, including all setpoint arbitration and any reset algorithms.	Degrees Fahrenheit	X	X	X	X	Hot Gas Reheat Present
AI-10246	Discharge Pressure Circuit 1	Indicates the refrigerant discharge pressure for DX circuit 1.	Pounds Per Square Inch	X	X	X	X	All Packaged RTU
AI-10247	Discharge Pressure Circuit 2	Indicates the refrigerant discharge pressure for DX circuit 2.	Pounds Per Square Inch	X	X	X	X	All Packaged RTU, 40-75T
AI-10249	Energy Consumption Lifetime	Indicates the total energy consumption of the unit (for the lifetime of the unit) when the power monitoring feature is included.	kWh	X	X	X	X	Power Monitoring Present
AI-10250	Evaporator Leaving Air Temperature	Indicates the leaving air temperature of the evaporator.	Degrees Fahrenheit	X	X	X	X	Hot Gas Reheat Present
AI-10251	Evaporator Leaving Air Temperature Evap A	Indicates the leaving air temperature of evaporator A when a split evaporator is used.	Degrees Fahrenheit	X	X	X	X	Hot Gas Reheat Present
AI-10252	Evaporator Leaving Air Temperature Evap B	Indicates the leaving air temperature of evaporator B when a split evaporator is used.	Degrees Fahrenheit	X	X	X	X	Hot Gas Reheat Present
AI-10253	Evaporator Leaving Air Temperature Setpoint Active	Indicates the evaporator leaving air temperature setpoint value resulting from any setpoint arbitration, when applicable.	Degrees Fahrenheit	X	X			Hot Gas Reheat Present
AI-10254	Final Filter Differential Pressure Local	Indicates the status of the final filter differential pressure sensor input on the controller.	Inches of Water	X	X	X	X	Final Filters Present
AI-10255	Line Frequency	Indicates the line frequency when the optional power monitoring option is included.	No Units	X	X	X	X	Power Monitoring Present
AI-10256	Mixed Air Temperature Evap A	Indicates the mixed air temperature associated with evaporator A when a split evaporator is used.	Degrees Fahrenheit	X	X	X	X	High-efficiency or Variable Speed Refrigeration System, 70-75T
AI-10257	Mixed Air Temperature Evap B	Indicates the mixed air temperature associated with evaporator B when a split evaporator is used.	Degrees Fahrenheit	X	X	X	X	High-efficiency or Variable Speed Refrigeration System, 70-75T

Table 1. Analog input (continued)

Object Identifier	Object Name	Description	Units	VVDA[a]	CVDA[b]	VVZT[c]	CVZT[d]	When Exists
AI-10258	Power Factor	Indicates the reported power factor from the optional power monitoring option, when applicable.	No Units	X	X	X	X	Power Monitoring Present
AI-10259	Prefilter Differential Pressure Local	Indicates the status of the pre-final filter differential pressure sensor input on the controller.	Inches of Water	X	X	X	X	Pre-filters Present
AI-10262	Suction Pressure Circuit 1	Indicates the suction pressure for DX circuit 1.	Pounds Per Square Inch	X	X	X	X	All Packaged RTU
AI-10263	Suction Pressure Circuit 2	Indicates the suction pressure for DX circuit 2.	Pounds Per Square Inch	X	X	X	X	All Packaged RTU, 40-75T
AI-10268	Total Apparent Energy	Indicates the total apparent energy as reported by the optional power monitoring feature, when present.	kWh	X	X	X	X	Power Monitoring Present
AI-10269	Energy Consumption	Indicates the total energy consumption of the unit (since last accumulation reset) when the power monitoring feature is included.	kWh	X	X	X	X	Power Monitoring Present
AI-10270	Total Reactive Energy	Indicates the total reactive energy as reported by the optional power monitoring feature, when present.	kWh	X	X	X	X	Power Monitoring Present
AI-10271	Total Real Power	Indicates the total real power as reported by the optional power monitoring feature, when present.	kW	X	X	X	X	Power Monitoring Present
AI-10272	Total Apparent Power	Indicates the total apparent power as reported by the optional power monitoring feature, when present.	kW	X	X	X	X	Power Monitoring Present
AI-10273	Total Reactive Power	Indicates the total reactive power as reported by the optional power monitoring feature, when present.	kW	X	X	X	X	Power Monitoring Present
AI-10274	Unit Source ID	Indicates the last diagnostic of the unit. Separately, individual diagnostics are reported with dedicated points, variables, registers.	No Units	X	X	X	X	All Packaged RTU
AI-10275	Voltage L1-L2	Indicates the voltage between line/leg L1 and L2.	Volts	X	X	X	X	Power Monitoring Present
AI-10276	Voltage L1-L3	Indicates the voltage between line/leg L1 and L3.	Volts	X	X	X	X	Power Monitoring Present
AI-10277	Voltage L1-N	Indicates the voltage between line/leg L1 and Neutral.	Volts	X	X	X	X	Power Monitoring Present
AI-10278	Voltage L2-L3	Indicates the voltage between line/leg L2 and L3.	Volts	X	X	X	X	Power Monitoring Present
AI-10279	Voltage L2-N	Indicates the voltage between line/leg L2 and Neutral.	Volts	X	X	X	X	Power Monitoring Present
AI-10280	Voltage L3-N	Indicates the voltage between line/leg L3 and Neutral.	Volts	X	X	X	X	Power Monitoring Present
AI-10281	Discharge Air Temperature Setpoint Active	Indicates the discharge air temperature setpoint value resulting from any setpoint arbitration.	Degrees Fahrenheit	X	X	X	X	All Packaged RTU

Table 1. Analog input (continued)

Object Identifier	Object Name	Description	Units	VVDA[a]	CVDA[b]	VVZT[c]	CVZT[d]	When Exists
AI-10282	Air Flow Percentage Circuit 1	Indicates the requested condenser percentage for circuit 1.	Percent	X	X	X	X	All Packaged RTU
AI-10283	Air Flow Percentage Circuit 2	Indicates the requested condenser percentage for circuit 2.	Percent	X	X	X	X	All Packaged RTU, 40-75T
AI-10284	Discharge Saturated Refrigeration Temperature Circuit 1	Indicates the discharge saturated refrigerant temperature for DX circuit 1.	Degrees Fahrenheit	X	X	X	X	All Packaged RTU
AI-10285	Discharge Saturated Refrigeration Temperature Circuit 2	Indicates the discharge saturated refrigerant temperature for DX circuit 2.	Degrees Fahrenheit	X	X	X	X	All Packaged RTU, 40-75T
AI-10286	Suction Saturated Refrigerant Temperature Circuit 1	Indicates suction saturated refrigerant temperature for DX circuit 1.	Degrees Fahrenheit	X	X	X	X	All Packaged RTU
AI-10287	Suction Saturated Refrigerant Temperature Circuit 2	Indicates suction saturated refrigerant temperature for DX circuit 2.	Degrees Fahrenheit	X	X	X	X	All Packaged RTU, 40-75T
AI-10288	Suction Temperature Evap 1A	Indicates the suction temperature for evaporator 1A.	Degrees Fahrenheit	X	X	X	X	High-efficiency or Variable Speed Refrigeration System, 70-75T
AI-10289	Suction Temperature Evap 1B	Indicates the suction temperature for evaporator 1B.	Degrees Fahrenheit	X	X	X	X	High-efficiency or Variable Speed Refrigeration System, 70-75T
AI-10290	Suction Temperature Evap 2A	Indicates the suction temperature for evaporator 2A.	Degrees Fahrenheit	X	X	X	X	High-efficiency or Variable Speed Refrigeration System, 70-75T
AI-10291	Suction Temperature Evap 2B	Indicates the suction temperature for evaporator 2B.	Degrees Fahrenheit	X	X	X	X	High-efficiency or Variable Speed Refrigeration System, 70-75T
AI-10292	Occupied Cooling Setpoint	Indicates the active occupied cooling setpoint being used by the controller, considering all possible sources.	Degrees Fahrenheit			X	X	Zone Temperature Control Units
AI-10293	Occupied Heating Setpoint	Indicates the active occupied heating setpoint being used by the controller, considering all possible sources.	Degrees Fahrenheit			X	X	Heat Present and Zone Temperature Control
AI-10294	Occupied Standby Cooling Setpoint	Indicates the active occupied standby cooling setpoint being used by the controller, considering all possible sources.	Degrees Fahrenheit			X	X	Zone Temperature Control Units
AI-10295	Occupied Standby Heating Setpoint	Indicates the active occupied standby heating setpoint being used by the controller, considering all possible sources.	Degrees Fahrenheit			X	X	Heat Present and Zone Temperature Control
AI-10296	Supply Fan Speed Setpoint Active	Active setpoint input to supply fan control.	Percent	X		X		Variable Volume Supply Fan Present
AI-10297	Discharge Air Temperature Maximum Cool Limit Active	Indicates maximum cooling setpoint allowed to be calculated by Space Temp Control.	Degrees Fahrenheit			X	X	Zone Temperature Control Units

Table 1. Analog input (continued)

Object Identifier	Object Name	Description	Units	VVDA[a]	CVDA[b]	VVZT[c]	CVZT[d]	When Exists
AI-10298	Discharge Air Temperature Minimum Heat Limit Active	Indicates minimum heating setpoint allowed to be calculated by Space Temp Control.	Degrees Fahrenheit			X	X	Heat Present and Zone Temperature Control
AI-10299	Discharge Air Temperature Minimum Cool Limit Active	Indicates minimum cooling setpoint allowed to be calculated by Space Temp Control.	Degrees Fahrenheit			X	X	Zone Temperature Control Units
AI-10300	Discharge Air Temperature Maximum Heat Limit Active	Indicates minimum heating setpoint allowed to be calculated by Space Temp Control.	Degrees Fahrenheit			X	X	Heat Present and Zone Temperature Control

[a] VVDA - Variable Volume Discharge Air Temperature Control
[b] CVDA - Constant Volume Discharge Air Temperature Control
[c] VVZT - Variable Volume Zone Temperature Control
[d] CVZT - Constant Volume Zone Temperature Control
[e] Not currently an option on IPAK

Table 2. Analog value

Object Identifier	Object Name	Description	Units	Valid Range	VVDA[a]	CVDA[b]	VVZT[c]	CVZT[d]	When Exists	Last One Wins[e]	Heartbeat[f]
AV-10101	Discharge Air Temperature Arbitrator	Indicates the actual discharge air temperature being used by the controller, as determined by the arbitration logic that considers all possible sources.	Degrees Fahrenheit	-40.0 to 200.0° F	X	X			Discharge Air Temperature Control		
AV-10103	Outdoor Air Temperature Arbitrator	Indicates the actual outdoor air temperature being used by the controller, as determined by the arbitration logic that considers all possible sources.	Degrees Fahrenheit	-40.0 to 200.0° F	X	X	X	X	Economizer Present		
AV-10104	Outdoor Air Humidity Arbitrator	Indicates the actual outdoor air humidity being used by the controller, as determined by the arbitration logic that considers all possible sources.	Percent	0.0 to 100.0 %	X	X	X	X	Economizer with Reference or Comparative Enthalpy		
AV-10106	Space Temperature Arbitrator	Indicates the actual space temperature being used by the controller, as determined by the arbitration logic that considers all possible sources.	Degrees Fahrenheit	-40.0 to 200.0° F	X	X	X	X	All Packaged RTU		
AV-10108	Space CO_2 Concentration Arbitrator	Indicates the actual space CO_2 concentration being used by the controller, as determined by the arbitration logic that considers all possible sources.	Parts Per Million	0 to 65,535 PPM	X	X	X	X	Economizer with TRAQ or Demand Control Ventilation		
AV-10109	Space Humidity Arbitrator	Indicates the actual space relative humidity being used by the controller, as determined by the arbitration logic that considers all possible sources.	Percent	0.0 to 100.0 %	X	X	X	X	Hot Gas Reheat Present		

Table 2. Analog value (continued)

Object Identifier	Object Name	Description	Units	Valid Range	VVDA[a]	CVDA[b]	VVZT[c]	CVZT[d]	When Exists	Last One Wins[e]	Heartbeat[f]
AV-10111	Discharge Air Temperature BAS	The value is normally provided by the BAS to send the discharge air temperature sensor value. 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	-40.0 to 200.0° F	X	X			Discharge Air Temperature Control		♥
AV-10113	Outdoor Air Temperature BAS	The value is normally provided by the BAS to send the outdoor air temperature sensor value. 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	-40.0 to 200.0° F	X	X	X	X	Economizer Present		♥
AV-10114	Space Temperature BAS	The value is normally provided by the BAS to send the space temperature value. 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	14.0 to 122.0°F	X	X	X	X	All Packaged RTU		♥
AV-10116	Outdoor Air Humidity BAS	The value is normally provided by the BAS to send the outdoor air humidity sensor value. The value is subject to arbitration logic in the controller, in which case it may or may not be used for control purposes.	Percent	10.0 to 90.0%	X	X	X	X	Economizer with Reference or Comparative Enthalpy		♥

Table 2. Analog value (continued)

Object Identifier	Object Name	Description	Units	Valid Range	VVDA[a]	CVDA[b]	VVZT[c]	CVZT[d]	When Exists	Last One Wins[e]	Heartbeat[f]
AV-10118	Space CO_2 Concentration BAS	The value is normally provided by the BAS to send the space CO_2 concentration value. The value is subject to arbitration logic in the controller, in which case it may or may not be used for control purposes.	Parts Per Million	50 - 2200 PPM	X	X	X	X	Economizer with TRAQ or Demand Control Ventilation		♥
AV-10119	Space Humidity BAS	The value is normally provided by the BAS to send the space relative humidity value. The value is subject to arbitration logic in the controller, in which case it may or may not be used for control purposes.	Percent	10.0 to 90.0%	X	X	X	X	Hot Gas Reheat Present		♥
AV-10121	Discharge Air Cooling Setpoint BAS	Normally provided by the BAS to request the discharge air temperature cooling setpoint value.	Degrees Fahrenheit	40.0 to 90.0°F	X	X	X	X	All Packaged RTU		
AV-10122	Discharge Air Heating Setpoint BAS	Normally provided by the BAS to request the discharge air temperature heating setpoint value.	Degrees Fahrenheit	40.0 to 180.0°F	X	X	X	X	Heat Present		
AV-10123	Unoccupied Cooling Setpoint	Normally used by the BAS to define the cooling temperature setpoint used for control in unoccupied mode.	Degrees Fahrenheit	52.0 to 90.0°F	X	X	X	X	All Packaged RTU	X	
AV-10124	Unoccupied Heating Setpoint	Normally used by the BAS to define the heating temperature setpoint used for control in unoccupied mode.	Degrees Fahrenheit	52.0 to 90.0°F	X	X	X	X	Heat Present	X	
AV-10125	Outdoor Air Minimum Flow Setpoint BAS	Normally provided by the BAS to send the requested minimum outdoor air flow setpoint.	Cubic Feet per Minute	0 to 60,000 CFM	X	X	X	X	TRAQ Present		

Table 2. Analog value (continued)

Object Identifier	Object Name	Description	Units	Valid Range	VVDA[a]	CVDA[b]	VVZT[c]	CVZT[d]	When Exists	Last One Wins[e]	Heartbeat[f]
AV-10127	Space Temperature Setpoint BAS	BAS-supplied space temperature setpoint value.	Degrees Fahrenheit	50.0 to 95.0°F			X	X	Zone Temperature Control Units		
AV-10128	Space Static Pressure Setpoint BAS	The value is normally provided by the BAS to send the space static pressure value. The value is subject to arbitration logic in the controller, in which case it may or may not be used for control purposes.	Inches of Water	-0.2 to 0.3 in. w.c.	X	X	X	X	Space Pressure Management Present		
AV-10130	Occupied Offset	This value is normally provided by the BMS to define the difference between the occupied cooling and heating setpoints when a single setpoint is provided (see Space Temperature Setpoint BAS, below).	Delta Degrees Fahrenheit	0.0 to 30.0°F			X	X	Zone Temperature Control Units	X	
AV-10134	Discharge Air Reheat Setpoint BAS	Normally provided by the BAS to request the discharge air temperature reheat setpoint value, for dehumidification control.	Degrees Fahrenheit	60.0 to 80.0°F	X	X			Discharge Air Temperature Control		
AV-10135	Space Dehumidification Setpoint BAS	Normally used by the BMS to define the (occupied) space dehumidification setpoint.	Percent	40.0 to 65.0 %	X	X	X	X	Hot Gas Reheat Present		
AV-10136	Supply Fan Speed Setpoint	BAS supplied supply fan speed setpoint value.	Percent	0.0 to 100.0 %	X		X		Variable Volume Supply Fan Control		
AV-10137	Exhaust Fan Speed Setpoint	BAS supplied exhaust fan speed setpoint value.	Percent	0.0 to 100.0 %	X	X	X	X	Relief/Exhaust Fan Present		
AV-10139	Cooling Capacity Enable	This percentage value is normally provided by the BAS to demand limit the cooling capacity.	Percent	0.0 to 100.0 %	X	X	X	X	All Packaged RTU		

Table 2. Analog value (continued)

Object Identifier	Object Name	Description	Units	Valid Range	VVDA[a]	CVDA[b]	VVZT[c]	CVZT[d]	When Exists	Last One Wins[e]	Heartbeat[f]
AV-10140	Heat Primary Enable BAS	This percentage value is normally provided by the BAS to demand limit the heating capacity.	Percent	0.0 to 100.0 %	X	X	X	X	Heat Present		
AV-10141	Morning Warmup Setpoint BAS	Normally provided by the BMS, defines the space temperature below which morning warmup will be exercised, when enabled.	Degrees Fahrenheit	50.0 to 90.0°F	X	X	X	X	Heat Present	X	
AV-10142	Occupied Standby Offset	This value is normally provided by the BMS to define the difference between the occupied standby cooling and heating setpoints when a single setpoint is provided (see Space Temperature Setpoint BAS, below).	Delta Degrees Fahrenheit	1.0 to 10.0°F			X	X	Zone Temperature Control Units	X	
AV-10143	Duct Static Pressure Setpoint BAS	Normally provided by the BAS to request the duct static pressure setpoint value.	Inches of Water	0.7 to 4.3 in. w. c.	X				Multiple-zone VAV Units		
AV-10144	Economizer Minimum Position Setpoint BAS	Normally provided by the BAS to request the ecominizer minimum position setpoint.	Percent	0.0 to 100.0 %	X	X	X	X	Economizer Present		
AV-10147	Cooling Setpoint High Limit	The value is normally used by the BMS to provide the occupied cooling setpoint high limit for space comfort control applications.	Degrees Fahrenheit	40.0 to 115.0°F			X	X	Zone Temperature Control Units	X	
AV-10148	Cooling Setpoint Low Limit	The value is normally used by the BMS to provide the occupied cooling setpoint low limit for space comfort control applications.	Degrees Fahrenheit	40.0 to 115.0°F			X	X	Zone Temperature Control Units	X	
AV-10149	Daytime Warmup Setpoint BAS	Defines the space temp below which daytime warmup will be enabled.	Degrees Fahrenheit	50.0 to 87.0°F	X	X			Heat Present and Discharge Temperature Control	X	

Table 2. Analog value (continued)

Object Identifier	Object Name	Description	Units	Valid Range	VVDA[a]	CVDA[b]	VVZT[c]	CVZT[d]	When Exists	Last One Wins[e]	Heartbeat[f]
AV-10150	Economizer Outdoor Air Enable Setpoint BAS	Related to the economizer enable decision, this value is normally provided by the BMS to determine the outdoor air temperature below which economizing is enabled.	Degrees Fahrenheit	50.0 to 140.0°F	X	X	X	X	Economizer Present		
AV-10152	Heating Setpoint High Limit	The value is normally used by the BMS to provide the occupied heating setpoint high limit for space comfort control applications.	Degrees Fahrenheit	40.0 to 115.0°F			X	X	Heat Present and Zone Temperature Control	X	
AV-10153	Heating Setpoint Low Limit	The value is normally used by the BMS to provide the occupied heating setpoint low limit for space comfort control applications.	Degrees Fahrenheit	43.0 to 100.0°F			X	X	Heat Present and Zone Temperature Control	X	
AV-10156	Space Dehumidification Unoccupied Setpoint BAS	Normally used by the BMS to define the unoccupied space dehumidification setpoint.	Percent	40.0 to 65.0 %	X	X	X	X	Hot Gas Reheat Present		
AV-10159	Occupied Cooling Setpoint BAS	The value is normally provided by the BMS to define the occupied cooling setpoint when both heating and cooling setpoints are provided in lieu of a single setpoint.	Degrees Fahrenheit	40.0 to 115.0°F			X	X	Zone Temperature Control Units		
AV-10160	Occupied Heating Setpoint BAS	The value is normally provided by the BMS to define the occupied heating setpoint when both heating and cooling setpoints are provided in lieu of a single setpoint.	Degrees Fahrenheit	40.0 to 115.0°F			X	X	Heat Present and Zone Temperature Control		

Table 2. Analog value (continued)

Object Identifier	Object Name	Description	Units	Valid Range	VVDA[a]	CVDA[b]	VVZT[c]	CVZT[d]	When Exists	Last One Wins[e]	Heart-beat[f]
AV-10161	Occupied Standby Cooling Setpoint BAS	The value is normally provided by the BMS to define the occupied standby cooling setpoint when both heating and cooling setpoints are provided in lieu of a single setpoint.	Degrees Fahrenheit	40.0 to 115.0°F			X	X	Zone Temperature Control Units		
AV-10162	Occupied Standby Heating Setpoint BAS	Indicates the active occupied standby heating setpoint being used by the controller, considering all possible sources.	Degrees Fahrenheit	40.0 to 115.0°F			X	X	Heat Present and Zone Temperature Control		
AV-10163	Demand Limit Setpoint	This value is normally provided by the BMS to demand limit the unit. Demand Limit Request BAS must be set to "Limited" in order for the value to have meaning.	Percent	-163.84 to 163.83 %	X	X	X	X	All Packaged RTU		
AV-10164	Evaporator Leaving Air Temperature Setpoint	Normally provided by the BAS to request the evaporator leaving air temperature setpoint.	Degrees Fahrenheit	40 to 55°F	X	X	X	X	Hot Gas Reheat Present		
AV-10165	Pre Cool Setpoint	Normally provided by the BMS, defines the space temperature above which pre-cool will be exercised, when enabled.	Degrees Fahrenheit	40 to 90°F	X	X	X	X	All Packaged RTU		
AV-10166	Discharge Air Temperature Maximum Heat Limit	Indicates the discharge air temperature maximum heat limit, above which a high temperature diagnostic will be generated This value can be provided by the BMS.	Degrees Fahrenheit	40 to 140°F			X	X	Heat Present and Zone Temperature Control		

Table 2. Analog value (continued)

Object Identifier	Object Name	Description	Units	Valid Range	VVDA[a]	CVDA[b]	VVZT[c]	CVZT[d]	When Exists	Last One Wins[e]	Heartbeat[f]
AV-10167	Discharge Air Temperature Minimum Cool Limit	Indicates the discharge air temperature minimum cool limit, below which a low temperature diagnostic will be generated This value can be provided by the BMS.	Degrees Fahrenheit	40 to 80°F			X	X	Zone Temperature Control Units		
AV-10168	Exhaust Enable Position Setpoint	Normally provided by the BMS to indicate the outdoor air damper position above which the exhaust sequence is enabled.	Percent	0.0 to 100.0 %	X	X	X	X	Relief/Exhaust Fan Present		
AV-10169	Occupied Bypass Time	Normally used by the BMS to configure the occupied bypass time The occupied bypass time is the amount of time the controller will be overridden when an occupancy request is initiated during the unoccupied mode.	No Units	0 to 240 minutes	X	X	X	X	All Packaged RTU	X	
AV-10170	Economizing Enthalpy Enable Setpoint	Related to the economizer enable decision, this value is normally provided by the BMS to determine the outdoor air enthalpy below which economizing is enabled.	BTUs per Pound	0 to 80 BTU/ lbm	X	X	X	X	Economizer with Reference or Comparative Enthalpy	X	
AV-10175	Space CO_2 High Limit	Normally provided by the BMS to define the CO_2 high limit, for ventilation purposes.	Parts Per Million	100 to 2000 ppm	X	X	X	X	Economizer with TRAQ or Demand Control Ventilation	X	
AV-10176	Space CO_2 Low Limit	Normally provided by the BMS to define the CO_2 low limit.	Parts Per Million	500 to 1500 ppm	X	X	X	X	Economizer with TRAQ or Demand Control Ventilation	X	
AV-10177	Supply Fan Speed Setpoint External Heat	Specifies the supply fan speed setpoint during external heat modes of operation.	Percent	0.0 to 100.0 %			X		Single-zone VAV	X	

Table 2. Analog value (continued)

Object Identifier	Object Name	Description	Units	Valid Range	VVDA[a]	CVDA[b]	VVZT[c]	CVZT[d]	When Exists	Last One Wins[e]	Heartbeat[f]
AV-10178	Discharge Air Temperature Maximum Cool Limit	Normally used by BMS to limit space temperature control calculated cooling setpoint.	Degrees Fahrenheit	39.9 to 80.1°F			X	X	Zone Temperature Control Units		
AV-10179	Discharge Air Temperature Minimum Heat Limit	Normally used by BMS to limit space temperature control calculated heating setpoint.	Degrees Fahrenheit	39.9 to 140.1°F			X	X	Zone Temperature Control Units with Heat		

(a) VVDA - Variable Volume Discharge Air Temperature Control
(b) CVDA - Constant Volume Discharge Air Temperature Control
(c) VVZT - Variable Volume Zone Temperature Control
(d) CVZT - Constant Volume Zone Temperature Control
(e) Last written value is persisted; not subject to a priority array
(f) Heartbeat values must be written at least once every 15 minutes (recommend 5 minutes). Arbitrator points are not intended to be written to.

Table 3. Binary input

Object Identifier	Object Name	Description	Object States	VVDA[a]	CVDA[b]	VVZT[c]	CVZT[d]	When Exists
BI-10001	microSD	Indicates when a micro SD card is present.	0 = MicroSD card is not present 1 = MicroSD card is present	X	X	X	X	All Packaged RTU
BI-10002	USB Port 1	Indicates when a USB device is present in port 1.	0 = USB device is not present 1 = USB device is present	X	X	X	X	All Packaged RTU
BI-10003	USB Port 2	Indicates when a USB device is present in port 2.	0 = USB device is not present 1 = USB device is present	X	X	X	X	All Packaged RTU
BI-10004	USB Port 3	Indicates when a USB device is present in port 3.	0 = USB device is not present 1 = USB device is present	X	X	X	X	All Packaged RTU
BI-10005	USB Port 4	Indicates when a USB device is present in port 4.	0 = USB device is not present 1 = USB device is present	X	X	X	X	All Packaged RTU
BI-10105	FDD: Unit Economizing When It Should Not	FDD: Indicates when the unit is economizing but should not be.	0 = Inactive 1 = Active	X	X	X	X	Economizer Present
BI-10106	FDD: Unit Not Economizing When it Should Be	FDD: Indicates when the unit is not economizing but should be.	0 = Inactive 1 = Active	X	X	X	X	Economizer Present
BI-10107	FDD: Excessive Outdoor Air	FDD: Indicates an excessive outdoor air condition.	0 = Inactive 1 = Active	X	X	X	X	Economizer Present
BI-10108	FDD: Outdoor Air Damper Not Modulating	FDD: Indicates when the outdoor air damper is not modulating but should be.	0 = Inactive 1 = Active	X	X	X	X	Economizer Present
BI-10111	Compressor 1A Status	Indicates the operating status of compressor 1A.	0 = Off 1 = Running	X	X	X	X	All Packaged RTU
BI-10112	Compressor 1B Status	Indicates the operating status of compressor 1B.	0 = Off 1 = Running	X	X	X	X	All Packaged RTU, 20-75T
BI-10113	Compressor 1C Status	Indicates the operating status of compressor 1C.	0 = Off 1 = Running	X	X	X	X	All Packaged RTU, 20-30T
BI-10114	Compressor 2A Status	Indicates the operating status of compressor 2A.	0 = Off 1 = Running	X	X	X	X	All Packaged RTU, 40-75T
BI-10115	Compressor 2B Status	Indicates the operating status of compressor 2B.	0 = Off 1 = Running	X	X	X	X	All Packaged RTU, 40-75T
BI-10132	FDD: Outdoor Air Temperature Sensor Failure	FDD: Indicates when the outdoor air temperature sensor has failed.	0 = Inactive 1 = Active	X	X	X	X	Economizer Present
BI-10140	Unit Running State	Indicates whether the unit is off or on.	0 = Off 1 = On	X	X	X	X	All Packaged RTU
BI-10143	VAV Box Command	Indicates whether the associated VAV boxes should be allowed to be in automatic control or forced wide open.	0 = Auto 1 = Open	X				Multiple-zone VAV Units
BI-10144	Alarm Relay Output Status	Indicates the state of the alarm output of the controller.	0 = De-energized 1 = Energized	X	X	X	X	All Packaged RTU

Table 3. Binary input (continued)

Object Identifier	Object Name	Description	Object States	VVDA[a]	CVDA[b]	VVZT[c]	CVZT[d]	When Exists
BI-10154	Supply Fan Configuration Status	Indicates the supply fan configuration.	0 = Cycling 1 = Continuouos			X	X	Zone Temperature Control Units
BI-10155	Rapid Restart Status	Indicates the active status of the Rapid Restart event.	0 = Inactive 1 = Active	X	X	X	X	Rapid Restart Control
BI-10161	Morning Warmup Active	Indicates the active status of the Morning Warmup event.	0 = Inactive 1 = Active	X	X	X	X	Heat Present
BI-10162	Daytime Warmup Active	Indicates the active status of the Daytime Warmup event.	0 = Inactive 1 = Active	X	X			Discharge Air Temperature Control and Heat Present
BI-10164	Coil Frost Protection Status Circuit 1	Indicates the status of evaporator frost protection function for circuit 1.	0 = Inactive 1 = Active	X	X	X	X	All Packaged RTU
BI-10165	Coil Frost Protection Status Circuit 2	Indicates the status of evaporator frost protection function for circuit 2.	0 = Inactive 1 = Active	X	X	X	X	All Packaged RTU, 40-75T
BI-10170	Condensate Overflow Input	Indicates the status of the condensate overflow input.	0 = Normal 1 = Overflow	X	X	X	X	Condensate Overflow Switch Present
BI-10172	Occupancy Input	Indicates the status of the occupancy input (see below).	0 = Occupied 1 = Unoccupied	X	X	X	X	All Packaged RTU
BI-10173	Precool Active	Indicates when the pre-cool mode is active.	0 = Inactive 1 = Active	X	X	X	X	All Packaged RTU
BI-10174	Supply Air Tempering Status	Indicates whether or not the supply air tempering feature is enabled.	0 = Disabled 1 = Enabled	X	X			Modulating Gas Heat or Modulating Electric
BI-10175	Timed Override Timer Is Active	Indicates whether or not the timed override timer is active.	0 = Inactive 1 = Active	X	X	X	X	All Packaged RTU
BI-10176	Diagnostic Present	Diagnostic Present.	0 = Normal 1 = In Alarm	X	X	X	X	All Packaged RTU
BI-10201	Changeover Input	Indicates the status of the (heat/cool) changeover input.	0 = Heating 1 = Cooling	X	X			Discharge Air Temperature Control and Heat Present
BI-10202	Condenser Fan Circuit 1 Relay 1 Status	Indicates the status of condenser fan circuit 1, relay 1.	0 = Off 1 = On	X	X	X	X	Standard Ambient Condenser Control Present
BI-10203	Condenser Fan Circuit 1 Relay 2 Status	Indicates the status of condenser fan circuit 1, relay 2.	0 = Off 1 = On	X	X	X	X	All Packaged RTU
BI-10204	Condenser Fan Circuit 1 Relay 3 Status	Indicates the status of condenser fan circuit 1, relay 3.	0 = Off 1 = On	X	X	X	X	All Packaged RTU, 60-75T
BI-10206	Condenser Fan Circuit 2 Relay 1 Status	Indicates the status of condenser fan circuit 2, relay 1.	0 = Off 1 = On	X	X	X	X	Standard Ambient Condenser Control Present
BI-10207	Condenser Fan Circuit 2 Relay 2 Status	Indicates the status of condenser fan circuit 2, relay 2.	0 = Off 1 = On	X	X	X	X	All Packaged RTU, 40-75T
BI-10208	Condenser Fan Circuit 2 Relay 3 Status	Indicates the status of condenser fan circuit 2, relay 3.	0 = Off 1 = On	X	X	X	X	All Packaged RTU, 60-75T
BI-10210	Emergency Stop	Indicates the status of the emergency stop function of the unit.	0 = Auto 1 = Emergency Stop - Manual Reset Required	X	X	X	X	All Packaged RTU
BI-10211	External Auto Stop Input Status	Indicates the status of the externally-wired auto/stop input.	0 = Stop 1 = Auto	X	X	X	X	All Packaged RTU

Table 3. Binary input (continued)

Object Identifier	Object Name	Description	Object States	VVDA[a]	CVDA[b]	VVZT[c]	CVZT[d]	When Exists
BI-10212	Supply Fan Bypass Status	Indicates the status of the supply fan bypass from the variable frequency drive (VFD).	0 = Off 1 = On	X	X	X	X	Supply Fan VFD Bypass Present
BI-10213	Ventilation Mode A Local	Indicates when the controller is actively in the Ventilation Override Mode A.	0 = Inactive 1 = Active	X	X	X	X	Ventilation Override Present
BI-10214	Ventilation Mode B Local	Indicates when the controller is actively in the Ventilation Override Mode B.	0 = Inactive 1 = Active	X	X	X	X	Ventilation Override Present
BI-10215	Ventilation Mode C Local	Indicates when the controller is actively in the Ventilation Override Mode C.	0 = Inactive 1 = Active	X	X	X	X	Ventilation Override Present
BI-10216	Ventilation Mode D Local	Indicates when the controller is actively in the Ventilation Override Mode D.	0 = Inactive 1 = Active	X	X	X	X	Ventilation Override Present
BI-10217	Ventilation Mode E Local	Indicates when the controller is actively in the Ventilation Override Mode E.	0 = Inactive 1 = Active	X	X	X	X	Ventilation Override Present
BI-10218	Diagnostic: Manual Reset Required	Indicates when a diagnostic exists that requires manual reset.	0 = Normal 1 = In Alarm	X	X	X	X	All Packaged RTU
BI-10219	Economizer Airside Status	Indicates the status of airside economizing This value will be true when airside economizing is active/ enabled.	0 = Inactive 1 = Active	X	X	X	X	Economizer Present
BI-10221	Exhaust Fan Output Status	Indicates the status of the exhaust fan output on the controller.	0 = Off 1 = On	X	X	X	X	Relief/Exhaust Fan Present
BI-10222	Heat Output 1 Status	Indicates the commanded state of heating output 1.	0 = Off 1 = On	X	X	X	X	Heat Present
BI-10223	Heat Output 2 Status	Indicates the commanded state of heating output 2.	0 = Off 1 = On	X	X	X	X	Heat Present
BI-10224	Heat Output 3 Status	Indicates the commanded state of heating output 3.	0 = Off 1 = On	X	X	X	X	Heat Present
BI-10225	Heat Output 4 Status	Indicates the commanded state of heating output 4.	0 = Off 1 = On	X	X	X	X	Heat Present
BI-10226	Supply Fan Output Status	Indicates the status of the supply fan output of the controller.	0 = Off 1 = On	X	X	X	X	All Packaged RTU
BI-10603	Diagnostic: Discharge Air High Temperature Detected	Indicates when a discharge air high temperature diagnostic is present.	0 = No 1 = Yes	X	X	X	X	All Packaged RTU
BI-10605	Diagnostic: Loss of Charge Lockout Ckt1	Indicates when a loss of charge lockout diagnostic exists for DX circuit 1.	0 = No 1 = Yes	X	X	X	X	All Packaged RTU
BI-10606	Diagnostic: Loss of Charge Lockout Ckt2	Indicates when a loss of charge lockout diagnostic exists for DX circuit 2.	0 = No 1 = Yes	X	X	X	X	All Packaged RTU, 40-757
BI-10608	Diagnostic: Morning Warmup Mode Exceeded 120 Minutes	Indicates when the morning warmup mode has exceeded 120 consectutive minutes.	0 = No 1 = Yes	X	X	X	X	Heat Present
BI-10609	Diagnostic: Pre Cool Mode Exceeded 120 Minutes	Indicates when the pre-cool mode has exceeded 120 consective minutes.	0 = No 1 = Yes	X	X	X	X	All Packaged RTU
BI-10611	Diagnostic: Return Air High Temperature Detected	Indicates when a return air high temperature diagnostic is present.	0 = No 1 = Yes	X	X	X	X	Economizer with Comparative Enthalpy

Table 3. Binary input (continued)

Object Identifier	Object Name	Description	Object States	VVDA[a]	CVDA[b]	VVZT[c]	CVZT[d]	When Exists
BI-10614	Diagnostic: Condensate Overflow Lockout	Indicates when a condensate overflow lockout diagnostic is present.	0 = No 1 = Yes	X	X	X	X	Condensate Overflow Switch Present
BI-10615	Diagnostic: High Condensate Level Detected	Indicates when a high condensate level is detected.	0 = No 1 = Yes	X	X	X	X	Condensate Overflow Switch Present
BI-10616	Supply Fan Speed Control Enabled	Supply fan speed is controlled via Supply Fan Speed Setpoint. If disabled/inactive, supply fan speed control is under local control.	0 = Inactive 1 = Active	X		X		Variable Volume Supply Fan Control
BI-10617	Supply Fan Speed Limited	Supply fan speed is being increased or decreased due to a limit control action.	0 = Not Limited 1 = Limited	X		X		Variable Volume Supply Fan Control
BI-10618	Exhaust Fan Speed Control Enabled	Exhaust fan speed is controlled via Exhaust Fan Speed Setpoint. If disabled/ inactive, supply fan speed control is under local control.	0 = Inactive 1 = Active	X	X	X	X	Relief/Exhaust Fan Present
BI-10619	Diagnostic Shutdown Present	Unit is shut down due to diagnostics.	0 = Normal 1 = In Alarm	X	X	X	X	All Packaged RTU
BI-10620	Diagnostic: Local Manual Reset Required	Diagnostic Reset required [Local only].	0 = Normal 1 = In Alarm	X	X	X	X	All Packaged RTU

[a] VVDA - Variable Volume Discharge Air Temperature Control
[b] CVDA - Constant Volume Discharge Air Temperature Control
[c] VVZT - Variable Volume Zone Temperature Control
[d] CVZT - Constant Volume Zone Temperature Control

Table 4. Binary values

Object Identifier	Object Name	Description	Relinquish Default	Object States[a]	VVDA [b]	CVDA[c]	VVZT[d]	CVZT[e]	When Exists	Last One Wins[f]
BV-10103	Heat Lockout Command	Normally used by the BMS to command the unit to prevent heating operation.	0 Normal	0 = Normal 1 = Locked Out	X	X	X	X	Heat Present	
BV-10104	Supply Fan Configuration Command	Normally used by the BAS to command the unit supply fan configuration as either cycling or continuous.	1 Continuous	0 = Cycling 1 = Continuous			X	X	Zone Temperature Control	
BV-10106	Dehumidification Enable Command	Normally used by the BMS to disable unit dehumidification.	0 Disable	0 = Disable 1 = Auto	X	X	X	X	Hot Gas Reheat Present	X
BV-10110	Reset Diagnostic	Normally used by the BMS to initiate a request to reset any controller diagnostics.	0 Normal	0 = Normal 1 = Reset	X	X	X	X	All Packaged RTU	X
BV-10111	Daytime Warmup Enable Command	Normally used by the BMS to enable daytime warmup.	1 Enable	0 = Disable 1 = Enable	X	X			Discharge Air Temperature Control and Heat Present	X
BV-10112	Morning Warmup Enable Command	Normally used by the BMS to enable morning warmup.	1 Enable	0 = Disable 1 = Enable	X	X	X	X	Heat Present	X
BV-10113	Occupancy Input BAS	Normally used by the BMS to provide the requested occupancy state to the unit.	1 Unoccupied	0 = Occupied 1 = Unoccupied	X	X	X	X	All Packaged RTU	
BV-10115	Cooling Lockout BAS	Normally used by the BMS as a command to (temporarily) prevent all mechanical cooling.	0 Normal	0 = Normal 1 = Locked Out	X	X	X	X	All Packaged RTU	
BV-10116	Demand Limit Request BAS	This command is normally provided by the BMS to demand limit the unit. The command is used in conjuction with Demand Limit Setpoint to determine the percentage the unit will be limited.	0 Not Limited	0 = Not Limiting 1 = Limited	X	X	X	X	All Packaged RTU	
BV-10117	Energy Consumption Reset	Normally used by the BMS to reset the energy consumption accumulated total.	0 Accumulating	0 = Accumulating 1 = Reset	X	X	X	X	Power Monitoring Present	X
BV-10118	Pre Cool Enable Command	Normally used by the BMS to enable pre-cool.	1 Enable	0 = Disable 1 = Enable	X	X	X	X	All Packaged RTU	X

Table 4. Binary values (continued)

Object Identifier	Object Name	Description	Relinquish Default	Object States[a]	VVDA [b]	CVDA[c]	VVZT[d]	CVZT[e]	When Exists	Last One Wins[f]
BV-10119	Supply Air Tempering Enable	Normally used by the BAS to enable the supply (discharge) air tempering feature of the unit.	0 Disable	0 = Disable 1 = Enable	X	X			Modulating Gas Primary Heat Present	X
BV-10120	Rapid Restart Enable	Enables/Disables rapid restart operation.	0 Disable	0 = Disable 1 = Enable	X	X	X	X	Rapid Restart Control	X
BV-10121	Rapid Restart Economizer Enable	Enables/Disables economizer evaluation during rapid restart operation.	0 Disable	0 = Disable 1 = Enable	X	X	X	X	Rapid Restart Control	X
BV-10122	Supply Fan Speed Setpoint Enable	Enables Supply Fan Speed Setpoint control.	0 Disable	0 = Disable 1 = Enable	X		X		Variable Volume Supply Fan Control	
BV-10123	Exhaust Fan Speed Setpoint Enable	Enables Exhaust Fan Speed Setpoint control.	0 Disable	0 = Disable 1 = Enable	X	X	X	X	Relief/Exhaust Fan Present	
BV-10124	Supply Fan Compensation	Enables the outdoor air damper position to compensate for changes in supply fan speed.	0 Disable	0 = Disable 1 = Enable	X		X		Economizer Present	

[a] Binary Values are signed 16-bit integers with 0=false, 1=true, -1=invalid.
[b] VVDA - Variable Volume Discharge Air Temperature Control
[c] CVDA - Constant Volume Discharge Air Temperature Control
[d] VVZT - Variable Volume Zone Temperature Control
[e] CVZT - Constant Volume Zone Temperature Control
[f] Last written value is persisted; not subject to a priority array

Table 5. Multi-state input

Object Identifier	Object Name	Description	Object States	VVDA[a]	CVDA[b]	VVZT[c]	CVZT[d]	When Exists
MI-10101	Heat Cool Mode Status	Indicates the current heat cool mode of the controller.	1 = Auto 2 = Heat 3 = Morning Warm-up 4 = Cool 5 = Night Purge 6 = Pre Cool 7 = Off 8 = Test 9 = Emergency Heat 10 = Fan Only 11 = Free Cool 12 = Ice-Making 13 = Max Heat 14 = Economizer 15 = Dehumidify 16 = Calibrate	X	X	X	X	All Packaged RTU
MI-10102	Ventilation Override Status	Indicates which of the 5 preprogrammed ventilation override modes is operations, when applicable.	1 = Inactive 2 = Mode A Active 3 = Mode B Active 4 = Mode C Active 5 = Mode D Active 6 = Mode E Active	X	X	X	X	Ventilation Override Present
MI-10103	Occupancy Status	Indicates the active occupancy mode of the controller.	1 = Occupied 2 = Unoccupied 3 = Occupied Bypass 4 = Occupied Standby 5 = Auto	X	X	X	X	All Packaged RTU
MI-10105	Cooling Reset Type Status	Indicates the type of cooling reset used by the controller.	1 = None 2 = Outdoor Air 3 = Zone 4 = Return Air	X	X			Discharge Air Temperature Control
MI-10106	Heating Reset Type Status	Indicates the type of heating reset used, when applicable.	1 = None 2 = Outdoor Air 3 = Zone	X	X			Discharge Air Temperature Control and Heat Present
MI-10107	Trane Unit Type	Indicates the equipment type according to the manufacturer's classification.	1 = 1 Heat/1 Cool 2 = Heat Pump 3 = Blower Coil 4 = Unit Ventilator 5 = Fan Coil 6 = Rooftop 7 = Air Handler 8 = Vertical Self Contained 9 = Unitary 10 = VAV Box 11 = Fan Coil	X	X	X	X	All Packaged RTU

Table 5. Multi-state input (continued)

Object Identifier	Object Name	Description	Object States	VVDA[a]	CVDA[b]	VVZT[c]	CVZT[d]	When Exists
MI-10108	Economizer Type	Indicates the general description of the type of economizer system.	1 = None 2 = 2 Position Ventilation 3 = Modulation Economizer 4 = 2 Position Ventilation/ Waterside Economizer 5 = Waterside Economizer 6 = Airside/ Waterside Economizer 7 = TRAQ Damper 8 = Airside Economizer and TRAQ Damper/ Sensor 9 = Waterside Economizer and TRAQ Damper/ Sensor 10 = Airside/ Waterside Economizer and TRAQ Damper/ Sensor	X	X	X	X	All Packaged RTU
MI-10109	Condenser Type	Indicates the general description of the equipment condenser system.	1 = None 2 = Air Cooled Condenser 3 = Water Cooled Condenser 4 = Evaporative Condenser	X	X	X	X	All Packaged RTU
MI-10117	Refrigerant Type	Indicates the type of refrigerant used in the equipment.	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)	X	X	X	X	All Packaged RTU
MI-10118	System Mode Switch Local	Indicates the status of the system mode switch connected to the controller.	1 = Off 2 = Auto 3 = Cool 4 = Heat 5 = Emergency Heat			X	X	Zone Temperature Control

Table 5. Multi-state input (continued)

Object Identifier	Object Name	Description	Object States	VVDA[a]	CVDA[b]	VVZT[c]	CVZT[d]	When Exists
MI-10119	Arbitration Method	The arbitration method is used to define the source of the data being provided to the controller. The source can be defined as DEFAULT (stored in the controller, such as setpoints and settings), LOCAL (for wired/ wireless sensors), or FULL (for all remote sources, including BMS, custom programming, etc.).	1 = Full (Auto) 2 = Local 3 = Default	X	X	X	X	All Packaged RTU
MI-10120	Timed Override Request Active	Indicates the status of the timed override request (see above).	1 = Idle 2 = On 3 = Cancel	X	X	X	X	All Packaged RTU
MI-10121	Electrical Service Type	Indicates the electrical service type used for the unit.	1 = A+N 2 = A+B 3 = A+B+N 4 = A+B+C 5 = A+B+C+N	X	X	X	X	Power Monitoring Present
MI-10132	Economizer Decision Method	Normally provided by the BAS to determine the method of enabling airside economizing.	1 = Absolute Temperature 2 = Relative Temperature 3 = Absolute Enthalpy 4 = Comparative Enthalpy	X	X	X	X	Economizer present
MI-10144	Economizer System Status	Indicates the status of enabling economizing.	1 = Disabled 2 = Enabled 3 = Not Present	X	X	X	X	Economizer present

(a) VVDA - Variable Volume Discharge Air Temperature Control
(b) CVDA - Constant Volume Discharge Air Temperature Control
(c) VVZT - Variable Volume Zone Temperature Control
(d) CVZT - Constant Volume Zone Temperature Control

Table 6. Multi-state values

Object Identifier	Object Name	Description	Object States	VVDA[a]	CVDA[b]	VVZT[c]	CVZT[d]	When Exists	Last One Wins[e]
MV-10102	Emergency Override BAS	Normally used by the BMS to command the unit into an emergency mode of operation.	1 = Normal 2 = Pressurize 3 = Depressurize 4 = Purge 5 = Shutdown 6 = Fire	X	X	X	X	All Pack-aged RTU	
MV-10103	Economizer Airside Enable	Normally provided by the BAS to enable airside economizing.	1 = Disabled 2 = Enabled 3 = Auto	X	X	X	X	Econo-mizer present	

Table 6. Multi-state values (continued)

Object Identifier	Object Name	Description	Object States	VVDA[a]	CVDA[b]	VVZT[c]	CVZT[d]	When Exists	Last One Wins[e]
MV-10104	Heat Cool Mode Request	Normally provided by the BMS to command the unit into a heat/cool mode, including additional possible control modes.	1 = Auto 2 = Heat 3 = Morning Warm-up 4 = Cool 5 = Night Purge 6 = Pre Cool 7 = Off 8 = Test 9 = Emergency Heat 10 = Fan Only 11 = Free Cool 12 = Ice-Making 13 = Max Heat 14 = Economizer 15 = Dehumidify 16 = Calibrate	X	X	X	X	All Packaged RTU	
MV-10106	Occupancy Request	Normally used by the BMS to command the unit into an occupancy mode.	1 = Occupied 2 = Unoccupied 3 = Occupied Bypass 4 = Occupied Standby 5 = Auto	X	X	X	X	All Packaged RTU	
MV-10110	Timed Override Request	Normally used by the BAS to request a temporary timed override during unoccupied.	1 = Idle 2 = On 3 = Cancel	X	X	X	X	All Packaged RTU	

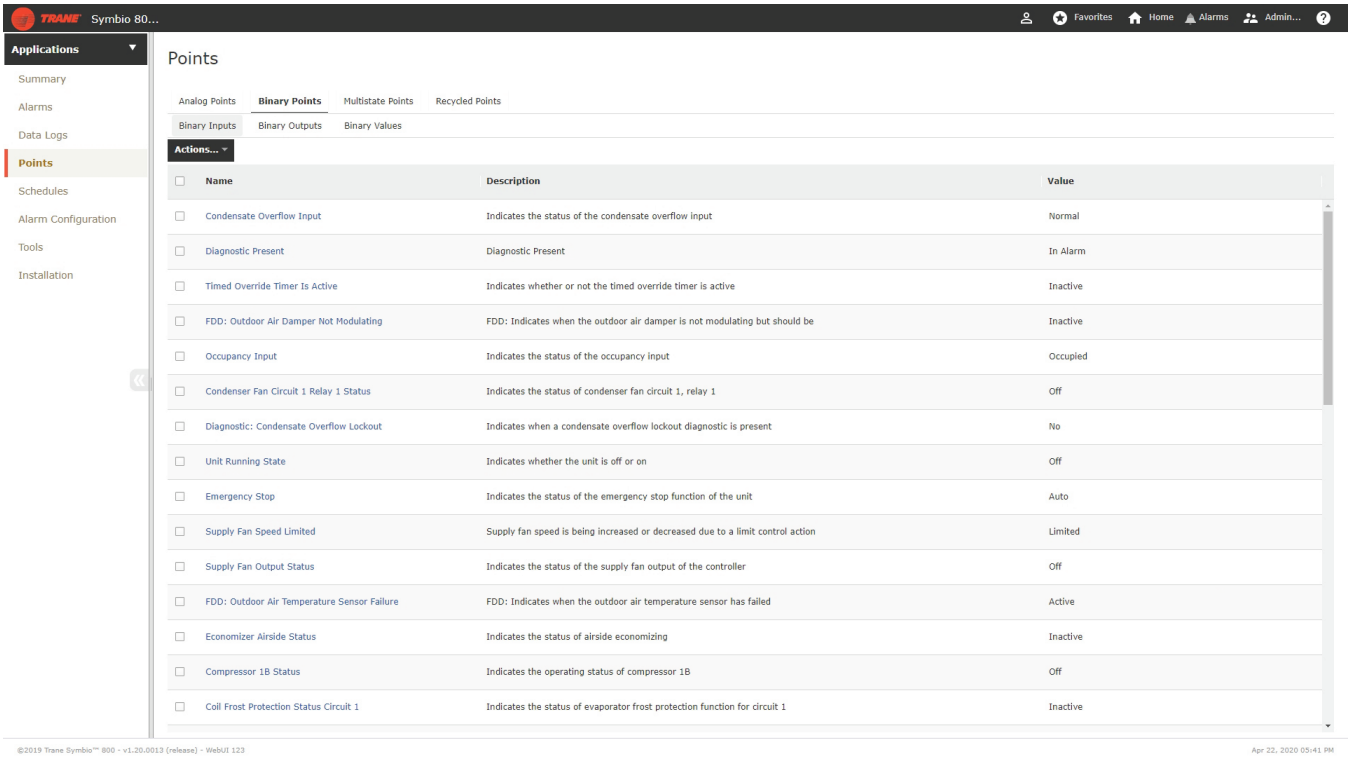
(a) VVDA - Variable Volume Discharge Air Temperature Control
(b) CVDA - Constant Volume Discharge Air Temperature Control
(c) VVZT - Variable Volume Zone Temperature Control
(d) CVZT - Constant Volume Zone Temperature Control
(e) Last written value is persisted; not subject to a priority array

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

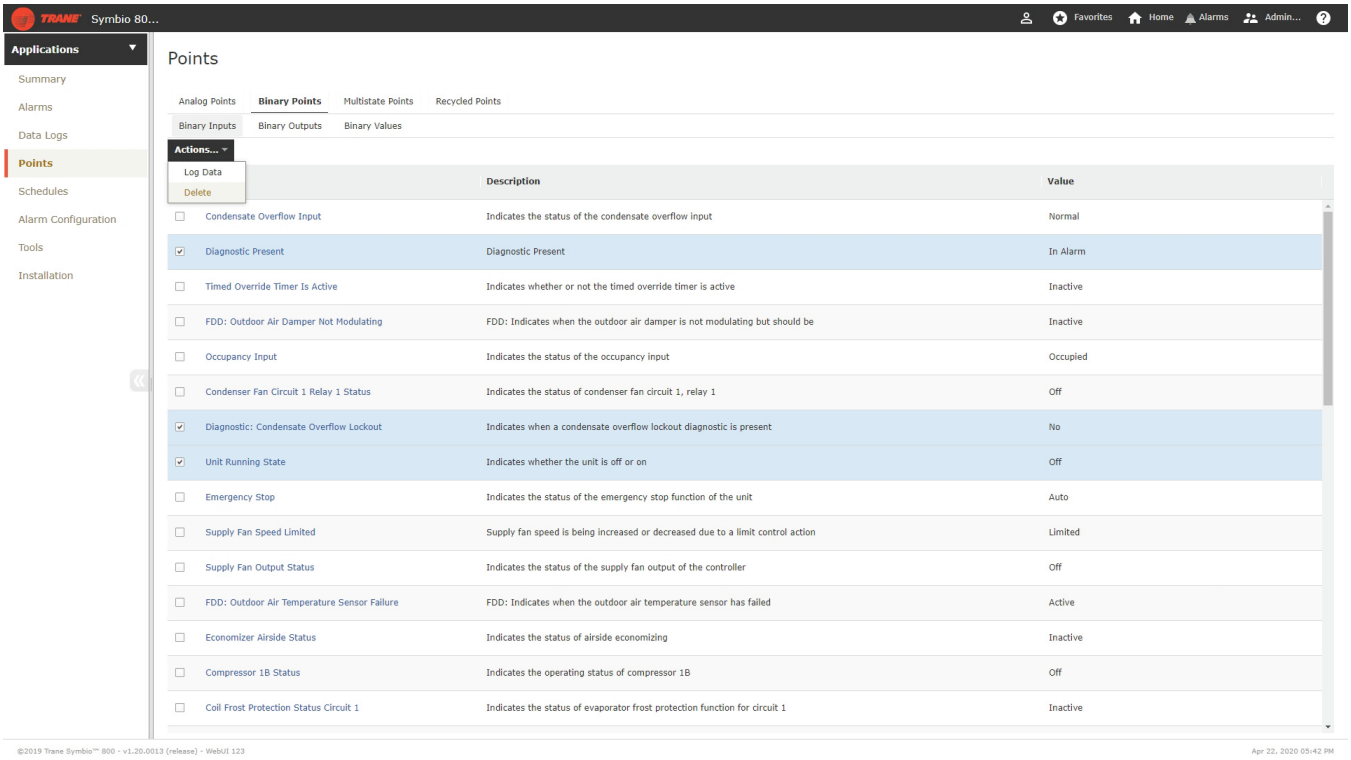


Any of the factory-provided points can be removed from the communication interface through a feature known as recycling. When the user selects and deletes a factory point, that point is moved to Recycled Points and is removed from the interface. This feature offers technicians the ability to strategically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

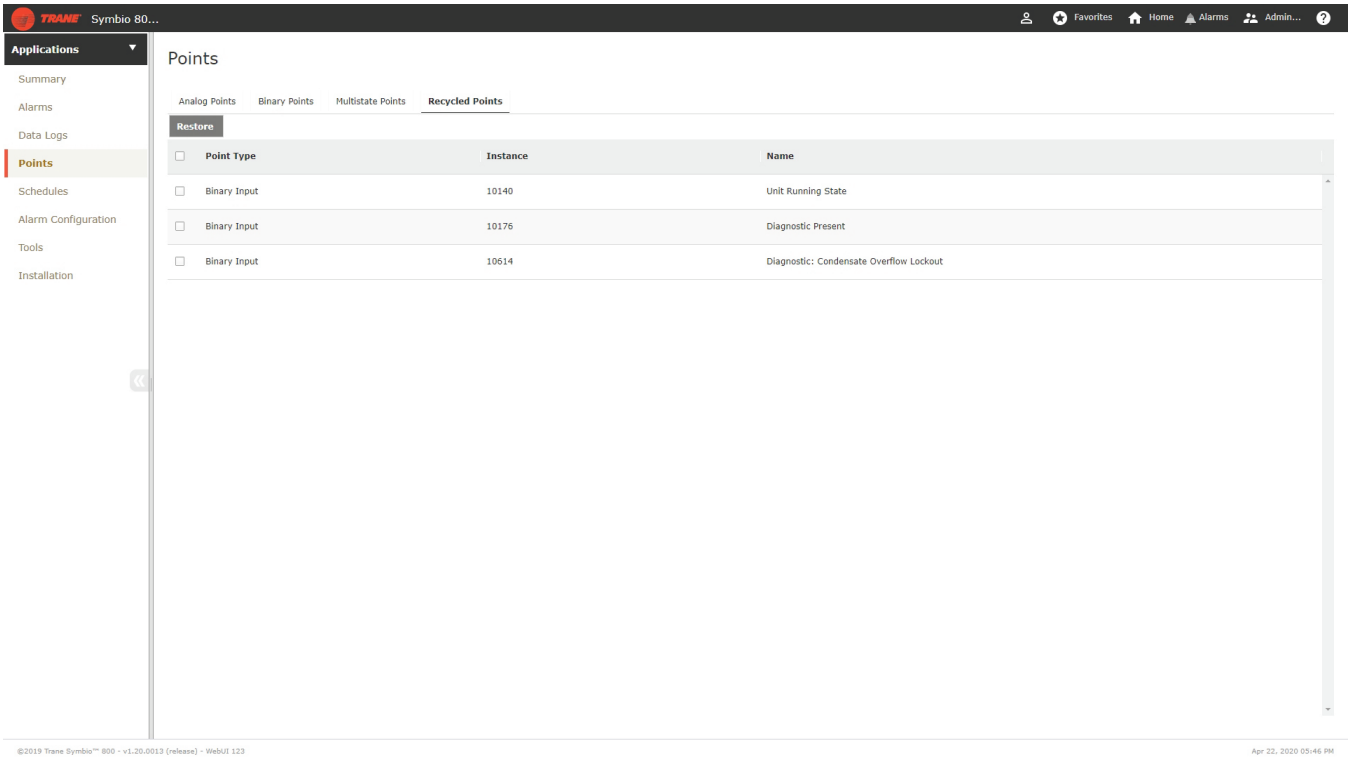


Note: *User-created points cannot be recycled. Instead, when the user selects and deletes user-created points, those points are permanently removed from the controller. Should the user decide later that one or more of the deleted user points are needed, they will need to be recreated.*

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



Appendix A

Arbitration

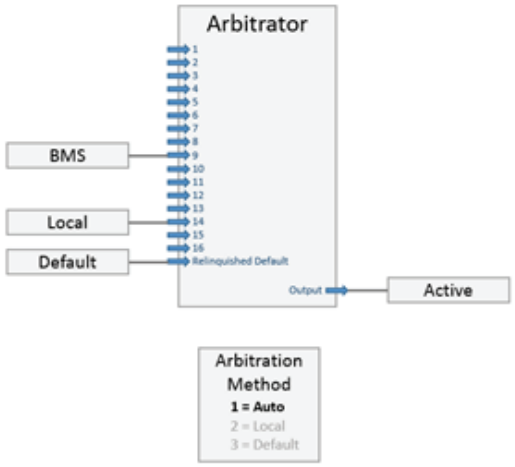
The Symbio™ 800 controller includes arbitration logic for several points. For each read/write point designated as “BAS”, an associated “Arbitration” point determines the behavior of that communicated data compared to the local hardwired (or wireless) sensor and a default value.

As shown in Figure 16, p. 46, 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.

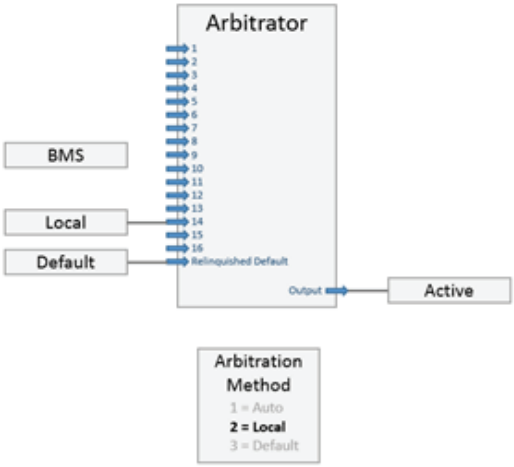
Because the arbitrated points are normally associated with sensors, the default value is invalid, meaning the value must be provided either by the BMS or the local sensor.

Figure 16. 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.

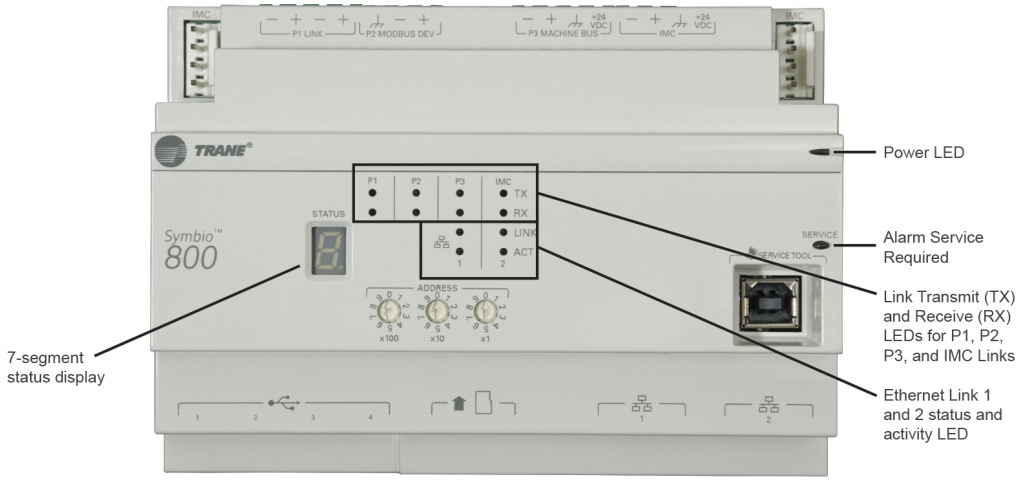
Figure 17. Arbitration method - local



Appendix B

Symbio™ 800 Controller Display

Figure 18. Symbio™ 800 controller display and LEDs



7–Segment status display

Table 7. 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 19. 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.*

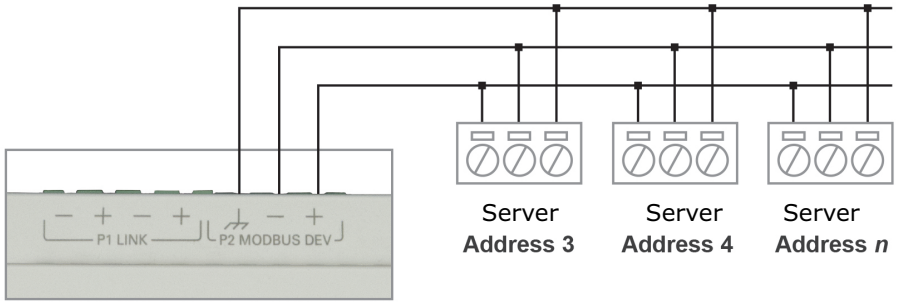


Figure 20. P3 machine bus (global bus — internal communication bus)

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

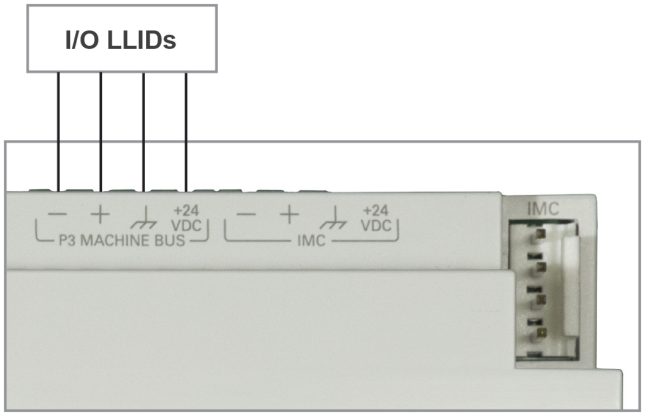
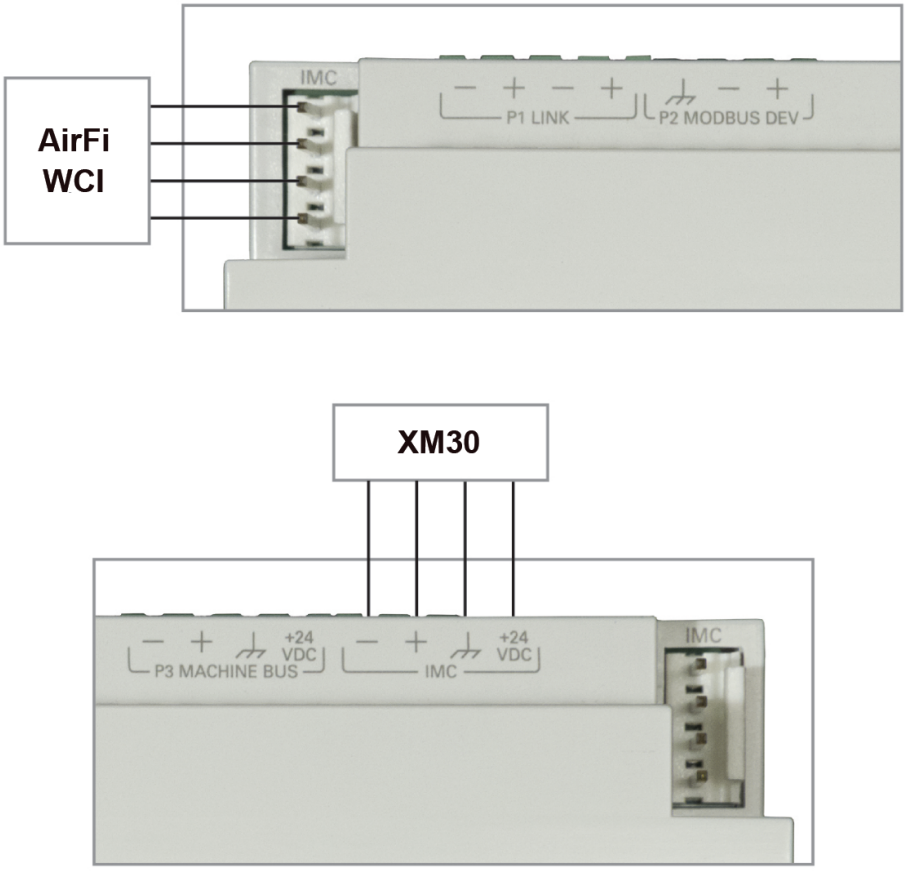
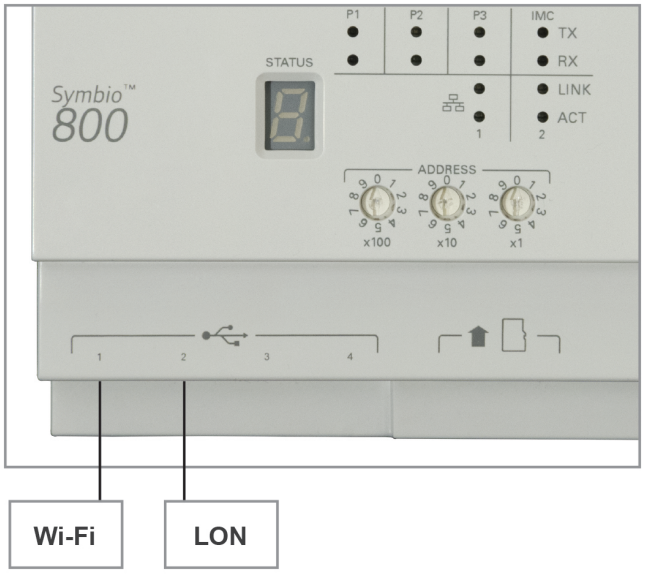


Figure 21. IMC link terminations for optional Air-Fi and expansion module (XM30)



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

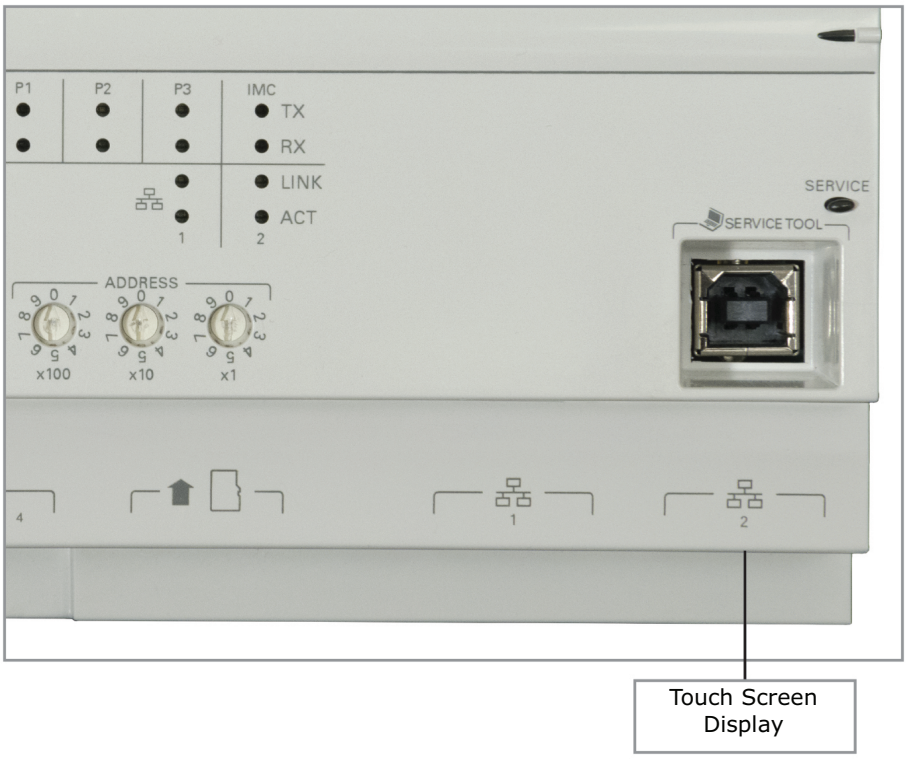
Figure 22. (4) USB connectors



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 23. 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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