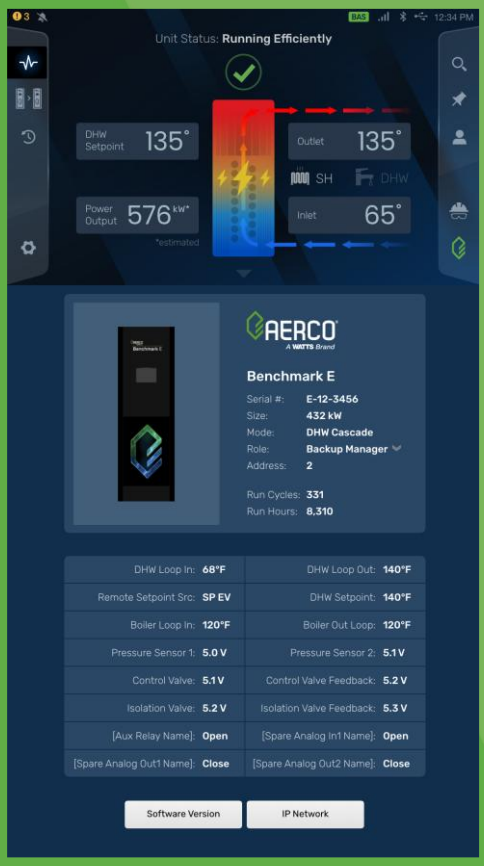
Edge X Controller Communication Manual

For Systems Integrators

Applies to AERCO Benchmark E Boilers

Other documents related to this manual:

- OMM-0170, Edge X Controller Operation Manual
- OMM-0169 BMK E - Installation, Startup, Operation and Maintenance Manual



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1. INTRODUCTION

Some of the information in this Manual is included in the Edge X Controller Operation & Maintenance Manual (OMM-0170). It is repeated here as a convenience to have all Edge X Controller communication setup and testing information needed by Systems Integrators in one location.

The Edge X Controller can communicate with a Building Automation System(BAS) using BACnet(R)® IP. A BAS is a tool that enables a user to control and monitor equipment in a facility. A BAS can read different parameters from the unit, or it can edit/write different parameters.

2. CONNECTING THE CONTROLLER VIA ETHERNET

1. Open the cabinet door to access the MCB Ethernet port on the the Edge X controller.
2. Connect a CAT 5 or better Ethernet cable to the wall jack or box provided at the site.
3. Route the ethernet cable through the conduit knockout hole on the roof of the unit and through the channel inside the unit to the left side of the Controller, avoiding hot locations.
4. Plug the cable into Ethernet port J6, situated on the right side of the board (back view).

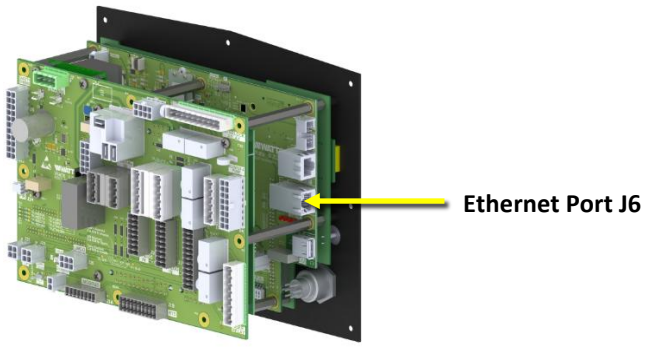

Figure 2-1: USB & Ethernet Port Locations

NOTE: When connecting a BAS to the Edge X Controller using Ethernet, make sure the BAS is on the same LAN as the Edge Controller.

3. BAS Configuration

3.1 BACnet IP

1. To connect the Edge X Controller via BACnet, go to **Settings → Advanced Setup → Comm & Failsafe → BAS Settings**.

2. The default is **Off**. To enable BACnet IP communication, toggle **BAS (J6)** to the **On** position.

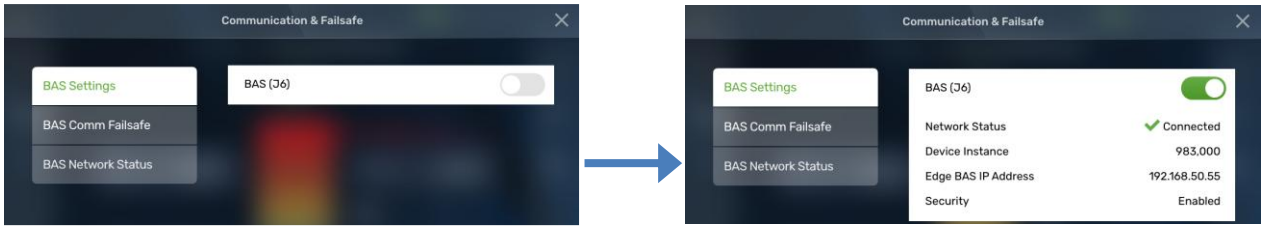

Figure 3-1: Enabling BAS Settings

3. The following parameters now appear:
   - **Protocol** and **Mode:** These parameters are automatically configured for BACnet IP.
   - **Communication Address:** Specify the network address of the Edge Controller (0-127).
   - **Node Offset:** This is *the* starting root BACnet address for the group of devices.
   - **Port Number:** Specify the BAS port to which the unit will communicate (47808-47823).
   - **Device Instance:** Identifies the device on a BACnet network. It is generated automatically when use updates the Communication address. Device Instance is a sum of Node offset and the communication Address. This value must be unique on a BACnet network.
   - **Communication Timeout:** This specifies the BAS communication timeout period.

4. **DHCP:** If enabled, Edge X automatically gets the IP address for the device.**Security:** This feature allows Edge X to securely communicate with BAS that matches with this IP address. If enabled, the BAS IP Address parameter appears. Enter the BAS server's IP address.

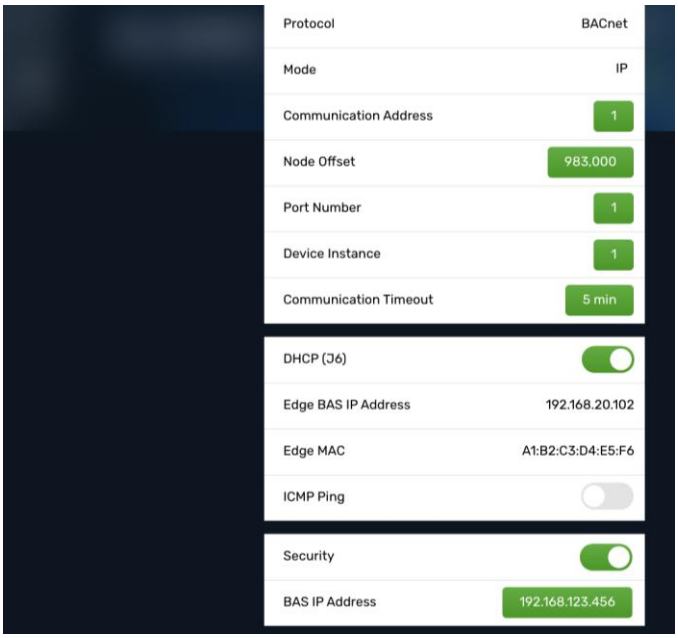

Figure 3-2: BAS Settings – BAS (J6) Enabled

3.2 DHCP Setup

The **BAS Settings** screen will typically have the DHCP option **Enabled**, and therefore won't require additional configuration. For the device to communicate with the network, DHCP needs to be disabled and the user must configure the addresses shown below. This setting should be configured by an IT/network expert

NOTE: Ethernet communication requires an Ethernet cable. See Connecting the Controller via Ethernet.

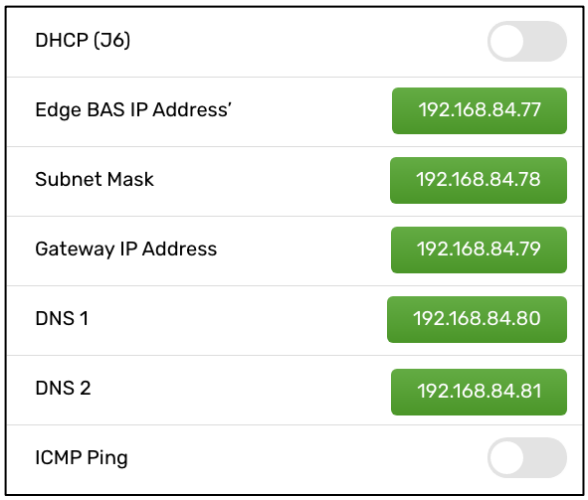

Figure 3-3: DHCP Disabled

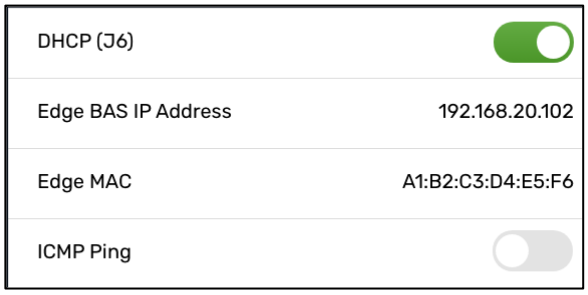

Figure 3-4: DHCP Enabled

1. Go to: **Settings → Advanced Setup → Comm & Failsafe → BAS Settings**.

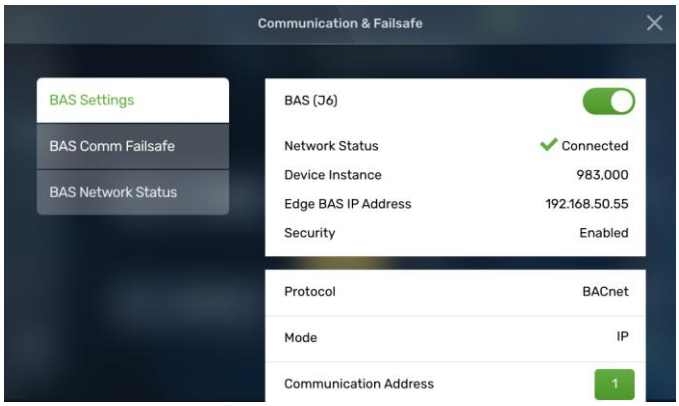

Figure 3-5: Communication & Failsafe – BAS Settings Screen 1

2. If DHCP is enabled, IP and MAC are displayed and no additional configuration is required. If the connection to BAS is not established, disable DHCP and configure manually by entering the communication parameters (typically provided by a network administrator) and clicking **Apply.**

3. If DHCP is disabled, manually enter the communication parameters in the available fields:
   - Edge BAS
   - IP Address
   - Subnet Mask
   - Gateway IP Address
   - DNS 1
   - DNS 2

4. If **ICMP Ping** is enabled, the unit will respond to a ping from a network administrator.

3.3 Ethernet Security

The Edge X Controller has security options built into its firmware. Enabling security allows the BAS to securely interact with the controller. It ensures that only authenticated access is granted to BAS objects, safeguarding the system from unauthorized modifications.

Figure 3-6: Enabling Security

4. BACnet Protocol Implementation Conformance Statement

Date: October 2024
BACnet Vendor Name: AERCO International Inc
BACnet Vendor ID: 983
Product Name: Edge X, BMKE
Product Model Number: BMKE (size in kW): 216, 360, 432, 576, 684
Application Software Version: 1.0

BACnet Protocol Revision: 19

Product Description: The EdgeX Controller is an integrated controller for AERCO products. It is designed to sequence boilers and water heaters while improving overall system efficiency and simplifying design, installation, startup and maintenance.

BACnet Standardized Device Profile (Annex L): BACnet Application Specific Controller (B-ASC)

List all BACnet Interoperability Building Blocks Supported (Annex K): K.1.2 BIBB - Data Sharing-ReadProperty-B (DS-RP-B); K.1.6 BIBB - Data Sharing-WriteProperty-B (DS-WP-B)

Segmentation Capability: None

Standard Object Types Supported: Device Object, Analog Input, Analog Value

Data Link Layer Options: BACnet IP, (Annex J)

Device Address Binding: Not supported

Networking Options:

☐ Router, Clause 6 - List all routing configurations, e.g., ARCNET-Ethernet, Ethernet-MS/TP, etc.
☐ Annex H, BACnet Tunneling Router over IP
☐ BACnet/IP Broadcast Management Device (BBMD)
Not supported

Network Security Options: N/A

APPENDIX A - BACNET OBJECTS LIST

A technician-level password is required for access to BAS communication points.

BAS Mode: BACnet IP

1. Over Ethernet
2. Port Number default: 47808
3. Local IP address [read-only]
4. Address range: 1 – 127 [Default: 0]
5. Node Offset range: 0 – 4194176 [Default: 983000]
6. Device Instance: Address + Node Offset [read-only]
7. Edge BAS IP Address
8. Edge MAC
9. Security

BACnet Objects – Object Type = AI, Read Only

BACnet Objects – Stand-Alone – Object Type = AI, Read Only			
BACnet ID	**BAS Screen Display**	**Min**	**Max**
0	Active Event ID	0	999
1	Unit Status	0 = Unit Disabled, 1 = Standby, 2 = Manual Mode, 3 = Automatic Mode, 4 = Unit Fault, 5 = Unit In Demand Delay	
2	Inlet Water Temperature	-70°F	250°F
3	Outlet Water Temperature	-70°F	250°F
11	Run Cycles	0	4294967295
13	Run Hours	0	4294967295
16	Active Setpoint	20	230
17	PID Out	0	100
19	BAS Communication Address	0	127
148	Serial Alpha	0 = E, 1 = G, 2 = H, 3 = R, 4 = N, 5 = A, 6 = Z	
149	Serial Year	0	99
150	Serial Number	0	99999
158	Target Power	0	100
159	Cabinet Temperature	-70°F	250°F
160	OAR Temperature	-70°F	250°F
161	Active Event	1	999
162	Unit Voltage	0 = 240, 1 = 480, 2 = 600	
163	Access Level	0 = Basic, 1 = Trained Technician, 2 = Master Trained Technician, 3 = Watts Factory, 4 = Watts S&C Engineer	

BACnet Objects – Object Type = AV, Read/Write

BACnet Objects – Stand-Alone or BST Client – Object Type = AV, Read/Write			
BACnet ID	**BAS Screen Display**	**Min**	**Max**
0	Remote Setpoint BAS	20	230
2	BAS Password	0	99999
4	DHW Setpoint	20	230
5	Language	0 = English	
6	Time	01/01/0001	12/31/9999
7	Date	English	Metric
8	Unit Of Measurement	0 = U.S. Customary, 1 = Metric	
10	Unit Type	0 = Benchmark E	
11	Unit Size	0 = 216, 1 = 360, 2 = 432, 3 = 576, 4 = 684	
12	Operating Mode	0 = Constant Setpt 1 = Remote Setpt, 2 = Outdoor Air Reset	
18	Setpoint Low Limit	20	230
19	Setpoint High Threshold	20	230
20	Temperature High Limit	40	210
24	Unit Failsafe Mode	0 = Constant Setpt., 1 = Shutdown	
70	Bas Enable	0 = Disabled, 1 = Enabled	

APPENDIX B – BMK E ALERT MESSAGE LIST

Alert #	Event Message	Alert Type	Description
1	Unit Disabled	Info	**Enable/Disabled** switch set to **Disabled**. Shows time/date disabled.
2	Standby	Info	Displayed when Enable/Disable switch is in Enable position, but there is no demand for heat. Time and date are also displayed.
3	Manual Mode	Info	See *Manual Run Enabled*
4	Automatic Mode	Info	Control over the boiler is automatically determined by the system outlet temperature or plant header temperature and current setpoint value.
5	Unit Fault	Fault, Non-Latching	See Section 5: Event History
8	Manual Reset	Fault, Latching	Max water temp exceeded; manual reset required.
9	Low Water Level	Fault, Latching	Primary Low Water Cutoff board indicating low water level
12	Remote Interlock Open	Fault, Non-Latching	Remote Interlock is open
13	Delayed Interlock Open	Fault, Latching	Delayed Interlock is open
40	Remote Setpt Signal Fault	Fault, Non-Latching	Remote Setpoint signal not present or out of range
56	Inlet Temp Sensor Short	Fault, Non-Latching	Inlet Water Temp Sensor has malfunctioned/ shorted out
57	Inlet Temp Sensor Open	Fault, Non-Latching	Inlet Water Temp Sensor is not connected or malfunctioned
58	Inlet Temp High	Fault, Non-Latching	Inlet water temperature above normal
59	Inlet Temp LOW	Fault, Non-Latching	Inlet water temperature below normal.
107	Warm Weather Shutdown	Warning	Standalone warm weather shutdown warning
300	OAT Sensor open circuit	Warning	*Connection to OAT sensor is incomplete*
301	OAT Sensor short circuit	Warning	Usually indicates a wiring fault, improper connection, or short circuit to OAT sensor.
302	OAT Sensor Not Set	Warning	Occurs when setpoint mode and source are set to Outdoor Air reset via direct and Spare 1 sensor is not configured as an OAT sensor.
303	High Cabinet Temperature	Fault, Non-Latching	Temperature measured by Cabinet Sensor out of range.
304	Cabinet Temp Sensor OPEN circuit	Fault, Non-Latching	Connection to Cabinet sensor is incomplete
305	Cabinet Temp Sensor SHORT circuit	Fault, Non-Latching	Temperature measured by the Cabinet Temp Sensor is out of range.
306	Outlet Temp Sensor Short	Fault, Non-Latching	Outlet Temp Sensor has shorted
307	Outlet Temp Sensor Open	Fault, Non-Latching	Cabinet sensor has malfunctioned/ shorted out
308	Demand Relay Open Fault	Fault - Latching	Signal sent, but demand relay not closed
309	Enable/Disable Switch Open	Warning	Enable/Disabled switch set to Disabled.
310	Auto Over-temp Limit Control Open	Fault, Non-Latching	When Auto Over-temp detects temperature greater than Trip Temperature, OTLC safety module trips to signify fault. Module resets when temperature returns to a safe level
311	24VAC Safety String Invalid	Warning	Indicates a mis-wired or "jumped" safety string
312	Manual Run Enabled	Warning	Manual Run mode enabled by user. Power is controlled manually to test unit operation.
313	Manual Run Disabled By User	Warning	Manual Run mode disabled by user.
314	Manual Run Auto Disabled	Warning	Manual Run mode was auto disabled by Edge due to > 30 mins of inactivity
315	Setback Schedule Enabled	Warning	Setback Schedule is configured and activated
900	Secondary Low Water Level	Fault, Latching	Secondary Low Water Cutoff board indicates low water level.
901	Cabinet Door Open	Fault, Latching	Cabinet Door switch disabled the unit when the Cabinet Door is opened to prevent accidental exposure to unsafe voltages.
998	High Water Temp Fault	Fault, Non-Latching	Temp measured by Outlet Sensor exceeded Temp Hi Limit