Edge X Communication Guide

For Systems Integrators

Applies to AERCO Benchmark E and Benchmark NX Boilers

Other documents related to this manual:

- OMM-0170, Edge X Controller Operation Manual
- OMM-0169 BMK E - Installation, Startup, Operation and Maintenance Manual
- OMM-0183 BMK NX – 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 MSTP or BACnet 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. BACnet is a Building Automation industry standard communication protocol while MSTP and IP are physical layers/means of communication for BACnet protocol.

AERCO uses cascade sequencing to achieve maximum operational efficiency. Some cascade technology operates with a common header temperature sensor (Boiler Sequencing Technology - BST) while other cascade technologies use individual appliances' outlet temperatures sensor (Independent Sequencing Technology - IST and Water Heater Management - WHM). BST/IST/WHM use MODBUS protocol over RS485 wiring in a daisy chain configuration. Figure 1 shows a schematic representation of the different communication layers in a plant involving Edge X controllers. Throughout the document, BST/IST/WHM will be referred to as "Cascade."

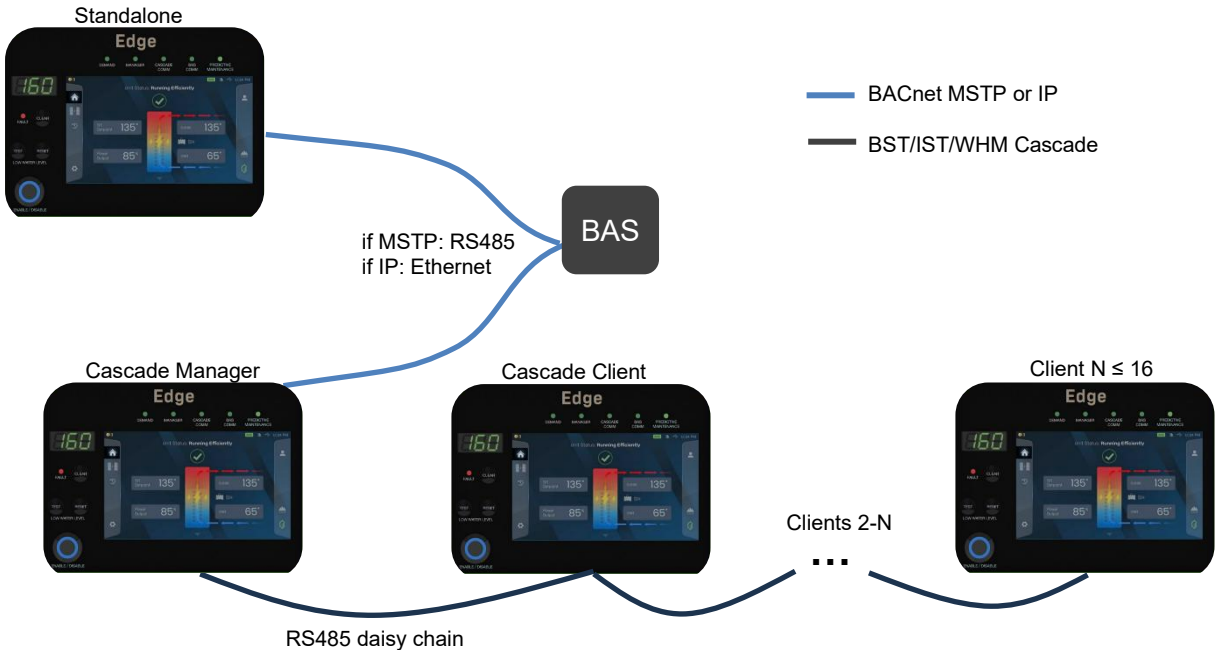


Figure 1-1: Schematic overview of Edge X integration into a BAS

Note that the BAS connection to the Edge X will depend on the building's choice of BACnet (MSTP or IP), which determines the type of wired connection required. If multiple boilers are installed and a Cascade is implemented, a single connection from the BAS is required to the Cascade Manager. Cascade Client-to-Client connections are all RS485 since they communicate with each other over MODBUS. A single Edge X acting as a Cascade Manager can support a plant of 16 boilers (1 Manager and 15 Clients). If a site wishes to monitor or control a standalone unit that is not in cascade, a separate BAS connection is required. The number of BAS connections to the plant is equal to the sum of Cascade Managers and standalone units.

1.1 Types of Communications

The Edge Controller is designed with integrated communication as one of its main features. The Controller currently supports BACnet connections from the BAS to the controller over two physical layers: ethernet for BACnet IP and RS485 for BACnet MSTP. The location of these connections on the controller is discussed in Chapter 2.



- **Ethernet**: BACnet IP. This implementation of BACnet functions over IP ("internet protocol" similar to world wide web) and uses ethernet cables and connectors to communicate between the buildings and devices such as the Edge X controller. It involves the Edge X ethernet port and ethernet cable like Cat 5 or Cat 6.



- **RS485**: BACnet MSTP. This implementation of BACnet relies on the MSTP communication protocol, which is a serial communication method and therefore relies on standard RS485 for its implementation. It involves the Edge X MODBUS serial communication port and twisted pair, shielded, grounded wire 18-24 AWG.

NOTE: Edge X Controller currently doesn't accommodate Modbus RTU, Modbus TCP/IP, or External Gateways.

2. WIRING

All field wiring connections can be made through conduit knockout holes on the enclosure. On the BMK-E, these holes are located on the top face near the front on the left-hand side.

⚠ WARNING!

ELECTRICAL SHOCK HAZARD. Disconnect, lock out, and verify removal of electrical power before accessing internal components or performing field wiring. Field wiring must be performed by qualified personnel in accordance with applicable electrical codes and the installation instructions for the equipment. Failure to follow these instructions may result in electrical shock, serious personal injury, death, or equipment damage.

2.1 BACnet MSTP Communication Wiring

The I/O board is the outermost board in the Edge X controller assembly. On the Edge X I/O Board connectors, pin 1 (P1) is designated by a white dot.

NOTE: The white dot denotes pin #1. Numbers on this connector increase from right to left.

NOTE: Pin numbers are shown for clarity, but do not appear on the physical board.

NOTE: Bottom right inset indicates location of I/O board on the back of the controller.

NOTE: Two IO Board revisions are in use. Check the **Board Number** and **Assembly Revision** printed below the Watts logo to identify the board version and refer to the appropriate wiring diagram in **Section 2.1.1** or **Section 2.1.2**.

2.1.1 IO Board 64188 Rev A Connection

On terminal strip J16 labelled “MODBUS”, this pin is on the right-hand side. Pins J16 P5(+) and J16 P7(-) are dedicated to BACnet MSTP connections. A schematic view of the I/O board showing the RS485 terminal for MODBUS protocol is shown below.

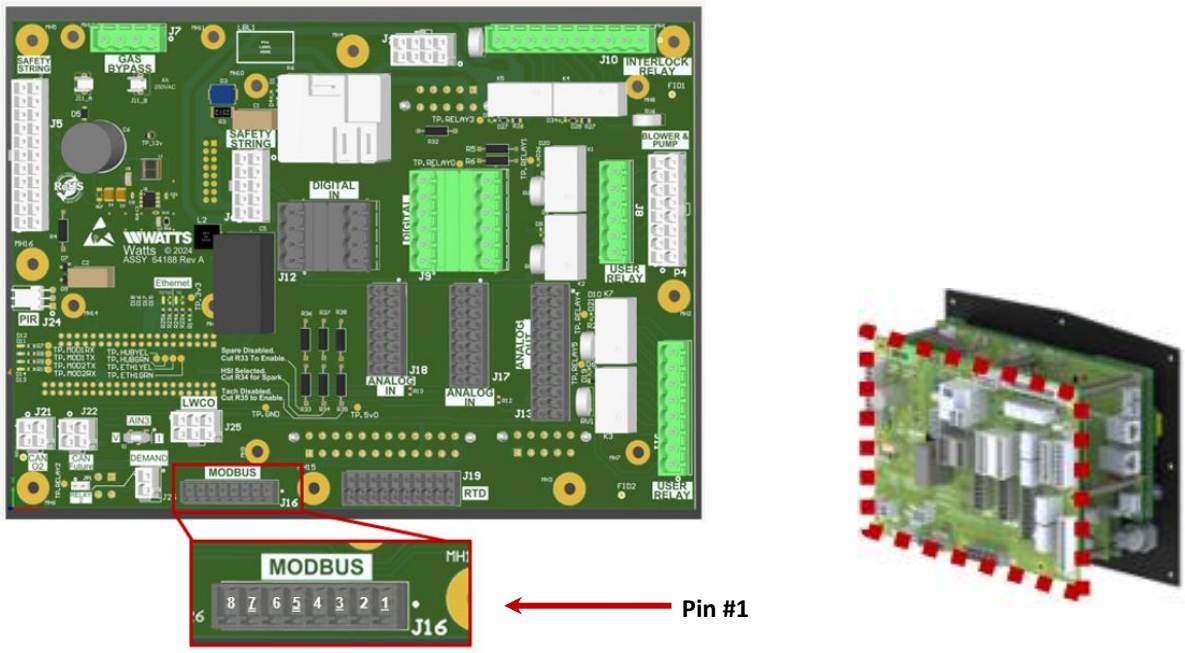


Figure 2-1: Edge X I/O board (64188 Rev A) showing RS485 connection for MODBUS protocol

2.1.2 IO Board 64220 Rev B2 Connection

On terminal strip J32 labelled “MODBUS”, this pin is on the right-hand side. Pins J32 P5(+) and J32 P7(-) are dedicated to BACnet MSTP connections. A schematic view of the I/O board showing the RS485 terminal for MODBUS protocol is shown below.

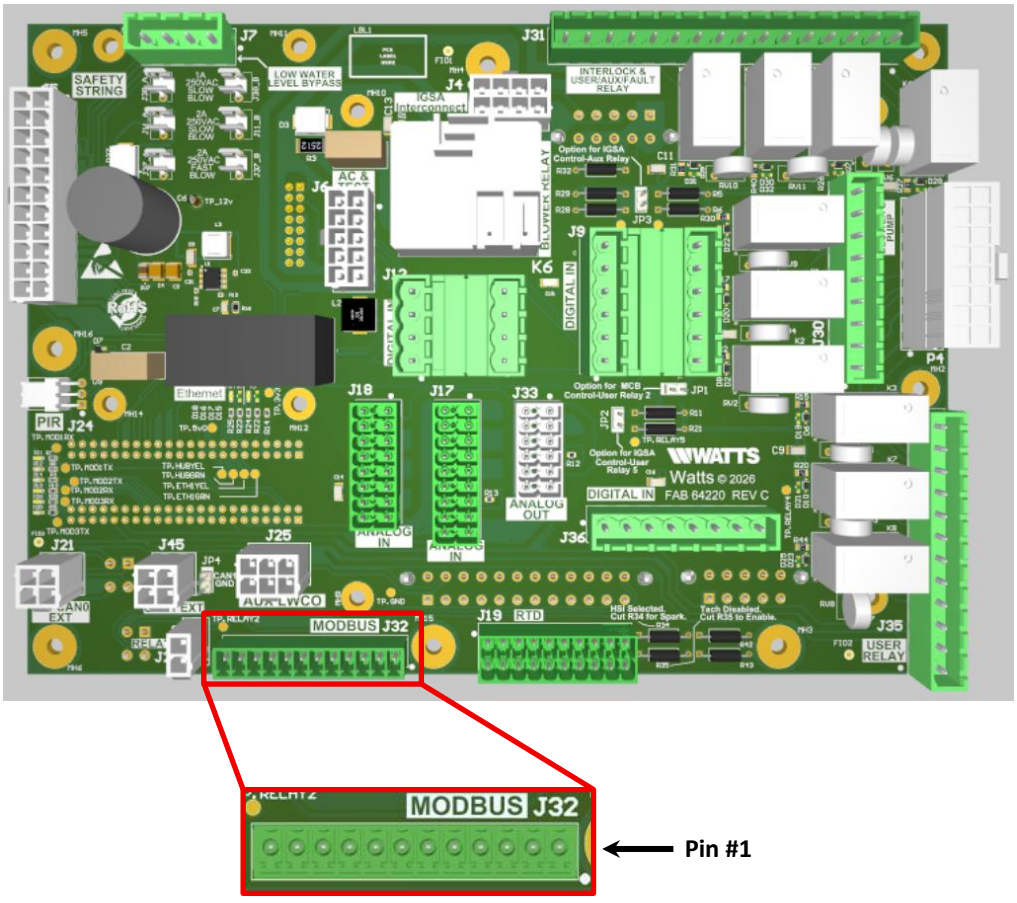


Figure 2-2: Edge X I/O board (64220 Rev B2) showing RS485 connection for MODBUS protocol

2.2 BACnet IP Communication Wiring

The Main Control Board (MCB) located behind the I/O board contains circuitry and connections for executing the central controlling functions of the Edge X controller. For field connection purposes the MCB contains:

- An ethernet port for BACnet IP network communication (J5),
- Configuration switches for analog input (SW1/SW5), output (K1/K2), and the MODBUS biasing and termination dipswitches for the Cascade (SW2) and BAS communication (SW5) chains

NOTE: Two MCB revisions are in use. Check the **Board Number** and **Assembly Revision** printed below the Watts logo to identify the board version and refer to the appropriate wiring diagram in **Section 2.2.1** or **Section 2.2.2**.

2.2.1 MCB 64180 Rev C Settings

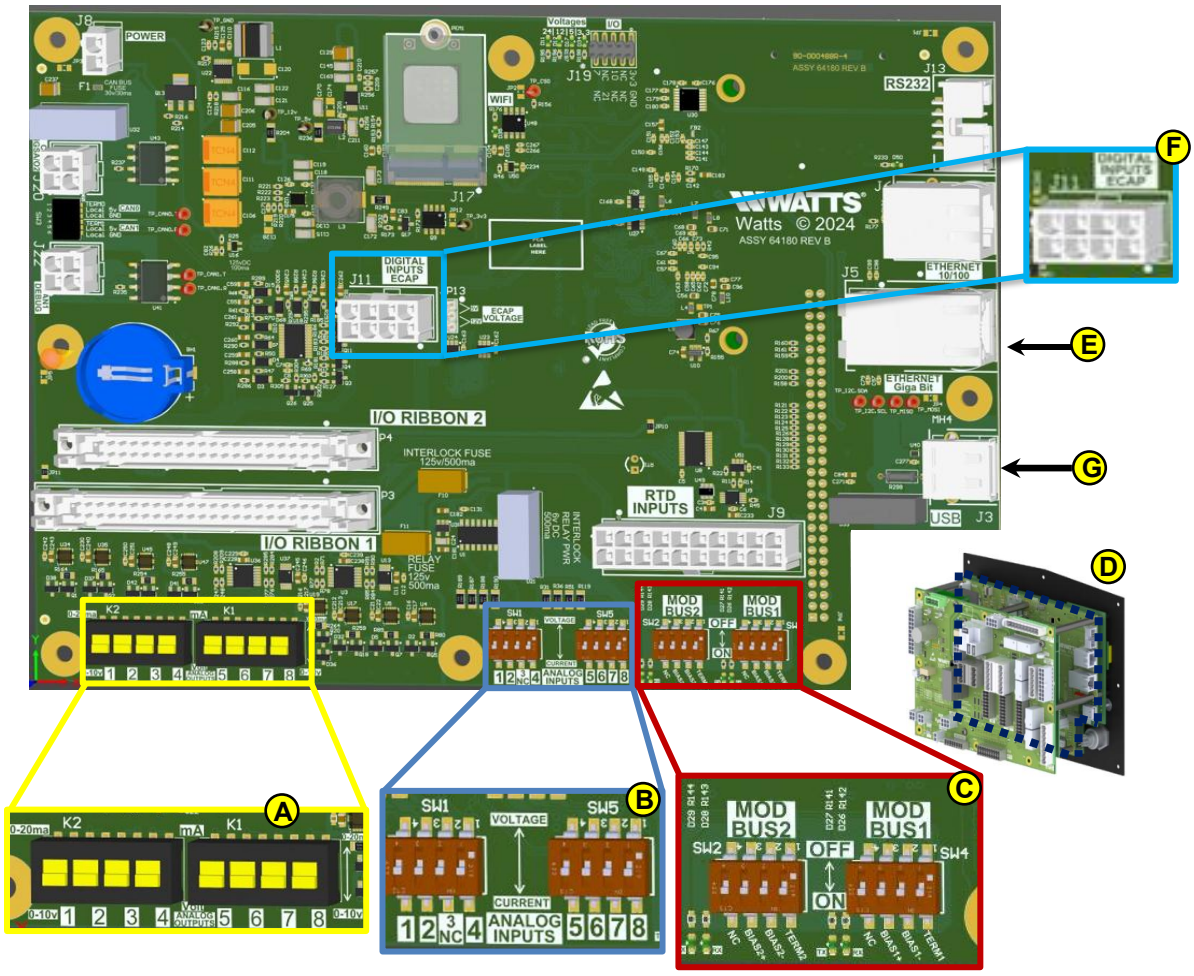


Figure 2-3: Edge X MCB (64180 Rev C)

(A): Analog Output configuration switches K2/K1
(B): Analog Input configuration switches SW1/SW5
(C): MODBUS1/2 dipswitch banks SW4/SW2 for BAS/Cascade termination respectively
(D): Back view of controller showing location of I/O board on back of the controller
(E): Location of J5 gigabit ethernet jack for BACnet IP connection
(F): Location of Digital Input terminal strip J11
(G): Location of the USB port J3

2.2.2 Expanded MCB 64180-1 Rev E Settings

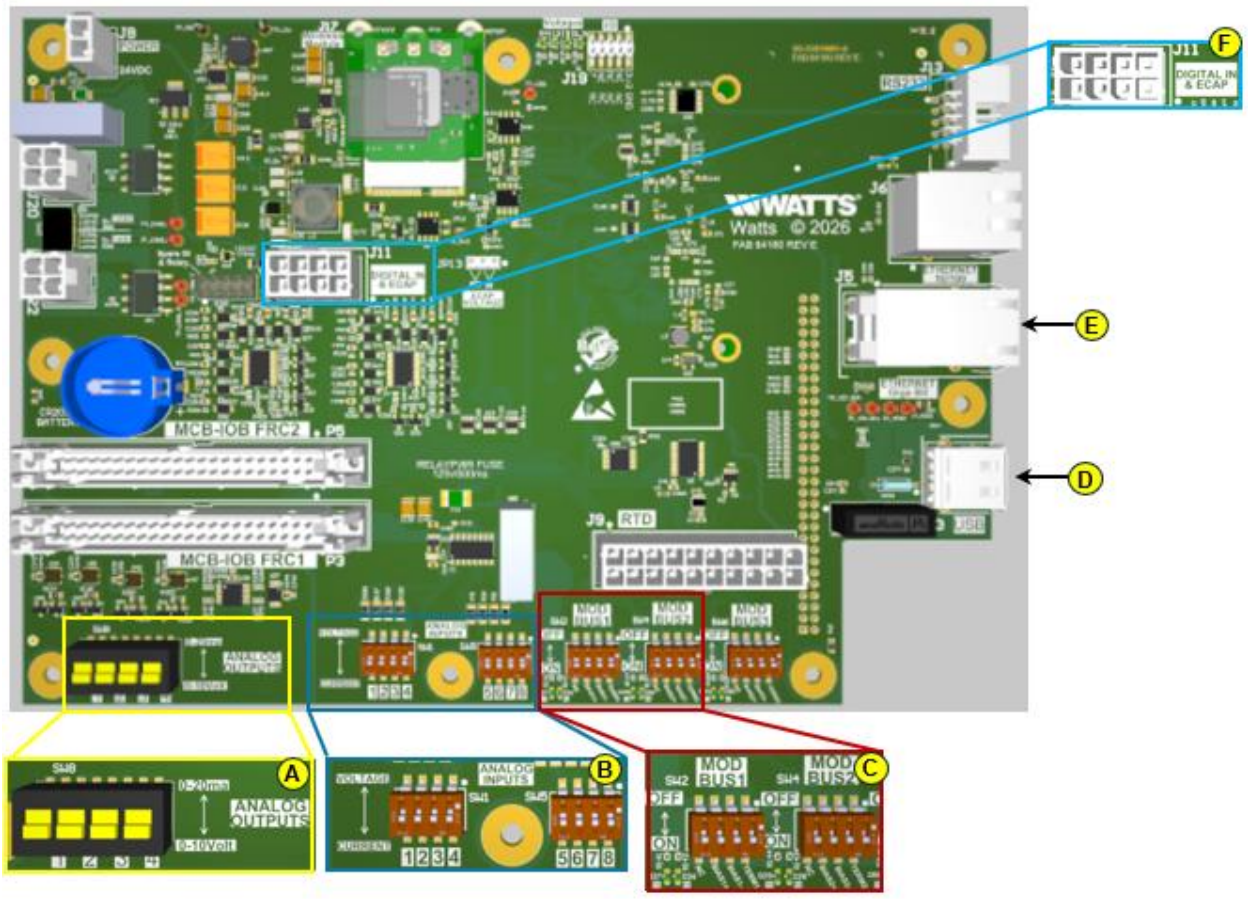


Figure 2-4: Edge X Expanded MCB (64180-1 Rev E)

(A): Analog Output configuration switches SW8
(B): Analog Input configuration switches SW1/SW5
(C): MODBUS1 & MODBUS2 dipswitch banks SW2 & SW4 for BAS/Cascade termination, respectively
(D): Location of the USB port J3
(E): Location of J5 gigabit ethernet jack for BACnet IP connection
(F): Location of Digital Input terminal strip J11

2.2.3 Communication Termination

The figure below shows dip switch banks MODBUS2 (SW2) and MODBUS1 (SW4).
BAS side termination: If the Edge X is the first or last device in the BAS daisy chain, the Edge X should have the MODBUS1 (SW4) TERM1 dipswitch ON.

NOTE: For proper communication operation in a Cascade, the first and last unit in the chain should have MODBUS2 (SW2) TERM2 dipswitch ON and the units internal to the chain should have TERM2 OFF. Only the first and last units should be terminated so that communication integrity is not compromised by signal reflection.

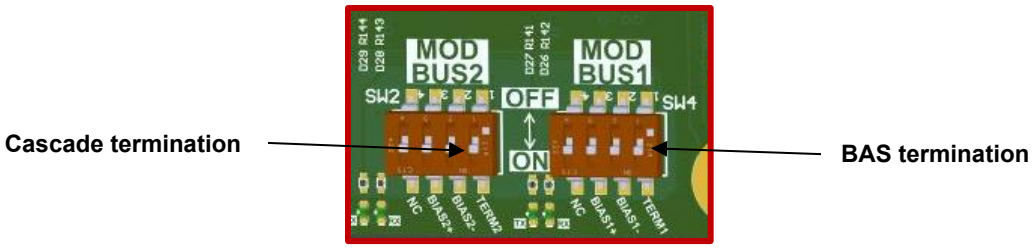


Figure 2-5: MODBUS2 and MODBUS1 Terminations

2.2.4 Ethernet Wiring

Figure 2-4 shows the location of the gigabit ethernet port J5 on the MCB. If BAS is connected to the Edge X controller by ethernet, ensure that the BAS is on the same LAN as the Edge X controller. Note that J6 is also an ethernet jack but it is currently not in use on the Edge X controller.

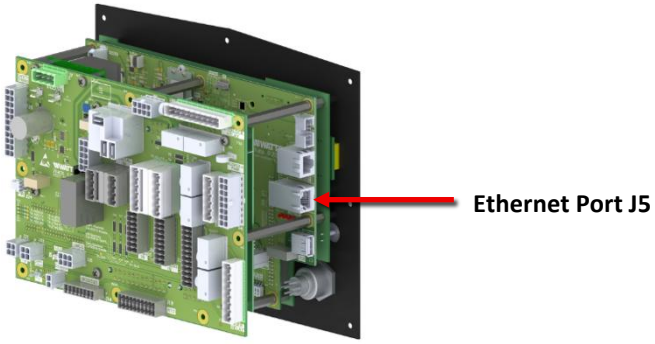


Figure 2-6: Location of Ethernet port J5 on Edge X

3. BAS CONFIGURATIONS

To see the **Communication & Failsafe** menu in the Edge X, follow the menu item path shown:

Settings > Advanced Setup > Comm & Failsafe

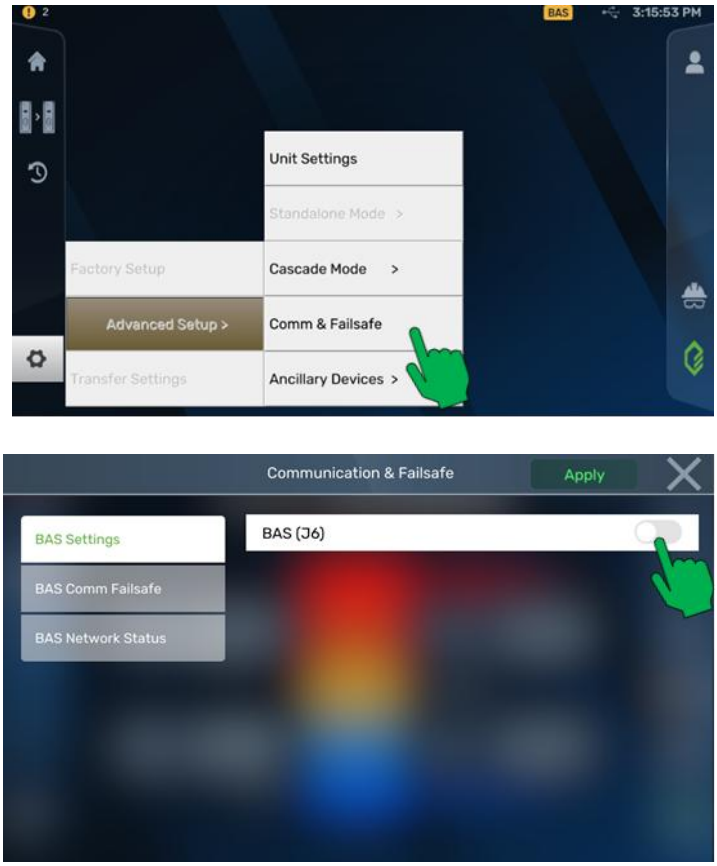


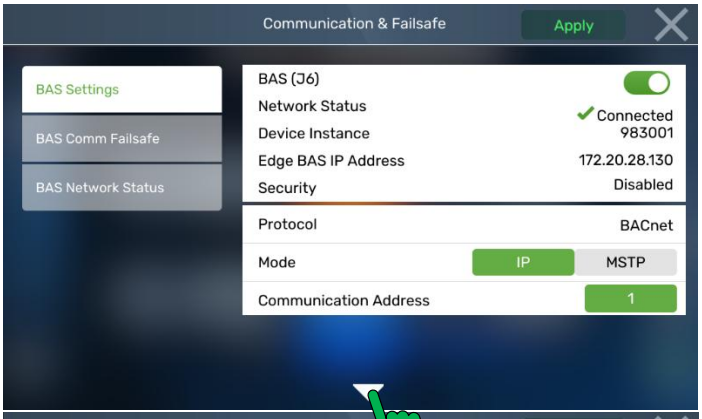
Figure 3-1: Communication & Failsafe Menu Path

The Communication & Failsafe menu will display various BAS menu options. The **BAS Comm Failsafe** menu allows you to select whether the unit will **shut down** or run at a **constant setpoint** if it loses communication with BAS. The **BAS Network Status** menu shows you the IP configuration of your device including DHCP lease information, IP address, DHCP address, and MAC address.

With ethernet connected, enable the **BAS (J6)** toggle button for the ethernet properties.

NOTE: This toggle button is called “BAS (J6)” but uses the J5 ethernet jack.

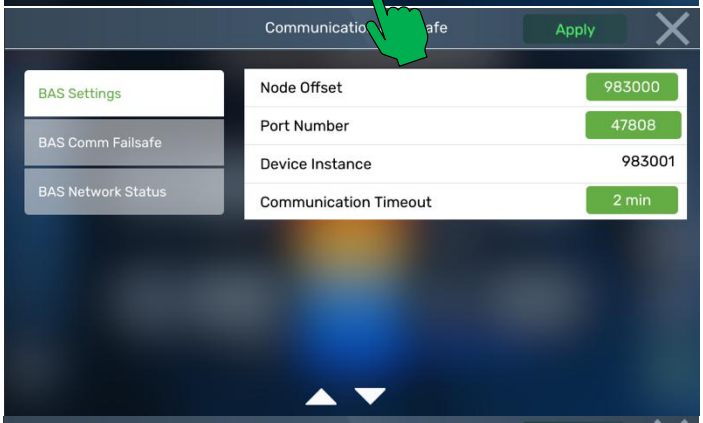
3.1 BAS Configuration: BACnet IP



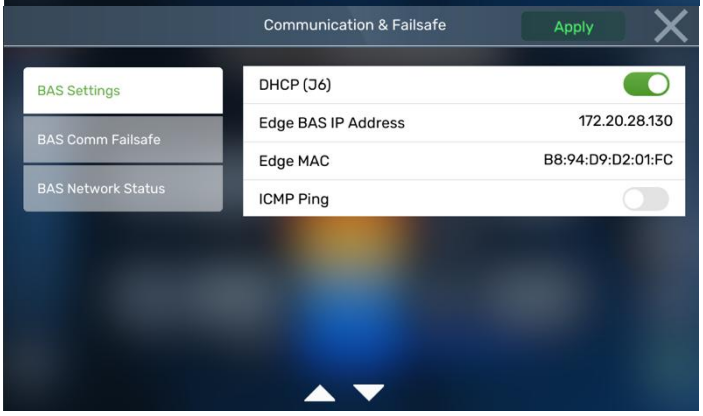
Enable/Disable
Current connectivity
BAS Unique identifier
I/P address of unit
For recognized host servers only

Diagnostic information

BAS protocol, typically BACnet
Connectivity “ethernet” or “serial”
BAS Unit identifier



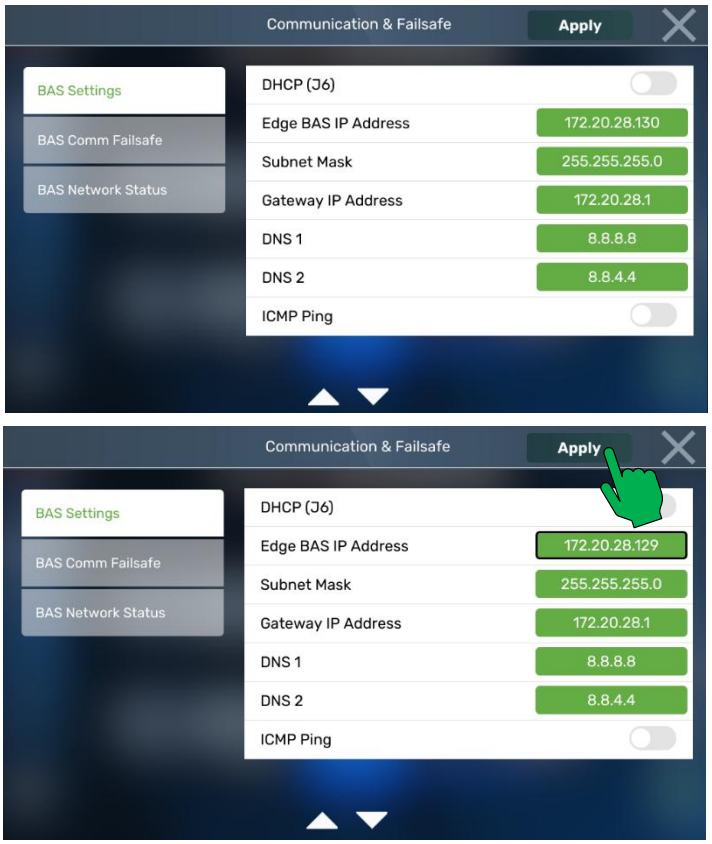
Offset for BACnet devices to avoid duplicates
UDP port number to broadcast ID and data
BAS network identifier
Delay before communication fault



Automatically assigns IP address
IP Address assigned to each network device
Unique hardware address
For testing network connectivity between devices



Security network-side authentication
Manual entry for trusted BAS server IP address



Auto-assign IP; if OFF, manual entry required

Automatically assigns IP address: when this is OFF, manual entry is required to set up IP connection.

Address assigned to this network device

Divides IP address by network/host portion

Routes traffic from local network to external

DNS 1 Main server that holds and updates

DNS 2 secondary, functions as a backup

NOTE: When these fields are changed **manually,** the Apply button will change from green font color to white font color and there will be a black box around it.

Apply Apply

Pressing white Apply button will restore it to green.

NOTE: This button is only used on this screen.

Figure 3-2: BACnet IP Settings

Troubleshooting tip: If ethernet is connected, DHCP is on, and IP address is not found or shows "N/A," reconnect ethernet cable and see if an IP address is assigned. If one is still not assigned, power cycle the unit with the ethernet cable plugged in.

3.2 BAS Configuration: BACnet MSTP

The BACnet MSTP screen maintains the BAS configuration from Section 3.1 but with only **Baud Rate** selection required as MSTP-specific configuration. All other parameters involved are described in the previous section. Wiring should be carried out per the description in Section 2.

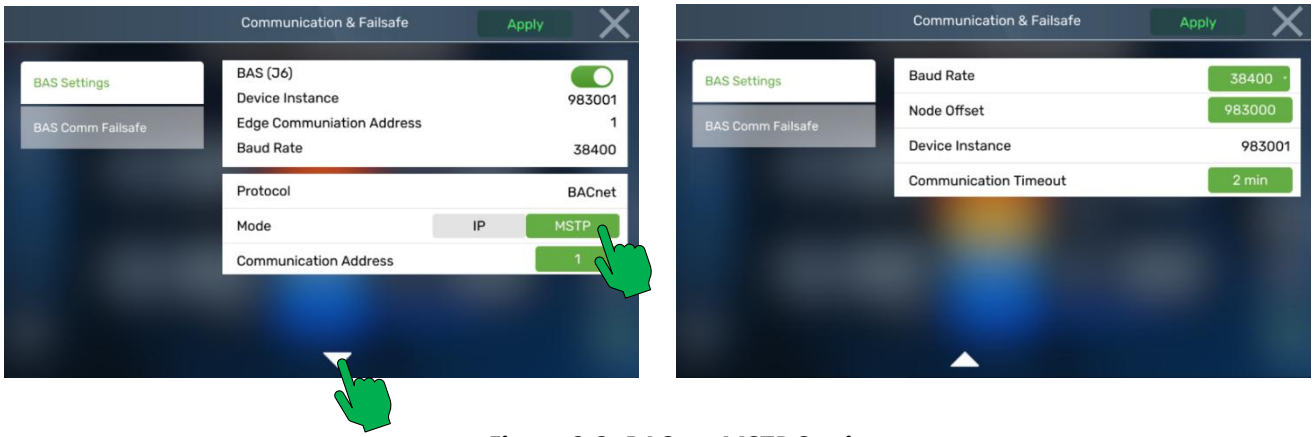


Figure 3-3: BACnet MSTP Settings

4. BACNET PICS STATEMENT

Date: October 2024
BACnet Vendor Name: AERCO International Inc
BACnet Vendor ID: 983
Product Name: Edge X, BMK E and BMK NX
Product Model Number: BMK E (size in kW): 216, 360, 432, 576, 684; BMK NX (size in MBH): 399, 500
Application Software Version: 1.0

BACnet Protocol Revision: 19

Product Description: The Edge X 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:

☒ Secure Device – Able to communicate with specific MAC and IP BAS system

APPENDIX A - BACNET OBJECTS LIST

A technician-level password is required for access to BAS communication points. BACnet communication objects are in the following sections below:

BMK E

- TABLE A-1.1: BACnet Objects – Standalone or BST Client Units, Read/Write
- TABLE A-1.2: BACnet Objects – Standalone or BST Client Units, Read Only
- TABLE A-1.3: BACnet Objects – BST Manager Unit, Read/Write
- TABLE A-1.4: BACnet Objects – BST Manager Unit, Read Only
- TABLE A-1.5: BACnet Objects – BST Client Info Thru Manager, Read Only

BMK NX

- TABLE A-2.1: BACnet Objects – Standalone or BST Client Units, Read/Write
- TABLE A-2.2: BACnet Objects – Standalone or BST Client Units, Read Only
- TABLE A-2.3: BACnet Objects – BST Manager Unit, Read/Write
- TABLE A-2.4: BACnet Objects – BST Manager Unit, Read Only
- TABLE A-2.5: BACnet Objects – BST Client Info Thru Manager, Read Only

A-1 BMK E BACnet Objects List

TABLE A-1.1: BACnet Objects – Standalone or BST Client Units, Read/Write

TABLE A-1.1: BACnet Objects – Standalone or BST Client Units, Read/Write [Object Type = AV]					
BACnet ID	BAS Object Name	BMK E		BMK	
		Min	Max	Min	Max
2	BAS Password	0 1 2 3 4 5			
4	Setpoint	40F	220F	20F	245F
5	Language	0 = English		0 = English, 1 = Spanish, 2 = French	
6	Time	NA		12.00am	11.59pm
7	Date	NA		0/0/0	12/31/9999
8	Unit of Measurement BAS	English	Metric	English	Metric
9	Cascade Baud Rate	0 = 9600, 1 = 19200, 2 = 38400, 3 = 57600, 4 = 115200		0 = 9600, 1 = 19200, 2 = 38400, 3 = 57600, 4 = 76800, 5 = 115200	
10	Unit Type	NA		0 = KC Boiler, 1 = KC Boiler LN, 2 = BMK Boiler Std, 3 = BMK Blr Std Dual, 4 = BMK Boiler LN, 5 = BMK Blr LN Dual, 6 = KC Water Heater, 7 = KC Water Heater LN, 8 = Innovation, 9 = Innovation N	
11	Unit Size	NA		0 = SPARE, 1 = 600 MBH, 2 = 800 MBH, 3 = 1060 MBH, 4 = 1350 MBH, 5 = 500 MBH, 6 = 750 MBH, 7 = 1000 MBH, 8 = 1.5 MBTU, 9 = 1500 MBH, 10 = 2.0 MBTU, 11 = 2000 MBH, 12 = 2500 MBH, 13 = 3.0 MBTU, 14 = 3000 MBH,	

TABLE A-1.1: BACnet Objects – Standalone or BST Client Units, Read/Write [Object Type = AV]					
BACnet ID	**BAS Object Name**	**BMK E**		**BMK**	
		Min	**Max**	**Min**	**Max**
				15 = 4000 MBH, 16 = 5000 MBH, 17 = 6000 MBH	
12	Operating Mode	0 = Constant Setpt, 1 = Rmt Setpt, 2 = Outdoor Reset		0 = Constant Setpt, 1 = Remote Setpt, 2 = Direct Drive, 3 = Combination, 4 = Outdoor Reset	
13	Remote Signal	0 = BAS, 1 = Analog Input		0 = 4-20mA/1-5V, 1 = 0-20mA/0-5V, 2 = Network, 3 = BAS, 4 = BST (PWM) Input	
16	For BMK E:Outdoor Sensor On/Off For BMK: Outdoor Sensor	Disable	Enable	Disable	Enable
17	For BMK E: Warm Weather Standby Temperature For BMK: Warm Weather Shtdwn	30F	120F	30F	120F
18	For BMK E: SH Temperature Control Setpoint Low Limit For BMK: Setpoint Low Limit	40F	220F	40F	245F
19	For BMK E: SH Temperature Control Setpoint Hi Limit For BMK: Setpoint High Limit	40F	220F	20F	220F
20	Temperature High Limit	40F	230F	40F	210F
23	For BMK E: Interlocks Aux Delay 2 For BMK: Auxiliary Delay	10secs	240secs	0	240
24	Unit Failsafe Mode	0 = Standby, 1 = Constant Setpt		0 = Shutdown, 1 = Constant Setpt	
26	Proportional Band	1F	120F	1F	120F
27	Integral Band	0	2	0	2
28	Derivative Band	NA		0	2min
70	BAS	NA		0 = Off, 1 = BACnet MSTP, 2 = BACnet IP, 3 = Modbus RTU, 4 = Modbus TCP	
71	BAS Baud Rate	NA		0 = 9600, 1 = 19200, 2 = 38400, 3 = 57600	
81	For BMK E: Outdoor Air Temp Sensor For BMK: Outdoor Temp Source	Direct		0 = Network, 1 = Direct, 2 = BAS	
83	PLM Enabled	0=Disable	1=Enable	NA	
84	PLM Power Limit	0%	100%	NA	
85	Supply Header Temp Source	0 = OFF, 1 = Direct, 2 = BAS		NA	

TABLE A-1.2: BACnet Objects – Standalone or BST Client Units, Read Only

TABLE A-1.2: BACnet Objects – Standalone or BST Client Units, Read Only [Object Type = AI]					
BACnet ID	**BAS Object Name**	**BMK E**		**BMK**	
		Min	**Max**	**Min**	**Max**
0	For BMK E: Active Event ID For BMK: Message Code	0	9999	0	9999
1	Unit Status	0 = Disabled, 1 = Standby, 2 = Manual Mode, 3 = Automatic Mode, 5 = Fault, 6 = Unit in Demand Delay, 7 = Unit Starting		0 = Disabled, 1 = Standby, 2 = Manual, 3 = Remote, 4 = Auto, 5 = Fault	
2	Outlet Temp	-40F	250F	0F	250F
3	Inlet Temp	-40F	250F	0F	250F
5	For BMK E: Outdoor Air Temp For BMK: Outside Temp	-70F	250F	-70F	130F
11	Run Cycles	0	999,999,999	0	999,999,999
13	Run Hours	0	999,999,999	0	999,999,999
16	Active Setpoint Temp	40F	220F	0F	250F
17	PID Output	NA		0	100
19	BAS Communication Address	0	16	0	255
45	For BMK E: Valve Control Mode For BMK: Control Mode	0 = On/Off		0 = On/Off, 1 = Linear Modulation, 2 = Delta T Modulation	
46	Isolation Feedback Mode	Disable	Enable	Disable	Enable
47	For BMK E: Minimum Signal Level For BMK: Open Vlv Control Signal	0V 0mA	10V 20mA	0 = 0mA, 1 = 4mA, 2 = 20mA	
48	For BMK E: Maximum Signal Level For BMK: Close Vlv Control Signal	0V 0mA	10V 20mA	0 = 0mA, 1 = 4mA, 2 = 20mA	
148	For BMK E: Serial Alpha For BMK: Unit Alpha	0 = E, 1 = G, 2 = H, 3 = R, 4 = N, 5 = A, 6 = Z		0 = E, 1 = G, 2 = H, 3 = R, 4 = N, 5 = A	
149	For BMK E: Serial Year For BMK: Unit Year	0	99	0	99
150	For BMK E: Serial Number For BMK: Unit Serial #	0	99999	0	9999
152	Unit Mode	0 = Standalone, 1 = Cascade		0=OFF(Standalone), 1=Client (Cascade), 2=Manager (Cascade)	
153	Unit Size	0 = 216kW, 1 = 360kW, 2 = 432kW, 3 = 576kW, 4 = 684kW		NA	

154	Unit Type	0 = KC Boiler, 1 = KC Boiler LN, 2 = BMK Boiler Std, 3 = BMK Blr Std Dual, 4 = BMK Boiler LN, 5 = BMK Blr LN Dual, 6 = BMK Inlet Natural Gas, 7 = BMK Inlet Dual Fuel, 8 = BMK Dual Inlet NGas, 9 = BMK Dual Inlet Dual Fuel, 10 = SmartPlate, 11 = Benchmark E, 12 = Other		NA
155	BAS Enable	0 = Off, 1 = BACnet MSTP, 2 = BACnet IP		NA
156	BAS Baud Rate	0 = 9600, 1 = 19200, 2 = 38400, 4 = 115200		NA
157	Power Output	0%	100%	NA
158	Header Temp	0F	250F	NA

TABLE A-1.3: BACnet Objects – BST Manager Unit, Read/Write

TABLE A-2.1: BACnet Objects – BST Manager Unit, Read/Write [Object Type = AV]			
BACnet ID	**BAS Object Name**	**BMK E**	
		Min	**Max**
200	Setpoint	40F	220F
201	Setback Setpoint	40F	220F
202	Setback Start Time	12.00am	11.59pm
203	Setback Stop Time	12.00am	11.59pm
204	SH Temperature Control Setback Schedule	Disable	Enable
213	Supply Header Temp Source	0 = OFF, 1 = Direct, 2 = BAS	
215	Rtn Hdr Temp Sensor	0 = OFF, 1 = Direct, 2 = BAS	
217	Outdoor Air Temp Sens	Direct	
219	BACnet Communication Protocol	0 = BACnet IP, 1 = BACnet MSTP	0 = OFF, 1 = BACnet MSTP, 2 = BACnet IP
230	PLM Enabled	0=Disable	1=Enable
231	PLM Power Limit	0%	100%

TABLE A-1.4: BACnet Objects – BST Manager Unit, Read Only

TABLE A-2.1: BACnet Objects – BST Manager Unit, Read Only [Object Type = AI]			
BACnet ID	**BAS Object Name**	**BMK E**	
		Min	**Max**
100	Unit Role	0 = BST Manager, 1 = BST Client	
101	Setpoint	40F	220F
102	Setback Setpoint	40F	220F
103	Setback Start Time	12.00am	11.59pm
104	Setback Stop Time	12.00am	11.59pm

TABLE A-2.1: BACnet Objects – BST Manager Unit, Read Only [Object Type = AI]			
BACnet ID	**BAS Object Name**	**BMK E**	
		Min	**Max**
106	For BMK E: Average Outlet Temp For BMK: Outlet Temp	-40F	250F
107	Units Available	0	16
108	Units Faulted	0	16
109	BAS Communication Address	0	16
110	Header Temp	0F	250F
111	Outdoor Air Temperature	-70F	250F
112	Average Power Output	0%	100%
113	Units Active	0	16
114	Active Setpoint	40F	220F
115	Gas Next On Threshold	25%	95%
116	SH Temperature Control Setpoint Hi Limit	40F	220F
117	SH Temperature Control Setpoint Low Limit	40F	220F
118	Temperature High Limit	40F	230F
119	Operating Mode	0 = Constant Setpoint, 1 = Rmt Setpt, 2 = Outdoor Air Reset	
120	Next Off Valve Pos Gas	25%	49%
122	Casc Next On Valve Pos Elec	9%	95%
123	Power Output	0%	100%
124	Next Off Valve Pos Elec	2%	49%
126	BAS Baud Rate	0 = 9600, 1 = 19200, 2 = 38400, 3 = 57600, 4 = 115200	

TABLE A-1.5: BACnet Objects – BST Client Info Thru Manager, Read Only

BAS BACnet objects list for each cascade unit (manager and client) is same, except for the BACnet ID. This applies to BMK E and BMK units. The BACnet ID range is listed below for all 16 units in the Cascade:

Cascade	BACnet ID Range	
Unit Address	Unit Role	Unit BACnet IDs
1	Client	300-320
2	Manager	400-420
3	Client	500-520
4	Client	600-620
5	Client	700-720
6	Client	800-820
7	Client	900-920
8	Client	1000-1020
9	Client	1100-1120
10	Client	1200-1220
11	Client	1300-1320
12	Client	1400-1420
13	Client	1500-1520
14	Client	1600-1620
15	Client	1700-1720
16	Client	1800-1820

TABLE A-3: BACnet Objects – BST Client Info Thru Manager, Read Only [Object Type = AI]					
BACnet IDs	BAS Object Name	BMK E		BMK	
		Min	Max	Min	Max
300, 400, 500, … 1800	For BMK E: Cascade Unit Address For BMK: Communication Address	0	16	0	255
301, 401, 501, … 1801	For BMK E: Casc Idx Cascade Client State For BMK: Unit Status	0 = Disabled, 1 = Standby, 2 = Manual Mode, 3 = Automatic Mode, 4 = Unit Fault, 5 = Unit In Demand Delay, 6 = Unit Starting, 8 = Comm Error		0 = Disabled, 1 = Standby, 2 = Manual, 3 = Remote, 4 = Auto, 5 = Fault	
302, 402, 502, … 1802	For BMK E: Active Event ID For BMK: Fault Code	0	9999	0	9999
303, 403, 503, … 1803	Outlet Temp	-40F	250F	0	250F
305, 405, 505, … 1805	Inlet Temp	-40F	250F	0	250F
306, 406, 506, … 1806	Exhaust Temp	NA		50F	450F
307, 407, 507, … 1807	Inlet Air Temp	NA		-70F	130F
308, 408, 508, … 1808	Flame Strength	NA		0%	100%

TABLE A-3: BACnet Objects – BST Client Info Thru Manager, Read Only [Object Type = AI]					
BACnet IDs	BAS Object Name	BMK E		BMK	
		Min	Max	Min	Max
309, 409, 509, … 1809	Fire Rate In	NA		0%	100%
310, 410, 510, … 1810	Fire Rate Out	NA		0%	100%
311, 411, 511, … 1811	Unit Type	0 = KC Boiler, 1 = KC Boiler LN, 2 = BMK Boiler Std, 3 = BMK Blr Std Dual, 4 = BMK Boiler LN, 5 = BMK Blr LN Dual, 6 = BMK SInlet Natural Gas, 7 = BMK SInlet Dual Fuel, 8 = BMK Dual Inlet NGas, 9 = BMK Dual Inlet Dual Fuel, 10 = SmartPlate, 11 = Benchmark E, 12 = Other		0 = KC Boiler, 1 = KC Boiler LN, 2 = BMK Boiler Std, 3 = BMK Blr Std Dual, 4 = BMK Boiler LN, 5 = BMK Blr LN Dual, 6 = KC Water Heater, 7 = KC Water Heater LN, 8 = Innovation, 9 = Innovation N	
312, 412, 512, … 1812	Unit Size	0 = 216kW, 1 = 360kW, 2 = 432kW, 3 = 576kW, 4 = 684kW		0 = SPARE, 1 = 600 MBH, 2 = 800 MBH, 3 = 1060 MBH, 4 = 1350 MBH, 5 = 500 MBH, 6 = 750 MBH, 7 = 1000 MBH, 8 = 1.5 MBTU, 9 = 1500 MBH, 10 = 2.0 MBTU, 11 = 2000 MBH, 12 = 2500 MBH, 13 = 3.0 MBTU, 14 = 3000 MBH, 15 = 4000 MBH, 16 = 5000 MBH, 17 = 6000 MBH	
313, 413, 513, … 1813	Valve Status	0 = Off, 1 = Closed, 2 = Open, 4 = Closing, 5 = Opening, 6 = Failed to Close, 7 = Failed to Open, 8 = Defaulted Closed		Close	Open
314, 414, 514, … 1814	Plant Setpoint	40F	220F	0	9999
315, 415, 515, … 1815	For BMK E: Run Cycles For BMK: Run Cycle Upper	0	999,999,999	0	999,999,999
316, 416, 516, … 1816	Run Cycle Lower	NA		0	999,999,999
317, 417, 517, … 1817	Run Hours	0	999,999,999	NA	
319, 419, 519, … 1819	Oxygen Level	NA		0%	24%

TABLE A-3: BACnet Objects – BST Client Info Thru Manager, Read Only [Object Type = AI]					
BACnet IDs	BAS Object Name	BMK E		BMK	
		Min	Max	Min	Max
320, 420, 520, … 1820	Power Output	0%	100%	NA	

A-2 BMK NX BACnet Objects List

TABLE A-2.1: BACnet Objects – Standalone or BST Client Units, Read/Write

TABLE A-1.1: BACnet Objects – Standalone or BST Client Units, Read/Write [Object Type = AV]			
BACnet ID	**BAS Object Name**	**BMK NX**	
		Min	**Max**
4	Setpoint	70F	180F
5	Language	0 = English	
8	Unit of Measurement BAS	English	Metric
9	Cascade Baud Rate	0 = 9600, 1 = 19200, 2 = 38400, 3 = 57600, 4 = 115200	
12	Operating Mode	0 = Constant Setpt, 1 = Rmt Setpt, 3 = Outdoor Reset	
13	Remote Signal	0 = BAS, 1 = Analog Input	
16	Outdoor Sensor	Disable	Enable
17	Warm Weather Shtdwn	30F	120F
18	Setpoint Low Limit	70F	180F
19	Setpoint High Limit	70F	180F
22	Pump Off Delay	0secs	600secs
23	Auxiliary Delay	10secs	240secs
24	Unit Failsafe Mode	0 = Standby, 1 = Constant Setpt	
49	On Delay	0secs	600secs

TABLE A-2.2: BACnet Objects – Standalone or BST Client Units, Read Only

TABLE A-1.2: BACnet Objects – Standalone or BST Client Units, Read Only [Object Type = AI]			
BACnet ID	**BAS Object Name**	**BMK NX**	
		Min	**Max**
0	Active Event ID	0	9999
1	Unit Status	0. Unit Disabled 1. Standby 2. Manual Mode 3. Purging 4. Ignition Trial 5. Flame Proven 6. Unit Post-Purging 7. Unit Faulted 8. Unit in Demand Delay 9. Unit Starting	
2	Outlet Temp	-40F	250F
3	Inlet Temp	-40F	250F
5	Outdoor Air Temp	-70F	250F
6	Exhaust	50F	450F
11	Run Cycles	0	999,999,999
13	Run Hours	0	999,999,999
15	Flame Strength	1	10
16	Active Setpoint Temp	70F	180F
19	BAS Communication Address	0	16
45	Valve Control Mode	0 = On/Off	
46	Isolation Feedback Mode	Disable	Enable
49	Blower Speed	0	65536
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
151	Fuel Type	0=Natural Gas	1=Propane
152	Unit Mode	0 = Standalone, 1 = Cascade	
153	Unit Size	0 = 399, 1 = 500	
154	Unit Type	0 = KC Boiler, 1 = KC Boiler LN, 2 = BMK Boiler Std, 3 = BMK Blr Std Dual, 4 = BMK Boiler LN, 5 = BMK Blr LN Dual, 6 = BMK Inlet Natural Gas, 7 = BMK Inlet Dual Fuel, 8 = BMK Dual Inlet NGas, 9 = BMK Dual Inlet Dual Fuel, 10 = SmartPlate, 11 = Benchmark E, 12 = Other, **13=Benchmark NX**	
155	BAS	0=Off, 1=BACnet MSTP, 2=BACnet IP	
156	Baud Rate	0=9600, 1=19200, 2=38400, 3=115200	

TABLE A-2.3: BACnet Objects – BST Manager Unit, Read/Write

TABLE A-2.1: BACnet Objects – BST Manager Unit, Read/Write [Object Type = AV]			
BACnet ID	**BAS Object Name**	**BMK NX**	
		Min	**Max**
200	Setpoint	70F	180F
201	Setback Setpoint	70F	180F
202	Setback Start Time	12.00am	11.59pm
203	Setback Stop Time	12.00am	11.59pm
204	SH Temperature Control Setback Schedule	Disable	Enable
213	Supply Header Temp Source	0 = OFF, 1 = Direct, 2 = BAS	
215	Rtn Hdr Temp Sensor	0 = OFF, 1 = Direct, 2 = BAS	
217	Outdoor Air Temp Sens	Direct	
219	BACnet Communication Protocol	0 = OFF, 1 = BACnet MSTP, 2 = BACnet IP	

TABLE A-2.4: BACnet Objects – BST Manager Unit, Read Only

TABLE A-2.1: BACnet Objects – BST Manager Unit, Read Only [Object Type = AI]			
BACnet ID	**BAS Object Name**	**BMK NX**	
		Min	**Max**
100	Unit Role	0 = BST Manager, 1 = BST Client	
101	Setpoint	70F	180F
102	Setback Setpoint	70F	180F
103	Setback Start Time	12.00am	11.59pm
104	Setback Stop Time	12.00am	11.59pm
106	Average Outlet Temp	-40F	250F
107	Units Available	0	16
108	Units Faulted	0	16
109	BAS Communication Address	0	16
110	Header Temp	0F	250F
111	Outdoor Air Temperature	-70F	250F
112	BST Fire Rate	0%	100%
113	Units Active	0	16
114	Active Setpoint	70F	180F
116	SH Temperature Control Setpoint Hi Limit	70F	180F
117	SH Temperature Control Setpoint Low Limit	70F	180F
119	Operating Mode	0 = Constant Setpoint, 1 = Rmt Setpt, 2 = Outdoor Air Reset	
126	BAS Baud Rate	0 = 9600, 1 = 19200, 2 = 38400, 3 = 57600, 4 = 115200	

TABLE A-5: BACnet Objects – BST Client Info Thru Manager, Read Only

BAS BACnet objects list for each cascade unit (manager and client) is same, except for the BACnet ID. This applies to all models of BMK NX. The BACnet ID range is listed below for all 16 units in the Cascade:

Cascade	BACnet ID Range	
Unit Address	Unit Role	Unit BACnet IDs
1	Client	300-320
2	Manager	400-420
3	Client	500-520
4	Client	600-620
5	Client	700-720
6	Client	800-820
7	Client	900-920
8	Client	1000-1020
9	Client	1100-1120
10	Client	1200-1220
11	Client	1300-1320
12	Client	1400-1420
13	Client	1500-1520
14	Client	1600-1620
15	Client	1700-1720
16	Client	1800-1820

TABLE A-3: BACnet Objects – BST Client Info Thru Manager, Read Only [Object Type = AI]			
BACnet IDs	BAS Object Name	BMK NX	
		Min	Max
300, 400, 500, … 1800	Cascade Unit Address	0	16
301, 401, 501, … 1801	Client State	0. Unit Disabled 1. Standby 2. Manual Mode 3. Purging 4. Ignition Trial 5. Flame Proven 6. Unit Post-Purging 7. Unit Faulted 8. Unit in Demand Delay 9. Unit Starting	
302, 402, 502, … 1802	Active Event ID	0	9999
303, 403, 503, … 1803	Outlet Temp	-40F	250F
305, 405, 505, … 1805	Inlet Temp	-40F	250F
306, 406, 506, … 1806	Exhaust Temp	0F	250F
308, 408, 508, … 1808	Flame Strength	0%	100%
310, 410, 510, … 1810	Fire Rate Out	0%	100%

TABLE A-3: BACnet Objects – BST Client Info Thru Manager, Read Only [Object Type = AI]			
BACnet IDs	**BAS Object Name**	**BMK NX**	
		Min	**Max**
311, 411, 511, … 1811	Unit Type	0 = KC Boiler, 1 = KC Boiler LN, 2 = BMK Boiler Std, 3 = BMK Blr Std Dual, 4 = BMK Boiler LN, 5 = BMK Blr LN Dual, 6 = BMK Inlet Natural Gas, 7 = BMK Inlet Dual Fuel, 8 = BMK Dual Inlet NGas, 9 = BMK Dual Inlet Dual Fuel, 10 = SmartPlate, 11 = Benchmark E, 12 = Other, **13=Benchmark NX**	
312, 412, 512, … 1812	Unit Size	0 = 399, 1 = 500	
313, 413, 513, … 1813	Valve Status	0 = Off, 1 = Closed, 2 = Open, 4 = Closing, 5 = Opening, 6 = Failed to Close, 7 = Failed to Open, 8 = Defaulted Closed	
314, 414, 514, … 1814	Plant Setpoint	70F	180F
315, 415, 515, … 1815	Run Cycles	0	999,999,999
317, 417, 517, … 1817	Run Hours	0	999,999,999

APPENDIX B – EDGE X STATE LIST

B-1: State List – BMK E

Applicable to	State	Description
BMK E & BMK	Unit Disabled	Edge controller **Enable/Disabled** switch is set to Disabled position.
BMK E & BMK	Standby	Displayed when: 1- Enable/Disable switch on Edge controller is in Enable position, but there is no demand for heat. 2- When unit is in failsafe 3- When Warm Weather Shutdown is enabled and Warm Weather Shutdown condition is satisfied
BMK E & BMK	Unit In Demand Delay	Demand delay timer is active. This timer represents the time allocated for isolation valve to open and make the remote interlock contact.
BMK	Purging	Displayed during the purge cycle during startup. The duration of the purge cycle counts up in seconds.
BMK	Ignition Trial	Displayed during ignition trial of startup sequence. The duration of cycle counts up in seconds.
BMK	Flame Proven	Displayed after flame has been detected for 2 seconds. Initially, the flame strength is shown in %. After 5 seconds has elapsed, the time and date are shown in place of flame strength.
BMK	Wait Ignition Retry	Retrial for ignition.
BMK	Wait Fault Purge	Fault while purging.
BMK	Wait Retry Pause	Pause before retrial for ignition.
BMK	Ignition Monitor	Waiting for proof of ignition.
BMK	Pre Ignition	Waiting for SSOV to prove open.
BMK	Cleaning Igniter	Ignition transformer is energized with SSOV closed.
BMK	Auto Diagnostic Mode ACTIVE	Informational message.
BMK	Auto Diagnostic Mode COMPLETED	Informational message.
BMK	Auto Diagnostic Mode ABORTED	Informational message.
BMK	O2 Cal Purge	O2 Purge in progress.
BMK	Auto Calibration In Progress	Auto Calibration in progress.
BMK	O2 Warning Service Required	O2 service is required.
BMK E & BMK	Fault	Unit has an active latching or non-latching fault
BMK E	Automatic Mode	Unit is running normally
BMK E	Manual Mode	Unit is being operated in Manual mode
BMK E & BMK	Starting	BMK E: Displayed during the initial power up only. BMK: Displayed for 2 minutes during the initial warm-up only for BMK.
BMK E	Meeting Demand	Displayed under Plant Dashboard when the plant is running towards meeting the demand
BMK E	Plant Failsafe Activated	Displayed when Manager loses contact with the external setpoint source.

B-2: State List – BMK NX

Applies to BMK NX standalone units and BMK NX-only cascades.

Applicable to	State	Description
BMK NX	Unit Disabled	Edge controller **Enable/Disabled** switch is set to Disabled position.
BMK NX	Standby	Displayed when: 4- Enable/Disable switch on Edge controller is in Enable position, but there is no demand for heat. 5- When unit is in failsafe 6- When Warm Weather Shutdown is enabled and Warm Weather Shutdown condition is satisfied
BMK NX	Unit In Demand Delay	Demand delay timer is active. This timer represents the time allocated for isolation valve to open and make the remote interlock contact.
BMK NX	Purging	Displayed during the purge cycle during startup. The duration of the purge cycle counts up in seconds.
BMK NX	Unit Post-Purging	Displayed during the post-purge cycle.
BMK NX	Ignition Trial	Displayed during ignition trial of startup sequence. The duration of cycle counts up in seconds.
BMK NX	Flame Proven	Displayed after flame has been detected for 2 seconds. Initially, the flame strength is shown in %. After 5 seconds has elapsed, the time and date are shown in place of flame strength.
BMK NX	Unit Fault	Unit has an active latching or non-latching fault
BMK NX	Manual Mode	Unit is being operated in Manual mode
BMK NX	Unit Starting	Displayed during the initial fire up only.
BMK NX	Meeting Demand	Displayed under Plant Dashboard when the plant is running towards meeting the demand
BMK NX	Plant Failsafe Activated	Displayed when Manager loses contact with the external setpoint source.

APPENDIX C – EDGE X ALERT LIST

The Edge X controller provides following three types of alerts:

Warning – indicates a potential problem that requires attention or inspection by a trained technician to prevent further damage, major breakdowns, or safety hazards.

Fault Non-Latching – indicates a condition that causes the unit to automatically reset and attempt a restart once the fault condition has cleared. Does not require a manual reset.

Fault Latching – This feature requires a manual reset even after the initial fault condition is cleared. Unlike a non-latching fault, a latched fault prevents unit operation to ensure the safety concern is addressed first.

These alert codes will be communicated from Edge X controller to BAS. For standalone unit, see BACnet Object ID 0. And for cascade unit, see BACnet Object IDs 302-1802.

NOTE 1: Table below shows the mode (Standalone) and role (Manager & Client) that is able to publish the alert.
NOTE 2: All Manager and Client alerts are displayed on the Manager Event History page (latest 200 records only).

C-1: Alert List – BMK E

CODE #	ALERT TYPE	ALERT MESSAGE	STANDALONE BMK E	MANAGER BMK E	CLIENT	
					BMK E	BMK
8	Fault Latching	High Temp Limit Control Open	Yes	Yes	Yes	Yes
9	Fault Latching	Primary Low Water Level	Yes	Yes	Yes	Yes
10	Fault Latching	Low Gas Pressure Fault	-	-	-	Yes
11	Fault Latching	High Gas Pressure Fault	-	-	-	Yes
12	Warning	Remote Interlock Open	Yes	Yes	Yes	Yes
13	Fault Latching	Delayed Interlock Open	Yes	Yes	Yes	Yes
14	Fault Latching	Airflow Fault During Purge	-	-	-	Yes
15	Fault Latching	SSOV Fault During Purge	-	-	-	Yes
16	Fault Latching	Prg Switch Open During Purge	-	-	-	Yes
17	Fault Latching	Ign Switch Open During Ignition	-	-	-	Yes
18	Fault Non-Latching	Airflow Fault During Ign	-	-	-	Yes
19	Fault Latching	Airflow Fault During Run	-	-	-	Yes
20	Fault Latching	SSOV Fault During Ignition	-	-	-	Yes
21	Fault Latching	SSOV Fault During Run	-	-	-	Yes
22	Fault Latching	Flame Loss During Ignition	-	-	-	Yes
23	Fault Latching	Flame Loss During Run	-	-	-	Yes
24	Fault Latching	High Exhaust Temp Switch	-	-	-	Yes
25	Fault Non-Latching	Loss of Power	-	-	-	Yes
28	Fault Non-Latching	High O2 Level	-	-	-	Yes
29	Fault Non-Latching	Low O2 Level	-	-	-	Yes
31	Fault Latching	SSOV Relay Failure	-	-	-	Yes
32	Fault Latching	Residual Flame	-	-	-	Yes
33	Fault Latching	Heat Demand Failure	-	-	-	Yes
34	Fault Latching	Ign Switch Closed During Purge	-	-	-	Yes
35	Fault Latching	Prg Switch Closed During Ign	-	-	-	Yes
36	Fault Latching	SSOV Switch Open	-	-	-	Yes
37	Fault Non-Latching	Ign Board Comm Fault	-	-	-	Yes

CODE #	ALERT TYPE	ALERT MESSAGE	STANDALONE BMK E	MANAGER BMK E	CLIENT	
					BMK E	BMK
40	Fault Non-Latching	Remote Setpt Signal Fault	-	-	-	Yes
40	Warning	Remote Setpt Signal Warning	Yes	Yes	-	-
42	Fault Non-Latching	Outlet Temp Sensor Fault	-	-	-	Yes
43	Fault Non-Latching	FFWD Temp Sensor Fault	-	-	-	Yes
44	Fault Non-Latching	High Water Temp Fault	Yes	Yes	Yes	Yes
45	Fault Latching	Line Voltage Out of Phase	-	-	-	Yes
46	Fault Latching	Stepper Motor Failure	-	-	-	Yes
47	Fault Non-Latching	Setpoint Limiting Active	-	-	-	Yes
48	Fault Non-Latching	Modbus Comm fault	-	-	-	Yes
48	Warning	BST Communication Loss	-	Yes	Yes	-
52	Warning	Exhaust Temp Sensor Short	-	-	-	Yes
53	Warning	Exhaust Temp Sensor Open	-	-	-	Yes
54	Warning	Warning Exhaust Temp High	-	-	-	Yes
55	Fault Latching	Exhaust Temp High	-	-	-	Yes
56	Warning	Inlet Temp Sensor Short	Yes	Yes	Yes	Yes
57	Warning	Inlet Temp Sensor Open	Yes	Yes	Yes	Yes
58	Warning	Inlet Temp High	Yes	Yes	Yes	Yes
59	Warning	Inlet Temp Low	Yes	Yes	Yes	Yes
60	Fault Non-Latching	Inlet Gas Press Sensor Open	-	-	-	Yes
61	Fault Non-Latching	Gas Plate Dp Sensor Open	-	-	-	Yes
62	Fault Non-Latching	O2 Percentage Low	-	-	-	Yes
63	Fault Non-Latching	O2 Sensor Malfunction	-	-	-	Yes
64	Warning	Warning O2 Level High	-	-	-	Yes
65	Fault Latching	Recirc Pump Failure	-	-	-	Yes
68	Fault Latching	Ignition Spark Fault	-	-	-	Yes
71	Fault Non-Latching	Too Many Cycles In 24 Hours	-	-	-	Yes
72	Fault Non-Latching	Too Many Ovrtemps In 24 Hours	-	-	-	Yes
73	Fault Non-Latching	Air Sensor Fault	-	-	-	Yes
88	Warning	Autocal Finished	-	-	-	Yes
89	Warning	O2 Sensor Out Of Range	-	-	-	Yes
91	Warning	Wait Sensor Warm-up	-	-	-	Yes
92	Fault Non-Latching	Air Pump Failed AERtrim Disabled	-	-	-	Yes
94	Warning	Isolation Valve Stuck Open	Yes	Yes	Yes	Yes
95	Fault Non-Latching	Isolation Valve Stuck Closed	Yes	Yes	Yes	Yes
99	Warning	Delta-T Activated	-	-	-	Yes
100	Warning	Delta-T Shutdown	-	-	-	Yes

CODE #	ALERT TYPE	ALERT MESSAGE	STANDALONE BMK E	MANAGER BMK E	CLIENT	
					BMK E	BMK
102	Warning	IO Board Comm Failed	-	-	-	Yes
106	Warning	BST Warm Weather Shutdown	-	-	-	Yes
107	Warning	Warm Weather Shutdown	Yes	Yes	Yes	-
112	Warning	System Return Sensor Short Warning	-	Yes	-	-
113	Warning	System Return Sensor Open Warning	-	Yes	-	-
300	Warning	OAT Sensor Open Circuit	Yes	Yes	-	-
301	Warning	OAT Sensor Short Circuit	Yes	Yes	-	-
302	Warning	OAT Sensor Not Set	Yes	Yes	-	-
303	Fault Non-Latching	High Cabinet Temperature	Yes	Yes	Yes	-
304	Fault, Non-Latching	Cabinet Temp Sensor Open	Yes	Yes	Yes	-
305	Fault, Non-Latching	Cabinet Temp Sensor Short	Yes	Yes	Yes	-
306	Fault, Non-Latching	Outlet Temp Sensor Short	Yes	Yes	Yes	-
307	Fault, Non-Latching	Outlet Temp Sensor Open	Yes	Yes	Yes	-
308	Fault Latching	Demand Relay Open	Yes	Yes	Yes	-
309	Warning	Enable/Disable Switch Open	Yes	Yes	Yes	-
310	Fault Non-Latching	OTLC Open	Yes	Yes	Yes	-
311	Warning	24VAC Safety String Invalid	Yes	Yes	Yes	-
312	Warning	Manual Run Enabled	Yes	Yes	Yes	-
313	Warning	Manual Run User Disabled	Yes	Yes	Yes	-
314	Warning	Manual Run Auto Disabled	Yes	Yes	Yes	-
315	Warning	Setback Schedule Enabled	Yes	Yes	-	-
318	Warning	Reserve Unit Enabled	Yes	Yes	-	-
319	Warning	Comm Failsafe Activated	Yes	-	Yes	Yes
320	Warning	SWT1 Sensor Short	-	Yes	-	-
321	Warning	SWT1 Sensor Not Set	-	Yes	-	-
322	Warning	SWT1 Sensor Open	-	Yes	-	-
323	Fault, Non-Latching	Valve/Pump Not Configured	-	Yes	Yes	-
324	Warning	Plant Failsafe Warning	-	Yes	-	-
325	Warning	Pri Pump FB Signal Lost	Yes	Yes	Yes	-
344	Warning	PLM Active via TS Priority	Yes	Yes	Yes	-
345	Warning	PLM Inactive via TS Priority	Yes	Yes	Yes	-
346	Warning	PLM Active via BAS Priority	Yes	Yes	Yes	-
347	Warning	PLM Inactive via BAS Priority	Yes	Yes	Yes	-
348	Warning	PLM Active via Analog Input Priority	Yes	Yes	Yes	-
349	Warning	PLM Inactive via Analog Input Priority	Yes	Yes	Yes	-
355	Warning	Remote Setpt AI Unassigned	Yes	Yes	-	-
900	Fault Latching	Secondary Low Water Level	Yes	Yes	Yes	-
901	Fault Latching	Cabinet Door Open	Yes	Yes	Yes	-

C-2: Alert List – BMK NX

CODE #	ALERT TYPE	ALERT MESSAGE	STANDALONE BMK NX	MANAGER BMK NX	CLIENT BMK NX
8	Fault Latching	High Temp Limit Control Open	Yes	Yes	Yes
9	Fault Latching	Primary Low Water Level	Yes	Yes	Yes
12	Warning	Remote Interlock Open	Yes	Yes	Yes
13	Fault Latching	Delayed Interlock Open	Yes	Yes	Yes
22	Fault Latching	Flame Loss During Ignition	Yes	Yes	Yes
23	Fault Latching	Flame Loss During Run	Yes	Yes	Yes
25	Fault Non-Latching	Loss of Power	Yes	Yes	Yes
32	Fault Latching	Residual Flame	Yes	Yes	Yes
40	Fault Non-Latching	Remote Setpt Signal Fault	Yes	Yes	-
42	Fault Non-Latching	Outlet Temp Sensor Fault	Yes	Yes	Yes
48	Fault Non-Latching	BST Comm Loss	-	Yes	Yes
52	Warning	Exhaust Temp Sensor Short	Yes	Yes	Yes
55	Fault Latching	Exhaust Temp High	Yes	Yes	Yes
56	Warning	Inlet Temp Sensor Short	Yes	Yes	Yes
94	Warning	Isolation Valve Stuck Open	Yes	Yes	Yes
95	Fault Non-Latching	Isolation Valve Stuck Closed	Yes	Yes	Yes
99	Warning	Delta-T Activated	Yes	Yes	Yes
105	Warning	No BAS Communication	Yes	Yes	Yes
107	Warning	Warm Weather Shutdown	Yes	Yes	-
112	Warning	RWT1 Sensor Short	Yes	Yes	-
113	Warning	RWT1 Sensor Open	Yes	Yes	-
300	Warning	OAT Sensor Open	Yes	Yes	-
301	Warning	OAT Sensor Short	Yes	Yes	-
302	Warning	OAT Sensor Not Set	Yes	Yes	-
306	Fault, Non-Latching	Outlet Temp Sensor Short	Yes	Yes	Yes
307	Fault, Non-Latching	Outlet Temp Sensor Open	Yes	Yes	Yes
308	Fault Latching	Demand Relay Open	Yes	Yes	Yes
309	Warning	Enable/Disable Switch Open	Yes	Yes	Yes
312	Warning	Manual Run Enabled	Yes	Yes	Yes
313	Warning	Manual Run User Disabled	Yes	Yes	Yes
315	Warning	Setback Schedule Enabled	Yes	Yes	-
318	Warning	Reserve Unit Enabled	Yes	Yes	-
319	Warning	Comm Failsafe Activated	Yes	-	Yes
320	Warning	SWT1 Sensor Short	Yes	Yes	-
321	Warning	SWT1 Sensor Not Set	Yes	Yes	-
322	Warning	SWT1 Sensor Open	Yes	Yes	-
323	Fault, Non-Latching	Valve/Pump Not Set	Yes	Yes	Yes
324	Warning	Plant Failsafe Activated	-	Yes	-
325	Warning	Pri Pump FB Signal Lost	Yes	Yes	Yes
334	Fault, Non-Latching	Freeze Protection Emergency	Yes	Yes	Yes
335	Warning	Freeze Protection Auto Disabled	Yes	Yes	Yes
336	Warning	Freeze Protection Flow Enabled	Yes	Yes	Yes
337	Warning	Freeze Protection Unit On	Yes	Yes	Yes
338	Warning	Reserve Unit On	Yes	Yes	-
342	Warning	Adj Stpt Reached Stpt Hi Lmt	Yes	Yes	Yes
343	Warning	Adj Stpt Reached Stpt Low Lmt	Yes	Yes	Yes

CODE #	ALERT TYPE	ALERT MESSAGE	STANDALONE BMK NX	MANAGER BMK NX	CLIENT BMK NX
379	Fault, Non-Latching	Blocked Condensate[1]	Yes	Yes	Yes
9988	Fault, Non-Latching	BTC II Communication Timeout	Yes	Yes	Yes
9990	Fault Latching	LGP/HGP/HIGH TEMP	Yes	Yes	Yes
9991	Fault, Non-Latching	EEROM	Yes	Yes	Yes
9992	Fault, Non-Latching	BLOWER SPEED BELOW MINIMUM	Yes	Yes	Yes
9993	Fault, Non-Latching	PIM INTERNAL FAILURE	Yes	Yes	Yes
9994	Fault, Non-Latching	AIR PRESSURE	Yes	Yes	Yes
9995	Fault, Non-Latching	BTC-PIM ID CARD ERROR	Yes	Yes	Yes
9996	Fault, Non-Latching	REMOTE PROOF	Yes	Yes	Yes
9997	Fault, Non-Latching	LOW HSI	Yes	Yes	Yes
9998	Fault, Non-Latching	FTBUS COMMUNICATION	Yes	Yes	Yes

[1] **Alert Code 379, Blocked Condensate (Non-Latching Fault):** This alert follows a timed retry sequence. During the initial 5 minute retry period, the alert remains active and cannot be manually cleared from the front panel. After three consecutive occurrences, the unit enters a 1-hour lockout. During the 1-hour lockout, the alert may be cleared using the front-panel CLEAR button once the blocked condensate condition has been corrected. If the condition remains when the lockout expires, another 1-hour lockout period begins.

APPENDIX D – GLOSSARY OF ABBREVIATIONS

SL. #	ABBREVIATION	FULL FORM
1	Adj	Adjusted
2	AI	Analog Input
3	AO	Analog Output
4	AV	Analog Value
5	AWG	American Wire Gauge
6	BACnet	Building Automation and Control Networks
7	BAS	Building Automation System
8	B-ASC	BACnet Application-Specific Controller
9	BIBB	BACnet Interoperability Building Block
10	BMK	Benchmark
11	BST	Boiler Sequencing Technology
12	BTC II	Boiler Temperature Controller II
13	Casc	Cascade
14	Comm	Communication
15	DHCP	Dynamic Host Configuration Protocol
16	DI	Digital Input
17	Diff	Differential
18	DNS	Domain Name System
19	DP	Differential Pressure
20	EEPROM	Electrically Erasable Programmable Read-Only Memory
21	FB	Feedback
22	FFWD	Feedforward
23	FTBus	Fenwal–tekmar Bus
24	Hdr	Header
25	HGP	High Gas Pressure
26	HSI	Hot Surface Igniter
27	ICMP	Internet Control Message Protocol
28	Ign	Ignition
29	I/O	Input/Output
30	IP	Internet Protocol
31	IST	Independent Sequencing Technology
32	LAN	Local Area Network
33	LGP	Low Gas Pressure
34	Lmt	Limit
35	MAC	Media Access Control
36	Max	Maximum
37	MBH	Thousand British Thermal Units per Hour
38	MBTU	Million British Thermal Units
39	MCB	Main Control Board
40	Min	Minimum
41	Mod	Modulation
42	MS/TP	Master-Slave/Token-Passing
43	N/A or NA	Not Applicable
44	NGas	Natural Gas
45	O_2	Oxygen
46	OAT	Outdoor Air Temperature

SL. #	ABBREVIATION	FULL FORM
47	OTLC	Operating Temperature Limit Control
48	Ovrtemp	Overtemperature
49	PICS	Protocol Implementation Conformance Statement
50	PID	Proportional-Integral-Derivative
51	PIM	Platform Ignition Module
52	PLM	Peak Load Management
53	Prg	Purge
54	Pri	Primary
55	RS-485	Recommended Standard 485
56	Rmt	Remote
57	RTD	Resistance Temperature Detector
58	Rtn	Return
59	RWT	Return Water Temperature
60	Sens	Sensor
61	Setpt or Stpt	Setpoint
62	Shtdwn	Shutdown
63	SSOV	Safety Shutoff Valve
64	SWT	Supply Water Temperature
65	Temp	Temperature
66	TS	Time Schedule
67	UDP	User Datagram Protocol
68	USB	Universal Serial Bus
69	Vlv	Valve
70	WHM	Water Heater Management

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