Edge® [ii] Controller Communication Manual

For Systems Integrators

Applies to Innovation 1600-2000® Water Heaters

Other documents related to this manual:

- OMM-0175 Innovation 1600-2000 Installation, Operation and Maintenance Manual
- OMM-0177 Edge [ii] Controller Manual

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1. INTRODUCTION

The Edge [ii]® Controller can communicate with a Building Automation System (BAS) using either BACnet® or Modbus®.

1.1 Types Of Communications

The Edge [ii] Controller is designed with integrated communication as one of its key features. In addition to the I/Os, whether On/Off or analog, it connects to BAS, Smart devices and the cloud using two primary methods:

Ethernet:
1. BACnet IP
2. Modbus TCP

RS485:
1. BACnet MSTP
2. Modbus RTU
3. External devices

1.2 Ethernet Security

1. Go to: **Main Menu → Advanced Setup → Comm & Network → BAS**.
2. Set the **BAS** parameter to**: BACnet IP** or **Modbus TCP**.
3. the **Security** parameter now appears. Set it to **Enabled**.
4. The **BAS IP and BAS MAC** parameters now appear. Enter the server's IP address in the **BAS IP** parameter, and/or the server's MAC address in the **BAS MAC** parameter.

Figure 1.1: BACnet IP Security Screen

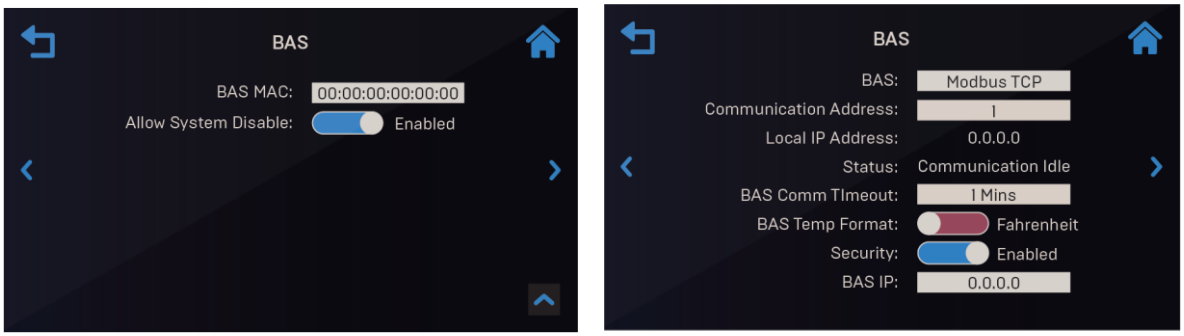


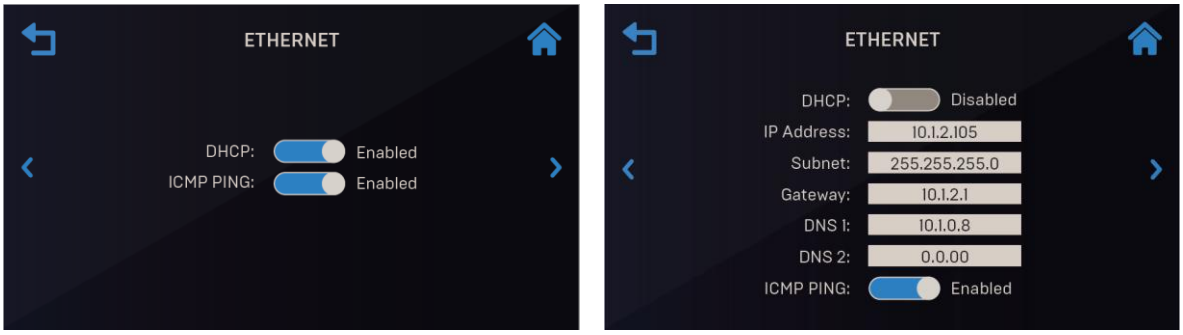
Figure 1.2: BAS IP and BAS MAC Parameter Screens

2. COMMUNICATION OPTIONS AND MENUS

2.1 Ethernet Setup Menu Flow

The **Ethernet** screen will typically have the DHCP option **Enabled**, so it won't require additional configuration. If the DHCP is **Disabled**, the parameters shown below are available for editing with addresses the unit can use to communicate with the network.

NOTE: Ethernet communication requires an Ethernet cable to be plugged into the Ethernet port on the Controller's left side (see Figure 3.2, in Section 3.1).



DHCP Enabled **DHCP Disabled**

Figure 2.1: Ethernet Screen

1. Go to: **Main Menu → Advanced Setup → Comm & Network → Ethernet**.
2. If **DHCP** is **Disabled**, manually enter the communication parameters, typically provided by a network administrator, in the available fields:
   - IP Address
   - Subnet
   - Gateway
   - DNS 1
   - DNS 2

2.2 BAS (BACnet IP) Menu Flow

The communication parameters for **BACnet IP** interface are in the Controller's **BAS** screen.

1. Go to: **Main Menu → Advanced Setup → Comm & Network → BAS**.

Figure 2.2: BAS Screen – BACnet IP

2. The default is **Off**. To enable BACnet IP communication with a BAS, press **BAS** and choose **BACnet IP**.
3. The following parameters now appear:
   - **Communication Address**: Specify the network address of the Controller (0 - 127).
   - **Node Offset**: The starting root BACnet address for the group of devices.
   - **Device Instance**: Identifies the device on a BACnet network. It is generated from the **Node Offset** added to the **Communication Address** field. This value must be unique on a BACnet network.
   - **Port Number**: Specify the BAS port to which the unit will communicate. (Range: 0xBAC0 – 0xBACF)
   - **Local IP Address**: Displays the local IP address.
   - **Status**: Displays the status of BAS communications.
   - **BAS Comm Timeout**: Specifies the BAS communication timeout period.
   - **BAS Temp Format**: Choose **Fahrenheit** or **Celsius**.
   - **Security**: Choose whether to **Enable** or **Disable** security. If enabled, the following parameters appear:
     - **BAS IP**: Secure communication to BAS server based on IP address.
     - **BAS MAC**: Secure communication to BAS server based on MAC address.

2.3 BAS (BACnet MSTP) Menu Flow

The communication parameters for **BACnet MSTP** interface are in the Controller's **BAS** screen.

1. Go to: **Main Menu → Advanced Setup → Comm & Network → BAS**.
2. The default is **Off**. To enable BACnet MSTP communication with a BAS, press **BAS** and choose **BACnet MSTP**.
3. The following parameters now appear:
   - **Baud Rate:** Choose one: **9600**, **19200**, **38400, 57600, 76800** or **115200**.
   - **Communication Address**: Specify the network address of the Edge [ii] Controller. (Range: 0 to 127)
   - **Node Offset**: The starting root BACnet address for the group of devices
   - **Device Instance**: Identifies the device on a BACnet network. It is generated from the **Node Offset** added to the **Communication Address** fields. This value must be unique on a BACnet network.
   - **Status**: Displays the status of BAS communications.
   - **BAS Comm Timeout**: Specifies the BAS communication timeout period.
   - **BAS Temp Format**: Choose **Fahrenheit** or **Celsius**.

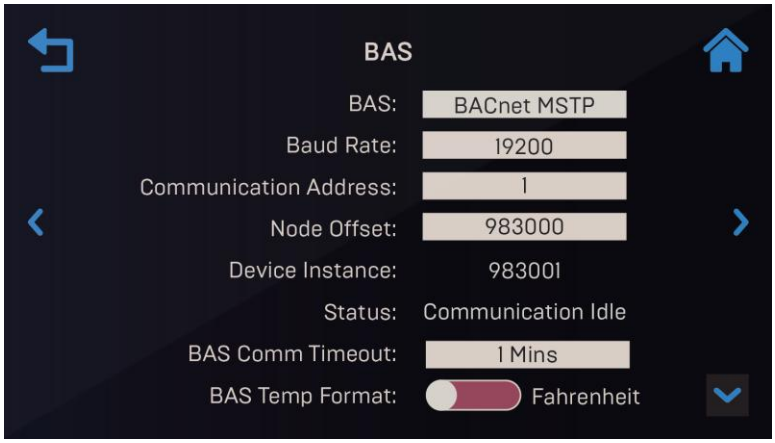


Figure 2.3: BAS Screen – BACnet MSTP

The following table lists Serial Port settings for all Edge [ii] RS485 communications:

Serial Port Setting	Value
Parity	None
Data Bits	8
Start or Stop Bit	1

2.4 BAS (Modbus TCP) Menu Flow

The communication parameters for **Modbus TCP** interface are in the Controller's **BAS** screen.

1. Go to: **Main Menu → Advanced Setup → Comm & Network → BAS**.
2. The default is **Off**. To enable Modbus TCP communication with a BAS, press **BAS** and choose **Modbus TCP**.
3. The following parameters now appear:
   - **Communication Address**: Specify the network address of the Edge [ii] Controller. (Range: 0 to 127)
   - **Local IP Address**: Displays the local IP address.
   - **Status**: Displays the status of BAS communications.
   - **BAS Comm Timeout**: Specifies the BAS communication timeout period.
   - **BAS Temp Format**: Choose Fahrenheit or Celsius.
   - **Security**: Choose whether to **Enable** or **Disable** BAS Security. If enabled, the following additional parameters appear:
     - **BAS IP**: Secure communication to BAS server based on IP address.
     - **BAS MAC**: Secure communication to BAS server based on MAC address.

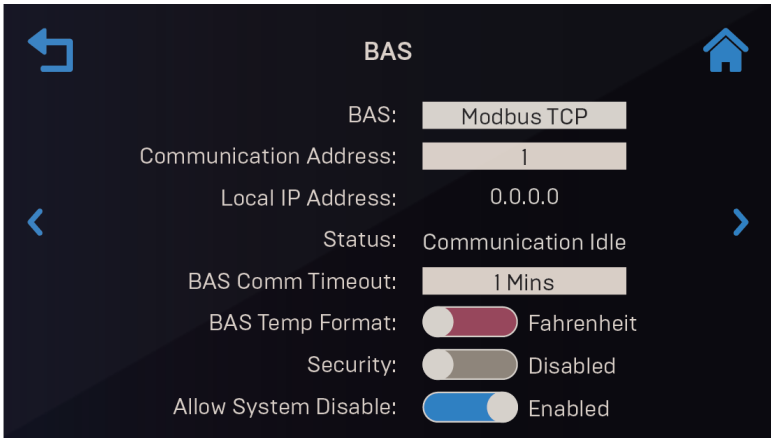


Figure 2.4: BAS Screen – Modbus TCP

2.5 BAS (Modbus RTU) Menu Flow

The communication parameters for **Modbus RTU** interface are in the Controller's **BAS** screen.

1. Go to: **Main Menu → Advanced Setup → Comm & Network → BAS**.
2. The default is **Off**. To enable Modbus RTU communication with a BAS, press **BAS** and choose **Modbus RTU**.
3. The following parameters now appear:
   - **Baud Rate**: Choose one: **9600**, **19200**, **38400, 57600, 76800** or **115200**.
   - **BAS Unit of Measurement**: Choose **Fahrenheit**, **Celsius,** or **Points**.
   - **Communication Address**: Specify the network address of the Edge [ii] Controller. (Range: 0 to 127)
   - **Status**: Displays the status of BAS communications.
   - **BAS Comm Timeout**: Specifies the BAS communication timeout period.
   - **BAS Temp Format**: Choose Fahrenheit or Celsius.

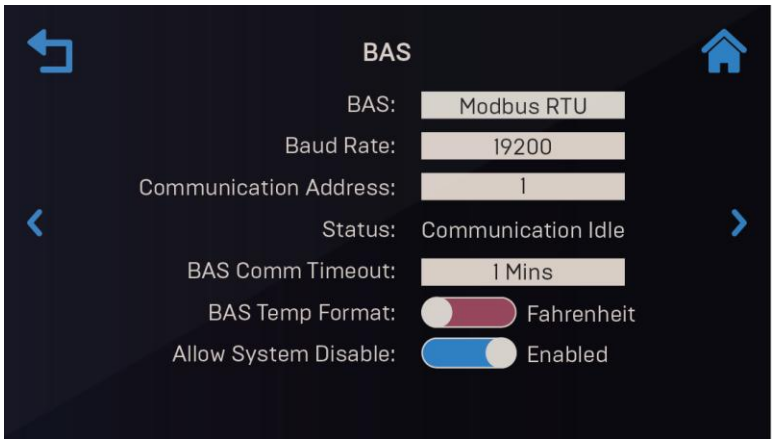


Figure 2.5: BAS Screen – Modbus RTU

The following table lists Serial Port settings for all Edge [ii] RS485 communications:

Serial Port Setting	Value
Parity	None
Data Bits	8
Start or Stop Bit	1

3. WIRING

The Edge [ii] Controller can communicate directly with a BAS using Modbus or BACnet over either Serial RS-485 or Ethernet TCP/IP. They connect to the unit's I/O board as shown below.

RS485 Connection to WHM, ACS and ProtoNode: Connect to Strip J3, Pins 13 and 15. Connect shield to strip J3 Pin 8

RS485 Connection to BAS using Modbus RTU, BACnet MSTP**:** Connect to Strip J14 Pins 1 & 2. Connect shield to strip J3 Pin 8.

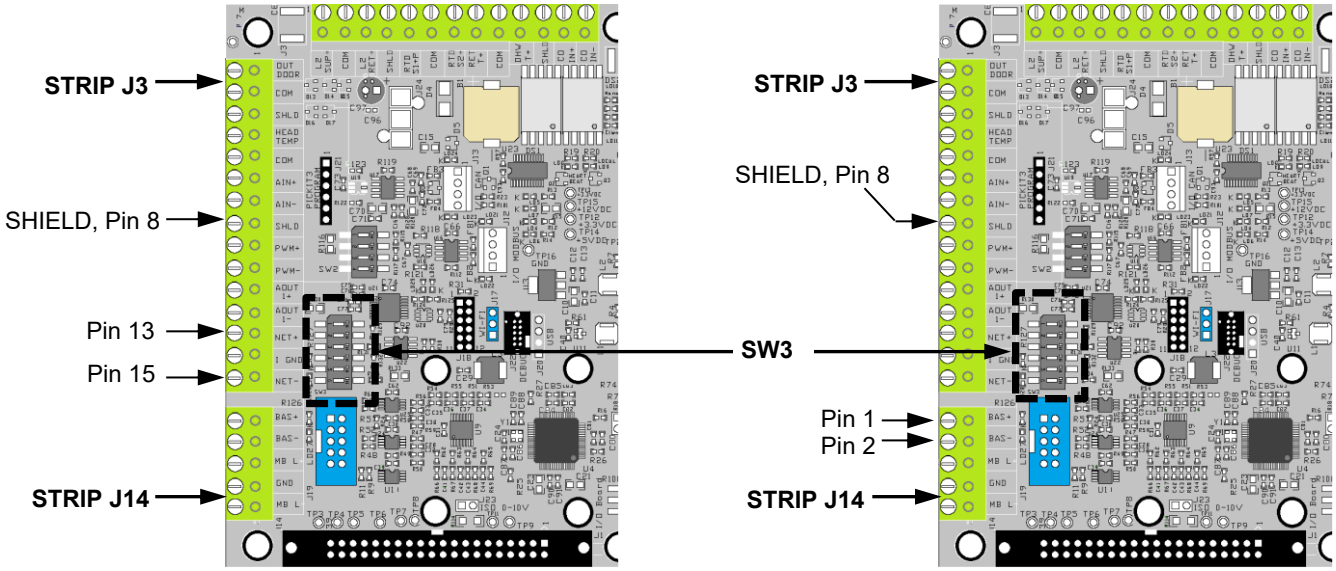


Figure 3.1: Edge [ii] Controller I/O Board

The I/O board contains the terminal listed below on removable, connector terminal strips J3 through J7, and J14. Terminal names are printed on the board and the I/O Board cover label.

The maximum gauge of wires connecting to the I/O board is 14.

NOTES:

These strips can be lifted off the I/O board and remounted on the I/O board (after all connections have been made) in its original orientation with connecting wires arranged around the ***outside*** perimeter of the I/O board.

DIP switch block SW3 numbers 1-3 apply to Strip J3, WHM RS485 terminals.

DIP switch block SW3 numbers 4-6 apply to Strip J14 BAS RS485 terminals. Set as follows:

- BAS RS485 wiring: set **SW3** switch **5** to **ON** only on BAS controls and the first and last equipment on the daisy chain.
- All other units must have this DIP switch set to **OFF**.

It is recommended to connect BAS wirings to the Backup Manager.

- If Manager fail-over occurs, the Backup Manager is ready to handle BAS communication.

Connector Strip J3 Terminals		
Pin #	**Name**	**Description**
8	Shield	Dedicated to internal communication between units in a WHM system.
13	WHM/WHM RS485 +	
15	WHM/WHM RS485 -	

Connector Strip J14 Terminals		
Pin #	**Name**	**Description**
1	BAS RS485 +	Connection to the building automation system (BAS) network (Modbus RTU, BACnet MSTP). For IP network, use the Ethernet port.
2	BAS RS485 -	

3.1 Wiring Ethernet

The location of the Ethernet port on the Controller's left side is shown below (remove front panel to gain access). There are conduit knockout holes on the top of the unit sheet metal.

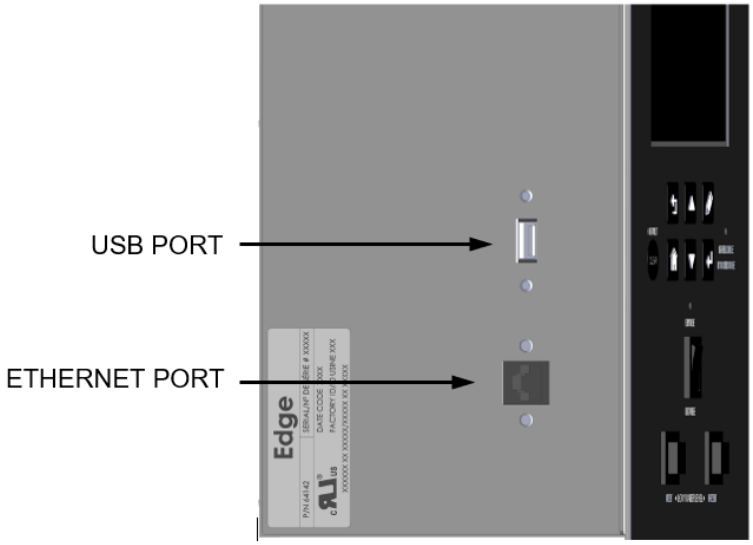


Figure 3.2: USB & Ethernet Port Locations

When connecting a BAS to the Edge [ii] Controller using Ethernet, make sure the BAS is on the same LAN as the Edge [ii] Controller.

NOTE: Each Standalone unit, Manager, or Backup Manager should be individually connected to the BAS via a network switch. These units must *not* be connected in a daisy-chain configuration for establishing connection with the BAS.

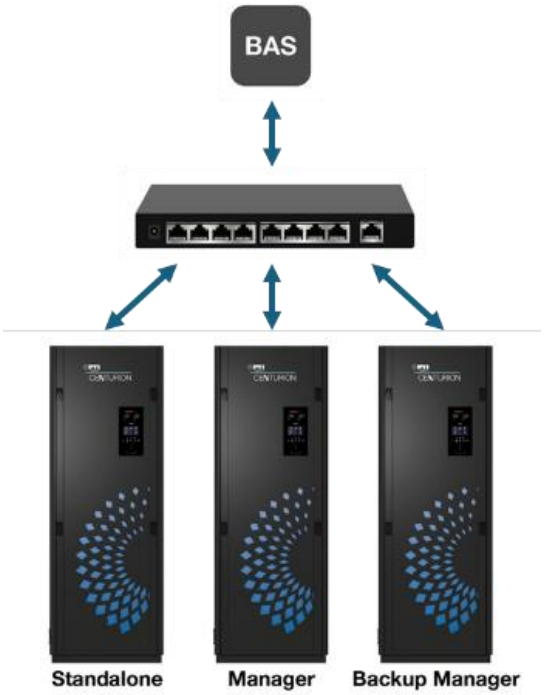
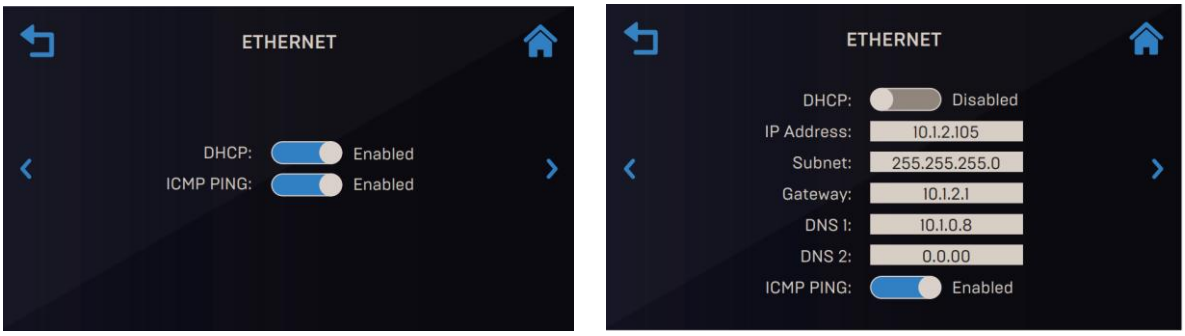


Figure 3-3: Standalone unit / Manager / Backup Manager connection to BAS

There are additional security settings necessary for TCP/IP communications in the Ethernet screen (Go to: **Main Menu → Advanced Setup → Comm & Network → Ethernet**). The communication parameters appear when **DHCP** is manually set to **Disabled**.



DHCP Enabled **DHCP Disabled**

Figure 3.3: Ethernet Screen

3.2 BAS RS-485

When connecting a BAS to a WHM Manager using RS-485, connect to the unit's I/O Board connector strip **J14**, pins 1 and 2, as shown in Figure 3.1. The Edge [ii] communicates at one of the following baud rates: **9600**, **19200**, **38400** or **115200**.

The WHM Manager supports either Modbus or BACnet protocols over either Serial RS-485 or Ethernet TCP/IP.

Connector Strip J14 Terminals		
Pin #	**Name**	**Description**
1	BAS RS485 +	Connection to the building automation system (BAS) network (Modbus RTU, BACnet MSTP). For IP network, use the Ethernet port.
2	BAS RS485 -	
3	RS485 Local +	Reserved for internal use only
4	RS4585 Ground	
5	RS485 Local -	

NOTE: When connecting the BAS RS485, Biasing must be calculated and applied externally.

Termination needs to be applied by setting DIP switch block SW3 switch #5 to **ON** (Termination Enabled) only to the first and last unit on a BAS RS485 wiring (see Figure 3-1).

All other units must have this DIP switch set to **OFF**.

4. BAS (BACNET)

The WHM Manager Edge [ii] Controller provides BAS information for the entire plant using a single connection. The register values are listed below. It supports either Modbus or BACnet protocols over either Serial RS-485 or Ethernet TCP/IP.

4.1 BACnet PICS Statement

BACnet Protocol Implementation Conformance Statement

Date: 9/27/2018
Vendor Name: AERCO (BACnet Vendor ID: 601)
Product Name: EDGE
Product Model Number: _____
Application Software Version: 1.0 **Firmware Revision:** _____ **BACnet Protocol Revision:** 12

Product Description:
The Edge controller is an integrated boiler and water heater 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 Operator Workstation (B-OWS)**
☐ **BACnet Advanced Operator Workstation (B-AWS)**
☐ **BACnet Operator Display (B-OD)**
☐ **BACnet Building Controller (B-BC)**
☐ **BACnet Advanced Application Controller (B-AAC)**
√ **BACnet Application Specific Controller (B-ASC)**
☐ **BACnet Smart Sensor (B-SS)**
☐ **BACnet Smart Actuator (B-SA)**

List all BACnet Interoperability Building Blocks Supported (Annex K):_____
_____
_____

Segmentation Capability:

☐ Able to transmit segmented messages Window Size _____
☐ Able to receive segmented messages Window Size _____

Standard Object Types Supported:
An object type is supported if it may be present in the device. For each standard Object Type supported provide the following data:

1) Whether objects of this type are dynamically creatable using the CreateObject service
2) Whether objects of this type are dynamically deletable using the DeleteObject service
3) List of the optional properties supported
4) List of all properties that are writable where not otherwise required by this standard
5) List of all properties that are conditionally writable where not otherwise required by this standard
6) List of proprietary properties and for each its property identifier, datatype, and meaning
7) List of any property range restrictions

Data Link Layer Options:
√ BACnet IP, (Annex J)
☐ BACnet IP, (Annex J), Foreign Device
☐ ISO 8802-3, Ethernet (Clause 7)
☐ ATA 878.1, 2.5 Mb. ARCNET (Clause 8)
☐ ATA 878.1, EIA-485 ARCNET (Clause 8), baud rate(s) _____
☐ MS/TP master (Clause 9), baud rate(s): _____
√ MS/TP slave (Clause 9), baud rate(s): _____
☐ Point-To-Point, EIA 232 (Clause 10), baud rate(s):_____
☐ Point-To-Point, modem, (Clause 10), baud rate(s): _____
☐ LonTalk, (Clause 11), medium: _____
☐ BACnet/ZigBee (ANNEX O)
☐ Other: _____

Device Address Binding:
Is static device binding supported? (This is currently necessary for two-way communication with MS/TP slaves and certain other devices.) ☐ Yes √ No

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)
Does the BBMD support registrations by Foreign Devices? ☐ Yes √ No
Does the BBMD support network address translation? ☐ Yes √ No

Network Security Options:
☐ Non-secure Device - is capable of operating without BACnet Network Security
☐ Secure Device - is capable of using BACnet Network Security (NS-SD BIBB)
☐ Multiple Application-Specific Keys:
☐ Supports encryption (NS-ED BIBB)
☐ Key Server (NS-KS BIBB)

Character Sets Supported:
Indicating support for multiple character sets does not imply that they can all be supported simultaneously.

√ ISO 10646 (UTF-8)	☐ IBM™/Microsoft™ DBCS	☐ ISO 8859-1
☐ ISO 10646 (UCS-2)	☐ ISO 10646 (UCS-4)	☐ JIS X 0208

4.2 BACnet Objects List

BACnet communication objects are in the following sections below:

Section 4.2.1 – BACnet Objects – Standalone or WHM Client Units

Section 4.2.2 – BACnet Objects – WHM Manager Only

Section 4.2.3 – BACnet Objects – WHM Client Info Thru WHM Manager

4.2.1 BACnet Objects – Standalone or WHM Client Units

TABLE 4-1: BACnet Objects – Standalone or WHM Client – Object Type = AI, Read Only				
BACnet ID	**Object Name**	**Min**	**Max**	**WHM Edge [ii]**
0	Message Code	See Table 6 in Section 6: *Fault/Status Codes*		
1	Unit Status	0 = Disabled 1 = Standby 2 = Manual	3 = Remote 4 = Auto 5 = Fault	
2	Outlet:	0	250F	
3	Lower Inlet:	0	250F	
4	Air Inlet:	-70	130F	
5	Outside Temp:	-70	130F	
6	Exhaust:	50	450	
7	Feed Forward:	0	250F	
8	Current Valve Position:	0	100	
9	O2:	0	24.00%	
10	Supply Gas Pressure:	Unused		NA
11	Run Cycles:	0	999,999,999	
13	Run Hours:	0	999,999,999	
15	Flame Strength:	0	100	
16	Active Setpoint Temp:	0	250F	
17	PID Output	0	100	
18	SET Valve Position	0	100	
19	Communication Address	0	255	
20	Modbus SW Version	Unused		
44	Select Output:	0 = Standard Setup 1 = Cascade Valve 2= Aout 2		
45	Control Mode:	0 = On/Off 1= Linear Modulation 2 = Delta T Modulation		
46	Isolation Feedback:	disable	enable	
47	Open Vlv Control Signal:	0 = 0mA 1 = 4mA 2 = 20mA		
48	Close Vlv Control Signal:	0 = 0mA, 1 = 4mA, 2 = 20mA		
49	Blower Speed	0	65536	
50	Blower Pulses/Rev:	0	100	
51 – 58	O2 Target 1 – O2 Target 8	3%	8%	
59	Sensor Status	Unused		
60	Not Used			
61	Not Used			

TABLE 4-1: BACnet Objects – Standalone or WHM Client – Object Type = AI, Read Only				
BACnet ID	**Object Name**	**Min**	**Max**	**WHM Edge [ii]**
62	WHM Uart3 errors	0 = No errors 1 = Overrun Error 2 = Framing Error 3 = Parity Error	4 = Uart Sync Error 5 = CRC Error 6 = Unknown Error	
63	Nox Requirement	0	200	
64	Manifold Gas Pressure	0	90	
65 – 72	O2 at Cal Point 1 to O2 at Cal Point 8	0	99.9	
73 – 80	NOx at Cal 1 to NOx at Cal 8	0	999	
81 – 88	CO at Cal 1 to CO at Cal 8	0	999	
89 –96	Flame Strength at Cal 1 to Flame Strength at Cal 8	0	99.9	
97	Calibration Time	12.00am	11.59pm	
98	Calibration Date	0/0/0	12/31/9999	
99 – 106	Previous O2 at Cal 1 to Previous O2 at Cal 8	0	99.9	
107 – 114	Previous NOx at Cal 1 to Previous NOx at Cal 8	0	999	
115 – 122	Previous CO at Cal 1 to Previous CO at Cal 8	0	999	
123 – 130	Previous CAL Point 1 to Previous CAL Point 8	0	100	
131 – 138	Pre Flame Strength at Cal 1 to Pre Flame Strength at Cal 8	0	99.9	
146	Current Blower Voltage	0	10v	
147	Software Version	00.00.000	99.99.999	
148	Unit Alpha	0=E, 1=G, 2=H, 3=R, 4=N, 5=A		
149	Unit Year	0	99	
150	Unit Serial #	0	9999	
151	Fuel Type	0=Natural Gas	1=Propane	
152	WHM Unit Mode	0=OFF, 1=Client, 2=Manager		

TABLE 4-2: BACnet Objects – Standalone or WHM Client – Object Type = AV, Read/Write				
BACnet ID	**Object Name**	**Min**	**Max**	**Edge [ii]**
0	Net Remote Setpt	0	9999	
1	Net Direct Drive	0	9999	NA
2	Remote Password	0, 1, 2, 3, 4, 5		
3	Password	0, 1, 2, 3, 4, 5		
4	Setpoint:	20F	245F	
5	Language:	0 = English, 1 = Spanish, 2 = French		
6	Time:	12.00am	11.59pm	
7	Date:	0/0/0	12/31/9999	
8	Unit of Measurement:	English	Metric	
9	Cascade Baud Rate	0 = 9600 1 = 19200 2 = 38400	3 = 57600 4 = 76800 5 = 115200	
10	Unit Type:	10 = Centurion		
11	Unit Size:	5 = 1600 MBH 6 = 2000 MBH		
12	Operating Mode	0 = Constant Setpt 1 = Remote Setpt		
13	Remote Signal	0 = 4-20mA/1-5V 1 = 0-20mA/0-5V 2 = Network 3 = BAS		
18	Setpoint Low Limit:	40F	245F	
19	Setpoint High Limit:	20F	220F	
20	Temperature High Limit:	40F	210F	
21	Max Valve Position:	40	100	
22	Not Used			
23	Auxiliary Delay:	0	240	
24	Unit Failsafe Mode	0 = Shutdown, 1 = Constant Setpt		
25	Low Fire Timer:	2sec	600Sec	
26	Proportional Band:	1F	120F	
27	Integral Band:	0	2	
28	Derivative Band:	0	2min	
29	Min Load Adj	-50	50F	
30	Max Load Adj	-50	50F	
31	Outlet Feedback	No	Yes	
32	Feedback Gain	0.01	1	
33	Breakpt at 0%	-100	100F	
34	Breakpt at 10%	-100	100F	
35	Breakpt at 20%	-100	100F	
36	Breakpt at 30%	-100	100F	
37	Breakpt at 40%	-100	100F	
38	Breakpt at 50%	-100	100F	
39	Breakpt at 60%	-100	100F	
40	Breakpt at 70%	-100	100F	
41	Breakpt at 80%	-100	100F	
42	Breakpt at 90%	-100	100F	
43	Breakpt at 100%	-100	100F	
44	Purge Timer:	5Sec	60Sec	
45	Post Purge Timer:	0	60Sec	
46	Ignition Position:	5%	60%	

TABLE 4-2: BACnet Objects – Standalone or WHM Client – Object Type = AV, Read/Write				
BACnet ID	**Object Name**	**Min**	**Max**	**Edge [ii]**
47	Stop Valve Position:	0	40%	
48	Start Valve Position:	0	40%	
49	On Delay:	0	600Sec	
50	Not Used			
53	FFWD Temp Display	Disable	Enable	
54	Not Used			
57	Valve Pos Out Dsp	Disable	Enable	
58	Exhaust Temp Dsp	Disable	Enable	
59	Setpoint Limiting:	Disable	Enable	
60	Setpoint Limit Band:	0	10F	
61	Not Used	None	Run Cycles	
62	Inlet Temp Display	Disable	Enable	
63	Not Used			
64	Water Temp Reset:	Manual	Automatic	
65	Gas Pressure Reset:	Manual	Automatic	
66	Not Used			
70	BAS:	0 = Off 1 = BACnet MSTP 2 = BACnet IP 3 = Modbus RTU 4 = Modbus TCP		
71	Cascade Baud Rate	0 = 9600 1 = 19200	2 = 38400 3 = 57600	
72	INTL Communication	Disable	Enable	
73	Intl Baud Rate	0 = 9600 1 = 19200 2 = 38400	3 = 57600 4 = 76800 5 = 115200	
74	Not Used			
75	O2 Trim	Disabled	Enabled	
80	Remote Disable Code (Advanced Setup → Comm & Network → BAS, **Allow System Disable** = **Yes**)	0 = Enable Unit	85 = Disable Unit	

4.2.2 BACnet Objects – WHM Manager Only

TABLE 4-3: BACnet Objects – BST Manager Only – Object Type = AI, Read Only				
BACnet ID	**Object Name**	**Min**	**Max**	**Edge [ii]**
100	Unit Mode:	0 = Off 1= WHM Client 2= WHM Manager		
101	Plant Constant Setpoint:	20F	245F	
102	Setback Setpoint:	20F	245F	
103	Setback Start Time:	12.00am	11.59pm	
104	Setback Stop Time:	0/0/0	12/31/9999	
105	Auto-Manager Transfer:	Disabled	Enabled	
106	OutletTemp	0F	250F	
107	UEnabled	0	16	
108	Units Faulted	0	16	
109	Unit Address:	0	16	
110	Header Temp	0F	250F	

TABLE 4-3: BACnet Objects – BST Manager Only – Object Type = AI, Read Only				
BACnet ID	**Object Name**	**Min**	**Max**	**Edge [ii]**
111	WHM Outdoor Temp	Unused		
112	Avg Fire Rate	0%	100%	
113	Units Ignited	0	16	
114	Act Setpt	0F	250F	
115	Next On Valve Pos:	16%	100%	
116	Setpt Hi Lim	20F	220F	
117	Setpt Low Limit:	40F	245F	
118	Cascade Temp Hi Limit:	40F	210F	
119	Operating Mode	0 = Constant Setpoint		119
120	DHW Header Temp	Unused		
121	DHW Setpoint	40F	170F	
122	Fuel Type	0 = Natural Gas, 1 = Propane		
123 – 151	Not Used			
152	Unit Mode	0=OFF, 1=Client, 2=Manager		

TABLE 4-4: BACnet Objects – BST Manager Only – Object Type = AV, Read/Write				
BACnet ID	**Object Name**	**Min**	**Max**	**Edge [ii]**
51	Allow BAS to Write	0	1	NA
53	Network Timeout:	5sec	999sec	
200	Not Used			
201	Setback Setpoint:	20F	245F	
202	Setback Start Time:	12.00am	11.59pm	
203	Setback Stop Time:	12.00am	11.59pm	
204	Setback Schedule:	Disable	Enable	
205-212	Not Used			
213	Hdr Temp Sensor	0 = Network 1 = FFWD Temp 2 = Direct 3 = BAS 4 = OFF		
214	BAS Header Temp	0F	250F	
215	Rtn Hdr Temp Sensor	OFF (0), Network (1), Direct (2), BAS (3)		
216	Rtn Hdr Temp Sensor	0F	250F	
219	BAS	0 = OFF 1 = BACnet MSTP 2 = BACnet IP	3 = Modbus RTU 4 = Modbus TCP	
220	Baud Rate	0 = 9600 1 = 19200	2 = 38400 3 = 57600	
221	INTL Communication	0 = Disabled 1 = Enabled		
222	Intl Baud Rate	0 = 9600 1 = 19200	2 = 38400 3 = 57600	
223	Not Used			
224	O2 Trim	0 = Disabled, 1 = Enabled		
229	Remote Disable Code (Advanced Setup → Comm & Network → BAS, **Allow System Disable** = **Yes**)	0 = Enable Plant	85 = Disable Plant	
245	WHM Setpoint	40F	170F	

4.2.3 BACnet Objects – WHM Client Info Thru WHM Manager

The BACnet objects listed below are all read-only from up to 16 WHM units, which includes the unit designated as the WHM Manager. They are divided into 16 sections, which are identical except for the BACnet ID. The BACnet ID pattern is as follows:

- 300 to 319 applies to the 1st WHM unit
- 400 to 419 applies to the 2nd WHM unit
- < Patter repeats up to >
- 1800 to 1819 applies to the 16th WHM unit

TABLE 4-5: BACnet Objects – BST Client Info Thru BST Manager – Object Type = AI, Read Only				
BACnet IDs	**Object Name**	**Min**	**Max**	**WHM Edge [ii]**
300, 400, 500 … 1800	Communication Address	0	255	
301, 401, 501 … 1801	unit Status	0 = Disabled 1 = Standby 2 = Manual	3 = Remote 4 = Auto 5 = Fault	
302, 402, 502 … 1802	Fault Code	See Table 1 in Section 6: Fault/Status Codes		
303, 403, 503 … 1803	Outlet Temperature	0	250F	
304, 404, 504 … 1804	FFWD Temperature	0	250F	
305, 405, 505 … 1805	Inlet Temperature	0	250F	
306, 406, 506 … 1806	Exhaust Temperature	50F	450F	
307, 407, 507 … 1807	Inlet Air Temperature	-70	130F	
308, 408, 508 … 1808	Flame Strength	0	100%	
309, 409, 509 … 1809	Fire Rate In	0	100%	
310, 410, 510 … 1810	Fire Rate Out	0	100%	
311, 411, 511 … 1811	Unit Type	10=Centurion		
312, 412, 512 … 1812	Unit Size	5 = 1600MBH 6 = 2000MBH		
313, 413, 513 … 1813	Valve State	close	open	
314, 414, 514 … 1814	Net Remote Setpoint	0	9999	
315, 415, 515 … 1815	Run Cycle Upper	0	999,999,999	
316, 416, 516 … 1816	Run Cycle Lower	0	999,999,999	
317, 417, 517 … 1817	Run Hours Upper	NA	NA	
318, 418, 518 … 1818	Run Hours Lower	NA	NA	
319, 419, 519 … 1819	Oxygen Lvel	0	24%	

5. BAS (MODBUS)

5.1 Modbus Point List

Modbus communication point list are in the following Sections, below:

Section 5.2.1 – Modbus Point List – Standalone or WHM Client

Section 5.2.2 – Modbus Point List – WHM Manager Only

Section 5.2.3 – Modbus Point List – Client Info Thru Manager

5.1.1 Modbus Point List – Standalone or WHM Client

Modbus Address	Object Name	Min	Max	Edge [ii]
30001	Message Code	0	100	
30002	Unit Status	0 = Disabled 1 = Standby 2 = Manual	3 = Remote 4 = Auto 5 = Fault	
30003	Outlet:	0	250F	
30004	Lower Inlet:	0	250F	
30005	Air Inlet:	-70	130F	
30006	Outside Temp:	-70	130F	
30007	Exhaust:	50	450	
30008	Feed Forward:	0	250F	
30009	Current Valve Position:	0	100	
30010	O2:	0	24.00%	
30011	Supply Gas Pressure:	Unused except for C-More compatibility		NA
30013	Run Cycles:	0	999,999,999	
30015	Run Hours:	0	999,999,999	
30016	Flame Strength:	0	100%	
30017	Active Setpoint Temp:	0	250F	
30018	PID Output	0	100%	
30019	SET Valve Position	0	100	
30044	Communication Address:	0	255	
30045	Select Output:	0 = Standard Setup 1 = Cascade Valve 2 = Aout 2		
30046	Control Mode:	0 = On/Off 1 = Linear Modulation 2 = Delta T Modulation		
30047	Isolation Feedback:	disable	enable	
30048	Open Vlv Control Signal:	0 = 0mA 1 = 4mA 2 = 20mA		
30049	Close Vlv Control Signal:	0 = 0mA 1 = 4mA 2 = 20mA		
30050	Blower Speed	0	65536	
30051	Blower Pulses/Rev:	0	100	
30052 to 30059	O2 Target 1 to O2 Target 8	3%	8%	

Modbus Address	Object Name	Min	Max	Edge [ii]
30060	O2 Error Code1	Available in BACnet only		NA
30061	O2 Error Code2	Available in BACnet only		NA
30062	O2 Timer	0 = 2 Hour On 1 = 4 Hour On 2 = 10 Hour Off (Only for BNM version v05.09.020 or below)		NA
30063	WHM Uart3 errors	0 = No errors 1 = Overrun Error 2 = Framing Error 3 = Parity Error	4 = Uart Sync Error 5 = CRC Error 6 = Unknown Error	
30064	Nox Requirement	0	200	
30065	Manifold Gas Pressure	0	90	
30066 to 30073	O2 at Cal Point 1 to O2 at Cal Point 8	0	99.9	
30074 to 30081	NOx at Cal 1 to NOx at Cal 8	0	999	
30082 to 30089	CO at Cal 1 to CO at Cal 8	0	999	
30090 to 30097	Flame Strength at Cal 1 to Flame Strength at Cal 8	0	99.9	
30098	Time	12.00am	11.59pm	
30099	Date	0/0/0	12/31/9999	
30100 to 30107	Previous O2 at Cal 1 to Previous O2 at Cal 8	0	99.9	
30108 to 30115	Previous NOx at Cal 1 to Previous NOx at Cal 8	0	999	
30116 to 30123	Previous CO at Cal 1 to Previous CO at Cal 8	0	999	
30124 to 30131	Previous CAL Point 1 to Previous CAL Point 8	0	100	
30132 to 30139	Pre Flame Strength at Cal 1 to Pre Flame Strength at Cal 8	0	99.9	
30147	Current Blower Voltage	0	10v	
30148	Software Version	00.00.000	99.99.999	
30149	Unit Alpha	0=E, 1=G, 2=H, 3=R, 4=N, 5=A		
30150	Unit Year	0	99	
30151	Unit Serial #	0	9999	
30152	Fuel Type	0=Natural Gas, 1=Propane		
30153	Unit Mode	0= OFF, 1=Client, 2=Manager		

Modbus Address	Object Name	Min	Max	Edge [ii]
40001	Net Remote Setpt	0	9999	
40002	Net Direct Drive	0	9999	NA
40003	Remote Password	0, 1, 2, 3, 4, 5		
40004	Password	0, 1, 2, 3, 4, 5		
40005	SH Setpoint:	20F	245F	
40006	Language:	0 = English, 1 = Spanish, 2 = French		
40007	Time:	12.00am	11.59pm	

Modbus Address	Object Name	Min	Max	Edge [ii]
40008	Date:	0/0/0	12/31/9999	
40009	Unit of Measurement:	English	Metric	
40010	Cascade Baud Rate	0 = 9600 1 = 19200 2 = 38400 3 = 115200		
40011	Unit Type:	10 = Centurion		
40012	Unit Size:	5 = 1600 MBH 6 = 2000 MBH		
40013	SH Operating Mode	0 = Constant Setpt 1 = Remote Setpt		
40016	Remote Signal	0 = 4-20mA/1-5V 1 = 0-20mA/0-5V 2 = Network 3 = BAS 4 = WHM (PWM) Input		
40019	Setpoint Low Limit:	40F	245F	
40020	Setpoint High Limit:	20F	220F	
40021	Temperature High Limit:	40F	210F	
40022	Max Valve Position:	40	100	
40023	Pump Off Delay	0	30	
40024	Auxiliary Delay:	0	240	
40025	Unit Failsafe Mode	0 = Shutdown, 1 = Constant Setpt		
40026	Low Fire Timer:	2sec	600Sec	
40027	Proportional Band:	1F	120F	
40028	Integral Band:	0	2	
40029	Derivative Band:	0	2min	
40030	Min Load Adj	-50	50F	NA
40031	Max Load Adj	-50	50F	NA
40032	Outlet Feedback	No	Yes	NA
40033	Feedback Gain	0.01	1	NA
40034	Breakpt at 0%	-100	100F	NA
40035	Breakpt at 10%	-100	100F	NA
40036	Breakpt at 20%	-100	100F	NA
40037	Breakpt at 30%	-100	100F	NA
40038	Breakpt at 40%	-100	100F	NA
40039	Breakpt at 50%	-100	100F	NA
40040	Breakpt at 60%	-100	100F	NA
40041	Breakpt at 70%	-100	100F	NA
40042	Breakpt at 80%	-100	100F	NA
40043	Breakpt at 90%	-100	100F	NA
40044	Breakpt at 100%	-100	100F	NA
40045	Purge Timer:	5Sec	60Sec	
40046	Post Purge Timer:	0	60Sec	
40047	Ignition Position:	5%	60%	
40048	Stop Valve Position:	0	40%	
40049	Start Valve Position:	0	40%	
40050	On Delay:	0	600Sec	
40053	Max Flow	10gpm	500gpm	

Modbus Address	Object Name	Min	Max	Edge [ii]
40054	FFWD Temp Display	Disable	Enable	
40057	Flow Rate Disply	Disable	Enable	
40058	Valve Pos Out Dsp	Disable	Enable	
40059	Exhaust Temp Dsp	Disable	Enable	
40060	Setpoint Limiting:	Disable	Enable	
40061	Setpoint Limit Band:	0	10F	
40062	Temp Comp Adjust	None	Run Cycles	
40063	Inlet Temp Display	Disable	Enable	
40064	Power Reset:	Manual	Automatic	
40065	Water Temp Reset:	Manual	Automatic	
40066	Gas Pressure Reset:	Manual	Automatic	
40070	Sensor Log Int	0 = Off 1 = 1 min 2 = 5 min 3 = 15 min 4 = 30 min	5 = 1 hr 6 = 6 hrs 7 = 12 hrs 8 = 24 hrs	
40071	BAS:	0 = Off 1 = BACnet MSTP 2 = BACnet IP 3 = Modbus RTU 4 = Modbus TCP		
40072	Cascade Baud Rate	0 = 9600 1 = 19200 2 = 38400	3 = 57600 4 = 76800 5 = 115200	
40073	INTL Communication	Disable	Enable	
40074	Intl Baud Rate	0 = 9600 1 = 19200	2 = 38400 3 = 57600	
40075	O2 Trim	Disabled	Enabled	
40081	Remote Disable Code (Advanced Setup → Comm & Network → BAS, **Allow System Disable** = **Yes**)	0 = Enable Unit	85 = Disable Unit	

5.1.2 Modbus Point List – WHM Manager Only

Modbus Address	Object Name	Min	Max	Edge [ii]
30100	Unit Mode:	0 = off, 1= WHM Client, 2= WHM Manager		
30101	Plant Constant Setpoint:	20F	245F	
30102	Setback Setpoint:	20F	245F	
30103	Setback Start Time:	12.00am	11.59pm	
30104	Setback Stop Time:	0/0/0	12/31/9999	
30105	Auto-Manager Transfer:	Disabled	Enabled	
30106	OutletTemp	0F	250F	
30107	UEnabled	0	16	
30108	Units Faulted	0	16	
30109	Unit Address:	0	16	
30110	Header Temp	0F	250F	
30113	Units Ignited	0	16	
30114	Act Setpt	0F	250F	
30115	Next On Valve Pos:	16%	100%	
30116	Setpt Hi Lim	20F	220F	
30117	Setpt Low Limit:	40F	245F	
30118	Cascade Temp Hi Limit:	40F	210F	
30119	Operating Mode	0 = Constant Setpoint		
30122	Fuel Type	0=Natural Gas, 1=Propane		
30124-30151	Not Used			
30152	Unit Mode (For BACnet only)	0=OFF, 1=Client, 2=Manager		
30153	Unit Mode	0=OFF, 1=Client, 2=Manager		

Modbus Address	Object Name	Min	Max	Edge [ii]
40051	Allow BAS to Write	0	1	NA
40053	Network Timeout:	5sec	999sec	
40200	Plant Remote Setpoint:	20F	245F	
40201	Setback Setpoint:	20F	245F	
40202	Setback Start Time:	12.00am	11.59pm	
40203	Setback Stop Time:	12.00am	11.59pm	
40204	Setback Schedule:	Disable	Enable	
40205-40212	Not Used			
40213	Hdr Temp Sensor	0 = Network 1 = FFWD Temp 2 = Direct	3 = BAS 4 = OFF	
40214	BAS Header Temp	0F	250F	
40215	Rtn Hdr Temp Sensor	OFF(0), Network(1), Direct(2), BAS(3)		
40216	Rtn Hdr Temp Sensor	0F	250F	
40219	BAS	0 = OFF 1 = BACnet MSTP 2 = BACnet IP	3 = Modbus RTU 4 = Modbus TCP	
40220	Baud Rate	0 = 9600 1 = 19200	2 = 38400 3 = 57600	

Modbus Address	Object Name	Min	Max	Edge [ii]
40221	INTL Communication	0 = Disabled 1 = Enabled		
40222	Intl Baud Rate	0 = 9600 1 = 19200	2 = 38400 3 = 57600	
40223				NA
40224	O2 Trim	0 = Disabled, 1 = Enabled		
40229	Remote Disable Code (Advanced Setup → Comm & Network → BAS, **Allow System Disable** = **Yes**)	0 = Enable Plant	85 = Disable Plant	

5.1.3 Modbus Point List – WHM Client Info Thru WHM Manager

Table 5-5 lists the Modbus addresses, all read-only, from up to 16 WHM, which includes the unit designated as the WHM Manager. They are divided into 16 sections, which are identical except for the Modbus addresses. The Modbus address pattern is as follows:

- Address 30300 to 30319 applies to the 1st WHM unit
- Address 30400 to 30419 applies to the 2nd WHM unit
- < Patter repeats up to >
- Address 31800 to 31819 applies to the 16th WHM unit

For example, the Modbus address of Unit Status for WHM unit # 3 is 30501.

Modbus Address	Object Name	Min	Max	Edge [ii]
30300, 30400, 30500 … 31800	Communication Address	0	255	
30301, 30401, 30501 … 31801	Unit Status	0 = Disabled 1 = Standby 2 = Manual	3 = Remote 4 = Auto 5 = Fault	
30302, 30402, 30502 … 31802	Fault Code	See Table 1 in Section 6: Fault/Status Codes		
30303, 30403, 30503 … 31803	Outlet Temperature	0	250F	
30304, 30404, 30504 … 31804	FFWD Temperature	0	250F	
30305, 30405, 30505 … 31805	Inlet Temperature	0	250F	
30306, 30406, 30506 … 31806	Exhaust Temperature	50F	450F	
30307, 30407, 30507 … 31807	Inlet Air Temperature	-70	130F	
30308, 30408, 30508 … 31808	Flame Strength	0	100%	
30309, 30409, 30509 … 31809	Fire Rate In	0	100%	
30310, 30410, 30510 … 31810	Fire Rate Out	0	100%	

Modbus Address	Object Name	Min	Max	Edge [ii]
30311, 30411, 30511 … 31811	Unit Type	10=Centurion		
30312, 30412, 30512 … 31812	Unit Size	5 = 1600 MBH 6 = 2000 MBH		
30313, 30413, 30513 … 31813	Valve State	close	open	
30314, 30414, 30514 … 31814	Net Remote Setpoint	0	9999	
30315, 30415, 30515 … 31815	Run Cycle Upper	0	999,999,999	
30316, 30416, 30516 … 31816	Run Cycle Lower	0	999,999,999	
30317, 30417, 30517 … 31817	Run Hours Upper	NA	NA	
30318, 30418, 30518 … 31818	Run Hours Lower	NA	NA	
30319, 30419, 30519 … 31819	Oxygen Lvel	0	24%	NA

6. FAULT/STATUS CODES

The Edge [ii] Controller displays the following status messages when appropriate. The **#** column lists the corresponding code returned to Building Automation Systems.

Four types of messages can appear on the Edge [ii] Controller's display screen:

- **Message**: Information about a current event or condition: no intervention required.
- **Warning**: An abnormal event or condition occurred, but the unit continues to operate normally: no intervention required.
- **Fault**: An abnormal event or condition occurred that caused the unit to shut down. The unit will restart automatically once the cause of the fault is resolved.
- **Fault, Reset**: An abnormal event or condition occurred that caused the unit to shut down. A corrective action may be required. Once the cause of the fault is resolved, the Controller's **CLEAR** button must be pressed manually to restart the unit.

TABLE 6: Fault Codes

Code	Message	Message Type	Description
0	NO FAULTS	n/a	
1	Disabled	Message	Indicates the **Enable/Disable** switch is set to **Disabled**. The display also shows the time (AM or PM) and date that the unit was disabled.
2	Standby	Message	Displayed when ON/OFF switch is in the **ON** position, but there is no demand for heat. The time and date are also displayed.
3	Demand Delay	Message	Displayed if Demand Delay is active.
4	Purging	Message	Displayed during the purge cycle during startup. The duration of the purge cycle counts up in seconds.
5	Ignition Trial	Message	Displayed during ignition trial of startup sequence. The duration of cycle counts up in seconds.
6	Flame Proven	Message	Displayed after flame has been detected for a period of 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.
7	Warmup	Message	Displayed for 2 minutes during the initial warm-up only.
8	High Water Temp Switch Open	Fault, Reset	The High Water Temperature Limit Switch is open.
9	Low Water Level	Fault, Reset	The Water Level Control board is indicating low water level.
10	Low Gas Pressure Fault	Fault, Reset	The Low Gas Pressure Limit Switch is open.
11	Gas Pressure Fault	Fault, Reset	The High Gas Pressure Limit Switch is open.
12	Interlock Open	Fault	The Remote Interlock is open.
13	Delayed Interlock Open	Fault, Reset	The Delayed Interlock is open.
14	Airflow Fault During Purge	Fault, Reset	The Blower Proof Switch opened during purge.
15	SSOV Fault During Purge	Fault, Reset	The SSOV switch opened during purge.
16	Prg Switch Open During Purge	Fault, Reset	The Purge Position Limit switch on the Air/Fuel valve opened during purge.
17	Ign Switch Open During Ignition	Fault, Reset	The Ignition Position Limit switch on the Air/Fuel valve opened during ignition.
18	Airflow Fault During Ign	Fault	The Blower Proof Switch opened during ignition.
19	Airflow Fault During Run	Fault, Reset	The Blower Proof Switch opened during run.
20	SSOV Fault During Ignition	Fault, Reset	The SSOV switch closed or failed to open during ignition.
21	SSOV Fault During Run	Fault, Reset	The SSOV switch closed for more than 15 seconds during run.

TABLE 6: Fault Codes			
Code	**Message**	**Message Type**	**Description**
22	Flame Loss During Ignition	Fault, Reset	The Flame signal was not seen during ignition or lost within 5 seconds after ignition.
23	Flame Loss During Run	Fault, Reset	The Flame signal was lost during run.
24	High Exhaust Temp Switch	Fault, Reset	The High Exhaust Temperature Limit Switch is closed.
25	Loss of Power	Fault	A power loss occurred. The time and date when power was restored is displayed.
26	Loss of Sensor	Not Used	Not Currently Used
27	Loss of Signal	Not Used	Not Currently Used
28	High O2 Level	Fault	Not Currently Used
29	Low O2 Level	Fault	Not Currently Used
30	High CO Level	Not Used	Not Currently Used
31	SSOV Relay Failure	Fault, Reset	A failure has been detected in one of the relays that control the SSOV.
32	Residual Flame	Fault, Reset	The Flame signal was seen for more than 60 seconds during standby.
33	Heat Demand Failure	Fault, Reset	The Heat Demand Relays on the Ignition board failed to activate when commanded.
34	Ign Switch Closed During Purge	Fault, Reset	The Ignition Position Limit switch on the Air/Fuel valve closed during purge.
35	Prg Switch Closed During Ign	Fault, Reset	The Purge Position Limit switch on the Air/Fuel valve closed during ignition.
36	SSOV Switch Open	Fault, Reset	The SSOV switch opened during standby.
37	Ign Board Comm Fault	Fault	Communication fault between the Ignition board and the CPU board.
38	Wait	Message	Prompts the operator to wait.
39	Direct Drive Signal Fault	Fault	The direct drive signal is not present or is out of range.
40	Remote Setpt Signal Fault	Fault	The remote setpoint signal is not present or is out of range.
41	Outdoor Temp Sensor Fault	Fault	The temperature measured by the Outdoor Air Sensor is out of range.
42	Outlet Temp Sensor Fault	Fault	The temperature measured by the Outlet Sensor is out of range.
43	FFWD Temp Sensor Fault	Fault	The temperature measured by the FFWD Sensor is out of range.
44	High Water Temp	Fault	The temperature measured by the Outlet Sensor exceeded the Temp Hi Limit setting.
45	Line Voltage Out of Phase	Fault, Reset	The High AC voltage is out of phase from the low AC voltage.
46	Stepper Motor Failure	Fault, Reset	The stepper motor failed to move the valve to the desired position.
47	Setpoint Limiting Active	Fault	Setpoint temperature has exceeded the maximum allowable setting.
48	Modbus Comm Fault	Fault	The RS485 (Modbus) network information is not present or is corrupted.
49	Wait Ignition Retry	Message	Retrial for ignition.
50	WaitFault Purge	Message	Fault while purging.
51	Wait Retry Pause	Message	Pause before retrial for ignition.
52	Exhaust Temp Sensor Short	Warning	Exhaust temperature sensor is shorted.
53	Exhaust Temp Sensor Open	Warning	Exhaust temperature sensor is open or missing.
54	Warning Exhaust Temp High	Warning	Exhaust temperature is getting high.
55	Exhaust Temp High	Fault, Reset	Exhaust temperature is too high.

TABLE 6: Fault Codes			
Code	**Message**	**Message Type**	**Description**
56	Inlet Water Temp Sensor Short	Warning	Inlet water temperature sensor is shorted.
57	Inlet Water Temp Sensor Open	Warning	Inlet water temperature sensor is open or missing.
58	Warning In Wtr Temp High	Warning	Inlet water temperature is getting too high.
59	Warning In Wtr Temp Low	Warning	Inlet water temperature is getting too low.
60	Inlet Gas Press Sensor Open	Fault	Inlet gas pressure switch is open.
61	Gas Plate Dp Sensor Open	Fault	Gas plate differential pressure switch is open.
62	O2 Percentage Low	Fault	Oxygen level is too low.
63	O2 Sensor Malfunction	Fault	Oxygen sensor reading is out of range.
64	Warning O2 Level High	Warning	Oxygen level is too high.
65	Recirc Pump Failure	Fault, Reset	Heater recirculation pump has malfunctioned.
66	Ignition Monitor	Message	Waiting for proof of ignition.
67	No Flow Safety Lockout	Not used	Flow input not registering when water heater is starting up.
68	Ignition Spark Fault	Fault, Reset	No ignition current measured when igniter is energized.
69	Pre Ignition	Message	Waiting for SSOV to prove open.
70	Cleaning Igniter	Message	Ignition transformer is energized with SSOV closed.
71	Too Many Cycles In 24 Hours	Fault	The number of cycles in 24 hour period has been exceeded.
72	Too Many Ovrtmps In 24 Hours	Fault	The number of over temperature events in 24 hour period has been exceeded.
73	Air Sensor Fault	Fault	The inlet air sensor is out of range.
74	Auto Diagnostic Mode ACTIVE	Message	Informational message.
75	Auto Diagnostic Mode COMPLETED	Message	Informational message.
76	Auto Diagnostic Mode ABORTED	Message	Informational message.
77	DHW Heating Active	Message	Domestic Hot Water is enabled. Message shows when in combo mode with a fault in the drive signal.
78	Water Heater Cooling Off	Message	Informational message during slow shutdown mode.
79	WHM Network Temp Sensor Fault	Fault	The WHM Modbus header temperature sensor is out of range.
80	WHM Network Temp Com Fault	Fault	The WHM Modbus failed to read the header temperature sensor.
81	WHM Local Header Sensor Fault	Fault	The WHM direct connected header temperature sensor is out of range.
82	WHM Net Outdoor Sensor Fault	Fault	The WHM Modbus connected outdoor air temperature sensor is out of range.
83	WHM Net Outdoor Com Fault	Fault	The WHM Modbus device failed to read the outdoor air sensor.
84	WHM Local Outdr Sensor Fault	Fault	The WHM direct connected outdoor air temperature sensor is out of range.
85	WHM Client Com Fault	Message	Communication between WHM Manager and WHM Client failed
86	O2 Cal Purge	Message	O2 Purge in progress
87	Auto Calibration In Progress	Message	Auto Calibration In Progress
88	Autocal Finished	Warning	Autocal Finished
89	O2 Sensor Out Of Range	Warning	O2 sensor reading is out of range
90	O2 Warning Service Required	Message	O2 service is required
91	Wait Sensor Warm-up	Warning	O2 sensor is warming up
92	Air Pump Failed O2 Trim Disabled	Fault	O2 Trim was disabled due to air pump failure (BMK 5000-6000 only)

TABLE 6: Fault Codes			
Code	**Message**	**Message Type**	**Description**
93	onAER Communication failed	Warning	onAER communication failed
94	Isolation Valve Stuck Open	Warning	Isolation Valve Stuck Open
95	Isolation Valve Stuck Closed	Fault	Isolation Valve Stuck Closed
96	Maintenance Overdue	Warning	Periodic maintenance is overdue
97	Maintenance Due Soon	Warning	Periodic maintenance will be due soon
98	BAS System Disable	Warning	BAS system is disabled
99	Delta-T Activated	Warning	Delta-T is activated
100	Delta-T Shutdown	Warning	Delta-T has shutdown
101	BackUp Manager is not Compatible	Warning	Designated WHM BackUp Manager is not compatible
102	IO Board Communication Failed	Warning	Communication with the I/O board failed
103	Not Applicable		
104	Not Applicable		
105	No BAS Communication	Warning	No communication from the Building Automation system after a period of 5 minutes
106	Warm Weather Shutdown	Warning	WHM warm weather shutdown warning
107	Warm Weather Shutdown	Warning	Standalone warm weather shutdown warning
108	DHW Header Temp over BAS Fault	Warning	BAS failed to update the DHW temperature periodically
109	WHM Header Temp over BAS Fault	Warning	BAS failed to update the WHM header temperature periodically
110	Supply Return Temp over BAS Fault	Warning	BAS failed to update the supply return temperature periodically
111	Outdoor Temp over BAS Fault	Warning	BAS failed to update the outdoor temperature periodically
112	WHM Return Sensor Short Warning	Warning	WHM return sensor is shorted. Check the wirings.
113	WHM Return Sensor Open Warning	Warning	WHM return sensor is disconnected
114	DHW Header Network Sensor Fault	Warning	DHW header network sensor temperature out of range.
115	DHW Header Network Comm Fault	Warning	No communication response from the DHW header network sensor
116	Supply Return Network Sensor Fault	Warning	Supply Return Network Sensor temp out of range.
117	Supply Return Network Comm Fault	Warning	No communication response from the supply return network sensor
120	Low Stack Temp Shutdown	Fault	Stack Guard temperature is below Stack Guard Low Limit
122	Stack Guard Sensor Short	Warning	Stack guard sensor is shorted
123	Stack Guard Sensor Open	Warning	Stack guard sensor is not installed