

Operation Manual

Edge[®] X Controller for Benchmark[®] E Electric Boilers

Other documents for this product include:

- OMM-0173, Edge X Communications Manual
- OMM-0169 BMK E - Installation, Startup, Operation and Maintenance Manual



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IMPORTANT

Read this Manual **BEFORE** using this equipment. Failure to read and follow all safety and use information can result in death, serious personal injury, property damage, or damage to the equipment.

Keep this Manual for future reference.

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SECTION 1: INTRODUCTION

This manual provides a guide to the **Edge X Controller** used on the **Benchmark E Electric Boiler** and the external sensors and devices that can interface to the unit using the boiler's Input/Output (I/O) Box.

1.1 Safety Precautions and Warnings

It is imperative that the initial startup of **Benchmark E** units be performed by factory trained personnel. Operation prior to initial startup by factory trained personnel will void the equipment warranty. In addition, the following **WARNINGS** and **CAUTIONS** must be observed at all times.

CAUTION!

All initial installation procedures must be completed before starting the unit.

⚡ ELECTRICAL HAZARD WARNING ⚡

Electrical voltages in Benchmark E boilers may include **480 or 600 volts AC**. Therefore, these units must be serviced only by factory certified service technicians.

Due to high electrical voltage the front door of the unit must always be closed during operation.

Opening the front door shuts down unit operation but does **not** completely remove high voltage from the unit. Be sure the main power switch is de-activated and locked out before servicing the unit.

⚠ WARNING!

Never dry fire the unit! Starting the unit without a full water level can seriously damage the unit, may result in personnel injury or property damage, and will void any warranty.

1.2 Downloading the Latest Firmware

As AERCO continuously implements improvements to the Controller firmware, it is possible the firmware on your boiler may be out of date. You must update the firmware to the latest version before using the Edge Controller for the first time (see [Section 9.2](#)).

SECTION 2: EDGE X CONTROLLER FRONT PANEL

The Edge X Controller’s front panel consists of six LEDs, a 7-segment digital display, a touchscreen display, three soft keys and an Enable/Disable button:



Figure 2-1: Edge X Controller Front Panel

2.1 LEDs

LED	Description
FAULT	Indicates a FAULT condition
DEMAND	Indicates a demand for heat
MANAGER	Indicates the Manager of a cascade of units
CASCADE COMM	Indicates active communication between the Manager unit and its Client units
BAS COMM	Indicates unit is communicating with Building Automation System (BAS)
PREDICTIVE MAINTENANCE	<i>This feature will be available in a future release</i>

2.2 7-Segment Display Messages

Message	Description
Out	Outlet
###	Temperature Value
°F or °C	Degrees Fahrenheit or degrees Celsius based on user selection

2.3 Button Functionality

Name	Description
CLEAR	Clears a fault, causing the red FAULT indicator to turn off
TEST	Initiates Low Water test
RESET	Resets unit after Low Water test
ENABLE/DISABLE	Enables or disables the unit functioning

SECTION 3: EDGE X MENU STRUCTURE

Edge X controller has an intuitive user interface. The menu navigation map can be found in [Appendix J](#).

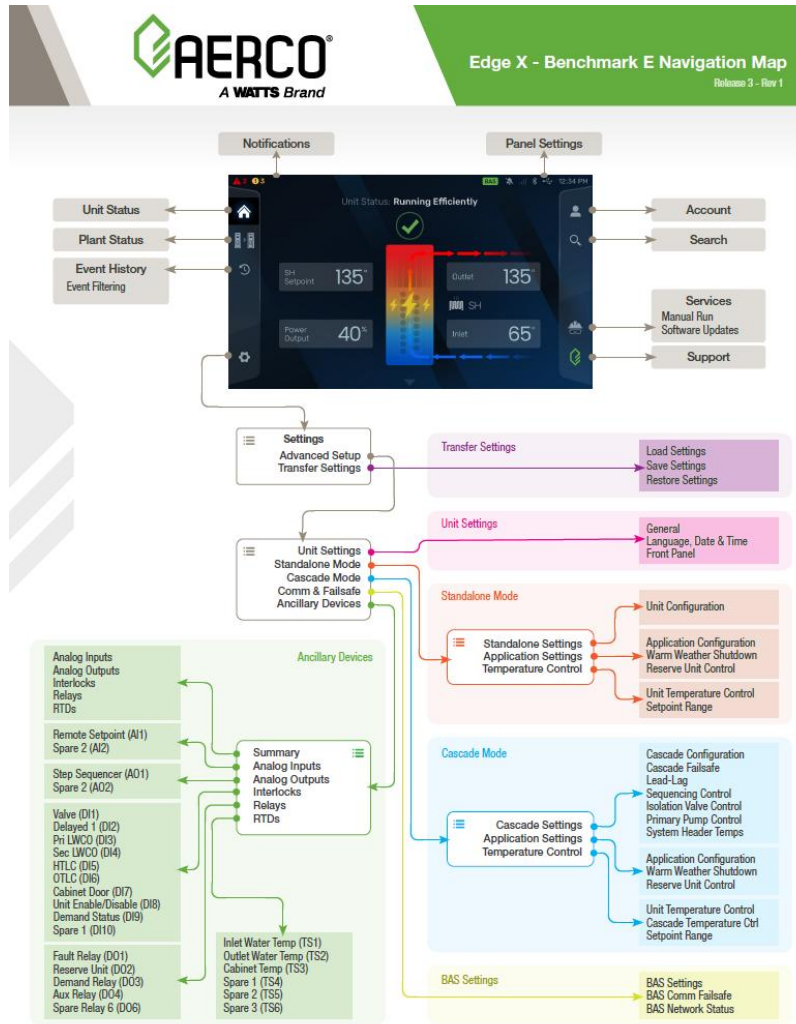


Figure 3-1: Menu Navigation Map



Figure 3-2: Notifications & Panel Settings

The menu icons on the left and right side of the controller screen are accessible from any screen. A downward-pointing arrow icon (▼) at the bottom of the page indicates the page is continued below. An upward-pointing arrow icon (▲) at the bottom of the page indicates there is a page above. Touch the arrows to access the pages.

SECTION 4: UNIT DASHBOARD

The **Unit Dashboard** screen for Benchmark E boiler provides a variety of parameters showing the status of the unit. It is the default screen for Standalone and Client units. The following fields are displayed on the first screen: **Unit Status**, **SH Setpoint**, **Power Output**, **Outlet** temperature, and **Inlet** temperature. Secondary screens accessed via the down arrow repeat some of the information from the primary screen and add other pertinent information about the unit.



Figure 4-1: Unit Dashboard: Screen 1

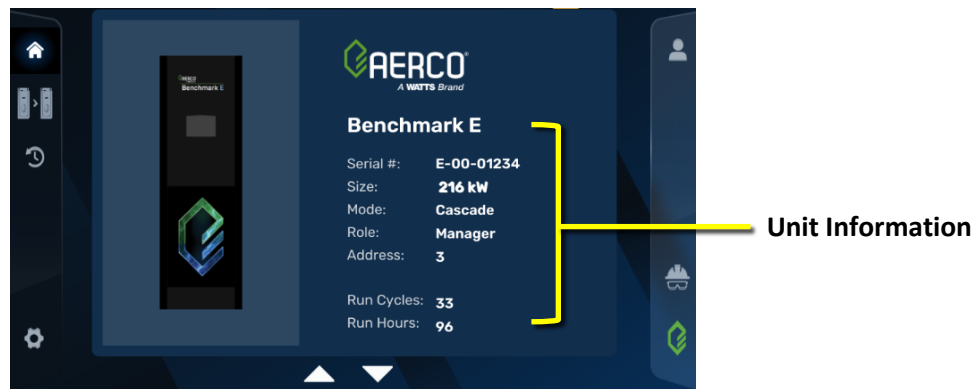


Figure 4-2: Unit Dashboard: Screen 2

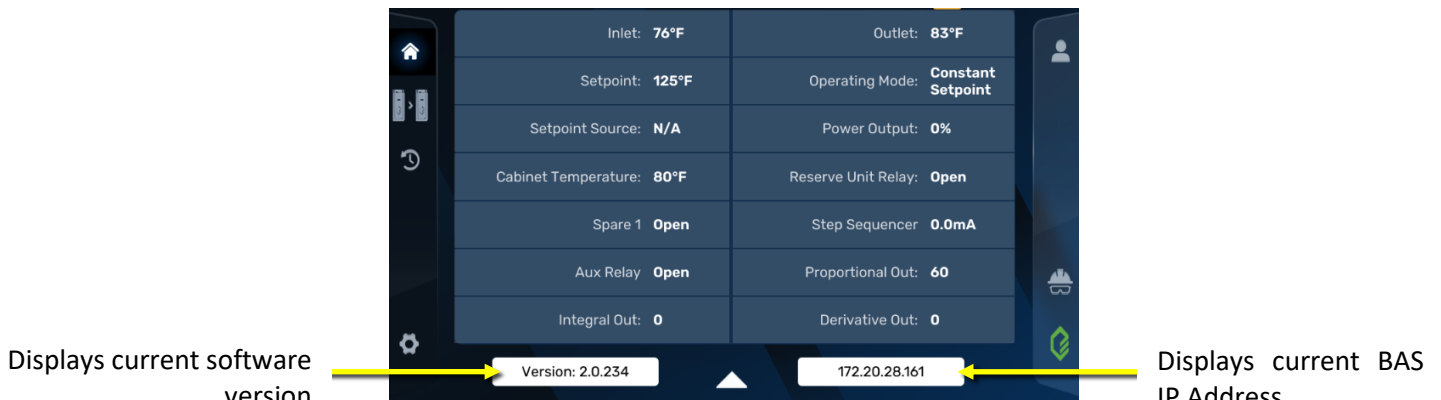


Figure 4-3: Unit Dashboard: Screen 3

The unit's operating status is displayed at the top of the Unit Status screen. In the event of an operating error, the error is displayed along with either a **Warning** or **Fault** indicator.



Figure 4-4: Unit Dashboard Screen – Running Efficiently



Figure 4-5: Unit Dashboard Screen – Warning Indicator

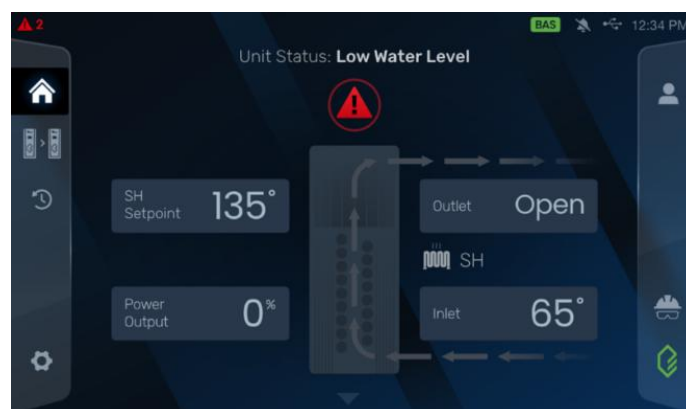


Figure 4-6: Unit Dashboard Screen – Fault Indicator

SECTION 5: PLANT DASHBOARD

The **Plant Dashboard** screen for Benchmark E boiler provides a variety of parameters showing the general status of the plant along with some status information about each unit. It is the default screen on the BMK E Manager unit. The following fields are displayed on the first screen: **Plant Status**, **Average Inlet Temperature**, **Average Outlet Temperature**, **Plant Application**, **Plant SH Setpoint**, **Plant Average Output**, and **Manager and Client Status**. The secondary screen accessed via the down arrow repeats some of the information on the primary screen and adds other pertinent information about the plant.

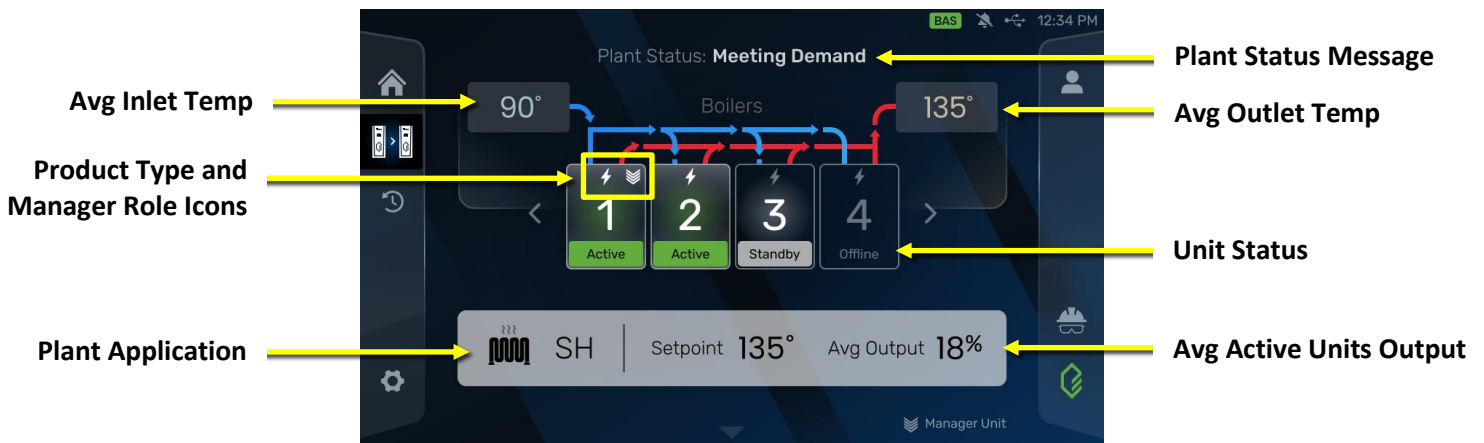


Figure 5-1: Plant Dashboard: Screen 1

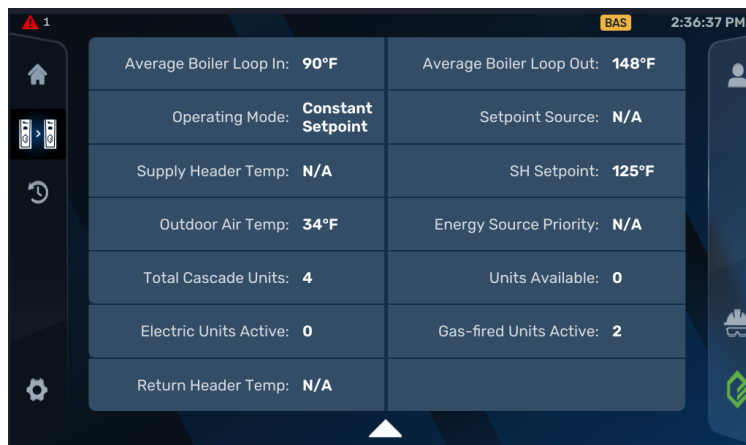


Figure 5-2: Plant Dashboard: Screen 2

The plant’s operating status is displayed at the top of the Plant Status screen. When the overall plant is operating to meet the setpoint or is meeting setpoint, the Plant Status message “Meeting Demand” is displayed. The status of each unit (Manager and Client) is shown within the boxes in the middle of the display along with its Unit Address. Active (running) units will show the white lightning symbol inside the top of its box. Inactive units (standby, faulted, and offline) will have this symbol greyed out. The manager unit will have the colonel symbol on it.

The Plant Status screen will indicate other operating information about the plant such as when a unit is being activated in the cascade. Though the plant may be meeting demand, individual units may be Disabled, Faulted, on Standby, or have a Warning message. This will be shown within the unit’s box in the middle of the display along with the number of open warnings and faults on each unit. You can go to the “Unit Status” screen of the unit for further details.

SECTION 6: EVENT HISTORY

This screen displays up to 200 of the most recent **Faults** and **Warnings**, providing a concise history of unit and plant operations. Event History under Standalone and Client units displays events related to the individual units, while Manager unit displays events related to the Manager as well as its Client unit(s). Each event has a unique **Event ID**; the **State** of the event (open or closed); a brief **Event Description**; and the event's **Date** and **Time** of occurrence. Event displayed on Manager Event History has **Unit Address** to inform on which unit that event occurred. See [Appendix H](#) for a list of fault codes.

Events are categorized into two types of alerts: **Warnings** and **Latching/Non-Latching Faults**.



Warnings

A Warning indicates that an abnormal event or condition occurred, but the unit continues to operate normally; no intervention is required.



Faults

Non-Latching 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.

Latching Fault: An abnormal event or condition occurred that caused the unit to shut down. Corrective action may be required. Once the cause of the fault is resolved, the CLEAR button on the Controller front panel must be pressed manually to restart the unit.

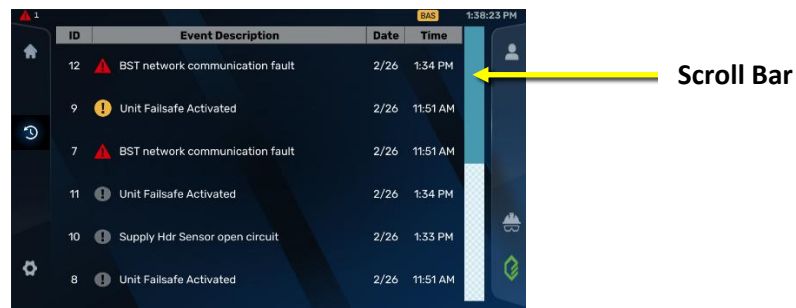


Figure 6-1: Unit Event History Screen



Figure 6-2: Manager Event History Screen

To clear an event, select it and press the CLEAR softkey. To clear all events, navigate to **Settings > Advanced Settings > Unit Settings > General > Clear Event History**.

SECTION 7: SETTINGS MENU

Settings menu includes Advanced Setup and Transfer Settings.

7.1 Advanced Setup

The Advanced Setup menu includes options for configuring **Unit Settings**, **Standalone Mode**, **Cascade Mode**, **Communication & Failsafe**, and **Ancillary Devices**.

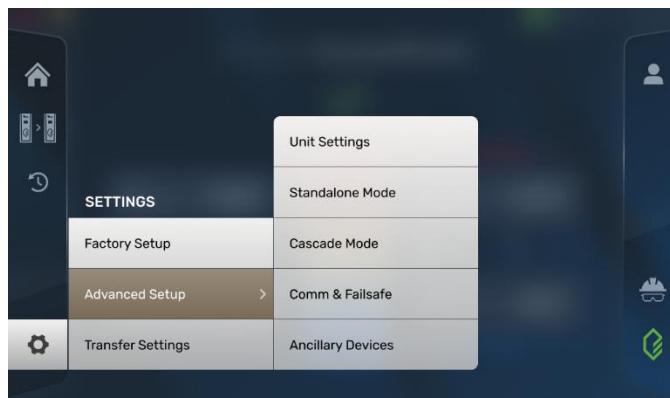


Figure 7-1: Advanced Setup Menu

7.1.1 Unit Settings

7.1.1.1 General

This page displays basic unit information and allows Clear Event History and Reset All Settings actions.

NOTE: Settings should be saved to a USB after the unit is turned on for the first time, or after the boiler has been reconfigured. This backup can be used to easily restore factory settings or a previous configuration in the event a **Reset All Settings** is performed on the unit.

7.1.1.2 Language, Date & Time

This page allows setting and adjusting language, units of measurement, date, and time parameters.

NOTE: Make sure to configure **Country** and country-specific **Time Zone** parameters before configuring **Date** and **Time**. Disable **Automatic Date & Time** to edit the date and time manually.

7.1.1.3 Front Panel

This page allows adjusting and testing the unit's display settings.

7.1.2 Standalone Mode

The settings available under **Advance Setup > Standalone Mode** menu need to be configured to run the unit in Standalone Mode.

7.1.2.1 Standalone Settings

Unit Configuration displays the current **Application** of the unit.

7.1.2.2 Application Settings

The following menu options are available under Application Settings:

- A. **Application Configuration:** This page allows configuring the **Constant Setpoint**, **Remote Setpoint**, and **Outdoor Air Reset** operating modes.

NOTE 1: Analog Input (AI1) must be set to **Remote Setpoint** under **Ancillary Devices** to get setpoint for the **Remote Setpoint > Analog Input** operating mode.

NOTE 2: When **Setpoint Source** is set to **Analog Input**, the **Signal Type** must match the DIP switch setting on MCB.

NOTE 3: **Spare 1 (TS4)** must be configured for **Outdoor Air Temperature** function under **Advanced Setup > Ancillary Devices > Temperature Sensors** for the Outdoor Air Reset mode.

- B. Warm Weather Shutdown:** The **Warm Weather Shutdown (WWS)** feature can be activated or deactivated from this screen. When activated, you can select the Outdoor Air Temperature (Warm Weather Shutdown Threshold) above which you want the unit to go into standby. You can also set a Warm Weather Shutdown Hysteresis - how many degrees below the WWS Threshold you want the unit to be active again.

NOTE: The Outdoor Air Temp Sensor Source must be configured in **Settings > Advanced Setup > Ancillary Devices > Temperature Sensors > Spare 1 (TS4) > Function**.

- C. Reserve Unit Control:** This page allows to activate and configure Reserve Unit Control feature. It is used to enable a spare boiler or spare boiler plant to provide extra heat when the plant is not able to reach setpoint, or to provide emergency heat if the plant is shut down due to a fault. It uses the Reserve Unit Relay (DO2).

NOTE: Reserve Unit O/P must be configured in **Ancillary Devices > Relays > Reserve Unit (DO2)**.

7.1.2.3 Temperature Control

The **Temperature Control** menu items can be used to fine-tune the temperature responsiveness and limitations under which the unit operates.

- A. Unit Temperature Control:** Includes options for Proportional Band, Integral Gain, and Temperature High Limit parameters.
- B. Setpoint Range:** The Setpoint Range and a daily Setback Schedule can be enabled on this screen. This allows one to set a Setback Setpoint temperature during certain times of the day or night. Outside of this time range, it will run based on the normal Operating Mode.

7.1.3 Cascade Mode

The settings available under **Settings > Advanced Setup > Cascade Mode** menu need to be configured for each unit in a boiler plant to run as a Cascade Manager or Cascade Client.

For **Cascade Mode** to be active, you must first access the **Settings > Advanced Setup > Standalone Mode > Standalone Settings** menu and enable the **Cascade Mode** toggle. Hit the “X” at the top right corner to come out of the menu and then select **Settings > Advanced Setup > Cascade Mode**.

NOTE: Isolation Valve/Primary Pump, OAT sensor, Supply system header sensor must be pre-configured in the Ancillary Devices menu before they can be activated in the Cascade Mode menu.

Hybrid Cascade – A hybrid cascade plant contains a combination of Electric (BMK E) and Gas-Fired (BMK) boilers. The BMK E boiler (with Edge X controller) must be the Manager in a hybrid cascade plant. A BMK boiler (with an Edge[i] or Edge[ii] controller) cannot be used as the manager of a hybrid cascade. A typical hybrid cascade setup is shown in the diagram below.



Figure 7-2: Hybrid Cascade Plant with BMK E Manager and BMK E and BMK Clients

The **Lead-Lag** feature allows selecting the type of unit - Electric or Gas-Fired, that should take precedence to run. The **Sequencing Control** allows you to configure the Power Output % or Fire Rate % thresholds for each type of unit that needs to be considered when adding a new unit of that type to the cascade or removing one.

NOTE 1: A **system header temperature sensor** connected to the BMK E Manager is **required** for normal functioning of cascade and hybrid cascade. If not available, the cascade will go into failsafe.

NOTE 2: Refer to Edge Controller Operation Manual OMM-0139 to configure natural gas BMK client unit.

7.1.3.1 Cascade Settings

The following menu options are available under Cascade Settings:

- A. Cascade Configuration:** This page allows to configure a unit as a Manager or a Client. Only one Manager can be configured on a cascade of up to 16 units (including manager unit). The Manager will command the client units as needed to meet the demand.

The Manager Address may default to 0 but should be adjusted to between Unit Start Address and Unit End Address. The range of units can only be set by the Manager.

Select **Minimum Valves Open** (default = 1) to match desired number of valves to stay open when demand is low to avoid exceeding maximum allowable flow through individual boiler(s).

When configuring a cascade client, select **Client** under Unit Role and then input a unique Address within the range set on the cascade Manager screen

NOTE 1: BMK E needs to be the Manager in the hybrid cascade of BMK E and BMK units.

NOTE 2: The Manager unit is also a Client unit.

NOTE 3: Ensure Cascade is set up for correct number of units and every unit is addressed uniquely.

NOTE 4: Baud Rate on all units in the plant must be same.

- B. Cascade Failsafe (Manager only):** A failsafe operation must be selected on the Manager unit, in case it loses any external signal or communication with the external setpoint source. That signal loss may be a Remote Setpoint, an Outdoor Air Temperature (OAT) sensor, or BAS.

- C. Lead-Lag (Manager only):** The Lead-Lag sequencing of the units in the plant must be set on this page. The default selection is **Run Hours** which will select the unit with the minimum Run Hours when a standby unit is asked to run. When the lead unit has exceeded another by the hours set, it will shut down and allow that unit to take the lead.

For a Hybrid Cascade, when Energy Source is chosen, the unit types of the particular energy source selected – Electric or Gas – will have precedence and run first while still following the run hours logic within the energy source selected.

D. Sequencing Control (Manager only):

- **Next On Threshold:** The Electric Next On Threshold (Power Output % for Electric client) or Gas Next On Threshold (Fire Rate % for Gas-Fired client) above which the Manager will call for another unit to start will be set on this screen.
- **Next Off Threshold:** The Electric Next Off Threshold or Gas Next Off Threshold at which Manager will call for a running unit to shut down will be set on this screen.

NOTE: For a Hybrid Cascade be sure to set the thresholds for both types of client units.

- **Next Off Delay:** The Next Off Delay is the time to wait for the plant to settle after shutting down a unit, before the manager can shut down another. If the Outlet temperature of the unit reaches the Temperature High Limit, this will take precedence and shut the unit down.
- **Cascade On Timeout:** This is the maximum time to allow a unit to start up before calling for the next unit in the startup sequence to run.

- E. Isolation Valve Control: This page provides Isolation Valve Control and Isolation Valve Feedback information once they are assigned under Ancillary Devices.** Enabling Isolation Valve Feedback lets you program the **Feedback Timer**.

NOTE 1: Isolation Valve Control must be configured in **Ancillary Devices > Analog Outputs > Spare 2 (AO2)** menu.

NOTE 2: The Isolation Valve Feedback must be configured in the **Ancillary Devices > Analog Inputs > Spare 2 (AI2)** menu.

- F. Primary Pump Control:** This screen is only active when “**Var Pri Pump Ctrl**” or “**Primary Pump SW**” is selected in Ancillary Devices > Analog Outputs > Spare 2 (AO2) or Ancillary Devices > Digital Outputs > Spare 6 (DO6), respectively. Configure the primary unit pump as needed.

G. System Header Temperatures (Manager only): Selects system header temperature source.

- **Supply System Header Temperature** must first be selected in Ancillary Devices > Temperature Sensors > Spare 2 (TS5) for it to be functional on this screen. Its source – Direct – can be selected here or it can be turned off.
- **Return System Header Temperature** must first be selected in Ancillary Devices > Temperature Sensors > Spare 3 (TS6) for it to be functional on this screen. Its source – Direct – can be selected here or it can be turned off.

7.1.3.2 Application Settings (Manager Only)

Allows the user to configure the **Operating Mode** and the following available system applications:

- A. Application Configuration:** This page allows **Operating Mode** selection and configuration for the plant on the Manager. The three current modes of operation are **Constant Setpoint**, **Remote Setpoint**, and **Outdoor Air Reset (OAR)**.

NOTE 1: Analog Input (AI1) must be set to **Remote Setpoint** under **Ancillary Devices** to get setpoint for the Remote Setpoint > Analog Input operating mode.

NOTE 2: When **Setpoint Source** is set to **Analog Input**, the **Signal Type** must match the DIP switch setting on MCB.

NOTE 3: Spare 1 (TS4) must be configured for **Outdoor Air Temperature** under **Settings > Advanced Setup > Ancillary Devices > Temperature Sensors** for Outdoor Air Reset mode.

- B. Warm Weather Shutdown:** Warm Weather Shutdown (WWS) can be activated or deactivated from this screen. When activated, users can select the Outdoor Air Temperature (Warm Weather Shutdown Threshold) above which the plant should go to standby. May set a Warm Weather Shutdown Hysteresis - how many degrees below the WWS Threshold the plant should be active again.

NOTE: The Outdoor Air Temperature sensor source must be configured in **Settings > Advanced Setup > Ancillary Devices > Temperature Sensors > Spare 1 (TS4) > Function**.

- C. Reserve Unit Control:** This page allows to activate and configure Reserve Unit Control feature. It is used to enable a spare boiler or spare boiler plant to provide extra heat when the plant is not able to reach setpoint, or to provide emergency heat if the plant is shut down due to a fault. It uses the Reserve Unit Relay (DO2).

NOTE: The Reserve Unit O/P must be configured in Ancillary Devices > Relays > Reserve Unit (DO2).

7.1.3.3 Temperature Control

- A. Unit Temp Control and Cascade Temp Control:** The basic temperature control operation of a unit (as a Manager or Client) uses PI (Proportional Band and Integral Gain). Considering Manager is also a Client, the PI used for the Manager when it has to control itself as a Client is programmed on the Unit Temp Control screen. The Temperature High Limit is the temperature above which a unit must go to standby. It will recycle after it cools down at least 5 degrees below this temperature.
- B. Cascade Temperature Control:** The PI used by the Manager to control the cascade of boilers is programmed under Cascade Temp Control.
- C. Setpoint Range:** The Setpoint Range that the unit is allowed to run within is set on this screen. A daily Setback Schedule can also be enabled on this screen. This allows one to set a Setback Setpoint temperature that is desired during certain times of the day or night. Outside of this time range, it will run based on the normal Operating Mode.

7.1.4 Communication & Failsafe

7.1.4.1 BAS Settings

Refer to Edge X Communication Manual OMM-0173 on how to commission BACnet IP and MSTP protocols.

7.1.4.2 BAS Comm Failsafe

The **BAS Comm Failsafe** option specifies how the unit will operate when a Remote Signal is lost, and the unit has to operate independently. If **Constant Setpoint** is selected, the unit will fall back into a constant setpoint mode of operation with the setpoint defined in **Failsafe Setpoint** setting. If **Shutdown** is selected, the until will fall back into a standby state until communication is reestablished.

7.1.5 Ancillary Devices

This menu allows input and output configurations of supplementary equipment connected to the unit, including Analog I/Os, Digital I/Os, and Temperature sensors. See [Appendix D](#) for a list of I/Os.

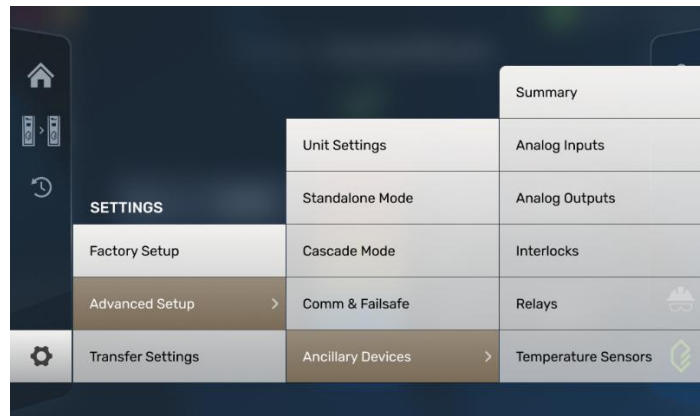


Figure 7-3: Ancillary Devices

NOTE: Some analog inputs and outputs on the controller must be configured for proper performance.

7.1.5.1 Summary

This page displays a list of all ancillary devices with their current values and statuses.

7.1.5.2 Analog Inputs

There are two channels of analog inputs available. Each analog input can be set to a Voltage or Current **Signal Type**. Each signal type has its own customizable mapping of minimum to maximum signal/threshold. This process can be repeated for all available analog inputs. The “Name” of all analog inputs can be customized.

These channels are dedicated to functions as shown below:

Analog Input	Default Function	Instruction
AI1	Unassigned	Can be configured for Remote Setpoint
AI2	Unassigned	Can be configured for Isolation Valve FB

NOTE 1: Signal Type (Voltage or Current) must match DIP switch setting on MCB.

NOTE 2: AI2 should be configured per isolation valve or primary pump in use. For the Belimo isolation valve provided by AERCO for BMK E (PN: 92084-12), feedback should be configured for 0.5-5V.

NOTE 3: If reliable feedback or external instrumentation indicates the reading is inaccurate, you can adjust its reading via the signal level parameter.

7.1.5.3 Analog Outputs

There are two channels of analog outputs available. Like analog inputs, analog outputs can be set to a Voltage or Current **Signal Type**. These channels are dedicated to functions as shown below:

Analog Output	Default Function	Instruction
AO1	Step Sequencer	Default function; settings configurable
AO2	Unassigned	Can be set for Isolation Valve Ctrl or Var Pri Pump Ctrl

NOTE 1: The Signal Type (Voltage or Current) must match DIP switch setting on MCB.

NOTE 2: AO2 should be configured according to the isolation valve or primary pump in use. For the Belimo isolation valve provided by AERCO for Benchmark-E (PN: 92084-12), control signal should be configured for 0.5-10V.

7.1.5.4 Interlocks

The Controller offers ten interlocks. These channels are dedicated to functions as shown below:

Digital Inputs	Default Function	Instruction
DI1	Remote Interlock 1	Default settings; no configuration needed
DI2	Delayed Interlock 1	Default settings; Aux Delay can be configured
DI3	Primary Low Water Cut-off	Default settings; no configuration needed
DI4	Secondary Low Water Cut-off	Default settings; no configuration needed
DI5	High-Temperature Limit Control (HTLC)	Default settings; no configuration needed
DI6	Operating Temperature Limit (OTLC)Control	Default settings; no configuration needed
DI7	Cabinet Door Switch	Default settings; no configuration needed
DI8	Demand Relay Status	Default settings; no configuration needed
DI9	Unit Enable/Disable SW	Default settings; no configuration needed
DI10	Unassigned	Can be configured for Pri Pump SW FB

NOTE:DI1-DI9 must be in the closed position for the unit to operate.

7.1.5.5 Relays

The Controller offers five relays. These channels are dedicated to functions as shown below:

Digital Outputs	Default Function	Instruction
DO1	Fault Relay	Default function; settings configurable needed
DO2	Reserve Unit	Default function; settings configurable
DO3	Demand Relay	Default function; settings configurable
DO4	AUX Relay	Default function; settings configurable
DO6	Unassigned	Can be configured for Pri Pump SW Ctrl

7.1.5.6 Temperature Sensors

The Controller offers six Resistance Temperature Detector (RTD) type temperature sensors. These channels are dedicated to functions as shown below:

Temperature Sensor	Default Function	Instruction
TS1	Inlet Water Temp	Default function; settings configurable
TS2	Outlet Water Temp	Default function; settings configurable
TS3	Cabinet Temp	Default function; settings configurable
TS4	Unassigned	Can be assigned to Outdoor Air Temp
TS5	Unassigned	Can be assigned to System Header Temp
TS6	Unassigned	Can be assigned to Return Header Temp

NOTE 1: TS1, TS2, and TS3 should be left in their default factory settings.

NOTE 2: OAT, System Header Temp, and Return Header Temp sensors must be wired to the Edge X IO board before configuring Outdoor Air Temperature, System Header Temp, and Return Header Temp functions for Spare 1 (TS4), Spare 2 (TS5), and Spare (TS6) under Ancillary Devices.

7.2 Transfer Settings

The Edge X Controller includes functionality for saving and loading a backup of all user-configurable parameters via a USB device plugged into the side of the Controller.

7.2.1 Save Settings

AERCO recommends using this option periodically to avoid needing to reconfigure the original setup.

NOTE: Each unit produces a setup file with a unique name based on the unit's serial number. If that setup file has already been saved, this step will overwrite it!

7.2.2 Load Settings

Once saved, the complete setup can be easily recovered by loading settings from the USB if the settings on the unit are lost or corrupted, through hardware malfunction or operator error.

7.2.3 Restore Settings

This feature will be available in a future release.

SECTION 8: ACCOUNT

The Edge X Controller has multiple access levels to prevent unwanted configuration changes.

Level	Access Code	Description
Basic User	None	The default, read-only level that allows basic access. No password is required.
Trained Technicians (TTs)	Received upon TT training completion	Includes all Basic User permissions as well as unit configuration capabilities.
Master Trained Technicians (MTTs)	Received upon MTT training completion	Includes all TT permissions as well as advanced features.

To enter an access code, go to **Account > Access**. Type in the code then press **Enter**. If correct, the user is given the corresponding access level which is displayed under Access.

Selecting **Logout** will remove the current access level and revert to **Basic User** access. When the unit enters sleep mode, the access permission reverts to **Basic User** access.

SECTION 9: SERVICES

The Services menu is used to service the individual unit, such as testing or checking unit operation, updating software on the unit and performing routine maintenance.

9.1 Manual Run

Manual Run allows the unit's power output to be controlled manually when testing or checking unit operation. When enabled, a yellow "Manual Run" banner will appear at the top of **Unit Dashboard**, **Plant Dashboard**, and **Event List** pages.

Raising or lowering the Analog Output value will raise or lower the Power Output of the unit.

CAUTION!

The unit will NOT follow normal operation while in Manual Run mode. Ensure adequate flow to prevent potentially hazardous over temperature condition.

If the unit is left in manual run and the controller screen is not touched for an extended period (30 minutes), the controller will automatically exit manual operation and return to automatic (normal) operation.

9.2 Software Updates

To update the Application Firmware or Operating System (OS) Software, the latest software package must first be downloaded from the Watts LMS to an external computer and then saved to a USB (Version 2.0 or higher) flash drive. Follow the steps below to update the software:

1. Disable the Unit by using the Enable/Disable switch.
2. Insert USB with latest software into the J3 connector on the MCB of the Controller (see [Appendix B](#)).
3. Go to **Service > Software Updates > Application & OS Update**; follow the on-screen prompts.
4. The unit will auto-restart after an Application Firmware update. A manual restart (power cycle) is required to complete the OS software update.

NOTE 1: Do not power cycle the unit until after restart.

NOTE 2: The "Update" button will be greyed out until a USB drive with a valid Application Firmware or OS Software file is detected.

SECTION 10: EDGE REPLACEMENT

⚡ ELECTRICAL HAZARD WARNING ⚡

Electrical voltages in Benchmark E boilers may include **480 or 600 volts AC**. Therefore, these units must be serviced only by factory certified service technicians. Opening the front door shuts down unit operation but does **not** completely remove high voltage from the unit. Be sure the main power switch is de-activated and locked out before servicing the unit.

1. Download the latest OS Software and Application Firmware to a USB Flash Drive (see [Section 9.2](#)).
2. Make sure all power to the boiler is disabled and the Edge X controller is off.
3. Open the front door of the boiler and insert the USB Flash Drive into the controller.
4. Close the front door and restore power to the boiler.
5. Enable the boiler using the Enable/Disable switch on the front panel of the Edge X controller.
6. Go to **Account > Access**. Log in with a TT or MTT access code, then press **Enter** (see [Section 8](#)).
7. Save current unit settings to the USB (see [Section 7.2.1](#)). This step is required before loading all or common settings to the new or repurposed controller.
8. Disable the boiler using Enable/Disable switch on the front panel of the Edge X controller.
9. Turn off all power to the boiler.
10. Make sure all power to the boiler is disabled and the Edge X controller is off.
11. Open the front door of the boiler and replace the Edge X controller or board(s), as needed.
12. Insert the USB Flash Drive into the controller.
13. Close the front door and restore power to the boiler.
14. Enable the boiler using the Enable/Disable switch on the front panel of the Edge X controller, if needed.
15. Go to **Account > Access**. Log in with a TT or MTT access code then press **Enter**.
16. To update software, go to **Services > Software Updates** and select **Update** under **Unit Operating System Software**. After updating, re-enter the TT or MTT access code in **Account > Access**.
17. If a firmware update is necessary, select **Update** under **Unit Application Firmware**. Once the update is complete, re-enter the TT or MTT access code in **Account > Access**.
18. If the Edge controller is being repurposed from an existing unit, make sure to reset all settings by going to **Settings > Advanced Settings > Unit Settings > General**.
19. Go to **Settings > Transfer Settings > Load Settings > USB**, to load settings, if desired. For previously saved settings file or if a controller is being replaced, select **Load Settings**.
20. To update settings, go to **Settings > Advanced Settings > Unit Settings**. If the Edge controller is being repurposed from an existing unit, select **Clear Event History**. Review and update other Unit Settings, if applicable.
21. To update Standalone Mode settings, go to **SETTINGS > Advanced Settings > Standalone Mode**.
22. To update Cascade Mode settings, go to **SETTINGS > Advanced Settings > Cascade Mode**.
23. To update Communication & Failsafe settings, go to **Advanced Settings > Comm & Failsafe**.

24. To review and update Ancillary Device settings go to **Advanced Settings > Ancillary Devices**.
25. Run boiler to test the unit operation and configuration.
26. After successful test run, clear faults by pressing the CLEAR Softkey on the controller front panel.

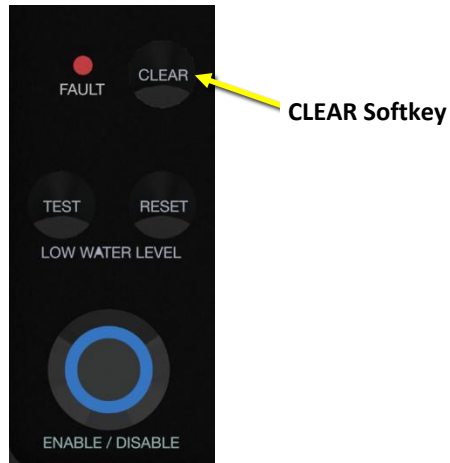


Figure 10-1: Clear Softkey

27. Make sure to logout by going to **Account > Logout** to log out of TT/MTT access.

APPENDIX A – ABBREVIATIONS & MENU ITEM DESCRIPTIONS

Common Abbreviations

Abbreviation	Term	Description
BAS	Building Automation System	A system that monitors and controls systems such as lighting, air conditioning, heating, ventilation, and air conditioning.
EMS	Energy Management System	A system that connects a building’s systems (lighting, HVAC, etc.) to create a single, central platform to manage energy consumption.
LWCO	Low Water Cutoff	A device that prevents a burner from firing in low- or no-water.
OAR	Outdoor Air Reset	An operating mode in which the Setpoint value is defined by OAT
OAT	Outdoor Air Temperature	The temperature of the air surrounding (outside of) the building.
RTD	Resistance Temperature Detector	A sensor used to measure temperature whose resistance changes when its temperature changes.
SSR	Solid State Relay	Electronic switching device used to modulate a 36kW element group.
MCB	Microcontroller Board	Edge Controller Microcontroller Board
IOB	Input/Output Board	Edge Controller Input/Output Board
OS	Operating System	Essential software managing Edge Controller hardware and software resources. It controls processors, memory, and storage, while enabling applications to run.
OTS	Off-the-Shelf	Off-the-shelf (OTS) products are pre-made, ready-to-use software or hardware components available for purchase by the general public, designed to meet standard needs without custom development.

Menu Item Descriptions

Menu Item	Description
Automatic Date & Time	Disable to edit the date and time manually
AUX Relay	Displays the state of the AUX relay
Auxiliary Delay	Specifies the amount of time to wait between activating the Aux Relay (due to a demand) and checking the pre-purge string to start the unit
Cabinet Temperature	Displays the temperature value inside the cabinet
Clear Event History	Clears all events on Event History screen. Do NOT clear except when replacing the controller
Comm Address	For RS-485 communications (0-127). RS232 should have its own password
Constant Setpoint	Used when a fixed header temperature is desired, i.e. for water source heat pump loops and indirect heat exchangers for potable hot water systems or processes
Controller Model	Displays current controller model
Country	Select unit location; selected option dictates available time zones
Date and Time	Allows user to set the date and time manually
Derivative Time	This value responds to the rate of change of the setpoint error. This is the time that this action advances the PID temperature output. If the value is increased, the PID acts slower. If this value is decreased, the PID acts faster.
Energy Source	Specifies source of energy for unit. For BMK E, it is Electric by default
Mode (Failsafe Mode)	This setting is applicable when the operating mode is set to Remote Setpoint in the Application Settings menu. If there is a loss of communication the unit will revert to the selected failsafe mode until communication is reestablished.
Failsafe Setpoint	If the selected failsafe Mode is constant setpoint, this is the active setpoint if there is a loss of communication in the Remote Setpoint signal
Inlet	Displays the temperature of the water entering the unit
Integral Gain	This sets the fraction of the PID temperature output, due to setpoint error, to add or subtract from the output each minute to move towards the setpoint. If the value is increased, the integral portion of the PID acts faster. If the value is decreased, the integral acts more slowly.
Language	The language option currently available is English
Network Timeout	Specifies the timeout value before a Modbus Fault is declared
OAR Max Outside Temp	Maximum outside temperature that will change the setpoint of the outdoor reset function
OAR Max Setpoint	The maximum allowable setpoint when in OAR operating mode

APPENDIX

OAR Min Outside Temp	Specifies minimum air temp unit will read; interacts with OAR Max Setpoint
OAR Min Setpoint	The minimum allowable setpoint when in OAR operating mode
Operating Mode	Displays current mode (Constant Setpoint, Remote Setpoint, or Outdoor Air Reset).
Outdoor Air Reset (OAR)	As the outside air temperature decreases, the supply header temperature will increase and vice versa. For this mode, it is necessary to install an outside air sensor.
Outdoor Air Temperature	Displays the current outdoor air temperature reading
Outlet	Displays the temperature of the water exiting the unit
Product Type	Displays AERCO products, BMK E
Proportional Band	Adjustment of the PID temperature output control based on error between setpoint temperature and actual outlet temperature. If value is increased, the proportional portion of the PID acts more slowly; if decreased, the proportional acts faster.
Remote Setpoint	The unit's setpoint can be remotely controlled by an Energy Management System (EMS) utilizing either a current or voltage signal level
Reserve Unit Enable and Disable Threshold	The Power Output level above which the Reserve Unit engages and below which the Reserve Unit deactivates.
Reserve Unit Relay	Displays the current state of the Reserve Unit relay (see Section 7.1.3)
Reset All Settings	Resets all settings and restores default values. Do NOT use except when replacing Controller.
Run Cycles	Displays number of run cycles since last system reset. Can be reset to 0 (or any other number)
Run Hours	Displays number of run hours since last system reset. Can be reset to 0 (or any other number)
Serial Number	Displays unit's factory-set serial number in a unique format of Z-YY-XXXX. Do NOT change except when replacing Controller. Z = a letter specific to Benchmark E boilers; YY = two-digit year; XXXX = 4-digit serial number.
Setback Schedule	This feature can be used to reduce the setpoint during periods of low use. This can help lower energy consumption when a building has a regular period of low demand. For example, an office building may have no occupancy from the hours of 0000 to 0500. For best comfort, it is recommended that the Setback Setpoint is no more than 5 to 10°F below normal setpoint, and to end the Setback period at least one hour before the demand returns to normal levels.
Setback Setpoint	The setpoint temperature the unit maintains within the setback schedule
Setback Start Time	The time that the Setback Schedule begins
Setback Stop Time	The time that the Setback Schedule ends
Setpoint Hi Limit	Used to set the maximum allowable setpoint (Setpoint Lo Limit up to 240°F)
Setpoint High Limit	If the operating mode is constant setpoint, this option allows the user to limit how high the unit's setpoint can be set in the Application Settings menu
Setpoint Lo Limit	Used to set the minimum allowable setpoint (40°F up to Setpoint Hi Limit)
Setpoint Low Limit	If the operating mode is constant setpoint, this option allows the user to limit how low the unit's setpoint can be set in the Application Settings menu
Setpoint Source	Used to set type of external signal used when operating in the Remote Setpoint
SH Setpoint	The target temperature value that the unit or plant aims to reach and maintain. To adjust setpoint see Application Settings .
SSR	Allows configuration with or without SSR. Change ONLY if updated by factory
Temperature High Limit	The temperature limit feature that will shut down the unit and generate an event if the actual outlet temperature exceeds this setting
Temperature Sensor	Specifies the sensor type (PT1000 = default) on the current units
Time Format	Select 12- or 24-hour format
Time Zone	Based on the Country selected, specific time zones will be available
Unit of Measurement	Choose English (°F, gpm, in. W.C., psi) or Metric (°C, lps, Pa). The LED indicator displays either °F or °C accordingly
Unit Size	Displays available sizes for given Product Type. Do NOT change except when replacing the Controller. Options are 216kW, 360kW, 432kW, 576kW, and 684kW.
Unit Voltage	480V or 600V
Warm Weather Shutdown	The outside temperature threshold above which the unit goes into standby

APPENDIX B - MICROCONTROLLER BOARD (MCB; 64180 REV C)

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, as seen below in Figure E-3, the MCB contains:

- A USB port (J3) for firmware upgrades,
- An ethernet port for network/BACnet IP communication (J5),
- Configuration switches for analog input (SW1/SW5) and analog output (K1/K2), and the MODBUS biasing and termination dipswitches for the Cascade (SW2) and BAS communication (SW5) chains

(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 Edge X 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.

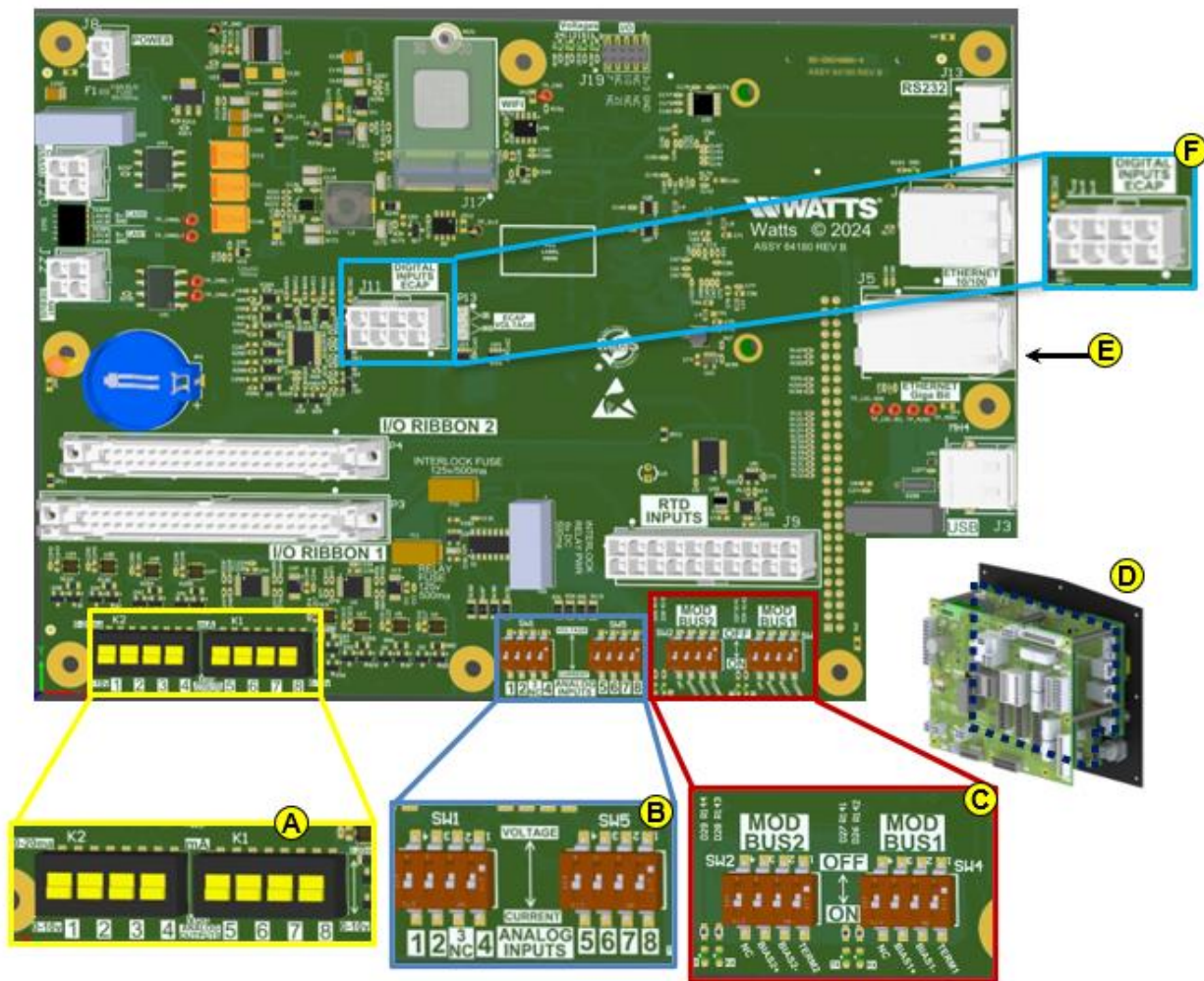


Figure B-1: Edge X MCB (64180 Rev C)

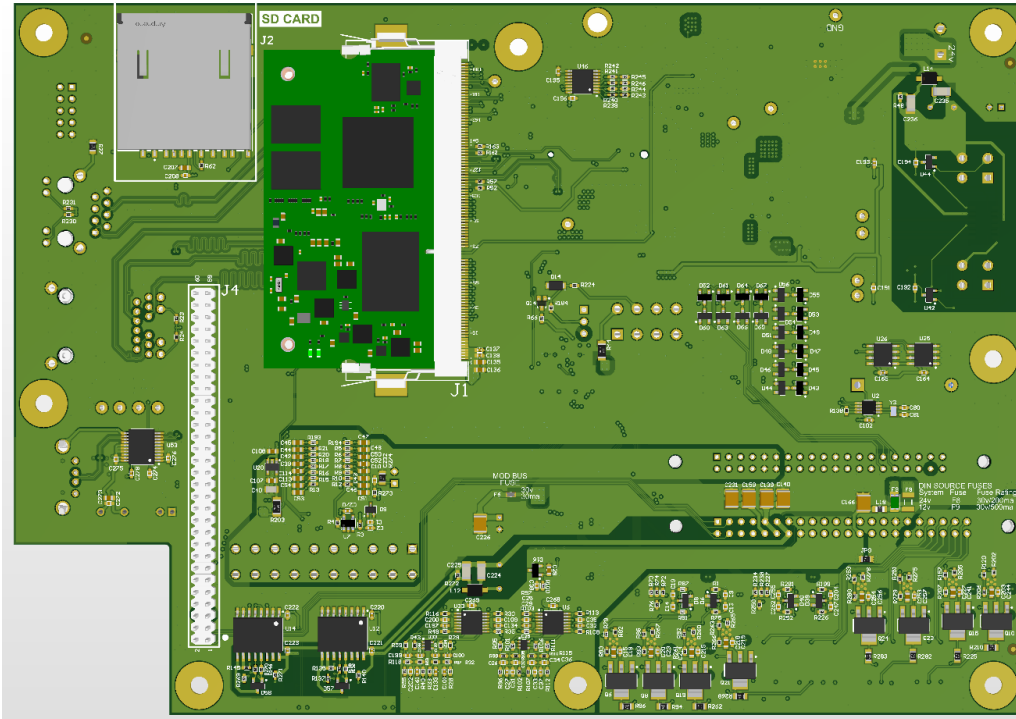


Figure B-2: Edge X MCB; Front View

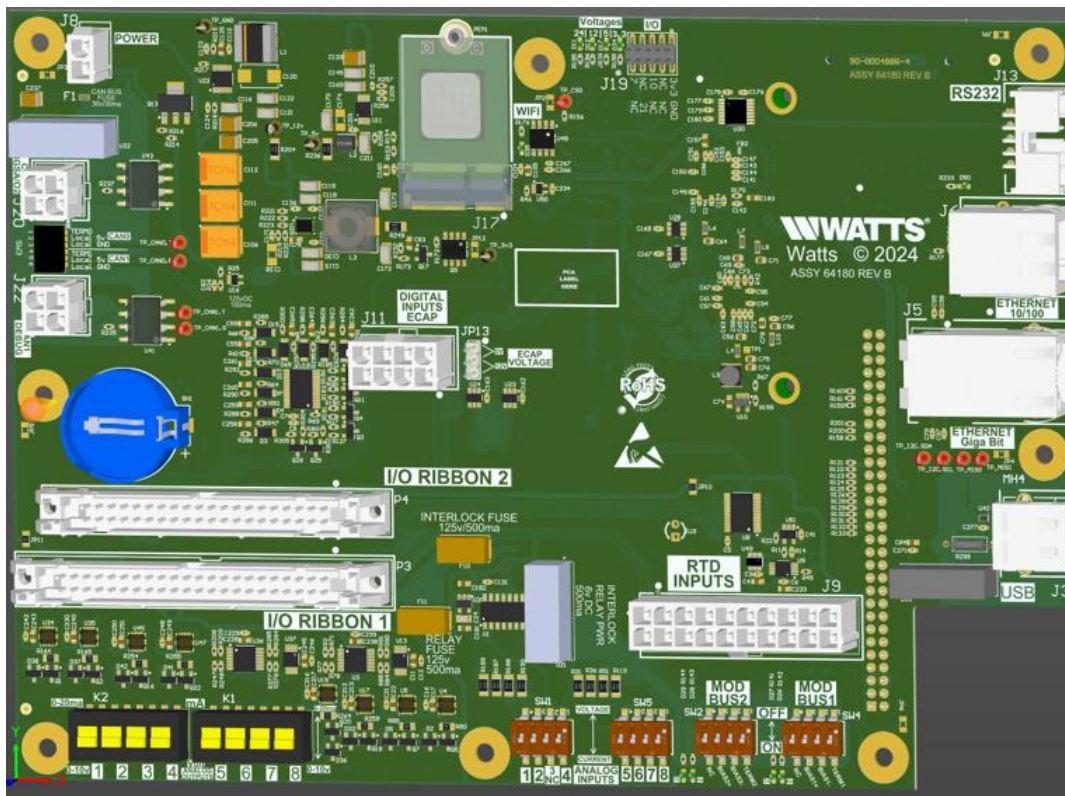


Figure B-3: Edge X MCB; Back View

B.1 Analog Outputs Configuration

The figure below shows dipswitch banks K2/K1 which are programmable to 0-10V or 0-20mA analog output. Switch K2-1 is factory configured for analog output 1 for the proportional sequencer. Analog output 2 is dedicated to dip switch K2-2 for **Isolation Valve** or **Variable Primary Pump Control** (I/O Board J13P4, 16) and requires configuration in accordance with the isolation valve and primary pump in use. **For the Belimo isolation valve provided by AERCO for Benchmark-E (PN: 92084-12), dip switch K2-2 should be set to “voltage.”** The other dip switches can be left in their default position. NOTE that Analog Outputs configured on these dip switches also require configuration in the Edge X controller as per [Section 7.1](#).

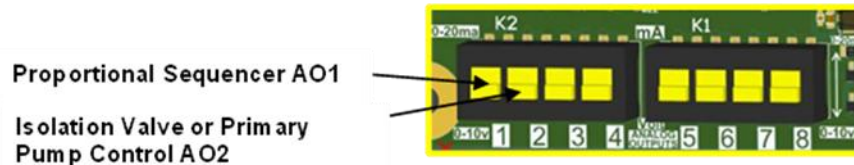


Figure B-4: Analog Output Configuration Switches K2/K1

B.2 Analog Inputs Configuration

The figure below shows dipswitch banks SW1/SW5. On SW1, switch 1 (SW1-1) is dedicated to analog output 1, which is the Remote Setpoint (I/O Board J18P1,9) whereas switch 2 (SW1-2) is dedicated to analog output 2, which is Isolation Valve Feedback or Variable Primary Pump Feedback (I/O Board J18P3,11). When programming analog inputs such as Remote Setpoint or Isolation Valve/Var Pri Pump Feedback, the corresponding dip switches must be configured per the specific site application. For example: a site whose BAS is sending a remote setpoint as a current should have SW1-1 set to “Current.” Similarly, dip switch SW1-2 must be configured for isolation valve feedback in accordance with the isolation valve feedback signal type. For the Belimo isolation valve provided by AERCO for Benchmark-E (PN: 92084-12), dip switch SW1-2 should be set to “voltage.”

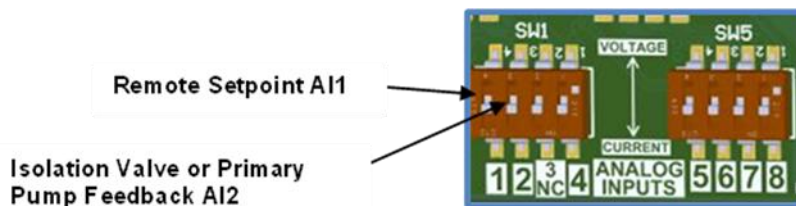


Figure B-5: Analog Input Configuration Switches SW1/SW5

APPENDIX C - INPUT/OUTPUT BOARD (IOB; 64188 REV A)

The IOB is the outermost board in the assembly on the Edge X controller. Field-wiring of relays, interlocks, communication (RS485), analog inputs, and analog outputs are wired to this board.

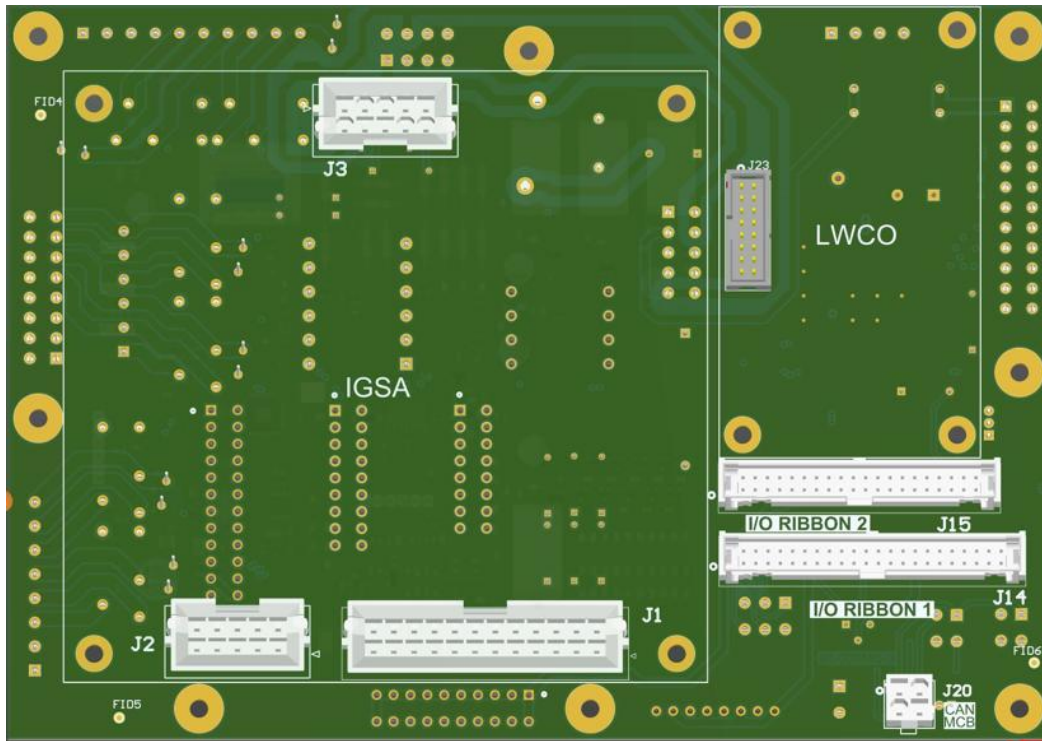


Figure C-1: I/O Board; Front View

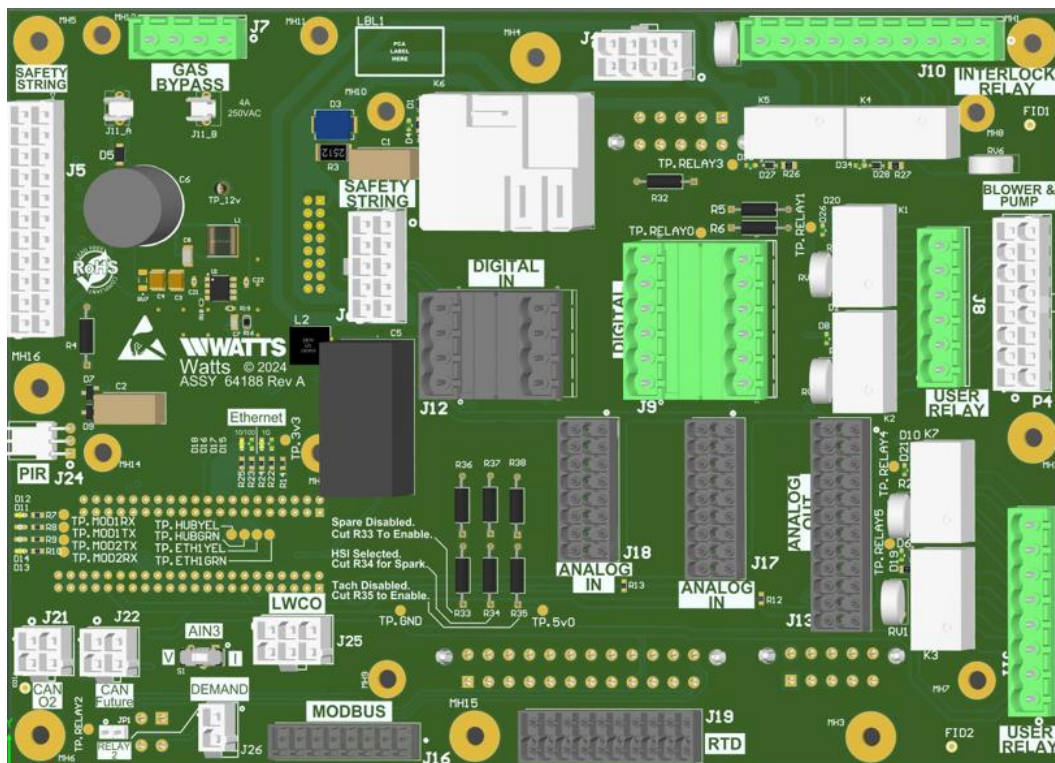


Figure C-2: I/O Board; Back View

APPENDIX D – FIELD INPUT/OUTPUT WIRING AND LIST

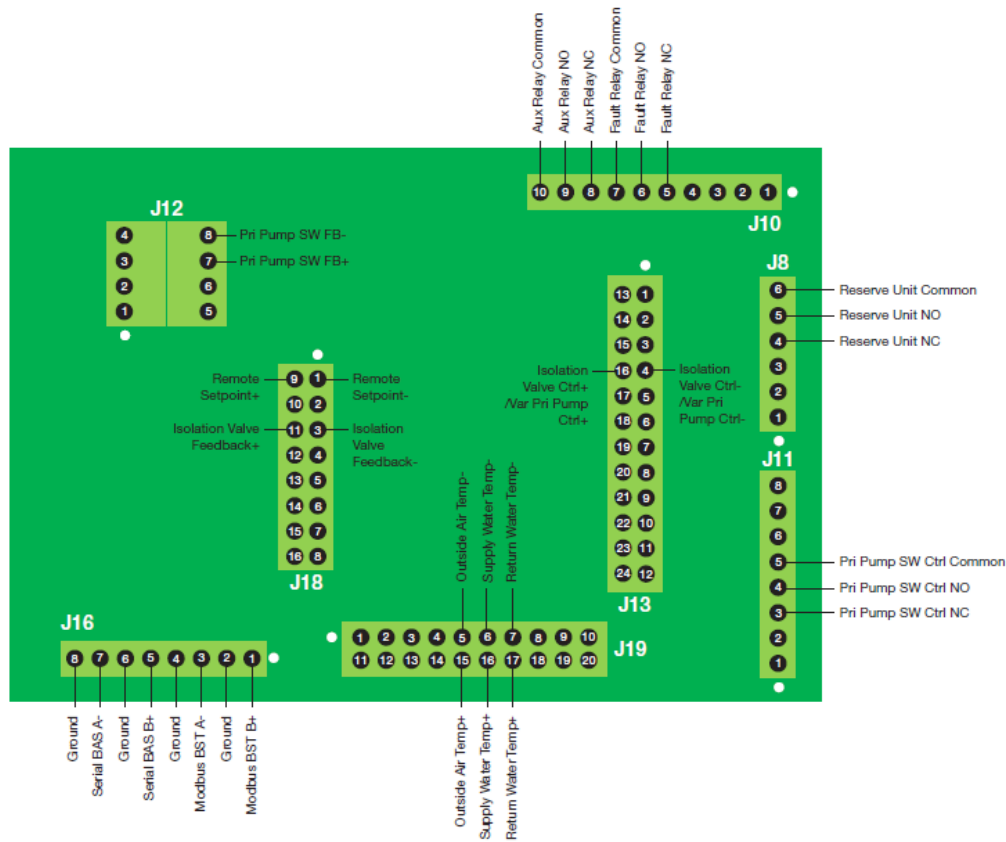


Figure D-1: I/O Board (64188 Rev A) showing only field-wiring terminal connections

Field Wiring Terminals	Terminal Pin Assignments
Terminal strips J8, J10, and J11 contain relay connections	<p>J8-P4,5,6 are available for Reserve Unit Control output signal.</p> <p>J10-P5,6,7 are available for Fault Relay output signal.</p> <p>J10-P8,9,10 are available for Aux Relay output signal.</p> <p>J11-P3,4,5 are available for Primary Pump Switch Control signals.</p>
Terminal strip J12 contains digital input connections	<p>J12-P7,8 are available for Primary Pump Switch Feedback signals.</p> <p>NOTE:For Edge X IO board 64188 Rev A and MC board 64180 Rev C, jump a 18-20 AWG wire between IO board J12-P7 and MC Board J11-P3 before wiring Isolation Valve Switch Feedback or Primary Pump Switch Feedback signals on to the IO board J12-P7,8. Refer to Appendix D for detailed instructions.</p>
Terminal strip J13 contains analog output connections	<p>J13-P4,16 are available for Isolation Valve Control or Primary Pump Control signals.</p> <p>NOTE that Analog Output must be configured (see Section 7.1)</p>
Terminal strip J18 has analog input connections	<p>J18-P1,9 are available for Remote Setpoint signal as current or voltage.</p> <p>J18-P3,11 are available for Isolation Valve Feedback or Primary Pump Feedback signals.</p> <p>NOTE that Analog Input must be configured (see Section 7.1)</p>
Terminal strip J19 has temperature sensor connections	<p>J19-P5,15 are available for Outdoor Air Temperature sensor (for outdoor air reset).</p> <p>J19-P6,16 are available for System Header Temperature sensor.</p> <p>J19-P7,17 are available for Return Header Temperature sensor.</p>

APPENDIX

BMK E Edge X: Input/Output Channels with Associated Functions (IOB 64188 Rev A)					
IOs	Functions	Signal Type	Units	Board	Connector-Pin#
AI1	Remote Setpoint	0-20mA / 0-10V	mA/V	IOB	J18 PIN 9 : AIN 1 J18 PIN 1 : Ain_GND
AI2	Isolation Valve FB / Var Pri Pump FB	0-20mA / 0-10V	mA/V	IOB	J18 PIN 11: AIN 2 J18 PIN 3: Ain_GND
AO1	Step Sequencer	0-20mA / 0-10V	mA/V	IOB	J13 PIN 15 : AOUT 1 J13 PIN 14: Aout_GND
AO2	Isolation Valve Ctrl / Var Pri Pump Ctrl	0-20mA / 0-10V	mA/V	IOB	J13 PIN 16: AOUT 2 J13 PIN 4: Aout_GND
DI1	Remote Interlock 1	24VAC / VDC	Volts	IOB	J9 PIN 1 - DIGITAL_IN_1 J9 PIN 2: AIN_12/24v
DI2	Delayed Interlock 1	24VAC / VDC	Volts	IOB	J9 PIN 3 - DIGITAL_IN_2 J9 PIN 4: AIN_12/24v
DI3	Primary Low Water Cut-off (Pri LWCO)	24VAC / VDC	Volts	IOB	J9 PIN 5 - DIGITAL_IN_3
DI4	Secondary Low Water Cut-off (Sec LWCO) [OTS Board]	24VAC / VDC	Volts	IOB	J9 PIN 7 - DIGITAL_IN_4
DI5	High-Temperature Limit Control (HTLC) [Manual Clear]	24VAC / VDC	Volts	IOB	J9 PIN 9 - DIGITAL_IN_5
DI6	Operating Temperature Limit Control (OTLC) [Auto Clear]	24VAC / VDC	Volts	IOB	J9 PIN 11 - DIGITAL_IN_6
DI7	Cabinet Door Switch	24VAC / VDC	Volts	IOB	J12 PIN 1 - DIGITAL_IN_7
DI8	Demand Relay Status	24VAC / VDC	Volts	IOB	J12 PIN 3 - DIGITAL_IN_8
DI9	Unit Enable/Disabled Switch [On Edge Front Panel]	24VAC / VDC	Volts	MCB	J11 PIN 1 - DIGITAL_IN_9
DI10	Pri Pump SW FB [Remote Interlock type]	24VAC / VDC	Volts	IOB	J12 PIN 7: OVERTEMP_IN J12 PIN 8: AIN_12/24v
DO1	Fault Relay	120V AC, 10 Amp	VAC	IOB	J10 PIN 7 - IGSA_FAULT_RELAY_COM J10 PIN 6 - IGSA_FAULT_RELAY_NO J10 PIN 5 - IGSA_FAULT_RELAY_NC
DO2	Reserve Unit	120V AC, 10 Amp	VAC	IOB	J8 PIN 6 - USER_RELAY1_COM J8 PIN 5 - USER_RELAY1_NO J8 PIN 4 - USER_RELAY1_NC
DO3	Demand Relay	120V AC, 10 Amp	VAC	IOB	J8 PIN 3 - USER_RELAY2_COM J8 PIN 2 - USER_RELAY2_NO J8 PIN 1 - USER_RELAY2_NC
DO4	Aux Relay	120V AC, 10 Amp	VAC	IOB	J10 PIN 10 - AUX_RELAY_COM J10 PIN 9 - AUX_RELAY_NO J10 PIN 8 - AUX_RELAY_NC
DO6	Isolation Valve SW Ctrl / Pri Pump SW Ctrl	120V AC, 10 Amp	VAC	IOB	J11 PIN 5 - USER_RELAYS5_COM J11 PIN 4 -USER_RELAYS5_NO J11 PIN 3 -USER_RELAYS5_NC
TS1	Inlet Water Temp	Voltage	V	IOB	J19 PIN 12 - RTD_IN8 J19 PIN 2 - RTD 8 RETURN
TS2	Outlet Water Temp	Voltage	V	IOB	J19 PIN 13 - RTD_IN9 J19 PIN 3 - RTD 9 RETURN
TS3	Cabinet Temp	Voltage	V	IOB	J19 PIN 14 - RTD_IN10 J19 PIN 4 - RTD 10 RETURN
TS4	Outside Air Temp (OAT)	Voltage	V	IOB	J19 PIN 15 - RTD_IN11 J19 PIN 5 - RTD 11 RETURN
TS5	Supply Water Temp	Voltage	V	IOB	J19 PIN 16 - RTD_IN12 J19 PIN 6 - RTD 12 RETURN
TS6	Return Water Temp	Voltage	V	IOB	J19 PIN 17 - RTD_IN13 J19 PIN 7 - RTD 13 RETURN

APPENDIX E – CASCADE WIRING & CONFIGURATION

On the Edge X I/O Board connectors, pin 1 (P1) is designated by a white dot. On terminal strip J16 labelled “MODBUS”, this pin is on the right-hand side. Pins J16 P1(+) and J16 P3(-) are dedicated for Cascade connections. A back view of the I/O board showing the RS485 terminal for MODBUS protocol is shown below.

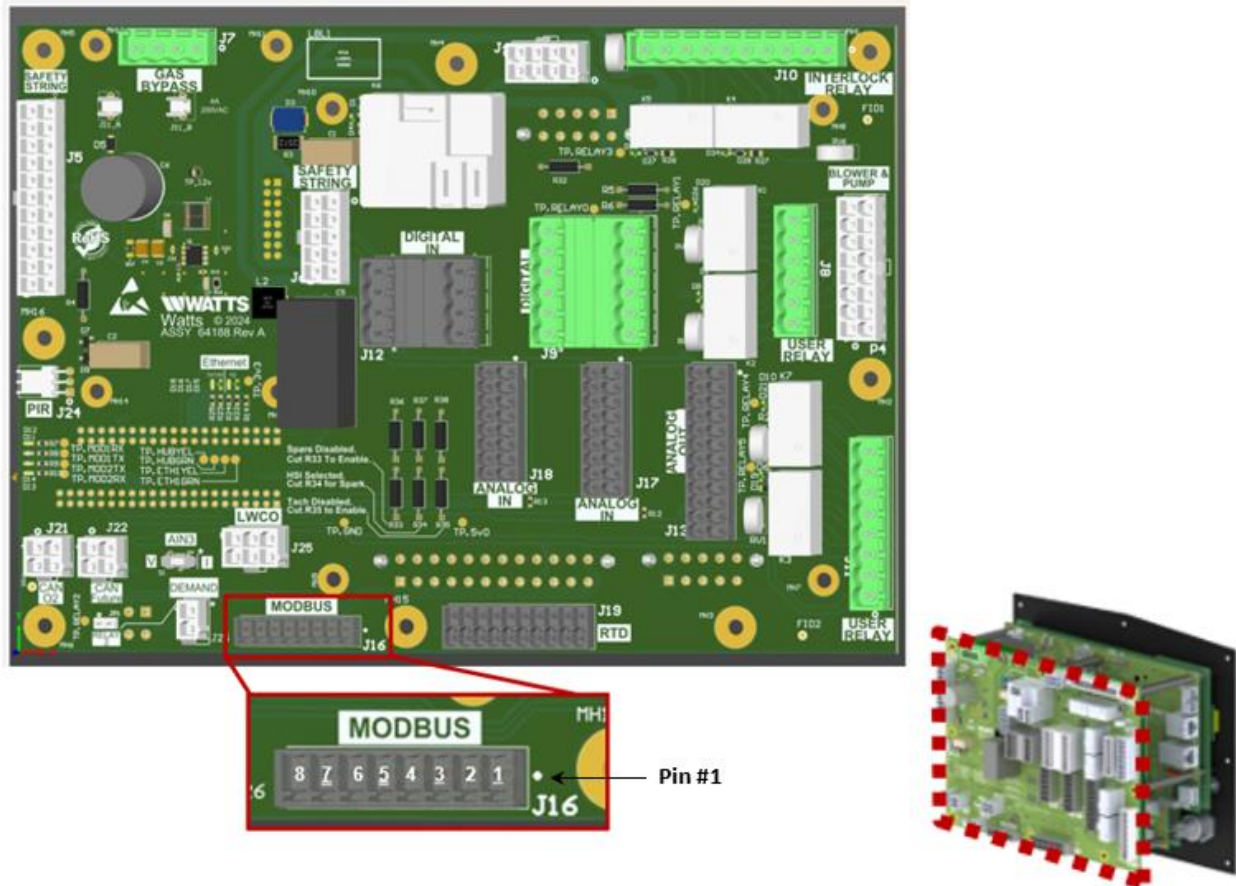


Figure E-1: Edge X I/O board (64188 Rev A) showing RS485 connection for MODBUS protocol

NOTE: The white dot denotes pin #1 and numbers on this connector increase from right to left. Pin numbers added for clarity as they do not appear on the physical board. Bottom right inset figure indicates the location of the I/O board on the back of the controller.

E.1 Cascade Communication Wiring

Edge X controllers connected for Cascade should be daisy chained together per the RS485 standard. Specifically, communication wire should run from J16P1 on one controller to J16P1 on the next controller (+ to +), and likewise for J16P3 to J16P3 (- to -), and so on.

The wiring diagram in Figure E-2 below shows a 3-unit cascade with RS485 wiring. This wiring will carry MODBUS signals from unit to unit in the cascade. For RS485 connections, twisted pair, shielded, 18-24 AWG wire is recommended per the RS485 standard. In this cascade, units 1 and 3 should be terminated (as discussed in Section 2.2.4) while unit 2 should be unterminated. NOTE that any of the units regardless of address can be assigned the cascade Manager role.

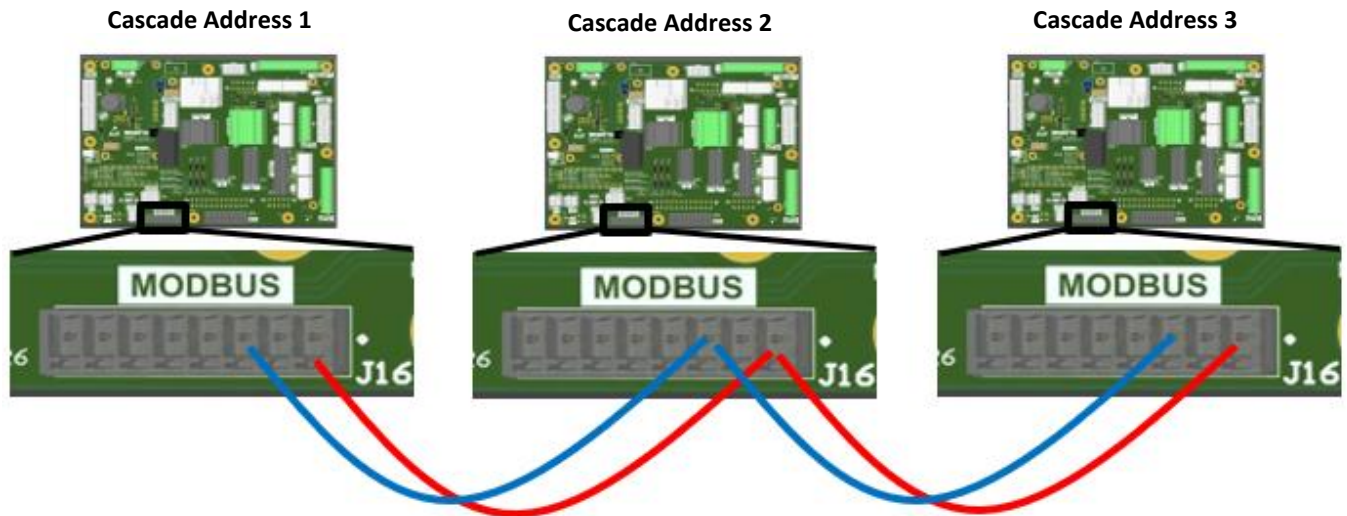


Figure E-2: RS485 daisy chain showing communication wire landings on I/O board terminal strip J16P1 (red, +) and J16P3 (blue, -)

E.2 Cascade Communication Termination

For field connection purposes, as seen below in Figure E-3, the MCB contains:

- A USB port (J3) for firmware upgrades,
- Configuration switches for the MODBUS biasing and termination dipswitches (SW2) for the Cascade chain

The figure below shows dip switch banks MODBUS2 (SW2) and MODBUS1 (SW4).

Cascade termination: 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.

NOTE: Refer to Edge X Communication Manual OMM-0173 for BAS termination.

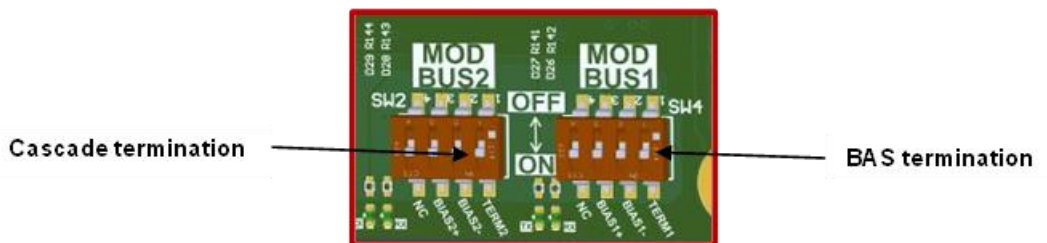


Figure E-3: Cascade and BAS Terminations

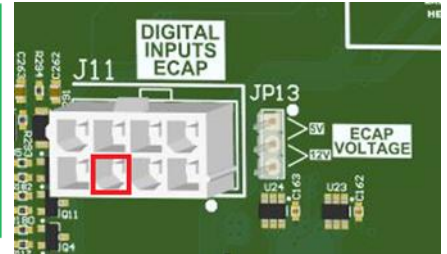
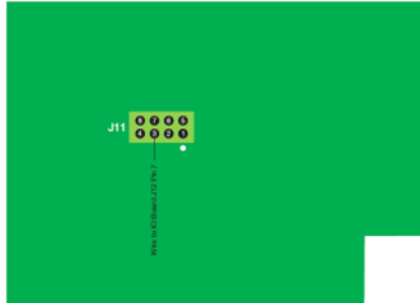
APPENDIX F – IO BOARD FIELD WIRING INSTRUCTION

Follow these instructions to wire J12 pin 7 TO MC Board J11 pin 3

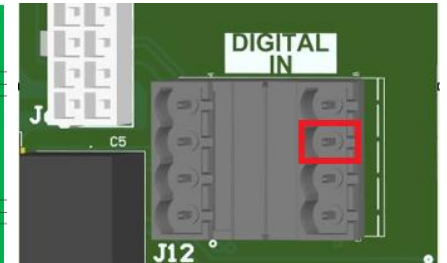
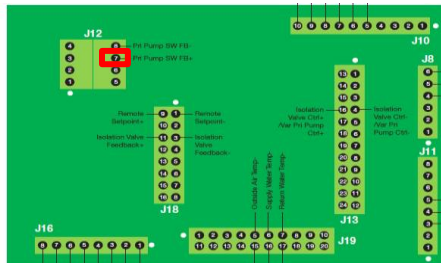
Connection: From I/O Board J12 Pin 7 to MC Board J11 Pin 3

Step 1: Identify Connection Points

1. Locate connector **J11 Pin 3** on the **Micro Control Board**. J11 Pin 3 is on the bottom row, second terminal from left.



2. Locate connector **J12 Pin 7** on the **I/O Board**. J12 Pin 7 is on the right side, second terminal from top.



Step 2: Prepare the Wire

1. Cut 18-20 AWG wire to required length ensuring adequate slack.
2. Strip insulation from both ends (5–6 mm recommended).
3. Label each end:
 - J11-3 → Primary Pump Feedback
 - J12-7 → Primary Pump Feedback Input
4. Jump the wire across J11 Pin3 [MC Board] to J12 Pin7 [I/O Board]

APPENDIX G – EDGE X STATE LIST

Code #	Applicable to	State	Description
1	BMK E & BMK	Unit Disabled	Edge controller Enable/Disable switch is set to Disabled position.
2	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 goes into standby due to failsafe 3. When Warm Weather Shutdown is enabled and Warm Weather Shutdown condition has occurred.
3	BMK E & BMK	Unit In Demand Delay	Demand delay timer is active, representing time allocated for isolation valve to open and make delayed interlock contact.
4	BMK	Purging	Displayed during the purge cycle during startup. The duration of the purge cycle counts up in seconds.
5	BMK	Ignition Trial	Displayed during ignition trial of startup sequence. The duration of cycle counts up in seconds.
6	BMK	Flame Proven	Displayed after flame has been detected for 2 seconds. Initially, flame strength is shown in %. After 5 seconds, time and date are shown in place of flame strength.
49	BMK	Wait Ignition Retry	Re-trial for ignition.
50	BMK	Wait Fault Purge	Fault while purging.
51	BMK	Wait Retry Pause	Pause before re-trial for ignition.
66	BMK	Ignition Monitor	Waiting for proof of ignition.
69	BMK	Pre Ignition	Waiting for SSOV to prove open.
70	BMK	Cleaning Igniter	Ignition transformer is energized with SSOV closed.
74	BMK	Auto Diagnostic Mode ACTIVE	Informational message.
75	BMK	Auto Diagnostic Mode COMPLETED	Informational message.
76	BMK	Auto Diagnostic Mode ABORTED	Informational message.
86	BMK	O2 Cal Purge	O2 purge in progress.
87	BMK	Auto Calibration In Progress	Auto Calibration in progress.
90	BMK	O2 Warning Service Required	O2 sensor 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 in Manual mode
-	BMK E & BMK	Starting	BMK E: Displayed during initial power up only. BMK: Displayed for 2 minutes during 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 signal from the external setpoint source.

APPENDIX H – EDGE X ALERT LIST

The Edge X controller provides the 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 standby and attempt a restart once the fault condition has cleared. Does not require a manual reset.

Fault Latching – This fault cause a standby and 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 mode (Standalone) and role (Manager & Client) that is able to publish the alert.

NOTE 2: All Manager and Client alerts are displayed on Manager Event History page (latest 200 records only).

CODE #	ALERT TYPE	ALERT MESSAGE	STANDALONE	MANAGER	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
39	Fault Non-Latching	Direct Drive Signal Fault	-	-	-	Yes

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CODE #	ALERT TYPE	ALERT MESSAGE	STANDALONE	MANAGER	CLIENT	
					BMK E	BMK
40	Fault Non-Latching	Remote Setpt Signal Fault	-	-	-	Yes
40	Warning	Remote Setpt Signal Warning	Yes	Yes	-	-
41	Fault Non-Latching	OAT Sensor Fault	-	-	-	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 Communication 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
79	Fault Non-Latching	BST Network Temp Sensor Fault	-	-	-	Yes
80	Fault Non-Latching	BST Network Temp Comm Fault	-	-	-	Yes
81	Fault Non-Latching	BST Local Header Sensor Fault	-	-	-	Yes
82	Fault Non-Latching	BST Network OAT Sensor	-	-	-	Yes

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CODE #	ALERT TYPE	ALERT MESSAGE	STANDALONE	MANAGER	CLIENT	
					BMK E	BMK
83	Fault Non-Latching	BST Network OAT Comm Fault	-	-	-	Yes
84	Fault Non-Latching	BST Local Outdr Sensor Fault	Yes	Yes	-	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
95	Fault Non-Latching	Isolation Valve Stuck Closed	-	-	-	Yes
98	Warning	BAS System Disable	-	-	-	Yes
99	Warning	Delta-T Activated	-	-	-	Yes
100	Warning	Delta-T Shutdown	-	-	-	Yes
102	Warning	IO Board Comm Failed	-	-	-	Yes
103	Warning	SH Swing Valve Fault	-	-	-	Yes
104	Warning	DHW Swing Valve Fault	-	-	-	Yes
105	Warning	No BAS Communication	Yes	Yes	Yes	Yes
106	Warning	BST Warm Weather Shutdown	-	-	-	Yes
107	Warning	Warm Weather Shutdown	Yes	Yes	Yes	-
109	Warning	System Header Temp BAS Comm Fault	-	Yes	-	-
110	Warning	Supply Return Temp BAS Comm Fault	-	-	-	-
111	Warning	OAT BAS Comm Fault	-	-	-	-
112	Warning	System Return Sensor Short Warning	-	Yes	-	-
113	Warning	System Return Sensor Open Warning	-	Yes	-	-
116	Warning	Supply Return Network Sensor Fault	-	-	-	-
117	Warning	Supply Return Network Comm Fault	-	-	-	-
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 circuit	Yes	Yes	Yes	-
305	Fault, Non-Latching	Cabinet Temp Sensor SHORT circuit	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 Fault	Yes	Yes	Yes	-
309	Warning	Enable/Disable Switch Open	Yes	Yes	Yes	-
310	Fault Non-Latching	Auto Over-temp Limit Control 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 Disabled By User	Yes	Yes	Yes	-
314	Warning	Manual Run Auto Disabled	Yes	Yes	Yes	-
315	Warning	Setback Schedule Enabled	Yes	Yes	-	-
316	Warning	Isolation Valve Stuck Open	-	Yes	Yes	-

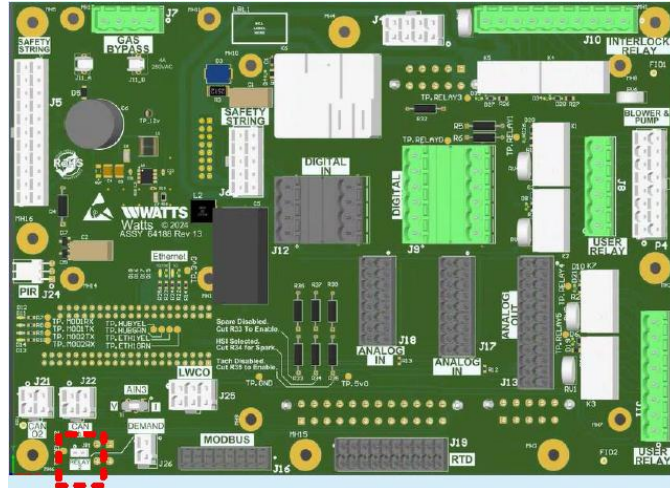
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CODE #	ALERT TYPE	ALERT MESSAGE	STANDALONE	MANAGER	CLIENT	
					BMK E	BMK
317	Fault Latching	Isolation Valve Stuck Closed	-	Yes	Yes	-
318	Warning	Reserve Unit Enabled	Yes	Yes	-	-
319	Warning	Unit Failsafe Activated	Yes	-	Yes	Yes
320	Warning	Supply Hdr Sensor short circuit	-	Yes	-	-
321	Warning	Supply Hdr Sensor Not Set	-	Yes	-	-
322	Warning	Supply Hdr Sensor open circuit	-	Yes	-	-
323	Fault, Non-Latching	Valve/Pump Not Configured	-	Yes	Yes	-
900	Fault Latching	Secondary Low Water Level	Yes	Yes	Yes	-
901	Fault Latching	Cabinet Door Open	Yes	Yes	Yes	-

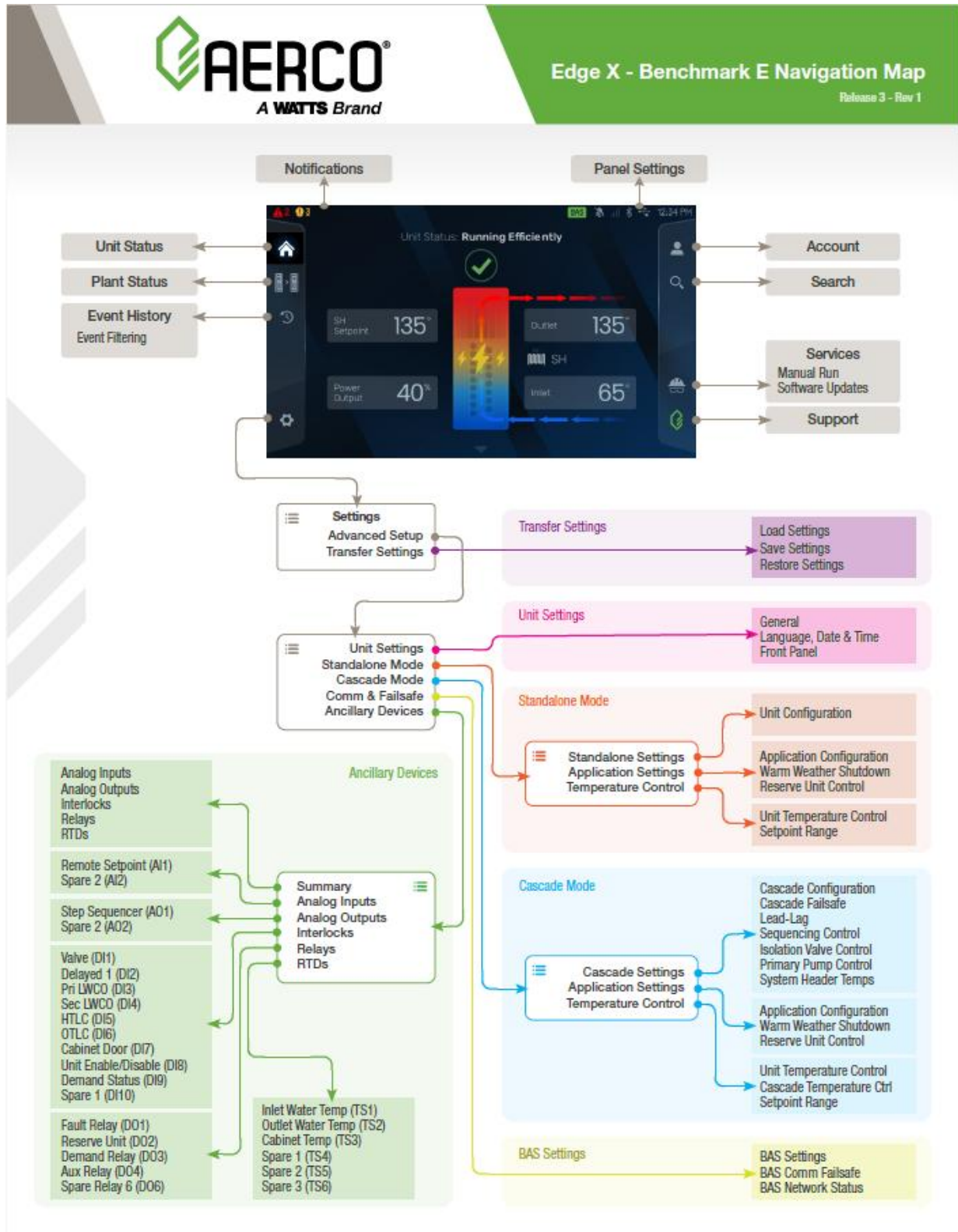
APPENDIX I - TROUBLESHOOTING

1. **Issue:** Enable/Disable button LED light stays active when unit is disabled.

Recommendation: Configure the I/O board to remove the jumper (SJ1) from the connector JP1 to disable the Enable/Disable button LED light on the front panel for Benchmark E only.



APPENDIX J – EDGE X – BENCHMARK E NAVIGATION MAP



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