PURE CONTROL®
USER MANUAL

EDR-750-1000
EDR+2500-6000
EXE-750-6000
EZE-120-600
KTV-750-2000

Version 5.0.0 or Newer

Serial/ National Board Number _____

Model _____

Fulton Order _____

Owner _____

Site Name _____

Date _____

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Overview

The Fulton PURE Control® is a feature-rich integrated boiler controller which includes robust functionality such as load control, Lead/Lag sequencing, diagnostics, and building integration. Operational information and configuration is accessed through the user-friendly touchscreen display.

This User Manual is intended for use in conjunction with the current edition of the respective boiler Installation, Operation, and Maintenance (IOM) manual. Refer to the IOM for terminology and initialism definitions.

Fulton practices continuous product improvement and reserves the right to change any part of this User Manual at any time.

When using this addendum, observe all warnings, cautions, and notes in literature, on stickers and labels, and any additional safety precautions that apply. Follow all safety codes and wear appropriate safety protection. Follow all jurisdictional codes and consult any jurisdictional authorities prior to installation.

Warnings & Cautions

WARNINGS and CAUTIONS appear in various chapters of this addendum. It is critical that all personnel read and adhere to all information contained in WARNINGS and CAUTIONS.

- WARNINGS must be observed to prevent serious injury or death to personnel.
- CAUTIONS must be observed to prevent damage or destruction of equipment or loss of operating effectiveness.

All Warnings and Cautions are for reference and guidance purposes, and do not substitute for required professional training, conduct, and strict adherence to applicable jurisdictional/professional codes or regulations.

Disclaimers and Local Codes

Installation of the equipment shall conform to all the requirements of all national, state and local codes established by the authorities having jurisdiction or, in the absence of such requirements, in the US to the National Fuel Gas Code ANSI Z223.1/NFPA 54 latest edition, and the specific instructions in this addendum. Authorities having jurisdiction should be consulted prior to installation.

When required by local codes, the installation must conform to the American Society of Mechanical Engineers Safety Code for Controls and Safety Devices for Automatically Fired Boilers (ASME CSD-1).

⚠ WARNING

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Do not install, operate, service or repair any component of this equipment unless you are qualified and fully understand all requirements and procedures.

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WHAT TO DO IF YOU SMELL GAS
• Do not try to light any appliance.
• Do not touch any electrical switch.
• Do not use any phone in your building.
• Immediately call your gas supplier from a neighbor's phone.
• Follow the gas supplier's instructions.
• If you cannot reach your gas supplier, call the fire department.

A qualified installer, service agency or the gas supplier, must perform installation and service.

Overview

PURE Control® hardware is detailed in the sections that follow.

Please be aware of which configuration has been supplied for your application.

The customer should examine the equipment for any damage. It is the responsibility of the installer to ensure all parts supplied with the equipment are fitted in a correct and safe manner.

5-Inch Control Display

The 5-inch control display platform is exclusive to Endura XE (EXE) condensing boilers. The control display hardware is shown below and described in Table 1 and Figure 1.

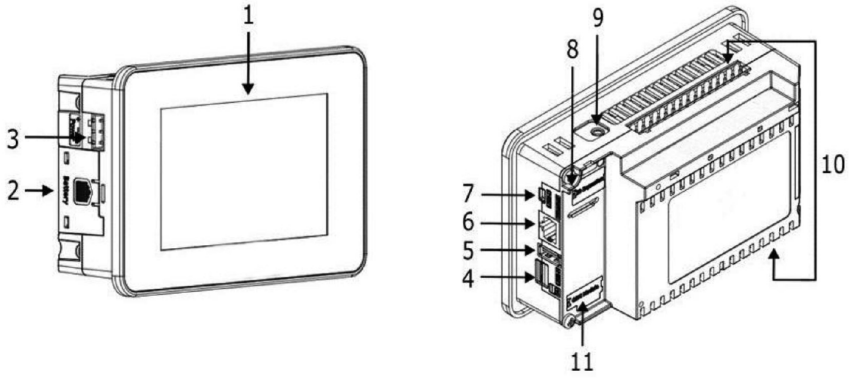

TABLE 1 - CONTROL DISPLAY HARDWARE CONNECTIONS

1	Screen Protector	A plastic sheet attached to the screen for protection. Remove it during installation of the HMI Panel.
2	Battery Cover	The battery is supplied with the unit, but must be periodically checked and replaced (CR2032).
3	24VDC Power Input	Power for the control HMI and applicable modules.
4	microSD Slot	Supports standard microSD cards.
5	USB Host Port	Provides the interface for external USB devices.
6	Ethernet Port	Provides connection for Boiler Lead Lag
7	USB Port	Use for data backup and restore as well as firmware and application software updates.
8	I/O Expansion Jack	Connection point for I/O Expansion Port.
9	Audio Jack	Allows for use of external speakers/headphones.
10	Built in I/O	Model dependent.
11	Module Jack	Connection point for up to 3 stack-on modules.

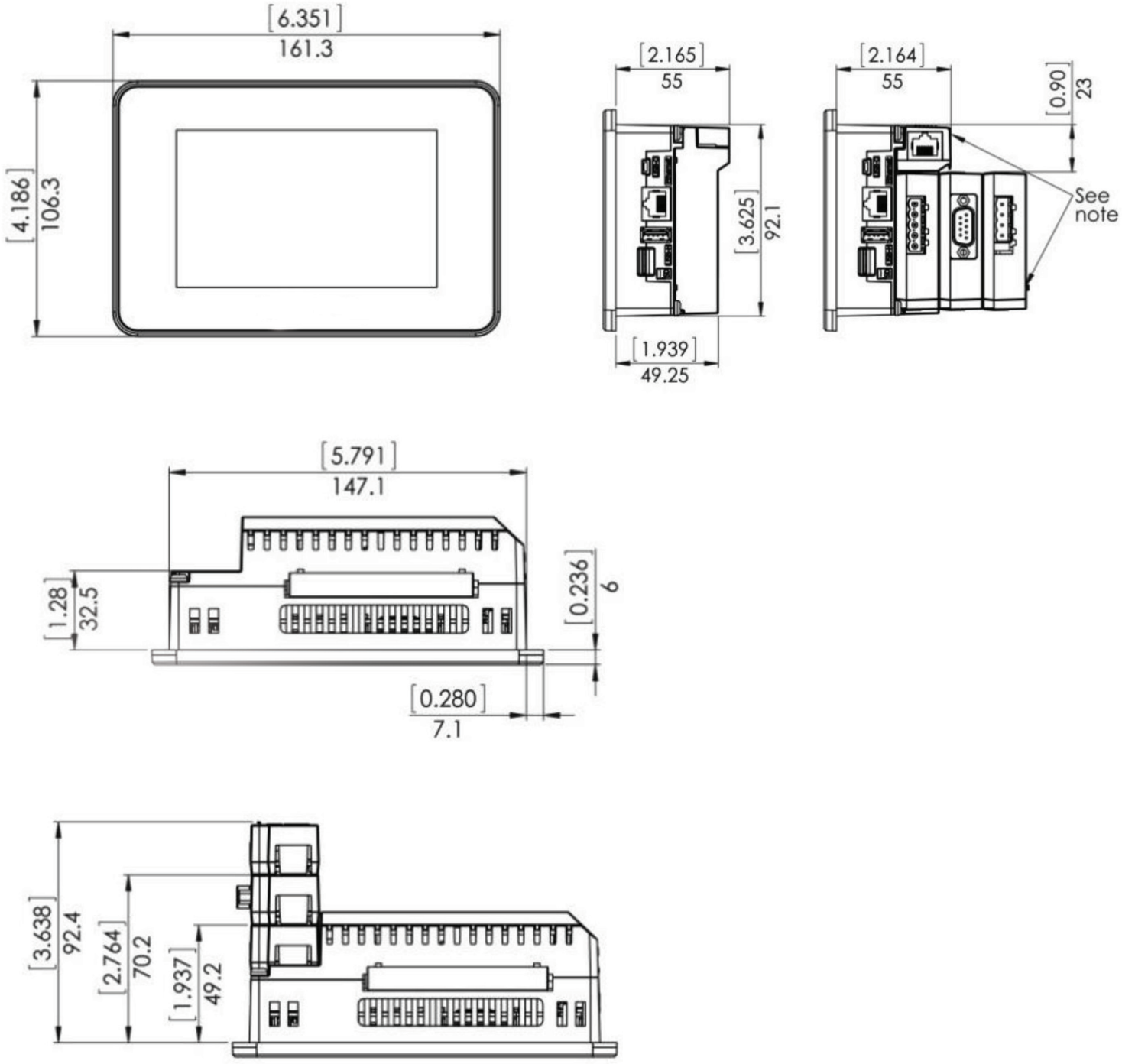

FIGURE 1 - CONTROL DISPLAY HARDWARE DIMENSIONS

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7-Inch Control Display

The 7-inch control display platform is standard on Endura (EDR) condensing boilers, Endura+ (EDR+) condensing boilers, Endura ZE (EZE) electric hydronic boilers, and Kestava (KTV) water heaters. Control display hardware is shown below and described in Table 2 and Figure 2.

The control display hardware is shown below and described in Table 2.

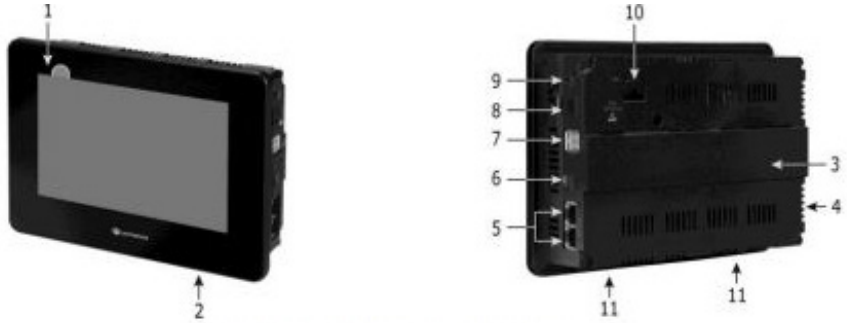
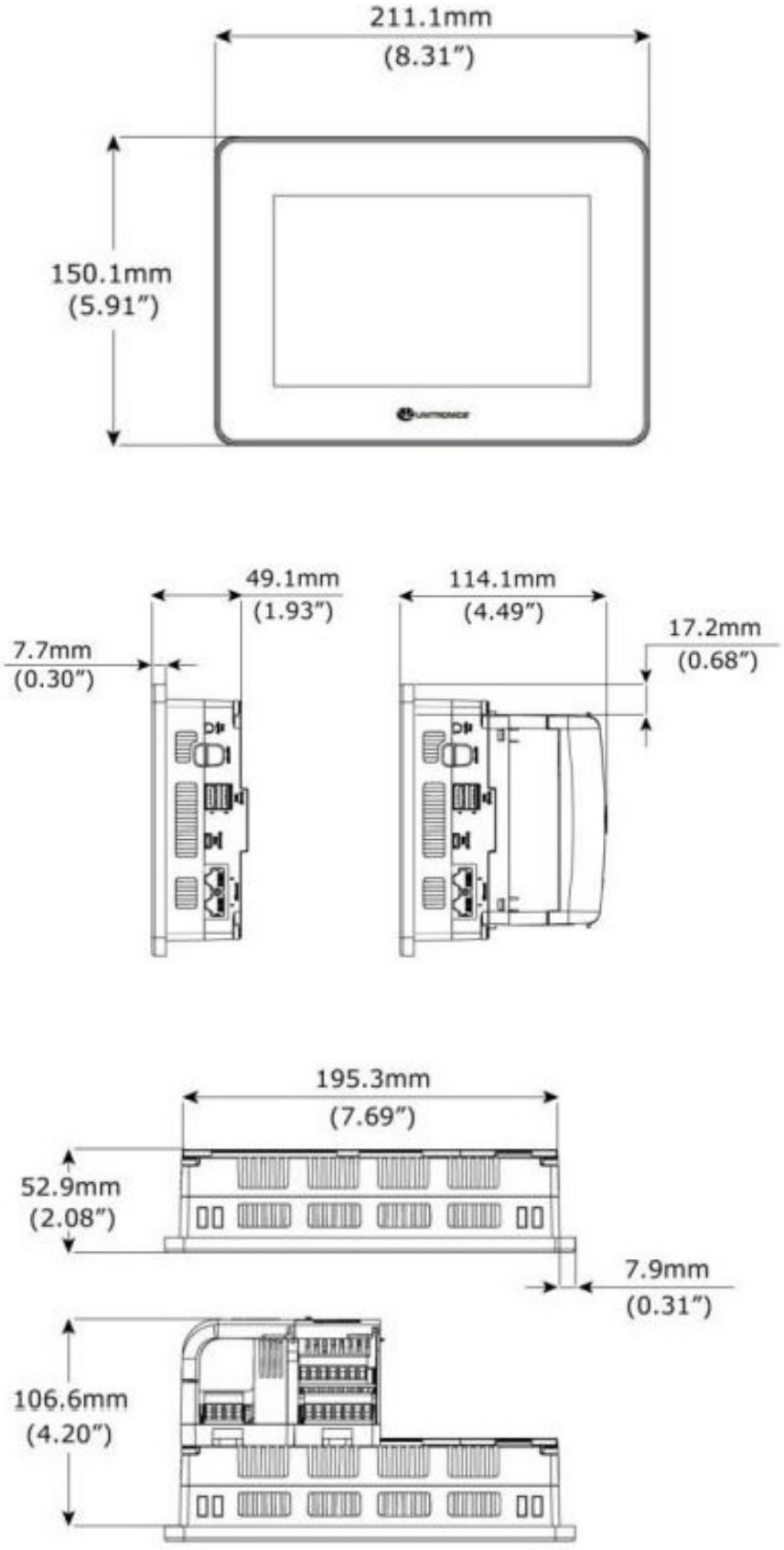


TABLE 2 - CONTROL DISPLAY HARDWARE CONNECTIONS

1	Screen Protector	Plastic removable sheet.
2	Audio Outlet and Seal	Embedded Speaker for use when the Alarm Horn is Enabled.
3	DIN-rail	Support and Installation of the CPU and other modules.
4	24VDC Power Input	Power for the control HMI and applicable modules.
5	Ethernet Port(s)	Allow for communication between boilers and Lead/Lag operation.
6-7	USB Ports	Use for data backup and restore as well as firmware and application software updates.
8	Micro SD Slot	Stores operating information and customer defaults for the boiler.
9	Audio Jack	Allows for use of external speakers/headphones.
10	Auxiliary Connection	Connection point for CPU module.
11	Mounting slots	Slots for installing mounting hardware.

Hydronic PURE Control® display hardware dimensions are shown below.



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Follow all proper lockout/tagout procedures for service. Before beginning any service, ensure area is free of combustible materials and other dangers.

In order to meet warranty conditions, ensure all appropriate maintenance activities are performed.

The information contained in this manual is written to cover a wide range of functions and features, some of which may not be available on every boiler. Human Machine Interface (HMI), algorithms, features and functions will vary depending on program version and boiler model. For detailed information specific to your boiler, please have your boiler Serial Number and PURE Control® software version ready and contact your Fulton Representative for further support.

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The control display hardware CPU is shown and described below.

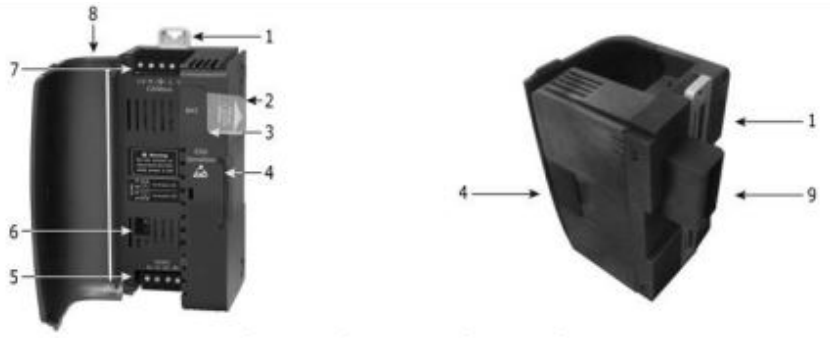

TABLE 3 - CPU FOR PANEL FRONT AND REAR VIEW

1	DIN-rail clips	6	RS485 termination selection DIP switch
2	Battery pull-tab (remove during installation)	7	CANbus connector
3	Battery compartment cover	8	CPU door
4	IO/COM Bus connector, shipped covered. Leave covered when not in use.	9	CPU connector to panel
5	RS485 connector		

Refer to the boiler electrical schematic for details on the communication module, expansion module, and I/O modules.

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Overview

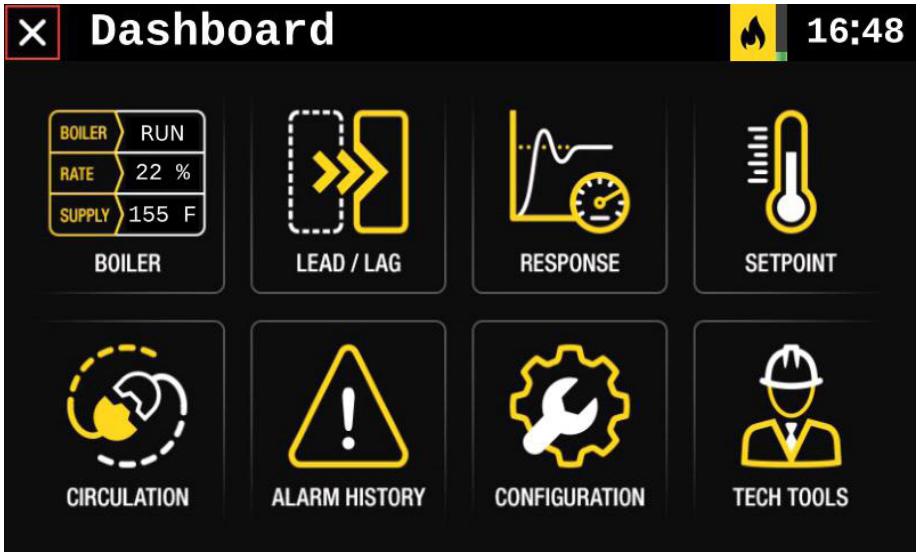
The screenshots and information in this section will guide you through the control menu screens.

Screenshots are for reference only, screens and features will vary by boiler product line, model and software version.

When entering in values to the control use the same number of decimal places as shown in the range information at the top of the entry box.

Dashboard Menu

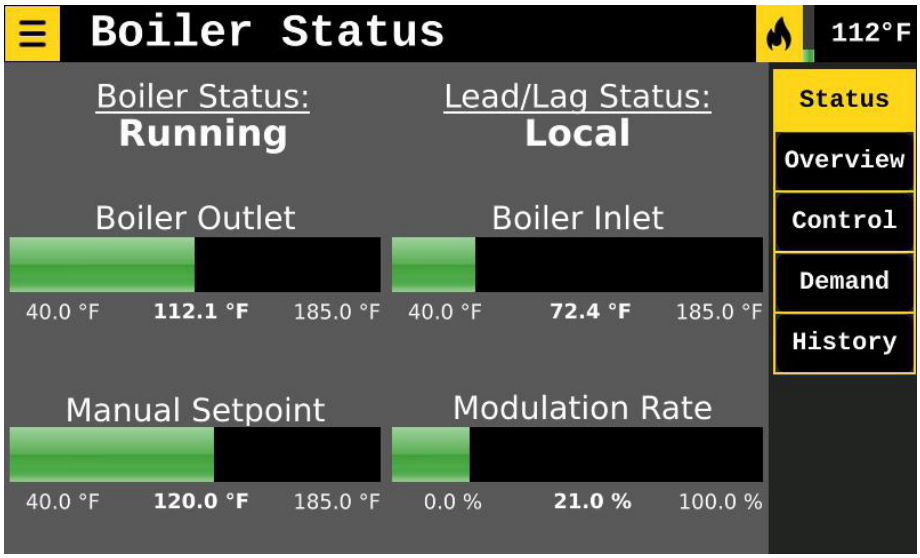
The Dashboard displays pertinent information on the Boiler Status, Firing Rate, and Temperature as well as organizes and allows access to all of the menus. It is accessed by tapping the hamburger icon ☰ located at the top left of every screen.



Boiler Menu

■ Boiler Status Screen:

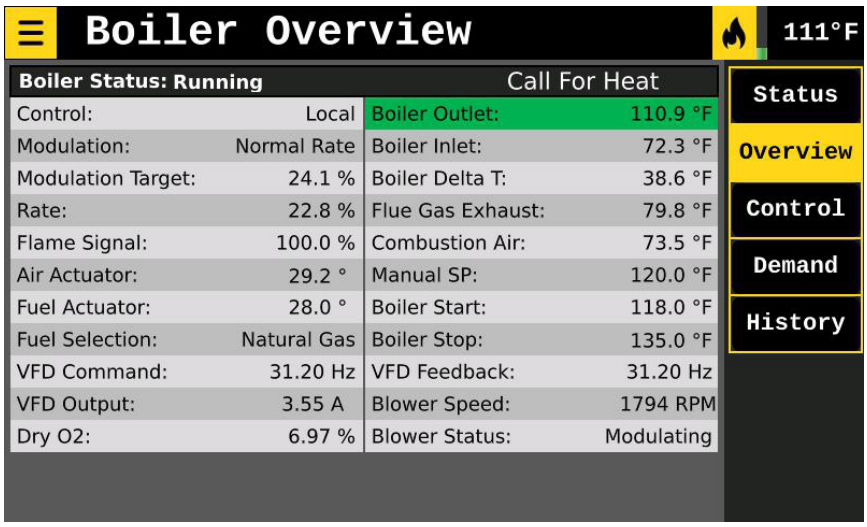
Provides a quick overview of the current boiler operations Including Status, Temperature, Setpoint, and Firing Rate



Parameter	Range	Units	Factory Default	Description
Boiler Status	-	-	-	Current Status of the Boiler
Lead/Lag Status	-	-	-	Lead/Lag Position or current source of boiler control
Boiler Outlet	-	°F	-	This will only be displayed when Lead/Lag is configured and communication is established. Factory mounted water temperature sensor at the boiler outlet (supply) connection, used for Local (standalone) control
Boiler Inlet	-	°F	-	Factory mounted water temperature sensor at the boiler inlet (return) connection
Supply Header	-	°F	-	Optional field installed sensor in the common supply water header, required for Lead/Lag operation
Setpoint	-	°F	160	Current Setpoint Value for the boiler
Modulation (Firing Rate)	-	%	-	Current modulation (firing rate) of the main burner or electric heater elements

Boiler Overview

Provides a more in depth overview of the boiler operation including Blower and Actuator Information, Additional System Temperatures, Start/Stop Parameters, and Modulation Information.

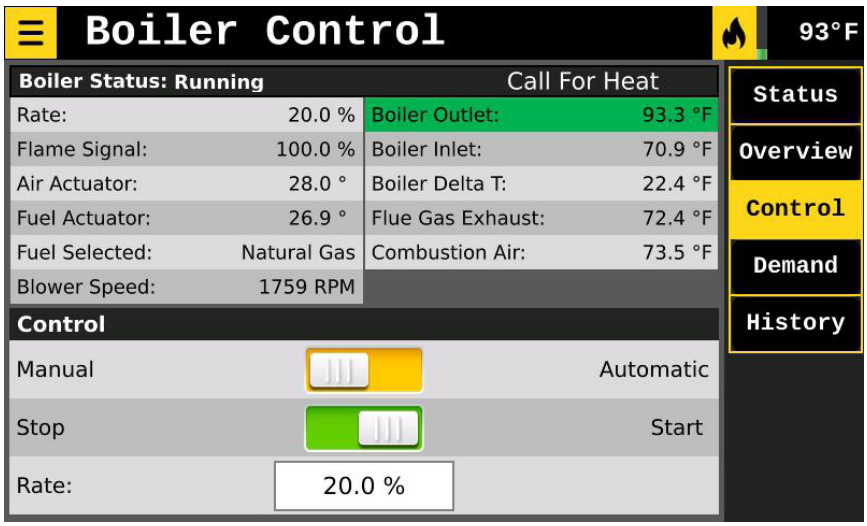


Parameter	Range	Units	Factory Default	Description
Boiler Status	-	-	-	Current Status of the Boiler
Control	-	-	-	Lead/Lag Position or current source of boiler control
Boiler Outlet	-	°F	-	Factory mounted water temperature sensor at the boiler outet (supply) connection, used for Local (standalone) control
Boiler Inlet	-	°F	-	Factory mounted water temperature sensor at the boiler inlet (return) connection
Setpoint	-	°F	-	The setpoint currently being used by the temperature control PID
Modulation	-	%	-	Displays whether the boiler is under normal rate modulation or a PID modifier is overriding modulation
Modulation Target / System Load	0.0 – 100.0	%	-	The rate the burner or heater elements are being commanded to drive towards
Rate	0.0 – 100.0	%	-	The actual modulation rate

Parameter	Range	Units	Factory Default	Description
Flame Signal	0.0 – 100	%	-	The strength of the flame signal from the flame detection device
Air Actuator	0.0 – 90.0	° (degrees)	-	The position of the servo motor used for electronic combustion air control
Fuel Actuator	0.0 – 90.0	° (degrees)	-	The position of the servo motor used for electronic fuel gas control
Blower Speed	0 – 10,000	rpm	-	The rotational speed of the combustion blower
Boiler Delta T	-	°F	-	The difference between the boiler outlet and boiler inlet water temperatures
Flue Gas Exhaust	-	°F	-	The temperature of the flue gases in the combustion exhaust
Combustion Air	-	°F	-	The temperature of the combustion air supply into the blower
Boiler Start	-	°F	-	The process temperature that will start a heat demand (call for heat)
Boiler Stop	-	°F	-	The process temperature that will end a heat demand (call for heat)
System Supply	-	°F	-	Optional field installed sensor in the common supply water header, required for Lead/Lag operation
System Return	-	°F	-	Optional field installed sensor in the common return water header
DHW	-	°F	-	Optional field installed domestic hot water temperature sensor
Outdoor Air	-	°F	-	Optional field installed outdoor air temperature sensor, required for OAT Reset

Boiler Control

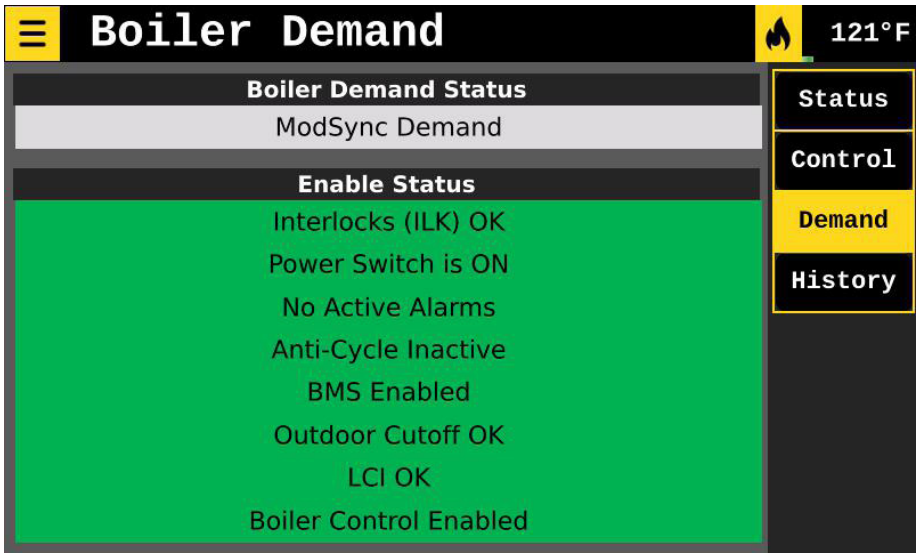
This screen also allows the operator to place the control into a manual firing rate mode, ensure the boiler is returned to Automatic Control after manual operation is completed. When the heat source control is placed into manual mode the heat source icon in the title bar will display a technician. Refer to Boiler Overview for parameter details.



■ Boiler Demand

Shows the current status alongside conditions that must be met in order for the boiler to receive a call for heat and run. This screen is helpful for troubleshooting purposes to identify a device or safety that is holding a boiler in a disabled state.

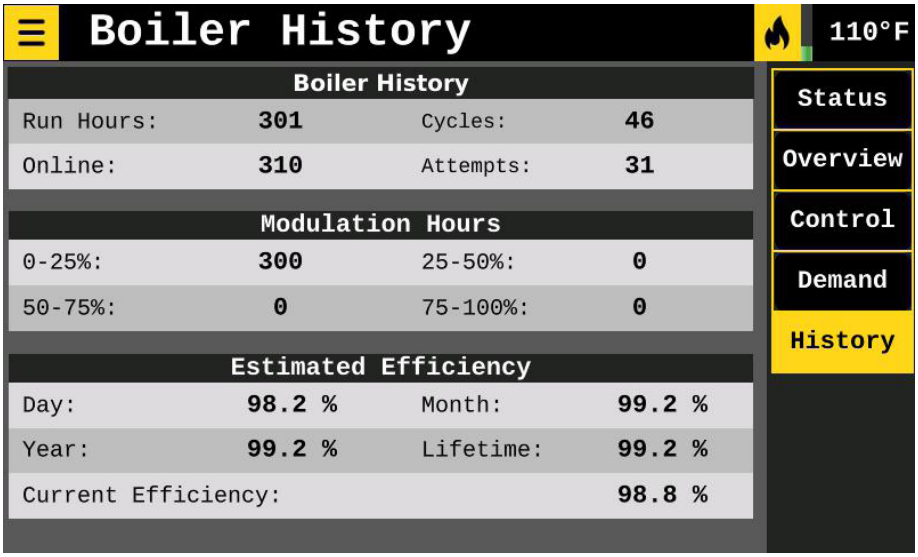
The row will be highlighted green when the limit is satisfied, rows which are not highlighted green are holding the boiler in a disabled standby state. The limits and devices listed will vary based on boiler type.



Parameter	Range	Units	Factory Default	Description
Boiler Demand Status	-	-	-	Displays where the current heat demand (call for heat) is coming from, a heat demand must be active for the boiler to run in Automatic operation
Interlocks (ILK)	-	-	-	The ILK input J5.1 on the Resideo flame safeguard only, refer to electrical diagram
Interlock 1	-	-	Customer Interlock 1	A dedicated installer interlock contact, tap to rename This is applicable to the 7-inch platform only.
Interlock 2	-	-	Customer Interlock 2	A dedicated installer interlock contact, tap to rename This is applicable to the 7-inch platform only.
Primary Low Water	-	-	-	Primary low water cut off safety device This is applicable to the 7-inch platform only.
Auxiliary Low Water	-	-	-	Second (auxiliary) low water cut off safety device This is applicable to the 7-inch platform only.
High Temperature Limit	-	-	-	The mechanical MRHL / HLTC Aquastat This is applicable to the 7-inch platform only.
Operating Temperature Control	-	-	-	The mechanical OTC Aquastat This is applicable to the 7-inch platform only.
Power Switch	-	-	-	The power switch or button on the front of the boiler
Alarms	-	-	-	Refer to Alarm History for active alarms
Anti-Cycle	-	-	-	The anti-cycle timer prevents boiler short cycling
BMS	-	-	-	The remote enable over automation or contact closure, a manual override is provided on the Modbus screen
Outdoor Cutoff	-	-	-	Prevents the boiler from running when the outdoor air temperature is warmer than configured
LCI	-	-	-	The LCI input J6.3 on the Resideo flame safeguard only, refer to electrical diagram
Boiler Control	-	-	-	Refer to the Boiler Control screen
LMV Safety Loop	-	-	-	The HGPS and other devices where applicable to the LMV flame safeguard only X3.04.1 and X3.04.2
Low Gas Pressure	-	-	-	The LGPS to the LMV flame safeguard only X5.01.2 and X5.01.3
Blocked Exhaust Switch	-	-	-	The blocked flue gas exhaust safety switch. This is applicable to the 7-inch platform only.

■ Boiler History

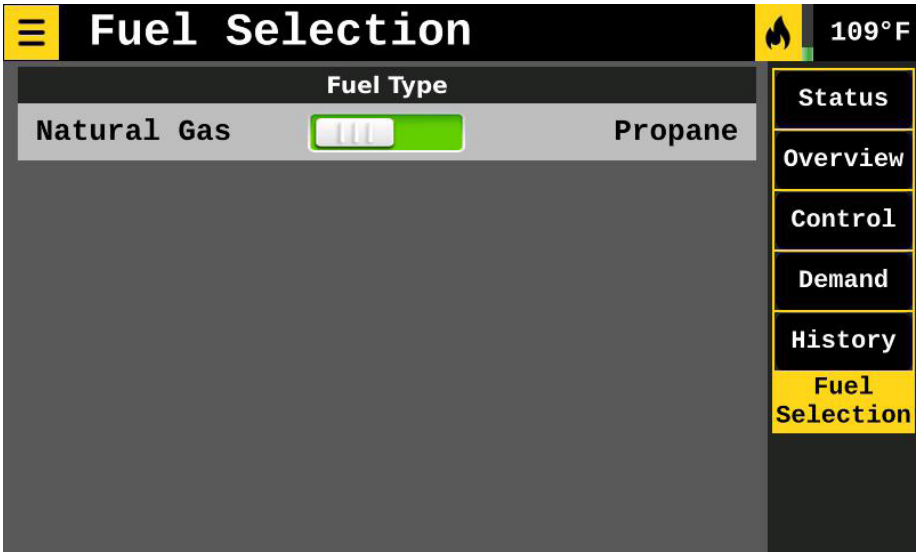
Shows operation information for the boiler.



Parameter	Range	Units	Factory Default	Description
Online Hours	0 – 999,999	Hours	-	Total Hours the Boiler has been powered on
Run Hours	0 – 999,999	Hours	-	Total Hours the Boiler has been firing
Attempts	0 – 999,999	Cycles	-	Total number of times the Boiler has tried to light
Cycles	0 – 999,999	Cycles	-	Total number of times the boiler has cycled on
Modulation Hours (0-25%)	0 – 999,999	Hours	-	Total number of hours spent modulating between 0-25%
Modulation Hours (25-50%)	0 – 999,999	Hours	-	Total number of hours spent modulating between 25-50%
Modulation Hours (50-75%)	0 – 999,999	Hours	-	Total number of hours spent modulating between 50-75%
Modulation Hours (75-100%)	0 – 999,999	Hours	-	Total number of hours spent modulating between 75-100%
Daily Estimated Efficiency	0.0 – 100.0	%	-	Daily Average
Monthly Estimated Efficiency	0.0 – 100.0	%	-	Monthly Average
Yearly Estimated Efficiency	0.0 – 100.0	%	-	Yearly Average
Lifetime Estimated Efficiency	0.0 – 100.0	%	-	Lifetime Average
Current Estimated Efficiency	0.0 – 100.0	%	-	Thermal Efficiency Calculation based on known boiler information.

Fuel Selection

Where available, configured and commissioned for multiple fuels, a Fuel Selection screen will be present to allow the boiler operator to switch fuel types.

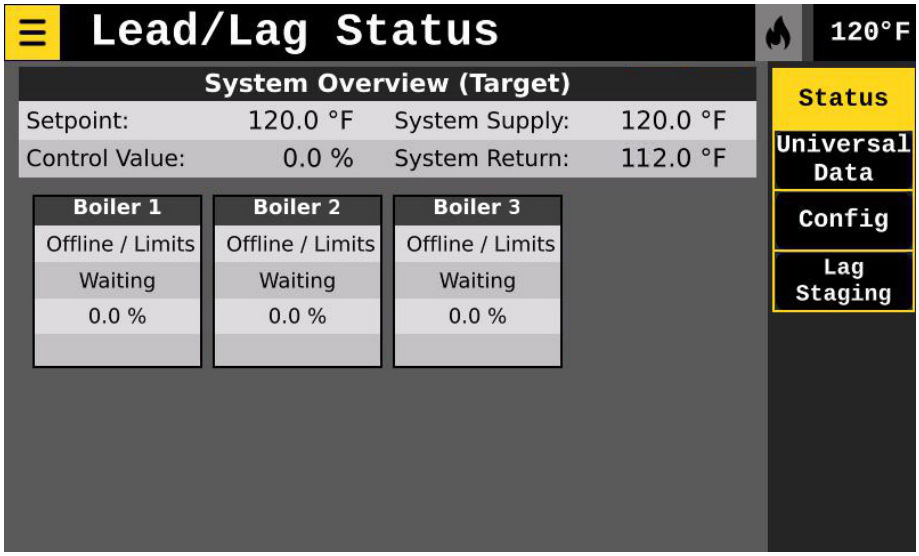


Lead/Lag Menu

■ Lead/Lag Status

Refer to section **Configuring Lead/Lag** Operation for detailed instruction on wiring and configuring Lead/Lag operation.

The Originator boiler is in command of the Lead/Lag plant and is assigned automatically by the boiler network. The Target boiler(s) receive commands from the Originator.

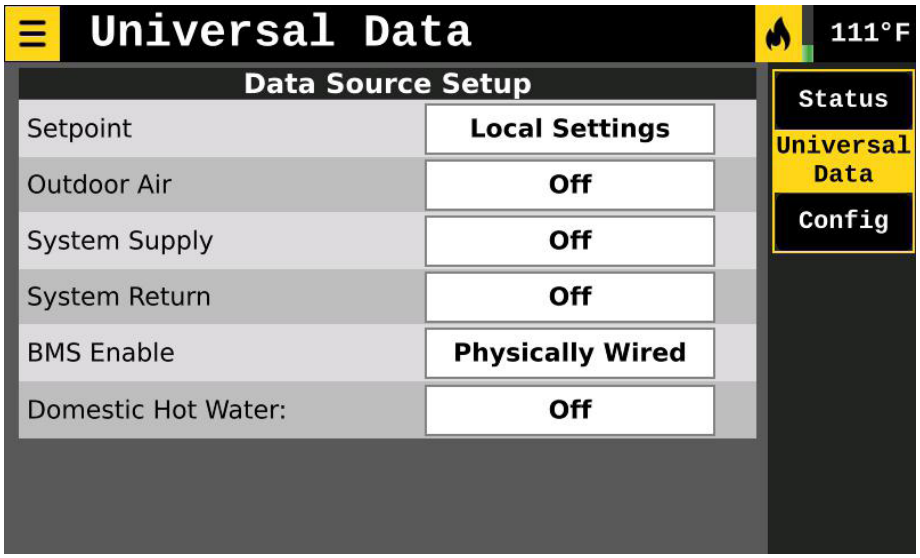


Parameter	Range	Units	Factory Default	Description
Setpoint	-	°F	160.0	Current Setpoint for the Boiler / System
System Supply	-	°F	-	Current reading from the System Supply Header sensor
System Delta T	-	°F	-	System Delta T calculation (System header – System return)
System Return	40.0 – 185.0	°F	-	Current reading from the System Return Header sensor
Boiler X Info	-	-	-	Information Specific to each Lead/Lag boiler

■ Universal Data

The Universal Data system broadcasts specific sensor, BMS, and hardwired connections over the boiler Lead/Lag network, allowing for flexibility and redundancy in installation and operation of the modular boiler plant. The Originator boiler will utilize this information for plant sequencing purposes. This data is also used for standalone boilers and must be configured appropriately by the installer.

To configure Universal Data, select the source of where the data is coming from for each parameter. This must be configured on each boiler in the Lead/Lag plant.



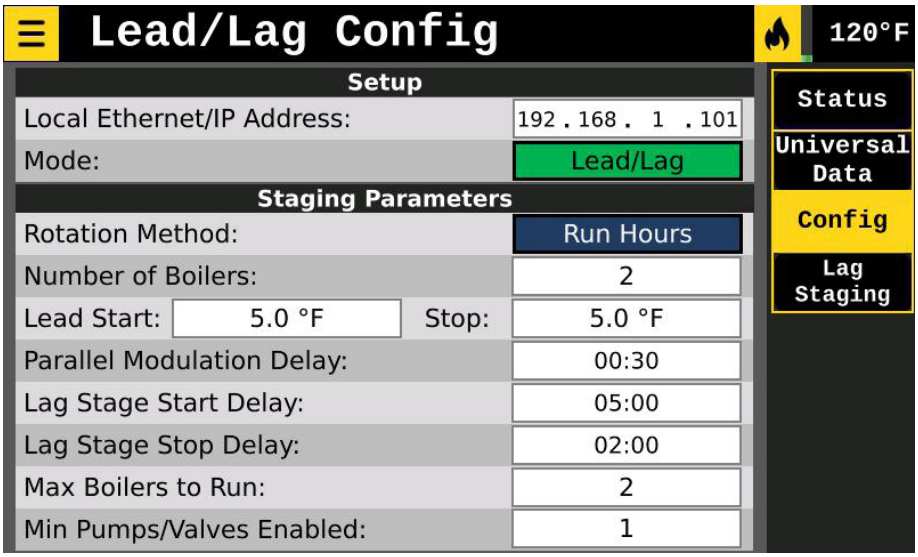
- Physically Wired: For a contact, signal, or sensor directly wired to this boiler. Refer to the boiler electrical schematic for details.
- BMS Network: For a parameter that is sent (written) to this boiler over Modbus automation interface; BACnet with Protonode.
- Boiler Network: For a parameter that is sent (shared) with this boiler over the Ethernet/IP Lead/Lag network from another boiler.
- Local Settings: To operate using the settings configured at this boiler.
- Off: Not used.

Parameter	Range	Units	Factory Default	Description
Setpoint	-	-	Local Settings	Determines if the Setpoint will be the Local Setpoint configured on the boiler screen, written over the BMS connection, or received from another boiler as part of the Lead/Lag operations.
Outdoor Air	-	-	Off	Determines if the Outdoor Air temperature will be a physically wired sensor, written over the BMS connection, received from another boiler as part of the Lead/Lag operations, or disabled.
System Supply	-	-	Off	Determines if the System Supply temperature will be a physically wired sensor, written over the BMS connection, received from another boiler as part of the Lead/Lag operations, or disabled.

Parameter	Range	Units	Factory Default	Description
System Return	-	-	Off	Determines if the System Return temperature will be a physically wired sensor, written over the BMS connection, received from another boiler as part of the Lead/Lag operations, or disabled.
BMS Enable	-	-	Physically Wired	Determines if the Remote enable will be provided by dry contact closure, written over the BMS connection, or received from another boiler as part of the Lead/Lag operations *Note there is a Factory Jumper that ships wired across the digital input used for dry contact closure.
Domestic Hot Water	-	-	Off	Determines if the DHW will be physically wired or received from another boiler as part of the Lead/Lag operations, or disabled.

■ Lead/Lag Config

The operation of the Lead/Lag modular plant is configured on this screen. Each boiler will require a unique IP address, however, for proper operation ensure all other settings are configured with identical values on each boiler.

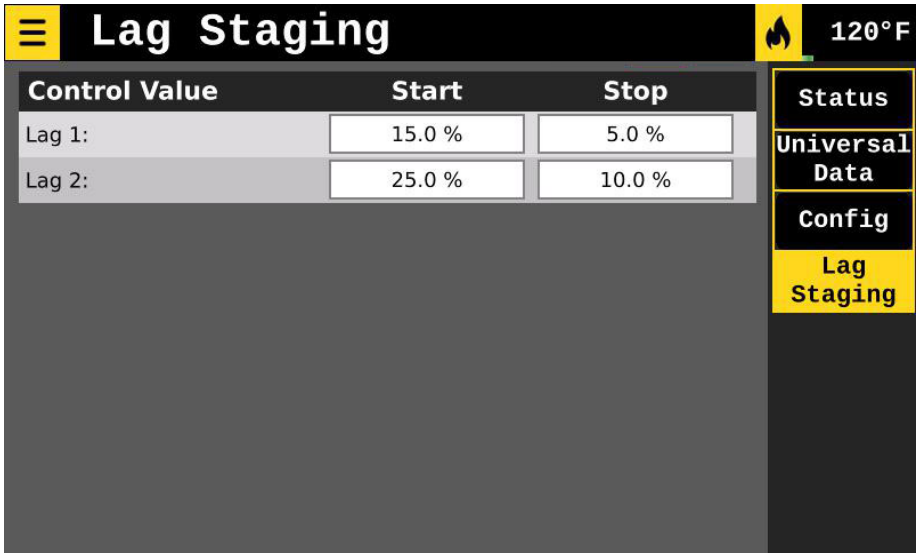


Parameter	Range	Units	Factory Default	Description
Local Ethernet/IP Address	192.168.1.100 – 192.168.1.109	-	192.168.1.109	Boiler 1 set to 192.168.1.100 Boiler 2 set to 192.168.1.101 Boiler 3 set to 192.168.1.102 Boiler 4 set to 192.168.1.103 Boiler 5 set to 192.168.1.104 Boiler 6 set to 192.168.1.105 Boiler 7 set to 192.168.1.106 Boiler 8 set to 192.168.1.107 Boiler 9 set to 192.168.1.108 Boiler 10 set to 192.168.1.109
Mode	Standalone Lead/Lag	-	Standalone	To enable Lead/Lag switch mode from Standalone to Lead/Lag. Standalone mode should be used for single boiler installations, or modular plants where the BMS is performing sequencing.
Rotation Method	Hours Cycles Optimized	-	Optimized	Determines how the network will select the staging order for the boilers based on hours and/or cycles. Optimized uses the Originator's cycle per run hour ratio history to maintain even utilization across all boilers.
Number of Boilers	0 – 10	-	0	Total number of boilers connected to the Lead/Lag network

Parameter	Range	Units	Factory Default	Description
Lead Start	0.0 – 20.0	°F	5.0	The Lead Start is the hysteresis below setpoint which begins a call for heat.
Lead Stop	0.0 – 20.0	°F	10.0	The Lead Stop is the hysteresis above setpoint which ends the call for heat.
Parallel Modulation Delay	00:00 - 59:59	MM:SS	00:30	When a Lag boiler receives a call for heat, the Lead/Lag system modulation rate as determined by the PID is reduced to prevent overshoot of setpoint. After the duration of the Parallel Modulation Delay timer and when the newly called boiler is modulating at within 3% of the Lead boilers rate, the system will be released back to normal modulation. The Lead/Lag system will be released to normal modulation if the newly called Lag boiler does not reach this rate within twice the duration of the Parallel Modulation Delay Timer, or if it goes into alarm or a modulation modifier is triggered. The Parallel Modulation Delay timer is reset each time a new boiler in the system gets a call for heat.
Lag Boiler Start Delay	00:00 - 59:59	MM:SS	05:00	Time Delay between Lag stages
Lag Boiler Stop Delay	00:00 - 59:59	MM:SS	05:00	Time Delay when dropping Lag stages
Max Boilers to Run	0 - 10	-	10	Total number of boilers allowed to run at one time. Can be set less than the total number of installed boiler in the case of redundant or oversized systems to prevent unneeded boilers from firing
Min Pumps/Valves Enabled	0 - 10	-	1	The number of dedicated boiler primary pumps or dedicated boiler motorized isolation valves that will be enabled regardless of demand. This is important for variable-primary flow arrangements to prevent dead-heading the system pumps.

■ Lag Staging

Used to adjust when a Lag boiler is given a call for heat. For proper operation ensure all staging settings are configured with identical values on each boiler in the modular plant.

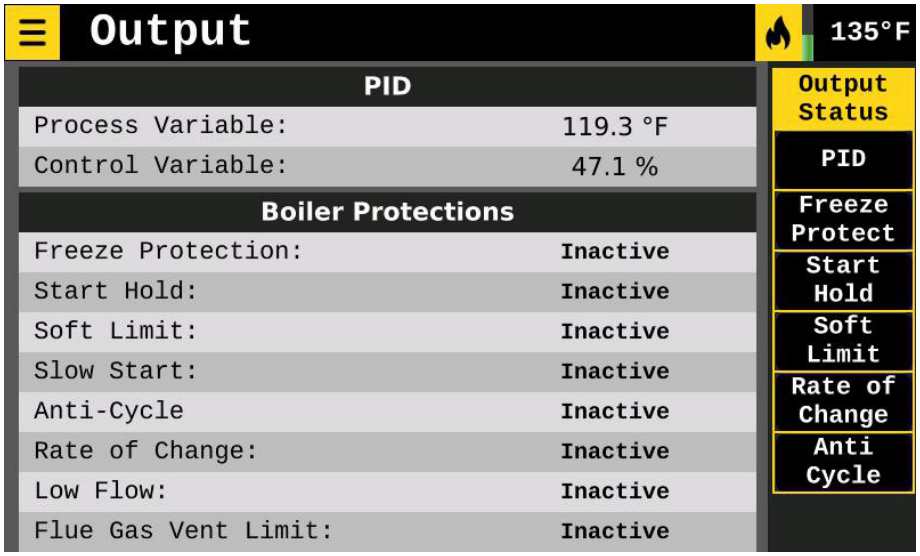


Parameter	Range	Units	Factory Default	Description
Control Value Start	0.0 - 100.0	%	Varies	Adjusts the PID CV at which the Lag boiler is given a call for heat. Decreasing this value will enable Lag stages sooner at lower firing rates, increasing this value will enable Lag stages later at higher firing rates.
Control Value Stop	0.0 - 100.0	%	Varies	Adjusts the PID CV at which the Lag boiler call for heat is removed. Decreasing this value will disable Lag stages later at lower firing rates, increasing this value will disable Lag stages sooner at higher firing rates.

Response Menu

■ Output

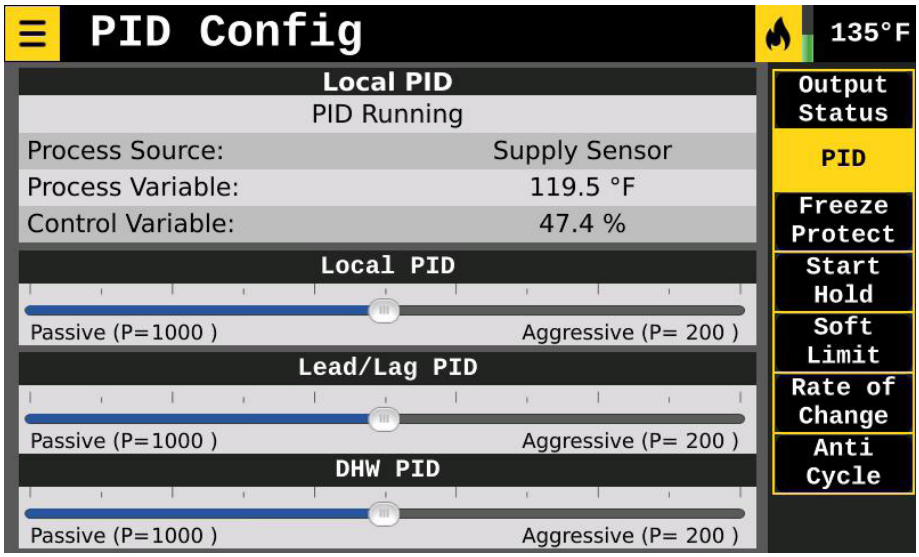
Shows information specific to control of the boiler and its firing rate as well as items that would impact it. The Boiler Protections act as PID "modifiers" and will override the firing rate of the burner in accordance with configured settings.



Parameter	Range	Units	Factory Default	Description
Process Variable	-	°F	-	Current temperature that the boiler(s) is controlling to.
Control Variable	0.0 – 100.0	%	-	PID-based Load calculation to determine where the boiler should be firing to based on current settings and boiler information.
Freeze Protection	-	-	-	Refer to Freeze Protection for details
Start Hold	-	-	-	Refer to Start Hold for details
Soft Limit	-	-	-	Refer to Soft Limit for details
Slow Start	-	-	-	Refer to Soft Limit for details
Flue Gas Vent Limit	-	-	-	Prevents overtemperature of the flue gas exhaust vent based on the material type set by the commissioning technician
Anti-Cycle	-	-	-	Refer to Anti Cycle for details
Low Flow	-	-	-	Protects the heat exchanger during insufficient water flow conditions.
Rate of Change	-	-	-	Caps the modulation to prevent undesired rapid heating.

■ PID Config

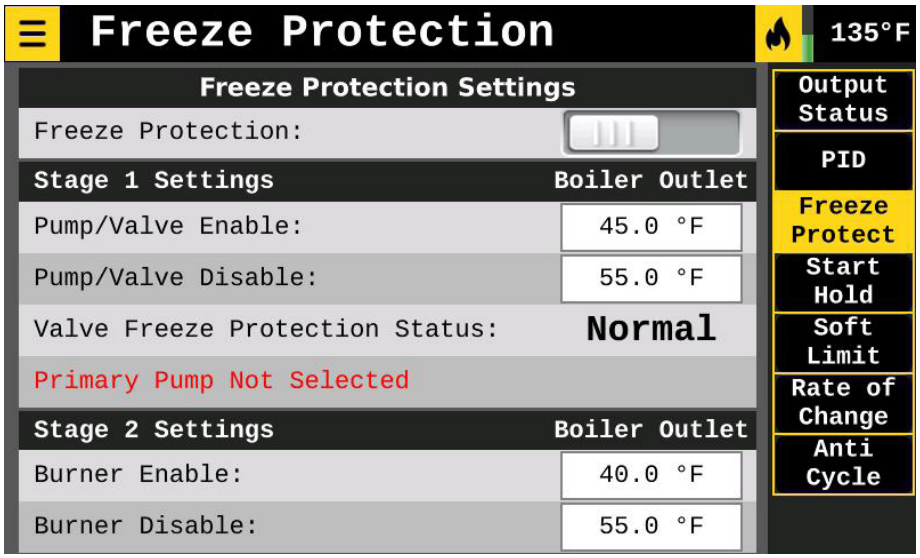
Shows information specific to which PID Loop is currently active and sliders to adjust how the boiler responds to its heating load. Adjusting the slider to Aggressive will result in faster burner response, but a potentially higher rate of cycling of the boiler. Setting towards Passive will slow down the response. The PID slider bounds may be tuned by an authorized service technician within the Tech Tools menu.



Parameter	Range	Units	Factory Default	Description
PID Status	-	-	-	Status of the Active PID
Process Source	-	-	-	What temperature the boiler is referencing or controlling to.
Process Variable	0 – 100%	%	-	Current Temperature being used by the PID
Control Variable	0 – 100%	%	-	Output of the PID
Local PID (Proportional Band)	50 - 1000 50 - 1000	Error	800 200	Slide Bar to adjust Local PID Response
Lead/Lag PID (Proportional Band)	50 - 1000 50 - 1000	Error	800 200	Slide Bar to adjust Lead/Lag PID Response
DHW PID (Proportional Band)	50 - 1000 50 - 1000	Error	800 200	Slide Bar to adjust DHW PID Response

■ Freeze Protection

This function helps protect the boiler pressure vessel from damage associated with freezing using an available pump or valve, and/or by running the burner.



Stage 1 Freeze Protection:

Requires a pump or valve to be selected and enabled. The pump will then be enabled based on the user-selected temperature range to circulate water and help prevent freezing.

Stage 2 Freeze Protection:

The burner will be enabled and run at low fire based on the user-selected temperature range to help prevent the boiler from freezing.

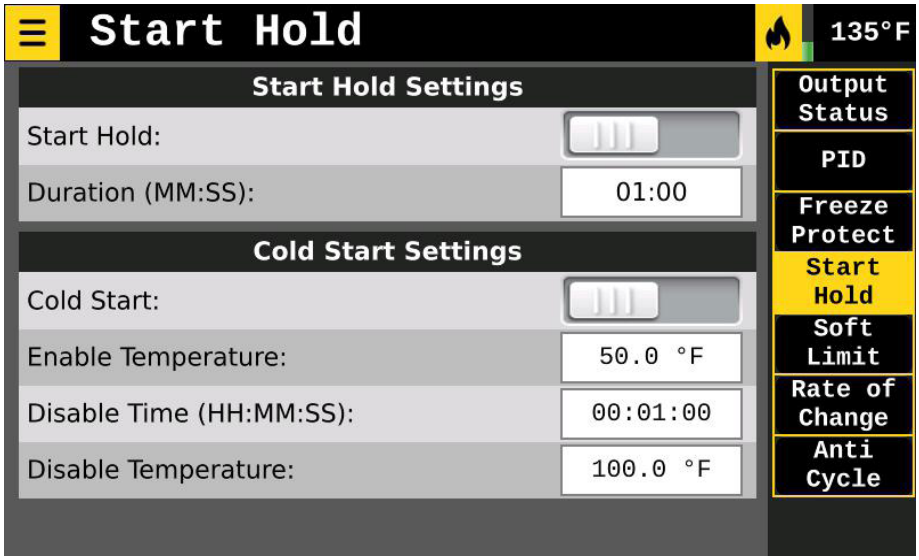
Parameter	Range	Units	Factory Default	Description
Freeze Protection	Enabled - Disabled	-	Disabled	Enables or disables the freeze protection feature
Stage 1 Pump/Valve Enable	32.0 – 100.00	°F	45.0	Temperature below which the pump/valve will operate.
Stage 1 Pump/Valve Disable	45.0 – 100.00	°F	55.0	Temperature at which the stage 1 freeze protection stops the selected pump/valve.
Stage 2 Burner Enable	32.0 – 100.00	°F	40.0	Temperature at which the boiler is enabled to run during stage 2.
Stage 2 Burner Disable	32.0 – 100.00	°F	55.0	Temperature at which the boiler is disabled and shuts off during stage 2.

■ Start Hold

Start Hold becomes active immediately after the call for heat. It is strictly time based and will hold the boiler at low fire until the user selected time has expired and then releases the boiler to normal operation.

Cold Start is active immediately after the call for heat. It is time / temperature based and will hold the boiler at low fire until those conditions are met.

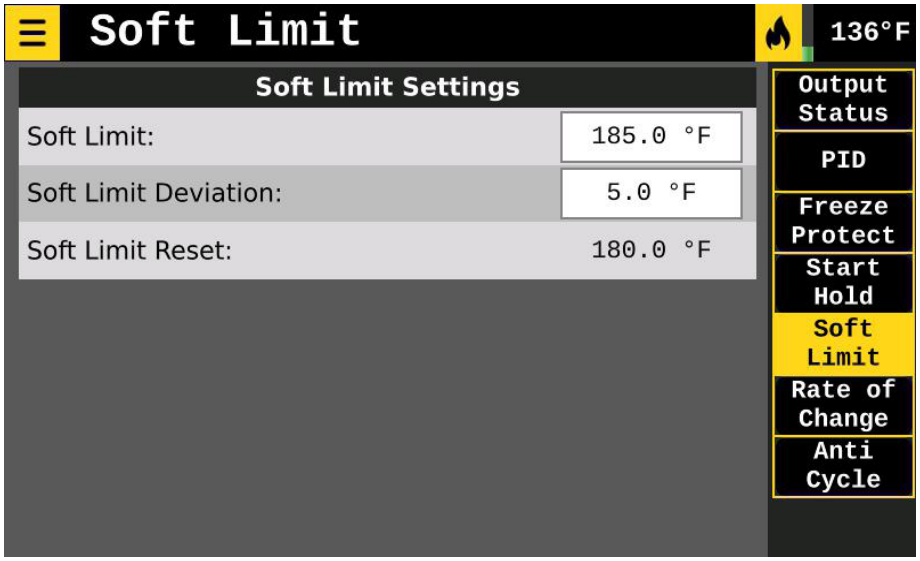
For system startups – i.e, when the loop is cold – this will allow the boiler to warm up slowly and help prevent conditions where the boiler may short cycle.



Parameter	Range	Units	Factory Default	Description
Start Hold	Enabled - Disabled	-	Disabled	Enables or disables the Start Hold feature
Duration	00:00 - 59:59	MM:SS	1:00	Length of time the boiler will be held at low fire before releasing to normal modulation.
Cold Start	Enabled - Disabled	-	Disable	Enables or disables the Cold Start feature
Enable Temperature	40.0 – 185.0	°F	50.0	Temperature below which the Cold Start will become active on a boiler call for heat. *Must be set lower than the Disable Temperature
Disable Time	00:00:00 - 99:59:59	HH:MM:SS	00:01:00	Maximum run time for the Cold Start before the boiler is released to modulate normally.
Disable Temperature	40.0 – 185.0	°F	100.0	Temperature above which the Cold Start will end and release the boiler to modulate normally. * Must be set higher than the Enable Temperature

■ Soft Limit

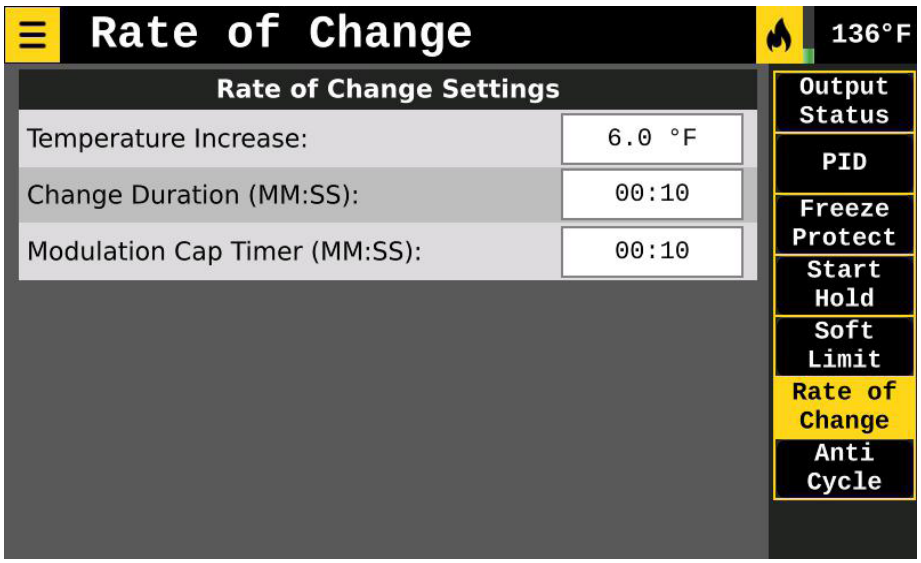
The Soft Limit feature will reduce the boiler firing rate to prevent excessive temperature situations which can lead to nuisance Manual Reset High Limit (MRHL) lockout alarms. This feature is useful in arrangements where the heating system has unbalanced flow and/or low flow conditions. Lowering the Soft Limit value(s) can help prevent MRHL alarms and short cycling..



Parameter	Range	Units	Factory Default	Description
Soft Limit	40.0 – 185.0	°F	185.0	The boiler outlet temperature at which the Soft Limit firing rate modifier will be enabled, reducing the burner firing rate to prevent excessive water temperature.
Soft Limit Deviation	1.0 - 50.0	°F	5.0	The boiler outlet temperature at which the Soft Limit firing rate modifier will reset, releasing the burner back to normal operation.
High Limit	-	°F	210.0	The Manual Reset High Limit (MRHL). This is not field-adjustable, for safety purposes this parameter requires OEM equipment for modification. Applies to equipment with Resideo Flame Safeguards only.

■ Rate of Change

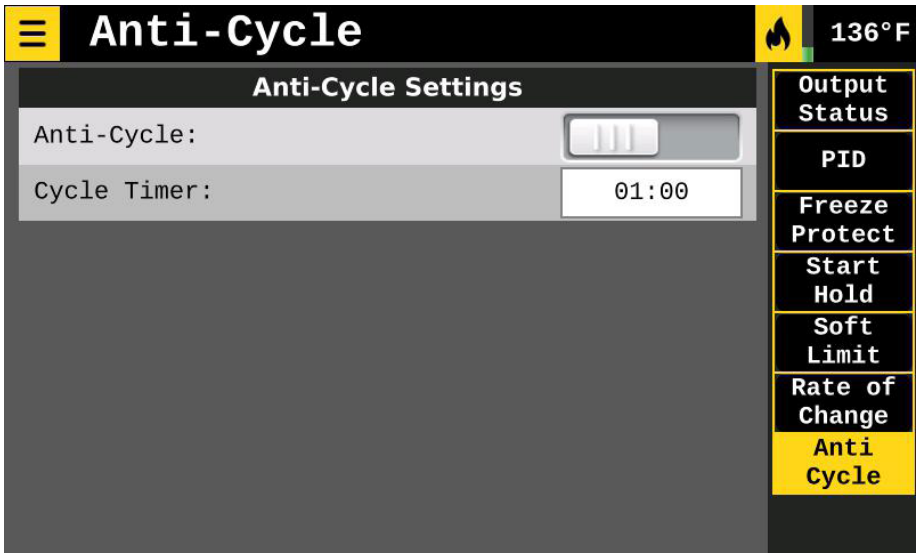
Rate of Change will prevent upward burner modulation in the event of excessive temperature rise in the heat exchanger. This feature prevents short cycling of the boiler, particularly during low flow situations.



Parameter	Range	Units	Factory Default	Description
Temperature Increase	5.0 - 40.0	°F	6.0	The amount the boiler outlet temperature must increase to trigger Rate of Change protection.
Change Duration	00:05 - 01:00	MM:SS	00:10	The alloted time for the temperate increase. The temperature increase must occur faster than the Change Duration to trigger Rate of Change protection.
Modulation Cap Timer	00:05 - 01:00	MM:SS	00:10	Rate of Change will be active for the amount of time defined by this parameter, which will prevent further upward modulation until the timer expires.

■ Anti-Cycle

Minimum amount of time that the boiler will remain OFF in between cycles and before it can receive an new call for heat. Enabling the anti-cycle timer is helpful to prevent excessive equipment short cycling during low load or low flow conditions.

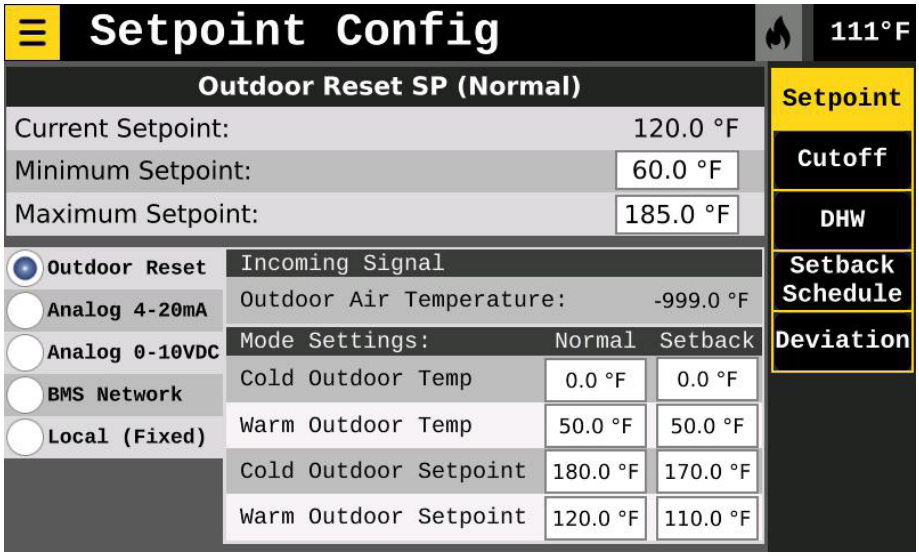


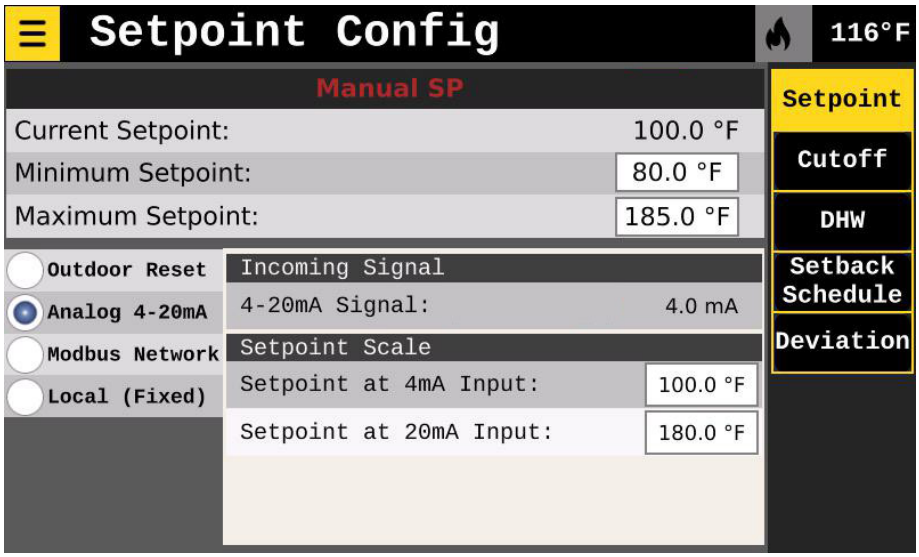
Parameter	Range	Units	Factory Default	Description
Anti-Cycle	Enabled - Disabled	-	Disabled	Turns the Anti-Cycle timer feature on or off
Cycle Timer	00:00 – 59:59	MM:SS	01:00	Amount of time the boiler must remain off between cycles, and before it can receive a new call for heat.

Temperature Menu

■ Setpoint Config

The setpoint settings are used for both Local standalone as well as Lead/Lag operation. For Lead/Lag operation, ensure the setpoint settings are identical on all boilers in the network. This screen allows configuration of the minimum and maximum allowable setpoint, as well as the selection of the setpoint source. Outdoor Reset will require either a remote-mounted outdoor air temperature (OAT) sensor, or a temperature value written to the boiler(s) over BMS communication.

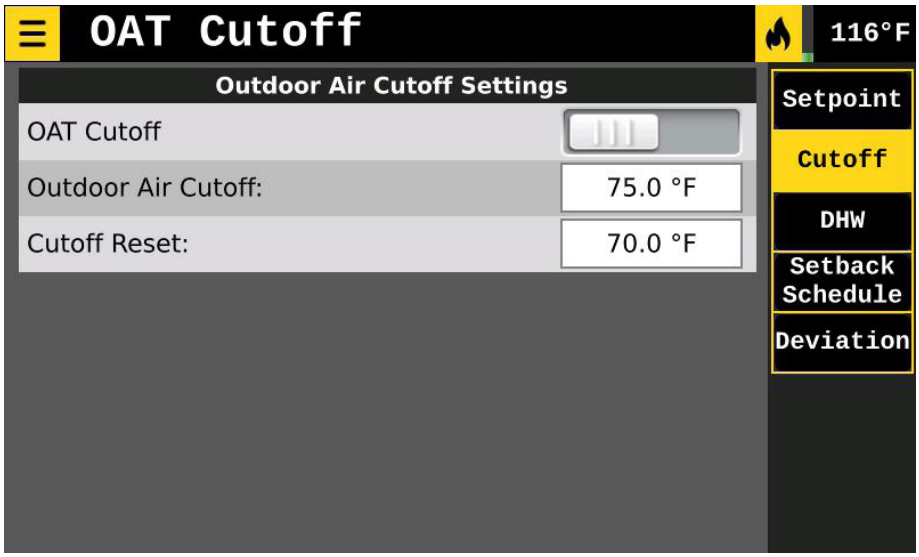




Parameter	Range	Units	Factory Default	Description
Current Setpoint	40.0 – 185.0	°F	-	The setpoint currently being used by the temperature control PID
Minimum Setpoint	40.0 – 185.0	°F	80.0	Absolute minimum allowable setpoint from any source. If it is lower the setpoint will be increased to match this value
Maximum Setpoint	40.0 – 185.0	°F	185.0	Absolute maximum allowable setpoint from any source. If it is higher the setpoint will be decreased to match this value.
Setpoint Selection	See List Below	-	Local	Configure which Setpoint source to utilize for temperature control
Outdoor Reset				
Outdoor Air Temperature	N/A	°F	-	Current Outdoor Air Temperature being referenced
Cold Outdoor Temp	-40.00 – 120.0	°F	0	Low range for the outdoor air temperature used in the setpoint scaling.
Warm Outdoor Temp	-40.00 – 120.0	°F	50	High range for the outdoor air temperature used in the setpoint scaling
Cold Outdoor Setpoint	40.0 – 185.0	°F	180	Low range for the Boiler Hot Water Setpoint used in the setpoint scaling
Warm Outdoor Setpoint	40.0 - 185.0	°F	120	High range for the Boiler Hot Water Setpoint used in the setpoint scaling
Analog 4-20mA				
4-20mA signal	0.0 – 20.0	mA	-	Current 4-20mA hardware remote signal being received
Setpoint at 4mA Input	40.0 – 185.0	°F	100.0	Low range for the Boiler Hot Water Setpoint used in the setpoint scaling
Setpoint at 20mA Input	40.0 – 185.0	°F	180.0	High range for the Boiler Hot Water Setpoint used in the setpoint scaling
Modbus Network				
BMS Network Setpoint	-	°F	-	Remote Modbus setpoint from the Building Management System (BMS).
Local (Fixed)				
Normal Setpoint	40.0 – 185.0	°F	160	Static local setpoint used during normal operation
Setback Setpoint	40.0 – 185.0	°F	140	Static local setpoint used during setback operation

■ OAT Cutoff

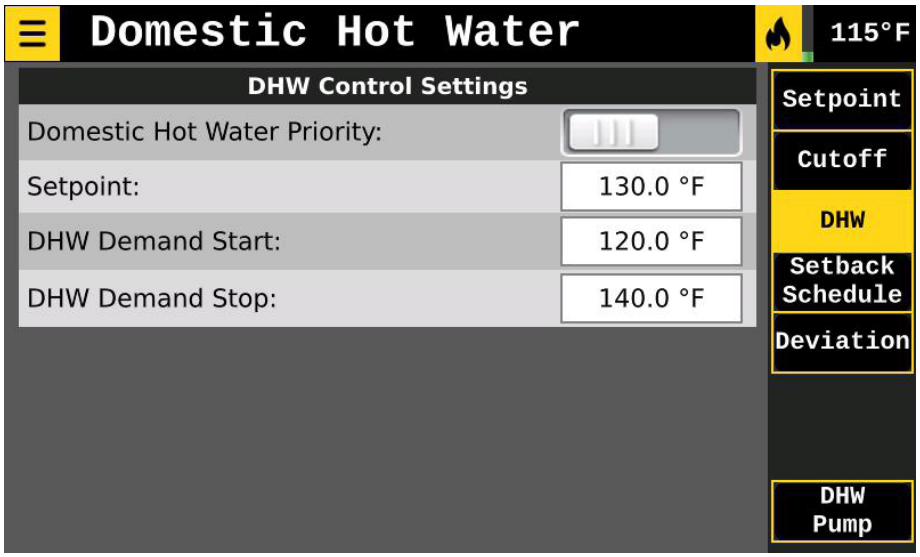
When enabled, Outdoor Air Temperature (OAT) Cutoff will disable the standalone boiler or Lead/Lag system upon reaching a configurable outdoor air temperature. This is a warm weather shutdown feature to prevent the boiler plant from running when heating is not required.



Parameter	Range	Units	Factory Default	Description
OAT Cutoff	Enabled - Disabled	-	Disabled	Enables or disables the Outdoor Air Temperature Cutoff (warm weather shutdown) feature.
Outdoor Air Cutoff	0.0 to 120.0	°F	100.0	Upon the remote mounted outdoor air temperature sensor reaching this value, the boiler or Lead/Lag plant will be disabled.
Cutoff Reset	0.0 to 120.0	°F	95.0	Upon the remote mounted outdoor air temperature sensor dropping to this valve, the boiler or Lead/Lag plant will be enabled. Ensure appropriate deadband exists between these two values to prevent short cycling, a minimum separation of 5°F is recommended.

■ Domestic Hot Water

Enabling the Domestic Hot Water (DHW) Priority function will increase the boiler(s) setpoint temperature, where needed, to satisfy an indirect DHW demand. When the DHW Demand ends, the boiler(s) will return to their normal hydronic heating setpoint temperature.

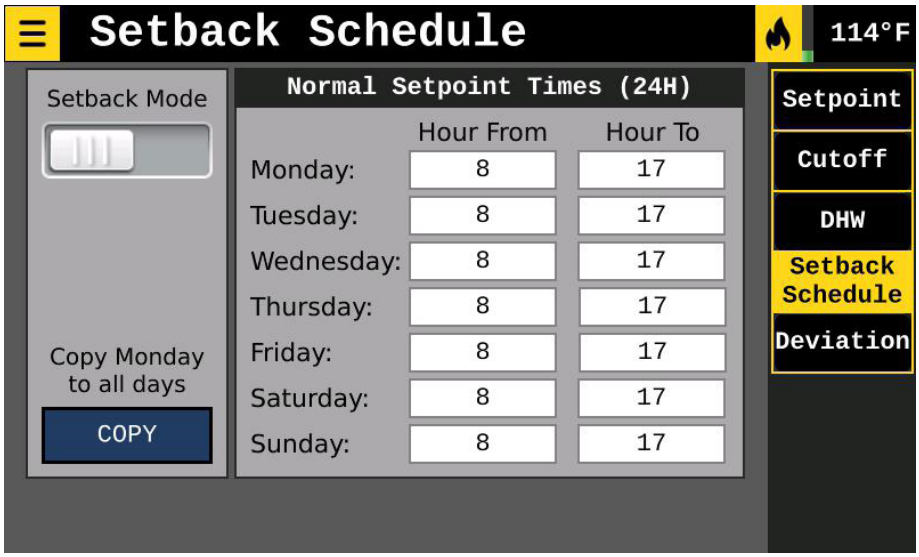


Parameter	Range	Units	Factory Default	Description
Domestic Hot Water Priority	Enabled - Disabled	-	Disabled	Turns the feature on/off. When disabled the DHW operation will not take affect even if remotely triggered.
Setpoint	40.0 – 185.0	°F	130.0	Minimum setpoint while DHW is active. If the DHW setpoint is larger than the current boiler setpoint then the DHW override will activate and raise the setpoint.
Demand Source	Dry Contact DHW Sensor	-	DHW Sensor	The DHW Demand may be configured for either a stat (contact closure), or a remote wired temperature sensor with configurable start and stop temperatures. This selection is applicable to the 5-inch platform only.
DHW Demand Start	40.0 – 185.0	°F	120.0	Pump Start temperature referenced when using DHW Sensor Demand Source
DHW Demand Stop	40.0 – 185.0	°F	140.0	Pump Start temperature referenced when using DHW Sensor Demand Source

■ Setback Schedule

Used to select timeframes for the normal and setback modes of operation. This energy saving feature can reduce carbon emissions and fuel bills during designated hours a building is unoccupied.

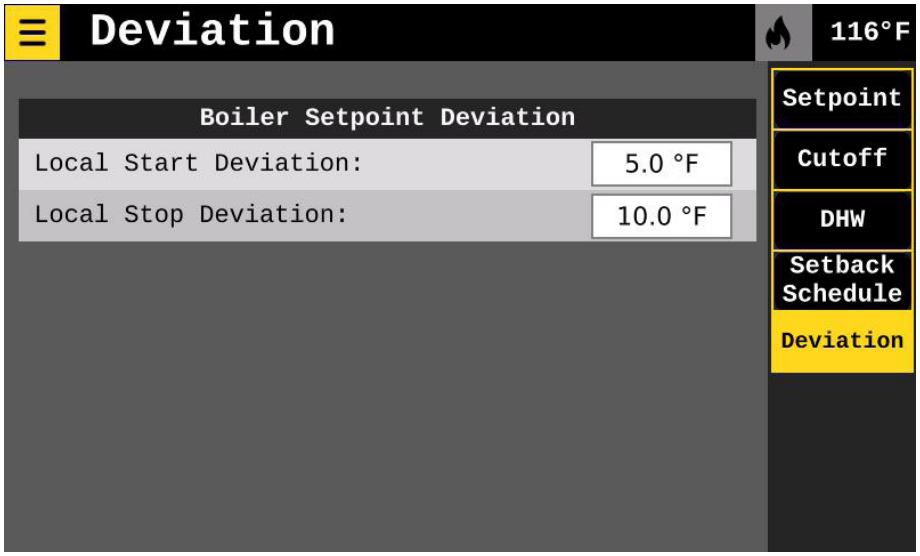
Press "COPY" to duplicate the Hour From and Hour To values entered on Monday across all seven days.



Parameter	Range	Units	Factory Default	Description
Setback Mode	Enabled - Disabled	-	Disabled	Turns the feature on/off. When disabled the setback options will not take effect.
Hour To	0 – 23	24 H	8	Normal Mode start time
Hour From	0 – 23	24 H	17	Setback Mode start time

■ Deviation

Determines the start and stop deviations (hysteresis) around setpoint when operating in Local mode. This setting is not used while the boiler in under ModSync or Lead/Lag control. For systems experiencing short cycling it is recommended to lower the Start or increase the Stop value to widen the Deviation temperature band, this facilitates greater run times per cycle.

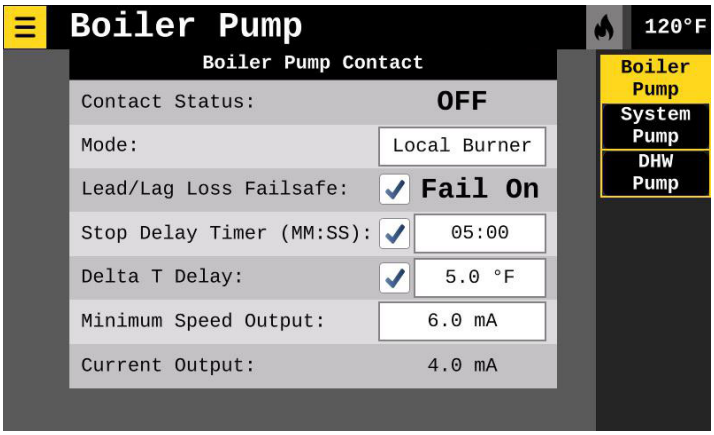


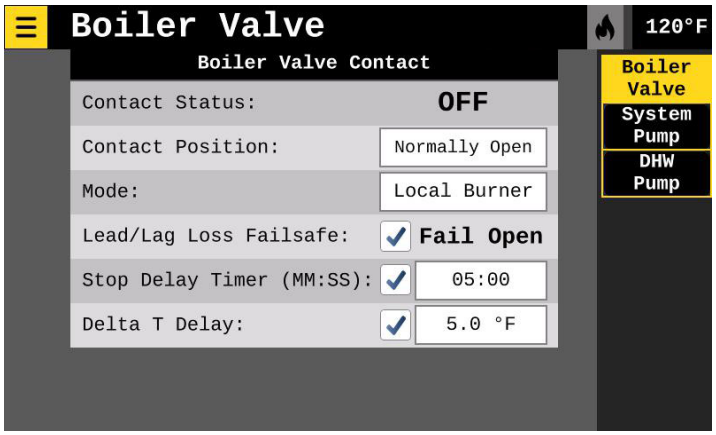
Parameter	Range	Units	Factory Default	Description
Local Start Deviation	40.0 – 100.0	°F	5.0	Temperature subtracted from the setpoint to determine where the boiler will get a call for heat and start
Local Stop Deviation	40.0 – 100.0	°F	10.0	Temperature added to the setpoint to determine where the boiler will lose the call for heat and stop

Circulation Menu

■ Boiler Pump / Valve (5-Inch Platforms Only)

This screen is is exclusive to 5-inch platforms only (Endura XE). It is used to configure the boiler flow control accessory, which is typically a boiler (primary) pump for primary-secondary piping arrangements, or a motorized boiler valve for variable primary flow piping arrangements. The flow accessory type should be selected within the Tech Tools menu prior to configuring the settings on this screen. Refer to the Lead/Lag Config screen for configuration of the minimum number of pumps or valves to remain enabled at all times while in Lead/Lag operation.





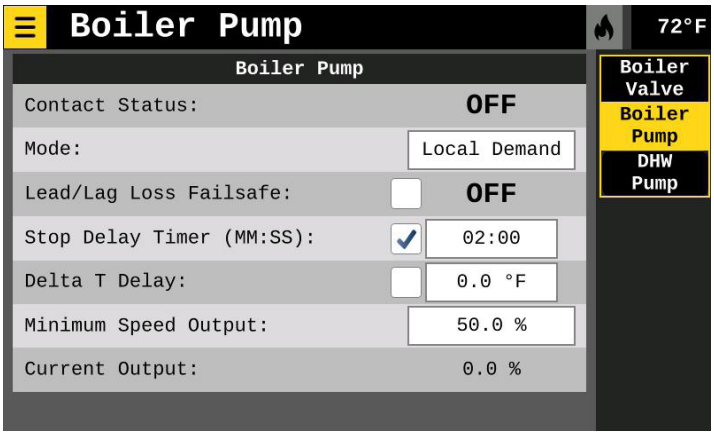
Parameter	Range	Units	Factory Default	Description
Contact Status	On - Off	-	-	Current State of the Output
Mode	See Description	-	Local Demand	Selects the automatic operation demand source to enable the pump or manual controls. Local Demand = Burner or Heater Element Demand through Postpurge OAT Cutoff = Outdoor Air Temperature Cutoff (Pump enabled when Cutoff is inactive) DHW Demand = Domestic Hot Water Demand Boiler Enable = Pump enabled when the BMS remote enable is enabled over automation or contact closure Manual On = Enabled Manual Off = Disabled
Lead/Lag Loss Failsafe	On - Off	N/A	On (Checked)	Determines the pump or valve failsafe action when lead/lag operation is lost.

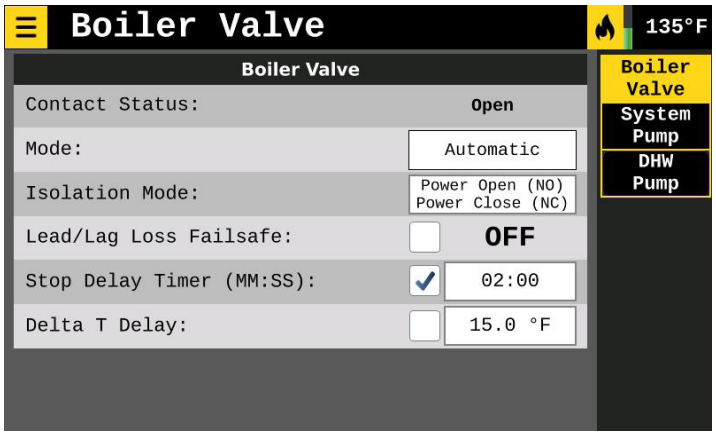
Parameter	Range	Units	Factory Default	Description
Stop Delay Timer (MM:SS)	00:00 - 59:59	MM:SS	05:00	When checked, will hold the valve open or boiler pump on until the delay timer expires to dissipate heat in the boiler preventing nuisance high limit trips.
Delta T Delay	0.0 - 20.0	°F	0.0	When checked, will hold the valve open until the differential temperature across the boiler inlet and outlet drops. This prevents wasted energy or nuisance high limit trips by stopping water flow too late or too soon.
Minimum Speed Output	4.0 - 20.0	mA	10.0	Prevents the boiler (primary) pump from operating below a specified speed.
Current Output	4.0 - 20.0	mA	-	Signal that is currently being sent.

■ Boiler Pump / Valve (7-Inch Platforms Only)

The following screens are used to configure the boiler flow control accessory, which is typically a boiler (primary) pump for primary-secondary piping arrangements, or a motorized boiler valve for variable primary flow piping arrangements. It is not standard practice to use both simultaneously.

Boiler Pump control is only available when System Pump control is not being used. Select the Pump type within the Tech Tools menu prior to configuring the settings on this screen.



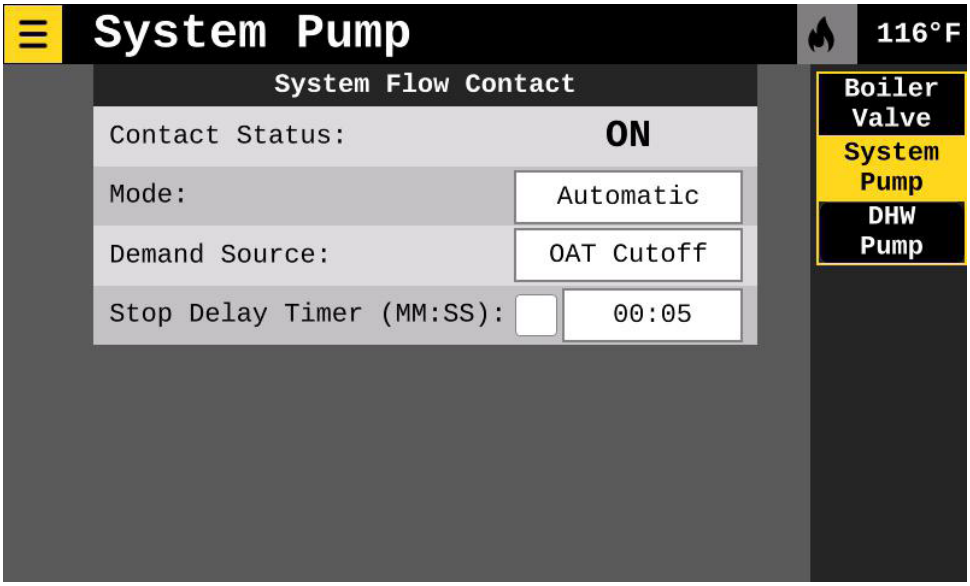


Parameter	Range	Units	Factory Default	Description
Boiler Pump				
Contact Status	On - Off	-	-	Displays the current state of the boiler pump contact.
Mode	See Description	-	Local Demand	Selects the automatic operation demand source to enable the pump or manual controls. Local Demand = Burner or Heater Element Demand through Postpurge OAT Cutoff = Outdoor Air Temperature Cutoff (Pump enabled when Cutoff is inactive) DHW Demand = Domestic Hot Water Demand Boiler Enable = Pump enabled when the BMS remote enable is enabled over automation or contact closure Manual On = Enabled Manual Off = Disabled
Lead/Lag Loss Failsafe	On - Off	-	Off (Unchecked)	Selects the failsafe action in the event of a Lead/Lag fault.

Parameter	Range	Units	Factory Default	Description
Stop Delay Timer	00:00 – 59:59	MM:SS	02:00	When checked, will hold the boiler pump on until the delay timer expires to dissipate heat in the boiler preventing nuisance high limit trips.
Delta-T Delay	0.0 - 20.0	°F	0.0	When checked, will hold the pump on until the differential temperature across the boiler inlet and outlet drops. This prevents wasted energy or nuisance high limit trips by disabling the pump too late or too soon.
Minimum Speed Output	0 to 100	%	50	The boiler pump modulation will not go below this value.
Current Output	-	-	-	The current modulation speed output.
Boiler Valve				
Contact Status	On - Off	-	-	Displays the current state of the boiler isolation valve contact. Refer to the boiler electrical schematic for connection locations.
Mode	-	-	Automatic	Allows the operator to put the valve into automatic operation or manual positions.
Isolation Mode	Open (NO) Close (NC) Open (NC) Close (NO) Power Close Spring Open Power Open Spring Close	-	Open (NO) Close (NC)	Selects how the isolation valve is wired to the control relay. The Normally Closed (NC) contacts will determine the valve action in the event of boiler power loss. The valve actuator requires a separate power source. Refer to the boiler electrical schematic for connection locations.
Lead/Lag Loss Failsafe	On - Off	-	Off (Unchecked)	Selects the failsafe action in the event of a Lead/Lag fault.
Stop Delay Timer	00:00 – 59:59	MM:SS	02:00	When checked, will hold the valve open until the delay timer expires to dissipate heat in the boiler preventing nuisance high limit trips.
Delta-T Delay	0.0 - 20.0	°F	15.0	When checked, will hold the valve open until the differential temperature across the boiler inlet and outlet drops. This prevents wasted energy or nuisance high limit trips by closing the valve too late or too soon.

■ System Pump (5-Inch Platforms Only)

This screen is exclusive to 5-inch platforms only (Endura XE). It determines how the system (secondary) pump enable contact will operate. The system pump is used to circulate hydronic heating water to the coils, zones or users.



Parameter	Range	Units	Factory Default	Description
Contact Status	0 – OFF 1 – ON	N/A	OFF	Current State of the output
Mode	Automatic Manual	N/A	Automatic	Allows for manual control of the output.
Demand Source	BMS OAT Cutoff	N/A	BMS	Determines what is triggering the output. BMS will enable the system pump contact when the BMS Enable is made. OAT Cutoff will enable the system pump when utilizing the OAT Cutoff feature, and the boiler is not in cutoff mode.
Stop Delay Timer (MM:SS)	00:00 – 59:59	MM:SS	02:00	When checked will keep pump on for the user designated amount of time to dissipate remaining heat in the system.

■ System Pump (7-Inch Platforms Only)

The following screens are used to configure the system (secondary) pump control.

System Pump control is only available when Boiler Pump control is not being used. Select the Pump type within the Tech Tools menu prior to configuring the settings on this screen.

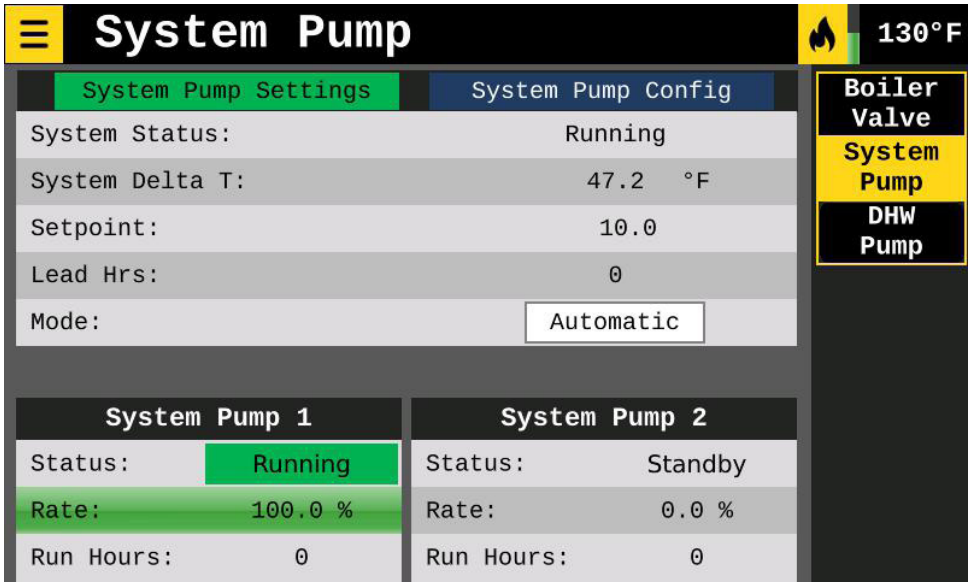
The System Pump feature allows control of up to two (2) system pumps in a Lead/Standby (Duty/Standby) rotation fashion based on either System Delta T (differential temperature) or System Delta P (differential pressure). The Delta P method is generally preferred for timely pump response.

Delta T requires both system supply header and system return header temperature sensors to be field wired to the boiler or written over automation.

Delta P requires a 4-20mA signal from a field wired differential pressure sensor (not provided).

Refer to the electrical schematic provided with the boiler for wiring locations.

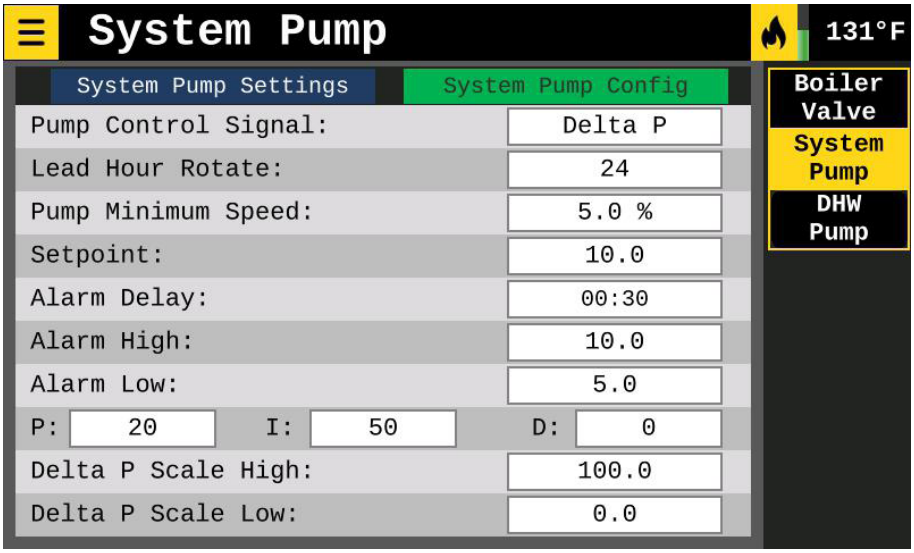
The System Pump Settings tab provides general readout information on pump statuses as well as the ability to set the pumps into Automatic or Manual operation modes.



Parameter	Range	Units	Factory Default	Description
System Status	-	-	-	Current system pump control status.
System Delta	-	PSI / °F	-	Current system process variable.
Setpoint	-	PSI / °F	10.0	Current system setpoint.
Lead Hrs	-	Hrs	-	Current run hours on the lead pump.

Parameter	Range	Units	Factory Default	Description
Mode	See Description	-	Off	Allows the user to choose pump operation mode. Automatic – Both pumps permitted to run in duty/standby mode as determined by the boiler. Pump 1 Only – Pump 1 exclusive automatic operation. Pump 2 Only - Pump 2 exclusive automatic operation. Manual On – Operator chooses which pump to run. Off – Pumps disabled.
Rate	0.0 – 100.0	%	0	Available when the pumps are set to Manual On mode, allows the operator to manually command the active system pump modulation rate.
Pump X Status	-	-	-	Current pump status.
Pump X Rate	0.0 – 100.0	%	0	Current modulation rate output to the analog output signal.
Pump X Run Hours	-	Hrs	-	Cumulative run hour history.

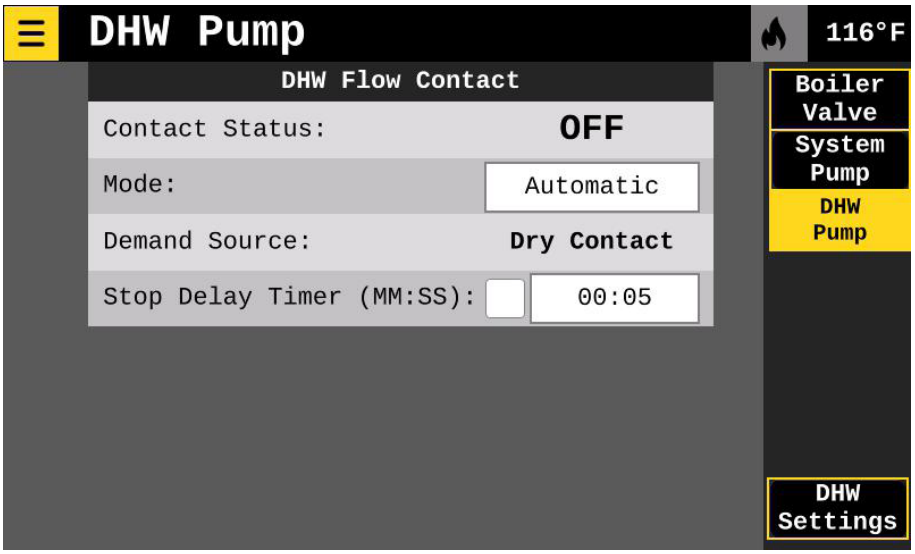
The System Pump Config tab is where the operator configures and tunes parameters necessary for Automatic pump operation.



Parameter	Range	Units	Factory Default	Description
Pump Control Signal	Delta T - Delta P	-	Delta P	Choose either Delta P or Delta T
Lead Hour Rotate	0 – 1000	Hrs	24	Hours between lead pump rotation.
Pump Minimum Speed	0.0 – 100.0	%	5.0	The boiler pump modulation will not go below this value.
Setpoint	0.0 – 100.0	PSI / °F	10.0	The differential pressure or temperature setpoint.
Alarm Delay	00:00 – 59:59	MM:SS	00:30	The system pump monitor alarm delay timer. A pump high or low fault condition must exist for the duration of the timer for an alarm to be annunciated.
Alarm High	0.0 – 100.0	PSI / °F	10.0	Exceeding this condition is considered a pump fault.
Alarm Low	-50 – 100	PSI / °F	5.0	Dropping below this condition is considered a pump fault.
P	10 – 50	Error	30	Proportional value for the PID
I	0 – 100	Sec	50	Integral value for the PID
D	0 – 100	Sec	0	Derivative value for the PID
Delta P Scale High	0.0 – 100.0	PSI	100.0	Available when Pump Control Signal is set to Delta P. This parameter sets the PSI at 20mA.
Delta P Scale Low	0.0 – 100.0	PSI	0.0	Available when Pump Control Signal is set to Delta P. This parameter sets the PSI at 4mA.

■ DHW Pump

Determines how the domestic hot water (DHW) pump enable contact will operate. A DHW pump is used to circulate hydronic heating water to a domestic hot water generator, such as a packaged heat exchanger.



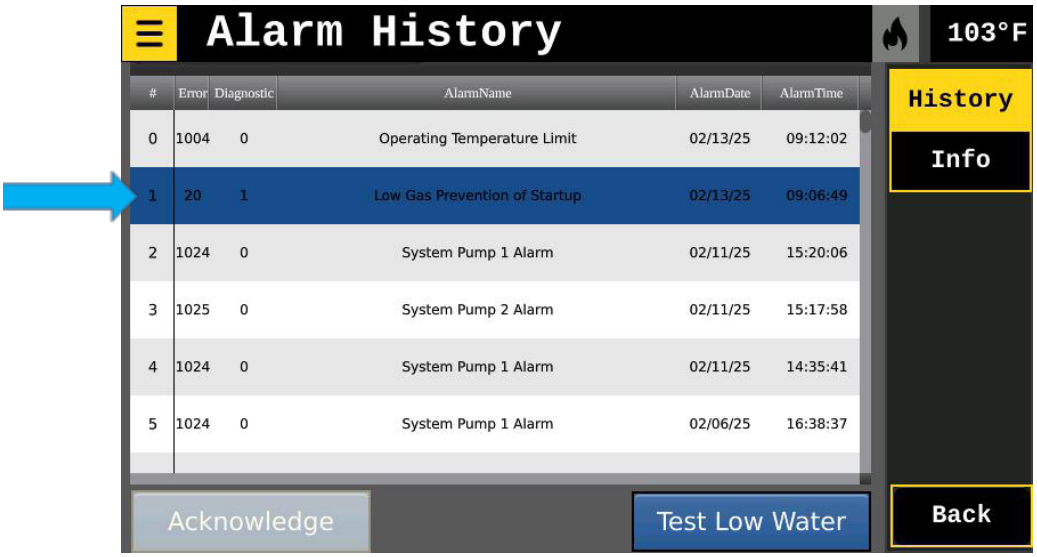
Parameter	Range	Units	Factory Default	Description
Contact Status	On - Off	-	-	Current state of the DHW pump contact
Mode	On Off Automatic	-	Automatic	Allows for manual on, manual off, or automatic mode selection
Demand Source	Dry Contact DHW Sensor	-	-	Determines what source is used for DHW pump demands. This applies to 5-inch platforms only.
Stop Delay Timer (MM:SS)	00:00 – 59:59	MM:SS	02:00	When selected will keep the valve open or pump on for the user designated amount of time to dissipate remaining heat in the boiler and prevent nuisance limit trips.

Alarm History Menu

The Alarm History logs the previous 100 alarms and warnings with the date and time. To reset an active alarm press the "Acknowledge" button, an additional reset may also be required at the safety device. Some alarms are not manual reset lockout conditions, they are for informational purposes only and will automatically resolve when the condition clears.

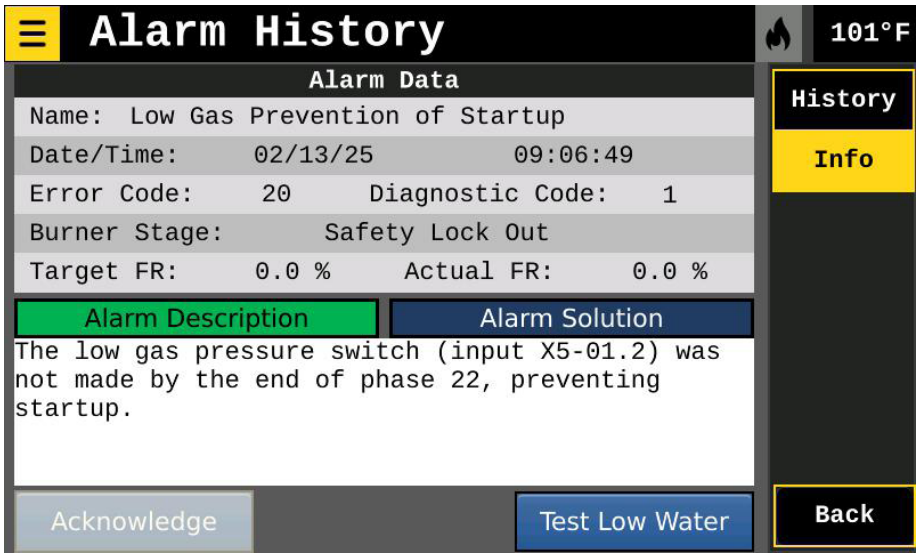
To view detailed information on an alarm or before contacting your Fulton Representative for technical support, it is necessary to tap the alarm index number in the first column and then tap "Info".

Important: The complete information found in the Info screen is often required for troubleshooting as this provides additional details that are not shown on the History screen. To expedite technical support services have the Info screen details ready prior to contacting your Fulton Representative, the support technician may be unable to assist when provided only the History.

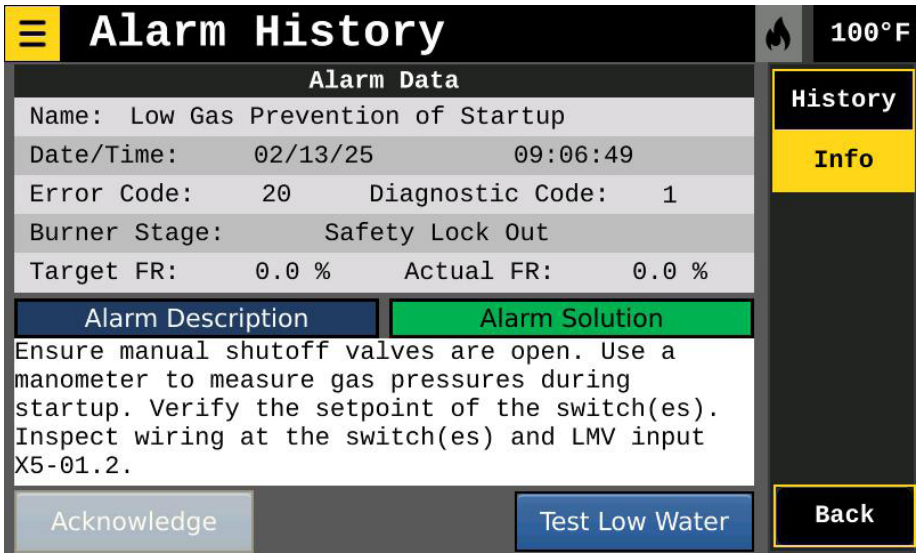


■ Info:

The Alarm Info screen will display detailed information on the selected alarm, including the burner stage, target and actual modulation rates, and a detailed description of the alarm. Record this information prior to contacting your local Fulton Representative for technical support.



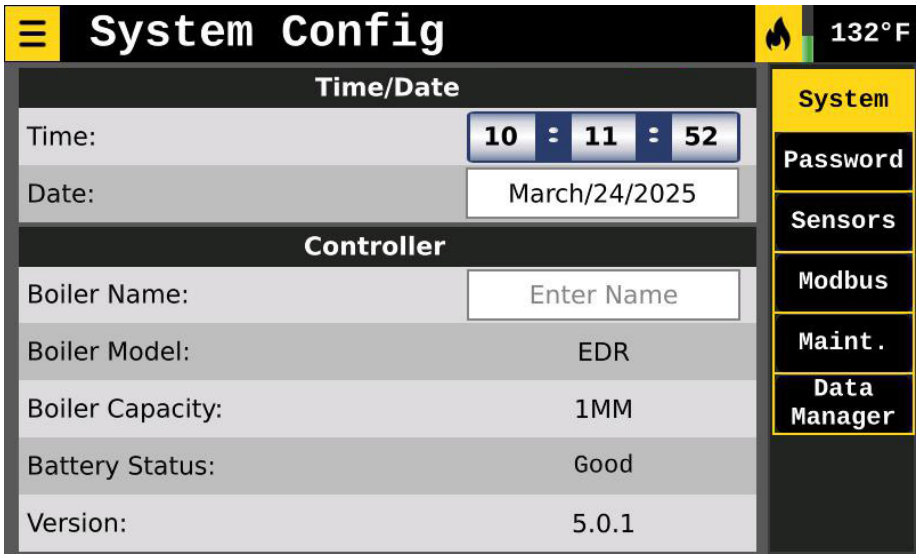
Tapping on "Alarm Solution" will provide troubleshooting tips to resolve the alarm. For additional support, contact your local Fulton Representative.



Configuration

■ System

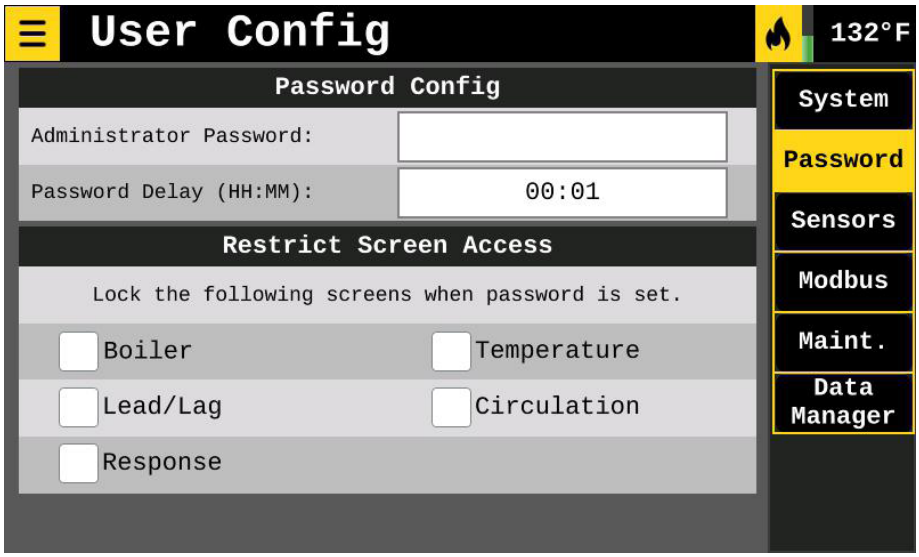
The System screen is where the system clock time and date is set. Correctly setting the time and date is important for proper operation of the setback schedule and alarm history. The boiler may also be given a unique name which will be displayed on the Lead/Lag Status screen. The version number of the software is also displayed on this screen. Record the version number prior to contacting your local Fulton Representative for technical support.



Parameter	Range	Units	Factory Default	Description
Time	-	HH:MM:SS	-	Current Time
Date	-	MM/DD/ YYYY	-	Current Date
Boiler Name	-	-	-	Customer field for naming the boiler.
Boiler Model	-	-	-	Boiler size as set by the factory and confirmed during startup.
Version	-	-	-	Current PURE Control software version
Battery Status	-	-	-	Replace battery if status reads low or bad to preserve customer settings during a loss of power or a software update It is recommended to replace the battery on an annual basis. Note: A power cycle is required to update the battery status.

■ Password

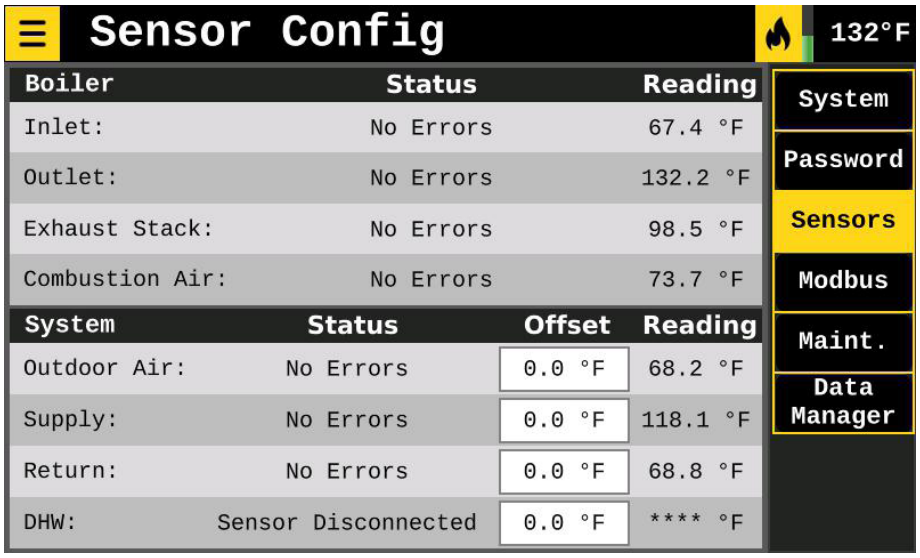
Certain user level screens may be password protected to prevent unauthorized personnel from modifying boiler settings. This screen allows the user to choose which menus to place behind a password, set a password, and choose the amount of time before a password entry expires and needs to be re-entered.



Parameter	Range	Units	Factory Default	Description
Administrator Password	-	-		User/site defined password for the control, leave blank for no password.
Password Delay	00:00 - 99:59	HH:MM	00:05	Time before the password will timeout and need to be re-entered.
Lock Screen Check Boxes	-	-	Disabled	Check box selection for what menus should be password protected.

■ Sensors

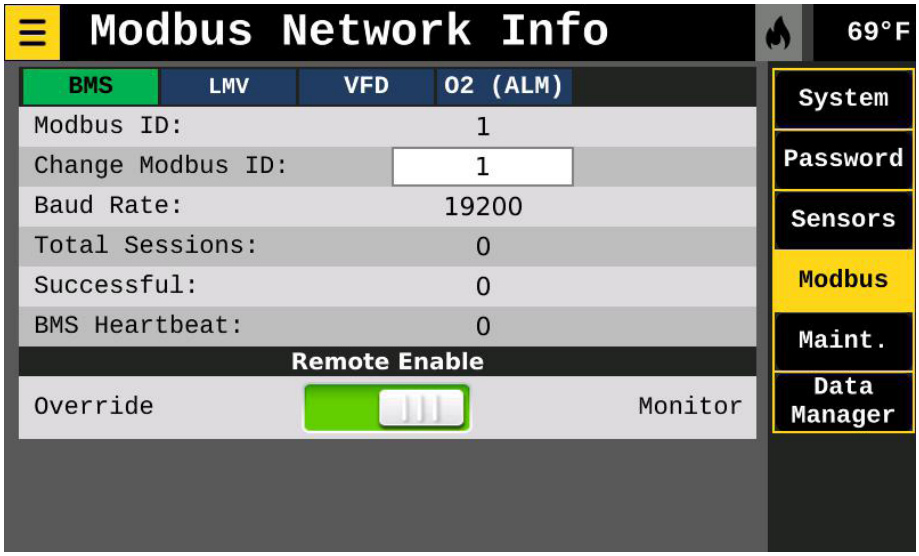
Displays the current status and reading from standard and optional sensors. The offset parameter may be used to calibrate sensor readings. Sensor values displayed on this screen are the live, raw, unfiltered values which is helpful for troubleshooting purposes.



Parameter	Range	Units	Factory Default	Description
Boiler Sensors	Inlet	°F	-	Boiler sensors are factory installed and wired. The boiler will not be allowed to run without them.
	Outlet			
	Exhaust Stack			
	Combustion Air			
System Sensors	Outdoor Air	°F	-	System sensors are optional field installed sensors required by some additional features/selections.
	Supply			
	Return			
	DHW			
Status	No Errors	°F	-	Sensor values displayed on this screen are the live, raw, unfiltered values which is helpful for troubleshooting purposes.
	Contact Support			
	Input Overflow			
	Input Over-range			
	Input Overflow			
	Input Underflow			
	Sensor Disconnected			
Offset	-20.0 - 20.0	°F	0.00	System sensor calibration offset
Reading	-220.0 - 750.0	°F	-	Current reading from the respective hardwire sensor including the offset

■ Modbus

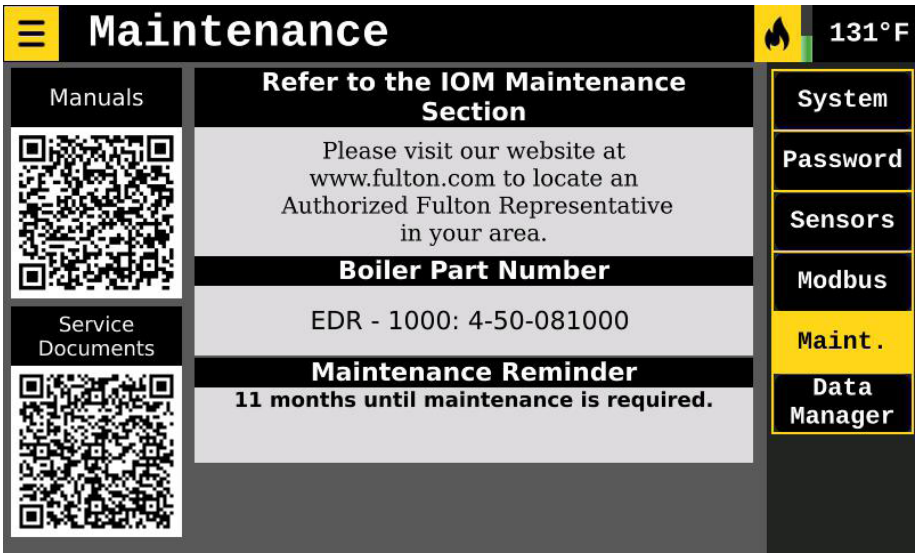
This screen is used to set the Modbus ID, view BMS Modbus communication, and override the BMS remote enable to permit the boiler to run regardless of BMS remote enable status. Use the tabs to monitor Modbus communication and status of devices integral to the boiler devices such the flame safeguard, devices will vary by boiler type. This is helpful for diagnostic and troubleshooting purposes.



Parameter	Range	Units	Factory Default	Description
Modbus ID	1 -247	-	1	Current Address
Change Modbus ID	1 -247	-	1	Should match the Modbus ID above once changed
Baud Rate	19200	bps	19200	Baud rate for BMS communication is 19200 and cannot be changed at this time.
Total Sessions	0 – 999,999,999	-	-	Total number of attempted communications for all devices on the network.
Successful	0 – 999,999,999	-	-	Total number of communications that have completed. There is no communication if the number is not increasing.
BMS Heartbeat	0 - No Heartbeat Sensed 1 - Heartbeat Sensed	-	-	BMS point that is required to be written once every 10 seconds in order to maintain remote/write control of the boiler. Including Enable/Disable, Setpoint, etc.... Monitoring does not require the use of the Heartbeat.
Remote Enable	-	-	Monitor	Provides a local override for the BMS enable. Used to temporarily enable the boiler if the BMS is unavailable or factory jumper is removed.

■ Maintenance

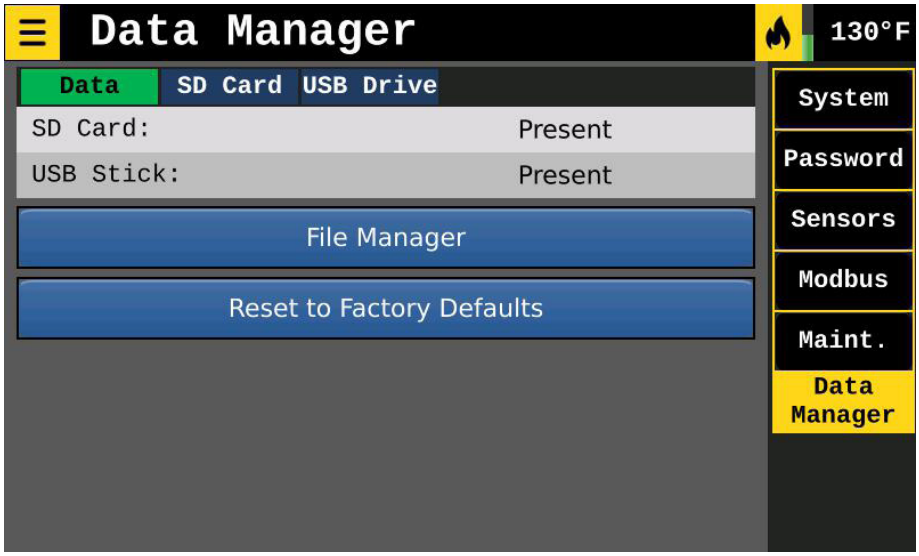
When the boiler is due for scheduled preventative maintenance, the maintenance icon will appear at the top of the screen. Tapping this icon will navigate to the Maintenance screen, which may also be accessed through the Configuration menu. The Maintenance screen will display boiler information and provide QR codes for digital documentation. The Maintenance interval and reminder may be configured in the Tech Tools menu.



■ Data Manager

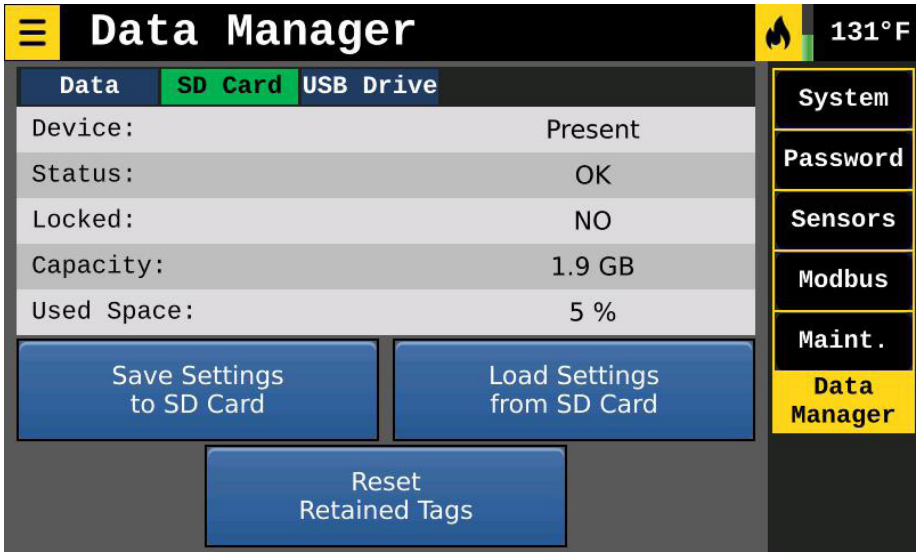
The Data Manager allows the user to save and load boiler settings to the microSD card or a portable USB flash drive. It is recommended to always save boiler settings after commissioning a new boiler or performing maintenance. Refer to the section "Exporting Data using the Data Manager" for detailed instruction.

Tap the "Reset to Factory Defaults" button to reset all parameters back to original factory settings. A prompt will ask for confirmation of this action. This will erase all user settings.



The control uses the microSD card to save and restore settings after a software update. To backup a copy of the user settings, the microSD card may be removed and contents copied to a PC using a microSD card reader. Do not migrate these settings or use the microSD card on another boiler. **Use a genuine name brand microSD card formatted FAT32 of capacity 4GB or larger.**

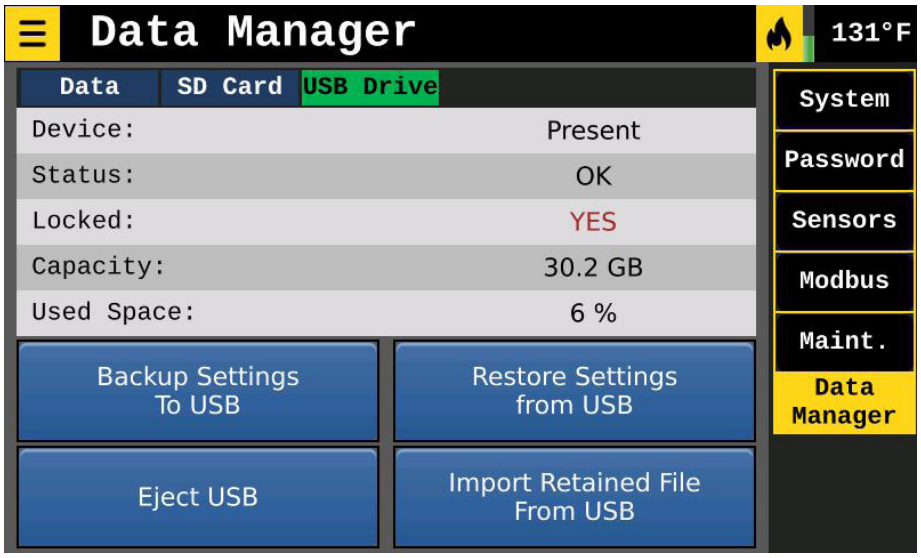
Retained Tags may also be reset from this screen provided the Retained Tags file is available on the microSD card. Resetting Retained Tags is helpful in the event of a stuck or erroneous parameter. Load the saved user settings after resetting Retained Tags.



Alternatively, a portable USB flash drive may be used to back up and restore settings.

If the Retained Tags file is missing from the microSD card it may be imported from a USB flash drive by tapping the "Import Retained File From USB" button. The software download package matching the software version will include a Retained Tags file.

Always tap "Eject USB" before removing the flash drive otherwise data may be permanently lost.



⚠ WARNING

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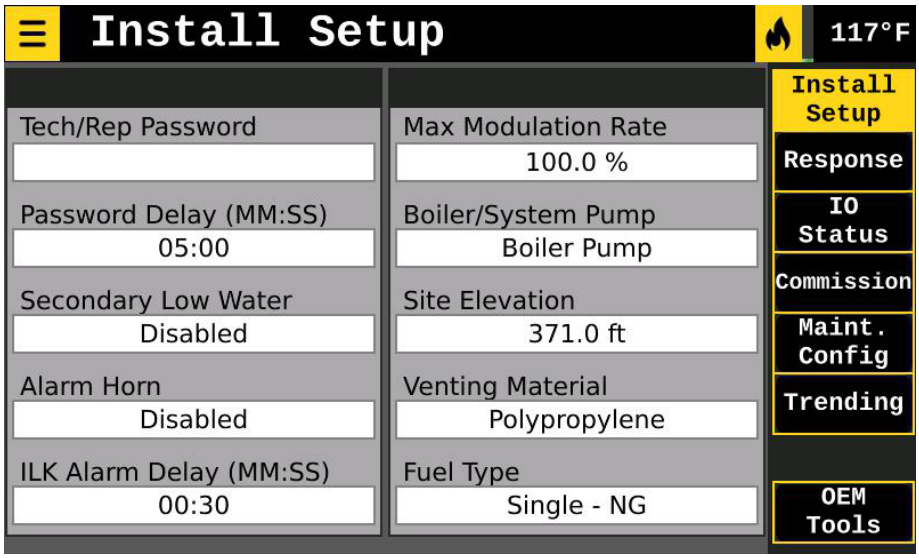
Follow all proper lockout/tagout procedures for service. Before beginning any service, ensure area is free of combustible materials and other dangers.

In order to meet warranty conditions, ensure all appropriate maintenance activities are performed.

Tech Tools

■ Install Setup

The installation details should be configured by the authorized service technician prior to commissioning and operating the boiler. The selections available on this screen will vary by boiler type.

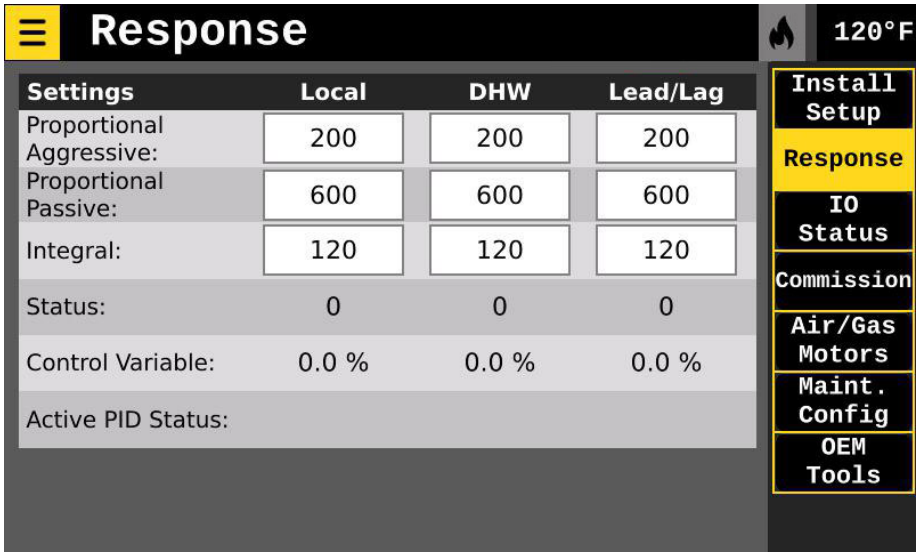


Parameter	Range	Units	Factory Default	Description
Tech/Rep Password	0 - 99999999	N/A	Consult your Local Fulton Representative	The numeric password (PIN) used to access the Tech Tools menu. Leave blank to disable the password.
Password Delay	1:00 - 59:00	MM:SS	05:00	When the PIN is successfully entered the user will not need to re-enter the PIN until this timer expires.
Max Firing Rate	0.0 - 100.00	%	100.0	This parameter may be used to limit the maximum firing rate of the burner. This can be helpful for installations with insufficient flow rate or load.
Site Elevation	0.0 - 15000.0	ft	371.0	Configure the site elevation for the O2 Compensation system to operate properly.
Venting Material	Varies by boiler type, refer to IOM	N/A	Polypropylene	Selecting the vent material type will automatically configure the appropriate flue gas exhaust temperature limit.
Boiler Pump/Valve	Boiler Pump Boiler Valve	N/A	Boiler Pump	Choose whether the boiler is piped primary-secondary with a dedicated boiler (primary) pump, or piped variable primary with a motorized boiler isolation valve. This parameter is only applicable to 5-inch platforms.

Parameter	Range	Units	Factory Default	Description
Secondary Low Water	Enabled Disabled	-	Disabled	Refer to the electrical diagram for detail on installing the secondary (auxiliary) low water cutoff safety device. This parameter is only applicable to 7-inch platforms.
Alarm Horn	Enabled Disabled	-	Disabled	Enables or disables the integral alarm speaker horn. Remove the rubber insert at the bottom of the control display for indoor installations only. This parameter is only applicable to 7-inch platforms.
ILK Alarm Delay	00:00 – 59:59	MM:SS	00:30	The interlock alarm start delay prevents nuisance boiler shutdown in the event of a brief opening of the interlock contact(s) during start. The interlock run delay timer is 5 seconds and is not adjustable. This parameter is only applicable to 7-inch platforms.
Fuel Type	Single - NG Single - LPG Dual	-	Single – NG	Used to select the boiler fuel type(s) prior to commissioning. This parameter is only applicable to 7-inch platforms.

■ Response

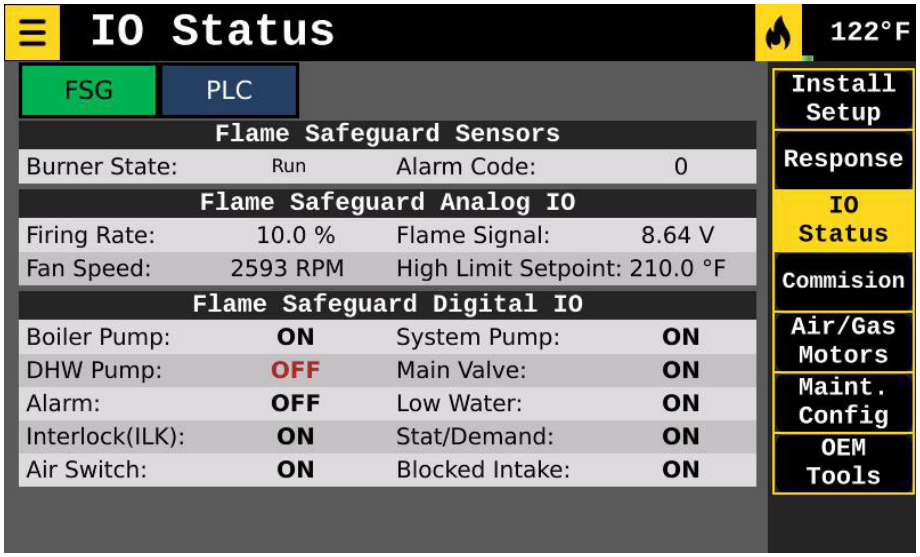
While the default PID slider bounds are appropriate for the majority of installations, some installations with special cases may require further adjustment and tuning outside of the typical values. The authorized service technician may use this screen to tune the bounds of the PID sliders located on the Response, PID Config screen. The slider adjusts between Passive and Aggressive bounds of the Proportional values, while Integral remains a constant.



Parameter	Range	Units	Factory Default	Description
Proportional Aggressive	50 - 1000	Error	200	The proportional value to be used for the aggressive bounds of the PID slider.
Proportional Passive	50 - 1000	Error	800	The proportional value to be used for the passive bounds of the PID slider.
Integral	1 - 1000	Error	120	The integral to be used for the full PID slider range.

■ IO Status

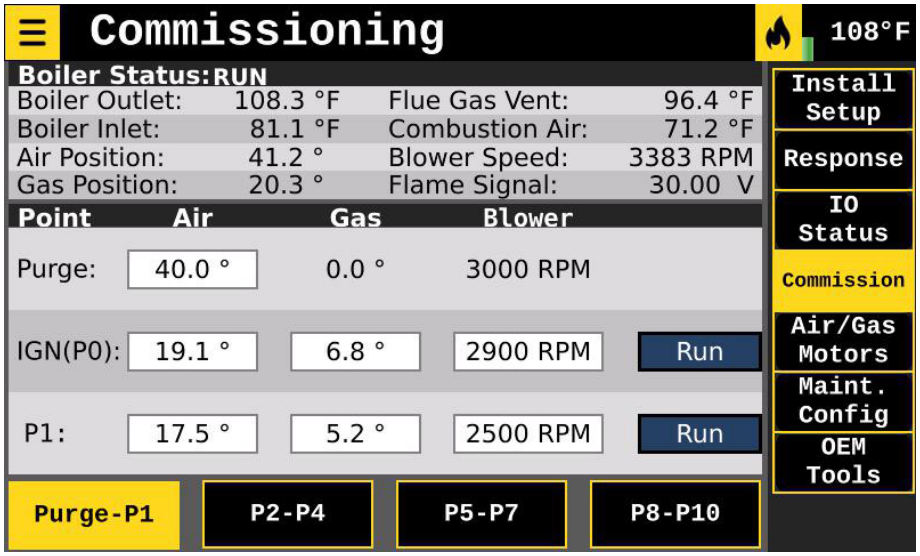
The IO Status screen provides rapid access the flame safeguard (FSG) and PLC input and output status which can be used for advanced diagnostics or troubleshooting purposes. The I/O hardware interfaces available on this screen will vary by boiler type.



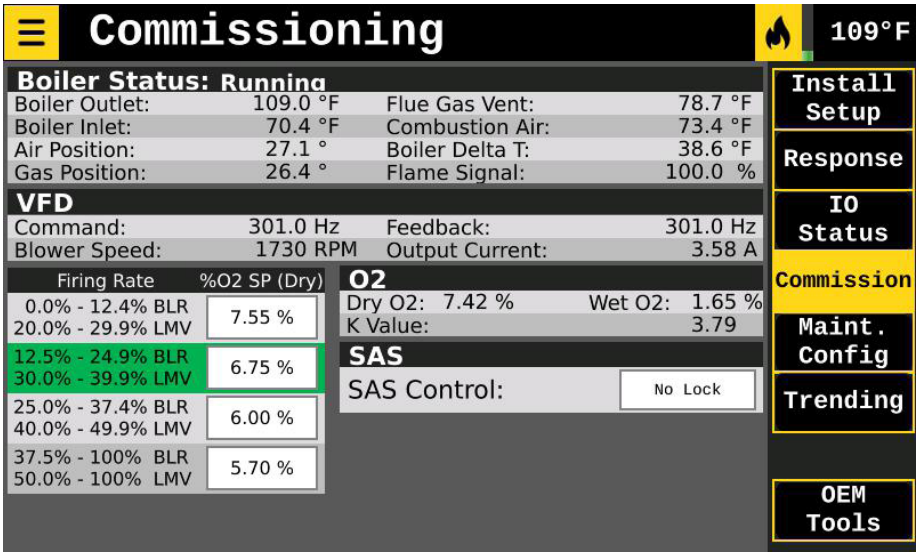
■ Commission

The Commission screen is used by the authorized service technician to perform combustion adjustment and verification when commissioning a new boiler and while performing preventative maintenance (PM) services. Technicians must successfully complete the Factory Authorized Commissioning Training (FACT) course prior to making adjustments to combustion parameters. Refer to the boiler IOM for instruction on adjusting and verifying combustion.

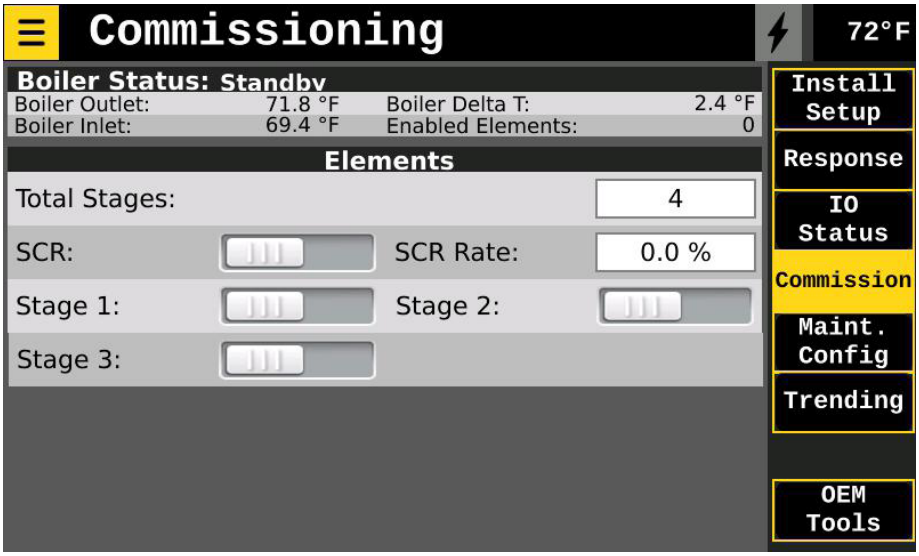
The Endura XE 5-inch platform allows the technician to tune air, gas and blower positions through the GUI.



To perform combustion adjustment on boilers featuring the LMV3 flame safeguard an AZL23 display or ACS410 PC software will be required (not provided). Available parameters will vary by boiler type.

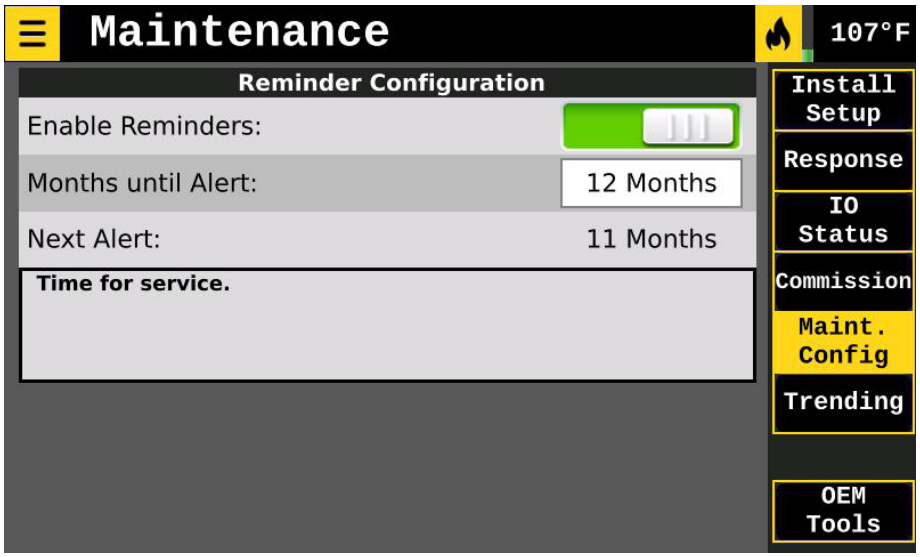


Resistive electric boilers allow for manual immersion heater and SCR control.



■ Maintenance Configuration

The Maintenance Configuration screen allows the service technician to enable maintenance reminders, the maintenance interval, and set a message for the operator when the interval expires. It is recommended to include contact information such as the service organization and phone number.



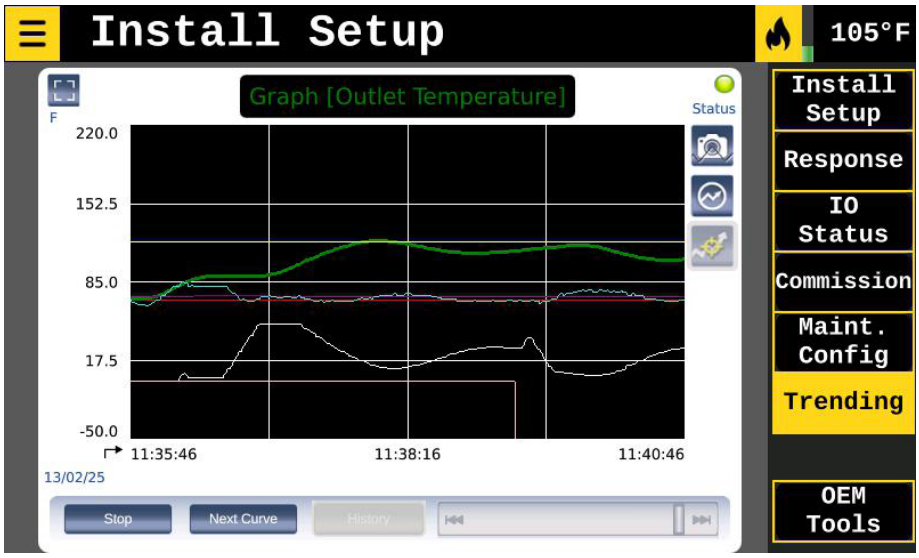
Parameter	Range	Units	Factory Default	Description
Enable Reminders	Enabled - Disabled	-	Enabled	Enables or disables the timed service reminders.
Months until Alert	1-12	Months	12	The configurable amount of time between service intervals.
Next Alert	-	Months	N/A	Months remaining until the next service interval. This resets when the Months until Alert is updated or the operator acknowledges service.
Reminder	-	-	Time for service.	The maintenance reminder message that will appear for the operator. It is recommended to configure this field to include sales and service organization contact information.

■ Trending

Real-time trending data is available exclusively for the 7-inch platforms. Tap "Next Curve" to toggle between highlighted parameters.

Press Stop to scroll and review past data.

History will allow review of previous dates/times from the microSD card.



⚠ WARNING

This User Manual is intended for use in conjunction with the current edition of the respective boiler Installation, Operation, and Maintenance (IOM) manual. Both should be read in their entirety and be made permanently available to the staff responsible for equipment operation.

Do not install, operate, service or repair any component of this equipment unless you are qualified and fully understand all requirements and procedures.

All information in this User Manual is for reference and guidance purposes, and does not substitute for required professional training, conduct, and strict adherence to applicable jurisdictional/professional codes or regulations.

WHAT TO DO IF YOU SMELL GAS
• Do not try to light any appliance.
• Do not touch any electrical switch.
• Do not use any phone in your building.
• Immediately call your gas supplier from a neighbor's phone.
• Follow the gas supplier's instructions.
• If you cannot reach your gas supplier, call the fire department.

A qualified installer, service agency or the gas supplier, must perform installation and service.

Configuring Lead/Lag

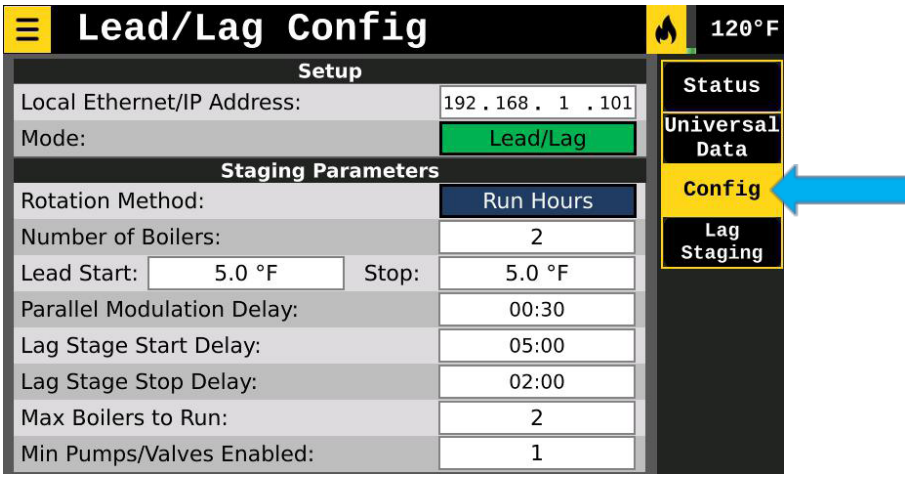
Configuring integrated modular boiler plant Lead/Lag requires the boilers are on a private Ethernet/IP Network not shared with any other devices. The boilers must be of the same type and hardware configuration, and have the same software version installed.

Two boilers may be joined directly with an Ethernet cable. Three to ten boilers will require an Ethernet switch. The Ethernet switch is available for purchase from your local Fulton Representative. For additional information on installation and wiring refer to the boiler IOM and electrical diagram.The procedure is broken down into two sections:

1. Wiring the boilers for Lead/Lag operation
2. Configuring the control for Lead/Lag operation.

Configuration at the control will need to be completed at each boiler.

1. Wiring the boilers for Lead/Lag operation.
   a. Refer to the boiler IOM for the location of the Lead/Lag 8P8C (Ethernet) port.
   b. On two boiler setups, simply run an Ethernet cable between the two boilers.
   c. On three to ten boiler setups, run an Ethernet cable from each boiler to the switch. No other devices shall be shared on this network.
   d. No configuration at the switch will be required.
2. Configure each boiler at the control for Lead/Lag operation.
   a. Navigate to the Lead/Lag menu and select Config.
   b. Set the Mode to Lead/Lag to enable this feature
   c. Enter in the Number of Boilers in the Lead/Lag network.
   d. Lead Start and Stop deviations above and below setpoint are also set here
   e. Ensure the above settings are configured identical at each boiler.



f. Give each boiler its own Local Ethernet/IP address at the following sequence:

   i. Boiler 1- 192.168.1.100

   ii. Boiler 2- 192.168.1.101

   iii. Boiler 3- 192.168.1.102

   iv. Boiler 4- 192.168.1.103

   v. Boiler 5- 192.168.1.104

   vi. Boiler 6- 192.168.1.105

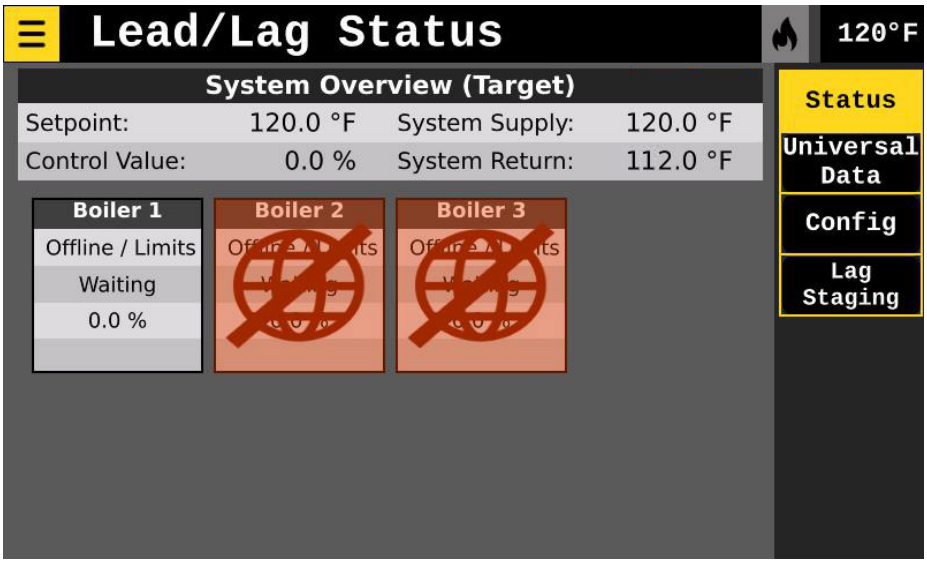
   vii. Boiler 7- 192.168.1.106

   viii. Boiler 8- 192.168.1.107

   ix. Boiler 9- 192.168.1.108

   x. Boiler 10- 192.168.1.109

g. Under the status screen verify that the boilers are connected. Boilers that are not recognized on the network are displayed in red.



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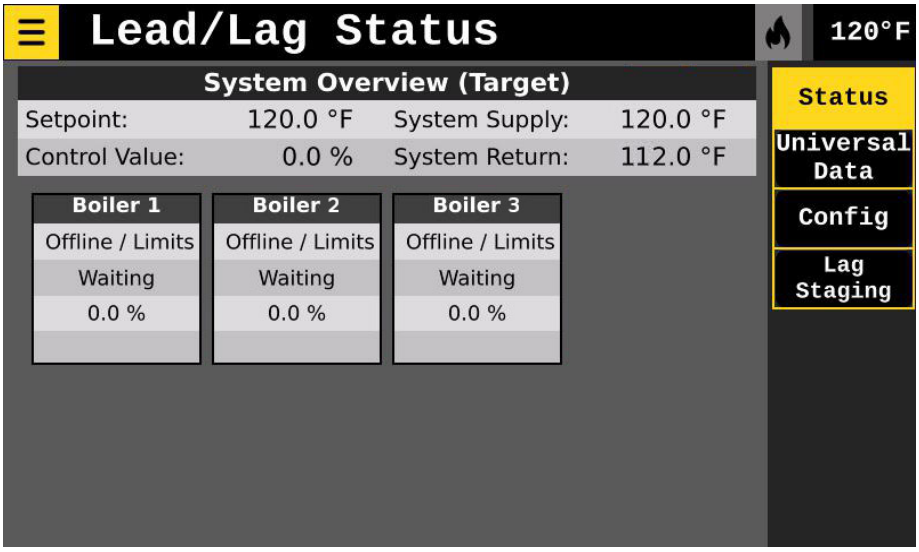
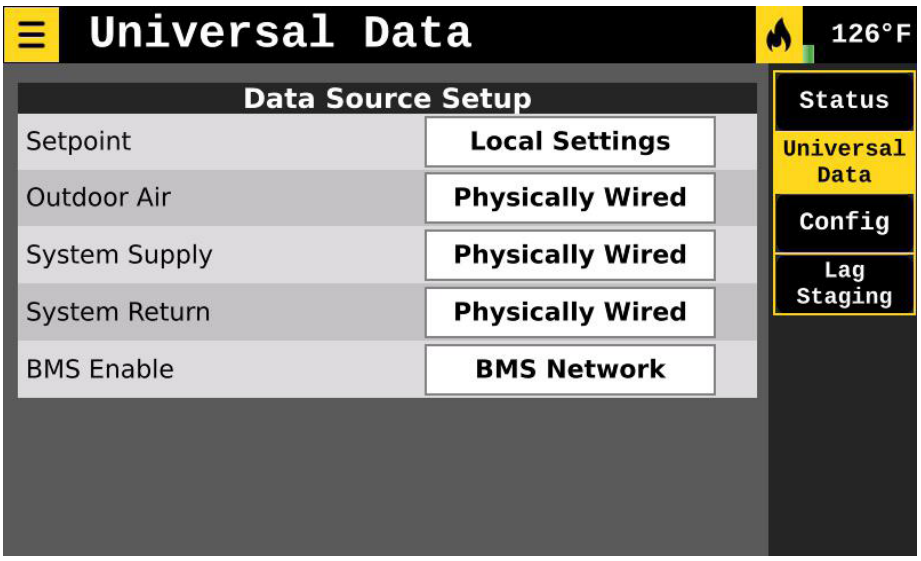
Follow all proper lockout/tagout procedures for service. Before beginning any service, ensure area is free of combustible materials and other dangers.

In order to meet warranty conditions, ensure all appropriate maintenance activities are performed.



h. Select Universal Data from the right while under the Lead Lag Menu



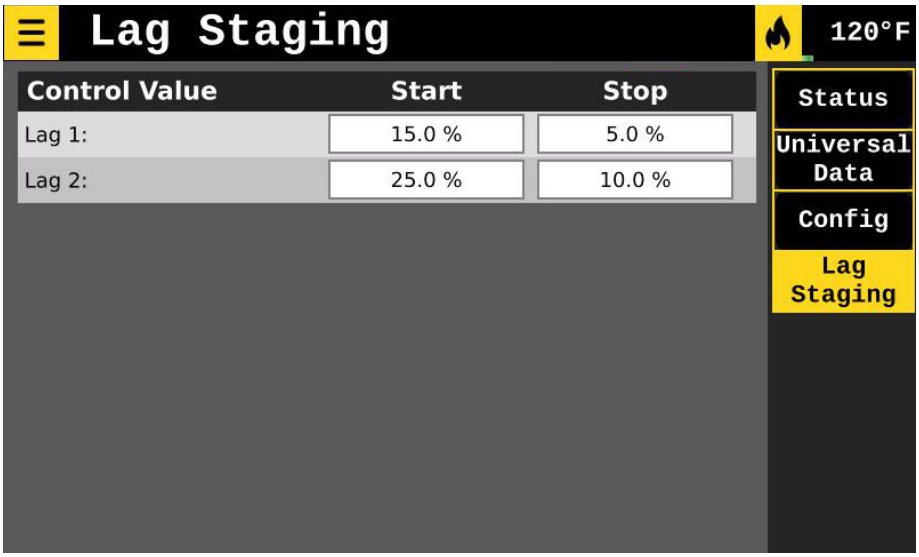
i. Verify appropriate settings on what information is being provided or received by each boiler. Note that at least 1 boiler must have the Header sensor reading in order for Lead Lag to operate, without the Header temperature boilers will default back to Local operation.

   i. **Local Settings** will operate the boiler using configured parameters at the boiler. Similarly **Physically Wired** is used for instrumentation or contacts physically hardwired to the boiler.

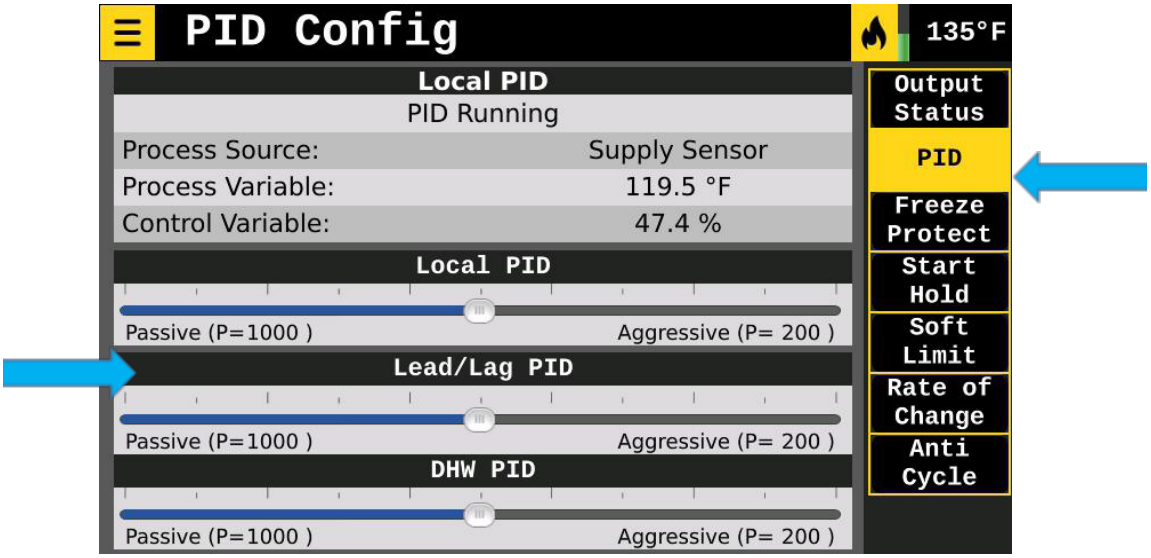
   i. BMS Network indicates that the BMS will be writing the information to the boiler over Modbus or BACNet.

   i. Boiler Network has the boiler retrieve the information from another available unit on the Lead Lag network.

j. The Staging Multiplier screen from the right on the Lead Lag menu contains information on how the Lag boilers stage on/off.

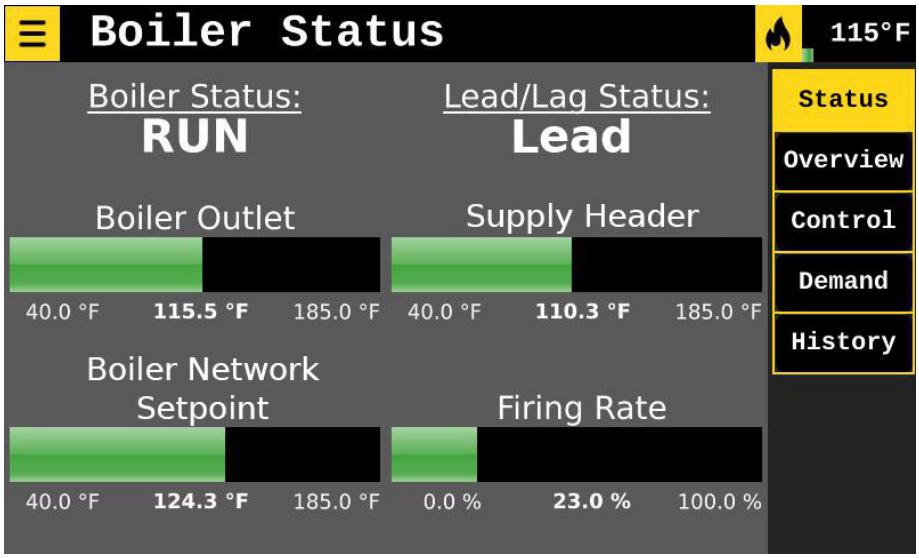


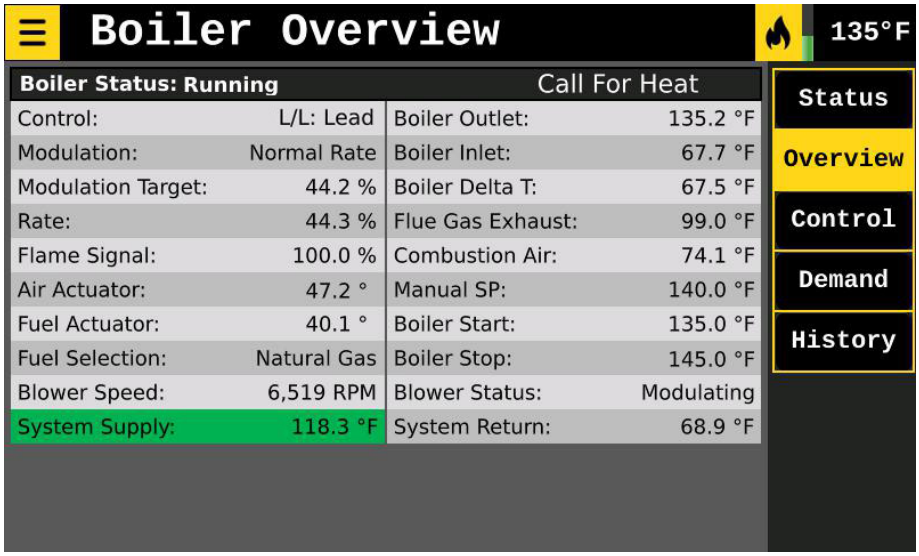
k. Verify the PID Settings at each boiler for the Lead Lag located under the Response Menu



l. For consistency all other settings on the Configuration screen should reflect the same data on all boilers in the Lead/Lag network.

m. The Boiler Status and Overview screens will now also reflect information specific to the Lead/Lag including Supply sensor temperature and Lead Lag position.





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• Follow the gas supplier's instructions.
• If you cannot reach your gas supplier, call the fire department.

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Performing A Software Update

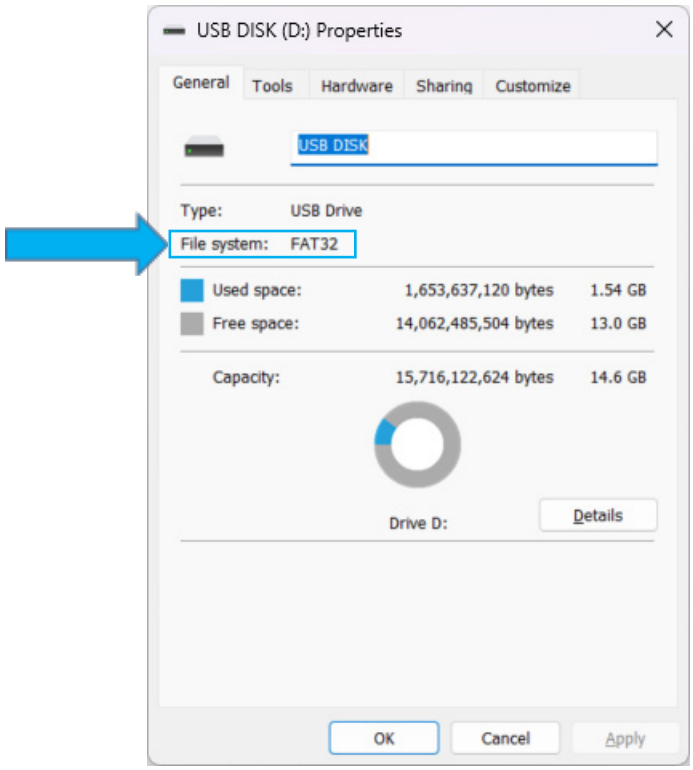
Fulton practices continuous product improvement and will periodically release software updates. It is recommended to update to the latest available software when commissioning new equipment or performing annual preventative maintenance services. The control interface will walk the technician through each step of the process. The typical time to complete an update is 10 to 20 minutes. It is recommended to document current settings prior to updating the software in case they are lost or reset during the process. An overview of the update process is as follows:

1. Download the appropriate software update package (.zip) specific to the boiler model.
2. Unzip the software update package and copy or move all unzipped files into the root folder of a FAT32 formatted16-32GB capacity USB flash drive.
3. Insert the USB drive into a powered controls display HMI and wait 1-2 minutes until a "USB Action File" prompt appears. Tap "Start", at CPU Stop Mode tap "OK" to reboot and begin the firmware update.
4. The firmware update will typically be completed within 10 minutes. Upon automatically rebooting a "Version Mismatch" message may be displayed, this is normal.
5. Another "USB Action File" prompt will appear. Tap "Reboot" to continue with the application software update.
6. A "Finished Successfully" message will appear, tap "OK" to acknowledge. Verify your boiler series and model and tap "Save Settings" then "OK".
7. Retained Tags will now be reset automatically. Once complete, confirm your boiler series and model and tap "Load User Settings" then "OK".
8. When prompted, power off the boiler, remove the USB drive and power on the boiler.
9. Configure the Modbus ID.
10. Confirm all settings are configured as appropriate for the installation.

■ Preparing the Update Package

The following instructions require a Windows PC and USB flash drive formatted FAT32. The update process may fail if instructions are not strictly followed. Adhere to the following:

1. A 16 to 32GB USB flash drive is required (not supplied) and must be formatted to FAT32. A name brand flash drive such as SanDisk, Kingston or PNY is strongly recommended.



2. Download the latest software update package from Fulton.com or as supplied by your Fulton Representative. Confirm the boiler model listed on the nameplate and verify the software package and version is compatible with this model.

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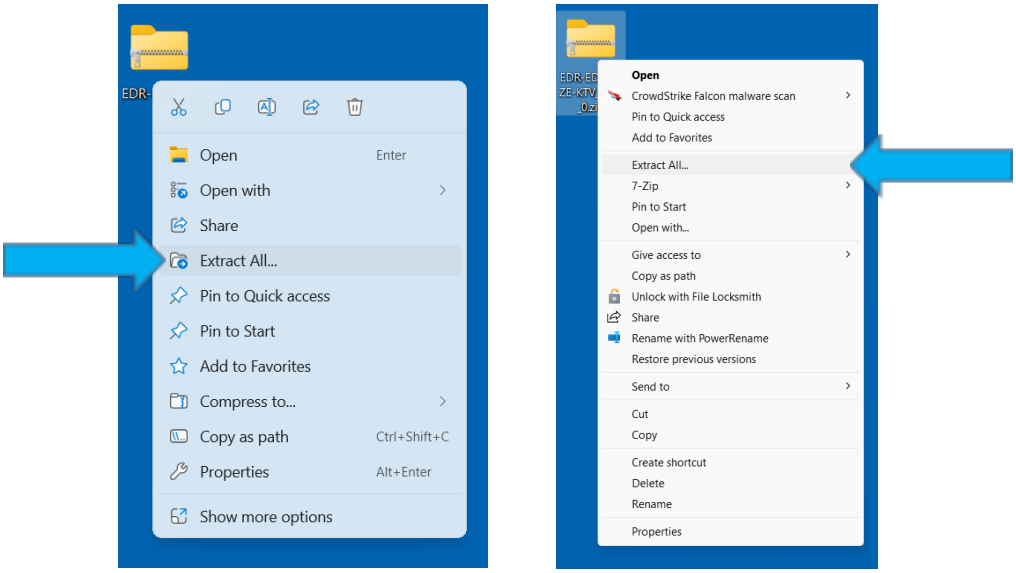
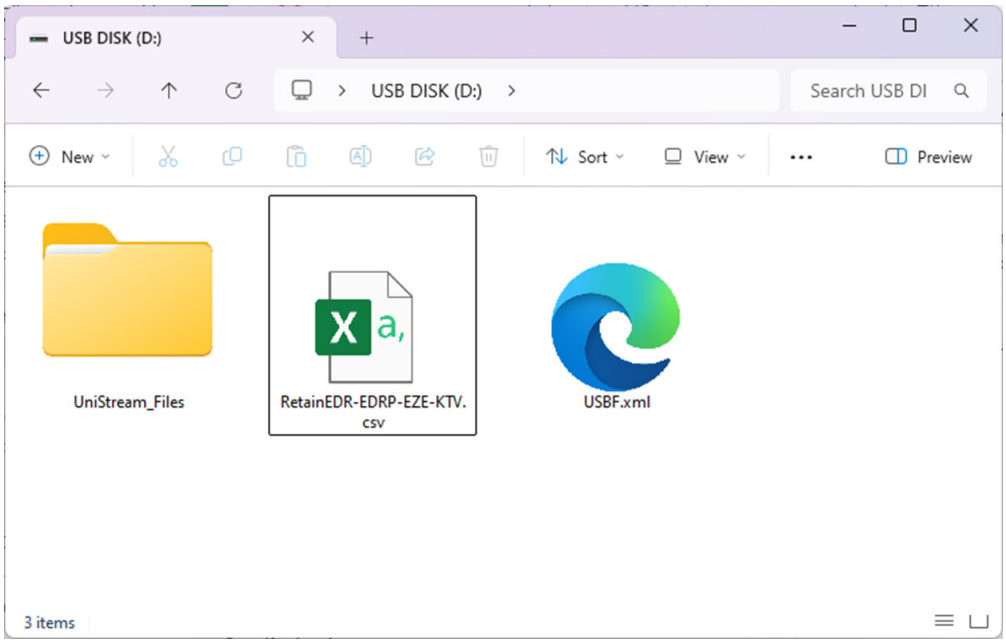
In order to meet warranty conditions, ensure all appropriate maintenance activities are performed.

3. Unzip the software update package by right clicking the .zip file on your Windows PC and select "Extract All" from the context menu. Do not copy the .zip file to the USB flash drive.



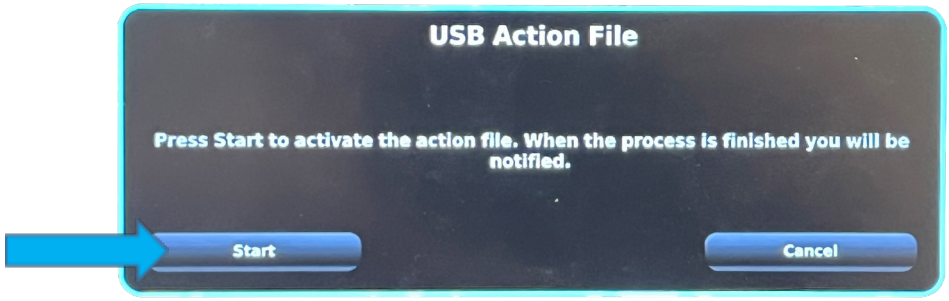
4. The extraction should leave a folder titled with the software version. Inside this folder will be a folder titled "Unistream_ Files", a .CSV file and .XML file, copy these onto the USB flash drive. Verify the files are not inside of another folder, verify all files are copied exactly as shown. A "README" file is also provided in the software update package will contain a list of compatible models.



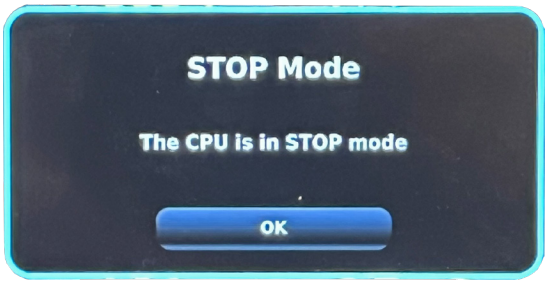
■ Updating the Control

Verify the control battery status is "good" before continuing. With the software update package successfully copied onto a FAT32 formatted USB flash drive the firmware and software may be updated on the control. Adhere to the following:

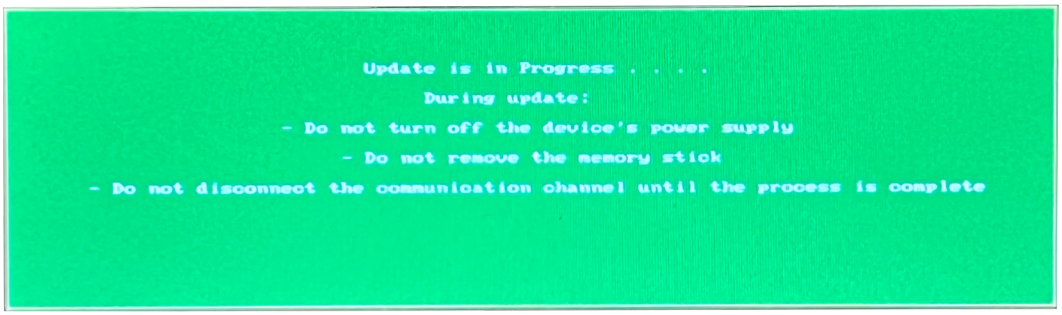
1. Insert the USB drive into the HMI USB Port 1, the screen will appear to freeze, do not remove the USB drive or press any buttons. Wait 1-2 minutes until a "USB Action File" prompt appears. Tap "Start".



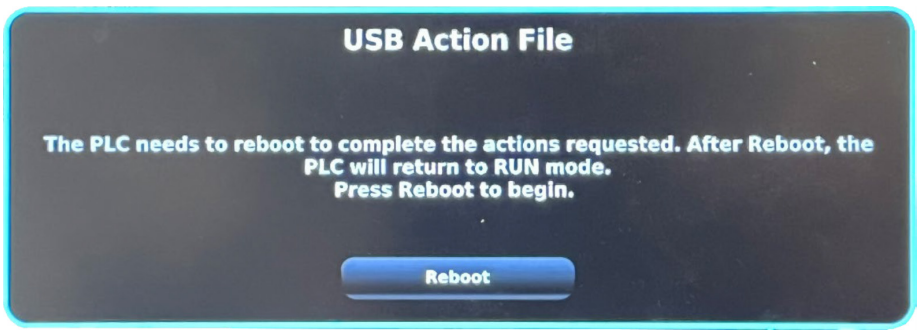
2. At CPU Stop Mode tap "OK" to reboot and begin the firmware update.



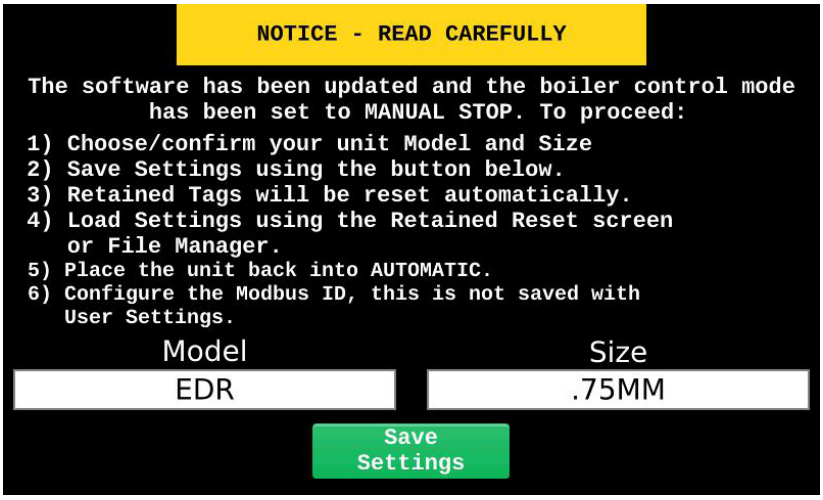
3. The firmware update will typically be completed within 10 minutes. Upon automatically rebooting a "Version Mismatch" message may be displayed, this is normal.



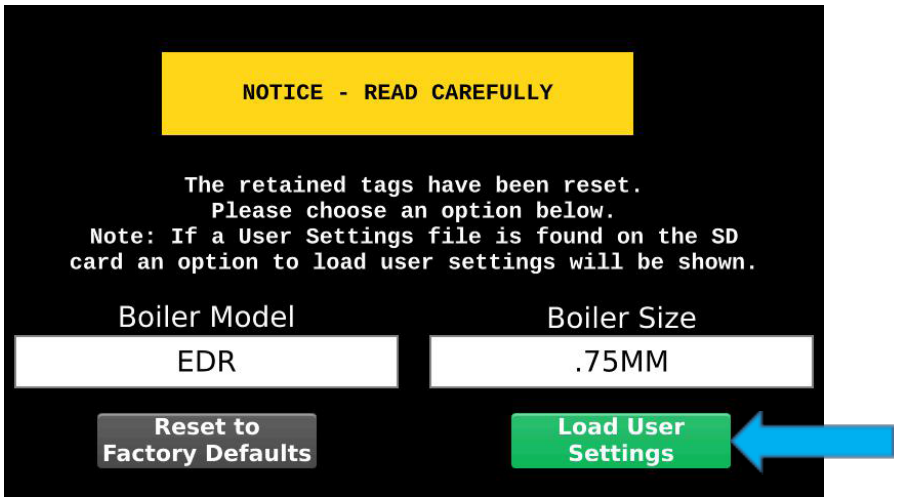
4. Another "USB Action File" prompt will appear. Tap "Reboot" to continue with the application software update. If prompted a second time to start the "USB Action File", press "Cancel" to continue.



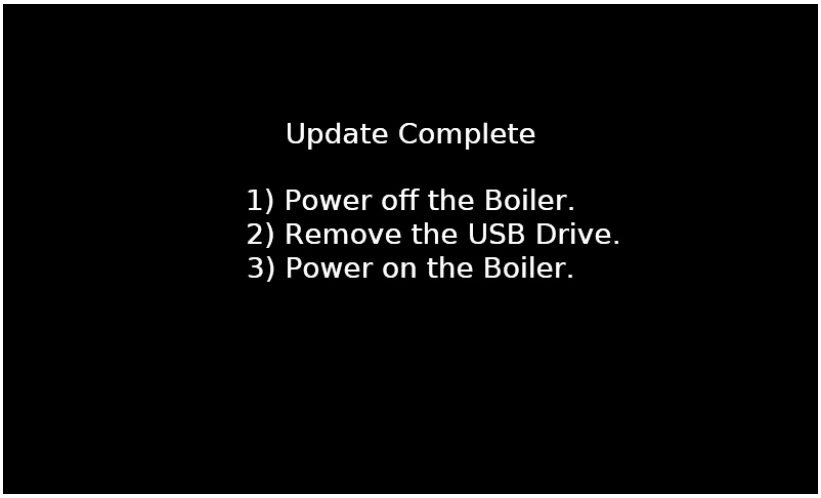
5. A "Finished Successfully" message will appear, tap "OK" to acknowledge. Verify your boiler series and model and tap "Save Settings" then "OK".



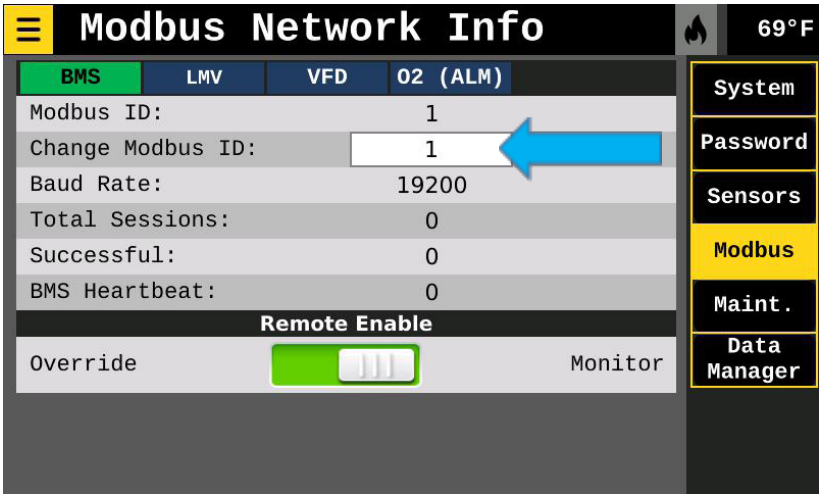
6. Retained Tags will now be reset automatically. Once complete, confirm your boiler series and model and tap "Load User Settings" then "OK".



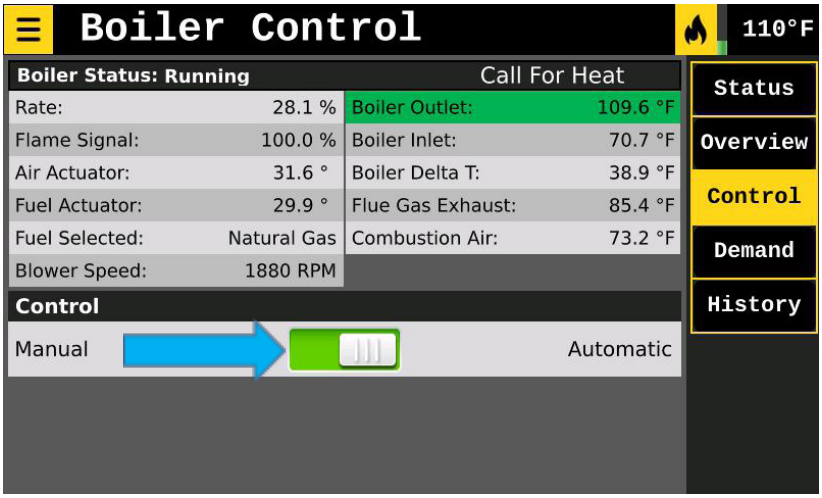
7. When prompted, power off the boiler, remove the USB drive and power on the boiler.



8. Navigate to Configuration, Modbus and configure the Modbus ID. Confirm all other settings are configured as appropriate for the installation.



9. Navigate to Boiler, Control and place the boiler back into Automatic. Verify the boiler operates as intended for the installation.



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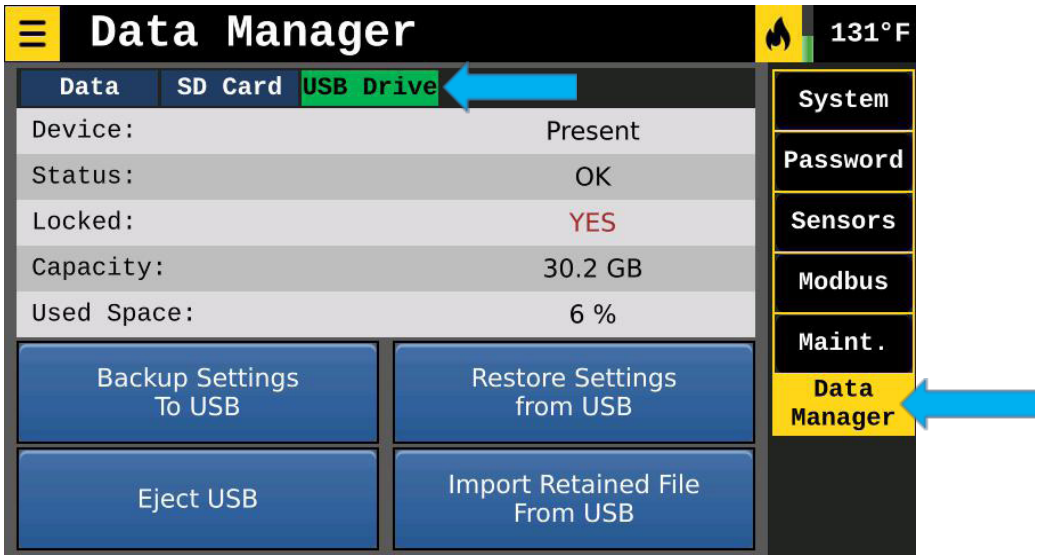
Overview

The Data Manager is a backup and restore tool which allows the user to save information to a USB Flash Drive. This is particularly useful while troubleshooting a boiler. Examples of files or information that can be save to a USB drive might be screenshots and user default settings.

■ Backing up settings to a USB Flash Drive or microSD Card

1. Navigate to the Data Manager section by selecting Configuration from the Main menu.
2. Settings files can then be backed up to the USB or restored to the Boiler
3. Always press the Eject button before removing the USB drive to finalize the file transfer.



Taking a Screenshot

1. On any screen, press and hold the top right corner of the screen until a drop down menu appears.
2. Click on **Screenshot**
3. Screenshots are saved to the microSD card and may be transferred to a USB flash drive using the File Manager.

Exporting Data Using the File Manager

1. The File Manager located within the Configuration menu allows the user to copy files, such as data logs and screenshots, to a USB flash drive. Ensure the flash drive is formatted FAT32. Always tap the eject USB button in the top right before removing the flash drive.

2. Screenshots are located under the **Screenshots** folder
3. **User Settings** will be located under the **Data Tables** folder

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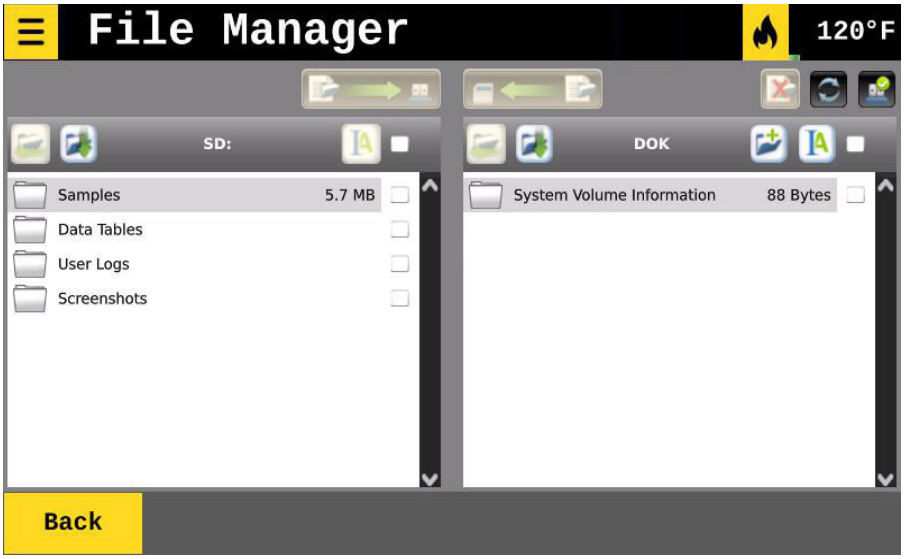
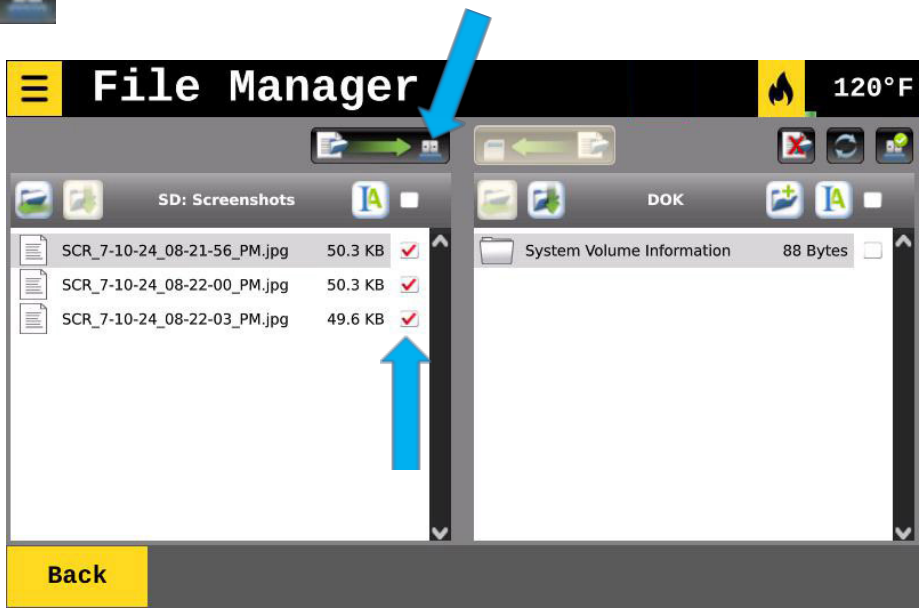
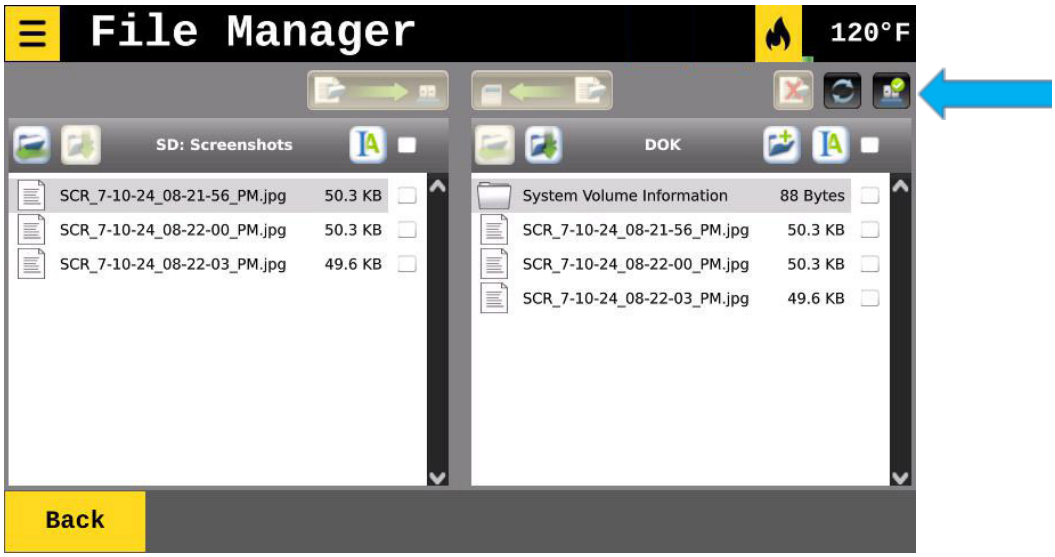


4. Double tap or highlight and press the down arrow icon above  to enter a folder
5. Select the checkbox next to the desired file or folder
6. Once the files have been selected, Select the Copy to USB button



7. Confirm Copying the files to the USB by selecting **OK** when the message pops up
8. When the desired files are on the USB drive and are ready to remove the drive from the control display, be sure to safely remove the drive. This can be done by selecting the Eject USB icon in the top right of the screen.


File Manager
120°F
SD: Screenshots
SCR_7-10-24_08-21-56_PM.jpg 50.3 KB
SCR_7-10-24_08-22-00_PM.jpg 50.3 KB
SCR_7-10-24_08-22-03_PM.jpg 49.6 KB
DOK
System Volume Information 88 Bytes
SCR_7-10-24_08-21-56_PM.jpg 50.3 KB
SCR_7-10-24_08-22-00_PM.jpg 50.3 KB
SCR_7-10-24_08-22-03_PM.jpg 49.6 KB
Back

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Overview

The PURE Control features the Modbus protocol, allowing the building management system (BMS) to integrate with the boiler. Refer to the Protonode Start-up Guide for BACnet protocols.

BACNET SETUP
Scan to download the FPC-N54 Protonode Start-Up Guide

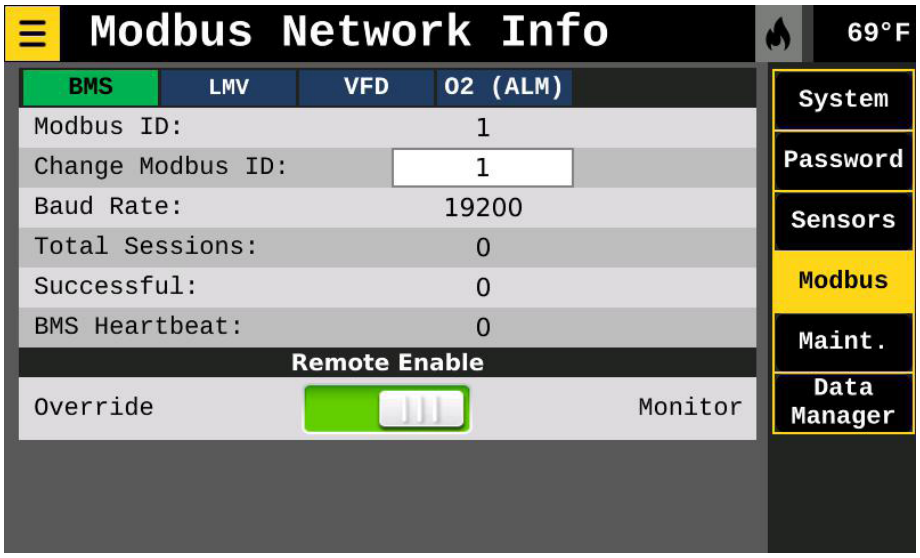
Wiring

Refer to the boiler IOM and the electrical diagram provided with the boiler for instruction on wiring to the Modbus RS-485 connections.

Configuring Modbus ID

1. Modbus ID is set under the Configuration menu and Modbus selection.
2. Note that the baud rate is set to 19200 and cannot be changed.
3. Heartbeat point value of "1" is required to be written by the BAS/BMS/DDC once every 10 seconds when writing points.

➨ *NOTE: This procedure must be completed at each boiler when using the N54 Protonode (BACnet Gateway) with per boiler profiles. The Modbus address will increase with each additional boiler (boiler 2= ID 2, boiler 3 = ID 3, etc...).*



Modbus Points Lists

■ Endura XE (EXE) Modbus Network Points List

Address	Description	Size	Notes	Units	Scope
40000	Boiler Status	INT16	0 – Standby	N/A	R
			1 – Pre-Purge		
			2 – Ignite		
			3 – Run		
			4 – Post-Purge		
			5 – Lock Out		
			6 – Homing		
			7 – Switch Off		
40001	Boiler Control Status	INT16	0 – Waiting	N/A	R
			1 – Disabled		
			2 – Not Available		
			3 – Lead		
			4 – Lag 1		
			5 – Lag 2		
			6 – Lag 3		
			7 – Lag 4		
			8 – Lag 5		
			9 – Lag 6		
			10 – Lag 7		
			11 – Lag 8		
			12 – Lag 9		
			13 – Lag 10		
			14 – Lag 1		
			15 – Lag 2		
			16 – Lag 3		
			17 – Lag 4		
			18 – Lag 5		
			19 – Lag 6		
			20 – Lag 7		
			21 – Lag 8		
			22 – Lag 9		
			23 – Lag 10		
			24 – Local		
			25 – Manual		
			26 – DHW Override		
			27 – Modsync		
			28 – ROC Protection		

Address	Description	Size	Notes	Units	Scope
40002	Boiler Modulation Status	INT16	0 – Normal Rate	N/A	R
			1 – Low Fire Hold		
			2 – Cold Start		
			3 – Freeze Protection		
			4 – Delta T Protection		
			5 – Outlet Soft Limit		
			6 – Venting Limitation		
			7 – Normal Rate		
40003	Modulation Target	INT16	0.0 – 100.0 [Note 1]	%	R
40004	Modulation Rate	INT16	0.0 – 100.0 [Note 1]	%	R
40005	Flame Signal	INT16	0.0 – 100.0 [Note 1]	%	R
40011	Fan Speed	INT16		rpm	R
40017	Outlet Temperature	INT16	-50.0 – 250.0 [Note 1]	F	R
40018	Inlet Temperature	INT16	-50.0 – 250.0 [Note 1]	F	R
40019	Boiler Delta T	INT16	-50.0 – 250.0 [Note 1]	F	R
40020	Boiler Start Temperature	INT16	-50.0 – 250.0 [Note 1]	F	R
40021	Boiler Stop Temperature	INT16	-50.0 – 250.0 [Note 1]	F	R
40022	Stack Temperature	INT16	-50.0 – 250.0 [Note 1]	F	R
40023	Combustion Air Temperature	INT16	-50.0 – 250.0 [Note 1]	F	R
40024	Current Setpoint	INT16	[Note 1]	F	R
40025	Outdoor Air Temperature	INT16	[Note 1,2]	F	R/W
40026	Common Header Supply Temperature	INT16	-50.0 – 250.0 [Note 1, 2]	F	R/W
40027	Common Header Return Temperature	INT16	-50.0 – 250.0 [Note 1, 2]	F	R/W
40028	Common Header Delta T	INT16	-50.0 – 250.0 [Note 1]	F	R
40029	Domestic Water Tank Temperature	INT16	-50.0 – 250.0 [Note 1, 2]	F	R
40030	Call for Heat	INT16	0 – No Call	N/A	R
			1 – Call for Heat		
40031	On/Off Switch	INT16	0 – Off	N/A	R
			1 – On		
40032	Primary Low Water	INT16	1 – Fault	N/A	R
			0 – No Fault		
40033	High Limit Aquastat	INT16	0 – Fault	N/A	R
			1 – No Fault		

Address	Description	Size	Notes	Units	Scope
40034	Operating Aquastat	INT16	0 – Fault 1 – No Fault	N/A	R
40036	Low Gas Pressure	INT16	0 – Fault 1 – No Fault	N/A	R
40037	Blocked Condensate	INT16	0 – Fault 1 – No Fault	N/A	R
40038	Blocked Flue	INT16	0 – Fault 1 – No Fault	N/A	R
40039	Customer Interlock 1	INT16	0 – Fault 1 – No Fault	N/A	R
40040	Customer Interlock 2	INT16	0 – Fault 1 – No Fault	N/A	R
40041	Secondary Low Water	INT16	1 – Fault 0 – No Fault	N/A	R
40042	Boiler Run Hours	UINT32		N/A	R
40044	Boiler Cycles	UINT32		N/A	R
40046	Boiler Powered Hours	UINT32		N/A	R
40048	Current Alarm Index	INT16	[Note 3]	N/A	R
40049	Active Alarm	INT16	0 – No Alarm 1 – Active Alarm [Note 3]	N/A	R
40050	Isolation Valve Enabled	INT16	0 – Not Enabled 1 – Enabled	N/A	R
40051	Isolation Valve Output Status	INT16	0 – Off [Note 6] 1 – On	N/A	R
40052	Isolation Valve Control	INT16	0 – Manual 1 – Automatic	N/A	R
40053	Primary Pump Enabled	INT16	0 – Not Enabled 1 – Enabled	N/A	R
40054	Primary Pump On/Off	INT16	0 – Off 1 – On	N/A	R
40055	Primary Pump Mode	INT16	0 – Manual 1 – Automatic	N/A	R
40066	Lead / Lag Enabled	INT16	0 – Not Enabled 1 – Enabled	N/A	R

Address	Description	Size	Notes	Units	Scope
40067	Boiler 1 LL Position	INT16	0 – Waiting	N/A	R
			1 – Disabled		
			2 – Not Available		
			3 – Lead		
			4 – Lag 1		
			5 – Lag 2		
			6 – Lag 3		
			7 – Lag 4		
			8 – Lag 5		
			9 – Lag 6		
			10 – Lag 7		
			11 – Lag 8		
			12 – Lag 9		
			13 – Lag 10		
			14 – Lag 1		
			15 – Lag 2		
40068	Boiler 2 LL Position	INT16	16 – Lag 3	N/A	R
40069	Boiler 3 LL Position	INT16	17 – Lag 4	N/A	R
40070	Boiler 4 LL Position	INT16	18 – Lag 5	N/A	R
40071	Boiler 5 LL Position	INT16	19 – Lag 6	N/A	R
40072	Boiler 6 LL Position	INT16	20 – Lag 7	N/A	R
40073	Boiler 7 LL Position	INT16	21 – Lag 8	N/A	R
40074	Boiler 8 LL Position	INT16	22 – Lag 9	N/A	R
40075	Boiler 9 LL Position	INT16	23 – Lag 10	N/A	R
40076	Boiler 10 LL Position	INT16	24 – Local	N/A	R
40077	Boiler 1 LL Status	INT16	0 – Offline	N/A	R
40078	Boiler 2 LL Status	INT16	1 – Alarm	N/A	R
40079	Boiler 3 LL Status	INT16	2 – Switch Off	N/A	R
40080	Boiler 4 LL Status	INT16	3 – Standby	N/A	R
40081	Boiler 5 LL Status	INT16	4 – Call for Heat	N/A	R
40082	Boiler 6 LL Status	INT16	5 - Modulating	N/A	R
40083	Boiler 7 LL Status	INT16		N/A	R
40084	Boiler 8 LL Status	INT16		N/A	R
40085	Boiler 9 LL Status	INT16		N/A	R
40086	Boiler 10 LL Status	INT16		N/A	R
40087	Boiler 1 LL Firing Rate	INT16	0.0 – 100.0 [Note 1]	%	R
40088	Boiler 2 LL Firing Rate	INT16	0.0 – 100.0 [Note 1]	%	R
40089	Boiler 3 LL Firing Rate	INT16	0.0 – 100.0 [Note 1]	%	R
40090	Boiler 4 LL Firing Rate	INT16	0.0 – 100.0 [Note 1]	%	R
40091	Boiler 5 LL Firing Rate	INT16	0.0 – 100.0 [Note 1]	%	R
40092	Boiler 6 LL Firing Rate	INT16	0.0 – 100.0 [Note 1]	%	R

Address	Description	Size	Notes	Units	Scope
40093	Boiler 7 LL Firing Rate	INT16	0.0 – 100.0 [Note 1]	%	R
40094	Boiler 8 LL Firing Rate	INT16	0.0 – 100.0 [Note 1]	%	R
40095	Boiler 9 LL Firing Rate	INT16	0.0 – 100.0 [Note 1]	%	R
40096	Boiler 10 LL Firing Rate	INT16	0.0 – 100.0 [Note 1]	%	R
40097	Current Setpoint Mode	INT16	0 - Outdoor Reset 1 - Analog 4-20mA 2 - BMS Network 3 - Local	N/A	R
40098	BMS Network Setpoint	INT16	40.0 – 185.0 [Note 1]	F	W
40099	Maximum Setpoint	INT16	40.0 – 185.0 [Note 1]	F	R
40100	Minimum Setpoint	INT16	40.0 – 185.0 [Note 1]	F	R
40101	Outdoor Air Cutoff	INT16	40.0 – 185.0 [Note 1]	F	R
40102	Outdoor Air Cutoff Reset	INT16	40.0 – 185.0 [Note 1]	F	R
40103	BMS Enable	INT16	0 – Not Enabled	N/A	W
			1 – Enabled		
			[Note 5]		
40104	BMS Heartbeat	INT16	An integer 1 must be written to this point continuously	N/A	W

Notes:

1. The decimal point is fixed to the tenths place, but not transmitted. For example, a value of 1000 equals 100.0
2. The value is only writable when the program has been set to accept a BMS communication signal, see program documentation for individual details
3. Refer to alarm chart for index number definition. Alarm index is only active when the active alarm value is equal to 1
4. This connection refers to the local boiler network required for Lead/Lag connectivity. Not all boilers will be available. For instance if you only have 5 boilers in your system, boilers 6 through 10 will show as not connected and should be ignored.
5. Physical jumper in panel must be removed in order to use this network enable point.
6. Use the output status in conjunction with the valve selection on the screen to determine the position of the valve. For instance, if it's a spring open valve, if the output is off the valve will be open. Alternatively if it's a power open / power closed valve and the power close is on the normally closed side of the relay the valve would be closed if the output is off. The valve selection parameter can be found on the isolation valve screen.
7. Some points have been removed to reflect the specific hardware configuration for this boiler.

■ Endura (EDR), Endura+ (EDR+), Endura ZE (EZE), Kestava (KTV) Modbus Network Points List

Address	Description	Notes	Type	Units	R / W
(4)0000	Boiler Phase Status	0 – LMV Safety Lockout 2 – LMV Safety Phase 10 – LMV Home Run 12 – LMV Standby 22 – Fan Motor 24 – Air Damper 30 – Pre-purging 36 – Air Damper 38 – Preignition 39 – Testing Pressure Switch 40 – Fuel Valve 42 – Ignition 44 – Interval 1 50 – Safety Time 2 52 – Interval 2 60 – Modulating 70 – Afterburn Time 72 – Afterburn Time 74 – Post-purge Time 78 – Post-purge Time 80 – Evacuation of Test Space 81 – Atmospheric Pressure Test 82 – Filling Test Space 83 – Gas Pressure Test 90 – Gas Shortage Waiting Time "91 – Limit String Open 92 - Starting [Note 11]"	INT16		R

Address	Description	Notes	Type	Units	R / W
(4)0001	Boiler Control Status	0 – Waiting 1 – Disabled 2 – Not Available 3 – Lead 4 – Lag 1 5 – Lag 2 6 – Lag 3 7 – Lag 4 8 – Lag 5 9 – Lag 6 10 – Lag 7 11 – Lag 8 12 – Lag 9 14 – Lag 1 (T) 15 – Lag 2 (T) 16 – Lag 3 (T) 17 – Lag 4 (T) 18 – Lag 5 (T) 19 – Lag 6 (T) 20 – Lag 7 (T) 21 – Lag 8 (T) 22 – Lag 9 (T) 23 – Not Used 24 – Local 25 - Manual	INT16		R
(4)0002	Boiler Modulation Status	0 – Normal Rate 1 – Low Fire Hold 2 – Cold Start 3 – Freeze Protection 4 – Delta T Protection 5 – Outlet Soft Limit 6 – Venting Limitation	INT16		R
(4)0003	Modulation Target	0.0 – 100.0 [Note 1]	INT16	%	R
(4)0004	Modulation Rate	0.0 – 100.0 [Note 1]	INT16	%	R
(4)0005	Flame Signal	0.0 – 100.0 [Note 1]	INT16	%	R
(4)0006	Air Actuator Position	-50.0 – 150.0 [Note 1,9]	INT16	°	R
(4)0007	Fuel Actuator Position	-50.0 – 150.0 [Note 1,9]	INT16	°	R

Address	Description	Notes	Type	Units	R / W
(4)0008	VFD Status	0 – No Fault 2 – Auxiliary Input 3 – Power Loss 4 – Undervoltage 5 – Overvoltage 6 – Motor Stalled 7 – Motor Overload 8 – Heatsink Over Temperature 12 – Hardware Overcurrent 300% 13 – Analog Input Loss 14 – Auto Restart Tried 38 – Phase U to Ground Short 39 – Phase V to Ground Short 40 – Phase W to Ground Short 41 – Phase U / V Short 42 – Phase U / W Short 63 – Software Overcurrent 70 – Power Unit Failure 80 – Autotune Failure 122 – I/O Board Failure	INT16		R
(4)0009	O2 Sensor Status	0 – Normal Operation 1 – E1: Internal Communication Error 2 – E2: Internal Register Error 3 – E3: Short to Power 4 – E4: Short to Ground 5 – E5: Short to Power 6 – E6: Short to Ground 7 – E7: Short to Power 8 – E8: Short to Ground 9 – E9: Operating Voltage Too Low 10 – E10: Check Sensor Connection 11 – E11: Heater Circuit Short 12 – E12: Heater Circuit Short	INT16		R
(4)0010	VFD Command	0.0 – 95.0 [Note 1]	INT16	Hz	R
(4)0011	VFD Feedback	0.0 – 95.0 [Note 1]	INT16	Hz	R
(4)0012	Fan Calculated RPM	0.0 – 5500.0	INT32	RPM	R
(4)0014	VFD Output Current	0.0 – 15.00 [Note 1]	INT16	A	R
(4)0015	VFD Output Voltage	0.0 – 461.0 [Note 1]	INT16	V	R
(4)0016	Current O2%	0.0 – 21.00 [Note 1]	INT16	%	R
(4)0017	Outlet Temperature	-50.0 – 250.0 [Note 1]	INT16	Deg. F	R
(4)0018	Inlet Temperature	-50.0 – 250.0 [Note 1]	INT16	Deg. F	R

Address	Description	Notes	Type	Units	R / W
(4)0019	Boiler Delta T	-50.0 – 250.0 [Note 1]	INT16	Deg. F	R
(4)0020	Boiler Start Temperature	-50.0 – 250.0 [Note 1]	INT16	Deg. F	R
(4)0021	Boiler Stop Temperature	-50.0 – 250.0 [Note 1]	INT16	Deg. F	R
(4)0022	Stack Temperature	-50.0 – 250.0 [Note 1]	INT16	Deg. F	R
(4)0023	Combustion Air Temperature for LMV Units, Cabinet Temperature for Endura ZE	-50.0 – 250.0 [Note 1]	INT16	Deg. F	R
(4)0024	Current Setpoint	-50.0 to 250.0 [Note 1]	INT16	Deg. F	R
(4)0025	Outdoor Air Temperature	-50.0 to 250.0 [Note 1, 2]	INT16	Deg. F	R/W
(4)0026	Common Header Supply Temperature	-50.0 – 250.0 [Note 1, 2]	INT16	Deg. F	R/W
(4)0027	Common Header Return Temperature	-50.0 – 250.0 [Note 1, 2]	INT16	Deg. F	R/W
(4)0028	Common Header Delta T	-50.0 – 250.0 [Note 1]	INT16	Deg. F	R
(4)0029	Domestic Water Tank Temperature	-50.0 – 250.0 [Note 1, 2]	INT16	Deg. F	R
(4)0030	Call for Heat	0 – No Call 1 – Call for Heat	INT16		R
(4)0031	On/Off Switch	0 – Off 1 – On	INT16		R
(4)0032	Primary Low Water	1 – Fault 0 – No Fault	INT16		R
(4)0033	High Limit Aquastat	0 – Fault 1 – No Fault	INT16		R
(4)0034	Operating Aquastat	0 – Fault 1 – No Fault	INT16		R
(4)0035	High Gas Pressure	0 – Fault "1 – No Fault [Note 9]"	INT16		R
(4)0036	Low Gas Pressure	0 – Fault "1 – No Fault. [Note 9]"	INT16		R
(4)0037	Blocked Condensate	0 – Fault 1 – No Fault	INT16		R

Address	Description	Notes	Type	Units	R / W
(4)0038	Blocked Flue	0 – Fault "1 – No Fault [Note 9]"	INT16		R
(4)0039	Customer Interlock 1	0 – Fault 1 – No Fault	INT16		R
(4)0040	Customer Interlock 2	0 – Fault 1 – No Fault	INT16		R
(4)0041	Secondary Low Water	1 – Fault 0 – No Fault	INT16		R
(4)0042	Boiler Run Hours	[Note 9]	UINT32		R
(4)0044	Boiler Cycles	[Note 9]	UINT32		R
(4)0046	Boiler Powered Hours	[Note 9]	UINT32		R
(4)0048	Current Alarm Index	[Note 3]	INT16		R
(4)0049	Active Alarm	0 – No Alarm 1 – Active Alarm [Note 3]	INT16		R
(4)0050	Isolation Valve Enabled	0 – Not Enabled 1 – Enabled	INT16		R
(4)0051	Isolation Valve Position	0 – Closed 1 – Open [Note 4]	INT16		R
(4)0052	Isolation Valve Control	0 – Manual 1 – Automatic	INT16		R
(4)0053	Primary Pump Enabled	0 – Not Enabled 1 – Enabled	INT16		R
(4)0054	Primary Pump On/Off	0 – Off 1 – On	INT16		R
(4)0055	Primary Pump Mode	0 – Manual 1 – Automatic	INT16		R
(4)0066	Lead / Lag Enabled	0 – Not Enabled 1 – Enabled	INT16		R

Address	Description	Notes	Type	Units	R / W
(4)0067	Boiler 1 LL Position	0 – Waiting 1 – Disabled 2 – Not Available 3 – Lead 4 – Lag 1 5 – Lag 2 6 – Lag 3 7 – Lag 4 8 – Lag 5 9 – Lag 6 10 – Lag 7 11 – Lag 8 12 – Lag 9 14 – Lag 1 (T) 15 – Lag 2 (T) 16 – Lag 3 (T) 17 – Lag 4 (T) 18 – Lag 5 (T) 19 – Lag 6 (T) 20 – Lag 7 (T) 21 – Lag 8 (T) 22 – Lag 9 (T)	INT16		R
(4)0068	Boiler 2 LL Position				
(4)0069	Boiler 3 LL Position				
(4)0070	Boiler 4 LL Position				
(4)0071	Boiler 5 LL Position				
(4)0072	Boiler 6 LL Position				
(4)0073	Boiler 7 LL Position				
(4)0074	Boiler 8 LL Position				
(4)0075	Boiler 9 LL Position				
(4)0076	Boiler 10 LL Position				
(4)0077	Boiler 1 LL Status	0 – Offline 1 – Alarm 2 – Switch Off 3 – Standby 4 – Call for Heat 5 - Modulating	INT16		R
(4)0078	Boiler 2 LL Status				
(4)0079	Boiler 3 LL Status				
(4)0080	Boiler 4 LL Status				
(4)0081	Boiler 5 LL Status				
(4)0082	Boiler 6 LL Status				
(4)0083	Boiler 7 LL Status				
(4)0084	Boiler 8 LL Status				
(4)0085	Boiler 9 LL Status				
(4)0086	Boiler 10 LL Status				

Address	Description	Notes	Type	Units	R / W
(4)0087	Boiler 1 LL Modulation Rate	0.0 – 100.0 [Note 1]	INT16	%	R
(4)0088	Boiler 2 LL Modulation Rate				
(4)0089	Boiler 3 LL Modulation Rate				
(4)0090	Boiler 4 LL Modulation Rate				
(4)0091	Boiler 5 LL Modulation Rate				
(4)0092	Boiler 6 LL Modulation Rate				
(4)0093	Boiler 7 LL Modulation Rate				
(4)0094	Boiler 8 LL Modulation Rate				
(4)0095	Boiler 9 LL Modulation Rate				
(4)0096	Boiler 10 LL Modulation Rate				
(4)0097	Current Setpoint Mode	0 – Outdoor Reset Curve 1 – BMS Analog 4-20mA 2 – BMS Analog 0-10VDC 3 – BMS Network 4 – Manual	INT16		R
(4)0098	BMS Network Setpoint	40.0 – 200.0 [Note 1, 12, 13]	INT16	Deg. F	W
(4)0099	Maximum Setpoint	40.0 – 200.0 [Note 1,12]	INT16	Deg. F	R
(4)0100	Minimum Setpoint	40.0 – 185.0 [Note 1]	INT16	Deg. F	R
(4)0101	Outdoor Air Cutoff	40.0 – 185.0 [Note 1]	INT16	Deg. F	R
(4)0102	Outdoor Air Cutoff Reset	40.0 – 185.0 [Note 1]	INT16	Deg. F	R
(4)0103	BMS Enable	0 – Not Enabled 1 – Enabled [Note 5]	INT16		W
(4)0104	BMS Heartbeat	1 must be written at least once every 60 seconds to maintain remote operation. If not received the boiler will revert back to local control and show a BMS Communication Warning.	INT16		W
(4)0110	System Pump(s) Enabled	0 – Not Enabled 1 – Enabled [Note 14]	INT16		R

Address	Description	Notes	Type	Units	R / W
(4)0111	System Pump(s) Status	0 – Standby 1 – Running 2 – Disabled by Outdoor Air 3 – Disabled by BMS 4 – Disabled by Other 5 - Alarm [Note 14]	INT16		R
(4)0112	System Delta P -or- System Delta T	0.0 to 100.0 [Note 1, 14]	INT16	psi -or- Deg F	R
(4)0113	System Delta P Setpoint -or- System Delta T Setpoint	0.0 to 100.0 [Note 1, 2, 14]	INT16	psi -or- Deg F	R/W
(4)0114	System Pump 1 Enabled	0 – Not Enabled 1 – Enabled [Note 14]	INT16		R
(4)0115	System Pump 1 Auto / Manual	0 – Manual 1 – Automatic [Note 14]	INT16		R
(4)0117	System Pump 1 Rate	0.0 to 100.0 [Note 1, 14]	INT16	%	R
(4)0118	System Pump 1 Run Status	0 - Not Enabled 1 - Enabled	INT16		R
(4)0119	System Pump 1 Alarm Status	0 – No Alarm 1 – Alarm [Note 3, 14]	INT16		R
(4)0120	System Pump 2 Enabled	0 – Not Enabled 1 – Enabled [Note 14]	INT16		R
(4)0121	System Pump 2 Auto / Manual	0 – Manual 1 – Automatic [Note 14]	INT16		R
(4)0123	System Pump 2 Rate	1.0 to 100.0 [Note 1, 14]	INT16	%	R
(4)0124	System Pump 2 Run Status	0 – Off 1 – On [Note 14]	INT16		R
(4)0125	System Pump 2 Alarm Status	0 – No Alarm 1 – Alarm [Note 3, 14]	INT16		R
(4)0126	Current Boiler Efficiency	0-100.0 [Note 1, 6,9]	INT16	%	R
(4)0300	Number of Stages On	1 to 11 [Note 8]	INT16		R

Address	Description	Notes	Type	Units	R / W
(4)0301	SCR Status	0 – Off 1 – On / Modulating 2 – Disabled 3 – Manual [Note 8]	INT16		R
(4)0302	Stage 1 Status	0 – Off 1 – On 2 – Disabled 3 – Manual [Note 8]	INT16		R
(4)0303	Stage 2 Status				
(4)0304	Stage 3 Status				
(4)0305	Stage 4 Status				
(4)0306	Stage 5 Status				
(4)0307	Stage 6 Status				
(4)0308	Stage 7 Status				
(4)0309	Stage 8 Status				
(4)0310	Stage 9 Status				
(4)0311	Stage 10 Status				
(4)0312	Limit Stages	1 to 11 [Note 8]	INT16		R
(4)0313	Current KW Calculation	0 to 9999	INT16	kWh	R
(4)0314	Total KW Size of Boiler	0 to 9999	INT16	kWh	R
(4)0505	Boiler Size	"EDR/KTV: 0 - .75MM BTU 1- 1MM BTU 2- 1.5MM BTU 3 - 2MM BTU EDR+: 0 - 2.5MM BTU 1 - 3MM BTU 2 - 4MM BTU 3 - 5MM BTU 4 - 6MM BTU EDR ZE: 0 - 120 kW 1 - 240 kW 2 - 360 kW 3 - 480 kW 4 - 600 kW [Note 6]"	INT16		R
(4)0506	Boiler Model	"0 - EDR/KTV 1 - EDR+ 2 - EDR ZE [Note 6]"	INT16		R

Notes:

1. The decimal point is fixed to the tenth place, but not transmitted. For example, a value of 1000 equals 100.0
2. The value is only writable when the program has been set to accept a BMS communication signal, see program documentation for individual details.
3. Refer to alarm chart for index number definition.
   a. Alarm index is only active when the active alarm value is equal to 1.
   b. Value 999 refers to no active alarm.
4. Use the output status in conjunction with the valve selection on the screen to determine the position of the valve. For instance, if it's a spring open valve, if the output is off the valve will be open. Alternatively, if it's a power open / power closed valve and the power close is on the normally closed side of the relay the valve would be closed if the output is off. The valve selection parameter can be found on the isolation valve screen.
5. Physical jumper in panel must be removed to use this network enable point.
6. Applies only to EDR-750-2000, EDR+2500-6000, EZE-120-600, KTV-750-2000 units using version 5.0.0 and up.
7. Points 8 through 11 and 13 through 16 apply to Endura+ (EDR+) boilers only.
8. The number of Endura ZE (EZE) stages will vary based on boiler size, setup, and customer settings.

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