PF3100

Software Setup Guide

PROFIRE

TABLE OF CONTENTS

! Warning: Do not disconnect power, open enclosures or otherwise service the product unless area is known to be non-hazardous.

! Warning: All safety functions must be end-to-end proven following commissioning of the system.

! Warning: System settings must only be modified by qualified personnel who have an understanding of the appliance under control and its effect on the other plant processes.

1 INTRODUCTION

This document outlines the configurable PF3100 system settings as well as general commissioning procedures. Before working through the steps in this guide, it is important to have a good understanding of the appliance in terms of its input and output requirements and its effect on other equipment and plant processes.

If the system has been previously commissioned, be sure to back up the previous settings to the USB storage device before making any changes or performing a firmware update.

1.1 SYSTEM OVERVIEW

System Status

System Settings

Select Appliance
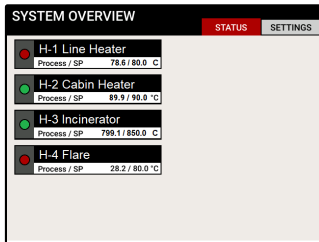
Appliance Status

Appliance Alerts

Appliance Settings

Select Controller

Controller Status

Flame Diagnostics

2 COMMISSIONING A PF3100 SYSTEM
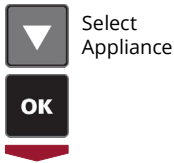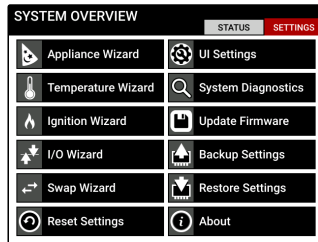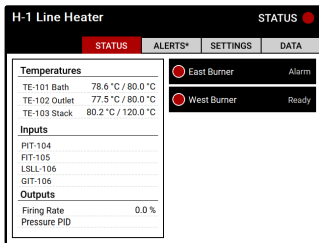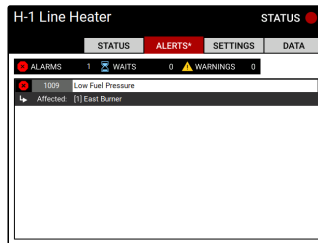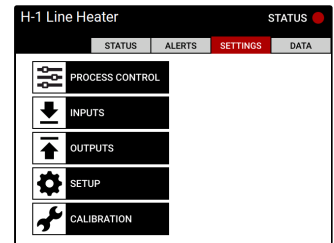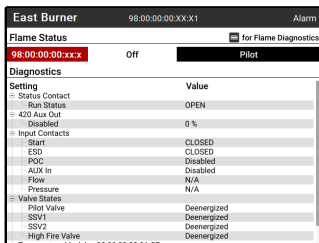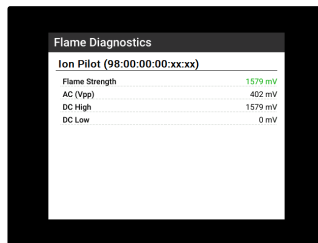
Mount and wire the entire system in accordance with local safety codes and design documentation then follow the steps outlined in the sections below to efficiently commission the system.

2.1 UPDATE FIRMWARE

The firmware must match on (1) the User Interface, (2) all BMS controllers and (3) all connected I/O modules for the system to operate as intended.

1. Obtain an approved PF3100 firmware bundle from Profire and save it to a USB storage device.
2. Insert into the USB port on the user interface and use the Update Firmware tool from the System Settings Screen.
3. Repeat as necessary until all connected modules report a successful update.

2.2 CONFIGURE UI SETTINGS

4. Configure all global UI settings as desired.

Setting	Default	Options	Description	
L1 Password Enable	Enabled	Enabled	The L1 password can be used to access non-safety critical settings.	
		Disabled	The L2 password must be used to access all settings.	
Debug Mode	Disabled	Enabled	Appliance software diagnostic events are displayed to the user through an on-screen pop-up menu.	
		Disabled	Appliance software diagnostic events are hidden.	
Display Sleep Timeout	3.0 min	0.5 min – 60 min	Specifies the time of user inactivity after which the backlight of the UI screen turns off.	
Pressure Units	kPa	kPa	Kilopascals	Specifies the display units for the BMS pressure input when Fuel Pressure Input Mode is set to 4-20.
		psi	Pounds per square inch	
		inWC	Inches of water	
		cmWC	Centimeters of water	
		kg/cm^2	Kilograms per square centimeter	
		%	Percent	
		mA	Milliamps	
Temperature Units	Celsius	C	Celsius	Specifies the display units for all temperature module inputs.
		F	Fahrenheit	
Volume Units	Liters	L	Liters	Specifies the display units for the BMS level/flow input when Level/Flow Input Mode is set to 4-20.
		m^3	Cubic meters	
		Gal	US Gallons	
		BBL	Barrels	
		%	Percent	
		mA	Milliamps	
		L/min	Liters per minute	

2.3 CONFIGURE APPLIANCE

The configuration wizards are used to create all the appliances under control and assign controllers and modules in accordance with design documentation and field wiring.

2.3.1 APPLIANCE WIZARD

The Appliance Wizard is used to create and modify appliances and assign controllers to each appliance.

Create Appliance Tab
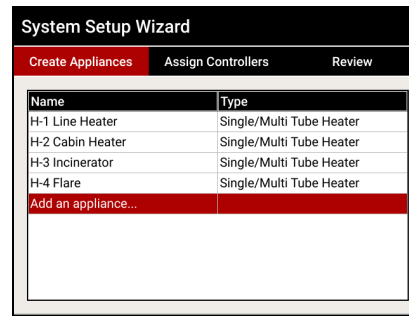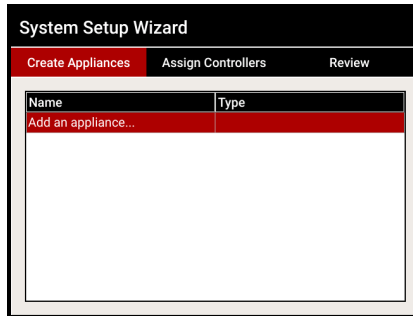
5. Select "Add an appliance..." and create all the appliances that are to be controlled.
6. Name each appliance based on equipment tag, location, type, etc. to differentiate between them on screen (e.g., H-123, North Incinerator, Cabin Heater).

Assign Controllers Tab
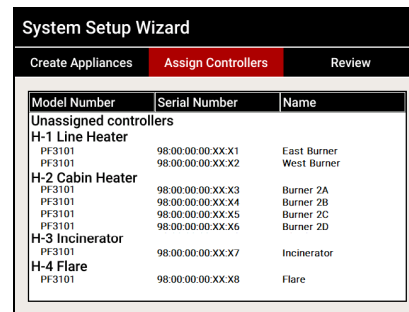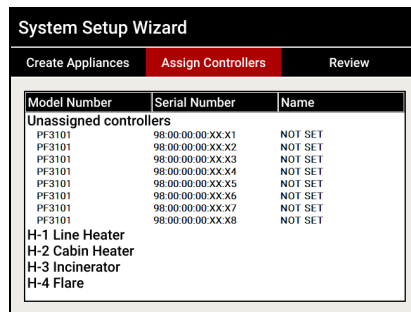
7. Assign each controller to its associated appliance to match field wiring. All connected BMS cards are listed as controllers and are identified by the serial numbers printed on the labels affixed to each card.
8. Name each controller to specify which burner it is controlling (e.g., East Burner, West Burner).

Review Tab
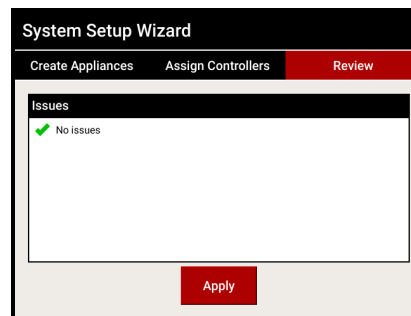
9. Ensure that there are no errors and select apply to save all changes and exit the Appliance Wizard.

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2.3.2 TEMPERATURE WIZARD

The Temperature Wizard is used to create, assign, and configure temperature inputs.

Appliance Tab

10. Select the appliance for which the temperature inputs are to be configured. Temperature inputs must be configured for each appliance separately.

Create Inputs Tab
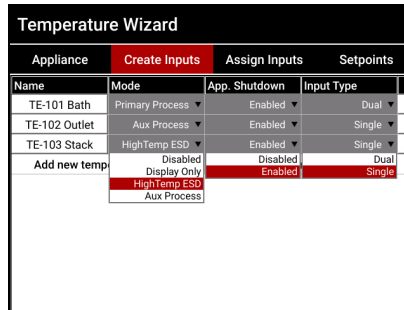
11. Create the temperature inputs associated with the selected appliance.
12. Configure and name each input based on design documentation and equipment tags.

Setting	Default	Options	Description
Mode	Primary Process	Primary Process	The temperature input is used to determine system behavior and dictate state transitions.
		Disabled	The temperature input is ignored.
		Display Only	The temperature input readings are displayed on the Appliance Status Screen, but otherwise ignored.
		High Temp ESD	The temperature input is used to trigger high temperature shutdowns only.
		Aux Process	The temperature input is used in conjunction with the primary process temperature to determine system behavior and dictate state transitions.
App. Shutdown	Enabled	Enabled	An input temperature reading above its corresponding High Temp SP shuts down all controllers in the appliance.
		Disabled	An input temperature reading above its corresponding High Temp SP shuts down only the controller to which it is connected.
Input Type	Dual	Single	The temperature input is a single-element thermocouple.
		Dual	The temperature input is a dual-element thermocouple.

Assign Inputs Tab
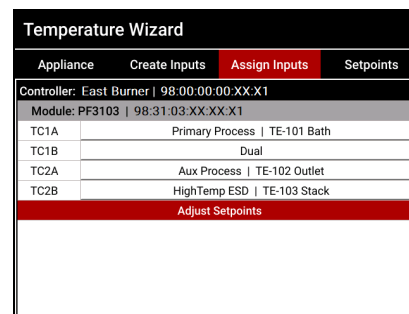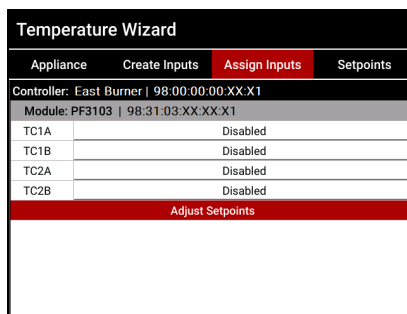
13. Assign each input to its corresponding temperature module as wired in the field (e.g., ensure that the temperature module installed in the appliance bath corresponds to the bath input from the Create Inputs tab.

Setpoints Tab
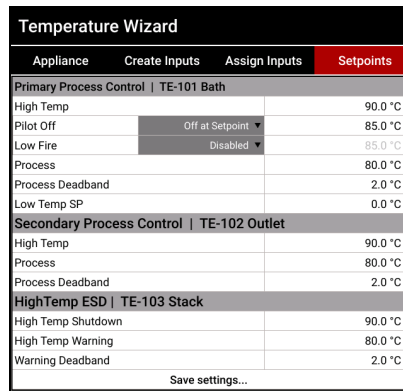
14. Configure setpoints and behavior for all temperature inputs according to design specifications.

Setting	Default	Options	Description
High Temp SP	90 °C 194 °F	0 °C - 1350 °C 32 °F - 2462 °F	Specifies the process temperature above which the appliance shuts down.
Pilot Off Mode	Off At Setpoint	Disabled	The pilot valves are de-energized when the process temperature is above the configured High Temp SP.
		Off At Setpoint	The pilot valves are de-energized when the process temperature is above the configured Pilot Off SP.
		Off After Main On	The pilot valves are de-energized after the main valves are energized.
		Follow Main	The pilot valves are de-energized with the main valves when the process temperature is above the configured Low Fire SP.
Pilot Off SP	85 °C 185 °F	0 °C – 1350 °C 32 °F – 2462 °F	Specifies the process temperature at which the pilot valves are de-energized when Pilot Off Mode is set to Off At Setpoint.
Low Fire Mode	Disabled	Disabled	The main valves are de-energized when the process temperature is above the configured High Temp SP
		At Process SP	The main valves are de-energized when the process temperature is above the configured Process Temp SP.
		At Lowfire SP	The main valves are de-energized when the process temperature is above the configured Low Fire SP.
Low Fire SP	85 °C 185 °F	0 °C – 1350 °C 32 °F – 2462 °F	Specifies the process temperature at which the main valves are de-energized when Low Fire Mode is set to At Lowfire SP.
Process Temp SP	0 °C 32 °F	0 °C - 1350 °C 32 °F - 2462 °F	Specifies the process temperature that the system attempts to maintain.
Process Deadband	2 °C 3.6 °F	0 °C - 100 °C 3.6 °F - 180 °F	Specifies the deadband applied around the Process setpoint to prevent fluctuation between states when the process temperature is near the setpoint.
Low Temp SP	0 °C 32 °F	0 °C – 1350 °C 32 °F – 2462 °F	Specifies the process temperature below which the system displays a warning on the Appliance Alerts Screen.
High Temp Shutdown	90 °C 194 °F	0 °C - 1350 °C 32 °F - 2462 °	Specifies the temperature above which the (1) appliance shuts down or (2) controller shuts down, in accordance with the App. Shutdown setting above.
High Temp Warning	80 °C 194 °F	0 °C - 1350 °C 32 °F - 2462 °	Specifies the temperature above which the system displays a high temperature warning on the Appliance Alerts Screen.
High Temp Deadband	2 °C 3.6 °F	0 °C - 100 °C 3.6 °F - 180 °F	Specifies the deadband applied around the High Temp Shutdown setpoint to prevent fluctuation between states when the temperature is near the setpoint.

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2.3.3   IGNITION WIZARD

The Ignition Wizard is used to configure ignition settings and assign connected Ion Pilot and UV Pilot modules for each appliance.

Appliance Tab

15. Select the appliance for which the ignition cards are to be configured. Ignition cards must be configured for each appliance separately.

Allocate Ignition Tab

Ignition Wizard		
Appliance	**Allocate Ignition**	Ignition Settings
Controller: East Burner | 98:00:00:00:XX:X1		
PF3102 - Pilot Module 1		Disabled
PF3102 - Pilot Module 2		Disabled
PF3102 - Pilot Module 3		Disabled
PF3102 - Pilot Module 4		Disabled
Controller: West Burner | 98:00:00:00:XX:X2		
PF3102 - Pilot Module 1		Disabled
PF3102 - Pilot Module 2		Disabled
PF3102 - Pilot Module 3		Disabled
PF3102 - Pilot Module 4		Disabled

PF3102 - Pilot Module 1	
MAC Address	00:00:00:00:00:00
Flame Detection Gain	7
Ion Aux In Type	Disabled ▼
Enabled / Disabled	Disabled ▼

16. Select a slot and press OK to open the pilot configuration window.
17. Select the MAC address of the pilot module. Ensure that pilot modules are assigned to burner to which they are wired in the field.
18. Configure individual module settings per design specifications, enable the input, and repeat for all connected pilot modules.

Setting	Default	Options	Description
MAC Address	-	MAC address of any connected pilot module	Identifies the ignition module connected to the controller.
Flame Detection Gain * Only visible for Ion Pilot cards	7	3 - 7	Specifies the flame signal amplification level.
Ion Aux In Type * Only visible for Ion Pilot cards	Disabled	Enabled	The Ion Aux Input affects system behavior in accordance with the Ion Aux Input settings.
		Disabled	The Ion Aux input is ignored.
Enabled/Disabled	Disabled	Enabled	The ignition module is used by the system for ignition/flame detection in accordance with the configured settings.
		Disabled	The ignition module is ignored by the system.

Ignition Settings Tab
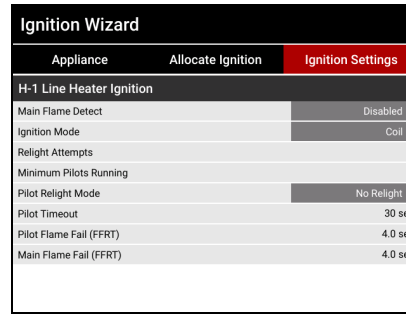
19. Configure appliance-wide ignition settings per design specifications.

Setting	Default	Options	Description
Main Flame Detect	Disabled	Enabled	Main flame detection is required.
		Disabled	Main flame detection is not required.
Ignition Mode	Coil	Coil	The Ion Pilot card coil output is connected to an ignition coil.
		HEI	The Ion Pilot card coil output is connected to a separate ignition module with DC input to control sparking.
Relight Attempts	3 attempts	1 – 3 attempts	Specifies the number of relight attempts allowed following a flame failure.
Minimum Pilots Running	1	1 – 4 pilots	Specifies the number of pilots that must have flame proven for the controller to remain running.
Pilot Relight Mode	During Flame Fail	No Relights	Lost pilot flames are not automatically reignited.
		During Flame Fail	The system attempts to reignite lost pilot flames for the duration of the configured Pilot Flame Fail (FFRT) setting.
		During Timeout	The system attempts to reignite lost pilot flames for the duration of the configured Pilot Timeout setting.
Pilot Timeout	30 s	10 s – 600 s	Specifies the duration for which the system attempts to reignite lost pilot flames when Pilot Relight Mode is set to reignite during timeout.
Pilot Flame Fail (FFRT)	4 s	0.8 s – 4 s	Specifies the time between pilot flame failure and controller shutdown (or restart if allowable relights remain).
Main Flame Fail (FFRT)	4 s	0.8 s – 4 s	Specifies the time between main flame failure and controller shutdown (or restart if allowable relights remain).

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2.3.4 I/O WIZARD

The I/O Wizard is used to configure inputs and outputs for use with the IO Expansion Module.

Select Appliance Screen

20. Select the appliance for which the I/O expansion inputs are to be configured. I/O expansion inputs must be configured for each appliance separately.

Add Inputs Tab

I/O Wizard (H-1 Line Heater)		
Add Inputs	I/O Cards	Review

Inputs

Add Input

I/O Wizard (H-1 Line Heater)		
Add Inputs	I/O Cards	Review

Inputs

PIT-104	(Pressure)
FIT-105	(Flow)
LSLL-106	(Level)
GIT-106	(Custom)
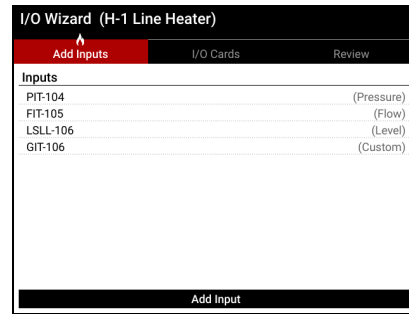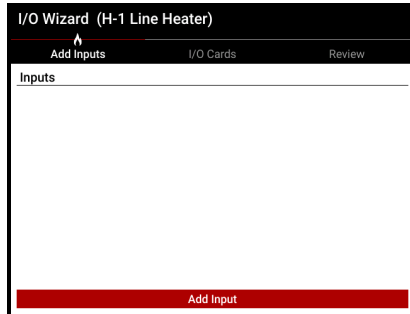
Add Input

21. Select "Add Input" and follow the on-screen menus to set up inputs per design documentation.

Setting	Options	Description
Input Type	Pressure	The input represents a fuel pressure device.
	Flow	The input represents a process flow device.
	Level	The input represents a fluid level device.
	Custom	The input represents a generic input device.
	Appliance Firing Rate	The input represents an external firing rate signal.
	FARC Valve Position	The input represents a proportional fuel gas valve for fuel air ratio control applications.
	FARC Air Position	The input represents a proportional airflow device for fuel air ratio control applications.
	Bleed Valve Proof of Open	The input represents a bleed valve proof of open switch.
Signal Type	Digital	The input represents a switch.
	4-20	The input represents 4-20mA transmitter.
Input Mode	Alarm	An input trip shuts down the system and prevents starting until cleared.
	Wait	An input trip transitions the system to the Waiting state and prevents transitions to any fuel state until cleared.
	Warning	An input trip generates an alert but does not otherwise affect system behavior.
	Main Permissive	An input trip transitions the system out of any main fuel state and prevents re-entry until cleared.
	Proof of Airflow	An input trip shuts down the system when it is actively attempting to prove airflow. Applicable when controlling a fan.
	Secondary PID Input	The input is used by the system as a secondary PID control input in accordance with the Advanced PID Control settings.
	Display Only	The input is displayed on the Appliance Status Screen and does not generate alerts or otherwise affect system behavior.
Name	Any	Specifies the input name displayed on the Appliance Status Screen.
Units	Temp/Level/Flow units	Specifies the input units displayed on the Appliance Status Screen.
Low Setpoint	0 % – 100 %	Specifies the threshold below which a low trip event occurs.
High Setpoint	0 % – 100 %	Specifies the threshold above which a high trip event occurs.
Deadband	0 % – 100 %	Specifies the deadband applied around each setpoint to prevent fluctuation between states when input is near the trip points.

I/O Cards Tab
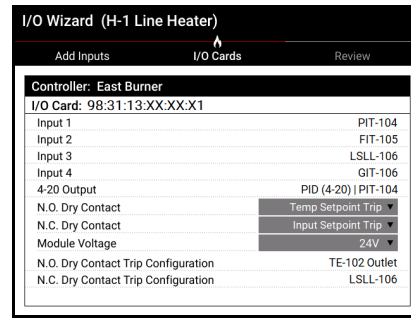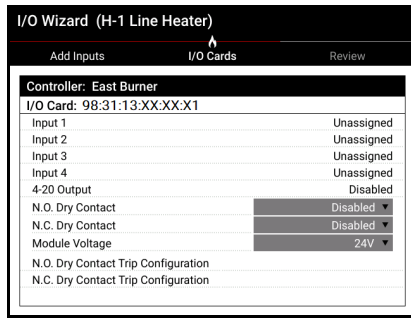
22. Assign each created input to the physical input location to which it is wired in the field. Note that a single created input can be assigned to multiple physical inputs for redundancy.
23. Select appropriate 4-20 Output mode and follow on-screen prompts to configure per design documentation.
24. Select behavior for the normally open and normally closed dry contacts.
25. Select desired voltage for the I/O Expansion PWR outputs (terminals 8, 11, 14 and 17).
26. Assign dry contact trip configuration inputs, if applicable.

Setting	Options	Description
Input 1	Any input created on the Add Inputs tab	Specifies the input device wired to terminals 8, 9 and 10 on the I/O Expansion card.
Input 2	Any input created on the Add Inputs tab	Specifies the input device wired to terminals 11, 12 and 13 on the I/O Expansion card.
Input 3	Any input created on the Add Inputs tab	Specifies the input device wired to terminals 14, 15 and 16 on the I/O Expansion card.
Input 4	Any input created on the Add Inputs tab	Specifies the input device wired to terminals 17, 18 and 19 on the I/O Expansion card.
4-20 Output	PID Output Controlled by 4-20mA Input	The I/O Expansion 4-20mA output is modulated in accordance with the PID configuration parameters.
	PID Output Controlled by TC Input	The I/O Expansion 4-20mA output is modulated in accordance with the PID configuration parameters rather than the BMS PID parameters.
	Air Position Controlled by FARC	The I/O Expansion 4-20mA output is connected to a proportional airflow device for a fuel air ratio control application.
N.O. Dry Contact/ N.C. Dry Contact	Disabled	Refer to I/O Expansion Status Contact Behavior table below for a description of each mode in each controller state.
	Started Status	
	High Temp Status	
	No Alert Status	
	Appliance Proc Control	
	Controller Proc Control	
	Temp Setpoint Trip	
	Input Setpoint Trip	
	Purge Status	
Module Voltage	12V	The I/O Expansion PWR Out terminals supply 12V.
	24V	The I/O Expansion PWR Out terminals supply 24V.
Dry Contact Trip Configuration *Only applicable when Dry Contact mode above is set to Temp Setpoint Trip or Input Setpoint Trip.	Any configured temperature input	Specifies the temperature input used to determine dry contact behavior.
	Any configured I/O expansion input	Specifies the I/O Expansion input used to determine dry contact behavior.

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I/O Expansion Status Contact Behavior

Mode	Condition	Lockout	Alarm	Ready	Confirm start	Waiting	Ignition	Pilot	Low Fire	High Fire	Incinerate	Incinerate No Assist	Not Communicating
		Normally Open Dry Contact behavior by system state O – Open C – Closed * Behavior is reversed for Normally Closed Dry Contact											
Disabled	Any	O	O	O	O	O	O	O	O	O	O	O	O
Started Status	Any	O	O	O	O	C	C	C	C	C	C	C	O
High Temp Status	Any controller has a high temp alarm	C	C	C	C	C	C	C	C	C	C	C	O
	No controllers have high temp alarms	O	O	O	O	O	O	O	O	O	O	O	O
No Alert status	Any other controller has alerts present	C	C	C	C	C	C	C	C	C	C	C	C
	No other controllers have alerts present	C	C	O	O	O	O	O	O	O	O	O	O
Appliance Process Control	Any other controller in Process Control state	C	C	C	C	C	C	C	C	C	C	C	O
	No other controller in Process Control state	O	O	O	O	O	O	O	C	C	C	C	O
Controller Process Control	Any	O	O	O	O	O	O	O	C	C	C	C	O
Temp Setpoint Trip	Above SP	C	C	C	C	C	C	C	C	C	C	C	O
	Below SP-DB	O	O	O	O	O	O	O	O	O	O	O	O
Input Setpoint Trip	Above SP	C	C	C	C	C	C	C	C	C	C	C	O
	Below SP-DB	O	O	O	O	O	O	O	O	O	O	O	O
Purge Status	Purging	C	C	C	C	C	C	C	C	C	C	C	O
	Not Purging	O	O	O	O	O	O	O	O	O	O	O	O

PID Configuration Parameters

The PID Configuration menu is accessed by (1) configuring the I/O Expansion 4-20 Output as a PID control output, or (2) selecting a configured I/O Expansion 4-20 PID output from the Appliance Status Screen.

Configure PID Parameters	
PID Input:	PIT-104
Name	Pressure PID
Setpoint	60.0 %
Proportional Band	10.0 %
Integral Time	3.0 min
Derivative Time	0.0 min
Sample Time	1.0 sec
Integral Reset Range	10.0 %
Direction	Direct ▼
Mode	Manual ▼
Manual Output	0.0 %
System Stop Output	80.0 %
Low Output Limit	0.0 %
High Output Limit	100.0 %
Finished	

Setting	Options	Description
PID Input		Indicates the I/O Expansion input for which the following configuration applies.
Name	Any	Specifies the name displayed on the Appliance Status Screen representing the I/O Expansion PID output.
Setpoint	0 % - 100 %	Specifies the PID Input reading that the system attempts to maintain.
Proportional Band	0 % - 100 %	Specifies the proportional term used by the I/O Expansion PID algorithm.
Integral Time	0 min – Any	Specifies the integral term used by the I/O Expansion PID algorithm.
Derivative Time	0 min – Any	Specifies the derivative term used by the I/O Expansion PID algorithm.
Sample Time	0 sec - Any	Specifies the time between samples for the I/O Expansion PID algorithm.
Integral Reset Range	0 % - 100 %	Specifies the range above and below the input Setpoint within which the I/O Expansion PID integral error accumulates.
Direction	Direct	The I/O Expansion PID output increases as the input increases.
	Reverse	The I/O Expansion PID output decreases as the input increases.
Mode	Auto	The I/O Expansion 4-20 Output is modulated automatically by the I/O Expansion PID algorithm based on the configured PID settings above.
	Manual	The I/O Expansion 4-20 Output delivers a 4-20mA signal in accordance with the configured Manual Output setting below.
Manual Output	0 % - 100 %	Specifies the I/O Expansion 4-20 Output signal when configured in Manual Mode.
System Stop Output	0 % - 100 %	Specifies the I/O Expansion 4-20 Output signal when the system is in a stopped state.
Low Output Limit	0 % - 100 %	Specifies the lowest possible output value for the I/O Expansion 4-20 Output.
High Output Limit	0 % - 100 %	Specifies the highest possible output value for the I/O Expansion 4-20 Output.

Review Tab

27. Ensure that there are no issues found and select Accept to save changes.

2.3.5   SWAP WIZARD

The Swap Wizard is used to swap controllers, user interfaces or modules into the system without having to recommission. Follow on-screen instructions to swap components in and out of the system. Ensure that all settings are saved to a USB stick prior to swapping BMS controllers as the settings will need to be restored on the new controller following the swap.

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2.4   CONFIGURE BMS SETTINGS

The settings below are available for all connected controllers. Settings are linked across controllers by default for multi-controller appliances. Select a setting and press ▤ to adjust for each controller independently.
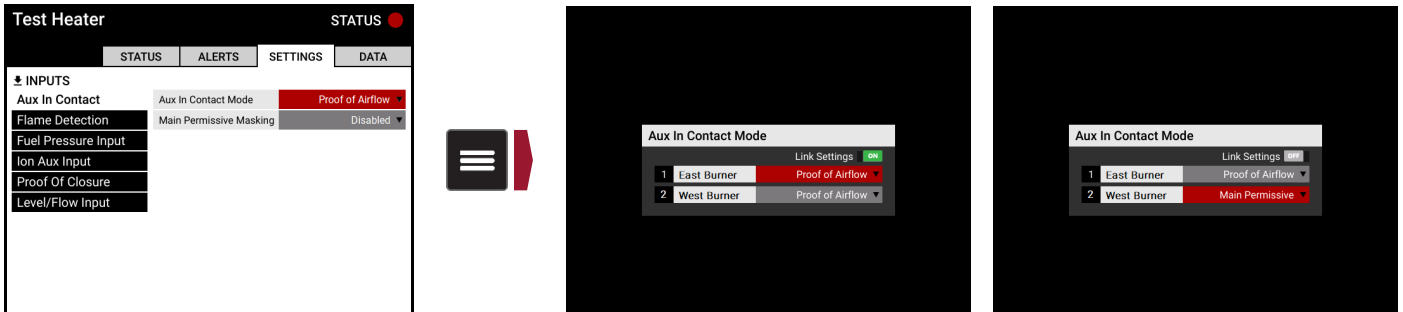
28. Configure all BMS settings below for each connected controller in accordance with manufacturer specifications and safety design documentation.

2.4.1   PROCESS CONTROL

Process Temp Control

Setting	Default	Options	Description
High Temp SP	90 °C 194 °F		
Pilot Off Mode	Off At Setpoint		
Pilot Off SP	85 °C 185 °F		
Low Fire Mode	Disabled	Refer to Temperature Wizard Setpoints Tab above for configuration options and descriptions.	
Low Fire SP	85 °C 185 °F		
Process Temp SP	0 °C 32 °F		
Low Temp SP	0 °C 32 °F		

Other Temperatures

The Process Temp Control settings above pertain only to the primary process temperature input. The Logical Input Configuration link shown in the Other Temperatures menu can be used to view the settings of all configured temperatures. Changes to the settings must be made in the Temperature Wizard.

Timing

Setting	Default	Options	Description
Purge Time	60 s	10 s - 900 s	Specifies the time for which the system purges prior to startup or following loss of flame.
Pilot to Main Delay	15 s	5 s - 600 s	Specifies the time for which the system remains in the Pilot state before proceeding to light off the main valves.
Low to High Fire Delay	30 s	30 s - 600 s	Specifies the time for which the system remains in the Low Fire state before proceeding to High Fire.

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BMS PID

Setting	Default	Options	Description
Proportional Band	10 °C 18 °F	1 °C – 999 °C 1.8 °F - 1832 °F	Specifies the proportional term used by the primary PID algorithm.
Integral Time	4 min	0 min – 999 min	Specifies the integral term used by the primary PID algorithm.
Derivative Time	0 min	0 min – 999 min	Specifies the derivative term used by the primary PID algorithm.
Sample Time	1 s	0.05 s – 99999 s	Specifies the time between samples for the primary PID algorithm.
Integral Reset Range	5 °C 9 °F	0 °C - 1350 °C 0 °F - 2430 °F	Specifies the range above and below the Process Setpoint within which the primary PID integral error accumulates.
PID Deadband Primary	0 °C 0 °F	0 °C – 10 °C 0 °F – 18 °F	Specifies the primary PID deadband applied to limit fluctuation between states when the primary process temperature is near configured setpoints.
Rate Limit Primary	100%/s	1 %/s – 100 %/s	Specifies the maximum rate of change of the TCV output during primary PID control.

Secondary PID

Setting	Default	Options	Description
Proportional Band Secondary	10 °C 18 °F	1 °C – 999 °C 1.8 °F - 1832 °F	Specifies the proportional term used by the secondary PID algorithm.
Integral Time Secondary	4 min	0 min – 999 min	Specifies the integral term used by the secondary PID algorithm.
Derivative Time Secondary	0 min	0 min – 999 min	Specifies the derivative term used by the secondary PID algorithm.
Integral Reset Range Secondary	5 °C 9 °F	0 °C - 1350 °C 0 °F - 2430 °F	Specifies the range above and below the secondary process setpoint within which the secondary PID integral error accumulates.
PID Deadband Secondary	0 °C 0 °F	0 °C – 10 °C 0 °F – 18 °F	Specifies the secondary PID deadband applied to limit fluctuation between states when the secondary process temperature is near configured setpoints.
Rate Limit Secondary	100%/s	1 %/s – 100 %/s	Specifies the maximum rate of change of the TCV output during secondary PID control.

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Advanced PID Config

Setting	Default	Options	Description
Integral Jacketing	Enabled	Enabled	PID integral error is reset upon controller state changes.
		Disabled	PID integral error is not reset upon controller state changes.
Cascaded PID	Disabled	Enabled	Cascaded PID is enabled
		Disabled	Cascaded PID is disabled
PID Staging Mode	Disabled	Disabled	The system controls based on the Primary process temperature only.
		High Input	The system switches from primary to secondary input control when the configured Staging Input is above its Low Trip setpoint.
		Low Input	The system switches from primary to secondary input control when the configured Staging Input is below its Low Trip setpoint.
		Primary In Range	The system switches from primary to secondary input control when the primary temperature is above the configured Primary Setpoint Min setting.
		Secondary In Range	The system switches from primary to secondary input control when the configured secondary temperature is between the configured Secondary Setpoint Min and Secondary Setpoint Max settings.
		Primary AND Secondary in Range	The system switches from primary to secondary input control when both the primary and secondary temperatures are between their configured Setpoint Min and Setpoint Max settings below.
		Primary OR Secondary in Range	The system switches from primary to secondary input control when either the primary or secondary temperature is between its configured Setpoint Min and Setpoint Max settings below.
PID Ramp Time	5 s	0 s – 60 s	Specifies the time the TCV output takes to ramp to 100% upon entry into the PID control state.
Primary Setpoint Max	90 °C 194 °F	0 °C - 1350 °C 32 °F - 2462 °C	Specifies the maximum value to which the primary process setpoint can be changed by the system. * Must be set between the configured Process Setpoint and Low Fire Setpoint.
Primary Setpoint Min	0 °C 32 °F	0 °C - 1350 °C 32 °F - 2462 °C	Specifies the minimum value to which the primary process setpoint can be changed by the system. * Must be set between the configured Process Setpoint and Low Temp Setpoint.
Secondary Setpoint Max	90 °C 194 °F	0 °C - 1350 °C 32 °F - 2462 °C	Specifies the maximum value to which the secondary process setpoint can be changed by the system. * Must be set between the configured Process Setpoint and Low Fire Setpoint.
Secondary Setpoint Min	0 °C 32 °F	0 °C - 1350 °C 32 °F - 2462 °C	Specifies the minimum value to which the secondary process setpoint can be changed by the system. * Must be set between the configured Process Setpoint and Low Temp Setpoint.
Secondary Input	-	Any configured temperature input	Specifies the temperature input used as a secondary PID input.
Staging Input	-	Any configured I/O expansion input	Specifies the I/O Expansion input used as a staging input

I/O Expansion PID

The I/O Expansion Module PID Configuration link can be used to access the PID configuration settings for the I/O Expansion card inputs.

Cold Start Ramping

Setting	Default	Options	Description
Temp Ramp	Disabled	Disabled	Cold start ramping is not used.
		Enabled	Firing rate is modulated upon start up to attempt to maintain the rate of temperature increase specified by the step size settings below.
Temp Step Size	0 °C 0 °F	0 °C - 1350 °C 0 °F - 2430 °F	Specifies the maximum temperature increase allowed over a specified period upon start up.
Time Step Size	0 min	0 min – 65535 min	

Incinerator Control

Setting	Default	Options	Description
Incinerator Enable	Disabled	Enabled	The appliance is an incinerator.
		Disabled	The appliance is not an incinerator.
Incinerator POC Valve	Waste	Waste	The POC input is connected to a proof of closure switch on the waste gas valve.
		Assist	The POC input is connected to a proof of closure switch on the assist gas valve.
High Temp SP	See Process Temp Control settings above		
Pilot Off SP			
Waste Gas Off Setpoint	84 °C 183.2 °F	0 °C - 1350 °C 32 °F - 2462 °F	Specifies the process temperature at which the waste gas valve is de-energized.
Assist Gas Off Setpoint	50 °C 122 °F	0 °C - 1350 °C 32 °F - 2462 °F	Specifies the process temperature at which the assist gas valve is de-energized.
Process Temp SP	See Process Temp Control settings above		
Waste Gas On Setpoint	50 °C 122 °F	0 °C - 1350 °C 32 °F - 2462 °F	Specifies the process temperature at which the waste gas valve is energized.
Waste Gas Off Deadband	2 °C 3.6 °F	0 °C - 100 °C 0 °F - 180 °F	Specifies the deadband applied to prevent fluctuation between states when the process temperature is near the setpoints.
Assist Gas Off Deadband	2 °C 3.6 °F	1 °C - 200 °C 1.8 °F - 360 °F	
Waste Gas On Deadband	2 °C 3.6 °F	2 °C - 2 °C 35.6 °F - 35.6 °F	

2.4.2   INPUTS

Aux In Contact

Setting	Default	Options	Description
Aux In Contact Mode	Disabled	Disabled	The Aux In contact is ignored.
		POLF	The Aux In contact is connected to a proof of low fire position switch on the temperature control valve or a proof of closure switch on the high fire valve.
		POC2	The Aux In contact is connected to a proof of closure switch.
		POP	The Aux In contact is connected to a proof of pilot position switch.
		Low Fuel Pressure	The Aux In contact is connected to a low fuel pressure switch.
		Proof of Airflow	The Aux In contact is connected to a proof of airflow switch.
		Main Permissive	The Aux In contact trip transitions the system out of any main fuel state and prevents re-entry until cleared.
Main Permissive Masking	No Inputs	All Inputs	Input waits are ignored and removed from the Appliance Alerts Screen until the system is in a main fuel state. * Applies to all I/O Expansion waits as well as waits associated with BMS low fuel pressure and low level/flow
		No Inputs	Input waits and alarms are not ignored.

Flame Detection

Setting	Default	Options	Description
Main Flame Detect	Disabled		Refer to Ignition Wizard Ignition Settings Tab above for configuration options and descriptions.

Fuel Pressure Input

Setting	Default	Options	Description
Fuel Pressure Input Mode	Disabled	Disabled	The fuel pressure input is ignored.
		Dry Contact	The fuel pressure input is connected to a low-pressure switch.
		4-20	The fuel pressure input is connected to a 4-20mA pressure transmitter.
		Dry Contact High pressure	The fuel pressure input is connected to a high-pressure switch.
Low Fuel Press Restart	Disabled	Enabled	The controller does not shut down on a low-pressure event. Behavior is dictated by the Restart Mode setting.
		Disabled	The appliance shuts down on low-pressure events.
Restart Mode	Wait	Wait	The system transitions into the Waiting state upon a low-fuel pressure event and does not proceed until cleared.
		Main Permissive	The system transitions out of any main state upon a low-fuel pressure event and only proceeds as far as the Pilot state until cleared.
4-20 Fuel Pressure Max	207 kPa 30 psi	Any	Specifies the maximum reading of the pressure transmitter.
4-20 High Fuel Pressure SP	172 kPa 25 psi	0 % - 100 % of Max	Specifies the transmitter reading above which the appliance shuts down on high pressure.
4-20 Low Fuel Pressure SP	20.7 kPa 3.1 psi	0 % - 100 % of Max	Specifies the transmitter reading below which the system registers a low-pressure event.
Fuel Pressure Deadband	2.6 kPa 0.4 psi	0 % - 6.25 % of Max	Specifies the deadband applied to prevent fluctuation between states.
Low Fuel Pressure Delay	2 s	2 s – 20 s	Specifies the time for which a low-pressure event must be present before the system acts.

Ion Aux Input

The Ion Aux Input is located on the Ion Pilot Card and can be used for either (1) thermocouple flame detection (with a thermocouple to 4-20mA converter) or (2) to connect a generic 4-20mA transmitter for high trip shutdown. The Ion Aux In Type setting must be enabled in the Ignition Wizard for the following settings to take effect.

Setting	Default	Options	Description
Ion Aux In Mode	High Trip Alarm	TC Flame Detect	The Ion Aux Input is used for flame detection and the trial for ignition time is increased from 10 to 120 seconds.
		High Trip Alarm	The Ion Aux Input is connected to a 4-20mA transmitter for shut down upon a high trip event.
Ion Aux In Trip Point	10 mA 62.5 %	4 mA - 20 mA 0 % - 100 %	Specifies the Ion Aux Input reading above which the system shuts down.
Ion Aux In Deadband	6 mA 12.5 %	4 mA - 20 mA 0 % - 100 %	Specifies the deadband applied to prevent fluctuation between states.

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Proof of Closure

Setting	Default	Options	Description
Proof of Closure	Disabled	Enabled	The POC input is connected to a proof of closure switch on the main valves.
		Disabled	The proof of closure input is ignored.

Level/Flow Input

Setting	Default	Options	Description
Level/Flow Input Mode	Disabled	Disabled	The Level/Flow input is ignored.
		Dry Contact	The Level/Flow input is connected to a Level or Flow switch.
		4-20	The Level/Flow input is connected to 4-20mA Level or Flow transmitter.
Local Level/Flow Input	Disabled	Enabled	The Level/Flow input device is physically wired to the controller.
		Disabled	The Level/Flow input device is physically wired to a different controller in the appliance.
Low Level/Flow Restart	Disabled	Enabled	The system transitions into the Waiting state upon a low-level/flow event and does not proceed until cleared.
		Disabled	The appliance shuts down on low-level/flow events.
4-20 Level/Flow Max	120 L 31.7 gal	0 L – Any	The maximum reading of the level or flow transmitter.
4-20 Level/Flow Min	0 L 0 gal	0 L – Any	The minimum reading of the level or flow transmitter.
4-20 High Level/Flow SP	117 L 31 gal	0 % - 100 % of Max	Specifies the transmitter reading above which the appliance shuts down on high level/flow.
4-20 Low Level/Flow SP	60 L 15.9 gal	0 % - 100 % of Max	Specifies the transmitter reading below which the system registers a low level/flow event.
Level/Flow Deadband	1.5 L 0.4 gal	0 % - 6.25 % of Max	Specifies the deadband applied to prevent fluctuation between states.
Low Level/Flow Delay	2 s	2 s – 20 s	Specifies the time for which a low-level/flow event must be present before the system acts.

2.4.3   OUTPUTS

4-20 Aux Out

Setting	Default	Options	Description
4-20 Aux Out Mode	Disabled	Disabled	The Aux output is disabled
		Manual	The Aux output delivers a 4-20mA signal in accordance with the configured Manual Control Output setting below.
		Temp Echo	The Aux output delivers a percentage value of the process temperature in relation to the High Temp SP, mapped as a 4-20mA signal. Example: High Temp SP setting = 100 ° Process temperature reading = 50 ° Aux output in % = (50°/100°) x 100 = 50% Aux output in mA = 12mA
		Pressure Echo	The Aux output delivers a 4-20mA signal identical to the 4-20mA Pressure input signal.
		Level Echo	The Aux output delivers a 4-20mA signal identical to the 4-20mA Level/Flow input signal.
		BMS PID	The Aux output delivers a 4-20mA signal in accordance with the PID control algorithm
		Firing Rate	The Aux output delivers a 4-20mA signal identical to the 4-20mA I/O Expansion card firing rate input.
Manual Override	Disabled	Enabled	The 4-20 Aux Out Mode setting can be set to Manual.
		Disabled	The Manual Control Output setting is ignored.
Manual Control Output	0 %	0 % - 100 %	Specifies the Aux output signal when 4-20 Aux Out Mode setting is set to Manual.
Purge Position	100 %	0 % - 100 %	Specifies the Aux output signal when requesting purge position. Applicable when 4-20 Aux Out Mode setting is set to BMS PID.
Pilot Position	25 %	0 % - 100 %	Specifies the Aux output signal when requesting pilot position. Applicable when 4-20 Aux Out Mode setting is set to BMS PID.
Minimum Firing Rate	40 %	0 % - 70 %	Specifies the minimum allowable Aux output signal when in a main fuel state . Applicable when 4-20 Aux Out Mode setting is set to BMS PID.

Ignition

Setting	Default	Options	Description
Ignition Mode	Coil		
Relight Attempts	3 attempts		
Minimum Pilots Running	1	Refer to Ignition Wizard Ignition Settings Tab above for configuration options and descriptions.
Pilot Relight Mode	During Flame Fail		
Pilot Timeout	30 s		
Pilot Flame Fail (FFRT)	4 s		
Main Flame Fail (FFRT)	4 s		

Valves

Setting	Default	Options	Description
Pilot Valve PWM	60 %	20 % - 100 %	Specifies the duty cycle of the Pilot valve output.
SSV1 PWM	60 %	20 % - 100 %	Specifies the duty cycle of the SSV1 valve output.
SSV2 PWM	60 %	20 % - 100 %	Specifies the duty cycle of the SSV2 valve output.
High Fire PWM	60 %	20 % - 100 %	Specifies the duty cycle of the HFV valve output.
HFV Output Mode	Valve	Valve	The HFV output is connected to a normally closed high fire valve.
		Forced Draft Fan	The HFV output is connected to a relay enabling a forced draft fan.
		Purge Fan	The HFV output is connected to a relay enabling a purge fan.

Status Contact

Mode	Condition	Lockout	Alarm	Ready	Confirm start	Waiting	Ignition	Pilot	Low Fire	High Fire	Incinerate	Incinerate No Assist
Run Status	Any	O	O	O	O	C	C	C	C	C	C	C
Run and Start Status	Start contact open	O	O	O	O	O	-	-	-	-	-	-
	Start contact closed	O	O	O	O	C	C	C	C	C	C	C
Heating Status	Any	O	O	O	O	O	C	C	C	C	C	C
Pilot Flame Monitor	flame quality < 50%	O	O	O	O	O	O	O	O	O	O	O
	flame quality > 50%	O	O	O	O	C	C	C	C	C	C	C
Low Temp Warning	Process temp < Low Temp	O	O	O	O	O	O	O	O	O	O	O
	Process temp > Low Temp	O	O	O	O	C	C	C	C	C	C	C
High Level/Flow	Level > High Trip	O	O	O	O	O	O	O	O	O	O	O
	Level < High Trip	O	O	O	O	C	C	C	C	C	C	C

Status Contact behavior by system state: O – Open, C - Closed

2.4.4 SETUP

Commissioning

Setting	Default	Options	Description
Commission Date	-	Any	Specifies the date that the system was commissioned.
Controller Name	Not Set	Any	Specifies the controller names as configured above in the Appliance Wizard.
Location	Not Set	Any	Specifies the controller location.
Appliance Size	1 controller	Read Only 1 – 16 controllers	Displays the number of controllers in the appliance.
Min Controllers Running	1 controller	1 – 16 controllers	Specifies the number of controllers that must be running for the appliance to remain running.

IO Modules

The IO Module Configuration link displays a list of connected Temperature and Pilot modules.

System Voltage

Setting	Default	Options	Description
Controller Voltage	24 V	12 V	The controller is supplied by a 12 V power source.
		24 V	The controller is supplied by a 24 V power source.
Voltage Deadband	0.2 V	0 V - 0.5 V	Specifies the deadband applied to the input voltage to prevent fluctuation between states when the reading is near the trip points.
Low Voltage Restart	Disabled	Enabled	The system automatically restarts following a power loss while running.
		Disabled	The system does not automatically restart following a power loss event.
High Voltage Restart	Disabled	Enabled	The system transitions to the Waiting state upon a high voltage event.
		Disabled	The system shuts down upon a high voltage event.

Other

Setting	Default	Options	Description
Comm Loss Restart	Disabled	Enabled	The system goes to the Waiting state upon controller communication loss.
		Disabled	The system shuts down upon controller communication loss.
BMS User Interface	Enabled	Enabled	BMS Enclosure LED indicators enabled.
		Disabled	BMS Enclosure LED indicators disabled.
BMS Wait Timeout	2 min	0 min – 120 min	Specifies the time a BMS wait condition holds before becoming an alarm.
IO Wait Timeout	2 min	0 min – 120 min	Specifies the time for which an I/O expansion wait holds before becoming an alarm.

2.4.5   CALIBRATION

BMS

Setting	Default	Options	Description
Level/Flow Offset	0 mA	-3.2 mA – 3.2 mA	Specifies the offset applied to the BMS Level/Flow input readings.
Level/Flow Scaling Factor	0.00	Read Only	
Pressure Offset	0 mA	-3.2 mA – 3.2 mA	Specifies the offset applied to the BMS Pressure input readings.
Pressure Scaling Factor	0.00	Read Only	
4-20mA Out Offset	0.0 mA	-3.2 mA – 3.2 mA	Specifies the offset applied to the 4-20mA output signal.
4-20mA Out Scaling Factor	0.00	Read Only	
Factory Cal Error Mode	Alarm	Alarm	Calibration errors prevent the system from starting.
		Warning	Calibration errors are displayed as warnings, but do not otherwise affect system behavior.
		Suppress	Calibration errors are ignored.

Ignition Module

Setting	Default	Options	Description
Ion Aux In Offset	0.0 %	-20 % - 20 %	Specifies the offset applied to the Ion Pilot module Aux input readings.
Ion Aux In Scaling Factor	0.00	Read Only	

Temperature Module

Setting	Default	Options	Description
Global Temperature Offset	0.0 °C 0.0 °F	-50 °C - 50 °C -90 °F – 90 °F	Specifies the offset applied to the temperature module inputs.

BMS 4-20 Inputs

Setting	Default	Options	Description
4-20 High Range Limit	22.0 mA	19 mA – 22 mA	Specifies the trip points for the 4-20mA out of range alarms.
4-20 Low Range Limit	3.0 mA	3 mA – 5 mA	

2.4.6 FARC SETTINGS

The FARC settings are accessed from the Appliance Status Screen by selecting any of the displayed FARC inputs or outputs.

Setting	Default	Options	Description
FARC Mode	Auto	Auto	The firing rate is provided by the BMS or the I/O Expansion firing rate input if configured
		Manual	The firing rate matches the Manual Firing Rate setting and the FARC table is unlocked for editing.
Manual Firing Rate	0 %	Min Firing Rate to 100 %	Specifies the firing rate when the FARC Mode setting is set to Manual.
Fuel Air Ratio Table - Firing Rate	Not adjustable		Indicates the firing rate values corresponds to the air and fuel positions listed in the table.
Fuel Air Ratio Table - Air	0 %	0 % - 100 %	Specifies the air actuator position or VFD speed for each firing rate value.
Fuel Air Ratio Table - Fuel	0 %	0 % - 100 %	Specifies the gas valve position for each firing rate value.
Airflow Control Type	Damper	Damper	The airflow position output is connected to an air damper.
		VFD	The airflow position output is connected to a variable frequency drive.
Air Purge Position	0 %	0 % - 100 %	Specifies the air output position when the system is purging.
Air Pilot Position	0 %	0 % - 100 %	Specifies the air output position when the system is in Pilot.
Valve Purge Position	0 %	0 % - 100 %	Specifies the gas valve output position when the system is purging.
Valve Pilot Position	0 %	0 % - 100 %	Specifies the gas valve output position when the system is in Pilot.
Light Off Position	20 %	Min Firing Rate to 100 %	Specifies the firing rate held while the main valves are energized.
Minimum Firing Rate	40 %	0 % - 70% * Cannot be set higher than the Light Off Position	Specifies the minimum allowable firing rate when in a main fuel state.
Position Error Timeout	10 sec	1 sec – 10 sec	Specifies the time for which a position error must be present before the system acts.
Position Error	2 %	0 % - 10 %	Specifies the allowable tolerance between the expected and measured air/valve positions
Cross Limit Error	1 %	0 % - 15 %	Specifies the maximum tolerance by which the fuel position may exceed the air position.

2.5 TEST SYSTEM

All settings changes must be verified against the safety design documentation and equipment manufacturer specifications prior to starting the system. All safety functions must be validated to ensure that the system behaves as required in all safety shut down situations.

29. Ensure that all safety settings are configured in accordance with safety design documentation and equipment manufacturer specifications.
30. Test all safety functions to ensure that they system has been configured correctly.
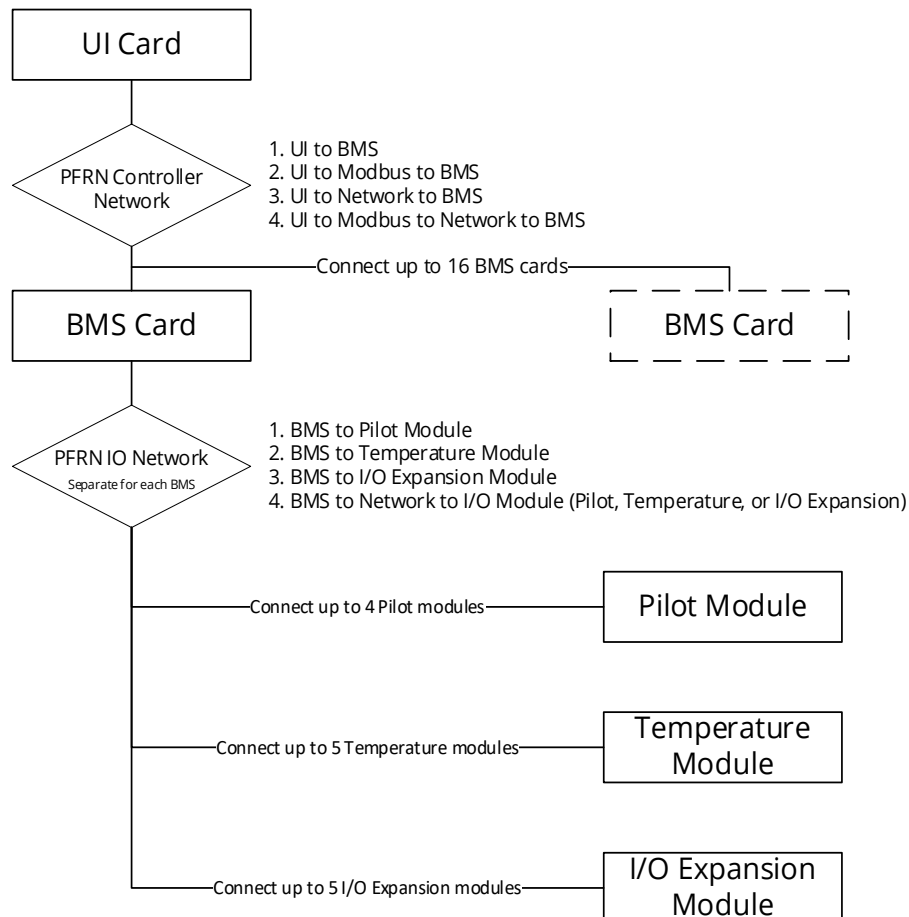
2.6 SAVE SETTINGS

Once commissioning is complete, settings should be backed up to a USB storage device. Saved settings can be restored on the system or used to commission a separate system (in conjunction with the Swap Wizard) identically.

31. Use the Backup Settings tool from the System Settings Screen to save settings to a USB storage device.

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3   COMMON APPLICATIONS

The following section outlines some common PF3100 applications and the device/configuration requirements for each. Each application can be customized and scaled up or down to meet specific application requirements in accordance with local safety codes and the following product limitations:

- PF3100-00 UI cards must be connected to BMS Controller port 28 (PFRN Controller Network) either (1) directly, or (2) through a PF3106-00 Network card or PF3107-00 Modbus card.
- PF3102-0x Pilot cards, PF3103-00 Temperature cards and PF3113-00 I/O Expansion cards must be connected to BMS Controller ports 29-32 (PFRN IO Network) either (1) directly, or (2) through a PF3106-00 Network card.
- PF3107-00 Modbus cards can only be connected between the UI and the BMS Controller port 28.
- Multiple PF3100-00 UI cards cannot be connected to a single appliance.
- The number of PF3101-00 BMS Controllers in a single appliance cannot exceed 16.
- The number of PF3102-0X Pilot modules connected to a single BMS Controller cannot exceed 4.
- The number of PF3103-00 Temperature modules connected to a single BMS Controller cannot exceed 5.
- The number of PF3113-00 I/O Expansion modules connected to a single BMS Controller cannot exceed 5.
- The number of thermocouple inputs created in the Temperature Wizard cannot exceed 20.
- The number of inputs created in the I/O Expansion Wizard cannot exceed 45.
- PID tuning parameters will vary between appliances and should be tuned by a PID expert.
- FARC system settings are protected by a FARC password and should only be changed by a FARC expert.

```
                        ┌─────────────────┐
                        │     UI Card     │
                        └─────────────────┘
                                 │
                              ◇ PFRN Controller      1. UI to BMS
                                Network              2. UI to Modbus to BMS
                                                     3. UI to Network to BMS
                                                     4. UI to Modbus to Network to BMS

              ──────── Connect up to 16 BMS cards ────────┐
                                 │                        │
                        ┌─────────────────┐      ┌ ─ ─ ─ ─ ─ ─ ─ ─ ┐
                        │    BMS Card     │        │    BMS Card     │
                        └─────────────────┘      └ ─ ─ ─ ─ ─ ─ ─ ─ ┘
                                 │
                              ◇ PFRN IO Network       1. BMS to Pilot Module
                                Separate for each BMS 2. BMS to Temperature Module
                                                      3. BMS to I/O Expansion Module
                                                      4. BMS to Network to I/O Module (Pilot, Temperature, or I/O Expansion)

              ──── Connect up to 4 Pilot modules ────  ┌─────────────────┐
                                 │                     │  Pilot Module   │
                                 │                     └─────────────────┘
              ──── Connect up to 5 Temperature modules ──  ┌─────────────────┐
                                 │                         │  Temperature    │
                                 │                         │    Module       │
                                 │                         └─────────────────┘
              ──── Connect up to 5 I/O Expansion modules ──  ┌─────────────────┐
                                                             │ I/O Expansion   │
                                                             │    Module       │
                                                             └─────────────────┘
```

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3.1 MULTI-BURNER CABIN HEATER

3.1.1 APPLIANCE SPECIFICATIONS
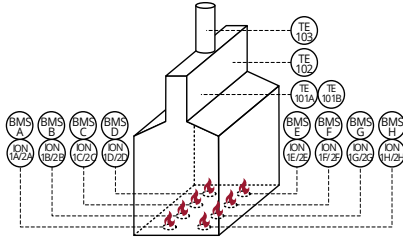
Heater Tag: H-101
Number of burners: 8
Number of pilots per burner: 2
Temperature Inputs: Outlet (TE-101A/B), Tube skin (TE-102), Stack (TE-103)
Process Control Mode: PID Control
Process Inputs: Fuel pressure
Pilot Flame Detection: Ionization
Main Flame Detection: None
Remote monitoring: Modbus

3.1.2 DEVICE REQUIREMENTS

PF3100-00 UI modules: 1
PF3101-00 BMS module: 8
PF3102-00 Ion Pilot modules: 16
PF3102-01 UV Pilot modules: 0
PF3103-00 Temperature modules: 1
PF3106-00 Network Switch modules: 2
PF3107-00 Modbus modules: 1
PF3113-00 I/O Expansion modules: 0
Dual element thermocouples: 1 (TE-101A/B)
Single element thermocouples: 2 (TE-102, TE-103)
Proportional temperature control valves: 8
Pressure transmitters: 8
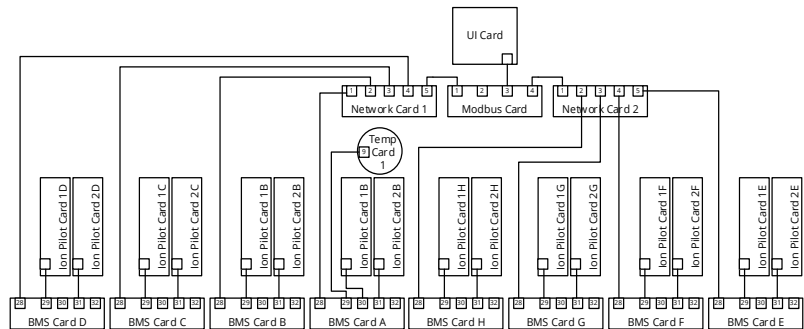
3.1.3 APPLIANCE SETUP

Appliance Wizard
1. Create an appliance named H-101.
2. Name each controller in accordance with the burner it will be controlling (Burner A, Burner B, …, Burner H).
3. Assign all controllers to the H-101 appliance.

Temperature Wizard
4. Create temperature inputs as follows:

Name	Mode	App. Shutdown	Input Type
TE-101A/B	Primary process	Enabled	Dual
TE-102	Aux process	Enabled	Single
TE-103	High Temp ESD	Enabled	Single

5. Assign each created input to the temperature card terminals to which they are physically wired in the field (TE-101A/B to terminals TC1A and TC1B, TE-102 to TC2A and TE-103 to TC2B).
6. Configure all setpoints and modes per local safety codes, appliance manufacturer specifications, and design documentation.

Ignition Wizard
7. Enable and assign each ion pilot card to the controller to which it is physically wired in the field.
8. Configure ignition settings per local safety codes, appliance manufacturer specifications, and design documentation.

3.1.4 BMS SETTINGS

9. Configure Pressure inputs for connection to 4-20mA fuel pressure transmitters.
   Inputs > Fuel Pressure Input
   - Fuel Pressure Input Mode: 4-20
   - 4-20 Fuel Pressure Max: Max reading of the pressure transmitter (reading corresponding to a 20mA transmitter output).
   - 4-20 High/Low Fuel Pressure SP: Configure per local safety codes, manufacturer specifications and design documentation.
10. Configure 4-20mA Aux outputs for connection to proportional temperature control valves.
    Outputs > 4-20 Aux Out:
    - 4-20 Aux Out Mode: BMS PID
    - Purge Position/ Pilot Position/ Minimum Firing Rate: Configure per local safety codes, manufacturer specifications and design documentation.
11. Configure all other BMS settings per local safety codes, manufacturer specifications and design documentation.

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## 3.2 SINGLE MAIN FUEL TRAIN/DUAL FIRE TUBE

3.2.1 APPLIANCE SPECIFICATIONS
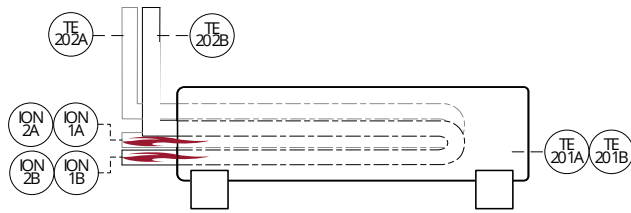
Heater Tag: H-200
Number of burners: 2 main burners from single fuel train
Number of pilots per burner: 2
Temperature inputs: Redundant Outlet (TE-201A/B), Stack A (TE-202A), Stack B (TE-202B)
Process Inputs: Tank level
Remote monitoring: None
Process Control Mode: PID Control
Pilot Flame Detection: Ionization
Main Flame Detection: None

3.2.2 DEVICE REQUIREMENTS

PF3100-00 UI modules: 1
PF3101-00 BMS modules: 1
PF3102-00 Ion Pilot modules: 4
PF3102-01 UV Pilot modules: 0
PF3103-00 Temperature modules: 2
PF3106-00 Network Switch modules: 1
PF3107-00 Modbus modules: 0
PF3113-00 I/O Expansion modules: 0
Dual element thermocouples: 4
Level transmitters: 1
Proportional temperature control valves: 1
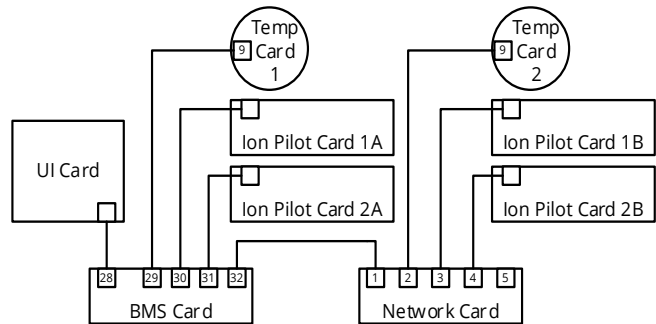
3.2.3 APPLIANCE SETUP

Appliance Wizard
1. Create an appliance named H-200.
2. Name and assign the controller to the H-200 appliance.

Temperature Wizard
3. Create temperature inputs as shown below:

Name	Mode	App. Shutdown	Input Type
TE-201A	Primary process	Enabled	Dual
TE-201B	Aux Process	Enabled	Dual
TE-202A	High Temp ESD	Enabled	Dual
TE-202B	High Temp ESD	Enabled	Dual

4. Assign each input to the temperature card terminals according to how they are physically wired in the field. Ensure that redundant temperature inputs are wired to separate temperature modules (i.e., wire TE-201A and TE-201B to separate temperature modules.)
5. Configure all setpoints and modes per local safety codes, appliance manufacturer specifications, and design documentation.

Ignition Wizard
6. Enable each ion pilot card.
7. Configure ignition settings per local safety codes, appliance manufacturer specifications, and design documentation.
   - Minimum Pilots Running: 4
     For appliances with a single fuel train and multiple fire tubes, flame must be proven, while running, in all fire tubes for the system to operate safely. Failure to comply could result in death, serious injury, equipment damage and environmental damage.

3.2.4 BMS SETTINGS

8. Configure Level/Flow input for connection to a 4-20mA level transmitter.
   Inputs > Level/Flow Input
   - Level/Flow Input Mode: 4-20
   - 4-20 Fuel Pressure Min/Max: Transmitter reading corresponding to a 4mA and 20mA transmitter output, respectively.
   - 4-20 High/Low Level/Flow SP: Configure per local safety codes, manufacturer specifications and design documentation.
9. Configure 4-20mA Aux output for connection to a proportional temperature control valve.
   Outputs > 4-20 Aux Out:
   - 4-20 Aux Out Mode: BMS PID
   - Purge Position/ Pilot Position/ Minimum Firing Rate: Configure per local safety codes, manufacturer specifications and design documentation.
10. Configure all other BMS settings per local safety codes, manufacturer specifications and design documentation.

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3.3   INCINERATOR APPLICATION

3.3.1   APPLIANCE SPECIFICATIONS
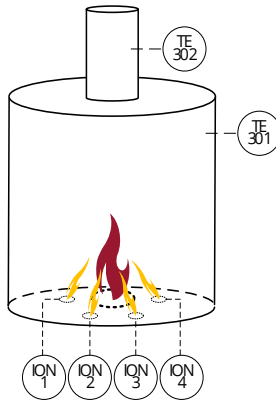
Heater Tag: H-300
Number of burners: 1
Number of pilots: 4
Temperature inputs: Chamber (TE-301), Stack (TE-302)
Process Inputs: None
Remote monitoring: None
Process Control Mode: Incinerator Control
Pilot Flame Detection: Ionization
Main Flame Detection: None

3.3.2   DEVICE REQUIREMENTS

PF3100-00 UI modules: 1
PF3101-00 BMS modules: 1
PF3102-00 Ion Pilot modules: 4
PF3102-01 UV Pilot modules: 0
PF3103-00 Temperature modules: 1
PF3106-00 Network Switch modules: 1
PF3107-00 Modbus modules: 0
PF3113-00 I/O Expansion modules: 0
Dual element thermocouples: 2
Single element thermocouples: 0
Pressure transmitters: 1
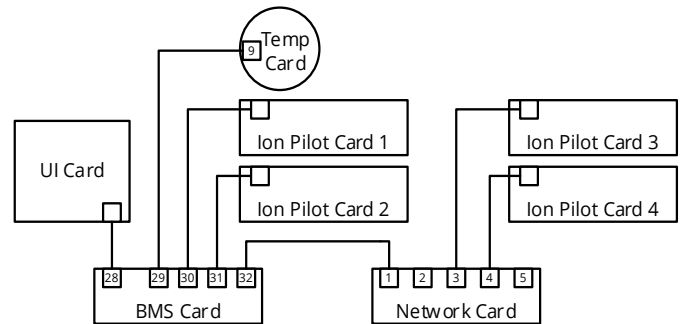
3.3.3   APPLIANCE SETUP

Appliance Wizard
1. Create an appliance named H-300.
2. Name and assign the controller to the H-300 appliance.

Temperature Wizard
3. Create temperature inputs as shown below:

Name	Mode	App. Shutdown	Input Type
TE-301	Primary Process	Enabled	Dual
TE-302	High Temp ESD	Enabled	Dual

4. Assign each input to the temperature card terminals according to how they are physically wired in the field.
5. Configure all setpoints and modes per local safety codes, appliance manufacturer specifications, and design documentation.

Ignition Wizard
6. Enable each ion pilot card.
7. Configure ignition settings per local safety codes, appliance manufacturer specifications, and design documentation.

3.3.4   BMS SETTINGS

8. Configure controller as an incinerator controller:
   Process Control > Incinerator Control
   - Incinerator Enable: Enabled
   - All other settings: Configure per local safety codes, appliance manufacturer specifications, and design documentation.
9. Configure all other BMS settings per local safety codes, manufacturer specifications and design documentation.

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3.4 FARC APPLICATION

3.4.1 APPLIANCE SPECIFICATIONS
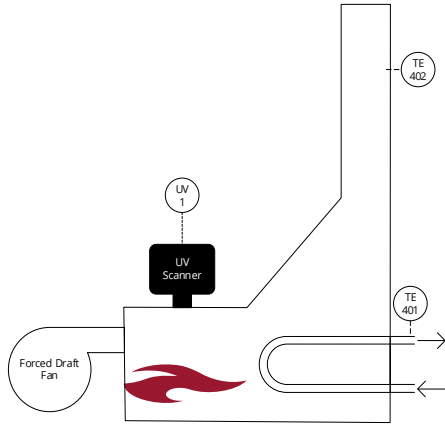
Heater Tag: H-400
Number of burners: 1
Number of pilots: 1
Temperature inputs: Outlet (TE-401), Stack (TE-402)
Process inputs: Main valve proof of closure, fuel pressure, process flow, proof of light off position, proof of airflow (FIT-402), airflow actuator position feedback (ZI-401), fuel actuator position feedback (ZI-402), firing rate (TIC-401).
Output requirements: Forced draft fan, proportional fuel gas control, proportional airflow control.
Remote monitoring: Modbus
Process Control Mode: External Firing Rate
Pilot Flame Detection: UV
Main Flame Detection: None

3.4.2 DEVICE REQUIREMENTS

PF3100-00 UI modules: 1
PF3101-00 BMS modules: 1
PF3102-00 Ion Pilot modules: 0
PF3102-01 UV Pilot modules: 1
PF3103-00 Temperature modules: 1
PF3106-00 Network Switch modules: 0
PF3107-00 Modbus modules: 1
PF3113-00 I/O Expansion modules: 1
Dual element thermocouples: 1 (TE-401)
Single element thermocouples: 1 (TE-402)
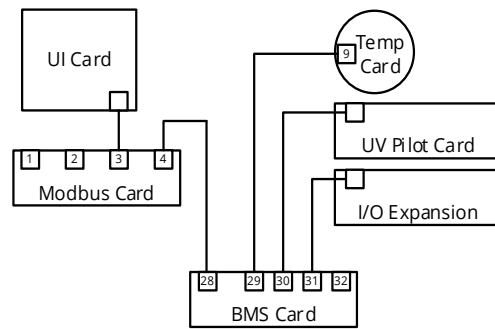
3.4.3 APPLIANCE SETUP

Appliance Wizard
1. Create an appliance named H-400.
2. Name and assign the controller to the H-400 appliance.

Temperature Wizard
3. Create temperature inputs as shown below:

Name	Mode	App. Shutdown	Input Type
TE-401	Primary Process	Enabled	Dual
TE-402	High Temp ESD	Enabled	Dual

4. Assign each input to the temperature card terminals according to how they are physically wired in the field.
5. Configure all setpoints and modes per local safety codes, appliance manufacturer specifications, and design documentation.

Ignition Wizard
6. Enable the UV Pilot card.
7. Configure ignition settings per local safety codes, appliance manufacturer specifications, and design documentation.
8. Ensure Flame Fail Response Time (FFRT) settings are adjusted to account for the response time of the flame scanner (e.g., If desired FFRT is 4s and the flame scanner has a response time of 3s, the FFRT setting(s) must be set to 1 second or less.)

I/O Wizard
9. Create I/O Expansion inputs as follows:

Name	Input Type	Signal Type	Input Mode	Low Setpoint	High Setpoint
FIT-402 Airflow	Flow	4-20	Proof of Airflow	Configure per local safety codes, equipment manufacturer specification and design documentation	
ZI-401 Air Pos.	FARC Air Position	-	-		
ZI-402 Fuel Pos.	FARC Valve Position	-	-		
TIC-401 Firing Rate	Appliance Firing Rate	-	-		

10. Assign each input to the I/O Expansion card terminals according to how they are physically wired in the field.
11. Configure the 4-20 output as "Air Position Controlled by FARC".
12. Configure the module voltage and dry contact behavior per design documentation.

3.4.4 BMS SETTINGS

13. Configure Aux In contact for connection to a proof of low fire position switch on the proportional temperature control valve.
    Inputs > Aux In Contact
    - Aux In Contact Mode: POLF
14. Configure Pressure input for connection to a 4-20mA fuel pressure transmitter.
    Inputs > Fuel Pressure Input
    - Fuel Pressure Input Mode: 4-20
    - 4-20 Fuel Pressure Max: Max reading of the pressure transmitter (reading corresponding to a 20mA transmitter output).
    - 4-20 High/Low Fuel Pressure SP: Configure per local safety codes, manufacturer specifications and design documentation.
15. Configure Proof of Closure unput for connection to a proof of closure switch on the SSV valves.
    Inputs > Proof of Closure
    - Proof of Closure: Enabled
16. Configure Level/Flow input for connection to a 4-20mA flow transmitter.
    Inputs > Level/Flow Input
    - Level/Flow Input Mode: 4-20
    - 4-20 Fuel Pressure Min/Max: Transmitter reading corresponding to a 4mA and 20mA transmitter output, respectively.
    - 4-20 High/Low Level/Flow SP: Configure per local safety codes, manufacturer specifications and design documentation.
17. Configure 4-20 Aux output for connection to a proportional temperature control valve.
    Outputs > 4-20 Aux Out
    - 4-20 Aux Out Mode: BMS PID
18. Configure HFV output for connection to a forced draft fan motor enable contact.
    Outputs > Valves
    - HFV Output Mode: Forced Draft Fan

3.4.5 FARC SETTINGS

19. Ensure FARC table and settings are configured by a FARC expert in accordance with local safety codes, equipment manufacturer specifications, design documentation, and PF3100 FARC User Guide.

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4 DOCUMENT REVISION HISTORY

Document Version	Release Date	Applicable Firmware
v2.0	12 MAR 2021	NA-42.0

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