PROFIRE

PF2200-FD

FARC USER GUIDE

DOC-001154
v1.1

PROFIRE

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

Installation and modification shall not be performed while the system is energized. Disconnect power source prior to connecting devices or modifying wiring.

System settings and appliance configuration details must only be modified by qualified personnel familiar with the both the appliance under control and related plant processes that could be affected.

Do not bypass any of the safety functions or modify any of the internal circuitry of the system. Doing so can lead to death, serious injury, electrocution, property damage, product damage and/or government fines.
The configuration examples provided in this guide are for demonstration purposes only and do not necessarily represent safe or reliable configurations for all applications. Installation, commissioning and tuning of a FARC system must be performed by a qualified technician with experience in commissioning and tuning forced draft positioning-type FARC systems in accordance with local safety codes and appliance manufacturer specifications. Regular maintenance should be performed on the system to verify tuning and system operation.

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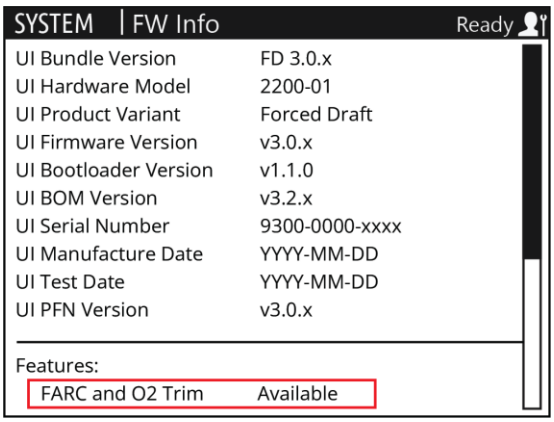
1 DOCUMENT SCOPE

The Profire PF2200-FD Forced Draft burner management controller can be configured to operate as a parallel positioning fuel-air ratio control (FARC) system. The system allows specific output positions to be configured for one air channel and one fuel channel across the entire operating range of the appliance. Channel feedback inputs are constantly monitored to ensure accurate positioning and outputs are adjusted to maintain precise ratio control. The system also supports single channel O_2 Trim to maintain desired stack oxygen readings and increase appliance efficiency.

This user guide contains a general overview of the PF2200-FD FARC system features, commissioning procedures and operation.

1.1 APPLICABLE FIRMWARE VERSIONS

The information provided in this document applies only to PF2200-FD controllers running FD 3.0.4 firmware with the optional FARC and O2 Trim software feature enabled. This feature must be specified at time of purchase as it cannot be field-installed on the controller. Feature availability is displayed at the bottom of the Information Screen.



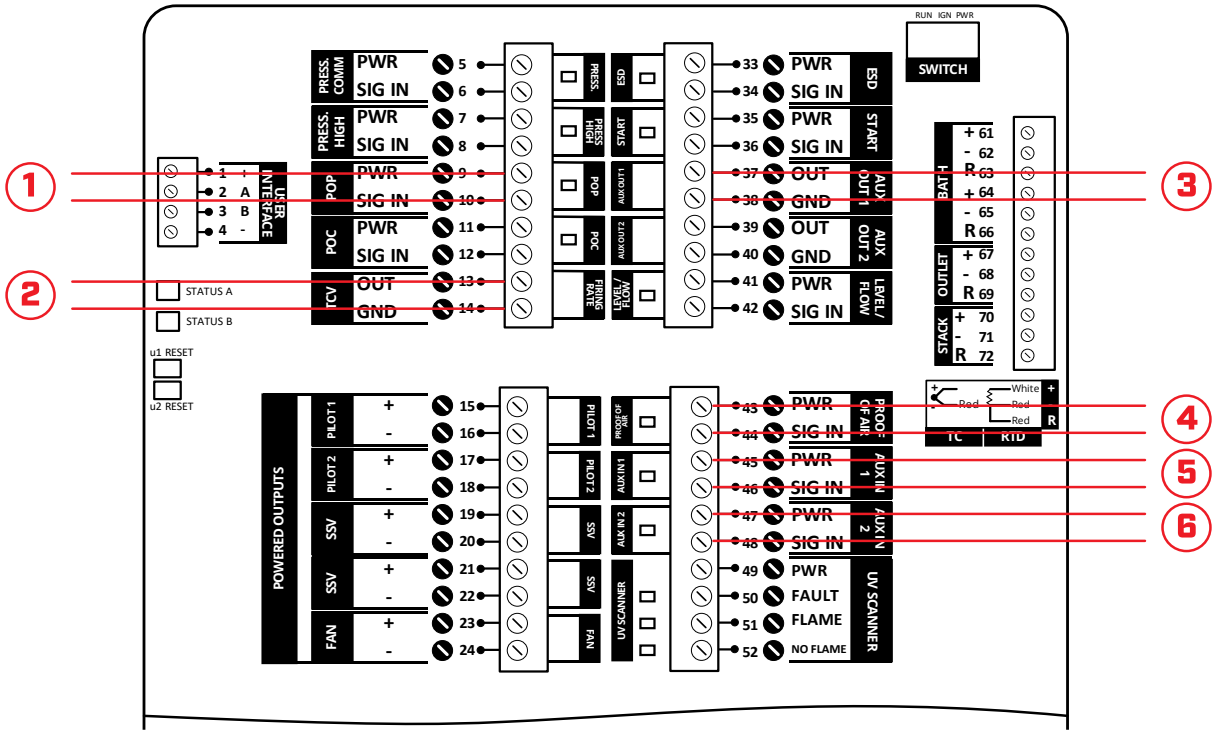
1.2 ADDITIONAL DOCUMENTATION

This document outlines information specific to FARC applications only. Visit PF2200-FD BMS Controller | Profire Energy to access additional PF2200-FD documentation.

2 HARDWARE REQUIREMENTS

The following peripheral equipment is required to satisfy the input and output requirements of a PF2200-FD FARC system:

ITEM	INTERFACE DETAILS		APPLICATION REQUIREMENTS
Fuel Gas Control Valve (fuel actuator)	1	4-20mA BMS input signal from fuel actuator position feedback output	Required for all FARC applications
	2	4-20mA BMS output signal to fuel actuator position control input	
Air damper or VFD blower (air actuator)	3	4-20mA BMS output signal to air actuator position/speed control input	
	4	4-20mA BMS input signal from air actuator position/speed feedback output	
Proof of Airflow device	5	Digital or 4-20mA BMS input signal from airflow switch or transmitter	
Oxygen sensor	6	4-20mA BMS input signal from stack O_2 transmitter	Required for FARC applications utilizing O_2 trim functionality.

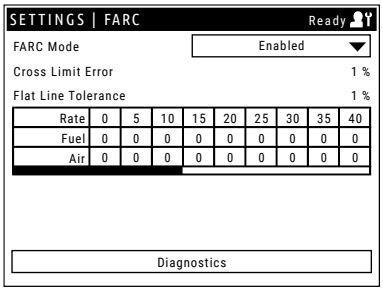


3 FARC FUNCTIONALITY OVERVIEW

3.1 FARC TABLE

The FARC Table can be configured to specify the output positions of one fuel channel and one air channel at 5% firing rate intervals across the operating range of the appliance (21 configurable points for each channel). Each column represents a specific firing rate for the system and each row specifies the corresponding channel output position required at that firing rate.

Settings > Proc Control > FARC



3.1.1 CROSS LIMITING

Cross limiting is the automatic adjustment of FARC channel outputs to ensure that a safe fuel-air mixture is always maintained in accordance with the FARC table. If a fuel-rich condition exists outside the configured Cross Limit Error setting the system de-energizes all safety outputs and proceeds to the Lockout state.

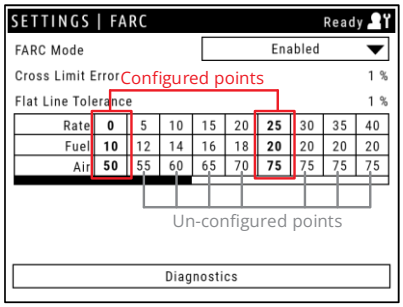
3.1.2 FLAT LINE TOLERANCE

The Flat Line Tolerance setting is meant to compensate for positioner inaccuracies that could cause chattering across flat sections of a FARC channel curve (i.e., segments of a FARC channel curve that have the same position configured in consecutive FARC table firing rate columns). The setting specifies the area above and below a flat section within which the system does not cross limit the outputs – in this case the outputs are held based on the system firing rate. Cross limiting is applied only when a channel feedback signal is outside its Flat Line Tolerance. Note that multiple flat sections with overlapping tolerances are treated as a single flat line section.

3.1.3 CONFIGURED POINTS VS UNCONFIGURED POINTS

Configured points are values in the FARC table that have been specified by the user; they are displayed in **bold** in the FARC table and can only be changed by the user. Unconfigured points are also displayed in the FARC table, but their values are automatically determined through interpolation between configured points. Note: be aware that updating configured points in the FARC table will change the values of the unconfigured points.

Settings > Proc Control > FARC



3.1.4 ADJUSTING POINTS

Use + and − to incrementally adjust points or press OK to access the numerical entry dialog. Making an adjustment to an unconfigured point automatically converts it to a configured point.

3.1.5 REMOVING POINTS

Select the point to be removed, press OK to access the numerical entry dialog, then select "Remove" to change the point from a configured point to an unconfigured point. Note that removing a configured point from the FARC table removes the points for all channels in the corresponding FARC table column.

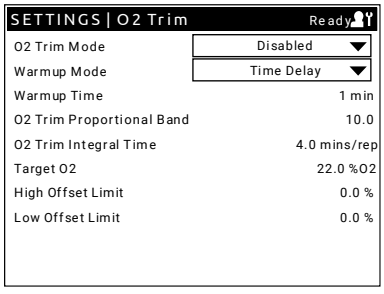
3.1.6 CHANNEL LIMITATIONS

The FARC channels must not have any sections where the FARC table position decreases as the firing rate increases; the channels must only have flat sections or sections with increasing slope. While negatively sloping FARC channel curves are not supported, the Air Inversion setting (Settings > Outputs > Air) can be used to accommodate inverted air actuators. 0% and 100% air channel output positions are represented as 4mA and 20mA output signals, respectively when Air Inversion is disabled, and 20mA and 4mA output signals, respectively when Air Inversion is enabled.

3.2 O_2 TRIM

O2 Trim is designed to fine-tune either the fuel or air channel output to maintain appliance efficiency across a variety of environmental conditions without having to recommission the FARC Table.

Settings > Proc Control > O2 Trim



3.2.1 O_2 SENSOR WARMUP

Stack-heated O2 sensors require the stack to be at a specific temperature and self-heated O2 sensors require a specific warmup time before they can be relied upon for accurate measurement. The warmup settings allow the system to be configured for either type of O2 sensor.

3.2.2 TARGET O_2

The target O2 setting specifies the desired stack O2 reading while the controller is actively trimming in the Process Control state.

3.2.3 OFFSET LIMITS

The Offset Limit settings specify the amount that the system can adjust FARC outputs to attempt to achieve the Target O2 setpoint.

3.2.4 O_2 TRIM PI CONTROLLER

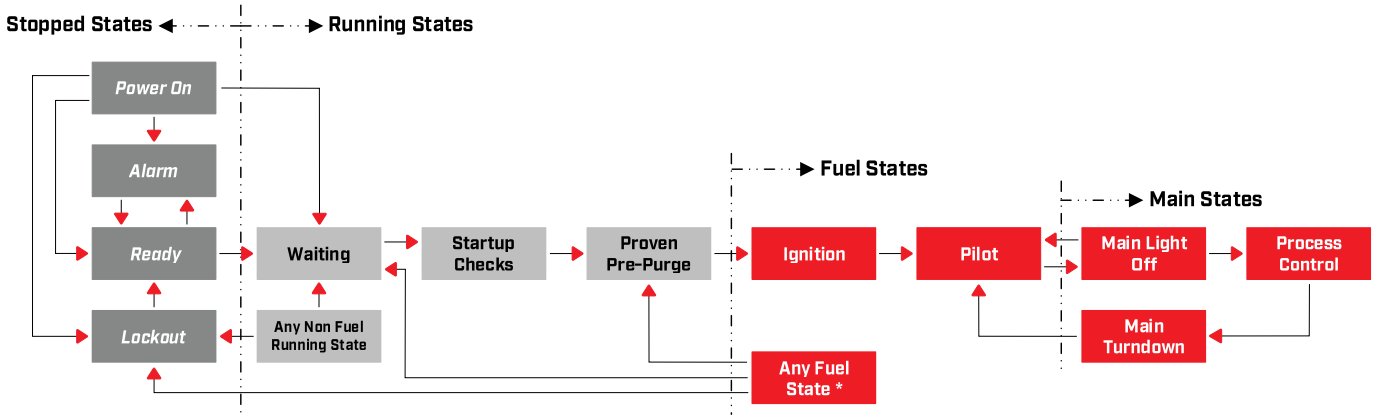
The O2 Trim PI controller uses the configured O2 Proportional Band and O2 Integral Time settings to apply an offset to the configured Trim Channel to achieve the Target O2 specified in the O2 table. It is meant to be a slow acting controller to maintain appliance stability.

3.3 MANUAL MODE

The Firing Rate Manual Override setting (Settings > Setup > OK Manual Overrides) must be enabled to make any changes to the FARC Table. When enabled, the system firing rate is held at the configured Manual Firing Rate setting during the Process Control state. Firing Rate Manual Override should only be enabled during commissioning – A warning is displayed in the Alerts Pane when enabled.

3.4 OPERATING SEQUENCE

The following section outlines the controller states applicable to FARC applications as well as the proof of position and proof of airflow requirements for each. Refer to the PF2200-FD Product Manual for detailed state information including safety output behavior and transition requirements.



**** The system cannot transition from the Process Control state to the Waiting state without going through the Main Turndown state first.***

CONTROLLER STATE	FARC CHANNEL OUTPUT POSITION	O_2 TRIM	PROOF OF AIRFLOW
Power On	Off Position	Inactive	N/A
Alarm	Off Position [1]	Inactive	N/A
Ready	Off Position [1]	Inactive	N/A
Lockout	Off Position [1]	Inactive	N/A
Waiting	Off Position [1]	Inactive	N/A
Startup Checks	Off Position	Inactive	must not be satisfied
Proven Pre Purge – Request Purge Position	Purge Position	Inactive	must be satisfied
Proven Pre Purge – Prove Airflow / Pre-Purge	Purge Position [2]	Inactive	must be satisfied
Proven Pre Purge – Request Pilot Position	Pilot Position	Inactive	must be satisfied
Ignition / Pilot	Pilot Position [2]	Inactive	must be satisfied
Pilot – Request Light Off Position	Light Off Position per FARC Table	Inactive	must be satisfied
Main Light Off	Light Off Position per FARC Table [2]	Inactive	must be satisfied
Process Control	FARC Table position	Active [3]	must be satisfied
Main Turndown	Minimum Position per FARC Table	Inactive	must be satisfied

1 If Purging, channel output matches configured Purge Position or last position in accordance with Post Purge Mode setting.
2 System proceeds to Lockout if position is not maintained for the duration of the state.
3 Following O_2 sensor warmup.

4 COMMISSIONING

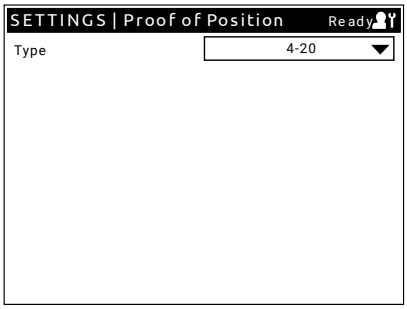
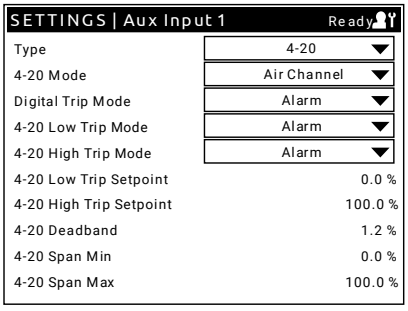
Prior to configuring FARC settings ensure that all non-FARC components of the BMS system have been configured per design documentation and manufacturer specifications. This section covers the configuration procedures for FARC functionality only - refer to the latest PF2200-FD Product Manual for additional details including commissioning instructions and descriptions of configuration options.

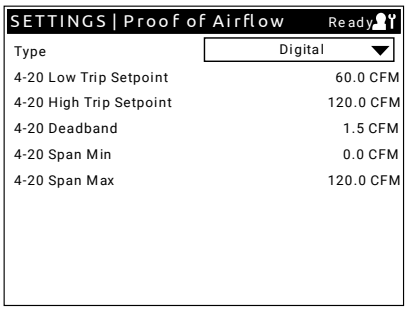
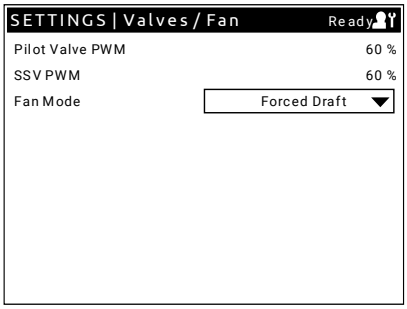
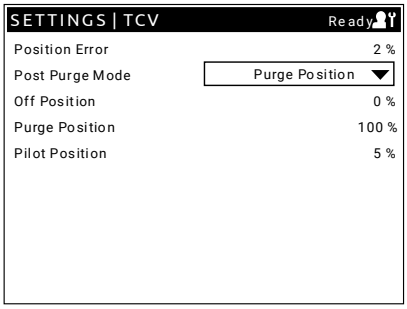
All FARC configuration settings should only be modified by qualified personnel.

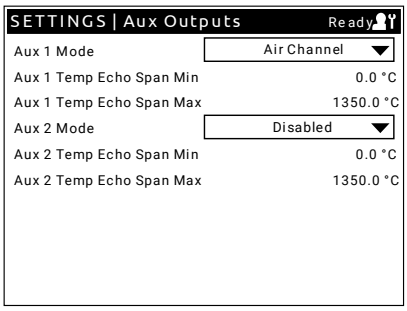
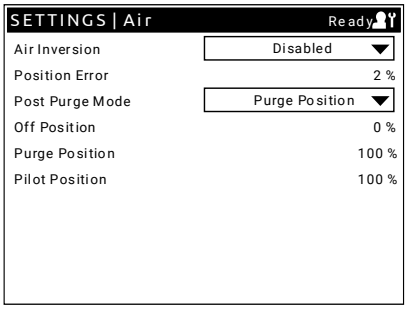
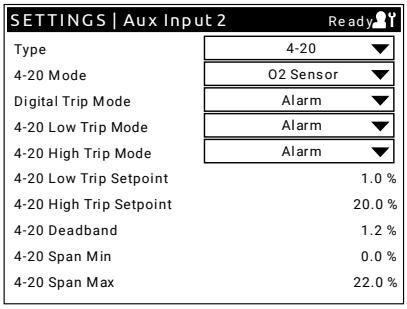
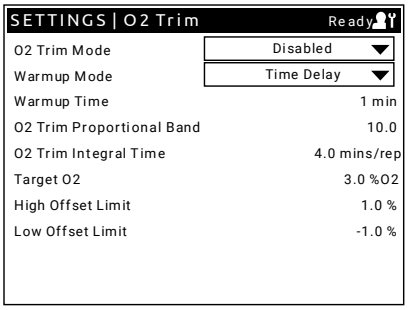
There are multiple methods that can be used to configure a FARC system. The method outlined in the steps below is designed to maximize control over the operating range of the appliance.

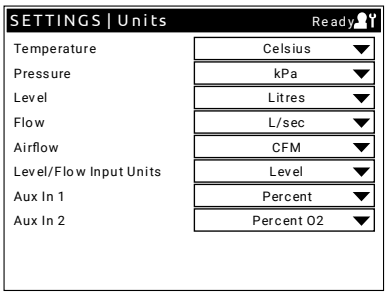
4.1 FARC COMMISSIONING PROCEDURE

4.1.1 CONFIGURE FARC INPUTS AND OUTPUTS

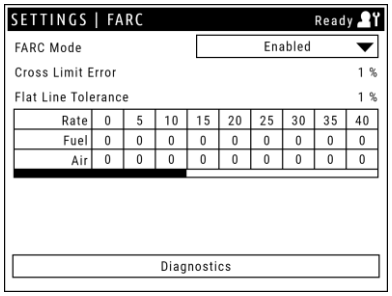
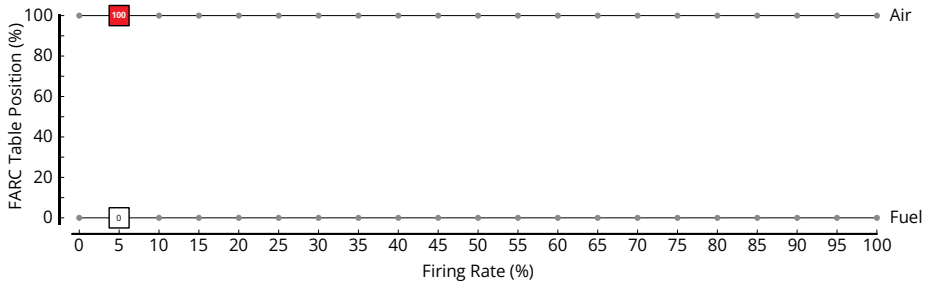
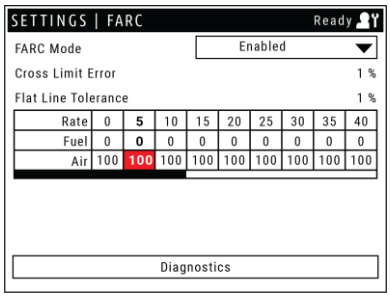
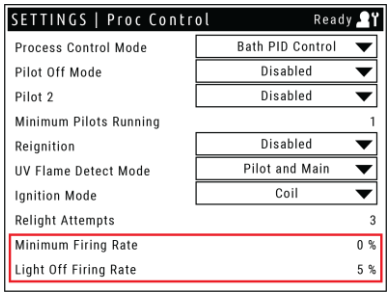
INPUT	CONFIGURATION SCREEN
Fuel channel feedback input: Type: must be set to 4-20	Settings > Inputs > Proof of Position 
Air channel feedback input: Type: must be set to 4-20 4-20 Mode: must be set to Air Channel All other settings: Ignored Air Channel units must be configured as Percent	Settings > Inputs > Aux 1 

INPUT	CONFIGURATION SCREEN
Proof of Airflow input: Type: As per proof of airflow device type. If Type is Digital: • All other settings are ignored If Type is 4-20: • Configure all settings as per device/appliance manufacturer specifications • Ensure that units are also configured accordingly	Settings > Inputs > OK Proof of Airflow 
Forced Draft Fan output: Fan Mode: must be set to Forced Draft	Settings > Outputs > OK Valves/Fan 
Fuel channel actuator control output: Pilot Position: must be set lower than expected fuel channel pilot position (to be adjusted during tuning) All other settings: must be configured as required per local safety codes and appliance manufacturer specifications	Settings > Outputs > OK TCV 

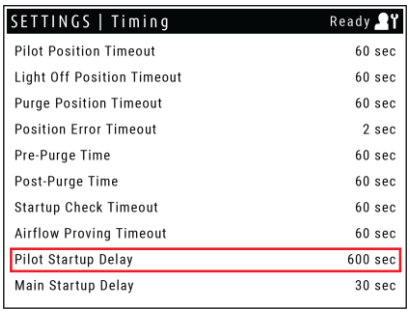
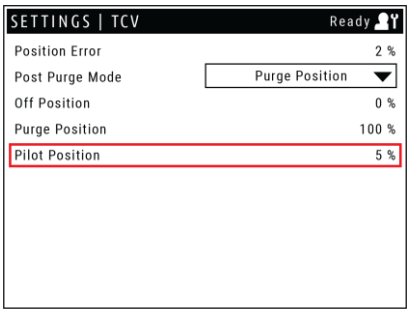
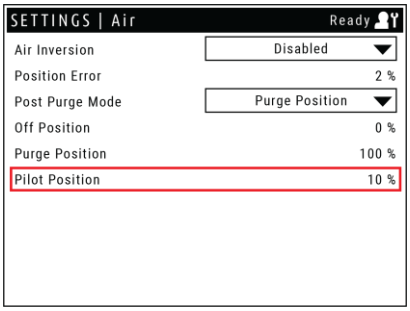
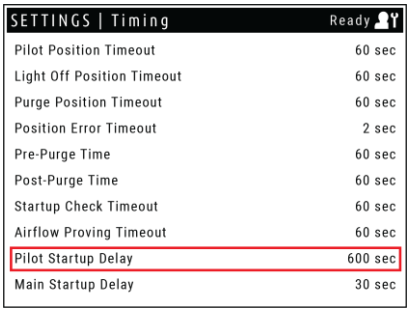
INPUT	CONFIGURATION SCREEN
Air channel actuator control output: Settings > Outputs > Aux: Aux 1 Mode: must be set to Air Channel Temp Echo Span Min/Max: Ignored Settings > Outputs > Air: Air Inversion: must be configured per air actuator device manufacturer specifications: • Disabled: 0% air channel output is represented as a 4mA signal and 100% output is represented as a 20mA signal • Enabled: 0% air channel output is represented as a 20mA signal and 100% output is represented as a 4mA signal Pilot Position: must be set higher than expected air channel pilot position (to be adjusted during tuning) All other settings: must be configured as required per local safety codes and appliance manufacturer specifications	Settings > Outputs > Aux  Settings > Outputs > Air 
O2 Sensor Input **(If required):** Settings > Inputs > Aux 2: Type: must be set to 4-20 4-20 Mode: must be set O2 Sensor 4-20 Low/High Trip Setpoint: As required per local codes and device/appliance manufacturer specifications. Settings > Proc Control > O2 Trim O2 Trim Mode: must be set to Disabled until after FARC tuning Warmup Mode/Time: must be configured in accordance with O2 sensor manufacturer specifications O2 Trim Proportional Band and Integral Time: should be kept at their respective default values to start. Adjustments can be made following FARC tuning. Target O2, High/Low Offset: must be configured in accordance with appliance manufacturer specifications. O2 Sensor units must be configured as Percent O2	Settings > Inputs > Aux 2  Settings > Proc Control > O2 Trim 

INPUT	CONFIGURATION SCREEN
Device Units: Airflow (if 4-20mA transmitter only): set per device specifications Aux Input configured as Air Channel: must be set to Percent Aux Input configured as O2 Sensor: must be set to Percent O2	Settings > Setup> OK Units 

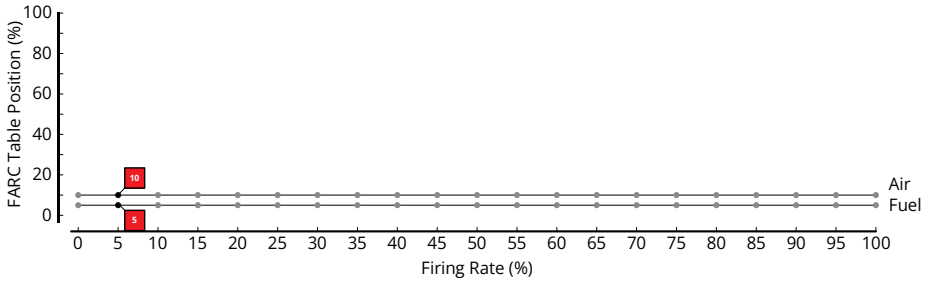
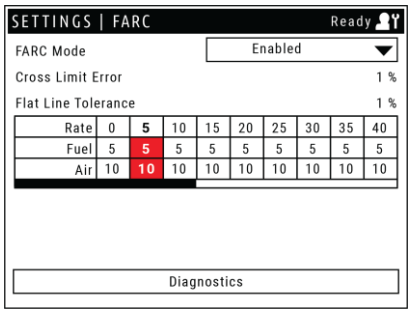
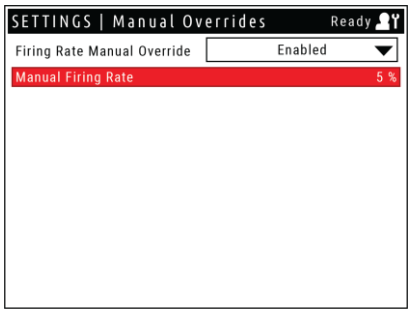
4.1.2 CONFIGURE GENERAL FARC SETTINGS

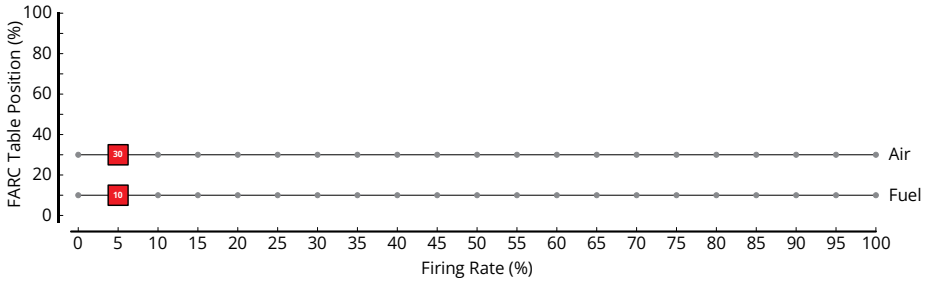
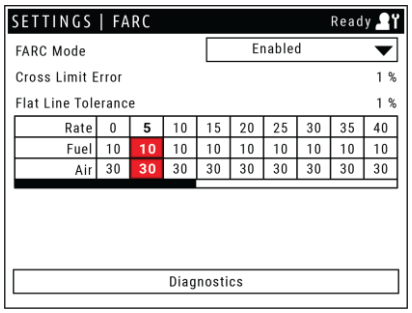
COMMISSIONING STEP	ASSOCIATED SYSTEM SCREEN
Enable FARC and set tolerances: Set FARC Mode to enabled Set Cross Limit Error and Flat Line Tolerance settings in accordance with design documentation, local safety codes and equipment manufacturer recommendations.	Settings > Proc Control > OK FARC 
In the 5% firing rate column of the FARC table, configure the air position to 100% and the fuel position to 0%: 	Settings > Proc Control > OK FARC 
Set the Minimum Firing Rate and Light Off Firing Rate: Set the Minimum Firing Rate to 0% Set the Light Off Firing Rate to 5% Note: "Firing Rate" in the case of FARC does not necessarily correspond to the rated firing rate of the appliance – rather it represents the operating range of the appliance while in a main fuel state.	Settings > Proc Control > OK Config 

4.1.3 TUNE SYSTEM FOR STABLE PILOT LIGHT OFF

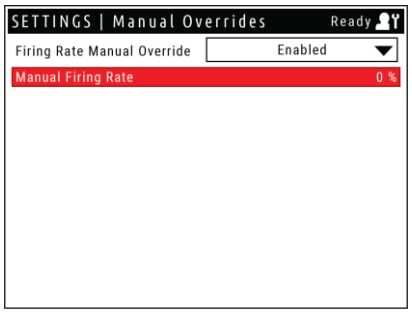
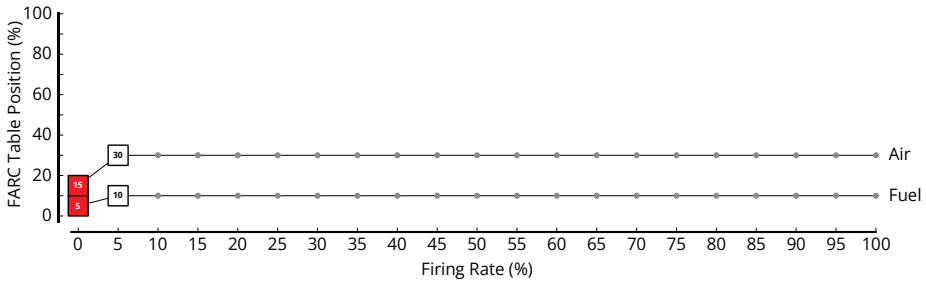
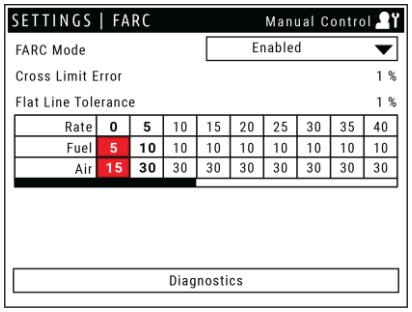
COMMISSIONING STEP	ASSOCIATED SYSTEM SCREEN
Keep system in Pilot for duration of pilot tuning: Following ignition, the system remains in pilot for the duration of the Pilot Startup Delay. Increase if necessary and return to original value following pilot tuning.	Settings > Proc Control > Timing 
Adjust fuel and air Pilot Position settings until successful pilot ignition and stability is achieved: • Adjust both fuel and air pilot positions until a stable pilot flame can be maintained. • Stop and restart the system to check ignition. • Repeat as necessary until pilot safely ignites and maintains stability.	Settings > Outputs > TCV  Settings > Outputs > Air 
Revert any changes made to the Pilot Startup Delay setting above: Ensure that any change made to the Pilot Startup Delay setting above is returned to its original value before proceeding to the next section.	Settings > Proc Control > Timing 

4.1.4 CONFIGURE FARC TABLE AT THE LIGHT OFF FIRING RATE

COMMISSIONING STEP	ASSOCIATED SYSTEM SCREEN
Copy Pilot Positions from pilot tuning section above into the 5% firing rate column of the FARC table: 	Settings > Proc Control > OK FARC 
Enable Firing Rate Manual Override and set the Manual Firing Rate to 5%.	Settings > Setup > OK Manual Overrides 
Start the system and monitor the following: • Pilot to main transition • Stack combustion analysis readings when in main	

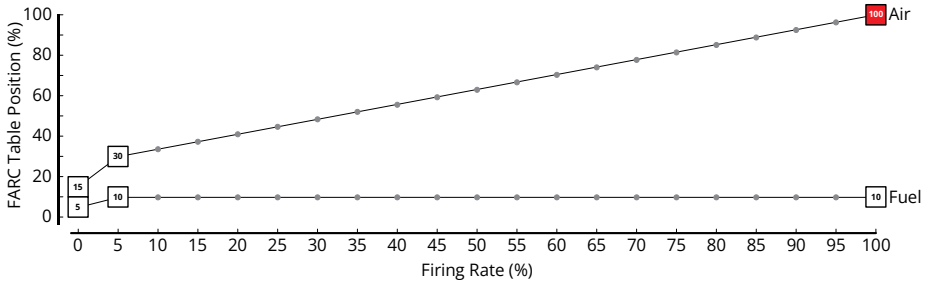
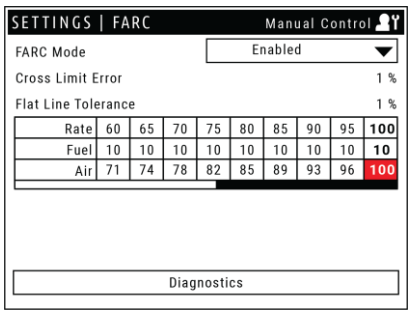
Stop the system
• Adjust the fuel and air positions in the 5% firing rate column of the FARC table
• Start the system and repeat above steps until the following are achieved:
  ○ Smooth pilot to main transition
  ○ Acceptable stack combustion readings per equipment manufacturer recommendations
 
	Settings > Proc Control > OK FARC
	 

4.1.5 CONFIGURE FARC TABLE AT THE MINIMUM FIRING RATE

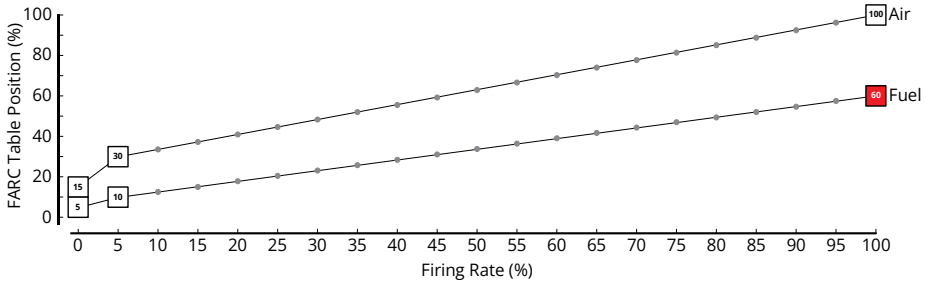
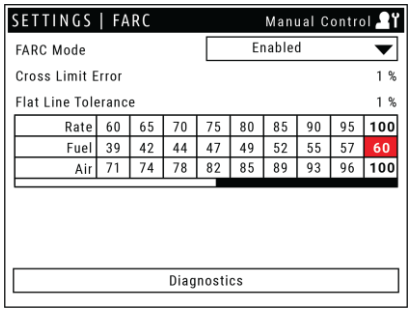
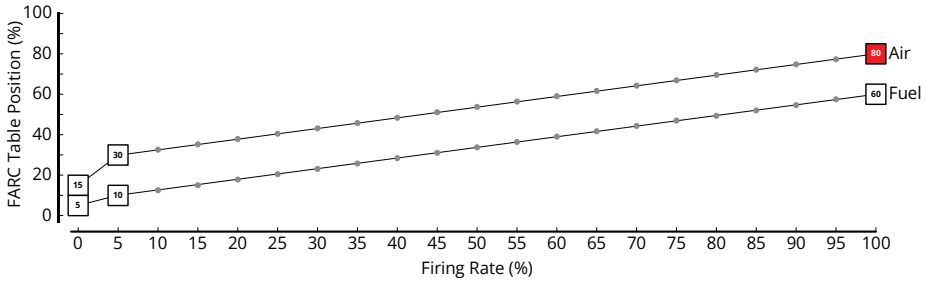
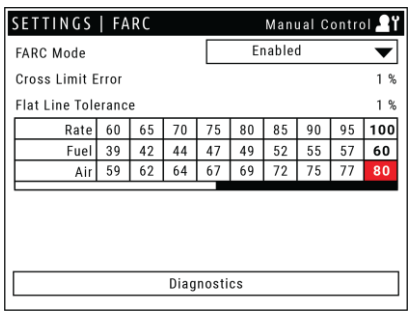
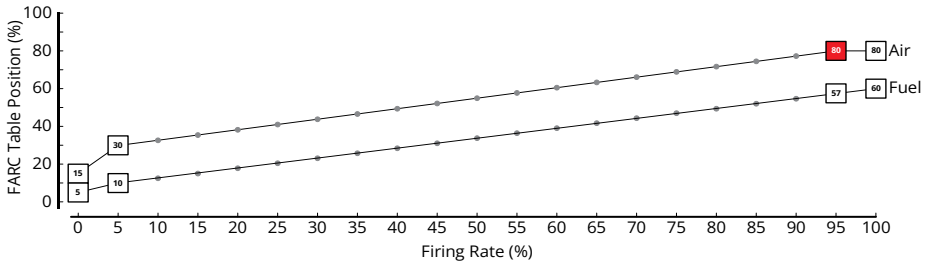
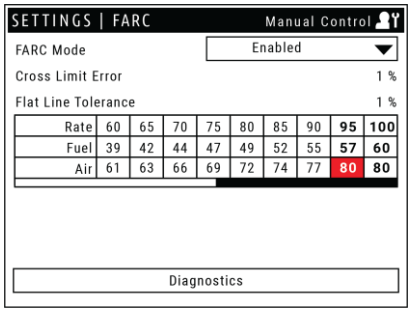
COMMISSIONING STEP	ASSOCIATED SYSTEM SCREEN
Set the Manual Firing Rate to 0%.	Settings > Setup > OK Manual Overrides 
Start the system and allow it to enter the Manual Control state: Monitor the stack combustion analysis readings	
Decrease the fuel and air positions in the 0% column of the FARC table: Set the fuel and air positions in the 0% column of the FARC table to their lowest possible values while maintaining the following: • Flame stability • Acceptable stack combustion readings per equipment manufacturer recommendations 	Settings > Proc Control > OK FARC 

Rate	0	5	10	15	20	25	30	35	40
Fuel	5	10	10	10	10	10	10	10	10
Air	15	30	30	30	30	30	30	30	30

4.1.6 CONFIGURE FARC TABLE AT THE MAXIMUM FIRING RATE

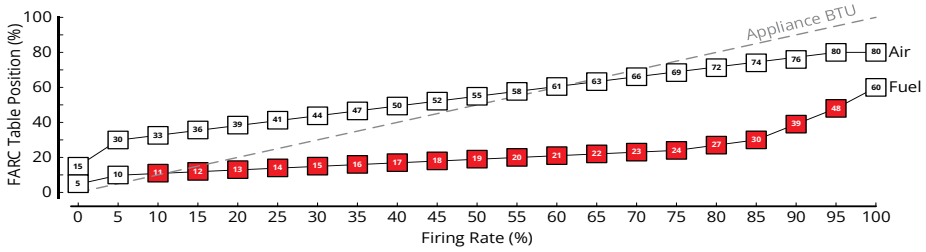
COMMISSIONING STEP	ASSOCIATED SYSTEM SCREEN
Set the air position to 100% in the 100% column of the FARC table: Keep the fuel channel flat across the entire table. 	Settings > Proc Control > OK FARC 

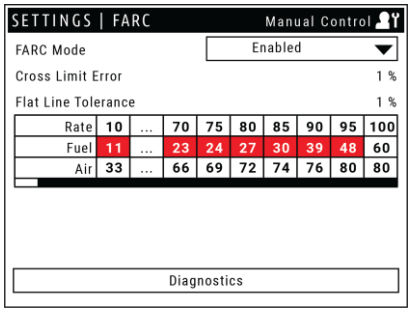
Rate	60	65	70	75	80	85	90	95	100
Fuel	10	10	10	10	10	10	10	10	10
Air	71	74	78	82	85	89	93	96	100

COMMISSIONING STEP	ASSOCIATED SYSTEM SCREEN
Slowly increase the Manual Firing Rate to 100%	Settings > Setup > Manual Overrides
Increase the fuel position in the 100% firing rate column of the FARC table until the appliance reaches its maximum BTU rating. Ensure regulators are set correctly so appliance ratings are not exceeded. 	Settings > Proc Control > FARC 
Decrease the air position in the 100% firing rate column of the FARC table until the stack readings indicate an acceptable fuel-air mix in accordance with appliance manufacturer recommendations 	Settings > Proc Control > FARC 
Adjust the air position in the 95% firing rate column of the FARC table to match the value configured in the 100% column in the step above: 	Settings > Proc Control > FARC 

4.1.7 CONFIGURE FUEL CHANNEL ACROSS ENTIRE TABLE

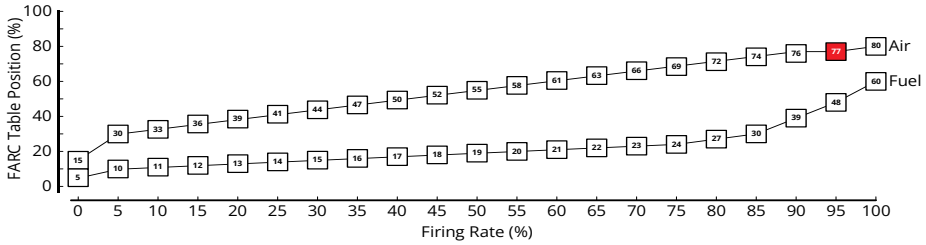
COMMISSIONING STEP	ASSOCIATED SYSTEM SCREEN
Adjust the fuel positions in unconfigured columns of the FARC table: Configure fuel positions with expected values such that appliance BTU increases linearly across the entire table – note that the fuel positions may not increase linearly.	Settings > Proc Control > FARC

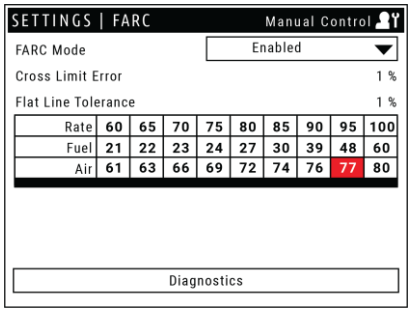




4.1.8 TUNE THE FARC TABLE BETWEEN 5% AND 95%

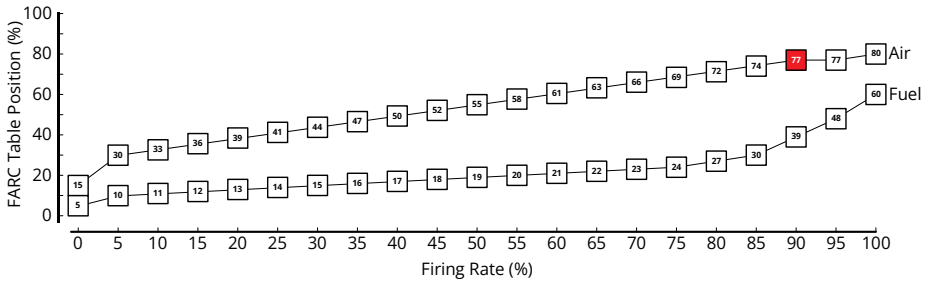
COMMISSIONING STEP	ASSOCIATED SYSTEM SCREEN
Set the Manual Firing Rate to 95%	Settings > Setup > Manual Overrides
Adjust the corresponding air channel position: Adjust until the stack readings indicate an acceptable fuel-air mixture in accordance with equipment manufacturer specifications.	Settings > Proc Control > FARC

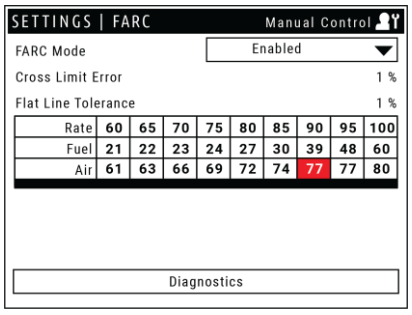


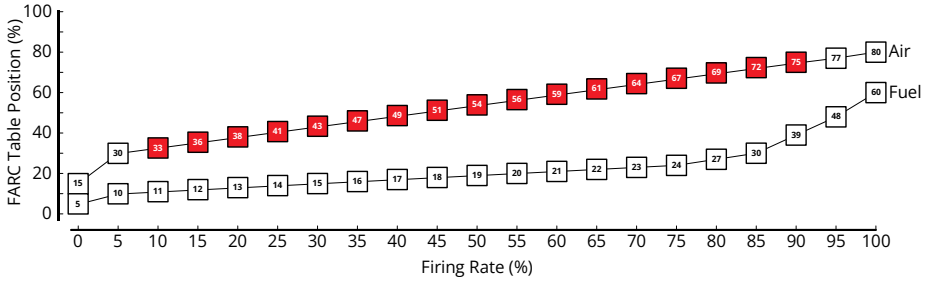
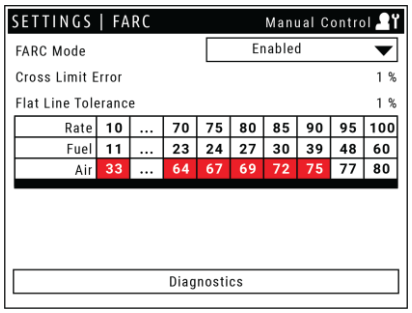


Copy air position value into adjacent FARC table column to the left.

Settings > Proc Control > FARC





COMMISSIONING STEP	ASSOCIATED SYSTEM SCREEN
Decrease the manual firing rate by 5% and repeat above steps: Continue until all remaining FARC table firing columns are configured 	Settings > Proc Control > FARC 

4.1.9 VALIDATE FARC TABLE

VALIDATION STEP	ASSOCIATED SYSTEM SCREEN
Set the Manual Firing Rate to 5% and start the system.	Settings > Setup > Manual Overrides
Increase the Manual Firing rate in 20% increments up to 100% and monitor the following: • Flame stability • Stack combustion analyzer readings	Settings > Setup > Manual Overrides
Decrease the Manual Firing rate in 20% increments down to 5% and monitor the following: • Flame stability • Stack combustion analyzer readings	Settings > Setup > Manual Overrides
Adjust fuel and air positions throughout the FARC table: Repeat the above steps as necessary until safe and smooth transitions are achieved in both directions	Settings > Proc Control > FARC
Repeat the above steps with ~30% increments.	Settings > Setup > Manual Overrides
Repeat the above steps with a jump from 5% to 100% and back.	Settings > Setup > Manual Overrides
Repeat all above steps: Continue until safe and smooth transitions are achieved for any size manual firing rate change in both directions.	
Disable Firing Rate Manual Override Firing Rate Manual Override should only be enabled during commissioning.	Settings > Setup > Manual Overrides

4.2 O_2 TRIM COMMISSIONING PROCEDURE

O_2 Trim must only be applied to a fully commissioned and tuned FARC system. Ensure that all previous steps mentioned in this guide are complete before enabling the O_2 Trim Mode setting (Settings > Proc Control > O2 Trim). Once enabled, monitor stack O2 readings across various firing rates and observe the system response across large changes in firing rate. Adjust O2 PID parameters (O2 Trim Proportional Band and Integral Time) as required to achieve stable responses to all firing rate changes.

5 TROUBLESHOOTING

ISSUE	CORRECTIVE ACTION
AL010: TCV Failed to Prove Pilot Position alarm	Ensure that fuel actuator is functioning and that the Pilot Position Timeout setting (Settings > Proc Control > Timing) is configured correctly.
AL011: Failed to Prove Airflow alarm	Ensure that air actuator and airflow proving device are functioning and that the Airflow Proving Timeout setting (Settings > Proc Control > Timing) is configured correctly.
AL012: TCV Failed to Prove Purge Position alarm	Ensure that fuel actuator is functioning and that the Purge Position Timeout setting (Settings > Proc Control > Timing) is configured correctly.
AL013: TCV Failed to Prove Light Off Position alarm	Ensure that fuel actuator is functioning and that the Light Off Position Timeout setting (Settings > Proc Control > Timing) is configured correctly.
AL158: FARC Enabled Without Feature Enabled alarm	Contact Profire. FARC and O2 Trim feature cannot be enabled in the field.
AL159: FARC Requires 4-20 Proof of Position alarm	Ensure that Proof of Position Input Type (Settings > Inputs > Proof Of Position) is set to 4-20.
AL160: FARC Requires 4-20 Air Input and Output alarm	Ensure both of the following conditions are met: 1. Aux In 1 or 2 (Settings > Inputs > Aux 1/2) 4-20 Mode and Type are configured as Air Channel and 4-20, respectively, and 2. Aux Out 1 or 2 Mode (Settings > Outputs > Aux) is configured as Air Channel.
AL161: FARC Table Requires Commissioning alarm	Ensure that the FARC Table (Settings > Proc Control > FARC) contains at least one configured point.
AL162: FARC Table Requires Positive Slope alarm	Ensure that all configured FARC points are greater than or equal to the points immediately to their left in the FARC table (Settings > Proc Control > FARC).
AL163: Too Many Air Inputs or Outputs alarm	Ensure that both the following conditions are met: 1. Only one of Aux In 1 or 2 (Settings > Inputs > Aux 1/2) is configured as an Air Channel feedback input. 2. Only one of Aux Out 1 or 2 (Settings > Outputs > Aux) is configured as and Air Channel output.
AL164: Air Aux In Requires Percent Units alarm	Ensure that Aux In Units setting (Settings > Setup > Units) for the Aux input configured as an Air Channel feedback input is set to %.
AL165: Air Input and Output Requires FARC alarm	Ensure that FARC Mode (Settings > Proc Control > FARC) is enabled.
AL166: Min Firing Rate Exceeds Light Off Firing Rate alarm	(Settings > Proc Control > Configuration) Ensure that the Minimum Firing Rate setting is below the Light Off Firing Rate setting.
AL167: Air Position Error alarm	Ensure air position actuator inputs and outputs are functioning and air channel output Position Error setting (Settings > Outputs > Air) is set correctly.
AL168: TCV Position Error alarm	Ensure fuel position actuator inputs and outputs are functioning and fuel channel output Position Error setting (Settings > Outputs > Fuel) is set correctly.
AL169: FARC Cross Limit Error alarm	Ensure air and fuel position actuator inputs and outputs are functioning and Cross Limit Error setting (Settings > Proc Control > FARC) is set correctly
AL170: FARC Requires Forced Draft Fan alarm	Ensure Fan Mode setting (Settings > Outputs > Valves / Fan) is set to Forced Draft.

ISSUE	CORRECTIVE ACTION
AL171: O2 Trim Requires FARC alarm	Ensure that FARC Mode (Settings > Proc Control > FARC) is enabled.
AL172: O2 Trim Requires 4-20 O2 Sensor alarm	Ensure that one of Aux In 1 or 2 (Settings > Inputs > Aux 1/2) 4-20 Mode and Type are configured as O2 Sensor and 4-20, respectively.
AL173: Too Many O2 Sensors alarm	Ensure that only one of Aux In 1 or 2 (Settings > Inputs > Aux 1/2) is configured as an O2 Sensor input.
AL174: O2 Sensor Requires %O2 Units alarm	Ensure that Aux In Units setting (Settings > Setup > Units) for the Aux input configured as O2 Sensor input is set to %O2 (Note: % and %O2 are different units).
AL175: O2 Trim Requires High Temp ESD Stack Temp alarm	Ensure Stack Mode setting (Settings > Temps > Stack) is set to High Temp ESD.
AL176: Target Percent O2 Below O2 Low Trip alarm	Ensure Target O2 setting (Settings > Proc Control > O2 Trim) is above the configured Low Trip Setpoint setting for the Aux input configured as an O2 Sensor input (Settings > Inputs > Aux 1/2).
AL177: Target Percent O2 Above O2 High Trip alarm	Ensure Target O2 setting (Settings > Proc Control > O2 Trim) is below the configured High Trip Setpoint setting for the Aux input configured as an O2 Sensor input (Settings > Inputs > Aux 1/2).
AL178: O2 Sensor Requires O2 Trim alarm	Ensure that O2 Trim Mode (Settings > Proc Control > O2 Trim) is not disabled.
AL179: Low Percent O2 alarm	Ensure that O2 Sensor is functioning and Aux In 4-20 Low Trip settings (Settings > Inputs > Aux In 1/2) for the aux input configured as an O2 Sensor input is configured correctly.
AL180: Air Failed to Prove Pilot Position alarm	Ensure that air actuator is functioning and that the Pilot Position Timeout setting (Settings > Proc Control > Timing) is configured correctly.
AL181: Air Failed to Prove Purge Position alarm	Ensure that air actuator is functioning and that the Purge Position Timeout setting (Settings > Proc Control > Timing) is configured correctly.
AL182: Air Failed to Prove Light Off Position alarm	Ensure that air actuator is functioning and that the Light Off Position Timeout setting (Settings > Proc Control > Timing) is configured correctly.
AL183: Stack O2 Temp Min Exceeds High Temp ESD alarm	(Settings > Temps > Stack) Ensure that the O2 Temp Minimum setting is below the stack High Temp Setpoint setting.
WN037: Firing Rate Manual Override Enabled warning	Ensure that Firing Rate Manual Override setting (Settings > Setup > Manual Overrides) is disabled when not actively commissioning the system.
WN038: O2 Trim at Limit warning	This warning indicates that the system is trimming O2 at its configured High Offset Limit or Low Offset Limit. Ensure all O2 Trim settings (Settings > Proc Control > O2 Trim) are configured correctly.
WN039: High Percent O2 warning	This warning indicates that the O2 sensor input is reading above its configured High Trip Setpoint. Ensure O2 sensor is functioning and O2 Sensor Aux input 4-20 High Trip Setpoint setting (Settings > Inputs > Aux In 1/2) is configured correctly.

6 VERSION HISTORY

DOCUMENT VERSION	RELEASE DATE	CHANGES
v1.1	08 MAY 2026	Branding update
v1.0	21 JUN 2022	Initial release for FD 3.0.4 firmware

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