GLOBAL FINISHING SOLUTIONS

Proven Control Panel

Operator Manual

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Read and keep this manual for future reference. All personnel operating the equipment described in this manual should review and understand all instructions before use.

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Introduction

About Global Finishing Solutions LLC

Leading the Industry in Paint Booth and Finishing System Technology

With decades of experience, Global Finishing Solutions is the leading manufacturer of paint booths and finishing systems for many industries, including automotive refinish, aerospace and defense, industrial manufacturing, woodworking, and large equipment. By combining high-quality components, strong relationships with paint manufacturers, and our experienced distribution network, GFS provides the best equipment and support to set your business up for success.

Contacting Global Finishing Solutions

General information

- Toll-free: 800-848-8738
- Fax: 715-597-2193
- Email: info@globalfinishing.com
- Online: www.globalfinishing.com

Technical support

- Toll-free: 800-848-8738
- Fax: 715-597-8818
- Email: techservices@globalfinishing.com

Parts and filters

- Toll-free: 800-848-8738
- Fax: 888-338-4584
- Email: parts@globalfinishing.com

Conventions used in this manual

This section describes how information is presented, organized, and referenced within this manual.

Safety notices

This manual uses the following standards to identify conditions related to safety hazards and equipment damage.

Table 1. Safety notices

Symbol	Description
DANGER	Indicates an imminent hazard that will result in death.
WARNING	Indicates a hazard that can result in serious personal injury or death.
CAUTION	Indicates a hazard that can result in personal injury.
NOTICE	Indicates a situation that can result in equipment or property damage, but poses no risk of personal injury.

Information notices

In addition to the safety notices described above, this manual uses a boldface keyword to identify certain other types of information.

Table 2. Information notices

Keyword	Description
NOTE	Denotes general information that provides additional context or guidance.
Important	Denotes information to which you should pay special attention.
Reference	Directs you to related content in a separate document.
Prerequisites	Specifies other tasks that must be completed or conditions that must exist before you perform the current task.
Scope	Describes limitations to the current task or conditions under which the task applies or does not apply to the procedure.

General safety

Follow all safety guidelines when assembling, operating, or servicing this product.

WARNING
There are inherent hazards associated with the operation and service of this equipment. For your personal safety, observe all safety information. Failure to observe these safety practices can result in personal injury or death.

WARNING
Operation and maintenance of this product must be performed properly by qualified personnel who observe the warnings in all documentation and notes provided with and on the product.

WARNING
Follow all general standards for installation and safety for work on installations. Follow all good practices for the proper use of lifting tackle and equipment. The use of protective equipment such as safety goggles and protective footwear must be considered.

WARNING
All persons who will operate, service, inspect, or otherwise handle this product must read and understand the safe operating practices, safety precautions, and warning messages in this documentation.

WARNING
The roofs of GFS equipment are not designed or intended to be walked upon or to support weight of any kind. As designed and manufactured, equipment roofs do not meet the minimum requirements of a safe walking and/or working surface under OSHA 1910.22. Under no circumstances should the roof be used by maintenance personnel or others for walking, standing, or storage of any kind. When necessary, roof access should be secured through the use of a properly supported platform that satisfies the minimum load requirements specified by ASCE 7 (Minimum Design Loads and Associated Criteria for Buildings and Other Structures) and ASCE 37 (Design Loads on Structures during Construction). Additionally, personnel should always utilize appropriate fall safety protocols when using an elevated platform. Use of the roof in a contrary manner may result in injury and/or death.

WARNING
Comply with OSHA and NFPA 86 guidelines and with all applicable local electrical, safety, and fire codes and standards.

WARNING
All ovens must comply with NFPA 86.

WARNING
All field wiring provided must comply with local codes or, in the absence of local codes, the National Electrical Code (NFPA 70).

WARNING
Electrical installation should be completed by a qualified electrician. Installation must meet all applicable national, state, and local electrical codes.

WARNING
Ensure that all electrical components are grounded to a central ground.

WARNING
Disconnect and lock out the main electrical service before installing, adjusting, or servicing the product.

WARNING
Guards and covers that prevent contact with electrically energized or moving parts are required and must not be removed or left open during operation.

WARNING
Local fire and building codes require fire protection. Check with local inspector authorities for requirements.

CAUTION
Read and save these instructions before attempting to assemble, install, operate, or maintain the product described. Protect yourself and others by observing all safety information. Failure to comply with instructions could result in personal injury and/or property damage. Retain these instructions for future reference.

CAUTION
This manual contains statements that relate to worker safety. Read this manual thoroughly and comply as directed. Operate this equipment in accordance with the guidelines set forth in this manual. It is impossible to list all potential hazards of this equipment. Instruct all personnel involved with this equipment in the safe conduct and operation of the system. GFS recommends that only qualified personnel operate and maintain this equipment.

CAUTION
Safety signs, panels, and labels that are normally affixed to the product must be replaced immediately if illegible or missing.

CAUTION
New or replacement parts that are installed during repair or maintenance must include all safety signs, panels, and labels as specified by the manufacturer. These must be affixed to the new or replacement parts as specified by the manufacturer.

CAUTION
Where applicable, use earplugs or take other safety measures for hearing protection.

NOTICE
Per NFPA 86, the product must be installed and serviced only by a trained, qualified service technician. Incorrect installation may void the warranty.

NOTICE
If you have questions about the warranty, please contact your distributor prior to contacting GFS.

Product safety

For oven safety information, refer to the documentation that accompanied your equipment.

NOTICE
The values shown on the screens are for illustrative purposes only and are not intended to be correct or accurate representations of times and temperatures.

Operator interface terminal

The Proven operator interface terminal provides a button to stop the Batch Process or Continuous Process Oven in the case of an emergency. Optionally, it may also include pushbuttons for start, stop, and standby; these can be mounted on the operator interface terminal or remotely.

The operator interface terminal also houses the HMI, which is a touchscreen used to monitor oven status and view or edit settings.

The operator interface terminal may be mounted on the outside of the oven or on a nearby wall.

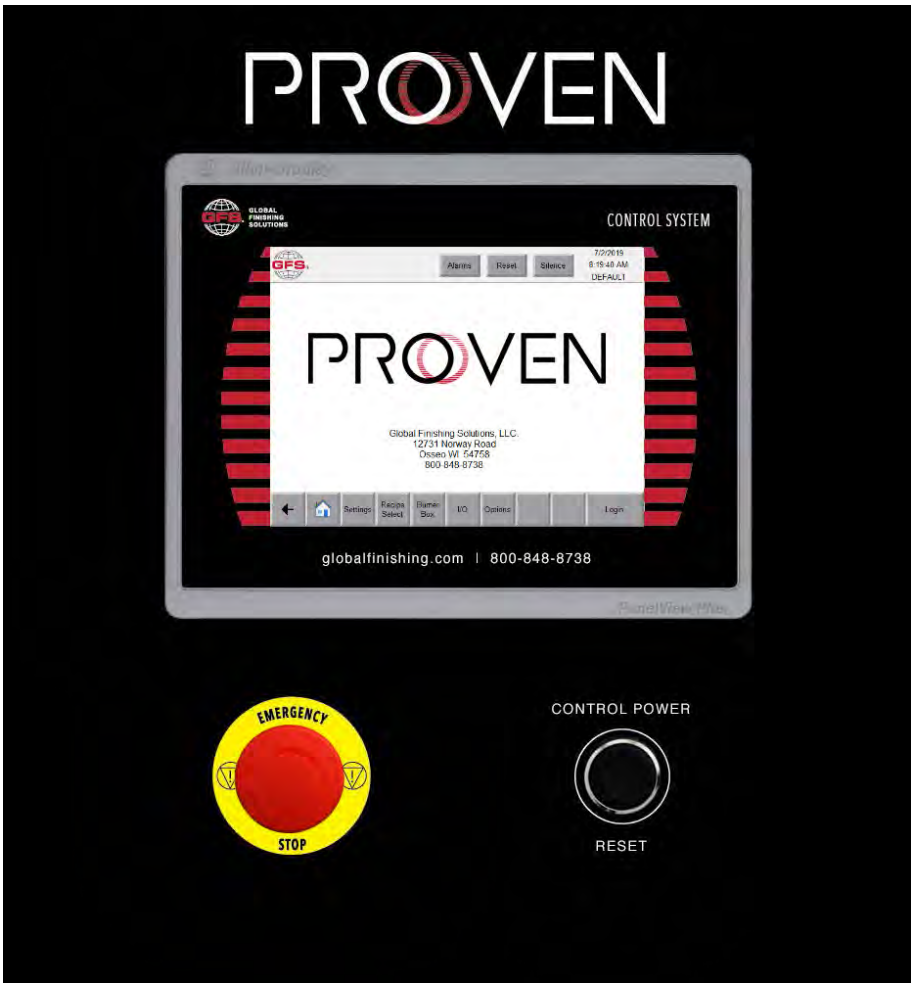


Figure 1. Operator interface terminal

Oven operating states

The HMI displays the oven's current operating state on the Overview screen. See Table 3 for more information about each oven state.

Table 3. Oven state banners

Mode	Description
	The oven is not configured correctly. Call GFS Technical Service for assistance (800-848-8738).
	The oven is off.
	All motors are starting and proving airflow. The PLC remains in the **Starting** state until the purge interlock requirements are met. If not met, the appropriate alarm notification will be raised.
	Air is purged out of the oven before the burners can start. A minimum of four complete air changes must be made prior to burner ignition. **NOTE** The remaining purge time is displayed on the main screen.
	The burner start output from the PLC is energized, enabling the flame relay and starting the flame ignition sequence. **NOTE** This typically takes less than 30 seconds to complete.
	The oven is purged and maintaining a low temperature as the oven awaits further operator input.

Mode	Description
	The oven runs at full temperature using the set cure configuration. **Batch Process Oven:** The oven runs a timed batch, switching into either **Standby** or **Shutdown** after the timer expires. **NOTE** If the oven is not running at the correct temperature, the timer will be paused (whether or not recipes are enabled). • *If recipe functionality was purchased:* The cure cycle continuously varies the cure cycle setpoints throughout the cycle according to the recipe. See “Viewing/editing recipe parameters” (page 31). • *If recipe functionality was not purchased:* The cure cycle runs at one consistent temperature for a set duration of time. **Continuous Process Oven:** The oven runs at the set temperature until an operator intervenes.
	As the oven switches from **Cure** to **Standby**, it passes through the **Post Cure Cool** state as the temperature is lowered to the set **Standby** temperature. If necessary, the oven may pass through the **Lighting Burner** state to achieve the correct temperature in **Standby**. Once the oven has reached the desired temperature, it switches to the **Standby** operating state. **NOTE** For a Batch Process Oven, the batch complete signal will be set at this time.
	The **Cool Down** state is displayed just prior to shutting down. If the oven is already below the maximum safe shutdown temperature, the **Cool Down** state is skipped. **NOTE** The burner is off as the oven is cooling down.
	The **Stopping** state is displayed while each of the oven’s motors are stopped in sequence.
	During the **Stop Delay** state, the fans must come to a full and complete stop before entering the **Off** state. This prevents the oven from restarting while the fans are spinning.
	**No Comms** is displayed on the HMI if communication to the control panel is lost.

Proven state diagram

The operation of the Proven control panel can be illustrated by its state machine. State machines are comprised of states (the operating state of the oven) and edges (the transition between states). The state machine can only be in one state at a time, and may only switch from one state to another if they are connected by an edge.

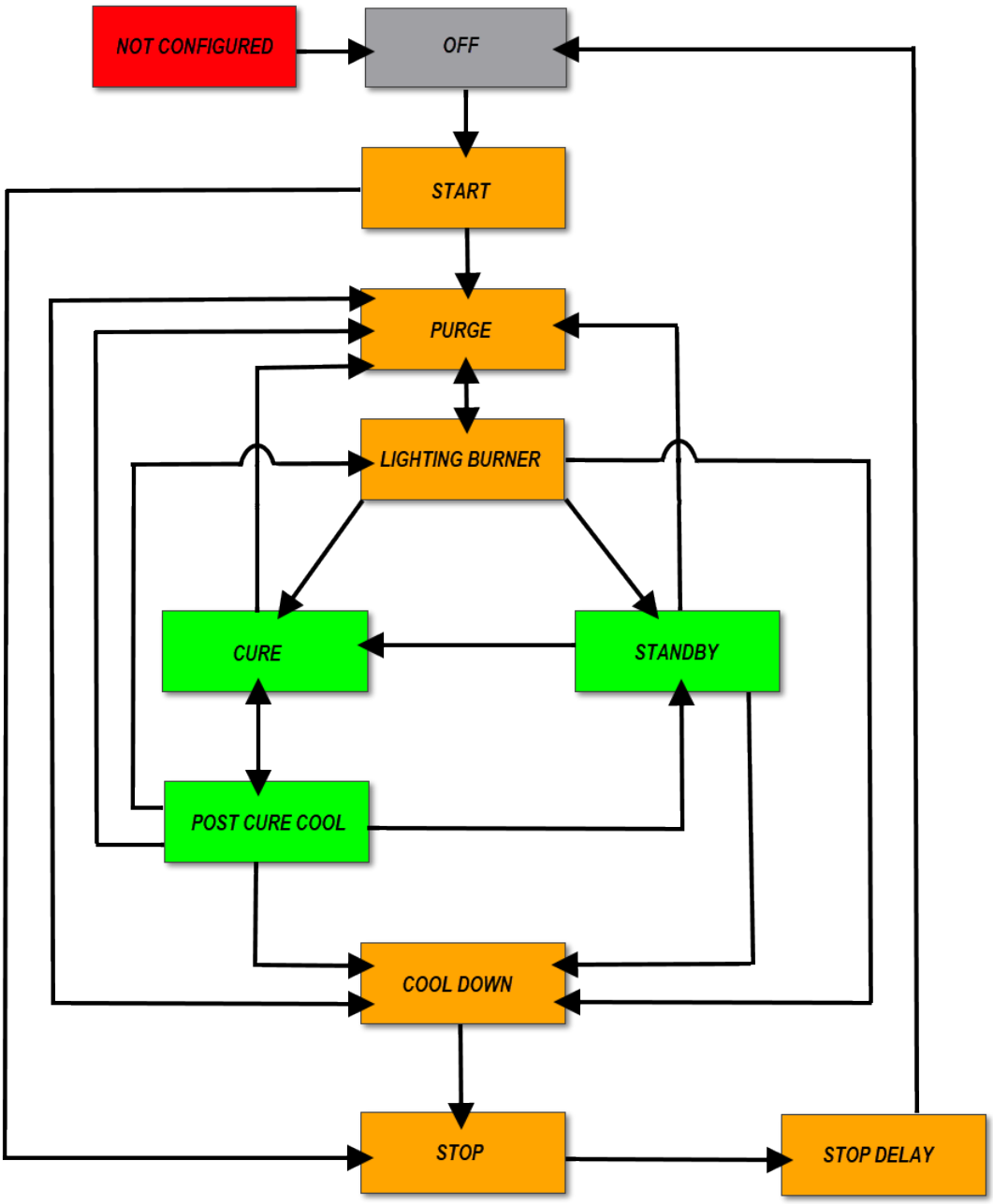


Figure 2. Proven state machine

Using the oven

This section describes how to use an oven that has Proven controls.

NOTICE
The values shown on the screens are for illustrative purposes only and are not intended to be correct or accurate representations of times and temperatures.

Starting the oven

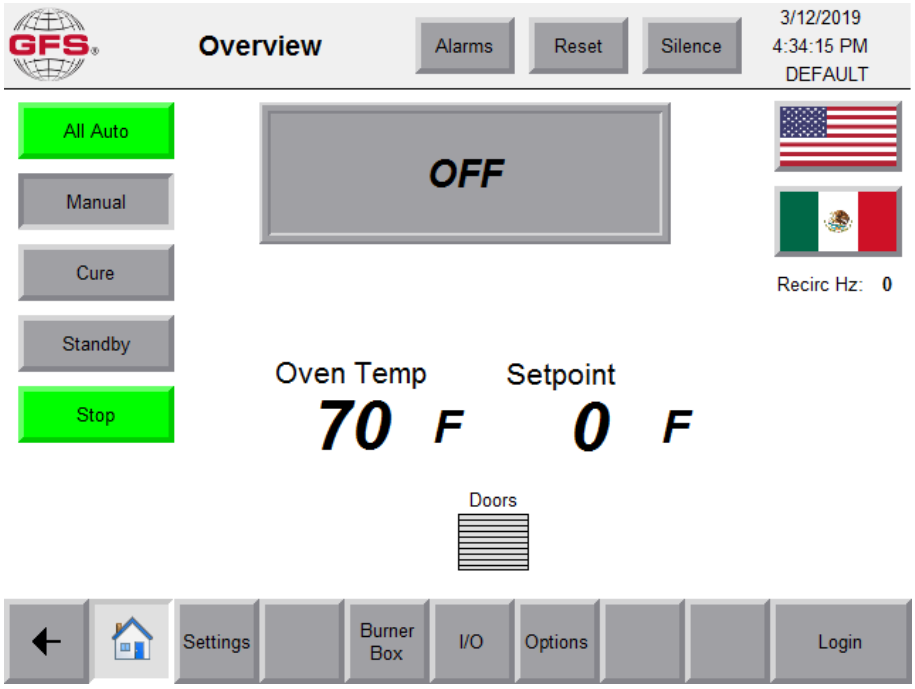
Perform the following steps to start the oven:

1. At the control panel, turn on the power by pressing **Control Power Reset**.

   Wait for the Proven splash screen to display on the HMI touchscreen.

2. On the touchscreen, tap the **Home** button.

   The oven powers up in the **Stop Delay** state, then transitions to **Off** after 60 seconds.



3. Ensure there are no active faults or warnings on the Overview screen. The oven is now ready for use.

   NOTE
   See “Alarm reset” (page 20) for information on troubleshooting and resetting active alarms.

4. Tap the **Cure** or **Standby** button to prepare the oven for a cure cycle.

   NOTE
   The banner in the center of the screen displays the current oven operating state.

Shutting down the oven

Tap **Stop** on the HMI to initiate oven shutdown.

The oven enters the shutdown sequence and the oven state banner displays each state on the Overview screen as the oven passes through.

NOTE
The shutdown sequence will vary depending on the setpoint(s), present operating state, settings, and oven configuration.

Emergency shutdown

In case of emergency, press the red **Emergency Stop** button to stop all equipment immediately.

NOTICE
Use of the Emergency Stop button can result in equipment damage and should be reserved only for emergencies.

If applicable: Interpreting the stack light

If a stack light is installed on your oven, you can use Table 4 to determine the oven's state without referring to the HMI.

NOTE
Different types of stack lights may be purchased with the equipment. The colors and their meanings may vary.

Table 4. Oven mode identification with a stack light

Color	Interpretation
Flashing Red	New fault
Red	Acknowledged fault
Flashing Amber/Blue	Purging
Amber/Blue	In cure mode
Flashing Green	Fan is ramping up
Green	Fan has reached the operating RPM

Proven HMI

The touchscreen provides useful information, including the screen name, current user, time, and alarm information.

The banners at the top and bottom of the screen also provide navigation buttons. These buttons remain on the screen unless you are working in a sub-menu or viewing a large pop-up dialog box.

NOTE
Tapping the GFS logo on the left side of the top banner will return you to the splash screen.

A: *Return to Splash screen*
B: *Date*
C: *Time*
D: *Access level*

Upper navigation buttons

The following navigation buttons are located at the top of the screen:

- **Alarms:** See “Alarms” (page 19).
- **Reset:** See “Alarm reset” (page 20).
- **Silence:** See “Alarm silence” (page 20).

Alarm types

Tap the **Alarms** button to navigate to the Alarms screen. From there, you can view details about current and past alarms, reset alarms, and clear alarm history. When alarm conditions occur, the color of the Reset and Silence buttons may change, depending on the type of alarm.

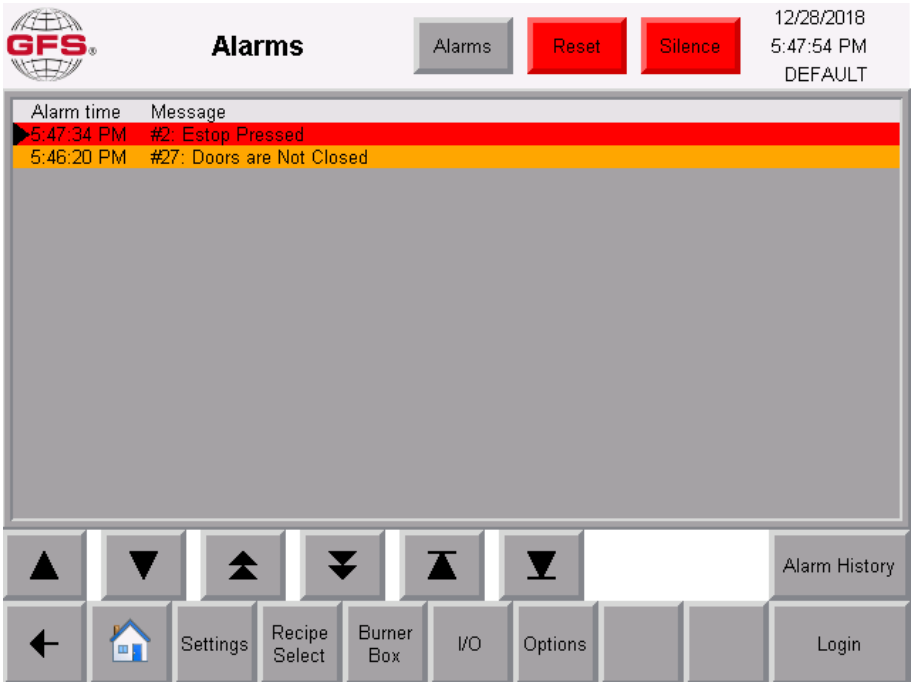
- Red indicates a **fault**. Faults are the most severe type of alarm. Faults immediately shut down the process and require a reset.
- Orange indicates a **warning**. Warnings are less severe than faults, but still indicate that something is wrong. Warnings do not shut down the oven, but may prohibit or limit the operation of equipment. Occasionally, warnings may correct themselves. If they do not self-correct, the warning will persist. Most warnings do not require a reset.

Table 5. Identifying alarm conditions

Button Color	Alarms Button	Reset Button	Silence Button
Gray	Always solid gray	No alarms	No new alarms
Orange		Indicates an existing warning	Indicates a new warning
Red		Indicates an existing fault	Indicates a new fault

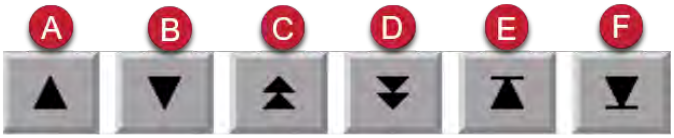
Alarms

The Alarm screen displays active alarms and provides access to the Alarm History screen.



Each alarm contains the date and time the alarm occurred, a short message identifying the alarm, and an alarm code. The alarm code can be used to reference specific information about the possible causes and suggested troubleshooting actions.

Use the navigation buttons to maneuver the alarm selection arrow.



A: *Alarm up*
B: *Alarm down*
C: *Page up*
D: *Page down*
E: *First alarm*
F: *Last alarm*

For guidance on troubleshooting faults and warnings, see “Troubleshooting” (page 60).

Alarm reset

The Reset button changes color to indicate the status of system alarms. See “Alarm types” (page 18) to determine if the alarm was caused by a fault or a warning.

1. Tap the **Reset** button to acknowledge and remove active alarms.

   NOTE
   If faults reoccur, see the information in “Troubleshooting” (page 60) to correct the issue. If faults continue after troubleshooting, call GFS Technical Service for assistance (800-848-8738).

2. Tap the **Alarms** button to view alarm information.

Alarm silence

The Silence button acknowledges the new alarm and silences the horn activated by an alarm (if present). See “Alarm types” (page 18) to determine if the alarm was caused by a fault or a warning.

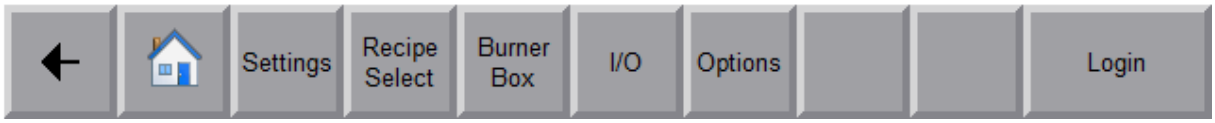
1. Tap the **Silence** button to acknowledge the new alarm and silence the horn (if present).

   NOTE
   Some warnings and faults cannot be silenced.

2. Tap the **Alarms** button to view alarm information.

Lower navigation buttons

The following navigation buttons are located at the bottom of the screen:



- **Back:** Tap to return to the previous screen.
- **Home:** See “Overview screen” (page 22).
- **Settings:** See “Settings screen” (page 23).
- **Recipe Select:** See “Recipe Select screen” (page 26).

  NOTE
  The Recipe Select button is only visible if recipe functionality was purchased with the oven.
- **Burner Box:** See “Burner Box screen” (page 36).
- **I/O:** See “Expansion and Burner Box I/O screens” (page 53).
- **Options:** See “Options screen” (page 58).
- **Login/Logout:** See “Login/logout” (page 28).

Overview screen

The Overview screen displays the factory-set options included in the system as well as the oven state.

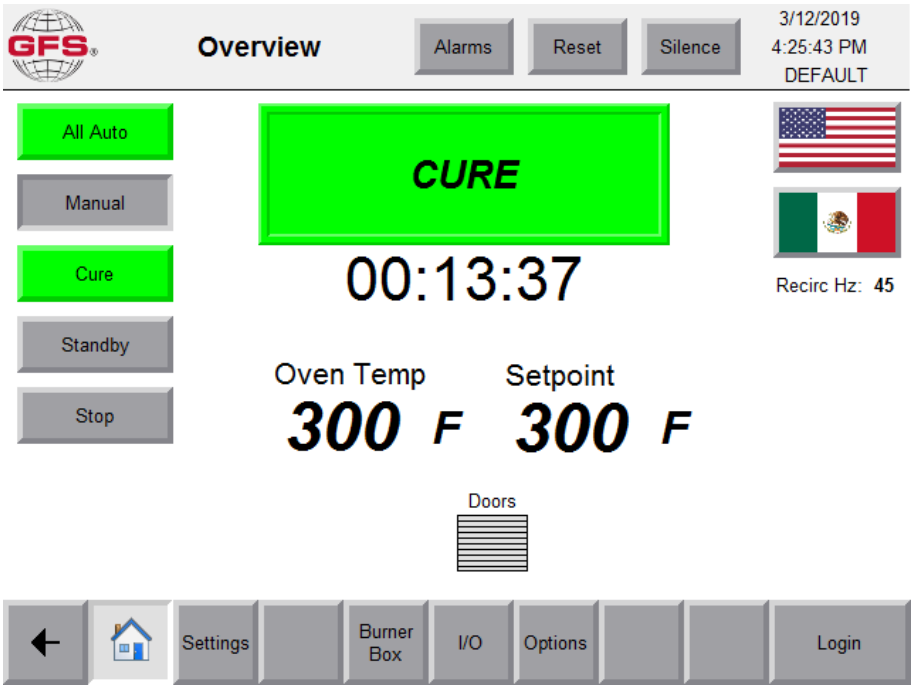


Table 6. Oven modes

Displayed Text	Description
Cure (Operating State Banner)	The Overview screen displays the oven's current operating state, as well as the time remaining in that state. In the image above, the banner shows that the oven is in cure mode. **NOTE** See “Oven operating states” (page 11) for a full list of oven operating states.
All Auto	Tap the **All Auto** button to put the oven into automatic mode. The button displays as green when any device in the oven is in automatic mode and gray when all devices in the oven are in manual mode. **NOTE** Make sure the oven is in automatic mode before pressing **Cure** or **Standby**.
Manual	Tap the **Manual** button to put the oven in manual mode. Manual mode is only selectable and adjustable only when the user is logged in at the maint user level or higher. The button displays as yellow when any device in the oven is in manual mode and gray when all devices in the oven are in automatic mode.
Cure	Tap the **Cure** button to initiate a cure cycle. **NOTE** If recipes are enabled, the operator can initiate the recipe in the recipe buffer by tapping **Cure**. **NOTE** A purge cycle may be required prior to burner ignition.
Standby	Tap the **Standby** button while a cure cycle is running to put the oven into the Post Cure Cool-down state until it reaches the defined standby temperature.

Displayed Text	Description
Stop	Tap the **Stop** button at any time to initiate the controlled stop sequence.

Table 7. Oven temperatures and setpoint

Displayed Text	Description
Oven Temp	Displays the current temperature inside the oven.
Setpoint	Displays the cycle setpoint. **NOTE** A setpoint of zero is displayed if no setpoint is selected.
• Heating to Setpoint • Cooling to Setpoint • Batch Complete	System updates (if present) will be displayed as one of the options in the left-hand column. **NOTE** System updates only pertain to Batch Process Ovens.

Table 8. Oven doors

Displayed Text	Description
Doors 	The Door button displays the status of the door and displays orange when open. **NOTE** Oven door buttons and indicators only pertain to ovens with optional door switches.

Table 9. VFD frequencies and recipes

Displayed Text	Description
Exhaust Hz	Displays the exhaust VFD frequency, if applicable.
Recirc Hz	Displays the recirc VFD frequency, if applicable.
Active Recipe	Displays which recipes is loaded into the active recipe buffer, if applicable.

Table 10. Language icons

Displayed Icons	Description
American Flag	Tap the **American Flag** icon to set the HMI to display in American English.
Mexican Flag	Tap the **Mexican Flag** icon to set the HMI to display in Spanish.

Settings screen

The Settings screen contains operator information and the ability to configure setpoints, the shutdown sequence, and control over the oven's cure settings.

Settings screen with recipes disabled

The settings shown in the image below will appear on the Settings screen if the oven does **not** have recipes enabled.

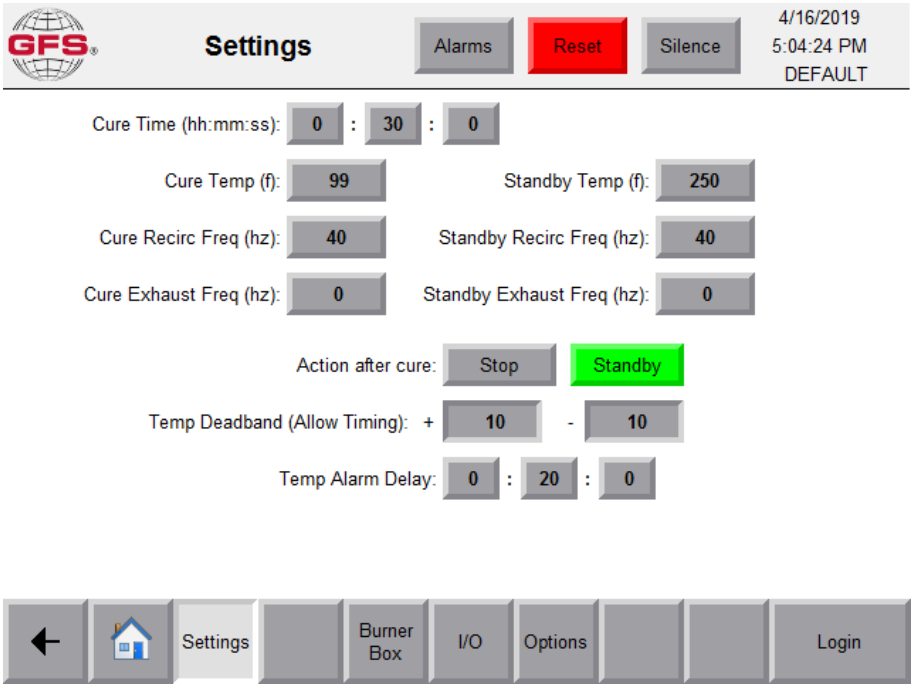


Figure 3. Settings screen with recipes disabled

Table 11. Settings on an oven with recipes disabled

Displayed Text	Description
Cure Time	The duration of the batch cure time, which times how long the oven must remain at the desired temperature. **NOTE** Warm up and cool down times are not included.
Cure Temp	The desired oven temperature during the cure cycle.
Standby Temp	The desired oven temperature during standby mode.
Cure Recirq Freq	The desired recirculation frequency during the cure cycle.
Cure Exhaust Freq	The desired exhaust frequency during the cure cycle if optional exhaust VFDs are used.
Standby Recirc Freq	The desired recirculation frequency during Standby mode.
Standby Exhaust Freq	The desired exhaust frequency during Standby mode.
Action after cure	After a successful batch cure cycle, the oven enters Off or Standby automatically. Continuous Process Ovens remain in cure until the operator intervenes.
Temp Deadband (Allow Timing)	The oven operates below the upper operating range and above the lower operating range to be considered "at temperature." Once the oven is at temperature, the cure cycle timer will commence.
Temp Alarm Delay	The amount of time the oven is allowed to heat up and reach its setpoint within the temperature deadband. If the set alarm delay time is exceeded, an alarm will be raised to alert the operator.

Settings screen with recipes enabled

The settings shown in the image below will appear on the Settings screen if the oven **has** recipes enabled.

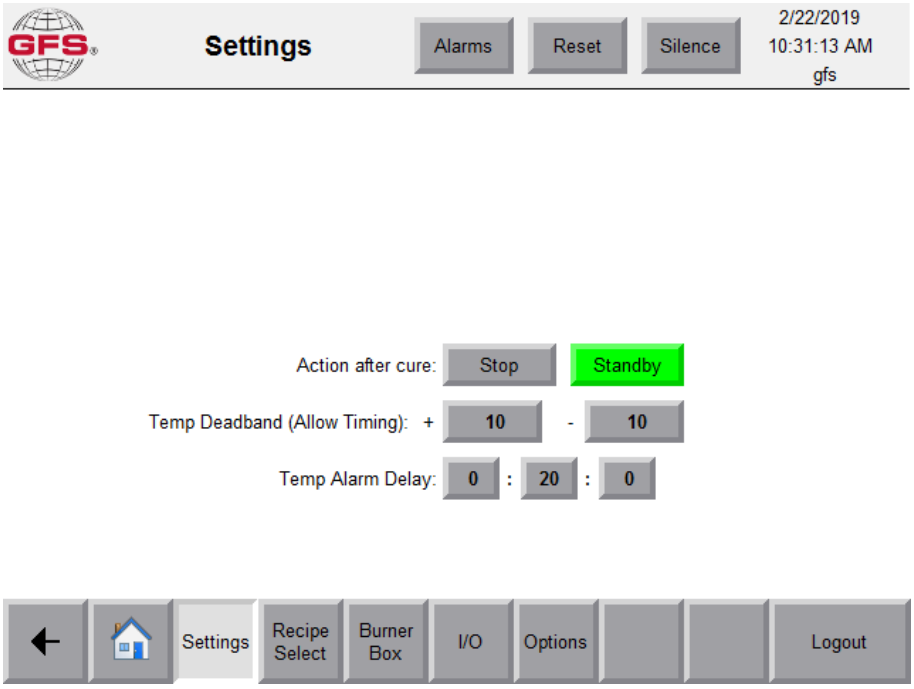


Figure 4. Setting screen with recipes enabled

Table 12. Settings on an oven with recipes enabled

Displayed Text	Description
Action after cure	After a successful batch cure cycle, the oven enters Off or Standby automatically. Continuous Process Ovens remain in cure until the operator intervenes.
Temp Deadband (Allow Timing)	The oven operates below the upper operating range and above the lower operating range to be considered "at temperature." Once the oven is at temperature, the cure cycle timer will commence.
Temp Alarm Delay	The amount of time the oven is allowed to heat up and reach its setpoint within the temperature deadband. If the set alarm delay time is exceeded, an alarm will be raised to alert the operator.

Recipe Select screen

The Recipe Select screen allows you to initiate an oven recipe or add/edit oven recipes. Up to 49 recipes may be entered into the Proven control panel.

For information on adding and editing recipes, see “Viewing/editing recipe parameters” (page 31).

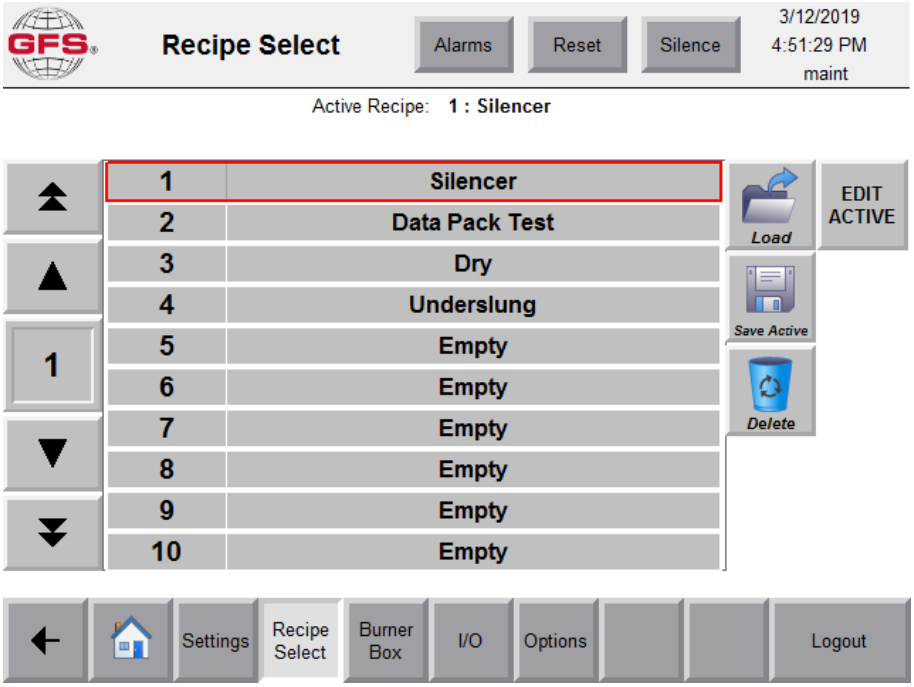


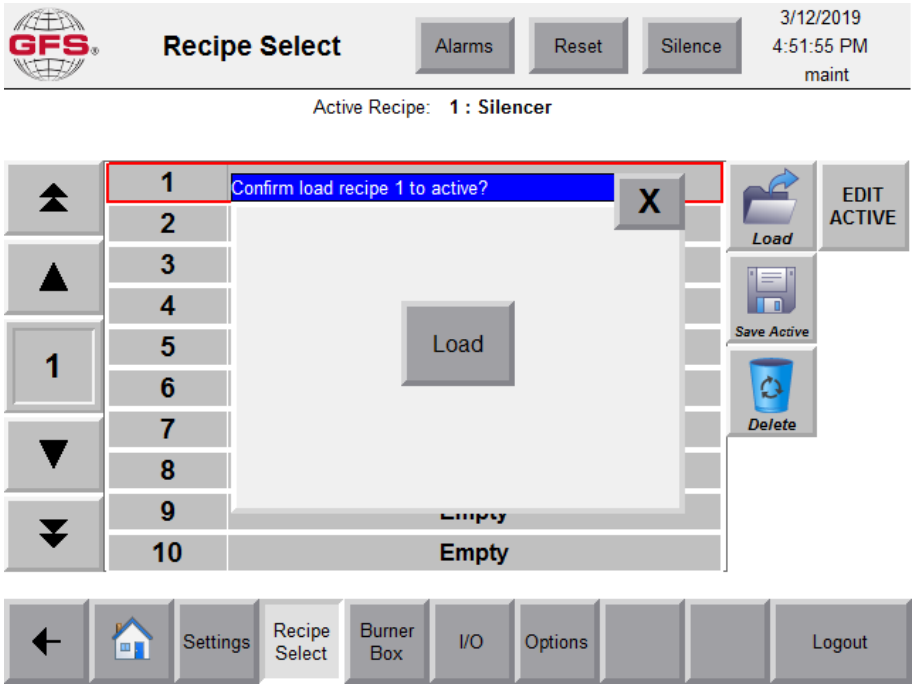
Figure 5. Recipe Select screen

1. Highlight the desired recipe:

   NOTE
   The recipe is highlighted when it is outlined in red, as shown in Figure 5. The number of the highlighted recipe also displays in the box on the left side of the screen.

   - Tap the **Up** or **Down** arrows to move the selector up or down one increment.
   - Tap the **Page Up** or **Page Down** double navigation arrows to access the next page or previous page of recipes.
   - Tap the recipe.

2. Tap the **Load** button. The confirm recipe load popup appears.



3. Tap the **Load** button to confirm.
4. The loaded recipe will display at the top of the touchscreen to copy the selected recipe into the recipe buffer.

NOTE
With the recipe in the recipe buffer, the operator must tap the **Cure** button on the Overview screen or press the optional Cure pushbutton to run the recipe.

NOTE
After the recipe is complete, the oven will automatically return to the Standby temperature.

Maintenance privileges

The maintenance-level operations within Proven controls provide access to various configuration and troubleshooting parameters.

NOTE
Some parameters may be password-protected and may not be available to operators.

Login/logout

Use the Login/Logout button to enter the desired account credentials or log out a previous user.

NOTE
The features within the “Maintenance privileges” (page 28) and “Advanced privileges” (page 35) sections require a login and password.

1. Tap the **Login** button in the lower navigation menu. A popup appears.
2. Select the access level and enter your password.
3. Tap **Login**.

Table 13. Access levels and default login information

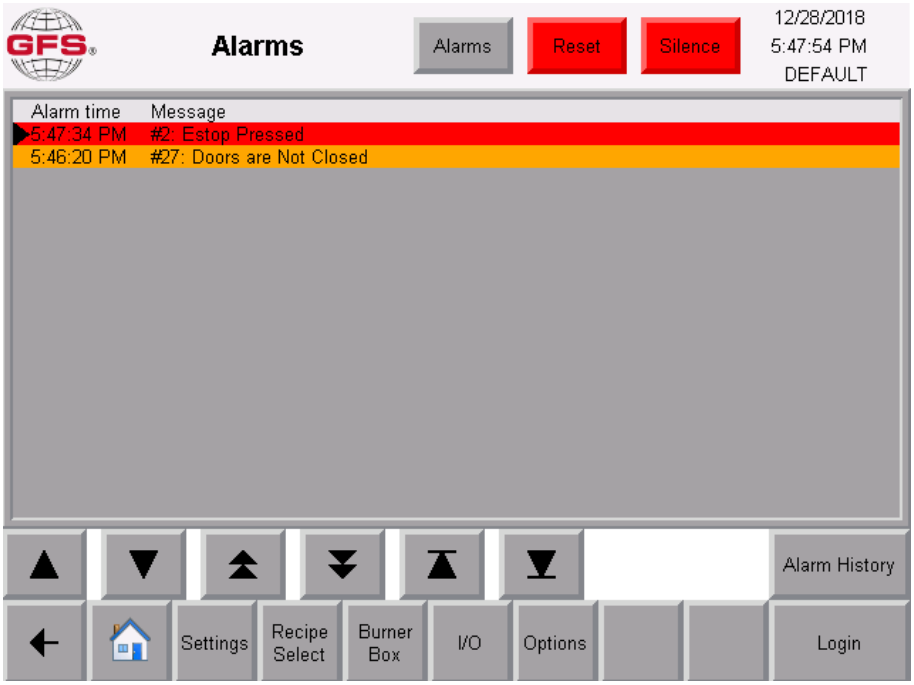
Account	Password	Access Level
DEFAULT	N/A	Basic Operations
maint	maint	Operate
supervisor	supervisor	Setpoints
tech	tech	Operate/Setpoints

Alarm history

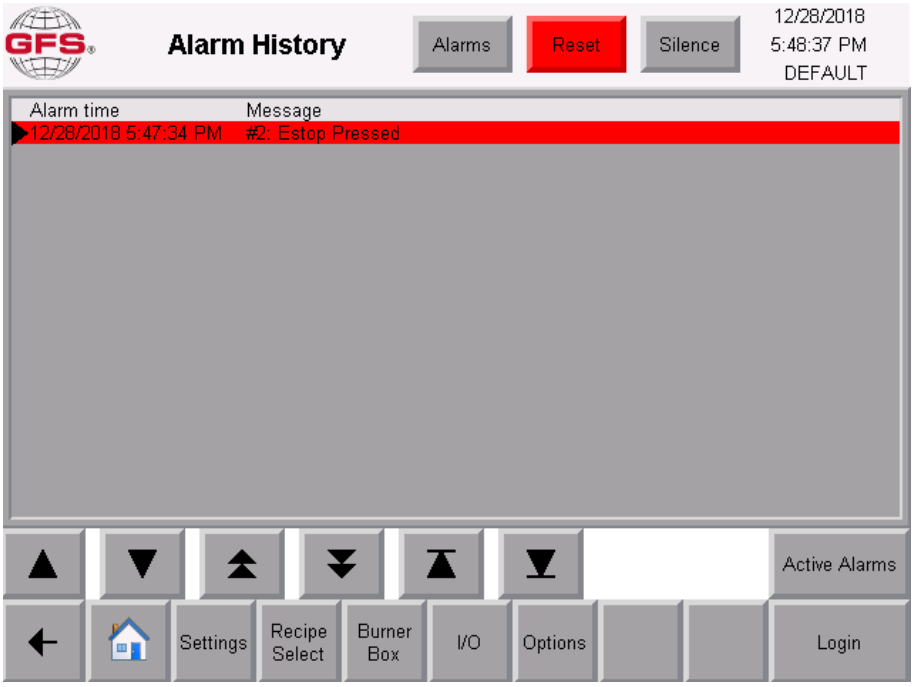
The Alarm screen displays active alarms and provides access to the Alarm History screen.

Each alarm contains the date and time the alarm occurred, a short message identifying the alarm, and an alarm code. The alarm code can be used to reference specific information about the possible causes and suggested troubleshooting actions.

1. To access a historical record of alarms, tap the **Alarm History** button.



2. Review historical alarms, using the up and down arrows to scroll through the list.



3. To return to the Alarms screen, tap the **Active Alarms** button.

Viewing/editing recipe parameters

The control panel allows you to create up to 49 pre-configured recipes for Batch Process Ovens. This section describes how to determine if recipes are enabled, select and use a recipe, and update recipe settings.

NOTE
The recipe feature is not available on Continuous Process Ovens.

Recipe status

To determine if recipes are enabled/configured on a Batch Process Oven:

- Tap **Home** from the lower navigation menu. If there is an active recipe, its identifying number and/or configured name will be visible in the lower left of the Overview screen.
- Tap **Recipe Select** from the lower navigation menu. Configured recipes will be listed and available to run.

  NOTE
  If the Recipe Select button is gray, recipes are not enabled on the oven.

NOTE
If recipes are not enabled, enter the cycle temperature and time on the Settings screen.

Recipe setup and updates

Recipes allow you to customize your cure cycle by specifying the temperature and recirc frequency for each step, as well as the duration of time between each step.

The Proven control panel can have up to 49 recipes, each with a maximum of ten steps with nine time spans between them.

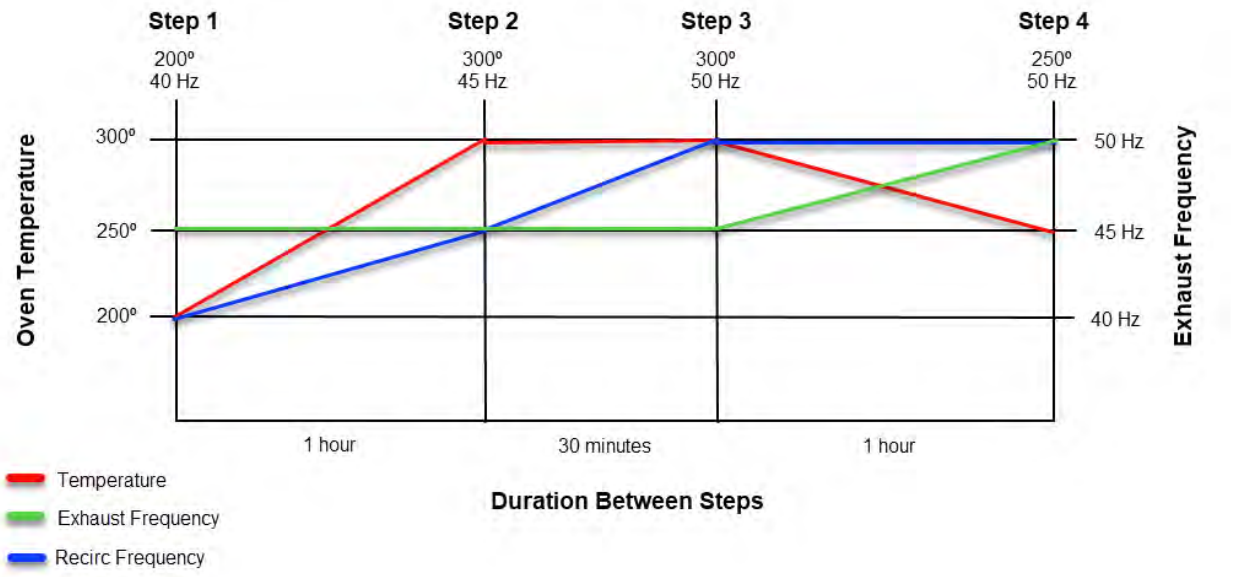


Figure 6. Recipe interpolating example

NOTE
If at any point the oven's temperature is not within tolerance of the setpoint, the master timer pauses until the temperature catches up to the setpoint. During this time, the oven ramps up as fast as possible within the parameters of the PID tuning and the segment duration will be extended.

1. To access the Recipe Select screen, tap the **Recipe Select** button in the lower navigation menu on the touchscreen.
2. From the Recipe Select screen, tap the **Up/Down** or **Page Up/Page Down** arrows until the desired recipe is highlighted.

   Recipes that have not yet been configured display as **Empty**.
3. Tap the **Edit Active** button.
4. Add the recipe parameters described below for the desired number of steps and time spans.

   NOTE
   Recipes can be configured on equipment without VFDs; however, only duration and cure temperature may be set.

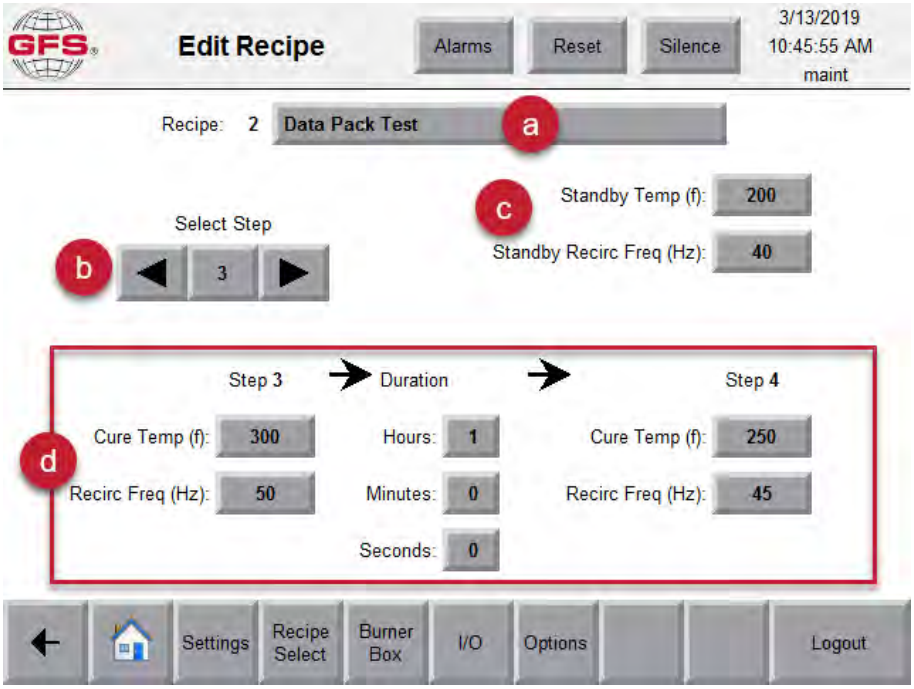
   a. Name (or rename) the recipe.

   b. Use the left and right arrow buttons or enter the desired number to select the step.

c. Set the **Standby Temp** and **Standby Recirc Frequency**.

d. Set the cure temperatures and recirc frequencies for the desired step and the duration.

e. Repeat steps b-d for each step.



5. Update the recipe settings as shown in Table 14:

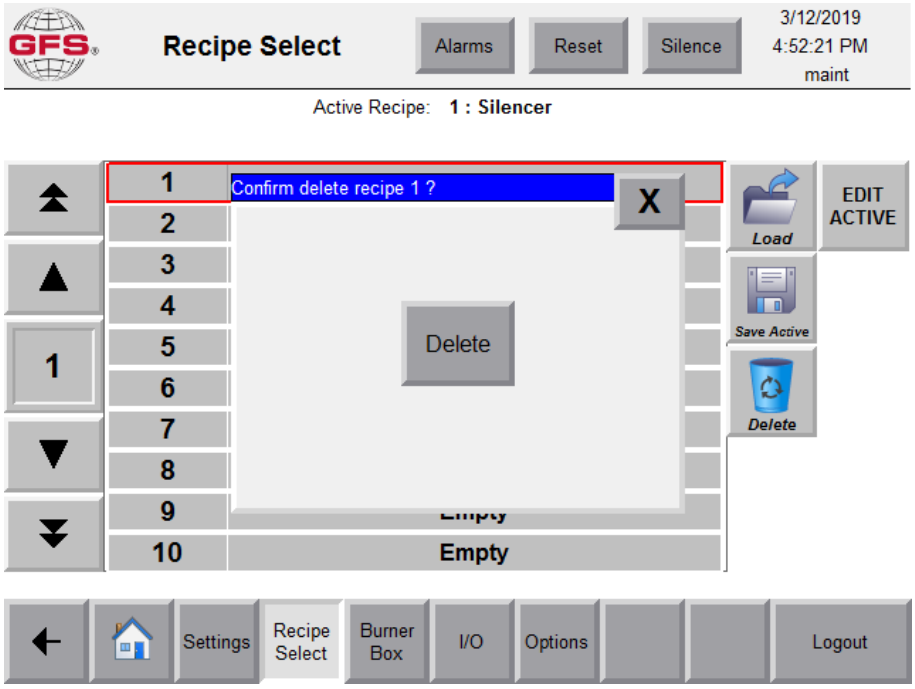
Table 14. Batch Process Oven recipe parameters

Displayed Text	Displayed As	Description
Cure Temp (f)	Setpoint	Desired temperature for each step.
Recirc Freq (Hz)	Setpoint	The value (shown in Hertz) is set frequency of the recirc fan on the VFD.
Duration	Setpoint	The value (shown in hours, minutes, and seconds) is the amount of time it will take to get from one step to the next. During this time, the cure temperature and recirc frequency adjust from the values set in one step to the values set in the next step. **NOTE** To indicate when a recipe should stop running, set the hours, minutes, and seconds fields in the duration column to zero. After the setpoints in the previous step are reached, the oven will automatically switch to **Cool Down** or **Standby**.

6. After the recipe has been configured, tap the **Save Active** button.

Deleting a recipe

1. Access the Recipe Select screen and tap the **Up/Down** or **Page Up/Page Down** arrows until the recipe you want to delete is highlighted.
2. Tap the **Delete** trash icon.
3. In the Confirm delete recipe popup, tap **Delete**.



Advanced privileges

The advanced settings on the Proven control panel include several screens that allow technicians to make specific changes to the way the oven operates. These screens are password-protected, and alterations require the assistance of a GFS Technical Services Representative.

Burner Box screen

Access the Burner Box screen:

1. Tap the **Burner Box** button in the lower navigation menu.
2. Tap the **Burner Box #** button to select the burner box screen you would like to monitor.

   NOTE
   This selection is only available if your oven has more than one burner box installed. Burner boxes are enabled in the Proven control panel to correspond with the hardware installed with your oven.

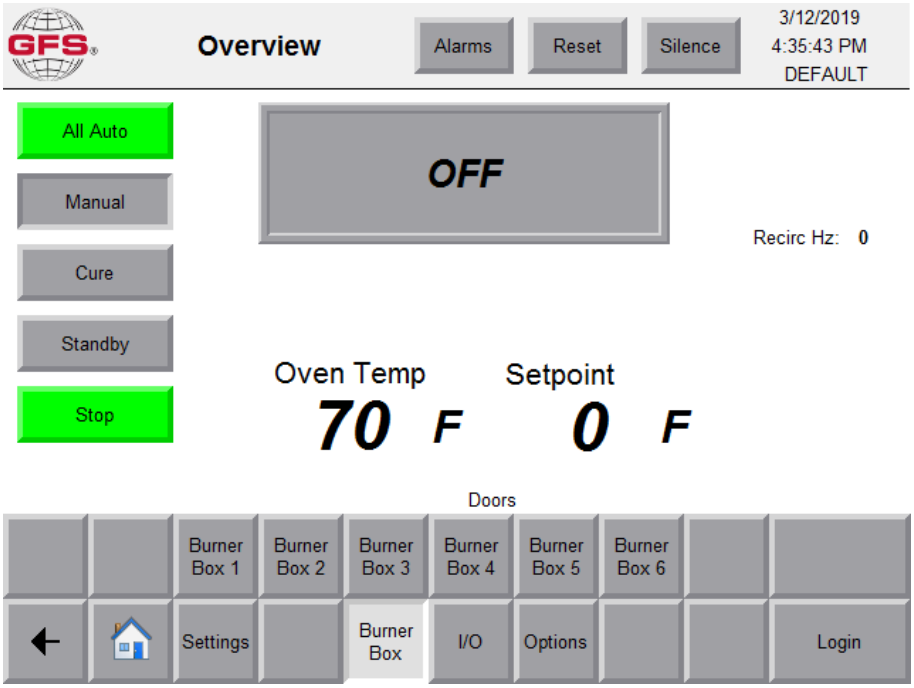


Figure 7. Burner box selection menu

NOTE
When running and operating properly, the burner box component icons display as green. For more information on the color scheme used throughout the Proven control panel, see “Program norms and conventions” (page 68).

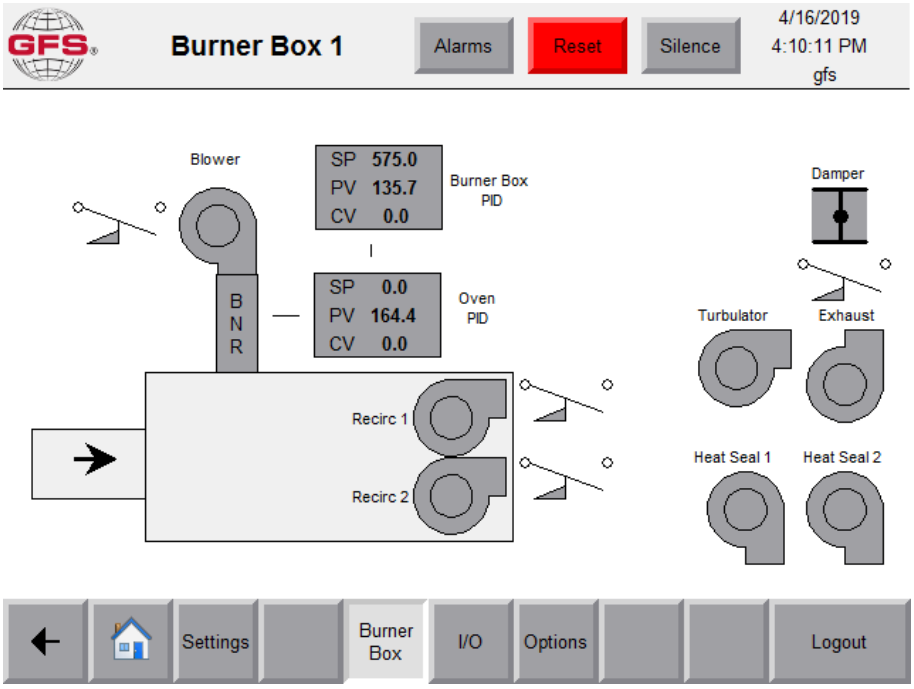


Figure 8. Burner box screen

Use the Burner Box screen to access the following burner box options, if they are enabled on your oven:

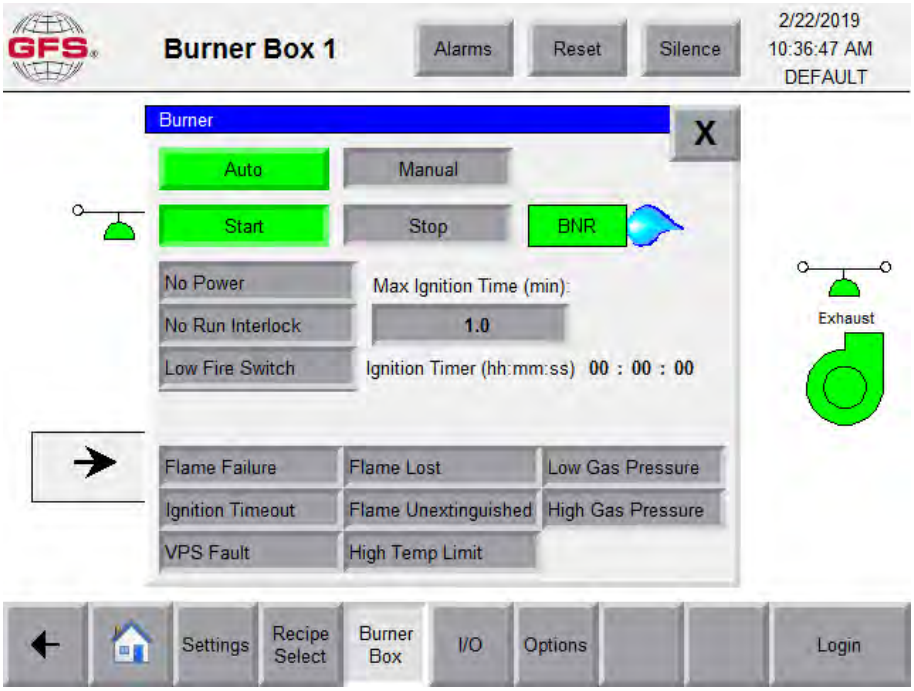
- **Burner Box PID/Oven PID:** The burner box and oven PID loops control the oven temperature. For more information, see “Burner box and oven PID temperature controller” (page 38).
- **Combustion Blower:** The combustion blower provides fresh air to the burner. For more information, see “Combustion blowers” (page 42).
- **Exhaust Motor:** The exhaust motor is used to exhaust or purge air from the oven. For more information, see “Exhaust motor” (page 44).
- **Heat Seal 1/Heat Seal 2:** The heat seals create a heat barrier on product openings. For more information, see “Heat seal” (page 46).

  NOTE
  Only available on Continuous Process Ovens.

- **Purge Damper:** The damper intake on the heater box opens in purge and cool down modes, and is closed during the cure cycle. For more information, see “Purge damper” (page 48).

  NOTE
  Only present on multiple-speed exhausts.

- **Recirc 1/Recirc 2:** The recirc fans blow heated air around inside the oven. For more information, see “Recirc fans” (page 49).
- **Turbulator:** The turbulator creates turbulent airflow inside the oven. For more information, see “Turbulator fans” (page 51).
- **BNR:** BNR represents the main oven burner.



Burner box and oven PID temperature controller

The Proportional Integral Derivative (PID) closed loop controller is used extensively to control conditions and temperatures in process equipment.

NOTE
A PID can be put into manual and an operator can adjust the output of the controller.

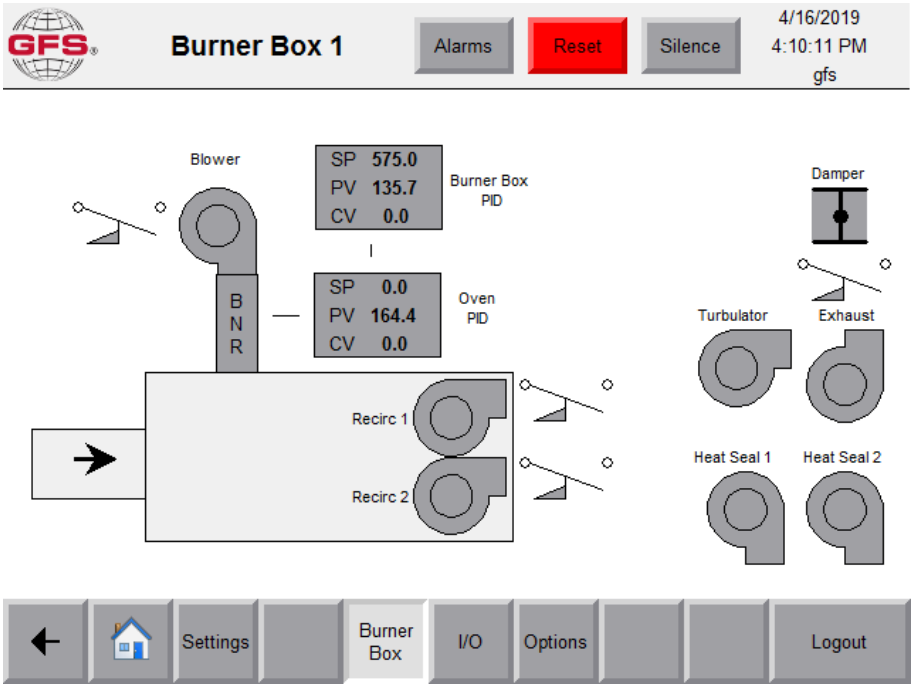


Table 15. Burner box and oven PID information

Displayed Text	Onscreen Interaction	Description
SP	Status	The SP, or setpoint, is the desired condition that the PID is attempting to obtain. The current setpoint is displayed on the bar chart. The setpoint is controlled by the nominal PLC logic and can be obtained from the setpoint screens. **NOTE** The setpoint cannot be changed by the PID object.
PV	Status	The PV, or process value, is the value that is measured by a sensor. This is usually a temperature.
CV	Status	The CV, or command value, is the output of the PID loop. The PID will vary the CV to cause the process value to reach the setpoint. The PID object can use any units or any range for the CV, but it is usually confined to percent, temperature, frequency, or RPM.

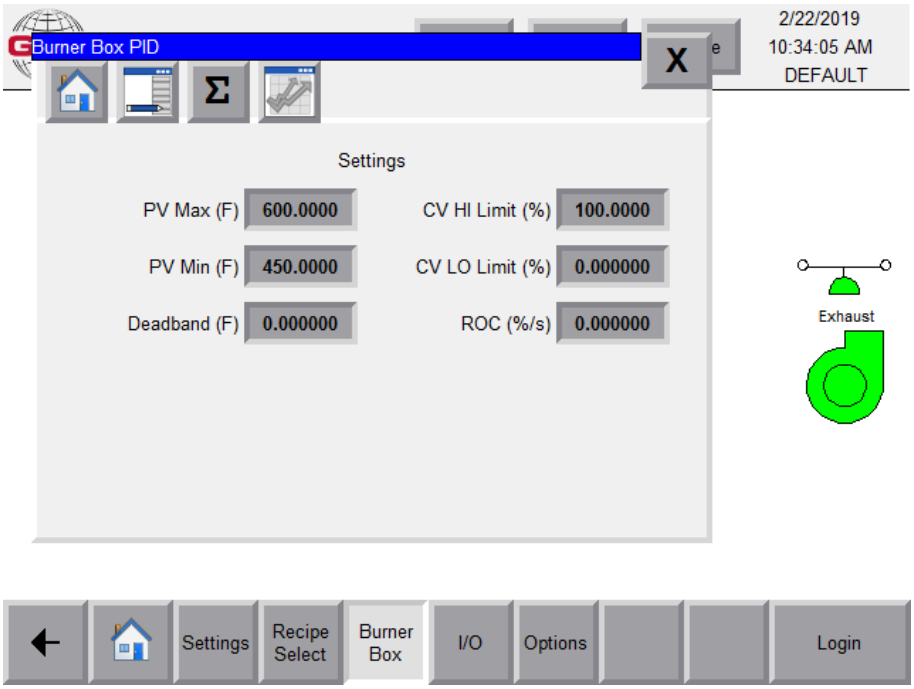


Figure 9. Burner Box PID popup

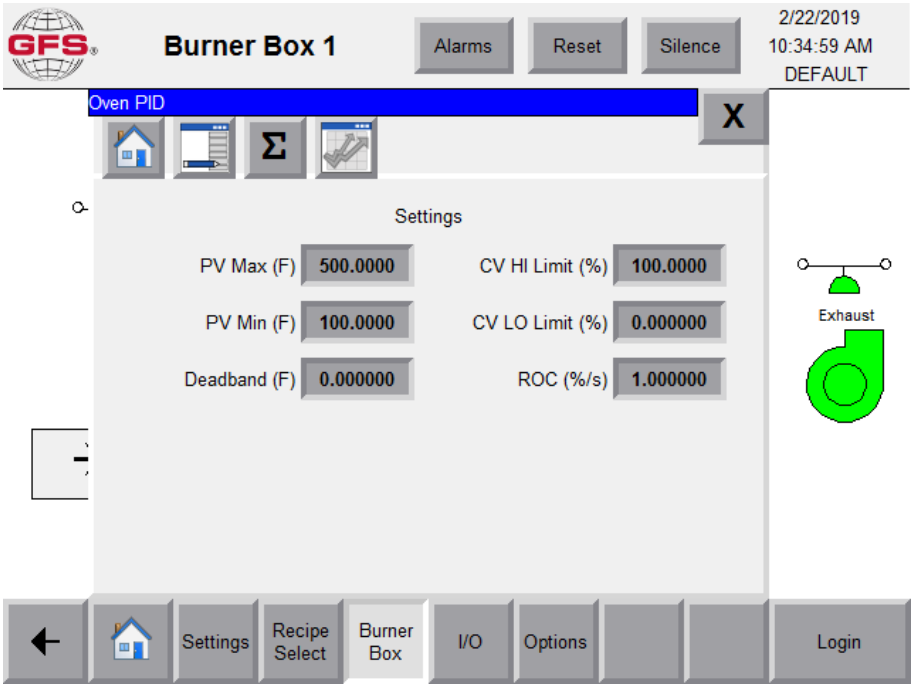


Figure 10. Oven PID popup

Table 16. Burner Box and Oven PID popups

Displayed Text	Onscreen Interaction	Description
PV Max (F)	Setpoint	Maximum expected process value from the sensor. This is used to scale the chart.
PV Min (F)	Setpoint	Minimum expected process value from the sensor. This is used to scale the chart.
Deadband (F)	Setpoint	This is the Zero Crossing Deadband for the PID Loop. The PID Loop will remain active until the process value crosses the setpoint. When this happens, the command value will be locked in place and the PID controller disabled. If process value diverges from the setpoint by Deadband, the PID loop will be reactivated. A deadband can be used to help the PID ignore noise and settle into place.
CV HI Limit (%)	Setpoint	Maximum allowed command value. Note that this is just the limit to the PID. If the PID is connected to a VFD, the VFD object may further override the limits before it reaches the VFD. The VFD itself could then even further override the limits.
CV LO Limit (%)	Setpoint	Minimum allowed command value. Note that this is just the limit to the PID. If the PID is connected to a VFD, the VFD object may further override the limits before it reaches the VFD. The VFD itself could then even further override the limits.
ROC (%/s)	Setpoint	This is the Rate of Change limiter. The command value will not be allowed to change at a greater rate. This is important for slow moving devices such as gas valves and dampers. If a gas value takes 90 seconds to go from full closed to full open, the ROC should be set to 100%/90 = 1.11% per second tops. The ROC limit should be a little slower than the output device to give it a chance to catch up with a fast moving PID. In the above example, 1% per second should be used, not 1.11%.

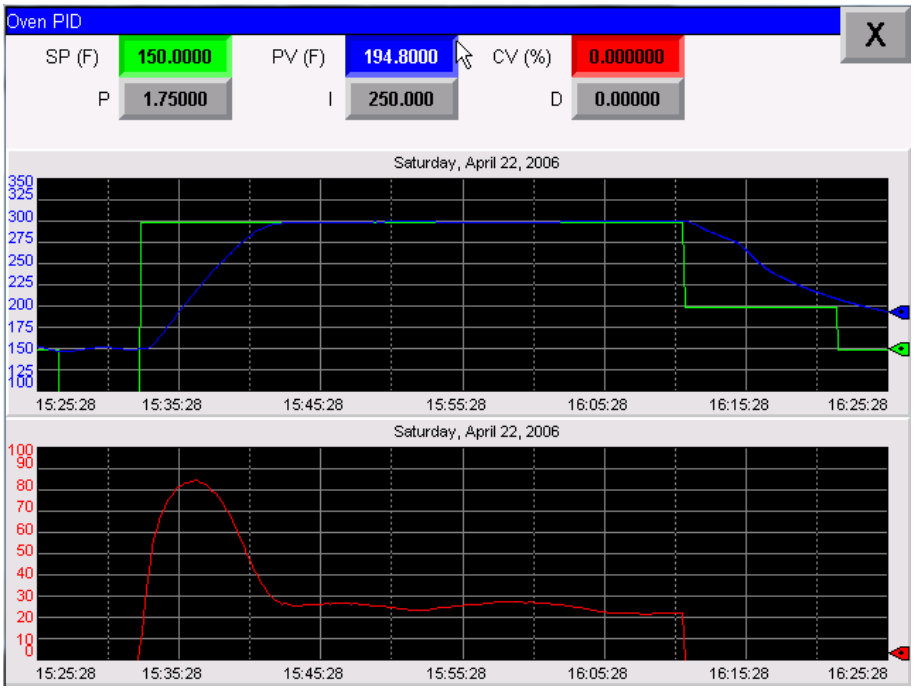


Figure 11. Burner box PID chart

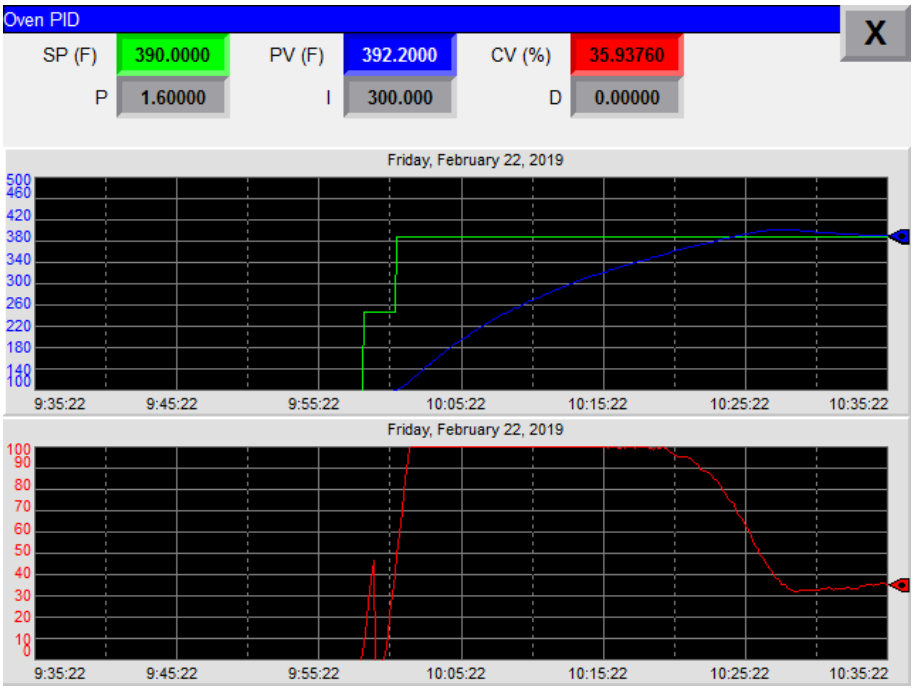


Figure 12. Oven PID chart

Table 17. Burner Box and Oven PID Chart

Displayed Text	Onscreen Interaction	Description
P	Setpoint	Proportional coefficient. This coefficient works to stabilize the process value and always attempts to hold the process value level at all time. Increasing P can help remove over shoot. If P is too large, the system will begin to oscillate.
I	Setpoint	Integral coefficient. This coefficient works to bring the process value to the command value. Increasing I will make the PID take longer to reach the set point. Decreasing I will make the PID act faster, but will increase over shoot. This over shoot can then be alleviated with the P term. If I is too small, the system can begin to oscillate. Either increase P or increase I until the process stabilizes.
D	Setpoint	Set D to zero.

Combustion blowers

The combustion blower uses either a motor starter or a VFD (if that option was purchased). The airflow switch is required for the burner safety circuit and is always present. Tap the airflow switch or blower icon to view the popup screens shown below.

For information on the control components (buttons, alarms, setpoints, and color scheme), see “Program norms and conventions” (page 68).

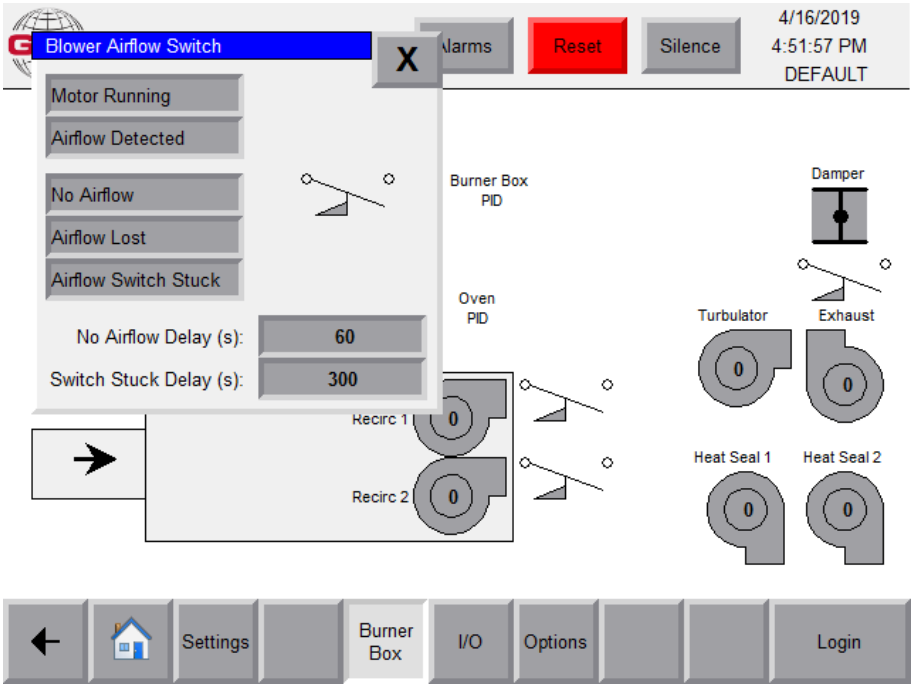


Figure 13. Combustion blower airflow switch

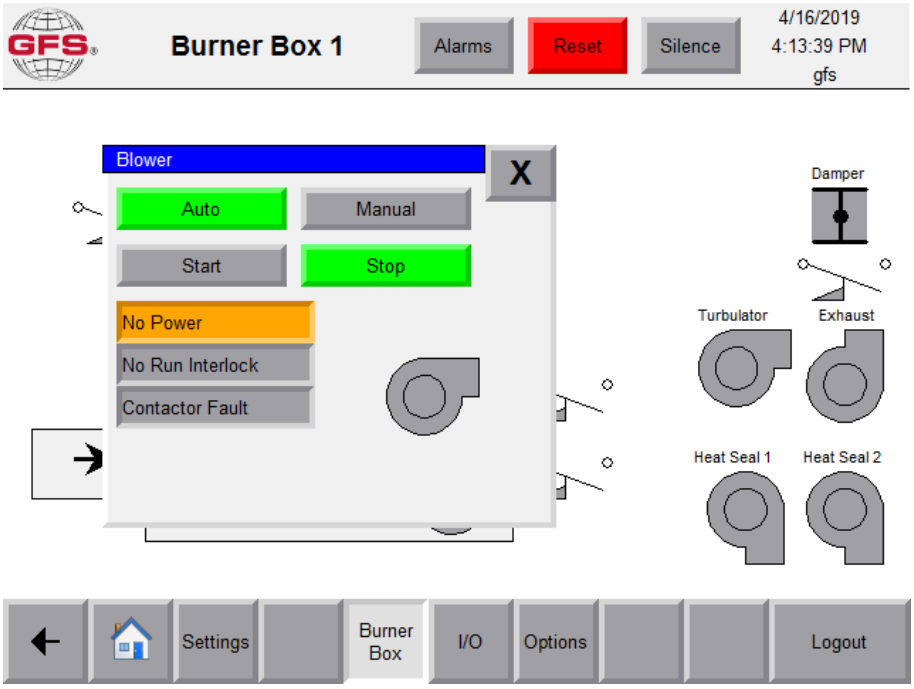


Figure 14. Combustion blower motor starter

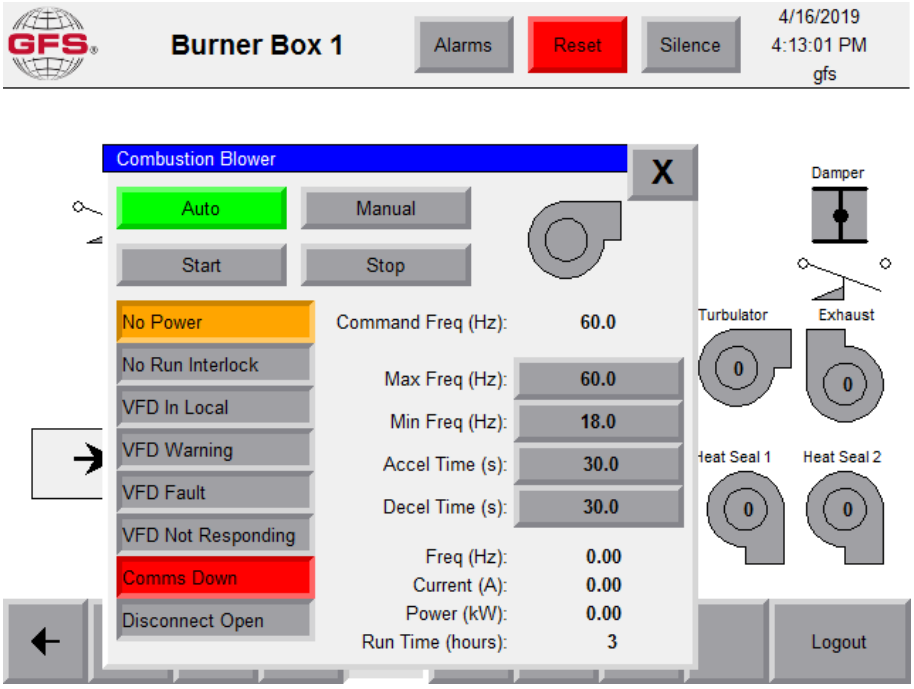


Figure 15. Combustion blower VFD

Exhaust motor

The exhaust motor uses either a motor starter or a VFD (if that option was purchased). The airflow switch is required for the burner safety circuit and is always present. Tap the airflow switch or blower icon to view the popup screens shown below.

For information on the control components (buttons, alarms, setpoints, and color scheme), see “Program norms and conventions” (page 68).

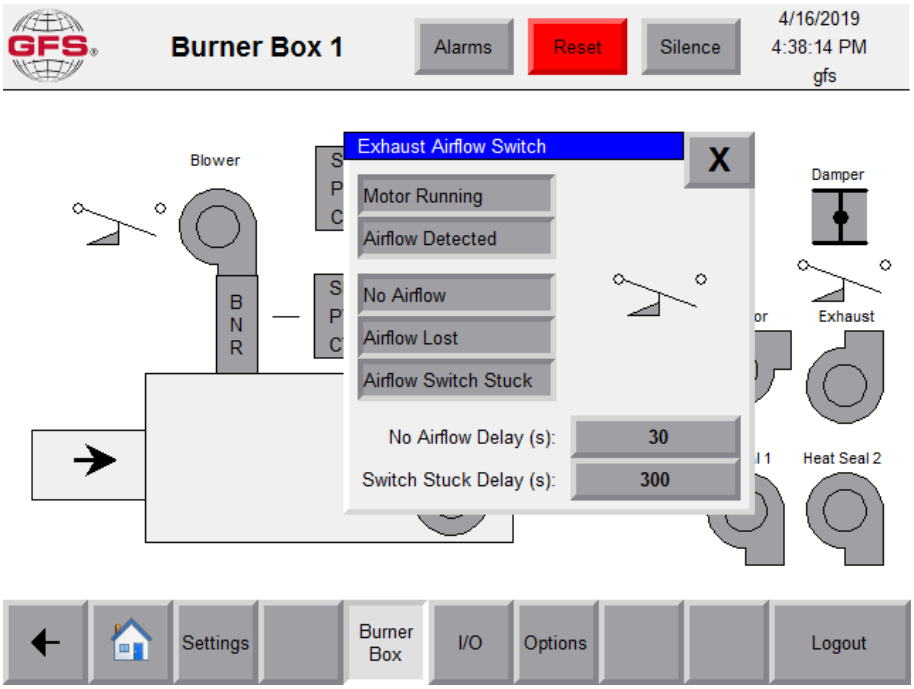


Figure 16. Burner box exhaust motor airflow switch

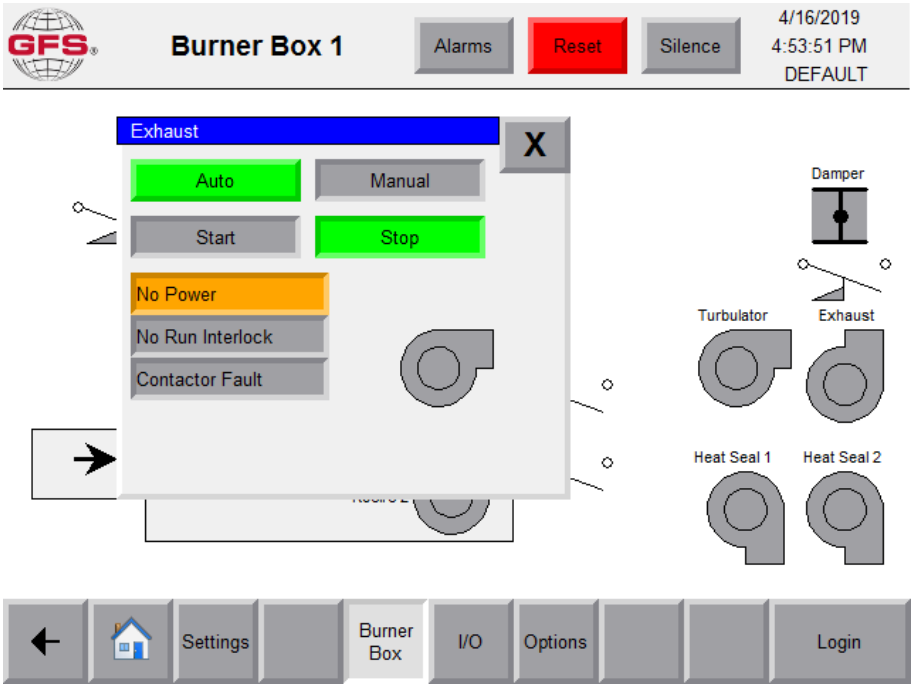


Figure 17. Burner box exhaust motor starter

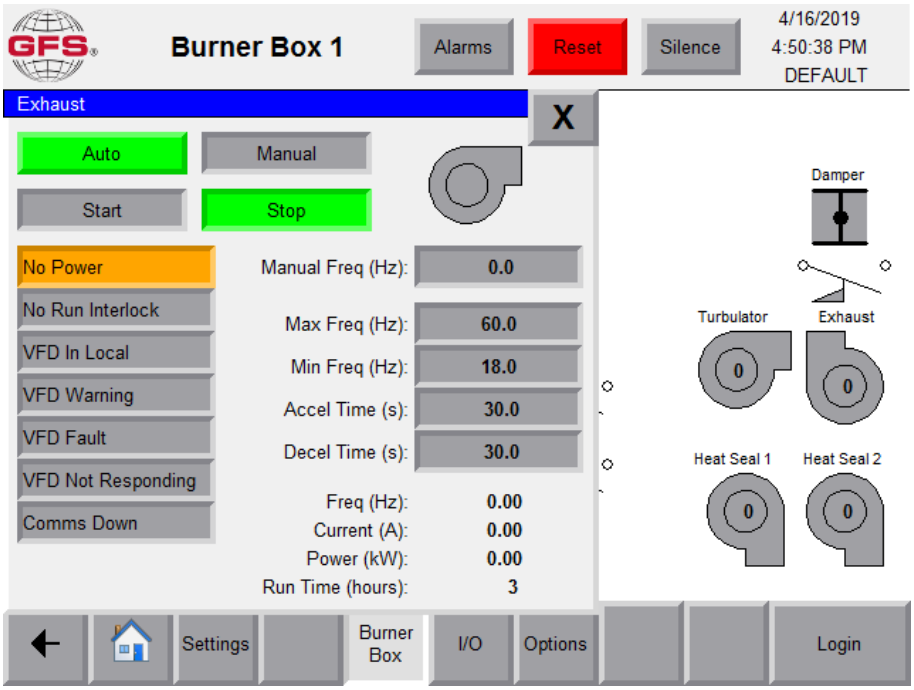


Figure 18. Burner box exhaust motor VFD

Heat seal

Burner box heat seals may be used on Continuous Process Ovens, and use either a motor starter or a VFD. Tap the heat seal icon to view the popup screens shown below.

For information on the control components (buttons, alarms, setpoints, and color scheme), see “Program norms and conventions” (page 68).

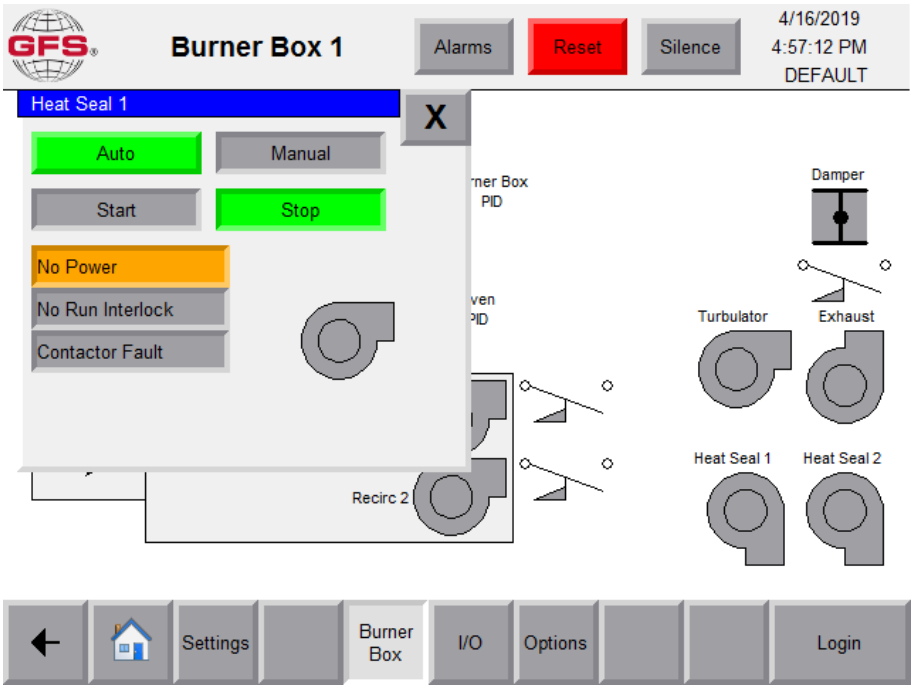


Figure 19. Burner box heat seal motor starter

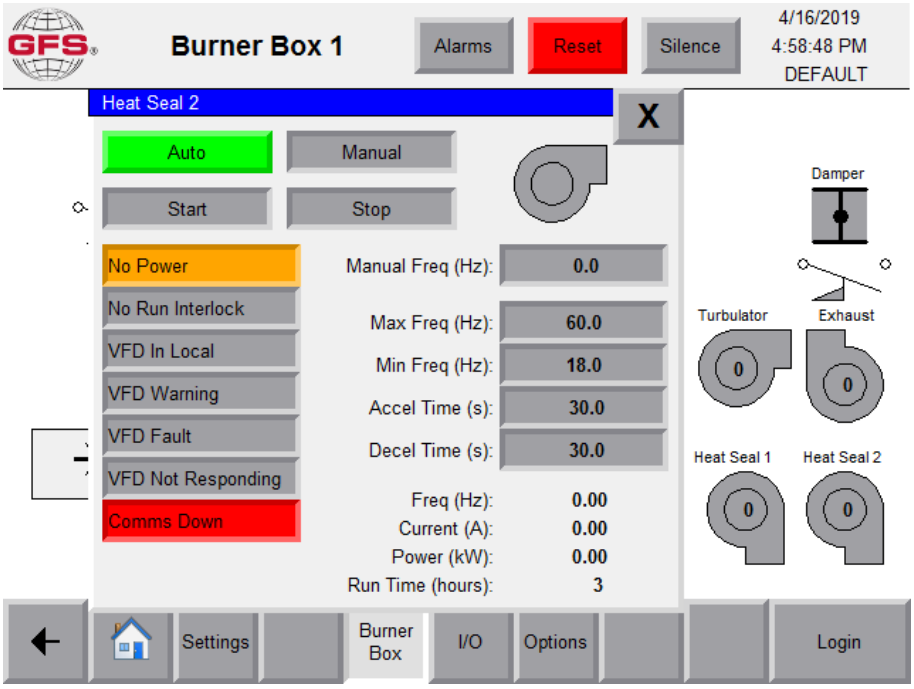


Figure 20. Burner box heat seal VFD

Purge damper

The damper object controls the damper intake on a heater box. The damper can be open, closed, or moving.

For information on the control components (buttons, alarms, setpoints, and color scheme), see “Program norms and conventions” (page 68).

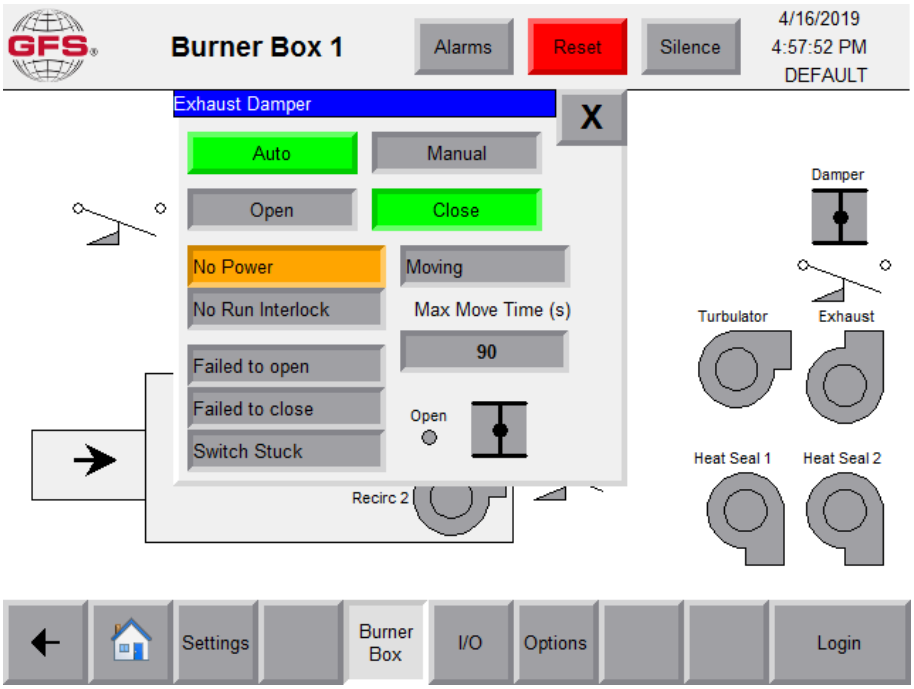


Table 18. Exhaust damper popup

Displayed Text	Onscreen Interaction	Description
Open	Button	Opens the damper. **NOTE** This is only selectable if the oven is in manual mode and the user has operate permissions.
Closed	Button	Closes the damper. **NOTE** This is only selectable if the oven is in manual mode and the user has operate permissions.
Max Move Time (s)	Setpoint	The maximum amount of time (denoted in seconds) that a damper is allowed to move from one side to another. If the damper takes too long, an alarm will be raised.
Moving	Status Indicator	The damper is moving and the Max Move Time has been activated.
Failed to open	Alarm	The damper failed to open in the allotted amount of time.
Failed to close	Alarm	The damper failed to close in the allotted amount of time.

Displayed Text	Onscreen Interaction	Description
Switch Stuck	Alarm	One of the damper end switches is stuck. **NOTE** This can be detected if both end switches are made at the same time.

Recirc fans

Recirc fans use either a motor starter or a VFD (if that option was purchased) to blow heated air around inside the oven. The airflow switch is required for the burner safety circuit and is always present. Tap the airflow switch or blower icon to view the popup screens shown below.

For information on the control components (buttons, alarms, setpoints, and color scheme), see “Program norms and conventions” (page 68).

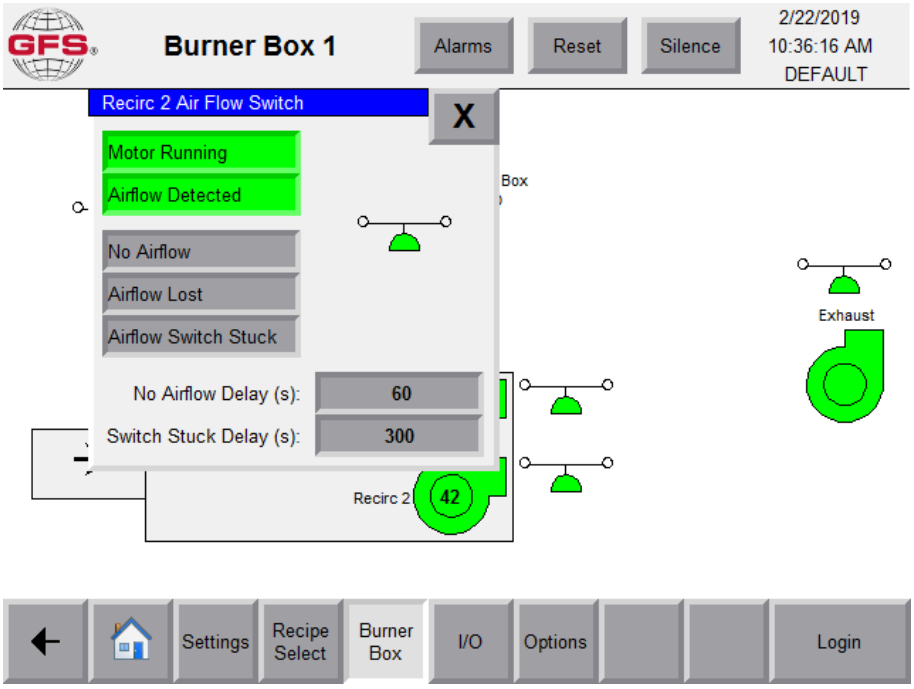


Figure 21. Recirc fan airflow switch popup

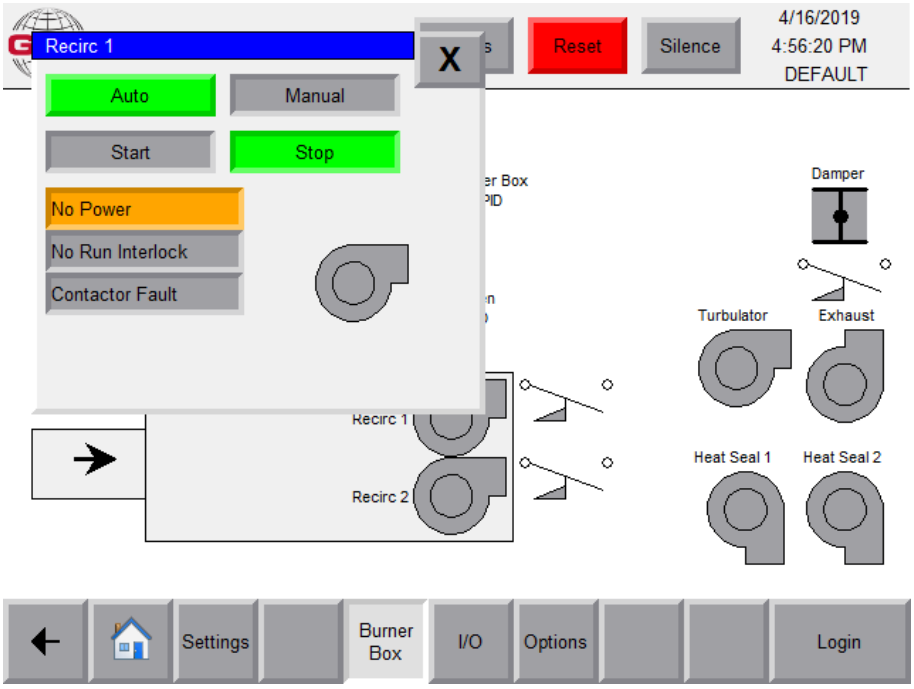


Figure 22. Recirc fan motor starter popup

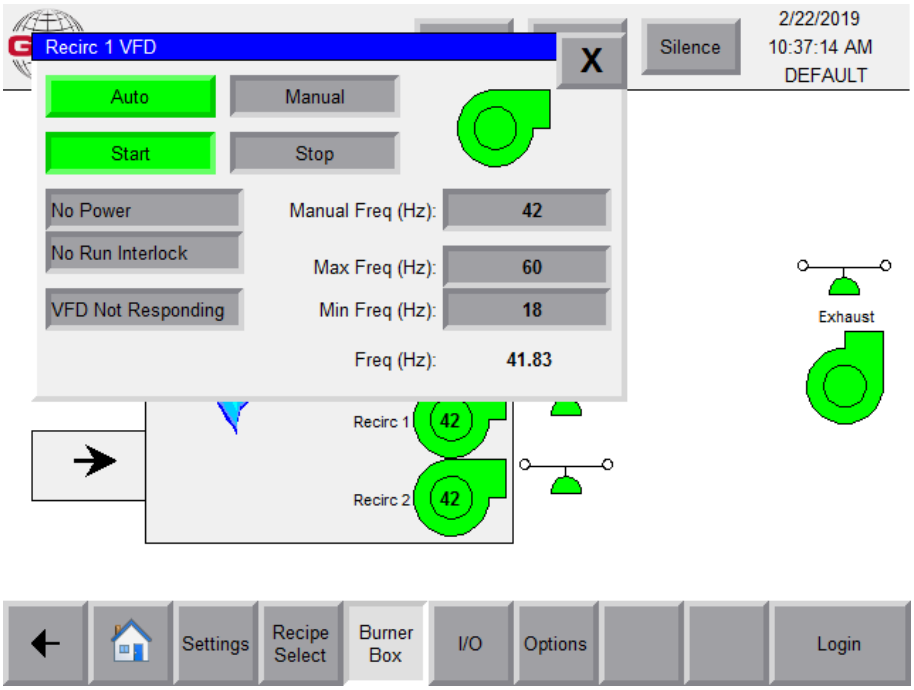


Figure 23. Recirc fan VFD popup

Turbulator fans

Turbulator fans may be used to create turbulent airflow inside the oven using either a motor starter or VFD. Tap the turbulator icon to view the popup screens shown below.

For information on the control components (buttons, alarms, setpoints, and color scheme), see “Program norms and conventions” (page 68).

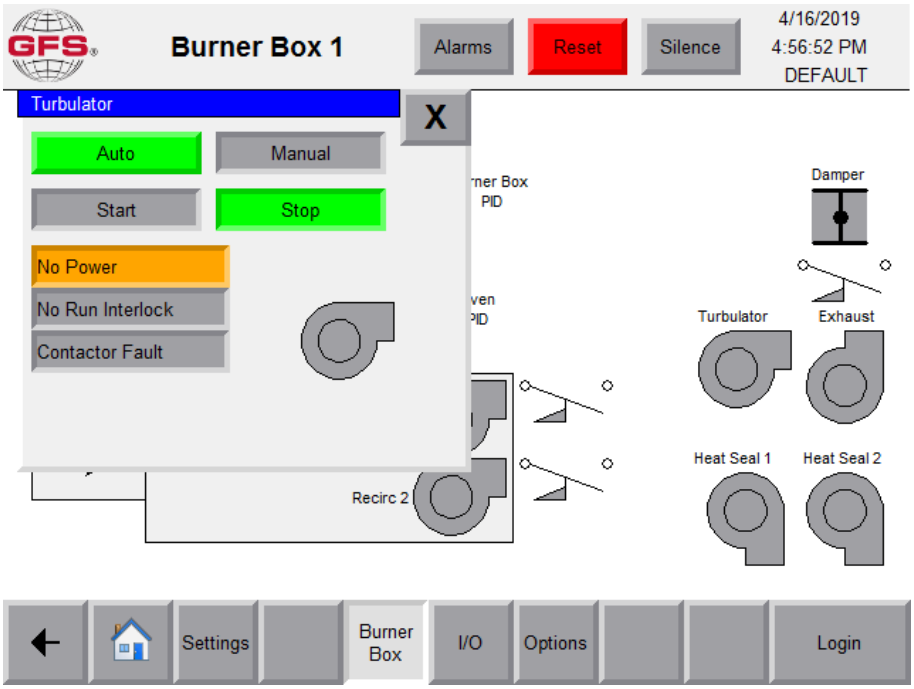


Figure 24. Turbulator motor starter popup

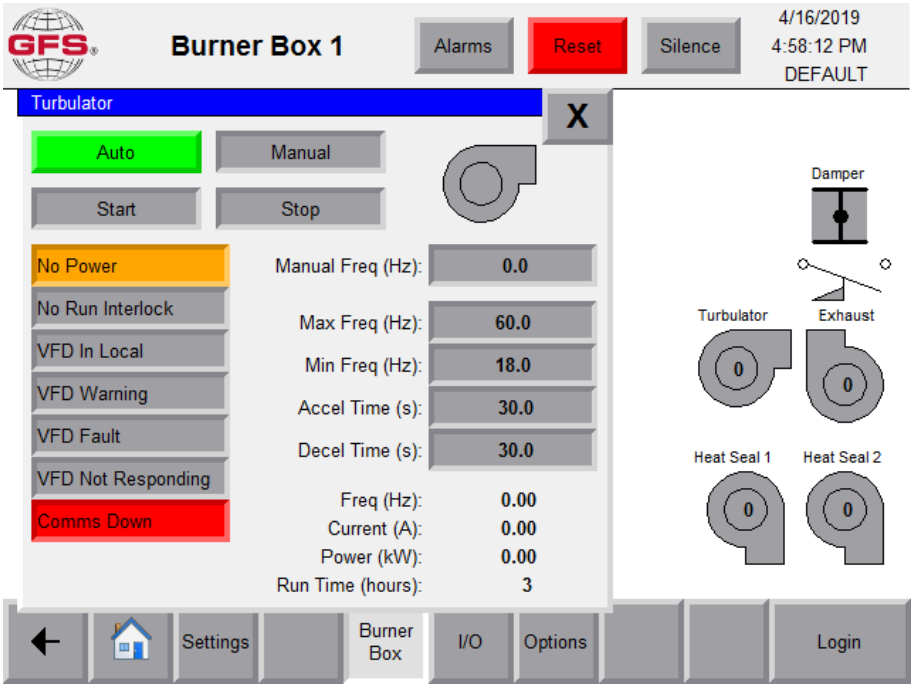


Figure 25. Turbulator VFD popup

Expansion and Burner Box I/O screens

The I/O screens control the inputs and outputs for the PLC.

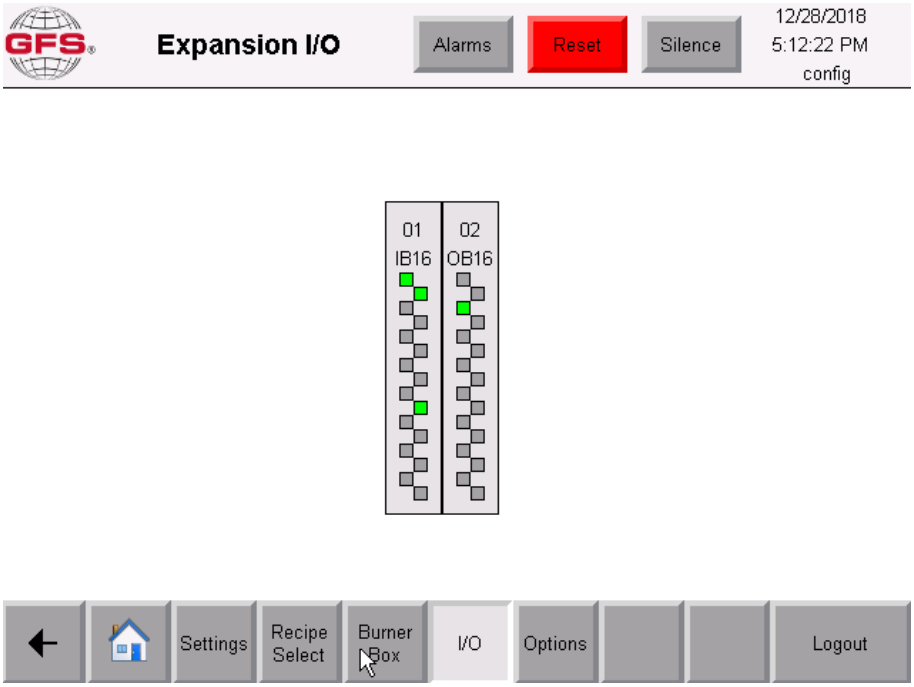


Figure 26. Expansion I/O screen

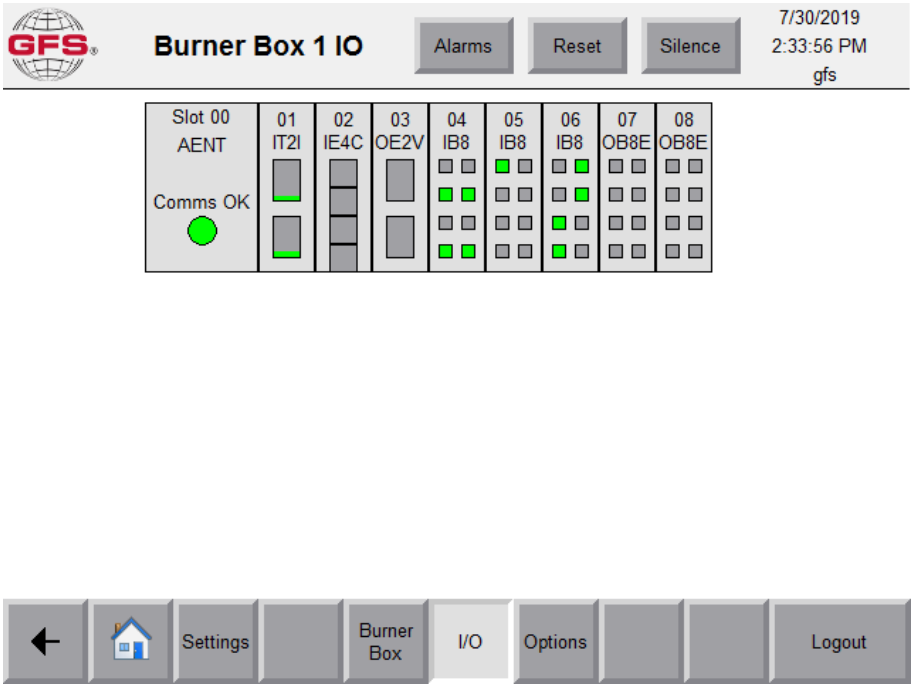


Figure 27. Burner box I/O screen

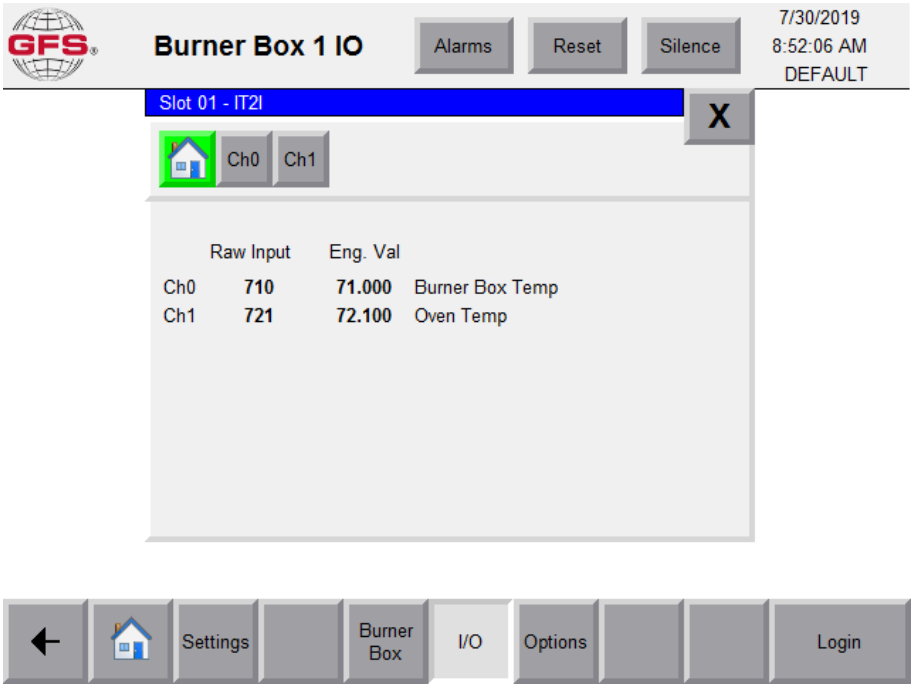


Figure 28. Burner box I/O slot 1

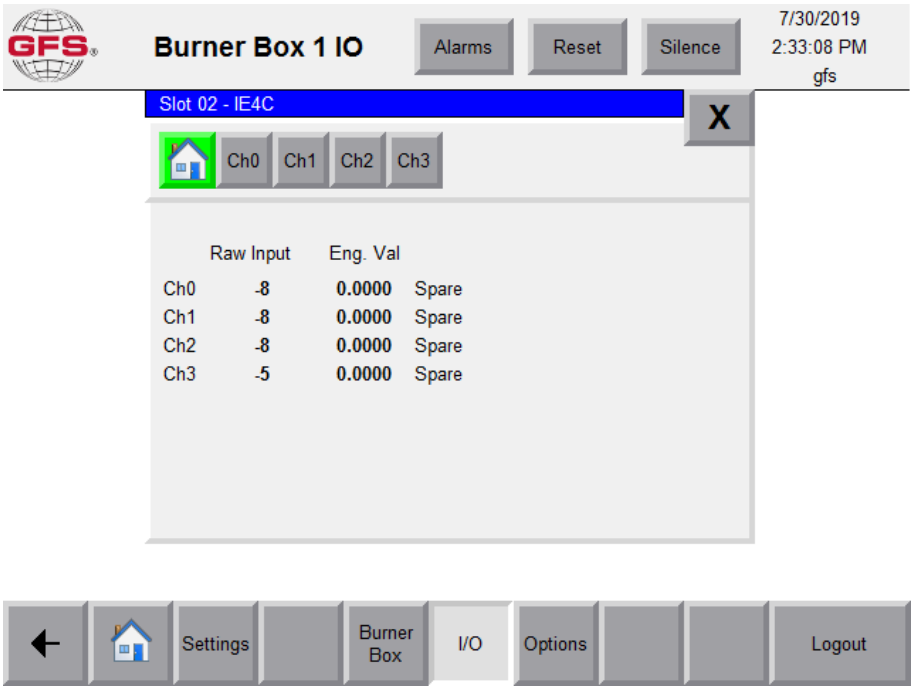


Figure 29. Burner box I/O slot 2

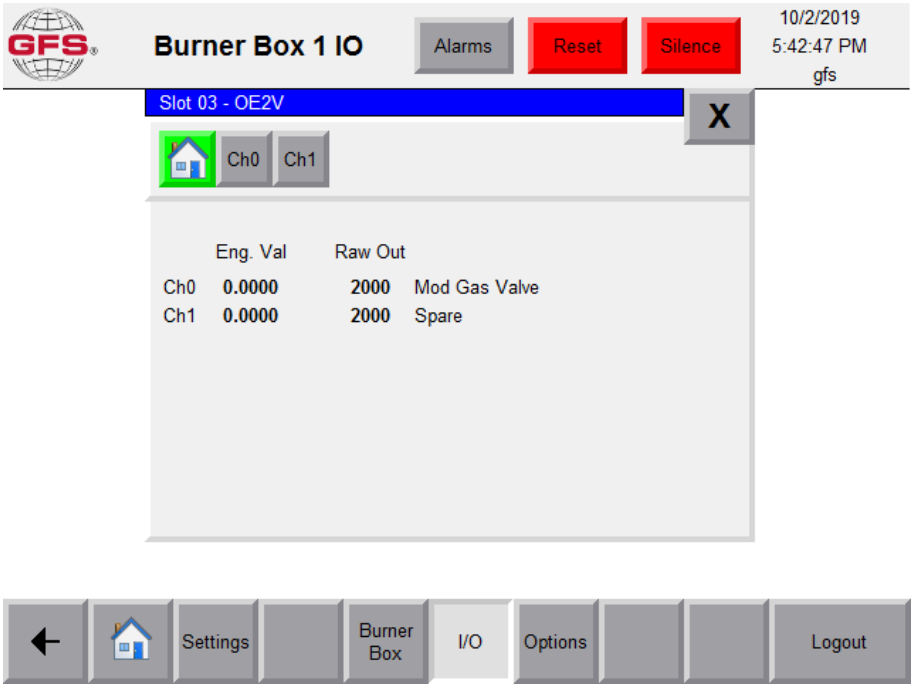


Figure 30. Burner box I/O slot 3

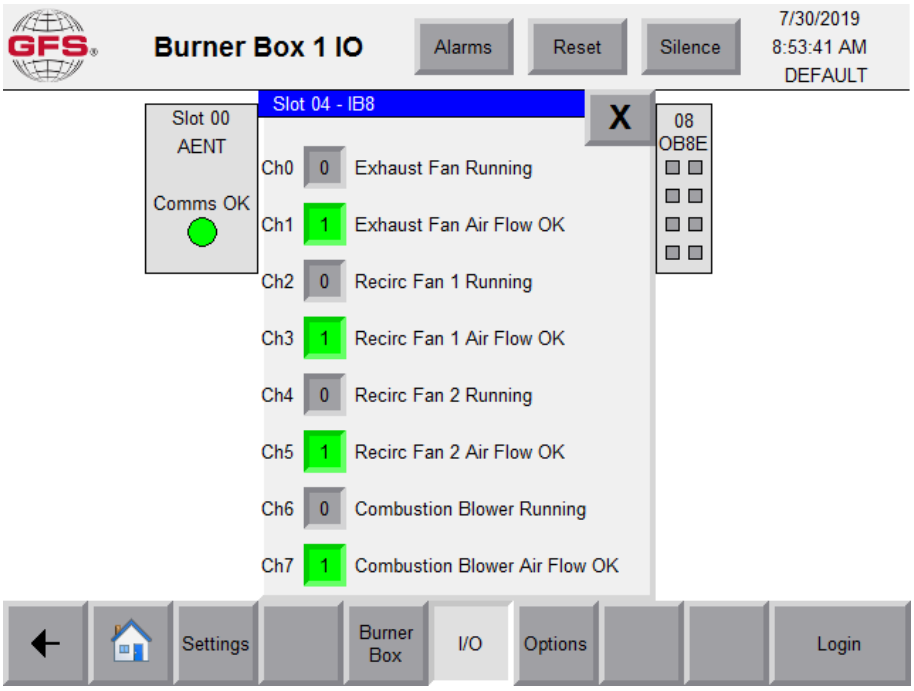


Figure 31. Burner box I/O slot 4

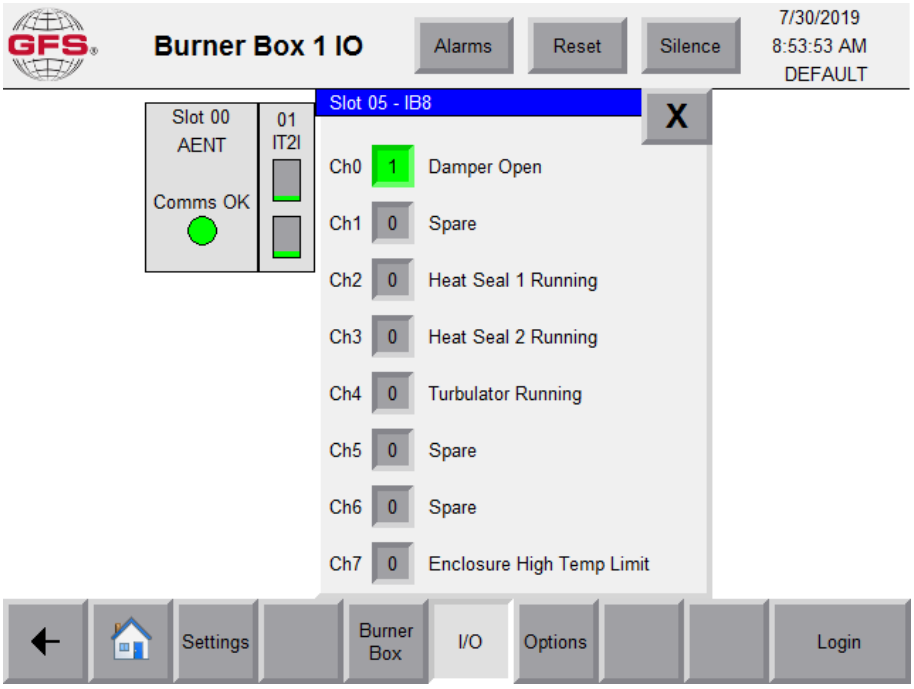


Figure 32. Burner box I/O slot 5

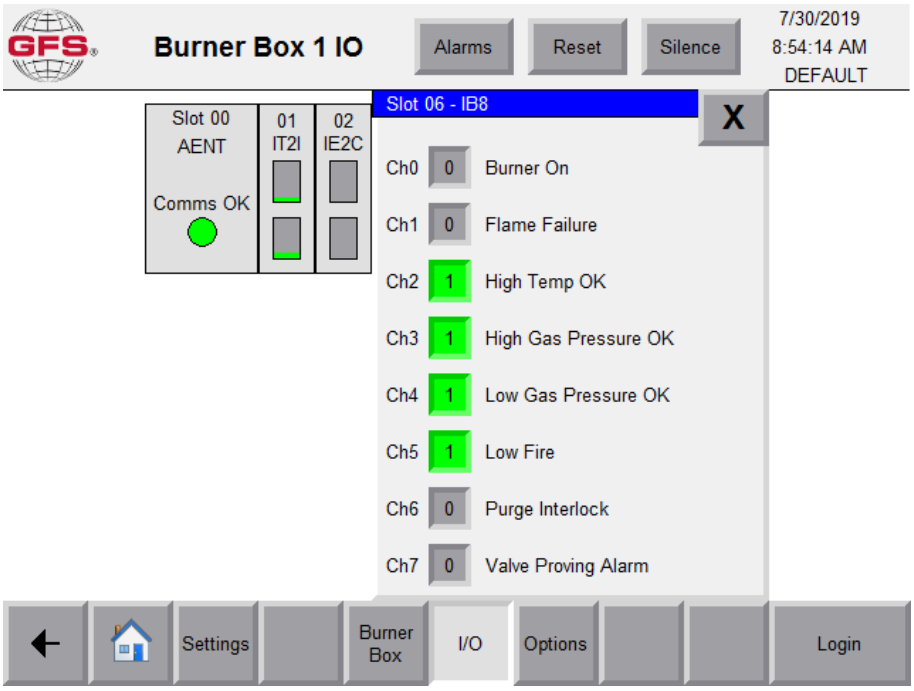


Figure 33. Burner box I/O slot 6

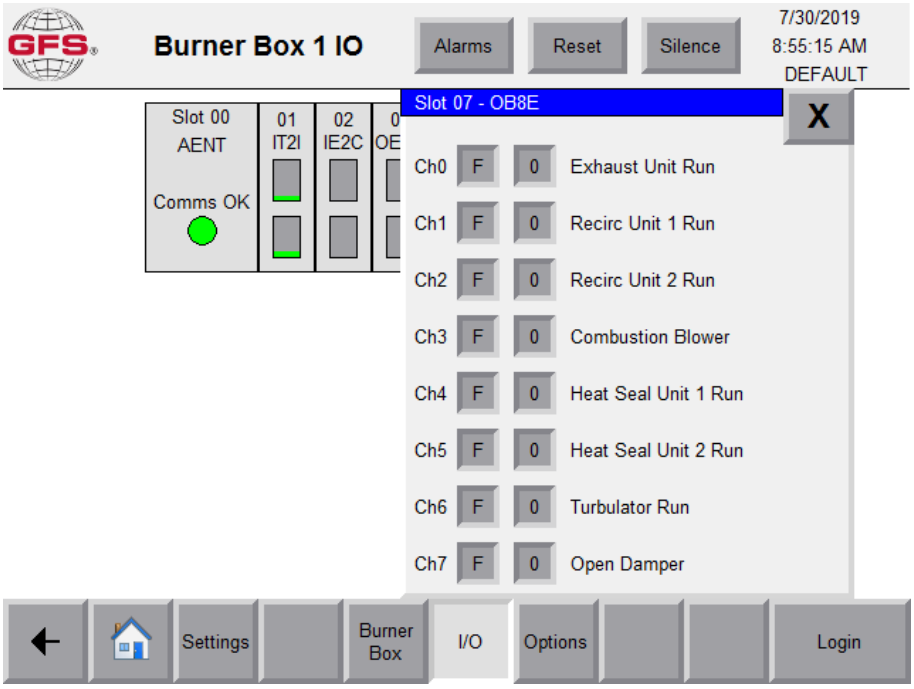


Figure 34. Burner box I/O slot 7

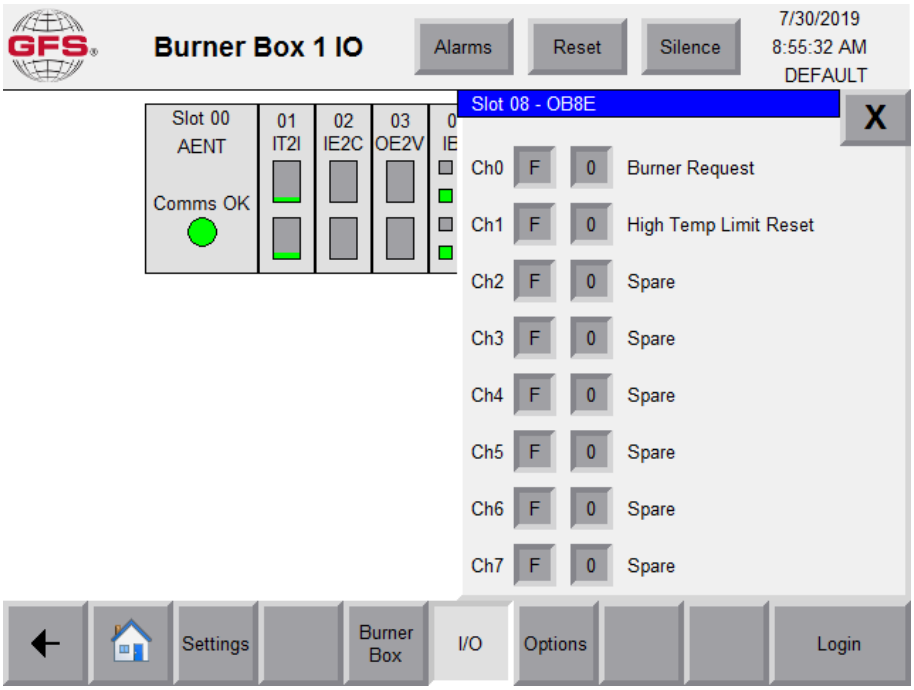


Figure 35. Burner box I/O slot 8

Options screen

Tap **Options** to display a secondary row of buttons that provide access to the following screens:

- Admin Settings
- User Management
- Shutdown HMI

NOTE
Admin Settings and User Management screens are password-protected and cannot be accessed by the end user.

NOTE
The PLC/HMI project and firmware version information is located on the Admin Settings screen.

Figure 36. Options access

Factory configuration

The factory configuration settings are based on the particular hardware or other options included with your oven.

Changing the factory configuration

Important: Changing the oven's factory configuration parameters requires GFS technical services.

NOTE
The GFS technical services representative might ask for the serial number of the oven and for the PLC and HMI software versions. Please have this information at hand for your call.

- The oven serial number is located on a data plate affixed to the control panel.
- The PLC and HMI software versions are displayed on the Admin Settings screen.

Troubleshooting

NOTE
The *x* variable in the Code column is used to indicate which burner box is experiencing the alarm.

NOTE
If fault and warning codes recur after troubleshooting or you need additional assistance, contact Global Finishing Solutions at 800-848-8738 to speak to a Technical Service Representative.

Table 19. Fault and warning codes

Code	Fault & Warning	Troubleshooting Guide
#0	Expansion Module 1 Faulted	Check the integrity of the Ethernet cable between the operator interface terminal and the remote IO module.
#1	Expansion Module 2 Faulted	Check the integrity of the Ethernet cable between the operator interface terminal and the remote IO module.
#2	Estop Pressed	Make sure all Emergency Stop buttons are pulled out.
#4	Fire Alarm Active	Check the Fire System input and verify that the contacts are closed.
#24	Cannot heat to temperature	Inspect the burner and ensure the burner is lit and the gas valve is operational.
#25	Cannot cool to temperature	Make sure the burner is sitting in low fire, and verify that low fire is set properly.
#26	Manual Enabled	Verify that **All Auto** is selected on the HMI.
#27	Doors are Not Closed	Make sure the doors are closed and the door limit switches (if present) are operational.
#28	Output Force	Verify that **All Auto** is selected on the HMI.
#29	Internal Software Error	Contact GFS technical services.
#30	Controller Forces Installed	Remove forces in IO screens. Verify that **All Auto** is selected on the HMI.
#31	Controller Forces Enabled	Remove forces in IO screens. Verify that **All Auto** is selected on the HMI.
#*x*000	Burner Box # - AENT Module Comm Loss	Check the integrity of the Ethernet cable between the operator interface terminal and the remote IO module.
#*x*001	Burner Box # - I/O Slot 1 Fault	Ensure modules are fully inserted in backplate. Check the integrity of the Ethernet cable between the operator interface terminal and the remote IO module.
#*x*002	Burner Box # - I/O Slot 2 Fault	Ensure modules are fully inserted in backplate. Check the integrity of the Ethernet cable between the operator interface terminal and the remote IO module.
#*x*003	Burner Box # - I/O Slot 3 Fault	Ensure modules are fully inserted in backplate. Check the integrity of the Ethernet cable between the operator interface terminal and the remote IO module.
#*x*004	Burner Box # - I/O Slot 4 Fault	Ensure modules are fully inserted in backplate. Check the integrity of the Ethernet cable between the operator interface terminal and the remote IO module.
#*x*005	Burner Box # - I/O Slot 5 Fault	Ensure modules are fully inserted in backplate. Check the integrity of the Ethernet cable between the operator interface terminal and the remote IO module.
#*x*006	Burner Box # - I/O Slot 6 Fault	Ensure modules are fully inserted in backplate. Check the integrity of the Ethernet cable between the operator interface terminal and the remote IO module.

Code	Fault & Warning	Troubleshooting Guide
#*x*007	Burner Box # - I/O Slot 7 Fault	Ensure modules are fully inserted in backplate. Check the integrity of the Ethernet cable between the operator interface terminal and the remote IO module.
#*x*008	Burner Box # - I/O Slot 8 Fault	Ensure modules are fully inserted in backplate. Check the integrity of the Ethernet cable between the operator interface terminal and the remote IO module.
#*x*009	Burner Box # - I/O Slot 9 Fault	Ensure modules are fully inserted in backplate. Check the integrity of the Ethernet cable between the operator interface terminal and the remote IO module.
#*x*032	Burner Box # - Purge Interlock Relay malfunction	Troubleshooting of the gas safety circuit is required; contact GFS technical services for assistance if needed.
#*x*033	Burner Box # - Burner Box Sensor Over Range	1. Inspect thermocouple and wiring. 2. Replace if necessary.
#*x*034	Burner Box # - Burner Box Sensor Under Range	1. Inspect thermocouple and wiring. 2. Replace if necessary.
#*x*035	Burner Box # - Oven Temp Sensor Over Range	1. Inspect thermocouple and wiring. 2. Replace if necessary.
#*x*036	Burner Box # - Oven Temp Sensor Under Range	1. Inspect thermocouple and wiring. 2. Replace if necessary.
#*x*037	Burner Box # - Enclosure Over Temperature	Ensure the filters are clean on the enclosure and the panel fan is operating.
#*x*059	Burner Box # - PID In Manual	If the PID button on the HMI displays as yellow, place into Auto mode.
#*x*064	Burner Box # - Blower Airflow Switch - No Airflow	1. Check the adjustment of the airflow switch and fan operation. 2. Make sure the motor starter is not tripped.
#*x*065	Burner Box # - Blower Airflow Switch - Airflow Lost	Check the adjustment of the airflow switch.
#*x*066	Burner Box # - Blower Airflow Switch - Airflow Switch Stuck	Check the adjustment of the airflow switch.
#*x*096	Burner Box # - Blower - Contactor feedback	Check the auxiliary contacts on the motor starter to ensure they are closing when the starter is enabled.
#*x*097	Burner Box # - Blower - Motor Disconnect	Make sure the disconnect switch is in the On position.
#*x*098	Burner Box # - Blower - Motor Overload	1. Check MSP Overload and reset if necessary. 2. Ensure setting matches motor FLA. 3. Check amp draw on motor if it continues to trip.
#*x*192	Burner Box # - Exhaust Airflow Switch - No Airflow	1. Check the adjustment of the airflow switch and fan operation. 2. Ensure the motor starter is not tripped. 3. Check belts.
#*x*193	Burner Box # - Exhaust Airflow Switch - Airflow Lost	1. Check the adjustment of the airflow switch. 2. Check belts.
#*x*194	Burner Box # - Exhaust Airflow Switch - Airflow Switch Stuck	Check the adjustment of the airflow switch.
#*x*224	Burner Box # - Exhaust Damper - Failed to Open	Inspect the damper actuator, ensuring it is tight on the shaft and the end switch is adjusted properly.
#*x*225	Burner Box # - Exhaust Damper - Failed to Close	Inspect the damper actuator, ensuring it is tight on the shaft and the end switch is adjusted properly.

Code	Fault & Warning	Troubleshooting Guide
#*x*226	Burner Box # - Exhaust Damper - Limit Switch Stuck	Inspect the damper actuator, ensuring it is tight on the shaft and the end switch is adjusted properly.
#*x*256	Burner Box # - Exhaust Motor Starter - Contactor feedback	Check the auxiliary contacts on the motor starter to ensure they are closing when the starter is enabled.
#*x*257	Burner Box # - Exhaust Motor Starter - Motor Disconnect	Ensure that the disconnect switch is in the On position.
#*x*258	Burner Box # - Exhaust Motor Starter - Motor Overload	1. Check MSP Overload and reset if necessary. 2. Ensure setting matches the motor FLA. 3. If it continues to trip, check amp draw on the motor.
#*x*288	Burner Box # - Exhaust VFD - VFD Fault	Check the fault code on the VFD and refer to the user manual to diagnose the fault. Contact GFS technical services if the fault does not reset.
#*x*289	Burner Box # - Exhaust VFD - Not Responding	Ensure power is applied to the VFD.
#*x*290	Burner Box # - Exhaust VFD - Comms Down	Check all Ethernet connections to the VFD.
#*x*291	Burner Box # - Exhaust VFD - Motor Disconnect	Make sure the disconnect switch is in the On position.
#*x*300	Burner Box # - OB8E Slot 7 Ch 0 Fault	Output channel faults indicate a problem with the wiring, e.g. a short circuit or an open wire. To reset the fault: 1. Turn off the main power. 2. Correct the wiring fault. 3. Turn the power back on. **NOTE** A power cycle is required to reset the faults.
#*x*301	Burner Box # - OB8E Slot 7 Ch 1 Fault	Output channel faults indicate a problem with the wiring, e.g. a short circuit or an open wire. To reset the fault: 1. Turn off the main power. 2. Correct the wiring fault. 3. Turn the power back on. **NOTE** A power cycle is required to reset the faults.
#*x*302	Burner Box # - OB8E Slot 7 Ch 2 Fault	Output channel faults indicate a problem with the wiring, e.g. a short circuit or an open wire. To reset the fault: 1. Turn off the main power. 2. Correct the wiring fault. 3. Turn the power back on. **NOTE** A power cycle is required to reset the faults.
#*x*303	Burner Box # - OB8E Slot 7 Ch 3 Fault	Output channel faults indicate a problem with the wiring, e.g. a short circuit or an open wire. To reset the fault: 1. Turn off the main power. 2. Correct the wiring fault. 3. Turn the power back on. **NOTE** A power cycle is required to reset the faults.

Code	Fault & Warning	Troubleshooting Guide
#*x*304	Burner Box # - OB8E Slot 7 Ch 4 Fault	Output channel faults indicate a problem with the wiring, e.g. a short circuit or an open wire. To reset the fault: 1. Turn off the main power. 2. Correct the wiring fault. 3. Turn the power back on. **NOTE** A power cycle is required to reset the faults.
#*x*305	Burner Box # - OB8E Slot 7 Ch 5 Fault	Output channel faults indicate a problem with the wiring, e.g. a short circuit or an open wire. To reset the fault: 1. Turn off the main power. 2. Correct the wiring fault. 3. Turn the power back on. **NOTE** A power cycle is required to reset the faults.
#*x*306	Burner Box # - OB8E Slot 7 Ch 6 Fault	Output channel faults indicate a problem with the wiring, e.g. a short circuit or an open wire. To reset the fault: 1. Turn off the main power. 2. Correct the wiring fault. 3. Turn the power back on. **NOTE** A power cycle is required to reset the faults.
#*x*307	Burner Box # - OB8E Slot 7 Ch 7 Fault	Output channel faults indicate a problem with the wiring, e.g. a short circuit or an open wire. To reset the fault: 1. Turn off the main power. 2. Correct the wiring fault. 3. Turn the power back on. **NOTE** A power cycle is required to reset the faults.
#*x*308	Burner Box # - OB8E Slot 8 Ch 0 Fault	Output channel faults indicate a problem with the wiring, e.g. a short circuit or an open wire. To reset the fault: 1. Turn off the main power. 2. Correct the wiring fault. 3. Turn the power back on. **NOTE** A power cycle is required to reset the faults.
#*x*309	Burner Box # - OB8E Slot 8 Ch 1 Fault	Output channel faults indicate a problem with the wiring, e.g. a short circuit or an open wire. To reset the fault: 1. Turn off the main power. 2. Correct the wiring fault. 3. Turn the power back on. **NOTE** A power cycle is required to reset the faults.

Code	Fault & Warning	Troubleshooting Guide
#*x*310	Burner Box # - OB8E Slot 8 Ch 2 Fault	Output channel faults indicate a problem with the wiring, e.g. a short circuit or an open wire. To reset the fault: 1. Turn off the main power. 2. Correct the wiring fault. 3. Turn the power back on. **NOTE** A power cycle is required to reset the faults.
#*x*311	Burner Box # - OB8E Slot 8 Ch 3 Fault	Output channel faults indicate a problem with the wiring, e.g. a short circuit or an open wire. To reset the fault: 1. Turn off the main power. 2. Correct the wiring fault. 3. Turn the power back on. **NOTE** A power cycle is required to reset the faults.
#*x*312	Burner Box # - OB8E Slot 8 Ch 4 Fault	Output channel faults indicate a problem with the wiring, e.g. a short circuit or an open wire. To reset the fault: 1. Turn off the main power. 2. Correct the wiring fault. 3. Turn the power back on. **NOTE** A power cycle is required to reset the faults.
#*x*313	Burner Box # - OB8E Slot 8 Ch 5 Fault	Output channel faults indicate a problem with the wiring, e.g. a short circuit or an open wire. To reset the fault: 1. Turn off the main power. 2. Correct the wiring fault. 3. Turn the power back on. **NOTE** A power cycle is required to reset the faults.
#*x*314	Burner Box # - OB8E Slot 8 Ch 6 Fault	Output channel faults indicate a problem with the wiring, e.g. a short circuit or an open wire. To reset the fault: 1. Turn off the main power. 2. Correct the wiring fault. 3. Turn the power back on. **NOTE** A power cycle is required to reset the faults.
#*x*315	Burner Box # - OB8E Slot 8 Ch 7 Fault	Output channel faults indicate a problem with the wiring, e.g. a short circuit or an open wire. To reset the fault: 1. Turn off the main power. 2. Correct the wiring fault. 3. Turn the power back on. **NOTE** A power cycle is required to reset the faults.

Code	Fault & Warning	Troubleshooting Guide
#*x*318	Burner Box # - Exhaust VFD - VFD Warning	Check the fault code on the VFD and refer to the user manual to diagnose the fault. Contact GFS technical services if the fault does not reset.
#*x*319	Burner Box # - Exhaust VFD - VFD In Local	Ensure VFD is showing EXT light on. Hit PU/EXT to cycle to EXT.
#*x*320	Burner Box # - Heat Seal 1 - Contactor feedback	Check the auxiliary contacts on the motor starter to ensure they are closing when the starter is enabled.
#*x*321	Burner Box # - Heat Seal 1 - Motor Disconnect	Ensure that the disconnect switch is in the On position.
#*x*322	Burner Box # - Heat Seal 1 - Motor Overload	1. Check MSP Overload and reset if necessary. 2. Ensure setting matches the motor FLA. 3. If it continues to trip, check amp draw on the motor.
#*x*352	Burner Box # - Heat Seal 1 VFD - VFD Fault	Check the fault code on the VFD and refer to the user manual to diagnose the fault. Contact GFS technical services if the fault does not reset.
#*x*353	Burner Box # - Heat Seal 1 VFD - Not Responding	Ensure power is applied to the VFD.
#*x*354	Burner Box # - Heat Seal 1 VFD - Comms Down	Check all Ethernet connections to the VFD.
#*x*355	Burner Box # - Heat Seal 1 VFD - Motor Disconnect	Ensure that the disconnect switch is in the On position.
#*x*382	Burner Box # - Heat Seal 1 VFD - VFD Warning	Check the fault code on the VFD and refer to the user manual to diagnose the fault. Contact GFS technical services if the fault does not reset.
#*x*383	Burner Box # - Heat Seal 1 VFD - VFD In Local	Ensure VFD is showing EXT light on. Hit PU/EXT to cycle to EXT.
#*x*384	Burner Box # - Heat Seal 2 - Contactor feedback	Check the auxiliary contacts on the motor starter to ensure they are closing when the starter is enabled.
#*x*385	Burner Box # - Heat Seal 2 - Motor Disconnect	Ensure that the disconnect switch is in the On position.
#*x*386	Burner Box # - Heat Seal 2 - Motor Overload	1. Check MSP Overload and reset if necessary. 2. Ensure setting matches the motor FLA. 3. If it continues to trip, check amp draw on the motor.
#*x*416	Burner Box # - Heat Seal 2 VFD - VFD Fault	Check the fault code on the VFD and refer to the user manual to diagnose the fault. Contact GFS technical services if the fault does not reset.
#*x*417	Burner Box # - Heat Seal 2 VFD - Not Responding	Ensure power is applied to the VFD.
#*x*418	Burner Box # - Heat Seal 2 VFD - Comms Down	Check all Ethernet connections to the VFD.
#*x*419	Burner Box # - Heat Seal 2 VFD - Motor Disconnect	Ensure that the disconnect switch is in the On position.
#*x*446	Burner Box # - Heat Seal 2 VFD - VFD Warning	Check the fault code on the VFD and refer to the user manual to diagnose the fault. Contact GFS technical services if the fault does not reset.
#*x*447	Burner Box # - Heat Seal 2 VFD - VFD In Local	Ensure VFD is showing EXT light on. Hit PU/EXT to cycle to EXT.
#*x*448	Burner Box # - Burner - Flame Failure	Make sure that the main incoming gas valve is open. Inspect the flame rod and igniter; replace if necessary.
#*x*449	Burner Box # - Burner - Ignition Timeout	The flame safety sequence must be verified; contact GFS technical services for assistance if needed.
#*x*450	Burner Box # - Burner - Flame Lost	Inspect the flame rod and igniter. Refer to the flame safety literature operator manual or contact GFS technical services for assistance if needed.
#*x*451	Burner Box # - Burner - Burner Unextinguished	Inspect the flame rod and igniter. Refer to the flame safety literature operator manual or contact GFS technical services for assistance if needed.

Code	Fault & Warning	Troubleshooting Guide
#*x*452	Burner Box # - Burner - Low Gas Pressure	1. Check for proper incoming gas pressure. 2. Reset the low gas pressure switch.
#*x*453	Burner Box # - Burner - High Gas Pressure	1. Reset the high gas pressure switch. 2. Make sure the switch is set properly to match the burner specifications on the drawings.
#*x*454	Burner Box # - Burner - VPS Fault	Reset the VPS module. Contact GFS technical services if the fault continues to occur.
#*x*455	Burner Box # - Burner - High Temperature Limit Tripped	Check the setting of the HTL and ensure the modulating gas valve is operational.
#*x*512	Burner Box # - Recirc 1 Airflow Switch - No Airflow	1. Check the adjustment of the airflow switch and fan operation. 2. Ensure the motor starter is not tripped. 3. Check belts.
#*x*513	Burner Box # - Recirc 1 Airflow Switch - Airflow Lost	1. Check the adjustment of the airflow switch. 2. Check belts.
#*x*514	Burner Box # - Recirc 1 Airflow Switch - Airflow Switch Stuck	Check the adjustment of the airflow switch.
#*x*544	Burner Box # - Recirc Motor Starter 1 - Contactor feedback	Check the auxiliary contacts on the motor starter to ensure they are closing when the starter is enabled.
#*x*545	Burner Box # - Recirc Motor Starter 1 - Motor Disconnect	Ensure that the disconnect switch is in the On position.
#*x*546	Burner Box # - Recirc Motor Starter 1 - Motor Overload	1. Check MSP Overload and reset if necessary. 2. Ensure setting matches the motor FLA. 3. If it continues to trip, check amp draw on the motor.
#*x*576	Burner Box # - Recirc 1 VFD - VFD Fault	Check the fault code on the VFD and refer to the user manual to diagnose the fault. Contact GFS technical services if the fault does not reset.
#*x*577	Burner Box # - Recirc 1 VFD - Not Responding	Ensure power is applied to the VFD.
#*x*578	Burner Box # - Recirc 1 VFD - Comms Down	Check all Ethernet connections to the VFD.
#*x*579	Burner Box # - Recirc 1 VFD - Motor Disconnect	Ensure that the disconnect switch is in the On position.
#*x*606	Burner Box # - Recirc 1 VFD - VFD Warning	Check the fault code on the VFD and refer to the user manual to diagnose the fault. Contact GFS technical services if the fault does not reset.
#*x*607	Burner Box # - Recirc 1 VFD - VFD In Local	Ensure VFD is showing EXT light on. Hit PU/EXT to cycle to EXT.
#*x*608	Burner Box # - Recirc 2 Airflow Switch - No Airflow	1. Check the adjustment of the airflow switch and fan operation. 2. Ensure the motor starter is not tripped. 3. Check belts.
#*x*609	Burner Box # - Recirc 2 Airflow Switch - Airflow Lost	1. Check the adjustment of the airflow switch. 2. Check belts.
#*x*610	Burner Box # - Recirc 2 Airflow Switch - Airflow Switch Stuck	Check the adjustment of the airflow switch.
#*x*640	Burner Box # - Recirc Motor Starter 2 - Contactor feedback	Check the auxiliary contacts on the motor starter to ensure they are closing when the starter is enabled.
#*x*641	Burner Box # - Recirc Motor Starter 2 - Motor Disconnect	Ensure that the disconnect switch is in the On position.

Code	Fault & Warning	Troubleshooting Guide
#*x*642	Burner Box # - Recirc Motor Starter 2 - Motor Overload	1. Check MSP Overload and reset if necessary. 2. Ensure setting matches the motor FLA. 3. If it continues to trip, check amp draw on the motor.
#*x*672	Burner Box # - Recirc 2 VFD - VFD Fault	Check the fault code on the VFD and refer to the user manual to diagnose the fault. Contact GFS technical services if the fault does not reset.
#*x*673	Burner Box # - Recirc 2 VFD - Not Responding	Ensure power is applied to the VFD.
#*x*674	Burner Box # - Recirc 2 VFD - Comms Down	Check all Ethernet connections to the VFD.
#*x*675	Burner Box # - Recirc 2 VFD - Motor Disconnect	Ensure that the disconnect switch is in the On position.
#*x*702	Burner Box # - Recirc 2 VFD - VFD Warning	Check the fault code on the VFD and refer to the user manual to diagnose the fault. Contact GFS technical services if the fault does not reset.
#*x*703	Burner Box # - Recirc 2 VFD - VFD In Local	Ensure VFD is showing EXT light on. Hit PU/EXT to cycle to EXT.
#*x*704	Burner Box # - Turbulator - Contactor feedback	Check the auxiliary contacts on the motor starter to ensure they are closing when the starter is enabled.
#*x*705	Burner Box # - Turbulator - Motor Disconnect	Ensure that the disconnect switch is in the On position.
#*x*706	Burner Box # - Turbulator - Motor Overload	1. Check MSP Overload and reset if necessary. 2. Ensure setting matches the motor FLA. 3. If it continues to trip, check amp draw on the motor.
#*x*736	Burner Box # - Turbulator VFD - VFD Fault	Check the fault code on the VFD and refer to the user manual to diagnose the fault. Contact GFS technical services if the fault does not reset.
#*x*737	Burner Box # - Turbulator VFD - Not Responding	Ensure power is applied to the VFD.
#*x*738	Burner Box # - Turbulator VFD - Comms Down	Check all Ethernet connections to the VFD.
#*x*739	Burner Box # - Turbulator VFD - Motor Disconnect	Ensure that the disconnect switch is in the On position.
#*x*766	Burner Box # - Turbulator VFD - VFD Warning	Check the fault code on the VFD and refer to the user manual to diagnose the fault. Contact GFS technical services if the fault does not reset.
#*x*767	Burner Box # - Turbulator VFD - VFD In Local	Ensure VFD is showing EXT light on. Hit PU/EXT to cycle to EXT.
#*x*800	Burner Box # - Slot 2 IE4C - Ch0 Underrange	A threshold was changed to customize the slot. Return the threshold to a value within range.
#*x*801	Burner Box # - Slot 2 IE4C - Ch0 Overrange	A threshold was changed to customize the slot. Return the threshold to a value within range.
#*x*802	Burner Box # - Slot 2 IE4C - Ch1 Underrange	A threshold was changed to customize the slot. Return the threshold to a value within range.
#*x*803	Burner Box # - Slot 2 IE4C - Ch1 Overrange	A threshold was changed to customize the slot. Return the threshold to a value within range.
#*x*804	Burner Box # - Slot 2 IE4C - Ch2 Underrange	A threshold was changed to customize the slot. Return the threshold to a value within range.
#*x*805	Burner Box # - Slot 2 IE4C - Ch2 Overrange	A threshold was changed to customize the slot. Return the threshold to a value within range.
#*x*806	Burner Box # - Slot 2 IE4C - Ch3 Underrange	A threshold was changed to customize the slot. Return the threshold to a value within range.
#*x*807	Burner Box # - Slot 2 IE4C - Ch3 Overrange	A threshold was changed to customize the slot. Return the threshold to a value within range.

Program norms and conventions

This section describes the norms and conventions used in the Proven control panel that are consistent throughout the program.

Various screens and popups contain the components (buttons, alarms, and setpoints) listed in the tables below. These components behave the same in each of the objects they represent. For example, an airflow switch on a recirc fan and an airflow switch on a blower will have the same status updates, alarms, and setpoint fields.

Commands

Objects that have manual and auto components display the commands shown in Table 20.

Table 20. Manual and auto commands

Displayed Text	Onscreen Interaction	Description
Auto	Button	Tap **Auto** to put the object into automatic mode. The object will accept commands to start and stop from the nominal PLC programming.
Manual	Button	Tap **Manual** to put the object into manual mode. The object will ignore nominal PLC programming and complete operator requests.
Start	Button	Tap **Start** to turn the object on. **NOTE** This button only works in manual mode.
Stop	Button	Tap **Stop** to turn the object off. **NOTE** This button only works in manual mode.

Airflow switch

Objects that have an airflow switch display the components shown in Table 21.

Table 21. Airflow switch components

Displayed Text	Onscreen Interaction	Description
Motor Running	Status	The motor is running and airflow is expected.
Airflow Detected	Status	Actual feedback from the airflow switch.
No Airflow	Alarm	The motor has been running without airflow for the amount of time set in the No Airflow Delay (s) field. This alarm occurs only when the motor is first started.
Airflow Lost	Alarm	Airflow was unexpectedly lost during normal operation. There is no delay associated with this fault; it occurs immediately after airflow is lost.
Airflow Switch Stuck	Alarm	The motor is off but airflow is still detected.The Airflow Switch Stuck alarm is interlocked with VFDs so they cannot be started until this fault is cleared. This prevents operation with a stuck (or jumpered) airflow switch. **NOTE** It can take a considerable amount of time for the fans to spin down, so the separate Switch Stuck Delay timer is used.
No Airflow Delay (s)	Setpoint	The maximum amount of time (denoted in seconds) for the fan to spin up before raising an alarm.
Switch Stuck Delay (s)	Setpoint	The maximum amount of time (denoted in seconds) for the airflow switch to open once the fan stops. **NOTE** This can take a long time, so it is recommended to set this time to be several minutes long.

Motor starter

Objects that have a motor starter display the components shown in Table 22.

Table 22. Motor starter components

Displayed Text	Onscreen Interaction	Description
Start	Button	Tap **Start** to start the motor.
Stop	Button	Tap **Stop** to stop the motor.
No Power	Alarm	No power to the motor starter.
No Run Interlock	Alarm	The blower cannot run or has been disabled.
Contactor Fault	Alarm	The blower motor starter feedback does not match the motor starter coil signal.

Variable frequency drive (VFD)

Objects that have an optional VFD display the components shown in Table 23.

Table 23. VFD components

Displayed Text	Onscreen Interaction	Description
Start	Button	Tap **Start** to start the VFD if the oven is in manual mode and the user is logged in with operate permissions.
Stop	Button	Tap **Stop** to stop the VFD if the oven is in manual mode and the user is logged in with operate permissions.
No Power	Alarm	No power detected; cannot run the VFD.
No Run Interlock	Alarm	Critical run conditions have not been met. The VFD cannot run without the interlock.
VFD in Local	Alarm	The PLD cannot control the VFD because it is in local control. The user must access the VFD and put it into remote/NET mode.
VFD Warning	Alarm	The VFD has generated a warning. Access the VFD to determine what caused the warning.
VFD Fault	Alarm	The VFD has generated a fault. Access the VFD to determine what caused the fault. Some faults can be reset by tapping **Reset** in the upper navigation buttons on the HMI.
VFD Not Responding	Alarm	The VFD will not turn on or off from PLC command.
Comms Down	Alarm	Communications are to the VFD are failing.
Disconnect Open	Alarm	The VFD disconnect is open. Unless they have been customized, VFDs on the Proven control panel are not monitored.
Max Freq (Hz)	Setpoint	The maximum frequency the VFD will use.
Min Freq (Hz)	Setpoint	The minimum frequency the VFD will use.
Accel Time (s)	Setpoint	Sets the VFD's rate of acceleration. **NOTE** The acceleration time setpoint is divided by 60 Hz. If the setpoint is set to 60 seconds, the resulting acceleration rate will be 1 Hz/s. The acceleration time setpoint is divided by 60 Hz.
Decel Time (s)	Setpoint	Sets the VFD's rate of deceleration. **NOTE** The deceleration time setpoint is divided by 60 Hz. If the setpoint is set to 60 seconds, the resulting deceleration rate will be 1 Hz/s.

Color scheme

All of the components (icons, buttons, alarms, etc.) within the system use the same color scheme for consistency and ease of interpretation. In cases where two events occur simultaneously, the color with the highest priority is displayed.

In Table 24, color indicators at the top have the highest priority, and the priority decreases as you go down the rows.

Table 24. Color scheme

Color Indicator	Description
Blinking red	New fault
Solid red	Acknowledged fault
Blinking orange	New warning
Solid orange	Acknowledged warning
Blinking yellow	Running in manual mode
Solid yellow	Stopped in manual mode
Solid green	Running in auto mode
Gray	Off in auto mode