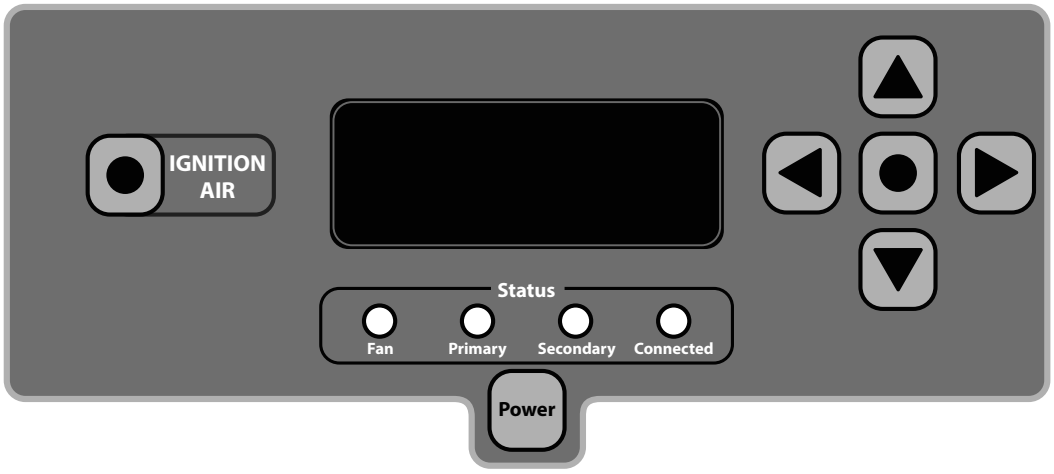
FIRESTAR®
COMBUSTION CONTROLLER
OPERATION MANUAL

SOFTWARE VERSION 6.8x



FIRESTAR® with E-Link Technology

For parts and accessories, service or repairs, call your authorized Central Boiler dealer or heating contractor. Record the information below for future reference.

Serial Number	Installation Date
Dealership Name	Phone Number
Owner Name	

MADE IN USA

Save This Manual
For Future Reference

(p/n 9000720) - Rev. D - AUG. 2021

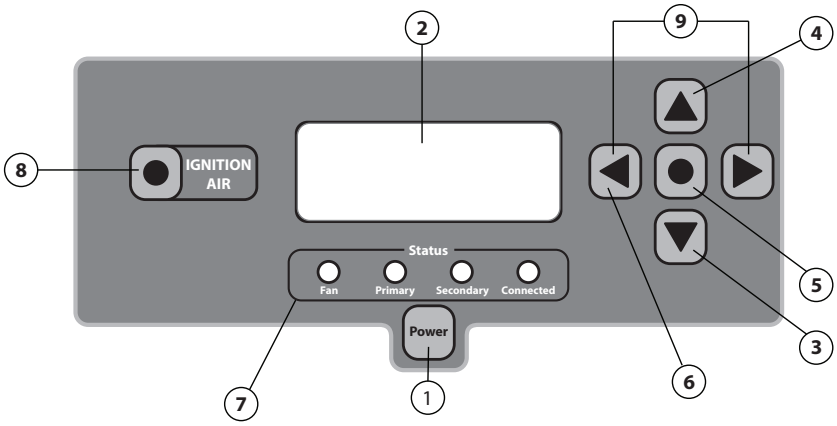
Contents

How to Use This Guide

The guide is divided into sections to help with the operation of the FireStar Combustion Controller. If questions arise that are not answered with this manual, consult with your authorized Central Boiler dealer.

Overview

FireStar Combustion Controller



The FireStar Combustion Controller uses a number of sensors and sophisticated programming to optimize the operation of the outdoor furnace. The controller will automatically adjust the amount of primary and secondary air to optimize the gasification process, making the outdoor furnace more efficient and clean burning.

If the controller detects an abnormal condition (for example, the water level is low or the fire has gone out because there is no more wood in the firebox), the controller will display a message to alert you.

Before operating the FireStar Combustion Controller, become familiar with the information the control panel provides and with the procedures for making changes to settings.

How to Check the Controller Software Version Number

Press the Power button to turn the controller off, wait a moment, and then press the Power button again to turn the controller back on. During startup, the current software version number will be displayed, followed by the current furnace model that the controller is installed on.

1. **Power button** - used to turn the FireStar Combustion Controller on and off. It does not disable all electrical power to the furnace.

   To disable electrical power to the furnace: shut the breaker off in the house or wherever the source of power to the furnace is.

   To disable electrical power to the controller: shut off the circuit breaker located in the pump compartment. The circuit breaker in the pump compartment does NOT shut off power to the furnace.

2. **LED display** - displays the furnace water temperature (and the Reaction Chamber % if enabled). Other information will also be displayed on the LED display depending on setting, modes, alarms, warnings, etc.

3. **DOWN arrow button** - if quickly pressed four times, the display will start alternating water temperature and Reaction Chamber % (only alternates when the fan is running).

4. **UP arrow button** - if pressed and held during normal operation, the LED display will show the current Reaction Chamber % (as it relates to the combustion temperature).

5. **Center MENU button** - used to enter the menu system to adjust settings, and to enter changes to those settings when used in combination with the UP and DOWN arrows.

6. **LEFT arrow button** - if pressed and held, it will display the temperature sensed by the optional return water temperature kit. To lock the controller, quickly press the LEFT arrow button four times. LOCK will display on the LED display.

7. **Status indicator LEDs** - display the current state of furnace operation. The Connected LED indicates the status of the controller's Wi-Fi connection, when enabled.

8. **IGNITION AIR button** - used to bypass the normal door open function. If this button is pressed while the furnace door is open, the primary air actuator will open, helping to light the fire in the firebox.

9. **LEFT arrow button + RIGHT arrow button** - if pressed and held at the same time, it will display the total amount of time the fan has been running for this load of wood.

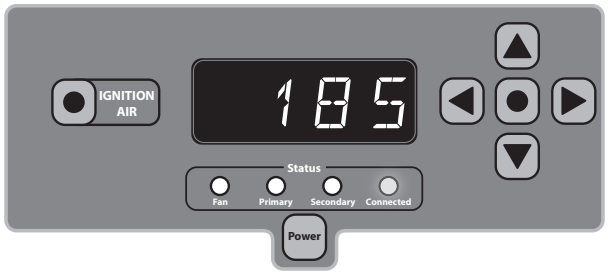
Outdoor Furnace Operation

Power

OVERVIEW: Turn the FireStar on or off by pressing the Power button. Look for the software version as the controller is turning on.

When the controller is off, the LED display will be off. To turn the controller on or off, press the Power button. Upon startup, the controller will display a number indicating the software version number followed by the furnace model number. Once the controller is on, briefly pressing the Power button will display the software version number. The settings and operation described in this article are for software version 6.8. Other software versions will operate differently.

Standby/Idle



OVERVIEW: Once the water is at the temperature you set, the controller waits until the water temperature drops before entering into one of the burn cycles.

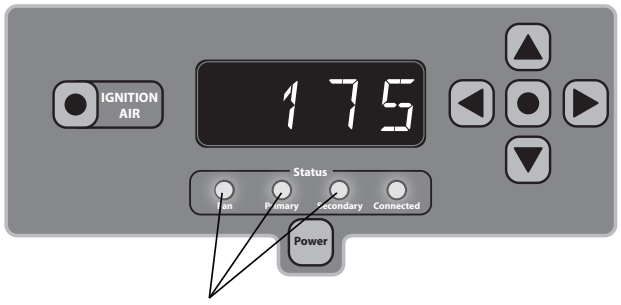
After the water temperature has risen above the Water Temperature Setpoint, the controller will go into Idle. When in Idle, the LED will display the furnace water temperature and the fan, primary and secondary air lights will be off. The connected light may be on, depending on Wi-Fi connection status.

Idle Pulse

OVERVIEW: When the controller is in idle, it adds a short burst of air occasionally to keep the fire in the coal bed ready.

While in idle, the combustion fan will start and the primary and secondary air actuators will open for a short time every 30 minutes to maintain the coal bed (the initial pulse will wait 60 minutes). Air will continue to flow until the temperature in the Reaction Chamber rises above 225°F. In recent software versions, the word PULSE will be displayed in the LED display.

Demand Mode

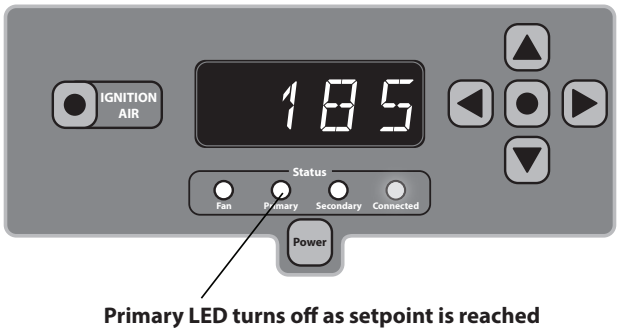


Fan, Primary and Secondary LEDs will be illuminated

OVERVIEW: When the water temperate drops enough, the controller starts to add air, which in turn gets the wood burning, causing the Reaction Chamber temperature to rise.

When the water temperature drops below the Water Temperature Setpoint minus the Water Temperature Differential, the controller will enter Demand Mode. During Demand Mode, the fan, primary and secondary LEDs will be illuminated.

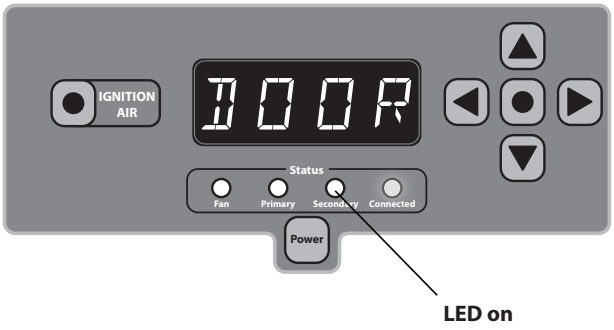
Idle Transition Mode



OVERVIEW: Once the water temperature reaches the water temperature you set, the primary air is shut and the secondary air is slowly shut off while burning off the remaining gases.

As the water temperature setpoint is reached in Demand Mode, the primary air actuator will close to stop combustion and the Primary status LED will turn off. The combustion fan will stay on for a while with the secondary air actuator open, and then the fan will shut off. This transition mode allows the combustion process to ramp down and burn off the gasification products before the furnace goes into idle.

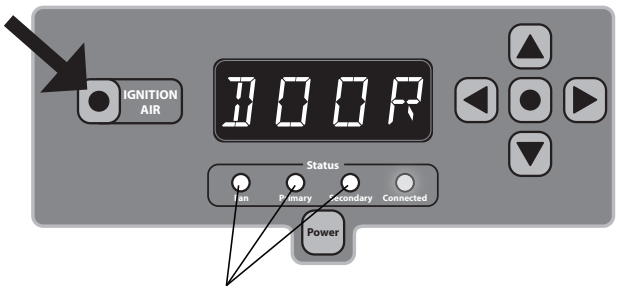
Door Open



OVERVIEW: Indicates that the firebox door is open. The combustion fan will be running to vent gases from the furnace.

Opening the furnace door automatically places the furnace in Door Open Mode. In this mode, the primary air actuator is closed, the combustion fan is on, and the secondary air actuator is open to continually vent gases from the Reaction Chamber. The Secondary status LED will be illuminated while the actuator is open. DOOR will be displayed in the LED display.

Ignition Air



Fan, Primary and Secondary LEDs will be illuminated

OVERVIEW: Press the Ignition Air button with the firebox door open to add air and help ignite a new load of wood.

When pressed with the firebox door open: If the water temperature is below the water temperature setpoint, the primary air actuator will be open significantly and the secondary air actuator will be open slightly. This will provide air to the firebox, helping to ignite a new fuel load. The burning time monitor is also reset. To exit this mode, close the furnace firebox door to allow the furnace to shift into Demand mode.

When pressed with the firebox door closed: If the water temperature is below the water temperature setpoint, the furnace will immediately shift into Demand mode, even if the water temperature has not yet fallen below the water temperature setpoint minus the water temperature differential. The burning time monitor is also reset.

NOTE: Ignition air will not run if the water temperature is at or above the water temperature setpoint. If the Ignition Air button is pressed when the water temperature is above the water temperature setpoint, all that will happen is that the burning time monitor will be reset.

Burning Time Monitor

Accumulated Fan Time Since Last Loading

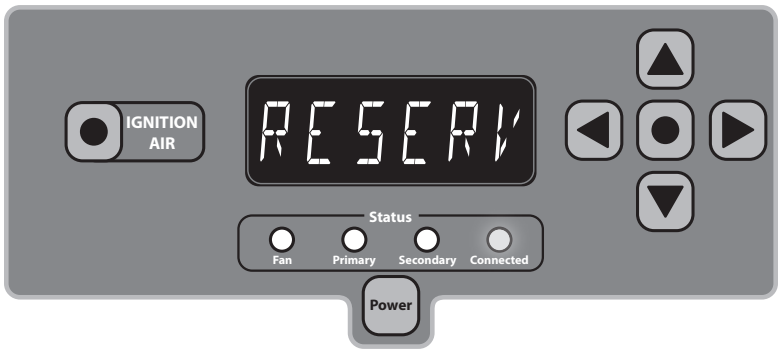
OVERVIEW: Burning time is the ***total amount of time the fan has been running*** *for this load of wood. It is not the actual time since you last loaded wood.*

The controller monitors how long the fan has been activated during the current wood load. To view the accumulated fan time for this load, press and hold the LEFT and RIGHT button at the same time. This monitor will reset to 00:00 each time the furnace is loaded with wood (i.e., the firebox door is left open for more than 30 seconds). To manually reset this monitor, press the Ignition Air button.

To learn more about the Burning Time Monitor, visit https://centralboiler.com/support.

Reserve Mode

Burning Time Limit



OVERVIEW: The Reserve Mode burning time limit feature will cause the controller to go into an Idle mode once it reaches the burning time limit that you choose. This can aid in the successful ignition of the next wood load. This is a useful feature if you're burning higher moisture wood or if you frequently let your furnace run out of wood.

This feature limits the amount of burning time (accumulated fan time since last loading) that is allowed between loadings in an effort to reserve a portion of the current wood load until the next loading. When RESERVE MODE is displayed on the controller, the furnace has limited-out and will remain in Idle state until the furnace is loaded with wood (i.e., the firebox door is left open for more than 30 seconds) or until the Ignition Air button is pressed.

The Reserve Mode burning time limit is operator-adjustable and should be set to appropriately match the amount of wood that is being loaded into the furnace. It can be disabled by setting the limit below 00:15 minutes so that the controller reads " - - - - ".

NOTE: "Reserve Mode" was previously displayed as either "Refire Mode" or "Coal Bed Saver Mode" in earlier software versions. These phrases are synonymous and describe the same operational feature. If the furnace is connected to the internet, a software update can be performed to obtain the latest version.

To learn more about how to successfully use the Reserve Mode burning time limit for your benefit, visit https://centralboiler.com/support.

Basic Controller Features

Adjusting Water Temperature Setpoint

The default setting is 185˚F. To change the water temperature setpoint, press and hold the center MENU button; then press the UP button to raise the water temperature setpoint or the DOWN button to lower the water temperature setpoint. This setpoint can be adjusted from 170˚F to 195˚F. Release all buttons to store the newly adjusted setpoint.

NOTE: To reduce condensation in the firebox, it is recommended to set the Water Temperature Setpoint at or above 185˚F.

NOTE: If the water temperature regularly exceeds the Water Temperature Setpoint, lower the setpoint to avoid over-heating the furnace and losing water though steam or a boil-over.

To Lock/Unlock Controller

The controller can be locked to prevent unauthorized access to the controller settings. **To lock the controller**: Quickly press the LEFT button four times. The LED display will indicate (locked) for several seconds. **To unlock the controller**: Quickly press the LEFT button four times. The LED display will indicate (unlocked) for several seconds.

NOTE: The controller can be locked while it is off. If the controller is locked while it is off, it will have to be unlocked before it can be turned on.

Power Outage

In the event of a power outage, all controller settings will be saved. When power is restored, the controller will continue operating as it was prior to the power outage.

Setup Mode and Adjusting FireStar Settings

The FireStar Combustion Controller provides you with preferences you can adjust.

To Enter Setup Mode

Press and hold the center MENU button for 10 seconds until the LED display changes from the water temperature to 1. The controller is now in Setup Mode. If no buttons are selected before ten seconds, the controller will automatically exit Setup Mode.

Changing Control Preferences

While in Setup Mode, refer to the Preferences Chart and select the control variable you want to change using the UP or DOWN buttons. Press the RIGHT arrow button to select the variable by menu number. Use the UP or DOWN buttons to adjust the variable to the desired setting. Press the center MENU button to save the setting and return to Setup Mode.

To Exit Setup Mode

Wait 10 seconds (without pressing any buttons) and the controller will automatically exit Setup Mode.

To reset controller to default settings:

1. Press the **Power** button to turn off the controller; then, while pressing and holding the **Ignition Air** button, press the **Power** button to turn on the controller. The LED display will momentarily indicate "CS" (clear settings).

2. WAIT a moment while the controller auto-detects the furnace model.

   (If SELECT MODEL is displayed, press the UP or DOWN button to manually select a furnace model; then press the center MENU button to save.)

3. Continue to press the UP button as shown on the display to perform each diagnostic test. The last message will display PRESS UP TO EXIT. Press the UP button and the controller will run using factory default settings.

4. If the furnace was connected to the internet prior to resetting to default settings, it may be necessary to enable Wi-Fi again by setting Menu Item #8 to a value of 1 (see Setup Mode and Adjusting FireStar Settings).

Preferences Chart

The Preferences Chart displays each user-adjustable variable, its menu number, a brief description, the default setting, and the minimum and maximum values that can be set.

Menu #	Setting	DEFAULT	Min.	Max.
1	**WATER TEMPERATURE DIFFERENTIAL** Normally the water temperature must fall this many degrees below the Water Temperature Setpoint before shifting from Idle into Demand mode. This differential is bypassed if the water temperature is below the Water Temperature Setpoint and either (a) the firebox door is opened and then closed, or (b) the controller is turned off and back on.	20˚F (11˚C)	5	25
2	**IDLE PULSE TIMEOUT** The length of time between air pulses while the controller is in Idle. Before the very first pulse in idle, this timeout length is doubled (60 minutes by default).	30 (minutes)	0	59
3	**MINIMUM PULSE DURATION** The pulse function will operate for at least this long, even if the Reaction Chamber temperature is above the temperature from menu #4 - 225˚F (107˚C).	50 (seconds)	0	255
4	**IDLE PULSE TEMPERATURE** The idle pulse will continue until the temperature in the Reaction Chamber is above this temperature.	225˚F (107˚C)	100	400
5	**REACTION CHAMBER % DISPLAY ENABLED** The furnace's Reaction Chamber % can be manually viewed at any time by pressing and holding the UP button on the FireStar controller. However, when this variable is set to 1, the FireStar controller display will alternate between the water temperature and the Reaction Chamber % without the need to press and hold the UP button. This alternating display will only show while the fan is running in Demand mode.	1	0	1
6	**RESERVED**	1	-	-
7	**RESERVED**	1	-	-
8	**WI-FI ENABLED** After configuration has been performed, use this menu item to disable (or enable) the Wi-Fi feature without losing your network settings. During a new installation, proceed directly to menu item #9 to enable Wi-Fi for the first time.	0	0	1
9	**ENABLE WI-FI CONFIGURATION** Setting this to 1 will enable Wi-Fi and turn on the configuration network. This will erase any current Wi-Fi settings. When the Connected light turns blue, find the Firestar_network on your smartphone; then visit http://www.wifiset.net to configure your network settings.	0	0	1
10	**WI-FI WIRELESS N SUPPORT ENABLED** When set to 1, the FireStar will be able to use the 5gz frequency (where available). May significantly lower Wi-Fi range.	0	0	1
11	**RESERVED**	0	0	1

Menu #	Setting	DEFAULT	Min.	Max.
12	**WI-FI NETWORK SSID (READ ONLY)** Displays the current Wi-Fi network being used by the FireStar. To use a different network, reconfigure the FireStar using menu item #9.	-	-	-
13	**WI-FI SERIAL NUMBER (READ ONLY)** Displays the serial number of the furnace used during Wi-Fi communication. Typically begins with a letter. An incorrectly entered serial number can be adjusted by visiting http://myfirestar.com/find on a smartphone that is attached to the same Wi-Fi network as the FireStar.	-	-	-
14	**WI-FI IP ADDRESS (READ ONLY)** Displays the local IP address assigned to your FireStar by your Wi-Fi router. The FireStar must be successfully connected to Wi-Fi first. This is a read only item--if a static IP is desired, you must set a reservation on your router by MAC address.	-	-	-
15	**WI-FI CLEAN RELOAD ENABLED** When set to 1, the FireStar will be able to use the Clean Reload feature through the MyFireStar.com site.	0	0	1
16	**SYSTEM TEST** When set to 1, a system test in initiated. During the test, press the UP button as shown on the display to perform each diagnostic test. The last prompt will display PRESS UP TO EXIT. After exiting the test, turn the FireStar off and back on to ensure that the furnace returns to normal operation.	0	0	1
17	**FACTORY HARDWARE CONFIGURATION** Factory use only. Do not adjust.	- (varies)	0	1
18	**LOW WATER TEMPORARY OVERRIDE WATER LEVEL SENSOR** Check the water level at the sight gauge and, if necessary, add water according to the Water Quality and Maintenance section of the Owner's Manual. If adding water does not clear the LOW WATER alarm, set this variable to 1 to ***temporarily*** silence a false LOW WATER level sensor alarm. The controller will operate normally until the next loading (until the firebox door is left open for more than 30 seconds). This will allow operation for one loading (must override each loading) until a repair can be made. Do not override this alarm if the system has a leak. **NOTE: If water is added to the outdoor furnace and/or system, the system water should be tested and corrosion inhibitor should be added (if necessary) to maintain the recommended level of protection (see Owner's Manual).**	0	0	1
19	**ENABLE CELSIUS** When set to 1, all temperatures will be displayed in Celsius. Changing between Fahrenheit and Celsius will cause any custom temperature settings to be reset to the factory default settings.	0	0	1

Menu #	Setting	DEFAULT	Min.	Max.
20	**RESERVE PULSE ENABLED** This setting is only utilized when the optional Reserve Mode burning time limit feature (see menu item #21) has also been enabled. When set to 1 and the Reserve Mode burning time limit has been met, the Idle Pulse (see menu items #2, #3 and #4) will be used to maintain active coals in the portion of the wood load that is being preserved. When set to 0, no Idle Pulse will be used.	1	0	1
21	**RESERVE MODE BURNING TIME LIMIT** This feature allows you to limit the amount of Burning Time (accumulated fan time since last loading) that is allowed between loadings in an effort to reserve a portion of the current wood load until the next loading. Before adjusting this setting, you should have a good understanding of how the Burning Time Monitor works, as well as a good understanding of the amount of wood that is being loaded into the furnace. To disable, set below 00:15 minutes so that the controller reads " - - - - ". To learn more about how to successfully use the Reserve Mode burning time limit for your benefit, visit https://centralboiler.com/support.	06:00 (6 hrs)^{360} 07:00 (7 hrs)^{560} 08:00 (8 hrs)^{760} 10:00 (10 hrs)^{960}	- - - - (disabled)	99:00 (99 hours, 0 min.)

LED Display Alarm Definitions

The LED display will display an alarm message when abnormal conditions appear. If any of the following messages appear, take corrective action.

FIRE OUT

When the system is calling for heat, if the temperature in the Reaction Chamber has been below 300˚F for 60 minutes and does not rise more than 5˚F, or after three hours even if the temperature is rising, the combustion fan will turn off and the primary air actuator will close. This alarm is reset by opening and closing the furnace door, or by turning the controller off and back on.

HIGH TEMP 1

The temperature sensor connected to the FireStar combustion controller has detected that the water temperature is above 200˚F. The controller will continue to alternate between HIGH TEMP 1 and the water temperature until it senses that the water temperature has fallen below 199˚F.

HIGH TEMP 2

The external high limit sensor has sensed that the water temperature is above 200˚F and has disconnected power to the combustion fan and actuators. The controller will continue to alternate between HIGH TEMP 2 and the water temperature until it senses that the external sensor has reconnected power. This will normally happen when the sensor cools to 165˚F.

LOW WATER

The water level in the furnace has fallen below the level of the water level float switch. This alarm will only clear when the water level is above the float switch. Check the water level at the sight gauge and, if necessary, add water according to the Water Quality and Maintenance section of the Owner's Manual.

NOTE: If water is added to the outdoor furnace and/or system, the system water should be tested and corrosion inhibitor should be added (if necessary) to maintain the recommended level of protection (see Owner's Manual).

PULSE

While in idle, the combustion fan will start and the primary and secondary air actuators will open for a short time every 30 minutes to maintain the coal bed (the initial pulse will wait 60 minutes). The pulse will continue until the temperature in the Reaction Chamber rises above 225˚F.

RESERVE MODE / REFIRE / COAL BED SAVER

The furnace has shut down because the optional Reserve Mode burning time limit has been met. This alarm is reset automatically during the next loading (when the firebox door is left open for more than 30 seconds). Pressing the **Ignition Air** button will also reset this alarm.

LOCKED

This will be displayed when any button is pressed while the controller is locked. When the controller is locked, all buttons are disabled. To lock and unlock the control, quickly press the LEFT arrow four times.

UNLOCKED

This will be displayed once after unlocking the controller.

BYPASS

The bypass door is open (if applicable to your model).

DOOR

The firebox door is open.

REACTION DOOR OPEN

The Reaction Chamber door is open (if your model is equipped with a Reaction Chamber door switch).

T-59, T-58, T-57, etc.

The furnace is currently in Idle Mode (no pulse) because the Clean Reload Idle feature has been activated. This T-minus countdown represents the number of minutes remaining before the furnace will resume normal operation.

To learn more about how to successfully use the Clean Reload Idle feature for your benefit, visit https://centralboiler.com/support.

TC1

The thermocouple in the Reaction Chamber outlet is unplugged, is disconnected, or has been damaged. The LED display will flash TC1 to indicate that the system is not operating at optimal efficiency. Contact your dealer.

TC2

The thermocouple in the Reaction Chamber outlet is shorting to ground, has absorbed moisture, or has been damaged. The LED display will flash TC2 to indicate that the system is not operating at optimal efficiency. Continue to operate the furnace. If the alarm does not clear within a few days, contact your dealer.

A-1

The thermocouple in the Reaction Chamber outlet is attempting to gather accurate Reaction Chamber temperature readings. The LED display will flash A-1 to indicate that the system is not operating at optimal efficiency. Wait 5 minutes for the alarm to clear. (You can also power cycle the furnace's main breaker to bypass this delay).

If the alarm recurs, take note of recent Reaction Chamber readings and contact your dealer.

INVALID MODEL

This message indicates that the FireStar controller's model setting does not match the actual furnace model the controller is installed on. The furnace will continue to operate normally (as the invalid model).

Power the controller off and back on to clear this alarm. If the alarm recurs, reset the controller to default settings according to Setup Mode and Adjusting FireStar Settings section.

NOTE: Model detection is performed by looking at the furnace's wiring harness. If the wiring harness has recently been damaged, repaired or replaced, contact your dealer for further assistance troubleshooting this alarm.

STEP FAIL 1, STEP FAIL 2

If the display indicates one of these messages, it indicates a protection fault to one of the stepper motor drives. Power the controller off and back on to clear this alarm. If the alarm recurs, contact your dealer.

EF

The message will indicate that the controller was unable to recover from a memory failure. All settings will be reset to the factory default settings and will not be saved if the controller is turned off or power is interrupted. In the event of a power outage, the controller will not restart when power is restored. Contact your dealer.

Connecting FireStar Combustion Controller to Wi-Fi Network

The FireStar Combustion Controller's integrated Wi-Fi allows you to connect to your local Wi-Fi network and take advantage of the online features when you create an online account.

YOUR WIRELESS NETWORK AND FURNACE INFORMATION

Record information about your home's wireless network and your furnace.

_____

Wireless Network Name

_____

Wireless Network Password

_____

Your Furnace Serial Number

CONNECT TO YOUR WI-FI NETWORK

1. Disconnect power to the furnace.
2. Using a 1/4" nut driver or socket, remove the two screws and open the control panel.
3. Remove the round plug on the left side of the control.
4. Install the supplied grommet into the hole (grommet is located in the bag with the Owner's Manual).
5. Align the antenna through the grommet and tighten it onto the gold threaded connector installed on the side of the control panel. Take care not to cross-thread the antenna and damage the threads on the connector.
6. Connect power to the furnace and turn on the control.
7. Press and hold the center MENU button until 1 is displayed.
8. Turn on the Wi-Fi configuration network by pressing the up or down arrow until menu #9 is displayed. Press the RIGHT arrow to display the setting stored in menu #9. Use the UP arrow to change this setting to 1. Press the center MENU button to store this setting. The connected light will start flashing blue.
9. Watch the connection LED as the control enters Wi-Fi setup mode. When the LED is a steady blue (not flashing), the control is ready to be configured.

10. On a smartphone or other Wi-Fi enabled device, find the Firestar_XXXX network and connect to it.

11. If a setup page doesn't launch automatically, open a web browser on the connected device and navigate to www.wifiset.net. You may need to temporarily turn off your cellular data and/or "refresh" the page a few times before the setup will load.

12. Your browser will display the FireStar Setup page. Select the Wi-Fi network SSID you would like to connect to. Select your Wi-Fi security type (if asked) and enter your Wi-Fi password and furnace serial number (SSID and password are case-sensitive).

13. Click the connect button. The control will now turn off the configuration network and attempt to connect to your selected Wi-Fi network.

14. The connection LED will flash blue while it is attempting to connect. When the LED is a steady green, the control is connected to your network.

15. If the control fails to connect, the connection LED will be steady red. Verify your personal Wi-Fi network's SSID and password before performing the setup steps again.

16. Visit https://centralboiler.com/support for more detailed "Connecting to Wi-Fi" instructions.

MYFIRESTAR.COM ACCOUNT

Create your online account at MyFireStar.com and access information about your furnace from anywhere via your web browser, smartphone or other web-enabled devices.

Record your User Name and Password once you have created them for your MyFireStar.com account.

_____

User Name

_____

Password

NOTES

NOTES

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