

Operation Manual

Genesis Spark

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Introduction

This manual covers the operation of the Genesis Spark kiln controller. The Genesis Spark is a versatile touch screen controller that regulates the temperature in your kiln so you can fire a variety of products like ceramics, glass, jewelry, and more. The Genesis Spark has preset ceramic programs with cone fire programming, preset glass firing profiles, and 30 custom programs, along with Wi-Fi capabilities for software updating, built in diagnostics, and maintenance logging among other new features.

Precautions

- The controller is used to control temperature; it is not a safety device.
- Do not operate the controller in temperatures above 160°F.
- Always supervise your kiln during a firing.
- The controller contains electronic components which are sensitive to static electricity. Before handling the controller dissipate any static charge you may have by touching metal or a screw on the controller panel, the electrical box, the kiln lid, or some other grounded object.
- Always check the position of the thermocouple probe before starting a firing. The current temperature displayed on the controller is measured at the end of the thermocouple which must be in the firing chamber about 1" to 1-1/2". Seal the opening around the thermocouple with kaowool or similar material if necessary.
- Always review the current program before firing to ensure the correct profile is programmed.
- Ensure the kiln and the areas around the kiln are clear of combustible material. See kiln manufacturer's recommendation on required clearances.

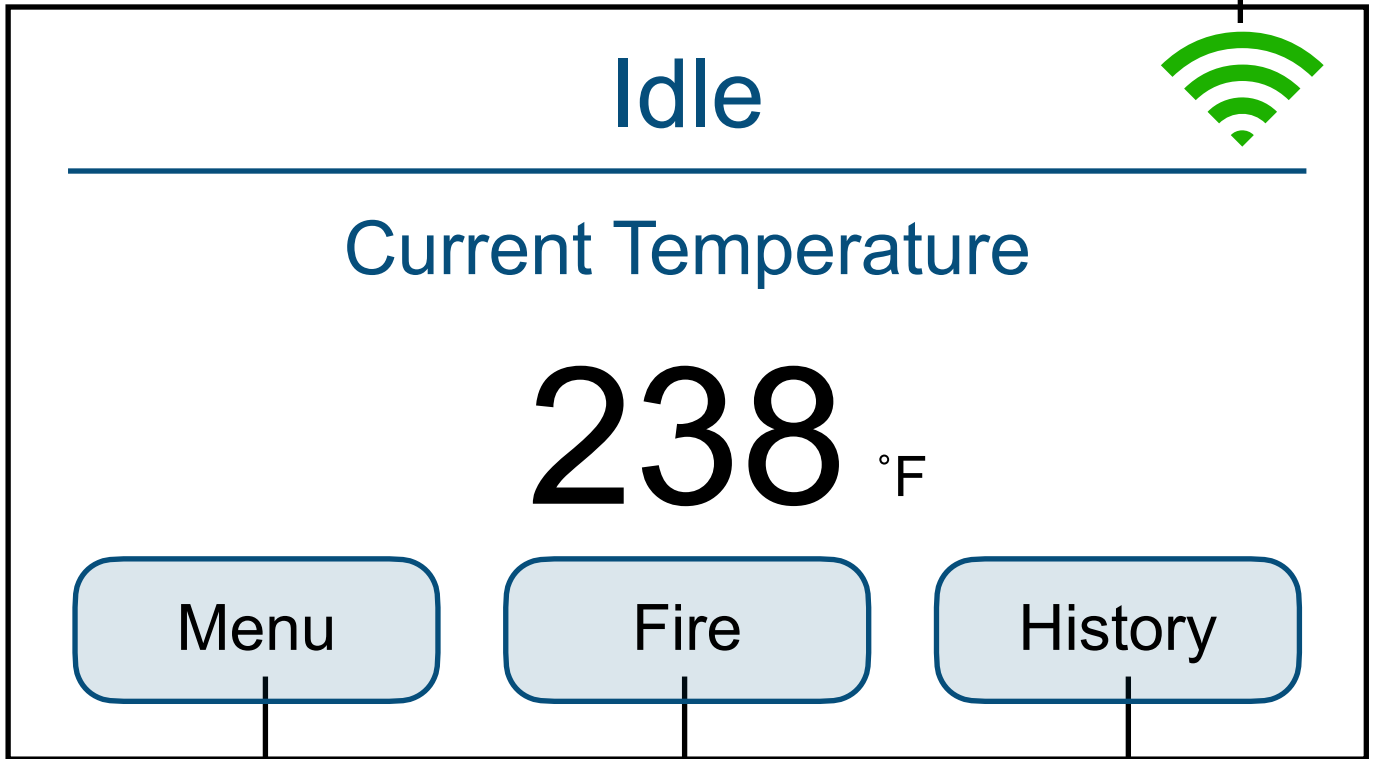
First Firing of the Kiln

The purpose of the first firing is to put a protective oxide layer on the elements and thermocouple. The first firing is done without ware in the kiln that might give off fumes that contaminate the elements. It should be done according to the kiln manufacturer's specifications. Consult your kiln manufacturer for questions on the first firing of the kiln.

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| Firing History |
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| List of the recent firings so you can view data <i>or</i> start controller with the same configuration of a previous firing. |

* Firing Type Menu options are configurable. To view how to configure which options are viewed in the Firing Type Menu see Page 12.

Quick Start

Step 1: Load A Program (See Pages 9-11)

- Press the Fire button to see the Firing Type Menu.
- Select the type of program.
 - Cone Fire
 - Glass
 - PMC
 - Heat Treat
 - Custom
 - Library

Step 2: Review or Edit the Program (See Pages 11)

- After you have finished completing the program details you will see a program overview screen.
- Press the Schedule button to see the firing details

Step 3: Start the Firing (See Page 11-12)

- Press the Start button to start the firing now

Menu

Press this button to see all of the menu sub-items in order to view, adjust and configure your controller.

Data Menu

The Data Menu holds 3 types of information: diagnostic, status, and kiln information.

Last Firing Status

Contains diagnostics information specific to the last firing of the kiln.

Last Error Status

Contains diagnostic information specific to the last error that was encountered by the controller when firing.

Last Manual Diagnostics

Contains diagnostic information from the last manual diagnostics test. This includes line voltage readings, and board output.

Factory Diagnostics

Contains diagnostic information from factory. This includes line voltage readings, and board output. This information can be used for comparison when a manual diagnostic test is run

Last Element Change

Contains diagnostic information from the last new elements diagnostics. This includes line voltage readings, and board output.

Export Log Files

Used to activate Server Mode. This allows the controller to “serve” a file to a computer/ phone that is on the same access point as the controller. When “Export Log File” is pressed, the controller will list an IP address and a code. Type the address listed on the controller into your internet browser and then enter the code when prompted.

The last 10 firings will be listed and each firing has 2 files – the temperature data and the event file. The temperature file collects data every 30 seconds. The event file collects data any time an “event” occurs such as a hold or an error occurs. Click on the file to be observed to download it.

Kiln Info

Contains the firmware version plus the serial number and mac address for registering and viewing your kiln at www.bartinst.com. Updating firmware will NOT affect the firing programs.

Diagnostics

Board Temperature: X°

Displays the current board temperature. Displaying the board temperature is a diagnostics function to check the operation of the board. The safe range for board temperature is between 0°F - 160°F. Any temperatures below or above that range may cause damage to the controller.

Run Manual Diagnostics

This is used to manually begin a diagnostics test. It turns on each section of elements to read voltage. The results are stored under Data Menu – Last Manual Diagnostics.

New Element Diagnostics

Run New Element Diagnostics when the elements have been changed to record voltages for the new element. The results are stored under Data Menu – Last Element Change.

Run Power Test

Selecting this option runs the full power test for your controller. This test is used to check the relays and elements of the kiln. To set the controller for a full power test, you can use the Diagnostics tool, Full Power Test, in the Diagnostics menu. With the kiln empty and the lid open, start the firing. Visually inspect the elements after the kiln has fired for 20 – 25 minutes. Observe each element from where it comes into the kiln all the way around to see that it is equally bright throughout. The following observations are possible:

One section of the kiln is dark and not coming on. – This could indicate a defective relay since there is usually one relay per section.

One element is not glowing at all. – This indicates a broken or bad element.

There are darker (Cool) spots along the elements. – This indicates worn elements.

The top and bottom elements appear brighter. – This is normal for many kilns that have hotter elements in the top and bottom.

After you've made your observations, turn off the kiln. Contact your kiln manufacturer for kiln replacement parts (relays and elements). If there is an issue with your controller, please contact us.

Relay Health: X

Keep track of the number of on/off cycles of the relays on your kiln. An on/off cycle will be counted as one. When a relay is replaced, press the corresponding zone and press the RESET button to set the number of cycles back to 0.

Firing Hours: X.X

Shows the number of total hours fired by the controller.

Adjustments

Adjustments allows you to change the Cone and Thermocouple offsets as well as the PID Gain and Dampening Factor.

Cone Offsets

Cone offset is used to raise or lower the final cone temperature. The final cone temperature can be raised or lowered a maximum of 99°F (37°C). To correct an under-firing set a positive cone offset. To correct an over-firing, set a negative (-) cone offset. To change the Cone Offset, press “Cone Offset”, and use the scroll bar to select the cone offset. When the correct cone is displayed, press “Edit”, enter the desired offset and press “Save”.

TC Offset: X°

Thermocouple offset is used to raise or lower the temperature indicated by the thermocouples. This is generally used to balance the heat-work in a zone controller kiln. The maximum TC Offset is 99°F (37°C). To correct an under-firing set a negative TC Offset. To correct an over-firing, set a positive TC Offset. To change the TC Offset for thermocouple 1, press “TC Offsets”, press “TC1 Offset”, enter the desired number and press “Save”. Repeat for TC2 Offset and TC3 Offset if needed.

PID Gain: X

Check with your kiln manufacturer before making changes to this setting.

Dampening Factor: X

Acceptable factors are between 1-10; this is typically set by the kiln manufacturer. If you need to adjust contact your kiln manufacturer before making changes to this setting.

Configuration

Error Codes

This menu option is used to turn error codes on or off.

UI Theme

This menu option allows you to choose the color scheme for your controller. There are 5 color combination options. Each combination can be shown in light, dark or solid mode. Simply press the color and mode you prefer for your controller.

Customization

Customization allows you to change what firing type menus are available. If none are selected only custom programs will be shown from the Firing Type menu. The menus that show may be defaulted by your kiln manufacturer.

Cone Menu

Allows the user to enable or disable the cone fire programming menu. When disabled, the Bisc and Glaze programs will be removed under “Fire”.

Glass Menu

Allows the user to enable or disable the glass programming menu. When disabled, the glass programs will be removed under “Fire”.

PMC Menu

Allows the user to enable or disable the precious metal clay programming menu. When disabled, the glass programs will be removed under “Fire”.

Heat Treat Menu

Allows the user to enable or disable the heat treat programming menu. When disabled, the glass programs will be removed under “Fire”.

Temperature F/C

Choose which temperature scale to use with your kiln, Fahrenheit or Celsius. To change the temperature scale, press “Temperature F/C”, press the desired temperature scale, either “Fahrenheit” or “Celsius”, and press “Save”.

Cost Setup

This menu option allows you to enter a cost per hour for your energy usage. By entering this information you can see the estimated cost for a firing.

Start Code

The Start Code is entered to start a firing. Enter any 4 number combination and press “Save”. Default = 1. This will be entered anytime the kiln is fired.

WiFi

To set up Wi-Fi for the Spark, press “WiFi” and the controller will scan for nearby networks. Select your desired network and enter the password (if required) and press “Save”.

Calibrate Touch

Used to re-calibrate the touch screen if buttons aren’t working properly. Press the “Calibrate Touch” button and follow the onscreen instruction to re-calibrate.

Software Reset

Use this option if you need to restart your controller for any reason.

Restore Presets

Restore all preset programs and offsets to factory settings.

Restore Cone Offsets

Reset cone offsets to factory settings. Default Cone Offset = 0 for all cones. To reset: Press “3-Reset Cone Offs” and press “RESTORE”.

Restore Glass

Restore the Glass firing setting back to factory. Once “RESTORE” is pressed, any changes made to the Glass profiles will be restored back to factory and cannot be undone.

Restore Factory Default

Restore the entire controller to the default factory settings. Take caution using this menu option as it will reset any customization.

Factory Protected

Factory configuration is used by the kiln manufacturer to set kiln specific parameters for the controller such as thermocouple type, top temperature, and board temperature. For more information, see the technical manual online. Contact the kiln manufacturer before making any changes that might damage the kiln.

Fire (Start a Firing)

Important: Pressing the Fire button does not immediately start a firing.

This button takes you to the type of firing programs you can start. Each of these types are described below. To configure this menu, go to Menu > Data Menu > Configuration.

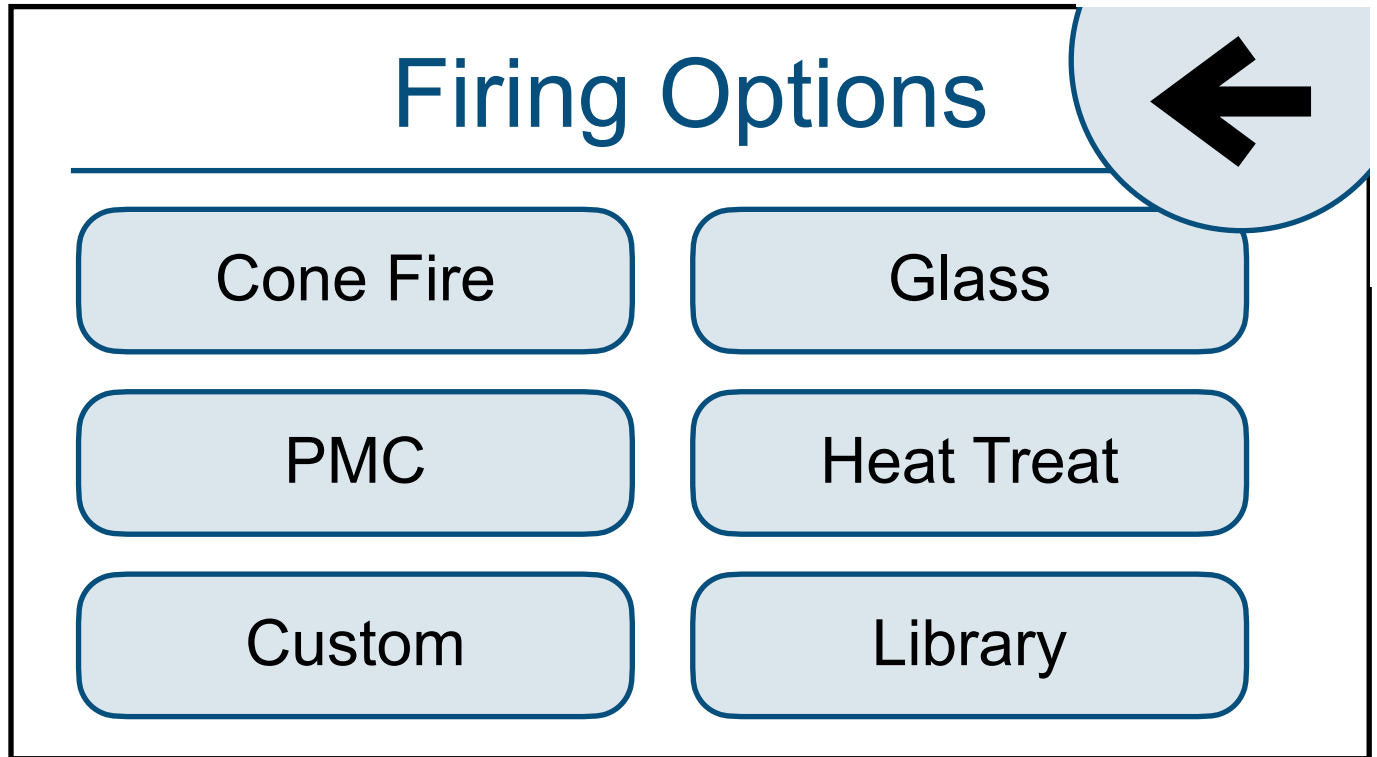


Figure 1. Firing Type Menu

Cone Fire

Programming for these type of firings consists of choosing a cone number, an optional preheat time, firing speed, and an optional hold time. The firing speed is chosen by the type of firing and thickness of the clay used. All 4 speeds below will calculate the firing rate at the end of a firing and adjust the final temperature for correct heat-work.

Cone Options: 022 - 12

Speed Options: Fast, Medium, Medium Slow, Slow

Glass

Programming consists of choosing the type of firing, firing speed, and COE (Coefficient of Expansion) and an optional hold time. The firing speed is chosen by the size of the glass being fired.

PMC

The included PMC programs are listed in Appendix B: Firing Programs.

Heat Treat

The included heat treat programs are listed in Appendix B: Firing Programs.

Custom

The Genesis Spark has 30 Custom user programs slots. Programs 1-12 have 32 segments each, while 13-30 have 8 segments each. When you select custom, you will first see a screen with all 30 custom programming slots. You must choose one of the thirty slots to add your custom program; if they are all full, you must choose one to override.

- If you select an Empty program slot, the controller will first ask for a name the custom program. The Custom Programming section below will outline how to enter the segments for your custom program.
- If you select a slot with a program, you will be taken to the firing review screen. Please refer to the Firing Review Screen section of the manual to continue firing with the selected, existing custom program.

Library

The included library programs are listed in Appendix B: Firing Programs.

Custom Programming

First, enter a name with the alpha-numeric keypad for your custom program. Press Save.

After you have entered a name the controller program the first segment of the custom program. Enter the ramp rate, temperature to achieve and whether to hold at the temperature. After entering each piece of information, press the forward arrow. Use the backward arrow if you need to adjust any value you've entered.

After entering all three for a segment, the Firing Review Screen will be shown.

- **START:** Start the program
- **EDIT:** Press Edit to add/edit the custom program segments
- **GRAPH:** Review the program in a graph

The Edit button will navigate to the Segment List Screen (see Figure 2). The following actions are permitted on each segment: delete, insert [after] and edit. Press anywhere in the segment line to take an action on the segment.

From the edit screen, pressing a segment will display the Segment Review Screen (Fig. 3) with action buttons. The edit button will navigate through editing the ramp rate, temperature to achieve and possible hold time.

The validations for each field are displayed to in the table shown to the right.

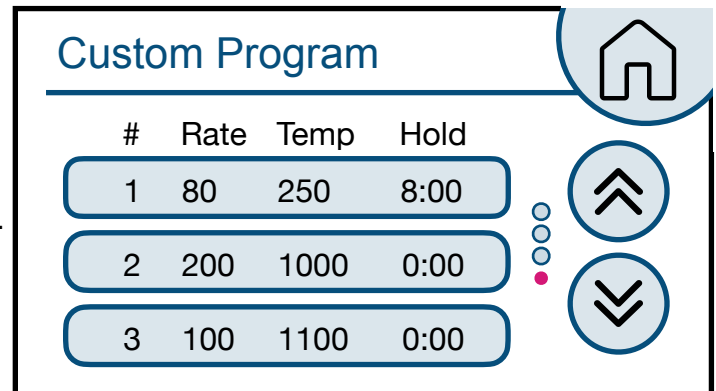


Figure 2. Segment List Screen

| | Min | Max |
|-----------|------|-------|
| Ramp | 1 | 9999 |
| Temp | 0 | 2400 |
| Hold Time | 0:00 | 99:00 |

NOTES FOR CUSTOM PROGRAMMING:

1. A firing will start in the earliest segment that has a soak temperature greater than the current kiln temperature. If the current kiln temperature is above all soak temperatures, the controller will go directly to complete.
2. To ramp up or down at the maximum rate, enter a rate of 9999.
3. To program a down ramp, enter the rate/hour then a temperature below the previous segment's temperature.
4. It is best to write out the firing profile that you plan to program before you begin programming. A blank form for writing your firing programs can be found in **Appendix C: Blank Firing Program**. Photo-copy as needed.

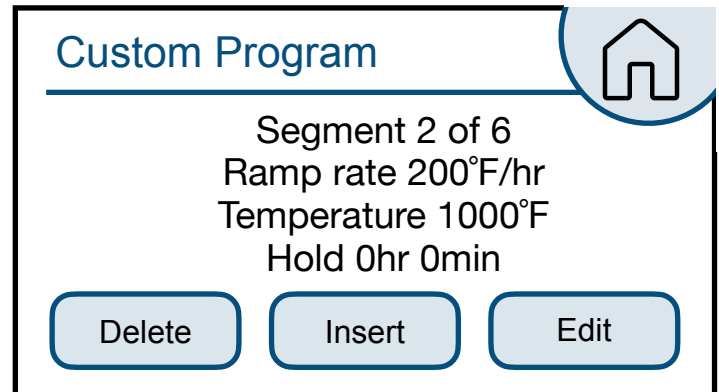


Figure 3. Segment Review Screen

Calculating Ramp Rates for Custom Firing

If you want to go from room temperature to 750°F in 3 hours, use this method to calculate the ramp rate. Take the temperature that you want to go to (750°F) minus the starting temperature (70°F – approximate room temperature) to get the number of degrees you want to increase in 3 hours ($750 - 70 = 680$). Divide this number by the time you want to get to 750 to give you the ramp rate ($680^{\circ}\text{F} \div 3 \text{ hrs} = 227^{\circ}\text{F/hr}$). If you want to add another segment to go from 750°F to 1000°F in 4 hours, the same procedure is used. Take the end temperature minus the starting temperature ($1000 - 750 = 250$) and divide this number by the number of hours to reach 1000°F ($250^{\circ}\text{F} \div 4 \text{ hrs} = 63^{\circ}\text{F/hr}$).

Firing Review Screen

After you have completed programming you will see a firing review screen. There are three actions you can take from this screen:

1. Start - Start the first segment of the firing, immediately
2. Schedule - View each individual segment for the program
3. Graph - View graph of program or copy to a custom program slot

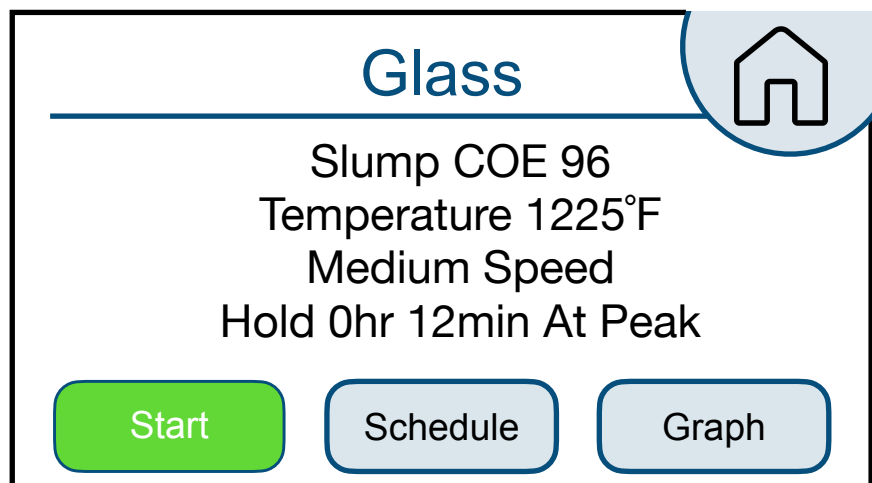


Figure 4. Firing Review Screen

During a Firing

Operation of the Controller During A Firing

The Genesis Spark controller eliminates much of the “babysitting” that is required with a manual kiln. To ensure the most consistent results from one firing to the next, you should understand how the controller operates and monitor the firing to ensure proper operation. The following diagram and flow chart show the basic components of a kiln’s control system.

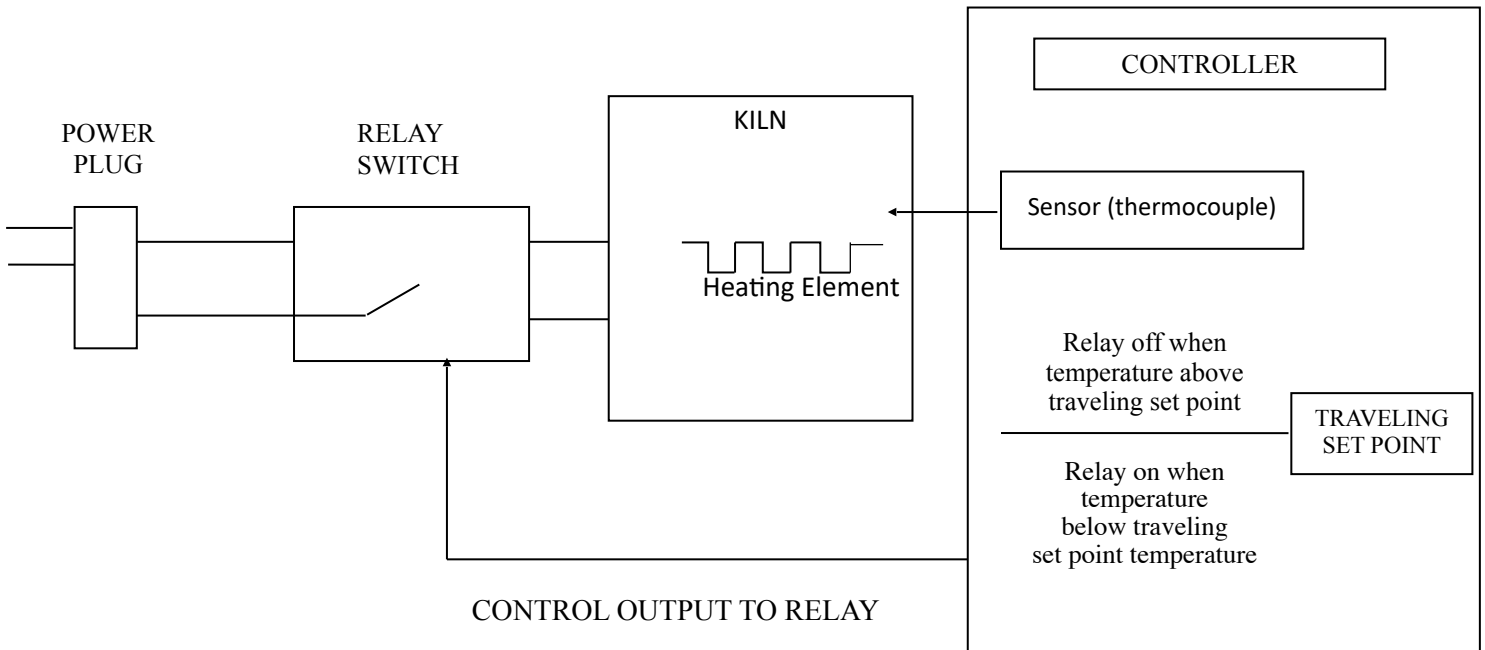


Figure 5. Kiln Operation

The diagram and flow chart show that the kiln control system, in its simplest form, works like your thermostat at home – when the temperature is too cool the heater comes on; when the temperature is too hot the heater turns off. The major components of the control system are the Genesis controller, thermocouple temperature sensor, relay switch, power source, and heating elements. The controller is the brain of the operation; the controller adjusts the traveling set point according to your program, reads the temperature in the kiln, cycles the relay on or off and determines when to end the program.

The thermocouple (T/C) sensor is the first part to inspect when loading the kiln. The tip of the T/C should protrude approximately 1- 1/2” into the firing chamber. Next, “START” is pressed, the controller reads the kiln temperature and uses that temperature as a starting point for a traveling set-point (also called the local set point). The displayed temperature is the temperature inside the kiln. You should then hear the relay(s) start cycling on and off to keep the temperature near the traveling set point. As the firing progresses the controller moves the traveling set-point according to the programmed firing rate. The displayed temperature should increase with the traveling set-point and the relay will be “on” longer. This sequence continues until the final temperature is reached and the controller turns off the kiln. The display reads “COMPLETE”.

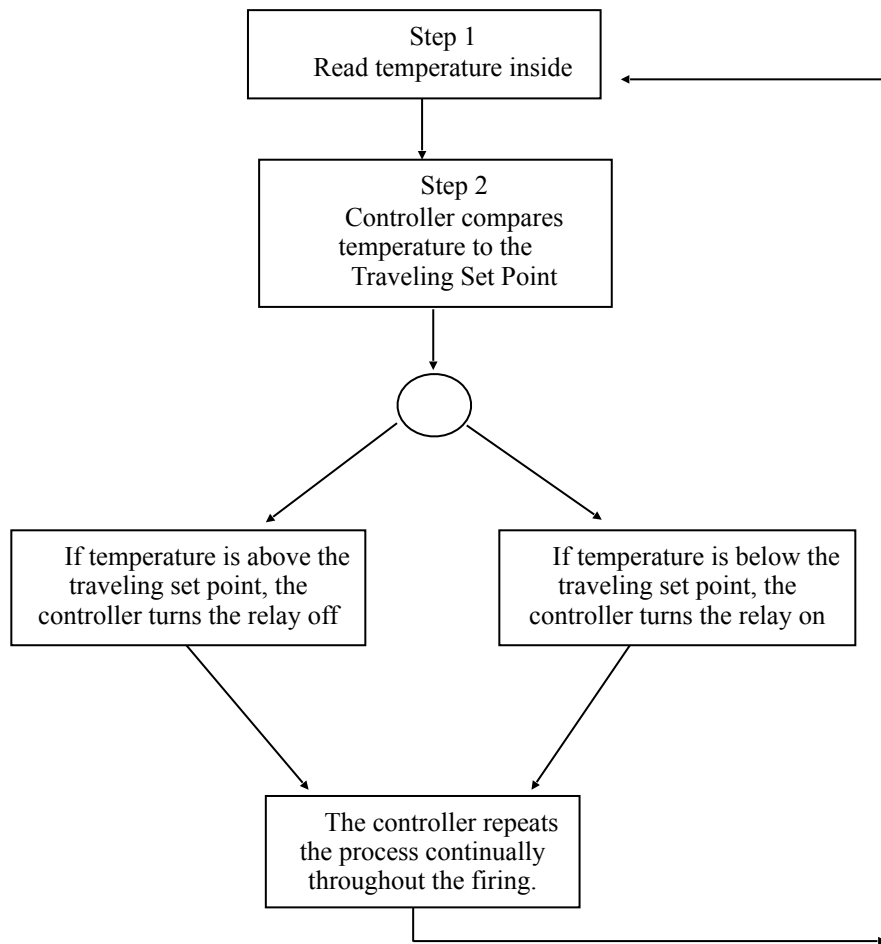


Figure 6. A flow chart of the control algorithm in its simplest form. Like your home thermostat.

Adjustments During a Firing

Once a firing has been started, the screen will change to the Firing Screen. Viewing and making some adjustments to the program is still available.

Stop

Press STOP at any point in the firing to immediately stop the firing. The controller will return to the Home Screen.

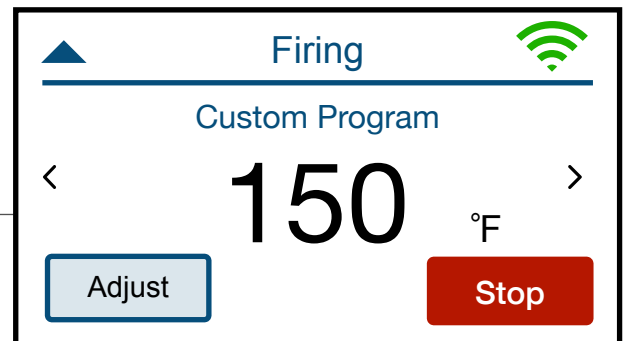


Figure 7. Firing in Temperature Ramp

View

Arrows on the Firing Screen provide access to several different view screens for the firing, including: current temperature; the Firing Review Screen; the Segment Status screen; or a graph of the firing.

Adjust

Press Adjust to make adjustments to the firing while a firing is in progress.

During a Hold:

- “Add Time” will add 5 minutes to the hold.
- “Add Temperature” will increase the hold temperature by 5°F.

During a Temperature Ramp:

- “Skip Step” will skip the current segment and move to the next in the firing. This feature is used when enough heat work has been done at the current segment and you want to immediately go to the next ramp rate.

End of Firing – COMPLETE

When the firing is complete, an alarm will sound and the controller will display COMPLETE with the current temperature and firing time. To return to IDLE, press “Clear”. You may open the kiln when the temperature has cooled to 150°F.

Care of Thermocouple

The small metal rod protruding into the firing chamber is the temperature sensor, or thermocouple. Do not let shelves, posts, or ware touch the thermocouple; this could affect the temperature reading.

Bumping the thermocouple during loading can damage it or push it out of the firing chamber. It should protrude into the firing chamber about 1 -1/2”. Check the kiln manufacturer’s placement instructions. Also, avoid firing clay with high sulfur content. The sulfur erodes the thermocouple making it brittle and easy to break.

History

List of the recent firings so you can view data or start controller with the same configuration of a previous firing. For each firing you can:

- View Graph (or copy this program to a Custom Program Slot)
- Start Firing Again With Same Settings

WiFi Menu

WiFi Status

This menu option displays the WiFi network the controller is connected to, WiFi signal strength and if it is connected to the Cloud API.

Enable Wi-Fi

Enable or disable the Wi-Fi feature. **Off** turns Wi-Fi capabilities off at all times. **On When Firing** enables Wi-Fi only when a firing is in progress. **Always On** turns the Wi-Fi on anytime it is within range of a setup Wi-Fi connection.

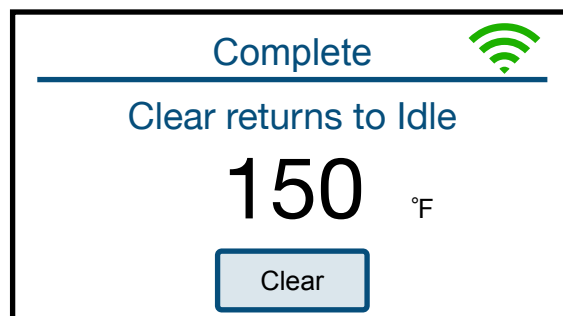


Figure 8. Firing in Hold

WiFi Setup

To set up Wi-Fi for the Genesis, press “Wi-Fi Setup” and the controller will scan for nearby networks. Select your desired network and enter the password (if required) and press “Save”.

*****For security reasons, we highly recommend that the user place all controllers into a separate logical network or VLAN, separate from other networks, routers, and hardware.**

Update Firmware

If your controller is connected to the internet through the WiFi module, by pressing Download Firmware, you will connect to www.bartinst.com to see if any updates are available. Once it has found the firmware, you have the option to update your controller. Updating firmware will **NOT** affect the firing programs.

Reset WiFi

Press Reset WiFi when having trouble with the WiFi connection. The controller will reset the WiFi connection and attempt to reconnect to your currently saved connection.

Manual WiFi Setup

Used to manually set up a WiFi network that is hidden or otherwise not found when running WiFi Setup. Enter the network name under SSID and press “Save”. Under password, enter the network password at press “Save”.

Advanced WiFi

Used for network administrators this information can be used when firewall settings need adjusted to allow the controller to communicate with the KilnAid app.

Appendix A: Error Codes

If you get an error code, it is important to note the error letter or number. It will help you in diagnosing any problem with the kiln. When an error code is displayed, it will give a short description of the error. Press “Clear” to clear an error code.

The list of error codes follows:

| Error Code | Description | Possible Causes |
|----------------|---|--|
| ERROR 1 | Kiln temperature increasing slower than 12°F per hour when ramping up | This is a kiln heating problem, not a controller problem. Do the Full Power Test to check elements and relays. Low or dropping voltage to the kiln could also be the cause. A thermocouple reading incorrectly or improperly placed may also be the cause. |
| ERROR 2 | Kiln temperature 50°F above hold temperature | A relay latched in the “on” position may cause this error. Another possible cause is if the kiln lid is opened for rapid cooling, then closed, such as for glass firings. |
| ERROR 3 | Kiln temperature 50°F below hold temperature | Relay failure. |
| ERROR 4 | Kiln temperature 50°F above previous hold when ramping down | Same causes as for E-2. |
| ERROR 5 | Kiln temperature 50°F below traveling set point when ramping down. | Relay failure. |
| ERROR D | Kiln temperature 50°F above traveling set point | Stuck relay or stuck output. If using zone control, then the outputs or t/c’s may be in the wrong zones. |

NOTE: THESE ERRORS WILL ONLY BE DETECTED IF THE ERROR CODES ARE TURNED ON:

NOTE: THE ERROR CODE SETTING DOES NOT AFFECT THESE ERRORS:

| Error Code | Description | Possible Causes and/or Corrections |
|----------------|---------------------------------|---|
| ERROR 0 | Software error | Check the selected program and reprogram, if necessary. If error persists or program does not hold in memory, controller may need to be returned to factory for service. |
| ERROR 6 | Problem with thermocouple leads | This generally indicates the thermocouple is connected incorrectly, possibly reversed. Ensure the thermocouple extension wires are connected correctly to the controller and at all connection blocks back to the thermocouple. |

| | | |
|--------------------------|---|--|
| ERROR 8 | In cone fire mode, temperature decreasing in last segment | If the kiln has a kiln-sitter, it may have turned the kiln off before the controller did. Other possible causes are broken element or relay failure. |
| ERROR 9 | Software thermocouple selection does not match the hardware thermocouple jumper selection | The jumper on the circuit board and the setting for thermocouple TYPE in the software do not match. |
| E-- | Power loss during EEPROM write | Turn the controller off and back on. Recheck the selected program and reprogram, if necessary. |
| ERROR A | Invalid program variable | Reprogram all segments of the program being fired. If error persists, controller may need to be returned to factory for service. |
| ERROR bd | Board temperature too high | The control box temperature may be too hot or the limit temperature may need to be reset. If the room temperature is very hot, aiming a fan at the control box may decrease the temperature. |
| ERROR E | Hardware error | Controller will need to be returned to the factory for service. |
| ERROR R | Microprocessor memory does not match program storage memory (EEPROM) | Reprogram and try to fire again. If error persists, controller may need to be returned to factory for service. |
| ERRP | ERRP will display. To clear the display, press "Clear". The firing in progress will continue. | Power outage; kiln is still firing. |
| Thermocouple FAIL | Thermocouple FAIL indicates one or more t/c's have failed. If more than one thermocouple is connected, the controller will indicate which thermocouple has failed. | Check the board temperature under Diagnostics under Menu. If the board temperature is approximately room temperature, then the t/c is defective. If the board temperature shows a high temperature the circuit board is defective. |
| PF | Power failure. Firing has stopped. | Power was lost during a firing and the kiln temperature was below 140°F or the kiln temperature dropped more than 250 degrees during the power outage. |

Appendix B: Firing Default Programs

Miscellaneous Programs

The library programs can be found below. You can access these programs by pressing Fire > Library > [Select program type - options include: Miscellaneous, Heat Treat or PMC]. For all programs, the alarm is set to off (9999). When the alarm temperature is changed, it only changes for the loaded program, not all programs.

| CN6 Crystal Glz | | | |
|-----------------|------|-------------|------|
| Seg | Rate | Temperature | Hold |
| 1 | 300 | 1000 | 0:00 |
| 2 | 500 | 2230 | 0:15 |
| 3 | 9999 | 2000 | 0:00 |
| 4 | 500 | 1800 | 4:00 |

| CN10 Crystal GLz | | | |
|------------------|------|-------------|------|
| Seg | Rate | Temperature | Hold |
| 1 | 300 | 1000 | 0:00 |
| 2 | 500 | 2320 | 0:10 |
| 3 | 9999 | 2000 | 3:00 |
| 4 | 500 | 1800 | 1:00 |

| Bead Annealing | | | |
|----------------|------|-------------|------|
| Seg | Rate | Temperature | Hold |
| 1 | 9999 | 960 | 8:00 |
| 2 | 9999 | 960 | 0:45 |

| Wine Bottle | | | |
|-------------|------|-------------|------|
| Seg | Rate | Temperature | Hold |
| 1 | 500 | 500 | 0:15 |
| 2 | 500 | 1000 | 0:15 |
| 3 | 600 | 1250 | 0:20 |
| 4 | 500 | 1475 | 0:15 |
| 5 | 9999 | 1100 | 0:30 |
| 6 | 200 | 970 | 0:30 |
| 7 | 120 | 750 | 0:10 |

Custom Programs: Heat Treat

| 154CM ATS34 | | | |
|-------------|------|-------------|------|
| Seg | Rate | Temperature | Hold |
| 1 | 9999 | 1900 | 0:30 |

| Draw 500 | | | |
|----------|------|-------------|------|
| Seg | Rate | Temperature | Hold |
| 1 | 9999 | 500 | 2:00 |

| AISI 0-1 | | | |
|----------|------|-------------|------|
| Seg | Rate | Temperature | Hold |
| 1 | 9999 | 1450 | 0:20 |

| Draw 400 | | | |
|----------|------|-------------|------|
| Seg | Rate | Temperature | Hold |
| 1 | 9999 | 400 | 2:00 |

| 440C S.S | | | |
|----------|------|-------------|------|
| Seg | Rate | Temperature | Hold |
| 1 | 9999 | 1850 | 0:25 |

| Draw 375 | | | |
|----------|------|-------------|------|
| Seg | Rate | Temperature | Hold |
| 1 | 9999 | 375 | 2:00 |

| AISI D-2 | | | |
|----------|------|-------------|------|
| Seg | Rate | Temperature | Hold |
| 1 | 9999 | 1850 | 0:20 |

| Draw 300 | | | |
|----------|------|-------------|------|
| Seg | Rate | Temperature | Hold |
| 1 | 9999 | 300 | 2:00 |

| AISI A-2 | | | |
|----------|------|-------------|------|
| Seg | Rate | Temperature | Hold |
| 1 | 9999 | 1750 | 0:20 |

| Draw 275 X2 | | | |
|-------------|------|-------------|------|
| Seg | Rate | Temperature | Hold |
| 1 | 9999 | 275 | 2:00 |
| 2 | 9999 | 120 | 0:00 |
| 3 | 9999 | 275 | 2:00 |

| Draw 900 X2 | | | |
|-------------|------|-------------|------|
| Seg | Rate | Temperature | Hold |
| 1 | 9999 | 900 | 2:00 |
| 2 | 9999 | 125 | 0:00 |
| 3 | 9999 | 900 | 2:00 |

| Draw 220/200 | | | |
|--------------|------|-------------|------|
| Seg | Rate | Temperature | Hold |
| 1 | 9999 | 220 | 2:00 |
| 2 | 9999 | 120 | 0:00 |
| 3 | 9999 | 200 | 2:00 |

Custom Programs: PMC

| PMC Stand | | | |
|-----------|------|-------------|------|
| Seg | Rate | Temperature | Hold |
| 1 | 9999 | 1650 | 2:00 |

| PMC + FAST | | | |
|------------|------|-------------|------|
| Seg | Rate | Temperature | Hold |
| 1 | 9999 | 1650 | 0:10 |

| PMC + | | | |
|-------|------|-------------|------|
| Seg | Rate | Temperature | Hold |
| 1 | 9999 | 1650 | 0:10 |

| PMC3 FAST | | | |
|-----------|------|-------------|------|
| Seg | Rate | Temperature | Hold |
| 1 | 9999 | 1290 | 0:10 |

| PMC 3 | | | |
|-------|------|-------------|------|
| Seg | Rate | Temperature | Hold |
| 1 | 9999 | 1290 | 0:10 |

| Lost Wax Silver | | | |
|-----------------|------|-------------|------|
| Seg | Rate | Temperature | Hold |
| 1 | 500 | 300 | 2:00 |
| 2 | 500 | 700 | 1:00 |
| 3 | 500 | 1350 | 4:00 |
| 4 | 9999 | 900 | 8:00 |

| PMC Gold | | | |
|----------|------|-------------|------|
| Seg | Rate | Temperature | Hold |
| 1 | 9999 | 1650 | 0:10 |

| Lost Wax Gold | | | |
|---------------|------|-------------|------|
| Seg | Rate | Temperature | Hold |
| 1 | 500 | 300 | 2:00 |
| 2 | 500 | 700 | 1:00 |
| 3 | 500 | 1350 | 4:00 |
| 4 | 9999 | 800 | 8:00 |

| ArtClay Silver | | | |
|----------------|------|-------------|------|
| Seg | Rate | Temperature | Hold |
| 1 | 9999 | 1436 | 0:05 |

| ArtClay Gold | | | |
|--------------|------|-------------|------|
| Seg | Rate | Temperature | Hold |
| 1 | 9999 | 1814 | 1:00 |

Appendix C: Blank Firing Program

Keep this page as a Master and photocopy as needed.

Firing Program Number: _____

| Segment | Rate Per Hour | Temperature | Hold |
|---------|---------------|-------------|------|
| 1 | | | |
| 2 | | | |
| 3 | | | |
| 4 | | | |
| 5 | | | |
| 6 | | | |
| 7 | | | |
| 8 | | | |

Firing Program Number: _____

| Segment | Rate Per Hour | Temperature | Hold |
|---------|---------------|-------------|------|
| 1 | | | |
| 2 | | | |
| 3 | | | |
| 4 | | | |
| 5 | | | |
| 6 | | | |
| 7 | | | |
| 8 | | | |

Appendix D: Common Questions and Situations

Q. How do I clear an error message?

A. To stop the sounding alarm, press anywhere on the screen. Then to clear the message, press “Clear” and the controller will return to the IDLE screen.

Q. What is a segment?

A. A segment is the basic building block of a program. Each segment consists of a ramp rate in degrees per hour, a temperature you want to achieve, and whether you want to hold there or not. For example, a program for drying ware going at 60°F/hour to 200°F and holding for 2 hours would be a one segment firing, the ramp is 60, the temperature is 200, and the hold is 2.00.

Q. Do I need to use witness cones for each firing?

A. After checking your kiln with witness cones for the first few firings, if you are satisfied with the results you are getting and how even the kiln is from top to bottom, then you do not need to use cones in each firing. It is a good practice to periodically place witness cones in the kiln to check for proper firing. If you suspect a problem or your results have changed, then it is a good idea to check the operation of the kiln with witness cones.

Q. Who do I contact for parts for my kiln?

A. For replacement parts for your kiln (relays, elements, etc.), contact the kiln manufacturer. For any issues with your controller contact us at Bartlett Instrument Co. for a solution.