

# GENESIS (Model LT3140) – Technical Manual

## GENERAL DESCRIPTION

The Genesis, model LT3140 is Bartlett Instrument's 8<sup>th</sup> generation kiln controller. We've enhanced all the great features from older models and added many new ones. The Genesis kiln controller regulates the temperatures in a kiln according to the program set by the artist. It has two different programming modes, Novice Mode and Advanced Programming. It can control a single zone or multi-zone kiln.

## POWER SUPPLY

The LT3140 board requires a 24V center-tap transformer, as did its predecessors. It connects to the board's bottom three quick connects, labeled AC1, CENTER TAP, and AC2. The VA rating of the transformer is dependent on the electrical load of the board and relays. The board requires approximately 80mA at 12V DC and a relay typically requires approximately 140mA at 12V DC. Therefore, a three-relay system will require a transformer with a minimum rating of 6VA (500mA X 12V DC = 6 VA).

## OUTPUTS

The LT3140 board has five 12V DC outputs. Four outputs are given power by a safety transistor, outputs 1, 2, 3, and safety. The safety transistor is capacitor coupled to the microprocessor so it only powers the output transistors when the microprocessor is operating correctly. Outputs 1, 2, and 3 respond to their respective thermocouple inputs. All outputs are capable of driving a 500mA 12 V DC load. Output 4 is an extra output that can be programmed to run a fan, alarm, or extra kiln section. The maximum combined output of all outputs is 1 Amp. The safety output powers on at the beginning of a firing and off at the end of the firing. It is used to drive a safety relay that sends line power to the switching relays on outputs 1, 2, and 3. When using the optional current sensor, wiring one section to each output will give an Amp reading per section for better diagnostics. See Configuration in the controllers Menu for details on the output 4 options.

## FACTORY CONFIGURATION - "HIDDEN MENU"

The "hidden" menu allows programming of options that are normally set at the factory. The options are listed in the order they appear in the menu with a description. The "hidden" menu can be entered by pressing "MENU", scroll down to "Factory Configuration", and selecting "Factory Configuration". Then, type in the sequence 4, 4, 3, and the Factory Configuration options will be displayed. Use the scroll bar on the right to scroll through the options found below: **TC Type, Max Program Temperature, Max Board Temperature, SSR Mode, Cycle Time, Current Sensor Rating, and Run Factory Diag.**

### TC Type

Change the thermocouple type used with the controller from Type K, Type S, or Type R. To change thermocouple type in Factory Configuration, select the thermocouple type being used with the controller and press "**Save**". When changing from a Type K to a Type S or Type R, you must change the software setting as well as placing a jumper on the circuit board. To change from a Type S or Type R to a Type K requires changing the software setting and removing a jumper from the circuit board.

**WARNING:** Using a Type S thermocouple and a controller set for Type K will cause serious over-fire. Using a Type K thermocouple and a controller set for Type S will cause an under-fire. Type S thermocouples must use Type S extension wire. Type K thermocouples must use Type K extension wire. If changing thermocouple type be sure to change the extension wire. Make sure the software and jumper settings match the type of thermocouple and extension wire you are using.

# GENESIS (Model LT3140) – Technical Manual

## **Max Program Temperature**

Enter the top temperature the kiln is rated for. Set the Max Program Temperature to the maximum temperature rating for the kiln. Check the side of the kiln or the kiln's manual for its temperature rating. The max setting is 2400°F (1316°C).

## **Max Board Temperature**

Set the maximum temperature the circuit board can reach. Valid temperature are 0 - 250°F. If the board reached a temperature higher than 250°F, it can cause serious damage to the circuit board.

## **SSR Mode**

SSR Mode can be turned on when solid state relays are being used on the kiln. When SSR mode is turned on, it cycles the relays at 500 millisecond intervals. This works the same with either 60hz or 50hz systems.

## **Cycle Time**

Sets the output cycle time. The cycle time is the length of time between an output coming on two consecutive times. If the cycle time is set for 14 seconds the output will come on every 14 seconds as needed. Cycle time can be set from 10 seconds to 60 seconds. To change the cycle time in the Factory Configuration Menu, press “5-Cycle Time”, type in the new time, and press “SAVE”.

## **Current Sensor Rating**

The Current Sensor Rating is used to set the number of Amps that will generate a 5V output from a current sensor. Factory default is 50 Amps.

## **Run Factory Diag.**

This is used by the kiln manufacturer. The factory diagnostics can be used for comparison when future diagnostics tests are ran. To view the amperages and voltages from the Factory Diagnostics test, press the “MENU” button, “1-Data Menu”, then “3-Factory Diagnostic” to view the results.

## **Rotate Display**

When set to on, the display will rotate 180 degrees. To rotate the screen, press “On” and then press “Save”.

## **Output Config.**

## **Mini Version**

Use to switch screen formatting from larger Genesis screen to the smaller Genesis Mini screen. This setting should remain set to off for the LT3140 version.

## **Lid Switch**

The Genesis LT3140 has connections for a lid switch. When a lid is connected and the lid switch setting is set to on, the controller shut power off to the elements, sound an alarm, and give a LID OPEN

# GENESIS (Model LT3140) – Technical Manual

message when the lid is opened during a firing. When a lid is connected and this is set to off, the controller will continue to fire as scheduled, even when the lid is opened.

## Output 3 Alarm

When in single zone mode and Output 3 Alarm is enabled, output 3 will turn on and off with the alarm. It is used by some to run a louder alarm.

## PROGRAMMING NUMBER OF THERMOCOUPLES

Selecting the number of thermocouples is the first option in the hidden menu. This allows one controller board to be used for single or multi-zone kilns. To program the number of thermocouples, press “MENU”, scroll down to “4-Configuration”, and select it. Scroll down to “5-Number of Zones” and select it. Type in the desired number of zones (1, 2, or 3) and press “SAVE”. When programmed as a single zone board, TC1, TC2, and TC3 will all read the same temperature on the Home Screen. When in multi-zone mode, they will read the temperature for the corresponding thermocouple.

**SINGLE ZONE (NUMBER OF THERMOCOUPLES IS ONE)** Input T/C 2 is used when it is programmed for single zone control. All three outputs work in unison so there are two alternatives for connecting the output. All relays can be connected to output 2 or one relay could be connected to each output. The first method allows direct replacement of the current single zone controller without changing wiring. The second method would allow an easy upgrade to a multi-zone kiln in the future by just adding thermocouples and reprogramming the number of T/C's. The second method also allows for better use of the diagnostic routines.

**3-ZONE (NUMBER OF THERMOCOUPLES IS THREE)** T/C 1 is the top thermocouple, T/C 2 is the middle, and T/C3 is the bottom. Likewise, output 1 drives the top relay, output 2 the middle, and output 3 the bottom. For taller kilns, output 2 can control several middle sections.

**2-ZONE (NUMBER OF THERMOCOUPLES IS TWO)** When two thermocouples are selected, use inputs T/C1 and T/C2 and outputs 1 and 2.

## FULL DIAGNOSTIC ROUTINE

The full diagnostic routine checks all the output voltages, the amperage or current draw of each section of the kiln, as well as the no load and full load kiln voltages. The amperage or current draw is used to measure the current draw of each section of the kiln. The diagnostic routines can only control each section separately if the outputs are wired for zone control. When checking the output voltages, the controller will turn on each section, starting with the top, for a few seconds. This allows checking to see if all elements are heating. The kiln voltages during load and without load are also measured. This helps to diagnose firing problems when the kiln is not able to reach a programmed temperature. First, it will read the voltages with the elements off, then the elements will come on momentarily and read the voltages again. To run a full diagnostics routine follow these steps:

1. Press the “MENU” button.
2. Press the “2-Diagnostics” button.
3. Press the “2-Run Manual Diag.” button and the controller will begin the diagnostics routine.
4. The controller will flash to the home screen and “CHK ALL” will be displayed across the firing banner. When the test is complete, it will return to IDLE.
5. To view the results, press the “MENU” button.
6. Press the “1-Data Menu” button.

# GENESIS (Model LT3140) – Technical Manual

7. Scroll down to “5-Last Manual Diag.” and select it.
8. Use the scroll bar to observe the results. You can use the Factory Diagnostics for comparison with your results. When you are finished press the “BACK” button.
9. To return to the Home Screen, press “HOME”.

## VOLTAGE CALIBRATION

To display voltage using the Genesis controller, a calibration must be done. Before calibration, make sure the relays and elements are connected. To run the voltage calibration follow these steps:

1. Press the “MENU” button
2. Scroll down to the “6-Factory Config” button and select it.
3. Type in the sequence “4”, “4”, “0”, and press the “SAVE” button.
4. The screen will read, “Are you sure you want to calibrate the voltages?” If you are ready, press the “START” button to begin or “CANCEL” to return to the menu.
5. After the “START” button has been pushed you’ll be asked to enter the no load voltage. The No Load voltage will need to be measured and entered into the controller. Min: 0 Max: 999.
6. Once you’ve typed in the No Load voltage, press the “SAVE” button and the screen will change to the Full Load voltage screen, and the power to the elements will be turned on.
7. Measure the Full Load voltage and enter the value into the controller and press the “SAVE” button.
8. The screen will read Voltage calibration is complete. Press the “HOME” button to return to the home screen.

## TECHNICAL SPECIFICATIONS

THERMOCOUPLE	TYPE K, S, and R (MAXIMUM RESISTANCE 100 OHMS)
ACCURACY	+/- 10°F
COLD JUNCTION COMPENSATION	ELECTRONIC
POWER INPUT	24V CENTER-TAP TRANSFORMER
OUTPUTS 1, 2, 3, 4, AND SAFETY	500 mA AT 12V; FIVE 12V RELAYS WITH 80 OHM COIL
OPERATING TEMPERATURE RANGE	0°F TO 125°F OR 0°C TO 52°C

## PRECAUTIONS

This controller contains static sensitive parts, which can be damaged by static electricity. Use ground strap or touch a grounded object when handling this controller. Pack in anti-static treated material or paper. Do not pack in plastic bags or untreated packing.

This controller is a temperature-regulating device not a safety device. You should attend your kiln during firings.

# GENESIS (Model LT3140) – Technical Manual

