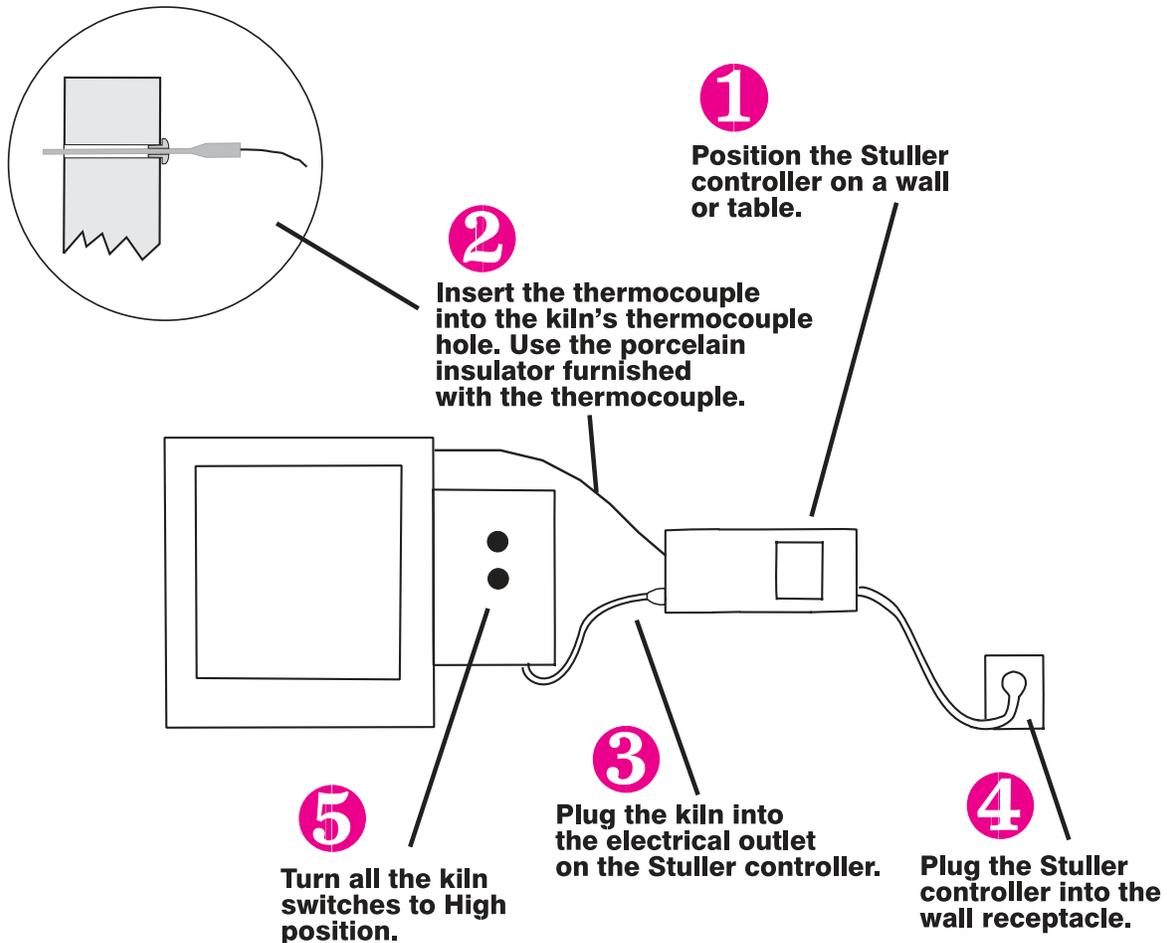




Stuller

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Installing the Stuller Portable Controller



Important Guidelines

- 1** Do NOT cut or bend the thermocouple.
- 2** Keep thermocouple wires and the thick end of the thermocouple completely out of the firing chamber. Only the 1/8" diameter tube should be inserted into the firing chamber hole.
- 3** Keep the thermocouple wires from touching the hot kiln case. The thermocouple itself must not touch anything metallic during operation.
- 4** Even though protected by insulation, thermocouple wires are sensitive to electromagnetic interference. Position the lead wires away from electrical appliances and wires such as the kiln cordset.
- 5** The thermocouple must protrude into the firing chamber at least 1/2" to 5/8" for accurate readings. (Over 1" is not recommended.) Keep the thermocouple at least 1/2" away from ware or furniture.

Step 1: Position the portable Stuller controller

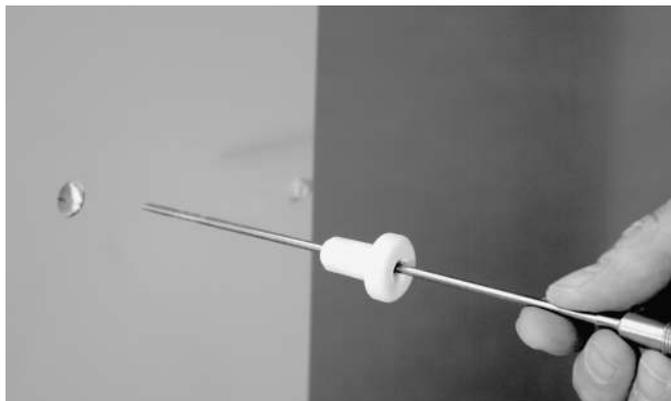
Position the controller far enough away from your kiln to avoid heat damage.

Step 2: Attach the thermocouple to the kiln

You can install the thermocouple (temperature sensor) through an existing 1/2" thermocouple hole or by drilling a new hole in the kiln.

If you use an existing 1/2" hole, first insert the porcelain insulator on the thermocouple. Then insert the thermocouple into the hole. (See photos, next page.) The thermocouple must protrude into the firing chamber at least 1/2" to 5/8".

IMPORTANT! If the thermocouple falls out of the kiln during firing or if the tip moves out of the firing chamber, the kiln will overfire. Monitor the kiln during firing to make sure the thermocouple has not moved.



The porcelain insulator that is furnished with the controller is used to mount the thermocouple in a 1/2" hole on the kiln. Do not allow the thermocouple to fall out of the kiln during firing, or the kiln could overfire.

Drill a thermocouple hole if your kiln does not have one already

1 Drill a 1/8" hole in either a row of blank bricks or between two brick rows, approximately midway between floor and top. Avoid drilling closer than 1" to a heating element. Use a tape measure, if needed, and mark the location of the hole on the kiln case.



2 Wearing safety glasses, drill a 1/8" hole all the way through the kiln case and wall.

3 Enlarge the 1/8" hole in the kiln case to 1/4". Using a 1/4" drill bit, drill just deep enough to go through the case and no further. Enlarging the hole in the kiln case to 1/4" will prevent the thermocouple from touching the grounded steel case.

4 Press the thermocouple into the hole so that 1/2" to 5/8" or more of the tip protrudes into the firing chamber.

REMINDER: If the thermocouple is pulled out of the hole, the kiln will overfire.

5 Position the thermocouple lead wires so they are away from the hot sides of the kiln case, the cord set, or any other electrical appliances or wiring.

Step 3: Plug the kiln into the receptacle on the controller.

Step 4: Plug the controller into the wall receptacle.

Plug your Stuller controller into the wall receptacle your kiln was using. Do NOT change the controller's plug if it won't fit the wall receptacle.

Step 5: Turn the kiln switches to High.

Turn all kiln switches to the On or High position. Leave all switches on full power when firing with the controller.

If kiln does not have a Kiln Sitter, the installation is complete. Read the controller instruction manual before firing.

Step 6: Insert a cone in Kiln Sitter, set Limit Timer.

1 If your kiln has a Kiln Sitter® or Limit Timer, use it as a back up shut-off for the controller. Place a cone in the Kiln Sitter rated one or two cones hotter than the firing. Set the Limit Timer for a few minutes longer than the expected firing time.

It will be necessary to use a new cone for every firing even if the previous cone did not bend.



WARNING: We cannot extend our warranty to cover any damage caused by overfiring, regardless of the circumstances. Even though your Stuller controller is automatic, do not leave your kiln unattended while firing.

Wear firing safety glasses when looking into the peephole during firing.

Operating Instructions for Stuller 160-923, 160-926, 160-928, and 160-930 Temperature Controllers

Getting Started

CAUTION: Keep your Stuller controller at least 12" from your furnace.

Operation Begins from the IdLE Display

The normal message that appears when you first plug in your Stuller controller is **IdLE**.

Before you can begin programming the controller, it must display **IdLE**. If the display shows **FAIL** instead of **IdLE** when you touch a key, the thermocouple is either disconnected or burned out.

Firing Features

Display Indicator Dots

When time is displayed, a dot in the bottom center of the display will light up. During temperature display, the dot disappears. The center display dot separates hours from minutes. 1 hour and 30 minutes would appear as 01.30, 1 hour and 15 minutes would appear as 01.15, etc.

You can enter up to 99 hours and 59 minutes.

The controller will operate in either °F or °C. When the controller is showing temperature in °C, a display dot on the bottom right of the window will light up. The dot disappears when the controller displays in °F.

Setting the Alarm from IdLE

The alarm sounds when a preset temperature is reached. Here's how to program the alarm temperature:

1 From **IdLE**, press **7**. **ALAR** will display, then the last alarm temperature entered.

2 Enter the new alarm temperature. Press **ENTER**. **IdLE** will appear.

When the alarm sounds during a program, shut off by pressing **ENTER**.

Resetting the Alarm While Firing

After the alarm goes off during a burnout, you can set it to go off again at another temperature. The alarm can be set for either a higher or lower temperature.

1 The alarm beeps while program is in progress. Touch **7**.

2 Enter the new temperature.

3 Touch **ENTER**. The furnace will continue firing.

If you touch 7, enter a new temperature, and forget to press ENTER, the controller will merely continue firing without setting the alarm.

Program Delay

With Program Delay, you can program the furnace now and have it begin heating later.

WARNING: Never leave your furnace unattended especially near the end of a firing. We cannot guarantee your furnace against overfiring even though it is automatic. Operator assumes full responsibility for making sure the furnace shuts off at the proper time.

To enter a delay time from **IdLE**:

1 Press **3**. Display shows **dELA**, then the last programmed delay time.

2 Enter delay time in hours and minutes (e.g. 12 hours and 30 minutes = 12.30).

3 Touch **ENTER**. **IdLE** will appear. To begin Delay, press **ENTER** again.

The Controller Operates in °F or °C

The display dot on the lower right corner lights when operating in °C. It disappears when operating in °F. To switch from °F to °C or visa versa from **IdLE**:

1 Press **ENTER**.

2 Press **0** repeatedly until **CHG-** appears.

3 Press **ENTER**. **°F** or **°C** will appear. Press **1** to change selection between °F and °C. Press **ENTER**.

Preprogrammed Burnouts

You can fire these factory-installed programs by using the instructions on the front of the controller. You cannot change the parameters in these burnouts; they are stored in "read-only memory." However, you can make your own custom programs in Ramp-Hold. (See next page.)

5 Hour Burnout

Warning: The 5 Hour Burnout will cause some flasks to explode. This fast burnout is meant only for small flasks.

Segment	Rate	Temp.	Hold Time
1	300° F.	300° F.	20 Minutes
2	100°	350°	10 Minutes
3	700°	1350°	1.5 Hours
4	450°	900°	99.99 Hours/Mins.

8 Hour Burnout

Segment	Rate	Temp.	Hold Time
1	300° F.	300° F.	1 Hour
2	100°	350°	30 Minutes
3	350°	1350°	1.5 Hours
4	300°	900°	99.99 Hours/Mins.

12 Hour Burnout

Segment	Rate	Temp.	Hold Time
1	300° F.	300° F.	1 Hour
2	100°	350°	30 Minutes
3	210°	1350°	3 Hours
4	225°	900°	99.99 Hours/Mins.

Using a Preprogrammed Burnout

- 1 Press **ENTER** to bring **IdLE** into display if it does not already appear.
- 2 Press **1**. The last program that was stored will appear in display: **5HR** (5 hour burnout), **8HR** (8 hour burnout) or **12HR** (12 hour burnout).
- 3 If you would like to run the same program again, press **ENTER**. **IdLE** will display. To run one of the other programs, press **1** for 5 hour, **2** for 8 hour, or **3** for 12 hour. Then press **ENTER**. **IdLE** will display.
- 4 To start the program, press **ENTER**.

Customizing a Preprogrammed Burnout

Below is a customized 12 Hour Burnout:

Segment	Rate	Temp.	Hold Time
1	9999° F.	300° F.	1 Hour
2	100°	350°	30 Minutes
3	210°	1350°	3 Hours
4	9999°	1300°	9.00 Hours
5	9999°	1250°	9.00 Hours
6	9999°	1200°	9.00 Hours

A jeweler used this burnout program to fire three different types of castings. He cast at 1300°F, 1250°F, and 1200°F.

When he was finished casting at 1300°F, he skipped to the next segment using instructions on page 3. Then the furnace began cooling down to 1250° for the second set of flasks. When he was ready for the third casting temperature, he again skipped a segment. To customize a preprogrammed burnout or to design your own program, use the Ramp-Hold mode shown next.

Ramp-Hold Mode

Theory of Operation

The temperature you are firing to is called the target temperature. After the controller reaches the target temperature, it can also hold that temperature.

The controller fires at a controlled heating rate. The rate is figured in degrees per hour. If you selected a rate of 100° per hour, it would take 10 hours for the furnace to reach 1000°. Rate is similar to “miles per hour.”

In summary, the controller does three basic tasks:

- 1) It fires at a controlled heating rate, or speed, measured in degrees of temperature change per hour.
- 2) It fires to a target temperature.
- 3) It can hold the target temperature.

The controller fires in segments, or stages. A segment is a given heating rate to a target temperature. Heating rate is figured in degrees per hour. The recommended heating rate for the mold you are firing is usually available from your supplier.

To figure how long a firing segment will take, subtract the current temperature from the target temperature and divide the resultant temperature by the heating rate.

The controller can fire up to 18 segments per firing. After the controller has finished firing the last segment, it will turn off power to the furnace.

Correcting Entries

If you enter the wrong temperature, rate, etc., while programming, enter **0000**. Then enter the correct numbers before pressing **ENTER**.

Storing User Programs

To program the controller, **IdLE** must appear. From **IdLE** press **4**. The first message you will see is **USER**, meaning “Choose one of your programs or enter a new one.” The segments you enter will be stored in memory. Segments stored in memory are called a firing schedule, or program.

The controller can hold four “user” programs in memory. They stay in memory even when the power is turned off. User programs are numbered from 1 through 4. User program #1 can have up to 18 segments. User programs #2 - #4 can have ten segments each. You don’t have to use all the segments available—only the number needed per firing.

When entering a program for the first time, press **1** when **USER** appears. Your first firing will be stored as User Program #1.

Each time you store another program, select the next available number, such as 2, at the **USER** prompt. Selecting a user number for a new program over-writes any program stored there. Write down your user programs.

Firing a Stored User Program

After you enter a program and the controller returns to **IdLE**, the program is in memory and ready to fire.

Selecting a different stored program takes only seconds:

- 1 From **IdLE** press **4**.
- 2 **USER** will appear. Enter the program number (1 - 4). Then press **ENTER**.
- 3 If there are no changes to the program, press **STOP**. **IdLE** will appear. The controller is ready to fire your selected program. To begin firing, press **ENTER** once.

Use Program Review, next page, before firing. See also “Repeat Firings,” next 8.

Rate

A segment must include a rate, which is degrees of temperature change per hour. A rate of 1000° per hour will reach 1000° in 1 hour. A rate of 500° will reach 1000° in 2 hours. A rate of 333° will reach 1000° in 3 hours. If you want the furnace to fire at full speed, enter a rate of 9999. See “Ramp-Hold Programming Steps.”

*In Program Review, a heating rate of 9999 is displayed as **FULL**. When a kiln is heated at full power, it may overshoot the target temperature, especially in the lower range. To avoid this, add an extra segment with a slower rate for the last 50 degrees of temperature rise.*

The controller includes error messages to warn you when the kiln is at the wrong temperature. Firing the kiln at full rate turns off some of these warnings.

If you are not sure how fast to fire, remember an old firing adage: “When in doubt, slow it down.”

Hold

“Hold” means maintaining the temperature of a segment for the length of time you specify. Hold gives the temperature time to become more even throughout the kiln. Hold can be used in either heating-up or cooling-down segments.

In programming step #5 (see boxed instructions, next column), enter hold time. When hold is set to 99.99 hours, the controller will remain at that temperature indefinitely until you press **STOP**.

When the controller is in hold during a firing, the display will alternate between time left in hold and the temperature.

Repeat Firings

To repeat the last firing, press **ENTER** from **IdLE**. The kiln will begin firing. But first, make sure you are repeating the correct firing by using Program Review.

Program Review

When you press **ENTER** to begin firing, the controller will fire the program that is in active memory. Program Review shows the values for that program. The program in active memory is—

The program that was fired last, or

The program that was selected since the last firing.

Start Program Review from **IdLE** or while firing by pressing **6**. The values for the program will flash one after the other.

CPLT Message: Firing Completed

When the firing has successfully completed, the controller will shut off power to the elements. Then four messages will cycle one after the other:

- 1 CPLT** (complete)
- Firing time in hours and minutes
- The temperature reached during the last segment
- The current kiln temperature

If the alarm (see page 1) sounded, and then the kiln fired to completion, you will see **ALAR** instead of **CPLT**. Press **ENTER**. **CPLT** will appear.

Present Status

Present Status shows which segment the kiln is in while firing. This is especially useful for programs that have both heating and cooling segments. To use Present Status, press **5** during a firing. The current program segment will display momentarily.

Skip Segment Feature

Skip Segment works only during firing. It jumps from the current segment to the next one.

To skip a segment, press **9**. **SKIP** will appear, then the current segment. Press **ENTER**. (If you change your mind and don't want to skip that segment, don't press **ENTER** after **SKIP** appears. Instead, press **9** again. The firing will continue in the same segment.)

Skip Segment skips to the ramp of the next segment from either a ramp or hold of the current segment.

Ramp-Hold Programming Steps

As you follow these steps, you will see values (temperatures, rates, etc.) from the last firing. To use these again, press **ENTER**. To program a controlled cooling, set the segment to a lower target temperature than that of the preceding segment.

To fire without Alarm or Delay: Follow steps 1 through 6. Then press **START** once.

1 Apply power to the kiln. **8888** then **IdLE** will appear. (Press **ENTER** if **IdLE** does not appear.)

2 Press **4**. **USER** will appear. Enter a program number from 1 to 4.

3 Press **ENTER**. **rA 1** will appear. Enter firing rate for segment 1 (temperature change per hour: from 1° to 9999°).

4 Press **ENTER**. **°F 1** (or **°C 1**) will appear. Enter the target temperature of segment 1.

5 Press **ENTER**. **Hd 1** will appear. Enter segment 1 hold time in hours/minutes (e.g. 12 hours, 30 minutes = 12.30). No hold = 00.00.

6 Continue entering values for the segments needed. When **RA _** appears for the first segment you don't need, press **00**, then **ENTER**. **IdLE** will appear. The kiln is ready to fire.

7 To set Alarm: press **7**. **ALAR** will appear. Enter alarm temperature. (Enter **0** to turn alarm off.) Then press **ENTER**. **IdLE** will appear.

9 To set Delay: press **3**. **dELA** will appear. Enter delay time (i.e. 12 hours, 30 minutes = 12.30). Then press **ENTER**. (Delay zeroes out after each completed firing.) **IdLE** will appear.

10 To start program: From **IdLE** press **ENTER** once. **STRT** will appear, then kiln temperature. If a delay was programmed, **DELA** will appear, then time remaining until start. To stop the firing at any time, press **STOP**.

We recommend using Program Review before firing. When program fires to completion, **CPLT** will appear. Press **ENTER**. **IdLE** will appear. To shut off the alarm when it sounds during a firing, press **ENTER**.



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