DELPHI

EZ-Pro 15-6 Kiln
USER MANUAL

A Delphi Exclusive, powered by Jen-Ken and Orton - trusted names in kiln innovation.

68813

www.DelphiGlass.com • 800-248-2048
3380 E. Jolly Road • Lansing, MI 48910

This manual contains instructions on the operation of the kiln and Delphi EZ-Pro controller as well as a discussion of general fusing procedures. It is not intended to replace a fusing class or comprehensive fusing instructional media.

If you are in doubt about anything, call Delphi Glass at 800-248-2048 or Jen-Ken Kilns during regular business hours at 863-648-0585.

Model	Width	Depth	CU/FT	Max Temp	Volts	Amps	Watts	Receptacle	Ship Weight
AF4P 15/6	15"	6.5"	.66	1700	120	15	1800	5-15R	85

Revised: September 18, 2025

Table of Contents

SAFETY FIRST

Read and understand all operating instructions before operating your kiln.

Kilns are as safe as any other electrical appliance when used under normal and proper operating conditions. All safety precautions throughout this manual should be observed.

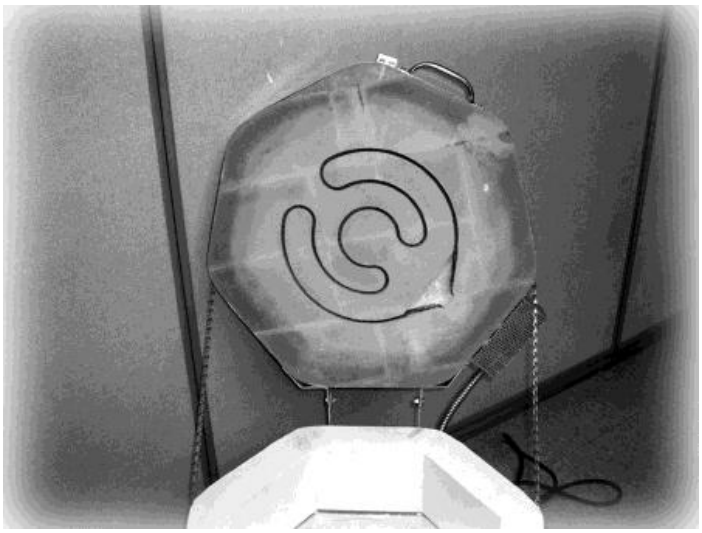
- Do not install kiln closer than 12" from any side. Remove all potentially combustible materials such as gasoline, paper, paints, plastics, etc. from the kiln area. The kiln should sit on a solid non-flammable surface, like concrete, ceramic tile, or stainless steel.
- Install in covered, walled in, well-ventilated area. Do not allow your kiln to get wet. Never use your kiln outside! Never use your kiln in a small enclosed area, like a closet, as these heat up considerably faster than large areas. Avoid moisture.
- **Never plug the kiln into an extension cord.** Do not let the power cord come in contact with the kiln body. The kiln may need to be rotated for the cord not to touch the kiln. Unplug the kiln before servicing or vacuuming.
- Always keep children and unsupervised personnel away. Surface will get hot and a burn could result. **Safety Glasses** are recommended whenever you look into a hot kiln to protect your eyes from infrared and ultraviolet light.
- Fire glass only to the manufacturers recommended firing temperature. Improper fire temperatures could result in damage to your kiln. Do not operate kiln over the maximum temperature rating of 1700°F.
- Replace any worn or defective parts with ONLY genuine Jen-Ken Kiln replacement parts.
- Do not drop or slam the lid shut.
- Let the kiln cool to room temperature before opening the lid.

ABOUT YOUR KILN

The Delphi EZ-Pro Kiln 15-6 is a professional quality Jen-Ken Kiln.

The controller has been designed and programmed to Delphi specifications by Orton Ceramics.

Elements



Elements are the coils of wire that produce heat inside the kiln. They are made from a high quality, high-temperature wire. During the firing, they become very soft and when cool become brittle. Life expectancy of the elements will depend on the number of firings and the firing temperatures. Higher temperature firings will wear coils faster than lower temperatures.

Care should be taken to make sure that no foreign matter (such as glass, clay, or kiln wash) come in contact with the elements. This will greatly reduce their life expectancy. Regularly vacuum the kiln lid, bottom, and element grooves to prolong kiln life.

In a digital kiln, the coils as a group turn on and off during firing. You will hear the clicking of the relays. It will click more if a slow rate of temperature increase is used and less if the kiln is told to fire quickly. Your EZ-Pro kiln has sperate relays for the time and side elements to increase the life of the relays.

Glass kilns usually have coils in the lid and side walls. The lid coils do most of the work in the kiln and get the hottest. Side coils are supplemental heat and help bring the kiln to temperature. It takes the side and the lid coils to bring the kiln to fusing temperatures.

In a digital kiln, if a relay fails, the section that the relay controls might not heat up, or could stay on continuously. If this happens, turn off the kiln at the breaker and unplug. At this point, you will need to replace the relay. Call Jen-Ken for assistance.

The EZ-Pro Kiln has multiple relays so that if one relay fails the kiln cannot heat too high in temperature.

Kiln Brick

This kiln is made of hand selected 2400°F refractory brick. The brick is strong as a whole and has a very long life. The brick can chip easily and care should be taken to avoid bumps while loading and unloading shelves. Frequently vacuum the brick lid, the grooves that the elements are in, and the bottom of the kiln. This will remove the dust, sand, and loose kiln wash from the kiln.

Kiln Jacket

Your kiln is encased in a stainless steel jacket and is also equipped with handles for easy moving. Due to the high temperatures, discoloration may appear on the stainless jacket. A good metal polish will remove this discoloration.

Recommended Accessories

Shelves help you make the most of the inside for your kiln. Shelves are sized a few inches smaller than the inside diameter of the kiln so that they can be placed in and out of the kiln more easily. They are made of refractory material so they should be handled carefully. A good coat of kiln wash should ALWAYS be maintained on top of the shelves. Store shelves upright on edge, leaning on a sturdy structure, not a flat on their sides. Shelves stacked flat can put too much pressure on the bottom shelf and cause it to stress and crack.

Posts are also made from refractory material and should be handled carefully. Post sizes range in heights from 1/2" to 6". They are used to support the shelves in your kiln at different levels depending upon the height of the pieces you are firing. Three to four posts allow you to level the shelf more easily.

Glass Kiln Wash is a mixture of very fine minerals that will not fuse or melt together at high temperatures and act as a barrier between the kiln shelf or mold and glass. It is used to prevent glass from sticking to the firebrick bottom of the kiln and the kiln shelves. Kiln wash starts as a powder and is mixed with water to brush it onto the kiln shelf. When mixing, follow manufacturer instructions for powder to water ratio. Take care not to breathe in the powder, a dust mask is recommended for this process. Kiln wash has an unlimited shelf life in dry powder form. For molds with high walls one might also use a boron nitride spray to evenly coat the mold and provide the same type of release.

Haik Brushes are very absorbent natural bristle brushes used to apply kiln wash onto the kiln shelf in a very smooth, thin layer.

INTRODUCTION TO FUSING

Fusing glass is a science, much of your technique and ability to achieve desired outcomes will grow by studied trial and error. Many variables will affect the repeatability of firing glass. In preparation of this, it is highly recommended to keep a fusing journal where you can record what steps you take, how you program your kiln, and what results you find.

This kiln is your tool for controlled heating and cooling of glass. Glass goes through a series of physical changes as it changes temperature. When conceptualizing how changes in temperature affect glass, it's important to think of it as a solid mass. First the kiln heats the air, then the air heats the surface of the glass, then the interior of the glass. The thicker a piece of glass is the longer it takes to heat and cool.

The Coefficient of Expansion (COE) refers to the rate at which glass expands and contracts when heated and cooled. All glass has a COE but we don't always know what it is. It's important that all of the glass you are fusing together expands and contracts at the same rate or stress and cracking can occur. Glass manufactured specifically for fusing is tested for compatibility. Always fuse glass with the same COE.

The purpose of careful, slow, heating and cooling is to allow the glass to equalize in temperature at every step. When cooling, this equalizing step is referred to as annealing.

Solid Glass (Below 1000°F)

Very rigid and is susceptible to thermal shock, or breaking, if heated or cooled too quickly. Visually the glass is unchanged from its state at room temperature. If the glass is heating or cooling in this range, avoid opening the kiln as the sudden drop in temperature will cool its surface and cause it to crack.

Unfired glass, solid and crisp.

Fire Polish (1000°F – 1250°F)

All surfaces of the glass have been fired to a glossy finish. The outside edges of the piece are crisp, clean, and somewhat square. The glass will begin to slump and succumb to gravity at the upper range of this temperature.

Slump (1250°F – 1350°F)

Glass has been placed onto a mold and fired, causing the glass to conform to the mold. The longer the glass is held in this range, the more prone to devitrification (sometimes short handed as devit) it becomes. In devitrification the glass crystallizes, moving away from its natural amorphous state, causing a cloudy surface finish.

Tack fused glass, still has its edges.

Tack Fuse (1350°F – 1400°F)

Glass appears to have been glued to the surface of the base glass. Edges are softened and pieces fully attached. Maintains texture of glass pieces and frit.

Full Fuse (1400°F – 1500°F)

The glass has liquefied and will completely melted together into one solid piece. No definitive edges between overlapping pieces, edges of full piece are well rounded.

Full fused, entirely embedded.

The schedules included in this manual and pre-programmed into your kiln are general guidelines. As you develop your fusing sixth sense, you'll want to ask yourself the following questions:

- **What is the size (diameter) of the piece? How many layers thick will it be?** Due to surface tension, liquid glass will always attempt to achieve a thickness of 1/4 in (6 mm). If it starts thicker than a 1/4" it will expand to reach it. If it is thinner than 1/4" the glass will contract to become 1/4". More glass in one place needs longer to equalize in temperature.
- **How many firings will my piece require?** If you're doing more complicated designs, you'll almost always fire a piece more than once. For example, if you wanted create a pattern on a clear sheet of glass you might first perform a full fuse. Then with the fused patterned sheet you could slump it into a bowl in a second firing. Finally you could add decals to your piece with a third firing.

FIRING PROGRAM TERMINOLOGY

All modern electronic kilns work in heating and cooling steps, commonly called "segments" of a larger firing schedule or program. Your kiln controller requires three pieces of information for each heating or cooling segment it needs to perform.

- A target temperature (the set point), this is the temperature you want to reach.
- A ramp rate, how fast the kiln should heat or cool to reach the set point.
- A hold time (or soak time), how long the kiln will remain at the temperature before moving onto the next segment.

When programming a firing schedule into your kiln, you'll be prompted for each of these values. First the ramp rate, then the set point, and finally the soak time.

Ramp Rate

Each step of a firing program must have a programmed rate of temperature increase or decrease. These rate values are selected as Degrees per Hour (°F/hr). During the programming the display prompt for Rate settings are **rA** followed by the step number like **rA1**, **rA2**, **rA3**, etc. To heat or cool as fast as possible, the setting **FULL** is available at the beginning or end of the Rate range (**FULL**, 0–1798°F/hr, **FULL**).

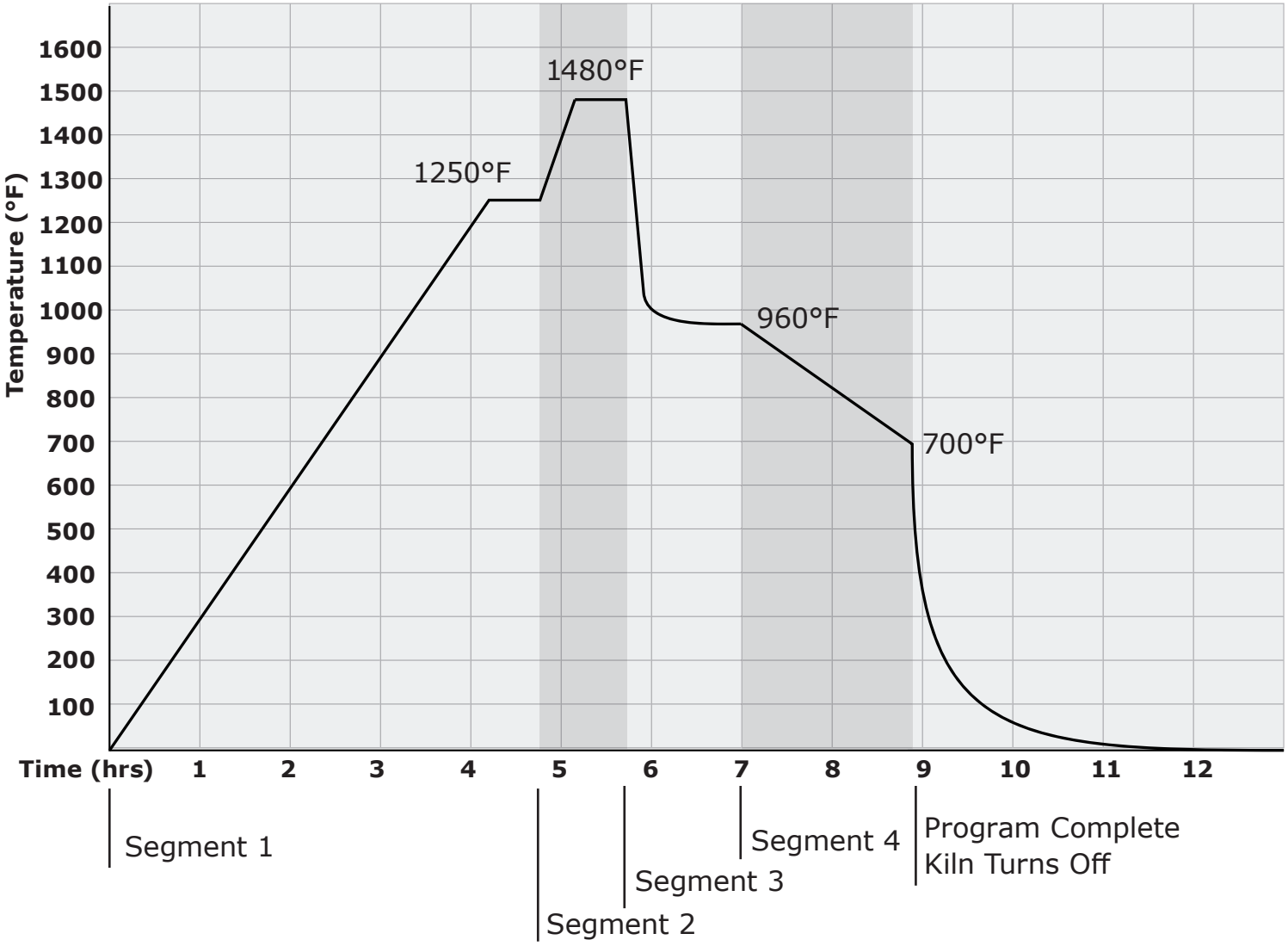
Set Point Temperature

At each step of the firing program, your kiln will attempt to reach the given temperature. Displayed as **°F** followed by the step number like **°F1**, **°F2**, **°F3**, etc. With a range, 32–2400°F.

Hold Time

Letting the glass rest at a given temperature allows your glass to stabilize and the temperature to even out internally and externally. When glass cools unevenly stress is created, resulting in breaks. A hold is programmed on both sides of the peak temperature to give the glass the ability to "adapt" to the rapid change in temperature. Holds are displayed as **HLd** followed by the step number like **HLd1**, **HLd2**, **HLd3**, etc.

Example Full Fuse Firing Program



Segment	Rate (°F/hr)	Set Point (°F)	Hold Time (HH.MM)
1	300	1250	00.30
2	600	1480	00.10
3	FULL	960	00.40
4	150	700	00.00

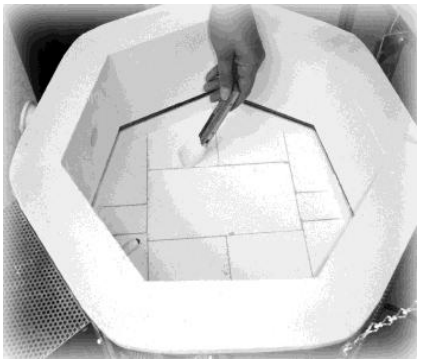
SETTING UP YOUR KILN

Review all safety instructions prior to installation.

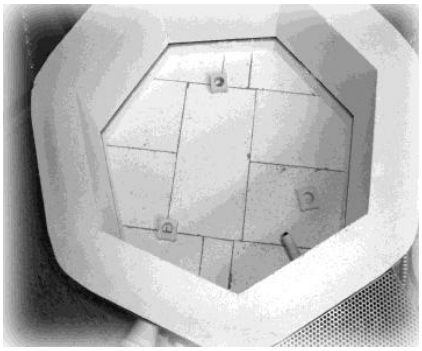
- Remove all packaging from the kiln, do not plug it in yet.
- If necessary, concrete blocks (8" x 8" x 16") with holes facing up, may be used to raise the kiln to a higher level. Solid bricks transfer heat through to the floor and should not be used.
- Open the lid of the kiln and inspect the interior looking for anything unusual like broken brick.
- Carefully inspect both side and top heating coils, ensure that they are seated back into the grooves. Try to avoid touching the coils with your fingers, oil from your skin may cause premature element failure.
- Vacuum out the interior of your kiln and along the grooves in the lid to remove any debris that may come loose when you close the lid or during firing.
- Carefully brush kiln wash on the floor of your kiln. This is preventative maintenance in case glass ends up on the floor of the kiln. Do not brush kiln wash on either the sides or lid of the kiln. Do not get kiln wash on any heating elements.
- Position the 1/2" kiln posts on the bottom of the kiln spaced out evenly to support the kiln shelf.
- Your kiln has been pre-fired at the Jen-Ken factory, and should not require pre-firing prior to its first use.
- Plug the kiln in to a standard 110–120 V outlet and turn it on using the toggle switch on the side of the control box.
- The display will first indicate **88.88** for about five seconds, then indicates the firing configuration that the controller is in (**-90-**, **-96-**, **bEAd**, **CLA**, or **USr**) for about 10 seconds. This is known as the Program Mode. The display then alternates between the internal kiln temperature and **IdLE**.

Make sure your kiln sits level.

Vacuum any loose debris.



Brush kiln wash on the kiln floor.



Position posts on bottom.

Changing Firing Program Mode

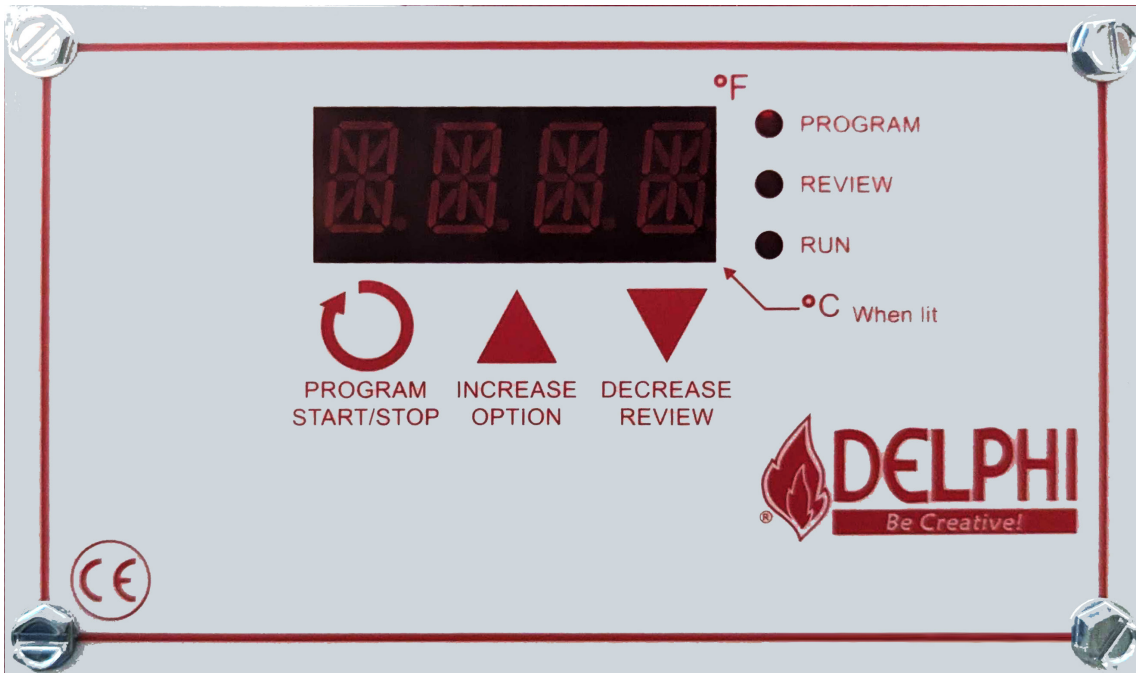
Your kiln stores a set of pre-programmed firing schedules under each of the Program Modes (**-90-**, **-96-**, **bEAd**, **CLA**, or **USr**).

- To change the Program Mode, press and hold the INCREASE button (▲) until the display reads **CFG**.
- Press the PROGRAM button (↻) to display the current Program Mode.
- Press the INCREASE button (▲) to change to the desired Program Mode.
- Press the PROGRAM button (↻) to save the current Program Mode, the display will return to the **IdLE** / internal kiln temperature indication. Restart kiln to confirm.

Running a Firing Program

- Press the PROGRAM button (↻) to display the current firing program.
- Press the INCREASE button (▲) to scroll to the desired firing program from the presets (e.g. in **-90-** mode: **FUSE**, **tAC**, **SLP**, **POL**, or user programs **PR01–04**).
- Press the DECREASE button (▼) to select the desired program. The small LED beside "Review" will light, and the display will show **rA1** (the program's first step).
- You may either manually review the firing program, or simply do nothing and the controller will automatically do a rapid step through for you.
- Once the review has been completed, the display will show **Strt**.
- Press the PROGRAM button (↻) and the kiln will display **-On-** and being the firing program. If you need to stop the program, press the PROGRAM button (↻) again. The kiln will shut down and display **Stop**.
- Once the kiln has completed a firing program, it will shut down and display **CPLt**, alternating with the kiln temperature and total program time. Do not open until display shows the kiln has reached room temperature.

Delphi EZ-Pro Controller



PROGRAM START/STOP

For selecting a firing program and advancing through the programming steps. After programming is complete, use this button to Start the firing. You can also use this button to Stop the firing at any time.

INCREASE OPTION

Used to change the firing program during programming and to change the display values for specific program settings. During a firing, use this button for special firing options (including Skip Step).

DECREASE REVIEW

Used to change the display values for specific program settings. It is also used to activate the Program Review feature.

INCREASE and DECREASE buttons can be held to rapidly change any numbers it can adjust.

Audible Alarm

A small buzzer will sound during button presses and at the successful completion of a firing for 30 seconds. It will also buzz to alert you to any errors in the firing. To silence the buzzer press any button.

Status Indicator Lights

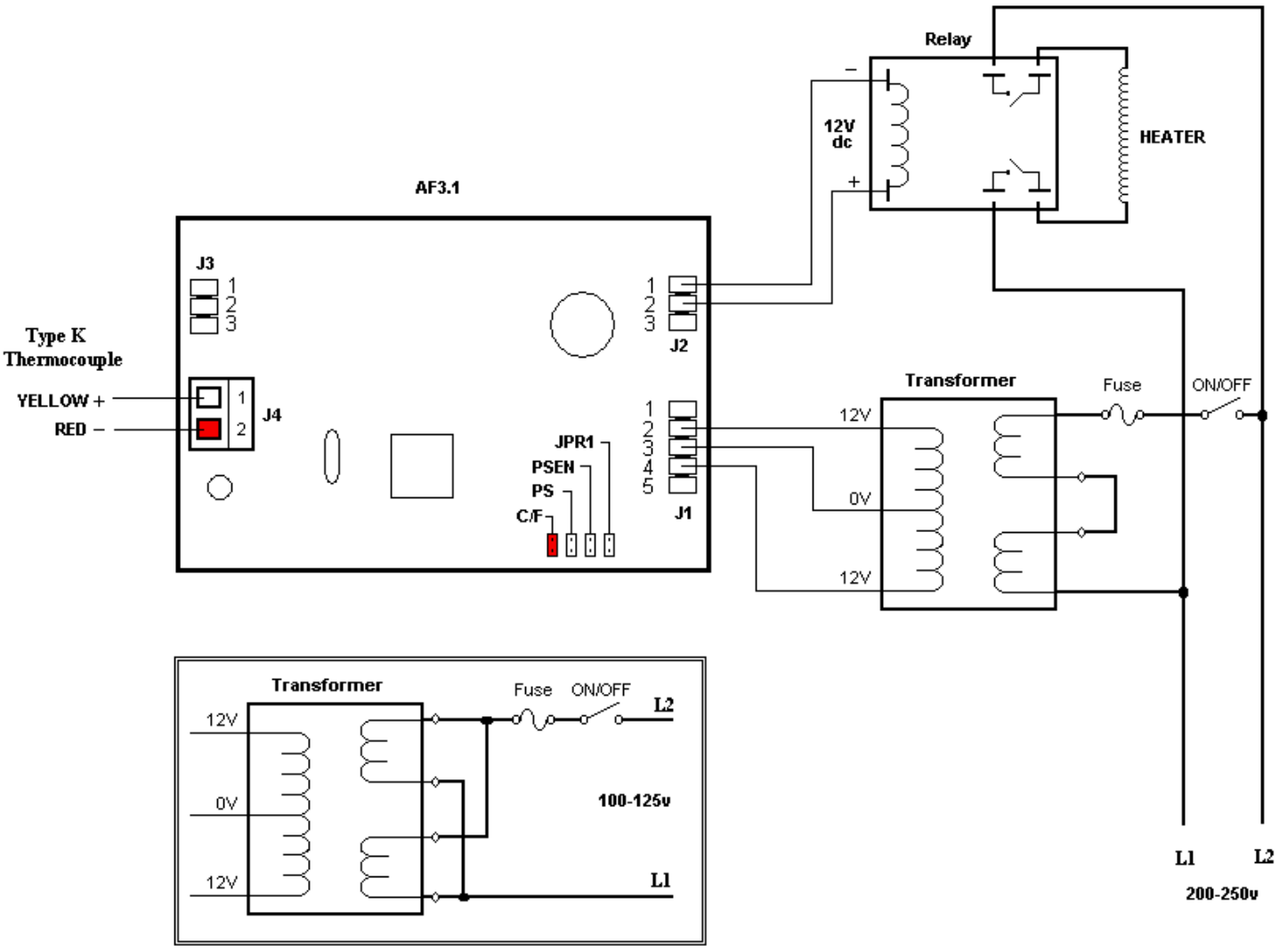
Three lights are located to the right of the display.

- Program — lit during controller programming
- Review — lit during Program Review
- Run — lit (blinks) during active firing

Temperature Display Preference

All temperature displays on the controller can be viewed as °F (Fahrenheit) or °C (Celsius). The temperature display preference is set by positioning a small circuit board jumper on the back side of the controller that is labeled C/F. The C/F jumper has 2 pin positions, when installed on the 2 corresponding circuit pins the controller with display all temperatures as Fahrenheit. If the C/F jumper is removed the controller will display all temperatures as Celsius.

To determine the mode your controller is set for without viewing the circuit board, check the "°C When lit" status light in the bottom right corner of the display. The C/F jumper position is shown on the wiring diagram.



CONTROLS BEFORE FIRING

Thermocouple Offset Option

Allows you to correct the temperature display a few degrees in a positive or negative direction. This can improve the controller accuracy if the thermocouple probe is aged or if the firing results appear to the slightly under or over fired. The offset has a limited range of +/-20°F and is only saved for the single firing.

After selecting the firing program, press INCREASE (▲) to activate the thermocouple offset prompt. The display will show **tCOS** alternating with the adjustable offset value. Use the INCREASE and DECREASE (▲/▼) buttons to set the offset and then press the PROGRAM (↻) button when you're ready to return to the **Strt** prompt.

Delay Start Option

From the **Strt** prompt, press DECREASE (▼) to activate the delay start prompt. The display will show **dELA** alternating with the adjustable delay time in hours and minutes format (**HH.MM**). Use the INCREASE and DECREASE (▲/▼) buttons to set the delay and then press the PROGRAM (↻) button when you're ready to return to the **Strt** prompt. The delay time has a setting range of 00.00 (no delay) to 99.59 (99 hours, 59 minutes).

When you're ready to begin the delay period, press the PROGRAM (↻) button again. The controller will display a countdown, at the end of which the actual firing program will automatically begin. To skip an active delay countdown, press PROGRAM (↻).

CONTROLS DURING FIRING

Program Review

Allows you to review the complete firing schedule during firing. Press the DECREASE (▼) button to activate. Each segment of your firing schedule will scroll automatically on the display for a few seconds each. To cancel the review in process, press any button.

Program review can also be activated when the controller is **IdLE** or during program selection. After this type of Program Review, the controller advances directly to the **Strt** prompt. The review can be used to bypass making any changes to the current firing schedule.

Options Menu

During firing, pressing INCREASE (▲) will activate the options menu. Again pressing INCREASE (▲) will cycle through the options available, pressing the PROGRAM (↻) button selects them. To exit the options menu or cancel a selected option press DECREASE (▼).

Skip Step (SStP) - Skips ahead to the next programmed step or hold time. After selecting this option, press PROGRAM (↻) again to skip the displayed step.

Add Hold Time (HLdt) - Once selected, press INCREASE (▲) to add 5 minute increments to the original hold time. Then press PROGRAM (↻) to return to the normal firing mode.

Change Set Point Temperature (CHGt) - Use the INCREASE and DECREASE (▲/▼) buttons to adjust the current step's set point. Then press PROGRAM (↻) to return to the normal firing mode.

Threshold Alarm (ALAr) - Sets a temperature at which the kiln will sound an audible alarm and display ALAr. Use the INCREASE and DECREASE (▲/▼) buttons to adjust the alarm's temperature setting. Then press PROGRAM (↻) to return to the normal firing.

The alarm is disabled when the temperature value is set to 32°F. The alarm value can be reset or changed as many times as needed during firing. To silence the alarm press any button.

USER PROGRAMMING (USr)

The **USr** program mode provides 6 blank programs for saving custom firing schedules to the controller. Each program can be up to 8 steps long. The undefined schedules are labelled **PrO1**, **PrO2**, **PrO3**, **PrO4**, **PrO5**, and **PrO6**.

Programming Ramp Rate

Each step of a firing program must have a programmed rate of temperature increase or decrease. These rate values are selected as Degrees per Hour (°F/hr). During the programming the display prompt for Rate settings are **rA** followed by the step number like **rA1**, **rA2**, **rA3**, etc. To heat or cool as fast as possible, the setting **FULL** is available at the beginning or end of the Rate range (**FULL**, 0–1798°F/hr, **FULL**).

The rate can be determined by diving the total degrees temperature change by the number of hours required to achieve the change. For example, if you want to heat the kiln to 900°F from room temperature (72°F) in 2 hours time, your rate would be 414°F/hr. [900°F - 72°F, 828°F, then divided by 2 hours, 828°F / 2 hr, equals a final rate of 414°F/hr]

Entering Zero for Ramp Rate

The controller determines where your firing program ends by the **rA** value. If zero is set for any rate, this tells the controller that there are no more steps to your firing schedule. If additional steps had previously been saved in the active program, all steps after the zero entry will be erased. This feature can also be used to erase and entire firing program by setting the first **rA1** value to zero.

Programming Set Point Temperature

At each step of the firing program, your kiln will attempt to reach the given temperature. Displayed as **°F** followed by the step number like **°F1**, **°F2**, **°F3**, etc. With a range, 32–2400°F. Each firing program must have at least one heating step to be valid, an invalid program returns the **bAdP** display alarm. A heating step is simply any step with a temperature set point above the current display temperature.

Programming Hold Time

Entered in Hours & Minutes format. The middle decimal point light on the display is used to separate Hours from Minutes. For example, a 1 hour hold time should be set like [01.00]. If no hold time is desired, the setting should be [00.00]. The value range of available for hold times are 00.00 to 99.58. Holds are displayed as **HLd** followed by the step number like **HLd1**, **HLd2**, **HLd3**, etc.

Status Display Codes

IdLE - This is ready mode; no firing in process. This message will alternate with the temperature display and/or any alarm codes that may occur.

dELA - Delay start mode. This message will alternate with the delay time count-down.

Strt - The final prompt before starting a new firing. The delay start and thermocouple offset features are accessed from this prompt.

-On- - A short (5 second) display that indicates a new firing has been started.

StOP - An abort message; firing was stopped early. This message will alternate with the temperature display and/or any alarm codes that may occur.

CPLt - Firing complete; the firing ended successfully. This message will alternate with the temperature and the total firing time from start to finish.

-90-, -96-, bEAd, CLA, USr - A short display of the Program Mode which appears every time the controller is turned on.

Program Memory

Program Mode	Pre-Programmed Schedules	User Programs
-90-	4	4
-96-	4	4
bEAd	4	4
CLA	5	4
Usr	0	6

Alarm Display Codes

These messages may be displayed if the controller detects a program during a firing.

tC - Thermocouple sensor is no longer detected and the kiln is idle. The controller can not operate without a thermocouple signal. In most cases, the thermocouple has failed and will need replacement, or the electrical connections for the thermocouple may be loose or damaged. Check the wiring for the thermocouple and the physical condition of the probe inside the firing chamber.

tCr - Thermocouple sensor signal reversed. The firing was terminated. The thermocouple signal is a low voltage direct current with +/- polarity. The controller will sense that the temperature is travelling backwards from what is expected. In this most cases this means the Thermocouple has been wired incorrectly and needs to be reconnected properly.

If your kiln is left idling while the room temperature drops you may see this code. The controller will interpret the room temperature decreasing as the kiln cooling. Merely shut off the kiln and restart.

tCL - Thermocouple is not responding to the demand for more system power during heat-up. The heating rate is slower than 9°F/hr. The actual kiln temperature is lagging being set point by more than 100°F. The actual temperature is less than 500°F. Most likely a failure of heating elements or thermocouple is improperly positioned, shorted with the controller, or defective.

FAIL - Alarm will appear during an active firing and indicates that the thermocouple signal was lost. The firing was terminated. Most often a failed thermocouple.

EtH - Electronics temperature is too hot for controller operation. The controller must be below 176°F to prevent damage to the electronic components. Cannot be cleared unless board temperature has cooled. If occurring often, check kiln for heat loss near controller, venting and heat-shielding should be inspected.

HtdE - High temperature deviation alarm. If the kiln temperature is above the set point by 100°F. Alarm is active only when the kiln temperature is above 500°F.

FtL - Firing was taking too long to complete and the firing was terminated. The controller monitors the deviation from the desired firing schedule as compared to actual firing results. The heating or cooling rate was slower than 27°F/hr or if the current program step has lasted 2 hours longer than anticipated.

In most cases, this alarm occurs when the heating rate is set too fast for the kiln to maintain. During cool-down, a well insulated system will have cooling limitations and rapid cooling rates may set off this alarm if the cooling speed cannot be maintained. Increase the final cool-down set point or lowering the cooling rate can avoid this alarm.

FE # - Fatal software errors. Indicates hardware failure or software problem with the controller. Alarms disable the normal controller operation and require corrective maintenance.

FE 1 - Failed to read or write to memory device
FE 2 - Failed memory test during power on
FE 3 - Corrupt data found in memory
FE 4 - Errors detecting thermocouple input signal
FE 5 - Software execution failed

Turn the controller off and back on, then press any button to try and clear the alarm. If the alarm reoccurs immediately or frequently, the controller may require service or replacement. FE 4 is often resolved by correcting problems with the thermocouple, loose connections, faulty wiring, or faulty thermocouple hardware can result in this alarm.

Power Failure Recovery

1. If the power is disrupted (power surge, breaker tripped, power outage) the display will show the alarm code **PF 1** and terminate the firing.
2. When power is restored the actual temperature must be above 212°F. If not, the display will show the alarm code **PF 2** and terminate the firing.
3. When power is restored, the temperature drop during the power interruption must be less than 72°F. If not, the display will show the alarm code **PF 3** and terminate the firing.

PRE-PROGRAMMED SCHEDULES

This kiln controller has been pre-programmed with proprietary firing schedules. We have listed them here for ease of reference.

Full list of pre-programmed schedules available on package insert.

HAPPY FUSING!