

# CROMARTIE KILNS LIMITED

*...at the centre of ceramics*

Customer Safety Instructions

## Safefire 1600

### Kiln Controller

*This Document should be read carefully before using your new Cromartie Controller.*

The New Safefire 1600 uses state of the art microprocessor technology which has been designed specifically for use with pottery kilns. The controller has a wide range of facilities which provide the user with a versatile, easy to use instrument. The controller contains a mimic display as a guide for both firing and programming, and to enable the user to determine what stage the controller is at whilst the program is in operation.

#### Principal features include the following.

- 2 Heating ramps.
- Top Temperature Soak.

#### Contents

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#### Explanation of Graphical Symbols:



The lighting flash with arrowhead symbol, within an equilateral triangle, is intended to alert the user to the presence of non insulated "dangerous shock to persons.



The exclamation point within an equilateral triangle is intended to alert the user to the presence of important operating and maintenance (servicing) instructions in the literature accompanying the appliance.

#### WARNING

To prevent fire or electrical shock hazard, Do not expose this unit to rain or moisture.

#### PLEASE...



#### Familiarise yourself:

Scan the contents list and look through the manual, note sections of interest.



Controller connections to the kiln must be made in a workmanlike manner. Failure may result in damage to the controller or kiln.

Such damage is not covered by warranty.

Manufactured  
in the UK



## 1 Installation



Check that the Safefire 1600 and thermocouple type are the same, otherwise proper control will not be possible. The letter prefix of the serial number of the instrument (R,S) indicates the thermocouple type. Check also that the Safefire 1600 if fitted with a plug is compatible to the kiln, check with kiln manufacturer.

**Note!** Failure to do this may result in your controller being damaged.

The Safefire 1600 should be fixed to a wall near the kiln using the bracket found on the back of the instrument, number 8 screws should be used (not supplied).

Do not position closer than 600mm to the kiln or above the kiln, (so that the unit is not damaged by heat from the kiln).



N.B. Always isolate from the mains supply before opening the case (Note there are no user alterations that can be made inside the instrument and damage could be caused by unskilled tampering).

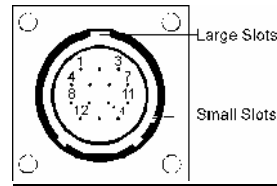
## 2 Connection to the Kiln

Ensure the Controller and Kiln are compatible, and simply plug the connection lead into the kiln. (If no plug is provided see below) If in doubt contact your kiln supplier or Cromartie. Connection to the kiln must only be carried out by a qualified electrician.

If no plug is provided connect as follows:-

<u>Mains Supply</u>		<u>T/Couple</u>		
<u>Wire Colour</u>	<u>PCB Terminals</u>	<u>Function</u>	<u>Colour</u>	<u>Polarity</u>
Brown	L	Supply	White	+
Green	E	Earth	Blue	-
Blue	N	Supply		
Black	C	Common		
White	O	Contactors		
		Relay		

## Standard Control Socket



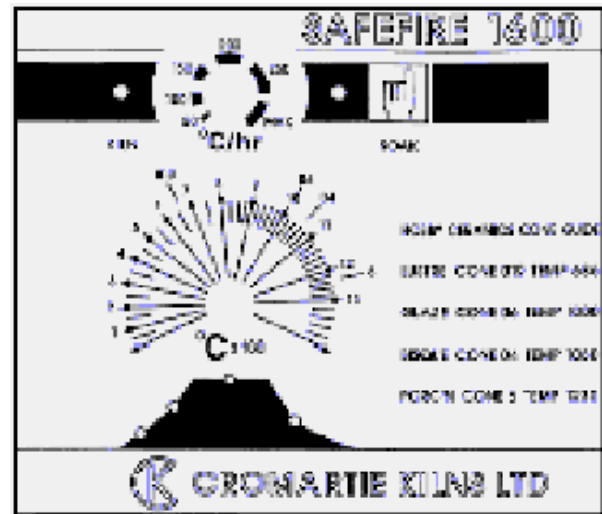
### Pin Connections

Pin 1.	Thermocouple +
Pin 2.	Thermocouple -
Pin 8.	Live
Pin 9.	Neutral
Pin 10.	Earth
Pin 13.	Coil
Pin 14.	Coil

## 3 Front Panel

### Indicator LED's

- Kiln mains power on.
- Soak mode.



## 4 Mimic Diagram (Graph)

In normal operation, green LED's show the stage reached in the firing cycle.

Below are listed the mimic display light sequence displayed during the running mode.

### Running Mode

<u>Delay</u>	<u>LED's</u>	<u>Colour</u>
1st Ramp	1	Green
2nd Ramp	2	Green
Soak	3	Green
End	4	Green

## 5 Controller Operation

Using the knob (°C/hr) select the rate of temperature at which you want the kiln to climb. You can select a climb of 50°C to 250°C per hr to an internal selected temperature of 600°C. If MAX is selected then the climb rate will be as fast as the kiln will allow. Using the lower knob (°C x 100) select the top or soak temperature you require.

\*Alternative temperatures of 400°C and 500°C can be specified upon purchase if required.

At this stage switch on the controller via the controllers On/Off switch. The instrument will automatically switch to the Cut Off mode, if a soak firing is required this can be selected by pressing the Hand symbol once. Please note that the Soak period is not timed and the controller will need switching off when the firing is complete.

## 6 Safety Feature

When the temperature reaches 1200°C, an internal timer will prevent the kiln from operating at high temperatures for more than 2 hours. This is to avoid irreparable damage to the kiln occurring. (this feature can be removed by Cromartie upon request)

## Purpose of Set Points / Ramps

The first ramp is normal set at a slow rate of climb to enable moisture/air to escape if the rate of climb is too steep the ware in the kiln may crack or even explode. this slow rate of climb, however, is only needed to a low temperature, ie. 600°C as once the ware has reached this temperature all the moisture has been irradiated. The temperature at which the kiln changes to a higher rate of climb is called a 'Set Point' and the faster climb is called a 2nd ramp.

## General Methods of Operation for Cromartie Kiln Controllers

The thermocouple generates a signal in electrical current which is detected by the controller. This signal is electrically converted into a temperature measurement in degrees centigrade which the controller reads and, according to the instructions given out, the controller will switch the mains contactor on and off as required.

When the controller is told to give full power the contactor is permanently 'on'. When top temperature is reached the contactor is switched off. In soak mode the contactor will be switch on and off to maintain the kiln at the temperature desired by the user.

Our controllers derive their power from the kiln via the multi-pin plug and socket supplied.

## Important Warranty Notes

Tampering inside controllers invalidates any warranty. Suspected faults should be reported to the company as soon as possible.

## Technical Specifications

<b>Supply</b>	230 volts ± 15% 50 Hz ~
<b>Thermocouple</b>	Type R, S,K or N indicated by first letter of serial number.
<b>Output</b>	Single pole 3A rated relay to operate kiln controller.
<b>Temperature display</b>	0-1400°C (Types R&S) 0-1300°C
<b>Soak time</b>	0~
<b>Temperature ramps</b>	1-1000°C/Hr.
<b>Set point temperature</b>	0-1400°C (Type R&S)
<b>Case Dimensions</b>	215mmx164mmx 65mm.

## 7 Glossary of Terms

### **Ambient Temperature**

The temperature inside the firing chamber of the kiln.

### **Contactor**

An electrical device used for switching electrical supply on and off to elements. It is energised and controlled from the temperature controller. It is also known as a relay.

**L.E.D** Light Emitting Diode, a small bulb-like device which lights up to indicate a function or warning.

### **Ramp**

This term is used to describe the rate of rise of temperature when firing. Some controllers do this in degrees per hour, others as a percentage of full power.

### **Soak Time**

The term 'soak' in this context is an old pottery term used to describe the holding of a particular temperature at a steady level to 'soak' the products to be fired to ensure even heat distribution and maturity of glaze body or colour.

### **Set Point**

This is a temperature at which a controller changes from one mode to another determined by the user e.g. for changing from ramp control to full power or from full power to soak.

### **Thermocouple**

A temperature sensing device located in the kiln wall protruding into the kiln. Its outer space is a high temperature ceramic tube. Inside the tube is a fine element consisting of two wires made of a mixture of platinum and rhodium. They are welded together at the end. This mixture of metals produces a minute electric current which varies with temperature. This current can be measured and translated electrically into a temperature read-out.



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