

## CROMARTIE TEMPERATURE CONTROL INSTRUMENTS

Please read these notes carefully before using instrument.

### GLOSSARY OF TERMS:

(1) Thermocouple: A temperature sensing device located in the kiln wall and protruding into the kiln. Its outer case 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.

IMPORTANT NOTE: There are many different types of thermocouples available depending on the temperature range required and denoted by type R,S,K,N,P etc. Cromarties standard before 1991 was type 'R' which is platinum and platinum/rhodium 13% mixture. After 1990 this was changed to type 'S' as standard which is platinum and platinum/rhodium 10% mixture.

It is critical that the thermocouple is wired correctly. With factory fitted units you have nothing to worry about. When wiring up yourself or by an Electrician you must ensure the cables are the correct way round.

Type R&S compensating cable

(New style) Orange outer sleeve, white innercable- orange inner cable +

(Old style) Green outer sleeve, white innercable+ blue inner cable –

Type K compensating cable (Perfect Fire Controllers)

(New style) Green outer sleeve, white innercable- green inner cable +

(Old style) Red outer sleeve, brown innercable+ blue inner cable –

(2) Contactor: An electrical device used for switching electrical supply on and off to elements. It is energized and controlled from the temperature controller. Otherwise known as a 'Relay'.

(3) Energy Regulator: An electrical device which can vary the amount of time an element or set of elements is on or off. It operates in exactly the same way as an electric cooker switch to work the rings.  
i.e. low = simmer; full on = full power and variable in between.

Without a controller the energy regulator is the main device for controlling the heating of the kiln. When a controller is used the energy regulator becomes a secondary device for controlling heat input or fine balancing of heat distribution in the kiln. This is most useful in larger units where the elements are split into zones, each zone with its own energy regulator. For the layman, one can consider the flow of electricity as being similar to water and the energy regulator is the tap. E.g. for a 3 zone kiln with 3 energy regulators which is showing more heat at the top than bottom – turn top regulator down a little. This will reduce power feed to top zone and put more heat into lower zones.

With automatic controllers the energy regulators should remain on full and used only for fine tuning.

- (4) Delay Time: This is a time period in hours and minutes which, when fed into a controller with this facility, will switch the kiln on at the appropriate time e.g. if you want your kiln to fire overnight and should start firing at 11.00 p.m. you can switch everything on at 5.00 p.m. with a delay time of 6 hours put in to the controller and everything starts to fire at 11.00 p.m.
- (5) Soak Time: This 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 (See notes on Heat Work).
- (6) 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.
- (7) 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.

#### GENERAL METHODS OF OPERATION OF CROMARTIE CONTROLLERS:-

The thermocouple generates a signal in electrical current (Milli voltage) which is detected by the controller. This signal is electronically converted into a temperature measurement in degrees centigrade which the controller reads and, according to the instructions given to it by the user, 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 a soak mode the contactor will be switched on and off to keep 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:

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