As we are continuously improving our products, changes to this specification may occur without notice.
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**Introduction**

**About this manual**

This manual is divided into several main sections to help find specific information quickly. For example, to find detailed information about the different methods of starting a firing see *Start a Firing*, page 9.

A good way to know the EMC 880 once the controller has been installed, as detailed in section *Installation*, page 19, is simply to try it.

Turn on power and follow the simple step by step procedure in the section called *Quick Firing Guide*, page 6.

As questions arise about the controllers operation refer to the appropriate section in this manual.

**Please Read**

Before the kiln is fired for the first time it is very important to check the input of the controller matches the thermocouple used.

If these do not match the kiln may over fire and cause a melt down. For instance the kiln will over fire if the controller is set for a type K thermocouple but a type R thermocouple is used.

*To check controller:*

Watch the display for the input sensor type when power is turned on as detailed in *Power Up Test*, page 13. To change the controller to another input sensor type refer to *Field Settings*, page 22.

*To check thermocouple:*

See if the type code is written on the probe, i.e. look under the terminal cover, otherwise consult kiln supplier.

*Check ambient temperature:*

After the power up test sequence check controller is showing ambient air temperature, which normally is about 20°C to 25°C.

As a precautionary measure the first firing should be observed to ensure firing progresses as expected.
Quick Firing Guide

Follow the procedure below to program the controller for a Bisque firing, stored as Program 1, and then start the firing.

Establish Firing Program

Draw the temperature profile required and write down program values as shown on the diagram and chart below, and then enter these values into the controller.

Store a Bisque Firing as Program 1

<table>
<thead>
<tr>
<th>Step</th>
<th>Action</th>
<th>Display</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Press MENU key. Display shows currently selected program.</td>
<td>Pr ( ? )</td>
</tr>
<tr>
<td>2</td>
<td>Set program number ( Pr 1 ) in large display with the UP or DOWN keys.</td>
<td>Pr ( 1 )</td>
</tr>
<tr>
<td>3</td>
<td>Press NEXT key and set Stage 1 Ramp to 500.</td>
<td>( r 1 )</td>
</tr>
<tr>
<td>4</td>
<td>Press NEXT key and set Stage 1 Temperature to 150.</td>
<td>( t 1 )</td>
</tr>
<tr>
<td>5</td>
<td>Press NEXT key and set Stage 1 Hold to 0.00.</td>
<td>( h 1 )</td>
</tr>
<tr>
<td>6</td>
<td>Press NEXT key and set Stage 2 Ramp to 100.</td>
<td>( r 2 )</td>
</tr>
<tr>
<td>7</td>
<td>Press NEXT key and set Stage 2 Temperature to 650.</td>
<td>( t 2 )</td>
</tr>
<tr>
<td>8</td>
<td>Press NEXT key and set Stage 2 Hold to 0.00.</td>
<td>( h 2 )</td>
</tr>
<tr>
<td>9</td>
<td>Press NEXT key and set Stage 3 Ramp to 150.</td>
<td>( r 3 )</td>
</tr>
<tr>
<td>10</td>
<td>Press NEXT key and set Stage 3 Temperature to 950.</td>
<td>( t 3 )</td>
</tr>
<tr>
<td>11</td>
<td>Press NEXT key and set Stage 3 Hold to 0.15.</td>
<td>( h 3 )</td>
</tr>
<tr>
<td>12</td>
<td>Press EXIT to return to normal operation and show ambient temperature.</td>
<td>( p 1 )</td>
</tr>
</tbody>
</table>

Start Bisque Firing Instantly

1. Check small display shows program you want to use, in this case program 1. | \( p 1 \) |
2. Press RUN STOP key to start firing.

Delay Start Bisque Firing By 3 Hours

1. Check small display shows program you want to use, in this case program 1. | \( p 1 \) |
2. Press RUN STOP key and while light is flashing set large display to 300. | \( d 300 \) |
Operation of Controller

This section gives an overview on how to operate the controller, describes in detail how to enter programs into the controller, how to start a firing and what can be done while firing is in progress, explains the function of keys, indicator lights, display and the internal beeper, describes what to look for when power is turned on and finally how the controller recovers from a power failure.

Operation Overview

The Kiln Controller is very easy to use.

When power is applied the display sequentially shows a display test to verify the controller is working correctly. See Power Up Test, page 13.

Before firing can commence the correct program values must be entered into at least one of the nine program storage containers.

A program has up to six stages. Each stage has a ramp setting, a temperature setting and a hold setting. When firing is started the temperature climbs at the ramp rate to the Hold Temperature and is maintained there for the Hold Time before advancing to the next stage.

If a ramp rate is not required, the ramp setting can be set to \( F \text{as} \) \( t \). The controller will then bring the kiln to the Hold Temperature as fast as possible.

If a stage needs to be kept at the Hold Temperature indefinitely, the hold setting can be set to \( H \text{ol} \) \( d \). The controller will then maintain temperature until stopped with the RUN STOP key.

If a stage is not required, the temperature setting can be set to \( P \text{r} \) \( s \) \( s \). The program will then skip onto the next stage.

To jump to the end of a program and skip all remaining unused stages set the ramp setting of the next stage after the last programmed stage to \( E \text{n} \) \( d \).

To commence a firing ensure the correct program number is showing in the small display, for example \( P \text{l} \) is program one, then press the RUN STOP key. The firing can also be delay started or stage started, see Start a Firing, page 9.

Once started, the kiln temperature will follow the temperature profile of the selected program. See During a Firing, page 10.

During the firing, settings of the program can be checked and changed, other stored programs can be changed or new programs can be entered.

When completed the alarm beeps five times and shuts power off to the kiln.

Enter a Program

How to select a program and enter a program value is explained in the following sections. Enter program mode by pressing the MENU key. Return to normal mode by pressing the EXIT key.

Select a Program

Press MENU key.

Large display shows current program number.

Use UP or DOWN keys to select a new program number.

Set Ramp 1

Press and release MENU key until the small display flashes \( r \) \( l \).

Large display shows the ramp rate for stage 1 or shows \( F \text{as} \) \( t \) or \( E \text{n} \) \( d \).

\( F \text{as} \) \( t \) means the kiln temperature will ramp as fast as possible to the set temperature.

\( E \text{n} \) \( d \) means the controller will skip to the end of the program bypassing the remaining stages and will not display other stage settings past this point except the vent close and vent open settings, \( c \) \( L \) and \( v \) \( P \).
Use UP or DOWN keys to set the required ramp rate, or hold down the UP key until display shows $R_e d$. Press DOWN once to set it to $R_e d$ or press it twice to select 3200, which is the largest ramp number that can be set.

Alternatively, pressing the UP and DOWN keys together will cycle between a ramp rate of 100°C/h, the setting $R_e d$ and the setting $R_e d$.

**Set Temperature 1**

Press and release MENU key until the small display flashes $t$.

Large display shows either the maximum temperature kiln will climb to during stage 1 or show $P_s S$. $P_s S$ means bypass stage 1 completely.

Use UP or DOWN keys to set the required temperature value, which must be between the setting limits, see *Hold Temperature Setting Limits*, page 23, or hold down the UP key until display shows $P_s S$.

Alternatively, pressing the UP and DOWN keys together will cycle between a value of half the Maximum Hold Temperature, see *Hold Temperature Setting Limits*, page 23, and the setting $P_s S$.

**Set Hold 1**

Press and release MENU key until the small display flashes $h$.

Large display shows length of time kiln temperature will be held for at stage 1 temperature setting or show the word $H_o l d$. $H_o l d$ means the kiln will be held at stage 1 temperature setting until the START/STOP key is pressed to stop the firing.

Use UP or DOWN keys to set required hold period, up to a maximum of 54 hours, or set to $H_o l d$ by holding down the UP key until display shows $H_o l d$.

Alternatively, pressing the UP and DOWN keys together will cycle between a hold time of 0.00 and the setting $H_o l d$.

**Set Stage 2 Through To Stage 6**

Entering setting values for Stage 2 through to stage 6 is the same as described for stage 1.

**Set Vent Close Set Point**

The Vent Close Set Point value is only shown in the display if relay option card OP-1 is fitted.

Press and release MENU key until the small display shows $c l$.

The large display shows either the close vent set point or $O_ff$ and the VENT light will be flashing.

If the close vent set point is exceeded by the kiln temperature the Vent light will turn off and the Vent will shut.

The vent limits do not operate when the setting is set to $O_ff$.

Use UP or DOWN keys to set the required close vent temperature value, which must be between the setting limits, see *Hold Temperature Setting Limits*, page 23, or set to $O_ff$ by holding down the UP key until display shows $O_ff$.

Alternatively, pressing the UP and DOWN keys together will cycle between half the Maximum Hold Temperature, see *Hold Temperature Setting Limits*, page 23, and the setting $O_ff$.

Press EXIT key to return to normal operation.

---

**Note**

At power on, the Vent is always opened. When the RUN key is pressed (or firing is Auto Continued after a power failure) the vent remains open, unless the current kiln temperature exceeds the $c l$ temperature.
Set Vent Open Set Point
The Vent Open Set Point value is only shown in the display if relay option card OP-1 is fitted.

Press and release MENU key until the small display shows \( OP \).

The large display shows either the open vent set point or \( OFF \) and the VENT light will be flashing.

If the kiln temperature falls below the open vent set point after the firing is completed, the Vent light will turn on and the vent will open.

The vent limits do not operate when the setting is set to \( OFF \).

Use UP or DOWN keys to set the required open vent temperature value, which must be between the setting limits, see Hold Temperature Setting Limits, page 23, or set to \( OFF \) by holding down the UP key until display shows \( OFF \).

Alternatively, pressing the UP and DOWN keys together will cycle between half the Maximum Hold Temperature, see Hold Temperature Setting Limits, page 23, and the setting \( OFF \).

Press EXIT key to return to normal operation.

Start a Firing
Before starting a firing, either select one of the nine programs if they have been previously entered or enter a new program as detailed in Enter a Program, page 7.

To view the total firing duration of this program press the TIME TO GO key, before starting the firing.

There are three ways the firing can be started.

- **Instant Start**: Starts from the beginning of a program.
- **Delayed Start**: Starts automatically after a time delay.
- **Stage Start**: Starts from any stage of the program.

Each section is described in detail below.

| Note | When the firing has started, the HEAT light will turn on and off at different times to regulate the kiln temperature. If the kiln temperature is too low the HEAT light will turn on. This indicates power has been applied to the kiln’s heating elements to increase the temperature. If the kiln temperature is too high the heat light will turn off. This indicates power has been cut off to the kiln’s heating elements to allow the temperature to fall. |

Instant Start
This is the simplest way of starting the firing.

Press the RUN STOP key.

The small display shows \( d \) and the RUN STOP light fast flashes for five seconds.

When the RUN STOP light stops flashing the small display will show the first ramp number, the heat light will turn on, and the firing will start.

Delayed Start
A delayed start allows a firing to be started after a delay of up to 99 hours and 59 minutes from when the START/STOP key was pressed.

Press the RUN STOP key.

The small display shows \( d \) and the RUN STOP light fast flashes for five seconds.

During the five seconds set the large display to the delay start time required.

At the end of the five seconds the small display comes on steady and the RUN STOP light slow flashes to indicate there is a delayed start in progress.
The large display shows remaining time to go before firing will commence.
The delay start time can be altered while timing out.

When the time gets to 000 the small display will show the first ramp or temperature stage number, the heat light will turn on, the RUN STOP light will come on steady and the firing will start.

To cancel a delayed start when in progress, press the RUN STOP key.

**NOTE**
If power fails during this delay period and the Auto Continue feature has been enabled, the countdown to the start of firing will continue when power is restored, but the start time will be extended by the time power was off.

---

**Stage Start**

The Stage Start method allows a firing to be started instantly from any point within the program.

Use the MENU key to step through the program until the small display shows the desired starting point.

The MENU light will be on and the small display will be fast flashing.

Press the RUN STOP key.

The MENU light will be on and the START/STOP light will fast flash for five seconds.

Press the RUN STOP key again during the five-second time out. Two long beeps will sound, the heat light will turn on, and the small display and the RUN STOP light will come on steady indicating the firing has started.

**Warning**
If the key is not pressed, during this time out, the firing will start from the beginning of the program.

Check the small display is showing the correct starting point in the program.

---

**During a Firing**

Once the firing is started, the kiln controller generates a temperature profile calculated from the ramp, temperature and hold settings of each stage.

Any of these settings can be adjusted during the firing to change the temperature profile.

As the program advances, the Control Temperature follows the temperature profile exactly.

The Heat output is turned on and off to make the kiln temperature follow the Control Temperature.

If the kiln temperature is less than the Control Temperature, heating is switched on, if the kiln temperature is higher heating is switched off.

To see the current Control Temperature press the CONTROL TEMP key at any time during a firing.

To view the remainder of the total firing time press and hold the TIME TO GO key for longer than 3 seconds.

When the small display shows 000... the kiln temperature is ramping up to the set temperature and the time to finish this ramp can be viewed by pressing the TIME TO GO key.

At lower temperatures, the kiln temperature will follow the Control Temperature very closely, but at higher temperatures the kiln temperature may fall behind the Control Temperature, especially if the ramp rate is too high or the heating elements are getting old.

If the Control Temperature reaches the set temperature and the kiln temperature is lagging behind, the mnemonic $t$... will show in the small display indicating the program is paused while waiting for the kiln temperature to catch up.
If the TIME TO GO key is pressed, when \( t \) is showing, the display will show \( 000 \).

When the kiln temperature is within 5°C of the Hold Temperature the kiln will either be held at this temperature for the hold period or will move into the start of the next stage if no Hold Time has been set for this stage.

To view how much time remains to the end of the current hold period, press the TIME TO GO key while the small display is showing \( h \)....

When all stages of the program have been completed the firing will be stopped and five long beeps indicate the program is finished.

**Keys**

There are two basic modes of operation, normal mode and programming mode.

- The controller is in programming mode after the MENU key has been pressed, and up until the EXIT key is pressed. In this mode key functions are identified by the blue captions.
- All other times the controller is considered to be in normal mode and functions are identified by the caption on the key except when using the UP and DOWN keys to set the delayed start time.

**RUN STOP Key**

Starts or stops a firing when pressed. When started the light fast flashes for five seconds to allow setting (with the UP or DOWN keys) the delay start period. If a delay start period is set, after the five-second-entry time, the RUN STOP light will change to slow flashing to indicate the controller is waiting to start at the end of this period. The delay time can be altered while waiting to start.

**Menu (Next) Key**

Used to go into the programming mode.

First press will display the current program number, further presses step through each setting of the current program.

During a firing this key can be used to view or change settings of the current program and also to view or changed settings of other stored programs or enter new programs.

**Control Temp (Down) Key**

This key has two functions;

- When programming or setting the Delayed Start Time, press to decrease the value of the selected setting. Alternatively to toggle between preset values and the instruction words press the UP and DOWN keys together.
  
  **Toggle settings are:**
  
  - Ramp Rate \( 100^\circ\text{C/hr, FAST and End} \)
  
  - Temperature Half the Maximum Hold Temperature of a stage, see **Hold Temperature Setting Limits**, page 23, and PASS,
  
  - Hold \( 0\text{hr 00min and Hold} \)

- When firing, press to display the Control Temperature.

**Time To Go (Up) Key**

This key has six functions.

- When programming or setting the Delayed Start Time, press to increase the value of the selected setting. Alternatively to toggle between preset values and the instruction words press the UP and DOWN keys together.
  
  **Toggle settings are the same as for the CONTROL TEMP (DOWN) key.**

- When not firing, press to show the total firing time.

- When firing press and hold key down for three seconds to show the remaining firing time.
• When firing and small display shows * ... press to show how much time re-
   mains to the end of the current ramp.

• When firing and small display shows h ... press to show how much time re-
   mains to the end of the current hold period.

• When firing and small display shows t ... pressing this key will show 0000 in
   the large display.
   t ... indicates the Control Temperature has reached the set temperature and
   the kiln temperature is lagging behind because there is not enough power go-
   ing in to the kiln to keep its temperature up with the ramp rate setting.

**Alarm Cancel (Exit) Key**

This key performs two functions, alarm cancel and exit programming.

• When an alarm has occurred press to acknowledge the alarm and mute the
   internal beeper and display the alarm number. See **Alarm List**, page 15 for
   alarm numbers.

• Press to return to normal operation after programming.

**Indicator Lights**

**Heat Light**

Turns on when heat is being applied to the kiln.

**Vent Light**

Turns on when kiln is venting. The Vent output is available only if option OP-1 relay
   card has been fitted. If the Close Vent _ and Open Vent _ settings are both set
   to OF, see **Set Vent**, page 8, the vent light will remain off.

**Run Stop Light**

Turns on when controller is running a program. If the controller has been set for a
   delayed start, the Run Stop light will flash slowly during the delay countdown.

**Menu Light**

Turns on when controller is in programming mode and indicates keys marked with
   blue captions are used to select and change settings.

**Alarm Light**

The Alarm light flashes’ indicating the controller has detected a problem. When the
   ALARM CANCEL key is pressed, the internal beeper is muted, and, if the problem
   is still present, the Alarm light becomes steady, or goes off if the problem has
   gone.

°C/h Ramp Light

Turns on when large display is showing a ramp rate.

°C Temp Light

Turns on when large display is showing a temperature.

h.m Hold Light

Turns on when large display is showing time in hours and minutes.

**Display**

**Both Displays**

• After a power failure both displays flash indicating firing has not resumed. See

**Large Display**

• In normal operation it shows the kiln temperature.

• When programming, it shows the value of the selected setting.
• When an alarm occurs, the alarm number mnemonic is shown if the ALARM CANCEL key is pressed. See **Alarm List**, page 15.

**Small Display**

• When the controller is stopped it shows the program number.
• When the controller is running, it shows the current stage number. For example, if the program has got to the ramp of stage 2, the display shows r2.
• When programming, it flashes and shows the stage number of the setting value shown in the large display.
• When an alarm occurs, the alarm number is shown if the ALARM CANCEL key is pressed. See **Alarm List**, page 15.

**Beeper**

The internal beeper is used as an audible indication for three events.
• When any key is pressed a single beep indicates a valid key press has been entered.
• Five long beeps indicate the firing is completed.
• If any alarm occurs bursts of five fast beeps are repeated until the ALARM CANCEL key is pressed to acknowledge the presence of an alarm.

**Power Up Test**

When the controller is powered up, the displays sequentially show a display test, the software revision number and model number, the code of an option card if fitted and finally shows the sensor code and type of sensor the controller has been set for.

<table>
<thead>
<tr>
<th>Power Up Sequence</th>
<th>Description of Displayed Information</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>All display segments and indicator lights turn on normally but if unit has been set to <strong>Demo Mode</strong>, see Demo Mode, page 23, the large display shows $\text{J},^\circ\text{F}$ with all indicator lights on.</td>
</tr>
<tr>
<td>2</td>
<td>Small display shows software revision number and large display shows model number. eg $2\times,880$.</td>
</tr>
<tr>
<td>3</td>
<td>If option card OP-1 is fitted large display shows $\text{OP} - 1$.</td>
</tr>
<tr>
<td>4</td>
<td>Small display shows input sensor code number and large display shows sensor type.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Input Sensor Type</th>
<th>Displayed Code Number &amp; Mnemonic</th>
</tr>
</thead>
<tbody>
<tr>
<td>J T/C</td>
<td>$^\circ\text{J}$</td>
</tr>
<tr>
<td>K T/C</td>
<td>$^\circ\text{K}$</td>
</tr>
<tr>
<td>N T/C</td>
<td>$^\circ\text{N}$</td>
</tr>
<tr>
<td>R T/C</td>
<td>$^\circ\text{R}$</td>
</tr>
<tr>
<td>T T/C</td>
<td>$^\circ\text{T}$</td>
</tr>
<tr>
<td>PT100</td>
<td>$^\circ\text{PT}$</td>
</tr>
</tbody>
</table>

If any segment or light does not turn on or the display is blank and the beeper sounds or the display shows $\text{no bko}$, the unit is faulty and should be returned for service.

**Power Failure**

If power fails during a firing, the controller remembers what it was doing at that time.

The controller has been factory set to automatically continue the firing from the point in the temperature profile at which power failed.
Alternatively the controller can be set to stop firing when power returns and show at what stage during the firing power failed. The firing must then be either manually restarted, or cancelled.

**Firing Auto Continues When Power Returns**

To automatically resume firing when power is restored, the Auto Continue field setting must be set $\text{On}$. See [Auto-Continue](#) page 23.

If power failed during the delay start count down or at any other time during the firing, the program will automatically resume and continue from where it left off when power returns. The ALARM light flashes to indicate there has been a power failure.

Note this is the only alarm where the internal beeper does not sound and, if option OP-1 relay card is fitted, the Alarm Relay contacts do not close.

Press the ALARM CANCEL key to clear the alarm. When this key is pressed and held, the display will show the alarm number $\text{F 0 0 U J}$ confirming a power failure occurred.

<table>
<thead>
<tr>
<th>NOTE</th>
<th>If power failed during the hold period of a stage, the controller automatically resumes firing in the ramp section of that stage. This ensures that the kiln temperature is brought back to the hold temperature at a controlled rate. Once the kiln is back at hold temperature, the controller resumes holding for the remaining hold time.</th>
</tr>
</thead>
</table>

**Firing Does Not Resume When Power Returns**

To prevent firing resuming when power is restored, the Auto Continue field setting must be set $\text{Off}$. See [Auto-Continue](#) page 23.

When power returns, the ALARM light and display flash and the internal beeper sounds to indicate that a power failure occurred. The small display shows during which program stage power failed, eg $\text{H 2}$ for Hold 2, or will show $\text{D}$ if it happened through the delayed start. The large display shows the current kiln temperature.

If option OP-1 relay card is fitted, the Alarm Relay contacts close to sound an external alarm device if fitted.

Press the ALARM CANCEL key to mute the beeper and open the Alarm Relay contacts. While pressing this key, the display will show alarm number $\text{F 0 0 U J}$ confirming fault was a power failure.

To continue with the firing, press the RUN STOP key. To cancel the firing, press the RUN STOP key a second time.

<table>
<thead>
<tr>
<th>NOTE</th>
<th>If the MENU key is pressed, from the time power is restored after a failure up until the RUN STOP key is pressed, its function will be ignored and if the CONTROL TEMP key is pressed during this time the large display will show $\text{FF}$.</th>
</tr>
</thead>
</table>
Alarms

EMC kiln controllers have proven over a number of years to be very reliable. However there are times when things do go wrong with an installation.

The controller has an inbuilt comprehensive monitoring system designed to avoid kiln melt down.

If a fault occurs an internal audible beeper is sounded and the firing cycle will either be paused, allowing the cycle to continue if the fault can be cleared, or the firing cycle will be stopped. The Alarm light flashes to indicate that the controller has detected a problem.

If option OP-1 relay card is fitted the ALARM contact, which can be used to sound an external alarm device, will close until the alarm is acknowledged and the RUN contact is opened and remains open until the firing is re started.

To acknowledge the alarm press the ALARM CANCEL key.

When the ALARM CANCEL key is pressed, the internal beeper is muted, and the Alarm light turns on steady if the problem is still present, or turns off if the problem has gone. While the ALARM CANCEL key is held down, the alarm number and alarm mnemonic are shown in the display.

The Alarm List below shows, for each alarm number, what the large and small displays are showing, what state the controller is in, the likely cause of the fault and the fault remedy.

To help short cut other problems not detected by the alarm system, a Typical Faults List has been compiled of common faults, with separate columns for easy identification of the Fault, the Cause and the Remedy.

## Alarm List

<table>
<thead>
<tr>
<th>ALARM NUMBER</th>
<th>SMALL DISPLAY</th>
<th>LARGE DISPLAY</th>
<th>CONTROLLER STATE</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Shows point in program where power failed (eg $r^2$)</td>
<td>Shows current kiln temperature</td>
<td>Controller is paused (only if Auto Continue is set to OFF). Heat is OFF</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>CAUSE</td>
<td>Mains power failed during a firing or delayed start.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>REMEDY</td>
<td>Press RUN STOP once to continue firing, or twice to cancel firing.</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>ALARM NUMBER</th>
<th>SMALL DISPLAY</th>
<th>LARGE DISPLAY</th>
<th>CONTROLLER STATE</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Not affected</td>
<td>Shows $H^1$ (over-range)</td>
<td>Heat is OFF</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>CAUSE</td>
<td>Thermocouple burnout or thermocouple wiring break</td>
<td></td>
</tr>
<tr>
<td></td>
<td>REMEDY</td>
<td>Check the thermocouple and wiring by turning power off to the controller and strap terminals 14 and 15 together with a wire link. Turn power on. If the display shows ambient temperature, i.e. approximately 25°C, the thermocouple probe or it’s wiring is faulty. If the display still shows $H^1$ the controller is faulty and should be returned to the supplier with a written description of the fault.</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>ALARM NUMBER</th>
<th>SMALL DISPLAY</th>
<th>LARGE DISPLAY</th>
<th>CONTROLLER STATE</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Not affected</td>
<td>Shows $L^0$ (under-range)</td>
<td>Heat is OFF</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>CAUSE</td>
<td>Thermocouple reverse connected</td>
<td></td>
</tr>
<tr>
<td></td>
<td>REMEDY</td>
<td>Check thermocouple connections. See Thermocouple, page 21.</td>
<td></td>
</tr>
<tr>
<td>ALARM NUMBER</td>
<td>SMALL DISPLAY</td>
<td>LARGE DISPLAY</td>
<td>CONTROLLER STATE</td>
</tr>
<tr>
<td>--------------</td>
<td>---------------</td>
<td>---------------</td>
<td>------------------</td>
</tr>
<tr>
<td>H1</td>
<td>Shows point in program where overload detected (eg ( r ))</td>
<td>Shows current kiln temperature</td>
<td>Controller is paused, Heat is OFF</td>
</tr>
</tbody>
</table>

**CAUSE** Kiln temperature is greater than the Maximum Hold Temperature setting. Possibly due to welded contacts on the kiln’s contactor.

**REMEDY** Check and repair kiln contactor. Press RUN STOP once to continue firing, or twice to cancel firing.

<table>
<thead>
<tr>
<th>ALARM NUMBER</th>
<th>SMALL DISPLAY</th>
<th>LARGE DISPLAY</th>
<th>CONTROLLER STATE</th>
</tr>
</thead>
<tbody>
<tr>
<td>H2</td>
<td>Shows point in program where loss of control detected (eg ( r ))</td>
<td>Shows current kiln temperature</td>
<td>Controller is paused, Heat is OFF</td>
</tr>
</tbody>
</table>

**CAUSE** Kiln temperature has been higher than the Control Temperature for more than 1 hour and is rising at more than 20°C per hour. Possibly due to welded contacts on the kiln’s contactor.

**REMEDY** Check and repair kiln contactor. Press RUN STOP once to continue firing, or twice to cancel firing.

<table>
<thead>
<tr>
<th>ALARM NUMBER</th>
<th>SMALL DISPLAY</th>
<th>LARGE DISPLAY</th>
<th>CONTROLLER STATE</th>
</tr>
</thead>
<tbody>
<tr>
<td>H3</td>
<td>Shows point in program where loss of control detected (eg ( r ))</td>
<td>Shows current kiln temperature</td>
<td>Controller is paused, Heat is OFF</td>
</tr>
</tbody>
</table>

**CAUSE** Kiln temperature has been higher than the Control Temperature for more than 1 hour and is not falling and is still rising. Possibly due to welded contacts on the kiln’s contactor.

**REMEDY** Check and repair kiln contactor. Press RUN STOP once to continue firing, or twice to cancel firing.

<table>
<thead>
<tr>
<th>ALARM NUMBER</th>
<th>SMALL DISPLAY</th>
<th>LARGE DISPLAY</th>
<th>CONTROLLER STATE</th>
</tr>
</thead>
<tbody>
<tr>
<td>C2</td>
<td>Shows point in program where loss of control detected (eg ( r ))</td>
<td>Shows current kiln temperature</td>
<td>Controller is paused, Heat is OFF</td>
</tr>
</tbody>
</table>

**CAUSE** Kiln temperature has been lower than the Control Temperature for more than 1 hour and is rising at less than 20°C per hour. Due to weak elements, low mains voltage, probe not fully inserted into the kiln or kiln overloaded.

**REMEDY** Check and replace faulty elements, check mains voltage, push probe fully into the kiln, remove some work from the kiln. Press RUN STOP once to continue firing, or twice to cancel firing.

<table>
<thead>
<tr>
<th>ALARM NUMBER</th>
<th>SMALL DISPLAY</th>
<th>LARGE DISPLAY</th>
<th>CONTROLLER STATE</th>
</tr>
</thead>
<tbody>
<tr>
<td>C3</td>
<td>Shows point in program where loss of control detected (eg ( r ))</td>
<td>Shows current kiln temperature</td>
<td>Controller is paused, Heat is OFF</td>
</tr>
</tbody>
</table>

**CAUSE** Kiln temperature has been lower than the Control Temperature for more than 1 hour and is falling at more than 20°C per hour. Due to failed elements, low mains voltage.

**REMEDY** Check and replace faulty elements, check mains voltage. Press RUN STOP once to continue firing, or twice to cancel firing.

---

1. This time period can be altered or the alarm turned off. See *Loss of Control Timeout* on page 24.
### Alarms

<table>
<thead>
<tr>
<th>ALARM NUMBER</th>
<th>SMALL DISPLAY</th>
<th>LARGE DISPLAY</th>
<th>CONTROLLER STATE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Press alarm key to view</td>
<td>Shows program number (eg P 1)</td>
<td>Shows current kiln temperature</td>
<td>Controller is stopped</td>
</tr>
</tbody>
</table>

**CAUSE** Electrical interference disrupted operation of controller or controller is faulty.

**REMEDY** Check Thermocouple is separated from power cabling as described in *Cable Separation*, page 19 or, if fault cannot be cleared, return to supplier with a written description of fault and the fault alarm number.

- **Clock fail reset**
- **Watch dog reset**
- **Bad instruction reset**
- **Unexpected interrupt reset**
- **A/D fail**
- **EEPROM fail**

**Fault Diagnostics**

When a fault occurs there are several values that should be looked at before the firing is stopped or power is turned off.

This information will be useful to a service person to help with fault location at a later date.

- Check program is correct.
- Note what stage firing is at. This is shown in small display.
- Note kiln temperature.
- Note control temperature by pressing the CONTROL TEMP key.
- Check if heat light is on or is being turned on and off.
- Check, if possible, power is applied to the elements when heat light is on.
- Note alarm number by pressing ALARM key. See *Alarms*, page 15.
- Note current kiln temperature ramp rate by pressing together the DOWN and ALARM keys.
- Check and apply remedy if fault is listed in *Typical Faults List* below.

### Typical Faults List

<table>
<thead>
<tr>
<th>FAULT</th>
<th>CAUSE</th>
<th>REMEDY</th>
</tr>
</thead>
<tbody>
<tr>
<td>Kiln over fires by up to 100°C.</td>
<td>Thermocouple compensating lead reverse connected.</td>
<td>Check the thermocouple connection. See <em>Thermocouple</em>, page 21.</td>
</tr>
<tr>
<td>Displays and lights frozen and no response from any key press.</td>
<td>Electrical interference or component failure has locked out the controller.</td>
<td>Check Thermocouple is separated from power cabling as described in <em>Cable Separation</em>, page 19. Turn power off then on to restart controller. If controller does not respond return to supplier with a description of fault.</td>
</tr>
<tr>
<td>Heat light is on but kiln temperature is not increasing.</td>
<td>Mains power not connected to heating elements.</td>
<td>Check kiln door is closed properly, heating contactor has operated, main supply switch is on and the heater fuses are okay.</td>
</tr>
<tr>
<td>None of the indicator lights illuminate and the display remains blank after mains power is switched on.</td>
<td>Mains power is not connected to controller.</td>
<td>Check supply fuse and that power is on the controller terminals. If power is okay the controller may be faulty and should be returned to the supplier with description of fault.</td>
</tr>
</tbody>
</table>

*Requires factory calibration*
<table>
<thead>
<tr>
<th>On power up, both displays are blank, the alarm light is on and the beeper sounds.</th>
<th>Controller is faulty.</th>
<th>Return to supplier with a description of fault.</th>
</tr>
</thead>
<tbody>
<tr>
<td>On power up some of the display segments or some of the indicator lights do not turn on as described in <em>Power Up Test</em>, page 13.</td>
<td>Controller is faulty.</td>
<td>Return to supplier with a description of fault.</td>
</tr>
</tbody>
</table>
Installation

This section provides information on mounting the controller, and wiring requirements, including details of good wiring practice to avoid the controller malfunctioning from electrical interference.

Take particular note of the two WARNING paragraphs in the wiring section.

EMC recommends that a qualified electrician install the unit to ensure all electrical safety requirements are met.

Dimensions

Mounting

The controller has plug-in screw terminals at the rear.

Install the unit in a 92 x 45 mm cut out in a position where it is easy to read and operate, and where the case temperature will not rise above 45°C.

Wiring

Cable Separation

WARNING Power and Thermocouple cabling must be separated by at least 50mm.

To avoid malfunction of the controller it is essential that all power and control cabling is run separately and at least 50mm away from the thermocouple wiring.
**Power Supply**
Connect supply phase to terminal L and supply neutral to terminal N.
Power requirement is 5VA maximum.

**WARNING** Before switching power on to controller, check supply voltage rating shown on the back panel, is correct for your mains power supply.

**Electrical Interference Suppression of Relay Outputs**
Inductive loads, such as the heat contactor coil used to switch power to kiln elements, connected to any of the relay contacts must have a suppression capacitor fitted across the coil.

This is to suppress the large back EMF randomly generated when switching off the contactor.

The fast changing back EMF voltage can couple into the controllers wiring which may crash the microcontroller causing an alarm, F 1 to F 5 or $\approx$ book. See **Alarm List**, page 15.

Use supplied suppression capacitor, RS Components Part Number 238-299 or an equivalent connected across the heat contactor coil.

**Warning** Do not connect capacitor across output relay contacts.

If relay option card OP-1 is fitted any inductive loads connected to the outputs should have suppression capacitors fitted.

**Heat Relay**
Link terminal 8 to supply phase, terminal L, and connect terminal 9 via the door interlock micro switch to the contactor coil. The other end of the coil connects to neutral.

The contacts close if the kiln temperature is lower than the Control Temperature by more than 2°C any time the program is running other than when there is an alarm.

Heat Relay contacts are on terminals 8 and 9 and are rated 240Vac, 2 amp load.
Link terminal 8 to supply phase, terminal L, and connect terminal 9 via the door interlock micro switch to the contactor coil. The other end of the coil connects to neutral.

**Heat Logic for Solid State Relay**
Out 1 Logic signal (5V at 20mA max) are on terminals 11 and 12.
Terminal 11 is positive and terminal 12 is negative.

This output, which operates when heat is called for, can be used for connection to solid-state relays.

**Run Relay (Option)**
Run Relay contacts are on terminals 16 and 17 and are rated at 240Vac, 2 amp load.

When firing starts, the contacts close and remain closed (except during a power failure or alarm) for the duration of the firing. At the end of firing the contacts open.
This output may be used as the master cut-off control switch in gas fired kilns.

**Vent Relay (Option)**
Vent Relay contacts are on terminals 18 and 19 and are rated at 240Vac, 2 amp load.

When the kiln temperature exceeds the programmed value $L$, the contacts close to close the vent. The contacts will only open again to open the vent when the firing has ended and the kiln temperature has dropped below the programmed value $OP$.

**Note** At power on, the Vent is always open. When the RUN key is pressed (or firing Auto Continues) the vent is opened, unless the current kiln temperature has exceeded the $L$ temperature.
**Alarm Relay (Option)**

Alarm output contacts are on terminals 20 and 21 and are rated at 240Vac, 2 amp load.

When an alarm occurs, the contacts close and remain closed until the ALARM CANCEL key is pressed.

**Thermocouple**

Connect positive lead to terminal 14 and negative lead to terminal 15.

Ensure thermocouple extension or compensating cable is separated from power cabling by at least 50mm, as described in **Cable Separation**, page 19.

Use the correct extension or compensating cable to extend the probe leads, and ensure cable is wired with correct polarity i.e. positive lead of extension/compensating cable connects the probe positive terminal to the controller positive terminal. If the extension/compensating cable is reverse wired, the kiln may over fire by as much as 100°C.

If unsure of cable polarity, disconnect from probe and twist the ends together. Leave the other end connected to terminals 14 and 15 of controller. Apply heat to the twisted ends and observe temperature reading on display. If the reading increases, the cable is connected correctly to controller. However if the reading decreases, the cable is reversed and should be rewired correctly.

<table>
<thead>
<tr>
<th>Note</th>
<th>If Thermocouple burns out or wiring breaks display will show HI</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>If Thermocouple is reverse connected, the temperature reading will decrease to -50°C, (the kiln temperature is actually rising to +50°C), then at that point the heating will be cut off and the display will show 0.</td>
</tr>
</tbody>
</table>

**Resistance Thermometer – 3 Wire**

This is the preferred method that compensates for temperature errors caused by cable loop resistance.

Use three core cable connected to terminals 13, 14 and 15. It is important wires connected to terminals 13 and 14 join together only at the resistance thermometer end of the cable and not at the controller terminals. Terminal 15 connects by itself to the other end of the resistance thermometer.

Ensure probe cable is separated from power cabling by at least 100mm, as described in **Cable Separation**, page 19.

**Resistance Thermometer – 2 wire**

This method of connection requires only a twin conductor cable however it suffers from temperature reading inaccuracies. For every 0.39 ohms loop resistance in the cable 1°C will be added onto the real temperature measured. Also temperature change of the cable affects the temperature reading accuracy. For each 20 °C rise in cable temperature the error caused by cable length is increased by approximately 10%.

<table>
<thead>
<tr>
<th>Wire Size mm²</th>
<th>Cable Length m For 1°C error</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.50</td>
<td>5.50</td>
</tr>
<tr>
<td>0.75</td>
<td>8.25</td>
</tr>
<tr>
<td>1.00</td>
<td>11.00</td>
</tr>
</tbody>
</table>

Loop terminals 13 and 14 together at the controller terminals and connect terminals 14 and 15 to the resistance thermometer.

Ensure probe cable is separated from power cabling by at least 50mm, as described in **Cable Separation**, page 19.
Field Settings

The controller has six settings, which are not often adjusted, but are there to allow customisation of the controller for a particular application. The table below gives a summary of these settings and each setting is explained in the following paragraphs.

Enter Field Setting Mode

To gain access to the Field Settings, code number 111 is entered into the large display, the appropriate field setting step number is selected and then the setting is altered.

- Press and hold the MENU key until the display shows $\text{C D E}_5$.
- Use the UP and DOWN keys to set the display to $\text{I I I}_5$.
- Press the MENU key to select the first step in the Field Settings list. The small display will flash $0^f$, showing the first step number, and the large display will show the current input sensor code.

Field Settings Table

<table>
<thead>
<tr>
<th>Heading</th>
<th>Step</th>
<th>Description</th>
<th>Field &amp; Factory Setting</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Input Sensor</strong></td>
<td>0 1</td>
<td>user select T/C Type J -50 to 1000ºC</td>
<td>000 1</td>
</tr>
<tr>
<td></td>
<td></td>
<td>user select T/C Type K -50 to 1250ºC</td>
<td>000 2</td>
</tr>
<tr>
<td></td>
<td></td>
<td>user select T/C Type N -50 to 1300ºC</td>
<td>000 3</td>
</tr>
<tr>
<td></td>
<td></td>
<td>user select T/C Type R -50 to 1750ºC</td>
<td>000 4</td>
</tr>
<tr>
<td></td>
<td></td>
<td>user select T/C Type T -50 to 400ºC</td>
<td>000 5</td>
</tr>
<tr>
<td></td>
<td></td>
<td>user select RTD Type PT100 -100.0 to 320.0 ºC</td>
<td>000 6</td>
</tr>
<tr>
<td><strong>Demo Mode</strong></td>
<td>0 2</td>
<td>demo mode</td>
<td>OFF</td>
</tr>
<tr>
<td><strong>Options</strong></td>
<td>2 1</td>
<td>auto continue after power failure</td>
<td>OFF</td>
</tr>
<tr>
<td></td>
<td>2 3</td>
<td>hold temperature maximum</td>
<td>1300 ºC</td>
</tr>
<tr>
<td></td>
<td>2 4</td>
<td>hold temperature minimum</td>
<td>0 ºC</td>
</tr>
<tr>
<td></td>
<td>2 5</td>
<td>loss of control timeout $^2$</td>
<td>01.00 hr.min</td>
</tr>
<tr>
<td></td>
<td>4 4</td>
<td>auto simmerstat temperature for full power</td>
<td>OFF</td>
</tr>
</tbody>
</table>

Input Sensor

Set Input Sensor Type Code Number

The input sensor is factory set to Type R thermocouple. This can be changed to one of four others available; types J, K, N or T or to Pt100 resistance thermometer.

- Enter Field Setting Mode.
- Use the UP and DOWN keys to adjust display to new code number selected from the list below.

<table>
<thead>
<tr>
<th>Input Sensor Type</th>
<th>Code Number</th>
<th>Displayed Mnemonic</th>
<th>Field &amp; Factory Setting</th>
</tr>
</thead>
<tbody>
<tr>
<td>J</td>
<td>T/C 0 1</td>
<td>J</td>
<td>OFF</td>
</tr>
<tr>
<td>K</td>
<td>T/C 0 2</td>
<td>K</td>
<td>OFF</td>
</tr>
<tr>
<td>N</td>
<td>T/C 0 3</td>
<td>N</td>
<td>OFF</td>
</tr>
<tr>
<td>R</td>
<td>T/C 0 4</td>
<td>R</td>
<td>OFF</td>
</tr>
<tr>
<td>T</td>
<td>T/C 0 5</td>
<td>T</td>
<td>OFF</td>
</tr>
<tr>
<td>PT100</td>
<td>RTD 0 6</td>
<td>PT100</td>
<td>OFF</td>
</tr>
</tbody>
</table>

- Return to normal operation by pressing the EXIT key.

$^2$ Controller automatically stops if the temperature remains out of control longer than this time. If this setting is set to OFF, the loss of control timeout is disabled.
Demo Mode

Set Demo Mode

Step 02

To run the controller and demonstrate its features without having to heat the kiln set step \( \text{ON} \) to \( \text{OFF} \). On power up the large display momentarily shows \( \text{ON} \). Ensure when demonstration is finished to set step \( \text{ON} \) back to \( \text{OFF} \).

While in this mode the heat relay contacts and the logic output do not turn on if the controller is asking for heat but the Heat light turns on and the temperature reading will increase. The dummy kiln has a time constant similar to a kiln with a heat transfer time constant of several minutes.

- Enter Field Setting Mode.
- Press MENU key until the small display flashes \( \text{ON} \).
- Press the UP key to set display to \( \text{OFF} \) or press the DOWN key to set display to \( \text{ON} \).
- Press EXIT key to return to normal operation.

Auto-Continue

Set Auto-Continue

Step 21

When the controller leaves the factory, Auto-Continue is set to \( \text{ON} \). This means if power fails during a firing, the controller will automatically continue firing when power is restored. If Auto-Continue is set to \( \text{OFF} \), the displays will show a power failure occurred and at what stage of the firing it failed. The firing must be manually continued or cancelled. Refer to Power Failure, page 13 for full details.

- Enter Field Setting Mode.
- Press MENU key until the small display flashes \( \text{ON} \).
- Press the UP key to set display to \( \text{OFF} \) or press the DOWN key to set display to \( \text{ON} \).
- Press EXIT key to return to normal operation.

Hold Temperature Setting Limits

The minimum and maximum setting limits are used to restrict the range over which the Hold Temperature can be set when programming the controller.

The minimum can be adjusted from \(-50.0^\circ\text{C}\) upwards and the maximum from \(3200^\circ\text{C}\) downwards for thermocouple ranges and \(320.0^\circ\text{C}\) for the RTD range.

When the controller leaves the factory the Hold temperature minimum is set to \(0^\circ\text{C}\) and the maximum for thermocouple ranges is set to \(1300^\circ\text{C}\), \(130.0^\circ\text{C}\) for RTD range). This prevents the Hold temperature being set to values that may damage the kiln.

For kilns which may still be damaged if fired to \(1300^\circ\text{C}\), the maximum limit should be reduced to suit. (Consult kiln supplier for firing temperature limits.)

The following procedure details how these limits may be altered.

Set Maximum Hold Temperature

Step 23

- Enter Field Setting Mode.
- Press MENU key until the small display flashes \( \text{ON} \).
- Use the UP and DOWN keys to alter the display to the new maximum value.
- Press EXIT key to return to normal operation or press MENU key to go onto next step, step \( \text{OFF} \), to adjust the minimum value.

Set Minimum Hold Temperature

Step 24

- Enter Field Setting Mode.
- Press MENU key until the display flashes \( \text{OFF} \).
• Use the UP and DOWN keys to alter the display to the new minimum value.
• Press EXIT key to return to normal operation.

**Loss of Control Timeout**

*Set Loss of Control Timeout*  
Step 25

The controller continually monitors the kiln temperature in comparison to the control temperature. It shuts down a firing if the kiln temperature is too high or too low for a period of time. See alarms $\text{HOT}_2$, $\text{HOT}_3$, $\text{COLD}_d$, $\text{COLD}_d$ in *Alarm List*, page 15.

By default the timer period is 1 hour. This may be made longer or shorter or set to OFF to disable these alarms.

• Enter Field Setting Mode.
• Press MENU key until the display flashes $^25$.
• Use the UP and DOWN keys to alter the display to the new timeout value.
• To set to OFF press and hold the UP key until display shows $^25$ OFF.
• Press EXIT key to return to normal operation.

**Note**  
To toggle the setting between 1.00 hour and OFF press both the UP and DOWN keys together.

**Auto Simmerstat**

*Automatic Simmerstat Temperature For Full Power*  
Step 44

Accurate temperature control between 20°C and 200°C is achieved by using the automatic simmerstat. Its purpose, to reduce power to the kiln over this temperature range, prevents the kiln temperature exceeding the Control Temperature by large amounts.

To control power output the output on to off ratio is changed over a fixed time period. The Heat Relay output has a cycle period of 30 seconds and the Heat Logic output 2 seconds.

When the Control Temperature is about 20°C and heat is called for, the Heat output will be on for approximately one tenth of the cycle period and off for about nine tenths of the time. As the control temperature rises, the Heat output on time becomes longer, and the off time shorter.

At 100°C the on and off times are about equal, while at about 180°C the on time is about nine tenths of the cycle period and the off time is about one tenth of the cycle period. Above 200°C the simmerstat action does not work at all and the Heat output will remain on whenever heat is called for.

**Note**  
If the kiln temperature equals or is greater than the Control Temperature, the Heat output will turn off irrespective of the simmerstat action.

The Auto-Simmerstat field setting has been factory set to 200°C.

For applications where the temperature profile does not go beyond 600°C the factory setting may not allow the kiln to heat up quick enough to follow the desired temperature profile, in which case the setting may need to be reduced or set to off.

• Enter Field Setting Mode.
• Press MENU key until the display flashes $^6$.
• To change the setting use the UP and DOWN keys.
• To set to OFF press and hold the UP key until display shows $^6$ OFF.
• Press EXIT key to return to normal operation.
**SPECIFICATIONS**

**Program Settings**

**Programs**
9 different temperature profiles can be entered and stored.

**Delayed Start**
of program up to 99 hrs, 59min.

**Ramp Rates**
adjustable: 0.1 to 3200°C/hr, or FAST for maximum ramp rate or END to skip remaining stages.

**Hold Temperatures**
adjustable: -50°C to 3200°C for thermocouple inputs or -50.0°C to 320.0°C for RTD input, or PASS to bypass the stage.

**Hold Times**
adjustable: 0:00 to 54:00 hrs:min, or to HOLD indefinitely.

**Vent**
The close and open vent temperature adjustable over the Hold Temperature range.

**Controller Settings**

**Inputs**

**Thermocouple**
Five user selectable types. Factory set to Type R. All thermocouple ranges are ambient temperature compensated. Accuracy ±0.2% of full-scale ±1°C.

**Resistance Thermometer**
Pt 100 to DIN 43760, 2 or 3 wire connection. Accuracy ±0.2% of full-scale ±0.1°C.

**Input Sensor Range**

<table>
<thead>
<tr>
<th>Sensor Type</th>
<th>Range</th>
</tr>
</thead>
<tbody>
<tr>
<td>Type J Iron-Constantan</td>
<td>-50°C to 1000°C</td>
</tr>
<tr>
<td>Type K Chromal-Alumel</td>
<td>-50°C to 1250°C</td>
</tr>
<tr>
<td>Type N Nicrosil-Nisil</td>
<td>-50°C to 1300°C</td>
</tr>
<tr>
<td>Type R Platinum, 13% Rhodium-Platinum</td>
<td>-50°C to 1750°C</td>
</tr>
<tr>
<td>Type T Copper-Constantan</td>
<td>-50°C to 400°C</td>
</tr>
<tr>
<td>PT100 Resistance Thermometer</td>
<td>-100.0°C to 320.0°C</td>
</tr>
</tbody>
</table>

**Other Settings**

**Auto Continue After Power Failure**
When set ON, program will resume automatically after a power failure.

**Hold Temperature Min/Max Setting Range**
Adjustable from -500°C to 3200°C for thermocouple inputs, or -50.0°C to 320.0°C for RTD input. Factory set 0°C to 1300°C.

**Loss of Control Timeout**
If kiln temperature has not reached Control Temperature within the timeout setting, the rate of temperature change is checked against the Ramp Rate Threshold setting and if out of control firing is stopped. Timeout adjustable from 0:10 to 12:00 hr:min or to OFF, factory set to 1hr.

**Auto Simmerstat**
A time proportioned automatic simmerstat, (30 second cycle time for relay output and 2 second cycle time for logic output), reduces power below the full power limit, factory set to 200°C. When heat is called for simmerstat gives 10% power at 20°C, 50% at 100°C, and 100% power above 200°C. Adjustable: 30°C to 3200°C and OFF.

**Demo Mode**
Allows features of the controller to be demonstrated without heating the kiln.

**Outputs**

Relay outputs have isolated clean contacts for general use rated at 250Vac 2A

**Heat Relay** for ON/OFF control. Output is turned off when kiln temperature is equal to or greater than the profile temperature and is turned on when kiln temperature falls 2°C less than profile temperature.

**Run Relay option OP-1**
Contacts close during firing and open when completed.

**Vent Relay option OP-1**
Contacts close when kiln temperature exceeds the close temperature setting and open when firing is completed and temperature has dropped below the open temperature setting.

**Alarm Relay option OP-1**
When firing fault detected contacts close until alarm is acknowledged.

**Logic**
Heat output logic signal of 5V 20mA maximum, suitable drive for solid-state relays.

**General**

**Stages**
6 stages, each stage comprises Ramp Rate, Hold Temperature and Hold Time.

**Display**
4 digit, 14mm high red LED main display plus 2 digit, 7mm high status display.

**Housing**
Panel mounted according to DIN 43700. IP65 Facia with polyester membrane covering. Connections via rear plug-in terminals. Shipping weight <0.5kg, volume 1.5 litres.

**Environment**
Ambient temperature range 0 to 45°C. Humidity <90% (non-condensing).

**Power Supply**
Standard is 240Vac +10% -15%, 5VA maximum. Refer to Ordering for other options.

**ORDERING**

To order, specify the model, power supply and options required.

**MODEL**

Kiln Controller 880

**POWER SUPPLY**

240Vac +10% - 15% A
115Vac +10% -15% B
24Vac +10% -15% C
10 to 35Vdc (not isolated, -ve supply connected to 0V) L

**OPTIONS (user installable)**

Run, Vent and Alarm relay outputs OP-1

**EXAMPLE OF ORDER CODE**

880-A, OP-1

**ACCESSORIES**

Wall mounted box CNT64
Contactor coil suppression capacitor (0.1uF + 100E) CSRC

**Other units in the EMC880 Controller Series:**

EMC 883 Ramp Controller – Industrial ramp controller. With 9 stages, PID or ON/OFF control and valve drive options.