

# INSTRUCTION & REFERENCE MANUAL

*For Fuego and  
Robin Kilns*



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L&L Kilns are imported into the United Kingdom by Potclays LTD

**FOR PARTS AND SERVICE CONTACT POTCLAYS LTD**

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# INSTRUCTIONS FOR L&L FUEGO, ROBIN, & LIBERTY-BELLE KILNS (ALL VERSIONS)

## IMPORTANT CAUTIONS

### INSTALLATION CAUTIONS

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#### AMBIENT TEMPERATURES

Operate in an environment between 0°C and 38°C (32 - 100°F).

#### CLEARANCES

Install kiln a minimum of 30 cm (12") away from any wall, although a minimum of 45 cm (18") is preferable. Maintain a minimum of 90 cm (36") between two adjacent kilns especially if they are going to be used at the same time.

#### YOU MUST USE THE SUPPLIED KILN STAND

Never set a kiln on a floor without significant air space circulating under the kiln. This is part of the insulation system of the kiln. Level the stand while installing.

#### WALL AND FLOOR MATERIALS

Walls and floors must be non-combustible. Recommended floor surfaces are cement, ceramic tile, stone, slate, breeze blocks or brick. Do not install on a wood floor or on carpet. Vinyl flooring may also be combustible. Protect linoleum flooring from discoloration with a non-combustible covering. Remember that the kiln radiates heat over a long period of time and that this could start a fire under certain conditions. The continued heat of the kiln can dry out combustible surfaces over time and lower the temperature at which they could start burning. Temperatures at combustible ceilings and floors should be kept below 70°C (160°F). Check temperatures around the kiln while firing.

#### REQUIRED VENTILATION FOR THE KILN

It is important to vent the room that the kiln is operating in. Kilns generate harmful fumes and heat when firing ceramics. Fumes can include carbon monoxide, formaldehyde, sulphur dioxide, heavy metal vapours, and fluorides (all of which can be very toxic). Install kiln in a well-ventilated area. Never operate in an enclosed space (such as a closet) without proper ventilation. The heat in an enclosed room could present a significant fire hazard. Severe corrosion can be caused by kiln fumes, salt air or other environmental conditions. Ventilation

must be to the outside (and not under a window).

#### USE COPPER WIRE FOR HOOK UP

Do not use aluminum wire.

#### PROTECT POWER LEAD FROM KILN CASE

Route Power Lead away from kiln in such a way that it cannot touch the hot case of the kiln. Secure wires so they cannot move.

#### KEEP KILN DRY & IN PROTECTED SPACE

The kiln must be kept dry. Water in contact with a kiln can cause an electrocution hazard.

#### FIRE EXTINGUISHER

Keep an adequate fire extinguisher (rated for electrical fires) near the kiln and check it yearly or according to local codes.

### GENERAL ENVIRONMENT CAUTIONS

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#### SURFACE IS HOT AND CAN CAUSE BURNS

Kiln surface can be extremely hot (up to 260°C/ 500°F) and can cause severe burns if touched.

#### KEEP CHILDREN & ANIMALS AWAY FROM KILN

Protect children, animals, and unqualified adults from the kiln.

#### KEEP FLAMMABLES AWAY FROM KILN

Avoid flammable or loose clothing around kiln.

### PRE-FIRING CAUTIONS

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#### PROPER USE OF KILN WASH

Make sure the floor of the kiln and the tops of the shelves are coated with kiln wash. This will protect these surfaces from melting glaze and ceramics. Do not coat the undersides or sides of the shelves. Do not apply kiln wash to the brick sides or element holders.

#### DO NOT USE SILICA SAND IN KILN

Silica can damage the kiln elements.

# INSTRUCTIONS FOR L&L FUEGO, ROBIN, & LIBERTY-BELLE KILNS (ALL VERSIONS)

## NEVER FIRE MOIST GREENWARE

We recommend using Preheat in your bisque programme to help dry out any moisture that you cannot see.

## LOADING & UNLOADING CAUTIONS

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### UNPLUG KILN WHEN NOT IN USE

### KEEP LID CLOSED WHEN KILN IS NOT IN USE

Do not store anything on the closed lid or in the kiln.

### DO NOT OPEN THE LID WHEN KILN IS ABOVE 120°C (250°F)

## FIRING CAUTIONS

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### DON'T FIRE KILN ABOVE CONE 10 (1290°C, 2350°F)

Note that the Robin Kiln is rated to Cone 02 (1100°C, 2012°F).

### ATTEND THE FIRING

No automatic safety device is foolproof! Be especially careful about attending the kiln while it is supposed to shut off. You can plan your firing using the Delay feature. If you can not be at the kiln all the time be sure to attend the end of the firing.

### USE PROGRAMME REVIEW

Review the current programme prior to starting the kiln to ensure the correct profile is programmed. This is done by pressing the Review Prog button.

### USE THE PROPER THERMOCOUPLE

Never use a different type of thermocouple with your controller unless it has been set up from the factory. Use of a type S thermocouple will over fire your kiln. The standard thermocouples that come with the Fuego, Robin and Liberty-Belle kilns are type K. They cannot be switched to a Type S.

### USE WITH THE THERMOCOUPLE PROTECTION TUBE

Note that the control has been programmed with a 10°C thermocouple offset to compensate for the effect of the ceramic thermocouple protection tube. If for some reason you were to use the kiln without that

protection tube the control would fire 10°C colder.

### USE CAUTION WHEN VIEWING INTO THE KILN

Use dark glasses (shade number 1.7 to 3.0) to view inside the kiln through the peepholes when firing. These will protect you from the radiant infrared radiation and will also protect your eyes in case the ceramic ware explodes. Do not use regular sunglasses for this.

### USE CAUTION WHEN OPENING THE KILN

- 1) Use heat resistant gloves when opening peephole plugs.
- 2) Use heat resistant gloves when opening a hot lid.
- 3) Do not open the lid when kiln is above 120°C (250°F).

## POST FIRING CAUTIONS

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### CHECK FOR GLAZE AND CERAMIC CHIPS

Remove any glaze that has splattered on the firebrick or shelves. (Use safety glasses when doing this because glaze can be sharp like broken glass). Vacuum the kiln after each firing.

## GENERAL MAINTENANCE CAUTIONS

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### ELECTRICAL SAFETY

Unplug kiln when servicing it. The elements carry high voltage when switched on and could electrocute you. Troubleshooting tests performed under power should ONLY be done by a licensed electrician.

### THE WRONG PARTS CAN BE HAZARDOUS

Off-brand elements, if not designed properly, can present a hazard to the kiln (by drawing too much amperage). The wrong type of fuse, relay, switch or other component can cause a fire or other hazardous condition. An improperly rated lead can cause a fire. Do not substitute or replace any parts with unauthorized products.

### KILN MODIFICATIONS

All customer modification is made solely at the risk of the customer. Modifications will void the warranty. L&L takes no responsibility for hazardous conditions created

# INSTRUCTIONS FOR L&L FUEGO, ROBIN, & LIBERTY-BELLE KILNS (ALL VERSIONS)

by unauthorized modifications. Any authorization for an engineering change must be in writing from the factory.

## **KILN MAINTENANCE**

See the section at the end of this booklet on periodic maintenance you need to perform on your kiln.

## **OPERATION**

### **HOW YOUR FUEGO, ROBIN OR LIBERTY-BELLE KILN WORKS**

The automatic program control measures the temperature inside the kiln using the thermocouple probe. The control automatically adjusts power to evenly heat up the kiln according to one of the four programs you are firing. You do not typically have to adjust anything once you start firing. However, if you are manually venting the kiln by opening the top vent hole you will have to manually close this at the appropriate point in the program (typically about 500°C / 932°F).

### **DIFFERENCES BETWEEN FUEGO, ROBIN & LIBERTY-BELLE KILN**

All these kilns use the same control system. The Fuego and Robin use the same elements and power supply. The Fuego is capable of reaching cone 10 temperatures (approximately 1290°C / 2350°F). The Robin is capable of reaching cone 02 temperatures (approximately 1100°F / 2012°F) because it is heating a larger chamber with the same power. The Liberty-Belle uses a different power supply with three separate contactors and is set up for 415 3-phase voltage.

### **FIRST FIRING**

See the information in this manual

### **CONTROL OPERATION**

See the One-Touch Instructions in this manual.

## **THE KILN DESIGN**

### **NOTABLE FEATURES**

#### **SECTIONAL CONSTRUCTION**

The Fuego, Robin and Liberty-Belle LB23S kilns are made up of two separate sections that sit on top of a separate kiln bottom. They are attached together by the control panel and hinge.

#### **CONTROL SYSTEM**

The automatic programme control uses a thermocouples to sense temperature. The control then automatically adjusts power output (turns the contactor on and off) to heat up the kiln. The programme control varies the target set point for the temperature according to various ramps and soak periods that are programmed in the control. Basic operating instructions are part of this manual.

#### **THERMOCOUPLE**

The standard thermocouple is a heavy-duty 8-gauge Type K thermocouple protected with an industrial grade mullite thermocouple protection tube.

#### **REMOVABLE CONTROL BOX**

The control panel can be easily removed and sent to your distributor for repairs if ever necessary.

#### **HEATING ELEMENTS IN CERAMIC HOLDERS**

The heating elements are designed to have a low watt density and good stretch ratio. These are supported in hard ceramic element holders (a unique L&L feature). This will promote long element and firebrick life.

#### **STURDY ALUMINIZED STEEL STAND**

Aluminized steel resists corrosion at the high temperatures. The stand has a full plate of aluminized steel under the bottom brick. This allows the bottom brick to move freely while expanding and contracting - which helps prevent broken bottoms. The legs, which have two bends for stiffness, are bolted onto the stand plates. There are plastic feet that slip over the metal legs.

#### **REVERSIBLE BOTTOM**

The brick bottom can be easily reversed in case of a firing mishap.



# INSTRUCTIONS FOR L&L FUEGO, ROBIN, & LIBERTY-BELLE KILNS (ALL VERSIONS)

## STAINLESS STEEL CASE

This resists most corrosion and strengthens construction. Stainless steel screws are used in case construction.

## THREE CASE CLAMPS PER SECTION

The case of each kiln section is held together by three adjustable stainless steel hose clamps. The clamps are easily accessible for occasional tightening.

## STAINLESS CLIPS HOLD BRICK LID IN PLACE

Stainless steel "U" clips hold the firebrick in the lid band.

## 76 mm (3") OF INSULATION

The insulation is a special hand picked lightweight highly insulating firebrick, which is 76mm (3") thick for all European models. In addition, on the Fuego and Robin kilns, a thin layer of non-RCF fibre paper is used as back-up insulation between the stainless case and the brick.

## LARGE DIAMETER PEEP & VENT HOLES

There is one 25 mm (1") diameter peephole per section for ventilation and cone sighting. In addition there is one vent hole in the top of the European models for manual venting.

## ELEMENT SHUT-OFF SAFETY SWITCH

A locking door safety switch shuts off all power to the elements when the door is open. This positive system breaks all power and does not rely on a relay.

## RECOMMENDED OPTIONS

### VENT-SURE VENT OPTION

The optional Vent-Sure automatic kiln ventilation system by L&L vents harmful fumes away from a kiln to the outside. Carbonaceous materials in clay, china paints and glazes containing oils, glue from decals, and certain glazes and other miscellaneous products generate fumes.

### CE CERTIFIED

All kilns are CE certified.

## LIMITED WARRANTY

### (3) THREE YEAR LIMITED WARRANTY

L&L Kilns and vents are warranted to be free of defects in workmanship for a period of three (3) years, starting on the date of original purchase from an authorized L&L distributor, subject to the following terms, including but not limited to, the exclusions and limitations set forth herein. A sales receipt is required for proof of purchase. In addition, your distributor may require you to deliver defective parts for examination. **DO NOT DISCARD PARTS BEFORE CONTACTING DISTRIBUTOR FOR INSTRUCTIONS. FAILURE TO ADHERE TO L&L'S INSTRUCTIONS, INCLUDING THOSE CONTAINED IN THE INSTRUCTION MANUAL AND AS STATED HEREIN, WILL VOID THIS WARRANTY.** L&L will replace or repair any defective part that is covered by this warranty and sent freight-prepaid to your local distributor. On-site labor is not covered by this warranty.

### EXCLUSIONS AND LIMITATIONS

The following are examples of items that are not covered by and/or circumstances that will void L&L's warranties:

1. Over-firing damage regardless of cause for the over firing. **IMPORTANT:** We specifically warn you not to fire the kiln unattended. No kiln controls are designed to be fail proof shut off devices. L&L is not responsible for damage caused by failure of one of these controls. Kiln should not be left unattended especially during its last phase of firing when it is supposed to stop firing.
2. Reduction firing or salt glaze use of kiln.
3. Damage due to: neglect, mechanical abuse, improper storage, inadequate maintenance, improper use or freight damage.
4. Damage to the elements or element holders due to failure to properly keep the kiln clean (i.e. getting glaze all over the element holders).
5. Damage to the elements or element holders due to failure to properly keep the kiln clean (i.e. allowing glaze to make contact with the element holders).

# INSTRUCTIONS FOR L&L FUEGO, ROBIN, & LIBERTY-BELLE KILNS (ALL VERSIONS)

6. Severe corrosion due to improper venting of kiln fumes or exposure to the ambient conditions, including but not limited to rain, snow, dust, and salt air.
7. Damage due to improper electrical installations or use of improper voltage.
8. Firebrick cracking or chipping for any reason. Firebrick is naturally fragile and will chip and crack over time.
9. Failure to report defect within ten (10) days after it becomes manifest or known.
10. Any alteration of parts or design that vary from factory designs.
11. Use of elements and/or other parts other than those supplied by L&L or it's authorized distributors.
12. Thermocouple Protection Tubes are not warranted against breakage.
13. L&L's warranty is strictly limited to repair or replacement of defective items. Kilns cannot be returned.
14. Dealers and Distributors are not authorized by L&L to modify and/or assume any other obligations or liabilities other than those expressed in this limited warranty and any such additional obligations are null and void.
15. EXCEPT AS SPECIFICALLY WARRANTED HEREIN, KILNS ARE SOLD AS IS. L&L MAKES NO OTHER WARRANTY, EXPRESS OR IMPLIED, COVERING THE GOODS SOLD AND SPECIFICALLY DISCLAIMS ALL IMPLIED WARRANTIES OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE. Purchaser acknowledges that certain conditions or circumstances may be created or incurred by Purchaser or user over which L&L has no control, including, but not limited to, climatic conditions, improper use, and inadequate maintenance. Purchaser, as a condition of purchase or use, assumes responsibility for and releases L&L from all liability arising out of the use of the kilns attributable to such causes.
16. L&L SHALL NOT BE LIABLE FOR ANY INCIDENTAL OR CONSEQUENTIAL DAMAGES, INCLUDING BUT NOT LIMITED TO, LOST PROFITS, LOSS OF USE, OR OTHER ECONOMIC

LOSSES. Purchaser agrees that L&L's total liability for any damages or remedies arising hereunder shall be limited to direct damages in an amount not exceeding the purchase price paid, and the provisions set forth herein constitute the exclusive remedy against, and the entire liability of, L&L in connection therewith. Any action for breach of contract or negligence must be commenced by Purchaser within one (1) year after the cause of action has accrued.

## **ONE YEAR ELEMENT & THERMOCOUPLE WARRANTY**

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Elements and thermocouples are warranted for one year with the following exceptions:

1. Glaze damage to element caused by accidentally scraping edges of unfired glazed ware against element groove and causing unfired glaze to contaminate element, which causes obvious damage to elements with resultant element failure.
2. Firing of kiln to higher than 1290°C (2350°F).
3. Damage to elements caused by explosion of ceramic object. This may cause small pieces of clay to contaminate the element and cause failure.

## **SERVICE**

### **TROUBLESHOOTING**

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See the separate TROUBLESHOOTING SECTION in the Reference Manual.

### **ELECTRICAL SPECIFICATIONS & WIRING DIAGRAMS**

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See the Reference Manual.

### **REPLACEMENT PARTS**

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Parts can be obtained from your local distributor. All parts can be viewed at [www.hotkilns/parts](http://www.hotkilns/parts).



# INSTRUCTIONS FOR L&L FUEGO, ROBIN, & LIBERTY-BELLE KILNS (ALL VERSIONS)

## REPAIRING OR REPLACING THE CONTROL PANEL

The control panel is removable from the kiln. This unique L&L Kiln design feature allows easy repair of your control panel. Disconnect power, unplug the kiln, remove panel (see the reference manual for details), pack it carefully in a box with protective cushioning, and send it to your local distributor for inspection and/or repair.

## CRACKS IN THE TOP & BOTTOM

It is quite normal to get hairline cracks in both the top and the bottom firebricks. They are caused by the expansion and contraction of the firebrick as it heats and cools. As long as the bottom is fully supported by the stand the cracks in the bottom will not adversely affect the operation of the kiln. It generally does not make sense to cement these hairline cracks.

## REGULAR KILN MAINTENANCE

### AFTER EACH FIRING

1. Unplug the kiln or turn off at the fused disconnect box.
2. Check element holders and walls for glaze, clay chips or anything that could melt at a high temperature. If melted clay or glaze comes in contact with an element, a rapid failure could result. To clean holders, a good shop vacuum will handle dust and loose crumbs. A very gentle chisel or grinder may help with glaze contamination on element holders, but remember that the elements themselves are quite brittle when they are cool. Replace the contaminated holder if you cannot clean it. Remove any glaze that has splattered on the firebrick or shelves. (USE SAFETY GLASSES WHEN DOING THIS BECAUSE GLAZE CAN BE LIKE BROKEN GLASS). Vacuum afterward. Make sure vacuum is grounded and periodically touch some grounded metal surface away from the kiln to discharge the energy while vacuuming (to protect control from static electricity).
3. Make sure the floor of the kiln and the tops of the

shelves are coated with kiln wash. Kiln wash will keep running glaze from ruining a kiln shelf or the floor of the kiln. (Do not coat the undersides or the sides of the shelves because you do not want the kiln wash to fall off into the kiln).

4. Keep a kiln log of firings. Tracking the performance of your kiln over time may turn out to be an extremely valuable tool if you ever need to diagnose future problems.

### AFTER 10 FIRINGS

1. Check temperatures of the power lead at the receptacle while the kiln is at its hottest. If these are hotter than normal, it could be a sign of a loose or corroded connection, or possibly the wire gauge used in the power hook-up is the wrong size for the amount of current being drawn by the kiln. Immediately diagnose and fix this because it could cause a fire.
2. Check plug for oxidation or any burn marks, discoloration or melted spots. If you see this replace the plug (and possibly the receptacle) before using the kiln again. Make sure the receptacle feels tight when you press the plug into the outlet. A loose receptacle indicates worn springs, which will lead to overheating. NOTE: you can put an oxidation inhibitor on the prongs.
3. Repair any firebrick problems.

### AFTER 30 FIRINGS OR ANNUALLY

1. Check element resistance. You will need a digital multimeter (see the Troubleshooting Guide). Keep track of this information.
2. Check tightness of case and retighten if necessary. (the case will expand and contract during each firing and may eventually become loose. Brick also shrinks slightly with use - especially if used at the higher temperatures like cone 10).
3. Check internal wires for deterioration or oxidation. Replace any that seem brittle or where the wire insulation has deteriorated or fallen off. Check terminals for oxidation (discoloration). If you are near salt air or if you notice corrosion on the stainless exterior of the kiln for whatever reason (like certain fumes generated by

# **INSTRUCTIONS FOR L&L FUEGO, ROBIN, & LIBERTY-BELLE KILNS (ALL VERSIONS)**

your work) then do this far more frequently.

4. Check power connection terminals in the kiln and control box for tightness. Be sure to do this with the kiln unplugged. If these terminal connections get loose heat can be generated and this can cause a fire.

5. Check thermocouple connections for corrosion, tightness and oxidation as well. A bad thermocouple connection can change the accuracy of the temperature reading, which could cause an overfiring.

When replacing electrical components, replace the electrical connectors. At the very least check for discoloration (an indication of oxidation).

## **CHECK THERMOCOUPLE CALIBRATION**

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Thermocouples will drift in reading over time. This could potentially lead to an overfiring before the thermocouple actually fails. Although you cannot easily check thermocouple calibration, the general accuracy of the entire kiln system can be checked by firing with witness cones.

# FIRST FIRING INSTRUCTIONS FOR L&L KILNS WITH A ONE-TOUCH™

## **WHEN TO DO A FIRST TEST FIRING?**

Once your kiln is set up, leveled properly (very important), control panel hooked up to the kiln correctly and all the power wired properly, you are ready for your first firing. Read these instructions and plan your time accordingly.

NOTE: This version is for kilns with the One-Touch™ control.

## **WHY DO A FIRST FIRING?**

The test firing is done very slowly, about 16 to 19 hours total to minimize the inner and outer surface temperature differences in the kiln while it goes through its maiden firing. Also this will slowly steam off any moisture absorbed by the firebrick during construction, shipping, and storage.

The test firing is done to cone 5 (about 2167°F) to vitrify the special coating on the inside on the firebrick and to allow an “aluminum oxide” coating to form on the element’s surfaces. The coating on the brick helps to reflect the heat radiated from the elements. The oxide layer on the elements helps to protect them from the many contaminants found in many materials fired in a kiln. This aluminum oxide layer will rejuvenate itself every time there is an oxygen rich firing to a high temperature. Going to cone 5 may also point out any problems with your electrical service - like low or incorrect voltage or wrong supply line wire size. The elements will also seat themselves in the ceramic holders - and any springiness you see when you first get your kiln will be alleviated.

## **HOW TO DO A FIRST FIRING**

The test firing is done with the operator present as much as possible. This is to be sure the kiln is heating up safely, and that the heating kiln affects nothing else in the room or the room itself. As for the operator being present, logistically this may be difficult as the test fire is designed to take about 16 to 19 hours.

See the “BASIC OPERATION OF L&L KILNS WITH A ONE-TOUCH™” for detailed instructions. You can do it in one firing or two firings.

The test fire is done with the kiln empty, or with the new kiln furniture. Anything else in the kiln (clay) will produce contaminants to some degree, and the elements in the kiln have not yet achieved this all important aluminum oxide coating before being subjected to these contaminants.

## **VENTING**

Leave the Vent-Sure downdraft vent system on while the kiln is heating and cooling. Keep the peephole plugs in and the lid closed. If you have no vent system then leave the top peephole plug out during the first test firing.

NOTE: It is best for the evenness and speed of the firing to keep all the peepholes closed. However, for longevity of things like the elements, thermocouples, and kiln-sitter tube, as well as for better colors in clays and glazes, it is best to have as much air as possible moving through the kiln, without compromising the speed and evenness of the firing (this is a tradeoff). Open peepholes can be an OK way to vent, except that uneven drafts through the kiln can affect thermocouple readings, or “freeze” cones, leading to uneven firings or slow firings.

## **WHAT TO EXPECT**

### **ELEMENT SMOKING**

Brand new elements will smoke a little initially the first time they are heated. A fan in a window is more than adequate to deal with this. If you have the Vent-Sure vent on this should also be adequate.

### **NOISES IN AN AUTOMATIC KILN**

Clicking noises from inside the control box as the unit heats. This will happen throughout the firing until it shuts off. Sometimes it will happen more frequently than other times. It is the result of the relays opening and closing as the control tells them to, turning the electricity on or off to the elements, working to heat the kiln evenly. (On manual kilns with contactors you will also hear contactors clicking).

**Hum.** Whenever kiln elements come on they are accompanied by a humming sound from electricity in

# FIRST FIRING INSTRUCTIONS FOR L&L KILNS WITH A ONE-TOUCH™

the elements. This is normal. The natural properties of electricity and the dynamics of the shape of the element combine to make a slight vibration in the element.

## WHAT HAPPENS AS THE KILN HEATS UP

All the materials used in the kiln's construction expand incrementally as they are heated. First the inside materials- i.e. the elements, holders, and inside surfaces of the walls, floor, and lid heat and expand slightly. Then, the heat moves slowly through the walls, lid and floor until it begins to heat the outer surface of the kiln. The greater the difference in temperature is between the inside surface vs. outside surface, the more stress there is on the material itself. Walls, lids and floors can sometimes hairline-crack on the surface or in the some cases, all the way through. Really this is normal and to be expected sooner or later to some degree. If you tighten the stainless steel bands that surround the floor, lid, and walls of the kiln every so often, the fact that the firebrick expands as it heats will mean that the cracks are actually closing up while the kiln is heating, expanding against the cooler outer shell. The geometry of the kiln and the tightness of the stainless steel bands are what holds everything together, whether the brick is in a few pieces or all one piece should not matter a whole lot, although cracked floors should be fully supported as they are with our full-support stands. See the *maintain.pdf* in the MAINTENANCE section and *troubleshoot-brick.pdf* in the TROUBLESHOOTING section for more information.

## VISIBLE RED HEAT

Another thing to expect is to see the "red heat" through the seams, between the sections of the kiln, beginning around 1000°F. This is normal. The seam between the lid and the top section will probably appear the largest. This is partly because, when the top heats up, it becomes slightly concave and the edge lifts up.

IMPORTANT NOTE: It is VERY important for this gap between the lid and the rest of the kiln to be even all the way around throughout the firing. If it is more open in the front when hot, then the hinge is out of adjustment and must be raised up. Your kiln's Assembly instructions detail the hinge adjustment.

The danger of this condition is that all the weight of the lid is now resting on the inner upper edge of the back firebricks on the top section. They will crack off in a firing or so and probably damage the lid too.

The outer metal and brick surfaces of the kiln will get very hot, as hot as 450°F - easily hot enough to burn you.

The interior of the kiln will look white hot at the highest temperatures. CAUTION: Be sure to always use kiln safety glasses when looking through the peepholes to protect your eyes from infrared radiation.

# OPERATION OF L&L KILNS WITH A ONE-TOUCH™ (Deg C)

Basic instructions are printed directly on the faceplate for easy reference.

Press the Enter button to start the program you have selected to fire.

Press and hold down Delay to enter a countdown time to delay the start of your program.

Press and hold down Review to see what program you are running.



The display area provides lots of information such as temperatures, program prompts, etc.

Choose one of either the Bisque or Glaze programs. They are preprogrammed for immediate no hassle use. Press for 5 seconds to bring up easy options like cone, heating & cooling rate and hold time

The Custom option allows more experienced users to create and save four of your own ramp/hold programs.

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# OPERATION OF L&L KILNS WITH A ONE-TOUCH™ (Deg C)

## 1. WATCH THE VIDEO FIRST!

We highly recommend watching the video before you read this instruction manual for quicker understanding of how this great control works. *Go to [hotkilns.com/one-touch-video](http://hotkilns.com/one-touch-video)*

## 2. HOW YOUR KILN WORKS

The One-Touch™ Intuitive Kiln Control was designed for busy school teachers, contemporary studios, and hobbyists. No programming is necessary - simple adjustments are easy, yet sophisticated programming is also easy.

The One-Touch automatic program control uses one thermocouple to measure the temperature of the kiln.

The control automatically adjusts power by turning power contactors on and off to control the heat up of the kiln according to the program you are firing.

The preprogrammed Bisque and Glaze programs are set to fire to the most universally accepted versions of these programs, which makes firing basic ceramics easy. These are a **slow bisque to Cone 04** and a **Medium Glaze to Cone 06**.

There are three modes of operation: Simple (just the basic Bisque and Glaze programs as mentioned above); Simple with Changes (you can adjust a few basic parameters like heat up speed, cool down speed, candling time at a low temperature, and the cone to fire to), and Custom where you program all ramps and holds yourself.

## 3. TYPEFACE CONVENTIONS

1. Typeface font: **CUSTOM** indicates a Button on the control.
2. Typeface font: **CUS↓** indicates what you see in the display.

## 4. NOTE ABOUT CONES

Cones measure “heat work” rather than just final set point temperature. It is like baking a turkey. You can bake it slow at a low temperature or bake it fast at a high temperature.

The One-Touch™ control adjusts the final set point temperature based on the *actual* final ramp rate of the

kiln (in the last segment of any program). It does this to achieve a particular result (which is the correct bending of the cone) rather than a particular final temperature.

*For a full explanation of cones go to [hotkilns.com/what-cone-numbers-mean](http://hotkilns.com/what-cone-numbers-mean)*

If you want to see the Orton Cone Chart go to [hotkilns.com/orton-cone-chart](http://hotkilns.com/orton-cone-chart).

*Note: you can adjust how the kiln fires by adjusting the thermocouple offset. For instance, if your kiln is firing cool (according to a witness cone placed in the kiln) then you can add positive Offset. If it is firing hot then you can reduce the offset or put in a negative offset. See the **OPTIONS** section for instructions on how to do this.*

## 5. CONE 6 & CONE 10 VERSIONS

There are two versions of the control: Cone 6 and Cone 10. The Cone 6 versions are used on the School-Master kilns to limit the maximum temperature of the kiln. Liberty-Belle, Doll, Fuego and Robin kilns use the Cone 10 version. There are only minor differences as noted in these instructions. The main issue is the maximum temperature that the control will let the kiln go to.

## 6. DEGREES CENTIGRADE

Your control comes set up to display Degrees Centigrade. This can easily be changed to display in Degrees Fahrenheit (see the **OPTIONS** section).

## 7. FIRST FIRING

Three of the **CUSTOM** programs have been programmed by the factory to simplify the first firing process.

Once this process has been completed they may be reprogrammed at will.

See the separate PDF called “FIRST FIRING INSTRUCTIONS FOR L&L KILNS WITH A ONE-TOUCH” *Go to [hotkilns.com/first-firing-one-touch-control](http://hotkilns.com/first-firing-one-touch-control). This will also be found in your complete instruction manual.*



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## 7.1 FIRST FIRING IN ONE FIRING (16 HOURS)

### 7.1.1 START.

1. Start with the display reading **IdLE** and flashing a temperature or **StOP** and temperature.

### 7.1.2 CHOOSE CUSTOM PROGRAMMING

1. Press **CUSTOM**
2. See **CUS t**
3. Press **ENTER**

### 7.1.3 PICK CUSTOM PROGRAM #1

1. You will see **CUS1**, **CUS2**, **CUS3** or **CUS4**. These are the four custom programs.
2. Scroll to **CUS1** with the **UP** and **DOWN** button.
3. Select **CUS1** by pressing the **ENTER** button.

### 7.1.4 MOVE THROUGH THE PROGRAM AND START

1. Press **ENTER** for each display prompt that you see as the control scrolls through the enter **CUS1** program until you see **Fire**.
2. Press **ENTER** again when you see **Fire** and the One-Touch control will start firing the kiln using the **CUS1** program.
3. You will know it is firing because the display just reads the kiln temperature steadily. You will probably also hear the relays clicking on and off.
4. There is a list of Preprogrammed Custom Programs later in this manual which will show you a list of values for **CUS1** you see while pressing **ENTER**.

### 7.1.5 REVIEW PROGRAM

1. Press the **REVIEW** button to review the program.
2. You can do this when you see the **Fire** display, **CUS1**, **CUS2**, **CUS3**, **CUS4** or while firing (when you see the kiln temperature).
3. The display will scroll though the name of the program (i.e. **CUS4**), then the number of segments, then all the ramps, temperatures and holds in sequence.
4. The display changes rapidly so you may have review more than once to see everything.

### 7.1.6 COMPLETE

1. When the program is complete, you will see **CPL t**.
2. If the Beep option has been turned to “**On**” then the control will beep about 15 times. If the beep option

is set for “**OFF**,” then there is no sound. If the beep option is set for “**FULL**,” the control will beep until any button is pressed. See the **OPTIONS** section for how to change this option.

## 7.2 FIRST FIRING IN TWO FIRINGS (2 x 9 HOURS)

1. Go through the above process but do it in two programs. It works the same as above except that you run the two separate programs at different times.
2. **CUS2** is the first program and that takes about 9 hours.
3. **CUS3** is the second program and that also takes about 9 hours.
4. See the list of Preprogrammed Custom Programs later in this manual for a list of values you see while pressing **ENTER**.

## 8. TURNING ON THE KILN

1. Make sure your circuit breaker or fused disconnect switch is turned on and the kiln is plugged in.
2. Turn on kiln with the toggle On/Off switch on the control box.
3. You will see a software code flash briefly. Then you will see either **IdLE** or **StOP** alternating with a display of the current kiln temperature.

## 9. THREE MODES OF OPERATION

### 9.1 SIMPLE (Bisque or Glaze)

1. Press one of two buttons marked **BISQUE** and **GLAZE**.
2. You will then see either **bISC** or **GLA** depending on which button you pressed.
3. The **bISC** is a slow bisque to Cone 04. The **GLA** is a medium glaze to Cone 06.
4. Press **ENTER** and the display reads **Fire**.
5. You can add a delay time to the program by pressing the **DOWN** arrow when you see **Fire** but before you press **ENTER**.
6. After you press the **DELAY** button, you will see **dELA** flashing with a time value, typically **00.00** which represents 00 hours and 00 minutes.

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- After you see this flashing display, you can press the **UP** or **DOWN** button to adjust the time. For instance if you want a delay time of one hour and thirty minutes you would enter a value of **01 • 30**.
  - Once you have the value you want, press **ENTER** and you will see **FIRE** again.
  - This will delay the start of the actual firing by the number of minutes and hours that you have chosen.
7. Press **ENTER** and the control will begin the firing cycle. If you have entered a delay, then you will see **dLY** flashing with a countdown of the time (for example **01 : 30** for 1 hour and 30 minutes)
8. Press the **REVIEW** button to review the program.
- You can do this when you see the **FIRE** display (which will be before the kiln has started to fire) or while firing (when you just see temperature continuously).
  - The display will scroll though:
  - The name of the program (i.e. **bISC**)
  - Then **CndL** (for candle low fire followed by a time)
  - Then **COnE** followed by a number like **04**
  - Then **°F** or **°C** to let you know the temperature scale
  - Then a temperature like **1063** which is the anticipated maximum temperature.

Then **HLd** followed by a time value like **00 : 00**, which is any hold time at top temperature that you may have programmed into the control.

- NOTE: Setting for **COOL** and **HtUP** are not shown so you need to make sure these are right before you fire your program.
9. Press **ENTER** anytime to stop the program.
10. When the program is complete, you will see **CPLt**.
11. If the Beep option has been turned to “**On**,” then the control will beep about 15 times. If it was set for “**OFF**,” then there will be no beeping. If it was set for “**FULL**,” then it will beep until a button is pressed. (See Options later in the manual for how to set this.)

## 9.2 SIMPLE WITH CHANGES (Bisque or Glaze)

It is easy to change simple options like candle time, cone to fire to, hold time at peak temperature, cool-down

rate and heat-up rate (plus, you can restore the default values in case you lose track of where you are).

*Note that the heat up rate is what changes a Bisque or a Glaze program to Slow, Medium or High.*

### 9.2.1 TO CHANGE A SIMPLE OPTION

1. When you press **BISQUE** or **GLAZE** and hold it for 5 seconds, then you will see either **CndL**, **COnE**, **HLd**, **COOL**, **rStr**, or **HtUP**.
2. Once you see one of these displays remove your finger from the button. (**NOTE: If you do not hit another button for 5 seconds the control will return to idle. If this happens just start over.**)
3. Once you see any of these displayed options you can scroll to other displayed options by pressing the **UP** or **DOWN** button.
4. Here are the options you can change:

<b>CndL</b>	Candle Time (this is a low temperature firing used to dry moisture from the clay)
<b>COnE</b>	Cone to fire to ( <b>022</b> to <b>10</b> )
<b>HLd</b>	Hold or Soak time at peak temperature in hours and minutes up to 99 hours and 99 minutes (Format: <b>00 • 00</b> )
<b>COOL</b>	Cool down rate. <b>OFF</b> (natural cooling), <b>SL0</b> (Slow = 52°C/hour), <b>MEd</b> (Med = 121°C/hour), <b>FASt</b> (Fast = 260°C/hour)
<b>rStr</b>	Restore default original values
<b>HtUP</b>	Heat up rates. <b>SL0</b> (Slow), <b>MEd</b> (Medium), <b>FASt</b> (Fast). This is what changes the program to Slow, Medium or High. The rates depend on whether you are in Glaze or Bisque - see the programs later in the manual for details.

5. Once you see the what you want to change press **ENTER**.
6. Once you have entered a option to change, the **UP** and **DOWN** button will then allow adjustment of the value of that particular option.

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7. Once you see the value you want press **ENTER** to select and save.
8. The display will then cycle back to the starting display of the control. (You will see **IdLE** or **StOP** alternating with a display of the current kiln temperature).
9. To change another option go through the process again.
10. You can not change more than one option at a time.
11. If you do

## 9.2.2 EXAMPLE: CHANGE CONE OF BISQUE FIRE

Change the cone that the Bisque program goes to from  $\Delta 04$  to  $\Delta 06$ :

1. Press the **BISQUE** Button for 5 seconds or more.
2. See **CndL** or **COnE** or **HLd** or **COOL** or **rStr** or **HtUP**.
3. Release your finger from the button.
4. Scroll to **COnE** display by pressing the **UP** or **DOWN** button.
5. Press **ENTER** to change the value of the **COnE** option.
6. See **04** alternating with **COnE**
7. Press the **DOWN** button until you see **06**
8. Press **ENTER**
9. See either **IdLE** or **StOP** alternating with a display of the current kiln temperature.

## 9.2.3 EXAMPLE: CHANGE SPEED OF BISQUE FIRE

Change the speed of firing for the Bisque program from **Slow** to **Fast**.

1. Press the **BISQUE** Button for 5 seconds or more.
2. See **CndL** or **COnE** or **HLd** or **COOL** or **rStr** or **HtUP**.
3. Release your finger from the button.
4. Scroll to **HtUP** display by pressing the **UP** or **DOWN** button.
5. Press **ENTER** to change the value of the **HtUP**

option.

6. See **SL0** alternating with **HtUP**
7. Press the **DOWN** button until you see **FASt**
8. Press **ENTER**
9. See either **IdLE** or **StOP** alternating with a display of the current kiln temperature.

*Note - the temperatures, ramps and soak times that for the various preset bisque and glaze programs, are shown later on. These charts are for your reference only - when you are using the Simple mode of operation - you can not change any of those ramp and hold settings - just the overall grouping of ramps and holds that makes up the "slow", "medium" and "fast" setting.*

## 9.3 CUSTOM (Ramps and Holds):

1. Press **CUSTOM** and you have four Ramp/Soak programs available for sophisticated custom programming.
2. Each program has eight segments.
3. Each segment has a ramp, a temperature set point, and a hold time for each segment.
4. See "CUSTOMRAMP/HOLD PROGRAMMING" later in manual for detailed instructions on how to program in the Custom mode of operation.

## 10. RESETTING FACTORY DEFAULTS

It is natural, when first learning a new technology, to get confused or to put in something you are not sure of and then not know where the beginning is. If you do this and you want to go back to the factory defaults so you begin from scratch do the following:

1. Press the **BISQUE** Button for 5 seconds or more.
2. See **CndL** or **COnE** or **HLd** or **COOL** or **rStr** or **HtUP**
3. Release your finger from the button.
4. Scroll to **rStr** display by pressing the **UP** or **DOWN** button.
5. Press **ENTER** to change restore the control to its factory default values

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6. See either **IdLE** or **StOP** alternating with a display of the current kiln temperature.
7. Repeat the same process for **GLAZE**

## 11. HOW TO CANCEL A FIRING

1. Just press **ENTER** while the kiln is firing.
2. You will see either **IdLE** or **StOP** alternating with a display of the current kiln temperature.

## 12. STANDARD (SIMPLE) PROGRAMS

1. The following tables show you exactly how the control is set up so you can understand what is going on “under the hood”.
2. You can not change the way the ramps, holds and temperature set points are set - if you need or want to do that then you need to use Custom Programming.
3. The “Default Bisque Program” is a Slow Bisque and the “Default Glaze Program” is a Medium Glaze.
4. “Slow”, “Medium” and “Fast” refer to the ramp speeds and lengths of the programs.
5. When you change the speed of the Cooldown this goes from **OFF** (no controlled cooling or no heat at all when cooling), to **FAST** (Fast = 260°C/hour) **MEd** (Medium = 121°C/hour) to **SL0** (Slow = 52°C/hour).
6. We recommend experimenting with slower cooldowns for interesting effects on glazing. It is usually irrelevant for bisquing.

### 12.1 STANDARD BISQUE PROGRAMS

1. Slow, Medium and Fast Settings for the Bisque programs are listed.
2. Note: Final temperatures are based on Orton cone charts (Small Self-Supporting Cones). For instance, Cone 04 is 1063° C and Cone 06 is 998° C. The second-to-last temperature is the cone temperature minus 124° C. If you want to see the Orton Cone Chart go to [hotkilns.com/orton-cone-chart](http://hotkilns.com/orton-cone-chart).
3. Note: Seg 1 is the candling segment. This segment

is skipped if the **CndL** option is set to “00 - 00”).

4. You can download an Excel spreadsheet that will generate any program (with graph and times) based on a particular cone number at [hotkilns.com/one-touch-calculator](http://hotkilns.com/one-touch-calculator).
5. Times are calculated assuming a room temperature of 21°C

### 12.1.1 Slow Bisque (Default Bisque Program):

Δ04 Standard Slow Bisque – SEGS-6 (6 segments)

Seg 1-	10.21 Hrs	RA1 - 14°C/Hr	° C1-66°C	HOLD- 7.0
Seg 2-	3.35 Hrs	RA2 - 38°C	° C2-85°C	HOLD- 3.0
Seg 3-	4.08 Hrs	RA3 - 93°C	° C3-538°C	HOLD- 00.00
Seg 4-	1.00 Hrs	RA4 - 38°C	° C4-593°C	HOLD- 00.00
Seg 5-	2.95 Hrs	RA5 - 93°C	° C5-921°C	HOLD- 00.00
Seg 6-	2.37 Hrs	RA6 - 42°C	° C6-1063°C	HOLD- 00.00

**TOTAL FIRING TIME = 23.95 HRS**

### 12.1.2 Medium Speed Bisque:

Δ04 Standard Medium Bisque – SEGS-6 (6 segments)

Seg 1-	1.00 Hrs	RA1 - 27°C	° C1-66°C	HOLD- 00.00
Seg 2-	0.44 Hrs	RA2 - 27°C	° C2-85°C	HOLD- 00.00
Seg 3-	0.81 Hrs	RA3 - 27°C	° C3-121°C	HOLD- 00.00
Seg 4-	3.00 Hrs	RA4 - 121°C	° C4-538°C	HOLD- 00.00
Seg 5-	3.83 Hrs	RA5 - 82°C	° C5-921°C	HOLD- 00.00
Seg 6-	2.37 Hrs	RA6 - 42°C	° C6-1063°C	HOLD- 00.00

**TOTAL FIRING TIME = 10.45 HRS**

### 12.1.3 Fast Speed Bisque:

Δ04 Standard Fast Bisque – SEGS-6 (6 segments)

Seg 1-	0.53 Hrs	RA1 - 66°C	° C1-66°C	HOLD- 00.00
Seg 2-	0.23 Hrs	RA2 - 66°C	° C2-85°C	HOLD- 00.00
Seg 3-	0.43 Hrs	RA3 - 66°C	° C3-121°C	HOLD- 00.00
Seg 4-	2.83 Hrs	RA4 - 149°C	° C4-593°C	HOLD- 00.00
Seg 5-	1.47 Hrs	RA5 - 204°C	° C5-921°C	HOLD- 00.00
Seg 6-	2.37 Hrs	RA6 - 42°C	° C6-1063°C	HOLD- 00.00

**TOTAL FIRING TIME = 7.34 HRS**

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## 12.2 STANDARD GLAZE PROGRAMS

1. Slow, Medium and Fast Settings for the Glaze programs are listed.
2. Note: Final temperatures are based on Orton cone charts (Small Self-Supporting Cones). For instance, Cone 04 is 1063° C and Cone 06 is 998° C. The second-to-last temperature is the cone temperature minus 124° C. If you want to see the Orton Cone Chart go to [hotkilns.com/orton-cone-chart](http://hotkilns.com/orton-cone-chart).
3. Note: Seg 1 is the candling segment. This segment is skipped if the **CndL** option is set to "00.00").
4. You can download an Excel spreadsheet that will generate any program (with graph and times) based on a particular cone number at [hotkilns.com/one-touch-calculator](http://hotkilns.com/one-touch-calculator).
5. Times are calculated assuming a room temperature of 21°C

### 12.2.1 Slow Glaze:

Δ06 Slow Glaze – SEGS–3 (3 segments)

Seg 1-	0.45 Hrs	RA1 - 222°C	° C1–121°C	HOLD-	00.00
Seg 2-	3.31 Hrs	RA2 - 222°C	° C2–856°C	HOLD-	00.00
Seg 3-	2.00 Hrs	RA3 - 71°C	° C3–998°C	HOLD-	00.00

**TOTAL FIRING TIME = 5.30 HRS**

### 12.2.2 Medium Glaze (Default Glaze Program):

Δ06 Medium Glaze – SEGS–3 (3 segments)

Seg 1-	0.29 Hrs	RA1 - 222°C	° C1–85°C	HOLD-	00.00
Seg 2-	3.47 Hrs	RA2 - 222°C	° C1–856°C	HOLD-	00.00
Seg 3-	1.71 Hrs	RA3 - 83°C	° C2–998°C	HOLD-	00.00

**TOTAL FIRING TIME = 5.17 HRS**

### 12.2.3 Fast Glaze:

Δ06 Fast Glaze – SEGS–3 (3 segments)

Seg 1-	0.20 Hrs	RA1 - 317°C	° C1–85°C	HOLD-	00.00
Seg 2-	2.43 Hrs	RA2 - 317°C	° C2–856°C	HOLD-	00.00
Seg 3-	1.28 Hrs	RA3 - 11°C	° C3–998°C	HOLD-	00.00

**TOTAL FIRING TIME = 3.71 HRS**

## 12.3 SIMPLE COOL DOWN SPEEDS

Note: These are entered as one of the simple options in the Simple Programming (C00L).

**Cool Down options are as follows:**

Off = no controlled cooldown

Slow = 69.4°C/hour

Med = 138.8°C/hour

Fast = 277.7°C/hour

## 13. CUSTOM RAMP/HOLD PROGRAMMING

1. Each fully customizable program has eight segments.
2. Each segment has a ramp rate, a hold time and a temperature set point.
3. Ramp Rate is some number of degrees centigrade per hour either increasing or decreasing in temperature. For example a ramp rate of 27 means that the program will move from the temperature at the beginning of the segment to the temperature at the end of the segment at 27 degrees centigrade per hour.
4. Hold time is a time that the program holds the temperature reached at the end of the segment. It can be set for 00.00 and, in fact, in most cases is.
5. The temperature set point is the final temperature intended to be reached in the segment.
6. At the end of the segment, i.e. when the program reached the temperature set point and finishes any hold time the control will move to the next segment. If it is the last segment then the program will be complete (CPLt).

### 13.1 REUSE A PREVIOUS PROGRAM

1. Start with the display reading **IdLE** and flashing a temperature or **StOP** and temperature.
2. Select **CUSTOM**
3. See **CUS t**
4. Press **ENTER**
5. You will see **CUS1**, **CUS2**, **CUS3** or **CUS4**.
6. These are the four custom programs.
7. You can scroll to other ones with the **UP** and **DOWN** button.
8. When the display shows the one you want to select press **ENTER**.
9. After you have selected your program with **ENTER**



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press the **REVIEW** button.

10. This will scroll through all the segments so you can see what is programmed in that custom program and the end up with **FIRE**. Press **ENTER** when you see **FIRE** and the program will start.

## 13.2 CHANGING A PROGRAM (STEP BY STEP)

### 13.2.1 START

1. Start with the display reading **IdLE** and flashing a temperature or **StOP** and temperature.

### 13.2.2 CHOOSE CUSTOM PROGRAMMING

1. Select **CUSTOM**
2. See **CUS1**
3. Press **ENTER**

### 13.2.3 PICK A PROGRAM

1. You will see **CUS1**, **CUS2**, **CUS3** or **CUS4**.
2. These are the four custom programs.
3. You can scroll to other ones with the **UP** and **DOWN** button.
4. When the display shows the one you want to select press **ENTER**.

### 13.2.4 SPECIFY NUMBER OF SEGMENTS

1. Once you have chosen a program, you need to specify the total number of segments that you will use.
2. All programs consist of 1 or more segments, as shown in the sample profiles in this manual.
3. Each segment has 3 parts: a ramp rate (speed of temperature rise in degrees centigrade per hour), hold temperature (in degrees centigrade), and hold time (in hours and minutes) at the hold temperature.
4. It is helpful to draw your profile to see how many segments you will need.
5. Then, use the **UP** and **DOWN** buttons to display the desired number of segments, and press **ENTER** to store the value when you see the number you want.

### 13.2.5 ENTER RAMP RATE

1. You will see **rA1**, followed by a value like **150**.
2. The **rA1** stands for Ramp One.
3. The value represents a rate of temperature rise expressed

in degrees per hour.

4. Use the arrow buttons to adjust the rate and press **ENTER** to store the value.
5. To help you visualize what is typical of various ramps read the following:
  - Slow rates range from 1-50 degrees per hour, and are used for thick glass projects.
  - Medium rates range from 60 to 200 degrees per hour, and are used for thick, hand-built ceramics.
  - Fast rates range from 250–1000 degrees per hour, and are used for glazes, thin ceramics and small glass projects.
6. A rate of **9999** sets the kiln to ramp as fast as possible.
7. Also, see the various ramps in the standard programs for an idea of what works.

### 13.2.6 ENTER HOLD TEMPERATURE

1. You will see **°C1** followed by a value like **0300**.
2. The **°C1** stands for Temperature One.
3. For a single segment program, this is the top temperature of the firing.
4. For multi-segment programs, this can be a temperature where you want to hold to dry the ware or for carbon burn-out, or to equalize the temperature across the item or it can be where you just want to switch ramp rates without a hold.
5. Adjust the temperature with the **UP** and **DOWN** buttons and press **ENTER** to store the displayed value.

### 13.2.7 ENTER HOLD TIME

1. You will see **HLd1** followed by a value like **00:00**.
2. The **HLd1** stands for Hold One.
3. Hours are displayed to the left of the decimal point and minutes to the right (HH.mm).
4. Use the **UP** and **DOWN** buttons to adjust the hold time at the soak temperature.
5. Use a zero (**00.00**) hold time if you just want to move to the next segment.
6. Drying ware can take several hours, while holds at peak temperature usually range 10–15 minutes to even out the kiln. Feel free to experiment - there is no one



# OPERATION OF L&L KILNS WITH A ONE-TOUCH™ (Deg C)

right way to program a kiln.

## 13.2.8 REPEAT STEPS FOR EACH SEGMENT

1. For segment two, the display will read **rA2**, **°C2** and **HLd2**
2. For segment three, the display will read **rA3**, **°C3** and **HLd3** etc.

## 13.2.9 SET A DELAY (OPTIONAL - CAN BE SKIPPED)

1. If you want to set a delay, you can do it when the display says **FIRE**.
2. You can add a delay time to the program by pressing the **DOWN** arrow when you see **FIRE** but before you press **ENTER**.
3. After you press the **DELAY** button you will see **dELA** flashing with a time value, typically **00.00** which represents 00 hours and 00 minutes.
4. After you see this flashing display, you can press the **UP** or **DOWN** button to adjust the delay time.
5. Once you see the value you want, press **ENTER** and you will see **FIRE** again.

13.2.10 This will delay the start of the actual firing by the number of minutes and hours that you have chosen.  
**START FIRING!**

1. The display will show **FIRE** (ready to fire) when all segments have been entered.
2. Press **ENTER** to start the firing.

*Caution should be taken to make sure that no one can place anything around or on the kiln during the delay start. Treat the kiln as firing during the delay start.*

## 13.2.11 REVIEW PROGRAM

1. Press the **REVIEW** button to review the program.
2. You can do this when you see the **FIRE** display, **CUS1**, **CUS2**, **CUS3**, **CUS4** or while firing.
3. The display will scroll through and show you the following:
  - The name of the program (i.e. **CUS4**)
  - Then the number of segments (i.e. **2** )
  - Then all the ramps, temperatures and holds in sequence.

## 13.2.12 COMPLETE THE FIRING

1. When the firing is complete, you will see **CPL t**.
2. If the Beep option has been turned to “**On**” then the control will beep about 15 times. If it was set for “**OFF**,” then there will be no beeping. If it was set for “**FULL**,” it will beep until a button is pressed. (See Options later in the manual for how to set this.)

## 14. KILN OPERATION DURING A CUSTOM FIRING PROGRAM

---

### 14.1 DESCRIPTION

1. At the start of a firing, the controller sets its moving set-point to the current temperature in the kiln.
2. The moving set-point is where the controller wants the kiln temperature to be.
3. The controller will then move the moving set-point up at the programmed rate, and cycle power to the elements to make the temperature of the kiln follow the moving set-point.
4. You will hear the relays clicking to regulate the kiln temperature.
5. The elements will receive power when the temperature is below the moving set-point.
6. The relays will click off when the temperature is above the moving set-point.
7. The current segment and moving set-point can be viewed by pressing the **UP** arrow during a firing.
8. The control can not make the kiln go any faster than it is capable of so there may be a lag between what the control wants to do and what the kiln can do. This is normal and is only of concern if the kiln starts firing slower than it normally has done in the past.

### 14.2 OPTIONS DURING FIRING

#### 14.2.1 DISPLAYING THE CURRENT SET-POINT AND ACCESSING THE FOLLOWING OPTIONS

1. During a firing, you may advance from the current segment to the next ramp rate by using **Skip Step (SStP)**; or, if you are in a hold period, you may add time (**tME**) and temperature (**tMP**) to the hold period.
2. When the **UP** button is pressed during a firing,

# OPERATION OF L&L KILNS WITH A ONE-TOUCH™ (Deg C)

the current ramp or hold is displayed, followed by the current or moving set-point, then **SStP** is displayed.

3. If you do not press a button within several seconds, the display will return to showing the current temperature in the kiln.

## 14.2.2 SKIP STEP

1. This option allows you to skip from the present segment to the next ramp rate.
2. Press the **UP** button, the display will show the current segment, then the set-point, then **SStP**.
3. When **SStP** is displayed, press **ENTER** to skip to the next ramp rate.

## 14.2.3 ADD TIME TO HOLD PERIOD

1. This is available only during a hold period.
2. This option allows you to add time in 5 minute increments to a hold (soak) period.
3. During a hold or soak, the temperature in the kiln will be alternating in the display with the remaining hold time.
4. When in a hold period, press the **UP** button.
5. When **SStP** is displayed, press the **UP** button again and **tME** will be displayed.
6. Press **ENTER** and 5 minutes will be added to the hold time.
7. You may use this procedure as many times as necessary to get the hold time that you want.

## 14.2.4 ADD TEMPERATURE TO HOLD PERIOD

1. This is available only during a hold period.
2. This option allows you to add temperature in 5 degree increments to a hold (soak) period.
3. During a hold or soak, the temperature in the kiln will be alternating in the display with the remaining hold time.
4. When in a hold period, press the **UP** button.
5. When **SStP** is displayed, press the **UP** button twice more and **tMP** will be displayed.
6. Press **ENTER** and 5 minutes will be added to the hold time.

7. You may use the add temperature procedure as many times as necessary to get the hold temperature desired.

## 15. CUSTOM PROGRAMS

1. There are the four programs (shown in Degrees C) that can be fully customized.
2. Three of these have been preprogrammed by the factory to simplify the first firing process.
3. Once this process has been completed they may be reprogrammed anyway you like.

### 15.1 CUSTOM PROGRAM 1:

Standard First Firing Program:

Δ5 Standard Slow Bisque – SEGS–5 (5 segments)

Seg 1-	2.15 Hrs	RA1 - 44.4°C	◦ C1–121°C	HOLD-	00.00
Seg 2-	3.75 Hrs	RA2 - 111.1°C	◦ C2–538°C	HOLD-	00.00
Seg 3-	1.00 Hrs	RA3 - 55.5°C	◦ C3–593°C	HOLD-	00.00
Seg 4-	4.58 Hrs	RA4 - 100°C	◦ C4–1046°C	HOLD-	00.00
Seg 5-	3.12 Hrs	RA5 - 44.4°C	◦ C5–1185°C	HOLD-	00.00

**TOTAL FIRING TIME = 15.6 HRS**

### 15.2 CUSTOM PROGRAM 2:

Split First Firing (First Segment):

Seg 1-	2.15 Hrs	RA1 - 44.4°C	◦ C1–121°C	HOLD-	00.00
Seg 2-	3.75 Hrs	RA2 - 111.1°C	◦ C2–538°C	HOLD-	00.00
Seg 3-	1.00 Hrs	RA3 - 55.5°C	◦ C3–593°C	HOLD-	00.00
Seg 4-	2.22 Hrs	RA4 - 100°C	◦ C4–816°C	HOLD-	00.00

**TOTAL FIRING TIME = 9.12 HRS**

### 15.3 CUSTOM PROGRAM 3:

Split First Firing (Second Segment):

Seg 1-	0.85 Hrs	RA1 - 111.1°C	◦ C1–121°C	HOLD-	00.00
Seg 2-	2.50 Hrs	RA2 - 277.7°C	◦ C2–816°C	HOLD-	00.00
Seg 3-	2.30 Hrs	RA3 - 100°C	◦ C3–1046°C	HOLD-	00.00
Seg 4-	3.12 Hrs	RA4 - 44.4°C	◦ C4–1185°C	HOLD-	00.00

**TOTAL FIRING TIME = 8.77 HRS**

### 15.4 CUSTOM PROGRAM 4:

Blank - nothing is preprogrammed.

# OPERATION OF L&L KILNS WITH A ONE-TOUCH™ (Deg C)

## 16. OPTIONS

---

### 16.1 ACCESSING OPTIONS

- Options are accessed by holding the **ENTER** button while turning the power onto the control (by turning on the kiln with the toggle switch) and continuing to hold onto the **ENTER** button until **EdIt** is displayed.
- This activates the Options Menu.
- The first thing you will see after turning the power on while pressing **ENTER** is **LL-G** or **1t-1** (This is the software version).
- Then you will see **1288** if it is a Cone 10 control or **1249** if it is a Cone 6 control.
- Then you will see **EdIt** and you will hear a beep. You can now let go of the **ENTER** button.

### 16.2 OPTIONS

#### 16.2.1 SOUND: BEEPING ON OR OFF AT END OF PROGRAM

- The first thing to change is the action of the beeper.
  - OFF** turns off the beeper.
  - FULL** makes the beeper stay on until any button is pushed.
  - On** makes the beeper sound 15 times and then turn off.
- If you don't want to change this option then press **ENTER**.

#### 16.2.2 MAXIMUM TEMPERATURE

- On a Cone 6 Version (School-Master): Maximum Temperature** (Deg C) **927**, **1093**, and **1249** are options.
- On a Cone 10 Version (Liberty-Belle, Doll, Fuego, Robin):** Cone 10 models have a preset maximum temperature limit of **1288** and you will not see the "Maximum Temperature" option come up.

#### 16.2.3 TEMPERATURE INDICATION

- °F** (Deg F) or **°C** (Deg C).
- When you are in Deg C, you will always see a little dot in the display at the bottom right to remind you.

- Use the **UP** or **DOWN** button to change the value and then press **ENTER**.

#### 16.2.4 THERMOCOUPLE OFFSET

- OFFS** (+/- deg C)
- Display shows **OFFS**.
- Press the **UP** arrow to enter a positive offset.
- Press the **DOWN** arrow to add a negative sign to the offset, and then the **UP** arrow to add negative offset to the control.
- The control comes with a pre-programmed +8 Deg C offset to compensate for the thermocouple protection tube.
- Note: if you first press the **DOWN** button you can only set a negative value or if you first press the **UP** button you can only enter a positive value.
- You can go back and change this later if you make a mistake.

*Note: you can adjust how the kiln fires by adjusting the thermocouple offset. For instance, if your kiln is firing cool (according to a witness cone placed in the kiln) then you can add positive Offset. If it is firing hot then you can reduce the offset or put in a negative offset. Try doing this in 5 degree increments.*

## 17. MESSAGES & DISPLAYS

---

**CndL** Candle Time (this is a low temperature firing used to dry moisture from the clay)

**COnE** Cone to fire to

**COOL** Cool down rate. **OFF** (natural cooling), **SLD** (Slow), **MEd** (Medium), **FASt** (Fast)

**CPLt** Firing Cycle Complete (firing time is alternately displayed).

**dELA** Delay. Displays when entering the delay time (hour:minutes) until the start of the firing.

**DLy** Delay. Alternates with the remaining delay time until the start of the kiln.

**°F#** Segment temperature in °F – Set temperature for a user program. (# stands for numbers 1 through 8)

**°C#** Segment temperature in °C – Set temperature for a user program. A decimal point will display in

# OPERATION OF L&L KILNS WITH A ONE-TOUCH™ (Deg C)

lower right corner. (# stands for numbers 1 through 8)

**EdIt** Edit the default options (beeping at complete, temperature scale, cone fire, delay, maximum programmable temperature)

**ErrP** There has been a power interruption that has stopped the firing. Press any button to clear.

**FASt** Fast (Heat up or Cool down rate)

**FIrE** Ready to fire current program. Press **START** to begin firing.

**FULL** Beeps continuously at end of firing until a button is pressed.

**HtUP** Heat up rates. **SL0** (Slow), **MEd** (Medium), **FASt** (Fast)

**HLd** Hold or Soak time at peak temperature

**HLd#** Soak time in hours:minutes at a hold temperature. (# stands for numbers 1 through 8)

**IdLE** This shows up when the control is not firing or is not being programmed. Message alternates with the current kiln temperature. Similar to **StOP**.

**lt-l** This comes on when you first turn on the control if it is a Cone 10 control.

**LL-G** This comes on when you first turn on the control if it is a Cone 6 control.

**MEd** Medium (Heat up or Cool down rate)

**OFF** No beeping when firing is complete. Or could be that an option is off when setting options. Also used to show that Cooling is off.

**On** Beeps for 15 seconds at end of firing.

**rA#** Ramp Number (rate per hour of temperature increase or decrease). (# stands for numbers 1 through 8)

**rStr** Restore default original values

**SEG** Short for Segments. You can enter up to 8 segments in a program.

**SL0** Slow (Heat up or Cool down rate)

**SStP** Skip Step (used to advance to the next ramp)

**StOP** The kiln is at idle and ready to be programmed. Message alternates with the current kiln temperature.

**CUS1, CUS2, CUS3, CUS4** Custom program number displayed.

## 18. ERROR CODES

---

**tC FAIL** tC alternating with **FAIL** indicates the thermocouple has failed. Replace the defective thermocouple. To clear the error, press any button.

**Errd** Displayed whenever the kiln temperature is 38°C above the traveling set-point, which is the current desired temperature in the kiln. The traveling set-point will increase or decrease according to the programmed rate.

**Errl** Displayed whenever the kiln temperature is rising during an up ramp slower than 9°C/hr. If this rate continues for 8 minutes the firing will be stopped. **Errl** may be an indication that the elements are worn or that a relay has stopped working.

**ErrP** Displayed whenever there is a power interruption that is long enough to stop the firing. If the power interruption is brief, the kiln will continue to fire when power is restored; in this case, there will be no indication of a power failure. To clear the error, press any button.

**ErrF** Displayed whenever the kiln temperature is decreasing during a down ramp slower than 9°C/hr. If this rate continues for 8 minutes the firing will be stopped. **ErrF** may be an indication that a relay has stuck in the on position.

**tC--** The red and yellow thermocouple wires are reversed.

## 19. SOFTWARE VERSION

---

These instructions apply to software version **LL-G** for the Cone 6 version of the control or **lt-l** for the Cone 10 version of the control. You will see this code flash when you first turn on the control.

## 20. FAHRENHEIT INSTRUCTIONS

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These instructions are available in a Fahrenheit version. *Go to [hotkilns.com/basic-one-touch-f](http://hotkilns.com/basic-one-touch-f)*

## 21. SPECIFICATIONS

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*Go to [hotkilns.com/one-touch-specifications](http://hotkilns.com/one-touch-specifications)*

# ASSEMBLY INSTRUCTIONS FOR L&L FUEGO AND ROBIN KILNS (ALL VERSIONS)

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## TOOLS NEED FOR THE JOB

You will need the following tools for the job:

- 1) Phillips head screw driver (medium size head)
- 2) Knife
- 3) Adjustable Wrench
- 4) 3/8" Nut Driver or socket wrench
- 5) Level (not absolutely necessary)

## UNPACKING

### INSPECT FOR VISIBLE DAMAGE

The carton should arrive without visible damage. If any carton was damaged in transit, you should either refuse shipment or unpack the kiln in the drivers presence in order to file a damage report with the freight company. **Call the distributor immediately if there is a problem. SAVE ALL MATERIALS UNTIL YOU ARE SURE YOU WON'T NEED THEM. AT THE VERY LEAST NOTE DAMAGE ON THE BILL-OF-LADING - WITHOUT THIS YOU HAVE NO PROTECTION!**

### REMOVE TOP FROM CARTON

- 1) Cut the banding around the kiln box.
- 2) With a screw driver pry off the staples holding the top of the box to the box sleeve and remove the top.

## UNPACKING THE KILN

- 1) With a screw driver pry off the staples holding the bottom box tray to the box sleeve.
- 2) Next remove the cardboard inset from the carton, and remove the carton sleeve from the skid.

## ASSEMBLING THE STAND

The stand consists of four legs, the stand base, and eight 1/4-20 bolts. Using the enclosed stand hardware, assemble the kiln stand.

- 1) Assemble the stand legs. **Make sure all the stand legs are tight.** Use a nut driver or an adjustable wrench to do this.

*Each leg gets bolted to the stand with two 1/4-20 bolts provided. They do not need nuts:*



## LOCATING THE KILN

- 1) Place the stand on the floor in the desired location. This should be set so that the outside stainless steel surface of the kiln will be at least 30cm (12") to 45cm (18") from any combustible wall. Floor must be non-flammable.

Information concerning clearances, ventilation and electrical requirements is detailed in the "INSTRUCTIONS" section of this manual. Read now if you are uncertain about any of these issues. **DON'T PROCEED UNTIL YOU ARE COMFORTABLE WITH THE LOCATION THAT YOU SELECT.**



# ASSEMBLY INSTRUCTIONS FOR L&L FUEGO AND ROBIN KILNS (ALL VERSIONS)

## SETTING UP THE KILN

1) Place the stand in your desired location.

*The stand in position on the floor:*



2) You're now going to build the kiln from the bottom up.

3) **LEVEL THE STAND NOW!** Do this before proceeding because at this point it is easy to put a level on the flat base. Use metal shims under the legs to accomplish the leveling. We suggest using a carpenter's level for this job. Make sure that the stand will not wobble.

*Ensuring that the kiln stand is level when in position.*



## WHY IS LEVELING SO IMPORTANT?

If the stand and the bottom are not level your kiln shelves will not be level and loading will be difficult. Kiln shelves loaded with ceramic ware are like a house of cards to begin with - don't make it any harder!

Also - an uneven floor will quickly become a cracked floor. There should be equal support under each leg of the stand so the floor does not rock back and forth.

Be patient about doing this right as you are assembling the kiln. Once you have put the kiln sections on the bottom of the kiln you will not feel like taking it off - so it is important to have this base be level to start with.

4) Note that the kiln bottom is packed on top of the kiln so it is easily removed first without moving the kiln.

*Removing the bottom from the package.*



5) Place the bottom of the kiln on the kiln stand, making sure to center it on the stand. It is not critical how the polygonal corners are oriented to the square stand.



# ASSEMBLY INSTRUCTIONS FOR L&L FUEGO AND ROBIN KILNS (ALL VERSIONS)

*The kiln base positioned on the stand.*



## ASSEMBLING WITH TWO PEOPLE

If you have two reasonably strong people available you can lift the whole kiln with the two sections and the top attached without disassembling the panel. (If you have only one person - skip this section and use the single person assembly technique).

**CAUTION:** The two kiln sections and top together of the Robin weigh about 70Kg (150 pounds). Be careful not to strain yourself. The Fuego weighs less and a strong person can probably lift this by themselves.

1) Pick up the kiln using the handles on the bottom section and place it on the bottom slab. Adjust it until the bottom section matches the bottom slab.

**Maneuvering the kiln using the handles on the bottom section.**



2) Your kiln is now fully assembled and ready to operate.

## ASSEMBLING WITH ONE PERSON

### REMOVING THE CONTROL PANEL

1) Remove one of the Cotter Pins from the hinge bar.

*Removing a cotter pin.*



2) Remove the Hinge Bar from the flanges on the control panel and the hinge bracket on the kiln lid.

*Removing the hinge bar.*



3) Set the kiln lid to the side of the top section. There is no need to remove the support chains unless you want to completely remove the kiln lid.

*Offsetting the lid for panel removal.*



# ASSEMBLY INSTRUCTIONS FOR L&L FUEGO AND ROBIN KILNS (ALL VERSIONS)

4) Loosen, but do not remove, the mounting screws that hold the control panel to the two kiln rings.

**Unscrewing the mounting screws.**



5) Lift the Control Panel up slightly so that the screws on its right side can pass through the keyhole slots.

**Lifting up the control panel.**



6) Swing the Panel out and to the left so that it is still attached to the kiln, yet the right side is open.

**Swinging the control panel to the left.**



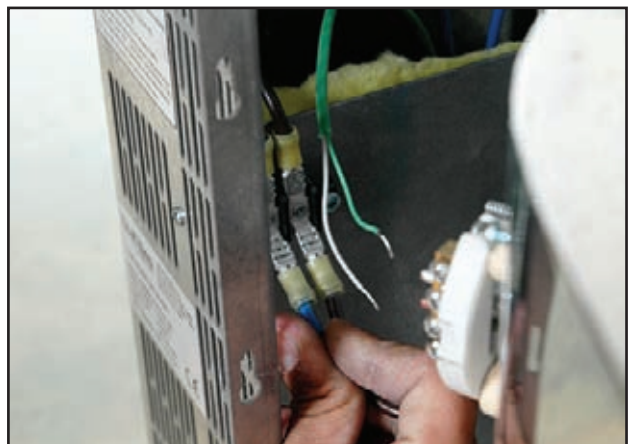
7) Unscrew the Thermocouple Wires.

**Unscrewing the thermocouple wires**



8) Pull the two element connections wires off of the Element Power Terminal.

**Removing the element connection wires.**

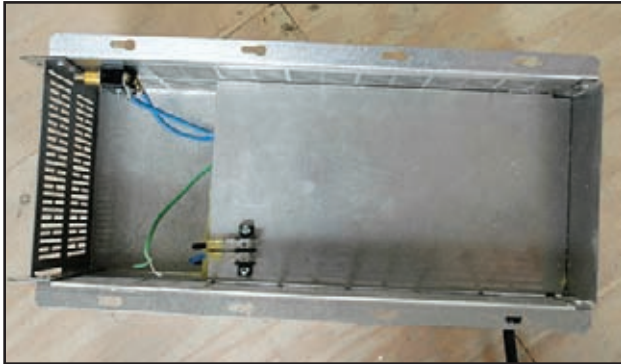




# ASSEMBLY INSTRUCTIONS FOR L&L FUEGO AND ROBIN KILNS (ALL VERSIONS)

9) The Control Panel can now be completely removed from the kiln rings.

*The removed control panel.*



## DISASSEMBLING THE KILN RINGS

1) Using a standard 10mm (3/8") nut driver, remove the nuts on the bottom Element Terminal Block so that the element wires that run between the two kiln sections can be removed. Set the hardware aside.

*Removing the jumper wires from the bottom section.*



2) Remove the top kiln section, with the lid still attached, from the bottom section. Temporarily place it in a stable location.

*Removing the top section along with the lid.*



**NOTE:** Usually the top section with the lid still attached is light enough for one person to move. If you feel uncomfortable with this amount of weight then remove the screws that hold the support chains to the kiln body and move the top separately. Do NOT over-exert yourself.

## SETTING UP THE KILN

1) Remove the bottom kiln section from the packaging and place it on the bottom slab. Adjust it until the section matches the slab.

*Positioning the bottom section on the base.*



# ASSEMBLY INSTRUCTIONS FOR L&L FUEGO AND ROBIN KILNS (ALL VERSIONS)

2) Place the top section, with the lid still attached, on top of the bottom section. Adjust it until the top section matches the bottom section.

**Positioning the top section and lid on the bottom section.**

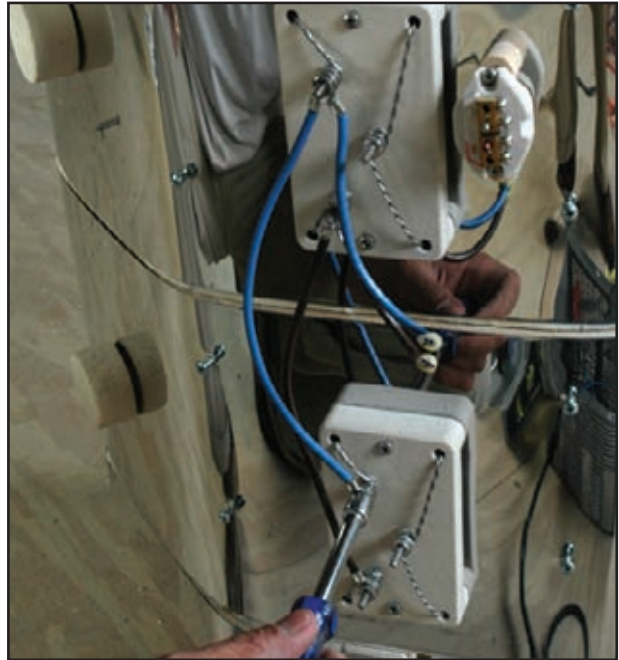


3) Reattach the element jumper wires to the bottom Element Terminal Block.

a) If it was taken off, replace the washer that goes between the second nut and the jumper cords.

b) Next the element jumper wires go on, with blue on the top-left terminal bolt and brown on the lower-left terminal bolt.

**How the element terminal blocks with elements, element jumper wires, and power lead wires should be wired.**



c) Then a washer goes on.

d) Then another nut goes on and gets tightened.

**Detail showing how all the hardware gets assembled on the terminal bolt before it is tightened. The white wires shown will be blue.**





# ASSEMBLY INSTRUCTIONS FOR L&L FUEGO AND ROBIN KILNS (ALL VERSIONS)

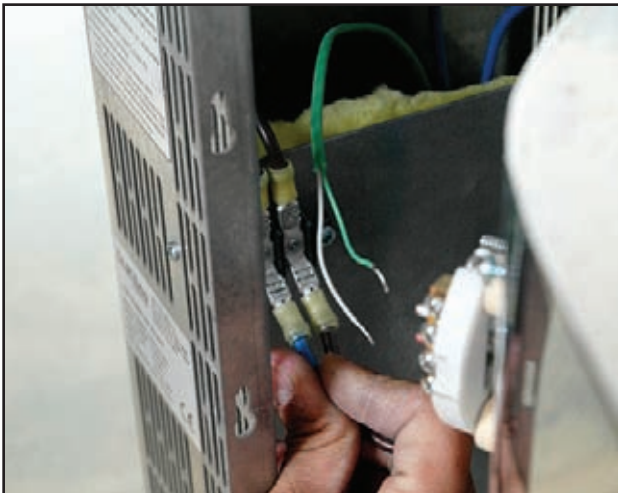
4) Rehang the Control Panel on the left-most mounting screws so that the panel is swung out to the left.

*The control panel rehung on kiln body.*



5) Reconnect the element connection wires to the Element Power Terminal.

*Reattaching the element connection wires.*



6) Reconnect the thermocouple wire to the Thermocouple. For most Fuegos: Be sure to get Black matched to the Plus (+) sign and the Red matched to the Minus (-) sign. For UK & European Fuegos: Be sure to get Green matched to the Plus (+) sign and the White matched to the Minus (-) sign.

*Tighten screws on thermocouple lead wire.*



**NOTE:** The terminals on the control are painted RED for negative (-) and YELLOW for positive (+).

7) Push the right side of the panel flush with the kiln body and slide the mounting screws through the keyhole slots.

*Reattaching the right side of the control panel.*





# ASSEMBLY INSTRUCTIONS FOR L&L FUEGO AND ROBIN KILNS (ALL VERSIONS)

8) Ensure that the top of the panel is flush with the top of the firebrick. Tighten all of the mounting screws.

**Ensuring that the control panel is flush.**



9) Reinsert the Hinge Bar through the control panel flanges and the lid mounting bracket.

**Reinserting the hinge bar.**



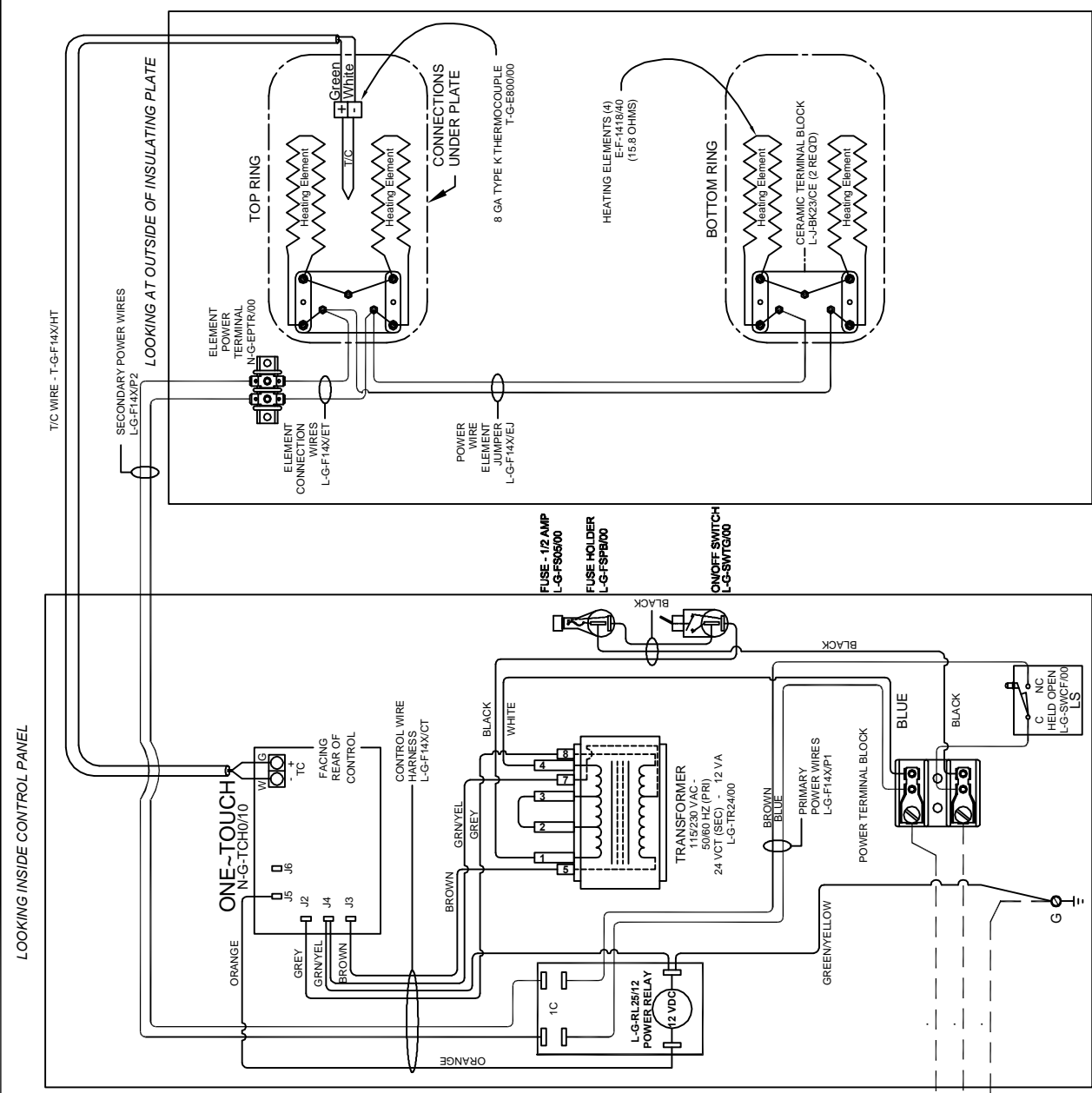
10) Reinsert the Cotter Pin into the hinge bar.

**Reinserting the cotter pin.**



11) Your kiln is now fully assembled and ready to operate.

<b>Models F1418-EU-230 And R1618-EU-230</b>	
VOLTAGE	220-240 / 1 / 50-60
WATTS	~ 3,450
AMPS	15.0
<b>Models F1418-UK-230 And R1618-UK-230</b>	
VOLTAGE	220-240 / 1 / 50-60
WATTS	~ 3,000
AMPS	13.0



**NOTES:**  
Control Wire:  
16 AWG, 105°C  
Power Wire:  
10 AWG, 150°C

PLUG BY CUSTOMER  
○  
○  
○

D	2/27/11	CORRECTED CONTROL WIRING & WIRING
C	10/17/10	REPLACED BARTLETT PK CONTROL WITH ONE TOUCH CONTROL. NEW PAN FOR WIRING
B	4/27/10	ADDED MODELS F1418-UK-230 AND R1618-UK-230
A	1/13/10	ADDED ROBIN MODEL / INSC AS BUILT CHANGE
0	1/13/10	FIRST ISSUE
REV.#	DATE	REVISION DESCRIPTION
FILE NAME	L:\EVL\KILN\FUEGO	MADE FROM
FILE NO	IK220-152.DWG	IK220-151.DWG
DRAWING NO.	K220-152	
SHEET OF	1/1	
REV	D	
TITLE	MODELS FUEGO AND ROBIN 1 PHASE KILN WIRING DIAGRAM	
SCALE	1 = 8	
DATE	10/11/04	
DRAWN BY	G.D.L.	

# **PARTS FOR ALL KILNS (ONLINE DATABASE)**

## **PARTS LIST**

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A comprehensive and up-to-date listing of parts that pertain to all Kiln Series' built by L&L Kiln Mfg., Inc. can now be found on our website at, <http://hotkilns.com/parts>

Use the "Kiln Series" Parts Filter to narrow down the list of available parts to those that pertain to your specific kiln.

If further brevity is desired, use the "Category" Parts Filter as well.

# TROUBLESHOOTING AND REPAIR INSTRUCTIONS FOR L&L FUEGO AND ROBIN KILNS (UNITED KINGDOM VERSION)

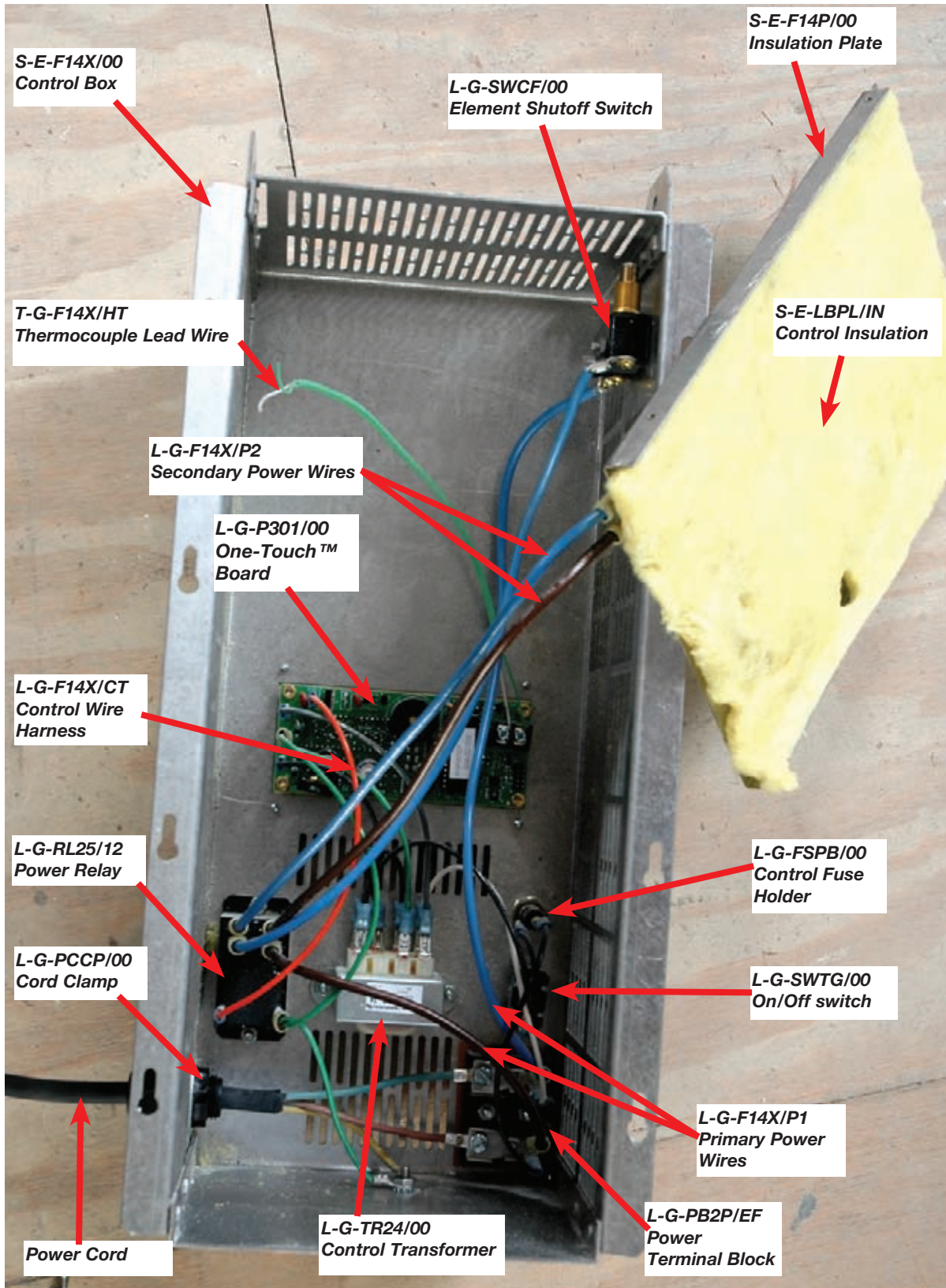
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# TROUBLESHOOTING AND REPAIR INSTRUCTIONS FOR L&L FUEGO AND ROBIN KILNS (UNITED KINGDOM VERSION)

Photo of inside a Fuego or Robin control panel





# TROUBLESHOOTING AND REPAIR INSTRUCTIONS FOR L&L FUEGO AND ROBIN KILNS (UNITED KINGDOM VERSION)

## CAUTION - ELECTRICITY CAN KILL

Many of the tests described in here are performed under power. They should be done ONLY by someone who is familiar with electrical safety such as an electrician or trained maintenance person. We identify any test that is live with a CAUTION statement. We describe these tests in detail so that an electrically trained person who doesn't specifically understand kilns can do the troubleshooting - the level of simplicity described is not meant as an invitation to harm the untrained. **AS LONG AS THE KILN IS UNPLUGGED YOU ARE SAFE.**

## GET A DIGITAL MULTIMETER!

If you want to do much of the troubleshooting described here and not be dependent on a kiln service person then get this tool. It is not hard to use! Without it you are only guessing at the origin and severity of an electrical problem based on how the kiln is acting. A slow-firing kiln may just have old elements, or the elements could be fine but the incoming voltage from your power supply could be low, or fluctuating. Unless you test with a multimeter, you could purchase new elements and run the risk that you might be wasting money and time without solving the problem. Be forewarned however: Testing electrical circuits is very dangerous and potentially deadly if you do it incorrectly. It could result in electrocution! If you don't feel comfortable doing this hire an electrician or get someone to do it who is qualified. That being said - many of the tests described in here just require testing for resistance - which is done with the kiln unplugged. **AS LONG AS THE KILN IS UNPLUGGED YOU ARE SAFE.**

The meter you buy should be digital simply because the analog type is not very accurate. You must be able to see ohm (resistance) readings to the first decimal place. Being able to see that '.7' on the meter is the difference between "I think it may be your elements..." and "I know it is your elements...".



## AN EASY-TO-USE TROUBLESHOOTING GUIDE

This troubleshooting guide is written specifically for the Fuego and the Robin kilns. We have tried to thoroughly illustrate it to guide you through step-by-step to solve most of the potential problems you might encounter. It is organized by symptom and potential causes and solutions. There are two major sections. The first section tells you how to diagnose the problem. The second section provides detailed explanations on how to change components and fix various problems. If you want to see the photographs in color you can download a PDF file of these instructions from our PDF library on our web site

## LIVE TESTS

Some tests are done live. These should be done only by someone experienced in working with electricity. You are dealing with over 200 volts which can easily electrocute you.

Some of the tests involve removing the control panel from the kiln and taping off the power leads and then plugging it in. See the "Assembling with One Person" section in the *fuego-robin-assembly.pdf* for instructions.

- 1) Remove the control panel from the kiln body.
- 2) Detach the insulation plate from the control panel by removing the four screws on the sides of the box.

**Remove the insulated panel by removing the four screws on the side of the control box.**

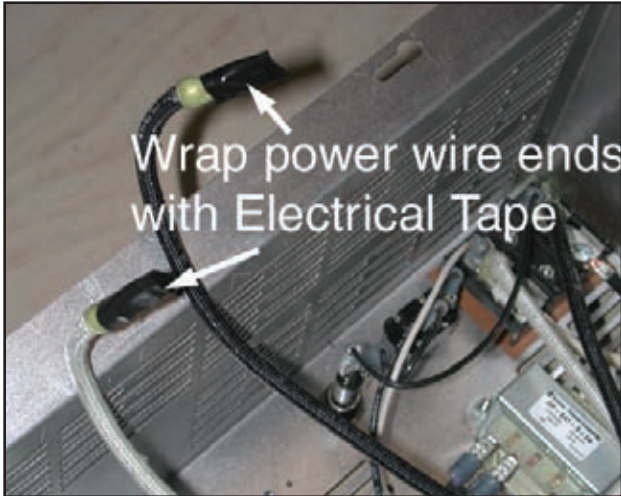


- 3) Tape off the secondary power wires, see page 2, by wrapping electrical tape around the terminal ends.

# TROUBLESHOOTING AND REPAIR INSTRUCTIONS FOR L&L FUEGO AND ROBIN KILNS (UNITED KINGDOM VERSION)

**CAUTION:** Be sure to surround the entire terminal end with two wraps of electrical tape. Only use electrical tape for this, as other kinds may not insulate from the high voltage.

*The ends of the secondary power wires taped off with electrical tape.*



## CONTROL DISPLAY DOESN'T SHOW ANYTHING

### ON/OFF SWITCH

1) Make sure the On/Off Switch is turned on. Turn it on and off.

### FUSE

2) Check control fuse in front of control box. Twist open the fuse holder and physically check the little fuse. You can see if the metal element inside is melted if it is blown. You can also use your digital multi-meter to check continuity across the fuse.

*Picture of the on/off switch and fuse holder opened.*



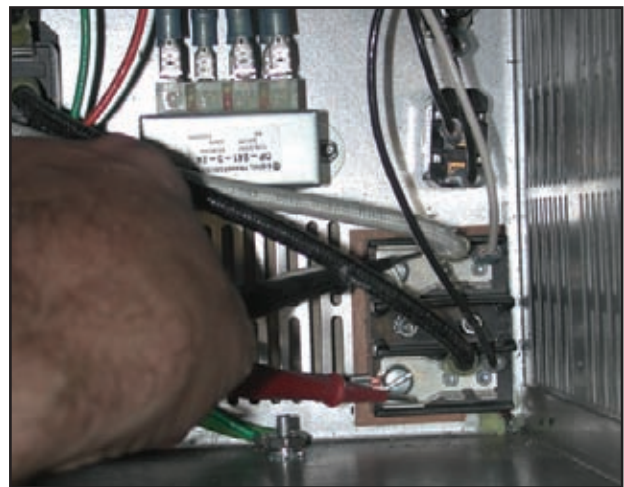
### PLUG & CORD

1) Make sure the power cord is plugged into the receptical. Reseat plug. Make sure it is held firmly and that the springs inside the receptical seem to be working.

2) With power off examine the electrical cord. Look for burned or melted areas and breaks or pinched sections. Look closely at the head of the plug. If there is an internal problem with the wires and the plug parts you won't be able to see it but you may detect a softening or melting of the plastic at the plug head. Look for oxidation or substantial discoloration or even burnt spots on the prongs. Replace plug and cord if this is questionable. Open up the head of the plug and check the connections inside.

3) Once the panel has been removed from kiln, the secondary power wires have been taped off, and the panel has been plugged in, check the voltage at the Power Terminal Block. If you see no voltage there then you know something is wrong with the power source. **CAUTION: This test should only be done by an experienced person familiar with electricity and its dangers.**

*Checking voltage at the power terminal block.*



### CIRCUIT BREAKER / POWER SOURCE

1) Check circuit breaker or fused disconnect switch to make sure it is turned on. Sometimes circuit breakers need to be turned on and off to reset them.

2) Check voltage at the receptical. **CAUTION: This test should only be done by an experienced person familiar with electricity and its dangers.**

# TROUBLESHOOTING AND REPAIR INSTRUCTIONS FOR L&L FUEGO AND ROBIN KILNS (UNITED KINGDOM VERSION)

3) If you have a fused disconnect check the fuses with your voltmeter for continuity. **CAUTION: This test should only be done by an experienced person familiar with electricity and its dangers.**

4) Make sure fuses or circuit breaker is the proper amperage and type. If your fuse keeps blowing try changing it with a slow blow fuse. If a circuit breaker keeps blowing it may need to be replaced.

5) Test for voltage at the main power supply as close to the kiln as possible. **CAUTION: This test should only be done by an experienced person familiar with electricity and its dangers.**

## INTERNAL WIRING

1) Unplug kiln and remove panel. Remove the inner insulated panel and look inside at the wires. Make sure that all the wires inside the control panel are connected. See photograph on page 2 and also the Wiring Diagram. Specifically look at the wires that go from the power connection block to the on/off switch, then to the control fuse and then to the control transformer.

## SHORT CIRCUITS

Do all the following with the kiln unplugged.

1) Check for short circuits. Look for any signs of burnt wires. This might indicate a short circuit. A way this might happen, as an example, is that frayed wires at the end of a wire connector might touch each other.

2) Check for worn wires that may have shorted against the case. Examine wire insulation. If the wire insulation has become frayed the wires could short to the metal casing which is electrically grounded.

3) Look for dirt. Some dirt (such as carbon compounds) are electrically conductive. This is generally not the case with ceramic materials but some can be. Vacuum out panel if you see dirt.

**NOTE:** Usually a short circuit will trip either the circuit breaker for the kiln or the fuses in the fused disconnect switch, if you have one. You will then not see any display on the One-Touch™. Turn your circuit breaker on and off, and check fuses on the fused disconnect and control fuse.

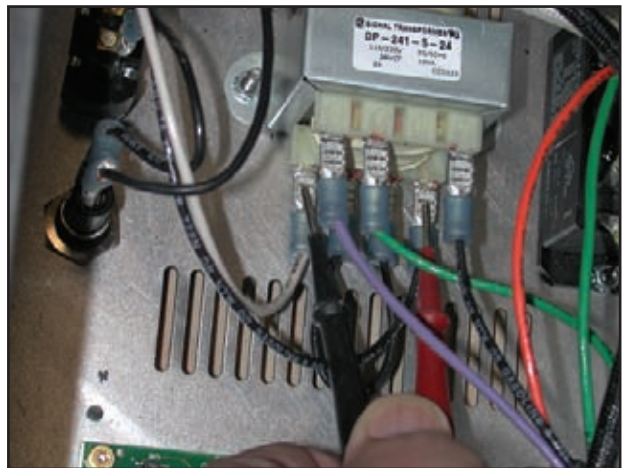
## CONTROL TRANSFORMER

**CAUTION:** These tests should only be done by an experienced person familiar with electricity and its dangers.

1) If none of these solve the problem then you could have a bad control transformer. To check the transformer operation test with your digital multimeter. It should read 220 to 240 volts across terminals 4 & 1 (where the black & white wires come into it) and 24 volts across terminals 5 & 8 (where the gray and brown wires come out). This is a live test so be very careful not to touch any of the wires - remember there is 220 to 240 volts in the panel and this can electrocute you. See photo below. If you are not getting proper voltage (or any voltage from the transformer and you are getting it to the transformer then you need to replace the transformer.

2) If there is 220 to 240 volts coming into the control transformer (terminals 4 & 1, black & white wires) and there is no voltage coming from the transformer then you have a bad control transformer and it needs to be replaced.

**Checking input of the control transformer across terminals 4 & 1 (DANGER-live test):**



3) The voltage across the top center tap (terminal #7, green-yellow wire) and either of the two top end taps (terminal #8, grey wire or terminal #5, brown wire) should be between 12 and 16 volts AC.



# TROUBLESHOOTING AND REPAIR INSTRUCTIONS FOR L&L FUEGO AND ROBIN KILNS (UNITED KINGDOM VERSION)

4) The voltage across the two top end taps (terminal #8, grey wire or terminal #5, brown wire) should be between 24 and 32 volts AC.

**Checking output of the control transformer across terminals 5 & 8 (DANGER-live test!)**



5) If there is no voltage coming into terminals 4 & 1, white & black, then test for it at the Power Terminal Block where the power cord comes in. If there is power there then look for a bad connection or wire between the power connection block and the transformer, i.e. a bad toggle switch, wire, or ½ amp fuse holder. If power is not there then go further back on the line and measure the voltage. Keep going until you find voltage, then look for the problem between that point with the voltage and the last point checked that had no voltage.

## CONTROL BOARD

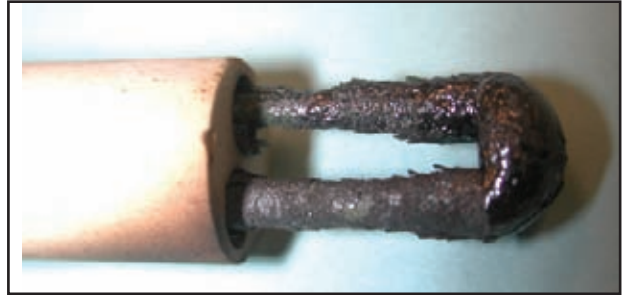
1) If the transformer is OK and you know you have voltage going to the control board but the control still shows no display then the control board needs to be replaced.

## DISPLAY READS FAIL and tC

**FAIL** will be seen flashing along with a **tC** indicating the thermocouple has failed.

1) Check thermocouple end. Examine end carefully. Sometimes there can be a crack that opens up while the kiln is hot but appears to be normal when the kiln is cold. If the end of the thermocouple looks severely corroded and you are getting Error codes then it is best to replace the thermocouple. NOTE: You have to open up the Element Cover Box and remove the thermocouples to check the ends.

*A thermocouple end that will still work but is getting close to creating a problem.*



2) Check thermocouple circuit. For instance check where the thermocouple lead wires go into the ends of the thermocouples. Are the wires loose? Tighten the screws on the ends of the thermocouples to be sure you have a tight connection. Check for corrosion. Check where the thermocouples connect to the control. Try pulling off each connection and reseating it. This can scrape away corrosion that may have built up. Check for melted wires.

3) If none of this works try testing the control board. Put a small jumper like a paperclip across the thermocouple terminals directly on the control board. If the control now reads room temperature then you have a bad thermocouple wire (or bad thermocouple). If it does not read room temperature then the control is definitely bad and needs to be replaced.

4) If you have a bad thermocouple replace it with a new one. Although you may be able to “make it work” by twisting the ends of the wire together this could easily fail during an important load and could also be extremely inaccurate.

## DISPLAY IS NORMAL BUT KILN WON'T HEAT UP

### PROGRAMMING

1) Make sure you have programmed the kiln properly and it is supposed to be firing. Do you have a **Delay Time** or a **Preheat Time** in your program? (Hold down the **Custom/Review** button on the control to find out).

### WIRING

1) Unplug kiln or disconnect from live power by turning off circuit breaker or fused disconnect switch. Remove

# TROUBLESHOOTING AND REPAIR INSTRUCTIONS FOR L&L FUEGO AND ROBIN KILNS (UNITED KINGDOM VERSION)

panel. Check all power wires for firm connections.

2) Pull off and reseal all the spade connector connections of the power wires to rub off any oxides and to ensure a good connection.

## CONTROL BOARD OUTPUTS

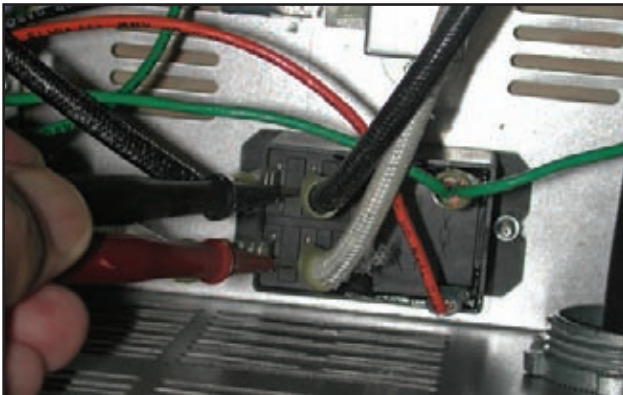
1) It is possible that the internal switches on the One-Touch™ control board could be bad. You can test that by checking to see if you find voltage (12 volts DC) between the output contacts (OUTPUT - J5 - Orange) & (SAFETY - J4 - or any Green/Yellow wire) marked on the control board) and ground (any green wire). **CAUTION: This test should only be done by an experienced person familiar with electricity and its dangers.**

## BAD POWER RELAY

1) You should be able to hear the relay going on and off with a soft clicking noise when you first turn on the kiln and it is supposed to be heating up. If not try turning the kiln off and then back on again and restarting the program. Of course if you don't hear the relay it only tells you that it isn't firing. The problem could be in the control for instance not telling the relay to fire. If you do hear the relay and the kiln is not heating then you know the problem is in the power circuit AFTER the relays.

2) With power on and panel off kiln check the output of the power relay. The voltage should read whatever your kiln is configured for, e.g. 220 or 240 volts. **CAUTION: This test should only be done by an experienced person familiar with electricity and its dangers.**

*Checking output of relay:*



## BAD ELEMENTS

See next section.

## KILN FIRES UNEVENLY

### PEEPHOLES

1) Plug up Peephole and vent holes in the kiln to prevent drafts.

### LID SEAL

1) Check to make sure that door/lid is sealing properly. If door/lid is not sealing against top brick correctly a bright red glow will be visible around the door/lid seal when kiln is operating. (A little of this is OK). Also excessive heat loss can be felt around seal. Rub seal high points down with sandpaper until no more than 1.5mm (1/16") gap is found at any point along seal. Note that the gap at the top will definitely appear larger than any gap you see between the kiln sections. This is partly because the lid actually bows down in the center of the lid when it heats up and the edges consequently rise slightly. Just check for an UNEVENNESS in this gap which will cause an excessive heat loss.

2) If door/lid is excessively cracked or worn or has holes in it this may cause drafts in the kiln. Replace lid.

*This shows a crack in a lid that is OK. Cracks are a natural event with refractory slabs. As long as the crack does not create a large pathway for heat to escape and remains stable it is OK to leave as it. See the section in the back called CRACKS IN THE TOP & BOTTOM:*



## ELEMENTS

1) Elements may have differentially changed in resistance. Check element resistance (see "CHECKING ELEMENT OHMS" section at the end of this guide).



# TROUBLESHOOTING AND REPAIR INSTRUCTIONS FOR L&L FUEGO AND ROBIN KILNS (UNITED KINGDOM VERSION)

2) Empty the kiln. Then turn kiln on using a fast program like FAST GLAZE until elements are red. Open the door carefully and observe the elements to see if they all seem to be glowing about the same amount. **CAUTION: The power does not turn off when you open the lid. Be careful not to put your hand inside the kiln while it is on. Dangerous electric shock could result if you touch an element.**

## LOADING

1) If you are having a problem with uneven firing try to vary the way you load it to match the firing characteristics of the kiln. For instance if it typically fires hot at the top then put more weight in the top to absorb that heat.

2) Be sure to put at posts under the bottom batt. The bottom batt should be at least 1.25cm to 2.5cm (1/2" to 1") above the floor of the kiln.

**TIP:** Lay longer posts down on their side to get a perfect amount of space under the bottom shelf.

## FIRING WITH CONES

1) Run an empty kiln with three cone packs top- middle - bottom. This will tell you if the load contributes to the problem.

2) Try using cone packs in all sections (top, center, bottom) of the kiln during loaded firings and keep records of what happens. See the *troubleshoot-cones.pdf*.

## KILN FIRES TOO HOT OR COLD

### FIRING WITH CONES

Try using cone packs in all sections (top, center, bottom) of the kiln and keep records of what happens. See the *troubleshoot-cones.pdf*.

### HOLD TIMES

Be very careful with hold times. Even a fairly short hold time of 10 minutes can dramatically increase the amount of heat work and hence the cone that the kiln fires to. On the other hand you can use the hold time to increase the heat-work to compensate for underfired work. Just test this in small increments. There is a great program available for free from Orton's web site that

allows you to calculate this with some precision.

## THERMOCOUPLE DRIFT

Thermocouples drift in their accuracy with time. You may have to make further adjustments in the final set point temperatures that you fire to over time.

## KILN STALLS

1) If for some reason the thermocouple wire touches the hot kiln case they may melt and fail. The result of this is that the kiln can "stall out", say **CPLt** prematurely or display any other number of other random error codes. It may refuse to increase in temperature, and the kiln will just run on and on. If it is re-started it may work fine for a while. What happens is that the millivolt signal in the TC wire goes to ground, or the two wires in the TC wire are 'electrically' connected by the stainless steel melting through the insulation and the 'temperature' is then taken right there, not in the kiln. However, the signal received can be so foreign to the microprocessor that the kiln will just stall. The Thermocouple Lead Wire needs to be replaced.

2) Thermocouples close to end of their useful life can cause some of these same problems.

3) Sometimes excessive ambient temperatures (over 50°C / 125°F) around the control can cause stalling too.

4) Corroded connection points can also cause stalling.

## KILN FIRES SLOWLY

### BAD OR WRONG VOLTAGE

1) Check your voltage. Do this at the receptical or at your fused disconnect box. **CAUTION: This test should only be done by an experienced person familiar with electricity and its dangers. You need to see what the voltage is when the kiln is firing.** Low voltage will make the kiln fire considerably slower. Check voltage at your panel and where the kiln is connected. Check the voltage when the kiln is firing and when it is not firing. Sometimes the high amperage draw of the kiln will cause a voltage drop at the kiln. A voltage drop of 5 to 10 volts is not uncommon and is to be expected. If your voltage drop is more than that then you may have a problem with your electrical supply.

# **TROUBLESHOOTING AND REPAIR INSTRUCTIONS FOR L&L FUEGO AND ROBIN KILNS (UNITED KINGDOM VERSION)**

2) Make sure no other large electrical appliances such as a clothes dryer or electric oven are on when you are operating your kiln. This may cause a voltage drop which would slow the kiln down.

3) Voltage may vary in your area depending on season and time of day. Frequently there are “brown outs” during the summer months in some areas. This is when the electric utility reduces the voltage. Try firing at night after peak electrical use hours. You can use your Delay feature to do this easily. Find out from your local utility company when the end of the peak period of electrical use is. Some utilities offer preferential rates for using electricity at night because it is cheaper for them.

4) Check to see what the wire size of your circuit is. If it is very long (more than 50 feet) from your main circuit box then the wire size might need to be higher (#8 instead of #10 wire).

## **ELEMENT AGING**

1) Elements age when fired and the elements increase in resistance. When they increase in resistance the amount of power they develop decreases. See the section on “CHECKING ELEMENT RESISTANCE” at end of this guide.

2) Replacing only one element may cause an unbalance in firing.

3) Empty the kiln. Then turn kiln on until elements are red. Open the door carefully and observe the elements to see if they all seem to be glowing about the same amount.

4) Elements expand and grow with age. If you fire low-fire clay and glazes and never get above cone 05 or so, your elements will last a long time, especially if you are only bisque firing. This is good, to a point. If you only low-fire, the problem you are most likely to encounter over many years is that the elements will expand as they age. The length and the coil diameter increase. Meanwhile the atmosphere in the kiln slowly eats away at the metal of the element. Although the total resistance usually increases as the elements age, sometimes it decreases, or reverses itself. This usually only happens when the elements are very old but have not yet failed completely. As the element expands, it binds up in the corners. This can make the individual coils push together and touch each other in the corners,

making a short cut for the electricity, reducing the amount of element material the electricity must pass through, and therefore reducing the resistance in the whole element. This may make it hotter in the kiln, but if there is a lot of element material jammed in the corners there will not be enough material left in the coiled form to radiate the heat generated by the increased amperage and decreased resistance. Only the parts of the wire not touching the coils on either side of them will emit heat. More amperage through the electrical components in the control could cause damage if the situation continues or the resistance drops far enough. In addition, the expanding diameter of an element can make it difficult to get it out of the holder. Usually this will not happen to those firing to higher temperatures because the maximum temperature of the kiln is quickly compromised by increases in the resistance, requiring the elements to be changed long before they can jam up in the corners. Also, high temperatures and glaze firings are more prone to eating through the element, causing it to fail, before the element can expand enough to cause the problems mentioned above. Visually inspect your elements for the above conditions and do a resistance check. If you see this it may be time to change elements.

## **POWER RELAYS**

1) Power Relays may cause poor transfer of power to elements when they have been used for a long period of time. It is not always a total failure - which is of course harder to troubleshoot. If this is suspected replace the relay.

## **BAD WIRING**

1) Have an electrician check your wiring. We have seen aluminum wire cause intermittent problems with allowing enough voltage through. We do not recommend aluminum wiring. The problem with it is that aluminum oxide, which is formed from heat, is a resistor while copper oxide is not a resistor. With kilns you will often develop some heat in the electrical lines. If all connections are perfect and the wire is oversized you probably will not have a problem - but why take that chance? Make sure your wires are of the proper size and that all connections are good.

# TROUBLESHOOTING AND REPAIR INSTRUCTIONS FOR L&L FUEGO AND ROBIN KILNS (UNITED KINGDOM VERSION)

## WIRES WILL GET HOT

Unlike many other appliances that use electricity (like motors) kilns are called a “resistive load.” This means that there will be a continuous pull of steady electrical power for many hours. Even with properly sized wire this will generate SOME heat in the wires. This is one reason we recommend against using aluminum wire for a power feed. If you look carefully you will see that we have **OVERSIZED** our internal power wires far in excess of their rated capacity. In addition all our power wire is rated for very high temperatures. The larger the wires the less resistance in the wires and the cooler they will operate.

- 2) Check your circuit breaker for proper operation. These sometimes go bad over time.
- 3) If all the elements are firing and the kiln is still firing too slow check the amperage draw of the kiln under a full load. you should read around 13 amps. **CAUTION: This test should only be done by an experienced person familiar with electricity and its dangers. You need to see what the voltage is when the kiln is firing.**
  - a) Hinge open the control panel by removing the screws on one side and loosening the screws on the other.
  - b) Put the amp-probe clamp of your multimeter around one of the element connection wires.

**Check amperage under load with an amp-probe**



## WIRING IN THE KILN

- 1) Unplug kiln.
- 2) Trace wiring for missing or bad connections.
- 3) Check wiring against wiring diagram.
- 4) Check for corroded connectors or connectors that have frayed wires. Replace if you see this.

## ELEMENT CONNECTIONS

- 1) The holes where the elements go through the firebrick walls are too large. This could cause too much heat to escape from the kiln thereby overheating the element terminals. This can be remedied by lightly stuffing non-RCF ceramic fiber in the element holes. (See the Parts List for non-RCF fiber). You can stuff this in from the inside of the kiln using a sharp tool like a very small screw driver.
- 2) Check to see if the element ends are twisted properly. They should be twisted clockwise around the terminal screw. If the twist is too loose this could generate extra heat at the element ends. Check for corrosion on the terminal. If there is corrosion sometimes you can remove it with a wire brush.

***An element terminal with element end twisted around it properly.***



- 3) The element connection hardware may not be tight enough. A loose connection can generate heat and cause oxidation of the hardware which in turn will cause a worse electrical connection (because of resistance) and more heat. Replace with new hardware.

# TROUBLESHOOTING AND REPAIR INSTRUCTIONS FOR L&L FUEGO AND ROBIN KILNS (UNITED KINGDOM VERSION)

## HEAT LEAKAGE & VENTS

- 1) Make sure peephole and vent plugs are in.
- 2) If your lid or bottom is cracked check to see if it seems to be leaking much heat at high temperatures. Patch or replace if extreme. (SOME IS OK).

## ADDING MORE INSULATION

- 1) In L&L's top loading kilns an additional bottom may be placed under the original bottom. This will improve the insulation in the kiln, thereby slowing heat loss and speeding the firing time. You can also put a 2" layer of calcium silicate on top of the stand beneath the bottom of the kiln.
- 2) Also try raising the height of the kiln from the floor or putting a reflective stainless steel or aluminum sheet under the kiln. All these things keep the floor from absorbing the radiant energy from the kiln and will improve heat up times (as well as bottom of the kiln uniformity).
- 3) Put a 1" layer of non-RCF ceramic fiber on the lid. This is non-hazardous which is important in this application because you will be releasing fibers into the air when you move it while loading. While this is a somewhat extreme measure we have found that a disproportionate amount of the heat loss from a kiln is through the top. Non-RCF ceramic fiber is soluble in the body and is considered totally safe. (See the Parts List).
- 4) Whatever you do be sure NOT to put the kiln directly on the floor. If the floor is cement or other hard non-flammable material it will absorb the heat from the kiln. If the floor is wood or other flammable material you will create a very DANGEROUS situation which could cause a serious fire.

## KILN HEATS TOO FAST

### VOLTAGE

- 1) Check your voltage. Some people may have high voltage like 245 volts where you should nominally have 220 to 240 volts.

### ELEMENTS

- 1) Check element ohms and compare with factory values. (See CHECKING ELEMENT OHMS).

- 2) Make sure the elements are wired properly. **Check the wiring diagram.** IF THE ELEMENTS ARE WIRED IN PARALLEL RATHER THAN SERIES THE KILN WILL OVERHEAT QUICKLY.

## ERROR MESSAGES

Error codes can appear at any time during the firing. They always refer to a problem that, if allowed to continue, could end with unknown or even disastrous results. **Errd**, **Err1**, **ErrP** and the **FAIL** message make the most frequent appearances.

### Errd

Error d indicates that the kiln temperature is 100°F above the traveling set-point, which is the current desired temperature in the kiln. The traveling set-point will increase or decrease according to the programmed rate.

- 1) Something is too close to, or is touching the thermocouple. Allow almost an inch between everything for thermal expansion. Fix and re-fire the kiln.
- 2) The Thermocouple Lead Wire has melted against the kiln case. The wire must be replaced.
- 3) The thermocouple is about to fail. Perform a physical inspection, or just re-start the kiln and monitor it carefully.
- 4) Element(s) just burned out. Perform an ohms test for more information.
- 5) The relay has just failed.
- 6) There is a bad connection point somewhere. This will become more of a possibility as the kiln ages. Examine all points carefully for melting, corrosion, discoloration and/or bad electrical smell.

### Err1

Error 1 indicates the temperature in the kiln is rising during an up ramp slower than 15°F/hr. If this rate continues for 8 minutes the firing will be stopped. Err1 may be an indication that the elements are worn or that a relay has stopped working.

- 1) If **Err1** is the error code on the screen when you check on the firing, then for some reason the kiln could not



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generate enough heat to counter the heat loss. If the kiln can get no hotter (even though all the elements appear to be on and the program is not holding), then **Err1** is what you will see. **Err1** can mean either you need new elements or a new relay. An ohms test and a voltage test can tell you which it is. If you recently changed locations, power supplies, elements, or did any repairs, then closely examine what changed between your last successful firing and this one. There may be some other issue besides bad elements or a bad component.

2) A new location can mean a 208 volt power supply rather than a 240 volt supply (about 25% less power).

3) In re-wiring the power supply you may not have used thick enough copper wire (line, conduit and connection points will be very hot).

4) The elements are the wrong resistance. Check new elements with your multimeter just to be safe. Mistakes can happen.

5) If you rewire anything improperly or incorrectly the potential for anything from a blown breaker to just no power at all is possible. (Using wire with a temperature rating of less than 150°C for the power wiring can seriously limit the life of the circuitry and can be dangerous as well, especially when the wires are close to the kiln. Use a wire diagram and trace every wire to check yourself). You can buy high temperature wire from L&L (see the Parts List).

## **ErrP**

Error P is displayed whenever there is a power interruption that is long enough to stop the firing. If the power interruption is brief the kiln will continue to fire when power is restored; in this case there will no indication of a power failure. To clear the error, press any key.

This error can also happen as a result of RF noise that resets the microprocessor. If this is suspected, the control panel should be returned to L&L for testing and possible modification.

## **ErrF**

Error F indicates the temperature in the kiln is decreasing during a down ramp less than 15°F/hr. If this rate continues for 8 minutes the firing will be stopped. **ErrF**

may be an indication that a relay has stuck in the on position.

## **tC-**

Error tC- indicates that the white and green thermocouple wires are reversed. Make sure they are right all the way through the circuit. Green is Plus (+) and White is Negative or Minus (-).

## **FAIL**

See the section in these Troubleshooting Instructions called **DISPLAY READS FAIL and tC**.

## **CAN YOU RESTART THE KILN AFTER IT STOPS BECAUSE OF ERROR CODES?**

You can try to restart the kiln after getting an error code. Some messages, like flashing **ErrP** and **FAIL**, will not necessarily turn off the kiln. Depending on the problem though, re-starting it may or may not let it finish the firing, or even start up again. An **Err1** at the end of the firing will re-start but will probably re-occur in about 22 minutes.

## **WORST CASE SCENARIO FOR RESTARTING AFTER AN ERROR CODE**

Keep in mind that you run the risk of over-firing if you re-start while the kiln is very close to the final temperature. A pyrometric cone melts with the proper combination of time and temperature. Add more time and you don't need as high a temperature, go to a higher temperature and you don't need as much time. When an error code shuts down the kiln near your final temperature (within about 10°C) and you do not know exactly how long it has been cooling, or what temperature it reached before the error code appeared, you run the risk of having too much unaccounted for time in your time-temperature equation.

If you have cones in the kiln that you can see through the peepholes, then use these after you re-start and turn off the kiln manually when the target cone bends over.

If you do not have cones visible then you can gamble and estimate a final temperature based on how many degrees per hour the kiln has risen, including the time it was off.

In reality, however, an **Err1** that close to the end of a firing probably means you need new elements. So



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re-starting the kiln will probably not enable it to climb much higher in temperature. Keeping track of the time, let it run, and when it shows **Err1** again just keep re-starting it until the firing finishes. Meanwhile call and order new elements.

In general though, Error Codes mostly appear after the kiln has been disassembled and set back up improperly, has had its power supply altered (like moving to a new studio with different voltage), or has had an element or a thermocouple burn out.

## REMOVING PANEL FOR SERVICE

- 1) It is easy to access the inside of the control panel for troubleshooting.
- 2) Unplug the kiln.
- 3) Follow the instructions in the Assembly Instructions for removing the Control Box.
- 4) Pack the control panel with cushioning material such as bubble wrap, balled-up newspaper or foam in a cardboard box and follow instructions from your local distributor or repair person about where to send it.

**CAUTION:** The controller contains electronic components which are sensitive to static electricity. Before handling the controller dissipate any static charge you may have by touching metal on the kiln or some other grounded object.

## REPLACING ONE-TOUCH™

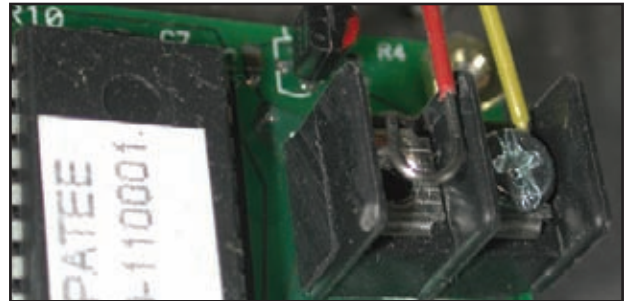
- 1) Unplug kiln or turn off the kiln at the fused disconnect switch.
- 2) Remove the four #6 screws that hold the One-Touch™ in place from the front face of the control panel.
- 3) Detach the control panel from the kiln body and remove the insulation plate by removing the four screws on the sides of the box.
- 4) Pull off the spade connectors from all the connection points on the back of the control. Loosen the screws that hold down the thermocouple wires and pull out the wires from under the screw heads. It is OK to remove

the screws if this is easier for you. First note where all the wires go. These are all clearly marked with color coding on the Wiring Diagram.

- 5) Pull old control out. Put new control in and screw in place with the #6 mounting screws. Replace wires on proper connectors.
- 6) Reattach the thermocouple wires to the control. Green matched to the Minus (-) sign and the White matched to the Plus (+) sign.

**NOTE:** The terminals on the control are painted RED for negative (-) and YELLOW for positive (+).

*Picture showing thermocouple wires installed on Control. One screw is removed to show how the TC wire should be prepared with a "U" shape. The red and yellow wires shown will be green and white respectively.*



- 7) Double check that the proper color coded wire goes to the proper terminal.

**Orange = J5 (wire goes to Relay)**

**Gray = J2 (Wire goes to Transformer #8)**

**Green/Yellow = J4 (Wire goes to Transformer #7)**

**Brown = J3 (Wire goes to Transformer #5)**

## REPLACING TRANSFORMER

- 1) Unplug kiln.
- 3) Remove the control box and remove the insulation panel.
- 3) Using needle nose pliers pull off the wires from the transformer. THIS CAN BE TRICKY. It can take a good bit of force sometimes to remove these little spade connectors. You will probably not be able to do it with

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just your hands. Also the spade connectors on the transformer are not very strong. Take your time. Of course, if you are replacing a bad transformer it doesn't matter if you damage it.

## ***Wires being pulled off the control transformer.***



4) Unscrew the two nuts that hold the control transformer onto the panel and remove the transformer.

5) Before installing the new transformer put the small jumper wire onto terminals #2 and #3 on the bottom row of terminals. Note the little numbers by the contacts.

## **REPLACING POWER RELAY**

- 1) Unplug kiln.
- 2) Remove the control box and remove the insulation panel.
- 3) Pull off the wires to the relay. Everything is color coded and marked so you can refer to the wiring diagram when replacing if you forget where the wires go.
- 4) Remove the nuts from the studs that hold the relay in place. Remove old relay and replace with new one.
- 5) Visually inspect the wire connectors. Do they look corroded or "cooked"? Are the wires frayed? Any corrosion on the wire itself? If any of this is questionable you should replace the appropriate wires.
- 6) Reconnect all wires. Visually inspect to make sure the spade connectors are down as far as they can go and feel to see that they are tight (a gentle tug should not remove one). If they are loose for some reason remove the wire and slightly squeeze the spade connector with

pliers to tighten it.

**IMPORTANT:** The slip on wire connectors can not be loose or corroded. If there is a bad connection then heat will be generated and the component that they slip onto (relay, terminal strip, etc) may overheat and fail. If you squeeze the slip on terminal to make it tighter - be sure to squeeze it evenly so that one side is not tight and the other loose. If there are any doubts about the integrity of the wire or the connector replace the whole wire or harness.

## **REPLACING FUSE HOLDER**

- 1) Unplug kiln.
- 2) Remove the control box and remove the insulation panel.
- 3) Remove the wire connectors from the end of the fuse holder on the inside of the panel.
- 4) Unscrew the nut that holds the fuse holder in place.
- 5) Remove and replace with a new fuse holder. Reconnect wires.

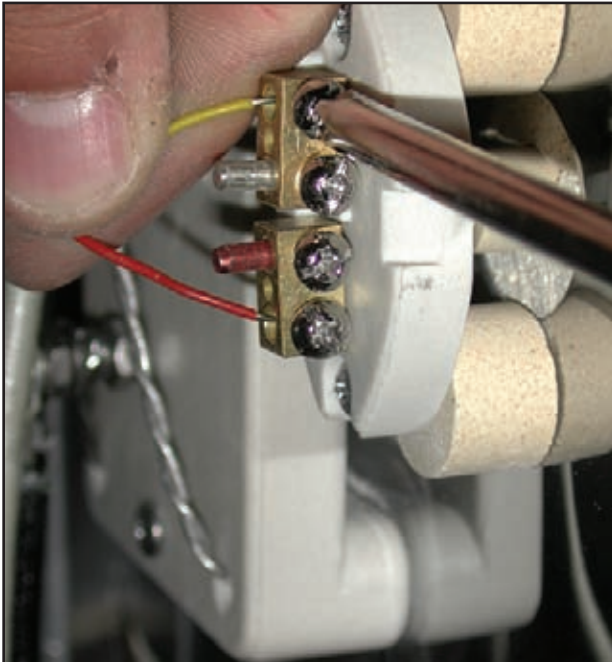
## **REPLACING THERMOCOUPLES**

- 1) Unplug kiln.
- 2) Remove or hinge open the control box.
- 3) Remove the Thermocouple Lead Wire from the Thermocouple.
- 4) Unscrew the Thermocouple from the kiln (these are #6 x 1-1/2" screws)
- 5) Remove Thermocouple.
- 6) Install a new Thermocouple and screw in place.
- 7) Replace Thermocouple Lead Wires and tighten. Be sure to get White matched to the Minus (-) sign and the Green matched to the Plus (+) sign.

**NOTE:** The terminals on the control are painted RED for negative (-) and YELLOW for positive (+).

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*Tighten screws on thermocouple lead wire, the red and yellow wires shown will be green and white respectively.*



*Untightening the element terminal:*



5) Using a sharp tool, such as a screw driver, lift the elements out of the ceramic grooves at the corners. You can slide the holder over in the channel to make enough of a gap to get the tool under the element.

*Lifting the element out of the element holder groove in a corner of the kiln.*



## REPLACING ELEMENTS

- 1) Unplug kiln.
- 2) Remove the Control Box.
- 3) Using a 3/8" nut driver remove the nuts that hold the element end onto the Element Terminal Bolt. If you don't have this tool you can use an adjustable wrench - it will just take longer.

*A standard 3/8" nut driver.*



- 4) Untwist the element end from around the Element Terminal Bolt. Straighten it out as much as possible.

6) In most cases you can just lift the element out of the holder at this point. Sometimes, if the element has really disintegrated, you need to remove it in pieces with needle nose pliers.

*Removing the entire element from the holders.*





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7) If element is hard to get out of the holders (because of growth of the element) you can try heating up the kiln slightly so as to heat up the element slightly to just the point where element is slightly pliable - don't let it get red. This will soften the wire. Then turn off the kiln and disconnect all power to the kiln. Then, using heat protecting gloves (such as welding gloves or the gloves that come with the Furniture/Accessory kit) and a pair of needle nose pliers pull out the softened element. **CAUTION: if you decide to use this method be very careful of the potential of burning or electrocuting yourself.**

8) From the inside of the kiln, using needle nose pliers, grab the element as close to where it goes through the brick wall to the Terminal Block. Pull the element end through the hole. Be careful not to enlarge the hole in the firebrick. The brick is quite soft and will not take much abrasion.

### Removing element from inside the kiln.



9) Be sure to check for failure points for evidence of contamination on the element and the element holder. If the element holder is contaminated it will cause rapid failure of the new element. Replace contaminated holders with new ones.

10) Using your multimeter check the resistance of your new element. Put the probes on the twisted element ends about 3" from the beginning of the coil. Check it against the chart at the back of this Troubleshooting Guide. This is a good double-check and can save you a lot of trouble if there is a mistake.

### Checking resistance of the elements before you put them in.



11) Install the twisted ends of the elements through the holes in the wall of the kiln. Element ends should be straight at this point.

12) Pull them up tight up to the wall of the kiln by pulling from outside the kiln.

13) Lay the element into the groove. Note that the unfired element is going to have some springiness to it before it is fired for the first time. You may need to use a screw drive to press the element into the holder.

**NOTE:** Pins are not needed when the kiln employs the Element Holder system.

14) Install the elements and hardware:

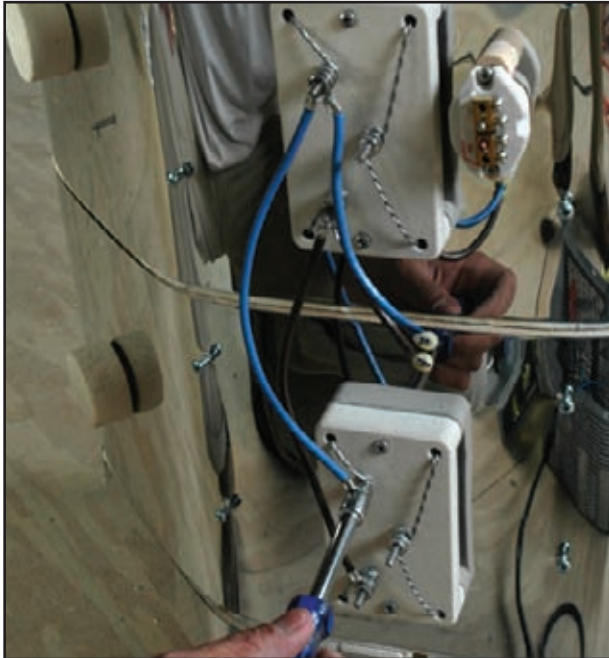
- a) A washer goes under the first element
- b) Twist the first element end **CLOCKWISE** around the Terminal Bolt.
- c) The next element gets twisted around the Terminal Bolt on top of the first element.
- d) Then another washer goes over the Terminal Bolt.
- e) Then the nut goes over it and get tightened.
- f) Then a washer goes on.
- g) The long element jumper wires that connect the element terminal blocks go on, with blue on the top-left terminal bolt and brown on the lower-left terminal bolt.
- h) If it is the top section's element terminal block that



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is being wired, then the short power lead wires go on at this point. Blue on the top-left terminal bolt and brown on the lower-left terminal blot.

***How the element terminal blocks with elements, element jumper wires, and power lead wires should be wired.***



- i) Then a washer goes on.
- j) Then another nut goes on and gets tightened.

***Detail showing how all the hardware gets assembled on the terminal bolt before it is tightened. The white wires shown will be blue.***



## **REPLACING ELEMENT HOLDERS**

1) When ordering a new holder provide model number of kiln and length of the element holder. See the Parts List for this information.

2) Note that if the holder has melted badly you may need to either replace the brick that holds it or at least patch the brick with our Brick Repair Kit.

### **METHOD #1**

1) This method leaves the kiln in tact. You break up the holder and remove it in pieces and then modify the new holder to snap into the groove.

2) Using a chisel or large screw driver and a hammer carefully crack the holder that needs to be removed. Take your time with this, the holder can be gradually broken into little pieces.

***The holder shown with small pieces broken off of it.***



***The holder shown with about half the job done.***



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*The groove shown with the entire holder removed.*



3) Using linemen's pliers, snap off the *bottom edge* of the holder. Make sure that the bottom of the element channel is closest to the edge that you are removing.

**Gradually snapping off the bottom edge of the holder.**



**A normal holder compared to one with edge removed.**



4) The new holder can now be snapped into the groove in the firebrick. It will hold in place with no cement.

**Positioning the holder back into place in the firebrick.**



## **METHOD #2**

This method requires you to take the kiln sections apart.

1) Take the section with the bad holder off the kiln and put it on a flat surface like a flat floor or table.

2) Carefully pull the elements out of the element holders of the brick section involved and allow them to hang loose. Take great care not to "break" the element as they are very brittle after firing.

4) Loosen up the adjustable clamps that hold the stainless steel wrapping. Loosen them just enough to allow the brick to slide out with slight hand pressure (so that the other bricks stay in place). NOTE: If you don't have the section on a flat surface then the bricks will all come out of proper alignment at this point.

5) Pull up the brick with the bad element holder just enough to allow removal of the defective element holder and replace with new one. Slide the bad brick(s) out and put in new brick(s). Be sure the element holders line up with the other holders on either side. Note there is a top and a bottom in the element holder so be sure to get the orientation correct.

6) Retighten the clamps on the wrap. Alternately tighten the bottom and top clamp so that you don't cock the stainless casing.

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## **CRACKS IN THE LID & BOTTOM**

- 1) It is quite normal to get hairline cracks in both the lid and the bottom firebricks.
- 2) They are caused by the expansion and contraction of the firebrick as it heats and cools.
- 3) As long as the bottom is fully supported by the stand the cracks in the bottom will not adversely affect the operation of the kiln.
- 4) The stainless steel clips we use in our lids also help keep these natural cracks from normally becoming a problem.
- 5) Note that it is possible to put another bottom under the original bottom as a second layer (this can also improve performance and heat up rate of the kiln).
- 6) It generally does not make sense to cement these hairline cracks.
- 7) You can tighten the stainless steel band.

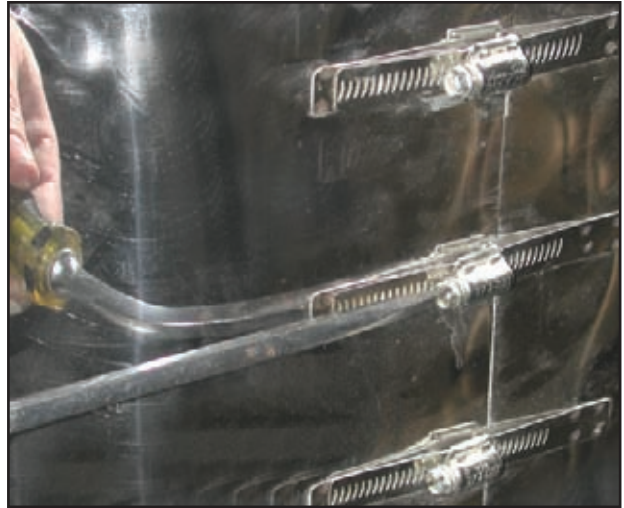
*This crack is OK.*



## **TIGHTENING STAINLESS BANDS**

- 1) The brick will shrink slightly over time. This is more pronounced when using the kiln at higher temperatures like cone 10.
- 2) If the bricks shrink too much they will become loose.
- 3) Tighten the case by turning the screws of the case clamps. Do this 1/4 of a turn at a time on each of the clamps. Keep a balanced tightening (i.e don't tighten one clamp too much at one time). Slow is good.

*Tightening the bands.*



- 4) You can do this on the bands around the top and bottom also. This will help maintain the integrity of those slabs even if there is a crack.

## **REPLACING FIREBRICK IN SIDES**

- 1) If you need to replace a firebrick piece in one of the sections do the following. While it does not require a great deal of experience to accomplish it does take time and patience.
- 2) Order the firebrick precut and prerouted from L&L Kiln. You can order this with the proper element holders already in place or you can reuse the holders from your old brick. Be sure to order it for your specific model kiln. Also, be sure to say whether it is a brick where the element connections come through (because this has different element holders. There are no holes drilled in the brick for either peepholes or element connections. This has to be done in the field.
- 3) Take the section off the kiln and put it on a flat surface like a flat floor or table. Elements will have to be removed and probably replaced.
- 4) Loosen up the adjustable clamps that hold the stainless steel wrapping. Loosen them just enough to allow the brick to slide out with slight hand pressure (so that the other bricks stay in place).



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**NOTE:** If you don't have the section on a flat surface then the bricks will all come out of proper alignment at this point.

- 5) Slide the bad brick(s) out and put in new brick(s). Be sure the element holders line up with the other holders on either side. Note there is a top and a bottom in the element holder so be sure to get the orientation correct.
- 6) Retighten the clamps on the wrap. Alternately tighten the bottom and top clamp so that you don't cock the stainless casing.
- 7) Sand off the top surface of the firebrick to match the surface of the other firebricks. Sandpaper will work fine. Reface with facing (See Parts List).

## DRILLING OUT HOLES FOR PEEPHOLES

- 1) Some of the bricks that you may need to replace will need to have holes drilled in them in the field. These holes can not be drilled in the factory because the alignment would not be perfect.
- 2) To drill out for peepholes use a 1" diameter drill bit or hole saw. You can also drill with a smaller drill and then file out with a round hasp type file. In all cases the peephole can be drilled perpendicular to the stainless case. You may have to remove the bit several times and clean it out as you drill deeper. It is a good idea to have someone help you by watching from the side to make you you are keeping the drill perpendicular.

### *Drilling the peephole.*



- 3) Drill slowly through the firebrick using the prepunched hole in the stainless steel.
- 4) Before drilling, as a precaution, you can measure down from the top of the brick to the top of the existing hole in the stainless steel case. This measurement on the inside will show you where the top of the drill bit will protrude. Adjust your angle of drilling accordingly.

## DRILLING OUT FOR ELEMENT CONNECTIONS

- 1) Use a 3.18mm (1/8") to 4.76mm (3/16") diameter drill bit and drill out from the center of the hole in the stainless steel case. Do this slowly with a speed control.
- 2) Do this perpendicular to the case.

## REPLACING BOTTOMS

- 1) Remove the kiln sections.
- 2) Take the old bottom off the stand.
- 3) Put the new bottom on the stand.
- 4) Relevel the kiln.
- 5) Replace the kiln sections.

**NOTE:** You may want to experiment with using the old bottom as a secondary back up bottom if it is not too badly damaged. Some people find that having this extra insulation thickness helps firing times and uniformity in the bottom of the kiln.

## REPLACING LIDS

- 1) With the kiln lid closed, remove one of the Cotter Pins from the Hinge Bar.
- 2) Pull out the Hinge Bar.
- 3) Unscrew the chains from the stainless steel case of the lid.
- 4) Remove the Top Hinge Part from the old lid.
- 5) Using the old top as a guide, install the Top Hinge Part onto the new lid.



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6) Reinstall the top by following the reverse of the steps listed above.

## CHECKING ELEMENT OHMS

1) The following chart gives you the ohm ratings for both the individual elements and the ohm ratings for the element circuits.

MODEL	VOLTS/ PHASE	ELEMENT OHMS	CIRCUIT OHMS
F1418-UK-230	230/1	15.8	31.6
R1618-UK-230	230/1	15.8	31.6

- 2) It is very easy to check the element circuit ohms.
- 3) Unplug kiln.
- 4) Remove the Control Box. See the *fuego-robin-assembly.pdf* if you need help with this.
- 5) To test the circuit of each section, first remove the jumper wires that run between their respective element terminal blocks.
- 6) Using your Multimeter set on Resistance or Ohms check the resistance by holding the probes against the two terminal bolts at which the element circuit terminate.

### Checking circuit ohms for a kiln section.



7) Each circuit would normally have the same resistance which should match the values given above for the "Circuit Ohms".

8) The values should be within 6% to 12% of the listed values. Typically the resistance increases over time and use and this makes the power generated by the elements decrease. Depending on the temperature you are firing to you may get away with a wider variation.

9) We provide ohms values for individual elements so that you can check specific element resistance before you put elements in or if you want to isolate the elements.

a) With the elements wired in the kiln, this can be done by holding the probes against the ends of each individual element. These are located at either the bottom, or the top of the element connection blocks.

### Checking ohms for one element, in this case, the bottom element.



b) With the elements unwired, this can be done by holding the probes against the twisted ends of each element about 7.62cm (3") from the coil.

### Checking resistance of an unwired element.



# NOTES



Made in USA

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Swedesboro, NJ 08085  
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Fax: 856.294.0070  
Email: [service@hotkilns.com](mailto:service@hotkilns.com)

MODEL NUMBER: \_\_\_\_\_

SERIAL NUMBER: \_\_\_\_\_

VOLTAGE: \_\_\_\_\_ PHASE: \_\_\_\_\_

AMPS: \_\_\_\_\_ WATTS: \_\_\_\_\_

**FOR PARTS AND SERVICE CONTACT POTCLAYS LTD**

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