



FOR OVER 55 YEARS... THE KILN TECHNOLOGY LEADER

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SQ SERIES “Super-Vent” **KILN INSTRUCTIONS**

You are now the proud owner of an L&L "SQ" kiln, engineered to give you the utmost in performance and results. This is an expensive and potentially hazardous appliance (if not used with proper caution). PLEASE TAKE THE TIME TO READ THESE INSTRUCTIONS. There is important information that you need to understand to operate your kiln safely and properly.

SEE ALSO

Also see all the instruction sheets that would apply to the DaVinci kilns.

CHECKING SHIPMENT

Your kiln was carefully packed and inspected prior to shipment to make sure that your kiln and accessories were in perfect condition.

When carrier makes delivery, you should immediately unpack your kiln and accessories to ascertain whether or not any damage has occurred in transit.

If damage has occurred, retain all of the packaging material, and notify the delivering carrier at once, requesting an inspection report. Retain all papers to insure that a proper claim can be filed. We will assist you in any way possible with your claim; however, filing and collecting on freight claims is the receiver's responsibility.

FEATURES

- **UNIQUE DYNA-GLOW ELEMENT HOLDERS.** The “C” Suffix models have larger diameter element holders to make element replacement easier and to accommodate heavy duty “Professional” element option.
- **INFINITELY VARIABLE INPUT SWITCHES:** These provide accurate temperature gradients from top to bottom. There are three zones from top to bottom, each with its own separate input switch. Soaking is easy. Perfect firing is standard!
- **PILOT LIGHTS FOR EACH ZONE SWITCH:** No more guessing which zones are firing.
- **POWER RELAYS:** All power is switched to the elements with power relays.
- **POWER CORD INCLUDED (ON MOST MODELS):** All single phase SQ Models except the SQ2427C are rated under 50 amps and include a 50 amp 6-50P power cord. 3 phase units and SQ2427C are direct hook up with branch fusing. Full power for high temperature firing is assured.
- **DAWSON KILN SITTER WITH TIMER:** The Dawson LT3 Kiln Sitter/Timer comes standard with all SQ Series kilns. If a digital control is ordered it becomes the back up. The Dawson kiln sitter uses a pyrometric cone to sense when the proper firing has been achieved and shuts off the kiln automatically. In addition there is a timer back up which is set for a time slightly past the anticipated heat up time. If the cone mechanism fails for any reason the timer will shut the kiln off.
- **UNIQUE SPRING COUNTERBALANCED SAFETY LID:** Lid can be opened with one hand. No heavy lifting. A safety turn screw allows lid to be clamped in up position.
- **3" THICK FIREBRICK HARDENED WITH SPECIAL FACING:** L&L uses a special coating on the firebrick to help prevent brick dusting from ruining your ware. This also helps energy reflect back into the kiln

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which improves the energy efficiency and gradient uniformity.

- **LARGE DIAMETER PEEPHOLES:** One inch diameter peephole with insulating ceramic plugs are supplied for ventilation and cone sighting. These are full diameter all the way through the firebrick which allows greater visibility into kiln.
- **PRESTRESSED STAINLESS STEEL CASE DESIGN:** The firebrick side walls and bottom are prestressed. They will expand and contract with all joints (also any cracks which may develop) in a tight manner.
- **SUPERVENT CASE DESIGN RESULTS IN COOLER CASE:** There is an air space between the firebrick and the case
- **OPTIONAL POWERED VENT SYSTEM**
- **KILN ON/OFF KEY SWITCH:** The kiln can not be turned on without the key. Two keys are included and extras can be ordered at any time.
- **SAFETY LID LATCH:** A latch is provided to keep the lid in the closed position.

PREPARATION

- Unpack kiln carefully and remove all packing material including the plywood base or skid if included. Replace bolts into legs for leveling purposes.
 - Install kiln in well-ventilated area.
 - Make certain floor is not flammable and install no closer than 12" to any wall.
 - Make certain the area is free of moisture and is under cover and protected from the weather.
 - If your kiln is equipped with a vent fan, exhaust tubing to outside. See separate vent instructions.
 - Check Dawson Kiln Sitter for adjustment. Read Dawson Kiln Sitter manual for instructions on this process.
 - **LEVEL THE KILN!** This is important because the Dawson Kiln Sitter is affected by gravity. If the kiln is not properly leveled the Kiln Sitter might be either too reactive or too sluggish.
2. ANY HIGHER THAN THIS. The elements, element holders and firebrick will melt.
 2. Have electrical installation performed by an electrician or other qualified technician. There is danger of electric shock.
 3. Do not allow children near the kiln at anytime.
 4. Kiln surface is extremely hot and will burn you if touched.
 5. Do not leave the kiln while firing. NO AUTOMATIC SAFETY DEVICE IS FAILPROOF! BE ESPECIALLY CAREFUL ABOUT ATTENDING THE KILN WHILE IT IS SUPPOSED TO SHUT OFF.
 6. BE SURE YOUR DAWSON KILN SITTER IS PROPERLY ADJUSTED. Overfiring could result. Note that the kiln sitter could have gone out of adjustment during shipment. Do NOT assume that it is adjusted when first firing the kiln.
 7. Kiln should be located at least 12" from any wall.
 8. The floor should be protected from the heat if it is combustible. IMPORTANT NOTE: If kiln overfires certain materials such as glass or glazes can reach superhot temperatures because they become electrically conductive and can melt. This can burn through the kiln bottom and, if there is a combustible floor, cause a fire. Be sure to protect against this possibility.
 9. Check temperatures around the kiln when it is at high fire to be sure that you are not creating an unsafe condition.
 10. Do not let the kiln's power cord or wire connection come in direct contact with the kiln side. The kiln could melt the cord covering and potentially cause a short circuit.
 11. Before opening kiln make sure that all switches are in the OFF position (so there is no power to elements). Make sure kiln is cooled down so you won't get burned.
 12. Do not put sealed containers or combustible materials in kiln.
 13. Keep all flammable and combustibles away from kiln. Examples are solvents, curtains, rags, etc.
 14. Operate in a well ventilated area.
 15. Never load moist greenware in your kiln. The expanding water vapor in the ware could cause

IMPORTANT CAUTIONS

1. **The SQ Series kilns are rated for use to 2350°F (1287°C) (Cone 10). DO NOT FIRE**

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the ware to explode, damaging your kiln interior.

16. Read the control and/or Dawson Kiln Sitter instructions as well as these and other general instructions that come with your kiln - **BEFORE OPERATING THE KILN!**
17. Use dark glasses to view inside the kiln through the peepholes when firing.
18. Do not open the kiln lid unless the kiln is turned off (except for carefully controlled troubleshooting tests).
19. Do not apply kiln wash to the brick sides, element holders or undersides of kiln shelves.
20. Do not operate kiln with deteriorated wiring. Be sure to check this periodically.
21. Do not use silica sand in the kiln (some people like to use this as a work support medium). The silica sand will attack the elements and thermocouples. It can migrate in the kiln from expansion and movement due to heat. It can also get into the cone control device. If you must use sand to support or stabilize your load try alumina oxide sand. Also consider ceramic fiber blanket.
22. When replacing infinite zone switches, replace the electrical connectors. These electrical connectors will typically oxidize over time and this can cause overheating of the switch at the connection spade. This can in turn lead to early failure of the switch. Make certain that the new connectors are firmly crimped onto the wire. A crimping tool can be easily purchased from an electrical or hardware store. Evidence of this type of switch failure is discoloration at the spade terminals of the switch. This is not a warranty item.

REGULAR KILN MAINTENANCE

To keep your kiln in top operating shape, we recommend the following minimum housekeeping:

WEEKLY OR AFTER EACH FIRING

1. Check element holders for possible contamination (pieces of clay, glaze, etc.). Replace if necessary. Contamination may cause abnormal element failure.
2. 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.

3. Make sure bottom and shelves are coated with kiln wash. Brush off or vacuum off any loose particles from the kiln shelves.
4. Check each shelf for cracks (you don't want a kiln shelf to break when loaded and cause a disaster in the kiln).
5. Check kiln sitter sensing rod for free and centered travel. Correct if movement is sluggish. Check rod and cone supports for straightness (replace if bent). Check supports and rod to make sure that only a thin layer of kiln wash coats them. Too much can interfere with proper operation. If any nonremovable materials accumulate replace the supports and/or sensing rod.
6. Plug up peepholes.
7. Observe thermocouples (if used) for excessive corrosion which could lead to thermocouple failure.

MONTHLY(15 FIRINGS)

1. Vacuum out kiln and element holders, repair any firebrick problems. **USE THE SOFT BRUSH ATTACHMENT ON YOUR VACUUM CLEANER.**
2. Check temperatures around kiln (at the high end of use).
3. Check kiln plug and outlet box for excessive heat during firing (at the high end of use).
4. Check kiln sitter adjustment.
5. Repair any firebrick chips or gouges.

SEMI-ANNUALLY (90 FIRINGS)

1. Check element resistance. Replace elements if resistance is more than about 9% of stated nominal resistance (see chart in back of instructions), or firing time has increased substantially.
2. Check tightness of case and retighten if necessary.
3. Check 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).
4. Check power connection terminals in the kiln for tightness. (Be sure to do this with the power disconnected (unplugged) for the kiln). If these terminals connections get loose heat can be generated and cause a fire.

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5. Check the operation of the Dawson Kiln Sitter/Timer. In particular make sure that the pivot point of the sensing rod does not get gummed up with material from the kiln that has condensed over time. This can cause the friction to increase and cause the sensing rod to be out of calibration (potentially causing an overfiring or misfiring). Consider replacing the entire Tube Assembly once a year or more often if you do have problems with condensation.

SAFETY FEATURES OF THE "DYNA-VENT" SQ SERIES

SAFETY KEY ACCESS:

Two keys are provided for operating the "Power Access Switch". This controls who turns the kiln on and prevents unauthorized use or dangerous "turn-on" by unauthorized persons. NOTE: Spare keys are available from L&L.

SAFETY AUTOMATIC LID SHUT-OFF LIMIT SWITCH

This switch is a limit switch that is designed to shut-off the power to the elements upon lid opening of 1" (adjustable by bending sensing rod that controls lid support surface). To test: operate with your lid open (also locked) and simulate action of lid manually.

SAFETY SPRING BALANCED LID

The lid is a rugged spring balanced type. Operating ease may be adjusted by means of the screw adjusters at the ends of the spring. If the lid seems to crack open too much upon high fire, add a simple weight to *the lid handle*.

SAFETY POSITIVE LID LOCK

When the lid is opened, it should be secured from closing or dropping by means of the hinge lock screw.

DAWSON KILN SITTER

L&L Kiln Mfg. Inc. cannot assume any responsibility for a kiln sitter. This item is purchased by us. We install it, and supply you with the material to test it, prior to doing your regular firings. (All kiln manufacturers purchase the kiln sitter). It is a safety back up device; however, they can and do fail. L&L does not recommend unattended firings. **PUT KILN WASH ON THE CONE SUPPORTS (NOT SENSING ROD)FOR ACCURATE CONE ACTION.**

OPTIONAL VENT SYSTEM

The "Dyna-Vent" SQ kilns series has been designed with a very unique venting system. This vents harmful fumes away from a kiln to the outside. Fumes are generated by carbonaceous materials in clay, china paints and glazes containing oils, glue from decals, and certain glazes and other miscellaneous products.

The vent system includes a collection system built into the SQ Kiln, a blower system and exhaust pipe that gets mounted to your wall and 15 feet of flexible connection duct. This method removes fumes and a great deal of heat during operation without affecting the firing of the kiln interior or by causing uneven firing chamber gradients or cold drafts. Operation of the system can be best determined by the kiln operator. Adjustment of the action is built in to suit your conditions. (NOTE: SEE VENT INSTALLATION DIAGRAM AND INSTRUCTIONS).

WARRANTY

See separate warranty for details on warranty. We can only be responsible for defects in the kiln itself. L&L purchases the shelves used in the kilns, and again, cannot assume any responsibility for defects or imperfections. Note that it is completely normal to experience hairline cracks in the firebrick. As the kiln heats up and expands this does not create a problem with the kiln. See the Troubleshooting Guide for more information.

Be sure to read and fill out the warranty form that is given with each kiln. Return the lower portion to our company, for filing purposes.

SERVICE FOR YOUR KILN

L&L kilns are designed to be as easy to work on and fix as possible. Most of our customers are comfortable doing their own service. The TROUBLESHOOTING GUIDE provides many helpful tips and suggestions. You can also call your local distributor, most of whom service the kilns they sell. If they don't they may be able to direct you to a local kiln service person. Also try your local yellow pages. L&L may also be able to recommend a local service person. If you can't find a person experienced specifically in kiln

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repair, then a good electrician is often more than adequate to repair most of the types of problems that commonly occur. Some of the more difficult problems occur within the instrument panel. The panel can be removed and sent to the factory for repair. We are happy to answer technical questions on the phone. **HOWEVER; PLEASE TAKE THE TIME TO READ THESE INSTRUCTIONS AND THE TROUBLESHOOTING GUIDE BEFORE CALLING THE FACTORY FOR HELP. ALSO WE CAN NOT GIVE YOU ADVICE OVER THE PHONE ON HOOKING UP YOUR KILN TO YOUR ELECTRICAL SYSTEM. YOU MUST HAVE A QUALIFIED ELECTRICIAN WHO CAN PHYSICALLY SEE WHAT YOUR SPECIFIC ELECTRICAL SITUATION IS.**

THEORY OF OPERATION

The SQ Series electric kiln is an insulated square top loading heating device designed specifically for firing of ceramics. Coiled elements made of a special high temperature alloy (iron-aluminum-chrome) are mounted around the perimeter of the kiln. The heating elements are designed to have a low watt density (radiating watts per square inch of element surface area) and good stretch ratio (ratio of stretched length to original coiled length). These are supported in hard ceramic element holders (a unique L&L feature). The insulation is a special hand picked lightweight firebrick (K23) which is 3" thick. This firebrick resists temperatures up to about 2450°F. It is highly insulating. At 2000°F the heat loss is 662 BTU's per square foot of insulating surface area. The heat storage (or the amount of energy it takes to heat up the brick itself) is 1970 BTU per square foot of brick. The case temperature, when the kiln has reached final set point and the firebrick is saturated with all the heat it will absorb, can be several hundred degrees. After the heating elements are turned off the insulation will slowly loose its heat and the kiln and ware will cool down. There are three separate zones of control in each SQ Model. In the panel are switches and contactors that control the time on that the elements get electrical power. In addition, there is a Dawson Kiln Sitter, which breaks power to the contactor coils. The kiln sitter uses a pyrometric cone to sense when you have reached your desired maximum temperature.

KILN FURNITURE

L&L supplies ceramic kiln furniture for all our kilns. Kiln posts of two crosssections are available. The larger, stronger posts are fluted square tubes approximately 1-1/2" square. The smaller posts are triangular posts. The square posts are available in 2", 4", 6", 8", 10" and 12" lengths. The triangular posts are available in 1/2", 1", 1-1/2", 2", 2-1/2", 3", 4", 5", 6", 8", 10" and 12" lengths. Three "post kits" are available which include a selection of posts. Kits for each kiln with a selection of posts and shelves are also available. See the price sheets for more information.

NOTE: Full shelves that are more than 20" square may crack when fired too quickly. 1/2 shelves do not have this problem. If in doubt order 1/2 shelves. Shelves are not warranted against cracking or warping.

REPLACEMENT ELEMENTS

Replacement Elements made by L&L Kiln Mfg., Inc. are designed for each individual model for long life and superior performance. Good element design is a complex balance of watt density, design voltage, stretch ratio, wire gauge, element length and material. It takes hours and years of experience to design a good element for each model. Do not expect an outside supplier with no interest in your kiln performance or long experience with L&L kilns to spend the necessary time to do this right. In the end you will not save money.

HEAVY DUTY "PROFESSIONAL" ELEMENTS
If your kiln model has a "C" suffix (i.e. SQ1818C) it has larger crosssection element holders. These new holders are capable of holding a larger diameter, heavy gauge element. These "Professional" grade heavy duty elements feature lower watt density than the standard elements and that, coupled with the heavier gauge wire, results in longer element life. If you are experiencing short element life because of your duty cycle (frequent firing, high temperature firing, long soak times) you should try these "professional" elements. They have the same ohm rating (resistance) as the standard elements. This means that the power rating of the kiln does not change. It also means that you can use them with the

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standard elements. One consideration with mixing the standard and “Professional” elements is that the “professional” elements will age more slowly than the standard elements and may have an effect on uniformity in the kiln. This is really no different than what you would experience when you change just one element and so have a new element (unaged) with older elements. The zone switches in the SQ Series will allow you to balance your system and compensate for this problem. Keep in mind that L&L can not keep track of which elements you have and that you must specify “Professional” elements when ordering. If you don’t specify “Professional” you will get standard elements.

ELEMENT HOLDERS

The new design of the Dyna-Glow element holders (on “C” suffix models) allows a larger diameter element to be used. This also makes it easier to remove old elements during replacement.

Any number of element replacements will not affect the hard ceramic element holders or brick walls, unlike other kilns where elements are pinned into the soft firebrick grooves. All pinning problems are eliminated and full firing space is always insured.

Dyna-Glow element holders secure and protect the elements so that the elements can not accidentally come out and cause damage to themselves, the kiln or your ware. Yet, replacement is simple.

Dyna-Glow element holders reflect the infra-red heat instantly into the kiln and therefore operate at a lower temperature relative to the internal kiln temperature. They require less firebrick insulation to be cut out. This means L&L Kilns are more efficiently insulated than other kilns of this type. This results in better, more accurate firing, lower electrical cost, lower case temperatures and, most significantly, longer element life.

Dyna-Glow element holders have a hard smooth surface. This allows the elements to expand and contract freely. No loose particles will fall in the kiln and ruin ware. Element life is longer because elements do not get easily snagged and bunched up (which causes hot spots and burn outs).

See the **TROUBLESHOOTING GUIDE** for information on how to replace elements and element holders.

POWER SUPPLY

VOLTAGE

SQ Series kilns are wired to work on either 240 Volt Single Phase, 240 Volt three Phase, 208 Volt Single Phase or 208 Volt Three Phase. Some non-US kilns (sold to countries with 380 Volt power systems) work on 220 Single Phase. It is important that the kiln be hooked up to the proper voltage. 208 volt kilns hooked up to 240 volt power supplies will generate too many amps. 240 volt kilns hooked up to a 208 volt power supply will heat up about 25% slower than they should and may not reach the higher temperatures. Although it is possible to hook a single phase kiln to one leg of a three phase supply it will cause an unbalanced load on your electrical supply. CHECK WITH A QUALIFIED ELECTRICIAN. It is best to get a three phase kiln for a three phase power supply. In addition to the power wires there is, on all L&L kilns, a ground wire. The ground wire is not used as a neutral (i.e. no electricity normally flows through the ground). BE SURE TO GROUND THE KILN PROPERLY USING THE GROUND WIRE.

ELEMENT VOLTAGE

The elements on all SQ Series kilns work on line voltage (208,220 or 240 volts). Elements may be wired in series or parallel depending on the kiln. See your wiring diagram.

POWER HOOK UP

From the wiring diagram, have your electrician install the proper receptacle and safety switch at your kiln location. Note that L&L has available 50 Amp NEMA 6-50F receptacles from stock if you can’t find them locally. Have receptacle placed in such a manner that the plug-in cord can in no way touch the body of the kiln. Some models hook up permanently to power supply. Be sure that your fuse ampere capacity is enough to carry the electrical load required. Also, ensure that your power lines are heavy enough to carry the required electrical load. Anticipate future needs (such as adding an extension) to save yourself from future electrical installation costs. If this is being used in

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an industrial application or environment be sure to follow lock out/tag out requirements and procedures. Be sure to ground kiln properly.

WHY PROPER GROUNDING IS IMPORTANT

All electrical appliances should be properly grounded. This can be to either a cold water pipe or proper system ground in your building. (NOTE: Grounding is normally provided in NEMA 6-50 type hook ups). If there is ever a short circuit (where the electricity flows through to the case or control panel and where you might touch it) you could be electrocuted if the kiln is not grounded. This is especially important with the high line voltage used on kilns. The higher the voltage the more easily it could flow through your body. In addition, because of the heat generated in a kiln, wires are subject to potential deterioration over time and expansion and contraction can move insulators and cause short circuits. **BE SURE TO REPLACE ANY DETERIORATED WIRES!**

ZONE SWITCHES

Each section of the kiln has an input control switch provided on the instrument panel. This type of switch will give you infinite control over the rate of speed of the firing. You can fire as slowly as you like, or as fast as the kiln is capable of attaining a certain temperature. Since this switch controls the amount of electrical current coming into the kiln, you can also maintain a desired temperature manually. (This would require a pyrometer system, as you must be able to know what degree or temperature the kiln is set for). At the desired temperature, you simply turn the switch knob until the needle on the pyrometer is stationary. This is the procedure to balance out the heat input against the heat loss. LOW means a 22 1/2% on time setting, MEDIUM means a 50% on time setting and High a 100% on time setting on the infinite control switch. 240 Volt Switches are L&L Part No L-J-INF0/30 and 208 Volt switches are L-J-INF0/20. They can not be interchanged! The voltage rating of the switch is marked on the switch itself.

REPLACING INFINITE ZONE SWITCHES

Often when an INFINITE ZONE switch burns out it exhibits overheating on the switch body at one of the spade connectors. When this occurs the mating female connector on the wire may not give good electrical contact if reused (due to oxidation

which acts an electrical insulator). a bad electrical connection can lead to localized heating at this point. To reduce the possibility of the new switch we recommend replacing the female connector with a new connectors. You may also need to replace the wires (check to see if they look oxidized or burnt). If the switch body looks O.K. then you normally do not need to replace the female spade connectors. To replace the female spade connector simply cut off the old connector with wire cutters, strip the end of the wire, insert the stripped end of the wire into the new female spade connectors and squeeze very tightly with a squeeze tool such as pliers or an electrical squeeze connector tool (available at the hardware store).

PILOT LIGHTS

There is a pilot light for each switch. The red light will flicker on and off at all switch settings except HIGH. This is a normal operating characteristic of the switch and actually shows that it is functioning properly. The switch and light operate just like an oven control on the average electric range. The switches are designed to maintain the temperature that you desire. When heat is required, the switch is on; when not required, it is off. The light simply shows when the switch is on or off. When your firing schedule calls for the switches to be set on HIGH, the switch will always be "on" and the light always stays illuminated. When the ware reaches maturity, and the kiln sitter turns the kiln off, then, of course, both switches and lights will be "off". The "pilot lights" or red lights are warning lights to guard against over-firing the kiln. At a glance you can check whether the kiln is on or off. If they are still on beyond the expected firing time, then check the kiln carefully.

KILN SITTER/TIMER

L&L Kiln Mfg. Inc. cannot assume any responsibility for a kiln sitter. This item is purchased by us. We install it, and supply you with the material to test it, prior to doing your regular firings. (All kiln manufacturers purchase the kiln sitter). It is a safety back up device; however, they can and do fail. L&L does not recommend unattended firings.

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PUT KILN WASH ON THE CONE SUPPORTS AND SENSING ROD FOR ACCURATE CONE ACTION. CLEAN OFF THE OLD WASH AND REAPPLY NEW WASH EACH TIME YOU FIRE.

Read your Dawson Kiln Sitter manual CAREFULLY AND COMPLETELY BEFORE USING YOUR NEW KILN. This control is the shut-off system for your kiln, and must be properly set to prevent over-fire of your kiln. With your kiln you have received two (2) 020 test cones for the initial test. You do not have to use 020 cones for the test but these are the ones that are provided.

In testing, you will use high heat only. When you are ready to test the kiln sitter, turn all of the switches to the highest point. The cone should go over within an hour, making the sitter cut off the kiln. An additional hour may be needed if you have a low voltage problem.

If, at the end of 2 hours, the kiln sitter has not turned off the kiln, turn it off manually. It probably needs an adjustment. Check the Dawson kiln Sitter book for instructions on how to make this adjustment. Be sure to check the action of the kiln sitter against cones that you put in the kiln. Be sure to keep your firing gauge for future adjustment.

NOTE: The Timer must be set so that it is not on "0" (Off). If it is the Dawson Kiln Sitter will not engage and the kiln will not turn on.

Be sure to read the section in the Dawson instruction book about Witness Cones. This is the most accurate method of determining temperature in the kiln.

FIRST FIRING OF THE KILN

On the first firing of the kiln fire it empty except for shelves and posts. Fire the kiln on low for two hours to bake out any moisture. Then set to medium for two hours and then increase enough to reach final temperature. Fire it to cone 5 (2150°F). This first firing will bake out the brick, oxidize the elements and act as a final test of the kiln's operation before real use. Keep note of how long it

takes to fire your first load under normal conditions. This will give you a benchmark to determine when the elements begin to "slow down."

SOAKING

Sometimes it may be desirable to "soak" at your end temperature for unusual glaze effects. This may be best accomplished by using a pyrometer system to make certain that you do not exceed your temperature. When the kiln reaches the desired temperature you may manipulate your switches to "hold" the desired temperature while observing your pyrometer readings. See "Dawson Kiln Sitter" instructions for soaking and cooling under power.

COOLING

If your kiln is cooling too rapidly for good glaze results, or if the cooling is so rapid that cracking occurs on certain large pieces, it is recommended to cool under power. This is accomplished by turning your switches to "low heat" for the initial cooling period, sometimes, turning to "medium heat" may be all right at first, before going to the "low" setting. Here again, the pyrometer system affords accurate and repeatable control over this important phase of your firing cycle. See "Dawson Kiln Sitter" instruction for "cooling under power" Another option is to purchase a Bartlett THP-600 program control from L&L which allows you to control your cool down.

OPTIONAL TRU-VIEW PYROMETER SYSTEM

There are three holes in the stainless steel casing already punched out, enabling the insertion and placement of the thermocouples to be as easy as possible. The pyrometer has one thermocouple (heat sensing probe); a pyrometer system has a thermocouple for each section of the kiln. (Order the P3 system for any of the SQ kilns; this has three thermocouples). If either one is ordered with the kiln, the thermocouple hole or holes is drilled through the fire brick section at our plant. If these items are ordered at a later date, you will only have to drill the thermocouple holes through the fire brick, which is quite soft. The pyrometer or pyrometer system is made so that it can be

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attached to the kiln or hung on a wall. After the installation of the thermocouples, in the case of the pyrometer system, place a match at each thermocouple, turn the switch to that particular thermocouple to see that it reads up-scale. Repeat for each thermocouple. If, at any thermocouple, the needle reads down-scale, reverse that particular thermocouple wire.

PYROMETER ACCURACY

You can check out the pyrometer against the cones: remember the most accurate readings are the cones. If your pyrometer is inaccurate do not make any adjustments, as the inaccuracy does not vary. When a cone goes over, simply note where the needle of the pyrometer is reading, draw a line at that point on the glass and mark the cone equivalent. From that point on, you are reading accurately with the cone.

THERMOCOUPLES

L&L Sells mostly Type K Chromel-Alumel thermocouples. These work by creating a slight millivoltage at the junction of the two dissimilar metals. This millivoltage varies proportionately with temperature. The thermocouple ends insert into a junction block. Into this junction block is also inserted precisely calibrated lead wire of varying lengths. The wires must touch with nothing in between and each wire must be of the correct polarity. See the Troubleshooting Guide for more information. Both standard 14 gauge thermocouples and heavier duty 8 gauge thermocouples are available from L&L. L&L recommends the 8 gauge thermocouples when you are firing frequently to higher temperatures. (8 gauge is a thicker wire size and will last longer than the 14 gauge).

KILN WASH

Kiln wash the floor of the kiln and the upper sides of the shelves only. Apply the kiln wash to the thickness of a post card or 1/16th of an inch. The only purpose of kiln wash is to prevent any glaze that drips from a piece from sticking to the floor or shelves. This saves both the piece and the floor or shelves. If dripping should occur, simply remove dripping and cover the spot with new kiln wash. Kiln wash is a powder mixed with water to a light creamy consistency.

LOADING KILN WITH GREENWARE

When placing greenware in kiln, all pieces may touch each other. Place lids on the pieces they go with when firing to bisque, this will prevent possible distortion. It is important to place tallest pieces on the center of the shelf and work outward to the shortest pieces. This will give you complete heat circulation. Be sure the ware is totally dry before firing (unless you use a very long drying cycle). Moisture in the work can cause cracking or even an explosion. Always use low and medium heat for one hour each, than high heat to maturity. The low heat can be used a great deal longer if desired, as its only purpose is to thoroughly dry the ware and to start the expansion of the ware to take place, so that the higher heat will not affect the ware. By using low heat, then medium heat, and finally high heat the danger of cracking or distortion is reduced. All switches are put on low heat at one time: this also is true for medium and high heat. Put peephole plugs into peepholes after the low firing is over. NOTE: HEAVY GREENWARE MAY TAKE LONGER TO DRY. EXERCISE CAUTION!

LOADING KILN WITH GLAZE WARE

When placing ware into the kiln to be glaze fired, we suggest that the pieces should be placed 1/2" apart, so that when they are heated and expanded (which all pieces do when being fired) there is no danger of them touching each other. If pieces are placed too close together, they may touch and stick to each other, thereby ruining both pieces of ware.

Except for placing ware the proper distance from each other and stiling the ware for heat circulation, follow the instructions for the firing of greenware. It is still important to go through low, medium, and high heats to get perfect results. Be certain when placing ware in the kiln, that no piece in expanding, can touch the rod of the kiln sitter, as this would prevent the kiln sitter from turning off the kiln even though the cone bends properly.

SPEED OF FIRING

Although the kiln may be capable of firing relatively fast this does not mean you should fire it as fast as it is capable of firing. The speed of firing

SQ INSTRUCTIONS

will depend on what you are trying to accomplish. Check with the glaze or clay manufacturer or supplier as to a recommended firing cycle.

OPTIONAL AUTOMATIC CONTROLS

A variety of automatic temperature controls are available for the SQ Series. Please request separate bulletin for these controls. They can be added at any time. If one of these controls is included with your purchase you will receive a separate instruction manual for the control.

REMOVING THE INSTRUMENT PANEL FOR REPAIR

REMOVING THE WHOLE PANEL

1. Turn off power to the kiln. either unplug the kiln (if a plug type unit) or turn off power from your disconnect (and lock out if possible).
2. You will typically want to remove the Dawson Kiln Sitter along with the control panel without disconnecting the Dawson from the control panel. To do this loosen the screws that hold the dawson to the kiln case and remove the Dawson from the kiln.
3. Remove the screws that attach the instrument panel from the kiln body.
4. For those models that are direct power attachment disconnect the power wire from the power connection block at the bottom of the control panel.
5. Disconnect the wires to the element connections and mark and identify them for latter reattachment.
6. The panel, if it is to be sent back to the factory, it should be carefully packaged in bubble wrap and properly boxed and sent to our shipping address. Be sure to alert us before sending a panel and be sure to include a note about the problem you are having.

SPARE PARTS

If you are operating in a production environment it is imperative that you stock certain spare parts if you must prevent down time. Do not rely on L&L to be your emergency supplier. While we do our best to ship parts quickly and to keep all parts in stock we can not be responsible for your

downtime. We recommend the following parts be kept on hand:

- Complete set of elements
- Complete set of fuses (if used)
- One Zone Switch
- One power contactor
- Spare program control (if used)
- Spare thermocouple (if used)
- Several element holders
- 1/2 pint firebrick cement
- 1/2 pint grout
- 1/2 pint facing

TROUBLESHOOTING

See the separate **TROUBLESHOOTING GUIDE** included with these instructions. **BE SURE TO READ THIS ALONG WITH THE SUGGESTIONS FOR IMPROVING ELEMENT LIFE. THERE ARE MANY HELPFUL POINTERS AND SUGGESTIONS.**

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ELECTRICAL SPECIFICATIONS

MODEL	INSIDE SQUARE	INSIDE HEIGHT	QTY OF CIRCUITS	VOLTS	PHASE	WATTS	AMPS	POWER SUPPLY REQUIRED (AMPS)	POWER CORD	OHMS PER ELEMENT	QTY OF ELEMENTS	QTY OF FUSES	QTY OF CONTACTORS
SQ1818 (240/1)	18"	18"	3	240	1	6816	28.4	40	72" 6-50P	12.7	6	0	3
SQ1818 (208/1)	18"	18"	3	208	1	6816	32.7	40	72" 6-50P	9.5	6	0	3
SQ1818 (240/3)	18"	18"	3	240	3	6816	16.3	30	Direct Hook Up	12.7	6	0	3
SQ1818 (208/3)	18"	18"	3	208	3	6816	18.9	30	Direct Hook Up	9.5	6	0	3
SQ1827 (240/1)	18"	27"	3	240	1	8424	35.1	50	72" 6-50P	6.80	9	0	3
SQ1827 (208/1)	18"	27"	3	208	1	8424	40.5	50	72" 6-50P	5.10	9	0	3
SQ1827 (240/3)	18"	27"	3	240	3	8424	20.2	30	Direct Hook Up	6.80	9	0	3
SQ1827 (208/3)	18"	27"	3	208	3	8424	23.3	30	Direct Hook Up	5.10	9	0	3
SQ2418 (240/1)	24"	18"	3	240	1	10000	41.6	60	72" 6-50P	34.6	6	0	3
SQ2418 (208/1)	24"	18"	3	208	1	10000	48.0	60	72" 6-50P	26.0	6	0	3
SQ2418 (240/3)	24"	18"	3	240	3	10000	24.0	40	Direct Hook Up	34.6	6	0	3
SQ2418 (208/3)	24"	18"	3	208	3	10000	27.7	40	Direct Hook Up	26.0	6	0	3
SQ2427 (240/1)	24"	27"	3	240	1	13000	54.0	80	Direct Hook Up	39.9	9	6	3
SQ2427 (208/1)	24"	27"	3	208	1	13000	63.0	80	Direct Hook Up	30.0	9	6	3
SQ2427 (240/3)	24"	27"	3	240	3	13000	31.2	50	Direct Hook Up	39.9	9	6	3
SQ2427 (208/3)	24"	27"	3	208	3	13000	36.3	50	Direct Hook Up	30.0	9	6	3

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FUSES AND FUSE BLOCKS: Units over 50 amps are fused with branch circuits. The fuses are 30 amp NLN or NON fuses (L&L Part No L-GFS30/NL).
NOTE ABOUT 220 VOLTS (NON-UNITED STATES) AND OTHER NON STANDARD VOLTAGES: "Overseas" voltage is typically based on 380/3/50 volts with 220 Single phase being used. The 220 volts is distinctly different from US 240 single phase and L&L has designed special elements for this condition. In addition there are some 380/3 and 460/3 "Y" connection kilns that have been made. Check your nameplate for voltage. BE SURE TO SPECIFY IF THE ELEMENTS ARE SPECIAL.

HEAVY DUTY ELEMENTS: On SQ Models with the "C" Suffix (i.e. SQ1818C) it is possible to install heavier duty "Professional" grade elements. These have the exact same ohm rating as the standard grade elements. The wire diameter and coil diameter are larger than the standard grade elements and the watt density is better. They can be interchanged with standard grade elements.

NOTE ABOUT MODEL SQ1518: Although this model has been discontinued parts are still available for it. Call for element ohm information.