

OPERATING YOUR JEN-KEN GLASS KILN

G, GS AND GS-E GLASS KILN SERIES

SETTING UP THE KILN:

Place your kiln in an open area away from all flammable surfaces, including walls and floors. If your floor is not concrete, metal stands may be purchased through Jen-Ken Kilns or concrete blocks may be used to raise your kiln above the floor at least 8 inches. See "Choosing a Location" in the beginning of this manual.

Make certain the kiln sits level, so that your hot glass will not have a tendency to run. The use of a level on top of the kiln from front to back and side to side will help ensure the kiln is level.

Vacuum the kiln while cool to remove brick dust from shipping. Use the soft brush attachment so that the brick will not be damaged. Vacuum shelves, lid and lid groove and the floor of the kiln periodically to remove particles that might fall on the glass during the firing.

KILN SWITCHES

JEN-KEN GLASS KILN G, GS & GS-E series are supplied with Infinite switch (es). These switches are marked LO 2 3 4 5 6 HI. Low will yield 7% to 20% power and high will yield 100% power. The numbers in between will cause the element(s) to maintain the temperature correspondent to that number. These switches are reliable and used in hundreds of different appliances because of the design and the unique operating principles.

Example: If the kiln switch is on #4, the kiln will maintain a temperature relative to the power given for that setting. It will cycle the element on and off to maintain that temperature. The setting #4 cannot be given in degrees because of the varying voltages and the kiln sizes. A pyrometer and a log book will help when figuring the proper settings at your location.

- Remember that low is low power, high is full power and the numbers in-between will cycle on and off.

HOW AN INFINITE SWITCH WORKS

An Infinite Switch turns clockwise or counter-clockwise. It is equipped with three indexing positions: "HI-OFF-LOW, also #2,3,4,5 & 6." In the high position the switch is energized continuously. At the other settings, it delivers the selected level of input under the control of a bimetal timer strip. A double line disconnect is provided when the control is in the "OFF" position. A permanent magnet provides snap action

of contacts. An Infinite Switch is a bi-metal input regulator. It operates on the same principle as a thermostat. Whenever the switch is turned on it closes a contact within the switch (which completes the circuit) thereby sending power to the elements and the bi-metallic control strip. It is the bi-metallic strip consisting of two metals (phosphor and bronze) which have different rates of expansion and contraction that causes the switch to cycle. As the strip becomes sufficiently heated, it will bend and open the contact points so current ceases to flow through the switch. This action causes the element to stop heating. As the strip cools, it relaxes enough that the pull from the magnet positioned opposite the strip comes into play with a snap action and the contacts close. This re-energizes the element and the bi-metallic strip causing the cycle to repeat.

CYCLING OF AN INFINITE SWITCH

When an Infinite Switch is turned on, it will automatically cycle on and off in the 2,3,4,5 & 6 positions. This regulates the amount of power the elements receive. The cycling of the switch causes a clicking sound and occasionally a small spark with the switch as the contact is broken.

LOW Position - This position should have the power on 10% to 30% of the time. As the switch is turned to higher numbers it gradually increases the amount of time the switch is on and therefore gradually increasing the amount of heat the elements generate.

#4 Position - This position is midway between low and high. At this position, the switch should be on about 50% to 60% of the time.

#6½ Position - This position is just before the "HI" indexing position. At this position, the switch should be on about 70% of the time.

High Position - At this position the switch is on and will not cycle off. It will deliver full power to the elements continuously. **WARNING:** DO NOT ALLOW kiln to exceed 1800°F Max temperature.

WHAT CAUSES HEATING VARIATIONS

The voltage available to the kiln will affect the switch calibration. We assume that your kiln is receiving full 240v volts. If the actual voltage is more than 240 volts, the amount of time on will be significantly decrease. This does not mean the switch is out of calibration, but that the switch is reacting to the voltage being applied to it. Low voltage will also affect the switch's performance (but in the opposite manner). The switch will be on more than is normal. This can cause the switch to be out of its set-range of percentages.

SLOW HEATING FROM ONE KILN TO ANOTHER

Some customers find that one kiln may fire more slowly than another. A standard firing time to one customer may be too long for another. This

can be related to kiln size and load or to your varying electric current. Electric current can be restricted by the following that would slow firing times:

- Gauge of house wiring too small
- Available voltage is low
- Switch not calibrated
- Loose wire connection in kiln control panel
- Loose wire connection house wiring or in receptacle

If the problem is not the switch or the electric supply, the firing time can be shortened by turning up the heat. If you usually start at Low and move to #1 try starting at #1 and move to #2 and so on. Remember identical kilns can fire differently.

THE POPPING SOUND

If dust makes its way to the electrical contacts in the switch, a popping sound may be heard when the switch is on. The dust causes an arc of electricity as the contact touches. This sound does not affect the kiln performance or the switch.

PILOT LIGHT

All JEN-KEN G, GS & GS-E Series with Infinite Switches come with a power-on light called a pilot light. It is a red or green neon light that is very long lasting. If the kiln is working properly, but the light is no longer working, check the wiring for loose connections or a bad switch.

LID PROP

The lid prop is a useful mechanism that will enable the kiln to be vented for moisture and fume removal on the temperature rise, usually to about 1000°F. Then it can increase the cooling rate once the glass has past the annealing and critical zone.

WARNING: Do not touch the lid handle during firing with your bare hands. A hot handle looks like a cold handle. Use a good pair of high-temperature (Kevlar) gloves if you are going to use the lid prop.

WARNING: Do not reach into a firing kiln. Do not insert any object into a firing kiln.

LOADING THE KILN

The kiln shelf needs to be placed on posts that rest on the bottom of the kiln. The posts allow heat and air to circulate around the shelf to uniformly heat the glass on the shelf. The post should be a minimum of ½" high. One inch posts are standard for larger kilns. Taller posts can be

used if the project requires more top heat thus putting the work closer to the lid elements.

It is NOT recommended that more than one shelf be used in a glass kiln during a firing. If small pieces such as jewelry are being fused then two shelves may be used if a third shelf is used as a baffle to redirect and absorb the heat from the lid element. This process has worked for many and may take trial- and-error to get the best spacing with the shelves and posts.

Follow the recommendations of the glass manufacturer or your dealer on how to fire the glass you are using. Glass type, thickness, size and annealing techniques can be widely different. This is an art and there is no firm set of rules.

WARNING: NEVER LEAVE A KILN FIRING UNATTENDED!!!

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TIP SHEET

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When the kiln is first set up, you can assign approximate temperature equivalents to the numbers on the Infinite Switch(es). Kilns can fire different because of variables like voltage differences, room size and ambient temperature.

Make a simple chart to list temperatures for the given switch numbers. Then place a shelf in the kiln on posts, close the lid and perform the following steps:

- Turn the switch to LO Allow the temperature to rise and level off. Write down the temperature.
- Turn the switch to 2 Allow the temperature to rise and level off. Write down the temperature.
- Turn the switch to 3 Allow the temperature to rise and level off. Write down the temperature.
- Turn the switch to 4 Allow the temperature to rise and level off. Write down the temperature.
- Turn the switch to 5 Allow the temperature to rise and level off. Write down the temperature.
- Turn the switch to 6 Allow the temperature to rise and level off. Write down the temperature.
- Turn the switch to HI Allow the temperature to rise to 1500°F, noting time took to reach that temperature.

Once the kiln has reached 1500°F, turn the switch(es) to off, time the amount of time it takes to cool to 1100°F, 1000°F, 900°F, 800°F and 700°F. This will give you the natural cooling speed of the kiln (and will be helpful later) knowing if the kiln needs to be powered down or if the kiln can cool and anneal the glass project on its own.

One other quick reference test is to start the kiln when cold. Turn the switch(es) on HI. The kiln will heat rapidly. Write down the time the kiln takes from room temperature to 500°F, then 1000°F, 1250°F and 1500°F. The rate of rise information is valuable in letting you know what your kiln can do. You will be able to calculate the rate of rise overall and the rates from say 1000°F to 1500°F. The kiln will heat faster from room temperature to 500° than it will from 1000°F to 1500°F.

An Infinite Switch works by time, not temperature. This means that the switch has the ability to turn on and off from numbers 2 to 6½, but that the switch does not know what the temperature is. If the kiln is turned to #2 (for example) and left, the kiln will heat to a temperature then it will soak there for a time. It is important to know that after awhile the kiln brick will absorb heat and then the temperature will begin to rise again. A setting of #2 (for example) will change if left alone.