

Frequently Asked Questions (FAQ) about the *AutoMate II* AUTOMATIC KILN SWITCH



1. What does it do?

When firing ceramic kilns, it's usually necessary to regulate the heat-up rate ... especially during the early stages of the firing, where the kiln's heating capacity is the greatest. Kilns are therefore usually equipped with a switch (or switches) that permit the user to adjust the heating rate. Ordinary kiln instructions direct that the firing should begin with the switches set at "low", then an hour or two later they are turned up to "medium", and after another hour or two they are set at "high", where they are left for the remainder of the firing.

The AutoMate II acts like an ordinary "infinite control switch" that turns itself up! This is purely a convenience mechanism, which permits the user to set the kiln up, start the firing, and then ignore the process until the scheduled completion time. The AutoMate II starts at zero, and gradually turns up the heat to 100% on during a timing period that the user may set ... from zero to about 10-hours.

When used in combination with an inexpensive shut-off device, such as the "KilnSitter" (W.P.Dawson Inc), a very low cost, fully automated kiln becomes a practical reality!

2. It this yet another shut-off device?

No. The AutoMate II is strictly a turn-up device, which relieves the user from having to return to the kiln every few hours to to adjust switches. The user must still be available at the end of the firing to turn the kiln off, or a separate shut-off device must be installed on the kiln.

3. When I turn on and set the AutoMate II, nothing seems to happen. Why not? And how do I know if the thing is even working?

The AutoMate II's very simple circuitry is the key to its very reasonable \$49.95 price ... in other words, there's always a trade-off between "smarts" and cost.

To keep things simple, the AutoMate II regulates the heating process by establishing a fixed cycle time ... say 30-seconds ... and then adjusting the "on-time"/"off-time" ratio within this timing period. For example, to apply 50% of the heating capacity, the switch turns the heaters on for 15-seconds, and keeps them off for 15-seconds. This method is called "time proportioning" or "duty-cycle proportioning".

As a practical matter, nothing much happens when as the kiln's heating rate is increased from 0% to about 15% ... in other words, this doesn't produce any perceptible temperature rise. Switching the heaters on and off for short little blips in this zone would therefore simply be a waste of mechanical action. The AutoMate II therefore doesn't actually begin the switching process until its output has increased to 10% (approximate).

The initial "dead time" varies directly with the TURN UP TIME setting ... about six-minutes per hour. The "TIMING" light flashes at a rate which is proportional to the turn-up rate, and may be taken as an indication that the AutoMate II is alive and operating properly, even though the "HEATING" light is, as yet, inactive.

4. Can I bypass this "dead time" and get the thing going? ... I'd like to know for sure that its working before I leave it!

Yes ... you can run the AutoMate II through the "dead time" by simply turning the "TURN UP TIME" switch to the "SET" position, until the "HEATING" light flashes for the first time (about ten seconds) ... then return the dial to the desired turn-up time.

(Technically, this reduces the turn-up time by 1/10th of the period you've chosen but, as explained above, since nothing really happens during this initial 10% anyway, this is inconsequential and there's really no reason to compensate for it.)

5. Is there a "Pre-firing Check-Out" procedure for the AutoMate II?

No, but if you wish to check it out, do this ...

Turn it on and move the TURN UP TIME knob to the set position. In about ten seconds the HEATING light should blink for the first time. In the SET position, the AutoMate II turns itself up about 10% per second, so each time the HEATING light blinks again, it'll remain on a little longer ... until the tenth time, at which point it should come on and remain on. After several more seconds, the TIMING light should go out, indicating that the switch has gone through its timing period and has turned the kiln full-on.

Each time the HEATING light comes on, you may also hear your heating relay click, or your heaters operating.

6. I have a spare unit. How can I check it out without installing it on the kiln?

You can operate the AutoMate II kiln switch from your 110v service by connecting a power cord to terminals "A" and "C" and plugging it into a wall receptacle. Then do the above check-out procedure. There will be no power on the output terminals, so you can connect a continuity tester (ohmmeter, etc) to terminals H1 and H2 if you wish to check the operation of the relay contact.

Since the AutoMate II uses a dual-primary transformer, you might want to try it with the power cord connected to terminals "B" and "D" to make sure that the second half of the primary is good.

7. I heard that the AutoMate kiln switch wasn't very reliable. How reliable are these switches? What usually goes wrong?

The original "AutoMate I" switch was a "transformerless" design, which generated a lot of heat all by itself. When mounted directly on kilns, this early model had problems withstanding the high ambient temperatures that resulted. Unfortunately, its failure rate was high enough to force a redesign ... hence the next generation AutoMate II.

The AutoMate II has earned a reputation that is just the opposite. Very few of these units are returned, and of those that are, only a fraction have bona fide defects in materials or workmanship. Fewer than 10% of the units shipped are ever returned. Of these, some are "false pulls", some are damaged, some have burned-out relay contacts, and some do have circuit failures. The percentages are about evenly split ... 1/4th of the returns in each category.

8. I notice that the relays you use on the AutoMate II are rated for 30-amps. How come you rate your unit at only 15-amps?

We respectfully disagree with the engineer's who design and spec the relay ... which is available from a variety of manufacturers. Even if we agreed that the relay could switch 30-amp circuits reliably, the connector tabs used on the AutoMate II are only spec'd for 15-amps, so that limits the current specification for our product. However, we've also found from experience that these relays do not hold up as well as we'd like when operated at the 15-amp limit, as they often are on small kilns operated on 110v power. Although we don't have any information regarding how long they've lasted, we do notice that most of the units returned with burned-out contacts a pulled off such kilns.

9. What about using mechanical "contactors" and mercury relays?

For kilns drawing more than 10-amps, this is the way to go. Even the largest mechanical power relays (contactors) require less than 1-amp through the AutoMate II's contacts, so they'll last practically for ever.

Some users object to the harmless sparking and "clicking" and "clacking" that these big relays do, and may therefore prefer mercury relays. Technically, mercury relays present a disposal problem and have a potentially "hazardous" failure mode (excessive coil heat sometimes causes the capsule containing the mercury to pressurize and rupture). But when used properly, they can provide reliable service over the life of the kiln.

The solenoid coils of mercury relays tend to be much more highly inductive than those of definite purpose contactors, and might produce erratic operation. If the AutoMate II "chatters", the problem is usually easy to correct by connecting a "snubber" at the contactor's coil connections. Use a .01uf to .1 uF 400v disc or film capacitor connected in series with a 100-ohm 1/2-watt resistor, and connect this network between the coil terminals as shown on the AutoMate II's instruction sheet.

10. I set the AutoMate II for a 4-hour turn up and it actually took about 4-1/2 hours to reach the full-on point. It doesn't seem to be very accurate, especially at the longer settings!

The AutoMate II is designed as a practical low-cost solution to the inconvenience of having to regulate the kiln's heat-up rate. The TURN-UP TIME dial is graduated in units from "0" thru "9+", and these loosely refer to "hours" ... although that isn't indicated on the dial plate. This is intentional, since we didn't intend anything more than a loose correlation.

Our production calibration procedure uses a special computer program to select three key component values which optimize the timing accuracy with the TURN UP TIME set at "5" ... so the switch should be most accurate at this setting. Even here, however, the tolerances of practical electronic components usually preclude "exact matches", so the accuracy at this setting may not be perfect.

The TURN UP TIME graduations should be viewed as loosely representing "hours", then used as relative marks as experience proves what the exact timing at a particular setting really is.

11. I pulled the knob off, and it wouldn't go back in. Then I noticed that it wasn't a pull-off type knob. What do I do now?

Forcibly pulling the knob off without loosening the set screw that attaches it damages the control, which then requires factory repair. Send it in and we'll be happy to fix it for you.

12. I have an older model ... a little plastic box type thing. Can I replace it with the AutoMate II model?

Yes. There are a couple of minor wiring differences, so be sure to ask us for the special instruction sheet that'll show you what they are.

The AutoMate II is also much easier to mount than the original model, although this didn't make retrofits easy since it requires that the holes provided in the kiln for the original unit be expanded to a rectangular cut-out for the new unit. A low cost nibbling tool available at your local Radio Shack store can make easy work of this, however.

13. I don't see any indication that these units are UL or CSA rated. Are they ... and if not, why not?

The power transformer and the output relay used in this product, parts which interface it to the electrical power service, are UL and CSA rated. The control itself is not UL/CSA listed, recognized, or certified.

Part of this is practical and part is philosophical.

Underwriters usually recognize only fixed and settled designs, any significant change or variation in which results in a requirement for reevaluation. The production of low volume, cost sensitive products requires that a high level of flexibility be maintained regarding choices of component types and sources ... a situation that directly conflicts with underwriters' rules. Frequent reinspection forced by such minor issues are simply impractical.

The issue of value is also relevant. Underwriting products involves a significant cost which is, of course, passed on to the buyers of those products. If we choose to involve a third party in our business affairs at a cost to you, we have the ethical and practical

obligation to assure that you are receiving some value for that part of the price that represents the cost of their participation.

Everyone has probably observed UL, and perhaps even CSA, stickers on some of the most inexpensive and shoddy electrical merchandise in their local discount store. On inspection, the label will say only that the item is "listed" or "recognized". It does not say "certified" or "approved". It does nothing to really assure quality and safety and, in fact, these organizations specifically disclaim any such inferences.

The underwriting practice has therefore become little more than a marketing game or, in the case of the Canadian CSA requirements, a method primarily designed to favor domestically produced products by creating trade barriers to imports.

14. Mine's broke ... is it fixable?

Send it in. There's no need to call for prior authorization. Just include a short note describing the problem and giving your return address (physical address, please, not a PO Box number).

AutoMate II units are covered by a 1-year warranty and will be repaired or replaced without charge during this period. When the warranty no longer applies, units are repaired or replaced at a flat-rate charge of US\$24.95

15. If you would like to discuss any of the above, or if you have other questions, please contact us. We are ...

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