

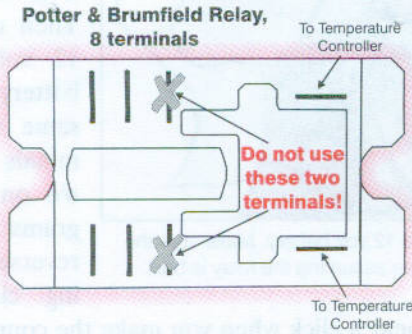
# Relay Replacement Guide

## 12 Volt Coil Relays on Paragon Digital Kilns

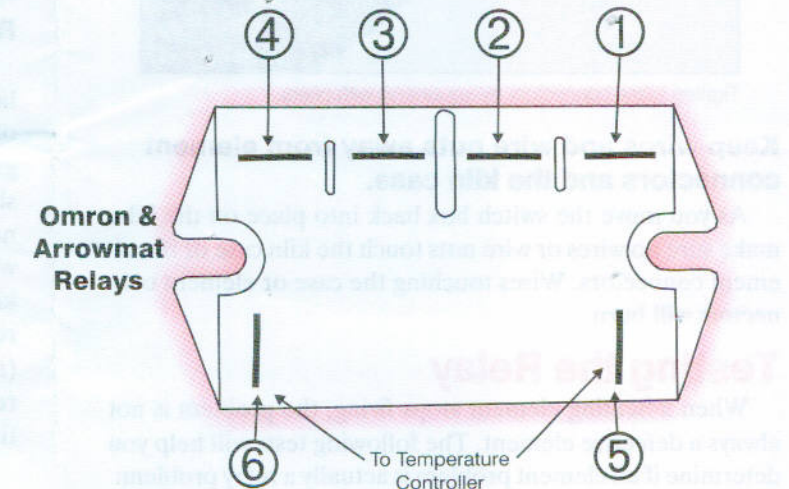
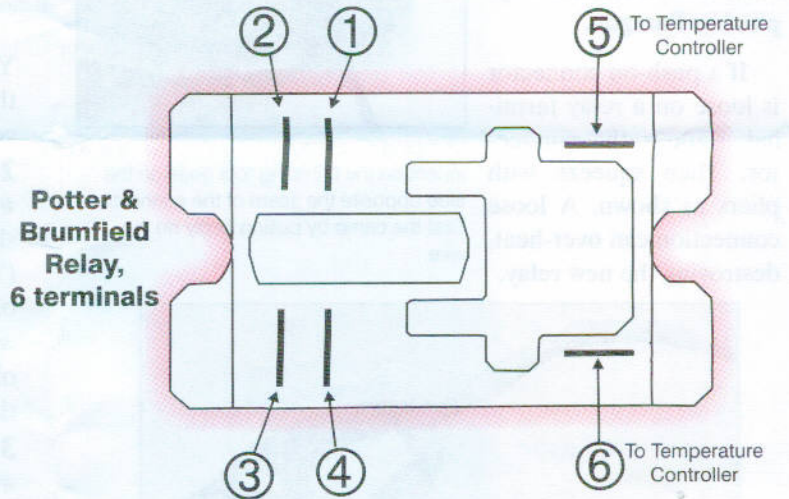
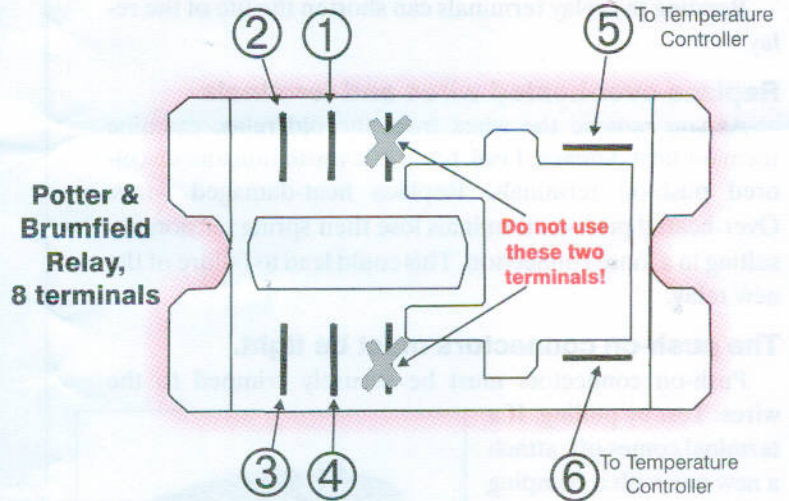
### Read This First!

**IMPORTANT!** Do not use the extra terminals on the Potter & Brumfield 8 terminal relay.

These terminals are shown crossed out in the diagram below. We ship these relays with covers over the extra terminals. CAUTION: If you use the crossed out terminals, your elements may turn on when you apply power to the kiln.



### Relay Comparison Chart



### When Your New Relay Does Not Match the Old One

Paragon has used several brands of interchangeable, 12 volt coil relays over the years. For this reason, a replacement relay may not be of the same type as the relay in your kiln or furnace. If this is the case, use the Relay Comparison Chart at right to transfer the wires from the old relay to the new one.

#### Terminal Numbers

A terminal on one relay diagram corresponds to a terminal of the same number on the other diagrams. Transfer the wires one at a time from the old relay to the new one.

Ignore the terminal numbers stamped into the plastic relay bodies. The numbers on this chart do not correspond with them.

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## How a Relay Works

The relay is a switch, which is triggered by the kiln's temperature controller. A 12 volt signal from the controller energizes an electromagnet inside the relay. This closes the switch, sending power to the elements.

## Replacing a Relay

### Avoid bending the relay terminals.

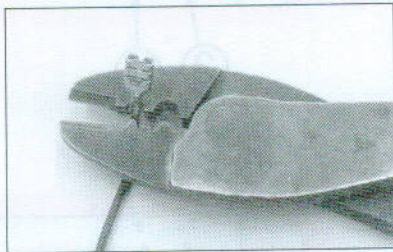
Bending the relay terminals can shorten the life of the relay.

### Replace over-heated wires and terminals.

As you remove the wires from the old relay, examine them for heat damage. Look for brittle insulation and discolored push-on terminals. Replace heat-damaged wires. Over-heated push-on terminals lose their spring tension, resulting in a loose connection. This could lead to failure of the new relay.

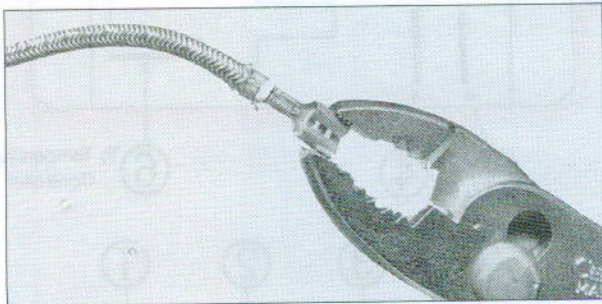
### The push-on connectors must be tight.

Push-on connectors must be securely crimped to the wires. Test by pulling. If a terminal comes off, attach a new one with a crimping tool. Use terminals supplied by Paragon.



Crimping a new push-on connector: the indent on the crimping tool goes on the side opposite the seam of the connector. Test the crimp by pulling firmly on the wire.

If a push-on connector is loose on a relay terminal, remove the connector. Then squeeze with pliers as shown. A loose connection can over-heat, destroying the new relay.



Tighten loose connectors by squeezing with pliers.

### Keep wires and wire nuts away from element connectors and the kiln case.

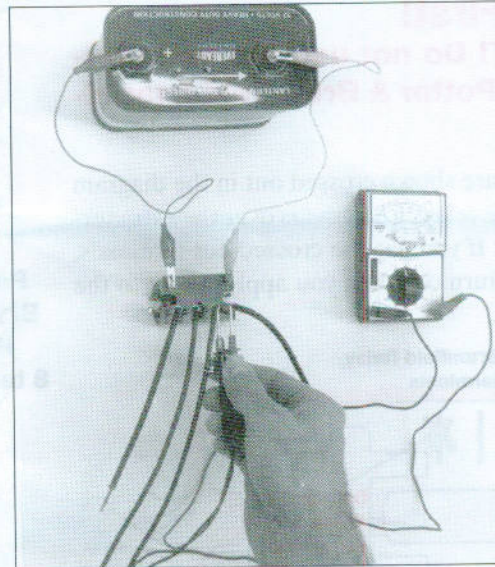
As you move the switch box back into place on the kiln, make sure no wires or wire nuts touch the kiln case or the element connectors. Wires touching the case or element connectors will burn.

## Testing the Relay

When a heating element stops firing, the problem is not always a defective element. The following tests will help you determine if an element problem is actually a relay problem:

## Relay 12 Volt Battery Test

You will need an ohmmeter, 12 volt battery and 2 clip wires. **WARNING:** You must disconnect the controller-to-relay wires to test the relay(s) with a battery. Leaving the wires connected could damage the controller.



Testing a relay with a 12 volt battery. Make sure the battery is good before assuming the relay is bad.

**1 UNPLUG** kiln/disconnect the power and remove switch box. Find the two wires going from the controller to the relay you are testing. Disconnect these wires from the relay. Then connect a 12 volt lantern battery to the same relay terminals (#5 and #6 on the diagrams shown on reverse side) using clip wires.

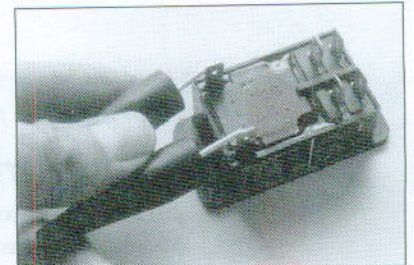
You should hear a click when you make the connection. If there is no click, the relay is probably defective. Make sure your battery is good before assuming the relay is bad.

**2** Touch ohmmeter leads to relay terminals marked #1 and #2 in the diagrams. With the battery still connected, you should get a continuity reading (0 ohms) on the ohmmeter. (This is the same reading you would get if you touched the ohmmeter leads together.) If you get a no-needle movement when the battery is connected, replace the relay. Place the ohmmeter leads on relay terminals marked #3 and #4 on the diagrams and test the same way.

**3** If the ohmmeter reading at terminals #1 and #2, and then #3 and #4, is 0 ohms when the battery is removed, the relay contacts are stuck. Replace the relay.

## Relay Coil Test

Disconnect the controller-to-relay lead wires from the relay (terminals #5 & #6 in diagrams, reverse side). Touch ohmmeter probes to the same two terminals on the relay. A good relay reads about 80 ohms. A defective relay with a short in its electromagnet will read 0 - 2 ohms, which will blow the kiln's switch box fuse. A relay with an "open" (no-needle movement) reading is also defective.



Testing a relay coil with an ohmmeter.