Paragon KILNS

The Easy Paragon Kiln Electrical Test – Ohmmeter Readings

An easy way to check electrical connections of a kiln is to use an ohmmeter. The ohms of a heating element is a measurement of the resistance of the heating element. A heating element will have the same ohms in the kiln factory, your shop, your customer's home, or any other part of the world. There will be a very slight difference in the readings of different persons—some ohmmeters are more accurate than others and some people read more accurately than others. The heating element is the power load of the kiln, and by measuring the power load possible for each switch, you will be checking all electrical connections from the power supply cord set through the element.

We do not recommend the use of an ammeter for checking kilns. Amperes are determined from ohms and volts and should not be used to check the electrical system of a kiln since volts can vary greatly from one location to another—even in the same building. Use only an ohmmeter for checking Paragon electric kilns.

Ohmmeter readings for two kilns of the same model will vary slightly depending upon the use of the kiln. One brand of heating element wire will require slightly different resistance in the elements than another brand of wire to produce the same firing results. This difference will produce slightly different ohm readings for the elements. You should therefore be concerned with the pattern formed by your readings for each switch rather than whether you read 7½ or exactly 8 ohms on your meter for a given reading. For instance, if your meter gives a reading of 7½ ohms for a position showing 8 ohms in the chart and you also get a reading of 15 ohms for a position showing 16 ohms in the chart, you are getting the same pattern.

The Basic Patterns

There are six basic patterns of ohmmeter readings, which can be easily recognized from the following electrical wiring:

1. 120/240 volt 3-pole (2 hot lines + line neutral), 4-wire grounding plug. Wired in parallel from element to 4-position rotary switch.
A-28B, A-29B, A-99B, A-100B, AA-10B, A-24B, A-123B, A-81B, A-82B, A-88B, A-77B, A-66B, H-16A, H-16B, H-17A, H-17B

2. 120/240 volt 3-pole (2 hot lines + line neutral), 4-wire grounding plug. Wired in series from element to 3-position rotary switch.
AA-8B, AA-6B, K-6A, K-6B

3. 240 volt 2-pole (2 hot lines only), 3-wire grounding plug. Wired in series from elements to stepless control switch.
E-14A, E-14B, and A-series kilns ending in "E" for the European voltage of 240 volts

4. 120 volt 2-pole (1 hot line + line neutral), 3-wire grounding plug. Wired in parallel from elements to 4-position rotary switch.
A-55B, A-11-9B

5. 120 volt 2-pole (1 hot line + line neutral), 3-wire grounding plug. Wired in series from elements to stepless control.
A-11-6B, X-14J, XX-4, E-10, E-10B, E-13, E-13B, Q-11A

6. 120 volt 2-pole (1 hot line + line neutral), 3-wire grounding plug. Wired in series from elements to power supply cord.
E-9A, E-9B, Q-11P

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The Ohmmeter Reading

1. Unplug the power supply cord set and place it in a position that allows the blades of the attachment cap to be easily reached by the leads of the ohmmeter.

2. If the kiln is equipped with a limit timer, set clock for one hour before operating the kiln sitter. If the kiln has a kiln sitter, raise the weight, press in the plunger, and then gently lower the weight so that the kiln sitter is on manual control.

3. Turn all kiln switches to OFF position. Only one (1) switch is to be checked during a reading. Be certain to leave each switch in the OFF position after reading has been made.

4. Check meter and the connections of meter leads by measuring the ohms of the 10 ohm resistor attached to one lead. This meter check is to be made only after the meter is in position to be read.

5. Touch one lead of the meter to the grounding blade (round shape) of the power supply cap and the other lead to the kiln jacket to give 0 ohms reading.

6. Touch one lead of meter to the grounding blade of the attachment cap and the other lead to the line neutral terminal of the attachment cap. This will result in NO MOVEMENT (N-M) of the ohmmeter needle.

Repeat steps 1 through 6 each time the meter is moved.

Ohmmeter Reading Chart

Model or Section of kiln*	Switch Position	Step 7 One Hot to Neutral	Step 8 Other Hot to Neutral	Step 9 Hot to Hot	Notes
A-99B Top or Center Switch	High	8	8	16	
	Med	8	N-M**	N-M	
	Low	16	N-M	N-M	
A-99B Bottom Switch	High	7	7	14	
	Med	7	N-M	N-M	
	Low	14	N-M	N-M	
A-82B Either Switch	High	8	8	16	
	Med	8	N-M	N-M	
	Low	16	N-M	N-M	
A-88B Either Switch	High	9¼	9¼	18½	
	Med	9¼	N-M	N-M	
	Low	18½	N-M	N-M	
A-77B Either Switch	High	13	13	26	
	Med	13	N-M	N-M	
	Low	26	N-M	N-M	
A-66B	High	7½	7½	15	
	Med	7½	N-M	N-M	
	Low	15	N-M	N-M	
A-55B	High	6	(Steps 8 & 9 do not apply to a 120 volt kiln.)		
	Med	12			
	Low	24			

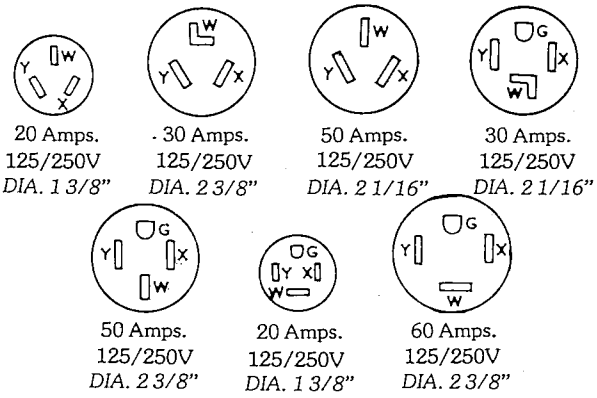
*Kilns with same Replacement Element Part Number have same readings.

**N-M indicates no movement of the ohmmeter needle.

Model or Section of Kiln	Switch Position	Step 7 One Hot to Neutral	Step 8 Other Hot to Neutral	Step 9 Hot to Hot	Notes
AA-8B	High	N-M	N-M	29	
	Low	29	N-M	N-M	
AA-6B	High	N-M	N-M	36	
	Low	36	N-M	N-M	
A-11-6B	High	8	(Steps 8 & 9 do not apply to a 120 volt kiln.)		
	Med (3)	8			
	Low	8			
E-14A	High	(Steps 7 & 8 do not apply to a 2-pole, 240 volt kiln.)		20	
	Med (3)			20	
	Low			20	
X-14J	High	8	(Steps 8 & 9 do not apply to a 120 volt kiln.)		
	Med (3)	8			
	Low	8			
Q-11P	Plug In	10			

How to Test a Wall Receptacle with a Voltmeter

With all due respect, electricians who have not studied changes established in 1965 will often make serious errors in connections of the nominal 120/240 volt wall receptacles. The wire connections on receptacles that are marked **"W"** from 1965 onward are the same connections that *were* marked **"G"** *prior* to 1965. This connection of the line neutral wire must be properly made in the circuit that provides the electrical power. Failure to make the connection properly can greatly shorten the life expectancy of the elements and the switch(es) of your kiln. Please refer below to the NEMA Configurations and connection markings of receptacles manufactured after 1965.



20 Amps. 125/250V *DIA. 1 3/8"*
30 Amps. 125/250V *DIA. 2 3/8"*
50 Amps. 125/250V *DIA. 2 1/16"*
30 Amps. 125/250V *DIA. 2 1/16"*
50 Amps. 125/250V *DIA. 2 3/8"*
20 Amps. 125/250V *DIA. 1 3/8"*
60 Amps. 125/250V *DIA. 2 3/8"*

1. With probes of voltmeter in **"W"** and **"Y"**, voltage should measure *NOT LESS* than 104 volts and *NOT MORE* than 130 volts.
2. With probes of voltmeter in **"W"** and **"X"**, voltage should measure *NOT LESS* than 104 volts and *NOT MORE* than 130 volts.
3. With probes of voltmeter in **"Y"** and **"X"**, voltage should measure between 208 and 240 volts. Very near the total voltage in steps 1 and 2.
4. Voltage from **"G"** and **"W"** should be 0 volts as proof that *NEITHER* "hot" wire is connected to **"G"** or **"W"**. 0 volts is *NOT* proof that the line *NEUTRAL* wire is properly connected as it must be for correct firing and long life.

Adapting WYE or Delta Three-Phase Power Supply to the Required 120/240 Volt, 3-Pole, Single-Phase Grounded Connection with a Separate Equipment Bond

The 120/208 volt WYE system (often called 208 volt, three-phase) has three hot poles of EQUAL voltage and a line neutral pole for a total of four poles in the system. To install the required 208 volt, single-phase, 3-pole line neutral circuit for kiln operation, the electrician would need to pull any two of the three hot poles and the one line neutral pole of the single-phase circuit with line neutral to be terminated in a standard circuit breaker box. Since all hot poles in the WYE system are equal, the electrician does not need to be concerned as to which two of the three hot poles are used, but he does need to be concerned that the line neutral pole is properly connected and that the line neutral pole is NOT confused with the third hot pole, which will not be used in the kiln circuit.

The 120/240 volt DELTA system of three-phase power requires more care on the part of the electrician. The DELTA system has three hot poles of UNEQUAL voltage and a line neutral wire for a total of four poles in the system. From the DELTA system the electrician also uses two hot poles, but he *MUST* be sure that each of the two hot poles does *NOT* measure more than 130 volts to ground. These two hot poles and the line neutral pole makeup the single-phase, 3-pole line neutral circuit, which will be terminated in the standard circuit breaker box. If the hot pole that measures more than 130 volts to ground is used in the kiln circuit, the kiln will have very short element life, switch problems, and other problems until the error is corrected.

WARNING: The grounding (round blade) connection must be separate and apart from the line neutral connection. The proper function of the line neutral is altered if a connection is made between the line neutral and the grounding or bonding connection.

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