

# NL-1009 IGNITRON

## Jumbo C

### 220 Amperes dc

**National Ignitron NL-1009** is a metal, water-cooled, mercury pool tube designed especially for welder control and similar AC control applications. Its rating is approximately equivalent to a 750 ampere magnetic contactor. **NL-1009** utilizes a thermostat mount brazed to an all-copper cooling system that provides exceptional cooling efficiency. The inner cylinder, copper cooling coil, and thermostat mount being brazed together in a single unit assures a rugged, dependable, and adjustment free temperature control system that operates directly on inner cylinder temperature.



#### TECHNICAL INFORMATION

**AC Control Applications** — Ratings are based on full-cycle conduction (no phase delay) regardless of whether or not phase control is used, on frequencies from 25 to 60 cycles, and any voltage between 250 and 600 volts rms. Ratings are for two tubes in inverse parallel.

|   |       |   |                            |
|---|-------|---|----------------------------|
| <sup>1</sup> Maximum demand — kva .....                             | 1700* | <sup>1</sup> Maximum averaging time — seconds |                            |
| <sup>2</sup> Corresponding maximum average anode current            |       | at 600 volts rms .....                        | 8                          |
| per tube — amps DC .....  | 120   | at 250 volts rms .....                        | 19.1                       |
| <sup>1</sup> Maximum average anode current per tube — amps DC ..... | 220   | Maximum surge current —                       |                            |
| <sup>1</sup> Corresponding maximum demand — kva .....               | 570   | peak amps .....                               | 280%                       |
|   |       |   | of max. rms demand current |

**Rectifier Applications** — Ratings are based on intermittent duty, on no phase delay, and on frequencies from 50 to 60 cycles. When phase control is used, current ratings are reduced as per phase control current rating curve. Values are for one tube.

|   |      |      |  |      |      |
|---|------|------|--|------|------|
| Maximum peak anode voltage — volts .....      | 1200 | 1500 | Maximum averaging time, sec: .....                   | 6.25 | 6.25 |
| Maximum peak anode current — amps .....       | 2100 | 1680 | Max. ratio of average to peak current,               |      |      |
| Corresponding Average Current—amps DC .....   | 28   | 22.4 | maximum averaging time 0.2 seconds .....             | .166 | .166 |
| Maximum average anode current — amps DC ..... | 98   | 78.4 | Max. ratio of peak fault to peak anode current ..... | 12.5 | 12.5 |
| Corresponding peak current — amps .....       | 588  | 470  | Max. duration time of surge current — sec. ....      | .15  | .15  |

**Ignition Requirements** — (Same for both applications.)

**Ignitor Voltage**

|  |               |
|--|---------------|
| Maximum instantaneous allowed,               |               |
| ignitor positive .....                       | anode voltage |
| <sup>2</sup> Maximum instantaneous required, |               |
| ignitor positive — volts .....               | 200           |
| Maximum instantaneous allowed,               |               |
| ignitor negative — volts .....               | 5             |

**Ignitor Current**

|   |     |
|---|-----|
| Maximum instantaneous allowed — amperes .....                   | 100 |
| <sup>2</sup> Maximum instantaneous required — amperes .....     | 30  |
| Maximum rms allowed — amperes .....                             | 10  |
| Maximum average allowed — ampere .....                          | 1   |
| <sup>2</sup> Ignitor ignition time maximum — microseconds ..... | 100 |
| Ignitor current max. averaging time — seconds .....             | 5   |

**Cooling Requirements** — (Same for both applications.)

|   |       |
|---|-------|
| Type of cooling .....                     | Water |
| Minimum inlet water temperature, °C ..... | 0     |
| Maximum cooling system temperature        |       |
| (measured at thermostat mount), °C .....  | 45    |
| Rectifier applications .....              |       |
| AC control applications .....             |       |
| At 600 volts rms .....                    | 45    |
| At 500 volts rms .....                    | 50    |
| At 250 volts rms .....                    | 55    |

Water flow may be reduced at light loads if cooling system temperature (measured at thermostat mount) is maintained within limits.

Typical cooling requirements at 500 volts rms operation for AC control applications, (2 tubes).

| Inlet Water Temp. °C | 100% Load                  |   | 50% Load                   |   |
|----------------------|----------------------------|---|----------------------------|---|
|                      | Water Flow Required G.P.M. | Pressure drop per tube lbs. per sq. in. | Water flow required G.P.M. | Pressure drop per tube lbs. per sq. in. |
| 15                   | 1%                         | 1.5                                     | 1/2                        | .6                                      |
| 30                   | 1%                         | 5.0                                     | 1/2                        | 1.5                                     |

More water is required at 600 volts to maintain cooling system temperature within limits and less at 250 volts.

Water temperature rise at 2 G.P.M., full load, °C .....

Approximate temperature rise inlet water to thermostat, (at 2 GPM and full load) °C .....

#### GENERAL CHARACTERISTICS

|   |          |
|---|----------|
| Number of Anodes .....                                | 1        |
| Number of Ignitrons .....                             | 1        |
| Mounting Position .....                               | Vertical |
| Peak arc drop at 6800 peak amps — approx. volts ..... | 35       |

|   |        |
|---|--------|
| Peak arc drop at 691 peak amps. — approx. volts ..... | 16     |
| Net weight — lbs. ....                                | 15 1/2 |
| Approx. shipping weight — lbs. ....                   | 19     |

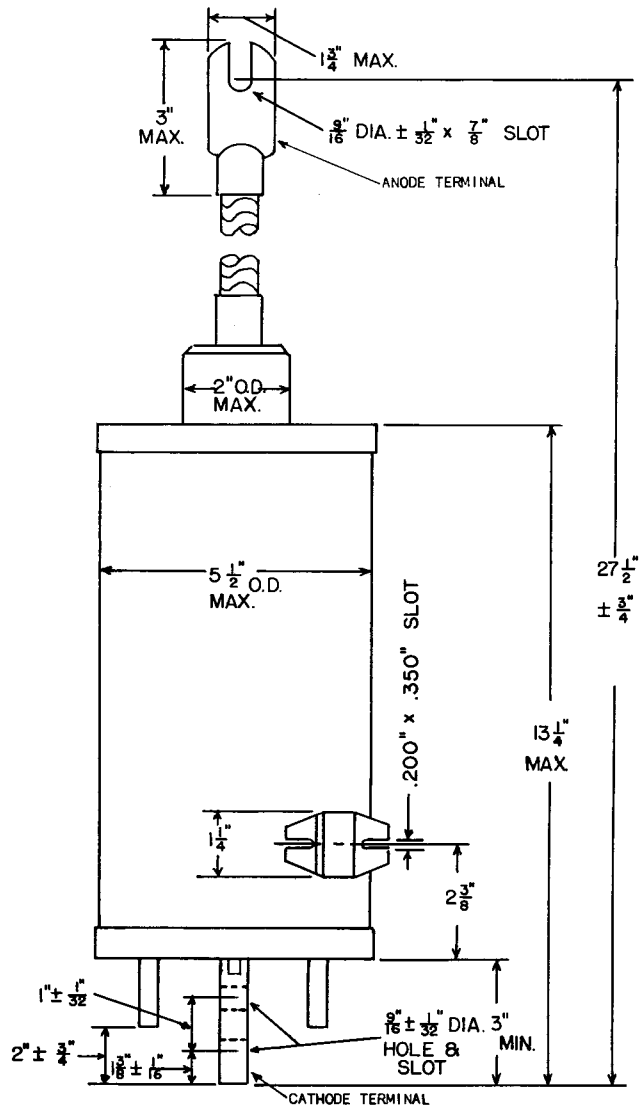
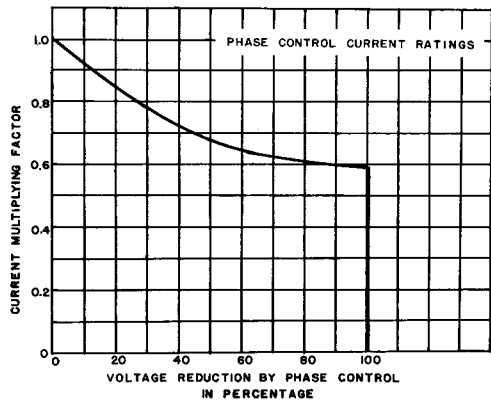
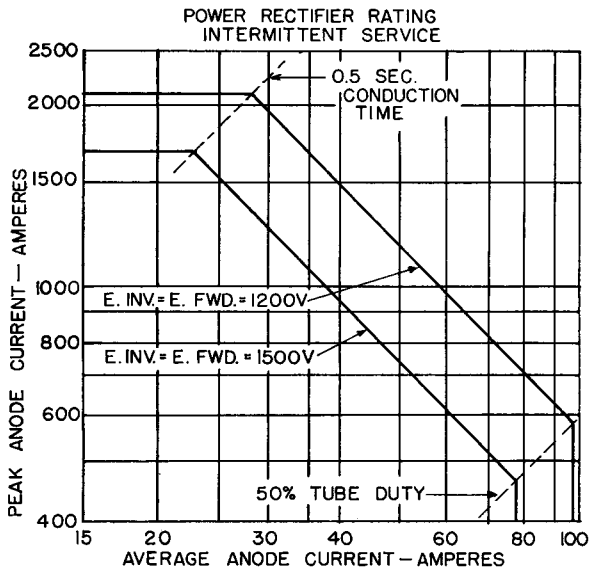
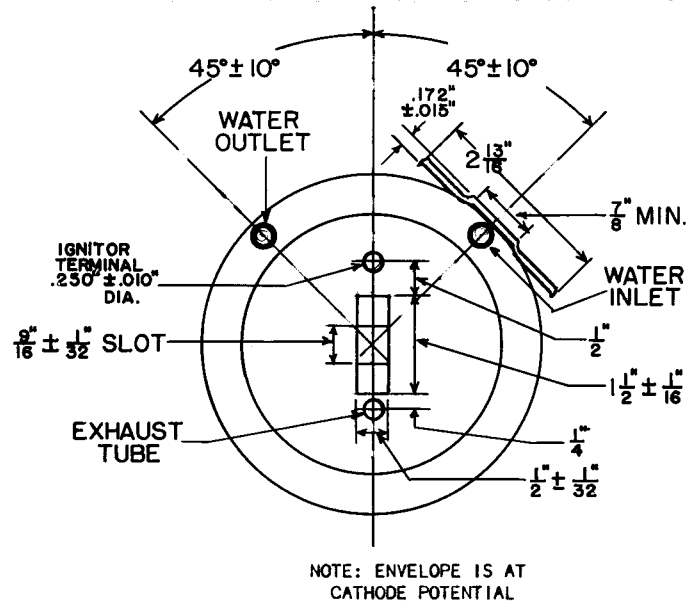
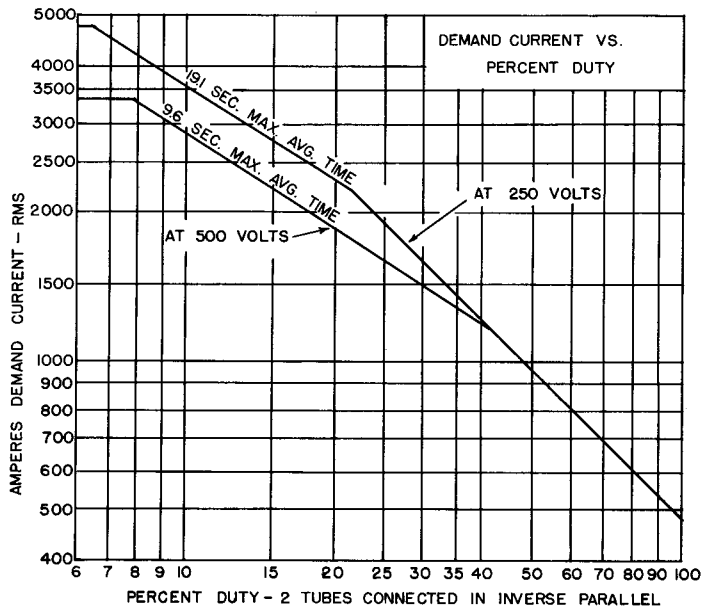
<sup>1</sup>Using log-log paper, straight line interpolation of RMS Demand Current vs. Average Anode Current and Maximum Averaging Time vs. Anode Voltage may be used to determine intermediate ratings.

<sup>2</sup>Using log-log paper, straight line interpolation of Peak Anode Current vs. Average Anode Current may be used to determine intermediate ratings. See curves for details.

<sup>3</sup>Ignition will occur if either maximum required instantaneous potential is applied or maximum required instantaneous current flows for the rated maximum ignitor ignition time.

\*For 500 to 600 volts rms. Max. demand current for 250 Volts rms is 4800 amperes rms, see curve. For voltages between 250 and 500, use proportional values between 3400 and 4800 amperes rms.

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