

The following tests have been conducted on the Inertia MSO switch operator in accordance to the applicable ANSI/IEEE standards. Additional tests are included that are not part of the ANSI/IEEE test standards.

Insulation Withstand (high potential)

Input line to ground and common to ground tested at 1,500 and 2,600 volts.

Dielectric withstand voltage, (input to output 1 minute): 2,500 VAC.

Insulation resistance, (input to output): 10 M ohm minimum with leakage current, less than 0.83 mA.

Line Voltage Variation

Input voltage-AC: 85-145 VAC Input frequency-AC: 47-63 Hz

Brown out protection (lowest input voltage that regulation is maintained): 85 VAC

Power supply drop out voltage : 40 ± 5 VAC

Power supply pick up voltage: 85 ± 5 VAC

The battery failure backup system maintained all control and status I/O and system operability during test

Power Failure Backup

Time to 'no-go' (0.6 amp. load): 50 hours

Recovery time (successful battery test), 25 minutes

Temperature Cycle

Five 24 hour cycles at -20°C to $+85^{\circ}\text{C}$. (One cycle without the switch operator's heater on)

Five 24 hour cycles at $+20^{\circ}\text{C}$ to $+91^{\circ}\text{C}$. The test was conducted with an additional 2.3 ohm load to simulate radio and RTU power consumption. One temperature cycle was conducted without 120 VAC input to the power supply.

Humidity cycle

Relative humidity: non-condensing to 70°C at 95% relative humidity with the door open.

Surge Withstand _____ Per ANSI C37.90.1-1989

3.0 kV, 100 kHz oscillatory waveshape, positive and negative polarities, injected into the AC mains and enclosure.

4.0 kV, 100 kHz fast transient waveshape, positive and negative polarities, injected into the AC mains and enclosure.

Powerline Surge Voltage and Current _____ Per ANSI C62.41-1991

100 kHz Ring waveshape both positive and negative polarities injected into the AC mains and the enclosure, and $1.2 \times 50 \mu\text{s}$, $8 \times 20 \mu\text{s}$ surge waveshape, positive and negative polarities injected into the AC mains and the enclosure.

4 kV amplitude, over 0-540 degrees phase, 15 degree phase increments

5 kV amplitude, over 0-180 degrees phase, 15 degree phase increments

6 kV amplitude, over 0-180 degrees phase, 15 degree phase increments

Electrostatic Susceptibility _____ ESD per MIL STD. DOD-HDGK-263, Schaffner 430 ESD Gun

Test all surfaces, switches, buttons and safety neutral terminals or grounds that will be contacted by personnel during operation or installation of the device per the following:

a: Test voltage at 10 kV: Discharge the test device on all the above surfaces.

b: Test voltage at 15 kV: Move the probe 0.5 inches above all contact surfaces (avoiding discharge).

Power On/Off Transition

Input voltage is varied from +20 %, -10%, -15%, -20%, -50% , -100% and nominal while the voltage is rapidly toggled on and off eight cycles. All device functions are verified to be operating correctly at all input voltage settings.

Power supply ratings: Turn-on delay: 1 Sec.

Charger hold up time (110 VAC): 20 mS min.

Operating frequency (switching frequency of main transformer: 22 kHz nom.

Brown-Out and Single Phase

Verify correct device operation at nominal input voltage, and after the following:

a: Nominal input voltage -20% for six hours. b: Nominal input voltage - 50% for six hours.

EMI/RFI Susceptibility _____ Per S.A.M.A. Std. PMC 33.1-1978 (Radiate frequencies from front, right and left sides)

14 kHz-512 kHz, 10V/m, operator energized with 120 VAC, door closed

512 kHz-10GHz, 5V/m, operator energized with 120 VAC, door open

Electromagnetic Radiation

Conducted per FCC part 15 Class B limits

Battery Life

36 amp-hour lead acid batteries (VRL), powering the control module only, for 22 hours prior to low voltage lockout. A battery shutdown algorithm is employed to prevent deep discharging the batteries during a sustained outage.

Mechanical Operation

Mechanically tested on 35 kV gang switch 3,500 operations, 300 without power supply, no maintenance was performed on the switch or the operator during the test. No appreciable wear or damage was identified.