SureImage

Imaging and Treatment Series

Power Conditioner Model Ultra-K/M 75K(i) – 225K(i)

Power Conditioning for Medical Imaging & Treatment Equipment

General Specifications

1.0 General

This specification defines the electrical and mechanical characteristics of a medical imaging and treatment power conditioning system. The Model Ultra-K/M as specified herein includes all the components required to meet the basic power requirements of medical imaging and treatment equipment. The power conditioning system's transformer is 3 phase, K13 rated, constructed using all copper windings, triple-shielded, and provided with an output voltage surge protection device (SPD) and high frequency filter. The Ultra-K/M's output impedance is 2% typical and is continuous duty cycle rated and intermittent duty cycle rated, 600 volt class, convection cooled. The power conditioning system's transformer meets and exceeds U.S. Department of Energy (DOE) 2016 high efficiency standards identified under DOE 10 CFR Part 431, and complies with the Canadian Energy Efficiency Standard C802.2-12.

2.0 Standards

The power conditioning system is designed in accordance with applicable portions of the following standards:

A. U.S. Department of Energy (DOE) 2016 high efficiency standards identified under DOE 10 CFR Part 431
B. Canadian Energy Efficiency Standard C802.2-12
C. American National Standards Institute (ANSI C57.110 & C62.41-1991)
D. Institute of Electrical and Electronic Engineers (IEEE 519-1992)
E. National Fire Protection Association (NFPA) 70, National Electrical Code (NEC)
F. Federal Information Processing Standards Publication 94 (FIPS Pub 94)
G. UL Listed to Standard 1561
H. C-UL listed to CSA Standard C22.2, No. 47-13
I. RoHS compliant

3.0 Manufactured Units

The power conditioning system is designed to meet IEC 601-1, Medical Electrical Equipment – Part 1: General Requirements for Safety.

A. Input Specifications

1. Nominal AC input voltage ratings: 600 VAC, 480 VAC, 240 VAC or 208VAC, 3 phase with sufficient margin to sustain a constant input of +10% without saturation.
2. The nominal operating frequency: 60 hertz $\pm$ 5%.

3. The power conditioning system's primary is configured in a three phase delta and includes the following full capacity voltage compensation taps:
   75K(i) to 150K(i): (2) above and (4) below the nominal voltage tap at 2.5% increments.
   225K(i) at 208 VAC or 240 VAC: (1) above and (2) below the nominal voltage tap at 5% increments.
   225K(i) at 480 VAC or 600 VAC: (2) above and (4) below the nominal voltage tap at 2.5% increments.
4. Energizing inrush current does not exceed a maximum of 10 times the full load input current for 1/2 cycle.

B. Output Specifications

1. Nominal AC output voltage ratings: 480 VAC or 208 VAC, wye derived, 60 hertz.
2. Output impedance: 2% typical at 50% of rated load.
3. Harmonic K-Rating: 13.

C. Performance Specifications

1. Dynamic load voltage regulation: $\leq$ 4% from no load to intermittent rating and $\leq$ 2% from typical steady state load to intermittent power demand.
2. Intermittent kVA rating duration: 15 seconds when followed by a steady state load of $\leq$ 80% of the continuous KVA rating for 2 minutes, repeated use. Lower steady state load conditions allow for a longer Intermittent kVA duration.
3. Overload: 500% for 10 seconds, and 1000% for 1 cycle.
4. THD: $\leq$ 1% added to the output voltage waveform.
5. Harmonic attenuation: Load generated triplen harmonics are attenuated at the primary.
6. Output voltage: Sinusoidal with no flat topping when high crest factor (3.0 : 1), non-linear loads are present at the output.
7. Audible noise: 50dBA when measured at one meter distance.
8. Efficiency: Meets and exceeds U.S. Department of Energy (DOE) 2016 high efficiency standards. All efficiency values are at 35% of nameplate-rated load with a transformer operating temperature of 75°C, determined according to the DOE Test Method for Measuring the Energy Consumption of Distribution Transformers under Appendix A to Subpart K of 10 CFR part 431.
9. Electrostatic shielding: Incorporates 3 solid copper foil electrostatic shields which minimize inner winding capacitance and noise coupling between primary and secondary windings.
10. Common mode noise attenuation: 146dB.
11. Transverse mode noise attenuation: 3dB down at 10K Hertz, decaying 40dB per decade.
12. SPD with high frequency filter: Integral, fused, 3 phase, secondary connected, 6 mode surge protection device (SPD). The SPD is a transient voltage suppression network comprised of high energy metal oxide varistors with less than a 5 nanosecond response time and a maximum peak current handling capability of 40,000 amps (8x20µsec) per mode. The suppression network will remain functional when subjected to ANSI/IEEE C62.41 Category B-3 waveforms. The SPD includes a high frequency noise filter that increases the transverse mode noise attenuation to 3dB down at 10kHz, decaying 40dB per decade. A single status indicator light is provided to show that the SPD and filter are fully operational and functioning properly.

D. Output Power Ratings, BTU's, Dimensions and Weights

Model	Intermittent kVA	Operational BTU's / hr.	Continuous kVA	Full Load BTU's / hr	Dimensions (in)	Weight (lbs.)
75K(i)	75	2300	45	4600	28"W x 25"D x 39"H	700
112.5K(i)	112.5	3825	75	7650	28"W x 25"D x 39"H	830
150K(i)	150	3825	75	7650	28"W x 25"D x 39"H	830
225K(i)	225	5750	112.5	11,500	38"W x 32"D x 57"H	1210

4.0 Construction

A. Main Transformer

1. Transformer windings: All copper conductor construction, with separate primary and secondary isolated windings. The transformer conforms to NEC article 250-5D that specifies a separately derived power source. The neutral conductor is sized for 200% of the ampacity of the phase conductor.
2. Copper bus connections are provided for isolated three phase output conductors, neutral conductor, and ground.
3. All leads, wires and terminals are labeled to correspond with the circuit wiring diagram.
4. Basic impulse level: No less than 10,000 Volts.
5. MTBF: $\geq$ 200,000 hours.
6. Transformer steel: Grain oriented, M3 grade, silicon steel, miter cut joint construction.
7. Flux density: $\leq$ 15k gauss.
8. Core losses: 0.2% to 0.4% of the continuous KVA rating, model dependent.
9. Insulation: Class N, 200°C with a temperature rise of 115°C above ambient, not exceeding 135°C under non-linear loading per UL 1561 standard.
10. Cooling: Natural convection.

B. Cabinet

1. Enclosure: NEMA type 2 general purpose, floor mounted, and indoor enclosure.
2. Construction: Cabinets are manufactured from 14 gauge steel with base sub-structure suitable for fork lifting.
3. Paint: Baked on, powder coat paint finish with proper pre-treatment.
4. Provisions exist to hardwire input and output to copper bus connections located behind the front panel of the transformer cabinet. Input and output landing locations are available on either side of the transformer cabinet.

5.0 Environment

A. Operating Conditions

1. Operating temperature range: -25°C to +40°C.
2. Humidity: 0 to 95% non-condensing.
3. Altitude: Up to 5000 feet above sea level without de-rating.
4. Audible noise: $\leq$ 50dBA at 1 meter.

6.0 Options

A. Optional Equipment

1. Output Voltage SPD with a peak surge current capacity rating of 100kA per phase, UL 1449 Listed, Type 2. The SPD has a nominal discharge current rating of 20kA, and a short circuit current rating (SCCR) of 200kA. Includes EMI/RFI filtering, Form C relay contacts rated for 2 amps at 30VDC or 250VAC, and LED protection status indicators.
2. Main input or output circuit breaker: Molded case, 3 pole circuit breaker provided in a separate NEMA 1 enclosure for external mounting and installation.
3. High temperature / over temperature alarm contacts: Thermal warning alarm contacts provided for customer hardwired connection. Thermal sensors at 180°C and 200°C.
4. IR scanning window: Infrared transparent polymer IR window(s) for safe routine thermal scanning of transformer connections under load, without exposing personnel to arc flash hazards (one or two 4" viewing windows provided, model dependent). Durable IR windows are industrial-grade with a patented reinforced grill, are fully impact-resistant, and are UL and C-UL Listed. This option adds 2" to the depth of the 225K(i) enclosure.
5. Lug kit: Mechanical (screw-type) lugs shipped for installer convenience. Consult factory for number of conductors per lug and wire range.

7.0 Warranty

Controlled Power Company warrants the Model Ultra-K/M transformer (core and coil) to be free from defects in material and workmanship for a period of 1 year full, and an additional 24 years prorated. All other unit components are covered by a 2 year full replacement warranty. The warranty periods begin following the original factory ship date.