**CONTROLLED POWER COMPANY**

**COMMERCIAL POWER PURIFIER (SERIES 800A)**

**GUIDE SPECIFICATION**

**(Optional Items in Red)**

**1.0 General**

 1.1 **Definition**

 This specification describes the design of a single phase, continuous duty rated, ferroresonant power line conditioner. The system shall condition electrical source power to the extent that power line disturbances are automatically corrected, thus providing conditioned electrical power for the load. Output power distribution circuits shall be pre-installed by the supplier so that conditioned output power can easily interface with the intended load.

 The power conditioner is to be Controlled Power Company Series 800A - Commercial Power Purification System or Owners / Engineers approval equal.

1.2 **Codes and Standards**

 All Transformers shall be manufactured in accordance with the most recent editions of the following codes and standards:

 - Institute of Electrical and Electronic Engineers (IEEE C62.41-1991)

 - National Fire Protection Association (NFPA) 70, National Electric Code (NEC)

 - Underwriters Laboratories (UL, C-UL 1012)

 - Federal Information Processing Standards Publication 94 (FIBS Pub 94)

 1.3 **Environment**

 1.3.1 Temperature - The system shall operate without overheating in an ambient temperature range of -20 to +40° Celsius.

 1.3.2 Humidity - Relative humidity of 0 to 95% non-condensing.

 1.3.3 Altitude - Sea level to 5000 feet above sea level.

 1.3.4 Audible Noise - Maximum allowable noise level shall be 60dB or less when measured at a three (3) foot distance.

* + 1. Safety - Systems shall be listed under UL, C-UL standard 1012 for power

 supplies (UL, C-UL 1012).

**2.0 Electrical Specifications**

 2.1 Input Power

 2.1.1 The nominal AC input voltage rating of the system shall be (120)(208)(240)

VAC, single phase, 60 hertz.

*Engineer’s reference*: Units 1KVA to 2.5KVA at 120VAC only. Units 3.5KVA at 120VAC or 208VAC or 240VAC. Units 5KVA to 15KVA at 208VAC or 240VAC.

 2.1.2 The power conditioners shall (include a pre-installed input plug with 8 foot input

 line cord)(include a pre-installed hospital-grade input plug with 8 foot input

line cord)(include an input terminal block to accommodate a hardwired power connection).

*Engineer’s reference*: Units 1KVA through 3.5KVA are provided with a pre-installed input plug with 8 foot input line cord. Medical models available with a 15A or 20A hospital-grade input plug, or “locking type” 120V, 30A or 50A input plug. Consult factory for proper plug selection. Units 5KVA through 15KVA are provided with an input terminal block to accommodate a hardwired power connection.

2.1.3 A molded case, manually operated, thermal magnetic, input circuit breaker (including input terminals) shall be provided.

 2.1.4 A grounding terminal shall be provided for one parity sized grounding conductor.

 2.2 Output Power

 2.2.1 The power conditioner continuous duty output power rating requirement shall be

(1)(1.6)(2.1)(2.5)(3.5)(5)(7.5)(10)(15)KVA.

 2.2.2 The output voltage of the system shall be (120)(120/208/240) VAC, single

 phase, 60 hertz.

*Engineer’s reference*: Units 1KVA to 2.5KVA at 120 VAC only.

 Units 3.5KVA to 15KVA at 120/208/240VAC.

 2.2.3 A newly derived neutral conductor shall be effectively bonded to the cabinet enclosure and a grounding terminal so that the isolated and conditioned output can be effectively referenced (grounded).

 2.2.4 Output power distribution circuits shall be pre-installed by the supplier as specified in section 3.2.

 2.3 Performance Specifications

 2.3.1 Line Voltage Regulation - Power conditioner output voltage shall be automatically regulated to within + 3% with input voltage fluctuations of +10% to -20% of nominal under typical load conditions. At 75% load, the

 output voltage shall be automatically regulated to within + 3% with input

 voltage fluctuations of +10% to -35% of nominal. At 50% load, the output

 voltage shall be automatically regulated to within + 3% with input voltage fluctuations of +10% to -40% of nominal. At 25% load and input variations of +10% to -45% the system must automatically regulate with + 3%.

 2.3.2 Immunity to Distortion - The power conditioner shall correct for highly distorted input voltage sinewave conditions. With input voltage distortion of up to 40% (THD), the output voltage sinewave shall contain a maximum harmonic content of 5% with linear load.

2.3.3 Load Regulation - The load regulation shall be 3-4% from 0% to 100% load.

 2.3.4 Voltage Recovery - The output voltage shall be within 95% of the nominal level within two AC cycles and to 100% within three cycles when the output is taken from no load to full load or vice-versa. Recovery from partial load changes shall occur in a shorter period of time.

 2.3.5 Response to non-linear loading - The power conditioner shall be designed to operate with non-linear, non-sinusoidal, high crest factor type loads without overheating.

 2.3.6 Power Factor Correction - The power conditioner shall represent a favorable power factor to the input power source thus correcting for poor power factor conditions created by the load. Transformer input power factor shall remain within 0.95 approaching unity with load power factor as poor as 0.6

 2.3.7 Harmonic Attenuation - The power conditioner shall attenuate load generated odd current harmonics (3rd, 5th, 7th, 9th, ect.) approximately 23 dB at the input.

 2.3.8 Isolation - The power conditioner primary must be electrically isolated from the secondary. The system shall meet isolation criteria as defined by National Electric Code article 250-5d.

 2.3.9 Lightning and Surge Protection - The power conditioner shall attenuate voltage spikes at least 3000 to 1 and shall meet or exceed U/L 1449 rating 330 volts per ANSI / IEEE C62.41-1991 category B3.

 2.3.10 Common Mode Noise Attenuation - 140dB.

 2.3.11 Transverse Mode Noise Attenuation - 120dB.

 2.3.12 Ride Through Capability - With complete loss of input power for up to 1 cycle, the output sine wave shall remain within usable AC voltage levels.

 2.3.13 Reliability - 200,000 hours (MTBF)

 2.3.14 Audible Noise - At full load, when measured at three foot distance, audible noise level shall not exceed 60 dB.

 2.3.15 Efficiency - Shall be approximately 92% at full load.

 2.3.16 Operating Temperature - -20° C to 40° C.

**3.0 Construction**

 3.1 Transformer

 3.1.1 Transformer shall be dry type ferroresonant, convection or fan air cooled, 600 volt class.

 3.1.2 All transformer windings shall be class H (220 °C) insulated copper.

 3.1.3 A class H insulation system shall be utilized throughout with operating temperatures not to exceed 150 °C over a 40 °C ambient temperature.

 3.1.4 The transformer primary shall be input voltage configured to accept the nominal

 voltage specified. Input terminals shall be provided for source conductors and

 ground as specified in section 2.1

 3.1.5 The transformers core and magnetic shunt shall be manufactured utilizing M-6 grade, grain oriented, silicon, stress relieved transformer steel.

 3.1.6 Hardwire interface terminals shall be provided for output power hot, neutral and ground conductors

 3.1.7 All leads, wires and terminals shall be labeled to correspond with circuit wiring diagram.

 3.1.8 Transformer shall be vacuum impregnated with an epoxy resin to minimize audible noise and maximum reliability.

3.1.9 Leakage current to ground on units 1KVA through 3.5KVA shall be measured

 at < 20 microamps.

 3.2 Power Distribution

 3.2.1 Units specified at 1KVA through 3.5KVA shall be provided with four (4)

 (hospital-grade) NEMA (5-15R)(5-20R) output receptacles. Outlets shall be

 Configured as (2) flush-mounted, fuse-protected duplex receptacles. Units

 specified at 3.5KVA shall be provided with one (1) NEMA (L6-20R)(L6-

 30R) receptacle, in addition to the standard 120 VAC receptacles provided.

*Engineer’s reference*: Select 5-15R for C-UL listed units to be installed in Canada. Select 5-20R for UL listed units.

 3.2.2 Units specified 5KVA through 15KVA shall be provided with terminals for hard

 wiring of output conductors, neutral conductor and ground.

3.2.3 Units specified 5KVA through 15KVA shall include the following circuit breaker

 protected (flush-mounted) output receptacles as specified (with each factory-

 wired through a flexible conduit).

*Engineer’s reference*: See output distribution options chart at the end of this specification.

3.2.4 Each output circuit shall be protected by a manually operated, molded case,

 thermal magnetic circuit breaker. Circuit breakers shall include visual

 indication showing on, off or tripped. Circuit breaker surge rating shall be

 10,000 AIC.

 3.2.5 Each circuit breaker feeding an output receptacle, factory-wired through flexible

 conduits, shall be clearly marked and identified with the associated receptacle.

 3.2.6 Flexible output power cables shall be shielded, multi-wall, flexible steel conduit with a plastic waterproof jacket.

 3.2.7 Conductors inside the flexible conduit shall be copper with THHN insulation. Each cable shall contain a parity sized grounding conductor.

 3.3 Cabinet

 3.3.1 Cabinet shall be an attractive, NEMA 1 general purpose indoor type enclosure.

3.3.2 (Cabinet for units specified at 1KVA - 3.5KVA shall be provided with rubber feet

 to prevent scratching of finished surfaces. Dimensions shall not exceed

 8.5"W x 12.75"D x 17.5"H.)

 (Cabinets for units 5KVA - 15KVA shall be provided with swiveling

 lockable wheels to facilitate movement during installation. The output power

 distribution section of the cabinet shall be designed to accommodate or addition

 of future output circuits. Dimensions shall not exceed 15"W x 23.75"D x 22.5"H.)

 3.3.3 Cabinet shall be manufactured from at least 16 gauge steel.

 3.3.4 Powder-coat textured paint finish with proper pre-treatment shall be provided.

**4.0 Warranty**

 Manufacturer shall guarantee all systems to be free from material defects and poor workmanship for a period of 10 years on the transformer core and coil, and 2 years

 on all other unit components. The warranty period shall commence following the original

 factory ship date.

*Engineer’s reference*: See output distribution options chart on the following page.

