PRODUCT SPECIFICATION FOR A 15 THRU 500 kVA, THREE PHASE, MODULAR POWER REGULATOR AND CONDITIONER

PIRANHA 3

(3-phase, Power Conditioning Voltage Regulator)

1.0 General

This specification covers the electrical characteristics and general requirements for a modular power conditioner and voltage regulation. The PIRANHA shall include all components and systems required to install, operate and maintain the system. The PIRANHA shall utilize tap switching regulation technology.

2.0 Applicable Documents

2.1 The National Electrical Code NFPA (Latest Edition).

2.2 American National Standards Institute Corp. and its Applicable standards C39.1, C80.1, C89, C84.1.

2.3 FCC Part 15, Sub-Part J, Class A.

2.4 IEC 435 International Electro-technical Commission Recommendation "Safety of Data Processing Equipment".

2.5 VDE 0804/3.77 Verbauch Deulscher Elektotechniker standard. "Telecommunication and Electronic Data Processing Unit and Systems".

2.6 UL 1950 Underwriters Laboratories Inc. Standard for Safety. Electronic Data Processing and Office Equipment systems.

2.7 VDE 0806 Verbond Deutscher Electrotechniker Standard "Safety Design".

2.8 CSA 22.1 Canadian Standards Association, "Data Processing Equipment".

2.9 NEMA National Electrical Manufactures Association and its applicable standards.

2.10 Local Inspection Authorities having jurisdiction over electrical equipment and its installation.

2.11 MIL-T-27B Dry Transformer Insulation.

2.12 UL 1561, K- Factor Transformer Ratings.

2.13 NEMW TP-1, Energy Star, efficiency rated transformers

3.0 Major Components

The basic components of the PIRANHA shall consist of: a three phase, copper wound, isolation transformer; input main circuit breaker; regulation electronics; internal wiring; manual bypass switch; input / output terminal blocks; input / output filters, over current and over temperature protection.

4.0 System Package and Construction

4.1 Agency approval.
The PIRANHA shall be UL Listed.

4.2 Input Main Circuit Breaker (IMCB)
The PIRANHA shall be equipped with an input main circuit breaker. The IMCB shall be rated for 125% of full load and be of thermal magnetic molded case construction. The IMCB shall have a minimum of 25,000 AIC rating. Provision for higher interrupting capacity shall be incorporated into the design to accommodate this type of breaker if required. The IMCB shall be UL Listed.

4.3 Cabinet

The Cabinet shall consist of the following:

1. Frame
   The Frame shall be of tubular construction of heavy gage metal and welded for maximum strength. Each frame shall be treated before paint is applied and be of textured baked enamel.

2. Internal Sheet Metal
   Internal sheet metal not welded to the frame shall be galvanized, treated or Gold Zinc wash plated to ensure RFI, EMI susceptibility reduced to the absolute minimum.

3. Access
   Access to the IMCB shall be through two metal doors attached with a continuous hinge and held shut with two keyed locks.

4. Top Cover
   The top cover shall not contain any openings into the interior of the PIRANHA

5. Alternative Cabinet (kVA dependent)
   NEMA 4, 4R and 12 cabinets are available.

4.4 Isolation Transformer

A copper wound, 3-phase, isolation transformer shall be provided. Construction of the transformer should separate the Primary connections and the Secondary connections by placing them on opposite sides of the core (when possible). In addition, the output terminals of the secondary shall be at opposite ends of the coil (when possible) from the input terminals of the primary to minimize the possibility of transverse mode injection. A copper foil shield shall be provided to allow a large surface area for shunting RFI signals of the core to ground. The isolation transformer shall be mounted on rubber isolation pads to prevent 60 Hz hum of the core from being transmitted to the frame. The Transformer insulation system shall be 220° C. The transformer temperature rise shall be 150° C rise at full load. K-13 rating is standard with higher K Ratings transformers available.

4.5 Regulation Electronics

A solid state electronic regulation system shall be provided. This technology shall use IGBT's high frequency technology in its construction and shall be rated at 100% above worst case current ratings without any adverse effects. The regulation system shall respond to a change in the input voltage within 1millisecond.

4.6 Bypass Switch

A manually operated bypass switch shall be provided. In the event that the electronic control circuit fails, the manual switch shall be available to select the bypass of the transformer to provide nominal voltage to the load. Access to the bypass shall not require removal of any panels. The bypass switch shall be accessible by the operator by opening the front doors. The bypass switch is a “break-before-make" switch.

4.7 Internal Wiring

All internal wiring shall be UL Listed appliance wire or power wiring of multi stranded construction. When in close proximity, Secondary and Primary wiring shall cross at a 90° angle to minimize the injection of transient electrical noise between the two circuits.

4.8 Single Point Ground (SPG)

A single point ground shall be provided.

The following shall be grounded to the SPG:

1. Equipment grounds.
2. Neutral (neutral to ground bond of the isolation transformer).
3. Core of the Transformer.
4. Frame.
5. Equipment grounding conductor from the branch circuit.

4.9 Input Transient Noise Filter

The Input Transient, electrical noise filter consist of a resistor/capacitor network which acts as a large snubber circuit to eliminate high frequency impulses from entering the power conditioner.

4.10 Output Transient Noise Filter

The Output Transient Noise Filter consists of a capacitor network installed on the secondary. This capacitor network, when coupled with the primary filter, virtually eliminates most electronic noise from reaching the applied load or being fed back to the unit from noise generating loads.

4.11 Surge Suppression

A transient suppression network shall be located on the secondary side of the isolation/regulation transformer. The Surge Suppressor shall suppress common mode and transverse mode noise. The Surge Suppressor shall have the following characteristics:

1. Fault Current. 200 amp max / 10,000 amp max short circuit current.

2.	Maximum Surge Current, Single Pulse, 8/20 µs	20 kA	
3.	Suppression Voltage / Current L-N, N-PE Using ANSI/IEEE C62-41 wave shapes	500 A, 100 kHz 500 A, 8/20 µs 3 kA, 8/20 µs 10 kA, 8/20 µs	(6 kV) (6 kV) (6 kV) (20 kV)
4.	UL 1449 Suppression Voltage, L-N, N-PE		
5.	Surge Energy Capability, Total		3056 joules
6.	Surge Life, VAC L-N applied	3 kA, 8/20 µs 10/20 µs	3000 times 75 times
7	Response Time		<1ns

8. Visual service indicators (one for each phase) shall be provided to indicate that the Surge Suppressor is no longer providing protection.

5.0 Electrical Characteristics

5.1 60 Hz Frequency units

1.	Output Rating kVA:	10, 15, 30, 50, 75, 100,125, 150*
2.	Input Voltage:	208 or 480 VAC*
3.	Output Voltage:	208Y/120 or 480Y/277 VAC *
4.	Input Frequency Tolerance:	60 Hz ± 3 HZ

5.2 50 Hz Frequency Units

1.	Output Rating, kVA:	15, 30, 50, 75, 100, 150*
2.	Input Voltage:	380 or 415 VAC*
3.	Output Voltage:	380Y/220 or 415Y/240*
4.	Input Frequency Tolerance:	50 Hz ± 3 Hz

*= consult factory for others

5.3 Transformer

1.	Type:	Dry, copper wound, isolation
2.	Impedance:	3% to 5% maximum
3.	Efficiency:	96 % @ 100% load
4.	Load Power Factor:	Unity to 0.3 lead or lagging

5.	Noise rejection (typical):	Common mode - 120 dB (0.1 Hz to 10 MHz) Normal Mode - 60 dB/decade (starting @ 2 KHz)
5.4	Audible Noise:	Meets or exceeds NEMA standards
5.5	Input Voltage Regulation:	+10 to -15 % of nominal
5.6	Output Voltage Regulation:	± 1% typical; ± 2% maximum for all load and line conditions
5.7	Response time:	1 millisecond typical
5.8	Output Rating:	Continuous regardless of line / load conditions
5.9	Overload Inrush Rating:	200% of full load for 10 seconds

6.0 Physical Characteristics

6.1 Dimensions of Nema 1 cabinet:

	Height	Width	Depth
10 – 150 kVA	71"	42.0"	25"

Consult factory for other cabinet configurations.

6.2 Floor Loading Weight: Not to exceed 250 lbs. per sq./ft.

7.0 Operating Environment

7.1 Temperature: 32° F to 104° F (0° C to 40° C)

7.2 Humidity: 10% to 90% relative humidity, non-condensing

7.3 Altitude: 0 to 7000 ft.

8.0 Storage Environment

8.1 Temperature: 32° F to 140° F (0° C to 60° C)

8.2 Humidity: 10% to 90% relative humidity, non-condensing

9.0 Warranty

The manufacturer shall warrant the PIRANHA to be free from defects in both material and workmanship for a period of 12 months from the time of installation or 18 months after shipment, which ever occurs first.

10.0 Manufacturer's Qualifications

The PIRANHA shall be furnished by a manufacturer who specializes in the manufacturing of Power Quality Systems. The manufacture shall have at least 20 years experience in the design and manufacturing of such products.

11.0 Qualified Systems.

The unit shall be a PIRANHA, Automatic Voltage Regulator as manufactured by

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