

LIFE LINE PRODUCT SPECIFICATION FOR A 1 TO 3 KVA, SINGLE PHASE, POWER DISTRIBUTION SYSTEM WITH REGULATION AND CONDITIONING

1.0 General

This specification covers the electrical characteristics and general requirements for a single phase power distribution system with power regulation / conditioning. The specified equipment herein shall be referred to as a " Line Line". The Line Line shall consist of a single phase power regulation and distribution unit. The Line Line includes all components and systems required to install, operate and maintain the system.

2.0 Applicable Documents

- 2.1 The National Electrical Code NFPA 1970 (latest edition).
- 2.2 American National Standards Institute Corporation 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 Electrotechnical Commission Recommendation "Safety of Data Processing Equipment".
- 2.5 VDE 0804/3.77 Verbrauch Deutscher Electrotechniker 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 Verbrauch Deutscher Electrotechniker Standard "Safety Design".
- 2.8 CSA 22.1 Canadian Standards Association, "Data Processing Equipment".
- 2.9 NEMA National Electrical Manufacturers 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.

3.0 Major Components

The basic components of the Line Line shall consist of an input power cord, input main circuit breaker, base, case, isolation transformer, regulating electronics, bypass switch, internal wiring, indicators, single point ground, input and output filters, EMI shielding, output circuit protection and mounting plates for output receptacles or output cables and other optional features.

4.0 System Package and Construction

- 4.1 Agency Approval
The Life Line shall be UL listed under standard 1950.

4.2 Input Power Cord

The input power cord shall be 3 conductor "SO" type, UL listed. Electrical conductors shall be sized to carry 125% of full load capability of the Life Line. The ground conductor shall be full sized. An input power plug shall be provided on units rated under 50 Amps. The input power cord shall be a minimum of 6 feet.

4.3 Input Main Circuit Breaker (IMCB)

The Life Line shall be equipped with a main input 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 10,000 AIC rating.

Provisions for higher interrupting capacity shall be incorporated into the design to accommodate this type of breaker if required. The IMCB shall be UL listed.

4.4 Cabinet

The cabinet shall consist of the following:

1. Base

The base shall be of heavy gage sheet metal of a minimum of 14 gage. Each base shall be plated gold zinc wash. The base shall be supported by (4) hard plastic bumpers.

2. Internal sheet metal

All internal sheet metal, attached to the base shall be plated zinc wash to ensure RFI/EMI susceptibility is reduced to an absolute minimum. Minimum thickness shall be 16 gage.

3. Access (top only)

Removable top / side panel shall be provided. Access to the IMCB and output distribution circuit breakers shall be through a removable top / side panel access plate and provisions shall be made for adding output cables and associated circuit breakers to the Life Line. All exposed access screws shall be black oxide plated. Convection cooling is accomplished by mesh screening on the bottom front and top rear of the front and rear panels.

4.5 Isolation Transformer

A double-shield, multi-tapped, all copper, baked varnish, convection cooled, single phase, isolation transformer shall be provided. Construction of the transformer shall separate the primary connections and the secondary connections by placing them on opposite sides of the core. The isolation transformer shall be mounted on rubber isolation pads to prevent 60 Hz hum of the core from being transmitted to the base. The transformer core clamp shall be grounded to the base through a 1" copper strap. The transformer insulation system shall be 220 degrees C.

4.6 Regulation Electronics

A solid state, electronic, zero current crossing, tap-switching regulation system shall be provided. This technology shall use SCR (silicon controlled rectifier) technology in its construction and shall be rated at 100% above worst case ratings (26% below nominal) without any adverse affects. The regulation system shall respond to a change in the input voltage within one cycle.

4.7 Bypass Switch (Regulation Only)

A manually operated bypass switch shall be provided in the event that the electronic control circuit fails. The switch shall select the 100% tap of the transformer to provide nominal voltage to the load.

4.8 Internal Wiring

All internal wiring shall be UL listed appliance wire or power wiring of multi-stranded construction. Secondary and primary power wiring from the transformer shall not be in close proximity of each other.

4.9 Indicator

The following indicator shall be provided:

1. Power "On"

This indicator shall be lit any time power is available to the Life Line.

4.10 Single Point Ground (SPG)

A single point ground bus shall be provided and shall be of copper construction. Minimum thickness shall be 1/4"X 1/4" and be silver plated to provide connection of the lowest possible resistance to all ground wires secured to the SPG. The following shall be grounded to the SPG:

1. Equipment grounds.
2. Neutral of isolation transformer.
3. Core of the transformer.
4. Primary and secondary shields.
5. Base.
6. Equipment grounding conductor from the branch circuit.
7. All output conduits through the output conduit mounting plate.
8. The input cord grounding conductor.
9. The equipment grounding lug (local code requirements).
10. Case.

4.11 Output Receptacle(s)

One or more output receptacles shall be provided. The Life Line shall be so constructed to accommodate either receptacles or output cables with optional receptacles. Each circuit shall have a separate equipment ground bus and neutral bus for each. Equipment ground buses shall not be shared between output circuits. The Life Line shall be capable of a maximum of four (4) duplex circuits or two (2) simplex circuits and shall accommodate both locking and non-locking receptacles up to the maximum rating of the CP-3.

4.12 Output Interconnect Cables (OPTIONAL)

Construction of the optional output cables shall be armored cable type DP, the output cable shall be UL listed as a field installed option and shall contain a parity ground for noise reduction. Isolated ground (I.G.) receptacles shall be grounded with a separate ground wire that shall be green with a yellow stripe. A separate ground bus shall be provided for the I.G. ground and shall be grounded to the single point ground bus in the Life Line. The output cable(s) shall be of liquid tight construction and be labeled as to circuit number, type, rating and length at each end. An optional output cord can be used as an extension cord for up to 150 feet. This option shall be UL listed as a field installable option.

5.0 Electrical Characteristics

5.1 60 Hz Frequency Units

1. Output Rating, kVA: 1, 1.5, 2, 2.5, 3
2. Input Voltage: 120, 208, 240 VAC, single phase
3. Output Voltage: 120, 120/240 VAC, single phase

- 4. Input Frequency Tolerance: 60 Hz \pm 3 Hz
- 5.2 50 Hz Frequency Units
 - 1. Output Rating, kVA: 1, 1.5, 2, 2.5, 3
 - 2. Input Voltage: 220 VAC, single phase
 - 3. Output Voltage: 220 VAC, single phase
 - 4. Input Frequency Tolerance: 50 Hz \pm 3 Hz
- 5.3 Transformer
 - 1. Type: Dry, isolation, dual shield, copper wound, single phase, computer grade
 - 2. Impedance: 3% to 5% maximum
 - 3. Efficiency: 96% @ full load
 - 4. Load Power Factor: Unity to 0.3 leading or lagging
 - 5. Harmonic Distortion: < 1% maximum added
 - 6. Waveform Distortion at Tap Switching: < 1%
 - 7. Noise rejection (typical): Common mode -120 dB (0.1 Hz to 10 MHz)
Normal Mode -60 dB / decade (1 KHz to 10 Mhz)
- 5.4 Audible Noise: Meets or Exceeds NEMA Standard
- 5.5 Input Voltage Regulation: + 7% to - 23% of nominal
- 5.6 Output Voltage Regulation: \pm 5% typical, \pm 6% for all load and line conditions
- 5.7 Response Time: 1 cycle typical
- 5.8 Output Rating: Continuous regardless of line / load conditions
- 5.9 Overload Inrush Rating: 200% of full load for 10 seconds
1000% of full load for 1 cycle

6.0 Physical Characteristics

- 6.1 Dimensions:
Height: 10.5", Width: 11.0", Depth: 16.0"

- 6.2 Weight:
- 1.0 kVA Life Line: 56 lbs.
 - 1.5 kVA Life Line: 59 lbs.
 - 2.0 kVA Life Line: 73 lbs.
 - 2.5 kVA Life Line: 76 lbs.
 - 3.0 kVA Life Line: 80 lbs.

7.0 Operating Environment

- 7.1 Temperature:
- 1. 32°F to 104°F (0° C to 40° C) for continuous operation at full load conditions.
 - 2. 32°F to 122°F (0° C to 50° C) for 3 hours of continuous operation at full load conditions.
- 7.2 Operating Humidity: 10% to 95% relative humidity, non-condensing.
- 7.3 Altitude: 0 to 7000 feet

8.0 Storage Environment

- 8.1 Temperature: -4°F to 140°F (-20° C to 60° C)
- 8.2 Humidity : 0% to 95% relative humidity, non-condensing.

9.0 Warranty

The manufacturer shall warrant the CP-3 to be free from defects in both material and workmanship for a period of 24 months from the time of installation or 30 months after shipment which ever occurs first.

10.0 Manufacturer's Qualifications

The CP-3 shall be furnished by a manufacturer who specializes in the manufacturing of Power Distribution Systems with power regulation / conditioning and has been in business for at least 15 documented years, and with a nationwide service organization. The manufacturer shall be an ISO9001 certified company.

11.0 Qualified Systems

The unit shall be a Life Line manufactured by Crucial Power Inc.:

5701 Smithway Street
City of Commerce, CA 90040

LIFE LINE PRODUCT SPECIFICATION FOR A 3 TO 15 KVA, SINGLE PHASE, POWER DISTRIBUTION SYSTEM WITH REGULATION AND CONDITIONING

1.0 General

This specification covers the electrical characteristics and general requirements for a single phase power distribution system with power regulation / conditioning. The specified equipment herein shall be referred to as a "Life Line". The Life Line shall consist of a single phase power regulation and distribution unit. The Unit includes all components and systems required to install, operate and maintain the system.

2.0 Applicable Documents

- 2.1 The National Electrical Code NFPA 1970 (latest edition).
- 2.2 American National Standards Institute Corporation 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 Electrotechnical Commission Recommendation "Safety of Data Processing Equipment".
- 2.5 VDE 0804/3.77 Verbrauch Deutscher Electrotechniker 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 Verbrauch Deutscher Electrotechniker Standard "Safety Design".
- 2.8 CSA 22.1 Canadian Standards Association, "Data Processing Equipment".
- 2.9 NEMA National Electrical Manufacturers 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.

3.0 Major Components

The basic components of the Life Line shall consist of an input power cord, input main circuit breaker, base, case, isolation transformer, regulating electronics, bypass switch, internal wiring, indicators, single point ground, input and output filters, EMI shielding, output circuit protection and mounting plates for output receptacles or output cables and other optional features.

4.0 System Package and Construction

4.1 Agency Approval

The Life Line shall be UL listed under standard 1950.

4.2 Input Power Cord

The input power cord shall be 3 conductor "SO" type, UL listed. Electrical conductors shall be sized to carry 125% of full load capability of the Life Line. The ground conductor shall be full sized. An input power plug shall be provided on units rated under 50 Amps. The input power cord shall be a minimum of 6 feet.

4.3 Input Main Circuit Breaker (IMCB)

The Life Line shall be equipped with a input main circuit breaker. A 24 volt shunt trip coil is available as an option. 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 10,000 AIC rating. Provisions for higher interrupting capacity shall be incorporated into the design to accommodate this type of breaker if required. The IMCB shall be UL listed.

4.4 Cabinet

The cabinet shall consist of the following:

1. Caster base

The base shall be of heavy gage sheet metal of a minimum of 14 gage. Each caster base shall be plated gold zinc wash. The caster base shall be supported by four (4) swivel casters.

2. Internal sheet metal

All internal sheet metal, attached to the caster base shall be plated zinc wash to ensure RFI, EMI susceptibility is reduced to an absolute minimum. Minimum thickness shall be 16 gage.

3. Access (top only)

A removable top / side panel shall be provided. Access to the IMCB and output distribution circuit breakers shall be through a removable top / side panel access plate and provisions shall be made for adding output cables and associated circuit breakers to the Life Line. All exposed access screws shall be black oxide plated. Convection cooling is accomplished by mesh screening on both side panels of the power conditioner.

4.5 Isolation Transformer

A double-shield, multi-tapped, all copper, baked varnish, convection cooled, single phase, isolation transformer shall be provided. Construction of the transformer shall separate the primary connections and the secondary connections by placing them on opposite sides of the core. The isolation transformer shall be mounted on rubber isolation pads to prevent 60 Hz hum of the core from being transmitted to the base. The transformer core clamp shall be grounded to the base through a 1" copper strap. The transformer insulation system shall be 220°C. Taps shall be provided on the primary to accommodate standard NEMA voltages up to 240 VAC. Access to these taps for field modification shall be by removal of the top / side cover.

4.6 Regulation Electronics

A solid state, electronic, zero current crossing, tap-switching regulation system shall be provided. This technology shall use SCR (silicon controlled rectifier) technology in its construction and shall be rated at 200% above worst case ratings (26% below nominal) without any adverse affects. The regulation system shall respond to a change in the input voltage within one cycle.

4.7 Bypass Switch (Regulation Only)

A manually operated bypass switch shall be provided in the event that the electronic control circuit fails. The switch shall select the 100% tap of the transformer to provide nominal voltage to the load.

4.8 Internal Wiring

All internal wiring shall be UL listed appliance wire or power wiring of multi-stranded construction. Secondary and primary power wiring from the transformer shall not be in close proximity of each other.

4.9 Indicators

The following indicators shall be provided:

1. Power "On" :

This indicator shall be lit any time power is available to the Life Line.

2. Tap selection:

Tap selection indicators shall be provided, one for each tap. The tap currently being selected by the control electronics shall be illuminated.

4.10 Single Point Ground (SPG)

A single point ground bus shall be provided and shall be of copper construction. Minimum thickness shall be 1/4" X 1/4" and be silver plated to provide connection of the lowest possible resistance to all ground wires secured to the SPG. The following shall be grounded to the SPG:

1. Equipment grounds.
2. Neutral of isolation transformer.
3. Core of the transformer.
4. Primary and secondary shields.
5. Base.
6. Equipment grounding conductor from the branch circuit.
7. All output conduits through the output conduit mounting plate.
8. The input cord grounding conductor.
9. The equipment grounding lug (local code requirements).
10. Case.
11. Regulation electronics.

4.11 Output Receptacle(s)

One or more output receptacles shall be provided. The Life Line shall be so constructed to accommodate either receptacles or output cables with optional receptacles. Each circuit shall have a separate equipment ground bus and neutral bus for each. Equipment ground buses shall not be shared between output circuits. The Life Line shall be capable of a maximum of twelve (12) duplex circuits or six (6) simplex circuits and shall accommodate both locking and non-locking receptacles up to the maximum rating of the Life Line.

4.12 Output Interconnect Cables (OPTIONAL)

Construction of the optional output cables shall be armored cable type DP, the output cable shall be UL listed as a field installed option and shall contain a parity ground for noise reduction. Isolated ground (I.G.) receptacles shall be grounded with a separate ground wire that shall be green with a yellow stripe. A separate ground bus shall be provided for the I.G. ground and shall be grounded to the single point ground bus in the Life Line. The output cable(s) shall be of liquid tight construction and be labeled as to circuit number, type, rating and length at each end. An optional output cord can be used as an extension cord for up to 150 feet. This option shall be UL listed as a field installable option.

4.13 Remote Emergency Power Off Interface - REPO (OPTIONAL)

Provisions shall be made to interface a REPO to the Life Line to provide emergency power off capability. A 3 terminal DIN connector shall be provided and identified.

5.0 Electrical Characteristics

5.1 60 Hz Frequency Units

1. Output Rating, kVA: 3, 5, 8, 10, 15
2. Input Voltage: 120 VAC (3, 5, 8 KVA only) or 208/220/240 VAC all models, single phase
3. Output Voltage: 120 or 240/120 VAC, single phase
(other voltages available, consult factory)
4. Input Frequency Tolerance: 60 Hz \pm 3 Hz

5.2 50 Hz Frequency Units

1. Output Rating, kVA: 3, 5, 8, 10, 15
2. Input Voltage: 220 VAC, single phase
3. Output Voltage: 220 VAC, single phase
4. Input Frequency Tolerance: 50 Hz \pm 3 Hz

5.3 Transformer

1. Type: Dry, isolation, dual shield, copper wound, single phase, computer grade
2. Impedance: 3% to 5% maximum
3. Efficiency: 96% @ full load
4. Load Power Factor: Unity to 0.3 leading or lagging
5. Harmonic Distortion: < 1% maximum added
6. Waveform Distortion at Tap Switching: < 1%
7. Noise rejection (typical): Common mode -120 dB (0.1 Hz to 10 MHz)
Normal mode -60 dB / decade (1 KHz to 10 MHz)

5.4	Audible Noise:	Meets or exceeds NEMA standards
5.5	Input Voltage Regulation:	+ 10% to - 26% of nominal
5.6	Output Voltage Regulation:	± 3% typical; ± 4% for all load and line conditions
5.7	Response Time:	1 cycle typical
5.8	Output Rating:	Continuous regardless of line / load conditions
5.9	Overload Inrush Rating:	200% of full load for 10 seconds 1000% of full load for 1 cycle

6.0 Physical Characteristics

6.1 Dimensions:

Height: 19.5", Width: 14.5", Depth: 25.5"

6.2 Weight:

3 kVA Life Line: 115 lbs.

5 kVA Life Line: 140 lbs.

8 kVA Life Line: 210 lbs.

10 kVA Life Line: 230 lbs.

15 kVA Life Line: 280 lbs.

7.0 Operating Environment

7.1 Temperature:

1. 32° F to 104° F (0° C to 40° C) for continuous operation at full load conditions
2. 32° F to 122° F (0° C to 50° C) for three (3) hours of continuous operation at full load conditions

7.2 Humidity: 10% to 95% relative humidity, non-condensing

7.3 Altitude: 0 to 7000 feet

8.0 Storage Environment

8.1 Temperature: -4° F to 140° F (-20° C to 60° C)

8.2 Humidity: 0% to 95% relative humidity, non-condensing

9.0 Warranty

The manufacturer shall warrant the Life Line to be free from defects in both material and workmanship for a period of 24 months from the time of installation or 30 months after shipment which ever occurs first.

10.0 Manufacturer's Qualifications

The Life Line shall be furnished by a manufacturer who specializes in the manufacturing of Power Distribution Systems with power regulation / conditioning and has been in business for at least 15 documented years, and with a nation wide service organization. The manufacturer shall be an ISO9001 certified company.

11.0 Qualified Systems

The unit shall be a Life Line manufactured by Crucial Power:

5701 Smithway Street
City of Commerce, CA 90040