**Power Protection and Conditioning**

### 2/50 Voltage Wave
Voltage surge with a virtual front time of 1.2 ms and a time to half-value of 50 ms delivered across an open circuit.

### 8/20 Current Wave
Current surge with a virtual front time of 8 μs and a time to half-value of 20 μs delivered into a short circuit.

### AC (Alternating Current)
Current that reverses direction in response to voltage that is changing polarity.

### AC Power Interface
The electrical points where an SPD is electrically connected to the AC power system.

### Active Tracking® Filter
A Surge Suppressor/Electrical Noise filter device, that suppresses both transient and Low voltage electrical noise found on the AC line.

### Active Tracking® Filter Plus:
A device that both divert or clamp high amplitude transients, and attenuate low-energy, high frequency noise.

### Air-Cooled
A product cooled by the natural circulation of air.

### Ambient Noise Level
The sound level of the area measured in decibels.

### Ambient Temperature
The temperature of the air surrounding a product.

### Ampacity
The current-carrying capacity of an electrical conductor or device.

### Ampere
The practical unit of electric current.

### Attenuation
Decrease in signal voltage or power.

### Autotransformer
A transformer in which part of one winding is common to both the primary and secondary circuits associated with that winding.

### Banked
Two or more transformers connected together to increase kVA.

### Basic Impulse Level (BIL)
A measure of the ability of the insulation system to withstand very high voltage surges. For example, a 600-volt class transformer has a 10 kV BIL rating.

### Battery Run Time
The amount of time (in minutes) a battery system can support a load.

### Blackout
Slang term for the total loss of electrical power for more than one minute.

### Breakdown Voltage
The maximum AC or DC voltage which may be applied from input to output and/or chassis of a power supply. See Hi-Pot.

### Brownout
Slang term for an extended voltage reduction (more than a few cycles) of more than 10%.

### Bypass
A mechanical or electronic switch to provide an alternate path for the line current.

### CBEMA

### CE Mark
(Conformité Européenne) - A marking that shows the product meets the fundamental safety, health, environmental and consumer protection requirements of the European Community.

### Chassis
The metal framework or case in which an electrical circuit or system is constructed.

### Combination Wave
Also called combination surge. A surge delivered by a generator which has the inherent capability of applying a 1.2/50 ms voltage wave across an open circuit and delivering an 8/20 ms current wave into a short circuit. The exact wave that is delivered is determined by the generator's fictive impedance.

### Common-Mode Noise
Noise that occurs between the current carrying conductors and ground.

### Compensated Transformer
A transformer with a turn's ratio that demands operation at a constant load for an indefinite period of time.

### CBEMA

### Constant Voltage Power Supply
A power supply that regulates its output voltages for changes in line, load, ambient temperature and time.

### Constant Voltage Transformer (CVT)
A power conditioner that provides a stable and regulated sinewave output voltage.

### Continuous Duty
The service requirement that demands operation at a constant load for an indefinite period of time.

### Control Transformer
Usually referred to as an Industrial Control transformer. Designed for good voltage regulation characteristics when low power factor and large inrush currents are drawn (5 to 15 times normal).

### Conductor Losses
Losses in the transformer winding that are incidental to the carrying of the load. These losses include those due to resistance as well as to stray and eddy currents.

### Core
The steel that carries the magnetic flux in a transformer.

### Core Loss
Losses caused by a magnetization of the core.

### Crest Factor
The ratio of the peak value and RMS value of a voltage or current waveform.

### Cross-Regulation
In a multiple output power supply, the percent voltage change at one output caused by the load change on another output.

---

Visit our website at [www.emerson.com](http://www.emerson.com) or contact Technical Services at (800) 377-4384 with any questions. © January 2017
Crowbar
An overvoltage protection circuit which rapidly places a low resistance shunt across the power supply output terminals if a predetermined voltage is exceeded.

CSA
Canadian Standard Association

Current Limiting
See Output Current Limiting.

DC
(Direct Current) Current that flows in only one direction.

Decibel (db)
A unit used to express the magnitude of a change in signal or sound level, either an increase or decrease.

Delta Connection
A method used for connecting the three windings of a three-phase transformer (or three single-phase transformers). The windings are connected in series, the three-phase supply being taken from or supplied to the junctions.

Delta-Wye
The method of connection for both primary and secondary windings of a three-phase transformer bank.

Derating
The specified reduction in an operating parameter to improve reliability.

Differential Mode Noise
Noise that occurs between the current carrying conductors.

DIN Rail
A standard rail (typically 35 mm wide) that mounts to the chassis and allows other electrical components to be installed and replaced easily.

Distribution Transformer
Any transformer rated between 3 and 500 kVA and a primary voltage of 601 volts or less.

Double Conversion UPS
See On-line UPS

Double Wound Transformer
A transformer with double wound coils on both the primary and secondary.

Drift
The change in output voltage of a power supply over a specified period of time, following a warm-up period, with all other operating parameters such as line, load, and ambient temperature held constant.

Drive Isolation Transformer
A transformer designed to withstand the additional heat and mechanical stress caused by DC drives.

Dry Type Transformer
A transformer cooled by a medium other than a liquid, usually through the circulation of air.

Dry Type Transformer
A transformer cooled by a medium other than a liquid, usually through the circulation of air.

Dynamic Load Regulation
The ratio of change in output voltage to change in load current.

Eddy Currents
Additional currents caused by a magnetic field.

Efficiency
A measure of energy loss in a circuit.

Electronic Tap Changing Regulator
An electronic switching system used to adjust for changes in line voltage to maintain the output voltage within acceptable levels.

Electrostatic Shield
A grounded conductor placed between the primary and secondary winding to greatly reduce or eliminate line-to-line or line-to-ground noise. Often referred to as a “Faraday shield”.

EMC
(Electromagnetic Compatibility) A directive necessary to get the CE Mark, which shows the electrical device will not create high levels of EMI and will not fail due to normal levels of EMI.

Encapsulated
A method of sealing a device with epoxy to resist environmental effects.

ESR
Equivalent Series Resistance.

Foldback Current Limiting
A power supply output protection circuit whereby the output current decreases with increasing overload, reaching a minimum at short circuit.

Force Air Cooled
A means of accelerating heat dissipation to lower the temperature rise of an electrical device.

Forward Converter
A power supply switching circuit in which energy is transferred to the transformer secondary when the switching transistor is on. In this circuit minimal energy is stored in the transformer.

Frequency (Hertz)
Cycles per second.
Power Protection and Conditioning

**Full Bridge Rectifier**
A power switching circuit in which four diodes are connected in a bridge configuration.

**Ground Loop**
The condition of having two or more ground references in a common system.

**Half Bridge Rectifier**
A power switching circuit similar to the full bridge converter except that only two diodes are used.

**Harmonics Distortion**
The distortion of the AC waveform due to the addition of sinewaves of different frequencies being added to the AC voltage.

**Hi-Pot Test**
High Potential Test. A test to determine if the breakdown voltage of a transformer or power supply exceeds the minimum requirement.

**Holdup Time**
The length of time a power supply’s output voltage remains within specifications following the loss of input power.

**Impulse**
A high amplitude, short duration spike (milliseconds) superimposed on the normal voltage or current.

**Input Line Filter**
A low-pass or band-reject filter at the input of a power supply which reduces line noise fed to the supply. This filter may be external to the device.

**Input Voltage Range**
The high and low input voltage limits within which a device meets its specifications.

**Inrush Current**
The peak instantaneous input current drawn by a device at turn-on.

**Inrush Current Limiting**
A circuit which limits the inrush current during turn-on of a device.

**Inverter**
A power converter that changes DC input power into AC output power.

**Isolation Transformer**
A transformer in which the input winding and the output winding are not electrically connected.

**Isolation**
The electrical separation between input and output of a circuit.

**Isolation Voltage**
The rated AC or DC voltage which may be continuously applied from input to output and/or chassis of a device. See Hi-Pot.

**kVA Rating**
A measurement of apparent power. 1 kVA = 1000 VA.

**KW Rating (kilowatts)**
A measurement of real power delivered to a load 1 KW = 1000 VA x Power Factor

**Leakage Current**
The AC or DC current flowing from input to output and/or chassis of an isolated device at a specified voltage.

**Line Regulation**
The change in output voltage due to a variation in input voltage.

**Linear Power Supply**
A power supply that uses a control device, like a transistor, in series (or parallel) with the load. The control device adjusts the effective resistance to give a constant voltage output.

**Linear Regulator**
See Linear Power Supply.

**Load Regulation**
The change in output voltage due to a variation in load.

**Local Sensing**
Using the power supply output voltage terminals as the sense points to provide feedback to the voltage regulator.

**Low Voltage Transients**
High frequency noise

**LVD**
Acronym for Low Voltage Directive. A European Community directive which shows the device is not a shock or fire hazard.

**Maximum Continuous Operating Voltage (MCOV)**
The maximum designated rootmean-square (rms) value of the power frequency voltage that may be continuously applied to the mode of protection of an SPD.

**Modes of Protection**
Electrical paths where the SPD offers defense against transient overvoltages. Examples include Line to Neutral (L-N), Line to Ground (L-G), Line to Line (L-L) and Neutral to Ground (N-G).

**MOV**
Acronym for Metal-Oxide-Varistor. A voltage sensitive device used to limit overvoltage conditions on AC power and data lines.

**Hi-Pot**
See Hi-Pot.

**Hi-Pot Test**
A test to determine if the breakdown voltage of a transformer or power supply exceeds the minimum requirement.

**Isolation**
The electrical separation between input and output of a circuit.

**Isolation Transformer**
A transformer in which the input winding and the output winding are not electrically connected.

**Isolation Voltage**
The rated AC or DC voltage which may be continuously applied from input to output and/or chassis of a device. See Hi-Pot.

**kVA Rating**
A measurement of apparent power. 1 kVA = 1000 VA.

**KW Rating (kilowatts)**
A measurement of real power delivered to a load 1 KW = 1000 VA x Power Factor

**Leakage Current**
The AC or DC current flowing from input to output and/or chassis of an isolated device at a specified voltage.

**Line Regulation**
The change in output voltage due to a variation in input voltage.

**Linear Power Supply**
A power supply that uses a control device, like a transistor, in series (or parallel) with the load. The control device adjusts the effective resistance to give a constant voltage output.

**Linear Regulator**
See Linear Power Supply.

**Load Regulation**
The change in output voltage due to a variation in load.

**Local Sensing**
Using the power supply output voltage terminals as the sense points to provide feedback to the voltage regulator.

**Low Voltage Transients**
High frequency noise

**LVD**
Acronym for Low Voltage Directive. A European Community directive which shows the device is not a shock or fire hazard.

**Maximum Continuous Operating Voltage (MCOV)**
The maximum designated rootmean-square (rms) value of the power frequency voltage that may be continuously applied to the mode of protection of an SPD.

**Modes of Protection**
Electrical paths where the SPD offers defense against transient overvoltages. Examples include Line to Neutral (L-N), Line to Ground (L-G), Line to Line (L-L) and Neutral to Ground (N-G).

**MOV**
Acronym for Metal-Oxide-Varistor. A voltage sensitive device used to limit overvoltage conditions on AC power and data lines.

**Hi-Pot Test**
High Potential Test. A test to determine if the breakdown voltage of a transformer or power supply exceeds the minimum requirement.

**Holdup Time**
The length of time a power supply’s output voltage remains within specifications following the loss of input power.

**Impulse**
A high amplitude, short duration spike (milliseconds) superimposed on the normal voltage or current.

**Input Line Filter**
A low-pass or band-reject filter at the input of a power supply which reduces line noise fed to the supply. This filter may be external to the device.

**Input Voltage Range**
The high and low input voltage limits within which a device meets its specifications.

**Inrush Current**
The peak instantaneous input current drawn by a device at turn-on.

**Inrush Current Limiting**
A circuit which limits the inrush current during turn-on of a device.

**Inverter**
A power converter that changes DC input power into AC output power.

**Isolation Transformer**
A transformer in which the input winding and the output winding are not electrically connected.

**Isolation**
The electrical separation between input and output of a circuit.

**Isolation Voltage**
The rated AC or DC voltage which may be continuously applied from input to output and/or chassis of a device. See Hi-Pot.

**kVA Rating**
A measurement of apparent power. 1 kVA = 1000 VA.

**KW Rating (kilowatts)**
A measurement of real power delivered to a load 1 KW = 1000 VA x Power Factor

**Leakage Current**
The AC or DC current flowing from input to output and/or chassis of an isolated device at a specified voltage.

**Line Regulation**
The change in output voltage due to a variation in input voltage.

**Linear Power Supply**
A power supply that uses a control device, like a transistor, in series (or parallel) with the load. The control device adjusts the effective resistance to give a constant voltage output.

**Linear Regulator**
See Linear Power Supply.

**Load Regulation**
The change in output voltage due to a variation in load.

**Local Sensing**
Using the power supply output voltage terminals as the sense points to provide feedback to the voltage regulator.

**Low Voltage Transients**
High frequency noise

**LVD**
Acronym for Low Voltage Directive. A European Community directive which shows the device is not a shock or fire hazard.

**Maximum Continuous Operating Voltage (MCOV)**
The maximum designated rootmean-square (rms) value of the power frequency voltage that may be continuously applied to the mode of protection of an SPD.

**Modes of Protection**
Electrical paths where the SPD offers defense against transient overvoltages. Examples include Line to Neutral (L-N), Line to Ground (L-G), Line to Line (L-L) and Neutral to Ground (N-G).

**MOV**
Acronym for Metal-Oxide-Varistor. A voltage sensitive device used to limit overvoltage conditions on AC power and data lines.

**Hi-Pot Test**
High Potential Test. A test to determine if the breakdown voltage of a transformer or power supply exceeds the minimum requirement.

**Holdup Time**
The length of time a power supply’s output voltage remains within specifications following the loss of input power.

**Impulse**
A high amplitude, short duration spike (milliseconds) superimposed on the normal voltage or current.

**Input Line Filter**
A low-pass or band-reject filter at the input of a power supply which reduces line noise fed to the supply. This filter may be external to the device.

**Input Voltage Range**
The high and low input voltage limits within which a device meets its specifications.
**Overshoot**
A transient change in output voltage, in excess of specified output accuracy limits, which can occur when a power supply is turned on or off, or when there is a step change in line or load.

**OVP**
Acronym for Overvoltage Protection. A power supply feature which shuts down the supply, or crowbars or clamps the output, when its voltage exceeds a preset level.

**Parallel Operation**
The connection of the outputs of two or more identical devices to obtain a higher output power.

**PARD**
Acronym for Periodic and Random Deviation. A term used for the sum of all ripple and noise components measured over a specified bandwidth and stated in either peak-to-peak or RMS values.

**PE**
Acronym for Protective Earthing. The incoming earthing conductor provided by the utility.

**PI Filter**
A commonly used filter at the input of a switching supply or DC/DC converter to reduce reflected ripple current. The filter usually consists of two parallel capacitors separated by a series inductance and is generally built into the supply.

**Post Regulator**
A linear regulator used on the output of a switching power supply to improve line and load regulation and reduce output ripple voltage.

**Power Boost™**
Describes the advanced overload capability of the SDN and SDP power supplies to power high inrush loads without oversizing.

**Power Factor**
The ratio of true power Watts) to apparent power (VA).

**Power Fail Detection**
A power supply option which monitors the input voltage and provides an isolated logic output signal when there is loss of line voltage.

**Pre-regulation**
The regulation at the front-end of a power supply, generally by a type of switching regulator, this is followed by output regulation, either by a linear or switching type regulator.

**PWM Inverter**
Acronym for Pulse Width Modulation. An efficient method of creating sinewave power.

**Push-Pull Converter**
A power switching circuit which uses a center-tapped transformer and two power switches which are driven on and off alternately. This circuit does not provide regulation by itself.

**Rated Output Current**
The continuous load current that a device was designed to provide.

**Rectification**
The conversion of alternating current to direct current.

**Redundancy**
The addition of extra devices to provide a backup in the event of the loss of one of those devices.

**Remote Sensing**
The ability for a power supply to sample the load voltage located a distance away, and adjust for the resulting voltage drop.

**Return**
The name for the common terminal of the output of a power supply; it carries the return current for the outputs.

**Reverse Voltage Protection**
A feature which protects a power supply against a reverse voltage applied at the input or output terminals.

**Ripple**
A small AC voltage on the DC output of a power supply that remains after filtering.

**Ripple and Noise Perturbations**
Small AC voltage on the output of a DC power supply at a specified bandwidth. This is the result of feed through of the rectified line frequency, internal switching transients and other random noise.

**Sag**
A temporary drop in the RMS voltage, which may last from one cycle to a few seconds.

**Switching Frequency**
The rate at which the voltage is switched in a DC-DC converter or switching power supply.

**Switching Regulator**
A high efficiency circuit used to regulate output voltages.

**Switchmode Power Supplies (SMPS)**
A power supply that uses a switching regulator.

**Temperature Coefficient**
The average percent change in output voltage per degree Centigrade change in ambient temperature over a specified temperature range.

**Temperature Range, Operating**
The ambient temperature range within which a device may be safely operated and meets its specifications.
Power Protection and Conditioning

Temperature Range, Storage
The ambient temperature range within which a device may be safely stored, non-operating, with no degradation in its subsequent operation.

Thermal Protection
An internal safeguard circuit that shuts down the unit in the event of excess internal temperatures.

THD
Acronym for Total Harmonic Distortion. The ratio of the harmonic content to the fundamental frequency expressed as a percent of the fundamental.

Transfer Time
The amount of time a device takes to switch from one mode of operation to another.

Transformer
An electrical device that changes AC voltage from one level to another.

Transformer Turns Ratio
The ratio of primary turns to secondary turns.

Transient
A high amplitude, short duration (milliseconds) spike superimposed on the normal voltage or current. Sometimes called a spike or a surge.

Transient Recovery Time
The time required for the output voltage of a device to settle within specified output accuracy limits following a step change in output load current or a step change in input voltage.

Transverse Mode Noise
See Differential Mode Noise.

TVSS
Transient Voltage Surge Suppressor. Also known as SPD

UL
Acronym for Underwriters Laboratories tested.

UL Recognized
Designation given to components that when used properly in an end product are deemed to be safe.

UL Listed
Designation given to products ready for end use.

Undervoltage
See Brownout.

UPS
Acronym for Uninterruptible Power Supply. A device which supplies power to the critical load when the existing AC line voltage is not within normal operating values, or fails completely.

VA
Acronym for Voltamp. A measure of power. 1000 VA = 1 kVA.

VFD
Variable Frequency Drive.

Voltage Balance
The difference in magnitude, in percent, between the two output voltages of a dual output power supply where the voltages have equal nominal values with opposite polarities.

Warm-Up Time
The time required, after initial turn-on, for a device to meet its performance specifications.

Warm-Up Drift
The initial change in output voltages of a device from turn-on until it reaches thermal equilibrium.