

Fourth Edition

Newly Revised and Expanded

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Standard Dictionary of

Elec and

Electronics

Terms

PLUS A UNIQUE FEATURE
OVER 10,000 ACRONYMS DEFINED

The largest current list of acronyms
used in electrical and electronics science,
business and industry, government,
and the military.

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MOSAID Technologies Inc.
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Technologies Inc.
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SH12070

(3) (magnetic amplifier). The ratio of differential output voltage to differential control voltage. 171

voltage and power directional relay (92) (power system device function numbers). A relay that permits or causes the connection of two circuits when the voltage difference between them exceeds a given value in a predetermined direction and causes these two circuits to be disconnected from each other when the power flowing between them exceeds a given value in the opposite direction. 402

voltage and pressure levels (loudness ratings of telephone connections). Voltage and pressure levels (V_T , V_w , S_E , and S_M) as used in definitions of this section are measured (as described in Section 5 of ANSI/IEEE Std 661-1979) or computed (as described in Section 6 of this standard). 409

voltage attenuation. See: attenuation, voltage.

voltage at the instant of chopping (high voltage testing) (chopped impulses). The voltage at the instant of chopping is the voltage at the instant of the initial discontinuity. 150

voltage balance relay (power switchgear). A balance relay which operates by comparing the magnitudes of two voltage inputs. 103

voltage buildup (rotating machinery). The inherent establishment of the excitation current and induced voltage of a generator. 63

voltage circuit (1) (ac high-voltage circuit breaker). That part of the synthetic test circuit from which the major part of the test voltage is obtained. 426

(2) (instrument). That combination of conductors and windings of the instrument to which is applied the voltage of the circuit in which a given electrical quantity is to be measured, or a definite fraction of that voltage, or a voltage or current dependent upon it. See: instrument; moving element (instrument); watthour meter. 280

voltage clamp (converter circuit elements)(self-commutated converters). A clamp that limits the peak voltage across a semiconductor device. 584

voltage clamping ratio (low voltage varistor surge arresters). A figure of merit measure of the varistor voltage clamping effectiveness as determined by the ratio of clamping voltage to rated root-mean-square (rms) voltage, or by the ratio of clamping voltage to rated direct-current (dc) voltage. 62

voltage class (power cables). See: medium voltage power cable; low-voltage power cable; control cable; low-level analog signal cable; low-level digital signal circuit cable.

voltage classes. See: voltage classes chart below.

voltage class, rated nominal. See: rated nominal voltage class.

voltage coefficient of capacitance (nonlinear capacitor). The derivative with respect to voltage of a capacitance characteristic, such as a differential capacitance characteristic or a reversible capacitance characteristic, at a point, divided by the capacitance at that point. See: nonlinear capacitor. 191

VOLTAGE CLASSES NOMINAL SYSTEM VOLTAGE			
TWO WIRE	THREE WIRE	FOUR WIRE	MAXIMUM VOLTAGE ¹
Single-Phase Systems			
(120)	120/240		127 127/254
Three-Phase Systems			
	(240) 480 (600)	208Y/120 240/120 480Y/277	220Y/127 245/127 508Y/293 635
	(2400) 4160 (4800) (6900)	4160Y/2400 (8320Y/4800) (12000Y/6930) 12470Y/7200 13200Y/7620 13800Y/7970 (20780Y/12000) (22860Y/13200)	2540 4400Y/2540 5080 7260 8800Y/5080 12700Y/7330 13200Y/7620 13970Y/8070 14520Y/8380 22000Y/12700 24200Y/13970 24340 26400Y/15240 36510Y/21080
	13800 (23000) (34500)	24940Y/14400 34500/19920	
HIGHER VOLTAGE SYSTEMS			
	(46 kV) 69 kV 115 kV 138 kV (161 kV) 230 kV		48.3 kV 72.5 kV 121 kV 145 kV 169 kV 242 kV
	345 kV ² 500 kV ² 765 kV ²		362 kV 550 kV 800 kV
	1100 kV ²		1200 kV

1978

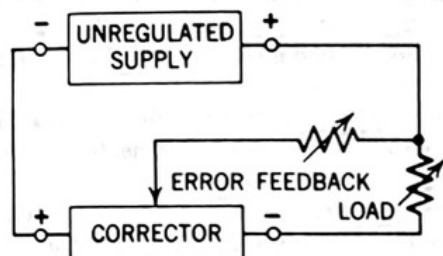
Preferred nominal voltages as shown without parentheses ().

1. Voltage class designations applicable to industrial and commercial power systems, adapted by IEEE Standards Board (LB 100A-April 23, 1975).
2. Typical nominal system voltage.
3. A comprehensive list of minimum and maximum voltage ranges is given in ANSI C84.1-1977.

voltage, common mode (surge withstand capability tests). The voltage common to all conductors of a group as measured between that group at a given location and an arbitrary reference (usually earth).

voltage-controlled oscillator (VCO) (radar). An oscillator whose frequency is a function of the voltage of an input signal. 13

voltage corrector (power supplies). An active source of regulated power placed in series with an unregulated supply to sense changes in the output voltage (or current); also to correct for the changes by automatically varying its own output in the opposite direction, thereby maintaining the total output voltage (or current) constant. See the accompanying figure. 228, 186



Circuit used to sense output voltage changes.

voltage deviation (transient)(converters having ac output)(self-commutated converters). The instantaneous difference between the actual instantaneous voltage and the corresponding value of the previously undisturbed wave form. *Note:* Voltage deviation amplitude is expressed in percent or per unit referred to the peak value of the previously undisturbed voltage. 584

voltage deviation, V_d (electromagnetic site survey). The ratio of the root-mean-squared envelope voltage to the average envelope of a signal expressed in decibels. 457

voltage directional relay (91) (power system device function numbers). A relay that operates when the voltage across an open circuit breaker or contactor exceeds a given value in a given direction. 402

voltage divider. A network consisting of impedance elements connected in series, to which a voltage is applied, and from which one or more voltages can be obtained across any portion of the network. *Notes:* (1) Dividers may have parasitic impedances affecting the response. These impedances are, in general, the series inductance and the capacitance to ground and to neighboring structures at ground or at other potentials. (2) An adjustable voltage divider of the resistance type is frequently referred to as a potentiometer. 307, 341, 201

voltage doubler. A voltage multiplier that separately rectifies each half cycle of the applied alternating voltage and adds the two rectified voltages to produce a direct voltage whose amplitude is approximately twice the peak amplitude of the applied alternating voltage. *See:* rectifier. 328

voltage drop (1) (general). The difference of voltages at the two terminals of a passive impedance. 63

(2) (supply system). The difference between the voltages at the transmitting and receiving ends of a feeder, main, or service. *Note:* With alternating current the

voltages are not necessarily in phase and hence the voltage drop is not necessarily equal to the algebraic sum of the voltage drops along the several conductors. *See:* alternating-current distribution. 64

voltage efficiency (specified electrochemical process). The ratio of the equilibrium reaction potential to the bath voltage. 328

voltage endurance (rotating machinery). A characteristic of an insulation system, obtained by plotting voltage against time to failure, for a number of samples tested to destruction at each of several sustained voltages. Constant conditions of frequency, waveform, temperature, mechanical restraint, and ambient atmosphere are required. Ordinate scales of arithmetical or logarithmic voltage, and abscissa scales of multicycle logarithmic time, normally give approximately linear characteristics. *See:* asynchronous machine. 63

voltage endurance test (rotating machinery). A test designed to determine the effect of voltage on the useful life of electric equipment. When this test voltage exceeds the normal design voltage for the equipment, the test is voltage accelerated. When the test voltage is alternating and the frequency of alternation exceeds the normal voltage frequency for the equipment, the test is frequency accelerated. *See:* asynchronous machine. 63

voltage, equivalent test alternating (charging inductor). A sinusoidal root-mean-square test voltage equal to 0.707 times the power-supply voltage of the network-charging circuit and having a frequency equal to the resonance frequency of charging. *Note:* This is the alternating component of the voltage that appears across the charging inductor in a resonance-charging circuit of the pulse-forming network. 137

voltage, exciter-ceiling. *See:* exciter-ceiling voltage.

voltage factor (electron tubes). The magnitude of the ratio of the change in one electrode voltage to the change in another electrode voltage, under the conditions that a specified current remains unchanged and that all other electrode voltages are maintained constant. *See:* ON period. 244, 190

voltage/frequency function (converters having ac output)(self-commutated converters). The ratio of output voltage to the fundamental frequency of the output as a function of that frequency. *See:* Appendix C, ANSI/IEEE Std 936-1987. 584

voltage generator (network analysis and signal-transmission system). A two-terminal circuit element with a terminal voltage substantially independent of the current through the element. *Note:* An ideal voltage generator has zero internal impedance. *See:* network analysis; signal. 125

voltage gradient (overhead-power-line corona and radio noise). A vector E equal to and in the direction of the maximum space rate of change of the voltage at the point specified. It is obtained as a vector field by applying the operator ∇ to the scalar voltage function u . Thus if $u = f(x, y, z)$,

$$E = \nabla u = \text{grad } u = i \frac{\partial u}{\partial x} + j \frac{\partial u}{\partial y} + k \frac{\partial u}{\partial z}$$

Notes: (1) Voltage gradient is synonymous with potential gradient and is often referred to simply as "gradient" or "field strength." (2) For alternating voltage, the voltage gradient is expressed as the peak value divided by the square root of two. For sinusoidal voltages, this is the rms value.

voltage impulse. A voltage pulse of sufficiently short duration to exhibit a frequency spectrum of substantially uniform amplitude in the frequency range of interest. As used in electromagnetic compatibility standard measurements, the voltage impulse has a uniform frequency spectrum over the frequency range 25 to 1000 megahertz.

voltage influence (electric instrument). In instruments, other than indicating voltmeters, wattmeters, and varmeters, having voltage circuits, the percentage change (of full-scale value) in the indication of an instrument that is caused solely by a voltage departure from a specified reference voltage. *See: accuracy rating (instrument).*

voltage-injection method (ac high-voltage circuit breaker). A synthetic test method in which the voltage circuit is applied to the test circuit breaker after power frequency current zero.

voltage jump (glow-discharge tube). An abrupt change or discontinuity in tube voltage drop during operation. *Note:* This may occur either during life under constant operating conditions or as the current or temperature is varied over the operating range. *See: gas tube.*

voltage level (data transmission). At any point in a transmission system, the ratio of the voltage existing at that point to an arbitrary value of voltage used as a reference. Specifically, in systems such as television systems, where wave shapes are not sinusoidal or symmetrical about a zero axis and where the arithmetical sum of the maximum positive and negative excursions of the wave is important in system performance, the voltage level is the ratio of the peak-to-peak voltage existing at any point in the transmission system to an arbitrary peak-to-peak voltage used as a reference. This ratio is usually expressed in dBV, signifying decibels referred to one V (volt) peak-to-peak.

voltage limit (industrial control). A control function that prevents a voltage from exceeding prescribed limits. Voltage limit values are usually expressed as percent of rated voltage. If the voltage-limit circuit permits the limit value to increase somewhat instead of being a single value, it is desirable to provide either a curve of the limit value of voltage as a function of some variable such as current or to give limit values at two or more conditions of operation. *See: control system, feedback.*

voltage loss (electric instrument) (current circuits). In a current-measuring instrument, the value of the voltage between the terminals when the applied current

corresponds to nominal end-scale deflection. In other instruments the voltage loss is the value of the voltage between the terminals at rated current. *Note:* By convention, when an external shunt is used, the voltage loss is taken at the potential terminals of the shunt. The overall voltage drop resulting may be somewhat higher owing to additional drop in shunt lugs and connections. *See: accuracy rating (instrument).*

voltage multiplier. A rectifying circuit that produces a direct voltage whose amplitude is approximately equal to an integral multiple of the peak amplitude of the applied alternating voltage. *See: rectifier.*

voltage, nominal (system or circuit). *See: nominal system voltage.*

voltage of a constant current circuit (National Electrical Safety Code). The highest normal full load voltage or the current.

voltage of an effectively grounded circuit (National Electrical Safety Code). The highest nominal voltage available between any conductor of the circuit and ground unless otherwise indicated.

voltage of circuit not effectively grounded (National Electrical Safety Code). The highest nominal voltage available between any two conductors of the circuit. *Note:* If one circuit is directly connected to and supplied from another circuit of higher voltage (as in the case of an autotransformer), both are considered as of the higher voltage, unless the circuit of the lower voltage is effectively grounded, in which case its voltage is not determined by the circuit of high voltage. Direct connection implies electric connection as distinguished from connections merely through electromagnetic or electrostatic induction.

voltage or current balance relay (60) (power system device function numbers). A relay that operates on a given difference in voltage, or current input or output, of two circuits.

voltage overshoot (1) (arc-welding apparatus). The ratio of transient peak voltage substantially instantaneously following the removal of the short circuit to the normal steady-state voltage value. *See: voltage recovery time.*

(2) (low voltage varistor surge arresters). The excess voltage above the clamping voltage of the device for a given current that occurs when current waves of less than 8 μ s virtual front duration are applied. This value may be expressed as a percent of the clamping voltage for an 8 x 20- μ s current wave.

voltage overshoot, effective (arc-welding apparatus). The area under the transient voltage curve during the time that the transient voltage exceeds the steady-state value. *See: voltage recovery time.*

voltage, peak working (charging inductor). The algebraic sum of the maximum alternating crest voltage and the direct voltage of the same polarity appearing between the terminals of the inductor winding or between the inductor winding and the grounded elements.

voltage phase-angle method (economic dispatch) (electric power systems). Considers the actual mea-