

Electrical Units

Quantity	Symbol	Equation	SI unit	SI unit symbol	CGS unit	Ratio of Magnitude of SI to cgs unit
Current	I, i	$I = E/R; I = E/Z; I = Q/t$	Ampere	A	Abampere	10^{-1}
Quantity	Q, q	$Q = it; Q = CE$	Coulomb	C	Abcoulomb	10^{-1}
Electromotive force	E, e	$E = IR; E = W/Q$	Volt	V	Abvolt	10^8
Resistance	R, r	$R = E/I; R = \rho l / A$	Ohm	Ω	Abohm	10^9
Resistivity	ρ	$\rho = RA / l$	Ohm-metre	$\Omega \cdot m$	Abohm-cm	10^{11}
Conductance	G, g	$G = \gamma A / l; G = A/\rho l$	Siemens	S	Abmho	10^9
Conductivity	γ	$\gamma = 1/\rho; \gamma = l / RA$	Siemens/meter	S/m	Abmho/cm	10^{11}
Capacitance	C	$C = Q/E$	Farad	F	Abfarad*	10^9
Permittivity	ϵ		Farads/meter	F/m	Stat farad*/cm	8.85×10^{-12}
Relative permittivity	ϵ_r	$\epsilon_r = \epsilon/\epsilon_0$	Numerical		Numerical	1
Self-inductance	L	$L = -N(d\phi/dt)$	Henry	H	Abhenry	10^9
Mutual inductance	M	$M = K(L_1 L_2)^{1/2}$	Henry	H	Abhenry	10^9
Energy	J	$J = eit$	Joule	J	Erg	10^7
	kwh	$kwh = kw/3600; 3.6 MJ$	Kilowatthour	kWh		36×10^{12}
Active power	W	$W = J/t; W = EI \cos \theta$	Watt	W	Abwatt	10^7
Reactive power	jQ	$Q = EI \sin \theta$	Var	var	Abvar	10^7
Apparent power	VA	$VA = EI$	Volt-ampere	VA		
Power factor	pf	$pf = W/VA; pf = W/(W + jQ)$				1
Reactance, inductive	X_L	$X_L = 2\pi fL$	Ohm	Ω	Abohm	10^9
Reactance, capacitive	X_C	$X_C = 1/(2\pi fC)$	Ohm	Ω	Abohm	10^9
Impedance	Z	$Z = E/I; Z = R + j(X_L - X_C)$	Ohm	Ω	Abohm	10^9
Conductance	G	$G = R/Z^2$	Siemens	S	Abmho	10^9
Susceptance	B	$B = X/Z^2$	Siemens	S	Abmho	10^9
Admittance	Y	$Y = I/E; Y = G + jB$	Siemens	S	Abmho	10^9
Frequency	f	$f = 1/T$	Hertz	Hz	Cps Hz	1
Period	T	$T = 1/f$	Second	s	Second	1
Time constant	T	$L/R; RC$	Second	s	Second	1
Angular velocity	ω	$\omega = 2\pi f$	Radians/second	rad/s	Radians/second	1

*1 Abfarad (EMU Units) = 9×10^{20} stat farads (ESU units).

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