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ELECTRICAL ENGINEERING UNITS AND CONSTANTS

As adopted by NBS[1]

Symbols and Units

Quantity	*Symbol*	*Unit*	*Symbol*
charge	Q	coulomb	C
current	I	ampere	A
voltage, potential difference	V	volt	V
electromotive force	$\mathscr{E}$	volt	V
resistance	R	ohm	Ω
conductance	G	mho (siemens)	A/V, or mho (S)
reactance	X	ohm	Ω
susceptance	B	mho	A/V, or mho
impedance	Z	ohm	Ω
admittance	Y	mho	A/V or mho
capacitance	C	farad	F
inductance	L	henry	H
energy, work	W	joule	J
power	P	watt	W
resistivity	ρ	ohm-meter	Ωm
conductivity	σ	mho per meter	mho/m
electric displacement	D	coulomb per sq. meter	C/m²
electric field strength	E	volt per meter	V/m
permittivity (absolute)	ϵ	farad per meter	F/m
relative permittivity	ϵ_r	(numeric)	
magnetic flux	Φ	weber	Wb
magnetomotive force	$\mathscr{F}$	ampere (ampere-turn)	A
reluctance	$\mathscr{R}$	ampere per weber	A/Wb
permeance	$\mathscr{P}$	weber per ampere	Wb/A

(over)

[1] Reprinted from NBS Technical News Bulletin, May 1965.

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ELECTRICAL ENGINEERING UNITS AND CONSTANTS

Symbols and Units—Continued

Quantity	*Symbol*	*Unit*	*Symbol*
magnetic flux density	B	tesla	T
magnetic field strength	H	ampere per meter	A/m
permeability (absolute)	μ	henry per meter	H/m
relative permeability	μ_r	(numeric)	
length	l	meter	m
mass	m	kilogram	kg
time	t	second	s
frequency	f	hertz	Hz
angular frequency	ω	radian per second	rad/s
force	F	newton	N
pressure	p	newton per sq. meter	N/m²
temperature (absolute)	T	degree Kelvin	°K
temperature (International)	t	degree Celsius	°C

Physicol Constonts[2]

Constant	*Symbol*	*Rounded Value*
electronic charge	e	1.602×10^{-19} C
speed of light in vacuum	c	2.9979×10^{8} m/s
permittivity of vacuum, electric constant	ϵ_0, Γ_e	8.8542×10^{-12} F/m
permeability of vacuum, magnetic constant	μ_0, Γ_m	$4\pi \times 10^{-7}$ H/m†
Planck constant	h	6.63×10^{-34} J·s
Boltzmann constant	k	1.38×10^{-23} J/°K
Faraday constant	F	9.649×10^{4} C/mol
proton gyromagnetic ratio	γ	2.6752×10^{8} rad/sT
standard gravitational acceleration	g_n	9.80665 m/s²†
normal atmospheric pressure	atm	101 325 N/m²†

(† defined value)

[2] A general list of physical constants giving more exact values is contained in NBS Misc. Publ. 253, for sale by the Superintendent of Documents, U.S. Government Printing Office, Washington, D.C., 20402 (5¢ each; $2.50 per 100).

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National Bureau of Standards
Washington, D.C. 20234

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Revised August 1976

ELECTRICAL ENGINEERING UNITS AND CONSTANTS

Units and Symbols

Quantity	*Symbol*	*Unit*	*Symbol*	*Identical Unit*
current	I	ampere	A	
charge	Q	coulomb	C	A · s
voltage, potential	V	volt	V	W/A
energy, work	W	joule	J	N · m
power	P	watt	W	J/s
resistance	R	ohm	Ω	V/A
conductance	G	siemens	S	A/V
resistivity	ρ	ohm–meter	Ω · m	
conductivity	σ	siemens per meter	S/m	
reactance	X	ohm	Ω	V/A
susceptance	B	siemens	S	A/V
impedance	Z	ohm	Ω	V/A
admittance	Y	siemens	S	A/V
capacitance	C	farad	F	C/V
inductance	L	henry	H	Wb/A
electric flux density	D	coulomb per square meter	C/m²	
electric field strength	E	volt per meter	V/m	
permittivity	ϵ	farad per meter	F/m	
relative permittivity	ϵ_r	(pure number)		
magnetic flux	Φ	weber	Wb	V · s
magnetic flux density	B	tesla	T	Wb/m²
magnetic field strength	H	ampere per meter	A/m	
permeability	μ	henry per meter	H/m	
relative permeability	μ_r	(pure number)		
magnetomotive force	$\mathcal{F}$	ampere	A	
reluctance	$\mathcal{R}$	ampere per weber	A/Wb	
permeance	$\mathcal{P}$	weber per ampere	Wb/A	
length	l	meter	m	
mass	m	kilogram	kg	
time	t	second	s	
force	F	newton	N	kg·m/s²
pressure	p	pascal	Pa	N/m²
frequency	f	hertz	Hz	1/s
angular frequency	ω	radian per second	rad/s	
plane angle	θ	radian	rad	
solid angle	Ω	steradian	sr	

(over)

Units and Symbols — Continued

Quantity	*Symbol*	*Unit*	*Symbol*
thermodynamic temperature	T	kelvin	K
Celsius temperature	t	degree Celsius	°C
amount of substance	n	mole	mol
luminous intensity	I	candela	cd

Physical Constants[1]

Constant	*Symbol*	*Rounded Value*
elementary charge	e	1.6022×10^{-19} C
speed of light in vacuum	c	2.9979246×10^{8} m/s
electric constant	ϵ_0	8.854188×10^{-12} F/m
magnetic constant	μ_0	$4\pi \times 10^{-7}$ H/m†
Planck constant	h	6.626×10^{-34} J · s
Boltzmann constant	k	1.381×10^{-23} J/K
Faraday constant	F	9.648×10^{4} C/mol
proton gyromagnetic ratio	γ_p	2.6752×10^{8} rad/(s · T)
standard acceleration of free fall	g_n	9.80665 m/s²†
standard atmosphere	atm	101325 Pa†

(† defined value)

[1] See Fundamental Physical Constants, NBS Special Publication 398, August 1974 (Pocket Card), Price 25c; $6.35 per 100.

Decimal Prefixes

Factor	*Prefix*	*Symbol*	*Factor*	*Prefix*	*Symbol*
10^{18}	exa	E	10^{-1}	deci	d
10^{15}	peta	P	10^{-2}	centi	c
10^{12}	tera	T	10^{-3}	milli	m
10^{9}	giga	G	10^{-6}	micro	μ
10^{6}	mega	M	10^{-9}	nano	n
10^{3}	kilo	k	10^{-12}	pico	p
10^{2}	hecto	h	10^{-15}	femto	f
10^{1}	deka	da	10^{-18}	atto	a

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