Units for magnetic measurement

	Symbol	Gaussian & cgs emu[a]	Conversion Factor, C[b]	SI & rationalized mks[c]
Magnetic flux density, magnetic induction	B	gauss (G)[d]	10^{-4}	tesla (T), Wb/m^2
Magnetic flux	Φ	maxwell (Mx), $G·cm^2$	10^{-8}	weber (Wb), volt second (V·s)
Magnetic potential difference, magnetomotive force	U, F	gilbert (Gb)	$10/4\pi$	ampere (A)
Magnetic field strength, magnetizing force	H	oersted (Oe),[e] Gb/cm	$10^3/4\pi$	A/m[f]
(Volume) magnetization[g]	M	emu/cm^3[h]	10^3	A/m
(Volume) magnetization	$4\pi M$	G	$10^3/4\pi$	A/m
Magnetic polarization, intensity of magnetization	J, I	emu/cm^3	$4\pi \times 10^{-4}$	T, Wb/m^2[i]
(Mass) magnetization	σ, M	emu/g	1 $4\pi \times 10^{-7}$	$A·m^2/kg$ $Wb·m/kg$
Magnetic moment	m	emu, erg/G	10^{-3}	$A·m^2$, joule per tesla (J/T)
Magnetic dipole moment	j	emu, erg/G	$4\pi \times 10^{-10}$	$Wb·m$[i]
(Volume) susceptibility	χ, κ	dimensionless, emu/cm^3	4π $(4\pi)^2 \times 10^{-7}$	dimensionless henry per meter (H/m), Wb/(A·m)
(Mass) susceptibility	χ_ρ, κ_ρ	cm^3/g, emu/g	$4\pi \times 10^{-3}$ $(4\pi)^2 \times 10^{-10}$	m^3/kg $H·m^2/kg$
(Molar) susceptibility	χ_{mol}, κ_{mol}	cm^3/mol, emu/mol	$4\pi \times 10^{-6}$ $(4\pi)^2 \times 10^{-13}$	m^3/mol $H·m^2/mol$
Permeability	μ	dimensionless	$4\pi \times 10^{-7}$	H/m, Wb/(A·m)
Relative permeability[j]	μ_r	not defined	—	dimensionless
(Volume) energy density, energy product[k]	W	erg/cm^3	10^{-1}	J/m^3
Demagnetization factor	D, N	dimensionless	$1/4\pi$	dimensionless

a. *Gaussian units and cgs emu are the same for magnetic properties. The defining relation is B = H + 4πM.*

b. *Multiply a number in Gaussian units by C to convert it to SI (e.g., 1 G × 10⁻⁴ T/G = 10⁻⁴ T).*

c. *SI (Système International d'Unités) has been adopted by the National Bureau of Standards. Where two conversion factors are given, the upper one is recognized under, or consistent with, SI and is based on the definition B = μ₀(H + M), where μ₀ = 4π × 10⁻⁷ H/m. The lower one is not recognized under SI and is based on the definition B = μ₀H + J, where the symbol I is often used in place of J.*

d. *1 gauss = 10⁵ gamma (γ).*

e. *Both oersted and gauss are expressed as cm⁻¹ᐟ²·g¹ᐟ²·s⁻¹ in terms of base units.*

f. *A/m was often expressed as "ampere-turn per meter" when used for magnetic field strength.*

g. *Magnetic moment per unit volume*

h. *The designation "emu" is not a unit*

i. *Recognized under SI, even though based on the definition B = μ₀H + J. See footnote c.*

j. *μᵣ = μ/μ₀ = 1 + χ, all in SI. μᵣ is equal to Gaussian μ.*

k. *B · H and μ₀M · H have SI units J/m³; M · H and B · H/4π have Gaussian units erg/cm³.*