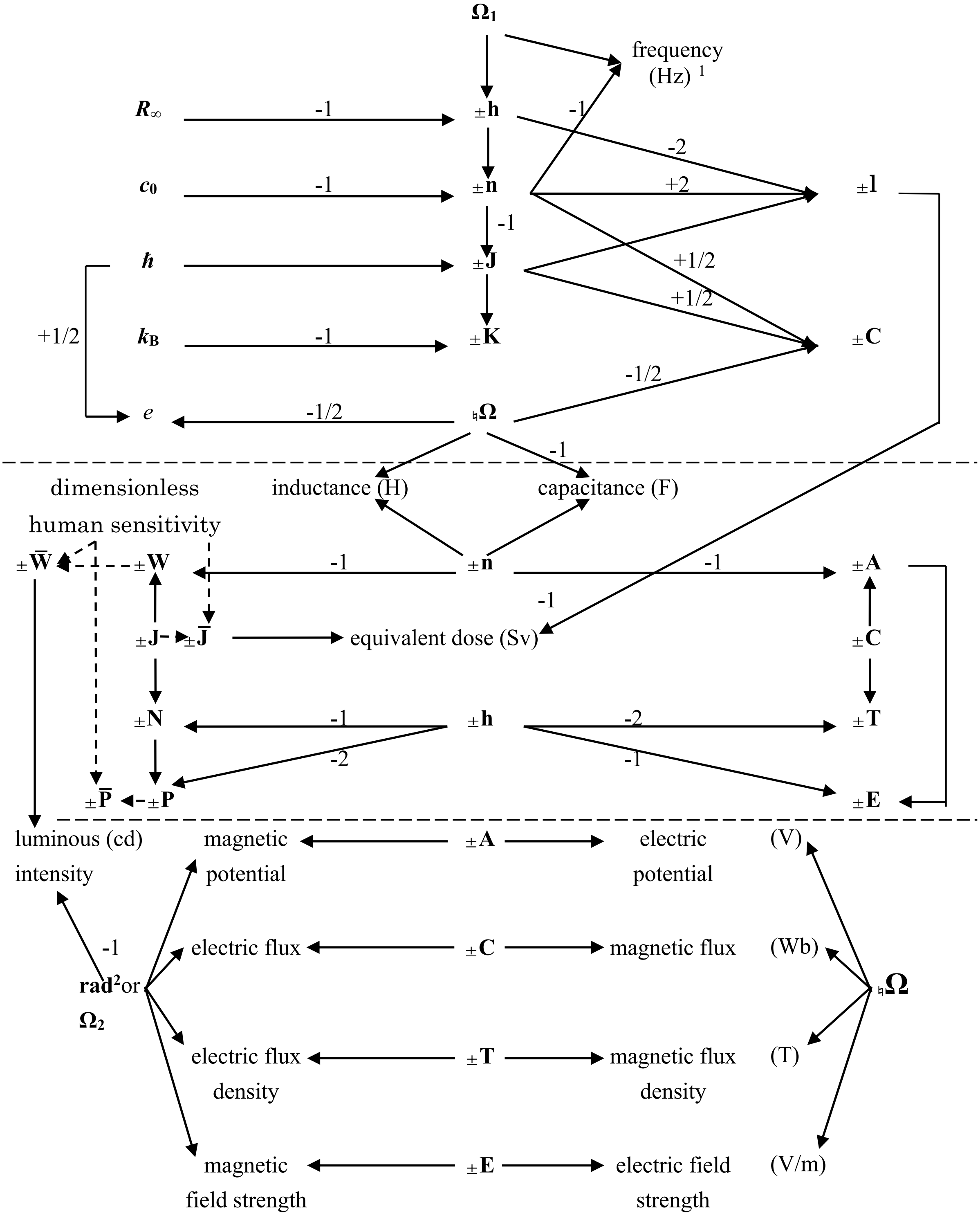
# E. Relation of Units and Dimensions




[1] The units enclosed with'()' are units of SI.

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|---|---|
| Force between electrical quantities | $f = \frac{1}{\epsilon_0}\frac{\Omega_2 Q}{4\pi r^2}Q' = \Omega_n c_0 \frac{QQ'}{r^2}$ |
| Force between electrical currents | $df = \mu_0 \frac{\Omega_2 I}{2\pi r}I' = \frac{2\Omega_n}{c_0}\frac{II'}{r}$ |
| Lorentz force | $\mathbf{F} = Q(\mathbf{E} + \mathbf{v} \times \mathbf{B})$ |
| Energy density of an electromagnetic field | $u = \frac{1}{2\Omega_2}(\mathbf{E} \cdot \mathbf{D} + \mathbf{H} \cdot \mathbf{B})$ |
| Poynting vector | $\mathbf{S} = \frac{1}{\Omega_2}\mathbf{E} \times \mathbf{H}$ |
| Electromagnetic induction law | $\nabla \times \mathbf{E} = -\frac{\partial \mathbf{B}}{\partial t}$ |
| | $\nabla \times \mathbf{H} = +\frac{\partial \mathbf{D}}{\partial t} + \Omega_2 \mathbf{J}$ |
| Gauss' theorem (differential form) | $\begin{cases} \nabla \cdot \mathbf{D} = \Omega_2 \rho \\ \nabla \cdot \mathbf{B} = 0 \end{cases}$ |
| Charge conservation law | $\nabla \cdot \mathbf{J} + \frac{\partial \rho}{\partial t} = 0$ |
| Scalar potential | $\mathbf{E} = -\nabla\phi - \frac{\partial \mathbf{A}}{\partial t}$ |
| Vector potential | $\mathbf{B} = +\nabla \times \mathbf{A}$ |
| Equation that satisfies the potential | $\begin{cases} \Delta\phi - \epsilon_0\mu_0\frac{\partial^2\phi}{\partial t^2} = -\Omega_2\frac{\rho}{\epsilon_0} \\ \Delta\mathbf{A} - \epsilon_0\mu_0\frac{\partial^2\mathbf{A}}{\partial t^2} = -\Omega_2\mu_0\mathbf{J} \end{cases}$ |

$$\text{Constant} \approx \Omega_0^n \times 12^m, \text{ where } n \in \{0, \pm 1\}, m \in \mathbb{Z}$$