# Frequently Used Metric Prefixes and Physical Quantities

## Metric Prefixes

| Symbol | Prefix | Decimal | Power of Ten |
|---|---|---|---|
| da | deca | 1 0 | $10^{1}$ |
| h | hecto | 1 00 | $10^{2}$ |
| k | kilo | 1 000 | $10^{3}$ |
| M | mega | 1 000 000 | $10^{6}$ |
| G | giga | 1 000 000 000 | $10^{9}$ |
| T | tera | 1 000 000 000 000 | $10^{12}$ |
| P | peta | 1 000 000 000 000 000 | $10^{15}$ |
| E | exa | 1 000 000 000 000 000 000 | $10^{18}$ |
| d | deci | 0.1 | $10^{-1}$ |
| c | centi | 0.01 | $10^{-2}$ |
| m | milli | 0.001 | $10^{-3}$ |
| $\mu$ | micro | 0.000 001 | $10^{-6}$ |
| n | nano | 0.000 000 001 | $10^{-9}$ |
| p | pico | 0.000 000 000 001 | $10^{-12}$ |

## Physical Quantities (International System of Units, SI Units)

| Unit Symbol | Unit | Physical Quantity |
|---|---|---|
| µs | microsecond | time |
| A | ampere | electric current |
| GHz | gigahertz | frequency |
| Gt | gigaton, gigatonne | mass |
| GV | gigavolt | electric potential |
| GW | gigawatt | power |
| GW h | gigawatt-hour | energy |
| h | hour | time |
| Hz | hertz | frequency |
| K | Kelvin | temperature |
| kg | kilogram | mass |
| kHz | kilohertz | frequency |
| km | kilometer | length |
| kV | kilovolt | electric potential |
| kVA | kilo volt-ampere | apparent power |
| kW | Kilowatt | power |
| kW h | kilowatt-hour | energy |
| $kW_p$ | kilowatt-peak | power |
| m | meter | length |

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| Unit Symbol | Unit | Physical Quantity |
|---|---|---|
| $m^2$ | square meter | area |
| $m^3$ | cubic meter | volume |
| MHz | megahertz | frequency |
| ms | millisecond | time |
| Mt | megaton, megaton | mass |
| MV | megavolt | electric potential |
| MW | megawatt | power |
| MWh | megawatt-hour | energy |
| ns | nanosecond | time |
| PW | petawatt | power |
| PWh | petawatt-hour | energy |
| s | second | time |
| t | ton, tonne | mass |
| THz | terahertz | frequency |
| TV | teravolt | electric potential |
| TW | terawatt | power |
| TWh | terawatt-hour | energy |
| V | volt | electric potential |
| VA | volt-ampere | apparent power |
| W | watt | power |
| Wh | watt-hour | energy |

### The Relationship Between Power and Energy

The energy $E$ can be derived from the integral of a power $P$ over a time interval $t_2$-$t_1$:

$$E = \int_{t_1}^{t_2} P(t)dt.$$

For a constant power, the equation can be simplified to

$$E = Pt.$$

The unit of energy in electrical energy supply is usually the *joule* with the unit symbol *J* or *watt-second* with the unit symbol *Ws*. The unit of power is the *watt*, having the unit symbol W.

| Physical Quantity | Unit | Unit Symbol | Conversion to Power | Conversion to Energy |
|---|---|---|---|---|
| Power | watt | W | 1,000 W = 1 kW | 1 kW * 1 h = 1 kWh |
| Energy | joule, watt second, newton-meter | J, Ws, Nm | 1 kWh/1 h = 1 kW | 1 kWh = 3,600,000 Ws |