Formelsammlung – Elektrotechnik

el. Spannung $= \frac{\text{Arbeit}}{\text{Ladung}} \rightarrow U = \frac{W}{Q}$

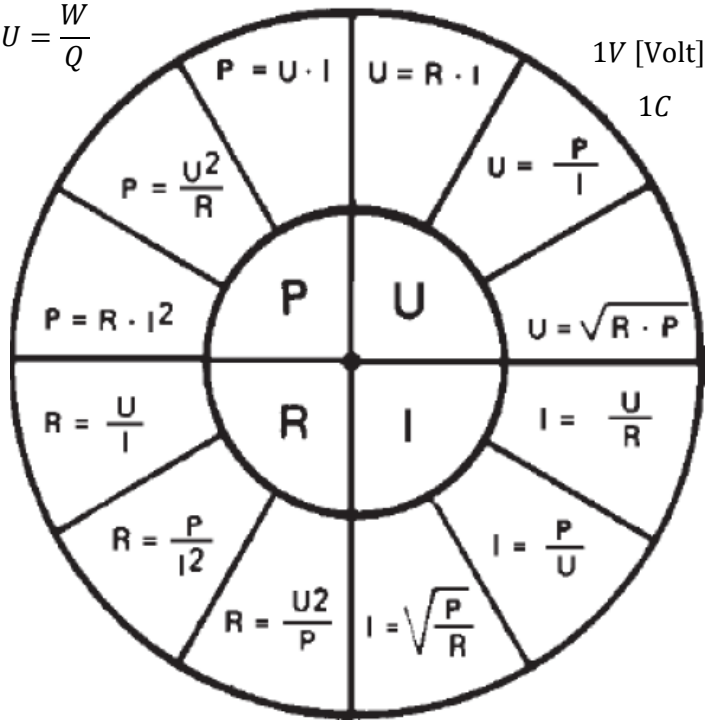
el. Potential φ [*phi*]

→ el. Spannung

$U = \Delta\varphi = \varphi_2 - \varphi_1$

el. Stromstärke I

$I = \frac{Ladung}{Zeit} \rightarrow I = \frac{Q}{T}$



$1V$ [Volt] $= \frac{1Nm\ [\text{Newtonmeter}]}{1C\ [\text{Coulomb}]}$

$1C = 6{,}25 * 10^{18}$ Elektronen

φ_2: Messpunkt

φ_1: Bezugspunkt

$1A = \frac{1C\ [Coulomb]}{1s\ [Sekunde]}$

OHMSCHES GESETZ

$$\boldsymbol{U = R * I}$$

el. Leistung

$$\boldsymbol{P = U * I}$$

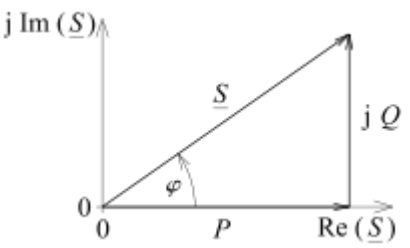
$$P = R * I^2$$

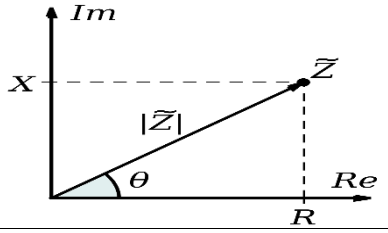
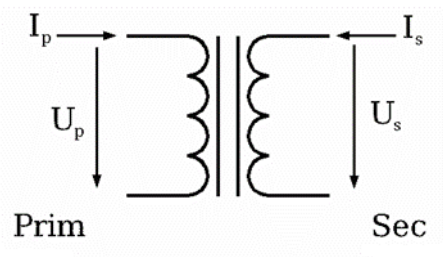
$$P = \frac{U^2}{R}$$

REIHENSCHALTUNG	PARALLELSCHALTUNG
$I_g = I_1 = I_2 = \cdots = I_n$	$I_g = I_1 + I_2 + \cdots + I_n$
$U_g = U_1 + U_2 + \cdots + U_n$	$U_g = U_1 = U_2 = \cdots = U_n$
$R_g = R_1 + R_2 + \cdots + R_n$	$R_g = \frac{R_1 * R_2}{R_1 + R_2}$ bzw. $\frac{1}{R_g} = \frac{1}{R_1} + \frac{1}{R_2} + \frac{1}{R_3} + \cdots$
$\frac{U_1}{U_n} = \frac{R_1}{R_n}$	el. Leitwert $G = \frac{1}{R} = \frac{U}{R}$ bzw. $G_{ges}=G_1+G_2+\ldots+G_n$
Wirkungsgrad $= \frac{abgegebene\ Leisung}{zugeführte\ Leistung}$	$\triangleq \eta = \frac{P_{ab}}{P_{zu}} = \frac{P_{Nutz}}{P_{zu}} = \frac{P_{Sekundär}}{P_{Primär}}$ [$* 100\ \%$]

Wechselstrom

Effektivwert	$U_{eff} = U_{RMS} = \frac{\hat{U}}{\sqrt{2}} = \frac{U_{Spitze}}{\sqrt{2}}$	$\frac{1}{\sqrt{2}} = 0{,}7071$	$I_{eff} = I_{RMS} = \frac{\hat{I}}{\sqrt{2}} = \frac{I_{Spitze}}{\sqrt{2}}$
Frequenz	$f = 1/T$	**Kreisfrequenz**	$\omega = 2\pi * f$
Scheinleistung	$S = U_{eff} * I_{eff}$ [VA]	$S^2 = P^2 + Q^2$	
Blindleistung	$Q = S * \sin\varphi$ [var]	$Q^2 = S^2 - P^2$	
Wirkleistung	$P = S * \cos\varphi$ [W]	$P^2 = S^2 - Q^2$	
Leistungsfaktor	$\cos\varphi = \frac{P}{S}$		



Spule		L … Induktivität
Blindwiderstand	$X_L = \omega * L$	ω … Kreisfrequenz
Kondensator		C … Kapazität
Blindwiderstand	$X_C = \frac{1}{\omega * C}$	
Scheinwiderstand	$Z = \sqrt{X^2 + R^2}$	
Transformator	$\frac{N_S}{N_P} = \frac{U_S}{U_P} = \frac{I_P}{I_S}$	
		N … Windungsanzahl