

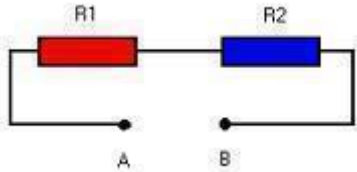
N

3. 01 Combinatie van componenten

N-03-01-001

Weerstanden in serie.

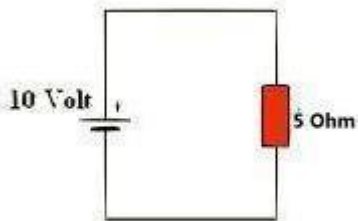
De weerstanden staan achter elkaar en hebben dezelfde stroom.



$$R_t = R_1 + R_2$$

De weerstanden worden hier opgeteld.

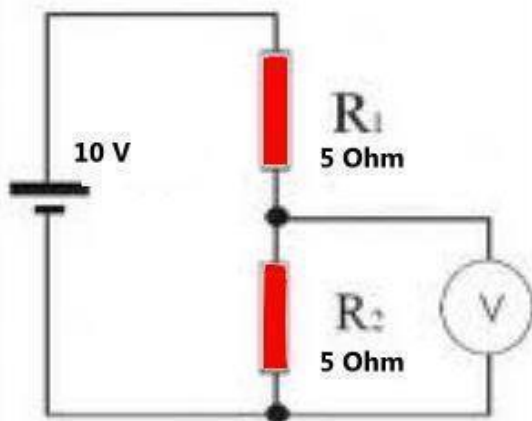
Wet van Ohm.



$$U = 10V \quad R = 5\text{Ohm} \quad I = ?$$

$$U = I \times R, \text{ dus } I = U/R \quad 10/5 = 2 \text{ A.}$$

$$UR = IR \times R \quad 2 \text{ dx } 5 = 10V.$$



$$R_t = R_1 + R_2 \quad 5 + 5 = 10 \Omega$$

$$U = I \times R, \text{ dus } I = U/R \quad 10/10 = 1A.$$

De 1 Ampère loopt door R1 en R2 SERIE.

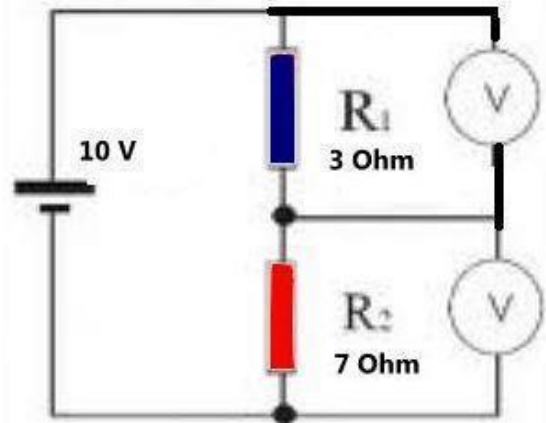
$$U_{r1} = I R_1 \times R_1 \quad 1 \times 5 = 5V$$

$$U_{r2} = I R_2 \times R_2 \quad 1 \times 5 = 5V$$

$$\text{Samen weer} \quad 10 \text{ V}$$

Opm:

We zien dat de spanning verdeeld wordt in 2*5V en samen weer 10V is.



$$R_t = R_1 + R_2 \quad 3 + 7 = 10 \Omega$$

$$U = I \times R, \text{ dus } I = U/R \quad 10/10 = 1A.$$

De 1 Ampère loopt door R1 en R2 SERIE

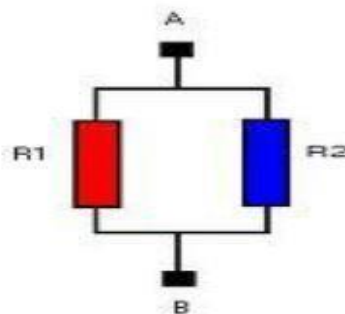
$$U_{r1} = I R_1 \times R_1 \quad 1 \times 3 = 3V$$

$$U_{r2} = I R_2 \times R_2 \quad 1 \times 7 = 7V$$

$$\text{Samen weer} \quad 10 \text{ V}$$

Weerstanden Parallel

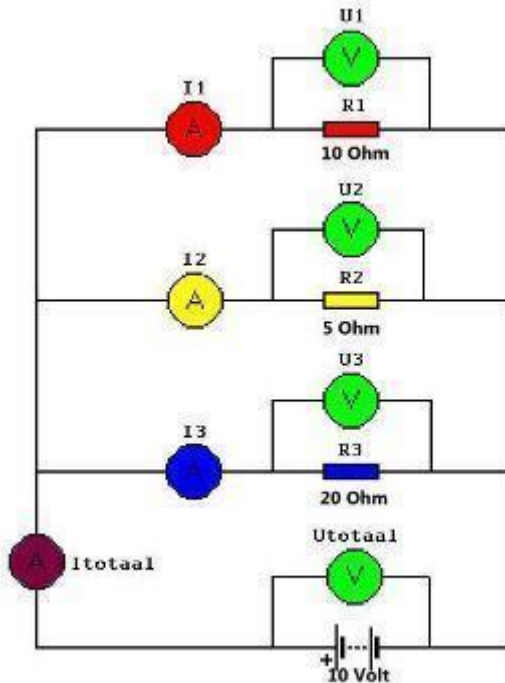
De weerstanden staan naast elkaar en hebben dezelfde spanning.



3. 01 Combinatie van componenten

$$R_v = \frac{1}{\frac{1}{R_1} + \frac{1}{R_2}}$$

$$R_v = 1 / [1/R_1 + 1/R_2]$$



De spanning U is hetzelfde, maar de stromen anders.

$$I_1 = U_1 / R_1 = 10 / 10 = 1 \text{ A}$$

$$I_2 = U_2 / R_2 = 10 / 5 = 2 \text{ A}$$

$$I_3 = U_3 / R_3 = 10 / 20 = 0.5 \text{ A}$$

$$I_t = I_1 + I_2 + I_3 = 1 + 2 + 0.5 = 3.5 \text{ A}$$

$$R_v = \frac{1}{\frac{1}{R_1} + \frac{1}{R_2} + \frac{1}{R_3}}$$

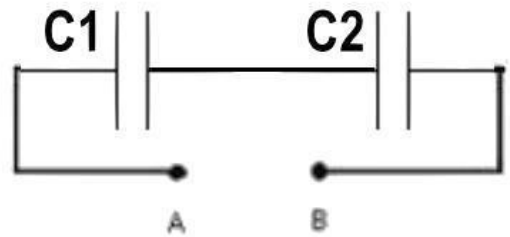
$$R_v = 1 / 350 \times 10^{-3} = 2.857 \text{ } \Omega$$

$$I_t = U_t / R_t = 10 / 2.857 = 3.5 \text{ A}$$

$$R_v = \frac{1}{\frac{1}{10} + \frac{1}{5} + \frac{1}{20}} = 2.857 \text{ } \Omega$$

N-03-01-002

Condensatoren in serie:



$$C_v = \frac{1}{\frac{1}{C_1} + \frac{1}{C_2} + \frac{1}{C_3}}$$

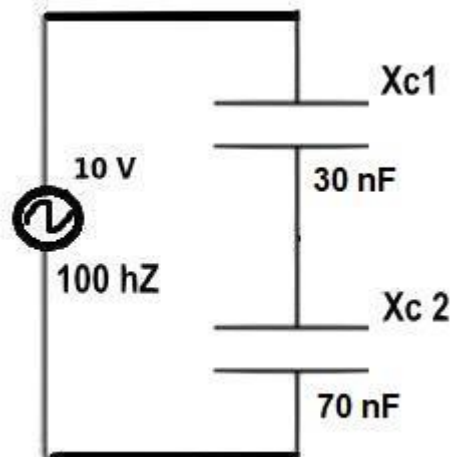
$$C_v = 1 / [1/C_1 + 1/C_2]$$

De Condensatoren staan achter elkaar en hebben dezelfde stroom.

De condensatoren worden hier **niet** opgeteld.

BELANGRIJK:
Maar behandelt als een weerstand of spoel die parallel staan.

Voorbeeld:



N

3. 01 Combinatie van componenten

$$C_V = \frac{1}{\frac{1}{C_1} + \frac{1}{C_2}} \quad C_V = \frac{1}{\frac{1}{30 \text{ nF}} + \frac{1}{70 \text{ nF}}}$$

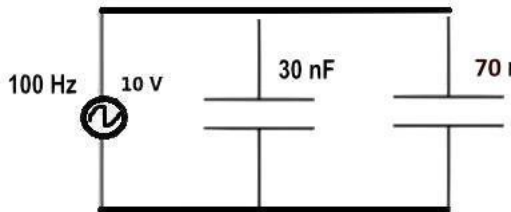
=21 nF

$$X_C = \frac{1}{2 \pi f C}$$

$$1 / (2 \times 3.14 \times 100 \times 21 \times 10^{-9}) = 75 \text{ Ohm}$$

I=U/Xc = 10/ 75 = 133 mA

Condensatoren Parallel:



Ct=C1+C2 30+70=100 nF.

$$X_C = \frac{1}{2 \pi f C} = 16 \text{ Ohm}$$

$$1 / (2 \times 3.14 \times 100 \times 100 \times 10^{-9}) = 16 \Omega$$

I=U/Xc = 10 / 16exp3= 625 mA.

Heel anders als bij weerstanden en spoelen !!!