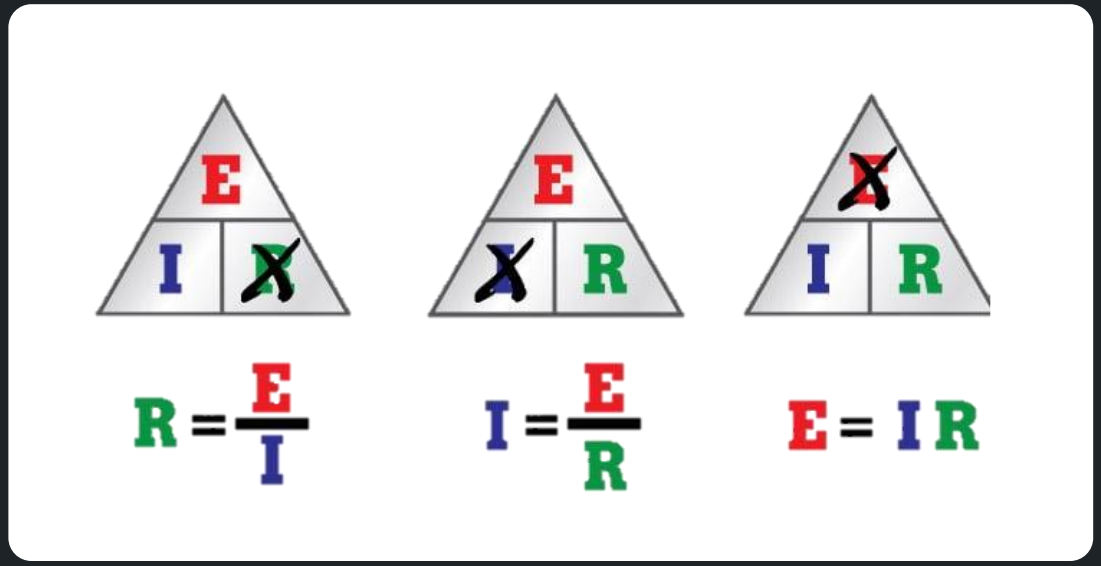
Wijnald Visser
www.lerendoortedoen.nl

LESINSTRUCTIE

Serieschakelingen



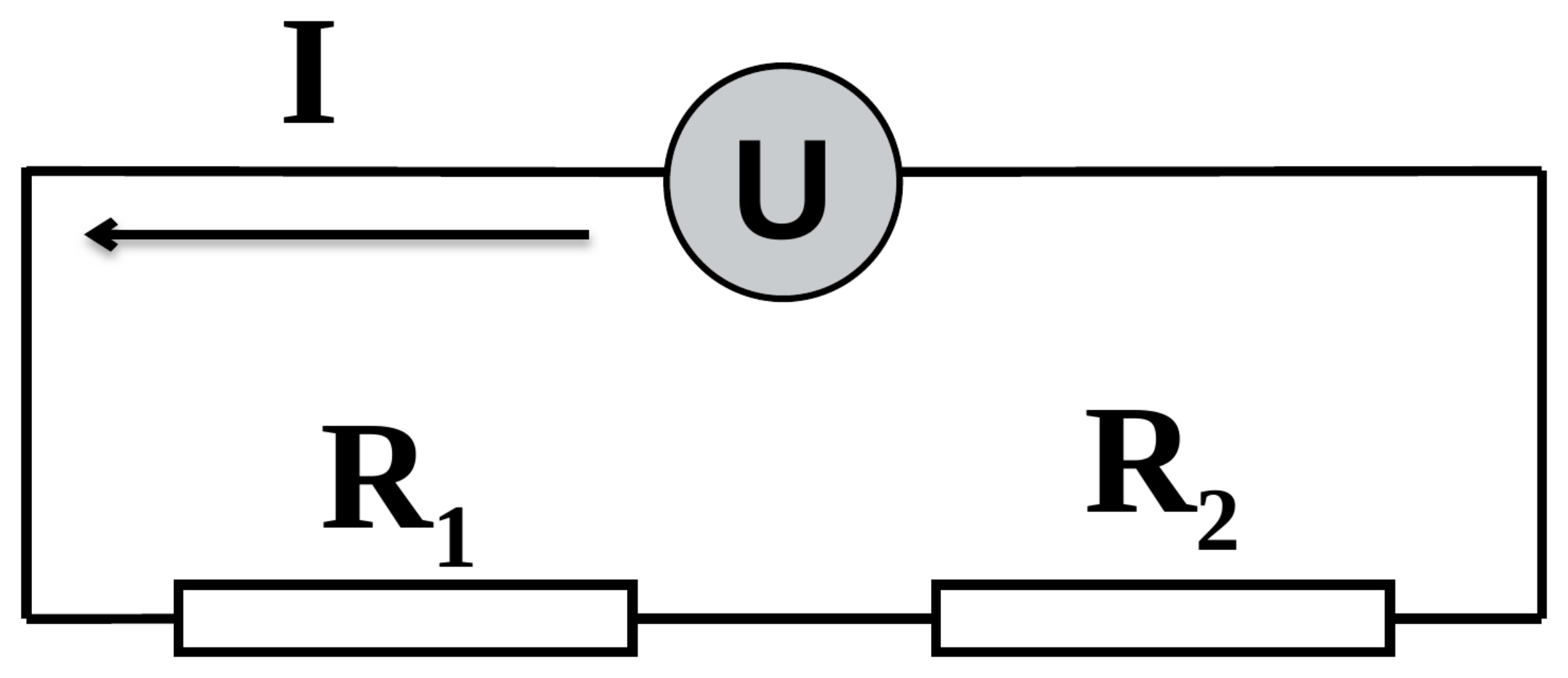
Serieschakelingen

$$U = I \times R$$

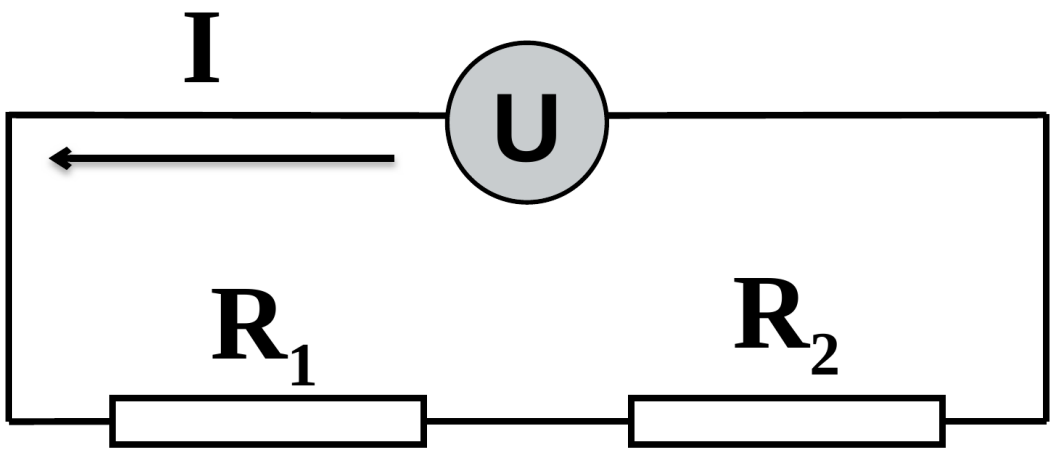
U = spanning in ?	Volt (V)
I = stroomsterkte in ?	Ampère (A)
R = weerstand in ?	Ohm (Ω)

Cu en Al

Serieschakelingen



Serieschakelingen



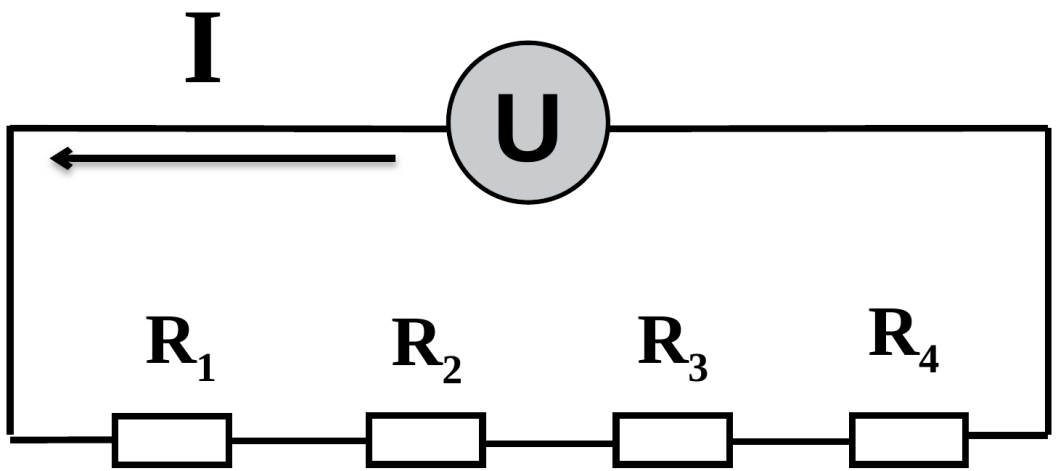
3 eigenschappen

$$U_t = U_1 + U_2$$

$$I_t = I_1 = I_2$$

$$R_t = R_1 + R_2$$

Serieschakelingen

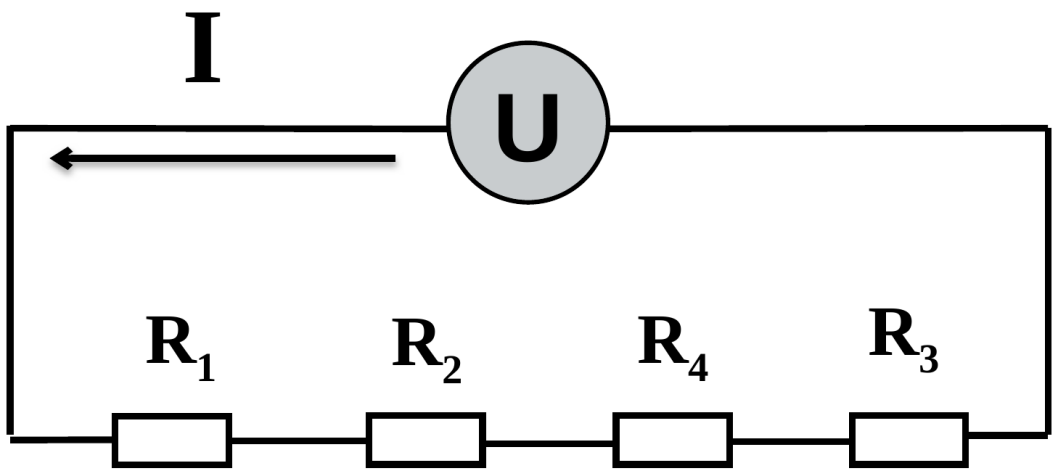


$$U_t = U_1 + U_2 + ?$$

$$I_t = I_1 = I_2 =$$

$$R_t = R_1 + R_2 + ?$$

Serieschakelingen



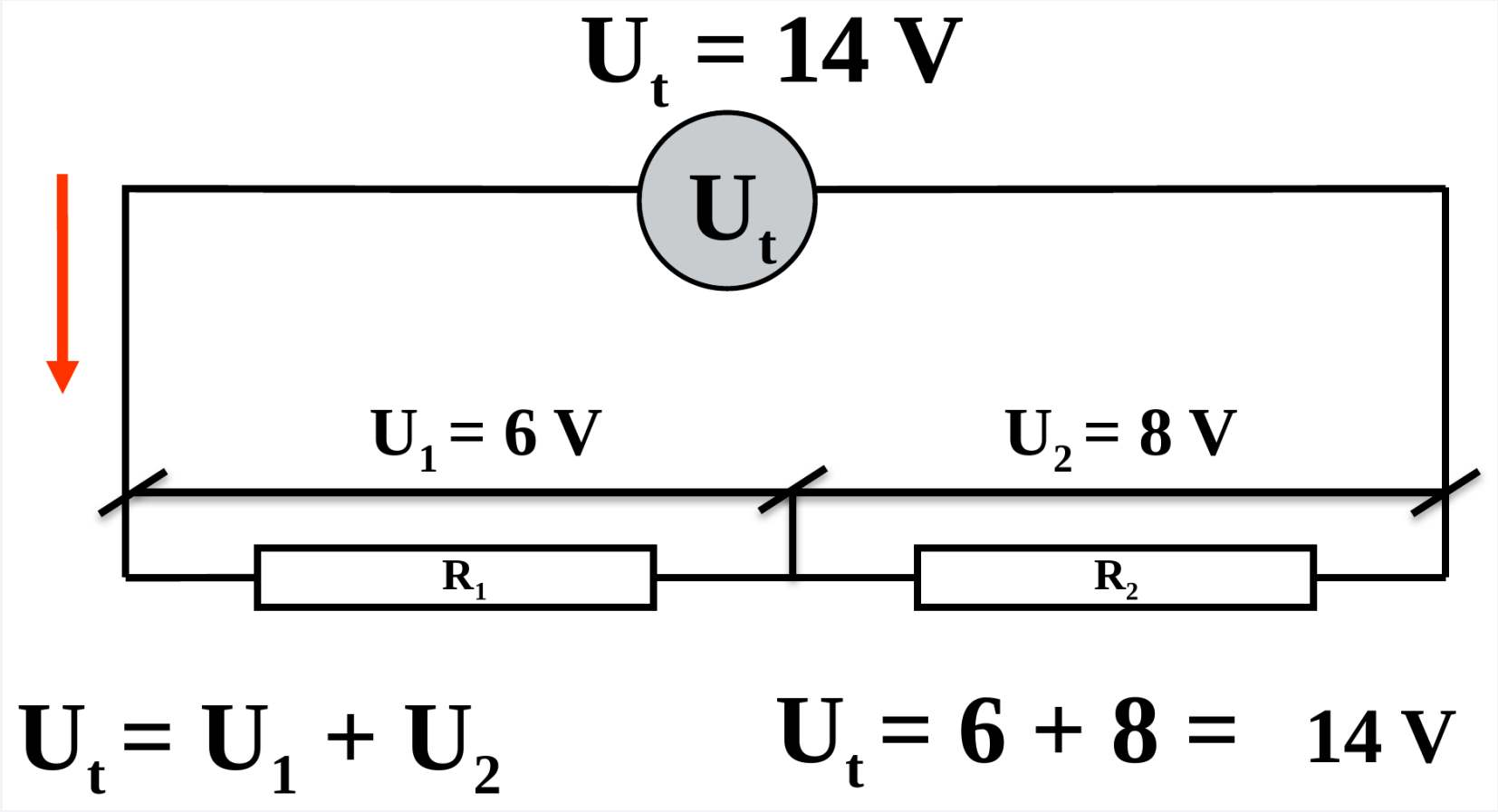
$$U_t = U_1 + U_2 + U_4 + U_3$$

$$I_t = I_1 = I_2 =$$

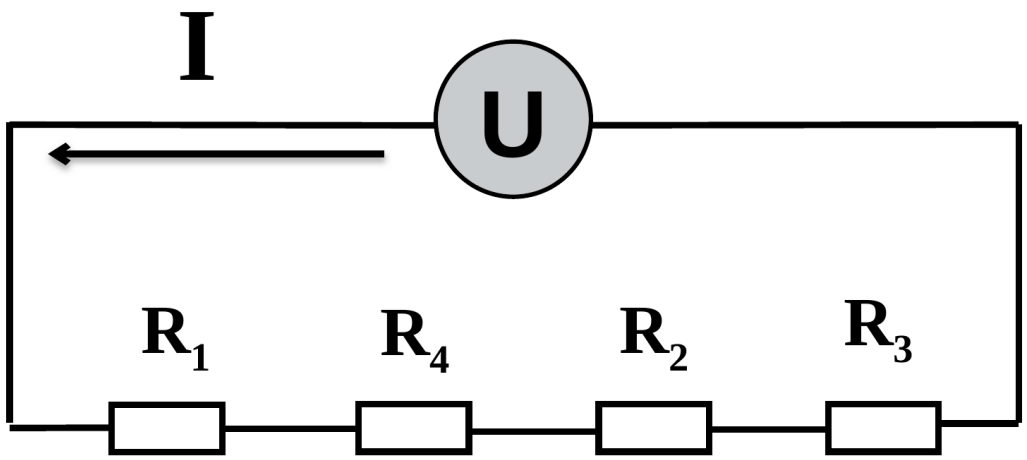
$$R_t = R_1 + R_2 + ?$$

1e eigenschap: de deelspanningen

U1 = een deelspanning
U2 = een deelspanning



Serieschakelingen

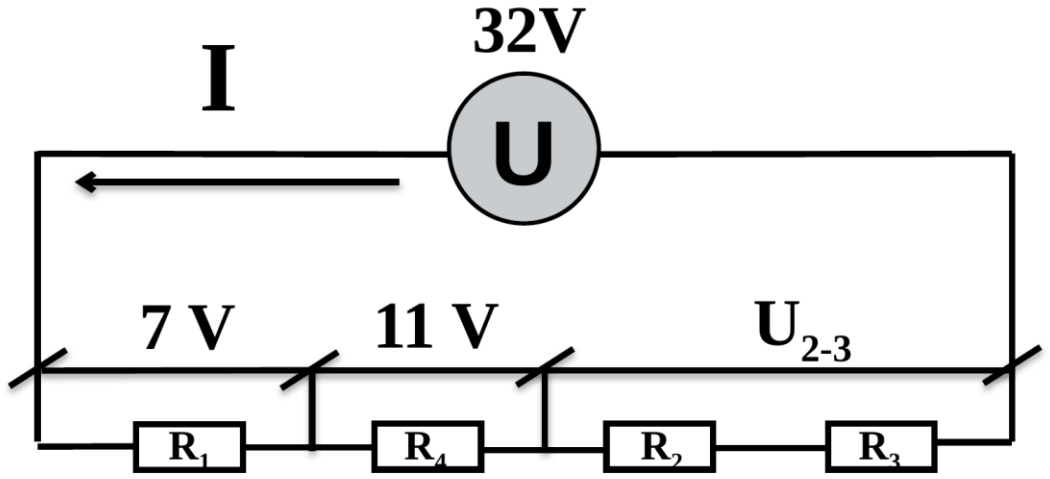


$$U_t = U_1 + U_2 + U_4 + U_3$$

$U_t = 32\ V$
$U_1 = 7\ V$
$U_4 = 11\ V$

Hoe groot is de spanning $U_{2\text{-}3}$ **14 V**

Serieschakelingen

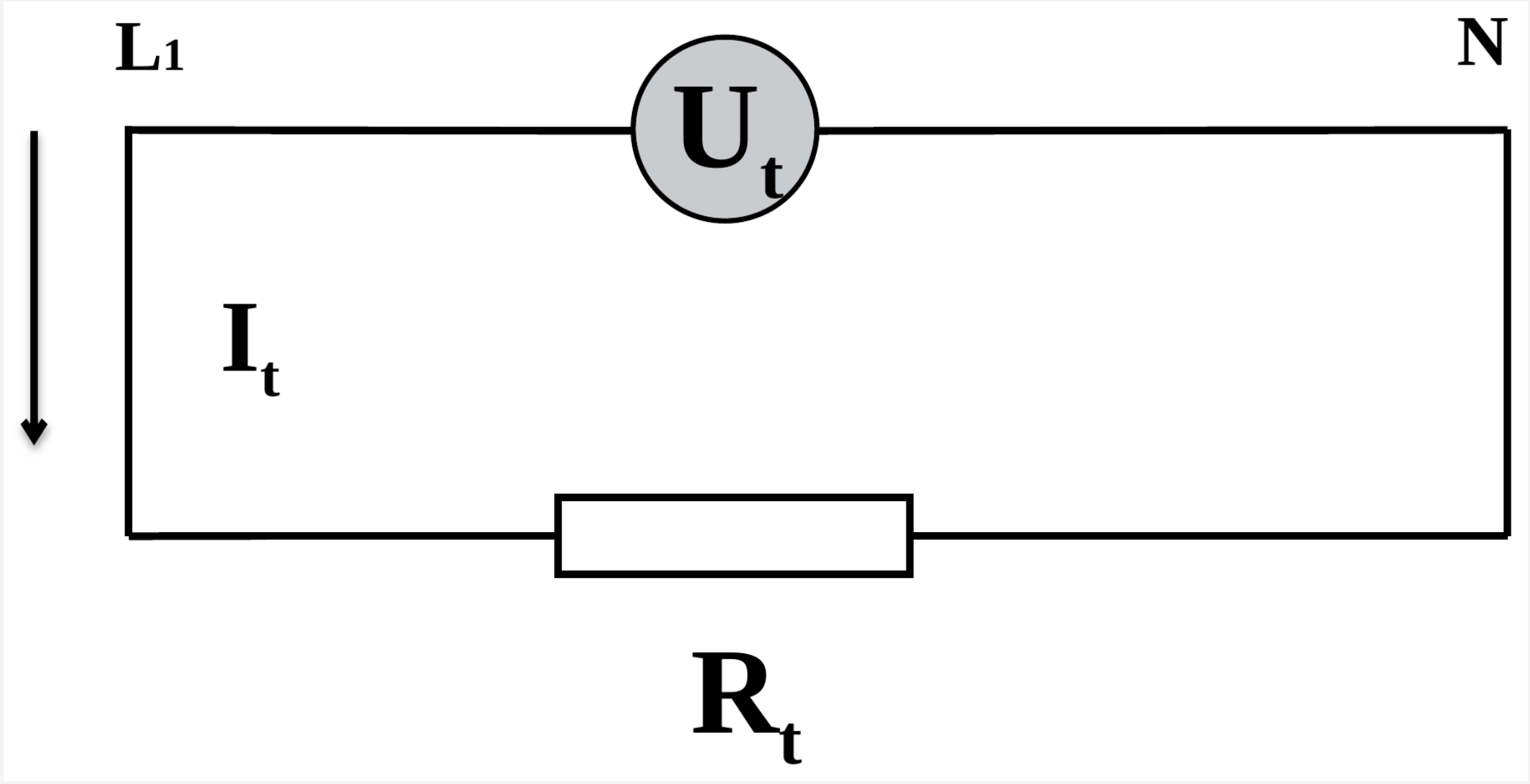


$$U_t = U_1 + U_2 + U_4 + U_3$$

$U_t = 32\ V$
$U_1 = 7\ V$
$U_4 = 11\ V$

Hoe groot is de spanning U_{2-3} **14 V**

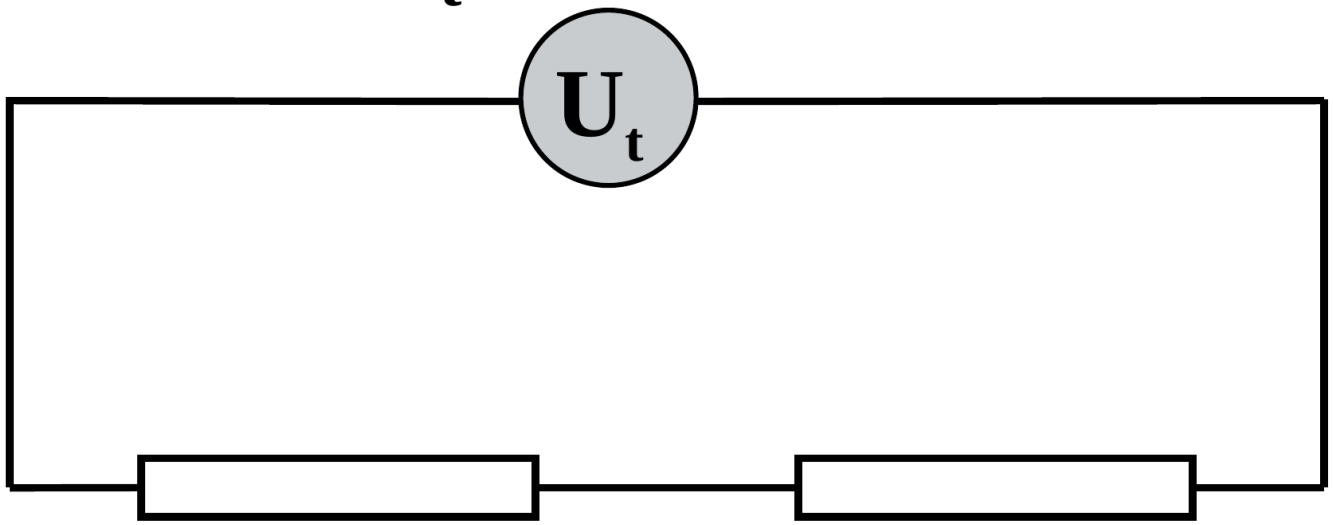
Vervangingsschakeling



2e eigenschap: It = I1 = I2

1a. Hoe groot is It

$U_t = 12\ V$



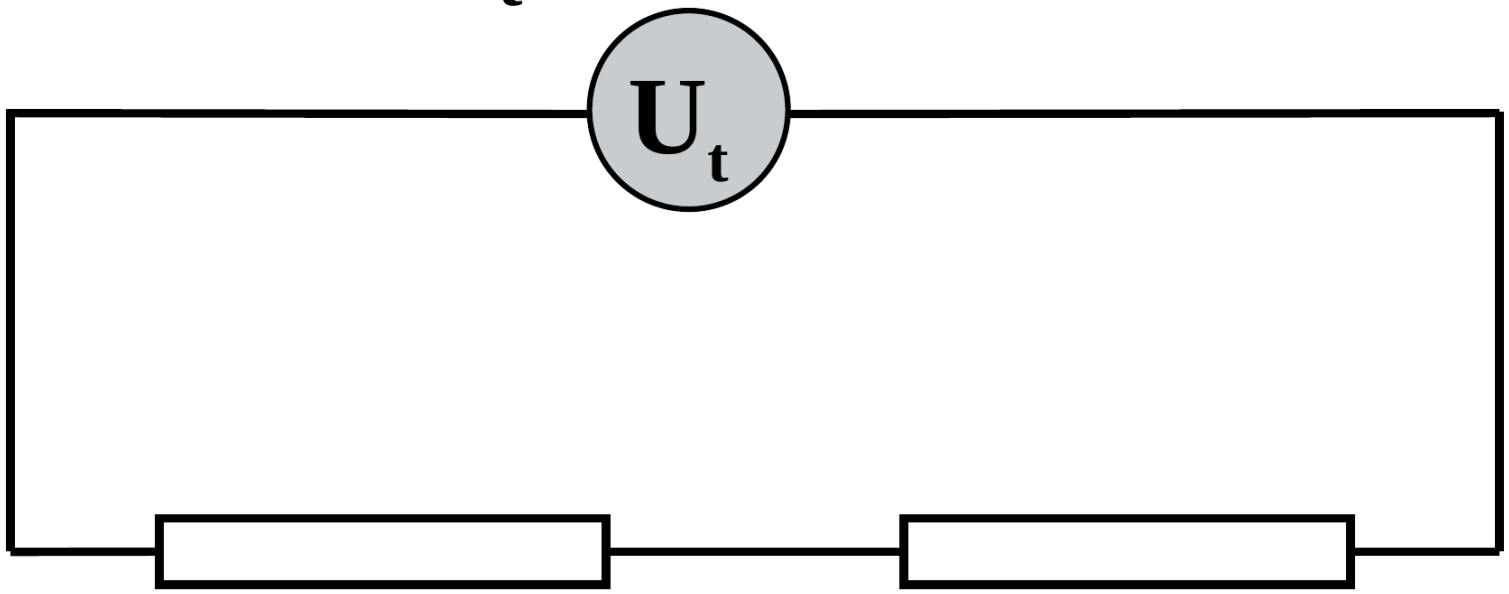
$R_1 = 40\ \Omega$ $R_2 = 80\ \Omega$

$I_t = I_1 = I_2$

3e eigenschap: Rt = R1 + R2

1a. Bereken Rt

$U_t = 12\ V$

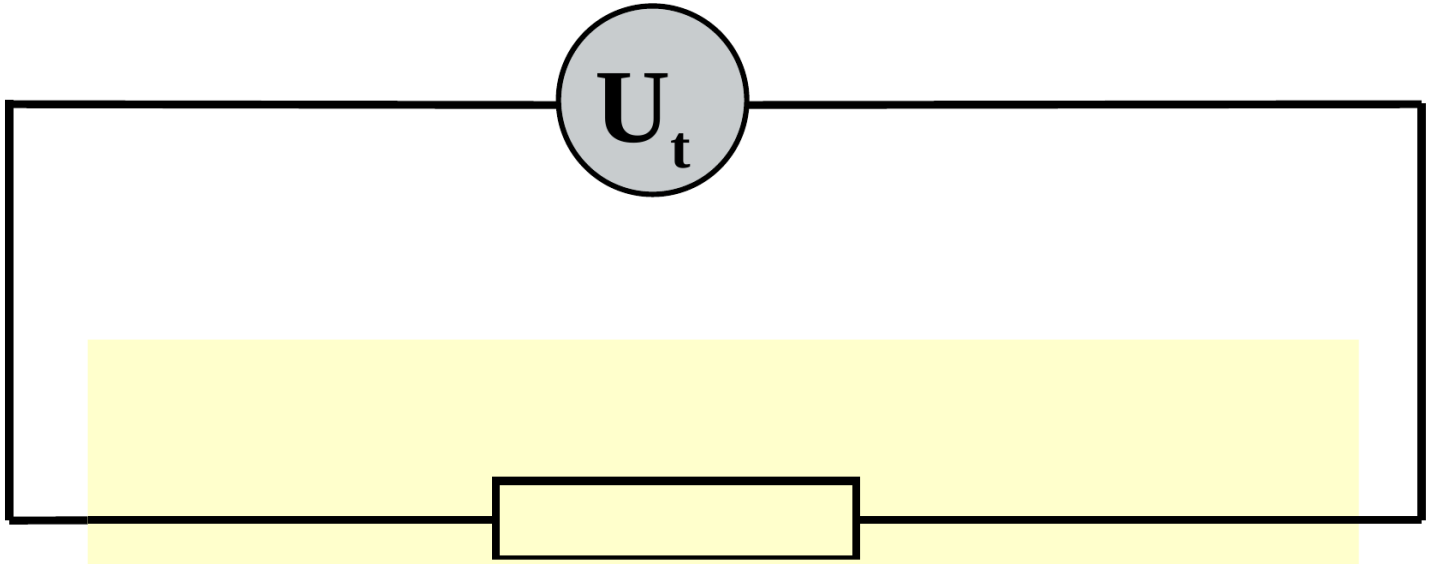


$R_1 = 40\ \Omega$ $R_2 = 80\ \Omega$

Bereken Rt

$$R_t = R_1 + R_2 = 40 + 80 = 120\ \Omega$$

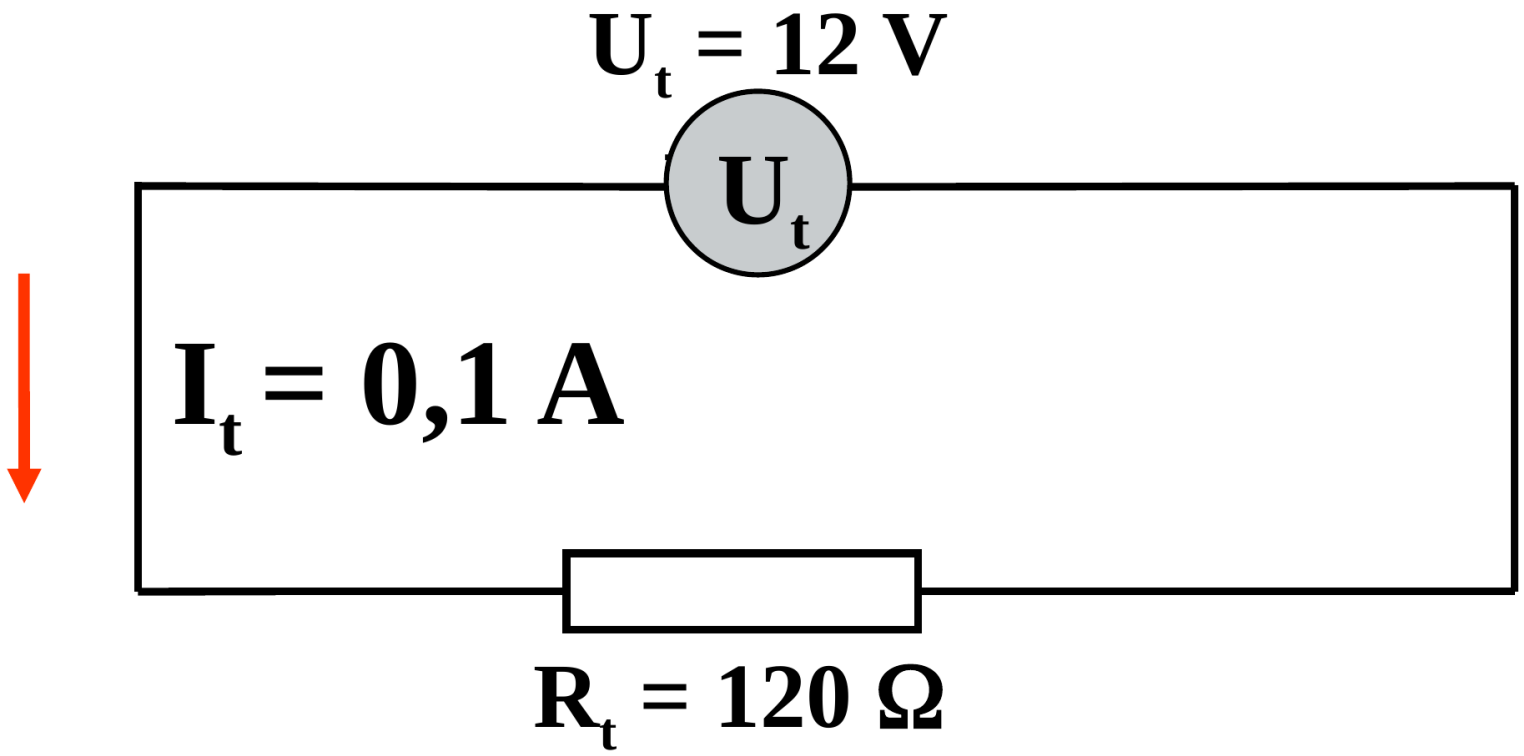
$$U_t = 12\ V$$



$$R_t = 120\ \Omega$$

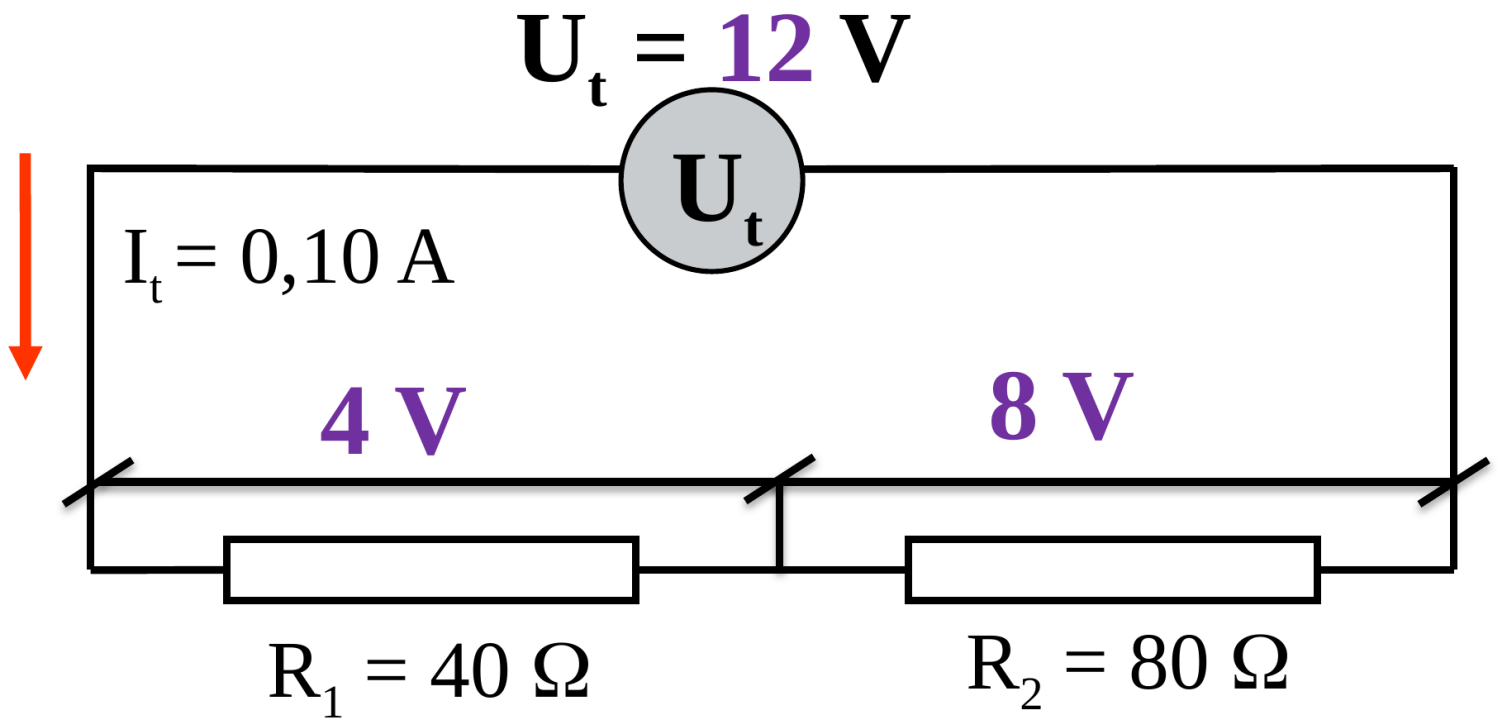
1 Bereken de stroom It

$$I_t = \frac{U_t}{R_t} \rightarrow I_t = \frac{12}{120} = 0{,}1\ A$$



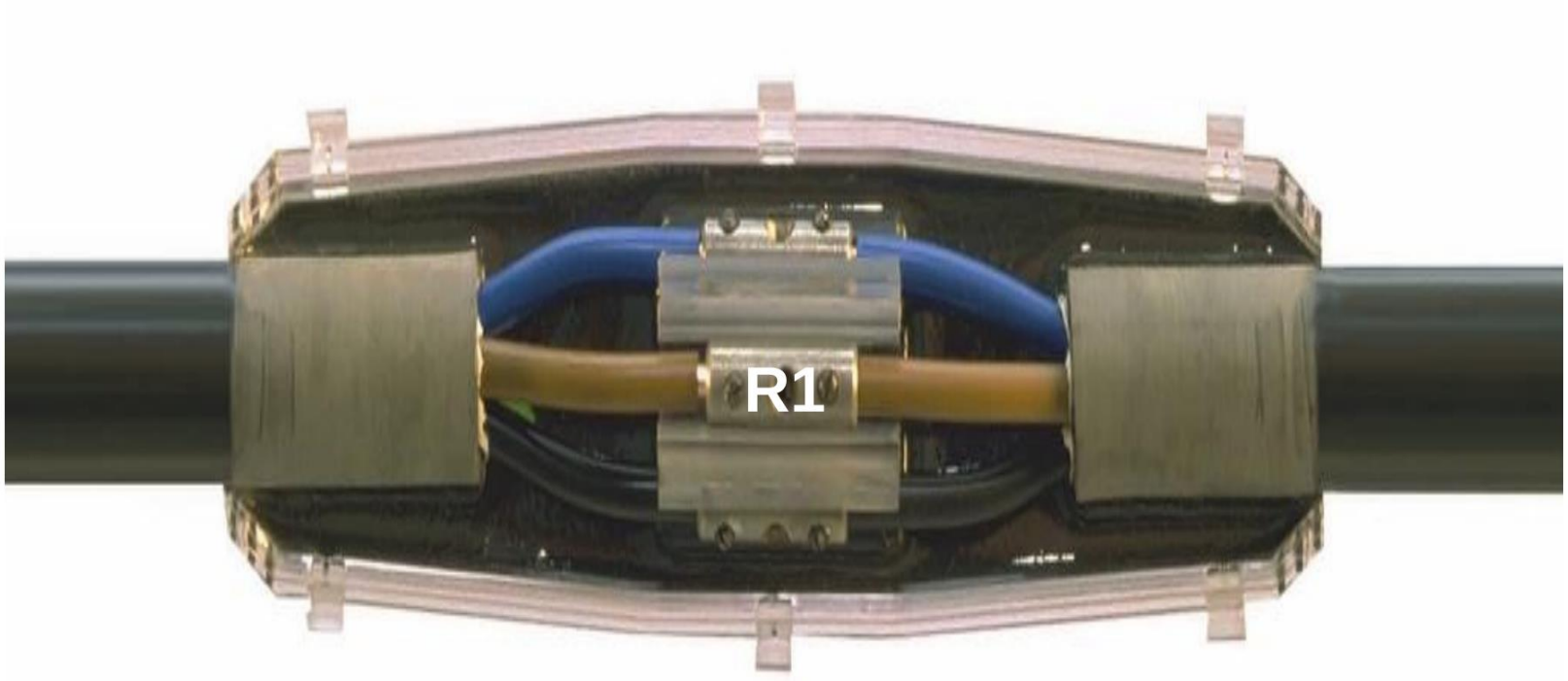
1b Bereken de deelspanningen

- $U_1 = I_t \cdot R_1 = 0{,}1 \cdot 40 = 4\ V$
- $U_2 = I_1 \cdot R_2 = 0{,}1 \cdot 80 = 8\ V$



Waar komen wij een serieschakeling van weerstanden in ons vak tegen?

Verbindingsmoffen !!



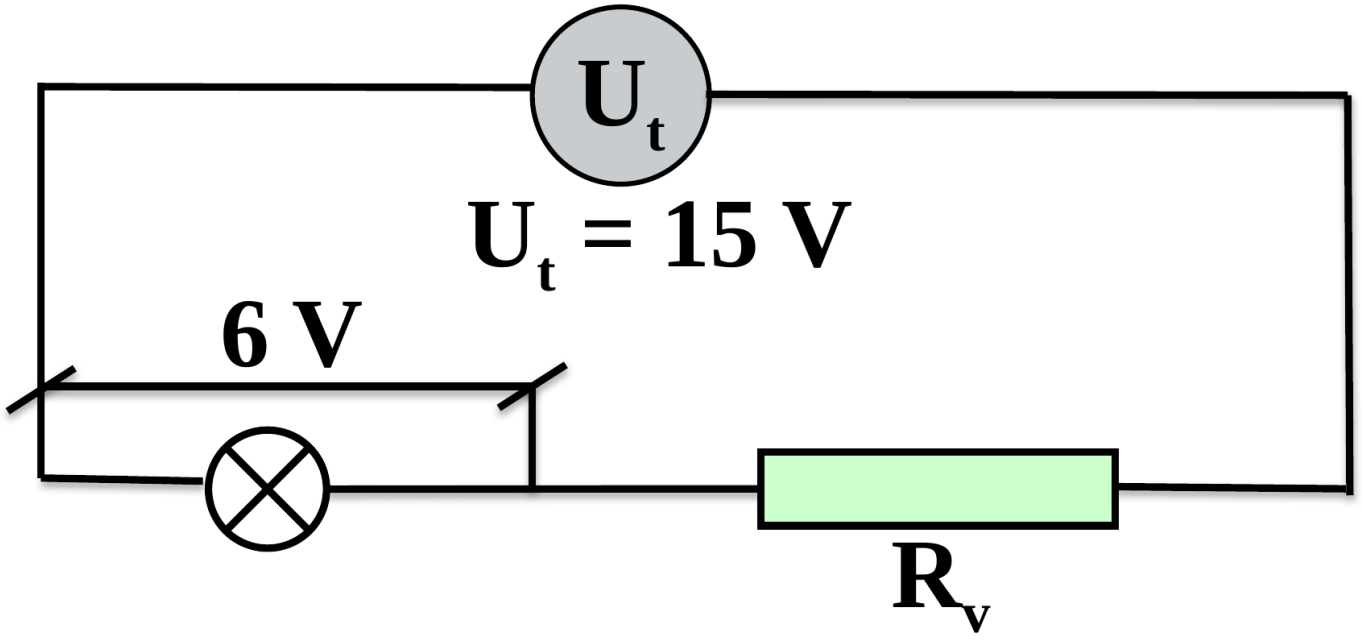
Hoe groot is de weerstand R1 ?

0 Ohm !

Voorbeeld 2 (voorschakelweerstand)

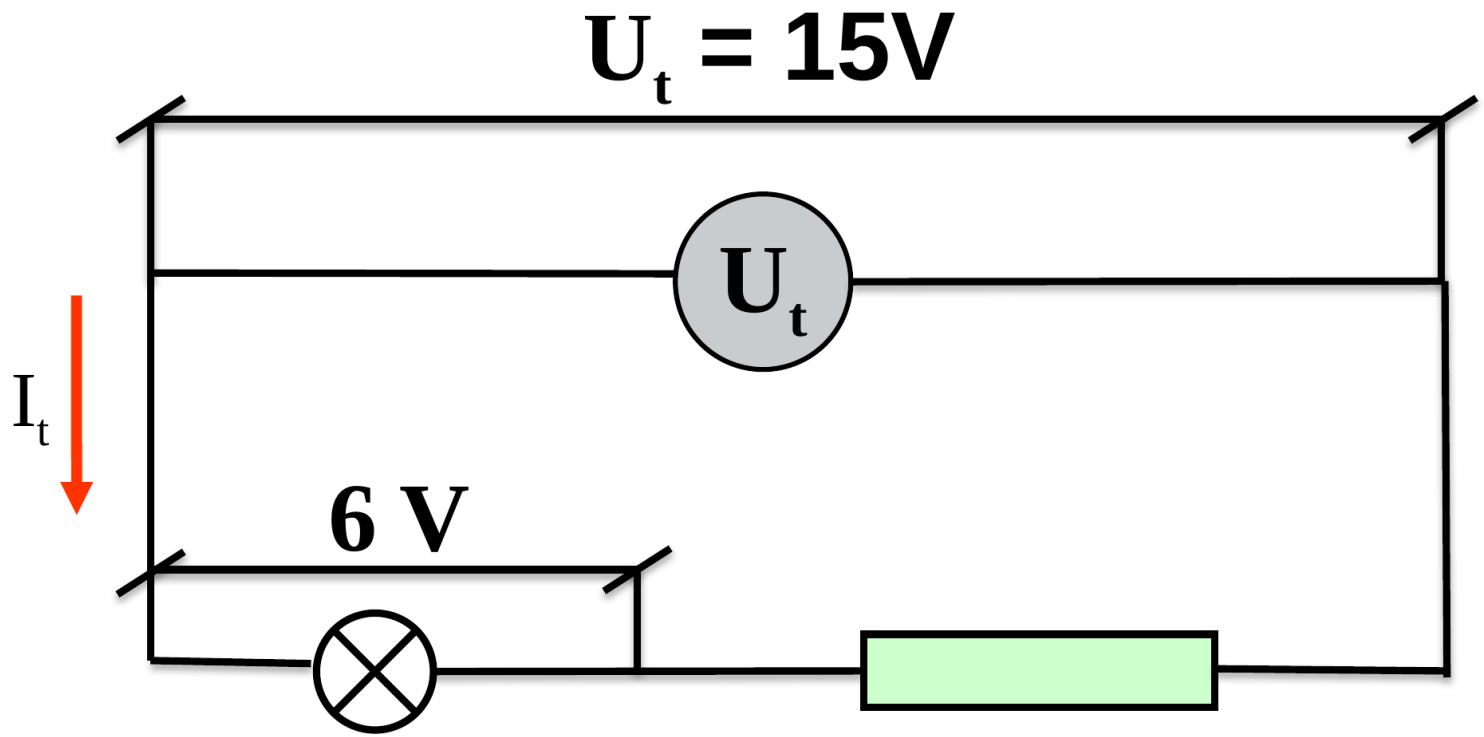
Je wilt een 6 V lamp aansluiten op 15 V.
de stroom door de lamp is 0,5 A

Teken het juiste schema



Bereken de voorschakelweerstand

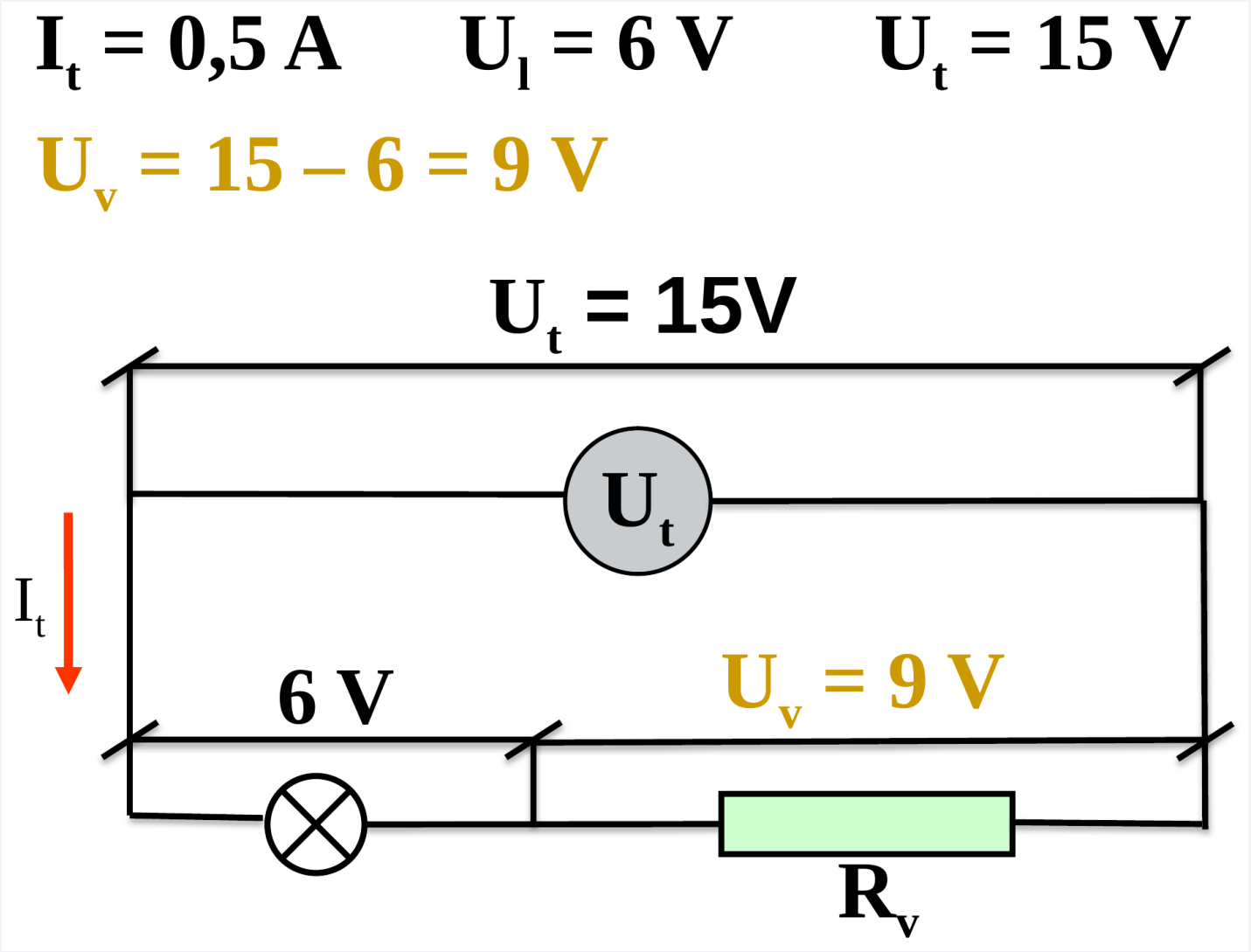
- **Welke gegevens zijn bekend?**
- **U_l = 6 V en I_t = 0,5 A U_t = 15V**



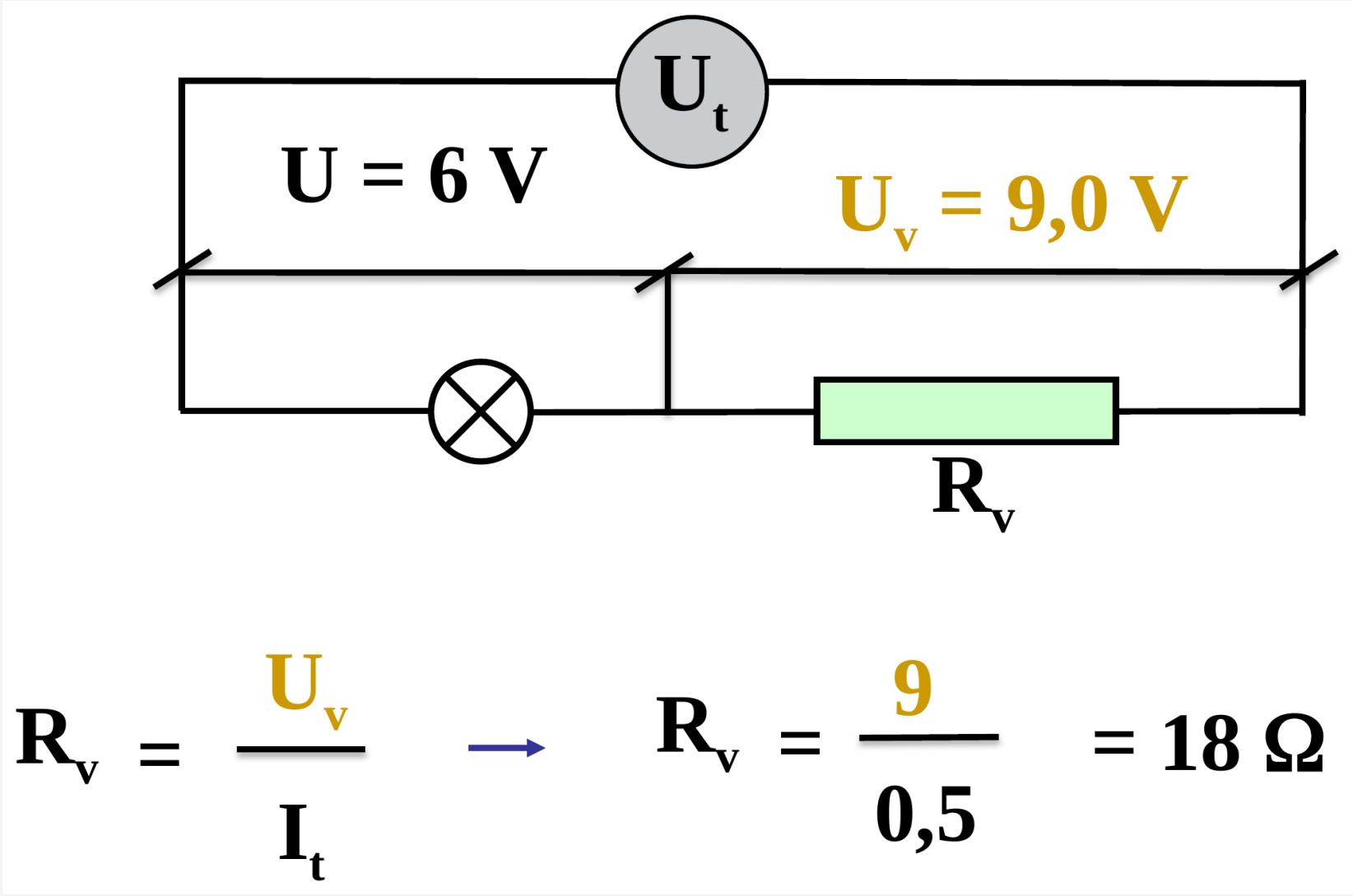
Bereken de spanning over de Rv

$I_t = 0{,}5\ A \qquad U_l = 6\ V \qquad U_t = 15\ V$

$U_v = 15 - 6 = 9\ V$



Bereken de voorschakelweerstand



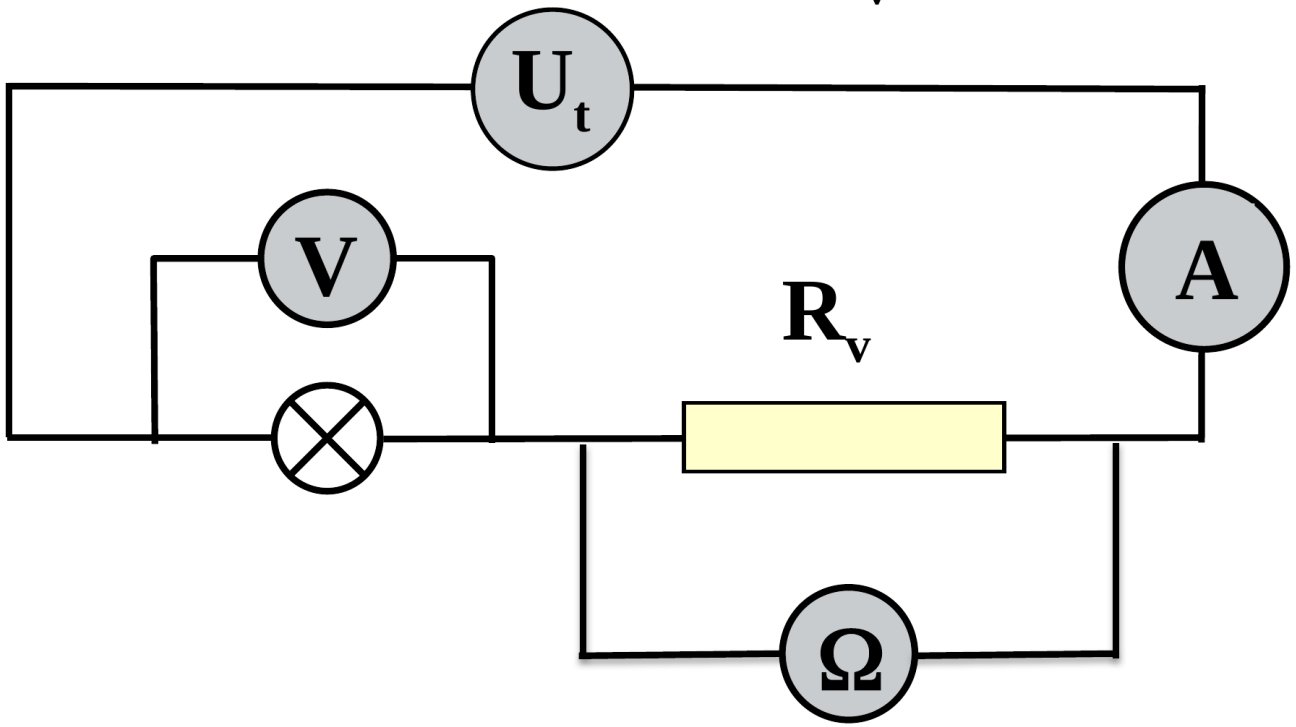
$$R_v = \frac{U_v}{I_t} \rightarrow R_v = \frac{9}{0{,}5} = 18\ \Omega$$

Het meetschema

Het meetschema voor : U_l = 6 V

I_t = 0,5A

R_v = 18 Ω



SAMENVATTING

De belangrijkste punten

- U = I x R
- Serie: Ut = U1 + U2 (de deelspanningen tellen op)
- Serie: It = I1 = I2 (de stroom is overal gelijk)
- Serie: Rt = R1 + R2
- It = Ut / Rt en U1 = It x R1
- Voorschakelweerstand: Rv = Uv / It