INSTITUTO FEDERAL
Santa Catarina

Introdução às Telecomunicações
Circuito Séries e Paralelos

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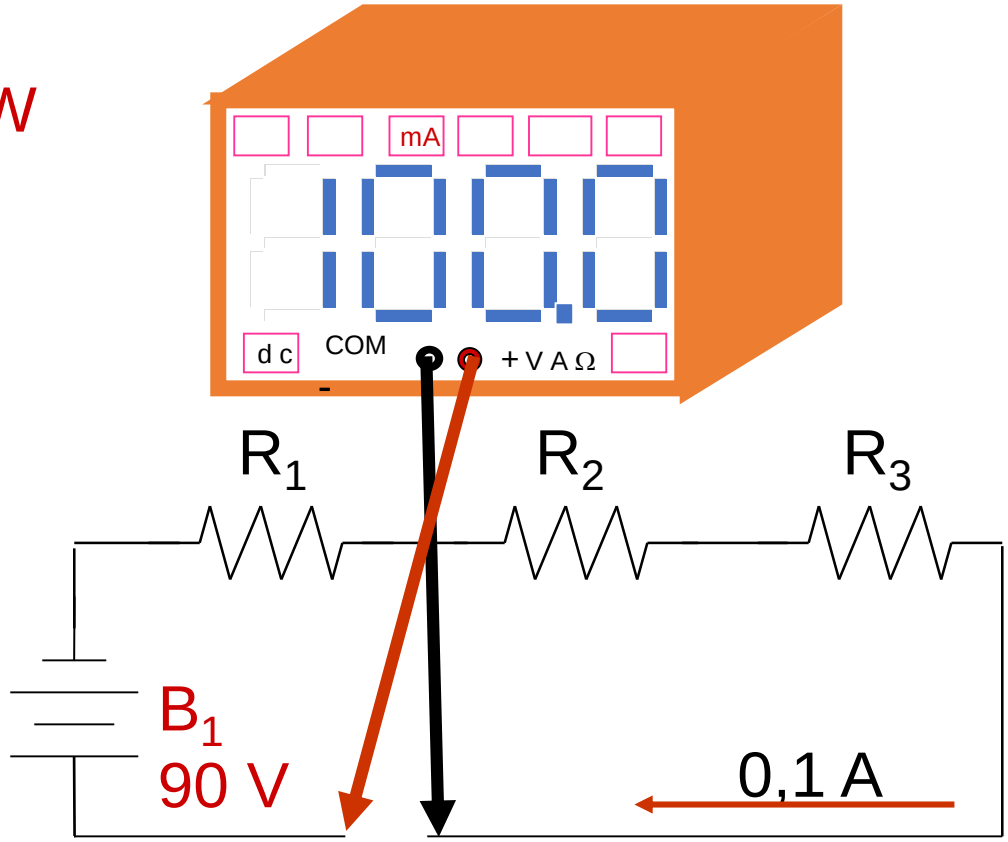
Santa Catarina

Introdução

- Medidas em Circuitos Série
- Cálculos em Circuitos Série
- Medidas em Circuitos Paralelo
- Cálculos em Circuitos Paralelo

Relações para circuitos série

$P_T = 9$ W



$R_T = 900\ \Omega$

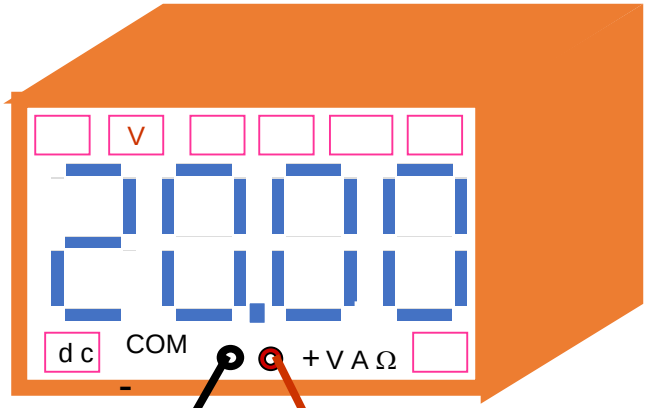
$R_T = V_T \div I_T = 90\ V \div 0{,}1\ A = 900\ \Omega$

$P_T = V_T \times I_T = 90\ V \times 0{,}1\ A = 9\ W$

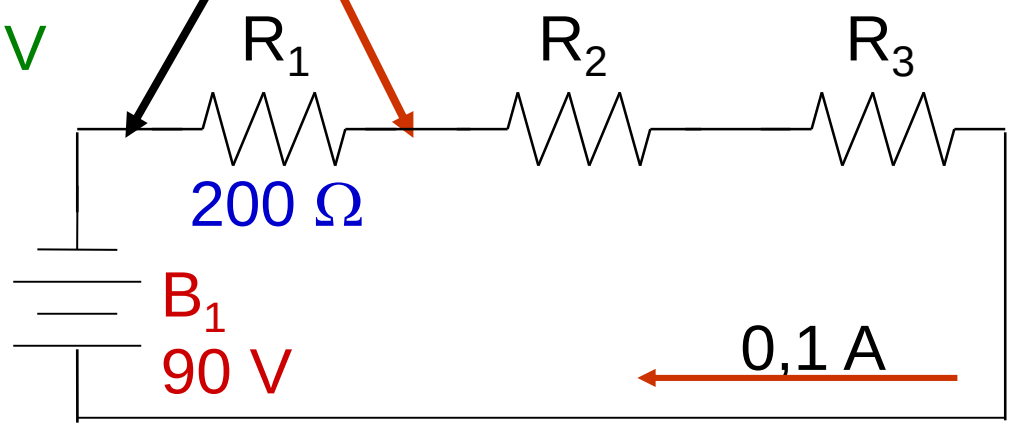
Relações para circuitos série

$P_T = 9$ W

$P_{R1} = 2$ W



$V_{R1} = 20$ V



$R_T = 900\ \Omega$

$R_1 = 200\ \Omega$

$R_1 = V_{R1} \div I_T = 20\text{ V} \div 0{,}1\text{ A} = 200\ \Omega$

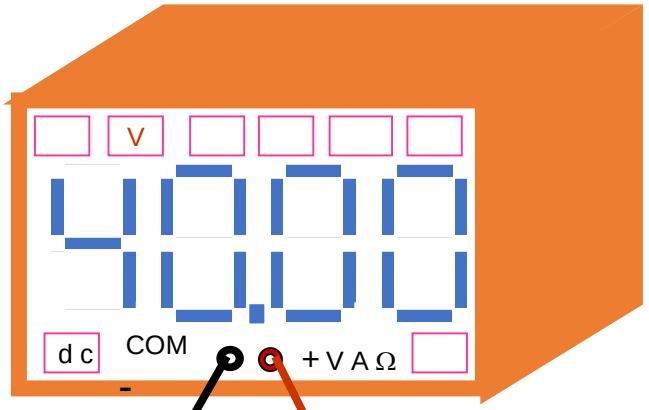
$P_{R1} = V_{R1} \times I_T = 20\text{ V} \times 0{,}1\text{ A} = 2\text{ W}$

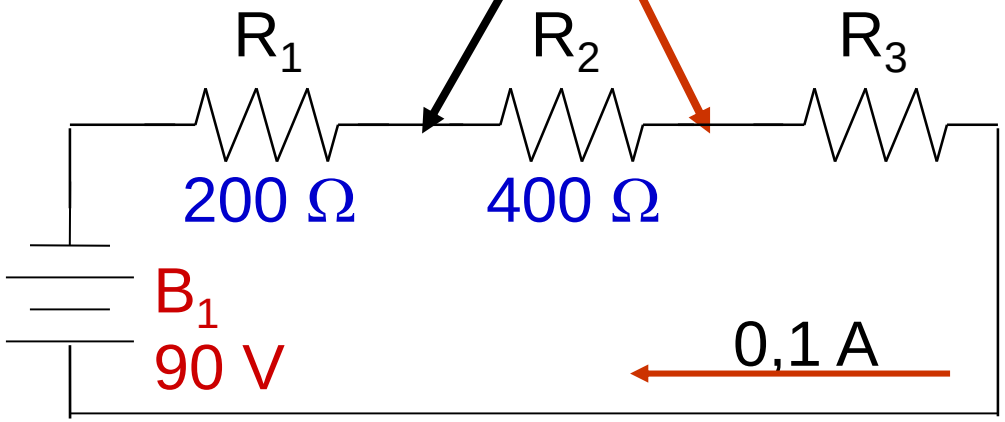
Relações para circuitos série

$P_T = 9$ W

$P_{R1} = 2$ W

$P_{R2} = 4$ W





$V_{R1} = 20$ V

$V_{R2} = 40$ V

$R_T = 900\ \Omega$

$R_1 = 200\ \Omega$

$R_2 = 400\ \Omega$

$R_2 = V_{R2} \div I_T = 40\text{ V} \div 0{,}1\text{ A} = 400\ \Omega$

$P_{R2} = V_{R2} \times I_T = 40\text{ V} \times 0{,}1\text{ A} = 4\text{ W}$

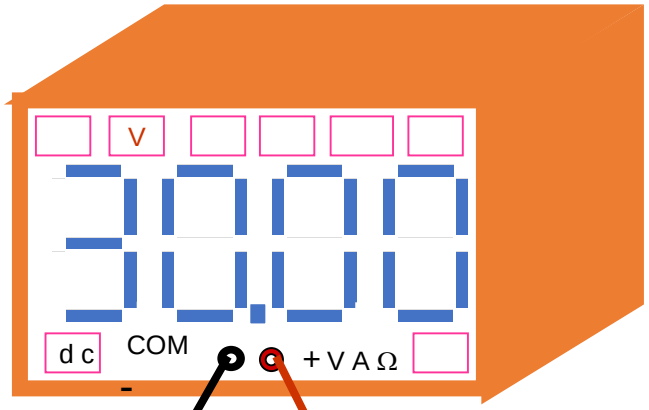
Relações para circuitos série

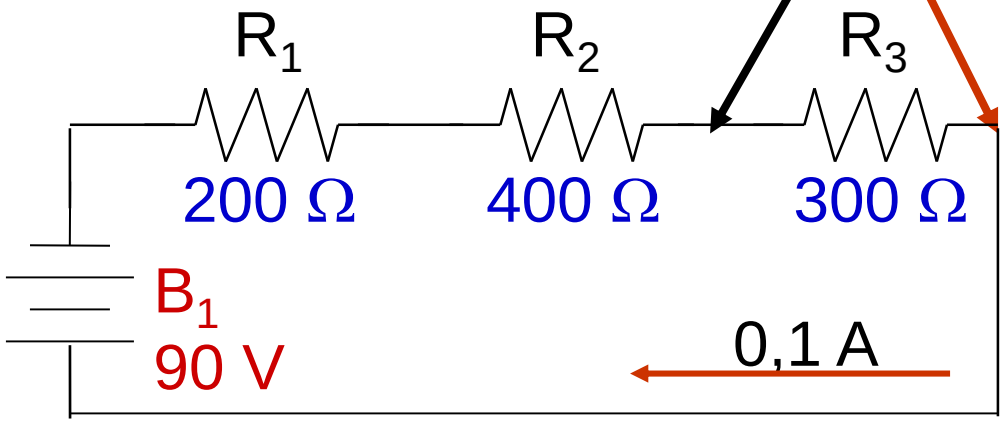
$P_T = 9$ W

$P_{R1} = 2$ W

$P_{R2} = 4$ W

$P_{R3} = 3$ W





$V_{R1} = 20$ V

$V_{R2} = 40$ V

$V_{R3} = 30$ V

$R_T = 900\ \Omega$

$R_1 = 200\ \Omega$

$R_2 = 400\ \Omega$

$R_3 = 300\ \Omega$

$R_3 = V_{R3} \div I_T = 30\text{ V} \div 0{,}1\text{ A} = 300\ \Omega$

$P_{R3} = V_{R3} \times I_T = 30\text{ V} \times 0{,}1\text{ A} = 3\text{ W}$

Relações para circuitos série

Compare valores totais com valores individuais

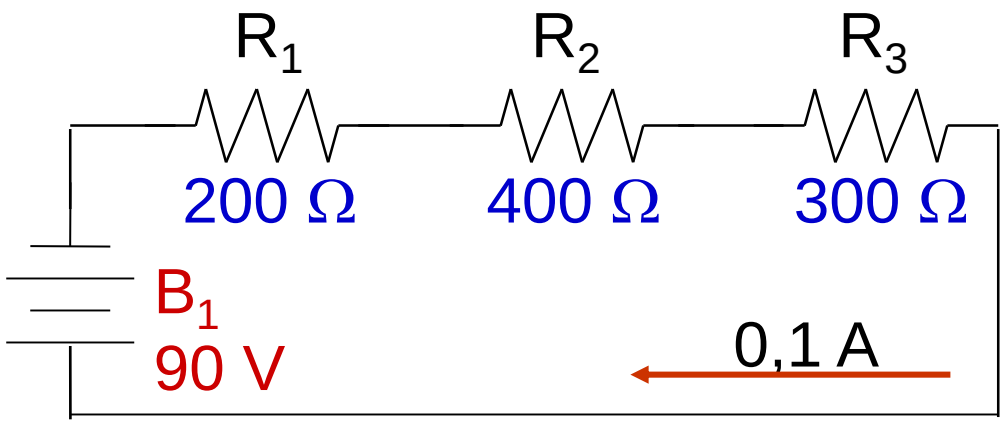
$P_T = 9$ W

$P_{R1} = 2$ W

$P_{R2} = 4$ W

$P_{R3} = 3$ W

$9\ W = 2\ W + 4W + 3\ W$



$R_T = 900\ \Omega$

$R_1 = 200\ \Omega$

$R_2 = 400\ \Omega$

$R_3 = 300\ \Omega$

$V_{R1} = 20$ V

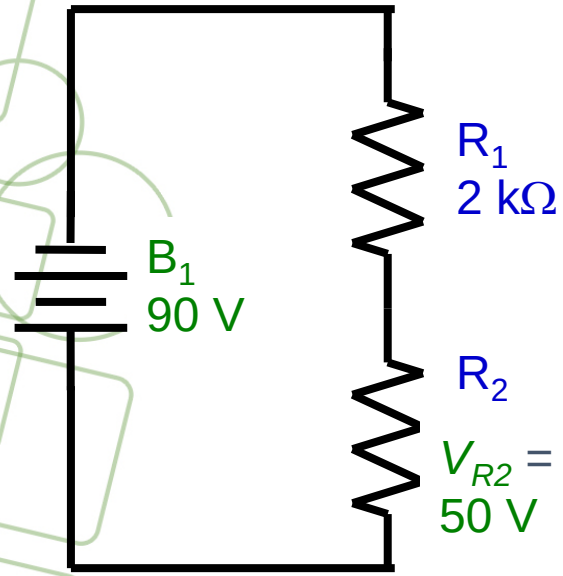
$V_{R2} = 40$ V

$V_{R3} = 30$ V

$90\ V = 20\ V + 40\ V + 30\ V$

$900\ \Omega = 200\ \Omega + 400\ \Omega + 300\ \Omega$

Um problema de circuito série



$V_{R1} = V_T - V_{R2} = 90\ V - 50\ V = 40\ V$

$I_{R1} = V_{R1} \div R_1 = 40\ V \div 2\ k\Omega = 20\ mA$

$R_2 = V_{R2} \div I_{R2} = 50\ V \div 20\ mA = 2{,}5\ k\Omega$

$R_T = R_1 + R_2 = 2\ k\Omega + 2{,}5\ k\Omega = 4{,}5\ k\Omega$

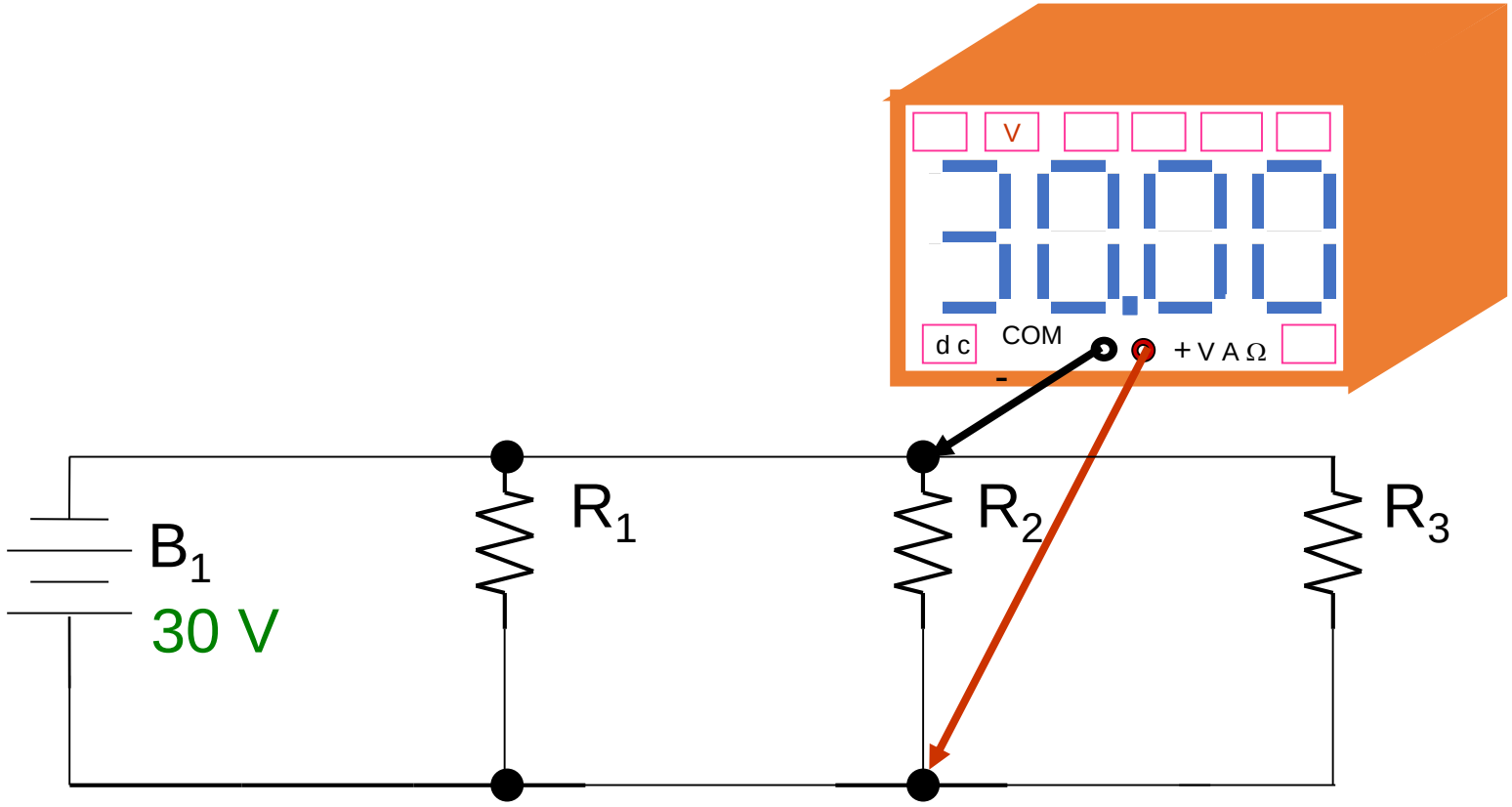
$P_T = I_T \times V_T = 0{,}02\ A \times 90\ V = 1{,}8\ W$

$P_{R1} = I_{R1} \times V_{R1} = 0{,}02\ A \times 40\ V = 0{,}8\ W$

$P_{R2} = I_{R2} \times V_{R2} = 0{,}02\ A \times 50\ V = 1{,}0\ W$

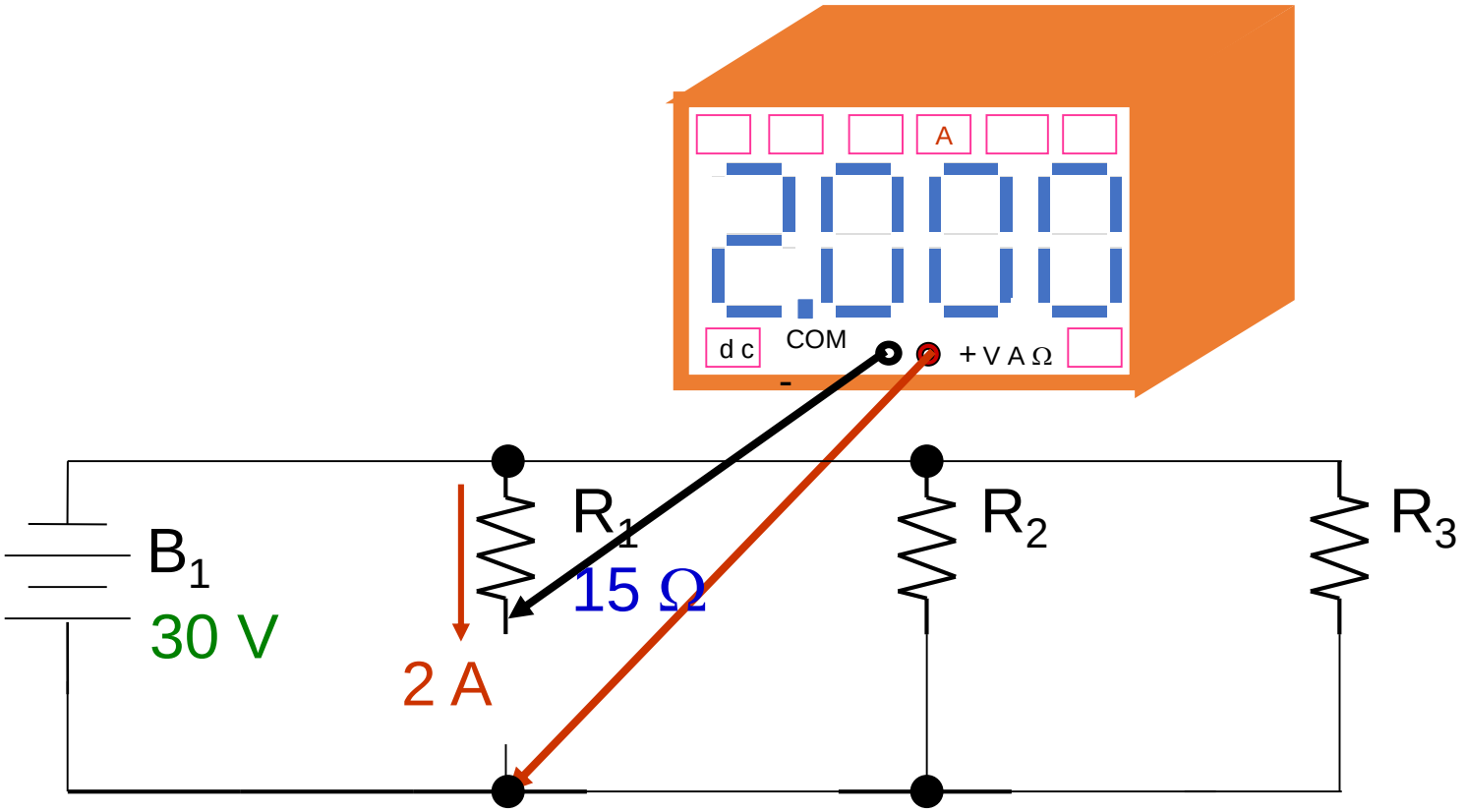
$P_T = P_{R1} + P_{R2} = 0{,}8\ W + 1{,}0\ W = 1{,}8\ W$

Relações para circuitos paralelo



$$V_T = V_{R1} = V_{R2} = V_{R3} = 30\ V$$

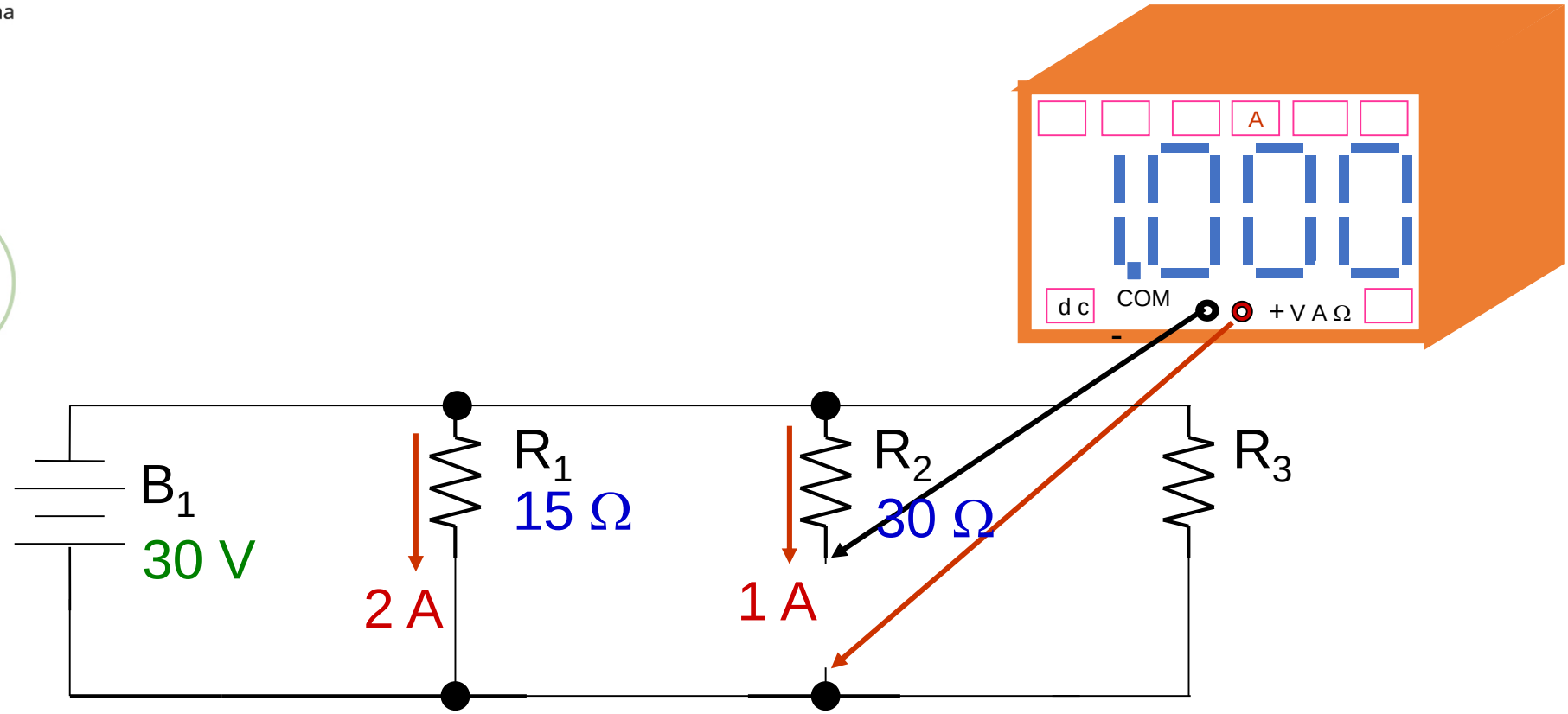
Relações para circuitos paralelo



$V_T = V_{R1} = V_{R2} = V_{R3} = 30\ V$

$R_1 = V_{R1} \div I_{R1} = 30\ V \div 2\ A = 15\ \Omega$

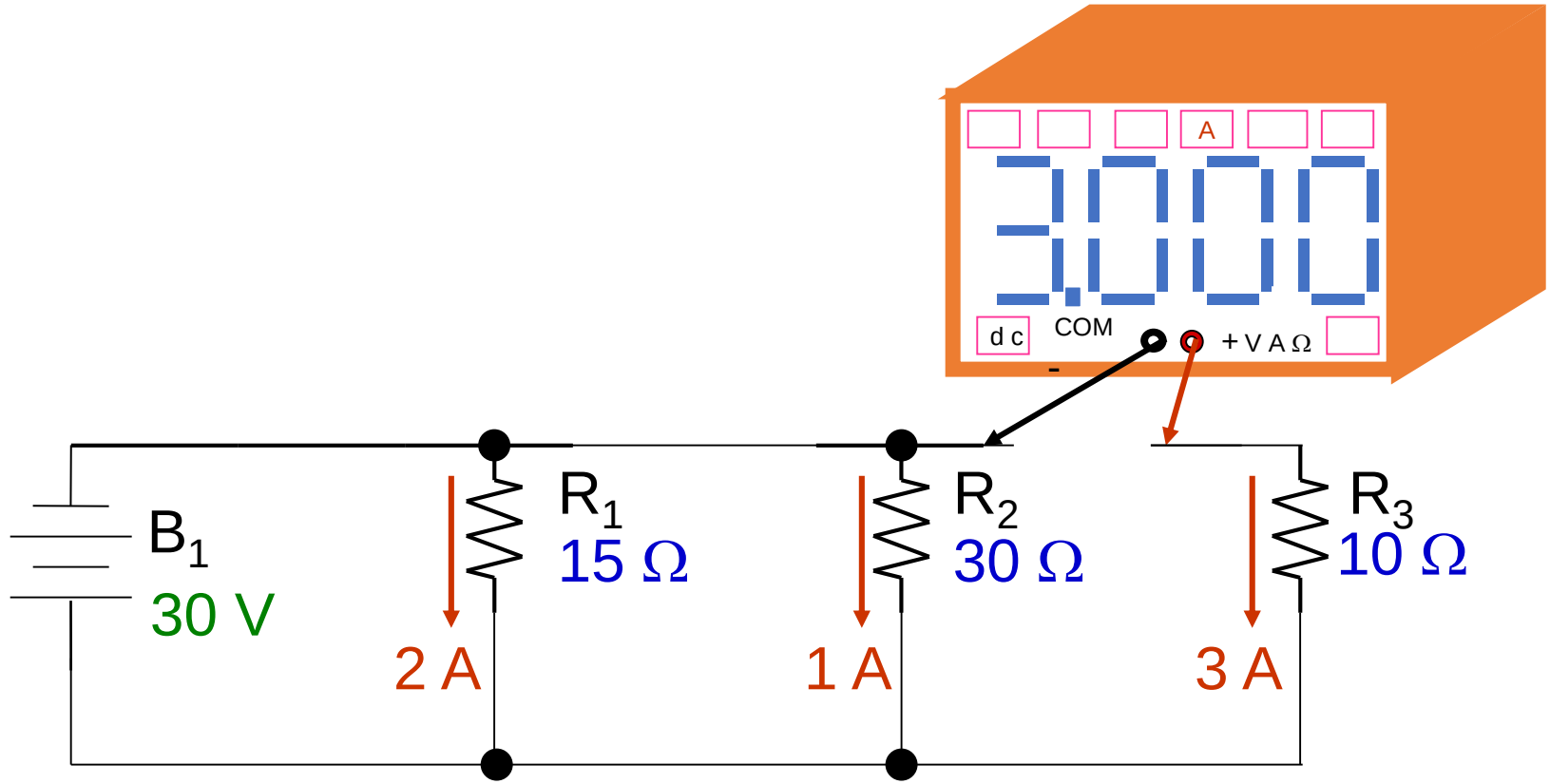
Relações para circuitos paralelo



$V_T = V_{R1} = V_{R2} = V_{R3} = 30\ V$

$R_1 = V_{R1} \div I_{R1} = 30\ V \div 2\ A = 15\ \Omega$

$R_2 = V_{R2} \div I_{R2} = 30\ V \div 1\ A = 30\ \Omega$

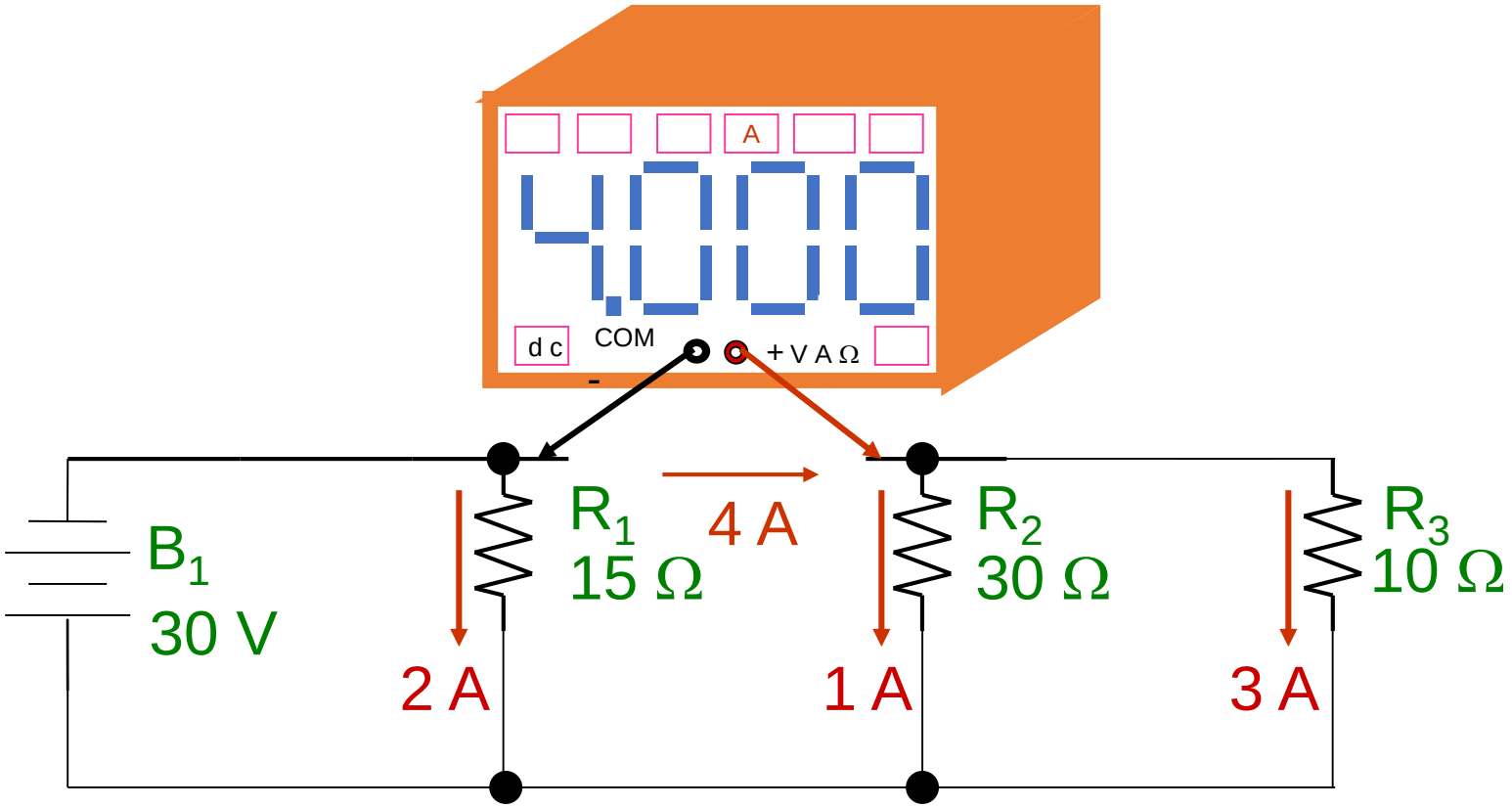


$V_T = V_{R1} = V_{R2} = V_{R3} = 30\ V$

$R_1 = V_{R1} \div I_{R1} = 30\ V \div 2\ A = 15\ \Omega$

$R_2 = V_{R2} \div I_{R2} = 30\ V \div 1\ A = 30\ \Omega$

$R_3 = V_{R3} \div I_{R3} = 30\ V \div 3\ A = 10\ \Omega$



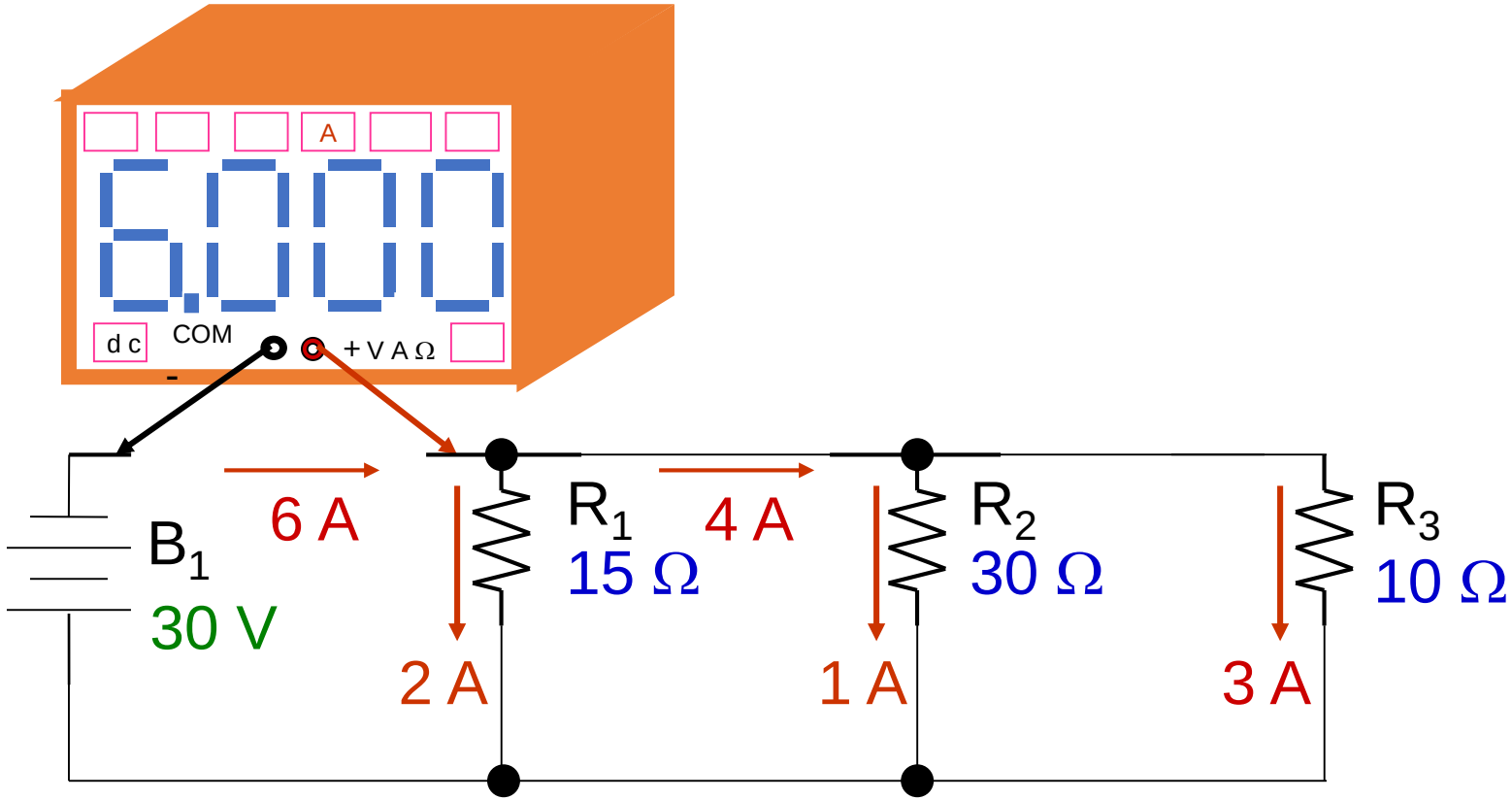
$V_T = V_{R1} = V_{R2} = V_{R3} = 30\ V$

$R_1 = V_{R1} \div I_{R1} = 30\ V \div 2\ A = 15\ \Omega$

$R_2 = V_{R2} \div I_{R2} = 30\ V \div 1\ A = 30\ \Omega$

$R_3 = V_{R3} \div I_{R3} = 30\ V \div 3\ A = 10\ \Omega$

$4\ A = 1\ A + 3\ A$



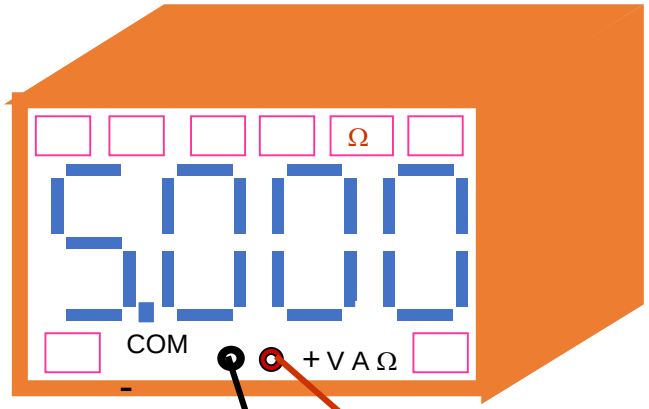
$V_T = V_{R1} = V_{R2} = V_{R3} = 30\ V$

$R_1 = V_{R1} \div I_{R1} = 30\ V \div 2\ A = 15\ \Omega$

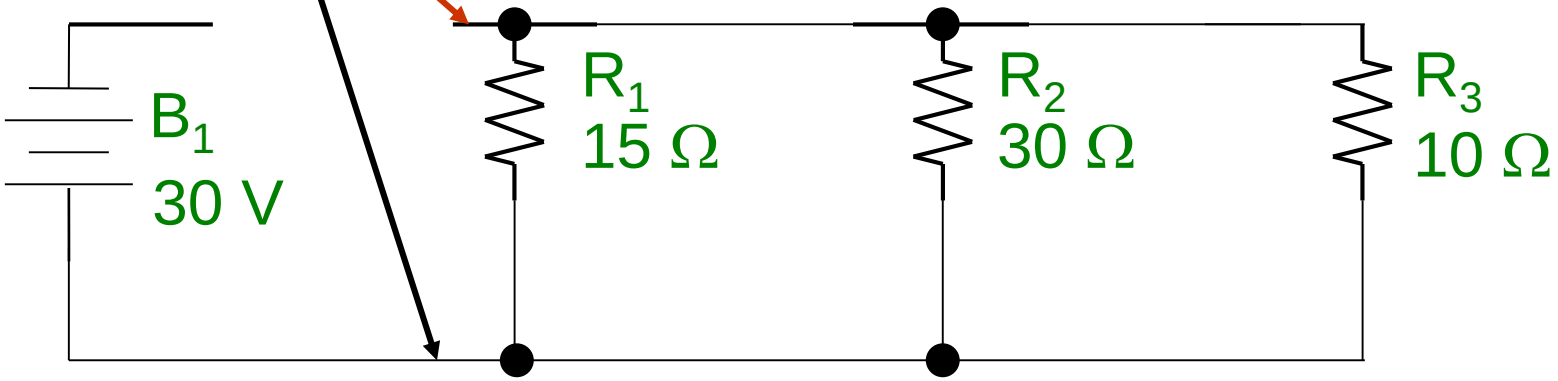
$R_2 = V_{R2} \div I_{R2} = 30\ V \div 1\ A = 30\ \Omega$

$R_3 = V_{R3} \div I_{R3} = 30\ V \div 3\ A = 10\ \Omega$

$4\ A = 1\ A + 3\ A \qquad I_T = 2\ A + 1\ A + 3\ A = 6\ A$



R_T medido = 5 Ω



A resistência total calculada é

$$R_T = \frac{1}{\frac{1}{R_1} + \frac{1}{R_2} + \frac{1}{R_3}} = \frac{1}{\frac{1}{15} + \frac{1}{30} + \frac{1}{10}} = \frac{30}{6} = 5\ \Omega$$

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Quiz sobre medidas em circuitos

Há apenas uma tensão para ser medida em um circuito paralelo.

Há apenas uma corrente para ser medida em um circuito série.

A medida de corrente requer uma interrupção fisica no caminho do circuito.

As medidas mais fáceis de se fazer em um circuito são as medidas de tensão.