

Aufgabe 1

Messinstrument

Klasse 1,5 MB 100 mA

a) $F = \pm 100 \mu\text{A} \cdot 1,5\% = 1,5 \mu\text{A}$

b) $F_1 = \frac{1,5 \mu\text{A}}{10 \mu\text{A}} \cdot 100\% = 15\%$

$F_2 = \frac{1,5 \mu\text{A}}{20 \mu\text{A}} \cdot 100\% = 7,5\%$

$F_3 = \frac{1,5 \mu\text{A}}{30 \mu\text{A}} \cdot 100\% = 5\%$

$F_4 = \frac{1,5 \mu\text{A}}{40 \mu\text{A}} \cdot 100\% = 3,75\%$

$F_5 = \frac{1,5 \mu\text{A}}{50} \cdot 100\% = 3\%$

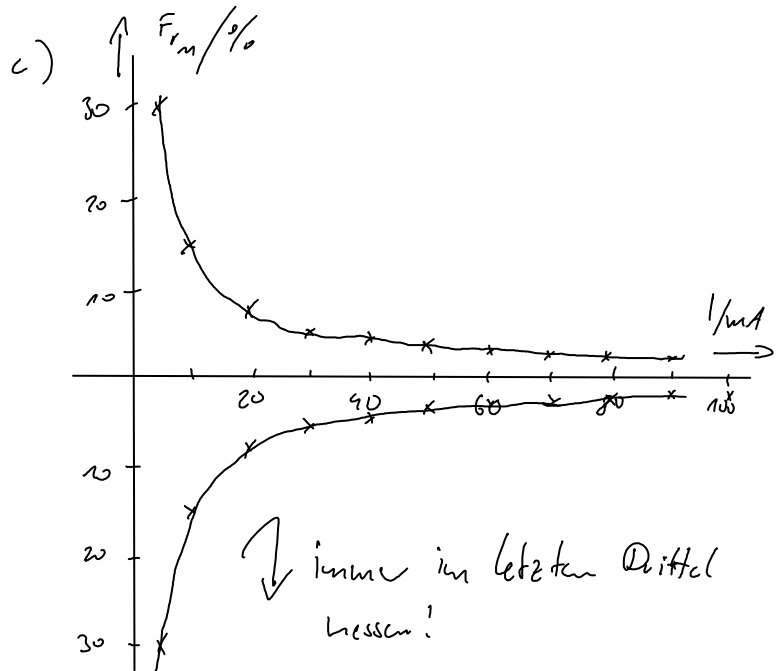
$F_6 = \dots = 2,5\%$

$F_7 = \dots = 2,14\%$

$F_8 = \dots = 1,875\%$

$F_9 = \dots = 1,67\%$

$F_{10} = \dots = 1,5\%$

Aufgabe 2

• MB: 1 A

$R_{iA} = 1 \Omega$

 $F_{\text{abs klein}} \rightarrow F \propto \Delta A$

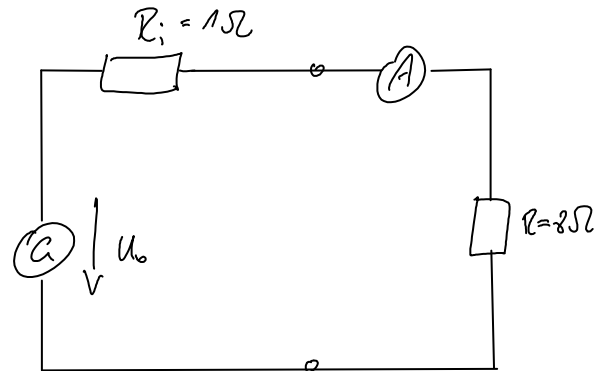
• Quelle

$U_0 = 10 \text{ V}$

$R_{iV} = 1 \Omega$

• Verbraucher

$R = 8 \Omega$



$F = I_A - I_W$

$I_W = \frac{U_0}{R_i + R} \quad , \quad I_A = \frac{U_0}{R_i + R + R_{iA}}$

$$F_{\text{fm}} = \frac{\frac{-R_{iA}}{(R_i + R + R_{iA})(R_i + R)} \cdot U_0}{\frac{U_0}{R_i + R + R_{iA}}} \cdot 100\% = \frac{-R_{iA}}{R_i + R} \cdot 100\%$$

a) $F = \frac{U_0}{R_i + R + R_{iA}} - \frac{U_0}{R_i + R}$

$F = \frac{R_i + R - (R_i + R + R_{iA})}{(R_i + R + R_{iA})(R_i + R)} \cdot U_0$

$F = \frac{-R_{iA}}{(R_i + R + R_{iA})(R_i + R)} \cdot U_0$

$$b) F = \frac{-1\Omega}{10\Omega \cdot 5\Omega} \cdot 10V = -\frac{1}{5} A$$

$$F_{\text{rel}} = \frac{-1\Omega}{5\Omega} \cdot 100\% = -20\%$$

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Aufgabe 3

$$\bar{x} = 200,05$$

$$s = 0,15$$

$$v = 0,073$$

$$\rightarrow x = 200,05 \text{ mm} \pm 0,073 \text{ mm}$$

Aufgabe 4

$$\bar{x} = 784,58$$

$$\bar{s} = 0,48$$

$$s = 0,56$$

$$v = 0,59$$

$$\frac{t}{n} = 1,05$$

$$x = 784,58 \Omega \pm 0,99 \Omega$$