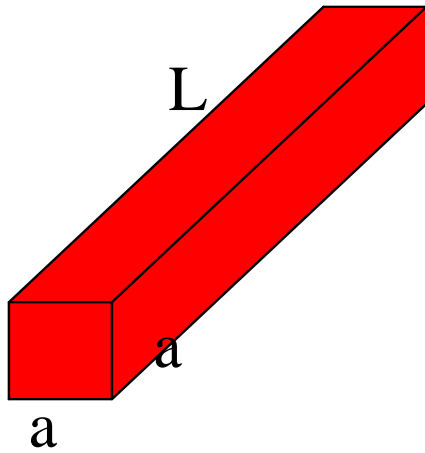# Resistive sensors

Material from

- Section 3.5: Resistivity
- Section 9.5: Strain gauges
- Chapter 5.7: Bridge circuits

Resistivity

$R_0 = \rho \, L/a^2$

Mass

$$\rho = \frac{m}{ne^2\tau}. \qquad (3.53)$$
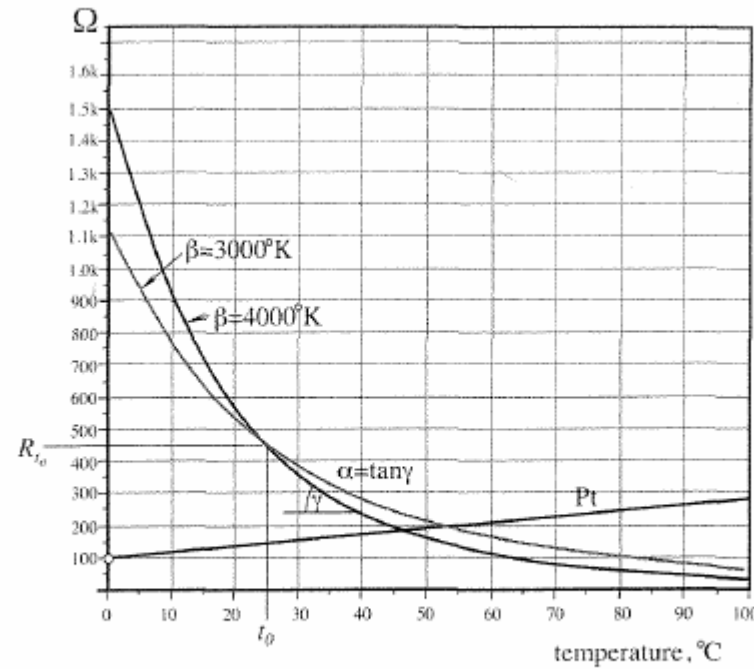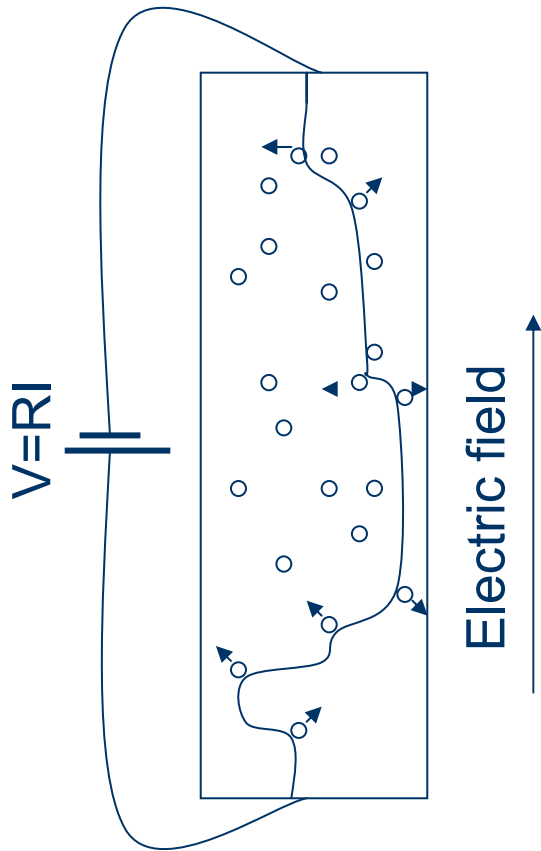
Time between collisions

Carrier density

Fig. 3.18. Resistance–temperature characteristics for two thermistors and Pt RTD ($R_0 = 1k$); thermistors are calibrated at $t_0 = 25°C$ and RTD at $0°C$.
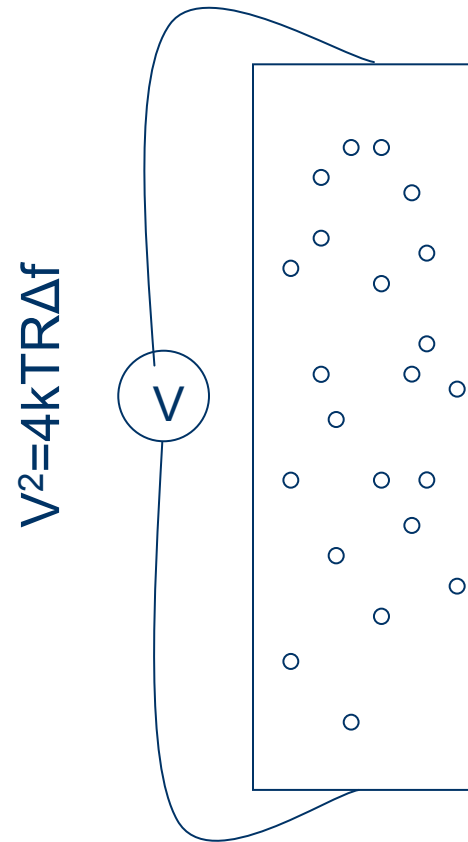
Noise

Resistivity/dissipation:
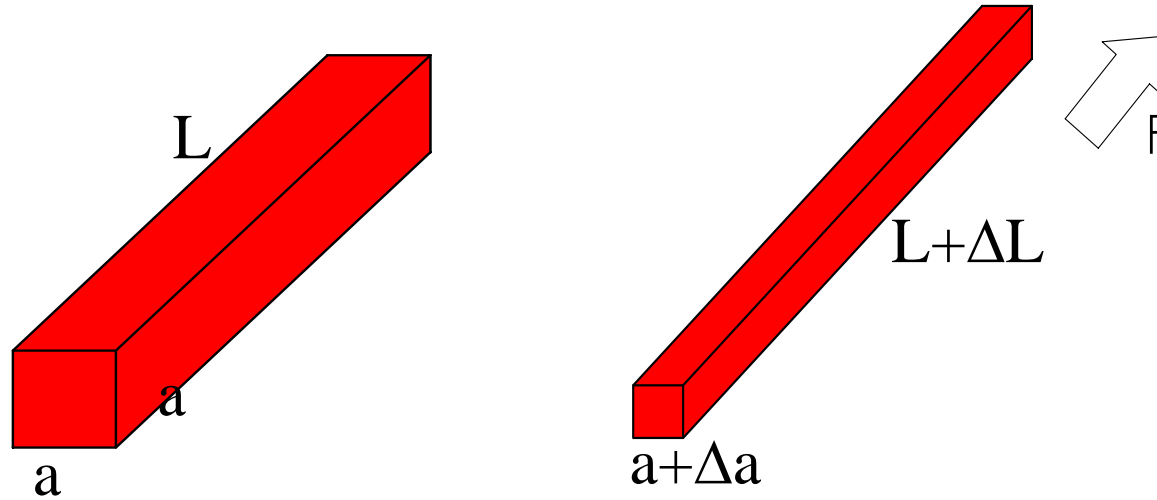
Noise:

$V=RI$

Electric field

$V^2=4kTR\Delta f$

V

Elecrtic energy -> Heat

Heat -> Electric energy

Motstandsendring i metall leder
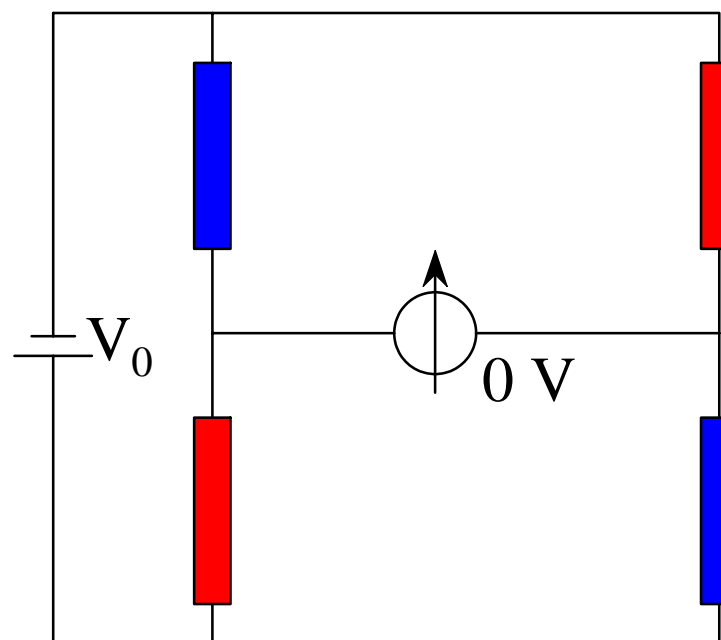

$$R_0 = \rho\, L/a^2$$

$$R = R_0 + R_0\, \Delta L/L + 2R_0 \Delta a/a$$

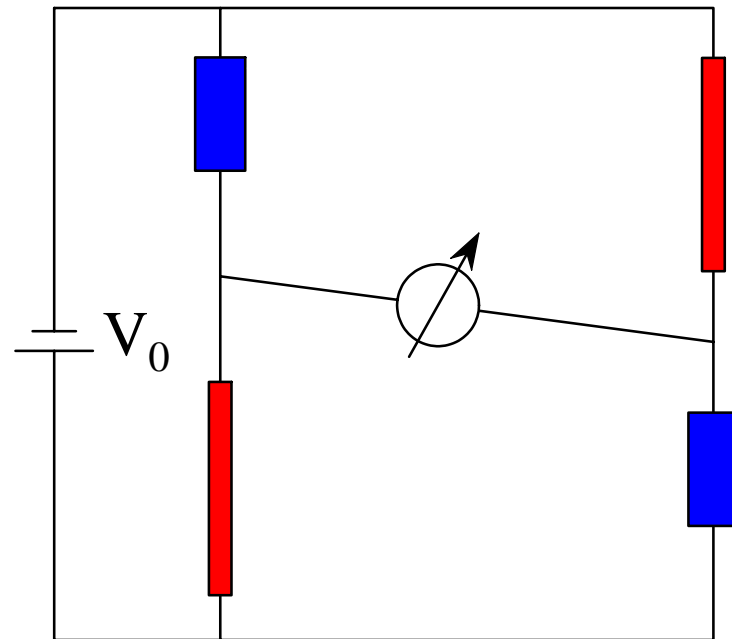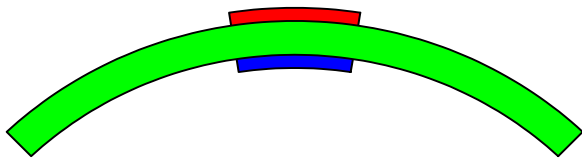$$\Delta a/a \approx 1/2\, \Delta L/L \qquad \Delta R/R \approx 2\, \Delta L/L \qquad \Delta R/R \approx 2\, \varepsilon$$
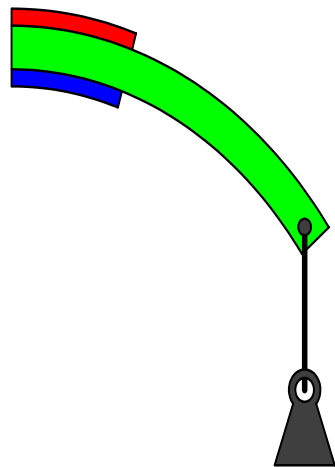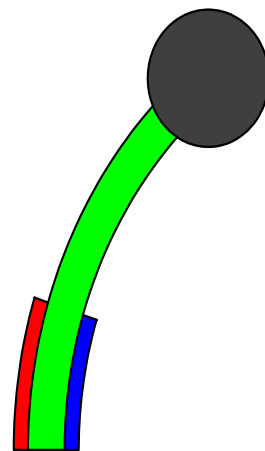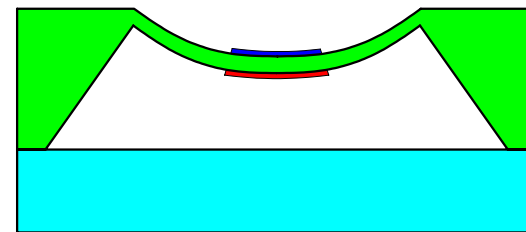
Balansert bro

V_0

0 V

Belastet struktur

Bruksområder

Veieceller

Akselerometer

Trykksensorer