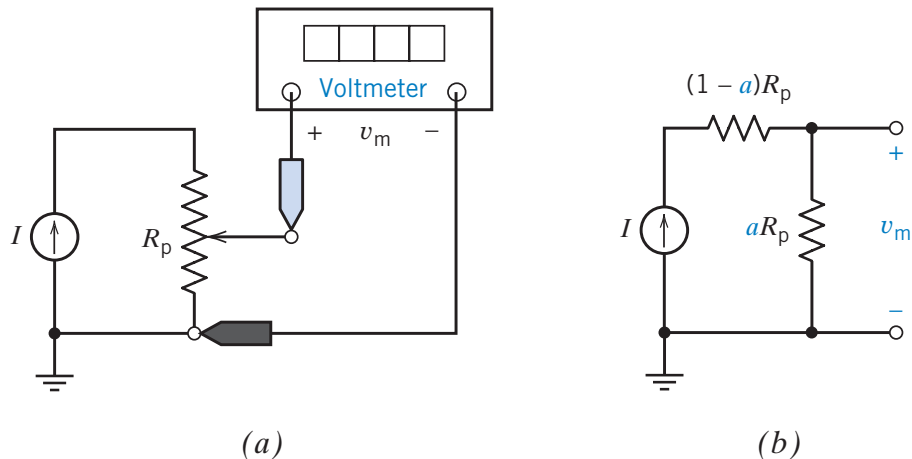


## Section 2-8 Transducers

**P 2.8-1** For the potentiometer circuit of Figure 2.8-2, the current source current and potentiometer resistance are 1.1 mA and 100 k $\Omega$ , respectively. Calculate the required angle,  $\theta$ , so that the measured voltage is 23 V.



**Figure 2.8-2**

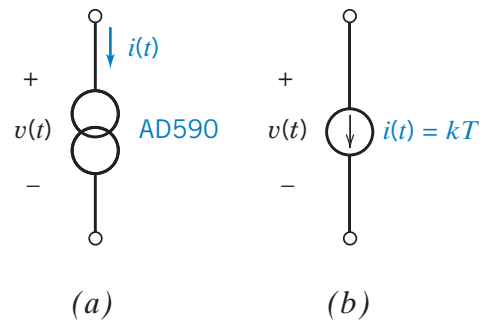
**Solution:**

$$a = \frac{\theta}{360}, \quad \theta = \frac{360 v_m}{R_p i} = \frac{(360)(23 \text{ V})}{(100 \text{ k}\Omega)(1.1 \text{ mA})} = 75.27^\circ$$

**P 2.8-2** An AD590 sensor has an associated constant  $k = 1 \frac{\mu\text{A}}{^\circ\text{K}}$ . The sensor has a voltage  $v = 20 \text{ V}$ ; and the measured current,  $i(t)$ , as shown in Figure 2.8-3, is

$$4 \mu\text{A} < i < 13 \mu\text{A}$$

in a laboratory setting. Find the range of measured temperature.



**Figure 2.8-3**

**Solution:**

$$\text{AD590 : } k = 1 \frac{\mu\text{A}}{^\circ\text{K}},$$

$$v = 20 \text{ V (voltage condition satisfied)}$$

$$\left. \begin{array}{l} 4 \mu\text{A} < i < 13 \mu\text{A} \\ T = \frac{i}{k} \end{array} \right\} \Rightarrow \underline{4^\circ\text{K} < T < 13^\circ\text{K}}$$