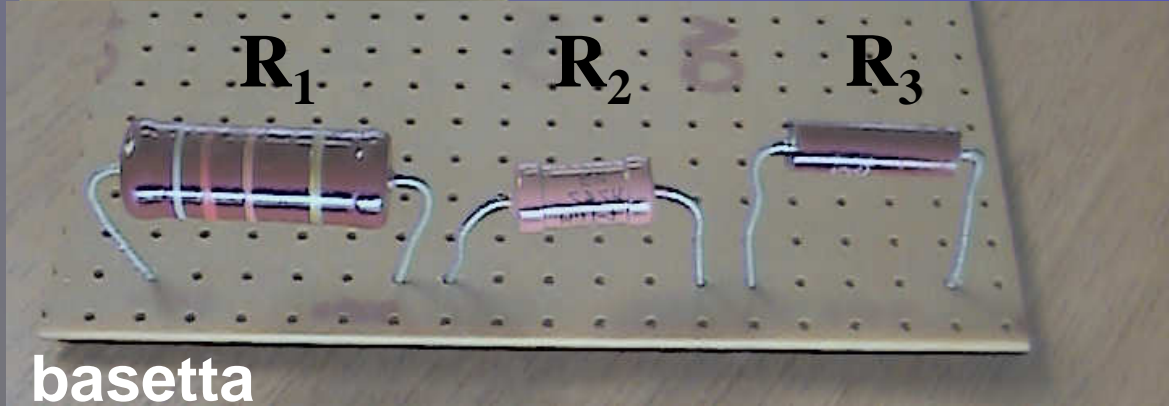
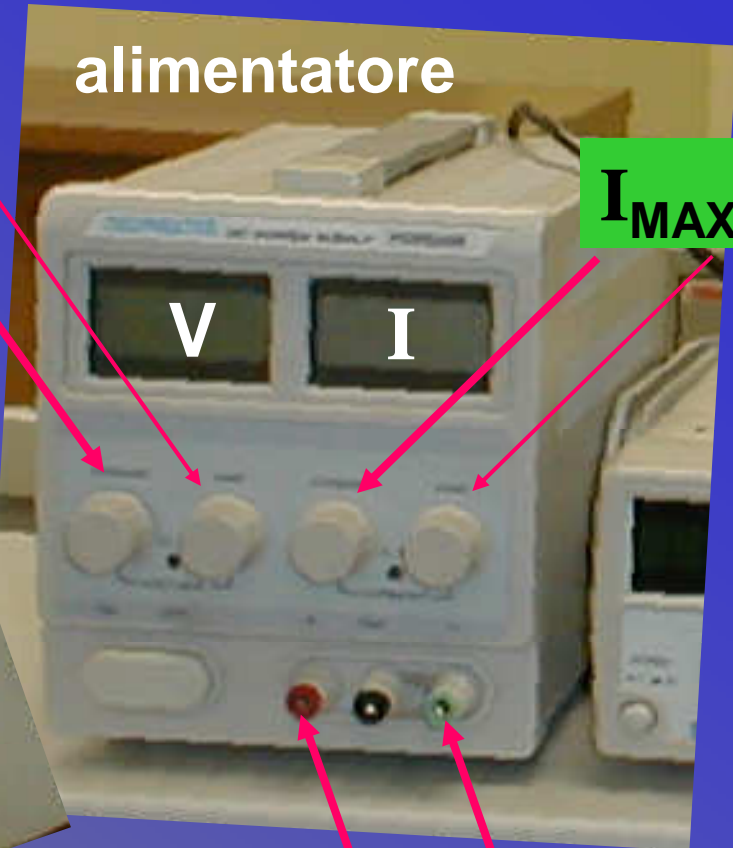


V

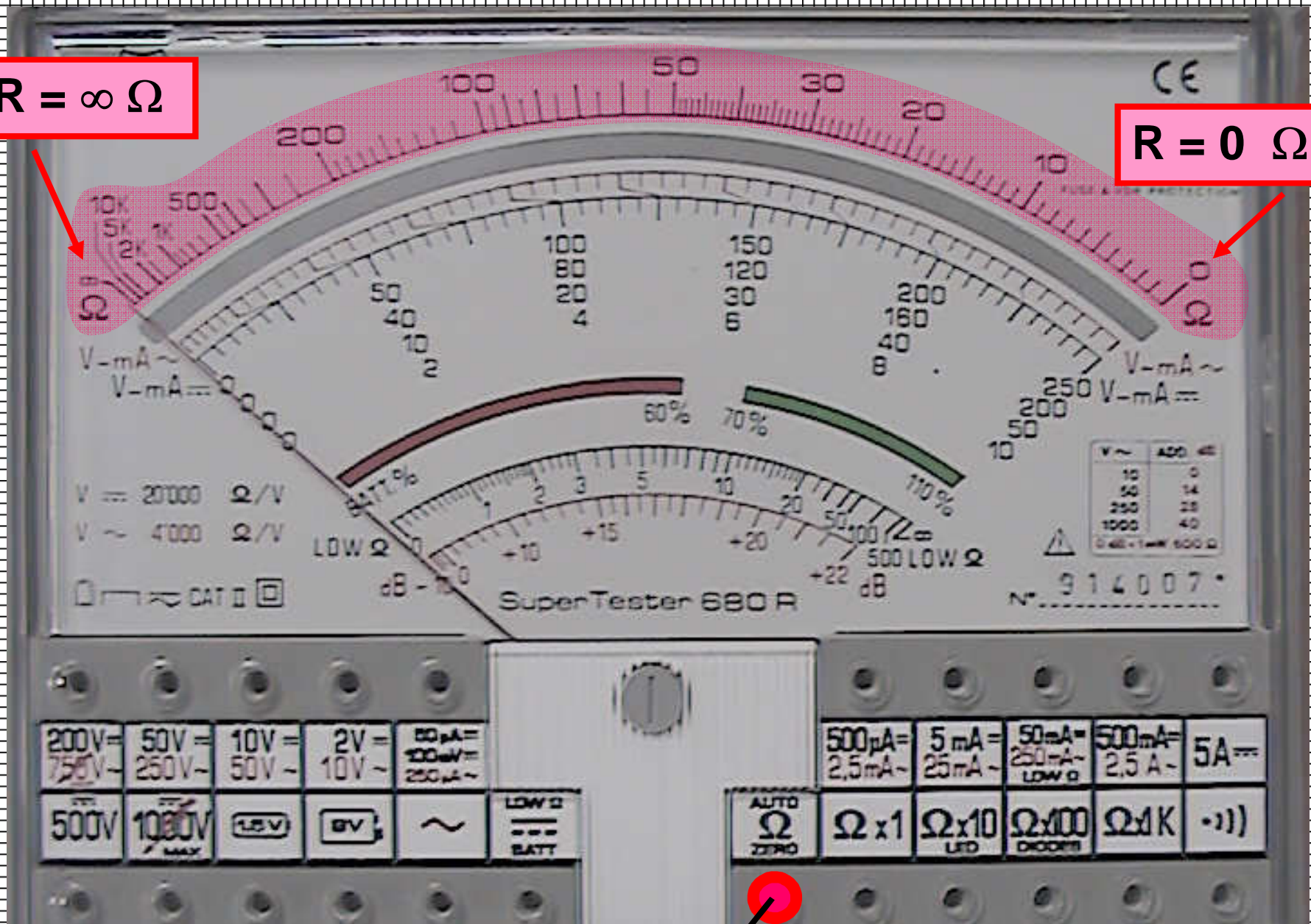


$R_1 < R_2 < R_3$

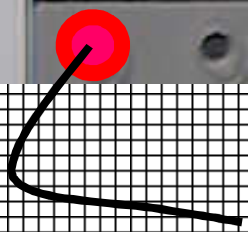


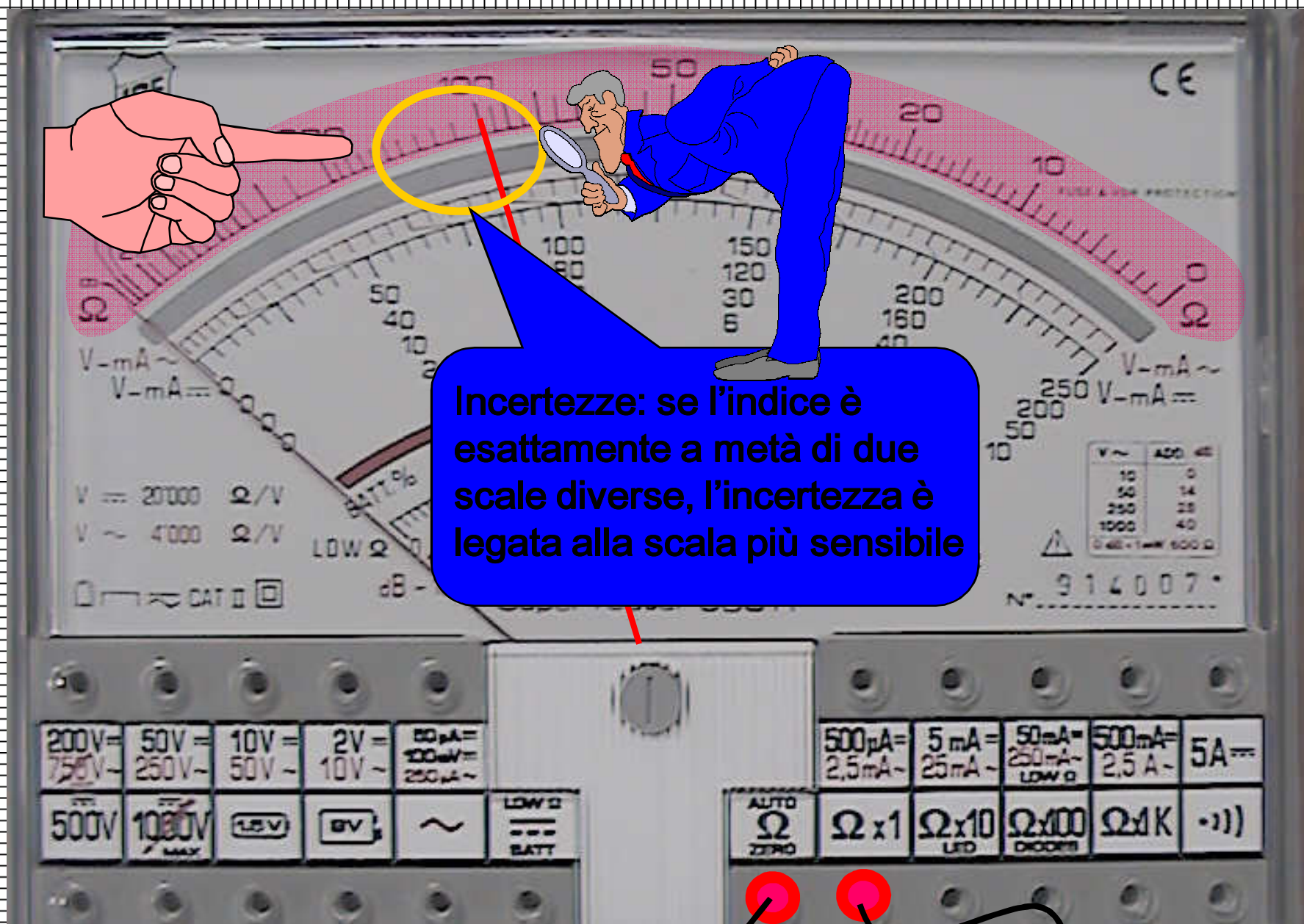
$R = \infty \Omega$

$R = 0 \Omega$



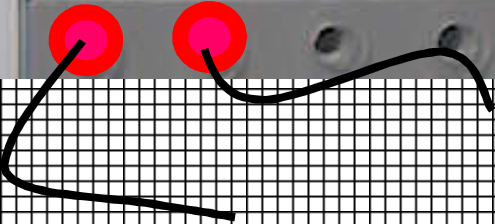
ohmmetro



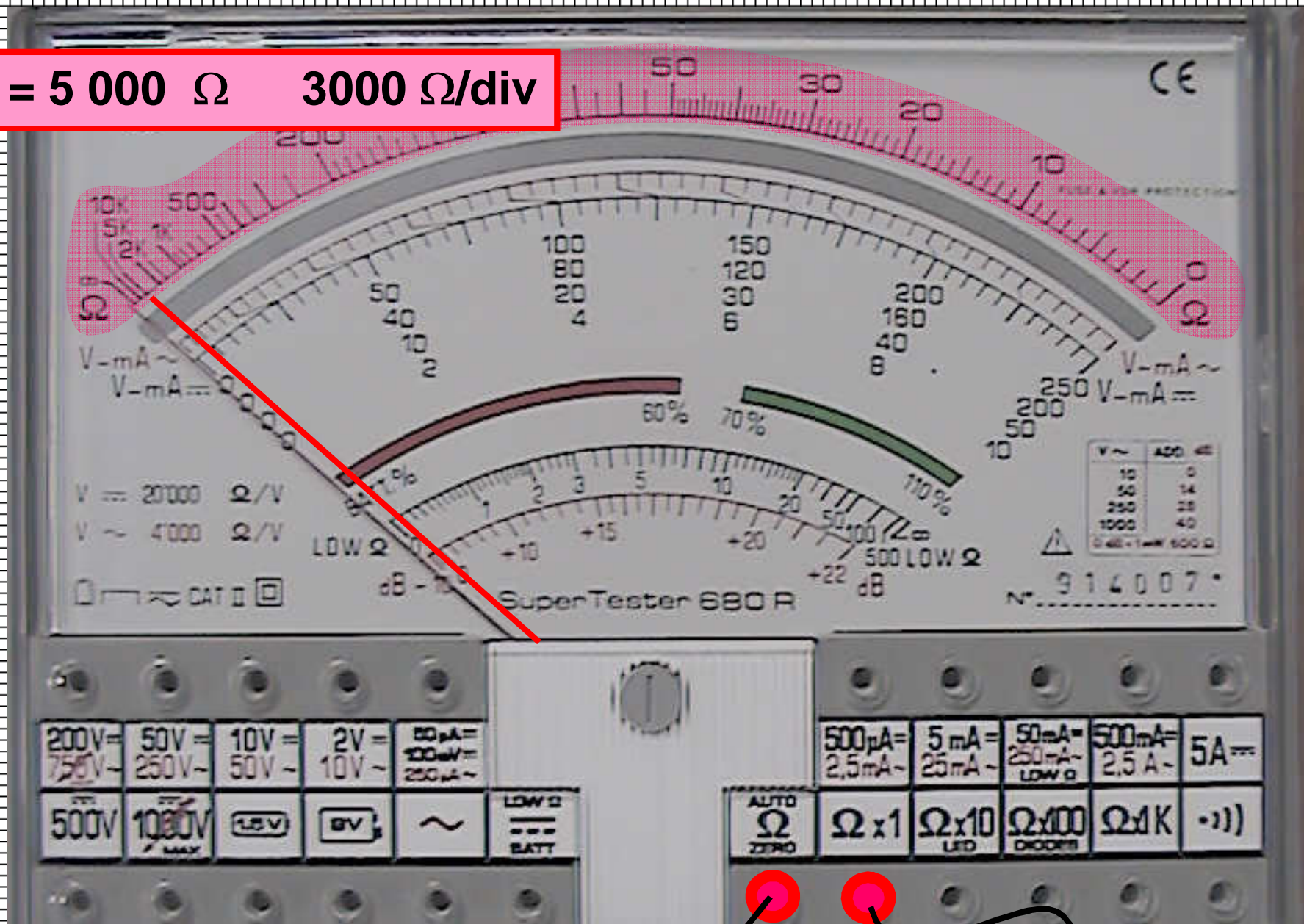


**Incertezze: se l'indice è esattamente a metà di due scale diverse, l'incertezza è legata alla scala più sensibile**

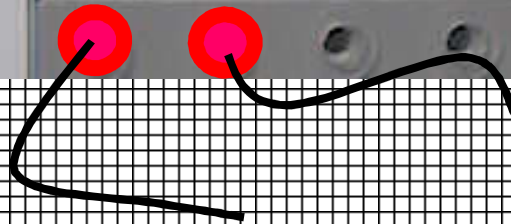
**ohmmetro**



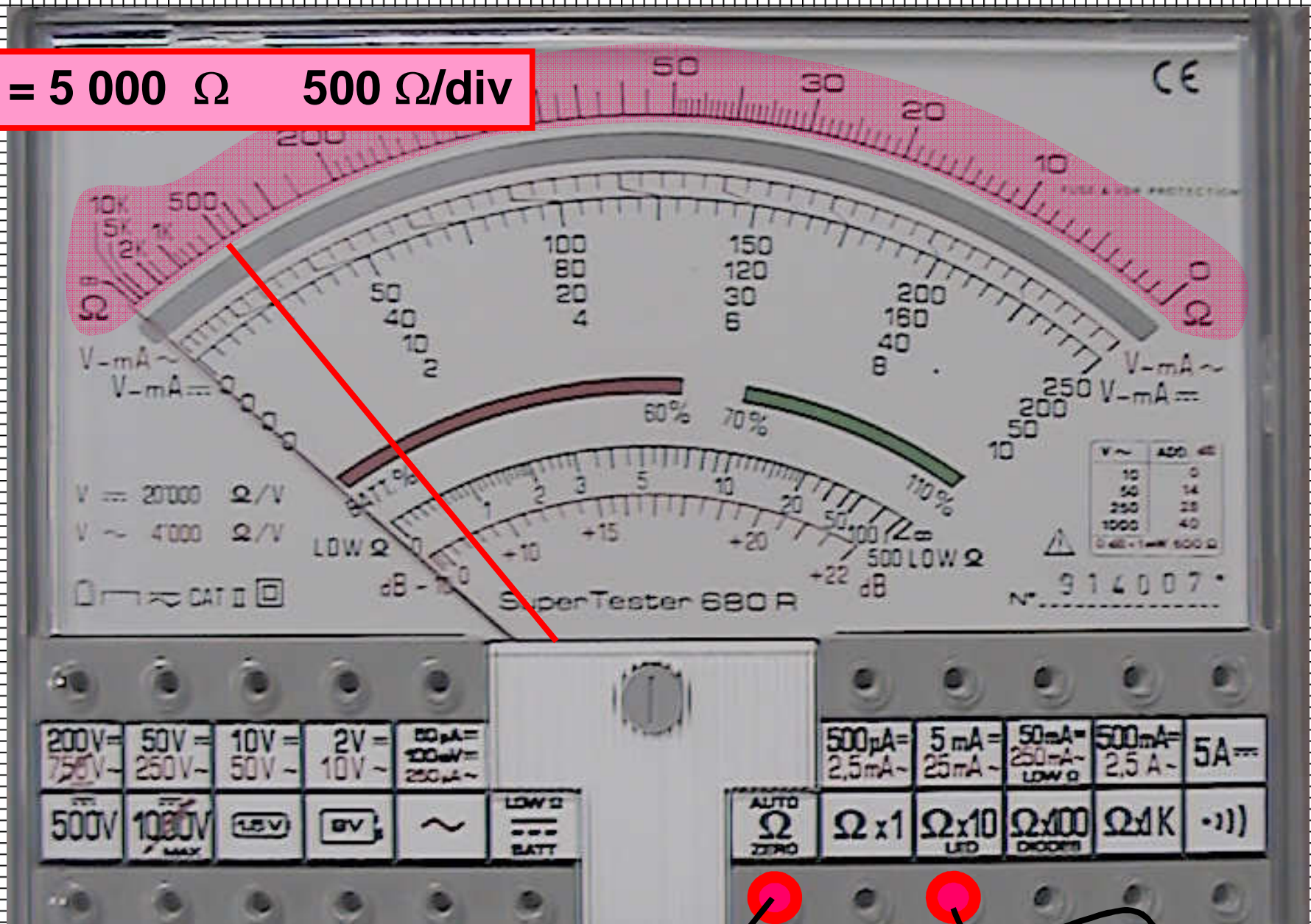
**$R = 5\,000\ \Omega$      $3000\ \Omega/\text{div}$**



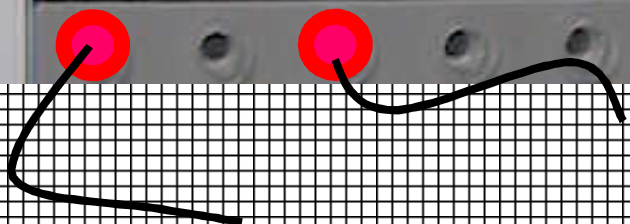
**ohmmetro**



**$R = 5\,000\ \Omega$      $500\ \Omega/\text{div}$**

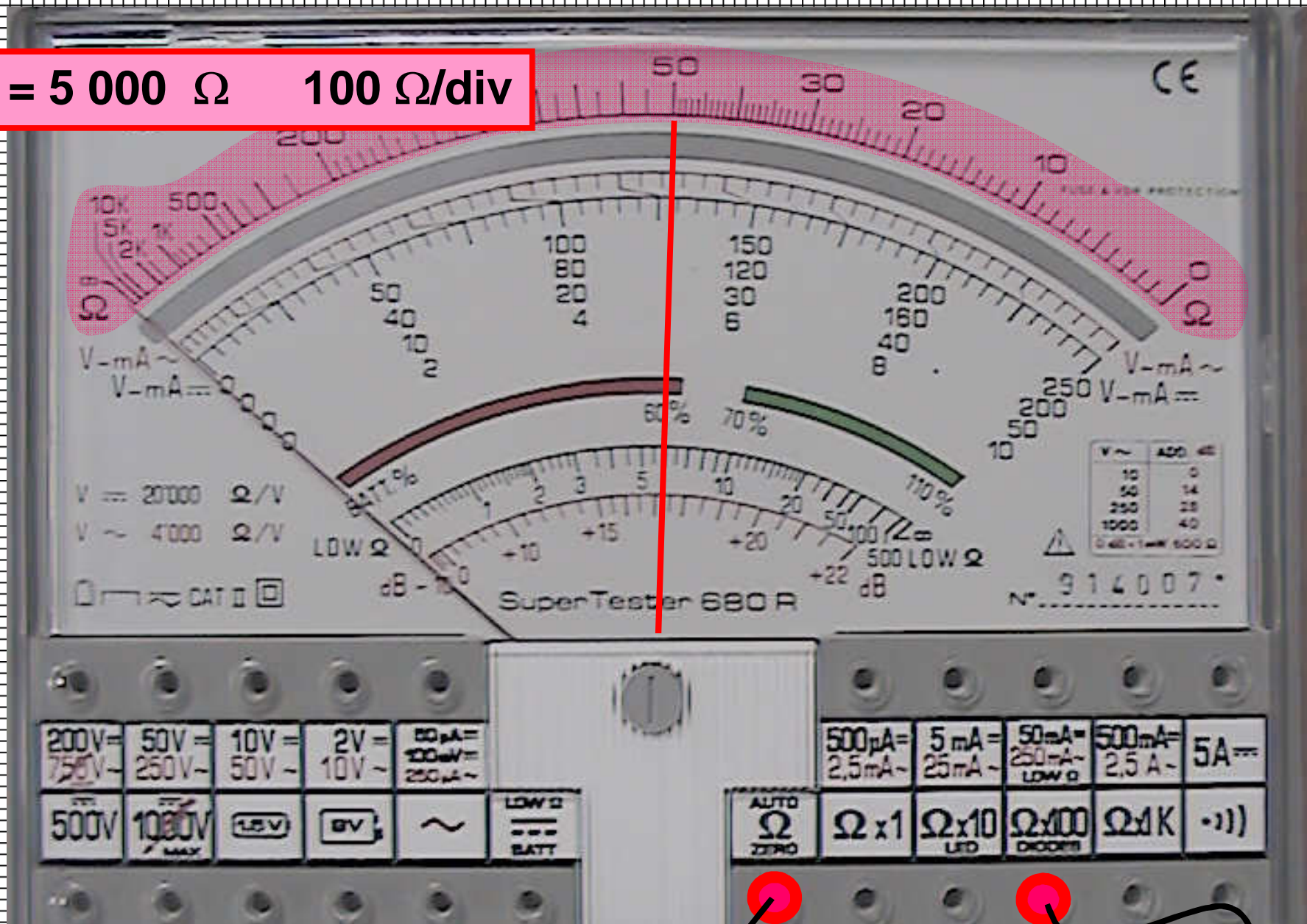


**ohmmetro**



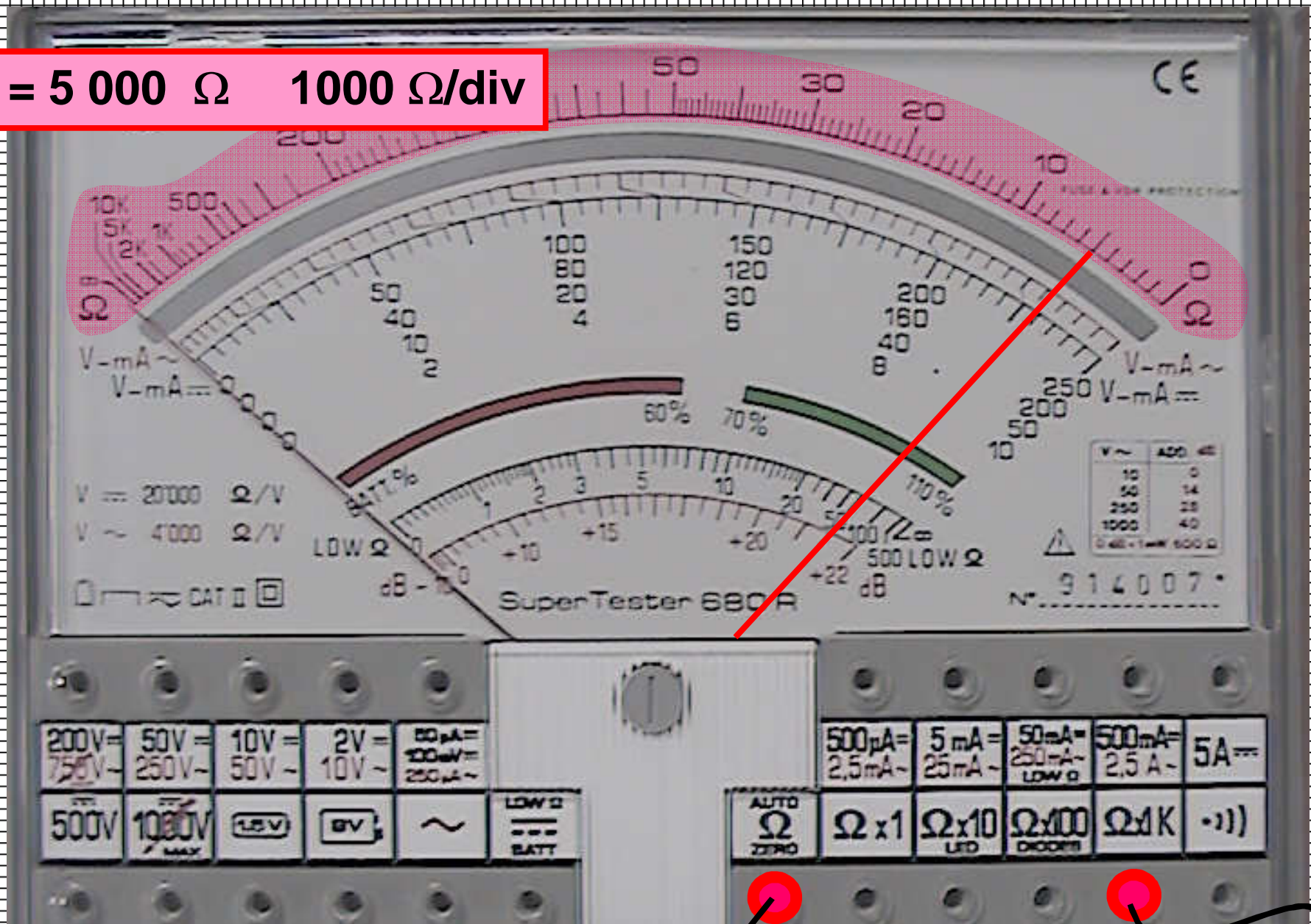


**R = 5 000  $\Omega$     100  $\Omega$ /div**

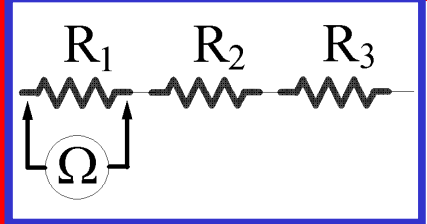


**ohmmetro**

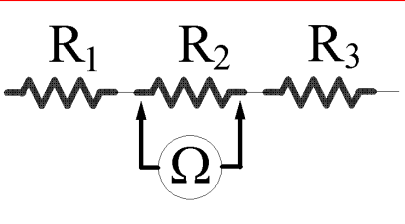
**$R = 5\,000\ \Omega$      $1000\ \Omega/\text{div}$**



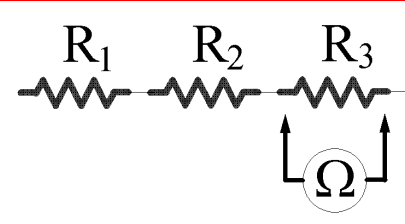
**ohmmetro**



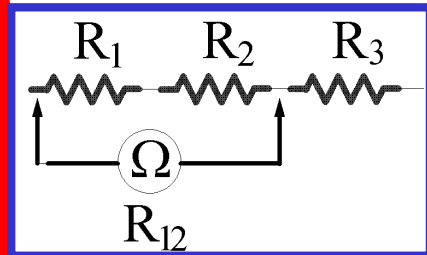
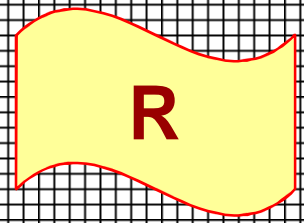
$R_1$



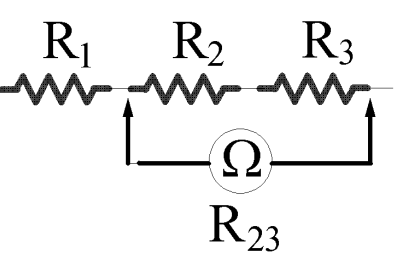
$R_2$



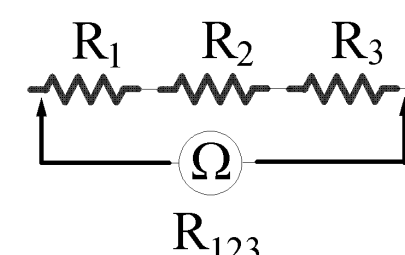
$R_3$



$R_{12}$

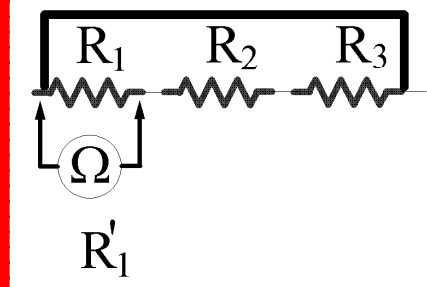


$R_{23}$

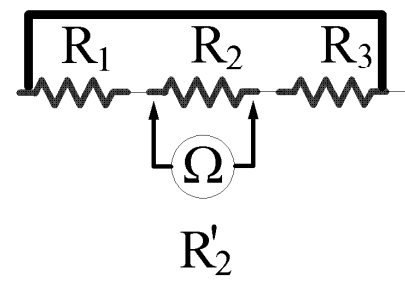


$R_{123}$

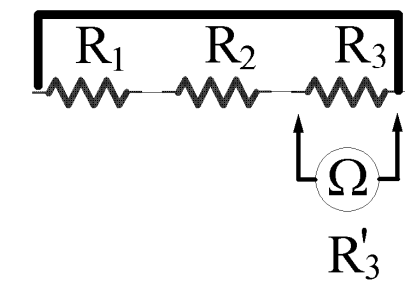
$R_{12} = R_1 + R_2 ?$   
 $R_{23} = R_2 + R_3 ?$   
 $R_{123} = R_1 + R_2 + R_3 ?$



$R'_1$

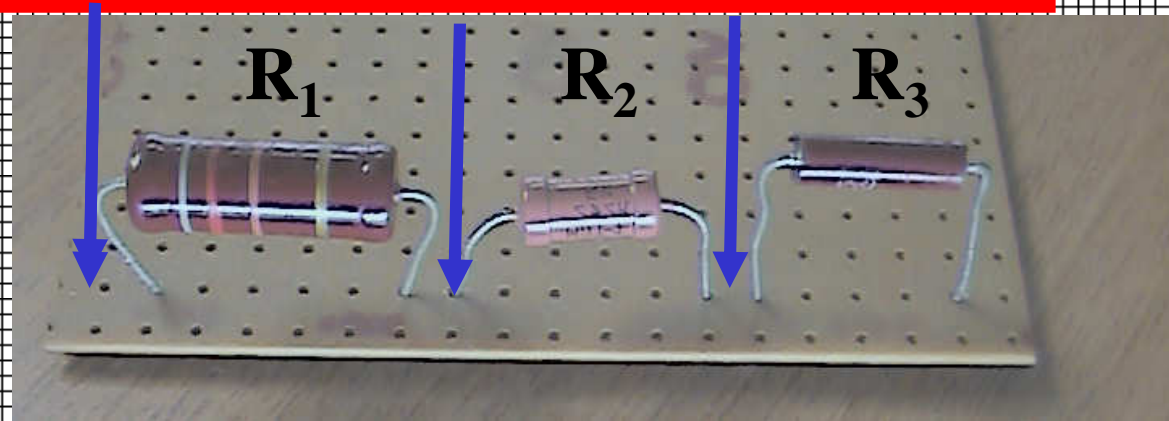


$R'_2$

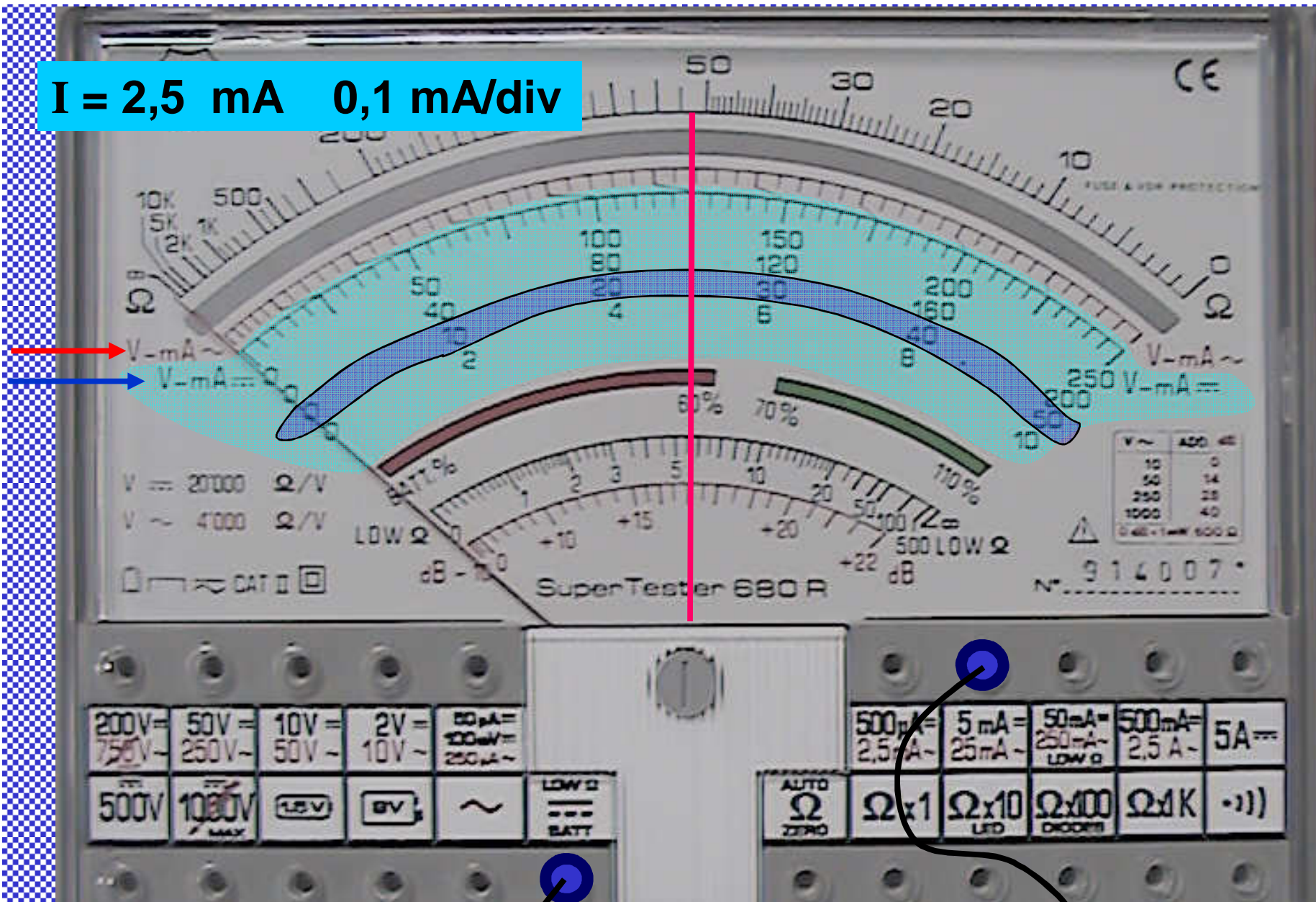


$R'_3$

$R'_1 = ?$   
 $R'_2 = ?$   
 $R'_3 = ?$



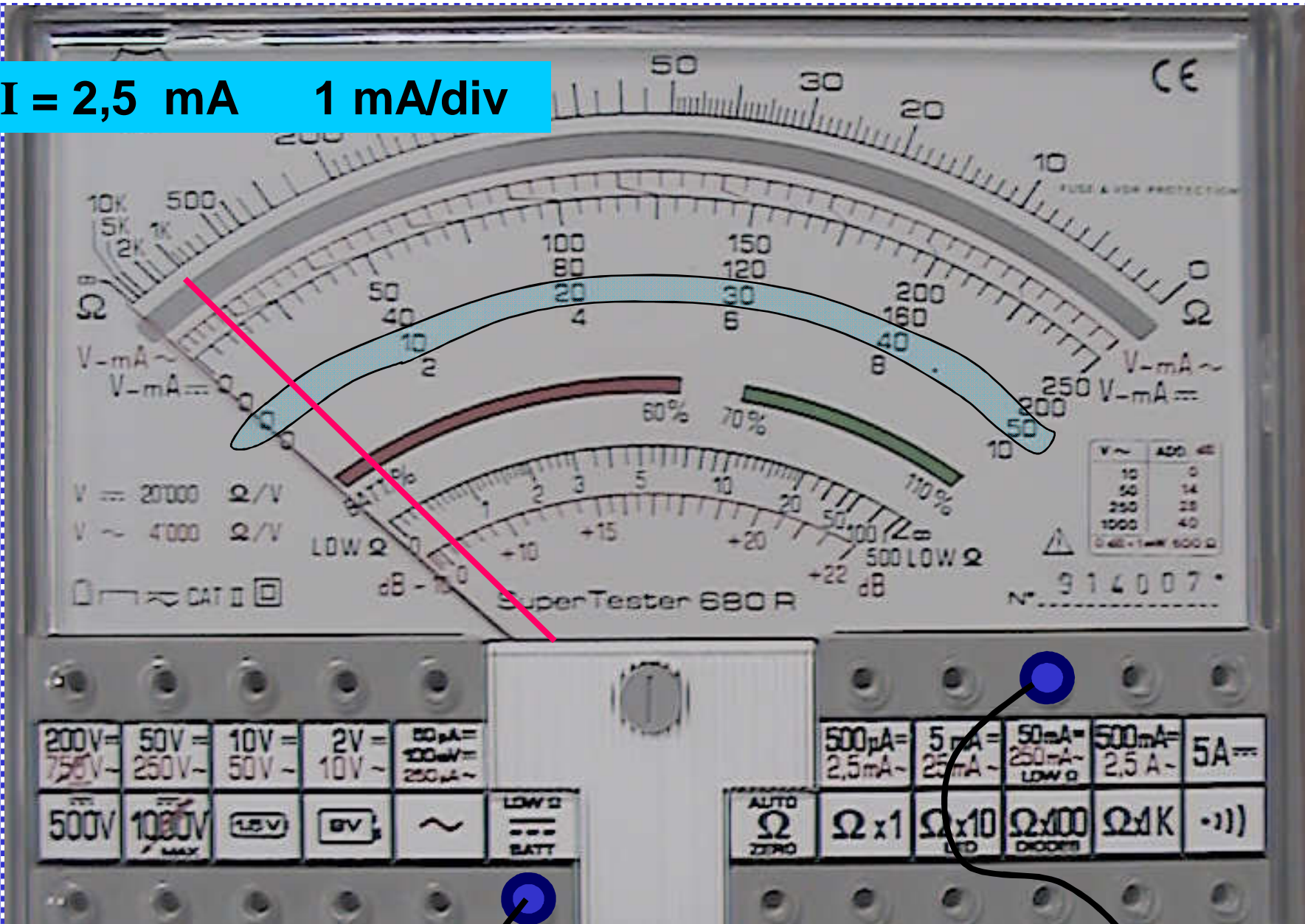
$I = 2,5 \text{ mA}$   $0,1 \text{ mA/div}$



amperometro

$I_{f.s.} = 5 \text{ mA}$   $R_A = 63,6 \Omega$

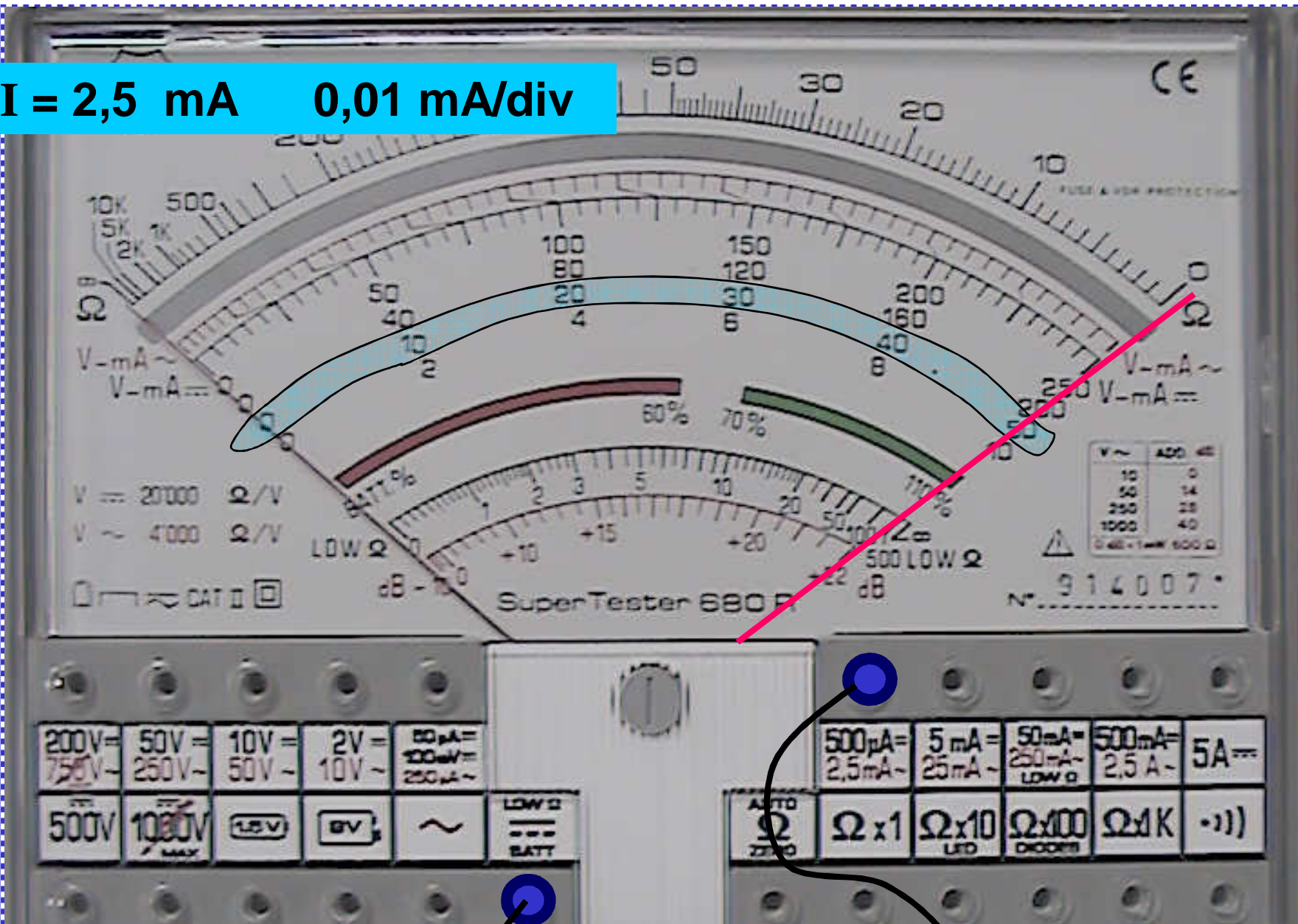
$I = 2,5 \text{ mA}$      $1 \text{ mA/div}$



amperometro

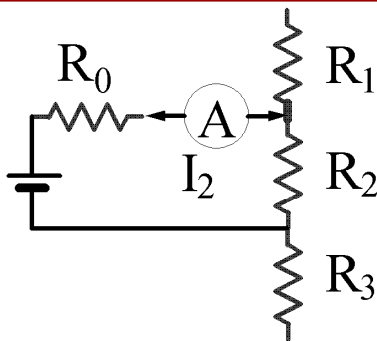
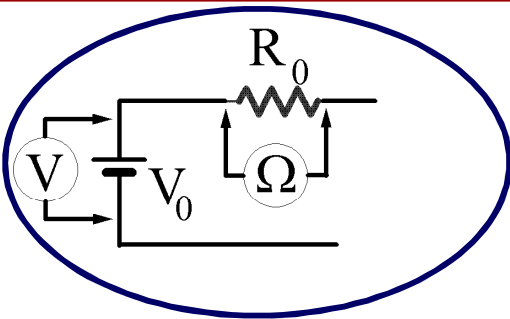
$I_{f.s.} = 50 \text{ mA}$      $R_A = 6,4 \Omega$

$I = 2,5 \text{ mA}$      $0,01 \text{ mA/div}$

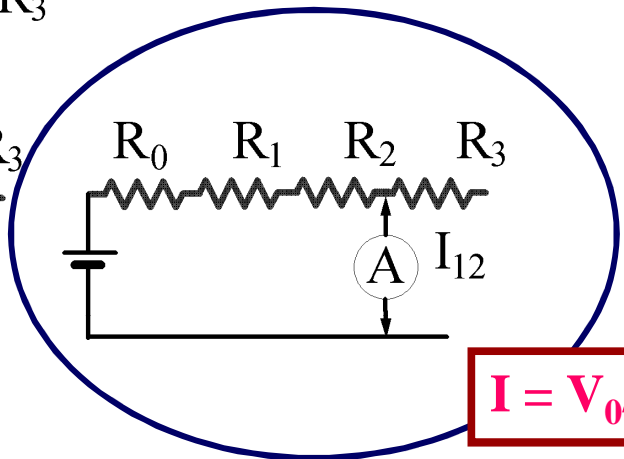
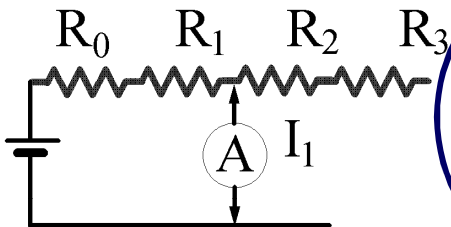
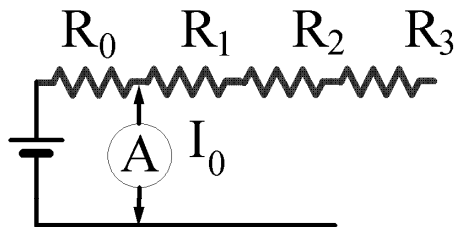


amperometro

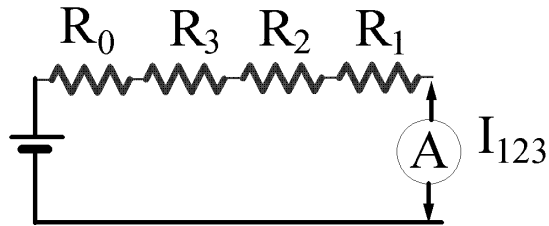
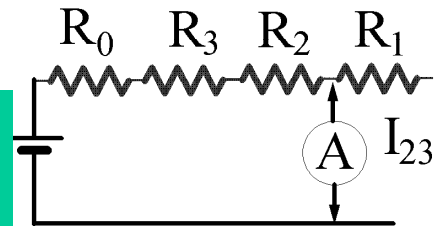
$I_{f.s.} = 500 \mu\text{A}$      $R_A = 588 \Omega$



**I**



$$I = V_0 / (R_0 + R)$$



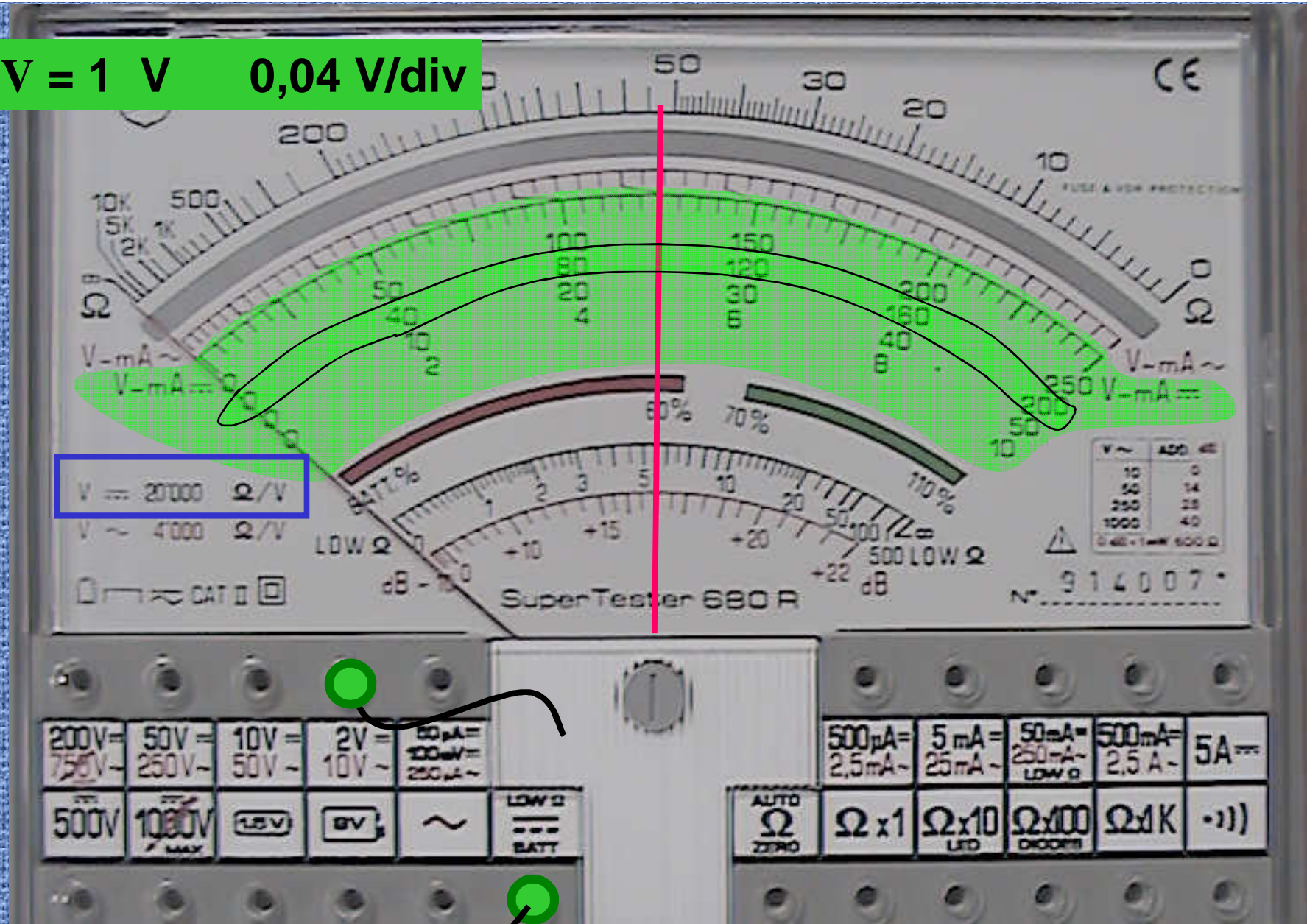
$I_{fs}$	$R_A$ [ $\Omega$ ]
50 $\mu A$	2000
500 $\mu A$	588
5 mA	63,5
50 mA	6,4
500 mA	0,64
5 A	0,064

**grafico:**

$$\frac{1}{I} = \Lambda R + \Lambda$$

$R_0 = ?$   
 $V_0 = ?$

$V = 1 \text{ V}$      $0,04 \text{ V/div}$



$V = 20000 \text{ } \Omega/V$   
 $V \sim 4000 \text{ } \Omega/V$

voltmetro

$V_{f.s.} = 2 \text{ V}$      $R_V = 40\,000 \text{ } \Omega$

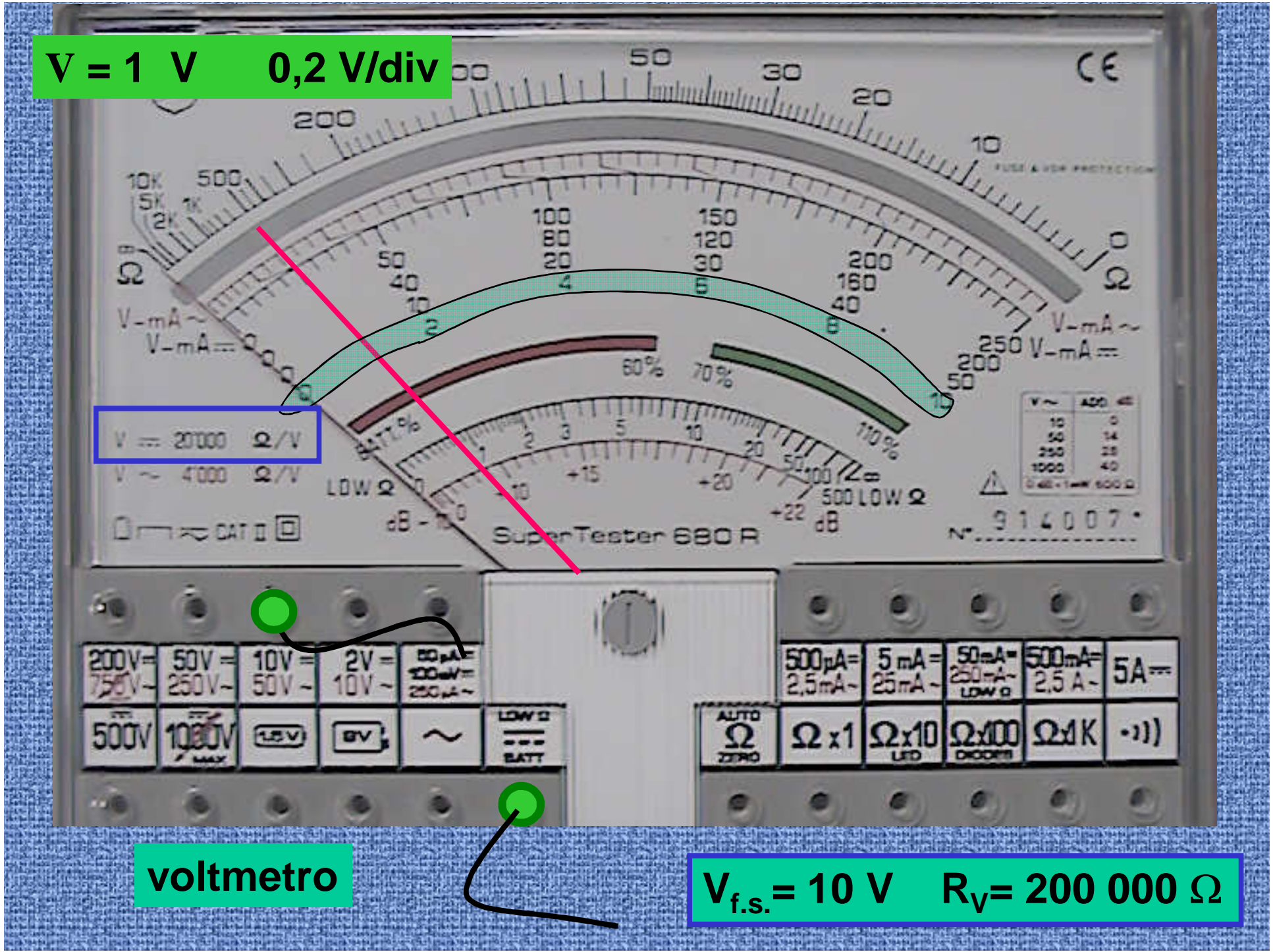


$V = 1 \text{ V}$      $0,2 \text{ V/div}$

$V = 20000 \ \Omega/V$   
 $V \sim 4000 \ \Omega/V$

voltmetro

$V_{f.s.} = 10 \text{ V}$      $R_V = 200\ 000 \ \Omega$

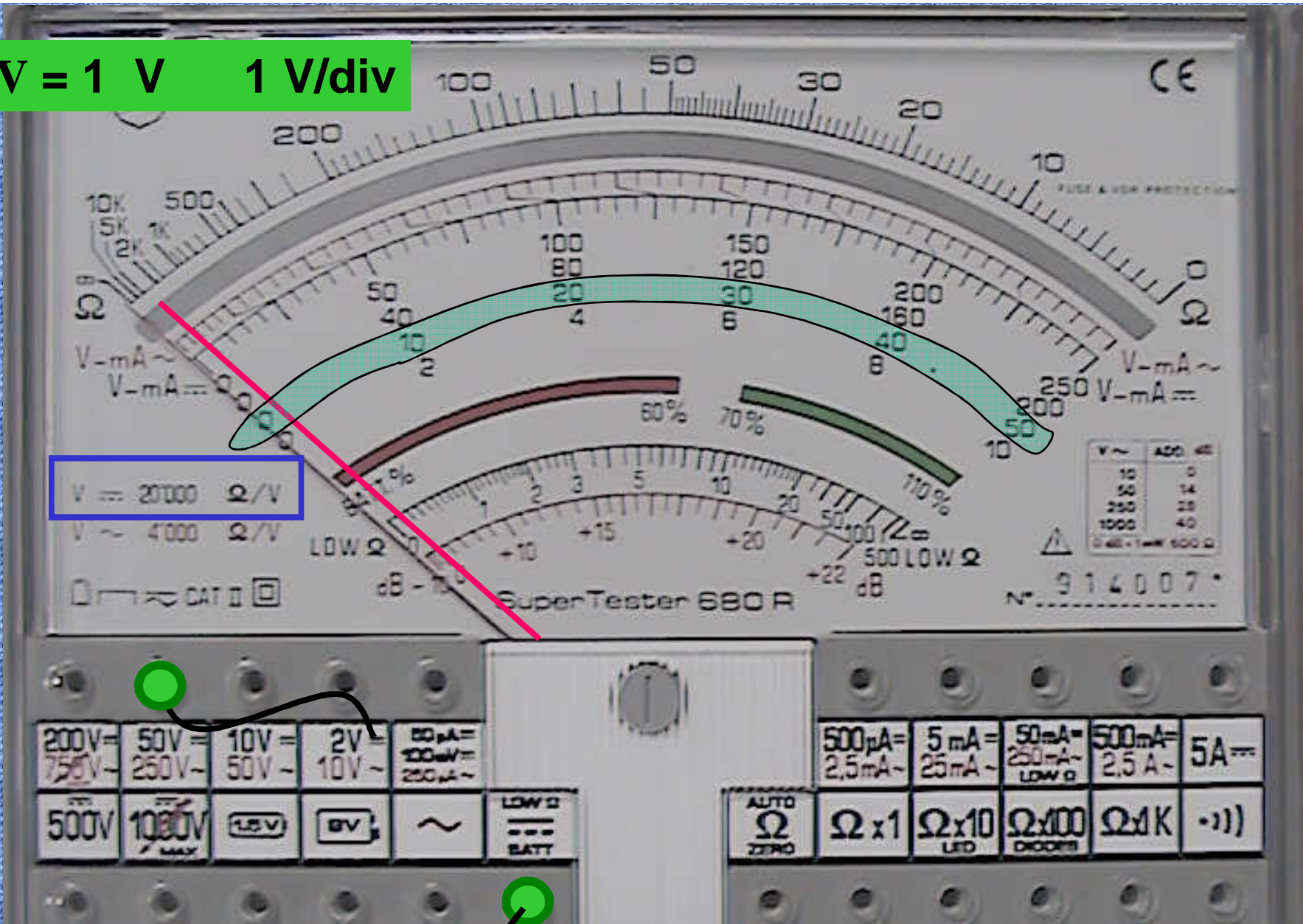


$V = 1 \text{ V} \quad 1 \text{ V/div}$

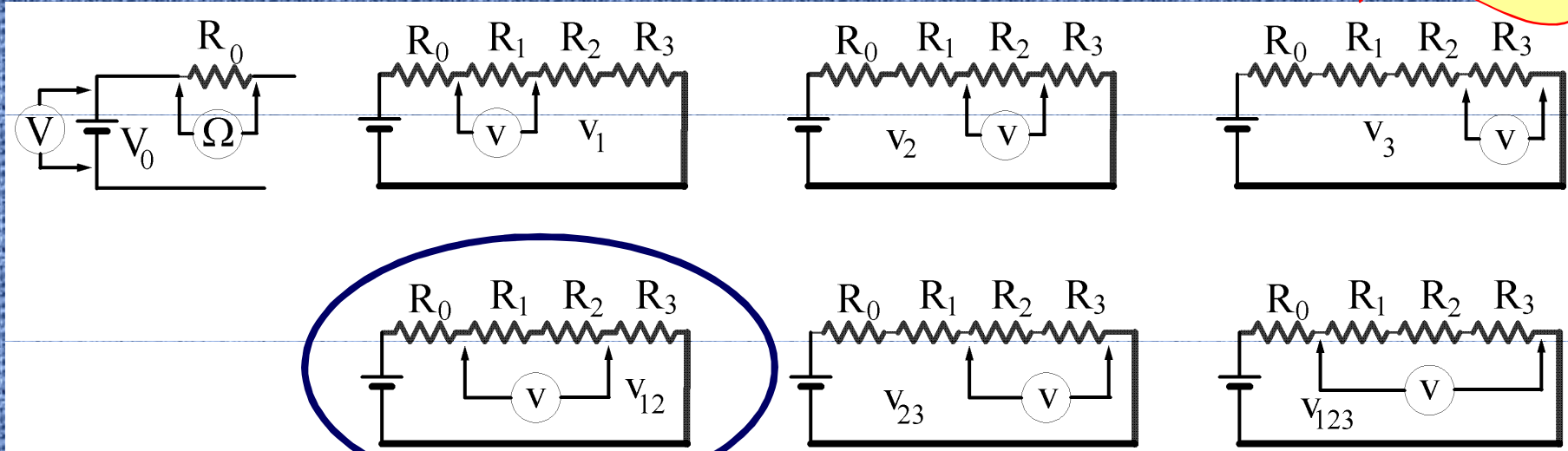
$V \sim 20000 \ \Omega/V$   
 $V \sim 4000 \ \Omega/V$

voltmetro

$V_{f.s.} = 50 \text{ V} \quad R_V = 1\,000\,000 \ \Omega$



**V**



$R_V = 20 \text{ k}\Omega / V_{f.s.}$

**$V_{f.s.} (V)$      $R_V [k\Omega]$**

<b>2</b>	<b>40</b>
<b>10</b>	<b>200</b>
<b>50</b>	<b>1000</b>

**grafico:**

$$V = \frac{V_0}{R_0 + R_{123}} R$$

→  **$I_{123} = ?$**