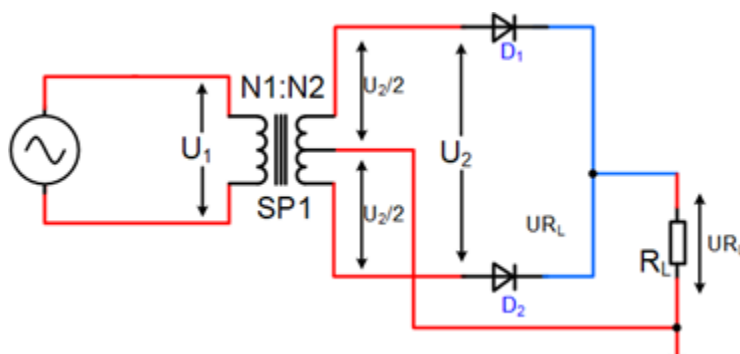


**Rafbók**

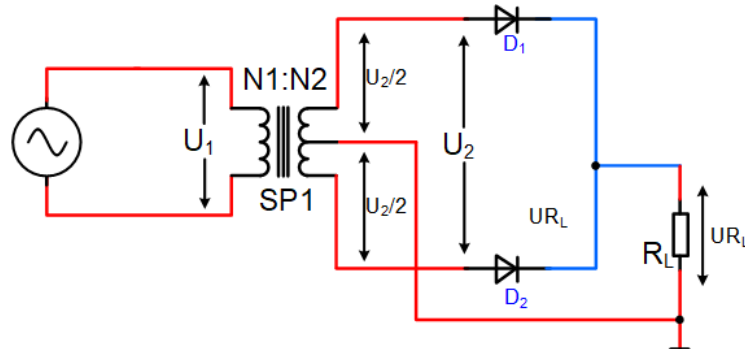


**RTM006**

**Heilbylgjuafriðun  
miðúttakstenging  
Svör og útreikningar**

**Dæmi 1.3 bls. 8 svör**

1.



a)

$$U_2 = \frac{N_2}{N_1} \cdot U_1 = \frac{1}{5} \cdot 230V = 46V \Rightarrow$$

$$U_{2t} = \sqrt{2} \cdot U_2 = \sqrt{2} \cdot 46V = 65V$$

$$U_{RL_t} = \frac{U_{2t}}{2} - 0,7V = \frac{65V}{2} - 0,7V = 31,8V$$

$$U_{RL_{DC}} = \frac{2 \cdot U_{RL_t}}{\pi} = \frac{2 \cdot 31,8V}{\pi} = \underline{\underline{20,3V}}$$

b)

$$U_{RL_{gára}} = 0,5 \cdot U_{RL_{DC}} = 0,5 \cdot 20,3V = \underline{\underline{10,2V}}$$

c)

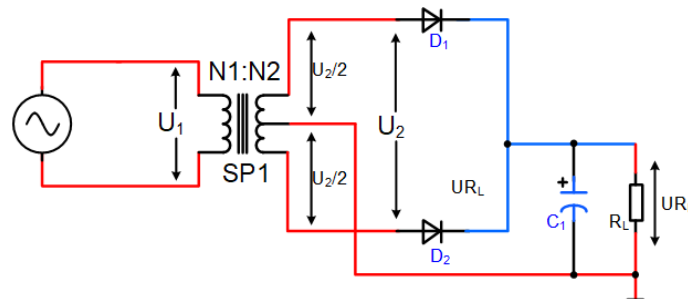
$$U_{PIV} > U_{2t} = \underline{\underline{65V}}$$

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**RTM006 Heilbylgjuafriðun miðúttakstenging svör og útreikningar**


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2.



a)

$$U_2 = \frac{N_2}{N_1} \cdot U_1 = \frac{1}{10} \cdot 230V = 23V \Rightarrow$$

$$U_{2t} = \sqrt{2} \cdot U_2 = \sqrt{2} \cdot 23V = 32,5V$$

$$U_{RL_t} = \frac{U_{2t}}{2} - 0,7V = \frac{32,5}{2}V - 0,7V = 15,5V$$

$$U_{RL_{DC}} = \frac{2 \cdot U_{RL_t}}{\pi} = \frac{2 \cdot 15,5V}{\pi} = \underline{\underline{9,9V}}$$

b)

$$U_{RL_{gára}} = 0,5 \cdot U_{RL_{DC}} = 0,5 \cdot 9,9V = \underline{\underline{4,95V}}$$

c)

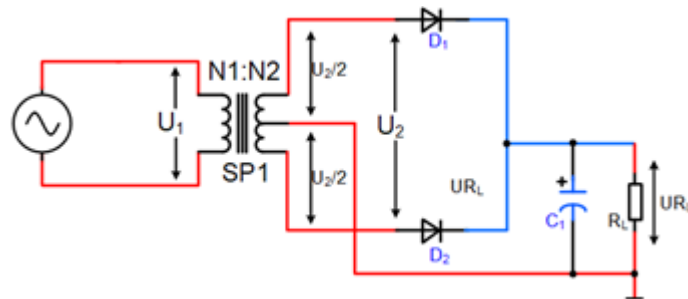
$$U_{PIV} > U_{2t} = \underline{\underline{32,5V}}$$

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**RTM006 Heilbylgjuafriðun miðúttakstenging svör og útreikningar**


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3.



a)

$$U_2 = \frac{N_2}{N_1} \cdot U_1 = \frac{1}{5} \cdot 230V = 46V$$

$$U_{2t} = \sqrt{2} \cdot U_2 = \sqrt{2} \cdot 46V = 65,1V$$

$$U_{RL(t)} = \frac{U_{2t}}{2} - 0,7V = \frac{65,1}{2}V - 0,7V = 31,8V$$

$$U_{RL_{DC}} = \frac{U_{RL(t)}}{1 + \frac{1}{2 \cdot f \cdot C \cdot R_L}} = \frac{31,8V}{1 + \frac{1}{2 \cdot 100[Hz] \cdot 470 \cdot 10^{-6}[uF] \cdot 1000[\Omega]}} = \underline{\underline{31,5V}}$$

b)

$$U_{RLgára(t)} = U_{RL(t)} - U_{RL_{DC}} = 31,8V - 31,5V = 0,3V$$

$$U_{RLgára} = \frac{U_{RLgára(t)}}{\sqrt{2}} = \frac{0,3V}{\sqrt{2}} = \underline{\underline{0,21V}}$$

c)

$$r[\%] = \frac{U_{RLgára}}{U_{RL_{DC}}} \cdot 100 = \frac{0,21V}{31,5V} \cdot 100 = 0,66\%$$

d)

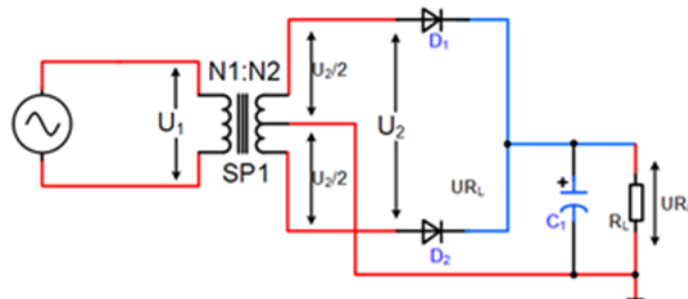
$$U_{PIV} > U_{2t} = 65V = 65V$$

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**RTM006 Heilbylgjuafriðun miðúttakstenging svör og útreikningar**


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4.



a)

$$U_2 = \frac{N_2}{N_1} \cdot U_1 = \frac{1}{10} \cdot 230V = 23V$$

$$U_{2t} = \sqrt{2} \cdot U_2 = \sqrt{2} \cdot 23V = 32,5V$$

$$U_{RL(t)} = \frac{U_{2t}}{2} - 0,7V = \frac{32,5}{2}V - 0,7V = 15,56V$$

$$U_{RL_{DC}} = \frac{U_{RL(t)}}{1 + \frac{1}{2 \cdot f \cdot C \cdot R_L}} = \frac{15,56V}{1 + \frac{1}{2 \cdot 100[Hz] \cdot 470 \cdot 10^{-6}[uF] \cdot 1000[\Omega]}} = \underline{\underline{15,4V}}$$

b)

$$U_{RLgára(t)} = U_{RL_t} - U_{RL_{DC}} = 15,56V - 15,4V = 0,16V$$

$$U_{RLgára} = \frac{U_{RLgára(t)}}{\sqrt{2}} = \frac{0,16V}{\sqrt{2}} = \underline{\underline{0,11V}}$$

c)

$$r[\%] = \frac{U_{RLgára}}{U_{RL_{DC}}} \cdot 100 = \frac{0,11V}{15,4V} = 0,71\%$$

d)

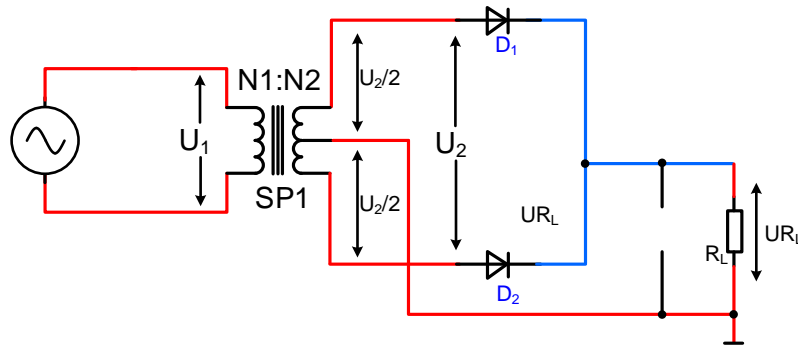
$$U_{PIV} > U_{2t} = 32,5V$$

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**RTM006 Heilbylgjuafríðun miðúttakstenging svör og útreikningar**


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5.



ATH. það verður ekkert spennufall yfir díóður þar sem enginn straumur rennur í rásinni.

a)

$$U_2 = \frac{N_2}{N_1} \cdot U_1 = \frac{10}{1} \cdot 230V = 2300V$$

$$U_{2t} = \sqrt{2} \cdot U_2 = \sqrt{2} \cdot 2300V = 3253V$$

$$U_{RL(t)} = \frac{U_{2t}}{2} - 0V = \frac{3253V}{2} - 0V = 1625,5V$$

$$U_{RL_{DC}} = \frac{U_{RL(t)}}{1 + \frac{1}{2 \cdot f \cdot C \cdot R_L}} = \frac{1625,5V}{1 + \frac{1}{2 \cdot 100[Hz] \cdot 220 \cdot 10^{-6}[uF] \cdot \infty[\Omega]}} = \underline{\underline{1625,5V}}$$

b)

$$U_{RLgára(t)} = U_{RL_t} - U_{RL_{DC}} = 1625,5V - 1625,5V = 0V$$

$$U_{RLgára} = \frac{U_{RLgára(t)}}{\sqrt{2}} = \frac{0V}{\sqrt{2}} = \underline{\underline{0V}}$$

c)

$$r[\%] = \frac{U_{RLgára}}{U_{RL_{DC}}} \cdot 100 = \frac{0V}{1625,5V} = 0\%$$

d)

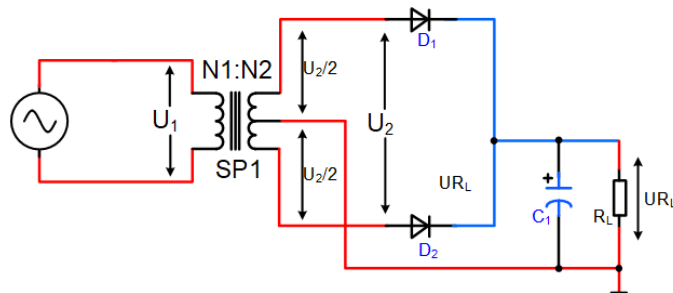
$$U_{PIV} > U_{2t} = 1625,5V$$

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**RTM006 Heilbylgjuafriðun miðúttakstenging svör og útreikningar**


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6.



a)

$$U_2 = \frac{N_2}{N_1} \cdot U_1 = \frac{1}{15} \cdot 230V = 15,3V$$

$$U_{2t} = \sqrt{2} \cdot U_2 = \sqrt{2} \cdot 15,3V = 21,7V$$

$$U_{RL(t)} = \frac{U_{2t}}{2} - 0,7V = \frac{21,7V}{2} - 0,7V = 10,2V$$

$$U_{RL_{DC}} = \frac{U_{RL(t)}}{1 + \frac{1}{2 \cdot f \cdot C \cdot R_L}} = \frac{10,2V}{1 + \frac{1}{2 \cdot 100[hz] \cdot 2200 \cdot 10^{-6}[uF] \cdot 220[\Omega]}} = 10,1V$$

b)

$$U_{RLgára(t)} = U_{RL_t} - U_{RL_{DC}} = 10,2V - 10,1V = 0,1V$$

$$U_{RLgára} = \frac{U_{RLgára(t)}}{\sqrt{2}} = \frac{0,1V}{\sqrt{2}} = 0,07V$$

c)

$$r[\%] = \frac{U_{RLgára}}{U_{RL_{DC}}} \cdot 100 = \frac{0,07V}{10,1V} = 0,7\%$$

d)

$$U_{PIV} > U_{2t} = 21,7V$$

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## RTM006 Heilbylgjuafriðun miðúttakstenging svör og útreikningar

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Höfundur er Sigurður Örn Kristjánsson.

Eftirvinnsla og umbrot í rafbók Báru Halldórsdóttir.

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