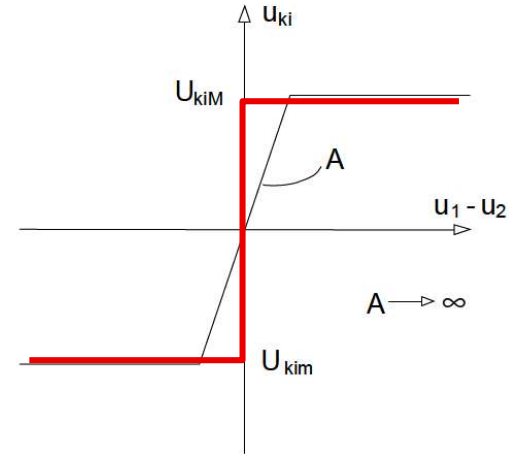
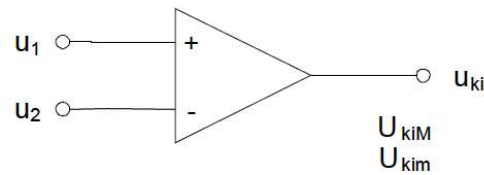


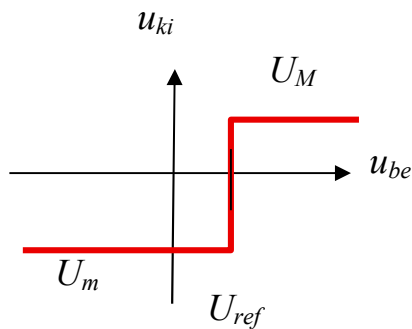
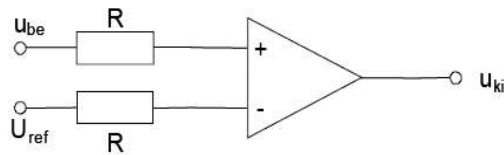
## Komparátorok

Ideális komparátor:

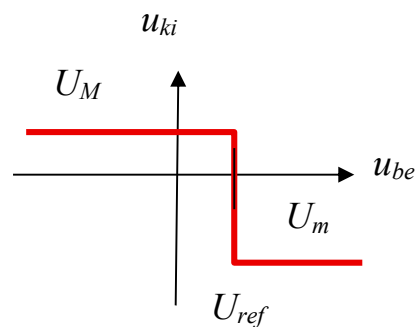
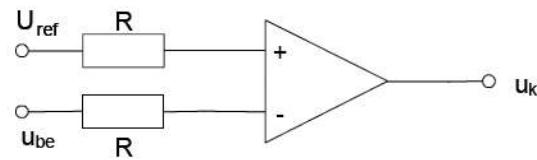


Ideális komparátor alapkapcsolások:

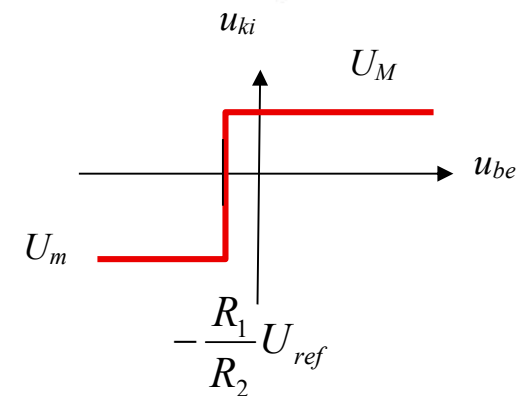
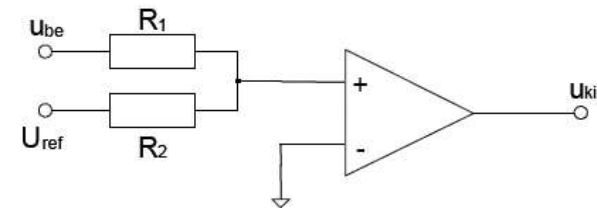
fázist nem fordító:



fázist fordító:

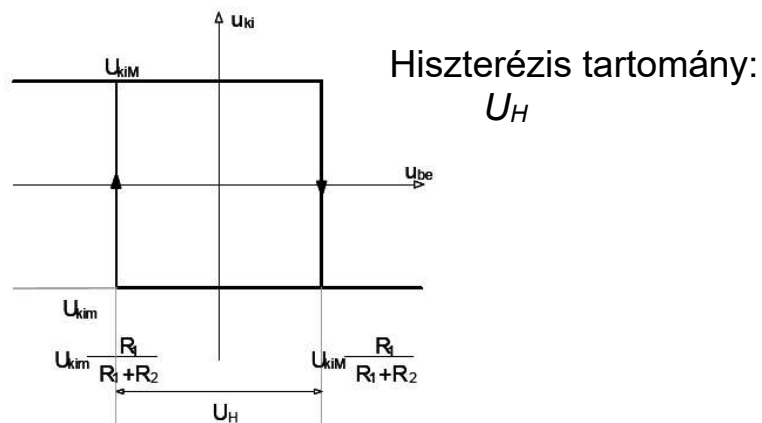
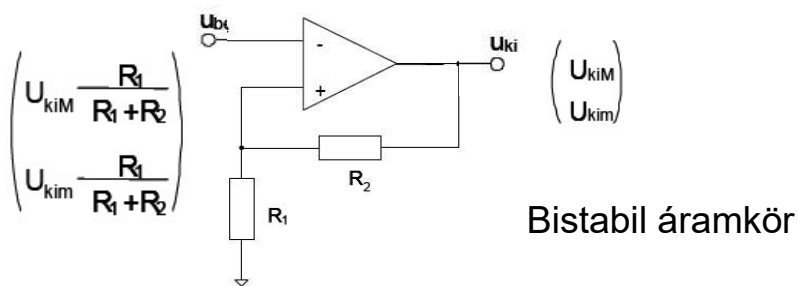


Súlyozott  
különbségképző:

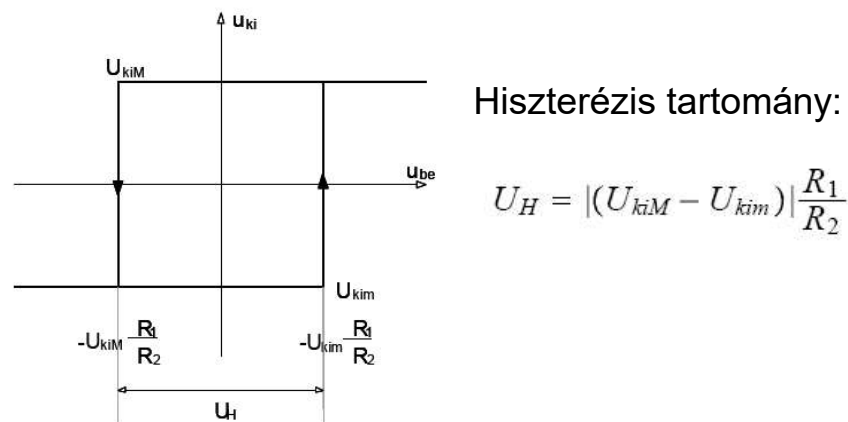
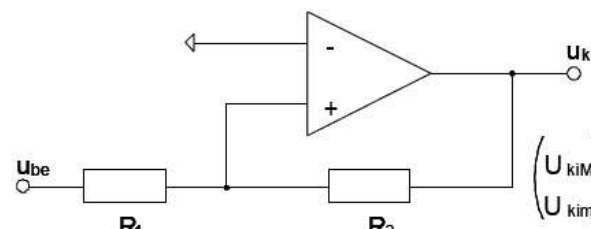


## Hiszterézises komparátorok

Fázisfordító pozitív visszacsatolású komparátor:



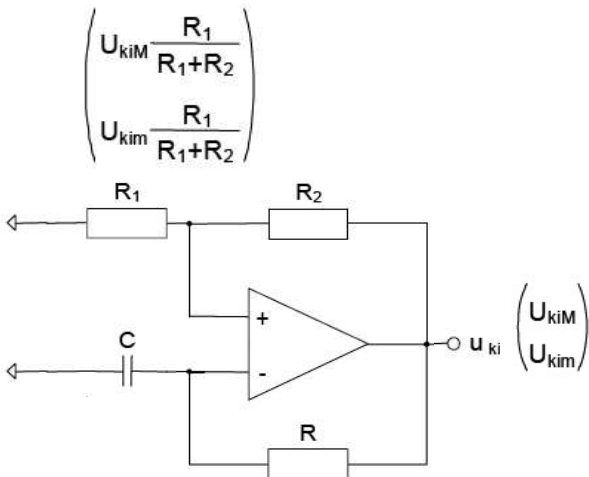
Fázist nem fordító pozitív visszacsatolású komparátor:



Hiszterézises, kétállapotú áramkörök alkalmazásai:

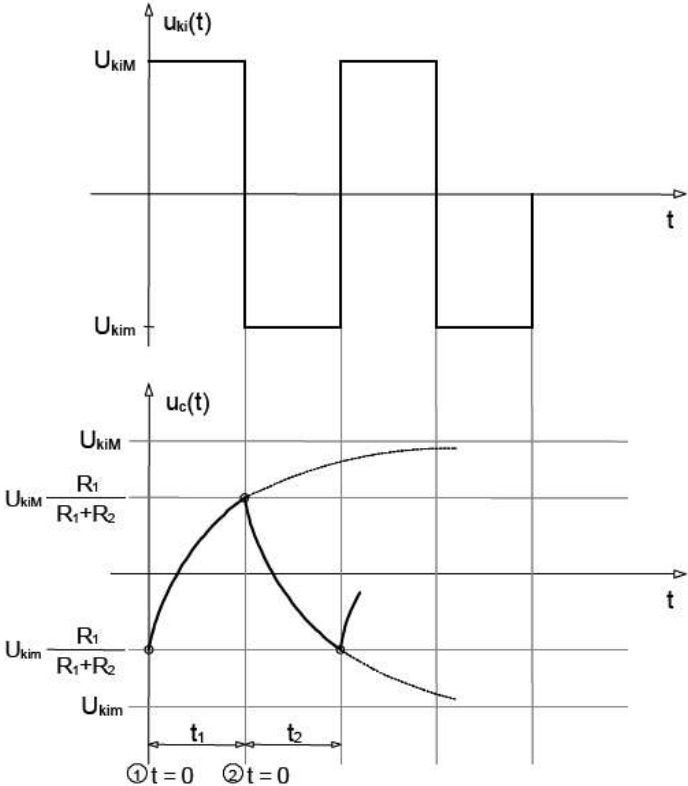
- logikai szintek zavarmentesítése (bistabil, Schmitt trigger)
- multivibrátorok (monostabil, astabil)

# Astabil multivibrátor



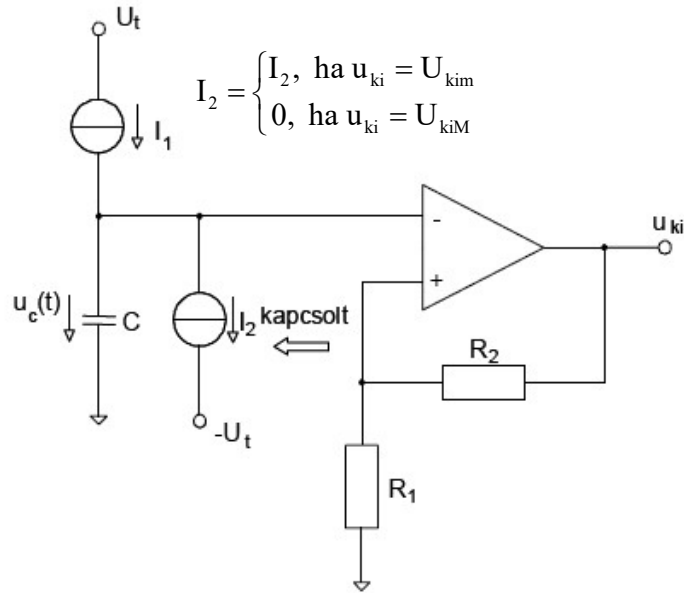
$$t_1 = RC \ln \left( \frac{U_{kiM} - U_{kim} \frac{R_1}{R_1+R_2}}{U_{kim} - U_{kiM} \frac{R_1}{R_1+R_2}} \right) \quad U_{kiM} > 0$$

$$t_2 = RC \ln \left( \frac{U_{kiM} \frac{R_1}{R_1+R_2} - U_{kim}}{U_{kim} \frac{R_1}{R_1+R_2} - U_{kiM}} \right) \quad U_{kim} < 0$$



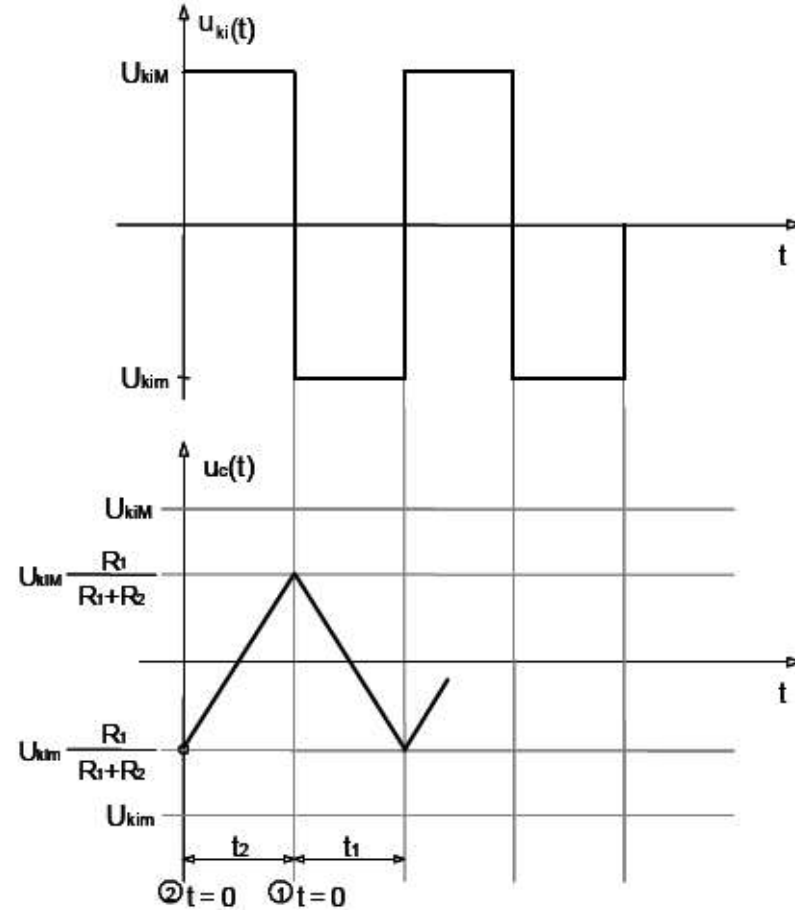
## Astabil multivibrátor

Kapcsolt áramgenerátoros

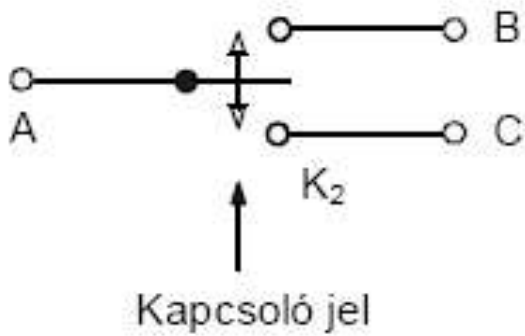
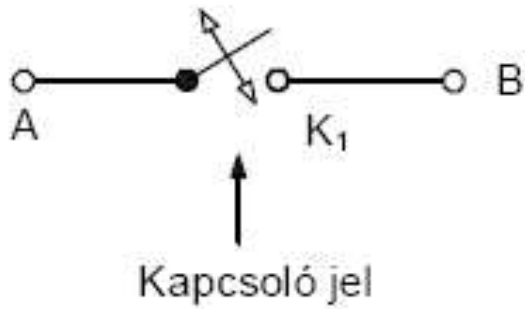


Ha  $I_2 = 2I_1$  akkor  $t_1 = t_2$ ,

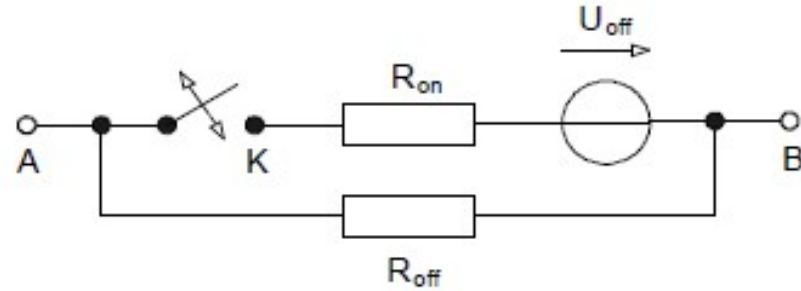
$$T = t_1 + t_2 = CU_H \frac{2}{I_1}$$



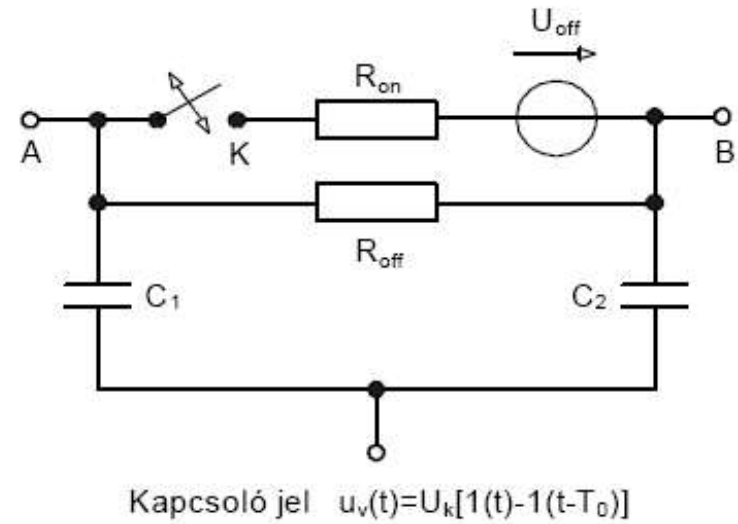
## Elektronikus kapcsolók



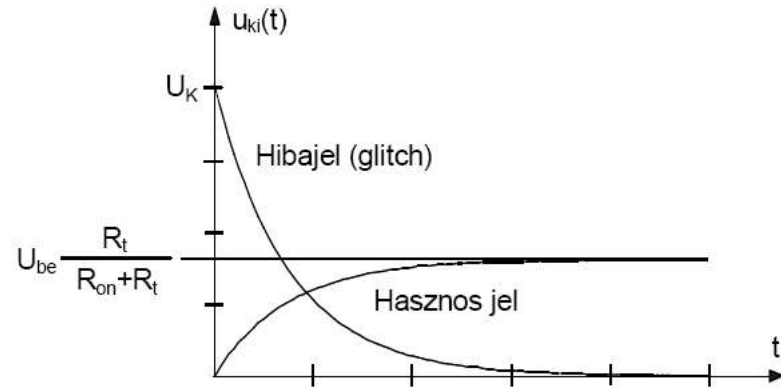
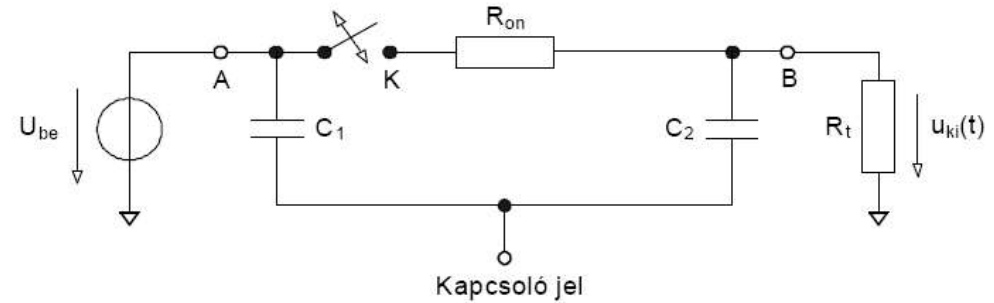
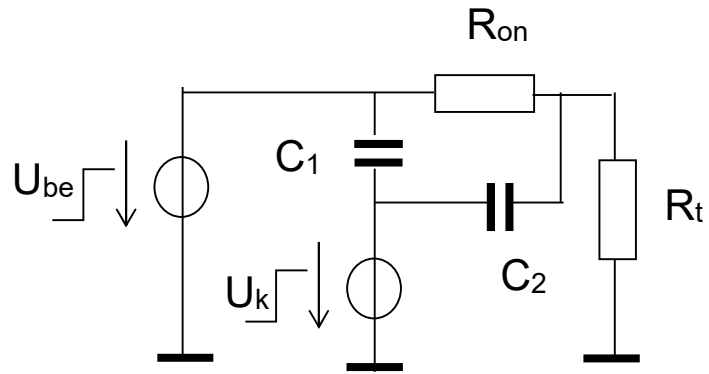
Kapcsoló kisjelű, lineáris modellje:



Dinamikus (frekvencia függő) modell:



Kapcsolás ohmos terhelésre:



$$u_{ki}(t) = U_{be} \frac{R_t}{R_{on} + R_t} \left( 1 - \exp\left(-\frac{t}{\tau_1}\right) \right) + U_k \exp\left(-\frac{t}{\tau_1}\right), \quad \tau_1 = C_2(R_{on} \times R_t)$$