Tápegységek (stabilizátorok)

Molnár Károly

PowerQuattro Zrt.

Fejlesztési igazgató

Tanúsítva: ISO 9001 0125

nqa. ISO 9001 Registered Quality Management

UKAS MANAGEMENT SYSTEMS 015

Tanúsítva: ISO 14001 0125

nqa. ISO 14001 Registered Environmental Management

UKAS MANAGEMENT SYSTEMS 015

NATO BESZÁLLÍTÁSRA ALKALMAS

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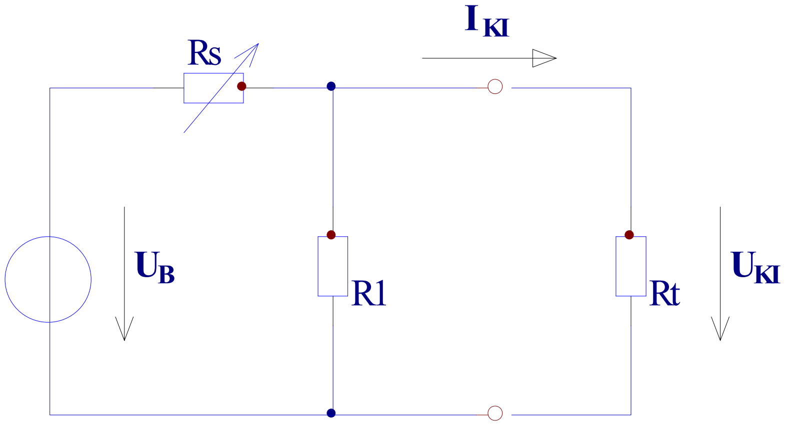
Analóg üzemű tápegységek

1.



$$U_{KI} = U_B \frac{R1 \otimes R_T}{R_S + R1 \otimes R_T}$$

$$P_{DR_S} = \frac{U_B - U_{KI}}{R_S}(U_B - U_{KI}) = \frac{(U_B - U_{KI})^2}{R_S} = (U_B - U_{KI}) I_{KI}$$

$pl.: U_{BE} = 10V$

$U_{KI} = 5V$

$I_{KI} = 10A$

$P_D = 5V \cdot 10A = 50W$

$P_{KI} = 5V \cdot 10A = 50W$

$\eta = \frac{P_{KI}}{P_{BE}} = \frac{50W}{100W} = 0,5 \rightarrow 50\%$

$R_S \rightarrow Bipoláristranzisztor$

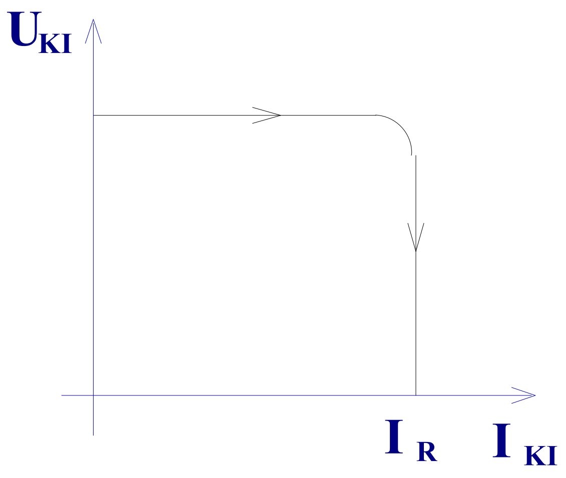
$IGBT$

FET

SIT

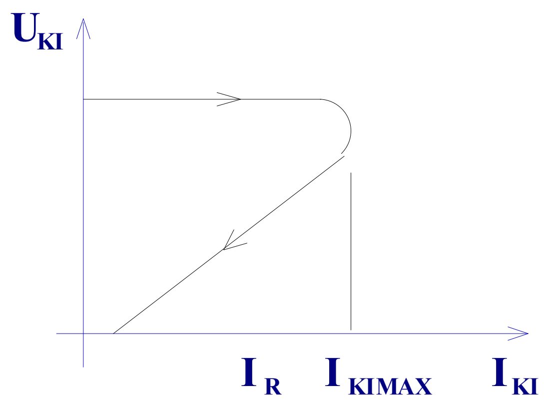
Túláram elleni védelem

2. a áramgenerátoros



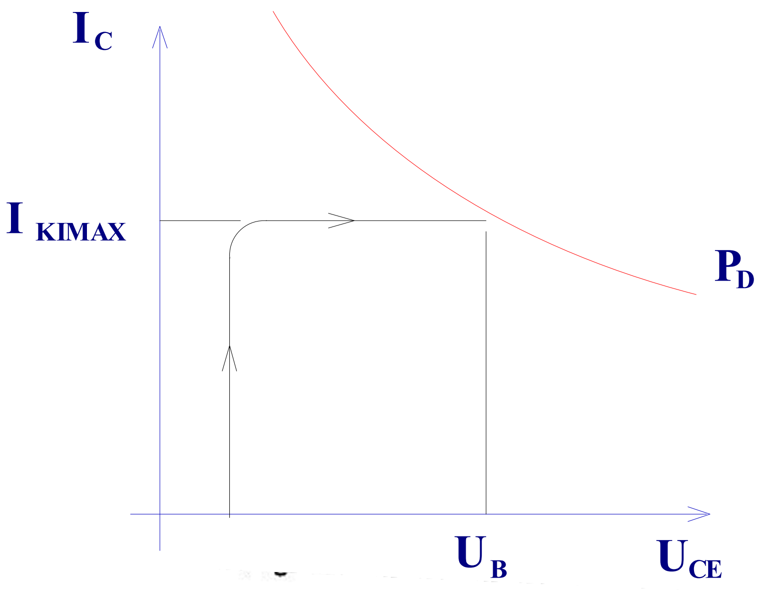
$$P_{DR} = U_{BI} \cdot I_{KI}$$
$$(P_{DR} = 10V \cdot 10A = 100W)$$

2. b visszahajló karakterisztikájú

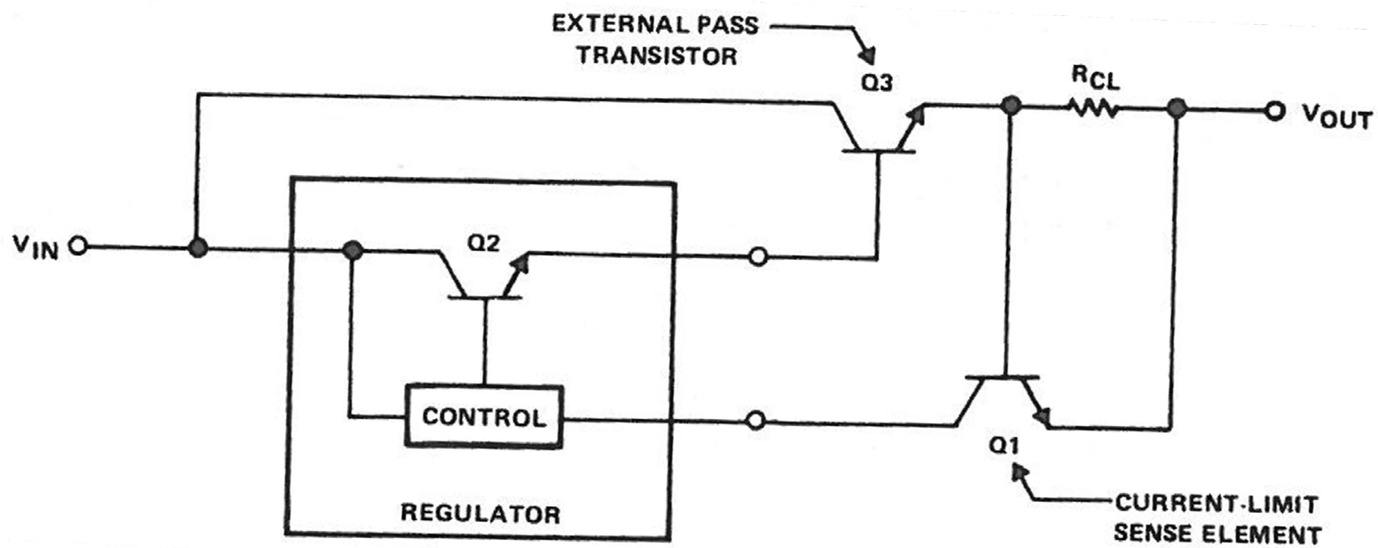


$$P_{DR} = U_{BI} \cdot I_R$$
$$(pl.: P_{DR} = 10V \cdot 2A = 20W)$$
$$(I_R = 2A)$$

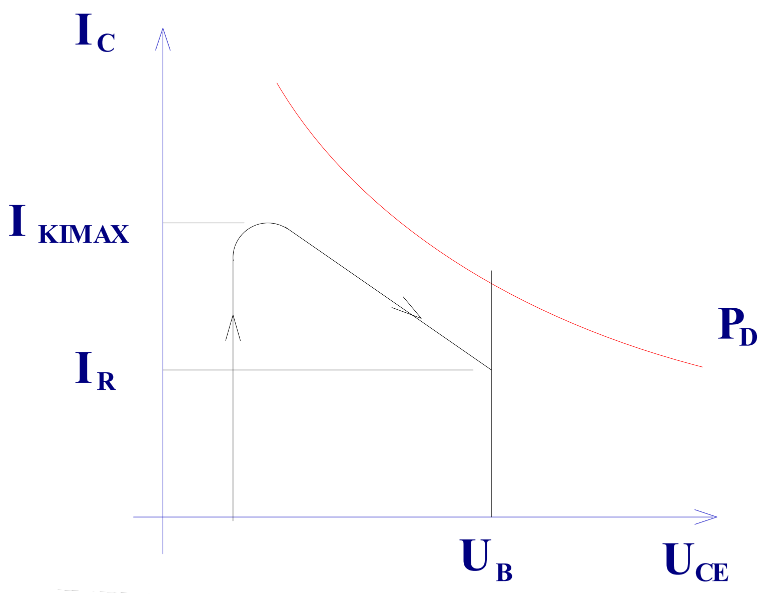
Munkapont pályák



áramgenerátoros

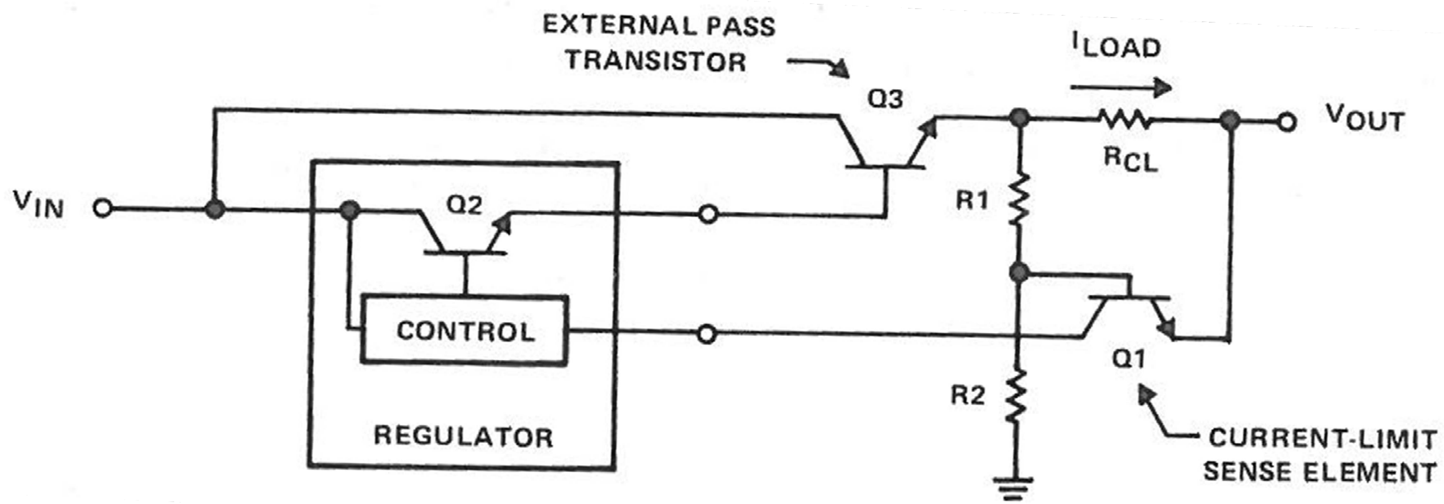


Munkapont pályák

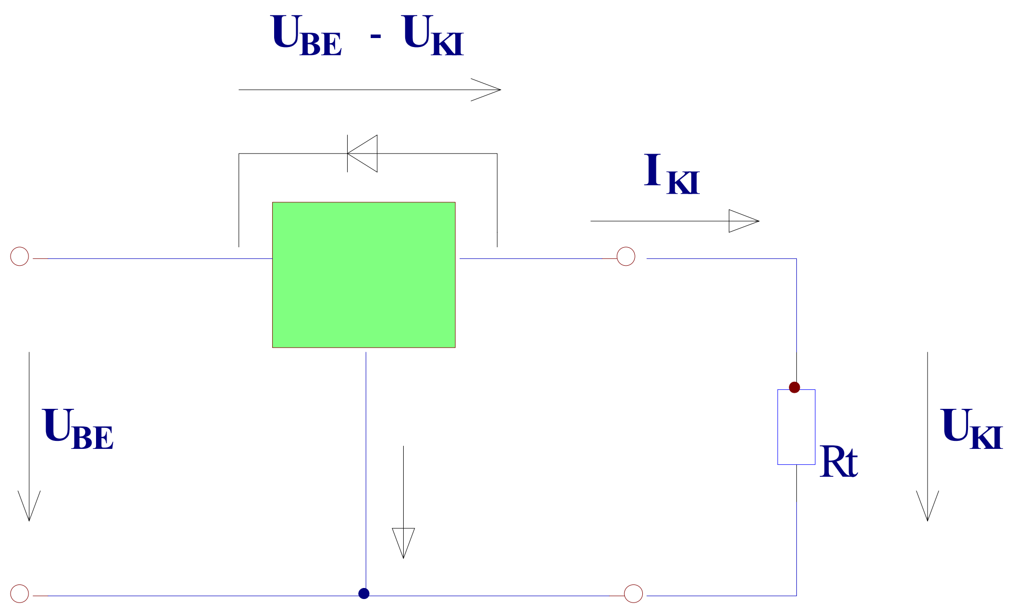


visszahajló karakterisztikájú

$$I_{SC} = I_K @(V_{OUT} = 0V) = \frac{V_{BE(Q1)}}{R_{CL}}(1 + \frac{R1}{R2})$$

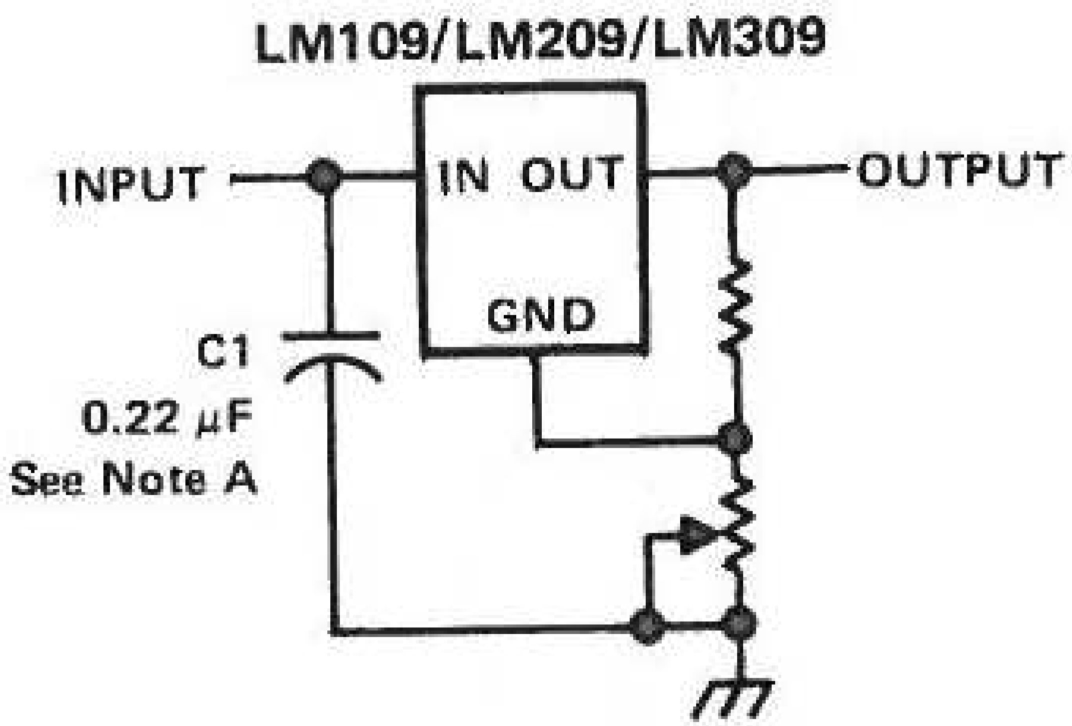


3 pont stabilizátorok

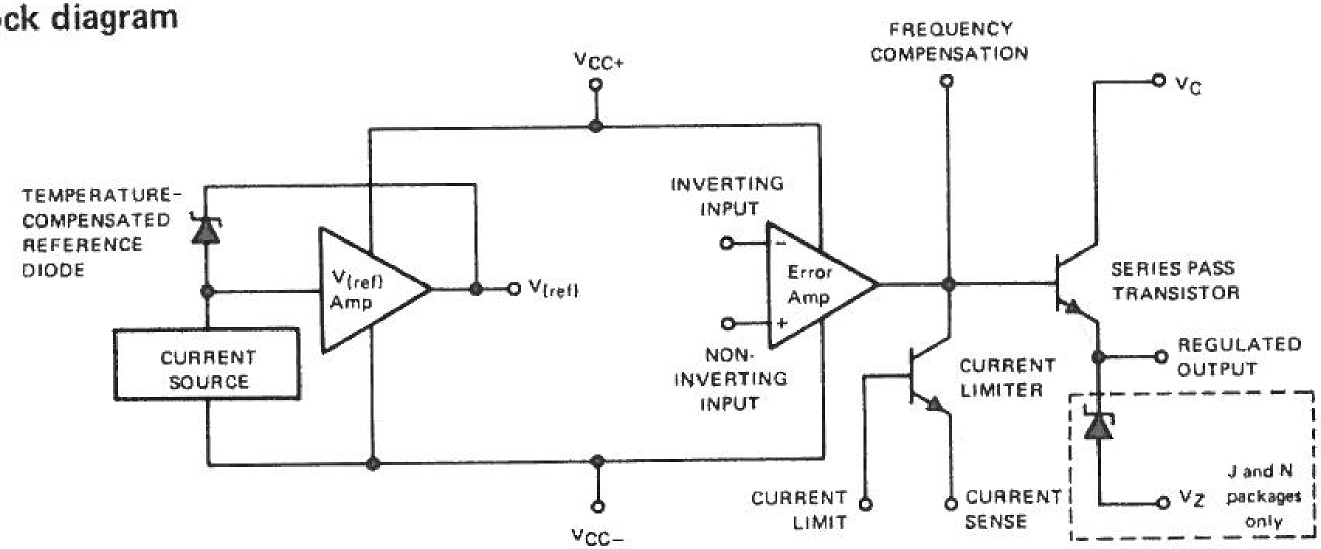


$$P_D \cong (U_{BE} - U_{KI}) \cdot I_{KI}$$

- Hővédelem (túlmelegedés elleni védelem)
- Rövidzárlat elleni védelem
- SOA védelem


LM109/LM209/LM309
INPUT
IN
OUT
OUTPUT
GND
C1
0.22 µF
See Note A

functional block diagram



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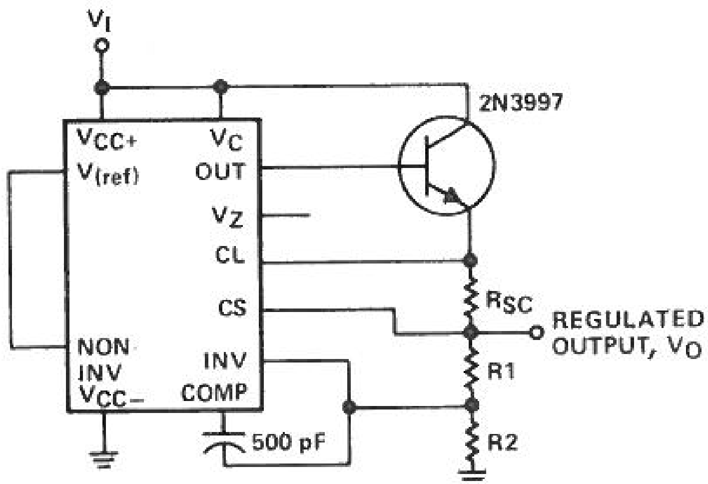

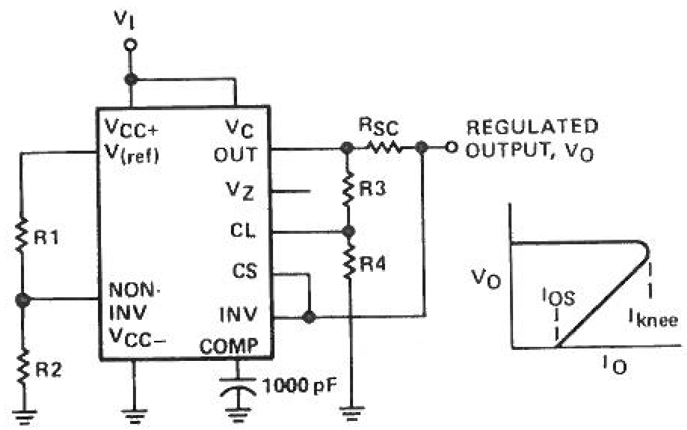

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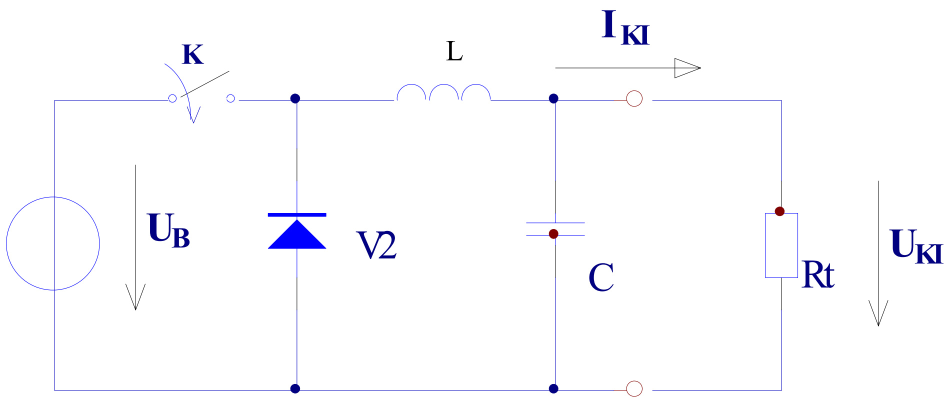
Előnyök:

- egyszerű felépítés
- RF zaj kicsi
- jó tranziens viselkedés
- alacsony kimeneti feszültség hullámosság

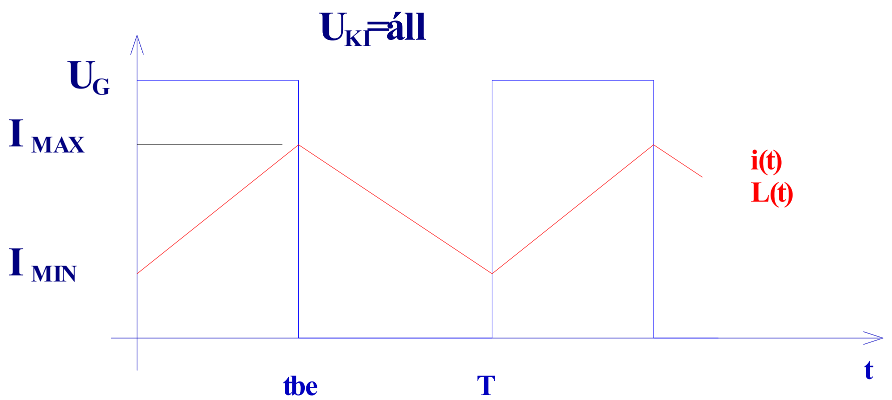
Hátrányok:

- rossz hatásfok
- nagy disszipációs teljesítmény
- nagy hűtőfelület
- nagy súly és méret

Kapcsoló üzemű tápegység



$$U_{KI} = U_B \frac{T_{be}}{T_{be} + t_{ki}} = U_B \frac{T_{be}}{T} = U_B \delta$$



$$U_L = L \frac{di}{dt}$$

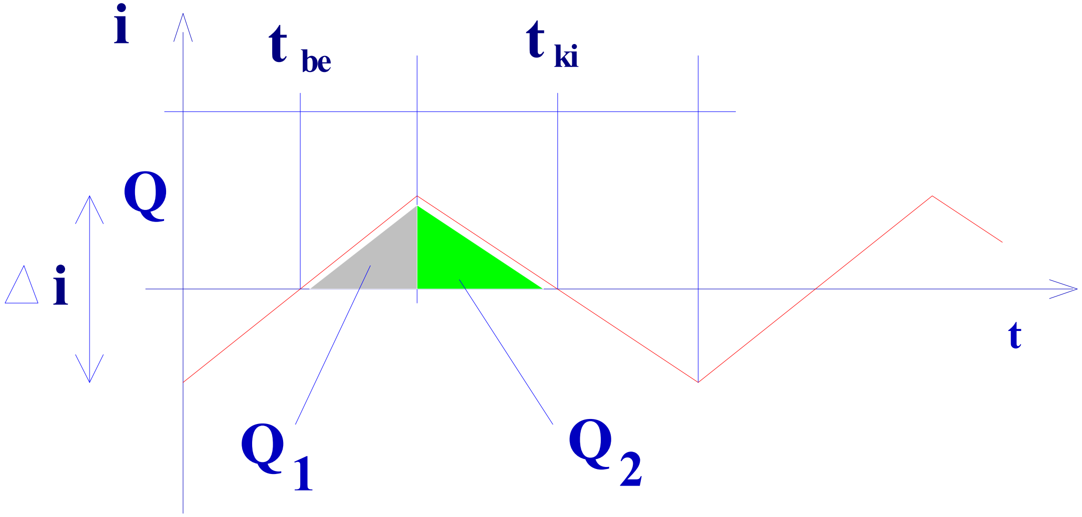
$$\frac{U_L}{L} dt = di \Rightarrow \int_0^{t_{be}} \frac{U_L}{L} dt = \int_{i_{\min}}^{i_{\max}} di$$

$$\Delta i = \frac{U_L}{L} t_{be} = \frac{U_B - U_{KI}}{L} t_{be} \Rightarrow L = \frac{U_B - U_{KI}}{\Delta i} t_{be}$$

$$U_C = \frac{1}{C}\int idt$$

$$\Delta U_C = \frac{1}{C}\int dQ$$

$$\Delta U_C = \frac{1}{C}\Sigma Q$$



$$Q_1 = \frac{\Delta i}{2}\frac{t_{be}}{2}\frac{1}{2}$$

$$Q_2 = \frac{\Delta i}{2}\frac{t_{ki}}{2}\frac{1}{2}$$

$$\Delta Q_C = Q1 + Q2$$

$$\sum Q = Q1 + Q2 = \frac{1}{8}\Delta iT$$

$$\Delta U_C = \frac{1}{C}\frac{1}{8}\Delta iT = \frac{1}{8}\frac{1}{C_f}\Delta i = \frac{\Delta i}{8Cf}$$

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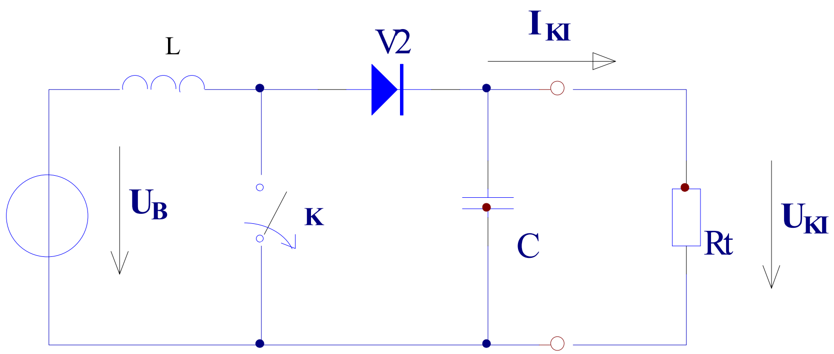
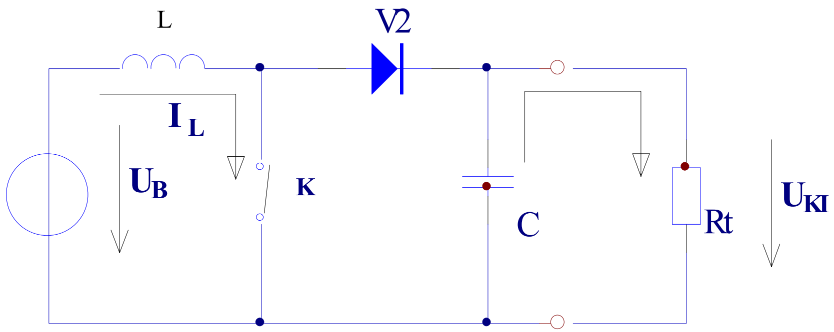
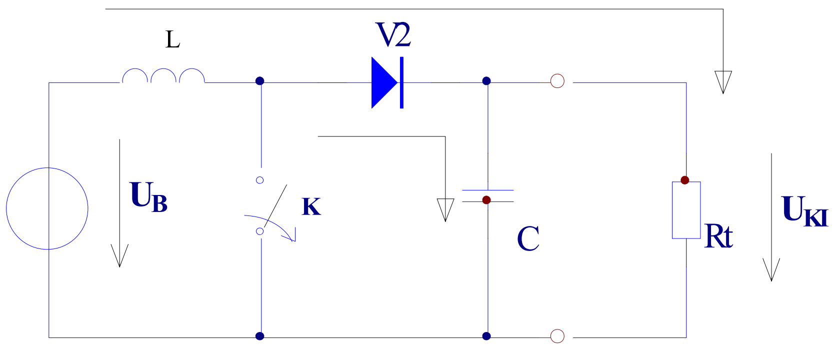
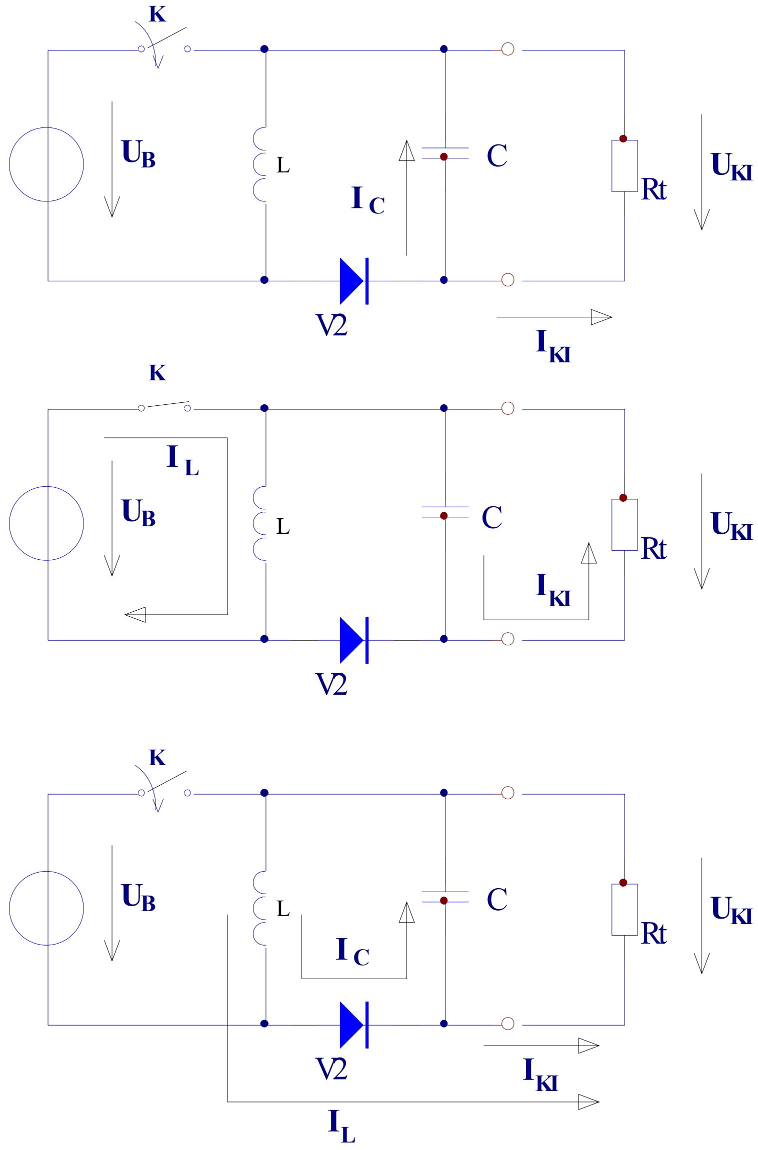
Záróüzemű konverter







Polaritás váltó konverter



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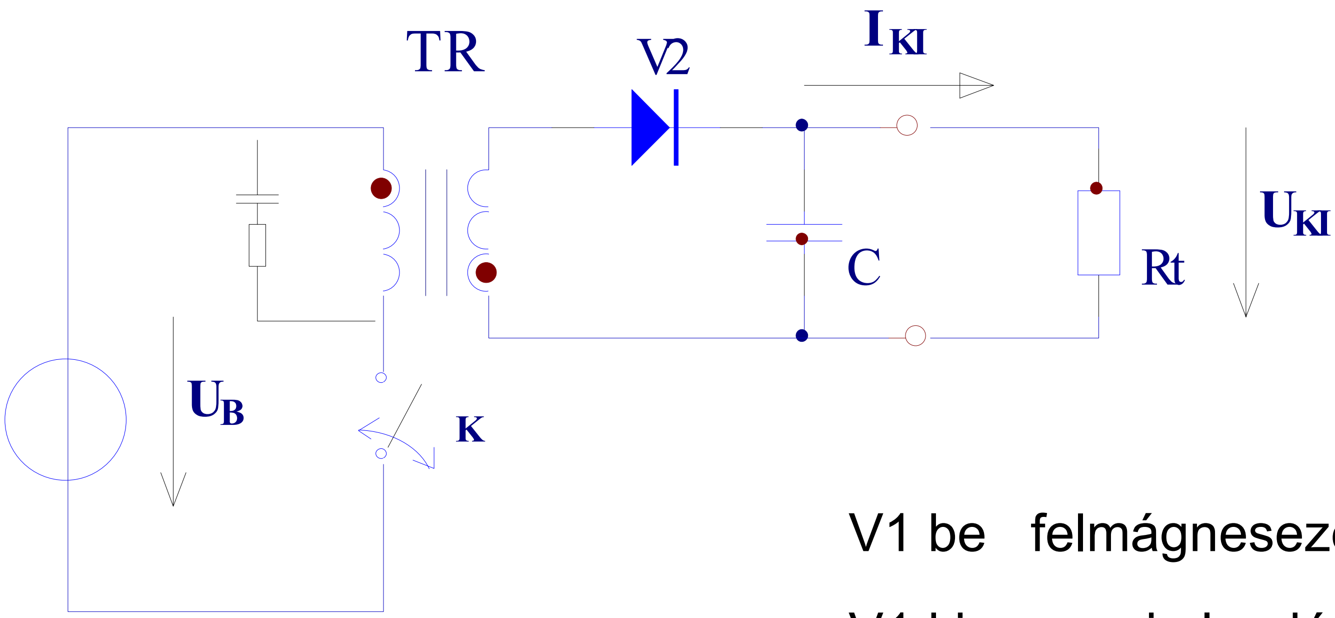
Szigetelt tápegységek (DC-DC konverter)

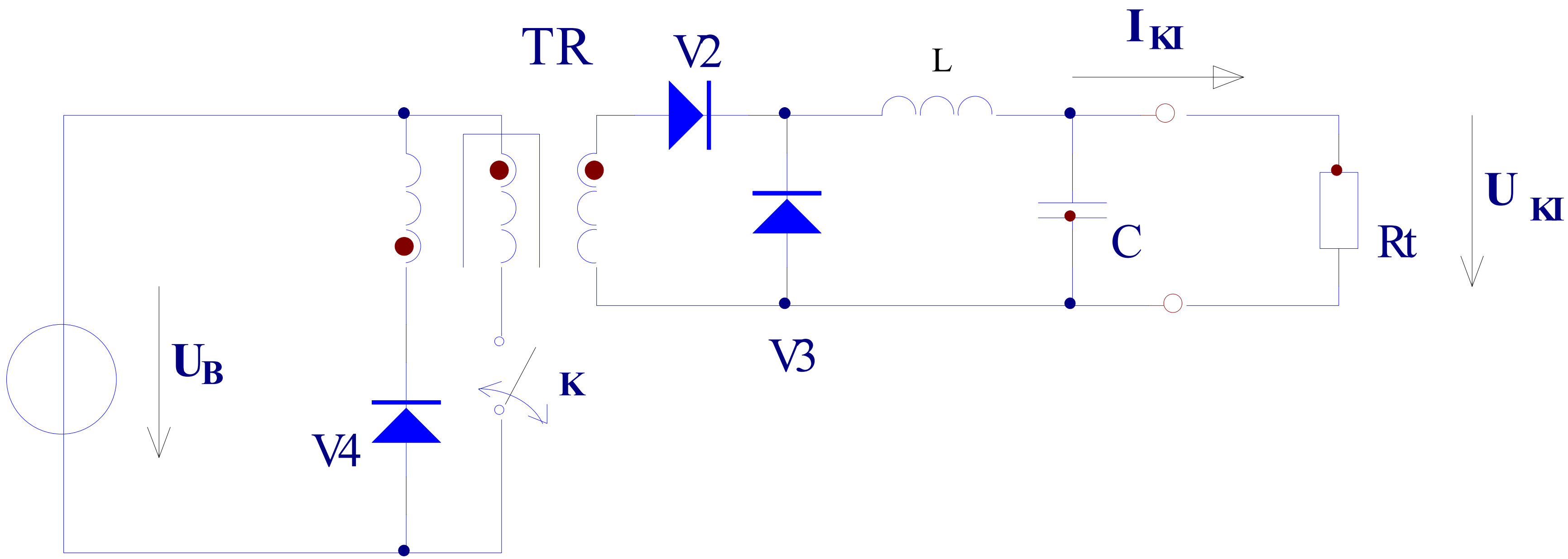
1. Záróüzemű tápegység



V1 be   felmágnesezés

V1 ki   energia leadás

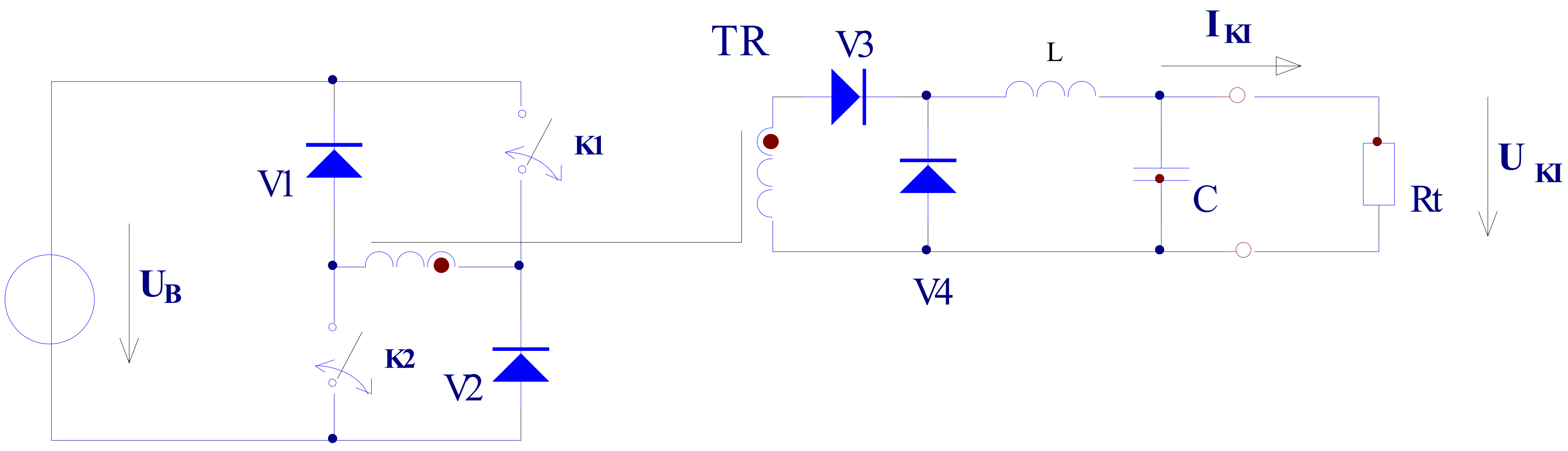
2.a Nyitó üzemű konverter (egy kapcsoló elemmel)



V1 be   transzformáció

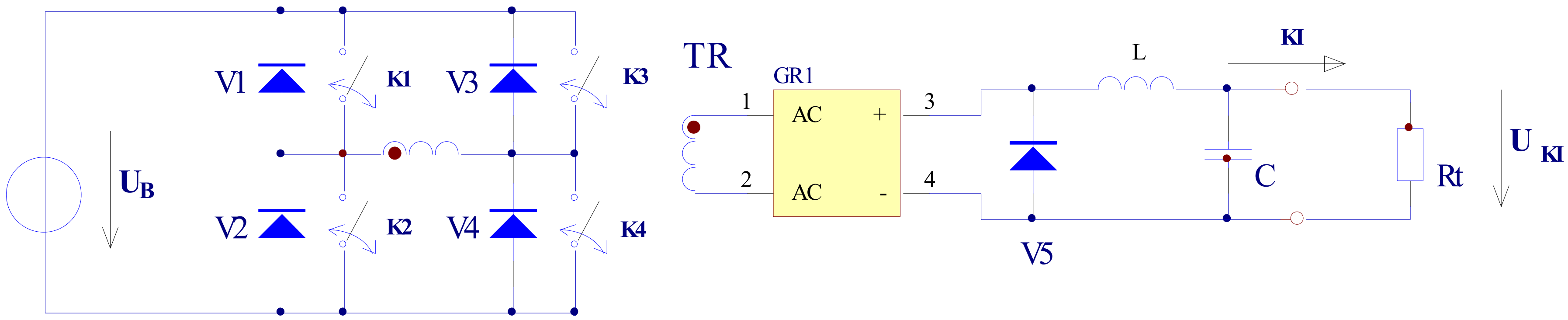
V1 ki   lemágnesezés

2.b Nyitó üzemű konverter (kettő kapcsoló elemmel)



$$\delta \leq 0{,}5$$

Ellenütemű (híd) kapcsolás



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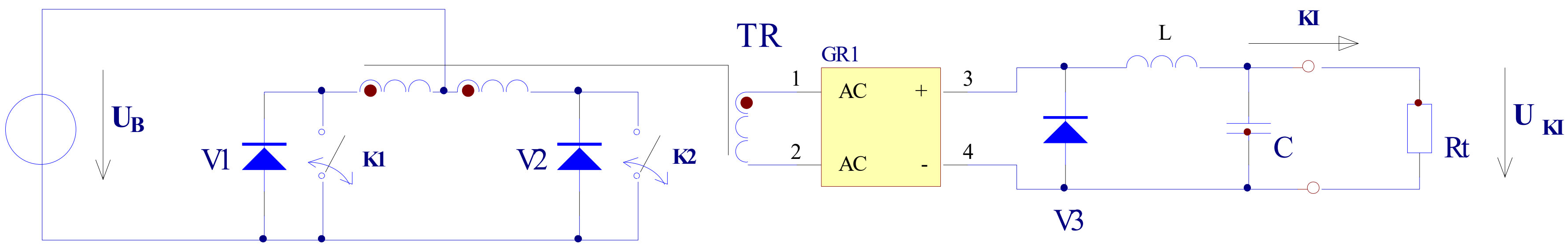
Középpont kapcsolás



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Köszönöm a figyelmet!

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