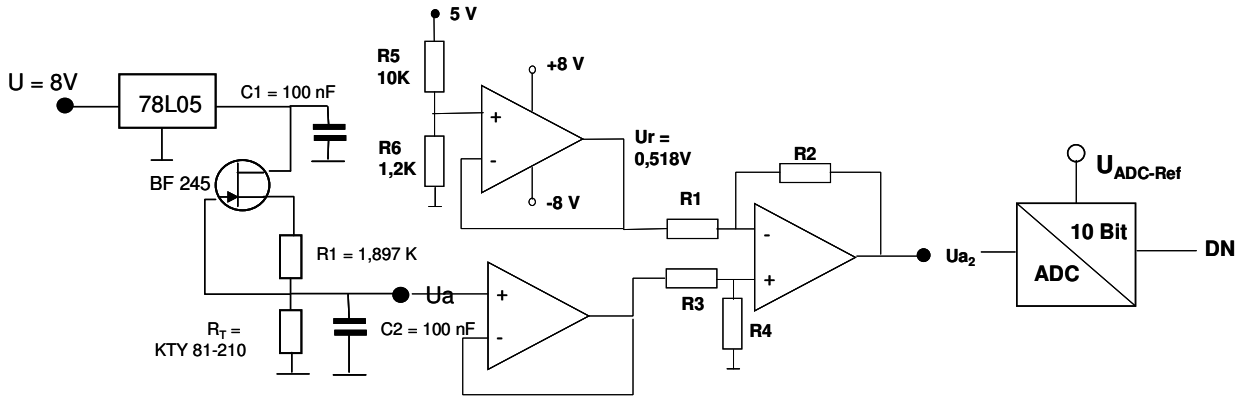
Temperaturmess-Schaltung



Gemessene Werte		Approximation	
Ua (V)	T (C)	X^2	Fehler (C)
1,579	-0,7	-0,7	-0,01
1,744	11,0	10,9	0,08
1,800	14,9	15,0	-0,05
1,860	19,2	19,3	-0,13
1,904	22,7	22,6	0,12
2,129	39,6	39,6	-0,04
2,154	41,6	41,6	0,02
2,172	43,0	43,0	0,01

Kalibrierung

$T [C] = T [C] = 7,7285 * ((Ua_2-b)/a)^2 + 44,667 * (Ua_2-b)/a - 90,488$

$Ua_2 = U_{ADC-Ref} * DN / 1024$

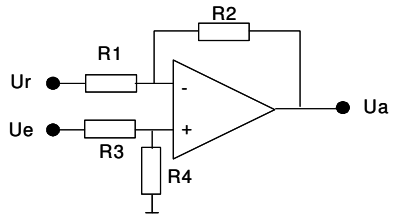
$T [C] = 7,7285 * ((U_{ADC-Ref} * DN / 1024-b)/a)^2 + 44,667 * (U_{ADC-Ref} * DN / 1024-b)/a - 90,488$

$U_{ADC-Ref}$ =	5,0	Volt
DN =	600	0 - 1023
a =	3,542	
b =	-3,587	
Ua_2 =	2,930	Volt
Ua =	1,840	Volt
Temp. =	17,9	C

mit $Ua_2 = a * Ua + b$

Gleichung Differenzverstärker:
Ua = -Ur * R2/R1 + Ue * R4/(R3+R4) * (1+R2/R1)
Ua = Ur * x + Ue * y

Eingabewerte:	
Ue1 =	1,100
Ue2 =	2,300
Ua1 =	0,500
Ua2 =	4,500
Ur =	0,518
R1 =	10.050
R3 =	10.050



Zwischenwerte:	
x =	-6,113
y =	3,333

x = (Ua2 - Ue2*y) / Ur
y = (Ua1 - Ua2) / (Ue1 - Ue2)

Soll-Widerstände:	
R2 =	61.438
R4 =	8.863

k = y / (1 + R2/R1)
R2 = -x * R1
R4 = R3 * k / (1-k)

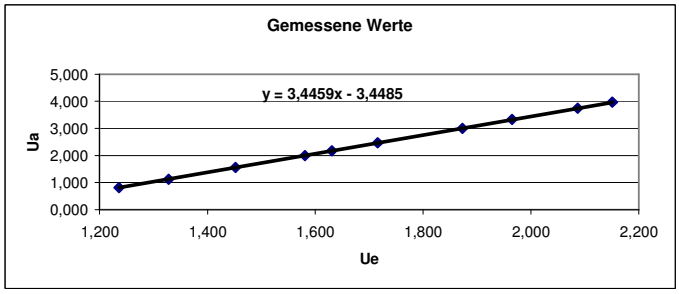
Einsetzen der R Normwerte:	
R2 =	69.600
R4 =	8.120

Mit den Normwerten gilt:	
Ua1 = f(Ue1) =	0,309
Ua2 = f(Ue2) =	4,559

Kalibrationsgleichung:	
Ua = a*Ue + b	
Ue = (Ua-b) / a	
a =	3,542
b =	-3,587

a = (Ua1-Ua2) / (Ue1-Ue2)
b = Ua2 - a*Ue2

Gemessene Werte	
Ue	Ua
1,236	0,812
1,328	1,128
1,452	1,555
1,581	2,000
1,631	2,171
1,716	2,464
1,873	3,003
1,965	3,321
2,087	3,740
2,151	3,970



Kalibration mit Ue = 0,2902*Ua + 1,0008		
Ua	Ue	Fehler
0,812	1,236	0,000
1,128	1,328	0,000
1,555	1,452	0,000
2,000	1,581	0,000
2,171	1,631	0,000
2,464	1,716	0,000
3,003	1,873	-0,001
3,321	1,965	0,000
3,740	2,087	-0,001
3,970	2,151	0,002