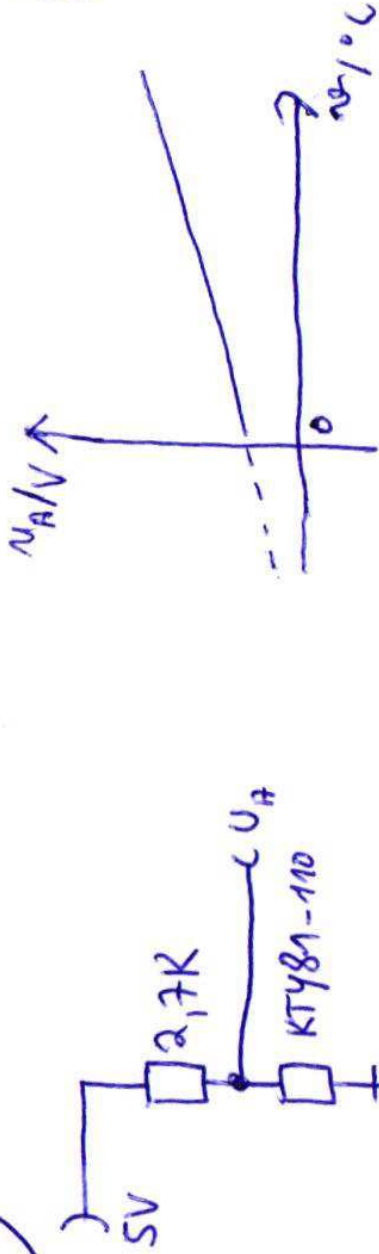


# Teil 1

[08.10.26]

(aus alten Unterlagen)



1. Ermittlung der Spannungswerte  $U_A$  durch Vorgabe der Temperaturen / hier:  $-40^\circ\text{C}$  -  $140^\circ\text{C}$

Vorgabe 1:  $t = -40^\circ\text{C} \Rightarrow R_{KTY} = 567\Omega$  (laut Tabelle)

$$\Rightarrow \boxed{U_{A \min}} = 5V \cdot \frac{R_{KTY}}{R_{KTY} + 2,7k} = 5V \cdot \frac{0,567k}{0,567k + 2,7k} = 0,8677V \approx 0,868V //$$

Vorgabe 2:  $t = 140^\circ\text{C} \Rightarrow R_{KTY} = 2124\Omega$  (laut Tabelle)

$$\Rightarrow \boxed{U_{A \max}} = 5V \cdot \frac{R_{KTY}}{R_{KTY} + 2,7k} = 5V \cdot \frac{2124\Omega}{2124\Omega + 2700\Omega} = 2,201V //$$

$$\Rightarrow \Delta U_{\max} = 2,201V - 0,868V = 1,333V //$$

[08.10.26]

Teil 2

[Ermittlung der Endformel]

$$\left[ \frac{\Delta v}{\Delta v_{\max}} = \frac{\Delta u_A}{\Delta u_{A_{\max}}} \Rightarrow \frac{v_{\max} - v_{\text{mess}}}{180^\circ\text{C}} = \frac{u_{A_{\max}} - u_{A_{\text{mess}}}}{u_{A_{\max}} - u_{A_{\min}}} \right]$$

$$\Rightarrow \frac{v_{\max} - v_{\text{mess}}}{180^\circ\text{C}} = \frac{u_{A_{\max}} - u_{A_{\text{mess}}}}{u_{A_{\max}} - u_{A_{\min}}} \quad | \cdot 180^\circ\text{C} | - v_{\max}$$

$$- v_{\text{mess}} = \frac{u_{A_{\max}} - u_{A_{\text{mess}}}}{u_{A_{\max}} - u_{A_{\min}}} \cdot 180^\circ\text{C} - v_{\max} \quad | \cdot (-1)$$

$$v_{\text{mess}} = v_{\max} - \frac{u_{A_{\max}} - u_{A_{\text{mess}}}}{u_{A_{\max}} - u_{A_{\min}}} \cdot 180^\circ\text{C}$$

$$\Rightarrow \left[ v_{\text{mess}} = 180^\circ\text{C} - \frac{u_{A_{\max}} - u_{A_{\text{mess}}}}{u_{A_{\max}} - u_{A_{\min}}} \cdot 180^\circ\text{C} \right]$$

Gültigkeitsbereich für 5 V:

$$\left[ v_{\text{mess}} = 140^\circ\text{C} - \frac{2,201\text{V} - u_{A_{\text{mess}}}}{1,333\text{V}} \cdot 180^\circ\text{C} \right]$$

**Table 1** Ambient temperature, corresponding resistance, temperature coefficient and maximum expected temperature error for KTY81-110 and KTY81-120

$I_{\text{cont}} = 1 \text{ mA}$ .

| AMBIENT TEMPERATURE |      | TEMP. COEFF. | KTY81-110      |      |      |                 | KTY81-120      |      |      |                 |
|---------------------|------|--------------|----------------|------|------|-----------------|----------------|------|------|-----------------|
| (°C)                | (°F) | (%/K)        | RESISTANCE (Ω) |      |      | TEMP. ERROR (K) | RESISTANCE (Ω) |      |      | TEMP. ERROR (K) |
|                     |      |              | MIN.           | TYP. | MAX. |                 | MIN.           | TYP. | MAX. |                 |
| -55                 | -67  | 0.99         | 475            | 490  | 505  | ±3.02           | 470            | 490  | 510  | ±4.02           |
| -50                 | -58  | 0.98         | 500            | 515  | 530  | ±2.92           | 495            | 515  | 535  | ±3.94           |
| -40                 | -40  | 0.96         | 552            | 567  | 582  | ±2.74           | 547            | 567  | 588  | ±3.78           |
| -30                 | -22  | 0.93         | 609            | 624  | 638  | ±2.55           | 603            | 624  | 645  | ±3.62           |
| -20                 | -4   | 0.91         | 669            | 684  | 698  | ±2.35           | 662            | 684  | 705  | ±3.45           |
| -10                 | 14   | 0.88         | 733            | 747  | 761  | ±2.14           | 726            | 747  | 769  | ±3.27           |
| 0                   | 32   | 0.85         | 802            | 815  | 828  | ±1.91           | 793            | 815  | 836  | ±3.08           |
| 10                  | 50   | 0.83         | 874            | 886  | 898  | ±1.67           | 865            | 886  | 907  | ±2.88           |
| 20                  | 68   | 0.80         | 950            | 961  | 972  | ±1.41           | 941            | 961  | 982  | ±2.66           |
| 25                  | 77   | 0.79         | 990            | 1000 | 1010 | ±1.27           | 980            | 1000 | 1020 | ±2.54           |
| 30                  | 86   | 0.78         | 1029           | 1040 | 1051 | ±1.39           | 1018           | 1040 | 1061 | ±2.68           |
| 40                  | 104  | 0.75         | 1108           | 1122 | 1136 | ±1.64           | 1097           | 1122 | 1147 | ±2.97           |
| 50                  | 122  | 0.73         | 1192           | 1209 | 1225 | ±1.91           | 1180           | 1209 | 1237 | ±3.28           |
| 60                  | 140  | 0.71         | 1278           | 1299 | 1319 | ±2.19           | 1265           | 1299 | 1332 | ±3.61           |
| 70                  | 158  | 0.69         | 1369           | 1392 | 1416 | ±2.49           | 1355           | 1392 | 1430 | ±3.94           |
| 80                  | 176  | 0.67         | 1462           | 1490 | 1518 | ±2.8            | 1447           | 1490 | 1532 | ±4.3            |
| 90                  | 194  | 0.65         | 1559           | 1591 | 1623 | ±3.12           | 1543           | 1591 | 1639 | ±4.66           |
| 100                 | 212  | 0.63         | 1659           | 1696 | 1733 | ±3.46           | 1642           | 1696 | 1750 | ±5.05           |
| 110                 | 230  | 0.61         | 1762           | 1805 | 1847 | ±3.83           | 1744           | 1805 | 1865 | ±5.48           |
| 120                 | 248  | 0.58         | 1867           | 1915 | 1963 | ±4.33           | 1848           | 1915 | 1982 | ±6.07           |
| 125                 | 257  | 0.55         | 1919           | 1970 | 2020 | ±4.66           | 1899           | 1970 | 2040 | ±6.47           |
| 130                 | 266  | 0.52         | 1970           | 2023 | 2077 | ±5.07           | 1950           | 2023 | 2097 | ±6.98           |
| 140                 | 284  | 0.45         | 2065           | 2124 | 2184 | ±6.28           | 2043           | 2124 | 2205 | ±8.51           |
| 150                 | 302  | 0.35         | 2145           | 2211 | 2277 | ±8.55           | 2123           | 2211 | 2299 | ±11.43          |