



Besides the resistance thermometers the thermocouples are the second „classical“ type of temperature sensors. In this case the voltage is a function of temperature. Thermocouples display great mechanical stability and can be used for high temperatures up to + 2200 ° C whereas resistance thermometers are especially suitable for low temperatures up to – 270 ° C and mean temperatures up to + 850 ° C at resolutions up to 0.0001 % and an error of 0.04 ° C.

In practice only the very cost-effective NiCr-Ni thermocouples with a fibre diameter of 0.5 up to 1.0 mm are used. They are sufficient regarding the measuring accuracy and the temperature interval to be measured. The ends of the wires are welded or soldered, sometimes they are only drilled. But those drillings can lead to corruption of values caused by moisture in the boundary layer. Table 1 indicates the thermovoltage in  $\mu\text{V}$  for thermocouples NiCr-Ni, referring to a reference point temperature of 0 ° C according to IED 584.

Tab. 1: Thermovoltage in  $\mu\text{V}$  for NiCr-Ni thermocouples according to DIN IEC 584 at a reference point temperature of 0° C

T(°C)	0	1	2	3	4	5	6	7	8	9	10
-20	-777	-739	-701	-662	-624	-585	-547	-508	-469	-431	-392
-10	-392	-353	-314	-275	-236	-197	-157	-118	-79	-39	0
0	0	39	79	119	158	198	238	277	317	357	397
10	397	437	477	517	557	597	637	677	718	758	798
20	798	838	879	919	960	1000	104	108	1122	116	1203
30	1203	1244	1285	1325	1366	1407	144	148	1529	157	1611
40	1611	1652	1693	1734	1776	1817	185	189	1940	198	2022
50	2022	2064	2105	2146	2188	2229	227	231	2353	239	2436
60	2436	2477	2519	2560	2601	2643	268	272	2767	280	2850
70	2850	2892	2933	2975	3016	3058	310	314	3183	322	3266
80	3266	3307	3349	3390	3432	3473	351	355	3598	363	3681
90	3681	3722	3764	3805	3847	3888	393	397	4012	405	4095
100	4095	4137	4178	4219	4261	4302	434	438	4426	446	4508