		Characteristic of sensing elements Thermocouple T				Termočlánek T	
						VÝTISK ČÍSLO	
AUTOR	Lukáš Osadník			SKART. ZNAK	S10		
STRANA	1 z 2	VERZE	A z 25.11.13	NAHRAZUJE		KLASIF. KÓD	I

Basic technical data

Sensing element	Thermocouple typu T
Range of working temperatures	-270 to 400 °C *
The reference voltage at 0 °C	0,000 mV

* The real range of working temperatures of sensor is defined by the design and technology

Princip

Due to changes in temperature measured environment is defined by the change in voltage measuring thermocouple. Change in voltage is defined according to ČSN EN 60584-1:

$$U = \sum_{i=1}^n a_i (t_{90})^i \quad \mu V \quad \text{in temperature range } -270 \text{ °C to } 0 \text{ °C}$$

Where:

$$\begin{aligned}
 a_1 &= 3,8748106364 \times 10^{-2} \\
 a_2 &= 4,4194434347 \times 10^{-5} \\
 a_3 &= 1,1844323105 \times 10^{-7} \\
 a_4 &= 2,0032973554 \times 10^{-8} \\
 a_5 &= 9,0138019559 \times 10^{-10} \\
 a_6 &= 2,2651156593 \times 10^{-11} \\
 a_7 &= 3,6071154205 \times 10^{-13} \\
 a_8 &= 3,8493939883 \times 10^{-15} \\
 a_9 &= 2,8213521925 \times 10^{-17} \\
 a_{10} &= 1,4251594779 \times 10^{-19} \\
 a_{11} &= 4,8768662286 \times 10^{-22} \\
 a_{12} &= 1,0795539270 \times 10^{-24} \\
 a_{13} &= 1,3945027062 \times 10^{-27} \\
 a_{14} &= 7,9795153927 \times 10^{-31}
 \end{aligned}$$

$$U = \sum_{i=1}^n a_i (t_{90})^i \quad \mu V \quad \text{in temperature range } 0 \text{ °C to } 400 \text{ °C}$$


Where:

$$\begin{aligned}
 a_1 &= 3,8748106364 \times 10^{-2} \\
 a_2 &= 3,3292227880 \times 10^{-5} \\
 a_3 &= 2,0618243404 \times 10^{-7} \\
 a_4 &= -2,1882256846 \times 10^{-9} \\
 a_5 &= 1,0996880928 \times 10^{-11} \\
 a_6 &= -3,0815758772 \times 10^{-14} \\
 a_7 &= 4,5479135290 \times 10^{-17} \\
 a_8 &= -2,7512901673 \times 10^{-20}
 \end{aligned}$$

Tolerance field

Tolerance classes for thermocouples T is defined according IEC 584-2

Sensing element	Tolerance Class	Tolerances °C
Thermocouple T	1	± 0,5°C for temperature -40°C to +125°C ± 0,004 * t for temperature +125°C to +350°C
	2	± 1°C for temperature -40°C to +133°C ± 0,0075 * t for temperature +133°C to +350°C

		Characteristic of sensing elements Thermocouple T				Termočlánek T	
						VÝTISK ČÍSLO	
AUTOR	Lukáš Osadník					SKART. ZNAK	S10
STRANA	2 z 2	VERZE	A z 25.11.13	NAHRAZUJE		KLASIF. KÓD	I

Relation of the voltage values in mV on the temperature

°C	0	-10	-20	-30	-40	-50	-60	-70	-80	-90
-200	-5,603	-5,753	-5,888	-6,007	-6,105	-6,180	-6,232	-6,258		
-100	-3,379	-3,657	-3,923	-4,177	-4,419	-4,648	-4,865	-5,070	-5,261	-5,439
0	0,000	-0,383	-0,757	-1,121	-1,475	-1,819	-2,153	-2,476	-2,788	-3,089

°C	0	10	20	30	40	50	60	70	80	90
0	0,000	0,391	0,790	1,196	1,612	2,036	2,468	2,909	3,358	3,814
100	4,279	4,750	5,228	5,714	6,206	6,704	7,209	7,720	8,237	8,759
200	9,288	9,822	10,362	10,907	11,458	12,013	12,574	13,139	13,709	14,283
300	14,862	15,445	16,032	16,624	17,219	17,819	18,422	19,030	19,641	20,255
400	20,872									

Characteristic of the sensing element

