TECH NOTE: TT-3/100 - Using Foil Sensors for Temperature Measurement

Version: 2019-04-26

Abstract

Foil resistors can also be used as temperature sensors.
The TT-3/100 is an RTD (Resistance Temperature Detector) based on Nickel that has a linear temperature coefficient, which allows performing accurate temperature measurements.

The Nickel resistor has a specific resistance, e.g. 113 ohms, at a reference temperature. Additionally, a polynomial is delivered with each sensor package which needs to be considered when calculating the temperature value.

The advantages of a TT-3 sensor are:

- ➜ Can be used on radial surfaces easily
- ➜ Flat.
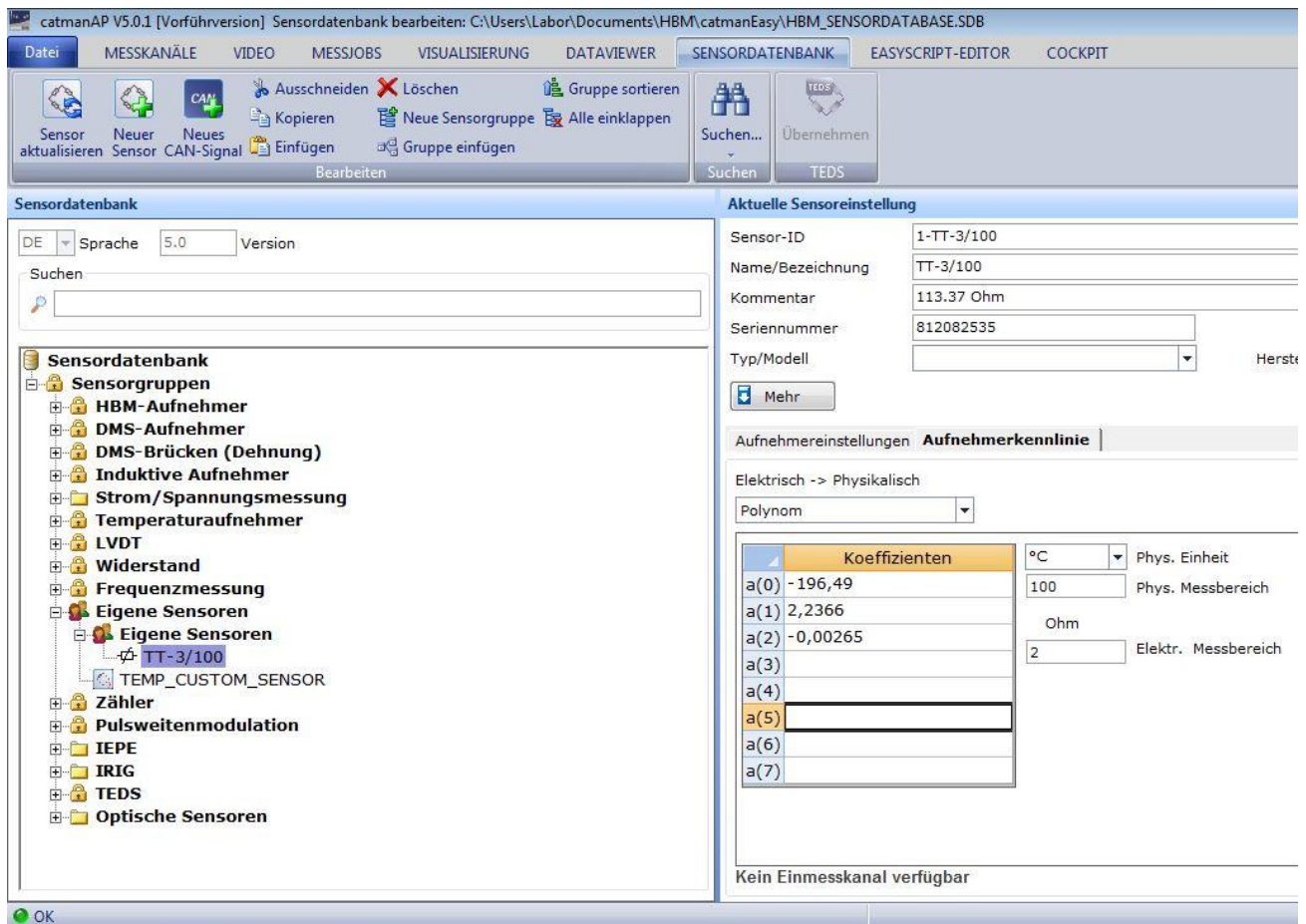- ➜ Provides Short reaction time.

We performed an experiment with Pt100 sensors as a reference to show how accurate a TT-3 sensor can work. The sensors were bonded onto a metal block and temperature ramps were performed in an oven.

5µm nickel grid
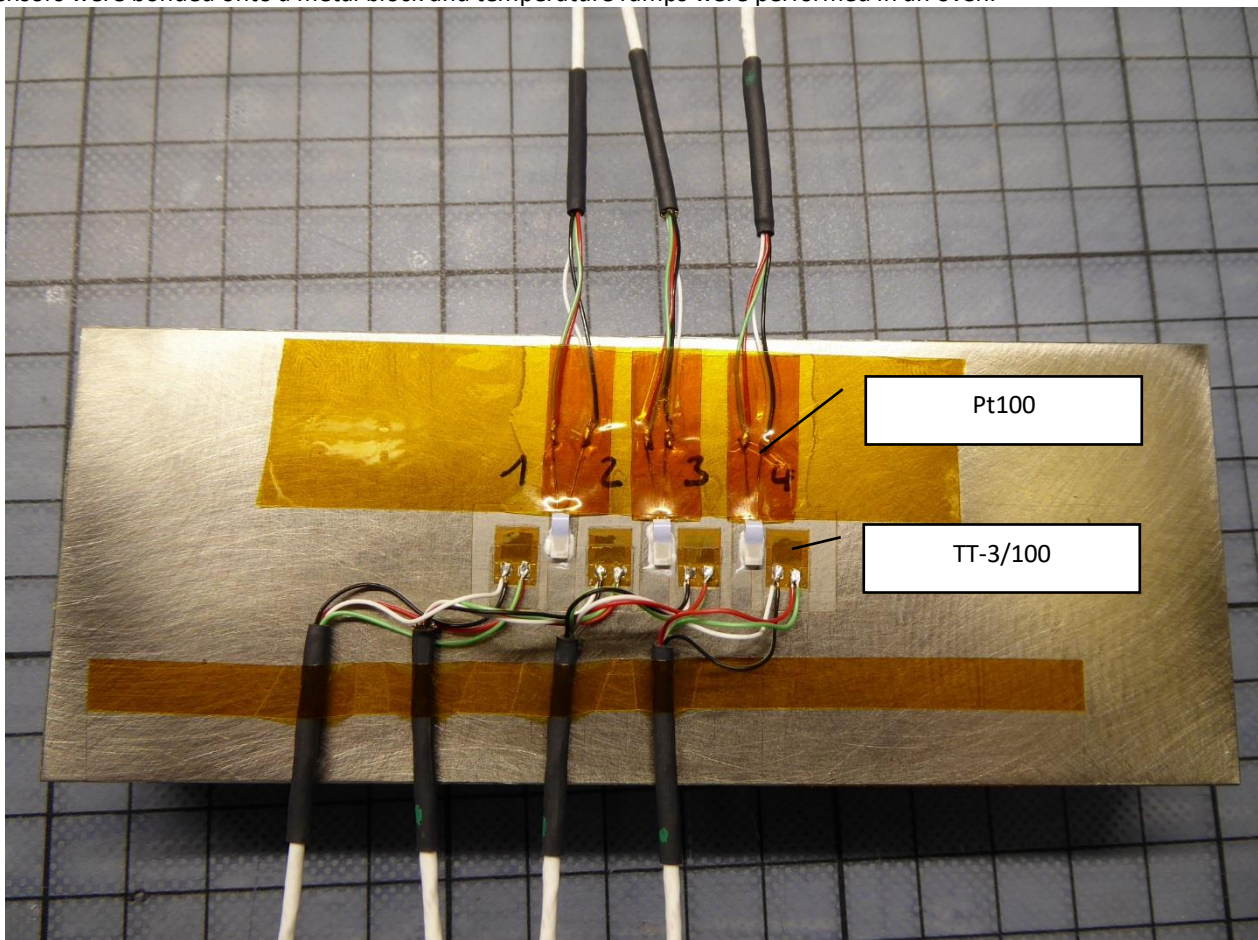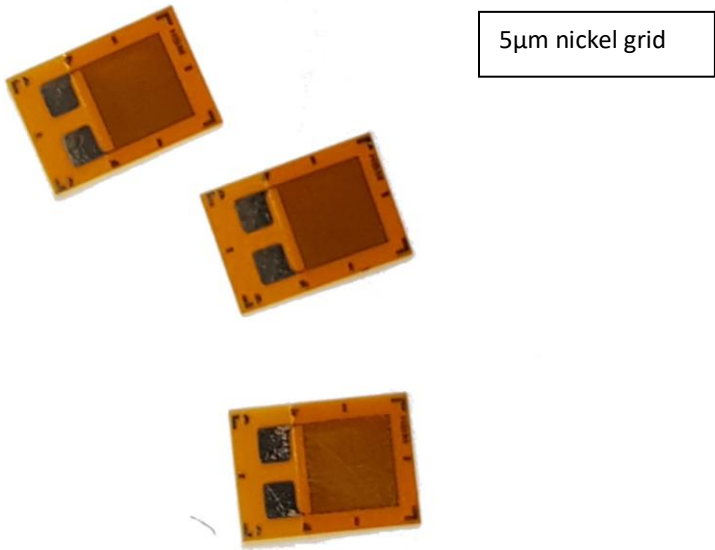
These sensors can be set up quickly. For example, using catman software:

➔ Create a customer-specific sensor and assign a name (e.g. "TT-3/100")
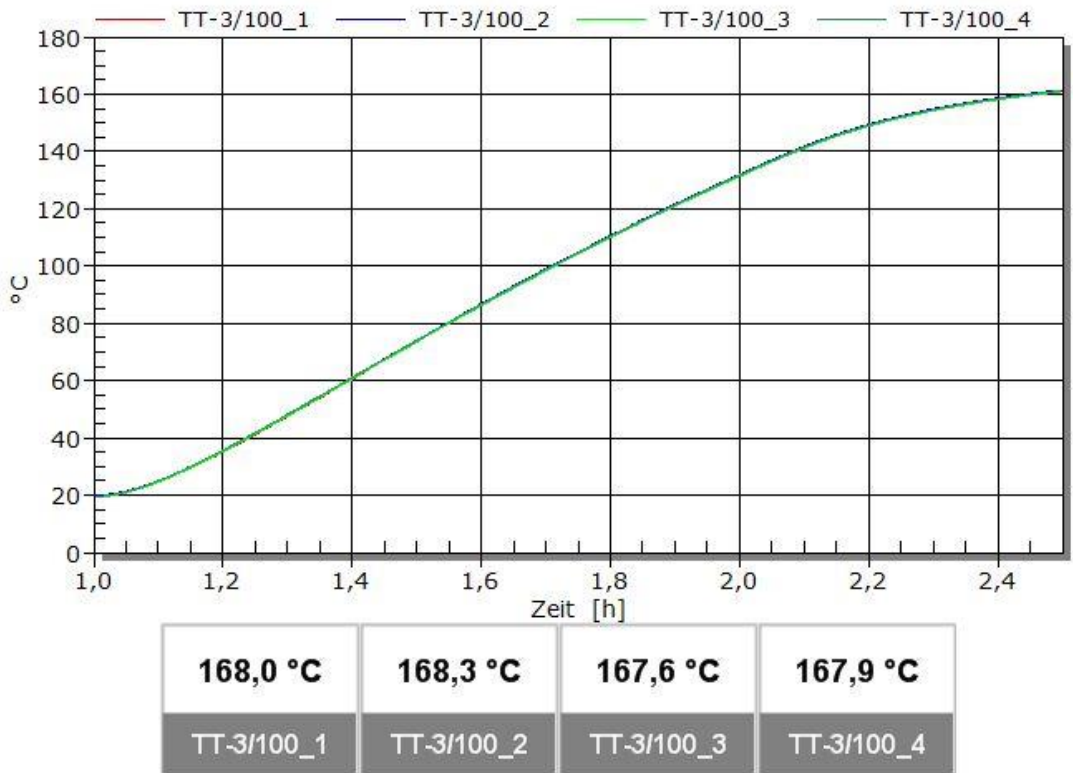➔ Enter the polynomial printed on each TT-3 sensor package
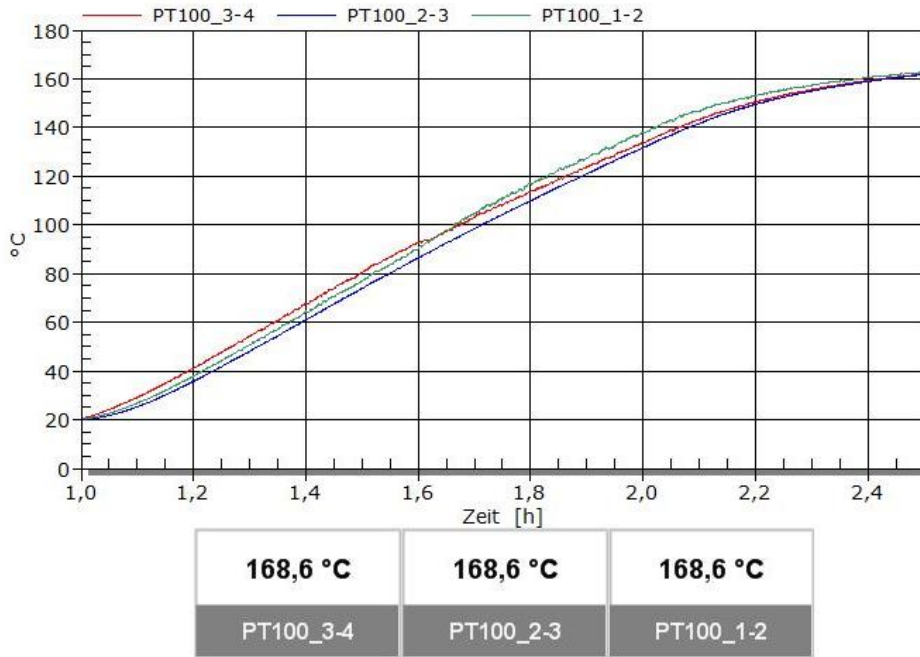
➔ Assign the sensor to the relevant channel

➔ Start the measurement

TT-3/100 measurement from 20°C to 160°C

168,0 °C	168,3 °C	167,6 °C	167,9 °C
TT-3/100_1	TT-3/100_2	TT-3/100_3	TT-3/100_4

In comparison, the Pt100 measurements show more scatter:

168,6 °C	168,6 °C	168,6 °C
PT100_3-4	PT100_2-3	PT100_1-2

Further measurements show a very good correlation between the Pt100 and the TT-3/100 sensor:

19,91 °C	20,10 °C	19,50 °C	19,68 °C
TT-3/100_1	TT-3/100_2	TT-3/100_3	TT-3/100_4

20,24 °C	20,34 °C	20,40 °C
PT100_3-4	PT100_2-3	PT100_1-2

19,83 °C	20,01 °C	19,42 °C	19,59 °C
TT-3/100_1	TT-3/100_2	TT-3/100_3	TT-3/100_4

20,10 °C	20,22 °C	20,25 °C
PT100_3-4	PT100_2-3	PT100_1-2