

TS, TS-Logger, THS sensor Temperature Calibration – 2018 evaluation

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Basics

- Seemoto temperature sensors include SHT21 humidity and temperature sensor of Sensirion integrated to the circuit board
- Every SHT21 sensor component is individually calibrated and tested by the manufacturer
- More details of the component can be found from manufacturers SHT21 datasheet from this [link](#).
- Before being sent to a customer every Seemoto sensor is calibrated by default in one temperature point according to the EN13486 standard based calibration process (described in a separate document)
 - calibration point is selected within ± 5 °C of the temperature at which the sensor is most frequently used
 - Normally the three calibration points used are: -22°C, +4°C and +22°C

SHT21 Typical Accuracy

- The Sensirion SHR21 component typical tolerance graph can be found from the manufacturers data sheet

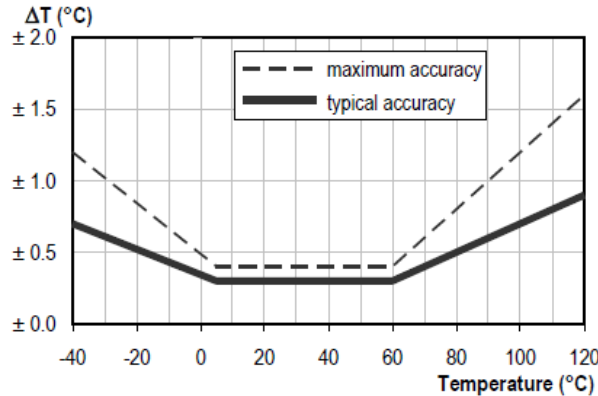


Figure 3 Typical and maximal tolerance for temperature sensor in °C.

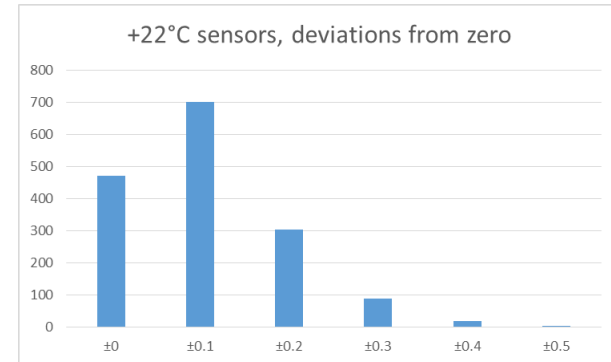
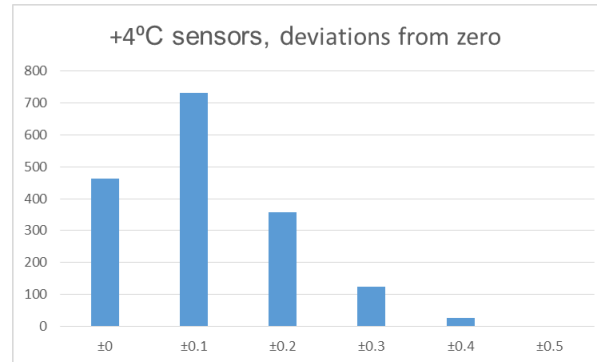
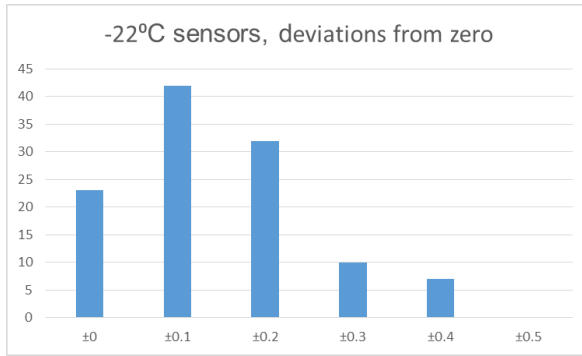
- The graph shows a typical accuracy of ± 0.3 degrees in temperature range from 5 to 60 degrees Celsius.
- Below 5 and above 60 degrees the typical accuracy raises a bit

Evaluation of the Seemoto calibrations

- To evaluate, how well Seemoto sensors follow the component accuracy informed by manufacturer, we evaluated Seemoto calibrations during 2018
 - We took a random sample of 3300 calibrations
 - We divided those calibrations into three groups according to the temperature: -22°C , $+4^{\circ}\text{C}$ and $+22^{\circ}\text{C}$. (Calibration in -22°C is less frequent and therefore the sample size there is smaller.)
 - We checked the deviations of each calibrated sensor in each temperature group separately and got the results shown in the next slide

Evaluation results

- Results are shown in pictures below.
- In all temperatures the results are very similar.
- Majority of Seemoto sensors have ± 0.2 degrees or smaller deviation.



Evaluation results (cont.)

- Typical deviations for different calibration temperatures were calculated
 - For +4 °C and +22 °C it is ± 0.10 degrees
 - For -22 °C it is ± 0.14 degrees
 - The results show a graph similar to the manufacturers component specification with the exception of Seemoto sensors showing a slightly better accuracy
 - In +4 °C and +22 °C results there were only one sensor in each having -0.5 deviation, as seen in “Max deviation” graph. Without those the “max” graph would have been straight on ± 0.4 , which is according to the manufacturers specification.

