

Calibrate laser sensors optoNCDT 2300

Background

Diffuse reflection laser triangulation, naturally enough, also records the fine structure of the object being investigated. In addition to the direct impact of waviness and roughness, the effects of optical structural features (for instance inhomogeneous reflectivity, penetration depth, and speckle pattern) also have an influence on the measured distance value.

Each individual measurement incorporates this additional information on the fine structure and so - unavoidably - deviates from the true value.

The pure distance information can be obtained by averaging sample locations with different fine structures, for example.

The special calibration procedure for the optoNCDT 2300 series of sensors takes into account this basic physical property of laser triangulation.

Calibration protocol

In the diagram, two other data sets are displayed in addition to the linearity limits.

The solid curve shows the mean deviation of the measured values when varying the sample location for each distance step. This shows the deviation of the pure distance information.

The individual data points represent the linearity deviations determined, as per DIN 32877, and still including the fine structure of the object to a limited extent.

The measuring frequency is 20 KHz. A flat ceramic unit (white, fine-grained, no glass ceramic) serves as a reference measurement object.

Reference to DIN 32877 1)

In the underlying test procedure, we only make reference to the observation of the linearity deviation. Those aspects covered in the DIN 32877 standard concerning temporal and local repeatability are not the subject of the calibration protocol.

To determine the linearity error, the DIN standard requires that at least 20 measurements must be recorded in the measurement range at irregular intervals, with five readings per measurement step on the target (offset by up to three spot sizes) with 10 timing averages each.

The linearity error to be determined is derived from the average of the 50 readings for each measurement step.

In the calculation of the linearity deviation performed by our test procedure, local and temporal averaging is performed in the reverse order.

The determination of the linearity deviation for sensors with measurement ranges greater than 100 mm is carried out without averaging.

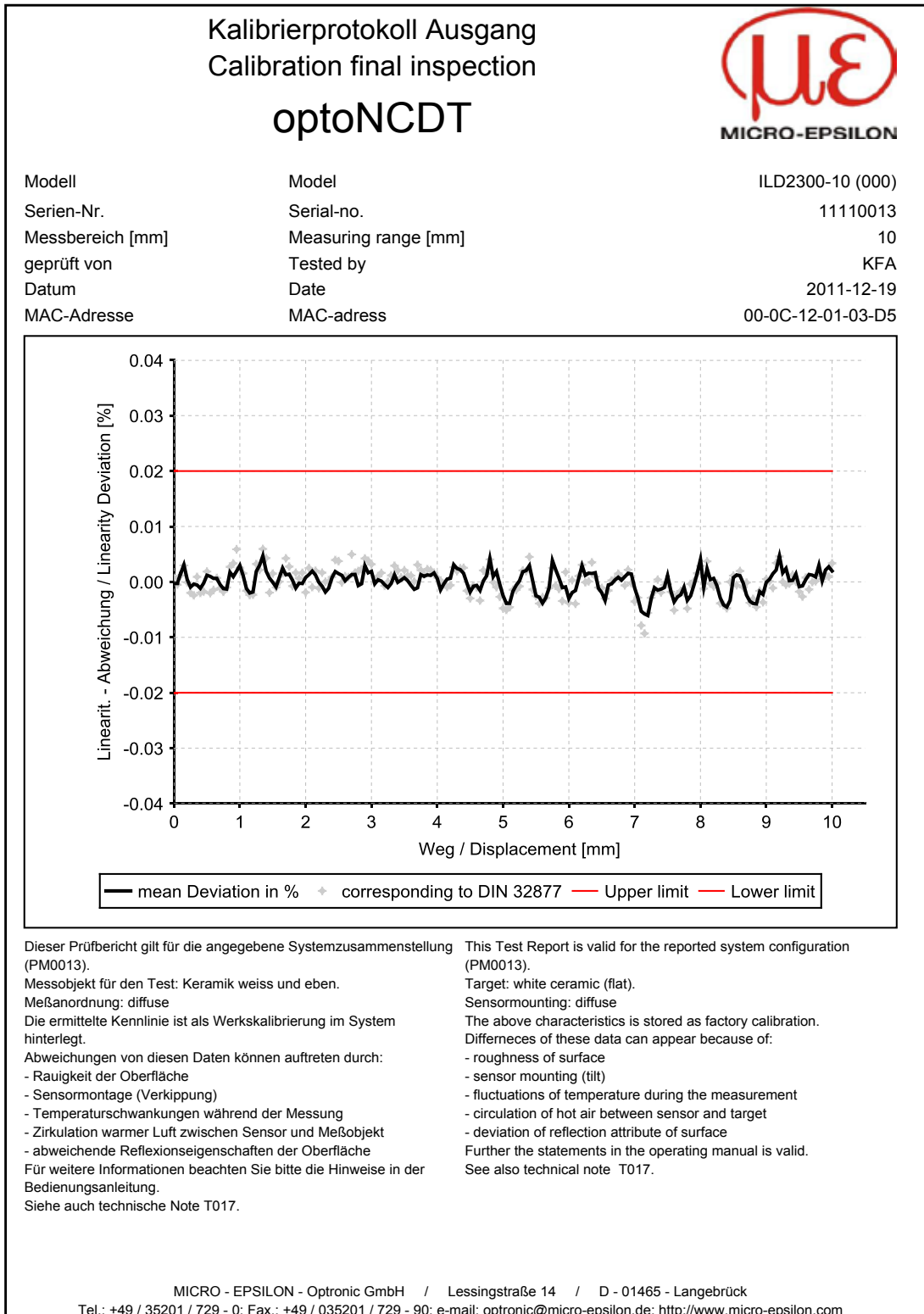


1) DIN 32877: 2000-08 optoelectronic measurement of form, profile and distances

TechNote

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Example for calibration of the 2 mm - 100 mm measurement ranges



Example for calibration of the 200 mm measuring range

