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testo 885/testo 890: Recognize more thanks to excellent temperature measurement accuracy.

The testo 885 and testo 890 have one of the best temperature measurement accuracies in their instrument class. This makes them ideally suited to tasks in Research and Development requiring the highest precision.

Testo guarantees a measurement accuracy of ±2 °C or ±2 % for the testo 885 and testo 890 thermal imagers. These values apply not only for one or two individual reference points, but for the entire thermal image and every single measurement value. In addition to this, the temperature measurement accuracy is also guaranteed over the entire operating temperature from -15 °C to +50 °C. Why is that the case?

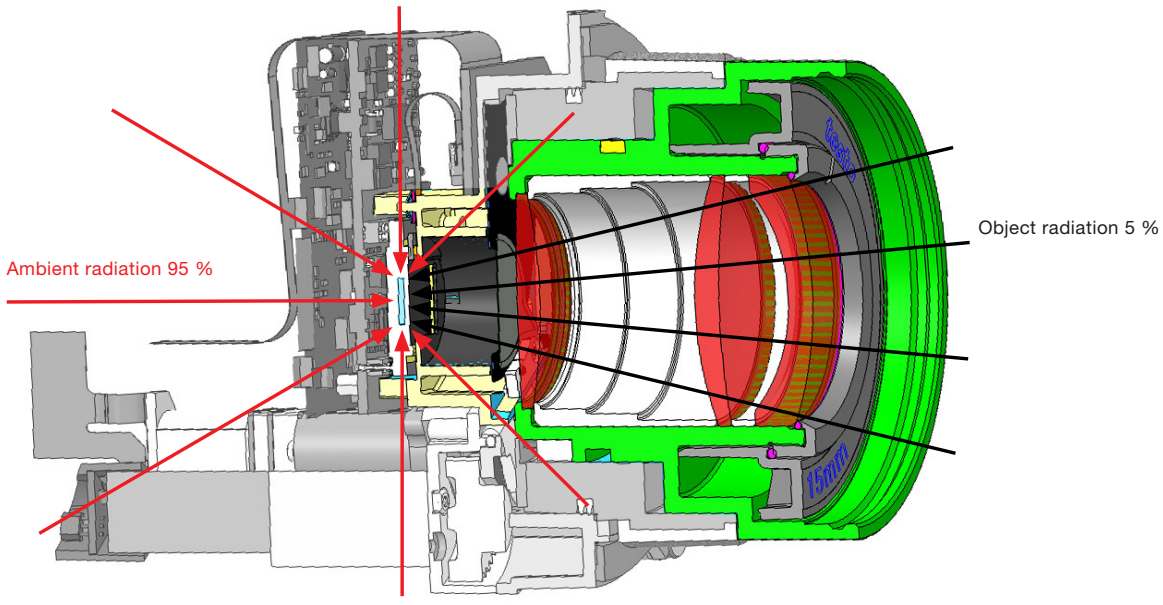

Fig. 1: Cross-section of a thermal imager with detector, optics and electronics.

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Detector

The heart of every thermal imager is the sensor. It consists of a matrix of very small, infrared-sensitive pixels which convert the electromagnetic radiation impacting on them into an electrical signal. The sum of the pixel signals results in a digital image. The digital image shows the surface temperature of the object and portrays it as a false colour image in the imager. Each individual pixel receives a colour tone in the false colour image defined by the scaling and the selected palette. The speed of a thermal imager depends on the time required to create an individual image. The testo 885 and testo 890 thermal imagers have an image frame rate of up to 33 Hz.

The detector of a Testo thermal imager can measure electromagnetic radiation in an atmospheric window between 7.5 and 14 µm. The ambient temperature (300 K) has the highest radiation intensity at a wavelength of 9.89 µm (Planck's radiation spectrum). For this reason, the detector of a Testo thermal imager is designed to show the highest sensitivity at a wavelength of 9.89 µm.

NETD

In addition to this, the sensor also has a high thermal sensitivity. This is understood to be the smallest temperature difference which the detector is able to measure and visualize. The thermal sensitivity is measured by the Noise Equivalent Temperature Difference (NETD) and is stated in milliKelvin (mK). NETD is thus the smallest resolution of the temperatures between 2 pixels. The NETD is improved by using lenses with especially large apertures. The better the NETD, the less noise and the more contrast the image has at the same number of pixels.

Compensation

Thermal imagers from Testo have an uncooled detector in micro-bolometer technology. The detector is influenced not only by the electromagnetic radiation of the object being measured, but also by the temperatures surrounding the thermal imager itself.
As the illustration shows, only 5 % of the total electromagnetic radiation comes from the measurement object. For exact measurements, the influence of the remaining 95 % must therefore be compensated. Because these influences change with the ambient temperatures, Testo installs several highly precise temperature sensors in the housing of the imagers. These ensure that the ambient temperatures at the sensor do not falsify the measurement values.

Calibration

The influences of the ambient radiation which are measured by the temperature sensors are compensated by calibration. For this reason, a careful, painstakingly conducted calibration is necessary for an excellent temperature measurement accuracy.
Testo carries out the calibration of the thermal imagers at ambient temperatures between -15 °C and +50 °C. Each pixel of the testo 885 and testo 890 imagers receives its own detailed sensor characteristic curve which guarantees its measurement accuracy at different ambient temperatures.
The reason for the excellent temperature measurement accuracy of the testo 885 and testo 890 is thus the precisely balanced interplay of detector, optics and calibration.

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