Be sure. testo

testo 885/testo 890: Highest resolution with testo SuperResolution technology.

In Research and Development, the highest precision is crucial. That is why Testo has developed a special technology for high-resolution thermal images.

The testo SuperResolution technology produces very precise thermal images. This means:

- Four times as many measurement values in the thermal image
- Improved geometric resolution (IFOVgeo) of the thermal image by a factor of 1.6
- Increased smallest measurable object (IFOVmeas) by a factor of 1.6
- Optimized analysis possibilities at a PC thanks to highest density of detail

How does testo SuperResolution work?

testo SuperResolution combines two known and recognized procedures: super-sampling and deconvolution.

Higher resolution by super-sampling

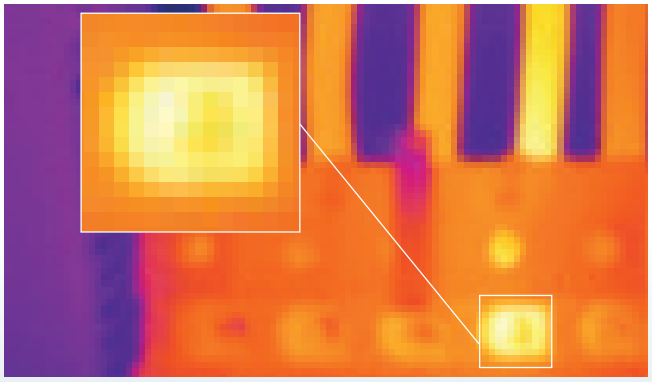
The classic super-sampling principle works by shifting the entire detector matrix by motion half a pixel width in each direction so that the image sequence created is stitched together into a single image.

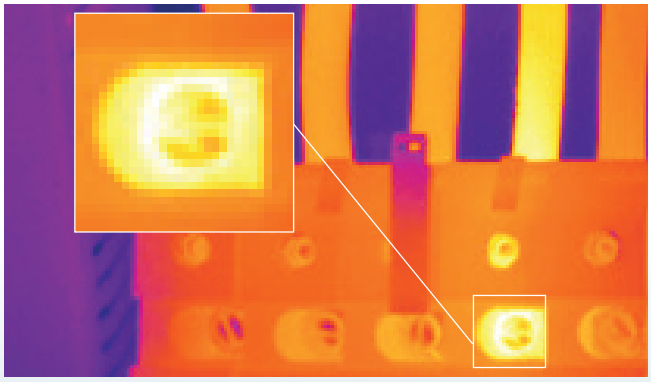
The gaps between the individual pixels are filled with additional information and the limit frequency of the detector is improved.

In super-sampling, thermal imagers from Testo use the natural tremor (from Latin tremere = to tremble), i.e. the minimal movements every person has, for the thermographic recording. This creates a sequence of images that are randomly minimally offset from each other. From these additional information and readings, Testo's special algorithm creates a higher-resolution image of the thermographed object.

Sharper images thanks to deconvolution

The ‘deconvolution’ process improves the image quality through the detailed knowledge of the infrared lens properties. This takes place by reconstructing the thermal image from the actual radiation of the thermographically recorded object and the exact knowledge of the imager's lens data. The result is a far sharper thermal image.





Be sure. testo

Reconstruction of the original signal for more detailed thermal images (fig. 1)

The black line in fig. 1 represents the respective original signal. The grey bars are the original pixel values. The blue bars in the left-hand graphic stand for the artificially generated interpolation values – these cannot reconstruct the original signal. The orange bars in the right-hand graphic are the testo SuperResolution values – they are able to reconstruct the original signal. In our case, this means that with the output signal of the detector and the knowledge of the lens properties of the thermal imager, the input signal, i.e. the actual radiation of the thermographically recorded object, is reconstructed. This creates a clearly sharper image. The testo SuperResolution technology works on a combination of super-sampling, deconvolution and an algorithm developed by Testo. It improves the geometric resolution by a factor of 1.6, and the resolution of the thermal image by the fourfold. With regard to the subjective impression of the image, this corresponds to a larger detector and a higher resolution.

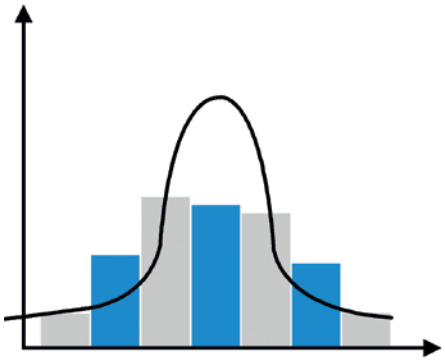
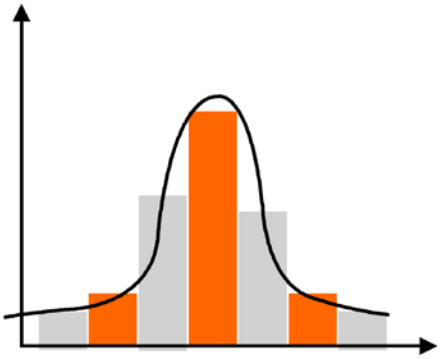


Fig. 1: Increase of display resolution by interpolation does not produce higher detail.



Improvement of detail thanks to testo SuperResolution.

The quality of testo SuperResolution technology can be proven (Fig. 2)

In thermography, there are several factors that play an important role in relation to the quality of the thermal image. Two of these factors which are particularly important are geometric resolution and sharpness of the object. The improved resolution and sharpness can be seen by looking at several narrow slit diaphragms. In this setup, a slit diaphragm mask with vertical apertures that gradually become smaller and closer together, is placed in front of a black panel radiator at a constant temperature. Without testo SuperResolution technology, the image becomes blurred with the increasing density of the slits. The same process with testo SuperResolution technology results in an overall sharper image, in which far more details are clearly visible despite the slits becoming smaller and closer together.

Fig. 2: Recording without SuperResolution technology

Recording with SuperResolution technology