Be sure. testo

A comparison of all Testo thermal imagers

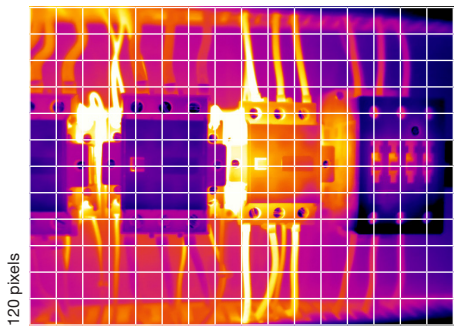
		testo 865s	testo 868s	testo 871s	testo 872s	testo 883	testo 890
Overview							
Infrared resolution	Number of pixels: The more the better	160 x 120 pixels (19,200 pixels)	160 x 120 pixels (19,200 pixels)	240 x 180 pixels (43,200 pixels)	320 x 240 pixels (76,800 pixels)	320 x 240 pixels (76,800 pixels)	640 x 480 pixels (307,200 pixels)
testo SuperResolution	Fourfold number of pixels	320 x 240 pixels (76,800 pixels)	320 x 240 pixels (76,800 pixels)	480 x 360 pixels (172,800 pixels)	640 x 480 pixels (307,200 pixels)	640 x 480 pixels (307,200 pixels)	1280 x 960 pixels (1,228,800 pixels)
Thermal sensitivity (NETD)	Smallest possible temperature difference that can be displayed: The smaller the better	< 0.18 F (< 0.10 °C) (100 mK)	<0.14 °F (<0.08 °C) (80 mK)	<0.14 °F (<0.08 °C) (80 mK)	<0.09 °F (<0.05 °C) (50 mK)	<0.07 °F (<0.04 °C) (40 mK)	<0.07 °F (<0.04 °C) (40 mK)
Measuring range		-4 to 536 °F (-20 to +280 °C)	-22 to 212 °F (-30 to +100 °C) / 0 to 1,202 °F (0 to +650 °C)	-22 to 212 °F (-30 to +100 °C) / 0 to 1,202 °F (0 to +650 °C)	-22 to 212 °F (-30 to +100 °C) / 0 to 1,202 °F (0 to +650 °C)	-22 to 1,202 °F (-30 to +650 °C)	-22 to 212 °F (-30 to +100 °C) / 0 to 662 °F 0 to +350 °C / 0 to 1,202 °F (0 to +650 °C) High-temperature option: 662 to 2,192 °F (350 to 1,200 °C)
Focus	Image focusing	Fixed focus	Fixed focus	Fixed focus	Fixed focus	Manual	Manual and autofocus
Integration of external measuring instruments	Connection to other Testo measuring instruments	–	–	testo 605i Thermohygrometer	testo 605i Thermohygrometer	testo 605i Thermohygrometer	Testo radio humidity probes
Communication with free testo Thermography App	Fast and easy image analysis, creation and dispatch of short reports, remote control of the imager	–	✓	✓	✓	✓	–
PC software testo IRSoft	Free, licence-free software for comprehensive analysis and reporting	✓	✓	✓	✓	✓	✓
Functions							
Humidity mode	Evaluate mould risk with traffic-light scale	–	–	✓	✓	✓	✓
testo ScaleAssist	Automatic contrast adjustment for optimum evaluation of building shell	✓	✓	✓	✓	✓	–
Panoramic image assistant	Stitch up to 3 x 3 images together to one overall image	–	–	–	–	–	✓
testo SiteRecognition	Automatic measurement location recognition and image management	–	–	–	–	✓	✓
Process analysis package	Record thermal processes as a time progression as a video or timelapse	–	–	–	–	–	✓
Technical data							
Lens/field of view (FOV)	The larger the value, the larger the visible image section	31° x 23°	31° x 23°	35° x 26°	42° x 30°	Standard: 30° x 23°	Standard: 42° x 32°
							25° lens: 25° x 19°
						Telephoto: 12° x 9°	Telephoto: 15° x 11°
							Super-tele: 6.6° x 5°
Spatial resolution (IFOV)	Smallest possible object size which can be recognized from 3.3 ft (1 m) distance	3.4 mrad	3.4 mrad	2.6 mrad	2.3 mrad	Standard: 1.7 mrad	Standard: 1.13 mrad
							25° lens: 0.68 mrad
						Telephoto: 0.7 mrad	Telephoto: 0.42 mrad
							Super-tele: 0.18 mrad
Minimum focusing distance		< 1.6 ft (< 0.5 m)	< 1.6 ft (< 0.5 m)	< 1.6 ft (< 0.5 m)	< 1.6 ft (< 0.5 m)	Standard: < 0.3 ft (< 0.1 m)	Standard: < 0.3 ft (0.1 m)
							25° lens: < 0.7 ft (0.2 m)
						Telephoto: < 1.6 ft (< 0.5 m)	Telephoto: < 1.6 ft (0.5 m)
							Super-tele: < 6.6 ft (2 m)
Accuracy		±3.6 °F (±2 °C), ±2% of reading (higher value applies)	±3.6 °F (±2 °C), ±2% of reading (higher value applies)	±3.6 °F (±2 °C), ±2% of reading (higher value applies)	±3.6 °F (±2 °C), ±2% of reading (higher value applies)	±3.6 °F (±2 °C), ±2% of reading (higher value applies)	±3.6 °F (±2 °C), ±2% of reading (higher value applies)
Image refresh frequency within EU	Number of images per second	9 Hz	9 Hz	9 Hz	9 Hz	27 Hz	33 Hz
Features							
Integrated digital camera	Real image is stored with thermal image	–	✓	✓	✓	✓	✓
Rotating handle and display		–	–	–	–	–	✓
Laser marker	Shows exact position of the laser and the corresponding temperature measurement value in the imager display	–	–	–	✓	✓	✓
LED (additional light)	For better lighting of the the real image	–	–	–	–	–	✓
Order no.		0560 8651	0560 8684	0560 8716	0560 8725	0560 8830 0563 8830 (Kit)	0563 0890 72 (Kit) 0563 0890 73 (Kit)

Infrared resolution/ detector resolution

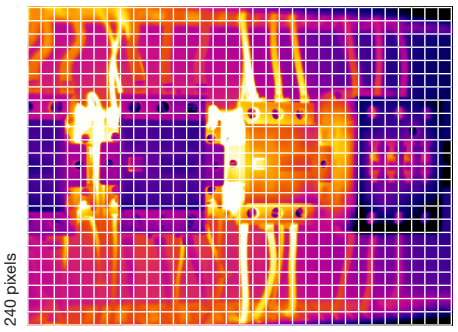
As in a digital camera, the detector in a thermal imager records image points (pixels), which are ordered in the so-called sensor matrix in a thermogram. A sensor matrix of 160 x 120 pixels records a total of 19,200 pixels, reflecting 19,200 individual measurement values. An imager with a 320 x 240 pixel detector (= 76,800 pixels) therefore produces four times more measurement values than an imager with 160 x 120 pixels.

Conclusion: The higher the resolution, the better a thermal imager can measure smaller objects from a greater distance, still providing sharp-focus images.

Detector resolution: 160 x 120



Detector resolution: 320 x 240

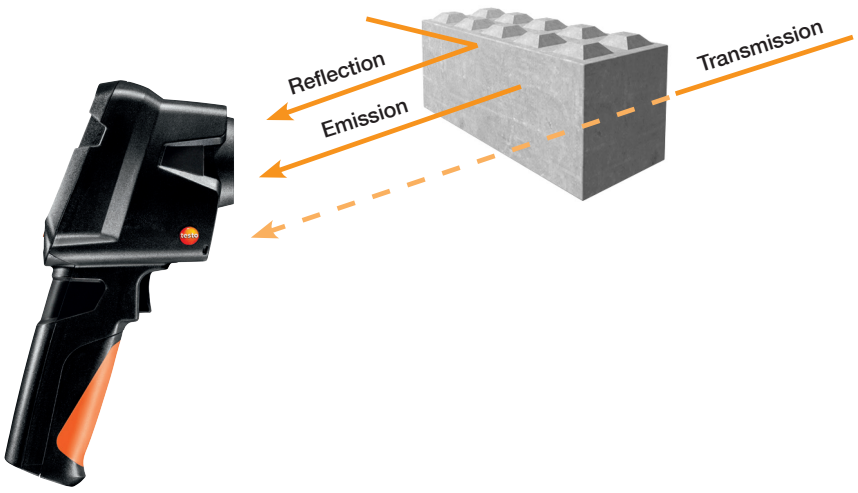


Emissivity, reflectance, transmittance

Emissivity is a measure of the ability of a material to emit infrared radiation. 100 % emission, and therefore an emissivity of 1, would be ideal, however this never occurs in daily life. Concrete is close, with an emissivity of 0.93, i.e. 93 % of the IR radiation is emitted by the concrete itself. Objects with an emissivity of 0.8 and higher are considered to be well suited to thermography. This value can be set in the imager.

Reflectance is a measure of the ability of a material to reflect infrared radiation. In general, smooth, polished surfaces reflect more strongly than rough, matt surfaces made of the same material. Applied to the already mentioned example of concrete, that means that concrete reflects 7 % of the ambient IR radiation. The reflected temperature must be taken into account in the measurement of objects with low emissivity. An offset factor in the camera enables the reflection to be calculated out and the accuracy of the temperature measurement is thus improved. This value can be set in the imager.

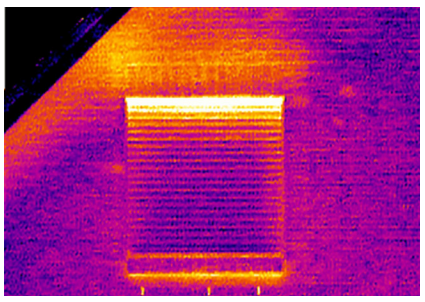
Transmission is the ability of a material to allow IR radiation to pass through it. However, most materials do not allow long-wave IR radiation to pass through, so that the transmissivity can as a rule be neglected.



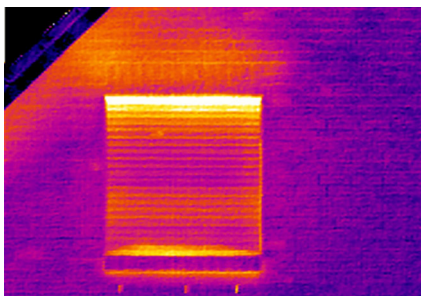
Thermal sensitivity (NETD)

The thermal sensitivity (Noise Equivalent Temperature Difference, NETD) states which smallest possible temperature difference a thermal imager can display. The value is usually given in millikelvin (mK). For example, the value 120 mK means the the thermal imager is able to record temperature differences from 120 mK (= 0.22 °F (0.12 °C)).

Conclusion: The smaller the NETD value, the higher the quality of the measurement.



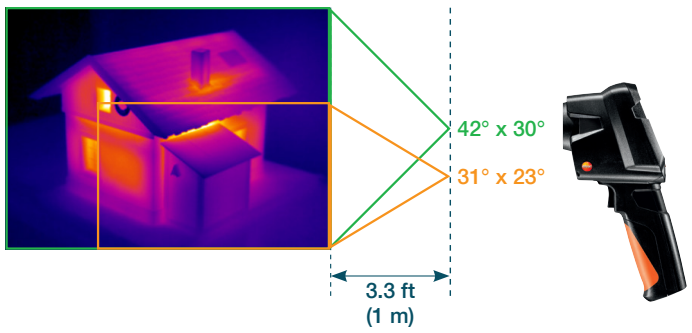
NETD 80 mK



NETD 50 mK

Field of view (FOV) Spatial resolution (IFOV)

The field of view (FOV) determines the visible image section of a thermal imager. It is given in degrees of angle, and is dependent on the detector resolution and lens of the imager. It can be compared to a person's field of view.



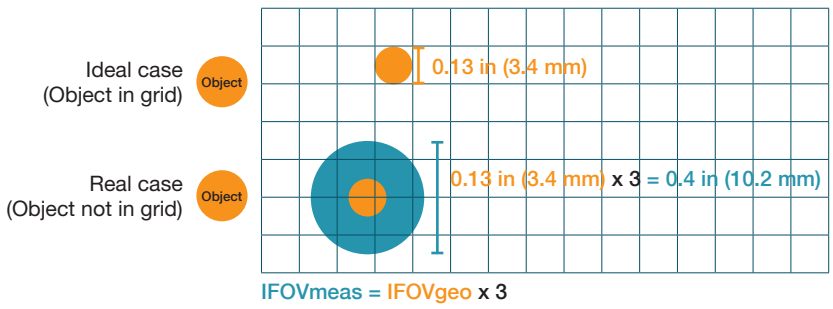
IFOVgeo is given in milliradiants (mrad) and describes the smallest object which can still be demonstrated by one pixel in the thermal image and shown in the display, dependent on the measurement distance. What does that mean? At a distance of 3.3 ft (1 m), a detector resolution of 160 x 120 pixels and an FOV of 31°, the IFOVgeo is 3.4 mrad. One pixel thus demonstrates a measurement spot with a 0.13 in (3.4 mm) edge length, which is shown in the imager's display.

More example calculations:
Distance: 6.6 ft (2 m), detector resolution = 160 x 120, field of view = 31°: measurement spot = 0.27 in (6.8 mm) (3.4 mrad x 2)
Distance: 16.4 ft, detector resolution = 160 x 120, field of view = 31°: measurement spot = 0.67 in (17 mm) (3.4 mrad x 5)

The IFOVgeo is however only a thoeretical value. An object to be measured will in reality not fit into the grid prescribed by the imager's resolution. This is why there is the IFOVmeas.

IFOVmeas is the smallest real measurable object.
The rule of thumb is: IFOVmeas = IFOVgeo x 3
Example: 3.4 mrad x 3 = 0.40 in (10.2 mm).
This means: From 3.3 ft (1 m) distance, objects up to a size of 0.40 in (10.2 mm) can be correctly measured.

Tip: If the object to be thermographically recorded is smaller than the IFOVgeo, the measurement of the object will not be correct. Recommendations: educe the measurement distance, select a different lens, or use a thermal imager with a better IFOVgeo.



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