

Impact of a water drop on a soldering iron, recorded in high-speed mode



ImageIR[®] 9400 hp

High-speed Infrared Camera in HD Format

1,280
1,024
Detector

Detector Format
Efficient measurement of smallest structures on large-scale objects

5.2
MegaPixel

MicroScan
(2.560 × 2.048) IR pixels by genuine camera hardware

640
512
622 Hz

IR-Frame Rate
Analysis of extreme temperature changes and gradients in full frame

±1
%

Measurement Accuracy
Highly accurate and repeatable measurements

≤ 20
mK

Thermal Resolution
Precise detection of smallest temperature differences

10
GigE

10 GigE Interface
High-speed, long-distance interference proof data transmission

High-speed
Mode

High-speed Mode
Increase frame rates and thermal resolution at the same time using binning technology

The strengths of the ImageIR[®] 9400 hp infrared camera from InfraTec are based on its versatility. It is the most universal camera of the series and offers both a high frame rate and an extremely high geometric resolution of up to (1,280 × 1,024) IR pixels. The high thermal resolution of the camera allows the detection of the smallest temperature differences as low as 20 mK (0.02°C) at 30°C. It measures temperature differences where other cameras only record noise. Based on binning technology, a high-speed mode can be selected in addition to the standard mode. It allows the frame rate to be tripled while maintaining the same field of view. At the same time, the thermal resolution increases by a factor of 2. Due to the opto-mechanical MicroScan, the geometric resolution can be increased to image formats with up to (2,560 × 2,048) IR pixels. This results in an enormous gain in measurement data that can be used for further analysis. In addition, the image quality is significantly improved, allowing even the finest structures to be resolved with enormous sharpness of detail.

The modular design enables individual configuration and consistent alignment to highly demanding applications in science and industry. Depending on the measurement task, HighSense allows users to select individual integration times while maintaining calibration. Interchangeable precision lenses, in combination with the motorised focus function, enable fast, precise and remote motorised focusing as well as a reliable autofocus function.

Technical Specifications

Spectral range	(1.5 ... 5.5) μm
Pitch	10 μm
Detector	InSb
Detector format (IR pixels)	(1,280 \times 1,024)
Detector format with opto mechanical MicroScan (IR pixels)	(2,560 \times 2,048)
Image acquisition	Snapshot
Readout mode	ITR/IWR
Aperture ratio	f/2.2 or f/3.0
Detector cooling	Stirling cooler
Temperature measuring range	(-40 ... 1,500) $^{\circ}\text{C}$, up to 3,000 $^{\circ}\text{C}^*$
Measurement accuracy	$\pm 1^{\circ}\text{C}$ or $\pm 1\%$
Temperature resolution @ 30 $^{\circ}\text{C}$	Better than 0.03 K / 0.02 K with High-speed Mode
Frame rate (full / half / quarter / sub frame)*	Up to 180 / 342 / 622 / 2,601 Hz High-speed Mode: up to 622 / 1,053 / 1,615 / 3,343 Hz
Window mode	Yes
Focus	Manual, motorised or automatic*
Dynamic range	Up to 16 bit*
Integration time	(1 ... 20,000) μs
Rotating filter wheel*	Up to 6 positions
Rotating aperture wheel*	Up to 5 positions
Interfaces	10 GigE, HDMI*, GigE*, CamLink
Trigger	4 IN / 2 OUT, TTL
Analogue signals*, IRIG-B*	3 IN / 2 OUT, yes
Tripod adapter	1/4" and 3/8" photo thread, 2 \times M5
Power supply	24 V DC, wide-range power supply (100 ... 240) V AC
Storage and operation temperature	(-40 ... 70) $^{\circ}\text{C}$, (-20 ... 50) $^{\circ}\text{C}$
Protection degree	IP54, IEC 60529
Dimensions; weight	(241 \times 123 \times 160) mm*; 4.3 kg (without lens)
Further functions	High-speed Mode*, Multi Integration Time*, HighSense*
Analysis and evaluation software	IRBIS [®] 3, IRBIS [®] 3 view, IRBIS [®] 3 plus*, IRBIS [®] 3 professional*, IRBIS [®] 3 control*, IRBIS [®] 3 online*, IRBIS [®] 3 process*, IRBIS [®] 3 active*, IRBIS [®] 3 mosaic*, IRBIS [®] 3 vision*

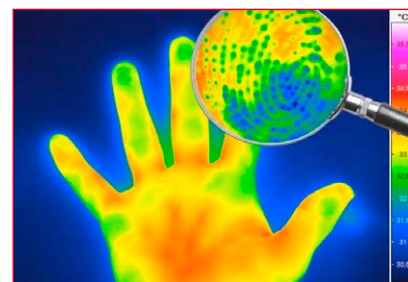
* Depending on model

Lenses	Focal length (mm)	FOV ($^{\circ}$)	IFOV (mrad)
Standard lens	25	(29 \times 23)	0.4
Telephoto lens	50	(15 \times 12)	0.2
Telephoto lens	100	(7.3 \times 5.9)	0.1
Telephoto lens	200	(3.7 \times 2.9)	0.05

Macro and microscopic lenses	Minimum object distance (mm)	Object size (mm)	Pixel size (μm)
Close-up for telephoto lens 50 mm	300	(77 \times 61)	60
Close-up for telephoto lens 100 mm	500	(64 \times 51)	50
Microscopic lens M=1.0x	40	(13 \times 10)	10
Microscopic lens M=2.5x	14	(5.1 \times 4.1)	4
Microscopic lens M=8.0x	14	(1.6 \times 1.3)	1.3

Fields of application:

- Monitoring of fast processes
- Material testing
- Microthermography
- Research and development



Detecting the smallest temperature differences with the highest level of detail using MicroScan

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