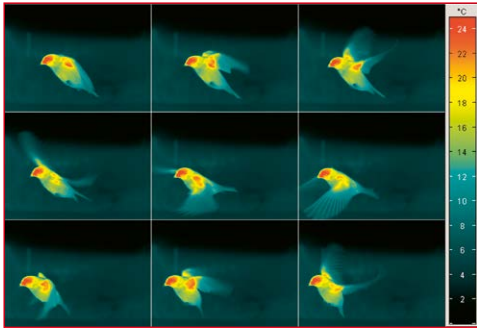


High-end Camera Series ImageIR®

Thermographic Systems to Match Highest Standards



- 1) High-speed image of a flying bird
- 2) Take-off of an Airbus A400M

INFRA^{TEC}.

Excellent thermal resolution

Very high frame rate

Modular design for individual system expansion

Long-life Stirling cooler for continuous operation

Robust light-weight metal housing

Accurate and repeatable triggering

Complete optical assortment



www.InfraTec.eu

www.InfraTec-infrared.com

Made in Germany



High-end System ImageIR®

1 Lens

High quality precision lenses allow the adaptation of the image geometry to almost every measuring situation. Its performance parameters are calibrated with respect to functionality, quality and flexible application. Due to proper IR-transparent lens materials and high-precision antireflexion coating, the lenses are optimised for different spectral ranges. Additional macro accessory lenses reduce the working distance, increase the geometrical resolution and guarantee highest imaging quality.

2 Ports/Interfaces

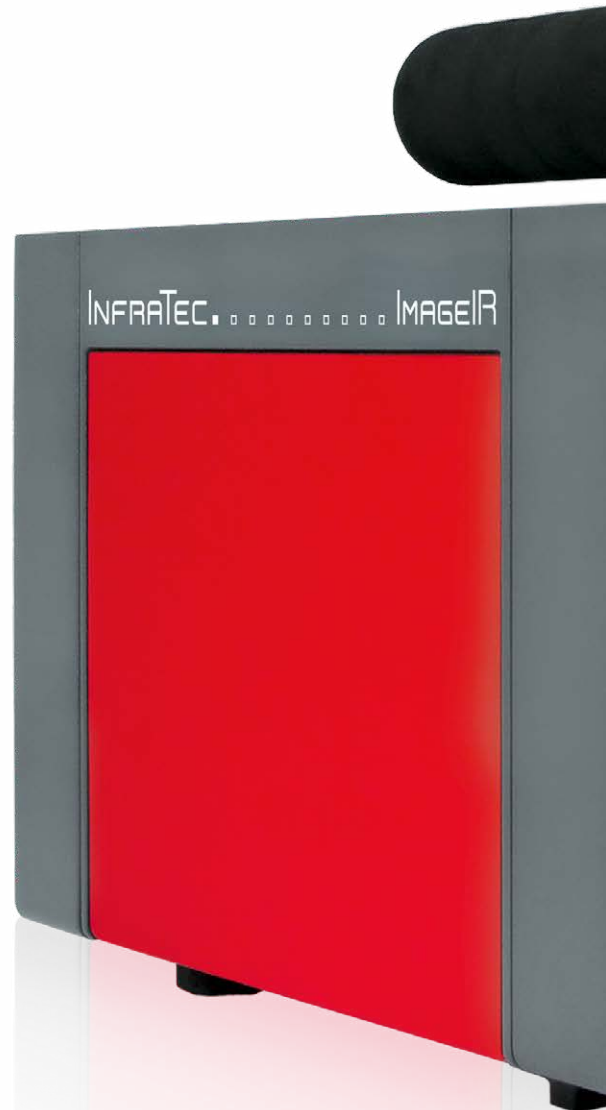
Numerous ports can be found on the front and backside of the ImageIR®. The front is equipped with ports for external sensors, motor focus and zoom lenses. At the back side of the ImageIR® the 10 GigE / GigE interface respectively CAM-Link / DualCAMLink data interface are located as well as the trigger interface, CAN-Bus-RS232- and USB connector.

3 10 GigE Interface

The 10 GigE interface allows for a very reliable high-speed data transfer in industrial environments independently from possible electro-magnetic radiation. It also works over very long distances and the speed of data transfer is 10 times higher in comparison with usual GigE interfaces.

4 Trigger and Process Interface

The camera series ImageIR® is equipped with a snapshot detector. It guarantees a repeatable time-driven and event-driven high-precision data recording in conjunction with the internal trigger and process interface. Two respective inputs and outputs are used to control the camera or to generate digital control signals for external devices. Additional digital and analogue in- and outputs are available in connection with the process interface of the IRBIS® 3 software.





5 Detector Unit

Modern high-performance photon detectors of different formats, spectral ranges and detector materials can be implemented application specifically.

6 Long-life Stirling Cooler

The high-quality Stirling coolers, which are used in the ImageIR®, guarantee a short cool-down time as well as a maintenance-free, long-term and low-vibration operation. Up to 15,000 hours of operation can be achieved with these latest generation long-life coolers.

7 Power Supply

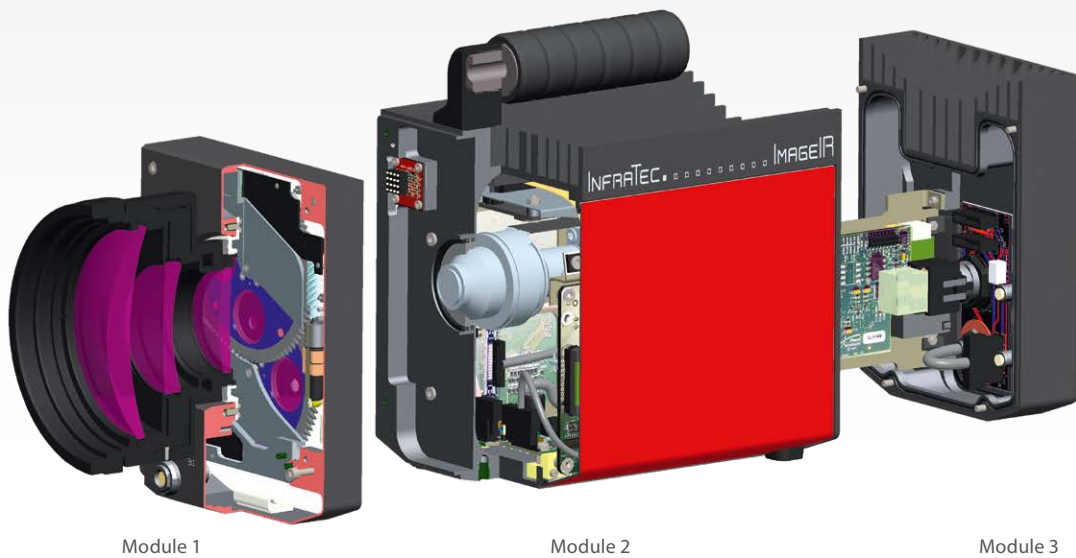
The camera is powered by an external wide range adaptor. The power adaptor provides the ImageIR® with either one or multiple direct currents, depending on the features, operation with external batteries is possible.

8 Camera Housing with Handle

The camera housing is suitable for usage in industrial environments and is made out of high-tensile aluminium compositions. On the top of the housing a handle for convenient transportation of the camera is mounted. The camera housing is very compact and it protects very well the sensor system and all other electronic components inside the camera.

9 Tripod Connector

The standardised tripod connector allows an installation on different tripods or pan-tilt solutions for both process-integrated continuous operation and laboratory application. Because of its additional mechanical interfaces, the ImageIR® can also be integrated into automated inspection systems.



The New Dimension of High-end Thermography

InfraTec's high-end camera series ImagerIR® excels in metrological performance characteristics and in unknown compactness and variability. Users who depend on extremely flexible camera technology with a maximum of sensitivity, accuracy, geometrical resolution and speed, the perfect solution can be received with the ImagerIR®.

The modular concept makes it easy to adapt the individual system configurations and performance data to the respective application.

Module 1

- Lens interface
- Optomechanics controller
- Filter wheel*
- Aperture wheel*
- Shutter*
- Motor focus*
- MicroScan*

Module 2

- IDCA (detector + cooler)
- Data processing
- Controller for camera, detector, temperature sensor
- Power supply
- Fan attachment*
- Water cooling system*

Module 3

- 10 GigE*, GigE, CAMLink* / DualCAMLink*
- Trigger interface
- Power on/off
- DC-IN

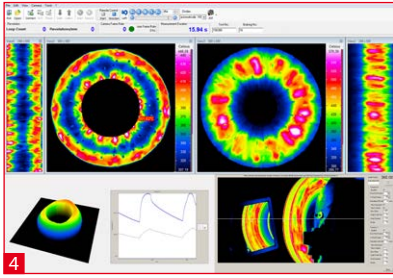
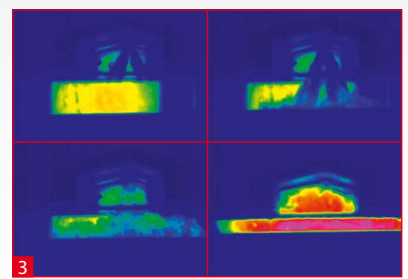
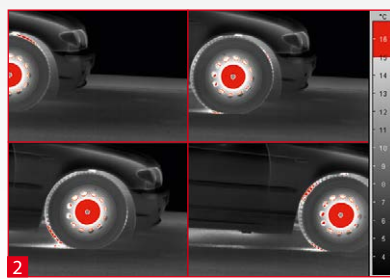
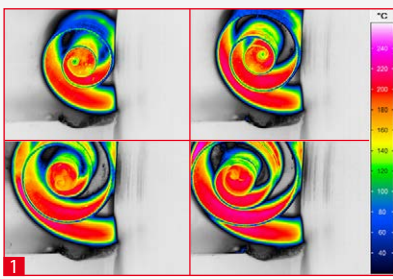
Accessories

Versatile accessories and the ability to realise customer-specific solutions very quickly ensure the optimal fulfilment of every request. The equipment packages of the ImagerIR® come complete with an extensive range of accessories:

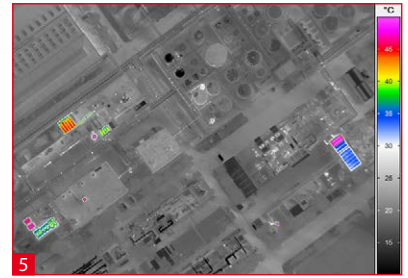
- Stable, airtight carrying case with security lock
- Wires, adaptors, special tripod
- Various software packages
- Installation CD and manual
- Interchangeable lenses for manual and motorised focusing*
- Excitation unit and controller for active thermography*
- Lens protections and mounts*



* Depending on model



- 1 Thermal analysis of a turning process
- 2 Measurement of the operative surface of an ABS
- 3 Fuel-injection of an internal-combustion engine
- 4 Thermal analysis of brake discs using software IRBIS® 3
- 5 Thermal aerial image of an industrial facility



ImageIR® – Demanding Measuring and Detection Tasks

ImageIR® is a high-end camera series, which was designed for particularly demanding measuring and inspection tasks and sets highest standards with its outstanding performance characteristics.

Main Fields of Application

- Aerospace technology
- Automotive industry and mechanical engineering
- Laser and welding technology
- Electronics / microelectronics, assembly group testing
- Glass, plastic and steel industry
- Research and development
- Non-destructive testing of materials (NDT)
- Quality assurance in bonding techniques and blowhole detection
- Observation and investigation
- Medicine

Spectral Thermography

The spectral range of the camera is optimised for measurements corresponding to the spectral characteristics of the materials to be detected. The preferred system for spectral thermography is the ImageIR® with a medium infrared of (2 ... 5) μm , since a lot of technically important materials show distinctive absorption bands in this range, for instance glass, plastics and gases. Equipped with a motorised filter and aperture wheel with up to five positions, different spectral filters can be swivelled into the optical path of the detector.

Microthermography

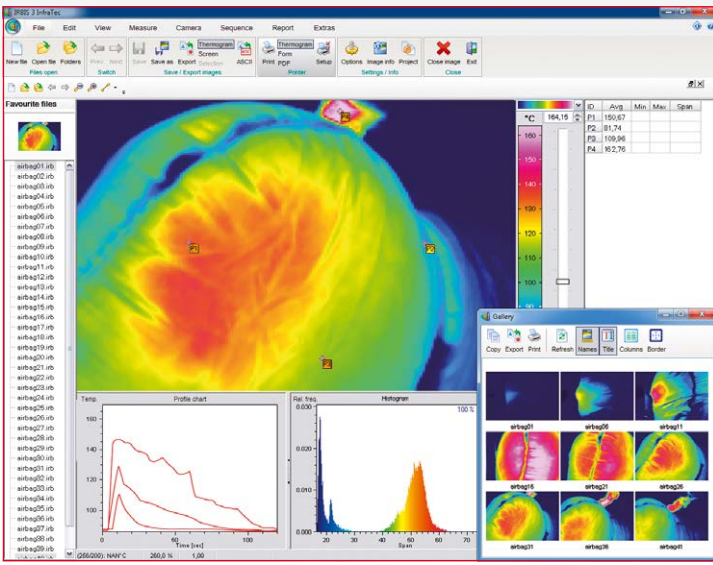
Microthermography permits you to analyse extremely small structures of only a few μm – if inevitable, even with working distances of up to 30 cm. Various microscopic lenses, which are capable of making visible smallest details with one pixel representing 2 μm of the object, are at your disposal to measure components and assembly groups.

Active Thermography

Due to the extremely high thermal sensitivity, fast frame rates and the snapshot mode of the detector reader electronic – which makes for an instantaneous triggering and therefore for an extremely stable phase synchronicity with external systems – the ImageIR® is perfectly suited for active and lock-in thermography. Several different analysis routines of the IRBIS® 3 active are available for that purpose. The algorithm choice depends on the material characteristics, the geometry and the type of defects which are to be detected.

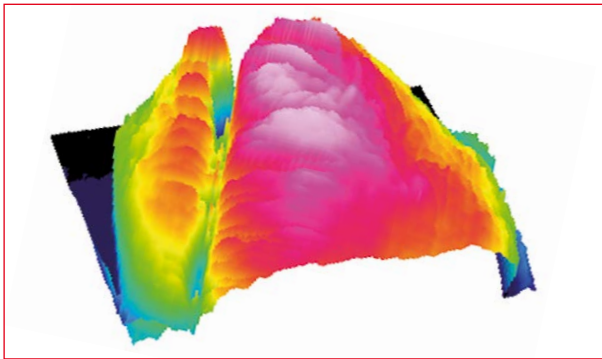
High-speed Thermography

ImageIR® can be run with extremely fast frame rates in fullscreen as well as in subwindow formats. This allows for hassle-free temperature measurements of fast running processes and moving objects. To measure fast-rotating objects such as brake discs the camera is equipped with a linescan mode, which is capable of reaching line frequencies up to 25 kHz.



Control and Analysis Software IRBIS® 3

The software family IRBIS® 3, developed by InfraTec, is part of a complete package of the camera series ImageIR®. Customer-specifically adaptable high-end thermography solutions for the most diverse measuring tasks and applications can be realised with this software.



3D view of the thermographic image

The convenient and professional thermography software family IRBIS® 3 offers a wide range of analysis and editing tools. Besides numerous implemented models for the correction of the emissivity value, the compensation of the temper-

ature-sensitive emissivity of objects, the macro editor and the IR editor cutting tool we also offer an active thermography module.

IRBIS® 3 online / IRBIS® 3 process

The comfortable control- and acquisition software for high-speed digital thermographic image data acquisition allows time and action-triggered capturing of thermographic images as well as for an intensity- and temperature-sensitive control of processes via digital or analogue in- and outputs.

IRBIS® 3 active / IRBIS® 3 active online

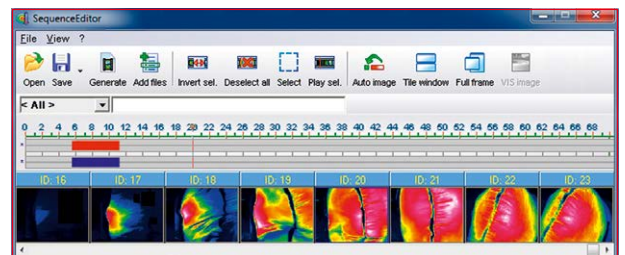
The special software for non-destructive material testing allows the analysis of thermographic image sequences by means of the active thermography analysis algorithms "quotient-", "pulse phase-" and "lock-in-method". All of these algorithms work independently of the degree of emissivity.

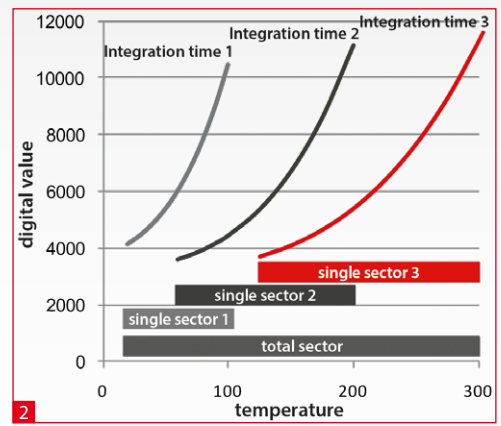
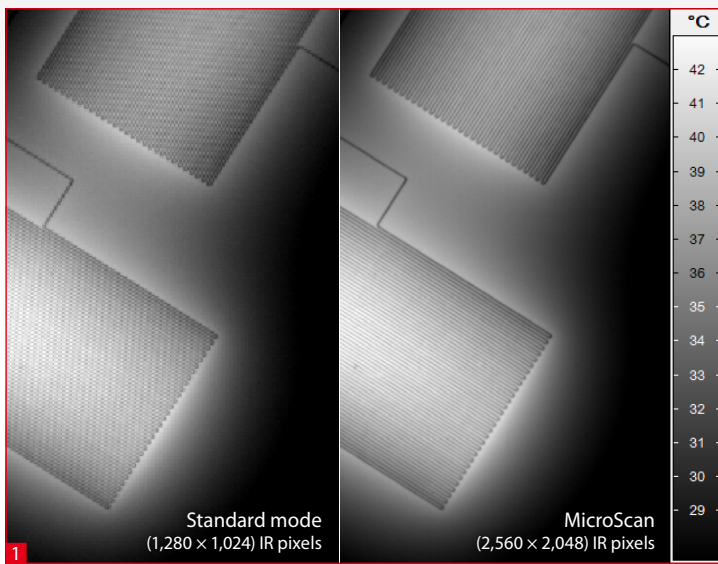
The Software Development Kit (SDK)

The SDK enables the easy to handle integration of the ImageIR® into customer's existing software modules. It supports several different program languages and offers an optional linking to Matlab and Labview.

IRBIS® 3 Sequence Editor

The sequence editor offers an efficient and freely definable automated selection of thermographic data from complex sequences, as well as generating filtered image sequences. The data can be provided with comments and saved as raw material or being restructured on a new basis.





- 1 Comparable images of an electronic board with and without MicroScan technology
- 2 Combining several integration times with MIT function

Innovations

Motorised Focus for Full Optics – More Comfort

- Combination with all exchangeable standard optics
- Precise, remote and quick focusing
- Reliable autofocus function, even in the case of low image contrasts

Separate Filter & Rotating Aperture Wheel – Spectral Thermography

- Combination consisting of one separate filter and aperture wheel with up to six free positions (30 combinations)
- Allows the camera to be used universally for measurement tasks with high object temperatures and applications in spectral thermography

Window Mode (Subwindowing) – Max. Frame Rates

- Operation optionally in full, half, quarter and sub-frame mode
- Convenient selection of freely definable sub-frame formats
- Sub-frame rate up to 25,000 Hz

MicroScan – Fourfold Increase in the Number of Pixels

- Integrated, fast-rotating MicroScan wheel ensures a fourfold increase in the image format up to (2,560 × 2,048) IR pixels
- Four different individual exposures are taken per wheel revolution, which are offset laterally by half a pixel each
- These individual exposures are brought together in real time into a high resolution thermogram
- Each pixel in the image represents a genuine temperature measured value
- Extremely low-noise and fine resolutions of the measurement objects

HighSense – More Flexibility

- Utilisation of individual temperature measurement ranges in addition to factory calibration
- Automatic calculation of the optimum integration time for previously selected temperature ranges or reverse order
- Retention of the calibration even in the case of changed integration times

Multi Integration Time (MIT) – Wide Measurement Ranges

- Significant expansion of the temperature measurement ranges and increase in the dynamic range of up to 16 bit
- Recording measurement objects with high temperature gradients with one measurement range while maintaining the maximum image updating rate and thermal resolution
- Elimination of manual measurement range switchover


Binning – Increase in Frame Rate & Sensitivity

- Aggregation of the pixels of adjacent lines and columns
- Significant increase in the frame rate to more than threefold compared to full-frame standard mode
- Improved thermal resolution by a factor of 2
- Constant field of view (FOV), recorded scene section remains unchanged

Precision Calibration & Lenses – Highest Level of Accuracy

- Multi-curve calibration for compensation of environmental temperature variations for repeatedly accurate measurements as well as ideal warm-up behaviour
- Thermally decoupled lenses for high image homogeneity
- Excellent measurement accuracy with tolerances of 1 %

Model Range – Imager® Camera Models from InfraTec

Model	 ImageIR® 4300/ ImageIR® 5300	 ImageIR® 7300/ ImageIR® 8300	 ImageIR® 8300 hp	 ImageIR® 8800	 ImageIR® 9300/ ImageIR® 9400	 ImageIR® 10300
Spectral range	(2.0 ... 5.5) µm	(2.0 ... 5.7) µm		(7.7 ... 10.2) µm	(2.0 ... 5.7 / 5.5) µm or (3.6 ... 4.9) µm	(3.6 ... 4.9) µm
Pitch	30 µm	15 µm			15 / 10 µm	10 µm
Detector	MCT or InSb			MCT	InSb	
Detector format (IR pixels)	(320 × 256)	(640 × 512)	(640 × 512)		(1,280 × 1,024)	(1,920 × 1,536)
Detector format (IR pixels) with MicroScan	–	–	(1,280 × 1,024)		(2,560 × 2,048)	–
Temperature measuring range	(-40 ... 300) °C/ (-40 ... 1,200) °C, up to 3,000 °C*	(-40 ... 300) °C/ (-40 ... 1,500) °C, up to 3,000 °C*	(-40 ... 1,500) °C, up to 3,000 °C*	(-40 ... 1,200) °C, up to 2,000 °C*	(-40 ... 1,500) °C, up to 2,000 °C*	(-40 ... 1,200) °C
Measurement accuracy	± 2 °C or ± 2 % / ± 1 °C or ± 1 %			± 1 °C or ± 1 %		
Temperature resolution @ 30 °C	Better than 0.02 K / 0.015 K	Better than 0.025 K / 0.02 K	Better than 0.02 K	Better than 0.025 K	Up to 0.025 K / 0.03 K (0.02 K in high- speed mode)	Up to 0.035 K / up to 0.022 K in high-speed mode
Frame rate (full / half / quarter / sub frame)*	Up to 75 / 265 / 706 Hz / up to 481 / 1,906 / 7,229 / 105,000 Hz	Up to 75 / 242 / 630 Hz / up to 125 / 404 / 1,051 / 2,996 Hz	Up to 355 / 670 / 1,200 / 5,000 Hz	Up to 233 / 874 / 2,892 / 14,593 Hz	Up to 106 / 200 / 390 / 3,200 Hz / up to 180 / 342 / 622 / 2,601 Hz	Up to 113 / 216 / 396 / 1,915 Hz
With high-speed mode: Frame rate (full / half / quarter / sub frame)*	–	–	–	–	– / up to 622 / 1,053 / 1,615 / 3,343 Hz	Up to 400 / 692 / 1,088 / 2,493 Hz
Dynamic range*	14 bit / 16 bit		16 bit			13 bit
Integration time	(1 ... 20,000) µs	(1 ... 20,000) µs / (0.6 ... 20,000) µs	(0.6 ... 20,000) µs	(10 ... 20,000) µs	(0.5 ... 18,000) µs / (1 ... 20,000) µs	(1 ... 20,000) µs
Rotating filter wheel*, Rotating aperture wheel*	No, no / yes, yes		Yes, yes	Yes	Yes, yes / yes	Yes
Interfaces*	GigE, HDMI	GigE, HDMI / GigE, CAMLink, HDMI	GigE, 10 GigE, 2× CAMLink, HDMI / 10 GigE, HDMI			10 GigE, HDMI
Trigger	1 IN / 1 OUT, TTL / 3 IN / 2 OUT, TTL		3 IN / 2 OUT, TTL			
Analog signals*, IRIG-B*	– / 2 IN / 2 OUT, yes	–	2 IN / 2 OUT, yes	2 IN / 2 OUT, yes	2 / 3 IN / 2 OUT, yes	2 IN / 2 OUT, yes
Dimensions (mm)	241 × 120 × 160	235 × 120 × 160				241 × 123 × 160
Weight (without lens)	3.3 kg			4.0 kg		4.7 kg

* Depending on model

Lenses – Optics Matching Your Application

Check the geometrical resolution of the Imager® camera for your application using our FOV calculator at <http://fov.infratec.eu>. Please choose from the following lenses:

- Wide angle lenses (12/25 mm)
- Standard lenses (25 / 50 mm)
- Telephoto lens (50 mm, 100 mm, 200 mm)
- Close-Up for telephoto lens (50 mm, 100 mm)
- Microscopic lens (M= 1,0×, 3,0× 8,0×)



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