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INFRARED CAMERAS

The most portable infrared online cameras in the world

innovative infrared technology

Important features of the infrared cameras

Special advantages

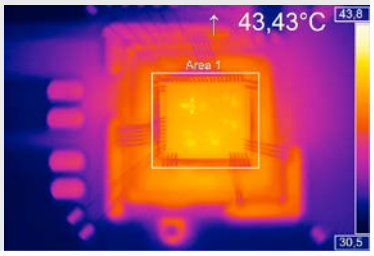
- Temperature range from –20 °C to 1500 °C
- Small cameras ideal for OEM use
- Up to 128 Hz for fast processing
- Optical resolution up to 640 x 480 pixels
- Including license-free software and full SDK

Made in Germany

2 years warranty

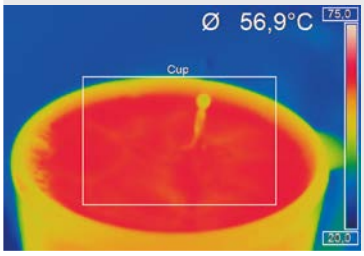
Automatic hotspot search

Objects can be thermally analyzed and **hot or cold spots** can be automatically found.

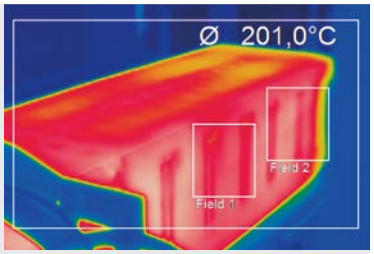


Fast measurements

Temperature distributions on a surface can be precisely recorded at **millisecond intervals.**



A drop of milk falling into a cup of coffee



Portable and stationary

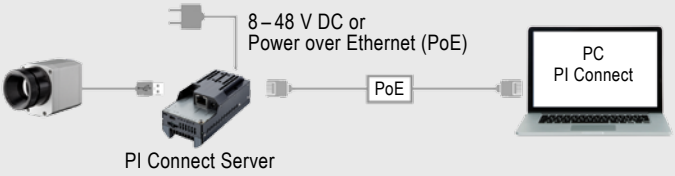
The cameras bridge the existing gap between portable infrared snapshot cameras and purely stationary devices.

Examples of areas of application are:

- **Process automation**
- **Test stations**
- **Research & development**
- **Mobile measuring jobs**

Simple process integration

Advanced interface concepts enable integration into networks and automated systems:



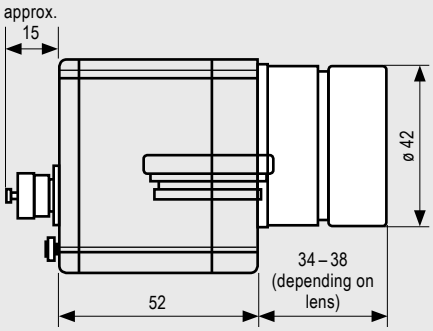
- USB cable extension up to 100 m (over Ethernet)
- Industrial Process Interface (PIF) with two analogue inputs, one digital input and over three analogue outputs/alarm outputs with three isolated relays (0 – 30 V/ 400 mA); additional fail-safe relay.
- Software Development Kit (SDK) for integration of the camera into customer-specific software via Dynamiclink Library (DLL) or COM-Port.

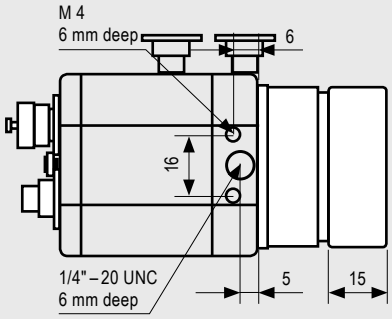
PI 400

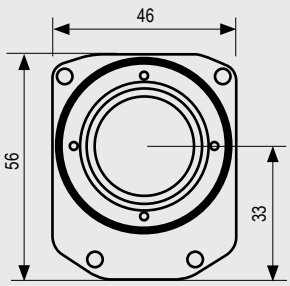
INFRARED CAMERA
WITH HIGH OPTICAL RESOLUTION

The smallest camera in its class

- The smallest camera in its class (46 x 56 x 90 mm)
- Very good thermal sensitivity at 80 mK
- Thermal image recording in real time at up to 80 Hz
- Interchangeable lenses & industrial accessories
- Lightweight (320 g incl. lens)
- Detector with 382 x 288 pixels
- Includes license-free analysis software and full SDK



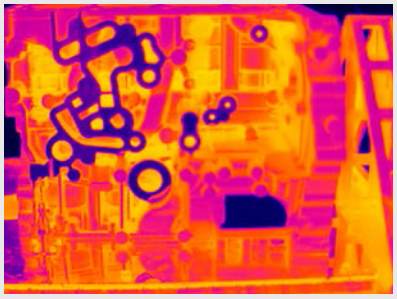


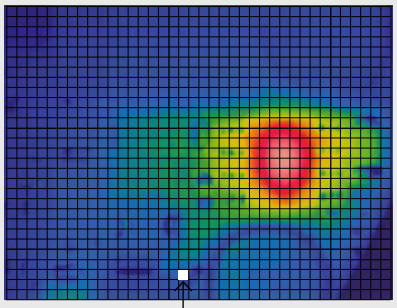


Dimensions in mm

High-performance for a wide range of uses

The high-performance PI 400 infrared camera has a wide range of uses in industry. For example, real time thermal image shots help to monitor processes and ensure the quality of manufactured products in the automotive field in particular, in the manufacture of plastics as well as in the semiconductor and photovoltaic industry.



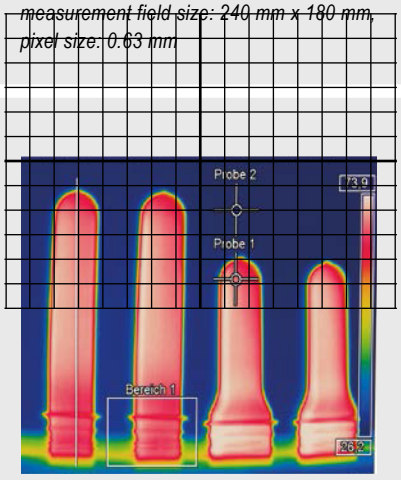


382 x 288 pixels *10 x 10 pixels = 40 mm²*

SMD chip as measurement object: measurement field size: 240 mm x 180 mm, pixel size: 0.63 mm

80 Hz recordings with full pixel resolution

The display and recording of thermal images at full optical resolution can be done at high measurement speeds of 80 frames per second.



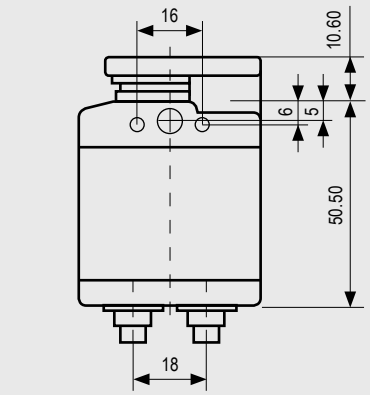
Thermal image shots of preforms in PET bottle production

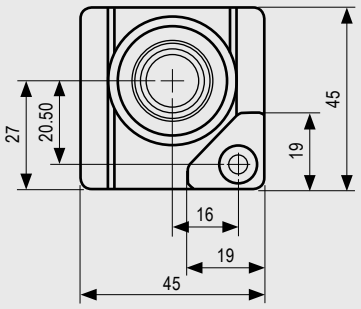
PI 200 / PI 230

INFRARED CAMERA
WITH BI-SPECTRAL TECHNOLOGY

Two cameras in one compact device

- BI-SPECTRAL Technology
- Time-synchronized real image recording at up to 32 Hz (640 x 480 pixels)
- Real image camera is highly sensitive in low-light conditions
- Thermal images in real time at up to 128 Hz (160 x 120 pixels)
- Compact design (dimensions: 45 x 45 x 62 mm)
- Thermo analysis kit including 3 lenses (optional)
- Includes license-free analysis software and full SDK





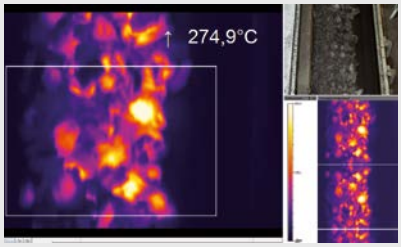
Dimensions in mm

BI-SPECTRAL Technology

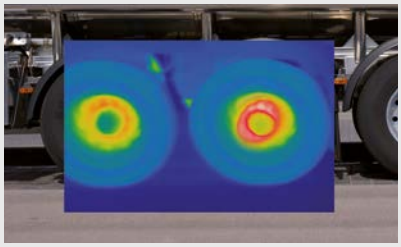
With the help of BI-SPECTRAL technology a **real image (VIS)** can be combined with a **thermal image (IR)** and plotted synchronistically:

Surveillance mode:
Easy orientation at the measuring point through separate display of the visual picture.

Crossfade mode:
Highlight critical temperatures by means of crossfade (transparency from 0 to 100 %) or by means of superimposition of defined temperature fields (thresholds).



Monitoring of a carbon ribbon



Measurement of the brake temperature in superimposed picture

Cross-fade of a VIS image above 35 °C

PI 400

INFRARED CAMERA
WITH HIGH OPTICAL RESOLUTION

The smallest camera in its class

- The smallest camera in its class (46 x 56 x 90 mm)
- Very good thermal sensitivity at 80 mK
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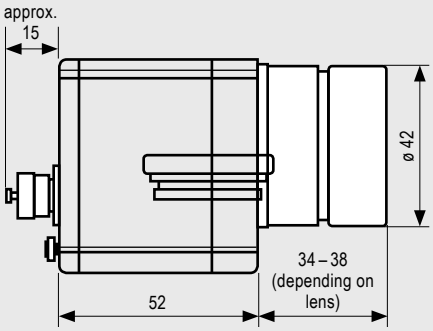
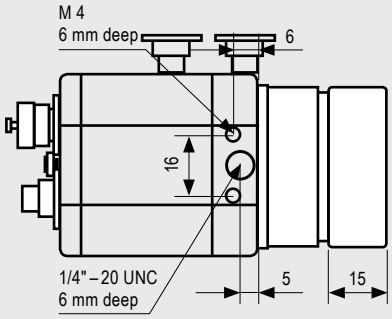
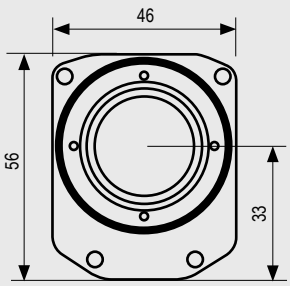
- Interchangeable lenses & industrial accessories
- Lightweight (320 g incl. lens)
- Detector with 382 x 288 pixels
- Includes license-free analysis software and full SDK







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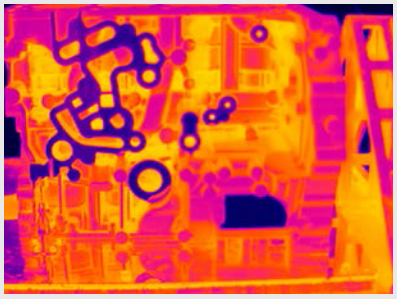
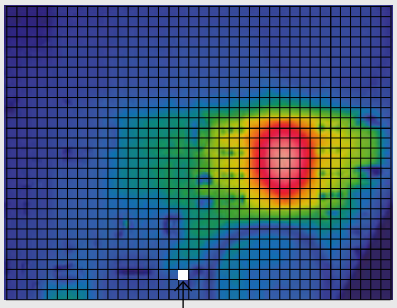


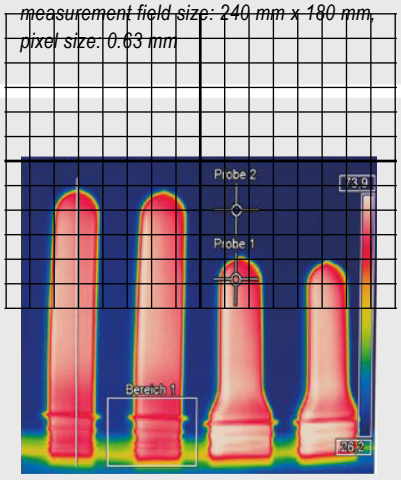


382 x 288 pixels *10 x 10 pixels = 40 mm²*

SMD chip as measurement object: measurement field size: 240 mm x 180 mm, pixel size: 0.63 mm

80 Hz recordings with full pixel resolution

The display and recording of thermal images at full optical resolution can be done at high measurement speeds of 80 frames per second.



Thermal image shots of preforms in PET bottle production

PI 450

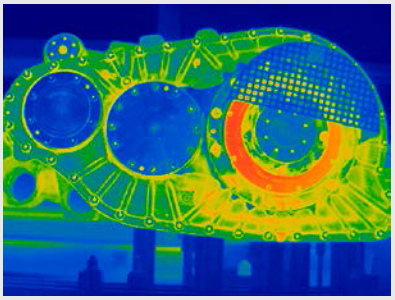
INFRARED CAMERA
WITH VERY HIGH OPTICAL RESOLUTION

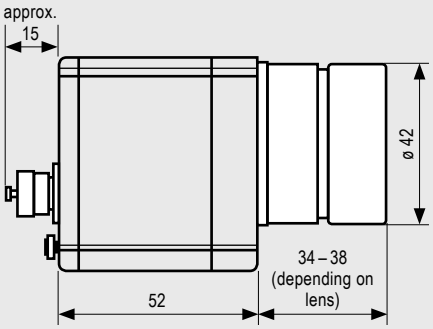
Detection of minimal temperature differences

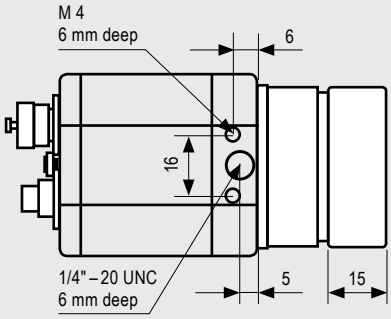
- The smallest camera in its class (46 x 56 x 90 mm)
- Very good thermal sensitivity at 40 mK
- Thermal image recording in real time at up to 80 Hz
- Interchangeable lenses & industrial accessories
- Lightweight (320 g incl. lens)
- Detector with 382 x 288 pixels
- Usable at ambient temperatures of up to 70 °C without the need for additional cooling
- Includes license-free analysis software and full SDK

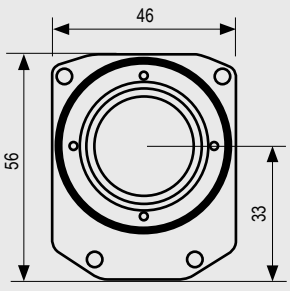
Highest temperature resolution of 40 mK

With an optical resolution of 40 mK, the PI 450 is used for measuring the most subtle temperature differences, e.g. in the quality control of products or in preventive medicine.





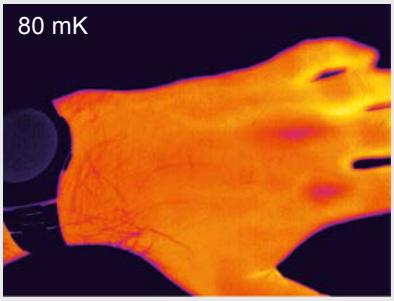


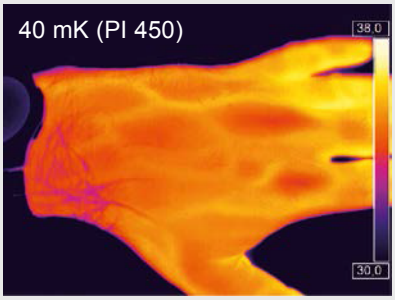


Dimensions in mm

Highest temperature resolution in the medical sector

The fine temperature resolution of the optrisPI 450 means that veins can even be seen under the skin.





Technical data

Compact infrared cameras for fast online applications, including line scanning

Basic model		PI 160	PI 200 / PI 230	PI 400 / PI 450
Type		IR	BI-SPECTRAL	IR
Detector		FPA, uncooled (25 µm x 25 µm)	FPA, uncooled (25 µm x 25 µm)	FPA, uncooled (25 µm x 25 µm)
Optical resolution		160 x 120 pixels	160 x 120 pixels	382 x 288 pixels
Spectral range		7.5 – 13 µm	7.5 – 13 µm	7.5 – 13 µm
Temperature ranges		–20 °C ... 100 °C, 0 °C ... 250 °C, 150 °C ... 900 °C, additional range: 200 °C ... 1500 °C (option) *	–20 °C ... 100 °C, 0 °C ... 250 °C, 150 °C ... 900 °C, additional range: 200 °C ... 1500 °C (option) *	–20 °C ... 100 °C, 0 °C ... 250 °C, 150 °C ... 900 °C, additional range: 200 °C ... 1500 °C (option for PI 400)
Frame rate		120 Hz	128 Hz ***	80 Hz
Lenses (FOV)		23° x 17° FOV / f = 10 mm or 6° x 5° FOV / f = 35.5 mm or 41° x 31° FOV / f = 5.7 mm or 72° x 52° FOV / f = 3.3 mm	23° x 17° FOV ** / f = 10 mm or 6° x 5° FOV / f = 35.5 mm or 41° x 31° FOV ** / f = 5.7 mm or 72° x 52° FOV / f = 3.3 mm	38° x 29° FOV / f = 15 mm or 62° x 49° FOV / f = 8 mm or 13° x 10° FOV / f = 41 mm
Thermal sensitivity (NETD)		0.08 K with 23° x 17° FOV / F = 0.8 0.3 K with 6° x 5° FOV / F = 1.6 0.1 K with 41° x 31° FOV and 72° x 52° FOV / F = 1	0.08 K with 23° x 17° FOV / F = 0.8 0.3 K with 6° x 5° FOV / F = 1.6 0.1 K with 41° x 31° FOV and 72° x 52° FOV / F = 1	**PI 400:** 0.08 K **PI 450:** 0.04 K mit 38° x 29° FOV / F = 0.8 **PI 400:** 0.08 K **PI 450:** 0.04 K mit 62° x 49° FOV / F = 0.8 **PI 400:** 0.1 K **PI 450:** 0.06 K mit 13° x 10° FOV / F = 1.0
Option for visual camera (only for BI-SPECTRAL camera)		–	Optical resolution: 640 x 480 pixels Frame rate: 32 Hz *** Lens (FOV): **PI 200:** 54° x 40°, **PI 230:** 30° x 23°	–
Accuracy		±2 °C or ±2 %, whichever is greater	±2 °C or ±2 %, whichever is greater	±2 °C or ±2 %, whichever is greater
PC interface		USB 2.0	USB 2.0	USB 2.0
Process interface (PIF)	Standard PIF	0 – 10 V input, digital input (max. 24 V), 0 – 10 V output	0 – 10 V Einput, digital input (max. 24 V), 0 – 10 V output	0 – 10 V input, digital input (max. 24 V), 0 – 10 V output
	Industrial PIF (optional)	2 x 0 – 10 V inputs, digital input (max. 24 V), 3 x 0 – 10 V outputs, 3 x relays (0 – 30 V / 400 mA), fail-safe relays	–	2 x 0 – 10 V inputs, digital input (max. 24 V), 3 x 0 – 10 V outputs, 3 x relays (0 – 30 V / 400 mA), fail-safe relays
Ambient temperature (T_{Umg})		0 °C ... 50 °C	0 °C ... 50 °C	**PI 400:** 0 °C ... 50 °C / **PI 450:** 0 °C ... 70 °C
Storage temperature		– 40 °C ... 70 °C	– 40 °C ... 70 °C	**PI 400:** – 40 °C ... 70 °C **PI 450:** – 40 °C ... 85 °C
Relative humidity		20 – 80 %, non-condensing	20 – 80 %, non-condensing	20 – 80 %, non-condensing
Enclosure (size/ rating)		45 mm x 45 mm x 62 mm / IP 67 (NEMA 4)	45 mm x 45 mm x 62 mm / IP 67 (NEMA 4)	46 mm x 56 mm x 90 mm / IP 67 (NEMA 4)
Weight		195 g, incl. lens	215 g, incl. lens	320 g, incl. lens
Shock/ vibration		**Shock:** IEC 60068-2-27 (25 g und 50 g) **Vibration:** IEC 60068-2-6 (sinus-shaped)/ IEC 60068-2-64 (broadband noise)	**Shock:** IEC 60068-2-27 (25 g und 50 g) **Vibration:** IEC 60068-2-6 (sinus-shaped)/ IEC 60068-2-64 (broadband noise)	**Shock:** IEC 60068-2-27 (25 g und 50 g) **Vibration:** IEC 60068-2-6 (sinus-shaped)/ IEC 60068-2-64 (broadband noise)
Tripod mount		1/4-20 UNC	1/4 - 20 UNC	1/4 - 20 UNC
Voltage supply		via USB	via USB	via USB
Contents (standard)		• USB camera with 1 lens • USB cable (1 m) • Table-top tripod • PIF cable with connecting terminal strip (1 m) • Optris PI Connect software package • Aluminium case	• USB camera with 1 lens and BI-SPECTRAL technology • USB cable (1 m) • Table-top tripod • Focus tool • PIF cable with connecting terminal strip (1 m) • Optris PI Connect software package • Aluminium case	• USB camera with 1 lens • USB cable (1 m) • Table-top tripod • PIF cable with connecting terminal strip (1 m) • Optris PI Connect software package • Aluminium case (PI400) • Robust hard shell case (PI 450)

* *The additional range is not available for 72° HFOV lenses*

** *For ideal combination of IR and VIS image, a 41° HFOV lens is recommended (PI 200). For the PI 230, a 23° lens is recommended*