INFRARED CAMERAS
The most versatile infrared cameras in the world

down temperature matters
Advanced thermal measurement systems

Optris' infrared cameras are fully radiometric stationary thermographic systems with an excellent price-performance ratio. The thermal imaging cameras are connected to a PC via USB or Ethernet and they are immediately ready to be used. Temperature data is displayed through optris PIX Connect – the license-free analysis software.

Non-contact temperature measurement made in Germany

Optris IR measurement devices enable constant monitoring and control of virtually every manufacturing process, and reductions in production costs through specific process optimization.

Once purchased, thermal imager are essential pieces of equipment used in a numerous industrial applications, e.g.:

- Glass
- Plastics
- Metal
- Automotive
- Electric utility sector
- Fire prevention / Safety
- Maintenance
- Life Science / Medical
- 3D printing & Additive manufacturing

For more info on application examples see page 19.

Applications Support

Optris application engineers and distribution partners have the experience and technical background necessary to apply its extensive portfolio of IR cameras and accessories to your temperature measurement challenge. Contact us directly or attend our numerous technical training events and YouTube presentations.

Have you seen our YouTube – Channel?

Learn more about Optris’ infrared temperature measurement devices and their setup, properties and special features.

The Optris YouTube channel will give you an overview of our company and the world of infrared measurement technology.

Our videos will help you discover the functionality of our products and learn how to use them for your business:

- New products,
- How to’s,
- Software tutorials
- Hands-on trainings

The Compact and the Precision Line offer thermal imagers for all applications

Advantages PI Precision Line

- Interchangeable lenses
- Suited for fast processes (up to 1 kHz)
- High thermal sensitivity (up to 40 mK NETD)
- High optical resolution (up to 784 x 480 Pixel)
- Laser blocking filters
- Temperature measuring ranges from –20 to 2450 °C (–4 to 3632 °F)
- Different spectral ranges (500 nm, 800 nm / 1 µm / 7.9 µm / 8 – 14 µm)
- Delivered with test certificate

Advantages Xi Compact Line

- Compact affordable industrial imager for temperature measurements from –20 to 900 °C (–4 to 1652 °F)
- Motorized focus
- Autonomous operation (without PC) with automatic spot finder and direct analog output – ideal for OEM use (XI 80 / 410)
- Direct Ethernet interface (XI 80 / 410)

Automatic hot spot search

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

Fast measurements

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

Simple process integration

Software Development Kit (SDK) for integration of the camera into customer-specific software via Dynamic Link Library (DLL) or COM-Port.

Interfaces to LabView and MATLAB are included as well.

optris Microscope optics

The interchangeable and focusable microscope optics enable electrical testing and thermal analysis of smallest components at the same time - with an optical resolution of up to 28 µm. Fast processes can easily be monitored with a frame rate of up to 125 Hz and, with the recording of radiometric video sequences and images, be saved for later analysis.

All optris infrared cameras are compatible with the Data Acquisition (DAQ) Software Dewesoft X by DEWESoft.
Compact spot finder IR camera

- Industrial imager for precise temperature measurements from –20 to 900 °C (– 4 to 1652 °F)
- Rugged, compact imager with motorized focus
- Autonomous operation with automatic spot search and direct analog output
- up to 80 Hz frame rate for the monitoring of fast thermal processes
- Extensive ready-to-use package for an attractive price – incl. versatile image processing software with line scan mode and connection cables

Pyrometer or camera?
The Xi series is a fusion of a rugged, compact pyrometer and a modern IR camera.

Thanks to analog and digital outputs as well as the option to process up to nine freely definable measuring areas using an external process interface, the Xi camera is perfectly suited for OEM applications.

Integrated spot finder function
The integrated spot finder function allows for precise temperature measurements of moving objects - without having to readjust the sensor.

The camera figures it out on its own, without being connected to a PC.

Easy integration into PLCs via RS485 interface

Motor focus simplifies handling

The Xi models are equipped with a motorized focus.

The free PIX Connect software enables a remote focusing from the distance.

Microscope optics for the inspection of assembled circuit boards

- optical resolution of 382 x 288 pixels for exact temperature measurement of -20 °C to 900 °C (– 4 to 1652 °F)
- Small sized rugged camera with motorized focus
- 80 Hz frame rate for monitoring of fast thermal processes - Real-time thermographic images in high speed
- Recording of radiometric videos
- Extensive ready-to-use package for an attractive price – including versatile image processing software and connection cables

The microscope optics for the Xi 400 allows reliable temperature measurement on tiny objects from 240 µm. In combination with a suitable stand, this enables professional measurement of printed circuit boards and components in the electronics industry.

The measuring distance between camera and object is variable between 90 and 110 mm (3.54 and 4.33 in).

The built-in motor focus allows for an easy focusing of the camera with the included PIX Connect software.

Areas of application

Circuit boards are a core part of electronic devices. They keep getting smaller while having to be more powerful at the same time.

Temperatures of assembled circuit boards can easily be measured with the microscope optics of the optris Xi 400 thermal imager, thus identifying overheated areas quickly and preventing possible defects.

The causes for excessive temperatures can be manifold: defective components, incorrectly dimensioned circuit paths or poorly soldered joints.
**Compact spot finder**

IR camera for use in harsh industrial environments, autonomous operation possible.

<table>
<thead>
<tr>
<th>Basic model</th>
<th>Xi 80</th>
<th>Xi 400</th>
<th>Xi 410</th>
</tr>
</thead>
<tbody>
<tr>
<td>Detector</td>
<td>FPA, uncooled (34 μm pitch)</td>
<td>FPA, uncooled (17 μm pitch)</td>
<td>FPA, uncooled (17 μm pitch)</td>
</tr>
<tr>
<td>Optical resolution</td>
<td>80 x 80 pixels</td>
<td>384 x 288 pixels</td>
<td>384 x 240 pixels</td>
</tr>
<tr>
<td>Spectral range</td>
<td>8 – 14 μm</td>
<td>8 – 14 μm</td>
<td>8 – 14 μm</td>
</tr>
<tr>
<td>Temperature ranges</td>
<td>–20 ... 100 °C (-4 to 212°F) (20 ... 300 °C [68 ... 572 °F])</td>
<td>–20 ... 100 °C (-4 to 212°F) (20 ... 300 °C [68 ... 572 °F])</td>
<td>–20 ... 100 °C (-4 to 212°F) (20 ... 300 °C [68 ... 572 °F])</td>
</tr>
<tr>
<td>Frame rate</td>
<td>50 Hz</td>
<td>50 Hz</td>
<td>50 Hz</td>
</tr>
<tr>
<td>Optics (FOV)</td>
<td>30° (f = 5.1 mm [0.2 in] / F = 0.9)</td>
<td>12° (f = 12.7 mm [0.5 in] / F = 0.9)</td>
<td>12° (f = 12.7 mm [0.5 in] / F = 0.9)</td>
</tr>
<tr>
<td>Microscope optics</td>
<td>30° x 22° (f = 12.7 mm [0.5 in] / F = 0.9)</td>
<td>30° x 22° (f = 12.7 mm [0.5 in] / F = 0.9)</td>
<td>30° x 22° (f = 12.7 mm [0.5 in] / F = 0.9)</td>
</tr>
<tr>
<td>Focus</td>
<td>Motorized focus</td>
<td>Motorized focus</td>
<td>Motorized focus</td>
</tr>
<tr>
<td>Optic resolution (D:S)</td>
<td>–</td>
<td>–</td>
<td>–</td>
</tr>
<tr>
<td>–</td>
<td>–</td>
<td>–</td>
<td>–</td>
</tr>
<tr>
<td>Thermal sensitivity (NETD)²</td>
<td>100 mK</td>
<td>80 mK</td>
<td>80 mK</td>
</tr>
<tr>
<td>Optical resolution (FOV)</td>
<td>80° x 44° (f = 5.7 mm [0.22 in] / F = 0.9)</td>
<td>55° x 31° (f = 7.7 mm [0.3 in] / F = 0.9)</td>
<td>55° x 31° (f = 7.7 mm [0.3 in] / F = 0.9)</td>
</tr>
<tr>
<td>Microscope optics</td>
<td>–</td>
<td>–</td>
<td>–</td>
</tr>
<tr>
<td>System accuracy at _T_amb _2 °C or _s_2 %, whichever is greater</td>
<td>±2 °C or 2 %, whichever is greater</td>
<td>±2 °C or 2 %, whichever is greater</td>
<td>±2 °C or 2 %, whichever is greater</td>
</tr>
<tr>
<td>Frame rate</td>
<td>50 Hz</td>
<td>50 Hz</td>
<td>50 Hz</td>
</tr>
<tr>
<td>Ambient temperature (Tamb)</td>
<td>0 °C ... 50 °C (32 ... 122 °F)</td>
<td>0 °C ... 50 °C (32 ... 122 °F)</td>
<td>0 °C ... 50 °C (32 ... 122 °F)</td>
</tr>
<tr>
<td>Size</td>
<td>Ø 80 x 90 mm (3.1 x 3.5 in) (M08x1 thread)</td>
<td>Ø 80 x 90 mm (3.1 x 3.5 in) (M08x1 thread)</td>
<td>Ø 80 x 90 mm (3.1 x 3.5 in) (M08x1 thread)</td>
</tr>
<tr>
<td>Environmental rating</td>
<td>IP67 (NEMA 4)</td>
<td>IP67 (NEMA 4)</td>
<td>IP67 (NEMA 4)</td>
</tr>
<tr>
<td>Weight (without mounting bracket)</td>
<td>216 – 220 g (7.62 – 7.76 oz)</td>
<td>216 – 220 g (7.62 – 7.76 oz)</td>
<td>216 – 220 g (7.62 – 7.76 oz)</td>
</tr>
<tr>
<td>Power supply</td>
<td>USB / PoE / 5-30 VDC</td>
<td>USB / PoE / 5-30 VDC</td>
<td>USB / PoE / 5-30 VDC</td>
</tr>
<tr>
<td>Power consumption (typical values)</td>
<td>1.5 W</td>
<td>1.5 W</td>
<td>1.5 W</td>
</tr>
</tbody>
</table>

² Accuracy effective starting at 150 °C (302 °F).

| Features | | | |
|---|---|---|
| when temperature matters | | | |

**Air purge unit**

| Features | | | |
|---|---|---|
| **ACKIAPL + ACKIAPLAB** (Mounting bracket) | | | |

**Water cooled housing**

| Features | | | |
|---|---|---|
| **ACKXW** | | | |

**Shutter**

| Features | | | |
|---|---|---|
| **ACKXSCBx² + ACKIAPLAB** (Mounting bracket) | | | |

**Outdoor protective housing** for Xi 400

| Features | | | |
|---|---|---|
| **ACXPHD4** | | | |

**USB server Gigabit 2.0** for Xi 400

| Features | | | |
|---|---|---|
| **ACPIUSB5GB** | | | |

**Industrial process interface (PIF) for Xi series**

| Features | | | |
|---|---|---|
| **ACXiPBFxx** | | | |

* New

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² Calculation of the noise equivalent temperature difference (NETD) according to VDI 5585 standard, method B.

© Measurement of the noise equivalent temperature difference (NETD) according to VDI 5585 standard, method B.

© Measurement of the noise equivalent temperature difference (NETD) according to VDI 5585 standard, method B.
### Infrared cameras

#### PI series

**Precision Line**

The PI Precision Line includes numerous IR cameras for temperature measurement in industrial process control and research applications. From the mid-range resolution of the PI400i / 450i to the high resolution PI640i and special thermal imagers for metal, glass and microscopic targets, Optris Precision IR cameras meet every customer requirement.

**Optris calculator App**

IR Camera Configurator:

- **www.optris.com/ir-camera-configurator**

**Applications and exchangeable lenses**

- **PI series – Precision Line**

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#### Basic model

<table>
<thead>
<tr>
<th>Model</th>
<th>Resolution</th>
<th>Spectral range</th>
<th>Temp. ranges</th>
<th>Power consumption</th>
<th>Interface</th>
<th>Environment rating</th>
</tr>
</thead>
<tbody>
<tr>
<td>PI 400i</td>
<td>382 x 288 pixels</td>
<td>8 – 14 μm</td>
<td>–20 ... 100 °C (-4 ... 212 °F)</td>
<td>1.5 W</td>
<td>USB 2.0 / optional USB to GigE (PoE)</td>
<td>IP 67 (NEMA 4)</td>
</tr>
<tr>
<td>PI 450i</td>
<td>382 x 288 pixels</td>
<td>8 – 14 μm</td>
<td>–20 ... 100 °C (-4 ... 212 °F)</td>
<td>2.5 W</td>
<td>USB 2.0 / optional USB to GigE (PoE)</td>
<td>IP 67 (NEMA 4)</td>
</tr>
<tr>
<td>PI 640i</td>
<td>640 x 480 pixels</td>
<td>8 – 14 μm</td>
<td>–20 ... 100 °C (-4 ... 212 °F)</td>
<td>2.5 W</td>
<td>USB 2.0 / optional USB to GigE (PoE)</td>
<td>IP 67 (NEMA 4)</td>
</tr>
<tr>
<td>PI 640i G7</td>
<td>640 x 480 pixels</td>
<td>8 – 14 μm</td>
<td>–20 ... 100 °C (-4 ... 212 °F)</td>
<td>7.9 W</td>
<td>USB 2.0 / optional USB to GigE (PoE)</td>
<td>IP 67 (NEMA 4)</td>
</tr>
</tbody>
</table>

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#### Infrared cameras

**PI series – Precision Line**

When temperature matters

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**For further information on our infrared cameras visit our website**

**www.optris.com/pi-series-precision-line**
One of the smallest cameras in its class

- One of the smallest cameras in its class (46 x 56 x 68 – 77 mm [1.81 x 2.20 x 2.67 – 3.03 in])
- Very good thermal sensitivity at 75 mK
- Thermal image recording up to 80 Hz
- Interchangeable lenses & industrial accessories
- Detector with 382 x 288 pixels
- Lightweight (237 – 251 g [8.36 – 8.85 oz], depending on lens)
- Includes license-free analysis software and full SDK

High performance for a wide range of applications

The high-performance optris PI 400i infrared camera has a wide range of uses in industry.

For example, thermal image shots help to monitor processes and ensure the quality of manufactured products in the automotive field, in particular in the manufacturing of plastics as well as in the semiconductor and photovoltaic industry.

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.

Detection of minimal temperature differences

- One of the smallest cameras in its class (46 x 56 x 68 – 77 mm [1.81 x 2.20 x 2.67 – 3.03 in])
- Exceptional thermal sensitivity at 40 mK
- Thermal image recording up to 80 Hz
- Interchangeable lenses & industrial accessories
- Detector with 382 x 288 pixels
- Lightweight (237 – 251 g [8.36 to 8.85 oz], depending on lens)
- Usable at ambient temperatures of up to 70 °C (158 °F) without the need for additional cooling
- Includes license-free analysis software and full SDK

For application examples, e.g. in the plastics industry, visit: www.optris.com/plastics

optris Pi 400i
INFRARED CAMERA WITH HIGH OPTICAL RESOLUTION

optris Pi 450i
INFRARED CAMERA WITH VERY HIGH THERMAL SENSITIVITY

Highest temperature resolution of 40 mK

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

Application example in the medical sector

Due to the very high resolution of the optris PI 450i, even veins can be made visible under the skin.

80 mK

40 mK (PI 450i)
One of the most compact infrared cameras in the world

- 640 x 480 pixels
- Radiometric video recording at 32 Hz / 125 Hz in subframe-mode (640 x 120 pixels)
- Compact size of 46 x 56 x 76 – 100 mm [1.81 x 2.20 x 2.99 – 3.94 in] (depending on lens)
- Lightweight (289 – 340 g [9.49 – 11.99 oz], depending on lens)
- Includes license-free analysis software and full SDK

Razor sharp infrared pictures and videos for process optimization

With a casing size of only 46 x 56 x 90 mm (1.81 x 2.20 x 3.54 in) and a weight of 320 grams (11.29 oz) (depending on lens), the optris PI 640i is among the most compact infrared cameras on the market.

The high-definition optris PI 640i infrared camera is best used in applications where finest thermal details matter.

It significantly contributes to process optimization in both research and development and in industry.

Microscope optics for the inspection of electronic boards

- Interchangeable, focusable optics for most flexible use of the camera
- Analysis of small chip level components down to 28 µm
- Hands-free operation for simultaneous testing and IR imaging
- Frame rates up to 125 Hz allow inspection of fast processes (like pulsed laser diodes)
- Radiometric video or tiff recording with +/-2 °C (3.6 °F) measurement accuracy
- License-free analysis software and complete SDK included

High-resolution microscope optics for test & measurement

The PI 640i can be equipped both with standard optics to image the entire circuit board and microscope optics to resolve tiny devices.

The PI 640i with microscope optics present high-resolution infrared images detailing thermal variations on targets as small as 28 µm.

The high-quality thermal and geometric detail resolution of the infrared cameras ensures precise functional testing of electronic products, as even the smallest temperature differences can be accurately detected.

Microscope stage fine tunes focus from 80 mm to 100 mm [3.15 in to 3.94 in]

For application examples, e.g. the early detection of fires in garbage bunkers, visit:
www.optris.com/fire-prevention

For application examples in the analysis of electronic boards, visit:
www.optris.com/electronics-industry
when temperature matters

Glass panes between heating and cooling zone

Smart temperature measurement – Innovative and fast

The IR cameras optris PI 05M, PI 08M and PI 1M are specially suited for measuring the temperature of metals, as these exhibit a distinctly higher emissivity at the short measurement wavelength of 500 nm and 1 μm than at measurements in the previously conventional wavelength range of 8 – 14 μm.

In particular, the spectral range of 500 nm enables more precise measurements at changing emissivities and is less sensitive to atmospheric influences. Thus, the PI 05M is ideally suited for temperature measurements of molten metals.

A direct 1 ms analog output allows all camera models a readout of a freely selectable 8x8 pixel region in real-time. The use of these image sensors allows a large dynamic range for temperature measurement so that the previously necessary use of relatively many and narrowly defined sub-ranges is no longer required.

The PI 1M, PI 08M and PI 05M’s two-dimensional temperature measurement opens up new options compared to the usual spot measurement of pyrometers.

Thanks to the large measurement temperature range of 450 °C (842 °F) up to 2450 °C (4442 °F), the optris PI 05M, PI 08M and PI 1M IR cameras satisfy practically all demands in the fields of metal production and processing.
Measurement of the noise equivalent temperature difference (NETD) according to VDI 5585 standard, method B; NETD value applies to all frame rates.

**Basic model**

**PI 0SM**
- Detector: CMOS (15 µm pitch)
- Optical resolution: 764 x 480 pixels (0.23°)
- NETD: 0.085 - 1.15 K
- Spectral range: 0.55 – 4.0 µm
- Temperature range: 0°C to 40 °C (32°F to 104°F)
- Frame rate: Up to 1 Hz / 1 ms real-time analog output (0 - 10 V) of 8 x 8 pixels (freely selectable)

**PI 08M**
- Detector: CMOS (15 µm pitch)
- Optical resolution: 764 x 480 pixels (at 32 Hz)
- NETD: 0.085 - 1.15 K
- Spectral range: 0.55 – 4.0 µm
- Temperature range: 0°C to 40 °C (32°F to 104°F)
- Frame rate: Up to 1 Hz / 1 ms real-time analog output (0 - 10 V) of 8 x 8 pixels (freely selectable)

**PI 1M**
- Detector: CMOS (15 µm pitch)
- Optical resolution: 764 x 480 pixels (at 32 Hz)
- NETD: 0.085 - 1.15 K
- Spectral range: 0.55 – 4.0 µm
- Temperature range: 0°C to 40 °C (32°F to 104°F)
- Frame rate: Up to 1 Hz / 1 ms real-time analog output (0 - 10 V) of 8 x 8 pixels (freely selectable)

**Power consumption**
- 2.5 W (typical values)
- 2.5 W (typical values)
- 2.5 W (typical values)

**Process**
- 46 x 56 x 88 – 129 mm (1.81 x 2.0 x 3.46 – 5.08 in)
- FOV @ 764 x 480 px:
  - 26° x 16° (f = 25 mm)
  - 4° x 3° (f = 75 mm)
  - 7° x 5° (f = 50 mm)

**Thermal sensitivity NETD**
- System accuracy (at T<sub>amb</sub> = 23 ± 5 °C)
- For object temperature > 1500 °C (2732°F):
  - ±2% of reading for 27/32/80 Hz
  - ±1% of reading for 1 kHz
- For object temperature < 1500 °C (2732°F):
  - ±1.5% of reading for 1 kHz
  - ±1% of reading for 27/32/80 Hz

**USB Server Gigabit 2.0 for optris PI cameras**
- part number: ACPIUSB505B

**Accessories Xi series**
- USB Camera with 1 lens
- Lens tube incl. protective window
- USB cable (1 m)
- Table tripod
- Vehicle version with terminal block (1 m)
- Software package optics PIConnect
- Manual
- Aluminum case
- Optional: Cooling Jacket, HT cable
- USB camera with 1 lens
- Lens tube incl. protective window
- USB cable (1 m)
- Table tripod
- Vehicle version with terminal block (1 m)
- Software package optics PIConnect
- Manual
- Aluminum case
- Optional: Cooling Jacket, HT cable

**Outdoor protective housing for infrared cameras**
- part number: ACPIOPH

**Industrial Process Interface (PIF) for optris series**
- part number: ACPIPIFMA

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1. Lenses with focal length f = 50 mm (1.97 in) and f = 75 mm (2.95 in) have an elevated starting temperature of +75 °C (167 °F)
2. Measurement of the noise equivalent temperature difference (NETD) according to VDI 5585 standard, method B; NETD value applies to all frame rates.
CoolingJacket Advanced

Features:
- Operation at ambient temperatures up to 315 °C (599 °F)
- Air/water cooling with integrated air purging and optional protective windows
- Modular concept for easy installation of different devices and optics
- Trouble-free sensor disassembling on site with quick release chassis
- Integration of additional components like PI NetBox, USB Server Gigabit 2.0 and Industrial Process Interface (PIF) in extended version

Laminar air purge

Features:
- Protection for rugged environments
- Air and water cooling, flexible laminar air stream for protection from dirt and dust
- Easy maintenance due to folding mechanism
- Focusable from the outside once installed
- Protection window for mechanical protection integrated
- Also available as line scanner version

Connection options

- Industrial Process Interface (PIF)
- PI NetBox
- USB Server Gigabit 2.0

Recommended devices:
- PI 640i Microscope optics, Xi 400 Microscope optics
- PI 450i
- Xi 400
- PI 1M, PI 05M

Application examples for non-contact temperature measurement

The process and product temperature is an important physical indicator for manufacturing processes and ensures a high quality level of the production line.

All Optris products apply in different areas, covering the non-contact temperature measurement. This covers the automotive industry, the food industry as well as 3D printing & additive manufacturing.

Electronics industry

Component inspection of circuit boards

More and more manufacturers of electronic circuit boards rely on noncontact temperature measurement due to the constantly increasing performance of their components.

Recommended devices:
- PI 640i Microscope optics, Xi 400 Microscope optics
- PI 450i

Injection molding

In order to prevent component distortion during injection molding, the process is monitored by thermal imaging cameras detecting and adjusting temperature over- or undershoots during molded part measurement.

Recommended device:
- PI 450i

Infrared technology in waste processing

Early fire detection with infrared cameras is an important protective measure in industry to prevent irreparable damage to industrial plants and buildings.

Recommended device:
- XI 400

Workpiece control during drop forging

In drop forging, the semi-finished products must be at a certain forging temperature before forming. In order to achieve the optimum production result, the surface temperature of the material is controlled accordingly.

Recommended devices:
- PI 1M, PI 05M

Plastics industry

Component inspection of circuit boards

Component inspection of circuit boards

Injection molding

Injection molding

Infrared technology in waste processing

Recommended device:
- XI 400

Fire prevention

Early fire detection with infrared cameras

Infrared cameras monitor planing systems - from fire protection to quality control

Recommended device:
- PI 1M, PI 05M

Metal industry

Component inspection of circuit boards

Injection molding

Infrared technology in waste processing

Workpiece control during drop forging

Recommended device:
- XI 400

Further information see our application brochures:

- www.optris.com/metal
- www.optris.com/plastics
- www.optris.com/glass

Industries

Application notes

Fire prevention / Safety

Battery monitoring with IR temperature measurement

Early fire detection with infrared cameras

Infrared cameras monitor planing systems - from fire protection to quality control

Electric utility sector

Web Access Converter Module

More infos

- www.optris.com/infrared-technology-for-fire-protection-details-first
- www.optris.com/electric-utility-sector
Comprehensive IR camera software

- No additional costs or licensing restrictions
- Modern software with intuitive user interface
- Remote control of camera
- Display of numerous images in different windows
- Compatible with Windows 7, 8, 10 and 11
- Two Software Development Kits for Windows and Linux included
- Various language options, incl. translation function
- Temperature display in °C or in °F

Pre-defined layouts make it quick and easy to start with your applications. And because we know that every measurement task has its own individual requirements, we have ensured that it is quite easy to adapt the preset layout to your individual requirements.

The user interface of the PIX Connect software can also be adapted to suit your personal workflow: Software windows can be easily arranged using drag & drop; in the toolbar you can save shortcuts for functions relevant to your application – or even remove links which you do not need.

Regardless of whether you are working on a desktop PC or a tablet, the user interface can be adapted.

Measuring areas

It is not just a matter of size, but also depends on the content: designing a suitable measurement area

The size and shape of measurement area can be freely designed and moved. For an easy introduction, a large selection of pre-defined measurement area shapes is available.

You can set up as many measurement areas as you like in the camera’s field of view. To do this, it is possible to make a distinction between main and ancillary fields.

Various modes can be set in a measurement area, such as minimum value, maximum value, or average value, or you can rule out the detection of hot or cold spots.

The separate setting of the emissivity for measurement areas allows various material surfaces to be monitored with a single camera.

Differences and averaging between different measurement areas are easy to calculate with the PIX Connect software.

Saved measurement areas can be displayed as an image, a digital display or a diagram and can then be saved for further analysis.

Our layouts – as individual as your applications

The PIX Connect software makes a wide range of preset color palettes available. This allows optimal depiction of thermal contrasts. The pre-defined color palettes can be individually adapted to be able to cater for the specific requirements of your respective application.

Associated temperature groups (isotherms) can be identified by color markers and highlighted. It is also possible to define temperature values in advance; pixels above, below, or between these values are highlighted in color.

The right color palette for every application

The temperature information in main window, as digital display or as graphic.

Graphics display of the temperature values

Temperature values can be shown along a straight line as temperature profiles as well as 3D diagrams.

A temperature/time diagram can be used to analyze the temperature development over time. Individual time sections can be lifted out of the diagram and be analyzed in detail by zooming in and out.

Diagrams defined in this way can be exported from the software and be saved in Excel for further analysis.
**Recording and display**

**Recording video sequences – for later analysis and documentation**

Beside of single snapshots also video recordings can be made with the software, both with radiometric data included. This allows a detailed analysis of the measurements results afterwards.

An integrated screen capture function makes it simple to retrospectively generate videos in wmv format. Videos recorded can be processed retrospectively. For example, individual sections can be cut out of a recording and can be saved as an independent sequence.

Saved video recordings are available for analysis. The sequences can be played back in slow motion or time lapse for this purpose. It is also possible to play back as a continuous loop.

**Event grabber**

The snapshot option works like a screenshot; an individual image is recorded from the live picture. This snapshot is a radiometric image (*.tiff), where all the temperature and measurement area information at the time of the recording is saved for every pixel.

Saving and exporting the image for further analysis in Excel is possible thanks to the option of saving the temperature matrix in text format, e.g. as comma-separated values (*.csv format).

It is also possible to continue processing the image data with standard programs such as Photoshop or Windows Media Player.

Sections of the saved image can be zoomed in to get a closer look. 3D display is also possible.

**Snaps**

**t**

**shots – all temperature information in one picture**

**Merging**

The merging function combines several camera angles together in a single picture

The PIX Connect software gives you the option of grouping together several cameras within a software instance, i.e. the field of view of several infrared cameras are merged together to make a single picture. For processes with several control points in particular, it is helpful to concentrate the various angles on one screen. Merging several cameras also makes it possible to get an all-round view of a 3D object.

You can merge several cameras either using a direct USB connection or via Ethernet. While in the first case, every camera needs to have its own USB port; for the second option, one Ethernet connection is enough.

The cameras here are each connected to the Ethernet switch on the PC via a USB Server Gigabit 2.0.

**Alarms**

**Defining several alarm values – allows quick intervention**

Alarms for freely definable measurement areas, calculated objects, uncommitted values of external transmitters as well as the internal temperature of the camera can be chosen via the software. Apart from minimum and maximum values, it is also possible to set so-called advance alarms. These will emit a warning when the measured temperature approaches the defined minimum or maximum value, therefore giving you more options and time to react.

If the measured temperature reaches one of the previously defined values, then the software will trigger an alarm which can be forwarded to a PLC via the process interface. In addition to that, the critical event can be easily documented as a snapshot or video recording and be used for analysis later on.
For the measurement of moving objects

The optris PIX Connect software is equipped with a line scan camera function.

The line scanner is primarily used for processes involving moving measurement objects, like rotary kiln measurements or large quantities on conveyor belts (batch process).

The advantages

Simple monitoring of processes with limited visual access

Indirect visualization of heat distribution in ovens via camera installation at oven exit

Increase the number of pixels, e.g. from 640 pixels to 800 pixels by diagonal screen measurement

Lines have FOV of up to 111° for detailed process analysis, e.g. on wide conveyor belts

111°

Up to 32 Hz data recording* of unlimited lines which in turn produce a thermal image of any given resolution.

*Up to 125 Hz data recording when using 90° in subframe mode (640 x 120px)

Only 3 steps to initialize the function

Step 1
Activation of the line scan camera function (continuous, self-triggered, external trigger) and definition of the position of the lines in the thermal image. For this the camera itself serves as an orientation aid.

Step 2
Configuration of line scan function, e.g. number of lines displayed or set trigger for automatic saving of images.

Step 3
Definition of individual layouts, e.g. display of saved images in the snapshot process.

Glass inspection system for process control in glass tempering machines

With the new glass inspection system, temperature differences during glass hardening processes can be quickly detected, thus avoiding rejects and providing automatic quality monitoring.

The Top Down GIS 640 R system with temperature referencing by means of a sensor from below as well as automatic emissivity correction for standard and low-E glasses was specially developed for process control in glass tempering machines.

Measurement principle

A variety of optics with different field of views allows an optimal mounting of the camera at a larger distance (no cooling needed) and avoids influences by the angle dependent emissivity.

Positioning of IR camera and reference pyrometer in a Top Down Glass Inspection System.

For more software tutorials watch our

https://www.optris.com/software-tutorials

Important specifications

- Top down system with additional reference pyrometer from underneat for automatic emissivity correction
- Digitally controlled lens protection system (DCLP) avoids extra air purging
- Glass area calculation
- Pre-assembled system for easy installation on glass tempering furnaces
- Automatic scan line adjustment – insensitive to distortions

Top Down GIS 640 R

Comprehensive IR camera software without licensing restrictions and with intuitive user interface.

Monitoring temperatures of glass sheets

New

Product

Glass inspection system for process control in glass tempering machines

FEATURES

when temperature matters

when temperature matters

when temperature matters
when temperature matters

Measuring field of the infrared camera
optris PI 450 using a 53° x 38° lens

HFOV
Horizontal expansion of the total measuring field on the object plane
VFOV
Vertical expansion of the total measuring field on the object plane
IFOV
Size of individual pixels on the object plane
DFOV
Diagonal expansion of the total measuring field on the object plane
MFOV
Recommended, smallest measuring object size of 3 x 3 pixels or 2 x 2 pixels when using the PI microscope optics or the Xi 80, respectively

Precise measuring at various distances

A choice of lenses allows you to precisely measure objects at various distances, from close and standard distances right up to large distances. The IR cameras of the optris PI series allow for changing between several lenses.

With infrared cameras there are various parameters which display the relationship between the distance from the measuring object and the size of the pixel on the object plane. In choosing the correct lens, the following should be taken into account:

IFOV 10.5 mm 5.2 mm 1.3 mm
4 m

VFOV
2.8 m

HFOV
4.0 m

DFOV
4.9 m

MFOV

Supported for

• PI and Xi series and all pyrometers
• For android devices from version 5.0 or higher with micro-USB or USB-C connectors that support USB OTG

Optris Calculator
Combines the measuring spot size calculator of the IR pyrometers and the optics calculator of the IR cameras

The measuring spot size of the respective device is calculated for each distance

Pyrometers
• The spot size calculator determines the exact spot size for all sensor / optics combinations for any entered distance
• For reliable measurements

Features
• Calculates for each distance the measuring spot size of the respective device
• Always the current software and features through regular updates

Supported for
• All android devices (5.0 or higher)

IRmobile app features:
• Live IR image with automatic hot and cold spot search
• Taking snapshots and analyze them later with PIXConnect software
• Adjustable camera features like temperature measuring range, frame rate and selectable color palettes
• Changing the temperature unit: Celsius or Fahrenheit
• Integrated simulator

Tool for all optris infrared cameras

• The cameras of the PI series have a direct connection to an android smartphone or tablet
• IRmobile App downloadable for free from the Google Play Store
• For connection to the device the IR App Connector is recommended

Xi 80 / 410 Part number: ACXI80IACM (Micro-USB) or ACXI80IACC (USB-C)
Xi 400 Part number: ACPIIACM (Micro-USB) or ACPIIACC (USB-C)
### Optical data

#### OPTICS

**Xi 80**

<table>
<thead>
<tr>
<th>B × 80 px</th>
<th>Focal length [mm]</th>
<th>Angle</th>
<th>Minimum distance [m]</th>
<th>Measurement accuracy [m]</th>
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<tbody>
<tr>
<td>38°</td>
<td>5.5 (0.85 ft)</td>
<td>1.9°</td>
<td>0.05 (0.15 ft)</td>
<td>0.10 (0.00 ft)</td>
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<tr>
<td>43°</td>
<td>6.0 (0.97 ft)</td>
<td>2.3°</td>
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<td>0.10 (0.00 ft)</td>
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<tr>
<td>55°</td>
<td>7.0 (1.03 ft)</td>
<td>3.0°</td>
<td>0.15 (0.00 ft)</td>
<td>0.10 (0.00 ft)</td>
</tr>
<tr>
<td>65°</td>
<td>7.0 (1.03 ft)</td>
<td>3.0°</td>
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<td>0.10 (0.00 ft)</td>
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<tr>
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<td>7.0 (1.03 ft)</td>
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<td>0.15 (0.00 ft)</td>
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<tr>
<td>80°</td>
<td>8.0 (1.26 ft)</td>
<td>3.6°</td>
<td>0.20 (0.00 ft)</td>
<td>0.10 (0.00 ft)</td>
</tr>
</tbody>
</table>

- **F05 Standard lens**
- **F06 Telephoto lens**
- **F08 Wide angle lens**
- **F09 Super wide angle lens**

**XI 400**

<table>
<thead>
<tr>
<th>300 × 280 px</th>
<th>Focal length [mm]</th>
<th>Angle</th>
<th>Minimum distance [m]</th>
<th>Measurement accuracy [m]</th>
</tr>
</thead>
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<tr>
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<tr>
<td>80°</td>
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<td>3.6°</td>
<td>0.20 (0.00 ft)</td>
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- **F05 Standard lens**
- **F06 Telephoto lens**
- **F08 Wide angle lens**
- **F09 Super wide angle lens**

**PI 400i/450i**

<table>
<thead>
<tr>
<th>384 × 240 pix</th>
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- **F13 Standard lens**
- **F20 Telephoto lens**
- **F08 Wide angle lens**
- **F09 Super wide angle lens**

*Note: Please use the optics calculator on our website in order to calculate measurement fields with shorter measurement distances.*

**Additional Information:**

- When temperature matters, lenses have radial distortion due to the angle of their aperture. The PIX Connect software has an algorithm which corrects this distortion.
- The measurement accuracy of the camera may lie outside of the specifications for distances below the defined minimum measurement distance.
### Optical data

**OPTICS**

#### Optical data

<table>
<thead>
<tr>
<th>Lens Model</th>
<th>Focal Length</th>
<th>Minimum Measurement Distance</th>
<th>Angle</th>
<th>Distance to Measurement Object [m (ft)]</th>
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**Microscope optics**

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<th>Angle</th>
<th>Distance to Measurement Object [m (ft)]</th>
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**Microscope optics X1 400**

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**Microscope optics XL 640**

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<td>1.5 (0.5)</td>
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<tr>
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**Microscope optics T 782 x 1808**

<table>
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**Microscope optics PI 640 G7**

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<td>5.0 (1.6)</td>
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</table>

### Notes

1. The optical PI 640 G7 is only available with QDF 25 lens and the optical PI GEM is available with QDF 16 and QDF 25 lens.
2. Table with acronyms showing which measurement fields and pixel sizes will be reached at each distance. For optimal performance of the camera there are several lenses available. Wide angle lenses have radial distortion due to the angle of their aperture. The PIX Connect software has an algorithm which corrects this distortion.

*Please note: Please use the optics calculator on our website in order to calculate measurement fields with shorter measurement distances.*