PRODUCT OVERVIEW
Non-contact temperature measurement
Made in Germany

when temperature matters
**Spot measurement or thermal image?**

First of all, it is important to define the measurement task and to decide on one of these two measures:

<table>
<thead>
<tr>
<th>Which measure?</th>
<th>Which object surface?</th>
</tr>
</thead>
<tbody>
<tr>
<td>A point measuring infrared thermometer should be used if you know where the critical point or the area to be measured is positioned within your application. The size of the measuring object is important to define which lens is necessary. It is therefore possible to monitor the accurate temperature and optimize processes – if necessary – before quality problems arise.</td>
<td>The condition of the object surface defines the measurement device and wavelength to be used for the application. The emissivity $\varepsilon$ occupies a central position. The choice of the right device is of great importance especially for metals, where the emissivity depends on the temperature and wave length. We are able to offer appropriate measurement devices for most applications throughout a wide product range. The following explanation helps to find the right wavelength for your application:</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Which temperature range?</th>
</tr>
</thead>
<tbody>
<tr>
<td>The temperature is another factor to decide on. The range should cover all relevant temperatures of the application. The measurement range of the devices is between $-50 ^\circ C$ and $3000 ^\circ C$.</td>
</tr>
</tbody>
</table>

| Infrared cameras should be used in cases where more than one critical area exists or the area cannot be clearly defined. Critical areas can be localized by the camera through the demonstration of thermal images. The areas can then be permanently monitored by one or multiple fixed infrared thermometers. |

<table>
<thead>
<tr>
<th>Which process velocity?</th>
</tr>
</thead>
<tbody>
<tr>
<td>To achieve accurate temperature measurement it is important to know how fast measuring objects are moving in front of the sensor or how fast they change temperature.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Integration of sensors?</th>
</tr>
</thead>
<tbody>
<tr>
<td>Our temperature sensors can be installed as part of the process with mounting brackets or flanges. Depending on the device, we offer different analog and digital interfaces for data evaluation such as triggering, alerting or saving of data.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Analog Interfaces:</th>
</tr>
</thead>
<tbody>
<tr>
<td>$0 – 20 mA$, $4 – 20 mA$, $0 – 5 V$, $0 – 10 V$, Thermocouple (type J, type K)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Digital Interfaces:</th>
</tr>
</thead>
<tbody>
<tr>
<td>USB, RS232, RS485, Relay, Profibus DP, Modbus RTU, Ethernet</td>
</tr>
</tbody>
</table>

**IR thermometers use the radiation signal emitted by the entire measurement spot. The size of the measurement spot (S) largely depends on the device, the optics selected and the distance between the sensor and measurement object plane (D):**

**Image:** Display of fast temperature changes over a period of time.

**Image:** IR image of an electronics circuit board – adaptation of the measurement spot to the object size.

**Image:** IR Basic Principles www.optris.global/downloads
Infrared thermometers

CS series
Single-piece pyrometer - Electronic within sensing head
In this design, the optics are installed together with the electronics in a compact housing.

CSMicro series
Single-piece pyrometer - Electronic within cable
To increase the robustness of the sensor head, Optris developed two-wire devices whose electronics are integrated into the cable. This makes the IR sensor, for example, significantly less sensitive to heat. In addition, the heat generated by the two-wire electronics has no influence on the thermal stability of the sensor head.

CT series
Two-piece pyrometer - Sensing head with separate electronic box
As a third variant, a two-part device consisting of measuring head and separate electronics box is available. In addition to the simple device configuration and a temperature display, the electronics box offers the possibility to choose between different interfaces, such as USB, RS232, RS485, Modbus RTU, Profibus DP and Ethernet.
### Infrared thermometers

#### CT series

| Model | Type | Basic Feature | Special Feature | Detector | Sensing head exchangeable | Head cable shortening | Temperature range | Optical resolution | Option: CF lens | Smallest spot (CF optics/adj. CF lens) | Response time (90%) | Accuracy | Outputs analog: 8–20 mA | Signal processing: Peak / Valley / AVG | Additional alarms/inputs/outputs | External emissivity adjustment | External background temperature control | Trigger input for reset of hold functions | Digital I/O pins/number | Simultaneous analog and digital output | Alarm output as an alternative to analog output | Additional alarm outputs / switching output | Voltage supply | Standard cable length | Cable length options |
|-------|------|--------------|----------------|----------|---------------------------|----------------------|------------------|-------------------|-----------------|-------------------|----------------|----------|----------------------|-----------------------------|---------------------------|-----------------------------|-----------------------------|-----------------------------|-----------------------------|-------------------------------|-----------------------------|-----------------------------|
| CT    | LT02 | Two-piece sensor with separate electronic box incl. programming keys and display | - | Thermopile | - | LT02: 2.5 mm / LT05F: 0.8 mm | LT02: 2.5 mm / LT05F: 0.8 mm | 0.1 K | 7 mm | - | 100 ms (90%) | ±1 °C or ±1 % | ±2 °C or ±1 % | ±1.5 °C or ±1 % | ±(0.3 % TMeas +1 °C) | 1/3 | - | - | - | - | - | - | - | - | - | - | - | - | - |
| CThot | LT02 | Two-piece sensor with fast response time and separate electronic box. | - | Thermopile | - | LT02: 2.5 mm / LT05F: 0.8 mm | LT02: 2.5 mm / LT05F: 0.8 mm | 0.25 K | 7 mm | - | 100 ms (90%) | ±1 °C or ±1 % | ±2 °C or ±1 % | ±1.5 °C or ±1 % | ±(0.3 % TMeas +1 °C) | 1/3 | - | - | - | - | - | - | - | - | - | - | - | - | - |
| CT    | LT02H/LT05H | Two-piece sensor for hot surroundings with separate electronic box incl. programming keys and display | - | Thermopile | - | LT02H: 130 °C / LT05H: 250 °C | LT02H: 130 °C / LT05H: 250 °C | 1.4 M | LT02H: 130 °C / LT05H: 250 °C | LT02H: 130 °C / LT05H: 250 °C | 500 °C | ±1 °C or ±1 % | ±2 °C or ±1 % | ±1.5 °C or ±1 % | ±(0.3 % TMeas +1 °C) | 3/2 | - | - | - | - | - | - | - | - | - | - | - | - | - |
| CT    | 1M / 2M | Two-piece sensor for high temp. | - | Thermopile | - | LT02H: 130 °C / LT05H: 250 °C | LT02H: 130 °C / LT05H: 250 °C | 1.4 M | LT02H: 130 °C / LT05H: 250 °C | LT02H: 130 °C / LT05H: 250 °C | 500 °C | ±1 °C or ±1 % | ±2 °C or ±1 % | ±1.5 °C or ±1 % | ±(0.3 % TMeas +1 °C) | 3/2 | - | - | - | - | - | - | - | - | - | - | - | - | - |
| CT    | 3M | Two-piece sensor for low temp. | - | Thermopile | - | LT02H: 130 °C / LT05H: 250 °C | LT02H: 130 °C / LT05H: 250 °C | 1.4 M | LT02H: 130 °C / LT05H: 250 °C | LT02H: 130 °C / LT05H: 250 °C | 500 °C | ±1 °C or ±1 % | ±2 °C or ±1 % | ±1.5 °C or ±1 % | ±(0.3 % TMeas +1 °C) | 3/2 | - | - | - | - | - | - | - | - | - | - | - | - | - |
| CT    | 4M | Two-piece sensor for low temp. | - | Thermopile | - | LT02H: 130 °C / LT05H: 250 °C | LT02H: 130 °C / LT05H: 250 °C | 1.4 M | LT02H: 130 °C / LT05H: 250 °C | LT02H: 130 °C / LT05H: 250 °C | 500 °C | ±1 °C or ±1 % | ±2 °C or ±1 % | ±1.5 °C or ±1 % | ±(0.3 % TMeas +1 °C) | 3/2 | - | - | - | - | - | - | - | - | - | - | - | - | - |
| CT    | G5 | Two-piece sensor for high temp. | - | Thermopile | - | LT02H: 130 °C / LT05H: 250 °C | LT02H: 130 °C / LT05H: 250 °C | 1.4 M | LT02H: 130 °C / LT05H: 250 °C | LT02H: 130 °C / LT05H: 250 °C | 500 °C | ±1 °C or ±1 % | ±2 °C or ±1 % | ±1.5 °C or ±1 % | ±(0.3 % TMeas +1 °C) | 3/2 | - | - | - | - | - | - | - | - | - | - | - | - | - |
| CT    | P3 / P7 | Two-piece sensor for low temp. | - | Thermopile | - | LT02H: 130 °C / LT05H: 250 °C | LT02H: 130 °C / LT05H: 250 °C | 1.4 M | LT02H: 130 °C / LT05H: 250 °C | LT02H: 130 °C / LT05H: 250 °C | 500 °C | ±1 °C or ±1 % | ±2 °C or ±1 % | ±1.5 °C or ±1 % | ±(0.3 % TMeas +1 °C) | 3/2 | - | - | - | - | - | - | - | - | - | - | - | - | - |
CTex LT + CTex LT hot

**Accessories CS/ CSmicro/ CT series**

**CTex LT + CTex LT hot**
- OPTCTEX

<table>
<thead>
<tr>
<th>Mechanical accessories</th>
<th>Combinations</th>
</tr>
</thead>
<tbody>
<tr>
<td>ACCTFB / ACCTFBMH / ACCTFB2</td>
<td>D06ACCTAPMHC</td>
</tr>
<tr>
<td>ACCTTA</td>
<td>ACCTAB</td>
</tr>
<tr>
<td>ACCTKF40B270 / ACCTKF40GE</td>
<td>D06ACCTAPMHC</td>
</tr>
<tr>
<td>ACCTAPL</td>
<td>ACCTAPL</td>
</tr>
<tr>
<td>ACCTOEMLST</td>
<td>ACCTOEMLST</td>
</tr>
</tbody>
</table>

**Mechanical accessories**
- ACCTFB: Mounting bracket, adjustable in one axis (M12x1 sensing head + Laser-Sighting tool)
- ACCTFBMH: Mounting bracket, adjustable in one axis (M12x1 sensing head)
- ACCTFB2: Mounting bracket, adjustable in one axis (M12x1 sensing head)
- ACCTTA: Tilt assembly for heads with optical resolution ≥10:1
- ACCTKF40: KF40 flange for CT1M, 2M, 3M with B270 window (up to 10^-7 mbar) / KF40 flange for CTLT with Ge window (up to 10^-7 mbar)
- ACCTAPL: Air purge collar, laminar, with integrated CF lens (for 1M / 2M / 3M)
- ACCTOEMLST: OEM Laser-Sighting tool, 635 nm, rotation symmetrical, for connection to CT electronics, power supply via CT electronic box or battery

**Optical accessories**
- ACCTCF / ACCTPW: CF-lens or protective window (for LT) for M12x1 sensing head
- ACCTCFE / ACCTPWE: CF-lens or protective window (for LT) with external thread for air purge or massive housing
- D06ACCTLSSTEP / ACCTOEMLST: Laser-Sighting tool (for CT): OEM Laser-Sighting tool, 325 mm, rotation symmetrical, for connection to CT electronics, power supply via CT electronic box or battery
- ACCTRAM: Right angle mirror for measurements 90° to the sensor axis for sensing heads with optical resolution ≥10:1
- ACCTPS20 / ACCTPS40 / ACCTPS88: Pipe adapter with M12x1 internal thread + Sighting tube with M12x1 external thread

**Accessories**
- ACCSAP
- ACCTAPL
- ACCTAPL / ACCTAPL (2:1 optics)
- ACCTAPL / ACCTAPL (2:1 optics)
- ACCTAPL / ACCTAPL (2:1 optics)
- ACCTAPL / ACCTAPL (2:1 optics)

**Air purges and protective housings**
- ACCSAP
- ACCTAPMHC
- Massive housing of:
  - Stainless steel (D06ACCTMHC)
  - Compact, brass (D06ACCTMHC)
  - Anodized aluminum (D06ACCTMHA)

**Combinations**
- ACCTAPL
- ACCTAPL / ACCTAPL (2:1 optics)
- ACCTAPL / ACCTAPL (2:1 optics)
- ACCTAPL / ACCTAPL (2:1 optics)

**CTex LT + CTex LT hot**
- OPTCTEX

**Advantage**
- Two-piece measuring system with active electronic for evaluation and passive IR receiver (sensing head)
- CTex sensing head can be installed as passive element in hazardous areas
- Energy limitation with appropriate zener barriers (STAH), with approval for zone 1 (PTB 01 ATEX 2053)

**CTex LT + CTex LT hot**
- OPTCTEX

**Optical accessories**
- ACCTCF / ACCTPW: CF-lens or protective window (for LT) for M12x1 sensing head
- ACCTCFE / ACCTPWE: CF-lens or protective window (for LT) with external thread for air purge or massive housing
- D06ACCTLSSTEP / ACCTOEMLST: Laser-Sighting tool (for CT): OEM Laser-Sighting tool, 325 mm, rotation symmetrical, for connection to CT electronics, power supply via CT electronic box or battery
- ACCTRAM: Right angle mirror for measurements 90° to the sensor axis for sensing heads with optical resolution ≥10:1
- ACCTPS20 / ACCTPS40 / ACCTPS88: Pipe adapter with M12x1 internal thread + Sighting tube with M12x1 external thread

**Accessories**
- ACCSAP
- ACCTAPMHC
- Massive housing of:
  - Stainless steel (D06ACCTMHC)
  - Compact, brass (D06ACCTMHC)
  - Anodized aluminum (D06ACCTMHA)

**Combinations**
- ACCTAPL
- ACCTAPL / ACCTAPL (2:1 optics)
- ACCTAPL / ACCTAPL (2:1 optics)
- ACCTAPL / ACCTAPL (2:1 optics)

**CTex LT + CTex LT hot**
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**Advantage**
- Two-piece measuring system with active electronic for evaluation and passive IR receiver (sensing head)
- CTex sensing head can be installed as passive element in hazardous areas
- Energy limitation with appropriate zener barriers (STAH), with approval for zone 1 (PTB 01 ATEX 2053)
Infrared thermometers
with highest optical resolution and double laser

CSlaser series
Single-piece - Electronic within sensing head
Probably the most space-saving design is the one-piece measuring head. Optics and electronics are built into one compact device.

CTlaser series
Two-piece - Sensing head and separate electronic box
The two-part thermometer design consists of the measuring head and separate electronics box. In addition to easy device configuration and a temperature display, the electronics box offers the possibility to choose between different interfaces, such as USB, RS232, RS485, Modbus RTU, Profibus DP and Ethernet.

Ratio pyrometer
In metallurgy, a high emission of dust, smoke or vapor often cannot be avoided. A ratio thermometer ensures a reliable temperature measurement of melts or metallic surfaces even under these adverse conditions. The CTRatio provides constant measurement results even with a partially dirty lens or for objects that move within the measurement area (e.g. metal rods or wires).
Infrared thermometers
CTLaser series

<table>
<thead>
<tr>
<th>Basic model</th>
<th>CTLaser</th>
<th>CTLaser</th>
<th>CTLaser</th>
<th>CTLaser</th>
<th>CTLaser</th>
<th>CTLaser</th>
<th>CTLaser</th>
<th>CTLaser</th>
<th>CTLaser</th>
</tr>
</thead>
<tbody>
<tr>
<td>Type</td>
<td>LTL / LTF</td>
<td>LTF</td>
<td>LTF</td>
<td>LTF</td>
<td>LTF</td>
<td>LTF</td>
<td>LTF</td>
<td>LTF</td>
<td>LTF</td>
</tr>
<tr>
<td>Classification / special features</td>
<td>Two-piece sensor with separate electronic box for high temp. measurement of liquid metal, incl. programming keys and display</td>
<td>Two-piece sensor with separate electronic box for high temp. measurement of metal, incl. programming keys and display</td>
<td>Two-piece sensor with separate electronic box for low temp. measurement of metal, incl. programming keys and display</td>
<td>Two-piece sensor for high temp. and high speed measurements, with separate electronic box incl. programming keys and display</td>
<td>Two-piece sensor with separate electronic box for measurement of glass, incl. programming keys and display</td>
<td>Two-piece sensor with separate electronic box for measurement of ultra-thin glass sheets, incl. programming keys and display</td>
<td>Two-piece sensor with separate electronic box for high temp. measurement of glass with green laser, incl. programming keys and display</td>
<td>Two-piece sensor with separate electronic box for high temp. measurement of glass with green laser, incl. programming keys and display</td>
<td>Two-piece sensor with separate electronic box for high temp. measurement of glass with green laser, incl. programming keys and display</td>
</tr>
<tr>
<td>Detector</td>
<td>Thermopile</td>
<td>Si</td>
<td>1M/Si</td>
<td>2M/InGaAs</td>
<td>Extended InGaAs</td>
<td>InGaAsB</td>
<td>Thermopile</td>
<td>Thermopile</td>
<td>Thermopile</td>
</tr>
<tr>
<td>Sensing head exchangeable</td>
<td>■</td>
<td>■</td>
<td>■</td>
<td>■</td>
<td>■</td>
<td>■</td>
<td>■</td>
<td>■</td>
<td>■</td>
</tr>
<tr>
<td>Head cable shortening</td>
<td>■ [max. 6 m]</td>
<td>■ [max. 6 m]</td>
<td>■ [max. 6 m]</td>
<td>■ [max. 6 m]</td>
<td>■ [max. 6 m]</td>
<td>■ [max. 6 m]</td>
<td>■ [max. 6 m]</td>
<td>■ [max. 6 m]</td>
<td>■ [max. 6 m]</td>
</tr>
<tr>
<td>Thread (sensing head)</td>
<td>M4x0.5</td>
<td>M4x0.5</td>
<td>M4x0.5</td>
<td>M4x0.5</td>
<td>M4x0.5</td>
<td>M4x0.5</td>
<td>M4x0.5</td>
<td>M4x0.5</td>
<td>M4x0.5</td>
</tr>
<tr>
<td>Spectral range</td>
<td>6 – 14 μm 0.5/25μm</td>
<td>1M: 1.0 μm 2M: 1.6 μm</td>
<td>2.3 μm</td>
<td>2.2 – 6 μm</td>
<td>MF: 3.3 μm / F: 2.4 μm /</td>
<td>90 μs</td>
<td>90 μs</td>
<td>90 μs</td>
<td>90 μs</td>
</tr>
<tr>
<td>Temperature ranges</td>
<td>–50...957°C</td>
<td>1000...2000°C</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Temperature resolution</td>
<td>0.2 K</td>
<td>0.1 K</td>
<td>0.1 K</td>
<td>0.1 K</td>
<td>0.1 K</td>
<td>0.1 K</td>
<td>0.1 K</td>
<td>0.1 K</td>
<td>0.1 K</td>
</tr>
<tr>
<td>Option: CF lens</td>
<td>■</td>
<td>■</td>
<td>■</td>
<td>■</td>
<td>■</td>
<td>■</td>
<td>■</td>
<td>■</td>
<td>■</td>
</tr>
<tr>
<td>Smallest spot (CF optics / add. CF lens)</td>
<td>L: 0.9 mm @ 70 mm 1L: 1.4 mm @ 70 mm</td>
<td>0.5 mm @ 150 mm</td>
<td>0.5 mm @ 150 mm</td>
<td>0.5 mm @ 150 mm</td>
<td>1.6 mm @ 70 mm</td>
<td>1.6 mm @ 70 mm</td>
<td>1.6 mm @ 70 mm</td>
<td>1.6 mm @ 70 mm</td>
<td>1.6 mm @ 70 mm</td>
</tr>
<tr>
<td>Smallest spot (BF optics)</td>
<td>L: 16 mm @ 1200 mm 1L: 24 mm @ 1200 mm</td>
<td>7.3 mm @ 1100 mm</td>
<td>3.7 mm @ 1100 mm</td>
<td>7.3 mm @ 1100 mm</td>
<td>11 mm @ 1200 mm</td>
<td>11 mm @ 1200 mm</td>
<td>11 mm @ 1200 mm</td>
<td>11 mm @ 1200 mm</td>
<td>11 mm @ 1200 mm</td>
</tr>
<tr>
<td>Response time (90%)</td>
<td>1.2 ms / LTL: 9 ms</td>
<td>1 ms</td>
<td>1 ms</td>
<td>1 ms</td>
<td>10 μs</td>
<td>10 μs</td>
<td>10 μs</td>
<td>10 μs</td>
<td>10 μs</td>
</tr>
<tr>
<td>Accuracy</td>
<td>±(0.3 % Tmax + 2°C)</td>
<td>±(0.3 % Tmax + 2°C)</td>
<td>±(0.3 % Tmax + 2°C)</td>
<td>±(0.3 % Tmax + 2°C)</td>
<td>±(0.3 % Tmax + 2°C)</td>
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<td>±(0.3 % Tmax + 2°C)</td>
<td>±(0.3 % Tmax + 2°C)</td>
</tr>
<tr>
<td>Optical resolution</td>
<td>LTL: 120:1 / LTF: 9 ms</td>
<td>1 ms</td>
<td>1 ms</td>
<td>1 ms</td>
<td>300 μs (80 μs exposure time)</td>
<td>10 ms</td>
<td>10 ms</td>
<td>10 ms</td>
<td>10 ms</td>
</tr>
<tr>
<td>External emissivity adjustment</td>
<td>■</td>
<td>■</td>
<td>■</td>
<td>■</td>
<td>■</td>
<td>■</td>
<td>■</td>
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<tr>
<td>External background temperature control</td>
<td>■</td>
<td>■</td>
<td>■</td>
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<td>■</td>
<td>■</td>
<td>■</td>
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<td>■</td>
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<tr>
<td>Trigger input for reset of hold functions</td>
<td>■</td>
<td>■</td>
<td>■</td>
<td>■</td>
<td>■</td>
<td>■</td>
<td>■</td>
<td>■</td>
<td>■</td>
</tr>
<tr>
<td>Digital I/O pins / number</td>
<td>■</td>
<td>■</td>
<td>■</td>
<td>■</td>
<td>■</td>
<td>■</td>
<td>■</td>
<td>■</td>
<td>■</td>
</tr>
<tr>
<td>Simultaneous analog and digital output</td>
<td>■</td>
<td>■</td>
<td>■</td>
<td>■</td>
<td>■</td>
<td>■</td>
<td>■</td>
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<td>■</td>
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<tr>
<td>Alarm output as alternative analog output</td>
<td>■</td>
<td>■</td>
<td>■</td>
<td>■</td>
<td>■</td>
<td>■</td>
<td>■</td>
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<tr>
<td>Additional alarm output / switching output</td>
<td>■</td>
<td>■</td>
<td>■</td>
<td>■</td>
<td>■</td>
<td>■</td>
<td>■</td>
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<td>■</td>
</tr>
<tr>
<td>Voltage supply</td>
<td>8 – 56 V DC</td>
<td>8 – 56 V DC</td>
<td>8 – 56 V DC</td>
<td>8 – 56 V DC</td>
<td>8 – 36 V DC</td>
<td>8 – 36 V DC</td>
<td>8 – 36 V DC</td>
<td>8 – 36 V DC</td>
<td>8 – 36 V DC</td>
</tr>
<tr>
<td>Standard cable length</td>
<td>3 m</td>
<td>3 m</td>
<td>3 m</td>
<td>3 m</td>
<td>3 m</td>
<td>3 m</td>
<td>3 m</td>
<td>3 m</td>
<td>3 m</td>
</tr>
<tr>
<td>Cable length options</td>
<td>8 / 15 m</td>
<td>8 / 15 m</td>
<td>8 / 15 m</td>
<td>8 / 15 m</td>
<td>8 / 15 m</td>
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</tbody>
</table>
### Basic model

<table>
<thead>
<tr>
<th>Type</th>
<th>CSvideo</th>
<th>CSvideo</th>
<th>CTvideo</th>
<th>CTvideo</th>
</tr>
</thead>
<tbody>
<tr>
<td>Classification / special features</td>
<td>Single-piece two wire sensor with electronics in sensing head, video camera and cross hair laser for measuring metal</td>
<td>Single-piece two wire sensor for low temperature measurement of metals with electronics in sensing head, video camera and cross hair laser</td>
<td>Two-piece sensor with electronic box for high temperature measurement of metals, video camera and cross hair laser</td>
<td>Two-piece sensor with electronic box for low temperature measurement of metals, video camera and cross hair laser</td>
</tr>
<tr>
<td>Detector</td>
<td>InGaAs</td>
<td>InGaAs</td>
<td>InGaAs</td>
<td>Extended InGaAs</td>
</tr>
<tr>
<td>Sensing head exchangeable</td>
<td>–</td>
<td>–</td>
<td>–</td>
<td>–</td>
</tr>
<tr>
<td>Head cable shortening</td>
<td>–</td>
<td>–</td>
<td>–</td>
<td>–</td>
</tr>
<tr>
<td>Thread (sensing head)</td>
<td>4-8 x 1.5</td>
<td>4-8 x 1.5</td>
<td>4-8 x 1.5</td>
<td>4-8 x 1.5</td>
</tr>
<tr>
<td>Spectral range</td>
<td>2.0 μm to infinity</td>
<td>2.0 μm to infinity</td>
<td>2.0 μm to infinity</td>
<td>2.0 μm to infinity</td>
</tr>
<tr>
<td>Temperature resolution</td>
<td>0.1 K</td>
<td>0.1 K</td>
<td>0.1 K</td>
<td>0.1 K</td>
</tr>
<tr>
<td>Optical resolution</td>
<td>3ML: 100:1 / 2ML: 150:1</td>
<td>3ML: 0.1 mm @ 90 mm / 2ML: 0.15 mm @ 90 mm</td>
<td>1.5 ML: 485 °C / 2ML: 650 °C / 3ML: 100 °C – 2000 °C</td>
<td>1.5 ML: 480 °C / 2ML: 650 °C / 3ML: 100 °C – 2000 °C</td>
</tr>
<tr>
<td>Smallest spot (SF-optics)</td>
<td>2MH: 1.3 mm @ 200 mm / 2ML: 0.7 mm @ 200 mm</td>
<td>2ML: 3.3 mm @ 200 mm / 3ML: 2.0 mm @ 200 mm</td>
<td>3ML: 0.3 mm @ 90 mm / 2ML: 0.6 mm @ 90 mm / 1ML: 0.3 mm @ 90 mm</td>
<td>3ML: 0.3 mm @ 90 mm / 2ML: 0.6 mm @ 90 mm / 1ML: 0.3 mm @ 90 mm</td>
</tr>
<tr>
<td>Sighting</td>
<td>Video camera and cross hair laser</td>
<td>Video camera and cross hair laser</td>
<td>Video camera and cross hair laser</td>
<td>Video camera and cross hair laser</td>
</tr>
<tr>
<td>Response time (90%)</td>
<td>15 ms</td>
<td>15 ms</td>
<td>15 ms</td>
<td>1 ms</td>
</tr>
<tr>
<td>Accuracy</td>
<td>±(0.3 % Tmeas + 2 °C)</td>
<td>±(0.3 % Tmeas + 2 °C)</td>
<td>±(0.3 % Tmeas + 2 °C)</td>
<td>±(0.3 % Tmeas + 2 °C)</td>
</tr>
<tr>
<td>Outputs analog</td>
<td>0 – 20 mA / 4 – 20 mA / 0 – 5 V / 0 – 10 V</td>
<td>0 – 20 mA / 4 – 20 mA / 0 – 5 V / 0 – 10 V</td>
<td>0 – 20 mA / 4 – 20 mA / 0 – 5 V / 0 – 10 V</td>
<td>0 – 20 mA / 4 – 20 mA / 0 – 5 V / 0 – 10 V</td>
</tr>
<tr>
<td>Interfaces: USB</td>
<td>RS232</td>
<td>RS232</td>
<td>USB OTG (On The Go)</td>
<td>USB OTG (On The Go)</td>
</tr>
<tr>
<td>Signal processing: Peak / Valley / AVG / Advanced hold</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Thead Head min.</td>
<td>–20 °C</td>
<td>–20 °C</td>
<td>–20 °C</td>
<td>–20 °C</td>
</tr>
<tr>
<td>Thead Head max.</td>
<td>70 °C</td>
<td>70 °C (50 °C at Laser ON)</td>
<td>70 °C</td>
<td>70 °C</td>
</tr>
<tr>
<td>Thead Electronics max.</td>
<td>70 °C</td>
<td>85 °C</td>
<td>85 °C</td>
<td>85 °C</td>
</tr>
<tr>
<td>Functional inputs / number</td>
<td>– / –</td>
<td>– / –</td>
<td>– / –</td>
<td>– / –</td>
</tr>
<tr>
<td>External emissivity adjustment</td>
<td>–</td>
<td>–</td>
<td>–</td>
<td>–</td>
</tr>
<tr>
<td>External background temperature control</td>
<td>–</td>
<td>–</td>
<td>–</td>
<td>–</td>
</tr>
<tr>
<td>Trigger input for reset of hold functions</td>
<td>–</td>
<td>–</td>
<td>–</td>
<td>–</td>
</tr>
<tr>
<td>Simultaneous analog and digital output</td>
<td>–</td>
<td>–</td>
<td>–</td>
<td>–</td>
</tr>
<tr>
<td>Alarm output as an alternative to analog output</td>
<td>–</td>
<td>–</td>
<td>–</td>
<td>–</td>
</tr>
<tr>
<td>Additional alarm output</td>
<td>0 – 30 V / 500 mA (open-collector)</td>
<td>0 – 30 V / 500 mA (open-collector)</td>
<td>0 – 20 mA (open-collector)</td>
<td>0 – 20 mA (open-collector)</td>
</tr>
<tr>
<td>Voltage supply</td>
<td>5 – 28 V DC</td>
<td>5 – 28 V DC</td>
<td>5 – 36 V DC</td>
<td>5 – 36 V DC</td>
</tr>
<tr>
<td>Standard cable length</td>
<td>3 m</td>
<td>3 m</td>
<td>3 m</td>
<td>3 m</td>
</tr>
<tr>
<td>Cable length options</td>
<td>8 / 15 m</td>
<td>8 / 15 m</td>
<td>5 / 10 m</td>
<td>5 / 10 m</td>
</tr>
</tbody>
</table>

1) Specifications available for object temperatures ≥ lower measurement range 50 °C.

---

**Infrared video thermometers**

**CSvideo / CTvideo** with variable focus and patented cross hair laser

---

**Software pyrometer**

**Software CompactConnect / CompactPlus Connect** Suitable for all optris infrared thermometer of the high performance series and compact line

- Automatic snapshots (time or temperature dependent) to control and document the process
- Graphical display and recording of the measurement values
- Setup of sensor parameters and signal processing functions
- Remote control of the sensor

**Connection options for CSvideo 2M**

| Analog operation mode: | 4 – 20 mA and alarm interface |
| Digital operation mode: | process control (video and temperature) |

**IRmobile App**

Tool for all optris pyrometers

- Change of the temperature unit: Celsius or Fahrenheit
- Integrated simulator
- Save / load configurations and T / t diagrams
- Pyrometer adjustment
- Alignment of the sensor via live video image with integrated simultaneous temperature display (CSvideo / CTvideo)
- Adjustment of emissivity, transmissivity and other parameters
- Scaling the analog output and setting the alarm output

**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 (On The Go)
More and more manufacturers of electronic circuit boards rely on noncontact temperature measurement due to the constantly increasing performance of their components. 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.

A sterilization of a defined temperature level is important to produce aseptic glass bottles for pharmaceutical products. A variant of the heat treatment of metals is induction hardening. The desired microstructure of the metal depends on an optimal temperature-time curve.
Compact spot finder IR camera for use in harsh industrial environments, autonomous operation possible.

### Basic model

<table>
<thead>
<tr>
<th>Model</th>
<th>Xi 80</th>
<th>Xi 400</th>
<th>Xi 410</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Type</strong></td>
<td>IR</td>
<td>IR</td>
<td>IR</td>
</tr>
<tr>
<td><strong>Detector</strong></td>
<td>PPA, uncooled (34 μm pitch)</td>
<td>PPA, uncooled (17 μm pitch)</td>
<td>PPA, uncooled (17 μm pitch)</td>
</tr>
<tr>
<td><strong>Optical resolution</strong></td>
<td>80 x 80 pixels</td>
<td>382 x 288 pixels</td>
<td>384 x 240 pixels</td>
</tr>
<tr>
<td><strong>Spectral range</strong></td>
<td>8 – 14 μm</td>
<td>8 – 14 μm</td>
<td>8 – 14 μm</td>
</tr>
<tr>
<td><strong>Temperature range</strong></td>
<td>–20 ... 100 °C; 0 ... 250 °C</td>
<td>–20 ... 100 °C; 0 ... 250 °C</td>
<td>–20 ... 100 °C; 0 ... 250 °C</td>
</tr>
<tr>
<td><strong>Frame rate</strong></td>
<td>50 Hz</td>
<td>50 Hz</td>
<td>25 Hz</td>
</tr>
<tr>
<td><strong>Optics (FOV)</strong></td>
<td>30° x 22° (f = 12.7 mm)</td>
<td>29° x 19° (f = 20 mm)</td>
<td>18° x 12° (f = 20 mm)</td>
</tr>
<tr>
<td><strong>New: Microscope optics</strong></td>
<td>80° x 64° (f = 6 mm)</td>
<td>80° x 54° (f = 7.7 mm)</td>
<td>80° x 44° (f = 5.7 mm)</td>
</tr>
<tr>
<td><strong>Focus</strong></td>
<td>Manual motor focus</td>
<td>Manual motor focus</td>
<td>Manual motor focus</td>
</tr>
<tr>
<td><strong>Optical resolution (D:S)</strong></td>
<td>90 – 110 mm</td>
<td>90 – 110 mm</td>
<td>90 – 110 mm</td>
</tr>
<tr>
<td><strong>Thermal sensitivity (NETD)</strong></td>
<td>100 mK</td>
<td>80 mK</td>
<td>80 mK</td>
</tr>
<tr>
<td><strong>Size / class</strong></td>
<td>Ø 36 x 90 mm (M30x1 thread) / Ø 36 x 100 mm (M30x1 thread)</td>
<td>Ø 36 x 90 mm (M30x1 thread) / Ø 36 x 100 mm (M30x1 thread)</td>
<td>Ø 36 x 90 mm (M30x1 thread) / Ø 36 x 100 mm (M30x1 thread)</td>
</tr>
<tr>
<td><strong>Ambient temperature (T Amb)</strong></td>
<td>–20 ... 100 °C; 0 ... 250 °C; 0 °C ... 50 °C</td>
<td>–20 ... 100 °C; 0 ... 250 °C; 0 °C ... 50 °C</td>
<td>–20 ... 100 °C; 0 ... 250 °C; 0 °C ... 50 °C</td>
</tr>
<tr>
<td><strong>Spectral range</strong></td>
<td>8 – 14 μm</td>
<td>8 – 14 μm</td>
<td>8 – 14 μm</td>
</tr>
<tr>
<td><strong>Detector</strong></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><strong>IR</strong></td>
<td>IR</td>
<td>IR</td>
<td>IR</td>
</tr>
</tbody>
</table>
| **Microscope optics for the inspection of assembled circuit boards**

The new microscope optics for the optris Xi 400 infrared camera allows reliable temperature measurement on tiny objects from 240 μm (IFOV). 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. Due to the bulk unit motor focus, the camera can be easily mounted in the supplied PIX Connect software focus. For measuring even smaller objects we recommend the PI 640microscope optics, smallest measuring spot: 28 μm (IFOV).

Further information on page 21 and [www.optris.global/optris-xi-400-microscope-optics](http://www.optris.global/optris-xi-400-microscope-optics)
Infrared cameras

**PI series Precision Line**

The optris infrared cameras of the PI Precision Line offer imaging infrared temperature measurement devices for numerous industrial applications. From all-round talents like the optris PI 400i / 450i to high resolution VGA cameras (optris PI 640i) and special imagers for metal as well as glass applications and even microscope images, we meet your every expectation.

---

### Basic model

<table>
<thead>
<tr>
<th>Model</th>
<th>PI 400i / PI 450i</th>
<th>PI 640i</th>
<th>PI 640i Microscope optics</th>
<th>PI 450i G7</th>
<th>PI 640i G7</th>
</tr>
</thead>
<tbody>
<tr>
<td>Type</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Detector</td>
<td>FPA, uncooled (17 μm pitch)</td>
<td>FPA, uncooled (17 μm pitch)</td>
<td>FPA, uncooled (17 μm pitch)</td>
<td>FPA, uncooled (17 μm pitch)</td>
<td>FPA, uncooled (17 μm pitch)</td>
</tr>
<tr>
<td>Optical resolution</td>
<td>382 x 289 pixels</td>
<td>640 x 480 pixels VGA</td>
<td>640 x 480 pixels @ 32 Hz</td>
<td>640 x 480 pixels @ 72 Hz</td>
<td>382 x 289 pixels</td>
</tr>
<tr>
<td>Spectral range</td>
<td>8 – 14 μm</td>
<td>8 – 14 μm</td>
<td>8 – 14 μm</td>
<td>7.9 μm</td>
<td>7.9 μm</td>
</tr>
<tr>
<td>Frame rate</td>
<td>80 Hz / switchable to 27 Hz</td>
<td>32 Hz / 125 Hz in subframe mode (640 x 120 pixels)</td>
<td>32 Hz / 125 Hz in subframe mode (640 x 120 pixels)</td>
<td>80 Hz / switchable to 27 Hz</td>
<td>32 Hz / 125 Hz in subframe mode (640 x 120 pixels)</td>
</tr>
<tr>
<td><strong>Optics (FOV)</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>PI 400i</td>
<td>29° x 22° / f = 12.7 mm or 18° x 14° / f = 20 mm or 53° x 38° / f = 7.7 mm or 80° x 54° / f = 7.7 mm</td>
<td>12° x 9° (PIF 1.1) / f = 44 mm</td>
<td>Smallest measuring spot (FOV): 28 μm</td>
<td>28° x 22° / f = 12.7 mm or 18° x 14° / f = 20 mm or 50° x 38° / f = 7.7 mm or 80° x 54° / f = 7.7 mm</td>
<td>33° x 25° (f = 18.7 mm or 15° x 11° / f = 24 mm or 90° x 64° / f = 7.7 mm or 80° x 54° / f = 7.7 mm</td>
</tr>
<tr>
<td>PI 450i</td>
<td>40 mm x 33°, 60° and 90° FOV</td>
<td>60 mm x 18° FOV</td>
<td>60 mK</td>
<td>80 mK</td>
<td></td>
</tr>
<tr>
<td>PI 400i (640 x 120 pixels)</td>
<td>60 mK</td>
<td>150 mK</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>PI 450i (640 x 120 pixels)</td>
<td>80 mK</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**System accuracy (at T_{Amb} = 23 ± 5°C)**

- PI 400i: ±0.2 % of reading ±2°C or ±2 %, whichever is greater
- PI 450i: ±0.2 % of reading ±2°C or ±2 %, whichever is greater
- PI 400i Microscope optics: ±0.05 °C / K² ±0.05 % / K² ±0.05 % / K²

**Ambient temperature (T_{Amb})**

- PI 400i: 0...50 °C / PI 450i: 0...70 °C

**Relative Humidity**

- PI 400i: 0...85 °C
- PI 450i: 0...85 °C
- PI 640i: 0...85 °C
- PI 450i (640 x 120 pixels) 0...85 °C

**Power supply**

- PI 400i: USB 2.0 / optional USB to GigE (PoE) / Interface
- PI 450i: USB 2.0 / optional USB to GigE (PoE) / Interface
- PI 640i: USB 2.0 / optional USB to GigE (PoE) / Interface

**Scope of supply (standard)**

- USB camera with lens
- USB cable (1 m)
- Table tripod
- PIF cable with terminal block (1 m)
- Manual
- Aluminum case (PI 400i)
- Rugged outdoor case (PI 450i)
- Software package optris PIX Connect
- USB camera with lens (standard kit [PI 640i: CO3), microscope lens [MOD19], microscope stand)
- USB cable (1 m)
- Table tripod
- PIF cable with terminal block (1 m)
- Manual
- Rugged outdoor case
- Software package optris PIX Connect
- USB camera with lens
- USB cable (1 m)
- Table tripod
- PIF cable with terminal block (1 m)
- Manual
- Rugged outdoor case
- Software package optris PIX Connect

---

1) Accuracy effective starting at 150 °C
2) For T_{Amb} = 10...30 °C and T_{Amb} ≤ 500 °C, otherwise: ± 0.1 °C / K² ±0.05 % / K² (whichever is greater)
3) For further details see operator’s manual

---

For further information on our infrared cameras see our [Infrared camera brochure](#).

---

**Optris calculator App**

With high resolution for fast online applications and exchangeable lenses, including line scan function.
Infrared cameras

**Basic model**

<table>
<thead>
<tr>
<th>Type</th>
<th>PI05M</th>
<th>PI08M</th>
<th>PI1M</th>
</tr>
</thead>
<tbody>
<tr>
<td>Detector</td>
<td>CMOS (15 µm pitch)</td>
<td>CMOS (15 µm pitch)</td>
<td>CMOS (15 µm pitch)</td>
</tr>
<tr>
<td>Optical resolution</td>
<td>794 x 480 Pixel (0.27 Hz)</td>
<td>382 x 228 Pixel (0.15 Hz)</td>
<td>205 x 109 Pixel (0.11 Hz)</td>
</tr>
<tr>
<td>Spectral range</td>
<td>500 – 560 nm</td>
<td>575 – 1900 nm</td>
<td>575 – 1900 nm</td>
</tr>
<tr>
<td>Temperature range</td>
<td>900 – 2650 °C (27 Hz mode)</td>
<td>625 – 1900 °C (32 Hz, 80 Hz modes)</td>
<td>750 – 1900 °C (1 kHz mode)</td>
</tr>
<tr>
<td>Frame rate</td>
<td>Up to 1 kHz / 1 ms real time analog output (0 – 10 V) of 8 x 8 pixels (freely selectable)</td>
<td>Up to 1 kHz / 1 ms real time analog output (0 – 10 V) of 8 x 8 pixels (freely selectable)</td>
<td>Up to 1 kHz / 1 ms real time analog output (0 – 10 V) of 8 x 8 pixels (freely selectable)</td>
</tr>
<tr>
<td>Optics (FOV)</td>
<td>FOV @ 764 x 480 px: 26° x 15° (f = 25 mm)</td>
<td>FOV @ 382 x 228 px: 13° x 10° (f = 25 mm)</td>
<td>FOV @ 382 x 228 px: 13° x 10° (f = 25 mm)</td>
</tr>
<tr>
<td>Temperature</td>
<td>5 ... 50 °C</td>
<td>5 ... 50 °C</td>
<td>5 ... 50 °C</td>
</tr>
<tr>
<td>Storage</td>
<td>40 – 70 °C</td>
<td>40 – 70 °C</td>
<td>40 – 70 °C</td>
</tr>
<tr>
<td>Relative Humidity</td>
<td>10 – 95 °C, non-condensing</td>
<td>10 – 95 °C, non-condensing</td>
<td>10 – 95 °C, non-condensing</td>
</tr>
<tr>
<td>Weight</td>
<td>245 – 311 g, depending on lens</td>
<td>245 – 311 g, depending on lens</td>
<td>245 – 311 g, depending on lens</td>
</tr>
<tr>
<td>Shock / Vibration</td>
<td>IEC 60068-2</td>
<td>IEC 60068-2</td>
<td>IEC 60068-2</td>
</tr>
<tr>
<td>Tripod mount</td>
<td>1/4-20 UNC</td>
<td>1/4-20 UNC</td>
<td>1/4-20 UNC</td>
</tr>
<tr>
<td>Power supply</td>
<td>via USB</td>
<td>via USB</td>
<td>via USB</td>
</tr>
</tbody>
</table>

**Detector**

- CMOS (15 µm pitch)
- IR, ROIS

**Optical resolution**

- 794 x 480 Pixel (0.27 Hz)
- 382 x 228 Pixel (0.15 Hz)
- 205 x 109 Pixel (0.11 Hz)

**Spectral range**

- 500 – 560 nm
- 575 – 1900 nm
- 575 – 1900 nm

**Temperature range**

- 900 – 2650 °C (27 Hz mode)
- 625 – 1900 °C (32 Hz, 80 Hz modes)
- 750 – 1900 °C (1 kHz mode)

**Frame rate**

- Up to 1 kHz / 1 ms real time analog output (0 – 10 V) of 8 x 8 pixels (freely selectable)

**Optics (FOV)**

- FOV @ 764 x 480 px: 26° x 15° (f = 25 mm)
- FOV @ 382 x 228 px: 13° x 10° (f = 25 mm)

**Temperature**

- 5 ... 50 °C
- 40 – 70 °C
- 5 ... 50 °C

**Storage**

- 40 – 70 °C
- 40 – 70 °C
- 40 – 70 °C

**Relative Humidity**

- 10 – 95 °C, non-condensing
- 10 – 95 °C, non-condensing
- 10 – 95 °C, non-condensing

**Weight**

- 245 – 311 g, depending on lens
- 245 – 311 g, depending on lens
- 245 – 311 g, depending on lens

**Shock / Vibration**

- IEC 60068-2

**Tripod mount**

- 1/4-20 UNC

**Power supply**

- via USB

**Scope of supply (standard)**

- USB camera with lens
- Lens tube incl. protective window
- USB cable (1 m)
- Table tripod
- PIF cable with terminal block (1 m)
- Software package optics PIX Connect
- Manual
- Aluminium case
- Optional: Cooling/Jacket, HT cable

- USB camera with lens
- Lens tube incl. protective window
- USB cable (1 m)
- Table tripod
- PIF cable with terminal block (1 m)
- Software package optics PIX Connect
- Manual
- Aluminium case
- Optional: Cooling/Jacket, HT cable

- USB camera with lens
- Lens tube incl. protective window
- USB cable (1 m)
- Table tripod
- PIF cable with terminal block (1 m)
- Software package optics PIX Connect
- Manual
- Aluminium case
- Optional: Cooling/Jacket, HT cable

---

**Important specifications**

1. Accuracy effective starting at +75 °C with optics (f = 50 mm – f = 75 mm)
2. Specified NETD value applies to all frequencies
3. For Ambient temperature at +25 °C
4. For further details see operator’s manual

---

**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 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.**

**Monitoring temperatures of glass sheets**

**Software PIX Connect**

- Comprehensive IR camera software without licensing restrictions
- With intuitive user interface.

---

**Top Down GIS 640 R**

- New

---

**Infrared cameras**

**PI series**

- **Basic model**
  - PI05M
  - PI08M
  - PI1M

- **Detector**
  - CMOS (15 µm pitch)
- **Optical resolution**
  - 794 x 480 Pixel (0.27 Hz)
  - 382 x 228 Pixel (0.15 Hz)
- **Spectral range**
  - 500 – 560 nm
- **Temperature range**
  - 900 – 2650 °C (27 Hz mode)
- **Frame rate**
  - Up to 1 kHz / 1 ms
- **Optics (FOV)**
  - FOV @ 764 x 480 px: 26° x 15° (f = 25 mm)
  - FOV @ 382 x 228 px: 13° x 10° (f = 25 mm)

---

**Thermal sensitivity NETD**

- < 2 K (< 1400 °C)
- < 4 K (< 2100 °C)

---

**System accuracy (at Tamb 23 ±5 °C)**

- For object temperature < 2000 °C:
  - ±2 % of reading for 1 kHz
- For object temperature > 1500 °C:
  - ±2 % of reading for 1 kHz
- For object temperature > 1500 °C:
  - ±2 % of reading for 1 kHz

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**Process Interface (PIF)**

- Standard PIF
- Industrial PIF (optional)

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**IR imager PI 640i**

- 600 °C
- 50 °C

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**New**

- Top down system with additional reference pyrometer from underneath 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

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**Glass inspection system**

- Comprehensive IR camera software without licensing restrictions
- With intuitive user interface.

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**New**

- Top down system with additional reference pyrometer from underneath for automatic emissivity correction
- Digitally controlled lens protection system (DCLP) avoids extra air purging
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**Software PIX Connect**

- Comprehensive IR camera software without licensing restrictions
- With intuitive user interface.

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**New**

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- Glass area calculation
- Pre-assembled system for easy installation on glass tempering furnaces
- Automatic scan line adjustment – insensitive to distortions
Outdoor protective housing for infrared cameras

Features
- Environmental rating IP 66
- Additional air purge collar allows for a continuous operation in dusty and humid conditions
- Heating element and build-in fan enable for a 24/7 operation from -40 °C to 50 °C
- Installation of USB Server Gigabit 2.0 and industrial process interface possible for integration into control systems over large outdoor distances

PI NetBox

Features
- Miniature PC as an add-on to the PI series for stand-alone system or for cable extension via GigE
- Integrated hardware and software watchdog
- Installation of additional user software possible
- Status LEDs
- Processor: Intel® E3845 Quad Core / 1.91 GHz, 16 GB SSD, 2 GB RAM
- Connections: 2 x USB 2.0, 1 x USB 3.0, 1 x Mini USB 2.0, Micro HDMI, Ethernet (Gigabit Ethernet), Micro SDHC / SDXC card
- Wide supply voltage range (8 – 48 V DC) or Power over Ethernet (PoE)
- Can be integrated into CoolingJacket Advanced

Part number: ACPIOPH
Part number: OPTPINBW712G

USB Server Gigabit 2.0 for optris PI cameras

Features
- Fully USB 2.0 compatible, Data rates: 1.5 / 12 / 480 Mbit/s, USB transfer mode: Isochronous
- Network connection via Gigabit Ethernet
- For optris PI series and XI-400 as well as CTvideo / CSvideo series
- Full TCP/IP support incl. routing and DNS
- Two independent USB ports
- Supply from PoE or external power supply with 24 – 48 V DC
- Galvanic isolation 500 VRMS (network connection)
- Remotely configurable via Web-Based Management
- Proven technology from Wiesemann & Theis

Part number: ACPIUSB5GB

Industrial Process Interface (PIF) for optris PI series

Features
- Industrial process interface for PI series with 3 analog / alarm outputs, 2 analog inputs, 1 digital input, 3 alarm relays
- 500 V AC RMS isolation voltage between camera and process
- Separate fail-safe relay output
- PI hardware including all cable connections and PIX Connect software are permanently observed during operation

Part number: ACPIPIFMA

Part number: ACPIOPH
Part number: OPTPINBW712G

Part number: ACPIUSB5GB
Part number: ACPIPIFMA

Accessories PI series

CoolingJacket Advanced

Features
- Operation at ambient temperatures up to 315 °C
- 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

Part number: ACPIJA
Part number: ACCJAAPLS

Part number: ACPIJA
Part number: ACCJAAPLS

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

Part number: ACPIJA
Part number: ACCJAAPLS

Part number: ACPIJA
Part number: ACCJAAPLS

Connection options

Industrial Process Interface (PIF)

USB Server Gigabit 2.0

Part number: ACPIJA
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Part number: ACCJAAPLS
PIX Connect
Comprehensive IR camera software

- No licensing restrictions
- Modern software with intuitive user interface
- Display of numerous images in different windows
- Extensive license-free analysis and two software development kits for Windows and Linux (Ubuntu)

The HummingBoard Edge computer from SolidRun is a hardware we are recommending to all customers who want to integrate our PI and Xi imagers in their Linux based software by using our Direct SDK.

High degree of individualization for customer-specific imaging
- Various layout options for individual customization (window arrangement, toolbar)
- Temperature display in °C or °F
- Choice of individual measurement parameters tailored to the respective application

Detailed online and offline data analysis
- Detailed analysis with the help of measurement areas, automatic hot/coldspot search
- Logical linking of temperature information (measurement areas discrepancy, image subtraction)
- Slow-motion replay of radiometric datasets and analysis even without camera
- Editing of sequences, e.g., cut and save individual images
- Various color palettes to highlight thermal contrasts
- Adjustable signal processing (Max, Min, Average)

Automatic process control and quality control
- Individual setting of alarm thresholds depending on the process
- External communication of software via COM-ports, DLL
- Adjustment of thermal image via reference values
- Definition of visual or acoustic alarms and analog data output

Video recording and snapshot function
- Manually or triggered data gathering
- Radiometric video sequences (*.ravi)
- Radiometric snapshots (*.tiff, *.csv for analysis in Excel)

Infrared camera features
- Live IR image with automatic hot and cold spot
- Adjustable camera features like temperature measuring range, frame rate, and selectable color palettes
- Changing the temperature unit: Celsius or Fahrenheit
- Creating snapshots
- Integrated simulator

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

IRmobile
The setting tool for all IR cameras

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

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

Supported for
- All android devices (5.0 or higher)

Features
- Based on camera / lens combination and the distance to the object, the measuring field dimensions and pixel size are calculated precisely.
- Ensures an optimal positioning of the camera and the avoidance of measuring errors

Optris Apps

IRmobile
The setting tool for all IR cameras

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