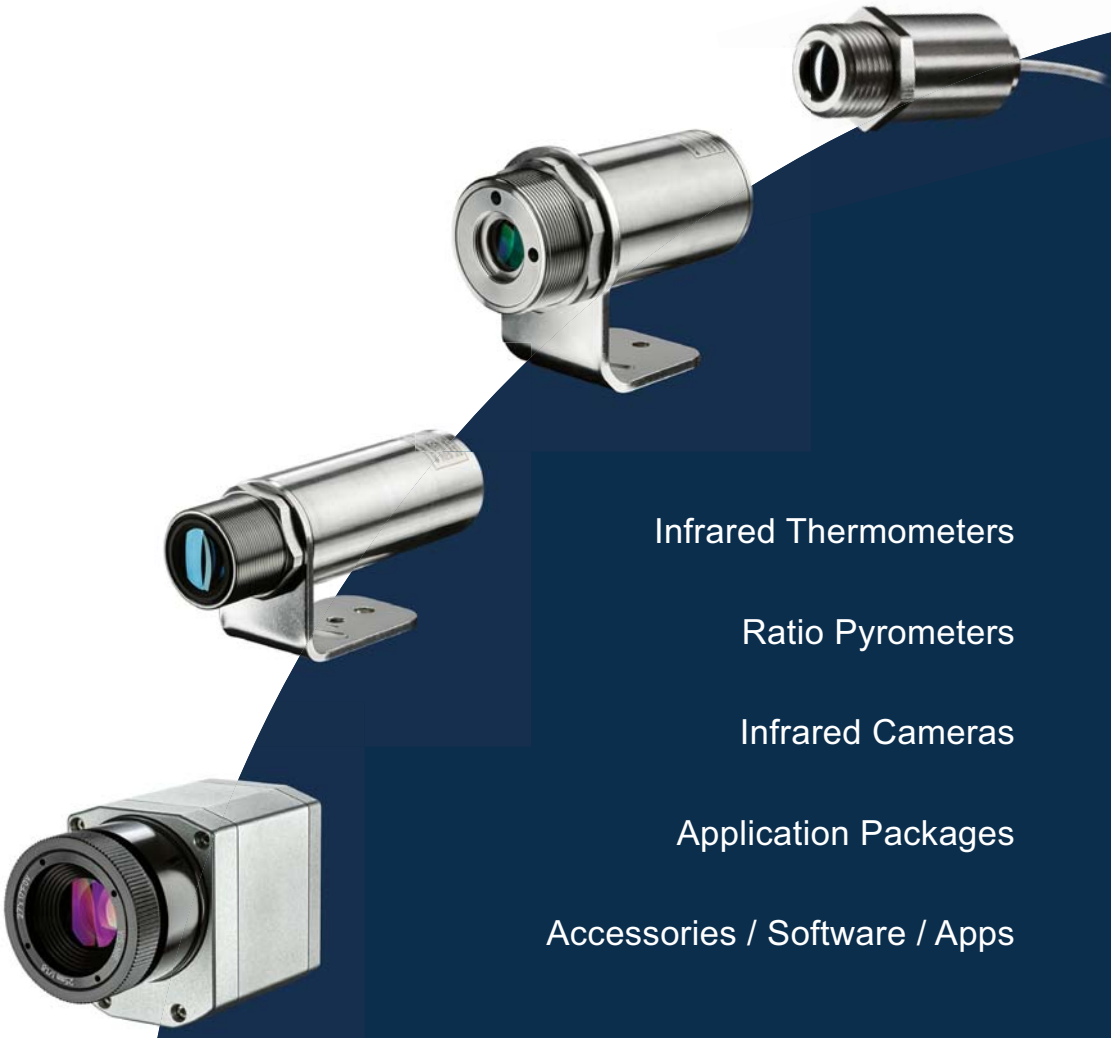
optris
infrared measurements



Infrared Thermometers

Ratio Pyrometers

Infrared Cameras

Application Packages

Accessories / Software / Apps

PRODUCT OVERVIEW

Non-contact Temperature Measurement
Made in Germany

when temperature matters

EXPERTISE IN INFRARED TEMPERATURE MEASUREMENT TECHNOLOGY

Welcome to the world of Optris!

As one of the leading companies in non-contact temperature measurement, Optris looks forward to welcoming more satisfied customers who rely on its measurement technology, known for high quality and pioneering measurement and application concepts.

Trusted Infrared Technology from Optris

Since its foundation in 2003, Optris has been dedicated to advancing the field of non-contact temperature measurement. Today, the Optris-company stands as a globally recognized provider of high-quality infrared cameras, pyrometers, software, accessories and system solutions, designed to meet the demands of modern industry—solutions engineered for reliability, precision, and flexibility across a wide range of applications.

From industrial manufacturing and automation to research and development, Optris products are trusted worldwide to deliver accurate thermal data in even the most challenging environments. A key strength of the Optris portfolio lies in its exceptional price-performance ratio. Customers benefit from advanced German engineering, robust system design, and high measurement accuracy. Optris products are developed with a strong focus on user needs, ensuring practical usability, seamless integration, and long-term operational stability.

Innovation is at the core of Optris' success. Over more than two decades, the product range has continuously evolved, incorporating new technologies and addressing increasingly specialized applications.
The result is a versatile and future-proof product portfolio, known and valued worldwide for its quality and reliability.

Dr. Sascha Kienitz, CEO of Optris GmbH & Co. KG

Flexibility and Support

Optris non-contact temperature measurement devices are flexible and versatile. Our customers are supported by experienced and knowledgeable specialists and partners who are always ready to provide the right support!

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 devices are essential pieces of equipment used in numerous industrial applications, e.g.

- Metal
- Glass
- Plastic
- Automotive
- Electronics
- Semiconductors
- Solar
- Battery Monitoring
- Early Fire Detection & Safety
- Condition Monitoring
- 3D Printing & Additive Manufacturing
- General Manufacturing
- Pharmaceutical & Medical
- Food

Applications Support

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

Further information on non-contact temperature measurement see our brochure:

IR Basic Principles

www.optris.com/download/infrared-basics

Learn more about infrared technology and check out our website:

Technology Knowledge

https://optris.com/technology/

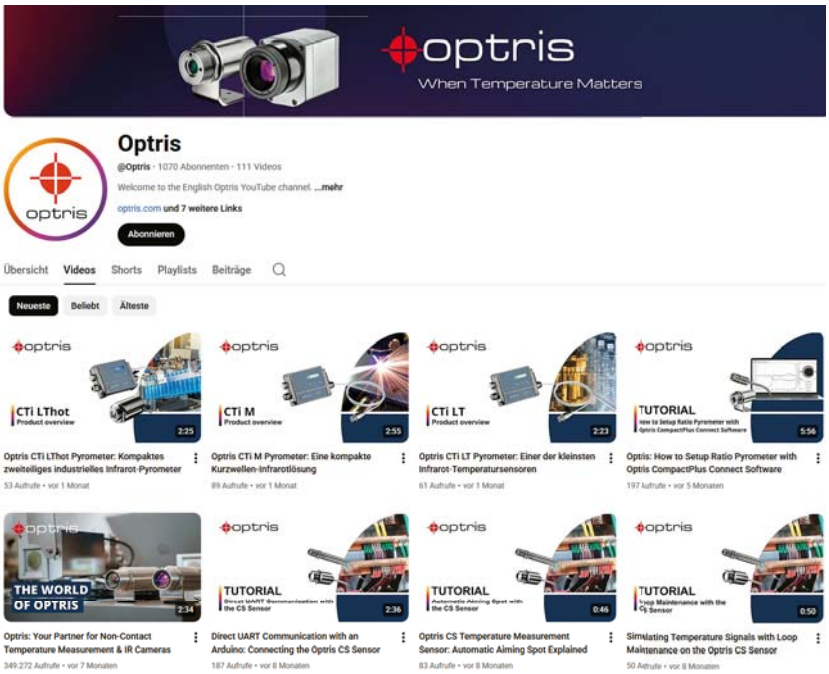
Discover the Optris YouTube Channel

Explore Optris infrared temperature measurement devices, including setup, properties, and special features.

The Optris YouTube channel provides an overview of the company and the world of infrared measurement technology.

The videos illustrate product functionality and practical industrial applications.:

- **New products**
- **How to‘s**
- **Software tutorials**
- **Hands-on-trainings**



The Adequate Measurement Device

Thermal Spot Measurement or Thermal Imaging?

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

Which measurement?

A **point-measuring infrared thermometer** should be used when the critical point or measurement area within an application is known. The **size** of the **target object** is an important factor in determining the required lens. This makes it possible to monitor temperature accurately and, if necessary, optimize processes before quality issues arise.

Pyrometer configurator:
www.optris.com/ir-thermometer-configurator

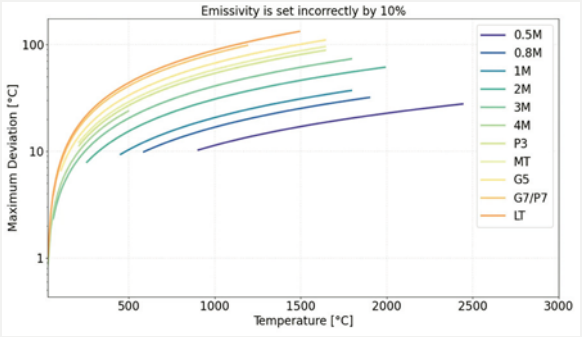
Infrared cameras should be used in cases where more than one critical area exists or the area cannot be clearly defined. Critical areas can be localized by the camera through the demonstration of thermal images. The areas can then be permanently monitored by one or multiple fixed infrared thermometers.

IR camera configurator:
www.optris.com/ir-camera-configurator

Which Material?

The condition of the object surface defines the measurement device and wavelength to be used for the application. The **emissivity Ɛ** 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 wavelength.

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:

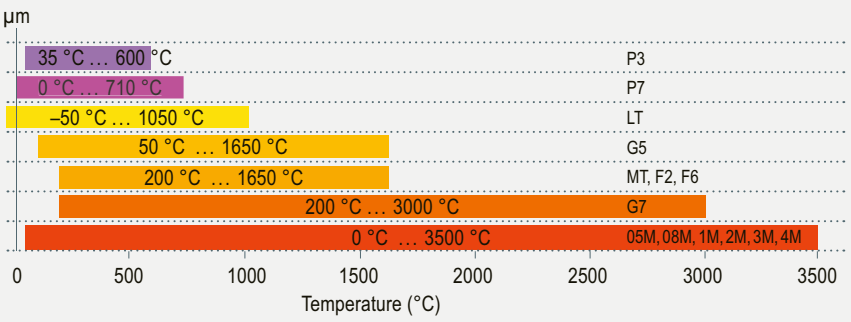


- **0.5; 1.0; 1.6; 2.3 µm**
  mainly for liquid metals and metal surfaces (Type of device: 05M; 08M; 1M; 2M; 3M; 4M)
- **3.43 µm**
  for thin plastic films like PE, PP and PS (Type of device: P3)
- **3.9 ; 4.24; 4.64 µm**
  for special applications (Type of device: MT; F2; F6)
- **5.0 µm**
  for glass surfaces (Type of device: G5)
- **7.9 µm**
  for plastic foils and glass surfaces (Type of device: P7 / G7)
- **8 – 14 µm**
  for non-metal surfaces (Type of device: LT)

Temperature measurement deviation as a function of object temperature for different infrared sensors, assuming a 10% emissivity error. The Y-axis is plotted on a logarithmic scale to highlight the magnitude of deviation. Measurement errors decrease exponentially with decreasing sensor wavelength, indicating higher robustness of short-wavelength sensors to emissivity inaccuracies.

Which Temperature Range?

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 °C and 3500 °C**.



Display of temperature over wavelength for the devices of the compact and the high performance series

For further information on non-contact temperature measurement see our brochure:

IR Basic Principles

www.optris.com/download/infrared-basics

Which Speed?

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.

Our fastest infrared thermometer captures changes within **110 µs**.

Display of fast temperature changes over a period of time.

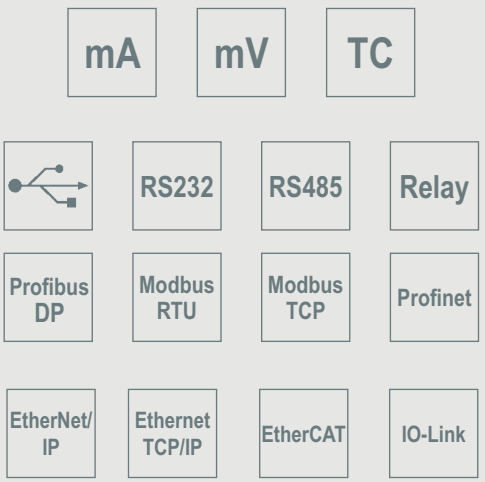
Which Signal Integration?

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.

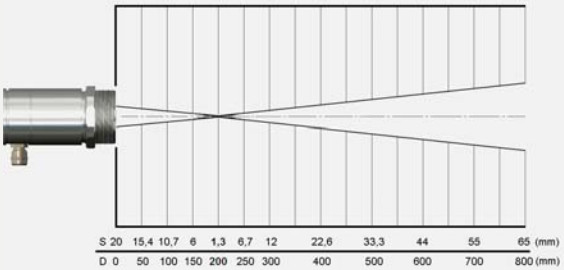
Analog Interfaces:
0 – 20 mA, 4 – 20 mA, 0 – 5 V, 0 – 10 V, Thermocouple (type J, type K)

Digital Interfaces:
USB, RS232, RS485, Relay, Modbus RTU, EtherNet/IP, Ethernet TCP/IP, Modbus TCP, Profinet, EtherCAT, IO-Link (detailed **overview** of **interfaces** on **page 37**).



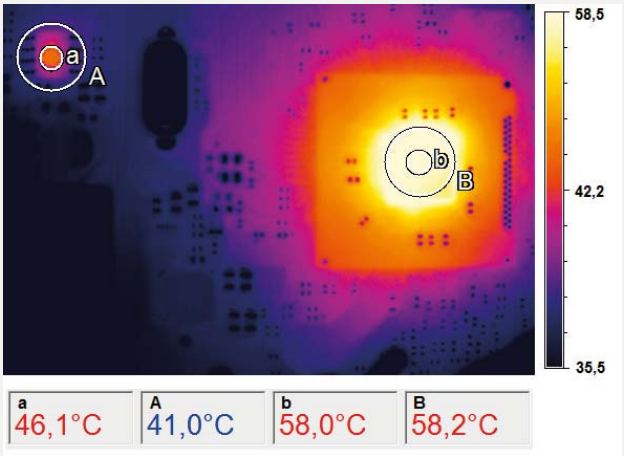
Which Optics?

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):



Measurement spot diameter (S) depending on the measurement distance (D) with an IR thermometer

For a precise temperature measurement, the measurement spot needs to be smaller than, or the same size as the object to be measured.
If the measurement spot is larger than the object, a temperature is calculated from the averaged heat radiation signal from the object and its environment. In a colder environment, it means that correspondingly, the temperature measurement value determined is too low.



IR image of an electronics circuit board – adaptation of the measurement spot to the object size

When transferred to the two-dimensional measurement with IR cameras, the pixel size there needs to suit the object size for the selected measurement distance. Here, the object should fill at least 3x3 pixels.

In the example above, the correct temperature of a chip of 46 °C is determined with the suitable measurement spot size (a). A measurement spot (A) which is three times larger already leads to a measurement error of 5 °C or 10%. Target a larger component on the same circuit board (on the right in the picture), then in this case, both measurement spots (b and B) provide the correct temperature measurement value of 58 °C.

Infrared thermometers

Small, compact infrared thermometers, ideal for use in cramped and hot surroundings

CS series

Single-piece pyrometer - Electronics within sensing head

In this device design, the optics are installed together with the electronics in a compact housing.

CSmicro series

Single-piece pyrometer - Electronics 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.

CTi series

Two-piece pyrometer - Sensing head with separate electronic box

The Optris CTi LT series pyrometers feature one of the world's smallest infrared sensing heads with an optical resolution of up to 75:1. The sensing heads can withstand ambient temperatures up to 180 °C or, in case of the CTi LThot, even 250 °C without cooling. The separate electronics allows a simple device configuration with three buttons and a temperature display.

The CTi offers the possibility to choose between different interfaces, such as USB, RS232, RS485. Fieldbuses like Modbus RTU or industrial Ethernet interfaces like Profinet, EtherNet/IP, Modbus TCP, Ethernet TCP/IP, EtherCAT, IO-Link are also available.

For further information on our CTi Series visit our website

i CTi Series

www.optris.com/products/category/infrared-thermometers-pyrometers/cti-series/

Infrared thermometers

CS/ CSmicro series

Basic model
Type
Classification / special features
Detector
Sensing head exchangeable
Head cable shortening
Thread (sensing head)
Spectral range
Temperature ranges
Temperature resolution
Optical resolution
Option: CF lens
Smallest spot (CF optics / add. CF lens)
Smallest spot (SF optics)
Sighting
Response time (90 %)
Accuracy
Outputs analog: 0 – 20 mA / 4 – 20 mA / 0 – 5 V / 0 – 10 V / t/c (K/J)
Second analog output
Interfaces: USB / RS232 / RS485 / Relay
Fieldbuses: Profibus DP / Modbus RTU
Industrial Ethernet: EtherNet/IP / Ethernet TCP/IP / Modbus TCP / Profinet / EtherCAT / IO-Link
Signal processing: Peak / Valley / AVG
T_{Amb} Head min.
T_{Amb} Head max.
T_{Amb} Electronics max.
Functional inputs/ number
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 output/ switching output
Voltage supply
Standard cable length
Cable length options

Optris calculator App with spot size calculator · p. 41

				
CS	**CSmicro**	**CSmicro**	**CSmicro**	**CSmicro**
LT	**LT02 / LT15 (H) / LT 22 H**	**LT15 HS**	**2M**	**3M**
Single-piece sensor with smart LED display (self diagnostics, aiming support, alarm, temperature code)	Single-piece sensor with electronics in cable; smart LED display	Single-piece two-wire sensor with electronics in cable; high thermal sensitivity; smart LED display	Single-piece sensor for temp. measurements on **metal**; electronics in cable; smart LED display	Single-piece sensor for temp. measurements on **metal**; electronics in cable; smart LED display
Thermopile	Thermopile	Thermopile	InGaAs	Ext. InGaAs
–	–	–	–	–
■	■ (behind electronics)	■ (behind electronics)	■ (behind electronics)	■ (behind electronics)
M12x1	M12x1	M18x1	M12x1	M12x1
8 – 14 µm	8 – 14 µm	8 – 14 µm	1.6 µm	2.3 µm
–50 ... 1030 °C	–50 ... 1030 °C	–20 ... 150 °C	2ML: 250 ... 800 °C 2MH: 385 ... 1600 °C	3ML: 50 ... 350 °C 3MH: 100 ... 600 °C
0.1 K	0.1 K	0.025 K [>20 °C]	0.1 K	0.1 K
15:1	LT02: 2:1 / LT15 (H): 15:1 / LT22 H: 22:1	15:1	2ML: 40:1 2MH: 75:1	3ML: 22:1 3MH: 33:1
■	■	■	■	■
0.8 mm @ 10 mm	LT02: 2.5 mm @ 23 mm LT15 (H): 0.8 mm @ 10 mm LT 22 H: 0.6 mm @ 10 mm	0.8 mm @ 10 mm	2ML: 2.7 mm @ 110 mm 2MH: 1.5 mm @ 110 mm	3ML: 1.5 mm @ 30 mm 3MH: 1 mm @ 30 mm
7 mm	7 mm	7 mm	7 mm	7 mm
LED aiming	LED aiming	LED aiming	LED aiming	LED aiming
25 ms	LT: 14 ms / LTH:150 ms	150 ms	8 ms (mA version: 20 ms)	8 ms (mA version: 20 ms)
±1.5 °C or ±1.5 %	±1 °C or ±1 %	±1°C or ±1 %	±(0.3 % T_{Meas} +2 °C)	±(0.3 % T_{Meas} +2 °C)
– / – / ■ / ■ / ■	– / – / ■ / ■ / – or – / ■ / – / – / –	– / – / ■ / ■ / – or – / ■ / – / – / –	– / – / ■ / ■ / – or – / ■ / – / – / –	– / – / ■ / ■ / – or – / ■ / – / – / –
–	–	–	–	–
■ / – / – / –	■ / – / – / –	■ / – / – / –	■ / – / – / –	■ / – / – / –
– / –	– / –	– / –	– / –	– / –
– / – / – / –	– / – / – / –	– / – / – / –	– / – / – / –	– / – / – / –
■ / ■ / ■	■ / ■ / ■	■ / ■ / ■	■ / ■ / ■	■ / ■ / ■
–20 °C	–20 °C	–20 °C	–20 °C	–20 °C
80 °C	LT02 / LT15: 120 °C LT15 H / LT22 H: 180 °C	75 °C	125 °C	85 °C
	80 °C / 75 °C (mA version)	80 °C / 75 °C (mA version)	80 °C / 75 °C (mA version)	80 °C / 75 °C (mA version)
■ / 1	■ / 1	■ / 1	■ / 1	■ / 1
■ (via V_{cc} adjust)	■ (mV version)	■ (mV version)	■ (mV version)	■ (mV version)
■	■ (mV version)	■ (mV version)	■ (mV version)	■ (mV version)
■	■	■	■	■
–	–	–	–	–
–	■ (mA version only)	■ (mA version only)	■ (mA version only)	■ (mA version only)
■	■	■	■	■
■	■	■	■	■
5 – 30 VDC	5 – 30 VDC	5 – 30 VDC	5 – 30 VDC	5 – 30 VDC
1 m	0.5 m + 0.5 m	0.5 m + 0.5 m	0.5 m + 0.5 m	0.5 m + 0.5 m
3 / 8 / 15 m	Options up to 9 m	Options up to 9 m	Options up to 9 m	Options up to 9 m

Infrared thermometers
CTi series

Basic model	CTi LT	CTi LTfast	CTi LThot
Type	LT02 / LT15 / LT22	LT02F / LT15F / LT25F	LT02H / LT10H
Classification / special features	Two-piece design with easy accessible programming keys and LCD backlit display	Two-piece sensor with fast response time and separate electronic box incl. programming keys and display	Two-piece design with easy accessible programming keys and LCD backlit display
Detector	Thermopile	Thermopile	Thermopile
Sensing head exchangeable	■	■	■
Head cable shortening	■ [–0.1 K/m]	■ [–0.1 K/m]	■ [–0.1 K/m]
Thread (sensing head)	M12x1	M12x1	M18x1
Spectral range	8 – 14 µm	8 – 14 µm	8 – 14 µm
Temperature ranges	LT02: –50 ... 650 °C LT15: –50 ... 800 °C LT22: –50 ... 1050 °C	LT02F: –50 ... 600 °C LT15F / 25F: –50 ... 1050 °C	–50 ...1050 °C
Temperature resolution	0.1 K	0.1 K	0.1 K
Optical resolution	LT02: 2:1 / LT15: 15:1 / LT22: 22:1	LT02F: 2:1 / LT15F: 15:1 / LT25F: 25:1	LT02H: 2:1 LT10H: 10:1
Option: CF lens	■	–	■
Smallest spot (CF optics/ add. CF lens)	LT02: 2.5 mm @ 23 mm LT15: 0.8 mm @ 10 mm LT22: 0.6 mm @ 10 mm	–	3 mm at 30 mm
Smallest spot (SF optics)	7 mm	7 mm	7 mm
Sighting	–	–	–
Response time (90 %)	40 ms (LT02) / 115 ms (LT15 & LT22)	02F: 30 ms / 15F: 9 ms / 25F: 6 ms	45 ms (LT02) / 40 ms (LT10)
Accuracy	±1 °C or ±1 %	±1 % or ±2 °C	±1.5 °C or ±1 %
Outputs analog: 0 – 20 mA / 4 – 20 mA / 0 – 5 V / 0 – 10 V / t/c (J)	■ / ■ / ■ / ■ / ■	■ / ■ / ■ / ■ / ■	■ / ■ / ■ / ■ / ■
Second analog output	■	■	■
Interfaces: USB / RS232 / RS485 / Relay	■ / ■ / ■ / ■	■ / ■ / ■ / ■	■ / ■ / ■ / ■
Fieldbuses: Profibus DP / Modbus RTU	– / ■	– / ■	– / ■
Industrial Ethernet: EtherNet/IP / Ethernet TCP/IP / Modbus TCP / Profinet / EtherCAT / IO-Link	■ / ■ / ■ / ■ / ■ / ■	■ / ■ / ■ / ■ / ■ / ■	■ / ■ / ■ / ■ / ■ / ■
Signal processing: Peak / Valley / AVG	■ / ■ / ■	■ / ■ / ■	■ / ■ / ■
T_{Amb} Head min.	–20 °C	–20 °C	–20 °C
T_{Amb} Head max.	LT02: 130 °C / LT15 / LT22: 180 °C	125 °C	250 °C
T_{Amb} Electronics max.	85 °C	85 °C	85 °C
External emissivity adjustment	■	■	■
External background temperature control	■	■	■
Trigger input for reset of hold functions	■ (via I/O pins)	■ (via I/O pins)	■ (via I/O pins)
Digital I/O pins / number	■ / 3	■ / 3	■ / 3
Simultaneous analog and digital output	■	■	■
Alarm output as an alternative to analog output	■	■	■
Additional alarm output/ switching output	■ (via I/O pins)	■ (via I/O pins)	■ (via I/O pins)
Voltage supply	8 – 30 VDC	8 – 30 VDC	8 – 30 VDC
Power consumption (typical values)	1.2 W	1.2 W	1.2 W
Standard cable length	1 m	1 m	3 m
Cable length options	3 / 8 / 15 m	3 / 8 / 15 m	8 / 15 m

Optris calculator App with spot size calculator · p. 41

				
CTi	**CTi**	**CTi**	**CTi**	**CTi**
1MXL / 1ML / 1MH / 1MH1	**2MXL / 2ML / 2MH / 2MH1**	**3MXL / 3ML / 3MH / 3MH1/H2/H3**	**4M**	**G5L / G5H**
Two-piece sensor for high temp. meas. of **metal** with separate electronic box incl. programming keys and display	Two-piece sensor for high temp. meas. of **metal** with separate electronic box incl. programming keys and display	Two-piece sensor for low temp. meas. of **metal** with separate electronic box incl. programmin. keys and display	Two-piece sensor for low temp. and high speed meas. with separate electronic box incl. programming keys and display	Two-piece sensor for temp. meas. of **glass** with separate electronic box incl. programming keys and display
InGaAs	Extended InGaAs	InGaAs	InAsSb	Thermopile
■	■	■	■	■
■ [–0.1 K/m]	■ [–0.1 K/m]	■ [–0,1 K/m]	■ [–0,1 K/m]	■ [–0,1 K/m]
M12x1	M12x1	M12x1	M12x1	M12x1
1.0 µm	1.6 µm	2.3 µm	2.2 ... 6.0 µm	5.0 µm
1MXL: 350 ... 800 °C 1ML: 485 ... 1150 °C 1MH: 650 ... 1850 °C 1MH1: 800 ... 2200 °C	2MXL: 150 ... 500 °C 2ML: 250 ... 900 °C 2MH: 385 ... 1600 °C 2MH1: 490 ... 2000 °C	3MXL: 30 ... 350 °C 3ML: 50 ... 475 °C 3MH: 100 ... 600 °C 3MH1: 150 ...1000 °C 3MH2: 200 ... 1500 °C 3MH3: 250 ... 1850 °C	0 °C ... 600 °C	G5L: 50 ... 1000 °C G5H: 100 ... 1650 °C
0.1 K	0.1 K	0.1 K	0.1 K	0.1 K
1MXL:15:1 / 1ML: 40:1 / 1MH/H1: 75:1	2MXL:15:1 / 2ML: 40:1 / 2MH/H1: 75:1	3MXL:12:1 / 3ML: 22:1 / 3MH: 33:1 3MH1/2/3: 75:1	L: 10:1	G5L: 14:1 G5H: 20:1
■	■	■	■	–
1.5 mm @ 110 mm	1.5 mm @ 110 mm	1.0 mm @ 30 mm	5.0 mm @ 50 mm	–
7 mm	7 mm	7 mm	7 mm	7 mm
–	–	–	–	–
320 µs (110 µs exposure time)	320 µs (110 µs exposure time)	320 µs (110 µs exposure time)	320 µs (110 µs exposure time)	G5L: 90 ms / G5H: 70 ms
±2.0 °C (1MXL) ±(0.3% of reading +1.5 °C) (1ML/MH) ±(0.3% of reading +2 °C) (1MH1)	± 1.5 °C (2MXL) ±(0.3% of reading +1.5 °C)(ML/H/ H1)	± 1,5 °C (3MXL / 3ML / 3MH) ± (0.3% of reading + 1,5 °C) (H1 /2 /3)	±0.3 % of reading +2 °C	±(1 % of reading +1.5 °C)
■ / ■ / ■ / ■ / ■	■ / ■ / ■ / ■ / ■	■ / ■ / ■ / ■ / ■	■ / ■ / ■ / ■ / ■	■ / ■ / ■ / ■ / ■
■	■	■	■	■
■ / ■ / ■ / ■	■ / ■ / ■ / ■	■ / ■ / ■ / ■	■ / ■ / ■ / ■	■ / ■ / ■ / ■
– / ■	– / ■	– / ■	– / ■	– / ■
■ / ■ / ■ / ■ / ■ / ■	■ / ■ / ■ / ■ / ■ / ■	■ / ■ / ■ / ■ / ■ / ■	■ / ■ / ■ / ■ / ■ / ■	■ / ■ / ■ / ■ / ■ / ■
■ / ■ / ■	■ / ■ / ■	■ / ■ / ■	■ / ■ / ■	■ / ■ / ■
–20 °C	–20 °C	-20 °C	–20 °C	–20 °C
125 °C	125 °C	85 °C	70 °C	85 °C
85 °C	85 °C	85 °C	85 °C	85 °C
■	■	■	■	■
■	■	■	■	■
■ (via I/O pins)	■ (via I/O pins)	■ (via I/O pins)	■ (via I/O pins)	■ (via I/O pins)
■ / 3	■ / 3	■ / 3	■ / 3	■ / 3
■	■	■	■	■
■	■	■	■	■
■ (via I/O pins)	■ (via I/O pins)	■ (via I/O pins)	■ (via I/O pins)	■ (via I/O pins)
8 – 36 VDC	8 – 36 VDC	8 – 36 VDC / 5 V USB / max. 1.2 W	8 – 30 VDC	8 – 30 VDC
1.2 W	1.2 W	1.2 W	1.2 W	1.2 W
3 m	3 m	3 m	3 m	3 m
8 / 15 m	8 / 15 m	8 / 15 m	8 / 15 m	8 m, 15 m

Infrared thermometers
CTi series

Basic model	CTi	CTi	CTi LTex
Type	P3	P7	OPTCTiEX
Classification / special features	Two-piece sensor for temp. meas. on **thin plastic film** with separate electronic box incl. programming keys and display	Two-piece sensor for temp. meas. on **thin plastic film** and **glass** with separate electronic box incl. programming keys and display	Aluminum housing with mounting device to accommodate the Zener barriers (top-hat rail) and the CTi electronics
Detector	Thermopile	Thermopile	Thermopile
Sensing head exchangeable	■	■	■
Head cable shortening	■ [–0.1 K/m]	■ [–0.1 K/m]	■ [–0.1 K/m]
Thread (sensing head)	M18x1	M18x1	M12x1
Spectral range	3.43 µm	7.9 µm	8 – 14 µm
Temperature ranges	35 ... 600 °C	0 ... 710 °C	LT02: –50 ... 650 °C LT15: –50 ... 800 °C LT22: –50 ... 1050 °C
Temperature resolution	0.1 K	0.1 K	0.1 K
Optical resolution	15:1	10:1	LT02: 2:1 / LT15: 15:1 / LT22: 22:1
Option: CF lens	–	–	■
Smallest spot (CF optics/ add. CF lens)	–	1.2 mm @ 10 mm	LT02: 2.5 mm @ 23 mm LT15: 0.8 mm @ 10 mm LT22: 0.6 mm @ 10 mm
Smallest spot (SF optics)	7 mm	7 mm	7 mm
Sighting	–	–	–
Response time (90 %)	15 ms	150 ms	40 ms (LT02) / 115 ms (LT15 & LT22)
Accuracy	±2.5 °C or ±1 %	±1.5 °C or ±1 %	±1 °C or ±1 %
Outputs analog: 0 – 20 mA / 4 – 20 mA / 0 – 5 V / 0 – 10 V / t/c (J)	■ / ■ / ■ / ■ / ■	■ / ■ / ■ / ■ / ■	■ / ■ / ■ / ■ / ■
Second analog output	■	■	■
Interfaces: USB / RS232 / RS485 / Relay	■ / ■ / ■ / ■	■ / ■ / ■ / ■	■ / ■ / ■ / ■
Fieldbuses: Profibus DP / Modbus RTU	– / ■	– / ■	– / ■
Industrial Ethernet: EtherNet/IP / Ethernet TCP/IP / Modbus TCP / Profinet / EtherCAT / IO-Link	■ / ■ / ■ / ■ / ■ / ■	■ / ■ / ■ / ■ / ■ / ■	■ / ■ / ■ / ■ / ■ / ■
Signal processing: Peak / Valley / AVG	■ / ■ / ■	■ / ■ / ■	■ / ■ / ■
T_{Amb} Head min.	–20 °C	–20 °C	–20 °C
T_{Amb} Head max.	85 °C	85 °C	LT02: 130 °C / LT15 / LT22: 180 °C
T_{Amb} Electronics max.	85 °C	85 °C	60 °C
External emissivity adjustment	■	■	■
External background temperature control	■	■	■
Trigger input for reset of hold functions	■ (via I/O pins)	■	■ (via I/O pins)
Digital I/O pins / number	■ / 3	■ / 3	■ / 3
Simultaneous analog and digital output	■	■	■
Alarm output as an alternative to analog output	■	■	■
Additional alarm output/ switching output	■ (via I/O pins)	■ (via I/O pins)	■ (via I/O pins)
Voltage supply	8 – 30 VDC	8 – 30 VDC	8 – 30 VDC
Power consumption (typical values)	1.2 W	1.2 W	1.2 W
Standard cable length	3 m	3 m	1 m
Cable length options	8 / 15 m	8 / 15 m	3 / 8 / 15 m

Optris CompactPlus Connect Software p. 19

Easy Integration into Applications

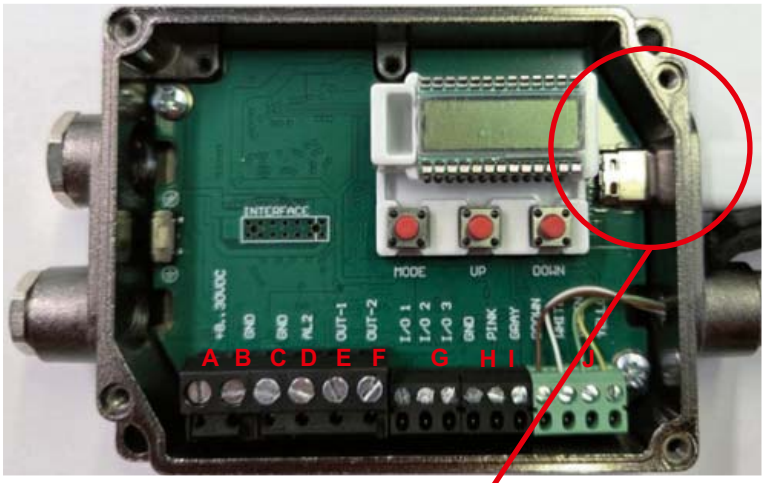
The Optris CTi offers many options for an easy integration into processes and applications.
The included electronics box features a wide range of digital and analog outputs.

I/O Functions

The CTi electronics box provides a flexible I/O interface with digital and analog functions for easy integration into industrial processes.The digital output can be used as a freely configurable alarm (high/low, normally open/closed). Digital inputs allow precise control of the measurement behavior, including signal validation (“Valid”), hold functions to freeze measured values, and reset signals for peak or minimum values. The laser can also be activated via digital signals.

Analog inputs enable advanced process adaptation: the emissivity can be set via a 0–10 V signal, and environmental influences such as ambient temperature or reflected radiation can be incorporated.This makes the CTi electronics box a compact and versatile solution for precise and adaptable temperature measurement.

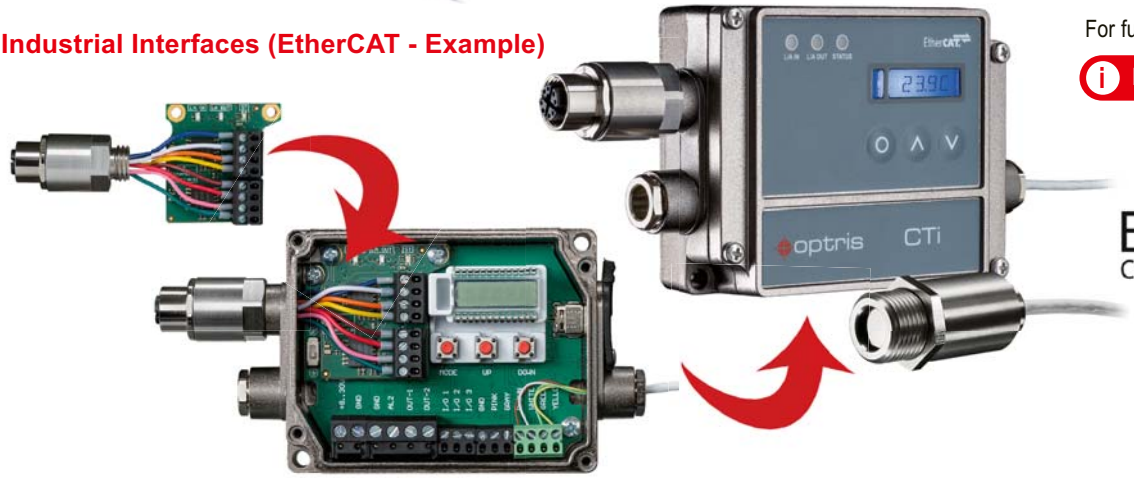
PINs and Functions of the Optris CTi



Only for CTi series!
Integrated USB-C port
with IP67 NEMA 4 protection

Pin Description	Function
A) +8…36 VDC	Power supply
B) GND	Ground (0 V) of power supply
C) GND	Ground (0 V) of internal in and outputs
D) AL2	Alarm 2 (Open collector output)
E) OUT-1	Analog output mA, mV, TCK
F) OUT-2	Analog output mA, mV, TCK
G) I/O1-I/O3	In- and outputs
H) GND	Ground (0 V)
I) PINK	3 VDC, switchable, for laser-sighting tool
J) GRAY - YELLOW	Sensing head cable

Industrial Interfaces (EtherCAT - Example)



For further information visit

Industrial Interfaces p. 37

EtherCAT®
Conformance tested

Mechanical accessories

ACCTFB / ACCTiFBMH / ACCTFB2

Mounting bracket, adjustable in one axis (M12x1 sensing head, massive housing, mounting of CTi /CT sensing head + Laser-Sightingtool)

ACCTTAS

Tilt assembly for heads with optical resolution ≥10:1

ACCTKF40GE / ACCTKF40B270 / ACCTKF40SI

KF40 flange for CTi /CT LT with Ge window, for CTi / CT 1M, 2M, 3M with B270 window, for CTi /CT 4M with Si window (up to 10-7 mbar)

ACCTRAIL

Rail mount adapter for CTi /CT electronics

ACCTMB

Mounting bolt with thread M12x1

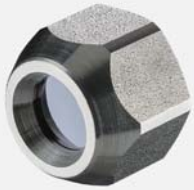
ACCTMG

Mounting fork, adjustable in 2 axes, with thread M12x1

Optical accessories

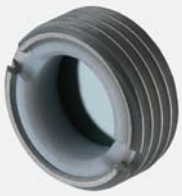
ACCTCF / ACCTiPW

CF-lens or protective window (for LT)
for M12x1 sensing head
ACCTCFHT / ACCTPWHT for 1M, 2M, 3M
ACCTPWSI35M for 4M



ACCTCFE / ACCTiPWE

CF-lens or protective window (for LT) with external thread for air purge or massive housing
ACCTCFHTE / ACCTWHTE for 1M, 2M, 3M
ACCTPWSI35ME for 4M



D08ACCTLST / ACCTOEMLST

Laser-Sightingtool (for CTi/ CT) / OEM Laser-Sightingtool, 635 nm, rotation symmetrical, for connection to CTi /CT electronics, power supply via CTi /CT electronic box or battery

ACCTRAM

Right angle mirror for measurements 90° to the sensor axis for sensing heads with optical resolution ≥10:1

ACCTPA + ACCTST20 (20 mm length) / ACCTST40 (40 mm length) / ACCTST88 (88 mm length)

Pipe adapter with M12x1 internal thread + Sighting tube with M12x1 external thread

Air purges and protective housings

ACCSAP

Air purge collar (for heads with optical resolution ≥10:1)

ACCTAPMH / ACCTiAPMHPW1M

Air purge collar for Massive housing (D06) CSmicro hs/ CTi LThot/ CTi P3/ CTi P7/ CTratio, optional with protective window (for 1M and 2M models)

Massive housing of:

- stainless steel (**D06ACCTMHS**)
- compact, brass (**D06ACCTMHB**)
- anodized aluminium (**D06ACCTMHA**)

- stainless steel version with CF optics (**D06ACCTMHSCF)**
- stainless steel version for HT CF optics (**D06ACCTMHSCFHT)**

ACCTAPLCFHT

Air purge collar, laminar, with integrated CF lens (for 1M / 2M / 3M)

ACCTAPL

Air purge collar, laminar

ACCTAP / ACCTAP2 (2:1 optics)

Air purge for CTi /CT heads
(not for heads with 32 mm length)

Combinations

ACCTAPL + ACCTMG = Device adjustable in two axes

Air purge collar, laminar + Mounting fork = Device adjustable in two axes

ACCTFB2 + D08ACCTLST/ACCTOEMLST = Sensing head with Laser-Sighting tool

Mounting bracket for sensing head + Sighting tool + OEM Laser-Sightingtool = Sensing head with Laser-Sighting tool

ACCTFB + ACCTMB = ACCTAB

Mounting bracket for M12x1 sensing head + Mounting bolt = Device adjustable in two axes

D06ACCTAPMH + ACCTAPMH = Massive housing with air purge

Massive housing, stainless steel + Airpurge, stainless steel = Massive housing with air purge

Infrared Thermometers & Pyrometers

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, EtherNet/IP, Ethernet TCP/IP and Modbus TCP.

Ratio pyrometers

The CTratio and CSvision provide constant measurement results even with a partially dirty lens or for objects that move within the measurement area (e.g. metal rods or wires). The sensing head of the CTratio can be used in high ambient temperatures up to 315 °C without cooling. The CSvision is a single-piece designed ratio pyrometer with video sighting, motorized focus and Brightness reduction filter.

For further information on our CTratio Series visit our website

CTratio Series

www.optris.com/optris.com/products/category/infrared-thermometers-pyrometers/ctratio-series

For further information on our CSvision Series visit our website

CSvision Series

www.optris.com/products/category/infrared-thermometers-pyrometers/csvision-series

Infrared thermometers
CSlaser series

Basic model	**CSlaser**	**CSlaser**	**CSlaser**
Type	**LT**	**hs LT**	**2M**
Classification / special features	Single-piece two-wire sensor with electronics in sensing head	Single-piece two-wire sensor with electronics in sensing head	Single-piece two-wire sensor with electronics in sensing head for measurement of **metal**
Detector	Thermopile	Thermopile	InGaAs
Sensing head exchangeable	–	–	–
Head cable shortening	■	■	■
Thread (sensing head)	M48x1.5	M48x1.5	M48x1.5
Spectral range	8 – 14 µm	8 – 14 µm	1.6 µm
Temperature ranges	–30 ... 1000 °C	–20 ... 150 °C	L: 250 ... 800 °C H: 385 ... 1600 °C
Temperature resolution	0.1 K	0.025 K	0.1 K
Optical resolution	50:1	50:1	2ML: 150:1 2MH: 300:1
Option: CF lens	–	–	–
Smallest spot (CF optics/ add. CF lens)	1.4 mm @ 70 mm	1.4 mm @ 70 mm	0.5 mm @ 150 mm
Smallest spot (SF optics)	24 mm @ 1200 mm	24 mm @ 1200 mm	3.7 mm @ 1100 mm
Sighting	Double laser	Double laser	Double laser
Response time (90 %)	150 ms	150 ms	10 ms
Accuracy	±1 °C or ±1 %	±1 °C or ±1 %	±(0.3 % T_{Meas} +2 °C)
Outputs analog: 0 – 20 mA / 4 – 20 mA / 0 – 5 V / 0 – 10 V / t/c (K/J)	– / ■ / – / – / –	– / ■ / – / – / –	– / ■ / – / – / –
Second analog output	–	–	–
Interfaces: USB / RS232 / RS485 / Relay	■ / – / – / –	■ / – / – / –	■ / – / – / –
Fieldbuses: Profibus DP / Modbus RTU	– / –	– / –	– / –
Industrial Ethernet: EtherNet/IP / Ethernet TCP/IP / Modbus TCP / Profinet / EtherCAT / IO-Link	– / – / – / –/ – / –	– / – / – / –/ – / –	– / – / – / –/ – / –
Signal processing: Peak / Valley / AVG / Advanced hold	■ / ■ / ■ / ■	■ / ■ / ■ / ■	■ / ■ / ■ / ■
T_{Amb} Head min.	–20 °C	–20 °C	–20 °C
T_{Amb} Head max.	85 °C	85 °C	85 °C
Functional inputs/ number	– / –	– / –	– / –
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 alternative to analog output	■	■	■
Additional alarm output/ switching output	■	■	■
Voltage supply	5 – 30 VDC	5 – 30 VDC	5 – 30 VDC
Standard cable length	3 m	3 m	3 m
Cable length options	8 / 15 m	8 / 15 m	8 / 15 m

1) At object temperatures >0 °C, ε = 1

optris **CTlaser series**

Infrared thermometers
CTlaser series




Basic model	**CTlaser**	**CTlaser**	**CTlaser**	**CTlaser**
Type	**LT / LTF**	**05M**	**1M**	**2M**
Classification / special features	Two-piece sensor with separate electronic box with fast response time, incl. programming keys and display	Two-piece sensor with separate electronic box for high temp. measurement of liquid **metal**, incl. programming keys and display	Two-piece sensor with separate electronic box for high temp. measurement of **metal**, incl. programming keys and display	Two-piece sensor with separate electronic box for high temp. measurement of **metal**, incl. programming keys and display
Detector	Thermopile	Si	Si	InGaAs
Sensing head exchangeable	■	■	■	■
Head cable shortening	■ [max. 6 m]	■ [max. 6 m]	■ [max. 6 m]	■ [max. 6 m]
Thread (sensing head)	M48x1.5	M48x1.5	M48x1.5	M48x1.5
Spectral range	8 – 14 µm	0.525 µm	1.0 µm	1.6 µm
Temperature ranges	–50 ... 975 °C	1000 ... 2000 °C	1ML: 485 ... 1050 °C 1MH: 650 ... 1800 °C 1MH1: 800 ... 2200 °C	2ML: 250 ... 800 °C 2MH: 385 ... 1600 °C 2MH1: 490 ... 2000 °C
Temperature resolution	LT: 0.1 K / LTF: 0.5 K	0.2 K	0.1 K	0.1 K
Optical resolution	LT: 75:1 LTF: 50:1	150:1	L: 150:1 H: 300:1	L: 150:1 H: 300:1
Option: CF lens	–	–	–	–
Smallest spot (CF optics/ add. CF lens)	LT: 0.9 mm @ 70 mm LTF: 1.4 mm @ 70 mm	–	0.5 mm @ 150 mm	0.5 mm @ 150 mm
Smallest spot (SF optics)	LT: 16 mm @ 1200 mm LTF: 24 mm @ 1200 mm	7.3 mm @ 1100 mm	3.7 mm @ 1100 mm	3.7 mm @ 1100 mm
Sighting	Double laser	Double laser	Double laser	Double laser
Response time (90 %)	LT: 120 ms / LTF: 9 ms	1 ms	1 ms	1 ms
Accuracy	LT: ±1 °C or ±1 % LTF: ±1.5 °C or ±1.5 %	±(0.3 % T_{Meas} +2 °C)	±(0.3 % T_{Meas} +2 °C)	±(0.3 % T_{Meas} +2 °C)
Outputs analog: 0 – 20 mA / 4 – 20 mA / 0 – 5 V / 0 – 10 V / t/c (K/J)	■ / ■ / ■ / ■ / ■	■ / ■ / ■ / ■ / ■	■ / ■ / ■ / ■ / ■	■ / ■ / ■ / ■ / ■
Second analog output	■	–	–	–
Interfaces: USB / RS232 / RS485 / Relay	■ / ■ /■ / ■	■ / ■ /■ / ■	■ / ■ /■ / ■	■ / ■ /■ / ■
Fieldbuses: Profibus DP / Modbus RTU	■ / ■	■ / ■	■ / ■	■ / ■
Industrial Ethernet: EtherNet/IP / Ethernet TCP/IP / Modbus TCP / Profinet / EtherCAT / IO-Link	■ / ■ / ■ / ■ / ■ / ■	■ / ■ / ■ / ■ / ■ / ■	■ / ■ / ■ / ■ / ■ / ■	■ / ■ / ■ / ■ / ■ / ■
Signal processing: Peak / Valley / AVG / Advanced hold	■ / ■ / ■ / ■	■ / ■ / ■ / ■	■ / ■ / ■ / ■	■ / ■ / ■ / ■
T_{Amb} Head min.	–20 °C	–20 °C	–20 °C	–20 °C
T_{Amb} Head max.	85 °C	85 °C	85 °C	85 °C
T_{Amb} Electronics max.	85 °C	85 °C	85 °C	85 °C
Functional inputs/ number	■ / 3	■ / 3	■ / 3	■ / 3
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 alternative to analog output	■	■	■	■
Additional alarm output/ switching output	■	■	■	■
Voltage supply	8 – 36 VDC	8 – 36 VDC	8 – 36 VDC	8 – 36 VDC
Power consumption (typical values)	2.0 W	2.0 W	2.0 W	2.0 W
Standard cable length	3 m	3 m	3 m	3 m
Cable length options	8 / 15 m	8 / 15 m	8 / 15 m	8 / 15 m

Optris calculator App with spot size calculator · p. 41

					
CTlaser	**CTlaser**	**CTlaser**	**CTlaser**	**CTlaser**	**CTlaser**
3M	**4M**	**MT / F2 / F6**	**G5**	**G7**	**P7**
Two-piece sensor with separate electronic box for low temp. measurement of **metal**, incl. programming keys and display	Two-piece sensor for low temp. and high speed meas. with separate electronic box incl. programming keys and display	Two-piece sensor with separate electronic box incl. progr. keys and display for measurement: MT: through flames F2: CO_2 flame gas F6: CO flame gas	Two-piece sensor with separate electronic box for measurement of **glass**, incl. programming keys and display	Two-piece sensor with separate electronic box for measurement of ultra-thin **glass** sheets, incl. programming keys and display	Two-piece sensor with separate electronic box for measurement of ultra-thin **plastic foils**, incl. programming keys and display
Extended InGaAs	InAsSb	Thermopile	Thermopile	Thermopile	Thermopile
■	–	■	■	■	■
■ [max. 6 m]	■	■ [max. 6 m]	■ [max. 6 m]	■ [max. 6 m]	■ [max. 6 m]
M48x1.5	M48x1.5	M48x1.5	M48x1.5	M48x1.5	M48x1.5
2.3 µm	2.2 – 6 µm	MT: 3.9 µm / F2: 4.24 µm / F6: 4.64 µm	5.0 µm	7.9 µm	7.9 µm
L: 50 ... 400 °C H: 100 ... 600 °C H1: 150 ... 1000 °C H2: 200 ... 1500 °C H3: 250 ... 1800 °C	0 °C ... 500 °C	MT / F2 / F6: 200 ... 1450 °C MTH / F2H / F6H: 400 ... 1650 °C	L: 100 ... 1200 °C H: 250 ... 1650 °C HF: 200 ... 1450 °C H1F: 400 ... 1650 °C	100 ... 1200 °C	0 ... 710 °C
0.1 K	0.1 K	0.1 K	0.1 K	0.5 K	0.5 K
L: 60:1 / H: 100:1 / H1-H3: 300:1	30:1	45:1	L / HF / H1F: 45:1 H: 70:1	45:1	45:1
–	■	–	–	–	–
0.5 mm @ 150 mm	2.4 mm @ 70 mm	1.6 mm @ 70 mm	1 mm @ 70 mm	1.6 mm @ 70 mm	1.6 mm @ 70 mm
11 mm @ 1100 mm	36.7 mm @ 1100 mm	27 mm @ 1200 mm	17 mm @ 1200 mm	27 mm @ 1200 mm	27 mm @ 1200 mm
Double laser	Double laser	Double laser	Double laser	Double laser	Double laser
1 ms	300 µs (90 µs exposure time)	10 ms	L: 120 ms / H: 80 ms HF / H1F: 10 ms	150 ms	150 ms
±(0.3 % T_{Meas} +2 °C)	±(0.3 % T_{Meas} +2 °C)	±1 %	±1.5 °C or ±1 %	±1.5 °C or ±1 %	±1.5 °C or ±1 %
■ / ■ / ■ / ■ / ■	■ / ■ / ■ / ■ / ■	■ / ■ / ■ / ■ / ■	■ / ■ / ■ / ■ / ■	■ / ■ / ■ / ■ / ■	■ / ■ / ■ / ■ / ■
–	■	■	■	■	■
■ / ■ /■ / ■	■ / ■ /■ / ■	■ / ■ /■ / ■	■ / ■ /■ / ■	■ / ■ /■ / ■	■ / ■ /■ / ■
■ / ■	■ / ■	■ / ■	■ / ■	■ / ■	■ / ■
■ / ■ / ■ / ■ / ■ / ■	■ / ■ / ■ / ■ / ■ / ■	■ / ■ / ■ / ■ / ■ / ■	■ / ■ / ■ / ■ / ■ / ■	■ / ■ / ■ / ■ / ■ / ■	■ / ■ / ■ / ■ / ■ / ■
■ / ■ / ■ / ■	■ / ■ / ■ / ■	■ / ■ / ■ / ■	■ / ■ / ■ / ■	■ / ■ / ■ / ■	■ / ■ / ■ / ■
–20 °C	0 °C	–20 °C	–20 °C	–20 °C	–20 °C
85 °C	70 °C	85 °C	85 °C	85 °C	85 °C
85 °C	70 °C	85 °C	85 °C	85 °C	85 °C
■ / 3	– / –	■ / 3	■ / 3	■ / 3	■ / 3
■	■	■	■	■	■
■	■	■	■	■	■
■	■ (via I/O pins)	■	■	■	■
–	■ / 3	–	–	–	–
■	■	■	■	■	■
■	■	■	■	■	■
■	■ (via I/O pins)	■	■	■	■
8 – 36 VDC	8 – 30 VDC / 5 V USB / max. 1.2 W	8 – 36 VDC	8 – 36 VDC	8 – 36 VDC	8 – 36 VDC
2.0 W	2.0 W	2.0 W	2.0 W	2.0 W	2.0 W
3 m	3 m	3 m	3 m	3 m	3 m
8 / 15 m	8 / 15 m	8 / 15 m	8 / 15 m	8 / 15 m	8 / 15 m

optris CSvision / CTratio Series

Optris calculator App with spot size calculator · p. 41

Infrared ratio thermometers
CSvision / CTratio
with vario focus and
video / laser sighting




Basic model	**CSvision**	**CSvision**	**CTratio**	**CTratio**
Type	**R1ML / R1MH / R1MH1**	**R2M (L)**	**1ML / 1MH / 1MH1**	**2ML / 2MH / 2MH1**
Classification / special features	Single-piece ratio pyrometer with video camera, cross hair laser and motorized focus for measuring metal	Single-piece ratio pyrometer with video camera, cross hair laser and motorized focus for measuring metal	Two-piece Rratio pyrometer for high temp. measurement of **metal** with green laser, incl. programming keys and display	Two-piece Rratio pyrometer for high temp. measurement of **metal** with green laser, incl. programming keys and display
Detector	Sandwich	Sandwich	Sandwich	Sandwich
Sensing head exchangeable	–	–	–	–
Head cable shortening	–	–	–	–
Thread (sensing head)	M48x1.5	M48x1.5	M18x1	M18x1
Spectral range	0.8 – 1.1 µm	1.35 – 1.75 µm	0.8 – 1.1 µm	1.45 – 1.75 µm
Temperature ranges (scalable via software)	R1ML[1)]: 550 (600)... 1800 °C R1MH[1)]: 900 (1000)... 3000 °C R1MH1[1)]:900 (1000)... 3500 °C	R2ML[1)]: 250 (300)... 1400 °C	1ML[1)]: 450 (525) ... 1400 °C 1MH[1)]: 650 (700) ... 2000 °C 1MH1[1)]: 900 (1000) ... 3000 °C	2ML[1)]: 250 (275) ...1000 °C 2MH[1)]: 375 (400) ... 1500 °C 2MH1[1)]: 500 (550) ... 3000 °C
Temperature resolution	0.1 K	0.1 K	0.1 K (> 900 °C)	0.1 K (> 900 °C)
Optical resolution	R1ML: 100:1 R1MH: 150:1 R1MH1: 150:1	75:1	1ML: 38:1 1MH / MH1: 100:1	2ML: 38:1 2MH / MH1: 100:1
Smallest spot (CF optics) **CF vario optics: focusable from 90 mm to 250 mm**	R1ML: 2 mm @ 200mm R1MH: 1.3 mm @ 200 mm R1MH1: 1.3 mm @ 200 mm	R2ML: 2.7 mm @ 200 mm	1.5 mm @ 150 mm	1.5 mm @ 150 mm
Smallest spot (SF optics) **SF vario optics: focusable from 200 mm to infinity**	R1ML: 3.5 mm @ 350 mm R1MH: 2.3 mm @ 350 mm R1MH1: 2.3 mm @ 350 mm	R2ML: 4.7 mm @ 350 mm	3 mm @ 300 mm	3 mm @ 300 mm
Sighting	video camera and cross hair laser	video camera and cross hair laser	Laser	Laser
Response time (90 %)	1 ms – 10 s	1 ms – 10 s	1 ms – 10 s	1 ms – 10 s
Accuracy	± (0.5 % of reading + 2 °C)	± (0.5 % of reading + 2 °C)	±(0.5 % T_{Meas} +2 °C)	±(0.5 % T_{Meas} +2 °C)
Outputs analog: 0 – 20 mA / 4 – 20 mA / 0 – 5 V / 0 – 10 V / t/c (K/J)	2x 0/4 – 20 mA	2x 0/4 – 20 mA	■ / ■ / – / – / –	■ / ■ / – / – / –
Interfaces: USB / RS232 / RS485 / Relay	■ / – / ■ / –	■ / – / ■ / –	■ / ■ /■ / ■	■ / ■ /■ / ■
Fieldbuses: Profibus DP / Modbus RTU	– / ■	– / ■	■ / ■	■ / ■
Ind. Ethernet: EtherNet/IP / Ethernet TCP/IP / Modbus TCP / Profinet / EtherCAT / IO-Link	■ / ■ / ■ / ■ / - / ■	■ / ■ / ■ / ■ / - / ■	■ / ■ / ■ / ■ / ■ / ■	■ / ■ / ■ / ■ / ■ / ■
Signal processing: Peak / Valley / AVG / Advanced hold	■ / ■ / ■ / ■	■ / ■ / ■ / ■	■ / ■ / ■ / ■	■ / ■ / ■ / ■
T_{Amb} Head min.	0 °C	0 °C	–20 °C	–20 °C
T_{Amb} Head max.	65 °C	60 °C	200 °C (optional: 315 °C)	200 °C (optional: 315 °C)
T_{Amb} Electronics max.	–	–	60 °C	50 °C
Functional inputs / number	– / –	– / –	– / –	– / –
External emissivity adjustment	■	■	■	■
External background temperature control	■	■	■	■
Trigger input for reset of hold functions	■	■	■ (via I/O-Pins)	■ (via I/O-Pins)
Digital I/O pins / number	■ / 1	■ / 1	■ / 3	■ / 3
Simultaneous analog and digital output	■	■	■	■
Alarm output as an alternative to analog output	■	■	■	■
Additional alarm output	24 V/ 1 A (open-collector)	24 V/ 1 A (open-collector)	■ (via I/O-Pins)	■ (via I/O-Pins)
Voltage supply	8 – 30 VDC	8 – 30 VDC	8 – 30 VDC or USB	8 – 30 VDC or USB
Standard cable length	3 m	3 m	3 m	3 m
Cable length options	8 / 15 m	8 / 15 m	8 / 15 m	8 / 15 m

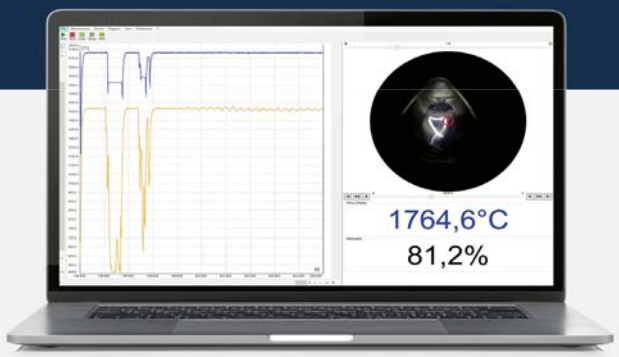
1) Values in brackets are valid for two-color mode

optris Pyrometer Software

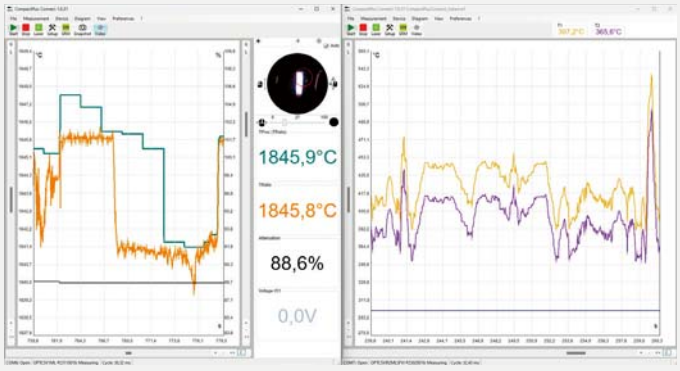
Software CompactConnect / CompactPlus Connect

Suitable for all optris infrared thermometer of the high performance series and compact line

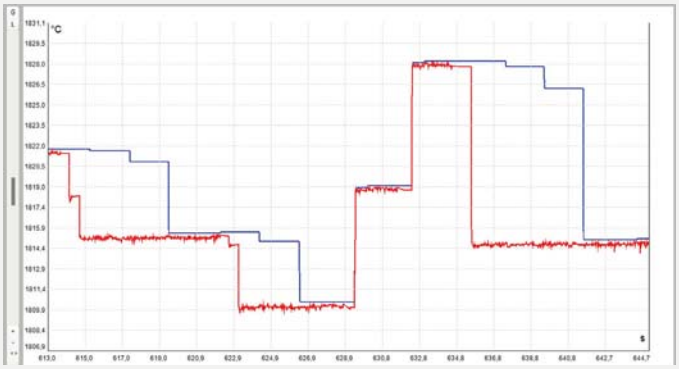
- Analysis and documentation of temperature data
- Graphic display and recording of the measurement values
- Setup of sensor parameters and signal processing functions
- Remote control of the sensor
- Automatic snapshots (time or temperature dependent) to control and document the process
- Multiple software instances are possible
- Softwares offers advanced signal processing and and the automation of process control
- There is no additional cost and no limitation in licensing



With pyrometers featuring video sighting technology, the video images can be displayed and optimized directly within the CompactPlus Connect software.



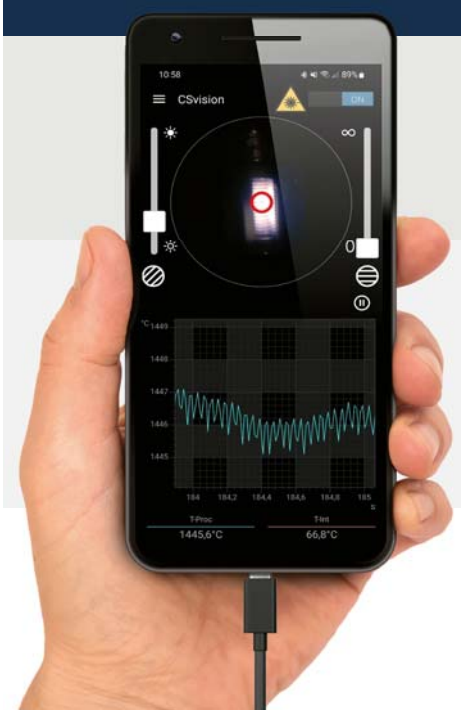
The software enables the starting of different stages to display multiple sensors simultaneously, increasing flexibility and usability in diverse environments.

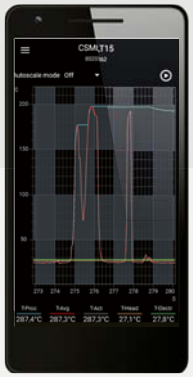


The CompactPlus Connect software offers advanced signal processing capabilities, including smart averaging, peak hold, and valley hold functions.

IRmobile App

tool for all optris pyrometers





- Change of the temperature unit: Celsius or Fahrenheit
- Integrated simulator
- Save / load configurations and Temperature-time diagrams

Pyrometer

- Alignment of the sensor via live video image with integrated simultaneous temperature display (CSvision)
- 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)

Accessories CSlaser / CTlaser / CSvision series

Mechanical Accessories

ACCTLFB

Mounting bracket,
adjustable in one axis

ACCTLABT

Mounting bracket,
adjustable in two axes

ACHAMA

Mounting adapter: Mounting and pipe flange incl. screws

ACCTRAIL

Rail mount adapter for CT electronics

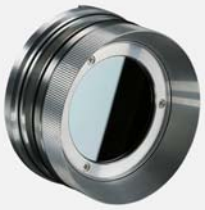
Optical Accessories

ACHAST300 + ACHAPA

Sighting tube M48x1.5, 300 mm length + pipe adapter with M48x1.5 internal thread for CoolingJacket

ACCJAFPCXL

Front part + optional with protective window for CoolingJacket



Combinations

ACHAMA

Mounting adapter

ACHAST300 + ACHAPA

Sighting tube
+ pipe adapter

ACCTLRM

Furnace wall mount for CSlaser / CTlaser

Air Purges and Cooling Units

ACCTAPMH

Air purge collar CTratio

ACCTLAP

Air purge collar CxL

ACCTLW

Water cooled housing CxL - stainless steel for T_{Amb} up to 175 °C

ACCSVIWA

Water cooled housing CSvision, stainless steel, for Tamb up to 250 °C

ACCTLCJA

CoolingJacket Advanced

ACCJAAPLS

Air purge laminar for CoolingJacket Advanced

ACCTLAP

Air purge collar

ACCTLW

Water cooled housing

Cooling sensing head + purging of optics

Applications

For further information about our applications, visit our website

Optris Applications

Applications Pyrometer

Laminating Interior fittings of Vehicles

Vehicle interiors are partly equipped with different surface decors during a laminating process. This process takes place at around 120°C – the decor temperature is controlled and optimized during this time.

Recommended device:
CSmicro LT

Blown Film Extrusion

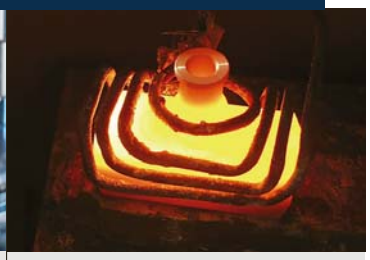
From the moment the melt emerges through the die at the extruder, the temperature of the tubular film must be measured at different points in order to ensure product quality.

Recommended device:
CTi P3

Sterilization of Glass Bottles

A sterilization of a defined temperature level is important to produce aseptic glass bottles for pharmaceutical products.
The right tempe-rature is secured and monitored by a punctual measuring pyrometer.

Recommended devices:
CTi G5,
CTi LT



Inductive Heat Treatment of Metals

A variant of the heat treatment of metals is induction hardening. The desired microstructure of the metal depends on an optimal temperature-time curve.

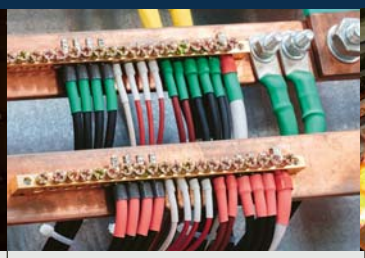
Recommended device:
CTlaser 1M

Applications Pyrometer

Temperature Control for Forging of Metals

Infrared pyrometers enable continuous, real-time, non-contact temperature monitoring throug-hout the forging process. They ensure accurate readings despite surface oxidation, smoke, and dust, allowing operators to maintain optimal temperatures.

Recommended devices:
CSvision R1M
CSvision R2M



High-Voltage System & Busbar Monitoring

The temperature of electrical connections in power distribution systems is a crucial indicator of their condition. Non-contact infrared sensors continuously monitor busbar temperature from a safe distance within cabinets, avoiding physical contact or complex insulation requirements.

Recommended device:
CS LT

Glass Tubes Production

The glass forming process de-mands precise temperature control to prevent structural defects like uneven wall thickness or breakage due to excessively high or low temperatures. Infrared pyrometers precisely measure glass tempera-tures in real-time.

Recommended device:
CTlaser G5

High-Speed Bottle Caps Measurement

Maintaining precise temperature control in the sealing proccess of small, fast-moving bottle caps is difficult due to their speed and size. High-speed thermal monitoring ena-bles real-time control of cap heating, ensuring the uniform sealing across all bottle caps

Recommended devices:
CTlaser 4M,
CTi 4M

References: 1) AdobeStock

Thermal Cameras

compact affordable industral fixed
infrared cameas for
non contact temperature measurement

Xi series
Compact Line

The Xi Compact Line is a testament to innovation in infrared camera technology, offering a comprehensive solution for high-resolution, non-contact temperature measurement. Its robust design, autonomous operation (Xi ETH series), and versatile interfaces make it a go-to choice for professionals seeking accurate and efficient thermal imaging in industrial settings. With its advanced features, the Optris Xi Compact Line sets a new standard in the field of infrared imaging, providing a cost-effective and powerful solution for diverse industrial applications.

Xi ETH series
Usable with Ethernet or USB

- Xi 80 LT ETH
- Xi 410 LT ETH
- Xi 1M ETH
- Xi 05M ETH
- Xi 320 MT[1)]

Direct Ethernet and RS485 communication. Possibility for autonomous stand-alone operation without using software or PC (smart pyrometer). Also, USB operation with PC possible.

Xi USB series
Usable with USB only

- Xi 400 LT USB
- Xi 640 LT USB

Fast configuration of the cameras due to licensed free software solution and USB communication. No extra driver installations necessary, Plug & Play ready.

IR camera configurator:

www.optris.com/ir-camera-configurator

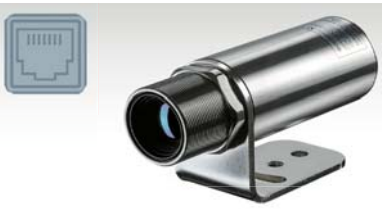
For further information on our infrared cameras visit our website

Xi Series – the Compact Line

www.optris.com/products/category/thermal-cameras/compact-line

1) *The Xi 320 MT is an exception in the ETH series and cannot be operated autonomously*

Thermal cameras
Xi ETH series



Basic Model	**Xi 80 LT ETH**	**Xi 410 LT ETH**
Detector	FPA, uncooled (34 µm pitch)	FPA, uncooled (17 µm pitch)
Optical resolution / Frame rate	80 x 80 pixels @ 50 Hz	**Ethernet:** 384 x 240 pixels @ 25 Hz **USB:** 384 x 240 pixels @ 4 Hz **autonomous operation:** 384 x 240 pixels @ 1.5 Hz
Spectral range	8 – 14 µm	8 – 14 µm
Temperature ranges	–20 ... 100 °C; 0 ... 250 °C; (20) 150 ... 900 °C[1]	–20 ... 100 °C; 0 ... 250 °C; (20) 150 ... 900 °C[1]; 200 ... 1500 °C (option)[2]
Optics (FOV)	12° (f = 12.7 mm / F = 1.0) 30° (f = 5.1 mm / F = 0.9) 55° (f = 3.1 mm / F = 0.9) 80° (f = 2.3 mm / F = 0.9)	18° x 12° (f = 20 mm / F = 1.1) 29° x 18° (f = 12.7 mm / F = 0.9) 53° x 31° (f = 7.7 mm / F = 0.9) 80° x 44° (f = 5.7 mm / F = 0.9)
Microscope optics	–	–
Focus	Motorized focus	Motorized focus
Autonomous operation	Yes	Yes
Optical resolution (D:S)	190:1 (12° optics)	390:1 (18° optics)
Thermal sensitivity (NETD)[3]	100 mK	60 mK
System accuracy (at T_{Amb}= 23 ±5 °C)	±2 °C or ±2 %, whichever is greater	±2 °C or ±2 %, whichever is greater
PC interfaces	USB 2.0 / Ethernet (100 Mbit/s) / PoE / RS485 (*Direct out- and inputs are not available while using the RS485 interface)	USB 2.0 / Ethernet (100 Mbit/s) / PoE / RS485 (*Direct out- and inputs are not available while using the RS485 interface)
Direct in-/outputs / Standard process interface (PIF)	1x 0/4–20 mA output 1x input (analog or digital) electrically isolated	1x 0/4–20 mA output 1x input (analog or digital) electrically isolated
Industrial process interface (PIF)	3x analog outputs (0/4–20 mA or 0–10 V) 3x alarm outputs (relais, 0–30 V / 400 mA) 3x inputs (analog or digital) 1x fail-safe (LED and relay) stackable up to 3 PIFs, electrically isolated	3x analog outputs (0/4–20 mA or 0–10 V) 3x alarm outputs (relais, 0–30 V / 400 mA) 3x inputs (analog or digital) 1x fail-safe (LED and relay) stackable up to 3 PIFs, electrically isolated
Ind. Ethernet: EtherNet/IP / Ethernet TCP/IP / Modbus TCP / Profinet	■ / ■ / ■ / ■	■ / ■ / ■ / ■
Cable length	USB: 1 m, 3 m, 5 m Ethernet: 100 m, RS485: 500 m	USB: 1 m, 3 m, 5 m Ethernet: 100 m, RS485: 500 m
Ambient temperature (T_{Amb})	0 °C ... 50 °C	0 °C ... 50 °C
Size	Ø 36 x 90 mm (M30x1 thread)	Ø 36 mm x 100 mm (M30x1 thread)
Environmental rating	IP 67 (NEMA 4)	IP 67 (NEMA 4)
Weight (without mounting bracket)	201 - 210 g (depending on lens)	216 - 220 g (depending on lens)
Power supply	USB / PoE / 5-30 VDC	USB / PoE / 5-30 VDC
Power consumption (typical values)	1.5 W	1.5 W
Scope of supply (standard)	• Process imager Xi 80 LT ETH • USB cable (1 m) • Cable for in-/outputs (1 m) with terminal block • Mounting bracket with tripod thread, mounting nut • Software package optris PIX Connect • Quick start guide	• Process imager Xi 410 LT ETH • Ethernet / PoE cable (1 m) / USB cable (1 m) • Cable for in-/outputs (1 m) with terminal block • Mounting bracket with tripod thread, mounting nut • Software package optris PIX Connect • Quick start guide

1) *Accuracy effective starting at 150 °C*
2) *If this option is ordered the (20)150 ... 900 °C range is not available*
3) *LT: Measurement of the noise equivalent temperature difference (NETD) according to VDI 5585 standard, method B; 25 °C black body temperature (-20 - 100 °C range), frame rate 20 Hz averaged*

Thermal cameras
Xi ETH series

Basic Model	Xi 1M ETH	Xi 05M ETH MeltScope	Xi 320 MT
Detector	CMOS (15 µm pitch)	CMOS (15 µm pitch)	FPA, uncooled (12 µm pitch)
Optical resolution / Frame rate	**Ethernet:** 396 x 300 pixels @ 20 Hz 396 x 8 pixels @ 500 Hz **USB:** 132 x 100 pixels @ 20Hz **autonomous operation:** 132 x 100 pixels @ 20 Hz 396 x 1 pixels @ 500 Hz	**Ethernet:** 396 x 300 pixels @ 20 Hz 396 x 8 pixels @ 500 Hz **USB:** 132 x 100 pixels @ 20Hz **autonomous operation:** 132 x 100 pixels @ 20 Hz 396 x 1 pixels @ 500 Hz	**Ethernet:** 320 x 240 pixels @ 30 Hz **USB:** 320 x 240 pixels @ 5 Hz
Spectral range	0.85 – 1.1 µm	500 – 540 nm	3.9 µm
Temperature ranges	450[2] °C ... 1800 °C (20 Hz mode)	20Hz: 950 ... 2450°C 500Hz: 1050 ... 2450°C	475 ... 1700 °C
Optics (FOV)	7° x 5° (f = 50 mm / F = 2.8) 14° x 10° (f = 25 mm / F = 1.8) 28° x 21° (f = 12 mm / F = 2.0) 50° x 38° (f = 7 mm / F = 2.0)	14° x 10° (f = 25 mm) 28° x 21° (f=12 mm)	11° x 8° (f = 20 mm) 17° x 13° (f = 13 mm) 29° x 21° (f = 8 mm) 41° x 30° (f = 6 mm)
Focus	Motorized focus	Motorized focus	Motorized focus
Autonomous operation	Yes	Yes	No
Optical resolution (D:S)	806:1 (7° optics)	830:1 (14° optics)	550:1 (11° optics)
Thermal sensitivity (NETD)[3]	< 2 K (< 900 °C)/ < 4 K (< 1400 °C)	< 2,5 K (< 1800 °C) / < 4,5 K (> 1800 °C)	1 K @ 600 °C
System accuracy (at T_{Amb}= 23 ±5 °C)	For object temperature < 1400 °C: ±1 % of reading for 20 Hz For object temperature < 1600 °C: ±2 % of reading for 20 Hz	For object temperature < 2000 °C: ±1 % of reading for 20 Hz, 500Hz For object temperature > 2000 °C: ±2 % of reading for 20 Hz, 500Hz	±2 %
PC interfaces	USB 2.0 / Ethernet (100 Mbit/s) / PoE) / RS485	USB 2.0 / Ethernet (100 Mbit/s) / PoE) / RS485	USB 2.0 / Ethernet (100 Mbit/s) / PoE)
Direct in-/outputs / Standard process interface (PIF)	1x 0/4–20 mA output 1x input (analog or digital) electrically isolated	1x analog output (0/4-20 mA) / 1x input (analog or digital); electrically isolated	1x analog output (0/4-20 mA) / 1x input (analog or digital); electrically isolated
Industrial process interface (PIF)	3x analog outputs (0/4–20 mA or 0–10 V) and 3x alarm outputs (relais) / 3x inputs (analog or digital) / fail-safe (LED and relay) stackable up to 3 PIFs; electrically isolated	3x analog outputs (0/4–20 mA or 0–10 V) and 3x alarm outputs (relais) / 3x inputs (analog or digital) / fail-safe (LED and relay) stackable up to 3 PIFs; electrically isolated	3x analog outputs (0/4–20 mA or 0–10 V) and 3x alarm outputs (relais) / 3x inputs (analog or digital) / fail-safe (LED and relay) stackable up to 3 PIFs; electrically isolated
Ind. Ethernet: EtherNet/IP / Ethernet TCP/IP / Modbus TCP / Profinet	■ / ■ / ■ / ■	■ / ■ / ■ / ■	- / - / - / -
Cable length	USB: 1 m, 3 m, 5 m Ethernet: 1 m (standard), 5 m, 10 m, 20 m (up to 100 m)	Ethernet: 1 m (standard), 5 m, 10 m, 20 m (up to 100 m) USB: 1 m, 3 m, 5 m	Ethernet: 1 m (standard), 5 m, 10 m, 20 m (up to 100 m) USB: 1 m, 3 m, 5 m
Ambient temperature (T_{Amb})	5 °C ... 50 °C	5 °C ... 50 °C	5 °C ... 50 °C
Size	Ø 36 mm x 112 – 126.5 mm, depending on lens (M30x1 thread)	Ø 36 mm x 112 (M30x1 thread)	Ø 36 mm x 100 mm (M30x1 thread)
Environmental rating	IP 67 (NEMA 4)	IP 67 (NEMA 4)	IP 67 (NEMA 4)
Weight (without mounting bracket)	270 g (depending on lens)	270 g (depending on lens)	216 - 220 g (depending on lens)
Power supply	8 - 30 VDC / PoE / USB	8 - 30 VDC / PoE / USB	5 - 30 V DC / PoE / USB
Power consumption (typical values)	2.5 W	2.5 W	2.5 W
Scope of supply (standard)	• Process imager Xi 1M ETH • Ethernet / PoE cable (1 m) / USB cable (1 m) • IN/ OUT cable incl. terminal block (1 m) • Mounting bracket with tripod thread, mounting nut • Software package optris PIX Connect	• Process imager Xi 05M ETH • Ethernet / PoE cable (1 m) / USB cable (1 m) • IN/ OUT cable incl. terminal block (1 m) • Mounting bracket with tripod thread, mounting nut • Software package optris PIX Connect	• Process imager Xi 320 MT • Ethernet/ PoE cable (1 m)/ USB cable (1 m) • IN/ OUT cable incl. terminal block (1 m) • Mounting bracket with tripod thread, mounting nut • Software package optris PIX Connect

1) *Accuracy effective starting at 150 °C*
2) *If this option is ordered the (20)150 ... 900 °C range is not available*
3) *LT: Measurement of the noise equivalent temperature difference (NETD) according to VDI 5585 standard, method B; 25 °C black body temperature (-20 - 100 °C range), frame rate 20 Hz averaged*

Thermal cameras
Xi USB series

Basic Model	Xi 400 LT USB	Xi 400 Microscope Optics	Xi 640 LT USB
Detector	FPA, uncooled (17 µm pitch)	FPA, uncooled (17 µm pitch)	FPA, uncooled (12 µm pitch)
Optical resolution / Frame rate	382 x 288 pixels @ 80 Hz (switchable to 27 Hz)	382 x 288 pixels @ 80 Hz (switchable to 27 Hz)	640 x 480 pixels @ 32 Hz
Spectral range	8 – 14 µm	8 – 14 µm	8 – 14 µm
Temperature ranges	–20 ... 100 °C; 0 ... 250 °C; (20) 150 ... 900 °C; 200...1500 °C (option)	–20 ... 100 °C; 0 ... 250 °C; (20) 150 ... 900	–20 ... 100 °C; 0 ... 250 °C; (20) 150 ... 900 °C[1)]
Optics (FOV)	29° x 22° (f = 12.7 mm / F = 0.9) 18° x 14° (f = 20 mm / F = 1.1) 53° x 38° (f = 7.7 mm / F = 0.9) 80° x 54° (f = 5.7 mm / F = 0.9)	18° x 14° (f = 20 mm / F = 1.1)	22° x 17° (f = 20.0 mm / F = 1.1) 36° x 26° (f = 12.7 mm / F = 0.9) 65° x 45° (f = 7.7 mm / F = 0.9)
Microscope optics	18° x 14° (f = 20 mm / F=1.1)	18° x 14° (f = 20 mm / F=1.1), Smallest measuring spot (IFOV): 80 µm	–
Focus	Motorized focus	Motorized focus	Motorized focus
Autonomous operation	No	No	No
Optical resolution (D:S)	390:1 (18° optics)	375:1	550:1 (22° optics)
Thermal sensitivity (NETD)[3)]	50 mK	80 mK	80 mK
System accuracy (at T_{Amb}= 23 ±5 °C)	±2 °C or ±2 %, whichever is greater	±2 °C or ±2 %, whichever is greater	±2 °C or ±2 %, whichever is greater
PC interfaces	USB 2.0 / optional USB to GigE (PoE) interface	USB 2.0 / optional USB to GigE (PoE) interface	USB 2.0 / optional USB to GigE (PoE) conversion
Direct in-/outputs / Standard process interface (PIF)	1x 0–10 V input 1x digital input (max. 24 V) 1x 0–10 V output	1x 0–10 V input 1x digital input (max. 24 V) 1x 0–10 V output	1x 0–10 V input 1x digital input (max. 24 V) 1x 0–10 V output
Industrial process interface (PIF)	2 x 0–10 V inputs, 1 x digital input (max. 24 V), 3x 0/4-20 mA outputs, 3 x relais (0–30 V / 400 mA), faile-safe relay	2 x 0–10 V inputs, 1 x digital input (max. 24 V), 3x 0/4-20 mA outputs, 3 x relais (0–30 V / 400 mA), faile-safe relay	2 x 0–10 V inputs, 1 x digital input (max. 24 V), 3x 0/4-20 mA outputs, 3 x relais (0–30 V / 400 mA), faile-safe relay
Cable length	USB: 1 m, 3 m, 5 m, 10 m	USB: 1 m, 3 m, 5 m, 10 m	USB: 1 m, 3 m, 5 m, 10 m
Ambient temperature (T_{Amb})	0 °C ... 50 °C	0 °C ... 50 °C	0 °C ... 60 °C
Size	Ø 36 x 100 mm (M30x1 thread)	Ø 36 x 100 mm (M30x1 thread)	Ø 36 mm x 100 mm (M30x1 thread)
Environmental rating	IP 67 (NEMA 4)	IP 67 (NEMA 4)	IP 67 (NEMA 4)
Weight (without mounting bracket)	216 - 220 g (depending on lens)	216 - 220 g (depending on lens)	216 - 220 g, depending on lens
Power supply	via USB	via USB	via USB
Power consumption (typical values)	1.5 W	1.5 W	1.5 W
Scope of supply (standard)	• Process imager Xi 400 LT USB • USB cable (1 m) • Standard PIF cable (1 m) incl. terminal block • Mounting bracket with tripod thread, mounting nut • Software package optris PIX Connect • Quick start guide	• Process imager Xi 400 LT USB • USB cable (1 m) • Standard PIF cable (1 m) incl. terminal block • Mounting bracket with tripod thread, mounting nut • Software package optris PIX Connect • Quick start guide	• Process imager Xi 640 LT USB • USB cable (1 m) • Standard PIF cable (1 m) incl. terminal block • Mounting bracket with tripod thread, mounting nut • Software package optris PIX Connect • Quick start guide

1) *Accuracy effective starting at 150 °C*
2) *Lens with focal length f = 50 mm has an elevated starting temperature of +525 °C*
3) *Specified NETD value applies to all frequencies*

Accessories Xi series

Laminar Air Purge

part number: ACXIAPL / ACXI1MAPL / ACXI05MAPL (with mounting bracket ACXIAPLAB)

Features

- The air purge attachment can be used in combination with the water cooled housing and protects the optics from contamination
- Used in rough and dusty areas to guarantee a reliabe temperature measurement

Water Cooled Housing

part number: ACXIMW

Features

- The rugged water cooled housing allows the Xi infrared cameras to be employed in hot environments up to 250°C
- Respective heat-resistant cables are also available

Shutter

part number: ACXISCBxx + ACXIAPLAB (Mounting bracket)

Features

- In addition Xi cameras can be equipped with a shutter
- The shutter protects the optics from falling parts within a response time of 100 ms
- Protects infrared camera optics
- Fast-closing mode (100 milliseconds)
- Complete seal when closed prevents dirt and contaminants
- Includes a control box for connections, allowing integration with other systems

Outdoor Protective Housing

for Xi serie

part number: ACXIOPH24/ ACXIOPH24VIS

Features

- Environmental rating IP 66
- Additional air purge collar allows continuous operation in dusty and humid environments
- Heating element and built-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
- USB-Server Gigabit enables easy integration of IR camera stream in video control systems

Accessories Xi series

USB Server Gigabit 2.0
for Xi USB series

part number: ACPIUSBSGB

Features

- Fully USB 2.0 compatible, Data rates: 1.5 / 12 / 480 mbps, USB transfer mode: Isochronous
- Network connection via Gigabit Ethernet
- Full TCP/IP support incl. routing and DNS
- Two independent USB ports
- Supply from PoE or external power supply with 24 – 48 VDC
- Galvanic isolation 500 V_{RMS} (network connection)
- Remotely configurable via Web Based Management

Industrial Process Interface (PIF)
for Xi series

part number: **ACXIPIFCBx (for Xi ETH series) ACPIPIFMACBx (for Xi USB series)**

Features

- Industrial process interface for Xi USB series with 3 analog / alarm outputs, 2 analog inputs, 1 digital input, 3 alarm relais
- Industrial process interface for Xi ETH series with 3 analog- / alarm outputs, 3 inputs (analog or digital), 3 alarm relais
- 500 V AC_{RMS} isolation voltage between camera and process
- Separate fail-safe relay output
- Xi hardware including all cable connections and PIX Connect software are permanently observed during operation
- Option Xi 80 LT ETH & Xi 1M ETH: stackable up to 3 PIFs

Industrial Ethernet Interfaces

part numbers: ACXICSVIEIPK / ACXICSVIENMBTCPK / ACXICSVIPFNK

Features

- EtherNet/IP / Ethernet TCP/IP / Modbus TCP / Profinet interfaces
- Certified by ODVA/ PROFIBUS Nutzerorganisation e.V.
- Full documentation and easy integration with GSD or EDS files

Air Purge Flange Laminar
for Xi water cooled housing

part number: ACXIMWAPFL

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
- Protection window for mechanical protection integrated

Thermal Cameras

with high resolution for fast online applications and exchangeable lenses, including line scan function

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 PI 400i / 450i to the high resolution PI 640i, special thermal imagers for metal, glass and special optics for microscopic targets or super wide-angle optics with 120° field of view – IR cameras of the Precision line meet every customer requirement.

IR camera configurator:
www.optris.com/ir-camera-configurator

For further information on our infrared cameras visit our website

PI series - the Precision Line
www.optris.com/products/category/thermal-cameras/precision-line

Thermal cameras
PI series

Basic Model		PI 400i / PI 450i
Detector		FPA, uncooled (17 µm pitch)
Optical resolution / Frame rate		382 x 288 pixels @ 80 Hz (switchable to 27 Hz)
Spectral range		8 – 14 µm
Temperature ranges		–20 ... 100 °C 0 ... 250 °C (20) 150 ... 900 °C [1] 200 ... 1500 °C (optional)
Optics (FOV) exchangeable		18° x 14° (f = 20 mm / F = 1.1) 29° x 22° (f = 12.7 mm / F = 0.9) 53° x 38° (f = 7.7 mm / F = 0.9) 80° x 54° (f = 5.7 mm / F = 0.9)
Thermal sensitivity (NETD)[2]		**PI 400i**: 75 mK with 29°, 53°, 80° FOV **PI 400i**: 100 mK with 18° FOV / F = 1.1 **PI 450i**: 40 mK with 29°, 53°, 80° FOV **PI 450i**: 60 mK with 18° FOV / F = 1.1
System accuracy (at T_{Amb}= 23 ±5 °C)		±2 °C or ±2 %, whichever is greater
Temperature coefficient		±0.05 % / K[3]
PC interfaces		USB 2.0 / optional USB to GigE (PoE) Interface
Process interface (PIF)	Standard PIF	1x 0 – 10 V input, 1x digital input (max. 24 V), 1x 0 – 10 V output
	Industrial PIF (optional)	2x 0 – 10 V input, 1x digital input (max. 24 V), 3x 0 / 4– 20 mA output, 3x relais (0 – 30 V / 400 mA), 1x fail-safe-relay
Ambient temperature (T_{Amb})		**PI 400i**: 0 ... 50 °C / **PI 450i**: 0 ... 70 °C
Size		46 x 56 x 68 – 77 mm (depending on lens and focus position)
Environmental rating		IP 67 (NEMA 4)
Weight		237 - 251 g, depending on lens
Power supply		via USB
Power consumption (typical values)		1.5 W
Scope of supply (standard)		• USB camera with 1 lens • USB cable (1 m) • Table tripod • PIF cable with terminal block (1 m) • Aluminum case (PI 400i) • Rugged outdoor case (PI 450i) • Software package optris PIX Connect

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PI 640i	**PI 640i Microscope optics**	**PI 450i G7**	**PI 640i G7**
FPA, uncooled (17 µm pitch)	FPA, uncooled (17 µm pitch)	FPA, uncooled (17 µm pitch)	FPA, uncooled (17 µm pitch)
640 x 480 pixels @ 32 Hz 640 x 120 pixels @ 125 Hz	640 x 480 pixels @ 32 Hz 640 x 120 pixels @ 125 Hz	382 x 288 pixels @ 80 Hz (switchable to 27 Hz)	640 x 480 pixels @ 32 Hz 640 x 120 pixels @ 125 Hz
8 – 14 µm	8 – 14 µm	7.9 µm	7.9 µm
–20 ... 100 °C 0 ... 250 °C (20) 150 ... 900 °C [1] 200 ... 1500 °C (optional)	–20 ... 100 °C 0 ... 250 °C **MO2X:** (20) 150 ... 500 °C [1] **MO44:** (20) 150 ... 900 °C [1] 200 ... 1500 °C (optional)	150 ... 900 °C 200 ... 1500 °C	150 ... 900 °C 200 ... 1500 °C 200 ... 3000 °C (optional)
15° x 11° (f = 41.5 mm / F = 1.0) 33° x 25° (f = 18.7 mm / F = 0.8) 60° x 45° (f = 10.5 mm / F = 0.8) 90° x 64° (f = 7.7 mm / F = 0.8) 120° x 100° FOV / f = 3.5 mm	**MO2X:** 5.4 x 4.0 mm (F=1.3) / f = 60 mm Smallest measuring spot (IFOV): 8 µm **MO44:** 20.0 x 14.0 mm (F=1.1) / f = 44 mm Smallest measuring spot (IFOV): 28 µm	18° x 14° (f = 20 mm / F = 1.1) 29° x 22° (f = 12.7 mm / F = 0.9) 53° x 38° (f = 7.7 mm / F = 0.9) 80° x 54° (f = 5.7 mm / F = 0.9)	15° x 11° / (f = 41.5 mm / F = 1.0) 33° x 25° / (f = 18.7 mm / F = 0.8) 60° x 45° / (f = 10.5 mm / F = 0.8) 90° x 64° / (f = 7.7 mm / F = 0.8)
40 mK with 33°, 60° and 90° FOV 60 mK with 15° FOV, 60 mK for 120° FOV	80 mK	150 mK 175 mK with 18 ° FOV	80 mK with 33°, 60°, 90° FOV 120 mK with 15° FOV
±2 °C or ±2 %, whichever is greater	±2 °C or ±2 %, whichever is greater	±2 °C or ±2 %, whichever is greater	±2 °C or ±2 %, whichever is greater
±0.05 % / K[3]	±0.05 % / K[3]	-	-
USB 2.0 / optional USB to GigE (PoE) Interface	USB 2.0 / optional USB to GigE (PoE) Interface	USB 2.0 / optional USB to GigE (PoE) Interface	USB 2.0 / optional USB to GigE (PoE) Interface
1x 0 – 10 V input, 1x digital input (max. 24 V), 1x 0 – 10 V output	1x 0 – 10 V input, 1x digital input (max. 24 V), 1x 0 – 10 V output	1x 0 – 10 V input, 1x digital input (max. 24 V), 1x 0 – 10 V output	1x 0 – 10 V input, 1x digital input (max. 24 V), 1x 0 – 10 V output
2x 0 – 10 V input, 1x digital input (max. 24 V), 3x 0 / 4– 20 mA output, 3x relais (0 – 30 V / 400 mA), 1x fail-safe-relay	2x 0 – 10 V input, 1x digital input (max. 24 V), 3x 0 / 4– 20 mA output, 3x relais (0 – 30 V / 400 mA), 1x fail-safe-relay	2x 0 – 10 V input, 1x digital input (max. 24 V), 3x 0 / 4– 20 mA output, 3x relais (0 – 30 V / 400 mA), 1x fail-safe-relay	2x 0 – 10 V input, 1x digital input (max. 24 V), 3x 0 / 4– 20 mA output, 3x relais (0 – 30 V / 400 mA), 1x fail-safe-relay
0 ... 70 °C	0 ... 70 °C	0 ... 70 °C	0 ... 70 °C
46 x 56 x 76 - 100 mm (depending on lens and focus position)	52 x 59 x 139 mm (depending on lens and focus position)	46 x 56 x 68 – 77 mm (depending on lens and focus position)	46 x 56 x 76 – 100 mm (depending on lens and focus position)
IP 67 (NEMA 4)	IP 67 (NEMA 4)	IP 67 (NEMA 4)	IP 67 (NEMA 4)
269 - 340 g, depending on lens	410 g	237 - 251 g, depending on lens	269 - 340 g, depending on lens
via USB	via USB	via USB	via USB
1.5 W	1.5 W	2.5 W	2.5 W
• USB camera with 1 lens • USB cable (1 m) • Table tripod • PIF cable with terminal block (1 m) • Rugged outdoor case • Software package optris PIX Connect	• USB camera with microscope lens • Base plate with ESD pad • Microscope stand (MO44) • Premium microscope stand (MO2X) • USB cable (1 m)/ Standard-PIF • Microscope accessory case • Software package optris PIX Connect	• USB camera with 1 lens • USB cable (1 m) • Table tripod • PIF cable with terminal block (1 m) • Rugged outdoor case • Software package optris PIX Connect	• USB camera with 1 lens • USB cable (1 m) • Table tripod • PIF cable with terminal block (1 m) • Rugged outdoor case • Software package optris PIX Connect

1) *Accuracy effective starting at 150 °C*

2) *LT: Measurement of the noise equivalent temperature difference (NETD) according to VDI 5585 standard, method B; 25 °C black body temperature (-20-100 °C range), frame rate 20 Hz averaged*
G7: Measurement of the noise equivalent temperature difference (NETD) according to VDI 5585 standard, method B; 650 °C black body temperature, frame rate 20 Hz averaged

3) *For T_{Amb} 10...50 °C and T_{Obj} ≤ 500 °C; otherwise: ± 0.1 K/K or 0.1%/K (whichever is greater)*

optris **PI series – *Precision Line***

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Thermal cameras **PI series**			
Basic Model	**PI 05M**	**PI 08M**	**PI 1M**
Detector	CMOS (15 µm pitch)	CMOS (15 µm pitch)	CMOS (15 µm pitch)
Optical resolution	764 x 480 pixels @ 32 Hz 382 x 288 pixels @ 80 Hz (switchable to 27 Hz) 72 x 56 pixels @ 1 kHz 764 x 8 pixels @ 1 kHz (fast line scan mode)	764 x 480 pixels @ 32 Hz 382 x 288 pixels @ 80 Hz (switchable to 27 Hz) 72 x 56 pixels @ 1 kHz 764 x 8 pixels @ 1 kHz (fast line scan mode)	764 x 480 pixels @ 32 Hz 382 x 288 pixels @ 80 Hz (switchable to 27 Hz) 72 x 56 pixels @ 1 kHz 764 x 8 pixels @ 1 kHz (fast line scan mode)
Spectral range	500 – 540 nm	780 – 820 nm	0.85 – 1.1 µm
Temperature range	900 °C (950 °C for f=50mm - optics) ... 2450 °C (27 Hz mode) 950 °C (1000 °C for f=50mm - optics) ... 2450 °C (32 / 80 Hz mode) 1100 °C (1150 °C for f=50mm - optics) ... 2450 °C (1 kHz mode)	575 ... 1900 °C (27 Hz mode) 625 ... 1900 °C (32 / 80 Hz mode) 750 ... 1900 °C (1 kHz mode)	450[1)] ... 1800 °C (27 Hz mode) 500[1)] ... 1800 °C (80 / 32 Hz mode) 600[1)] ... 1800 °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)	Up to 1 kHz / 1 ms real time analog output (0 - 10 V) of 8 x 8 pixels (freely selectable)	Up to 1 kHz / 1 ms real time analog output (0 - 10 V) of 8 x 8 pixels (freely selectable)
Optics (FOV) **exchangeable**	**FOV @ 764 x 480 px:** 27° x 17° (f = 25 mm) 13° x 8° (f = 50 mm) **FOV @ 382 x 288 px:** 14° x 11° (f = 25 mm) 7° x 5° (f = 50 mm)	**FOV @ 764 x 480 px:** 41° x 25° (f = 16 mm) 27° x 17° (f = 25 mm) **FOV @ 382 x 288 px:** 20° x 15° (f = 16 mm) 14° x 11° (f = 25 mm)	**FOV @ 764 x 480 px:** 41° x 25° (f = 16 mm) 27° x 17° (f = 25 mm) 13° x 8° (f = 50 mm) 9° x 6° (f = 75 mm) **FOV @ 382 x 288 px:** 20° x 15° (f = 16 mm) 14° x 11° (f = 25 mm) 7° x 5° (f = 50 mm) 4° x 3° (f = 75 mm)
F-number	1.4	1.4	1.4 (39° and 26° lens) 2.4 (13° lens) 2.8 (9° lens)
Thermal sensitivity NETD[2)]	< 2 K (< 1400 °C) < 4 K (< 2100 °C)	< 2 K (< 1000 °C) < 4 K (< 1600 °C)	< 2 K (< 900 °C) < 4 K (< 1400 °C)
System accuracy (at T_{Amb}= 23 ±5 °C)	**For object temperature < 2000 °C:** ±1 % of reading for 27/32/80 Hz ±1.5 % of reading for 1 kHz **For object temperature > 2000 °C:** ±2 % of reading for 27/32/80 Hz ±2.5 % of reading for 1 kHz	**For object temperature < 1500 °C:** ±1 % of reading for 27/32/80 Hz ±1.5 % of reading for 1 kHz **For object temperature > 1500 °C:** ±2 % of reading for 27/32/80 Hz ±2.5 % of reading for 1 kHz	**For object temperature < 1400 °C:** ±1 % of reading for 27/32/80 Hz ±1.5 % of reading for 1 kHz **For object temperature < 1600 °C:** ±2 % of reading for 27/32/80 Hz ±2.5 % of reading for 1 kHz
PC interfaces	USB 2.0 / optional USB to GigE (PoE) interface	USB 2.0 / optional USB to GigE (PoE) interface	USB 2.0 / optional USB to GigE (PoE) interface
Process Interface (PIF) – **Standard PIF**	1x 0 – 10 V input, 1x digital input (max. 24 V), 1x 0 – 10 V output	1x 0 – 10 V input, 1x digital input (max. 24 V), 1x 0 – 10 V output	1x 0 – 10 V input, 1x digital input (max. 24 V), 1x 0 – 10 V output
Process Interface (PIF) – **Industrial PIF (optional)**	2x 0 – 10 V inputs, 1x digital input (max. 24 V), 3x 0 / 4-20 mA outputs, 3x relais (0 – 30 V / 400 mA), 1x fail-safe relay	2x 0 – 10 V inputs, 1x digital input (max. 24 V), 3x 0 / 4-20 mA outputs, 3x relais (0 – 30 V / 400 mA), 1x fail-safe relay	2x 0 – 10 V inputs, 1x digital input (max. 24 V), 3x 0 / 4-20 mA outputs, 3x relais (0 – 30 V / 400 mA), 1x fail-safe relay
Ambient temperature (T_{Amb})	5 ... 50 °C	5 ... 50 °C	5 ... 50 °C
Size	46 x 56 x 88 – 129 mm with protection tube (depending on lens and focus position)	46 x 56 x 88 – 129 mm with protection tube (depending on lens and focus position)	46 x 56 x 88 – 129 mm with protection tube (depending on lens and focus position)
Environmental rating	IP 67 (NEMA 4)	IP 67 (NEMA 4)	IP 67 (NEMA 4)
Weight	245 - 311 g, depending on lens	245 - 311 g, depending on lens	245 - 311 g, depending on lens
Power supply	via USB	via USB	via USB
Power consumption (typical values)	2.5 W	2.5 W	2.5 W
Scope of supply (standard)	• USB camera with 1 lens • Optional: Protective window • USB cable (1 m) • Table tripod • PIF cable with terminal block (1 m) • Software package optris PIX Connect • Aluminum case • Optional: CoolingJacket, HT cable	• USB camera with 1 lens • Optional: Protective window • USB cable (1 m) • Table tripod • PIF cable with terminal block (1 m) • Software package optris PIX Connect • Aluminum case • Optional: CoolingJacket, HT cable	• USB camera with 1 lens • Optional: Protective window • USB cable (1 m) • Table tripod • PIF cable with terminal block (1 m) • Software package optris PIX Connect • Aluminum case • Optional: CoolingJacket, HT cable

1) *Lenses with focal lengths f = 50 mm and f = 75 mm have an elevated starting temperature of +75 °C*
2) *Measurement of the noise equivalent temperature difference (NETD) according to VDI 5585 standard, method B; NETD value applies to all frame rates*

Accessories PI series

Outdoor Protective Housing

part number: **ACPIOPH24xx/ ACPIOPH24xx**

Features

- Environmental rating IP 66
- Additional air purge collar allows for a continuous operation in dusty and humid conditions
- Heating element and built-in fan enable for a 24/7 operation from -40 °C to 50 °C (optional: 60 °C with USB-Server HT)
- Installation of USB Server Gigabit 2.0 and industrial process interface
  possible for integration into control systems over large outdoor distances

Protective Housing

part number: **ACPIPH**

Features

- Weight: 350g
- Material: high-quality stainless steel
- Designed to be compatible with all PI series cameras
- Providing secure and stable support.
- Adjustable on two axes - the infrared camera can rotate horizontally / vertical

CoolingJacket Advanced

part number: **ACPICJA**

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

Laminar Air Purge

part number: **ACCJAAPLS**

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
- Focussable from the outside once installed
- Protection window for mechanical protection integrated
- Also available as line scanner version

USB Server Gigabit 2.0/ USB Server HT

part number: **ACPIUSBSGB/ ACPIUSBSHT**

Features

- Fully USB 2.0 compatible, Data rates: 1.5 / 12 / 480 mbps, USB transfer mode: Isochronous
- For optris PI series, Xi 400 LT USB as well as CTvideo/ CSvideo and CSvision series
- Two independent USB ports
- Operation temperature: 0 °C to 50 °C (USB Server HT: 60 °C in combination with PI 450i and Outdoor protective housing)
- Supply from PoE or external power supply with 24 – 48 VDC
- Galvanic isolation 500 VRMS (network connection)
- Remotely configurable via Web Based Management

Industrial Process Interface (PIF)

part number: **ACPIPIFMA**

Features

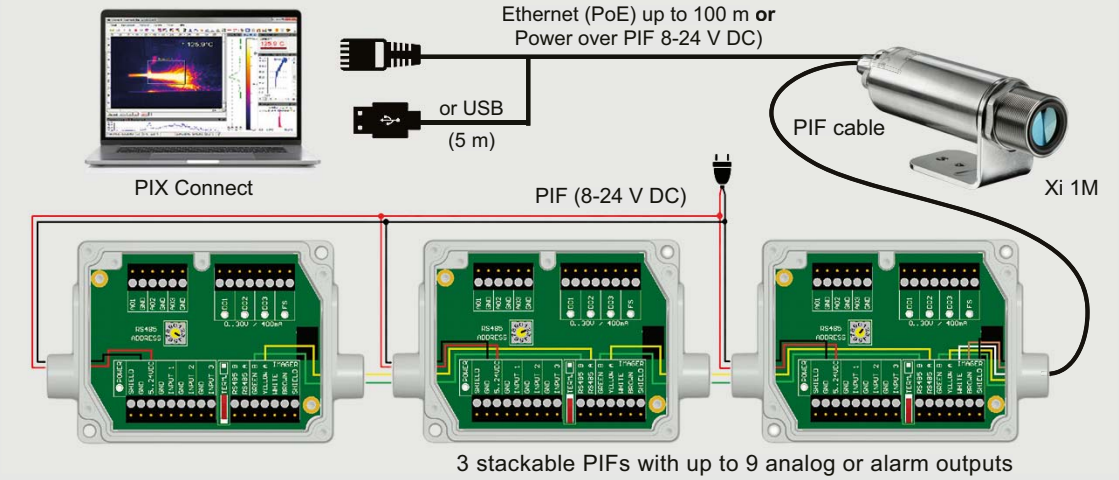
- Industrial process interface for PI series with 3 analog / alarm outputs, 2 analog inputs, 1 digital input,
  3 alarm relais
- 500 V AC_{RMS} isolation voltage between camera and process
- Separate fail-safe relay output
- PI hardware including all cable connections and PIX Connect software
  are permanently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

Connections and Integration

Expansion options

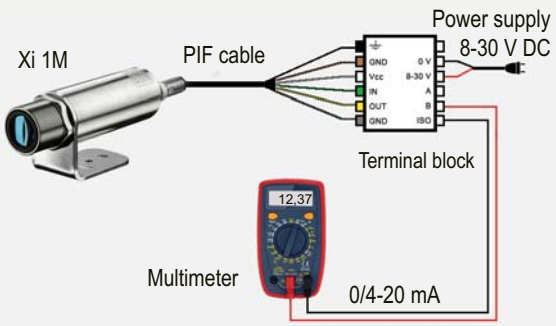
Connection Options Xi series

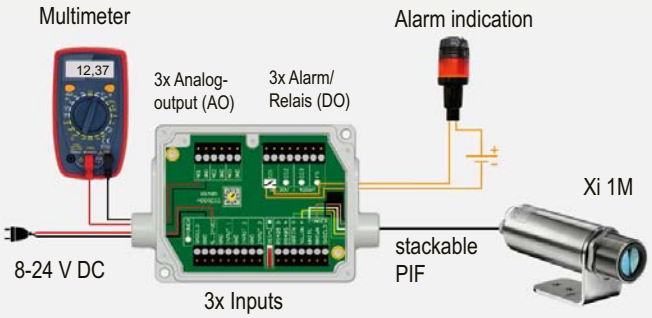
Operation with PIX Connect Software and 3 stackable PIFs



3 stackable PIFs with up to 9 analog or alarm outputs

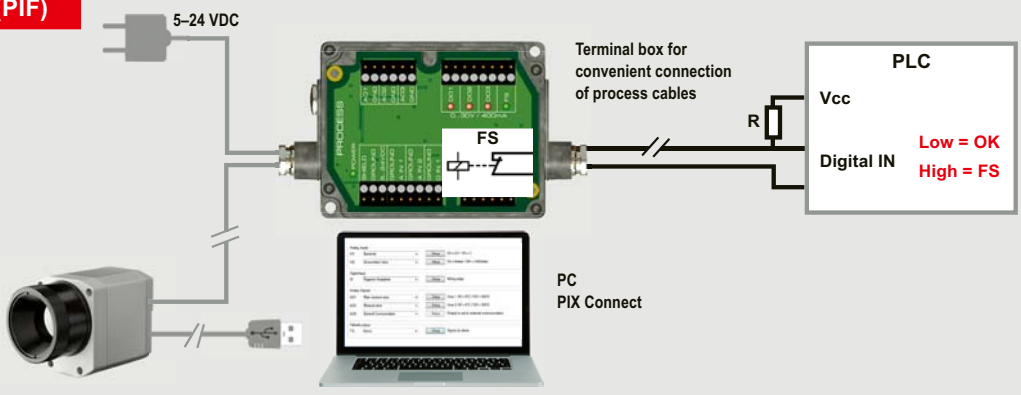
Autonomous Operation (without PC) with up to 9 analog Outputs/ Alarm Outputs and 3 stackable PIFs



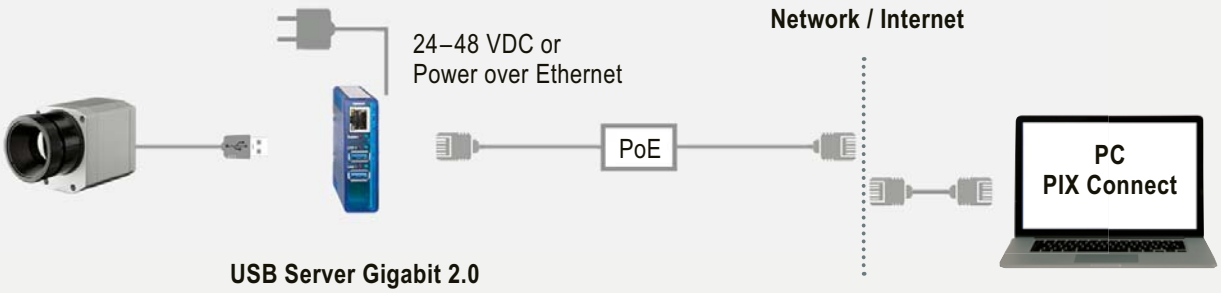


Connection Options PI series

Industrial Process Interface (PIF)



USB Server Gigabit 2.0



Applications

For further information about our applications, visit our website

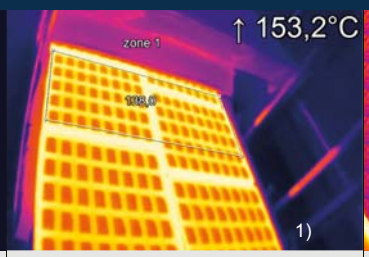
Optris Applications

Applications IR Cameras

Glass Gob Production Control

Glass gob processing suffers from inconsistent temperatures and positioning during transport. By continuously monitoring both temperature and position with infrared cameras, operators gain real-time feedback on each gob.

Recommended device:
PI 1M



Industrial Baked Goods Production

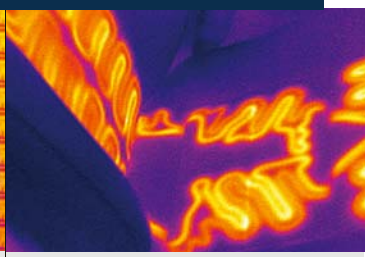
Achieving uniform heat distribution in industrial dough production is difficult, often leading to inconsistent baking, texture variations, or cracked pasta or cookies. The use of thermal imaging enables real-time, automated monitoring and control of oven temperatures, ensuring even heat distribution.

Recommended device:
Xi 410 LT ETH
Xi 400 / 640 LT USB

Wafer Cleaning for Lithography Process

Photoresist residues and contaminants can interfere with precise pattern transfer, resulting in defective circuits and reducing the reliability of the components. Infrared imaging leverages thermal contrasts between residues and wafer surfaces, allowing precise detection of otherwise invisible contaminants.

Recommended devices:
PI 640i LT

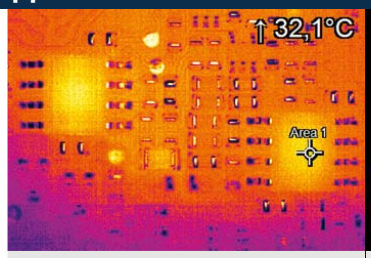


Car Seat Heater Testing

Manual testing of car seat heaters is time-consuming and unreliable, risking undetected faults in fragile heating wires or cable connections that could lead to overheating or fire hazards. The thermal imaging cameras automates visual and functional testing of seat heaters

Recommended device:
PI 640i LT
Xi 400 / 640 LT USB

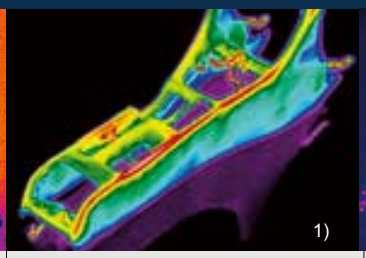
Applications IR Cameras



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.

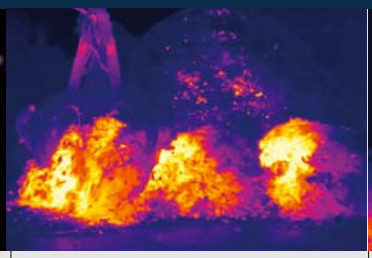
Recommended devices:
PI 640i Microscope optics,
Xi 400 Microscope optics



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.

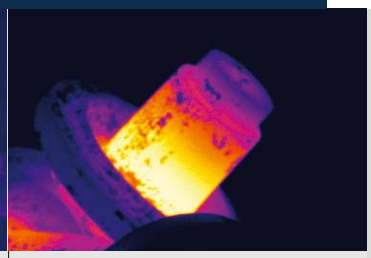
Recommended device:
PI 450i



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 LT USB
Xi 410 LT ETH



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

References: 1) GTT Willi Steinko

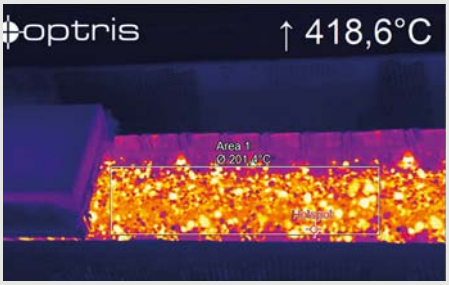
optris PI 640i CM/ 450i CM/ Xi 400 CM

INFRARED CAMERAS FOR CONDITION MONITORING AND EARLY FIRE DETECTION

Product package for outdoor condition monitoring and fire detection

- Environmental rating IP66 and an integrated air purge ensure reliable 24/7 operation under harsh conditions
- Built-in heater/ fan for an extra wide operating temperature range of - 40 °C up to 60 °C for PI 450i CM and - 40 °C up to 50 °C for PI 640i CM and Xi 400 CM
- USB Server (PoE) for PI 640i CM and USB Server HT (PoE) for PI 450i CM for easy integration of IR camera stream in video management systems

This new dedicated product package consists of a PI 640i, PI 450i or Xi 400 imager and the USB Server – all pre-assembled into the Outdoor housing. This package is completed by a wall mount.



Use infrared cameras under harsh environmental conditions

A constant air purge across the front window helps prevent dust, moisture, and insects from landing on the optics. This action maintains image quality and reduces the need for manual cleaning.

Easy Ethernet integration

The USB Server Gigabit makes it easy to combine both IR and VIS streams into video management or monitoring systems using standard network infrastructure. Its compatibility with common switches and industrial PCs allows for flexible setups.

For further information on our condition monitoring visit our website

Infrared Condition Monitoring Systems

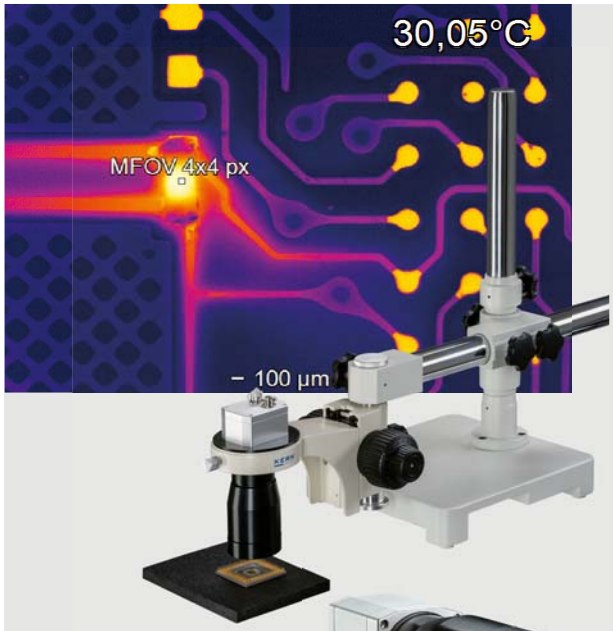
www. optris.com/products/infrared-application-packages/condition-monitoring-systems

optris PI 640i Thermal Microscope

THERMAL ANALYSIS OF TINY OBJECTS DOWN TO 8 µm

Microscope optics for inspection of electronic components or chip-level structures

- Exchangeable, focusable optics for most flexible use of the camera
- Analysis of small chip level components down to 8 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 measurement accuracy
- License-free analysis software and complete SDK included



Two high-resolution microscope optics for thermal imaging on electronic components or chip-level structures down to 8 µm pixel size

The PI 640i can be equipped with two different microscope optics to measure the temperature on circuit board parts and components or on very tiny structures.

The PI 640i with the standard microscope optics MO44 can resolve thermal variations on targets as small as 28 µm.

The new MO2X microscope optics with 2x magnification offers an instantaneous field of view of 8 µm and can resolve very tiny structures down to chip-level.

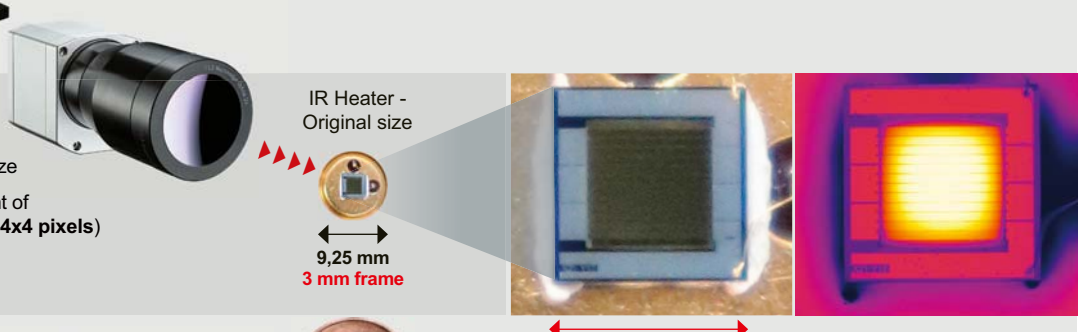
The PI 640i offers a superb NETD of 80 mK with both microscope optics to detect the smallest temperature differences.

PI 640i MO2X

Thermal analysis of tiny chip-level structures down to **8 µm** size

Exact temperature measurement of **34 µm** small structures (**MFOV=4x4 pixels**)

Field of view: **5,4 x 4 mm**
Working distance: **15 mm**

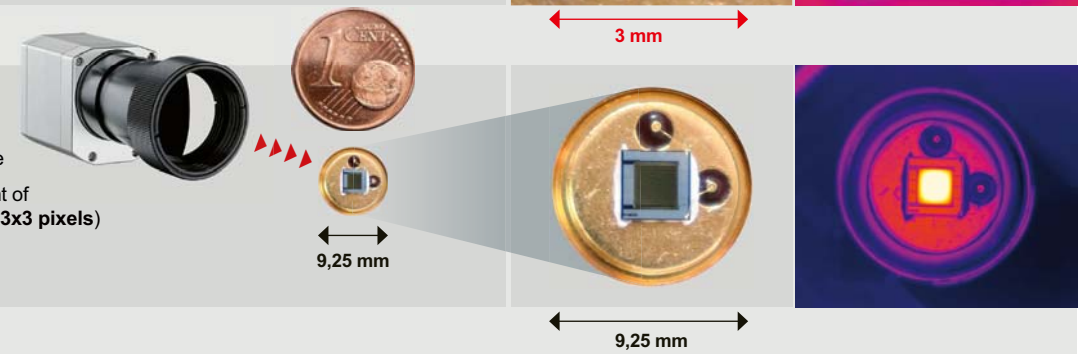


PI 640i MO44

Thermal analysis of small components down to **28 µm** size

Exact temperature measurement of **85 µm** small structures (**MFOV=3x3 pixels**)

Field of view: **23 x 16 mm**
Working distance: **80-100 mm**



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Application examples for the analysis of electronic boards:
www.optris.com/application/electronics

optris Indusrial Packages / Furnace Package

READY TO USE THERMAL IMAGER SYSTEMS

Application packages with water cooled housing for high temperature applications with different options

- Ready to use system, pre-assembled
- Dedicated for harsh industrial environments
- Complete system usable in up to 250 °C ambient temperature
- Process interface for easy signal integration

Industrial Packages

New

The Industrial Packages are designed for harsh conditions in high temperature industrial environments. They are based on a Xi thermal imager, optimally protected by the water-cooled housing with air purge and shutter, keeping the optics clean under conditions with dust, smoke or fumes. It can operate in ambient temperatures up to 250 °C. The Industrial Packages are pre-assembled and ready to use.

Furnace Package

New

The Furnace Package has been designed for use under harsh conditions. It is a combination of the short-wavelength Xi 1M thermal imager with water-cooled housing and air purge flange laminar. The whole system can operate in ambient temperatures up to 250 °C. The Air purge flange laminar allows an easy mounting directly on furnace walls and with the integrated protective window it gives optimal protection for the imager optics. The Furnace Package is pre-assembled and ready to use.

For further information on the industrial packages visit our website

Industrial Packages

www.optris.com/products/category/infrared-application-packages/industrial-packages/

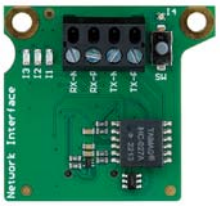
For further information on the furnace package visit our website

Furnace Package

www. optris.com/products/category/infrared-application-packages/furnace-package/

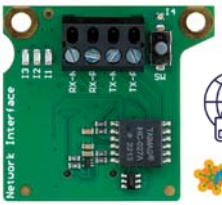
Interfaces

Optris pyrometers and IR cameras support a wide range of industrial interfaces. This makes it particularly easy to integrate Optris devices flexibly into processes and applications.



ACCTEIPK EtherNet/IP

The Optris CTi EtherNet/IP interface board ensures seamless integration and easy installation within the electronic boxes of Optris CT, CTlaser, or CTratio pyrometers.



Ethernet/ TCP/IP

Modbus TCP/IP

ACCTENMBTCPK

The CTi-Ethernet TCP/IP and Modbus TCP Interface Kit facilitate industrial communication for CTi, CTlaser, or CTratio infrared devices.

Modbus RTU

ACCTMBRTUB

The Modbus RTU interface, used for CTi, CTlaser, and CTRatio pyrometers, operates at baud rates of 9600 or 19200. Up to 32 pyrometers can be connected on a single bus.

New

EtherCAT Conformance tested

ACCTIECATK
EtherCAT interface kit

The Optris CTi EtherCAT Interface Kit facilitate industrial communication for CTi, CTlaser, or CTratio infrared devices. It uses a 2 x 4-pin M12 connector and communicates via the EtherCAT protocol.

New

IO-Link

ACCTIIOLK
IO-Link interface kit

The Optris CTi IO-Link Interface Kit facilitates standardized point-to-point communication for CTi, CTlaser, or CTratio infrared devices. It uses a 4-pin M12 A-coded connector and communicates via the IO-Link protocol.

ACCTIACC
USB - IR App Connector

Includes board and cable with a USB-C plug, plus a USB-A adapter for universal compatibility. Connect to IRmobile (Android), CompactConnect and CompactPlus Connect (Windows) for data transfer and analysis.

PROFIBUS

ACCTPFBDPK

The Profibus DP interface is a robust fieldbus communication protocol used in automation technology for efficient data exchange between devices.

PROFINET

ACCTPFNK

Profinet is an industrial Ethernet standard for real-time data exchange in automation networks, enabling efficient communication between controllers, sensors, and actuators.

ACCTRI RELAY-INTERFACE

The Relay interface, used for CTi, CTlaser, and CTratio pyrometers, provides robust and flexible alarming for infrared temperature monitoring in industrial environments.

RS232

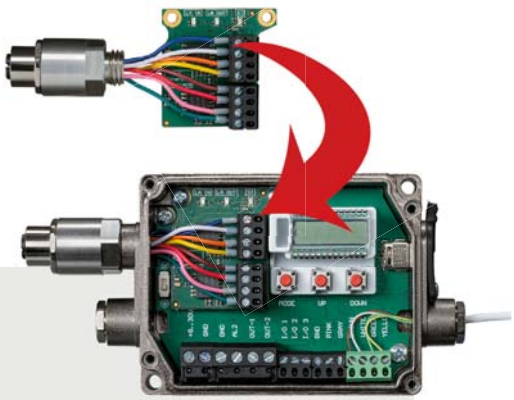
ACCTRS232K

The RS232 interface, used for CTi, CTlaser, and CTratio pyrometers, is a robust and flexible communication standard for infrared temperature monitoring in industrial environments.

RS485

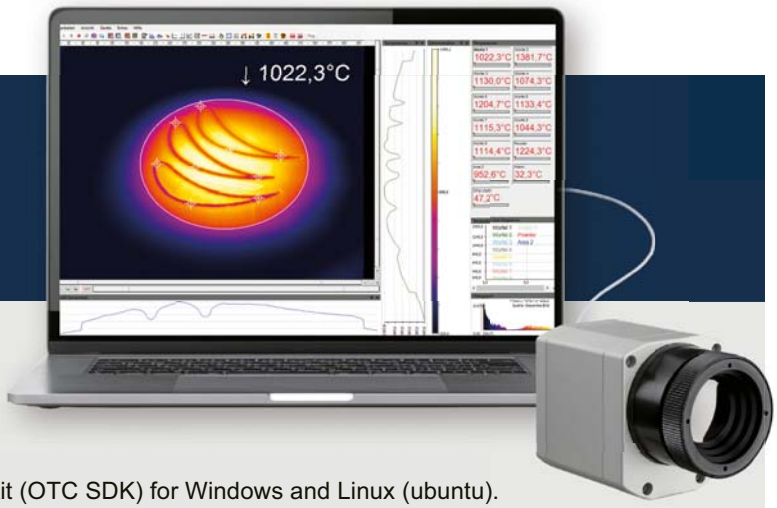
ACCTRS485B

The RS485 interface, used for CTi, CTlaser, and CTratio pyrometers, operates in a half-duplex mode over two wires (A and B), and supports differential signaling, which enhances noise immunity.



optris Software Thermal Cameras

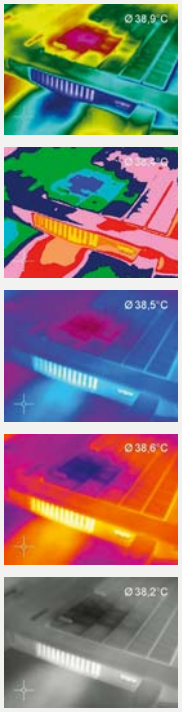
PIX Connect
Comprehensive
Thermal Camera Software



- No licensing restrictions & free of charge
- Modern software with intuitive user interface
- Display of numerous images in different windows
- Extensive analysis features and software development kit (OTC SDK) for Windows and Linux (ubuntu).

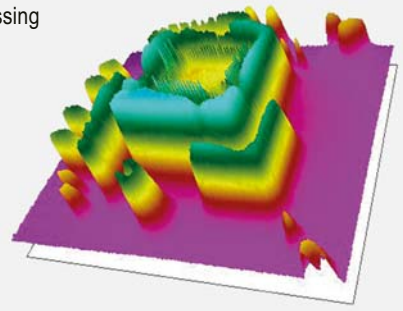
High degree of individualization for customer-specific imaging

- 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



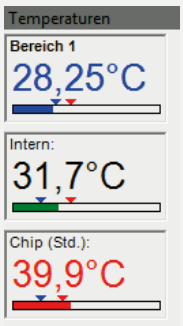
Detailed online and offline data analysis

- Detailed analysis with the help of measurement areas, automatic hot / cold spot 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)



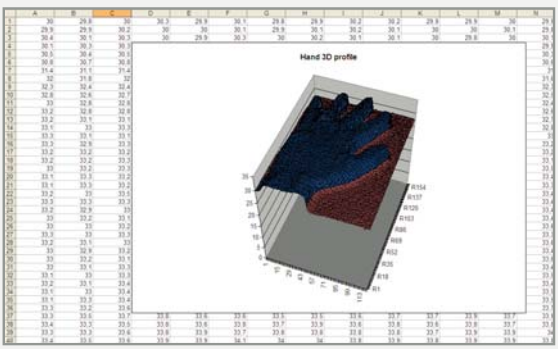
Automatic process control and quality control

- 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)



For further information about our software, please visit our website

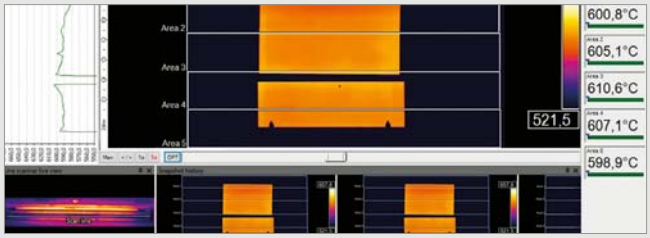
Optris PIX Connect

https://optris.com/software/pixconnect/

PIX Connect Software

FEATURES

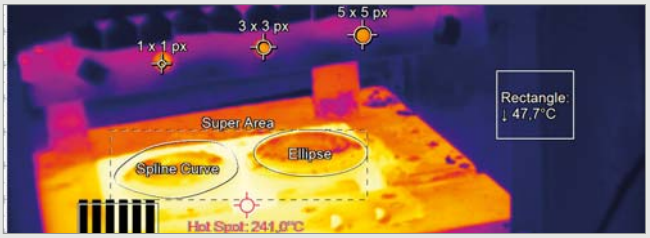
Advanced line scanner function



The popular line scanner function is included, ideal for continuous processes with moving objects with limited optical access, such as through a slit.

This function extends pixel count via picture diagonal, rapidly records unlimited lines, and produces thermal images of any resolution, offering a wide field of view for detailed process analysis. The software's auto-slit detection simplifies the commissioning and alignment of the IR cameras.

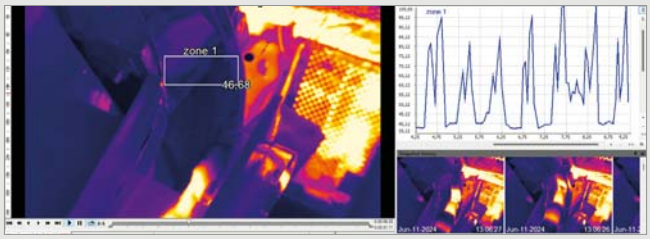
Measuring areas



PIX Connect supports unlimited measurement fields, also known as regions of interest, with various shapes, including user-defined rectangles, measure points (1×1, 2×2, 3×3, 5×5), ellipses, polygons, curves (spline), and super areas.

Displayed values can be minimum, maximum, mean, or distribution percentage. Users can view these values in field mode or via toolbar icons, and convert percentage distribution into area size for precise analysis.

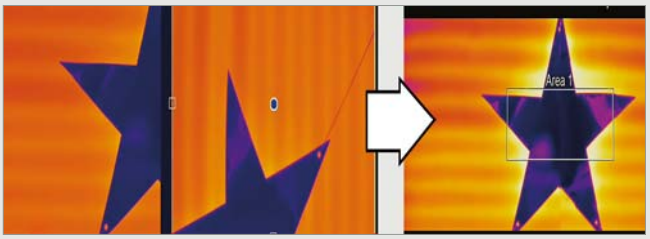
Event grabber



The EventGrabber simplifies batch processes by capturing snapshots of each object during fast-paced, recurring manufacturing processes when an alarm condition occurs.

This enables the analysis of critical automated thermal inspection for each individual object and comparison between them. Users can choose between self-triggered mode, which activates due to an alarm within a region of interest, and externally triggered mode for greater flexibility.

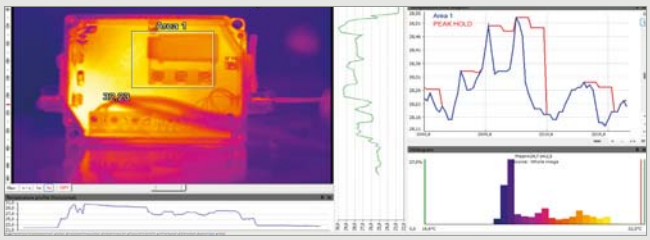
Merging of multiple IR imagers



The merging function in PIX Connect combines multiple thermal images for detailed analysis of large objects or different viewing angles. This stitching process ensures no critical data is missed and supports various image resolutions and offsets.

Accessible through the software's intuitive interface, it integrates multiple Optris IR camera feeds into one cohesive view, even if the images are tilted or have different resolutions.

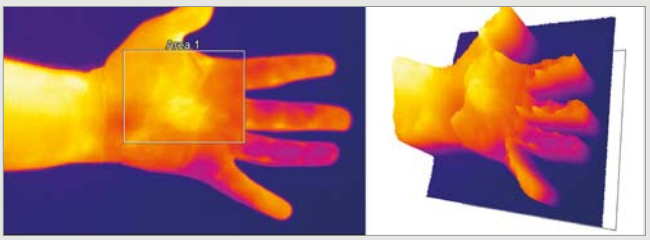
Signal processing capabilities



The infrared software solution offers advanced data processing capabilities with various algorithms and functions. Users can perform signal processing operations, including or excluding areas, and setting individual emissivity values.

The software supports image subtraction and advanced peak and valley hold signal processing, enabling the adjustment and scaling of feedback input for control loops in machinery applications.

Visualization of temperature trends



PIX Connect features advanced tools, including temperature time diagrams, temperature profiles, histograms, and 3D thermal image displays. Thermal images can be visualized in real-time with 3D plots, allowing users to observe temperature trends and historical data across all measurement areas in a single diagram.

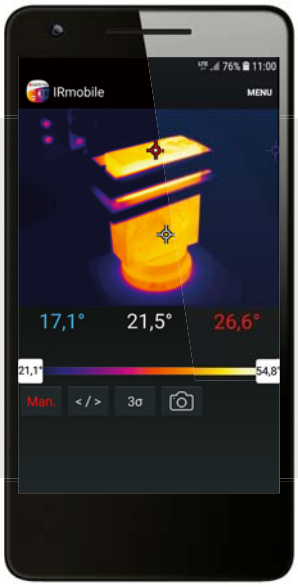
The software supports customizable charts and graphs, enabling the display of data from different regions of interest.

optris Apps & SDK

IRmobile

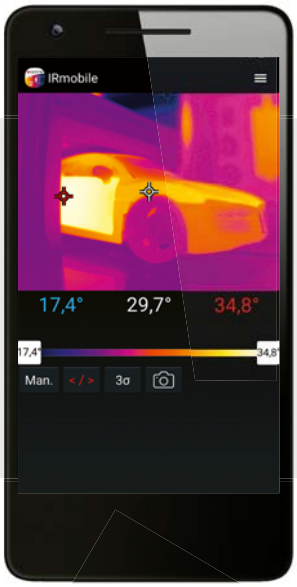
The setting tool
for all Thermal cameras

- 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



IRmobile app features:

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

GET IT ON Google Play

Optris Thermal Camera SDK

The OTC SDK, the Optris Thermal Camera Software Development Kit, is a library of functions that enable software developers to create custom software applications for Optris Thermal Imaging Cameras.

It is a digital toolbox that includes everything needed to connect and work with Optris thermal cameras, such as sample programs in different software languages, useful code libraries, searchable documentation, an FAQ, and clear instructions on where to start.

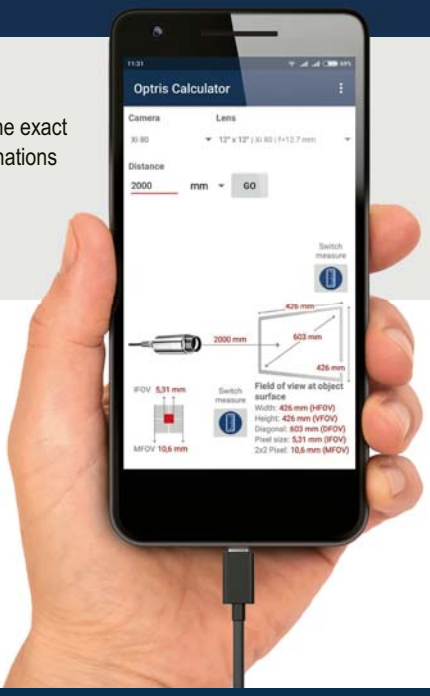
Apps

CALCULATOR

Optris Calculator

Combines the measuring spot size calculator of the IR pyrometers and the optics calculator of the Thermal 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

Thermal cameras

- 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

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)
- iOS devices

Available on the App Store

GET IT ON Google Play

Precise Measuring at various Distances

The ideal choice allows to focus opjects 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:

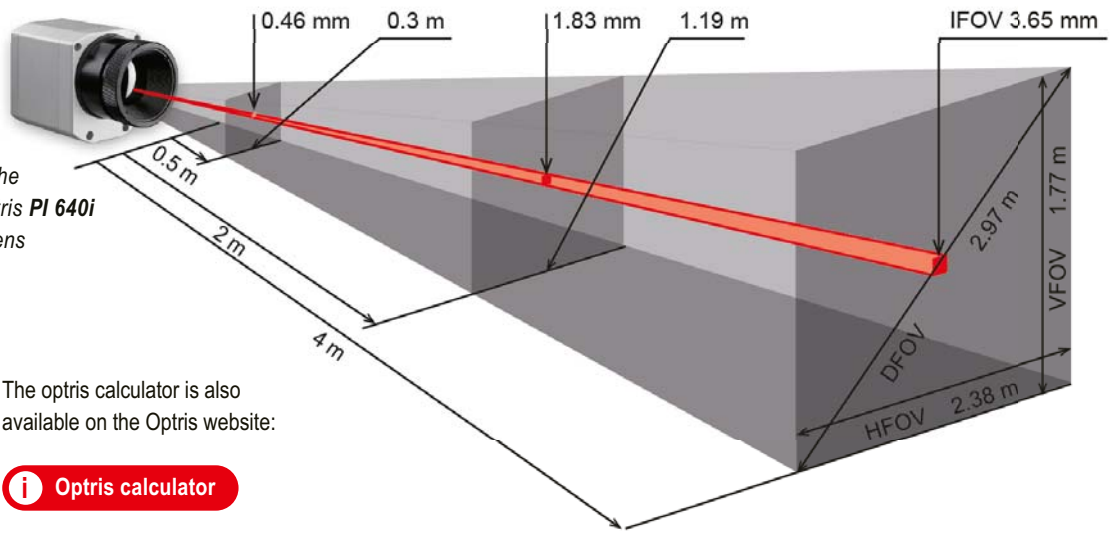
HFOV Horizontal expansion of the total measuring field on the object plane

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



*Measuring field of the infrared camera optris **PI 640i** using a 33° x 25° lens*

The optris calculator is also available on the Optris website:

Optris calculator

3rd Party Software

SOLUTIONS AND PLUGINS BY PARTNERS

Detailed information about partner solutions.
Please visit our website:

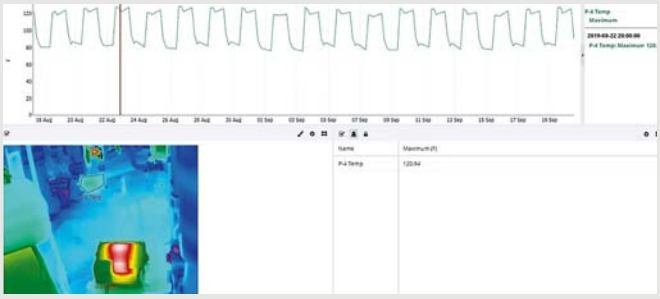
3rd Party Software

Custom Software Solutions

Various suppliers and integrators have created custom software solutions using Optris infrared cameras to boost industrial performance and precision. These commercial products offer in-depth integration, connectivity, and automated controls.

Developed by partners and not maintained, tested, or supported directly by Optris, these solutions ensure specialized support and service. The dedicated partners responsible for these software applications are there to provide the necessary assistance and support

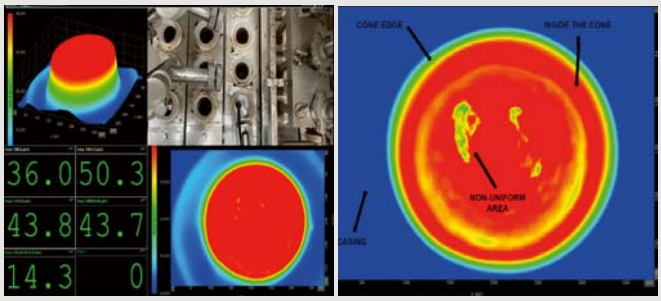
Cutsforth InsightCM



Cutsforth's IR Infrared Thermography Monitoring system enhances maintenance efficiency and reliability by providing continuous, thermal monitoring of electrical utilities. This soultion allows for early detection of potential failures, reducing downtime and maintenance costs of industrial electrical utilities.

Integrating advanced thermal imaging capabilities ensures precise monitoring and predictive maintenance, enabling industrial operators to maintain optimal performance and prevent unexpected breakdowns.

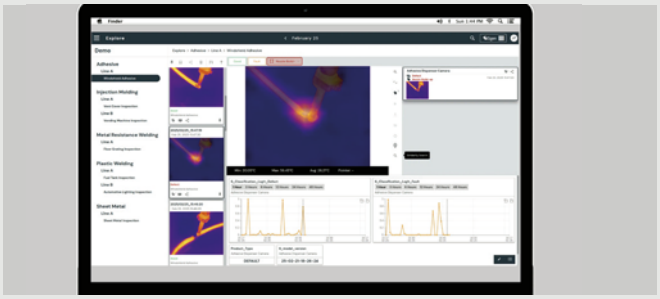
DewesoftX



All Optris infrared cameras are compatible with the Data Acquisition (DAQ) Software Dewesoft X. DewesoftX is an award-winning data acquisition and signal processing software.

It is heavily used for numerous test & measurement applications across all markets. DewesoftX is a popular tool for signal measurement, data recording, signal processing, and data visualization.

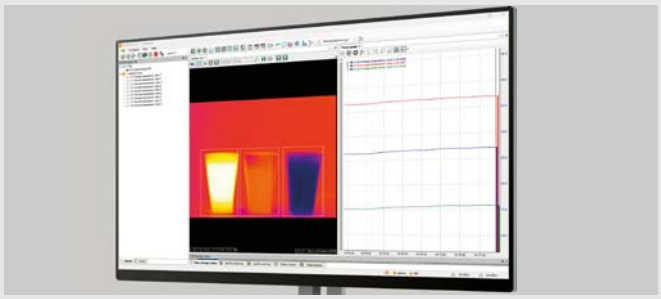
Eigen OneView



At Eigen, we created OneView to make deploying AI-powered thermal vision solutions seamless across manufacturing processes. OneView Edge runs inspection models directly on the line, processing thermal image data at the edge for faster response times and delivering real-time quality alerts that can drive closed-loop automation.

In the browser-based Cloud workspace, teams access anomaly detection, prediction heatmaps, no-code model training, and similarity search to refine AI and push updates to every line, without specialized expertise. By combining thermal imaging with AI, OneView identifies subtle patterns that rules-based systems miss and even predicts emerging issues, giving manufacturers a proactive grip on heat-critical processes.

ibaCapture



The video recording system ibaCapture records video and HMI images synchronously to measurement data – either continuously or triggered by events. With ibaCapture, customers can improve process transparency and make smarter decisions by monitoring and analyzing industrial processes using synchronized video and thermal data.

Starting with ibaCapture 5.6, Optris thermal cameras integrate seamlessly. Once connected, temperature measurement values from Optris cameras are instantly available in ibaPDA (Process Data Acquisition). By combining thermal data with other production data captured by ibaPDA and ibaCapture, users gain a complete, real-time view of their process, enabling faster troubleshooting, enhanced quality control, and optimized efficiency.

The optris Website - Find your Answer here!

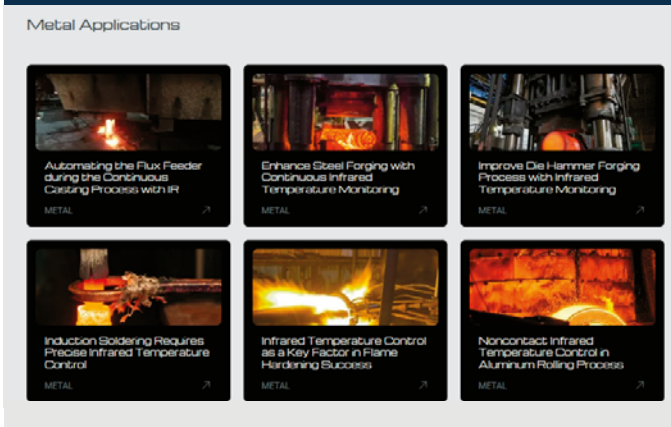
All topics in one place!
Please visit our website:

Optris Website

https://optris.com

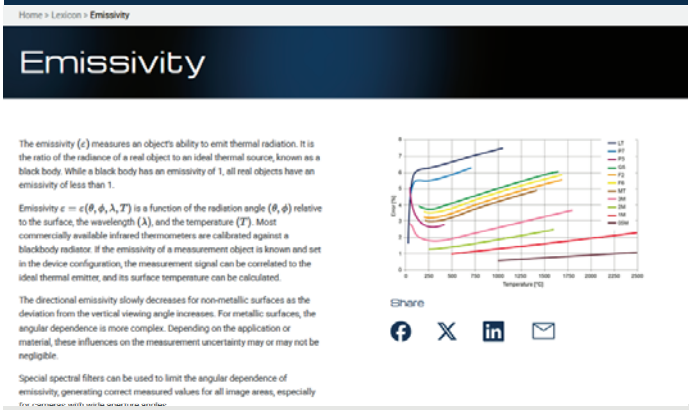
Features include:

Articles on practical Applications using Optris Devices

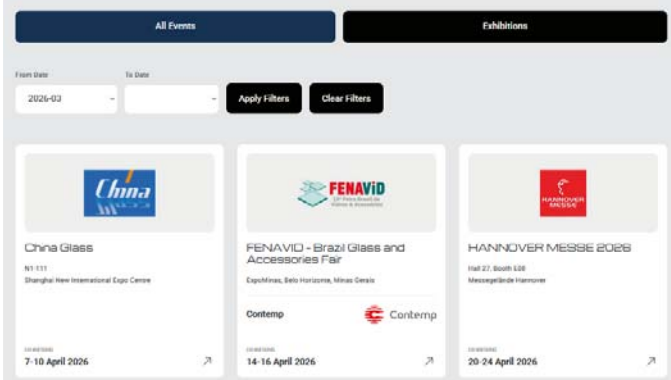


Detailed product descriptions and specifications

Extensive Technology Section (Lexicon, White Papers, FAQ)



Upcoming Optris Events - Come meet us in Person



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Please visit our website:

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when temperature matters

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