Non-contact temperature measurement up to 3000°C

Infrared thermometers, infrared cameras and their applications
Best Value Process Monitoring and Quality Control

Infrared sensors supplied by Optris are often implemented in monitoring and control applications for manufacturing processes. Our **reasonably priced** instruments enable customers to set up multiple measuring points (for example in **OEM solutions**). Innovative ideas such as a comprehensive (analog and digital) interface concept ensure rapid parameter set-up and **easy integration of the temperature measurement devices** with the process. The use of non-contact temperature measurement offers many advantages:

- Enhanced quality of products
- Optimized processes for increased output
- Process documentation
- Energy savings

The right type of sensor for your measuring application

In almost all industrial production processes the temperature is a critical variable. Compliance with specified process temperatures guarantees, among other things, a high quality of the products. **Non-contact temperature measurement** has become the technology of choice. Especially with high-temperature processes it delivers **reliable and repeatable measuring results**.

Infrared temperature sensors (see block diagram in fig. 1) are used in traditional applications in the **metal and glass industries**, but also in new fields such as the **solar and semiconductor industries** and **medical engineering**. With its broad range of products Optris offers the best choice of instruments for most applications.

The surface of the target object determines which sensor and which measuring wavelength are appropriate (see also fig. 2 and 3). For ease of navigation, this brochure is based on following colour scheme:

- 8 - 14 μm mainly for non-metal surfaces  
  (Type of device: LT)
- 7.9; 4.64; 4.24; 3.9 μm for special applications  
  (Type of device: P7; F6; F2; MT)
- 5.0 μm for glass surfaces  
  (Type of device: G5)
- 2.3; 1.6; 1.0; 0.5 μm mainly for metal surfaces  
  (Type of device: 3M; 2M; 1M; 05M)
Overview application examples

Maintenance

**Requirement:**
Early detection of wear in the refractory lining of torpedo cars, slag cars, and ladles; scheduled maintenance without the risk of metal runouts.

**Process temperature:**
300°C to 600°C

**Recommended sensor:**
optris PI 400: Thermal imaging camera for permanent monitoring and automatic alarming on detection of hot spots on the outer wall.

Inspecting the brick lining of slag cars as they exit the shop
Metal industry applications

**Continuous casting line**

**Requirement:**
Controlled cooling of the strand in the cooling sections to prevent breakouts through the outer shell and ensure the high quality of the material.

**Process temperature:**
800°C to 1000°C

**Recommended sensor:**
1. optris CTRatio 1M: Ratio pyrometer inside the cooling chamber, highly insensitive to fumes and dirt, tolerates ambient temperatures up to 250°C without cooling.
2. optris CT laser 1M: To measure the outer shell in the runout section and correct the closed-loop controlled cooling zone temperature.

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**Rolling mill**

**Requirement:**
Continuous measurement of forming temperature between individual rolls for optimized process control and quality assurance.

**Process temperature:**
700°C to 1100°C

**Recommended sensor:**
1. optris CT Laser 1M / 2M: Fast pyrometer for sheet temperature measurement.
2. optris CTRatio 1M: Ratio pyrometer inside the cooling chamber, highly insensitive to fumes and dirt, tolerates ambient temperatures up to 250°C without cooling.
3. optris CTRatio 1M: Ratio pyrometer for wire temperature measurement, yielding precise results even when the wire only fills 5% of the spot size.

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**Hot metal detection**

**Requirement:**
Precise measurement of hot objects, e.g., for material tracking or verification of ejection from the mold.

**Process temperature:**
150°C to 900°C

**Recommended sensor:**
optris CT 3M: Rapid response time of 1 ms; reliable measurements even with low metal temperatures, large measuring range.
5. **Die forming**

**Requirement:**
Temperature measurement of the blank before hot forming, or of the formed part after forming / before storage

**Process temperature:**
700°C to 1250°C

**Recommended sensor:**
1. optris CTlaser 1M: Fixed pyrometer for permanent monitoring
2. optris P20 1M: Handheld device for sporadic measurement of the parts; laser or sighting scope for acquisition of target object

6. **Deep-drawing**

**Requirement:**
Permanent tool and blank temperature measurement prior to deep-drawing for stable process control

**Process temperature:**
200°C to 350°C

**Recommended sensor:**
optris CTlaser 3M: Reliable measurements even with low metal temperatures, large measuring range

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7. **Mould casting**

**Requirement:**
Measuring the molten metal stream pouring into the mould

**Process temperature:**
1250°C to 1600°C

**Recommended sensors:**
optris CTlaser 05M: Especially designed for accurate temperature measurements of liquid metals, short wavelength of 525 nm minimizes errors due to emissivity uncertainty and atmospheric vapour effects
optris P20 05M: Handheld device for sporadic measurements of liquid metals, innovative double laser sighting for accurate spot size markings in every distance and optical sighting through target telescope
optris CTratio 1M: Ratio pyrometer highly insensitive to fumes and dirt, featuring automatic analysis of measured values by software (Combined evaluation using peak hold, averaging and other features.)
9. Induction welding of pipes

**Requirement:**
Ensure a high quality of weld seams by measuring the temperature on pipe edges after the induction heater and before the squeeze rolls

**Process temperature:**
950°C to 1450°C

**Recommended sensor:**
optris CTratio 1M: Ratio pyrometer for continuous measurement and closed-loop control of the weld seam temperature, highly insensitive to fumes and dirt, tolerates ambient temperatures up to 250°C without cooling

10. Coating

**Requirement:**
Heating the metal workpiece to target temperature before hot-dip galvanizing with a view to optimizing the electrochemical reaction

**Process temperature:**
150°C

**Recommended sensor:**
optris CTlaser 3M: Reliable measurements even with low metal temperatures, large measuring range, sighting laser for acquisition of target object

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**Induction hardening**

**Requirement:**
Adherence to an optimum temperature-time profile so as to achieve the desired microstructure of the metal

**Process temperature:**
700°C to 1100°C

**Recommended sensor:**
1. optris CTlaser 1M / 2M: Permanent temperature monitoring, laser for precise alignment, remote optical head to protect the electronics package against electromagnetic radiation
2. optris P20 1M / 2M: Handheld device for sporadic temperature measurements, laser or sighting scope for target object acquisition
Measuring devices and accessories

Overview of measuring devices

Compact Series
Small, compact infrared thermometers, ideal for use in cramped and hot surroundings
Prices start at 95 €

Infrared Cameras
Compact thermal imagers for fast stationary applications, including linescanner functionality
Prices start at 2,690 €

High Performance Series
Infrared thermometers with highest optical performance and double laser
Prices start at 490 €

Portable Thermometers
High-quality infrared thermometers with integrated USB interface
Prices start at 89 €

Accessories for industrial use

Mounting angle, adjustable in one axis
Mounting angle and mounting fork, adjustable in two axes
Massive housing (CSmicro, CT)
Cooling jacket (CTlaser, CSlaser)
Cooling jacket with high-temperature cable (CTlaser, CSlaser, PI)
Air purge collars
Mounting device for cooling housing (Mounting adapter and protection pipe)
Ancillary lens and exchangeable optics
Digital interface modules for electronics box
Rail-mounting adapter and Closed box cover for electronic box

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