

# Infrared temperature sensors and infrared cameras for metal production



More Precision



Temperature monitoring of inductively heated pipes using CTlaser M2 pyrometers



Temperature measurement in the milling line using the CTratio pyrometer

# Process monitoring and quality control with non-contact infrared temperature measurement

IR temperature sensors and thermal imaging cameras from Micro-Epsilon are frequently used for monitoring and control purposes in metal production processes. Numerous models, equipment options and a comprehensive interface concept enable their fast and easy integration in different measuring positions.

## Advantages of non-contact temperature measurement technology:

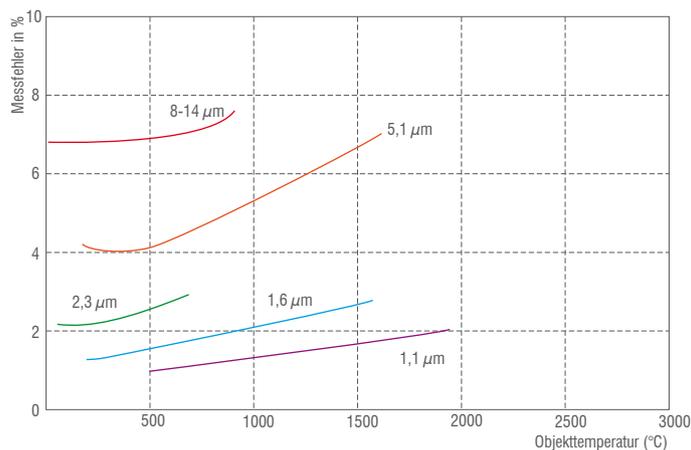
- Energy savings and increased product quality
- Process optimization for increased output
- Non-contact temperature measurement from a safe distance and no influence on the object to be measured
- In-process temperature measurement of moving, hard-to-reach and very hot objects
- Real-time measurements enable temperature adjustments during the process
- Process documentation with thermal videos and images (part of quality audits)

## Typical metal production processes

- Blast furnace / melting material
- Manufacture of semi-finished products
- Parts production
- Treatment / mounting

Temperature is a crucial factor in almost every industrial manufacturing process. Adhering to predetermined process temperatures ensures, amongst other things, high product quality.

Providing reliable, reproducible measurement results, particularly in high temperature processes, non-contact infrared temperature measurement has become well established in the metal production and processing industry.



Measuring error depends on wavelength and object temperature.

## Temperature measurement of metals with suitable wavelength

The surface of the measurement object determines the choice of the respective sensor model and its wavelength. When choosing a suitable temperature measurement device, it is important to ensure that the infrared radiation has, with a certain wavelength and in a certain temperature range, the highest possible emissivity. The graph shows that it is sensible to use the shortest wavelength available for the measurement. Choosing a suitable measurement device with the corresponding wavelength ensures maximum measurement accuracy.

Our sales team will be pleased to advise you on the most suitable wavelength for your temperature measurement application.



Temperature monitoring in hot rolling processes using the TIM M1



Temperature monitoring of cast and forged parts using the TIM M1



## Infrared cameras for metal measurements

Thermal imaging cameras are especially used for control and condition monitoring of processes and of semi-finished parts. They measure from a safe distance to the measurement object, record temperature values and can be directly integrated into the control system. The thermoMAGER TIM M1 from Micro-Epsilon is an extremely compact infrared camera for non-contact temperature measurement of metal surfaces. Their short-wave range enables the cameras to reliably measure the temperature of hot metal surfaces.

In parallel to the visualization of a thermal process, powerful electronics ensures fast response times of 1ms to output the temperature information of the center pixel. Therefore, the camera can also be used for the integration into control systems.



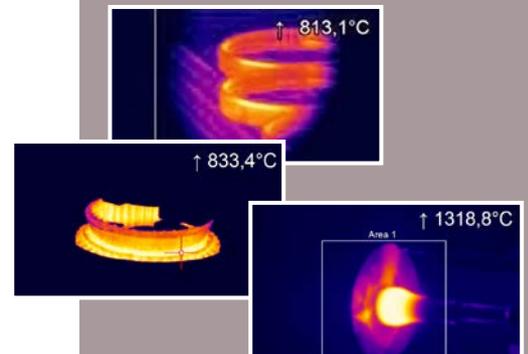
### Cooling Jacket / Cooling Jacket Advanced

- Universal cooling housing for infrared cameras up to 315°C
- Ambient operating temperatures up to 315°C
- Also available with protection housing and cooling function up to 180°C
- Air/Water cooling with integrated air purging and optional protective windows
- Modular design for easy fitting of different devices and lenses
- Easy sensor removal on site due to quick-release chassis
- Integration of additional components such as the TIM NetBox, USB Server Gigabit and Industrial Process Interface (PIF) can be integrated in the "Extended" version.



### Software

- Display of the thermal image with recording function
- Complete set up of parameters and remote control of the camera
- Detailed analysis of fast, thermodynamic processes
- Output of analog temperature or alarm values via the process interface
- Digital communication via RS232 or DLL for software integration





Temperature monitoring in continuous casting processes using the CTratio pyrometer



Temperature monitoring in the cooling processes of forged parts using the CTLaser M1

### Proven technology

Infrared sensors developed and produced by Micro-Epsilon stand out due to their long service life, robust construction and high precision measurements. The sensors are based on proven technology concepts and therefore provide reliable measurements even in harsh environmental conditions.

### High speed measurements

For moving objects e.g. in transportation lines, thermoMETER sensors with extremely fast response times are available. Fast response times are an advantage, particularly in high speed processes and control tasks.

### Precise and stable measurements

The thermoMETER product group is renowned for its high accuracy and high resolution. Particularly in temperature-critical applications, IR sensors from Micro-Epsilon are the preferred choice for easy, precise measurements. In dusty or smoky environments, the CTRatio series of ratio pyrometers are ideal. For improved visualization of the measurement spot, e.g. with red-hot glowing metals, the CTVideo series of video pyrometers are used.

Sensors with integrated electronics for OEM applications are available on request.



Model	Spectral range	Description	Temperature range
<b>Infrared temperature sensors</b>			
CTM1/M2	1 $\mu$ m / 1.6 $\mu$ m	Hot metals	250°C up to 2200°C
CTM3	2.3 $\mu$ m	Metals & composite materials from 50°C	50°C up to 1800°C
<b>Infrared temperature sensors with laser sighting</b>			
CTLaserM1/M2	1 $\mu$ m / 1.6 $\mu$ m	Hot metals	250°C up to 2200°C
CTLaserM3	2.3 $\mu$ m	Metals & composite materials from 50°C	50°C up to 1800°C
CTLaserM5	0.525 $\mu$ m	Liquid metals from 1000°C	1000°C up to 2000°C
CTLaser COMBUSTION	3.9 / 4.24 / 4.64 $\mu$ m	Measurement through and on flames	200°C up to 1450°C
<b>Infrared temperature sensors with crosshair laser sighting and video module</b>			
CTVideo M1/M2	1 $\mu$ m / 1.6 $\mu$ m	Metals & composite materials	250°C up to 2200°C
CTVideo M3	2.3 $\mu$ m	Metals & composite materials from 50°C	50°C up to 1800°C
<b>Ratio pyrometer for high speed temperature measurements of red-hot glowing metal objects</b>			
CTRatioM1	0.7 $\mu$ m to 1.1 $\mu$ m	Hot metal objects, harsh environments e.g. steam, smoke	700°C up to 1800°C



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