

# KELLER

*infrared  
temperature  
solutions*

# ITS



**No 1** in terms of  
ACCURACY  
RELIABILITY  
INNOVATION



## Pyrometer CellaPort PT

for non-contact temperature measurement  
from 0 °C to + 3000 °C



Range of models

Compact pyrometer



Single-colour pyrometer

| Model  | Temperature range | Application   | Shot shape |
|--------|-------------------|---|------------|
| PT 110 | 0 - 1000 °C       | Non metallic, oxidized metal surfaces                 | ○          |
| PT 113 | 500 - 1600 °C     | Furnace with flames                                   | ○          |
| PT 115 | 300 - 1300 °C     | Glass surface   | ○          |
|        | 500 - 2500 °C     |   |            |
| PT 117 | 400 - 2000 °C     | hot CO <sub>2</sub> containing gases                  | ○          |
| PT 118 | 500 - 2500 °C     | hot CO containing gases                               | ○          |
| PT 120 | 250 - 2000 °C     | Metals, ceramics, molten glass                        | ○          |
| PT 128 | 75 - 650 °C       | Metals, ceramics, molten glass                        | ○          |
| PT 129 | 150 - 800 °C      | Aluminium, reflective metals, laser applications      | ○          |
|        | 180 - 1200 °C     |   |            |
| PT 130 | 500 - 2500 °C     | Metals, ceramics at high temperature                  | ○          |
| PT 135 | 600 - 3000 °C     | Ultra accurate measurement of metals, semi-conductors | ○          |

Two-colour pyrometer

| Model  | Temperature range | Application   | Shot shape |
|--------|-------------------|---|------------|
| PT 140 | 500 - 1400 °C     | Metals, cement, lime, graphite, crystal growing       | ○          |
|        | 650 - 1700 °C     |   | ○          |
|        | 750 - 2400 °C     |   | ○          |
|        | 850 - 3000 °C     |   | ○          |
| PT 143 | 600 - 1400 °C     | Wires, rods, heating coils, heating tapes, glass gobs | □          |
|        | 650 - 1700 °C     |   | □          |
|        | 750 - 2400 °C     |   | □          |
| PT 147 | 700 - 1700 °C     | Sooty flames  | ○          |
| PT 180 | 750 - 2400 °C     | Molten metals   | ○          |
| PT 183 | 650 - 1700 °C     | Molten metals   | □          |

CellaPort Series

With 10 models, the CellaPort series covers a wide range of industrial applications where high-precision non-contact temperature measurement is required.

The CellaPort series is based on a modular concept consisting of the following components: optics, signal acquisition and processing, data output and sighting aid. The **optical system (1)** comes with one of five available lenses. The selection depends on the target size and measuring distance of the application. It is infinitely adjustable to ensure high precision across a wide focusing range.

The **aperture (2)** determines the shape of the measuring field. A circular area is the standard shape. A rectangular target area is optionally available for two-colour pyrometers.

A DC-based **sensor (3)** without moving parts detects the infrared radiation emitted from the measuring object. The CellaPort is available as one (single-channel sensor) and two-colour (two-channel sensor) model.

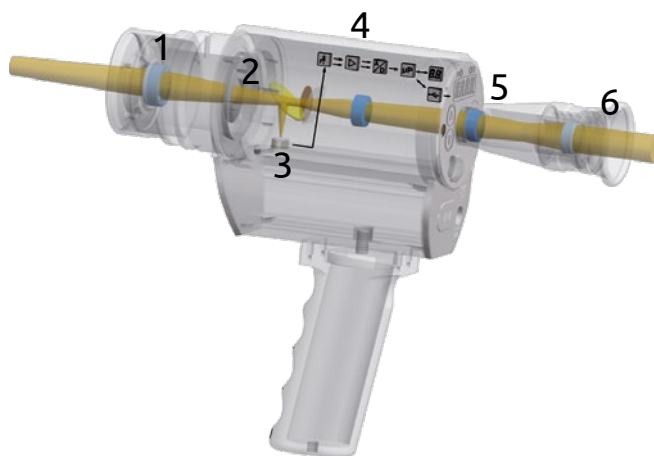
The CellaPort's special **signal processing unit (4)** combined with a high-analogue-to-digital conversion enables a wide measuring span while the temperature resolution remains uniformly high across the entire measuring range.

The **temperature value (5)** is displayed on the LED screen and transmitted through the USB output.

The parallax-free reflex optics used as a **sighting aid (6)** ensures perfect targeting, focusing and aligning to the measuring area. A diopter correction compensates bad eyesight and a polarization filter protects the eye from very bright measuring objects.

A laser spot light for long distance alignment is optionally available to replace the ocular lens.

Thanks to the aluminum housing, the CellaPort is designed for extreme industrial environments.



# Pyrometer CellaPort PT

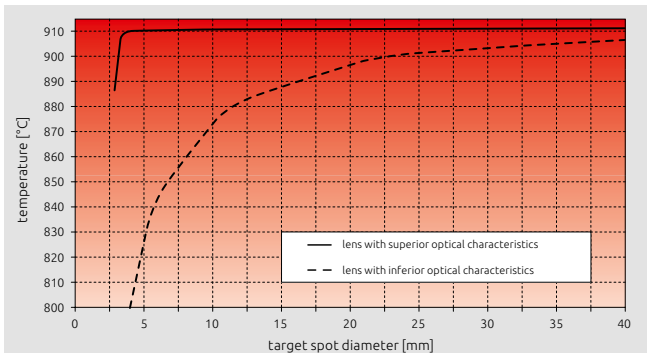
## Special Features

- Ranges 0 - 3000 °C / 32 - 5432 °F
- Parallax-free and through-the-lens sighting with diopter correction and widened interpupillary distance
- Reflex optics with large field of view and target marking to visualize the exact measuring area
- Premium quality focusable optics with precise lenses for high optical resolution
- 10 models to match with all applications
- ATD function for automatic detection of objects
- One and two-colour pyrometers
- Robust aluminium housing
- Patented SSI traffic light function in the through-the-lens sighting for displaying the signal strength and the optimum measuring distance

## Optics

Pyrometry is an optical process to measure temperatures. The quality of the optics greatly influences the accuracy of the measurement.

The "size of source effect" is a factor which affects the uncertainty of the measurement. Light scattered into the optical path will result in false temperature data. When the target size or the distance to the target changes, as shown in the chart, the temperature reading will change as well, depending on the quality of the optical system.



The lower the quality of the optical system of a pyrometer, the larger is the reading error when the size of the measuring object changes.

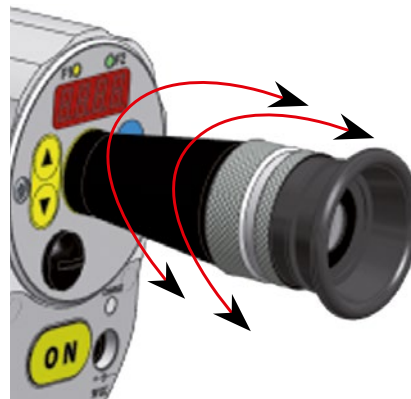
The CellaPort features an optical system optimized for the visible and infrared range. Its superior glass lens is covered with an anti-reflective coating. Due to its superior imaging properties, the high-precision lens provides consistently high optical resolution across the entire focussing range.

In addition, the patented optic and apertures are mechanically designed to minimize sensitivity to light scattered into the sight path. The lens is infinitely adjustable and can be precisely set to the required distance between pyrometer and target.

Its anti-reflective coating makes it extremely durable, easy to clean and perfectly suitable for harsh industrial environments. Five lenses are available for different target distances and measuring object sizes.



## Through-the-lens-sighting



Adjustable ocular with dioptic correction and polarizing filter

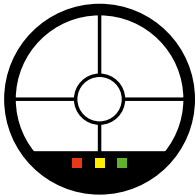
The wide field of view makes it easy to focus on the target object. The ocular features a widened interpupillary distance to accommodate users who wear glasses or a helmet. A built-in diopter compensation allows users to compensate for bad eyesight.

Models with a temperature range larger than 2000 °C have a built-in polarizing filter which attenuates the brightness of the target to protect the user's eye.

## Housing

The aluminium housing is very robust and is perfectly suited for the use in harsh industrial environments. The CellaPort does not require extra protection.

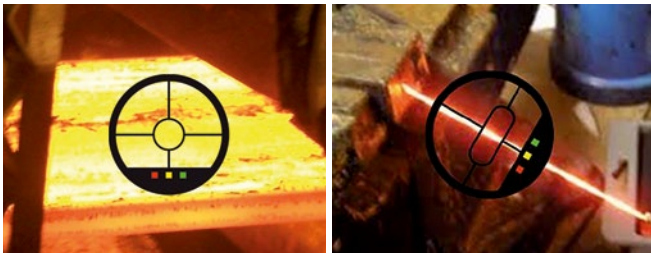
## Patented SSI traffic light function



A traffic light status indicator is integrated in the viewfinder. It informs the user of a single-colour pyrometer that the measurement is in progress, and it indicates whether the object temperature is within range.

For two-colour pyrometers, the colour of the traffic light indicates the signal strength (SSI – Signal Strength Indicator). A green LED confirms that the signal is sufficient for a reliable measurement. If the distance-to-target ratio is too large or when dust, vapour or smoke disturb the signal, the red LED lights up and the measurement is stopped.

## Target marker



A single-colour pyrometer needs a fully illuminated target area to provide a correct measurement. The CellaPort has a target marker reflected in the optical path showing the exact size and position of the measuring area.

Instruments with a rectangular target area have a rectangular marker. With a two-colour pyrometer, the measurement area may be smaller than the object, thus allowing a measurement of thin wires.

## USB Output



Rear USB port

The CellaPort has a USB port on its rear side. A complete communication and operation software is already integrated in the CellaPort. The pyrometer can therefore be connected to every PC or terminal no matter which operating system or language is used. The USB interface transfers the temperature readings to a PC where they are stored.

The USB interface also allows the configuration of all parameters from a PC, thus facilitating stationary online operation.

## Software CellaView



The CellaView software is included in the scope of delivery. It is a Microsoft SQL server-based database software running under Windows designed for real-time graphic display, analysis and storage of the measurement readings. Monitoring, remote control and configura-

tion of the pyrometer are additional features of this software. The modern MDI-based user interface makes it possible to open multiple graphs at the same time. The series of measurements of up to 31 instruments can be recorded simultaneously.

- Windows-based multiple-document interface (MDI)
- Graphic display, recording and logging of measurement data
- Free selection and combination of the measurement readings and status information of up to 31
- Simultaneous start of any number of diagrams to record series of measurements in parallel
- Configuration of the cycle duration for data logging and independent archiving
- Parameter setting, calibration and remote control of the pyrometers
- Saving, loading and transferring of configuration profiles of the devices
- Filtering function to reduce data volume
- Automatic device search
- Permanent connection monitoring
- Automatic archiving of the series of measurements
- Tamper-proof storage of the series of measurements
- Optional data storage in CSV format for subsequent handling in Excel
- Zoom, scroll and analysis functions
- Cursor to display the temperature and the time on the measurement curve
- Very fast data recording (milliseconds)
- Logging of user entries in a log file to check for configuration changes
- Download and software update via Internet
- No license restriction
- Runs under Windows XP, Vista, 7, 8, 10

## ATD function

The CellaPort offers an ATD function (Automatic Temperature Detection).

ATD automatically recognizes the presence of the hot object and starts measuring the temperature. The measuring cycle either adapts dynamically to the duration of the object in the sight path, or it can be configured to a fixed value. An audible alarm signals the end of the measurement. The reading is displayed and, if required, transferred via interface.

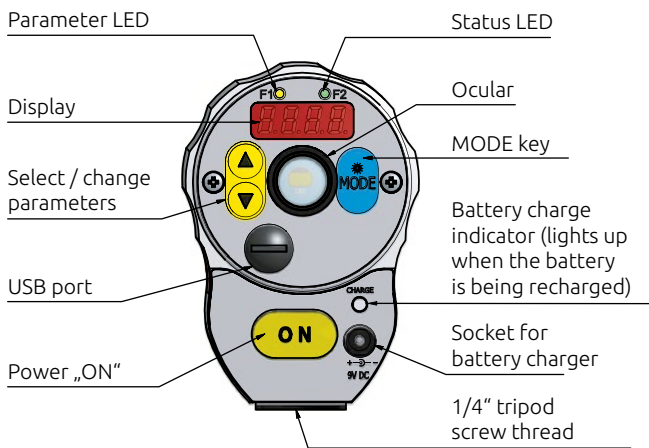
With many applications, this operating mode facilitates measurements for the user.

## Audible alarm

The CellaPort is equipped with a buzzer. When using the ATD function, the signal indicates the end of the automatic temperature detection.

## Control keys

The large control keys on the keypad are easy to access and operate. All parameters can be configured during running operation using the rear keypad.



## LED display

The CellaPort features a brightly lit 8 mm LED display showing temperature readings, configuration and function parameters and the battery status. During stationary operation the LED display is readable from large distances. Two status LEDs can be custom-configured to indicate operating conditions.

## Adjustable parameters

- Number of storage positions for material emissivities
- Smoothing filter
- Memory mode and hold time
- Measuring mode
- Emissivity / emissivity ratio
- Transmittance of windows
- Background radiation correction
- Alarm contacts (mode and limits)
- ATD function parameters
- Linearization
- LED status display
- Temperature scale °C / °F
- User calibration
- Automatic shut off

### In addition, for two-colour pyrometers

- Measuring channel: two-colour – one colour
- Signal strength threshold
- Soot factor (at the CellaCombustion PT 147)

## Background correction

The radiation of a hot furnace wall reflected on a colder object may cause false measurements. The CellaPort uses a correction function to eliminated this stray radiation.

## Emissivity correction

The heat radiation of a measuring object depends on the material and its surface. Adjust the material constant, i.e. the emissivity (or the emissivity ratio with a two-colour pyrometer) on the CellaPort for the material you want to measure. When the object temperature is known, enter it into the pyrometer which automatically defines the emissivity.

The CellaPort proposes up to 10 pre-defined material emissivities to be selected with the corresponding keys.

## Max. value storage

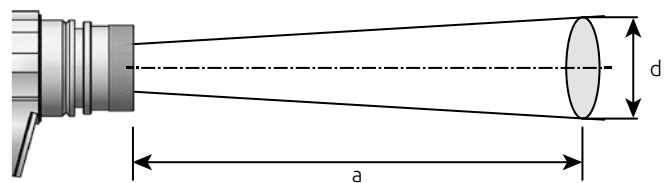
A maximum value storage supplies safe measuring results for discontinuing processes or inhomogeneous measuring objects.

## Measuring area

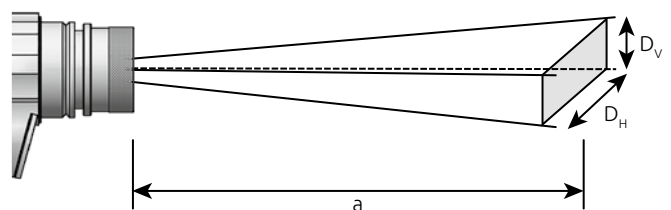
For pyrometers with focusable optics, the optical ratio  $D$  is defined as ratio of the measurement field over the measuring distance.

The diameter of the measurement area at the focus distance results from the formula:

$$d = \frac{a}{D}$$



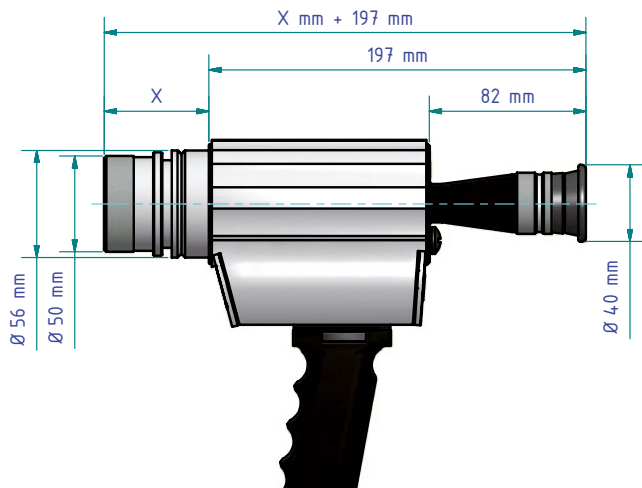
For models with rectangular field of view, the definition is extended to the horizontal  $D_H$  and vertical  $D_V$  optical ratio.



## EMV standard

- DIN EN IEC 61000-6-2:11/2019
- DIN EN IEC 61000-6-4:09/2020
- BS EN IEC 61000-6-2:2019
- BS EN IEC 61000-6-4:2019

## Dimensions



## Shipment includes

- Pyrometer CellaPort
- Battery charger
- USB cable VK 11/D (1.8 m)
- CellaView software
- Protective carrying case
- Instruction manual
- Calibration certificate according to ISO 9001

### In addition for CellaCast PT 183

- Protective glass 70146



## Technical data \*

### Temperature ranges

- As per table of models

### Resolution display

- 1 K

### Resolution USB port

- 0.1 K

### Temperature coefficient

- $\leq 0.05\%/K$   
Referenced to 23 °C

### Response time $t_{98}$

- As per table of models

### LED display (7 segments)

- 4-digit  
(digit height 8 mm)

### Power supply

- Rechargeable  
battery pack

### Battery life

- approx. 15 hours  
(based on continuous  
operation at  $T_a = 23^\circ C$ )

### Permissible humidity

- 95 % r.h. max.  
(non-condensing)

### Ambient operating temperature

- 0 - +50 °C

### Storage temperature

- -20 - +60 °C

### Material

- housing: aluminium  
handle: polyamide

### Protection

- IP 40 according to  
DIN 40050

### Weight

- approx. 1.1 kg

### Sighting

- True-sided through-the-  
lens sighting, parallax  
free, target spot indicator,  
diopter compensation,  
polarizing filter

### Diopter range

- -3 - +1 diopters,  
adjustable

### Digital output

- USB

### Buzzer alarm

- Highly configurable

### Tripod

- 3/8" for housing and  
handle

### Memory modes

- Current, maximum,  
average values

### ATD function

- Automatically identifies  
the target and detects its  
temperature

### SSI traffic light function

- For displaying the signal  
strength

### CSD filter function

- For measuring the oxide-  
and slag-free molten  
metal (PT 180/PT 183)

\* Specifications of the technical data according to DIN IEC TS 62492-1 and DIN IEC TS 62492-2

Calibration of the pyrometers according to VDI/VDE 3511 sheet 4.4

## Accessories



Protective glass  
70146



Supplementary lens  
PZ 20/O

## Single-colour pyrometer

| Technical data |   |                           |          |                   |                |       |   |                               |                 |
|----------------|---|---------------------------|----------|-------------------|----------------|-------|---|-------------------------------|-----------------|
| Model          | Range   | Spectral range            | Lense    | Focus range       | Distance ratio | FOV   | Response time $t_{98}$  | Precision*                    | Reproducibility |
| PT 110 ...     | For non-metal materials, such as ceramics, wood, rubber, synthetic materials, textiles, paper |                           |          |                   |                |       |   |                               |                 |
| AF 1           | 0 - 1000 °C<br>32 - 1832 °F   | 8 - 14 $\mu\text{m}$      | PZ 10.01 | 0.30 m - $\infty$ | 50 : 1         | 10.8° | $\leq 30$ ms  | 1 % of reading,<br>min. 2 K   | 1 K             |
| AF 2           |   |                           | PZ 10.05 | 0.15 m - 0.30 m   | 48 : 1         | 10.8° |   |                               |                 |
| PT 120 ...     | For metallic surfaces, ceramics, liquid glass at medium temperature range                     |                           |          |                   |                |       |   |                               |                 |
| AF 1           | 250 - 2000 °C<br>482 - 3632 °F  | 1.1 - 1.7 $\mu\text{m}$   | PZ 20.01 | 0.40 m - $\infty$ | 175 : 1        | 7.1°  | $\leq 50$ ms<br>( $T > 250$ °C)<br>$\leq 2$ ms<br>( $T > 750$ °C) | 0.3 % of reading,<br>min. 4 K | 1 K             |
| AF 2           |   |                           | PZ 20.03 | 0.20 m - 0.40 m   | 150 : 1        | 7.0°  |   |                               |                 |
| AF 3           |   |                           | PZ 20.06 | 1.20 m - $\infty$ | 275 : 1        | 4.5°  |   |                               |                 |
| AF 4           |   |                           | PZ 20.05 | 0.20 m - $\infty$ | 40 : 1         | 27.0° |   |                               |                 |
| PT 130 ...     | For metallic surfaces, ceramics, liquid glass at high temperature range                       |                           |          |                   |                |       |   |                               |                 |
| AF 1           | 500 - 2500 °C<br>932 - 4532 °F  | 0.78 - 1.06 $\mu\text{m}$ | PZ 20.01 | 0.40 m - $\infty$ | 210 : 1        | 7.1°  | $\leq 50$ ms<br>( $T > 550$ °C)<br>$\leq 2$ ms<br>( $T > 750$ °C) | 0.3 % of reading,<br>min. 4 K | 1 K             |
| AF 2           |   |                           | PZ 20.03 | 0.20 m - 0.40 m   | 200 : 1        | 7.0°  |   |                               |                 |
| AF 3           |   |                           | PZ 20.06 | 1.20 m - $\infty$ | 310 : 1        | 4.5°  |   |                               |                 |
| AF 4           |   |                           | PZ 20.05 | 0.20 m - $\infty$ | 55 : 1         | 27.0° |   |                               |                 |

\*(at  $\epsilon = 1$  and  $T_a = +23$  °C)

## Pyrometers for special applications

### CellaPort PT 113



The CellaPort PT 113 is specially designed for temperature measurements in flame-heated furnaces. The narrow spectral range of 3.9  $\mu\text{m}$  eliminates the influence on the reading caused by water vapour and CO<sub>2</sub> in the detector's field of view even at

large target distances. This allows an accurate measurement through flames and combustion gases. With this instrument, stray radiation emitted from a hot background affects a measurement of a colder object in a hot furnace environment to a much lesser extent than with pyrometers working in a short-wave range. This CellaPort model is configurable to compensate the reflected background radiation and to determine the true temperature.

### CellaPort PT 115



Glass is transparent in the visible spectral range and in the near infrared range. Its emissivity is a function of the temperature, the wavelength, the colour, the type and the thickness of the glass. Glass has an emissivity of nearly 100 % in the spectral band

from 4.6 - 4.9  $\mu\text{m}$ . Atmospheric influences such as humidity and vapour have an effect on the measurement above 5  $\mu\text{m}$ .

The CellaPort PT 115 uses a blocking filter with a spectral sensitivity of 4.6 - 4.9  $\mu\text{m}$ , thus capturing the temperature from the near surface of the glass. With this wavelength, varying thicknesses or types of glass or changing humidity do not affect the temperature reading.

### CellaCombustion PT 117

The CellaCombustion PT 117 uses a specific wavelength, in which hot carbonaceous gases have a high optical density and therefore good radiation properties. The pyrometers are used to measure the exhaust gas temperature in gas-fired boilers and small combustion plants.

### CellaCombustion PT 118

The CellaCombustion PT 118 uses a specific wavelength, in which the chemical components of the hot combustion gas have a high optical density. The devices are used in large combustion plants such as thermal waste-disposal plants and coal power plants.

### CellaPort PT 128

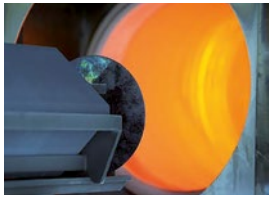
The CellaPort PT 128 is equipped with a light-intense lens and a special sensor for the reliable low temperature measuring of metals.

### CellaPort PT 129

The CellaPort PT 129 uses a special blocking filter which prevents daylight influences on the reading. It is considerably less sensitive to reflecting stray radiation caused by hot objects in the pyrometer environment than traditional short-wave models. Thus, the CellaPort PT 129 works perfectly for a large variety of applications in the metal-working industry and specially for the temperature measurement of aluminium and polished metals at low temperatures. The blocking filter facility makes it also ideal for the measurement of processes using diodes, Nd:YAG or CO<sub>2</sub> lasers for heating. The high energy laser radiation does not affect the temperature reading.

Pyrometers for special applications

CellaPort PT 135



The CellaPort PT 135 features a narrow-band, short wavelength spectral response to minimize the effect of interferences which lead to measurement errors. Detectors which respond to narrow wavebands at short wavelengths are far less susceptible to fluctuating emissivity or signal attenuation due to sight path obstructions such as dust, steam, smoke or a dirty lens. Metal surfaces, for example, exhibit higher emissivity at shorter wave-lengths and at higher temperatures.

Due to the special wavelength, CellaPort PT 135 is especially suitable for temperature detection of metals and high-temperature appli-

cations. The pyrometer's specific spectral sensitivity is also ideal for the silicon wafer production process. Silicon is transparent at wavelengths > 1µm. Standard pyrometers will see through the silicon surface and detect the temperature of the material below it.

CellaCombustion PT 147

The CellaCombustion PT 147 is a special pyrometer for non-contact temperature measurement of sooty flames in coal power plants or waste incineration plants. The measurement and signal processing based on the two-colour method detects the heat radiation of the sooty particles of the flame in the near infrared range at two wavelengths. The burn-out operation can be controlled by the flame temperature to reduce the pollutant emission and to minimize the slagging of the walls in the combustion chamber.

| Technical data |  |                       |          |                 |                |       |   |                             |                  |
|----------------|--|-----------------------|----------|-----------------|----------------|-------|---|-----------------------------|------------------|
| Model          | Range  | Spectral range        | Lense    | Focus range     | Distance ratio | FOV   | Response time $t_{98}$                  | Precision*                  | Repro-ducibility |
| PT 113 ...     | For measurements in combustion plants and flame-heated furnaces  |                       |          |                 |                |       |   |                             |                  |
| AF 1           | 500 - 1600 °C<br>932 - 2912 °F   | 3.9 µm                | PZ 15.03 | 0.60 m - ∞      | 45 : 1         | 7.1°  | ≤ 100 ms                                | 1 % of reading              | 2 K              |
| PT 115 ...     | For glass surfaces   |                       |          |                 |                |       |   |                             |                  |
| AF 1           | 500 - 2500 °C<br>932 - 4532 °F   | 4.6 - 4.9 µm          | PZ 15.03 | 0.80 m - ∞      | 70 : 1         | 7.1°  | ≤ 100 ms                                | 0.75 % of reading           | 2 K              |
| AF 2           | 300 - 1300 °C<br>572 - 2372 °F   |                       | PZ 15.03 | 0.80 m - ∞      | 45 : 1         | 7.1°  |   | 0.75 % of reading, min. 3 K |                  |
| PT 117 ...     | For measurements in environments with hot, CO <sub>2</sub> -containing gases (e.g. in gas-fired boilers and small combustion plants) |                       |          |                 |                |       |   |                             |                  |
| AF 1           | 400 - 2000 °C<br>752 - 3632 °F   | CO <sub>2</sub> range | PZ 15.03 | 0.80 m - ∞      | 75 : 1         | 7.1°  | ≤ 100 ms                                | 0.75 % of reading + 1 K     | 2 K              |
| PT 118 ...     | For measurements in environments with hot combustion gases (e.g. in thermal waste-disposal plants and coal power plants)             |                       |          |                 |                |       |   |                             |                  |
| AF 1           | 500 - 2500 °C<br>932 - 4532 °F   | CO range              | PZ 15.03 | 0.80 m - ∞      | 70 : 1         | 7.1°  | ≤ 100 ms                                | 0.75 % of reading           | 2 K              |
| PT 128 ...     | For measurements of aluminium, polished metal surfaces and laser applications at low temperatures                                    |                       |          |                 |                |       |   |                             |                  |
| AF 10          | 75 - 650 °C<br>167 - 1202 °F   | 1.8 - 2.4 µm          | PZ 20.08 | 0.30 m - ∞      | 48 : 1         | 10.8° | ≤ 50 ms (T>150 °C)<br>≤ 2 ms (T>350 °C) | 0.75 % of reading, min. 5 K | 1 K              |
| PT 129 ...     | For measurements of aluminium, polished metal surfaces and laser applications  |                       |          |                 |                |       |   |                             |                  |
| AF 10          | 150 - 800 °C<br>302 - 1472 °F  | 1.8 - 2.2 µm          | PZ 20.08 | 0.30 m - ∞      | 48 : 1         | 10.8° | ≤ 50 ms (T>150 °C)<br>≤ 2 ms (T>350 °C) | 0.75 % of reading, min. 5 K | 1 K              |
| AF 21          | 180 - 1200 °C<br>356 - 2192 °F   |                       | PZ 20.01 | 0.40 m - ∞      | 60 : 1         | 7.1°  | ≤ 75 ms (T>180 °C)                      |                             |                  |
| AF 22          |  |                       | PZ 20.03 | 0.20 m - 0.40 m | 56 : 1         | 7.0°  | ≤ 2 ms (T>600 °C)                       |                             |                  |
| AF 23          |  |                       | PZ 20.06 | 1.20 m - ∞      | 96 : 1         | 4.5°  |   |                             |                  |
| PT 135 ...     | For the precise measurement of metals, very high temperatures and semiconductors   |                       |          |                 |                |       |   |                             |                  |
| AF 11          | 600 - 3500 °C<br>1112 - 5432 °F  | 0.82 - 0.93 µm        | PZ 20.01 | 0.40 m - ∞      | 210 : 1        | 7.1°  | ≤ 50 ms (T>650 °C)<br>≤ 2 ms (T>850 °C) | 0.3 % of reading, min. 4 K  | 1 K              |
| AF 12          |  |                       | PZ 20.03 | 0.20 m - 0.40 m | 200 : 1        | 7.0°  |   |                             |                  |
| AF 13          |  |                       | PZ 20.06 | 1.20 m - ∞      | 310 : 1        | 4.5°  |   |                             |                  |
| AF 14          |  |                       | PZ 20.05 | 0.20 m - ∞      | 55 : 1         | 27.0° |   |                             |                  |
| PT 147 ...     | For the measurement of sooty flames (e.g. in power plants or incineration plants)  |                       |          |                 |                |       |   |                             |                  |
| AF 1           | 700 - 1700 °C<br>1292 - 3092 °F  | 0.8/1.05 µm           | PZ 20.01 | 0.40 m - ∞      | 80 : 1         | 7.1°  | ≤ 10 ms (T>750 °C)                      | 1 % of reading              | 2 K              |

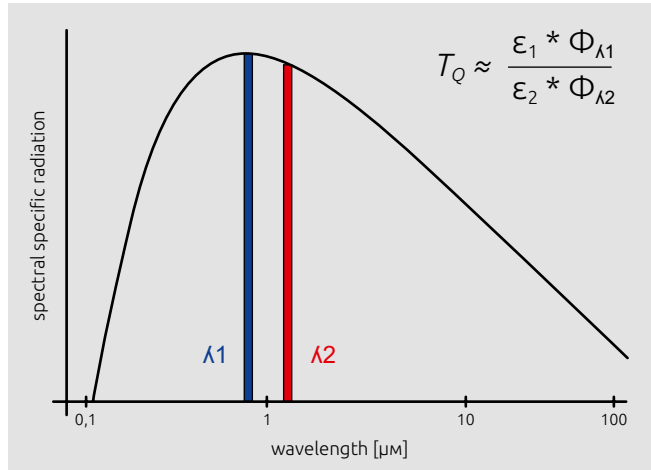
\*(at ε = 1 and Ta = +23 °C)

## Two-colour pyrometer

### CellaPort PT 140/CellaCast PT 180

The two-colour pyrometers CellaPort PT 140 and CellaCast PT 180 detect the infrared radiation emitted from the measuring object, using a two-element photodiode to capture both radiation intensities simultaneously from the exact same spot.

The advantage of the two-colour or dual wavelength technique is that the pyrometer will still produce highly accurate temperature data, even at signal attenuation of up to 90%.



A two-colour or ratio pyrometer is far less sensitive to contaminants in the line of sight such as steam, dust or smoke than a standard single-colour pyrometer. The same holds true for other sources of visibility impairment such as dirt on the pyrometer lens or sediment and debris buildup within the sight tube of the furnace.

The two-colour method enables the pyrometer to correct for measurement errors which would otherwise occur when a material's emissivity varies as a function of temperature or surface properties, or when the pyrometer is used at a production line which produces a variety of products having different emissivities.

The CellaPort PT 140 not only captures the two-colour temperature but independently also the two single-colour temperatures.

An online measurement with temperature recording thus provides an analysis of these three readings and allows conclusions regarding the quality of the readings and of the radiation behaviour of the measured object.

Information on the radiation characteristics of the measuring object can be displayed on the pyrometer.

The CellaCast PT 180 is designed for temperature measurement of liquid metals in the runner of blast furnaces and cupola furnaces. It is equipped with a CSD (Clean Surface Detection) function to measure the correct temperature of the oxide- and slag-free molten metal.

| Technical data |  |                   |          |                 |                |       |                        |                   |                 |
|----------------|--|-------------------|----------|-----------------|----------------|-------|------------------------|-------------------|-----------------|
| Model          | Range  | Spectral range    | Lense    | Focus range     | Distance ratio | FOV   | Response time $t_{98}$ | Precision*        | Reproducibility |
| PT 140 ...     | For use in these industries: steel, ceramics or cement in harsh environments |                   |          |                 |                |       |                        |                   |                 |
| AF 20          | 500 - 1400 °C<br>932 - 2552 °F   | 0.95 /<br>1.05 μm | PZ 20.08 | 0.30 m - ∞      | 55 : 1         | 10.8° | ≤ 10 ms<br>(T>650 °C)  | 1 % of<br>reading | 2 K             |
| AF 1           | 650 - 1700 °C<br>1202 - 3092 °F  |                   | PZ 20.01 | 0.40 m - ∞      | 80 : 1         | 7.1°  | ≤ 10 ms<br>(T>750 °C)  |                   |                 |
| AF 2           |  |                   | PZ 20.03 | 0.20 m - 0.40 m | 75 : 1         | 7.0°  |                        |                   |                 |
| AF 3           |  |                   | PZ 20.06 | 1.20 m - ∞      | 120 : 1        | 4.5°  |                        |                   |                 |
| AF 4           | 750 - 2400 °C<br>1382 - 4532 °F  |                   | PZ 20.01 | 0.40 m - ∞      | 150 : 1        | 7.1°  | ≤ 10 ms<br>(T>950 °C)  |                   |                 |
| AF 5           |  |                   | PZ 20.03 | 0.20 m - 0.40 m | 140 : 1        | 7.0°  |                        |                   |                 |
| AF 6           |  |                   | PZ 20.06 | 1.20 m - ∞      | 240 : 1        | 4.5°  |                        |                   |                 |
| AF 7           | 850 - 3000 °C<br>1562 - 5432 °F  |                   | PZ 20.01 | 0.40 m - ∞      | 150 : 1        | 7.1°  | ≤ 10 ms<br>(T>1050 °C) |                   |                 |
| AF 8           |  |                   | PZ 20.03 | 0.20 m - 0.40 m | 140 : 1        | 7.0°  |                        |                   |                 |
| AF 9           |  |                   | PZ 20.06 | 1.20 m - ∞      | 240 : 1        | 4.5°  |                        |                   |                 |
| PT 180 ...     | For measurement of molten metals   |                   |          |                 |                |       |                        |                   |                 |
| AF 4           | 750 - 2400 °C  | 0.95 /<br>1.05 μm | PZ 20.01 | 0.40 m - ∞      | 150 : 1        | 7.1°  | ≤ 10 ms<br>(T>950 °C)  | 1 % of<br>reading | 2 K             |
| AF 6           | 1382 - 4532 °F   |                   | PZ 20.06 | 1.20 m - ∞      | 240 : 1        | 4.5°  |                        |                   |                 |

\*(at  $\epsilon = 1$  and  $T_a = +23$  °C)

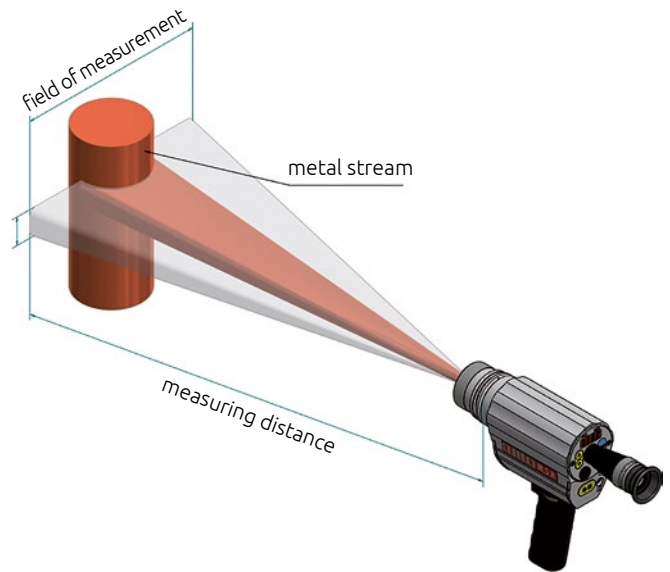
Two-colour pyrometer with rectangular field of view

CellaPort PT 143

The CellaWire PT 143 features a rectangular measurement area. The target object can move freely within this area.

Therefore, the temperature of moving objects, such as swaying wires can be reliably captured. The rectangular area is also ideal when the position of the object tends to vary during the production process. Such objects include billets or metal rods at a roller table.

Even with very small objects, such as filament wires, it is much easier with a mobile pyrometer to aim at a target when the measurement area is rectangular instead of circular.



CellaPort with rectangular measuring area

| Technical data |   |                   |                                 |                 |                                   |                                   |                        |                  |                  |       |                       |
|----------------|---|-------------------|---------------------------------|-----------------|-----------------------------------|-----------------------------------|------------------------|------------------|------------------|-------|-----------------------|
| Model          | Range   | Spectral range    | Lense                           | Focus range     | Distance ratio                    | FOV                               | Response time $t_{98}$ | Precision*       | Repro-ducibility |       |                       |
| PT 143 ...     | For use in these industries: steel, ceramics, or cement in harsh environments |                   |                                 |                 |                                   |                                   |                        |                  |                  |       |                       |
| AF 20          | 600 - 1400 °C<br>1112 - 2552 °F   | 0.95 /<br>1.05 μm | PZ 20.08                        | 0.30 m - ∞      | $D_v = 150 : 1$<br>$D_h = 30 : 1$ | 10.8°                             | ≤ 10 ms<br>(T>650 °C)  | 1.5 % of reading | 3 K              |       |                       |
| AF 1           | 650 - 1700 °C<br>1202 - 3092 °F   |                   | PZ 20.01                        | 0.40 m - ∞      | $D_v = 230 : 1$<br>$D_h = 45 : 1$ | 7.1°                              | ≤ 10 ms<br>(T>750 °C)  |                  |                  |       |                       |
| AF 2           |   |                   | PZ 20.03                        | 0.20 m - 0.40 m | $D_v = 215 : 1$<br>$D_h = 40 : 1$ | 7.0°                              |                        |                  |                  |       |                       |
| AF 3           |   |                   | PZ 20.06                        | 1.20 m - ∞      | $D_v = 375 : 1$<br>$D_h = 75 : 1$ | 4.5°                              |                        |                  |                  |       |                       |
| AF 10          |   |                   | PZ 20.05                        | 0.20 m - ∞      | $D_v = 55 : 1$<br>$D_h = 10 : 1$  | 27.0°                             |                        |                  |                  |       |                       |
| AF 13          |   |                   | PZ 20.08                        | 0.30 m - ∞      | $D_v = 150 : 1$<br>$D_h = 30 : 1$ | 10.8°                             |                        |                  |                  |       |                       |
| AF 4           |   |                   | 750 - 2400 °C<br>1382 - 4532 °F | PZ 20.01        | 0.40 m - ∞                        | $D_v = 350 : 1$<br>$D_h = 50 : 1$ |                        |                  |                  | 7.1°  | ≤ 10 ms<br>(T>950 °C) |
| AF 5           |   |                   |                                 | PZ 20.03        | 0.20 m - 0.40 m                   | $D_v = 330 : 1$<br>$D_h = 45 : 1$ |                        |                  |                  | 7.0°  |                       |
| AF 6           |   |                   |                                 | PZ 20.06        | 1.20 m - ∞                        | $D_v = 580 : 1$<br>$D_h = 85 : 1$ |                        |                  |                  | 4.5°  |                       |
| AF 11          |   |                   |                                 | PZ 20.05        | 0.20 m - ∞                        | $D_v = 85 : 1$<br>$D_h = 11 : 1$  |                        |                  |                  | 27.0° |                       |
| AF 14          |   |                   |                                 | PZ 20.08        | 0.30 m - ∞                        | $D_v = 230 : 1$<br>$D_h = 34 : 1$ |                        |                  |                  | 10.8° |                       |

\*(at  $\epsilon = 1$  and  $T_a = +23$  °C)

## Two-colour pyrometer for molten metals

### CellaCast PT 183

The CellaCast PT 183 was specially designed for mobile temperature detection of molten metal. This pyrometer can capture the temperature of a metal stream poured from a foundry ladle or discharged from a bottom-pour ladle into the moulds. The challenge of this temperature measurement application: the position of the pour stream varies with the tilt angle or pouring nozzle of the ladle. The CellaCast PT 183 features a rectangular measurement area.

As long as the moving target remains somewhere within this rectangular area, the pyrometer captures the pour and produces an accurate temperature reading.

The pyrometer is also ideal for temperature detection when molten metal is transferred from the melting furnace to the transfer or pouring ladles.



### Measuring molten metal

Liquid metal presents a unique challenge due to the composition of its surface which is particularly susceptible to slag and oxides which have a significant effect on the radiation properties of the material. To obtain accurate temperature data, it is essential that the pyrometer only detects the IR energy emitted from the metal surface. The PT 183 is equipped with a special algorithm which filters out the signal obtained from the metal surface which is free of slag and oxides.

Only a pyrometer can detect temperature at the crucial moment in the casting process: just as the mould is being filled, and the pyrometer verifies the temperature of each individual workpiece.

Immersion probes can only detect molten metal temperature at the furnace or ladle but they cannot capture the molten metal steam as it pours into the mould. Therefore, it is impossible to verify the temperature of each individual workpiece.

Another disadvantage: data accuracy is subject to the precision with which the foundry operator performs the measurement. Temperature readings will vary, depending on immersion depth and position of the probe. The pyrometer requires virtually no maintenance and does not contain parts subject to wear. Foundries eliminate the need for expendable thermocouple tips and thus reduce their operating costs.

| Technical data |                                  |                   |          |             |                                   |       |                         |                  |                 |
|----------------|----------------------------------|-------------------|----------|-------------|-----------------------------------|-------|-------------------------|------------------|-----------------|
| Model          | Range                            | Spectral range    | Lense    | Focus range | Distance ratio                    | FOV   | Response time $t_{98}$  | Precision*       | Reproducibility |
| PT 183 ...     | For measurement of molten metals |                   |          |             |                                   |       |                         |                  |                 |
| AF 1           | 500 - 1700 °C<br>1202 - 3092 °F  | 0.95 /<br>1.05 µm | PZ 20.01 | 0.40 m - ∞  | $D_v = 230 : 1$<br>$D_h = 45 : 1$ | 7.1°  | ≤ 10 ms<br>(T > 750 °C) | 1.5 % of reading | 3 K             |
| AF 3           |                                  |                   | PZ 20.06 | 1.20 m - ∞  | $D_v = 375 : 1$<br>$D_h = 75 : 1$ | 4.5°  |                         |                  |                 |
| AF 13          |                                  |                   | PZ 20.08 | 0.30 m - ∞  | $D_v = 150 : 1$<br>$D_h = 30 : 1$ | 10.8° |                         |                  |                 |

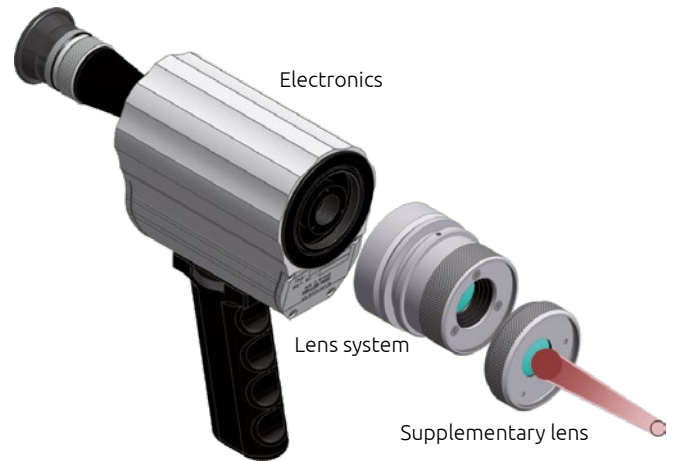
\*(at  $\epsilon = 1$  and  $T_a = +23$  °C)

| Measuring spot size |  | Distance [m]             |     |    |     |    |    |     |     |     |     |     |     |     |     |
|---------------------|--|--------------------------|-----|----|-----|----|----|-----|-----|-----|-----|-----|-----|-----|-----|
| Model               |  | 0.3                      | 0.4 | 1  | 1.2 | 2  | 3  | 4   | 5   | 6   | 7   | 8   | 9   | 10  |     |
|                     |  | Measuring spot size [mm] |     |    |     |    |    |     |     |     |     |     |     |     |     |
| PT 183 AF 1         |  |                          | 9   | 22 | 27  | 44 | 67 | 89  | 111 | 133 | 156 | 178 | 200 | 222 |     |
| PT 183 AF 3         |  |                          |     |    | 13  | 27 | 40 | 53  | 67  | 80  | 98  | 107 | 120 | 147 |     |
| PT 183 AF 13        |  |                          | 10  | 13 | 33  | 40 | 66 | 100 | 133 | 166 | 200 | 233 | 266 | 300 | 330 |

## Supplementary lenses

An additional lens can be mounted onto the pyrometer's lens system to capture target spots as small as  $\varnothing$  0.4 mm.

The pyrometer models can be combined with four supplementary lenses, providing additional optical resolutions for maximum versatility as shown in the chart below.



| Pyrometer   | Supplementary lenses |                               |               |                               |               |                               |               |                               |
|---|----------------------|-------------------------------|---------------|-------------------------------|---------------|-------------------------------|---------------|-------------------------------|
|   | PZ 20/O-50           |                               | PZ 20/O-63    |                               | PZ 20/O-75    |                               | PZ 20/O-120   |                               |
| Typ   | distance [mm]        | spot size $\varnothing$ in mm | distance [mm] | spot size $\varnothing$ in mm | distance [mm] | spot size $\varnothing$ in mm | distance [mm] | spot size $\varnothing$ in mm |
| PT 120 AF 1 / 5<br>PT 129 AF 1<br>PT 130 AF 1<br>PT 135 AF 1<br>PT 140 AF 4 | 36 - 41              | 0.35 - 0.45                   | 45 - 54       | 0.40 - 0.60                   | 52 - 63       | 0.45 - 0.70                   | 84 - 112      | 0.70 - 1.10                   |
| PT 120 AF 2 / 6<br>PT 129 AF 2<br>PT 130 AF 2<br>PT 135 AF 2<br>PT 140 AF 5 | 31 - 36              | 0.30 - 0.40                   | 38 - 45       | 0.35 - 0.50                   | 43 - 52       | 0.40 - 0.60                   | 66 - 84       | 0.55 - 0.90                   |
| PT 120 AF 3 / 7<br>PT 129 AF 3<br>PT 130 AF 3<br>PT 135 AF 6<br>PT 140 AF   | 41                   | 0.30                          |               |                               |               |                               | 101 - 112     | 0.55 - 0.67                   |
| PT 128 AF 10  | 34 - 41              | 1.28 - 1.75                   |               |                               |               |                               |               |                               |
| PT 129 AF 10  | 34 - 41              | 1.28 - 1.75                   |               |                               |               |                               |               |                               |
| PT 129 AF 21 / 22   |                      |                               | 45 - 54       | 1.05 - 1.5                    | 52 - 63       | 1.2 - 1.75                    |               |                               |
| PT 129 AF 23  |                      |                               |               |                               |               |                               | 101 - 112     | 1.43 - 1.75                   |
| PT 40 AF 1  | 36 - 41              | 0.65 - 0.90                   | 45 - 54       | 0.80 - 1.10                   | 52 - 63       | 0.90 - 1.40                   | 84 - 112      | 1.30 - 2.10                   |
| PT 40 AF 2  | 31 - 36              | 0.60 - 0.80                   | 38 - 45       | 0.70 - 1.00                   | 43 - 52       | 0.80 - 1.10                   | 66 - 84       | 1.10 - 1.70                   |
| PT 40 AF 3  | 41                   | 0.55                          |               |                               |               |                               | 101 - 112     | 1.10 - 1.40                   |

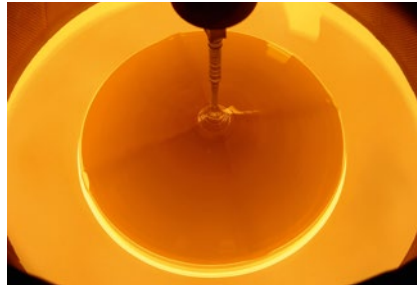
## Supplementary lenses

| Pyrometer    |   | Supplementary lenses |                   |               |                   |               |                   |               |                   |
|--------------|---|----------------------|-------------------|---------------|-------------------|---------------|-------------------|---------------|-------------------|
| Typ          |   | PZ 20/O-50           |                   | PZ 20/O-63    |                   | PZ 20/O-75    |                   | PZ 20/O-120   |                   |
|              |   | distance [mm]        | spot size Ø in mm | distance [mm] | spot size Ø in mm | distance [mm] | spot size Ø in mm | distance [mm] | spot size Ø in mm |
| PT 143 AF 1  | h | 36 - 41              | 1.2 - 1.6         | 45 - 54       | 1.4 - 2           | 52 - 63       | 1.6 - 2.4         | 84 - 112      | 2.4 - 3.8         |
|              | v |                      | 0.2 - 0.3         |               | 0.3 - 0.4         |               | 0.5               |               | 0.5 - 0.8         |
| PT 143 AF 2  | h | 31 - 36              | 1.1 - 1.4         | 38 - 45       | 1.3 - 1.7         | 43 - 52       | 1.4 - 2           | 66 - 84       | 2 - 2.9           |
|              | v |                      | 0.2 - 0.3         |               | 0.3               |               | 0.3 - 0.4         |               | 0.6               |
| PT 143 AF 3  | h | 41                   | 1                 |               |                   |               |                   | 101 - 112     | 1.9 - 2.4         |
|              | v |                      | 0.2               |               |                   |               |                   |               | 0.4 - 0.5         |
| PT 143 AF 13 | h | 34 - 41              | 1.7 - 2.4         |               |                   |               |                   | 77 - 112      | 3.5 - 5.7         |
|              | v |                      | 0.3 - 0.5         |               |                   |               |                   |               | 0.7 - 1.1         |
| PT 143 AF 4  | h | 35 - 41              | 1.0 - 1.4         | 45 - 54       | 1.3 - 1.8         | 52 - 63       | 1.4 - 2.1         | 84 - 112      | 2.1 - 3.4         |
|              | v |                      | 0.2               |               | 0.2 - 0.3         |               | 0.3 - 0.4         |               | 0.4 - 0.6         |
| PT 143 AF 5  | h | 31 - 35              | 0.9 - 1.2         | 38 - 45       | 1.1 - 1.5         | 43 - 52       | 1.3 - 1.8         | 66 - 84       | 1.8 - 2.6         |
|              | v |                      | 0.2               |               | 0.2 - 0.3         |               | 0.2 - 0.3         |               | 0.4               |
| PT 143 AF 6  | h | 41                   | 0.9               |               |                   |               |                   | 101 - 112     | 1.7 - 2.1         |
|              | v |                      | 0.1               |               |                   |               |                   |               | 0.3               |
| PT 143 AF 14 | h | 34 - 41              | 1.5 - 2.1         |               |                   |               |                   | 77 - 112      | 3.1 - 5           |
|              | v |                      | 0.3               |               |                   |               |                   |               | 0.5 - 0.8         |

Applications



Asphalt and concrete mixing



Crystal growing



Coke oven



Wires, tubes and rods



Filaments / Metal bands



Runner



Incineration plant



Rolling mill



Blast furnace / stove dome



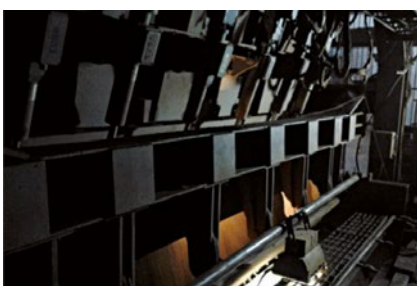
Power plant



Continuous casting



Rotary kiln



Sinter plant



Glass production



Induction heating

## Other products



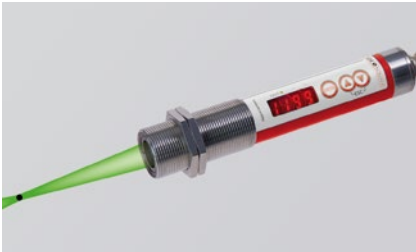
### CellaTemp PA

Versatile pyrometers with focusable lens, through-the-lens sighting/ laser spotlight or video camera.



### CellaTemp PA-LWL

Versatile fiber optics pyrometers with focusable head and laser spotlight.



### CellaTemp PK(L)

Compact infrared thermometer for cramped environments. Optional with LED spot light.



### CellaTemp PKF

Compact infrared thermometer with optical fibre and optical sensor head.



### CellaTemp PZ

Profibus pyrometers with focusable lens, through the lens sighting or laser spotlight.



### CellaTemp® PZ-LWL

Pyrometer with Profibus interface, fibre optics, focusable measuring heads and laser spot light.



### Mikro PV

Intensity comparison pyrometer for ultra accurate measurement.



### CellaSwitch

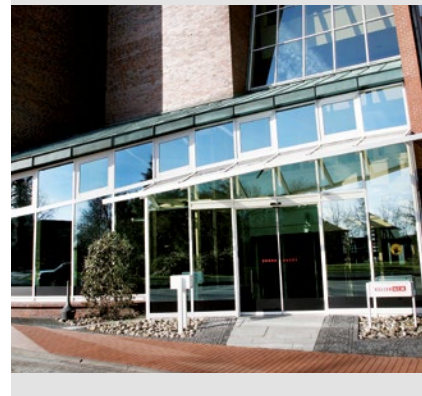
Compact infrared switch with LED display and auto-diagnostics.

Since 1967, the Division Infrared Thermometer Solutions (ITS) of KELLER HCW GmbH develops and manufactures precision instruments and systems solutions for non-contact temperature measurements. Thanks to the continuous development of its range, KELLER ITS now is one of the leading providers for infrared thermometers and pyrometers worldwide.

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