

Pyrometer CellaPort PT

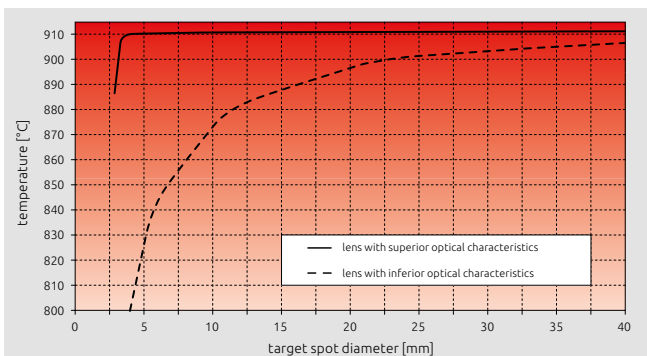
Special Features

- 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

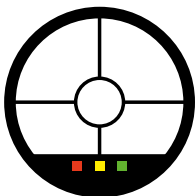
The wide field of view makes it easy to focus on the target object. The ocular features a widened interpupillary distance to accommodate users who wear glasses or a helmet. A built-in diopter compensation allows users to compensate for bad eyesight.

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.

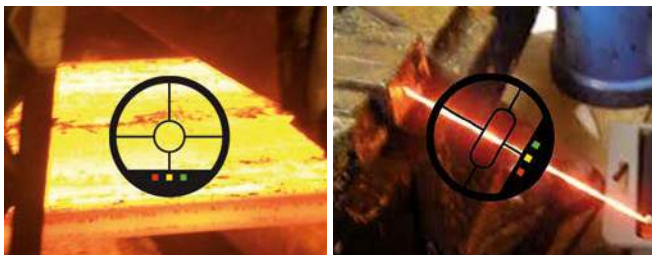
Patented SSI traffic light function



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 configuration

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.

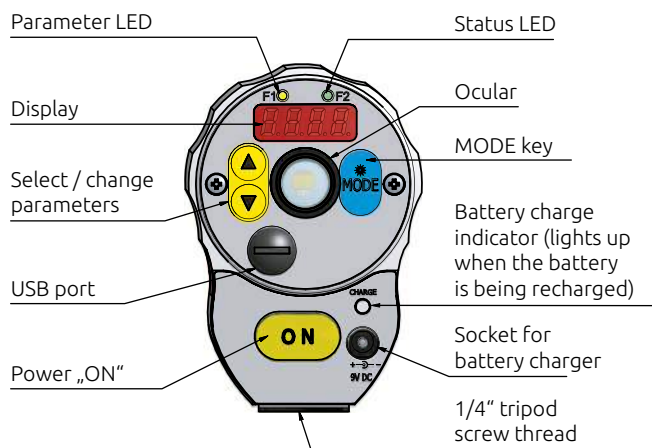
With many applications, this operating mode facilitates measurements for the user.

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 eliminate 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

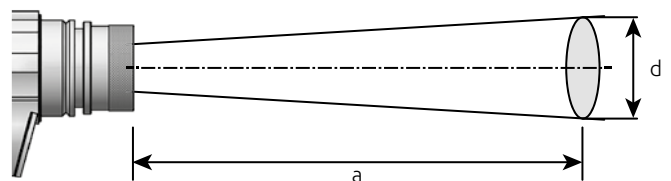
A maximum value storage supplies safe measuring results for discontinuing processes or inhomogeneous measuring objects.

Measuring area

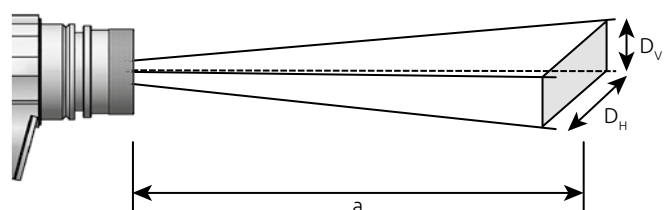
For pyrometers with focusable optics, the optical ratio D is defined as ratio of the measurement field over the measuring distance.

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

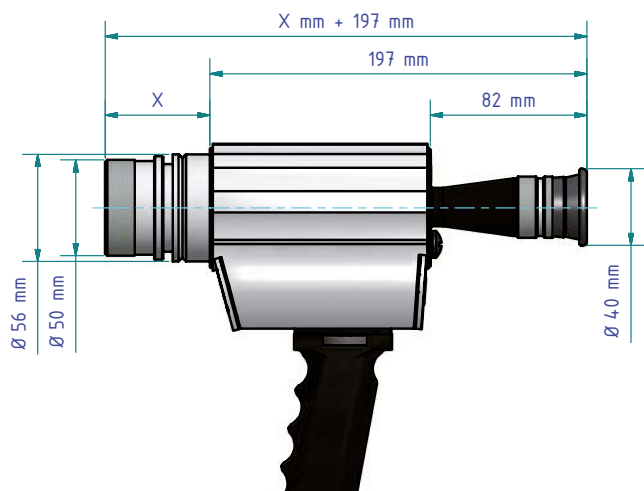
$$d = \frac{a}{D}$$



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



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)

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*	Repro- ducibility
PT 110 ...	For non-metal materials, such as ceramics, wood, rubber, synthetic materials, textiles, paper								
AF 1	0 - 1000 °C 32 - 1832 °F	8 - 14 μm	PZ 10.01	0.30 m - ∞	50 : 1	10.8°	≤ 30 ms	1 % of reading, 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 482 - 3632 °F	1.1 - 1.7 μm	PZ 20.01	0.40 m - ∞	175 : 1	7.1°	≤ 50 ms (T>250 °C)	0.3 % of reading, 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 - ∞	275 : 1	4.5°	≤ 2 ms (T>750 °C)		
AF 4			PZ 20.05	0.20 m - ∞	40 : 1	27.0°			
PT 130 ...	For metallic surfaces, ceramics, liquid glass at high temperature range								
AF 1	500 - 2500 °C 932 - 4532 °F	0.78 - 1.06 μm	PZ 20.01	0.40 m - ∞	210 : 1	7.1°	≤ 50 ms (T>550 °C)	0.3 % of reading, 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 - ∞	310 : 1	4.5°	≤ 2 ms (T>750 °C)		
AF 4			PZ 20.05	0.20 m - ∞	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 μm eliminates the influence on the reading caused by water vapour and CO₂ 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 μm . Atmospheric influences such as humidity and vapour have an effect on the measurement above 5 μm .

The CellaPort PT 115 uses a blocking filter with a spectral sensitivity of 4.6 - 4.9 μm , 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

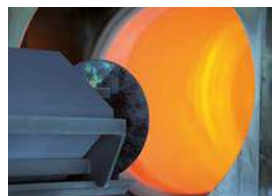
The CellaPort PT 128 is equipped with a light-intense lens and a special sensor for the reliable low temperature measuring of metals.

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 CO₂ 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 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 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 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 ₂ -containing gases (e.g. in gas-fired boilers and small combustion plants)								
AF 1	400 - 2000 °C 752 - 3632 °F	CO ₂	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 932 - 4532 °F	combustion gas	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 167 - 1202 °F	1.8 - 2.4 µm	PZ 20.08	0.30 m - ∞	48 : 1	10.8°	≤ 50 ms (T>150 °C) ≤ 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 302 - 1472 °F	1.8 - 2.2 µm	PZ 20.08	0.30 m - ∞	48 : 1	10.8°	≤ 50 ms (T>150 °C) ≤ 2 ms (T>350 °C)	0.75 % of reading, min. 5 K	1 K
AF 21	180 - 1200 °C 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°	≤ 2 ms (T>600 °C)		
PT 135 ...	For the precise measurement of metals, very high temperatures and semiconductors								
AF 1	600 - 3000 °C 1112 - 5432 °F	0.82 - 0.93 µm	PZ 20.01	0.40 m - ∞	210 : 1	7.1°	≤ 50 ms (T>650 °C) ≤ 2 ms (T>850 °C)	0.3 % of reading, 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 - ∞	310 : 1	4.5°			
AF 4			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 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

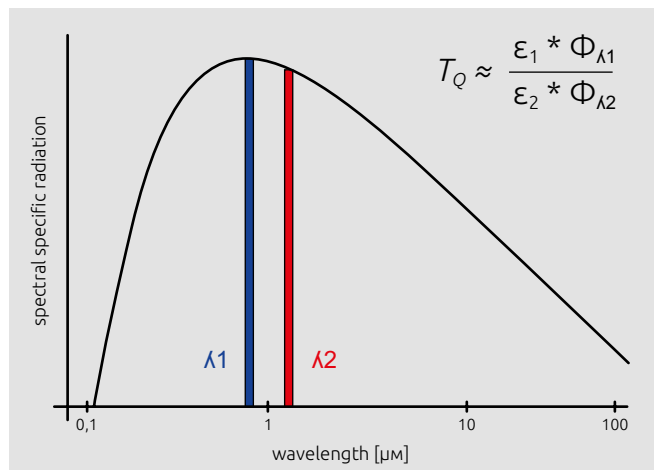
*(at $\epsilon = 1$ and $T_a = +23$ °C)

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*	Repro- ducibility
PT 140 ...	For use in these industries: steel, ceramics or cement in harsh environments								
AF 20	500 - 1400 °C 932 - 2552 °F	0.95 / 1.05 μm	PZ 20.08	0.30 m - ∞	55 : 1	10.8°	≤ 10 ms (T>650 °C)	1 % of reading	2 K
AF 1	650 - 1700 °C 1202 - 3092 °F		PZ 20.01	0.40 m - ∞	80 : 1	7.1°	≤ 10 ms (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 1382 - 4532 °F		PZ 20.01	0.40 m - ∞	150 : 1	7.1°	≤ 10 ms (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 1562 - 5432 °F		PZ 20.01	0.40 m - ∞	150 : 1	7.1°	≤ 10 ms (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 1382 - 4532 °F	0.95 / 1.05 μm	PZ 20.01	0.40 m - ∞	150 : 1	7.1°	≤ 10 ms (T>950 °C)	1 % of reading	2 K
AF 6			PZ 20.06	1.20 m - ∞	240 : 1	4.5°			

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

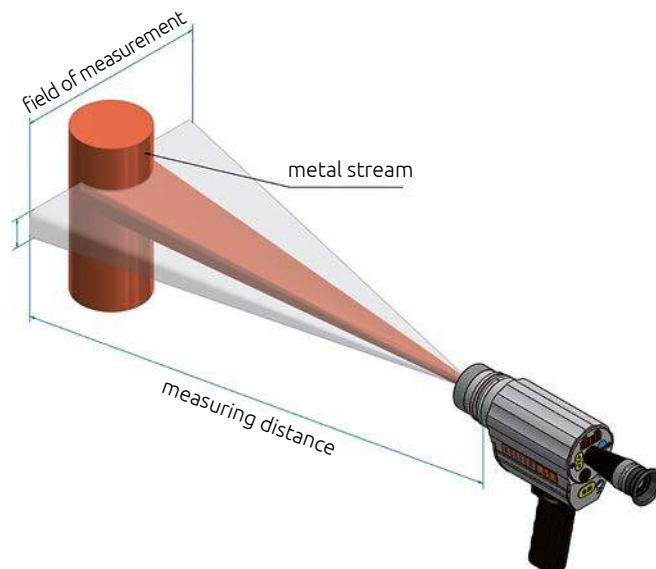
Two-colour pyrometer with rectangular field of view

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 1112 - 2552 °F	0.95 / 1.05 μm	PZ 20.08	0.30 m - ∞	D _v = 150 : 1 D _h = 30 : 1	10.8°	≤ 10 ms (T>650 °C)	1.5 % of reading	3 K
AF 1	650 - 1700 °C 1202 - 3092 °F		PZ 20.01	0.40 m - ∞	D _v = 230 : 1 D _h = 45 : 1	7.1°	≤ 10 ms (T>750 °C)		
AF 2			PZ 20.03	0.20 m - 0.40 m	D _v = 215 : 1 D _h = 40 : 1	7.0°			
AF 3			PZ 20.06	1.20 m - ∞	D _v = 375 : 1 D _h = 75 : 1	4.5°			
AF 10			PZ 20.05	0.20 m - ∞	D _v = 55 : 1 D _h = 10 : 1	27.0°			
AF 13			PZ 20.08	0.30 m - ∞	D _v = 150 : 1 D _h = 30 : 1	10.8°			
AF 4	750 - 2400 °C 1382 - 4532 °F		PZ 20.01	0.40 m - ∞	D _v = 350 : 1 D _h = 50 : 1	7.1°	≤ 10 ms (T>950 °C)		
AF 5			PZ 20.03	0.20 m - 0.40 m	D _v = 330 : 1 D _h = 45 : 1	7.0°			
AF 6			PZ 20.06	1.20 m - ∞	D _v = 580 : 1 D _h = 85 : 1	4.5°			
AF 11			PZ 20.05	0.20 m - ∞	D _v = 85 : 1 D _h = 11 : 1	27.0°			
AF 14			PZ 20.08	0.30 m - ∞	D _v = 230 : 1 D _h = 34 : 1	10.8°			

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

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 1202 - 3092 °F	0.95 / 1.05 μm	PZ 20.01	0.40 m - ∞	$D_v = 230 : 1$ $D_h = 45 : 1$	7.1°	$\leq 10 \text{ ms}$ ($T > 750 \text{ °C}$)	1.5 % of reading	3 K
AF 3			PZ 20.06	1.20 m - ∞	$D_v = 375 : 1$ $D_h = 75 : 1$	4.5°			
AF 13			PZ 20.08	0.30 m - ∞	$D_v = 150 : 1$ $D_h = 30 : 1$	10.8°			

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

Measuring spot size															
Model		Distance [m]													
		0.3	0.4	1	1.2	2	3	4	5	6	7	8	9	10	
PT 183 AF 1	Measuring spot size [mm]		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 Ø 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							
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 120 AF 1 / 5 PT 129 AF 1 PT 130 AF 1 PT 135 AF 1 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 PT 129 AF 2 PT 130 AF 2 PT 135 AF 2 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 PT 129 AF 3 PT 130 AF 3 PT 135 AF 6 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

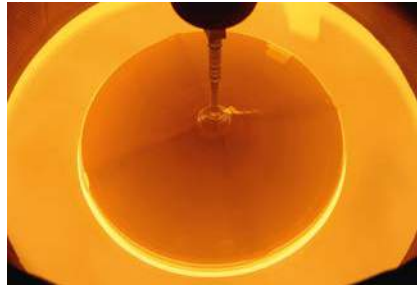
Supplementary lenses

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.

With its very large product range of more than 250 models and systems KELLER ITS offers solutions for all standard applications and a variety of special measuring tasks.

Following the KELLER philosophy, the key focus in the development and production of the devices is set to the high measuring accuracy and reliability. Therefore, KELLER grants a warranty of 5 years on its products.

A global network of distributors and service points ensures competent and personal consultation on site.





- Headquarters
- Sales and Service Center
- Sales abroad



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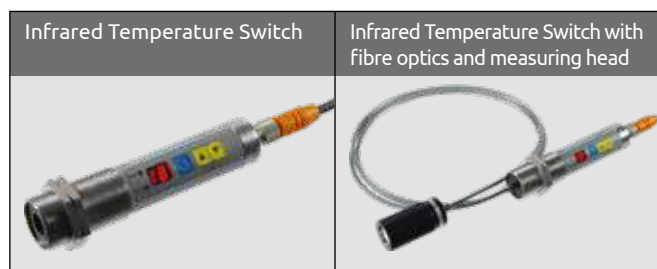
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Infrared Temperature Switch CellaSwitch PKS

for quick, non-wearing, non-contact detection
of hot objects from 50°C to 1350°C



Infrared Temperature Switch CellaSwitch PKS

Special features

- Temperature ranges 50 – 1350 °C / 122 – 2462 °F
- 2 independent switching outputs, individually configurable as N/O or N/C contacts or to monitor temperature spans
- Switching thresholds exactly adjustable at display panel
- Shows temperature readings as a percentage
- Excellent optical resolution due to high-precision lens
- Robust lens with a tempered antireflective coating
- All parameters adjustable via control keys
- Diagnostics feature activated by control keys or a control signal
- M30 connector for easy installation
- Available as a compact model or with fibre optics

Description

The CellaSwitch PKS Infrared Temperature Switch detects infrared energy radiated by objects and converts this to an electric signal. A switch command will be triggered when a hot object, present within the sensor's field of view, exceeds a configured threshold. LEDs indicate the switching status.

CellaSwitch PKS features 2 independent relay switching outputs. These relays can be operated either as normally open (NC) or normally closed (NO) contacts, enabling various monitoring options such as limit temperatures or temperature spans.

The switch points and the desired function of the outputs can be configured directly using the control keys.

The display panel indicates the set threshold values. This makes precise configuration easy, without requiring a hot object. If numerous infrared temperature switches are installed at a plant, they can all be precisely configured with the exact same threshold values.

While in use, the display panel will show the measurement value as a percentage. This gives the operator an indication of how close the object's temperature is to the configured threshold.

The display is based on the latest LED technology and is easy to read from a distance of several meters. It is brightly lit but nevertheless energy efficient.

Optics

The optics of the CellaSwitch PKS features a high-quality glass lens with a tempered antireflective coating. The lens is robust, easy to clean and suitable for harsh industrial environments.

Due to the superior imaging properties of the high-precision lens, the instrument is insusceptible to the effects of stray light. Even when the size of the hot object fluctuates or the measuring distance varies, the switch point remains highly accurate.

Outputs

2 independent switching outputs

- PNP open collectors active by positive supply voltage
- Switch function: NO/NC
- Current carrying capacity 150 mA per output
- Safety shutdown to protect against overcurrent (≥ 250 mA)
- Polarity protection for the supply voltage
- Short-circuit proof

Inputs

Test input 10 - 34 V DC

Diagnostics feature

Diagnostics can be performed during installation or running operations. A functional check can be activated using the keys on the operator control panel or an external control signal.

The test simulates a hot object in the field of view and triggers a switch command. This feature serves to check the infrared temperature switch as well as downstream signal processing.

General technical data

Switching point uncertainty

- 1 % of end of range
(at $\epsilon = 1$ and $T_a = 23$ °C)

Ambient operating temperature

- 0 - 65 °C

Power requirement

- 10 - 34 V DC
Ripple ≤ 200 mV

Permissible humidity

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

Current consumption

- ≤ 30 mA at 24 V DC
without load current

Protection

- IP65 acc. to DIN 40050

Material

- Stainless steel housing

Connectivity

- M12 plug connector 5-pin

Storage temperature

- -20 - +80 °C

Weight

- 0.235 kg

Technical data

Model	Application	Temperature range	Resolution	Spectral sensitivity	Focusing distance	Spot size	Response time
Infrared Temperature Switch							
PKS 10 AF 1	plastics, organic materials, rubber, paper, paints and lacquer, foodstuffs, coated metal, cement, asphalt	50 - 500 °C 122 - 932 °F	4.5 K	8 - 14 µm	0.3 m	Ø 12 mm	≤ 100 ms
PKS 20 AF 1	ceramic, graphite, metal	250 - 1250 °C 482 - 2282 °F	10 K	1.0 - 1.7 µm	1.5 m	Ø 16 mm	≤ 2 ms
Infrared Temperature Switch with fibre optics and measuring head							
PKS 21 AF 1	ceramic, graphite, metal	350 - 1350 °C 662 - 2462 °F	10 K	1.0 - 1.7 µm	1.5 m	Ø 12.5 mm	≤ 2 ms

Indicators

LED Display

- 2 x 7-segment, red, digit height 8 mm
- shows measurement as a percentage during running operations

2 yellow LEDs

- indicate switching status
- flash to indicate overcurrent
- both flash to indicate faulty connection of supply voltage

Fibre optic cable for CellaSwitch PKS 21 AF 1

Model	Length	Weight
LWL-2HT	2 m	0.08 kg
LWL-5HT	5 m	0.19 kg
LWL-10HT	10 m	0.38 kg

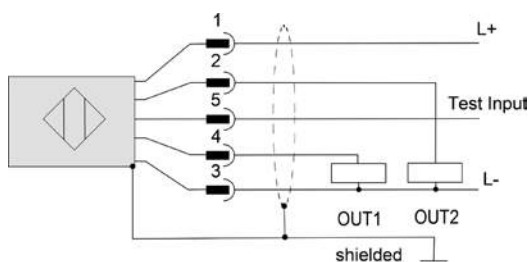
other lengths up to 50 m on request

- **Ambient temperature:** -40 to +250 °C
- **Material:** nickel-plated brass

Target diagrams

To calculate the measuring field diameter use the "Field of View Calculator" on our homepage!

Pin assignment



Adjustable parameters

- Switch point in increments of 1% of temperature range
- Switch function: NO/NC
- Switching delay 0 – 9.9 sec. in increments of 0.1 sec

Operating controls

- 3 control keys

Dimensions

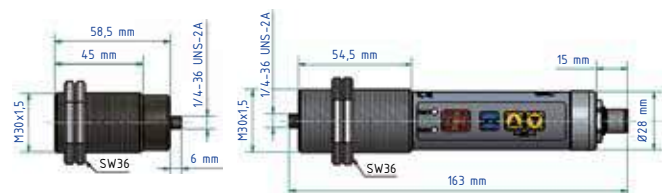
PKS 10 AF 1



PKS 20 AF 1



PKS 21 AF 1



For the CellaSwitch PKS 21 the electronics are housed separately from the fibre optic sensor head. A fibre optic cable conducts the infrared radiation to the electronics assembly.

The optical sensor head can withstand high electromagnetic fields and ambient temperatures up to 250 °C without cooling.



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- Sales and Service Center
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KELLER


*infrared
temperature
solutions*

ITS

N^o1

in terms of
ACCURACY
RELIABILITY
INNOVATION



 IO-Link



Infrared thermometer CellaTemp[®] PK/PKF/PKL

for non-contact temperature measurements
from -30 °C to +2500 °C

Range of models

Compact infrared thermometer

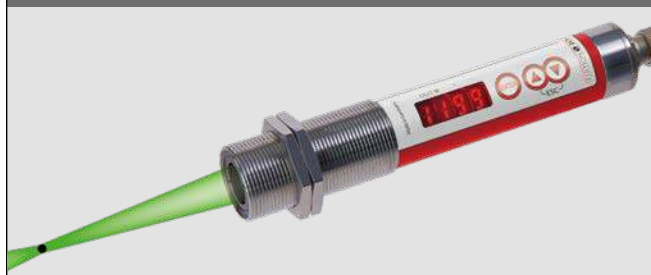


Type	Measuring range	Application
Single-colour infrared thermometer		
PK 11	0 - 1000 °C	Non metals
PK 12	-30 - 300 °C	Non metals at low temperatures
PK 14	0 - 500 °C	Non metals large objects
PK 18	0 - 500 °C	Non-metals in aggressive measuring environment
PK 21	250 - 1600 °C	Metals, ceramics, molten glass
PK 24	250 - 1600 °C	Metals, ceramics large objects
PK 25	75 - 650 °C	Metals at very low temperatures
PK 29	150 - 800 °C	Aluminum, bright metal surfaces, laser applications
PK 31	500 - 2500 °C	Metal, ceramics at high temperatures
PK 41	300 - 1300 °C	Glass surfaces
PK 42	500 - 2500 °C	
PK 51	400 - 1400 °C	Flame-heated furnaces
PK 52	500 - 2000 °C	
PK 72	400 - 2000 °C	Hot CO ₂ gas
PK 73	500 - 2500 °C	Hot combustion gases

Two-colour infrared thermometer

PK 62	700 - 1700 °C	Sooty flames
PK 68	550 - 1400 °C	Metals, ceramics, molten glass at difficult measuring conditions like dust, steam, smoke

Compact infrared thermometer with LED spot light



Type	Measuring range	Application
Single-colour infrared thermometer		
PKL 11	0 - 1000 °C	Non metals, coated metals
PKL 28	250 - 1600 °C	Metals (small measuring objects), induction heating
PKL 29	180 - 1200 °C	Metals (small measuring objects), induction heating at low temperatures
PKL 38	500 - 2500 °C	Metals (small measuring objects), induction heating at high temperatures

Panorama infrared thermometer

PKL 63	650 - 1600 °C	Metals (oscillating measuring objects), production and heat treatment of wires, rods, bolts
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Two-colour infrared thermometer

PKL 68	650 - 1600 °C	Metals (small measuring objects), induction heating at difficult measuring conditions like dust, steam, smoke
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Infrared thermometer with optical fibre and optical sensor head



Type	Measuring range	Application
Single-colour infrared thermometer with fibre optic and sensor head		
PKF 26	300 - 1600 °C	Metals, ceramics, molten glass
PKF 36	550 - 2500 °C	Metals, ceramics large objects

Two-colour infrared thermometer with fibre optic and sensor head

PKF 66	700 - 1800 °C	Metals, ceramics, molten glass at difficult measuring conditions like dust, steam, smoke
PKF 67	600 - 1400 °C	

Infrared thermometer CellaTemp® PK/PKF/PKL

Special features

- Compact infrared thermometer with large, bright LED display and control panel
- All parameters adjustable with control keys on the sensor head and digital interface
- High optical resolution and accuracy due to wide band anti-reflective precision lenses
- Target sizes from Ø 1.2 mm
- High temperature resolution over large measuring ranges
- Standardized IO-Link interface, independent of PLC and fieldbus
- Analogue output 0 / 4 – 20 mA
- Universally configurable switching output
- Test function triggered by push-button or control signal
- Easy mounting thanks to the M30 screw thread
- Optionally with patented LED spot light to display focal distance with the exact size and position of the target
- Optionally as fibre optic version with separate sensor head
- Optionally as two-colour infrared thermometer (difficult measuring conditions due to dust, vapour, smoke)
- SCM function for pollution monitoring (with two-colour infrared thermometer)

CellaTemp® PK series

The infrared thermometer CellaTemp® PK records the infrared radiation emitted by an object and converts it into an electrical signal. The detected temperature is displayed and transmitted to the analogue output and the digital interface for further processing.

A unique combination of analogue and digital linearisation features provides the CellaTemp® PK with a high-resolution signal processing unit. Therefore, even with wide measuring ranges, the infrared thermometer has a very high temperature resolution while its noise equivalent temperature difference (NETD) is extremely low. The pyrometer thus supplies stable measurement readings even when the response times are extremely short (from 2 ms) and the measured temperatures are very low.

The bright display unit is based on state-of-the-art LED technology. Even from a great distance it is easy to read and it is energy-efficient at the same time.

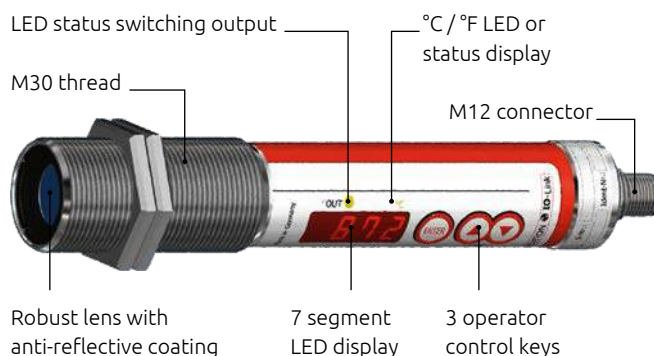
CellaTemp® PK 18

The CellaTemp® PK 18 comes with an especially resilient lens, allowing its use even in extreme environmental conditions, such as in asphalt and concrete mixing plants, preventing the lens from damage by aggressive vapours and dust.

CellaTemp® PK 25/29

The CellaTemp® PK 25/29 is equipped with a special blocking filter, thus avoiding that the measurement is affected by daylight. This infrared thermometer also responds substantially less sensitive to reflective external radiation than conventional devices measuring in the short-wave range. Therefore, the CellaTemp® PK 25/29 can be used for a variety of applications in the metal-working industry and in particular for temperature measurements of aluminium and bright metals at low temperatures.

Thanks to the blocking filter it is also suitable to measure processes where diodes, Nd:YAG or CO₂ lasers are used for heating. The high-energy laser radiation does not affect the measurement.



CellaTemp® PK 41/42

In the range of 4.6 - 4.9 µm glass has an emissivity of almost 100%. Above 5 µm, atmospheric influences, such as humidity or water vapour, affect the measurement. The CellaTemp® PK 41/42 is provided with a blocking filter with a spectral sensitivity of 4.6 - 4.9 µm, thus measuring the temperature from the near surface area of the glass. Owing to the wavelength used, changes in thickness, different types of glass or varying moisture contents in the atmosphere do not affect the measurement reading.

CellaTemp® PK 51/52

The CellaTemp® PK 51 was especially developed for temperature measurements in flame heated furnaces. Thanks to the selective spectral range of 3.9 µm, water vapour and CO₂ existing in the pyrometer's field of vision have no effect on the measuring results, even when measuring from large distances. This allows precise measurements through flames and combustion gases.

CellaCombustion PK 62

The CellaCombustion PK 62 is a special infrared thermometer 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.

CellaCombustion PK 72

The CellaCombustion PK 72 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 PK 73

The CellaCombustion PK 73 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.

Infrared thermometer CellaTemp® PKF with optical fibre and optical sensor head



CellaTemp® PKF 26/36/66/67

The electronic elements of the CellaTemp® PKF 26/36/66/67 version are separated from the measuring head. A fibre optics system transmits the infrared radiation to the electronic unit where it is transformed into an electric signal. The measuring head is entirely composed of mechanical and optical components, enabling its use at ambient temperatures up to 250 °C without auxiliary cooling systems. The fibre optics version is also used in confined spaces or in powerful electromagnetic fields. The fibre optics cable is detachable both from the measuring head and the electronic unit using a screw-in FSMA connector which makes the cable easy to install. The length of the fibre optics cable can be up to 50 m.

Laser pointer



The laser pointer PK 01/E has to be attached to the end of the optical fibre to set the focal distance and to check the alignment during setup of the CellaTemp®PKF 26/36/66/67.

Infrared Thermometer CellaTemp® PKL with LED pilot light



Special features of the LED spot light

- lights up permanently
- shows exactly the size and position of the target as well as the focal point
- is absolutely safe
- innovative, bright LED technology with low power consumption
- Parallax-free – identical geometric and optical axis to exclude squinting of the device
- green pilot light is bright and clearly visible to the eye

CellaTemp® PKL 11/28/29/38/68

The CellaTemp® PKL comes with an integrated LED spot light. The spot light is particularly indispensable for small measuring objects from Ø 1.2 mm as it helps to align the infrared thermometer to view the hot zone and to adjust the correct focal distance. The LED spot light is continuously illuminated and due to its permanent control function it offers a high degree of operational safety.

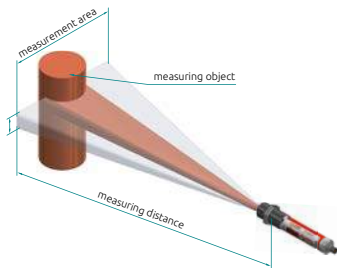
The special feature of the patented spot light is that it shows both the focal point and the exact position and true size of the measuring point. Thanks to the high-precision mechanical and optical design the geometric and optical axes are identical, thus providing a parallax-free CellaTemp® PKL. This excludes squinting of the device when, for example, measuring through a narrow furnace or kiln wall.

The optical system of the CellaTemp® PK features a high-quality glass lens optimised for the visible and infrared range. This ensures that within the focal range both the infrared radiation on the sensor and the spot light are reproduced in an equally sharp way.

The LED light is technically safe and there is no risk of injury to the human eye as with a laser device. Unlike a laser, it is not subject to aging and, regardless of the ambient temperature, it always works with a constant luminous intensity. Without cooling, the maximum permissible ambient temperature is 65 °C. The innovative LED technology ensures a very intense light spot with low power consumption. As the human eye has the highest sensitivity in the wavelength range of green light, green light appears brighter and sharper to the viewer than red light.

Panorama infrared thermometer CellaTemp® PKL 63

The two-colour infrared thermometer CellaTemp® PKL 63 features a rectangular measurement area. The unique design enables the pyrometer to detect the temperature of target objects which move within the rectangular area. This is accomplished without requiring any moving parts. The CellaTemp® PKL 63 reliably captures objects which



typically show fluctuating behaviour (such as swaying wires). The rectangular area is also ideal when measuring objects whose position tends to vary during the production process. Such objects include billets or metal rods at a roller table.

Two-colour infrared thermometer

The two-colour infrared thermometers CellaTemp® PKL 63, PK(L) 68 and PKF 66 capture the infrared radiation of the object with a dual photodiode (sandwich design) at two wavelengths at the same time and spot. The temperature is then defined by the ratio of these two signals.

The particular advantage of a two-colour measuring procedure is that it produces a correct reading even when the infrared radiation picked up by the sensor is weakened by up to 90%. The two-colour infrared thermometer reacts substantially less sensitive than a single-colour pyrometer to visual obstructions in the target area caused by steam, dust and smoke. The same applies if the optical system of the device or the inspection glass of the furnace is dirty or inspection openings are clogged. Therefore, two-colour pyrometers are preferably used for industrial applications in harsh ambient environments and under difficult measuring conditions, such as rotating kilns in the cement industry or rolling mills in the steel industry.

The ratio principle also compensates for changes in the radiation characteristics of the measuring object. The emissivity, i.e. the radiation characteristics of the object to be measured may change due to the nature of the surface or in relation to the temperature, but with simultaneous changes over both wavelengths there is no influence on the measurement.

Another advantage of the two-colour infrared thermometers is that the measuring object may even be smaller than the target field of the device. Therefore, with smaller measuring objects, such as in inductive heating installations, a two-colour infrared thermometer is less sensitive to an imperfect alignment than a single-colour thermometer.

Analogue output

The analogue output supplies a signal linear to the temperature; 0/4 – 20 mA are optionally available. The range setting can be configured with the control keys according to the needs of the user. The outputs deactivate and a warning appears on the display when the internal temperature reaches > 75 °C.

Switching outputs

With a hot object in the sensor's field of vision, a switching contact is triggered when a pre-defined temperature threshold is exceeded. An LED indicates this switching status. Optionally, the switch can operate as a normally closed or normally open contact.

This configurable switch on/switch off delay permits a suppression of short interference pulses and for the adaptation of the switching output to the response time of a PLC.

The two-colour infrared thermometers CellaTemp® PKL 63, PK(L) 68 and PKF 66/67 have two independent switching outputs for the configuration of the measuring values, the internal temperature, the contamination monitoring or the DTD function.

A variety of possible applications includes:

- Monitoring of limit temperatures or temperature ranges
- Signalisation of status information of the DTD function
- Determination of the measurement time
- Synchronisation of the measurement value transmission to a PLC

Optical system

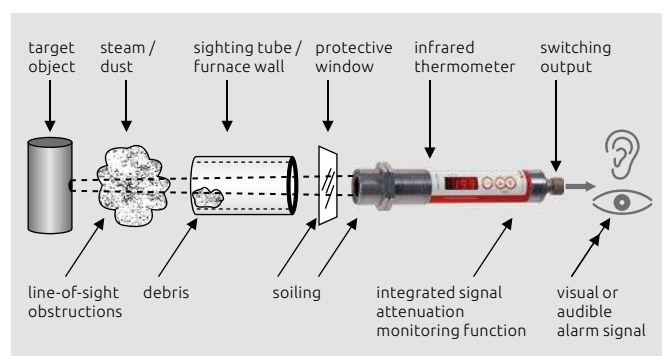
An infrared thermometer uses an optical measuring method for non-contact temperature measurements. The quality of the optical system has a great influence on the measurement accuracy of the device as a whole.

This influence is defined as "size of source effect". Light scattered into the optical path will result in false temperature data. When the distance to the target or the size of the object change, the temperature reading may change as well depending on the quality of the optical system.

The excellent imaging characteristics of the precision lenses provide a high optical resolution and a minimum sensitivity to stray light. The anti-reflective coated lenses are extremely durable, easy to clean and therefore suitable for rough industrial applications.

Contamination monitoring

The two-colour infrared thermometers CellaTemp® PKL 63, PK(L) 68 and PKF 66/67 are equipped with a SCM (Smart Contamination Monitoring) function that continuously monitors the signal power. If the infrared radiation decreases to a critical value due to a contamination of the lens or the protective window, this condition is recorded, visually displayed on the device and transmitted via a switching contact. Visual obstructions in the target area or deposits in the furnace opening are also detected. The sensitivity to detect the contamination level is adjustable.



DTD function

The two-colour infrared thermometers CellaTemp® PKL 63, PK(L) 68 and PKF 66/67 are equipped with a DTD (Discontinuous Temperature Detection) function. In discontinuous processes it is used for the automatic detection of the temperature.

The measurement starts automatically when this function detects a hot object. It ends when the temperature is below the threshold and the maximum value is displayed. A switching contact may be activated during the measurement for synchronisation with a PLC. The duration of measurement can thus also be recorded.

Diagnostic function

The diagnostic function ensures a high operational reliability. Incorrect supply voltages, reverse polarities of connections, overloads at the switching output, unacceptable ambient temperatures or out-of-range object temperatures appear on the display as error messages.

Test function (in the single-colour thermometer)

A functional test of the device and the signal processing unit can be performed at any time via an external control signal or via the operating menu. The analogue output generates an electric current of 20.5 mA and the switching function is triggered.

Service function

The service function is used during setup or running operation to key in a simulated temperature value that is displayed and transmitted via the analogue output. This feature checks the correct functioning and range setting for the downstream signal processing units (display, controller, PLC) quickly and safely even without a hot object.

Reverse polarity protection

- for the power supply voltage
- for the analogue output
- for the switching output

LED display

- indicating the operating state, overload and incorrect connection of the supply voltage
- for display of unit (°C or °F) in single-colour infrared thermometer
- for display the signal power in two-colour infrared thermometer

Operating elements

- 3 buttons

Technical data

Analogue output

- 0/4 - 20 mA linear according to NAMUR 43, scalable
- max. burden 500 Ω

Switching output

- PNP open collector active from positive supply voltage (2 independent switching contacts at the PK(L) 68)
- NC or NO
- current-carrying capacity 150 mA
- clocked overload safety shut-off ≥ 250 mA

Interface

- IO-Link V1.1

Test input (in the single-colour thermometer)

- Digital input (IEC 61131-2, Typ 3)
Low level ≤ 5 V DC,
High level ≥ 11 V DC
Load current ≤ 11,6 mA at 30 V DC

Display

- 4 x 7 segment red, character height 8 mm

Resolution of power output

- 0.2 K + 0.03 % of the set span

Resolution of display

- 0.1 K for T < 200 °C
- 1 K for T ≥ 200 °C

Power supply

- 18 - 32 V DC

Power consumption

- ≤ 50 mA (≤ 75 mA with spot light) at 24 V DC without load current

Ambient temperature

- 0 - 65 °C

Storage temperature

- -20 - +80 °C

Housing material

- Stainless steel V2A (1.4305)

Permissible humidity

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

Protection

- IP65 acc. to DIN 40050 protection class III

Connection

- M12 connector, 5-pole A coding (DIN EN 61076-2-101)

Weight

- approx. 0.4 kg

Shock resistance

- (EN60068-2-27)
- 30 g (11 mg)

Vibration resistance

- (EN60068-2-6)
- 5 g (10 - 2000 Hz)

Troubleshooting

- Output overload
- Excess temperature in the sensor
- Measuring range too high/too low
- Incorrect supply voltage connection
- incorrect supply voltage

Approvals

EMV

- EN 61000-6-4
- EN 61000-6-2

Fibre optic cable for CellaTemp® PKF

Type	Length	Weight
LWL-2HT	2 m	0.08 kg
LWL-5HT	5 m	0.19 kg
LWL-10HT	10 m	0.38 kg

other lengths up to 50 m on request

Ambient temperature

- 40 - +250 °C

Material

- brass, nickel-plated

Scope of delivery

- Infrared thermometer
- Operating manual
- 2 fastening nuts

Additionally for CellaTemp® PKF

- Measuring head, depending on model
- Fibre optic cable (please specify length)

- i** The connecting cable VK 02/L (length as required) must be ordered separately.

Adjustable parameters

Analogue output

- Analogue output 0 / 4 – 20 mA
- Scaling of the analogue output

Switching output

- ON and reset
- Switching function: NC and NO contacts
- Switch-on and switch-off delay

General parameters

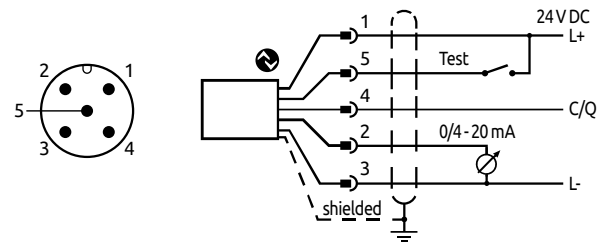
- Emissivity (quick set) with temperature display
- Smoothing function
- Hold time for peak value
- Reset to factory setting
- Key lock
- Temperature display
- Temperature unit °C / °F
- Temperature simulation
- Test function (single-colour thermometer)

Additionally for the two-colour thermometer

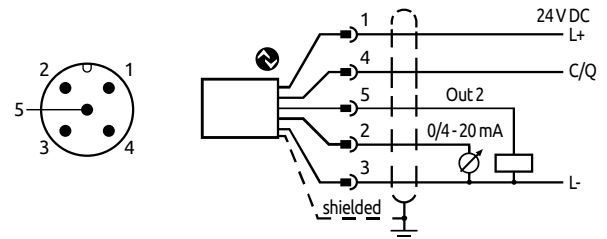
- Shut down and alarm threshold for contamination monitoring
- Source of the second switching contact
- Transmission factor
- Threshold for the DTD function
- Measuring method single-colour / two-colour
- Soot factor (at the CellaCombustion PK 62)

Connector pin assignment

CellaTemp® PK(L) single-colour infrared thermometer



CellaTemp® PKL63/PK(L)68/PKF66/67 two-colour infrared thermometer



- i** It is imperative to use a cable with shielding.

Supplementary lenses

A lens can be screw-mounted on the sensor of the infrared thermometer CellaTemp® PK for the measurement of very small objects.

Infrared thermometer	Supplementary lens	Distance to target	Target Ø
PK 11 AF 1	PK 11/E AF 1	30 mm	1.5 mm
PK 11 AF 2		33 mm	1.6 mm
PK 12		30 mm	2.3 mm
PK 21/31	PK 21/E AF 1	520 mm	5 mm
PK 41/42	PS 41/E AF 1	20 mm	1.3 mm
	PS 42/E AF 1	43 mm	2.5 mm
PK 68	PK 21/E AF 1	520 mm	10 mm
PKL 29	PS 27/E AF 1	150 mm	3.5 mm



Technical data - Compact infrared thermometer

Type	Measuring range	Spectral sensitivity	Focal distance	Target size	Measurement uncertainty* ¹	Response time t ₉₀	Repeatability	Temperature coefficient* ²
Single-colour infrared thermometer								
PK 11 AF 1	0 - 1000 °C 32 - 1832 °F	8 - 14 µm	0.3 m	Ø 11 mm	0.75 % of measured value [°C] plus 2.0 K	≤ 60 ms	1 K	0.1 K/K (for T < 250 °C) 0.04 %/K (for T > 250 °C)
PK 11 AF 2			0.9 m	Ø 33 mm				
PK 12 AF 1	-30 - 300 °C -22 - 572 °F		0.3 m	Ø 18 mm		≤ 90 ms		
PK 14 AF 1	0 - 500 °C		1.0 m	Ø 0.42 m	≤ 60 ms			
PK 18 AF 1	32 - 932 °F		0.3 m	Ø 11 mm				
PK 21 AF 1	250 - 1600 °C	1.0 - 1.7 µm	1.5 m	Ø 10 mm	0.3 % of measured value [°C] plus 2.5 K	≤ 2 ms for T > 600 °C		0.07 %/K
PK 24 AF 1	482 - 2912 °F		1.0 m	Ø 0.2 m				
PK 25 AF 1	75 - 650 °C 167 - 1202 °F	1.8 - 2.4 µm	0.3 m	Ø 7 mm	0.3 % of measured value [°C] plus 4.0 K	≤ 2 ms for T > 200 °C ≤ 15 ms for T > 125 °C ≤ 50 ms for T > 100 °C ≤ 200 ms for T > 75 °C		0.25 K/K (for T < 500 °C) 0.05 %/K (for T > 500 °C)
PK 29 AF 1	150 - 800 °C 302 - 1472 °F	1.8 - 2.2 µm	0.3 m	Ø 7 mm		≤ 2 ms for T > 300 °C ≤ 15 ms for T > 200 °C ≤ 45 ms for T > 150 °C		
PK 31 AF 1	500 - 2500 °C 932 - 4532 °F	0.78 - 1.06 µm	1.5 m	Ø 8 mm	0.2 % of measured value [°C] plus 2.5 K	≤ 2 ms for T > 900 °C		0.07 %/K
PK 41 AF 1	300 - 1300 °C 572 - 2372 °F	4.6 - 4.9 µm	0.4 m	Ø 11 mm	0.5 % of measured value [°C] plus 2.5 K	≤ 90 ms	2 K	0.04 %/K
PK 42 AF 1	500 - 2500 °C 932 - 4532 °F		0.4 m	Ø 7 mm		≤ 60 ms	4 K	
PK 51 AF 1	400 - 1400 °C 752 - 2552 °F	3.8 - 4.0 µm	0.4 m	Ø 11 mm	1.0 % of measured value [°C]	≤ 90 ms	2 K	
PK 52 AF 1	500 - 2000 °C 932 - 3632 °F		0.4 m	Ø 7 mm		≤ 60 ms	4 K	
PK 72 AF 1	400 - 2000 °C 752 - 3632 °F	CO ₂ range	0.4 m	Ø 7 mm			2 K	
PK 73 AF 1	500 - 2500 °C 932 - 4532 °F	Combustion gas	0.4 m	Ø 7 mm			4 K	
Two-colour infrared thermometer								
PK 62 AF 1	700 - 1700 °C 1292 - 3092 °F	0,80/1,05 µm	1.5 m	Ø 20.5 mm	1.0 % of measured value [°C]	≤ 10 ms	2 K	0.05 %/K
PK 68 AF 1	550 - 1400 °C 1022 - 2552 °F	0.95/1.05 µm	1.5 m	Ø 21 mm		≤ 10 ms for T > 650 °C		

Technical data - Infrared thermometer with fibre optic

Type	Measuring range	Spectral sensitivity	Measuring head	Focal distance	Target size	Measurement uncertainty* ¹	Response time t ₉₀	Repeatability	Temperature coefficient* ²
Single-colour infrared thermometer with fibre optic and sensor head									
PKF 26 AF 1	300 - 1600 °C 572 - 2912 °F	1.0 - 1.7 µm	PA 41.01	0.2 m - ∞	180 : 1	0.3 % of measured value [°C] plus 2.5 K	≤ 2 ms for T > 600 °C	2 K	0.07 %/K
PKF 26 AF 2			PKS 21.01	1.5 m	Ø 7.2 mm				
PKF 26 AF 3			PA 41.05	0.12 m - ∞	100 : 1				
PKF 26 AF 4			PZ 41.18	33 - 45 mm	50 : 1				
PKF 36 AF 1	550 - 2500 °C 1022 - 4532 °F	0.78 - 1.06 µm	PA 41.01	0.2 m - ∞	190 : 1		≤ 2 ms for T > 900 °C		
PKF 36 AF 2			PKS 21.01	1.08 m	Ø 5.6 mm				
PKF 36 AF 3			PA 41.05	0.12 m - ∞	100 : 1				
PKF 36 AF 4			PZ 41.18	33 - 45 mm	50 : 1				
Two-colour infrared thermometer with fibre optic and sensor head									
PKF 66 AF 1	700 - 1800 °C 1022 - 4532 °F	0.95/1.05 µm	PA 41.01	0.2 m - ∞	190 : 1	1.0 % of measured value [°C] plus 3.0 K	≤ 10 ms for T > 800 °C	2 K	0.05 %/K
PKF 66 AF 2			PKS 21.01	1.08 m	Ø 5.6 mm				
PKF 66 AF 3			PA 41.05	0.12 m - ∞	100 : 1				
PKF 66 AF 4			PZ 41.18	33 - 45 mm	50 : 1				
PKF 66 AF 5			PA 41.03	1.8 m	Ø 8 mm				
PKF 67 AF 5	600 - 1400 °C 1112 - 2552 °F		PA 41.03	1.8 m	Ø 16 mm				

*¹ at $\epsilon = 1$ and $T_a = +23$ °C*² deviation to $T_a = +23$ °C

Technical data - Compact infrared thermometer with LED spot light

Type	Measuring range	Spectral sensitivity	Focal distance	Target size	Measurement uncertainty* ¹	Response time t ₉₀	Repeatability	Temperature coefficient* ²
Single-colour infrared thermometer								
PKL 11 AF 1	0 - 1000 °C 32 - 1832 °F	8 - 14 μm	0.295 m	Ø 9 mm	0.75 % of measured value [°C] plus 2.0 K	≤ 60 ms	1 K	0.1 K/K (For T < 250 °C) 0.04 %/K (for T > 250 °C)
PKL 11 AF 2			0.089 m	Ø 3.2 mm				
PKL 28 AF 1	250 - 1600 °C 482 - 2912 °F	1.0 - 1.7 μm	0.21 m	Ø 1.4 mm	0.3 % of measured value [°C] plus 2.5 K	≤ 2 ms for T > 600 °C		0.07 %/K
PKL 28 AF 2			1.0 m	Ø 6.7 mm				
PKL 29 AF 1	180 - 1200 °C 356 - 2192 °F	1.8 - 2.2 μm	0.29 m	Ø 6.2 mm	0.3 % of measured value [°C] plus 4.0 K	≤ 2 ms for T > 300 °C ≤ 10 ms for T > 250 °C ≤ 25 ms for T > 180 °C		0.25 K/K (for T < 500 °C) 0.05 %/K (for T > 500 °C)
PKL 38 AF 1			0.21 m	Ø 1.2 mm				
PKL 38 AF 2	500 - 2500 °C 932 - 4532 °F	0.78 - 1.06 μm	1.0 m	Ø 5.6 mm				
Panorama infrared thermometer								
PKL 63 AF 1	650 - 1600 °C 1202 - 2912 °F	0.95/1.05 μm	0.21 m	4.1 x 0.6 mm	1,5 % of measured value [°C]	≤ 10 ms for T > 750 °C	3 K	0.05 %/K
PKL 63 AF 2			1.0 m	18.5 x 2.7 mm				
Two-colour infrared thermometer								
PKL 68 AF 1	650 - 1600 °C 1202 - 2912 °F	0.95/1.05 μm	0.21 m	Ø 1.2 mm	1.0 % of measured value [°C]	≤ 10 ms for T > 750 °C	2 K	0.05 %/K
PKL 68 AF 2			1.0 m	Ø 5.6 mm				

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

*² deviation to $T_a = +23$ °C

Dimensions

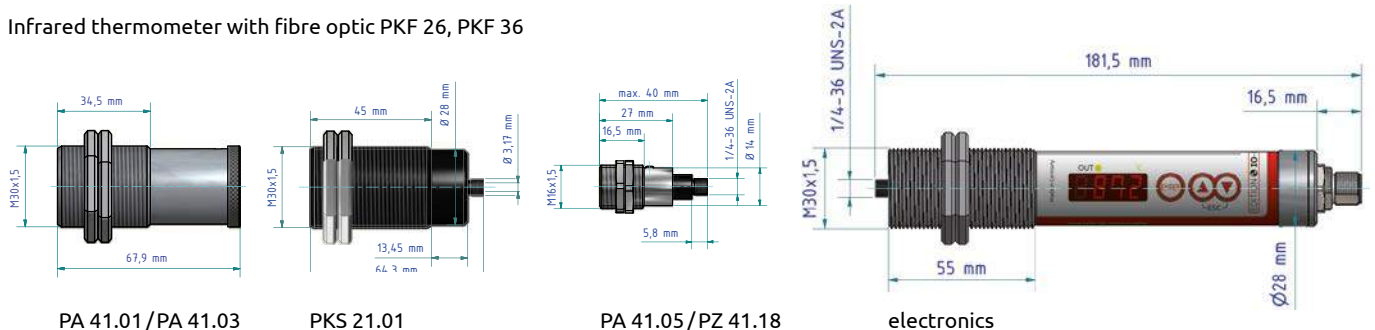
Compact infrared thermometer



Length of the compact infrared thermometer

Type	Length
PK 11, PK 12, PK 14, PK 18	185 mm
PK 21, PK 24, PK 25, PK 29, PK 31, PK 68	210 mm
PK 41, PK 42, PK 51, PK 52, PK 72, PK 73, PKL 11	200 mm
PKL 25, PKL 28, PKL 29, PKL 38, PKL 63, PKL 68	235 mm

Infrared thermometer with fibre optic PKF 26, PKF 36



PA 41.01/PA 41.03

PKS 21.01

PA 41.05/PZ 41.18

electronics

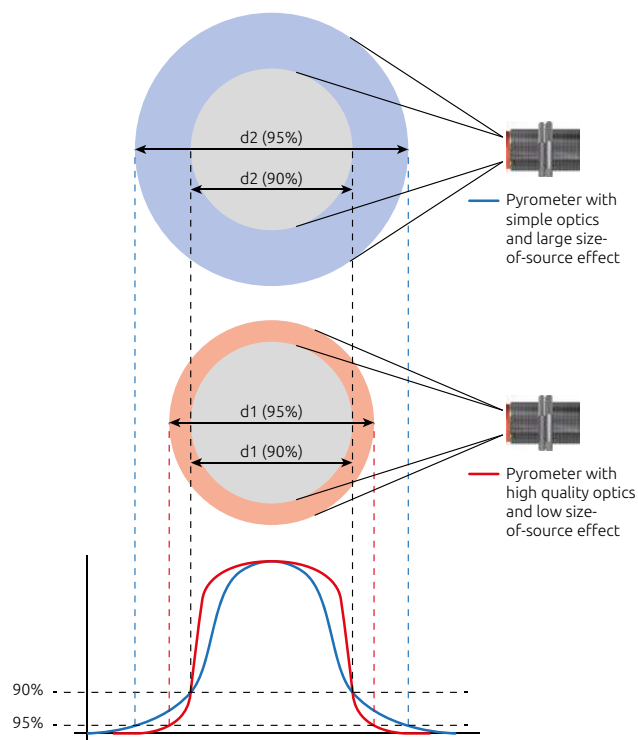
Definition of the measurement field size

The data of the measurement field diameter refers to a percentage of the radiant energy received by the pyrometer. It is necessary to use the same energy reference parameters when comparing the size specification of pyrometer measurement fields.

The higher the quality and the image sharpness of the optical system, the lower are the differences at 90% and at 95% of the received energy when stating the diameter and the smaller is the "size-of-source effect".

As shown in the graph, the values of a received energy of 90% either with a high-quality optical system or with a simple optical system can be comparable. However, with a simple optical system the amount of energy received increases considerably when the target is enlarged. In practice, this is demonstrated by a more or less strong temperature change when measuring different object sizes.

For an individual display of the field of view or for the calculation of the spot size for each of our pyrometers under indication of your special measuring conditions, please use our field of view calculator at www.keller.de/its.



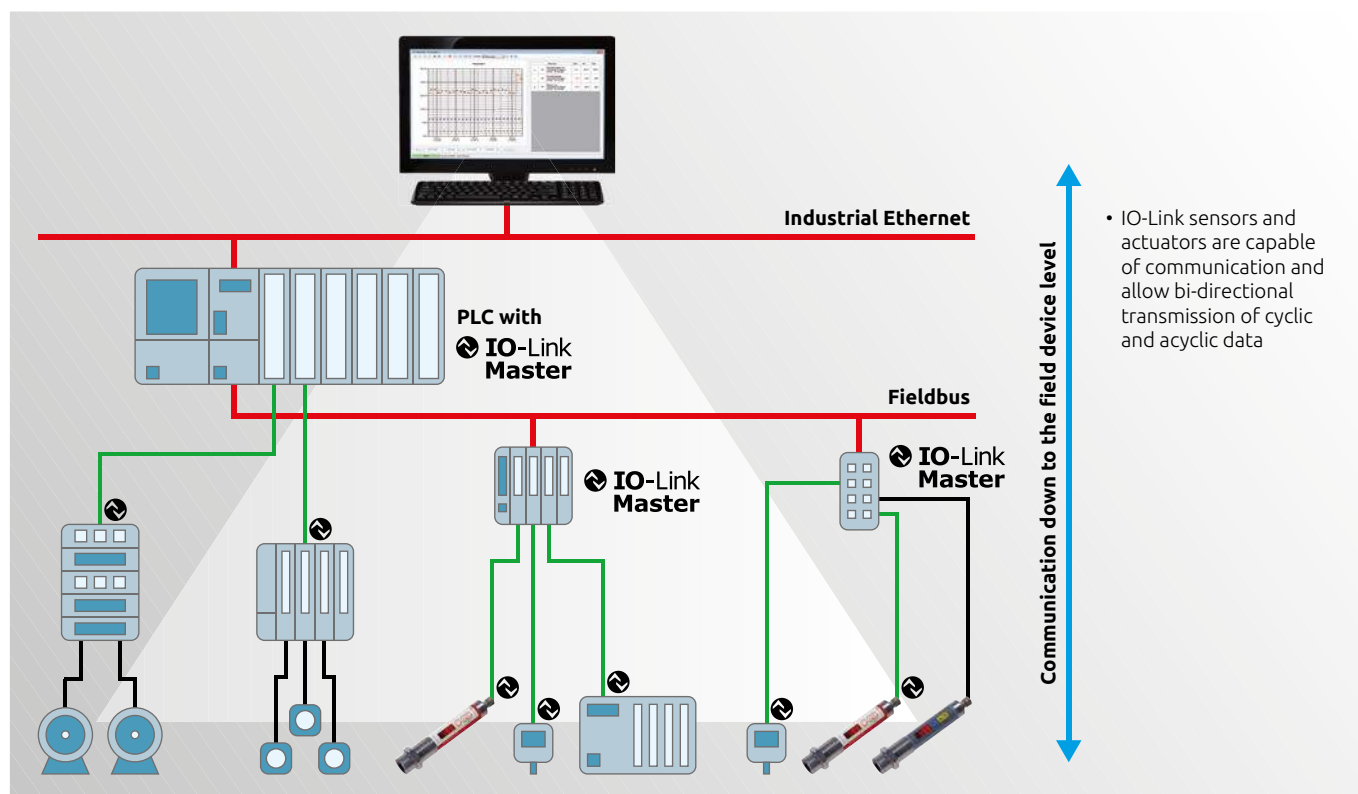
IO Link interface

All devices of the CellaTemp® PK series are equipped with the new IO-Link communication interface according to IEC 61131-9.

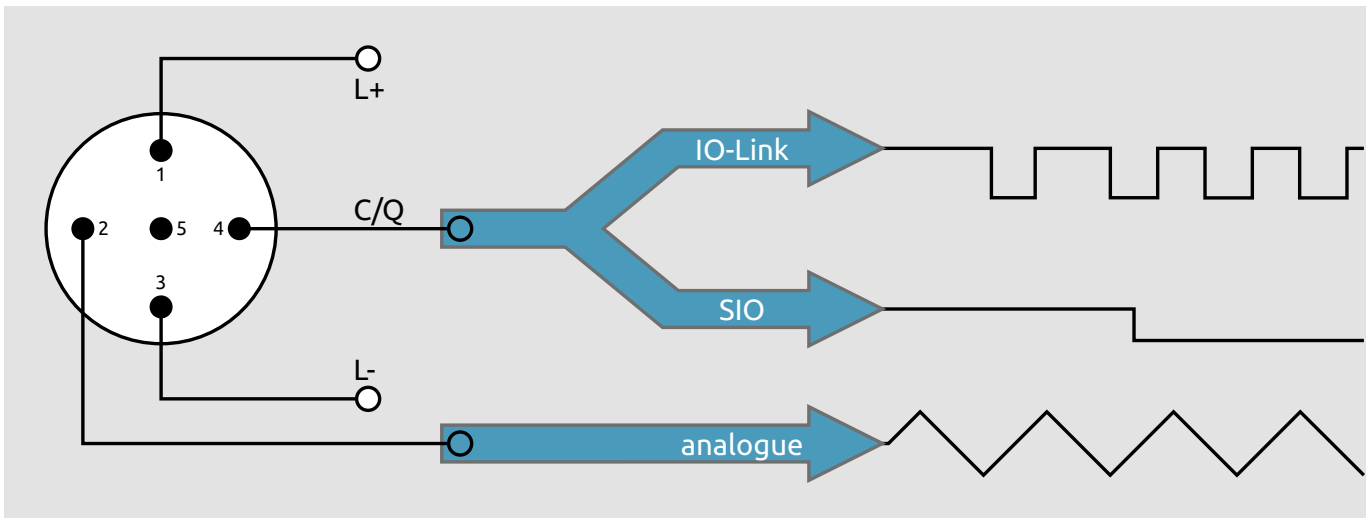
Advantages of the IO-Link interface

- Standardised non-proprietary and field-bus-independent interface
- Cost-effective and simple point-to-point connection with a standard cable

- Low wiring costs
- Setting to work is easy
- Data transmission without interference
- Automatic parameter setting with central data backup
- Full transparency down to the lowest field level
- Systematic diagnostic concepts
- Device exchange by plug & play



IO Link interface



Open systems non-proprietary communication interface

- Internationally recognised standard according to IEC 61131-9
- IO-Link consortium includes all leading control system manufactures
- Uniform description of the communication and device properties in the IODD device description file
- Certified IO-Link hardware components

Simple project planning and integration

- Can be integrated in all common field bus and automation systems
- Fast project planning and simple system documentation
- Any combination of analogue and IO-Link devices in one plant control system
- Downwards compatible – IO-Link devices can also be operated in standard mode (SIO) as conventional sensors with switching or analogue output
- Existing wiring can remain in use

Simple, fast and safe commissioning and maintenance

- Simple point-to-point connection – low wiring costs
- Uniform and “error-free” wiring with standard cables with M12 connectors (plug & play)
- Simple and error-free sensor exchange
 - Incorrect exchanges are avoided thanks to unique device identification in the vendor and device ID.
 - Incorrect settings are avoided as the parameters are stored in the master and are automatically transmitted after a device change
- Predictive maintenance and targeted service operations
- Minimal effort for troubleshooting
- Modern, non-proprietary tools for commissioning
- Minimum variety of types and no large stocks

High working reliability

- Tamper-proof, as incorrect settings can be excluded by the operator
- Immediate, central fault diagnostics (wire breakage, short circuit, etc.)
- Retrieval of diagnostic information for preventive maintenance, repair, and thus reduced risk of failure

Easy parameter setting

- Central parameter setting and storage of configuration data
- Dynamic parameter setting during running production for adaptive plant control during a change of recipes, materials or tools reduces downtimes and increases flexibility and production variety
- Automatic setting of sensor parameters, plug & play after device exchange
- Easy duplication of parameters

Secure integrated digital communication

- Process data, diagnostic data, device information and configuration parameters
- Interference-free transmission (EMC standard) of measured data with 24 V signal and checksum test
- Integrated communication from the lowest field level to the ERP system
- One sensor for several measurement values and switching points
- Worldwide remote maintenance and teleservice down to the lowest field level

Cost savings

- Reduced installation and cabling costs
- No analogue input cards required due to standardised field bus connection groups

Accessories



Shielded cable
VK 02 / L AF 1: 5 m
VK 02 / L AF 2: 10 m



Shielded cable
VK 02/R AF 1: 5 m



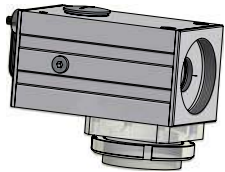
Thermal insulating tube
PS 01/K



Laser pointer
PK 01/E



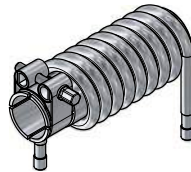
Axial air nozzle
PS 01/A AF 1 (M30)
PS 01/A AF 2 (1 1/4")



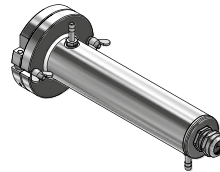
Oscillating mirror
PZ 20 / X AF 5 (± 14.4 °)
PZ 20 / X AF 6 (± 28°)



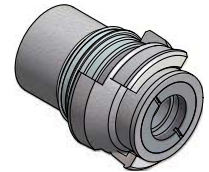
Set of mounting brackets
PS 11/U



Cooling jacket
PK 01/B AF 1



Cooling jacket, sealed
PK 01/C AF 1 (M30)
PK 01/C AF 2 (M65)



Bayonet coupling
PS 11/N AF 4 (G1.1/4")
PS 11/N AF 5 (M30)



90 ° deflection mirror
PS 11/W



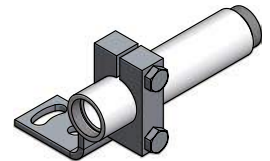
Supplementary tube
Ø 35 mm
ZA 01/Q-35



Intermediate tube
Ø 45 mm
ZA 01/M



Intermediate tube
Ø 35 mm
ZA 01/Q AF 2



Clamping collar
with angle
PS 11/K-35 AF 2



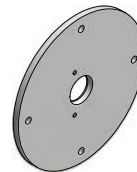
Radiation shield
PA 20/S AF 1



Flange
PS 01/N



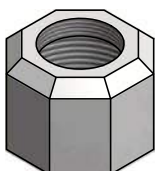
Flange
ZA 01/I



Flange
ZA 01/W



Flange
DN 50



Tube cap
ZA 01/A



Mounting bracket
PS 11/P



Ball flange
ZA 01/D



Supplementary lens
PK 11/E (for PK 11)
PK 21/E (for PK 21/31)
PS 41/E (for PK 41/42)
PS 42/E (for PK 41/42)
PS 27/E AF 1
(for PKL 28/38/68)

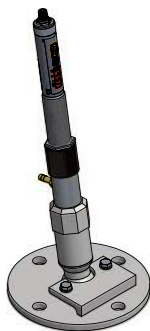


Quartz window
PS 01/I AF 2
Sapphire window
PS 15/I
ZnS window adapter
PS 11/D AF 2

Installation examples

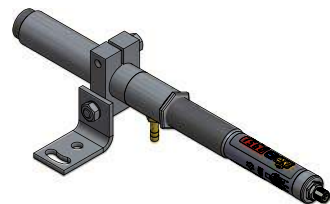
Assembly combination PK 01-006, consisting of:

- Thermal insulation tube PS 01/K
- Air purge PS 01/A
- Tube cap ZA 01/A
- Intermediate tube ZA 01/M
- Dust stop ZA 01/C
- Ball flange ZA 01/D
- Clamp ZA 01/E
- Flange ZA 01/I



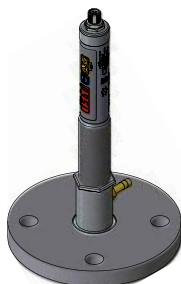
Assembly combination PK 01-007, consisting of:

- Air purge PS 01/A
- Supplementary tube ZA 01/Q-35
- Clamping collar with angle PS 11/K-35 AF2



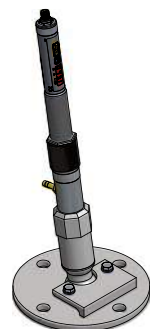
Assembly combination PK 01-011, consisting of:

- Air purge PS 01/A
- Reduction 1 1/4" to M30x1, 5
- DN 50 Flange



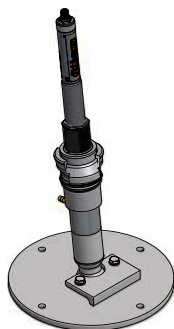
Assembly combination PK 21-001, consisting of:

- Thermal insulation tube PS 01/K
- Quartz window PS 01/I AF2
- Air purge PS 01/A
- Tube cap ZA 01/A
- Intermediate tube ZA 01/M
- Dust stop ZA 01/C
- Ball flange ZA 01/D
- Clamp ZA 01/E
- Flange ZA 01/I



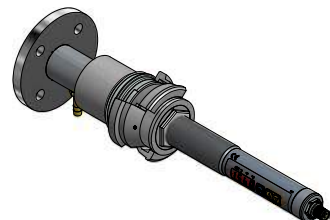
Assembly combination PK 21-002, consisting of:

- Thermal insulating tube PS 01/K
- Bayonet coupling PS 11/N AF4
- Quartz window PS 01/I AF2
- Air purge PS 01/A AF2
- Dust stop ZA 01/C
- Intermediate tube ZA 01/M
- Ball flange ZA 01/D
- Clamp ZA 01/E
- Flange ZA 01/W



Assembly combination PK 21-004, consisting of:

- Quartz window PS 01/I AF2
- Bayonet coupling PS 11/N AF5
- Air purge PS 01/A AF1
- Washer Ø 35 mm
- Flange PK 20/F-70

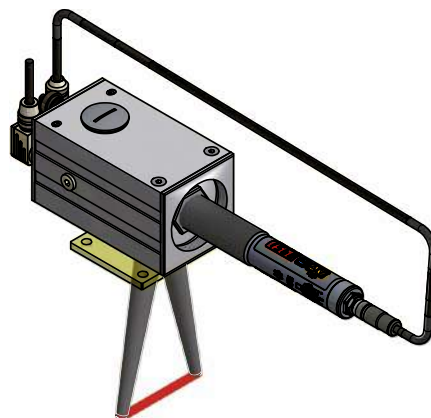
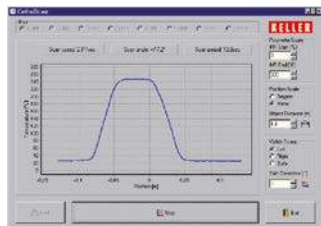


Oscillating mirror PZ 20/X

An oscillating mirror can be mounted in front of the infrared thermometer for periodic diversion of the target area.

The temperature is transmitted via the analogue output or the RS-422 interface of the mirror. The measuring position is additionally transmitted via the interface.

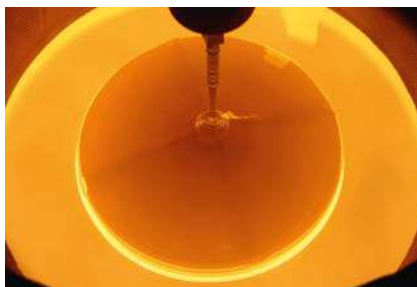
The CellaScan PC software which is supplied with the thermometer shows an online temperature profile.



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.



CellaCast PT

Portable pyrometer for non-contact temperature measurement of molten metal at automated casting machines and blast furnaces.



CellaPort PT

Portable single-colour and two-colour pyrometers with through-the-lens sighting, laser spot light and USB interface.



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.

With its very large product range of more than 250 models and systems KELLER ITS offers solutions for all standard applications and a variety of special measuring tasks.

Following the KELLER philosophy, the key focus in the development and production of the devices is set to the high measuring accuracy and reliability. Therefore, KELLER grants a warranty of 5 years on its products.

A global network of distributors and service points ensures competent and personal consultation on site.





- Headquarters
- Sales and Service Center
- Sales abroad



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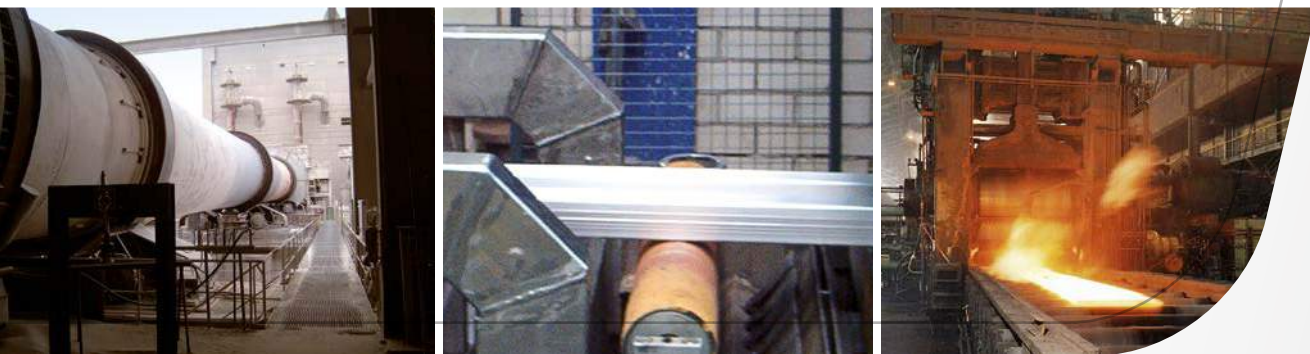
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N°1 in terms of
ACCURACY
RELIABILITY
INNOVATION



Pyrometer CellaTemp® PA

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

Range of models

Compact pyrometer



Pyrometer with fibre optic cable and optical head



Single-colour pyrometer

Model	Temperature range	Application	Shot shape
PA 10	0 - 1000 °C	nonmetals	○
PA 13	500 - 1600 °C	flame heating	○
PA 15	300 - 1300 °C 500 - 2500 °C	glass surfaces	○
PA 17	400 - 2000 °C	hot CO ₂ gas	○
PA 18	500 - 2500 °C	hot combustion gases	○
PA 20	250 - 2000 °C 350 - 2500 °C	metals, ceramics, molten glass	○
PA 28	75 - 650 °C	aluminium; bright, shiny metal surfaces; laser applications	○
PA 29	150 - 800 °C 180 - 1200 °C 250 - 2000 °C	aluminium; bright, shiny metal surfaces; laser applications	○
PA 30	500 - 2500 °C	metals, ceramics, high temperatures	○
PA 35	600 - 3000 °C	precise measurement of metals, semiconductors	○

Single-colour pyrometer

Model	Temperature range	Application
PA 21	300 - 2000 °C	metals, ceramics, molten glass
PA 31	550 - 2500 °C	metals, ceramics, high temperatures
PA 36	650 - 3000 °C	precise measurement of metals, semi- conductors

Two-colour pyrometer

Model	Temperature range	Application	Shot shape
PA 40	500 - 1400 °C	metals, cement, lime, graphite, glass gobs, crystal pulling	○
	650 - 1700 °C		○
	750 - 2400 °C		○
	850 - 3000 °C		○
PA 43	600 - 1400 °C	wires, rods, heating coils, filaments	□
	650 - 1700 °C		□
	750 - 2400 °C		□
	850 - 3000 °C		□
PA 47	700 - 1700 °C	sooty flames	○
PA 50	500 - 1400 °C	metals at low temperatures	○
PA 60	300 - 800 °C	metals at very low temperatures	○

Two-colour pyrometer

Model	Temperature range	Application
PA 41	700 - 1800 °C	metals, cement, lime, graphite, glass gobs, crystal pulling
	800 - 2400 °C	
	900 - 3000 °C	

Pyrometer CellaTemp® PA

Special Features

- Wide measuring ranges with high resolution
- Modular design: Electronics and optionally up to 5 optics
- Focusable optics
- 3 target sighting options: through-the-lens, colour video camera or laser spot light
- 2 analogue outputs, 2 switching outputs, inputs provide versatile configuration options
- Compact models and fibre optic models
- Two-colour and single-colour pyrometers
- Parameters adjustable via control keys
- USB and RS-485 bus interface
- SCM function for dirty window monitoring (two-color pyrometer)
- Option: ATD function (automatic temperature detection)

CellaTemp® PA Series

The CellaTemp® PA Pyrometer Series is based on a modular concept consisting of the following components: optics, sensor and signal processing, data output and target sighting.

The **optical system (1)** comprises one of five available objective lenses. Select the one most suitable, depending on the required target size and measuring distance. The pyrometer is infinitely adjustable to ensure superior precision across a wide focusing range.

The **aperture (2)** determines the shape of the measurement area. As a standard, the pyrometer features a circular measurement spot. As an option, the two-colour pyrometer models can be equipped with a rectangular measurement area.

A **sensor (3)** detects the IR radiation emitted by an object's surface. It is based on the latest DC technology and does not involve any moving parts. Depending on the specific model, CellaTemp® pyrometers are available either in a single-colour version (single wavelength detector) or in a two-colour version (dual wavelength detector).

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

For **measurement data output (5)**, CellaTemp® PA features 2 analogue outputs, a USB interface and a network compatible RS-485 interface as well as two switching outputs.

Three **target sighting (6)** systems are available to facilitate focusing, alignment and indication of spot size: through-the-lens sighting, laser spot light or an integrated video camera.



Analogue outputs

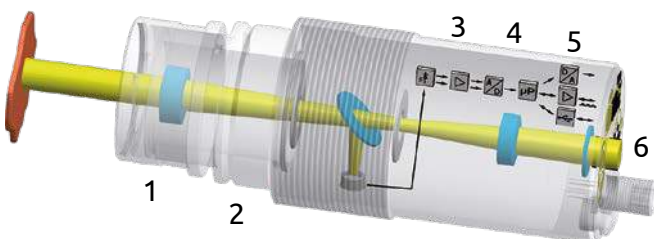
CellaTemp® PA features two analogue outputs which the user can custom configure. Two-colour pyrometers allow you to record the temperatures detected at each of the separate wavebands in addition to the ratio from these two signals (the two-colour temperature). Examining this data affords an analysis of the measured object's emissivity behaviour.

Analogue output 1 can be assigned to the current temperature reading, whereas output 2 can be programmed to perform another signal processing task such as maximum value, average value or to monitor the device's internal temperature.

Analogue input

Alternatively, the second analogue output can be configured as a signal input. This enables remote emissivity adjustment during running operations, either via PLC or when used together with the material selection switch VK 30.01.

Another possible use: to feed in the temperature signal from the radiation emitted by another source (as measured by another sensor). CellaTemp® PA can correct for the effect of this interfering radiation and thus produce readings of the true object temperature.



Switching outputs

CellaTemp® PA's two switching outputs provide a variety of configuration possibilities. They can be assigned to monitor a specific process temperature such as the device's internal temperature.

- The outputs function as a normally open or normally closed contacts
- This results in different application possibilities
- Monitor compliance with configured limit values
- Trigger a status indicator
- Synchronize data communication to the PLC

Switching inputs

Both switching outputs can also be operated as switching inputs for:

- Control memory reset command
- Activate the laser spot light

Data communication

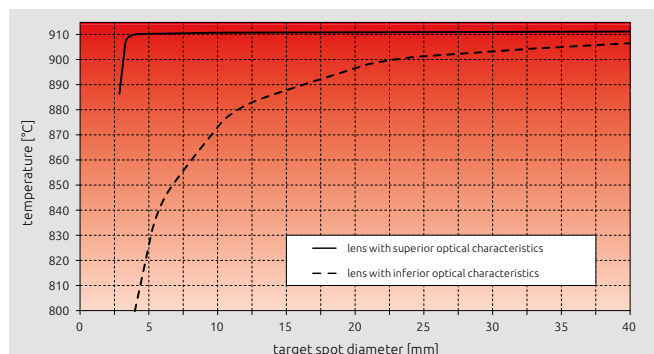
The CellaTemp® PA features a USB interface and a network compatible RS-485 interface to enable remote pyrometer configuration. Beyond that, the RS-485 also provides network communication capabilities and permits long distance data transmission.

Because of its integrated software, the CellaTemp® PA can communicate with all commonly used operating systems at any PC or terminal, regardless of language.

The shipment includes the multilingual software CellaView for remote control, online display of the measurement curve, measurement analysis and storage of measured values.

Optics

A pyrometer is an optical means of measuring temperature. 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 change, as shown in the chart, the temperature reading will change as well, depending on the quality of the optical system.



Influence of the size of the measured object on the temperature display with good and bad error correction of the optics of the pyrometer

CellaTemp® PA pyrometers feature an optical system which is optimized for the visible and infrared range. The superior glass lens features an antireflective coating. Due to its superior imaging properties, the high-precision lens provides consistently high optical resolution across the entire focusing range and a very small „size of source effect“.

In addition, the patented optics and apertures are mechanically designed to minimize sensitivity to light scattered into the sight path, so that the devices measure the same values even at different measuring distances.

Supplementary lenses

The CellaTemp® PA can capture target spots as small as Ø 0.3 mm when an additional lens is mounted.

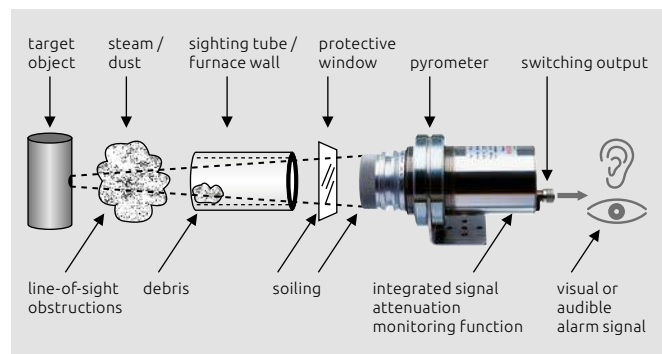
The pyrometer models can be combined with supplementary lenses in a variety of ways, enabling additional optical resolutions for maximum versatility.



Dirty window monitor

Two-colour pyrometers feature SCM (Smart Contamination Monitoring), a function which indicates when the pyrometer lens or the protective quartz window are dirty.

The pyrometer identifies when the emitted IR energy does not completely reach the sensor due to obstructions in the line of sight or dirt buildup in the furnace port hole. The user can adjust the sensitivity of this function to a tolerated amount of signal attenuation.



Indication of field-of-view obstruction

Sighting options for compact models



Through-the-lens

The CellaTemp® PA compact models can be supplied with through-the-lens, parallax-free sighting. The wide field of view makes it easy to focus on the target object. The ocular features a widened interpupillary distance, making it suitable for users who wear glasses or a helmet.



The circle in the viewfinder indicates the exact position and size of the measured target spot. If the target is especially bright, the polarizing filter PA 20/P can be mounted on the lens to protect the user's eye. For devices with a measuring range over 2000 °C, the filter is included as standard.



Laser spot light

The third sighting option available for CellaTemp® PA is an integrated laser spot light. The laser dot marks the center of the target spot and is well visible even from a distance of up to 10 m. The laser is activated either directly by push-button or remote by means of an external switch or via interface.



Video camera

As an option, the pyrometer can be equipped with a built-in colour video camera to view the target. Based on the latest HDR (High Dynamic Range) technology, the camera provides a higher dynamic range from the imaging process and automatic exposure control. The video image appears without over-exposure and glare.

Another special feature is TBC (target brightness control). The light sensitivity adapts dynamically to the target object captured within the measurement spot to produce a high-contrast image of the target, regardless of whether the object focused on is cooler or hotter than the background.

The white balance can be switched to either „automatic“ or „daylight“ mode. The video signal also transmits the measurement data. The temperature reading is superimposed onto the screen. A separate PC is not required.

A video image allows you to observe possible changes in the micro-structure of the measured object relative to temperature. Because the video recording captures the temperature data in conjunction with the visible surface behaviour, it enables in-depth data analysis and process optimisation.

The target marker shown on the screen indicates the exact size of the measuring field. With a resolution of 5.6 µm / pixel, even the tiniest target objects are visible. The video signal is electrically isolated from the supply voltage to prevent noise that may interfere with the image signal. The camera provides reliable performance and a sharp image in ambient temperatures up to 65 °C.



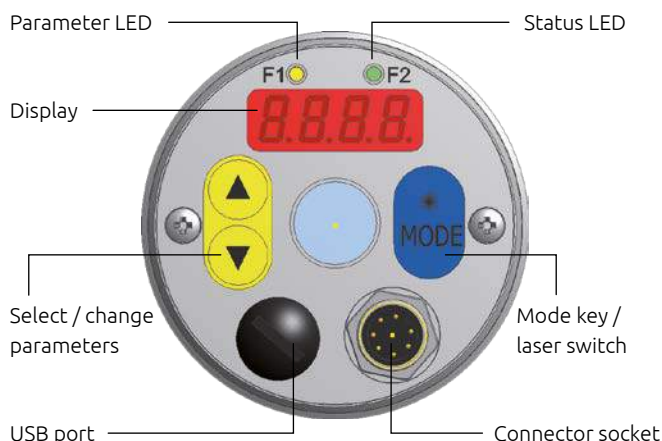
Thanks to the automatic exposure control and the TBC feature, the target always appears in optimum exposure. The temperature reading and the circled target spot are superimposed onto the image.



Without TBC, the light exposure would be averaged over the total illumination. A bright target object in front of a dark background would appear overexposed as shown above.

Control keys

Parameters can be configured during running operations using the rear keypad. The large control keys are easy to access and operate. The brightly lit 8 mm digits on the LED display are visible from a great distance. Two status LEDs can be custom configured to indicate operating conditions.



Adjustable parameters

- Temperature range
- Measured variable and scale of analog input and output signals
- Smoothing filter
- Min/max memory
- Hold time
- Emissivity
- Transmittance
- Background radiation correction
- Alarm contacts (mode and limits)
- ATD function parameters
- Linearization
- Function of LEDs
- Temperature scale °C / °F
- Simulation of current and temperature

In addition, for two-colour pyrometers

- One-colour/two-colour mode
- Signal attenuation threshold level
- Soot factor (at the CellaCombustion PA 47)

In addition, for model with camera

- TBC target brightness control
- White balance

Shipment includes

- Pyrometer CellaTemp® PA
- Connection cable VK 02/A (5 m)*
- Video cable VK 02/F (5 m)* for model with built-in camera
- USB cable VK 11/D (1.8 m)
- CellaView software
- Instruction manual

i * other lengths must be ordered separately

ATD function

ATD (Automatic Temperature Detection) is an optional feature especially useful for temperature control at discontinuous processes.

With ATD, objects moving across the pyrometer's field of view at undefined intervals are automatically detected. Examples include rolled steel slabs at a rolling mill stand or billets discharged from an induction heating system.

With ATD, CellaTemp® PA automatically recognizes a 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 custom configured by the user. At the end of each measurement, a temperature reading is generated for each object.

Diagnostics feature

During setup and running operations, a test current or a temperature can be applied to perform diagnostic and simulation functions.

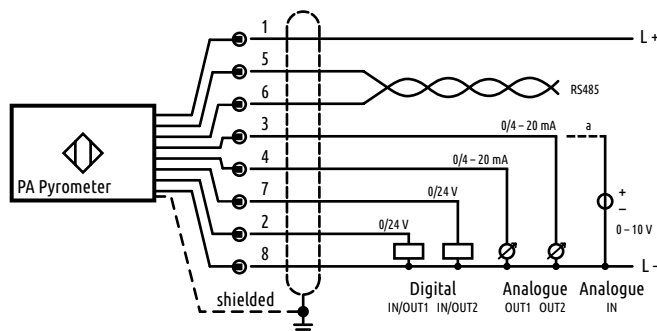
Without requiring a hot object in the field of view, it is possible to test the entire signal path to the transducer and to the control system.

Calibration for tungsten

Due to the physical properties of tungsten, its emissivity changes as a function of its temperature.

For tungsten filament applications, the CellaTemp® PA 40 can be calibrated with a special response curve for the behaviour of tungsten. This calibration option enables the pyrometer to correct for any temperature-induced emissivity changes.

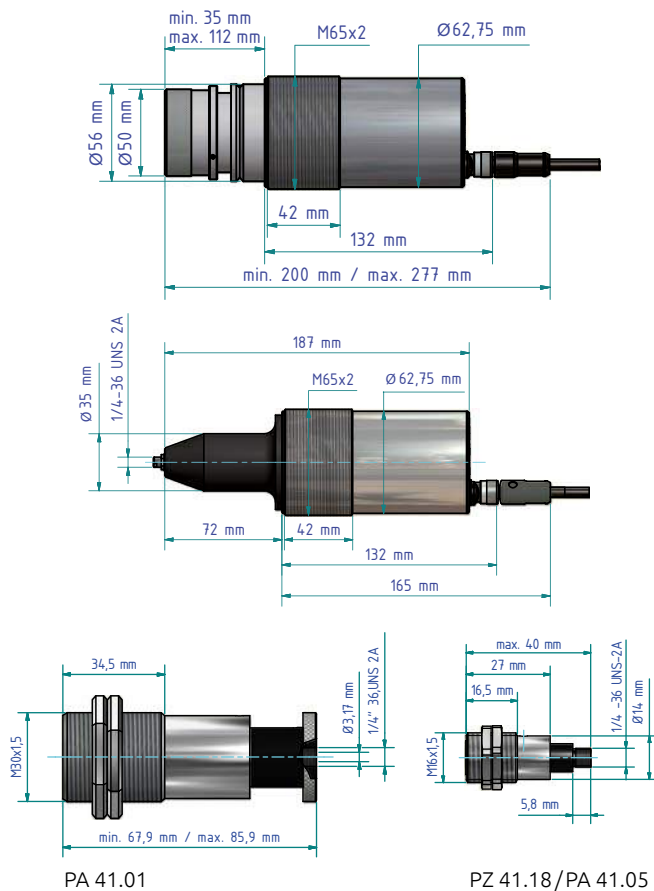
Connection diagram



EMV standard

- EN 61000-6-4
- EN 61000-6-2
- EN 61000-4-2/-3 / -4 / -6
- EN 55011

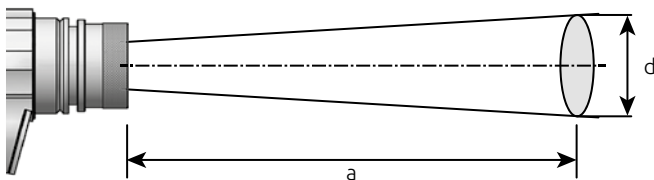
Dimensions



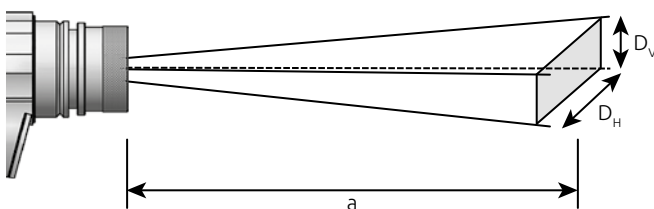
Measuring area

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.



Technical data

Pyrometer

2 Analogue outputs

- 0(4) - 20 mA linear, scalable

Operating voltage

- 24 V DC +10% / -20%

Load

- max. 500 Ω

Current consumption

- ≤ 135 mA
- ≤ 150 mA with laser sighting
- ≤ 175 mA with video camera
- Ripple ≤ 200 mV

Voltage input

- 0 - 10 V linear, scalable

2 Switching outputs

- Open Collector 24 V, ≤ 30 mA

Permissible humidity

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

2 Switching inputs

- to 24 V

Ambient temperature

- 0 - 65 °C (without cooling)

Data communication

- USB
- RS 485
- Integrated user interface

Storage temperature

- -20 - +80 °C

LED Display

- 4-digit (digit height 8 mm)

Housing material

- Stainless steel

Resolution current output

- 0.2 K + 0.03 % of selected range

Protection

- IP65 according to DIN 40050

Resolution temperature reading

- 1 K

Connectivity

- M14 thread, 8-pin connection

Resolution USB / RS 485

- 0.1 K in terminal mode

Weight

- approx. 0.9 kg

Camera specifications

Video signal

- Composite PAL, 1Vpp, 75 Ohm

Screen display

- Target size and position
- Temperature reading

Resolution

- 722 x 576 pixels

Connectivity

- TNC connector

TBC exposure control

- Automatic, across the pyrometer's entire measuring range

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 configuration 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)
- Microsoft SQL Server Compact-based database
- Graphic display, recording and logging of measurement data
- Free selection and combination of the measurement readings and status information of up to 31 devices in one or more diagrams
- 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
- 9 languages selectable

Single-colour pyrometer

Model			Technical data							
Target sighting			Temp. range	Wave-length	Lens system	Focus range	Distance ratio	Response time t ₉₈	Precision*	Repro-ducibil-ity
Through-the-lens	Video camera	Laser spot light								
PA 10 ...	For non-metal materials, such as ceramics, wood, rubber, synthetic materials, textiles, paper									
AF 1	AF 1/C	AF 1/L	0 - 1000 °C 32 - 1832 °F	8 - 14 μm	PZ 10.01	0.30 m - ∞	50 : 1	≤ 30 ms	1 % of reading, min. 2 K based on 30 ms	1 K
AF 2	AF 2/C	AF 2/L			PZ 10.05	0.15 m - 0.30 m	48 : 1			
PA 20 ...	For metallic surfaces, ceramics, liquid glass at medium temperature range									
AF 1	AF 1/C	AF 1/L	250 - 2000 °C 482 - 3632 °F	1.1 - 1.7 μm	PZ 20.01	0.40 m - ∞	175 : 1	≤ 50 ms (T>250 °C) ≤ 2 ms (T>750 °C)	0.3 % of reading, min. 4 K	1 K
AF 2	AF 2/C	AF 2/L			PZ 20.03	0.20 m - 0.40 m	150 : 1			
AF 3	AF 3/C	AF 3/L			PZ 20.06	1.20 m - ∞	275 : 1			
AF 4	AF 4/C	AF 4/L			PZ 20.05	0.20 m - ∞	40 : 1			
AF 9	AF 9/C	AF 9/L			PA 20.06	0.60 m - ∞	380 : 1			
AF 5	AF 5/C	AF 5/L	350 - 2500 °C 662 - 4532 °F		PZ 20.01	0.40 m - ∞	175 : 1			
AF 6	AF 6/C	AF 6/L			PZ 20.03	0.20 m - 0.40 m	150 : 1			
AF 7	AF 7/C	AF 7/L			PZ 20.06	1.20 m - ∞	275 : 1			
AF 8	AF 8/C	AF 8/L			PZ 20.05	0.20 m - ∞	40 : 1			
PA 30 ...	For metallic surfaces, ceramics, liquid glass at high temperature range									
AF 1	AF 1/C	AF 1/L	500 - 2500 °C 932 - 4532 °F	0.78 - 1.06 μm	PZ 20.01	0.40 m - ∞	210 : 1	≤ 50 ms (T>550 °C) ≤ 2 ms (T>750 °C)	0.3 % of reading, min. 4 K	1 K
AF 2	AF 2/C	AF 2/L			PZ 20.03	0.20 m - 0.40 m	200 : 1			
AF 3	AF 3/C	AF 3/L			PZ 20.06	1.20 m - ∞	310 : 1			
AF 4	AF 4/C	AF 4/L			PZ 20.05	0.20 m - ∞	55 : 1			
AF 5	AF 5/C	AF 5/L			PA 20.06	0.60 m - ∞	430 : 1			

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

Pyrometers for special applications

CellaTemp® PA 13



The CellaTemp® PA 13 was especially developed for temperature measurements in flame heated furnaces. Thanks to the selective spectral range of 3.9 μm , water vapour and CO_2 existing in the pyrometer's field of vision have no effect on the measuring results,

even when measuring from large distances. This allows precise measurements through flames and combustion gases.

CellaTemp® PA 15



In the range of 4.6-4.9 μm glass has an emissivity of almost 100%. Above 5 μm , atmospheric influences, such as humidity or water vapour, affect the measurement.

The CellaTemp® PA 15 is provided with a blocking filter with a spectral sensitivity of 4.6-4.9 μm , thus measuring the temperature from the near surface area of the glass. Owing to the wavelength used, changes in thickness, different types of glass or varying moisture contents in the atmosphere do not affect the measurement reading.

CellaCombustion PA 17

The CellaCombustion PA 17 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 PA 18

The CellaCombustion PA 18 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.

CellaTemp® PA 28

The CellaTemp® PA 28 is equipped with a light-intense lens and a special sensor for the reliable low temperature measuring of metals.

CellaTemp® PA 29

CellaTemp® PA 29 was designed with a special band-stop filter and sensor which ignore interfering IR radiation from sources such as daylight or laser beams.

CellaTemp® PA 29 features a response spectrum which is far less sensitive to incidental light reflections from nearby hot objects than most commonly available pyrometers which are responsive at short wavelengths. The individual components and subassemblies can be combined in different ways, yielding 24 instrument variants. In combination with supplementary lenses the CellaTemp® PA 29 can capture target spots as small as $\varnothing 0.3 \text{ mm}$.



Due to the wide temperature ranges and the variety of available optics, the CellaTemp® PA 29 provides maximum versatility. It is suitable for various applications in the metalworking industry, and is ideal for measuring reflective metals and aluminium at low temperatures.

With its band-stop filter, the CellaTemp® PA 29 is highly accurate in capturing the temperature of metal surfaces which are heat-treated by diode, Nd:YAG or CO_2 lasers without being effected by the extremely high laser energy.

CellaTemp® PA 35

The CellaTemp PA 35 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 wavelengths and at higher temperatures. Due to the special wavelength, CellaTemp PA 35 is especially suitable for temperature detection of metals and high-temperature applications. The pyrometer's specific spectral sensitivity is also ideal for the silicon wafer production process. Silicon is transparent at wavelengths $> 1 \mu\text{m}$. Standard pyrometers will see through the silicon surface and detect the temperature of the material behind it.

CellaCombustion PA 47

The CellaCombustion PA 47 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.

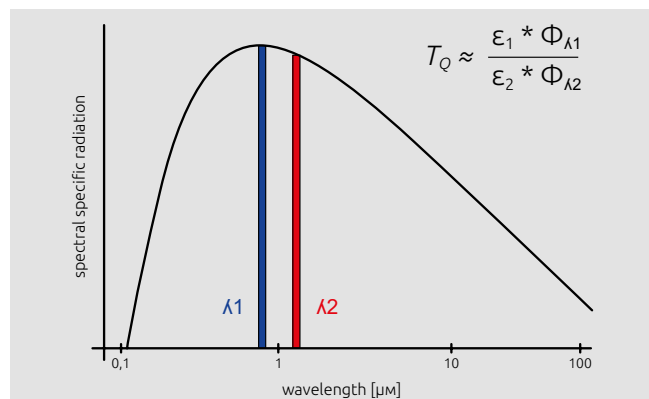
Pyrometers for special applications

Model			Technical data								
Target sighting	Through-the-lens	Video camera	Laser spot light	Temp. range	Wave-length	Lens system	Focus range	Distance ratio	Response time t ₉₈	Precision*	Repro-ducibility
PA 13 ...	For measurements in combustion plants and flame-heated furnaces										
AF 1	AF 1/C	AF 1/L		500 - 1600 °C 932 - 2912 °F	3.9 µm	PZ 15.03	0.80 m - ∞	45 : 1	≤ 100 ms	1 % of reading	2 K
PA 15 ...	For glass surfaces										
AF 1	AF 1/C	AF 1/L		500 - 2500 °C 932 - 4532 °F	4.6 - 4.9 µm	PZ 15.03	0.80 m - ∞	70 : 1	≤ 100 ms	0.75 % of reading	2 K
AF 2	AF 2/C	AF 2/L		300 - 1300 °C 572 - 2372 °F		PZ 15.03	0.80 m - ∞	45 : 1		0.75 % of reading, min. 3 K	
PA 17 ...	For measurements in environments with hot, CO ₂ -containing gases (e.g. in gas-fired boilers and small combustion plants)										
AF 1	AF 1/C	—		400 - 2000 °C 752 - 3632 °F	CO ₂	PZ 15.03	0.80 m - ∞	75 : 1	≤ 100 ms	0.75 % of reading + 1 K	2 K
PA 18 ...	For measurements in environments with hot combustion gases (e.g. in thermal waste-disposal plants and coal power plants)										
AF 1	AF 1/C	—		500 - 2500 °C 932 - 4532 °F	combustion gas	PZ 15.03	0.80 m - ∞	70 : 1	≤ 100 ms	0.75 % of reading	2 K
PA 28 ...	For measurements of aluminium, polished metal surfaces and laser applications										
AF 10	AF 10/C	AF 10/L		75 - 650 °C 167 - 1202 °F	1.8 - 2.4 µm	PZ 20.08	0.30 m - ∞	48 : 1	≤ 200 ms (T>75 °C) ≤ 50 ms (T>100 °C) ≤ 15 ms (T>125 °C) ≤ 2 ms (T>200 °C)	0.75 % of reading, min. 3 K	1 K
PA 29 ...	For measurements of aluminium, polished metal surfaces and laser applications										
AF 10	AF 10/C	AF 10/L		150 - 800 °C 302 - 1472 °F	1.8 - 2.2 µm	PZ 20.08	0.30 m - ∞	48 : 1	≤ 50 ms (T>150 °C) ≤ 15 ms (T>200 °C) ≤ 2 ms (T>350 °C)	0.75 % of reading, min. 5 K	1 K
AF 21	AF 21/C	AF 21/L		180 - 1200 °C 356 - 2192 °F		PZ 20.01	0.40 m - ∞	60 : 1	≤ 75 ms (T>180 °C) ≤ 35 ms (T>200 °C) ≤ 5 ms (T>300 °C) ≤ 2 ms (T>600 °C)		
AF 22	AF 22/C	AF 22/L				PZ 20.03	0.20 m - 0.40 m	56 : 1			
AF 23	AF 23/C	AF 23/L				PZ 20.06	1.20 m - ∞	96 : 1			
AF 1	AF 1/C	AF 1/L		250 - 2000 °C 482 - 3632 °F		PZ 20.01	0.40 m - ∞	210 : 1	≤ 50 ms (T>250 °C) ≤ 2 ms (T>750 °C)	0.5 % of reading, min. 4 K	
AF 2	AF 2/C	AF 2/L				PZ 20.03	0.20 m - 0.40 m	200 : 1			
AF 3	AF 3/C	AF 3/L				PZ 20.06	1.20 m - ∞	310 : 1			
AF 4	AF 4/C	AF 4/L				PZ 20.05	0.20 m - ∞	55 : 1			
PA 35 ...	For the precise measurement of metals, very high temperatures and semiconductors										
AF 1	AF 1/C	AF 1/L		600 - 3000 °C 1112 - 5432 °F	0.82 - 0.93 µm	PZ 20.01	0.40 m - ∞	210 : 1	≤ 50 ms (T>650 °C) ≤ 2 ms (T>850 °C)	0.3 % of reading, min. 4 K	1 K
AF 2	AF 2/C	AF 2/L				PZ 20.03	0.20 m - 0.40 m	200 : 1			
AF 3	AF 3/C	AF 3/L				PZ 20.06	1.20 m - ∞	310 : 1			
AF 4	AF 4/C	AF 4/L				PZ 20.05	0.20 m - ∞	55 : 1			
AF 5	AF 5/C	AF 5/L				PA 20.06	0.60 m - ∞	430 : 1			
PA 47 ...	For the measurement of sooty flames (e.g. in power plants or incineration plants)										
AF 1	AF 1/C	—		700 - 1700 °C 1292 - 3092 °F	0.8/1.05 µm	PZ 20.01	0.40 m - ∞	80 : 1	≤ 20 ms (T>650 °C) ≤ 10 ms (T>750 °C)	1 % of reading	2 K

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

Compact two-colour pyrometer

The two-colour pyrometer detects the infrared radiation emitted from an object's surface at two separate wavelengths. The dual sandwich detector uses a two-element photo-diode to capture both radiation intensities simultaneously from the exact same spot. The pyrometer produces temperature data based on the ratio of these two intensities. 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%. The 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. Even if other sources impair the visibility such as dirt on the pyrometer lens or sediment and debris buildup within the sight tube, it has up to a certain degree no influence on the measurement value. When the signal is equally attenuated at both wavelengths, this will have no impact on the accuracy of the temperature reading. 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 pyrom-

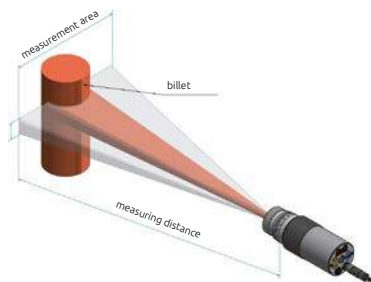


eter is used at a production line which produces a variety of products having different emissivities.

Model			Technical data							
Target sighting			Temp. range	Wave-length	Lens system	Focus range	Distance ratio	Response time t ₉₈	Precision*	Repro-ducibil-ity
Through-the-lens	Video camera	Laser spot light								
PA 40 ...	For use in these industries: steel, ceramics or cement in harsh environments									
AF 20	AF 20/C	AF 20/L	500 - 1400 °C 932 - 2552 °F	0.95/ 1.05 µm	PZ 20.08	0.30 m - ∞	55 : 1	≤ 10 ms (T>650 °C)	1 % of reading	2 K
AF 1	AF 1/C	AF 1/L	650 - 1700 °C 1202 - 3092 °F		PZ 20.01	0.40 m - ∞	80 : 1	≤ 20 ms (T>650 °C) ≤ 10 ms (T>750 °C)		
AF 2	AF 2/C	AF 2/L			PZ 20.03	0.20 m - 0.40 m	75 : 1			
AF 3	AF 3/C	AF 3/L			PZ 20.06	1.20 m - ∞	120 : 1			
AF 10	AF 10/C	AF 10/L			PZ 20.05	0.20 m - ∞	20 : 1			
AF 13	AF 13/C	AF 13/L			PZ 20.08	0,30 m - ∞	55 : 1			
AF 21	AF 21/C	AF 21/L			PA 20.06	0.60 m - ∞	190 : 1			
AF 4	AF 4/C	AF 4/L	750 - 2400 °C 1382 - 4532 °F		PZ 20.01	0.40 m - ∞	150 : 1	≤ 10 ms (T>950 °C)		
AF 5	AF 5/C	AF 5/L			PZ 20.03	0.20 m - 0.40 m	140 : 1			
AF 6	AF 6/C	AF 6/L			PZ 20.06	1.20 m - ∞	240 : 1			
AF 11	AF 11/C	AF 11/L			PZ 20.05	0.20 m - ∞	35 : 1			
AF 14	AF 14/C	AF 14/L			PZ 20.08	0,30 m - ∞	100 : 1			
AF 22	AF 22/C	AF 22/L			PA 20.06	0.60 m - ∞	370 : 1			
AF 7	AF 7/C	AF 7/L	850 - 3000 °C 1562 - 5432 °F		PZ 20.01	0.40 m - ∞	150 : 1	≤ 10 ms (T>1050 °C)		
AF 8	AF 8/C	AF 8/L			PZ 20.03	0.20 m - 0.40 m	140 : 1			
AF 9	AF 9/C	AF 9/L			PZ 20.06	1.20 m - ∞	240 : 1			
AF 12	AF 12/C	AF 12/L			PZ 20.05	0.20 m - ∞	35 : 1			
AF 15	AF 15/C	AF 15/L			PZ 20.08	0,30 m - ∞	100 : 1			
AF 18	AF 18/C	AF 18/L			PA 40.01	86 mm - 115 mm	250 : 1			
AF 23	AF 23/C	AF 23/L			PA 20.06	0.60 m - ∞	370 : 1			
PA 50 ...	For measurements of materials with varying emissivity									
AF 1	AF 1/C	AF 1/L	500 - 1400 °C 932 - 2552 °F	0.95/ 1.55 µm	PZ 20.01	0.40 m - ∞	80 : 1	≤ 30 ms	1 % of reading	2 K
AF 2	AF 2/C	AF 2/L			PZ 20.03	0.20 m - 0.40 m	75 : 1			
AF 3	AF 3/C	AF 3/L			PZ 20.06	1.20 m - ∞	120 : 1			
AF 4	AF 4/C	AF 4/L			PZ 20.05	0.20 m - ∞	20 : 1			
PA 60 ...	For measurements at low temperatures from 300 °C									
AF 1	AF 1/C	AF 1/L	300 - 800 °C 572 - 1472 °F	1.5/ 1.9 µm	PZ 20.08	0.30 m - ∞	39 : 1	≤ 30 ms	1 % of reading	2 K
AF 11	AF 11/C	AF 11/L	400 - 1000 °C 752 - 1832 °F		PZ 20.01	0.40 m - ∞	60 : 1			

*(at ε = 1 and Ta = +23 °C)

Panorama pyrometer® with rectangular measurement area



The CellaTemp® PA 43, a panorama pyrometer®, features a rectangular measurement area. The unique design enables the pyrometer to detect the temperature of target objects which move within the rectangular area. This is accomplished without requiring any moving parts.

The CellaTemp® PA 43 reliably captures objects which typically show fluctuating behaviour (such as swaying wires). The rectangular area is also ideal when measuring objects whose position tends to vary during the production process. Such objects include billets or metal rods at a roller table.

A rectangular measurement field simplifies pyrometer alignment and focusing in applications which involve small measurement objects. The pyrometer models can be combined with supplementary lenses for very small targets such as filaments.

Model			Technical data							
Target sighting			Temp. range	Wave-length	Lens system	Focus range	Distance ratio	Response time t ₉₈	Precision*	Repro-ducibil-ity
Through-the-lens	Video camera	Laser spot light								
PA 43 ...	For use in these industries: steel, ceramics, or cement in harsh environments									
AF 20	AF 20/C	AF 20/L	600 - 1400 °C 1112 - 2552 °F		PZ 20.08	0.30 m - ∞	D _v = 150 : 1 D _h = 30 : 1	≤ 10 ms (T>650 °C)		
AF 1	AF 1/C	AF 1/L			PZ 20.01	0.40 m - ∞	D _v = 230 : 1 D _h = 45 : 1	≤ 10 ms (T>750 °C)		
AF 2	AF 2/C	AF 2/L			PZ 20.03	0.20 m - 0.40 m	D _v = 215 : 1 D _h = 40 : 1			
AF 3	AF 3/C	AF 3/L			PZ 20.06	1.20 m - ∞	D _v = 375 : 1 D _h = 75 : 1			
AF 10	AF 10/C	AF 10/L			PZ 20.05	0.20 m - ∞	D _v = 55 : 1 D _h = 10 : 1			
AF 13	AF 13/C	AF 13/L			PZ 20.08	0.30 m - ∞	D _v = 150 : 1 D _h = 30 : 1			
AF 21	AF 21/C	AF 21/L			PA 20.06	0.60 m - ∞	D _v = 500 : 1 D _h = 95 : 1			
AF 4	AF 4/C	AF 4/L	750 - 2400 °C 1382 - 4532 °F	0.95/ 1.05 μm	PZ 20.01	0.40 m - ∞	D _v = 350 : 1 D _h = 50 : 1	≤ 10 ms (T>950 °C)	1.5 % of reading	3 K
AF 5	AF 5/C	AF 5/L			PZ 20.03	0.20 m - 0.40 m	D _v = 330 : 1 D _h = 45 : 1			
AF 6	AF 6/C	AF 6/L			PZ 20.06	1.20 m - ∞	D _v = 580 : 1 D _h = 85 : 1			
AF 11	AF 11/C	AF 11/L			PZ 20.05	0.20 m - ∞	D _v = 85 : 1 D _h = 11 : 1			
AF 14	AF 14/C	AF 14/L			PZ 20.08	0.30 m - ∞	D _v = 230 : 1 D _h = 34 : 1			
AF 17	AF 17/C	AF 17/L			PA 40.01	86 mm - 115 mm	D _v = 380 : 1 D _h = 80 : 1			
AF 22	AF 22/C	AF 22/L			PA 20.06	0.60 m - ∞	D _v = 730 : 1 D _h = 105 : 1			
AF 7	AF 7/C	AF 7/L	850 - 3000 °C 1562 - 5432 °F		PZ 20.01	0.40 m - ∞	D _v = 350 : 1 D _h = 50 : 1	≤ 10 ms (T>1050 °C)		
AF 8	AF 8/C	AF 8/L			PZ 20.03	0.20 m - 0.40 m	D _v = 330 : 1 D _h = 45 : 1			
AF 9	AF 9/C	AF 9/L			PZ 20.06	1.20 m - ∞	D _v = 580 : 1 D _h = 85 : 1			
AF 12	AF 12/C	AF 12/L			PZ 20.05	0.20 m - ∞	D _v = 85 : 1 D _h = 11 : 1			
AF 15	AF 15/C	AF 15/L			PZ 20.08	0.30 m - ∞	D _v = 230 : 1 D _h = 34 : 1			
AF 18	AF 18/C	AF 18/L			PA 40.01	86 mm - 115 mm	D _v = 380 : 1 D _h = 80 : 1			
AF 23	AF 23/C	AF 23/L			PA 20.06	0.60 m - ∞	D _v = 730 : 1 D _h = 105 : 1			

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

Single-colour / two-colour fibre optics pyrometer



A pyrometer with fibre optics has the sensor head housed separately from the electronics assembly. A fibre optic cable transmits the detected infrared energy to the electronics. The optical sensor head can withstand ambient temperatures up

to 250 °C without cooling. Both the sensor head and the fibre optic cable are unsusceptible to electromagnetic radiation. Pyrometers with fibre optics are ideal for cramped, hard-to-access locations. Three different focusable optical heads are available. Select the one most suitable, depending on the required target size and measuring distance.

For target sighting and focussing, the pyrometer features a built-in laser spot light. Laser sighting can be activated either by remote switch, using the control keys on the instrument, or via interface.

The optical fibre can be supplied at a length of up to 50 m, ensuring that the electronics can be installed at a safe distance. The fibre optic cable is equipped with a screw connector at each end to ease installation and detachment. Metallic armouring provides the optical fibre with a high degree of mechanical protection.



PA 41.../V devices with two optical fibers and vacuum feedthrough

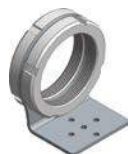
Model	Technical data									
Type	Temp. range	Wave-length	Lens system	Focus range	Distance ratio	Method	Response time t ₉₈	Precision*	Reproducibility	
PA 21 ...	For metallic surfaces, ceramics, liquid glass at medium temperature range									
AF 11	300 - 2000 °C 572 - 3632 °F	1.1 - 1.7 μm	PA 41.01	0.20 m - ∞	180 : 1	single-colour	≤ 50 ms (T>300 °C)	0.75 % of reading, min. 4 K	2 K	
AF 21			PZ 41.05	0.12 m - ∞	100 : 1		≤ 2 ms (T>800 °C)			
AF 22			PZ 41.18	33 mm - 45 mm	50 : 1					
AF 901	450 - 2500 °C 842 - 4532 °F	PA 41.02	0.50 m - ∞	320 : 1	≤ 50 ms (T>450 °C) ≤ 2 ms (T>900 °C)					
PA 31 ...	For metallic surfaces, ceramics, liquid glass at high temperature range									
AF 11	550 - 2500 °C 1022 - 4532 °F	0.78 - 1.06 μm	PA 41.01	0.20 m - ∞	190 : 1	single-colour	≤ 50 ms (T>600 °C)	0.75 % of reading	2 K	
AF 21			PZ 41.05	0.12 m - ∞	100 : 1		≤ 2 ms (T>800 °C)			
AF 22			PZ 41.18	33 mm - 45 mm	50 : 1					
AF 901	700 - 3000 °C 1292 - 5432 °F	PA 41.02	0.50 m - ∞	340 : 1	≤ 50 ms (T>750 °C) ≤ 2 ms (T>950 °C)					
PA 36 ...	For the precise measurement of metals, very high temperatures and semiconductors									
AF 11	650 - 3000 °C 1202 - 5432 °F	0.82 - 0.93 μm	PA 41.01	0.20 m - ∞	190 : 1	single-colour	≤ 50 ms (T>680 °C)	0.75 % of reading	2 K	
AF 21			PZ 41.05	0.12 m - ∞	100 : 1		≤ 2 ms (T>900 °C)			
AF 22			PZ 41.18	33 mm - 45 mm	50 : 1					
PA 41 ...	For use in these industries: steel, ceramics or cement in harsh environments									
AF 211	700 - 1800 °C 1292 - 3272 °F	0.95 - 1.05 μm	PA 41.01	0.20 m - ∞	110 : 1	two-colour	≤ 20 ms (T>850 °C)	1.5 % of reading	3 K	
AF 221			PZ 41.05	0.12 m - ∞	50 : 1					
AF 222			PZ 41.18	33 mm - 45 mm	36 : 1					
AF 222/V			PZ 41.18	33 mm - 45 mm	36 : 1					
AF 11	800 - 2400 °C 1472 - 4352 °F		PA 41.01	0.20 m - ∞	190 : 1					≤ 20 ms (T>950 °C)
AF 21			PZ 41.05	0.12 m - ∞	100 : 1					
AF 22			PZ 41.18	33 mm - 45 mm	50 : 1					
AF 22/V			PZ 41.18	33 mm - 45 mm	50 : 1					
AF 111	900 - 3000 °C 1652 - 5432 °F		PA 41.01	0.20 m - ∞	190 : 1					≤ 20 ms (T>1050 °C)
AF 111/V			PA 41.01	0.20 m - ∞	190 : 1					
AF 121			PZ 41.05	0.12 m - ∞	100 : 1					
AF 122			PZ 41.18	33 mm - 45 mm	50 : 1					
AF 901	1100 - 3000 °C 2012 - 5432 °F		PA 41.02	0.50 m - ∞	340 : 1					≤ 20 ms (T>1350 °C)

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

Accessories



Shielded cable
VK 02/A AF 1: 5 m
VK 02/A AF 2: 10 m
VK 02/A AF 3: 20 m



Mounting bracket
with 2 shaft nuts
PA 11/U



Mounting angle,
adjustable
PA 11/K



Clamping collar
PZ 20/L: Ø 70 mm
PZ 20/N: Ø 65 mm



Pedestal mount
PB 08/K



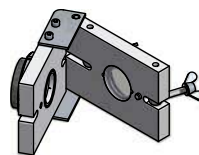
Air purge
PZ 20/A



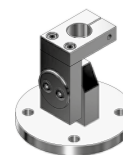
ZnS window PA 10/I
Sapphire window PA 15/I
Quartz window PA 20/I



Quick connector with window
PA 10/C (ZnS)
PA 15/C (Sapphire)
PA 20/C (Quartz)



Window with hinge
PZ 10/I (ZnS)
PZ 15/I (CaF₂)
PZ 20/I (Quartz)



Mounting with flange
PB 08/Q AF1 (Mounting)
PB 08/R AF1 (Flange)



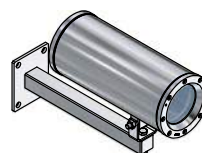
Illumination ring
PZ 10/P



Ball flange
PB 08/I



Intermediate tube
PZ 20/C



Ex proof enclosure
PZ 40/N AF1



Protective enclosure,
open PA 40/B



Protective enclosure
closed PA 40/M



Cooling jacket, open
PA 20/B



Cooling jacket, closed
PA 20/M



Cooling jacket PA 20/M
AF2 for pyrometer
with camera



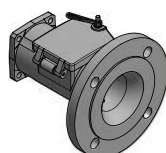
Supplementary lens
PZ 20/O



Protective glass
PZ 10/I AF 1 (ZnS)
70146 (Quartz)



Junction box with
material selection switch
VK 30.01



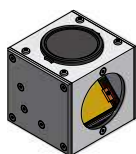
Flange tube
PB 08/M AF1



Fan
PB 08/F AF4



Connection head
PB 08/N



Mirror attachment 90°
PA 20/E



Dust stop
PZ 10/T (35 mm)
PZ 20/T (20 mm)



Intermediate tube
with socket
PZ 40/C



Intermediate tube
PZ 20/J



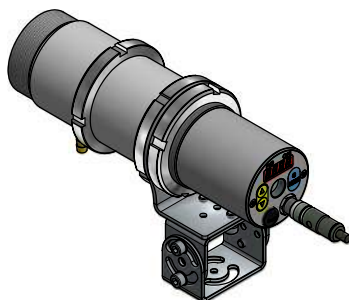
Flange
PZ 20/F

Mountings

Mounting PA 20-006

consisting of:

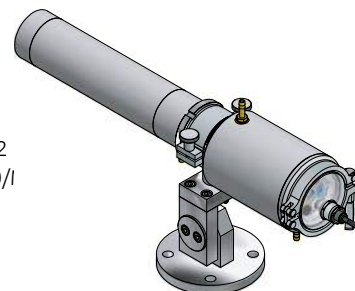
- Air purge PZ 20/A
- Intermediate tube PZ 20/J
- Mounting bracket PA 11/U
- Mounting angle, adjustable PA 11/K



Mounting PA 83-010 for pedestal mount

consisting of:

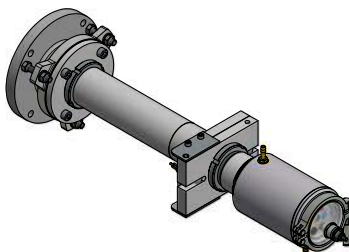
- Dust stop PZ 10/T
- Intermediate tube PZ 20/C
- Air purge PZ 20/A
- Clamping collar PZ 20/L AF 2
- Cooling jacket, closed PA 20/I
- Hose nozzle G1/8"
- Mounting PB 08/Q AF 1
- Flange PB 08/R AF 1



Mounting PA 20-027 for furnace installation

consisting of:

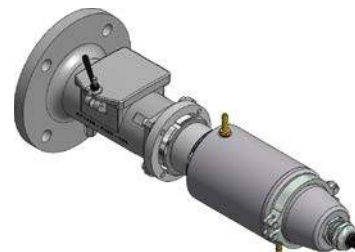
- Cooling jacket PA 20/M AF 1
- Quartz window with hinge PZ 20/I
- Air purge PZ 20/A
- Intermediate tube PZ 20/C
- Mounting flange PZ 20/F
- Dust stop PZ 20/S
- Ball flange PB 08/I



Mounting PA 20-077 for hot blast stoves

consisting of:

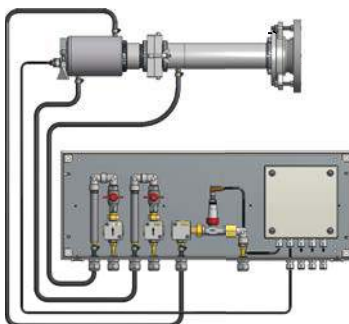
- Cooling jacket, closed PA 20/M AF 2
- Flange PB 08/O
- Flange tube PB 08/M AF 1



Mounting PA 20-065 for compressed air for the cement industry

consisting of:

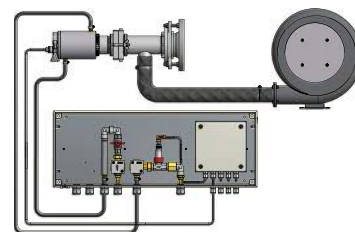
- Cooling jacket PA 20/M AF 1
- Quartz window with hinge PZ 20/I
- Air purge PZ 20/A
- Intermediate tube PZ 20/C
- Flange PZ 20/F
- Dust stop PZ 20/S
- Ball flange PB 08/I
- Hose clamp 10-16 mm
- Industrial hose GP40
- Mounting plate in wall housing SK 613 with flow monitor



Mounting PA 20-066 fan air for the cement industry

consisting of:

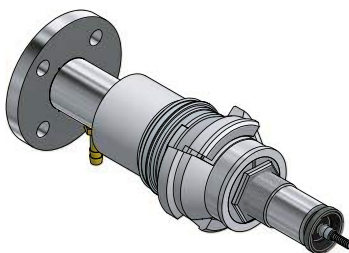
- Cooling jacket PA 20/M AF 1
- Quartz window with hinge PZ 20/I
- Intermediate tube with socket PZ 40/C
- Flange PZ 20/F
- Ball flange PB 08/I
- Fan PB 08/F AF 3
- Aluminium hose PB 08/L
- Hose clamps 10-16 mm and 50-70 mm
- Industrial hose GP40
- Mounting plate in wall housing SK 749 with flow monitor



Mounting of the fibre optics version PA 21-001 for furnace installation

consisting of:

- Quartz window PS 01/I AF 2
- Bayonet coupling PS 11/N AF 5
- Air purge PS 01/A AF 1
- Shim Ø 35 mm
- Flange PS 01/N



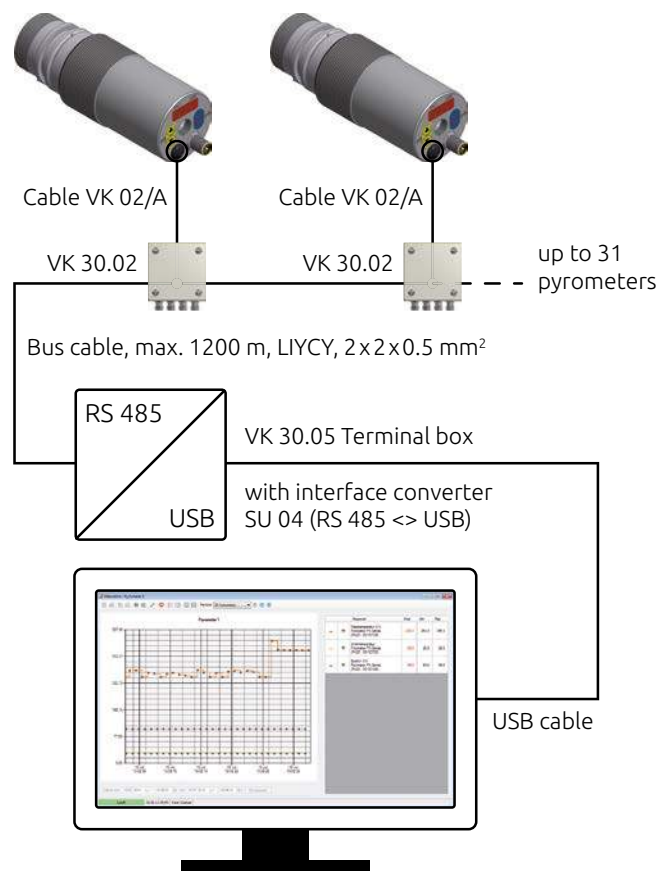
Mounting PA 20-004 with oscillating mirror for pedestal mount

consisting of:

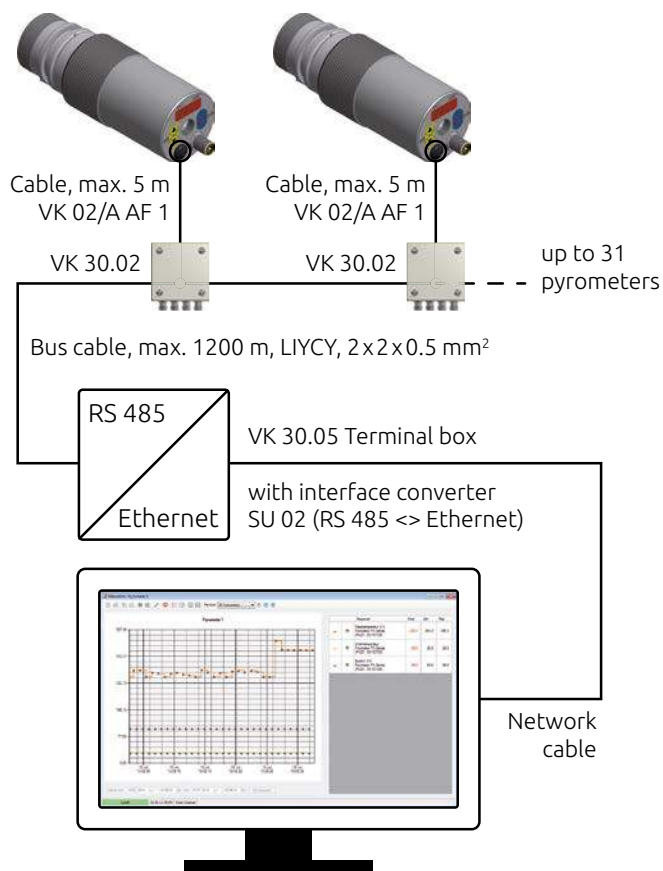
- Cable VK 01/X
- Oscillating mirror PZ 20/X AF 6
- Intermediate tube PZ 20/J
- Clamping collar PZ 20/L AF 2
- Cable VK 01/Y AF 3
- Pedestal mount PB 08/K AF 2



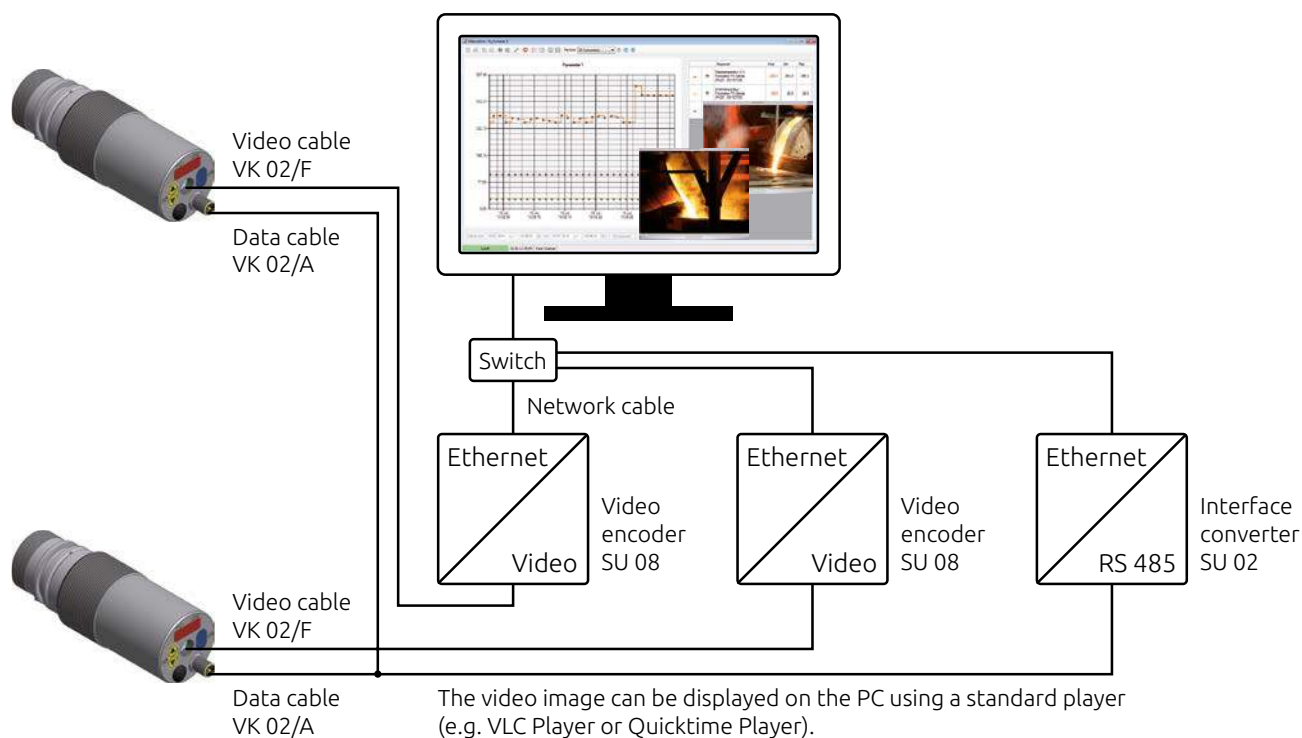
Networking and communication via the USB interface



Networking and communication via Ethernet interface



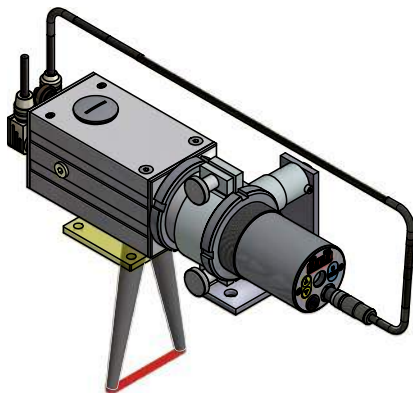
Networking, communication and video transmission via Ethernet



Special Accessories

Oscillating mirror PZ 20/X

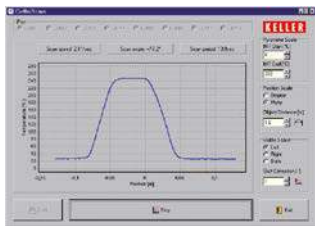
An oscillating mirror with scanner function can be mounted to a CellaTemp® PA pyrometer. The measurement field is deflected to capture the target object. Use the analogue output in conjunction with a RS-422 interface to collect temperature readings together with target position.



With the PZ/20 X you can:

- Detect „hot spots“ at belt conveyors
- Capture swaying wires
- Generate temperature profiles of sheet metals and steel slabs
- Measure the temperature of objects at a roller table whose size and position are not constant

The PZ 20/X accessory is supplied with CellaScan software to generate graphic images showing temperature data plotted against the scan angle.

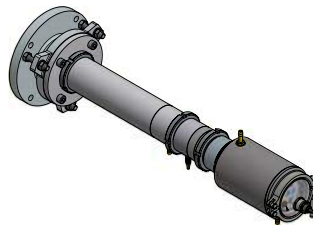


Illumination ring PZ 10/P



In dark furnaces, it is often impossible to see the target. Installing an auxiliary light source in a second porthole can be quite difficult and costly. Thus, in actual practice, pyrometers are often focused at the target only at the time of installation. Verification of correct focusing during running operations will not be possible.

The PZ 10/P illuminates the target spot in a closed furnace, utilizing the same furnace opening in which the pyrometer is installed. This built-in accessory is part of the pyrometer's mounting assembly.



The illumination ring helps you align and focus the pyrometer to the measurement spot at the time of initial setup. What's more, this accessory lets you view the target area anytime later, such as during routine spot checks, and make adjustments if necessary.



When used in conjunction with a pyrometer featuring a built-in video camera, you can view a live image of the illuminated target at a control room monitor.

Display unit DA 230

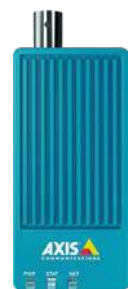
- Input: 0(4)–20 mA / 0(2)–10 V
- Thermocouples type K, S, J, T
- PT 100
- Analogue output: 0(4)–20 mA
- User-configurable ranges
- Panel mounting: 48 x 96 mm
- Supply voltage: 115–230 V/50–60 Hz
- Source voltage: 24 V DC
- RS-485 interface
- Data communication in ASCII format
- CellaMevis software for online imaging and archiving of temperature data



Interface converter / Video encoder



Interface converter SU 04
RS 485 <-> USB



Video encoder SU 08
Video <-> Ethernet

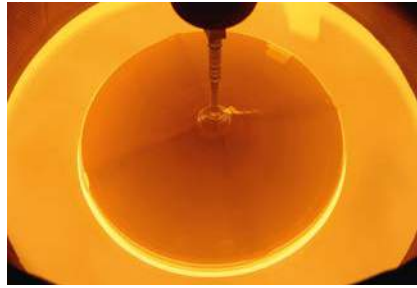


Interface converter SU 02
RS 485 <-> Ethernet

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



CellaPort PT

Portable single-colour and two-colour pyrometers with through-the-lens sighting, laser spot light and USB interface.



CellaCast PT

Portable pyrometer for non-contact temperature measurement of molten metal at automated casting machines and blast furnaces.



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.

With its very large product range of more than 250 models and systems KELLER ITS offers solutions for all standard applications and a variety of special measuring tasks.

Following the KELLER philosophy, the key focus in the development and production of the devices is set to the high measuring accuracy and reliability. Therefore, KELLER grants a warranty of 5 years on its products.

A global network of distributors and service points ensures competent and personal consultation on site.





- Headquarters
- Sales and Service Center
- Sales abroad



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KELLER

infrared
temperature
solutions

ITS



No 1

in terms of
ACCURACY
RELIABILITY
INNOVATION



Pyrometer CellaCast PA 80/PT 180

for non-contact temperature measurement
in the production of liquid metals

Pyrometer CellaCast PA 80/PT 180

Special features

- Maintenance-free, wear-free measuring system
- Temperature range: 750 – 2400 °C
- CSD filter to determine the correct temperature of the melt despite the presence of slag and oxides
- High optical resolution for safe measurement of the melt from a long distance
- Dual wavelength technique yields accurate readings despite smoke or dust in the sight path
- ATD function for automatic temperature detection
- Through-the-lens sighting, laser spot light or use of a video camera for perfect alignment and monitoring of the field of view
- Very large and bright LED display
- RS 485 bus interface to connect multiple units
- CellaView software for on-time presentation and logging of the measurement values

Range of models

Stationary pyrometer CellaCast PA 80



Portable pyrometer CellaCast PT 180



Model				Technical data				
stationary			portable					
Sighting device				Temperature range	Lens system	Focus range	Distance ratio	Measuring field
Through-the-lens	Video camera	Laser spot light	Through-the-lens					
PA 80 ...				PT 180 ...				
AF 4	AF 4/C	AF 4/L	AF 4	750 - 2400 °C 1382 - 4352 °F	PZ 20.01	0.40 m - ∞	150 : 1	○
AF 6	AF 6/C	AF 6/L	AF 6		PZ 20.06	1.20 m - ∞	240 : 1	○

Measurement of molten metals

Temperature is one of the most critical process parameters affecting the resulting quality, strength and working properties of a metal casting. Molten metal which is too hot will damage the sand moulds. A temperature which is too low will result in low fluidity.

Especially complex and thin-walled cast metal parts demand precisely controlled casting temperatures. A molten mass which is not hot enough will exhibit poor metal flow within the complex passages of the mould and may result in bubbles or cavities. Strict compliance with process parameters is therefore of utmost importance – and this requires precise temperature monitoring and control already during the production of the molten metal in the runner of the blast furnace, cupola furnace or pressurized pouring systems.

The temperature of molten metal is most commonly measured using immersion probes periodically. The probe is dipped into the liquid metal in the melting furnace or after the ladle is filled, that is before casting even begins. That does not enable a constant monitoring of the temperature. Data accuracy is subject to the precision with which the foundry operator performs the measurement. Depending on the immersion depth and the position of the probe, temperature readings can deviate.

At fully automated casting machines, temperature is commonly controlled by infrequent immersion of the probe into the melt. At semi-automated operations, the temperature of the liquid metal is usually only measured once for each newly filled ladle. The thermocouple is dipped into the ladle before pouring begins, that is, before the molds are filled. Depending on the number of castings poured from one ladle, there may be a considerable time offset between ladle temper-



ature measurement and the last mold filled from the content of that ladle. The ladle operator decides how many castings can be poured from one ladle, basing his decision on the flow behavior of the melt and his empirical knowledge of heat loss and cooling time. Actual temperature tests using measurement instrumentation – to assure that the required process temperature is maintained right down to the last filled mold – is rarely performed.

A pyrometer can detect the temperature of the running smelting continuously and at the crucial moment in the casting process: just as the mould is being filled. This makes it possible to react immediately to changes in temperature and to establish constant production conditions. Measuring with pyrometers ensures full temperature control of each single workpiece.

A pyrometer has no parts subject to wear and tear, therefore a foundry does not incur any operating costs for expendable parts. The immersion method is subject to wear on parts.

How it works

The CellaCast pyrometer is an optical non-contact temperature measurements device. It detects the infrared radiation emitted from an object and determines the temperature from these values. The optical system is designed to measure the radiation within a defined field of view. Depending on the size of the measuring object and the selection of the optical system, the CellaCast covers measuring distances of up to several metres.

The problem of non-contact temperature detection is the development of slag and oxide on the molten metal surface. Changes to the surface characteristics will change the radiation properties. To



achieve reliable and accurate temperature data, it is essential that a pyrometer only detects and processes the infrared radiation from the surface which is free of oxides and slag. The CSD function (Clean Surface Detection) of CellaCast ignores the slag and oxides floating on the surface and filters out the temperature detected from the pure liquid metal.

Different alloys (e.g. iron, steel, SG iron, grey iron) will feature slightly different infrared radiation properties. The specific emissivity can be determined by performing a comparison measurement using a thermocouple. This material constant is then set at the pyrometer.

The CellaCast's signal detection is based on the two-colour measuring principle. This means that the infrared radiation is measured simultaneously at two wavelengths. The temperature received is the calculated ratio of these two radiances. Due to the ratio principle, the CellaCast is also considerably more insensitive to interfering factors such as dust, vapour or smoke obstructing the field of view than conventional single colour pyrometers.

Measurement from large distance

The stationary CellaCast PA 80 and the portable PT 180 are specially designed for temperature measurement of liquid metals. They are used for the continuous monitoring of the temperature of the melt in the runner of a blast furnace, a cupola furnace or in casting machines. In such plants, measurements from a large distance are often the only option.

Thanks to the high resolution optics and the small measuring field of the PA 80 / PT 180, measurements from a distance up to 30 m are possible.

Determination of measured values

With optical temperature detection a pyrometer is aligned on the floating melt. CellaCast features an intelligent ATD function (Automatic Temperature Detection). In connection with the CSD feature (Clean Surface Detection), the temperature is detected at the slag and oxide-free spots and is evaluated periodically. Thus, the measured value is continuously displayed on the digital display and simultaneously transmitted via the analog output and digital interface. For better visibility, an external large-scale display unit can be used to show the temperature value.

As an option, a signal lamp lights up or a horn sounds an alarm when the reading is outside the permissible temperature range. The temperature data can be recorded and saved online in a PC or a data acquisition system. A complete control and documentation of temperature is ensured.

The portable pyrometer CellaCast PT 180 starts reading the temperature as soon as it targets a hot melt. A traffic light display in the visor helps to find the optimum measuring distance. After a few seconds, an audible alarm indicates the end of the measurement and the temperature is displayed when it was correctly determined.

Optics

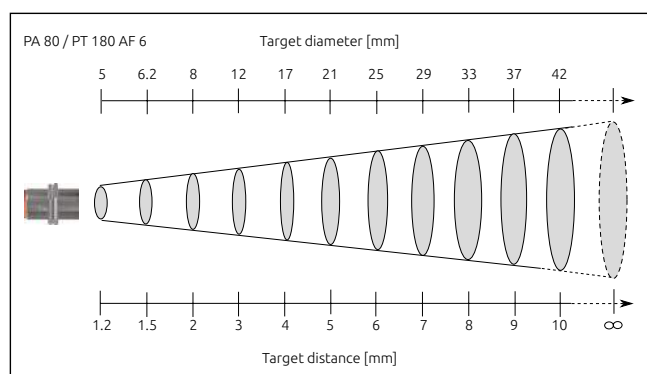
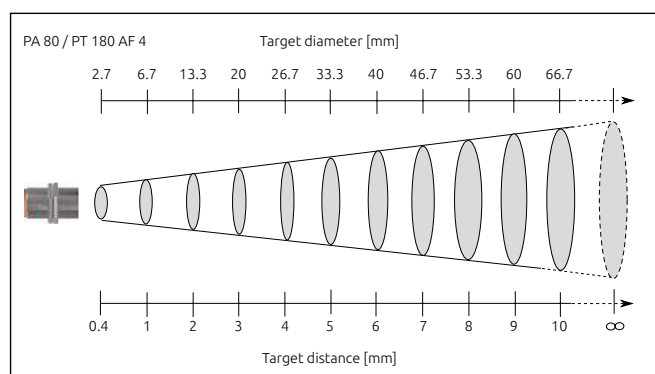
A pyrometer is an optical method of measuring temperature. The quality of the optics greatly influences the accuracy of the measurement.

The lens system of the CellaCast consists of a high-quality glass lens that is optimized for the visible and infrared spectrum. The tempered anti-reflective coated lens is extremely durable, easy to clean and therefore suitable for rough industrial environments.

Due to its superior imaging properties, the high-precision lens provides consistently high optical resolution across the entire focusing range.

The lens is infinitely adjustable and can be precisely set to the required distance between pyrometer and target. Depending on the measuring distance, 4 objective lenses are available.

Field of view



Sighting options of the measuring system



Through-the-lens

The CellaCast can be supplied with through-the-lens, parallax-free sighting. The wide field of view makes it easy to focus on the target object. The ocular features a widened interpupillary distance, making it suitable

for users who wear glasses or a helmet. The circle in the viewfinder indicates the exact position and size of the measured target spot.



Laser spot light

Another sighting option available for CellaCast is an integrated laser spot light. The laser dot marks the center of the target spot and is well visible even from a distance of up to 10 m. The laser is activated either directly

by push-button or remote by means of an external switch or via interface.



Video camera

As an option, the pyrometer can be equipped with a built-in colour video camera to view the target. Based on the latest HDR (High Dynamic Range) technology, the camera provides a higher dynamic range from the

imaging process and automatic exposure control. The video image appears without over-exposure and glare.



Another special feature is TBC (target brightness control). The light sensitivity adapts dynamically to the target object captured within the measurement spot to produce a high-contrast image of the target, regardless of whether the object

focused on is cooler or hotter than the background.

The video signal also transmits the measurement data. The temperature reading is superimposed onto the screen. A separate PC is not required.

Stationary Pyrometer CellaCast PA 80

Analogue outputs

CellaCast PA 80 features two analogue outputs which the user can custom configure. The second analogue output can be used to monitor a specific process temperature such as the device's internal temperature. If this is too high, it could indicate that the permissible ambient temperature has been exceeded or the cooling jacket (if used) is malfunctioning. Alternatively, the second output can be configured as an input.

When used together with the material selection switch VK 30.01, you can choose one of the four custom-configured ratio settings for the specific material being cast.

Switching outputs

CellaCast PA 80 features two switching outputs which provide a variety of configuration possibilities. These outputs can be used to monitor compliance with configured limit values or to trigger a status indicator.

A switching output can also be used to synchronize data communication to the PLC in order to transmit one temperature reading per cast mold. Each of the switching outputs can be configured as gate inputs.

Data communication

The CellaCast PA 80 is equipped with a USB interface and RS 485. Both enable remote configuration and temperature data transmission to a data acquisition system.

The pyrometer comes with the multilingual CellaView software. It is used for remote control, online presentation of the measuring curve, and analyses and storage of the readings.

Diagnostics Feature

During commissioning and operation, a test current or a temperature can be applied to perform diagnostic and simulation functions. Without requiring a hot object in the field of view, it is possible to test the entire signal path to the transducer and to the control system.

Dirty window monitor

CellaCast PA 80 is equipped with a SCM function (Smart Contamination Monitoring) that detects a dirty lens or window or blind spots in the pyrometer's line-of-sight and signalizes it via switching contact. The sensitivity of this function is user-adjustable.

Device-specific technical data PA 80

2 analogue outputs

- 0(4) - 20 mA linear, switchable, scalable

Load

- max. 500

2 switching inputs / outputs

- Open Collector 24 V, ≤ 30 mA

Data communication

- USB
- RS 485 (integrated menu-driven user interface to set parameters and transmit data to a PC)

Current input

- ≤ 135 mA
- ≤ 150 mA with laser spot light
- ≤ 175 mA with video camera
- Ripple ≤ 200 mV

Power requirement

- 24 V DC +10% / -20%

Ambient operating temp.

- 0 - 65 °C (without cooling)

Storage temperature

- -20 - +80 °C

Housing

- Stainless steel

Protection rating

- IP65 acc. to DIN 40050

Connectivity

- 8-pin connection with screw thread

Weight

- approx. 0.9 kg

Camera

Video signal

- Composite PAL, 1Vpp, 75 Ohm

Resolution

- 722 x 576 pixels

TBC exposure control

- Automatic, across the entire measuring range

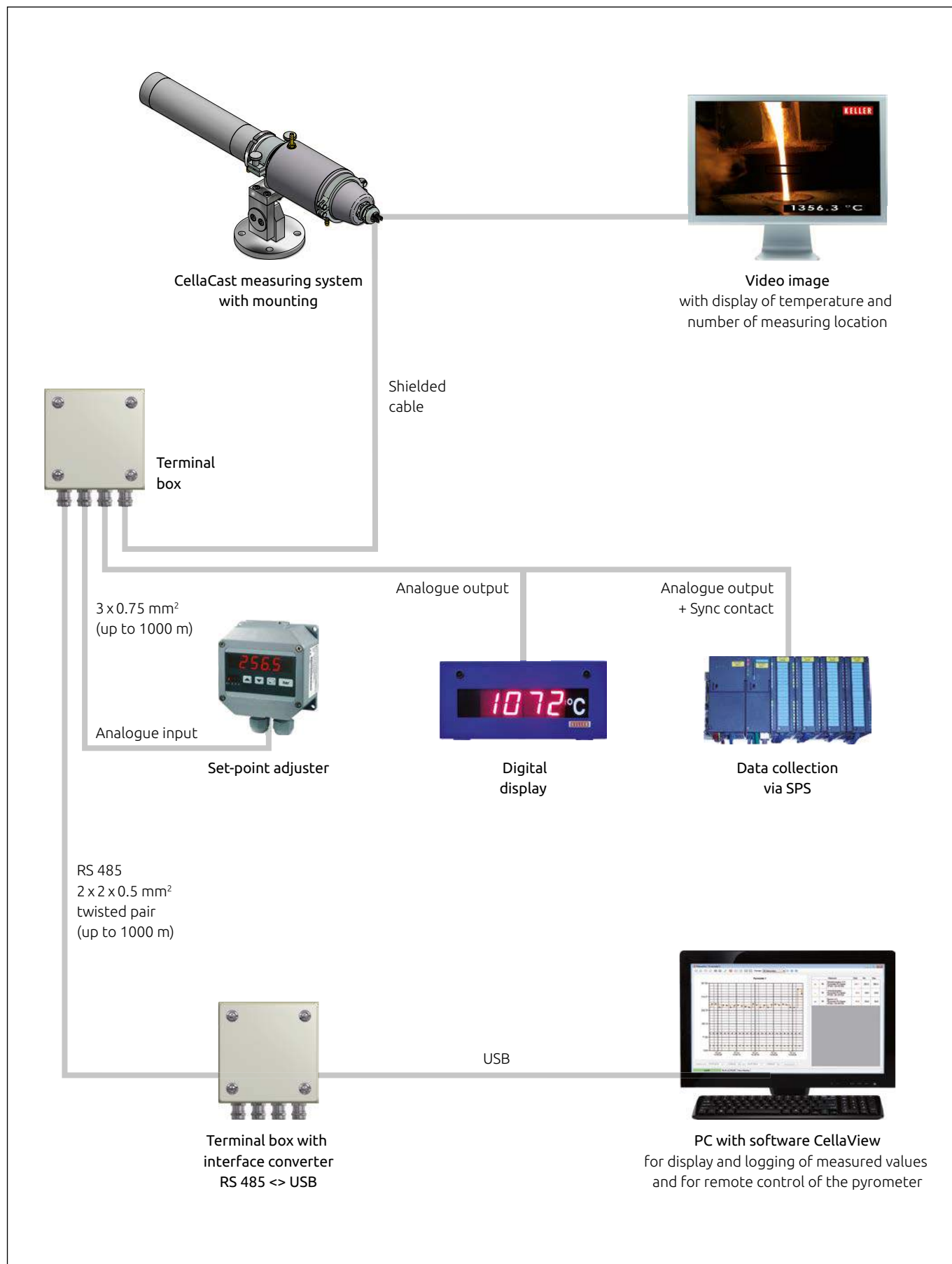
Screen display

- Indication of the measuring field
- temperature reading

Connectivity

- TNC connector

Components of the measuring system CellaCast

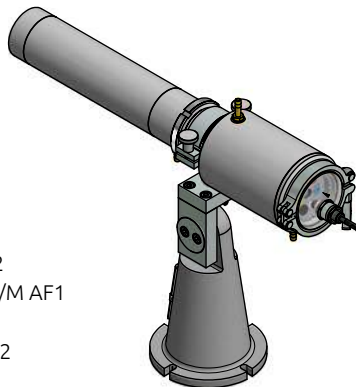


Mountings

Mounting for execution with
through-the-lens sighting
or laser spot light
PA 83-002

consisting of:

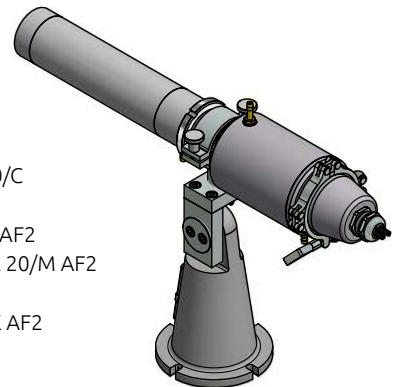
- Dust stop PZ 10/T
- Intermediate tube PZ 20/C
- Air purge PZ 20/A
- Clamping collar PZ 20/L AF2
- Cooling jacket closed PA 20/M AF1
- Hose nozzle G1/8"
- Pedestal mount PB 08/K AF2



Mounting for execution
with video camera
PA 83-003

consisting of:

- Dust stop PZ 10/T
- Intermediate tube PZ 20/C
- Air purge PZ 20/A
- Clamping collar PZ 20/L AF2
- Cooling jacket closed PA 20/M AF2
- Hose nozzle G1/8"
- Pedestal mount PB 08/K AF2



Protective accessories



The PZ 20/A air purge creates air flow to prevent dirt from settling on the lens. Used together with the PZ 20/C intermediate tube and the PZ 10/T dust stop, the system provides maximum efficiency with minimum air consumption.



The PA 20/M cooling jacket provides protection against dirt and high ambient temperatures. It can be operated with either water or air as a coolant.

The pyrometer is easy to install/remove without tools. The cooling jacket PA 20/M AF1 features a glass window on the back and thus does not obstruct the pyrometer's display panel.

Accessories



Terminal box
VK 30.02



Junction box with power supply
230 VAC/24 VDC
VA 20.01



Set-point adjuster
VK 30.03



Terminal box with interface
converter RS485 <-> USB
VK 30.05



Interface converter /
video encoder SU 01
RS485 and video <-> Ethernet



Interface converter
SU 04: RS485 <-> USB
SU 02: RS485 <-> Ethernet

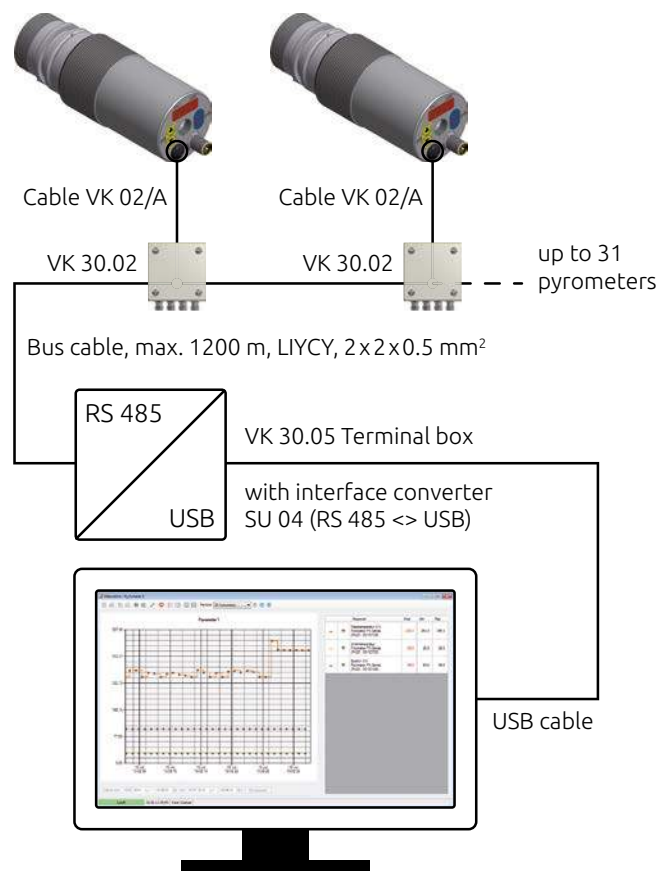


Digital display DA 570
digit height 50 mm,
up to 25 meters still legible

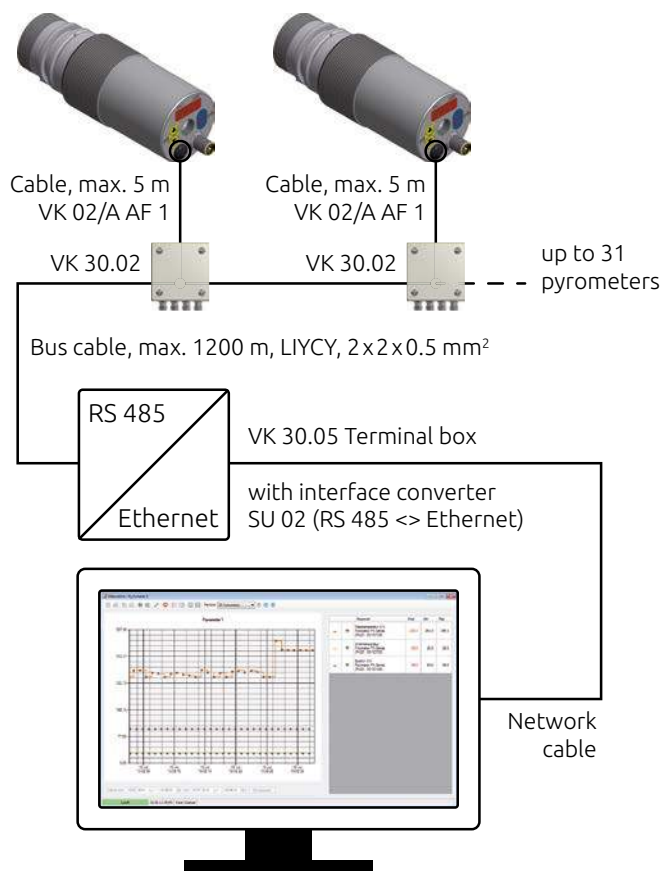


Protective glass
70146

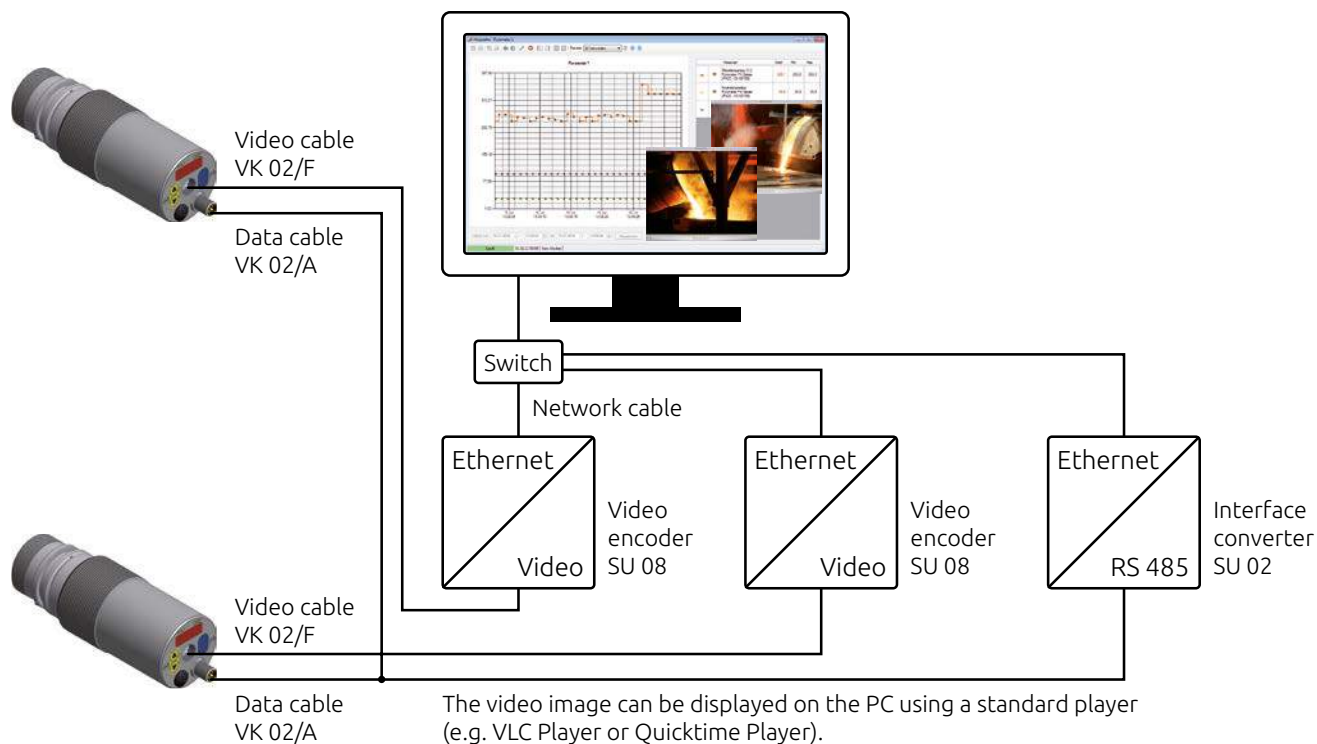
Networking and communication via the USB interface



Networking and communication via Ethernet interface



Networking, communication and video transmission via Ethernet



Portable pyrometer CellaCast PT 180

Through-the-lens-sighting



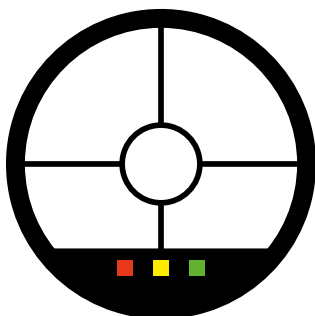
The wide field of view makes it easy to focus on the target object. The ocular features a widened interpupillary distance to accommodate users who wear glasses or a helmet.

A built-in diopter compensation allows users to compensate for bad eyesight.

To protect the user's eye, the built-in polarizing filter can be adjusted to the brightness of the target.



Signal strength indicator



A traffic light status indicator is integrated in the viewfinder. When targeting on the measuring object, it indicates the user, if the signal strength 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.

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.

Device-specific technical data PT 180

Data communication

- USB

Power supply

- rechargeable battery pack
- mains adapter

Battery life

- up to 12 hours of use (based on continuous operation at $T_a = 23\text{ °C}$)

Ambient operating temperature

- $0 - 50\text{ °C}$

Storage temperature

- $-20 - +50\text{ °C}$

Housing

- aluminium

Protection rating

- IP40 acc. to DIN 40050

Sighting

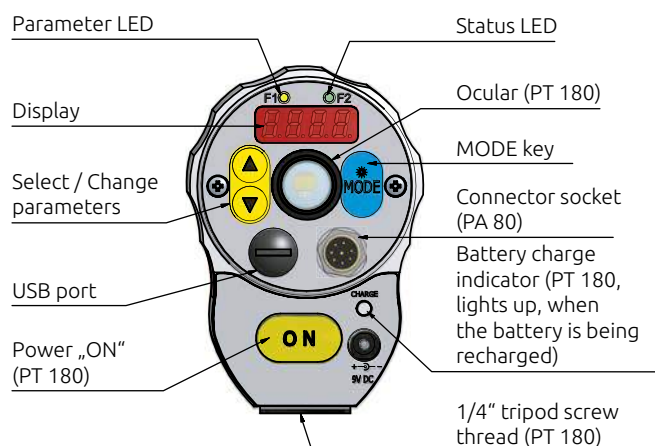
- Through-the-lens sighting, parallax-free imaging, target spot indicator, diopter compensation, polarizing filter

Weight

- approx. 1.1 kg

Control keys

Parameters can be adjusted during running operations using the rear keypad. The large control keys are easy to access and operate. The brightly lit 8 mm digits on the LED display are visible from a great distance. Two status LEDs can be custom configured to indicate operating conditions. The PT 180 can easily and fast be adjusted to the radiation characteristics of the target object using preconfigurable emissivity tables.



Adjustable parameters

- Smoothing filter
- Min/max memory
- Emissivity ratio
- Emissivity table (PT 180)
- ATD function parameters
- Sensitivity of the dirty window monitoring
- Function of LEDs

Additionally at the CellaCast PA 80

- Scale of analogue input and output signals
- Function and limits of the switching contacts
- TBC (Target Brightness Control)
- White balance of the camera
- Simulation of current and temperature

Shipment includes

CellaCast PA 80

- CellaCast PA 80 pyrometer
- Polarizing filter for ocular PA 20/P for model with through-the-lens sighting
- Connection cable VK 02/A (5 m)
- Video cable VK 02/F (5 m) for model with built-in camera
- USB cable VK 11/D (1.8 m)
- Software CellaView
- Instruction manual

CellaCast PT 180

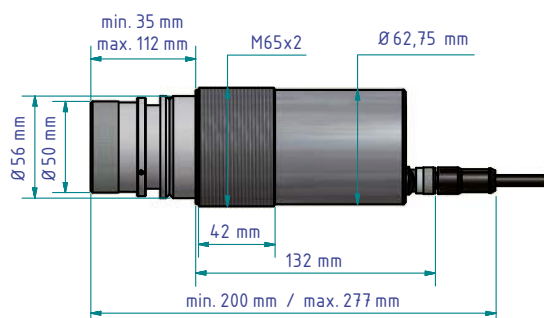
- Pyrometer CellaCast PT 180
- Carrying and protective case
- Battery charger / mains adapter
- Quartz protective glass 70146
- USB cable VK 11/D (1.8 m)
- Software CellaView
- Instruction manual
- Calibration certificate ISO 9001

Common technical data PA 80/PT 180

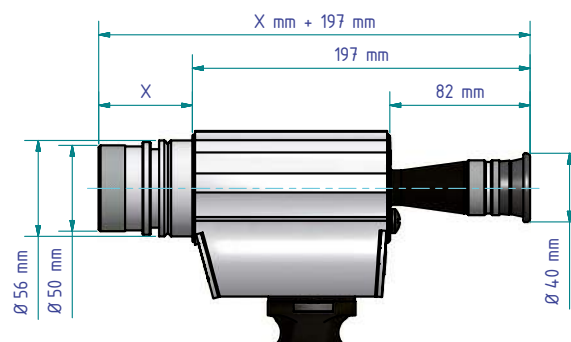
Sensor	Resolution current output
• Photodiode	• 0.2 K + 0.03 % of selected range
Spectral sensitivity	Resolution display
• 0.95 / 1.05 μm	• 1 K
LED display	Resolution USB / RS 485
• 4-digit (digit height 8 mm)	• 0.1 K in terminal mode
Response time t_{98}	Temperature coefficient
• $\leq 10 \text{ ms}$ ($t > 750^\circ\text{C}$)	• $\leq 0.05 \text{ \%}/\text{K}$ of temp. reading [$^\circ\text{C}$] (deviation to 23°C)
Measurement uncertainty	Permissible humidity
• 1.5 % of temp. reading, at least 4 K (at $e = 1$ and $T_a = 23^\circ\text{C}$)	• 95 % r.H. max. (non condensing)
Repeatability	
• 3 K	

Dimensions

CellaCast PA 80



CellaCast PT 180



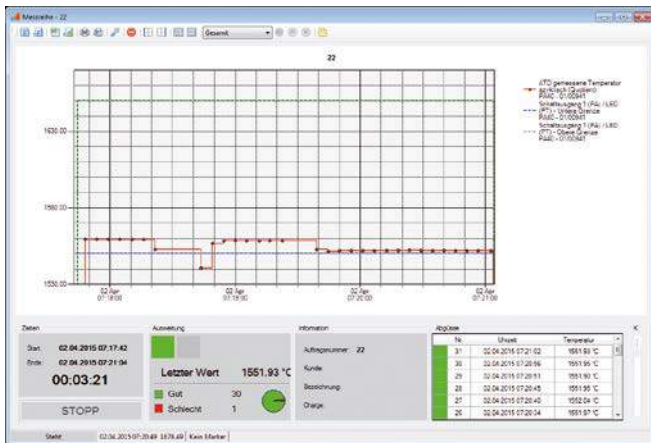
Software CellaView



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 configuration 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)
- Microsoft SQL Server Compact-based database
- Graphic display, recording and logging of measurement data
- Free selection and combination of the measurement readings and status information of up to 31 devices in one or more diagrams
- Parameter setting and remote control of the pyrometers
- Saving, loading and transferring of configuration profiles of the devices
- 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
- Logging of user entries in a log file to check for configuration changes
- Entering the production parameters
- Archive with filter function
- Generating a measurement protocol per production batch
- No license restriction
- Compatible with Windows XP, Vista, 7, 8
- 9 languages selectable



Produkt auswählen

Produktauswahl: Produkt 4

Name	Emission [%]	Min. [°C]	Max. [°C]	Gießzeit [Sek.]
Produkt 1	100	25	35	2
Produkt 2	100	50	80	2
Produkt 3	100	80	90	2
Produkt 4	100	90	105	2

Buttons: Kopieren, Löschen, Bearbeiten, Start

Protokolle

Filter

Startdatum von: 12.2014, Auftragsnummer: A20, Kunde: A10, Bezeichnung: A10, Charge: A10

Standort	Erstdatum	Dauer	Auftragsnummer	Kunde	Bezeichnung	Charge	Gut	Schlecht	Anweisung
05.01.2015 17:51:46	05.01.2015 17:51:55	00:00:09	A20				1	0	100
05.01.2015 17:51:18	05.01.2015 17:51:37	00:00:19	A19				4	0	100
05.01.2015 17:50:40	05.01.2015 17:51:01	00:00:21	A18				2	0	100
05.01.2015 17:50:10	05.01.2015 17:50:31	00:00:21	A16				2	0	100
05.01.2015 17:48:38	05.01.2015 17:50:00	00:00:32	A15				3	0	100
05.01.2015 17:48:04	05.01.2015 17:49:18	00:00:24	A14				3	0	100
05.01.2015 17:48:24	05.01.2015 17:48:44	00:00:20	A13				2	0	100
05.01.2015 17:47:37	05.01.2015 17:48:14	00:00:37	A12				2	0	100

Buttons: Beenden, Öffnen, Schließen



- Headquarters
- Sales and Service Center
- Sales abroad



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KELLER

infrared
temperature
solutions

ITS



No 1

in terms of
ACCURACY
RELIABILITY
INNOVATION



Pyrometer CellaCast PA 83 / PT 183

for non-contact temperature measurement
in the casting of molten metals

Pyrometer CellaCast PA 83/PT 183

Special features

- Maintenance-free, wear-free measuring system
- Temperature range: 650 – 2400 °C
- CSD filter to determine the correct temperature of the melt despite the presence of slag and oxides
- Rectangular measuring field ensures reliable temperature data even when pour stream position varies
- ATD function for automatic temperature detection during discontinuous casting processes
- Dual wavelength technique yields accurate readings despite smoke or dust in the sight path
- Through-the-lens sighting or use of a video camera for perfect alignment and monitoring of the field of view
- Very large and bright LED display
- RS 485 bus interface to connect multiple units
- CellaView software for on-time presentation and logging of the measurement values
- Patented SSI traffic light function in the through-the-lens sighting for displaying the signal strength and the optimum measuring distance

Range of models

Stationary pyrometer CellaCast PA 83



Portable pyrometer CellaCast PT 183



Model				Technical data				
stationary			portable					
Sighting device				Temperature range	Lens system	Focus range	Distance ratio	Measuring field
Through-the-lens	Video camera	Laser spot light	Through-the-lens					
PA 83 ...			PT 183 ...					
AF 1	AF 1/C	AF 1/L	AF 1	650 - 1700 °C 1202 - 3092 °F	PZ 20.01	0.40 m - ∞	D _v = 230 : 1 D _h = 45 : 1	
AF 3	AF 3/C	AF 3/L	AF 3		PZ 20.06	1.20 m - ∞	D _v = 375 : 1 D _h = 75 : 1	
AF 10	AF 10/C	AF 10/L			PZ 20.05	0.20 m - ∞	D _v = 55 : 1 D _h = 10 : 1	
AF 13	AF 13/C	AF 13/L	AF 13		PZ 20.08	0.30 m - ∞	D _v = 150 : 1 D _h = 30 : 1	
AF 11	AF 11/C	AF 11/L		750 - 2400 °C 1382 - 4352 °F	PZ 20.05	0.20 m - ∞	D _v = 85 : 1 D _h = 11 : 1	

Measurement of molten metals

Temperature is one of the most critical process parameters affecting the resulting quality, strength and working properties of a metal casting. Molten metal which is too hot will damage the sand moulds. A temperature which is too low will result in low fluidity. Especially complex and thin-walled cast metal parts demand precisely controlled casting temperatures. A molten mass which is not hot enough

will exhibit poor metal flow within the complex passages of the mould and may result in bubbles or cavities. Strict compliance with process parameters is therefore of utmost importance – and this requires precise temperature monitoring and control. The temperature of molten metal is most commonly measured using immersion probes. The probe is dipped into the liquid metal after the ladle is filled, that is before casting even begins. Data accuracy is subject to the precision with which the foundry operator performs the meas-

urement. Depending on the immersion depth and the position of the probe, temperature readings can deviate.



At fully automated casting machines, temperature is commonly controlled by infrequent immersion of the probe into the melt. At semi-automated operations, the temperature of the liquid metal is usually only measured once for each newly filled ladle. The thermocouple is dipped into the ladle before pouring begins, that is, before the molds are filled. Depending on the number of castings poured from one ladle, there may be a considerable time offset between ladle temperature measurement and the last mold filled from the content of that ladle. The ladle operator decides how many castings can be poured from one ladle, basing his decision on the flow behavior of the melt and his empirical knowledge of heat loss and cooling time. Actual temperature tests using measurement instrumentation – to assure that the required process temperature is maintained right down to the last filled mold – is rarely performed.

Only a pyrometer can detect the temperature at the crucial moment in the casting process: just as the mould is being filled. Measuring with pyrometers ensures full temperature control of each single workpiece.

A pyrometer has no parts subject to wear and tear, therefore a foundry does not incur any operating costs for expendable parts. The immersion method is subject to wear on parts.

How it works

The CellaCast pyrometer is an optical non-contact temperature measurements device. It detects the infrared radiation emitted from an object and determines the temperature from these values. The optical system is designed to measure the radiation within a defined field of view. Depending on the size of the measuring object and the selection of the optical system, the CellaCast covers measuring distances of up to several metres.



The problem of non-contact temperature detection is the development of slag and oxide on the molten metal surface. Changes to the surface characteristics will change the radiation properties. To achieve reliable and accurate temperature data, it is essential that a pyrometer only detects and processes the infrared radiation from the surface which is free of oxides and slag. The CSD function (Clean Surface Detection) of CellaCast ignores the slag and oxides floating on the surface and filters out the temperature detected from the pure liquid metal.

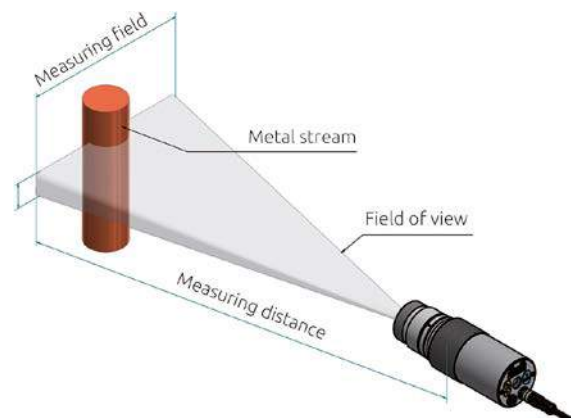
Different alloys (e.g. SG iron, grey iron) will feature slightly different infrared radiation properties. The specific emissivity can be determined by performing a comparison measurement using a thermocouple. This material constant is then set at the pyrometer.

The CellaCast's signal detection is based on the two-colour measuring principle. This means that the infrared radiation is measured simultaneously at two wavelengths. The temperature received is the calculated ratio of these two radiances. This measuring principle allows measurements of objects that are smaller than the field of view. Due to the ratio principle, the CellaCast is also considerably more insensitive to interfering factors such as dust, vapour or smoke obstructing the field of view than conventional single colour pyrometers.

Rectangular measuring field

The stationary CellaCast PA 83 and the portable PT 183 were specially designed to measure the temperature of liquid metal. It is used to capture the temperature when the melt is taken from the furnace and filled into the ladle or, with automatic casting machines, at the time when the moulds are filled. It is even more difficult, that the position of the pouring stream varies depends on the outlet or the tilt angle of the ladle.

CellaCast PA 83/PT 183 features a rectangular measurement area. As long as the moving target remains some-where within this rectangular area, it captures the pour and produces an accurate temperature reading, even when the liquid stream moves within this area.



Determination of measured values

With optical temperature detection a pyrometer is focused on the free falling liquid metal stream. CellaCast features an intelligent ATD function (Automatic Temperature Detection) for detecting the temperature per casting. After starting the pouring process, the measured value determination is started automatically. The ATD function

recognises and suppresses any perturbations caused by flames or dripping pouring streams that might prevent a correct measurement. The reading is displayed when the measurement is finished and, at the same time, the reading is transmitted via the analogue output and the digital interface. For better visibility, an external large-scale display unit can be used to show the temperature value. As an option, a signal lamp lights up or a horn sounds an alarm when the reading is outside the permissible temperature range. The temperature data can be saved at a PC or recorded via a data acquisition system. A temperature reading is produced for each cast workpiece, providing continuous verification of compliance with temperature requirements.

Production of further casts can be stopped when the minimum admissible casting temperature is reached. This avoids scrap and therefore unnecessary costs.

The portable pyrometer CellaCast PT 183 starts reading the temperature as soon as it targets a hot melt. A traffic light display in the visor helps to find the optimum measuring distance. After a few seconds, an audible alarm indicates the end of the measurement and the temperature is displayed when it was correctly determined.

Optics

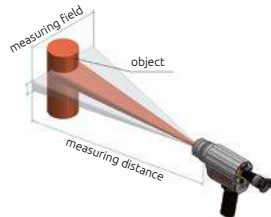
A pyrometer is an optical method of measuring temperature. The quality of the optics greatly influences the accuracy of the measurement.

The lens system of the CellaCast consists of a high-quality glass lens that is optimized for the visible and infrared spectrum. The tempered anti-reflective coated lens is extremely durable, easy to clean and therefore suitable for rough industrial environments.

Due to its superior imaging properties, the high-precision lens provides consistently high optical resolution across the entire focusing range.

The lens is infinitely adjustable and can be precisely set to the required distance between pyrometer and target. 4 objective lenses are available to cover different pouring streams, variations of the position and measuring distances.

Measuring spot size

Measuring spot size															
Type		Distance [m]													
		0.2	0.3	0.4	1	1.2	2	3	4	5	6	7	8	9	10
PA 83 AF 1 PT 183 AF 1	min. width of the pouring stream [mm]			3	7	9	15	22	30	37	44	52	59	67	74
	width of the measuring area [mm]			9	22	27	44	67	89	111	133	156	178	200	222
PA 83 AF 3 PT 183 AF 3	min. width of the pouring stream [mm]					4	9	13	18	22	27	31	36	40	49
	width of the measuring area [mm]					13	27	40	53	67	80	93	107	120	147
PA 83 AF 10	min. width of the pouring stream [mm]	7	10	13	33	40	67	100	133	167	200	233	267	300	330
	width of the measuring area [mm]	20	30	40	100	120	200	300	400	500	600	700	800	900	1000
PA 83 AF 13 PT 183 AF 13	min. width of the pouring stream [mm]			3	4	11	13	22	33	44	55	67	78	89	110
	width of the measuring area [mm]			10	13	33	40	66	100	133	166	200	233	266	330
PA 83 AF 11	min. width of the pouring stream [mm]	6	9	12	30	36	61	91	121	152	182	212	242	273	303
	width of the measuring area [mm]	18	27	36	91	109	182	273	364	455	545	636	727	818	909

Sighting options of the measuring system



Through-the-lens

The CellaCast can be supplied with through-the-lens, parallax-free sighting. The wide field of view makes it easy to focus on the target object. The ocular features a widened interpupillary distance, making it suitable for users who wear glasses or a helmet. The target marking in the viewfinder indicates the exact position and size of the measured target spot.



Video camera

As an option, the pyrometer can be equipped with a built-in colour video camera to view the target. Based on the latest HDR (High Dynamic Range) technology, the camera provides a higher dynamic range from the imaging process and automatic exposure control. The video image appears without over-exposure and glare.

Another special feature is TBC (target brightness control). The light sensitivity adapts dynamically to the target object captured within the measurement spot to produce a high-contrast image of the target, regardless of whether the object focused on is cooler or hotter than the background.

The video signal also transmits the measurement data. The temperature reading is superimposed onto the screen. A separate PC is not required.



Stationary Pyrometer CellaCast PA 83

Analogue outputs

CellaCast PA 83 features two analogue outputs which the user can custom configure. The second analogue output can be used to monitor a specific process temperature such as the device's internal temperature. If this is too high, it could indicate that the permissible ambient temperature has been exceeded or the cooling jacket (if used) is malfunctioning. Alternatively, the second output can be configured as an input. When used together with the material selection switch VK 30.01, you can choose one of the four custom-configured ratio settings for the specific material being cast.

Switching outputs

CellaCast PA 83 features two switching outputs which provide a variety of configuration possibilities. These outputs can be used to monitor compliance with configured limit values or to trigger a status indicator.

A switching output can also be used to synchronize data communication to the PLC in order to transmit one temperature reading per cast mold. Each of the switching outputs can be configured as gate inputs.

Data communication

The CellaCast PA 83 is equipped with a USB interface and RS 485. Both enable remote configuration and temperature data transmission to a data acquisition system.

The pyrometer comes with the multilingual CellaView software. It is used for remote control, online presentation of the measuring curve, and analyses and storage of the readings.

Diagnostics Feature

During commissioning and operation, a test current or a temperature can be applied to perform diagnostic and simulation functions. Without requiring a hot object in the field of view, it is possible to test the entire signal path to the transducer and to the control system.

Dirty window monitor

CellaCast PA 83 is equipped with a SCM function (Smart Contamination Monitoring) that detects a dirty lens or window or blind spots in the pyrometer's line-of-sight and signalizes it via switching contact. The sensitivity of this function is user-adjustable.

Device-specific technical data PA 83

2 analogue outputs

- 0(4) - 20 mA linear, switchable, scalable

Load

- max. 500

2 switching inputs / outputs

- Open Collector 24 V, ≤ 30 mA

Data communication

- USB
- RS 485 (integrated menu-driven user interface to set parameters and transmit data to a PC)

Power requirement

- 24 V DC +10% / -20%

Current input

- ≤ 135 mA
- ≤ 175 mA with video camera
- Ripple ≤ 200 mV

Ambient operating temp.

- 0 - 65 °C (without cooling)

Storage temperature

- -20 - +80 °C

Housing

- Stainless steel

Protection rating

- IP65 acc. to DIN 40050

Connectivity

- 8-pin connection with screw thread

Weight

- approx. 0.9 kg

Camera

Video signal

- Composite PAL, 1Vpp, 75 Ohm

Resolution

- 722 x 576 pixels

TBC exposure control

- Automatic, across the entire measuring range

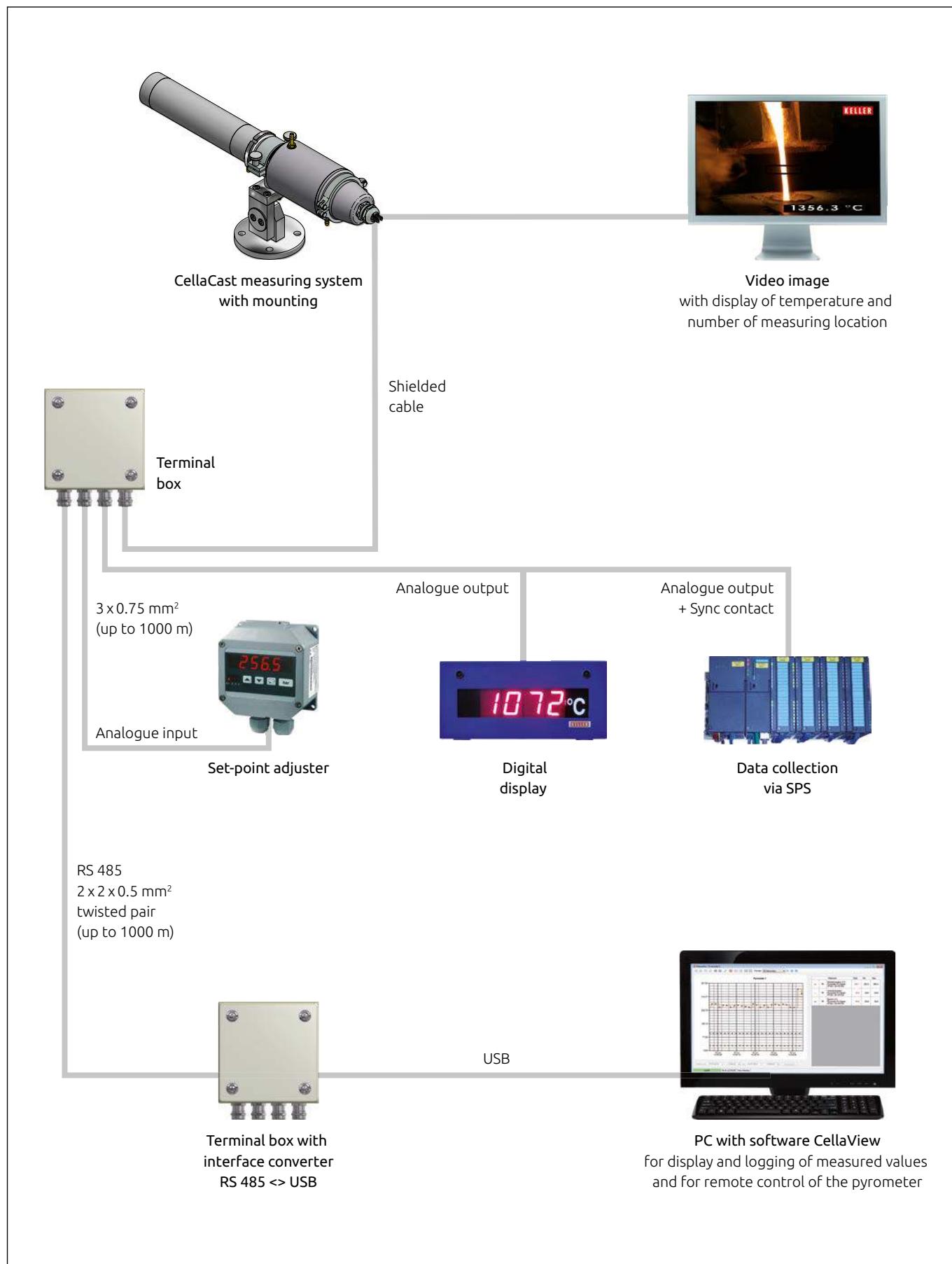
Screen display

- Indication of the measuring field
- temperature reading

Connectivity

- TNC connector

Components of the measuring system CellaCast

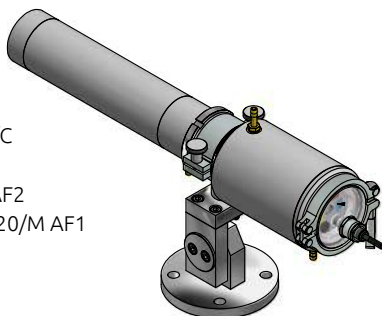


Mountings

Mounting for execution with through-the-lens sighting or laser spot light
PA 83-010

consisting of:

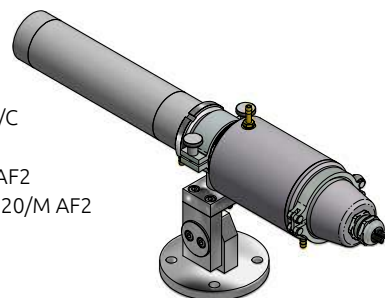
- Dust stop PZ 10/T
- Intermediate tube PZ 20/C
- Air purge PZ 20/A
- Clamping collar PZ 20/L AF2
- Cooling jacket closed PA 20/M AF1
- Hose nozzle G1/8"
- Mounting PB 08/Q AF1
- Flange PB 08/R AF1



Mounting for execution with video camera
PA 83-011

consisting of:

- Dust stop PZ 10/T
- Intermediate tube PZ 20/C
- Air purge PZ 20/A
- Clamping collar PZ 20/L AF2
- Cooling jacket closed PA 20/M AF2
- Hose nozzle G1/8"
- Mounting PB 08/Q AF1
- Flange PB 08/R AF1



Protective accessories



The PZ 20/A air purge creates air flow to prevent dirt from settling on the lens. Used together with the PZ 20/C intermediate tube and the PZ 10/T dust stop, the system provides maximum efficiency with minimum air consumption.



The PA 20/M cooling jacket provides protection against dirt and high ambient temperatures. It can be operated with either water or air as a coolant.

The pyrometer is easy to install/remove without tools. The cooling jacket PA 20/M AF1 features a glass window on the back and thus does not obstruct the pyrometer's display panel.

Accessories



Terminal box
VK 30.02



Junction box with power supply
230 VAC/24 VDC
VA 20.01



Set-point adjuster
VK 30.03



Terminal box with interface
converter RS 485 <-> USB
VK 30.05



Interface converter /
video encoder SU 01
RS 485 and video <-> Ethernet



Interface converter
SU 04: RS 485 <-> USB
SU 02: RS 485 <-> Ethernet

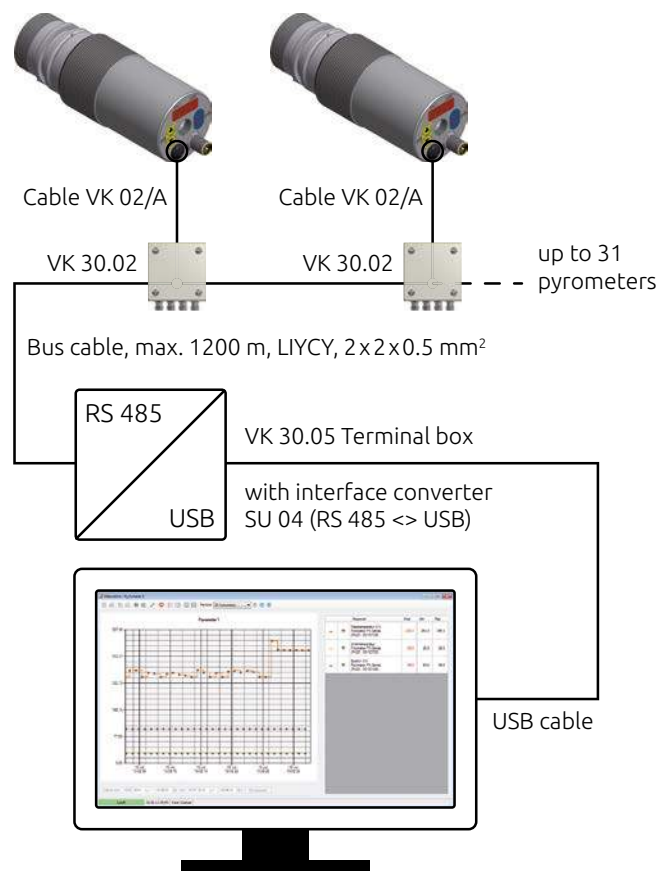


Digital display DA 570
digit height 50 mm,
up to 25 meters still legible

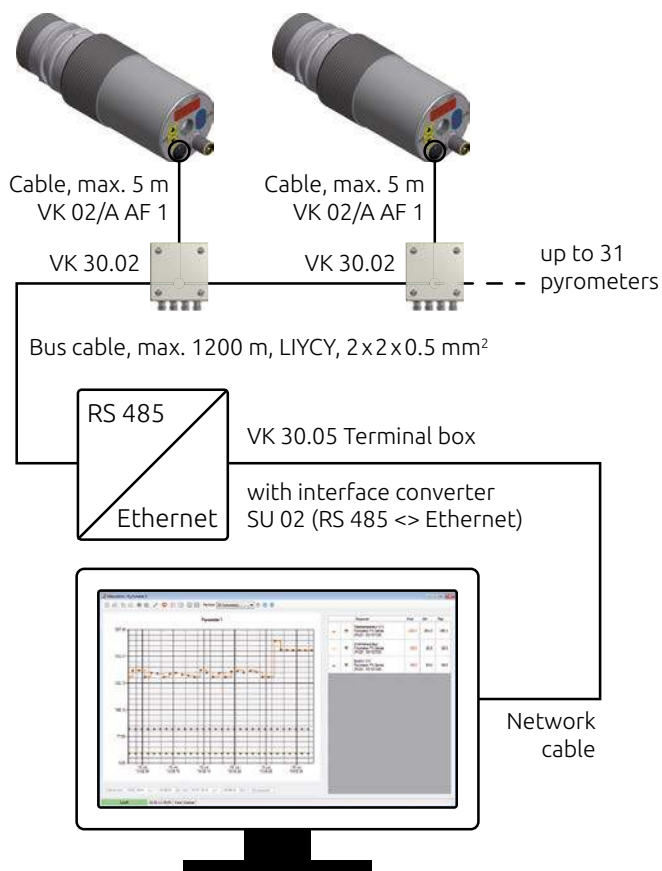


Protective glass
70146

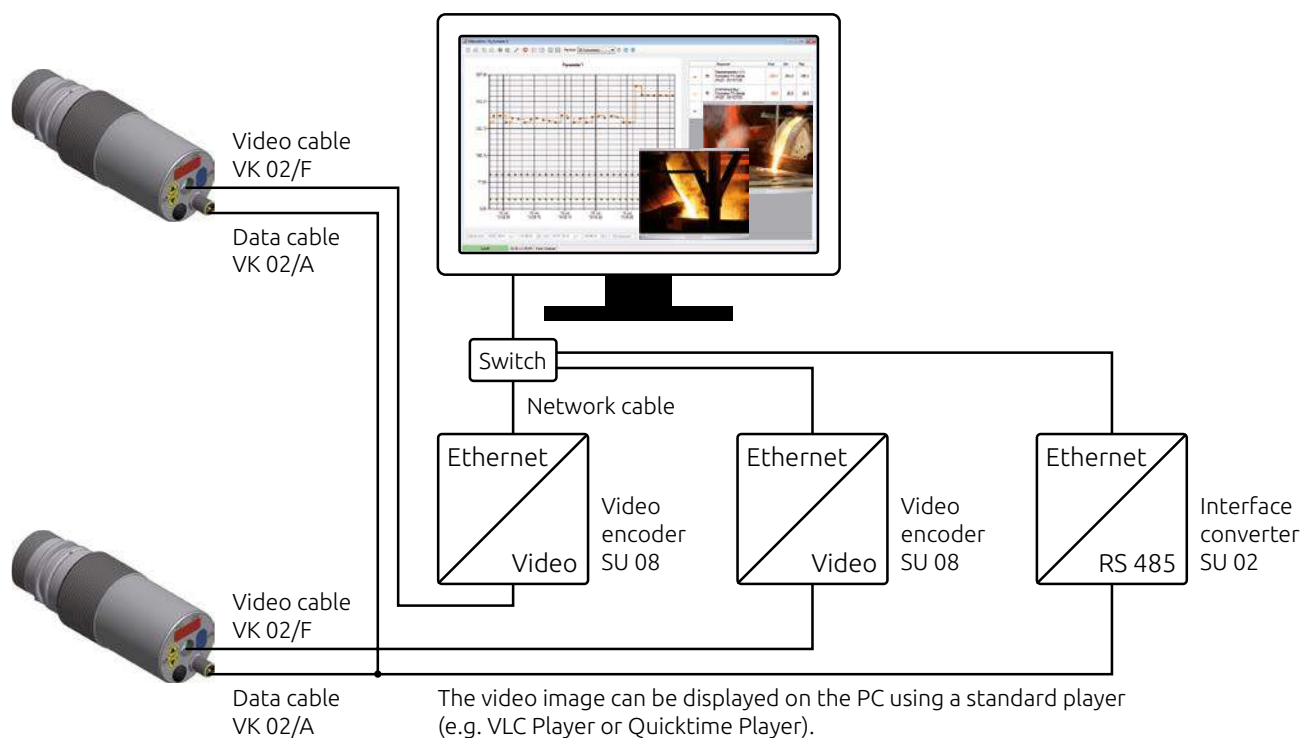
Networking and communication via the USB interface



Networking and communication via Ethernet interface



Networking, communication and video transmission via Ethernet



Portable pyrometer CellaCast PT 183

Through-the-lens-sighting

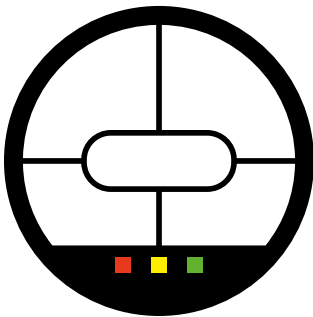


The wide field of view makes it easy to focus on the target object. The ocular features a widened interpupillary distance to accommodate users who wear glasses or a helmet.

A built-in diopter compensation allows users to compensate for bad eyesight.

To protect the user's eye, the built-in polarizing filter can be adjusted to the brightness of the target.

Signal strength indicator



A traffic light status indicator is integrated in the viewfinder. When targeting on the measuring object, the patented SSI (Signal Strength Indicator) function indicates the user, if the signal strength 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.

Housing

The aluminium housing is very robust and is perfectly suited for the use in harsh industrial environments. The CellaCast PT 183 does not require extra protection.



Device-specific technical data PT 183

Data communication

- USB

Power supply

- rechargeable battery pack
- mains adapter

Battery life

- up to 12 hours of use (based on continuous operation at $T_a = 23^\circ\text{C}$)

Ambient operating temperature

- $0 - 50^\circ\text{C}$

Storage temperature

- $-20 - +50^\circ\text{C}$

Housing

- aluminium

Protection rating

- IP40 acc. to DIN 40050

Sighting

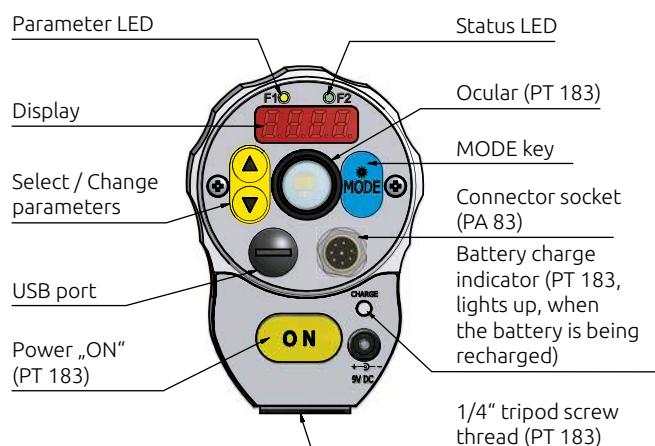
- Through-the-lens sighting, parallax-free imaging, target spot indicator, diopter compensation, polarizing filter

Weight

- approx. 1.1 kg

Control keys

Parameters can be adjusted during running operations using the rear keypad. The large control keys are easy to access and operate. The brightly lit 8 mm digits on the LED display are visible from a great distance. Two status LEDs can be custom configured to indicate operating conditions. The PT 183 can easily and fast be adjusted to the radiation characteristics of the target object using preconfigurable emissivity tables.



Adjustable parameters

- Smoothing filter
- Min/max memory
- Emissivity ratio
- Emissivity table (PT 183)
- ATD function parameters
- Sensitivity of the dirty window monitoring
- Function of LEDs

Additionally at the CellaCast PA 83

- Scale of analogue input and output signals
- Function and limits of the switching contacts
- TBC (Target Brightness Control)
- White balance of the camera
- Simulation of current and temperature

Shipment includes

CellaCast PA 83

- CellaCast PA 83 pyrometer
- Polarizing filter for ocular PA 20/P for model with through-the-lens sighting
- Connection cable VK 02/A (5 m)
- Video cable VK 02/F (5 m) for model with built-in camera
- USB cable VK 11/D (1.8 m)
- Software CellaView
- Instruction manual

CellaCast PT 183

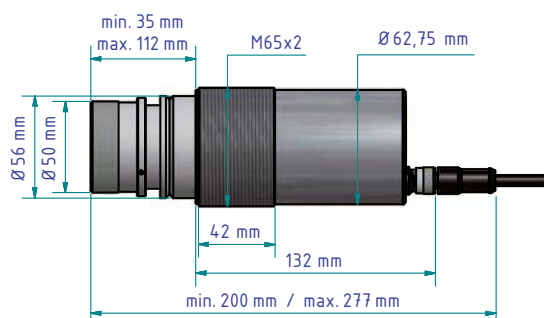
- Pyrometer CellaCast PT 183
- Carrying and protective case
- Battery charger / mains adapter
- Quartz protective glass 70146
- USB cable VK 11/D (1.8 m)
- Software CellaView
- Instruction manual
- Calibration certificate ISO 9001

Common technical data PA 83/PT 183

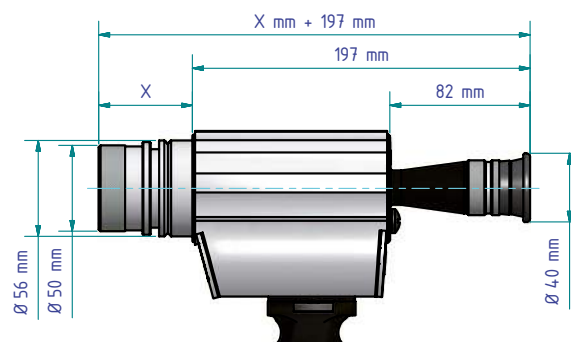
Sensor	Resolution current output
• Photodiode	• 0.2 K + 0.03 % of selected range
Spectral sensitivity	Resolution display
• 0.95 / 1.05 μm	• 1 K
LED display	Resolution USB / RS 485
• 4-digit (digit height 8 mm)	• 0.1 K in terminal mode
Response time t_{98}	Temperature coefficient
• $\leq 10 \text{ ms}$ ($t > 750^\circ\text{C}$)	• $\leq 0.05 \text{ \%}/\text{K}$ of temp. reading [$^\circ\text{C}$] (deviation to 23°C)
Measurement uncertainty	Permissible humidity
• 1.5 % of temp. reading, at least 4 K (at $e = 1$ and $T_a = 23^\circ\text{C}$)	• 95 % r.H. max. (non condensing)
Repeatability	
• 3 K	

Dimensions

CellaCast PA 83



CellaCast PT 183



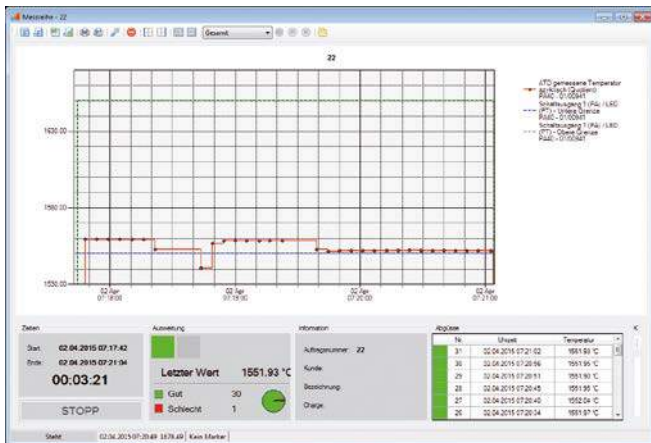
Software CellaView



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 configuration 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)
- Microsoft SQL Server Compact-based database
- Graphic display, recording and logging of measurement data
- Free selection and combination of the measurement readings and status information of up to 31 devices in one or more diagrams
- Parameter setting and remote control of the pyrometers
- Saving, loading and transferring of configuration profiles of the devices
- 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
- Logging of user entries in a log file to check for configuration changes
- Entering the production parameters
- Archive with filter function
- Generating a measurement protocol per production batch
- No license restriction
- Compatible with Windows XP, Vista, 7, 8
- 9 languages selectable



Produkt auswählen

Produktauswahl: Produkt 4

Name	Emission [%]	Min. [°C]	Max. [°C]	Gießzeit [Sek.]
Produkt 1	100	25	35	2
Produkt 2	100	50	80	2
Produkt 3	100	80	90	2
Produkt 4	100	90	105	2

Kopieren
Löschen
Bearbeiten
Start

Protokolle

Filter

Startdatum von: 12.2014
Startdatum bis: 05.01.2015

Auftrag: A20
Kunde: A18
Bezeichnung: A16
Charge: A15

Standort	Erstdatum	Dauer	Auftragsnummer	Kunde	Bezeichnung	Charge	Gut	Schlecht	Auswertung
05.01.2015 17:51:46	05.01.2015 17:51:55	00:00:09	A20				1	0	100
05.01.2015 17:51:18	05.01.2015 17:51:37	00:00:19	A18				4	0	100
05.01.2015 17:50:40	05.01.2015 17:51:01	00:00:21	A16				2	0	100
05.01.2015 17:50:10	05.01.2015 17:50:31	00:00:21	A16				2	0	100
05.01.2015 17:48:28	05.01.2015 17:50:00	00:00:32	A15				3	0	100
05.01.2015 17:48:54	05.01.2015 17:49:18	00:00:24	A14				3	0	100
05.01.2015 17:48:24	05.01.2015 17:48:44	00:00:20	A13				2	0	100
05.01.2015 17:47:37	05.01.2015 17:48:14	00:00:37	A12				2	0	100

Beitrag
Öffnen
Schließen



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- Sales and Service Center
- Sales abroad



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