

# CellaTemp® PQ, PL Pyrometer Series



- Sub-ranges from -30 °C bis +2500 °C
- Bright LED display
- Precision optics with broadband anti-reflection coating; parallax-free viewing
- Analogue output
- Configurable via USB interface
- LED spot light
- Focusable optics



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# Features that make CellaTemp® PQ and PL Pyrometers superior

## General

- For temperatures ranging from -30 °C to +2500 °C
- Both wide measuring range and high temperature resolution
- Digital signal processing
- Based on light sensor technology; no mechanical moving parts
- Nonwearing
- No maintenance

## Optics

- Excellent optical characteristics due to the precision lens (non-hygroscopic) with broad band antireflection coating
- Various distance ratios
- Customised focus adjustment (CellaTemp® PQ)
- Smallest target diameter 0.66 mm
- Focusable optics for accurate distance adjustment (CellaTemp® PL)

## Electronics

- High accuracy due to digital signal processing
- Very short response time
- Very wide measuring ranges
- Immune to electromagnetic interference

## Signal Outputs

- Analogue output 0/4 – 20 mA, linear, switchable
- USB interface via VK 11/C-USB PC connection box.

## Display

- Bright, easy to read LED display
- Digit height 8 mm
- Data readable from a distance of up to 5 m

## Mechanical Construction

- Rugged stainless steel housing
- Compact design
- Electrical connection via plug
- Rated IP 65
- Optional: encapsulated housing for use in potentially explosive areas (EEx d IIC T6)
- Complete line of mounting and protective accessories

## Parameter settings

- Measuring range
- Emissivity
- Smoothing constant
- Maximum value memory

## Functions

- Automatic monitoring of pyrometer internal temperature
- Simulation of current and temperature

## PC Communication

- Integrated software enables online sensor configuration and data transmission
- Simple communication using Windows® Hyperterminal
- CellaMevis® data recording and visualisation software features graphic user interface

## LED Spot Light

- For the series CellaTemp® PL, PQ 27/28/38
- LED spot light for continuous indication of exact target spot
- LED does not influence the measurement
- Measurement spot as small as 1.5 mm

## Fibre Optics

For pyrometers featuring fibre optics, the electronics are housed separately from the fibre optic sensor head. A fibre optic cable transmits the infrared radiation to the electronics assembly. The optical sensor head can withstand ambient temperatures up to 250 °C without cooling. Due to their compact size (Ø 30 mm and 16 mm) these sensor heads can be installed in cramped, hard-to-access locations. The fibre optic cable can be unscrewed on both sides for easy detachment. The optical head is focusable. A variety of lenses is available to accommodate target spots as small as 0.66 mm.



## Industrial laser applications

- PQ 27 with integrated filter to block laser diode radiation.

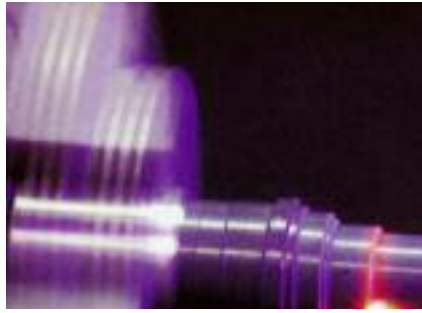
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# CellaTemp® PQ, PL Application Examples



## Moving or difficult-to-access objects

Immediate temperature readings for process monitoring and quality control of textiles, paper, coated sheet metals and plastic films



## Laser applications

Purpose-built pyrometer model is resistant to diode laser radiation to provide fast temperature detection and monitoring



## Continuous casting of steel, rolling mills

Quick temperature detection of slab products and rolled steel plates



## Resin extruders and moulding machines

Temperature monitoring during the plastic bottle manufacturing process



## Cement and asphalt Industry

Provide evidence of temperature during the production and treatment process as a quality control measure



## Annealing furnaces, tunnel kilns, combustion plants

Nonwearing measuring system for quick and exact temperature detection of the fired products to achieve high kiln/furnace efficiency



## Heat treatment of metals

Detection and optimal control of object temperature during induction heating processes



## Rotary kilns

Continuous monitoring of the kiln shell temperature



## Glass industry

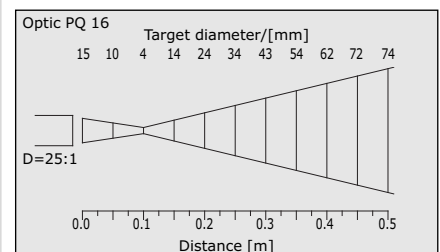
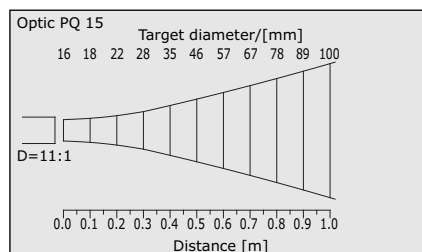
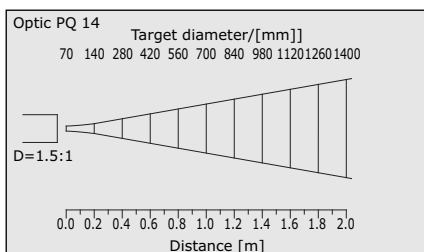
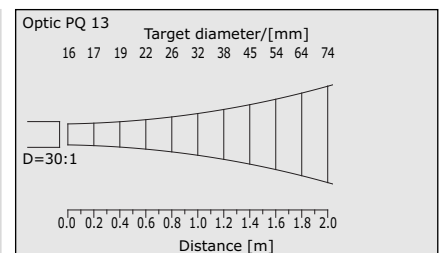
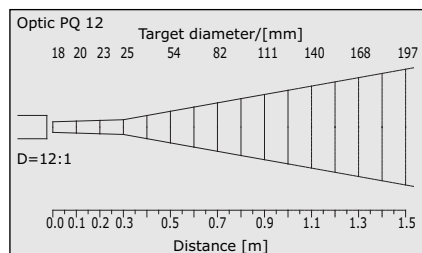
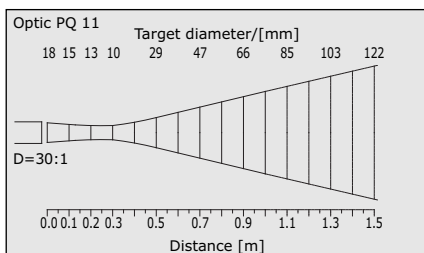
Special pyrometers accurately measure the surface temperature during plate glass and glassware manufacturing

# Technical Data

## CellaTemp® PQ Pyrometer Series

Version	Low Temperature						
Type	PQ 11 AF...	PQ 12 AF...	PQ 13 AF...	PQ 14 AF...	PQ 15 AF...	PQ 16 AF...	
Distance ratio	30:1	12:1	30:1	1,5:1	11:1	25:1	
Focal distance	300 mm	300 mm	1000 mm	1000 mm	300 mm	100 mm	
Ranges	AF1:	±0 °C – +150 °C	-30 °C – +70 °C	±0 °C – +250 °C	±0 °C – +150 °C		±0 °C – +150 °C
	AF2:	±0 °C – +300 °C	-10 °C – +40 °C	±0 °C – +500 °C	±0 °C – +300 °C	±0 °C – +300 °C	±0 °C – +300 °C
	AF3:	±0 °C – +500 °C	-30 °C – +300 °C	±0 °C – +1000 °C		±0 °C – +500 °C	±0 °C – +500 °C
	AF4:	±0 °C – +800 °C					±0 °C – +800 °C
	AF6:	±0 °C – +400 °C					
	AF7:	±0 °C – +1000 °C					
	Sensor	thermopile					
Spectral range	8 – 14 μm						
Uncertainty (at ε=1 and Tu=+23 °C)	1 % of reading at least 1.5 K						
Repeatability	1 K						
Response time t <sub>90</sub>	≤ 60 ms						
Resolution	≤ 0.3 K						
Length of enclosure A	123 mm			112 mm		123 mm	
Length of thread B	35 mm						

## Target Diagrams<sup>1)</sup>



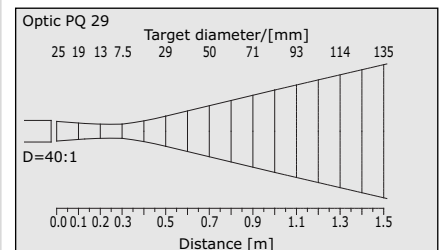
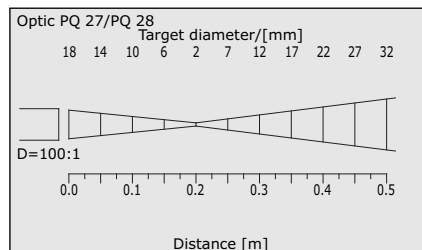
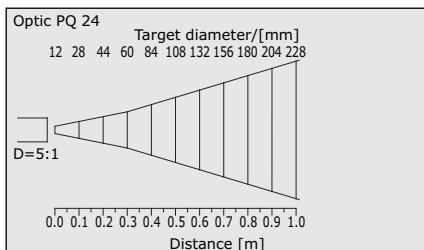
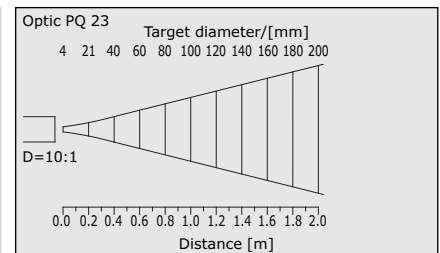
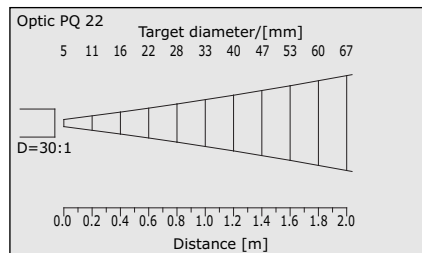
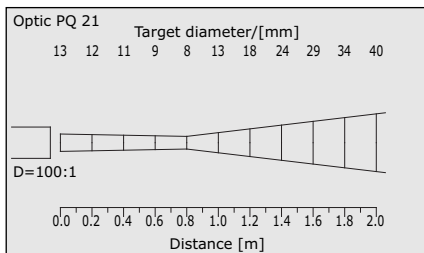
1) Taking into account optical tolerances at 90 % of the maximum detected radiation

# Technical Data

## Pyrometer Series CellaTemp® PQ

Version	High Temperature							
Type	PQ 21 ...	PQ 22 ...	PQ 23 ...	PQ 24 ...	PQ 27 ...	PQ 28 ...	PQ 29 ...	
Distance ratio	100:1	30:1	10:1	5:1	100:1		40:1	
Focal distance	800 mm	1000 mm	300 mm	300 mm	200 mm		300 mm	
Ranges	AF1:	+300 °C – +900 °C						+150 °C – +800 °C
	AF2:	+400 °C – +1400 °C						
	AF3:	+250 °C – +1600 °C						
Sensor	photodiode							
Spectral range	1.0 – 1.7 μm			1.2 – 1.7 μm	1.1 – 1.7 μm	1.8 – 2.2 μm		
Target marker					continous LED spotlight			
Uncertainty (at ε=1 and Tu=+23 °C)	0.5 % of reading at least 4 K						0.75 % of reading at least 5 K	
Repeatability	1 K						2 K	
Response time t <sub>90</sub>	≤ 2 ms for T > +600 °C						≤ 2 ms for T > +300 °C	
Resolution	≤ 0.45 K							
Length of enclosure A	149 mm	112 mm		149 mm	189 mm		203 mm	
Length of thread B	66 mm	35 mm		66 mm	100 mm		56 mm	

## Target Diagrams<sup>1)</sup>



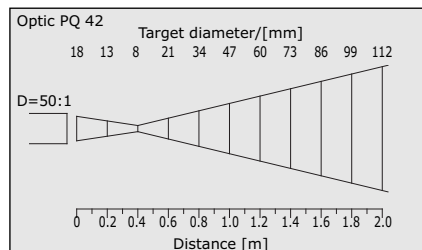
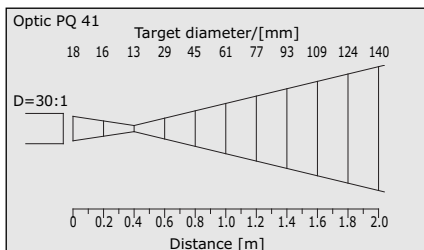
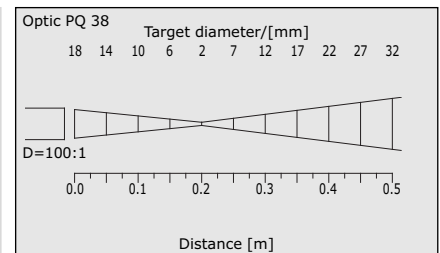
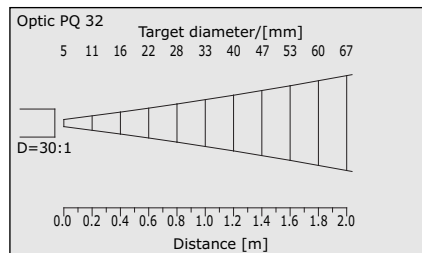
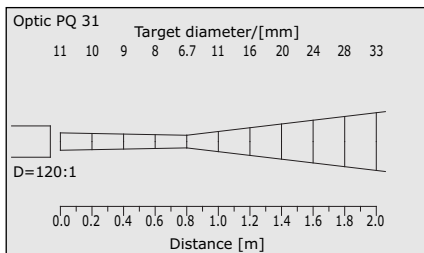
1) Taking into account optical tolerances at 90 % of the maximum detected radiation

# Technical Data

## Pyrometer Series CellaTemp® PQ

Version	High Temperature			Glass Surface Pyrometer	
Type	PQ 31 AF...	PQ 32 AF...	PQ 38 AF...	PQ 41 AF...	PQ 42 AF...
Distance ratio	120:1	30:1	100:1	30:1	50:1
Focal distance	800 mm	1000 mm	200 mm	400 mm	400 mm
Ranges	AF1:	+700 °C – +1400 °C		+300 °C – +1300 °C	+700 °C – +1500 °C
	AF2:	+800 °C – +2000 °C			+1000 °C – +2500 °C
	AF3:	+1000 °C – +2500 °C			
	AF4:	+500 °C – +2500 °C			
Sensor	photodiode			thermopile	
Spectral range	0.78 – 1.06 μm			4.6 – 4.9 μm	
Target marker			continous LED spotlight		
Uncertainty (at ε=1 and Tu=+23 °C)	0.3 % of reading at least 4 K			0.75 % of reading at least 4 K	
Repeatability	1 K			2 K	
Response time t <sub>90</sub>	< 2 ms for T > +900 °C			≤ 100 ms	
Resolution	≤ 0.65 K			≤ 0.65 K	
Length of enclosure A	149 mm	112 mm	189 mm	149 mm	
Length of thread B	66 mm	35 mm	100 mm	66 mm	

## Target Diagrams<sup>1)</sup>



1) Taking into account optical tolerances at 90 % of the maximum detected radiation

# Technical Data

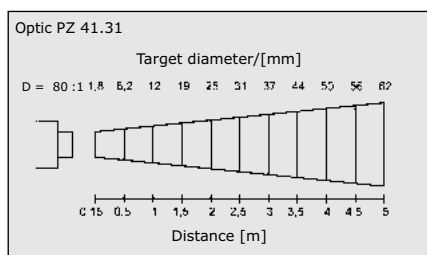
## Pyrometer Series CellaTemp® PQ

Version	Pyrometers with fibre optics			
Type	PQ 26 AF...	PQ 26 AF...	PQ 36 AF...	PQ 36 AF...
Optics	PZ 41.31	PZ 41.28	PZ 41.31	PZ 41.28
Distance ratio	80:1	50:1	80:1	50:1
Focal distance	0.15 m – ∞	0.12 m – ∞	0.15 m – ∞	0.12 m – ∞
Ranges	AF1:	+300 °C – +2000 °C	+700 °C – +1400 °C	
	AF2:		+800 °C – +2000 °C	
	AF3:		+550 °C – +2500 °C	
	AF21:		+300 °C – +2000 °C	+700 °C – +1400 °C
	AF23:			+550 °C – +2500 °C
Sensor	photodiode			
Spectral range	1.0 – 1.7 μm		0.78 – 1.06 μm	
Uncertainty (at ε=1 and Tu=+23 °C)	0.5 % of reading at least 4 K			
Repeatability	2 K			
Response time t <sub>90</sub>	≤ 2 ms for T > +700 °C		≤ 2 ms for T > +1000 °C	
Resolution	≤ 0.55 K		≤ 0.65 K	
Length of enclosure A	125 mm			
Length of thread B	35 mm			

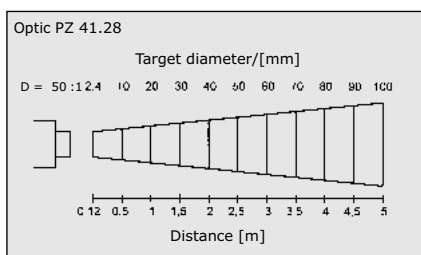
Selectable for any of the above models: either Kevlar (<85 °C) or metal-sheathed (<250 °C) fibre optic cable.

## Target Diagrams<sup>1)</sup>

### Sensor head Ø 30 mm



### Sensor head Ø 16 mm



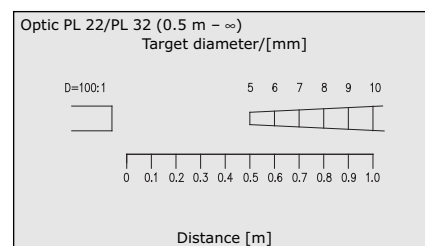
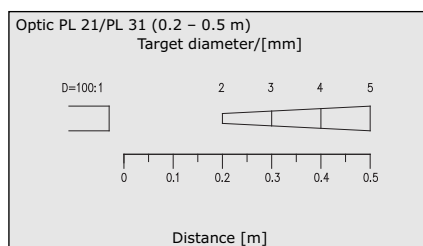
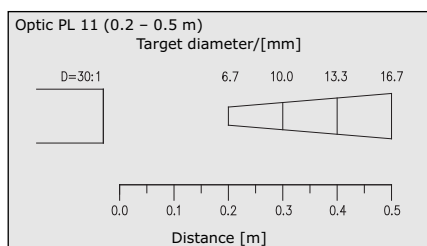
1) Taking into account optical tolerances at 90 % of the maximum detected radiation

# Technical Data

## Pyrometer Series CellaTemp® PL

Version	Pyrometer mit focusable optics				
Type	PL 11 AF...	PL 21 AF...	PL 22 AF...	PL 31 AF...	PL 32 AF...
Distance ratio	30:1	100:1	100:1	100:1	100:1
Focal distance	200 – 500 mm		500 – ∞	200 – 500 mm	500 – ∞
Ranges	AF1:	±0 °C – +250 °C	+300 °C – +900 °C		+700 °C – +1400 °C
	AF2:	±0 °C – +500 °C	+400 °C – +1400 °C		+800 °C – +2000 °C
	AF3:	±0 °C – +800 °C	+250 °C – +1600 °C		+1000 °C – +2500 °C
	AF4:	±0 °C – +1000 °C			+500 °C – +2500 °C
Sensor	thermopile	photodiode			
Spectral range	8 – 14 μm	1.0 – 1.7 μm		0.78 – 1.06 μm	
Target marker	continuous LED spotlight				
Uncertainty (at ε=1 and Tu=+23 °C)	1 % of reading at least 1.5 K	0.5 % of reading at least 4 K		0.3 % of reading at least 4 K	
Repeatability	1.0 K				
Response time t <sub>90</sub>	≤ 60 ms	≤ 2 ms for T > +600 °C		≤ 2 ms for T > +900 °C	
Resolution	0.3 K	0.45 K		0.65 K	
Length of enclosure A	203 mm	202 mm			
Length of thread B	56 mm	100 mm			

## Target Diagrams<sup>1)</sup>



1) Taking into account optical tolerances at 90 % of the maximum detected radiation

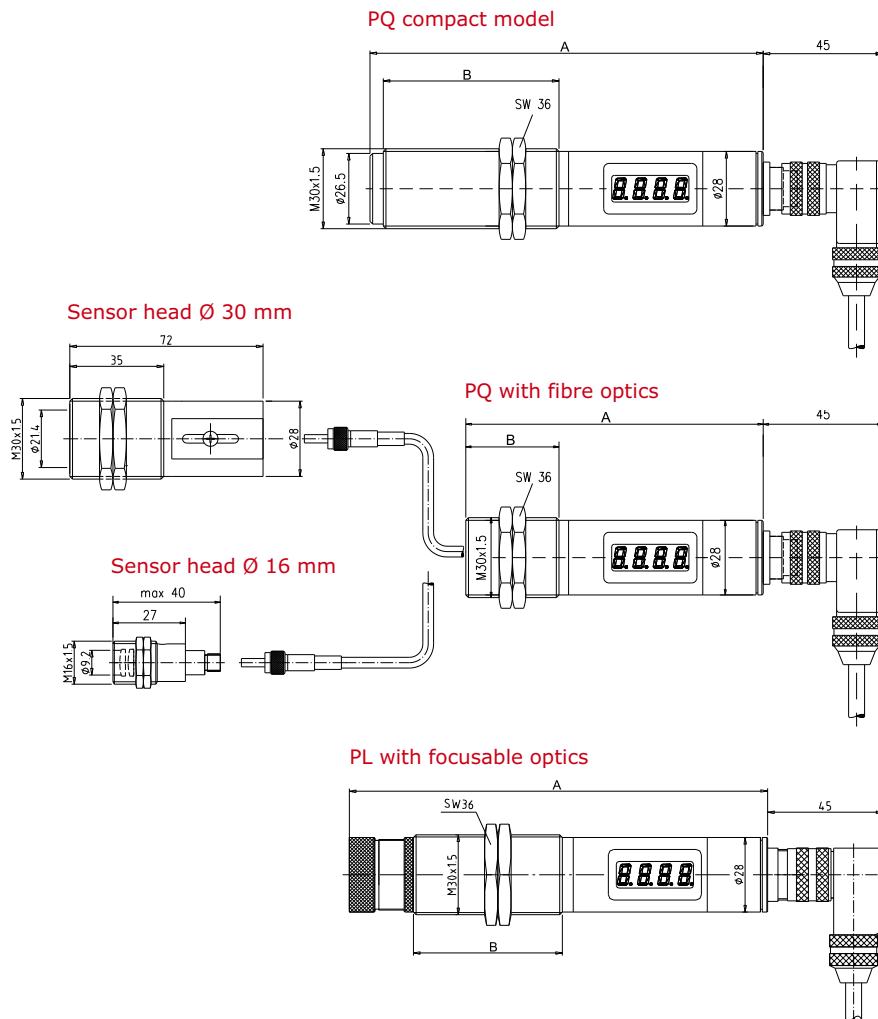


# Common Specifications

Analogue output	0 (4) – 20 mA linear, switchable, scalable <sup>1)</sup>	
Load	max. 500 Ohm	
Linearisation	Digital via microcontroller	
Ambient temperature	0 – +65 °C (without cooling accessory)	
Overheating control	Output switches to > 20.5 mA when internal temperature exceeds 80 °C	
Storage temperature	-20 – +80 °C	
LED display	4-digit (digit height 8 mm)	
Power supply	24 V DC +10 %/-20 % current consumption ≤ 50 mA ripple ≤ 200 mV	
Permissible humidity	95 % RH (non-condensing)	
Enclosure	stainless steel	
Length of enclosure A	112 – 202 mm	
Mounting	with outer thread M 30 x 1.5	
Connection	via plug	
Weight	approx. 0.35 kg	
Protection	IP 65 (DIN 40050) when plug is connected	
Emissivity $\epsilon$	Setting	Externally via 8-bit cable (binary signal, static)
	Range	$\epsilon = 0.100 - 0.996$
	Increments	0.0039

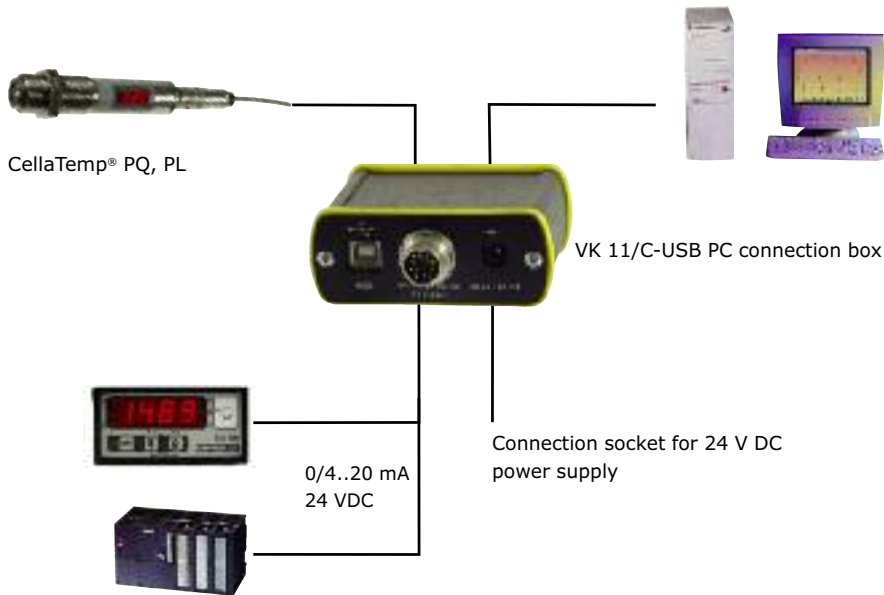
1) available with an optional VK 11/C-USB PC connection box

# Dimensions



# Software CellaMevis® Software

## PC Communication



The VK 11/C-USB PC connection box can be easily inserted into the pyrometer's connection cable during initial installation or field service. The simple plug connector enables on-site connection in a matter of seconds without interrupting operations.

To check if peripheral equipment such as the signal conditioner or analogue scaling is functioning properly, an output signal can be simulated.

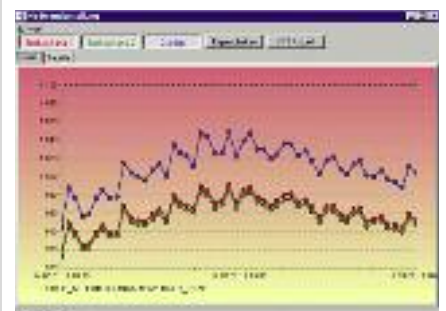
With CellaMevis®, remote configuration at a PC during running operations is possible. Parameter changes are effective immediately. Measurement data is not only displayed at the pyrometer, but transmitted and recorded at a PC.

The connection box is especially convenient when performing on-site test measurements because it enables connection to a PC in a matter of seconds. To provide the pyrometer with an electrical current, the power supply is simply connected to the box, thus creating a mains-independent data acquisition system.

## CellaMevis®

CellaMevis® is Keller's Windows®-based industrial software system for data capture and visualisation. The use of an USB interface enables communication to a PC and allows the temperature data to be saved in ASCII file format. Measurements can be instantly displayed as a table or plotted online as a time/temperature curve. Data can also be exported into MS-Excel® or other spreadsheet program for further analysis.

- Graphical user interface based on Windows®
- Full-screen temperature/time graph can be displayed in real time
- Enables analysis of min/max temperatures
- Records and archives data for future reference and analysis
- Zoom function magnifies parts of the screen for detailed view
- Temperature trend indicator
- Save data either manually or automatically
- Remote pyrometer configuration from a PC terminal



Temperature/time chart

# Accessories and Fittings

## ■ Supplementary lenses



Attaching an additional lens to the enables various target spot sizes as small as  $\varnothing$  1.2 mm.

## ■ Protective window



A protective window can be placed in front of the lense to protect it.

## ■ PS 01/B cooling jacket



Can be operated with air or water. Surrounds the pyrometer and protects it against high ambient temperatures.

## ■ Pressure-proof enclosure



For pyrometer use in potentially explosive atmospheres. Certified EEx d IIC T6.

## ■ PS 01/A air purge



Prevents dirt or dust from settling on the pyrometer's lenses or quartz window. Circular airflow provides maximum efficiency with minimal air consumption.

## ■ PS 11/W mirror attachment



Deflects infrared radiation 90° when attached in front of the pyrometer.

## ■ PZ 20/X AF 5 oscillating mirror



Deflects the radiation emitted from the target for hot spot recognition or measurement of thin target objects. Can be mounted in front of any PZ or PQ model pyrometer. Coupled to the pyrometer, the PZ 20/X can act as a scanner and generate a temperature profile across a target area. Using a digital interface, the data can be transmitted to a PC.

## ■ PS 01/K insulation tube



Prevents heat transfer from the hot accessories to the pyrometer.

## ■ PS 11/N bayonet connector



Enables quick pyrometer dismounting, e.g. when the optics require cleaning.

## ■ ZA 01/Q intermediate tube



Enhances the purging effect of the PS 01/A by increasing the air cushion to keep the lens free of dust and debris.

## ■ PS 01/N mounting flange



For wall mounting or ceiling suspension.

## ■ PS 11/U mounting bracket



Enables vertical or horizontal pyrometer mounting.

## ■ VK 01/K AF 5 terminal box with cable



Features integrated emissivity switch.

## ■ VK 11/C-USB PC connection box



Interconnection between pyrometer and PC

# Combination Examples

**Due to their modular design, the CellaTemp® PQ Series accessories enable a wide variety of combinations, thus creating customised assemblies to meet the requirements of specific measuring tasks and serve special applications.**

The PS 21-010 assembly is used with chamber kilns and tunnel kilns.

The PS 01/K insulation tube provides electrical decoupling and insulates the pyrometer from heat. The

PS 11/N bayonet coupling with optionally integrated protective window does not require tools to dismount the assembly. This facilitates easy cleaning of the optics and a quick view of the measurement point within the kiln. When combined, the PS 01/A air purge, ZA 01/M intermediate tube and ZA 01/C dust stop generate a laminar air flow. This ensures that the protective window and pyrometer optics remain perfectly clean. The ZA 01/E ball flange provides maximum flexibility in pyrometer alignment.



PS 21-010



PS 01-008

The PS 01-008 assembly offers comprehensive pyrometer protection. The PS 01/B cooling jacket allows the pyrometer to be installed in ambient temperatures up to 200 °C.

The protective window safeguards the pyrometer's optical system against damage. The air purge prevents dirt and dust from settling on the the protective window.

The PS 01-048 assembly makes it possible to install the pyrometer even in the harshest industrial conditions.

The PS 01/A air purge generates an air flow in the ZA 01/Q intermediate tube, thus keeping dirt and debris off of the pyrometer optics. The PS 11/K mounting bracket enables the pyrometer to mounting at any angle.



PS 01-048

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