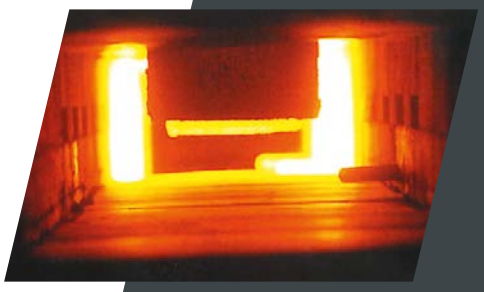
PRECISION
PYRO
PYROMETERS

by KELLER
infrared temperature solutions ITS

APPLICATION
Furnace

Non-contact temperature measurement
for optimal fuel efficiency



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Furnace applications

Pyrometer CellaTemp® PK with mounting

In today's international competition, a manufacturer of heavy clay products or refractories is forced to deal permanently with the reduction of production costs and the increasement of the efficiency of the production plant.

It only makes sense to influence such cost-intensive operating parameters which have the greatest savings potential: reducing energy consumption and minimizing the reject rate. The kiln temperature profile has a significant influence on the amount of fuel required and the quality of the yield. In this respect, it is of utmost importance to precisely monitor the temperature of the clay product during the firing cycle using accurate measuring instruments.

Advantages of Non-contact Temperature Measurement

Today we see a trend toward equipping new kilns (and retrofitting older ones) with pyrometers. Pyrometers determine the temperature of an object of its infrared radiation. They - as opposed to thermocouples - measure the temperature from a distance directly at the surface of the product, and thus give the most accurate representation of the real heating process taking place within the kiln to enable optimal process control. Thermocouples merely measure the air temperature within the kiln. Their measurement reading will deviate significantly from the actual temperature of the product and will furthermore depend on variables such as air flow and kiln setting.

Thermocouples react sluggishly to thermal fluctuations whereas pyrometers instantly indicate temperature changes. A pyrometer immediately detects the lower temperature of a new batch entering the kiln so that the firing process can be adjusted accordingly. Tighter control of the optimal kiln temperature profile will result in a significant reduction of fuel consumption.

Since effective process control depends on reliable temperature measurement, the sensor drift that thermocouples experience while in service is a major drawback of thermocouple use. Sensor drift will creep up unnoticeably and measurement errors will not be recognised until defects are discovered on the products exiting the kiln. Process intervention is only possible at a very late stage in the firing process.

Pyrometers have the advantage of not being subject to drift. Process control based on reliable pyrometer readings results in a considerably lower reject rate. Furthermore, pyrometer measurement is a nonwearing system meaning that no follow-up costs will be incurred. Today the purchase price of a pyrometer system hardly exceeds the initial cost of a thermocouple. With a view toward operating cost reduction it is wise to switch to pyrometer measurement.

Stationary Systems

The pyrometers of the PK Series have proven successful for stationary measurements at the kilns of countless ceramic works. The entire optics and electronics are housed in a stainless steel enclosure with a 30 mm diameter and a length of 210 mm. The output signal of the instrument is a 4-20 mA linear current signal, thus the pyrometer can be directly connected to standard, commercially available displays, controllers and PLC's. A comprehensive range of accessories - designed for tunnel kiln applications - round off the system. This set consists of an insulation tube, a quartz window, an air purge, a sighting tube and a mounting flange.

The only weakness of conventional one-colour pyrometers is the contamination of the optics, as this leads to a decreased signal intensity. To avoid this, two-colour pyrometers are offered within the PK series. In two-colour measurements, the device responds much less sensitive to contamination. In addition, an integrated pollution monitoring ensures, that the operator will immediately be pointed in to a problem in case of need. This ensures a continuous safe operation.

Portable Instrument

The portable pyrometers of the CellaPort PT series have been well established for quick temperature checks. These devices feature a precision through-the-lens optic which is focusable and interchangeable. The target marker indicates the exact measurement spot and thereby facilitates precise aiming through the furnace opening.

The ATD function makes operation easy because only the hot object must be targeted for measurement. The data logging starts automatically. After 3 seconds an acoustic signal marks the end of the measurement. A patented traffic light status indicator, that is visible in the through-the-lens-sighting, also supports the recognition of the hottest point.

The PC connection cable and the analysis software CellaView, which are included in the scope of supply, offer the possibility to record and evaluate temperature and time courses over a longer period.

Conclusion

Today, modern pyrometers can easily replace thermocouples for temperature measurement tasks in furnaces. Pyrometers measure reliable over many years, do not cause consequential costs and reduce scrap and fuel consumption. Beside the stationary measuring systems of the PK series, the portable pyrometer CellaPort PT is used for quick control measurements. Only by continously investing into new, improved and cost-saving technologies, one is able to stay competitive in the long term.

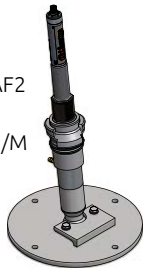
System solutions - Stationary measuring systems

Pyrometer	PK 21 AF 1	PK 68 AF 1
Temperature range	250 - 1600 °C	550 - 1400 °C
Measurement method	one-colour	two-colour
Spectral sensitivity	1.0 - 1.7 µm	0.95 / 1.05 µm
Focus distance	1500 mm	
Target spot diameter	10 mm	21 mm
Response time t_{90}	≤ 2 ms for T > 600 °C	≤ 10 ms for T > 650 °C
Power supply	18 - 32 V DC	
Analogue output	0(4) - 20 mA linear	
Switching output	PNP Open Collector (1 x 150 mA max.)	2 x PNP Open Collector (2 x 150 mA max.)
Ambient temperature	0 - 65 °C	
Dimensions measuring head	M30 x 210 mm	
Housing material	Stainless steel	
Connectivity	5-pin connection M12 (A coded)	
Functions	Smoothing function Peak hold function	Smoothing function - before Max/min memory - after Max/min memory Peak hold function DTD (Discontinuous Temperature Detection) function

Mountings

Mounting PK 21-002 for side mounting consisting of:

- Thermal insulating tube PS 01/K AF1
- Bayonet coupling PS 11/N AF4
- Quartz window PS 01/I AF2
- Air purge PS 01/A AF2
- Intermediate tube ZA 01/M
- Dust stop ZA 01/C
- Ball flange ZA 01/D
- Clamp ZA 01/E
- Flange ZA 01/W



Mounting PK 21-012 for ceiling mounting consisting of:

- Thermal insulating tube PS 01/K AF1
- Bayonet coupling PS 11/N AF4
- Quartz window PS 01/I AF2
- Air purge PS 01/A AF2
- Intermediate tube ZA 01/B
- Dust stop ZA 01/C
- Ball flange ZA 01/D
- Clamp ZA 01/E
- Flange ZA 01/I

Accessories

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

System solutions - Portable instruments

Pyrometer	PT 120 AF 1	PT 140 AF 1
Temperature range	250 - 2000 °C	650 - 1400 °C
Measurement method	one-colour	two-colour
Spectral sensitivity	1.1 - 1.7 µm	0.95 / 1.05 µm
Focus range	400 mm .. ∞	
Distance ratio	175 : 1	80 : 1
Response time t_{90}	≤ 50 ms for T > 250 °C ≤ 2 ms for T > 750 °C	≤ 10 ms for T > 750 °C
Power supply	rechargeable battery pack, mains adapter (continuous operation)	
Digital output	USB	
Ambient temperature	0 - 50 °C	
Material	housing: aluminium; handle: polyamide	
Functions	ATD (Automatic Temperature Detection) function	

PRECISION PYRO PYROMETERS by KELLER ITS infrared temperature solutions

IO-Link

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